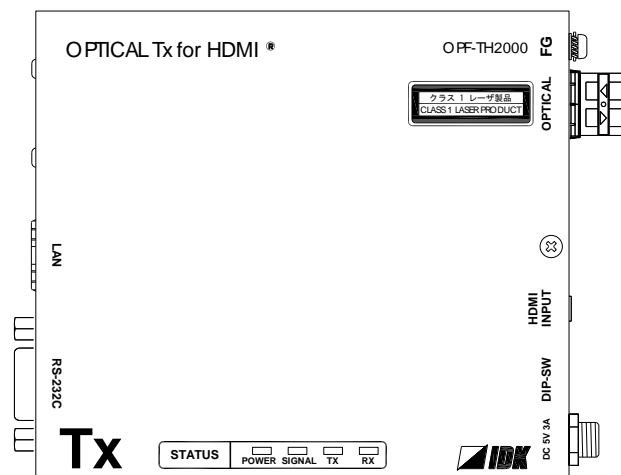
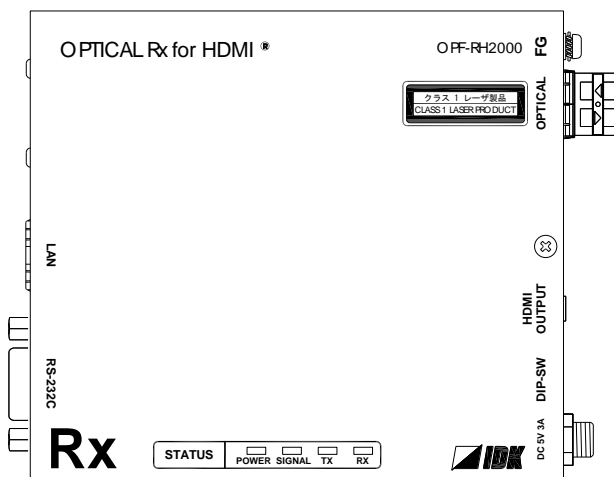


4K-compatible HDMI Fiber Optic Extender

OPF-TH2000/OPF-RH2000

User's Guide Ver.1.0.0



- Thank you for choosing our product.
- To ensure the best performance of this product, please read this User's Guide fully and carefully before using it and keep this manual beside the product.

Trademarks

- The terms HDMI and HDMI High-Definition Multimedia Interface, and the HDMI Logo are trademarks or registered trademarks of HDMI Licensing, LLC in the United States and other countries.
- All other company and product names mentioned in this manual are either registered trademarks or trademarks of their respective owners. In this manual, the “®” or “™” marks may not be specified.

Before reading this manual

- All rights reserved.
- Some of the contents in this User's Guide such as appearance diagrams, menu operations, communication commands, and so on may differ depending on the version of the extender.
- This User's Guide is subject to change without notice. You can download the latest version from IDK's website at: <http://www.idk.co.jp/en/index.html>



The lasers in this product meet Class 1 Laser Safety per FDA/CDRH and EN (IEC) 60825 laser safety standards which specify design safety.

FCC STATEMENT

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.

CE MARKING

This equipment complies with the essential requirements of the relevant European health, safety and environmental protection legislation.

WEEE MARKING











Waste Electrical and Electronic Equipment (WEEE), Directive 2002/96/EC (This directive is only valid in the EU.).

This equipment complies with the WEEE Directive (2002/96/EC) marking requirement. The left marking indicates that you must not discard this electrical/electronic equipment in domestic household waste.

Safety instructions







Read and understand all safety and operating instructions before using this product. Follow all instructions and cautions as detailed in this document.






Enforcement Symbol	Description
 Warning	Indicates the presence of a hazard that may result in death or serious personal injury if the warning is ignored or the equipment is handled incorrectly.
 Caution	Indicates the presence of a hazard that may cause minor personal injury or property damage if the caution is ignored or the equipment is handled incorrectly.

Symbol	Description	Example
 Caution	This symbol is indicated to alert the user. (Warning and caution)	 Electrical Hazard
 Prohibition	This symbol is intended to prohibit the user from actions.	 Do not disassemble
 Instruction	This symbol is intended to instruct the user.	 Unplug




Warning

 <p>Prohibition</p>	<p>Do not place the product in any unstable place. Install the product to a horizontal and stable place. Otherwise, it may fall/turn over and lead to injury.</p>
	<p>Do not place the product in any environment with vibration. Otherwise, it may move/fall and lead to injury.</p>
	<p>Keep out any foreign objects. In order to avoid fire or electric shock, do not allow foreign objects, such as metal and paper, to enter the product from the vent holes.</p>
	<p>For power cable/ plug:</p> <ul style="list-style-type: none"> • Do not scratch, heat, or modify, including extending them. • Do not pull, put heavy stuff on them, or pinch them. • Do not bend, twist, or tie them together forcefully. <p>If they are used in those states continuously, it may cause fire or electric shock. If power cables/plugs become damaged, contact IDK.</p>
 <p>Do not disassemble</p>	<p>Do not repair, modify or disassemble. Since the product includes high-voltage parts, those actions may cause fire or electric shock. For internal inspections or repairs, contact IDK.</p>
 <p>Do not touch</p>	<p>In the event of lighting or thunder, do not touch the main unit or cables such as power cable and LAN cable. Contact may cause electric shock</p>
 <p>Instruction</p>	<p>For installation: The product is intended to be installed by skilled technicians. For installation, please contact a system integrator or IDK. Otherwise, it may cause fire, electric shock, injury, or property damage.</p>
	<p>Set the power plug in a convenient place to unplug easily. You can easily unplug in case of any extraordinary failure or abnormal situation, and it also helps for unplugging when you do not use it for a long period.</p>
	<p>Plug the power plug into appropriate outlet completely. If the plug is plugged incompletely, it may overheat which causes electrical shock or fire. Do not use damaged plug or loosened outlet.</p>
	<p>Clean the power plug regularly. If the plug is covered in dust, it may cause fire due to reduced insulating power.</p>
 <p>Unplug</p>	<p>Unplug immediately if the product smokes, makes unusual noise, or smells. If you continue to use the product under those situations, it may cause electric shock or fire. After confirming that the product stops smoking, contact IDK.</p>
	<p>Unplug immediately if you drop the product or if the cabinet is damaged. If you continue to use the product under those situations, it may cause electrical shock or fire. For maintenance and repair, contact IDK.</p>
	<p>Unplug immediately if water or other objects are directed inside. If you continue to use it under those situations, it may cause electrical shock or fire. For maintenance and repair, contact IDK.</p>
For connection	
 <p>Instruction</p>	<p>Differences in ground potential among the product and peripheral devices may cause electric shock or damage of the devices. When using cables to connect devices, including connection of long-distance transmission, unplug the power cables of all related devices. After connecting signal/control cables of each device, plug in the power cables of each device.</p>


