



CMX-09

9-SLOT PXIe CHASSIS

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CERTIFICATION

VTI Instruments Corp. (VTI) certifies that this product met its published specifications at the time of shipment from the factory. VTI further certifies that its calibration measurements are traceable to the United States National Institute of Standards and Technology (formerly National Bureau of Standards), to the extent allowed by that organization's calibration facility, and to the calibration facilities of other International Standards Organization members. Note that the contents of this document are subject to change without notice.

WARRANTY

The product referred to herein is warranted against defects in material and workmanship for a period of one year from the receipt date of the product at customer's facility. The sole and exclusive remedy for breach of any warranty concerning these goods shall be repair or replacement of defective parts, or a refund of the purchase price, to be determined at the option of VTI. Note that specifications are subject to change without notice.

For warranty service or repair, this product must be returned to a VTI Instruments authorized service center. The product shall be shipped prepaid to VTI and VTI shall prepay all returns of the product to the buyer. However, the buyer shall pay all shipping charges, duties, and taxes for products returned to VTI from another country.

VTI warrants that its software and firmware designated by VTI for use with a product will execute its programming when properly installed on that product. VTI does not however warrant that the operation of the product, or software, or firmware will be uninterrupted or error free.

LIMITATION OF WARRANTY

The warranty shall not apply to defects resulting from improper or inadequate maintenance by the buyer, buyer-supplied products or interfacing, unauthorized modification or misuse, operation outside the environmental specifications for the product, or improper site preparation or maintenance.

VTI Instruments Corp. shall not be liable for injury to property other than the goods themselves. Other than the limited warranty stated above, VTI Instruments Corp. makes no other warranties, express or implied, with respect to the quality of product beyond the description of the goods on the face of the contract. VTI specifically disclaims the implied warranties of merchantability and fitness for a particular purpose.

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GENERAL SAFETY INSTRUCTIONS

Review the following safety precautions to avoid bodily injury and/or damage to the product. These precautions must be observed during all phases of operation or service of this product. Failure to comply with these precautions, or with specific warnings elsewhere in this manual, violates safety standards of design, manufacture, and intended use of the product. Note that this product contains no user serviceable parts or spare parts.

Service should only be performed by qualified personnel. Disconnect all power before servicing.

TERMS AND SYMBOLS

These terms may appear in this manual:

WARNING	Indicates that a procedure or condition may cause bodily injury or death.
CAUTION	Indicates that a procedure or condition could possibly cause damage to equipment or loss of data.

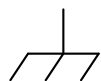
These symbols may appear on the product or in the manual:



ATTENTION - Important instructions



Indicates hazardous voltage.



Frame or chassis ground



Indicates that the product was manufactured after August 13, 2005. This mark is placed in accordance with *EN 50419, Marking of electrical and electronic equipment in accordance with Article 11(2) of Directive 2002/96/EC (WEEE)*. End-of-life product can be returned to VTI by obtaining an RMA number. Fees for take-back and recycling will apply if not prohibited by national law.

WARNINGS

Follow these precautions to avoid injury or damage to the product:

Use proper Power Cord	To avoid hazard, only use the power cord specified for this product.
Use proper Power Source	To avoid electrical overload, electric shock, or fire hazard, do not use a power source that applies other than the specified voltage. The mains outlet that is used to power the equipment must be within 3

	meters of the device and shall be easily accessible.
Use proper Fuse	To avoid fire hazard, only use the type and rating fuse specified for this product.
Power Consumption	Prior to using EX1200 series plug-in modules, it is imperative that the power consumption of all modules that will be installed in the mainframe be calculated for all power supply rails. The required information can be found in <i>Appendix B</i> of the <i>EX1200 Series User's Manual</i> (P/N: 82-0127-000). <i>Failure to do so may result in damaging the switch card and the mainframe.</i>
Avoid Electric Shock	To avoid electric shock or fire hazard, do not operate this product with the covers removed. Do not connect or disconnect any cable, probes, test leads, etc. while they are connected to a voltage source. Remove all power and unplug unit before performing any service. <i>Service should only be performed by qualified personnel.</i>
Ground the Product	This product is grounded through the grounding conductor of the power cord. To avoid electric shock, the grounding conductor must be connected to earth ground.
Operating Conditions	To avoid injury, electric shock or fire hazard: - Do not operate in wet or damp conditions. - Do not operate in an explosive atmosphere. - Operate or store only in specified temperature range. - Provide proper clearance for product ventilation to prevent overheating. - When selecting the installation location, be certain that there is enough space around the power plug and the outlet so that they are readily accessible. Do not insert the power cord into an outlet where accessibility to the plug cord is poor. - All unused slots should be closed with the dummy filler panels to ensure a proper air circulation. This is critical to avoid overheating of the cards. - DO NOT operate if any damage to this product is suspected. <i>Product should be inspected or serviced only by qualified personnel.</i>

IMPROPER USE

The operator of this instrument is advised that if the equipment is used in a manner not specified in this manual, the protection provided by the equipment may be impaired.

Conformity is checked by inspection.

SUPPORT RESOURCES

Support resources for this product are available on the Internet and at VTI Instruments customer support centers.

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SECTION 1

INTRODUCTION

OVERVIEW

The CMX-09 is designed to be a highly versatile chassis with multiple mounting options. The CMX-09 is very easy to maintain because of the easily accessible power supply, fan panel, and air filter. The chassis also has an integrated user interface which makes using the chassis very easy to do without any external applications.

UNPACKING

Upon arrival, the shipping carton should be inspected for damage. If the carton or any of its contents are damaged please contact VTI Instruments immediately for a replacement. Do not dispose of the carton or any of its contents; VTI Instruments will not replace the damaged product if these materials are not returned.

Please check that the following materials are in the carton. If any of these materials are missing please contact VTI Instruments immediately.

- CMX-09 3U 9-Slot Chassis
- User's Manual
- Power Cord

SECTION 2

FEATURES

FEATURES

The CMX-09 chassis provides the following features:

- 9-slot PXI Express chassis with 1 system controller slot, 1 timing slot, 1 hybrid slot, and 6 peripheral slots
- High bandwidth PCIe 2nd Generation backplane with 2 GB/s slot bandwidth and 8 GB/s system bandwidth
- True 4U chassis
- Rugged construction with extended temperature range
- IEEE 1588 distributed instrument synchronization
- Smart switch display for health monitoring and control
- Flexible slot-to-slot direct communication for highly-deterministic operations
- Partitionable switch architecture with non-transparent bridging for true multi-root support
- First and only chassis that is PXI Multicomputing (PXImc) ready
- Versatile chassis featuring custom front panels and options for either racking mounting or bolting down the chassis

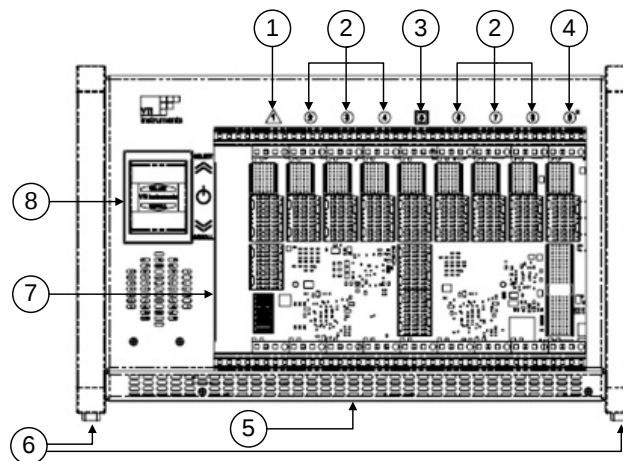


FIGURE 2-1 - CMX-09 FRONT OVERVIEW

- 1 PXI Express Controller Slot
- 2 PXI Express Peripheral Slots
- 3 PXI Express Timing Slot
- 4 PXI Express Hybrid Peripheral Slot
- 5 Removable Air Filter Cover
- 6 Removable Rubber Feet
- 7 Controller Expansion Slot
- 8 Front Panel Switch Interface

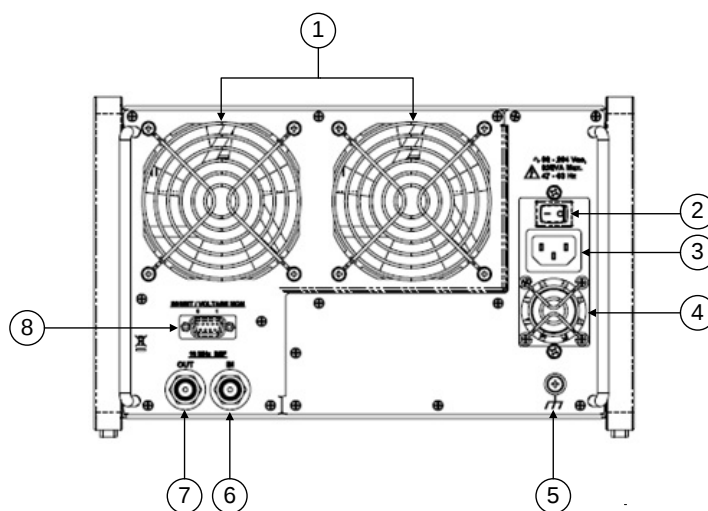


FIGURE 2-2 - CMX-09 BACK OVERVIEW

- 1 Chassis Fans
- 2 Chassis On/Off Switch
- 3 AC Input
- 4 Power Supply Fan
- 5 Chassis Ground Connector
- 6 10 MHz Ref IN BNC Connector
- 7 10 MHz Ref OUT BNC Connector
- 8 Inhibit/Power Monitoring DB9 Connector

SLOT CONFIGURATION

The CMX09 is a 9-slot PXI Express mainframe with 1 system controller slot, 1 PXIe timing slot, 1 PXIe hybrid slot and 6 PXIe peripheral slots.

The PXI Express hybrid slot delivers connectivity to either an x4 PCI Express link or to the 32-bit, 33 MHz PCI bus on the backplane. This allows PXI Express hybrid-compatible, or 32-bit cPCI/PXI-1 modules (without J2 connector), to be used in this slot.

The PXIe timing slot accepts either a PXI Express module or a PXI Express system timing controller for advanced timing and synchronization.

The system controller slot has configurable 4x4, 2x8 and 1x8 links, which allows all PXIe controllers to be supported per spec.

SPEED, FLEXIBILITY, AND PERFORMANCE

Best in Class Bandwidth

The CMX09 uses a 4-lane 2nd generation PCIe backplane to achieve unmatched data rates of up to 2 GB/s per slot and 8 GB/s system. This is especially useful when using high-speed instruments like digitizers, oscilloscopes, and signal generators.

Advanced PCIe Switch Fabric

The CMX09's advanced switch fabric uses innovative methods like non-transparent bridging (NTB) and partitionable switch architecture to allow slot-to-slot direct communication and true multi-root support.

Slot-to-slot direct communication allows data from any slot to be read directly by another slot without having to go through the controller and host. This allows extremely high-speed deterministic data transfers between slots which is very useful for applications that require closed loop control.

True multi-root support allows any slot to be used as a root-complex meaning data processing or memory units can be plugged into any slot on the chassis. This combined with slot-to-slot communication capability allows data to be streamed directly from a plug-in module to a root complex for storage or processing without burdening the host processor.

PXImc Ready

The slot-to-slot direct communication capability combined with true multi-root support allows the CMX-09 to be the first and only PXImc (PXI MultiComputing) ready mainframe in the industry. This provides the ability to use multiple processor modules, in any slots on the mainframe, to share the processing requirements for an application.

This allows CMX-09 to be used in high-speed, high-channel count, applications where large amounts of streaming data require in-line processing and analysis.

