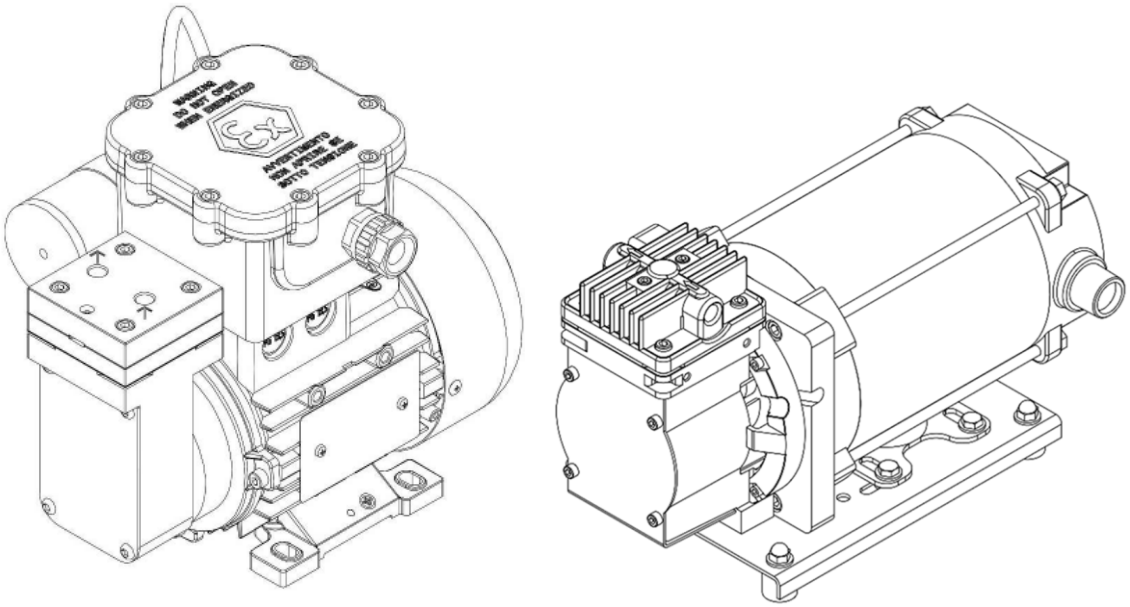
AccuLase-GPA™

Tunable Diode Laser Adsorption Spectroscopy Analyzer

External Vacuum Pump Addendum

Revision 0
January 2023



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NOTICES

All information in this manual is subject to change without notice and does not represent a commitment on the part of Galvanic Applied Sciences, Inc.

Note: Changes or modifications not expressly approved by Galvanic Applied Sciences, Inc. could void the user's authority to operate the equipment.

Purpose

This manual describes how to safely install and maintain external vacuum pumps for the AccuLase-GPA™. This includes both models J161-FP-GB2 and R221-FP-RA1.

Important

Galvanic Applied Sciences is not responsible for any deviation from this manual.

Scope

If products and components from other manufacturers are used, these must be recommended or approved by Galvanic Applied Sciences (The 'Manufacturer'). Due to design changes and product improvements, information is subject to change without notice. The Manufacturer reserves the right to change hardware and software design at any time, which may subsequently affect the contents of this manual. The Manufacturer assumes no responsibility for any errors that may appear in this manual. The Manufacturer will make every reasonable effort to ensure that the manual is up to date and corresponds with your AccuLase-GPA™.

Users

The vacuum pumps described in this manual are intended for use by trained personnel. Trained personnel are those who, based on their training and experience, are capable of identifying risks and avoiding potential hazards when working with the AccuLase-GPA™. For start-up or technical assistance contact:

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Safety Symbols used in Manual

The danger symbol indicates a hazardous situation that, if not avoided will result in death or serious injury.

The Warning symbol indicates a hazardous situation that, if not avoided could result in death or serious injury.

The Caution symbol with the safety alert symbol indicates a hazardous situation that, if not avoided could result in minor or moderate injury, and/or damage to the analyzer system

The Notice symbol is used to highlight information that will optimize the use and reliability of the system.

Important Safety Guidelines for the AccuLase-GPA™

Please read the following warnings and cautions carefully before using the AccuLase-GPA™.

