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Fiber Optic Digital Extension Modules in 19" 1RU Frame for Broadcast

User's Manual
(BR-100)

Contents

Welcome!

Congratulations on your purchase of the **19" 1RU Power Unit, BR-100 and Fiber-Optic Extension modules**, VT-1xx/VR-100, AT-1xx/AR-100, DX-1/DX-2, EX-1/EX-2 and WM-81. This manual contains information that will assist you in installing and operating the product.

Product Description

1. BR-100

OPTICIS **BR-100** 19" 1RU frame is an modular and systematic fiber-optic solution providing a variety of optical extenders with flexibility to handle multi-rate SDI formats such as 3G-SDI (SMPTE-424M), HD-SDI (SMPTE-292M), SD-SDI (SMPTE-259M) by 8-channel of CWDM, AES-3id audio compatible with SMPTE- 276 and Dolby-E, RS-232/422 and 100Base Ethernet.

All extenders and dual power supplying modules are hot-swappable to allow system maintenance without any disruption or disconnection. All extenders are also available in a compact stand-alone type to be incorporated into any broadcast workflow from small studio and OB vans to master control room.

BR-100 can deploy 1 slot sized extender up to 16 slots and has LED indicators on the front panel to monitor status of BR-100 and mounted extenders (ID, SD, Status, Power and FAN alarm).

2. VT-1xx/VR-100

Multi-rate SDI extender, VT-1xx/VR-100 can handle multi-rate SDI formats such as 3G-SDI (SMPTE-424M), HD-SDI (SMPTE-292M), SD-SDI (SMPTE-259M) and DVI-ASI by 8-channel of CWDM.

Where XX refers to 2 digits in wavelength of transmitter,
VT-133: 1330nm DFB-LD
VT-135: 1350nm DFB-LD
VT-137: 1370nm DFB-LD
VT-143: 1430nm DFB-LD
VT-145: 1450nm DFB-LD
VT-147: 1470nm DFB-LD
VT-149: 1490nm DFB-LD
VT-151: 1510nm DFB-LD

* VR-100 is commonly used receiver at any wavelengths.

Fig. 1: VT-151

3. AT-1xx/AR-100

AES-3id audio extender, AT-1xx/AR-100 transmits 8-channel of AES-3id signals by CWDM over one(1) fiber. It also has 8 wavelengths transmitters to be used with CWDM multiplexer/de-multiplexer.

Where XX refers to 2 digits in wavelength of transmitter,
AT-133: 1330nm DFB-LD
AT-135: 1350nm DFB-LD
AT-137: 1370nm DFB-LD
AT-143: 1430nm DFB-LD
AT-145: 1450nm DFB-LD
AT-147: 1470nm DFB-LD
AT-149: 1490nm DFB-LD
AT-151: 1510nm DFB-LD
* AR-100 is commonly used receiver at any wavelengths.

Fig. 2: AT-147

4. DX-1/DX-2

RS-422/232 extenders, DX-1 and DX-2 transmit and receive RS-422 and RS-232 signals at 10Mbps over one(1) fiber. DX-1 and DX-2 must be used as a pair to make bi-directional serial data communication.

DX-1 (1310nm FP-LD, 1550nm PD)
DX-2 (1550nm FP-LD, 1310nm PD)

Fig. 3: DX-1

5. EX-1/EX-2

Ethernet extender, EX-1 and EX-2 transmit and receive Ethernet (100Base-Tx) signal over one (1) fiber. EX-1 and EX-2 must be used as a pair to make bi-directional Ethernet communication.

EX-1 (1310nm FP-LD, 1550nm PD)
EX-2 (1550nm FP-LD, 1310nm PD)

Fig. 4: EX-1

6. WM-81

Multiplexer/De-multiplexer, WM-81 combines 8-different wavelength fiber-optic inputs into 1-fiber and also divides combined signal into 8-different wavelength outputs. User can configure 8 x SDI extenders and WM-81 in one BR-100 to transmit 8 different 3G-SDI signals over 1-fiber.

It has 1330nm, 1350nm 1370nm, 1430nm, 1450nm, 1470nm, 1490nm and 1510nm filters.

* Be sure to match each wavelength of transmitters to marked inlet of WM-81.
  For example, fiber optic output of VT-147 must be connected to inlet of WM-81, marked
  1470nm.

Fig. 5: WM-81

Installation

1. BR-100

Step 1
Connect two (2) AC plugs to inlets of BR-100.

