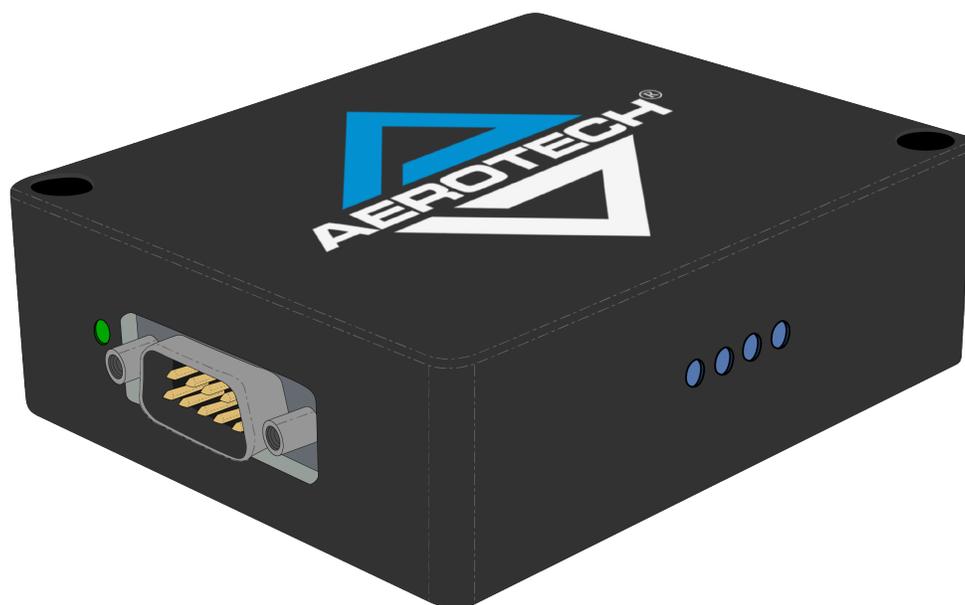




Enhanced Throughput Module (ETM)

HARDWARE MANUAL

Revision 2.00



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EU Declaration of Conformity

Manufacturer Aerotech, Inc.
Address 101 Zeta Drive
Pittsburgh, PA 15238-2811
USA
Product ETM
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
EU 2015/863	Directive, Restricted Substances (RoHS 3)

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.

Authorized Representative:

A handwritten signature in black ink that reads 'Jochen Jäger'.

/ Jochen Jäger

Operations Manager
Aerotech GmbH
Gustav-Weißkopf-Str. 18
90768 Fürth
Germany

Engineer Verifying Compliance:

A handwritten signature in black ink that reads 'Alex Weibel'.

/ Alex Weibel

Aerotech, Inc.
101 Zeta Drive
Pittsburgh, PA 15238-2811
USA
11/26/2024

Date:

UKCA Declaration of Conformity

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



To which this declaration relates, meets the essential health and safety requirements and is in conformity with the relevant UK Legislation listed below:

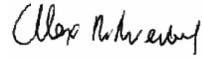
Electrical Equipment (Safety) Regulations 2016
Hazardous Substances in Electrical and Electronic Equipment Regulations 2012

Using the relevant section of the following UK Designated Standards and other normative documents when installed in accordance with the installation instructions supplied by the manufacturer.

Authorized Representative:

 / Simon Smith
Managing Director
Aerotech Ltd
The Old Brick Kiln
Ramsdell, Tadley
Hampshire RG26 5PR
UK

Engineer Verifying Compliance:

 / Alex Weibel
Aerotech, Inc.
101 Zeta Drive
Pittsburgh, PA 15238-2811
USA

Date:

11/26/2024

Safety Procedures and Warnings

IMPORTANT: This manual tells you how to carefully and correctly use and operate the module.



- Read all parts of this manual before you install or operate the module or before you do maintenance to your system.
- To prevent injury to you and damage to the equipment, obey the precautions in this manual.
- All specifications and illustrations are for reference only and were complete and accurate as of the release of this manual. To find the newest information about this product, refer to www.aerotech.com.

If you do not understand the information in this manual, contact Aerotech Global Technical Support.



IMPORTANT: This product has been designed for light industrial manufacturing or laboratory environments. If the product is used in a manner not specified by the manufacturer:

- The protection provided by the equipment could be impaired.
- The life expectancy of the product could be decreased.

Safety notes and symbols are placed throughout this manual to warn you of the potential risks at the moment of the safety note or if you fail to obey the safety note.



The voltage can cause shock, burn, or death.



You are at risk of physical injury.
You could damage the module.



A surface can be hot enough to burn you.



Your actions, the temperature of the system, or the condition of the atmosphere that surround the system could start a fire.



Components are sensitive to electrostatic discharge.



Unsecured cables could cause you to:

- trip and fall
- drag the product off of its mounting location
- damage the cable connections.



A blue circle symbol is an action or tip that you should obey. Some examples include:

- General tip
- Read the manual/section
- Wear protective safety equipment (eye protection, ear protection, gloves)
- If applicable, do not lift unassisted



Handling and Storage

Unpacking the module



IMPORTANT: All electronic equipment and instrumentation is wrapped in antistatic material and packaged with desiccant. Ensure that the antistatic material is not damaged during unpacking.

Inspect the shipping container for any evidence of shipping damage. If any damage exists, notify the shipping carrier immediately.

Remove the packing list from the shipping container. Make sure that all the items specified on the packing list are contained within the package.