 Caution	
 Prohibition	<p>Do not place the product in any place where it will be subjected to high temperatures. If the product is subjected to direct sunlight or high temperatures, it may cause fire.</p>
	<p>Do not place the product in humid, oil smoke, or dusty place. If the product is placed near humidifiers or dusty area, it may cause fire or electric shock.</p>
	<p>Do not block the vent holes. If ventilation slots are blocked, it may cause fire or failure due to internal heat.</p>
	<p>Do not put heavy items on the product. It may fall/turn over and lead to injury.</p>
	<p>Do not exceed ratings of outlet and wiring devices. If several plugs are put in an outlet, it may cause fire and electric shock.</p>
	<p>Use only the provided AC adapter and power cable. If non-compliant adapter or power cables is used, it may cause fire or electrical shock. Use the provided AC power connection cable. If you want to use your product in other countries that use different AC power cables, contact IDK.</p>
 No wet hands	<p>Do not plug or unplug with wet hands. It may cause electrical shock.</p>
 Instruction	<p>Use and store the product within the specified temperature/humidity range. If the product is used outside the range continuously, it may cause fire or electric shock.</p>
	<p>Turn off devices when they are connected to another device. It may cause fire or electric shock.</p>
 Unplug	<p>Unplug the power plug if you do not use the product for a long period. In case of defect, it may cause fire.</p>
	<p>Unplug the power plug before cleaning. It may cause electric shock.</p>

For installation

For rack mount devices:

 Instruction	<p>Mount the product to the rack meeting EIA standards, and maintain spaces above and below for air cooling. For your safety, attach an L-shape bracket in addition to the mount bracket kit for the front panel in order to balance the weight.</p>
---	--

For devices with rubber feet:

 Instruction	<p>Never insert only the screws into the holes after removing the rubber feet. It may lead to damage when the screws contact electrical circuit or parts inside of the product. To put the rubber feet back on, use only provided rubber feet and screws.</p>
---	---

Altitude:


 Instruction	<p>Do not place the product at elevations of 2,000 meters (6562 feet) or higher above sea level. Failure to do so may shorten the life of the internal parts and result in malfunctions.</p>
---	--

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1 Included items

Make sure all items below are included in the package.

If any items are missing or damaged, please contact IDK.

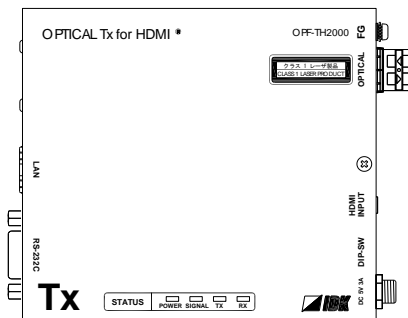
“OPF-H2000” mentioned in this manual refers to OPF-TH2000 and OPF-RH2000 set.

- Transmitter (OPF-TH2000)
 - OPF-TH2000 (main unit) x 1
 - AC adapter with screw type lock (1.2 m/3.94 feet) x 1
 - Cable clamp x 1

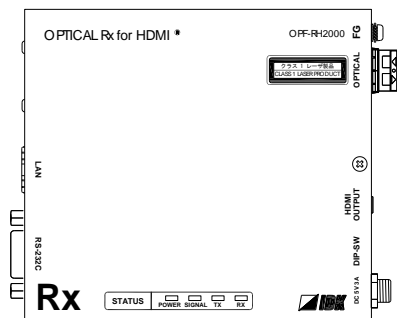
- Receiver (OPF-RH2000)
 - OPF-RH2000 (main unit) x 1
 - AC adapter with screw type lock (1.2 m/3.94 feet) x 1
 - Cable clamp x 1

This User's Guide is common to both the transmitter and receiver.

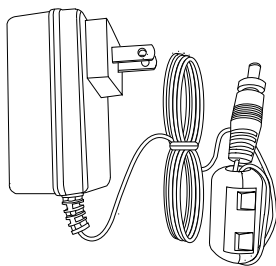
You can download the latest version from IDK's website at: <http://www.idk.co.jp/en/index.html>



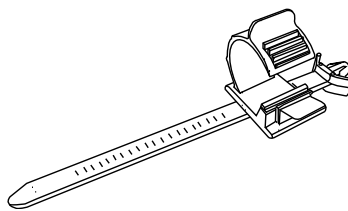
OPF-TH2000



OPF-RH2000



AC adapter with screw type lock
(1.2 m/3.94 feet)



Cable clamp

2 Product outline

Caution: The OPF-H2000 outputs continuous invisible light, which may be harmful to your eyes. Please follow the cautions below.

- Do not look into the rear panel fiber optic cable connectors or into the fiber optic cables themselves.
- Plug the attached dust caps into the optical transceivers when the fiber optic cable is unplugged.

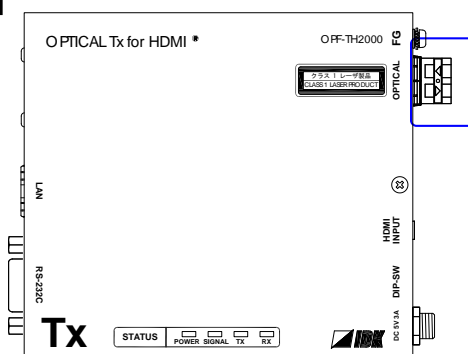
The OPF-H2000 is a transmitter and receiver set that enables HDMI signals to be transmitted long distance over fiber optic cables.

The supported resolution can be up to 4K@30 or 4K@60 (4:2:0), the input signals are transmitted without quality deterioration since they are not compressed or processed.

The OPF supports RS-232C bidirectional communication and LAN transmission.

- For multi-mode fiber
 - Transmitter: OPF-TH2000-MM
 - Receiver: OPF-RH2000-MM
- For single-mode fiber
 - Transmitter: OPF-TH2000-SM
 - Receiver: OPF-RH2000-SM

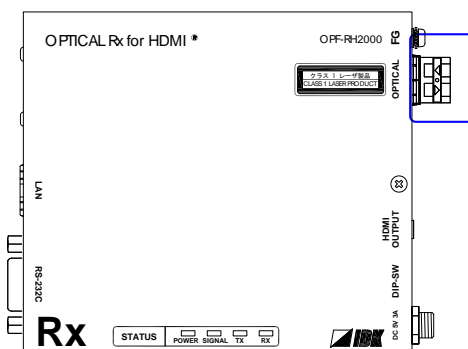
[Transmitter]



The SPF module can be replaced depending on the fiber optic cable.

