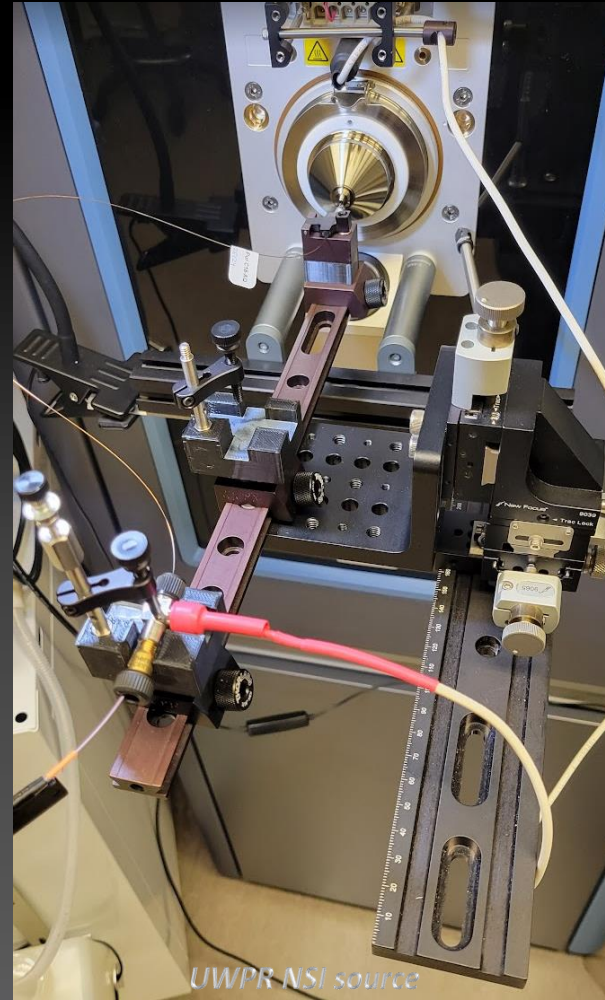
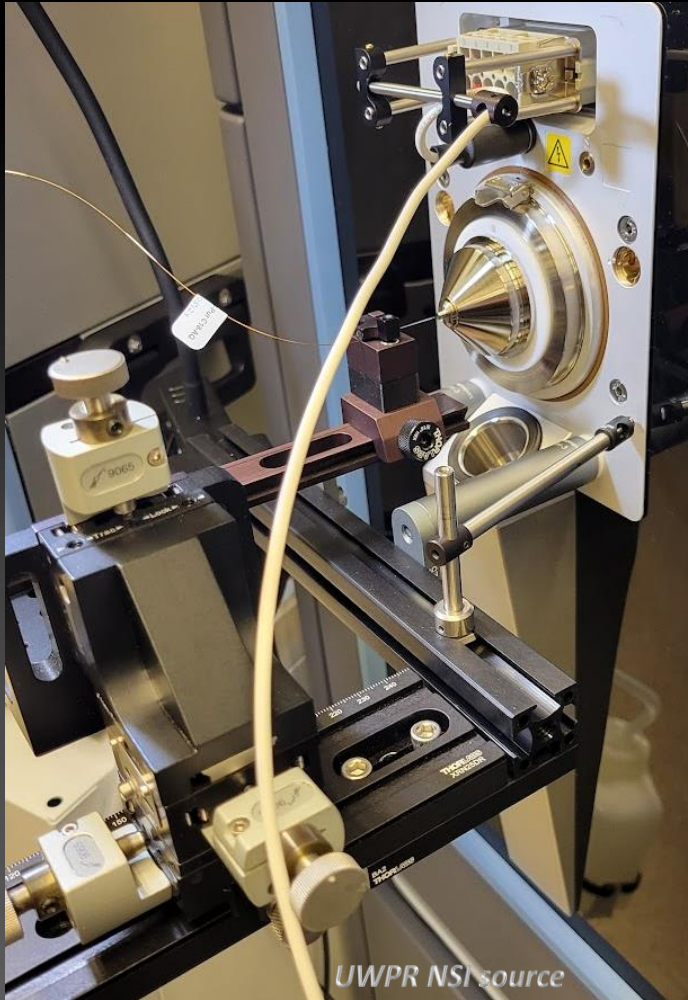
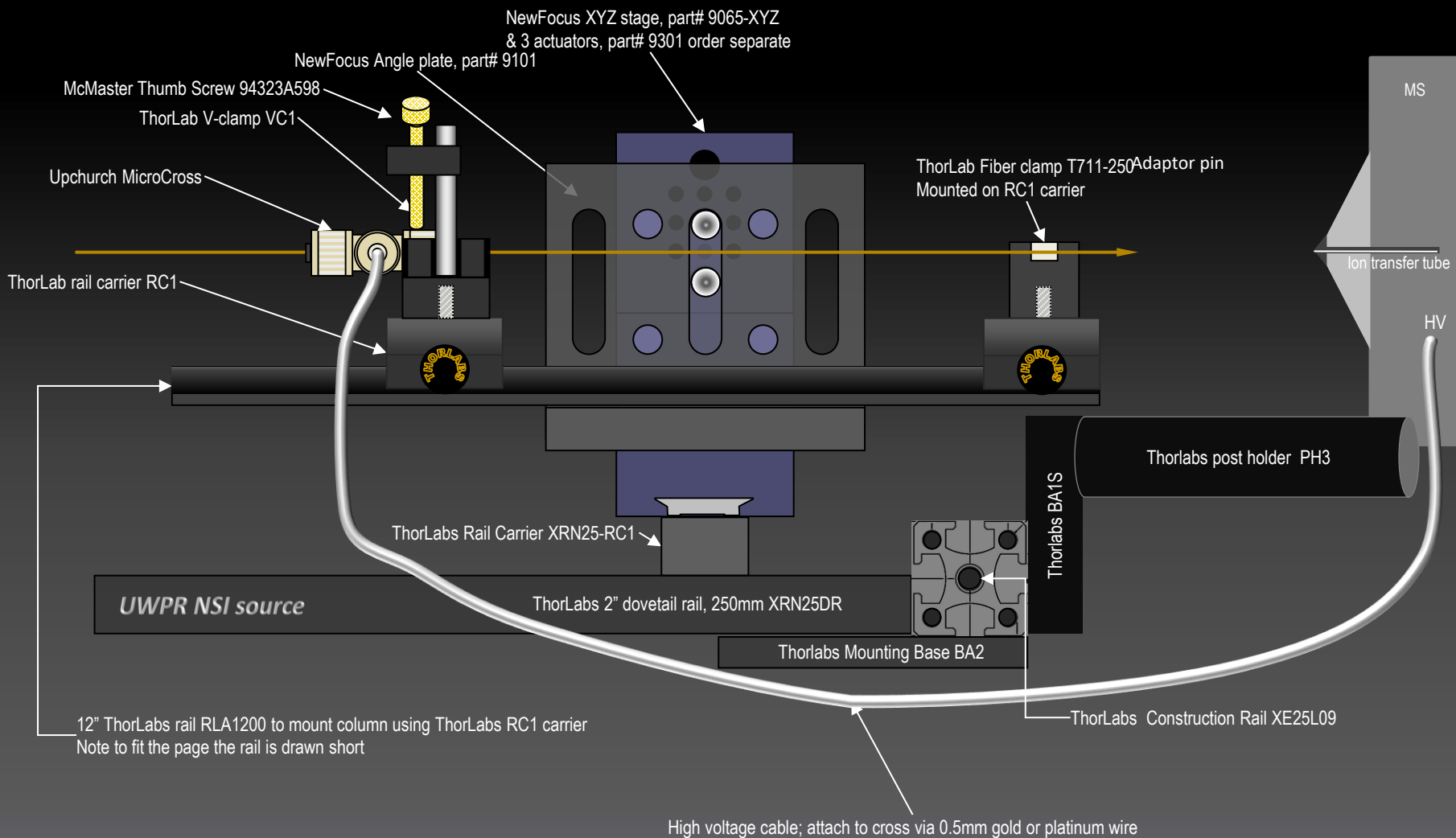


