WOODWARD

Product Manual 35113
(Revision C, 1/2026)
Original Instructions

LXM Liquid Mixing Single Manifold

Installation and Operation Manual

General Precautions

Read this entire manual and all other publications pertaining to the work to be performed before installing, operating, or servicing this equipment.

Practice all plant and safety instructions and precautions.

Failure to follow instructions can cause personal injury and/or property damage.

Revisions

This publication may have been revised or updated since this copy was produced. The latest version of most publications is available on the Woodward website.

Woodward Industrial Support: Get Help

If your publication is not there, please contact your customer service representative to get the latest copy.

Proper Use

Any unauthorized modifications to or use of this equipment outside its specified mechanical, electrical, or other operating limits may cause personal injury and/or property damage, including damage to the equipment. Any such unauthorized modifications: (i) constitute "misuse" and/or "negligence" within the meaning of the product warranty thereby excluding warranty coverage for any resulting damage, and (ii) invalidate product certifications or listings.

Translated Publications

If the cover of this publication states "Translation of the Original Instructions" please note:

The original source of this publication may have been updated since this translation was made. The latest version of most publications is available on the Woodward website.

Woodward Industrial Support: Get Help

Always compare with the original for technical specifications and for proper and safe installation and operation procedures.

If your publication is not on the Woodward website, please contact your customer service representative to get the latest copy.

Revisions— A bold, black line alongside the text identifies changes in this publication since the last revision.

Manual 35113

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Important Definitions

This is the safety alert symbol used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

- **DANGER** - Indicates a hazardous situation, which if not avoided, will result in death or serious injury.
- **WARNING** - Indicates a hazardous situation, which if not avoided, could result in death or serious injury.
- **CAUTION** - Indicates a hazardous situation, which if not avoided, could result in minor or moderate injury.
- **NOTICE** - Indicates a hazard that could result in property damage only (including damage to the control).
- **IMPORTANT** - Designates an operating tip or maintenance suggestion.

⚠WARNING

Overspeed / Overtemperature / Overpressure

The engine, turbine, or other type of prime mover should be equipped with an overspeed shutdown device to protect against runaway or damage to the prime mover with possible personal injury, loss of life, or property damage.

The overspeed shutdown device must be completely independent of the prime mover control system. An overtemperature or overpressure shutdown device may also be needed for safety, as appropriate.

⚠WARNING

Personal Protective Equipment

The products described in this publication may present risks that could lead to personal injury, loss of life, or property damage. Always wear the appropriate personal protective equipment (PPE) for the job at hand. Equipment that should be considered includes, but is not limited to:

- **Eye Protection**
- **Hearing Protection**
- **Hard Hat**
- **Gloves**
- **Safety Boots**
- **Respirator**

Always read the proper Material Safety Data Sheet (MSDS) for any working fluid(s) and comply with recommended safety equipment.

⚠WARNING

Start-up

Be prepared to make an emergency shutdown when starting the engine, turbine, or other type of prime mover, to protect against runaway or overspeed with possible personal injury, loss of life, or property damage.

Regulatory Compliance

European Compliance for CE Marking:

Pressure Equipment Directive:	Directive 2014/68/EU on the harmonisation of the laws of the Member States relating to making pressure equipment available on the market. PED Category II PED Module H – Full Quality Assurance

Other European and International Compliance:
Compliance with the following European Directives or standards does not qualify this product for application of the CE Marking:

Machinery Directive:	Compliant as partly completed machinery with Directive 2006/42/EC of the European Parliament and the Council of 17 May 2006 on machinery.
ATEX – Potentially Explosive Atmospheres Directive:	Exempt from the non-electrical portion of the ATEX Directive 2014/34/EU due to no potential ignition sources per EN ISO 80079-36:2016 for Zone 2 installations.

Special Conditions for Safe Use:

Compliance with the Machinery Directive 2006/42/EC noise measurement and mitigation requirements is the responsibility of the manufacturer of the machinery into which this product is incorporated.

The surface temperature of this valve approaches the maximum temperature of the applied process media. It is the responsibility of the user to ensure that the external environment contains no hazardous gases capable of ignition in the range of the process media temperatures.

Chapter 1.
General Information

Description

NOTICE

This product is designed for use with light distillate fuels. It is the customer's responsibility to confirm the product's suitability with any other fluids. Wetted internal parts include, but are not limited to, the following materials: perfluorinated elastomers, mineral filled PTFE, stainless steel, aluminum, and chrome nitride plating.

The Woodward Liquid Mixing Manifold (LXM) is a component of the liquid fuel metering system and NOx reduction system for an industrial gas turbine. It is designed for use with distillate fuel, demineralized water, and natural gas (to the primary liquid fuel circuit). The valve provides precisely controlled restrictions on both the primary and main liquid fuel and water injection circuits, which mitigate the effects of gravimetric head and ensure uniform flow delivery between combustors at different elevations. In addition, during liquid fuel operation, distillate fuel and water are mixed using counter-flow impingement within the manifold, to provide a uniform emulsion to the combustor nozzles.

The Liquid Mixing Manifold (LXM) is comprised of four pneumatically actuated, two-position poppet-style valves mounted to a multi-path manifold. The LXM provides the capability to direct flow from one or more of the three inlet ports (two Fuel Inlets and Water Inlet) to one or more of the output Discharge ports. The device is provided with fail closed actuators. Valves are available in three configurations: Main Mixing Block containing two main circuits, Pilot Mixing Block with two pilot circuits and Standard Mixing Block which has one Pilot circuit and one Main.

The LXM is designed for ease of mounting and servicing. The valve assembly can be mounted to the fuel and water manifolds by its inlet flange connections in any orientation around the turbine. Threaded holes for an angle bracket are included on the manifold if additional support is desired.

Figure 1-1. Back View of LXM

Construction

The main components of the LXM include:

- Manifold
- 4x Normally Closed Actuators

Manifold

The LXM manifold is the common mounting block for the four actuators as well as the location for process fluid inlet and discharge connections. During liquid fuel operation, drilled cross channels within the manifold provide counterflow mixing of liquid fuel and water.

The manifold is a single-piece design constructed from austenitic stainless steel. The block contains the process fluid passages, connects the actuator overboard drain passages to allow for common connections to drain, and serves as the interface for process fluid connections.

The inlet side of the manifold block has three ports, two Fuel and a shared Water Inlet in the middle. Both discharge ports are located on the opposite side of the manifold. Fluid connection and actuator interface labels are engraved on the manifold for ease of identification during assembly, disassembly, and servicing.

Single manifold serves also as the location for orifice seat installation, as well as the interface between the manifold and actuators. The actuator and manifold interfaces have been designed to ensure that the correct actuator is assembled on each circuit.

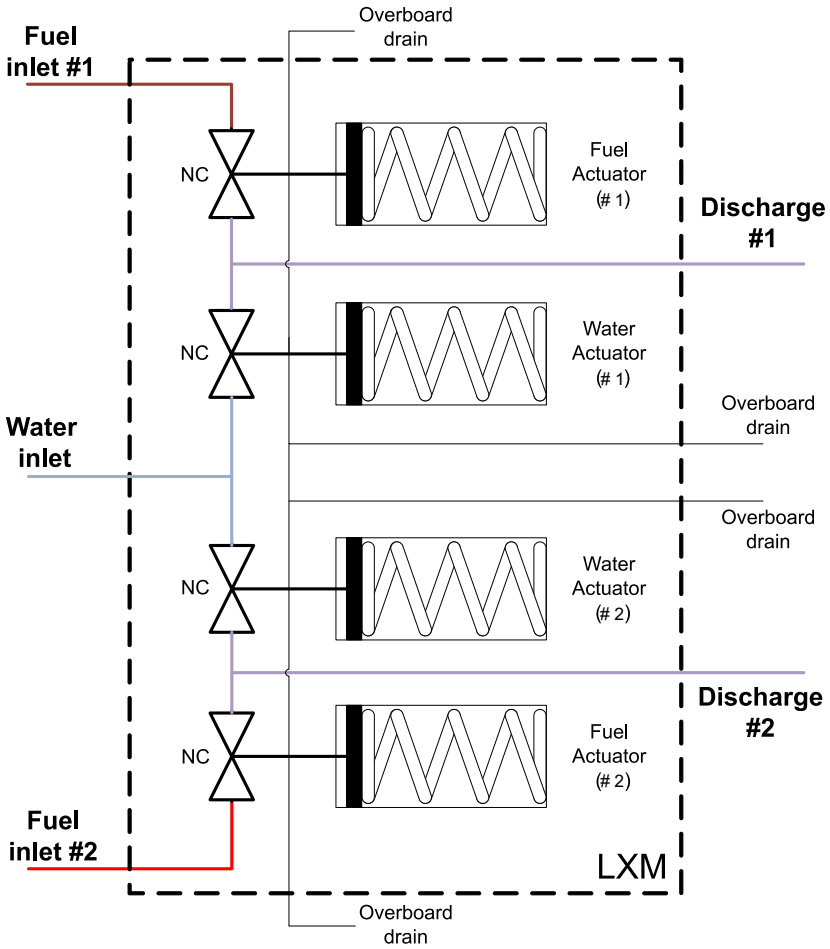


Figure 1-2. LXM Circuit Schematic

Actuators

The LXM uses four pneumatic actuators, which provide reliable open/close functionality. The actuators are integrated into the manifold design to control the isolation or combination of the process fluids within the manifold. Required connections to the actuators are SAE J514 ¾" -16 straight thread actuation supply ports and a SAE J514 7/16"-20 straight thread overboard vent ports.

