Operation Manual

MN25131A Series
Multi-Function Extender

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Chapter 1 — Introduction

The MN25131A Multi-Function Extender provides USB hub and communication extension, multiple voltage outputs, and battery power capabilities to enable remote use of USB instruments. USB to SFP (small form-factor pluggable fiber-optic transceivers) allow two extenders to make a USB communications link over distances in excess of 100 meters via fiber optic cables. An internal re-chargeable battery system enables remotely powering measurement instruments in locations that are not necessarily close to AC line power. One +5 V, four +12 V, and one +20 V supply connections are available. The inclusion of a six-port USB HUB allows the extender to support multiple USB devices and interface accessories that may be part of a measurement application. Such an application is the ME7868A 2-Port Modular Vector Network Analyzer System.

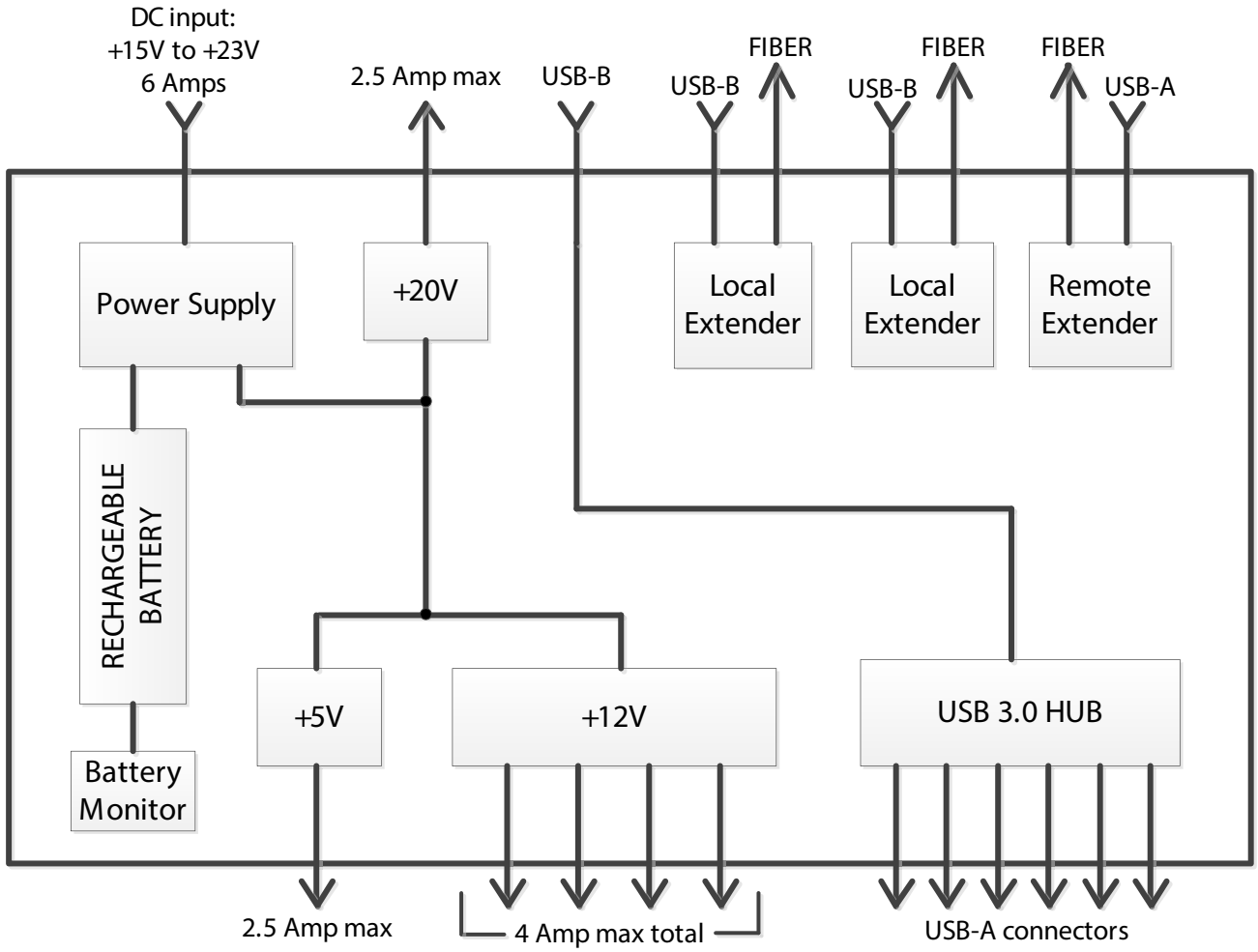

Figure 1-1. MN25131A Multifunction Extender

Figure 1-2. The MN25131A modules play a key role in supporting the two 25-meter MS46131As in the ME7868A Modular 2-Port Network Analyzer System.

Chapter 2 — Front and Rear Panel Connections

2-1 Front Panel

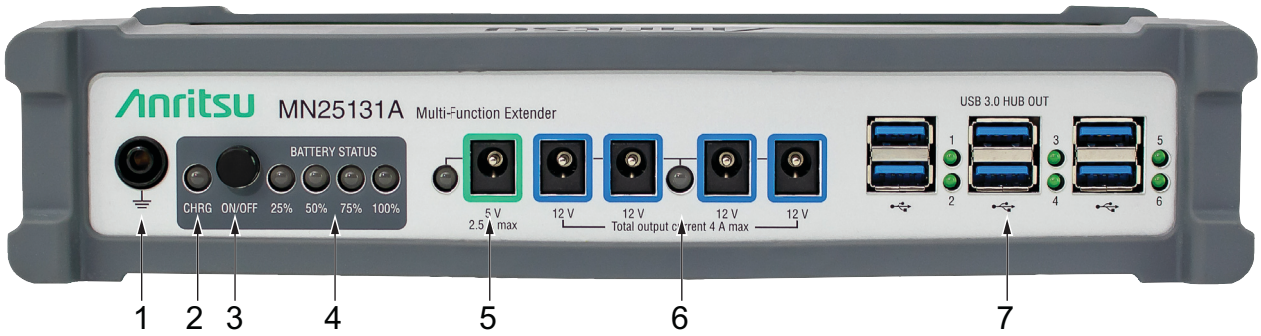

Figure 2-1. MN25131A Front Panel Connectors

