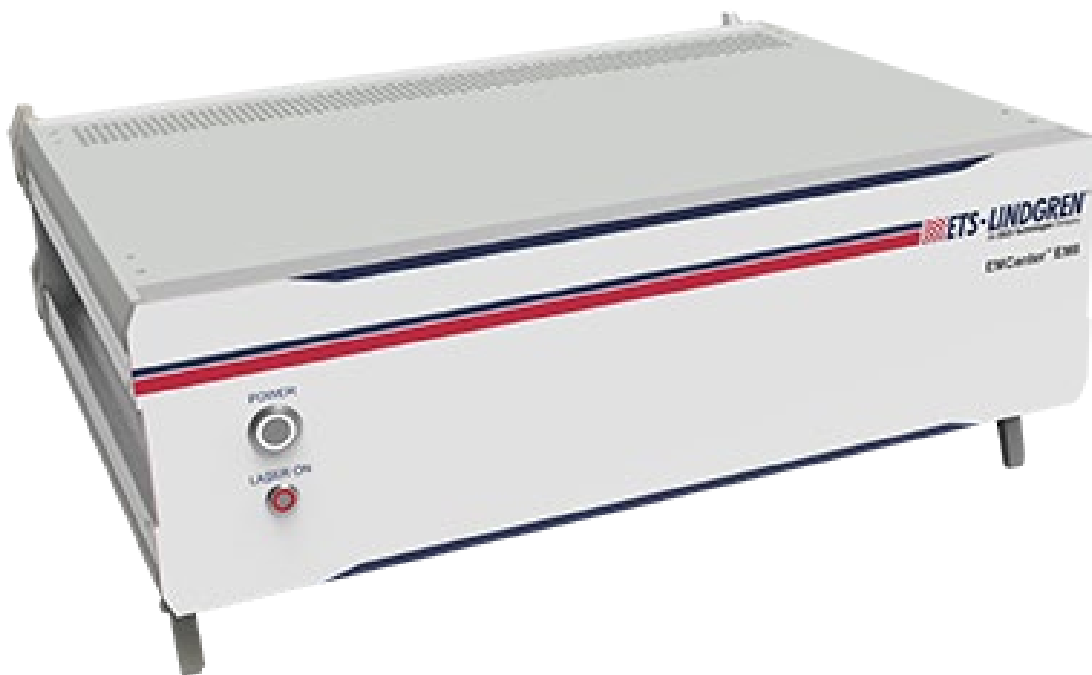


# **EMCenter™ EM8 Modular Test System**

## **Model 7000-013**

### **Product Manual**



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## Revision Record

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### MANUAL, EM8 | Part #1788365, Rev. A

Revision	Description	Date
A	Initial Release	FEB, 2024

## Safety Information

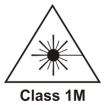
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**High Voltage:** Indicates presence of hazardous voltage. Unsafe practice could result in severe personal injury or death.



**Protective Earth Ground (Safety Ground):** Indicates protective earth terminal. You should provide uninterruptible safety earth ground from the main power source to the product input wiring terminals, power cord, or supplied power cord set.



**Laser Warning:** Denotes a laser (class 1M) is part of the operating system of the device.



**Waste Electrical and Electronic Equipment (WEEE) Directive:** (European Union) At end of useful life, this product should be deposited at an appropriate waste disposal facility for recycling and disposal. Do not dispose of with household waste.

## Notes, Cautions, and Warnings

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**Note:** Denotes helpful information intended to provide tips for better use of the product.



**CAUTION:** Denotes a hazard. Failure to follow instructions could result in minor personal injury and/or property damage. Included text gives proper procedures.



**WARNING:** Denotes a hazard. Failure to follow instructions could result in SEVERE personal injury and/or property damage. Included text gives proper procedures.

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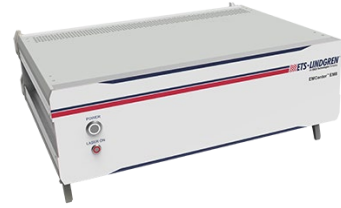
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## Introduction

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ETS-Lindgren's EMCenter™ EM8 is the latest member of the EM family of products capable of significantly higher data collection speeds.

