

**Model 2405OE  
SMPTE 259M Re-Clocking  
Fiber to Electrical Converter  
Instruction Manual**

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## **INFORMATION TO USERS IN EUROPE**

### **NOTE**

#### **CISPR 22 CLASS A DIGITAL DEVICE OR PERIPHERAL**

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to the European Union EMC directive. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

## **INFORMATION TO USERS IN THE U.S.A.**

### **NOTE**

#### **FCC CLASS A DIGITAL DEVICE OR PERIPHERAL**

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

### **WARNING**

Changes or Modifications not expressly approved by Evertz Microsystems Ltd. could void the user's authority to operate the equipment.

Use of unshielded plugs or cables may cause radiation interference. Properly shielded interface cables with the shield connected to the chassis ground of the device must be used

## REVISION HISTORY

<u>REVISION</u>	<u>DESCRIPTION</u>	<u>DATE</u>
1.0	Original Version	Jan 02
1.1	Fixed Formatting	Jun 08

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## 1. OVERVIEW

The 2405OE Fiber to Electrical converter provides an economical method of converting incoming optical distribution for SMPTE 259M (143 - 360Mb/s) serial digital signals to in-plant coaxial distribution. The companion 2405EO Electrical to Fiber converter facilitates conversion from coaxial distribution at the source. The 2405EO is ideal for use in portable, remote and link extension applications where the small size, rugged enclosure and high performance operation meet the stringent requirements of these applications.

The 2405OE converter features one optical input, one coaxial input with two re-clocked serial digital outputs. A coaxial SDI input can be used as a fallback source, in case of optical link failure or can be selected as the primary input. It has been designed to be used primarily as a reclocking SMPTE 259M or DVB-ASI distribution amplifier and converter, however SMPTE 310M (19.4 Mb/s) signals can also be reclocked.

### Features:

- Reclocking for all SDTV video rates including SMPTE 259M (143Mb/s-360Mb/s), SMPTE 344M (540Mb/s), DVB-ASI (270Mb/s) and SMPTE 310M (19.4Mb/s)
- Independent isolated output drivers to ensure no cross channel loading effects and maintain polarity from input to output for DVB-ASI applications
- Operation with multi-mode or single-mode fiber
- SC/PC, ST/PC or FC/PC connector options
- Comprehensive signal, laser and modules status indicator LEDs
- Rugged, small form factor enclosure
- Low power +12 VDC operation

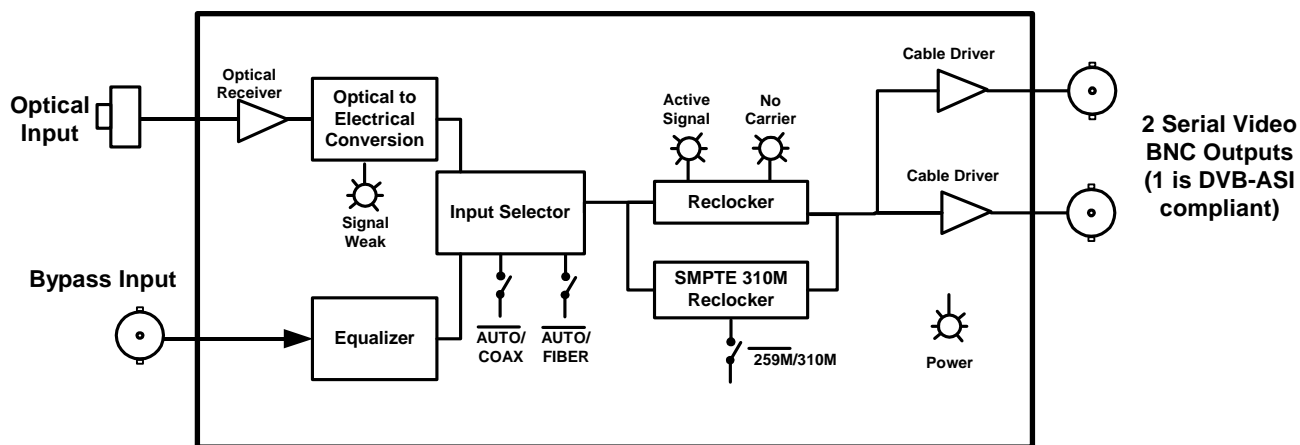


Table 1-1: 2405OE Block Diagram

2. INSTALLATION

The 2405EO is a compact module that has two BNC connectors and one SC/PC (shown), ST/PC or FC/PC optical connector.

