



UFM-ST Hardware Manual

Revision: 1.03.00



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EU Declaration of Conformity

Manufacturer Aerotech, Inc.
Address 101 Zeta Drive
Pittsburgh, PA 15238-2811
USA
Product UFM-ST
Model/Types All

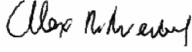
This is to certify that the aforementioned product is in accordance with the applicable requirements of the following Directive(s):

2014/35/EU	Low Voltage Directive
2011/65/EU	RoHS 2 Directive

and has been designed to be in conformity with the applicable requirements of the following Standard(s) when installed and used in accordance with the manufacturer's supplied installation instructions.

EN 61010-1:2010	Safety Requirements for Electrical Equipment
-----------------	--

Authorized Representative: Simon Smith, European Director
Address: Aerotech Ltd
The Old Brick Kiln, Ramsdell, Tadley
Hampshire RG26 5PR
UK

Name  / Alex Weibel
Position Engineer Verifying Compliance
Location Pittsburgh, PA
Date 1/18/2019



Agency Approvals

Aerotech, Inc. Model UFM-ST Filter Modules have been tested and found to be in accordance to the following listed Agency Approvals:

Approval / Certification:	CUS NRTL
Approving Agency:	TUV SUD America Inc.
Certificate #:	U8V 13 12 68995 014
Standards:	CAN/CSA-C22.2 No. 61010-1:2012; UL 61010-1:2012

Visit <https://www.tuev-sued.de/product-testing/certificates> to view Aerotech's TÜV SÜD certificates. Type the certificate number listed above in the search bar or type "Aerotech" for a list of all Aerotech certificates.

Chapter 1: Introduction

Aerotech's UFM (Universal Filter Module) is used to reduce conducted line noise generated by switching servo amplifiers. The UFM-ST is for customers requiring compliance with the CE EMC directives and provides RFI filtering and surge suppression. See the Declaration of Conformity within the individual products hardware manual for applicability.



Figure 1-1: UFM-ST

1.1. Electrical Specifications

The specifications for the are indicated in the table below.

Table 1-1: UFM-ST Filter Specifications

Specification	Value
Input Voltage Range	0-240 VAC
Output Voltage Range	0-240 VAC
Maximum Continuous Current	8 A _{rms} with convection cooling 10 A _{rms} with forced air cooling
Frequency	50/60 Hz
Phases	Single Phase
Leakage Current	1.1 mA (max)
Fuse Protection	Internal 10 A fuses on AC1 and AC2 inputs