The actuators are comprised primarily of anodized aluminum to provide performance while reducing total valve weight. Primary wetted parts of the valve are stainless steel for additional corrosion resistance. For replacement of actuators or actuator parts, see CMM-03011.

Visual Indicators

The position of the actuator can be verified by inspection of the visual indicator at the top of each actuator. When an actuator is open, the indicator rod protrudes from the actuator cover by approximately 6 mm / ¼ inch; when the actuator is closed, the indicator rod is flush with the actuator cover.

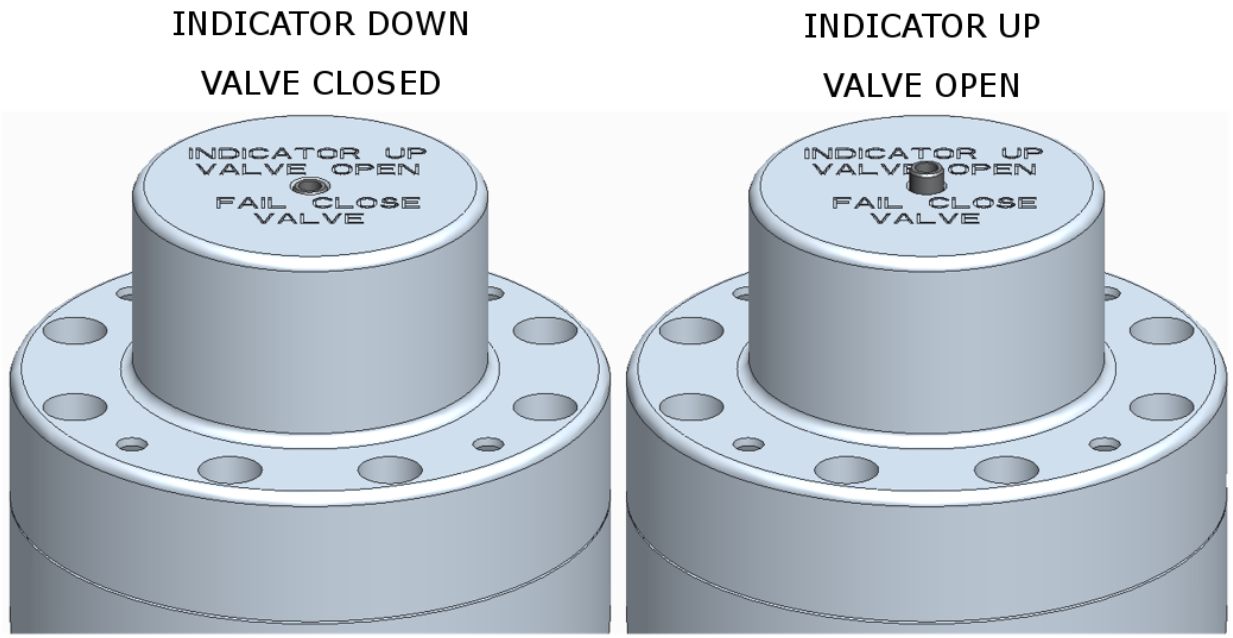


Figure 1-3. Visual Indicator of Actuator Position

Chapter 2.
Specifications

Table 2-1. LXM Specifications Table

Valve Specifications			
Valve Type	Poppet Hybrid		
Type of Operation	On/Off		
Fluid Ports	SAE J518 Code 61, 4-Bolt Flange		
	LXM STANDARD	LXM MAIN	LXM PILOT
	Pilot Fuel Inlet ¾” Water Inlet 1” Main Fuel Inlet 1” Pilot Discharge ¾” Main Discharge 1½”	Main #2 Inlet ¾” Water Inlet 1” Main #1 Inlet 1” Main #2 Discharge 1” Main #1 Discharge 1¼”	Pilot #2 Inlet ¾” Water Inlet 1” Pilot #1 Inlet ¾” Pilot #2 Discharge ¾” Pilot #1 Discharge ¾”
OVBD Connection	SAE J514 .438-20 Straight Thread Port (-04)		
Max OVBD Pressure	2.8 bar (40 psig), 5 second max duration		
Allowable Process Fluid Leakage to OVBD	New: 5.88 cm³/min, 6.9 bar (100 psig) air or nitrogen (approx. Class V) Worn: 200 cm³/min, 6.9 bar (100 psig) air or nitrogen (approx. 7 % of Class IV)		
Allowable Seat Leakage (Forward or Reverse)	New: 285 cm³/min, 6.9 bar (100 psig) air or nitrogen (approx. 10 % of Class IV) Worn: 2850 cm³/min, 6.9 bar (100 psig) air or nitrogen (approx. Class IV)		

Flow Specifications (Cv)			
	LXM STANDARD	LXM MAIN	LXM PILOT
Fuel (A/D/H)	1.0±3% | 0.498±5%	1.5 ± 3%	0.25 ± 5%
Water (B/C/G)	0.4±3% | 0.234±5%	1.5 ± 3%	0.25 ± 5%
Water (C/B/F)	3.5±3% | 2.108±3%	3.5 ± 3%	0.25 ± 5%
Fuel (D/A/E)	3.0±3% | 1.791±3%	3.0 ± 3%	0.25 ± 5%

Process Fluid Specifications	
Process Fluids	Natural gas, Demineralized water, Light True Distillate Fuel
Process Fluid Temperature	Liquid Fuel & Water: (0 to 93) °C [(32 to 200) °F] Gas Fuel: (–5 to +210) °C [(23 to 410) °F]
Recommended Process Fluid pH Range	pH 5–8
Recommended Process Fluid Filtration	$\beta_{5/10/20}$ = 2/75/1000 (20 µm absolute filtration)
Design Pressure	148 bar (2150 psig)
Max Continuous Differential Pressure	119 bar (1720 psid) (Forward or Reverse)
Proof Pressure	222 bar (3225 psig)
Minimum Burst Pressure	445 bar (6450 psig)

Maximum Service Conditions	
Liquid Fuel	Max Process Fluid Pressure: 118.6 bar (1720 psig) Max Process Fluid Temperature: 93 °C (200 °F)
Gas Purge Operation	Max Process Fluid Pressure: 34.5 bar (500 psig) Max Process Fluid Temperature: +210 °C (410 °F)

Actuator Specifications	
Actuator Type	Pneumatic
Actuation Supply Pressure	(6.2 to 7.6) bar [(90 to 110) psig]
Actuation Supply Temperature	(–31 to +49) °C [(–23 to +120) °F]
Recommended Actuation Supply Filtration	0.9 µm absolute
Actuation Supply Connection	0.750-16 Straight Thread Port (-08)
Allowable Air Leakage to Piston Vent	New: 41.1 cm³/min, 6.9 bar (100 psig) air or nitrogen (approx. Class V) Worn: 455.5 cm³/min, 6.9 bar (100 psig) air or nitrogen (approx. 16% Class IV)
Slew Time	Less than 0.5 second opening & closing from nominal cracking pressure to fully extended position, or nominal closing pressure to fully retracted position.

Environmental Specifications	
Design Ambient Temperature	(–5 to +218) °C [(23 to 425) °F]
Max Continuous Ambient Temperature	196 °C (385 °F)
Max Operating Ambient Temperature	210 °C (410 °F)
Vibration Test Level	2 G Sine sweep from 10 to 2000 Hz, resonance search. Random 0.04 G^2/Hz, from 10 to 2000 Hz for a period of 1-1/2 hours per axis. Equivalent to 8.2 G rms per MIL-STD 202F, M214A, TC(B).
Shock	40 G Peak, 11 ms duration sawtooth pulse per MIL-STD 810F, Method 516.5, Procedure 1.

Physical Specifications	
Height x Width x Depth	Approx. (513.7 x 336.3 x 169.7) mm [(20.2 x 13.2 x 6.7) inches]
Weight	Approx. 78 kg (172 lb) empty

