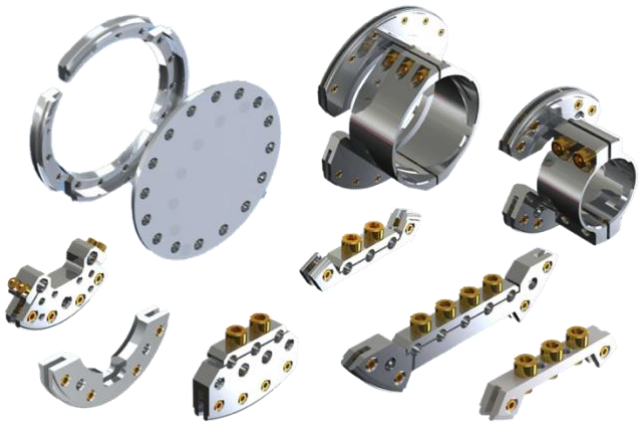
Multi-CF™ UHV Internal Mounting Apparatus System for 2.75", 4.50", 6.00", 8.00 and 10.00" CF Ports



Examples of Multi-CF™ Groove Grabber Designs and Sizes

APPLICATIONS:

- Securely Mounting Electron Guns, Electron and Ion Sources, Detectors, Specimens and More
- Convenient Internal Mounting both Parallel and Perpendicular to the CF Port Axis
- Compatible with Kimball Physics eV Parts: Mounting Plates, Rods, Tubes, and other Prototyping Components

FEATURES / OPTIONS:

- Heavy Duty Axial Mounting
- Transverse Tapped Mounting
- Split Axial Clamping
- Compatible with eV Parts®
- Stainless Steel Construction

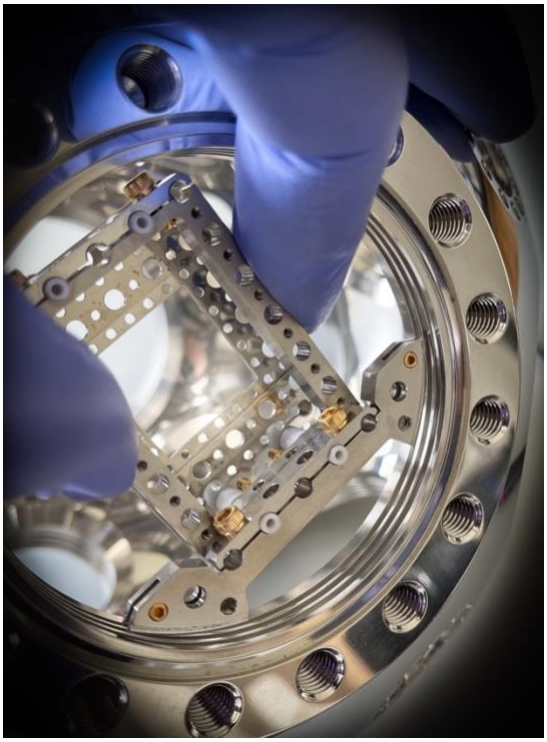
The Groove-Grabber / Grabber-Groove System

The Groove-Grabber/Grabber-Groove internal apparatus attachment or mounting system greatly increases the capability (and user flexibility) of the Multi-CF™ Vacuum Chambers and other Multi-CF™ Fittings.

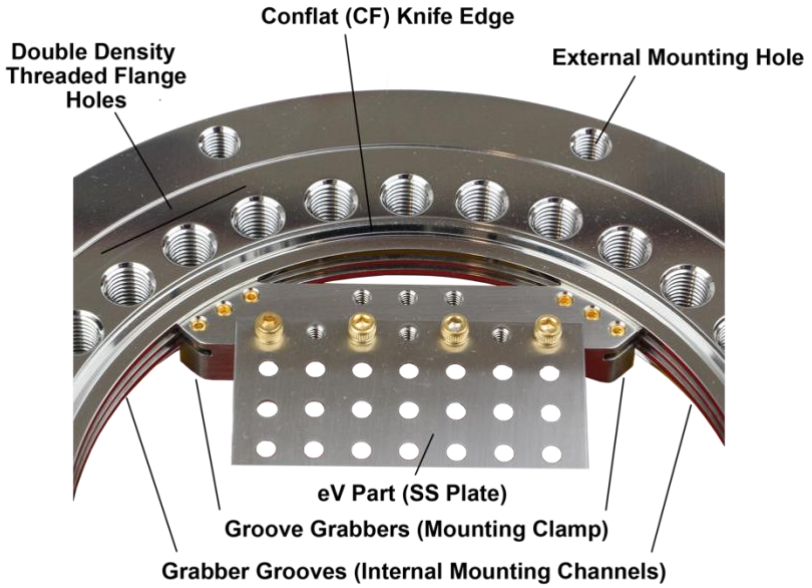
Internal circumferential channels, that we refer to as "*Grabber Grooves*", are precisely machined along the inside bore of the aperture in CF (Conflat®) ports with sealing surfaces between 2.75" inches and 10.00" in diameter (see figure right). These Grabber Groove contours provide the mechanical features used to securely attach (mount) various instruments, devices, apparatus and concept prototypes (fabricated from eV parts) to the inside of the chamber using our matching "*Grove Grabber*" mounting clamps.

Typically, one pair of Grabber Grooves is present at each aperture, and in some components, additional grooves are provided for even more flexibility. With the axial symmetry of the circumferential grooves, the mounted device can be easily positioned at any desired angular orientation about the CF port axis.

Most Groove Grabber Clamps, fabricated from 316L Stainless Steel, expand to lock into the Grabber Grooves by tightening the easily accessible axial set screws.



Split Axial Groove Grabber with eV Part prototype being placed into internal mounting channels "Grabber Grooves" of a 4.50" Multi-CF™ port vacuum chamber.



View of internal mounting "Grabber Groove" channels along the CF port internal bore, with a Groove Grabber mounting clamp engaging the mounting channels to securely support the internal apparatus. Other features of Kimball Physics CF ports shown including double density threaded flange holes, external mounting holes, and prototyping "eV" parts.

Basic designs are included for 1) Split Axial Clamping, 2) Reverse Split Axial Clamping, 3) Transverse Tapped Mounting, 4) Center Mounting, 5) Heavy Duty with Blank Mounting, and 6) Large Load Axial Mounting. Details and components available from each of these designs are provided later in the document.

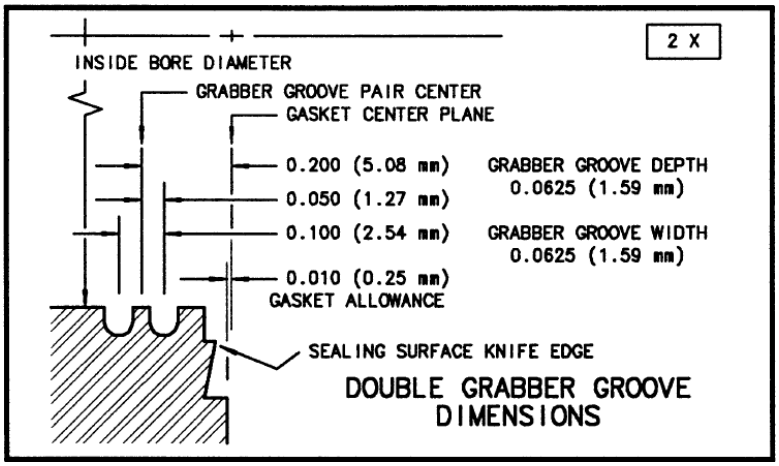
Most of the Groove Grabber clamps are compatible with our "eV Parts" prototyping system that consists of numerous components (solid and perforated plates, clamping plate assemblies, metal and ceramic rods and tubes, various brackets and locking rings and more …) that can be used to create adapters to your device or apparatus, or else be used to rapidly create and prototype new concepts without the delays and expense encountered trying to design and fabricate your own parts.

The Grabber Grooves typically have the *same* cross-sectional dimension in all flange diameters (see illustration below).

