Operator's Manual

for the

RSGd

Gas Filling Machine

FDR Design, Inc.

World Leaders in Gas Filling Technology

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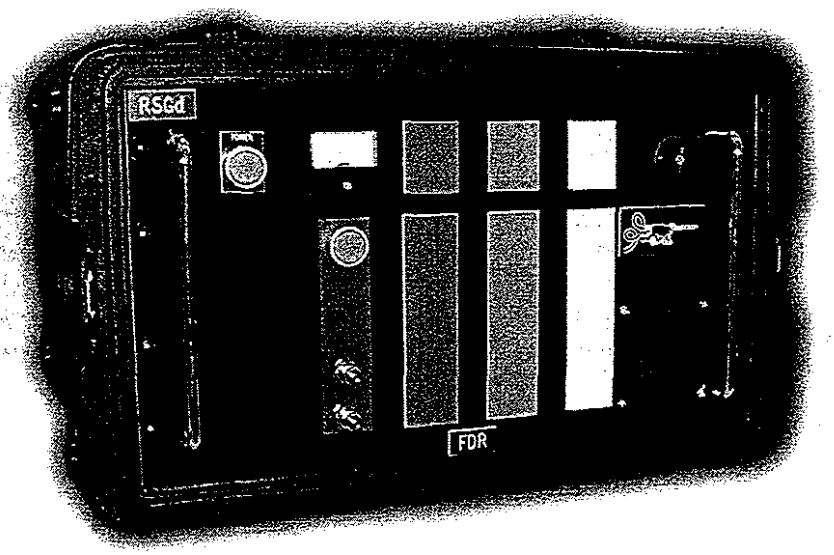
World Leaders in Gas Filling Technology



RSGd...

- Multiple-line gas filler
- Gas sensor meter for visual display of filling process
- Flow rate of 9 to 18 liters per minute*
- Two-hole filling option
- Gas flow shuts off automatically when IG unit is full
- Computer control
- Complete with filling lances, snifflers, bottle regulator, and hoses
- Designed and manufactured in North America, serviced worldwide

** Flow rate dependent on exhaust hole size*

For a free guide to gas filling, please write or call!

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IT IS THE RECOMMENDATION OF FDR DESIGN, INC. THAT ALL OPERATING PERSONNEL READ THIS MANUAL TO ENSURE THE SAFE AND PROPER OPERATION OF THE MACHINE.

✖**WARNING**✖ This machine is designed with specific safety features which must be monitored at all times to ensure the safety of personnel and/or the machine. This machine is also designed with specific operating procedures which must be followed to ensure safe and proper operation.

FOR THESE REASONS, FDR DESIGN, INC. PROVIDES THE FOLLOWING SIGN OFF SHEET FOR ALL OPERATING PERSONNEL TO SIGN AND DATE ONCE THEY HAVE READ THIS OPERATING MANUAL.

NAME OF OPERATOR	DATE

TABLE OF CONTENTS

Safety Precautions

Safety compliance liability (OSHA)

The seller will endeavor to make this machinery as safe to operate as possible. State and local laws and regulations designed and issued to ensure a safe place to work apply primarily to the employer, not the equipment manufacturer. The seller agrees to cooperate with the buyer in finding feasible answers to possible compliance problems. However, because the seller has little control over many factors which may significantly affect the safety of this machinery (such as installation, plant layout, building acoustics, material processed, processing procedures and supervisional training of employees), the seller does not warrant this machinery to be in compliance with OSHA or any like state or local laws or regulations. It will be the buyer's responsibility for compliance and any modifications necessary to comply will be made at the buyer's expense.

Symbols used in this manual

CAUTION!! This symbol is used to indicate that failure to observe can cause damage to equipment.

✖WARNING✖ This symbol is used to indicate that failure to observe can cause damage to equipment and/or injury to personnel.

General precautions

✖WARNING✖ This machine has been designed for safe operation. Any modification or removal of safety features should be reported to your supervisor immediately.

✖WARNING✖ Be sure all personnel are clear of the machine before starting.

✖WARNING✖ A shock hazard may exist if equipment is not properly grounded.

✖WARNING✖ Always stop machinery before oiling, wiping, repairing, or any activity that requires the removal of the guards.

✖WARNING✖ High voltage is present within the motor starter enclosure. **DO NOT** operate the machine with the cover off.

✖WARNING✖ Guarding is provided to prevent accidents and should always remain in place when operating the machine.

FUNCTIONAL SCOPE

Gas to be used

The RSGd Gas Filler is calibrated to handle argon gas, but may be changed to suit other gases such as krypton or SF_6. The RSGd fills windows via two holes – one hole for the filling lance (bottom hole) and the other hole for the Sniffler™ (upper hole). The Sniffler™ is designed to release air and internal cavity pressure as well as send a sample of the exhaust gas to the gas sensor.

The RSGd is compatible with liquid tanks as well as compressed tanks. Final bottle outlet pressure should be greater than 50 psi.

Filling speed

Calibrated flow rate: 9 to 18 liters per minute, per line.

Hole Size	RSGd
3mm 0.118	9 lpm (liters per minute) 1.5mm Sniffler
4mm (5/32") 0.157	13 lpm 1.5mm Sniffler
5mm (3/16") 0.196	18 lpm 1.5mm Sniffler
	Max recommended pressure 1.5-2" H2O

Normally, the RSGd is set to yield 95%(±2) fill rates. The RSGd can also be adjusted at the factory for various filling percentages. Fill rates are largely dependent on the operator's skill and window construction. Fill rate can be field changed by adjusting the calibration voltage on the gas sensor amplifier board.

Gas consumption

The amount of gas used is dependent on the IG unit size and configuration. To determine the length of time your argon tank will last, multiply the liters used per window by the number of units normally filled per shift.

EXAMPLE: IG unit is 10 liters in size.
Gas loss is 100% in each IG.
Filled IG unit will use approximately 20 liters of argon.

The typical amount of gas used is 110% to 200% of cavity volume. The condition of the lance and the Sniffler™ can greatly influence the amount of gas lost in the filling process.

The RSGd Gas Filler is designed to be used with an 1/8" filling lance (Part #10229-A) and Sniffler™ (Part #10521-A). If your IG unit requires a different filling lance size, contact FDR DESIGN, INC. for technical support.

NOTE: Failure to use the recommended filling lances will affect the performance of the RSGd Gas Filler.

FUNCTIONAL COMPONENTS

All components of the RSGd are contained in an industrial standard 19" rack enclosure. The rack is removable.

✖WARNING✖ Before removing rack always disconnect all power lines and gas supply hoses.

The rack is the heart of the machine. It houses the operator controls, logic boards, and the control circuit breaker. Access to these components may be gained by removing the back panel door. The removal of the rack is accomplished by removing the screws on the front panel. Care should be taken that lines and cables are not pinched.

✖WARNING✖ Make sure the argon tank is shut off before disconnecting the gas supply hoses.

An argon bottle regulator is provided with each machine (North America and United Kingdom only) . Refer to the instructions provided by the manufacturer in Appendix 4 for information about the installation and care of the regulator.

MACHINE INTERFACE

Controls

Controls include the following:

- Start / Stop Cycle push-buttons to control cycle
- Power on light to signal machine is plugged in
- Green light to signal run condition

Service & control data

North American version:

- Incoming power: 120 vac, 60 Hz
- Power consumption: 8 amps
- Internal: 24 vdc inputs, 24 vdc outputs

Export version:

- Incoming power: 240 vac, 50 Hz
- Power consumption: 4 amps
- Internal: 24 vdc inputs, 24 vdc outputs

Machine operation

When the RSGd gas filler is turned on the green power on light will illuminate indicating that the machine is powered up. The RSGd automatically establishes a 9 to 18 lpm flow rate for the gas. This flow rate is pre-set during assembly at the FDR DESIGN, INC. factory but may be altered by adjusting the flow control regulator.

The RSGd turns on the vacuum and argon flow simultaneously. The vacuum flow rate is less than the argon gas flow rate. As the cavity pressure slowly increases, the excess pressure flows past the Sniffler™ thereby maintaining a stable, positive cavity pressure.

When the evacuated gas matches the preset value, the RSGd will shut off. the RSG will run for an additional 2 seconds. This time is referred to as filling lag and ensures that the fill rate is at the proper level.

At the end of the cycle, the RSGd beeps and is ready for the next cycle. The green start light will illuminate when the gas filler is running. Each cycle is initiated by the start button. A "PLC display" on the control panel provides setup information.

PLC display/switch setup functions

Display Switch:	Meaning:
Sensor O-Ride	Used for setup. Overides gas sensor signal to end the filling cycle. Machine will run until stop is pressed or switch is turned off. To display the gas sensor analog input, press and hold the desired sensor's start button.

TO POWER UP

✖WARNING✖ A test fill should be performed into a clean, dry plastic bottle (such as an empty, dry, antifreeze bottle) when powering up the RSGd. This purges the system and ensures that the machine is running properly before actually filling a window. Drill holes in the plastic container that are the same size as the gas filling holes in the insulating glass.

1) Plug the RSGd power cord into a 120 volt AC outlet. (The RSGd draws 8 amps.) (Export may be 220 volt AC, check machine label)

2) A fifteen minute warm-up phase is necessary for the RSGd to be operational, plugged in and "POWER" switched on.

3) Attach the regulator to the argon tank.

4) Connect the gas supply hose (white hard hose) to the pressure regulator hose push-in fitting. Connect the other end to the push-in fitting at the rear of the machine.

5) Open the tank valve fully for maximum flow and to prevent leakage. (Tank pressure should not drop below 50 psi.)

6) Turn the bottle regulator control counter-clockwise to 50 psi.

7) Connect the gas filling hose with the filling lance attached to the "OUTPUT" connector(s) on the gas filler. Match hose color(s) to template color.

8) Connect the gas sensor hose with the Sniffler™ to the "SENSOR" connector(s) on the gas filler. Match hose color(s) to template color.

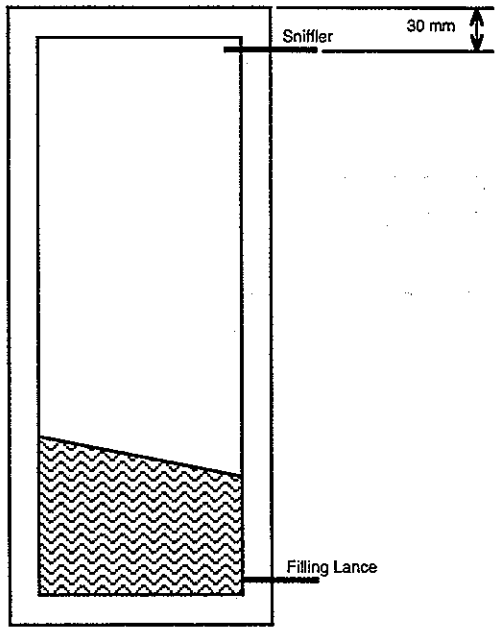
9) Press the green CYCLE button. Vacuum pump should start and gas should flow. Press the green CYCLE button again to stop filling process.

Cycle buttons

Cycle button (green) will light when depressed. If the cycle button is depressed a second time the cycle will be terminated. Light will flash for several seconds then go out when filling process is complete. If the cycle was stopped before the window is full the cycle light will not flash and the horn will not sound.

Remember to turn off the machine and shut off the argon bottle when the RSGd is not in use.

POP® RIVETS & SPACERS

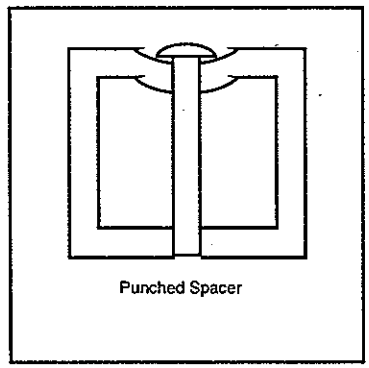


When lateral filling through one spacer leg, the spacer must have two holes, one for filling and one for venting or evacuating the gas.

The recommended hole size to accommodate FDR Design filling lances and Snifflers™ should range from 3 mm to 4 mm (.1181" to .1575"). Using a 5/32" hole with either a 1/8" or a 3.5 mm Sniffler™ and filling lance is most common.

The sizes of the rivet and hole must be matched. Typically, a 1/8" rivet will require a 1/8" hole; a 5/32" rivet will require a 5/32" hole. The 5/32" size is most common.

Both holes should be located as close to the corners as feasible. The holes should be centered and square to the spacer width to minimize the possibility of gas being deflected and possibly resulting in a poor filling degree. It is helpful to be consistent in hole location to facilitate plug location.



Holes may either be drilled with small jigs or punched with a hole punching device. If drilled, this should be done from opposing sides so the burr created remains in the center of the spacer. If punched, it should be done from the outside so the depression left by the punch is filled by the head of the pop rivet.

Inspection of the spacer after punching is important to be certain that the punch did not swell the width of the spacer creating a pressure point against the glass.

The rivet need only be long enough to engage the single layer of the outer spacer. A longer rivet is often chosen for cosmetic reasons, as the excess length allows the end of the rivet to be flush with the inner spacer wall. If longer rivets are used, be certain that the rivet does not "engage" the inner spacer wall thereby deforming it. A pneumatic rivet gun should be used since the "wobbly" motion created by squeezing the hand powered tools can create a poor seal.

If a spacer is inadvertently riveted, the rivet can usually be removed by using a needle nose pliers with a modified tip so it can grip under the head. If the rivet is drilled out, be careful not to introduce chips into the IG cavity. If it is carefully removed a new rivet can generally be reinstalled. In these cases an improvement to the rivet such as an o-ring or extra sealant may be appropriate. If the rivet cannot be installed, the use of hot melt or some other sealing method will be necessary.

The spacer leg through which gas is filled should remain free of desiccant. If the spacer frame assembly method does not permit this, bushings have to be punched through the spacer leg or some type of blocking material must be placed in the spacer near the holes in order to prevent entry of desiccant into the cavity of the IG unit.

Narrower profile spacers (1/4" and 5/16") are difficult to punch and hence are usually drilled. Also, due to the narrow cross section, the spacer often swells when a rivet is installed. For this reason these spacers are usually sealed with hot melt or by using special corner keys and plugs.

Because the Sniffler™ is loose fitting and the filling lance is tight fitting and acts as a plug, the top hole should always be plugged first.

After filling, the integrity of the spacer needs to be restored. This is usually done with a pop-rivet. Sealed end cup rivets provide the best seal. Cup rivets make an excellent primary seal and so far provide the neatest and fastest solution. Some manufacturers dip the rivet in PIB or add a small o-ring around the rivet, but experience shows there is not much improvement in the seal obtained.

If bent corners are used, care must be taken in handling the unit to prevent the desiccant from leaking into the window via the fill holes. Butyl or hot melt is sometimes injected into the corners to act as a block if the bending process is not sufficient to hold the desiccant in place.

In some window constructions a rivet is impractical. In this case, hot melt or butyl is injected into and around the hole. Care must be taken to be sure the material does not leak into the window cavity or prevent a good application of the final or secondary sealant.

TO FILL A WINDOW

To fill a window using a sensor filler

1) Insert the filling lance into the bottom hole of the window. (The most common size hole is 5/32" (4 mm) filled with a 5/32" or 4 mm pop rivet.)

2) Insert the Sniffler™ into the top hole of the window.

3) Depress the CYCLE button. CYCLE indicator will light and filling process will begin.

4) Filling process is complete when the horn sounds and the CYCLE light flashes for 6 seconds then turns off.

5)
- 1 beep means the RED LINE is done.
- 2 beeps mean the BLUE LINE is done.
- 3 beeps mean the GREEN LINE is done.
- 4 beeps mean the YELLOW LINE is done.
- If more than one line is finished, multiple beeps will sound.

EXAMPLE: If the red and yellow lines finish at the same time, you would hear: BEEP – pause – BEEP/BEEP/BEEP/BEEP – pause – BEEP – pause – BEEP/BEEP/BEEP/BEEP – pause. (Horn beeps for about 6 seconds.)

6) Remove the Sniffler™ and close the top hole first. Proceed to remove the filling lance and close the bottom hole. (Holes are closed by pop rivets, hot melt, or metallic tape.) Seal the unit with edge seal (i.e., polysulfide, polyurethane, hot melt, silicone, etc.)

SET UP PROCEDURES

Setting the gas sensor

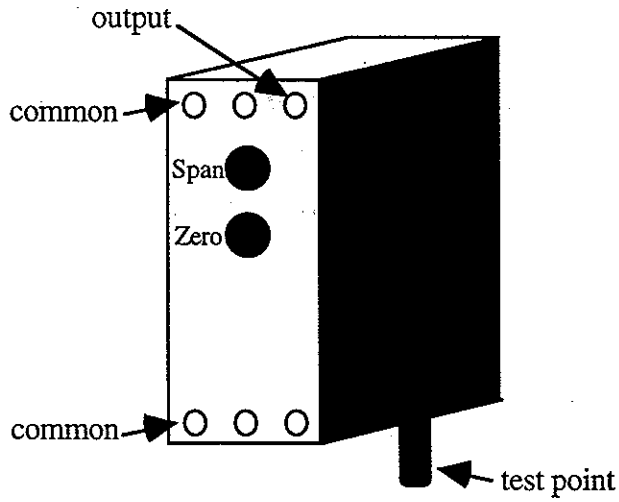


Diagram represents the gas sensor amplifier.

✖WARNING✖ High voltage (120 / 220 vac) is present within the enclosure. A shock hazard may exist. Equipment should be serviced by a qualified technician.

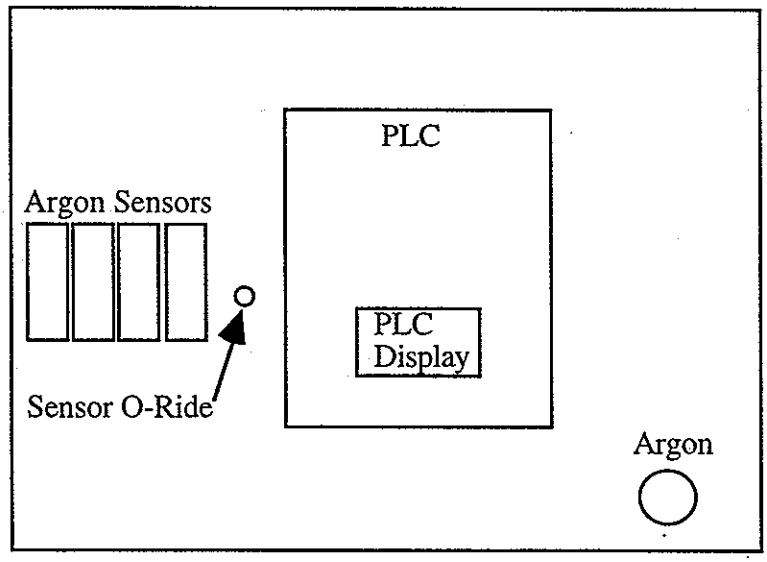
In order to set the gas sensor, the RSGd should be fully functional, meaning the argon bottle and regulator is connected, the electricity connected, and the hoses installed.

