Operating Manual for OPTOCORE DD8RP

REPEATER / MEDIA CONVERTER MODULE

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Germany

DD8RP
Operating Manual
Rev. 1.0

Important Safety Instructions

- **Please read this manual carefully.**
- **Please keep this operating manual in a safe place.**
- **Heed all warnings.**
- **Follow all instructions.**
- **This device may only be used in accordance to the information provided in this operating manual. Ensure that all recommendations, especially the safety recommendations as detailed in this operating manual, are followed before and during the usage of the device.**
- **Do not use this device near water, for example, in moist or damp rooms.**
- **Clean only with a dry cloth.**
- **Do not block or cover any ventilation slits. Install the device in accordance to the operating manual.**
- **Do not install or place the device near any heat source such as radiators, power-amplifiers, stoves, or any other heat producing equipment.**
- **Protect the power cord from being walked on, crushed, pinched, or damaged in any other way. Pay special attention to plugs and sockets of the device.**
- **Never switch on power amplifiers before the complete system is stable and the level meters of the OPTOCORE CONTROL software indicate a normal level.**
- **Do not place this device on an unstable table, tripod, cart, etc. The device may fall, causing serious damage to the device, and a risk of injury.**
- **The device can only be removed from the power supply by pulling the plug. This must be freely accessible at all times. The device has to be disconnected during lightning storms or when unused for long periods of time.**
- **The device must be grounded; any disconnection of the grounding is not permitted.**
- **The switched-mode power supplies operate with high voltage. Coming into contact with them can lead to considerable electric shocks, which may result in death.**
- **Only use attachments specified by the manufacturer.**
- **This device contains no user serviceable parts: only refer to authorized, qualified service personnel for any servicing.**
- **Your warranty will be voided if you tamper with the internal components.**

Purchaser Information

- **Operating Manual**

  Please read this manual – if you call for technical support, we'll assume that you have. Study the operating manual carefully in order to familiarize yourself with the device and its operation. It contains numerous information and hints for the proper use of the device.

  It cannot be excluded that this operation manual shows typographical mistakes or misprints; it is however regularly revised.

  Modifications, which serve the purpose of technical improvement of the device, may be carried out without prior notification.

- **Transport and Shipping**

  Always ensure the careful handling of the device. If possible transport or shipping should always occur in special, shock-absorbing transport cases. If these are not available we recommend well-upholstered packaging such as the coated carton in which the device was delivered.

  We strongly advise not to use simple flight-cases without rack-in-rack mounting.

- **Environments**

  This device can be used in E1, E2, E3, E4, or E5 environments (as listed below) according to the harmonized European standards EN55103-1 and EN55103-2 "Electromagnetic compatibility – Product family standard for audio, video and audio-visual and entertainment lighting control apparatus for professional use"

  E1-Residental

  E2-Commercial and light industrial

  E3-Urban outdoors

  E4-Controlled EMC environment e.g. broadcast and TV-studio

  E5-Heavy industry

  The product is intended for the use in moderate climate.

- **Ventilation**

  Do not block or cover any ventilation slits. Install the device in accordance to the operating manual. Leave sufficient ventilation space around the units (at least approx. 200mm ≡ 7,87" free space behind the rear-panel) and care for free air movement near the ventilation-slits on both sides of the device. Keep the rear of the rack open during operation. Do not set up the device close to equipment producing a lot of heat, for example power-amplifiers. Leave enough space (minimum ½ RU) to any heat emitting device. A DD8RP may be placed on top or beneath other Optocore products, except DD32, without additional space.

- **Water and Moisture etc.**

  To prevent fire or shock hazard do not expose device to the effects of direct sunlight, dust, water, or rain during operation or storage.

- **Cleaning**

  Only use a dry linen cloth to clean the device. In case of strong soiling moisten the cloth using a little water and a small amount of household detergent. Never use cleansing agents containing solvents to clean the device.

- **Operating and Storage Temperature**

  Operating temperature: 0°C …50°C ≡ 34°F … 122°F; ensure proper ventilation

  Storage temperature: -20°C …60°C ≡ -4°F … 140°F

- **Power Supply**

  The device can only be removed from the power supply by pulling the plug. This must be freely accessible at all times. The switched-mode power supplies operate with high voltage. Coming into contact with them can lead to considerable electric shocks, which may result in death.