Fig. 6: Connect AC plugs to BR-100

BR-100 has load shared dual power suppliers to run the system stable without any disruption or disconnection from the power failure. So it is highly recommend to connect separate power source to AC IN1 and AC IN2 to avoid power failure problem.

Step 2
Turn on PS1 and PS2 and check the status LED of Powers and Fans.

Fig. 7: Frame status LEDs on front panel

BR-100 has four (4) fans. Two fans are attached on the main frame and each of two fans are in the power supplier 1 (PS1) and power supplier 2 (PS2). If user turns on PS1 and PS2, all of power LEDs (PWR) and fan status LEDs (FAN) will be lit on. But in case of any failure of power or fan, it will be blackout (PWR) and blinking (FAN).

For example, if PS 1 is not turned on or defective and PS 2 is turned on and normal;

	MAIN	PS 1	PS 2
PWR	ON	OFF	ON
FAN	ON	Blinking	ON

Each power supplier has enough electric capacity to run fully configured BR-100 even though another one has been damaged or deactivated. In that case, just removed failed power supplier and replace it without power shut down (Hot swappable).

Fig. 8: Hot-swapping of power supplier

On the rear side of BR-100, it has 16 slots to adopt various extenders like VT-1xx/VR-100, AT-1xx/AR-100, DX-1/DX-2, and EX-1 /EX-2. In case of WM-81, it does not need electric power because of no existence of active components in it. User can leave WM-81 as stand-alone box beside BR-100 or plug it into BR-100, if it has available space. Looking at the rear side, left side is slot 1 and right side is slot 16.

Slot 1   Slot 16

Fig. 9: Slots for extenders on rear side

Each extender has its own width that occupies the number of slots in BR-100 as below.

Model name	Number of slots occupancy
VT-1xx, VR-100	1
AR-1xx, AR-100	5
DX-1, DX-2	3
EX-1, EX-2	2
WM-81	8

All extenders are Hot pluggable in BR-100 while turned on and also available in a compact stand-alone type to be incorporated into any broadcast workflow, if connected with supplied DC power adapter in shipping group. Once the extenders are plugged in BR-100, Slot status LED indicator shows the status of each slot as shown Fig. 10.
For more detail information, please see appendix.

Fig. 10: Slots status LEDs

2. VT-1xx/VR-100

Step 1
Plug fiber-optic SDI transmitter, VT-1xx to any slots of back side of BR-100, located in local side and fasten it by thumb screw. Then Power LED (PWR) will be lit ON (Red).

Step 2
Connect the SDI source like camera output to SDI input of VT-1xx over BNC cable. Then optic video LED (LD) will be lit ON (Green).

Step 3
Connect SC single mode fiber to SC receptacle of VT-1xx as shown in Fig. 11.

Fig. 11: Plugging SC fiber-optic cable to VT-1xx

Step 4
Plug fiber-optic SDI receiver, VR-100 to any slots of rear side of BR-100, located in remote side and fasten it by thumb screw. Then Power LED (PWR) will be lit ON (Red).

Step 5
Connect the SDI display to SDI output of VR-100 over BNC cable.

Step 6
Connect SC single mode fiber from VT-1xx to SC receptacle of VR-100. Then optic signal detect LED (SD) will be lit ON (Green).

Transmit multiple SDI signals (up to eight) over one fiber

 I. **Let's assume to transmit 2 x SDI signals, we choose VT-143 and VT-151. Follow the step 1 to step 3 for VT-143 and VT-151.**


Fig. 12: Setup of 2xVT-1xx

 II. **Place WM-81 (multiplexer) beside local BR-100. (WM-81 is composed of passive optical components. It does not need power)**
 III. **Connect the other side SC connector from VT-143 to inlet of WM-81, marked 1430.**
 IV. **Connect the other side SC connector from VT-151 to inlet of WM-81, marked 1510.**
 V. **Connect another SC single mode fiber to IN/OUT of WM-81 to send combined optical signal as shown in Fig 13.**

Fig. 13: WM-81 multiplexer to combine optical signal

 VI. **Place another WM-81 (de-multiplexer) beside remote BR-100.**
 VII. **Follow the step 4 to step 5 for two units of VR-100 (Please remind that VR-100 is commonly used receiver at any wavelengths).**
 VIII. **To extract the signal, connect the other side SC connector from WM-81 (multiplexer, located in local site) to IN/OUT of WM-81 (de-multiplexer).**
 IX. **Connect the outlet of WM-81 (de-multiplexer), marked 1430 and one of SC receptacle of VR-100 over SC-SC fiber cable.**
 X. **Connect the outlet of WM-81 (de-multiplexer), marked 1510 and one of SC receptacle of VR-100 over SC-SC fiber cable.**

