EMX Series Multiframes

User Manual

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REVISION HISTORY

REVISION	DESCRIPTION	DATE
1.0	First Release	Feb 2011
1.1	Updated power supply specs	May 2013
1.2	Updated EMX1-FR	May 2014
1.3	Added EMX-FC information	Aug 2014
1.4	Some minor changes	Oct 2015

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1. OVERVIEW

The EMX series frames are designed to house the EMR series router, the EMC master controller and other high-density system products. This advanced rack frame design comes in three sizes. The EMX1-FR occupies 1RU rack space and can house up to 2 single-slot modules. The EMX3-FR occupies 3RU rack space and can house up to 5 single-slot modules of any combination of the EMR and EMC products. The EMX6-FR occupies 6RU rack space and can house up to 15 single-slot modules of the same products.

Special care was taken during the design process to ensure that the EMX1-FR, EMX3-FR and EMX6-FR frames meet the demanding needs of television studios today and have the sufficient flexibility to satisfy the emerging demands of the future. The EMX1-FR, EMX3-FR and EMX6-FR frames are designed with a high density capacity to conserve on precious equipment rack space. Care has been taken to ensure sufficient thermal relief for up to 140 W (EMX1-FR), up to 360 W (EMX3-FR) and 650 W (EMX6-FR) of processing power per frame, to meet the increasing power demands of future high speed processing cards. Hot swappable redundant switching power supplies and cooling fans allow power supply or fan replacement without compromising the integrity of critical signal paths. The EMX1-FR, EMX3-FR and EMX6-FR frames are available with auto ranging 100-240 VAC power supplies. The front loading design permits extraction of the power supplies and active modules from the front without compromising performance even at 3.0Gb/s. Thus, there is no need for time consuming re-cabling nor is there need to have access to the rear of the frame to replace or exchange modules.

The EMX1-FR, EMX3-FR and EMX6-FR frames can both accommodate a main and redundant frame controller (EMX-FC) to provide reference, Ethernet control and serial control for certain applications.

Features:

- Houses up to 2 (EMX1-FR), 5 (EMX3-FR) or 15 (EMX6-FR) single-slot processing modules
- Each slot has individually configurable inputs and outputs
- Front extractable modules, power supplies and fans
- Auto-ranging power supply that operates from 100-240VAC at 50/60 Hz
- Power supply and frame cooling fans are fully redundant and hot-swappable
- High-speed busing and control system provided for modular applications
- Slots available for main and redundant EMX-FC frame controllers, in EMX3-FR and EMX6-FR
- 140 W (EMX1-FR), 360 W (EMX3-FR) or 650 W (EMX6-FR) power supplies and cooling to support EMR and EMC modules
- Two BNCs for connecting two separate genlock references for modules equipped to take a frame reference input

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2. INSTALLATION

The EMX1-FR, EMX6-FR and EMX3-FR frames use an EMX-FC frame controller which provides two network connections via RJ-45 connectors and two references via BNC connectors. The BNC labeled Ref 1 is the main reference and the BNC labeled Ref 2 is the backup reference. Figure 2-2 and Figure 2-3 show the rear of the EMX3-FR and EMX6-FR frames respectively.

The EMX3-FR and EMX6-FR frames have optional redundant frame controller configurations; however the EMX1-FR only houses one frame controller.