The EMCenter™ EM8 Modular Test System forms the heart of many different EMC and RF test systems. The EMCenter has the ability to store up to eight (8) instrument plug-in cards, which can all be controlled and used simultaneously. The 1 Gigabit LAN interface, providing some of the fastest acquisition in the industry, makes the EMCenter EM8 the ideal hardware platform for applications requiring multiple channels and fast measurements, like automotive mode-stir (reverberation chamber) testing or switching applications.



## Product Features

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- Fast Measurements
  - The EMCenter EM8 is equipped with a 1 Gigabit LAN interface. Each instrument that is installed in the eight slots can be directly controlled at a designated IP address, allowing for fast measurement throughout.
- Laser safety
  - The EMCenter EM8 is equipped with a laser ON/OFF switch to prevent accidental operation and/or starting the laser power supply of the EMSense™ probes.
- Flexible
  - Each of the eight slots can be configured by the user, allowing any combination of plug-in cards. All cards can be commanded and operated using TILE! software.
- Scalable
  - The EMCenter can be scaled using a wide array of available plug-in cards including:
    - EMSense™ LASER powered E-Field Sensors
    - EMField™ Integrated EMC Immunity Test Solution
    - EMPower™ RF power meters for EMC application
    - EMGen™ RF signal generators
    - EMSwitch™ for switching one, two, four or six RF signal

## 8-Slot Example Application

The international standard ISO11451-5 vehicle test methods for electrical disturbances from narrowband radiated electromagnetic energy – part 5: reverberation chamber describes the measurement of E-fields at eight reference points as part of the immunity test in a reverb chamber.

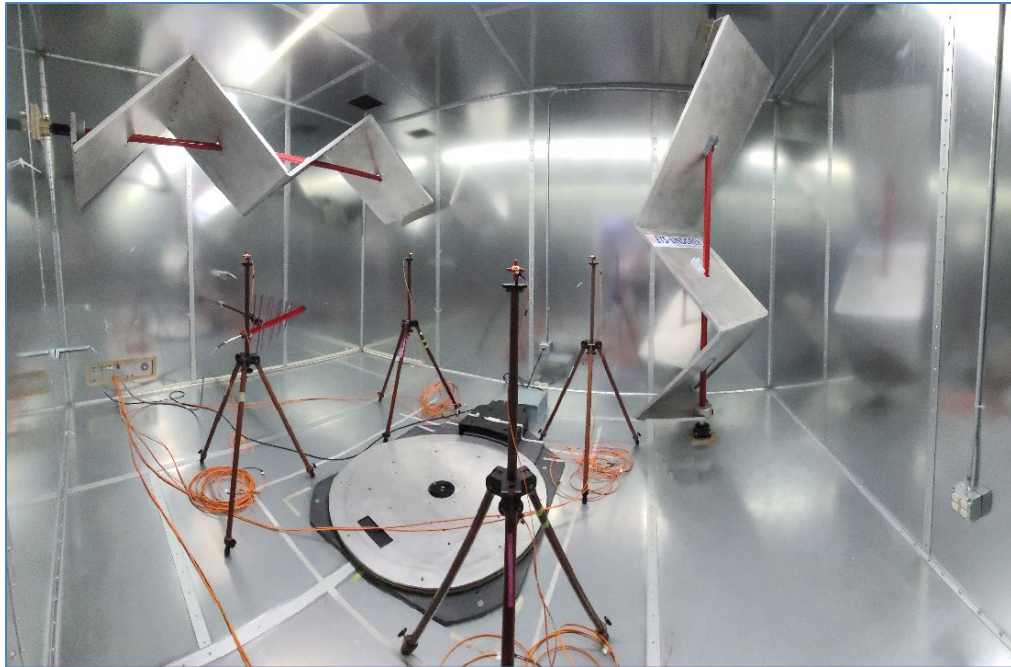
For this application, the EMCenter EM8 can be configured with eight EMSense laser powered E-field probes, allowing the fast and accurate measurement of the isotropic field strength within the working volume of the chamber. Utilizing multiple switches, the EMCenter EM8 allows for simultaneous communication, increasing the rate of switch state changes and reducing test lag time.