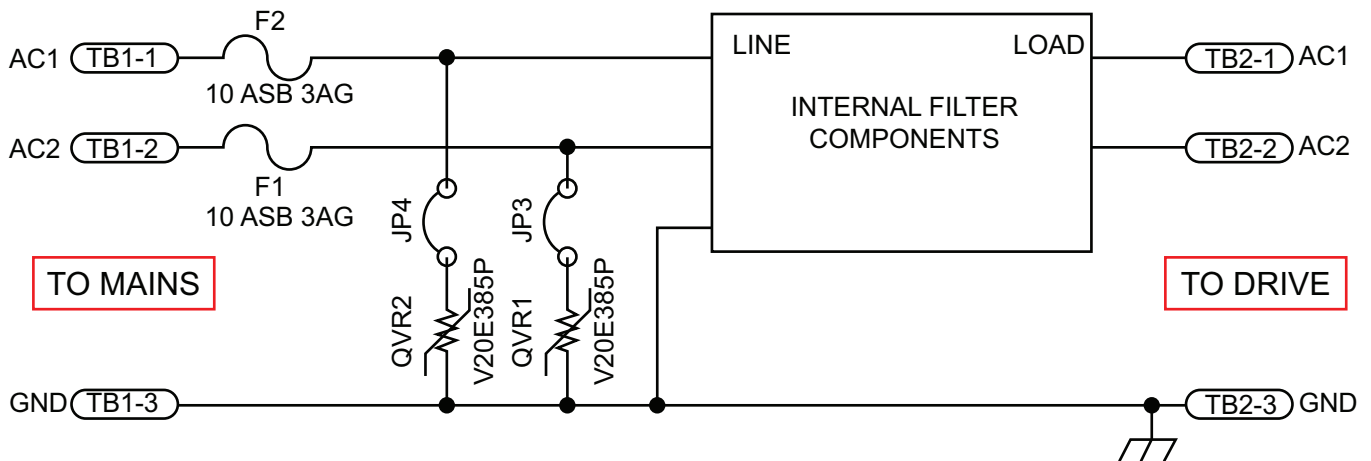


Figure 1-2: AC Line Filter Functional Diagram

Table 1-2: TB1 and TB2 Mating Connector

Type	Aerotech P/N	Phoenix P/N	Screw Torque Value: Nm	Wire Size: mm ² [AWG]
3-Pin Terminal Block	ECK00213	1754465	0.5 - 0.6	3.3 - 0.516 [12-30]

1.2. Environmental Specifications

The environmental specifications for the UFM-ST are listed below.

Ambient Temperature	Operating: 5° to 40°C (41° to 104° F)
	Storage: -20° to 70°C (-4° to 158° F)
Convection Cooling	Convection cooling can be used for operating currents up to 8 A _{rms}
Forced-Air Cooling	Forced-air cooling of 50 LFM at 10 CFM is required for operating currents above 8 A _{rms}
Humidity	Maximum relative humidity is 80% for temperatures up to 31°C. Decreasing linearly to 50% relative humidity at 40°C. Non condensing.
Altitude	Up to 2000 meters.
Pollution	Pollution degree 2 (normally only non-conductive pollution).
Use	Indoor use only.

1.3. Mechanical Specifications

Line filters should be located as close to the drive as possible with the case connected through a low impedance connection to earth ground for maximum effectiveness. The unit should be mounted to earth ground, where possible, with M4 (#8) mounting hardware.