In addition to our UHV Multi-CF ™ Vacuum Chambers, other UHV fittings are available from Kimball Physics to retrofit most CF compatible systems (port sizes from 2.75" to 8.00") with Grabber Groove internal channels when there are no integrated mounting grooves in the current system. Mounting Flanges, Thin Flanges, Close Couplers and Flange Adapters are examples of fittings

Close-up view of interface between mounting clamp (Groove Grabber) and internal mounting channels (Grabber Grooves).

Close-up sectioned view of interface between mounting clamp (Groove Grabber) and internal mounting channels (Grabber Grooves). Set screws laterally expand legs to securely engage grooves.

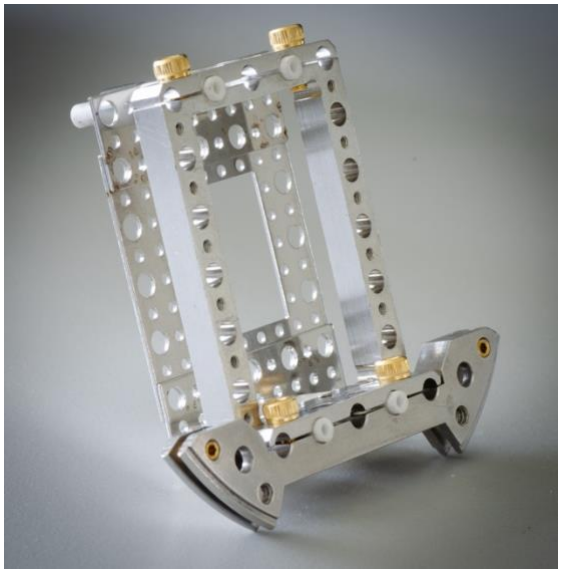


available to retrofit Grabber Grooves into your current system.

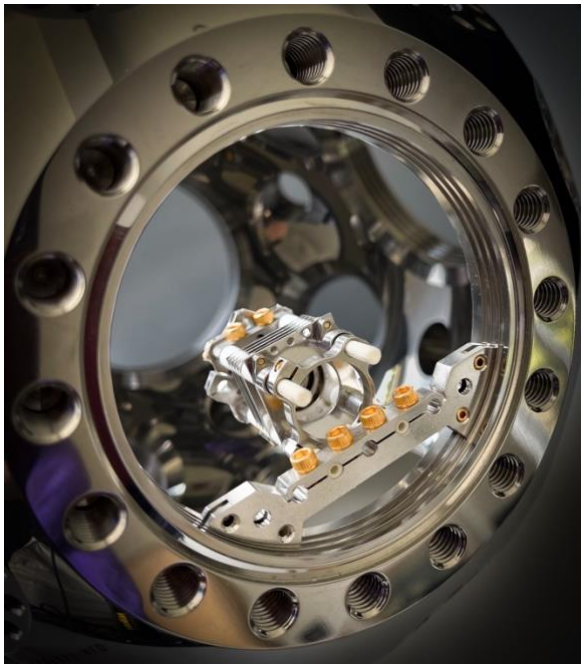
The Groove Grabber mounting and clamping components are available in several designs and sizes and provide versatile solutions to mounting and clamping your instruments or custom designs and fabricated prototypes using our eV System of parts. Examples of various eV Part configurations are demonstrated in the figures on this page.

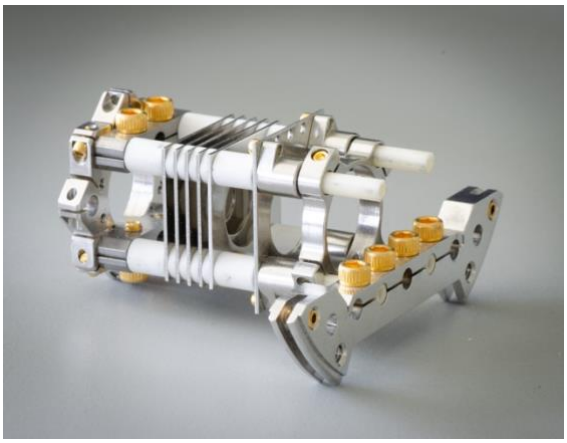
The variations of the Grabber Groove design are summarized in the table below, with more in-depth description and examples of uses and applications available in the pages that follow.

Please reach out to Kimball Physics with any questions or to speak with our engineers about custom designs and applications.



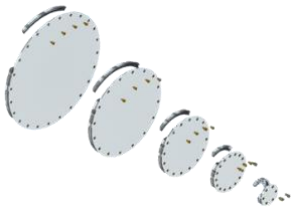
Split Axial Groove Grabber with eV Part construct mounted perpendicular to the CF Port Axis.



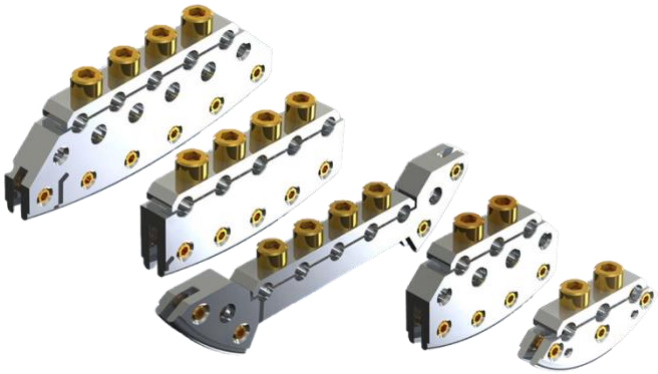


Split Axial Groove Grabber with eV Part construct mounted parallel to the CF Port Axis (left and above)

Table 1: Summary of Groove Grabber Designs

Grabber Groove Model	Part Examples (*not to scale*)	CF Port Sizes	Notes
Split Axial Clamping		2.75” 4.50” (2 designs) 8.00” 10.00”	-Mounting 0.125” diameter rods and tubes -Rigid mounting of objects -Axial and parallel mounting
Reverse Split Axial Clamping		4.50” 6.00”	-Mounting 0.125” diameter rods and tubes
Transverse Tapped Mounting		2.75” 4.50”	-Mounting eV Parts Plates and Brackets Parallel to port axis.
Centering		2.75”	-Clamping (2) 0.125" rods which are spaced to enable centering of eV plates or Element Clamps
Cylindrical Mounting		2.75” -Mounts 0.75” cylinder 2.75” -Mounts 1.00” cylinder 4.50” -Mounts 1.75” cylinder	-Mounting Cylindrical elements
Heavy Duty with Blank Mounting Plate		2.75” 4.5” 6.0” 8.0” 10.0”	- Fully customizable mounting plate which utilizes a 20° taper lock design -Taper lock makes the mounting plate capable of supporting heavy loads while accurately centering within the bore inside the vacuum chamber.
Large Load Axial Mounting		2.75”	-Designed to support heavier components such as electron guns. -Typical two components to circumferentially provide 4 evenly spaced holes

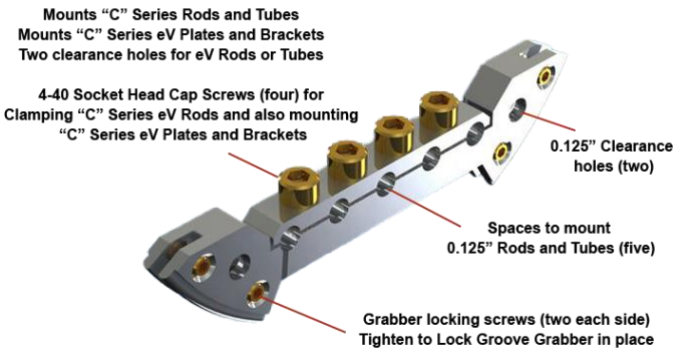
Groove Grabbers: Split Axial Clamping



10.00", 8.00", 4.50", 4.50", and 2.75" CF, from left to right, Split Axial Clamping Groove Grabbers.

The Split Axial Clamping design works nicely for clamping 0.125" metal and ceramic alumina rods and tubes. Kimball Physics eV Plates and Brackets can also be secured using the 4-40 socket head cap screws.
These Groove Grabbers are secured to the grabber groove channels located in the CF port by tightening the mount's set screws, which lock the Groove Grabber into position.

