Overview

Trunk Lines at the Moment

Migrating to Fiber Optics

Trunk lines carry many different kinds of signals—video, synchronization, audio, control, power supply—and consequently they're usually comprised of numerous different types of cables. As a result, conduits, electrical pits, and ladders tend to overflow with cabling, leaving hardly any room when lines must be added to upgrade or expand the system.

But, converting these disparate signals into optical signals and transmitting them using fiber optic cables greatly reduces the need for so many specialized cables. Converting trunk lines to fiber optics makes it much easier to design and upgrade equipment and systems, because once laid these lines can be used with considerable flexibility. Fiber optic cables also have smaller diameters, meaning they take up less space, a clear advantage in alleviating some of the problems of today's cable-stuffed broadcasting facilities.

Sending HD Signals Everywhere

HD-SDI signals can be transmitted only about 100 meters over standard coaxial cables (5C-FB). This means that when wiring rooms and buildings with coaxial cables, it's sometimes difficult to achieve an optimal layout or position equipment where it will be most convenient and useful. Further, signal transmissions often need to cover unexpectedly long distances, and fiber optic cables, with their transmission distance measured in tens of kilometers, win hands-down over coaxial cables. This flexibility alleviates much of the conventional worry about cable routing and allows the equipment itself to take center stage. The cost of optical signal converters has dropped radically, too–most can be had for a few hundred dollars–making it difficult these days to find reasons not to introduce fiber optic systems!

Diversified Needs for Optical Conversion

■ It is not just the HD-SDI signal

It is not just the HD-SDI signal that is converted into optical signals. For example, there is a case in which the HD-SDI signal is converted into optical signals along with the control signal to transmit video images during recording in a studio. Converting various signals into optical signals allows them to be transmitted through fiber-optic cables, eliminating the necessity of separately preparing metal cables.

Advantages of Fiber Optic Transmission in the Field

With it now so easy to convert transmissions into optical signals, fiber optic systems are better suited than ever to field recording applications. Newly developed extra-strong, extra-bendable optical fibers have finally reduced past concerns about cable durability, meaning that in applications like remote broadcasting, video, audio and other signals can all be transmitted on a single cable, one of the inherent merits of fiber optic systems.

Cable Diameters

Even with 100 cores (lines), a fiber optic cable has an external diameter of just 11.5 mm. Compare that to a typical coaxial cable and the difference is clear.



Example of an Optical Fiber Trunk Line

Fiber optic systems are used in signal transmissions within a single broadcast station, or between a main building and an annex building.





Tough & Flexible HFO Camera Cable



Overview

Important Fiber Optic Line Considerations

Light Receiving Power

In optical transmission, transmission quality is evaluated by the relationship between "light receiving power" and "error rate." Error rate is dependent upon the signal to noise ratio (S/N), but since the noise level is thought of as being at a set level independent of the signal strength, the strength of the signal (light receiving power) at the receiver influences S/N considerably, in turn affecting the error rate. Therefore, to maintain a specified transmission quality, it is necessary to design light receiving power to be above the minimum light receiving power of the receiver. The graph at right is an example showing the light receiving power and error rate within the combination of a TX and a RX. From this graph, we can estimate that to get an error rate of $2 \times 10-18$ (to ensure a probability of 1 for transmission errors during 10 years of continuous operation), the light receiving power of the RX must be set greater than -24.3 dBm assuming the signal source and the TX are connected with a coaxial cable 1 meter in length (SMPTE connection standard).

If the signal source and the TX are connected by a coaxial cable 190 meters in length, then the light receiving power of the RX must be more than -23.6 dBm, from which we can see that the light receiving power deteriorates by about 1 dB as compared with the connection standard.



Loss Budget Diagram



Loss Budget (LB)

Loss budget is the difference between the optical power output (P1) from the EO converter and the light reception sensitivity (P2) of the OE converter.



Example) If the optical power output P1 = -2.5 dBm and the reception sensitivity P2 = -22 dBm :



In EO/OE system design, 1) cable attenuation loss, 2) connector insertion loss, 3) fusion splice connection loss, and 4) Mux/Demux insertion loss must be calculated so that they are less than the loss budget (LB) of the optic link.

For SDI system, since the loss of Mux/Demux is greater than that of the fiber attenuation loss, it would be essential you to consider such loss factors when you configure the system.

Loss Attenuation

	Loss Factor	Value
1	Connector Insertion Loss	0.5 dB/Point
2	Mux/Demux	2~3 dB/Point
3	Fiber Cable	0.3 dB/km(*)
	Splitter	0.5 dB/Main 10 dB/Branch
	Divider	3 dB/Point
	Fusion Splice Loss	0.2 dB/Point
	System Margin	2~6 dB

* 0.5~1.0 dB/km for Dark fiber

Overview

Wavelength Multiplexing Systems

Multiplexing

"Multiplexing" is a technology that allows multiple signals with different wavelengths to be transmitted together over a single optical fiber. Three general types of multiplexing – WDM, CWDM and DWDM – offer increasing signal-carrying capacities, as described below.

Wavelength Division Multiplexing (WDM)

WDM is the simplest form of multiplexing and uses two wavelengths of 1310nm and 1551nm. Unlike when using and optical divider, insertion loss can be kept below 0.5dB.

Coarse Wavelength Division Multiplexing (CWDM)

CWDM systems use 8 wavelengths (20nm grid) primarily between 1471nm and 1611nm. To these it is also possible to add 8 more between 1271nm and 1451nm to allow a maximum of 16 wavelengths to be carried as a single multiplexed transmission. An ultra-thin membrane filter on the optical multiplexer/demultiplexer (mux/demux) keeps insertion loss at just 2-3dB. *CWDM standardized through ITU G695.

Optical Converter (TX for CWDM)

Canare's CWDM optical converter uses a DFB laser, which offers a much tighter spectrum than FP lasers. Up to 16 different

wavelengths fall within 1271nm and 1611 nm in 20nm intervals. The wavelengths in the 20nm grid between 1391nm and 1411nm are not used because their proximity to the water peak results in too much attenuation.



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-(um)

Optical Multiplexer/Demultiplexers

The optical signals output from the optical converter (TX) are combined into a single signal by the multiplexer (mux) and transmitted along a single optical fiber. At the receiving end, these combined optical signals are demultiplexed (demux) to split them back into their original component 8 signals.

0.1 0.8 1.0

Optical mux/demuxers are bi-directional, so the same model can be used for transmitting and receiving on each end. It's also possible to use 4 wavelengths out of the 8 for transmitting and the remaining four for receiving. Both 8-wavelength and 16-wavelength models are available, and combining these with an optical converter allows a variety of system constructions with many uses.

Optical Converter (RX)

Canare's optical converter (RX) converts an optical signal comprised of 8 different wavelengths into electrical signals. This converter is common to all wavelengths and one converter is required for each wavelength.

Once optical fiber cables have been laid, multiplexing the transmissions carried on them eliminates the need to purchase and install new cables when more transmission lines are needed.

Eight Canare optical converters and an FCWDM-8B mux/demuxer can be installed compactly on a single 161UPSC 1RU-size platform, effectively allowing an 8-wavelength transmission system to be achieved in just 1RU of space.

Multiplexing (CWDM)







Note: Please use with Canare platform.

12G-SDI EO/OE Converters

■ Electric to Optic Converter (TX)

Model	Wavelength	Emission	Occupancy
EO12G-100B	1310 nm	-2 dBm	1 slot
EO12G-100A-**	1271-1451nm for CWDM*	-1 dBm	1 slot

*Refer to the following information to specify the wavelength and the model number.