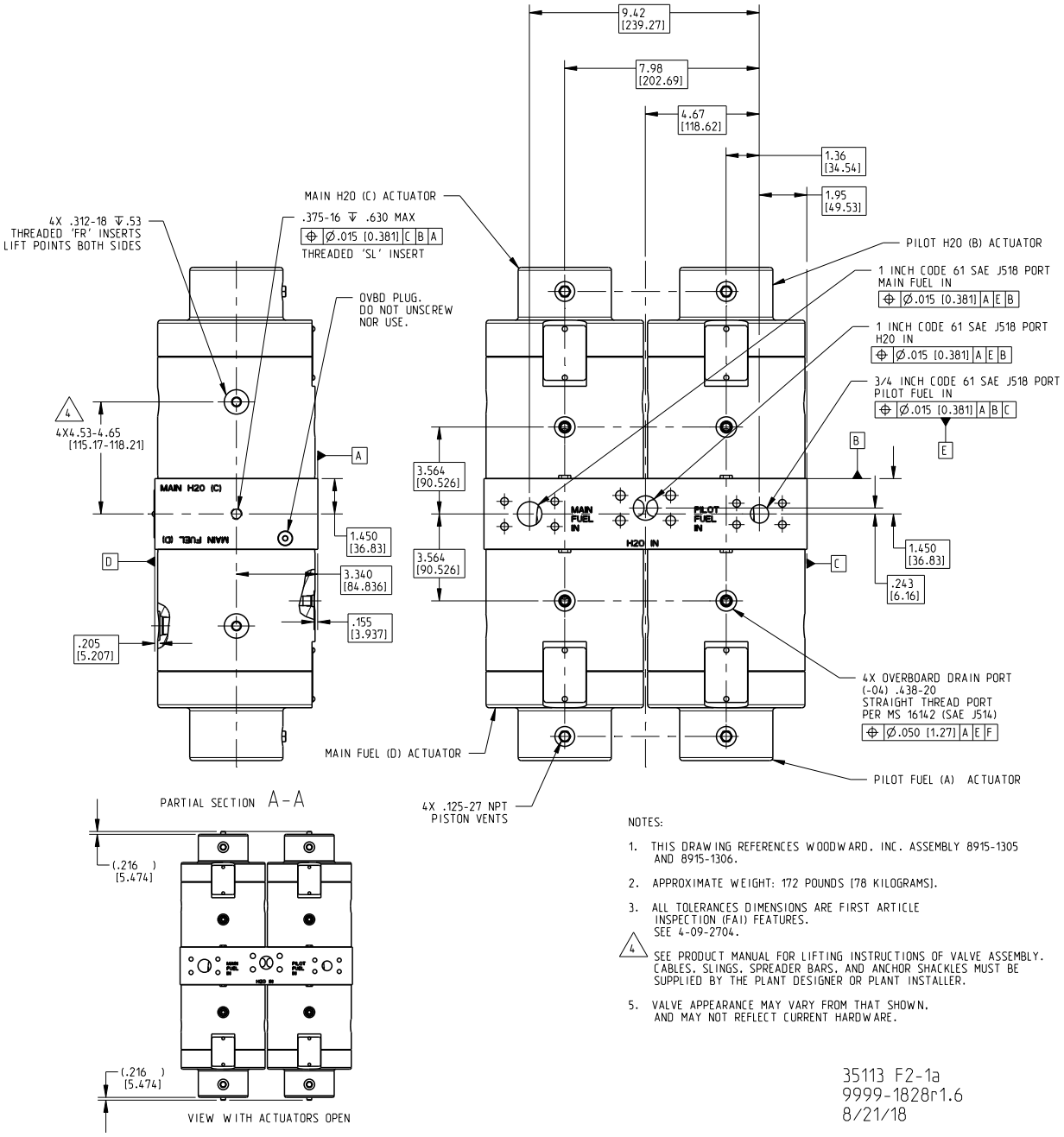


Figure 2-1a. Standard LXM Outline Drawing

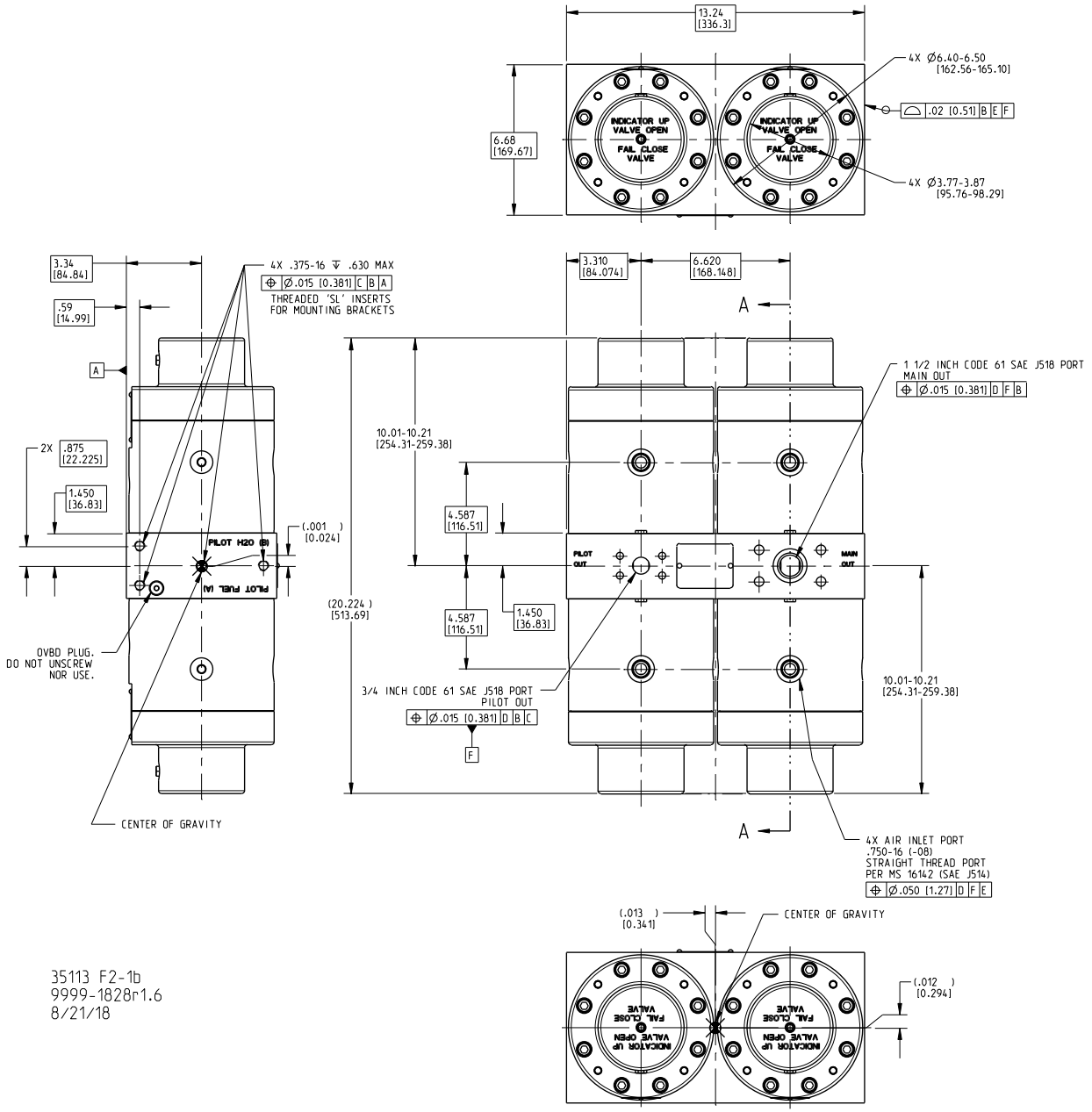


Figure 2-1b. Standard LXM Outline Drawing

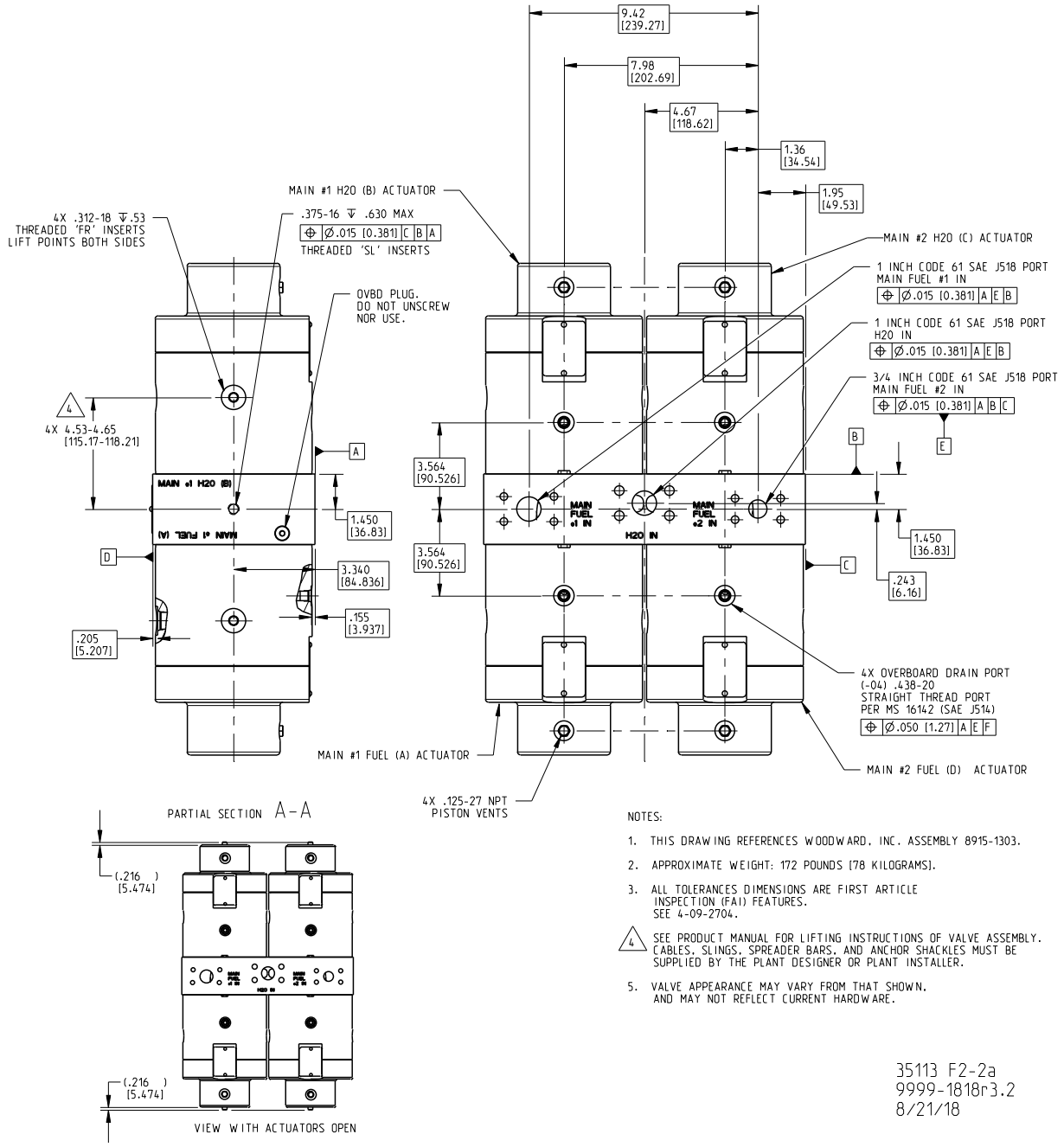


Figure 2-2a. Main LXM Outline Drawing

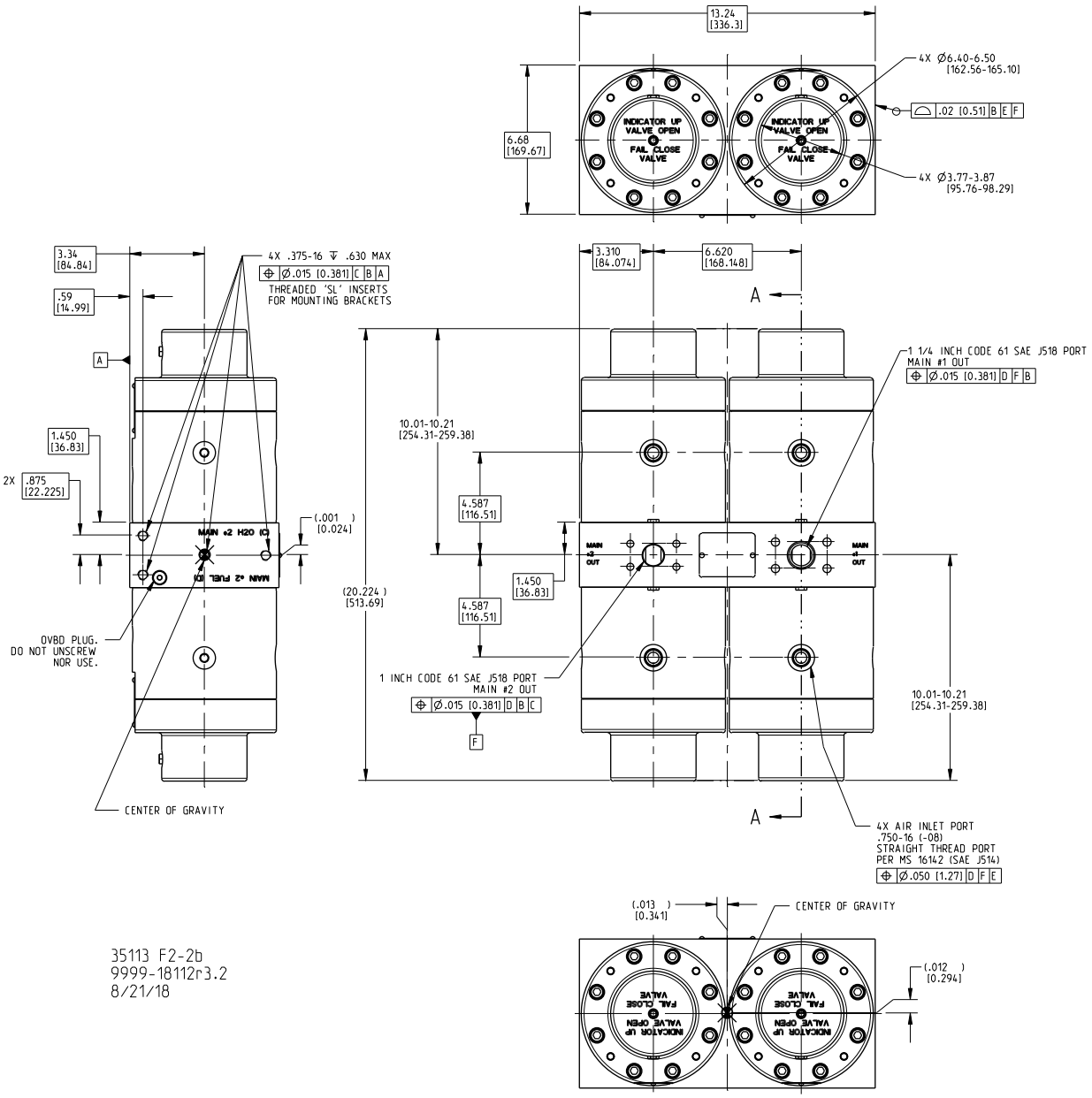


Figure 2-2b. Main LXM Outline Drawing

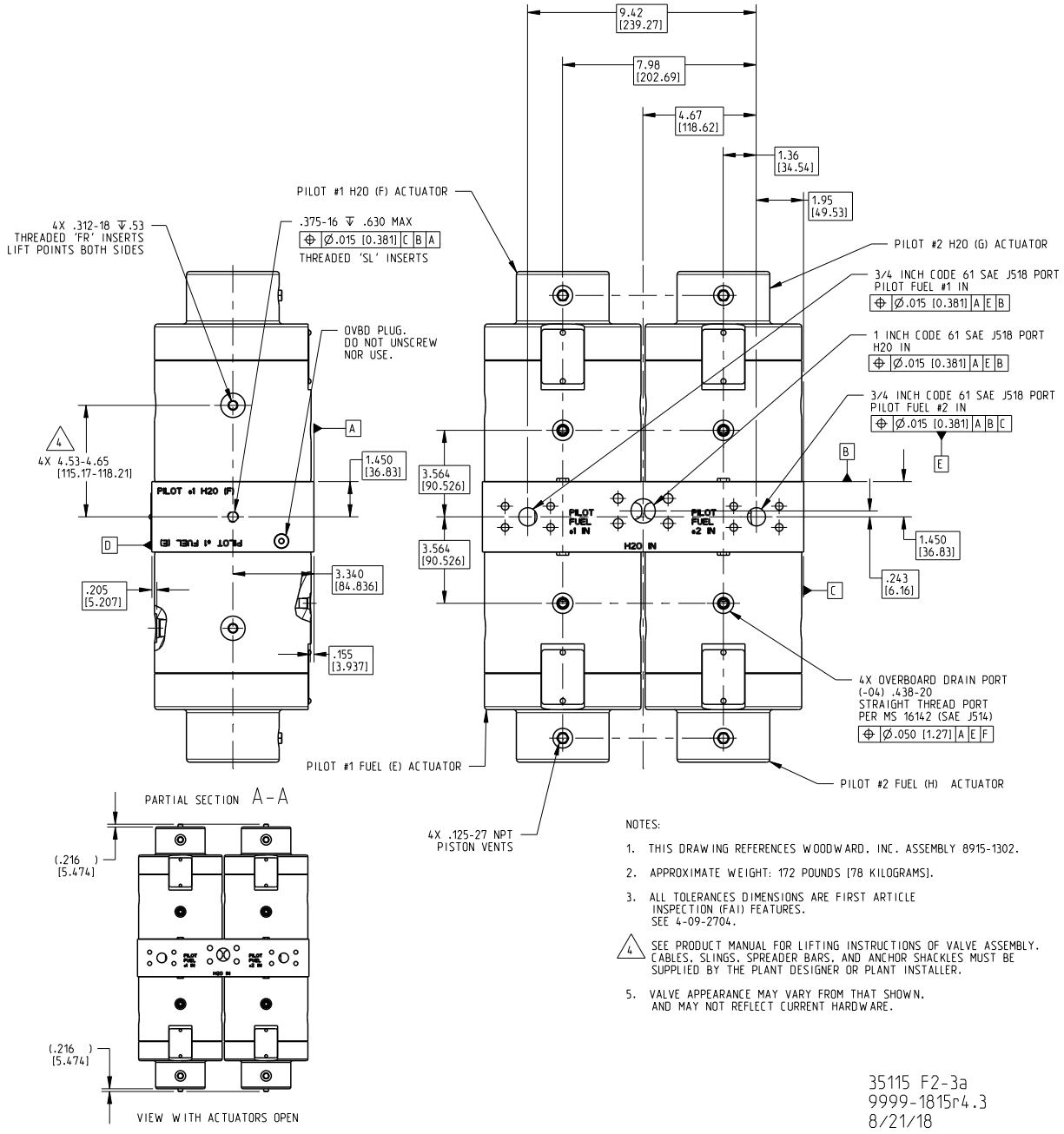


Figure 2-3a. Pilot LXM Outline Drawing

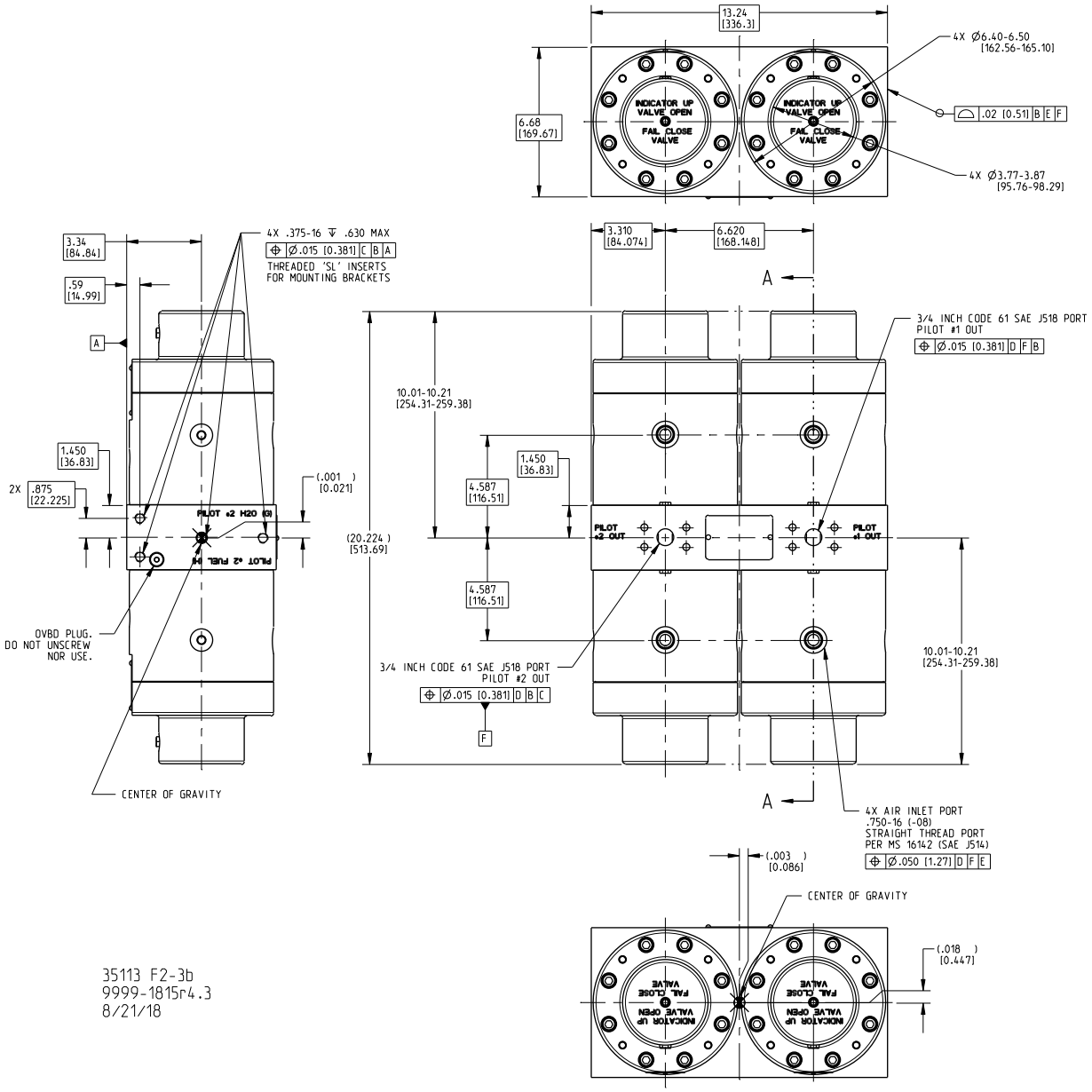


Figure 2-3b. Pilot LXM Outline Drawing

Chapter 3.
Installation

Receiving

The LXM is carefully packed at the factory to protect it from damage during shipping. It is recommended that the LXM be stored in its shipping container until installation. When unpacking the LXM, leave the port covers in place to protect the valve interior. Do not remove the port covers until just prior to valve installation.

NOTICE

Remove all shipping plugs and caps prior to installation. Failure to remove plastic overboard plugs may result in process fluid release through drains during operation.

Lifting

⚠WARNING

The LXM weighs approximately 78 kg / 172 pounds. Do not attempt to lift or move it without appropriate lifting equipment. Use caution when moving or lifting the LXM to prevent serious injury.