The documentation for the module is on the included installation device. The documents include manuals, interconnection drawings, and other documentation pertaining to the system. Save this information for future reference. Additional information about the system is provided on the Serial and Power labels that are placed on the chassis.

The system serial number label contains important information such as the:

- Customer order number (please provide this number when requesting product support)
- Drawing number
- System part number

Handling



IMPORTANT: It is the responsibility of the customer to safely and carefully lift and move the module.

- Be careful when you move or transport the module.
- Retain the shipping materials for future use.
- Transport or store the module in its protective packaging.



WARNING: Electrostatic Discharge (ESD) Sensitive Components!

You could damage the power supply or drives if you fail to observe the correct ESD practices. Wear an ESD wrist strap when you handle, install, or do service to the system assembly.

Storage

Store the module in the original shipping container. If the original packaging included ESD protective packaging, make sure to store the module in it. The storage location must be dry, free of dust, free of vibrations, and flat.

Refer to [Section 1.6. Environmental Specifications](#).

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Chapter 1: Enhanced Throughput Module

The Enhanced Throughput Module (ETM) improves the positioning performance of high-dynamic motion systems by directly measuring the unwanted motion of the machine base and communicating it back to the controller. By working in concert with the Dynamic Controls Toolbox and the Aerotech controllers, ETM allows the servo system to do a superior job of executing the desired motion path.

Design Features

- Significantly improves move-and-settle time and contouring performance
- Increases throughput of existing and new machines
- Greatly reduces undesirable effects of frame motion on the servo system
- Compatible with all current Aerotech controllers

Unwanted base motion typically occurs because the force applied to accelerate the stage reacts against the machine frame. The machine frame responds with an oscillation that can extend over hundreds of milliseconds. Fine positioning or high-dynamic motion requires that the controller wait for this oscillation to subside before continuing with the process. This forces the controller to wait or causes inaccurate motion, either of which reduces productivity. The most appropriate solution is an optimized frame and machine-base design, but in many cases this is either not practical or is prohibitively expensive.

The Aerotech ETM provides a low-cost solution for improving the productivity of new and existing equipment with easy installation and no changes to existing mechanical hardware.

The ETM module is offered in two versions: the -SD for standard resolution systems and the -HD for ultra high resolution applications. The modules share the same electrical connections and mounting footprint, however the -HD version is 10 mm taller than the -SD version.

The ETM module must be securely mounted to the system base in line with the axis of motion being corrected. The ETM module requires an external 5 V power source and outputs a differential analog signal centered at 2.5 V to the controller.

Table 1-1: Feature Summary

Options	
ETM-SD	Standard solution for higher-performance automation applications
ETM-HD	High-performance solution for the most demanding applications
Cables (refer to Cables for schematics)	
C22501-50	ETM 9D to flying leads; Length 5m
C22502-50	ETM 9D to 26HD for CP/CL/HPe/HLe direct connection to Auxiliary IO connector; Length 5 m
C22503-50	ETM 9D to 2x26HD for CP/CL/HPe/HLe direct connection to Auxiliary IO connectors – gantry mode; Length 5 m
C22504-50	ETM 9D to 15D Npaq analog IO connector; channel 0; Length 5 m
C22505-50	DUAL ETM 9D to 15D Npaq analog IO connector; channels 0/1; 5 m
C22506-50	
C22507-50	
Note: IO option is required when using panel-mount drives.	

1.1. Electrical Specifications

Table 1-2: ETM Electrical Specifications

Description	Specification
Input Voltage	5 V ($\pm 10\%$)
Input Current	100 mA (max)
Output Voltage	0 - 5 V, differential centered at 2.5 V, 1 mA max drive current
Warm Up Time	1 minute

1.2. Electrical Connections

The ETM connector is a 9 pin male D connector.

Table 1-3: ETM Connector Pin Assignment

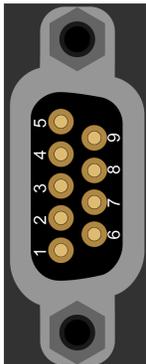
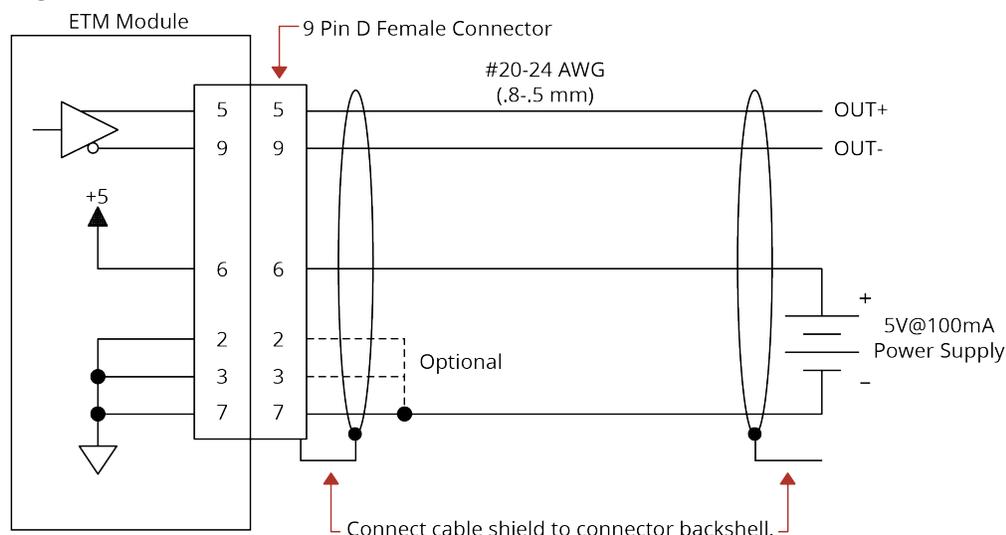
Pin	Description	Pin Locations
1	Reserved	
2	Ground	
3	Ground	
4	Reserved	
5	Output +	
6	+5V Input	
7	Ground	
8	Reserved	
9	Output -	