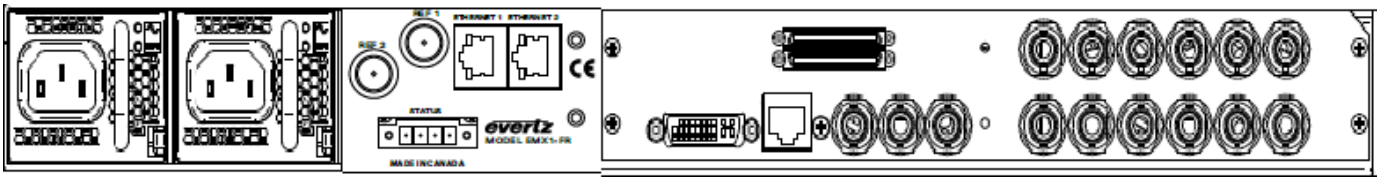

Figure 2-1: EMX1-FR Rear View

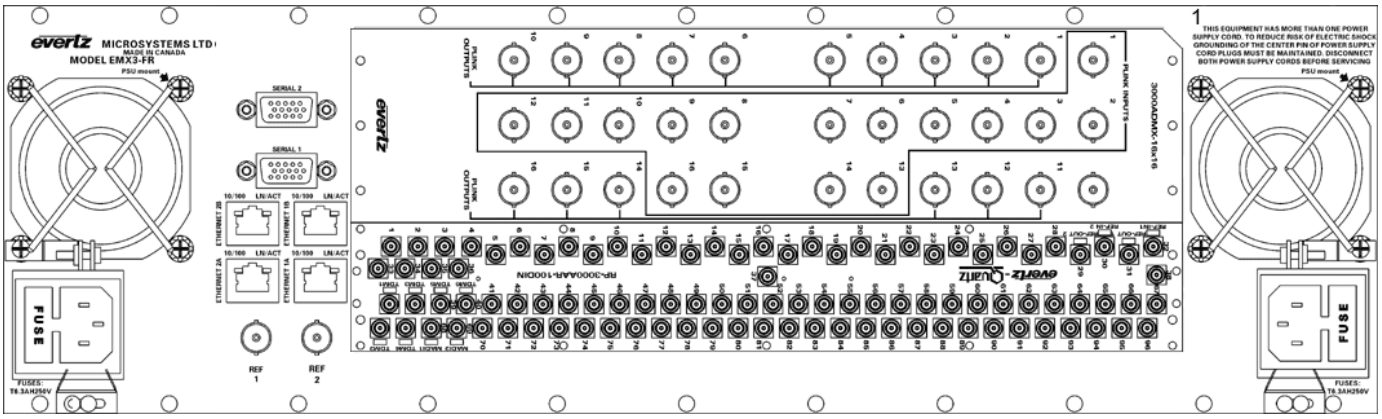

Figure 2-2: EMX3-FR Rear View

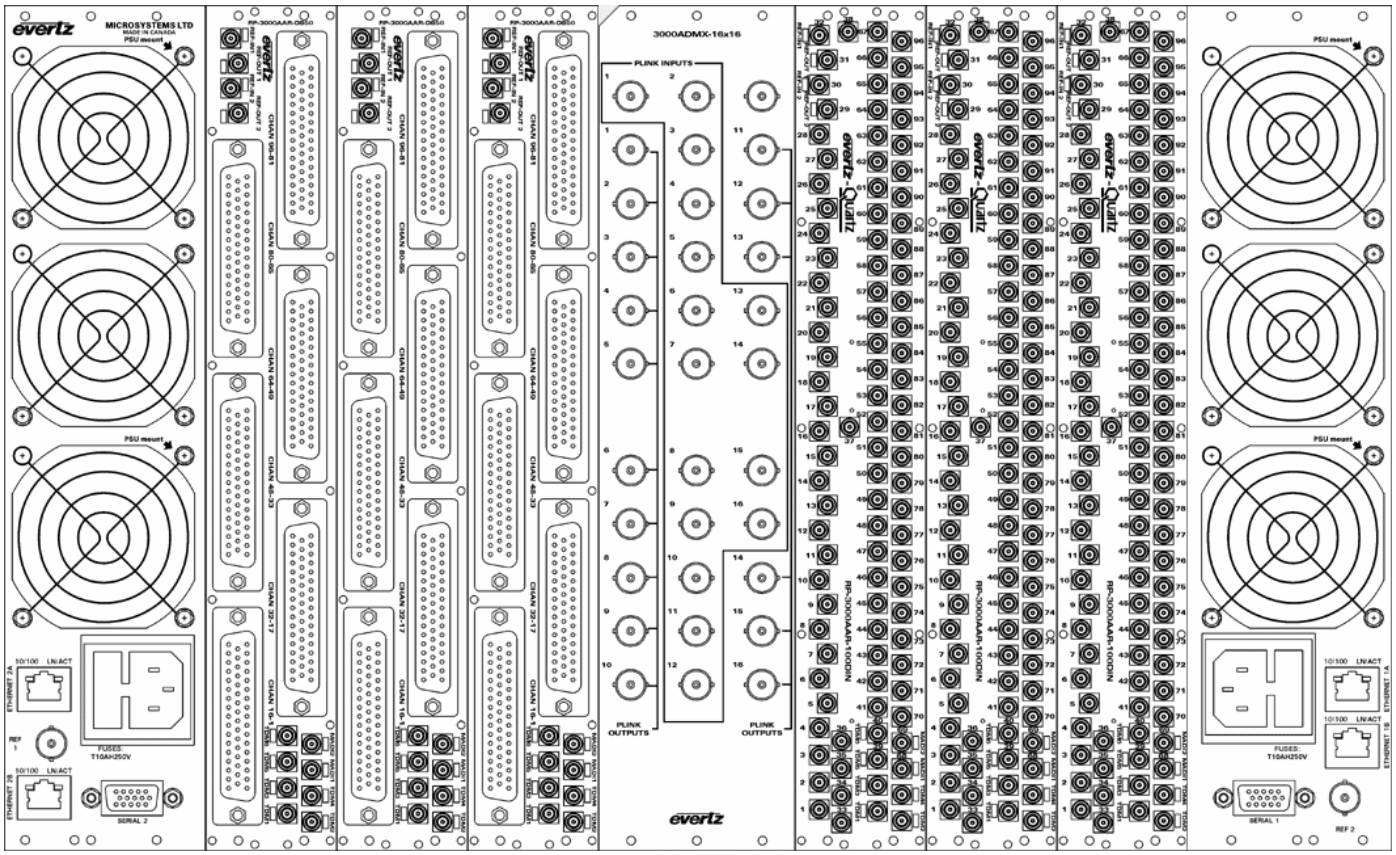

Figure 2-3: EMX6-FR Rear View

2.1. COOLING – EMX1-FR

The EMX1-FR frame is designed to ensure adequate cooling for up to 140 watts of processing power per frame. PSU's are cooled with their own internal fans. Adjacent equipment may be mounted immediately to the top and bottom of the EMX1-FR. Module cooling is provided by fans mounted to the front of panel of the frame.

2.1.1. Fan Exhaust

The power supply fans draw air in the front and exhaust out the back of the frame. The module fans draw in air from the front and exhaust out the right hand side of the frame.

CAUTION: To ensure adequate cooling, care should be taken to ensure that the fan inlets and exhaust openings are free of obstructions.

CAUTION: To ensure adequate cooling of modules, the front panel must always be securely mounted to the frame.

2.2. COOLING - EMX3-FR

The EMX3-FR is designed to ensure adequate cooling for up to 360 watts of processing power per frame. Fans at the front and rear of each power supply module accomplish forced air cooling. Adjacent equipment may be mounted immediately to the top and bottom of the EMX3-FR frame. Additional module cooling is provided by interior cooling channels to ensure that even fully loaded frames mounted vertically adjacent to each other will operate within the normal temperature range.

2.2.1. Fan Exhaust

