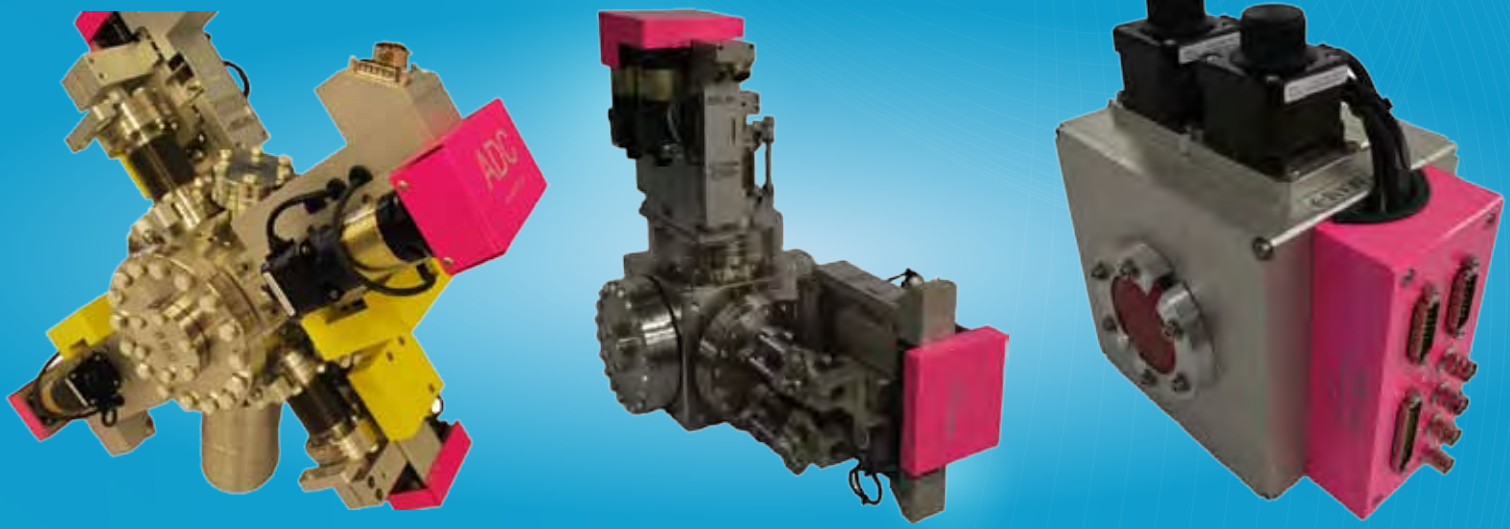
HIGH PRECISION SLITS

Custom and Standard Slit Designs



CERTIFIED ISO 9001:2008 COMPANY

Registered International Traffic in Arms Regulations ITAR

ADC

ISO 9001:2008 Certified

www.adc9001.com

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INTRODUCTION

ABOUT ADC

ADC an ISO9001 certified company

ADC an ISO9001 certified company, located near Cornell University in Ithaca, New York, is a leading developer and supplier of complex scientific components and instruments for large government laboratories and corporations around the world. Founded as a privately held company in 1995, ADC has grown into one of world's leading technology companies and has enjoyed 18 straight years of business growth and profitability with more than 500 customers located in over 26 countries. ADC's vision is to be a global leader in the development and manufacturing of innovative products for scientific and research markets.

For more information on "ADC" please go to:
http://www.adc9001.com

BUREAU VERITAS
Certification

ADVANCED DESIGN CONSULTING USA, INC.

126 Ridge Rd
Lansing, NY, 14882 USA

Bureau Veritas Certification Holding SAS – UK Branch certifies that the Management System of the above organization has been audited and found to be in accordance with the requirements of the management system standards detailed below

Standards

ISO 9001:2008

Scope of certification

Design, manufacture, and delivery of devices, integrated systems, components and instruments for commercial, academic and government agencies

Certification cycle start date: **31 December 2014**

Subject to the continued satisfactory operation of the organization's Management System, this certificate expires on: **30 December 2017**

Original certification date: **31 December 2014**

Certificate No. **US007466-1**

Signed on behalf of BVCH SAS – UK Branch

Certification body address: 66 Prescot Street, London, E1 8HG, United Kingdom

Issuing office: Bureau Veritas Certification North America, Inc.
390 Benmar Drive, Houston, Texas, USA
www.us.bureauveritas.com/bvc

UKAS MANAGEMENT SYSTEMS
008

Further clarifications regarding the scope of this certificate and the applicability of the management system requirements may be obtained by consulting the organization.
To check this certificate validity please call **+(800) 937-9311.**

ADC (ISO9001:2008 certified) has been a leading supplier of slits to the synchrotron and neutron source scientific community for over 18 years. Many of our slits have been in operation nearly that long in facilities around the world. Our standard slits run the range from in-air monochrome beam to UHV high heat load white beam. In co-operation with CHESS at Cornell, we have developed the very best blade polishing available in the industry today. We have built an extended family of standard slits in application categories though continuous improvement in our designs.
Please see http://www.adc9001.com/SLITS

These improvements have come from our custom designs for customers that require improved space constraints, heat load capacity, low reflectance and scatter, blade stability, and precision positioning.
for more information Please see
http://www.adc9001.com/products/show_list/id/142

The attached catalog provides more information on our standard slits and custom designs along with specific applications and references. Additional details are provided on motors, limit switches, encoders, cabling and connectors, blades and polishing, frequency response, repeatability measurements, non-contact surface mapping of blades, testing and quality control, supports and stands, floor mounting, and electronics instrumentation and controls. We hope you find our product line exceeds your needs and our friendly staff willing to satisfy your specific requirements. Please do not hesitate to contact ADC for further details.

ADC'S HIGH PRECISION SLITS

For X-Ray Application

http://www.adc9001.com/products/show_list/id/112
http://www.adc9001.com/SLITS

ADC offers a comprehensive line of slits that covers both Synchrotron and Neutron applications; from white beam to monochromatic beam. We offer several series of standard slits as well as many custom design fabricated to specific customers' requirements such as; space constraint, heat load, precision, motor/encoder, limit switches, connectors, type of experiments budget and schedule.

ADC's standard slits use standard micro stepped stepper motors that can be controlled with a wide array of controllers/drivers available on the market. Our High Precision Slits are being used at many of the world class research facilities around the world. This list includes: Los Alamos National Lab, Argonne, Brookhaven, CAMD, ELETTRA, BESSY, MAX Lab, CLS, ALS, DESY, Soleil, CHESS, SSRF, NSRRC, PAL, SNS, NSRRC, and DLS and many other world class facilities around the world.


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X-Ray Slits SLT-50-P


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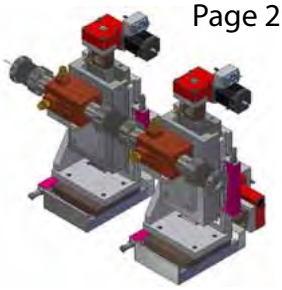
SLT-800 Exit Slit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SLT-1200-Cooled UHV High Heat Load OFHC-Glidcop Slit

STANDARD SLITS

X-Ray Slits: SLT-50-P

High Precision X-Ray Slits with Blade Beam Monitoring (BBM)
For more information please visit the following website:
http://www.adc9001.com/SLT-200-10

X-Ray Slits SLT-50-P is from a new family of slits ADC has introduced. The original slits design was developed in collaborative effort with National Institute of Standards and Technology (NIST) for compact, reliable, high-precision slits with sub-micron resolution. It consist of four motors; two motors determine the slits aperture size in X & Y and the other two provide the ability to scan the aperture in X & Y axis 'a curtain affect'.

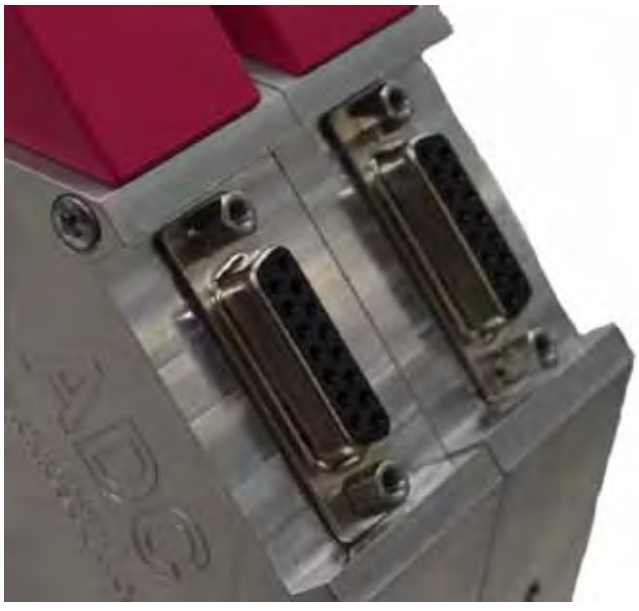
SLT-50-P Specification	
Aperture size	6 mm x 6 mm Blades can go "past closed" without clashing "Fully overlap"
Resolution	~ 50 nm scanning precision & ~160 nm aperture precision
Accuracy	Accuracy ± 2 µm
Blade material	Tungsten or Tantalum, Tungsten Carbide, Cadmium, Boron Nitride
Blade Thickness	Standard 2 mm Thicker blade available; 5, 7 and 10 mm thick blade upon request.
Blade Options	Knife-edge profile (2 degrees slope) Or round blade edge Roughness of the jaw edge surface: <0.2 µm (rms)
Environmental Options	Air or Vacuum (Tested to 10-6 mbar)
Overall Dimensions	Vacuum: 133 mm x 171 mm x 98 mm Air: 133 mm x 171 mm x 70 mm
Blade Beam Monitoring	Each blade is isolated to have the ability to monitor the current off the blade

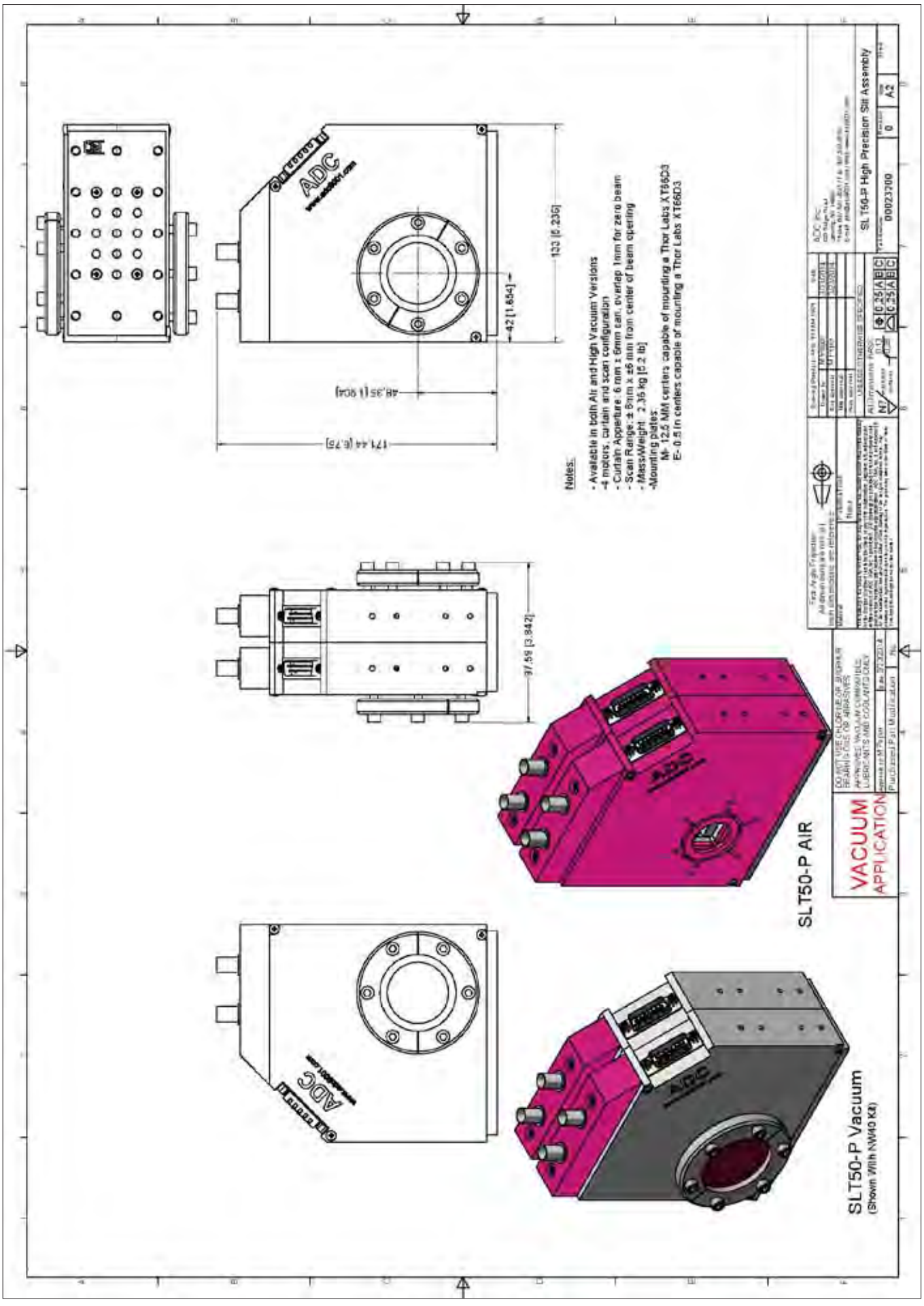
Ordering information

The SLT-50-P can be ordered with different configurations, please use the following codes provided below when ordering:

Air	- A
Vacuum	- V
Tungsten Blades	- TU
Tantalum Blades	- TA
Custom	- C
Standard Blade 2 mm Thickness	- S
Custom Blade Thickness	- C
2° Knife-edge	- K
Round-edge	- R
Blade Beam Monitoring	- B
No Blade Beam Monitoring	- N

SLT-50-P-( )-( )-( )-( )-( )




SLT50-P AIR
SLT50-P Vacuum
(Shown With NW40 Kit)
SLT50-P High Precision Slit Assembly
VACUUM APPLICATION
Notes:
- Available in both Air and High Vacuum Versions
- 4 motors, curtain and scan configuration
- Curtain Appeture: 6 mm ± 6mm ean, overlap 1mm for zero beam
- Scan Range: ± 6mm x ±6 mm from center of beam opening
- Mass/Weight: 2.35 kg [5.2 lb]
-Mounting plates:
M- 12.5 MM centers capable of mounting a Thor Labs XT66D3
E- 0.5 in centers capable of mounting a Thor Labs XT66D3

SLT-50-P

SLT-100-P

High Precision X-Ray Slits with Blade Beam Monitoring (BBM)

For more information please visit the following website:
http://www.adc9001.com/SLT-100-10

SLT-100-P is from a new family of slits ADC has introduced. The SLT-100-P is ADC's latest design that incorporates many improvements/feedback we have received from hundreds of our customers that have been using the SLT-100 (Blue Slits). These improvements includes: - Better O-ring design resulting in a better and long-term consistent vacuum (eliminating any biding) - Much better quality bearing and simpler assembly - Bigger micro stepper motor resulting in smoother operation - Bigger and better quality drive screw mechanism for higher precision and better accuracy - Blade Beam Monitoring (BBM) These high-precision slits systems consist of four blades that are housed in an aluminum body. All of these slits use standard micro stepped stepper motors that can be controlled with a wide array of controllers/drivers available on the market. The design incorporates mechanical limit switches.

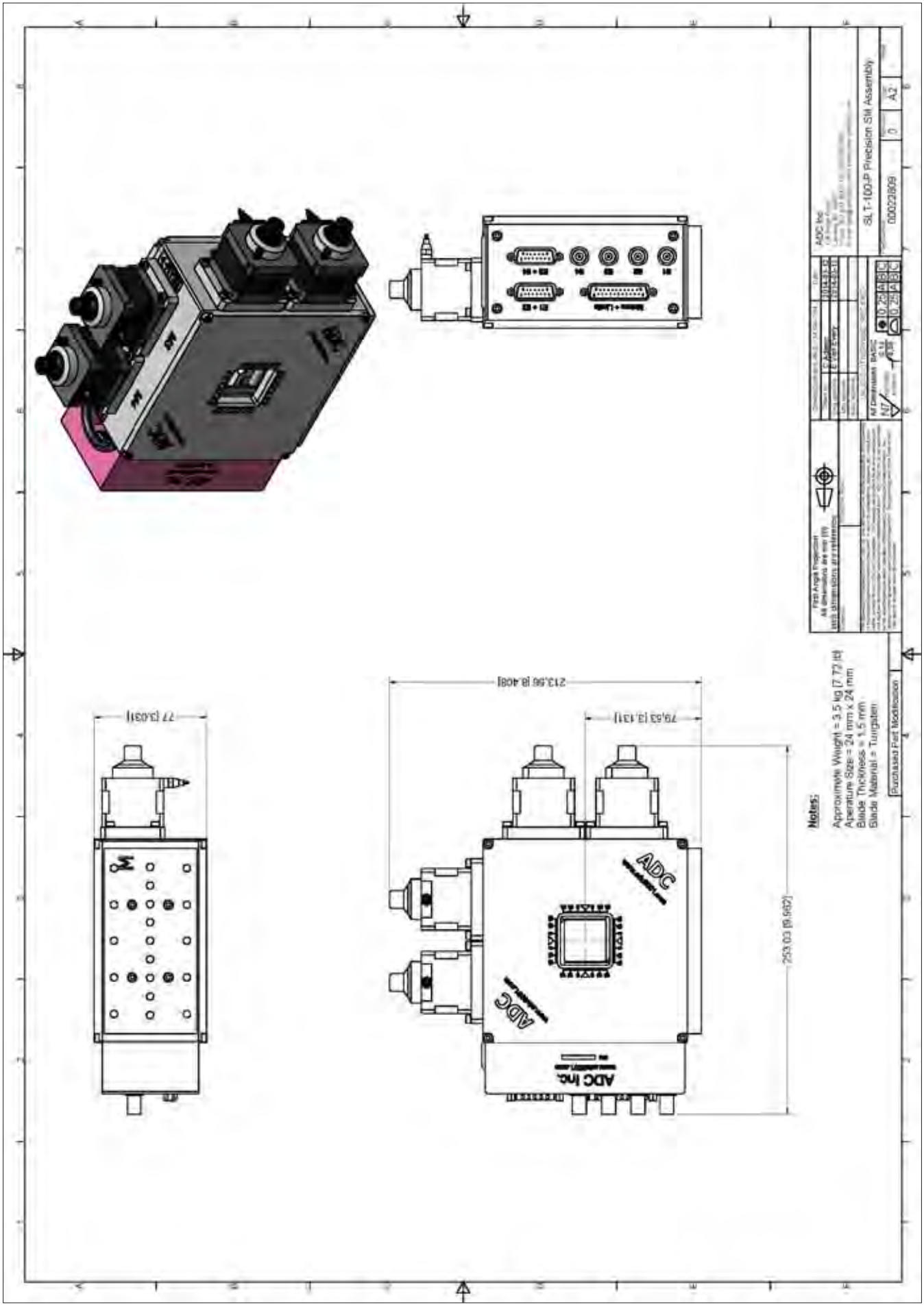
SLT-100-P Specifications and Options	
Aperture size	24 mm x 24 mm Blades can go "past closed" without clashing "Fully overlap"
Resolution	<0.16µm precision*
Accuracy	Accuracy ± 2 µm
Blade material	Tungsten or Tantalum, Tungsten Carbide, Cadmium, Boron Nitride
Blade Thickness	Standard 1.5 mm Thicker blade available; 5, 7 and 10 mm thick blade upon request.
Blade Options	Knife-edge profile (2 degrees slope) Or round blade edge Roughness of the jaw edge surface: <0.2µm (rms)
Environmental Options	Air or Vacuum (Tested to 10-6 mbar)
Overall Dimensions	Vacuum: 235 mm x 209 mm x 104 mm Air: 235 mm x 209 mm x 77 mm
Gearhead Options	Motors come with optional gearhead to increase resolution, 5:1, 10:1
Blade Beam Monitoring	Each blade is isolated to have the ability to monitor the current off the blade
Locking Manual Knobs	Each motor comes standard with a manual locking knob with scale
Encoder Options	Standard: Optional differential rotary encoder By request: Internal linear encoder
Motor Options	Bi-polar 2-phase steppers, 5-phase stepper, and IMS motors

ORDERING INFORMATION

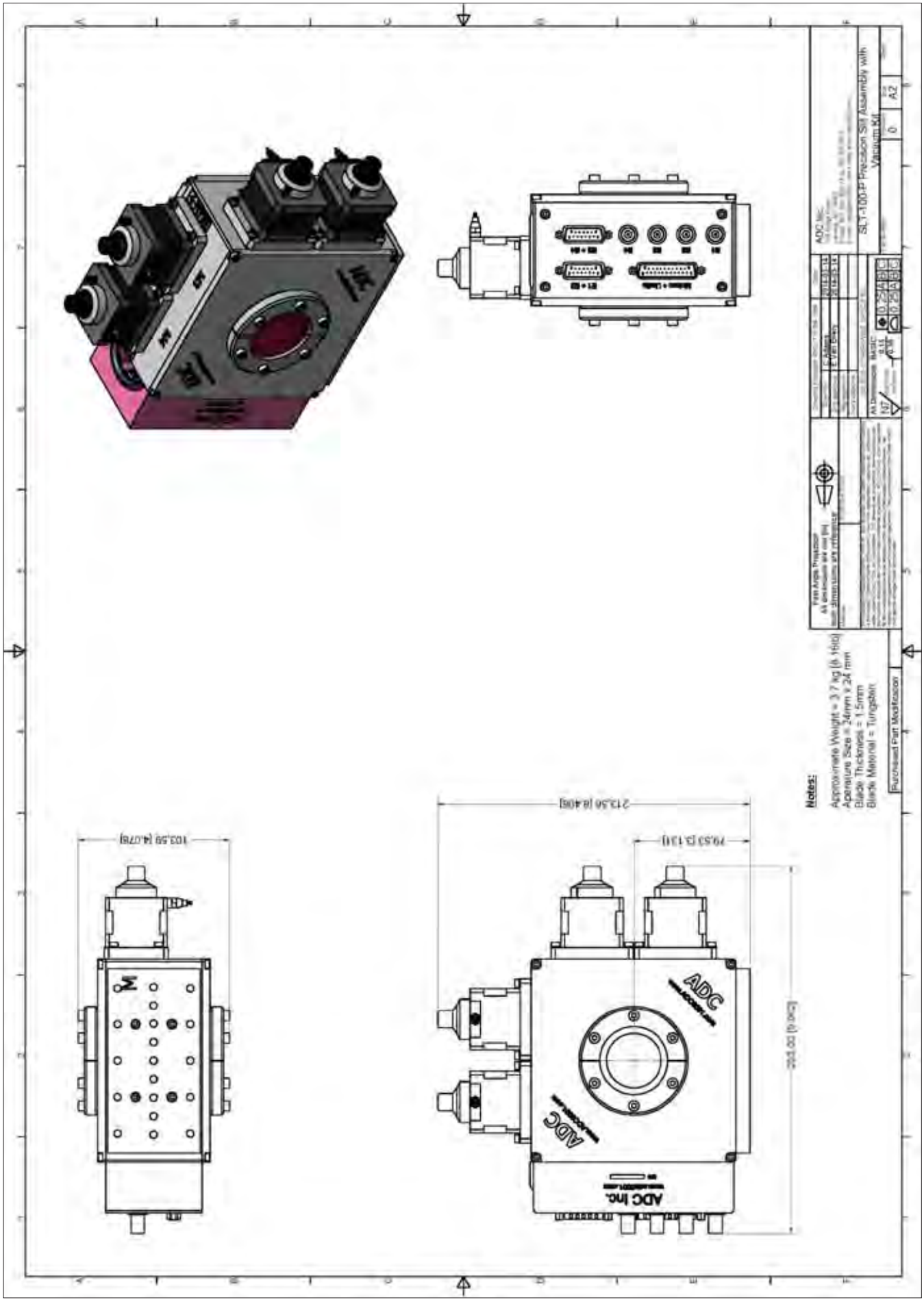
The SLT-100-P can be ordered with different configurations, please use the codes provided below when ordering.

