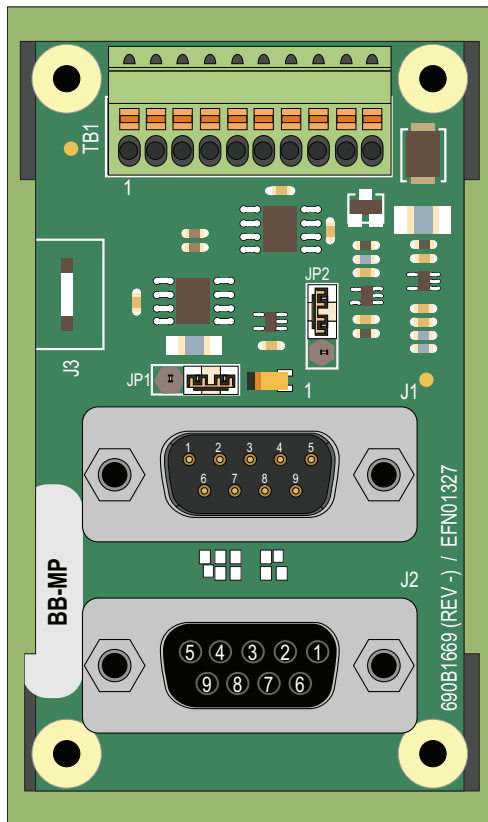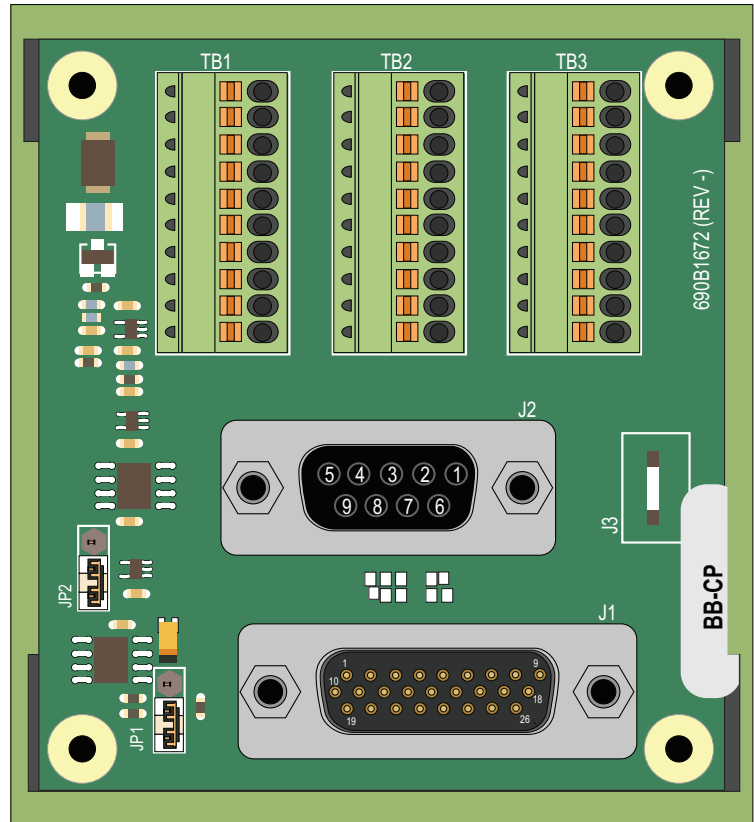# AEROTECH

BB-MP/BB-CP Hardware Manual

Revision: 1.03.00

BB-MP

BB-CP

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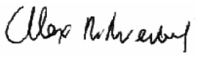
Manufacturer   Aerotech, Inc.
Address   101 Zeta Drive
     Pittsburgh, PA 15238-2897
     USA
Product   BB-MP/BB-CP
Model/Types   All

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 LVD
2011/65/EU	RoHS 2 Directive

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

EN 61010-1:2001   Safety requirements for electrical equipment

Name   / Alex Weibel
Position   Engineer Verifying Compliance
Location   Pittsburgh, PA

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Chapter 1: BB-MP / BB-CP

Aerotech's BB-MP and BB-CP are wiring modules used to connect to the Soloist, Ensemble, and Ndrive MP, ML, CP, CL, HPe, and HLe family of motion controllers and amplifiers. Most signals pass directly from the D-style connector to the discrete wire terminal block connectors. The PSO output is an isolated high-speed output derived from the differential RS-422 marker output. This signal is capable of sourcing or sinking current and interfacing in a fail safe way to lasers or other systems requiring electrical isolation. A 9-pin D style connector is included to connect encoder signals between modules when used in multi-axis PSO applications.