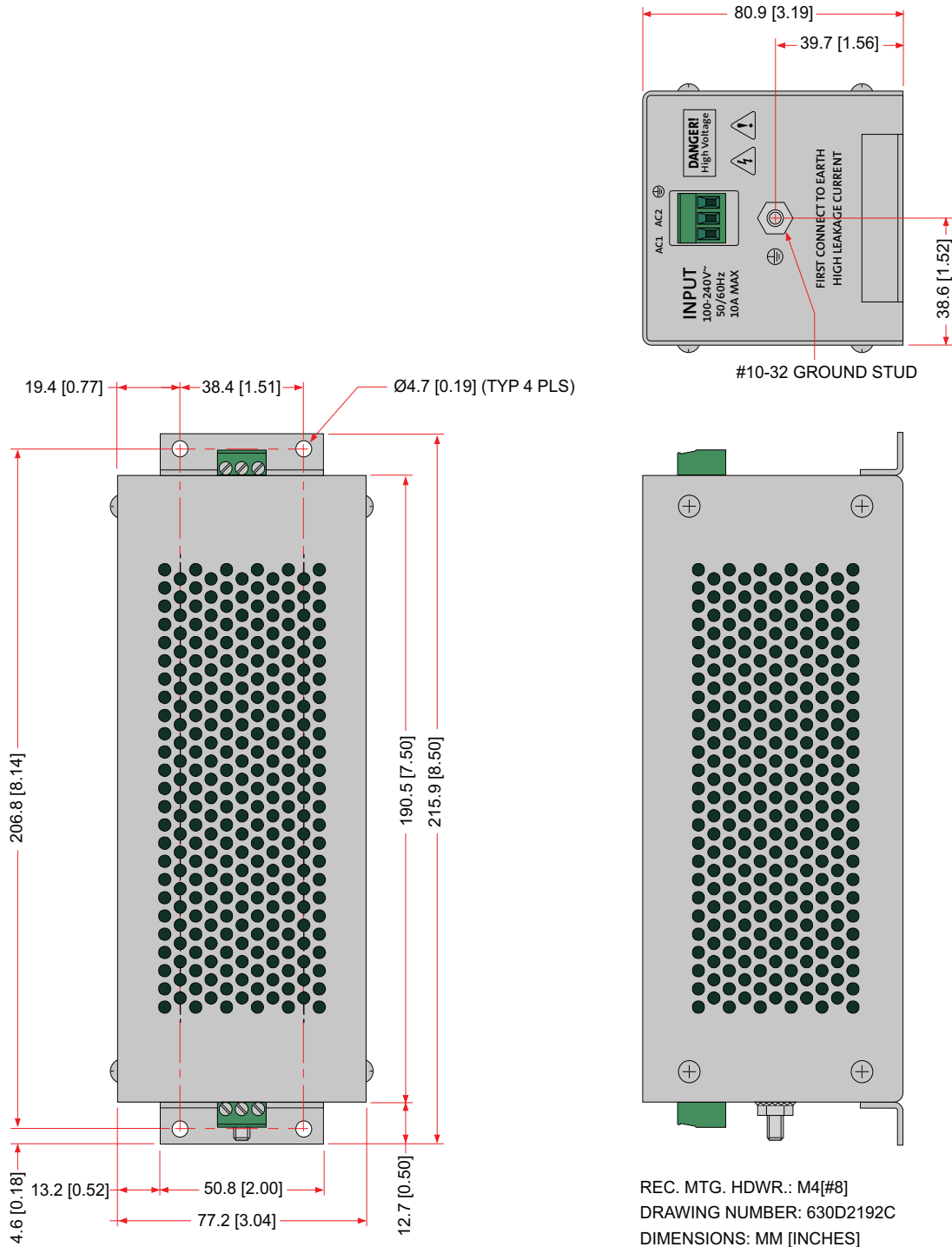


Figure 1-3: UFM-ST Dimensions

Chapter 2: Installation

This section provides information concerning the installation and wiring of the UFM-ST filter. Wiring information includes wire size and insulation requirements. Refer to other product documentation for additional installation requirements.

2.1. Safety Procedures and Warnings

This manual tells you how to carefully and correctly use and operate the UFM-ST. Read all parts of this manual before you install or operate the UFM-ST or before you do maintenance to your system. To prevent injury to you and damage to the equipment, obey the precautions in this manual. The precautions that follow apply when you see a Danger or Warning symbol in this manual. If you do not obey these precautions, injury to you or damage to the equipment can occur. If you do not understand the information in this manual, contact Aerotech Global Technical Support

This product has been designed for light industrial manufacturing or laboratory environments. The protection provided by the equipment could be impaired if the product is used in a manner not specified by the manufacturer.



DANGER: This product contains potentially lethal voltages. To reduce the possibility of electrical shock, bodily injury, or death the following precautions must be followed.

1. Disconnect electrical power before servicing equipment.
2. Disconnect electrical power before performing any wiring.
3. Access to the UFM-ST and component parts must be restricted while connected to a power source.
4. To minimize the possibility of electrical shock and bodily injury, extreme care must be exercised when any electrical circuits are in use. Suitable precautions and protection must be provided to warn and prevent persons from making contact with live circuits.
5. Do not connect or disconnect any electrical components or connecting cables while connected to a power source.
6. All components must be properly grounded in accordance with local electrical safety requirements.
7. Operator safeguarding requirements must be addressed during final integration of the product.



WARNING: To minimize the possibility of electrical shock, bodily injury or death the following precautions must be followed.