■ Optic to Electric Converter (RX)

Model	Wavelength	Sensitivity	Occupancy
OE12G-101B	1260-1650 nm	-13 dBm	1 slot

Key Features and Benefits

- Supports 12G/6G/3G/HD/SD-SDI and DVB-ASI
- Capable of Pathological Test Pattern transmission (SMPTE RP-178, 198 Check Field Test Pattern)
- · Super low latency
- Compact size
- No complicated settings
- 3-color LED signal indication

Specifications

Model	EO12G-100B	EO12G-100A-**	OE12G-101B
Convertibility	Electric	to Optic	Optic to Electric
Fiber Type		Single Mode	
Optical Input	N	/A	1 × LC
Optical Output	1 × LC		N/A
SDI Input	1 × 75Ω BNC		N/A
SDI Output	N/A		1 × 75Ω BNC
Dimensions	17 × 43.4 × 78.4 mm		
Weight	Approx. 95 g		
Standards	SMPTE ST 2082-1, 2081-1, 424, 297-1, 292-1, 259, EN50083-9		





EO12G-100A-* 12G-SDI



12G-SDI

EO12G-100A- 27

Wavelength

27 1271nm 29

31 1311nm 33 1331nm 35 1351nm 37 1371nm 43 1431nm 45 1451nm

1291nm

Ordering Information for EO12G-100A-**

Note : Platform is required for power supply (page 16).

12G-SDI Repeater

Equalizes and reclocks SDI signals to extend the transmission distance over a coaxial cable.

Model	Supporting Signals	Occupancy
EE12G-100	12G/6G/3G/HD/SD-SDI, DVB-ASI	1 slot

Key Features and Benefits

- Supports 12G/6G/3G/HD/SD-SDI and DVB-ASI
- 12G-SDI cable equalization: 100 m over L-5.5CUHD (Typ.)
- 3-color LED signal indication
- Allows for efficient use of existing cable infrastructure.

Specifications

I/O Connectors	2 × 75Ω BNC	
Standards	SMPTE ST 2082-1, 2081-1, 424, 292-1, 259, EN50083-9	



Digital Recorder

EE12G-100

12G-SDI

Weight: 85g

Dimensions: $17 \times 43.4 \times 78.4$ mm

Note : Platform is required for



Website

EO/OE Converters

3G-SDI EO/OE Converters

Electric to Optic Converter (TX)

Model	Wavelength	Emission	Monitor Out	Occupancy
EO3G-100	1310 nm	-2.5 dBm	No	1 slot
EO3G-200	1310 nm	-2.5 dBm	Yes	2 slots
EO3G-100A-**	1271-1611 nm for CWDM*	+2.5 dBm	No	1 slot

*Refer to the following information to specify the wavelength and the model number.

■ Optic to Electric Converter (RX)

Model	Wavelength	Sensitivity	Dual Out	Occupancy
OE3G-101	1200-1620 nm	-22 dBm	No	1 slot
OE3G-201	1200-1620 nm	-22 dBm	Yes	2 slots

Key Features and Benefits

- Supports 3G/HD/SD-SDI and DVB-ASI
- Capable of Pathological Test Pattern transmission
- (SMPTE RP-178, 198 Check Field Test Pattern)
- Super low latency
- Compact size
- No complicated settings
- Cost effective





Website

EO3G-100



OE3G-101



OE3G-201 (with Dual Output)

Specifications

Model	EO3G-100	EO3G-200	EO3G-100A	OE3G-101	OE3G-201
Convertibility		Electric to Optic	;	Optic to Electric	
Optical Connector	1 × LC (output)			1 × LC (input)	
Fiber Type	Single Mode				
SDI Input	1 × 75Ω BNC	1 × 75Ω BNC	1 × 75Ω BNC	N/A	N/A
SDI Output	N/A	1 × 75Ω BNC (no-re- clocked)	N/A	1 × 75Ω BNC	2 × 75Ω BNC
Dimensions (mm)	17 × 43.4 × 78.4	35.5 × 43.4 × 78	17 × 43.4 × 78.4	17 × 43.4 × 78.4	35.5 × 43.4 x 78
Weight (approx.)	100 g	150 g	95 g	100 g	150 g
Standards	SMPTE ST 259, 292-1, 297-1, 424, EN50083-9			9	

Ordering Information for EO3G - 100A - ** EO3G - 100A - 27 — Wavelength 27 1271nm 29 1291nm 31 1311nm 33 1331nm 53 1531nm

EO3G-	100A-*	*

Note: Platform is required for power supply (page 16).

35 1351nm

37 1371nm **43** 1431nm 55 1551nm 57 1571nm

59 1591nm

45 1451nm 61 1611nm

Technical Note

Jitter

The timing deviation of the periodic signal waveform is called jitter. For serial data signals such as SDI signals, Jitter occurs due to the deviation of reference clock signal, reflection caused by connection through coaxial cables or between devices, loss of DC and high frequency components, the influence of noise from the equipment itself or from the outside.

In the worst case, an error occurs in clock data recovery due to this jitter and that with SDI signals, noise may appear on the screen or signal transmission may come to be fail.



Jitter: 93 ps

Jitter: 210 ps

AES 3id Optical Converters End of Sale

Model	Wavelength	Emission	Sensitivity	Occupancy
EO-500-**	1471-1611 nm for CWDM*	-3 dBm	N/A	5 slots
OE-501	1200-1620 nm	N/A	-26 dBm	

* Refer to the following information to specify the wavelength.

Key Features and Benefits

- Multiplex and optically convert AES signals from up to 8 ports (16 audio channels) to allow them to be transmitted over long distance.
- Supports 8 wavelengths CWDM; enables max. 64 ports (128 audio channels) signals to transmit over a single optical fiber.
- AES-3id-1995 and SMPTE 276M
- Fully asynchronous multiplex transmission.
- Word clock can be transmitted (30kHz to 50kHz).
- Dolby-E compatible



Specifications

Model	EO-500-**	OE-501	
Convertibility	Electric to Optic	Optic to Electric	
Fiber Type	Single Mode		
Optic Connector	1 × SC (output)	1 × SC (input)	
AES I/O Connector	8 × 75Ω BNC (input)	8 × 75Ω BNC (output)	
Dimensions	91 × 43.4 × 76.2 mm		
Weight	174 g		
Standards	AES-3id-1995, SMPTE ST 276		

Analog Audio Optical Converters

Model	Wavelength	Occupancy	Remark
TRM-540	1310 nm		Work with TRM-541.
TRM-541	1550 nm	5 slots	Work with TRM-540.
TRM-540A-**	1471-1611 nm for CWDM (*1)		Work with TRM-540A-** of a different wavelength (*2).

*1) Refer to the following information to specify the wavelength and the model number. *2) TRM-540A-** does not work with TRM-540 or TRM-541.

Key Features and Benefits

- Enables line level audio signals to transmit long distance over a fiber-optic cable.
- 8 channel transmission (4-channel inputs/4-channel outputs)
- Maximum input/output voltage: +24 dBu (balanced)
- Supports 600Ω input by each channel with selector switches.



Block Diagram of TRM-540 and TRM-541

Specifications

Model	TRM-540, TRM-541	TRM-540A-**	
Fiber Type	Single Mode		
Optic I/O Connector	1 × SC 2 × LC		
Audio I/O Connector	1 × D sub 25 pin (F)		
Frequency Response	20 Hz - 40 kHz (-3 dB, +0.1 dB)		
Dimensions	91 × 43.4 × 78.4 mm		
Weight	265 g		



EO-500-55

OE-501

Website

Ordering Information for EO-500-**

EO-500- 47	Wave	elength
	47	1471nm
	49	1491nm
	51	1511nm
	53	1531nm
	55	1551nm
	57	1571nm
	59	1591nm
	61	1611nm

Website



Note: Platform is required for power supply (page 16).

Ordering Information for TRM-540A-** TRM-540A- 47 Wavelength

wavelength		
47	1471nm	
49	1491nm	
51	1511nm	
53	1531nm	
55	1551nm	
57	1571nm	
59	1591nm	
61	1611nm	
	47 49 51 53 55 57 59 61	

EO/OE Converters

1000BASE-T Optical Converters

Model	Wavelength	Occupancy	Remark
TRM-300-G31	1310 nm		Work with TRM-300-G55.
TRM-300-G55	1550 nm	2 slots	Work with TRM-300-G31.
TRM-300A-G**	1471-1611 nm for CWDM (*1)		Work with TRM-300A-G** of a different wavelength (*2).

*1) Refer to the following information to specify the wavelength and the model number *2) TRM-300A-G** does not work with TRM-300-G31 or TRM-300-G55.