The cooling fans for the power supplies, located at the front of the frame, draw air in the front and exhaust out the sides of the frame. The cooling fans for the modules, located at the rear of the frame, draw air in the front and the exhaust out the rear of the frame.

CAUTION: To ensure adequate cooling, care should be taken to ensure that the fan inlets and exhaust openings are free of obstructions.

2.3. COOLING – EMX6-FR

The EMX6-FR frame is designed to ensure adequate cooling for up to 650 watts of processing power per frame. Fans at the front and rear of each power supply module accomplish forced air cooling. Adjacent equipment may be mounted immediately to the top and bottom of the EMX6-FR. Additional module cooling is provided by interior cooling channels to ensure that even fully loaded frames mounted vertically adjacent to each other will operate within the normal temperature range.

2.3.1. Fan Exhaust

The cooling fans for the power supplies, located at the front of the frame, draw air in the front and exhaust out the sides of the frame. The cooling fans for the modules, located at the sides of the frame, draw air in the front and the exhaust out the left and right sides of the frame.

CAUTION: To ensure adequate cooling, care should be taken to ensure that the fan inlets and exhaust openings are free of obstructions.

2.4. MOUNTING

The EMX1-FR requires a 19" x 1.75" x 18.75" (483 mm x 45mm x 477mm) space, the EMX3-FR requires a 19" x 5.25" x 15.75" (483 mm x 133 mm x 400 mm) space and the EMX6-FR requires a 19" x 10.5" x 15.75" (483 mm x 260 mm x 400 mm) space. To securely fasten the frame to the equipment rack, make sure that all four mounting screws on each mounting rail are tightened securely.