1. If the product is used in a manner not specified by the manufacturer, the protection provided by the product can be impaired and result in damage, shock, injury, or death.
2. Moving parts can cause crushing or shearing injuries. Access to all stage and motor parts must be restricted while connected to a power source.
3. Cables can pose a tripping hazard. Securely mount and position all system cables to avoid potential hazards.
4. Do not expose this product to environments or conditions outside of the listed specifications. Exceeding environmental or operating specifications can cause damage to the equipment.
5. Operators must be trained before operating this equipment.
6. All service and maintenance must be performed by qualified personnel.

2.2. AC Input/Output Power Wiring

The UFM-ST has two AC connectors; an Input connector (AC Mains) and an Output connector (Load). Each of these connectors also has a ground terminal.



WARNING: The System Integrator or end user is responsible for determining and meeting all safety and compliance requirements necessary to integrate the UFM-ST into the final application.

2.2.1. AC Input Power Wiring

The UFM-ST three-terminal input connector (Figure 2-1) is the AC power (Mains) connector. The AC1 and AC2 terminals are the AC power lines (Internally fused at 10 Amps). The Ground terminal is connected internally to the external Ground Stud and must be connected to Ground.

Wiring to the UFM-ST filter must use #16 AWG wires or larger and have an insulation rating of at least 300 V.



DANGER: Ground connection must be connected to ground to minimize possibility of electrical shock hazard.

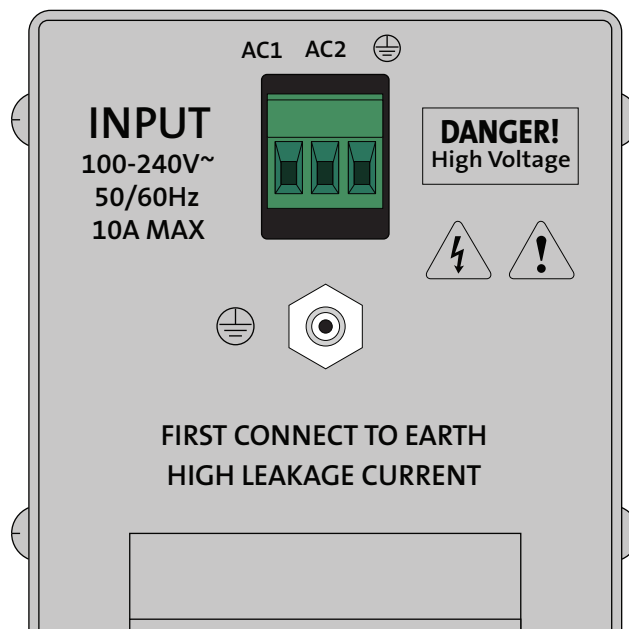


Figure 2-1: AC Input Connections

2.2.2. AC Output Power Wiring

The UFM-ST three-terminal output connector (Figure 2-2) is the filter AC output (load) connector. Terminals AC1 and AC2 are the AC power connections and are wired to the equipment being filtered. The Ground terminal (connected internally to the Input ground and the external Ground Stud) and is typically connected to the ground of the equipment being supplied by this filter.

Wiring to the UFM-ST filter must use #16 AWG wires or larger and have an insulation rating of at least 300 V.