Table 1-4: ETM Mating Connector

9 Pin D Female	Aerotech P/N	Third Party P/N
Connector	ECK00781	Tyco/Amp 1-745491-7
Backshell	ECK001021	Amphenol #17-1724-2

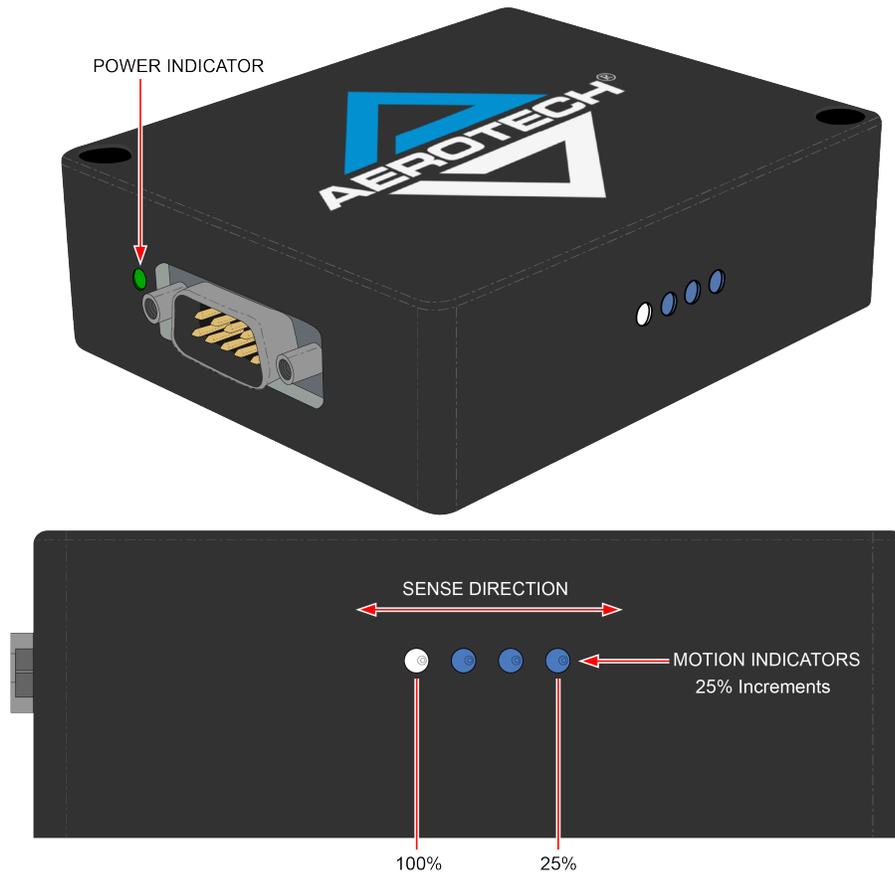
Figure 1-1: ETM Connector



1.3. Sensor Display

The blue LED display is a bar graph display indicating motion in 25% increments from 0-100%.