NOTE: It takes about 15 minutes for the gas sensor to reach operating temperature when the RSGd is first turned on. The reason for this is that the gas sensor temperature block must reach 130° F.

The procedure for the set up of the gas sensor is as follows:

1) Turn latches on the back of the enclosure (2 latches). Rear cover can now be removed.

2) Locate the green gas sensor amplifier inside the enclosure. The gas sensor box has two multiple-turn potentiometers "Zero" is the lower one "Span" is the upper one both are mounted on the face (pointing back towards the cover).



3) Zero potentiometer is calibrated to read air (.013 mV).

4) Span potentiometer is calibrated to read 100% argon (5.00 vdc). (optionally 100% krypton)

5) Set sensor override switch to the override position

6) Krypton option — Set Argon / Krypton switch to appropriate amplifier

7) Air/Zero Calibration

   a) Set up a DC volt meter scale to read mV for zero (air) setting.

   b) Connect the red lead of DC volt meter to tab "test point" on the bottom of the gas sensor amplifier.

   c) Connect the black lead of DC volt meter to terminal screw marked "common" on the gas sensor amplifier (white wire).

   d) Press the CYCLE button to start the machine running. The Sniffler™ should be hanging free in the air so it is drawing in just air, not argon.

   e) Use the zero potentiometer on gas sensor amplifier to adjust DC volt meter to a reading of .013 v d c (13 mV).

8) Argon/Span Calibration

a) Remove the filling lance from the filling hose, install the filling hose over the nose of the Sniffler™. (Alternately install the Sniffler™ and filling lance in a small IG and wait until you are confident that the window is 100% full of argon. This will occur in approximately 3 minutes on a small IG.)

b) Set up a DC volt meter scale to read 5.00 VDC for span (argon) setting. Connect the red lead of DC volt meter to the terminal screw marked "output" on the gas sensor amplifier.

c) The black lead of DC volt meter stays connected to the terminal screw marked "common" on the gas sensor amplifier (white wire).

d) With the machine still running use the span potentiometer on the gas sensor amplifier to adjust the DC volt meter to a reading of 5.000 vdc. (100% argon.)

9) Periodically check gas sensor calibration every 3 to 4 weeks or if you notice unusually long fill times or final fill percentages of less than 90%.

10) If the gas sensor element is damaged or destroyed the output of the amplifier will stay at 100% (5 vdc).

11) The panel meter is basically a 0 to 5 vdc voltmeter. If a test meter is not available a quick calibration can be done using just the panel meter. In this case you will not be able to accurately set the zero reading so set only the span (100% argon) setting.

12) If compensation block is "cold" or the heater is not functional, the reading will be low (80%) and the machine may not shut off or may take an unusually long time to reach a fill percentage of 95%.

13) Optional krypton board — to conserve krypton the krypton amplifer may be calibrated using argon. Set 100% argon on krypton board to 1.35 vdc. The argon board can not be calibrated to krypton .

Krypton gas sensor option

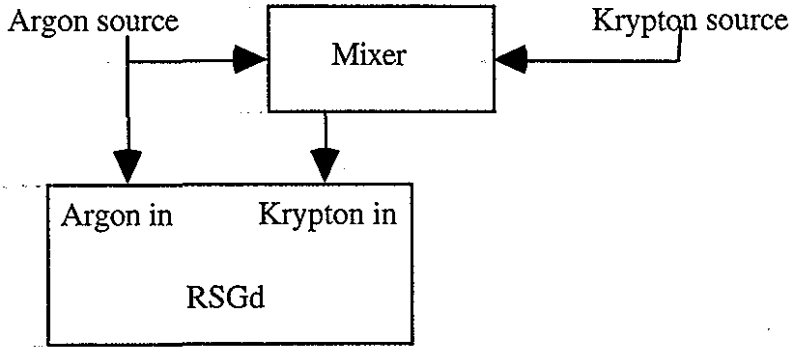
This option means the machine has the ability to fill with Krypton as well as Argon. One or more of the 4 available filling lines can be configured with a krypton sensor instead of an argon sensor.

CAUTION!! Do not connect krypton to the argon line. Krypton can not be run over the argon sensor as it will damage the sensor element.

An argon/krypton mix may be run on the krypton line. If the mix is changed the sensor will have to be calibrated for the new mix. Calibration of the krypton sensor is the same procedure as calibration of the argon sensor.

Connect argon to the argon input on the RSGd and to the argon input on the gas mixer. Connect krypton to the krypton inlet on the mixer, run the output of the mixer to the krypton input on the RSGd.

If using a premixed gas cylinder connect it at the RSGd krypton inlet.



Set the gas mixer to the desired amount of argon. The balance will be krypton. Both dials should read the same. For example if you want 65% krypton and 35% argon set the dial to 35% on both scales. Calibrate the RSGd after the desired mix has been set on the mixer.

SF_6

SF_6 is a very heavy gas and will laminate and fill very well. Final fill rates (%) are typically high as well. Depending on what mixture of SF_6 and argon is being used you may not be able to achieve the 5.00 vdc setting with the standard 0.013 vdc zero (air) setting.

If you want an SF_6 percentage greater than 20% you will need to calibrate the gas sensor on air ("zero") at 0.150 vdc instead of the normal 0.013 vdc.

The SF_6 being thicker will not flow into the window as fast as argon. The Sniffler may be extracting the air from the top of the window faster than the SF_6 is flowing in and as a result the IG will have negative pressure. By increasing the flow regulator setting you can increase the flow rate.

Set the gas sensor zero setting drawing in normal air. Then set the high (span) setting with the gas mixture that you will be using to fill the window.

Do not change the SF_6 / Argon mix with out calibrating the high setting.

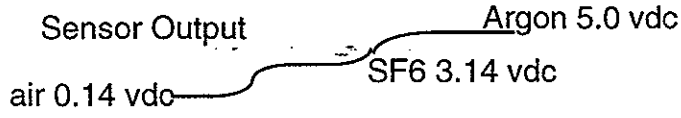
The "zero" setting is done with air flowing over the sensor. In theory the air or "zero" setting should always be the same regardless of which filling gas is being used.

At the start of filling the display may read 25.0% to 30.0% with just air flowing over it because you have increased the zero setting, but you can ignore this, the machine will shut off at the proper time when the amplifier reads 4.6 vdc.

The "span" or amplified setting is set using the filling gas as a reference. Different gas or gas mixes will have different conductivity. As a result the "span" or amplified setting must be reset for every different filling gas so that 100% of the filling gas is equal to 5 vdc (5.0 vdc - 5.1 vdc).

Below is an example monitoring the output of the amplifier after span was set to yield 5 vdc with argon gas.

If you run air over the sensor with the air or "zero" setting at 13mv the amplified signal (output terminal) is 0.14 vdc. If you run SF_6 over the sensor it is 3.14 vdc and then finally when you run argon over the sensor the amplified signal is 5.0 vdc.



The Smith mechanical mixer allows inexpensive, precise mixing of argon and SF_6. The gas is mixed prior to inputting to the gas filler. A

Smith data sheet is attached to this document. Service is available from FDR Design or directly from Smith.

Premixed gas is also available from gas suppliers in whatever concentration you want.

On export machines we do not provide a SF_6 regulator. World standards do not exist so you will have to obtain a simple single stage SF_6 regulator from your gas supplier. The most basic regulator will be more than adequate, supply flow required is less than 100 liters per minute, output pressure a nominal 5 bar.

****** Once a mix is set the gas filler machine will have to be calibrated for that mix. If the mix is changed the machine will have to be re-calibrated. ******

Setting the gas fill percentage

The computer shuts down the filling process when the gas sensor output reading is 4.55 vdc (93% argon). The filling machine will shut off when the exhaust gas concentration at the Sniffler™ reaches approximately 93% argon. This setting will yield a final overall window fill percentage of 95%.

There are a few window configurations that are problematic, specifically if the IG is short and wide, and if it has a wide air space. A method to increase the final fill percentage is to calibrate the gas sensor board to a lower setting. This will move the shutoff point closer to 100%.

The following is a chart showing the effect of various sensor calibration settings and the degree of fill percentage the exhaust gas must achieve before the computer will stop the filling process.

Gas Sensor Reading:	Fill Percentage:
5.00 vdc	93.00 %
4.90 vdc	94.40 %
4.80 vdc	95.80 %
4.70 vdc	97.20 %
4.60 vdc	98.60 %
4.50 vdc	100.00 %

There is nothing cast in stone about the 5.00 vdc gas sensor calibration setting. Set the gas sensor where the best results are achieved.

The probability of a problem occurring due to a damaged filling lance or a gas sensor out of calibration is more likely than a problem due to the shutoff point setting.

Setting pressure & vacuum flow rates (flow meter method)

1) Connect the setup test hose and the flow meter.

2) Insert the filling lance in the flow meter.

3) Press the CYCLE button.

4) Set the regulator to:
   9 lpm — 10 psi original sniffler, 5/32" hole (4mm)
   13 lpm — 17 psi 1.5mm sniffler, 5/32" hole (4mm)
   18 lpm — 30 psi 1.5mm sniffler, 3/16" hole (5mm)
   Regulator is located on back of machine at gas inlet or on the face of the machine if it has the krypton option.

5) After adjusting the regulator, tighten the lock nut.

6) Press the CYCLE button.

7) Remove Sniffler™ from hose – insert hose in flow meter.

8) Press the CYCLE button.

9) Vacuum flow should read 3 to 4 lpm.

10) Vacuum flow cannot be adjusted. If under 3 lpm check for damaged hose or rebuild pump.

11) After checking flow replace Sniffler™.

12) Press the CYCLE button.

13) Disconnect the test gear.

NOTE: Contact FDR DESIGN, INC. for information on approved flow meters to use for calibrating the machine. It should not be necessary to use this procedure in the field since the machine is set at the factory.

✖WARNING✖ Failure to follow this procedure or setting the machine to a non-authorized flow rate could result in part wear, poor operation of machinery and over-pressurization of the IG cavity causing permanent damage to the IG and/or injury to personnel.

Setting pressure & vacuum flow rates (cavity pressure method)

1) Drill a 3rd hole in a test IG connect a gauge capable of measuring 1.5 inches of water.

2) Insert the filling lance and sniffler in the IG.

3) Press the CYCLE button.

4) Set the flow regulator to 1.5 " of H2O pressure in the IG cavity Regulator is located on back of machine at gas inlet or on the face of the machine if it has the krypton option.

5) After adjusting the regulator, tighten the lock nut.

6) Press the CYCLE button.

7) Disconnect the test gear.

NOTE: Contact FDR DESIGN, INC. for information on approved pressure meters to use for calibrating the machine. It should not be necessary to use this procedure in the field since the machine is set at the factory.

✖WARNING✖ Failure to follow this procedure or setting the machine to a non-authorized flow rate could result in part wear, poor operation of machinery and over-pressurization of the IG cavity causing permanent damage to the IG and/or injury to personnel.

PREVENTIVE MAINTENANCE

The filling lances and the Sniffler™ should be periodically checked to ensure that they are not bent, damaged, or plugged.

REMINDER: THESE ARE DELICATE LABORATORY INSTRUMENTS AND SHOULD BE HANDLED WITH CARE.

The condition of the hoses should be regularly examined for signs of kinks or holes. Care should be taken to avoid stepping on hoses or rolling equipment over them. Make certain the gas flow is not restricted during the filling process.

Maintenance procedures

✖WARNING✖ Failure to follow these procedures could result in part wear, thus causing poor operation of machinery and eventually causing permanent damage to machine and/or injury to personnel.

ITEM	INSPECTION	FREQUENCY
Filling lance	bent/damaged/plugged	per shift
Sniffler™	bent/damaged/plugged	per shift
Hoses	kinks/pinched/general integrity/make sure flow is unrestricted	per shift
Diaphragm & filter	test vacuum capacity of pump & replace diaphragm if flow drops below 3 liters per minute per line	once per year
Filters	(1) main pump	once per year

TROUBLE SHOOTING GUIDELINES

PROBLEM	POSSIBLE CAUSES	SOLUTION
Gas filler won't shut off	Sensor out of calibration	Calibrate per procedure
Filling % erratic	Temperature compensation block	Test to see if thermostat is holding temperature at 129° F
Meter reads 100% always, machine short cycles	Defective gas sensor	Replace & calibrate
Window takes a long time to fill	Damaged filling lances, turbulent flow	Repair or replace
Window bulges	Plugged Sniffler™	Clean
	Defective vacuum pump	Repair or replace

SPARE PARTS & REPLACEMENTS

When ordering spare parts from FDR DESIGN, INC. please provide the part number, description, your purchase order number and your shipping preference.

If a motor is required, be sure to state its horsepower, speed, voltage, phase, and cycle. Take this information from the old motor data plate to ensure the delivery of the correct replacement.

NOTE: For quick reference when ordering replacement parts, record the following identifying information for your unit below.

Name of equipment: RSGd - Argon Gas Filler

Model number: _____

Serial number: _____

Date received: _____

Sub-manufacturer's instructions for ordering parts

Locate the needed parts on the drawings or at the back of the manual.

Send a purchase order listing the parts by PART NAME and PART NUMBER as determined from the drawings and parts list. If the needed part does not appear on the drawings, describe it in full and include the following information:

- Length
- Width
- Bore
- Diameter (inside and outside)
- Voltage

If possible, state model and serial numbers, voltage characteristics, and any other available information.

When placing orders by fax or phone, include a purchase order number, shipping address, and billing address.

ARGON REGULATOR

The following instructions are intended specifically for operators who know the general principles of operation and safety practices to be followed in operating this type of equipment. This information was provided by the regulator manufacturer. Therefore, FDR DESIGN, INC. makes no assurance regarding it's accuracy or applicability.

If you are not sure you understand these principles fully, we urge you to read the booklet "Precautions and Safe Practices for Electric Welding" published by L-TEC Welding & Cutting Systems, P.O. Box F-6000, Florence, SC 29501, in addition to these instructions, or contact your argon supplier.

CAUTION!! Do NOT permit untrained persons to install, operate, or maintain this equipment. Do NOT attempt to install or operate this equipment until you have read and fully understand these instructions. If you do not fully understand these instructions, contact your supplier for further information.

NOTE: The regulator covered by these instructions has been approved by Underwriter's Laboratories only when using parts manufactured by L-TEC Welding & Cutting Systems to the exact specifications on file with Underwriter's Laboratories, Inc., and when used in the gas service for which it is designed and listed. The use of other parts voids the Underwriter's Laboratories Listing and the manufacturer's warranty.

Specifications

Gas Service	Cylinder Argon
Inlet Connection	CGA-580
Outlet Connection	CGA-032*
Flow Range (Argon)	10 to 40 cfh (5-19 L/min)
Gauges (2 in. diam.):	
Cylinder Pressure	4000 psig (27600 kPa)
Delivery Flow**	10 to 40 cfh (5-19 L/min)
Overall Length	5 in. (127 mm)
Body Diameter	2 1/4 in. (57 mm)
Weight	3 lbs. (1.4 kg)

* Formally "B"-size Inert Gas (5/8" - 18 RH female)
** Gauge calibrated in cfh with flow through metering spud installed in outlet connection.

June 22, 1996

Accessory

Gauge Guard, P/N 999901: Impact-resistant, plastic guard clamps to cap and cover gauges, and protect them for any abuse. Tough. Yellow in color.

Repair service

Regulators in need of repair should be returned to your L-TEC Welding Equipment distributor or to L-TEC Re-manufacturing Center, P.O. Box F-6000, Florence, SC 29501.

If you have your own properly equipped and staffed repair facility, repair parts information for this regulator (Form F-12-752) is available on request.

To connect

1) Open the cylinder valve slightly for an instant and then close it. This is known as "cracking" the valve. This blows away any dirt or dust which may have accumulated in the valve outlet.

   ✖**WARNING**✖ Be sure to keep your face **away** from the valve outlet to protect your eyes.

2) Make sure the regulator flow-adjusting screw is released by turning it to the left (counter-clockwise) until it turns freely.

3) Attach the regulator to the cylinder valve and tighten the union nut securely with a wrench.

4) Open the cylinder valve slowly a fraction of a turn. When the cylinder pressure gauge pointer stops moving, open the valve fully. **Never stand directly in front of or behind the regulator when opening the cylinder valve. Always stand to one side.**

5) Attach the torch hose to the regulator outlet ("B"-size inert gas female connection) and tighten the connection snugly with a wrench. (A shutoff valve, such as the OX-WELD V-30 Argon-Water Shutoff Valve, P/N 16X21, may be connected between the regulator and torch if desired.)

NOTE: If the regulator is to be out of use for more than a day, turn in the flow-adjusting screw enough to move the valve stem off the seat. When the regulator is returned to service, be sure to back out the flow-adjusting screw completely before admitting cylinder pressure to the regulator.

To stop flow

If work is to be stopped for a half-hour or more, or the regulator is to be removed from the cylinder, shut down the regulator as follows:

1) Close the cylinder valve.

2) Release gas from the regulator by opening all valves downstream.

3) Allow flow gauge to read zero, then turn the flow-adjusting screw counterclockwise until it turns freely.