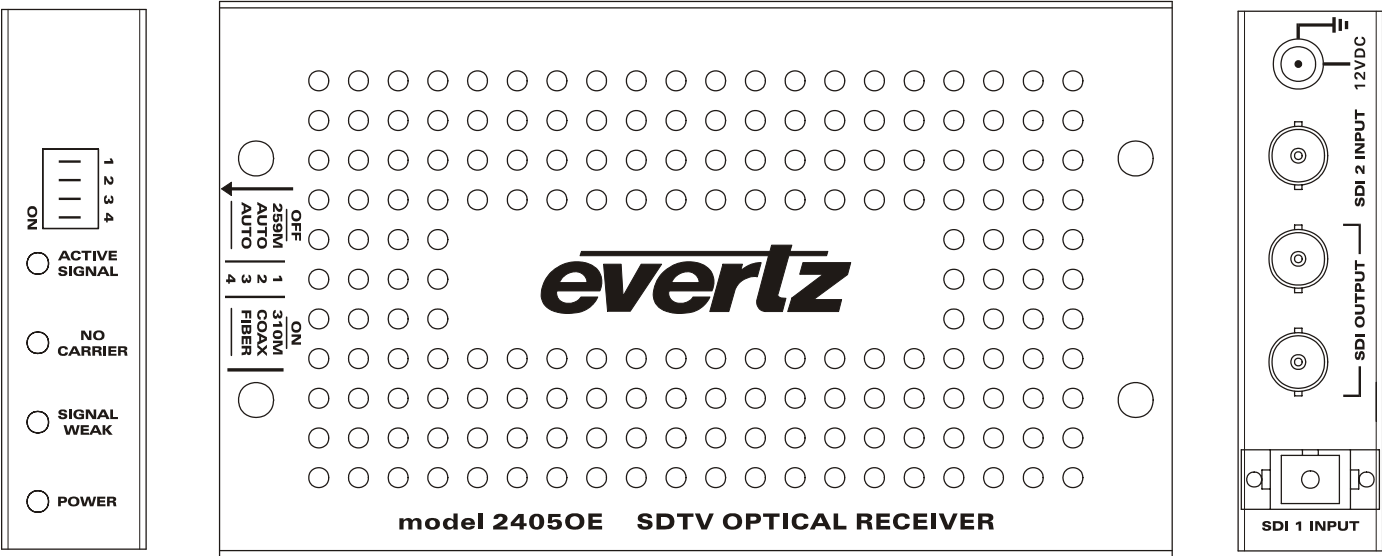



Table 2-1: 2405OE Module

**SDI 1 INPUT:** This SC/PC (shown), ST/PC or FC/PC female optical connector is the primary input to the 2405OE, providing reclocking of serial digital signals at the specified rates. This wide range input accepts optical wavelengths of 1310nm to 1610nm, accommodating standard or CWDM transmission schemes.

**SDI 2 INPUT:** This BNC input provides a second Serial Video input. When the SOURCE DIP switches are set to the AUTO mode, the module will switch to the coaxial input in case of optical link failure. In addition either input may also be selected as the sole signal source. See section 5.2 for more information on setting the SOURCE DIP switches.

**SDI OUTPUT:** The 2405OE provides two coaxial outputs for signal distribution. These outputs will contain the signal from either the optical or coaxial input depending on the settings of the SOURCE DIP switches. Only the SDI OUTPUT closest to the SDI 1 INPUT connector maintains the correct polarity for DVB-ASI signals.



12VDC

The 2405OE comes with an auto-ranging DC voltage adapter that automatically senses the input voltage. Power should be applied by connecting a 3-wire grounding type power supply cord to the power entry module on the DC voltage adapter. The power cord should be minimum 18 AWG wire size; type SST marked VW-1, maximum 2.5 m in length. The DC cable of the voltage adapter should be connected to the DC power jack on the rear panel. A green LED located beside the power connector will be illuminated when there is power applied to the 2405OE.



## 2.1. CARE AND HANDLING OF OPTICAL FIBER

### 2.1.1. Safety



**Never look directly into an optical fiber. Non-reversible damage to the eye can occur in a matter of milliseconds.**

The laser modules used in the Evertz fiber optic modules are Class I, with a maximum output power of 2mW, and wavelengths of either 1310 nm or 1470 to 1610 nm.

### 2.1.2. Handling And Connecting Fibers



**Never touch the end face of an optical fiber.**

The transmission characteristics of the fiber are dependent on the shape of the optical core and therefore care must be taken to prevent fiber damage due to heavy objects or abrupt fiber bending. Evertz recommends that you maintain a minimum bending radius of 3 cm to avoid fiber-bending loss that will decrease the maximum attainable distance of the fiber cable. The Evertz fiber optic modules come with cable lockout devices, to prevent the user from damaging the fiber by installing a module into a slot in the frame that does not have a suitable I/O module. For further information about care and handling of fiber optic cable see section 3 of this manual.

### **3. SPECIFICATIONS**

#### **3.1. OPTICAL INPUT**

**Standards:** SMPTE 297M  
**Normal:** SMPTE 259M A, B, C, D (143 to 360 Mb/s) SMPTE 344M (540 Mb/s),  
SMPTE 305M (SDTI), or DVB-ASI  
**Switch Selectable:** SMPTE 310M (19.4 Mb/s)  
**Connector:** Female SC/PC, ST/PC or FC/PC.  
**Wavelength:** 1310 -1610nm.  
**Optical Sensitivity:** -27dBm @ 270 Mb/s.  
**Max. Input Power:** 0dBm.  
**Fiber Size:** 62  $\mu$ m core / 125  $\mu$ m overall.

