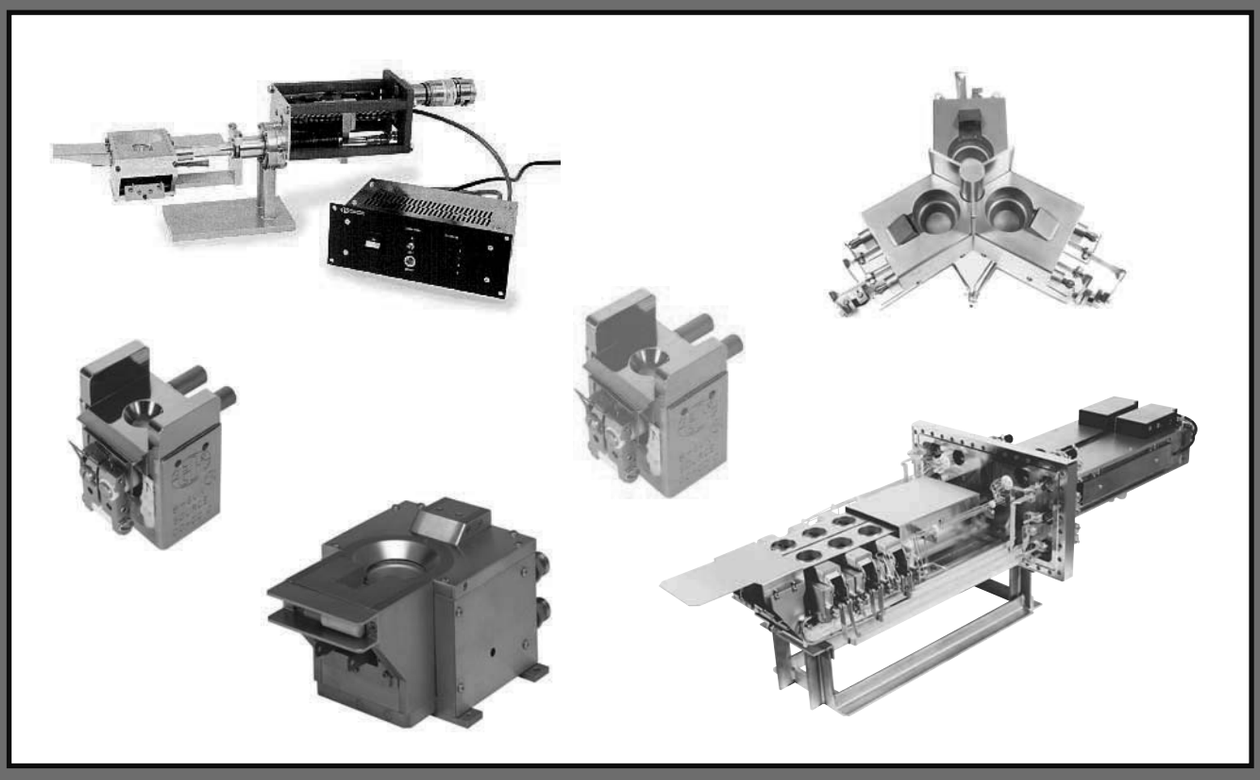
e-Gun™ Evaporation Equipment

4



Resistive Evaporation Source

Resistive evaporation offers a simple and economical alternative to vacuum coating.

Hositrad RES-200-2 high current feedthroughs are designed to hold both filament- and boat-type elements. A wide range of filaments and boats are available allowing most materials to be evaporated by this process.

Hositrad REPS Series power supplies come standard with multiple output taps for 5, 10, 20 and 40 volts to make full use of the various resistive elements available. The power supply can be operated in a manual or remote mode. The manual mode allows regulated control of current to the evaporation source by the control's hand-held potentiometer. In the remote mode an external signal can be provided to the power supply through its rear panel BNC-style connector to control current output.

Resistive Evaporation Source and Power Supply

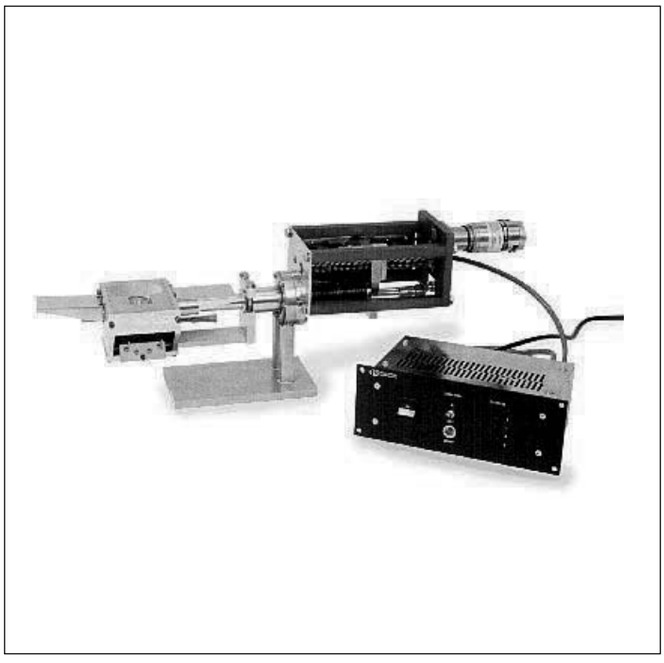
Resistive Evaporation Source

Model No.	Description	Price
RES-200-2	Dual 1" high current feedthrough with filament/boat clamps	*on request*

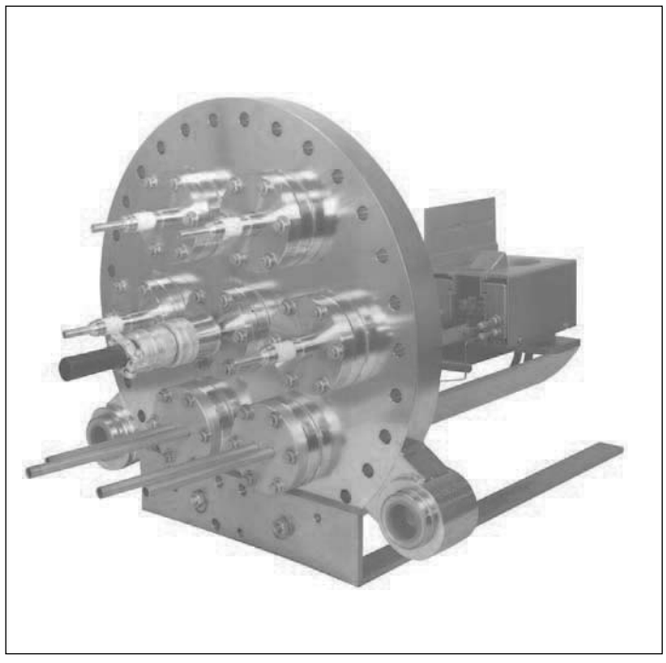
Power Supplies

Model No.	Description	Price
REPS-1000	1 kVA closed loop power supply includes hand-held control with digital metering. Two channel sequential output. Remote BNC input for rate control.	*on request*
REPS-2000	2 kVA closed loop power supply includes hand-held control with digital metering. Two channel sequential output. Remote BNC input for rate control.	*on request*
RES-200-RK	Feedthrough rebuild kit includes Teflon spacers and O-ring.	*on request*

e-Guns Designed for Today's Technology



RCL — linear multi-pocket e-Gun shown with motorized indexer



ICR — large capacity industrial e-Gun: 1500cc or 10x 100cc

Introduction

Hositrads e-Gun, an electron beam evaporation source, is used to produce uniform high-purity films and optical coatings. The compact design and ease of maintenance make it useful in practically all vacuum systems and for many varied applications. It has been used to evaporate refractory and dielectric materials, as well as the more common conductive and semiconductor materials. e-Gun evaporation sources are reliable and simple to operate. They are equally suited for research or production applications.

Theory of Operation

Electron beam heating is an efficient way of achieving temperatures in excess of 3500°C (6300°F) for uniform thin film, optical coating and vacuum metallurgic processes. The all metal-sealed models are bakeable to 230°C (446°F). The e-Gun source and companion control power supply have been designed to be part of any high or ultra-high vacuum system.

The e-Gun source is a self-accelerated electron beam device. A beam of electrons, held at a high negative potential, is produced by the hot tungsten filament. The beam of electrons leaving the filament is magnetically focused and then deflected 270° by the integral permanent magnet. The electron beam is accelerated into the evaporant material contained within the water-cooled, grounded crucible. The beam strikes the evaporant material with a spot of approximately 1/8" diameter and an intensity of approximately 25 kW/cm^2. Sweeping the electron beam across the evaporant material contained in the crucible is performed by an electromagnetic system, with either manual or automatic controls.

The rate at which source materials may be evaporated is dependent upon power input, charge size, charge shape, and the characteristics of the material to be evaporated. The highest evaporation rates are obtained with materials that have low evaporation temperatures and low thermal conductivity.

The evaporant vapor cannot become contaminated because the focused electron beam strikes only the evaporant source material in the crucible. The beam deflection and effective shielding keeps the filament hidden from the evaporant vapor. The crucible is cooled so efficiently that its surface never gets warm enough to unite with the evaporant material.

The e-Gun source will operate in a system base pressure as low as 5 x 10^{-11} Torr. The magnitude of pressure, which normally increases during evaporation, depends on the pumping capacity of the system and the cleanliness of the evaporant material. This pressure increase is minimized by the high thermal efficiency of the source. There is minimal outgassing of surrounding surfaces because only the evaporant is heated.

All of Thermionics' single, linear motion, three and five crucible e-Guns are 100% metal-sealed, thus eliminating "O" ring outgassing. Outgassing could require additional pumping capacity and sometimes result in sample contamination.

Mounting Configurations

Each gun is available in three standard mounting configurations:

1. e-Gun mounted on a PyraFlat or ConFlat metal seal type flange, which uses a standard OFE copper gasket
2. e-Gun with a 1" diameter bolt-type mount, which mounts through a 1" diameter hole, and is sealed by a compression O-ring
3. e-Gun alone with no mounting flange

Ordering Information

Please specify the mounting configuration at the time the order is placed, the prices listed *may* not include the bolt-type or flange-type mount.

Other mounting flanges, configurations and geometries are routinely supplied, please call the factory for further information.

Custom e-Guns

Any e-Gun can be designed and manufactured to fit existing or new systems. Please consult the factory with your special requirements.

Hanks HM^2 e-Guns are manufactured and protected under one or more of the following patents: 4,835,789; 4,891,821; 4,947,404

PyraFlat flanges are manufactured and protected under one or more of the following patents: 5,640,751; 4,685,193

Hositrad Holland B.V. - De Wel 44 - 3871 MV - P.O.B. 114 - 3870 CC Hoevelaken - Phone: +31 (0)33-2537210 Fax: +31 (0)33-2535274
Hositrad Deutschland - Lindnergasse 2 - D-93047 Regensburg - Phone: +49 (0)941-55827 Fax: +49 (0)941-562296

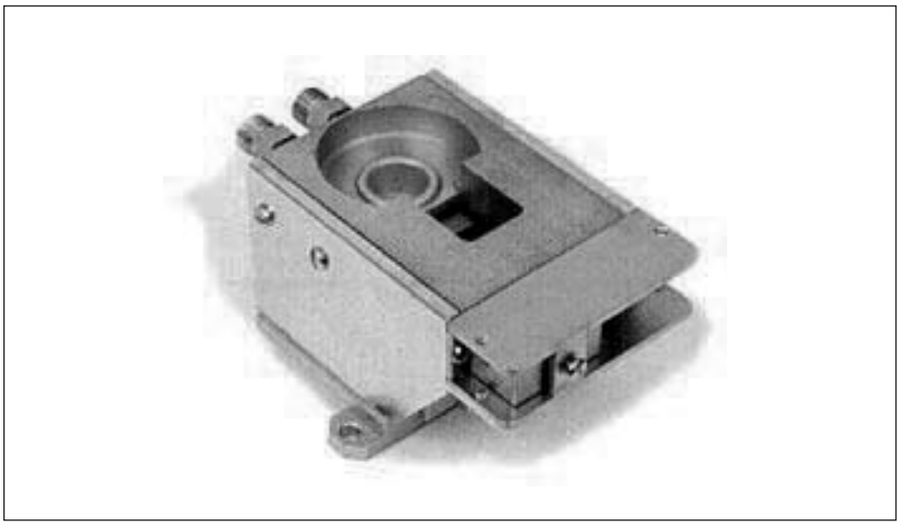
www.hositrad.com - e-mail:info@hositrad.com

RC Series 3 kW Single Crucible Linear e-Gun

Hositrads new Research Capacity series single crucible e-Gun provides enhanced beam stability and efficient XY sweep with full crucible coverage. The plug-in emitter and sweep coil assemblies make the e-Gun source easier to service. The sweep coil assembly is included with the e-Gun.

Features

- True XY sweep with full crucible coverage
- Sweep coils included with source
- Enhanced beam collimation
- Plug-in emitter module
- Enhanced high-stability cooling
- Cross-contamination shielding
- Rugged design



RC Series Single Crucible e-Gun

4

Specifications

Operating Pressure	Below 5 x 10^{-5} Torr is desirable for best operation
Beam voltage	5,000 VDC
Beam current	0–600 mA continuously variable
Maximum power	3 kW
Cooling water	1.5 gpm
Pressure differential	25 psi minimum
Maximum bakeout temperature	230°C (446°F)
Crucible volume	2.24 cc

Mounting Configurations

Each e-Gun is available in three standard mounting configurations:

1. e-Gun mounted on a PyraFlat or ConFlat metal-seal type flange, which uses a standard OFE copper gasket
2. e-Gun with a 1" diameter bolt-type mount, which mount through a 1" diameter hole, and is sealed by a compression O-ring
3. e-Gun alone with no mounting flange

Ordering Information

Please specify the mounting configuration at the time the order is placed; the prices listed *may* not include the bolt-type or flange-type mount.

Other mounting flanges, configurations and geometries are routinely supplied, please call the factory for further information.

Model No.	Description	Price
RCF0301	Single Crucible e-Gun source with sweep coils	*on request*

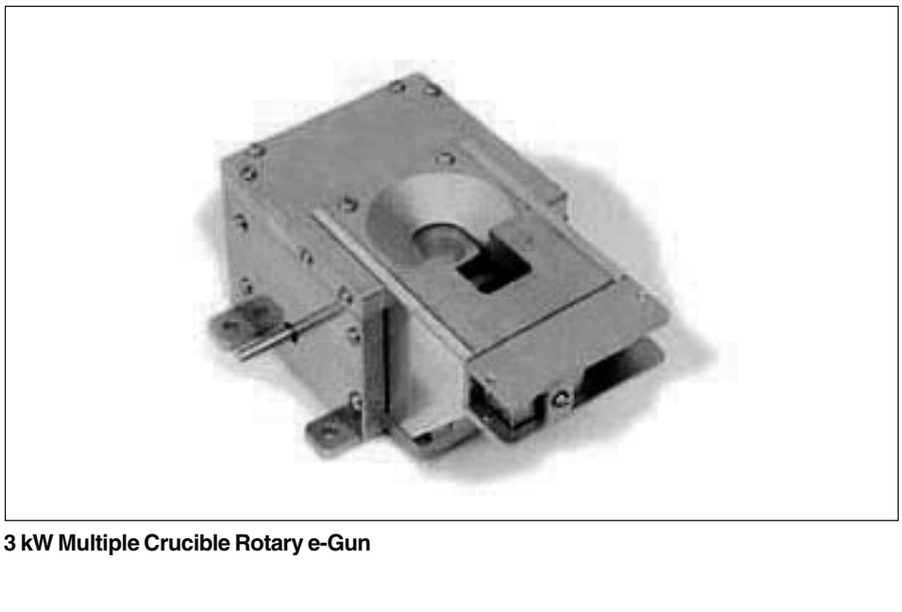
** NOTE: The price shown is an estimate provided for budgetary purposes only. Actual price may be lower or higher, and is dependent upon mounting configurations, system geometry and utility requirements. Please consult factory for more information.*

NOTE: For further information also see

Power Supply
Controllers
Accessories
Crucible Liners

PyraFlat flanges are manufactured and protected under one or more of the following patents: 5,640,751; 4,685,193

3 kW Multiple Crucible Rotary e-Gun



3 kW Multiple Crucible Rotary e-Gun

4

Operation

The operating principle of the multiple crucible e-Gun is identical to the single crucible source with the following advantages:

- Large supply of evaporant — When every crucible is filled with the same source material, an increased volume of evaporant can be evaporated in a single vacuum cycle.
- Deposition of up to eight different materials in one vacuum cycle — A different material can be put in each crucible and deposited in any sequence during a single vacuum cycle. The deposition rates are the same as those of the single crucible model. Only one crucible is heated at a time. The single filament remains stationary and the crucible head is indexed into position by the drive handle. Therefore, the evaporation always originates from exactly the same position in the vacuum chamber. The inactive crucibles are shielded from the heated crucibles by the magnetic pole pieces, thereby eliminating contamination between crucibles.