Nano-Spray-Ionization Source



- The NSI source can be adjusted to fit all Thermo instruments (LTQ, Tribrid, Exploris, TSQ etc)
- It offers all the benefits and features of commercial NSI sources:
 - Lower flow rates: no drying gas or thermal heating is required and increased sensitivity compared to higher flow ESI
 - Higher tolerance to a wide variety of liquid compositions than conventional ESI
- Additionally, this NSI source offers significant improvements over most commercial NSI sources:
 - Great flexibility: it will not only accommodate in house packed columns of all length but also commercial columns, as well as configurations with traps, spray tips etc.
 - The source can be customized to your specific needs: e.g. mounting of cameras, LED lights or anything else you can think of.....
 - Additionally, this NSI source can be used in conjunction with the Thermo NSI probes (static , dynamic and packed tip probe)
 - The open design allows for leaks to be detected immediately
 - Significantly lower cost
 - The NSI platform can also be used with the adaptor ring of the Thermo NSI source, eliminating the need to machine the adaptor bracket
 - All the parts are commercially available , except for the adaptor system, which is custom machined, e.g. by emachineshop.com
- The UWPR is currently using the NSI source on our Thermo instruments
- The plans for this NSI source are available for free, use at your own risk.... 😊
- This document and the xls file with all the part numbers should help you build your own source
- Note this is just a basic version, you can modify this source to fit your needs

UWPR new NSI Source



NSI Source: step 1



Tribids
Astral
TSQ Altis
Exploris

LTQ
LTQ-Orbitrap
TSQ Vantage

Q Exactive series

Note: you need two sets per instrument (one for each pin)

1. Attach base to post holder using a ¼-20 screw
2. Slide the bushings into the post holder in the order shown above
3. Replace the thumb screw with a ¼-20 set screw (optional)
4. Lightly tighten the set screw (or thumb screw) to hold flanged bushing
5. Slide the assembled post holders over the pins on the instrument

PH3	½" Post holder, 3"	(Thorlab)
PH2	½" Post holder, 2"	(Thorlabs)
BA1S	Mounting Base, 1" x 2.3" x 3/8"	(Thorlabs)
MSPH-2	Optical Post Holder, 2.25 in.	(Newport)
2706T16	Flanged PTFE Bearing	(McMasterCarr)
6362K233	Rulon Bearing	(McMasterCarr)
2639T13	PTFE Bearing	(McMasterCarr)

NSI Source: step 1 **untested** concept: alternate post holders



Note: you need two sets per instrument (one for each pin)

1. Attach Fixed Lens Mount to the Tube lens
2. Slide the bushings into the post holder in the order shown above
3. Attach the construction cube (or elbow plate) to the Lens Mount using a 8-32 screw with a washer
1. Slide the assembled post holders over the pins on the instrument

SM05L30	Lens Tube, 3"	(Thorlabs)
SM05L20	Lens Tube, 2"	(Thorlabs)
SMR05	Lens Mount with SM05 Internal Threads	(Thorlabs)
RM1G	1" Construction Cube	(Thorlabs)
XE25GP	Elbow Gusset Plate	(Thorlabs)
MSPH-2	Optical Post Holder, 2.25 in.	(Newport)
2706T16	Flanged PTFE Bearing	(McMasterCarr)
6362K233	Rulon Bearing	(McMasterCarr)
2639T13	PTFE Bearing	(McMasterCarr)