Figure 1-2: Sensor Display

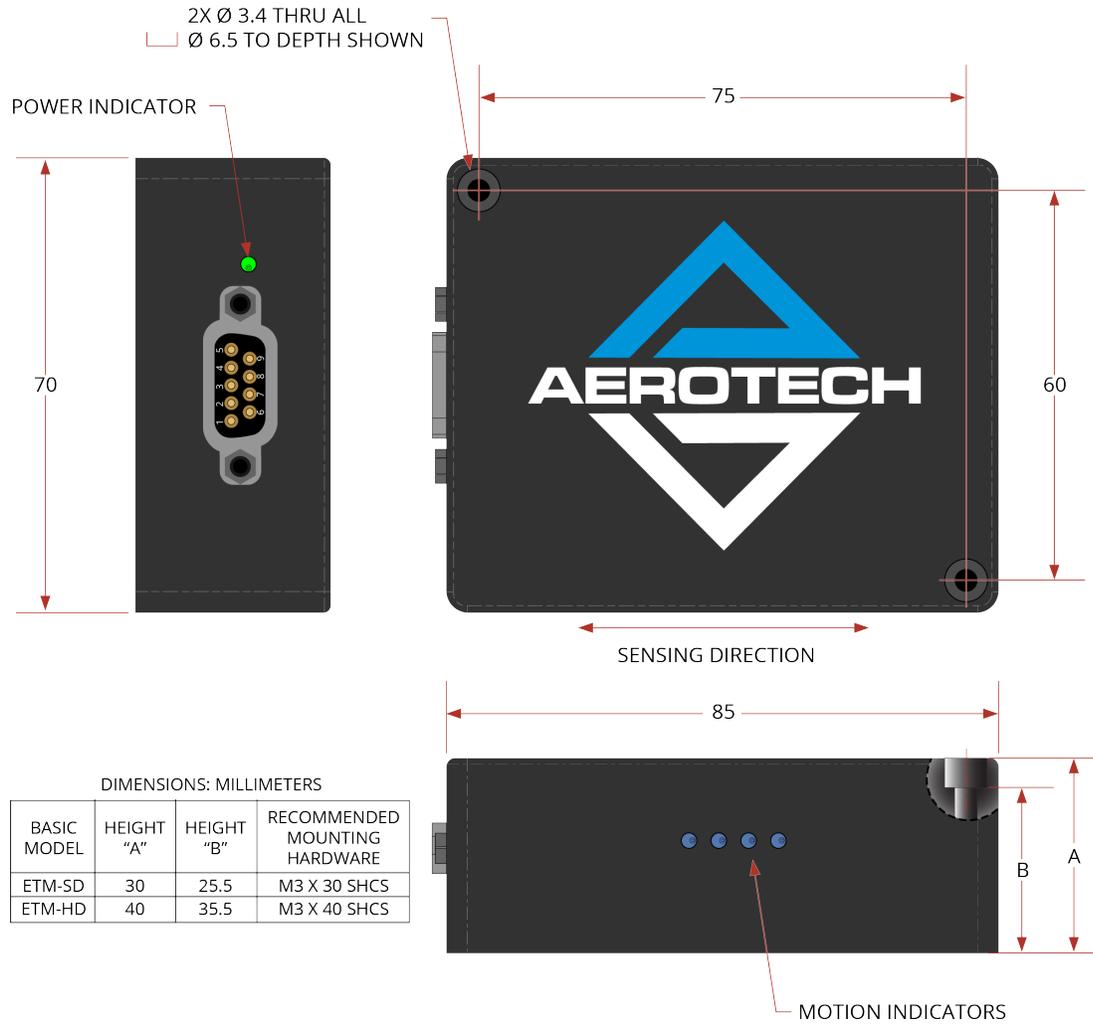


1.4. Mechanical Specifications

Table 1-5: Mounting Specifications

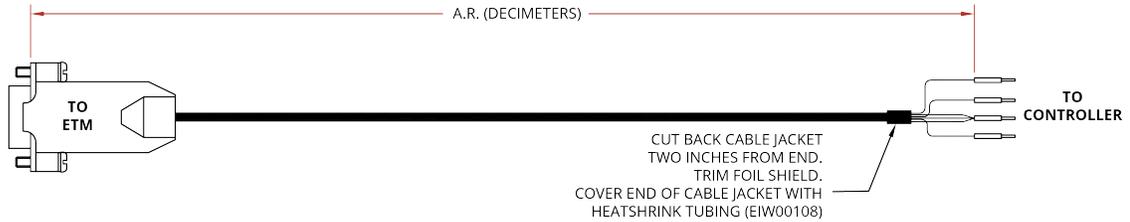
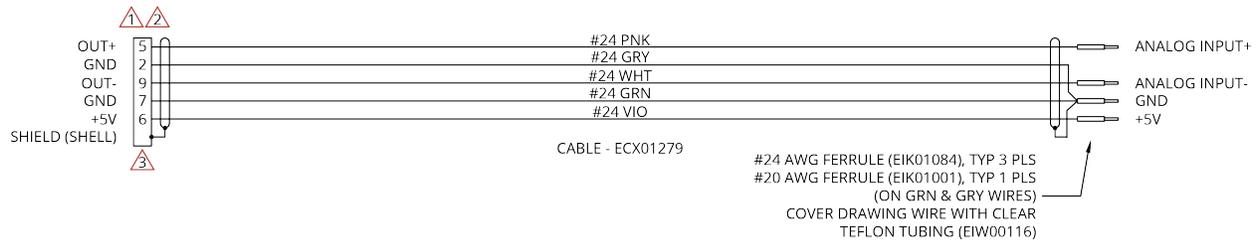
		ETM
Customer-Supplied Enclosure		IP54 Compliant
Weight	-SD	.24 kg
	-HD	.385 kg
Mounting Hardware (Tightening Torque: 1.1 N·m)	-SD	M3 x 30 Socket Head Cap Screws (SHCS)
	-HD	M3 x 40 Socket Head Cap Screws (SHCS)
Operating Temperature		Refer to Section 1.6 .

Figure 1-3: ETM Dimensions

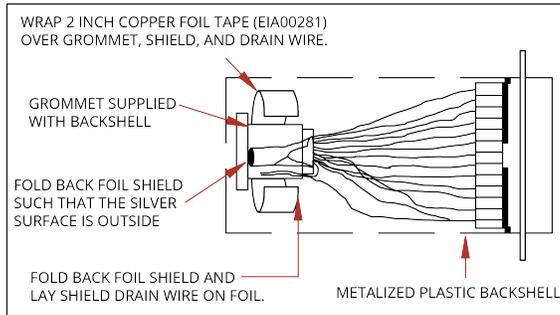


1.5. Cable Options

Figure 1-4: C22501 Cable (ETM-FL-9DU)