- □ ●OPF-TH2000-MM
- □ □ □ □ Multimode fiber
- □ ●OPF-TH2000-SM
- □ □ □ □ Singlemode fiber

[Receiver]

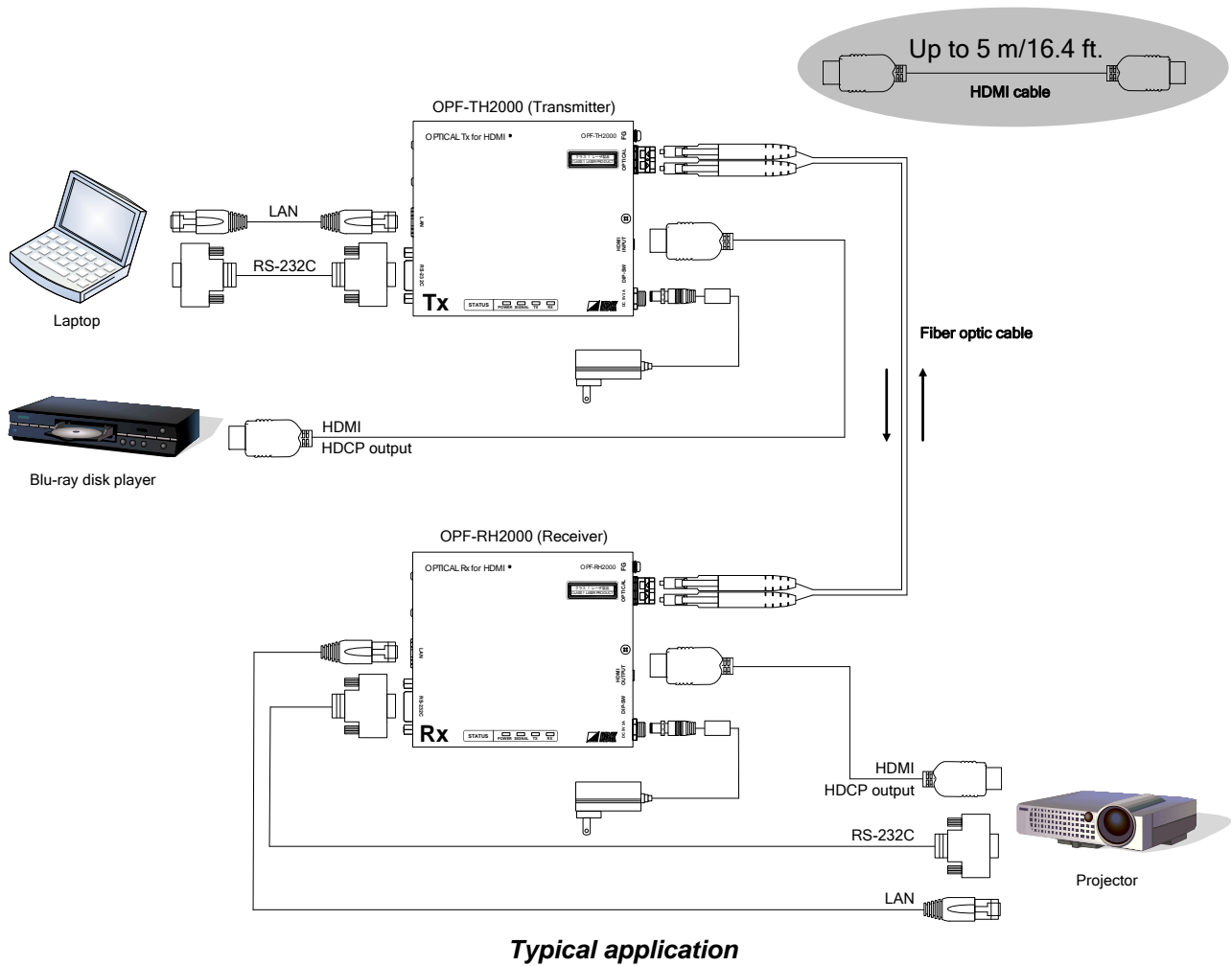


- □ ●OPF-RH2000-MM
- □ □ □ □ Multimode fiber
- □ ●OPF-RH2000-SM
- □ □ □ □ Singlemode fiber

OPF-H2000 series

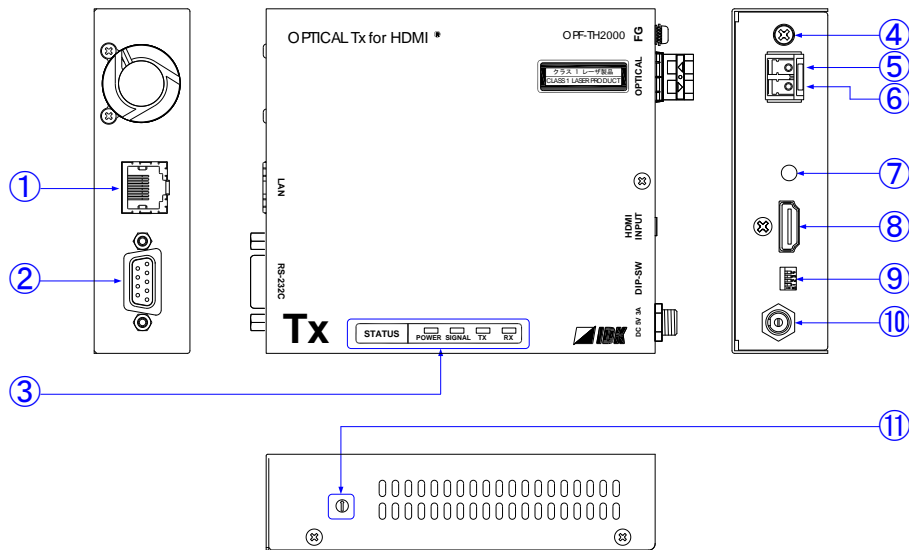
3 Features

- Video
 - Maximum resolution: 4K@30 or 4K@60 (4:2:0)
 - HDCP1.4 (Pass through)
 - Transmission distance
 - Multimode fiber (OM3) : 150 m/492.13 feet
 - Singlemode fiber (OS1) : 1.4 km/ 0.87 mile
- Communication
 - RS-232C bidirectional communication
 - LAN transmission
- Others
 - CEC (Pass through)
 - The jack of the AC adapter has a locking mechanism.