High Vacuum Compatible

Metal and elastomer seals, measured base pressure: 2×10^{-9} Torr.

Interchangeable Crucibles

The main crucible wheel can be removed from the top of the source without total source disassembly. This flexibility allows field upgrades.

Specials

All multiple crucible e-Guns can be mounted on larger diameter ConFlat or rectangular PyraFlat flanges, single or back-to-back.

PyraFlat flanges are manufactured and protected under one or more of the following patents: 5,640,751; 4,685,193

Specifications

Operating pressure	Below 5×10^{-5} Torr is desirable for best operation
Beam voltage	5,000 VDC
Beam current	0–600 mA continuously variable
Maximum power	3,000 W
Cooling water	1.5 gpm
Maximum bakeout temperature	120°C (150°F)
Crucible volume	2.24 cc x 4, 6, or 8 crucibles

Hositrad Holland B.V. - De Wel 44 - 3871 MV - P.O.B. 114 - 3870 CC Hoevelaken - Phone: +31 (0)33-2537210 Fax: +31 (0)33-2535274
Hositrad Deutschland - Lindnergasse 2 - D-93047 Regensburg - Phone: +49 (0)941-55827 Fax: +49 (0)941-562296

www.hositrad.com - e-mail:info@hositrad.com

Mounting Configurations

Each e-Gun is available in three standard mounting configurations:

1. e-Gun mounted on a PyraFlat or ConFlat metal-seal type flange, which uses a standard OFE copper gasket
2. e-Gun with a 1" diameter bolt-type mount, which mounts through a 1" diameter hole, and is sealed by a compression O-ring
3. e-Gun alone with no mounting flange

Ordering Information

Please specify the mounting configuration at the time the order is placed; the prices listed *may* not include the bolt-type or flange-type mount.

Other mounting flanges, configurations and geometries are routinely supplied, please call the factory for further information.

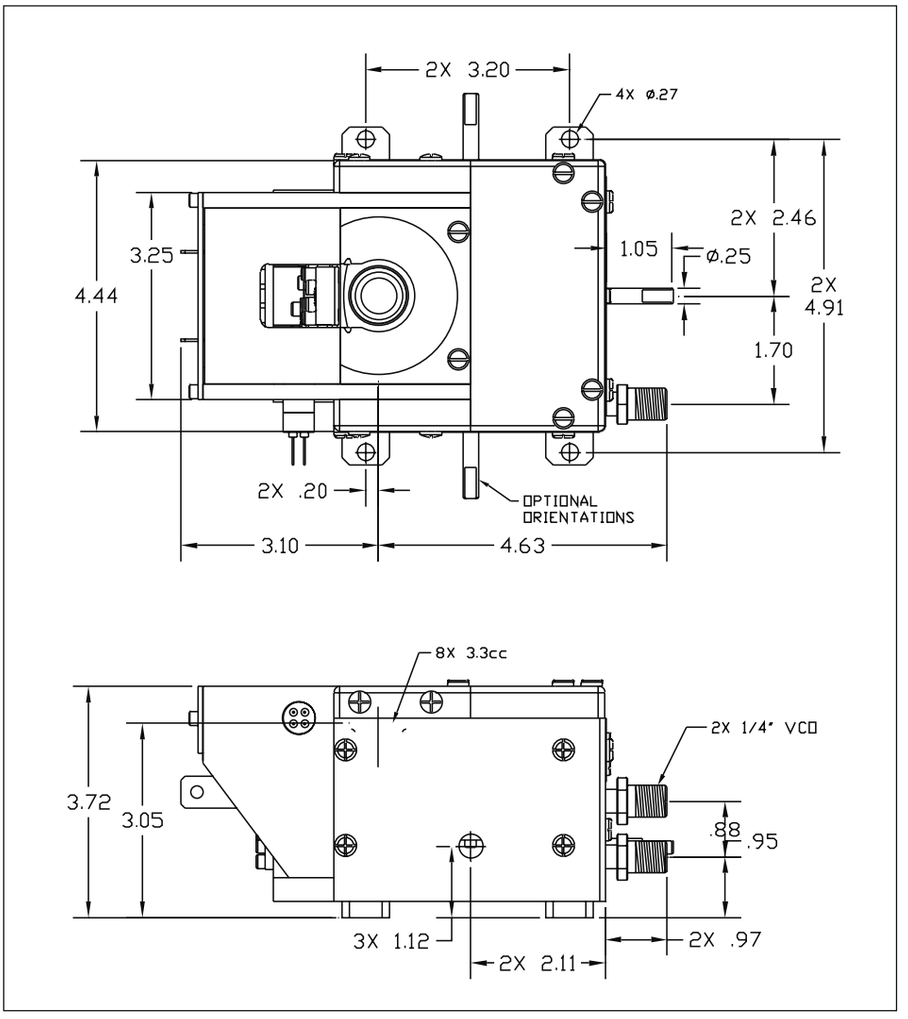
Standard Models

Model No.*	Crucibles	Price
RCR0304-SD	4	*on request*
RCR0304-BD	4	*on request*
RCR0306-SD	6	*on request*
RCR0306-BD	6	*on request*
RCR0308-SD	8	*on request*
RCR0308-BD	8	*on request*

** NOTE: SD denotes side drive, BD denotes bottom drive*

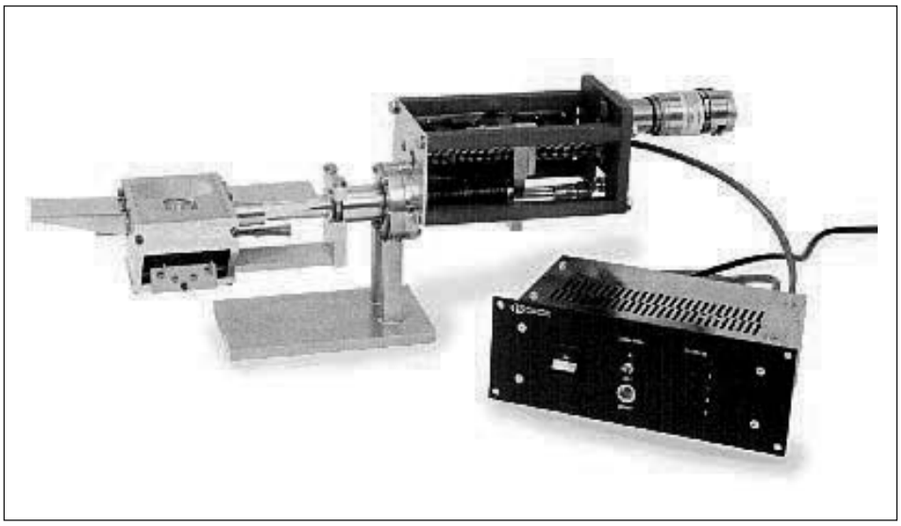
NOTE: For further information also see

Power Supply
Controllers
Accessories
Crucible Liners



Base Schematics—RCR e-Gun Layout

3 kW Multiple Crucible Linear e-Gun



RC Series 3-Position Linear e-Gun (shown with optional Auto-indexer)

Hositrads new Research Capacity series, 3kW multiple-crucible linear e-Gun, provides enhanced beam stability and efficient XY sweep with full crucible coverage. The plug-in emitter and sweep coil assemblies make the e-Gun source easier to service. Automatic positioning available with the Auto-indexer, sold separately.

Features

- True XY sweep with full crucible coverage
- Sweep coils included with source
- Enhanced beam collimation
- Plug-in emitter module
- Enhanced high-stability cooling
- Cross-contamination shielding
- Rugged design
- Optional auto-indexer

Specifications

Operating pressure	Below 5 x 10^{-5} Torr is desirable for best operation
Beam voltage	5,000 VDC
Beam current	0–600 mA continuously variable
Maximum power	3 kW
Cooling water	1.5 gpm
Maximum bakeout temperature	230°C (446°F)
Crucible volume	2.24 cc x 3, 4 or 5

RC Series Linear e-Guns

Model No.	Description	Price*
RCL0303	Multiple Crucible 3kW e-Gun source with sweep coils, linear 3-position	*on request*
RCL0304	Multiple Crucible 3kW e-Gun source with sweep coils, linear 4-position	*on request*
RCL0305	Multiple Crucible 3kW e-Gun source with sweep coils, linear 5-position	*on request*

** Please note: The price shown is an estimate provided for budgetary purposes only. Actual price may be lower or higher, and is dependent upon mounting configurations, system geometry and utility requirements. Please consult factory for further information.*

Option

Auto-Indexer

Model No.	Description	Price
/AI3	3 position e-Gun	*on request*
/AI4	4 position e-Gun	*on request*
/AI5	5 position e-Gun	*on request*

NOTE: For further information also see

Power Supply
Controllers
Accessories
Crucible Liners

Hositrad Holland B.V. - De Wel 44 - 3871 MV - P.O.B. 114 - 3870 CC Hoevelaken - Phone: +31 (0)33-2537210 Fax: +31 (0)33-2535274
Hositrad Deutschland - Lindnergasse 2 - D-93047 Regensburg - Phone: +49 (0)941-55827 Fax: +49 (0)941-562296

www.hositrad.com - e-mail:info@hositrad.com

3 kW Rod-Fed e-Gun

The operation of the 3 kW rod-fed e-Gun is unique. The evaporant source material, in the form of a rod up to 3/8" in diameter, is fed continuously into the crucible using an external linear feedthrough. Film thickness may be controlled using a rate monitor.

The e-guns are available mounted on various flanges.

UHV Compatible

Metal-sealed, fully UHV compatible, measured base pressure: 2 x 10^{-11} Torr.

Features

- The 3 kW rod-fed e-Gun may be mounted and operated in any orientation, including upside down (which is material dependent)
- The rod-fed e-Gun shown in the photo on the right can fit through a 2.5" O.D. tube
- An optional cryoshroud to surround the e-Gun is available
- Multiple rod-fed e-Guns can be mounted side-by-side
- Custom designs are available, please consult the factory

Knudsen Cell Replacement

e-Guns can evaporate difficult materials, i.e.: carbon, niobium, and silicon.

A rod-fed e-Gun, complete with all the necessary utility and mechanical feed-throughs, installed on a 4.5" O.D. ConFlat mounting flange, is available as a direct replacement for existing Knudsen Cell furnaces on Varian/Intevac, Perkin-Elmer, Riber, EPI and VG systems.

Please call to discuss your specific application requirements.

Specifications

Operating pressure	Below 5 x 10^{-5} Torr is desirable for best operation; fully UHV compatible design
Beam voltage	5,000 VDC
Beam current	0–600 mA continuously variable
Maximum power	3 kW
Cooling water	1/2 gpm
Maximum bakeout temperature	230°C (446°F)
Feedthrough requirements	Two 7 kV 50 A
Crucible volume	1/4" or 3/8" dia. rod
e-Gun size	2.25" dia. x 2.95" L

3 kW Rod-Fed e-Gun
(shown with feedthroughs)

Mounting Configurations

Each e-Gun is available in three standard mounting configurations:

1. e-Gun mounted on a PyraFlat or ConFlat metal-seal type flange, which uses a standard OFE copper gasket
2. e-Gun with a 1" diameter bolt-type mount, which mounts through a 1" diameter hole, and is sealed by a compression O-ring
3. e-Gun alone with no mounting flange

Ordering Information

Please specify the mounting configuration at the time the order is placed; the prices listed *may* not include the bolt-type or flange-type mount.

Other mounting flanges, configurations and geometries are routinely supplied, please call the factory for further information.

Standard Models

Model No.	Description	Price*
RCRF0325	1/4" rod-fed e-Gun only	*on request*
RCRF0325/SK	1/4" rod-fed e-Gun with all utility, electrical and mechanical feedthroughs	*on request*
RCRF0338	3/8" rod-fed e-Gun only	*on request*
RCRF0338/SK	3/8" rod-fed e-Gun with all utility, electrical and mechanical feedthroughs	*on request*
RCRFWC/FT	Optional water-cooled feedthrough for evaporant holder	*on request*

** Please note: The price shown is an estimate provided for budgetary purposes. Actual price may be lower or higher, and is dependent upon mounting configurations, system geometry, and utility requirements. Please contact the factory for more information.*

NOTE: For further information also see

Power Supply
Controllers
Accessories
Crucible Liners

PyraFlat flanges are manufactured and protected under one or more of the following patents: 5,640,751; 4,685,193

3 kW e-Gun Accessories

Replacement Parts

Model No.	Description	Price
22001-1	Ceramic insulator (6-32 x 3/8" dia. x 3/4" length)	*on request*
22001-2	Ceramic insulator (6-32 x 1/4" dia. x 1/2" length)	*on request*
22009	Ceramic washer	*on request*
RCERK	Wishiw iasdi wiosd foidfdfi	*on request*
111407	Filament, 300 W	*on request*
112540	Cathode block—L.H.	*on request*
112541	Cathode block—R.H.	*on request*
22013	Hardware set (includes all screws, ceramics and shims)	*on request*
112539	Anode plate	*on request*
112546	Beam former	*on request*

Sweep Controllers and Coils

Model No.	Description	Price
XYS	X-Y beam sweep controller	*on request*
XYCS	Circular beam sweep controller	*on request*

Accessories

Model No.	Description	Price
210-SW	Water interlock switch for all e-Guns	*on request*
PS-GR	Grounding rod	*on request*

Feedthroughs and Connectors

Model No.	Description	Price
B111136-07	Two electrical feedthroughs mounted on a 2.75" ConFlat flange, 7 kV @ 70 A (use with connector/cable assembly HVC-D-12) *Note: Please consult the factory for power supply installation information.*	*on request*
HVC-D-12	Dual feedthrough connector with interlock and 10' dual cable assembly (use with dual feedthrough B111136-07)	*on request*
B111137	One electrical feedthrough mounted on a 2.75" ConFlat flange, 7 kV @ 70 A, two are required for each e-Gun (use with connector/cable assembly HVC-T-12)	*on request*
B111138	One electrical feedthrough mounted on a 1.33" ConFlat flange, 7 kV @ 70 A, two are required for each e-Gun (use with connector/cable assembly HVC-T-12)	*on request*
HVC-T-12	Single feedthrough connector and 10' cable assembly, two are required for each e-Gun (use with single feedthroughs B111137 and B111138)	*on request*
A111489	Feedthrough connector, internal 1/4" rod to 10-32 screw connector	*on request*

Hositrad Holland B.V. - De Wel 44 - 3871 MV - P.O.B. 114 - 3870 CC Hoevelaken - Phone: +31 (0)33-2537210 Fax: +31 (0)33-2535274
Hositrad Deutschland - Lindnergasse 2 - D-93047 Regensburg - Phone: +49 (0)941-55827 Fax: +49 (0)941-562296

www.hositrad.com - e-mail:info@hositrad.com

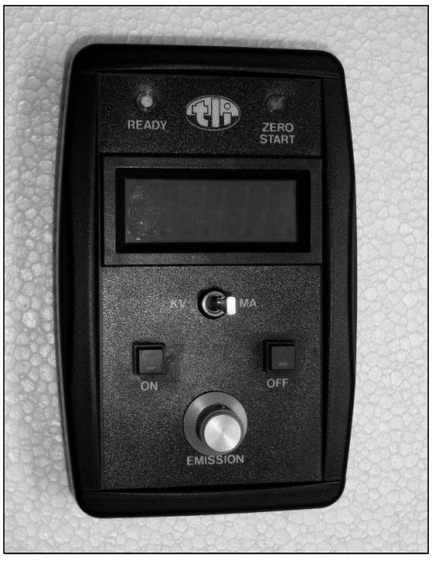
3 kW Power Supply

Application

Model RC-3000 is a 3 kW e-Gun power supply. Redesigned and upgraded, it replaces our 150-0030 power supply. All controls are remotely located in a hand-held remote control (including a meter to read both voltage and current). This unit features closed-loop filament control and beam stabilization that allow for better evaporation at lower emission rates. It can be operated manually or remotely by a rate or signal monitor. Interlocks are provided to assure power shut off in the case of water stoppage, vacuum failure, or high voltage access.