The BB-MP /BB-CP is conveniently packaged in a DIN-rail mountable package with quick connect/release terminals. It provides a jumper selection (JP2) for determining the output state (normally open or normally closed) however the normally open mode must be used for fail safe applications.
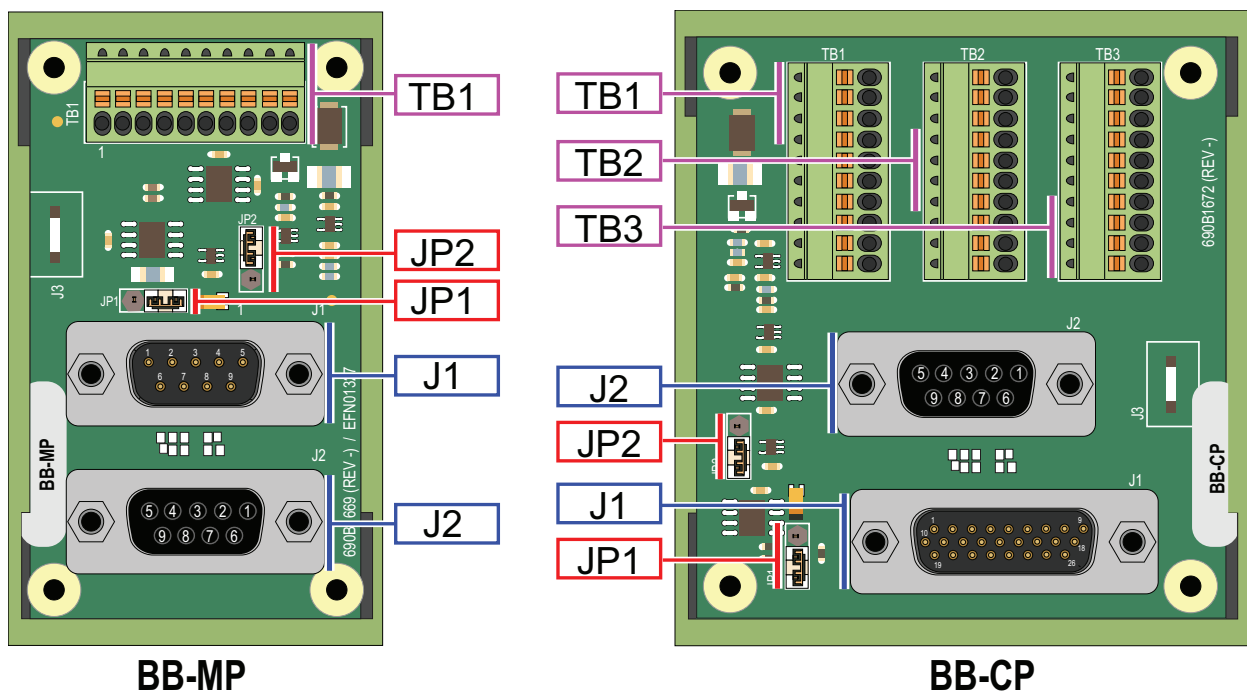

BB-MP   **BB-CP**

Figure 1-1:   BB-MP and BB-CP

1.1. Mechanical Specifications

N O T E : Aerotech continually improves its product offerings; listed options may be superseded at any time. All drawings and illustrations are for reference only and were complete and accurate as of this manual's release. Refer to www.aerotech.com for the most up-to-date information.
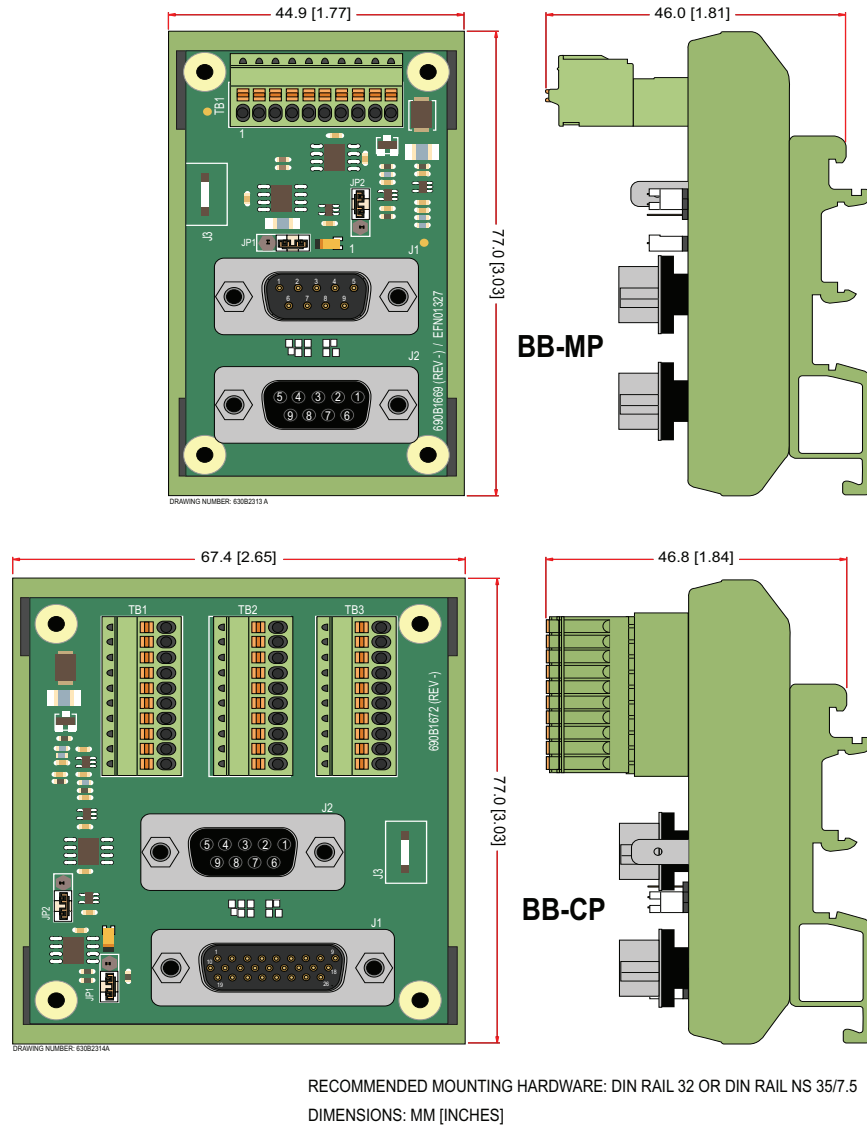