Inlet filter maintenance

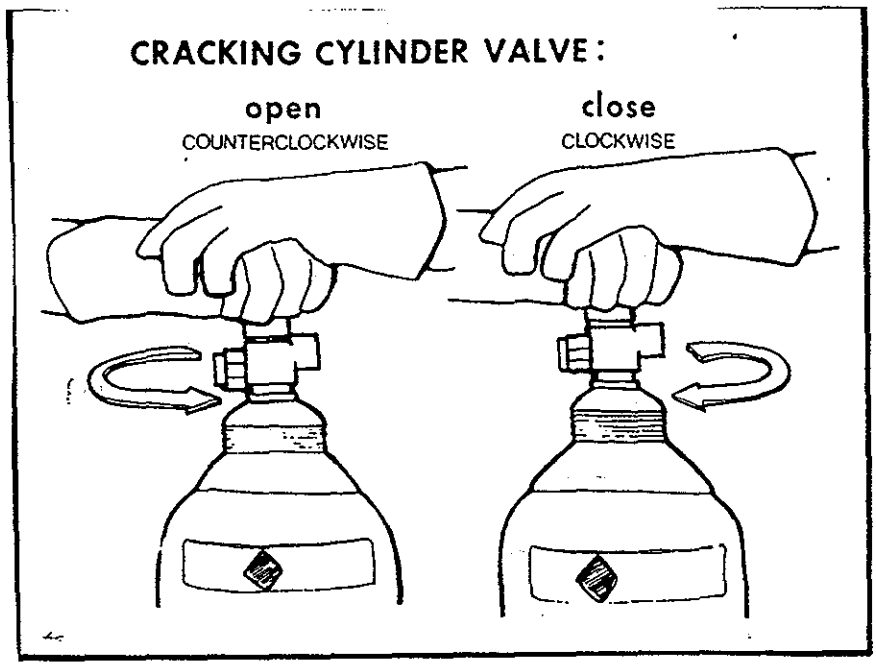
Each regulator is equipped with a porous metal inlet filter, P/N 71Z33, pressed into the regulator inlet nipple. No regulator should be connected to a cylinder or station valve unless it contains this filter. You can replace the filter if you have reason to do so. To remove a filter, insert a No. 1 'EZY-OUT' or a No. 6 wood screw (about 2-in. long) into the filter and pull it out. Press the new filter into the nipple with a 1/4-in. round metal rod.

Connecting & adjusting shielding gas supply

Here is a list of steps and important points to check when hooking up cylinders. These steps are intended to help prevent possible injury or death to you and your fellow workers as well as prevent possible equipment and property damage.

1) **Fasten the cylinders to be used in an upright position.** If cylinders are not on a suitable cylinder cart, they should be securely chained or strapped to a workbench, wall, or post so that they cannot be accidentally knocked or pulled over.

2) **"Crack" the cylinder valve.** Stand at one side or rear of the cylinder outlet. Open the cylinder valve slightly for an instant, and then close it. This will clean the valve of dust or dirt which may have accumulated during storage. Dirt can damage critical parts of a regulator.



3) **Always attach a regulator to the gas supply (and a flow meter when required).** When a single cylinder is used, a pressure-reducing regulator must be connected at the cylinder valve. Normally in electric welding and cutting, a combination regulator/flow meter is used. Make certain that the regulator is proper for the particular gas, service pressure, and flow requirements. If the shielding gas is supplied at the proper working pressure through a piping system that is regulated from a large storage unit or bank of manifold cylinders, a flow meter may be connected at the work station.

4) **Do not use adapters unless you follow the instructions of a manufacturer.** The various Compressed Gas Association (CGA) designated connections are designed for your protection. Refer to CGA pamphlet V-1.

5) **Never force connections that do not fit properly.** This can strip the threads on fittings and result in leaky connections. To prevent leakage, be sure the regulator nut is pulled up wrench-tight, not merely hand-tight. Do not tighten the connections excessively.

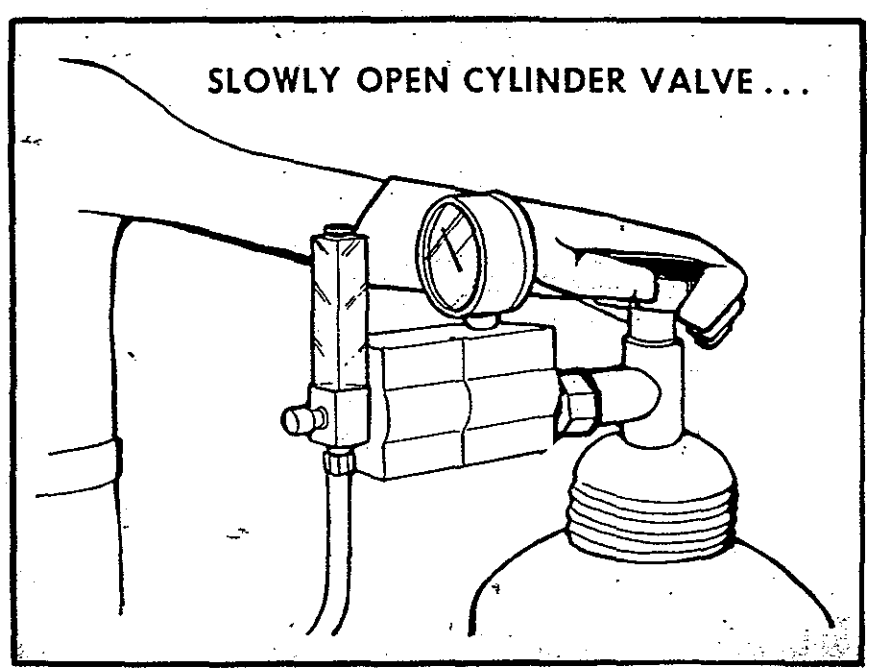
6) **Do not use lubricants or pipe fitting compound for making connections.** Connections in apparatus are designed so that they can be made up clean and leak tight. Oil or grease in lubricants and compounds tends to gum up regulating equipment torches.

7) **IMPORTANT: Make sure the regulator pressure-adjusting screw is released by rotating it counterclockwise until it turns freely.** This closes the regulator valve and prevents a sudden surge of pressure from possibly damaging components in the system. If the regulator is equipped with a flow meter, be certain the flow control valve is closed by turning the knob all the way in (clockwise).

8) **IMPORTANT: Stand to one side of the regulator or regulator/flow meter away from gauge face. SLOWLY open the cylinder valve.** NEVER open a cylinder valve suddenly. Sudden surge of high pressure gas can weaken or damage critical components in the regulator.

9) **Check all connections and joints for leaks.** After making all connections, close torch or downstream valve and then turn in the regulator pressure-adjusting screw to the desired operating pressure (or just open the flow meter valve). Using a suitable leak test solution, check every connection and joint from cylinder to torch for leaks. Correct any leakage before starting operations.

10) **Never tighten a leaky connection between a regulator and cylinder when under pressure.** Close the cylinder valve; allow the trapped gas to leak out; and then tighten the connection.



11) **Use correct pressure and gas flow.** Always be sure you are using the correct gas pressure. Refer to the manufacturer's instructions for the torch or apparatus being used. If operating properly, the regulator maintains pressure as set. The required flow rate will, of course, vary according to the type of job. Once set at the desired rate, a flow meter will give an accurate measurement of flow at all times.

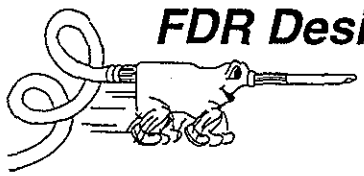
12) **As soon as you have finished working, or if you are going to disconnect the regulator or regulator/flow meter combination, do the following:**

a. Close the cylinder valve.

b. Open the flow meter and torch valves to release all pressure from the hose and regulator.

c. When the gauge pressure drops to zero, close the flow meter valve.

This will prevent the occurrence of an accident caused by someone removing the regulator with the cylinder valve open. Double check by observing the inlet gauge.



FDR Design Inc.

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612-682-6096 612-682-6197 (fax) 303 12th Avenue South
Buffalo, MN 55313

RSG Gas Sensors

FDR gas fillers use one of two gas sensors depending on the amplifier board revision level.

Machines with a gas sensor amplifier board with a revision level of 1.0 through 1.5 use the original gas sensor which will have green or black wire leads.

Machines with a gas sensor amplifier board with a revision level 1.6 or greater use the new gas sensor which will have yellow wire leads.

If not certain which amplifier board revision level you have a quick way of identifying it is the test point (see drawing 10602) the 1.6 and greater amplifier boards have a small metal test point tab on the underside of the amplifier board housing.

The 1.0 thorough 1.5 amplifier boards have the test point on the terminal strip and often have a small wire hanging from this terminal strip test point.

The symptom of having the wrong gas sensor with the wrong amplifier board will be the inability to calibrate the board, specifically the gain / argon setting.

Randi L. Ernst

SET UP PROCEDURES

Setting the gas sensor

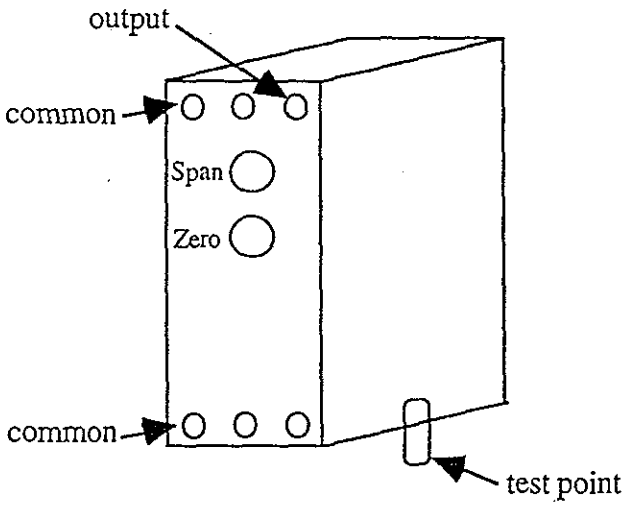


Diagram represents the gas sensor amplifier.

✖WARNING✖ High voltage (120 / 220 vac) is present within the enclosure. A shock hazard may exist. Equipment should be serviced by a qualified technician.

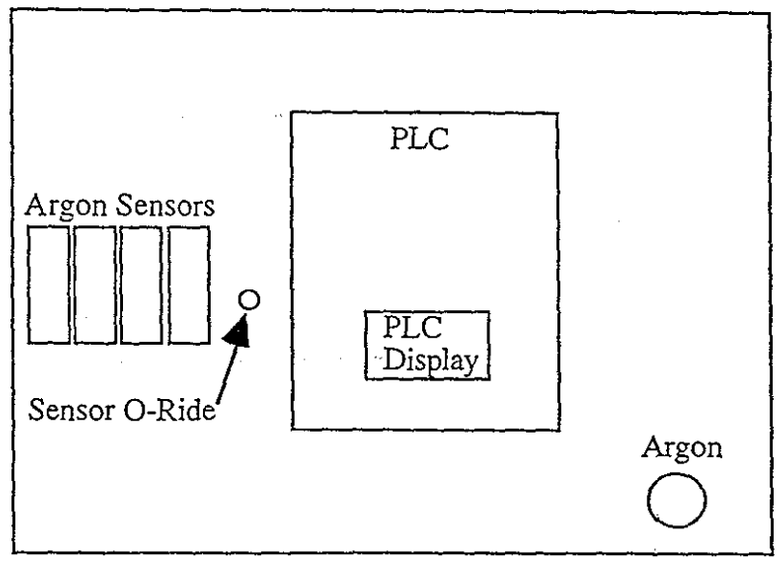
In order to set the gas sensor, the RSGd should be fully functional, meaning the argon bottle and regulator is connected, the electricity connected, and the hoses installed.

NOTE: It takes about 15 minutes for the gas sensor to reach operating temperature when the RSGd is first turned on. The reason for this is that the gas sensor temperature block must reach 130° F.

The procedure for the set up of the gas sensor is as follows:

1) Turn latches on the back of the enclosure (2 latches). Rear cover can now be removed.

2) Locate the green gas sensor amplifier inside the enclosure. The gas sensor box has two multiple-turn potentiometers "Zero" is the lower one "Span" is the upper one both are mounted on the face (pointing back towards the cover).



3) Zero potentiometer is calibrated to read air (.013 mV).

4) Span potentiometer is calibrated to read 100% argon (5.00 vdc). (optionally 100% krypton)

5) Set sensor override switch to the override position

6) Krypton option — Set Argon / Krypton switch to appropriate amplifier

7) Air/Zero Calibration

   a) Set up a DC volt meter scale to read mV for zero (air) setting.

   b) Connect the red lead of DC volt meter to tab "test point" on the bottom of the gas sensor amplifier.

   c) Connect the black lead of DC volt meter to terminal screw marked "common" on the gas sensor amplifier (white wire).

   d) Press the CYCLE button to start the machine running. The Sniffler™ should be hanging free in the air so it is drawing in just air, not argon.

   e) Use the zero potentiometer on gas sensor amplifier to adjust DC volt meter to a reading of .013 v d c (13 mV).

8) Argon/Span Calibration

a) Remove the filling lance from the filling hose, install the filling hose over the nose of the Sniffler™. (Alternately install the Sniffler™ and filling lance in a small IG and wait until you are confident that the window is 100% full of argon. This will occur in approximately 3 minutes on a small IG.)

b) Set up a DC volt meter scale to read 5.00 VDC for span (argon) setting. Connect the red lead of DC volt meter to the terminal screw marked "output" on the gas sensor amplifier.

c) The black lead of DC volt meter stays connected to the terminal screw marked "common" on the gas sensor amplifier (white wire).

d) With the machine still running use the span potentiometer on the gas sensor amplifier to adjust the DC volt meter to a reading of 5.000 vdc. (100% argon.)

9) Periodically check gas sensor calibration every 3 to 4 weeks or if you notice unusually long fill times or final fill percentages of less than 90%.

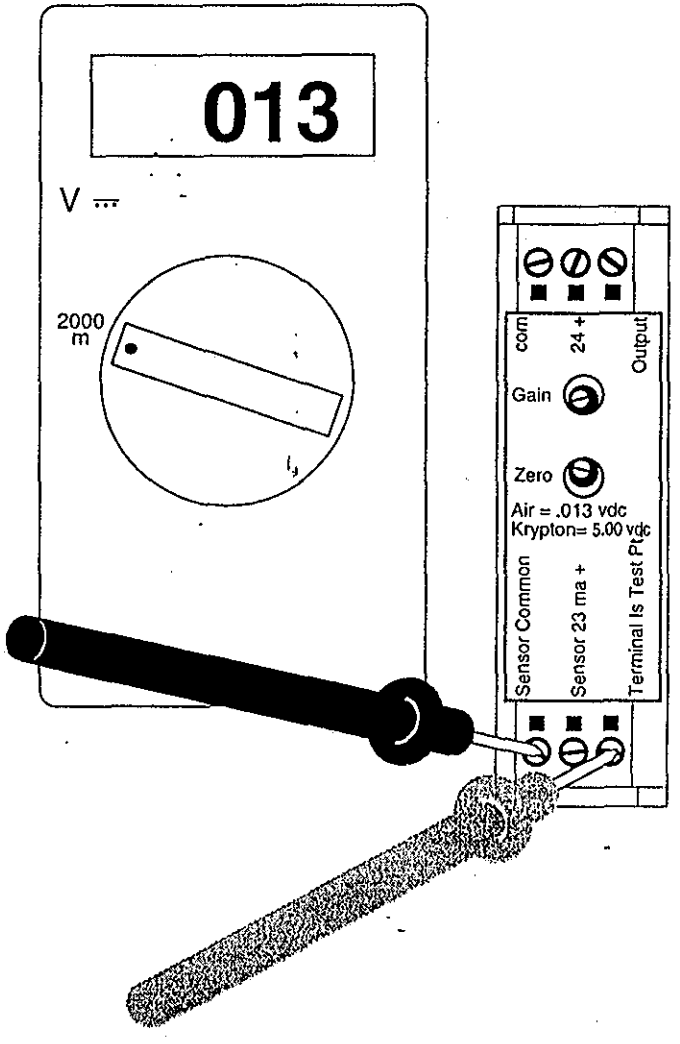
10) If the gas sensor element is damaged or destroyed the output of the amplifier will stay at 100% (5 vdc).

11) The panel meter is basically a 0 to 5 vdc voltmeter. If a test meter is not available a quick calibration can be done using just the panel meter. In this case you will not be able to accurately set the zero reading so set only the span (100% argon) setting.

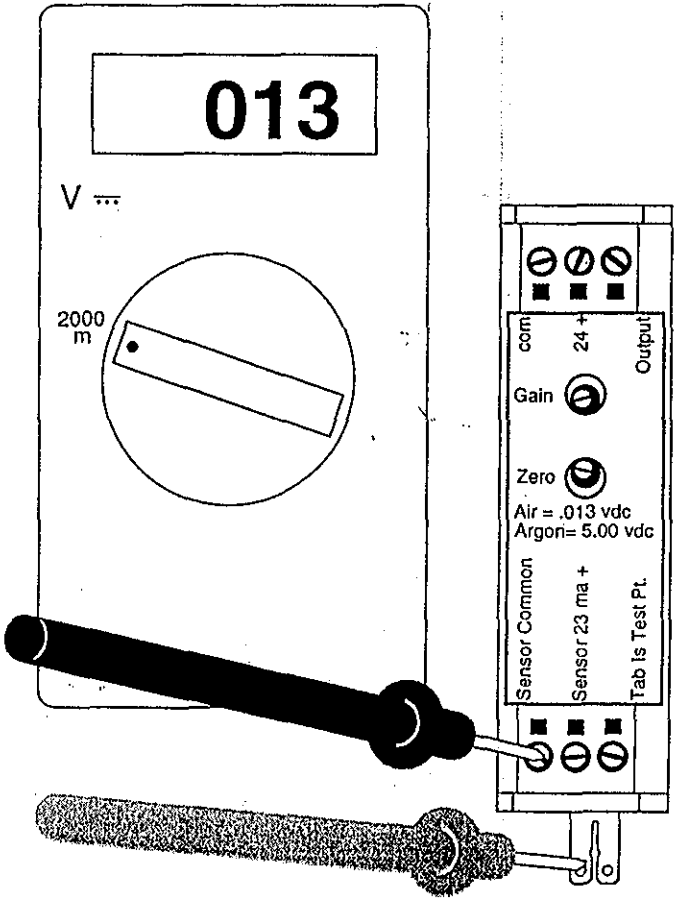
12) If compensation block is "cold" or the heater is not functional, the reading will be low (80%) and the machine may not shut off or may take an unusually long time to reach a fill percentage of 95%.

13) Optional krypton board — to conserve krypton the krypton amplifer may be calibrated using argon. Set 100% argon on krypton board to 1.35 vdc. The argon board can not be calibrated to krypton .