Power Supply Specifications

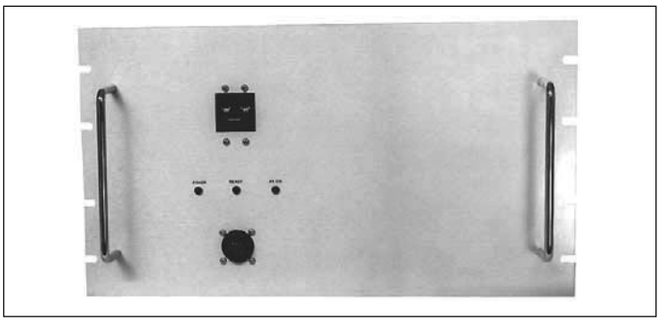
Input power	208/240 V, 50/60 cycles (single phase), 30 A. NOTE: Maximum input current is 23 A during normal operation. The e-Gun source can draw line currents up to 30 A during arcing.
Output, high voltage	5,000 V (negative) DC, unregulated
Output, current	Variable 0–600 mA, regulated by feedback control
Output, gun filament	0–6 VAC @ 25 A, both filament leads at high voltage
Metering	Dual scale, 0–10 kV and 0–1 A, full scale; accurancy ±2% of full scale
Interlocks	Interlock power (24 VDC) connected to terminal strip mounted on rear panel of PS cabinet 1) e-Gun water flow 2) HV access 3) vacuum
e-Gun filament leads	10 ft
Remote control cable	15 ft
Panel space	19"w x 10.5"h x 20"d
Weight	180 lbs



Remote Control —
Dimensions: 3.5"w x 4.5"h x 2.25"d

3 kW Power Supply and Sweep Controllers

Model	Description	Price
RC-3000	3 kW power supply	*on request*
XYS	X-Y beam sweep controller	*on request*
XYCS	Circular beam sweep controller	*on request*



3 kW
Power Supply —
Dimensions:
19"w x 10.5"h x 18"d

Retrofit Upgrade

We have developed an upgrade for Thermionics Model 150-0030 3 kW e-Gun power supply. (This is the three kilowatt power supply that has been in the electron beam industry for many years.) This upgrade has been very popular with our customers. The modification increases the utility of the 3 kW power supply, particularly for those using multiple crucible sources with evaporation materials requiring a broad range of power. We offer this upgrade to any users of this type of power supply.

Modification turn-around is approximately two weeks. F.O.B. Modesto or San Leandro, CA.

UPG-2—
Filament Control Modification
(updates Model No. 150-0030 to RC-3000 specs)

Solid state closed-loop filament control. All controls are remotely located in a hand-held remote control (including a meter to read both voltage and current). New front panel and control unit are pictured above.

Price *on request*

Hositrad Holland B.V. - De Wel 44 - 3871 MV - P.O.B. 114 - 3870 CC Hoevelaken - Phone:+31 (0)33-2537210 Fax:+31 (0)33-2535274
Hositrad Deutschland - Lindnergasse 2 - D-93047 Regensburg - Phone:+49 (0)941-55827 Fax:+49 (0)941-562296

www.hositrad.com - e-mail:info@hositrad.com

High Capacity Single Crucible e-Guns

Specifications

Maximum power	10 kW
Emission voltage	-6 to -10 kV
Emission current	0 to 1 A
Filament	700 W
E-beam deflection	270°
Beam spot size	.25" dia., tight beam
Evaporation rate	1 gram/min @ 10 kW 36,000 Å/min Al @ 10" (250 mm) source to substrate distance
X and Y sweep	Longitudinal and lateral control up to 200 Hz when operated with Thermionics sweep controller
Water	3 gpm, 20°C, 50 psi pressure differential
Crucible material	OFE copper
Bakeout temperature	230°C (446°F)

UHV Compatible

Metal-sealed, fully UHV compatible, measured base pressure: 2 x 10^{-11} Torr.

HCF and HCRF e-Guns

Model No.	Description	Price
HCF1007	7 cc single crucible	*on request*
HCF1015	15 cc single crucible	*on request*
HCF1025	25 cc single crucible	*on request*
HCF1040	40 cc single crucible	*on request*
HCRF1001	1" rod-fed e-gun	*on request*
HCRF1002	2" rod-fed e-gun	*on request*

Options

Emitter Assemblies

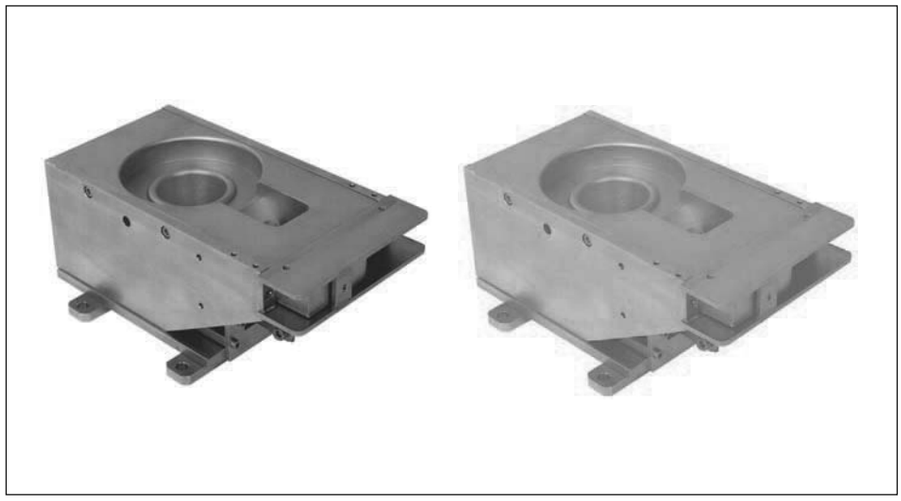
Model No.	Description	Price
112128-SD	Standard	*on request*
112128-HD	Heavy-duty	*on request*
112128-DE	Dual filament	*on request*

Spare Parts Kits

Model No.	Description	Price
HC/ERK-SD	Standard	*on request*
HC/ERK-HD	Heavy-duty	*on request*
HC/ERK-DE	Dual filament	*on request*

NOTE: For further information also see

Power Supplies
Controllers
Accessories
Crucible Liners



High Capacity Single Crucible e-Gun **HCRF Rod-Fed e-Gun**

270° Beam Deflection

The HCF incorporates a proven 270° electron beam deflection system. The filament is hidden below and out of the line-of-sight of the crucible. This prevents ion erosion and provides maximum protection from shorting caused by stray particles or condensate.

Long Life Emitter Assembly

The 270° electron beam deflection design has been enhanced with a new and improved emitter assembly.

Easy Filament Replacement

The emitter assembly design makes removal or replacement of the filament fast and easy. A filament alignment tool maintains critical filament tolerances, allowing quick and accurate filament replacement.

Permanent Magnet Beam Positioning

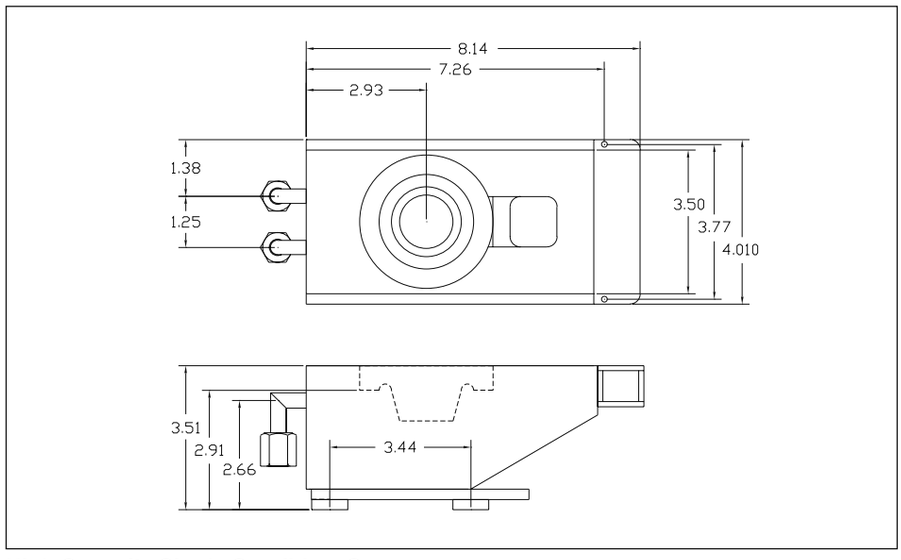
Primary beam position is controlled by a permanent magnet. Electromagnets are used for precise positioning and beam sweep.

Mounting Configurations

Each gun is available in three standard mounting configurations:

1. e-Gun alone with no mounting flange
2. e-Gun with a 1" diameter bolt-type mount, which mounts through a 1" diameter hole, and is sealed by a compression O-ring
3. e-Gun mounted on a PyraFlat or ConFlat metal seal type flange, which uses a standard OFE copper gasket

Custom Mounting is available. Please consult the factory.

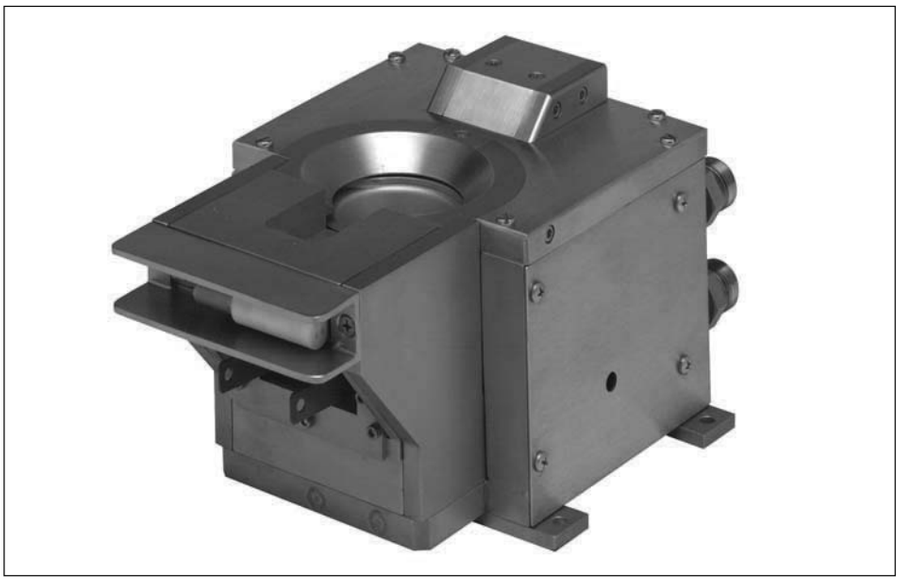


High Capacity Single Crucible e-Gun

Hositrad Holland B.V. - De Wel 44 - 3871 MV - P.O.B. 114 - 3870 CC Hoevelaken - Phone:+31 (0)33-2537210 Fax:+31 (0)33-2535274
Hositrad Deutschland - Lindnergasse 2 - D-93047 Regensburg - Phone:+49 (0)941-55827 Fax:+49 (0)941-562296

www.hositrad.com - e-mail:info@hositrad.com

High Capacity Multiple Crucible Rotary e-Guns



High Capacity Multiple Crucible Rotary e-Gun

Specifications

Maximum power	10 kW
Emission voltage	-6 to -10 kV
Emission current	0 to 1 A
Filament	700 W
E-beam deflection	270°
Beam spot size	.25" dia., tight beam
Evaporation rate	1 gram/min @ 10 kW 36,000 Å/min Al @ 10" (250 mm) source to substrate distance
X and Y sweep	Longitudinal and lateral control up to 200 Hz when operated with Thermionics sweep controller
Water	3 gpm, 20°C, 50 psi pressure differential
Crucible material	OFE copper
Bakeout temperature	120°C (250°F)

270° Beam Deflection

The HCR incorporates a proven 270° electron beam deflection system. The filament is hidden below and out of the line-of-sight of the crucible. This prevents ion erosion and provides maximum protection from shorting caused by stray particles or condensate.

Long Life Emitter Assembly

The 270° electron beam deflection design has been enhanced with a new and improved emitter assembly.

Permanent Magnet Beam Positioning

Primary beam position is controlled by a permanent magnet. Electromagnets are used for precise positioning and beam sweep.

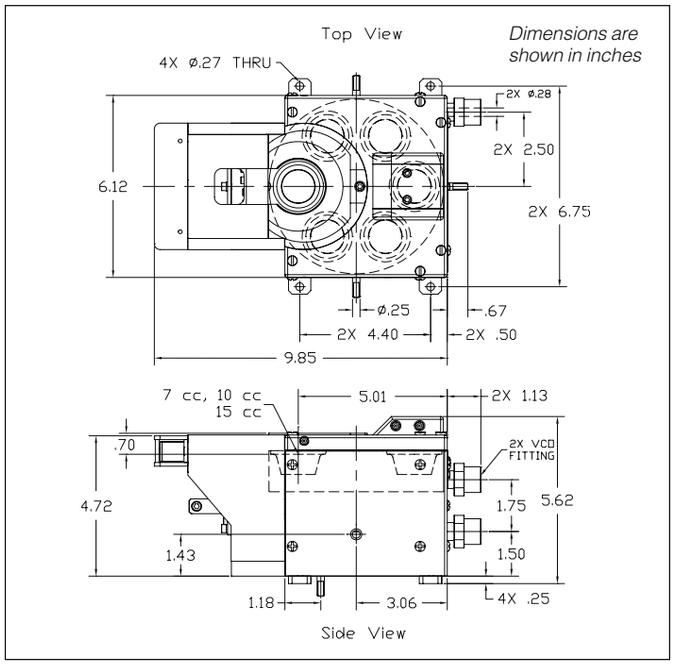
Interchangeable Crucibles

The HCR offers interchangeable crucible blocks, available in a variety of volumes and geometries. Five standard crucible arrangements, illustrated in Fig. 4-1, offer the flexibility necessary for a wide variety of source materials, applications, and processes.