A 5/16-18 tapped hole with thread insert is provided on each actuator body as provision for using a lifting eye (Figure 3-1). This allows for flexibility of lifting configurations to match the various mounting orientations. Prior to lifting a valve, use at least two eye bolts in the actuators. Lifting hardware may be removed upon final installation.

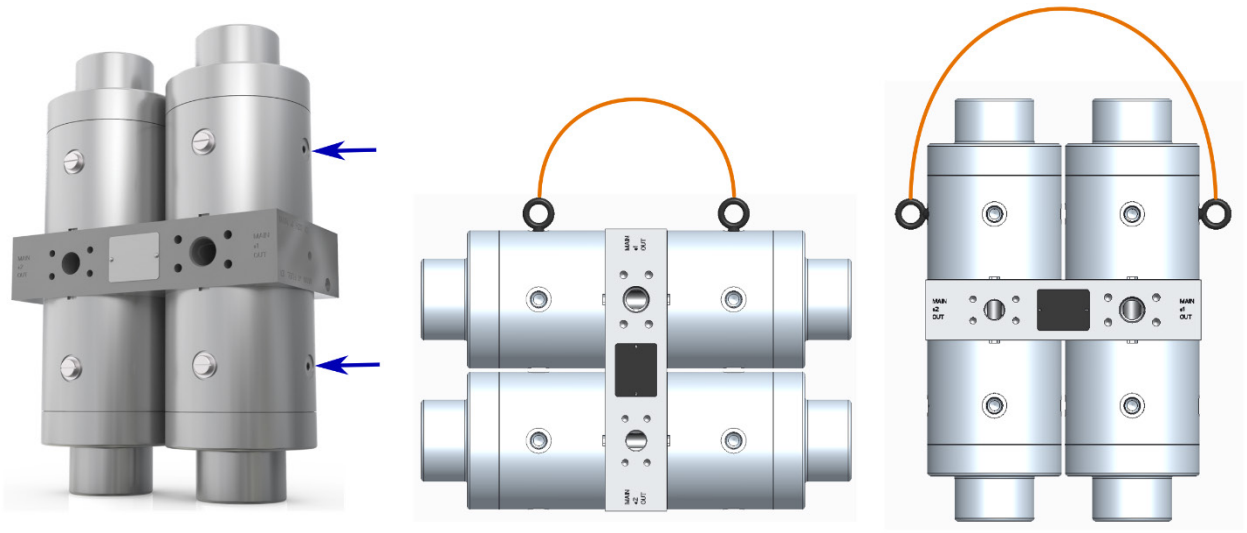


Figure 3-1. Lifting Eye Locations and Recommended Lifting Configurations

Fluid Connections and Mounting

⚠WARNING

Due to typical noise levels in turbine environments, hearing protection should be worn when working on or around the LXM Valve.

⚠WARNING

The surface temperature of this valve approaches the maximum temperature of the applied process media. It is the responsibility of the user to ensure that the external environment contains no hazardous gases capable of ignition in the range of the process media temperatures.

⚠WARNING

The surface of this product can become hot enough or cold enough to be a hazard. Use protective gear for product handling in these circumstances. Temperature ratings are included in the specification section of this manual.

⚠WARNING

External fire protection is not provided in the scope of this product. It is the responsibility of the user to satisfy any applicable requirements for their system.

Inlet and discharge ports are all SAE J518 code 61 four bolt -flange connections (see Valve Specification and/or outline figures). If expected fluid or ambient temperatures are in excess of 177 °C (350 °F), high temperature and explosive decompression resistant O-rings must be used in the connecting flanges. These O-rings are available as a kit, listed in 9999-1826. Inlet lines to the valve must be hard pipe of appropriate strength and wall thickness to support the valve.

Installation attitude does not affect actuator or valve performance. However, to promote the most effective flushing of the valve internals, it is recommended that the inlet face be mounted in a vertical arrangement perpendicular to the turbine axis.

The LXM can be supported by its three inlet flange connections. Three 3/8-16 holes are also included on the one side of the manifold as provisions for additional support. These holes are intended for connection to an angle support bracket to connect to the turbine manifold.

NOTICE

Fluid supply lines should be thoroughly flushed prior to LXM installation. Fluid filters are recommended upstream of the LXM supply lines.

⚠WARNING

Valve process fluids are irritants. Route vent lines away from operators and hazardous areas. Ensure that personal protective equipment and proper area ventilation are used.