  Never disconnect the main plug by pulling the cable, always pull the plug itself.

  Power-supply cords should be routed in such a way that they are not likely to be walked on, crushed, pinched, or damaged in any other way. Pay special attention to the plugs and the sockets of the device.

  Replace a damaged power cable immediately.

  The device must be grounded; any disconnection of the grounding is not permitted. Always ensure the correct grounding of the device via the main plug. Never cover the grounding terminal of the plug by means of insulation material!

- **Fuse**

  The main fuse cannot prevent an unexpected malfunction of electrical components; it is rather there to protect the user and its environment from damage. Therefore never try to replace the main fuse by any other than the specified D1.0A type (1.0A, slow behavior). Never try to repair or bypass a blown main fuse.

- **Lightning**

  For additional protection of this device during lightning storms, or when it is left unattended and unused for a long period of time, unplug the power line. This will prevent damage to the device due to lightning and power line surges. Disconnection from the mains power supply can only be achieved by removing the plug from the mains socket.

- **Eye Safety**

  This product is a Laser Class 1 product. It complies with IEC 60825-1, FDA 21 CFR 1040.10, and 1040.11.

- **Interference of external objects and/or liquids with the device**

  Never push objects of any kind into the device through openings in the casing. They may come in touch with dangerous voltage points or short out parts that could result in a fire or electric shocks. Never spill liquid of any kind on the device.

- **Cables and Accessories**

  Only use attachments specified by the manufacturer.

  Only use high quality cable material to connect the device. For the optical data connection exclusively use the specified optical waveguide cables. If not in use, ensure that the optical connectors of both, device and waveguide are closed with the provided lids.

  Do not place this device on an unstable table, tripod, cart, etc. The device may fall, which can cause injury and serious damage to the device. Any mounting of the device should follow the manufactures instructions, and should use mounting accessory recommended by the manufacturer.

- **Servicing**

  Do not attempt to service this device yourself.

  This device contains no user serviceable parts: only refer to authorized, qualified service personnel for any servicing.

  The opening of the device is not required for operation as there are no user serviceable components located inside the device. The operation of an opened device is not permitted. It can lead to damage of components due to the absence of required ventilation. The device may not be serviced, altered or modified without authorization of Optocore or an Optocore authorized distributor / dealer. Only qualified service personnel may carry out repair and maintenance work. The warranty will be voided if unauthorized manipulation occurred**.**

CE-Conformity

This document confirms that the product DD8RP bearing the CE (Communauté Européenne) label meets all requirements in the EMC directive 2004/108/EG laid down by the Member States Council for adjustment of legal requirements. Furthermore the product complies with the rules and regulations of the low-voltage directive 2006/95/EG. This product bearing the CE label complies with the following standards, ratified by CENELEC (Comité Européen de Normalisation Electrotechnique):

Electromagnetic compatibility – Product family standard for audio, video, audio-visual and entertainment lighting control apparatus for professional use

EN 55103-1, Emission
EN 55103-2, Immunity

The authorised declaration and compatibility certification lies with the manufacturer and can be viewed on request. Responsible as manufacturer is:

OPTOCORE GmbH, Lisbergstr.7, 81249 Munich, Germany

Represented by Marc Brunke, Managing Director

N.B. The awarding of the CE label confirms the compliance with legal directives issued for the manufacture and marketing of electronic and electrical devices. As such the CE label is not a "seal of quality" but rather proof that the device bearing the CE label is conform with the electromagnetic compatibility standards laid down in the above named testing regulations.

Munich, 30.11.2007

Marc Brunke

Eye Safety

This product is a Laser Class 1 product. It complies with IEC 60825-1 and FDA 21 CFR 1040.10 and 1040.11.

DD8RP REPEATER / MEDIA CONVERTER MODULE

Table of Contents

Device Description

Congratulations on your purchase of a DD8RP Repeater / Media Converter Module. The DD8RP will quickly convince you with its advantages and will facilitate your day-to-day work.