NSI Source: step 2



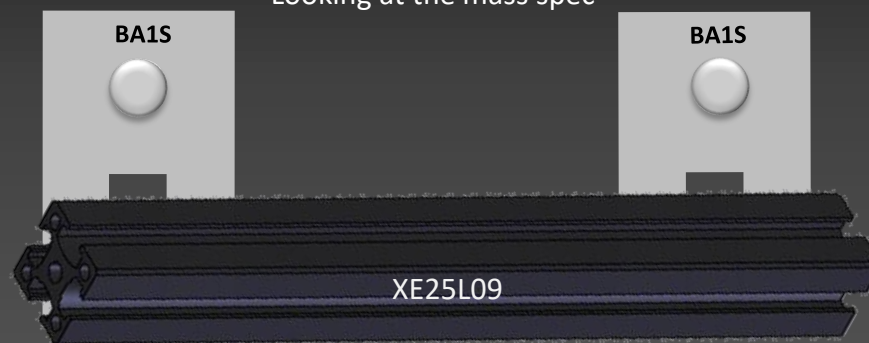
XE25L09

Use low profile T-nut and
1/4-20 screw to attach to rail



Side view

Front View
Looking at the mass spec



5. Slide the two post holders over the two pins on the mass spectrometer
6. While attached to the mass spec use two 1/4-20 screws to attach the construction rail to the two bases
Make sure the construction rail is level and tighten the screws

XE25L09
XE25T3

Construction Rail 9 in. Length
Low profile T-Nuts

(Thorlabs)
(Thorlabs)

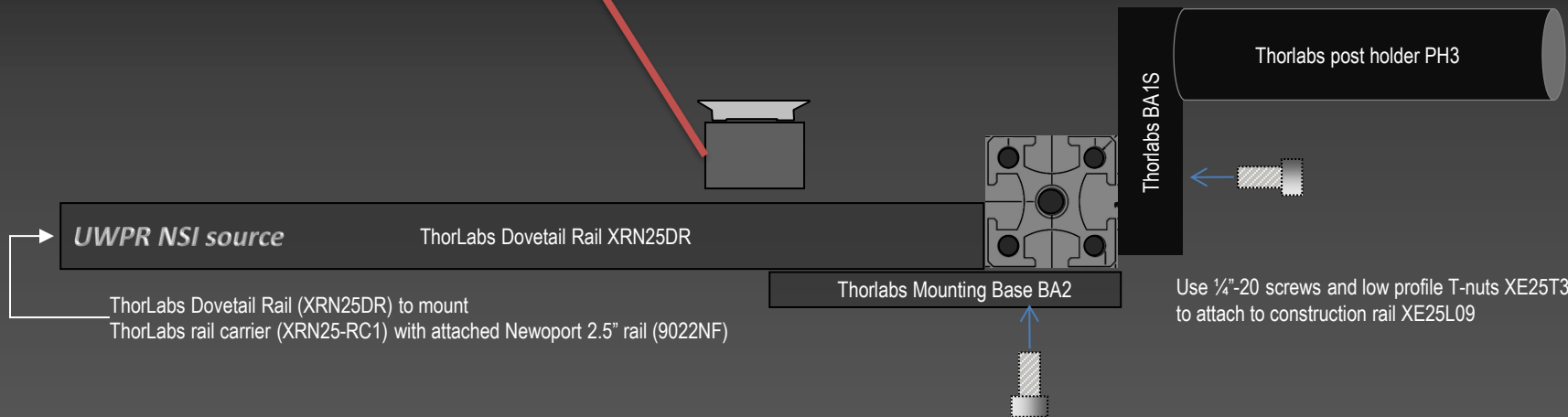
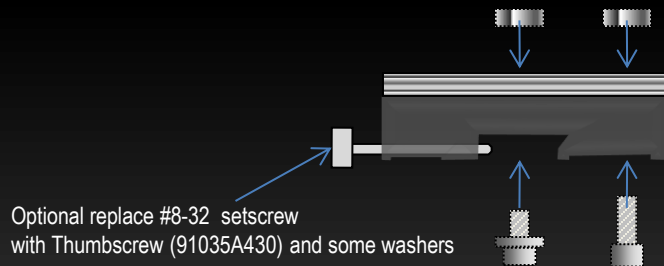
NSI Source: step 3

Use one #8-32 x 1/4" with a #8-32 washer and nut and one #8-32 x 3/8" with a nut, to attach 2.5" rail to rail carrier



Newport 2.5" rail (9022NF)

ThorLabs rail carrier (XRN25-RC1)



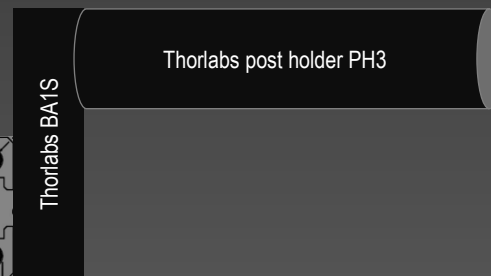
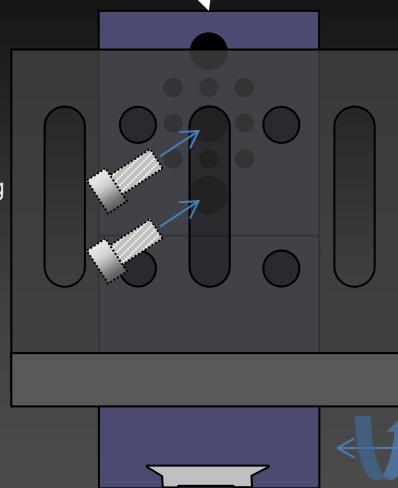
- | | | |
|-----------|---|----------------|
| BA2 | Mounting Base | (Thorlabs) |
| XRN25DR | Dovetail Rail | (Thorlabs) |
| XRN25-RC1 | Rail Carrier | (Thorlabs) |
| 9022NF | Rail, 2.5" | (Newport) |
| 91035A430 | 18-8 Stainless Steel Knurled Head Screw | (McMasterCarr) |