RECOMMENDED MOUNTING HARDWARE: DIN RAIL 32 OR DIN RAIL NS 35/7.5

DIMENSIONS: MM [INCHES]

Figure 1-2:   BB-MP and BB-CP Dimensions

1.2. TB1 (Terminal Block Connector)

TB1 is present on both the BB-MP and the BB-CP and has the same functionality on both. See the controller or amplifier hardware manual for a description of each signal.

Table 1-1:   TB1 Interface Connector Pin Assignment

Pin #	Label	Description	In/Out/Bi
1	SIN+	Sine +	Bidirectional
2	SIN-	Sine -	Bidirectional
3	COS+	Cosine +	Bidirectional
4	COS-	Cosine -	Bidirectional
5	MRK+	Marker + (RS-422 PSO Output) [1]	Bidirectional
6	MRK-	Marker - (RS-422 PSO Output) [1]	Bidirectional
7	+5V	User +5V. Direct connection to J1 +5V Input. See the controller hardware manual for the maximum current specification.	Output
8	GND	Ground	-
9	PSO+	Position Synchronized Output (Isolated, see Section 1.2.1. PSO Output Specifications)	Output
10	PSO-	Position Synchronized Output (Isolated, see Section 1.2.1. PSO Output Specifications)	Output
(1) Refer to JP1, Table 1-3			
(2) Refer to JP2, Table 1-3			

Table 1-2:   TB1 Interface Mating Connector

Description	Aerotech P/N	Phoenix P/N	Wire Size: AWG [mm^2]
10-Pin Terminal Block	ECK01294	1881406	20-28 [0.5- 0.080]

Table 1-3:   Jumper Settings

Jumper	Setting	Description
JP1	1-2 [1]	removes a 180 Ohm terminating resistor to the MRK+/- signal
	2-3	adds a 180 Ohm terminating resistor to the MRK+/- signal
JP2	1-2 [1]	normally opened output state
	2-3	normally closed output state
(1) Default		

1.2.1. PSO Output Specifications

The PSO output is capable of interfacing to TTL, LVTTL, or 24V systems and provides a sourcing or sinking fail safe interface. The output circuit must be ground referenced and is not suitable for connection to high voltage systems exceeding 24V.

Table 1-4:   PSO Output Electrical Specifications

Specification	Value
Switching Voltage (max)	24 VDC
Switching Current (max)	.25 A
Switching Frequency (max)	5 MHz
On Resistance	1 Ω
Terminal Block Wire Gauge	20-26 AWG / .14 - .5 mm^2

By default, JP2 is installed in the 1-2 position for normally-open operation (refer to Figure 1-1 for the physical location of JP2) and should be used when fail safe operation is required. Normally closed operation (JP2 set to position 2-3) should be used with caution because the closed state cannot be maintained when power is removed. The normally-closed setting should not be used when failsafe operation is required.
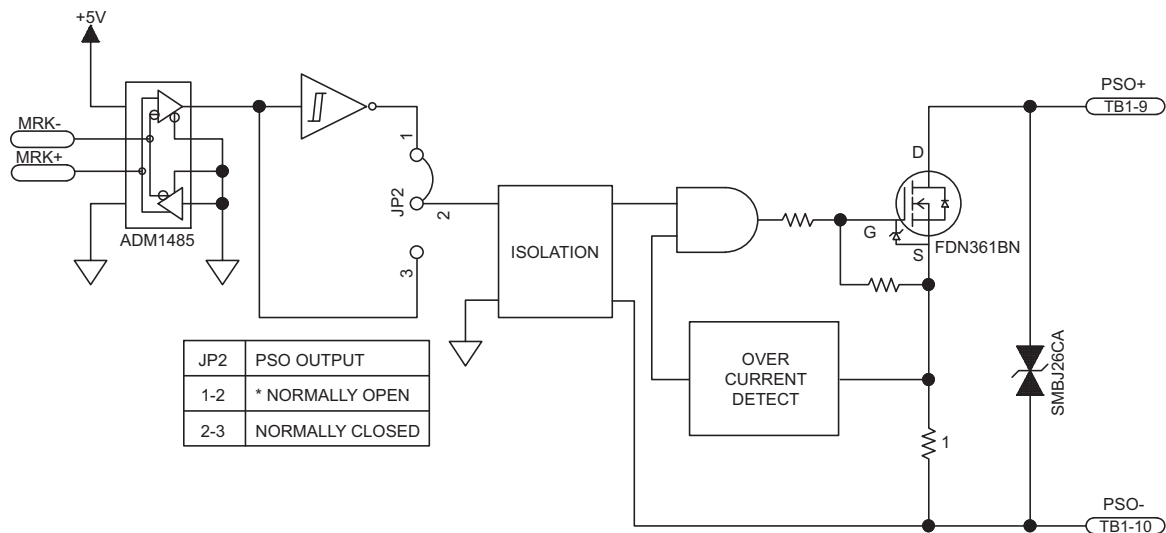

Figure 1-3:   PSO Output Schematic

Typical input circuitry is provided in Figure 1-4 for sourcing mode and in Figure 1-5 for sinking mode.

