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2.1 SITE SELECTION AND PLANNING

The Main Cabinet is designed to exist entirely within a cleanroom and all ancillary support equipment is designed to operate outside a cleanroom (see Figure 2-4, Section 2.5.1.2).

Ideally, the support equipment should be located as closely as possible to the Main Cabinet. However, if care is used when sizing, routing and connecting vacuum plumbing, the vacuum system may be located elsewhere as is compatible with your facility.

If there are any questions about the layout of your vacuum system, contact a Unaxis representative and provide a rough sketch of the following information:

1. A description of the proposed location of your vacuum system (i.e., basement, separate room).
2. Distance plumbing is to run.
3. Number of 90º bends in plumbing.
4. Plumbing size(s).

In addition to equipment proximity, other site planning considerations include available floor space for operation and maintenance, weight, lighting and air handling constraints, availability of utilities and flow of unprocessed and processed product.

Floor space must take into account the physical requirements of the equipment and space for access to the equipment. The following parameters should be used for site planning:

Item	(Inches)			(Pounds)
	Width	Depth	Height	Approximate Weight
Main Cabinet (Single Chamber)	44.10	41.00	72.62	1,000
Main Cabinet (Dual Chamber)	67.48	41.00	72.62	1,400
ECR Instrument Cabinet	22.38	32.00	38.38	
Heat Exchanger	See the Equipment Manual.			
Vacuum Pump(s)	See the Equipment Manual.			

Table 2-1. Equipment Dimensions

Recommended minimum clearances for equipment installation, operation and maintenance are:

Item	(Feet)		
	Front	Side	Back
Main Cabinet	3	2	3
System Disconnect Box	3	2	0
ECR Instrument Cabinet	3	2	3
Heat Exchanger	2.5	1	2.5
Vacuum Pump	2.5	1	2.5
Lock Pump	1	1	2

Table 2-2. Recommended Minimum Clearances

2.1.1 ENVIRONMENTAL REQUIREMENTS

	Room Temperature:
During Operation	26º C max, 15º C min
During Idle Time	26º C max, 15º C min
During Storage	26º C max, 7º C min

Relative Humidity at 20º C:

During Operation	45% max
During Idle Time	45% max
During Storage	75% max

For the best processing results, wafer cassette sites should be provided with Class 10 air.

NOTE: If the system is to be stored for a long period, we recommend that all units be in a cool, dry area with the chamber under vacuum.

2.2 SITE PREPARATION

The customer is responsible for all water, air and gas lines, valves, pressure regulators, input power cables and overcurrent protection at the facility service panel. The following utilities should be available at the site prior to installation:

Main Cabinet		
Compressed Air	Clean, dry, 80-90 psig. Flow rate less than 1 slpm. Avg flow rate l scfm, oil free to 50 ppm. Max moisture content -60º F dew point, and filtered to max particle size of 3 microns	
Machine Purge (Fluid Input Panel)	Nitrogen, 5-7 psig @ 1 slpm*	
Flush Gas (Gas Panel)	Nitrogen, 15-20 psig @ 1 slpm*	
Vent Gas	Nitrogen, 5-20 psig @ 10 slpm*	
Process Gases	Up to 8 gases standard (per chamber), 5-25 psig	
Gas Panel Exhaust	50/cfm min @ 0.5 inch H_2O, connection to 4-inch OD duct	
Electrical *Please verify on your System Configuration sheets.*	<u>Standard Domestic:</u> 208/240 VAC, 3 phase, 60 Amp, 5-wire, 60 Hz <u>Standard International</u>*:* 200 VAC, 3 phase, 60 Amp, 4-wire, 50Hz 380 VAC, 3 phase, 60 Amp, 5-wire, 50 Hz 415 VAC, 3 phase, 60 Amp, 5-wire, 50 Hz	<u>Interrupt Rating</u> 65kA 50kA 25kA 25kA
Cooling *House Water* *House Water* *House Water*	<u>Standard:</u> 1 to 1.5 gpm @ 30 to 60 psig differential, supply temp. 20º C to 25º C. Heat load approximately 1kW <u>ICP</u>*:* 40 psig @ 15 to 30º C, 1 MegOhm resistivity. RF-20M flow rate 2.5 GPM. <u>ECR</u>*:* 1.25 GPM @ 60 psig differential, supply temperature 4 ºC (40ºF), maximum heat load approximately 7 kW.	
Helium	20 psig @ 20 sccm, Helium Input connection at Fluid Input Panel.	
Remote Components		
Pump Case Purge Gas	Customer supplied (see the Equipment Manual for pressure specification)	
Pump Vacuum Exhaust	Piping must be compatible with effluent gases. All joints must be leak tight. Connections should be KF type (size is dependent upon pump configuration; see Section Six)	
*Nitrogen purity as the process requires; 99.999% is recommended.		

Table 2-3. Required Utilities

Figures 2-1 (Single Chamber) and 2-2 (Dual Chamber) illustrate the center-to-center dimensions of utilities connections on system units. These are used to make air, water, gas and exhaust line pipes.

NOTE: Pipe bends should conform to SAE standards to avoid kinking. All lines should be continuous without splices (where practical).

Particular attention should be paid to the leak integrity of all joints (welded or fitted), especially when plumbing process gas lines (see Section 2.7).

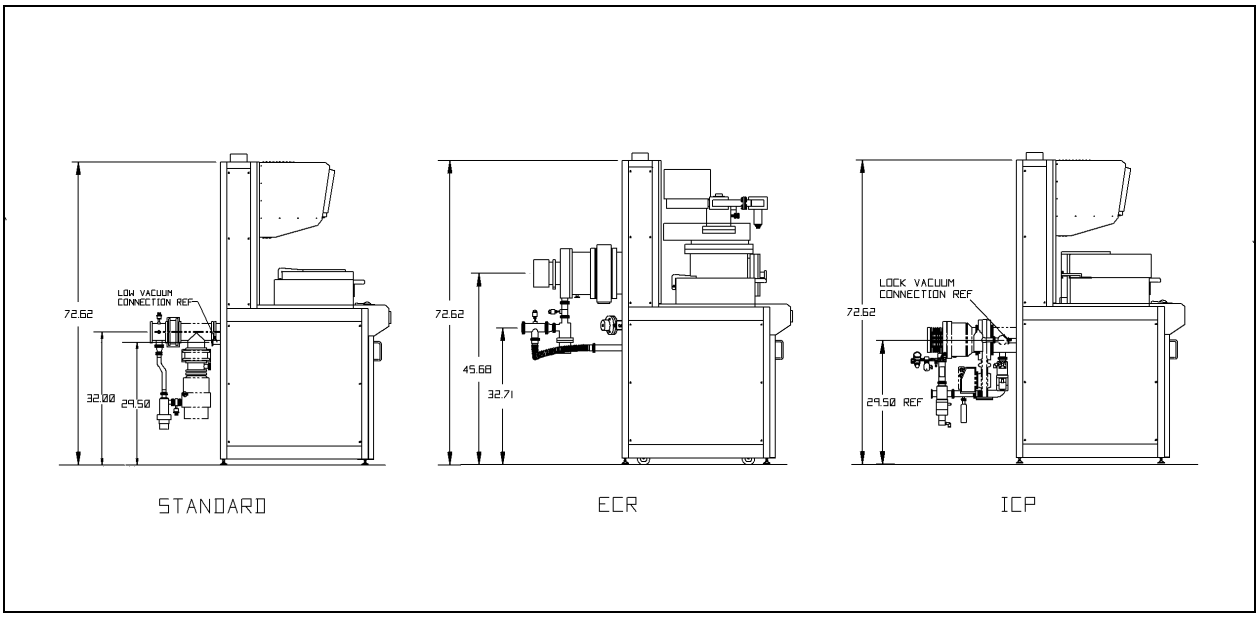
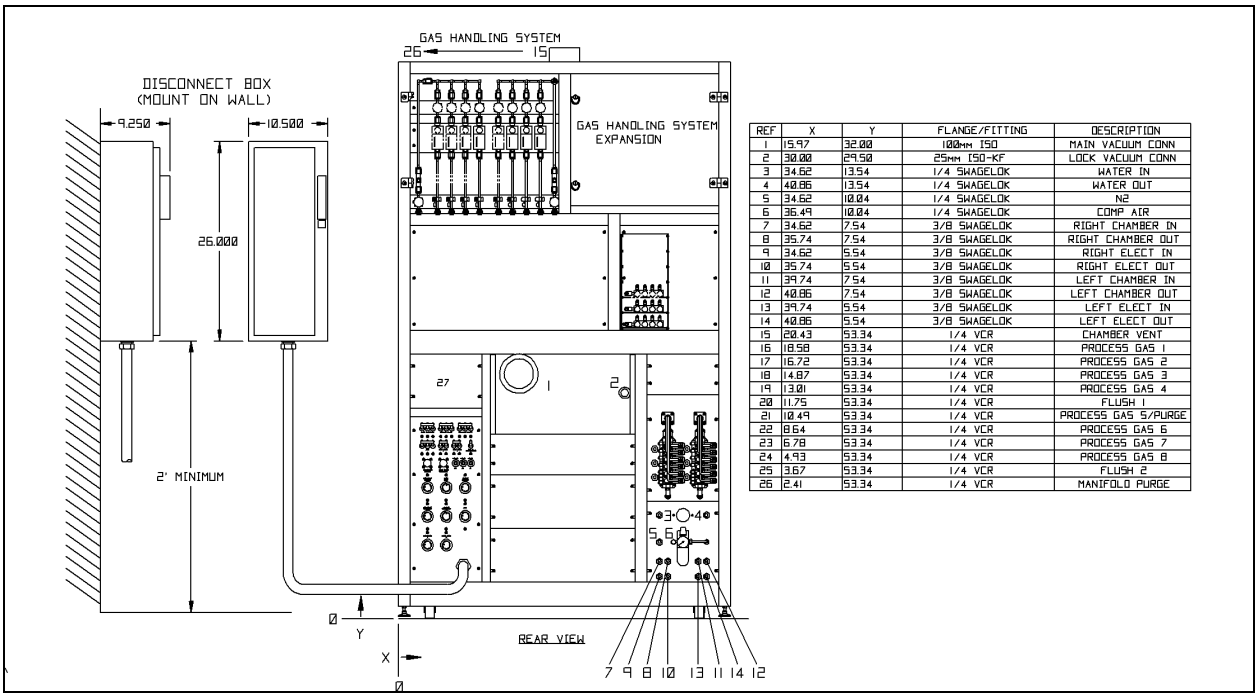
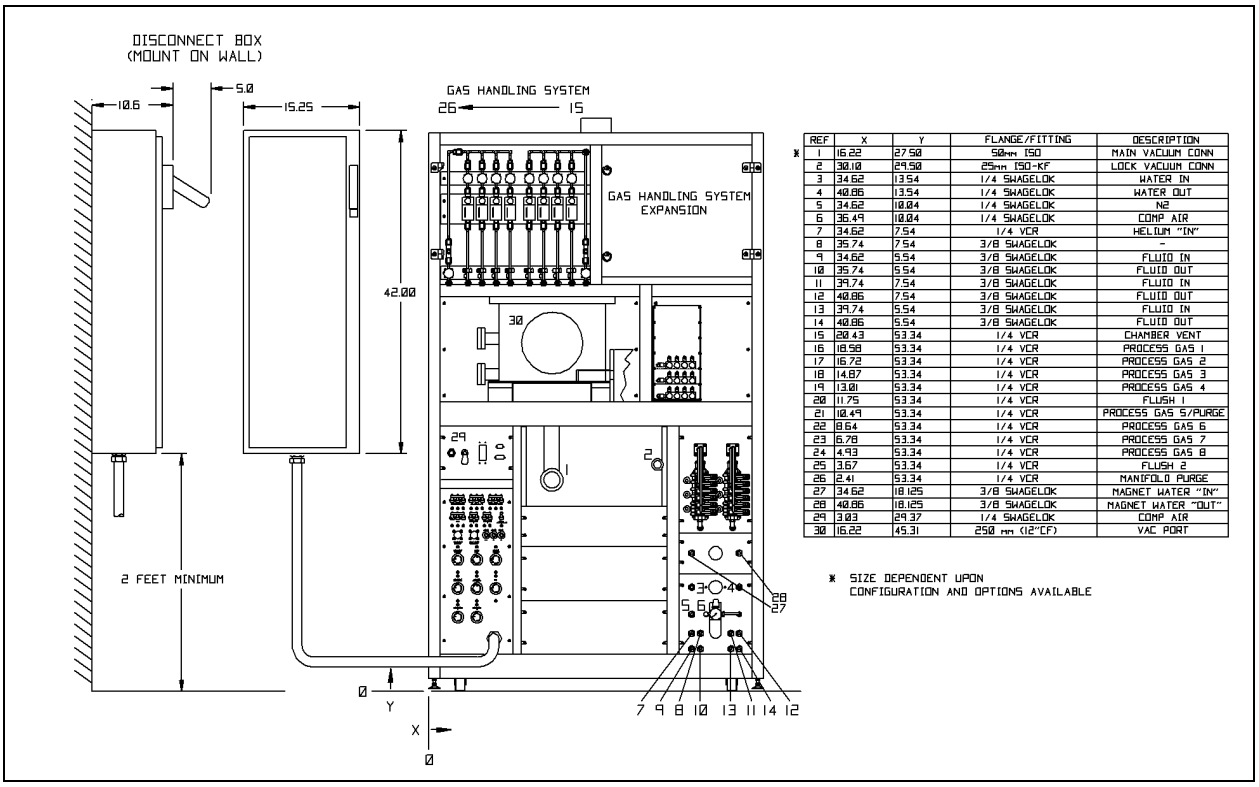