Table 2-1. MN25131A Front Panel Connectors (1 of 2)

Ref	Name	Function
1	Ground Lug	Chassis ground
2	CHRG	- Green if external supply is > 15 V. - Orange if external supply is < 15 V. - Off if no external supply is connected.
3	On/Off	Turns Battery Status LEDs on or off.
4	BATTERY STATUS	- Four LEDS show internal battery charge status. - 25% range for each LED. - For example if 50% LED is on then battery is charged from 26 to 49%. - 25% LED will turn Orange if charge is < 10%. - 25% LED will flash Orange is charge is < 5%. - All four LEDs will flash green if charge is = 100%. - Battery fully discharged if no status LEDs are illuminated - LEDs will flash randomly if external supply is applied and no battery is inserted.
5	+5 V	+5 Volt Supply - 2.5 Amps available. - LED is Green when connector is inserted. - LED will turn orange when > 2.2 A is drawn. - LED will extinguish when > 2.5 A are drawn.

Table 2-1. MN25131A Front Panel Connectors (2 of 2)

Ref	Name	Function
6	+12 V	+12 Volt Supply - Four output connections. - LED is Green when connector is inserted in any of the four. - LED will turn orange when > 3.7A is drawn from the supply. - LED will extinguish when > 4.0 A are drawn.
7	USB 3.0 HUB	- Six USB 3.0 Connections. - Hub input on rear of extender. - Each connector has an LED indicator that shows of activity present.