⚠WARNING THIS EQUIPMENT MUST BE USED AS SPECIFIED BY THE MANUFACTURER OR OVERALL SAFETY WILL BE IMPAIRED.

⚠WARNING INSTALLATION, MAINTENANCE AND REPAIR TO THIS EQUIPMENT IS LIMITED TO AUTHORIZED, TRAINED PERSONNEL ONLY.

⚠WARNING USE OF UNAUTHORIZED PARTS MAY IMPAIR SUITABILITY FOR EXPLOSIVE OR HAZARDOUS LOCATIONS.

⚠WARNING OBSERVE ALL WARNING LABELS ON THE ANALYZER ENCLOSURES, AS WELL AS ON RELATED CONTAINERS AND CHEMICALS.

⚠WARNING THIS MANUAL SHOULD BE FULLY REVIEWED PRIOR TO OPERATION OF THE ANALYZER.

External vacuum pumps are powered by a source separate from the one (s) used to power the analyzer system. Disconnecting the main power source may not remove power from the vacuum pump.

Any safety recommendations or comments contained herein are suggested guidelines only. Galvanic Applied Sciences Inc. bears no responsibility and assumes no liability for the use and/or implementation of these suggested procedures.

This system, when operating in its normal mode, and/or when it is being serviced, maintained, installed and commissioned contains items which may be hazardous to humans if handled or operated incorrectly or negligently.

The AccuLase-GPA™ can be configured to be safely operated in a CSA hazardous areas Class 1, Div. 2, Groups B, C. D (D2 Model), a Class 1, Div. 1, Groups B, C, D (D1 model) or ATEX/IECEx zones II 2G IIB+H2 or II 3G IIB+H2.

Manufacturer's Warranty Statement

Galvanic Applied Sciences Inc. ("Seller") warrants that its products will be free from defects in materials and workmanship under normal use and service in general process conditions for 12 months from the date of Product start-up or 18 months from the date of shipping from Seller's production facility, whichever comes first (the "Warranty Period"). Products purchased by Seller from a third party for resale to Buyer ("Resale Products") shall carry only the warranty extended by the original manufacturer. Buyer agrees that Seller has no liability for Resale Products beyond making a reasonable commercial effort to arrange for procurement and shipping of the Resale Products. Buyer must give Seller notice of any warranty claim prior to the end of the Warranty Period. Seller shall not be responsible for any defects (including latent defects) which are reported to Seller after the end of the Warranty Period.

THIS WARRANTY AND ITS REMEDIES ARE IN LIEU OF ALL OTHER WARRANTIES OR CONDITIONS EXPRESSED OR IMPLIED, ORAL OR WRITTEN, EITHER IN FACT OR BY OPERATION OF LAW, STATUTORY OR OTHERWISE, INCLUDING BUT NOT LIMITED TO, WARRANTIES OR CONDITIONS OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, WHICH SELLER SPECIFICALLY DISCLAIMS.

Seller's obligation under this warranty shall not arise until Buyer notifies Seller of the defect. Seller's sole responsibility and Buyer's sole and exclusive remedy under this warranty is, at Seller's option, to replace or repair any defective component part of the product upon receipt of the Product at Seller's production facility, transportation charges prepaid or accept the return of the defective Product and refund the purchase price paid by Buyer for that Product. If requested by Buyer, Seller will use its best efforts to perform warranty services at Buyer's facility, as soon as reasonably practicable after notification by the Buyer of a possible defect provided that Buyer agrees to pay for travel time, mileage from the Seller's facility or travel costs to the airport / train station closest to Buyer's facility plus all other travel fees, hotel expenses and subsistence.

Except in the case of an authorized distributor or seller, authorized in writing by Seller to extend this warranty to the distributor's customers, the warranty herein applies only to the original purchaser from Seller ("Buyer") and may not be assigned, sold, or otherwise transferred to a third party. No warranty is made with respect to used, reconstructed, refurbished, or previously owned Products, which will be so marked on the sales order and will be sold "As Is".

Limitations

These warranties do not cover:

- Consumable items such as lamps.
- Analyzer components which may be damaged by exposure to contamination or fouling from the process fluid due to a process upset, improper sample extraction techniques or improper sample preparation, fluid pressures in excess of the analyzer's maximum rated pressure or fluid temperatures in excess of the analyzer's maximum rated temperature. These include but are not limited to sample filters, pressure regulators, transfer tubing, sample cells, optical components, pumps, measuring electrodes, switching solenoids, pressure sensors or any other sample wetted components.