The DD8RP features two possible applications. It can operate as a repeater in an Optocore network, if distances between devices are longer than 700 m and the standard multimode fiber cables are used. Or it can function as media converter from multimode to monomode fiber connections and vice versa. The four repeaters / media converters work protocol independent, they can be implemented in networks based on protocols such as Ethernet as well. The unit is specially designed for low power consumption and provides a DC 12 V power supply. Battery packs can supply the power, if no mains supply is available. This can immensely simplify outdoor applications.

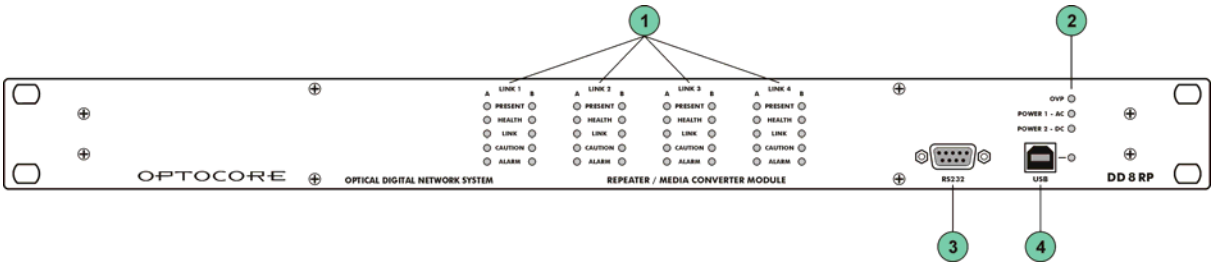
The flexibility to use the DD8RP as repeater and converter is achieved by receptacles for SFP (Small Form-factor Pluggable) optical transceivers. Eight receptacles form the four independent LINK interfaces; each LINK can consist of two SFPs with dual LC type connectors. The function of a LINK as repeater or converter depends on the implemented optical transceiver. This allows the configuration exactly appropriate for the application. E.g. one LINK may extend the distance between two Optocore devices in an OPTOCORE® OPTICAL DIGITAL NETWORK, while the other LINKs are used in totally different networks with non-Optocore protocols.

LEDs on the front give detailed information about the status and operating state of each LINK. They indicate if a malfunction of any connection could influence the high quality data transmission.

Two power supplies with automatic switchover and individual connectors provide a high grade of safety. The first power supply is for AC mains input including the unique 400 V tolerant Optocore design. An over-voltage-monitor lights the OVP (Over Voltage Protection) status LED during an over voltage condition, simultaneously suppressing the normal function of the device. The second power supply is for DC 12 V, equipped with a male 4-pin connector. The DC power supply is compatible with battery packs, UPSs (Uninterruptible Power Supply) or standard AC adapters.

Due to SMD production the DD8RP fulfills the demand of highest digital standards occupying only one rack unit of a 19" rack. The FPGA (field programmable gate array) based concept of the internal logic circuitry permits updating of the hardware via the units remote ports, ensuring a continual state-of-the-art device.

Front Panel



1

LINK 1 … 4: Indicates the status of each optical transceiver:

A:	Status at LC connector A
B:	Status at LC connector B
PRESENT:	Fiber transceiver (SFP) installed
HEALTH:	Fiber transceiver operates within specified parameters
LINK:	Optical signal detected
CAUTION:	Received optical signal is low but still operational
ALARM:	Received optical signal is too low for proper operation

2

OVP LED: Indicates over-voltage protection (> 300 V_{AC})
PWR 1 LED: AC Power supply 1 is working correctly
PWR 2 LED: DC Power supply 2 is working correctly