HC Series Rotary e-Guns

Model No.	Description	Crucible Size in Cubic Centimeters	No. of Crucibles	Price
HCR0607-4-SD	4 crucible, side drive	7	4	*on request*
HCR0607-4-BD	4 crucible, bottom drive	7	4	*on request*
HCR1015-4-SD	4 crucible, side drive	15	4	*on request*
HCR1015-4-BD	4 crucible, bottom drive	15	4	*on request*
HCR1025-4-SD	4 crucible, side drive	25	4	*on request*
HCR1025-4-BD	4 crucible, bottom drive	25	4	*on request*
HCR1040-4-SD	4 crucible, side drive	40	4	*on request*
HCR1040-4-BD	4 crucible, bottom drive	40	4	*on request*
HCR0607-6-SD	6 crucible, side drive	7	6	*on request*
HCR0607-6-BD	6 crucible, bottom drive	7	6	*on request*
HCR1015-6-SD	6 crucible, side drive	15	6	*on request*
HCR1015-6-BD	6 crucible, bottom drive	15	6	*on request*
HCR1025-6-SD	6 crucible, side drive	25	6	*on request*
HCR1025-6-BD	6 crucible, bottom drive	25	6	*on request*
HCR1007-8-SD	8 crucible, side drive	7	8	*on request*
HCR1007-8-BD	8 crucible, bottom drive	7	8	*on request*
HCR1010-8-SD	8 crucible, side drive	10	8	*on request*
HCR1010-8-BD	8 crucible, bottom drive	10	8	*on request*
HCRC320-1-SD	Rotary carousel, continuous trough crucible, side drive	320	360° trough	*on request*
HCRC320-1-BD	Rotary carousel, continuous trough crucible, bottom drive	320	360° trough	*on request*
HCRP360-1-SD	Rotary pan-type carousel, side drive	360	360° pan	*on request*
HCRP360-1-BD	Rotary pan-type carousel, bottom drive	360	360° pan	*on request*

High Capacity Multiple Crucible Rotary e-Guns



High Capacity Multiple Crucible Rotary e-Gun

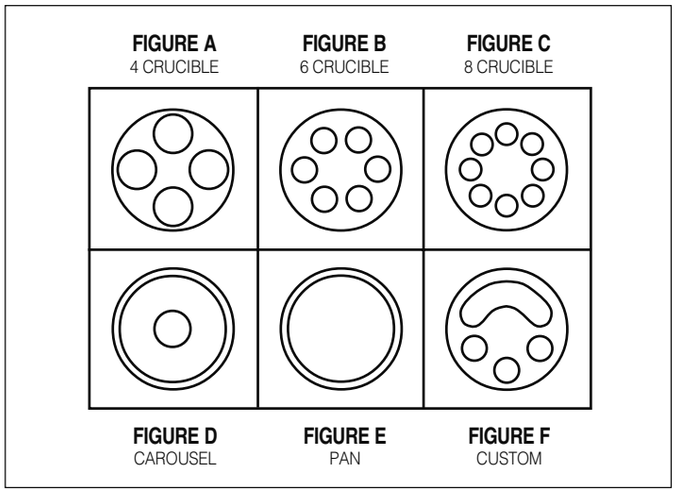


Fig. 4-1. Crucible illustration, top view

Crucible Specifications

No. of Crucibles	Crucible Size in Cubic Centimeters	Top View Illustration (Fig. 4-1)
4	7	A
4	15	A
4	25	A
4	40	A
6	7	B
6	15	B
6	25	B
8	7	C
8	10	C
Carousel	320	D
Pan	360	E

Consult Factory for combinations or special sizes.

Mounting Configurations

Each gun is available in three standard mounting configurations:

1. e-Gun alone with no mounting flange
2. e-Gun with a 1" diameter bolt-type mount, which mounts through a 1" diameter hole, and is sealed by a compression O-ring
3. e-Gun mounted on a PyraFlat or ConFlat metal seal type flange, which uses a standard OFE copper gasket

Custom Mounting is available. Please consult the factory.

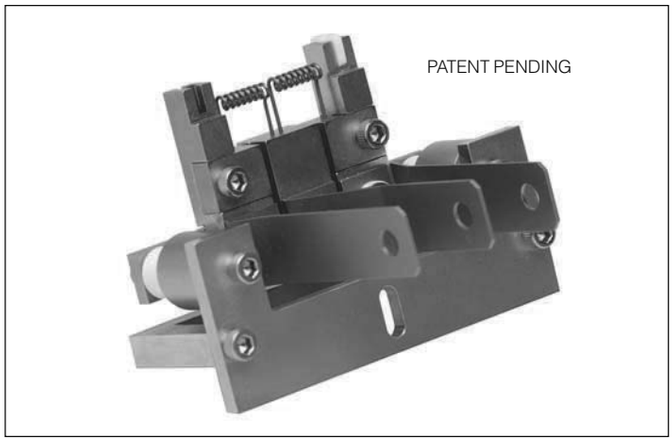
PyraFlat flanges are manufactured and protected under one or more of the following patents: 5,640,751; 4,685,193

Universal Installation

An optional universal mounting adapter plate is available. The plate permits the direct mounting of HCR rotary e-Guns into existing Temescal or similar evaporation source installations.

NOTE: For further information also see

Power Supplies
Controllers
Accessories
Crucible Liners



Dual Filament Emitter

Options

Emitter Assemblies

Model No.	Description	Price
112128-SD	Standard	*on request*
112128-HD	Heavy-duty	*on request*
112128-DE	Dual filament	*on request*

Spare Parts Kits

Model No.	Description	Price
HC/ERK-SD	Standard	*on request*
HC/ERK-HD	Heavy-duty	*on request*
HC/ERK-DE	Dual filament	*on request*
112128-OR	O-ring kit	*on request*

Hositrad Holland B.V. - De Wel 44 - 3871 MV - P.O.B. 114 - 3870 CC Hoevelaken - Phone:+31 (0)33-2537210 Fax:+31 (0)33-2535274
Hositrad Deutschland - Lindnergasse 2 - D-93047 Regensburg - Phone:+49 (0)941-55827 Fax:+49 (0)941-562296

www.hositrad.com - e-mail:info@hositrad.com

High Capacity Multiple Crucible Linear e-Guns

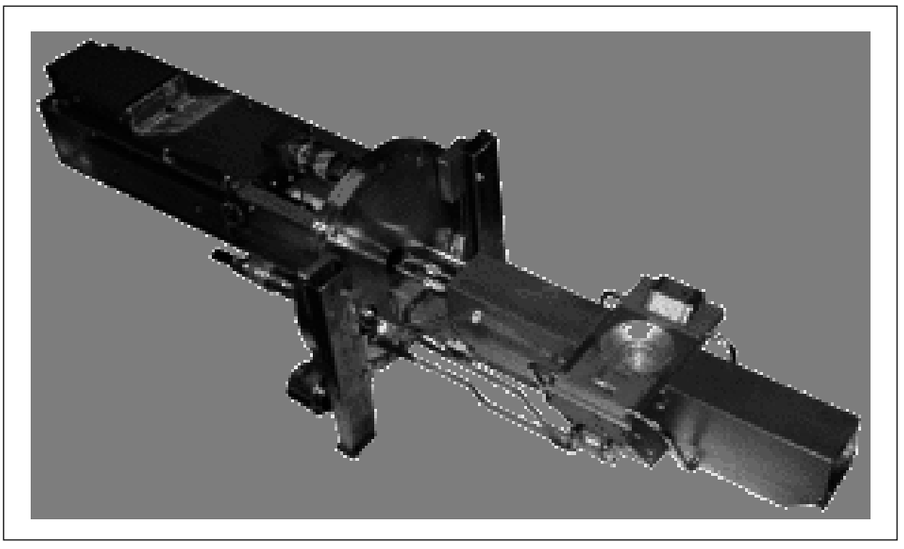
The HC Series linear e-Gun is an all metal-sealed e-Gun. Available in 4 and 5 crucible versions, the source allows sequential deposition of up to 5 materials. Standard mounting is on a 12" O.D. Conflat-type flange and includes auto indexer and all mechanical and electrical connections.

Features

- 4- and 5-crucible models
- 12" O.D. CF mounting flange
- Includes all electrical and utility feedthroughs

Specifications

Maximum power	10 kW
Emission voltage	-6 to -10 kV
Emission current	0 to 1 A
Filament	700 W
E-beam deflection	270°
Beam spot size	Approx. .25" dia., tight beam
Evaporation rate	1 gram/min @ 10 kW 36,000 Å/min Al @ 10" (250 mm) source to substrate distance
Water	3 gpm, 25 psi pressure differential
Crucible material	OFE copper
Bakeout temperature	230°C (446°F)



HCL 6 kW e-Gun

UHV Compatible

Metal-sealed, fully UHV compatible, measured base pressure: 2×10^{-11} Torr.

270° Beam Deflection

The filament is completely hidden to ensure maximum protection from shorting caused by stray particles.

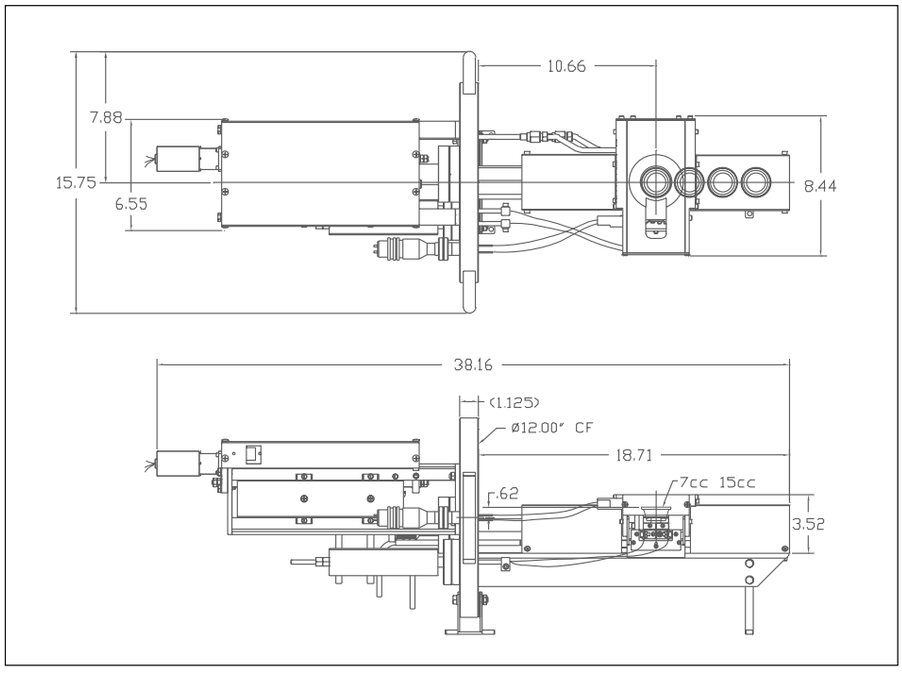
Easy Filament Replacement

A filament alignment tool maintains critical filament tolerances during emitter assembly allowing quick and accurate filament replacement.

Permanent Magnet Beam Positioning

The primary beam position is controlled by a permanent magnet; electromagnets are used only for precise positioning and beam sweep.

High Capacity Multiple Crucible Linear e-Guns



HCL 6 kW 7-2scc e-Gun

Mounting Configurations

Each gun is available in three standard mounting configurations:

1. e-Gun mounted on a PyraFlat or ConFlat metal-seal type flange, which uses a standard OFE copper gasket
2. e-Gun with a 1" diameter bolt-type mount, which mounts through a 1" diameter hole, and is sealed by a compression O-ring
3. e-Gun alone with no mounting flange

Ordering Information

Please specify the mounting configuration at the time the order is placed; the prices listed *may* not include the bolt-type or flange-type mount.

Other mounting flanges, configurations and geometries are routinely supplied, please call the factory for further information.

PyraFlat flanges are manufactured and protected under one or more of the following patents: 5,640,751; 4,685,193

HC Series Linear e-Guns

Model No.	Power	Crucible Size (cm^3)	No. of Crucibles	Price
HCL0607-4	6 kW	7	4	*on request*
HCL0607-5	6 kW	7	5	*on request*
HCL0615-4	6 kW	15	4	*on request*
HCL0615-5	6 kW	15	5	*on request*
HCL0625-4	6 kW	25	4	*on request*
HCL1040-4	10 kW	40	4	*on request*
HCL1040-5	10 kW	40	5	*on request*
HCL1575-4	15 kW	75	4	*on request*
HCL1575-5	15 kW	75	5	*on request*

Options

Emitter Assemblies

Model No.	Description	Price
112128-SD	Standard	*on request*
112128-HD	Heavy-duty	*on request*
112128-DE	Dual filament	*on request*

Spare Parts Kits

Model No.	Description	Price
HC/ERK-SD	Standard	*on request*
HC/ERK-HD	Heavy-duty	*on request*
HC/ERK-DE	Dual filament	*on request*

NOTE: For further information also see

Power Supplies
Controllers
Accessories
Crucible Liners

Hositrad Holland B.V. - De Wel 44 - 3871 MV - P.O.B. 114 - 3870 CC Hoevelaken - Phone: +31 (0)33-2537210 Fax: +31 (0)33-2535274
Hositrad Deutschland - Lindnergasse 2 - D-93047 Regensburg - Phone: +49 (0)941-55827 Fax: +49 (0)941-562296

www.hositrad.com - e-mail:info@hositrad.com

Emitter Components (All Models)

Model No.	Description	Price
112153-02	Filament, 500 W	*on request*
112153-01	Filament, 700 W	*on request*
112156	H.V. insulator	*on request*
112157	Collar insulator	*on request*
112158	Cross insulator	*on request*
112134	Cathode block, LH	*on request*
112133	Cathode block, RH	*on request*
112132	Filament clamp	*on request*
112137	Anode	*on request*
112138	Beam former	*on request*

Emitter Assemblies

Model No.	Description	Price
HCXYC	Sweep coil assembly	*on request*
112128-SD	Standard emitter assembly	*on request*
112128-HD	Heavy-duty emitter assembly	*on request*
112128-DE	Dual filament emitter assembly	*on request*

Spare Parts Kits

Model No.	Description	Price
ERK-SD	Standard emitter rebuild kit	*on request*
ERK-HD	Heavy-duty emitter rebuild kit	*on request*
ERK-DE	Dual filament emitter rebuild kit	*on request*
112128-OR	O-ring kit for HCR rotary e-gun	*on request*

Feedthroughs and Connectors

Model No.	Description	Price
111139-04	4-pin instrument feedthrough mounted on a 1.33" ConFlat flange	*on request*
111140-04	4-pin instrument feedthrough mounted on a 2.75" ConFlat flange	*on request*
B111136-12	Two electrical feedthroughs mounted on a 2.75" ConFlat flange, 12 kV @ 70 A (use with connector/cable assembly HVC-D-12)	*on request*
HVC-D-12	Dual feedthrough connector w/interlock and 10' dual cable assembly (use with dual feedthrough B111136-12)	*on request*
EBFT-100	One electrical feedthrough mounted on a 2.75" ConFlat flange, 12 kV @ 70 A, two are required for each e-Gun (use with connector/cable assembly HVC-T-12)	*on request*
EBFT-100-1B	One electrical feedthrough mounted on a 1" bolt-type baseplate feedthrough, 12 kV @ 70 A, two are required for each e-Gun (use with connector/cable assembly HVC-T-12)	*on request*
EBFT-133	One electrical feedthrough mounted on a 1.33" ConFlat flange, 12 kV @ 70 A, two are required for each e-Gun (use with connector/cable assembly HVC-T-12)	*on request*
HVC-T-12	Single feedthrough connector and 10' cable assembly, two are required for each e-Gun (use with single feedthroughs EBFT-100, EBFT-100-1B, and EBFT-133)	*on request*
EBFT-200	Dual pass water, 1/4" O.D. tubes	*on request*
EBFT-300	Dual pass water, 3/8" O.D. tubes	*on request*
EBFT-400	Instrumentation, 10-pin	*on request*
EBFT-500	Rotary, 1/4" O.D. shaft	*on request*
EBFT-600	Rotary, with right angle translation, 1/4" O.D. shaft	*on request*
EBFK-700	Feedthrough Kit, for single crucible e-Gun	*on request*
EBFK-800	Feedthrough Kit, for rotary multiple crucible e-Gun	*on request*
EBFK-900	Feedthrough Kit, for rotary multiple crucible e-Gun, with right angle translation	*on request*
A111489	Feedthrough connector, internal 1/4" rod to 10-32 screw connector	*on request*
A086190	Feedthrough connector, internal 1/4" rod to 0.090" wire	*on request*
111680	Universal mounting adapter plate	*on request*
Feedthrough Installation Kits	Kits include all components necessary for installation. Kits are available for all e-Gun evaporation sources and power supplies.	*on request*
Crucible Liners	Crucible liners will enhance your process or application. We recommend you use a suitable crucible liner.	