Air	- A
Vacuum	- V
No Encoder	- N
Encoder	- E
Tantalum Blades	- TA
Tungsten Blades	- TU
Custom	- C
Standard 1.5 mm Blade Thickness	- S
Custom Blade Thickness	- C
Beam Monitoring	- B
No Beam Monitoring	- N
2° Knife-edge	- K
Round-edge	- R
Standard 2 Phase Motor	- 2PH
5 Phase Motor	- 5PH
IMS Motor	- IMS
No Gearhead	- N
5:1 Gearhead	- 5G
10:1 Gearhead	- 10G

SLT-100-P-( )-( )-( )-( )-( )-( )-( )-( )


SLT-100-P Precision SM Assembly
Notes:
Approximate Weight = 3.5 kg [7.72 lb]
Aperature Size = 24 mm x 24 mm
Blade Thickness = 1.5 mm
Blade Material = Tungsten
Purchased Part Modification
ADC Inc
ADC

SLT-100-P-A


SLT-100-P Precision Slit Assembly with Vacuum Kit
Notes:
Approximate Weight = 3.7 kg (8.16lb)
Aperature Size = 24mm x 24 mm
Blade Thickness = 1.5mm
Blade Material = Tungsten
Purchased Part Modification
ADC Inc.

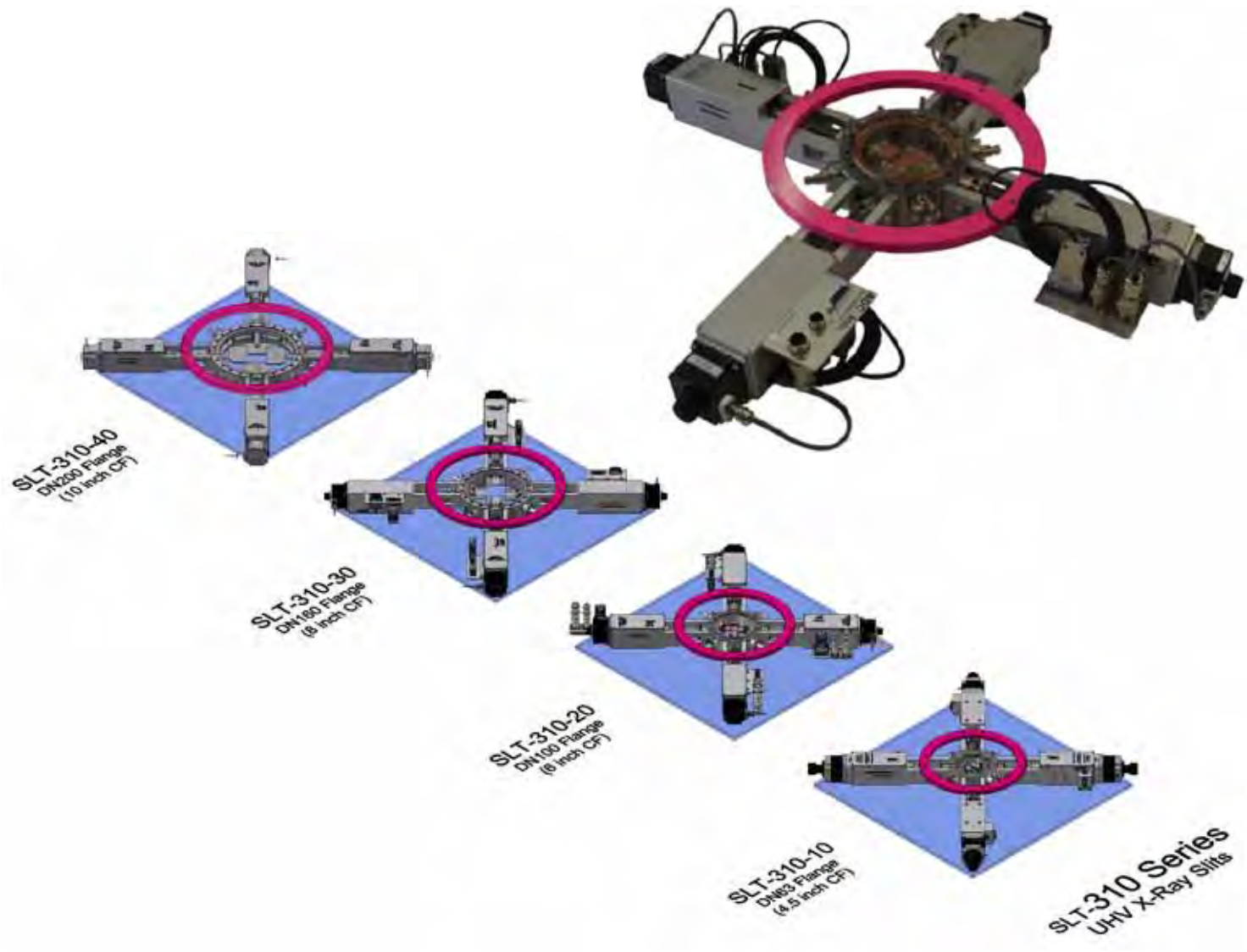
SLT-100-P-V

X-RAY UHV SLIT SYSTEM

SLT-310

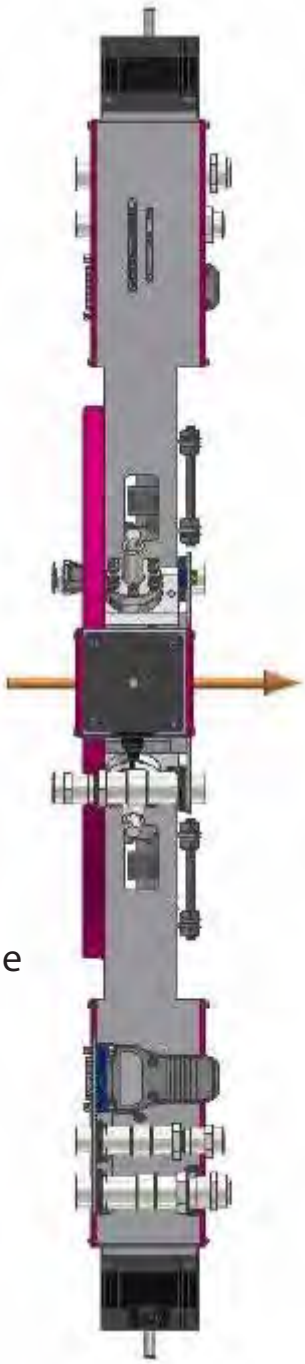
For more information please visit the following website:
http://www.adc9001.com/SLT-300-10

SLT-310 is from a new family of slits ADC has introduced and is based on ADC's previous SLT-300 slits design. The SLT-310 incorporates many improvements from the feedback we have received from the hundreds of our customers that have been using the SLT-300 (UHV). The slits is offered in 4 standard flange sizes as shown below. The SLT-310 slits unit consists of vertical and horizontal slit mechanisms, a vacuum vessel which houses them, connected to the individual blades, micro stepper motors with linear encoders, mechanical limit switches, and electrical connections including internal wiring for drain current measurement system. Imaging screen is scintillation crystals processed to a thin flat surface plate that serves as excellent imaging screens with high spatial resolution. There are four fiduciary marks provided per slit unit. All UHV sections are vacuum rated for better than 5x10-10 mbar and have a leak rate of less than 1x10-9 mbar-l/s.



SLT-310 X-Ray UHV Slit System Specification:

Aperture size	20 mm, 25 mm, 50 mm, & 60 mm
Resolution	<0.16µm precision*
Accuracy	± 2 µm
Blade material	Tungsten or Tantalum, Tungsten Carbide, Cadmium, Boron, cupper, Nitride, or custom Blades can go "past closed" without clashing (Overlapping/Zero beam ~6mm)
Blade Thickness	Standard 1.5 mm Thicker blade available; 5, 7 and 10 mm thick blade upon request.
Blade Options	Knife-edge profile (2 degrees slope) Or round blade edge Roughness of the jaw edge surface: <0.2µm (rms)
Vacuum	Vacuum rated to better than $5x10^{-10}$ mbar and have a leak rate of less than $1x10^{-9}$ mbar-l/s.
Gearhead Options	Motors come with optional gearhead to increase resolution, 5:1, 10:1
Blade Beam Monitoring	Each blade is isolated to have the ability to monitor the current off the blade
Encoder Options	Standard: Renishaw (Incremental or Absolute) By request: Heidenhain, Other
Motor Options	Standard: Bi-polar 2-phase steppers By request: 5-phase stepper and IMS motors
Image Screen Options	Using fluorescent screen fixed to vertical upper and lower blade, single crystal YAG (Yttrium Aluminum Garnet)



Ordering Information

The SLT-310 can be ordered with different configurations, please use the codes provided below when ordering.

SLT-310-( )-( )-( )-( )-( ) -( )

- 0-20 mm Aperture (DN63 Flange) - 10
- 0-25 mm Aperture (DN100 Flange) - 20
- 0-50 mm Aperture (DN160 Flange) - 30
- 0-60 mm Aperture (DN200 Flange) - 40
- Custom - C

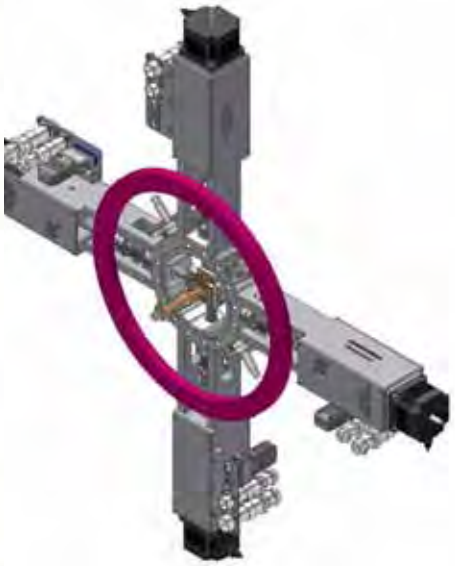
- With Encoder - E
- Without Encoder - N

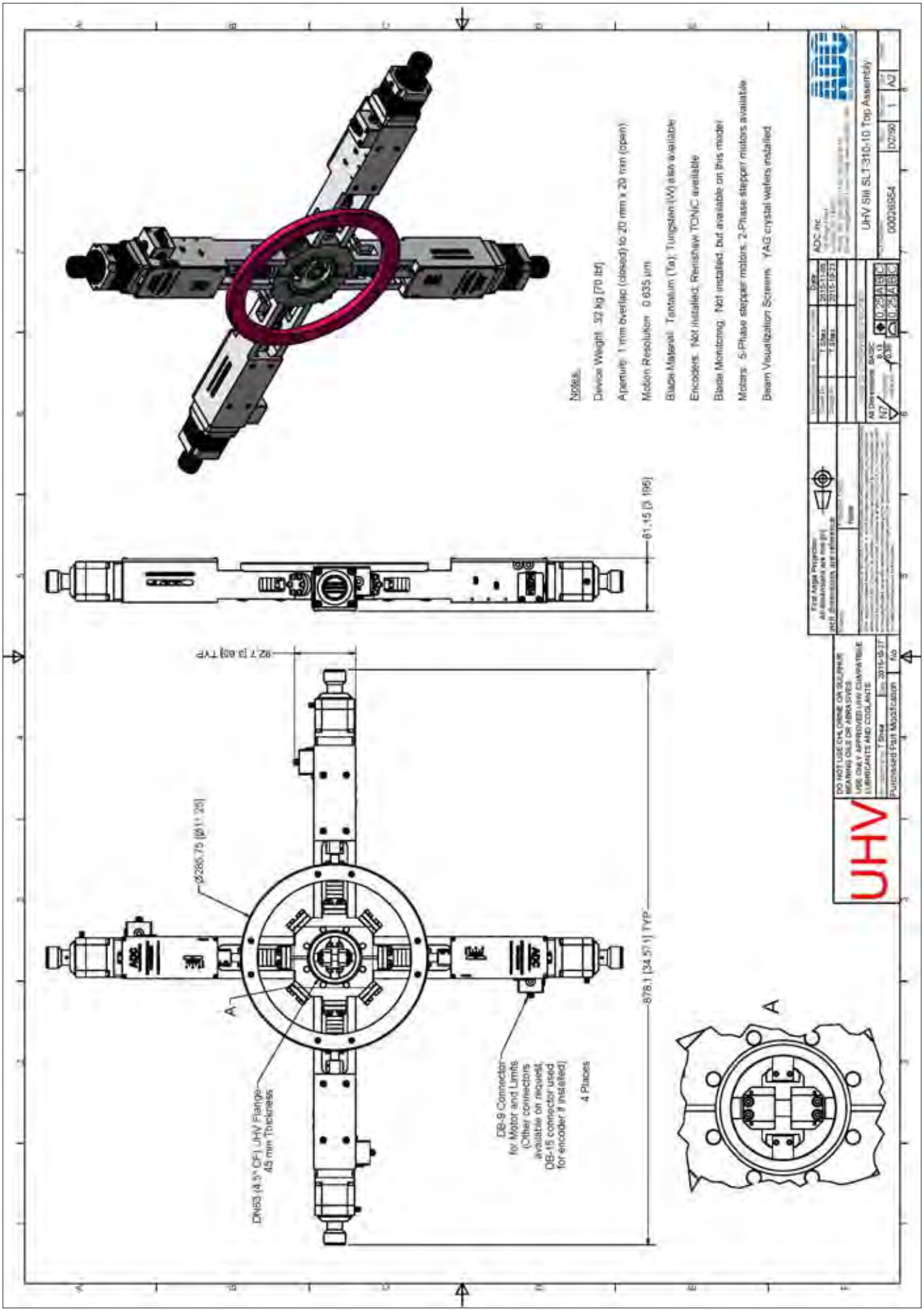
- Tantalum Blades - TA
- Tungsten Blades - TU
- Custom - C

- Beam Monitoring - B
- No Beam Monitoring - N

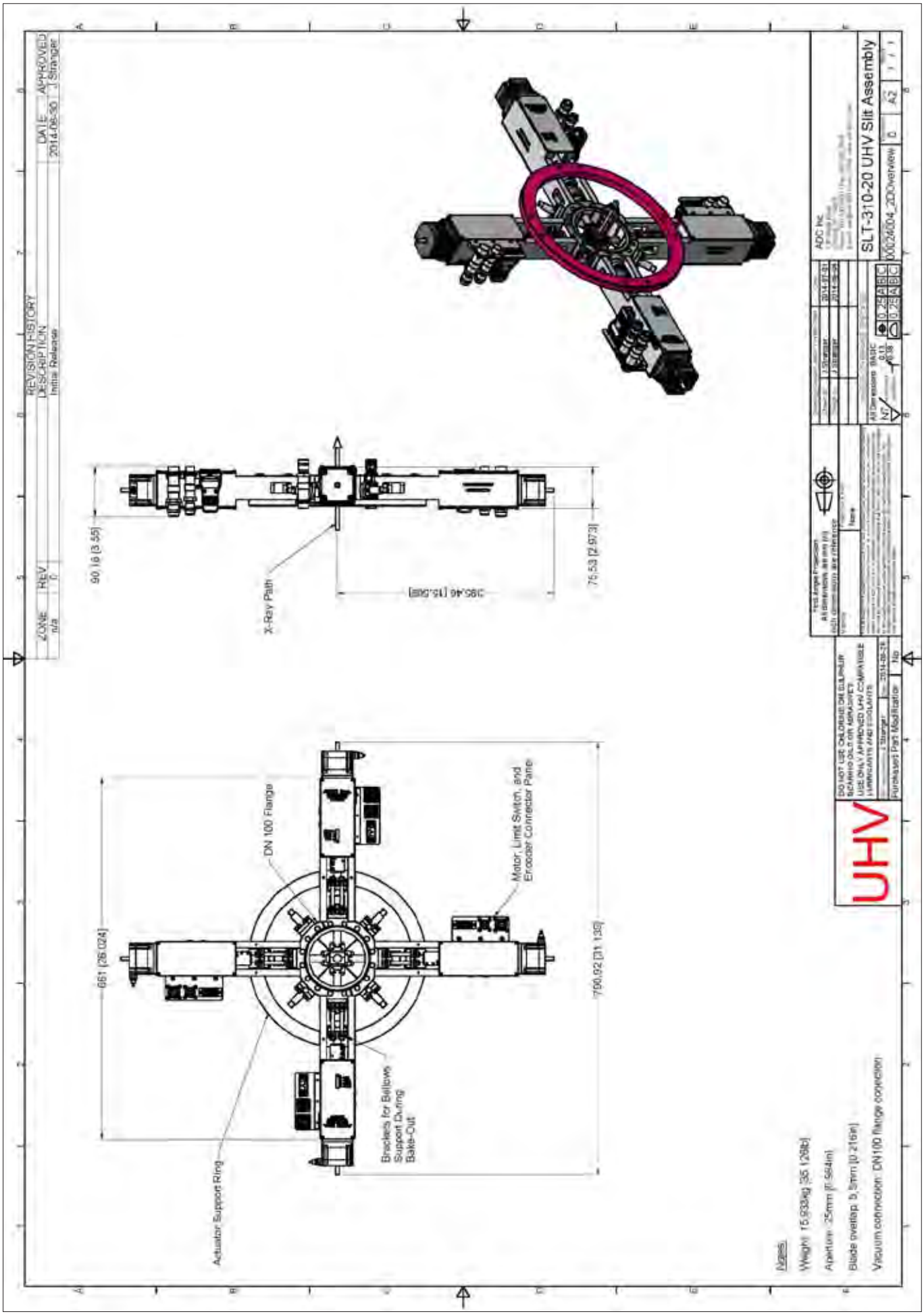
- Imaging Screen - I
- No Imaging Screen - N

- RGA - B
- No RGA - N

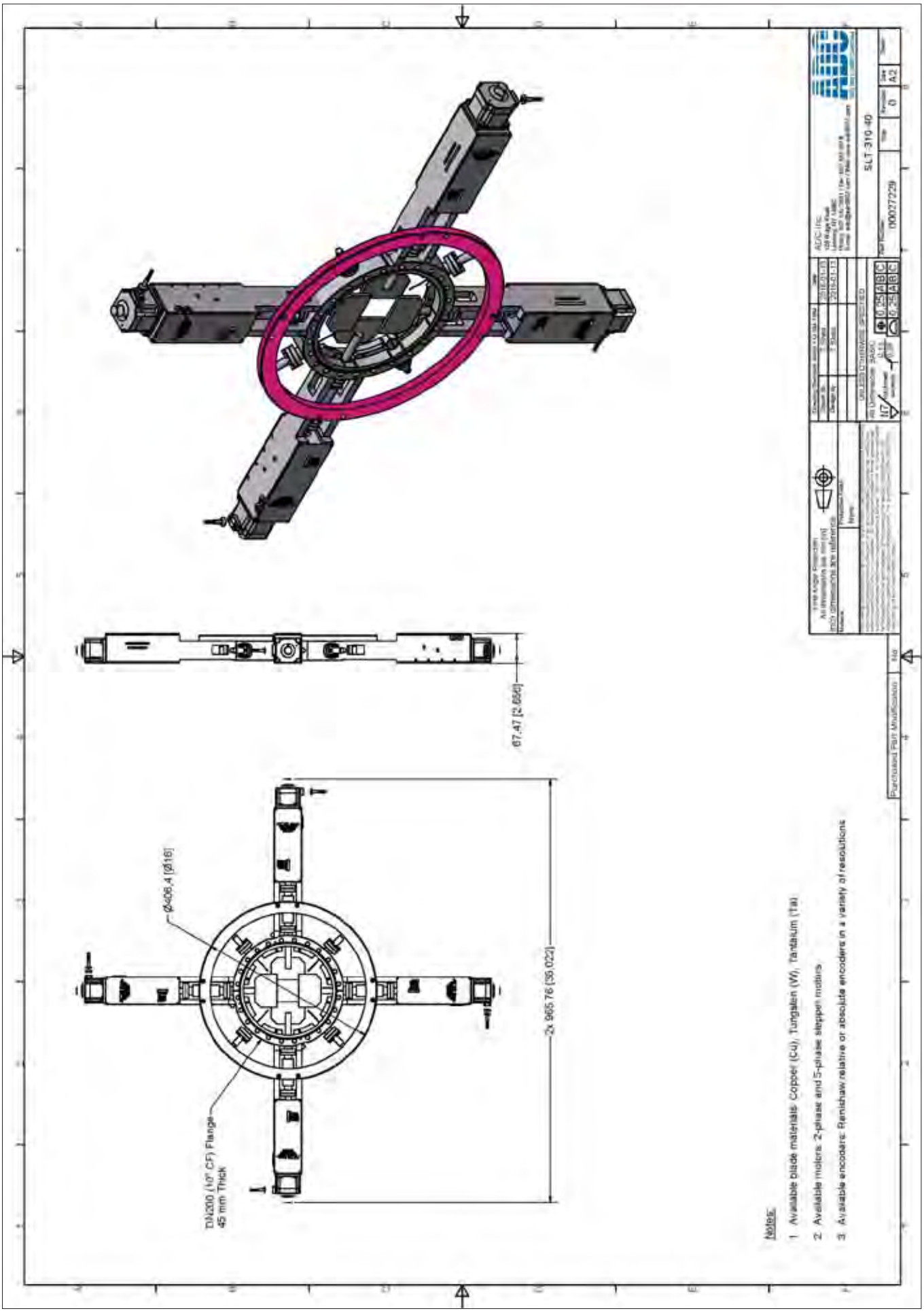



Notes:
Device Weight 32 kg [70 lbf]
Aperture 1 mm overlap (closed) to 20 mm x 20 mm (open)
Motion Resolution 0.635 µm
Blade Material Tantalum (Ta); Tungsten (W) also available
Encoders Not installed; Renishaw TONIC available
Blade Monitoring Not installed, but available on this model
Motors 5-Phase stepper motors; 2-Phase stepper motors available
Beam Visualization Screens YAG crystal wafers installed
UHV SW SLT-310-10 Top Assembly
ADC Inc.
61.15 [2.196]
82.7 [3.69] TYP
Ø265.75 [Ø11.26]
878.1 [34.571] TYP
DN63 (4.5" CF) UHV Flange
45 mm Thickness
DB-9 Connector
for Motor and Limits
(Other connectors
available on request.
DB-15 connector used
for encoder if installed)
4 Places
A
A
UHV