FDR DESIGN, INC.	sensor calibration	Created: 3/2/96 KDW	Scale: 1/1	Sheet 6 of 6
303 12th Ave South Buffalo, MN 55313 (612) 682-6096 Fax (612) 682-6197		Last Modified: 3/2/96 KDW		Drawing Numb 10602-A



1.0-1.5
revision amplifiers
original gas sensor
green or black
wire leads
(any color but yellow)



1.6-
new gas sensor
yellow leads

GLOSSARY

Argon
Chemical formula: Ar. Colorless, odorless, nonflammable, non-reactive, inert gas which is compressed to high pressures. Acts as a simple asphyxiant by displacing air. Major hazards: High pressure and suffocation. Most often used for gas filling due to low cost and ready availability. Argon performs well as an insulator and is chemically inert to UV radiation, heat, glass coatings, and spacers. Argon has a low diffusion rate, a significant property since it is imperative the gas not diffuse through sealing materials. (A 75 to 80 percent gas retention rate over the life of the IG is minimal for satisfactory performance.)

Carbon Dioxide
Chemical formula: CO_2. Colorless, odorless, nonflammable, liquefied high pressure gas which is slightly acidic and is shipped at its vapor pressure of 820 psi. Major hazards: High pressure and suffocation.

cfh
Abbreviation for "cubic feet per hour."

°F
Degrees Fahrenheit.

Hz
Abbreviation for "cycles per second."

IGU
Abbreviation for "insulated glass unit." Also IG for "insulated glass."

kPa
A measure of pressure meaning "kilo-Pascals."

Krypton
Chemical formula: Kr. Colorless, odorless, nonflammable, nonreactive, inert gas which is compressed to high pressures. It acts as a simple asphyxiant by displacing air. Major hazards: High pressure and suffocation.

lpm
Abbreviation for "liters per minute."

mm
Abbreviation meaning "millimeters."

mV
Abbreviation meaning "millivolts."

OSHA
Occupational Safety and Health Act

PIB
Abbreviation for polyisobutylene.

psi
Abbreviation for "pounds per square inch."

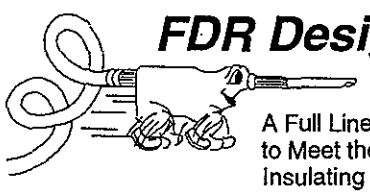
RSG
Abbreviation for "Rapid Single Gas."

SU
Abbreviation for "sealed unit."

Sulfur Hexafluoride
Chemical formula: SF_6. Colorless, odorless, nonflammable, liquefied high pressure gas which is shipped at its vapor pressure of 310 psi. Major hazards: High pressure and suffocation. Exposure limit of 1000 ppm. SF_6 improves an IGU's sound deadening characteristics in specific frequences; SF_6 accounts for a 2 to 3 decibels increase in sound reduction.

vac
Abbreviation for "volts alternating current."

vdc
Abbreviation for "volts direct current." Also DC for "direct current."



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A Full Line of Gas Filling Equipment
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We welcome your comments and inquiries concerning gas filling. You may call or write us at:

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Buffalo, MN 55313 USA

Ph: 763 (~~612~~) 682-6096
Fx: (~~612~~) 763 682-6197

Sniffler@PioneerPlanet.infi.net
or
Sniffler1@AOL.com

June 22, 1996

ITEM #	PART #	DESCRIPTION
1	10245-A	RSG9 Manual
2	10242-A	Electrical drawings
3	10243-A	Pneumatic drawings
4	10156-A	Legend Plate - " Gas Sensor "
5	10156-A	Legend Plate - " Power "
6	10157-A	Legend Plate - " FDR "
7	10157-A	Legend Plate - " RSG-9 "
8	10036-A	Legend Plate - Red
9	10037-A	Legend Plate - Blue
10	10038-A	Legend Plate - Green
11	10039-A	Legend Plate - Yellow
12	549-80-VA-LS PK	Miniature Panel Meter
13	HOF-ASPBSS	Hole Plug (1,2,3)
14	R-27-CF-580	Argon Bottle Regulator
15		1/4' tube x 1/4 npt bottle fitting
16	10199-A	Gas Sensor Element
17	10198-A	Gas Sensor Board Assy
18	10240-A	Gas Sensor manifold block
19	2E889	Gas Sensor heater 7.5" x 1/4" 100 watt 120vac
20	9T58L0045G09 E5C2	Control Transformer Temperature Controller
21	HC24-2.4A	Power Supply 2.4 amp 24vdc (3&4)
22	HC24-1.2A	Power Supply 1.2 amp 24vdc (1&2)
23	376500 or 3765200 (vent)	Enclosure RSG/15
24	EL2092	Captive Nut

25	EL2093	Fixing Screws
26	26-113	Mini Fan 115 vac A30716-10
27	43-104	Black Plastic Fan Guard 16-1C
28	FQ	Fuse 1 amp
29	H-9113	Handles
30	10241-D	Face
31	10163-D	Baseplate
32	10162-D	Side Plate
33	43-122	Fuse holders
34		Fuse 1 amp
35		Fuse 5 amp
36		PLC
37	13-137	Horn 5-8-F piezo alarm
38	28-105	Power Plug
39		3.5 meters 18/3 SJO cord
40	LB15WKWO128FJ	Start switch
41	LB15WKWO128CJ	Stop switch
42	LB16WKW0128FJ	Power on / off switch
43	MTA-106D	SPDT on-none-on Calibrate Switch
44	206705-1	9 pin square flange
45	206708-1	9 pin plug
46	207708-1	9 pin cord clamp
47		pins
48	240D25-40	Solid state Relay 24 vdc / 240 vac 25 amp

49	640923-1	Push on tab crimp connectors
50	14-01-01-9	Terminal Strip MBK
51	14-01-63-7	Terminal Strip end bracket
52		Gromets
53	MAA-V103-HD	Vac Pump 3 & 4 240 vac
54	MOA-V111-CD	Vac pump 1 & 2 240 vac
55	10008-A	Sniffler 1/8" slow fill
56	10229-A	Fill lance 1/8" short lance
57	10043-A	Red Hose 3.5 meters
58	10044-A	Blue Hose 3.5 meters
59	10045-A	Green Hose 3.5 meters
60	10046-A	Yellow Hose 3.5 meters
61		1/4" clear poly tube
62		1/4" red, blue, green, yellow tube
63	10057-A	5 Meter long, Argon supply hose
64	1590-6/4	Bulkhead Fitting
65	35A-AAA-DDAJ-OKA	35 single valve 24vdc, vac
66	35A-SAC-DDAJ-2KE	35 manifold valve 24vdc, flow
67	M35001-01	Manifold end plates
68	N10 B	Needle Valve
69	R384-02A	Regulator 0-25 psi (with gauge)
70	M60-01	Muffler
71	120-4	1/4" bulkhead
72	130-4-4	1/4" plug in elbow

73	100-4-4	1/4" male conector
74	100-4-2	1/4" x 1/8" male connector
75	102-4	1/4" tee
76	104-4	1/4" elbow
77	PC112B-2	1/8" close nipple
78	PC110B-42	1/4" x 1/8" bushing
79	PC116B-4	1/4" street elbow
80	PC122B-4	1/4" hex nipple
81	PC133B-6	3/8" plug
82		4" din rail

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The New Generation Push-in Fittings

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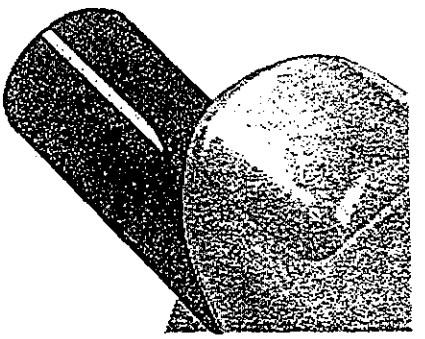

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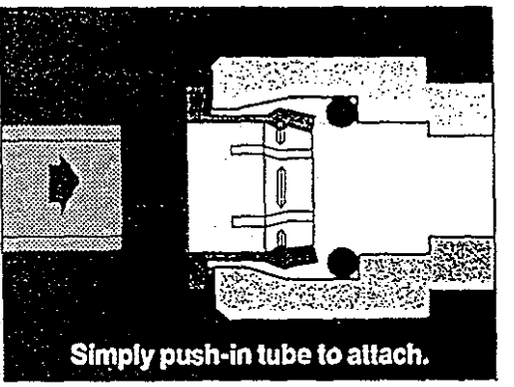
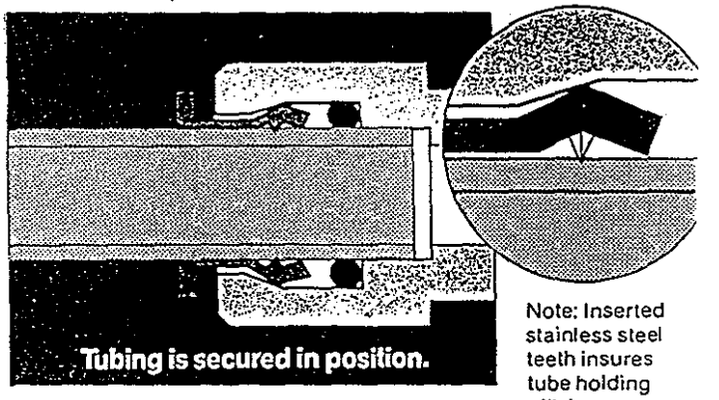
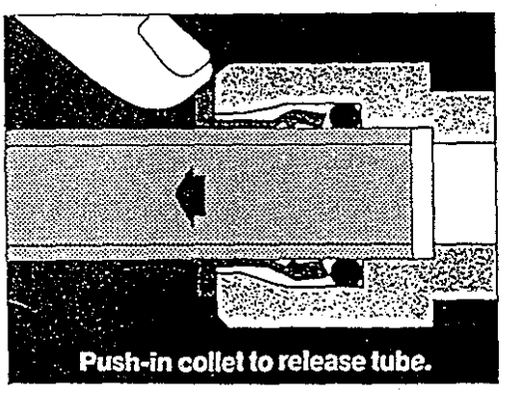
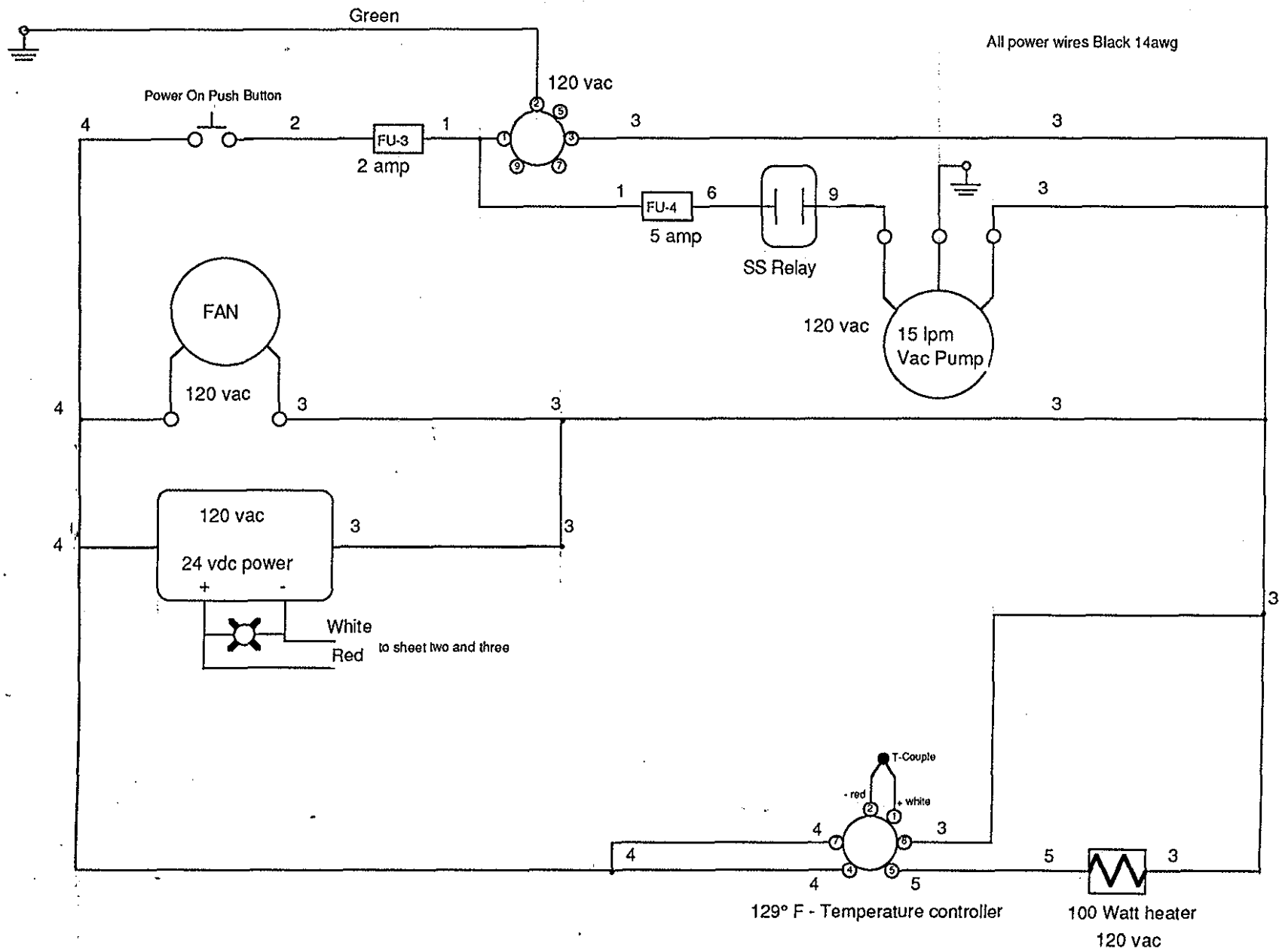
- Ideal for compressed air and carbonated liquids.
- Can be re-used many times.
- Collet cover prevents accidental removal of tubing and allows color-coding.
- FDA approved materials
- NSF listed products (NSF 51)





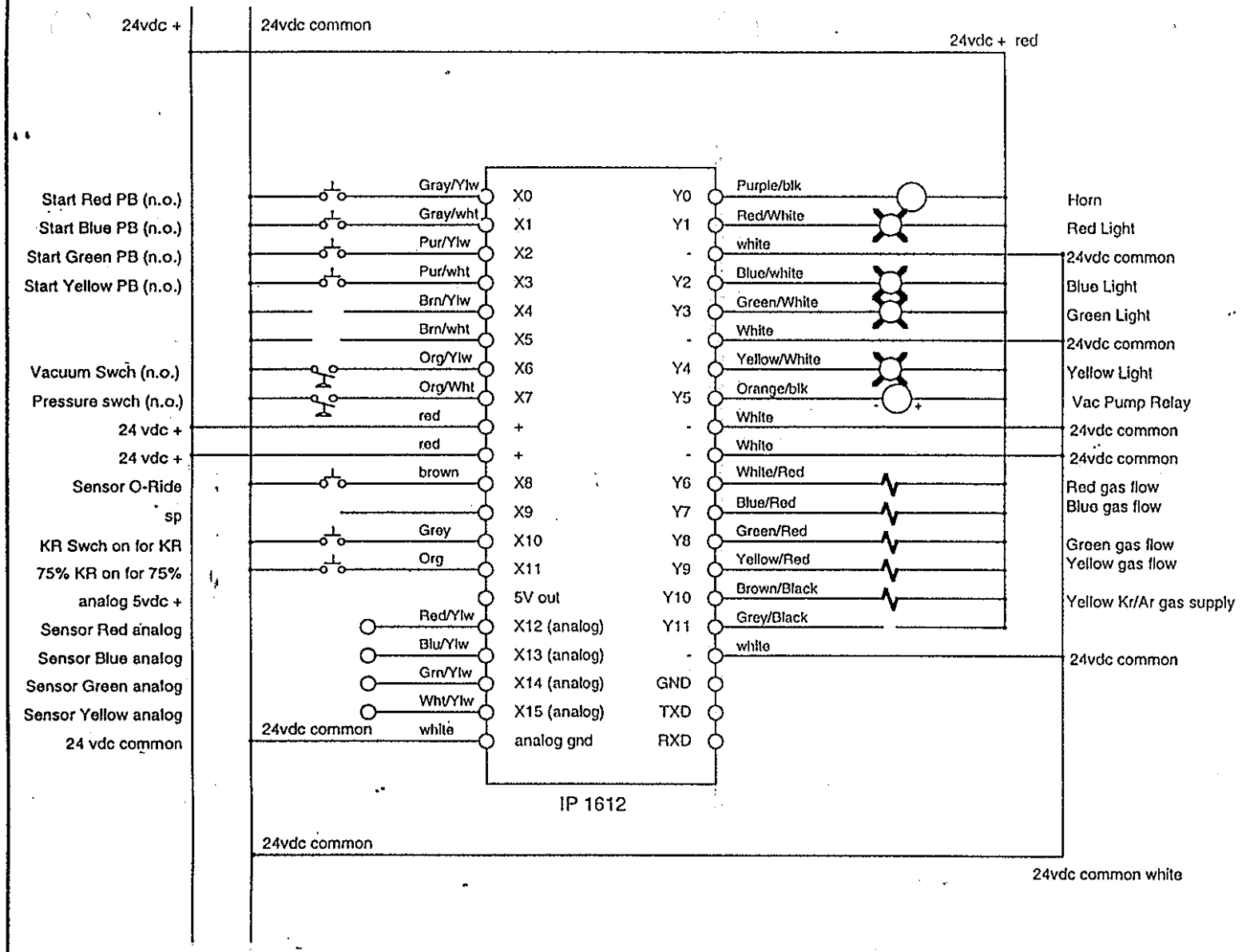
Note: Inserted stainless steel teeth insures tube holding efficiency.