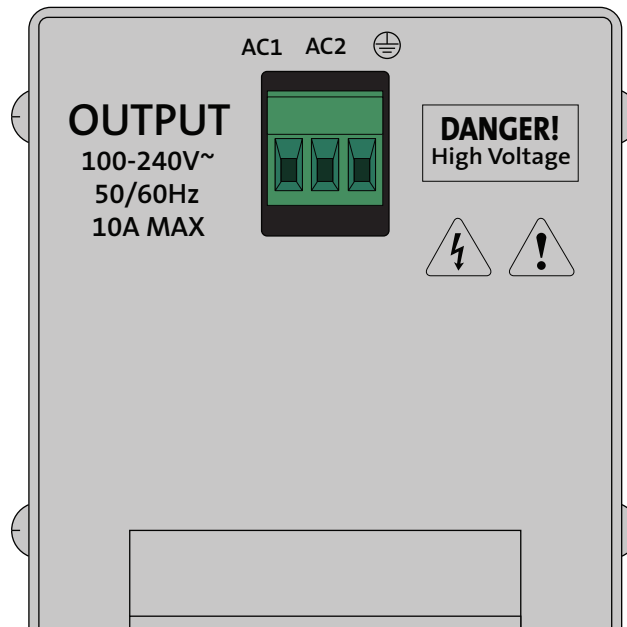


Figure 2-2: AC Output Connections

2.3. Forced-Air Cooling

The UFM-ST filter requires additional cooling for operation above $8 A_{rms}$. Air flow must be directed into the ventilation holes on the UFM-ST filter case. Sufficient cooling is being provided if the UFM-ST case temperature is less than 45°C during all operation conditions.

Chapter 3: Maintenance



DANGER: Always disconnect the Mains power connection before opening the UFM-ST chassis.



DANGER: Before performing any tests, be aware of lethal voltages inside the controller and at the input and output power connections. A qualified service technician or electrician should perform these tests.

3.1. Troubleshooting

This section lists some symptoms and causes for problems that may be encountered with the UFM-ST filter.

Table 3-1: Troubleshooting

Symptom	Possible Cause and Solution
No voltage output	<ol style="list-style-type: none"> 1. Verify AC input voltage is present at AC1 & AC2. 2. Check for blown fuse inside UFM-ST filter. Fuse can be checked by making continuity check between Input & Output connectors. Resistance between AC inputs and outputs is less than 1 OHM. There should be no continuity between AC1, AC2, and Ground.
UFM-ST filter blows fuses	<ol style="list-style-type: none"> 1. Check UFM-ST output wiring for shorts. 2. Verify that UFM-ST load is not exceeding 10 Amps.
Fails Hi-pot test	The UFM-ST filter contains MOV's that will cause a Hi-pot failure and could be damaged by Hi-pot testing. Contact Aerotech concerning Hi-pot testing the UFM-ST filter.



DANGER: To minimize the possibility of electrical shock and bodily injury or death, disconnect power (Mains disconnect) before servicing equipment.

3.2. AC Line Filter PCB

The UFM-ST Filter contains the Aerotech AC Line Filter PCB. The AC Line Filter PCB contains various filter components, transient suppressors, and the 10 A AC line fuses (F1 & F2) on the standard version of the UFM-ST filter.

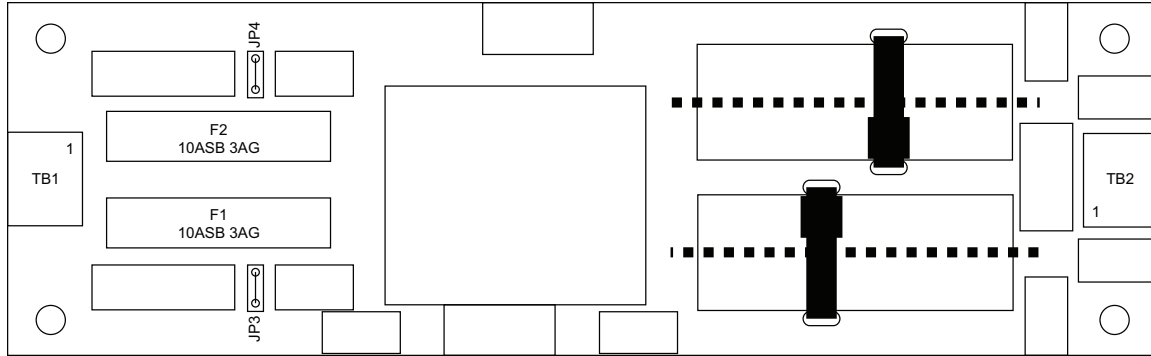


Figure 3-1: AC Line Filter PCB Assembly



DANGER: To minimize the possibility of electrical shock and bodily injury or death, disconnect power (Mains disconnect) before servicing equipment.