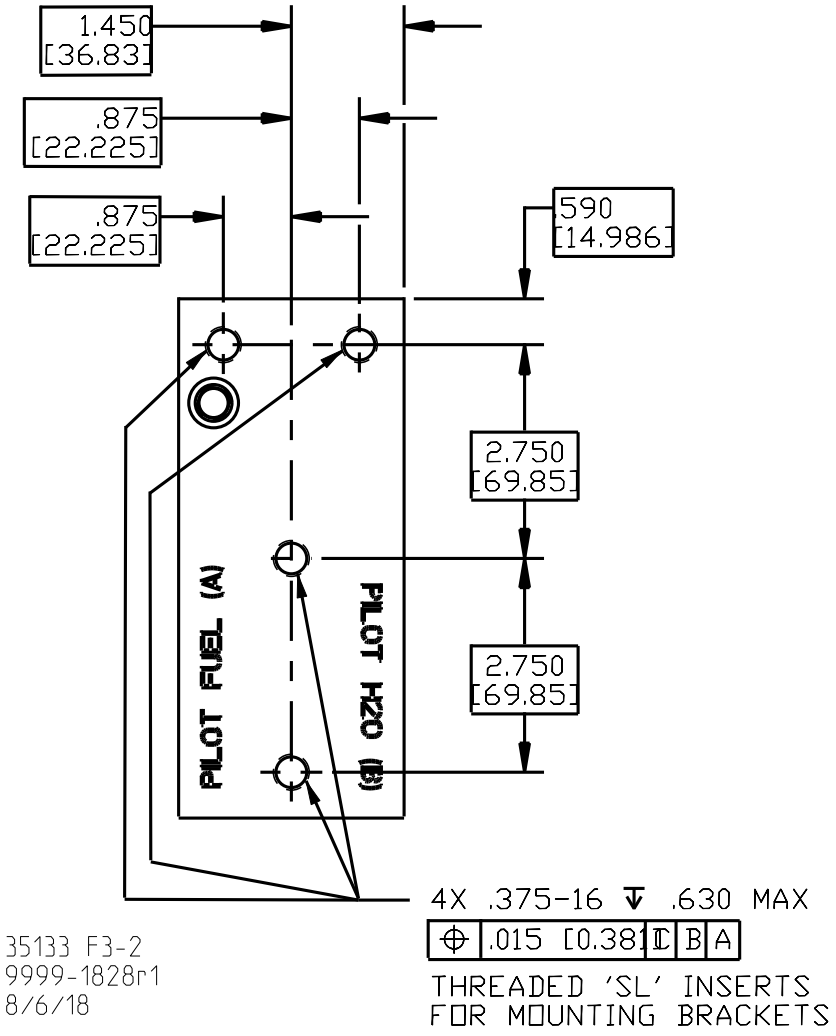


Figure 3-2. Support Bracket Provisions on Manifold

Once the LXM is installed in its final orientation, overboard drain lines should be connected to the two lowest ports of each LXM to allow for effective fluid removal from the valve. The remaining two upper overboard ports must be closed with stainless steel straight thread plugs.

Actuation air supply lines must be connected to each individual actuator.

Recommend not connecting to the actuator piston vents during normal operation.

NOTICE

Removal of the piston vents could allow ingress and cause damage to actuator internals. Plugging of the piston vents traps pressure and may result in failure to actuate.

Allowable Flange Loads

Allowable flange loads are provided for each LXM port size (3/4”, 1”, 1¼, 1½”). For each size, the allowable loads were resolved about the axes of a local coordinate system defined at each flange (Figure 3-3).The loads are considered as the combination of a tensile force along the specified axis and a moment about the same axis.

Coordinate axes were defined as follows. This local coordinate system can be utilized to determine if predicted flange loads are acceptable for use with the LXM.

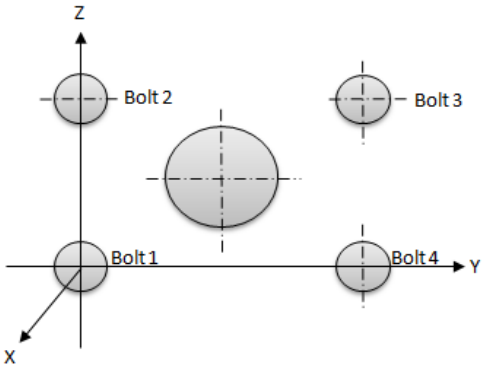


Figure 3-3. Local Coordinate System for Flange Load Calculations

It is the responsibility of the customer to ensure that the predicted and actual flange loads are within the specified limits.

For flange loads to be acceptable, the force and the moment when plotted must lie beneath the limiting force-moment line. This must be true for each axis of the flange.

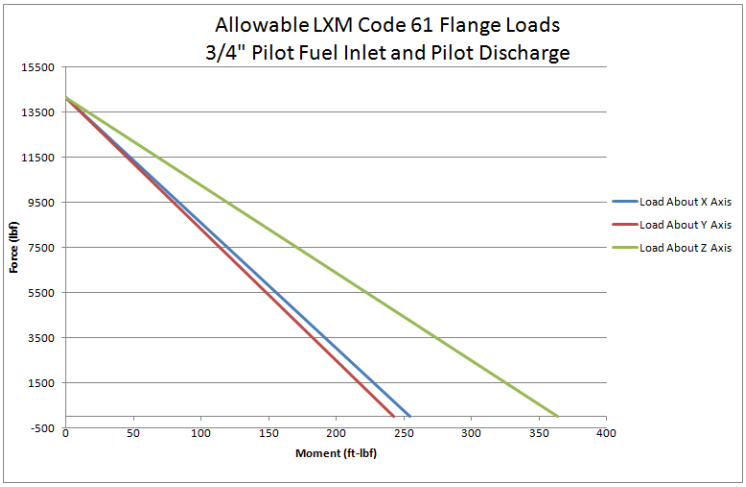


Figure 3-4. ¾" Flange, Allowable Loads

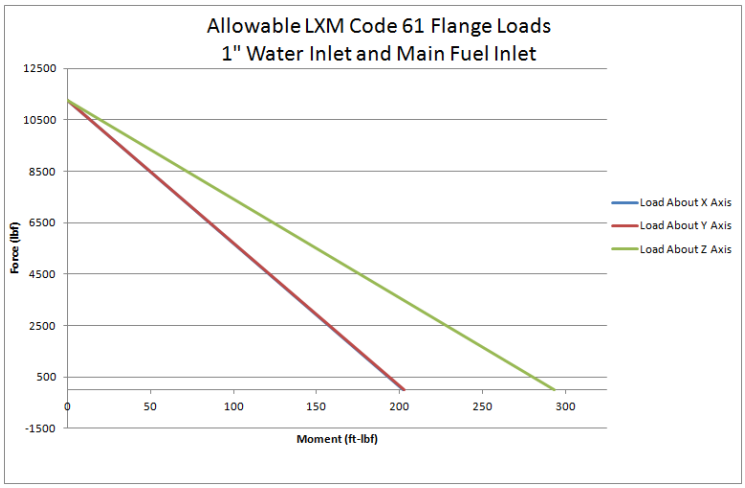


Figure 3-5. 1" Flange, Allowable Loads

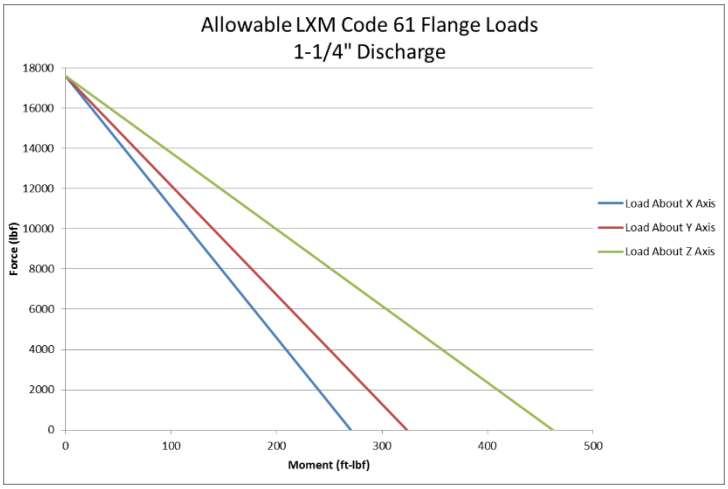


Figure 3-6. 1¼" Flange, Allowable Loads

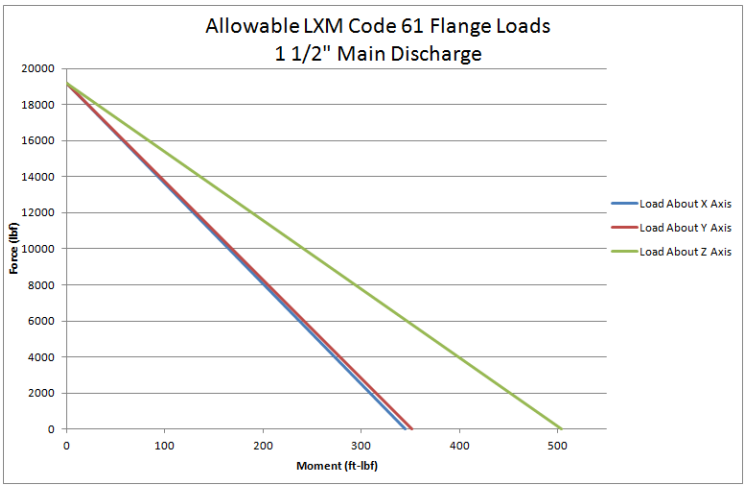


Figure 3-7. 1½" Flange, Allowable Loads

$$L \geq F_{Axial} + A * M_{Bending}$$

Where:

F_{Axial} = Maximum axial force applied by piping (lbf)

$M_{Bending}$ = Maximum bending moment applied by piping (ft-lbf)

L & A = Constants according to Table 2 (Constants for flange load equation)

Table 3-1. Constants for Flange Load Equation

Flange Size	¾"	1"	1 ¼"	1 ½"
L	14160	11248	17600	19200
A (x-axis)	55.65	55.65	65.09	55.65
A (y-axis)	58.48	55.5	54.39	54.59
A (z-axis)	38.91	38.34	38.18	38.15

It is the responsibility of the user to determine the appropriate sized flange and to supply the flange connections. If the calculated flange loads exceed the limits described in this section, contact Woodward about possible redesign with larger flange connections.

Storage

In order to protect the valve from potential damage caused by freezing or corrosion, recommended storage procedures must be followed.

Prior to packing the valve for long term storage, the LXM should be drained of all fluids. It is recommended to purge the valve with pressurized air or nitrogen to aid in fluid removal.