6–15 kW Power Supply, Switch Mode

High Frequency Switching

The SEB Series e-Gun power supply is a high performance switch mode power supply. It operates above 20 kHz and uses the most reliable IGBT switches available. The SEB power supply is designed to optimize e-Gun performance and maximize power supply reliability in any production coating application.

Conservative Electrical Design

SEB power supplies are conservatively designed. Each SEB power supply is designed to operate continuously and reliably at full power and maximum load ratings, with enough head room to accommodate the most dynamic operating characteristics and brutal operating conditions. Every power supply is dynamically tested, including repetitive arc testing, prior to shipment.

FilChek™ Filament Check

FilChek is an exclusive feature included on every SEB power supply. FilChek is a momentary switch mounted on the power supply front panel. It provides a quick, convenient, and simple test of the e-Gun evaporation source filament. *Not simply a continuity check*, FilChek supplies a measured, dynamic load through the filament to provide a reliable, easy-to-use, and *true* test of filament condition.

Dynamic Arc Suppression

SEB power supplies incorporate advanced arc detection and suppression circuits to insure maximum performance with any evaporant material.

Multiple Output

Each SEB power supply is designed to power and operate up to three e-Gun evaporation sources either sequentially or simultaneously. Multiple output taps are provided at the rear of each power supply. Each power supply is shipped with one e-Gun control module as standard equipment. An additional "plug in" e-Gun control module is required for each additional e-Gun you may wish to operate.

Low Stored Energy

SEB power supplies maintain excellent output regulation while minimizing the amount of energy available during arc events. This permits fast arc recovery and greatly enhances e-Gun operation, performance, and reliability.

Compatible with Other Evaporation Sources

The SEB power supplies can be used with all Thermionics e-Gun evaporation sources as well as evaporation sources from other manufacturers. Contact our factory for specific applications.

Specifications

Model No.	SEB-06	SEB-10	SEB-15
Output power	6 kW	10 kW	15 kW
Output voltage	0 to -10 kV DC	0 to -10 kV DC	0 to -10 kV DC
Output current	0 to 600 mA DC	0 to 1.5 A DC	0 to 1.5 A DC
Output regulation	± 0.5%	± 0.5%	± 0.5%
Ripple	1% RMS	1% RMS	1% RMS
Input voltage	208/240/380/415 3 phase, 50/60 Hz	208/240/380/415 3 phase, 50/60 Hz	208/240/380/415 3 phase, 50/60 Hz
Cooling	Air cooled	Air cooled	Air cooled
Metering	Digital LCD	Digital LCD	Digital LCD
Remote interface	17-pin connector is provided on rear panel for monitoring and controlling power supply output		
CE compliant	yes	yes	yes
Size	19"w x 8.75"h x 19"d	19"w x 10.5"h x 19"d	19"w x 10.5"h x 19"d
Weight	60 lbs	85 lbs	85 lbs

NOTE: All cables and connectors for "plug-in" installation are included

SEB Series e-Gun Power Supplies

Model No.	Description	Price
SEB-06	6 kW high frequency switch mode e-Gun power supply, with one source controller	*on request*
SEB-15	15 kW high frequency switch mode e-Gun power supply, with one source controller	*on request*
S-HHRC	Hand-held e-Gun power supply controller and sweep controller	*on request*
S-CLFC	Additional gun controller, includes filament transformer and cable assemblies	*on request*

Interlocked Push-on HV Connector

One interlocked, push-on, dual high voltage connector, Model No. HVC-D-12, is included with each power supply. The connector is shown here with the mating dual high voltage feedthrough, Model No. B111136-12, which is ordered separately.

This unique, interlocked, dual high voltage connector and feedthrough assembly may be utilized in a wide range of applications.

Source Controller

NOTE: One e-Gun source controller is included with each power supply. Additional source controllers may be purchased and installed to operate up to a total of three e-Guns from a single power supply.

6–15 kW Switch Mode Power Supply

Hositrad Holland B.V. - De Wel 44 - 3871 MV - P.O.B. 114 - 3870 CC Hoevelaken - Phone: +31 (0)33-2537210 Fax: +31 (0)33-2535274
Hositrad Deutschland - Lindnergasse 2 - D-93047 Regensburg - Phone: +49 (0)941-55827 Fax: +49 (0)941-562296

www.hositrad.com - e-mail:info@hositrad.com

Hyper-Unimelt Sweep Controller, Triangular

Triangular Beam Sweep Controller

A triangular wave generator for driving the horizontal and lateral coils of the gun. Frequency range of each channel is 1 to 200 Hz and the peak amplitude is +/- 2 A. Rack mountable and includes all connecting cables.

Model No. XYS
Price *on request*

Features

- Triangular output
- Current regulated
- Independent amp/frequency control
- High 200 Hz frequency
- +/- operation

Hyper-Unimelt Triangular Beam Sweep Controller

Hyper-Unimelt Sweep

New Sweep Coil for Higher Frequencies

Present day e-Gun technology does not allow for a sweep above 60 Hz. When trying to sweep above these frequencies, the beam spot shrinks in size and the electromagnet core becomes saturated and cannot respond to frequencies above 60 Hz. In order to prevent hot spots and tunneling the sweep must be above these frequencies. Hositrad Hyper-Unimelt sweep can respond up to 200 Hz. This entitles users of subliming materials, for example, chrome or quartz, an extremely uniform melt temperature over the entire crucible sweeping area. Thus, hot spots and tunneling are eliminated.

Description

The Model XYS sweeper is designed to provide the required drive to the longitudinal and lateral coils of electron beam guns. The two outputs are independently variable such that the electron beam can be positioned anywhere over the entire surface of the crucible. In addition to this DC positioning, it also provides a variable amplitude/frequency to the coils so that the beam can be swept over the surface of the evaporant. The position, amplitude and frequency are continuously adjustable from the control panel.

Beam Position and Sweep

The electron beam gun uses electromagnets to position the beam in the crucible. The beam sweeper provides current for these electromagnets. Longitudinal and lateral position controls are capable of positioning the point of the beam impact anywhere in the crucible area. By changing the current in either one of the coils, the beam will traverse a straight line. The amplitude of the traverse is determined by the maximum and minimum currents delivered to the electromagnet. If the current is changed in both coils simultaneously, the beam can sweep over the entire area of the evaporant.

The wave shape provided by the sweeper is triangular; therefore, the current in the electromagnet changes from maximum to minimum at a constant rate. As a result, the electron beam spends equal amounts of time at all points along its traverse path. When the beam sweep is activated for both coils, the entire surface of the evaporant is uniformly heated.

Electrical Specifications

Wave shape	Triangular
Frequency	1–200 Hz
Input power	115 VAC, 50/60 Hz, 2 A max.
Output power	Dual channel, ±40 V, 2 A max.

Mechanical Specifications

Panel dimensions	9.5”w x 5.25”h (rack mountable)
Chassis dimensions	8.25”w x 5.25”h x 20”d
Weight	30 lbs

Hyper-Unimelt Sweep Controller, Circular

Circular Beam Sweep Controller

Drives the beam in a circular path. Includes modulation for sweeping the beam over the entire surface of the crucible. Fixed 200 Hz circular frequency with a variable 5 to 50 Hz modulation. Rack mountable and includes all connecting cables.

Model No. XYCS
Price *on request*

Features

- Circular output
- Current regulated
- Amplitude modulated
- High 200 Hz frequency
- +/– operation

4

Description

With the model XYCS circular sweeper, the entire surface of the e-Gun crucible can be swept, yielding a uniform melt with no discernible hot spots across the surface.

The XYCS sweeper supplies a sine wave drive to the longitudinal and lateral coils of electron beam guns. These waves are separated by 90 electrical degrees. As a result, the electron beam is driven in a circular pattern across the surface of the melt.

By adjusting the amplitude of the longitudinal and lateral sine waves, the diameter of the circle is changed. A triangular-shaped modulating wave is applied to the amplitude control, and the resulting beam expands and retracts in a concentric, linear manner.

Hyper-Unimelt Circular Beam Sweep Controller

Electrical Specifications

Waveshape	Circular
Maximum frequency	200 Hz
Modulating frequency	5 to 50 Hz
Input power	115 VAC, single phase, 50/60 Hz
Output power	+/- 30 volts, 2 amperes (per channel, peak)

Mechanical Specifications

Panel Dimensions	9.5”w x 5.25”h x 20”d
Weight	20 lbs

Option

Half Rack Adapter
Space for two XYS or XYCS controllers, to mount to standard 19” rack

Model No.	Description	Price
XYRA	Half Rack adapter	*on request*

Hositrad Holland B.V. - De Wel 44 - 3871 MV - P.O.B. 114 - 3870 CC Hoevelaken - Phone: +31 (0)33-2537210 Fax: +31 (0)33-2535274
Hositrad Deutschland - Lindnergasse 2 - D-93047 Regensburg - Phone: +49 (0)941-55827 Fax: +49 (0)941-562296

www.hositrad.com - e-mail:info@hositrad.com

Classic e-Guns & Special Order Products

4

Sources for direct replacement of old sources and for special low-volume research applications

3 kW Single Crucible e-Gun

Single Models—standard

Model No. 100-0010 (shown)
Price *on request*

Special Models

- 2 singles mounted on ConFlat flange
- 3 singles mounted on 8" dia. ConFlat flange

UHV Compatible

Metal-sealed, fully UHV compatible, measured base pressure: 2 x 10^{-11} Torr.

4

Specifications

Operating pressure	Below 5 x 10^{-5} Torr is desirable for best operation
Beam voltage	5,000 V
Beam current	0–600 mA continuously variable
Maximum power	3,000 W
Cooling water	1/2 gpm
Maximum bakeout temperature	230°C (446°F)
Feedthrough requirements	Two 7 kV 50 A
Crucible volume	2.24 cc
e-Gun size	2.50"h x 1.94"w x 1.69"d

Mounting Configurations

Each gun is available in three standard mounting configurations:

1. e-Gun mounted on a PyraFlat or ConFlat metal-seal type flange, which uses a standard OFE copper gasket
2. e-Gun with a 1" diameter bolt-type mount, which mounts through a 1" diameter hole, and is sealed by a compression O-ring
3. e-Gun alone with no mounting flange

Ordering Information

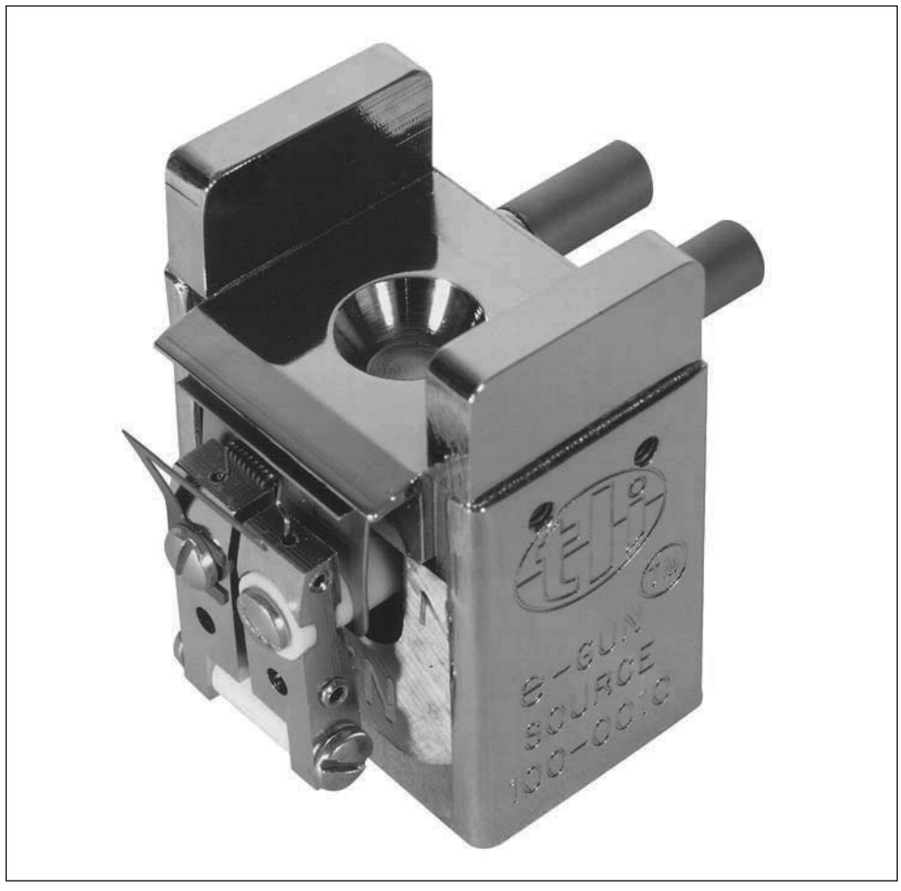
Please specify the mounting configuration at the time the order is placed; the prices listed *may* not include the bolt-type or flange-type mount.

Other mounting flanges, configurations and geometries are routinely supplied, please call the factory for further information.