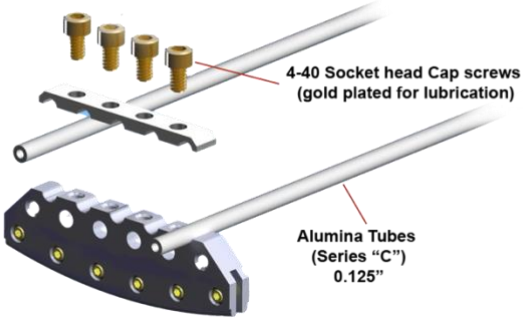
Split Axial Clamping
4.50" Groove Grabber
MCF450-GrvGrb-C02



All screws are gold plated for lubrication

Split Axial Clamping
10.00" Groove Grabber
MCF1000-GrvGrb-C01

(Mounting Series "C" Alumina Rods on Split Axial Groove Grabber Parallel to CF Port Axis)

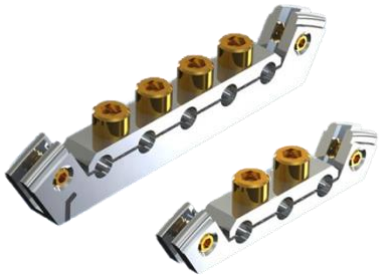


Groove Grabber Model	CF Sealing Surface	eV Part Compatible	Notes
MCF275-GrvGrb-CB03	2.75"	"B" Series "C" Series	-Split design for clamping (3) 0.125" Ø rods or tubes parallel to port axis -(2) 4-40 tapped holes (2 screws incl) for mounting "C" Series eV Plates & Brackets parallel to port axis -(1) 4-40 tapped hole for mounting "C" Series eV Plates and Brackets perpendicular to port axis -(2) 0-80 tapped holes for mounting "B" eV Plates and Brackets perpendicular to port axis
MCF450-GrvGrb-CB02	4.50"	"C" Series	-Split design for clamping (5) 0.125" Ø rods or tubes parallel to port axis -(4) 4-40 tapped holes (4 screws incl) for mounting "C" Series eV plates & brackets parallel to port axis -(2) additional 0.125" Ø clearance holes parallel to port axis
MCF450-GrvGrb-CB04	4.50"	"C" Series	-Split design for clamping (3) 0.125" eV Rods and Tubes parallel to port axis -(2) 4-40 tapped holes (2 screws incl) for mounting "C" Series eV Plates and Brackets parallel to port axis -(2) 4-40 tapped holes for mounting "C" Series eV Plates and Brackets perpendicular to port axis -(2) additional 0.125" Ø clearance holes parallel to port axis

MCF800-GrvGrb-C01	8.00”	“C” Series	-Split design for clamping (5) 0.125" rods or tubes parallel to port axis -(4) 4-40 tapped holes (4 screws incl) for mounting "C" Series eV plates & brackets parallel to port axis
MCF1000-GrvGrb-CB03	10.00”	“C” Series	-Split design for clamping (5) 0.125" Ø Rods or Tubes parallel to port axis -(4) 4-40 tapped holes (4 screws incl) for mounting "C" Series eV Plates and Brackets *parallel* to port axis -(2) 4-40 tapped holes for mounting "C" Series eV Plates and Brackets *perpendicular* to port axis -(4) additional 0.125" Ø clearance holes parallel to port axis
-Dimension Drawings available in the Appendix -STEP file 3D CAD models available on website			

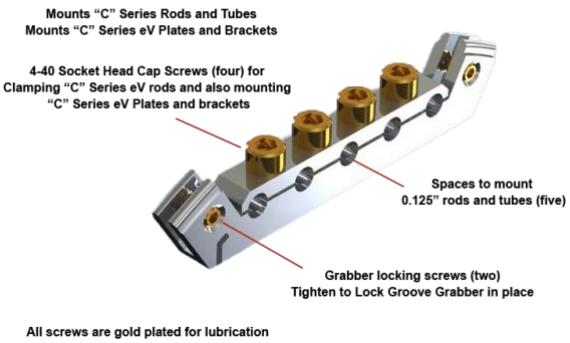
Groove Grabbers: Reverse Split Axial Clamping

The Reverse Split Axial Clamping design is used for clamping 0.125” metal (Stainless Steel) and ceramic (Alumina) rods and tubes. Kimball Physics eV Plates and Brackets can also be secured using the 4-40 socket head cap screws. More port clearance is available by positioning the 4-40 screws on the more radially side.
These components are secured to the Grabber Groove channels located in the CF port by tightening the mount’s adjacent set screws, which lock the Groove Grabber into position.



6.00” CF (MCF600-GrvGrb-C03) and 4.50” CF (MCF450-GrvGrb-C03), from left to right, Reverse Split Axial Groove Grabbers.

Reverse Split Axial Clamping
Groove Grabber
MCF600-GrvGrb-C01

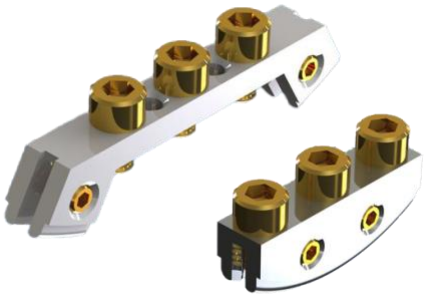


All screws are gold plated for lubrication

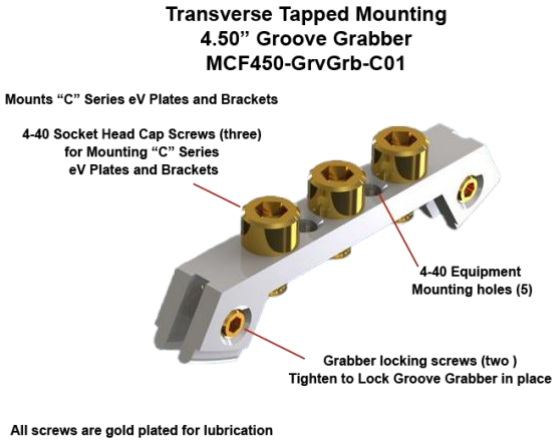
Groove Grabber Model	CF Sealing Surface	eV Part Compatible	Notes
MCF450-GrvGrb-C03	4.50”	“C” Series	-Reverse Split design for clamping (3) 0.125" rods or tubes parallel to port axis -(2) 4-40 tapped holes (2 screws incl) for mounting "C" Series eV Plates & Brackets parallel to port axis
MCF600-GrvGrb-C01	6.00”	“C” Series	-Reverse Split design for clamping (5) 0.125" rods or tubes parallel to port axis -(4) 4-40 tapped holes (4 screws incl) for mounting "C" Series eV plates & brackets parallel to port axis
-Dimension Drawings available in the Appendix -STEP file 3D models available on website			

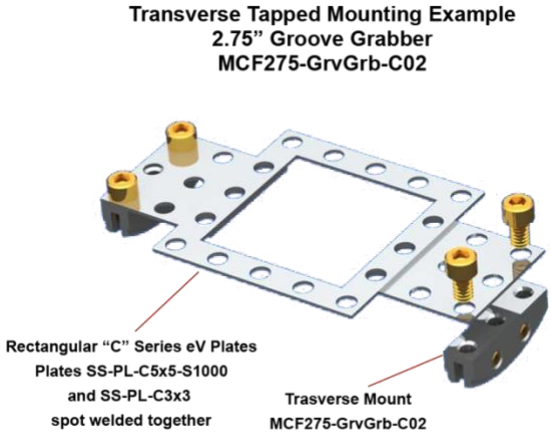
Groove Grabbers: Transverse Tapped Mounting

The Transverse Tapped Mounting design is used for mounting “C” Series eV Plates and Brackets parallel to the port axis. Designs are available to interface 2.75” and 4.5” CF grabber grooves Five (5) 4-40 tapped holes are available with three (3) gold plated 4-40 socket head cap screws provided in the 4.5” CF model and three (3) holes with the 2.75” part.
These components are secured to the Grabber Groove channels located in the CF port by tightening the set screws which lock the Groove Grabber into position.