NSI Source: step 4



Mount Newport XYZ stage, part# 9065-XYZ
To 2.5" rail using set screws provided with stage

Attach angle plate, part# 9101 to XYZ stage using
two 1/4"-20 x 3/8" screws



UWPR NSI source

9065-XYZ
AJS100-0.5K-NL
9101NF

Pint-Sized XYZ-Translation Stage
High Precision Large Knob Adjustment Screw, 12.7 mm Travel, 100 TPI, No Lock
Angle Plate, 1/4-20 Thru Slots, 8-32 and 1/4-20 Threads

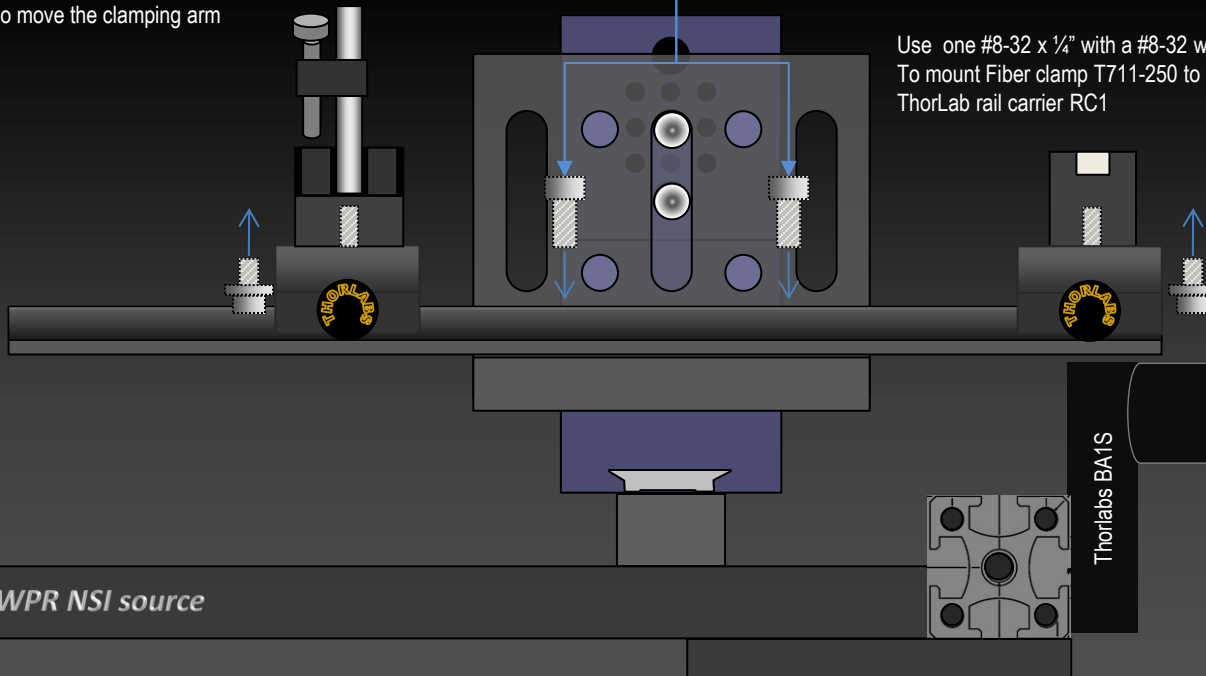
(Newport)
(Newport)
(Newport)

NSI Source: step 5

Use one #8-32 x 1/4" with a #8-32 washer
To mount V clamp VC1 to ThorLab rail carrier RC1
Replace the set screw in the VC1 mounting arm with
A 8-32 nylon thumb screw
And/or use the red HKTS thumbscrew
To move the clamping arm

Mount 12" rail RLA1200 to angle plate
using two 1/4"-20 x 3/8" screws

Use one #8-32 x 1/4" with a #8-32 washer
To mount Fiber clamp T711-250 to
ThorLab rail carrier RC1



UWPR NSI source



5/64" (2 mm) Hex Key Thumbscrew
To move the clamping arm up and down

RLA1200
RC1
VC1
HKTS-5/64
T711-250
94323A598

Imperial Dovetail Optical Rail, 12"
Rail Carrier, Counterbored Hole 1"x 1"
Small V-Clamp with PM3 Clamping Arm
5/64" (2 mm) Hex Key Thumbscrew
Post Mountable Fiber Clamp, 250mm
Nylon Raised-Head Thumb Screws
8-32 Thread Size, 1" Long

(Thorlabs)
(Thorlabs)
(Thorlabs)
(Thorlabs)
(Thorlabs)
(McMasterCarr)

- ▶ Adjustable Force Magnetic Clamp for 250µm Jacketed Fiber
- ▶ Clamping Arm Swings Clear for Easy Loading
- ▶ Rubber Pad Provides Excellent Holding Force

