FUSION Focus Module
User Manual

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Revision History

Revision Date	Rev#	Issued By	Change Details
2023-09-26	A	Carmelo Scaffidi	First release.
2025-12-22	B	Carmelo Scaffidi	Second release. Updated logo and branding information.

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Preface

The following topics are covered:

Document Conventions

The following text conventions are used throughout this document.

Table 1 Document Conventions

Paragraph Format	Indicates
NOTE:	Useful information or helpful tips.
CAUTION:	Information about actions that could cause damage to the system or equipment. Identifies a potentially hazardous situation that could result in minor or moderate personal injury, damage to equipment, or loss of data.
WARNING!	Information that is essential to your safety. Identifies a potentially dangerous situation that could result in serious personal injury or death.
Bold	Noteworthy information.

List of Acronyms

CE	Conformité Européenne
ESD	Electrostatic Discharge
LED	Light Emitting Diode
NIR	Near Infrared
RMA	Return Merchandise Authorization
SWIR	Short Wave InfraRed

Safety

This section provides guidelines on the use and safety of the Optem® FUSION Focus Module, to avoid personal injury or damage to the module.

Warning Labels

Excelitas products have labels affixed to their packaging or enclosures, similar or identical to those shown below.

WARNING! *Be sure to read and follow all warning labels.*

Electrostatic discharge (ESD) can damage or destroy the product's electronic components. Observe precautions for handling these components (e.g., use anti-static mats, gloves, wrist straps).

Safety Precautions

This section outlines the safety precautions that users must take when operating the Optem® FUSION Focus Module.

General Precautions

Observe the following general safety precautions:

- Permit only authorized individuals to operate the Optem® FUSION Focus Module.
- Permit only authorized individuals to have access to controlled areas during Optem® FUSION Focus Module operation.

ESD Precautions

Handling of this product needs precautions against static electricity because this is a semiconductor product. Please take adequate measures to prevent any static electricity being produced such as the wearing of a wristband or anti-static gloves when handling this product.

Every manufacturing facility in regard to the product (plant, equipment, machine, carrier machine and conveyance unit) should be connected to ground and please avoid the product to be electric-charged.

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CHAPTER

1

Introduction

This chapter provides an overview of the Optem® FUSION Focus Module as well as some general product, warranty, and safety information.

The following topics are covered:

Optem® FUSION Focus Module Overview

The Optem® FUSION Focus Module is a device for motorized Z-axis motion, complete with a stepper motor and limit switches. The Optem® FUSION Focus Module also interfaces with Optem® FUSION fixed magnification or zoom tube lenses, and the Optem® FUSION 1.5A or 3A Illuminator. The module includes a 50/50 beamsplitter to couple the illuminator to the optical path. The Optem® FUSION Focus Module is available in two variants, one supporting visible wavelengths (400-700nm) and one supporting NIR/SWIR wavelengths (633-1700nm). The Optem® FUSION Focus Module should be used in conjunction with Optem® FUSION lower lenses or microscope objectives.

WARNING! *Do not look at the light emitted from the Optem® FUSION Focus Module, when a high power illuminator is enabled. Under some circumstances, the high intensity light could cause eye injury. Photosensitive individuals may be affected by strobe lighting, which can lead to epileptic seizures or other undesirable sensations.*

The Optem® FUSION Focus Module is controlled by the Optem® FUSION Controller, which provides the unit with power and also controls the Optem® FUSION Focus Module z-position.

NOTE: *Refer to the MAN-350013 Optem® FUSION Controller User Manual for more information.*

Intended Use

The Optem® FUSION Focus Module is intended to be used as a component within a microscope system such as the Optem® FUSION micro-imaging lens system. The Optem® FUSION Focus Module should be used in conjunction with Optem® FUSION lower lenses or microscope objectives.

Regulatory compliance

The Optem® FUSION Focus Module has been tested and certified to comply with the IEC 61326-1:2012/EN 61326-1:2013 Basic Electromagnetic Environment Emissions & Immunity for Measurement, Control, and Laboratory Use Electrical Equipment. It also complies with IEC 61010-1/EN 61010-1:2010/A1:2019 Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use.

NOTE: *If the product is modified or changed, the FCC and/or CE approval becomes invalid. In this case, you are responsible for ensuring product conformity.*

Changes to Excelitas Products

Excelitas reserves the right to improve, change, or modify products without incurring any obligations to make changes to previous Excelitas equipment.

Technical Support

For technical support, please contact our Technical Support Team at *Inspection@excelitas.com*.

Limited Warranty Information

Excelitas Technologies Corp. (“Excelitas”) warrants that the enclosed Excelitas component(s) and related Excelitas accessories (individually a “Product” and collectively the “Products”) will be free from defects in materials and workmanship under normal use and service for a period, beginning from the date of shipment, of twelve (12) months.

Excelitas, at its sole discretion, will repair, replace, or adjust the defective Product, provided that Excelitas's investigation and factory inspection disclose that:

- such defect developed under normal and proper use, and
- the Product is covered under this limited warranty.