1 SHIELD TERMINATION WITH METALIZED PLASTIC BACKSHELLS

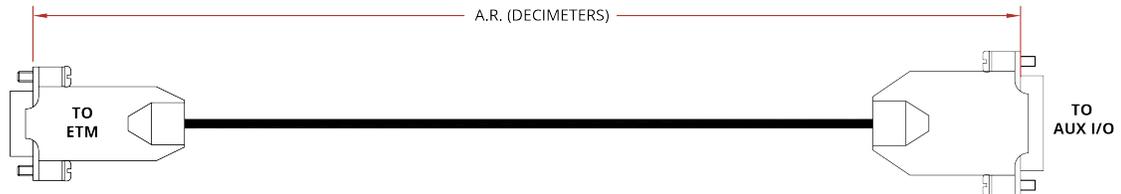
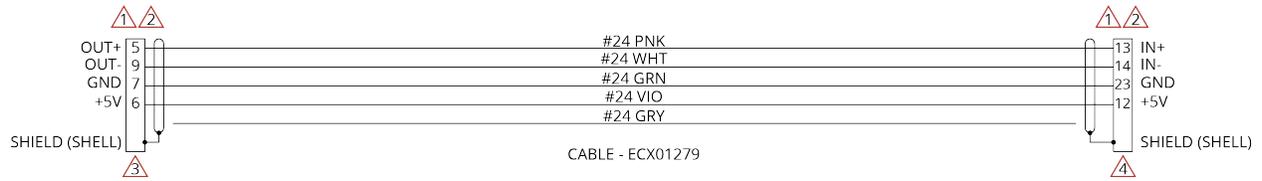


2 UNUSED PINS NOT SHOWN

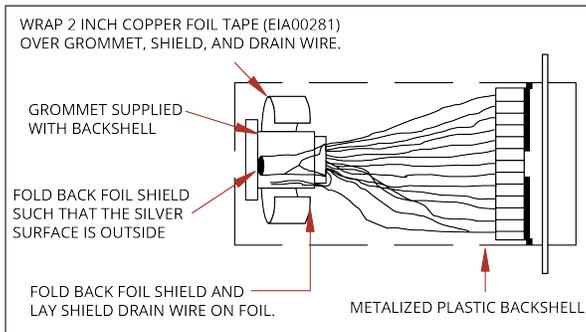
3 9-PIN CONNECTOR
DE9S CONNECTOR (ECK00781)
BACKSHELL (ECK01021)

CABLE ASSEMBLY: ETM-FL-9D
DRAWING NUMBER: 630C2250-1, REVA

Figure 1-5: C22502 Cable (ETM-26HD-9DU)



⚠ SHIELD TERMINATION WITH METALIZED PLASTIC BACKSHELLS



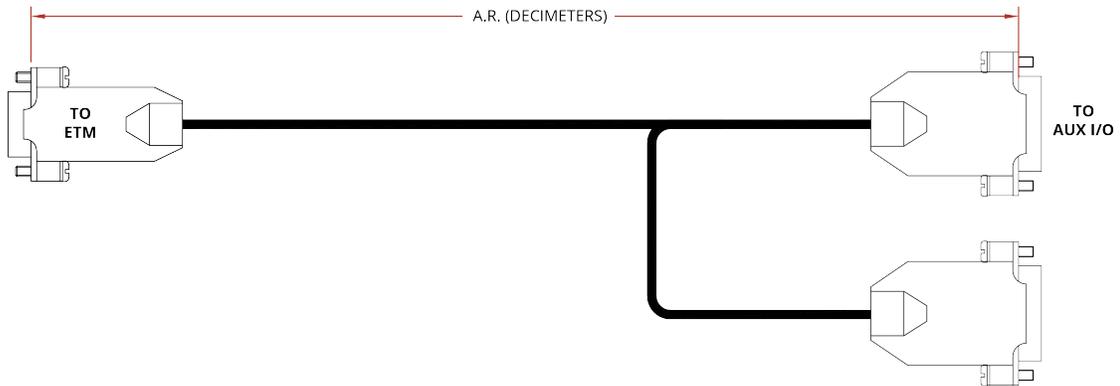
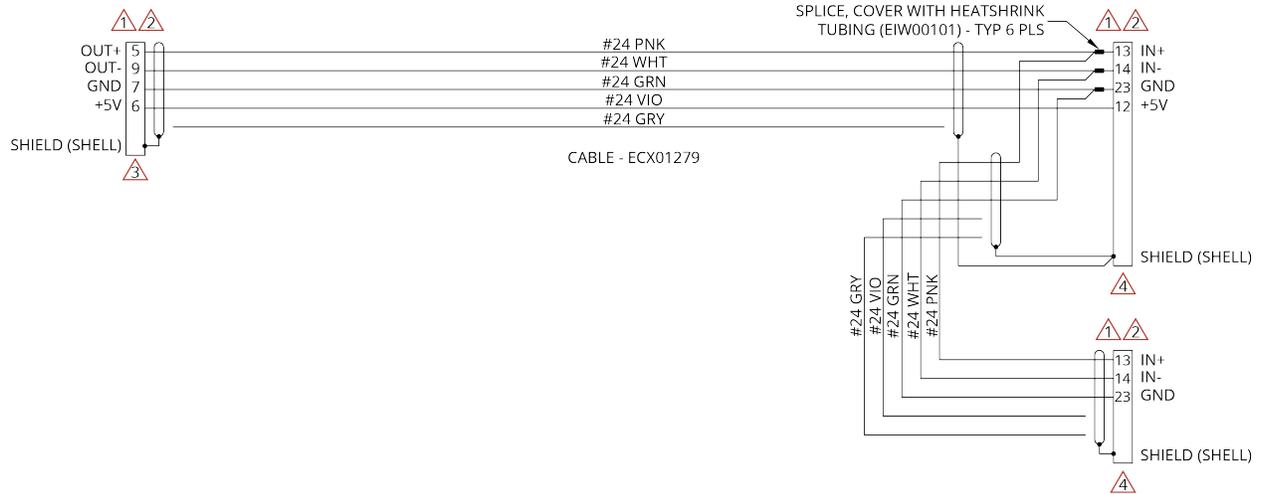
⚠ UNUSED PINS NOT SHOWN