FDR DESIGN, INC. 303 12th Avenue South Buffalo MN 55313 (612) 682-6096 Fax (612) 682-6197	RSG9 Electrical Schematic 120 vac Power FDR Gas Fillers	Checked by: RLE	Date: 11/18/93	Drawn by: RLE	Scale: na

Sheet 1 of 5
Drawing Number: 10421-B



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Buffalo MN 55313
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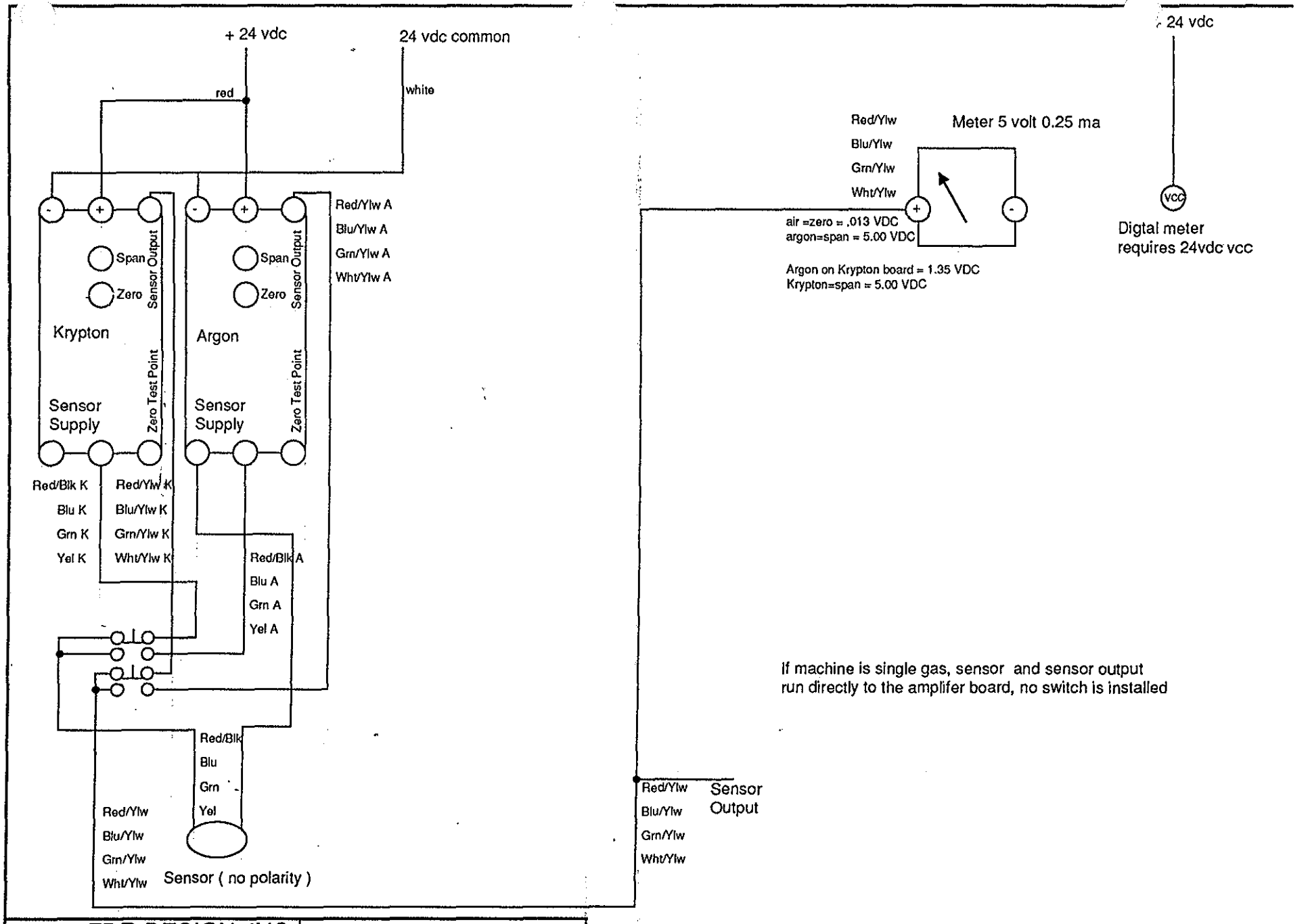
RSGh Electrical Schematic
24 VDC Power
FDR Gas Fillers

Checked by:	Date:	Drawn by:	Scale:	Sheet 2 of 6 Drawing Number:
RLE	10/22/94	RLE	na	10504-B



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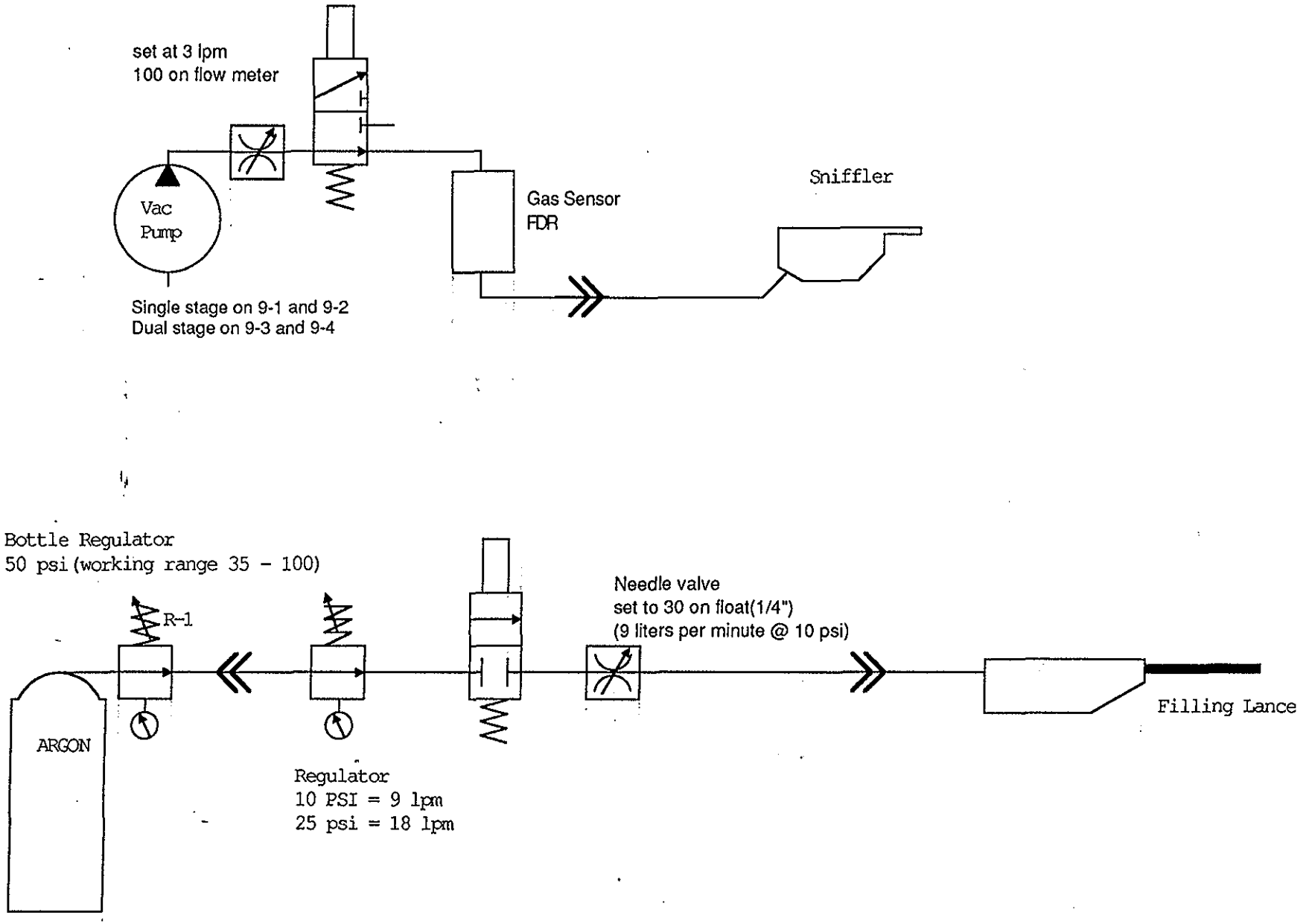
Sheet 3 of 5
Drawing Number: 10421-B



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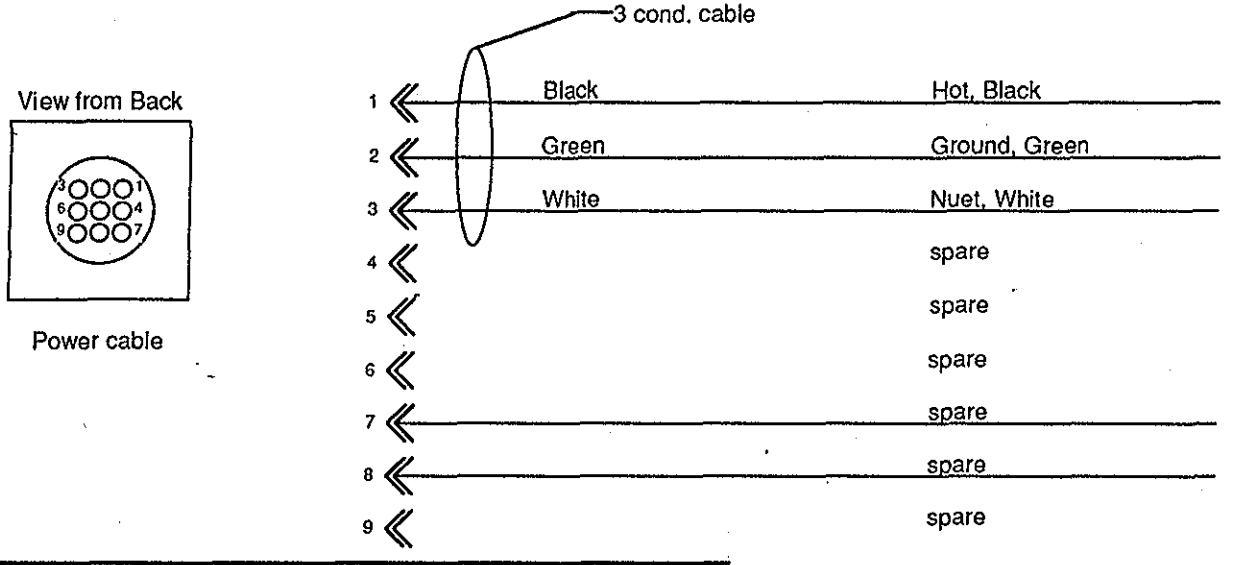
RSG9 Electrical Schematic
120 vac Power
FDR Gas Fillers

Checked by:	Date:	Drawn by:	Scale:
RLE	11/18/93	RLE	na

Sheet 4 of 5
Drawing Number: 10421-E



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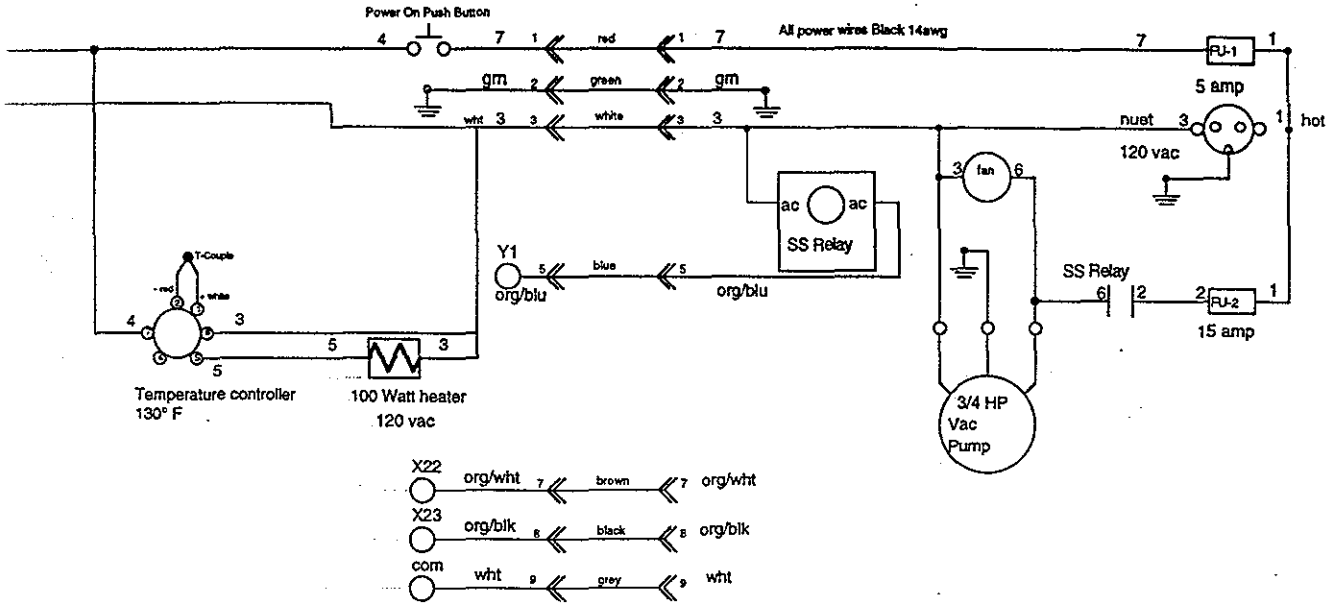
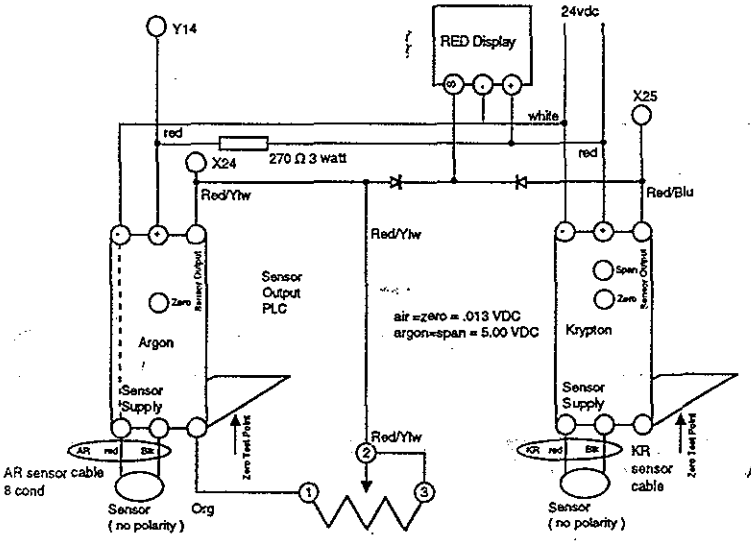
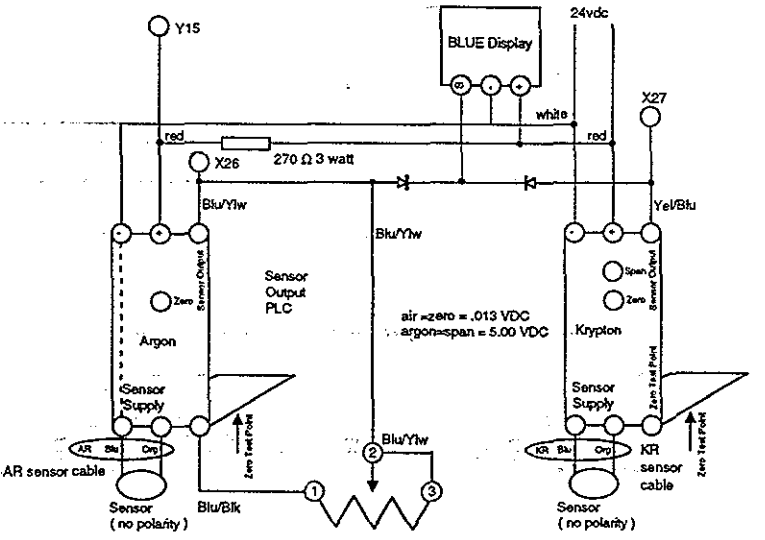
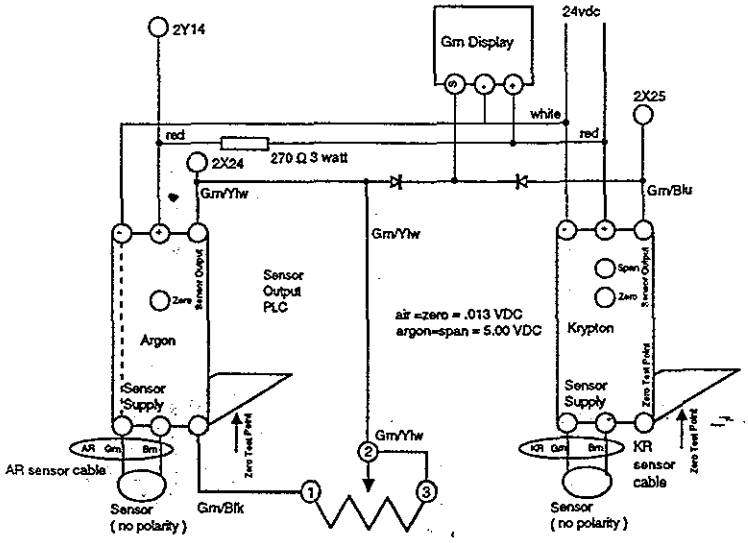
RSG9 Electrical Schematic
120 vac Power
FDR Gas Fillers

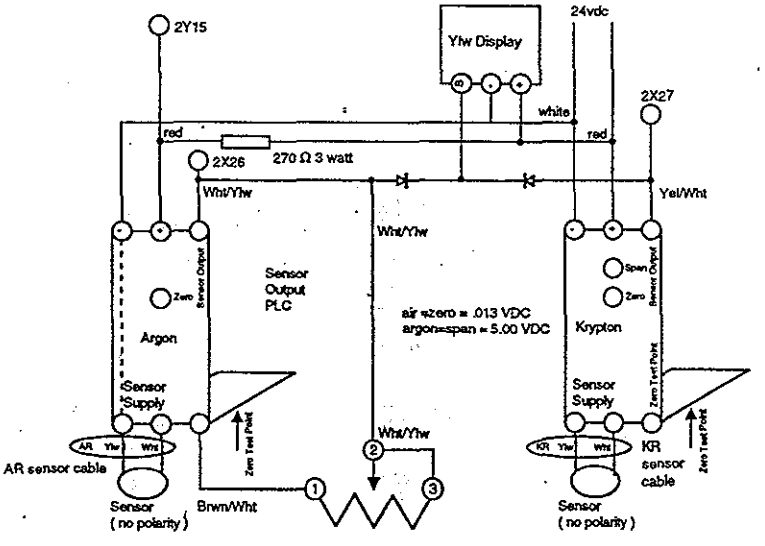
Checked by:	Date:	Drawn by:	Scale:	Sheet 5 of 5 Drawing Number:
RLE	11/18/93	RLE	na	10421-B