All examples are Active High (V+ = Laser On)
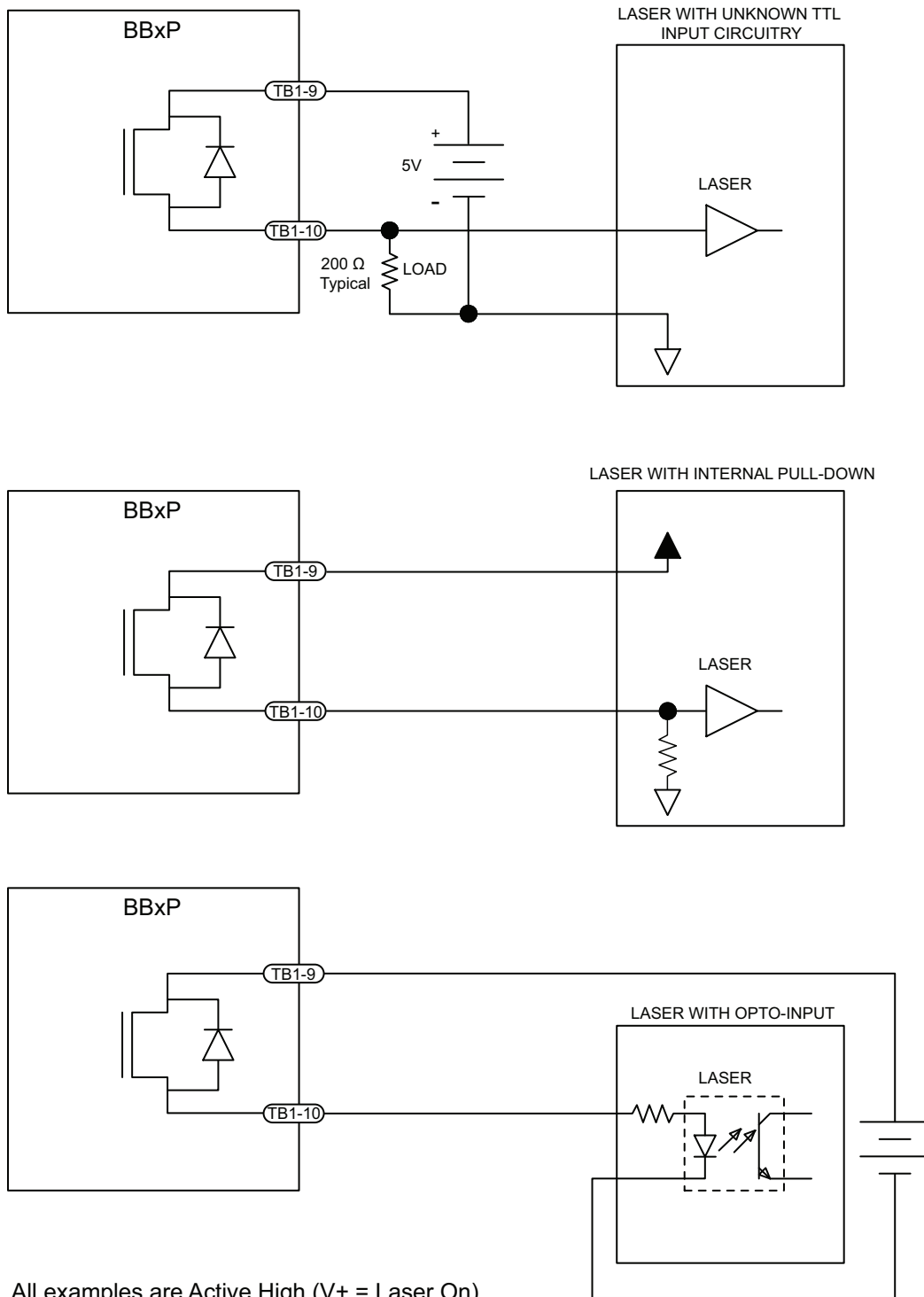
Figure 1-4:   PSO Output Sources Current

