

L-33 FLOWMETER



These INSTRUCTIONS are for experienced operators. If you are not fully familiar with the principles of operation and safe practices for gas regulation equipment, we urge you to read our booklet "Precautions and Safe Practices for Arc Welding, Cutting and Gouging," Form 52-529. 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.

I. DESCRIPTION AND SPECIFICATIONS

The L-33 flowmeter (P/N 21988) is calibrated to operate with an upstream (inlet) pressure of 25 ± 1 psig and to meter any one of three different gases in cubic feet per hour (cfh): helium, argon or C-25 (75% argon - 25% carbon dioxide). Each of the two faces of the round plastic tube has a calibrated scale for one of the above gases. The flow readings are accurate with ± 5% of the maximum calibrated scale reading for each gas. The range of each calibrated scale is as follows:

Helium 20 to 150 CFH
Argon/C-25 10 to 50 CFH

The L-33 is equipped with standard "B"-size (CGA-032) inert gas connections (5/8-in — 18 R.H. threads, male inlet and female outlet). The L-33 will connect directly to any inert gas or carbon dioxide regulator with matching threads. If pipeline installation is desired, install a suitable commercially cleaned shut-off valve and a 1/4-in. NPT (male) x "B" inert gas (CGA-032) (female) fitting (P/N 74S76) for each L-33 flowmeter to be used.

Also available for pipeline installations are L-33 inert gas and CO₂ flowmeters with 1/4-in. NPT female connections (P/N's 21989 and 21990 respectively). The CO₂ flowmeter has a flow range of 20 to 80 cfh and it is calibrated for 80 psig which reduces "freeze-up" possibilities of CO₂ at high flows (up to 40 cfh). If higher flow rates or duty cycles are required, use CO₂ heater, P/N 950578.

II. PRESSURE AND FLOW CONVERSIONS

If operating at pressures other than 25 psig, you will not be reading the actual flow rate from the scale. The true flow rate is determined by multiplying the indicated flow reading by the pressure correction factor (see table)

Example: If you are operating a 25 psig calibrated L-33 flowmeter from 50 psig pipeline and you are reading 40

cfh from the flowmeter scale, the actual flow rate is 40 x 1.28 = 51.2 cfh.

Other Conversions:

1. To convert flow to liters per minute (L/min) multiply indicated flow reading by 0.47.
2. For inert gas mixtures other than the C-25, consult your gas supplier for the conversion factor that will apply to one of the calibrated scales.

| Inlet Pressure psig | Pressure Correction Factor 25 psig Calibrated Flowmeter |
|---------------------|--|
| 15 | 0.86 |
| 25 | — |
| 30 | 1.06 |
| 40 | 1.17 |
| 50 | 1.28 |
| 60 | 1.37 |
| 70 | 1.46 |
| 80 | 1.54 |
| 90 | 1.62 |
| 100 | 1.70 |



INERT GAS OR CARBON DIOXIDE can cause suffocation in confined spaces.

- Always work in well ventilated area.
- Prevent leaks.
- Follow operating instructions on this sheet.
- This flowmeter must be installed, operated, and maintained only by trained servicemen.
- For complete safety information on welding and cutting equipment, read form 2035 (oxy-fuel gas) and 52-529 (arc welding). For safety information on gases, see your supplier.
- Do not use with oxygen.

Be sure this information reaches the operator. You can get extra copies through your supplier.



ESAB Welding & Cutting Products

SAFETY PRECAUTIONS

WARNING

These Safety Precautions are for your protection. They summarize precautionary information from the references listed in Additional Safety Information section. Before performing any installation or operating procedures, be sure to read and follow the safety precautions listed below as well as all other manuals, material safety data sheets, labels, etc. Failure to observe Safety Precautions can result in injury or death.