DANGER: Always disconnect the Mains power connection before opening the UFM-ST chassis.

3.3. Fuse Replacement

Table 3-2 provides fuse information for the UFM-ST Filter.

Table 3-2: UFM-ST Fuse Replacement Specifications

Function/Location	Fuse Rating	Manufacturer P/N	Aerotech P/N
AC Input (AC1 & AC2) / F1 & F2 on AC Line Filter PCB	10 A, 250 V (Standard)	Littelfuse, 326010P or Bussmann, MDA-10-R	EIF00117

NOTE: See your System Documentation for additional and alternative fuse requirements.



DANGER: To minimize the possibility of electrical shock and bodily injury or death, disconnect power (Mains disconnect) before servicing equipment.



DANGER: Always disconnect the Mains power connection before opening the UFM-ST chassis.

3.4. Preventative Maintenance

While the UFM-ST filter normally does not require any maintenance it is recommended that the filter and associated wiring be inspected at least once a year. [Table 3-3](#) lists some recommended checks that should be made during these inspections.

Table 3-3: Preventative Maintenance

Check	Action To Be Taken
Visually check filter for loose or damaged parts / hardware. Note: Internal inspection is not required unless internal contamination or damage is suspected.	Parts and hardware should be repaired or replaced.
Check for fluids or electrically conductive material on or around filter.	Remove and cleanup any fluids or conductive Material from filter. Fluids and conductive material must not be allowed to enter filter.
Visually inspect all wires and connectors.	Tighten or re-secure any loose connections. Replace or repair damaged or frayed wires.



DANGER: To minimize the possibility of electrical shock and bodily injury or death, disconnect power (Mains disconnect) before servicing equipment.



DANGER: Always disconnect the Mains power connection before opening the UFM-ST chassis.

3.4.1. Cleaning

The UFM-ST filter box can be wiped with a clean, dry, soft cloth. The cloth may be slightly moistened if required with water or isopropyl alcohol to aid in cleaning if necessary. In this case, be careful not to allow moisture to enter the filter or onto exposed connectors / components. Fluids and sprays are not recommended because of the possibility of internal contamination, which may result in electrical shorts and/or corrosion. The electrical power must be disconnected from the filter while cleaning. Do not allow cleaning substances or other fluids to enter the filter or to get on to any of the connectors. Avoid cleaning the labels to prevent removing the label information.



DANGER: To minimize the possibility of electrical shock and bodily injury or death, disconnect power (Mains disconnect) before servicing equipment.

Appendix A: Warranty and Field Service

Aerotech, Inc. warrants its products to be free from harmful defects caused by faulty materials or poor workmanship for a minimum period of one year from date of shipment from Aerotech. Aerotech's liability is limited to replacing, repairing or issuing credit, at its option, for any products that are returned by the original purchaser during the warranty period. Aerotech makes no warranty that its products are fit for the use or purpose to which they may be put by the buyer, whether or not such use or purpose has been disclosed to Aerotech in specifications or drawings previously or subsequently provided, or whether or not Aerotech's products are specifically designed and/or manufactured for buyer's use or purpose. Aerotech's liability on any claim for loss or damage arising out of the sale, resale, or use of any of its products shall in no event exceed the selling price of the unit.

THE EXPRESS WARRANTY SET FORTH HEREIN IS IN LIEU OF AND EXCLUDES ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, BY OPERATION OF LAW OR OTHERWISE. IN NO EVENT SHALL AEROTECH BE LIABLE FOR CONSEQUENTIAL OR SPECIAL DAMAGES.