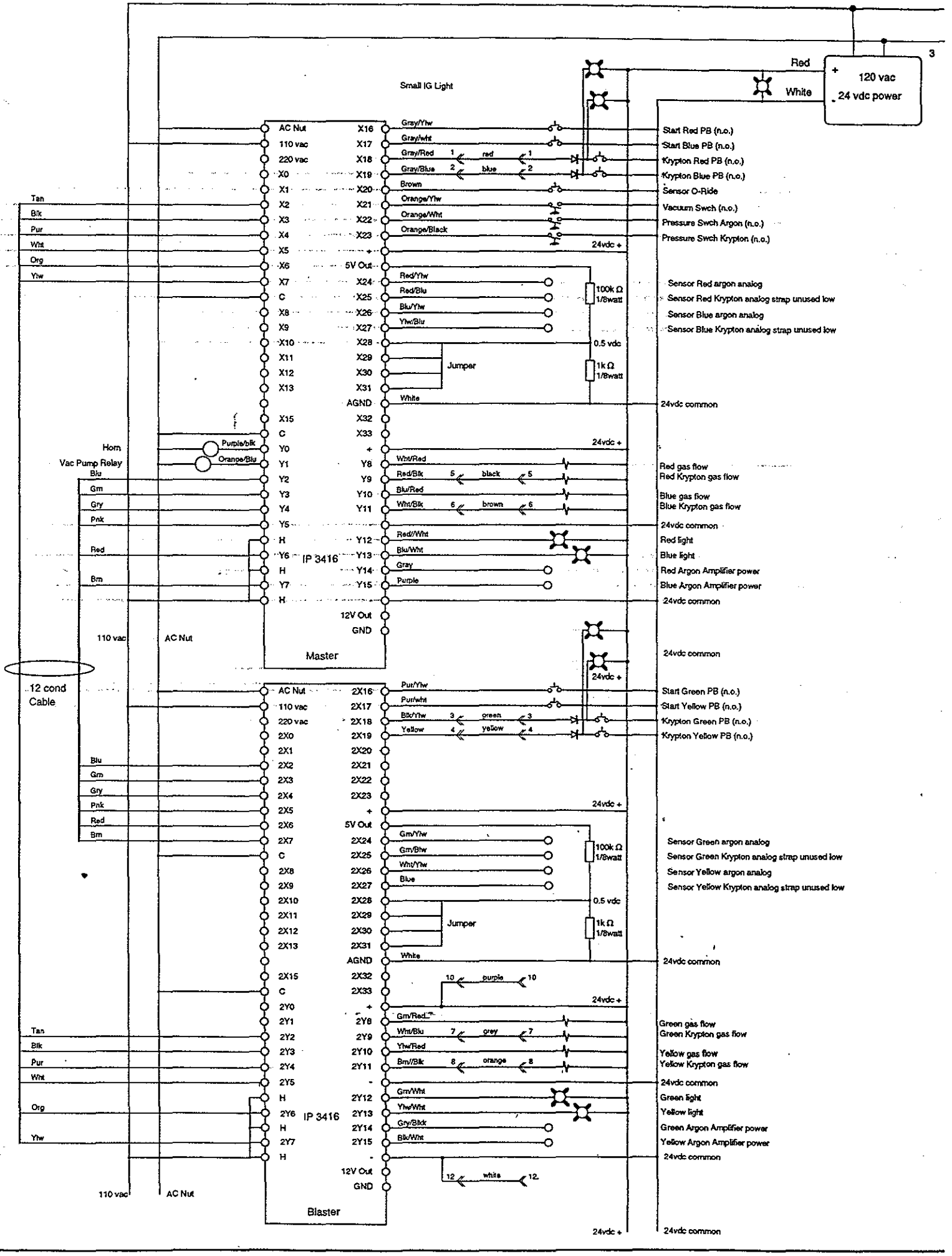




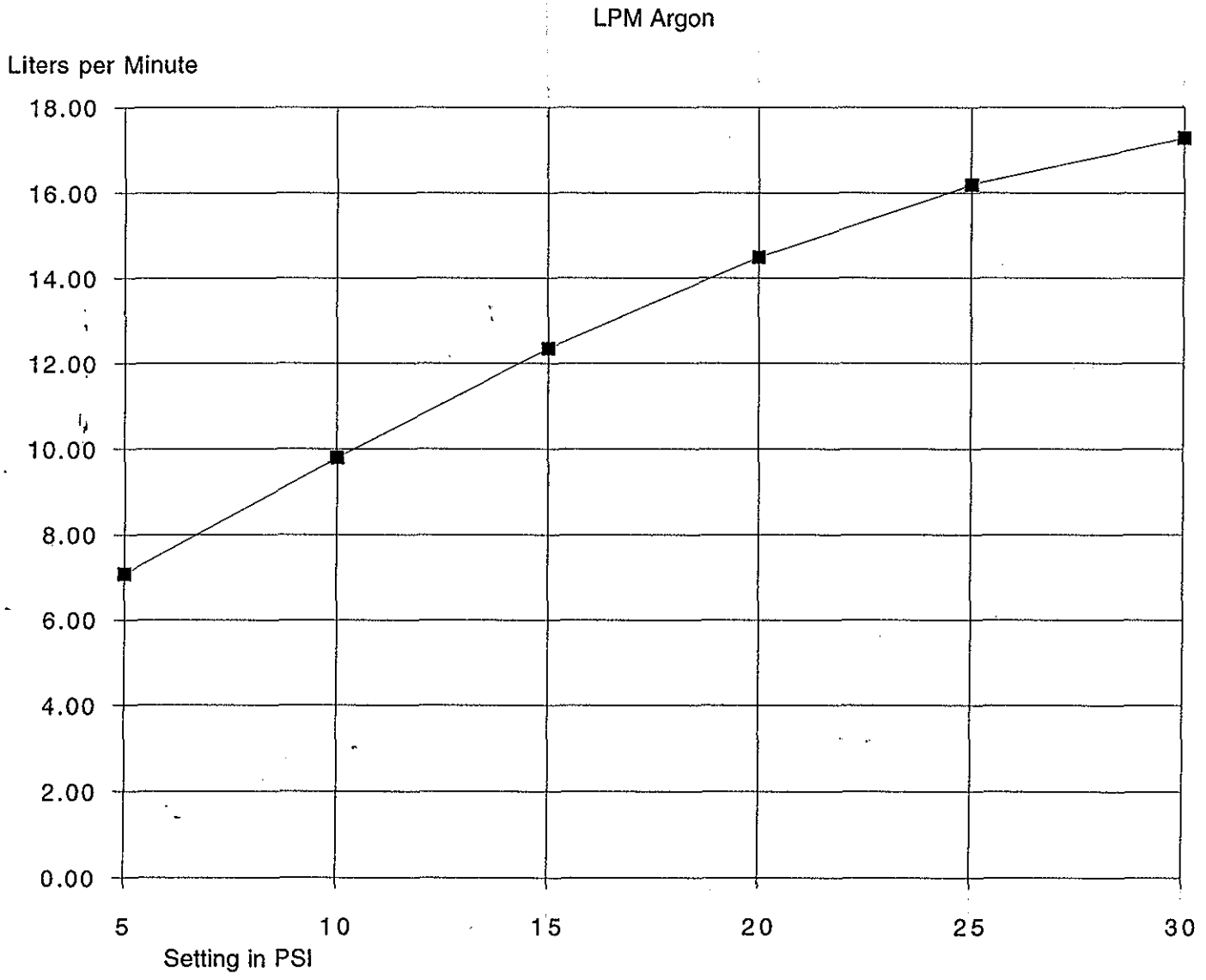




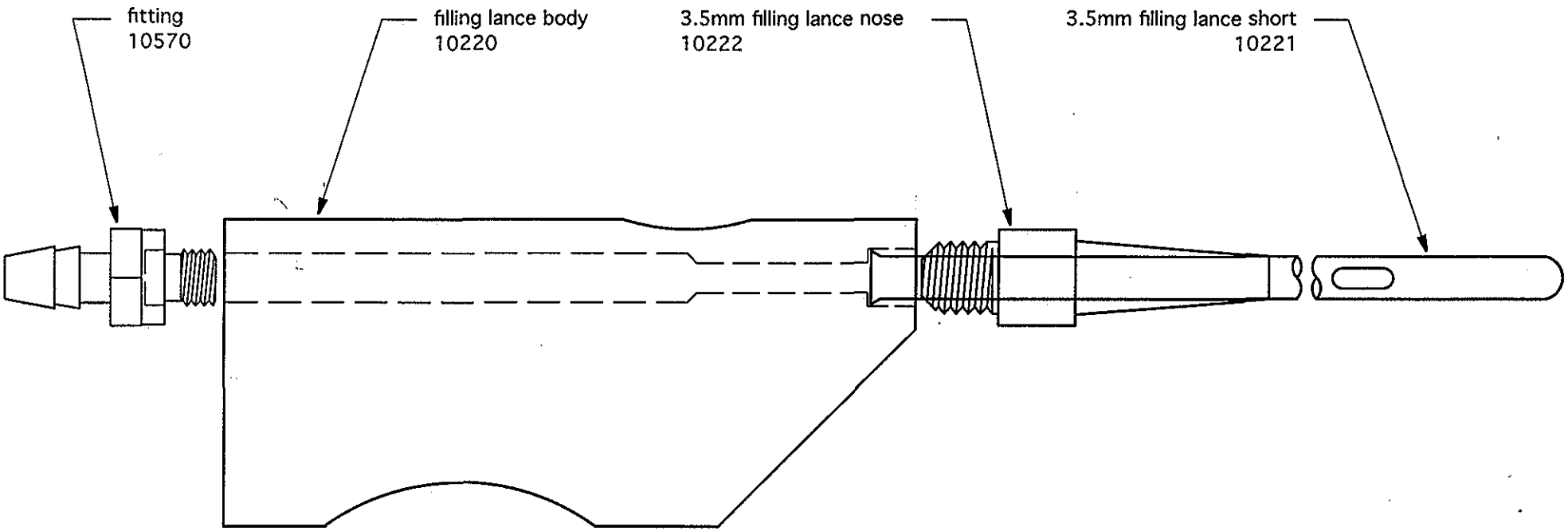
FDR DESIGN, INC. 303 12th Ave South Buffalo, MN 55313 (612) 682-6096 Fax (612) 682-6197	2-3416 PLC KR RSGh					Sheet 4 of 6 Drawing Number:	
	Created: --/--/--	RLE	Last Modified: 6/18/96	KDW	Scale: n/a		10612-D


3
Red
White
+ 120 vac
- 24 vdc power
Small IG Light
AC Nut
110 vac
220 vac
X0
X1
X2
X3
X4
X5
X6
X7
C
X8
X9
X10
X11
X12
X13
X15
C
Y0
Y1
Y2
Y3
Y4
Y5
H
Y6
H
Y7
H
12V Out
GND
X16
X17
X18
X19
X20
X21
X22
X23
+
5V Out
X24
X25
X26
X27
X28
X29
X30
X31
AGND
X32
X33
+
Y8
Y9
Y10
Y11
Y12
Y13
Y14
Y15
-
IP 3416
Master
Tan
Blk
Pur
Wht
Org
Yhw
Horn
Vac Pump Relay
Purple/blk
Orange/Blu
Blu
Grn
Gry
Pnk
Red
Brn
110 vac
AC Nut
12 cond Cable
Gray/Yhw
Gray/wht
Gray/Red
Gray/Blue
Brown
Orange/Yhw
Orange/Wht
Orange/Black
24vdc +
Red/Yhw
Red/Blu
Blu/Yhw
Yhw/Blu
0.5 vdc
Jumper
100k Ω 1/8watt
1k Ω 1/8watt
White
24vdc common
Wht/Red
Red/Blk
Blu/Red
Wht/Blk
Red/Wht
Blu/Wht
Gray
Purple
Start Red PB (n.o.)
Start Blue PB (n.o.)
Krypton Red PB (n.o.)
Krypton Blue PB (n.o.)
Sensor O-Ride
Vacuum Swch (n.o.)
Pressure Swch Argon (n.o.)
Pressure Swch Krypton (n.o.)
Sensor Red argon analog
Sensor Red Krypton analog strap unused low
Sensor Blue argon analog
Sensor Blue Krypton analog strap unused low
Red gas flow
Red Krypton gas flow
Blue gas flow
Blue Krypton gas flow
Red light
Blue light
Red Argon Amplifier power
Blue Argon Amplifier power
2X16
2X17
2X18
2X0
2X1
2X2
2X3
2X4
2X5
2X6
2X7
C
2X8
2X9
2X10
2X11
2X12
2X13
2X15
C
2Y0
2Y1
2Y2
2Y3
2Y4
2Y5
H
2Y6
H
2Y7
H
12V Out
GND
2X19
2X20
2X21
2X22
2X23
+
5V Out
2X24
2X25
2X26
2X27
2X28
2X29
2X30
2X31
AGND
2X32
2X33
+
2Y8
2Y9
2Y10
2Y11
2Y12
2Y13
2Y14
2Y15
-
IP 3416
Blaster
Pur/Yhw
Pur/wht
Blk/Yhw
Yellow
Gm/Yhw
Gm/Blw
Wht/Yhw
Blue
Gm/Red
Wht/Blu
Yhw/Red
Brn/Blk
Gm/Wht
Yhw/Wht
Gry/Blck
Blk/Wht
purple
grey
orange
white
Start Green PB (n.o.)
Start Yellow PB (n.o.)
Krypton Green PB (n.o.)
Krypton Yellow PB (n.o.)
Sensor Green argon analog
Sensor Green Krypton analog strap unused low
Sensor Yellow argon analog
Sensor Yellow Krypton analog strap unused low
Green gas flow
Green Krypton gas flow
Yellow gas flow
Yellow Krypton gas flow
Green light
Yellow light
Green Argon Amplifier power
Yellow Argon Amplifier power

RSG9 Flow rate



FDR Design 9/14/94



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3.5mm filling lance assembly

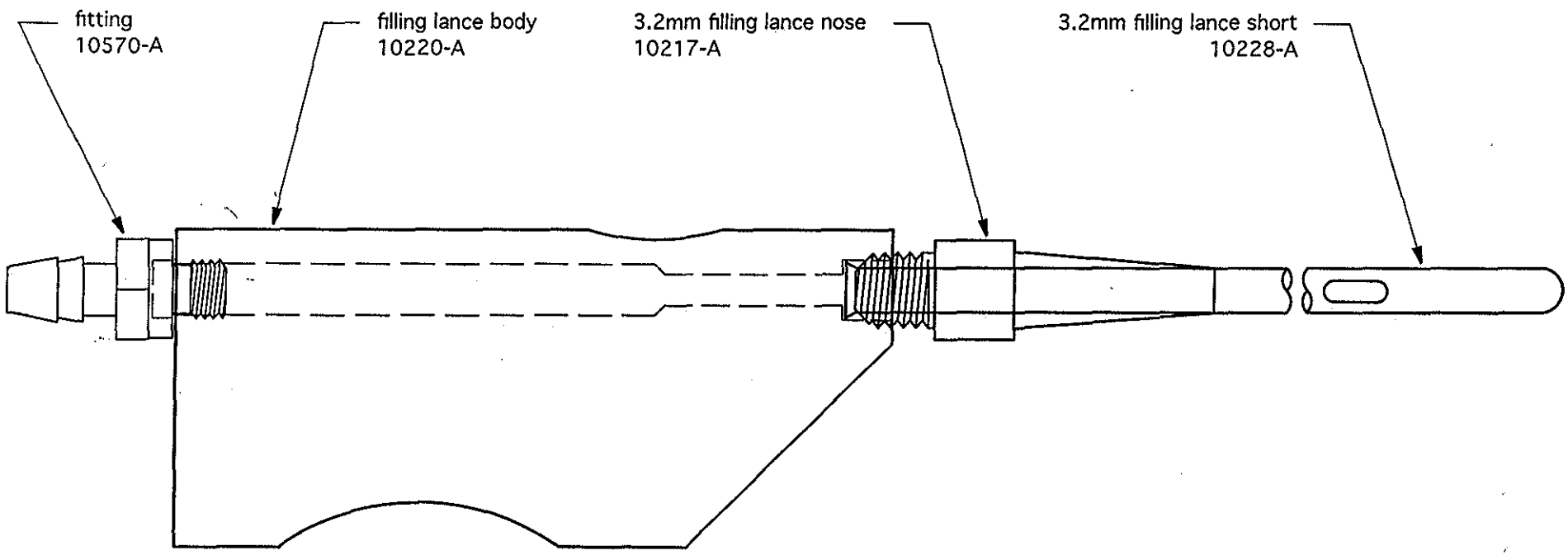
Created: 6/12/92 RLE

Last Modified: 8/5/97 KDW

Scale: 2/1

Sheet 1 of 1

Drawing Number: 10218-A



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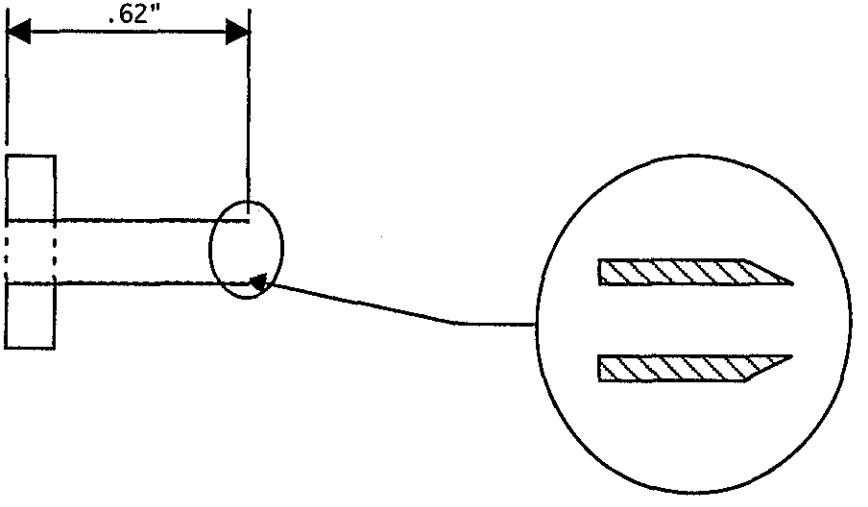
3.2mm filling lance assembly

Created: 6/16/92	RLE	Scale: 2/1	Sheet 1 of 1
Last Modified: 7/29/97	KDW		Drawing Number: 10229-A