Key Features and Benefits

- Media converters for Gigabit Ethernet 1000BASE-T*
- *No backwards compatibility with other Ethernet standards such as 100BASE-TX.
- Super-low latency: less than 1 micro-second.
- Extends communications up to 20 km (condition: line loss 0.5 dB/km)
- Bi-directional optical communication



Block Diagram of TRM-300-G31 and TRM-300-G55

Specifications

Model	TRM-300-G31, TRM-300-G55	TRM-300A-G**	
Fiber Type	Single Mode		
Optic I/O Connector	1 × SC 2 × LC		
Ethernet I/O Connector	1 × RJ45		
Dimensions	35.5 × 43.4 × 76 mm		
Weight (approx.)	155 g		
Standards	IEEE 802.3ab (1000BASE-T)		

Model	Wavelength	Occupancy	Remark
TRM-210	1310 nm		Work with TRM-211.
TRM-211	1550 nm	2 slots	Work with TRM-210.
TRM-210A-**	1471-1611 nm for CWDM (*1)		Work with TRM-210A-** of a different wavelength (*2).

*1) Refer to the following information to specify the wavelength and the model number.
 *2) TRM-210A-** does not work with TRM-210 or TRM-211.

Key Features and Benefits

Media converters for Fast Ethernet 100BASE-TX*

100BASE-TX Optical Converters

- *No backwards compatibility with other Ethernet standards such as 10BASE-T.
- Auto MDI/MDX
- Extends communications up to 30 km (condition: line loss 0.5 dB/km)
- Bi-directional optical communication



Block Diagram of TRM-210 and TRM-211

Specifications

Model	TRM-210, TRM-211	TRM-210A-**	
Fiber Type	Single Mode		
Optic I/O Connector	1 × SC 2 × LC		
Ethernet I/O Connector	1 × RJ45		
Dimensions	35.5 × 43.4 × 76.2 mm		
Weight (approx.)	103 g	110 g	
Standards	IEEE 802.3u (100BASE-TX)		



TRM-300A-G**

Ordering Information for TRM-300A-G**

TRM-300A-G 47 -	Wave	elength
	47	1471nm
	49	1491nm
	51	1511nm
	53	1531nm
	55	1551nm
	57	1571nm
	59	1591nm
	61	1611nm

Note: Platform is required for power supply (page 16).

Website



TRM-210A-**

Ordering Information for TRM-210A-** TRM-210A- 47 — Wavelength

wavelength		
47	1471nm	
49	1491nm	
51	1511nm	
53	1531nm	
55	1551nm	
57	1571nm	
59	1591nm	
61	1611nm	

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Website

RS-422/RS-232 Optical Converters

Model	Wavelength	Occupancy	Remark
TRM-220	1310 nm		Work with TRM-221.
TRM-221	1550 nm	3 slots	Work with TRM-220.
TRM-220A-**	1471-1611 nm for CWDM (*1)		Work with TRM-220A-** of a different wavelength (*2).

*1) Refer to the following information to specify the wavelength and the model number. *2) TRM-220A-** does not work with TRM-220 or TRM-221.

Key Features and Benefits

- TIA-422, SMPTE ST 207, RS-232
- Usable in a case of RS-422 <=> RS-232
- Extends communications up to 30 km (condition : line loss 0.5 dB/km)
- Bi-directional optical communication



Block Diagram of TRM-220 and TRM-221

Specifications

Model	TRM-220, TRM-221	TRM-220A-**	
Fiber Type	Single Mode		
Optic I/O Connector	1 × SC 2 × LC		
Serial I/O Port	1 × Dsub 9 pin (F)		
Max. Data Rate	RS-422: 10 Mbps, RS-232: 1 Mbps		
Dimensions	54 × 43.4 × 76.2 mm		
Weight (approx.)	110 g	120 g	
Standards	TIA-422, SMPTE ST 207, RS-232C		

TRM-220	

TRM-220A-**

1.5

Ordering Information for TRM-220A-** TRM-220A- 47 — Wavelength

- Wave	 Wavelength 			
47	1471nm			
49	1491nm			
51	1511nm			
53	1531nm			
55	1551nm			
57	1571nm			
59	1591nm			
61	1611nm			

Note: Platform is required for power supply (page 16).

More Converters

Model	Occupancy	
TRM-100	2 alata	(he
TRM-101	3 SIOLS	

Multiplex and optically convert HD-SDI and RS-485 signal to transmit long distance over a fiber-optic cable. Suited for HD surveillance camera system.

Model	Occupancy	
TRM-400	2 alata	
TRM-401	3 slots	

Multiplex and optically convert analog video, stereo audio, RS-422, and relay signals to transmit long distance over a fiber-optic cable.

Model	Occupancy
TRM-230	2 alata
TRM-231	3 SIOLS

Multiplex and optically convert 7 of each input/output relay signal and RS-422/232 signals to transmit long distance over a fiber-optic cable.



Note: Platform or Stand Alone Kit required for power supply (page 16).

Mux/Demux, Splitter

CWDM Mux/Demux

■ Slot-in Module Types

Model	Ch.	Wavelengths	Occupancy
FCWDM-8B	8	1471-1611 nm	9 alata
FCWDM-8B-13	8	1271-1451 nm	o siots

Rack Mount Types

Model	Ch.	Wavelengths	Size
FCWDM8/1A	8	1471-1611 nm	
FCWDM8/1A-13	8	1271-1451 nm	
FCWDM8/2A	2 each of 8	8 2 each of 1471-1611 nm 1F	
FCWDM8/2A-13	2 each of 8	2 each of 1271-1451 nm	
FCWDM16A	16	1271-1611 nm	

Key Features and Benefits

- Bi-directional 8 or 16 wavelengths.
- Passive and stand-alone products.
- Easy to use Just plug in SC- type connectors.
- FCWDM-8B(-13) can be loaded into 161UPSC; enables 8- wavelength CWDM within 1RU frame.

<Loading example (rear view of 161UPSC)>



Mux/DeMux 3G-SDI EO Converter for CWDM FCWDM-8B EO3G-100A-47~61

Specifications

Model	FCWDM-8B (-13)	FCWDM8/1A (-13)	FCWDM8/2A (-13)	FCWDM16A
Connectors		S	С	
Passband	+/- 6.5 nm (ITU-T G.695)			
Min. Passband Ripple	0.5 dB			
Max. Insertion Loss*	2.0 dB 3.3 dB			3.3 dB
Min. Isolation	30 dB			
Dimensions (mm)	146 × 43.4 x 94.2	482.6 × 44 × 362.3		
Weight (approx.)	210 g	1700 g	1800 g	1890 g
Wavelengths Details (nm)	1271-1451: 1271/1291/1311/1331/1351/1371/1431/1451 1471-1611: 1471/1491/1511/1531/1551/1571/1591/1611			

* Insertion loss includes ripple, PDL, and connector loss

Optical Splitter			
Model	Wavelength	Description	
FDM-2	1001 1011	1 × 2 Splitter for Single Mode Fiber	
FDM-4	1261-1611nm	1 × 4 Splitter for Single Mode Fiber	

Key Features and Benefits

- Divides single optical input into multiple optical output.
- Passive and stand-alone products.
- Can be loaded into platform for Canare plug-in unit.
- Easy to use Just plug in SC-type connectors.
- Low insertion loss.















Slot Occupancy: 3 slots Dimensions: 54 × 43.4 × 82 mm Weight: 83g



Slot Occupancy: 4 slots Dimensions: 72 × 43.4 × 82 mm Weight: 110g

Power Supply

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Power supply for Canare plug-in modules. The robust 1RU rack mountable and space efficient portable types are available.

Model	Description	Number of Slots
161UPSC-**	1RU rack mount type	16
6PSC-**	Portable type	6
2PSC	Palm size	2
PSM2-**	Redundant power supply module for 161UPSC	N/A

Note: 161UPSC shall be used in countries where CE marking directive is not applied. Contact Canare for details.

Key Features and Benefits

- · Compact design Maximum 16 modules within 1RU
- · Hot swappable
- 161UPSC can be output 4 types of alarm signals via Dsub 9P (F).
- 161UPSC provides power redundancy by adding a PSM2.