6.00” CF (MCF600-GrvGrb-C01) and 2.75” CF (MCF275-GrvGrb-C02), from left to right, Transverse Tapped Groove Grabbers.



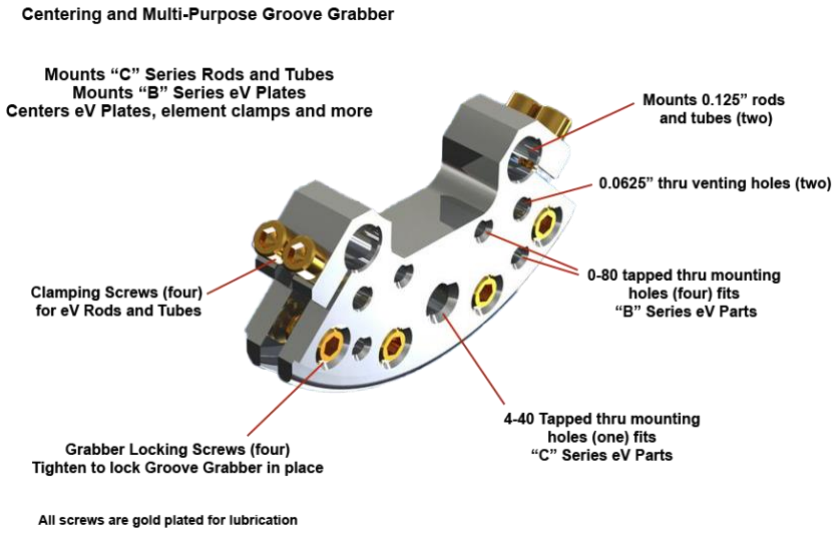


Groove Grabber Model	CF Sealing Surface	eV Part Compatible	Notes
MCF275-GrvGrb-C02	2.75”	“C” Series	-Transverse Tapped for mounting “C” Series eV Plates and Brackets -(3) 4-40 tapped holes (3 screws incl) for mounting "C" Series eV Plates & Brackets parallel to port axis
MCF600-GrvGrb-C01	6.00”	“C” Series	-Transverse Tapped for mounting “C” Series eV Plates and Brackets -(4) 4-40 tapped holes (4 screws incl) for mounting "C" Series eV plates & brackets parallel to port axis
-Dimension Drawings available in the Appendix -STEP file 3D CAD models available on website			

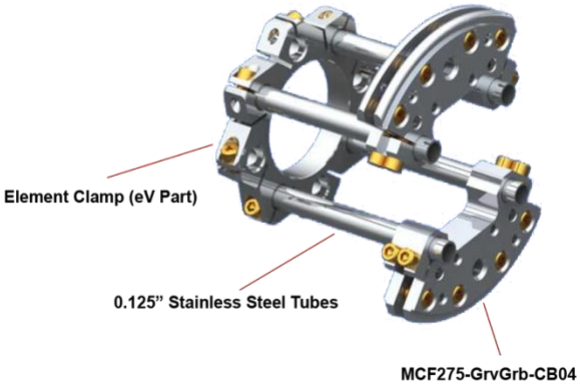
Groove Grabbers: Centering

The Centering mounting component is designed to center structures within the 2.75" CF aperture. It is primarily used for mounting "C" Series eV Rods and Tubes parallel to the port axis and to center components such as eV Element Clamps (see figure below). It also serves as a multi-purpose mount for "B" and "C" Series eV Plates and Brackets.

MCF275-GrvGrb-CB04 Centering and Multi-Purpose Groove Grabber.



Centering Example:
MCF275-GrvGrb-CB04



Example of Centering Groove Grabber MCF275-GrvGrb-CB04, typically used in pairs, to then provide 4 properly spaced 0.125" SS tubes that engage and center an Element Clamp (eV Part).

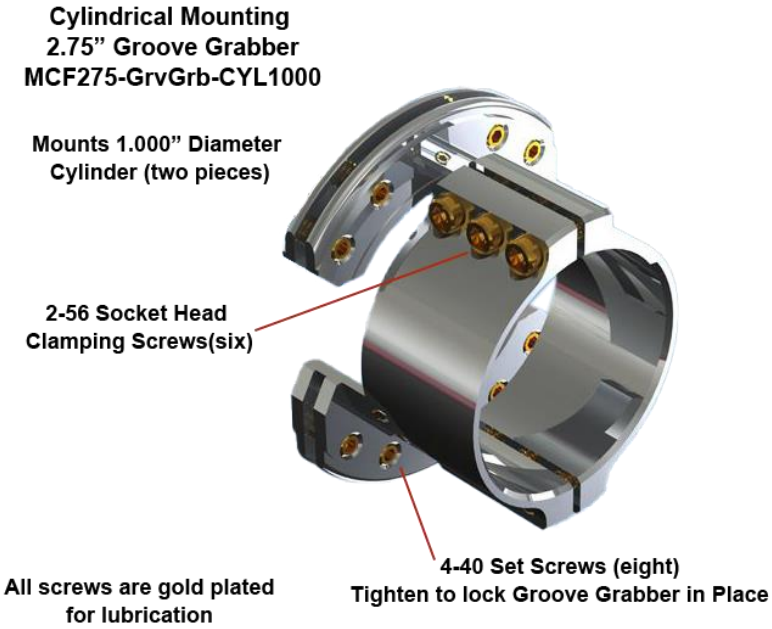
This versatile Groove Grabber can also mount "B" and "C" Series eV plates directly using other tapped holes on the clamp body (see figure above).

Groove Grabber Model	CF Sealing Surface	eV Part Compatible	Notes
MCF275-GrvGrb-C04	2.75"	"B" Series "C" Series	-Designed to clamp "C" Series eV 0.125" Ø Rods which are then spaced to center eV Plates and Element Clamps. -(1) 4-40 tapped hole for mounting "C" Series eV Plates and Brackets perpendicular to the port axis -(4) 0-80 tapped holes for mounting "B" Series Plates and Brackets perpendicular to the port axis.
-Dimension Drawings available in the Appendix -STEP file 3D CAD models available on website			

Groove Grabbers: Cylindrical Mounting

The Cylindrical Mounting groove grabber components are designed to mount cylindrical objects in 2.75” and 4.50” CF ports. The 2.75” CF Cylindrical Mounts come with options to either mount 0.75” and 1.00” diameter cylindrical structures, and the 4.5” Mount has a 1.75” diameter option. The components are fabricated from Stainless Steel with gold plated screws for lubrication.

Family of Cylindrical Mounting Groove Grabbers in 2.75” CF and 4.50” CF sizes



Groove Grabber Model	CF Sealing Surface	eV Part Compatible	Notes
MCF275-GrvGrb-CYL0750	2.75”	Yes, SS Cylinders	-Designed to clamp (1) 0.75” Ø cylindrical structure
MCF275-GrvGrb-CYL0750	2.75”	Yes, SS Cylinders	-Designed to clamp (1) 1.00” Ø cylindrical structure
MCF450-GrvGrb-CYL1750	4.50”	Yes, SS Cylinders	-Designed to clamp (1) 1.75” Ø cylindrical structure
-Dimension Drawings available in the Appendix -STEP file 3D CAD models available on website			

Family of 2.75" to 10.00" Heavy Duty Groove Grabber with Blank Mounting Plate Assemblies.

Groove Grabbers: Heavy Duty with Blank Mounting Plate

Heavy Duty Groove Grabbers in 2.75", 4.50", 6.00", 8.00" and 10.00" CF sizes that offer a fully customizable mounting plate which utilizes a 20-degree taper lock design to interface the mounting plate with the Groove Grabbers. The taper lock makes the mounting plate capable of supporting heavy loads while accurate centering within the bore of the vacuum chamber. The blank can be customized for the user's devices and experiments.

Parts are fabricated from 316L Stainless Steel. All screws are gold plated for lubrication.