Magnetically Coupled Swing Arm Makes Loading/Unloading Fiber Simple

T711-250

T711-250

Soft Rubber Pad Securely Clamps Ø250µm Fiber in Machined V-Groove

Related Products

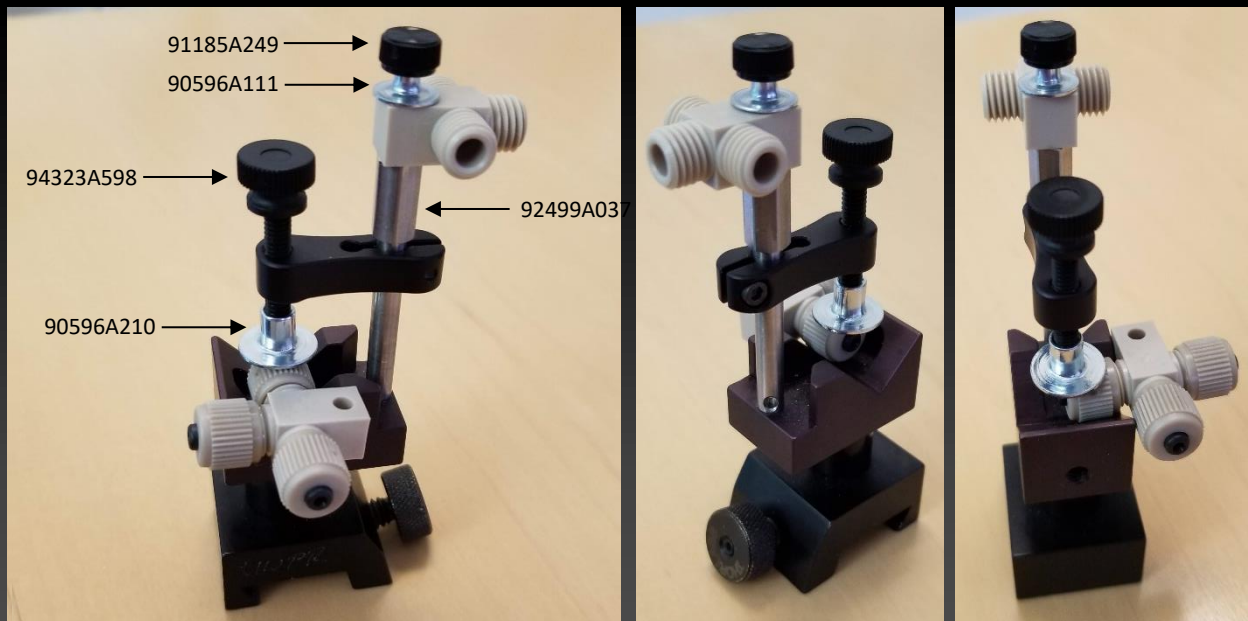
Multimode Fiber

Bare Fiber Terminator

Fiber Launch Systems

NSI Source: step 5 (optional)

Replace the set screw in the VC1 mounting arm with A 8-32 nylon thumb screw and attach the flat weld nut to clamp down on the micro cross
Add a Teflon disc to the bottom of the weld nut to protect the micro cross from marring up.
The micro tee with mounting whole can be mounted to the VC1 post using the thread adapter and a 4/40 thumbscrew with a flat weld nut



RC1
VC1
HKTS-5/64

Rail Carrier, Counterbored Hole 1"x 1"
Small V-Clamp with PM3 Clamping Arm
5/64" (2 mm) Hex Key Thumbscrew

(Thorlabs)
(Thorlabs)
(Thorlabs)

94323A598
90596A210
7802A22

Nylon Raised-Head Thumb Screws 8-32 Thread Size, 1" Long
Steel Round-Base Weld Nut, Zinc-Plated, 8-32 Thread Size, 1/2" Base Diameter
Low-Friction UHMW Tape Shapes, 1/2" Diameter Disc
stick to the bottom of the weld nut

(McMasterCarr)
(McMasterCarr)
(McMasterCarr)

92499A037
91185A249
90596A111

18-8 Stainless Steel Male-Female Hex Thread Adapter, 6-32 to 4-40 Thread Size
Plastic-Head Thumb Screws, Knurled, 4-40 Thread Size, 3/4" Long, black
Steel Round-Base Weld Nut, Zinc-Plated, 4-40 Thread Size

(McMasterCarr)
(McMasterCarr)
(McMasterCarr)

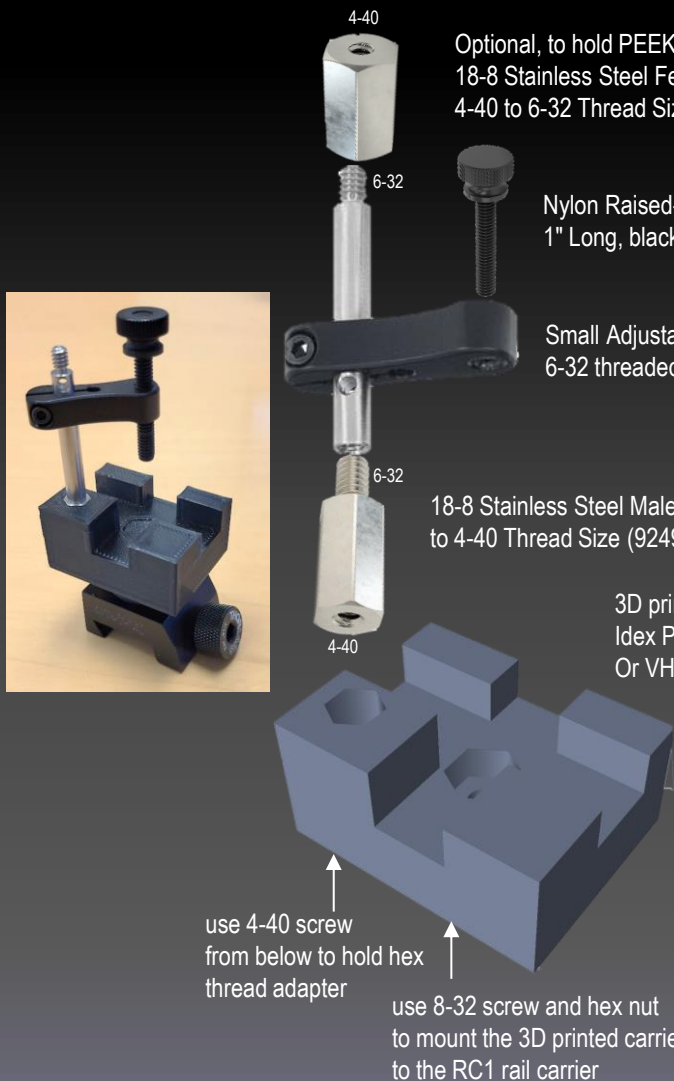
91458A115

Threadlocker, Loctite® 243, 0.34 oz. Bottle
optional to prevent weld nuts from unthreading