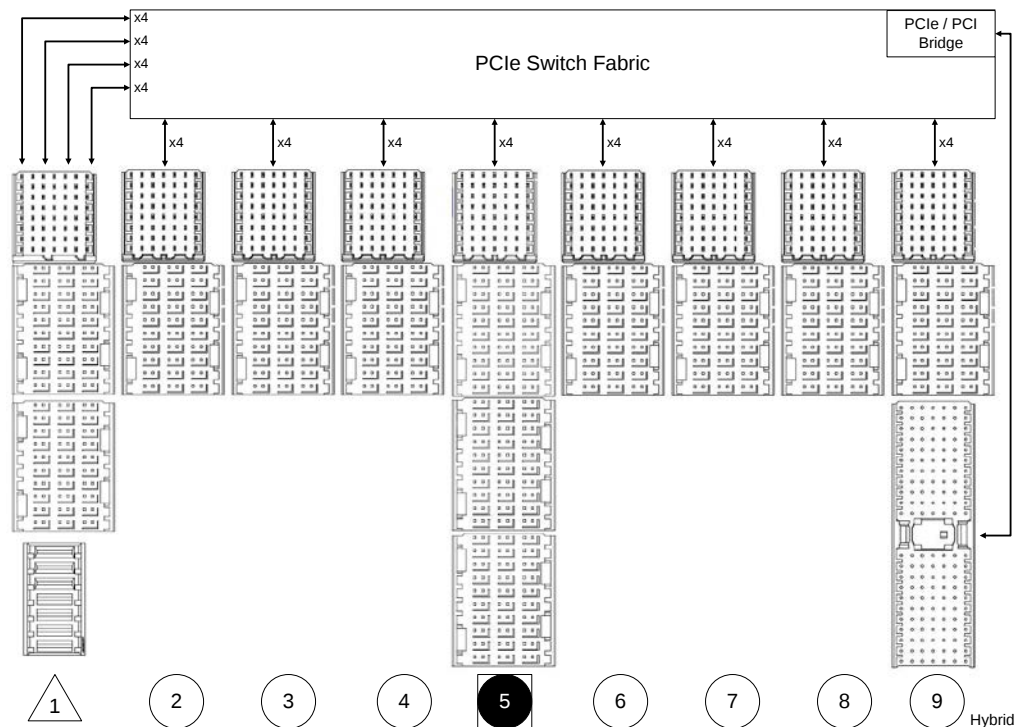


FIGURE 2-3 - CMX-09 BACKPLANE ARCHITECTURE (4 LINK)

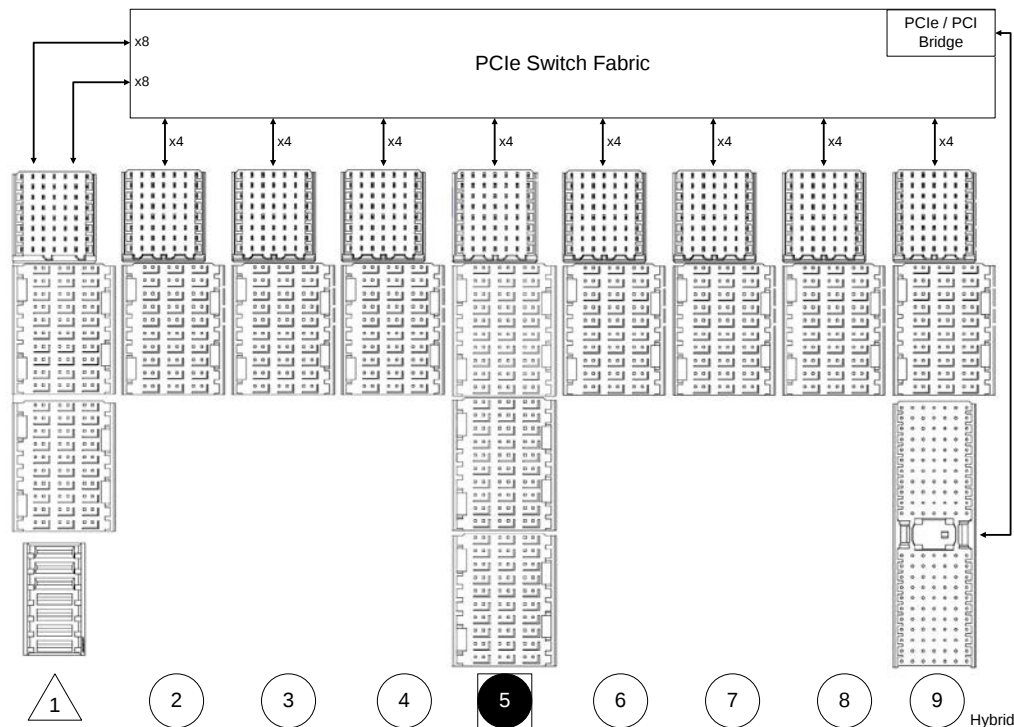


FIGURE 2-4 - CMX-09 BACKPLANE ARCHITECTURE (2 LINK)

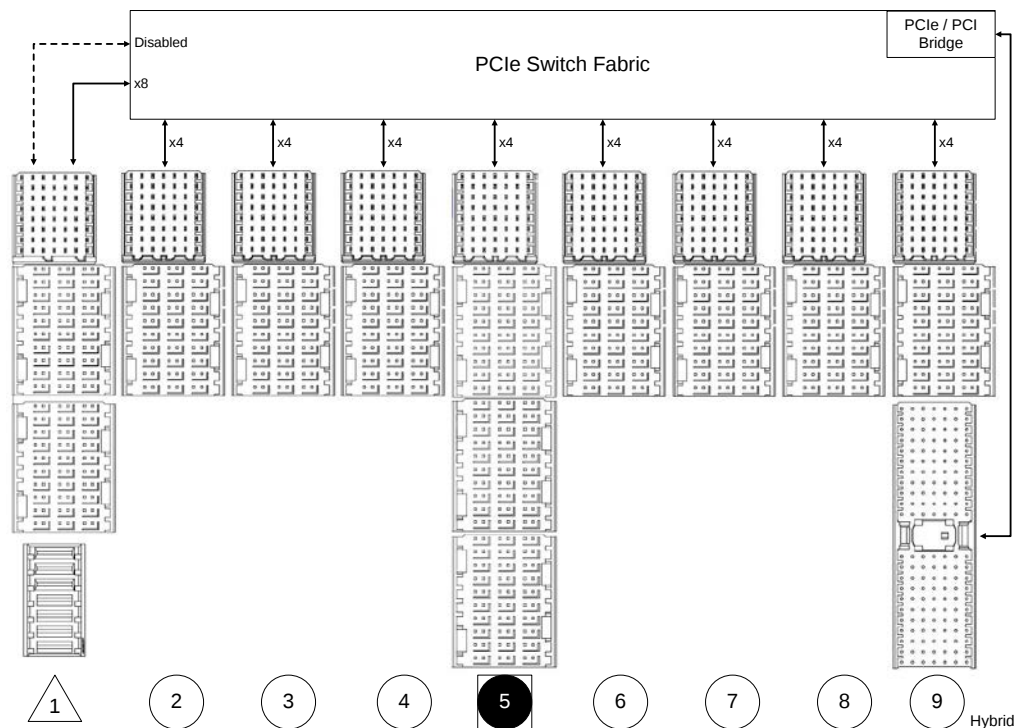


FIGURE 2-5 - CMX-09 BACKPLANE ARCHITECTURE (1 LINK)

IEEE-1588 DISTRIBUTION

The CMX-09 backplane contains a built-in mechanism for distributing an IEEE-1588 time source to the plug-in modules. This mechanism is only supported when using the EMX-2500 Gigabit Ethernet LXI controller which allows the time stamping of data from all plug-in modules on a common time-base for advanced timing and synchronization. In addition, it also provides the capability to synchronize PXI systems with LXI instruments.

SYSTEM MONITORING FOR SIMPLIFIED MAINTENANCE

The CMX-09 has a smart-switch display on the front panel which reports the chassis status/health and can also be used to control chassis fan speed.

- Temperature monitoring: The CMX-09 chassis monitors its own internal temperature using temperature sensors placed within the chassis. The smart switch can display the measured temperature readings and alert the user if an over-temperature condition occurs.
- Power monitoring: The smart switch monitors the power rail voltages and reports fault conditions if they occur.
- IP Address: When used with the EMX-2500 Gigabit Ethernet LXI controller, the smart switch displays the mainframe IP address allowing quick and easy connectivity to the instrument
- Fan Speed: The smart switch allows the user to adjust the mainframe fan speed. When set in auto-mode, the fan speed is optimized based on the temperature readings from the temperature sensors.

In addition, a DB-9 connector has been implemented in the rear of the chassis that allows for voltage monitoring and remote inhibit. Please refer to *Remote Voltage Monitoring* and Inhibit Control on page 19 for detailed information.

RUGGED DESIGN

The CMX-09's rugged, compact, and light-weight design makes it ideal for portable applications. The CMX-09 is available with optional handles which makes it convenient to lift and move. There are no ventilation-holes on the bottom and top of the chassis, which protects the instruments from spills when used in industrial environments.



FIGURE 2-6 - TABLE TOP OPTION

For in-vehicle or on-floor applications, a bolt-down option is available which allows the mainframe to be mounted to a surface. The bolt-down option includes vibration isolators that can withstand up to 11 G's of acceleration on the vertical axis and 4 G's of acceleration on the horizontal axis. In addition, the clearance between the surface and mainframe is adjustable to accommodate user constraints.



FIGURE 2-7 - BOLT DOWN OPTION

Traditional rack-mount options are also available.

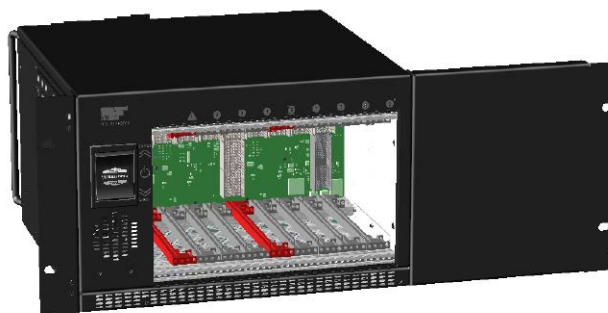


FIGURE 2-8 - RACK MOUNT OPTION

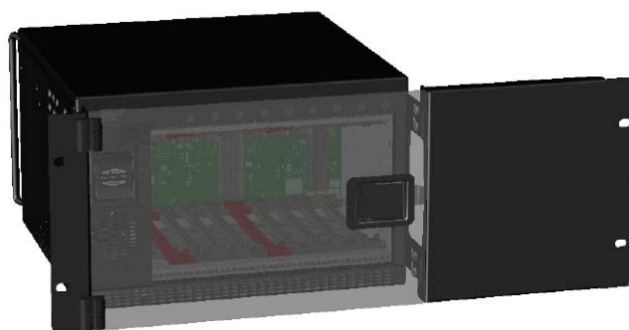


FIGURE 2-9 - RACK MOUNT OPTION WITH DOOR

EXTERNAL CLOCK

The CMX-09 includes a pair of IN/OUT BNC connectors in the rear to allow for an external 10 MHz reference clock. When a 10 MHz clock signal is detected on the IN connector, the internal clock is phase locked to the external clock. This reference clock may also be driven by a system timing module in slot 5. System timing controllers are high-stability clock sources which

provide the ability to drive the PXI star and PXI Express differential star triggers. In addition, timing controllers typically have the ability to import and export the PXI trigger lines on the backplane.

The OUT BNC connector provides a buffered, non-TTL version of the 10 MHz reference clock.

REMOTE VOLTAGE MONITORING AND INHIBIT CONTROL

The CMX-09 features remote voltage monitoring and inhibit control through a DB-9 connector located on the rear of the chassis. The DB-9 connector is intended for voltage monitoring as well as using the inhibit functionality of the chassis. The DB-9 connector should not be used to provide power to external devices.

In order to use the remote inhibit functionality, remote inhibit must first be turned on which can be done through the front panel switch. While remote inhibit is ON the chassis will not shut down through the front panel switch. Once remote inhibit is ON the chassis can only be shut down by connecting the remote inhibit pin (pin 5) to a ground pin (pin 1 or 9).

The following table outlines the pin assignment of the DB-9 connector.

Pin	Signal	Pin	Signal
1	GND	6	+12V
2	+5V	7	PWR_OK
3	+5Vsb	8	-12V
4	+3.3V	9	GND
5	INHIBIT (low)		

CAUTION Do not short the DB-9 connector probe leads together. Doing so can cause permanent damage to the chassis.