Specifications

Model	161UPSC	6PSC	2PSC	
Number of Slots	16	6	2	
AC Input Voltage	100 to 240V 50/60Hz 0.35A		N/A	
DC Input Voltage	N/A	10 to 18V	10 to 18V	
Max Power Consumption (exclusive of modules)	22W	4.5W (AC) 2.2W (DC)	2.2W	
Power Connector	AC3P Jack AC3P Jack (AC) XLR4 Male (DC)		XLR4 Male	
Supply Voltage to Module	DC 5V			
Operating Temperature	-10 to 40 deg C			

Stand Alone Kit

Model	For	Description		
WMM0190	TBM with power input	a clamping bracket (one side)		
WEPZ0258	(TRM-100/230/400/540)	AC 100-240V to DC 5V adapter, Plug Type A No CE marking		

Key Features and Benefits

- Operates a TRM converter without a Platform.
- Simple and cost-effective method
- Used in combination of two WMM0190 and WEPZ0258.



161UPSC-** Dimensions: 434 \times 44 \times 340 mm Weight: 4500g



6PSC-**

Dimensions: 210 \times 44 \times 165 mm Weight: 650g



Dimensions: $90 \times 44 \times 110$ mm Weight: 200g





2 of WMM0190 with TRM

WEPZ0258



Support 12G/6G/3G/HD/SD-SDI and DVB-ASI

Support 3G/HD/SD-SDI and DVB-ASI

HFO Transmission Devices

HFO Transmission Device (Quad-link)

Transmit 4-channel SDI over a HFO camera cable.

FCBK4-12G	12G-SDI
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Model	HFO EO/OE Modules		Model HFO Connector EO/OE Modules		EXT Connector	IDX V-plate
FCBK4-FF5W1-12G	FCFRA (Female)	4 × OE12G-101B (RX)	XLR5 Female	No		
FCBK4-FF5W1-12G-PV	FCFRA (Female)	4 × OE12G-101B (RX)	XLR5 Female	Yes		
FCBK4-FM5W2-12G	FCMRA (Male)	4 × EO12G-100A-** (TX)	XLR5 Male	No		
FCBK4-FM5W2-12G-PV	FCMRA (Male)	4 × EO12G-100A-** (TX)	XLR5 Male	Yes		

FCBA4-3G

Model	HFO Connector	HFO Connector EO/OE Modules		IDX V-plate
FCBA4-FF5W1	FCFRA (Female)	4 × OE3G-101 (RX)	XLR5 Female	No
FCBA4-FF5W1-PV	FCFRA (Female)	4 × OE3G-101 (RX)	XLR5 Female	Yes
FCBA4-FM5W2	FCMRA (Male)	4 × EO3G-100A-** (TX)	XLR5 Male	No
FCBA4-FM5W2-PV	FCMRA (Male)	4 × EO3G-100A-** (TX)	XLR5 Male	Yes

Key Features and Benefits

- All-in-one device which combines four EO/OE modules and a power supply unit.
- The best solution for Quad-link 12G/3G-SDI outside broadcasting.
- Flexible configuration by replacing EO/OE modules.
- AC and DC input redundancy
- Optical SC connector for optional use
- * Canare OC series (Hybrid-OPS profile) is also available. Please contact us for more details.

Specifications

Туре	without V-plate	with V-plate			
SDI connector	4 × 75Ω BNC				
Optical connector	SC (for optional use)				
AC input	AC 3P Jack				
DC input	XLR4-32-F77 (Male)				
Power requirement	AC 100-240 V, DC 10-18 V				
Operating Temp.	-10 to 40 deg C				
Dimensions	210 × 42 × 240 mm				
Weight	1800 g	1850 g			



FCBK4-FM5W2-12G



FCBK4-FF5W1-12G



FCBA4-FM5W2





HFO Transmission Device (Bi-directional)

Transmit 2-channel SDI over a HFO camera cable.

■ FCBK-12G 12G-SD/

FCBK-12G 12G-SD/ Support 12G/6G/3G/HD/SD-SDI and DVB				
Model	HFO Connector	EO/OE Modules	EXT Connector	IDX V-plate
FCBK-FF3W1-12G	FCFRA (Female)	EO12G-100B (TX) OE12G-101B (RX)	2 × XLR3 Female	No
FCBK-FF3W1-12G-PV	FCFRA (Female)	EO12G-100B (TX) OE12G-101B (RX)	2 × XLR3 Female	Yes
FCBK-FM3W2-12G	FCMRA (Male)	OE12G-101B (RX) EO12G-100B (TX)	2 × XLR3 Male	No
FCBK-FM3W2-12G-PV	FCMRA (Male)	OE12G-101B (RX) EO12G-100B (TX)	2 × XLR3 Male	Yes

■ FCBA-3G		Support 3G	i/HD/SD-SDI a	nd DVB-AS
Model	HFO Connector	EO/OE Modules	EXT Connector	IDX V-plate
FCBA-FF3W1-3G	FCFRA (Female)	EO3G-100 (TX) OE3G-101 (RX)	2 × XLR3 Female	No
FCBA-FF3W1-3G-PV	FCFRA (Female)	EO3G-100 (TX) OE3G-101 (RX)	2 × XLR3 Female	Yes
FCBA-FM3W2-3G	FCMRA (Male)	OE3G-101 (RX) EO3G-100 (TX)	2 × XLR3 Male	No
FCBA-FM3W2-3G-PV	FCMRA (Male)	OE3G-101 (RX) EO3G-100 (TX)	2 × XLR3 Male	Yes

Key Features and Benefits

- All-in-one device which combines two EO/OE modules and a power supply unit.
- Ideal for outside broadcasting.
- Flexible configuration by replacing EO/OE modules.
- AC and DC input redundancy
- * Canare OC seires (Hybrid-OPS profile) is also available. Please contact us for more details.

Specifications

Ту	pe	without V-plate	with V-plate			
SDI connector		2 × 75Ω BNC				
AC input		AC 3P Jack				
DC input		XLR4-32-F77 (Male)				
Power requirement		AC 100-240 V, DC 10-18 V				
Operating T	emp.	-10 to 40 deg C				
Dimensions		210 × 42	× 240 mm			
Woight	FCBK-12G	1400 g	1450 g			
weight	FCBA-3G	1200 g	1250 g			

<Example of Use>



(rear view)

FCBA-FM3W2-3G



FCBA-FF3W1-3G



FCBA-FM3W2-3G-PV





FCBK-FM3W2-12G



FCBK-FF3W1-12G

HFO Camera Cables

Hybrid Fiber-optic Camera Cables (SMPTE ST 311)

		Calaa	Nom				Tension	Strength	n Min. Bend Radius	in. Temp. nd Range lius (deg C)	Channel Unit		
Туре	Model	Units (m)	O.D. (mm)	Weight kg/100m	Outer Jacket	Overall Shield	Tolerance (N)	Member O.D. (mm)			Fiber	Aux. (Power)	Signal (Control)
¥	LF-2SM9N	Call	9.2	12.0	Abrasion- resistance PVC	9/24/	700	26	6 ×	-40	2 × SM 9/125	4 × 20 AWG 21 / 0.18TA	2 × 25 AWG 7 / 0.18TA
LF-2SM9N Jacket color: ELK	LF-2SM16	Call	16	29.0	Double PVC	91%	700	2.0	Nom. O.D.	+75	Unit O.D. 0.9 mm	Unit O.D. 1.7 mm	Unit O.D. 1.2 mm

Website

FCC**-N

Website

Website

FCC**A-WJ

LF-2SM9N

• For general use.

- · Abrasion-resistance Jacket enhance the adaptability to all studio and outside broadcast applications.
- · Cost effective

LF-2SM16

- · For studio use.
- O.D. 16mm Double Jacket prevents the cable from being jammed under a camera pedestal dolly.

Camera to CCU

Туре	Model	Length (m)
<u> </u>	FCC10N	10
FCFA Heat Shrink Tubes FCMA	FCC20N	20
	FCC25N	25
	FCC35N	35
	FCC50N	50
	FCC100N	100
	FCC150N	150
Jacket color: BLK	FCC200N	200
FCFA Heat Shrink Tubes Heat Shrink Tubes FCMA	FCC30A-WJ	30
	FCC50A-WJ	50
Jacket color: BLK	FCC100A-WJ	100

• Standard and widely-used models.

• Heat shrink tubes help in labeling.