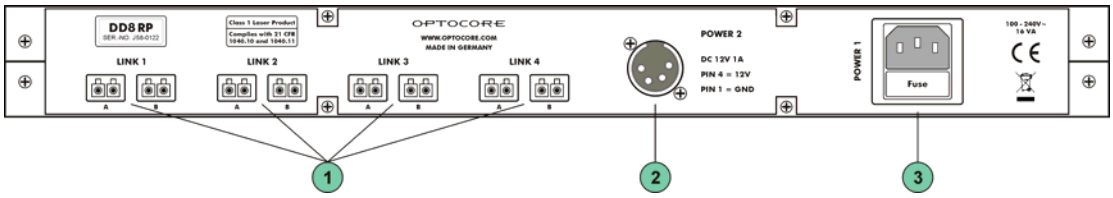
3

RS232 plug: D-Sub-9 RS232 connection for remote control and update via PC

4

USB plug and LED: USB connection for remote control via PC
LED ON indicates USB is connected;
LED blinking indicates data traffic

Rear Panel



1

LINK 1 … 4: Independent LC-type optical interface, equipped with SFP transceivers. Type of transceivers depend on costumer's order.

2

POWER 2: Input for DC 12V / 1A power supply

3

POWER 1: Mains input for AC power supply 1 (100 … 240 V)

Device Details

LINK Ports

Four independent LINK ports provide receptacles for SFP optical transceivers. Each LINK can be equipped with two SFPs with two LC-type connectors. The advantage of this concept is obvious. Each port holds the SFP needed in the particular application. They can be changed without opening the device. The multimode full duplex SFP transceiver (850nm) or monomode full duplex SFP transceiver (1300nm) can be purchased with the device or can be ordered later.

The specification of the ports as A or B serves only for orientation. A dual LC cable with an input and output signal connected to port A will be transferred to port B, either refreshed by the repeater or refreshed and converted to another media type.

The DD8RP is not limited to be used in Optocore networks. It can operate in all sorts of networks no matter which protocol is the base of the data transmission. The four LINKS are functioning totally independent; so one LINK can serve in an Optocore network, the next one in a 1 Gbit-Ethernet and the others in completely different networks.

Power Supply

The device is equipped with two power inputs and power supply units. If one power supply fails, due to malfunction of the feeding power line or the power supply unit itself, the device will automatically switch over to the other power supply unit.

One power supply unit operates with mains voltage of 100 ... 240 V and frequency of 50 … 60 Hz. Thus the device can be used throughout the world without any adjustments or transformers.

The power supply unit is 400 V_{AC} tolerant and protected against high current. The OVP (Over Voltage Protection) LED on the front will indicate over voltage at > 300 V, simultaneously suppressing the normal function of the device. When the OVP LED is lit, immediately disconnect the device from the power line to prevent any damage to the device. The power input has a fuse, replaceable without opening the device.

Never bypass the fuse and only use the specified type.

Be aware that the switched-mode power supply operates with high voltages! Coming into contact with it can lead to considerable electric shocks that may result in death! To prevent electric shocks do not remove any covers!

The second power supply operates with 9-15 V / 1 A AC or DC. The low voltage can be provided by a wide range of alternatives such as battery packs, UPSs (Uninterruptible Power Supply) or standard AC adapters. Specially in temporary outdoor applications with long distances between devices, e.g. at a race course or a road race, this simplifies the power supply. No generator or long power cables are necessary. The unit is specially designed for low power consumption. A battery pack with a sufficient capacity can easily supply the required power.

Connectors and Cables

Optical Connection

The type of the optical fiber cables depends on the optical transceivers. The connectors are LC-type.

RS232-Connection

Shielded, standard 1-modem cable is sufficient for the RS232 port.

USB-Connection

For the USB-port use a standard PC/device cable.

Mains-Connection

For the power supply 1 standard power cords with IEC C13 socket can be used.

12V-Connector

For the power supply 2 a cable with 4 pole female XLR connector can be used.

Starting Up

The DD8RP is functioning independent of the format and structure of the connected devices. So no software configuration is necessary, no ID has to be set and there is no limitation of the number of DD8RP implemented in the network.

Hardware Connection

Each LINK is working autonomous. There are four separate repeaters or converters. To extend the distance between two devices, e.g. two DD32E as shown in Fig. 1 and Fig. 2, one LINK interface of the DD8RP equipped with the appropriate SFP optical transceivers is needed.

In Fig. 1 both receptacles of LINK 1 are equipped with multimode transceivers (orange). The LINK is functioning as a repeater in order to extend the distance of a multimode connection. Port A of the LINK 1 is used as interface to the DD32E with ID 2; port B as interface to the DD32E with ID 2.