⚠ 9-PIN CONNECTOR
 DE9S CONNECTOR (ECK00781)
 BACKSHELL (ECK01021)

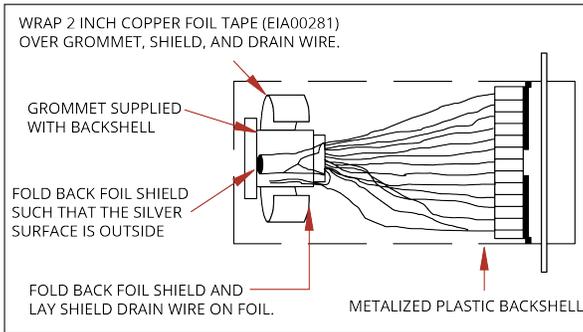
⚠ 26-PIN HD CONNECTOR
 26HD MALE CONNECTOR (ECK01259)
 BACKSHELL (ECK01022)

CABLE ASSEMBLY: ETM-26HD-9DU
 DRAWING NUMBER: 630C2250-2, REV -

Figure 1-6: C22503 Cable (ETM-26HD 26HD-9DU)



SHIELD TERMINATION WITH METALIZED PLASTIC BACKSHELLS



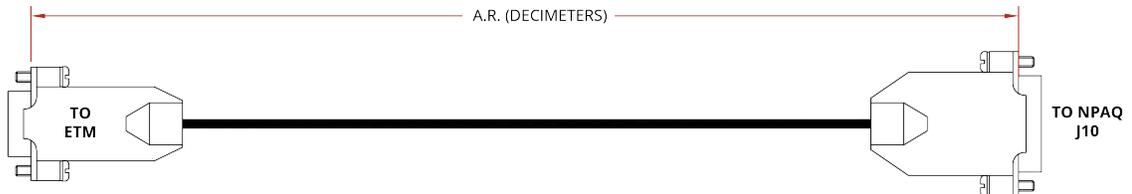
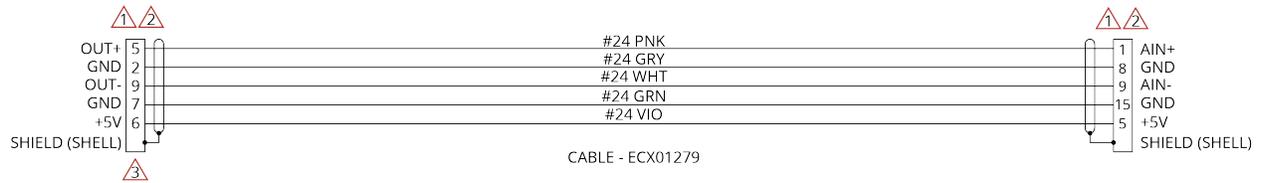
UNUSED PINS NOT SHOWN

- 9-PIN CONNECTOR**
DE9S CONNECTOR (ECK00781)
BACKSHELL (ECK01021)
- 26-PIN HD CONNECTOR**
26HD MALE CONNECTOR (ECK01259)
BACKSHELL (ECK01022)

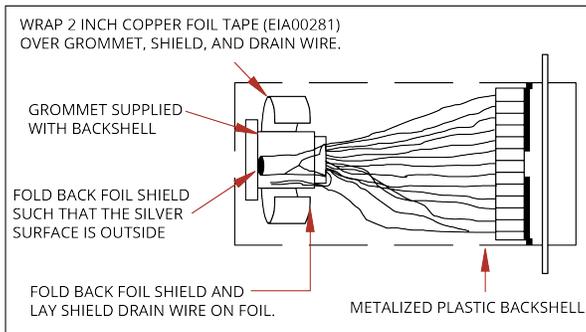
CABLE ASSEMBLY: ETM-26HD 26HD-9DU

DRAWING NUMBER: 630C2250-3, REV -

Figure 1-7: C22504 Cable (ETM-FL-15DU-9DU)