INNOVATIVE COOLING TECHNIQUES

The innovative cooling techniques implemented on the CMX-09 allow it to be a “True 4U chassis”. Traditional PXIe chassis, even if advertised as 4U, often require an additional 1U rack space for airflow. The CMX-09 uses innovative cooling methods to pull cool air from the front and sides of the chassis, rather than the top, and expels it from the rear. The temperature control mechanism monitors the temperature at the exhaust and automatically adjusts fan speed to optimize the internal temperature of the chassis.

The cooling implementation allows an extended temperature range of up to 70°C¹.

SERVICEABILITY

The CMX-09 was designed with serviceability in mind. The CMX-09 sports a very modular design with an easily removable power supply, fan assembly, and filter tray. The mentioned components were designed to be easily removed from the chassis to simplify on-site diagnostics and the replacement of any failed components.

¹ There will be power derating at >60°C. Refer to the detailed specifications.

DETAILED SPECIFICATIONS

GENERAL SPECIFICATIONS

Total Slots	9 slots
PXI Express System Controller	1 slot (slot 1)
PXI Express Peripheral	6 slots (slots 2, 3, 4, 6, 7, 8)
PXI Express Timing	1 slot (slot 5)
PXI Express Hybrid	1 slot (slot 9)
Module Size	3U
Bandwidth	
Slot	2 GB/s
Mainframe	8 GB/s
Standards Compliance	PXI-5 PXI Express Hardware Specifications PXI-1 hardware specifications Rev 2.2 PICMG EXP.0 R1.0 specification

SYSTEM SYNCHRONIZATION CLOCKS

10 MHz System Reference Clock:
PXI_CLK10

Max slot-to-slot skew	1 ns
Accuracy	±100 ppm Max
Max Jitter	5 ps RMS Phase Jitter
Duty Factor	45 to 55%

100MHz System Reference Clock:
PXI_CLK100

Max slot-to-slot skew	200 ps
Accuracy	±100 ppm Max
Max Jitter	< 1 ps RMS Phase Jitter (10 Hz to 12 kHz) < 1 ps RMS Phase Jitter (12 kHz to 20 MHz)
Duty Factor	45 to 55%

External 10 MHz Reference Out (from
BNC OUT)

Accuracy	±100 ppm max
Maximum Jitter	5 ps RMS Phase Jitter (10 Hz – 1 MHz range)
Output Amplitude	1 Vpp, ±20% square wave into 50 Ω 2 Vpp unloaded
Output Impedance	50 Ω ± 5 Ω

External Clock Source	
Frequency	10 MHz $\pm$ 100 ppm
Input Amplitude	200 mVpp to 5 Vpp square-wave or sine-wave (Rear panel BNC)
	5 V or 3.3 V TTL Signal (System timing slot)
Rear panel BNC input impedance	50 $\Omega \pm 5 \Omega$
Maximum jitter introduced by backplane	1 ps RMS Phase Jitter (10 Hz – 1MHz range)

MECHANICAL

Size	10.8'' L x 10.52'' D x 7.43'' H
Weight	10.8 lbs

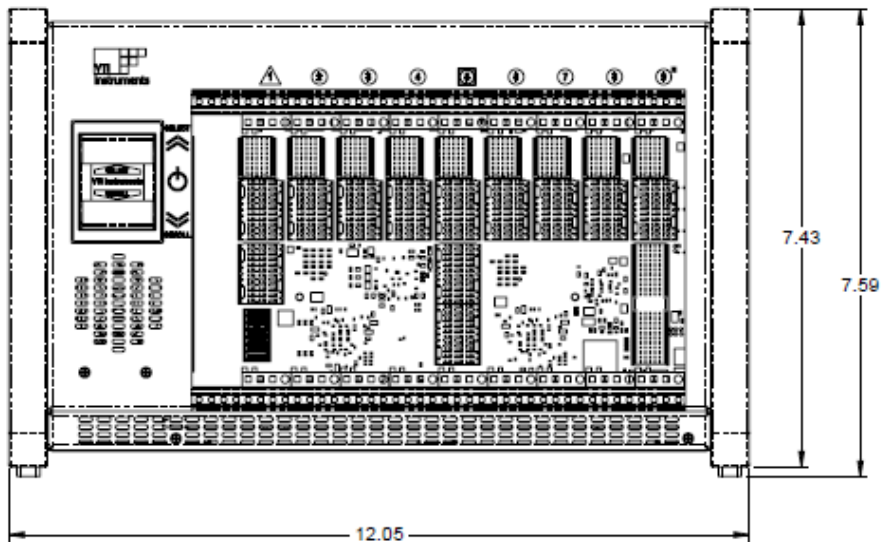


FIGURE 2-10 - FRONT VIEW

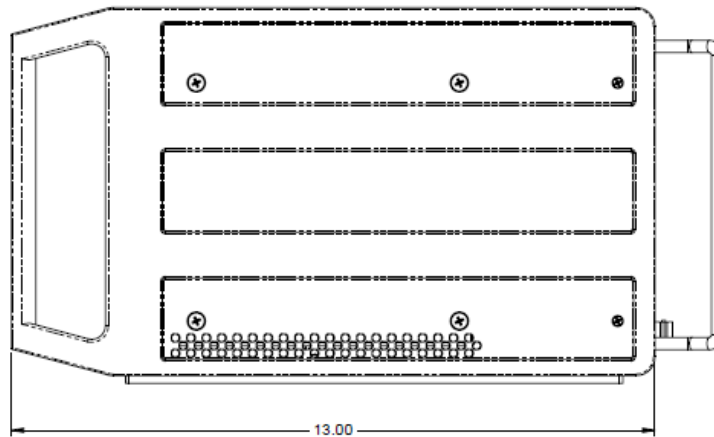


FIGURE 2-11 - RIGHT VIEW

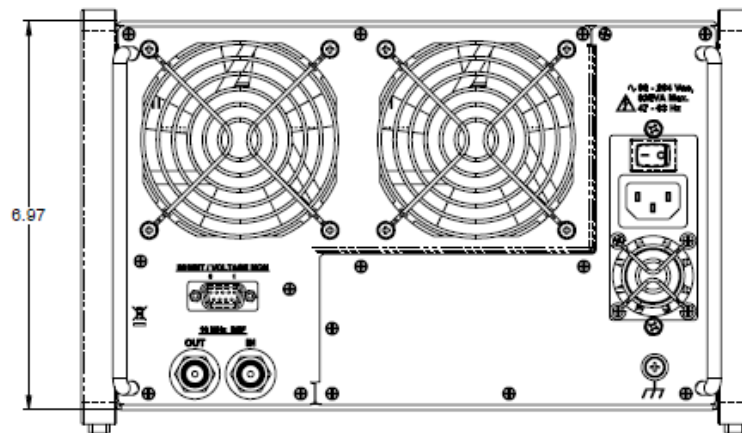


FIGURE 2-12 - REAR VIEW

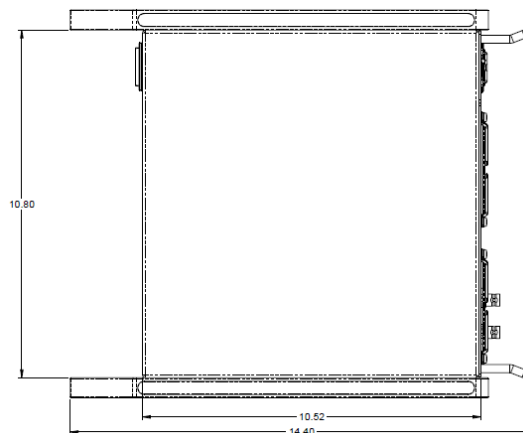


FIGURE 2-13 - TOP VIEW

ELECTRICAL

AC Input

Input Voltage Range	90 to 264 VAC
Input Frequency range	47 to 63 Hz
Input current	Max 8 A @ 115 VAC, 4 A @ 230 VAC

DC Output

Max DC Power Output	460 W
Efficiency	85% (typical)
+3.3V Max Load	20 A
+5V Max Load	20 A
+12V Max Load	32 A
-12V Max Load	0.5 A
+5V standby Max Load	2.5 A

COOLING

Fans	Two 130 CFM fans with High / Auto speed modes
Chassis cooling intake	Bottom of front bezel, bottom panel of chassis
Chassis cooling exhaust	Rear of chassis
Slot airflow direction	Bottom of module to top of module

ENVIRONMENTAL SPECIFICATIONS

Operating Temperature	-20 °C to 60 °C Chassis can operate up to 70 °C with 25W derating per °C beyond 60 °C
Storage Temperature	-30 °C to 85 °C
Humidity	20% to 90% non-condensing
Altitude	10,000 ft.

SAFETY AND EMC

Safety Compliance	EN 61010-1, IEC 61010-1 UL 61010-1, CSA 61010-1 2006/95/EC; Low-Voltage Directive (safety)
EMC Compliance	EN 61326 (IEC 61326): Class A emissions, basic immunity

EN 55011 (CISPR 11): Group 1, Class A emissions

AS/NZS CISPR 11: Group 1, Class A emissions

FCC 47 CFR Part 15B: Class A emissions

ICES-001: Class A emissions

SECTION 3

PREPARATION FOR USE

SYSTEM POWER REQUIREMENTS

The CMX-09 operates from 90 V to 264 V AC at 43 Hz to 63 Hz. A power source providing at least 920 VA is required in order for the chassis to function correctly.

CONNECTING THE MAINFRAME TO EARTH GROUND

The supplied power cord grounding conductor provides adequate grounding for this voltage and frequency level. However, if an ungrounded power cord is to be used or if the power source is not grounded please use the following steps to connect the chassis to a safety ground.

- 1) Connect a 16 AWG (or larger) wire to the ground terminal located on the rear panel (this connection is marked by a symbol). Use a grounding lug with a star washer or a toothed lug, to make this connection.
- 2) Attach the other end of the wire to a permanent earth ground also using a star washer or a toothed lug.

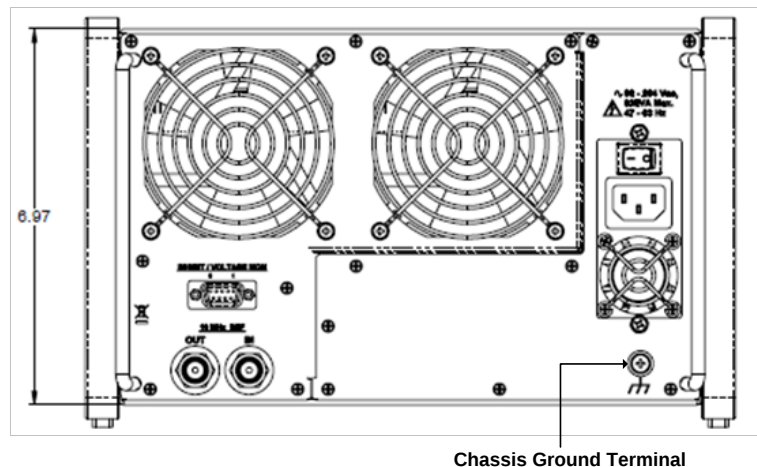


FIGURE 3-1 - CHASSIS GROUND TERMINAL

AIR FLOW REQUIREMENTS

The CMX-09 is designed to intake air from the sides and front of the unit. The fans pull air into the unit from the sides and front ventilation ports of the unit and push it out of the rear.

There are no ventilation ports on the top or bottom of the chassis to prevent spills from entering and damaging the chassis.

Placing objects against the ventilation ports on either side of the chassis or against the rear of the unit will obstruct airflow and cause the chassis to overheat. Prolonged obstruction of ventilation can cause permanent damage to the chassis. Therefore, consideration should be given when placing objects around the chassis so that the airflow is not obstructed.

If the internal temperature of the chassis exceeds 90 °C for more than 15 minutes the chassis will immediately shut down. Similarly, if the internal temperature reaches 100 °C the chassis will also immediately shut down.