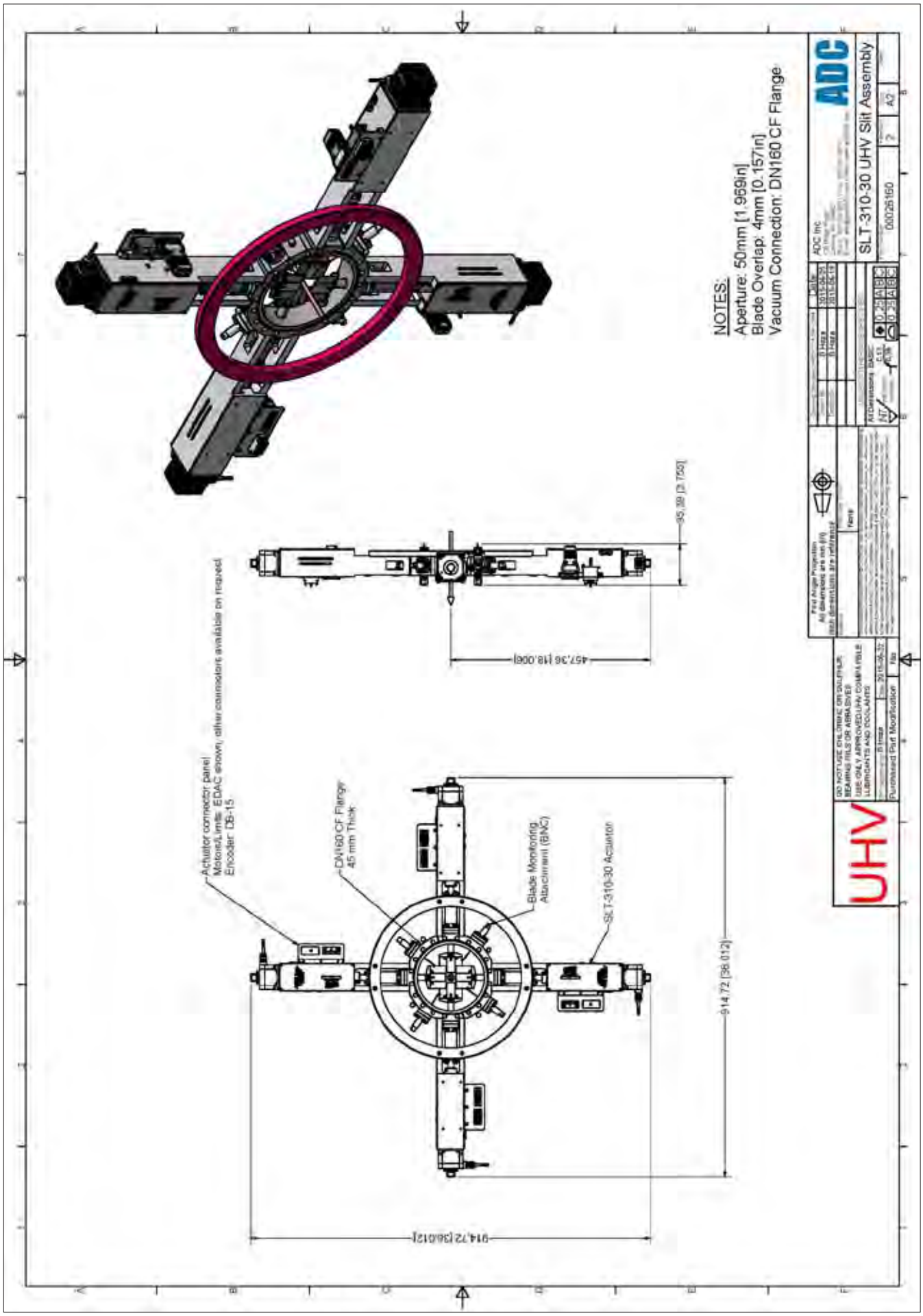
SLT-310-10


SLT-310-20 UHV Slit Assembly
ADC Inc.
UHV
X-Ray Path
DN 100 Flange
Motor, Limit Switch, and Encoder Connector Pane
Brackets for Bellows Support During Bake-Out
Actuator Support Ring
661 [26.024]
760.92 [31.136]
90.18 [3.55]
75.53 [2.973]
385.46 [15.268]
REVISION HISTORY
ZONE REV DESCRIPTION DATE APPROVED
n/a C Initial Release 2014-06-30 J. Stranger
Notes
Weight: 15.933kg [35.126lb]
Aperture: 25mm [0.984in]
Blade overlap: 5.5mm [0.216in]
Vacuum connection: DN100 flange connection

SLT-310-20


SLT-310-40
100027229
67.47 [2.656]
Ø406.4 [Ø16]
DN200 (10" CF) Flange
45 mm Thick
2x 965.76 [38.022]
Notes:
1 Available blade materials: Copper (Cu), Tungsten (W), Tantalum (Ta)
2 Available motors: 2-phase and 5-phase stepper motors
3 Available encoders: Renishaw relative or absolute encoders in a variety of resolutions

SLT-310-30


NOTES:
Aperture: 50mm [1.969in]
Blade Overlap: 4mm [0.157in]
Vacuum Connection: DN160 CF Flange
SLT-310-30 UHV Slit Assembly
ADC
UHV
Actuator connector panel
Motors/Limits: EDAC shown; other connectors available on request
Encoder: DB-15
DN160 CF Flange
45 mm Thick
Blade Monitoring Attachment (BNC)
SLT-310-30 Actuator
914.72 [36.012]
457.36 [18.006]
45.39 [2.750]

SLT-310-40

UHV PRECISION SLIT SYSTEM UNCOOLED

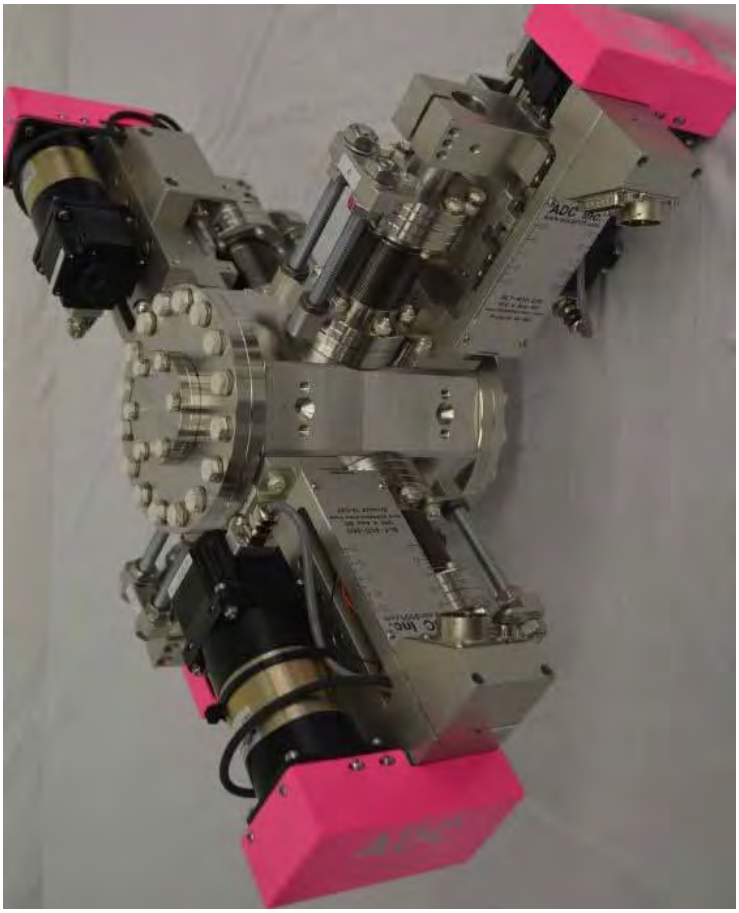
SLT-400-250

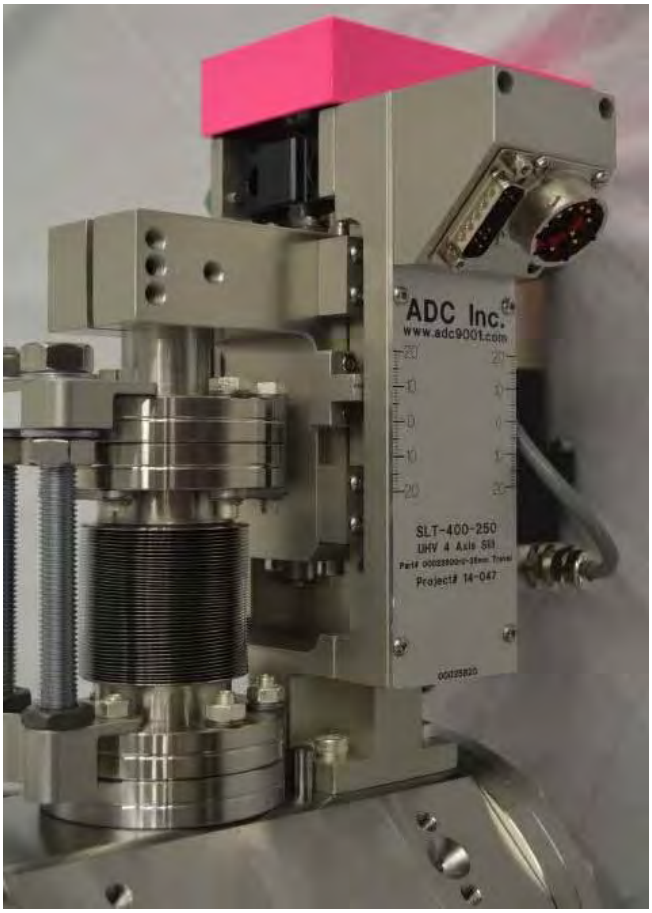
For more information please visit the following website:
http://www.adc9001.com/SLT-600-Monochromatic-Slit

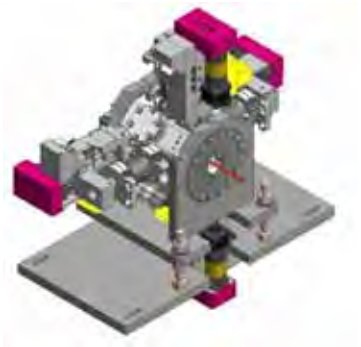
The SLT 400-250 slit system is designed for UHV and can be used for apertures up to 25mm x 25mm. Blades are actuated independently by 4 actuators mounted on the slit body. This slit system was designed to be robust and easily serviceable. All of the actuator components (bearing rails, ballscrews, limit switches, encoders, and ballscrews) are located outside of the UHV chamber. This eliminates the need for special lubricants on the actuator bearings. It also allows for the actuators to be adjusted, aligned, and serviced with the system installed on the beamline. A rigid connection between the slit blade and the actuator guarantees that encoder readings at the actuator are accurate. Modal analysis with FEA and physical tests were done during the design to make sure there are no resonant frequencies below 200 Hz at the blade. The UHV chamber has 4 spare DN40 CF ports for connecting pumping and diagnostics. Edge-welded UHV bellows connect the chamber to the blade actuator. Blades can be removed through the inside diameter of the bellows. The bellows themselves can be removed with the unit still installed on the beamline. Water-cooled options and beam position monitoring are also available with the SLT 400-250. There are four fiduciary marks provided per slit unit. All UHV sections are vacuum rated for better than 5x10-10 mbar and have a leak rate of less than 1x10-9 mbar-l/s.

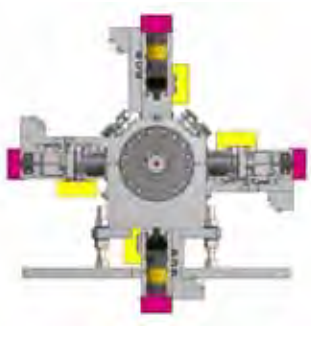
SLT-310 X-Ray UHV Slit System Specification:

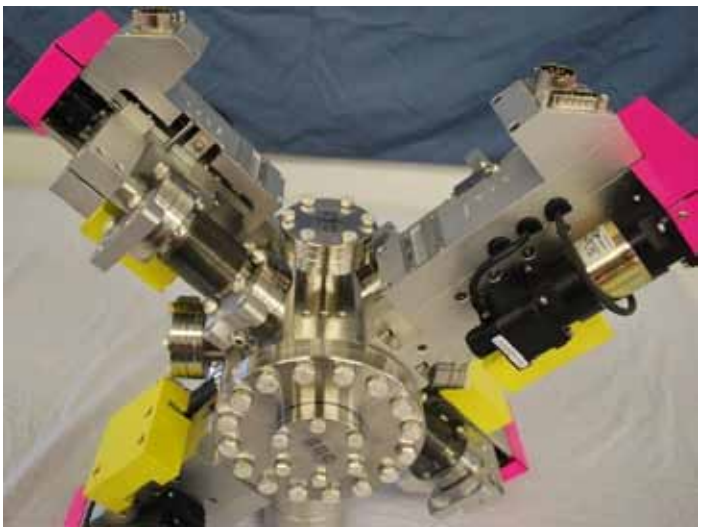
Aperture size	25 mm
Resolution	<0.16µm precision*
Accuracy	± 2 µm
Blade material	Tungsten or Tantalum. Tungsten Carbide, Cadmium, Boron, cupper, Nitride, or custom Blades can go "past closed" without clashing (Overlapping/Zero beam ~6mm)
Blade Thickness	Standard 2 mm Thicker blade available: 5, 7 and 10 mm thick blade upon request.
Blade Options	Knife-edge profile (2 degrees slope) Or round blade edge Roughness of the jaw edge surface: <0.2µm (rms)
Vacuum	Vacuum rated to better than $5x10^{-10}$ mbar and have a leak rate of less than $1x10^{-9}$ mbar-l/s.
Gearhead Options	Motors come with optional gearhead to increase resolution, 5:1, 10:1
Blade Beam Monitoring	Each blade is isolated to have the ability to monitor the current off
	the blade
Encoder Options	Standard: Renishaw (Incremental or Absolute) By request: Heidenhain, Other
Motor Options	Standard: Bi-polar 2-phase steppers By request: 5-phase stepper and IMS motors
Image Screen Options	Using fluorescent screen fixed to vertical upper and lower blade, single crystal YAG (Yttrium Aluminum Garnet)

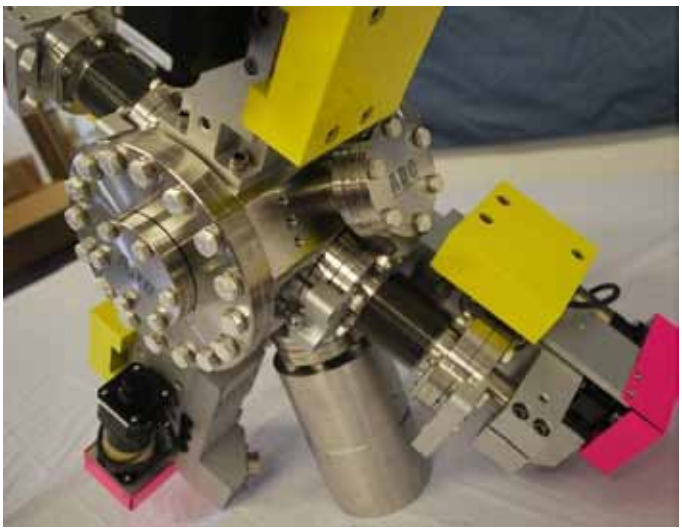


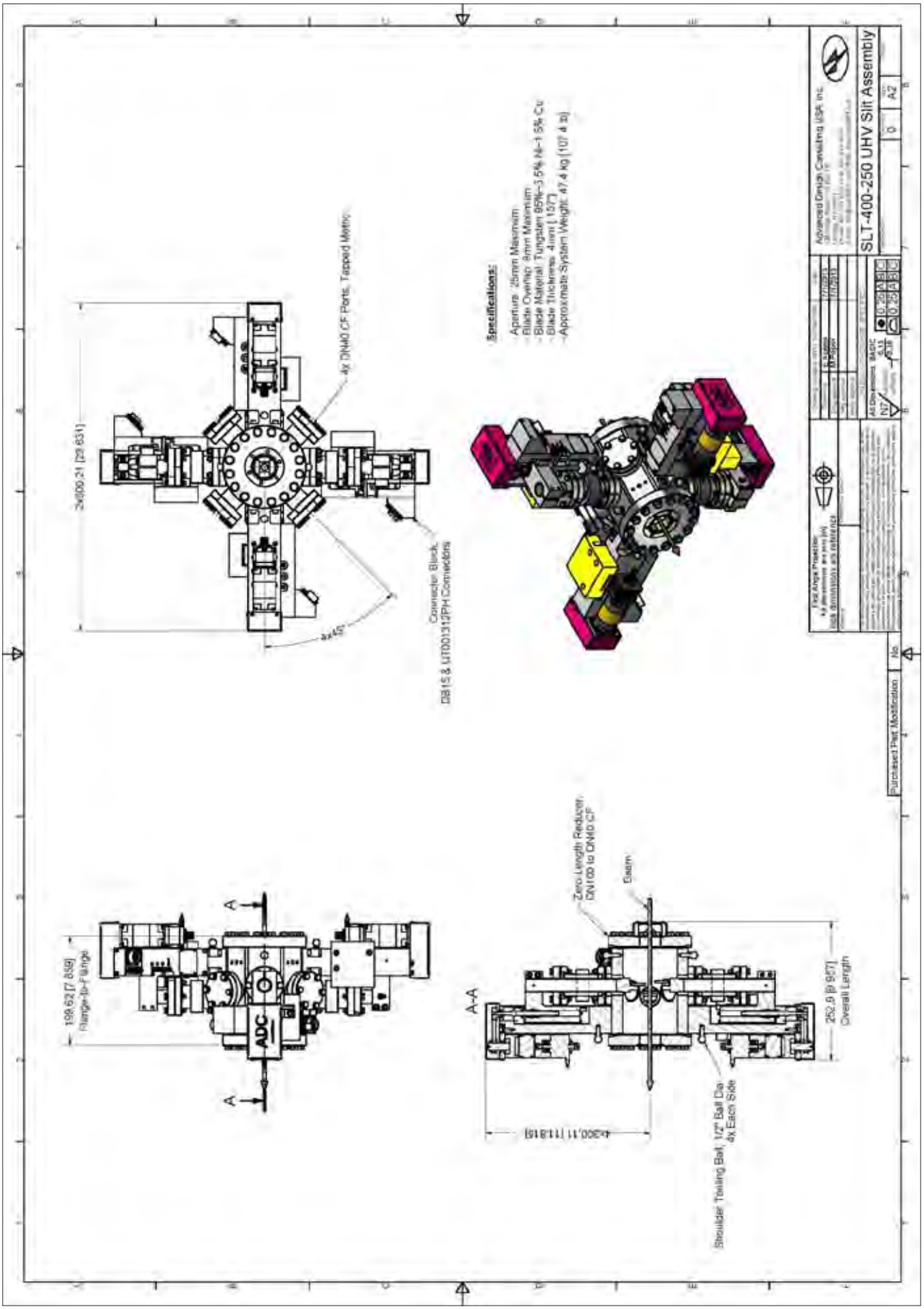

ADC Inc.
www.adc9001.com
SLT-400-250
UHV 4 Axis Sli
Project# 14-047










SLT-400-250 UHV Slit Assembly
Advanced Design Consulting USA, Inc.
Specifications:
Aperture: 25mm Maximum
Blade Overlap: 8mm Maximum
Blade Material: Tungsten 95%–3.5% Ni–1.5% Cu
Blade Thickness: 4mm [.157"]
Approximate System Weight: 47.4 kg [107.4 lb]
4x DN40 CF Ports, Tapped Metric
Connector Block
DB15 & UT001313PH Connectors
4x 45°
Zero Length Reducer
DN100 to DN40 CF
Beam
Shoulder Tooling Ball, 1/2" Ball Dia
4x Each Side
Overall Length
Flange-to-F Flange
ADC
A-A
Purchased Part Modification

SLT-400-250

UHV HIGH PRECISION X-RAY SLIT SYSTEM (COOLED & UNCOOLED)

SLT-600

For more information please visit the following website:
http://www.adc9001.com/products/view/650

- 0.1 µm Resolution
- Renishaw Encoder (Incremental or Absolute)
- High Accuracy Ball Screw Drive
- Cross Roller Bearing
- 1 µm Home Limit Switch (Optional)
- Ability to monitor the beam (Optional)
- Imaging Screen (Optional)
- Designed for heat load 680 W
- Best slit blade edges in the synchrotron community
- Blade material; Tungsten or Tantalum, Tungsten Carbide, Cadmium, Boron Nitride, or custom
- Roughness of the jaw edge surface

The SLT-600 slit system is designed for UHV and can be used for apertures from 25mm x 25mm all the way up to 100mm x 100mm. Blades are actuated independently by 4 actuators mounted on the slit body. This slit system was designed to be robust and easily serviceable. All of the actuator components (bearing rails, limit switches, encoders, and ballscrews) are located outside of the UHV chamber. This eliminates the need for special lubricants on the actuator bearings. It also allows for the actuators to be adjusted, aligned, and serviced with the system installed on the beamline. A rigid connection between the slit blade and the actuator guarantees that encoder readings at the actuator are accurate. Modal analysis with FEA and physical tests were done during the design to make sure there are no resonant frequencies below 200 Hz at the blade. The UHV chamber has 4 spare DN40 CF ports for connecting pumping and diagnostics. Edge-welded UHV bellows connect the chamber to the blade actuator. Blades can be removed through the inside diameter of the bellows. The bellows themselves can be removed with the unit still installed on the Beamline within an hour not days!! The SLT-600 slits unit consists of vertical and horizontal slit mechanisms, a vacuum vessel which houses them, connected to the individual blades, micro stepper motors with linear encoders, limit (home position) switches and electrical connections including internal wiring for drain current measurement system. As an optional feature Imaging Screen: is Scintillation crystals processed to a thin flat surface plate that serves as excellent imaging screens with high spatial resolution. There are eight fiduciary marks provided per slit unit. All UHV sections are vacuum tested to better than 5x10–10 mbar and have a leak rate of less than 2x10–10 mbar l-1 s -1 . Water-cooled options and beam position monitoring are also available with the SLT-600.