(McMasterCarr)

NSI Source: step 5 (optional) 3-D printed carriers

When using stainless steel crosses of tees there is the potential for the high voltage to arc. To minimize that risk we use 3D printed carriers, using PETG filament to print the carrier.



use 4-40 screw from below to hold hex thread adapter

use 8-32 screw and hex nut to mount the 3D printed carrier to the RC1 rail carrier

Optional, to hold PEEK tee with mounting hole, use 4-40 screw
18-8 Stainless Steel Female Hex Thread Adapter,
4-40 to 6-32 Thread Size (98434A102, McMaster)

Nylon Raised-Head Thumb Screws 8-32 Thread Size,
1" Long, black (94323A598, McMaster)

Small Adjustable Clamping Arm,
6-32 threaded Post (PM3, Thorlabs)

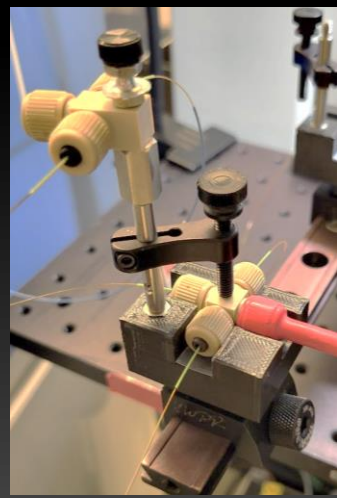
18-8 Stainless Steel Male-Female Hex Thread Adapter, 6-32
to 4-40 Thread Size (92499A037 McMaster)

3D printed carrier for
Idex PEEK cross (P-777) or PEEK tee (P-875)
Or VHP cross (UH-752) or tee (UH-750 or UH-753)

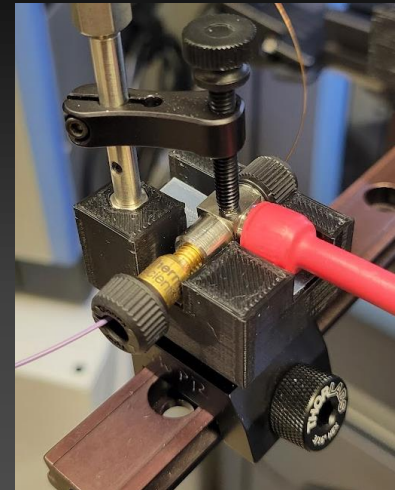
98434A102
94323A598
PM3
92499A037
3D printed carrier for IDEX PEEK cross (P777) or PEEK tee (see separate files to print this carrier)
RC1

18-8 Stainless Steel Female Hex Thread Adapter, 4-40 to 6-32 Thread Size
Nylon Raised-Head Thumb Screws 8-32 Thread Size, 1" Long, black
Small Adjustable Clamping Arm, 6-32 threaded Post
18-8 Stainless Steel Male-Female Hex Thread Adapter, 6-32 to 4-40 Thread Size
Rail Carrier, Counterbored Hole 1"x 1"

(McMasterCarr)
(McMasterCarr)
(Thorlabs)
(McMasterCarr)
(Thorlabs)



Carrier with P-777 cross connected to high voltage lead and 360µm OD column, Trap column and waste line



Carrier with UH-753 adapting tee connected to nanoViper line, high voltage lead and 360µm OD column

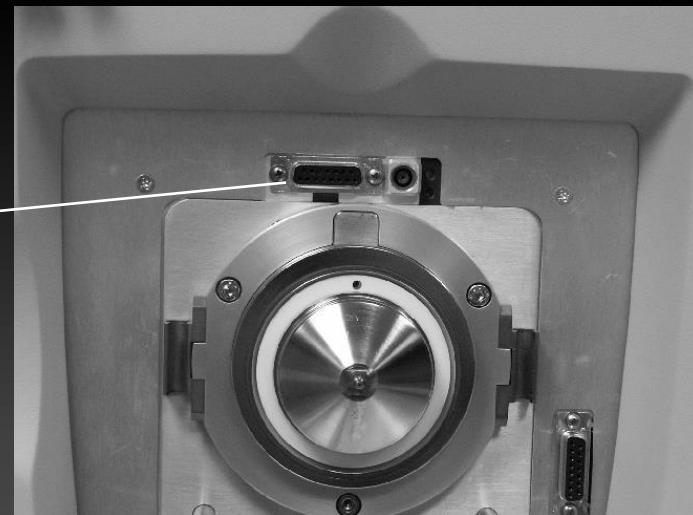
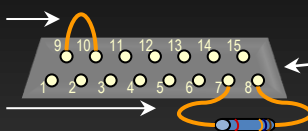
NSI Source: step 6a

To bypass interlock on ThermoElectron LTQ, TSQ, QE when using alternate nanospray source (NSI)

Note: Jumper and resistor can either be attached directly to the connector on the front of the LTQ or via a DB15 male connector (easier to change between different sources).

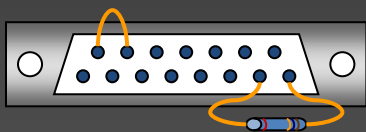
Jumper to bypass interlock between socket 9 and 10