⚠ SHIELD TERMINATION WITH METALIZED PLASTIC BACKSHELLS



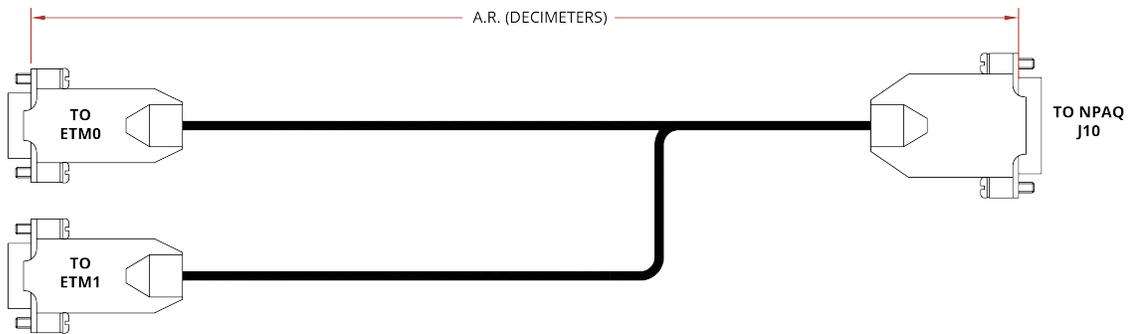
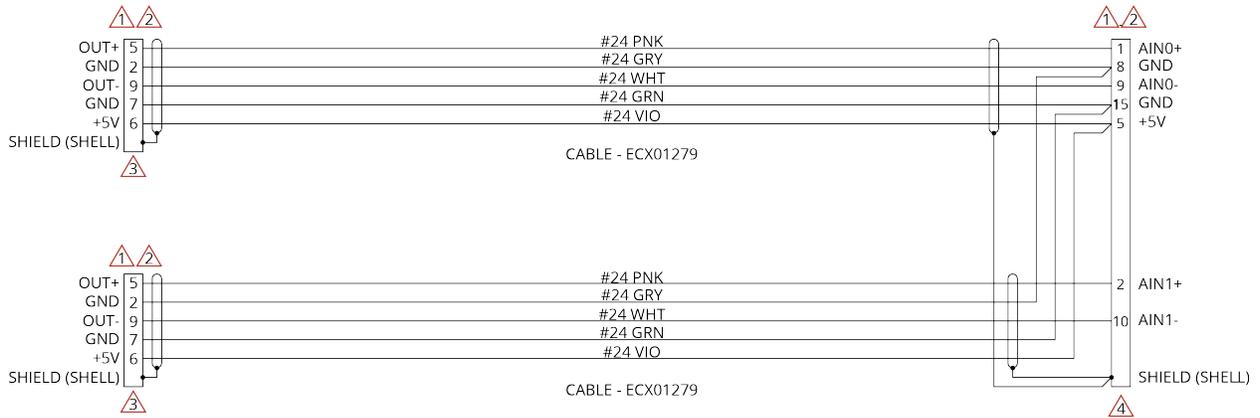
⚠ UNUSED PINS NOT SHOWN

⚠ 9-PIN CONNECTOR
 DE9S CONNECTOR (ECK00781)
 BACKSHELL (ECK01021)

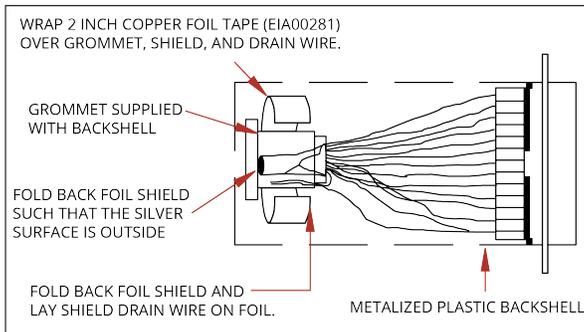
⚠ 15-PIN CONNECTOR
 DB15P CONNECTOR (ECK00790)
 BACKSHELL (ECK01022)

CABLE ASSEMBLY: ETM-15DU-9DU
 DRAWING NUMBER: 630C2250-4, REV -

Figure 1-8: C22505 Cable (ETM-15DU-9DU 9DU)



⚠ SHIELD TERMINATION WITH METALIZED PLASTIC BACKSHELLS



⚠ UNUSED PINS NOT SHOWN

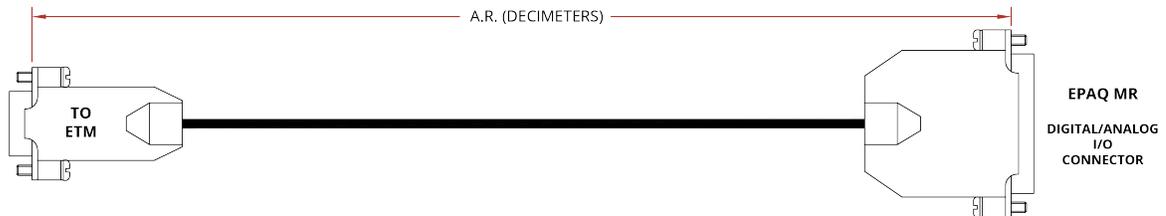
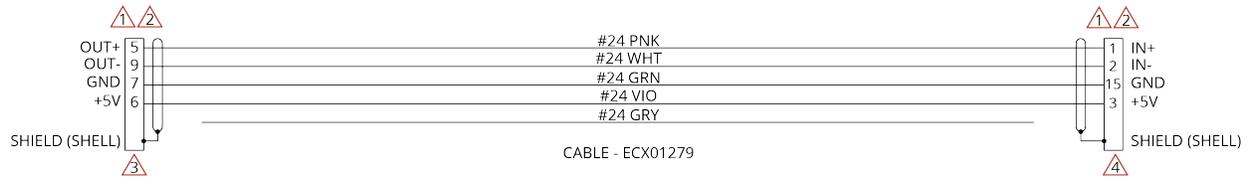
⚠ 9-PIN CONNECTOR
DE9S CONNECTOR (ECK00781)
BACKSHELL (ECK01021)

⚠ 15-PIN CONNECTOR
DB15P CONNECTOR (ECK00100)
BACKSHELL (ECK01022)

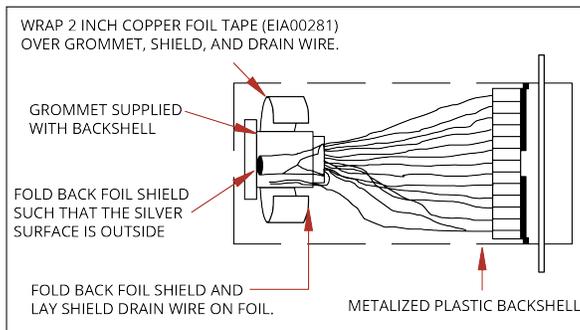
CABLE ASSEMBLY: ETM-15DU 9DU-9DU

DRAWING NUMBER: 630C2250-5, REV -

Figure 1-9: C22506 Cable (ETM-25D-9DU)