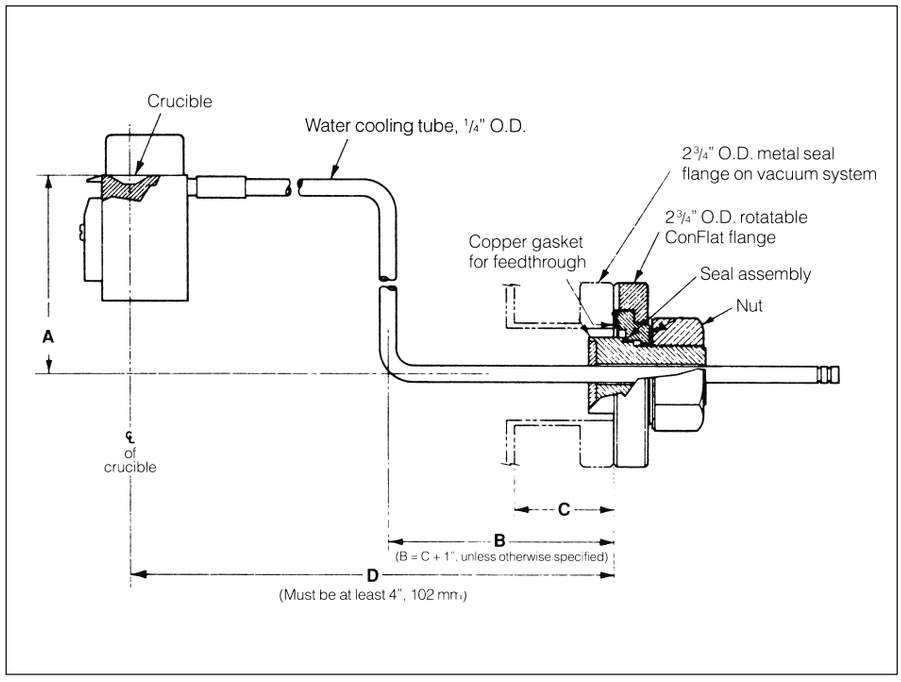
NOTE: For further information also see

Power Supplies
Controllers
Accessories
Crucible Liners

PyraFlat flanges are manufactured and protected under one or more of the following patents: 5,640,751; 4,685,193



3 kW Single Crucible e-Gun

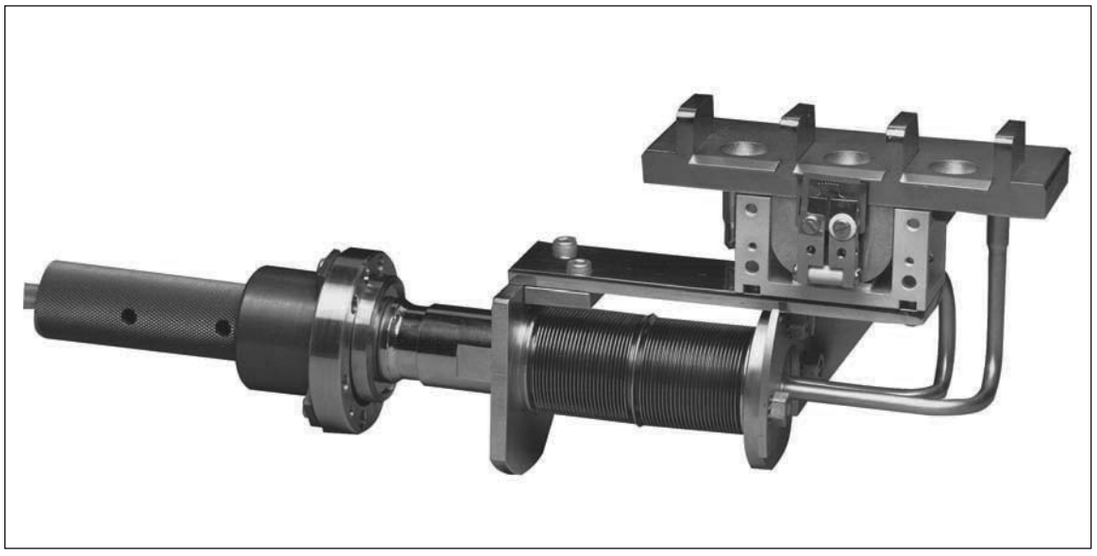


3 kW Single Crucible e-Gun

Hositrad Holland B.V. - De Wel 44 - 3871 MV - P.O.B. 114 - 3870 CC Hoevelaken - Phone: +31 (0)33-2537210 Fax: +31 (0)33-2535274
Hositrad Deutschland - Lindnergasse 2 - D-93047 Regensburg - Phone: +49 (0)941-55827 Fax: +49 (0)941-562296

www.hositrad.com - e-mail:info@hositrad.com

3 kW Multiple Crucible Linear e-Gun



3 kW Multiple Crucible Linear e-Gun

Operation

The operating principle of the multiple crucible e-Gun is identical to the single crucible source with the following advantages:

- Large supply of evaporant — When every crucible is filled with the same source material, an increased volume of evaporant can be evaporated in a single vacuum cycle.
- Deposition of up to five different materials in one vacuum cycle — A different material can be put in each crucible and deposited in any sequence during a single vacuum cycle. The deposition rates are the same as those of the single crucible model. Only one crucible is heated at a time. The single filament remains stationary and the crucible head is indexed into position by the drive handle. Therefore, the evaporation always originates from exactly the same position in the vacuum chamber. The inactive crucibles are shielded from the heated crucibles by the magnetic pole pieces, thereby eliminating contamination between crucibles.

UHV Compatible

Metal-sealed, fully UHV compatible, measured base pressure: 2×10^{-11} Torr.

Specials

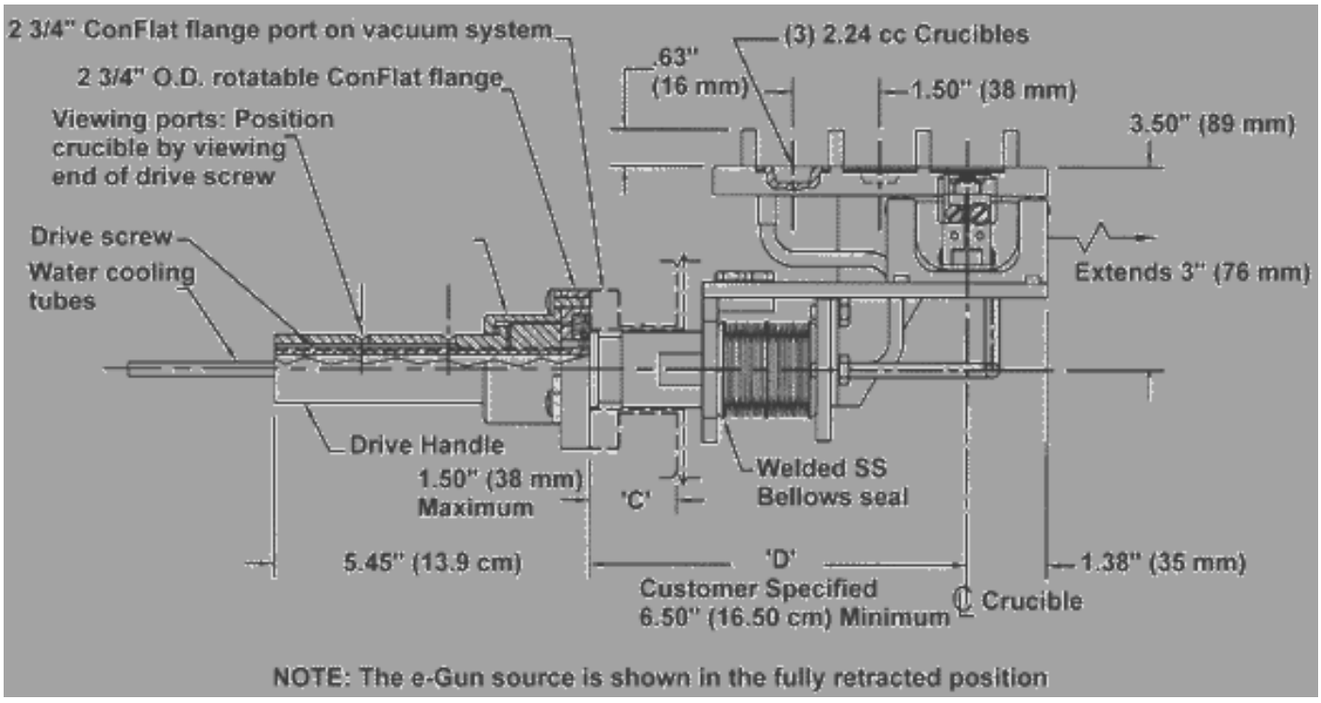
All multiple crucible e-Guns can be mounted on larger diameter ConFlat or rectangular PyraFlat flanges, single or back-to-back.

NOTE: For further information also see

Power Supplies
Controllers
Accessories
Crucible Liners

PyraFlat flanges are manufactured and protected under one or more of the following patents: 5,640,751; 4,685,193

3 kW Multiple Crucible Linear e-Gun



Three Crucible 3 kW e-Gun Source, Model 100-0030

Specifications

Operating pressure	Below 5 x 10^{-5} Torr is desirable for best operation
Beam voltage	5,000 V
Beam current	0–600 mA continuously variable
Maximum power	3,000 W
Cooling water	1/2 gpm
Maximum bakeout temperature	230°C (446°F)
Feedthrough requirements	Two 7 kV 50 A
Crucible volume	2.24 cc

Mounting Configurations

Each gun is available in three standard mounting configurations:

1. e-Gun mounted on a PyraFlat or ConFlat metal-seal type flange, which uses a standard OFE copper gasket
2. e-Gun with a 1" diameter bolt-type mount, which mounts through a 1" diameter hole, and is sealed by a compression O-ring
3. e-Gun alone with no mounting flange

Ordering Information

Please specify the mounting configuration at the time the order is placed; the prices listed *may* not include the bolt-type or flange-type mount.

Other mounting flanges, configurations and geometries are routinely supplied, please call the factory for further information.

Standard Models

Model No.	Crucibles	Price
100-0030	3	*on request*
100-0040	4	*on request*
100-0050	5	*on request*

NOTE: For further information also see

Power Supplies
Controllers
Accessories
Crucible Liners

PyraFlat flanges are manufactured and protected under one or more of the following patents: 5,640,751; 4,685,193

Hositrad Holland B.V. - De Wel 44 - 3871 MV - P.O.B. 114 - 3870 CC Hoevelaken - Phone: +31 (0)33-2537210 Fax: +31 (0)33-2535274
Hositrad Deutschland - Lindnergasse 2 - D-93047 Regensburg - Phone: +49 (0)941-55827 Fax: +49 (0)941-562296

www.hositrad.com - e-mail:info@hositrad.com

Replacement Parts

Model No.	Description	Price
22001-1	Ceramic insulator (6-32 x 3/8" dia x 3/4" length)	*on request*
22001-2	Ceramic insulator (6-32 x 1/4" dia x 1/2" length)	*on request*
22009	Ceramic washer	*on request*
21040	3 kW emitter assembly (includes filament assembly two filaments, legs, hardware set, cathode shield, overspray shield, and two flange gaskets)	*on request*
21015	Filament, 300 W	*on request*
21007-1	Filament leg—neutral	*on request*
21007-2	Filament leg—insulated	*on request*
22013	Hardware set (includes all screws, ceramics and shims)	*on request*
21005	Magnet	*on request*
21011	Cathode shield	*on request*
21013	Overspray shield	*on request*
22008	Copper flat gasket (vacuum annealed), each	*on request*
310-6A18-1P	Shorted plug	*on request*
310-990009	Diode pack	*on request*

Sweep

Model No.	Description	Price
XYS	X-Y beam sweep controller	*on request*
XYCS	Circular beam sweep controller	*on request*
180-1030	Beam adjust (requires 150-0030 or 150-0040 power supply)	*on request*
180-8384	Set of two coils for multiple crucible guns	*on request*
180-8385	Set of two coils for single crucible guns	*on request*

Accessories

Model No.	Description	Price
210-SW	Water interlock switch for all e-Guns	*on request*
PS-GR	Grounding rod	*on request*

Feedthroughs and Connectors

Model No.	Description	Price
B111136-07	Two electrical feedthroughs mounted on a 2.75" ConFlat flange, 7 kV @ 70 A (use with connector/cable assembly HVC-D-12) *Note: Please consult the factory for power supply installation information.*	*on request*
HVC-D-12	Dual feedthrough connector with interlock and 10' dual cable assembly (use with dual feedthrough B111136-07)	*on request*
B111137	One electrical feedthrough mounted on a 2.75" ConFlat flange, 7 kV @ 70 A, two are required for each e-Gun (use with connector/cable assembly HVC-T-12)	*on request*
B111138	One electrical feedthrough mounted on a 1.33" ConFlat flange, 7 kV @ 70 A, two are required for each e-Gun (use with connector/cable assembly HVC-T-12)	*on request*
HVC-T-12	Single feedthrough connector and 10' cable assembly, two are required for each e-Gun (use with single feedthroughs B111137 and B111138)	*on request*
A111489	Feedthrough connector, internal 1/4" rod to 10-32 screw connector	*on request*
A086190	Feedthrough connector, internal 1/4" rod to 0.090" wire	*on request*

e-Gun Crucible Liners

NOTE: (1) The price of raw materials for liners (*****) is very volatile, please check with the factory to confirm current prices. (2) Please consult the factory if there is a special material that you need or (3) if you are unsure which liner fits your gun, we will send you a template.

Pre-1988
Single Crucible, Single Position
(60° wall angle, old style)

Material Type	Model No.	Price
Graphite	**A111455-G**	*on request*
Glassy Carbon	**A111455-CG**	*on request*
Fabmate	**A111455-FM**	*on request*
Tantalum	**A111455-TA**	*on request*
Alumina	**A111455-AL**	*on request*
Molybdenum	**A111455-MO**	*on request*
Tungsten	**A111455-W**	*on request*
Boron Nitride	**A111455-BN**	*on request*

Pre-1988
Multiple Crucible, 3 and 5 Position
(60° wall angle, old style)

Material Type	Model No.	Price
Graphite	**A111449-G**	*on request*
Glassy Carbon	**A111449-CG**	*on request*
Fabmate	**A111449-FM**	*on request*
Alumina	**A111449-AL**	*on request*
Molybdenum	**A111449-MO**	*on request*
Tungsten	**A111449-TA**	*on request*
Boron Nitride	**A111449-BN**	*on request*

Post-1990
Multiple Crucible, 3 and 5 Position
(New style 15° wall angle)

Material Type	Model No.	Price
Graphite	**A111460-G**	*on request*
Glassy Carbon	**A111460-CG**	*on request*
Fabmate	**A111460-FM**	*on request*
Tantalum	**A111460-TA**	*on request*
Alumina	**A111460-AL**	*on request*
Molybdenum	**A111460-MO**	*on request*
Tungsten	**A111460-W**	*on request*

Hanks HM² Single Crucible e-Guns

Hanks HM² e-Gun
6, 10, and 15 kW
Crucible Volumes—7, 10, 15, 40, 75, and 100 cc

Single Crucible Models — Single Emitter

Model No.	Power	Crucible Volume	Price
0607	6 kW	7 cc	*on request*
0610	6 kW	10 cc	*on request*
1010	10 kW	10 cc	*on request*
1015	10 kW	15 cc	*on request*
1540	15 kW	40 cc	*on request*
1575	15 kW	75 cc	*on request*
15100	15 kW	100 cc	*on request*

Twin—*Two Single Crucible e-Guns*

Model No.	Power	Crucible Volume	Price
D1010	10 kW	10 cc	*on request*
D1015	10 kW	15 cc	*on request*
D1540	15 kW	40 cc	*on request*

Hanks HM² Single Crucible e-Gun

UHV Compatible

Metal-sealed, fully UHV compatible, measured base pressure: 2×10^{-11} Torr.