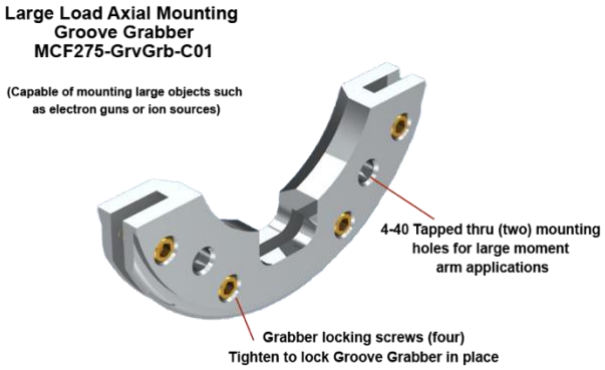
Example of how the 6.00" CF Heavy Duty Groove Grabber Assembly and Mounting plate would interface to a Kimball Physics 6.00" Multi-CF™ Spherical Octagon UHV Vacuum Chamber

Groove Grabber Model	CF Sealing Surface	eV Part Compatible	Notes
MCF275-GrvGrb-H-Blank	2.75"	Custom Applications	-Assembly includes two (2) Groove Grabbers, one blank plate, and six (6) 4-40 clamping screws.
MCF450-GrvGrb-H-Blank	4.50"	Custom Applications	-Assembly includes four (4) Groove Grabbers, one blank plate, and sixteen (16) 4-40 clamping screws.
MCF600-GrvGrb-H-Blank	6.00"	Custom Applications	-Assembly includes four (4) Groove Grabbers, one blank plate, and sixteen (16) 4-40 clamping screws.
MCF800-GrvGrb-H-Blank	8.00"	Custom Applications	-Assembly includes four (4) Groove Grabbers, one blank plate, and sixteen (16) 4-40 clamping screws.
MCF1000-GrvGrb-H-Blank	10.00"	Custom Applications	-Assembly includes four (4) Groove Grabbers, one blank plate, and sixteen (16) 4-40 clamping screws.
-Dimension Drawings available in the Appendix -STEP file 3D models available on website			

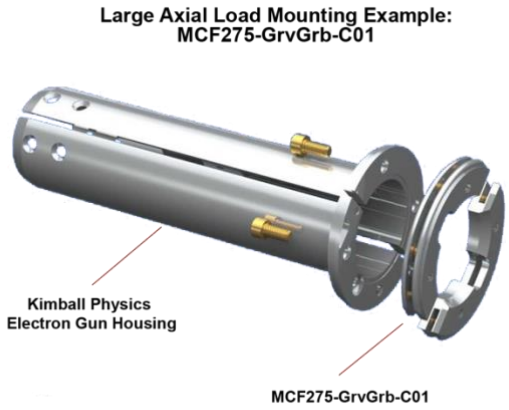
Groove Grabbers: Large Load Axial Mounting

The Large Axial Load 2.75" CF Groove Grabbers was designed to enable mounting of large objects such as electron guns and ion sources. Typically, two mounts will be equally spaced in the Grabber Grooves around the CF aperture and the device will be mounted using the four (4) equally spaced 4-40 (tapped through) mounting holes positioned at 90-degree (see figure below).
The device is fabricated from 316L Stainless Steel, and all screws are gold plated for lubrication.

MCF275-GrvGrb-C01 Large Load Axial Mount Groove Grabber.



Example of two Large Load Axial Mount Groove Grabbers in place in a Kimball Physics 2.75" CF Spherical Hexagon UHV Vacuum Chamber to provide four (4) equally spaced holes circumferential for mounting large objects.



Example of a Kimball Physics electron gun housing being attached to two (2) MCF275-GrvGrb-C01 groove grabbers prior to being inserted into a Flange Multiplexer.

Groove Grabber Model	CF Sealing Surface	eV Part Compatible	Notes
MCF275-GrvGrb-C01	2.75"	Custom applications	-Designed to enable mounting of large objects such as electron guns and ion sources. -Mounting holes (4) 4-40 tapped with radius of 1.20" with diametric distance when two components placed of 2.400". Please see dimensioned drawing for more detail.
-Dimension Drawings available in the Appendix -STEP file 3D CAD models available on website			

Summary

The Groove-Grabber/Grabber-Groove internal apparatus attachment (mounting) system greatly increases the capability (and user flexibility) of the Multi-CF™ Vacuum Chambers and other Multi-CF™ Fittings. Kimball Physics provides a broad range of solutions to mount devices, instruments, or prototypes to the inside of your vacuum system.

Dimensioned drawings are available in the Appendix of this document for most of the parts presented to further assist in selecting the best solution.

3D CAD Model STEP files are available for most products presented and can be accessed from the Kimball Physics website. These models provide an additional resource to planning your system, enabling you to virtually assemble and evaluate the various design options in your CAD Software.

Please reach out to Kimball Physics with any questions or to speak with our engineers and physicists about custom designs and applications.

References

For more information about Multi-Port CF (MCF™) Vacuum Chambers and Accessories, visit our website at: Multi-CF Hardware.

Other References:
MCF Vacuum Hardware Overview
External Bracket- Mounting

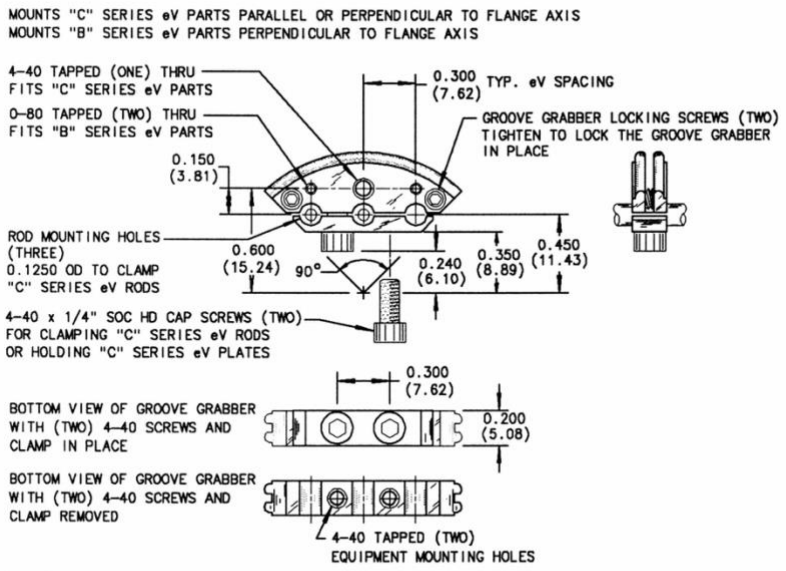
Notes:
1. 3D Solid Models most parts shown are available as STEP files.
   They can be downloaded from Kimball Physics Website for interactive visualization and measurements in your CAD software environment.
2. Specifications Subject to Change Without Notice.
3. Images are not to scale
4. DE Altobelli, DT Taylor 3/13/2023

Document MCF_Groove_Grabbers_2023_0313

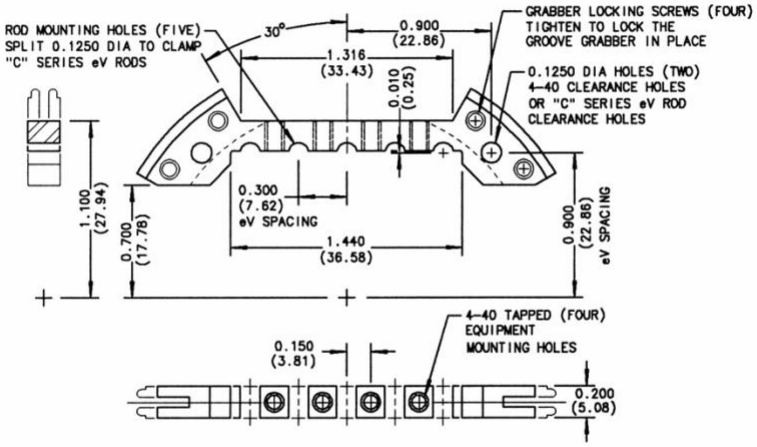
APPENDIX: Groove Grabber Dimension Drawings and Other Resources

- Split Axial Clamping
- Reverse Split Axial Clamping
- Transverse Tapped Mounting
- Centering
- Cylindrical Mounting
- Heavy Duty Mounting with Blank Mounting Plate