10 K ohm resistor (2% var.) for NSI source recognition between socket 7 and 8



OR use DB15 male connector:

solder the jumper and resistor to the corresponding pins



DB15 male connector backside view



Solder Cup D-Sub Connector, DB15 Male

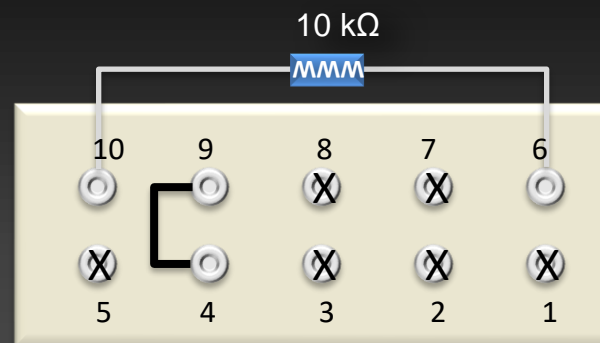
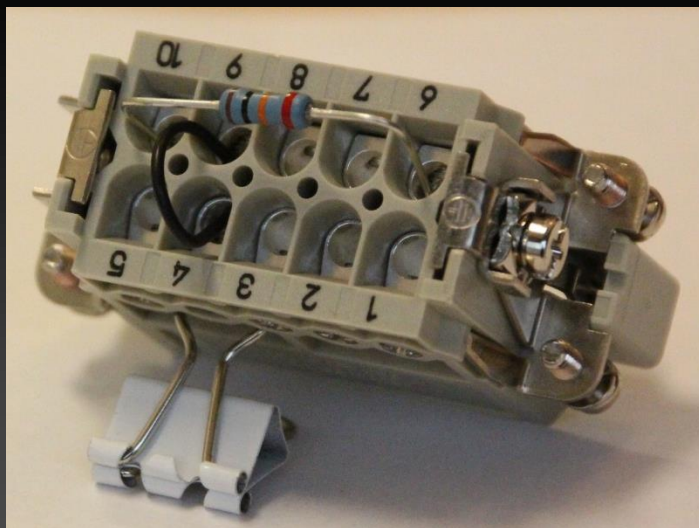
510-2002
510-2445
70201054

Emerson Network Power, D-Sub Plug; Thermoplastic; Plug; Copper Alloy; Solder Termination
Emerson Network Power, Hood; D-Sub; Chrome; Metalized Plastic; Steel; UL 94 VO; RoHS Compliant
Resistor; Metal Film; Res 10 Kilohms; Pwr-Rtg 0.25 W; Tol 2%; Axial; Epoxy

(Allied Electronics)
(Allied Electronics)
(Allied Electronics)

NSI Source: step 6b

To bypass interlock on ThermoElectron Fusion or Quantiva when using alternate nanospray source (NSI)



Male Plug HARTING 09200102612: Connect 10 kΩ resistor between pin 6 and 10 and jumper wire between pin 4 and 9
Optionally a ground wire can be attached to pin 7

In case you wonder why I show it upside down... that's because looking at the instrument from the front, that is how it will plug into the instrument

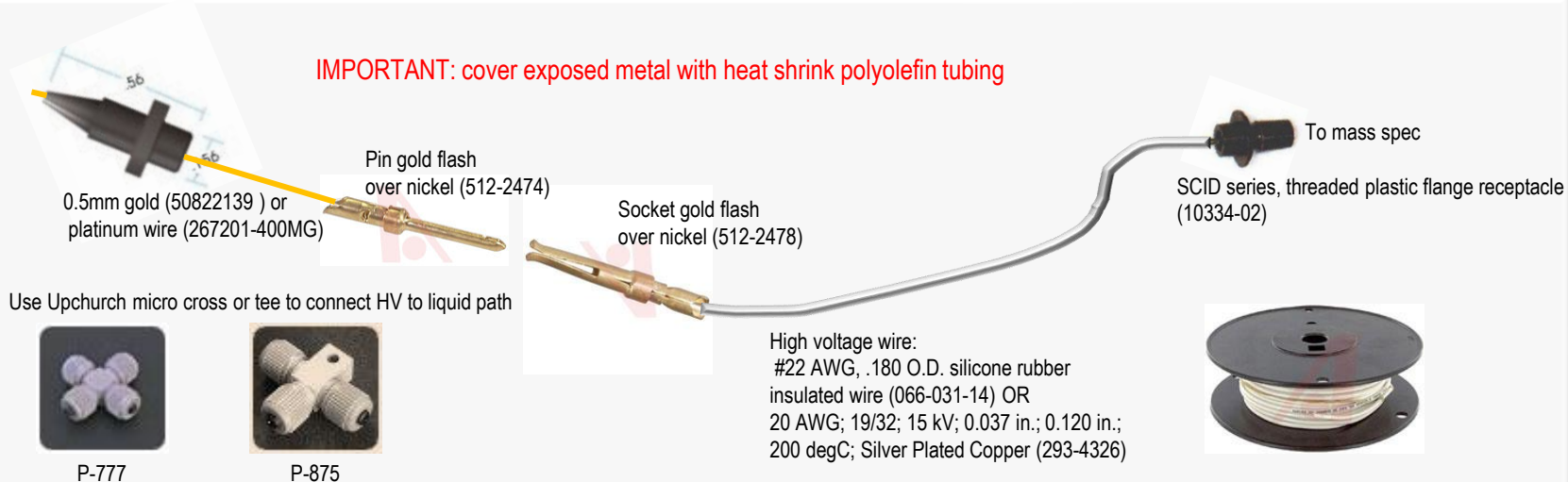
70104585
70201054

Insert; 250 V; 16 A; Male; 10; RoHS Compliant; Han A Series; 10 A Product Size Mfr. Part#: 09200102612
Resistor; Metal Film; Res 10 Kilohms; Pwr-Rtg 0.25 W; Tol 2%; Axial; Epoxy

(Allied Electronics)
(Allied Electronics)