Figure 2-1a. Sample System Utilities Connections (Single Chamber)



REF	X	Y	FLANGE/FITTING	DESCRIPTION
1	15.97	32.00	100mm ISO	MAIN VACUUM CONN
2	30.00	29.50	25mm ISO-KF	LOCK VACUUM CONN
3	34.62	13.54	1/4 SWAGELOK	WATER IN
4	40.86	13.54	1/4 SWAGELOK	WATER OUT
5	34.62	10.04	1/4 SWAGELOK	N2
6	36.49	10.04	1/4 SWAGELOK	COMP AIR
7	34.62	7.54	3/8 SWAGELOK	RIGHT CHAMBER IN
8	35.74	7.54	3/8 SWAGELOK	RIGHT CHAMBER OUT
9	34.62	5.54	3/8 SWAGELOK	RIGHT ELECT IN
10	35.74	5.54	3/8 SWAGELOK	RIGHT ELECT OUT
11	39.74	7.54	3/8 SWAGELOK	LEFT CHAMBER IN
12	40.86	7.54	3/8 SWAGELOK	LEFT CHAMBER OUT
13	39.74	5.54	3/8 SWAGELOK	LEFT ELECT IN
14	40.86	5.54	3/8 SWAGELOK	LEFT ELECT OUT
15	20.43	53.34	1/4 VCR	CHAMBER VENT
16	18.58	53.34	1/4 VCR	PROCESS GAS 1
17	16.72	53.34	1/4 VCR	PROCESS GAS 2
18	14.87	53.34	1/4 VCR	PROCESS GAS 3
19	13.01	53.34	1/4 VCR	PROCESS GAS 4
20	11.75	53.34	1/4 VCR	FLUSH 1
21	10.49	53.34	1/4 VCR	PROCESS GAS 5/PURGE
22	8.64	53.34	1/4 VCR	PROCESS GAS 6
23	6.78	53.34	1/4 VCR	PROCESS GAS 7
24	4.93	53.34	1/4 VCR	PROCESS GAS 8
25	3.67	53.34	1/4 VCR	FLUSH 2
26	2.41	53.34	1/4 VCR	MANIFOLD PURGE

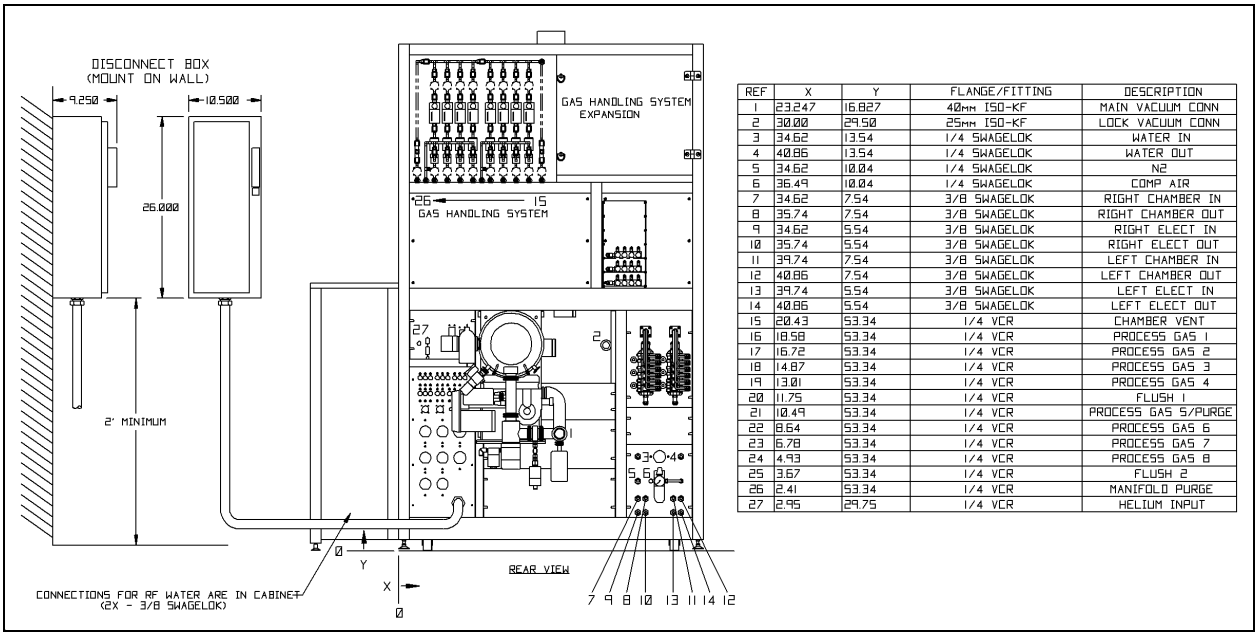
Figure 2-1b. Sample System Utilities Connections (Standard Single Chamber)



REF	X	Y	FLANGE/FITTING	DESCRIPTION
* 1	16.22	27.50	50MM ISO	MAIN VACUUM CONN
2	30.10	29.50	25MM ISO-KF	LOCK VACUUM CONN
3	34.62	13.54	1/4 SWAGELOK	WATER IN
4	40.86	13.54	1/4 SWAGELOK	WATER OUT
5	34.62	10.04	1/4 SWAGELOK	N2
6	36.49	10.04	1/4 SWAGELOK	COMP AIR
7	34.62	7.54	1/4 VCR	HELIUM "IN"
8	35.74	7.54	3/8 SWAGELOK	-
9	34.62	5.54	3/8 SWAGELOK	FLUID IN
10	35.74	5.54	3/8 SWAGELOK	FLUID OUT
11	39.74	7.54	3/8 SWAGELOK	FLUID IN
12	40.86	7.54	3/8 SWAGELOK	FLUID OUT
13	39.74	5.54	3/8 SWAGELOK	FLUID IN
14	40.86	5.54	3/8 SWAGELOK	FLUID OUT
15	20.43	53.34	1/4 VCR	CHAMBER VENT
16	18.58	53.34	1/4 VCR	PROCESS GAS 1
17	16.72	53.34	1/4 VCR	PROCESS GAS 2
18	14.87	53.34	1/4 VCR	PROCESS GAS 3
19	13.01	53.34	1/4 VCR	PROCESS GAS 4
20	11.75	53.34	1/4 VCR	FLUSH 1
21	10.49	53.34	1/4 VCR	PROCESS GAS 5/PURGE
22	8.64	53.34	1/4 VCR	PROCESS GAS 6
23	6.78	53.34	1/4 VCR	PROCESS GAS 7
24	4.93	53.34	1/4 VCR	PROCESS GAS 8
25	3.67	53.34	1/4 VCR	FLUSH 2
26	2.41	53.34	1/4 VCR	MANIFOLD PURGE
27	34.62	18.125	3/8 SWAGELOK	MAGNET WATER "IN"
28	40.86	18.125	3/8 SWAGELOK	MAGNET WATER "OUT"
29	3.03	29.37	1/4 SWAGELOK	COMP AIR
30	16.22	45.31	250 MM (12"CF)	VAC PORT

* SIZE DEPENDENT UPON CONFIGURATION AND OPTIONS AVAILABLE

Figure 2-1c. Sample System Utilities Connections (ECR Single Chamber)



REF	X	Y	FLANGE/FITTING	DESCRIPTION
1	23.247	16.827	40MM ISO-KF	MAIN VACUUM CONN
2	30.00	29.50	25MM ISO-KF	LOCK VACUUM CONN
3	34.62	13.54	1/4 SWAGELOK	WATER IN
4	40.86	13.54	1/4 SWAGELOK	WATER OUT
5	34.62	10.04	1/4 SWAGELOK	N2
6	36.49	10.04	1/4 SWAGELOK	COMP AIR
7	34.62	7.54	3/8 SWAGELOK	RIGHT CHAMBER IN
8	35.74	7.54	3/8 SWAGELOK	RIGHT CHAMBER OUT
9	34.62	5.54	3/8 SWAGELOK	RIGHT ELECT IN
10	35.74	5.54	3/8 SWAGELOK	RIGHT ELECT OUT
11	39.74	7.54	3/8 SWAGELOK	LEFT CHAMBER IN
12	40.86	7.54	3/8 SWAGELOK	LEFT CHAMBER OUT
13	39.74	5.54	3/8 SWAGELOK	LEFT ELECT IN
14	40.86	5.54	3/8 SWAGELOK	LEFT ELECT OUT
15	20.43	53.34	1/4 VCR	CHAMBER VENT
16	18.58	53.34	1/4 VCR	PROCESS GAS 1
17	16.72	53.34	1/4 VCR	PROCESS GAS 2
18	14.87	53.34	1/4 VCR	PROCESS GAS 3
19	13.01	53.34	1/4 VCR	PROCESS GAS 4
20	11.75	53.34	1/4 VCR	FLUSH 1
21	10.49	53.34	1/4 VCR	PROCESS GAS 5/PURGE
22	8.64	53.34	1/4 VCR	PROCESS GAS 6
23	6.78	53.34	1/4 VCR	PROCESS GAS 7
24	4.93	53.34	1/4 VCR	PROCESS GAS 8
25	3.67	53.34	1/4 VCR	FLUSH 2
26	2.41	53.34	1/4 VCR	MANIFOLD PURGE
27	2.95	29.75	1/4 VCR	HELIUM INPUT

Figure 2-1d. Sample System Utilities Connections (ICP Single Chamber)