Warranty Repair Process

Unless otherwise arranged by Excelitas, all service and support requests and Return Material Authorization (RMA) requests must be directed to the Excelitas customer support team, who are responsible for conducting preliminary analysis of issues and leading the investigation on all returned Product(s). The Excelitas customer support team, or another Excelitas officer, will issue a RMA number at its discretion if the analysis performed meets the criteria for RMA. This includes Original Warranty claims, Out of Box failures and Post Warranty service requests.

For complete warranty information, limitations, coverage, and process refer to the sales terms and conditions.

CHAPTER

2

General Description

The chapter provides a general description of the Optem® FUSION Focus Module components and sub-components.

The following topics are covered:

Main Components

The Optem® FUSION Focus Module is controlled by the Optem® FUSION Controller, which provides the unit with power and the Optem® FUSION Focus Module z-position. For more information regarding the Operational Modes, Controller Interfacing, and Software refer to *MAN-350013 Optem® FUSION Controller User Manual*.

Figure 1 *Optem® FUSION Focus Module – Shown with 1.5A Optem® FUSION Illuminator*

Figure 2 *Optem® FUSION Focus Module – Shown with 3A Optem® FUSION Illuminator*

Optem® FUSION Focus Module Cable

The Optem® FUSION Focus Module connects to the Optem® FUSION Controller with an RJ45 cable. This section provides information on the RJ45 connection.

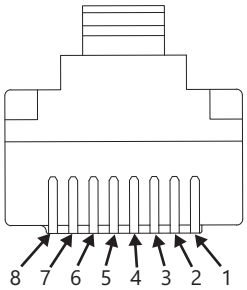


Figure 3 *Optem® FUSION Focus Module RJ45 Connector Pinout*

Table 2 RJ45 Connector Pin Assignments

Pin	Signal	Description
1	MCOIL_A+	Motor Coil A+
2	MCOIL_A-	Motor Coil A-
3	POWER_5V	5V Power output
4	HOME/CWLIM	Home Sensor or CW Limit Switch Input[a]
5	LIMIT_CCWLIM	Limit Sensor or CCW Limit Switch Input[a]
6	POWER_GND	Return Ground
7	MCOIL_B+	Motor Coil B+
8	MCOIL_B-	Motor Coil B-

a. Home/Limit switches are software programmable.

CHAPTER

3

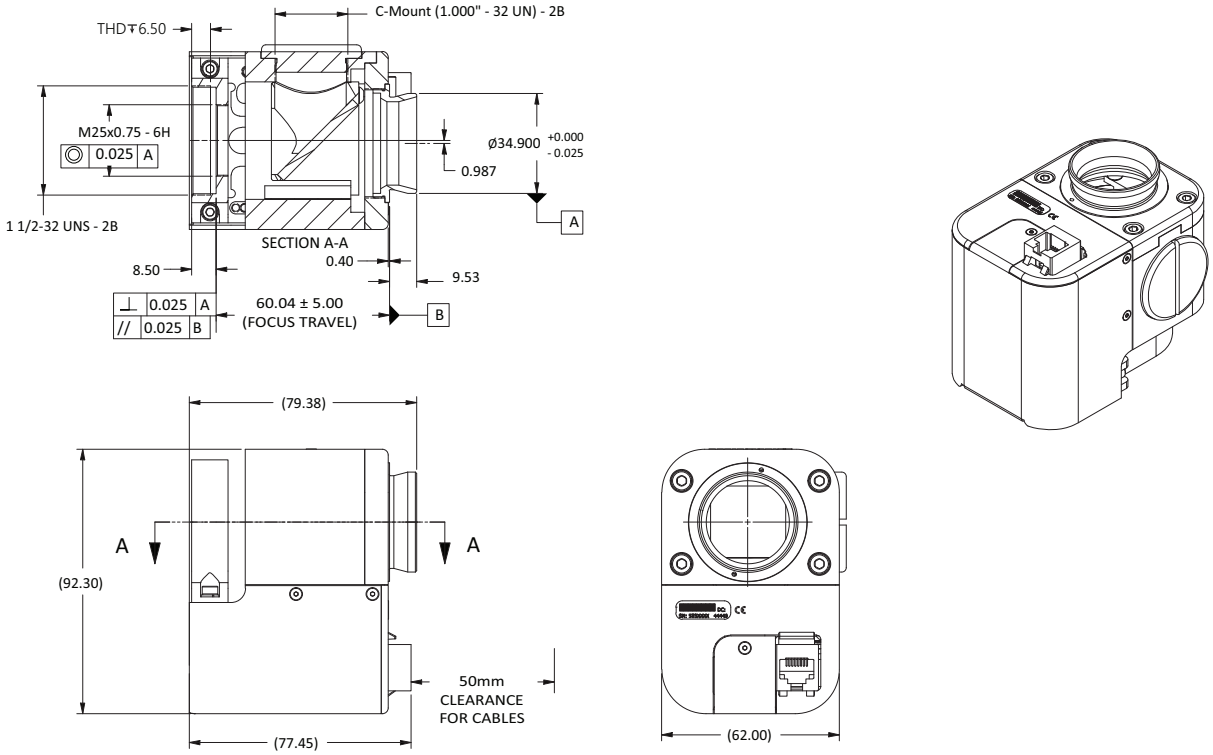
Specifications and Dimensions

This chapter provides the Optem® FUSION Focus Module's mechanical, electrical and environmental specifications and dimensions.