FRONT PANEL SMART SWITCH OPERATION

Please reference the *Using the Front Panel* section on page 29 for instructions on how to operate the integrated user interface.

TURNING ON THE CHASSIS

The chassis will not power on until a controller has been installed. A VTI controller (such as the EMX-2500) or similar controller must first be installed.

Turning on the Chassis

- 1) Ensure the power switch at the rear of the chassis is in the OFF position.
- 2) Connect the AC power cord.

CAUTION	Do not turn on the chassis before inserting the controller into the chassis.
----------------	---

- 3) Insert the controller into slot 1 (left-most slot; a triangle with a 1 inside of it is located above the slot). Take care that the card is properly mounted on the red brackets and that the ejector handle is fully engaged. When installed properly, the controller should not be able to be removed except by pressing down on the ejector handle. Please reference the *Plug-in Module Installation and Removal* section on page 26 if you have difficulty installing the controller; the installation process is the same as installing a plug-in module.
- 4) Attach the controller to the chassis with the Philip's screw located at the very top of the controller.
- 5) Turn the power switch at the rear of the chassis to the ON position.
- 6) Finally, to turn on the chassis, press and hold the center toggle button on the front panel for 1.5 seconds.

PLUG-IN MODULE INSTALLATION AND REMOVAL

Required Tools

#2 Philips Screwdriver

Installing a Plug-In Module

- 1) Insert the module after aligning it with the top and bottom mounting brackets. The module should slide in with ease if properly aligned on the brackets. Make sure that the ejector handle is disengaged from the module and lowered completely (circled in black).



FIGURE 3-2 - PLUG-IN MODULE INSTALLATION STEP 1

- 2) Once the module has been slid as far back as possible, pull up on the ejector handle to lock the module into the chassis. The module should sit flush with the chassis and should not be able to be removed without disengaging the ejector handle. The red button should 'click' into place to once the ejector handle is fully engaged.



FIGURE 3-3 - PLUG-IN MODULE INSTALLATION STEP 2

- 3) Attach the module to the chassis with the Philip's screw located at the top and bottom of the module.

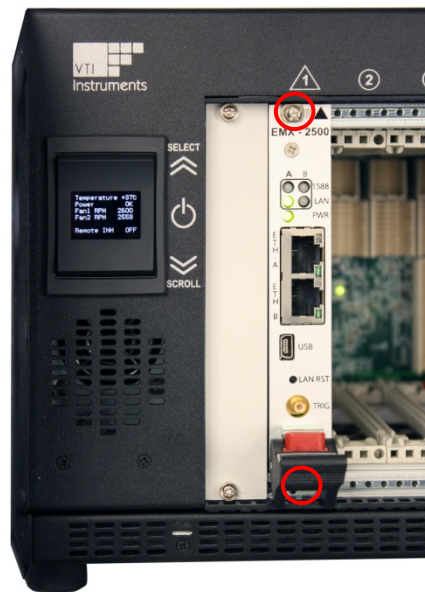


FIGURE 3-4 - PLUG-IN MODULE INSTALLATION STEP 3

Removing a Plug-In Module

- 1) Using a #2 Philips screwdriver, disengage the Philips screw located at the very top of the module. The screw does not have to be fully extracted from the module.

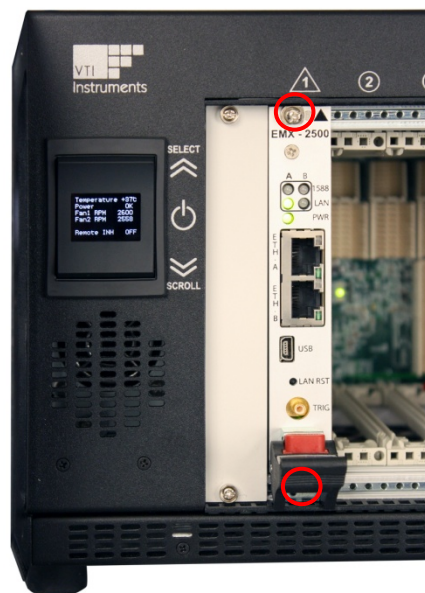


FIGURE 3-5 - PLUG-IN MODULE REMOVAL STEP 1

- 2) Press down on the button (marked in black) located on the ejector handle while simultaneously pressing down on the ejector handle (marked in red). Doing so will release the module from the chassis.



FIGURE 3-6 - PLUG-IN MODULE REMOVAL STEP 2

- 3) Slide the module out of the chassis.

USING THE FRONT PANEL

The front panel consists of three buttons: the top toggle button, the bottom toggle button, and the center toggle button.

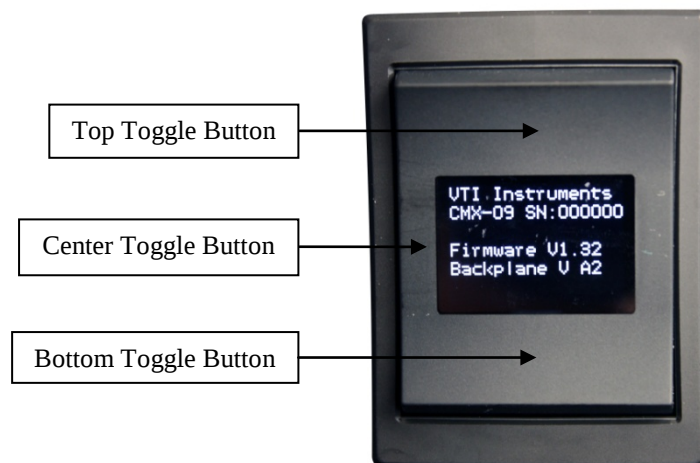


FIGURE 3-7 – FRONT PANEL

Turning on the chassis:

Pressing and holding the center toggle button for 1.5 seconds while the chassis is off will turn the chassis ON.

Turning off the chassis:

Soft shutdown² – Navigate to the ‘Power Shutdown Screen’, enter edit mode, and select ‘Shutdown’.

Hard shutdown – Press and hold the center toggle button outside of edit mode for 5 seconds to shutdown the chassis. **CAUTION:** Performing a hard shutdown may cause a loss of data.

Scrolling through menus:

The available monitoring and option screens can be scrolled through by pressing the bottom and top toggle buttons.

Controlling chassis operations/Edit mode:

Pressing the center toggle button on a screen that displays a status, such as power or temperature, will not cause the screen to perform any action.

Pressing the center toggle button on a screen that has options such as fan settings or remote inhibit will cause the screen to enter edit mode.

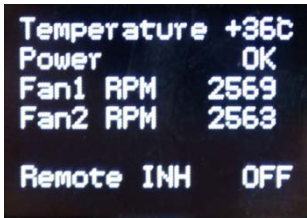
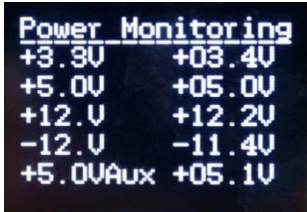
While in edit mode, the user may alter the settings of the unit by using the top and bottom toggle buttons to hover over the options. Selecting a setting with the center toggle button will activate the setting and will exit edit mode. If edit mode is entered and no setting is selected, then the screen will return to the main menu.

Returning to Main Menu:

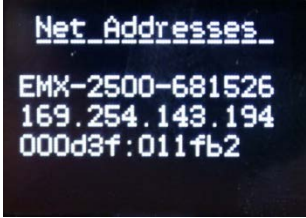
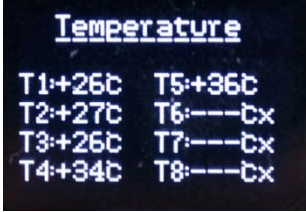
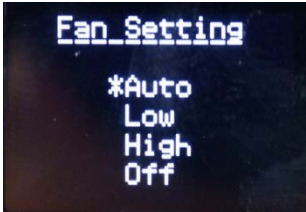
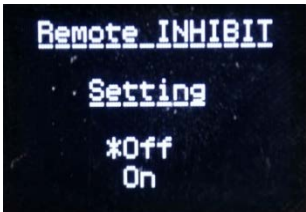
If the user leaves the screen on any screen other than the main menu, the screen will return to the main menu after 30 seconds of inactivity.

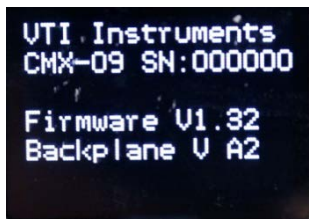
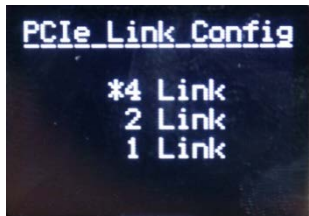
If the user enters edit mode and selects no options then the screen will return to the main menu

Screens:

Main Menu (System Monitoring Screen) 	Temperature Status: #°C, OVERHEAT Power Supply Status: OK, ERROR Fan 1: #RPM, OFF, FAIL Fan 2: #RPM, OFF, FAIL
Power Monitoring Screen 	#Volts An exclamation mark will follow the voltage if it is above or below the maximum or minimum voltage. The left column represents the expected voltage. The right column represents the actual voltage.

² It is recommended that the chassis be powered off using the ‘soft shutdown’ method.

Controller Screen 	Displays an IP address if a controller card is plugged in. If no controller card is plugged in then it read: "IP address not assigned".
Temperature Screen 	#°C If a sensor is not detected it will read: "---". An exclamation mark will follow the temperature if it is above the maximum temperature (the default is 90°C).
Fan Setting Screen 	A '→' is shown when in edit mode. A '*' is shown when outside of edit mode to indicate the current setting. Auto – Adjusts fan RPM based on internal temperature. Low – Sets the fans at approximately 2600 RPM. High – Sets the fans at approximately 5500 RPM. Off – Turns off the fans.
Remote Inhibit Screen 	A '→' is shown when in edit mode. A '*' is shown when outside of edit mode to indicate the current setting. If remote inhibit is ON and the remote inhibit line is HIGH or floating, the chassis cannot be turned off using the front panel switch (both hard and soft shutdown methods will not work). If remote inhibit is ON and the remote inhibit line is LOW, the chassis will turn off immediately and turn back on when the inhibit line is set back to HIGH or floating. The chassis cannot be turned on or off the front panel switch if the inhibit line is LOW. If remote inhibit is OFF then the chassis can be powered on and off using the front panel switch.
Power Shutdown Screen 	A '→' is shown when in edit mode. A '*' is shown when outside of edit mode to indicate the current setting. Shutdown – Turns off the chassis. Cancel – Returns to display mode.

Identification Screen 	Displays the CMX-09 serial number, firmware version, and backplane version.
PCIe Link Configuration 	A '→' is shown when in edit mode. A '*' is shown when outside of edit mode to indicate the current setting. Allows the user to toggle between the 4, 2, and 1 link configurations.

INSTALLING THE BLANKING PANELS

Unused slots on the CMX-09 should be covered with blanking panels. Blanking panels ensure that optimal air flow is achieved while the unit is in use. They also ensure that all air flowing through the chassis is first passed through the air filter to reduce the amount of maintenance that the chassis needs.

Assembly Preparation

The following part is needed for blanking panel installation:

Sequence	Stock Code	Description	Quantity
1	70-0409-007	KIT, BLANK PANELS, CMX-09	5
1	58-0463-000	CHASSIS ASSY, CMX-09, 9-SLOT 3U PXI-E	1

Required Tools

#2 Philips Screwdriver

Installing a Blanking Panel

- 1) Acquire a blanking panel and the two Philips screws provided with the blanking panel.
- 2) Line the blanking panel vertically with the chassis so that the two holes of the blanking panel align properly with the holes on the chassis.
- 3) Install the two Philips screws using the #2 Philips Screwdriver to firmly attach the blanking panel to the chassis.