4 Part names and descriptions

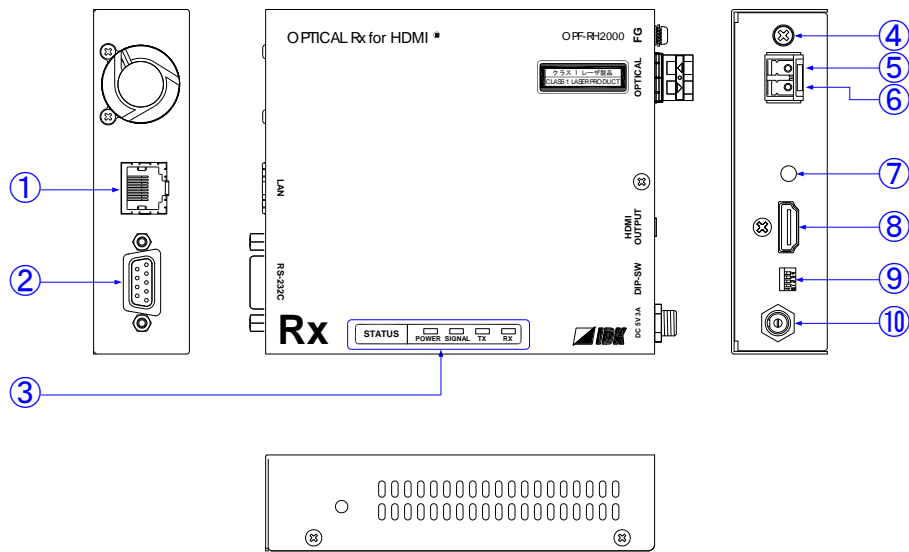
4.1 Transmitter



Panel drawing (Transmitter)

#	Part name	Description
①	LAN port	Port for LAN signals
②	RS-232C port	Port for RS-232C signals
③	LED lights	POWER: Lights when power is supplied from the AC adapter. SIGNAL: Lights when video signals are valid. TX: Lights when a valid code is sent from the OPF. RX: Lights when a valid code is received from the fiber optic cable connected to the receiver.
④	FG	Frame ground. An M3 screw is used.
⑤	Optical input connector for extension	Input connector of digital optical signals for extension. Connected to the optical output connector of receiver using a fiber optic cable.
⑥	Optical output connector for extension	Output connector of digital optical signals for extension. Connected to the optical input connector of receiver using a fiber optic cable.
⑦	HDMI cable fixing hole	Hole for the attached cable clamp to secure an HDMI cable.
⑧	HDMI input connector	Input connector for HDMI signals Connect to a source device such as Blu-ray player.
⑨	DIP switch	Sets the +5V Power transmission of the transmitter. 【See : 5.3.1】
⑩	AC adapter connector	Connector for the attached AC adapter.
⑪	Rotary switch	Sets input equalizer. 【See : 5.3.2】

4.2 Receiver



Panel drawing (Receiver)

#	Part name	Description
①	LAN port	Port for LAN signals
②	RS-232C port	Port for RS-232C signals
③	LED lights	POWER : Lights when power is supplied from the AC adapter. SIGNAL: Lights when video signals are valid. TX: Lights when a valid code is sent from the OPF. RX: Lights when a valid code is received from the fiber optic cable connected to the transmitter.
④	FG	Frame ground. An M3 screw is used.
⑤	Optical input connector for extension	Input connector of digital optical signals for extension. Connected to the optical output connector of the transmitter using a fiber optic cable.
⑥	Optical output connector for extension	Output connector of digital optical signals for extension. Connected to the optical input connector of the transmitter using a fiber optic cable.
⑦	HDMI cable fixing hole	Hole for the attached cable clamp to secure an HDMI cable.
⑧	HDMI output connector	Output connector for HDMI signals Connect to a sink device such as monitor.
⑨	DIP switch	Sets the following items: pre-emphasis and swing of TMDS signals in the receiver, transmission response time of Hot Plug Detect, and clock speed of Display. Data Channel signals. 【See : 5.3.1】
⑩	AC adapter connector	Connector for the attached AC adapter.

5 Connection

5.1 Preparation

Before connecting to external devices, such as source devices and sink devices, prepare the following cables:

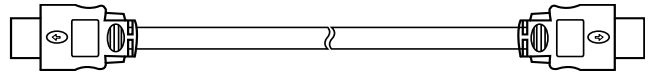
- HDMI cable (Type A (19 pin) plug, 5 m/16.4 ft. or shorter)
- Fiber optic cable (2 cores, LC connector)
- LAN cable (RJ-45 connector)
- RS-232C cable (D-sub9 pin, female)

■ HDMI Cable

If the external device has a DVI connector, use a proper cable.

Followings are recommended cables from IDK.

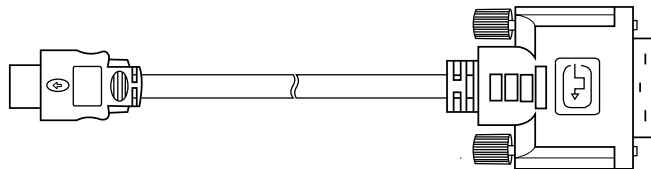
Model number	Length
HDSS-005	0.5 m/1.64 ft.
HDSS-01	1 m/3.28 ft.
HDSS-02	2 m/6.56 ft.
HDSS-03	3 m/9.84 ft.
HDSS-05	5 m/16.4 ft.



HDMI cable (flexible model)

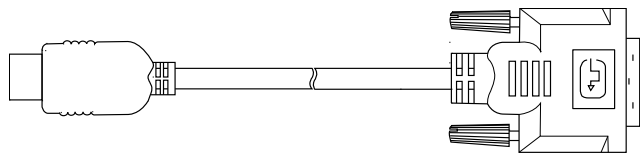
[HDMI-DVI conversion cables]

Model number	Length
HDSS-DMHM-005	0.5 m/1.64 ft.
HDSS-DMHM-01	1 m/3.28 ft.
HDSS-DMHM-02	2 m/6.56 ft.



HDMI-DVI conversion cable (flexible model)

Model number	Length
CBL-DH-015A	1.5 m/4.92 ft.
CBL-DH-03A	3 m/9.84 ft.
CBL-DH-05A	5 m/16.4 ft.