Standard Key Specifications:

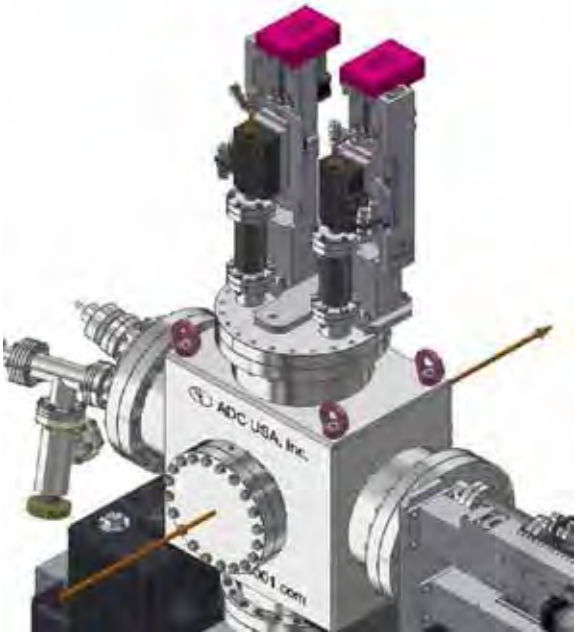
Parameter	Value
Maximum Aperture	25mm, 50mm, 100mm
Blade Overlap	20mm, 30mm, 50mm
Blade Material	Tungsten 95%~3.5% Ni~1.5% Cu*
Blade Thickness	4mm [0.16"]*
Cooling Connection	¼" Swagelok
Total Heat Load	680 W
Maximum Heat Flux	44.85 W/mm^2
Recommended Cooling Flow	1.9 l/m [0.5 g/m]
Flange-to-Flange Length	400mm [15.41"]
Vacuum Level	< 5x10–10 mbar (UHV)
Beamline Connection	DN150, DN100 (6") CF to DN40 (2 ¾") CF*

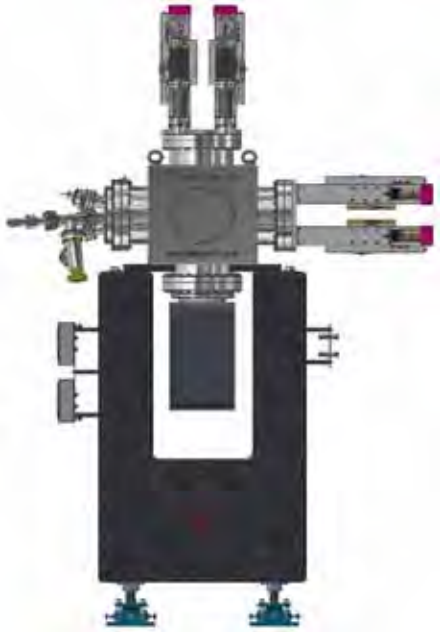
ORDERING INFORMATION

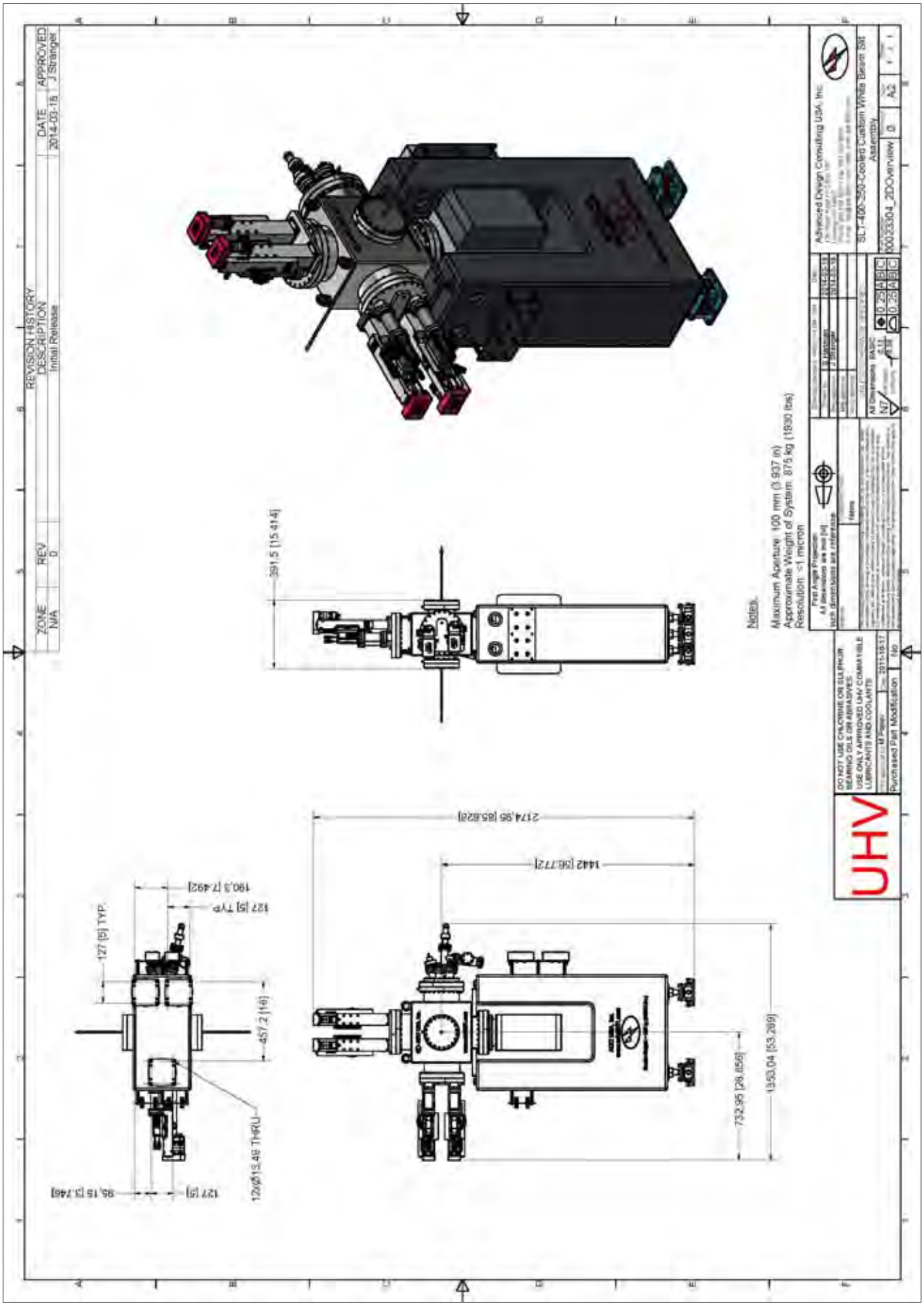
The SLT-310 can be ordered with different configurations, please use the codes provided below when ordering

No Home Limit Switch	- N
1 µm Home Limit Switch	- H
DN40 (Conflate) Flanges	- 40
DN100 (Conflate) Flanges	- 100
DN150 (Conflate Flanges	- 150
Custom	- C
Uncooled	- U
Cooled	- L
Beam Monitoring	- B
No Beam Monitoring	- N
Imaging Screen	- I
No Imaging Screen	- N
Tantalum Blades	- TA
Tungsten Blades	- TU
Custom	- C
Apperture 25mm	- 25
Apperture 50mm	- 50
Apperture 100mm	- 100
Stand	- S
No Stand	- N
RGA	- B
No RGA	- N

SLT-600-( )-( )-( )-( )-( )-( )-( )-( )-( )






REVISION HISTORY
ZONE | REV | DESCRIPTION | DATE | APPROVED
N/A | 0 | Initial Release | 2014-03-18 | J Stranger
391.5 [15.414]
2174.95 [85.628]
1442 [56.772]
732.95 [28.856]
1353.04 [53.269]
180.3 [7.492]
127 [5] TYP
127 [5] TYP
457.2 [18]
12x Ø13.49 THRU
95.15 [3.746]
127 [5]
Maximum Aperture: 100 mm (3.937 in)
Approximate Weight of System: 875 kg (1930 lbs)
Resolution: <1 micron
Notes:
Advanced Design Consulting USA, Inc
SLT-400-350-Cooled Custom White Beam SM
Assembly
00023304_2DOverview
UHV

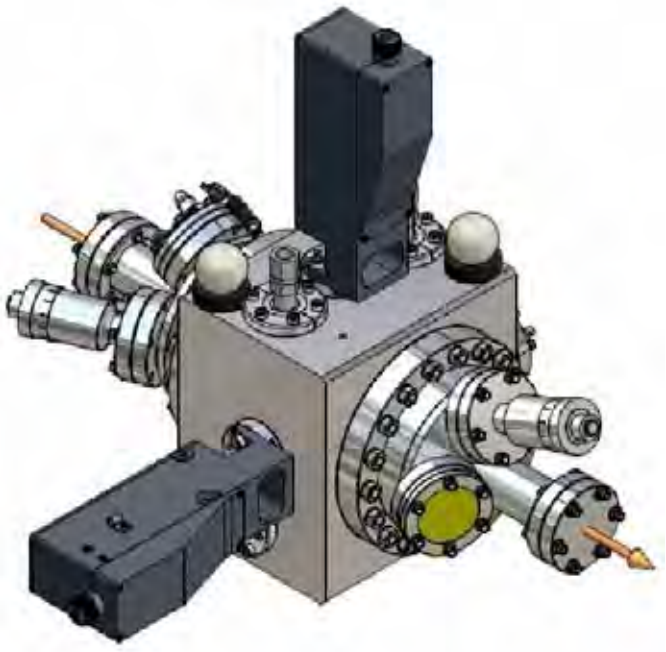
SLT-600

SLT-800

UHV Flexure Design White/Pink Beam Exit Slit System
For more information please visit the following website:
http://www.adc9001.com/SLT-800

- 0.1 µm Micron precision
- Renishaw Encoder
- High Accuracy Ball Screw Drive
- 1 µm Home Limit Switch
- Ability to monitor the beam
- Best slit blade edges in the synchrotron community!!!
- Blade material; Tungsten or Tantalum, Tungsten Carbide, Cadmium, Boron Nitride
- Roughness of the jaw edge surface:

The flexure design slits unit consists of vertical and horizontal slit mechanisms, a vacuum vessel which houses them, connected to the individual blades, micro stepper motors with linear encoders, limit (home position) switches and electrical connections including internal wiring for drain current measurement system. The total slit size is adjustable from 2000 microns to 0 microns in both vertical and horizontal directions. The actuation is such that the blade pairs move symmetrically about a central point. The slit will go to a completely closed position. The slit has a flat bottom and is firmly attached to a horizontal plate. There are three fiduciary marks provided per slit unit. A common heat sink with individual blades connected to the sink through "heat bridges/copper braids" is incorporated. The total power can be as high as 60W total or (6W/mm2) using water-cooling. A common heat sink with individual blades connected to the sink through "heat bridges" is also incorporated. Each pair of slit blades is motorized by a single micro stepper motor drive system with a linear encoder as well as end of stroke limit switches. Please note the linear encoder is UHV type from Renishaw and is located inside the chamber and measures directly the actual blade movement. All UHV sections are vacuum tested to better than 5x10–10 torr and have a leak rate of less than 2x10–10 mbar l-1 s.

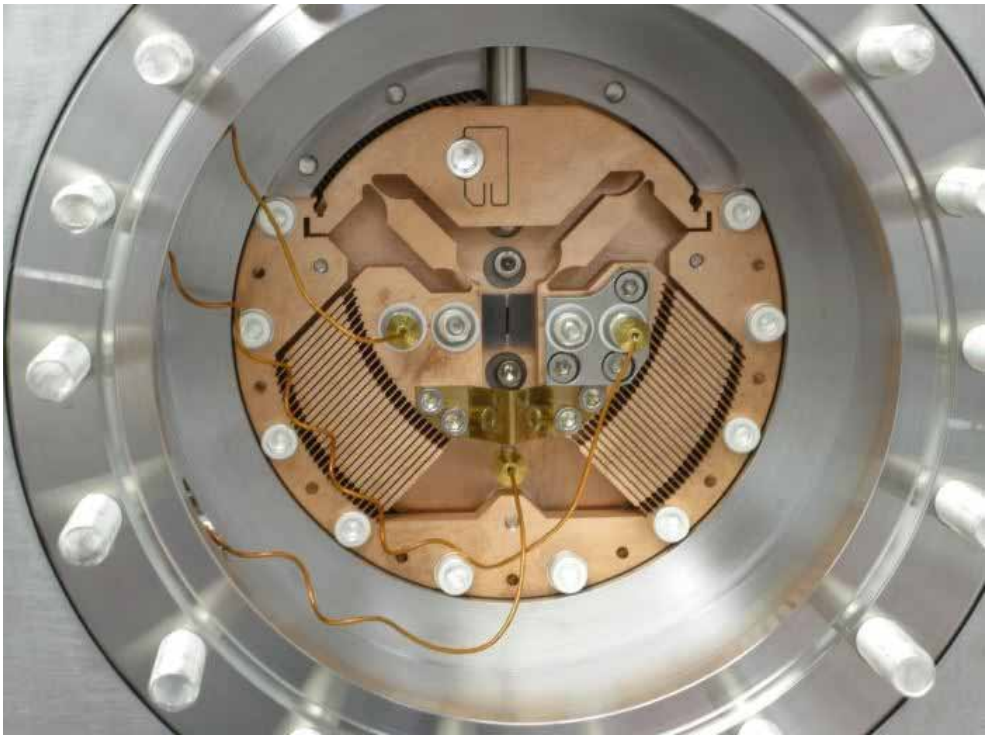


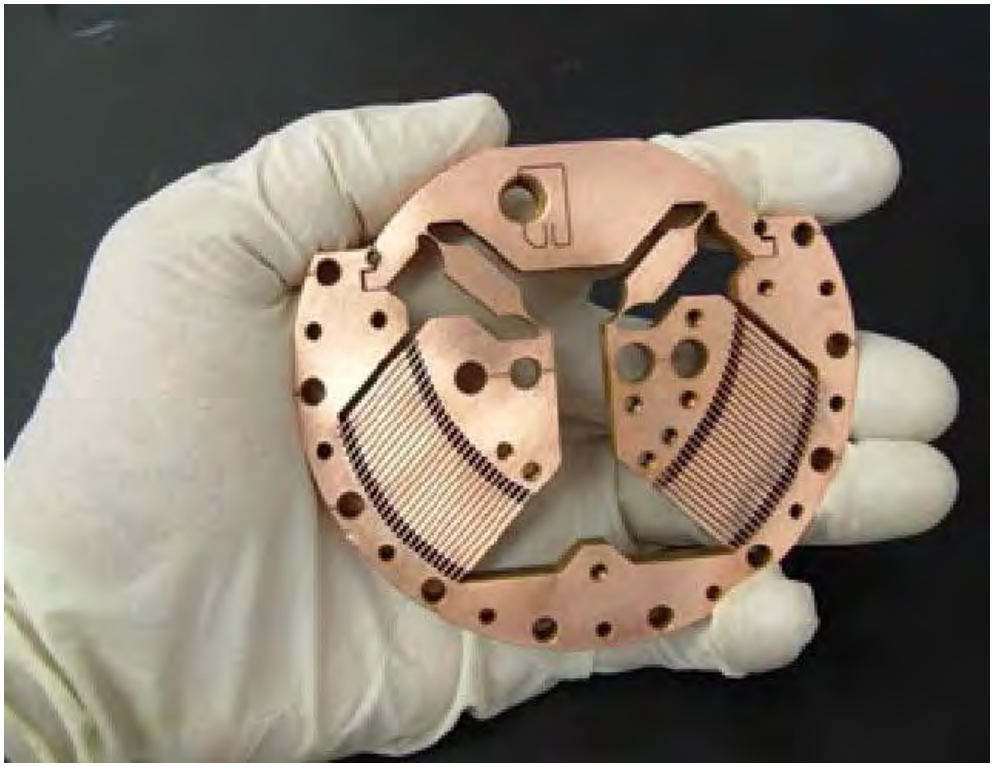
Stand Motion Specification

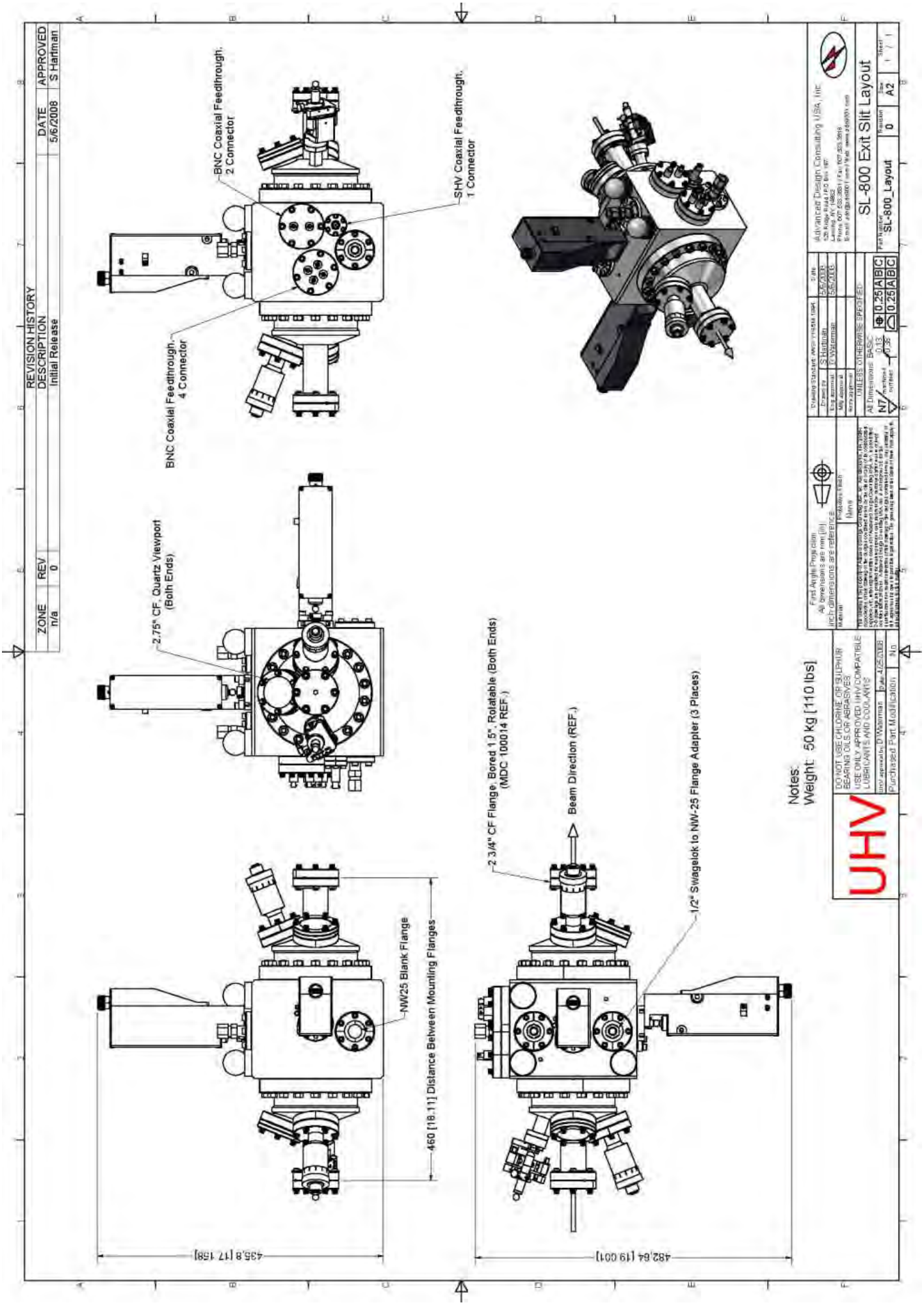
	Horizontal Motions	Vertical Motions
Range	-10mm to +10mm	-6mm to +6mm
Resolution	<0.1µm	<0.1µm
Repeatability	<0.4µm	<0.4µm
Accuracy	<1µm	<1µm

This extremely fine, accurate flexture design is rigidly mounted inside a solid StainlessSteel Chamber. Please note this chamber is specially designed and is machines from a solid piece for rigidity, good vacuum and excellent damping frequencies.

The total flexure slits system design is mounted on a special vertical jack. This jack/stage series is for high-precision, high-load vertical positioning tasks. This stage features a precision-machined base of high-density, stress-relieved aluminum for exceptional stability. Precision--cross-roller guided wedges and low-friction lead screws provides incremental motion down to 0.2 µm and maintenance-free positioning. Total travel is 12.5 mm. The flexure slits system + the high-precision jack/stage is then mounted on precise linear stage that is designed specially to mount on a solid granite system as shown below for specifically damping application. This complete state of the art extreme precise system has the option of mounting on the floor by grouting a plate.