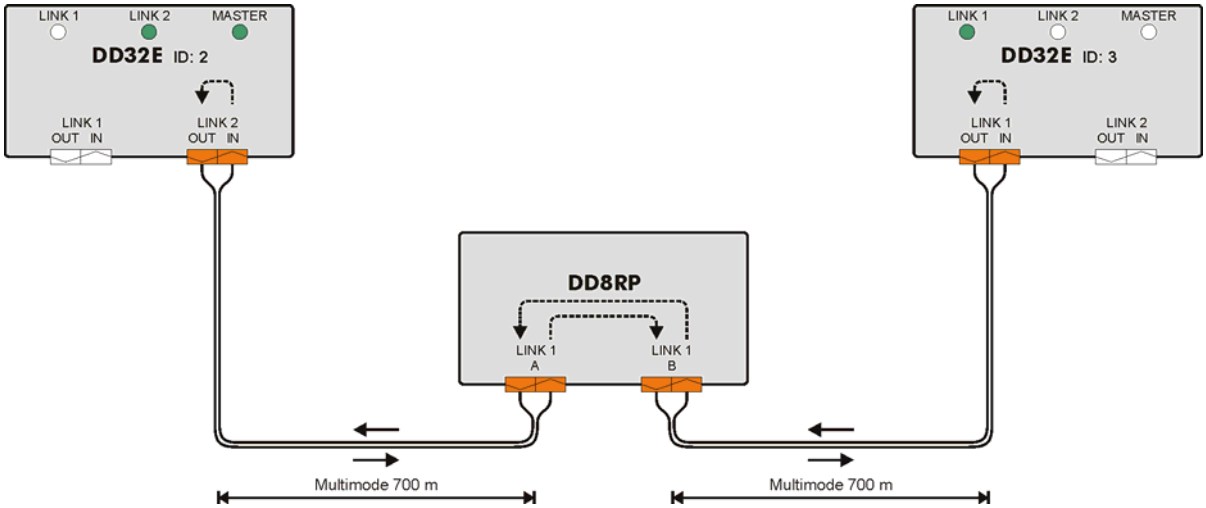


Fig. 1: DD8RP between two DD32E, functioning as repeater in order to extend the distance of the multimode connection.

The second example in Fig. 2 shows an application where the two DD8RP work as repeater and media converter. The first DD8RP functions as a converter from multimode to monomode, the second DD8RP converts the signal back to multimode. The ports of LINK 1 connected to the DD32E are equipped with multimode SFPs (orange). The second ports of LINK 1 contain standard monomode SFPs (yellow) in order to enable distances up to 10 km. SFPs for distances up to 70 km can be purchased on request. The converters refresh the signal as well. The full cable length, 700 m between multimode transceivers and 10 km between monomode transceivers, is available.

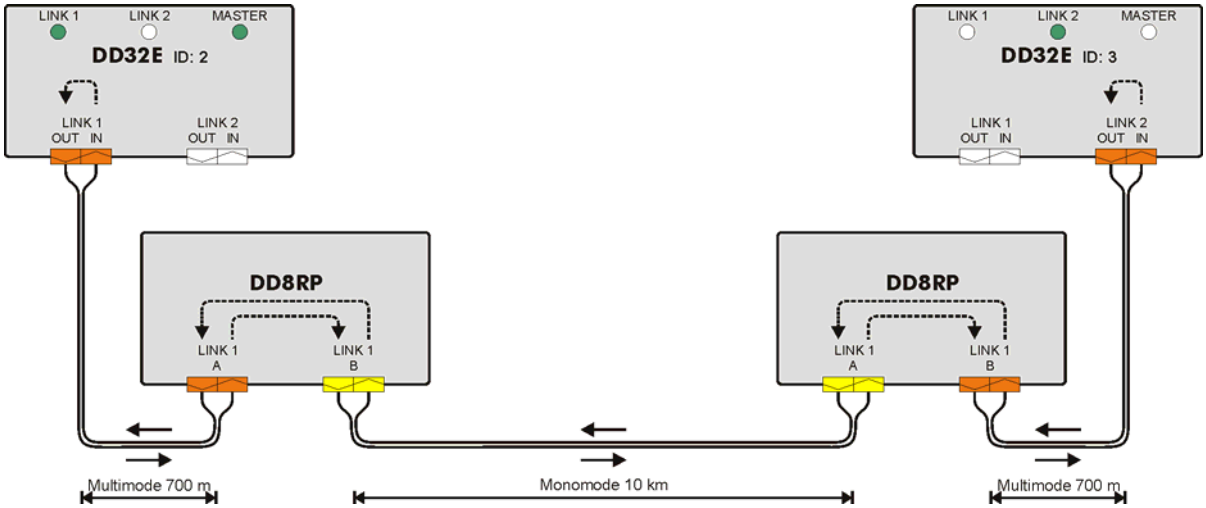
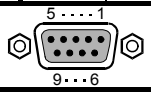