Note: The EMX6-FR, EMX3-FR and EMX1-FR have front mounted cooling fans and require that the area below is flush so that there is sufficient room to open the frame completely to be able to remove the modules.

After the unit has been installed in a rack, all cards in the frame should be checked to ensure they are fully seated within the frame. This is best accomplished by simply pushing (simultaneously, with moderate force) on each card's top and bottom insertion/extraction levers. This step should be repeated any time the frame is shipped, or relocated within a facility.

2.5. POWER

2.5.1. Power Supply Status Indicators

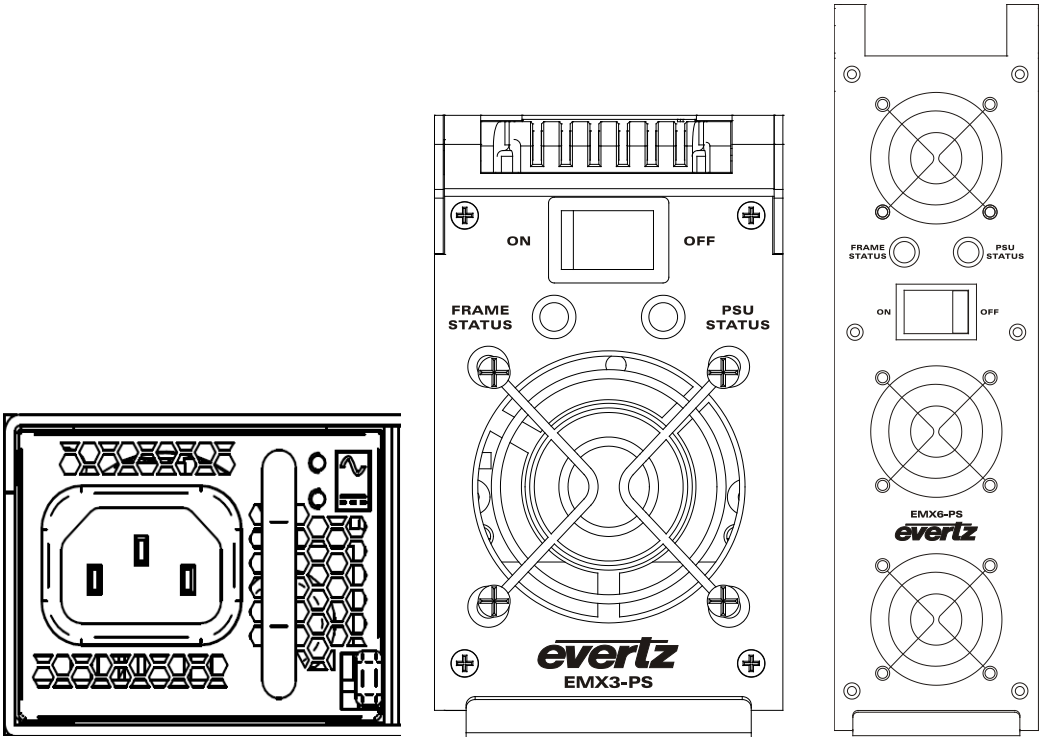

Figure 2-4: EMX1-PS, EMX3-PS & EMX6-PS Status Indicators

2.5.1.1. EMX1-FR

EMX1-FR power supplies have 2 LEDs which are located on the rear side of the frame, showing the status of each supply. Top LED is green and indicated AC power is on or off. Bottom LED is bi-colored: green and yellow. This indicated DC power presence or fault situations. For the position of LEDs see Figure 2-4. The following table shows different LED states:

Operating Condition	LED Signaling
AC LED	
AC Line within range	Solid Green
AC Line UV condition	Off
DC LED	
12V DC	Solid Yellow
Over temperature shutdown	
Output over voltage shutdown (12V DC)	
Output over current shutdown (12V DC)	
PSU Fan Error (>15%)	
Over temperature warning	Blinking Yellow/Green (2:1)
Minor fan regulation error (>5%, <15%)	Blinking Yellow/Green (1:1)
12V DC Good	Solid Green

Table 2-1: LED Status

2.5.1.2. EMX3-FR and EMX6-FR

Each power supply has two status indicator LEDs. The green PSU STATUS LED indicates the health of the local power supply and its fans. The green PSU STATUS LED will be On under normal conditions. The FRAME STATUS LED indicates the health of the entire frame and is operated by the frame status bus of the frame. The red FRAME STATUS LED will be Off under normal conditions and On when there are Frame Status Fault conditions.