HDMI-DVI conversion cable (standard model)

■ **Fiber optic cable**

- Use a duplex fiber cable having LC connectors for both ends.
- Use a cable whose length complies with the extension standard.

- IDK can provide high-performance optic cable.

【See : 5.2.3】

[High-performance optic cable]

Part number	Part number	Part number
S-13085-2-DLC-DLC-S-LXX	S-13085-2-LC-LC-S-LXX	S-13086-2-DLC-DLC-LXX
S-13085-2-DLC-DLC-U-LXX	S-13085-2-LC-LC-U-LXX	S-13086-2-LC-LC-LXX

XX: the length (e.g. L10 = 10 m/32.8 ft.)

■ **LAN cable**

- 1G bps Ethernet signals can be transmitted over a long distance.
- Use cables meeting 10Base-T/100Base-TX/1000Base-T specification.

【See: 6.1.2】

■ **RS-232C cable**

- RS-232C signals (up to 115.2 Kbps) can be transmitted in duplex over a long distance.
- Use a cross cable or straight cable according to the connected devices.

【See : 6.1.3】

5.2 Precautions

Read and follow the precautions below before connecting to external devices.

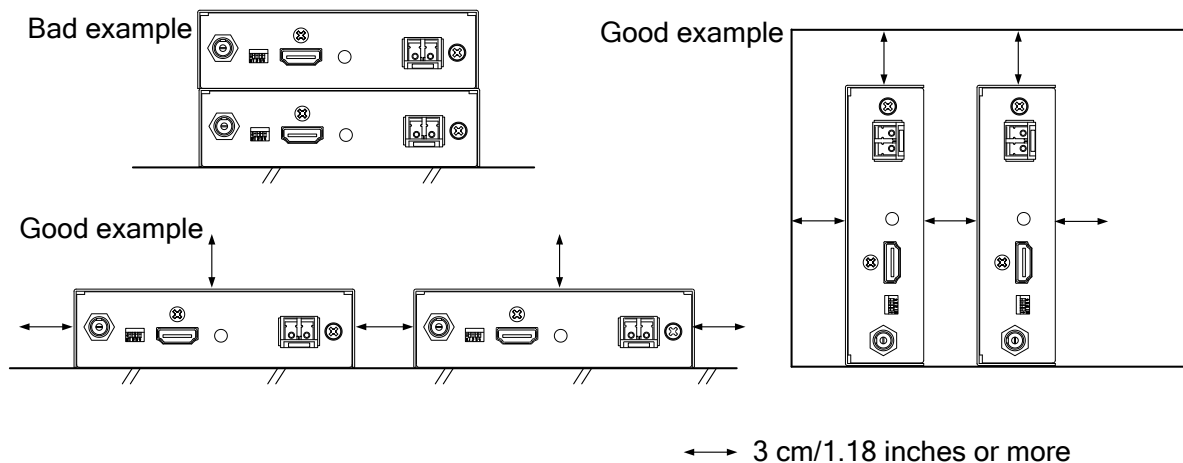
5.2.1 Installation

- Before connecting a cable to the OPF or to an external device that is connected to the OPF, eliminate static electricity by touching metallic item or the like.
- Do not place the transmitter on top of the receiver and vice versa.
- Do not block vent holes.

Keep enough space (3 cm/1.18 inches or more) around the product.

- Do not install the OPF-H2000 in closed space.

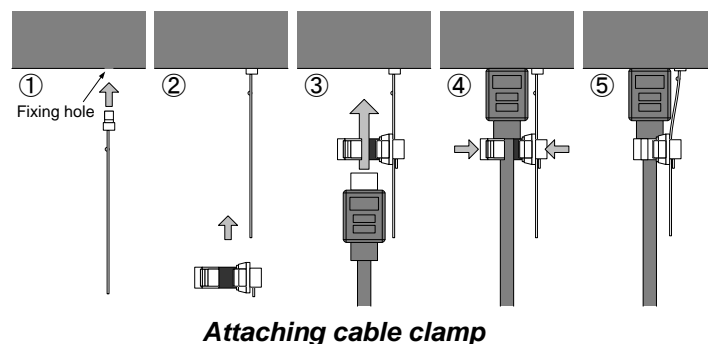
If you have to install the product to an EIA rack mount in closed space, add a ventilation to keep the ambient temperature of 40 degrees C/104 degrees F or less. (Exception: Installing to IDK's Quarter rack, RM-42HQ) If inadequately vented, the life of parts may be shortened and operations may be affected.



Space needed for OPF-H2000

5.2.2 Cabling

- Read the instruction manuals of the external devices carefully.
- Turn off the OPF-H2000 before connecting cables.
- Secure the HDMI cable using an attached cable clamp in order to prevent it from falling off this device.



5.2.3 Fiber optic cable

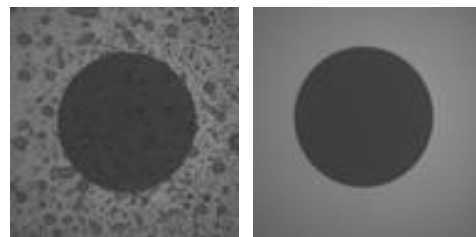
To ensure the best performance of a fiber optic cable for a long-haul transmission, select and connect the proper fiber optic cable correctly.

- Connect a fiber optic cable to the OPF as follows:
 - Optical output connector of the transmitter & optical input connector of the receiver
 - Optical input connector of the transmitter & optical output connector of the receiver
- To polish connectors:
 - For SFP+ module for multi-mode: PC polishing is recommended.
 - For SFP+ module for single-mode: UPC polishing is recommended.

Note: APC polishing is not supported.
- Extension distance varies depending on attenuation of the fiber, connector and other contact portions.
- Do not exceed the allowable tension and bend radius; otherwise it may affect the performance of the product and the product life cycle.
- Make sure to plug the dust cap to the both ends except for when connecting it to the product. Do not leave a fiber optic cable without the dust cap if you do not use the cable in order to prevent scratches and dirt.
- Before connecting a fiber optic cable to the OPF, make sure there is no scratch or dirt on the ends of the connector; otherwise, the OPF may not work correctly. Clean it up if it is dirty.



Left: without dust cap
Right: with dust cap



Before cleaning After cleaning

5.2.4 SFP module

The fiber type and extension distance to be used vary depending on the SFP module.