Edgetech Bushing
Part # 10267-A

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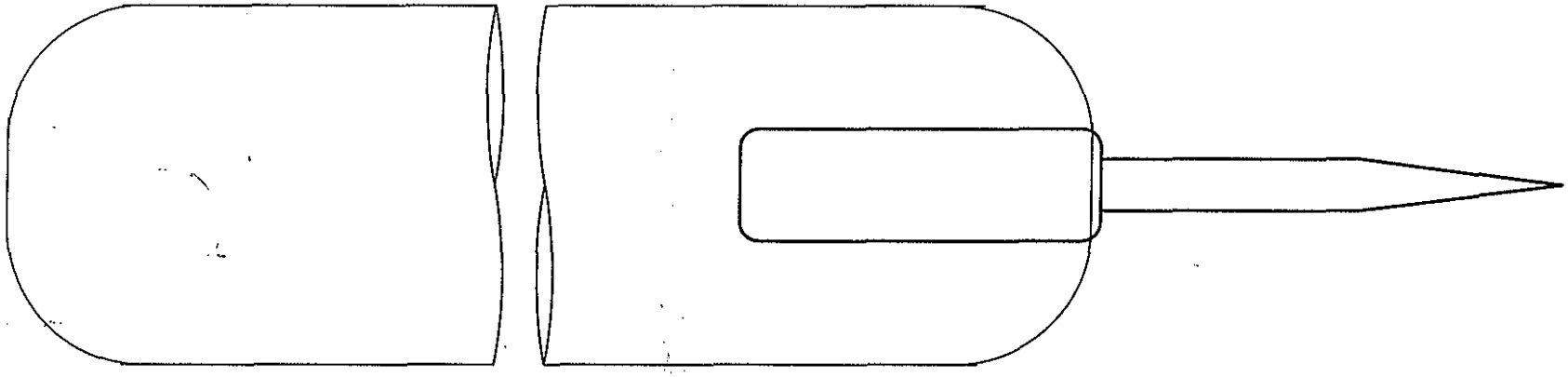
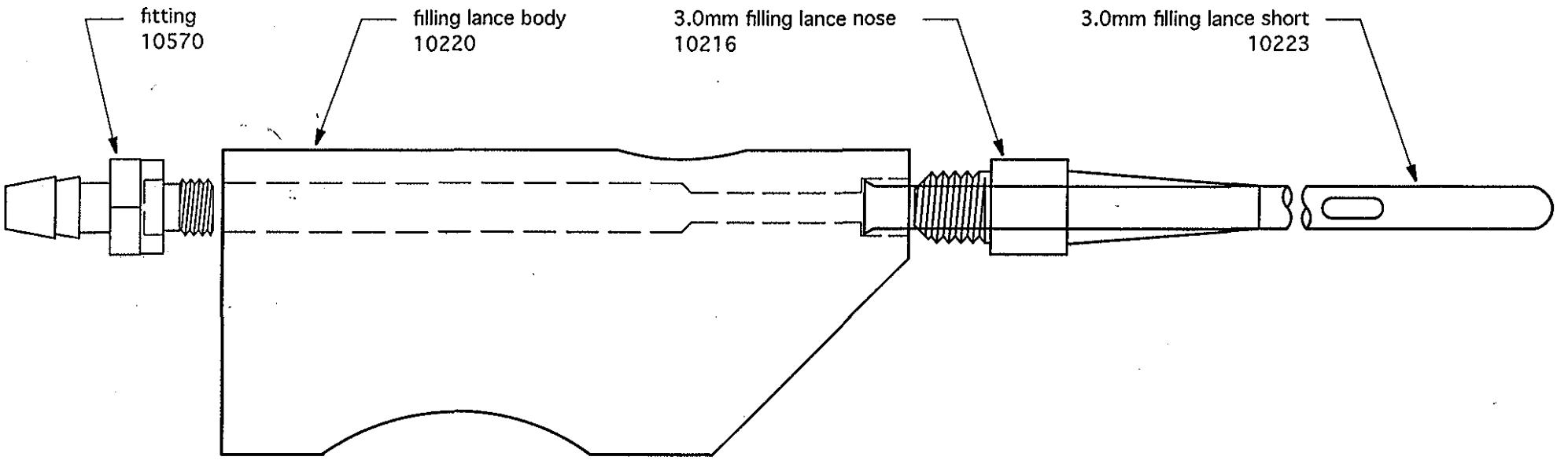
EdgeTech bushing .62"	Drawn by: RLE	Scale: 2/1	Sheet 1 of 1 Drawing Number:
	Last Modified:	Date: 12/9/91	10267-A

Edgetech Insertion Tool
Part # 10268-A



FDR Design, Inc. 303 12th Ave. South Buffalo, MN 55313 phone 763-682-6096 fax 763-682-6197	EdgeTech Insertion Tool	Created: 12/9/91 RLE Last Modified:	Scale: 2/1	Sheet 1 of 1 Drawing Number: 10268-A



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3.0mm filling lance assembly

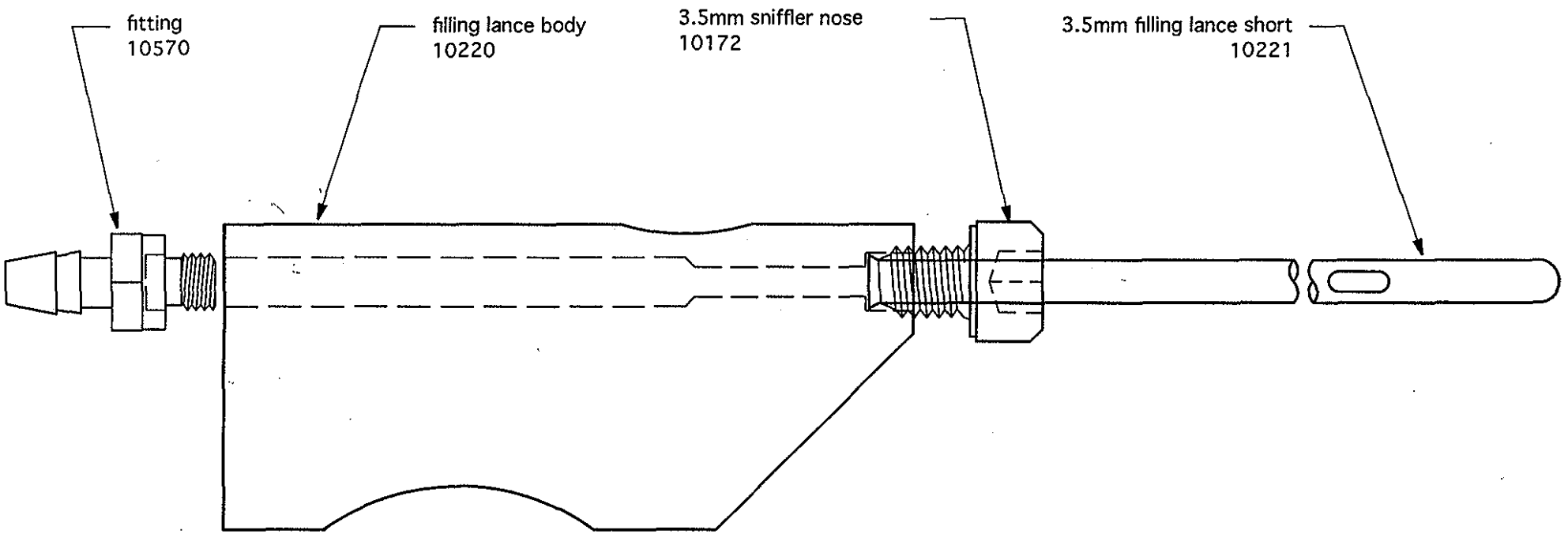
Created: 6/16/92 RLE

Last Modified: 7/29/97 KDW

Scale: 2/1

Sheet 1 of 1

Drawing Number: 10288-A



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3.5mm Edgetech
filling lance complete
for long bushings

Created: 12/16/03 CG

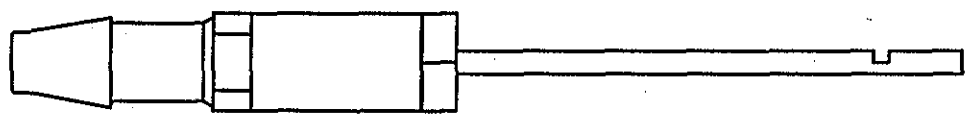
Last Modified:

Scale: 2/1

Sheet 1 of 1

Drawing Number:

10299-A



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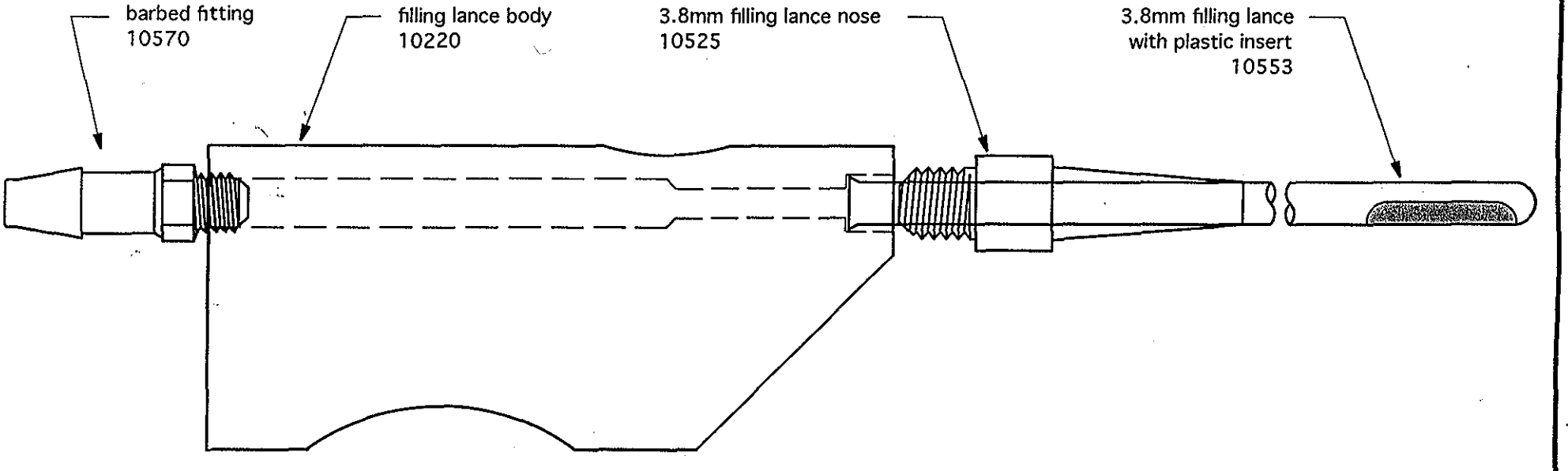
1.5mm slow sniffler complete

Created: 2/9/93 DAN

Last Modified: 8/7/03 CG

Scale: 2/1

Drawing Number: 10375-A



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3.8mm filling lance assembly

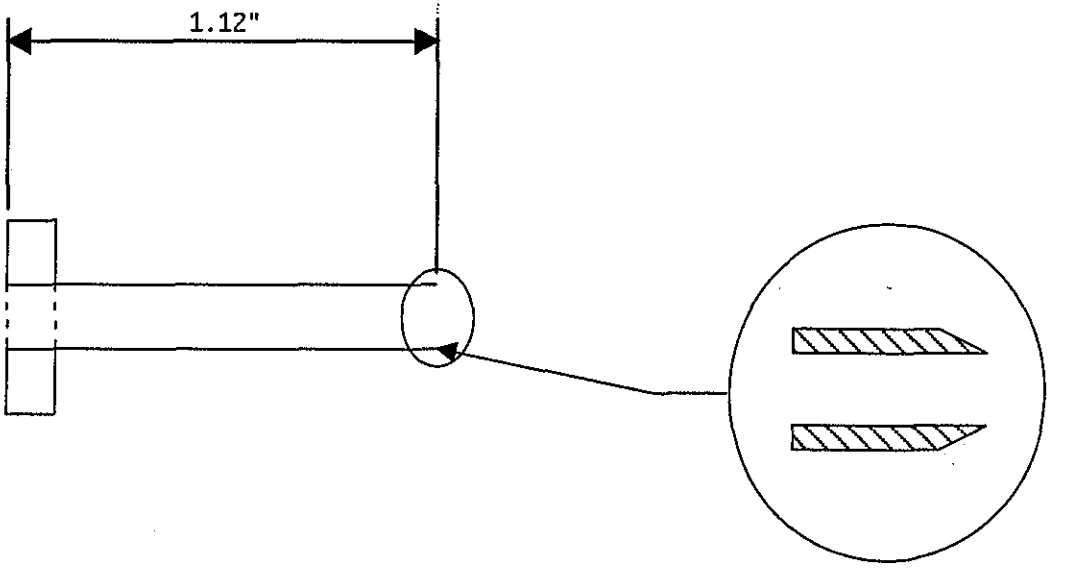
Created: 1/16/96 DAN

Last Modified: 2/18/03 CG

Scale: 2/1

Sheet 1 of 1

Drawing Number: 10581-A



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EdgeTech bushing 1.12" long

Created: 12/9/91 RLE

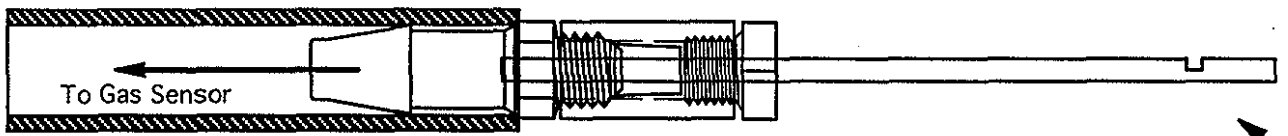
Last Modified:

Scale: 2/1

Sheet 1 of 1

Drawing Number: 10674-A

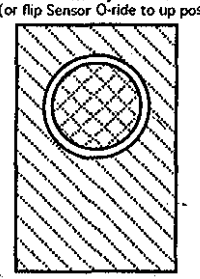
Gas Filler air (Zero) calibration

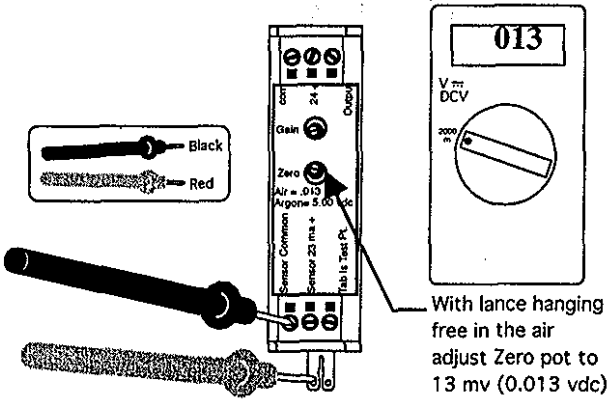


Sensor hose (sniffler)

Sniffler is pointed away from the filling lance pulling normal air across the sensor.

Press and hold cycle start button
(or flip Sensor O-ride to up position)





With lance hanging free in the air adjust Zero pot to 13 mv (0.013 vdc)

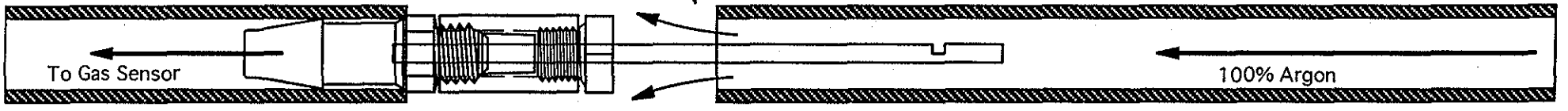
Output hose is pointed away from the sniffler to keep argon out of the sensors during air calibration.

Output hose (filling lance)

FDR Design, Inc. 303 12th Ave. South Buffalo, MN 55313 phone763-682-6096 fax763-682-6197	1.5mm slow sniffler complete Calibration • Step 1	Created: 2/9/93 DAN Last Modified: 8/7/03 CG	Scale: 2/1	Sheet 1 of 2 Drawing Number: 10375-A

Gas Filler argon (Gain) calibration

The filling lance has been carefully removed, and the sniffler lance is set inside the Output hose. It is important to leave room around the end of the sniffler for excess gas to escape.

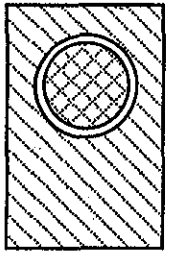


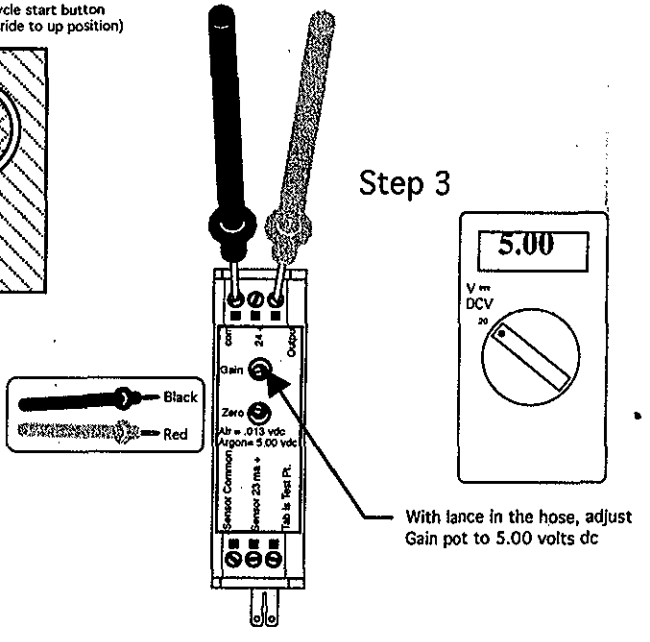
Sensor hose (sniffler)

Output hose (filling lance)

Step 2

Press and hold cycle start button (or flip Sensor O-ride to up position)





Step 3

With lance in the hose, adjust Gain pot to 5.00 volts dc

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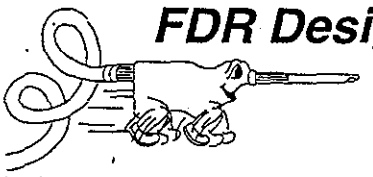

FDR Design Inc.

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303 12th Avenue South
Buffalo, MN, 55313

FDR Gas Sensors

FDR gas fillers use one of several different gas sensors depending on when the machine was built and the amplifier board revision level.

We have not done this to confuse you or to make your life difficult. The key component in the fabrication of the gas sensor is a small resistive element that is suddenly no longer available from our supplier. FDR manufactures the gas sensor and the amplifier board but we depend on our suppliers for this critical component.