Close off all external openings with appropriate plugs or caps to prevent contamination by solvents, cleaning agents, moisture, or other elements.

NOTICE

Fluid supply lines should be thoroughly flushed prior to LXM storage to prevent internal freezing damage.

⚠WARNING

When storing LXM in crates, do not stack crates more than two high to prevent tipping hazard that could result in death or serious injury.

Chapter 4.
Maintenance and Hardware Inspection

Maintenance and Inspections

⚠WARNING

Maintenance procedures detailed in this section will compromise the device's pressure containment if not followed with due care and attention. Operating the valve in this condition could result in a sudden release of pressure that could cause injury or death.

⚠WARNING

Disconnect all pressure from actuators and valve fluid connections before disassembly. Failure to do so could result in death or serious injury

⚠WARNING

External fire protection is not provided in the scope of this product. It is the responsibility of the user to satisfy any applicable requirements for their system.

⚠WARNING

Due to typical noise levels in engine and turbine environments, hearing protection should be worn when working on or around the LXM.

⚠WARNING

The surface of this product can become hot enough or cold enough to be a hazard. Use protective gear for product handling in these circumstances. Temperature ratings are included in the specification section of this manual.

Woodward recommends the following maintenance and inspection schedule for the LXM.

Routine Inspections

1. Verify position of the valve by inspection of the position of the visual indicators. Ensure that they are in the proper position based on the commanded actuator state. Ensure that all the valves are open if the control state is open and closed if the control state is closed. Indicators will extend approximately 6 mm (¼ inch) from the end of each actuator when open, and will be flush with the top of the actuator when the actuator is in the closed (seated) position.
2. Routinely remotely monitor the ambient temperature within the enclosure during operation. Ensure that the ambient temperature does not exceed the design ambient temperature limits given in the specifications section.

Annual Inspections

1. Piston Seal Inspection: Pressurize the actuation supply ports of each actuator to 6.9 bar (100 psig) air. Remove the external breather and check for excessive piston seal leakage. Leakage should be less than 455.5 cm^3/min, as stated in the specifications section. Reinstall the external breather to protect valve internals from environmental contaminants.

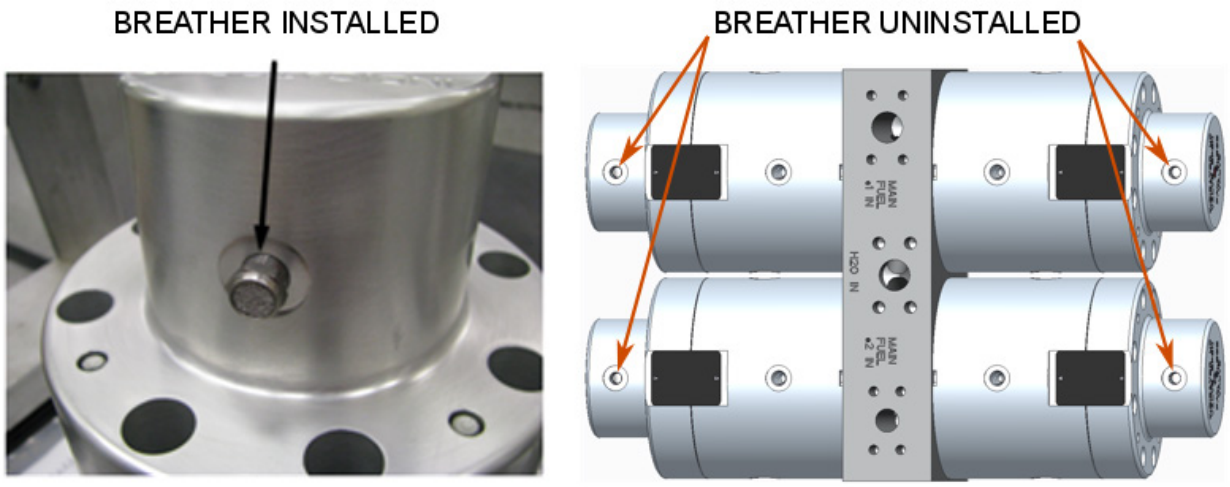


Figure 4-1. External Breather Locations

2. Pressurize the process fluid inlets to 6.9 bar (100 psig) with air or liquid and perform the following inspections:
   - Inspect all interfaces for external leakage.
   - Monitor the leakage from the two lowest overboard drain ports. Leakage should be less than 1.84 cm^3/min when tested with liquid or 345 cm^3/min when tested with gas.

Overhaul / Replace Valve

- If leakage from the overboard drain port or the piston seals exceed the limits stated above, the actuator assembly should be replaced or removed and returned to Woodward for overhaul.
- If an actuator becomes non-functional, or if replacement of the poppets or seats is required, field repair can be performed. See CMM-03011 for replacement procedures and drawing 9999-1826 for available replacement kits.
  - Although signs and degrees of poppet wear may vary by site, CMM-03011 can be used as a guideline for poppet inspection. Additionally, it is recommended to replace the poppets during periods of planned outages for maintenance or major inspections, no less than every three years.

- Woodward recommends valves be removed from service and returned for factory overhaul every 48,000 hours of operation or at the major turbine overhaul closest to 48,000 hours, whichever comes first.

Spare and Replacement Parts

Spare and replacement parts are available from Woodward. See 9999-1826 for available repair kits. To purchase any of kits, please contact Woodward, and reference the part number provided.

Chapter 5. Troubleshooting

General

The following troubleshooting guide assist in troubleshooting the Liquid Mixing Valve, its connections, and system problems. Troubleshooting beyond this level is recommended ONLY when performed at a Woodward facility or by Woodward Field Service Personnel.

Troubleshooting Procedure

This table is a general guide for isolating system problems. Make sure that the input/output connections, controls and contacts are correct and in good working order. Complete the checks in order. Each check assumes that the preceding checks have been completed and any problems have been corrected.

⚠WARNING

Be prepared to make an emergency shutdown when starting the engine, turbine, or other type of prime mover, to protect against runaway or overspeed with possible personal injury, loss of life, or property damage.

Table 5-1. Troubleshooting Table

Symptom	Actuator	Possible Cause	Remedy
Valve will not open	Normally Closed Actuator	Actuation supply connected incorrectly.	Correct supply connection.
		Actuation supply pressure inadequate.	Actuation supply pressure must be greater than 6 bar (90 psig).
		Air supply is excessively contaminated, actuator piston seal degraded or wear ring is binding.	Check air supply for contamination. Increase actuator supply pressure to 7.6 bar (110 psig), note whether or not the actuator opens. Contact Woodward for replacement actuator.
		Actuator piston seal worn.	Replace actuator (See CMM-03011).
Valve will not close	Normally Closed Actuator	Actuation supply port pressurized.	Eliminate source of pressure on actuation supply.
		Visual indicator not coupled properly.	Push visual indicator end. Do not exceed 40 N (9 lb) of force. If no change, proceed to following actions.
		Actuator spring broken.	Replace actuator (See CMM-03011).
		Seat seal blocked.	Verify fluid supply contamination levels are within specifications of Table 2-1. Contact Woodward to return and replace actuator.

Chapter 6.
Product Support and Service Options

Product Support Options

If you are experiencing problems with the installation, or unsatisfactory performance of a Woodward product, the following options are available:

- Consult the troubleshooting guide in the manual.
- Contact the manufacturer or packager of your system.
- Contact the Woodward Full Service Distributor serving your area.
- Contact Woodward technical assistance (see “How to Contact Woodward” later in this chapter) and discuss your problem. In many cases, your problem can be resolved over the phone. If not, you can select which course of action to pursue based on the available services listed in this chapter.

OEM or Packager Support: Many Woodward controls and control devices are installed into the equipment system and programmed by an Original Equipment Manufacturer (OEM) or Equipment Packager at their factory. In some cases, the programming is password-protected by the OEM or packager, and they are the best source for product service and support. Warranty service for Woodward products shipped with an equipment system should also be handled through the OEM or Packager. Please review your equipment system documentation for details.

Woodward Business Partner Support: Woodward works with and supports a global network of independent business partners whose mission is to serve the users of Woodward controls, as described here:

- A **Full Service Distributor** has the primary responsibility for sales, service, system integration solutions, technical desk support, and aftermarket marketing of standard Woodward products within a specific geographic area and market segment.
- An **Authorized Independent Service Facility (AISF)** provides authorized service that includes repairs, repair parts, and warranty service on Woodward's behalf. Service (not new unit sales) is an AISF's primary mission.

A current list of Woodward Business Partners is available at:
https://www.woodward.com/en/support/industrial/service-and-spare-parts/find-a-local-partner

Product Service Options

The following factory options for servicing Woodward products are available through your local Full-Service Distributor or the OEM or Packager of the equipment system, based on the standard Woodward Product and Service Warranty (Woodward North American Terms and Conditions of Sale 5-09-0690) that is in effect at the time the product is originally shipped from Woodward or a service is performed:

- Replacement/Exchange (24-hour service)
- Flat Rate Repair
- Flat Rate Remanufacture

Replacement/Exchange: Replacement/Exchange is a premium program designed for the user who is in need of immediate service. It allows you to request and receive a like-new replacement unit in minimum time (usually within 24 hours of the request), providing a suitable unit is available at the time of the request, thereby minimizing costly downtime. This is a flat-rate program and includes the full standard Woodward product warranty (Woodward North American Terms and Conditions of Sale 5-09-0690).

