Tech Note: viewer assembly for injector viewers

Marcy Stutzman and Phil Adderley

2020 air cylinder design modifications

1. Air cylinder: https://misportal.jlab.org/reqs/pr/viewPr.do?prNum=398800
2. Remove nuts on viewer air cylinder and remove endplate over end of hex shaft –DO NOT remove piston from cylinder. (See figure below)
3. Extend hex shaft out being careful not to pull piston from cylinder body
4. Attach spring guide to piston end of hex shaft.
	1. JL0109878-0001-0
5. Slide spring over hex shaft and centering ring



1. Slide piston stop into cylinder (see figure and assy dwg for orientation)
	1. JL0109878-0001-01
2. Replace endplate, compress (using bar clamp as needed) and tighten nuts
3. Add instrument air line to top hole
	1. Dibert: Stainless Steel Swagelok Tube Fitting, Male Connector, 1/8 in. Tube OD x 3/8 in. Male NPT
4. Add pinhole nut (part xxx) to bottom hole:
	1. Grainger: TK48826579T Hex Plug Pipe Fitting Material Low Lead Brass Pipe Size - Pipe Fitting 38 in Standards NSF 61 Annex G Max. Pressure 1000 psi Temp. Range -65 Degrees to 250 Degrees F.
	2. Drill 1/16” hole through plug, stopping 0.020” from end of plug. Drill the last 0.020” with a 0.010 or 0.015” bit to make a conductance limiting orifice for the air stop.



Viewer bellows alignment

1. Attach support rods to bellows
	1. Rods modified for 2021 air cylinder: JL0109878-0002-01
	2. Bellows: 103-55-5-1-1/3” CFFR, 2-3-4” CFFNR modified with 58432-C-0100
2. Install plunger weldment taking care not to tighten rotatable mini flange
	1. Weldment: 58432-B-0126
	2. Shaft: 58432-B-0123
	3. Flange modification: 58432-B-0120
3. For 45 degree alignment, camera to the right of viewer: Get print of alignment tool
	1. Support bellows flange with the 2.75 knife edge UP
	2. Identify upstream leak check groove as the one with a support rod at the same position
	3. Install 45 degree alignment tool with knife edge up, leak check grove aligned with upstream bellows flange leak check groove
	4. Rotate mini conflat until rod flat matches alignment tool flat and secure with bolt
	5. Tighten gasket
4. For 45 degree alignment, camera to the left of viewer:
	1. Support bellows flange with the 2.75 knife edge DOWN
	2. Identify upstream leak check groove as the one with a support rod at the same position
	3. Install 45 degree alignment tool with knife edge up, leak check grove aligned with upstream bellows flange leak check groove
	4. Rotate mini conflat until rod flat matches alignment tool flat and secure with bolt
	5. Tighten gasket

Building full viewer assembly

1. Attach top plate (58432-B-0116) to three support rods (JL0109878-0002-01) using 10-32, 0.5” or 5/8” long using split ring lock washer
2. Attach air cylinder to top plate using 1/4-20 socket head bolds, 3/4” long using split ring lock washer
3. Screw turnbuckle onto air cylinder threaded rod 2.5 turns
	1. JL0109878-0002-02
4. Use turnbuckle to draw in the rod and turnbuckle to desired insertion depth
	1. Loosen 10/32 bolts and drive in set screw to split for turning. Back out setscrew and tighten bolts to secure at appropriate depth

Adding viewer screens

1. Viewer screens assy (JL0091130-0214)
	1. Front plate: JL0091130-0214-01 Modify to show 45 degree cutaway!
	2. Back Plate: JL0091130-0214-02
	3. Top Hat: JL0091130-0219
	4. Wire: Tungsten/Rhenium (W75/Re25) 0.05mm Goodfellow
	5. Viewer string jig: **print?**
2. Assemble viewer flag
	1. Place front plate in jig, front side down
	2. Secure one end of wire with hemostat clamp, run wire from bottom left screw around top right screw and back, secure under screw and washer at bottom left.
	3. Repeat wire stringing from bottom right around top left and back
	4. Make sure wires go on the outsides of bushings if present
	5. Lay chromox screen on wires and center carefully (yag can be used too, but may not need wires)
	6. Gently place back plate on screen, seat into position, and insert 2 screws at top loosely (4-40, ¼” long, silver plated, button head)
	7. Place top hat on bottom, insert two screws (4-40, 3/8” long, silvernplated, button head)
	8. Secure all screws snugly
	9. Loosen wire clamp screws, checking carefully that tension remains on the wires with the frame screws. Adjust if necessary.
	10. Remove from stringing jig and clip off ends of wires
3. Add shaft extension if needed
	1. JL0091130-0227
4. Install on depth alignment cross and adjust insertion depth with turnbuckle
	1. Set 6-way 2.75 conflat cross (or other size) on flat surface
	2. Use pinhole center tool to align laser through middle of cross
	3. Install viewer assy on centering cross
	4. Adjust height with turnbuckle
	5. Adjust any tilt with shims between bellows assy and air cylinder
	6. Tighten and install