	Multimode fiber	Singlemode fiber
Wave length	850 nm (Oxide VCSEL laser*)	1310 nm (Fabry-Perot laser*)
Maximum extension distance	OM3: 300 m/984.25 feet OM4: 1 km/3280.84 feet	OS1: 4.7 km/15419.94 feet
Input level	-11.2 dBm or higher	-13.8 dBm or higher
Output level	-8.2 dBm to -2 dBm	-10.6 dBm to +0.5 dBm
Optical overload	0 dBm	+0.5 dBm
Connector	LC (Duplex)	

* Some SFP modules for single-mode can extend the transmission distance up to 10 km with OS1. Please contact us if needed.

Notes:

- Plug the dust cap to the fiber optical cable if you do not use it.
- Do not use the SFP module for other devices. Do not connect the fiber optic cable that is connected to other devices to the SFP module; otherwise, the SFP module may be broken.
- If you need to replace the SFP module, please contact us.

5.2.5 Cascade connection

Distribution amplifiers and multi switchers that are HDCP compliant repeaters can be connected. However, cascade connection is not available in the following cases:

- Repeater that only supports HDCP pass through (such as some switchers, boosters and so on) is included
- Another set of OPF-TH/RH2000 (IDK's fiber optic cable extender supporting HDCP signals)

5.3 Settings

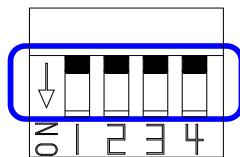
Setting the DIP switch and input equalizer

5.3.1 Setting DIP switch

You can change the settings of the following items of the transmitter and receiver.

Transmitter : +5V power transmission method.

Receiver : Pre-emphasis and swing of TMDS signals, transmission response time of Hot Plug Detect, and clock speed of Display. Data Channel signals.



Default: OFF (SW1 to SW4)

DIP switch

For transmitter:

DIP SW #	Function
1	+5V Power (pin18 HDMI connector): sets a transmission method. OFF: The receiver will supply + 5V Power when + 5V Power signal was detected by the transmitter. ON : The receiver will supply +5V when the link between transmitter and receiver was established, regardless of +5V that was input to the transmitter or not.
2	Not used
3	Not used
4	Not used

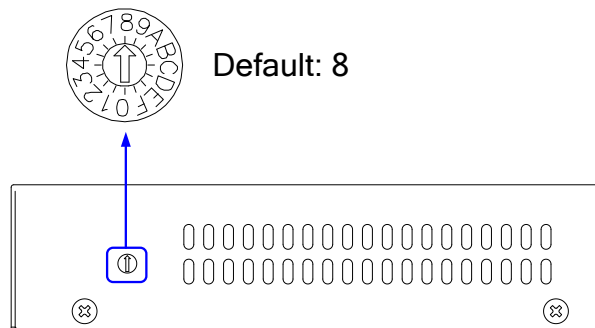
For receiver:

DIP SW #	Function
1	Sets pre-emphasis of the TMDS signals. OFF: Equalizes up to 2.5 dB. ON : No equalization.
2	Sets the swing of the TMDS signals. OFF: 13% amplification. ON : No amplification.
3	Sets the response time of Hot Plug Detect transmission (pin19 HDMI connector).

	<p>OFF: Transmits the detection when the Hot Plug Detect signals of the sink device continue to change for 0.1 second or longer.</p> <p>ON : Transmits the detection when the Hot Plug Detect signals of the sink device continue to change for 1 second or longer (for 0.9 second or shorter, it is not transmitted).</p>
4	<p>Sets the clock speed of the Display. Data Channel (15 pin HDMI connector) signals.</p> <p>OFF: Signals are output at 100 KHz from the receiver.</p> <p>ON : Signals are output at 75KHz from the receiver.</p>

5.3.2 Setting input equalizer (only transmitter)

The HDMI signal input part has manual compensation circuit. Signal deterioration caused by cables can be minimized by setting the amount of equalization according to the connected cable.



Default: 8

Setting input equalizer

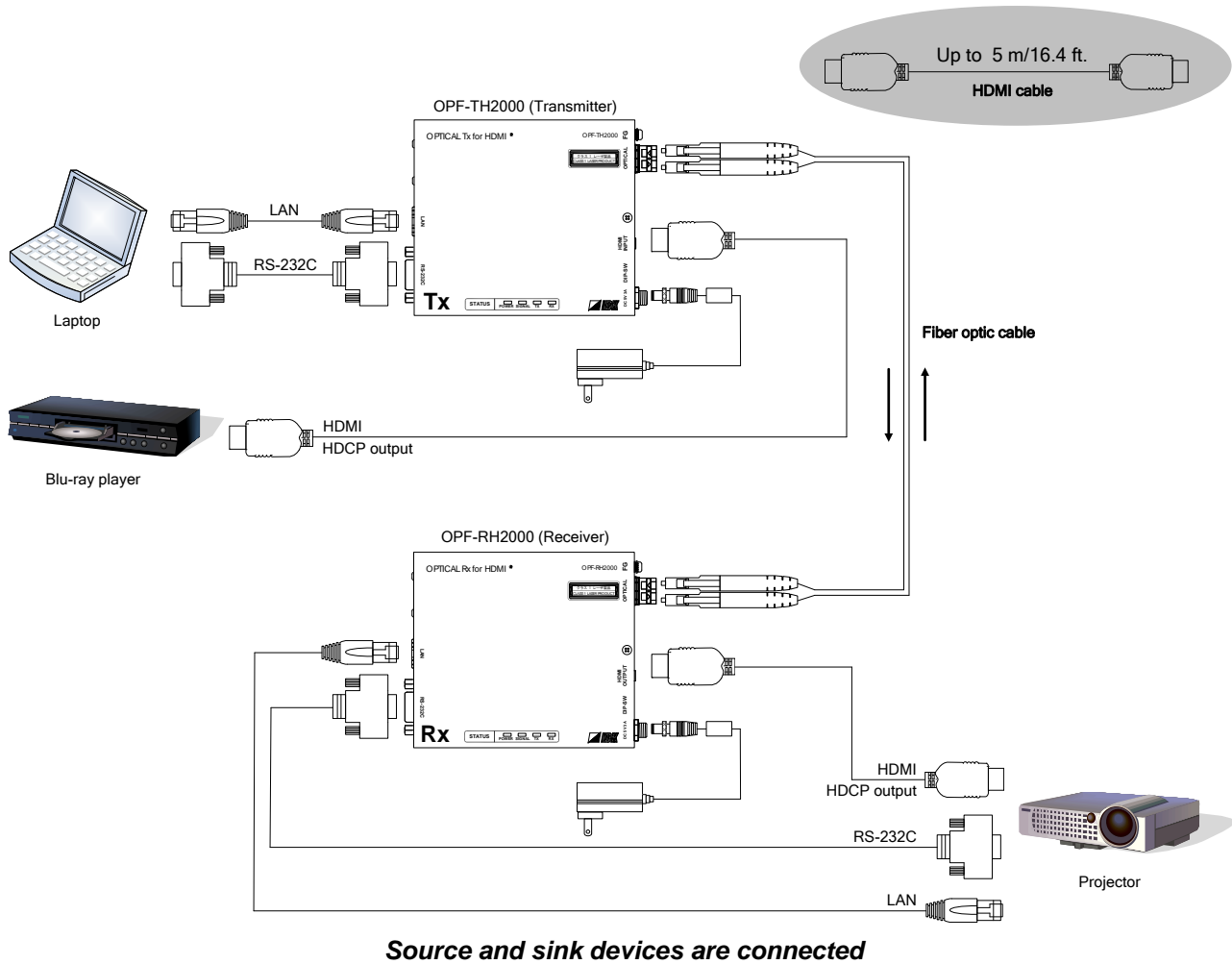
Switch	Equalizer
0	Minimum
~	
8	(Default)
~	
F	Maximum