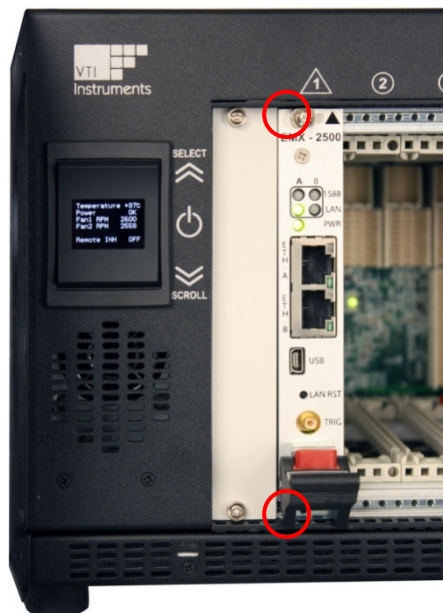


FIGURE 3-8 - BLANKING PANEL INSTALLATION

SECTION 4

BENCH-TOP USE

OVERVIEW

The CMX-09 chassis, in its most basic form, is designed for bench-top use with its four rubberized pegs. In the event of a spill, the pegs prevent the chassis from being submerged in any spilled liquid. The rubberized pegs additionally prevent the chassis from accidentally being pushed off of table tops or shelves.

The stock code to order the CMX-09 preassembled with this option is: 70-0463-000.



FIGURE 4-1 - TABLE TOP OPTION

ASSEMBLY PREPARATION

The following parts are needed to assemble the rack mount option.

Sequence	Stock Code	Description	Quantity
2	37-0182-050	SCREW, 8-32 x 1/2", PAN HEAD PHILLIPS, STAINLESS STEEL	4
3	37-0445-100	BUMPER, RUBBER, UNTHREADED HOLE W/ WASHER, 0.781 DIA, 9/16"H	4
4	37-0461-100	END CAP, COMPOSITE, CMX09	2
5	37-0461-101	HANDLE-CAP, END CAP, COMPOSITE, CMX09	2
6	37-0494-075	SCREW, 4-40 x 3/4", FLAT HEAD PHILLIPS, BLACK OXIDE	6
7	37-0502-038	SCREW, 4-40 x 3/8", F/H SELF TAP PHILLIPS,	6

		BLACK OXIDE	
1	37-0523-062	SCREW, 8-32 x 5/8", FLAT HEAD PHILLIPS, 82 DEG, SS, BLACK OXIDE	4
8	43-0047-000	LABEL, METALIZED POLYESTER, 0.75"H x 1.50"W	1
9	58-0463-000	CHASSIS ASSY, CMX-09, 9-SLOT 3U PXI-E	1

ASSEMBLY

STEP 1

REMOVE THE 4 SCREWS AS SHOWN ON BOTH SIDES.

NOTE: THESE SCREWS WILL BE RE-USED IN STEP 2.

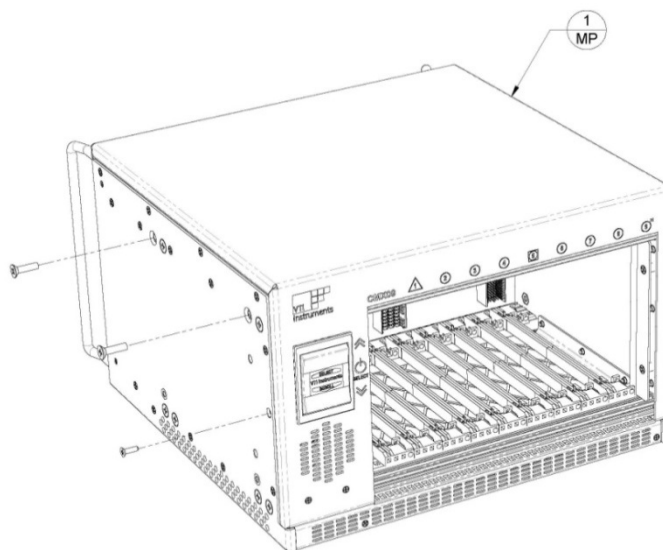


FIGURE 4-2 - TABLE TOP STEP 1

STEP 2

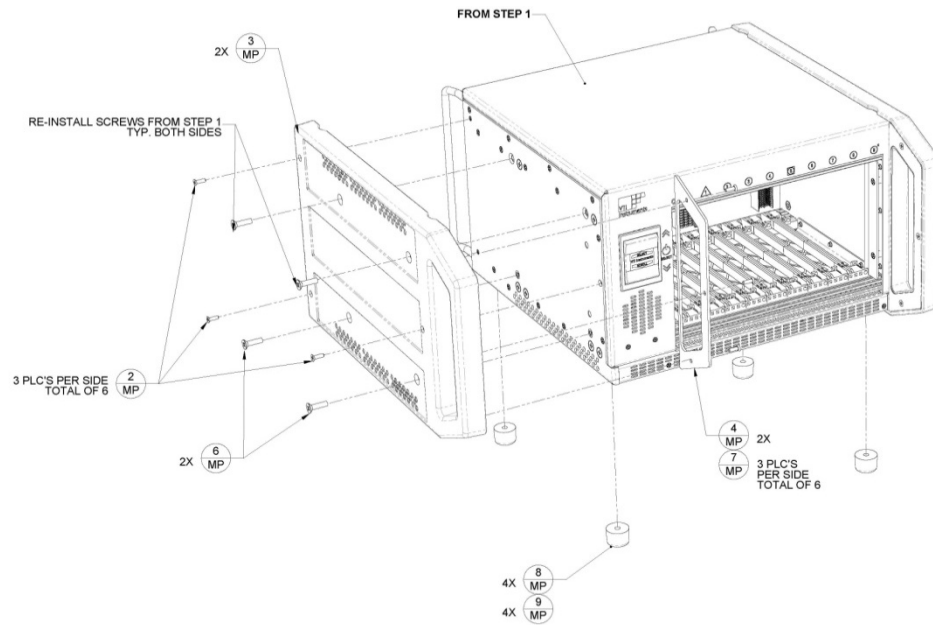


FIGURE 4-3 - TABLE TOP STEP 2

STEP 3

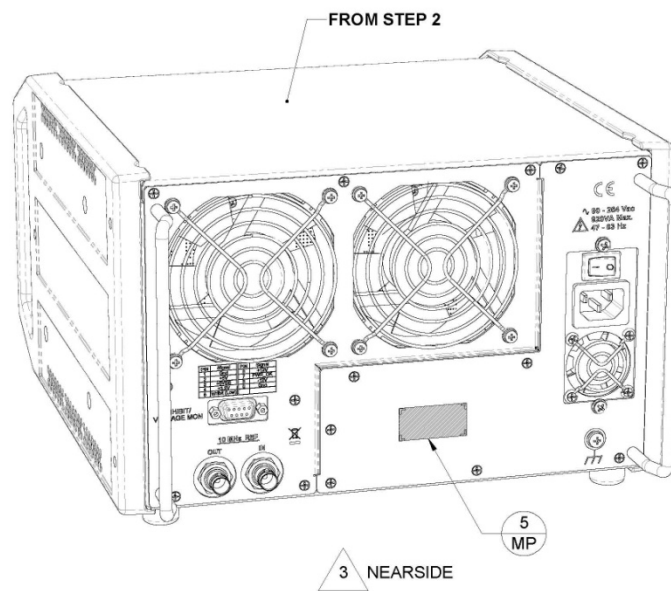


FIGURE 4-4 - TABLE TOP STEP 3

RACK MOUNT OPTION

OVERVIEW

A rack mount option is offered for the CMX-09 to provide a convenient way to store the chassis. Rack mounting the chassis also ensures that the chassis cannot be accidentally dropped or knocked over.

The stock code to order the CMX-09 preassembled with this option is: 70-4063-100



FIGURE 4-5 - RACK MOUNT OPTION

ASSEMBLY PREPARATION

The following parts are needed to assemble the rack mount option.

Sequence	Stock Code	Description	Quantity
2	41-0532-011	BRACKET, SHORT RACK EAR, CMX-09	1
3	41-0532-012	BRACKET, LONG RACK EAR, CMX-09	1
4	43-0047-000	LABEL, METALIZED POLYESTER, 0.75"H x 1.50"W	1
1	58-0463-000	CHASSIS ASSY, CMX-09, 9-SLOT 3U PXI-E	1

ASSEMBLY

STEP 1

REMOVE THE 6 SCREWS SHOWN ON EACH SIDE.

NOTE: THESE SCREWS WILL BE REUSED IN STEP 2.

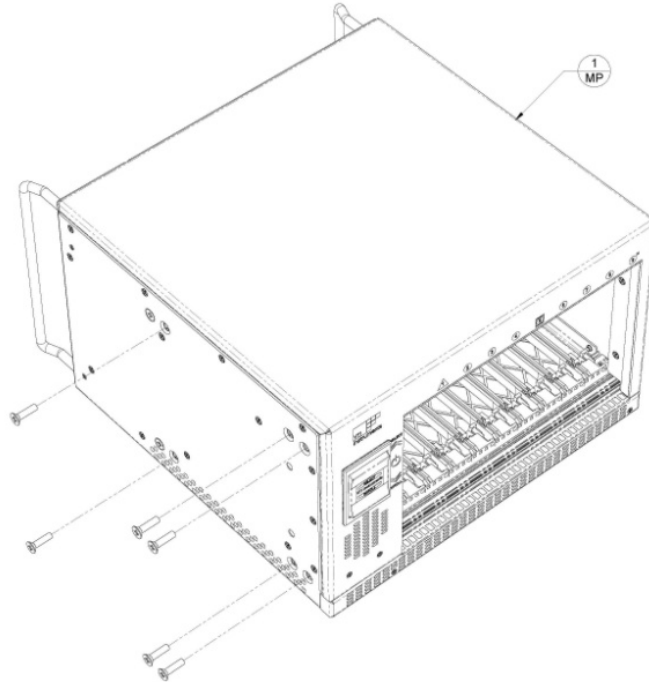


FIGURE 4-6 - RACK MOUNT STEP 1

STEP 2-A

FOR MOUNTING BRACKETS FLUSH WITH THE CHASSIS.

SEE STEP 2-B FOR RECESSED CHASSIS MOUNTING.

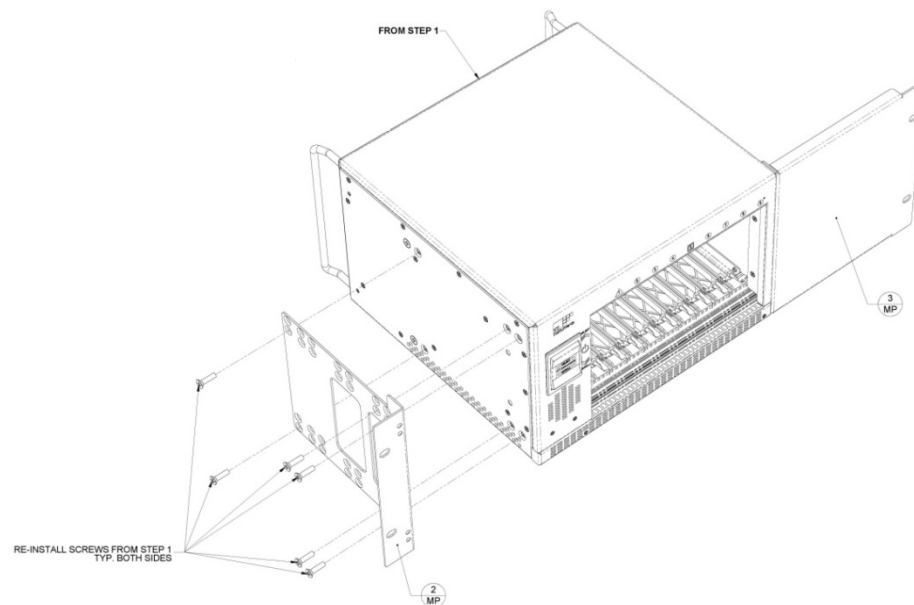


FIGURE 4-7 - RACK MOUNT STEP 2-A

STEP 2-B

REINSTALL SCREWS AND MOUNTING BRACKETS AS SHOWN.