• FCC**A-WJ prevents the cable from being jammed under a camera pedestal dolly by its O.D. 16mm double jacket.

- 7 color connector rings included.
- * Canare OC series (Hybrid-OPS profile) is also available. (see page 23)

Cross Section Website







FCFA

FCMA



Color Rings



Wiring Diagram

O

HFO Protective Covers

Any-time-fit-on protector for SMPTE connector the new traditional

Model	Shape	Component	Co	lor	
FC-CV-F-SET-**	Female	1 × Boot RD : Red GR : Gr			
FC-CV-M-SET-**	Male	1 × Holder	YL : Yellow BK: Black		
Please specify the color such	Cover: I	PVC, Holder: PE			

Please specify the color such as FC-CV-F-SET-RD

- Canare exclusive retrofittable construction
- (patent pending)
- Fit for Canare FC series and other SMPTE 304 plugs
- · Heavy-duty and harsh environment applications
- · Quality verified over shock resistance tests
- * Not available for Canare OC series
- * The male and female are for FCMA and FCFA or equivalent respectively.



FC-CV-F-SET-GR





HFO Camera Cables

Slim Hybrid Fiber-optic Camera Cable

	Colo		Nom	lam			Tanaian	Strength	Min	T	Channel Unit		
Туре	Model	Units (m)	O.D. (mm)	Weight kg/100m	Outer Jacket	Overall Shield (N)	Tolerance (N)	Tolerance (N) (mm)	Bend Radius	Range (deg C)	Fiber	Aux. (Power)	Signal (Control)
Jacket color: ELK	LF-2SM7N	Call	7.1	7.3	Abrasion- resistance PVC	8/24/ 0.10TA 91%	300	1.4	6 × Nom. O.D.	-40 to +75	2 × SM 9/125 (low-water-peak) Unit O.D. 0.9 mm	2 × 20 AWG 21 / 0.18TA Unit O.D. 1.7 mm	2 × 25 AWG 7 / 0.18A Unit O.D. 1.2 mm

Website

Website

LF-2SM7N

- \bullet O.D. 7 mm of slim profile and approx. 40% lighter than LF-2SM9N.
- Best fit for mobile applications.
- The power transmission distance is approx. twice as long as the previous model LF-2SM7R.
- Note: The power transmission distance is shorter than typical HFO camera cables (approx. 50% of LF-2SM9N). Please contact us for more information.

Camera to CCU

Туре	Model	Length (m)
	FCC10-7N	10
FCF7A Heat Shrink Tubes FCM7A	FCC20-7N	20
	FCC30-7N	30
	FCC50-7N	50
Jacket color: BLK	FCC100-7N	100

- Equipped with slim and lightweight cable.
- FCC100-7N is approx. 5 kg lighter than typical 100m HFO camera cable as FCC100N.
- Heat shrink tubes help in labeling.

• 7-color connector rings included.

Note : The power transmission distance of FCC**-7N is approx. half of that of the FCC**N. * Canare OC series (Hybrid-OPS profile) is also available. (see page 23)

Cross Section







FCM7A



Color Rings



Wiring Diagram



HFO Camera Cables

Tough & Flexible HFO Camera Cables

Thermoplastic polyurethane type jacket offers amazing flexibility and superior mechanical properties; Crush Resistance, Impact Resistance and Cyclic Flexing exceed that of MIL.

		Calaa	Nom	Weight kg/100m	Outer Jacket	Overall Shield	Tension Tolerance (N)	Strength Member O.D.	Min. Bend Radius	Temp. Range (deg C)	Channel Unit		
Туре	Model	Units (m)	O.D. (mm)								Fiber	Aux. (Power)	Signal (Control)
Jacket color: BLK DEEP RED DEEP GRN	LF-2SM9T	Call	9.2	9.8	TPU + PVC	N/A	1500	1.8 mm + Tensile strength fiber	Equal to Nom. O.D.	-40 to +75	2 × SM 9/125 (Iow-water-peak) Unit O.D. 0.9 mm	4 × 20 AWG 102 / 0.08A Unit O.D. 1.75 mm	2 × 25 AWG 24 / 0.08A Unit O.D. 1.2mm
Jacket color: EIK	LF-2SM7T	Call	7.1	5.5	TPU + PVC	N/A	1000	0.63 mm + Tensile strength fiber	Equal to Nom. O.D.	-40 to +75	2 × SM 9/125 (Iow-water-peak) Unit O.D. 1.7 mm	2 × 23 AWG 60 / 0.08A Unit O.D. 1.4 mm	2 × 26 AWG 30 / 0.08A Unit O.D. 1.1 mm

Website

Website

FCC**-7T

Website

FCC**-9T

LF-2SM9T

• Heavy-duty yet Flexible.

- · Ideal for remote broadcast applications.
- Minimum bend radius: 9.2 mm.

LF-2SM7T

- Flexible, Slim, Lightweight, and moreover, Heavy-duty.
- Ideal for short-distance remote broadcast applications of up to 200 meters.
- O.D. 7.1 mm and weighing only 5.5 kg/100 m, it's so easy to carry around.
- Minimum bend radius: 7.1 mm.
- Fiber units include tensile strength fiber.
- Note : The power supply distance of LF-2SM7T is shorter than other HFO camera cables. (approx. 30% of LF-2SM9N) LF-2SM7T requires a special technique during a connector assembly, so you

LF-2SM71 requires a special technique during a connector assembly, so you can buy the cable assemblies shown below.

Cross Section





FCFA, FCF7A

FCMA, FCM7A



Color Rings





Camera to CCU

Туре	Model	Length (m)
	FCC10-9T	10
	FCC20-9T	20
FCFA FCMA	FCC25-9T	25
LF-2SM9T	FCC35-9T	35
	FCC50-9T	50
	FCC100-9T	100
	FCC150-9T	150
Jacket color: BLK DEEP RED DEEP GRN	FCC200-9T	200
	FCC10-7T	10
FCF7A Heat Shrink Tubes Heat Shrink Tubes FCM7A	FCC20-7T	20
LF-2SM7T	FCC30-7T	30
│	FCC50-7T	50
Jacket color: BLK	FCC100-7T	100

- Tough & Flexible cable
- Fit for mobile applications in harsh environments.
- Heat shrink tubes help in labeling.
- 7-color connector rings included.
- Note : The power transmission distance of FCC**-7T is quite shorter than typical HFO camera cables.
- * Canare OC seires (Hybrid-OPS profile) is also available. Please contact us for more details.





HFO Camera Cables



Patent No.7241055B2 Patent No.4340186

Quick-release

HFO Camera Cable Assemblies (Flanged Type)

■ Panel to CCU

Туре	Model	Length (m)
Heat Shrink Tubes Heat Shrink Tubes	FCC05N-FRCM	5
Jacket color: ELK IU-FCF-SET included	FCC10N-FRCM	10
FCFA Heat Shrink Tubes Heat Shrink Tubes FCMRCA	FCC05N-FMRC	5
Jacket color: EUK IU-FCM-SET included	FCC10N-FMRC	10

* Canare OC series (Hybrid-OPS profile) is also available. (see page 23)

Website

Website

- HFO camera cable with the flange for panel mounting.
- SMPTE ST 304, ST 311, and ARIB BTA S-1005B compliant.
- Return loss: 45dB or greater (λ =1.3µm).
- Insertion loss: 0.5dB or less (λ =1.3µm).
- · Connector body material is stainless steel.
- · Color rings and insulation plates included.
- See below for the panel hole dimensions.



FCFRCA



Color Rings



FCMRCA

IU-FC*-SET

HFO Camera Receptacle Cables Pigtails

Туре	Model	Length (m)
FCERA Braid Tube Nylon connector	FCS015A-FR	1.5
FCMRA SC×2, Nylon connector	FCS015A-MR	1.5

• Ideal for connecting wall terminal panels to splice enclosures, etc.

- Return loss: 45dB or greater (λ =1.3µm) .
- Insertion loss: 0.5dB or less (λ =1.3µm).
- · Connector body material is stainless steel.
- Insulation plates included.
- See below for the panel hole dimensions.