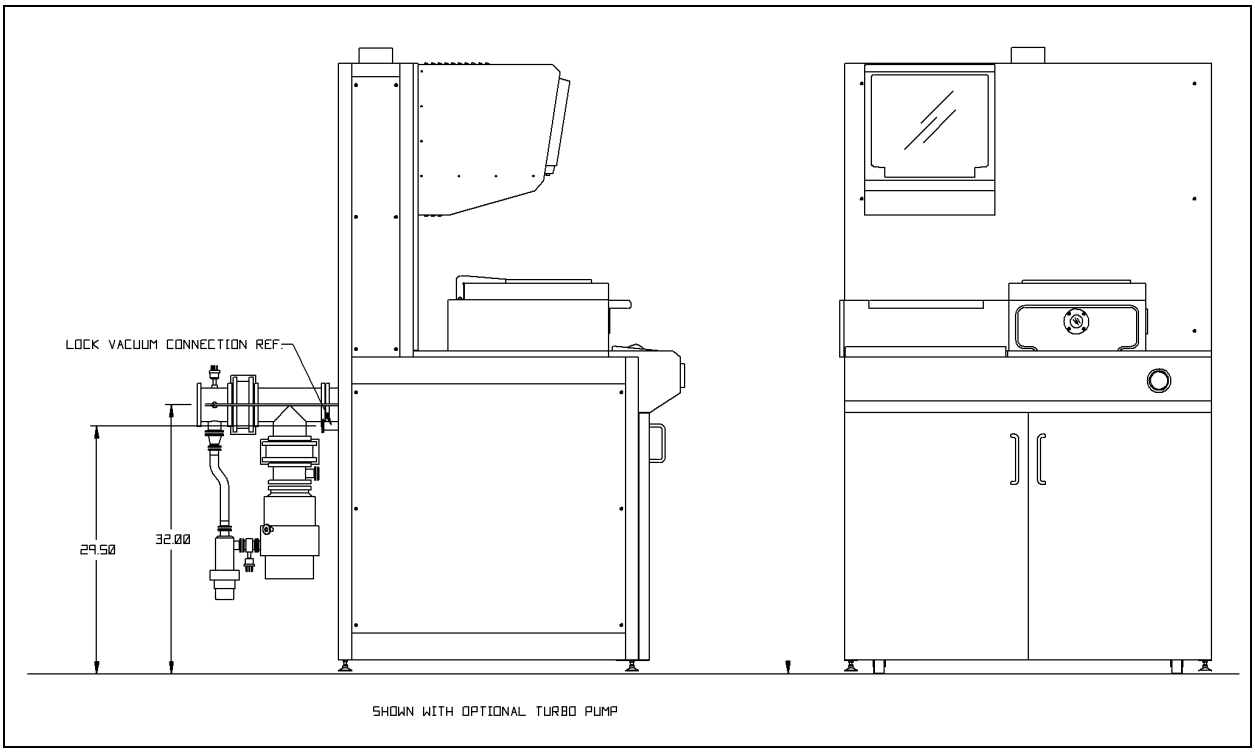
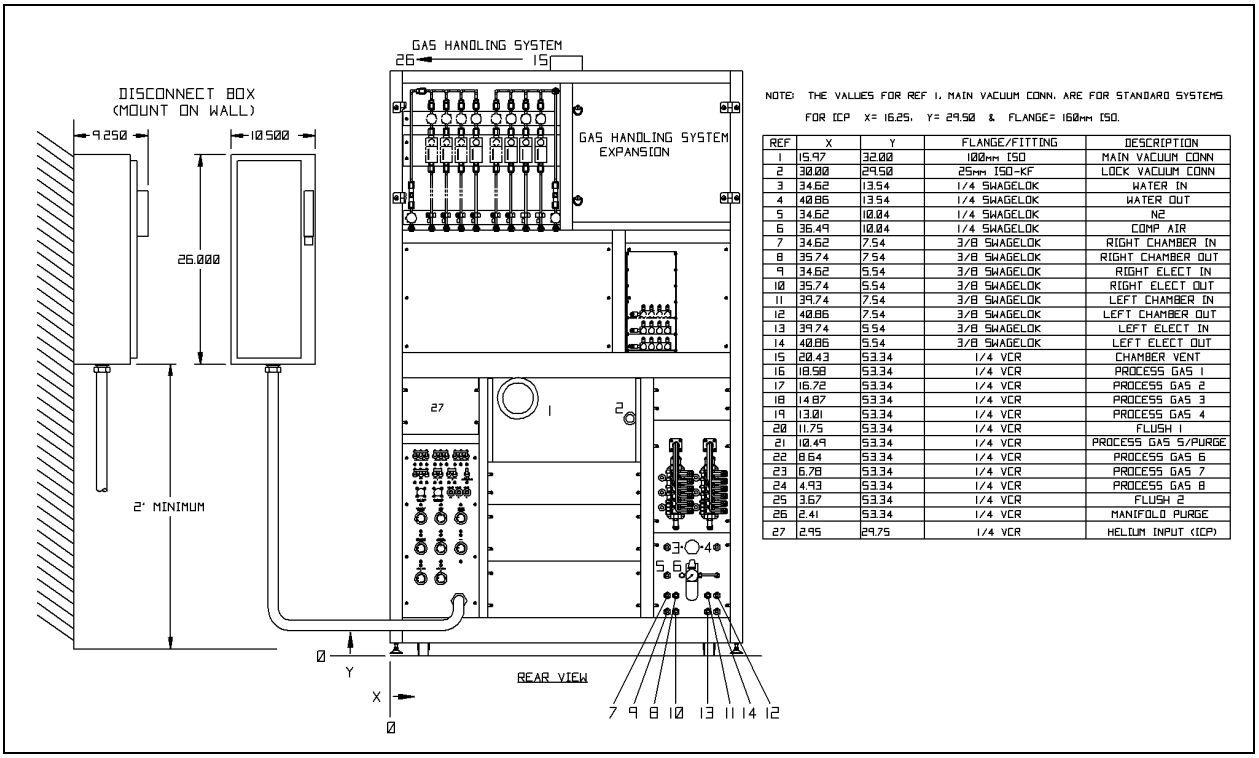


Figure 2-2a. Sample System Utilities Connections (Standard Dual Chamber)



NOTE: THE VALUES FOR REF 1, MAIN VACUUM CONN, ARE FOR STANDARD SYSTEMS FOR ICP X= 16.25, Y= 29.50 & FLANGE= 160mm ISO.

REF	X	Y	FLANGE/FITTING	DESCRIPTION
1	15.97	32.00	100mm ISO	MAIN VACUUM CONN
2	30.00	29.50	25mm ISO-KF	LOCK VACUUM CONN
3	34.62	13.54	1/4 SWAGELOK	WATER IN
4	40.86	13.54	1/4 SWAGELOK	WATER OUT
5	34.62	10.04	1/4 SWAGELOK	N2
6	36.49	10.04	1/4 SWAGELOK	COMP AIR
7	34.62	7.54	3/8 SWAGELOK	RIGHT CHAMBER IN
8	35.74	7.54	3/8 SWAGELOK	RIGHT CHAMBER OUT
9	34.62	5.54	3/8 SWAGELOK	RIGHT ELECT IN
10	35.74	5.54	3/8 SWAGELOK	RIGHT ELECT OUT
11	39.74	7.54	3/8 SWAGELOK	LEFT CHAMBER IN
12	40.86	7.54	3/8 SWAGELOK	LEFT CHAMBER OUT
13	39.74	5.54	3/8 SWAGELOK	LEFT ELECT IN
14	40.86	5.54	3/8 SWAGELOK	LEFT ELECT OUT
15	20.43	53.34	1/4 VCR	CHAMBER VENT
16	18.58	53.34	1/4 VCR	PROCESS GAS 1
17	16.72	53.34	1/4 VCR	PROCESS GAS 2
18	14.87	53.34	1/4 VCR	PROCESS GAS 3
19	13.01	53.34	1/4 VCR	PROCESS GAS 4
20	11.75	53.34	1/4 VCR	FLUSH 1
21	10.49	53.34	1/4 VCR	PROCESS GAS 5/PURGE
22	8.64	53.34	1/4 VCR	PROCESS GAS 6
23	6.78	53.34	1/4 VCR	PROCESS GAS 7
24	4.93	53.34	1/4 VCR	PROCESS GAS 8
25	3.67	53.34	1/4 VCR	FLUSH 2
26	2.41	53.34	1/4 VCR	MANIFOLD PURGE
27	2.95	29.75	1/4 VCR	HELIUM INPUT (ICP)

Figure 2-2b. Sample System Utilities Connections (Standard Dual Chamber)

2.3 SAFETY PRECAUTIONS

IMPORTANT NOTICE TO CUSTOMERS WITH CE MARKED SYSTEMS!
In order to maintain CE directive compliance, the customer is responsible for ensuring that all add-on systems, components and their replacements are equipped with shielded cabling excluding AC power supply lines. Furthermore, all OEM complaint equipment must be replaced with CE compliant equivalent components. Any deviations from or modifications of the system must comply with CE directives in order to maintain CE compliance or the system must be re-evaluated by a qualified EMC or safety engineer.

2.3.1 OVERVIEW

Unaxis, Inc. designs and manufactures its equipment in accordance with two major criteria: (1) that it meets or exceeds established performance specifications, and (2) that it satisfies stringent operator safety requirements. Wherever personnel hazards exist, all possible precautions have been integrated into the equipment and appropriate warnings noted.

Voltages in certain areas of the system are potentially dangerous and can cause injury to personnel. Many gases are toxic and hazardous, and vacuum pump outgases may harm personnel if proper exhaust precautions are not taken. Other cautions and warnings are provided where applicable.

Voltage interlocks should not be overridden or by-passed except by competent maintenance personnel.

***WARNING!* POTENTIAL HAZARDS EXIST IN AN ELECTROMECHANICAL ENVIRONMENT. TO PREVENT INJURY TO PERSONNEL OR EQUIPMENT DAMAGE ENSURE THAT POWER IS OFF AT SERVICE PANEL. FOLLOW COMPANY AND GOVERNMENT SAFETY REGULATIONS. KEEP UNAUTHORIZED PERSONNEL OUT OF THE AREA WHEN WORKING ON EQUIPMENT.**

Utmost care should be taken to protect personnel and avoid equipment damage. The following paragraphs highlight potential areas of concern. If there are any questions, contact your Plant Safety Engineer or Unaxis, Inc.

2.3.2 HANDLING

Use the “two-person lift” for any unit weighing between 35 and 51 pounds.

Lift any unit weighing 51 pounds or more with a forklift. Ensure that: (1) the unit is lifted from the bottom, (2) the fork tines extend the full depth or width of the unit, and (3) the unit is balanced before moving.

Use the proper gas cylinder hand truck with safety chain when transporting standard gas cylinders. Ensure that cylinder caps are tightly in place.

Use lint-free gloves when working inside or around the Process Chamber. Fingerprints can cause contamination during processing.

2.3.3 ELECTRICAL

Care should be taken when making input power connections or interconnections between the System Disconnect Box and other devices.

WARNING! **VOLTAGE LEVELS WITHIN THE SYSTEM PRESENT A SHOCK HAZARD AND CAN BE LETHAL. DISCONNECT POWER BEFORE MAKING OR BREAKING POTENTIALLY LIVE WIRES. ENSURE THAT INPUT POWER WIRES ARE AT LEAST #6 AWG AND HOUSED IN ACCORDANCE WITH LOCAL CODES AND REQUIREMENTS. ENSURE THAT THE GROUND WIRE IS AT LEAST #8 AWG OR NOT LESS THAN TWO GRADES SMALLER THAN THE INPUT POWER LINES.**

The voltage used by this machine could cause injury or death. To avoid injury to personnel and damage to property, use of an approved lock out/tag out device equipped to accommodate three or more pad locks or tags is recommended when securing the main power disconnect switch during maintenance of the electrical system. This switch handle is located at the front of the main disconnect enclosure and is clearly marked with a lock out label.

RF power within the system is carried by coaxial cable. Do NOT: cut outer shield, bend less than a 10-inch radius or operate with loose or defective connectors at either end. Ensure that RF switch(es) (if applicable) and Matching Network covers are secure.

2.3.4 GASES

This system may use toxic and hazardous gases and can combine safe gases into toxic or hazardous compounds.

We highly recommend that all tubing for reactant gases be seamless Type 316L stainless steel with VCR® (or equivalent) compression connections.

All cut lines must be deburred. All joints must be helium leak tested to less than $4.9 \times l0^{-9}$ scc/second.

Reactant gas lines must be cleaned before installation by flushing with a sequence of 1.1.1 trichloroethane, acetone and methyl alcohol. Lines should be dried with filtered dry nitrogen.

Supply lines should be free of mechanical joints except in well-ventilated areas. Fittings should not be installed in non-vented spaces or in trenches, ducts, or hallways if possible.