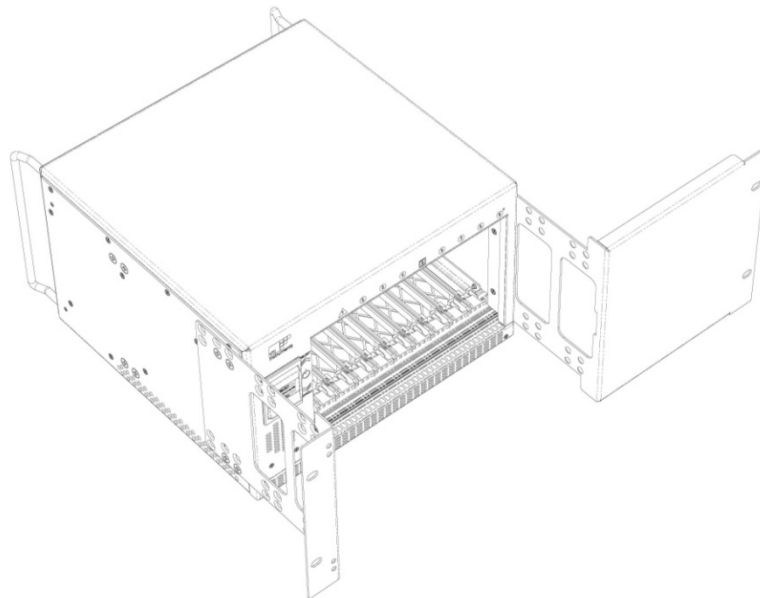


FIGURE 4-8 - RACK MOUNT STEP 2-B

STEP 3

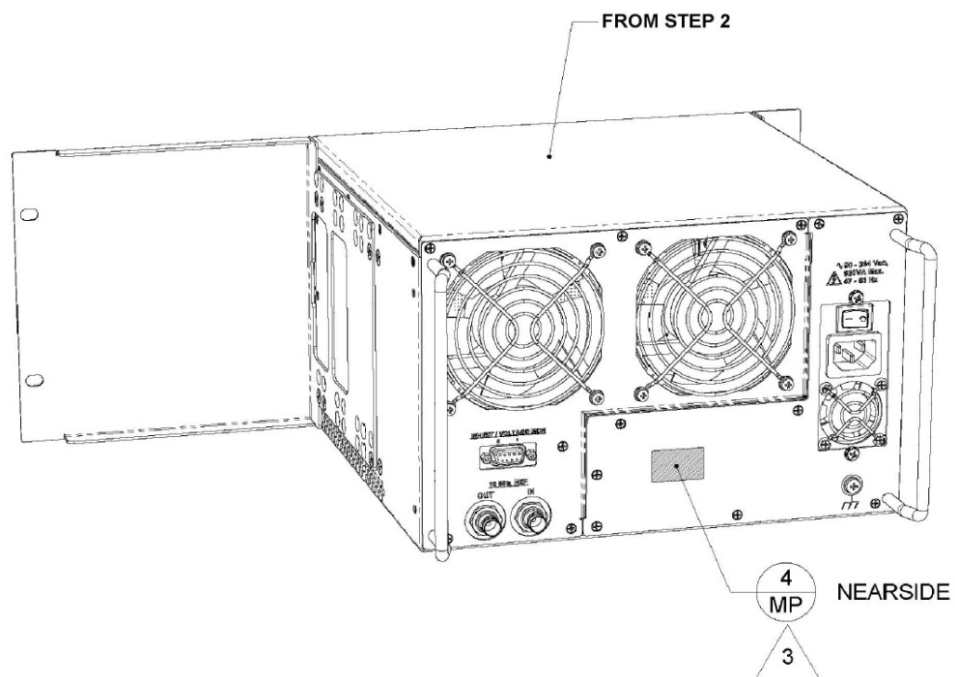


FIGURE 4-9 - RACK MOUNT STEP 3

RACK MOUNT OPTION WITH DOOR

OVERVIEW

The CMX-09 rack mount is also offered with a door to minimize the amount of dust and debris that can enter the chassis. The rack mount with door is recommended for particularly dusty or dirty working environments. The door also protects the controller, modules, and backplane from being hit directly by moving objects.

The stock code to order the CMX-09 preassembled with this option is: 70-0463-200

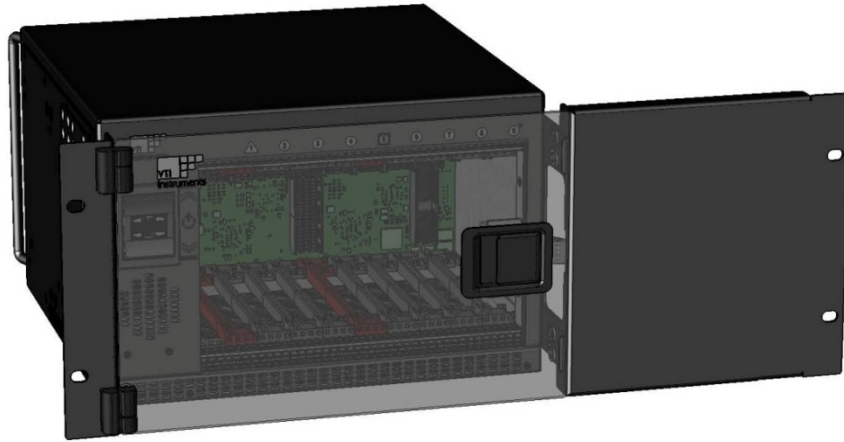


FIGURE 4-10 - RACK MOUNT WITH DOOR

ASSEMBLY PREPARATION

The following parts are needed to assemble the rack mount with door option.

Sequence	Stock Code	Description	Quantity
7	37-0028-037	SCREW, 6-32 X 3/8", PAN HEAD PH, SQ CONE SEMS ZINC	4
4	37-0114-025	SCREW, 6-32 X 1/4", F/H UNDERCUT PHILIPS, ZINC	4
8	37-0499-006	SCREW, M4 X 6MM, PHIL FLAT HEAD, ZINC PLATED	4
9	37-0500-001	OFFSET HINGE, PLASTIC, COLOR BLACK, TOP	1
10	37-0500-002	OFFSET HINGE, PLASTIC, COLOR BLACK, BOTTOM	1
11	37-0501-000	PADDLE LATCH, COLOR BLACK	1
2	41-0532-011	BRACKET, SHORT RACK EAR, CMX-09	1
3	41-0532-012	BRACKET, LONG RACK EAR, CMX-09	1
5	41-0532-024	BRACKET, DOOR STOP, CMX-09	1
6	41-0532-025	DOOR, FRONT, CMX-09, ACRYLIC	1
12	43-0047-000	LABEL, METALIZED POLYESTER, 0.75"H x 1.50"W	1
1	58-0463-000	CHASSIS ASSY, CMX-09, 9-SLOT 3U PXI-E	1

ASSEMBLY

STEP 1

REMOVE THE 4 SCREWS AS SHOWN ON EACH SIDE.

NOTE: THESE SCREWS WILL BE RE-USED IN STEP 2.

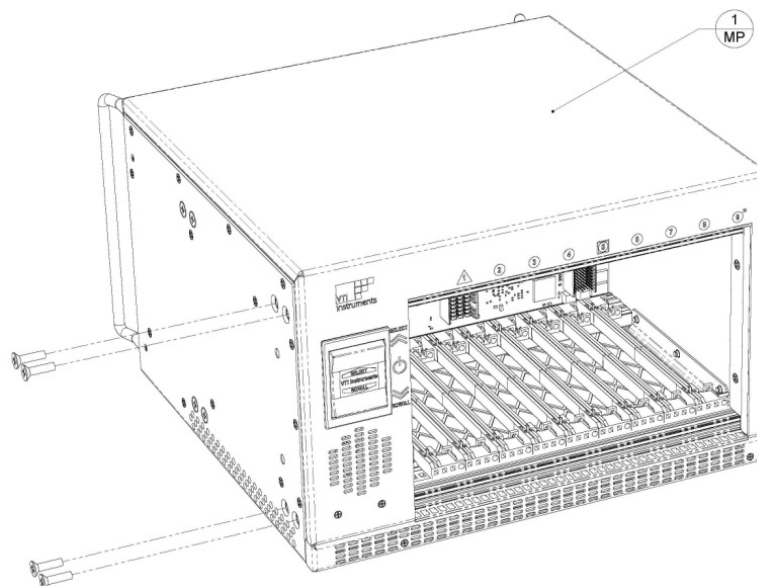


FIGURE 4-11 - RACK MOUNT WITH DOOR STEP 1

STEP 2

BRACKETS CANNOT BE MOUNTED FLUSH WITH FACE OF CHASSIS.

MUST BE INSTALLED AS SHOWN WITH THE CHASSIS RECESSED BACK 2 INCHES OR WITH CHASSIS RECESSED BACK 4 INCHES.