Fiber-optic (SM)

Fiber-optic (SM)

Control (22AWG)

Control (22AWG

Power line (18AW

wer line (18AWG



FCMRA

0 SC 0 SC

0 2

gray

black

Nylon connector

E.

003

466

4-M3 or φ 3.2





ual connector and panel.			
Connector		Wahaita	
FCMRCA			
FCFRCA			
	IU-FC*-SET		
nare HFO connectors.			
Connector			
CFRA, FCFRCA	Sec.		
unit when cleaning	Sec. 1	Website	US F
fiber-optic camera connectors.	ASPT-1		JP P



Ideal for perfect insulation between individual connector and panel.

Model	Suitable Connector
IU-FCM-SET	FCMRA, FCMRCA
IU-FCF-SET	FCFRA, FCFRCA

Material: Bakelite (phenolic resin)

• Mounting screws included.

Extraction Tool

Extraction tool helps easy to clean Can

Model	Suitable Connector	
ASPT-1	FCFA, FCF7A, FCFRA, FCFRCA	

· Tool to be used to release the alignment sleeve HFO connectors.

* Use the CLETOP 2.5/2.0 (100) cleaning stick to clean

22



30

FCFRA

Hole Dimensions

(with IU-FC*-SET)

HFO Camera Cables

HFO Camera Cable Assemblies (Japanese Style)

Canare OC hybrid camera connectors are commonly used in Japan and Asian countries. It includes the same combination of SMPTE 304 but different pinouts. Improved reliabilities and advanced maintenance features.



OC connectors Symmetric pinout

Finger detachable insulator Better grip, proper connections SMPTE 311 cable ready Camera MFGs accepted Hybrid-OPS profile



Website

FC connectors

SMPTE and ARIB standard Detachable insulator with tool Widely used in the market Hybrid-3K profile

Camera to CCU

OCC100 - N

Series name

Cable mount plugs Male and female

01 = 1 meters 100 = 100 meters Call for stocked lengths.

Lengths

Ca	able type
N	: LF-2SM9N O.D. 9 mm PVC Jacket (most common)
WJ	: LF-2SM16 O.D. 16 mm PVC Jacket
7N	: LF-2SM7N O.D. 7 mm PVC Jacket
9T	: LF-2SM9T O.D. 9 mm TPU Jacket w/o Shield
7T	: LF-2SM7T O.D. 7 mm TPU Jacket w/o Shield

TPU = Thermoplastic Polyurethane

OCFA



ОСМА

Panel to CCU Website 0 5 M Ν R Series name Lengths PNL mount M to OCFRCB OCMRCA **Connector type** 05 = 5 meters cable mount F [7N] [9T] [7T] [others] OCFA ОСМА and vice versa 10 = 10 meters FRCM: OCFRCB-OCMA YEL YEL YEL BLU BLU BLU BLU BLU PL RED RED RED GRY GLR GRN CLR RED BLK BLK BLK BLK WHT WHT WHT WHT Fiber-optic Fiber-optic Control FMRC: OCMRCA-OCFA Call for custom lengths. Cable type: LF-2SM9N Contro Power line ower line eld CLR GRN Shie Pigtails Wiring Diagram for OCC S 0 Website С 1 5 Ο Series name Lengths OCS015-FR OC breakout **Connector type** 015 = 1.5 meters OCFRA 1 o Fiber-optic (SM) 2 o Fiber-optic (SM) Call for custom lengths. $\textbf{FR}: \text{OCFRA} \text{ to } 2 \times \text{SC}, 1 \times \text{Nylon}$ YEL-1 o SC YEL-2 o SC Nylon connector 面 MR: OCMRA to 2 × SC, 1 × Nylon 100 --: Pin contact -c: Socket contact SMPTE Conversion Wiring Diagram for OCS Website 0 Ν С Ο **Connector A** Lengths FCF02N-OCM FCM: FCMA **Connector B** FCF: FCFA 02 = 2meters OCFA OCF: OCFA FCMA Call for custom lengths. GR1 OCM: OCMA Cable type: LF-2SM9N 10 Contro -04 h و Call for custom models.

Wiring Diagram for Conversion

Hybrid Fiber-Optic Camera Cable Checker

Canare Cable Checker allows fast, easy confirmation of HFO cables in the field. No heavy equipment to drag around. The compact design features a backlight digital display to measure optic loss/power and electrical continuity. Small and light, Canare Cable Checker helps make mobile installations smooth, secure and constant.

	Kit Madal	Individual Model				
	Kit Woder	Measuring Unit	Loop-back Unit			
4	FCT-FCKIT RED	FCT-FC RED	FCT-FCLB RED			
	FCT-OCKIT RED	FCT-OC RED	FCT-OCLB RED			

Key Features and Benefits

- · Check hybrid camera cables instantly
- · Indicating optic power and loss, electrical open-circuit and short-circuit at the same time
- · Available in two most common hybrid camera connector interfaces
- All-in-one kit includes storage box, leather case, AA batteries, and CLETOP

Specifications

Kit Model	FCT-FCKIT RED	FCT-OCKIT RED		
Connector	Canare FC series (SMPTE/ARIB)	Canare OC series (Hybrid-OPS)		
LD	FP-	LD		
Wavelength	1310) nm		
Output Power	-2.5	dBm		
Sensitivity	-24 to -2 dBm			
Maximum Length	3.5 km (Canare LF-2SM9N)			
Optic Signals	Optical Power and Loss			
Electric Signals	Open-circuit ar	nd Short-circuit		
Battery/Life	2 pcs of AA/ A	pprox. 20hours		
Operating Temperature	-10 to 6	i0 deg C		
Dimensions	Measuring Unit: 46 × 46 × 150 mm Loop-back Unit: 46 × 46 × 65 mm			
Weight	hight Measuring Unit: 380 g Loop-back Unit: 170 g			
Accessories	Storage case, carrying cases, AA Batteries, and cleaning sticks			

CE, FCC, FDA registere US Patent No.7113678

Technical Note

Note: Red cap model will not work with black cap model.

Maintaining Hybrid Fiber-Optic Camera Connectors

The connector sections to be cleaned are the key parts, including the tips and sides of ferrules, the interior walls of alignment sleeves and the interior and exterior of connector shells. Note that scratches and particles of foreign matter on the tip of the ferrule can have a disabling effect on fiber-optic transmission. The following procedures should be used when cleaning hybrid fiber-optic camera connectors.

· For Plugs, the interior surfaces of alignment sleeves and the tips of ferrules are to be cleaned with the non-alcohol treated cleaning stick using a gentle stroking action. Canare FCFA and FCFRA enhance easy cleaning procedure for its

Ferrule Alignment Cleaning stick

innovative alignment sleeve and insulator detachable design. US Patent: No.7241055B2, JP Patent: No.4340186

- · For Jacks, it is important to clean both the tips and sides of the completely protruding ferrules with the cleaning stick.
- · Both the male and female connector shells tend to attract dust and metal particles, so it is important to clean both the insides and outsides using cotton gauze or similar material.



Before cleaning

Cleaning Stick Model: CLETOP 2.5/2.0

- Compact and disposable
- Allows cleaning both the tips and sides of ferrules
- Manufactured by NTT-AT

IBC Brand Cleaner M-20 Model: 14347 CLEANER

- Easy "one-push" cleaner
- Allows cleaning the tips of ferrules without removing alignment sleeve
- Manufactured by US Conec



Storage Case

After cleaning





IBC Brand Cleaner M-20 14347 CLEANER



Website



To prevent the product from being damaged, please NOTE the following

A) Discharge static electricity from HFO camera cable by grounding its metal part.

C) Do not connect anything other than the Cable Checker and HFO camera cable.

Carrying Cases



HFO Camera Connector Panels

Hybrid Fiber-optic Camera Connector Panels

Pre-terminated HFO camera connector panel with built-in splice enclosure box provides easy and quick installation between HD camera system and terminal panel or rack. By combining the unit and frame, HFO camera connector panel enables a variety of layouts depending on the system design.