- Loss, damage, or defects resulting from transportation to Buyer's facility, improper or inadequate maintenance by Buyer, software or interfaces supplied by Buyer, operation outside the environmental specifications for the instrument, use by unauthorized or untrained personnel or improper site maintenance or preparation.
- Products that have been altered or repaired by individuals other than Seller personnel or its duly authorized representatives, unless the alteration or repair has been performed by an authorized factory trained service technician in accordance with written procedures supplied by Seller.
- Products that have been subject to misuse, neglect, accident, or improper installation.
- The sole and exclusive warranty applicable to software and firmware products provided by Seller for use with a processor internal or external to the Product will be as follows: Seller warrants that such software and firmware will conform to Seller's program manuals or other publicly available documentation made available by Seller current at the time of shipment to Buyer when properly installed on that processor, provided however that Seller does not warrant the operation of the processor or software or firmware will be uninterrupted or error-free.

The warranty herein applies only to Products within the agreed country of original end destination. Products transferred outside the country of original end destination, either by the Seller at the direction of the Buyer or by Buyer's actions subsequent to delivery, may be subject to additional charges prior to warranty repair or replacement of such Products based on the actual location of such Products and Seller's warranty and/or service surcharges for such location(s).

Repaired Products

Repaired products are warranted for 90 days with the above exceptions.

Limitation of Remedy and Liability

IN NO EVENT SHALL SELLER BE LIABLE TO BUYER FOR ANY INDIRECT, CONSEQUENTIAL, INCIDENTAL, SPECIAL OR PUNITIVE DAMAGES, OR FOR ANY LOSS OF USE OR PRODUCTION, OR ANY LOSS OF DATA, PROFITS OR REVENUES, OR ANY CLAIMS RAISED BY CUSTOMERS OF BUYER OR ANY ENVIRONMENTAL DAMAGE OR ANY FINES IMPOSED ON BUYER BY ANY GOVERNMENTAL OR REGULATORY AUTHORITIES, WHETHER SUCH DAMAGES ARE DIRECT OR INDIRECT, AND REGARDLESS OF THE FORM OF ACTION (WHETHER FOR BREACH OF CONTRACT OR WARRANTY OR IN TORT OR STRICT LIABILITY) AND WHETHER ADVISED OF THE POSSIBILITY OF SUCH DAMAGES OR NOT.

Section 1 AccuLase-GPA™ Vacuum Pump

1.1 Overview

These vacuum pumps are intended for use with gases only, do not use this product for liquids. For applications where liquid may be present in the gas stream, mount the pump so that the discharge port faces toward the ground. Mounting the pump at the highest point in the system will prevent liquid from collecting in the pump head. An elevated head pump may be required to maintain the gas temperature through the head.

⚠CAUTION VACUUM PUMPS ARE INTENDED FOR USE WITH GASES ONLY, DO NOT USE THIS PRODUCT FOR LIQUIDS.

1.2 Vacuum Pump Features

General

- Pump operation protected by thermal switch with auto restart
- No oiling or lubrication

Model J161-FP-GB2

- ATEX/IECEx certified Ex db IIC T4
- IP66

Model R221-FP-RA1

- CSA/UL certified Class I, Div I BCD
- 0.124 kW motor (1/6 HP)
- IP54

1.3 Electrical Ratings

Supply Voltage			
	Voltage (Volts)	Phase	Frequency (Hz)
J161-FP-GB2	115/230 AC	1	50/60
R221-FP-RA1	115/230 AC	1	50/60

Running amps are provided on the pump nameplate.

1.4 Location and Ambient Temperature

The pump is suitable for either indoor or outdoor installation without additional protection.

J161-FP-GB2 – Ambient temperature of this pump should not exceed 50°C (122°F).

R221-FP-RA1 – Ambient temperature of this pump should not exceed 60°C (140°F).

⚠WARNING THE PUMP HOUSING IS MADE OF ALUMINUM WHICH IS SUSCEPTIBLE TO SPARK CREATION WHEN STRUCK BY OBJECTS MADE OF STEEL. TOOLS AND OTHER OBJECTS USED AROUND THE PUMP SHOULD BE SELECTED IN SUCH A MANNER AS TO ELIMINATE THIS POSSIBLE IGNITION SOURCE.