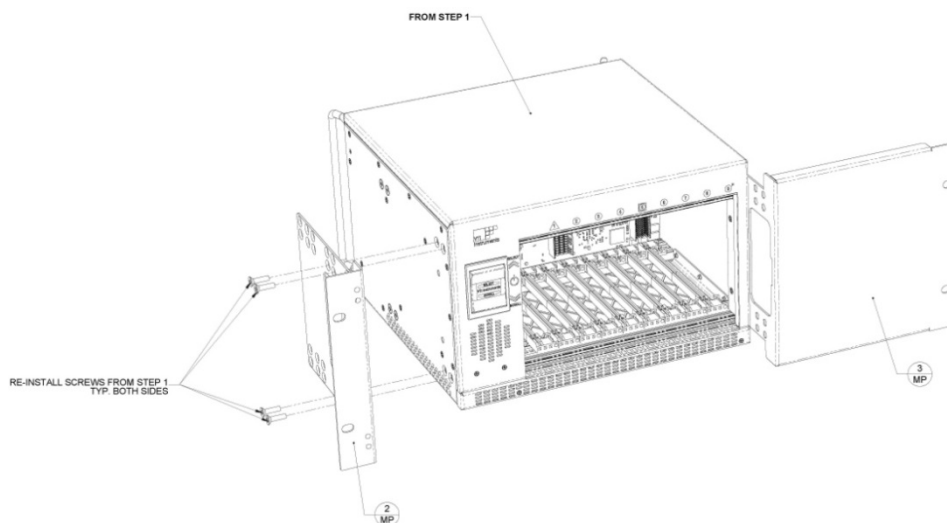


FIGURE 4-12 - RACK MOUNT WITH DOOR STEP 2

STEP 3

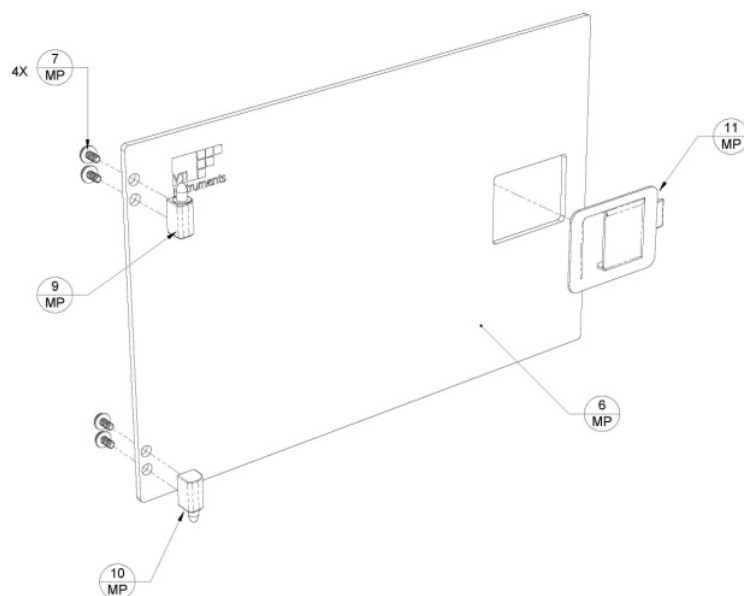


FIGURE 4-13 - RACK MOUNT WITH DOOR STEP 3

STEP 4

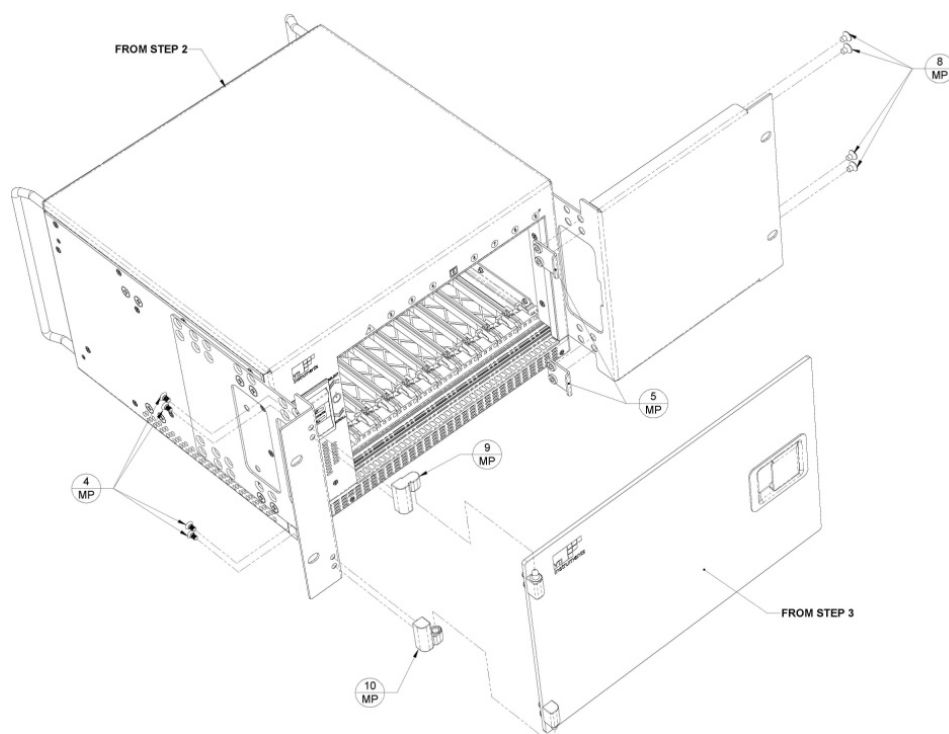


FIGURE 4-14 - RACK MOUNT WITH DOOR STEP 4

STEP 5
REAR VIEW.

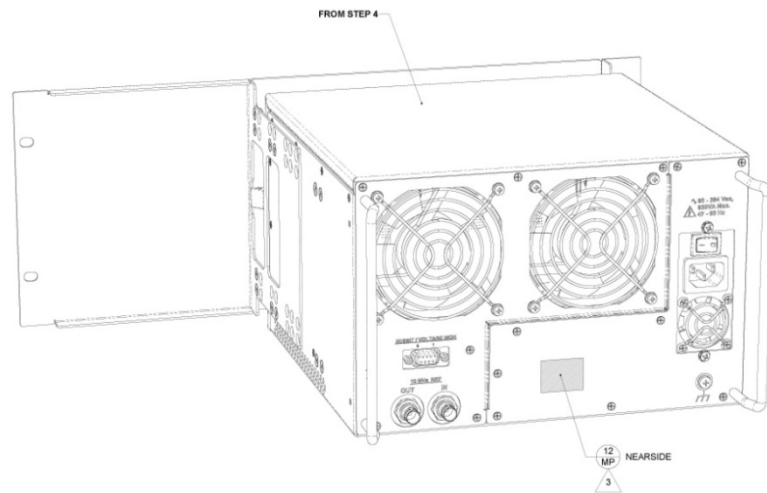


FIGURE 4-15 - RACK MOUNT WITH DOOR STEP 5

BOLT DOWN OPTION

OVERVIEW

The CMX-09 bolt down option is offered as an additional way to affix the CMX-09 to a workstation if a rack is not available for the CMX-09 to be stored in. The bolt down option is also suitable for mounting the chassis in a vehicle.

The stock code to order the CMX-09 preassembled with this option is: 70-0463-300



FIGURE 4-16 - BOLT DOWN OPTION

ASSEMBLY PREPARATION

The following parts are needed to assemble the bolt down option.

Sequence	Stock Code	Description	Quantity
4	37-0126-008	WASHER, SPLIT LOCK, #8, STAINLESS	8
3	37-0171-012	SCREW, M4 X 12MM, PHIL PAN HEAD, STAINLESS STEEL	8
2	43-0532-016	BRACKET, FLOOR MOUNTING, CMX-09	2
5	43-0047-000	LABEL, METALIZED POLYESTER, 0.75"H x 1.50"W	1
1	58-0463-000	CHASSIS ASSY, CMX-09, 9-SLOT 3U PXI-E	1

ASSEMBLY

STEP 1

REMOVE THE 4 SCREWS AS SHOWN ON EACH SIDE.

NOTE: THAT THESE SCREWS WILL NOT BE RE-USED.

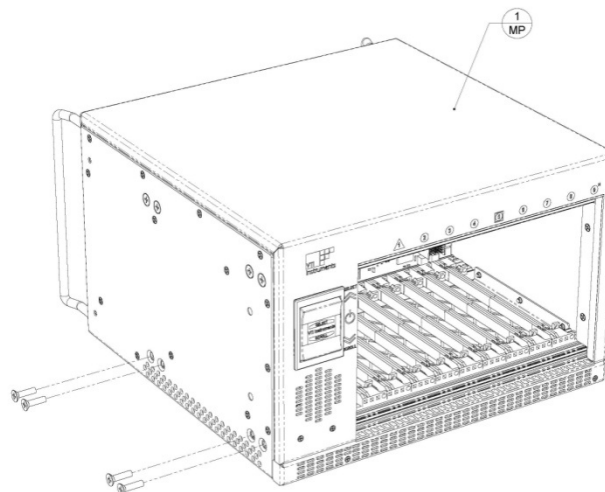


FIGURE 4-17 - BOLT DOWN OPTION STEP 1

STEP 2

NOTE: THAT MOUNTING BRACKETS CAN BE INSTALLED AS TO RECESS THE CHASSIS BOTTOM FROM 0.25" OF AN INCH TO 1.25" OF AN INCH.

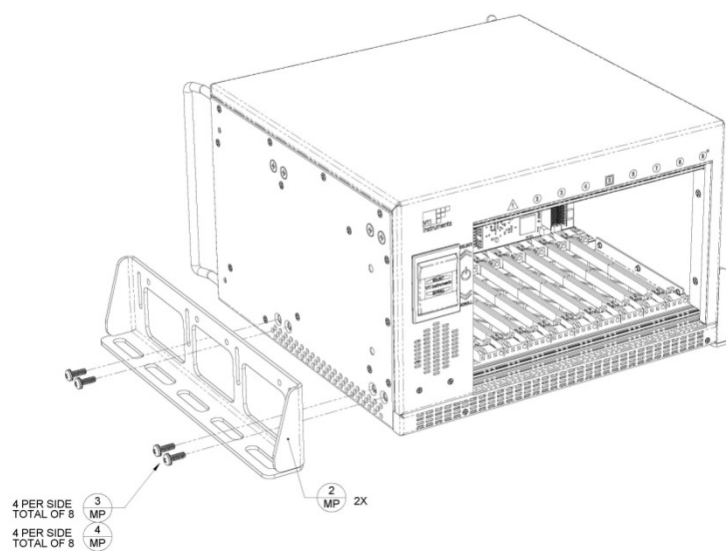


FIGURE 4-18 - BOLT DOWN OPTION STEP 2

STEP 3

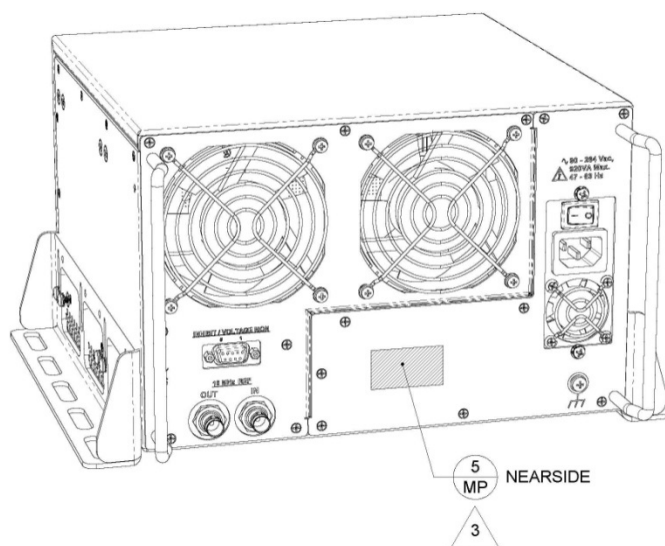


FIGURE 4-19 - BOLT DOWN OPTION STEP 3

DISCONNECTING THE MAINFRAME

WARNING **The chassis may be extremely hot. Use caution when handling the chassis.**

- 1) Navigate to the 'Power Shutdown' screen and select 'Shutdown'. If the chassis does not turn off, navigate to the remote inhibit menu and turn off remote inhibit. Once remote inhibit is disabled, navigate to the 'Power Shutdown' screen and select 'Shutdown'.



FIGURE 4-20 – FRONT PANEL SHUTOFF

- 2) Once the both the screen is off and the fans are no longer audibly running, flip the power switch to the OFF position.



FIGURE 4-21 – REAR PANEL SHUTOFF

- 3) Disconnect the power cable from the back of the chassis.

SECTION 5

MAINTENANCE AND TROUBLESHOOTING

INTRODUCTION

The CMX-09 should operate without the need for service, except for occasional cleaning of the air filter. The need for cleaning will vary depending on how many hours a day the unit operates for as well as the cleanliness of the air. The following sections will cover various details of cleaning the chassis as well as the steps to replace or clean various components.

The short section below describes the indicators of common problems as well as how to fix them.

Troubleshooting

General

Fans are nonoperational and their statuses do not read: 'FAIL'	A previous user could have set the fan setting to OFF. The chassis is programmed to remember the most recent settings, meaning that even upon a reboot of the chassis the chassis will continue to operate with the most recent settings. Navigating to the 'Fan Setting Screen' and selecting AUTO will allow the software to adjust the fan speed to the appropriate setting.
Fans are running on the HIGH setting and the temperature of the chassis is not exceeding the maximum temperature	A previous user could have set the fan setting to HIGH. The chassis is programmed to remember the most recent settings, meaning that even upon a reboot of the chassis the chassis will continue to operate with the most recent settings. Navigating to the 'Fan Setting Screen' and selecting AUTO will allow the software to adjust the fan speed to the appropriate setting.
Fans are running on the LOW setting even when the temperature of the chassis is exceeding the maximum temperature	A previous user could have set the fan setting to LOW. The chassis is programmed to remember the most recent settings, meaning that even upon a reboot of the chassis the chassis will continue to operate with the most recent settings. Navigating to the 'Fan Setting Screen' and selecting AUTO will allow the software to adjust the fan speed to the appropriate setting.
The chassis will not shutdown through the front panel switch	Remote Inhibit is enabled meaning that the chassis will not shutdown unless Remote Inhibit is set to OFF.

The chassis will not turn on through the front panel switch	The Remote Inhibit line is ON and therefore will not turn on. The chassis will turn back on if the remote inhibit line is floating or HIGH.
---	---

Main Menu (System Monitoring Screen)

Temperature status reads: 'FAIL'	The chassis is exceeding the maximum programmed temperature (default maximum temperature is 90°C). If Fan1 or Fan2 read: FAIL, then shutdown the chassis as soon as possible to prevent overheating. If both fans are functional and the chassis continually overheats then contact VTI Instruments for further instructions..
Power status reads: 'FAIL'	If any voltage is not within the specified limits then the status will read: FAIL. Please refer to the trouble shooting section for instructions to remove the power supply. Please contact the manufacturer as the power supply needs to be replaced.
Fan1 or Fan2's status reads: 'FAIL'	If the fan setting is on and the RPM is below the minimum (default minimum RPM is 500) then the corresponding fan will read: FAIL. If a fan status reads: FAIL then please refer to the <i>Removing and Cleaning/Replacing the Fans</i> section on page 56 in order to replace the defective fan.