All examples are Active Low (0V = Laser On)
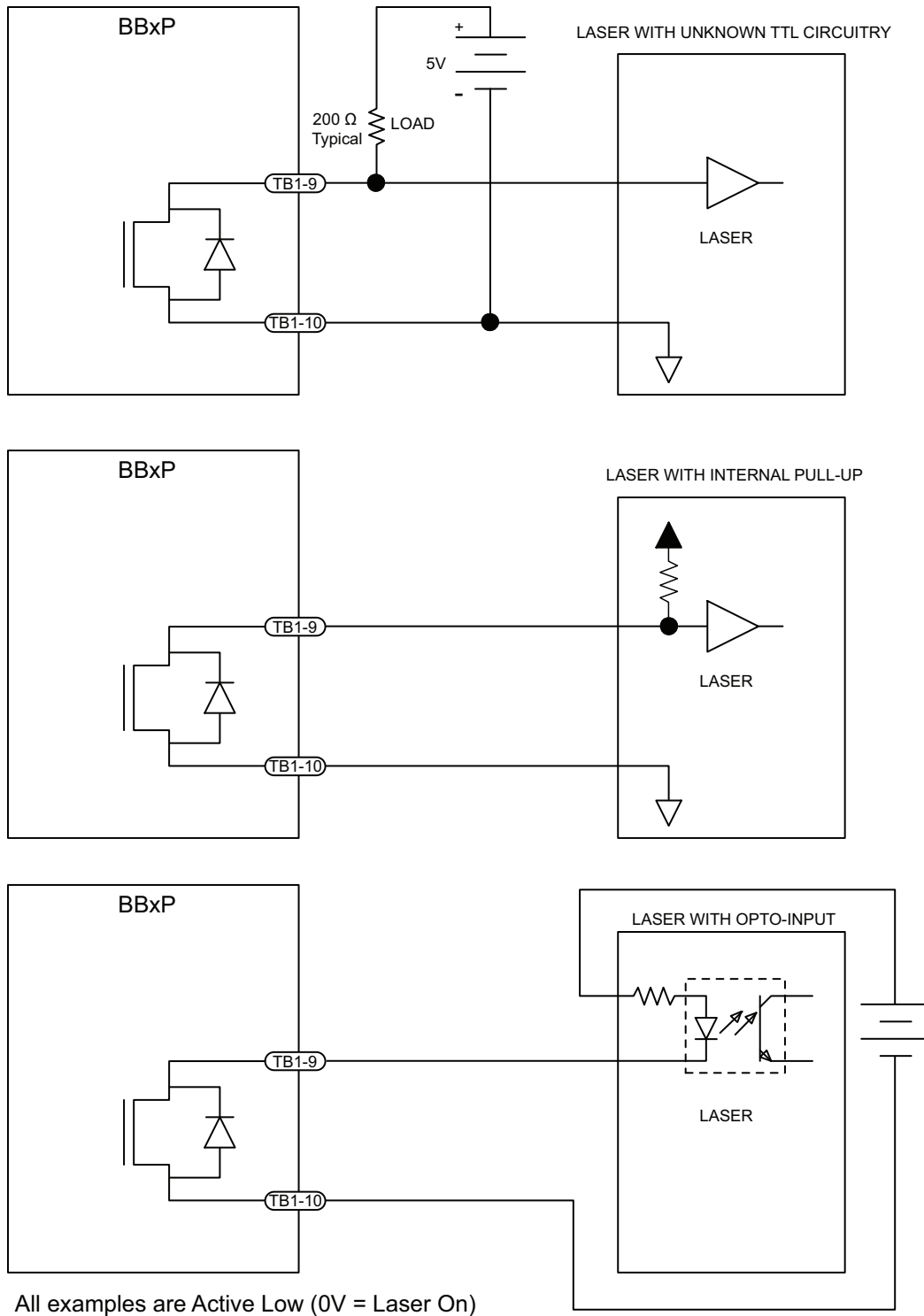
Figure 1-5:   PSO Output Sinks Current

1.2.2. PSO Interconnection

Dual PSO firing and easy user connection to PSO signal from one BB-MP.
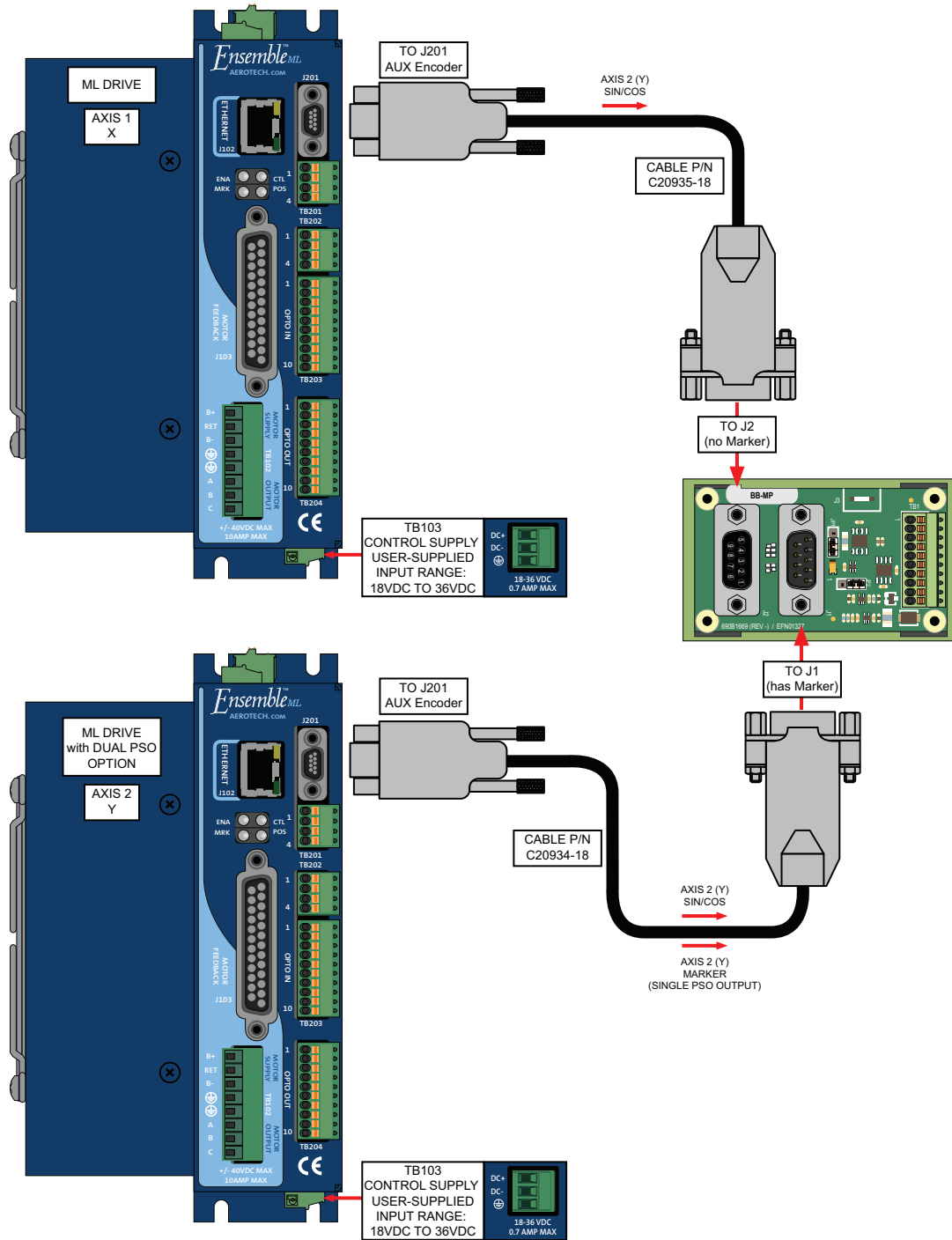