To understand it more clearly, please see the diagram as below.
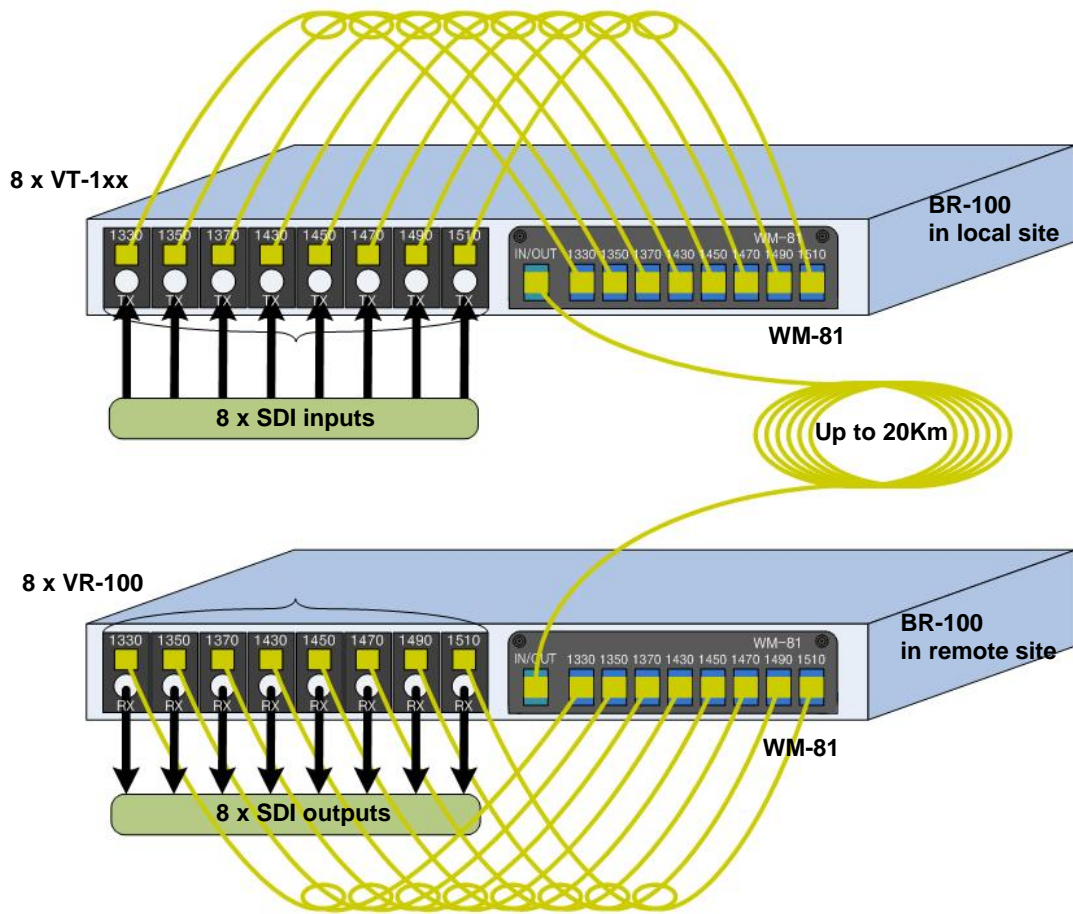
3. AT-1xx/AR-100

Step 1
Plug fiber-optic audio transmitter, AT-1xx to any slots of rear side of BR-100, located in local side and fasten it by thumb screw. Then power LED (PWR) will be lit on (Red) and if AT-1xx is normal, status LED (ST) will be lit on (Green).

Step 2
Connect the audio sources (up to eight) to any of audio inputs of AT-1xx over BNC cable. Then audio input detect LEDs (From 1 to 8) will be lit on (Green).

Fig. 15: 4 audio inputs and SC output of AT-1xx

Step 3
Connect SC single mode fiber to SC receptacle of AT-1xx as shown in Fig. 15.

Step 4
Plug fiber-optic audio receiver, AR-100 to any slots of rear side of BR-100, located in remote side and fasten it by thumb screw. Then power LED (PWR) will be lit on (Red).

Step 5
Connect SC single mode fiber from AT-1xx to SC receptacle of VR-100. Then optic audio signal detect LED (SD) will be lit on (Green) and audio output detect LEDs (From 1 to 8) will be lit on (Green).