Groove Grabber: Split Axial Clamping

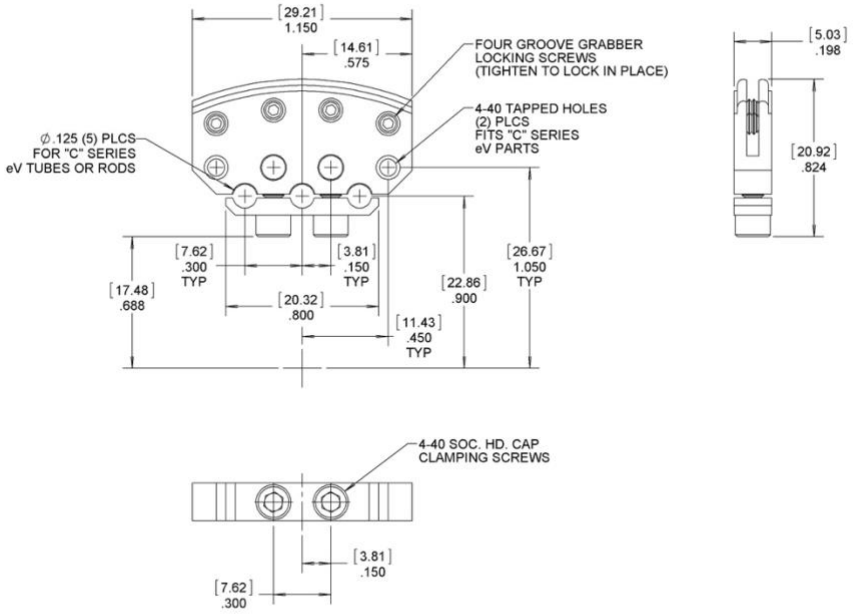


MCF275-GrvGrb-CB03

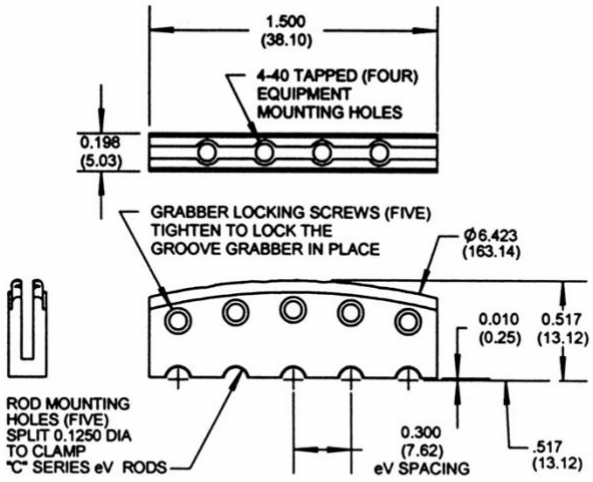


MCF450-GrvGrb-C02

Groove Grabber: Split Axial Clamping (continued)



MCF450-GrvGrb-C04



MCF800-GrvGrb-C01

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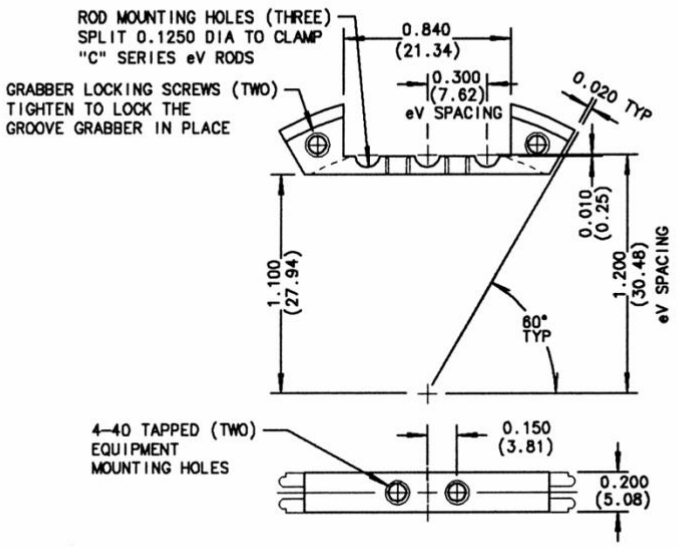
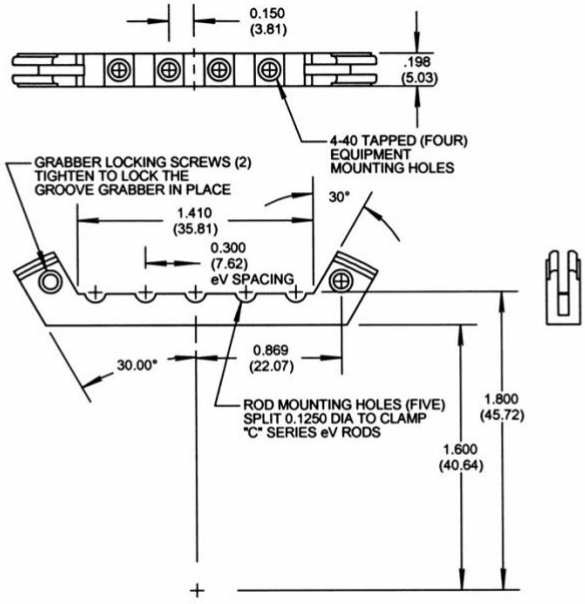
Groove Grabber: Reverse Split Axial Clamping



MCF450-GrvGrb-C03



MCF600-GrvGrb-C01

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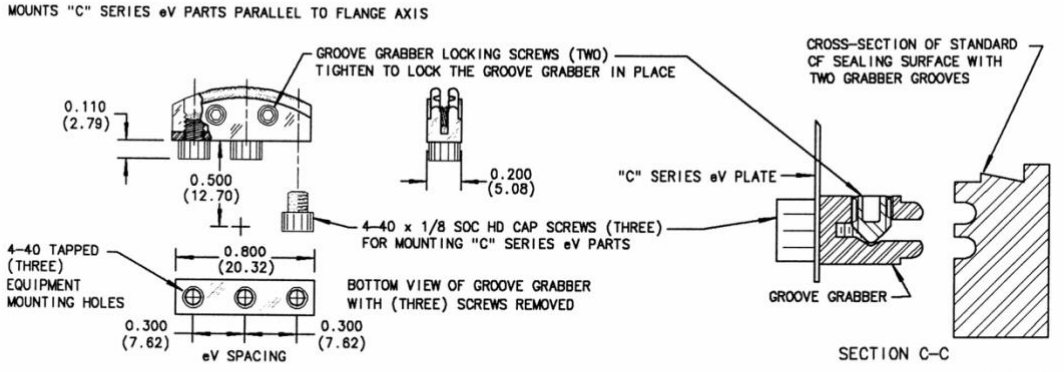
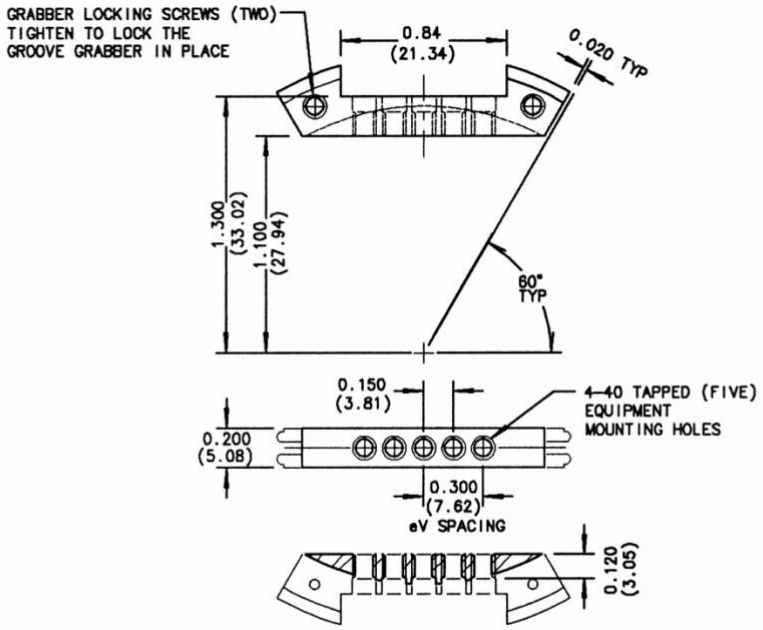
Groove Grabber: Transverse Tapped Mounting