NOTE: For further information also see

Power Supplies
Controllers
Accessories
Crucible Liners

Hanks HM² e-Guns are manufactured and protected under one or more of the following patents: 4,835,789; 4,891,821; 4,947,404

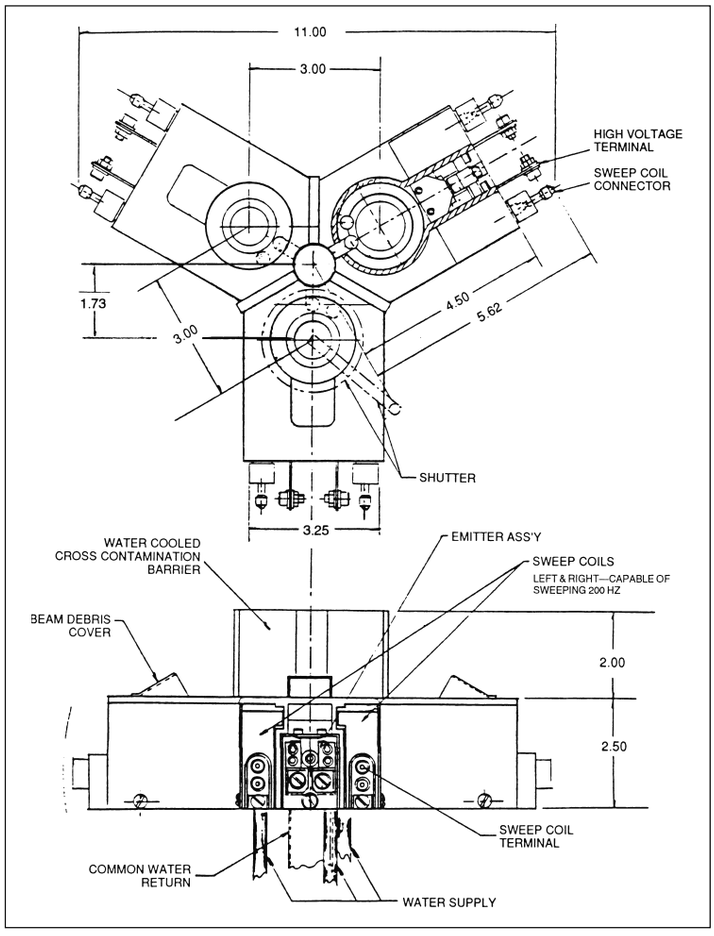
Specifications	6 kW	10 kW	15 kW
Power output	6 kW 7.5 kV 0 to 800 mA	10 kW 10 kV 0 to 1.0 A	15 kW 10 kV 0 to 1.5 A
Crucible volume	7/10 cc	10/15/40 cc	40/75/100 cc
Dimensions*	2.50" x 3.25" x 4.50"	2.50" x 3.25" x 4.50"	2.50" x 3.50" x 5.00"
Weight	5 lbs	5 lbs	7 lbs
Filament	700 W		
Electron beam	220° deflection		
Evaporation rates (for aluminum/40 cc crucible)		1 gm/min at 10 kW 3.6 microns at 25 cm	1.5 gm/min at 15 kW 50,000 Å min
Beam spot size	.25" circular (approximate) (beam can be adjusted and located electrically with beam sweep controller)		
Crucible	OFE copper		
Bakeout temperature	230°C (446°F)		
Water	3.0 gpm (filtered) at 70 psi		
Minimum water tube size	3/8" dia. (6/10/15 kW)		
Pressure differential	50 psi minimum		
X and Y sweep	Hyper-Unimelt sweep (0 to above 200 Hz)		

** Dimensions given are height x width x length*

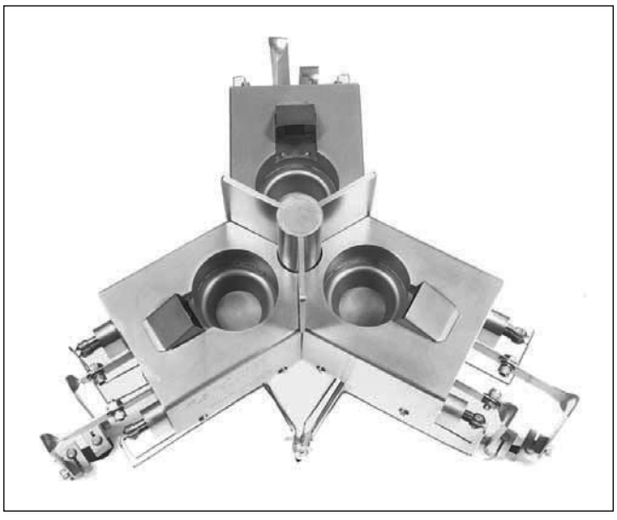
Hositrad Holland B.V. - De Wel 44 - 3871 MV - P.O.B. 114 - 3870 CC Hoevelaken - Phone: +31 (0)33-2537210 Fax: +31 (0)33-2535274
Hositrad Deutschland - Lindnergasse 2 - D-93047 Regensburg - Phone: +49 (0)941-55827 Fax: +49 (0)941-562296

www.hositrad.com - e-mail:info@hositrad.com

Hanks HM² Triad e-Gun



Hanks HM² Triad e-Gun



Hanks HM² Triad e-Gun

Triad, Three Single Crucible e-Guns

(Not all models appear in this pricing grid, please consult the factory.)

Model No.	Power*	Crucible Volume	Price
T0610	6 kW	10 cc	*on request*
T1010	10 kW	10 cc	*on request*
T1015	10 kW	15 cc	*on request*
T1040	10 kW	40 cc	*on request*

*****Please note: This is the power capacity of each crucible, multiply by three to determine the total system power requirement.*

Specifications	6 kW	10 kW
Power output	6 kW 7.5 kV 0 to 800 mA	10 kW 10 kV 0 to 1.0 A
Crucible volume	10 cc, 15 cc, or 40 cc	
Filament	700 W	
Electron Beam	220° deflection	
Dimensions	See drawing	
Weight	14 lbs	
Evaporation Rates (for aluminum)	1 gm/min at 10 kW 3.6 microns at 25 cm	
Beam Spot Size	.25" circular (approximate) (beam can be adjusted and located electrically with beam sweep controller)	
Crucible	OFE copper	
Bakeout Temperature	230°C (446°F)	
Water	9 gpm (filtered) at 70 psi (each crucible has its own water supply)	
Pressure Differential	50 psi minimum	
X and Y Sweep	Hyper-Unimelt sweep (0 to above 200 Hz)	

UHV Compatible

Metal-sealed, fully UHV compatible, measured base pressure: 2×10^{-11} Torr.

NOTE: For further information also see

Power Supplies
Controllers
Accessories
Crucible Liners

Hanks HM² e-Guns are manufactured and protected under one or more of the following patents: 4,835,789; 4,891,821; 4,947,404

Hanks HM² Hydra e-Gun

A Breakthrough in Co-Evaporation Technology

The Hydra evaporation system is specifically designed to meet the current technological challenges posed by complex co-deposition processes and "leading-edge" materials research. The Hydra design consists of a compact array of crucibles and electron emitters which translate linearly with respect to each other to provide for the co-deposition of up to six different materials simultaneously. By the efficient utilization of space, four different combinations of six crucibles or up to forty-two permutations of two-material combinations are available for co-deposition in a single vacuum pumpdown.

Innovative technology and a creative approach to magnetic field concepts has been fostered by Hositrad to result in several new, unique electron emission configurations. The Hydra configuration eliminates adjacent source interactions without complex beam directions and bulky field shunting components. Thus, the design allows close source proximity for uniform coating and material interaction. Each source crucible is independently water cooled to prevent steam build-up. Each source crucible has separate sweep coils, insuring the independent operational integrity of each source, and eliminating cross talk interference from any adjacent source.

UHV Compatible

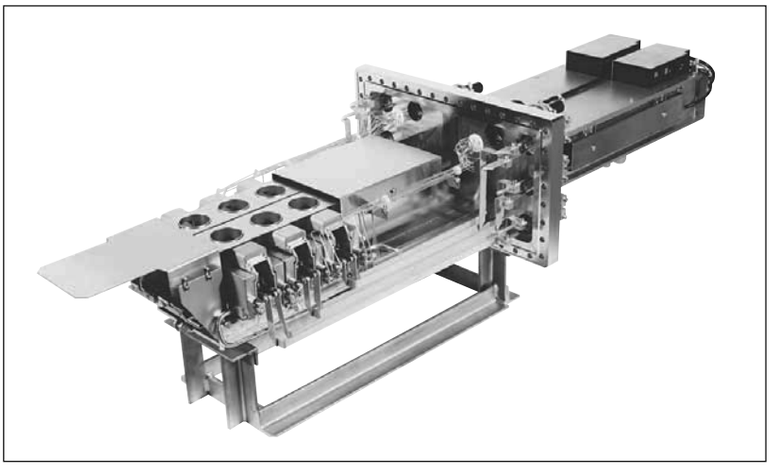
Metal-sealed, fully UHV compatible, measured base pressure: 2×10^{-11} Torr.

Prices

Prices are dependent upon many factors, i.e.: system, mounting flange, and e-Gun configurations, geometries, etc. Our engineering group will work closely with you to determine your requirements, then a firm quotation can be given.

NOTE: For further information also see

Power Supplies
Controllers
Accessories
Crucible Liners

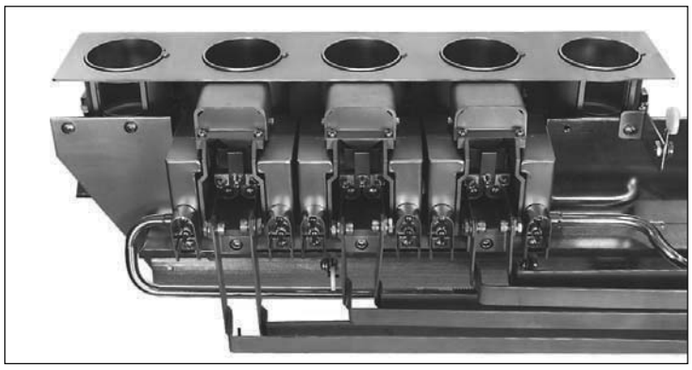


PyraFlat flanges are manufactured and protected under one or more of the following patents: 5,640,751; 4,685,193

Hanks HM² e-Guns are manufactured and protected under one or more of the following patents: 4,835,789; 4,891,821; 4,947,404

Hanks HM² Hydra e-Gun—Double Array (shown mounted on a PyraFlat flange, with an optional stand)

Specifications	10 kW	15 kW
Power output	10 kW 10 kV 0 to 1.0 A	15 kW 10 kV 0 to 1.5 A
Crucible volume	10/15 cc	40 cc
Dimensions	10/15 cc	40 cc
Single Array	6.25"h x 5.5"w x 15"l	6.25"h x 5.75"w x 15"l
Double Array	6.25"h x 11"w x 15"l	6.25"h x 11.5"w x 15"l
Filament	700 W	
Electron Beam	220° deflection	
Evaporation rates (for aluminum)	1 gm/min at 10 kW 3.6 microns at 25 cm	1.5 gm/min at 15 kW 50,000 Å min
Beam Spot Size	.25" circular (approximate) (beam can be adjusted and located electrically with beam sweep controller)	
Crucible	OFE copper	
Bakeout Temperature	230°C (446°F)	
Water	30 gpm (filtered) at 70 psi (each crucible has its own water supply, common return)—(3 gpm/crucible)	
Pressure Differential	50 psi minimum	
X and Y Sweep	Hyper-Unimelt sweep (0 to above 200 Hz)	



Hanks HM² Hydra e-Gun—Single Array

Hydra e-Guns

Model No.*	Power	Crucible Volume	Crucibles	Price
H1010-S	10 kW	10 cc	5	*on request*
H1010-D	10 kW	10 cc	10	*on request*
H1015-S	10 kW	15 cc	5	*on request*
H1015-D	10 kW	15 cc	10	*on request*
H1540-S	15 kW	40 cc	5	*on request*
H1540-D	15 kW	40 cc	10	*on request*

* *NOTE: S denotes single array, D denotes double array*

Hositrad Holland B.V. - De Wel 44 - 3871 MV - P.O.B. 114 - 3870 CC Hoevelaken - Phone: +31 (0)33-2537210 Fax: +31 (0)33-2535274
Hositrad Deutschland - Lindnergasse 2 - D-93047 Regensburg - Phone: +49 (0)941-55827 Fax: +49 (0)941-562296

www.hositrad.com - e-mail:info@hositrad.com

Hanks HM² Accessories

Replacement Parts

Model No.	Description	Price
A111555	Filament, 700 W	*on request*
A111556	Beam deflector	*on request*
A112019-01	New beam deflector	*on request*
A111557	Beam former	*on request*
A111558	Insulator post	*on request*
A111562-01	Anode	*on request*
A111906	Main insulator	*on request*
A111418-03	Ceramic washer	*on request*
B111336	Beam cover	*on request*
A526482-04	Emitter assembly	*on request*
C111540-01	Sweep coil right side	*on request*
C111540-02	Sweep coil left side	*on request*
A111366	HM² emitter rebuild kit—includes screws, washers, ceramic insulators and spacers, two filaments and a filament alignment tool	*on request*

Accessories

Model No.	Description	Price
210-SW	Water interlock switch	*on request*
PS-GR	Grounding rod	*on request*

Feedthroughs and Connectors

Model No.	Description	Price
111139-04	4-pin instrument feedthrough mounted on a 1.33" ConFlat flange	*on request*
111140-04	4-pin instrument feedthrough mounted on a 2.75" ConFlat flange	*on request*
B111136-12	Two electrical feedthroughs mounted on a 2.75" ConFlat flange, 12 kV @ 70 A (use with connector/cable assembly HVC-D-12)	*on request*
HVC-D-12	Dual feedthrough connector w/interlock and 10' dual cable assembly (use with dual feedthrough B111136-12)	*on request*
EBFT-100	One electrical feedthrough mounted on a 2.75" ConFlat flange, 12 kV @ 70 A, two are required for each e-Gun (use with connector/cable assembly HVC-T-12)	*on request*
EBFT-100-1B	One electrical feedthrough mounted on a 1" bolt-type baseplate feedthrough, 12 kV @ 70 A, two are required for each e-Gun (use with connector/cable assembly HVC-T-12)	*on request*
EBFT-133	One electrical feedthrough mounted on a 1.33" ConFlat flange, 12 kV @ 70 A, two are required for each e-Gun (use with connector/cable assembly HVC-T-12)	*on request*
HVC-T-12	Single feedthrough connector and 10' cable assembly, two are required for each e-Gun (use with single feedthroughs EBFT-100, EBFT-100-1B, and EBFT-133)	*on request*
EBFT-200	Dual pass water, 1/4" O.D. tubes	*on request*
EBFT-300	Dual pass water, 3/8" O.D. tubes	*on request*
EBFT-400	Instrumentation, 10-pin	*on request*
EBFT-500	Rotary, 1/4" O.D. shaft	*on request*
EBFT-600	Rotary, with right angle translation, 1/4" O.D. shaft	*on request*
EBFK-700	Feedthrough Kit, for single crucible e-Gun	*on request*
EBFK-800	Feedthrough Kit, for rotary multiple crucible e-Gun	*on request*
EBFK-900	Feedthrough Kit, for rotary multiple crucible e-Gun, with right angle translation	*on request*
A111489	Feedthrough connector, internal 1/4" rod to 10-32 screw connector	*on request*
A086190	Feedthrough connector, internal 1/4" rod to 0.090" wire	*on request*
111680	Universal mounting adapter plate	*on request*

Hanks HM² e-Guns are manufactured and protected under one or more of the following patents: 4,835,789; 4,891,821; 4,947,404

Crucible Liners for e-Guns

Crucible Liners and e-Gun Electron Beam Evaporation

Crucible liners are used with electron beam evaporation sources in applications throughout the coating industry. Crucible liners are widely accepted as part of the coating process, and are considered to be an integral component for coating success. Liners provide many advantages, for example:

When you select the right crucible liner for your evaporation source you will improve its performance and simplify your coating process. Using separate liners for each evaporant material will reduce contamination, by eliminating the need to clean the evaporation source crucible even when performing routine material changes.

Crucible liners provide thermal isolation between the evaporant material and the water-cooled crucible. Therefore, the evaporation process requires less power, and you will achieve:

1. higher evaporation rates at the same power level, or
2. the same evaporation rate at a lower power level.

Crucible liners reduce the thermal gradient across the evaporant material. This increases the thermal stability within the melt, thereby increasing heating efficiency and reducing particle ejection and oscillations within the molten material.

Crucible liners also provide extra protection against crucible damage.

- Higher evaporation rates
- Reduced contamination
- Higher yield
- Improved performance
- Reduced thermal gradient
- Thermal isolation
- Thermal stability
- Lower power requirements
- Reduced maintenance
- Reduced crucible damage
- Liners for all manufacturers' sources

An Assortment of Crucible Liners

Hositrad Holland B.V. - De Wel 44 - 3871 MV - P.O.B. 114 - 3870 CC Hoevelaken - Phone: +31 (0)33-2537210 Fax: +31 (0)33-2535274
Hositrad Deutschland - Lindnergasse 2 - D-93047 Regensburg - Phone: +49 (0)941-55827 Fax: +49 (0)941-562296

www.hositrad.com - e-mail:info@hositrad.com

Crucible Liner Material Selection Guide

Liner Materials

Crucible liners are available in various materials. Carbon graphite and glassy coated carbon graphite are two of the more common materials used. They are popular due to their low cost and favorable thermal properties.