PROTECT YOURSELF AND OTHERS - Some welding, cutting and gouging processes are noisy and require ear protection. Hot metal can cause skin burns and heat rays may injure eyes. Training in the proper use of the processes and equipment is essential to prevent accidents. Also:

1. Always wear safety glasses with side shields in any work area, even if welding helmets, face shields, or goggles are also required.
2. Wear flameproof gauntlet type gloves, heavy long-sleeve shirt, cuffless trousers, high-topped shoes, and a welding helmet or cap for hair protection, to protect against hot sparks and hot metal. A flameproof apron may also be desirable as protection against radiated heat and sparks.
3. Hot sparks or metal can lodge in rolled up sleeves, trousers cuffs, or pockets. Sleeves and collars should be kept buttoned, and open pockets eliminated from the front of clothing.
4. Protect other personnel from hot sparks with a suitable non-flammable partition or curtains.
5. Use goggles over safety glasses when chipping slag or grinding. Chipped slag may be hot and can travel considerable distances. Bystanders should also wear goggles over safety glasses.



FIRES AND EXPLOSIONS - Heat from a flame can act as an ignition source. Hot slag or sparks can also cause fires or explosions. Therefore:

1. Remove all combustible materials well away from the work area or completely cover the materials with a protective non-flammable covering. Combustible materials include wood, cloth, sawdust, liquid and gas fuels, solvents, paints and coatings, paper, etc.
2. Hot sparks or hot metal can fall through cracks or crevices in floors or wall openings and cause a hidden smoldering fire on the floor below. Make certain that such openings are protected from hot sparks and metal.
3. Do not weld, cut, or perform any other hot work on materials, containers, or piping until it has been completely cleaned so that no substances on the material can produce flammable or toxic vapors. Do not do hot work on closed containers. They may explode.
4. Have fire extinguishing equipment handy for instant use, such as a garden hose, a pail of water or sand, or portable fire extinguisher. Be sure you are trained in its use.
5. After completing operations, inspect the work area to be sure that there are no hot sparks or hot metal which could cause a later fire. Use fire watchers when necessary.
6. For additional information, refer to NFPA Standard 51B, "Fire Prevention in Use of Cutting and Welding Processes", which is available from the National Fire Protection Association, Batterymarch Park, Quincy, MA 02269.



FUMES AND GASES - Fumes and gases, particularly in confined spaces, can cause discomfort or injury. Do not breathe fumes or gases from welding or cutting. Therefore:

1. Always provide adequate ventilation in the work area by natural or mechanical ventilation means. Do not weld, cut, or gouge on materials such as galvanized steel, stainless steel, copper, zinc, lead, beryllium, or cadmium unless positive mechanical ventilation is provided. Do not breathe fumes and gases from these materials.
2. If you develop momentary eye, nose, or throat irritation while operating, this is an indication that ventilation is not adequate. Stop work at once and take necessary steps to improve ventilation in the work area. Do not continue to operate if physical discomfort persists.

3. Refer to ANSI/ASC Standard Z49.1 listed below for specific ventilation recommendations.

4. **WARNING:** This product, when used for welding or cutting, produces fumes or gases which contain chemicals known to the State of California to cause birth defects and, in some cases, cancer. (California Health & Safety Code §25249.5 et seq.)



EQUIPMENT MAINTENANCE - Faulty or improperly maintained equipment, such as torches, hoses and regulators, can result in poor work, but even more important, it can cause injury or death through fires. Therefore:

1. Always have qualified personnel perform the installation, troubleshooting, and maintenance work. Do not operate or repair any equipment unless you are qualified to do so.
2. Keep all oxy-fuel equipment free of grease or oil. Grease, oil, and other similar combustible materials, when ignited, can burn violently in the presence of oxygen.
3. Do not abuse any equipment or accessories. Keep equipment away from heat and wet conditions, oil or grease, corrosive atmospheres and inclement weather.
4. Keep all safety devices in position and in good repair.
5. Use equipment for its intended purpose. Do not modify it in any manner.