1.5 Installation and Mounting

The vacuum pump must be installed according to local electrical safety regulations. The supply voltage must not vary more than ± 10% of the voltage shown on the motor plate.

The vacuum pump can be mounted in any position. If the housing needs to be rotated for mounting purposes, please notify your Galvanic Service Representative. The pump head can be mounted in any position and the gas will always flow in the direction of the arrows.

If the pump is to be mounted vertically, the motor must be positioned above the pump.

It is recommended that the pump be either hard mounted to a secure surface or isolators used to minimize vibrations.

The pump/motor assembly must be properly grounded.

1.6 Dimensions and Weight

Pump Dimensions				
	Height (mm)	Width (mm)	Depth (mm)	Weight (kg)
J161-FP-GB2	205	183	240	7.3
R221-FP-RA1	205	187	340	4.3

1.7 Pump Performance Ratings (at 60hz)

Pump Performance Ratings				
	Inlet Pressure (psig)	Ultimate Vacuum (inHg)	Max. Outlet Pressure (psig)	Min. Open Flow Rate (LPM)
J161-FP-GB2	0	23.5	35	13
R221-FP-RA1	0	23	46	26

⚠WARNING ENSURE THAT ALL SYSTEM COMPONENTS CONNECTED TO THE OUTLET OF THE VACUUM PUMP ARE CAPABLE OF HANDLING THE MAXIMUM PRESSURE OF THE PUMP.

NOTICE PUMPS POWERED AT 50HZ HAVE A 17% LOWER MINIMUM OPEN FLOW RATE.

Section 2 Maintenance and Repair

2.1 Maintaining the Vacuum Pump Diaphragm, Plates and Seals

Some models of the AccuLase-GPA may have an external vacuum pump. If you do not know if your AccuLase-GPA™ has an external vacuum pump, please contact your Galvanic Service representative. For internal vacuum pumps, please refer to the AccuLase-GPA Operation and Maintenance Manual.

The diaphragm, valve discs, sealing washer, and gasket are the only consumable parts of the pump. The degree of usage and condition of operating temperatures or pressure will determine the rate of replacement of part or parts. For heavy loads (25 ‑ 75 PSI) and constant operation the diaphragm should be inspected at least every 4 - 6 months. For lighter loads (0 ‑ 15 PSI or up to maximum vacuum) or pumps with reduced eccentric the diaphragm may operate successfully for a year or more. The corrosive content of the gas media being pumped can affect the recommended inspection and replacement cycle of the diaphragm.

NOTICE WHERE CRITICAL PROCESSES MAY INVOLVE THE PUMPING OF CORROSIVE OR TOXIC GAS MEDIA, IT IS RECOMMENDED THAT A MONTHLY CHECK OF THE DIAPHRAGM BE PART OF A SCHEDULED MAINTENANCE PROCEDURE.

Diaphragm Material Temperature Rating		
	Teflon/Viton	205°C (400°F)
	Viton	205°C (400°F)
	2-ply Teflon	205°C (400°F)
	3-ply Teflon	205°C (400°F)

2.1.1 List of Materials Required

The following list of materials is required to complete the pump maintenance:

- Replacement diaphragm, plates and seals set
- Flat-head screwdriver
- Allen wrench set
- Clean dry cloth
- Shop air or compressed air (if available)
- A clean workspace

2.1.2 Preparatory Steps

1. Disconnect the vacuum pump from the source of electrical power and isolate it from the AccuLase-GPA analyser.

2. The vacuum pump may be hot; allow time for it to cool before handling.

3. Make note of any fittings and screws used to attach and connect the vacuum pump to the analyzer in order to reconnect and reattach them correctly when maintenance is complete. Refer to Figure 2-1 and Figure 2-2 for pump disassembly.

4. Remove the vacuum pump to a clean workspace for maintenance.

2.1.3 Head Section and Diaphragm Disassembly

1. Prior to disassembly, make note of the orientation and position of the individual parts as they are removed. This will ensure they are reassembled correctly after maintenance is complete. Refer to Figure 2-1 and Figure 2-2 for pump disassembly.