REVISION HISTORY
ZONE | REV | DESCRIPTION | DATE | APPROVED
n/a | 0 | Initial Release | 5/6/2008 | S Hartman
BNC Coaxial Feedthrough, 2 Connector
SHV Coaxial Feedthrough, 1 Connector
BNC Coaxial Feedthrough, 4 Connector
2.75" CF, Quartz Viewport (Both Ends)
NW25 Blank Flange
460 [18.11] Distance Between Mounting Flanges
435.8 [17.158]
2 3/4" CF Flange, Bored 1.5", Rotatable (Both Ends) (MDC 100014 REF.)
Beam Direction (REF.)
1/2" Swagelok to NW-25 Flange Adapter (3 Places)
482.64 [19.001]
Notes:
Weight: 50 kg [110 lbs]
UHV
DO NOT USE CHLORINE OR SULPHUR BEARING OILS OR ABRASIVES
USE ONLY APPROVED UHV COMPATIBLE LUBRICANTS AND COOLANTS
Advanced Design Consulting USA, Inc
SL-800 Exit Slit Layout
SL-800_Layout
A2

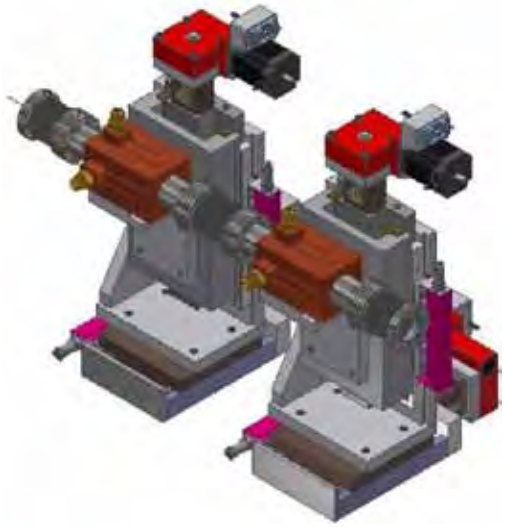
SLT-800

SLT-1200 UHV HIGH HEAT LOAD OFHC-GLIDCOP DESIGN HIGH PRECISIONSLIT

for Superior Strength & Thermal Performance

For more information please visit the following website:
http://www.adc9001.com/products/view/649

This slit system is designed to accommodate a 3 mm x 5 mm white beam with heat fluxes of >240 W/mm2 (for a total heat load of 3.6 kW with the slit closed) from an undulator at a machine energy of 5.3 GeV and current of 250 mA. The system is placed downstream of a series of three apertures (termed primary, secondary, and tertiary) which guard and trim the beam, with the tertiary aperture defining a beam size of 3 mm x 5 mm. These apertures upstream of the slit assembly were also designed by ADC and technical information for these devices is available from ADC. The apertures upstream serve primarily to guard against improper steering of the beam and only trim it slightly, while this slit system trims the beam significantly and absorbs a large portion of the heat from the beam before final beam definition is accomplished by another slit closer to the sample. The slit consists of two water cooled aperture blocks made of OFHC Copper mounted on high precision motion stages which drive the apertures in planes perpendicular to the beam. Each block has a fixed 3 mm tall by 5 mm wide downstream aperture, with four tungsten edges to sharply define the beam, and is cooled by a single water circuit which connects to the facility cooling system. The effective aperture is adjusted from the full size down to closed by controlling the position of the two aperture blocks relative to each other. The motion stages are ball screw driven and guided by crossed roller bearings.



Aperture Block Dimensions			
Dimension	Nominal	Tolerance per Edge	Units
Acceptance Width	15	+0.127 / -0	[mm]
Acceptance Height	10	+0.127 / -0	[mm]
Aperture Width with Tungsten	5	+0.025 / -0.025	[mm]
Aperture Height with Tungsten	3	+0.025 / -0.025	[mm]
Horizontal Half-Taper Angle	2.6	n/a	[°]
Vertical Half-Taper Angle	1.8	n/a	[°]
Diameter of Cooling Channel	12.7	n/a	[mm]
Length of Block	121.5	n/a	[mm]

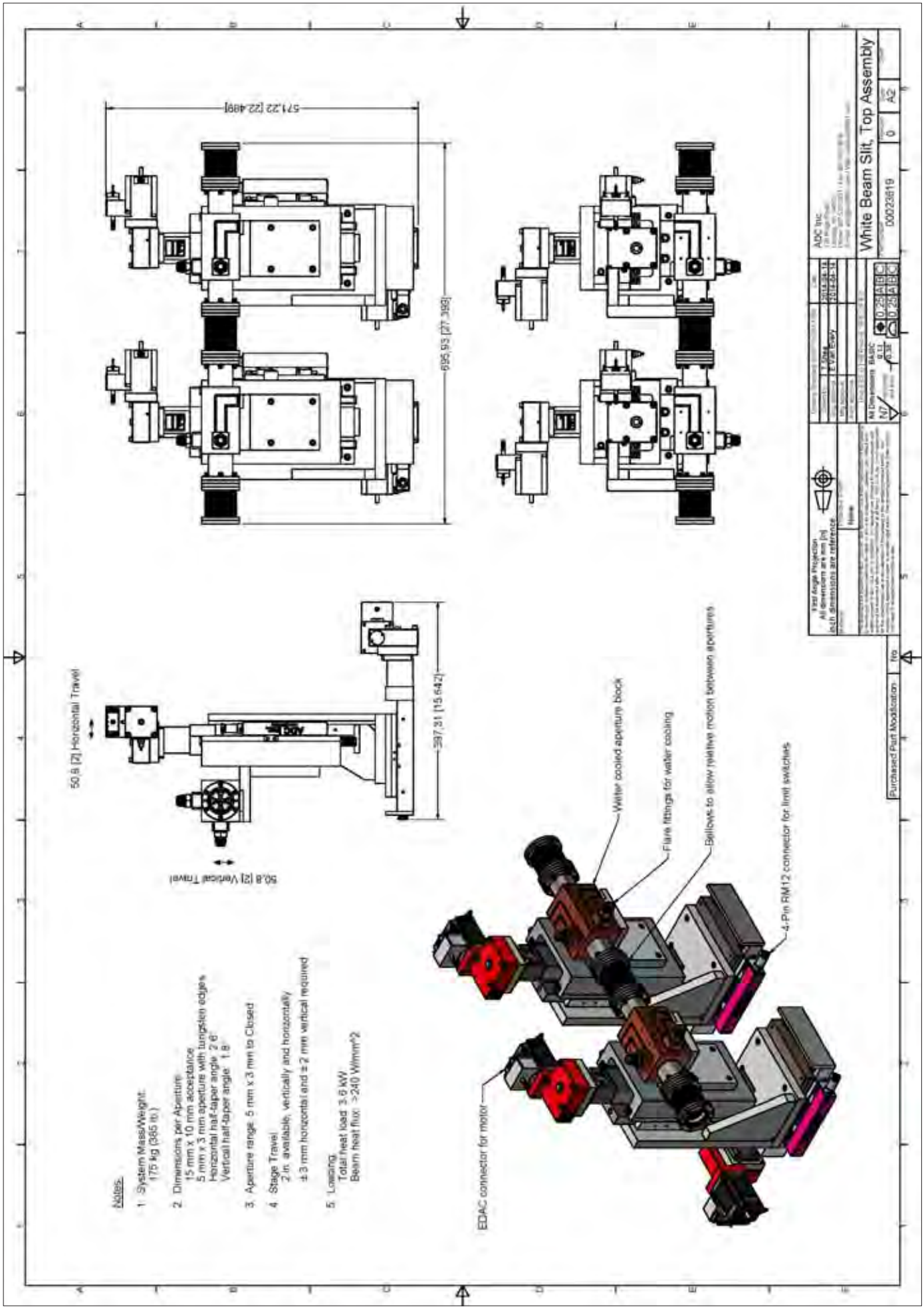
ORDERING INFORMATION

The SLT-1200 can be ordered with altered configurations. ADC can easily provide a cost and schedule estimate with the answers to several questions in the table below.

		Needs to be filled by customer
1	Machine Energy	
2	Total Heat Load (kW)	
3	Power Density/Heat Load (W/mm^2)	
4	Beam Size	
5	Beam Pipe Size	
6	Any Space Constraint	
7	Any Specific Requirements	

Connections	
Vacuum	2 ¾" CF Flanges
Cooling	½" Tube 45° Flare X ½" NPT Male
Motor Control	EDAC
Limit Switches	4-pin circular (Hirose RM12)

Ranges of Motion			
Axis	Travel [mm]	Resolution [µm]	Repeatability [µm]
Horizontal Required	± 3	-	
Vertical Required	± 2	-	
Horizontal Available	50	0.1	2
Vertical Available	50	0.1	2


White Beam Slit, Top Assembly
ADC Inc
571.22 [22.488]
695.93 [27.398]
50.8 [2] Horizontal Travel
50.8 [2] Vertical Travel
397.31 [15.642]
Notes:
1. System Mass/Weight:
175 kg (385 lb.)
2. Dimensions per Aperture:
15 mm x 10 mm acceptance
5 mm x 3 mm aperture with tungsten edges
Horizontal half-taper angle 2°
Vertical half-taper angle 1.8°
3. Aperture range: 5 mm x 3 mm to Closed
4. Stage Travel:
2 in. available, vertically and horizontally
± 3 mm horizontal and ± 2 mm vertical required
5. Loading:
Total heat load: 3.6 kW
Beam heat flux: >240 W/mm^2
EDAC connector for motor
Water cooled aperture block
Flare fittings for water cooling
Bellows to allow relative motion between apertures
4-Pin RM12 connector for limit switches

SLT-1200

NEUTRON SLITS

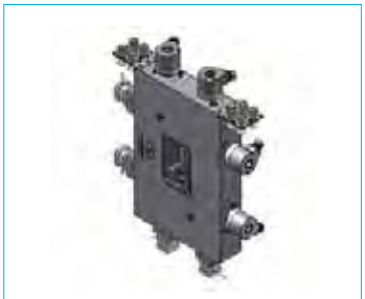
New High Precision Neutron Scattering Slits

For more information please visit the following website:
http://www.adc9001.com/products/show_list/id/111

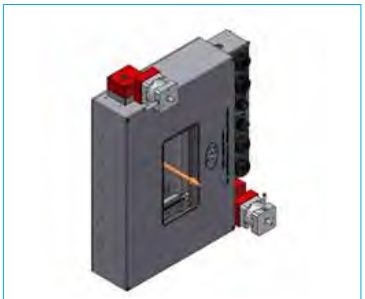
ADC has developed the most complete set of high-precision slits for Neutron applications.

- Air or Vacuum
- Micron precision
- High radiation resistance components such as motors, brake, and encoders
- Blade material; (Cadmium, Boron Nitride, Boron Carbide and/or composite structure consisting of several materials)
- Blades can go "past closed" without clashing (Overlapping/Zero beam).
- Customized to Customer Specifications; size, blade material, etc.

All of these slits use standard micro stepped stepper motors that could be controlled with a wide array of controllers/drivers available on the market. Our slits are being used in many Neutron facilities including: Los Alamos National Lab (LANL), Spallation Neutron Source (SNS), Rutherford Appleton Laboratory (CCLRC), ANSTO and Indiana University Cyclotron Facility

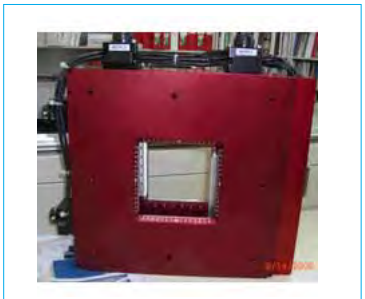


NSLT-100 Series



NIST "curtain style" XY Vacuum Slit

ANSTO Kookaburra Instrument Slits

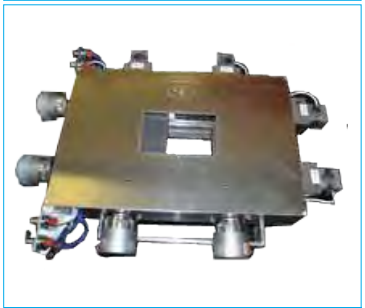


CCLRC Reflectometer Slits

ANSTO PELICAN INSTRUMENT Slits

LANL SMART Instrument Slits

SNS Custom SLT-100-30



ANSTO SANS Instrument Vacuum Slits

CUSTOM SLITS

For more information please visit the following website:
http://www.adc9001.com/products/show_list/id/142

ADC designs and builds custom, one-of-a-kind slits for countries all over the world. Below are just a few of our examples of the custom slits we have designed, built, and shipped to different facilities

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SwissFEL High Precision Slits (Curtain Design)

Page 37

SwissFEL High Precision Slits- 45 Degree

Page 39

UHV Slit System….with YAG Crystal

Custom Monochromatic UHV Slits BL02B at SSRF

High Heat Load UHV Slit System for ESRF ID11 Pinhole Mono

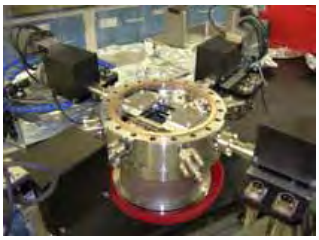
Page 41

UHV Slit System for ESRF

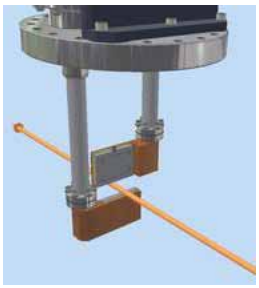
ALS Copper Braided Cooled High Precision Slit

DLS I13 Front End Slit

DLS Custom Water Cooled High Precision Slit

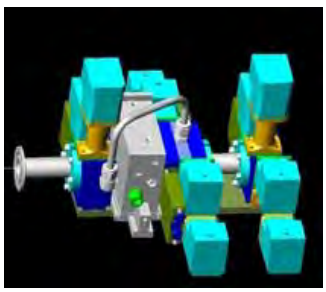


DLS Custom UHV Slit



MAX-Lab Custom Water Cooled Slit

SNS Custom SLT-100-30



ALS-Slits-Ion Chamber Assembly

ANKA- Copper Braided SLT-Slits

APS Two Slanted 30 Degree Slits

SSRF UHV Slits

SLT-800-1 UHV Flexure Design White/Pink Beam Exit Slit System

SLT-700 High Heat Load Water Cooled Slit

LSU/CAMD Water Cooled UHV Slits

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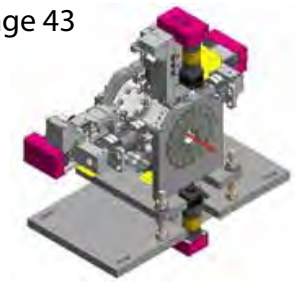


UHV, high precision, slit for MAX IV

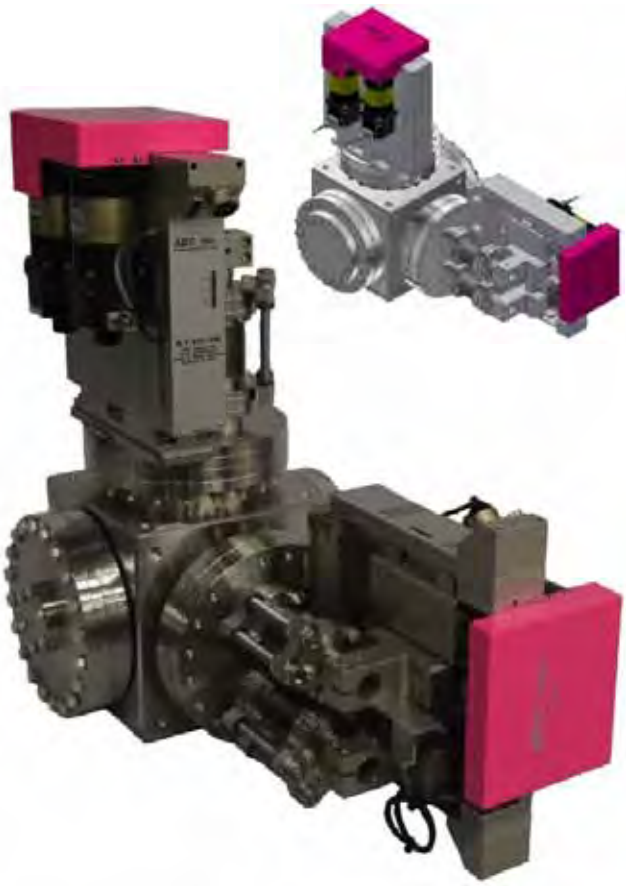
PAL UHV Slit System

APS UHV, high precision slit

SWISSFEL HIGH PRECISION SLITS

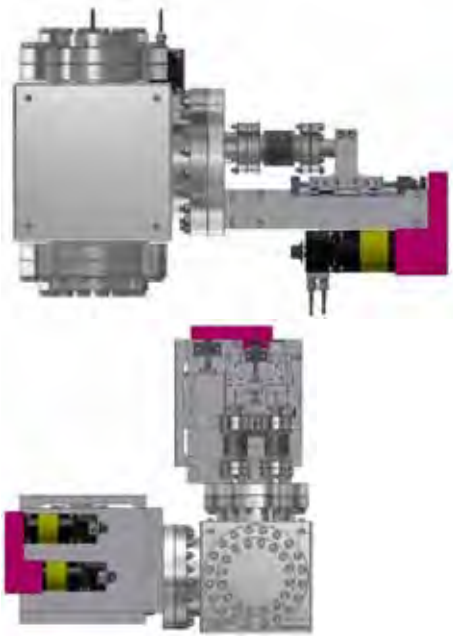
Curtain Design

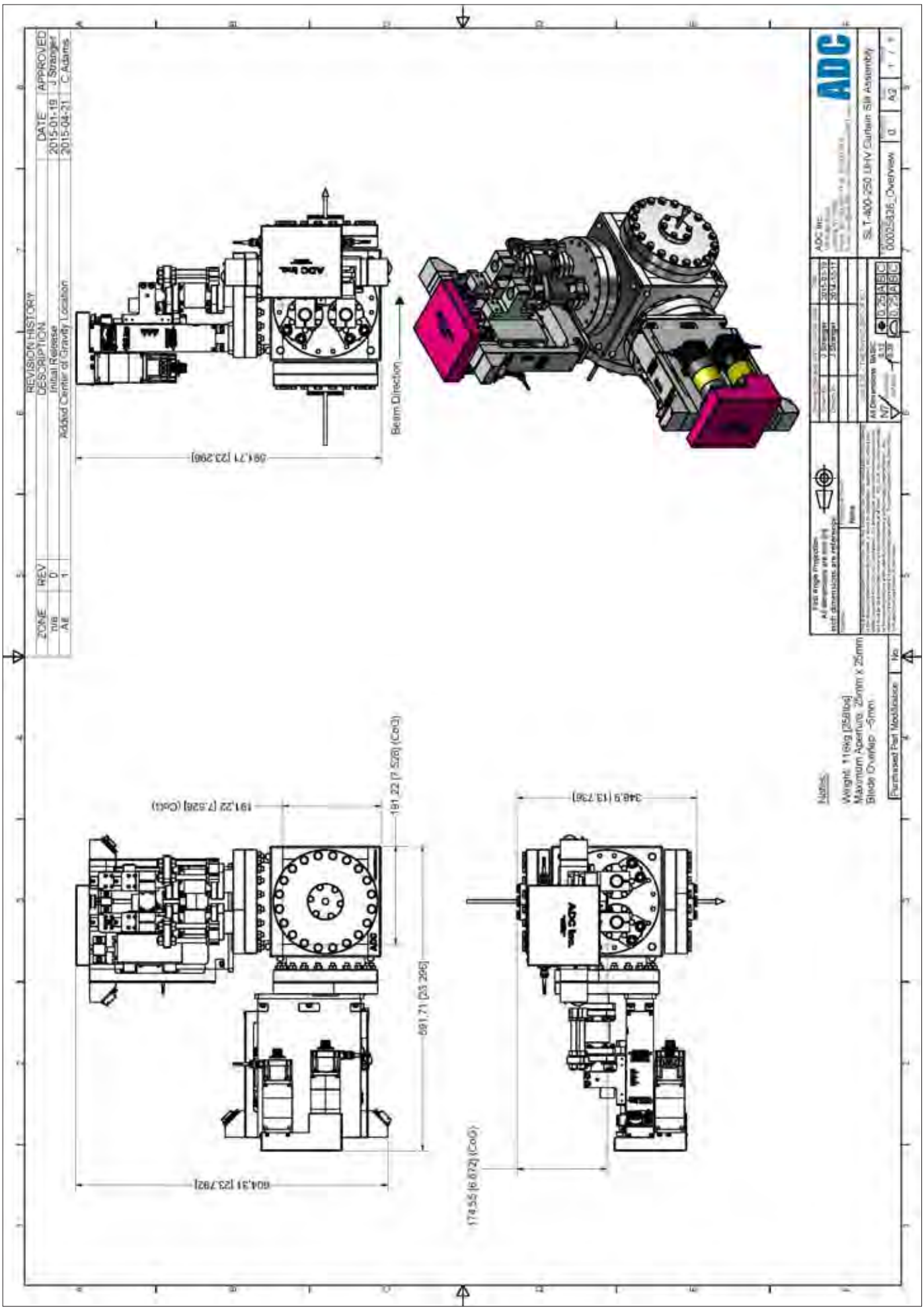
For more information please visit the following website:
http://www.psi.ch/swissfel/swissfel



The SwissFEL baseline design produce FEL pulses covering the wavelength range 1 Å to 70 Å (0.1–7 nm) with a compact and economic design. These custom high precision slits for SwissFEL were designed for UHV that can be used for apertures up to 25mm x 25mm. This curtain slit allows a gap to be set and allows that set gap to be scanned across the full travel. The full range of scan motion allowable for the slit is 25mm. The allowable gap for the slit is 25mm max with 5mm allowable blade overlap. Both the gap and scan axes feature burgess limit switches. Each axis is also encoded using a Renishaw incremental encoder. All of the actuator components (bearing rails, ballscrews, limit switches, encoders, and ballscrews) are located outside of the UHV chamber. This eliminates the need for special lubricants on the actuator bearings. It also allows for the actuators to be adjusted, aligned, and serviced with the system installed on the beamline. A rigid connection between the slit blade and the actuator guarantees that encoder readings at the actuator are accurate.