GAS CYLINDER HANDLING - Gas cylinders, if mishandled, can rupture or explode violently. Sudden rupture of a cylinder, valve or relief device can injure or kill you. Therefore:

1. Use the proper gas for the process and use the proper pressure reducing regulator designed to operate from the compressed gas cylinder. Do not use adaptors to mount the regulator on the cylinder. Maintain hoses and fittings in good condition. Follow manufacturer's operating instructions for mounting the regulator to the gas cylinder.
2. Always secure cylinders in an upright position by chain or strap to suitable hand trucks, benches, walls, post, or racks. Never secure cylinders to work tables or fixtures where they may become part of an electrical circuit.
3. When not in use, keep cylinder valves closed. Have the valve protection cap in place on top of the cylinder if no regulators is installed. Secure and move cylinders by using suitable hand trucks. Avoid rough handling of cylinders.
4. Locate cylinders away from heat, sparks, or flame of a welding, cutting, or gouging operation. Never strike an arc on a cylinder.
5. For additional information, refer to CGA Standard P-1, "Precautions for Safe Handling of Compressed Gases in Cylinders", which is available from the Compressed Gas Association, 1235 Jefferson Davis Highway, Arlington, VA 22202.



ADDITIONAL SAFETY INFORMATION - For more information on safe practices for oxy-fuel welding and cutting equipment, ask your distributor for a copy of "Precautions and Safe Practices for Gas Welding, Cutting, and Heating", Form 2035. Gas apparatus safety guidelines are also available on video cassettes from your distributor.

The following publications, which are available from the American Welding Society, 550 N.W. LeJuene Road, Miami, FL 33126, are recommended to you:

1. ANSI/AWS Z49.1 - "Safety in Welding and Cutting".
2. AWS F4.1 - "Recommended Safe Practices for the Preparation for Welding and Cutting of Containers and Piping That Have Held Hazardous Substances".
3. AWS SP - "Safe Practices" - Reprint, Welding Handbook.



MEANING OF SYMBOLS - As used throughout this manual: Means Attention! Be Alert! Your safety is involved.



DANGER Means immediate hazards which, if not avoided, will result in immediate, serious personal injury or loss of life.



WARNING Means potential hazards which could result in personal injury or loss of life.



CAUTION Means hazards which could result in minor personal injury.

III. INSTALLATION

Using Cylinder Gas: An inert gas or a carbon dioxide regulator must be used. The regulator should be equipped with a delivery pressure gauge graduated in increments of 1 or 2 psi so that the pressure to the flowmeter can be set to 25 psig \pm 1. Be sure to read the complete instructions packed with the regulator before connecting. Position the regulator so that the flowmeter will end up in a vertical position. Connect hose to the outlet connection of the flowmeter. Tighten all connections firmly with a wrench.

Using Pipeline Gas: Connect the flowmeter to regulator or station valve. Be sure to align the flowmeter in a vertical position. Connect delivery line to the flowmeter outlet connection and tighten all connections firmly with a wrench.

NOTE: If operating the flowmeter with solenoid valve operation, the solenoid valve must be located upstream. It is recommended to connect at least a 10-ft. long 5/16 or 3/8-in. I.D. hose between solenoid valve and flowmeter. Do NOT place valve immediately upstream of flowmeter. The hose should cushion the sudden release of gas pressure when the valve opens to prevent breaking the metering tube and other parts.

IV. OPERATION

From Regulator:

1. Close the flowmeter valve and then SLOWLY open the cylinder valve.
2. Turn in the regulator pressure-adjusting screw until the regulator delivery pressure gauge reads 27 - 30 psig.
3. Open valve (torch or other gas-using device) downstream of the flowmeter.
4. Open flowmeter valve to the desired flow and readjust regulator to deliver exactly 25 psig. It may be necessary to manipulate both the regulator pressure-adjusting screw and the flowmeter valve to get the exact pressure and flow condition.
5. Close the downstream valve.

After setting up and before starting operations, test all connections for leakages using Leak Test Solution (P/N 998771) or a soap-and-water solution. Bubbling of the solution will indicate leakage and should be corrected before starting work.

From Pipeline

1. If pipeline pressure is not delivering a pressure of 25 psig \pm determine the desired flow by using the correction table on the front page. Correction factors for in between supply pressures can be interpolated.