This option allows you to call your Full-Service Distributor in the event of an unexpected outage, or in advance of a scheduled outage, to request a replacement control unit. If the unit is available at the time of the call, it can usually be shipped out within 24 hours. You replace your field control unit with the like-new replacement and return the field unit to the Full-Service Distributor.

Charges for the Replacement/Exchange service are based on a flat rate plus shipping expenses. You are invoiced the flat rate replacement/exchange charge plus a core charge at the time the replacement unit is shipped. If the core (field unit) is returned within 60 days, a credit for the core charge will be issued.

Flat Rate Repair: Flat Rate Repair is available for the majority of standard products in the field. This program offers you repair service for your products with the advantage of knowing in advance what the cost will be. All repair work carries the standard Woodward service warranty (Woodward North American Terms and Conditions of Sale 5-09-0690) on replaced parts and labor.

Flat Rate Remanufacture: Flat Rate Remanufacture is very similar to the Flat Rate Repair option with the exception that the unit will be returned to you in “like-new” condition and carry with it the full standard Woodward product warranty (Woodward North American Terms and Conditions of Sale 5-09-0690). This option is applicable to mechanical products only.

Returning Equipment for Repair

If a control (or any part of an electronic control) is to be returned for repair, please contact your Full-Service Distributor in advance to obtain Return Authorization and shipping instructions.

When shipping the item(s), attach a tag with the following information:

- Return authorization number
- Name and location where the control is installed
- Name and phone number of contact person
- Complete Woodward part number(s) and serial number(s)
- Description of the problem
- Instructions describing the desired type of repair

Packing a Control

Use the following materials when returning a complete control:

- Protective caps on any connectors
- Antistatic protective bags on all electronic modules
- Packing materials that will not damage the surface of the unit
- At least 100 mm (4 inches) of tightly packed, industry-approved packing material
- A packing carton with double walls
- A strong tape around the outside of the carton for increased strength

NOTICE

To prevent damage to electronic components caused by improper handling, read and observe the precautions in Woodward manual 82715, *Guide for Handling and Protection of Electronic Controls, Printed Circuit Boards, and Modules*.

Replacement Parts

When ordering replacement parts for controls, include the following information:

- The part number(s) (XXXX-XXXX) that is on the enclosure nameplate
- The unit serial number, which is also on the nameplate

Engineering Services

Woodward offers various Engineering Services for our products. For these services, you can contact us by telephone, by email, or through the Woodward website.

- Technical Support
- Product Training
- Field Service

Technical Support is available from your equipment system supplier, your local Full-Service Distributor, or from many of Woodward's worldwide locations, depending upon the product and application. This service can assist you with technical questions or problem solving during the normal business hours of the Woodward location you contact. Emergency assistance is also available during non-business hours by phoning Woodward and stating the urgency of your problem.

Product Training is available as standard classes at many of our worldwide locations. We also offer customized classes, which can be tailored to your needs and can be held at one of our locations or at your site. This training, conducted by experienced personnel, will ensure that you will be able to maintain system reliability and availability.

Field Service engineering on-site support is available, depending on the product and location, from many of our worldwide locations or from one of our Full-Service Distributors. Field engineers are experienced with Woodward products and much of the non-Woodward equipment with which our products interface.

For information on these services, please contact one of the Full-Service Distributors listed at: **https://www.woodward.com/en/support/industrial/service-and-spare-parts/find-a-local-partner**

Contacting Woodward's Support Organization

For the name of your nearest Woodward Full-Service Distributor or service facility, please consult our worldwide directory at **https://www.woodward.com/support**, which also contains the most current product support and contact information.

You can also contact the Woodward Customer Service Department at one of the following Woodward facilities to obtain the address and phone number of the nearest facility at which you can receive information and service.

Products Used in Electrical Power Systems

Facility	Phone Number
Brazil	+55 (19) 3708 4800
China	+86 (512) 8818 5515
Germany	+49 (711) 78954-510
India	+91 (124) 4399500
Japan	+81 (43) 213-2191
Korea	+82 (51) 636-7080
Poland	+48 (12) 295 13 00
United States	+1 (970) 482-5811

Products Used in Engine Systems

Facility	Phone Number
Brazil	+55 (19) 3708 4800
China	+86 (512) 8818 5515
Germany	+49 (711) 78954-510
India	+91 (124) 4399500
Japan	+81 (43) 213-2191
Korea	+82 (51) 636-7080
United States	+1 (970) 482-5811

Products Used in Industrial Turbomachinery Systems

Facility	Phone Number
Brazil	+55 (19) 3708 4800
China	+86 (512) 8818 5515
India	+91 (124) 4399500
Japan	+81 (43) 213-2191
Korea	+ 82 (51) 636-7080
Poland	+48 (12) 295 13 00
United States	+1 (970) 482-5811

Technical Assistance

If you need to contact technical assistance, you will need to provide the following information. Please write it down here before contacting the Engine OEM, the Packager, a Woodward Business Partner, or the Woodward factory:

General

Your Name _____

Site Location _____

Phone Number _____

Fax Number

Prime Mover Information

Manufacturer _____

Turbine Model Number _____

Type of Fuel (gas, steam, etc.) _____

Power Output Rating _____

Application (power generation, marine, etc.) _____

Control/Governor Information

Control/Governor #1

Woodward Part Number & Rev. Letter _____

Control Description or Governor Type _____

Serial Number

Control/Governor #2

Woodward Part Number & Rev. Letter _____

Control Description or Governor Type _____

Serial Number

Control/Governor #3

Woodward Part Number & Rev. Letter _____

Control Description or Governor Type _____

Serial Number

Symptoms

Description _____

_____

If you have an electronic or programmable control, please have the adjustment setting positions or the menu settings written down and with you at the time of the call.

Revision History

Revision C—

- Updated EU DoC

Revision B—

- Removed CE line from Pressure Equipment Directive
- Added new warning box to Chapter 4
- Updated DoC

Revision A—

- Revised PED and ATEX Directives in the Regulatory Compliance section
- Replaced Declarations

Declarations

EU DECLARATION OF CONFORMITY

EU DoC No.:	00454-04-EU-02-02
Manufacturer's Name:	WOODWARD INC.
Manufacturer's Contact Address:	1041 Woodward Way Fort Collins, CO 80524 USA
Model Name(s)/Number(s):	LXM – Liquid Mixing Manifold
The object of the declaration described above is in conformity with the following relevant Union harmonization legislation:	Directive 2014/68/EU on the harmonisation of the laws of the Member States relating to the making available on the market of pressure equipment PED Category II
Applicable Standards:	ASME B31.1 Pressure Piping, 2007 ASME Boiler and Pressure Vessel Code VIII, Div. 2, 2007 ASME Boiler and Pressure Vessel Code II, Part D, 2007
Conformity Assessment:	PED Module H – Full Quality Assurance CE-0062-PED-H-WDI 001-22-USA Bureau Veritas SAS (0062) Tour ALTO, 4 Place des Saisons, 92400 COURBEVOIE, FRANCE

This declaration of conformity is issued under the sole responsibility of the manufacturer
We, the undersigned, hereby declare that the equipment specified above conforms to the above Directive(s).

MANUFACTURER

Annette Lynch
Signature

Annette Lynch
Full Name

Engineering Manager
Position

Woodward, Fort Collins, CO, USA
Place

25 August 2023
Date

5-09-1183 Rev 39

DECLARATION OF INCORPORATION
Of Partly Completed Machinery
2006/42/EC

File name:	00454-04-EU-02-01
Manufacturer's Name:	WOODWARD INC.
Contact Address:	1041 Woodward Way Fort Collins, CO 80524 USA
Model Names:	LXM – Liquid Mixing Manifold
This product complies, where applicable, with the following Essential Requirements of Annex I:	1.1, 1.3, 1.5, 1.6, 1.7

The relevant technical documentation is compiled in accordance with part B of Annex VII. Woodward shall transmit relevant information if required by a reasoned request by the national authorities. The method of transmittal shall be agreed upon by the applicable parties.

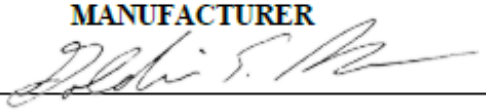
The person authorized to compile the technical documentation:

Name: Dominik Kania, Managing Director
Address: Woodward Poland Sp. z o.o., ul. Skarbowa 32, 32-005 Niepolomice, Poland

This product must not be put into service until the final machinery into which it is to be incorporated has been declared in conformity with the provisions of this Directive, where appropriate.

The undersigned hereby declares, on behalf of Woodward Inc. of Loveland and Fort Collins, Colorado that the above referenced product is in conformity with Directive 2006/42/EC as partly completed machinery:

MANUFACTURER



Signature

Dino Alves

Full Name

Director of Engineering

Position

Woodward Inc., Fort Collins, CO, USA

Place

07/06/2021

Date

Document: 5-09-1182 (rev. 16)

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Released

We appreciate your comments about the content of our publications.

Send comments to: industrial.support@woodward.com

Please reference publication 35113.

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1041 Woodward Way, Fort Collins CO 80524, USA
Phone +1 (970) 482-5811

Email and Website—www.woodward.com

Woodward has company-owned plants, subsidiaries, and branches, as well as authorized distributors and other authorized service and sales facilities throughout the world.

Complete address / phone / fax / email information for all locations is available on our website.