2. Remove head assembly by unscrewing the four head bolts. A flat‐bladed screw driver may be needed to gently pry the head free of the service diaphragm.

3. The valve body can then be removed by unscrewing the two smaller screws (also accessible on the top of the head section). This part may be freed by gently tapping on these two screws after they have been loosened about three or four turns.

4. When the valve body is removed, check all internal surfaces for any accumulation of dirt. The two valve discs can be wiped clean and replaced as long as they appear unaffected by usage.

5. The valve gasket can be easily removed and should be inspected. The valve discs and valve gasket should be replaced during any routine maintenance check of the head section. A once-a-year routine procedure is recommended at minimum.

6. Unfasten the screw using an Allen wrench and remove the diaphragm.

7. To reattach diaphragm, first insert the diaphragm plate screw through the Teflon® washer, then through the diaphragm plate, then finally through the diaphragm.

8. Next apply a drop of a medium strength thread locker (such as Loctite®242) to the screw. Tighten the diaphragm plate screw into the connecting rod bolt. It is important that when reassembling your pump you follow the torquing specifications listed in Figure 2-1 or Figure 2-2.

⚠CAUTION FAILURE TO USE A THREAD LOCKER MAY RESULT IN THE DIAPHRAGM PLATE SCREW BACKING OUT, RESULTING IN DAMAGE TO THE PUMP.

NOTICE A SHORT BOLT FOR GROUND CONNECTION BETWEEN THE HEAD AND VALVE BODY MAY BE REQUIRED ON YOUR PUMP. DO NOT USE THREAD LOCKER ON THIS SCREW AND HAND TIGHTEN.