Power Screen

A '!' appears after a voltage	Please contact the manufacturer as the power supply might need to be replaced.
-------------------------------	--

Controller Screen

Screen displays: "IP address not assigned"	If this message appears when an EMX-2500 is plugged into the chassis, remove the card and check for any visible damage to the connections or the card itself. If nothing appears to be damaged then reinsert the card into the chassis, making sure that it is properly seated on the mounting brackets.
--	--

Temperature Screen

A '!' appears after a temperature	The maximum temperature (default maximum temperature is 90°C) is being exceeded. Check the Summary Main Screen to see if Fan1 or Fan2 read: FAIL. If either read: FAIL, then shutdown the chassis as soon as possible to prevent overheating. If both fans are functional and the chassis continually
-----------------------------------	---

	overheats then contact VTI Instruments for further instructions.
A temperature reads: '---°CX'	A sensor is not detected. A total of 5 temperature sensors are in the chassis and therefore there should be 5 temperature readings. If one of the 5 sensors are reading: '---°CX' please contact VTI Instruments to have the unit repaired or replaced.

EXTERIOR



Before attempting to clean the chassis, ensure that the chassis is powered off and the power cord is removed. Specific instructions can be found in the

Disconnecting the Mainframe section on page 48.

Wipe the exterior of the chassis with a clean cloth in order to remove dust and dirt that has accumulated on the chassis. Areas such as air inlets should be thoroughly cleaned of dust in order to maximize airflow to the unit.

INTERIOR



Before attempting to clean or disassemble the chassis, ensure that the chassis is powered off and the power cord is removed. Specific instructions can be found in the

Disconnecting the Mainframe section on page 48.

Stock Code for Ordering Replacement Parts

Power Supply: 56-0277-000

Fan: 35-0176-012

Air Filter: 37-0492-000

Required Tools:

#2 Philips Screwdriver

Removing and Replacing the Power Supply

- 1) Use a Philips screwdriver to remove the 8 screws which affix the power supply panel to the chassis. The power supply panel is the panel which the right handle is attached to.



FIGURE 5-1 - REMOVING THE POWER SUPPLY STEP 1

- 2) Slide the power supply half way out of the chassis. If the power supply does not easily slide out, use a star key to slightly loosen the screws on both sides of the case.



FIGURE 5-2 - REMOVING THE POWER SUPPLY STEP 2

- 3) If the power supply is to be completely removed, then disconnect the three cables which are connected to the backplane. After they are disconnected, the power supply may be completely removed from the chassis.

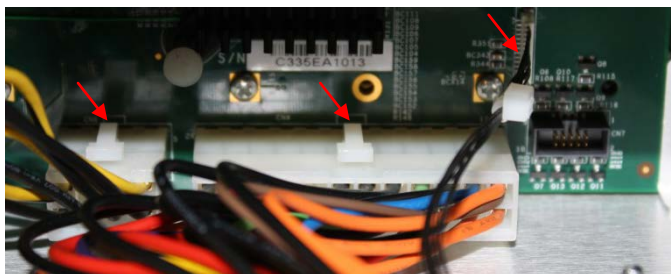


FIGURE 5-3 - REMOVING THE POWER SUPPLY STEP 3

- 4) Finally, remove the two silver screws which attach the power supply to the panel to release the power supply from the panel. The power supply may now be replaced.



FIGURE 5-4 - REPLACING THE POWER SUPPLY STEP 4

Removing and Cleaning/Replacing the Fans

If only the fans are to be removed from the chassis, then only follow instructions 1 and 2 from the *Removing and Replacing the Power Supply* section on page 55. If both the power supply and fans are to be removed then follow all instructions in the *Removing and Replacing the Power Supply* section on page 55. Once the appropriate instructions have been performed from the previous section, continue onto the following instructions in order to remove the fans from the chassis.

- 1) Remove the remaining 7 screws which affix the fan panel to the chassis.



FIGURE 5-5 - REMOVING THE FANS STEP 1

- 2) Using the left handle, which is attached to the fan panel, carefully remove the panel.
CAUTION The panel must have adequate clearance from the 2 protruding BNC connectors so that connectors are not damage in the process of removing the panel.



FIGURE 5-6 - REMOVING THE FANS STEP 2

- 3) Disconnect both fans from the backplane before attempting to completely remove the fan panel.

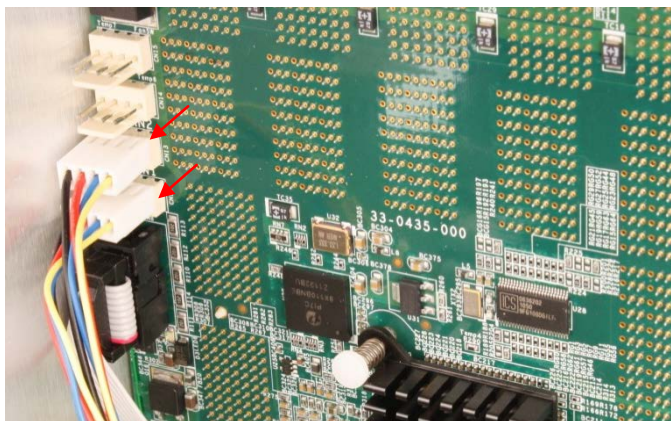


FIGURE 5-7 - REMOVING THE FANS STEP 3

- 4) Both fans may now be removed from the panel by unscrewing the 4 screws (8 total) which affix each fan to the panel.



FIGURE 5-8 - REPLACING THE FANS STEP 4

- 5) Now that both fans have been removed from the chassis, they can now be cleaned with a damp cloth or pressurized air. If needed, the fan(s) can now be replaced.

Reinstalling the Fans and Power Supply

Start from instruction 1 if both the power supply and fans are to be reinstalled. Start from instruction 4 if only the power supply is to be reinstalled.

- 1) Attach the two fans to the fan panel by using the 8 appropriate screws, nuts, and washers.



FIGURE 5-9 - REINSTALLING THE FANS STEP 1

- 2) Connect both fan cables to the backplane.

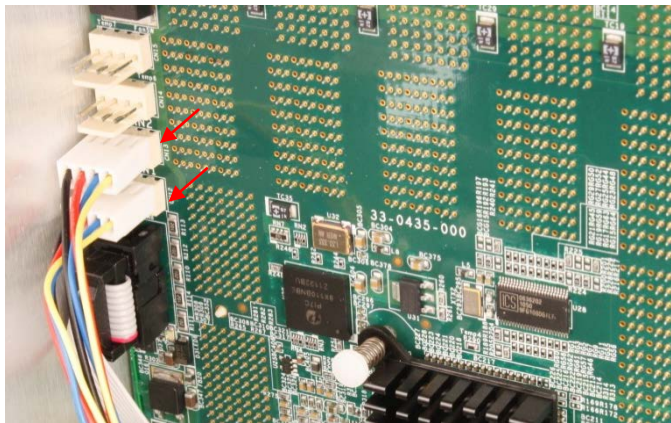


FIGURE 5-10 - REINSTALLING THE FANS STEP 2

- 3) Attach the fan panel to the chassis using the 7 appropriate screws.



FIGURE 5-11 - REINSTALLING THE FANS STEP 3

- 4) Attach the power supply to the power supply panel by using the 2 appropriate silver screws and washers.



FIGURE 5-12 - REINSTALLING THE POWER SUPPLY STEP 4

- 5) Connect all three cables from the power supply to the backplane.

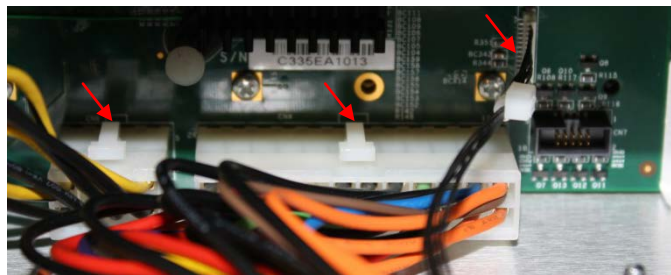


FIGURE 5-13 - REINSTALLING THE POWER SUPPLY STEP 5

- 6) While sliding the power supply into the chassis, make sure that the cables are not damaged by the case and that they are properly routed to the small cutout in the case. If the power supply does not slide smoothly into the case, loosen the star screws on both sides of the case.
CAUTION Improperly routing the cables and forcing the power supply back into the chassis could permanently damage the cables.



FIGURE 5-14 - REINSTALLING THE POWER SUPPLY STEP 6

- 7) Once the power supply is fully inserted, attach the power supply panel to the chassis using the 8 appropriate screws.



FIGURE 5-15 - REINSTALLING THE POWER SUPPLY STEP 7

Cleaning the Air Filter

- 1) Locate the long grated panel on the front of the chassis and remove both screws which affix the grated panel to the chassis.

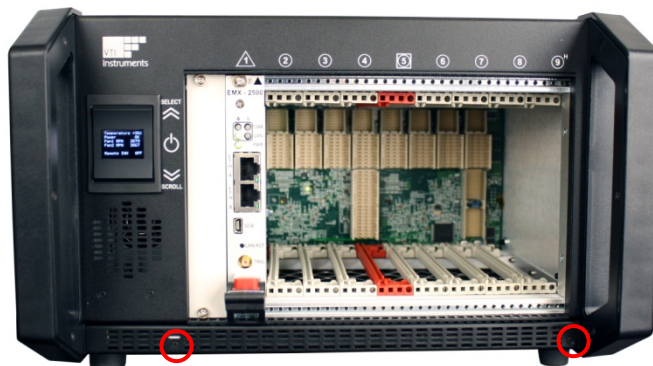


FIGURE 5-16 - CLEANING THE AIR FILTER STEP 1

- 2) Using the tabs on the air filters, slide the air filters out of the chassis.
- 3) The air filter may be cleaned with water or compressed air. If water is used, be sure to let the air filter dry completely before reinstalling it. Contact VTI in order a replacement air filter if unable to be sufficiently cleaned.
- 4) Once the air filter is clean, slide it back into the chassis.
- 5) Reaffix the long grated panel to the chassis using the appropriate screws.

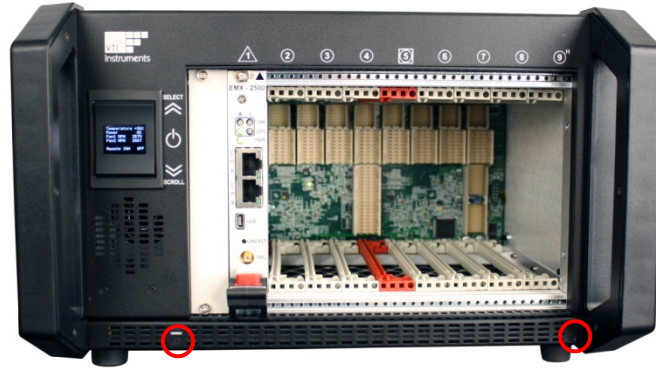


FIGURE 5-17 - CLEANING THE AIR FILTER STEP 2

TEMPERATURE DETECT

If the system is exceeding the maximum programmed temperature (default maximum temperature is 90°C) then the temperature on the 'Temperature' on the 'Main Status Screen' will read: 'FAIL'. The 'Temperature Screen' will have exclamation marks following the temperatures which are exceeding the maximum temperature with their respective sensor. The chassis is allowed to exceed the maximum temperature of 90°C for 15 minutes after which it will immediately shut down. If the chassis reaches 100°C at any point, the chassis will immediately shut down.

HANDLING THE CHASSIS AND CABLES

The CMX-09 features two robust handles in order to be as portable as possible. The handles are designed to support the full weight of the chassis and it is strongly recommended that both handles are used during transportation.



All cables must be handled with care. The power supply cables run tightly against the frame of the chassis when routed to the backplane; therefore the user must exercise extra care when inserting the power supply into the chassis to prevent pinching or tearing of the cables. Caution must also be exercised when removing the fans or power supply from the chassis since they are connected to the backplane. Forcing the fans or power supply out of the chassis without disconnecting their respective wires can seriously damage the backplane and/or destroy the wiring.

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