Return Products Procedure

Claims for shipment damage (evident or concealed) must be filed with the carrier by the buyer. Aerotech must be notified within thirty (30) days of shipment of incorrect material. No product may be returned, whether in warranty or out of warranty, without first obtaining approval from Aerotech. No credit will be given nor repairs made for products returned without such approval. A "Return Materials Authorization (RMA)" number must accompany any returned product(s). The RMA number may be obtained by calling an Aerotech service center or by submitting the appropriate request available on our website (www.aerotech.com). Products must be returned, prepaid, to an Aerotech service center (no C.O.D. or Collect Freight accepted). The status of any product returned later than thirty (30) days after the issuance of a return authorization number will be subject to review.

Visit <https://www.aerotech.com/global-technical-support.aspx> for the location of your nearest Aerotech Service center.

Returned Product Warranty Determination

After Aerotech's examination, warranty or out-of-warranty status will be determined. If upon Aerotech's examination a warranted defect exists, then the product(s) will be repaired at no charge and shipped, prepaid, back to the buyer. If the buyer desires an expedited method of return, the product(s) will be shipped collect. Warranty repairs do not extend the original warranty period.

Fixed Fee Repairs - Products having fixed-fee pricing will require a valid purchase order or credit card particulars before any service work can begin.

All Other Repairs - After Aerotech's evaluation, the buyer shall be notified of the repair cost. At such time the buyer must issue a valid purchase order to cover the cost of the repair and freight, or authorize the product(s) to be shipped back as is, at the buyer's expense. Failure to obtain a purchase order number or approval within thirty (30) days of notification will result in the product(s) being returned as is, at the buyer's expense.

Repair work is warranted for ninety (90) days from date of shipment. Replacement components are warranted for one year from date of shipment.

Rush Service

At times, the buyer may desire to expedite a repair. Regardless of warranty or out-of-warranty status, the buyer must issue a valid purchase order to cover the added rush service cost. Rush service is subject to Aerotech's approval.

On-site Warranty Repair

If an Aerotech product cannot be made functional by telephone assistance or by sending and having the customer install replacement parts, and cannot be returned to the Aerotech service center for repair, and if Aerotech determines the problem could be warranty-related, then the following policy applies:

Aerotech will provide an on-site Field Service Representative in a reasonable amount of time, provided that the customer issues a valid purchase order to Aerotech covering all transportation and subsistence costs. For warranty field repairs, the customer will not be charged for the cost of labor and material. If service is rendered at times other than normal work periods, then special rates apply.

If during the on-site repair it is determined the problem is not warranty related, then the terms and conditions stated in the following "On-Site Non-Warranty Repair" section apply.

On-site Non-Warranty Repair

If any Aerotech product cannot be made functional by telephone assistance or purchased replacement parts, and cannot be returned to the Aerotech service center for repair, then the following field service policy applies:

Aerotech will provide an on-site Field Service Representative in a reasonable amount of time, provided that the customer issues a valid purchase order to Aerotech covering all transportation and subsistence costs and the prevailing labor cost, including travel time, necessary to complete the repair.

Service Locations

<http://www.aerotech.com/contact-sales.aspx?mapState=showMap>

USA, CANADA, MEXICO	CHINA	GERMANY
Aerotech, Inc. Global Headquarters Phone: +1-412-967-6440 Fax: +1-412-967-6870	Aerotech China Full-Service Subsidiary Phone: +86 (21) 5508 6731	Aerotech Germany Full-Service Subsidiary Phone: +49 (0)911 967 9370 Fax: +49 (0)911 967 93720
JAPAN	TAIWAN	UNITED KINGDOM
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Have your customer order number ready before calling.

Appendix B: Revision History

Revision	Description
1.03.00	Updated: <ul style="list-style-type: none">• EU Declaration of Conformity• Agency Approvals
1.02.00	Updated Declaration of Conformity
1.01.00	<ul style="list-style-type: none">• Added section: Agency Approvals• Added RoHS statement to Declaration of Conformity• Added Installation and Maintenance sections• Added/updated cooling specifications: Section 1.1., Section 1.2., Section 2.3.
1.00.00	New Manual

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