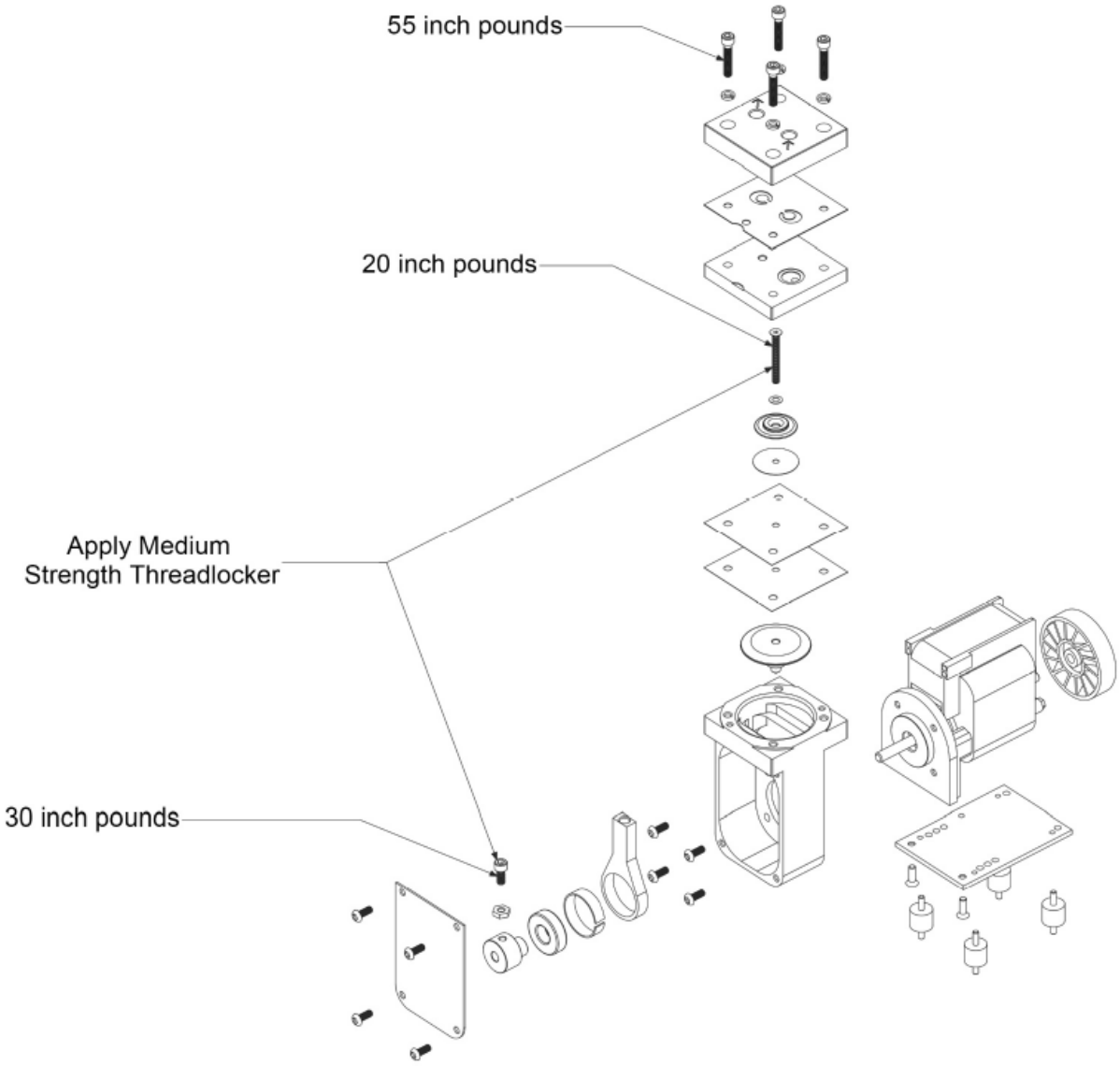

Figure 2-1: J161-FP-GB2 Bolt Torque Diagram

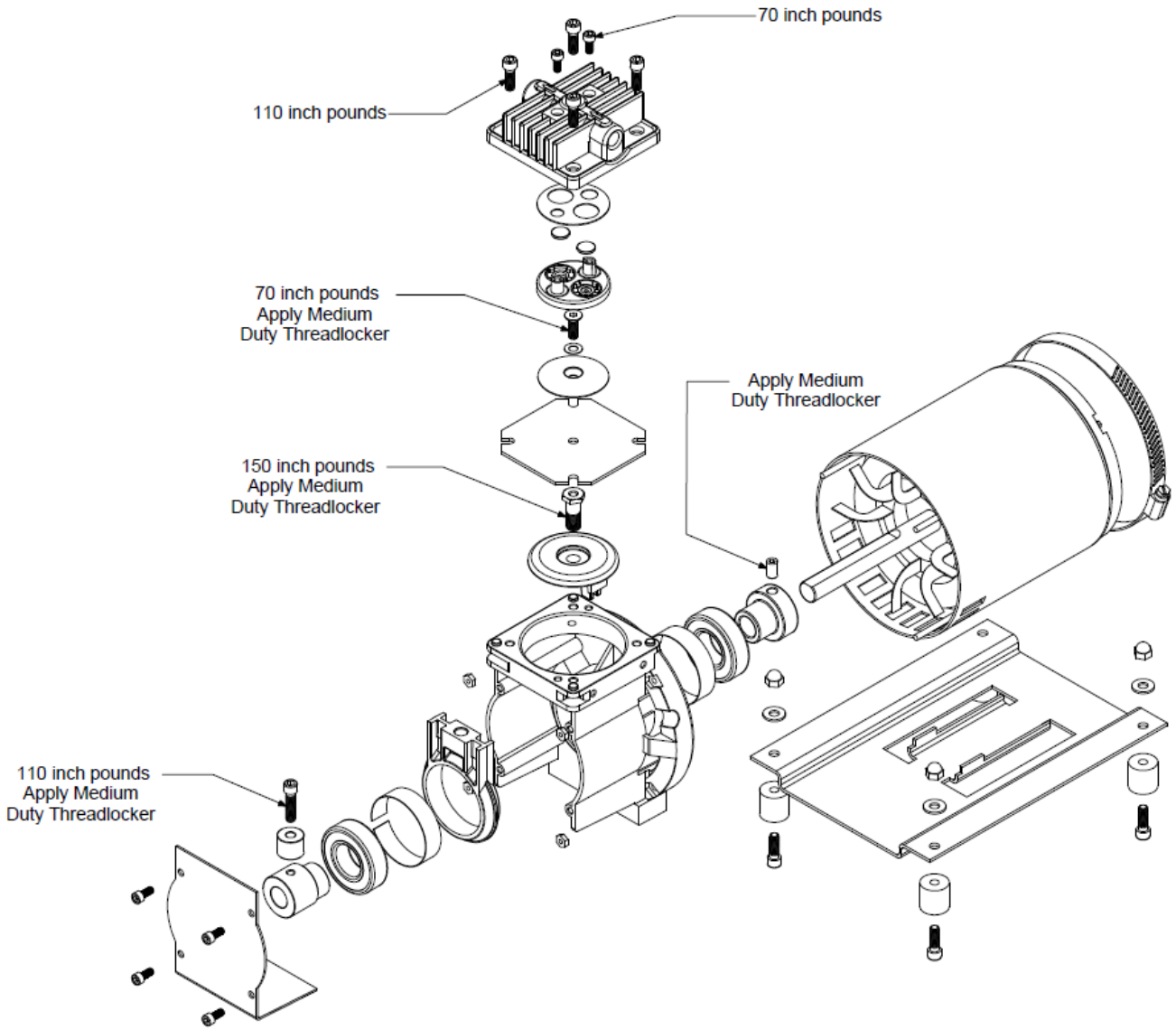

Figure 2-2: R221-FP-RA1 Bolt Torque Diagram

Section 3 Troubleshooting

3.1 Pump draws excessively high current

Solution 3.1A – Motor is overloaded:

- Turn off pump
- Remove all pressure and vacuum conditions
- Restart and test at atmospheric pressure

Solution 3.1B – Power input is incorrect

- Confirm wiring is correct for the rated power
- Check power mains against pump electrical rating

3.2 Little or no flow is being produced

Solution 3.2A – Connections or lines are blocked

- Remove blockage

Solution 3.2B – Liquid or foreign debris has collected in the head

- Clean out the pump head
- Place pump outlet facing downward

Solution 3.2C – Diaphragms or valve gaskets are worn

- Inspect and clean or replace parts as necessary

3.3 Pump is rattling or knocking

Solution 3.3 – Assembly screws are under torqued

- See Section 2 for proper screw torquing

3.4 Pump is hot or warm

Solution 3.4A – Warm temperatures are part of normal operation.

- No action required

Solution 3.4B – Vacuum pump has overheated

- The vacuum pump is protected by a thermal switch and will restart automatically once cooled down.
- The thermal switch may be connected to a contactor or relay that will required to be reset manually

Section 4 Spare Parts