2. With flowmeter valve closed. SLOWLY open the station valve.
3. Open valve (torch or other gas-using device) downstream of flowmeter and then open flowmeter valve and adjust to the corrected flow reading.
4. Close downstream valve and leak-test the entire set-up as described above.

V. MAINTENANCE

If equipment does not operate properly, stop work immediately and investigate the cause of the malfunction. Maintenance work must be performed by an experienced person. Do not permit untrained persons to inspect, clean, or repair this equipment. Use only recommended replacement parts.

Test for Leakage

Periodically, all joints of a flowmeter should be tested for leakage. Wipe the metal-to-metal seating surfaces of the inlet nipple and outlet connection with a clean grease-free cloth. Connect flowmeter as directed by the installation procedures, making sure flowmeter valve is closed, and apply 25 psig pressure to the flowmeter. Using Leak Test Solution (P/N 998771), or a soap-and-water solution, check flowmeter for leakage as follows:

1. Apply leak test solution on all flowmeter parts including the inlet connection. Also, place a film of leak test solution over the opening of the outlet connection. Leakage will be indicated by bubbling of the solution.
2. Close gas supply valve and open flowmeter valve to release all gas from flowmeter. If leakage was noted, have the flowmeter repaired. Wipe off the leak test solution thoroughly with a clean oil-free cloth.

Safety Relief Device

A safety relief device is mounted on top of the flowmeter which will pop and release gas in case of overpressure. It is not a resealable relief device. If the safety relief device does vent, close the cylinder valve or inlet supply valve immediately. Gas remaining in the regulator will be released through the relief device. Have the regulator supplying the gas repaired and checked over thoroughly.

NOTE: The safety relief device is designed for protecting the flowmeter; not hose or equipment downstream.

General

The following are recommended for maintaining the L-33 in good working condition:

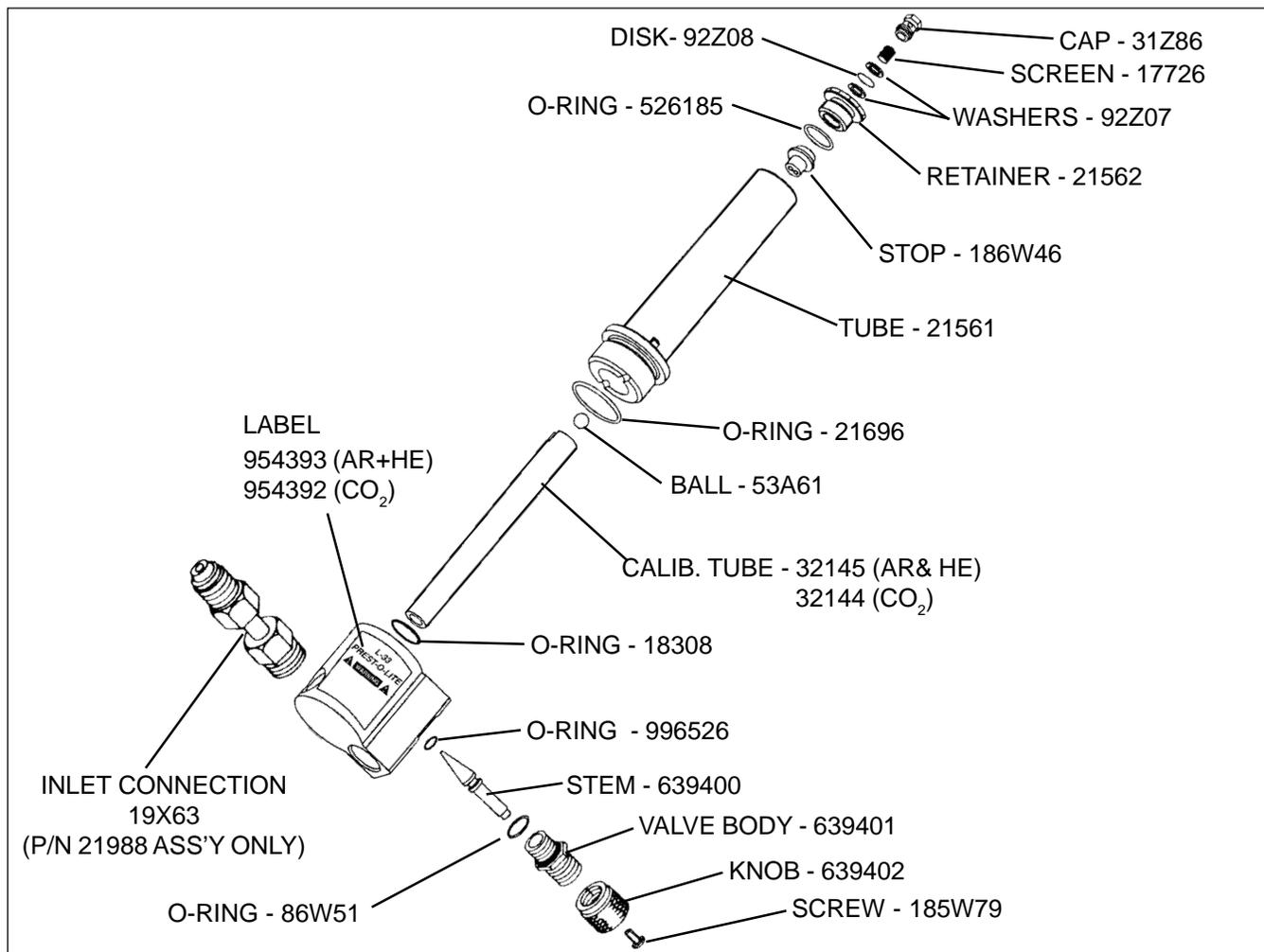
1. Replace "O"-rings periodically or whenever there are signs of leakages. Before installing new "O"-