Figure 1-6:   Single BB-MP Interconnection

Independent single axis firing from two ML or MP drives OR dual PSO firing from one drive, also with easy user PSO connection.
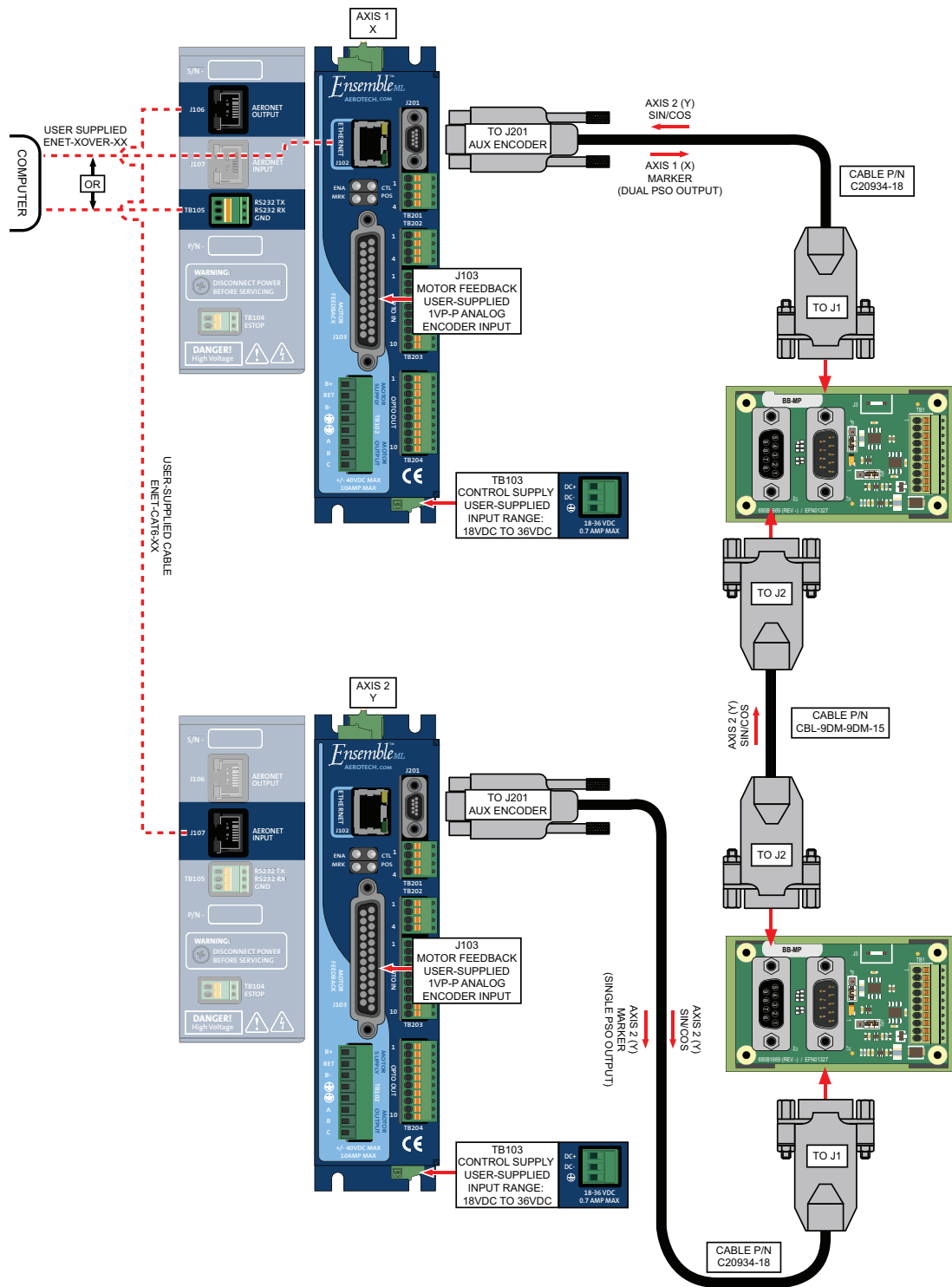

Figure 1-7: Dual BB-MP Interconnection

1.3. TB2 Connector (BB-CP only)

TB2 is only available on the BB-CP. See the controller or amplifier hardware manual for a description of each signal.