⚠WARNING SUBSTITUTION OF ANY COMPONENT WITH UNAUTHORIZED PARTS MAY IMPAIR SUITABILITY OF EQUIPMENT FOR HAZARDOUS LOCATIONS

Part Number	Description
123-5X6	Membrane Filter
123-500	O-ring for Membrane Filter
5267T32	Laser Cell O-ring, Viton
BA2286	110-240 VAC Laser Enclosure Heater (D1 model only)
BA2958	Solenoid Valve 12 VDC
BA3206	230 VAC Laser Enclosure Heater (Z2 model only)
BA7442	110-240 VAC Laser Enclosure Heater (Z1 model only)
CPA 200 T3 100	120 or 240 VAC Laser Enclosure Heater (D2 model only)
J161-FP-GB2	ATEX/IECEx External Vacuum Pump (Z1 and Z2 models)
R221-FP-RA1	CSA/UL External Vacuum Pump (D1 and D2 models)
MC3200	Laser Protector Sleeve (must be ordered with AF3065 if original AF3175 installed)
MPU4673-N838	Internal Vacuum Pump (D1 and D2 models)
PT3042	IO Peripheral Board
PT3044	USB to Serial Expansion Card
PT3048	UCII Controller Board
PT3050	UCII Display Board
RK3140	Internal Vacuum Pump Diaphragm Kit
SA2992	IECEx Remote Keypad and Connector (Z1 model only)
SA3147	Remote Keypad and Connector (D1, D2 and Z2 models)
0001.2709.11	5x20 Ceramic Fuse 3.15A Time Lag
0001.2711.11	5x20 Ceramic Fuse 5A Time Lag
	Diaphragm repair kit – Teflon/Viton (J161-FP-GB2) (ADI 11706)
	Diaphragm repair kit – Viton (R221-FP-RA1) (ADI 11007)
	Diaphragm repair kit – 2-Ply Teflon (J161-FP-GB2) (ADI 11711)
	Diaphragm repair kit – 3-Ply Teflon (R221-FP-RA1) (ADI 11011)