Fig. 2: Two DD8RP as multimode to monomode and vice versa converters.

Connection Tables

Pin-out	DC-12V 1A		
		12V	GND
	Pin	4	1
4 pole male XLR			

Pin-out	RS232-Port						
	Channel	RS232		Internally Bridged		Power		Use 1-modem cable, male – female, to connect to PC
		RXD	TXD			+5VS	GND	
	Pin	3	2	1, 4, 6	7, 8	9	5	
D-Sub-9- female						Locking system acc. to 4-40 UNC		

Pin-out	USB-Port					
	Channel	USB			GND	**USB device-connector**
		VBUS	D -	D +		
	Pin	1	2	3	4	

Technical Specifications

Link Ports	Input, output dual – full bandwidth	
Connection	Small Form Pluggable (SFP) optical transceiver	4 Duplex LC
Compatible Protocol	Protocol independent	
Transmission		Full duplex
Data rate	Standard	100 Mbps to 1 Gbps
	On request	2 Gbps
Optical wave guide cable lengths	e.g. Multimode fiber 50 µm	≤ 700 m
	e.g. Multimode fiber 62.5 µm	≤ 350 m (not recommended)
	e.g. Monomode fiber 9 µm	≤ 70 km

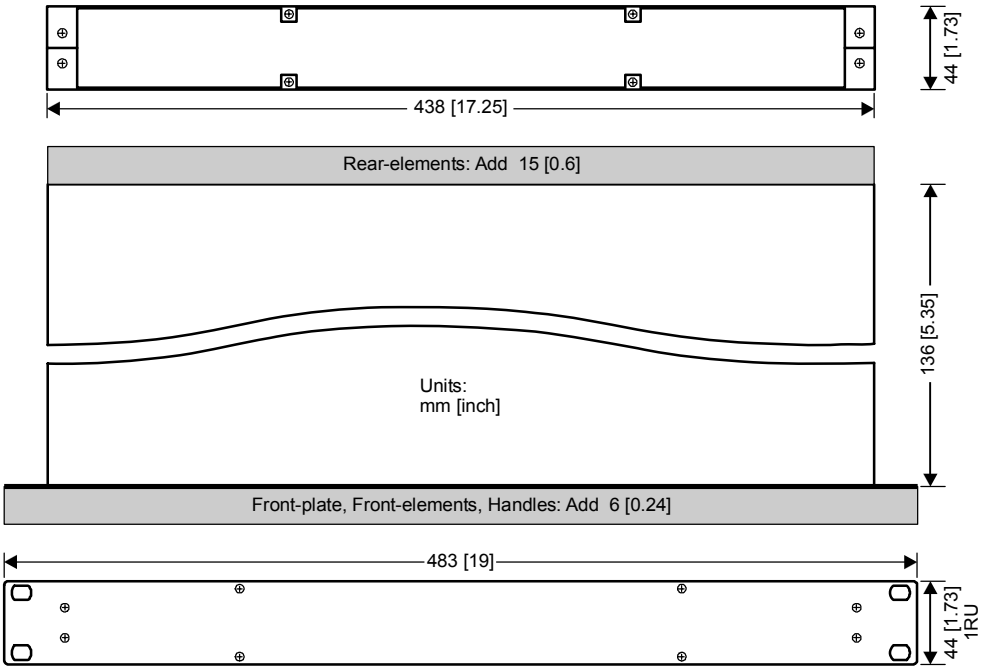
RS232 Port	Convention EIA / TIA-232	
Data channels	Digital control data	R x D, T x D
Data rate		Up to 115200 Baud
External supply	Current limited	+ 5 V