Figure 1: EM8 Front



Figure 2: EM8 Back



**Figure 3: Probes inside the chamber connected to the EM8**

**Instruments**

Name	Module	Type	Bd	Addr	Driver	Version	Serial Number	Cal Date	VISA
Tuner	ETS-Lindgren EMCenter EMControl Controller Module	Controller	VISA		ETS_EMControl.ins	7.9.0.3	00123838	N/A	EMCenter
SG	Agilent N518X Series Signal Generators	Signal Generator	VISA		ag_n518x.ins	7.9.0.3	N/A	N/A	MXG
Amp	ETS-Lindgren 8100 Series Amplifier	Amplifier	VISA		ETS_8100_Amp_Series.ins	7.9.0.3	Unknown	Unknown	8100-002
Probe_1	ETS-Lindgren EMCenter EMSense 10/40 Probe Module	Probe	VISA		ETS_EMSENse10.ins	7.9.0.3			EM8_S1_EMSENse
Probe_2	ETS-Lindgren EMCenter EMSense 10/40 Probe Module	Probe	VISA		ETS_EMSENse10.ins	7.9.0.3			EM8_S2_EMSENse
Probe_3	ETS-Lindgren EMCenter EMSense 10/40 Probe Module	Probe	VISA		ETS_EMSENse10.ins	7.9.0.3	Unknown	Unknown	EM8_S3_EMSENse
Probe_4	ETS-Lindgren EMCenter EMSense 10/40 Probe Module	Probe	VISA		ETS_EMSENse10.ins	7.9.0.3	Unknown	Unknown	EM8_S4_EMSENse
Probe_5	ETS-Lindgren EMCenter EMSense 10/40 Probe Module	Probe	VISA		ETS_EMSENse10.ins	7.9.0.3	Unknown	Unknown	EM8_S5_EMSENse
Probe_6	ETS-Lindgren EMCenter EMSense 10/40 Probe Module	Probe	VISA		ETS_EMSENse10.ins	7.9.0.3	Unknown	Unknown	EM8_S6_EMSENse
Probe_7	ETS-Lindgren EMCenter EMSense 10/40 Probe Module	Probe	VISA		ETS_EMSENse10.ins	7.9.0.3	Unknown	Unknown	EM8_S7_EMSENse
Probe_8	ETS-Lindgren EMCenter EMSense 10/40 Probe Module	Probe	VISA		ETS_EMSENse10.ins	7.9.0.3	Unknown	Unknown	EM8_S8_EMSENse
PM_1	ETS-Lindgren EMCenter EMPower Power Meter Module	Power Meter	VISA		ETS_EMPower.ins	7.9.0.3	N/A	N/A	COM3
PM_2	ETS-Lindgren EMCenter EMPower Power Meter Module	Power Meter	VISA		ETS_EMPower.ins	7.9.0.3	N/A	N/A	COM4

**Reverberation Test**

Freq: 223.13 MHz Step: 12 of 163 Positioner 1 Target: 147.9

Target Amplitude: -40.00 Desired Field: 50.00 V/m Current: 41.8

Power Meter: 22.45 Sig Gen: -40.00 dBm Power: 0 Cycle: 253.9

Trial #: 2

Probe Max: 51.31 V/m

Modulation: ☒ Off ☐ On

Test Mode: ☒ Load ☐ Test

Probe Cycle: ☐ Off ☒ On

Step Size: 1.0   ☒ Auto Level

Probe Combined

Probe RMS: 89.92 V/m Required Readings: 200

Probe X - Max: 56.15 V/m Acquired Readings: 332

Probe Y - Max: 40.16 V/m Cycle Time: 4.6

Probe Z - Max: 57.61 V/m Readings/Sec: 71.6

Spacebar to Pause/Run

Properties | Data | Instruments | Log | Graph: Probe Max for X,Y,Z

Running LoadTest Errors: 0, Warnings: 0 00:03:31 14:06:46

**Figure 4: ISO11451-5 vehicle test of EM8 in TILE!**

# Operation

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## Installation

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**CAUTION:** Before connecting any components, follow the safety information in the ETS-Lindgren *Product Information Bulletin* included with your shipment.