Description	Value	Units
Maximum Aperture	25 [~1]	mm [“]
Blade Overlap	5 [~.2]	mm [“]
Blade Materials	Tungsten, Tantalum, Copper	-
Blade Thickness	4 [~.16]	mm [“]
Scan Range of Motion	+/- 12.5 [~.5]	mm [“]
Gap Range of Motion	+25 [~1] / -10 [~.4]	mm [“]
Scan Resolution (unit/step)	~ 0.000182	mm/step
Gap Resolution (unit/step)	~ 0.000179	mm/step
Weight	120 [265]	Kg [lbs]
Encoder Manuf.	Renishaw	-
Encoder Resolution	0.1	µm
Vacuum Level	$< 10^{-9}$	mbar
Beamline Connection	DN100 (6”) CF	-





SWISSFEL HIGH PRECISION SLITS

SWISSFEL HIGH PRECISION SLITS

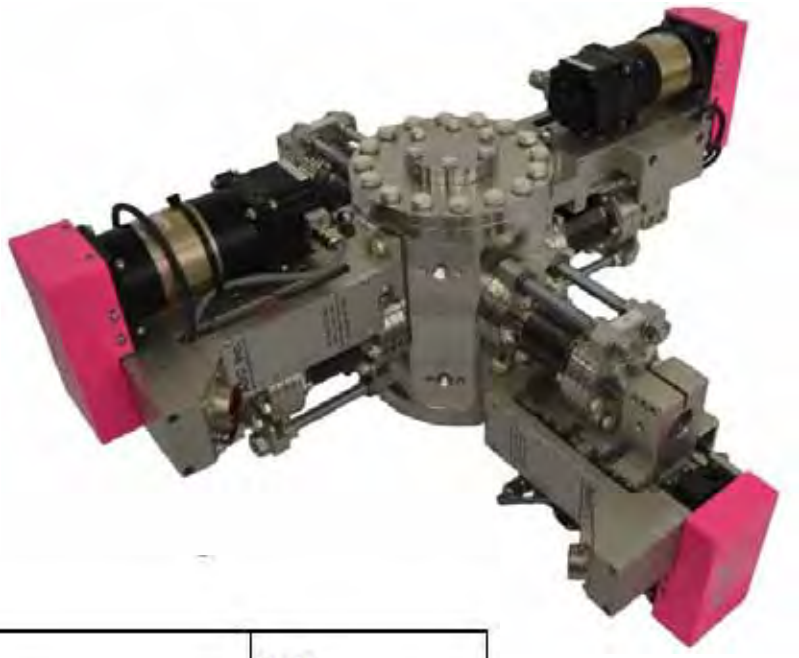
45 Degree

The SwissFEL baseline design produce FEL pulses covering the wavelength range 1 Å to 70 Å (0.1–7 nm) with a compact and economic design.

These custom high precision slits for SwissFEL were designed for UHV that can be used for apertures up to 25mm x 25mm. This curtain slit allows a gap to be set and allows that set gap to be scanned across the full travel. The full range of scan motion allowable for the slit is 25mm. The allowable gap for the slit is 25mm max with 5mm allowable blade overlap. Both the gap and scan axes feature burgess limit switches. Each axis is also encoded using a Renishaw incremental encoder. All of the actuator components (bearing rails, ballscrews, limit switches, encoders, and ballscrews) are located outside of the UHV chamber. This eliminates the need for special lubricants on the actuator bearings. It also allows for the actuators to be adjusted, aligned, and serviced with the system installed on the beamline. A rigid connection between the slit blade and the actuator guarantees that encoder readings at the actuator are accurate.

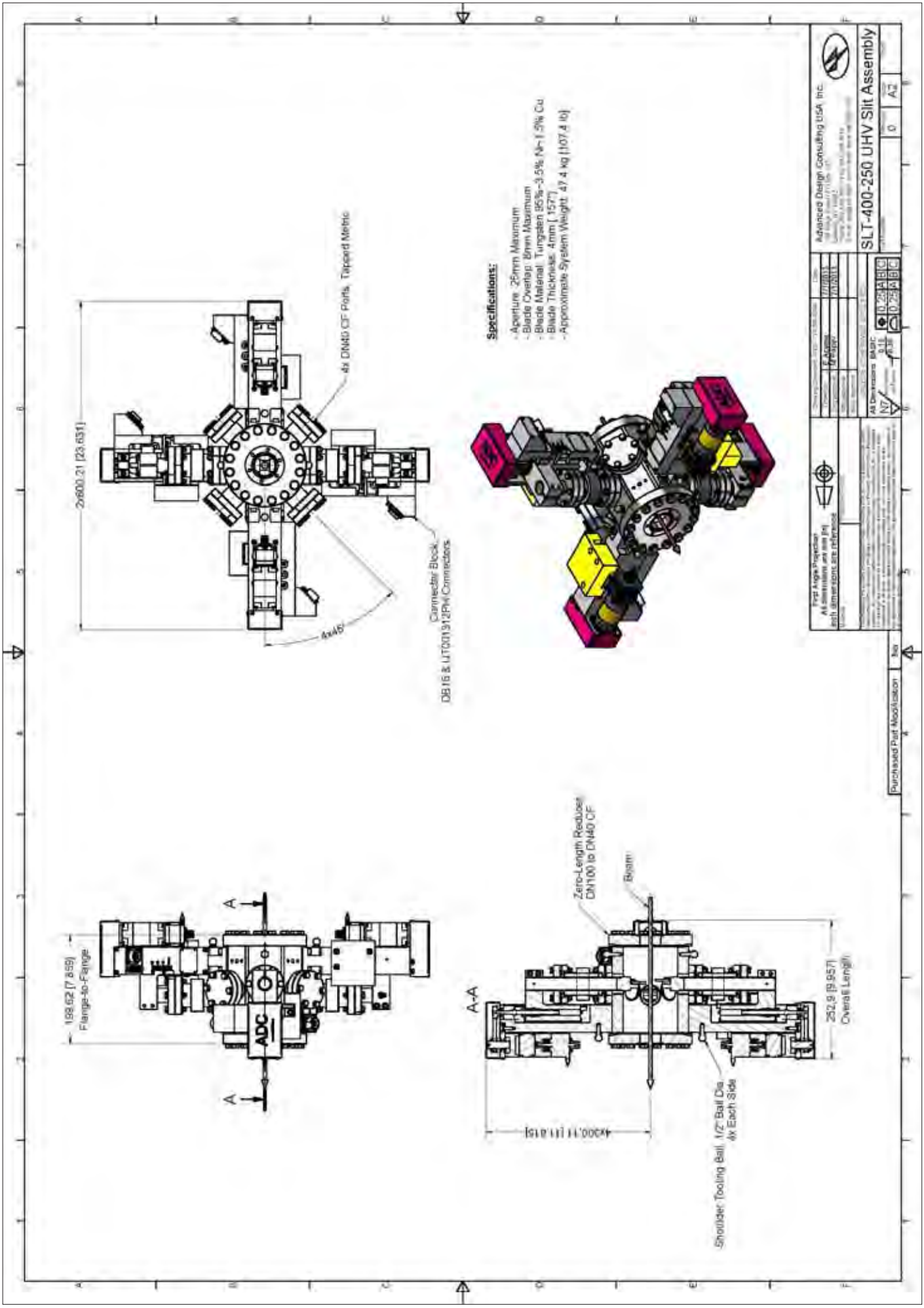
To find more please follow the link:

http://www.adc9001.com/products/view/540



Key Specifications:

Description	Value	Units
Maximum Aperture	25 [~1]	mm [“]
Blade Overlap	5 [~.2]	mm [“]
Blade Materials	Tungsten, Tantalum, Copper	-
Blade Thickness	4 [~.16]	mm [“]
Scan Range of Motion	+/- 12.5 [~.5]	mm [“]
Gap Range of Motion	+25 [~1] / -10 [~.4]	mm [“]
Scan Resolution (unit/step)	~ 0.000182	mm/step
Gap Resolution (unit/step)	~ 0.000179	mm/step
Weight	120 [265]	Kg [lbs]
Encoder Manuf.	Renishaw	-
Encoder Resolution	0.1	µm
Vacuum Level	$< 10^{-9}$	mbar
Beamline Connection	DN100 (6”) CF	-



SWISSFEL HIGH PRECISION SLITS – 45 DEGREE

UHV SLIT SYSTEM WITH YAG CRYSTAL

To find more please follow the link:

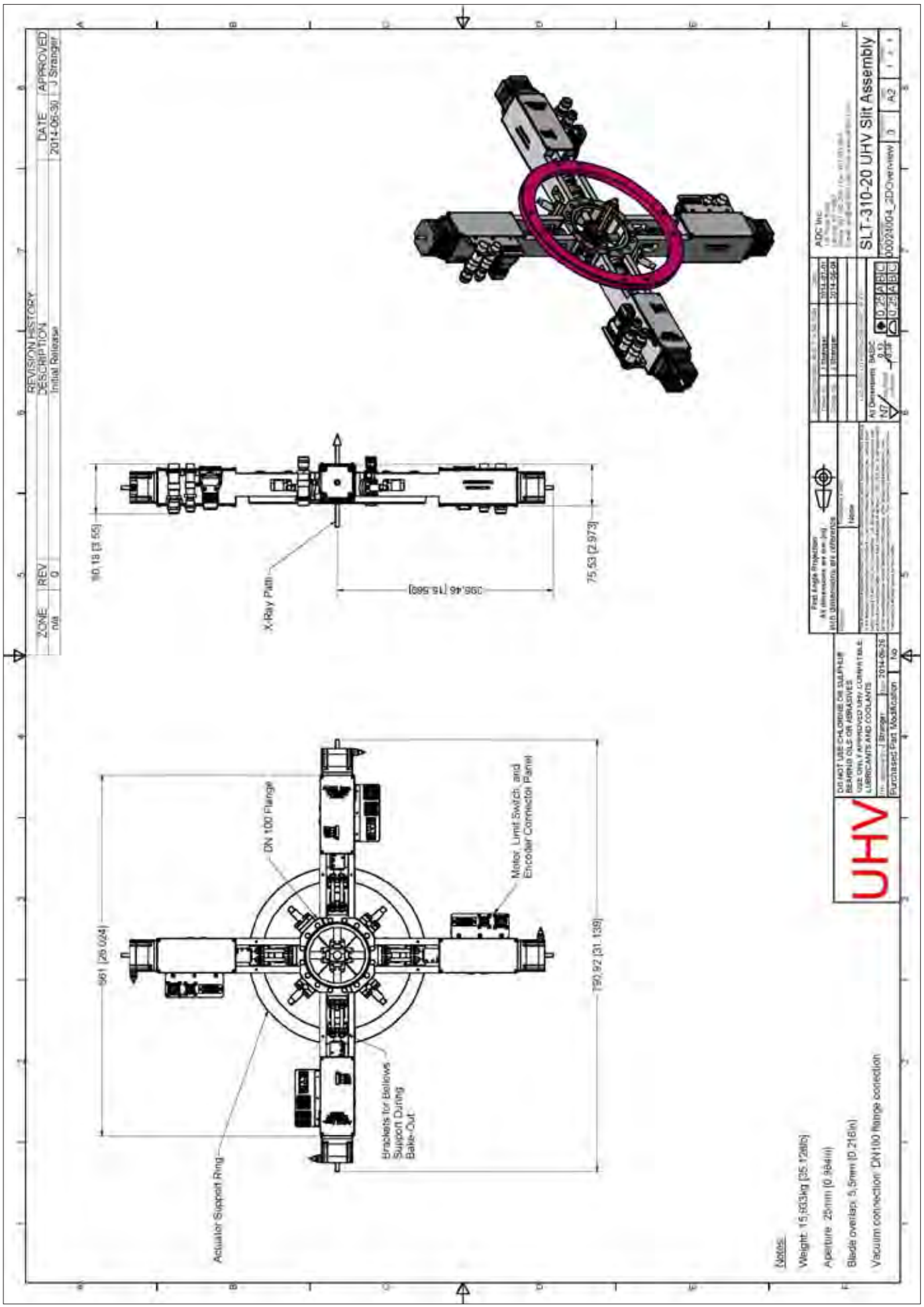
http://www.adc9001.com/products/view/540

The high precision UHV slit system was designed for DLS I05 Nano ARPES Beamline. http://www.diamond.ac.uk/Beamlines/Surfaces-and-Interfaces/I05.html

The total apertures is 25mm x 25mm. Each blade is actuated independently by the 4 actuators mounted to the slit body. This slit system is designed to be especially easy to service. There are no bearing rails, limit switches, encoders, or drive screws within the slit chamber. This eliminates the need for special lubricants and allows the actuators to be adjusted, aligned, and serviced with the system installed in the beamline. This slits application required using fluorescent screen fixed to vertical upper and lower blade, that was single crystal YAG (Yttrium Aluminum Garnet). Each slit unit has 4 fiduciary marks provided. All UHV sections are vacuum tested to better than 5x10-10 torr and have a leak rate of less than 2x10–10 mbar l -1 s-1 . Blades are available in Tungsten, Tantalum, and Copper.

Key Specifications:

Description	Value	Units
Maximum Aperture	25 [~1]	mm [“]
Blade Overlap	5 [~.2]	mm [“]
Blade Thickness	2 [~.08]	mm [“]
Resolution (unit/step)	~0.001588	mm/step
Weight	16 [35]	Kg [lbs]
Encoder Manuf.	Renishaw	-
Resolution	0.1	µm



DLS UHV SLITS WITH YAG CRYSTAL

HIGH HEAT LOAD FOR ESRF

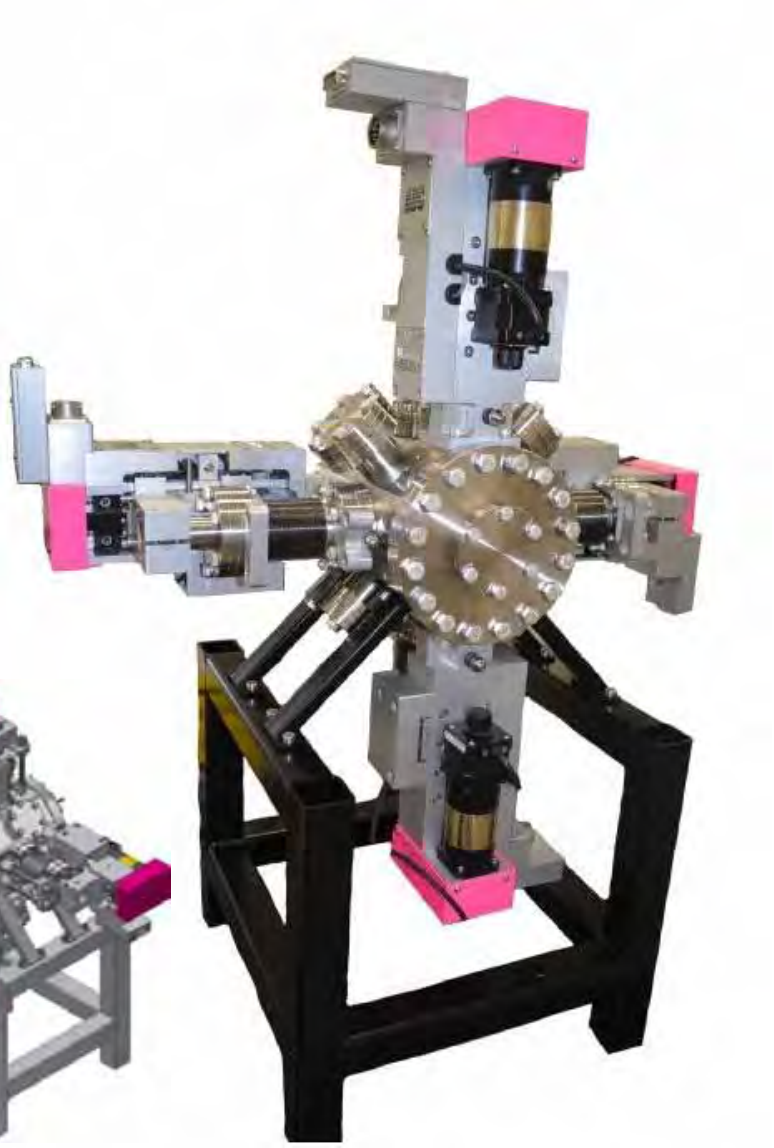
To find more please follow the link:

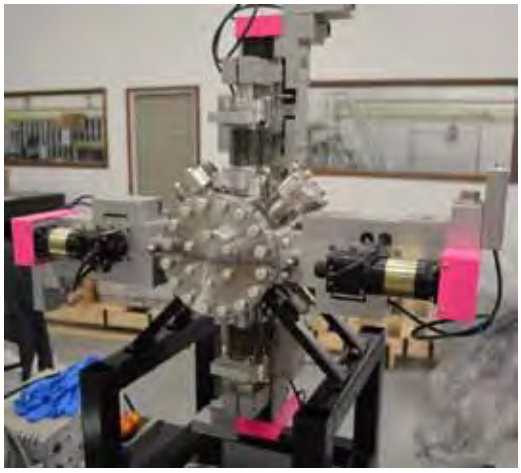
http://www.adc9001.com/products/view/538

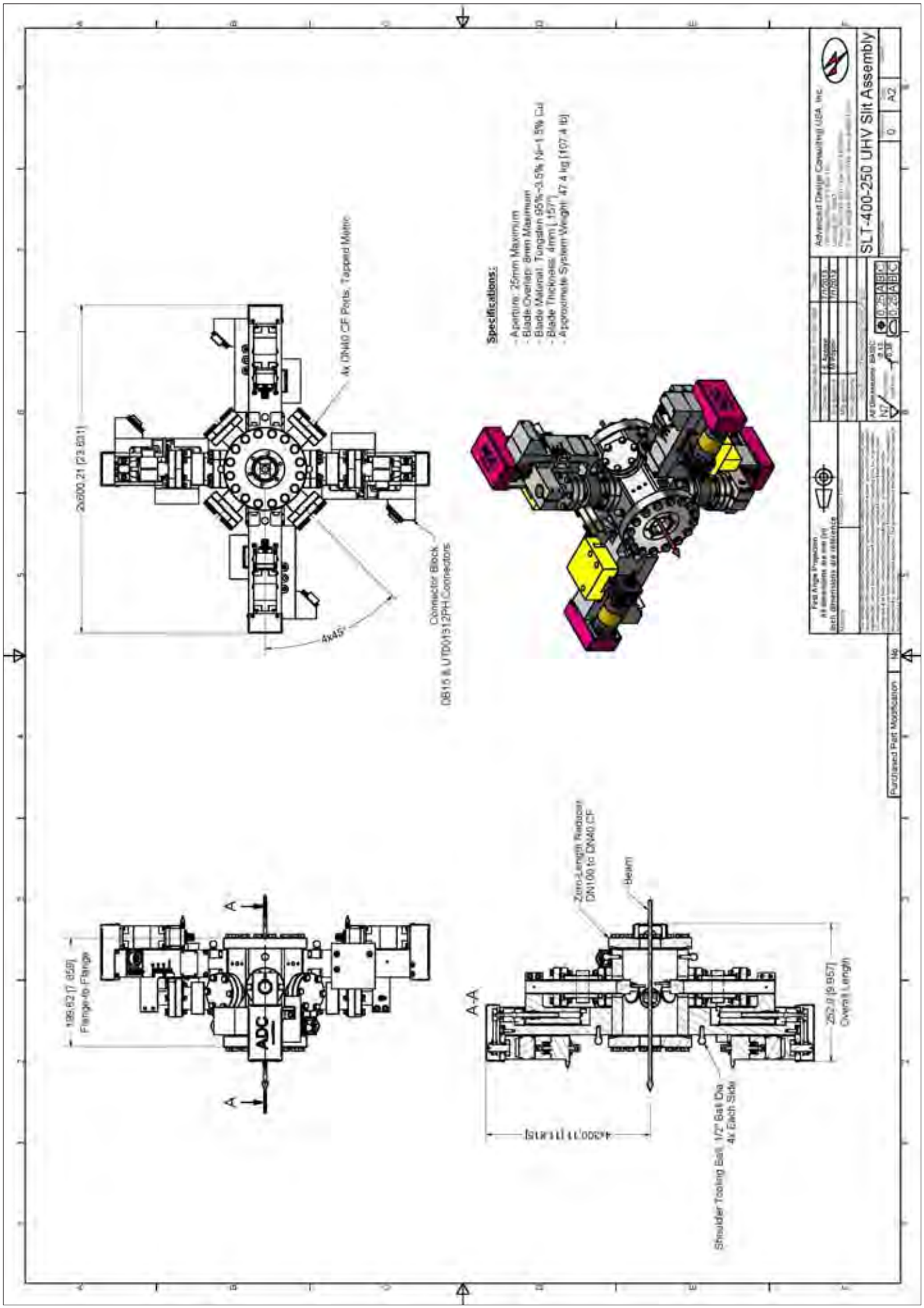
The high precision slit system is designed for UHV and can be used for apertures up to 25mm x 25mm. Blades are actuated independently by 4 actuators mounted on the slit body. This slit system was designed to be robust and easily serviceable. All of the actuator components (bearing rails, limit switches, encoders, and ballscrews) are located outside of the UHV chamber. This eliminates the need for special lubricants on the actuator bearings. It also allows for the actuators to be adjusted, aligned, and serviced with the system installed on the beamline. A rigid connection between the slit blade and the actuator guarantees that encoder readings at the actuator are accurate. Modal analysis with FEA and physical tests were done during the design to make sure there are no resonant frequencies below 200 Hz at the blade. The UHV chamber has 4 spare DN40 CF ports for connecting pumping and diagnostics. Edge-welded UHV bellows connect the chamber to the blade actuator. Blades can be removed through the inside diameter of the bellows. The bellows themselves can be removed with the unit still installed on the Beamline within an hour not days.