To make things even more exciting one of our suppliers decided to substitute (without telling us) putting us in a real bind when we discovered it during production.

We have solved the component problem and have assurances of supply, however it meant having to change some components in the amplifier board to match the new gas sensor. We do have a limited number of the old sensors still in stock but most likely what we will need to do if a gas sensor has failed in our machine is to replace both the sensor and the amplifier board.

To make things simpler in the future we strongly recommend replacing all the gas sensors and all the amplifier boards at one time so you have only the one most recent sensor style to deal with. All the components needed to make this exchange are provided by FDR at no charge. If your machine came in to FDR for repair this exchange and update was done again at no charge.

Brief history

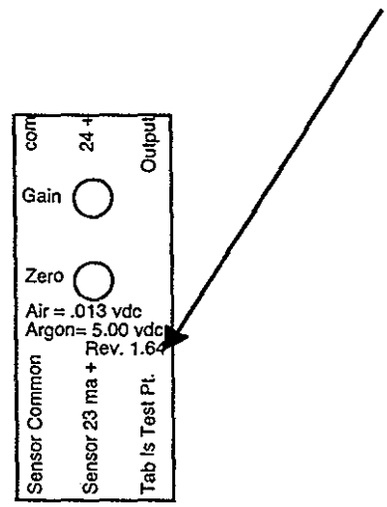
Machines with a gas sensor amplifier board with a revision level of 1.0 through 1.5 used the original FDR gas sensor which will have green or black wire leads.

Machines with a gas sensor amplifier board with a revision level 1.6 used a gas sensor which will have yellow wire leads.

1.61 to 1.64 Red leads
1.68.01A Orange leads (A= argon)
1.68.01K Orange leads(K= krypton)

Presently 1.68.01 Orange leaded sensors are the most recent and up to date gas sensor. This is the only gas sensor that FDR can produce today. If you have a machine with older gas sensors at some point in time they will need to be changed to the 1.68.01 Orange lead sensor. Changing to the Orange lead sensor will also require changing the amplifier board.

To determine the correct gas sensor for your machine check the Rev. level of the gas sensor board, located here.



The symptom of having the wrong gas sensor with the wrong amplifier board will be the inability to calibrate the board, specifically the gain / argon setting. It may also destroy the gas sensor.

Please save and return to FDR all failed gas sensors. Also save and return any exchanged amplifier boards.

When you order new sensors, we'll be asking that you send in your old gas sensors for exchange. If you need updated amplifier boards we also ask that you return your old amplifier boards once we have exchanged them with the new boards.

New sensors are sold at a cost of $125.00 so it is much more economical to send us your old sensors, and we will exchange them free of charge.

If something is not working quite right with the gas filler the temptation is there to first replace the gas sensor. While the gas sensor does on occasion fail, it is fairly rare and should only be replaced when it is clear that it is indeed defective.

Much more common is for there to be damage to the sniffler or filling lances or to a hose. Or maybe just normal sensor calibration is all that is needed.

When does the sensor need to be replaced?

1) When it is "burned out"

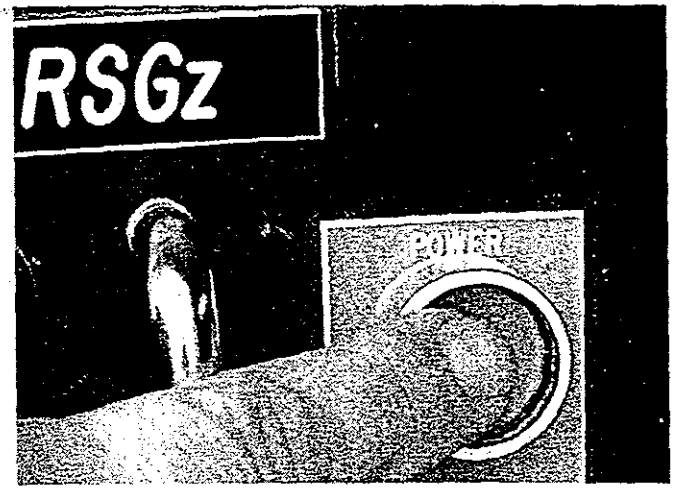
1) When the seal is damaged

OK, so how do we know?

To tell if a sensor is burned out, first look to see if the panel meter reads 100% all the time. Does the machine start, run for 4 or 5 seconds then shut off beeping that the window is filled? Even when you start the machine running with the lines hanging in the air it will read 100% and short cycle?

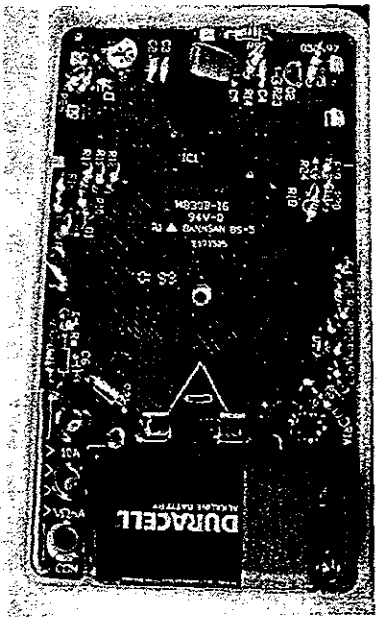
But don't replace the sensor yet let's make another inspection.

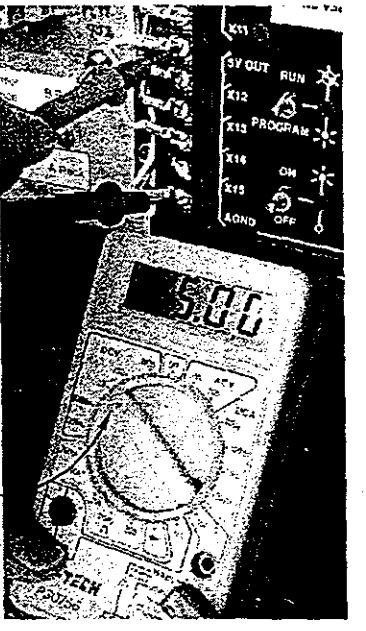
Turn off the power to the machine.



We are going to take an ohm reading of the gas sensor.

By the way, if the batteries are near death in your meter it is possible to get strange readings. It is a good idea to test the meter against the 5vdc on the PLC terminal strip, left-hand side near the bottom. One terminal is labeled "5v OUT" the other "AGND". Another sign of a dying battery is if the decimal point dims on ohm readings.



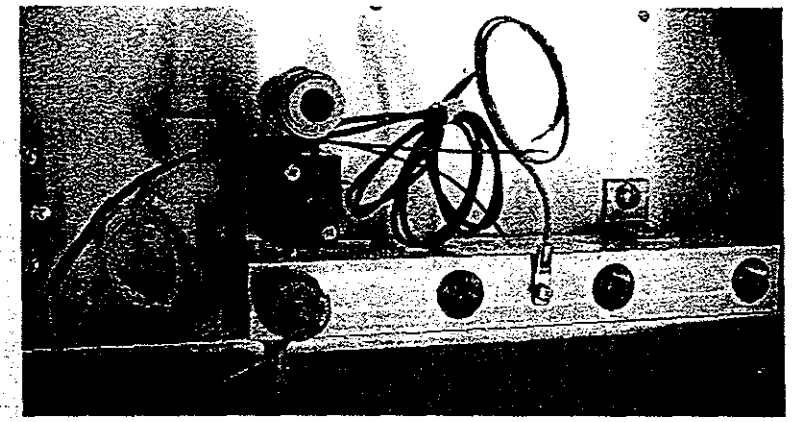


set at 20 DCV scale

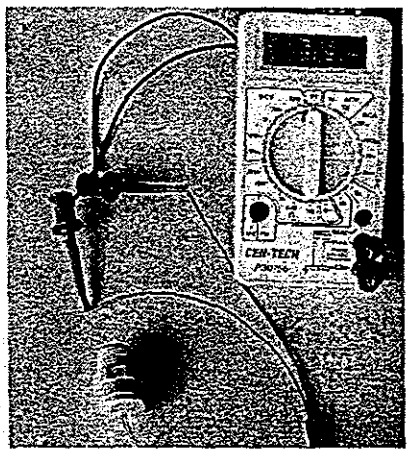
At the gas sensor amplifier board take a reading it should be 30 ohms to 50 ohms. If open or 2000 ohms the sensor may be defective, but let's test it in another location.

At the terminal strip near the gas sensor(s) take a reading.

Take a reading again after removing both leads. Sometimes a wire gets tightened down on the plastic insulation instead of the bare wire.

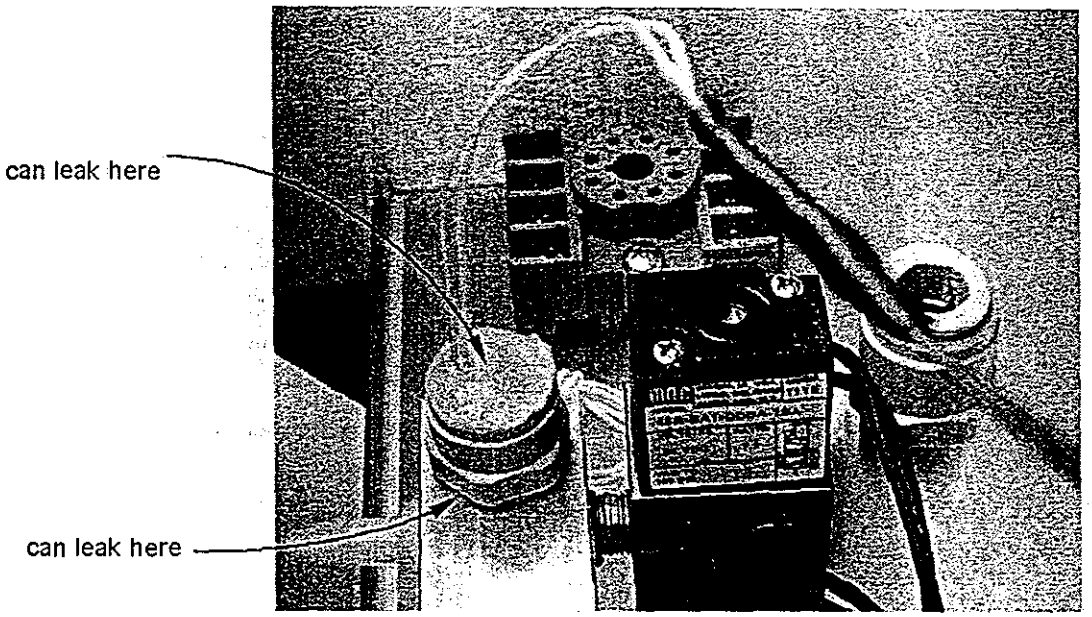


If it still reads open or 1000 ohms, grab a spare sensor or check one of the other gas sensors just to make sure your meter is working OK.



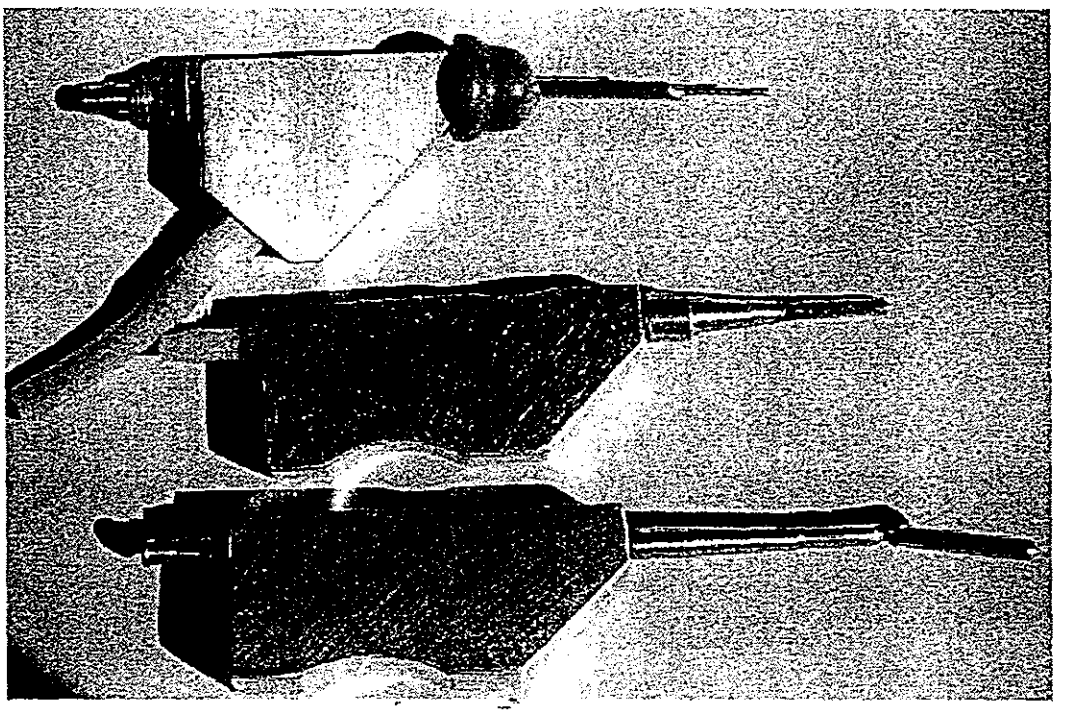
Remove and replace the gas sensor.

There is another way the gas sensor can fail. If the seal where the wires are coming out is damaged or defective, it is possible for air to sneak in along the wires and give a false low reading. In a similar manner if the sensor is not installed with Teflon tape or pipe sealant (non-hardening), it is also possible for air to sneak in by the threads.

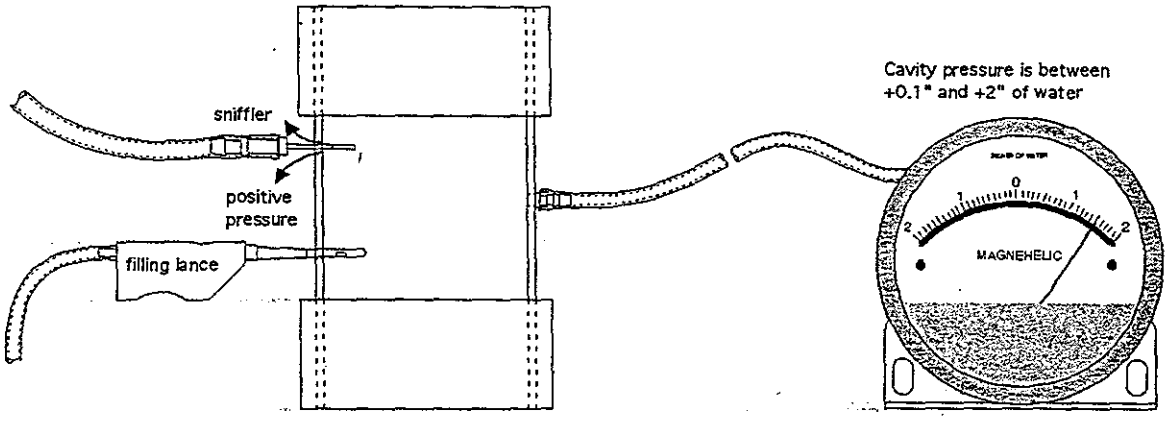


The symptom of this is inability to set the argon or high 5vdc setting.

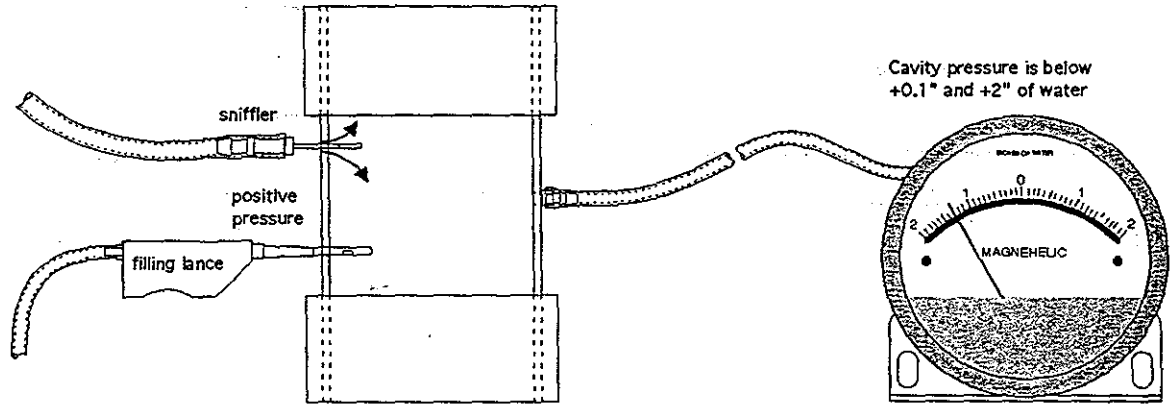
If the symptom is low final fills odds are it is not the gas sensor. 98% of the problems with a low fill are sniffler or filling lance condition.



It is also important that the flow rates are checked before trying to set the gas sensor.



If the unit has slightly negative cavity pressure or more air being pulled out of the unit than gas going in, it is possible for air to mix with the fill gas and you will never achieve the shut off point. So prior to checking the gas sensor always check the flow rate first.



We strongly urge maintenance to keep one known good set of filling lance, sniffler, and hose. We often paint them a separate color so they will not be used for production. Then when in doubt go to your known good set for testing.

So what should you do when operation or management says go check out the gas filler it seems slow.

First don't panic, don't clean out your locker, and don't book the next flight out of town.

1) Start the suspected line running in free air, not in a unit. Does the display meter read near zero? If reading is 100% start in on gas sensor testing.

2) Is the sensor over-ride switch off?

3) Do the lances look good, not beat up or bent? Is gas flowing out OK, can you feel it? Is the suction on?

4) If an RSGh — put lance in plastic test container and start line, is flow rate OK? Does machine shut off after filling the plastic container?

5) If a multi-line machine — swap hoses between a working line and the suspect line. Does the problem follow the hose and lances?

6) Check to make sure your meter is working with the 5vdc on the PLC and to the air and argon calibration of the gas sensor

7) If you can't set zero or argon reading swap hoses and lances and try again.

8) If machine still won't calibrate start gas sensor tests.

An operator told me one time that the machine was acting really strange. As long as he stood up it ran fine but if he sat down on his chair the gas filler would not run right.

I removed the hose from under his chair leg.