Carbon graphite is a fine grain, high density polycrystalline material with interconnecting porosity. It can be purified to 5 ppm or less. The glassy coated carbon graphite liners are made from the same high grade carbon with a coated graphite process that is baked above 1,400°C to eliminate any porosity in the carbon.

FABMATE crucible liners are an alternative to the glassy coated graphite. FABMATE receives an amorphous carbon treatment to provide a hard, abrasion resistant, non-porous surface.

Other crucible liner materials include Alumina, Boron Nitride, Copper, Molybdenum, Tantalum and Tungsten. Liners made from these more exotic materials are more expensive and typically limited to special applications.

Crucible Liner Material Selection Guide

The following table provides a list of common evaporation source materials and makes general recommendations for compatible liner materials. This selection guide has been derived from various sources and is based upon specific cases; results may vary with your application. A more comprehensive list of evaporation source and liner materials is available upon request.

		LINER MATERIAL								
		Standard Graphite -G	**Glassy Coated Graphite -CG**	**FABMATE® -FM**	**Copper -CU**	**Alumina -AL**	**Boron Nitride -BN**	**Molybdenum -MO**	**Tantalum -TA**	**Tungsten -W**
EVAPORANT MATERIAL	Aluminum		X	X			X			
	Antimony	X				X	X			
	Barium				X			X	X	X
	Beryllium		X	X						
	Boron		X	X						
	Cerium		X	X		X				
	Chromium		X	X						
	Cobalt					X				
	Copper					X		X	X	
	Gallium					X				
	Germanium					X				
	Gold		X			X	X			
	Indium							X		
	Iron					X				
	Lead					X				
	Magnesium					X				
	Neodymium					X				
	Nickel		X			X				
	Palladium					X				
	Platinum		X							
	Rhodium		X							
	Samarium					X				
	Selenium		X			X				
	Silicon		X	X					X	
	Silver					X		X		
	Strontium		X							
	Tin					X			X	
	Yttrium					X				
	Zinc					X				

Crucible Liner Ordering Information

Crucible Liner Material Suffix Chart

Dash Suffix	Description
-G	Standard Graphite
-CG	Glassy Coated Graphite
-FM	FABMATE
-CU	Copper
-AL	Alumina
-BN	Boron Nitride
-MO	Molybdenum
-TA	Tantalum
-W	Tungsten

4

Special Orders

Hositrad can provide crucible liners for most e-Gun applications. If your requirement is not met with the selection offered in this catalog please let us know. Contact the factory for custom crucible liner information.

3 kW e-Gun Sources

Model No.	Description e-Gun Application
A111455- X X	TLI Old style, 1.5 cc 3 kW single crucible e-Gun liner
A111449- X X	TLI Old style, 1.5 cc 3 kW multiple crucible e-Gun liner
A111460- X X	TLI New style, 2.2 cc 3 kW e-Gun liner. All models
A111541- X X	Varian style 2 kW single crucible e-Gun
A111542- X X	Varian style 2 kW multiple crucible e-Gun

6 to 15 kW e-Gun Sources

Model No.	Description e-Gun Application	Compatible Manufacturers
A113101- X X	7 cc crucible liner	Temescal, Varian
A111959- X X	10 cc crucible liner	
A111962- X X	15 cc crucible liner	Temescal, Telemark
A111677- X X	25 cc crucible liner	Temescal, Telemark
A111368- X X	40 cc crucible liner	Temescal, Sloan
A111675- X X	75 cc crucible liner	
A111466- X X	156 cc crucible liner	Temescal
A111676- X X	100 cc crucible liner	
A111967- X X	10 cc to 4 cc reducing liner	
A111464- X X	15 cc to 10 cc reducing liner	Temescal, Telemark
A111369- X X	40 cc to 15 cc reducing liner	Temescal, Sloan

NOTE: All crucible liners listed are compatible with Thermionics e-Gun evaporation sources. Some crucible liners are marked as compatible with specific manufacturer's evaporation sources.

3 kW e-Gun Crucible Liners

Pre-1988

Single Crucible, Single Position
(60° wall angle, old style)

Material Type	Model No.	Price
Graphite	**A111455-G**	*on request*
Glassy Carbon	**A111455-CG**	*on request*
Fabmate	**A111455-FM**	*on request*
Alumina	**A111455-AL**	*on request*
Molybdenum	**A111455-MO**	*on request*
Tungsten	**A111455-W**	*on request*
Boron Nitride	**A111455-BN**	*on request*

Pre-1988

Multiple Crucible, 3 and 5 Position
(60° wall angle, old style)

Material Type	Model No.	Price
Graphite	**A111449-G**	*on request*
Glassy Carbon	**A111449-CG**	*on request*
Fabmate	**A111449-FM**	*on request*
Alumina	**A111449-AL**	*on request*
Molybdenum	**A111449-MO**	*on request*
Tungsten	**A111449-TA**	*on request*
Boron Nitride	**A111449-BN**	*on request*

All RC Models Post-1990

Multiple Crucible, 3 and 5 Position
(New style 15° wall angle)

Material Type	Model No.	Price
Graphite	**A111460-G**	*on request*
Glassy Carbon	**A111460-CG**	*on request*
Fabmate	**A111460-FM**	*on request*
Alumina	**A111460-AL**	*on request*
Molybdenum	**A111460-MO**	*on request*
Tungsten	**A111460-W**	*on request*

NOTE: (1) The price of raw materials for liners (*****) is very volatile, please check with the factory to confirm current prices. (2) Please consult the factory if there is a special material that you need or (3) if you are unsure which liner fits your gun, we will send you a template.

Hositrad Holland B.V. - De Wel 44 - 3871 MV - P.O.B. 114 - 3870 CC Hoevelaken - Phone: +31 (0)33-2537210 Fax: +31 (0)33-2535274
Hositrad Deutschland - Lindnergasse 2 - D-93047 Regensburg - Phone: +49 (0)941-55827 Fax: +49 (0)941-562296

www.hositrad.com - e-mail:info@hositrad.com

Crucible Liner Ordering Information

6 kW–15 kW e-Gun Crucible Liners

	7 cc		10 cc		15 cc		25 cc	
Material Type	**Model No.**	**Price**	**Model No.**	**Price**	**Model No.**	**Price**	**Model No.**	**Price**
Graphite	**A113101-G**	*on request*	**A111959-G**	*on request*	**A111962-G**	*on request*	**A111677-G**	*on request*
Glassy carbon	**A113101-CG**	*on request*	**A111959-CG**	*on request*	**A111962-CG**	*on request*	**A111677-CG**	*on request*
Fabmate	**A113101-FM**	*on request*	**A111959-FM**	*on request*	**A111962-FM**	*on request*	**A111677-FM**	*on request*
Alumina	**A113101-AL**	*on request*	**A111959-AL**	*on request*	**A111962-AL**	*on request*	**A111677-AL**	*on request*
Molybdenum	**A113101-MO**	*on request*	**A111959-MO**	*on request*	**A111962-MO**	*on request*	**A111677-MO**	*on request*
Tungsten	**A113101-W**	*on request*	**A111959-W**	*on request*	**A111962-W**	*on request*	**A111677-W**	*on request*
Boron nitride	**A113101-BN**	*on request*	**A111959-BN**	*on request*	**A111962-BN**	*on request*	**A111677-BN**	*on request*
Copper	**A113101-CU**	*on request*	**A111959-CU**	*on request*	**A111962-CU**	*on request*	**A111677-CU**	*on request*

	40 cc		75 cc		100 cc	
Material Type	**Model No.**	**Price**	**Model No.**	**Price**	**Model No.**	**Price**
Graphite	**A111368-G**	*on request*	**A111675-G**	*on request*	**A111676-G**	*on request*
Glassy carbon	**A111368-CG**	*on request*	**A111675-CG**	*on request*	**A111676-CG**	*on request*
Fabmate	**A111368-FM**	*on request*	**A111675-FM**	*on request*	**A111676-FM**	*on request*
Alumina	**A111368-AL**	*on request*	**A111675-AL**	*on request*	**A111676-AL**	*on request*
Molybdenum	**A111368-MO**	*on request*	**A111675-MO**	*on request*	**A111676-MO**	*on request*
Tungsten	**A111368-W**	*on request*	**A111675-W**	*on request*	**A111676-W**	*on request*
Boron nitride	**A111368-BN**	*on request*	**A111675-BN**	*on request*	**A111676-BN**	*on request*
Copper	**A111368-CU**	*on request*	**A111675-CU**	*on request*	**A111676-CU**	*on request*

6 kW–15 kW e-Gun Crucible Reducing Liners

	10 cc to 4 cc		15 cc to 10 cc		40 cc to 15 cc	
Material Type	**Model No.**	**Price**	**Model No.**	**Price**	**Model No.**	**Price**
Copper	**A111967-CU**	*on request*	**A111464-CU**	*on request*	**A111369-CU**	*on request*

NOTE: (1) The price of raw materials for liners (*****) is very volatile, please check with the factory to confirm current prices. (2) Please consult the factory if there is a special material that you need or (3) if you are unsure which liner fits your gun, we will send you a template.

Handling

Maximizing the life of a crucible liner requires careful attention to handling and storage. Never handle liners with bare hands. Liners should be handled with gloves, tongs or finger cots. Graphite, coated graphite and FABMATE liners **should not be cleaned with chemicals or solvents of any kind.** Used liners should be stored in a dry, **oxygen-free environment**.

Better Utilization of Liners

Proper technique is important, otherwise crucible liners will break due to thermal shock. Breakage, however, can be minimized. In addition, some materials become highly reactive when molten and may alloy to the liner.

The most common cause of crucible liner breakage is overfilling. Overfilling a liner can cause the evaporant material to "spill over" the liner onto the water-cooled crucible surface. This causes an increased thermal stress across the liner and in most cases will cause it to crack or shatter.

Liners should be filled with evaporant material at a level of no less than 25% volume and no more than 80% volume. Aluminum has a tendency to "wet" most liner materials and requires a reduced maximum charge level of 70%. Aluminum becomes highly reactive when molten and as a result will eventually react with any material.

Start-Up Operation Using a Crucible Liner

When beginning an evaporation run and using a crucible liner, care must be taken to increase the emission current (beam power) slowly. The evaporant material and liner will, in most cases, contain impurities and/or trapped gases that will be released as the temperature is increased.

If the temperature is increased too quickly this outgassing process can cause eruptions in the evaporant material. Increase power slowly, stopping whenever the oscillations in the melt occur, until achieving thermal equilibrium. The power required to evaporate materials from a liner are typically on the order of 25% of the total power required in a bare crucible (75% less, i.e.: 1 ampere without liner vs. 250 milliamperes with liner).

Transformers and Magnetic Devices

Introduction

Hositrad offers design and manufacturing capabilities in the fabrication of magnetic components. We are capable of delivering a large run of O.E.M. “standard” devices, or the design and manufacture of one unit to fulfill a special requirement.

With over 24 years experience in the magnetics industry, our engineering and applications personnel can help your development/component engineers expedite the development of your product. We can provide design assistance and can recommend the transformer or magnetic component best suited for your application.

4

Our Services and Magnetic Products Include:

Transformers

- Custom designs, linear transformers
- 3 phase and 1 phase
- High voltage output
- High voltage/high reactance
- Low voltage/low current
- Low voltage/high current nominal isolation
- Low voltage/high voltage isolation
- Line isolation
- Auto transformers
- Machine tool transformers
- Buck-boost transformers
- Power switching transformers

Other Magnetic Products

- Power inductors
- Filter inductors
- Line filters
- Magnetic coils
- Saturable reactors
- Transducers
- RF power coils
- Current transducers

Replacement Transformers

We supply replacement transformers for:

- e-Gun power supplies
- Ion pump power supplies
- Filament/resistance coaters
- Special equipment

for equipment manufactured by:

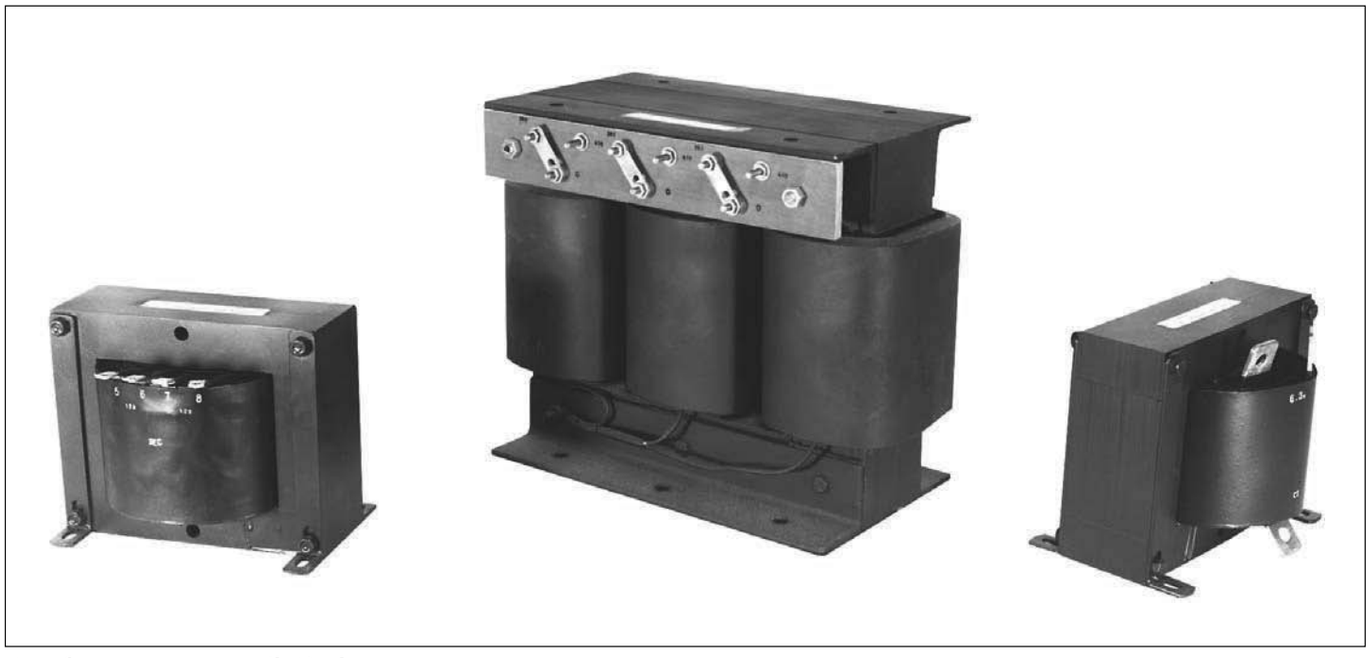
- Thermionics
- Varian
- Temescal
- Perkin-Elmer/Ultek
- Ion Equipment
- other manufacturers

Specifications and Safety

All designs meet or exceed customer specifications. We manufacture and comply to UL, CSA, VDE, IEC, and ISO 9002 safety standards.

Quality, Delivery, and Price

Our fully-equipped transformer manufacturing facility insures the quality and on-time delivery of our products. Please call for a quotation on your transformer needs.



Transformers and Magnetic Devices

Hositrad Holland B.V. - De Wel 44 - 3871 MV - P.O.B. 114 - 3870 CC Hoevelaken - Phone: +31 (0)33-2537210 Fax: +31 (0)33-2535274
Hositrad Deutschland - Lindnergasse 2 - D-93047 Regensburg - Phone: +49 (0)941-55827 Fax: +49 (0)941-562296

www.hositrad.com - e-mail:info@hositrad.com