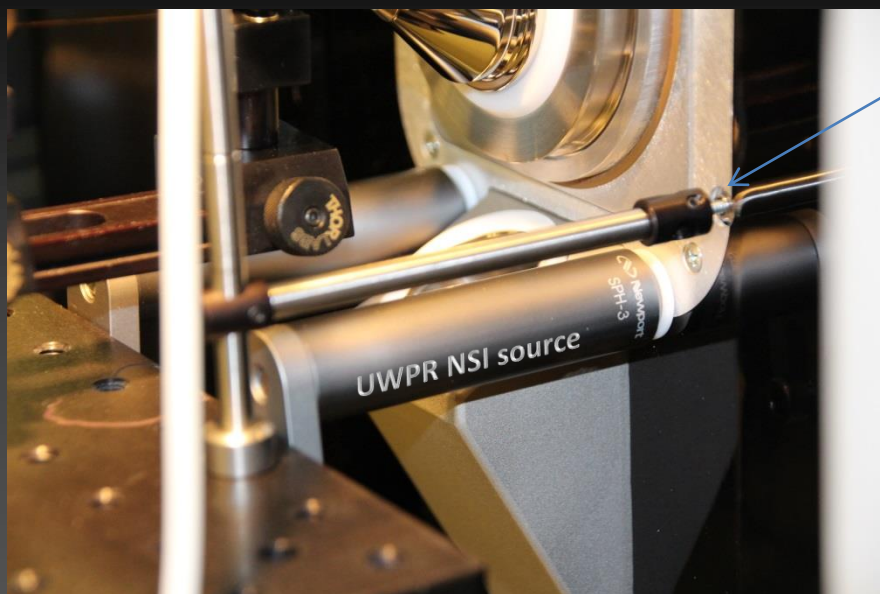
NSI Source: step 7

IMPORTANT: cover exposed metal with heat shrink polyolefin tubing



10334-02	SCID series, threaded plastic flange receptacle assembly	(Connectronics Corp)
Or		
00004-95039	Connector, Feed thru, 15KVdc, 7.5A, Connectronics	(Unity Lab Services)
066-031-14	High voltage wire, #22 AWG, .180 O.D. silicone /rubber insul.	(Connectronics Corp)
512-2474	20DF PIN CONT. LP	(Allied Electronics)
512-2478	20DF SOCKET CONT. L.P.	(Allied Electronics)
AA43288BU	Platinum wire; 99.95% ; Alfa Aesar; 0.5mm dia; 25cm; 4.21g/m	(Fisher)
P-777	Microcross, .025" OD tubing sleeves, .006" THRU HOLE, PEEK	(Upchurch)
P-875	Microtee, w/ mount. whole, for .025" OD tubing sleeves, PEEK™	(Upchurch)
F-172x	Ferrule, for .025" sleeves/P-416 NUT, PEEK™, BLACK (10 PK)	(Upchurch)
F-185x	Tubing sleeve, 395µm (.015") ID x .025", PEEK™, GREEN (10 PK)	(Upchurch)
P-116	Plug, for micro fittings, PEEK™, BLACK	(Upchurch)

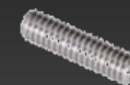
Note on the Fusion and Quantiva there is a inter-lock that needs to be pushed in
I used the miniature posts and a 0.5" 4-40 set screw



Adjust set screw to make sure the interlock is pressed in



MS3R



Set screw 4-40 0.5"



MSA25



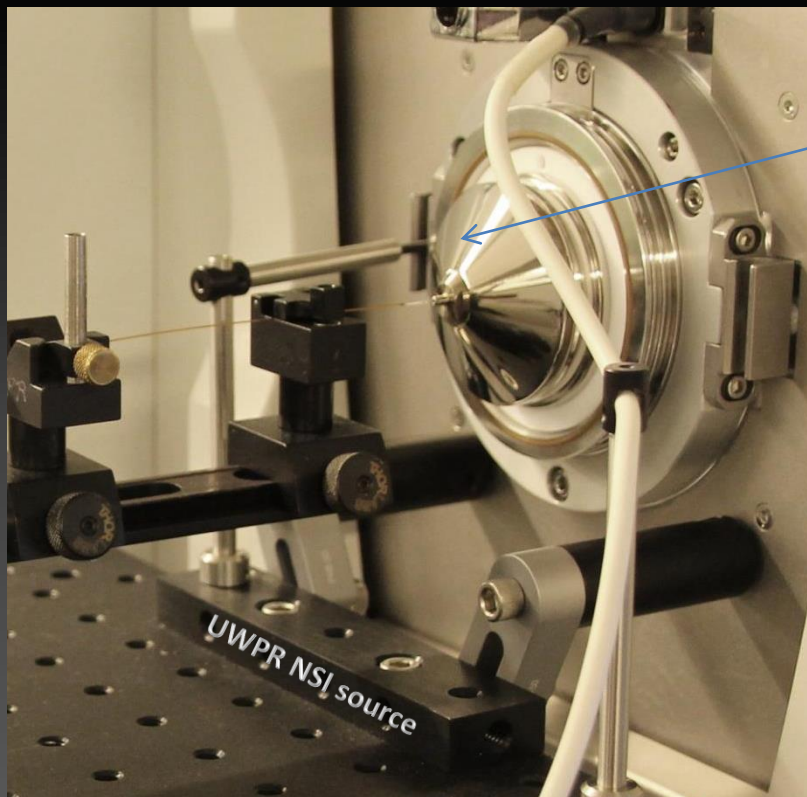
ER90B

MS3R
MSA25
ER90B
Set screw 4-40 0.5"

Mini Series Mounting Posts, 6mm Diameter, 3" Long
Thread Adapter, 1/4"-20 to #4-40
Mini-Post Right Angle Adapter

(Thorlabs)
(Thorlabs)
(Thorlabs)

Note on the QE there is a inter-lock that needs to be pushed in
I used the miniature posts and a 1" 4-40 set screw



Adjust set screw to make sure the interlock is pressed in



MS3R



MS2R



Screw 4-40 1"



MSA25



ER90B

MS3R
MS2R
MSA25
ER90B
4-40 screw 1in long

Mini Series Mounting Posts, 6mm Diameter, 3" Long
Mini Series Mounting Posts, 6mm Diameter, 2" Long
Thread Adapter, 1/4"-20 to #4-40
Mini-Post Right Angle Adapter

(Thorlabs)
(Thorlabs)
(Thorlabs)
(Thorlabs)