5.4 Typical application example

Digital video and audio are transmitted from the Blu-ray disc player to the transmitter. The transmitter sends those signals to the receiver over a fiber optic cable. The receiver outputs the received video and audio signals to the projector from the HDMI output connector.

Peripheral device control (such as projectors) and Ethernet communication will be available by using a control device (such as PCs).

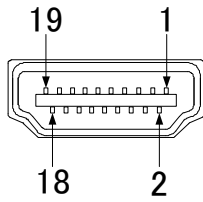
Note: The OPF-TH2000 must be paired with OPF-RH2000. The OPF-H2000 cannot be connected to an I/O slot board of the FDX series or other models of the OPF series.



6 Specification

6.1 Pin assignments

6.1.1 HDMI Type A connector



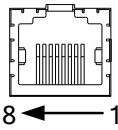
Pin #	Signal name	Pin #	Signal name
1	TMDS data 2+	10	TMDS clock+
2	TMDS data 2 shield	11	TMDS clock shield
3	TMDS data 2-	12	TMDS clock-
4	TMDS data 1+	13	CEC
5	TMDS data 1 shield	14	spare (N.C.*)
6	TMDS data 1-	15	SCL
7	TMDS data 0+	16	SDA
8	TMDS data 0 shield	17	DDC/CEC ground
9	TMDS data 0-	18	+5 power supply
		19	Hot plug Detect

*N.C.: No Connection

HDMI Type A assignments

6.1.2 RJ-45 connector

8 pin RJ-45 modular connector

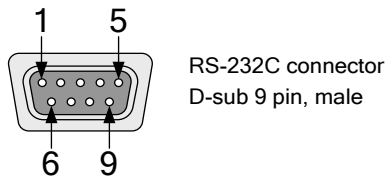


Pin #	Signal name			
	MDI		MDI-X	
	1000BASE-T	100BASE-TX/10BASE-T	1000BASE-T	100BASE-TX/10BASE-T
1	TRX+ (Bi-directional pair+)	TX+ (Transmit data+)	TRX+ (Bi-directional pair+)	RX+ (Receive data+)
2	TRX- (Bi-directional pair-)	TX- (Transmit data-)	TRX- (Bi-directional pair-)	RX- (Receive data)
3	TRX+ (Bi-directional pair+)	RX+ (Receive data+)	TRX+ (Bi-directional pair+)	TX+ (Transmit data+)
4	TRX+ (Bi-directional pair+)	N.C. (Not used)	TRX+ (Bi-directional pair+)	N.C. (Not used)
5	TRX- (Bi-directional pair-)	N.C. (Not used)	TRX- (Bi-directional pair-)	N.C. (Not used)
6	TRX- (Bi-directional pair-)	RX- (Receive data-)	TRX- (Bi-directional pair-)	TX- (Transmit data-)
7	TRX+ (Bi-directional pair+)	N.C. (Not used)	TRX+ (Bi-directional pair+)	N.C. (Not used)
8	TRX- (Bi-directional pair-)	N.C. (Not used)	TRX- (Bi-directional pair-)	N.C. (Not used)

N.C.: No Connection

The OPF supports Auto MDI/MDI-X function that detects and switches the straight/cross cable.

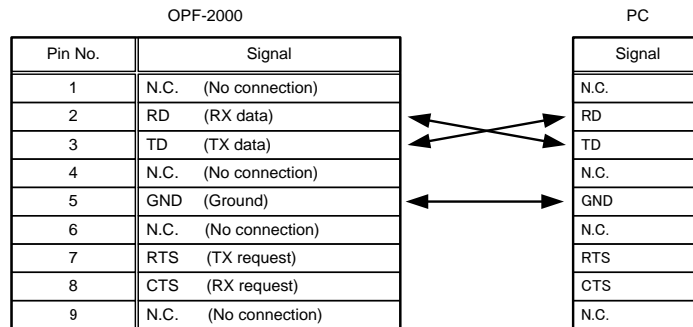
6.1.3 RS-232C connector



RS-232C connector pin assignments

■ **Connection to PCs**

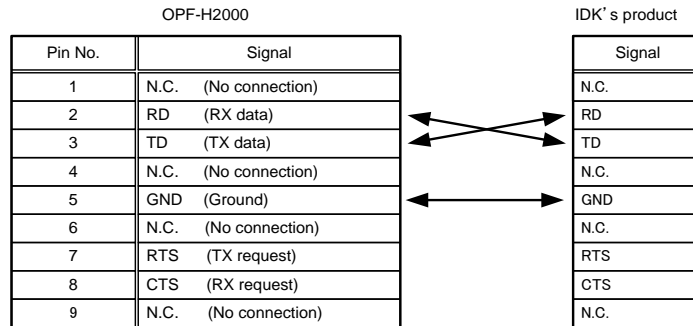
Make sure to use a cross cable when connect to a PC.