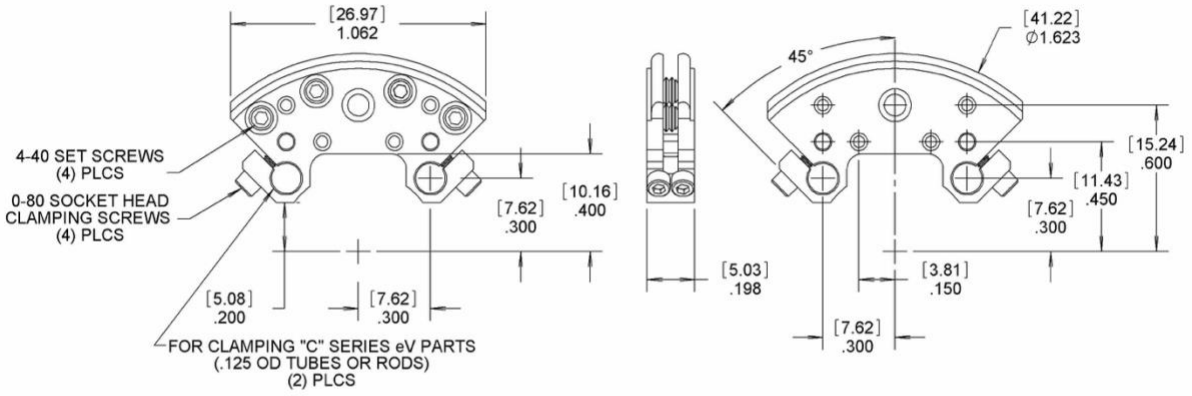


MCF275-GrvGrb-C02



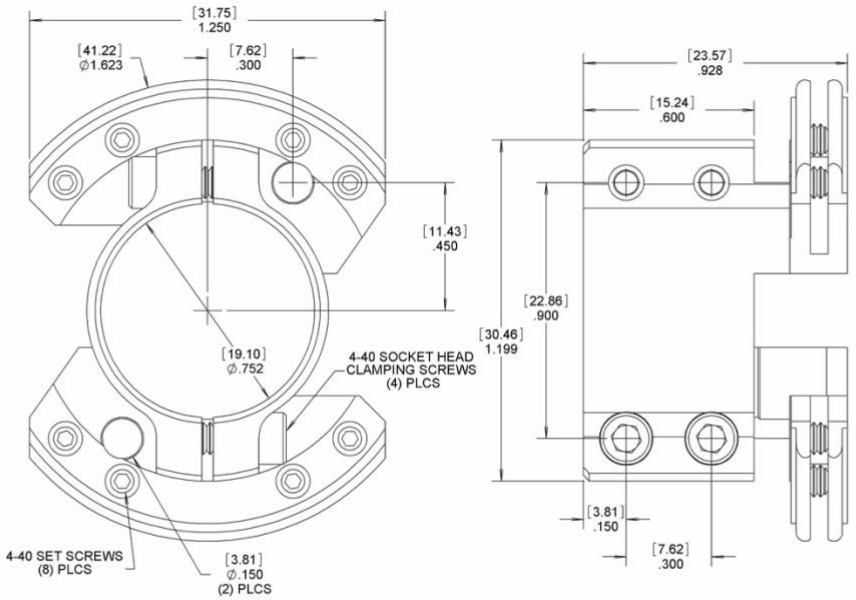
MCF450-GrvGrb-C01

Groove Grabber: Centering

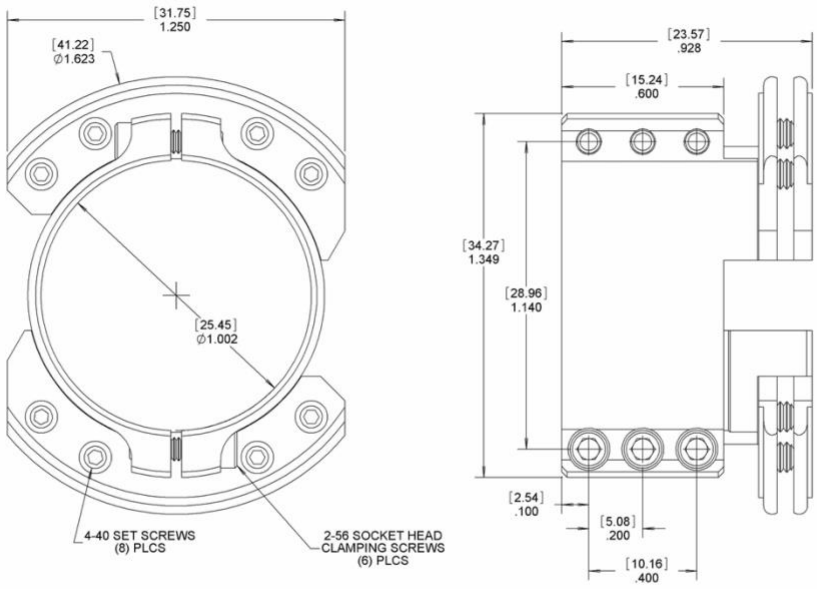


MCF275-GrvGrb-CB04

Groove Grabber: Cylindrical

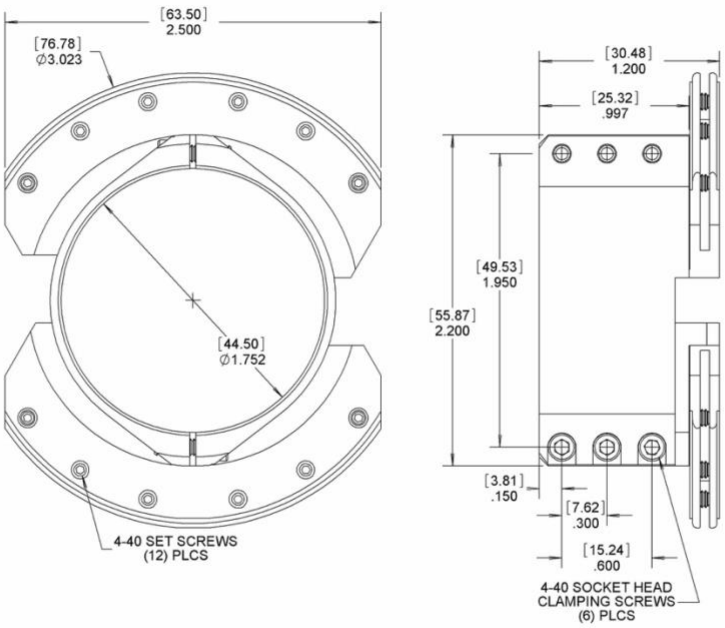


MCF275-GrvGrb-CYL0750



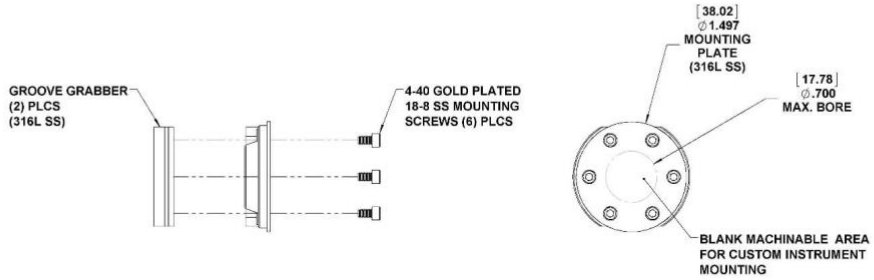
MCF275-GrvGrb-CYL1000

Groove Grabber: Cylindrical (continued)