**WARNING:** Always unplug the unit before starting maintenance to prevent electrical shock. Maintenance includes removal of the plug-in cards or the top panel.



**CAUTION:** Leave an empty slot or space 1U in height beneath the EMCenter to allow sufficient cooling through the bottom air inlets of the cabinet.

## Changing Plug-In Cards

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1. Before installing and inserting a new plug-in card make sure that the EMCenter is turned OFF and disconnect the AC Mains power cord.
2. Determine in which empty slot of the EMCenter you want to install the Plug-in Card. Looking at the back of the EMCenter, the slots are numbered 1 through 8 from left to right.
3. Remove the blank panel from the slot by removing the two screws at the top of the blank panel and the two screws at the bottom. Be careful not to lose the screws.
4. Carefully insert the card into the slot of the EMCenter. Position the plug-in card into the slot and slowly push it, using the lower part of the plug-in card. When it reached the end of the rail, gently push and lock the plug-in card into the backplane socket.

5. Secure the card by tightening the four previous screws using a Pozi type screwdriver head PZ1.
6. Plug the interlock into the connector on the back of the EMCenter.
7. Connect the desired device(s) to the correct plug-in card.
8. Connect the EMCenter to a computer using Ethernet.
9. Re-connect the AC mains power cord and turn ON the EMCenter. It can now be started by tapping the touch screen. The EMCenter will automatically detect the newly installed card.
10. The card installation is complete and the EMCenter is now ready for use. You can control the cards by sending [remote commands](#).

## Interface and Cable Setup

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**CAUTION:** Never disconnect the fiber optic cables when one of the lasers is active.



**CAUTION:** Before placing into operation, follow the information provided in Safety Information on page v.



**CAUTION:** Prior to operation, verify that the mains voltage is within the operating range of the equipment.

## Front Panel

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## Power Button

How long you press the power button determines which function is used:

- ON/OFF (1 sec)
  - To power ON the EM8, press and hold the power button for one second until the LED ring around the button lights up in white. After a brief moment, the LED ring will begin flashing, indicating the booting process. Once the LED stops flashing and continues to burn steadily, the EM8 is now ready for use.
  - To power OFF the EM8, press and hold the power button one second until an audible beep is heard. After a brief pause, the LED ring will initiate flashing, signaling the shutdown process. Once the LED ceases flashing and turns off, the EM8 is fully powered down.
- Reset IP addresses to default (10 secs)
  - While the EM8 is in normal operation, hold the power button for about 10 seconds. Release the button within two seconds after the two short audible beeps to initiate the reset of the IP addresses to their default values.
  - **NOTE:** It is important not to continuously press the button, as doing so will prevent the IP address reset.
- Full Factory reset
  - In the event of lost credentials or the need for reconfiguration of the EM8, a reset to default settings is possible. Factory Reset includes default IP addresses, default software version, default password.
  - To perform a factory reset, follow these steps:
    1. Begin by shutting down the EM8.
    2. Turn off the mains power, wait for 20 seconds, and then turn the power back on.
    3. Hold the power button for approximately 30 seconds. Release the button immediately after hearing two short audible beeps.
    4. It's crucial not to keep pressing the button, as this will prevent the factory reset. Releasing the button within two seconds after the two beeps will execute the factory reset.

## LASER Button

When the EM8 is equipped with plugin cards, including one or multiple plugin cards containing lasers, the LASER ON button takes on a critical role. Its primary function is to activate the lasers safely simultaneously on all installed plugin cards.

To maintain safety standards, initiating the laser power in the plugin cards follows a twostep process: entering a designated 'laser code' and manually activating the lasers.