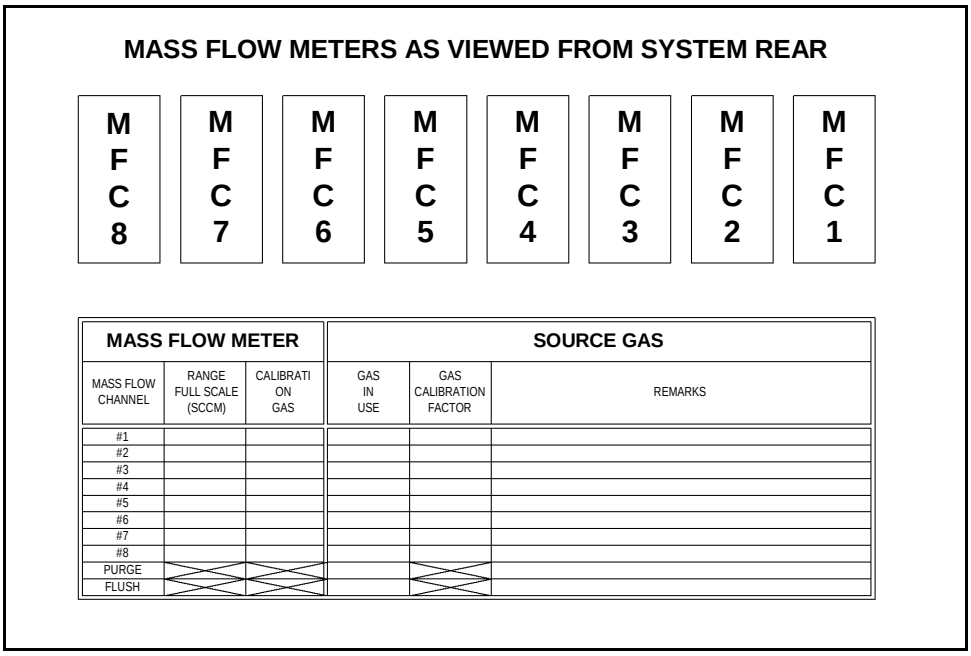
All trenches, ducts and hallways should be vented to avoid potentially dangerous gas pockets.

All gas lines should be marked at both ends and enroute where possible.

Avoid dead-end plumbing and gas lines.

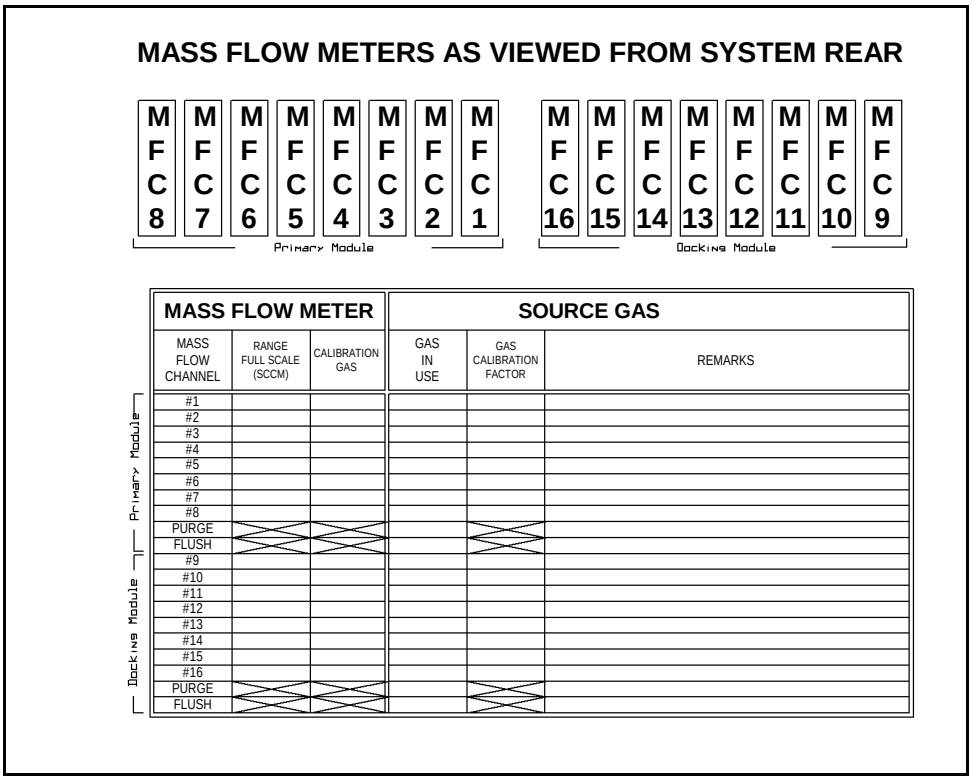
Compressed gas cylinders should be stored in vented cabinets or in separate storage areas per OSHA regulations. The cylinders must be turned off at the tank when not in use or in the event of an emergency. Routine and emergency gas handling and shut-off procedures should be posted and practiced. A gas panel input chart (Figure 2-3) should be referenced and maintained with full-scale flows, calibration factors and specific gas listings for each channel.

Automatic shut-off of dangerous gases at the source, interlocked with the ventilation system and the system EPO, is recommended. Pressure regulators for dangerous gases should be a non-venting type and should only be used with a purge assembly. Install a pressure relief system to alleviate a pressure regulator failure, which could stress other gas control system components.



MASS FLOW METER			SOURCE GAS		
MASS FLOW CHANNEL	RANGE FULL SCALE (SCCM)	CALIBRATION GAS	GAS IN USE	GAS CALIBRATION FACTOR	REMARKS
#1					
#2					
#3					
#4					
#5					
#6					
#7					
#8					
PURGE					
FLUSH					

Figure 2-3a. Gas Input Chart (Single Chamber)



	MASS FLOW METER			SOURCE GAS		
	MASS FLOW CHANNEL	RANGE FULL SCALE (SCCM)	CALIBRATION GAS	GAS IN USE	GAS CALIBRATION FACTOR	REMARKS
Primary Module	#1					
	#2					
	#3					
	#4					
	#5					
	#6					
	#7					
	#8					
	PURGE					
	FLUSH					
Docking Module	#9					
	#10					
	#11					
	#12					
	#13					
	#14					
	#15					
	#16					
	PURGE					
	FLUSH					

Figure 2-3b. Gas Input Chart (Dual Chamber)

WARNING! **HOUSE NITROGEN SUPPLIES MUST NEVER BE USED TO PURGE DANGEROUS GAS LINES. INCORRECT PROCEDURES OR MALFUNCTIONING CHECK VALVES COULD ALLOW HIGHLY DANGEROUS GASES TO INFILTRATE HOUSE NITROGEN LINES. UHP DRY NITROGEN (99.999% PURE) SHOULD BE SUPPLIED TO PURGE REACTANT GAS SUPPLY LINES.**

Separate purge cylinders are required to keep oxidizers from reducers.

CAUTION: The use of the purge gas channel for reactive gases is **not** recommended.

2.3.5 WATER/HEAT TRANSFER FLUID

It is recommended that all water lines contain a 120-micron sediment filter followed by a 10-micron filter, pressure gauge and shut-off valve.

2.3.6 EXHAUST

Although exhaust piping requirements permit some latitude in the type of material used, care should be taken to ensure a safe, correct installation. The material must be compatible with effluent gases. Joints and bends should be minimized.

If exhausted into an existing facilities exhaust system, be sure it can handle the additional SLR exhaust load. Additional precautions should be taken to prevent volatile gas mixtures.

2.3.7 VACUUM SYSTEM OIL

- Process Pump - Use pump fluids compatible with process gases used in the system. Perfluoropolyethers (i.e., Krytox, Fomblin) are recommended for most applications.

NOTE: Please refer to the System Configuration sheets (Section Six) and the Equipment Manual.

WARNING! **PERFLUOROPOLYETHERS (PFPE's) HEATED TO TEMPERATURES ABOVE 290º C EMIT TOXIC VAPORS.**

- Lock Pump - Any good grade of hydrocarbon-based oil may be used since the lock pump is not involved with any of the process gases.

NOTE: If perfluoropolyether fluid will be used, the pump must first be prepared by the manufacturer.

2.3.8 ENDPOINT DETECTION

This system may employ the use of non-ionizing light sources. Use of controls, adjustment or performance procedures other than those provided by the manufacturer of the light source may result in hazardous radiation exposure.

> ***WARNING!*** **AVOID DIRECT EYE EXPOSURE.**
>
> **TO PREVENT INJURY TO PERSONNEL OR EQUIPMENT DAMAGE, IT IS RECOMMENDED THAT ALL SYSTEM OPERATORS AND MAINTENANCE PERSONNEL BECOME FAMILIAR WITH THE SAFE USE AND MAINTENANCE PRACTICES PROVIDED BY THE MANUFACTURER OF THE LIGHT SOURCE.**

Safety practices and technical infromation regarding the light source may be found in the equipment manual provided with the system.

2.4 INSTALLATION PREPARATION

Personnel should read the safety precautions listed in Section 2.3 prior to performing any installation. These precautions could prevent injury to personnel and/or avoid accidental equipment damage.

2.4.1 SPECIFICATIONS OF INSTALLATION MATERIALS

The user must supply the following materials:

l. ISO/KF clamps (size and quantity as required).

2. Electrical cable, 5-wire, 6 AWG/8 AWG or better if required by local codes (length as required).

3. Overcurrent protection at the facility service panel (please verify on the System Configuration sheets in Section Six):

Standard Domestic:
208/240 VAC, 3 phase, 60 Amp, 5-wire
Standard International:
200 VAC, 3 phase, 60 Amp, 4-wire
380 VAC, 3 phase, 60 Amp, 5-wire
415 VAC, 3 phase, 60 Amp, 5-wire

4. Gas Lines - Figures 2-3 illustrate gas panel input charts for single and dual chamber systems. The correct chart must be completed by the user at the time of system start-up.

CAUTION: It is recommended that a filter with an absolute rating of 0.3 microns be installed in the nitrogen line between the source and the system.

5. Water lines - If the heat exchanger option was not chosen, the user must supply the water line tubing. It is also recommended that the user supply sediment filters, a flowmeter and, if desired, inlet and outlet pressure gauges (see Section 2.7).

   If the heat exchanger option was purchased, it is supplied with 3/8-inch ID flexible tubing and proper fittings. The Fluid Input Panel (Figure 2-8) is also supplied with fittings designed to connect with the tubing.

6. Heat Exchanger Fluid - Please refer to the System Configuration sheets (Section Six) and the Equipment Manual for specific requirements.

If there are any questions about process requirements, please contact a Unaxis representative.

2.4.2 INSTALLATION TOOLS AND EQUIPMENT

The following tools and equipment are required to install the system:

- Common mechanic's and electrician's hand tools
- Tube bender
- Helium leak detector

2.4.3 UNPACKING

CAUTION: **BEFORE OPENING ANY EQUIPMENT**, be aware that all systems are shipped with potential damage indicators mounted on the sides of crates. If there was excessive shock to the load or if the load was subjected to inordinate tilting, these indicators will reflect potential damage. **DO NOT OPEN CRATE(S) UNLESS A TRUCKING REPRESENTATIVE IS PRESENT** if at all possible.

The following procedure should be used when unpacking the equipment:

1. Be present for the unpacking. Carefully open the shipping crates and remove the contents.
2. Miscellaneous parts are of particular importance when unpacking. Miscellaneous parts are shipped in a separate crate or in a cardboard box packed inside the system crate. Compare the items received with those listed on the packing list. If any items are missing, immediately notify Unaxis, Inc. Failure to do so may result in a charge for replacing the items.
3. Carefully inspect each item for damage. If an item is damaged, notify the carrier and Unaxis, Inc., immediately. The carrier will provide information for filing a claim .

CAUTION: **DO NOT** attempt arm/substrate adjustment or movement. Alignment was set at the factory.

CAUTION: Handle precision equipment with extreme care or damage may occur.

4. Review Section 2.1 and refer to Figure 2-4, Section 2.5.1.2 before proceeding.

2.5 INSTALLATION PROCEDURES

The system can be installed only when all of the preceding requirements have been met.