If one of the power supplies malfunctions, (power cord disconnected, power switch is off, fuse is blown, rear fan is stopped, etc,) then its green PSU STATUS LED will go Off, and the red FRAME STATUS LED on both power supplies will turn On and the Frame Status fault will be signaled to the Frame status buss. The PSU STATUS LED on the power supply that is functioning will remain On.

2.6. FRAME CONTROLLER

To successfully install the EMX-FC, you will require the following:

1. Unused IP address on the network or a DHCP server.
2. Evertz serial cable.

Before handling the card it is important to minimize the potential effects of static electricity. It is therefore recommended that an ESD strap be worn.

Before inserting the card, connect the serial cable to the board using the serial cable provided as shown in Figure 2-5. Now insert the FC card into the dedicated front slot ensuring the card lines up with the slot runners on the bottom and the top of the chassis. Push the card **firmly** into the slot ensuring that when it mates with the rear card it has been firmly pushed into a seated position. Do not connect any cables to the rear card (failure to do this could cause unwanted network issues) until the initial configuration has been completed.

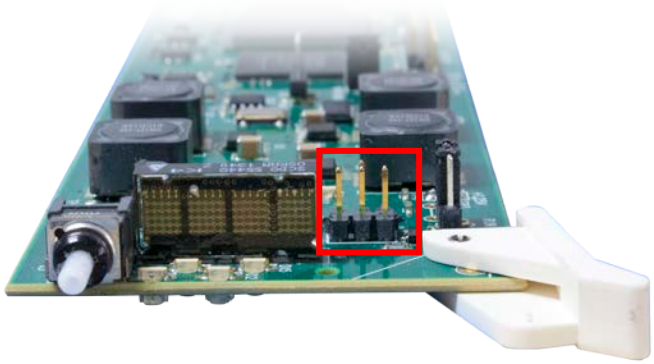

Figure 2-5: Serial Connection

Connect the 9-pin D-type end of the serial cable to the serial port of your computer.

Open Tera Term (if using Windows XP or older operating systems, open Hyper Terminal) to make the required changes to the IP address on the card. Set the required Baud rate to 115200 and use username *customer* and password *customer* to login.

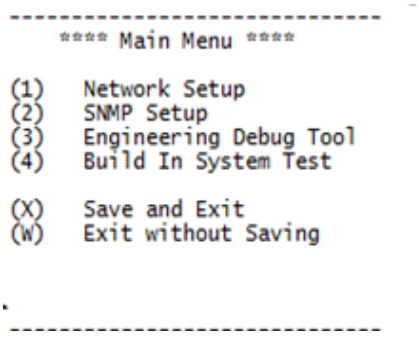

Figure 2-6: Tera Term Main Menu

2.6.1. Configuring Basic Network settings

To make changes to the IP address select ***Network Setup***. Set the IP address of the B Network as well as the ***Netmask*** and the ***Gateway***. Make the same changes for the IP address and Gateway of Network A and C as required. When done ***Exit (X)*** the Network Setup and ***Save and Exit (X)*** from the Main Menu to ensure all changes are saved. Reboot the card to ensure the changes take effect.