USB Port	Remote control input	No transmission purposes

Power 1	Automatic switch-over to DC power supply
Type	Switch-mode, universal input
Mains voltage	100 ... 240 V, 400 V_{AC} tolerant
Frequency	50 ... 60 Hz
Power consumption	4-14 VA (dependent of number of SFPs installed)
Fuse	D1.0 A, slow behavior, glass 5 mm x 20 mm, acc. to UL 48-14
Inrush current limit	≤ 7 A
Protection circuit	400 V_{AC} tolerance, over-voltage, over-current and over-temperature monitor
Security classification	Class 1: basic insulation, connected to the protective grounding conductor
Security regulations	Harmonized European standard EN60065: 2002
Mains connector	Including EMI-filter, a fuse and spare-fuse, acc. to IEC-950
Cooling	Via surface and ventilation-slits on both sides

Power 2	
Type	12 V DC, compatible to battery packs, UPS, standard AC adapters
Voltage	9 - 15 V AC or DC
Power consumption	0,6 VA – idle, plus 0,45 / 0,6 VA per SFP installed (multimode / monomode)
Protection circuit	Electronic fuse
12 V device connector	4 pole XLR male
12 V cable connector	4 pole XLR female (e.g. Neutrik NC4FX)
Cooling	Via surface and ventilation-slits on both side

Dimensions and Weight



Weight

2.0 kg ≡ 4.4 lbs

Modifications that serve the purpose of technical improvement of the device may be carried out without prior notification.

Warranty and Liability

Summary of Warranty

Optocore DD8RP is warranted against defects in material and workmanship for 24 months.

This warranty covers the original purchaser only and is not transferable. Valid evidence for warranty is the official Optocore invoice issued by the distributor / dealer.

Optocore will, at its discretion, repair or replace a defective product, providing that the defect has appeared under normal operating conditions.

This warranty does not cover damage from acts of God, accident, abuse, neglect, contamination, unauthorized modification or misuse, operation outside of the environmental specifications for the product, improper site preparation or maintenance, or abnormal conditions of handling. This would include over-voltage failures, and conditions outside of the products specified ratings, problems with buyer-supplied software or interfacing, or normal wear and tear of mechanical components. Optocore or its distributor / dealer will acknowledge the evaluation of warranty after inspection.

Devices on which the Serial Number has been removed or defaced are not eligible for warranty service.

Failure to properly package and protection of the product during shipping may void this warranty.

How to Obtain Warranty Service

To return a defective product, please contact your distributor / dealer. Our web site: **http://www.optocore.com/** provides a complete list of Optocore distributors / dealers.

Always ensure the careful handling of the device. If possible transport or shipping should always occur in special, shock-absorbing transport cases. If these are not available we recommend well-upholstered packaging such as the coated carton in which the device was delivered.

We strongly advise not to use simple flight-cases without rack-in-rack mounting.

Declaration of Liability

Optocore accepts no liability for damage caused to other devices through operation of the DD8RP device.

Optocore is not liable for any damage caused by shipping accidents, misuse, abuse, operation with incorrect AC voltage, operation with faulty peripheral equipment, or improper or careless installation of the device.

Optocore accepts no claims for compensation whatsoever (e.g. cancellation of events).

Shipping Contents

The standard shipment of a DD8RP device contains the following:

- 1 DD8RP device
- Number and type of SPF transceivers according to customer's order (not included in standard shipment)
- 1 D1.0A (1.0A, slow behavior) replacement fuses per device

  inserted next to the operational fuses in the power supply inlet.
- 1 operating manual

Any additionally purchased equipment such as optical wave-guide cables in required lengths, D-Sub cables and adapters, RS232 cables, and international electric cables have been supplied on your request and your purchase order and cannot be listed in the above.

Company Information

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