WARNING! **POTENTIAL HAZARDS EXIST IN AN ELECTROMECHANICAL ENVIRONMENT. TO PREVENT INJURY TO PERSONNEL OR EQUIPMENT DAMAGE ENSURE THAT POWER IS OFF AT SERVICE PANEL. FOLLOW COMPANY AND GOVERNMENT SAFETY REGULATIONS. KEEP UNAUTHORIZED PERSONNEL OUT OF THE AREA WHEN WORKING ON EQUIPMENT.**

2.5.1 POSITIONING OF EQUIPMENT

2.5.1.1 CABLES AND PLUMBING

One of the primary considerations when positioning the equipment is the routing of cables and plumbing. Routing will depend on the physical layout of the area and the location of required utilities. Preferred routes are overhead runs or through the floor or ceiling.

A routing survey should be made as soon as the equipment is positioned. The following should be considered:

- Routing should ensure the safety of personnel (i.e., no cables or plumbing projecting out of floors or walls without properly marked safety barriers).
- Some plumbing is restricted to length and the number of 90º bends (a 90º bend is equal to three feet).
- Cables and plumbing must be protected from damage by personnel and material handling equipment.
- Cables and plumbing must be accessible for servicing.
- The finished job should present a neat appearance.

2.5.1.2 MAIN CABINET

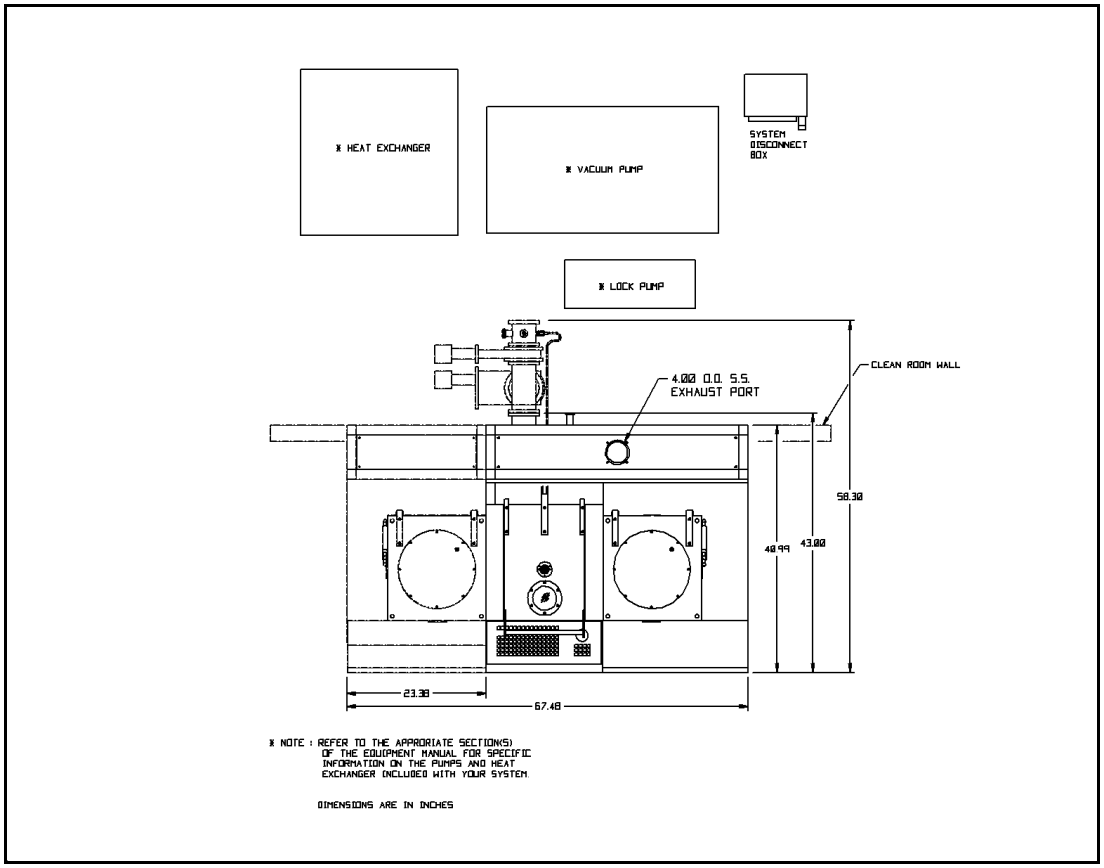


Figure 2-4. Typical Equipment Installation Arrangement

Figure 2-4 illustrates a typical system arrangement.

1. Preparation: The Main Cabinet is typically positioned in a cleanroom with support equipment housed in a local service area. Leveling of the unit is required and should be considered before any wall openings are made. Wall openings should only be large enough to accept the cabling/plumbing. This will reduce the size of the openings to be sealed to maintain cleanroom integrity. Sealing of through-wall plumbing/cabling is done at the customer's discretion.
2. Cleanroom Position: Determine the exact position of the Main Cabinet in the cleanroom. Following the dimensions specified in Figures 2-1 and 2-2, prepare through-wall openings for the pump vacuum lines, the Gas Panel exhaust line, Fluid Input Panel lines, Electrical Interface Panel cables, RF cables, and process gas lines.
3. Leveling: To level the Main Cabinet, position a carpenter's level on the cabinet top, either front-to-back or side-to-side. Adjust the leveling screws (pads) which support the system. Alternate the level between front-to-back and side-to-side until the system is level in both directions. Proper leveling minimizes movement of process samples during pump down cycles.

2.5.1.3 VACUUM PUMPS

Connect the mechanical pump(s) as follows:

l. Drip Pans: The mechanical pump(s) should have a drip pan placed beneath them (not supplied).

2. Leveling: Level the main blower/process pump by adjusting the leveling mounts. If the main pump vacuum line is straight tube (as is typical for a roots blower configuration), the height of the pump must be adjusted so the centerlines of the vacuum port and the Main Cabinet vacuum port are of equal height.

3. Cable Interconnects: The unit power cable (hardwired to the pump) must be routed to the rear of the Electrical Enclosure.

4. Mechanical Pump: Connect the mechanical pump to the vacuum port (or to the turbomolecular pump foreline port, if applicable) with a one meter long flexible vacuum line (shipped with the miscellaneous system components, including all necessary vacuum clamps and size adapters).

5. Lock Pump: Connect the lock pump to the Loadlock vacuum port with flexible vacuum line (shipped with the miscellaneous system components, including all necessary vacuum clamps and size adapters).

2.5.1.4 HEAT EXCHANGER

Connect the heat exchanger as follows:

l. Drip Pan: Place a drip pan (not provided) under the fittings on the side of the unit.

2. Cable Interconnects: Route the power cable hardwired to the rear of the heat exchanger to the rear of the Electrical Enclosure.

3. Fluid Line Connections: Connect the heat exchanger fluid lines. The 3/8" ID flexible tubing connects to the Fluid Input Panel by means of 3/8" tube fitting screw-type connectors and to the heat exchanger with 3/8" brass hose connections (lines and connectors are supplied by Unaxis).

   Customers supplying their own water or heat exchanger must supply their own tubing. Choose heavy wall or reinforced tubing to minimize the possibility of line failure. The distance between the system and the heat exchanger should be minimized whenever possible (see Section 2.7).

2.5.1.5 ENDPOINT DETECTION

The system supports one of three endpoint detection options: an optical filter, a monochromator or a LASER.

1. The optical filter is comprised of a broad-band photo-diode detector and a narrow band (10nm) detector which mounts directly on the Chamber Viewport. A range of filters are available which can be used for specific applications.

2. The monochromator has a 100 mm focal length and is equipped with either a 600 or 1200 groove/mm grating. A PMT detector is used with a range of 200 nm - 900 nm. The spectral band pass is 3 nm (1.5 nm with 1200 groove/mm grating). The head is connected to the Chamber Viewport via a fiber optic cable.

3. The LASER is mounted to the top of the Process Chamber. The LASER incorporates beam-splitting optics; therefore, the chamber top has only one Viewport. The port position is tailored to each customer's individual requirements and, as such, can be in virtually any location on the chamber top. The LASER is the most versatile endpoint technique as it can be used to detect endpoint in a variety of transparent films (oxide, nitride, ITO), semitransparent films (poly-Si), and opaque films (Cr, Ta, Al). It can also be used to determine etch depth and etch rate for some applications. A LASER head with an

integral CCD camera is available which allows simultaneous viewing of a magnified portion of the sample.

The raw analog output of each head is fed into a control box which amplifies the signal according to the individual characteristics of the endpoint system (see Figure 2.5). Each controller can interpret two individual endpoint signals. The controller has an adjustable gain potentiometer for each signal. All endpoint signals are then fed into the computer and manipulated via an internal algorithm in the configuration. The software accepts a signal from the interface and determines endpoint based on a user-selected endpoint algorithm which is accessed during run time.

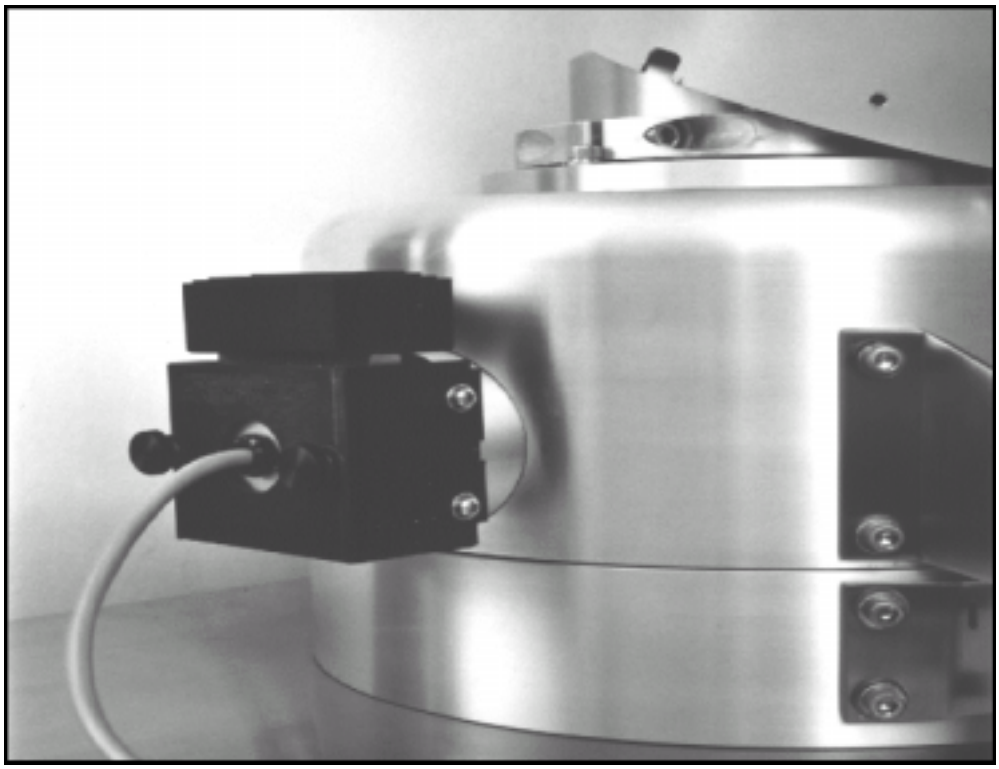


Figure 2-5. Endpoint Detector Head

2.5.2 SYSTEM INTERCONNECTS

System interconnects are performed after the equipment is positioned and the routing survey is complete. Make all power interconnects first, then control cabling and plumbing interconnects.

> ***CAUTION:*** Do not connect the main power until the system has been checked for correct installation.