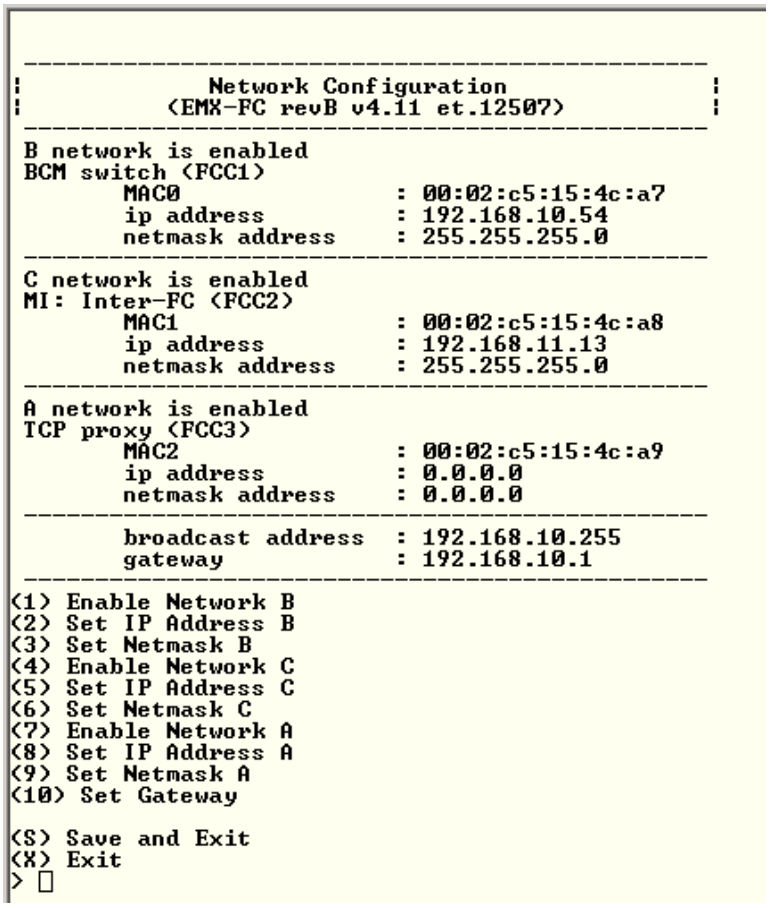

Figure 2-7: Tera Term Network Configuration

2.6.2. Ethernet Connection

For the EMX6 and EMX3 frames, ensure the Ethernet connection is made through Ethernet port 1B. For the EMX1 frame, ensure the Ethernet connection is made through Ethernet port 1.

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3. SPECIFICATIONS

3.1. ELECTRICAL

EMX6-FR:

AC Mains Input:	Auto ranging, 100 ⇔ 240 VAC, 50/60 Hz
Max Operating Current:	9.5 A (@ 115 VAC nominal), 4.0 A (@ 220 VAC nominal)
Max Power Consumption:	850 W
Max Module Load:	650 W (40 W per slot)
Power Supply Configuration:	1 supply standard, optional redundant supply requires separate inlet
Connector:	IEC 60320 - 1 per power supply

EMX3-FR:

AC Mains Input:	Auto ranging, 100 ⇔ 240 VAC, 50/60 Hz
Max Operating Current:	4.6 A (@ 100 V/60Hz), 1.85A (@ 240 V/50Hz)
Max Power Consumption:	450 W
Max Module Load:	360 W (24 W per slot)
Power Supply Configuration:	1 supply standard, optional redundant supply requires separate inlet
Connector:	IEC 60320 - 1 per power supply

EMX1-FR:

AC Mains Input:	Auto ranging, 100 ⇔240 V AC, 50/60Hz
Max Operating Current:	8.5 A (@ 100V/60Hz), 3.0 A (@ 240V/50Hz)
Max Power Consumption:	600 W
Max Module Load:	140 W (70 W per slot)
Power Supply Configuration:	1 supply standard, optional redundant supply required separate inlet
Connector:	IEC 60320 – 1 per power supply

3.2. PHYSICAL

EMX6-FR:

Height:	10.5” (266mm)
Width:	19.0” (483mm)
Depth:	15.75” (400mm)
Module Capacity:	15 single slot EMR series modules
Weight Approx.:	34.8lbs (15.8kg) with 2 power supplies, no slots occupied 64.0lbs (29kg) with 2 power supplies, all slots occupied

EMX3-FR:

Height:	5.25” (133mm)
Width:	19.0” (483mm)
Depth:	15.75” (400mm)
Module Capacity:	5 single slot EMR series modules
Weight Approx.:	17.4lbs (7.9kg) with 2 power supplies, no slots occupied 32.0lbs (14.5kg) with 2 power supplies, all slots occupied

EMX1-FR:

Height:	1.75” (45 mm)
Width:	19.0” (483 mm)
Depth:	18.75” (477 mm)
Module Capacity:	2 single slot EMX series modules
Weight:	15 lbs (6.8kg) with 2 power supplies, no slots occupied 22.0lbs (10kg) with 2 power supplies, all slots occupied