- rings, lubricate lightly with silicone lubricant P/N 17672 (1 oz. tube).
2. Wipe the metal seating surfaces on the inlet and outlet connections. Replace if seats are scored. When replacing, apply a single turn of 1/4-in. wide Teflon tape on the male 1/4-in. NPT threads.
 3. Clean the polycarbonate inner tube with mild soap and water only and dry thoroughly. To remove the tube, unscrew the hex retainer. Carefully tilt the flowmeter to slide the tube and ball out (ball should not pass through the bottom of the tapered tube). Pull the float stop off of the retainer, make sure holes through stop are clear.
 4. Clean the polycarbonate outer tube (21561) with water or alcohol and dry thoroughly. To remove tube, un-

- screw it counterclockwise from the brass body.
5. Clean dirt, chips, or any other foreign matter from valve stem (639400) with alcohol or mild soap-and-water or wipe off with a clean lint-free, oil-free cloth.
6. The bursting-disk (92Z08) and the two washers (92Z07) should be replaced whenever the flowmeter is overhauled and, of course they must be replaced whenever the disk has ruptured due to overpressure. Handle the replacement disk carefully. It is a very thin copper foil that will crinkle easily. Use only one disk and it must be sandwiched between the two washers. Do not tighten the cap (31Z86) more than 20 in.-lbs. Overtightening may damage the disk.
7. Leak test the reassembled flowmeter as described above.

VI. REPLACEMENT PARTS

Replacement parts for L-33 flowmeter as currently manufactured are keyed in the illustration below. When ordering, supply both part number and description. **DO NOT ORDER BY PART NUMBER ONLY.** Parts can be ordered from your welding equipment distributor or from ESAB Welding & Cutting Products, Customer Service Department, Florence, SC.



L-33 Flowmeter Assembly with "B"-size (CGA-032) Male Inlet Connection - P/N 21988
L-33 Flowmeter Assembly with 1/4-in. NPT Female Inlet Connection - P/N 21989
CO₂ Flowmeter Assembly with 1/4-in. NPT Female Inlet Connection - P/N 21990



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