2.5.2.1 ELECTRICAL ENCLOSURE CONNECTIONS

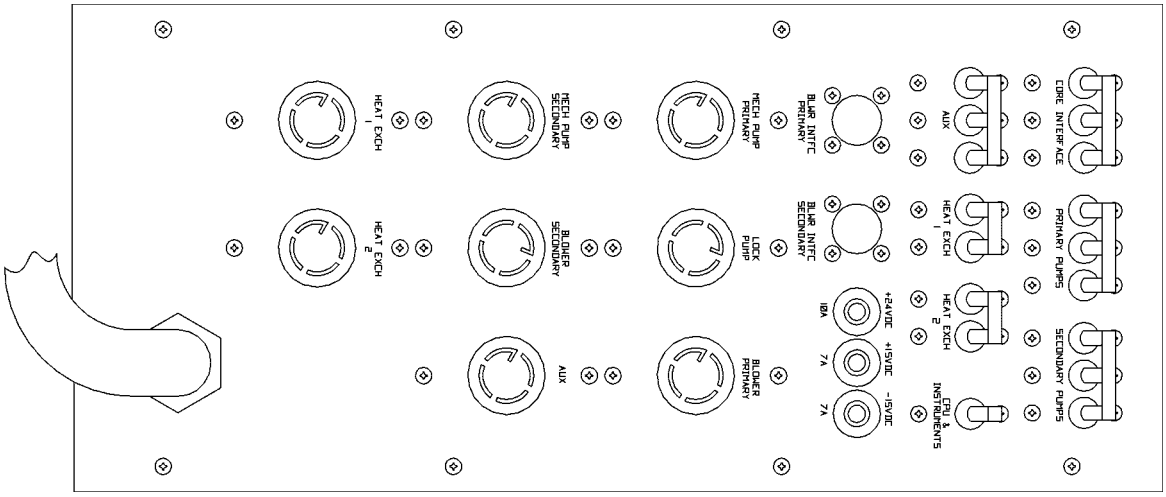


Figure 2-6. Electrical Interface Panel

The Electrical Enclosure is located on the lower right side of the Mainframe. The Electrical Interface Panel (EIP) is located at the rear of the Electrical Enclosure. Review Figure 2-6 before performing any connections described in this section. Ensure that all switches and breakers on the Front Panel (Figure 2-7) are in the OFF position before proceeding.

1. Main Power: The system is shipped with the main power cable hardwired to the System Disconnect Box. Facility power must be hardwired to the System Disconnect Box. It is recommended that a local power disconnect be available and that the disconnect be in the OFF position until the installation has

been thoroughly checked. Consult a licensed electrician for details on allowable facility power connections in your local area.

2. ECR Instrument Cabinet Power: The ECR instrument cabinet power cable is hardwired to the instrument cabinet. At the time of installation it must be hardwired to the System Disconnect Box. System components housed within the instrument cabinet must be connected to components within the Mainframe. All cabling is supplied and marked. Ensure proper connections have been accomplished prior to applying power.
3. Mechanical Pump Power Cable: The mechanical pump power cable is hardwired to the pump package and terminates in a standard plug. Connect this plug to the mating receptacle labeled MECHANICAL PUMP on the EIP.
4. Blower Power Cable: The blower power cable is hardwired to the blower package and terminates in a standard plug. Connect this plug to the mating receptacle labeled BLOWER on the EIP.
5. Turbomolecular Pump Power Cable: The turbomolecular pump power cable is supplied with the Turbo Power Supply/Frequency Converter. It terminates as a standard receptacle that connects to the Frequency Converter. Connect the standard plug on the other end to the appropriate receptacle on the side panel (left side as viewed from front) of the Electrical Enclosure.
6. Lock Pump: The lock pump power cable is hardwired to the pump package and terminates in a standard plug. Connect this plug to the mating receptacle labeled LOCK PUMP on the EIP.
7. Heat Exchanger Power Cable: Make sure that the breaker labeled HEAT EXCHANGER on the front panel of the Electrical Enclosure is in the OFF position. Connect a standard plug (250V, 30 Amp, 3-phase) to the heat exchanger power cable (hardwired to the heat exchanger). Connect the plug to the mating receptacle labeled HEAT EXCHANGER on the EIP.
8. Auxiliary Power Receptacle: The system provides six (6) 125 V, 15 Amp receptacles on the side panel (left side as viewed from front) of the Electrical Enclosure to allow for additional options or future system enhancements. Information on the use of the auxiliary receptacles will be provided as necessary.
9. Dual Chamber System Power: Docking module power is supplied internally by the Main Cabinet via conduit.

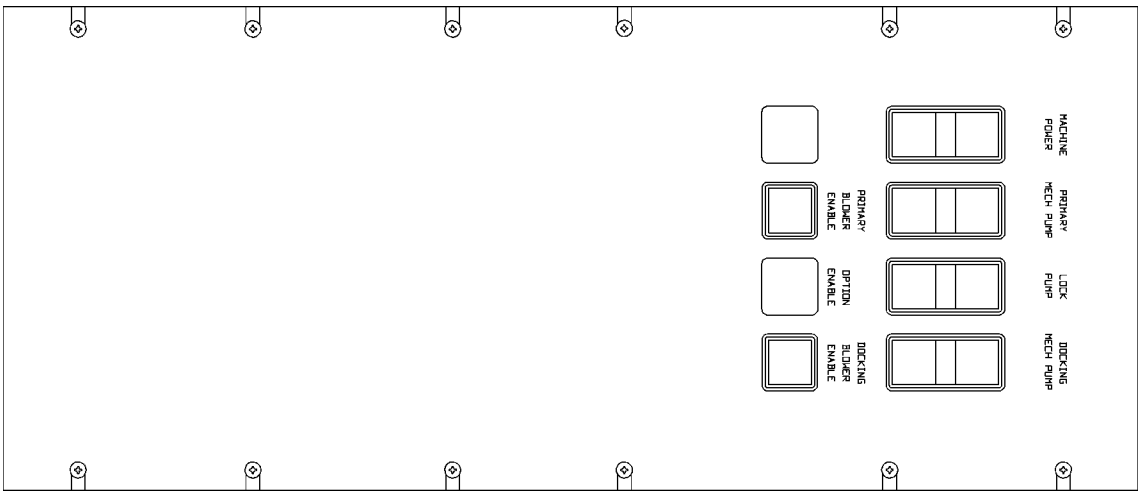


Figure 2-7. Electrical Enclosure Front Panel

2.5.2.2 HEAT EXCHANGER FLUID LINE CONNECTIONS

***WARNING!* THERMAL TRANSFER MEDIUM (TMM) IS OFTEN HARMFUL AND MAY BE FATAL IF SWALLOWED. PROLONGED EXPOSURE TO TTM VAPOR CAUSES EYE IRRITATION.**

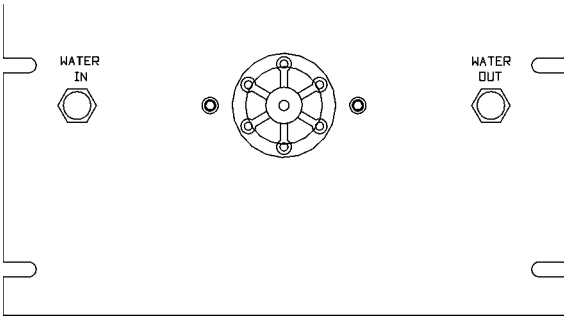


Figure 2-8a. ECR Magnet FIP

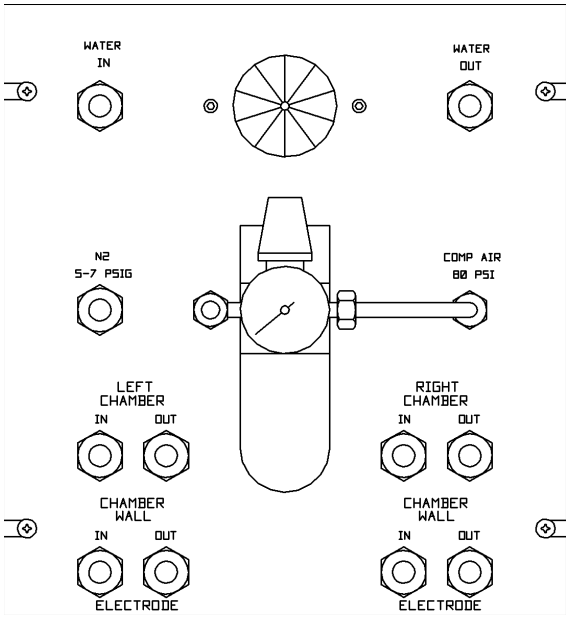


Figure 2-8b. Standard FIP

Figure 2-8. Fluid Input Panel (FIP)

1. Coolant Lines: Connect the two pump connections on the rear of the heat exchanger to the two fluid connections on the back of the Mainframe with 3/8" ID flexible tubing (supplied). Connect the heat exchanger PUMP INLET and PUMP OUTLET to the ELECTRODE OUT and ELECTRODE IN connections on the Fluid Input Panel (Figure 2-8), respectively. Connections labelled WATER IN and WATER OUT use *House Water* (see Table 2-3).
2. Keep the distance between the heat exchanger and the SLR Mainframe to a minimum (maximum length is sixteen (16) feet). Avoid sharp bends in the tubing. Any long lengths of tubing should be prefilled with thermal transfer medium.
3. Keep extra thermal transfer medium on hand. Check the heat exchanger fluid level on a regular basis to ensure that the proper fluid level is maintained while the system is operating.

NOTE: Please see the System Configuration sheets (Section Six) and the Equipment Manual for specific information on the heat exchanger included with this system.

2.5.2.3 STANDARD VACUUM SYSTEM CONNECTIONS

***WARNING!* TO AVOID DANGEROUS OR CORROSIVE CONDENSABLE VAPORS FROM ACCUMULATING IN PUMP OIL RESERVOIRS, THE PUMP CASES ARE PURGED WITH AN INERT GAS. THIS PURGE PRESSURE SHOULD BE CAREFULLY REGULATED ACCORDING TO PUMP MANUFACTURER RECOMMENDATIONS.**

1. Mechanical Pump: Connect the following lines to the mechanical pump:
   a. Vacuum line from MAIN VACUUM FLANGE at rear of Main Cabinet to mechanical pump INLET FLANGE.
   b. Exhaust line from mechanical pump(s) EXHAUST FLANGE to facility exhaust outlet(s) or air pollution control device.
   c. OPTIONAL: Provide a source of inert gas per manufacturer specifications (please see the Equipment Manual for specific information).
2. Blower/Process Pump: Connect the following lines to the blower/process pump:
   a. Vacuum line from MAIN VACUUM FLANGE at rear of Main Cabinet to roots blower INLET FLANGE (standard 100 mm bellows and stainless steel tubing is provided).
   b. Provide a source of inert gas per manufacturer specifications (see the Equipment Manual for specific information.
   c. Exhaust line from the mechanical pump EXHAUST FLANGE to facility exhaust outlet(s) or air pollution control device.
3. Lock Pump: Connect the following lines to the lock pump:
   a. Flexible vacuum line from LOAD LOCK VACUUM FLANGE at rear of Main Cabinet to lock pump INLET FLANGE.
   b. Exhaust line from the lock pump EXHAUST FLANGE to an oil mist eliminator, facility exhaust outlet and/or air pollution control device.
4. Pump Oil Filter: If not already connected, connect the oil filter to the main pump as described in the mechanical pump section of the Equipment Manual.

NOTE: Please see the System Configuration sheets (Section Six) and the Equipment Manual for specific information on the pump(s) included with this system.