OPF-H2000 and PC are connected

■ **Connecting to an IDK's product**

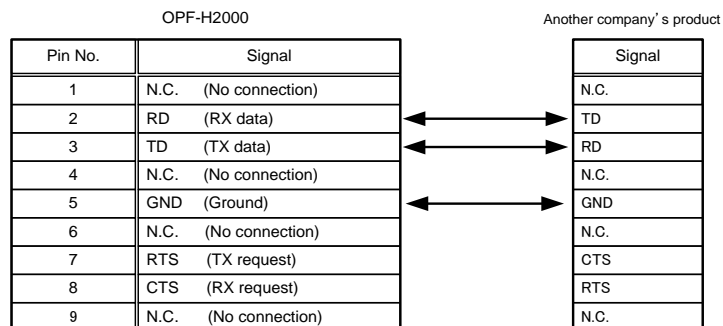
Make sure to use a cross cable when connect to an IDK's product.



OPF-H2000 and IDK's product are connected

■ **Connecting to a product requiring straight cabling**

Make sure to use a straight cable when connect to a product that needs straight cabling.



OPF-H2000 and another company's product requiring straight cabling are connected

*N.C.: No Connection

6.2 Product specification

Item		Description		
Model number		OPF-TH2000 (Transmitter)	OPF-RH2000 (Receiver)	
Input				
Video	Digital	Number/Signal	1 input/ HDMI (*1) <ul style="list-style-type: none"> • HDCP 1.4: Pass through • CEC: Pass through • TMDS Single Link • TMDS clock: 25 MHz to 297 MHz 	1 input/Optical signal for extension
		Connector	1 female HDMI Type A (*2)	2 LC connectors
	Others		Color depth: 24bit, 30 bit, 36 bit Deep Color (*4)	
	Formats		VGA/SVGA/XGA/WXGA (1280x768)/WXGA (1280x800)/Quad-VGA/SXGA/WXGA (1360x768)/WXGA (1366x768)/SXGA+/WXGA+/WXGA++/UXGA/WSXGA+/WUXGA/QWXGA/4K (*3) 480i/480p/576i/576p/720p/1080i/1080p/4K (*3)	
Audio	Digital	Number/Signal	1 input/Multi-channel linear PCM up to 8 channels	1 input/Optical signal for extension
		Connector	1 female HDMI Type A (*2)	2 LC connectors
Output				
Video	Digital	Number/Signal	1 output/Optical signal for extension	1 output/HDMI (*1) <ul style="list-style-type: none"> • HDCP 1.4: Pass through • CEC: Pass through • TMDS Single Link • TMDS clock: 25 MHz to 297 MHz
		Connector	2 LC connectors	1 female HDMI Type A (*2)
	Others		Color depth: 24bit, 30 bit, 36 bit Deep Color (*4)	
	Formats		VGA/SVGA/XGA/WXGA (1280x768)/WXGA (1280x800)/Quad-VGA/SXGA/WXGA (1360x768)/WXGA (1366x768)/SXGA+/WXGA+/WXGA++/UXGA/WSXGA+/WUXGA/QWXGA/4K (*3) 480i/480p/576i/576p/720p/1080i/1080p/4K (*3)	
Audio	Digital	Number/Signal	1 output/Optical signal for extension	1 output/Multi-channel linear PCM up to 8 channels
		Connector	2 LC connectors	1 female HDMI Type A (*2)
Plug & Play		Pass through		
Fiber optic cable	Suitable cable		Duplex fiber optic cable, SFP module (2 LC connectors)	
	Polishing (*5)		SFP for Multimode: PC (recommended) SFP for Singlemode: UPC (recommended), SPC supported * APC is not supported	
Signal transmission distance (*6)		Multimode fiber (OM3): 493 ft. (approx.) <150 m> Singlemode fiber (OS1): 4593 ft. (approx.) <1.4 km>		
Control	Serial control port	Number/Signal	1 port/Full duplex up to 115.2kbps	
		Connector	1 male 9-pin D-Sub	
	LAN control port	Number/Signal	1 port/10Base-T, 100Base-TX, 1000Base-T (Auto Negotiation), Auto MDI/MDI-X	
		Connector	1 RJ-45	
Others	AC adapter		Input: 100 - 240 VAC \pm 10%, 50 Hz/60 Hz \pm 3 Hz Output: 5VDC (AC adapter is supplied)	
	Power consumption		About 9 Watts	
	Dimensions		4.17 (W) x 1.16 (H) x 4.72 (D)" (approx.) <106 (W) x 29.5 (H) x 120 (D) mm>	

		(Quarter rack, not including projections)
	Weight	0.88 lbs./0.4 kg
	Temperature	Operating temperature: 32°F to 104°F <0°C to +40°C> Storage temperature: -4°F to +176°F <-20°C to +80°C>
	Humidity	Operating/Storage humidity: 20% to 90% (Non Condensing)

(*1) HEC and ARC are not supported.

(*2) Please use a 5 m/16.4 ft. or shorter HDMI cable.

(*3) 4K signals: only 24 Hz/25 Hz/30 Hz/60 Hz 4:2:0 are supported.

(*4) 4K signals: only 24 bit is supported.

(*5) Polishing methods other than the recommended one can also be used, but that may cause a change of extension distance ability due to an increase in return loss.

(*6) The max extension distance above was measured under the following conditions: a fiber polished by the recommended method was used, no connection was established in the transmission path, and the allowable bending radius was not exceeded.

Standard SFP+

Item		Multimode fiber	Singlemode fiber
Connector		2 LC connectors (Duplex)	
Wave length		850 nm (Oxide VCSEL Laser (*7))	1310 nm (Fabry-Perot laser (*7))
Max. extension distance		OM3: 493 ft (approx.) <150 m>	OS1: 4593 ft (approx.) <1.4 km>
Optical power level	Input	Over -11.2 dBm	Over -13.8 dBm
	Output	-8.2 dBm to -2 dBm	-10.6 dBm to +0.5 dBm

(*7) The OPF-H2000 has lasers that meet Class 1 Laser Safety.

Notes:

- Specifications are subject to change without notice.
- All nominal levels are at ±5%.

7 Troubleshooting

In case this device does not work correctly, please check the following items first. Refer to manuals of connected devices as well, since they may possibly be the cause of the problem.

- Are this device and the connected devices turned on normally?
- Are cables connected correctly?
- Are there no loose connections?
- Are cables that are appropriate to this device being used?
- Are signal specifications of connected devices matched to each other?
- Are settings of the sink device correct?
- Are there any close objects that may cause noise?

If additional assistance is required, please perform the following tests and then contact us.

1. The problem occurs in all connectors?
 2. Connect the devices using genuine cables without connecting the OPF-H2000.
- The problem still cannot be solved? Please contact us for assistance.

OPF-TH2000/OPF-RH2000 User's Guide

Ver.1.0.0

Issued on: 30 October 2015



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