The following topics are covered:

Mechanical Specifications

The following figures highlight the mechanical specifications of the Optem® FUSION Focus Module.



NOTES:
1. APPROXIMATE WEIGHT OF THE MODULE : 0.7 kg

Figure 4 *Optem® FUSION Focus Module Dimensions*

Mechanical Characteristics

The mechanical characteristics for the Optem® FUSION Focus Module are provided in Table 3.

Table 3 Optem® FUSION Focus Module Mechanical Characteristics

Parameter	Minimum	Typical	Maximum	Units
Maximum Payload Weight			1000 500 (Upward)	g
Operating Wavelength Range (Visible)	400		700	nm

Table 3 Optem® FUSION Focus Module Mechanical Characteristics (continued)

Parameter	Minimum	Typical	Maximum	Units
Operating Wavelength Range (SWIR)	633		1700	nm
Focus Travel Range	10	10		mm
Focus Resolution	0.039	0.156		µm
Focus Repeatability			0.600	µm
Focus Backlash			0.600	µm
Focus Travel Time - Entire Range			2	sec
Runout (Flatness & Straightness) (mrad for 1000µm travel)			0.150	mrad
Weight		0.7		Kg

Optical Specifications

This section provides the optical specifications of the Visible and SWIR Optem® FUSION Focus Module.

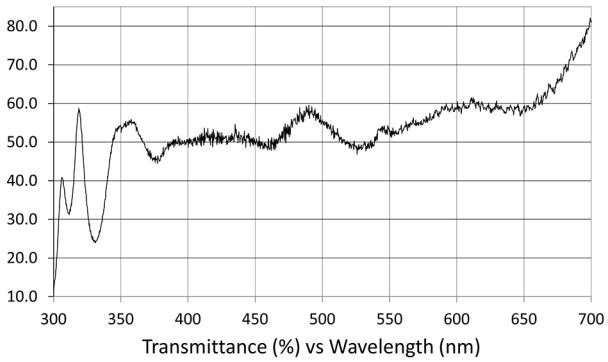


Figure 5 *Transmission curve – Visible (Part Number 35-04-40-000)*

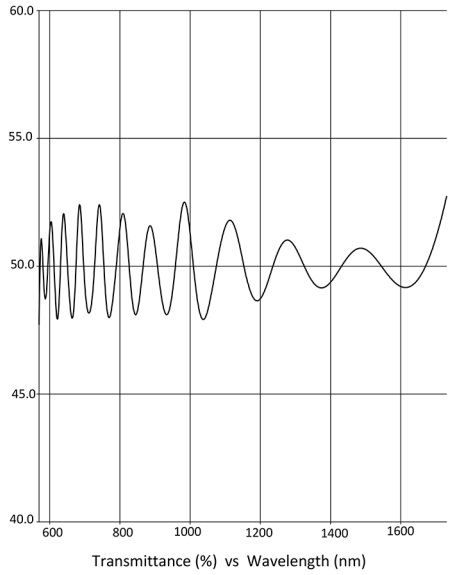


Figure 6 *Transmission Curve – SWIR (Part Number 45-04-40-000)*

Electrical Specifications

The following section highlights the electrical specifications of the Optem® FUSION Focus Module.

Electrical Characteristics

The electrical characteristics for the Optem® FUSION Focus Module are provided in Table 4.

Table 4 Optem® FUSION Focus Module Electrical Characteristics

Parameter	Condition	Min	Typical	Max	Units
Limit Switch Power Supply					
Voltage (POWER_5V)		4.5	5	5.5	V
Current				60	mA
Limit Switches Outputs CWLIM, CCWLIM					
Output Voltage High (VIH)		2.1			V
Output Voltage Low (VIL)				0.4	V
Output Resistance			5		KΩ
Stepper Motor MCOIL A+/A- B+/Current (per Phase)					
Current				0.49	A RMS
Winding Voltage				2.5	V
Winding Resistance			5.1		Ω
Winding Inductance			1.5		mH

Environmental Specifications

NOTE: *Excelitas takes no responsibility for poor performance or malfunction of the system if the conditions described in this section are not met.*

The Optem® FUSION Focus Module is intended to be operated and stored under the following conditions:

1) In a non-corrosive clean room, laboratory, or factory environment having Class 100,000 (ISO8) or better.
2) Operating Environment:
   – The modules meet all performance requirements in the operating range 10ºC to 40ºC, and a humidity range of 10% to 75% non-condensing.
3) Non-Operating (Storage) Environment:
   – The modules meet all performance requirements after being stored in the non-operating environment from 0ºC to 45ºC.
4) Non-Operating (Transport) Environment:
   – The modules meet all performance requirements after being transported in the non-operating environment from -25ºC to 70ºC. Devices shall not be stored in this range for an extended period of time.

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