2.5.2.4 GAS CONNECTIONS

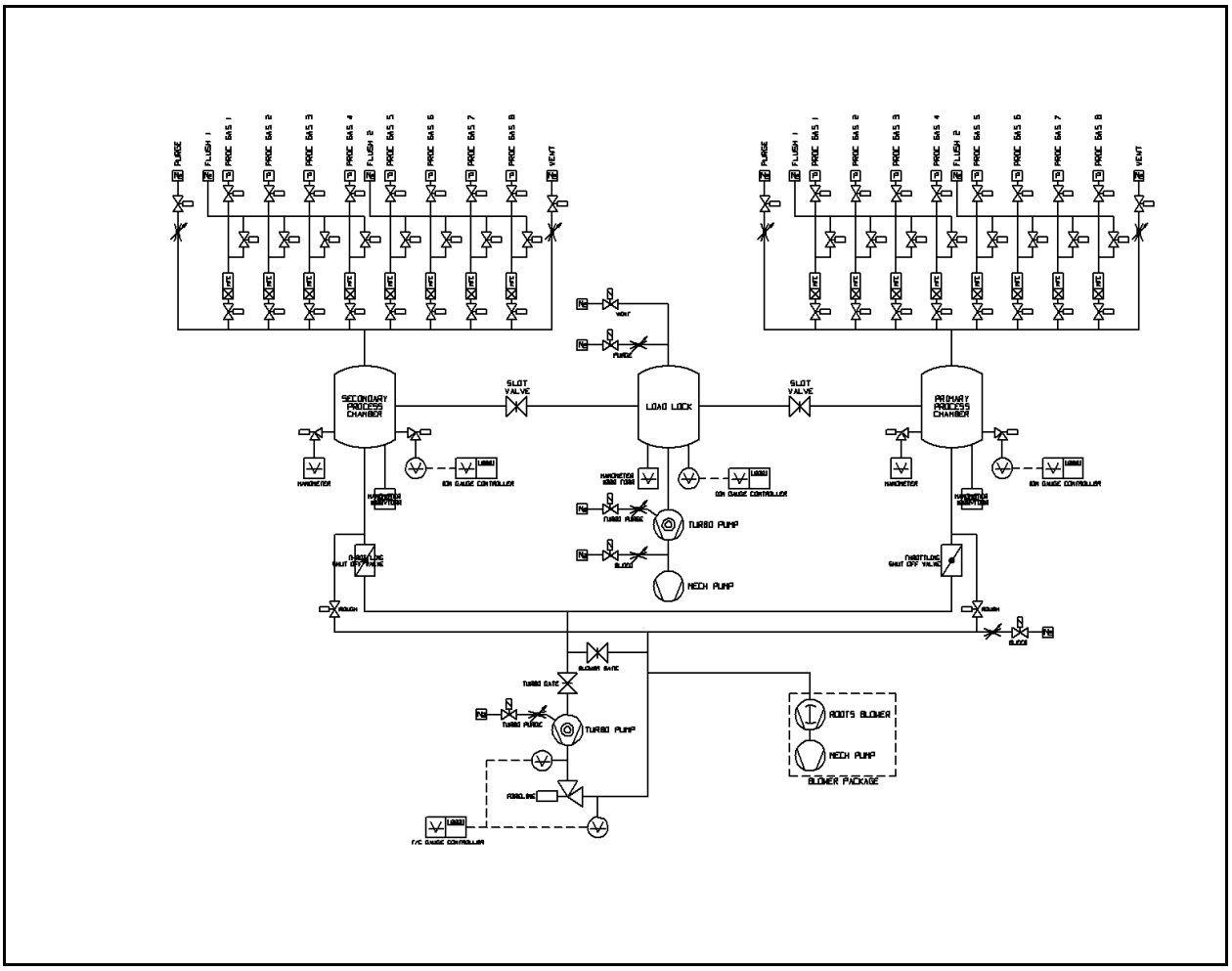


Figure 2-9. Sample Vacuum Schematic (Standard)

1. Refer to the specific Vacuum Schematic in the Service Document (similar to Figure 2-9) and connect an N_2 gas line to the N_2 connector on the Fluid Input Panel (Figure 2-8).
2. All connectors within the Gas Panel are VCR® (or equivalent) fittings.
3. The routing of the gas lines must ensure that they are protected from damage and do not present a hazard to personnel.
4. Determine the most practical routing for your application and make the gas line connections (refer to Section 2.7). The final process gas connections are made within the Gas Panel.
5. Helium leak test all connections to ensure proper sealing.

2.5.2.5 AIR CONNECTIONS

- Connect the house air supply to the COMP AIR 80 PSI connector on the Fluid Input Panel (See Figure 2-8 and Section 2.7)

NOTE: The machine should be supplied with clean, dry, 80-90 psi, regulated compressed air (see Section 2.2).

2.5.2.6 MAIN CABINET EXHAUST CONNECTIONS

WARNING! **IN CASES WHERE TOXIC, NOXIOUS, OR POISONOUS GASES ARE EXHAUSTED, REFER TO THE EPA SPECIFICATIONS FOR HANDLING THESE ATMOSPHERIC POLLUTANTS.**

- Locate the exhaust port on top of the Gas Panel (see Figures 2-1 and 2-2). Connect 4-inch ID exhaust piping to the port.

NOTE: Exhaust is typically piped to an alkaline/H_2O scrubber. Exhaust procedures must comply with local, state and Federal requirements.

2.6 SYSTEM CHECKOUT

2.6.1 GENERAL

After installation, inspect all system units for the following (as applicable):

1. Damage from installation.
2. Foreign objects or remaining packing material.
3. Loose mounting hardware or missing parts.
4. Kinked, stressed or loose gas, water and air lines.
5. Loose power or control cables.
6. All circuit breakers and power-on switches should be turned off.

2.6.2 MAIN POWER CONNECTION

The customer must supply the electrical cable to distribute facility power from the service panel to the System Disconnect Box (cable length as required). The cable gauge must correspond to local code requirements (6 AWG/8 AWG minimum).

WARNING! **POTENTIAL HAZARDS EXIST IN AN ELECTROMECHANICAL ENVIRONMENT. TO PREVENT INJURY TO PERSONNEL OR EQUIPMENT DAMAGE, ENSURE THAT POWER IS OFF AT SERVICE PANEL, FOLLOW COMPANY AND OSHA SAFETY REGULATIONS. KEEP UNAUTHORIZED PERSONNEL OUT OF THE AREA WHEN WORKING ON EQUIPMENT.**

2.6.3 PUMP SERVICING

The oil filtration system should contain the required amount of pump oil. The oil should be added before testing the pump system(s).

WARNING! **TO PREVENT INJURY TO PERSONNEL OR EQUIPMENT DAMAGE, ENSURE THAT THE CORRECT FLUIDS ARE USED. HANDLE WITH CARE AND USE ONLY AS NEEDED. FRESH FOMBLIN IS NON-TOXIC. HOWEVER, AFTER A PERIOD OF USE IN A VACUUM PUMP IT MAY COLLECT AND HOLD HAZARDOUS EFFLUENTS IN SUSPENSION.**

NOTE: For specific information on the pump(s) included with this system and the oil required, please see the System Configuration sheets (Section Six) and the Equipment Manual.

NOTE: Subsequent tasks require power to the pump(s). Therefore, at this time, enable power to the service panel, and set the (1) Main System Power Disconnect, (2) the disconnect switch, and (3) the circuit breaker labeled VACUUM SYSTEM to ON.

1. Briefly apply power to the pump(s) and check rotation by alternately pressing the MECH PUMP START and OFF buttons and the LOCK PUMP START and OFF buttons. These are located on the Electrical Enclosure front panel (Figure 2-7).
   The motor shaft must turn in the direction of the arrow on the motor housing. If the motor turns incorrectly, reverse any two phases at the disconnect switch in the System Disconnect Box.
2. Apply power to the pump(s) for 20 minutes. This heats the pump oil to operating temperature and reduces fluid viscosity. Be sure N_2 bleed is available and flowing.

***WARNING!* POTENTIAL HAZARDS EXIST IN RESETTING THE THERMAL OVERLOAD DUE TO THEIR PROXIMITY TO HIGH VOLTAGE. FOLLOW COMPANY AND OSHA SAFETY REGULATIONS. IT IS NOT UNCOMMON FOR BREAKERS AND/OR THERMAL OVERLOAD TO OCCASIONALLY TRIP WHEN PUMP(S) ARE COLD, AND THUS NEED TO BE RESET.**

NOTE: It is normal to hear the upper and lower blower rotors rotate slowly when it is turned off. This is due to the mechanical vane pumps causing a gas flow through the blower when they are turned on.

3. When the setpoint is reached, the blower will start automatically if the blower enable switch is positioned in the ENABLE mode. The manostat (automatic pressure switch) located on the blower triggers the blower at a preset pressure.

CAUTION: Operating the blower at pressures above the setpoint may cause damage.

4. Allow the pump(s) to run for one hour while constantly monitoring the oil level in the sight glass.
5. Disable power to the pump(s) and oil filtration system. Recheck all fittings.

2.6.4 HEAT EXCHANGER CHECKOUT

The following steps should be taken to check heat exchanger operation:

WARNING! **POTENTIAL HAZARDS EXIST IN AN ELECTROMECHANICAL ENVIRONMENT. TO PREVENT INJURY TO PERSONNEL OR EQUIPMENT DAMAGE, ENSURE THAT THE HEAT EXCHANGER CIRCUIT BREAKER IS OFF.**

NOTE: For specific information on the heat exchanger included with this system, please see the System Configuration sheets (Section Six) and the Equipment Manual.

1. Ensure that all fluid lines are leak tight. Check the bath to make sure it has been properly filled with fluid.
2. Switch ON the heat exchanger circuit breaker.
3. Turn on the heat exchanger using the front panel ON/OFF switch. Let the unit run for approximately five (5) minutes. Check all fluid connections in the cooling loop to ensure that they are leak tight. If pressure and flow gauges are installed, record the gauge values.
4. Turn the heat exchanger off and check the fluid level. Refill the bath to the proper level if necessary. Restart the unit and check for leaks again.

2.6.5 INITIAL START-UP PROCEDURE

NOTE: The initial start-up of the system should be performed by Unaxis, Inc., Field Service Personnel. Contact our Customer Service Department at (727) 577-4999 to schedule start-up.

2.6.6 GAS LINE VACUUM INTEGRITY

To ensure gas line vacuum integrity, every gas line connection must be helium leak tested from the source to the vacuum chamber and vacuum pump(s).

2.6.7 SYSTEM ADJUSTMENTS

System adjustments should only be made after:

1. Determining that an adjustment is needed (i.e., improper operation or a malfunctioning device).
2. Determining which adjustment procedure will correct the malfunction.
3. Having a clear understanding of the normal operation of the function.
4. Having a clear understanding of the purpose and effects of the adjustment(s).

NOTE: If the transfer arm requires adjustment, please contact Unaxis Customer Service Department at (727) 577-4999.

Unaxis Customer Service Department will provide assistance if a system component malfunctions or needs adjusted. Additional system adjustment information can be found in the Service Document and Equipment Manual.

2.6.8 CUSTOMER FACILITY CERTIFICATION RECORD

The Customer Facility Certification (Section 2.6.9) ensures Unaxis, Inc., that all customer facility requirements have been properly met.

An authorized representative of your company is obligated to initial each item on the Customer Facility Certification as it is completed. Please FAX the completed Customer Facility Certification to Unaxis, Inc., using the FAX Cover sheet provided on the following page. Upon receipt, our Customer Service Department will schedule a Field Service Engineer to complete your system start-up.

The following statement should be completed and will serve as your record of notifying us of facility compliance:

_____ The completed Customer Facility Certification was FAXed to Unaxis, Inc., on

_____ by _____ _____
(Date) (Name)

_____
(Title)

Facsimile Cover Sheet

To: Customer Service Department

Company: Unaxis USA, Inc.

Phone: 727-577-4999

Fax: 727-576-6648

From: _____

Company: _____

Phone: _____

Fax: _____

Date: _____

Pages including this cover page: _____

Comments:

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2.6.9 CUSTOMER FACILITY CERTIFICATION

SLR SERIES PROCESS SYSTEM
Page 1 of 3

CUSTOMER: _____ MODEL: _____
ADDRESS: _____ CONTROL #: _____
_____ SERIAL #: _____

1. **Minimum Installation Clearance:**

INITIAL:	ITEM	*(all dimensions in feet)* FRONT	SIDE	BACK
	Main Cabinet	3	2	3
	ECR Instrument Cabinet	3	2	3
	System Disconnect Box	3	2	0
	Heat Exchanger(s)	2.5	1	2.5
	Vacuum Pump(s)	2.5	1	2.5
	Lock Pump	1	1	2

NOTE: The following facility services should be connected to the system as specified in Section Two of this manual. Please refer to Figures 2-1 and 2-2 for input locations.