3.2.1. Compliance

EMX6-FR:

Safety:	CSA Listed to CSA C22.2 No. 60065-03, UL 60065-03 IEC 60065-(2001-12) 7th Edition Complies with CE Low voltage Directive 93/68/EEC
EMC:	Complies with FCC part 15, class A Complies with EU EMC directive 89/336/EEC

EMX3-FR:

Safety:	CSA Listed to CSA C22.2 No. 60065-03, UL 60065-03 IEC 60065-(2001-12) 7th Edition Complies with CE Low voltage Directive 93/68/EEC
EMC:	Complies with FCC part 15, class A Complies with EU EMC directive 89/336/EEC

EMX1-FR:

Safety:	CSA Listed to CAN/CSA-C22.2 No. 60950-1-07, Amendment 1:2011(MOD) ANSI/UL Std. No. 60950-1-2011 Complies with CE Low voltage Directive 2004/108/EC
EMC:	Complies with FCC part 15, class A Complies with EU EMC directive 89/336/EEC

3.3. STATUS INDICATORS

- PSU status LED
- Local Error/Failure LED

3.4. PHYSICAL

Dimensions:

EMX3-FR:	19” W x 5.25” H x 15.75” D (483mm W x 133mm H x 400mm D)
EMX6-FR:	19” W x 10.5” H x 15.75” D (483mm W x 266mm H x 400mm D)
EMX1-FR:	19.0” W x 1.75” H x 18.75” D (483mm W x 45mm H x 477mm D)
Temperature:	0-40°C

3.5. MODULE CAPACITY

EMX1-FR:	2 single slot modules
EMX3-FR:	5 single slot modules
EMX6-FR:	15 single slot modules

3.6. WEIGHT

EMX1-FR:	22.0lbs (10kg) Full**,** 15lbs (6.8kg) Empty
EMX3-FR:	32lbs (14.5kg) Full, 17.4lbs (8kg) Empty
EMX6-FR:	64lbs (29g) Full, 34.8lbs (16kg) Empty

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4. INSTALLING AND REMOVING THE MODULES

4.1. ELECTRO STATIC DISCHARGE (ESD) PRECAUTIONS

All semiconductor devices are sensitive to ESD. To prevent any damage or degradation on components of the product caused by ESD, observe these precautions when installing or removing modules from the frame.

1. Discharge static from your body. Wear a grounded anti-static wrist or heel strap, to discharge the static voltage from your body.

2. Use a Safe Work Area. Avoid handling modules in areas that have a floor or work surface covering capable of generating a static charge. Also nothing capable of generating or holding a static charge should be allowed in the work area.

3. Handle ESD sensitive modules carefully. Do not slide modules over any surface. Do not touch exposed connector pins. Pick-up modules by the edges of the modules, never by touching exposed leads.

4. Transport and store sensitive components or assemblies in a static-protected bag or container.

4.2. INSTALLING THE MODULE REAR PLATES

Each module is shipped with a matching rear panel plate which houses the connectors appropriate for the module. When installing a rear plate, locate the desired slot position where you wish to install the rear plate. Make a note of the slot number where you are installing the rear plate. Orient the plate so that the labeling is visible when the plate is installed. Loosely fasten the plate to the extrusions using the mounting screws provided, beginning with the top screw. You will tighten the screws after the main module is installed.

4.3. OPENING AND CLOSING THE FRONT PANEL

4.3.1. EMX3 and EMX6

In order to insert or remove modules you will have to open the front panel. Turn the two captive screws located on the front panel counter clockwise several turns until they release completely from the front extrusions. Carefully lower the front panel door so that the front edge of the door is lower than the rear of the door.

When closing the door, make sure that the thumbscrews are properly finger tightened. If the frame is operated in environments subject to excessive vibration such as mobile trucks, you may tighten the screws carefully with a screwdriver. Be careful not to over tighten as the thumbscrew head may twist off.

4.3.2. EMX1

In order to insert or remove modules you will have to remove the front panel. Turn the two captive screws located on the front panel counter clockwise several turns until they release completely from the front extrusions. Pull the front panel from the frame so it is completely removed.

When closing the door, make sure that the thumbscrews are properly finger tightened. If the frame is operated in environments subject to excessive vibration such as mobile trucks, you may tighten the screws carefully with a screwdriver. Be careful not to over tighten as the thumbscrew head may twist off.