MCF450-GrvGrb-CYL1750

Groove Grabber: Heavy Duty Mounting with Blank Mounting Plate

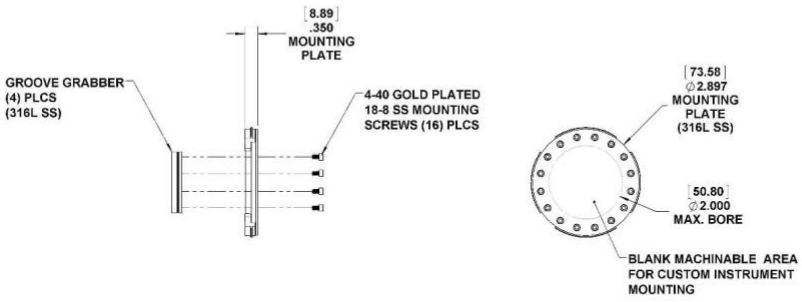


MCF275-GrvGrb-H-Blank

QUICK OVERVIEW

UHV BLANK MOUNTING PLATE
FOR USE IN KPI MCF CHAMBERS
INTENDED FOR CUSTOM MODIFICATIONS
BY CUSTOMER
WEIGHT: 0.16 lbs (0.07 kg)

MCF275-GrvGrb-H-Blank_(53-720020-1)



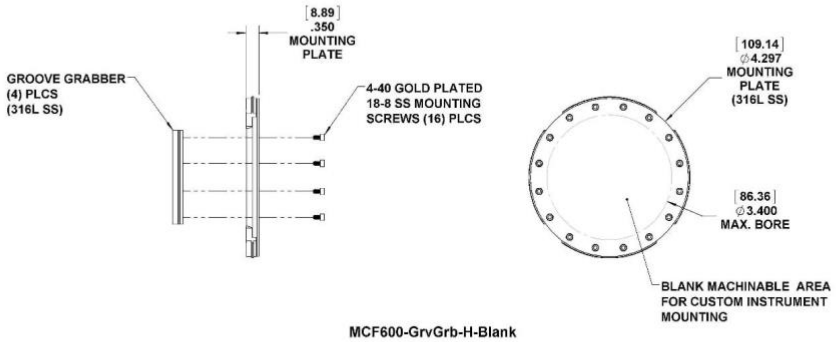
MCF450-GrvGrb-H-Blank

QUICK OVERVIEW

UHV BLANK MOUNTING PLATE
FOR USE IN KPI MCF CHAMBERS
INTENDED FOR CUSTOM MODIFICATIONS
BY CUSTOMER
WEIGHT: 0.62 lbs (0.28 kg)

MCF450-GrvGrb-H-Blank_(53-740020-1)

Groove Grabber: Heavy Duty Mounting with Blank Mounting Plate (continued)

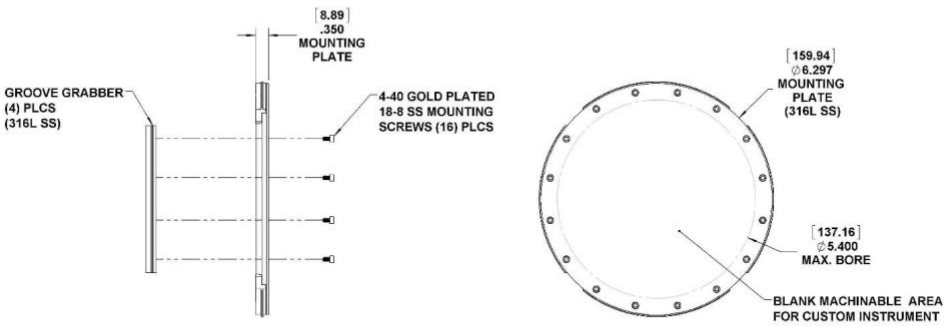


MCF600-GrvGrb-H-Blank

QUICK OVERVIEW

UHV BLANK MOUNTING PLATE
FOR USE IN KPI MCF CHAMBERS
INTENDED FOR CUSTOM MODIFICATIONS
BY CUSTOMER
WEIGHT: 1.41 lbs (0.64 kg)

MCF600-GrvGrb-H-Blank_(53-760020-1)



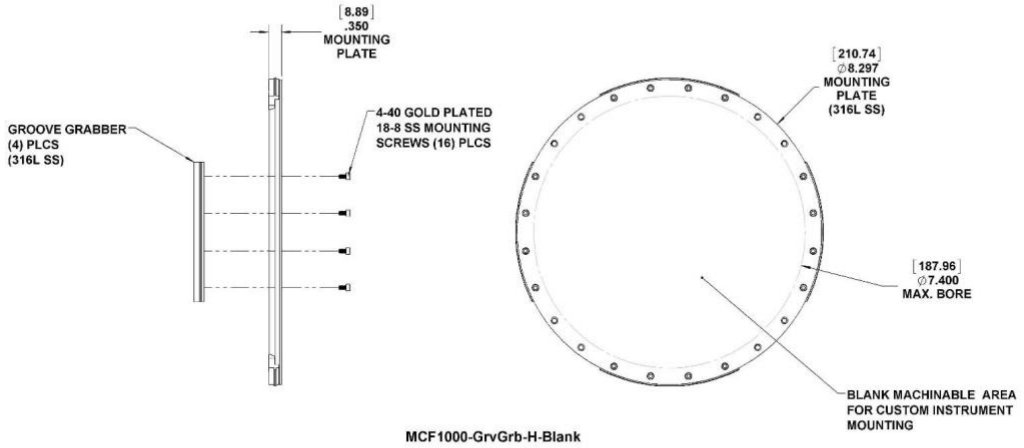
MCF800-GrvGrb-H-Blank

QUICK OVERVIEW

UHV BLANK MOUNTING PLATE
FOR USE IN KPI MCF CHAMBERS
INTENDED FOR CUSTOM MODIFICATIONS
BY CUSTOMER
WEIGHT: 3.07 lbs (1.39 kg)

MCF800-GrvGrb-H-Blank_(53-780020-1)

Groove Grabber: Heavy Duty Mounting with Blank Mounting Plate (continued)

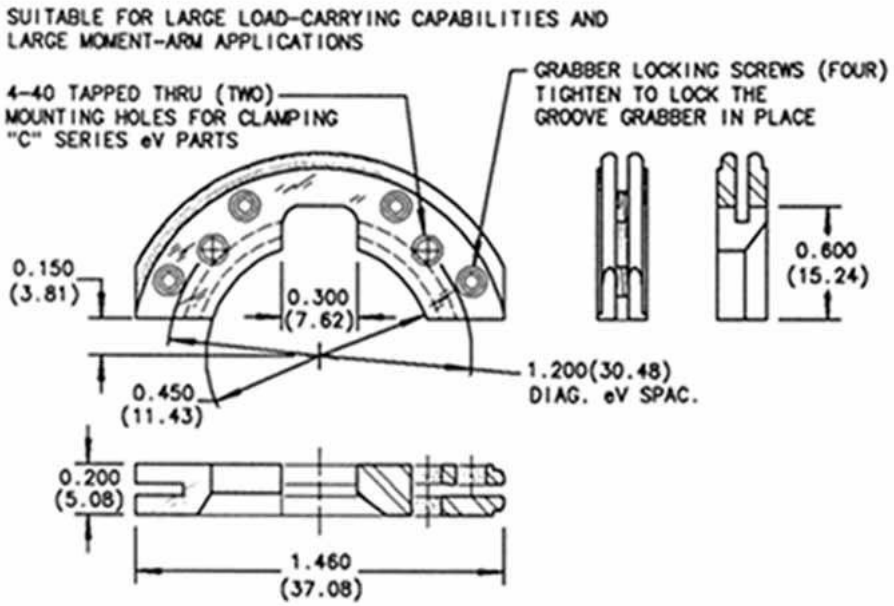


QUICK OVERVIEW

UHV BLANK MOUNTING PLATE
FOR USE IN KPI MCF CHAMBERS
INTENDED FOR CUSTOM MODIFICATIONS
BY CUSTOMER
WEIGHT: 5.25 lbs (2.38 kg)

MCF1000-GrvGrb-H-Blank_(53-790030-1)

Groove Grabber: Large Load Axial Mounting



MCF275-GrvGrb-C01