2-2 Rear Panel

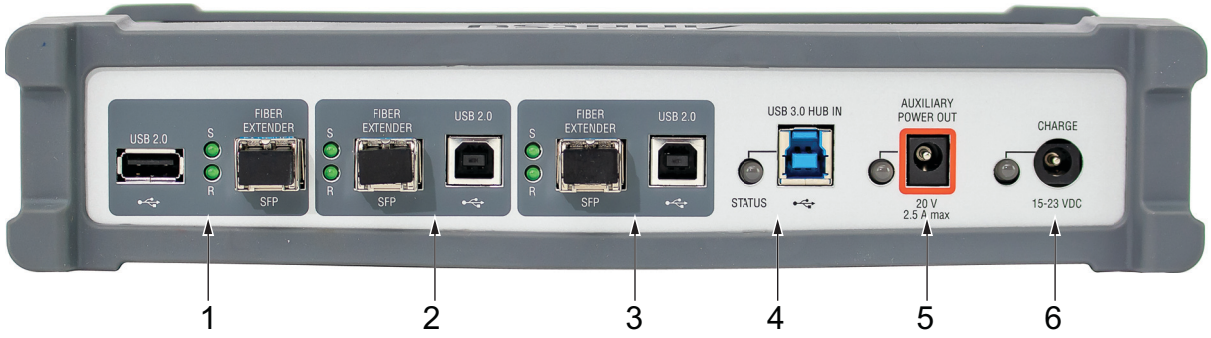

Figure 2-2. MN25131A Rear Panel Connectors

Table 2-2. MN25131A Rear Panel Connectors

Ref	Name	Function
1	FIBER EXTENDER	USB Type A to SFP Optical Fiber Converter S (send) and R (receive) LEDs indicate Activity on the Fiber Outputs This converter enables the system power only when optical power is sensed at its SFP input. (See functional description in Section 3-8 “USB to SFP Optical Fiber Converters” on page 3-4.
2	FIBER EXTENDER	USB Type-B to SFP Optical Fiber Converter S and R LEDs indicate Activity on the Fiber Outputs
3	FIBER EXTENDER	USB Type-B to SFP Optical Fiber Converter S and R LEDs indicate Activity on the Fiber Outputs
4	USB 3.0 IN	USB Type-B Input to Front Panel HUB - Status LED is Green when bus activity is present.
5	+20 V	+ 20 V Power Supply - LED turns green when a connector is inserted. - LED will turn orange when > 2.3 A is drawn. - LED will extinguish when > 2.5 A is drawn.
6	CHARGE	External Supply Input - Charge indicator is green if input voltage is > 15 V. - Charge indicator is orange if input voltage is < 15 V. - Charge rate is 4 Amps.

Chapter 3 — Performance Considerations

3-1 Power Connection

Warning 	When supplying power to the equipment, connect the accessory power supply to a 3-pin grounded power outlet connected in turn to local AC Mains. If a grounded 3-pin outlet is not available, use a conversion adapter and ground the green wire, or connect the equipment frame to a suitable ground. If power is supplied without grounding the equipment, there is a risk of receiving a severe or fatal shock.

Note	For maximum ESD protection, proper grounding is required. Connect the accessory power supply to a three pin grounded power outlet and use the ground receptacle on the front panel of the unit to ground the chassis.

Note	With the battery installed the unit is active as long as there is still charge on the battery. There is no power ON/OFF switch.

Warning	To insure proper operation, only use the 40-204-R power supply (15V, 80W, with a right angle connector) with the MN25131A Multi-Function Extender.

3-2 Battery Operation

- A fully charged battery has a 94 watt-hour capacity.
- When the battery is charged to 100% the four status LEDs will blink in unison on and off when the battery indicator is switched on. If the external AC/DC power supply is connected when there is no battery, then the four LEDs will blink randomly.
- Removing the charger or battery while operating does not interrupt the power supplies or the USB communications.

3-3 Battery Removal

Figure 3-1. Battery Compartment and Battery Removal

The battery can be replaced without the use of tools. The battery compartment door is located on the right side of the unit (when you are facing the front of the unit). To remove the battery:

1. Unscrew the knurled connector on the battery compartment cover.
2. Remove the battery door.
3. Pull straight out on the lanyard to remove the battery pack from the unit.

Note	When inserting the battery, the battery contacts should face up and slide in first. If the battery door does not close tightly, the battery may be inserted incorrectly.