#### **3.2. COAXIAL INPUT**

**Standards:**  
**Normal:** SMPTE 259M A, B, C, D (143 to 360 Mb/s) SMPTE 344M (540 Mb/s),  
SMPTE 305M (SDTI), or DVB-ASI  
**Switch Selectable:** SMPTE 310M (19.4 Mb/s)  
**Connector:** BNC per IEC 169-8.  
**Impedance:** 75 $\Omega$  (nominal).  
**Equalization:** Automatic to 250m @ 270Mb/s with Belden 8281 cable.  
**Return Loss:** > 15dB to 540Mb/s.

#### **3.3. SERIAL VIDEO OUTPUTS**

**Connectors:** BNC per IEC 169-8.  
**Impedance:** 75 $\Omega$  (nominal).  
**Signal Level:** 800mV (nominal).  
**DC Offset:** 0V (nominal).  
**Rise and Fall Time:** 900ps (nominal).  
**Overshoot:** < 10% of amplitude.  
**Return Loss:** > 15dB to 540Mb/s.  
**Wide Band Jitter:** < 0.15UI (Reclocked).

#### **3.4. ELECTRICAL**

**Voltage:** + 12VDC  
**Power:** 6 Watts.  
**EMI/RFI:** Complies with FCC regulations for class A devices.  
Complies with EU EMC directive.  
**DC Power Supply:** 115/230 VAC 50/60 Hz, 30 VA

#### **3.5. PHYSICAL**

**Dimensions:** 6" L x 3.5" W x 1" H (152mm L x 89mm W x 25mm H)  
**With Mounting Flanges:** 6" L x 4" W x 1" H (152mm L x 114mm W x 25mm H)  
**Weight:** 0.5 lbs. (0.28 Kg)

## **4. STATUS LEDS**

- ACTIVE SIGNAL:** This Green LED will be On when there is a valid signal present at the module input.
- NO CARRIER:** This Red LED will be On when there is no valid signal present at the module input.
- SIGNAL WEAK:** This Yellow LED will be On when the cable equalizer detects that the cable length is greater than a preset threshold. (factory set for 250 meters of Belden 8281 or equivalent cable). See section 5.3 for information on adjusting the cable equalizer warning threshold.
- POWER:** This Green LED will be On when there is power to the unit.

## 5. USER CONTROLS

The 2405EO is equipped with a 4 position DIP switch to allow the user to configure the module. The On position is down, or closest to the printed circuit board. Table 5-1 gives an overview of the DIP switch functions. Sections 5.1 and 5.2 give specific information about each of the DIP switch functions.

DIP Switch	Function
1	Reclock Mode Selection
2	Input Source
3	
4	Future use

**Table 5-1: DIP Switch Functions**

### 5.1. SELECTING THE VIDEO STANDARD

DIP switch 1 determines whether the module will operate as a distribution amplifier with SMPTE 259M (143 to 360 Mb/s), SMPTE 344M (540 Mb/s) or DVB-ASI video signals or with SMPTE 310M (19.4 Mb/s) signals as shown in Table 5-2.

DIP 1	FUNCTION	DESCRIPTION
Off	259M (default)	The 2405OE will reclock SMPTE 259M (143 to 360 Mb/s), SMPTE 344M (540 Mb/s) or DVB-ASI video signals.
On	310M	The 2405OE will reclock SMPTE 310M (19.4 Mb/s) video signals.

**Table 5-2: Reclock Mode Switch Setting**

### 5.2. SELECTING THE INPUT SOURCE

DIP switches 2 and 3 allow the user to set whether the 2405OE will use the Optical or Coaxial Input.

DIP 2	DIP 3	DESCRIPTION
Auto (default)	Auto (default)	Set both switches to the AUTO position to enable automatic switching between the SDI 1 (optical) and SDI 2 (coaxial) inputs. The optical input is selected as the default signal source. If the module loses lock on the optical signal and a signal carrier is present on the coaxial input, the module will automatically switch to the coaxial input.
COAX	Auto	Set switch 2 to the COAX position to select the SDI 2 (coaxial) input as the only signal source.
Auto	FIBER	Set switch 3 to the FIBER position to select the SDI 1 (optical) input as the only signal source.

**Table 5-3: Input Source Switch Settings**

### **5.3. SETTING THE EQUALIZER WARNING THRESHOLD**

The EQ Adj. trimpot (accessible by removing the top cover of the module) is used to set the threshold of the cable equalizer warning. The equalizer warning is factory set to 250 meters of Belden 8281 cable, but may be adjusted for other cable types or cable lengths. To adjust the cable equalizer warning threshold, connect a signal to the input of the module using the required length of cable. Adjust the trimpot slowly until the Weak Signal warning LED comes on. You can verify that the equalizer warning is operating correctly by removing a few meters of cable from the input. The LED should go off.

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