Step 6
Connect the audio input devices to active audio outputs channels of AR-100 over BNC cables.

To transmit more than eight audio signals (up to 8 x 8 = 64) over one fiber, please refer to CWDM transmission explained in AT-1xx/AR-100.


4. DX-1/DX-2

Step 1
To make bi-directional serial data extension link, DX-1 and DX-2 should be used as a pair. Plug fiber-optic serial data transceiver, DX-1 or DX-2 to any slots of rear side of BR-100, located in local side and fasten it by thumb screw. Then power LED (PWR) will be lit on (Red).

Step 2
Connect the serial communication device and DX-1 or DX-2 over D-sub 9 cable. (Please see pin assignment of D-sub 9 connector below)

D-sub 9 pin female connector on DX-1/DX-2

```
   5    4    3    2    1
   O    O    O    O    O

      O    O    O    O
      9    8    7    6
```
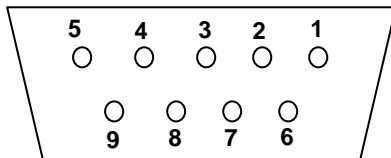
Pin #	For RS-232	For RS-422
1	-	Data In+
2	Data Out	-
3	Data In	-
4	-	Data In -
5	GND	GND
6	-	-
7	-	Data Out +
8	-	Data Out -
9	-	-

Fig. 16: Pin assignment of D-sub 9 connector

Step 3
Connect SC single mode fiber to SC receptacle of DX-1 or DX-2 as shown in Fig. 16.

Step 4
Plug fiber-optic serial data transceiver, DX-2 or DX-1 to any slots of rear side of BR-100, located in remote side and fasten it by thumb screw. Then power LED (PWR) will be lit on (Red).

Step 5
Connect the serial communication device and DX-2 or DX-1 over D-sub 9 cables.

Step 6
Connect SC single mode fiber from DX-1 or DX-2 from local site to SC receptacle of DX-2 or DX-1.

Step 7
Once the connection done, optic signal detect LED (SD) will be lit on (Green) and TxD and RxD LED will be blinking (Green) while data in and out.

Fig. 16: Connection of DX-1

5. EX-1/EX-2

Step 1
To make bi-directional Ethernet extension link, EX-1 and EX-2 should be used as a pair. Plug fiber-optic Ethernet transceiver, EX-1 or EX-2 to any slots of rear side of BR-100, located in local side and fasten it by thumb screw. Then power LED (PWR) will be lit on (Red).

Step 2
Connect the Ethernet device and EX-1 or EX-2 over RJ45 cable. (EX-1 and EX-2 are worked with both of strait and twist type RJ45 cables)

Step 3
Connect SC single mode fiber to SC receptacle of EX-1 or EX-2 as shown in Fig. 17.

Fig. 17: Connection of EX-1

Step 4
Plug fiber-optic Ethernet transceiver, EX-2 or EX-1 to any slots of rear side of BR-100, located in remote side and fasten it by thumb screw. Then power LED (PWR) will be lit on (Red).

Step 5
Connect the Ethernet device and EX-2 or EX-1 over RJ45 cables.

Step 6
Connect SC single mode fiber from EX-1 or EX-2 from local site to SC receptacle of EX-2 or EX-1.

Step 7
Once the connection done, optic signal detect LED (SD) will be lit on (Green) and TP and FX will be blinking while data in and out.

Maintenance

No special maintenance is required for the BR-100 and converters. Ensure that the cables and power modules are stored or used in a benign environment free from liquid or dirt contamination.
There are no user serviceable parts.   Refer all service and repair issues to Opticis.

Technical Support and Service

For commercial or general product support, contact your reseller.   For technical service, contact Opticis by email techsupp@opticis.com or visit its website at www.opticis.com.

Warranty Information

1 (One) Year Warranty
Opticis warrants BR-100 and extenders to be free from defects in workmanship and materials, under normal use and service, for a period of one (1) year from the date of purchase from Opticis or its authorized resellers.
If a product does not work as warranted during the applicable warranty period, Opticis shall, at its option and expense, repair the defective product or part, deliver to customer an equivalent product or part to replace the defective item, or refund to customer the purchase price paid for the defective product.
All products that are replaced will become the property of Opticis.
Replacement products may be new or reconditioned.
Any replaced or repaired product or part has a ninety (90) day warranty or the reminder of the initial warranty period, whichever is longer.
Opticis shall not be responsible for any software, firmware, information, or memory data of customer contained in, stored on, or integrated with any products returned to Opticis for repair under warranty or not.