3-4 Supply Overload Protection

- The battery will disconnect the outputs when the load current exceeds 8 amps for 6 seconds.
- All output voltage connections have overload protection that will shut down the specific supply when its current rating or output voltage is exceeded.

SFP Fiber Optic Transceiver Care and Removal

1. If SFP transceiver is not being used, then cover with the protective cap that is shipped with the unit.
2. For initial use, or if interface issues appear, clean the SFP receptacle optical ports and the fiber optic cable connectors with a fiber cleaning kit.
3. The SFPs can be removed/replaced by doing the following:
   a. Pull the retaining clip on the front of the SFP down to disengage the module and then pull it directly out from the unit.

Figure 3-2. SFP Fiber Optic Transceiver Removal

3-5 USB 3.0 Interface Compatibility

The six USB A connectors on the front panel of the MN25131A are a USB 3.0 Hub.

The 6-port Hub appears as two USB 2.0 Hubs and two USB 3.0 hubs on the PC device manager. It can control any USB 1.0/2.0/ High Speed USB 2.0/ Super Speed USB 3.0 devices if connected to a Host USB 3.0 Super Speed port. It can also support older USB 2.0 PCs with the 6 ports dropping down to the USB 2.0 speed of the host including High Speed USB 2.0. Lower speeds are also supported. The Operation over the SFP/USB interfaces are always High Speed USB 2.0. The Hub connected to the SFP/USB interface will support any USB 1.0/2.0/ High Speed USB 2.0 devices on the 6 ports.

3-6 Fans

The MN25131A contains two cooling fans that operate off an internal +5 V supply. They will operate at low or high speed depending on battery temperature and/or power output load.

3-7 USB Extension Connection

Two MN25131As are connected via fiber optic cables to allow USB operation over a long distance (farther than the 5-meter limit for USB 2.0 wired connections). The fiber extenders in each unit are used to drive a fiber optic cable pair that emulates a USB bus interface. One unit uses the USB-A to Fiber Extender to interface with one of the two USB-B to Fiber Extenders on the second MN25131A.

One typical configuration, shown in Figure 3-3, is:

1. A driving PC connects to the USB-B HUB input on the rear panel of the one MN25131A.
2. A USB cable is connected from one of the USB-A connectors on the front panel and goes to the USB-B connector of one of the two USB B to Fiber Extenders on the rear panel.
3. The fiber cable is then connected into the Fiber Extender with the USB-A connector on the rear panel of the second MN25131A.
4. The output of the USB-A connector on the Fiber Extender with the USB-A connection is then cabled to the USB-B HUB input on the rear panel. This then enables the front panel USB Hub to function as an extension of the driving PC.