1 SHIELD TERMINATION WITH METALIZED PLASTIC BACKSHELLS



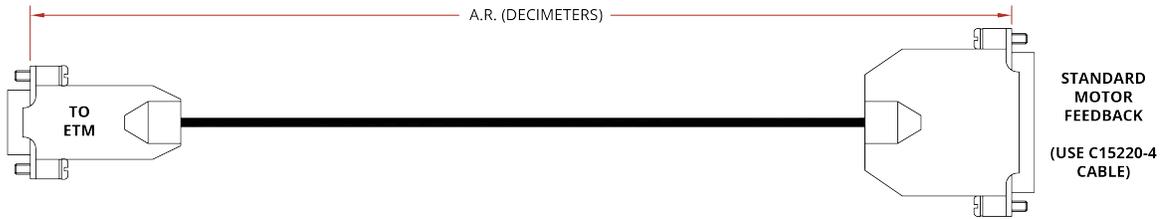
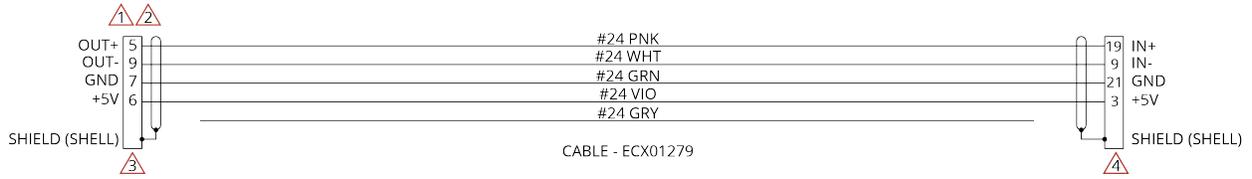
2 UNUSED PINS NOT SHOWN

3 9-PIN CONNECTOR
DE9S CONNECTOR (ECK00781)
BACKSHELL (ECK01021)

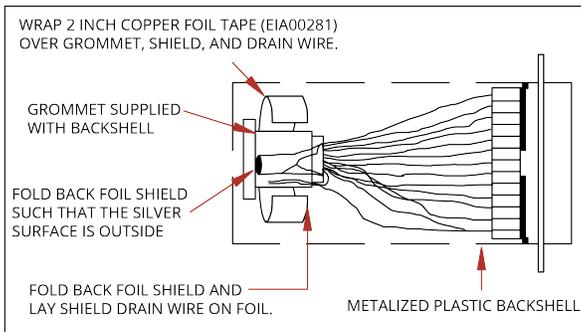
4 25-PIN CONNECTOR
25D MALE CONNECTOR (ECK00786)
BACKSHELL (ECK00656)

CABLE ASSEMBLY: ETM-25D-9DU
DRAWING NUMBER: 630C2250-6, REV -

Figure 1-10: C22507 Cable (ETM-25D-9DU)



⚠ SHIELD TERMINATION WITH METALIZED PLASTIC BACKSHELLS



⚠ UNUSED PINS NOT SHOWN

⚠ 9-PIN CONNECTOR
DE9S CONNECTOR (ECK00781)
BACKSHELL (ECK01021)

⚠ 25-PIN CONNECTOR
25D MALE CONNECTOR (ECK00786)
BACKSHELL (ECK00656)

CABLE ASSEMBLY: ETM-25D-9DU
DRAWING NUMBER: 630C2250-7, REV -

1.6. Environmental Specifications

The environmental specifications are listed below.

Table 1-6: Environmental Specifications

Ambient Temperature	Operating: 0 °C to 50 °C (32 °F to 122 °F)
	Storage: -30 °C to 85 °C (-22 °F to 185 °F)
Humidity Non-condensing	The maximum relative humidity is 80% for temperatures that are less than 31 °C and decreases linearly to 50% relative humidity at 40 °C.
Operating Altitude	0 m to 2,000 m (0 ft to 6,562 ft) above sea level.
Pollution	Pollution Degree 2
	Typically only nonconductive pollution occurs.
Operation	Use only indoors

1.7. Preventative Maintenance

While the ETM normally does not require any maintenance it is recommended that the module and associated wiring be inspected at least once a year. [Table 1-7](#) lists some recommended checks that should be made during these inspections.

Table 1-7: 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.

Cleaning



DANGER: Before you clean the ETM, disconnect the electrical power from the drive.

Use a clean, dry, soft cloth to clean the ETM. If necessary, use a cloth that is moist with water or isopropyl alcohol. If you use a moist cloth, make sure that moisture does not go into the module. Also make sure that it does not go onto the outer connectors and components. Internal contamination from the cleaning solution can cause corrosion and electrical short circuits.

Do not clean the labels with a cleaning solution because it might remove the label information.

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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 [Global Technical Support Portal](#) 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

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

USA, CANADA, MEXICO

Aerotech, Inc.
Global Headquarters

CHINA

Aerotech China
Full-Service Subsidiary

GERMANY

Aerotech Germany
Full-Service Subsidiary

TAIWAN

Aerotech Taiwan
Full-Service Subsidiary

UNITED KINGDOM

Aerotech United Kingdom
Full-Service Subsidiary

Appendix B: Revision History

Revision	Description
2.00	General Update Updated: EU Declaration of Conformity (Page 6)
1.02	Revision changes have been archived. If you need a copy of this revision, contact Aerotech Global Technical Support.
1.01	
1.00	

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