Specification:
- 0.09 µm precision
- Renishaw Encoder (Absolute)
- High Accuracy Ball Screw Drive
- 1 µm Home Limit Switch

Ability to monitor the beam
- Blade material; Tungsten
- Roughness of the jaw edge surface:







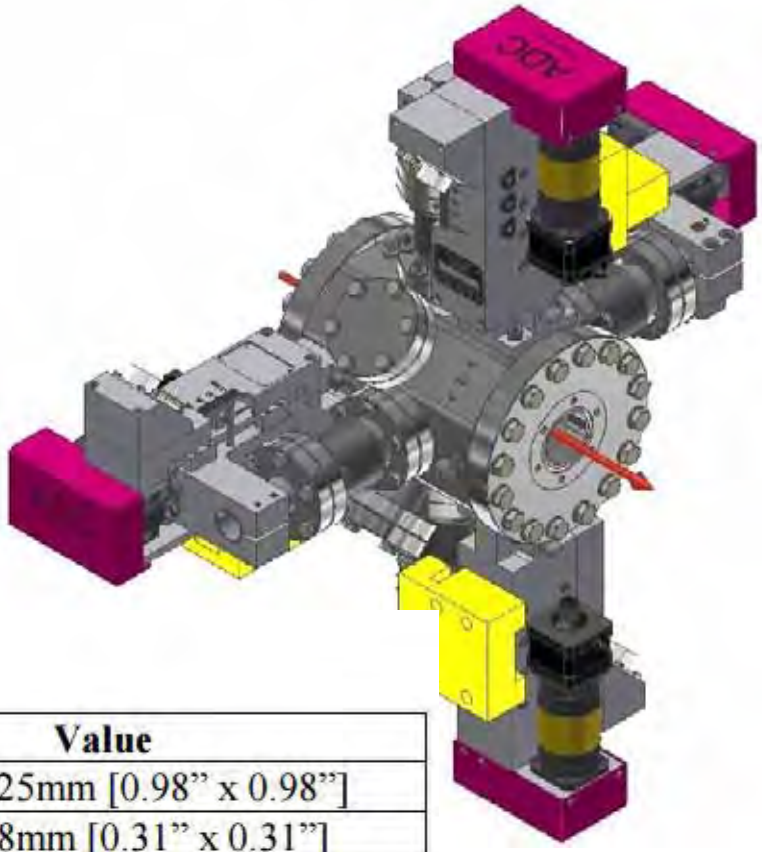
ESRF HIGH HEAT LOAD

MAX IV HIGH PRECISION SLITS

For more information please visit

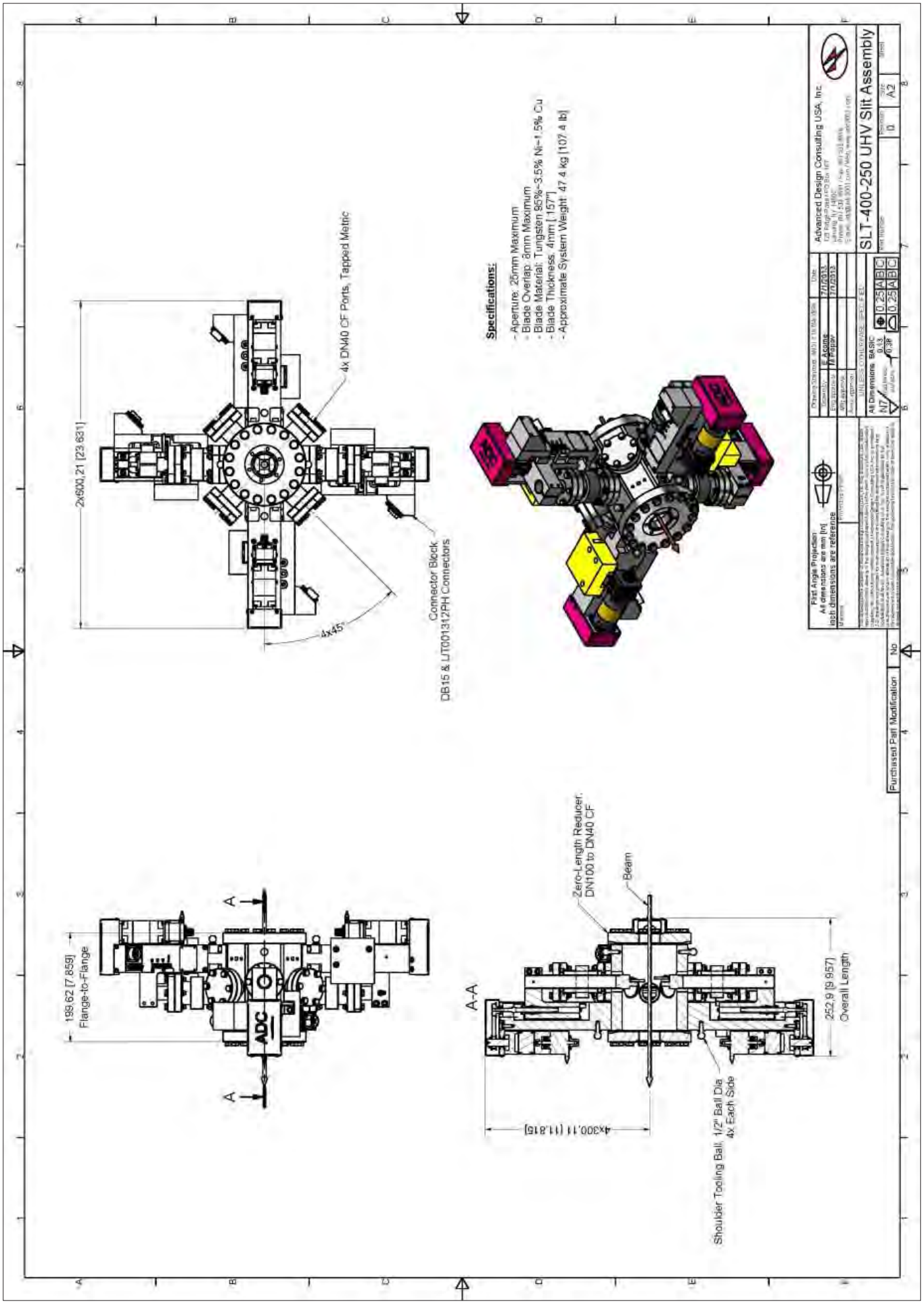
http://www.adc9001.com/products/view/542

ADC engineered a new family of custom UHV, high precision, slit for MAX IV. The slit has 4 independent blades with a maximum aperture of 25mm x 25mm. Description: These slit system were designed for UHV and can be used for apertures up to 25mm x 25mm. Blades are actuated independently by 4 actuators mounted on the slit body. This slit system was designed to be robust and easily serviceable. All of the actuator components (bearing rails, ballscrews, limit switches, encoders, and ballscrews) are located outside of the UHV chamber. This eliminates the need for special lubricants on the actuator bearings. It also allows for the actuators to be adjusted, aligned, and serviced with the system installed on the beamline. A rigid connection between the slit blade and the actuator guarantees that encoder readings at the actuator are accurate. Modal analysis with FEA and physical tests were done during the design to make sure there are no resonant frequencies below 200 Hz at the blade. The UHV chamber has 4 spare DN40 CF ports for connecting pumping and diagnostics. Edge-welded UHV bellows connect the chamber to the blade actuator. Blades can be removed through the inside diameter of the bellows. The bellows themselves can be removed with the unit still installed on the beamline.



Key Specifications:

Parameter	Value
Maximum Aperture	25mm x 25mm [0.98" x 0.98"]
Blade Overlap	8mm x 8mm [0.31" x 0.31"]
Blade Material	Tungsten 95%~3.5% Ni~1.5% Cu*
Blade Thickness	4mm [0.16"]*
Flange-to-Flange Length	200mm [7.87"]
Vacuum Level	$< 10^{-9}$ mbar (UHV)
Beamline Connection	DN40 (2 ¾") CF*

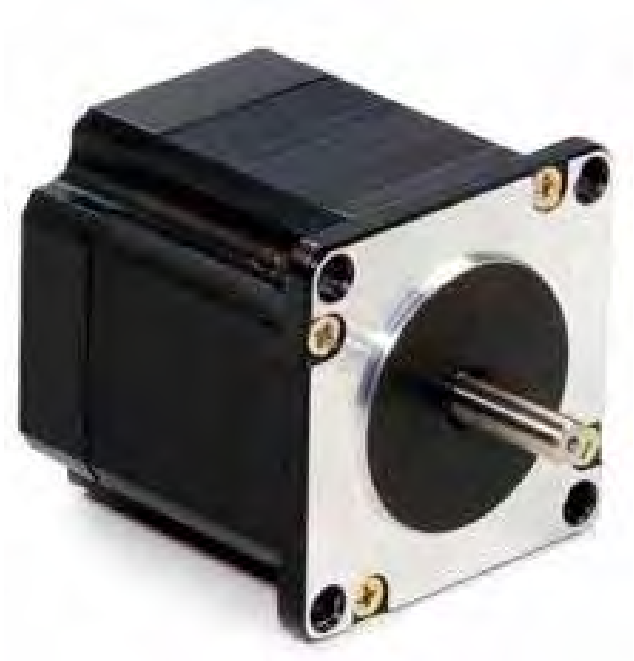


MAX IV HIGH PRECISION SLITS

GENERAL SLIT INFORMATION

The following section will highlight the common information shared between the high precision slit systems. For more information please contact ADC or visit our website at:

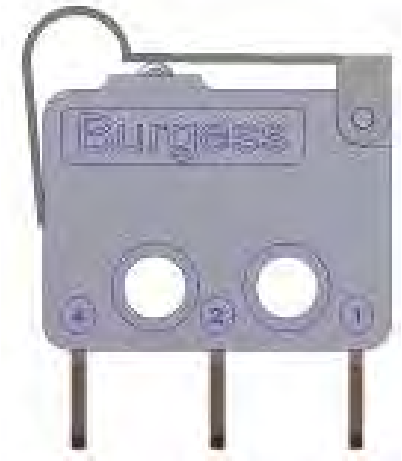
http://www.adc9001.com/SLITS



Motors

Custom High Precision Systems are provided with motors and limit switches for the equipment. ADC uses standard Lin Engineering NEMA bi-polar (2-phase) stepper motors with 200 steps/rev (1.8°/step) and Micromo Motors with gearboxes on the SLT-50 slits. Depending upon the application and customer requirements, stepper motors of sizes 17 or 23 may be used. For more information please contact ADC.

These motors could be controlled with the majority of off the shelf controller/drivers on the market. Planetary gear boxes from CGI are provided on slits achieve high resolution and load capacity. ADC also offers the option of using a 5 phase stepper motor or servo motor on the Custom High Precision Systems. All axis of motion are equipped with limit switches to prevent failure in case of a problem.



Limit Switches

All axes are fitted with mechanical limit switches. The in all but the SLT-50 the standard limit switchis made by Burgess PN: F4T7Y1 with a lever modification. These limit switches are located outside of UHV and protected by an aluminum cover. They are calibrated and tested by ADC's engineers to ensure proper operation and travel. Limit switches are mounted in slots so they can be adjusted if a different travel is required.

Home Switches

The SLT-310 and SLT-400 series have the option of a high precision Baumer MY-COM home switch. With a repeat accuracy of 1 micron, the My-Com® remains undisputedly the most accurate and most compact mechanical switch in the world. With its extremely compact design it can be placed in many arrangements.

Linear Incremental Encoders

Linearincremental encoders are available as an additional option for slits. Al uses high resolution Renishaw TONiC series encoders. TONiC is Renishaw's ne super-compact non-contact optical encoder that offers speeds up to 10 m/s a resolutions down to 1 nm for both linear and rotary applications. Offeri significant enhancements to Renishaw's existing range of high spe non-contact optical encoders, TONiC also gives improved signal stability a long-term reliability, low cost of ownership and refreshing simplicity.

Linear Absolute Encoders

Linear absolute encoders are also available on most of the ADC's slits T... Renishaw RESOLUTE is a true absolute, fine pitch optical encoder system that has excellent dirt immunity, and an impressive specification that breaks new ground in position feedback. It is the world's first absolute encoder capable of 1 r resolution up to 100 m/s.

Rotary Incremental Encoders

In the two small slits series (SLT-50 and SLT-100) a US Digital miniature encode designed to provide digital quadrature encoder feedback.

Features:

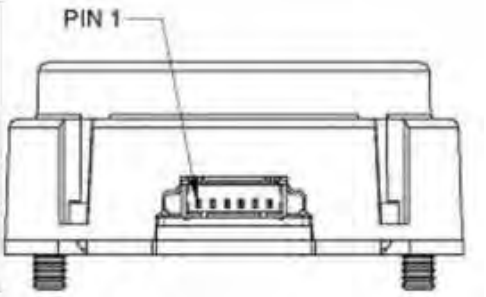
- 200 cycles per revolution (CPR)
- 800 pulses per revolution (PPR)
- Single +5V supply
- Maximum CPR of 18,000

Cabling & Connectors

To ensure proper operation of the system, all cabling, wiring and connectors supplied comply with the EMC and NEC directive. To meet these criteria, all conductors and connectors used have sufficient and appropriate shielding capacity. The shielding efficiency is affected by a number of factors such as the overall cable installation and the components employed. Therefore, continuous and homogeneous shielding is done by the use of screened conductors.

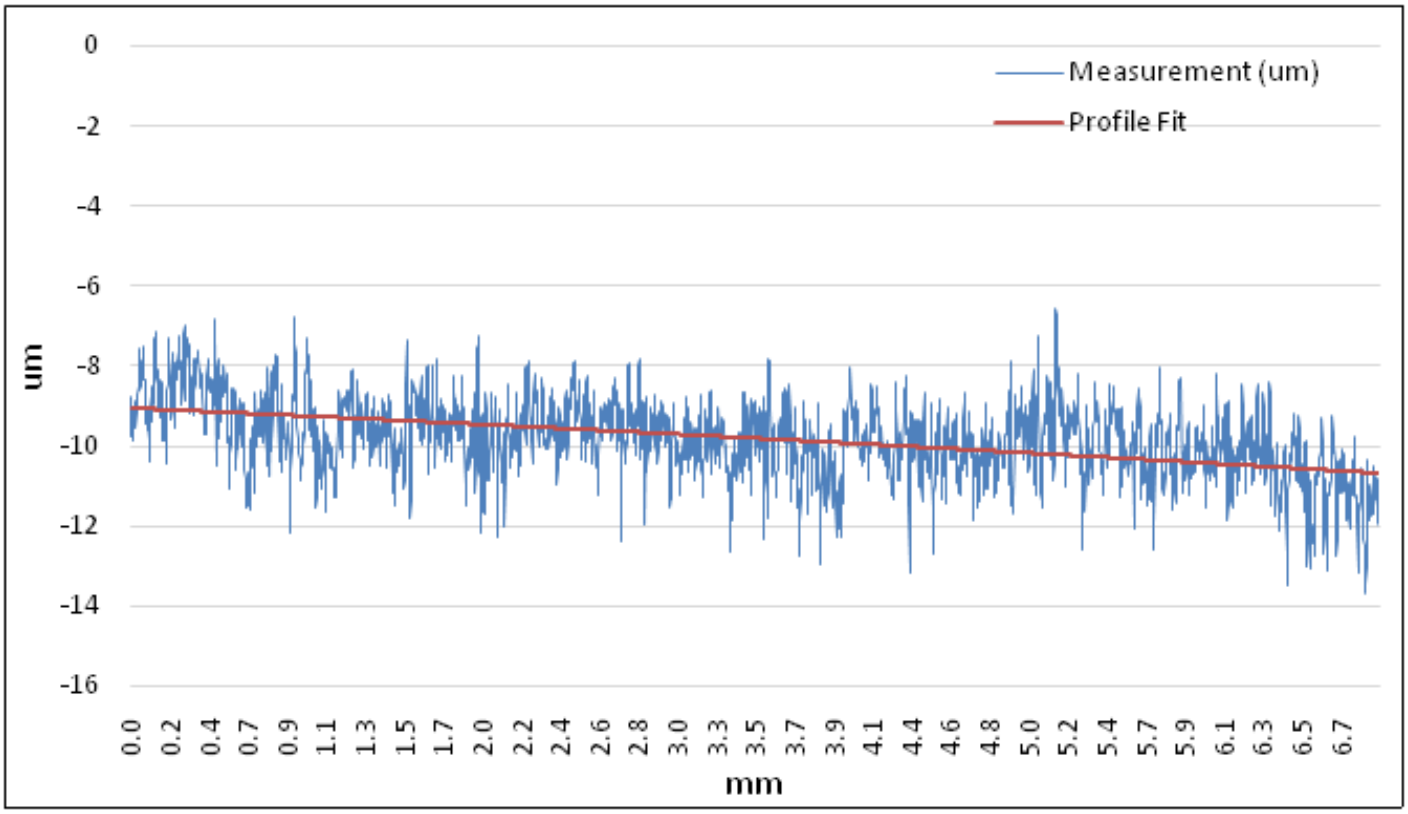
The connectors are firmly mounted on the overall equipment frame by the use of patch panels/bulkhead plates. This provides a safe and easy connection and disconnection of all field/control cables to the equipment. ADC provides a customized connector panel that exactly matches the type of connectors and wiring used at the customer's facility. This facilitates ease of installation and operation at a customer's site.

ADC provides a proper routing and grouping of cables installed. Consideration is given to the design of the cable management system, so practical assembly/disassembly of individual sub-assemblies is not affected during installation or maintenance.

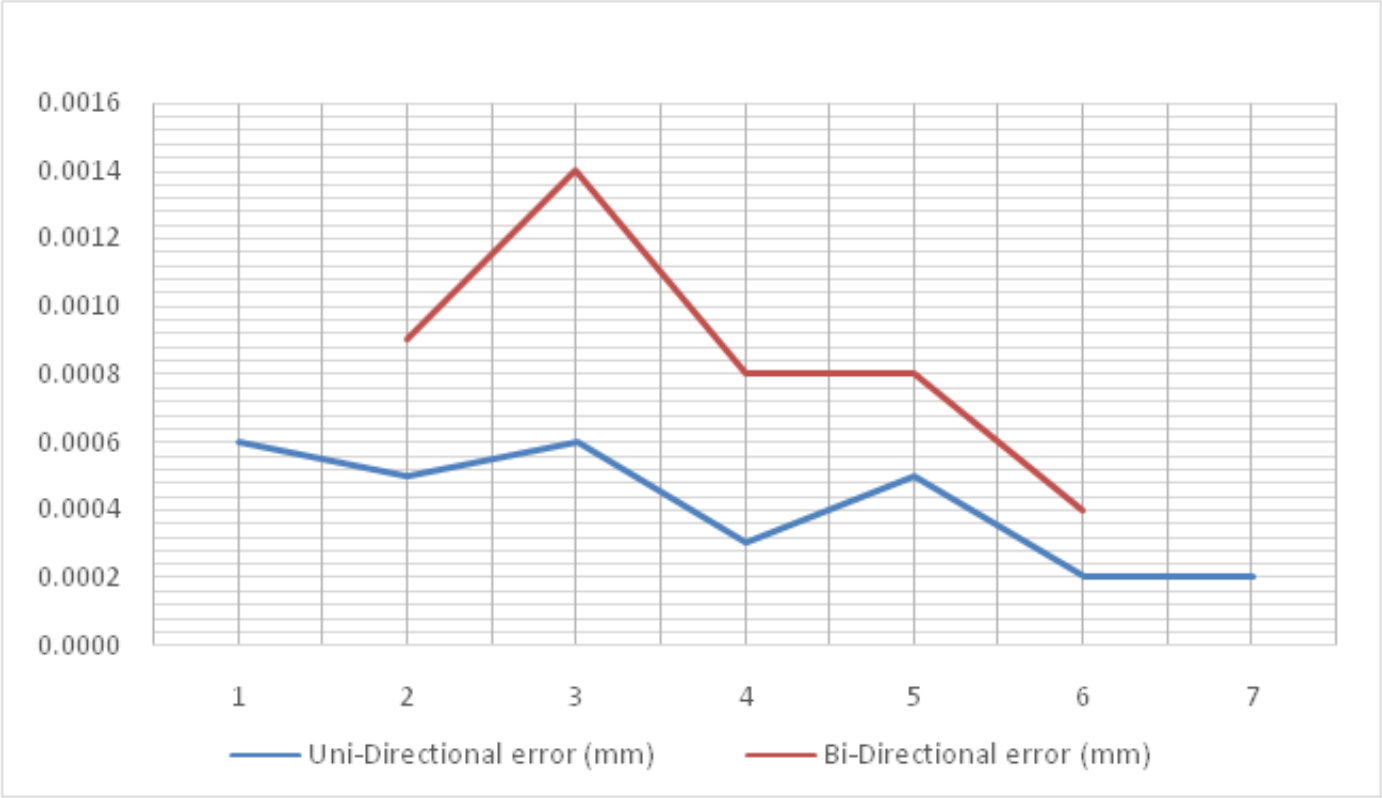


Testing & Quality Control

ADC thoroughly tests all relevant aspects of the slit systems to ensure the highest quality for our customers. Using state-of-the-art equipment, ADC verifies the accuracy, repeatability, and parallelism of each set of blades. Our technicians then generate reports to be presented to the customer with the completed system.



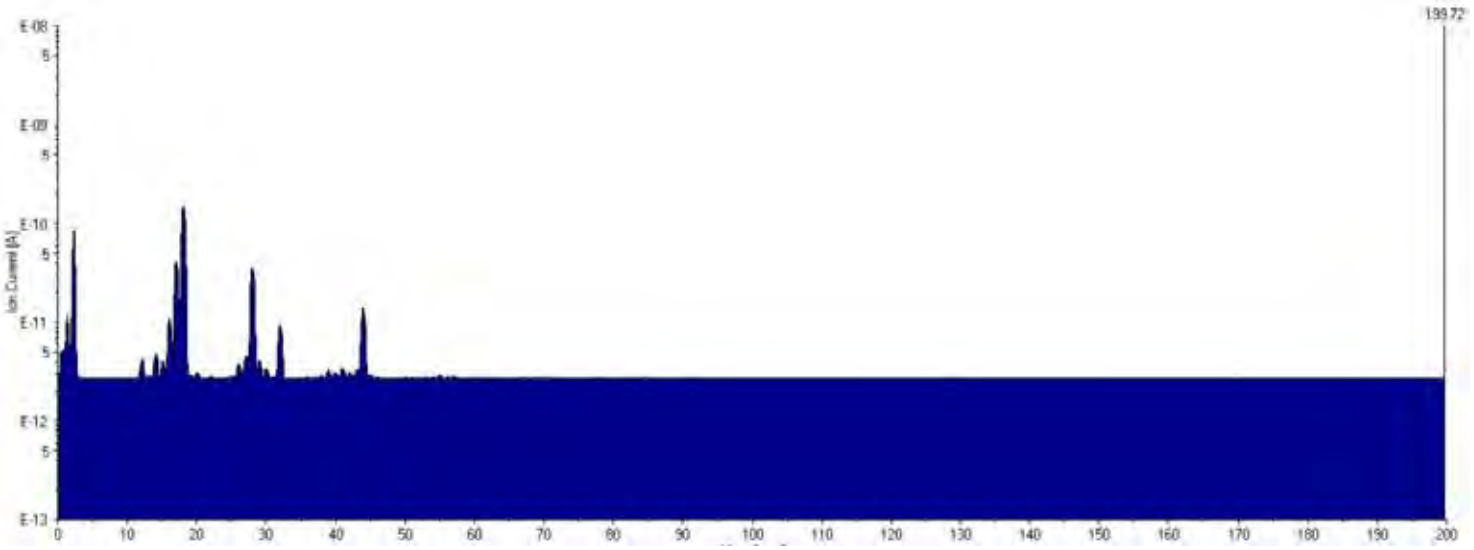
Sample Flatness Record
Flatness = 0.72mm over a 6.7mm distance



SAMPLE REPEATABILITY RECORD
UNI-DIRECTIONAL ERROR = 0.004 MM / BI-DIRECTIONAL ERROR = 0.009 MM

RGA System

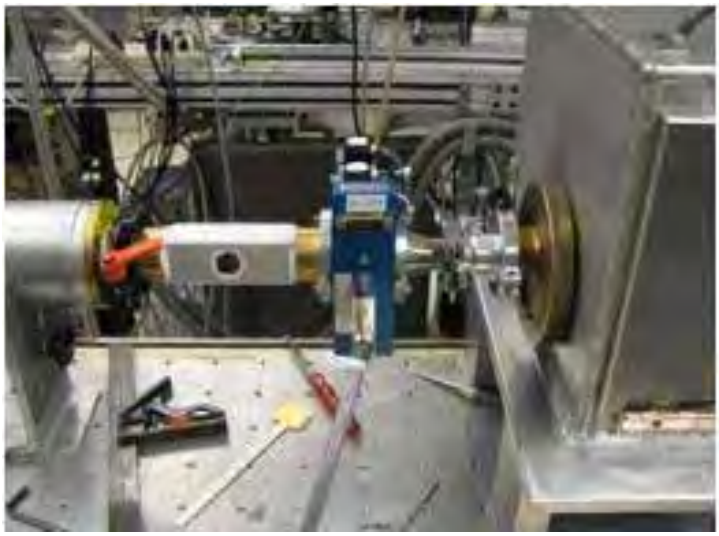
For ultra-high vacuum compatible equipment, ADC has the ability performs a bake-out and RGA for each system. The output of the RGA is documented and presented with the final product. ADC uses a Pfeiffer VacuumQMS 220 M2, PrismaPlus Compact Mass Spectrometer with a mass range 1 - 200 amu. The PrismPlus use secondary electron multiplier C-SEM and Faraday detectors.