- To activate the laser(s) in the EM8, follow these steps:
  1. Press the 'Laser ON' button on the front of the EM8 and hold it.
  2. Five loud 'beep' sounds should be heard.
  3. On the fifth 'beep,' the laser source is activated, and the red LED ring around the button lights up.
  4. Release the 'Laser ON' button.
- This means that:
  - If the activation process is to be interrupted, release the 'Start' button (before the fifth 'beep'). The laser will not be activated.
  - If the activation process is interrupted (and released 'Start' button by accident), the laser will not be activated.
  - The user is warned by an audible warning when the start button is pressed by accident (i.e., without the intention to activate the laser).
- To deactivate the lasers, press the laser-on button once, and all lasers will be powered off.
- **NOTE:** If an error occurs with one of the laser plugin cards, an audible beep will notify you. To resolve this error, simply press the laser on button briefly. This action will clear the error, and the plugin card will stop beeping.

## Back Panel



## Mains

Plug the power supply cable into the mains inlet of the EM8, power the system by toggling the mains switch located beneath the mains inlet.

## Ethernet

There is no display, so everything is controlled exclusively via the Ethernet connection. Therefore, an Ethernet cable must be connected to the rear of the EM8 and your network for proper functionality.

- The box itself a LAN address to change the system settings.
- Each slot can have its own LAN address and therefore be regarded as its own instrument.

## Interlock Plug



The EM8 uses a hardware interlock plug (6,3mm ¼" stereo jack) which can be used as a safety interlock. The hardware interlock plug provides two floating contacts which require connection for certain plugin cards to operate.

By default, the supplied interlock plug is shorted and must be inserted into the interlock input at the back side of the EM8. When a safety interlock is required in your system, please cut the RED wire, and connect the open ends to your interlock system.

## Network configuration

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The EM8 is factory configured with standard static Ethernet addresses:

Slot number	IP Address	Port number
<b>EM8 system</b>	192.168.1.200	80
<b>Slot 1</b>	192.168.1.201	27531
<b>Slot 2</b>	192.168.1.202	27531
<b>Slot 3</b>	192.168.1.203	27531
<b>Slot 4</b>	192.168.1.204	27531
<b>Slot 5</b>	192.168.1.205	27531
<b>Slot 6</b>	192.168.1.206	27531
<b>Slot 7</b>	192.168.1.207	27531
<b>Slot 8</b>	192.168.1.208	27531
<b>Subnet address</b>	255.255.255.0	-

## Remote Control

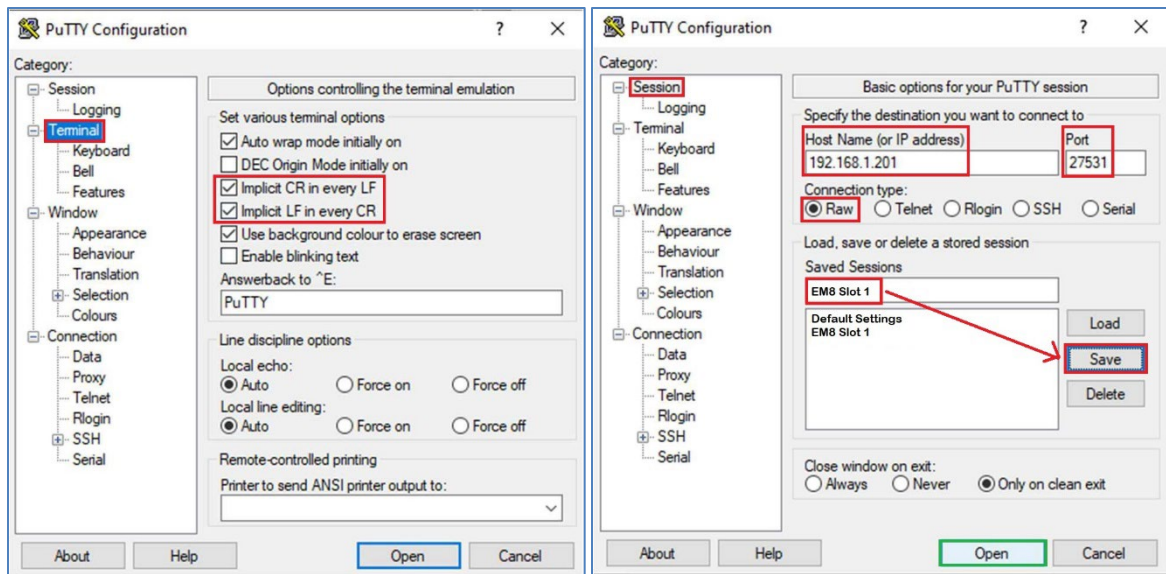
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To use the EMCenter remote commands, read the [manual document 399342](#) **EMCenter** for examples and a full command list.