INITIAL:

_____ 2. **Compressed Air:**
Clean, dry, 80 - 90 psig. Flow rate less than 1 slpm. Average flow rate 1 scfm. Oil-free to 50 ppm. Max moisture content -60º F dew point, and filtered to max particle size of 3 microns

_____ 3. **Purge Gas:**
Nitrogen, 5-7 psig @ 1 slpm (99.999% purity recommended)

_____ 4. **Vent/Vacuum Bleed Gas:**
Nitrogen, 5-20 psig @ 10 slpm

_____ 5. **Flush Gas:**
Nitrogen, 15-20 psig @ 1 slpm (99.999% purity recommended)

_____ 6. **Process Gases** (8 max per chamber):
5-25 psig, all lines helium leak tested to less than 4.9×10^{-9} scc/sec

_____ 7. **Gas Panel Exhaust:**
50 cfm/minute @ 0.5 inch H_2O, connection to 4-inch OD duct

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CUSTOMER FACILITY CERTIFICATION

SLR SERIES PROCESS SYSTEM

INITIAL:

_____ 8. **Electrical Input:** (Please verify on the System Configuration sheets in Section Six)

Standard Domestic:
208/240 VAC, 3 phase, 60 Amp, 5-wire
Standard International:
200 VAC, 3 phase, 60 Amp, 4-wire
380 VAC, 3 phase, 60 Amp, 5-wire
415 VAC, 3 phase, 60 Amp, 5 wire

_____ 9. **Heat Exchanger Reservoir:**
Filled with proper fluid and to proper level (see the Equipment Manual for specific requirements).

_____ 10. **Cooling:**

Standard:

House Water 1 to 1.5 GPM @ 30 to 60 psig differential, supply temperature 20 ºC to 25º C,heat load approximately 1 kW

ICP:

House Water 40 psig @ 15 to 30º C, 1 MegOhm resistivity. RF-20M flow rate 2.5 GPM.

ECR:

House Water 1.25 GPM @ 60 psig differential, supply temperature 4 ºC (40^{o}F), maximum heat load approximately 7 kW.

Helium 20 psig @ 20 sccm, Helium Input connection at Fluid Input Panel.

Heat Exchanger:
(See the Equipment Manual for specific requirements)

_____ 11. **Pump Case Purge Gas:**
Typically nitrogen (see the Equipment Manual for specific requirements).

_____ 12. **Pump Vacuum Exhaust:**
Piping must be compatible with effluent gases. All joints must be leak tight.

_____ 13. All **interconnect cables** have been routed as specified in this Users Manual.

_____ 14. All **hoses** have been routed as specified in this Users Manual.

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CUSTOMER FACILITY CERTIFICATION

SLR SERIES PROCESS SYSTEM

Page 3 of 3

This is to confirm that the Unaxis, Inc., semiconductor system _____ , Serial # _____ has been installed and properly connected to our facility as stated above.

_____

Name (print)

_____

Title (print)

_____

Signature

_____

Date

Comments:

_____

_____

_____

_____

_____

_____

_____

_____

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2.6.10 START-UP/SYSTEM ACCEPTANCE RECORD

The start-up will be performed by a qualified Unaxis Field Service Engineer, who will: (1) verify the system electrical and mechanical functions, (2) ensure optimum system operation, and (3) provide operator training during system start-up to include programming, operation and troubleshooting.

The final step in system start-up is the customer's checkout and sign-off. Upon meeting all electrical and mechanical requirements and receiving sufficient training for independent operation, please fill out the Start-Up/System Acceptance (Section 2.6.11) and FAX it to Unaxis at (727) 576-6648.

The following statement should be completed and saved for your records.

The completed Start-Up/System Acceptance was FAXed to Unaxis, Inc., on:

_____ by _____

(Date) (Name)

_____

(Title)

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2.6.11 START-UP /SYSTEM ACCEPTANCE

CUSTOMER: _____ DATE: _____

UNAXIS C/N: _____

PO #: _____

SYSTEM S/N: _____

SYSTEM TYPE: _____

This is to confirm that the Unaxis, Inc., semiconductor system referenced above has met all electrical and mechanical requirements for total operation as specified.

System start-up and instruction was satisfactorily performed by a Unaxis, Inc., Field Service Engineer.

CUSTOMER COMMENTS:

_____

_____

_____

_____

_____

_____

_____

AUTHORIZED CUSTOMER REPRESENTATIVE:

_____
Signature

_____
Print Name and Title

_____
Date

AUTHORIZED UNAXIS, INC. REPRESENTATIVE:

_____
Signature

_____
Print Name and Title

_____
Date

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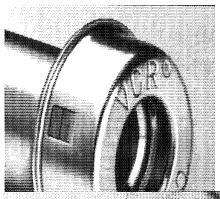
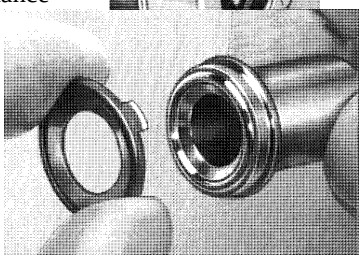
2.7 FITTING INSTALLATION INSTRUCTIONS

2.7.1 FACE SEAL FITTINGS (VCR®)

Handling

A protective cap is placed on all VCR sealing beads to prevent nicks or scratches. Damage to the sealing beads will affect the fitting performance and cause system leakage. This cap should remain in place during storage and handling.



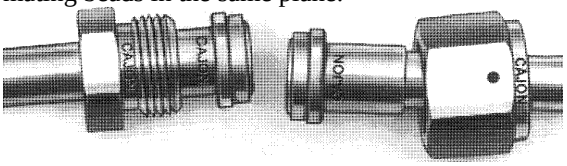


Cleaning

Many chemical processes used for cleaning, electropolishing and passivation will remove the silver plating from the inside of VCR female nuts. Protect this plating. If the plating is damaged or removed, thread galling will occur and prevent a proper seal.

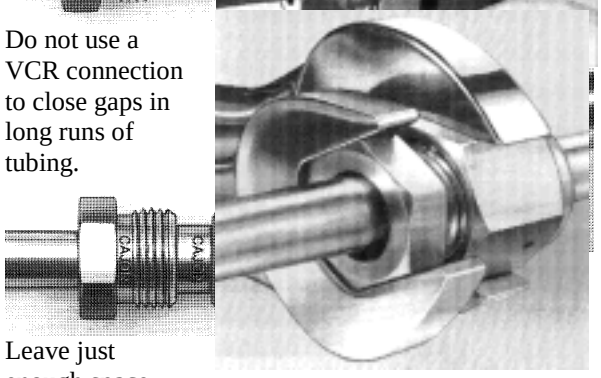
Alignment

A VCR connection cannot compensate for misaligned tubing or components. Keep mating beads in the same plane.

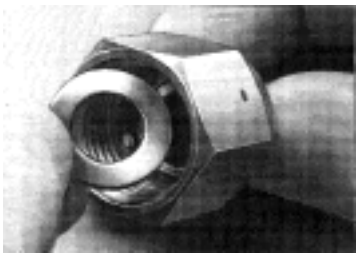


Check for proper alignment before assembly.

Do not use a VCR connection to close gaps in long runs of tubing.



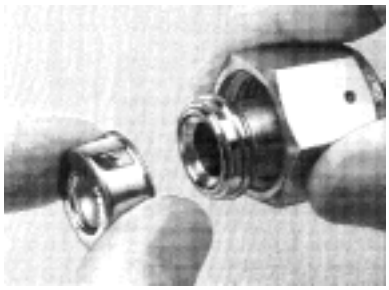
Leave just enough space between the beads to insert the gasket.



Assembly

Caution: VCR components with fixed threads must remain stationary during installation. Do not allow the sealing beads to rotate against the gasket. Remove the Original-style Gasket or Gasket Retainer Assembly from its package.

When using an original-style Gasket, place it into the female nut whenever possible. No special positioning is needed, because the gasket is self-aligning.



When using a Gasket Retainer Assembly, press the assembly onto the gland as shown. The retainer assembly will locate the gasket over the bead and hold it in place. Be careful not to scratch or nick the sealing bead. Damage to the bead may cause leakage.

1. To assemble the connection, hold the male nut or body hex stationary. Tighten the female nut finger-tight.
2. Mark both the female and the male nut or body hex.
3. Hold the male nut or body hex stationary with a backup wrench. Tighten the female nut 1/8 turn past finger-tight for 316 stainless steel and nickel gaskets or 1/4 turn past finger-tight for copper and aluminum gaskets.

Caution: Excessive over tightening will damage the sealing beads and possibly cause system leakage.

Disassembly

Removing VCR components in an assembled system requires no axial clearance. To disassemble a VCR connection, hold the male nut or body hex stationary with a backup wrench and loosen the female nut. After removing the

components, be sure to protect the sealing beads with the protective caps or Gasket Retainer Assemblies.

Re-Tightening

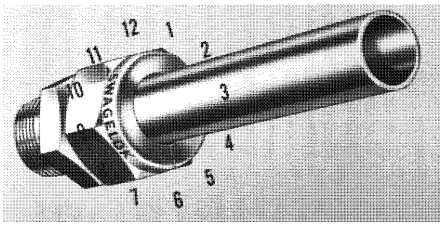
To maintain system reliability, install a new Original-style Gasket or Gasket Retainer Assembly on each remake. Simply follow the assembly instructions listed above.

Installation Instructions courtesy of Swagelok Co.

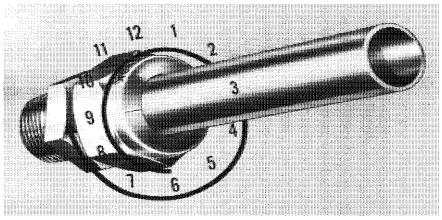
2.7.2 TUBE FITTINGS

1. Simply insert the tube into the SWAGELOK® Tube Fitting. **Make sure that the tubing rests firmly on the shoulder of the fitting and that the nut is finger-tight.**

2. Before tightening the SWAGELOK nut, scribe the nut at the o'clock position.



3. Now, while holding the fitting body steady



with a backup wrench, tighten the nut 1-1/4 turns*. Watch the scribe mark, make one complete revolution and continue to the 9 o'clock position.
By scribing the nut at the 6 o'clock position as it appears to you, there will be no doubt as to the starting position. When tightening 1-1/4 turns* to the 9 o'clock position you can easily see that the fitting has been properly installed.

Use Gap Inspection Gage (1-1/4 turns from finger-tight) assures sufficient pull-up.

* For 1/16", 1/8" and 3/16" size tube fittings, only 3/4 turn from finger-tight is necessary.

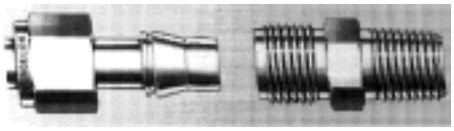
Re-Tightening Instructions

Connection can be disconnected and re-tightened many times. The same reliable, leak-proof seal can be obtained every time the connection is remade.

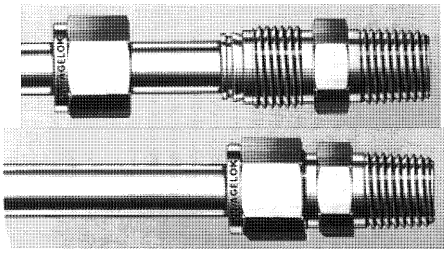
Fitting shown in disconnected position.

Tubing with pre-swaged ferrules inserted into the fitting until front ferrule seats in fitting.

Tighten nut by hand. Rotate nut to the original position with a wrench. (An increase in resistance will be encountered at the original position). Then tighten slightly with the wrench. The original position will generally be about 1/4 turn for 1/4" to 1/2" tubing. (Smaller tubes sizes will take less tightening to reach the original position, while larger tube sizes will require more tightening. The wall thickness



will also have an effect on tightening).



Installation Instructions courtesy of Swagelok Co.

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