Warranty Limitation and Exclusion
Opticis shall have no further obligation under the foregoing limited warranty if the product has been damaged due to abuse, misuse, neglect, accident, unusual physical or electrical stress, unauthorized modifications, tampering, alterations, or service other than by Opticis or its authorized agents, causes other than from ordinary use or failure to properly use the Product in the application for which said Product is intended.

Dispose of Old Electrical & Electronic Equipment
(Applicable in the European Union and other European countries with separate systems)
This symbol on the product or on its packaging indicates that this product shall not be treated as household waste. Instead it shall be handed over to the applicable collection point for the recycling of electrical and electronic equipment.

By ensuring this product is disposed of correctly, you will help prevent potential negative consequences for the environment and human health, which could otherwise be caused by inappropriate waste handling of this product. The recycling of materials will help to conserve natural resources. For more detailed information about recycling of this product, please contact your local city office, your household waste disposal service or the shop where you purchased the product.

FCC/CE Statement

This device complies with part 15 of FCC Rules and EN 55022/61000-3 for CE certification. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation. This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 and 2 of FCC Rules and EN 55022/61000-3 for CE certification. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and. if not installed and used in accordance with the instruction guide, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Re-orient or relocate the receiving antenna.
- Increase the separation between the equipment and the receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult a service representative for help.

Properly shielded and grounded cables and connectors must be used in order to comply with FCC/CE emission limits. Changes or modifications not expressly approved by the party responsible for compliance could void the user s authority to operate the equipment.

Appendix

A. Slot status LEDs

1) Status LEDs on the front panel of BR-100

Slot	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
ID	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
SD	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
Status	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○

ID and SD are status indicators of the plugged transmitter, receiver and transceiver.

Case 1. Plugged extenders are Transmitter or Receiver such as VT-1xx/VR-100 or AT-1xx/AR-100
  ID ON, SD OFF: Transmitter plugged and operating condition
  ID OFF, SD ON: Receiver plugged and operating condition
  ID BLINK, SD OFF: Transmitter plugged and standby condition
  ID OFF, SD BLINK: Receiver plugged and standby condition

Case 2. The plugged extenders are transceiver such as DX-1/DX-2 or EX-1/EX-2
  ID ON, SD ON: Transceiver plugged
  ID OFF, SD OFF: Not plugged

The meanings of Status are different depending on the plugged extender.

VT-1xx / VR-100

●	ID
●	SD
●	**Video**

EX-1 / EX-2

●	○	ID	x
●	○	SD	x
●	●	**FX**	**TP**

DX-1 / DX-2

●	○	○	ID	x	x
●	○	○	SD	x	x
○	○	○	**x**	**x**	**x**

AT-1xx / AR-100

●	○	○	○	○	ID	x	x	x	x
●	●	●	●	●	SD	**ch1**	**ch2**	**ch3**	**ch4**
○	●	●	●	●	**x**	**ch5**	**ch6**	**ch7**	**ch8**

2) Status LEDs Example

1) If the plugged extenders are Slot 1: VT-1xx, Slot2: AT-1xx, Slot7: DX-1, Slot10: EX-1, Slot 12: VT-1xx, Slot 13~14: VR-100 and Slot15: EX-1, the status LEDs would be as below.

Slot	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
ID	●	●	○	○	○	○	●	○	○	●	○	●	○	○	●	○
SD	○	○	●	●	●	●	●	○	○	●	○	○	●	●	●	○
Status	●	○	●	●	●	●	○	○	○	●	●	●	●	●	●	●

2) If the plugged extenders are Slot1~8: VT-1xx and Slot 9~16: VR-100, the status LEDs would be as below.

Slot	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
ID	●	●	●	●	●	●	●	●	○	○	○	○	○	○	○	○
SD	○	○	○	○	○	○	○	○	●	●	●	●	●	●	●	●
Status	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●

3) If the plugged extenders are Slot1: AT-1xx, Slot6: AR-100, Slot11: DX-1, and Slot14: DX-2, the status LEDs would be as below.

Slot	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
ID	●	○	○	○	○	○	○	○	○	○	●	○	○	●	○	○
SD	○	●	●	●	●	●	●	●	●	●	●	○	○	●	○	○
Status	○	●	●	●	●	○	●	●	●	●	○	○	○	○	○	○

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