### EXAMPLE: Connect Via PuTTY

If you want to establish a raw connection without specifying a particular protocol in PuTTY, you can follow these steps:



1. Open PuTTY.
2. On the left menu select **"Terminal"**:
  - a. Enable **"Implicit CR in every LF"** and **"Implicit LF in every CR"** to automatically send a Carriage Return after every Line Feed and vice versa.
3. On the left menu select **"Session"**:
  - a. Enter the IP address "192.168.1.201" in the "Host Name (or IP address)" field.
  - b. In the "Port" field, enter "27531" as the port number for the default configuration.
  - c. Under "Connection type," choose the "Raw" option.
  - d. Under "Saved Sessions," enter a name for your session in the "Saved Sessions" field (e.g., "EM8 Slot 1").
  - e. Click the "Save" button to save your configuration.
  - f. Click the "Open" button to start the raw connection.

The provided configuration enables a raw connection without specifying a particular protocol, facilitating direct interaction with the plugin card in an unprocessed manner. This setup allows for the transmission of commands and reception of responses from the plugin card. Specifically, each plug-in card supports the command **"\*IDN?"** for retrieving its identification information. When the configuration and connection are correct, issuing this command to the plug-in card will prompt it to return the identifier string (ID) associated with the plug-in card.

## Specifications

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### Physical Specifications

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<b>Height:</b>	132 mm (5.2 in)(3U)
<b>Width:</b>	19 in rack mountable
<b>Depth:</b>	312 mm (12.3 in) excluding rear panel
<b>Weight:</b>	~15.4 lbs. (7kg) empty

### Environmental Specifications

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<b>Temperature Range:</b>	0°C to 40°C (32°F to 104°F)
<b>Relative Humidity:</b>	5% to 95% (non-condensing)

### Power Specifications

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<b>Supply Voltage:</b>	115/230 VAC
<b>Power Consumption:</b>	<ul style="list-style-type: none"><li>• <b>Standby:</b> &lt; 3 W</li><li>• <b>Empty:</b> 33 W</li><li>• <b>Max load:</b> 225 W</li></ul>

### Interface and Cable Specifications

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<b>Backplane</b>	<ul style="list-style-type: none"><li>• Ethernet</li><li>• 6.35mm (1/4") jack</li><li>• Fused and switched IEC 320 C13 socket</li><li>• 8 blanking plates (replace with plug in cards)</li></ul>
<b>Cables:</b>	IEC power cord
<b>Interfaces:</b>	LAN
<b>Interlock:</b>	6.35 mm jack plug connection to safety disables interlock & interlocked laser outputs when triggered
<b>Mounting:</b>	Desktop or 19-in rack mountable
<b>Slots:</b>	8 modular card slots

## Appendix A: EC Declaration on Conformity

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ETS-Lindgren Inc. declares these products to be in conformity with the following standards and provisions:

**Product Models:**     **EMCenter Modular RF Platform**

**Directives:**    EMC Directive 2014/30/EU  
                      Low Voltage Directive 2014/35/EU  
                      RoHS Directive: 2015/863/EU

**Emission:**     EN 61326-1:2013, Class A1  
                      Electrical equipment for measurement, control and laboratory use.

**Immunity:**     EN 61326-1:2013, Industrial level, performance criteria A  
                      Electrical equipment for measurement, control and laboratory use.

**Safety:**        EN 61010-1:2010, Safety requirements for electrical equipment  
                      for measurement, control, and laboratory use.

**RoHs:**         EN 63000:2018, Technical documentation for the assessment of electrical and  
                      electronic products with respect to the restriction of hazardous substances.

Technical Construction Files are available upon request.