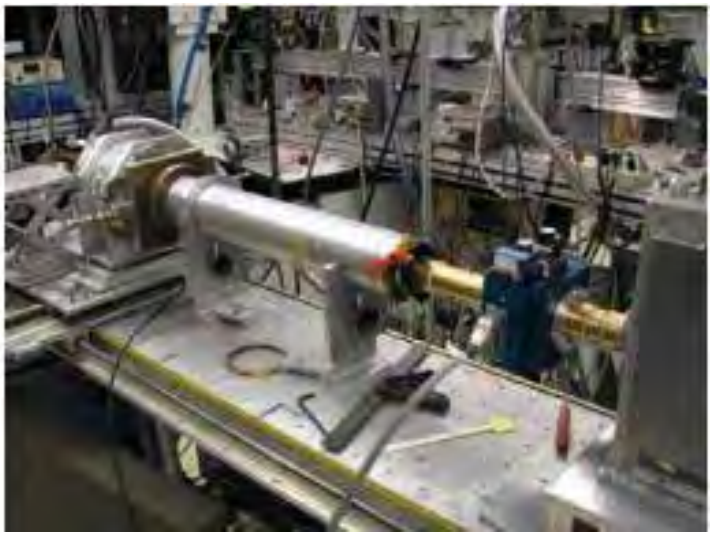


Blade Polishing

ADC has worked with the Cornell High Energy Synchrotron Source (CHESS) for many years developing a polishing process that produces the best slit blade knife-edges in the synchrotron community. We have collaborated in the design and test of slit blades in tungsten and tantalum with lessons learned that could be applied to other materials.

Recently we delivered 8 sets of slits to CHESS and we decided to go through another round checking our polishing process. ADC would polish different blade with small process modification. We would then have Cornell do the scattering test for us and compare the results.
The tests were conducted on a rotating anode source at Cornell University's lab with an evacuated flight path and a CCD.

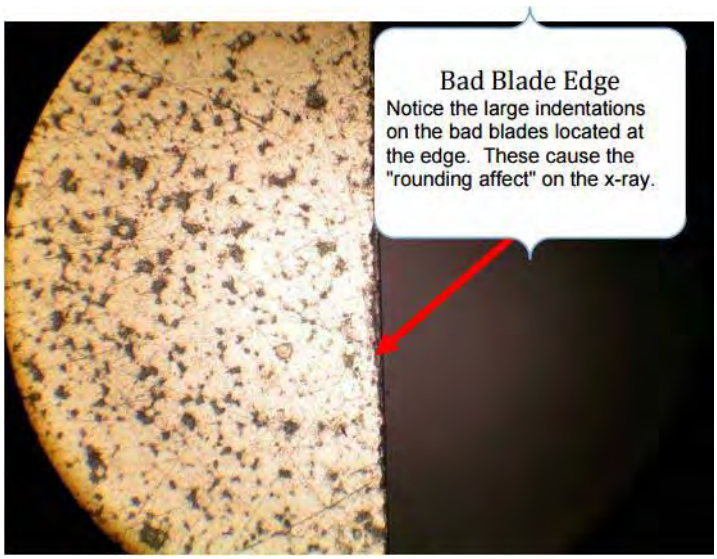




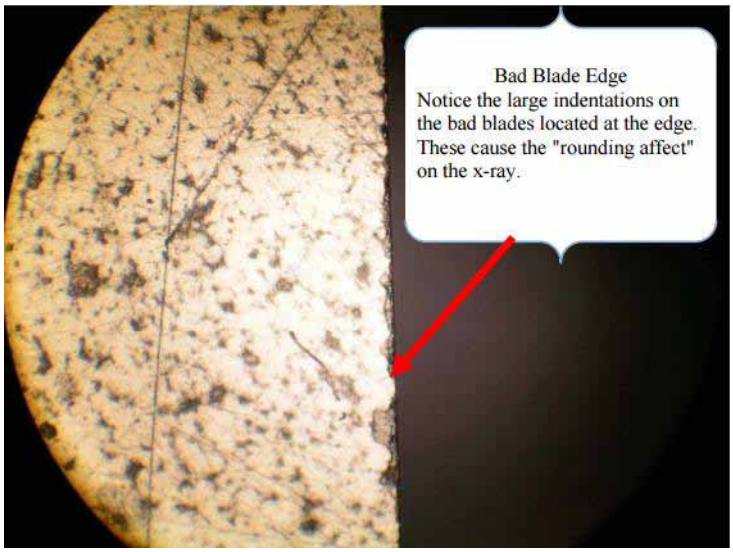
This is a small-angle setup on a laboratory source with an approximately 1 meter path length, the wavelength was about 1.5 A. Based on this typical configuration one would expect at least down to q = 0.01 (2Pi Sing(theta)/lambda) or equivalently (d-spacing of maybe 600 A).
The setup already has beam defining slits and guard slits in place. We place a single blade half way in the direct beam (in vacuum) after the guard slits and compare the scattering with what we see without the blade. We know that the blade cuts through 1/2 the beam due to PIN diode readings in the beamstop.

Results:
These tests were conducted on the same material but different polishing process. Here are the photos of the blades.

Material: Tungsten 95%~3.5% Ni~1.5% Cu which is Tungsten Alloy Product Standard: ASTM B 777 Class Using an Olympus microscope at a power.



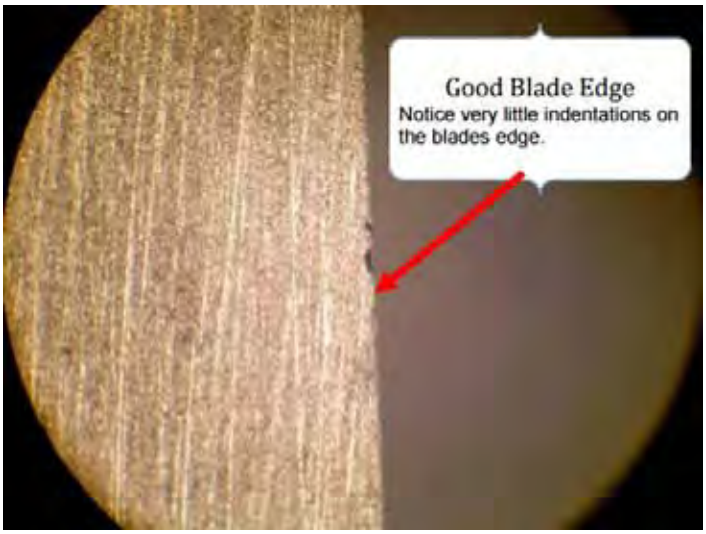
Blade 1



Blade 2

Notice the large indentations on the bad blades located at the edge. These cause the "rounding affect" on the x-ray.

Blade 3



Blade 4

Presented below is a x-ray scattering document showing the beam with no slit, photos of a set of bad blades (1 & 2), and a set of good blades (3 & 4). These tests were done at Cornell for a comparison purposes so that one can see what is really meant by a "bad" polished blade and a "good" polished blade.

Notes: intensity in flares is 6000 cts
Exposure 2 x 100 sec

Bad Blades (1 & 2)

Good Blades (3 & 4)

No Slit

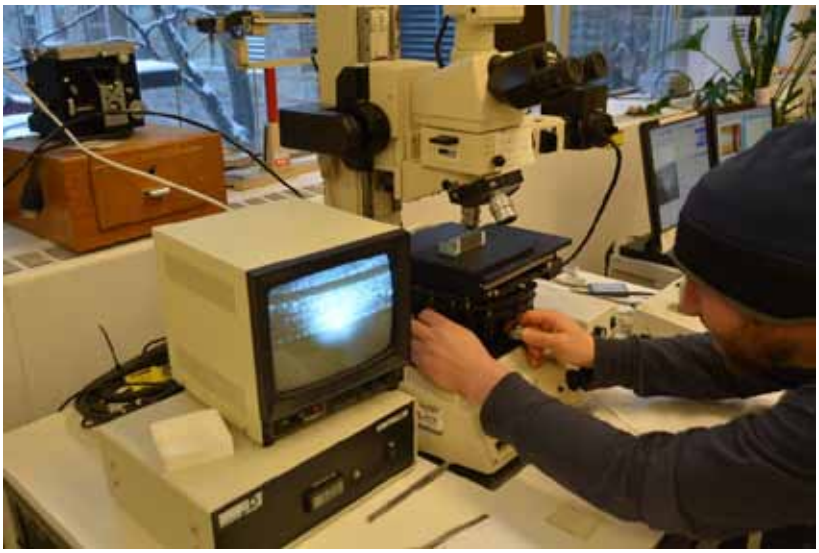
Related Pulication: Slit Blade Surface Roughness
http://adc9001.com/data/Surface_Roughness_Measurements.pdf

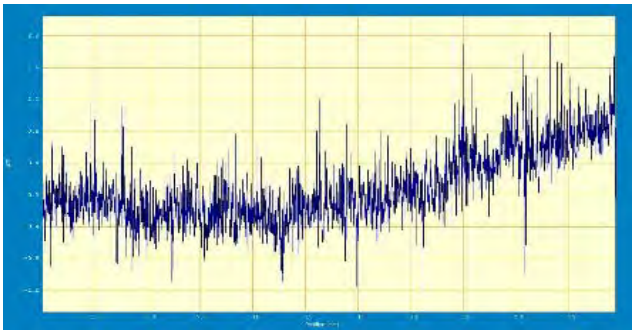
Non-Contact Surface Mapping of Slit Blades

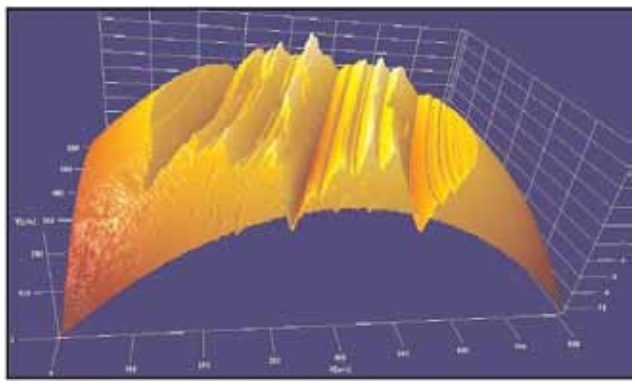
The high brilliance of third-generation synchrotron radiation sources necessitates the use of small beam sizes, extendingbelow 10 µm. This is of great interest for probing micrometer-sizedobjects, for diffraction at very smallangles orfor speckle and coherent scattering experiments. In x-ray diffraction experiments, imperfectionsof the optics makeit necessary to useslits (or pinholes), either to limit thebeam size or to reduce background scattering.

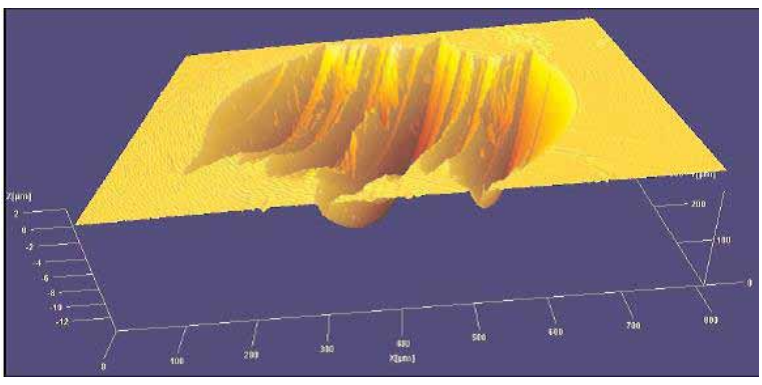
ADC has worked with the Cornell High Energy Synchrotron Source (CHESS) for many years developing a polishing process that produces the best slit bladeknife-edges in the synchrotron community. We have recently developed the capabilities to do "Non-Contact Surface Mapping of Slits Blade profile". We now can measure roughness, finish and texture of surfaces of slits blade tip.

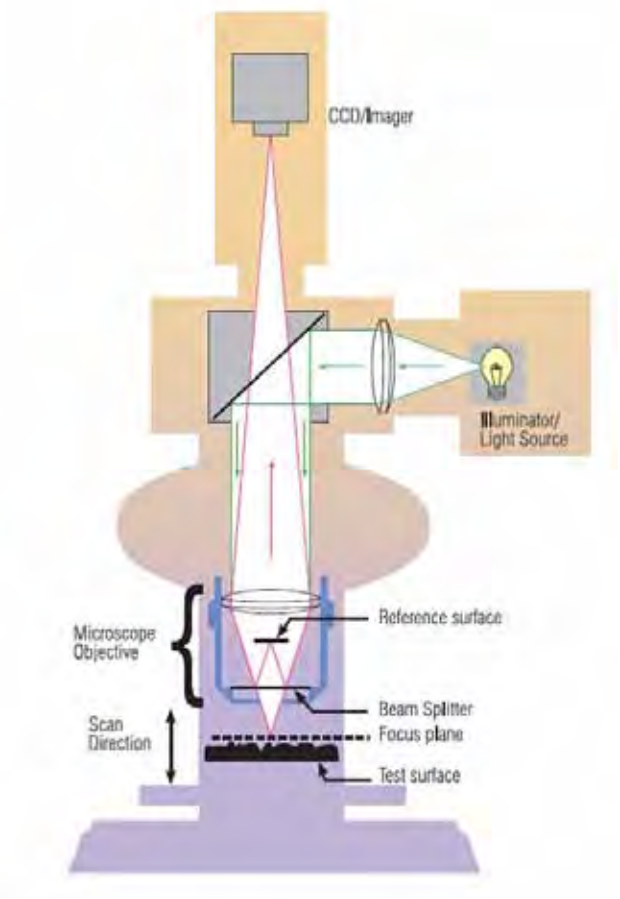
Using a powerful mapping and analysis software we are able to provide our customers, surface information (3-D interferometric profiling) which provide information on the texture, shape andfinish of surfaces. Complete mapping options allow three-dimensional pictures to bedrawn, profiles examined and color output to be printed. Our surface mapping system has RMS repeatability (standard mode): 1 nm; RMS repeatability (precision mode): 0.1 nm and RMS repeatability (single wavelength): 0.05 nm











Blade Beam Monitoring

The blades of the slits are independently, electrically isolated and have a connector and wire to enable beam monitoring. This is used to determine the position of the beam. Four independent electrical connections are typically used. The minimum DC resistance between the blade and earth is >110 ohms or 10 gigaohms.

Slit Stand

The stand is available for slit models SLT-600, SLT-700 and SLT-800.

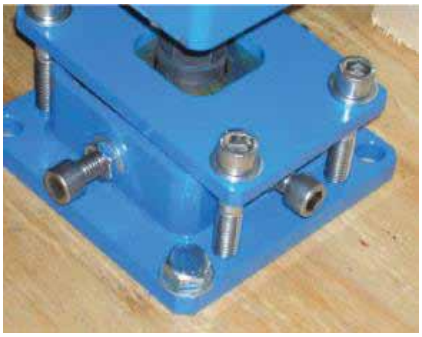
Granite

Welded tubular steel

The system base is comprised of welded tubular steel (can also be Aluminum) with a powder coated finish or granite better for vibrational dampening. The tubular structure has holes in the steel tubes so it can easily be filled with sand for added stability. Kinematic mounts on the base offer fine adjustment when lining up the slit to the beamline

Floor Mounting

ADC's slit stand comes with the ability to anchor to the floor and adjust and lock the parallelism of the slit stand with respect to the floor (pitch and roll) within ±50 µrad. The slit stand can be aligned in height and transverse position with an accuracy of 0.25mm. The frame is fitted with x-y-z adjustable shoes and bubble levels for adjusting roll, pitch,and yaw, x, y, and z position.



Permanent floor mounting options are also available with ADC optical tables. This is typically done by first grouting a precision flat plate to the facility floor. Before grout is poured, the plate is leveled and can be tied into the floor using threaded inserts. The grouted plate provides a permanent and extremely stable floor mount for the optical table.

Electronics and Instrumentation

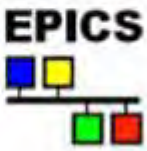
AADC has several electrical/software engineers and techs capable of providing custom circuit design and complete turn-key control systems. Some of our skills include integrated PLC design and programming, analog and digital circuit design, logic design (including PLA and FPGA programming), stepper and servo motor applications, microprocessor, RFID, serial and RF communications, and system controllers.

Our design tool set includes National Instruments (NI) MultiSim for schematic capture and NI UltiBoard for circuit board design, Xilinx ISE for FPGA design, ModelSim for simulation, and StateCad. Non-circuit board Schematics are drawn on various platforms with output to DXF. Microprocessor experience is broad but recent projects focus on the PIC Micro Family from MicroChip. ICE units and code simulation for the PIC microprocessors are in-house. Software skills and development platforms include Microsoft Visual C++, PERL, LabView, Visual Basic, CNC, and generic PLC (AB, NAIS, GE-Fanuc, Schneider, etc.) and Parker 6K and 9K (Accroloop).

Our standard motor controls and driver that we offer is the Aerotech Ensemble™ series controllers as described in this document. However, many of our customers have requirements for custom integration of these components into a functioning system, fully debugged, documented, and ready for operation.

We have provided mostly stepper motors but also servo motors on occasion. We have applied incremental and absolute linear and rotary encoders. A brake on all axes is standard. Limits consist of mechanical switches. For close repeatability at small gaps or near the beam pipe, ADC uses high repeatability (< 1 um) mechanical limit switches.

Software skills and development platforms include Microsoft Visual C++, LabView, EPICS, Visual Basic, CNC, and generic PLC (AB, NAIS, GE-Fanuc, Schneider, etc.) and Parker ACR and Accroloop. Our primary skill, however, is the integration of these components into a functioning system, fully debugged, documented, and ready for operation.



REFERENCES

The following is a list of the world class facilities that work with ADC creating cutting edge instrumentation. To see more information, follow the link to our reference page on our website.
http://www.adc9001.com/REFERENCES

National Aeronautics and Space Administration (NASA)	The Air Force Research Laboratory (AFRL)	ITER(International Thermonuclear Experimental Reactor)	The Advanced Light Source (ALS)
ANKA (abbreviation for „ Angströmquelle Karlsruhe“)	The Australian Nuclear Science and Technology Organisation (ANSTO)	The Australian Synchrotron (AS)	Diamond Light Source (DLS)
MAX IV Laboratory	CCLRC (Council for the Central Laboratory of the Research Councils)	Cornell High Energy Synchrotron Source (CHESS)	The Canadian Light Source (CLS)
Deutsches Elektronen-Synchrotron (DESY)	Department of Justice (DOJ)	Department of Transportation (DOT)	Brookhaven National Laboratory (BNL)
The European Synchrotron Radiation Facility (ESRF)	Free Electron Laser for Infrared eXperiments (FELIX)	High Flux Isotope Reactor (HFIR)	Hiroshima Synchrotron Radiation Center (HiSOR)
Raja Ramanna Centre for Advanced Technology, Indore (INDUS, RRCAT)	Science & Technology Facilities Council (ISIS)	ALBA (meaning "Sunrise" in Catalan and in Spanish)	IUC
Korea Atomic Energy Research Institute (KAERI)	Photon Factory (PF) at KEK	Los Alamos National Laboratory (LANL)	Laboratory for Atmospheric and Space Physics (LASP)

Michigan State University (MSU)

United States Navy (USN)

National Institute of Standards and Technology (NIST)

National Nuclear Security Administration (NNSA)

National Synchrotron Radiation Research Center (NSRRC)

Oak Ridge National Laboratory (ORNL)

Pohang Accelerator Laboratory (PAL)

Paul Scherrer Institute (PSI)

SLAC National Accelerator Laboratory

Spallation Neutron Source (SNS)

Special Operations Command (USSOCOM)

SOLARIS National Synchrotron Radiation Centre

Shanghai Synchrotron Radiation Facility (SSRF)

Mayo Clinic

Cornell University Department of Astronomy

Bar-Ilan University

The Advanced Photon Source (APS)

CAMD (LSU Lousiana State University

Canadian Institute for Neutron Scattering (CINS)

Elettra Sincrotrone Trieste

Institute of High Energy Physics, Chinese Academy of Sciences (IHEP)

Thomas Jefferson National Accelerator Facility (Jefferson Lab)

Brazilian Synchrotron Light Laboratory (LNLS)

National Oceanic and Atmospheric Administration (NOAA)

Shanghai Institute of Applied Physics (SINAP)

SPring-8
(Super Photon ring-8 GeV)

National Science Foundation

Design

Fabrication

Assembly

Installation

CERTIFIED ISO 9001:2008 COMPANY

Registered International Traffic in Arms Regulations ITAR

ADC

ISO 9001:2008 Certified

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