> HFO Connectors* (Assembly) 2 × FCFRA (FCS003A-FR)



■ COPS Series (SMPTE)						
Model	Panel Size					
COPS-FF3A	Wall Mount Type					
COPS-FM3A	3RU Height, W:197.6mm					

COPS-FM3A	SRU Height, W. 197.6mm	2 × FCMRA (FCS003A-MR)
COPS-FF2A	Wall Mount Type	2 × FCFRA (FCS003A-FR)
COPS-FM2A	2RU Height, W:197.6mm	2 × FCMRA (FCS003A-MR)
COPS3-FF3A	Rack Mount Type	6 × FCFRA (FCS003A-FR)
COPS3-FM3A	3RU	6 × FCMRA (FCS003A-MR)
COPS3-FF2A	Rack Mount Type	6 × FCFRA (FCS003A-FR)
COPS3-FM2A	2RU	6 × FCMRA (FCS003A-MR)

*HFO connectors are pre-terminated. (length: 0.3 m) *Canare OC series (Hybrid-OPS profile) is also available. Please contact us for more details.

Key Features and Benefits

- Exclusive "5-directional Wiring"
- Convenient to build I/O interface between HD facilities and HD OB vans
- · Variety of choice of 2RU/3RU and wall/rack mount
- Pre-terminated HFO connectors reduce installation time dramatically.
- · Cost effective
- Lightweight aluminum chassis





Wiring Diagram





COPS-FF3A



COPS-FF2A





COPS3-FM3A

Accessories

Fiber-optic cable w/SC connector (2m), grounding cable, nylon connector, pin contact, socket contact, tie-band, fusion splice protection sleeve, splice holder, color-coded tube, mounting screw, laser warning label.

Note: Assembly tools for the nylon connectors are NOT include. (AMP 91529-1: 26 to 22 AWG and AMP 91536-1: 20×2 to 16 AWG)

HFO Camera Connector Panels, Splice Enclosures

Individual Frame	I Individual Frame and Unit							
Model	Height	Description						
COUS-FF3A	3RU -	Connector Unit of COPS(3)-FF3A						
COUS-FM3A		Connector Unit of COPS(3)-FM3A						
COF-13C		Frame of COPS (for 1 unit)						
COF-33B		Frame of COPS3 (for 3 units)						
COUS-FF2A		Connector Unit of COPS(3)-FF2A						
COUS-FM2A	2011	Connector Unit of COPS(3)-FM2A						
COF-12B	2R0	Frame of COPS (for 1 unit)						
COF-32A		Frame of COPS3 (for 3 units)						

*HFO connectors are pre-terminated. (length: 0.3 m) *Canare OC series (Hybrid-OPS profile) is also available. Please contact us for more details.

Optional Parts

Model	Туре	Suitable Frame/Unit
COU-BP3A	Blank Danal	COF-13A, COF-33B (3RU frames)
COU-BP2A	Biank Panei	COF-12A, COF-32A (2RU frames)
COU-CV3	Ten Cover	COUS-FF3A, COUS-FM3A (3RU units)
COU-CV2	lop Cover	COUS-FF2A, COUS-FM2A (2RU units)



onnectivity Products

Website

<Example of Use>



Hybrid Fiber-optic Splice Enclosures

The optimized fiber-optic splice enclosures for use with HFO camera cables.

Madal	No. of cables	No. of	No. of Adapters			
(capacity) splice		splice trays	SC	Nylon		
FCE-2	2	1	4	2		
FCE-4	4	2	8	4		
FCE-6	6	3	12	6		

Used to protect fusion splice connection parts

- Designed for use with LF-2SM9N
- Easy cable installation
- Can be placed vertically or horizontally
- Detachable brackets and a connector protection cover
- Insulated tension member clamp

Note :

The following tools are required for installing the nylon connector. AMP 91529-1 (26 to 22 AWG) and AMP 91536-1 (20 × 2 to 16 AWG)





Fiber-optic cable w/SC connector (2m), splice holder, fusion splice protection sleeve, nylon connector, pin contact, socket contact, tie band, grounding cable, color-coded tube.

С

D

150mm

126mm



Wiring Diagram

FCE-4 FCE-6

240mm

230mm

220mm

196mm

Fiber-optic Cables

6-channel Fiber-optic Snakes

Туре	Model	Length (m)
	OM6C10	10
	ОМ6С20	20
	ОМ6С25	25
OM6PA Heat Shrink Tubes Heat Shrink Tubes OM6JA	ОМ6С35	35
	ОМ6С50	50
	OM6C100	100
	OM6C150	150
Jacket color: BIK	ОМ6С200	200

- Ruggedized multichannel fiber-optic assemblies with robust 6-fiber connector
- Single-mode, ITU-T G.657.A2 low bending loss and low water-peak fiber
- Abrasion resistance cable jacket
- Tensile strength: 700 N or less
- Return loss : 45 dB or greater ($\lambda \!\!=$ 1.3 $\mu m)$
- Insertion loss: 0.5 dB or greater ($\lambda \!\!=$ 1.3 $\mu m)$
- 7-color connector rings included.
- Blue dust cap makes it easier to distinguish OM6 from HFO camera connectors.
- Canare OM6 connectors are NOT compatible with other multichannel/hybrid fiberoptic connectors.
- * IBC brand "one-push" cleaner M-20 is highly recommended for cleaning OM6 connectors. (see page 24, model: 14347 CLEANER)



- OM6 receptacle with 6 SC single-mode fiber cord (2.0mm).
- Return loss : 45 dB or greater (λ = 1.3 $\mu\text{m})$
- Insertion loss: 0.5 dB or greater ($\lambda\!\!=$ 1.3 $\mu m)$
- Blue dust cap makes it easier to distinguish OM6 from HFO camera connectors.
- * Canare OM6 connectors are NOT compatible with other multichannel/hybrid fiberoptic connectors.
- * IBC brand "one-push" cleaner M-20 is highly recommended for cleaning OM6 connectors. (see page 24, model: 14347 CLEANER)





OM6PA



OM6JA



Color Rings





OM6PRA



OM6JRA

Hole Dimensions



Fiber-optic Cables

Tactical Fiber-optic Cable

Particularly rugged multichannel fiber-optic cable designed for mobile applications.

Type Model				Sales Nom. Jnits O.D. (m) (mm)	Weight kg/100m	Tension Tolerance (N)	Strength Member	Min. Bend Radius	Temp. Range (deg C)	Fiber-optic Unit		
	Model	No. of Ch.	Sales Units (m)							Fiber	Attenuation	Unit O.D.
Jacket color: ELK	LF-SM2T-4C	4	100 200 500	7.8	4.9	1400	Aramid yarn	Equal to Nom. O.D.	-55 to +85	SM 9/125 (low-water- peak)	1.6 dB/km @1310 nm	2.0 mm including aramid yarn

Jacket : TPU

LF-SM2T-4C

- Heavy-duty and high flexibility
- * Crush resistance: 2,000 N/cm
- * Impact resistance: 300 impacts
- * Cycle flexing: 20,000 cycles
- Single-mode
- Color-coded breakout type unit
- Thermoplastic polyurethane jacket
- Aramid yarn strength member
- 4-channel cable best suited for Quad-link 3G-SDI signals.



Cable Assemblies

Туре	Model	Length (m)
SC Plug SC Plug	4FS50T-SS	50
LF-SM2T-4C	4FS100T-SS	100
500mm	4FS150T-SS	150
Jacket color: BLK	4FS200T-SS	200
LC Plug LC Plug	4FS50T-LS	50
LF-SM2T-4C	4FS100T-LS	100
500mm	4FS150T-LS	150
Jacket color: BLK	4FS200T-LS	200
ST Diug ST Diug	4FS50T-ST	50
LF-SM2T-4C	4FS100T-ST	100
500mm	4FS150T-ST	150
Jacket color: BLK	4FS200T-ST	200

Single-mode Fiber-optic Cables (Multichannel)

									_	Fibe	r-optic Unit	t
Туре	Model No. of Ch. Sales Units (m) Nom. (m) Weight kg/100m Outer Jacket Tension Telerance Jacket Min. Telerance N F-SM2-2C 2 7.4 5.4 290 290 LF-SM2-6C 6 9.0 7.3 300 10 × Nom. C LF-SM2-8C 8 Call 10.0 10.4 PVC 780 10 × Nom. C	Min. Bend Radius	Temp. Range (deg C)	Fiber	Attenuation	Unit O.D.						
	LF-SM2-2C	2		7.4	5.4		290					
Contraction of the second	LF-SM2-4C	4	Call	7.4	5.5	PVC	290	10 × - Nom. O.D.	10 × -40 to om. O.D. +75	-40 to +75 + Aramid yarn + PVC jacket @131	0.5 dB/km @1310nm	
	LF-SM2-6C	6		9.0	7.3		300					2.0 mm including aramid yarn
	LF-SM2-8C	8		10.0	10.4		780					
	LF-SM2-12C	12		12.8	14.2		780					
	LF-SM2-16C	16		14.7	16.3		780					
LF-SM2-6C	LF-SM2-24C	24		15.0	18.3		780					

Smooth PVC Jacket

Including a central strength member and a rip cord.