Table 1-5:   TB2 Interface Connector Pin Assignment

Pin #	Label	Description	In/Out/Bi
1	OPTOIN +	**Ndrive**: Opto-Isolated High-Speed Input 12+ user interrupt **Soloist/Ensemble**: Opto-Isolated High-Speed Input 4+ user interrupt	Input
2	OPTOIN -	**Ndrive**: Opto-Isolated High-Speed Input 12- user interrupt **Soloist/Ensemble**: Opto-Isolated High-Speed Input 4- user interrupt	Input
3	OPTOIN+	**Ndrive**: Opto-Isolated High-Speed Input 13+ user interrupt **Soloist/Ensemble**: Opto-Isolated High-Speed Input 5+ user interrupt	Input
4	OPTOIN-	**Ndrive**: Opto-Isolated High-Speed Input 13- user interrupt **Soloist/Ensemble**: Opto-Isolated High-Speed Input 5- user interrupt	Input
5	AOUT0	Analog Output 0	Output
6	AIN0+	Analog Input 0+	Input
7	AIN0-	Analog Input 0-	Input
8	AGND	Analog Ground	-
9	SHIELD	Signal cable shield	Input
10	SHIELD	Signal cable shield	Input

Table 1-6:   TB2 Interface Mating Connector

Description	Aerotech P/N	Phoenix P/N	Wire Size: AWG [mm^2]
10-Pin Terminal Block	ECK01294	1881406	20-28 [0.5- 0.080]

1.4. TB3 Connector (BB-CP only)

TB3 is only available on the BB-CP. Refer to the tables below for TB3 pinouts. See the controller or amplifier hardware manual for a description of each signal.

Table 1-7:   TB3 Interface Connector Pin Assignment

Pin #	Label	Description	In/Out/Bi
1	OPTOINCOM	Input Common	-
2	OPTOIN 0/8	**Ndrive**: Opto-Isolated Input 8 **Soloist/Ensemble**: Opto-Isolated Input 0	Input
3	OPTOIN 1/9	**Ndrive**: Opto-Isolated Input 9 **Soloist/Ensemble**: Opto-Isolated Input 1	Input
4	OPTOIN 2/10	**Ndrive**: Opto-Isolated Input 10 **Soloist/Ensemble**: Opto-Isolated Input 2	Input
5	OPTOIN 3/11	**Ndrive**: Opto-Isolated Input 11 **Soloist/Ensemble**: Opto-Isolated Input 3	Input
6	OPTOOUTCOM	Output Common	-
7	OPTOOUT 0/8	**Ndrive**: Opto-Isolated Output 8 **Soloist/Ensemble**: Opto-Isolated Output 0	Output
8	OPTOOUT 1/9	**Ndrive**: Opto-Isolated Output 9 **Soloist/Ensemble**: Opto-Isolated Output 1	Output
9	OPTOOUT 2/10	**Ndrive**: Opto-Isolated Output 10 **Soloist/Ensemble**: Opto-Isolated Output 2	Output
10	OPTOOUT	**Ndrive**: Opto-Isolated Output 11 **Soloist/Ensemble**: Opto-Isolated Output 3	Output

Table 1-8:   TB3 Interface Mating Connector

Description	Aerotech P/N	Phoenix P/N	Wire Size: AWG [mm^2]
10-Pin Terminal Block	ECK01294	1881406	20-28 [0.5- 0.080]

1.5. J1 Connector (BB-MP only)

The BB-MP J1 connector is designed to interface to the Soloist, Ensemble, or Ndrive MP or ML AUX ENC connector located on the drive's IO board. Aerotech part number C20934-xx is a 9 pin micro D to 9 pin D adapter cable. Note that the cable pinout is not one-to-one in this case. The BB-MP derives its power from this cable. See the controller or amplifier hardware manual for a description of each signal.

Table 1-9:   J1 Interface Connector Pin Assignment

Pin	Label	Description	In/Out/Bi
1	SIN+	Sine +	Bidirectional
2	COS+	Cosine +	Bidirectional
3	MRK+ [1]	Marker +	Bidirectional
4	+5V	+5V Power Input for Controller	Input
5	GND	Ground (+5V Power Return)	-
6	SIN-	Sine -	Bidirectional
7	COS-	Cosine -	Bidirectional
8	MRK- [1]	Marker -	Bidirectional
9	GND	Ground	-
(1) Refer to JP1, Table 1-11			

Table 1-10:   J1 Interface Mating Connector

Description	Aerotech P/N	Third Party P/N
Female 9-Pin D style	ECK340	Cinch DE-9S
Backshell	ECK01021	Amphenol 17-1724-2

Table 1-11:   Jumper Settings

Jumper	Setting	Description
JP1	1-2 [1]	removes a 180 Ohm terminating resistor to the MRK+/- signal
	2-3	adds a 180 Ohm terminating resistor to the MRK+/- signal
(1) Default		

1.6. J1 Connector (BB-CP only)

The BB-CP J1 is a one-to-one compatible connector designed for direct connection to the CP, CL, HPe, or HLe AUX IO connector. Aerotech part number ECZ01231 is a 26-HD cable which can be used for this purpose. See the controller or amplifier hardware manual for a description of each signal.