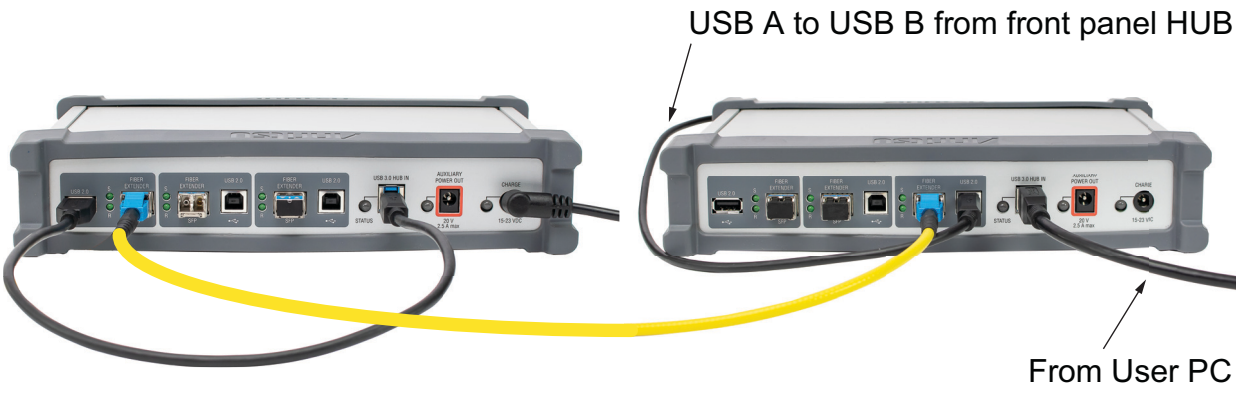

Figure 3-3. MN25131A Fiber Extension Connections

3-8 USB to SFP Optical Fiber Converters

The USB to Fiber converters are used to drive the fiber cable that extends the USB communications between MN25131A extenders used in long-distance ME7868A installations. They consist of either USB-A or USB-B 2.0 connectors which are converted to LC Duplex drivers. The USB 2.0 connections drive a proprietary USB 2.0 to Bi-directional Fiber Optic SFP (small form-factor pluggable) converter. The type A USB 3.0 connector is plugged into the Hub USB 3.0 type B connector with a short 1.5 foot patch cable. Only USB 2.0 signals are passed, so the HUB drops down to High Speed USB 2.0 operation. This completes the path from the Host computer to the Remote MN25131A Multi-function Extender via Full Duplex fiber optic cable with support for lengths in excess of 100 meters. The Type A connector at the remote device side supplies +5 V @ 1 A for the converter. Power is disabled if no optical receive signal is detected. This has the benefit of disabling all USB HUB activity if the fiber connection is broken, allowing shut down of the Remote Extender by simply disconnecting the fiber optic connection at the Host side. When no optical power is detected, a low-duty-cycle power up of the SFP+ Transceiver tests for optical power on the receiver. If power is detected, full power is applied. Testing for optical power occurs every 10 Seconds and consumes very little battery power. Removal of the SFP in the fiber extender with the Type A USB connection disables the testing for long term non-operation.

Chapter 4 — Specifications

This chapter contains the following tables:

Table 4-1. Electrical Specifications

Input Charging Port	15-23 VDC, 6 Amp Max current at 15 VDC
Battery	Lithium Ion 11.1V, 8.4 Ah, 94 Wh capacity
Supply Outputs	
20 V	19.5-20.4 VDC, 2.5 Amps Max
5 V	4.9-5.1 VDC, 2.5 Amps Max
12 V	11.7-12.25 VDC, 4.0 Amps Max (between the four connections)
USB HUB Input	USB 3.0 (supports USB 3.0 and 2.0)
USB Outputs	USB 3.0 (supports USB 3.0 and 2.0)
FIBER Extender Ports	Two USB B 2.0 to Fiber Extenders One USB A 2.0 to Fiber Extender SFPs support Duplex LC Single Mode Fiber

Table 4-2. Mechanical/Environmental Specifications

Dimensions	56 mm x 265 mm x 172 mm
Weight	< 1.5 kg (3.3 lb) typical weight
Connectors	DC Connections: 2.1 x 5.5 mm Receptacles SFP Connection: Duplex LC Single Mode Fiber

Table 4-3. Regulatory Compliance

European Union	EMC 2014/30/EU, EN 6 1326:2013, CSPR 11/EN 55011, IEC/EN 61000-4-2/3/4/5/6/8/11 • Low Voltage Directive 2014/35/EU • Safety EN 6010-1:2010 • RoHS Directive 2011/65/EU applies to instruments with CE marking placed on the market after July 22, 2017.
Australia and New Zealand	RCM AS/N25 4417-2012
South Korea	KCC-REM-A21-0004

Table 4-4. MIL-PRF-28800F Class 2 Environmental Specifications

Operating Temperature Range	-10 C to 55 C
Storage Temperature Range	-51 C to 71 C
Maximum Relative Humidity	95% RH at 30 C, non-condensing
Altitude	4600 meters, operating and non-operating

Table 4-5. Warranty

Term	One year from date of purchase

Table 4-6. Included Hardware/Accessories

	40-204-R AC/DC Power Supply
	AC Power Cord

Table 4-7. Replaceable Parts

40-204-R	AC/DC Power Supply
633-75	Rechargeable Battery
68-11-R	SFP Transceiver

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