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Fiber-optic Cables

Single-mode Fiber Optic Patch Cables

Туре	Model	Length (m)
SC - SC	FS3C002A-S	0.2
	FS3C003A-S	0.3
	FS3C005A-S	0.5
)	FS3C007A-S	0.7
	FS3C01A-S	1
	FS3C02A-S	2
	FS3C03A-S	3
	FS3C04A-S	4
Jacket color: YEL Cable O.D.: 3 mm	FS3C05A-S	5
SC - SC	FS2C002A-SS	0.2
	FS2C003A-SS	0.3
	FS2C005A-SS	0.5
	FS2C007A-SS	0.7
	FS2C01A-SS	1
	FS2C02A-SS	2
	FS2C03A-SS	3
	FS2C04A-SS	4
Jacket color: YEL Cable O.D.: 2 mm	FS2C05A-SS	5
SC - LC	FS2C002A-SS/LS	0.2
	FS2C003A-SS/LS	0.3
	FS2C005A-SS/LS	0.5
	FS2C007A-SS/LS	0.7
	FS2C01A-SS/LS	1
(~	FS2C02A-SS/LS	2
	FS2C03A-SS/LS	3
	FS2C04A-SS/LS	4
Jacket color: YEL Cable O.D.: 2 mm	FS2C05A-SS/LS	5

Туре	Model	Length (m)
LC - LC	FS2C002A-LS	0.2
	FS2C003A-LS	0.3
	FS2C005A-LS	0.5
- the recent	FS2C007A-LS	0.7
	FS2C01A-LS	1
	FS2C02A-LS	2
	FS2C03A-LS	3
	FS2C04A-LS	4
Jacket color: YEL Cable O.D.: 2 mm	FS2C05A-LS	5
LC - LC Duplex	2FSZ2S005A-DLS	0.5
	2FSZ2S007A-DLS	0.7
150mm	2FSZ2S01A-DLS	1
	2FSZ2S02A-DLS	2
	2FSZ2S03A-DLS	3
150mm	2FSZ2S04A-DLS	4
Jacket color: YEL Cable O.D.: 2 mm	2FSZ2S05A-DLS	5

• ITU-T G.652.D/G.657.A2

Low - water - peak

• Minimum bend radius: 10 mm

• Insertion loss: 0.5 dB max.

• Return loss: 50 dB max. (UPC)

UL type OFNR



Single-mode Fiber Optic Fantails

Tune		Madal	Longth (m)	Fiber Optic Cable			
туре	Channel	Model	Length (m)	Part Number	Unit O.D. (mm)	Nom. O.D. (mm)	
SC - SC		2FS10-S	10				
	2	2FS20-S	20	LF-SM2-2C		7.4	
		2FS50-S	50				
		4FS10-S	10				
150mm Peel-riff String	4	4FS20-S	20	LF-SM2-4C		7.4	
		4FS50-S	50				
		6FS10-S	10				
	6	6FS20-S	20	LF-SM2-6C	2	9.0	
		6FS50-S	50				
500mm		8FS10-S	10				
150mm Bed of String	8	8FS20-S	20	LF-SM2-8C		10.0	
		8FS50-S	50				
		12FS10-S	10				
	12	12FS20-S	20	LF-SM2-12C		12.8	
500mm		12FS50-S	50				
		16FS10-S	10				
	16	16FS20-S	20	LF-SM2-16C		14.7	
		16FS50-S	50				
		24FS10-S	10]		
	24	24FS20-S	20	LF-SM2-24C		15.3	
Jacket color: YEL		24FS50-S	50				

• Flexible cable with reliable bellcore boots

• Adjustable fantail length with peel-off string

• UPC polishing; Return loss ≥50dB for single mode

• Transmission loss 0.5dB at $\lambda\text{=}1.31\mu\text{m}$ and 0.4dB at $\lambda\text{=}1.55\mu\text{m}$



Fiber-optic Cables

Туре	Model	Length (m)
SC - SC	FM33C005-S	0.5
	FM33C01-S	1
	FM33C03-S	3
Jacket color: AQUA Cable O.D. : 3 mm	FM33C05-S	5
SC - SC	FM32C005-SS	0.5
	FM32C01-SS	1
	FM32C03-SS	3
Jacket color: AQUA Cable O.D.: 2 mm	FM32C05-SS	5
SC - LC	FM32C005-SS/LS	0.5
	FM32C01-SS/LS	1
	FM32C03-SS/LS	3
Jacket color: AQUA Cable O.D.: 2 mm	FM32C05-SS/LS	5

Туре	Model
LC - LC	FM32C005-LS
	FM32C01-LS
	FM32C03-LS
Jacket color: AQUA Cable O.D.: 2 mm	FM32C05-LS
LC - LC Duplex	2FM3Z2S005-1
150mm	2FM3Z2S01-D
	2FM3Z2S03-D
lacket color: AQUA Cable O.D.: 2 mm	2FM3Z2S05-D

Model	Length (m)
M32C005-LS	0.5
M32C01-LS	1
M32C03-LS	3
M32C05-LS	5
M3Z2S005-DLS	0.5
M3Z2S01-DLS	1
M3Z2S03-DLS	3
M3Z2S05-DLS	5

Website	

- Insertion loss: 0.3 dB max.
- Return loss: 30 dB max. (PC)
- UL type OFNR

OM3 Multi-mode Fiber Optic Fan-out Cables

Туре	Model	Length (m)	
SC - Open	4FO-M3-015-SS	1.5	
	4FO-M3-03-SS	3	
	4FO-M3-05-SS	5	

• 4-core Multimode 50/125 OM3 Ribbon Fiber

• Typically used in 10 Gigabit Ethernet

• Fiber type: Multi-mode 50/125 OM3

Typically used in 10 Gigabit Ethernet

Minimum bend radius: 10 mm

- Insertion loss: 0.3 dB max.
- Return loss: 30 dB max. (PC)

Туре	Model	Length (m)
LC - Open	4FO-M3-015-LS	1.5
	4FO-M3-03-LS	3
Jacket color: AQUA	4FO-M3-05-LS	5

• Ribbon fiber cable : 2.1 \times 3.5 mm outer dimensions

- Fan-out unit: 2 mm outer diameter, 500 mm length
- Fan-out tubing: 8 mm outer diameter • U

L type OFNR	
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Fiber Color Cording

Multi-core OM3 Multi-mode Fiber Optic Cables

Туре		No. of Ch.	Sales Units (m)		Weight kg/100m	Tension Tolerance (N)	Min. Bend Radius	Temp. Range (deg C)	Fiber-optic Unit											
	Model			O.D. (mm)					Fiber	Attenuation	Dim. (mm)									
and the second s	LF-M32-4C-EM	4	Call	7.4	5.6	290														
	LF-M32-6C-EM	6		9.0	7.5	300					2.0 (round)									
Jacket color: ELK Unit color: AQUA	LF-M32-8C-EM	8		Call	Call	Call	Call	Call	Call	Call	Call	Call	10.1	10.8	780	6 × Nom	-20 to +60	MM 50/125	3 dB/km @850nm	
Jacket color: ELK Unit color: ADM	LF-M3R4-12C-EM	12 (3×4core)		7.4	5.6	300	O.D.	O.D.	2010 100		1 dB/km @1300nm	1.5 × 2.5 (ribbon)								

Jacket material: Flame retardant PE

• OM3 fiber; typically used in 10 Gigabit Ethernet.

• Including a central strength member and a rip cord.

• Each unit has aramid strength member.