Table 1-12:   J1 Interface Connector Pin Assignment

Pin	Label	Description	In/Out/Bi
1	SIN+	Sine +	Bidirectional
2	SIN-	Sine -	Bidirectional
3	OPTOIN 4/12+	**Ndrive**: Opto-Isolated High-Speed Input 12+ user interrupt **Soloist/Ensemble**: Opto-Isolated High-Speed Input 4+ user interrupt	Input
4	OPTOIN 4/12-	**Ndrive**: Opto-Isolated High-Speed Input 12- user interrupt **Soloist/Ensemble**: Opto-Isolated High-Speed Input 4- user interrupt	Input
5	OPTOIN 5/13+	**Ndrive**: Opto-Isolated High-Speed Input 13+ user interrupt **Soloist/Ensemble**: Opto-Isolated High-Speed Input 5+ user interrupt	Input
6	OPTOIN 5/13-	**Ndrive**: Opto-Isolated High-Speed Input 13- user interrupt **Soloist/Ensemble**: Opto-Isolated High-Speed Input 5- user interrupt	Input
7	OPTOOUT 0/8	**Ndrive**: Opto-Isolated Output 8 **Soloist/Ensemble**: Opto-Isolated Output 0	Output
8	OPTOOUT 1/9	**Ndrive**: Opto-Isolated Output 9 **Soloist/Ensemble**: Opto-Isolated Output 1	Output
9	OPTOOUT 2/10	**Ndrive**: Opto-Isolated Output 10 **Soloist/Ensemble**: Opto-Isolated Output 2	Output
10	COS+	Cosine +	Bidirectional
11	COS-	Cosine -	Bidirectional
12	+5V	+5V Power Input for Controller	Input
13	AIN0+	Analog Input 0+	Input
14	AIN0-	Analog Input 0-	Input
15	OPTOOUTCOM	Output Common	
16	OPTOOUT 3/11	**Ndrive**: Opto-Isolated Output 11 **Soloist/Ensemble**: Opto-Isolated Output 3	Output
17	OPTOIN 0/8	**Ndrive**: Opto-Isolated Input 8 **Soloist/Ensemble**: Opto-Isolated Input 0	Input
18	OPTOIN 1/9	**Ndrive**: Opto-Isolated Input 9 **Soloist/Ensemble**: Opto-Isolated Input 1	Input
19	MRK- [1]	Marker -	Bidirectional
20	MRK+ [1]	Marker +	Bidirectional
21	GND	Ground (+5V Power Return)	-
22	AOUT0	Analog Output 0	Output
23	AGND	Analog Ground	-
24	OPTOINCOM	Input Common	-
25	OPTOIN 2/10	**Ndrive**: Opto-Isolated Input 10 **Soloist/Ensemble**: Opto-Isolated Input 2	Input
26	OPTOIN 3/11	**Ndrive**: Opto-Isolated Input 11 **Soloist/Ensemble**: Opto-Isolated Input 3	Input
(1) Refer to JP1, Table 1-14			

Table 1-13:   J1 Interface Mating Connector

Description	Aerotech P/N	Third Party P/N
Female 26-Pin D style	ECK01260	Kycon K86X-AA-26S
Backshell	ECK1022	Amphenol 17-1725-2

Table 1-14:   Jumper Settings

Jumper	Setting	Description
JP1	1-2 [1]	removes a 180 Ohm terminating resistor to the MRK+/- signal
	2-3	adds a 180 Ohm terminating resistor to the MRK+/- signal
(1) Default		

1.7. J2 Connector

J2 is present on both the BB-MP and the BB-CP and is used to connect encoder sine and cosine signals between drives for multi-axis PSO applications. A one-to-one ribbon or shielded cable may be used between modules. Alternately, discrete wire connections can be made using the terminal block connectors. See the controller or amplifier hardware manual for a description of each signal.

Table 1-15:   J2 Interface Connector Pin Assignment

Pin	Label	Description	In/Out/Bi
1	SIN+	Sine +	Bidirectional
2	COS+	Cosine +	Bidirectional
3	N/C	not connected	-
4	N/C	not connected	-
5	N/C	not connected	-
6	SIN-	Sine -	Bidirectional
7	COS-	Cosine -	Bidirectional
8	N/C	not connected	-
9	N/C	not connected	-

Table 1-16:   J2 Interface Mating Connector

Description	Aerotech P/N	Third Party P/N
Male 9-Pin D style	ECK137	Cinch DE-9P
Backshell	ECK1021	Amphenol 17-1724-2

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 http://www.aerotech.com/service-and-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.

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Fax: +81 (0)43 306 3773		Fax: +44 (0)1256 855649

Have your customer order number ready before calling.

Appendix B: Revision History

Revision	Description
1.03.00	• Updated the EU Declaration of Conformity
1.02.00	• Added RoHS statement to the EU Declaration of Conformity
1.01.00	• Added PSO Sinking and Sourcing schematics: Section 1.2.1. • Added new section: Section 1.2.2. • Jumper information updated
1.00.00	New Manual

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