4.4. INSTALLING THE MODULES

For the EMX6-FR, orient the module vertically such that the white card ejector is on the bottom. For the EMX1-FR and the EMX3-FR, orient the module horizontally such that the white card ejector is to the right. In both cases, align the card with the card guide corresponding to the slot number where you installed the rear panel plate. Carefully slide the module into the frame and press it completely into the rear panel connectors. Make sure that the connectors are fully seated in the rear panel. When this is done, close the front panel and then tighten the screws that hold the rear panel in place.

4.5. REMOVING THE MODULES

Press the card ejector down to release the module. Grasp the card using the card ejector and pull the module out from the frame. As the card ejector goes past the front extrusion, you will have to pull it with slightly more force. Carefully place the module in a safe place, free from static discharge.

5. SERVICING INSTRUCTIONS

CAUTION – These servicing instructions are for use by qualified service personnel only. To reduce risk of electric shock do not perform any servicing instructions in this section of the manual unless you are qualified to do so.

5.1. CHANGING THE FUSES (NOT APPLICABLE TO EXM1)

Check that the line fuse is rated for the correct value marked on the rear panel. Never replace with a fuse of greater value.

The fuse holder is located inside the power entry module. To change the fuses, pull out the fuse holder from the power entry module using a small screwdriver. The fuse holder contains two fuses, one for the line and one for the neutral side of the mains connection. Pull out the blown fuse and place a fuse of the correct value in its place. The correct fuse rating is marked on the rear panel near the power entry module.

Fuse Rating: 10 Amps, 250 Volt ceramic time delay, 5 x 20 mm

5.2. REPLACING THE POWER SUPPLY

Each power supply is a complete assembly and includes the power supply cooling fan and one frame cooling fan. In the event that the power supply or one of the fans malfunctions, you will need to replace the power supply assembly with a spare one while the failed assembly is being repaired.

Do not run the frame for extended periods of time with one of the power supplies removed or with the door open. Proper cooling of the frame requires both power supplies to be inserted into the frame, or one power supply and a power supply fan module.

The EMX3-FR & EMX6-FR power supplies are hot swappable and can be easily replaced from the front without interrupting the signal integrity of the frame. Each power supply is capable of supplying full power to the frame by itself, however we recommend running with both supplies powered for power redundancy. In the case of the EMX6-FR, the redundant power supply is required to provide adequate cooling to the frame so it is always recommended.

On EMX3-FR frames with only one power supply, a blank power supply fan module with cooling fan (properly rated for the wattage of the power supply) **must be** inserted into the second power supply space. The blank power supply fan module contains a module cooling fan sufficient to cool the maximum power dissipation of the frame and baffles to maintain proper airflow within the frame.

The power supply is secured into the frame by a machine screw through the rear panel. This screw must be removed before the power supply can be extracted from the front.

To reduce risk of electric shock you must replace the mounting screw after replacing the power supply.

To replace the power supply the following procedure should be used for the EMX6-FR and EMX3-FR.

1. Turn off the power supply switch.
2. From the rear of the frame locate the power supply mounting screw. This screw is the top right screw holding the fan guard in place, and is indicated by the legend

PSU mount ↓

3. Remove the power supply mounting screw.
4. Open the front door of the frame and pull the power supply out of the frame.
5. Reinsert the new power supply into the frame taking care that it is properly aligned with the card guides. Press firmly to make sure that the power supply is fully seated into the rear panel connector.
6. Reinstall the power supply mounting screw from the rear of the frame.
7. Turn on the power switch for the power supply. After a few seconds you should see the PSU STATUS LED come on indicating that the power supply is working correctly.

To replace the power supply the following procedure should be used for the EMX1-FR.

1. Remove AC power cable
2. Turn off the power supply switch
3. From the front of the frame, locate the power supply locking tab. Releasing this tab will allow the PSU to be removed from the frame.
4. Release the power supply locking tab.
5. Remove the Power Supply from the frame.
6. Reinsert the new power supply into the frame taking care that it is properly aligned with the card guides. Press firmly to make sure that the power supply is fully seated into the rear panel connector.
7. Turn on the power switch for the power supply. After a few seconds you should see the PSU STATUS LED come on indicating that the power supply is working correctly.