Model 7008 Series

EMField™ Generator

User Manual

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Revision Record

MANUAL,EMFIELD GENERATOR | Part #399396, Rev. A

Revision	Description	Date
A	Initial Release	September, 2015

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Notes, Cautions, and Warnings

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.

Safety Information

Refer to Manual: When product is marked with this symbol, see the instruction manual for additional information. If the instruction manual has been misplaced, download it from www.ets-lindgren.com, or contact ETS-Lindgren Customer Service.

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.

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.

Note: For warnings and precautions while operating the EMField, see page 19.

1.0 Introduction

The **ETS-Lindgren Model 7008 Series EMField™ Generator** is a unique, integrated solution for Radiated Immunity testing, including IEC/EN 61000-4-3. It combines an amplifier, directional couplers, and an antenna array into one remarkable, simplified design. Almost all of the generated power is converted into useable field strength.

The supporting instrumentation (signal generator, laser probe controller, and EMField power supply) are plug-and-play card modules that insert into the back of the EMCenter™ Modular RF Platform, which is typically placed in the control room.

The EMField is available in a variety of models:

- **Model 7008-001:** 6 GHz, 10 V/M
- **Model 7008-002:** 6 GHz, 3 V/M
- **Model 7008-003:** 3 GHz, 10 V/M
- **Model 7008-004:** 3 GHz, 3 V/M

The EMField is air-cooled. Air is drawn in at the back and blown out along the external cooling ribs, through the side air outlets, and then out of the openings in the foam cones. The cooling system keeps the internal amplifiers at a constant operating temperature. Failure to meet the specified environmental temperature range might result in a too high or too low amplifier temperature.

The power, RF input, and communication connection run through one coaxial cable. This cable is connected at the back to an N-type connector.

The EMField has a standard 1/4–20 UNC-1B thread on the bottom. This can be used to mount on a tripod, antenna tower, or boom mount.

EMField Plug-in Card

The EMField includes a two-slot plug--in card (Model 7008-100) for the EMCenter. It combines power, RF input, and communication within the coaxial cable to the EMField.

The plug-in card has a separate mains input connection to power the EMField. An SMA connector is used for the RF input and an N-type connector for the connection to the EMField.

System Benefits

- **Eliminate Power Loss—**RF power loss is at a minimum, reducing energy consumption and eliminating the need for expensive, high-power amplifiers.
- **Integrated Power Meters—**Eliminates the need for separate external coupler and power meters.
- **Easy to Use—**By using only one coaxial cable for the transport of the RF signal, the communication signals and DC power supply are easy to set up; this saves time and costs, as well as reduces the risk of equipment damage due to incorrect equipment connections.
- **Fully Compliant—**Fully compliant with the international EMC immunity standards. These standards describe aspects such as the frequency, field strength, and homogeneity.
- **High Value for Money—**With the integrated coupler and power meters, is a complete EMC immunity testing setup; in addition, calibrations costs are reduced.
- **EMCenter Integration—**Allows for easy touchscreen operation and several control interfaces such as GPIB, Ethernet, and USB. For more information about the EMCenter, see page 9.

System Safety

The EMField will only be able to power on if all connections are properly made. In addition, the EMField will shut down immediately if the interlock of the EMCenter is triggered.

The start-up procedure consists of three phases that ensure the safe use of the EMField. If the EMField is not connected correctly, or if there is any other irregularities, the safety measures of this startup procedure will be triggered. In each phase the supply power is increased, building up to the DC power needed for normal usage.

1. **Probing Stage—**When the startup command is given to the EMField, a safe probe signal is sent through the coaxial cable to the EMField. If the EMField does not respond correctly to the probe signal, the startup procedure is aborted. This probe signal is harmless to other equipment and will therefore not cause defects to other instruments in case of an incorrect connection.
2. **Communication Stage—**After a successful probing phase, the plug-in card will attempt to communicate with the intelligent backplane of the EMField. If the intelligent backplane does not respond, the startup procedure is aborted.

3. **Final Startup—**When communication is established, the final DC power will be applied on the coaxial cable to power the EMField. The amplifiers in the EMField can now be switched on and are ready to operate.

Standard Configuration

- EMField Generator
- EMField Plug-in Card

EMCenter Modular RF Platform (Required)

The EMCenter Modular RF Platform is required for operation, and is sold separately.

Front Panel

Back Panel

The EMCenter may be controlled from a computer using these software products:

- ETS-Lindgren TILE!™ (Totally Integrated Laboratory Environment)
- ETS-Lindgren EMQuest™ Data Acquisition and Analysis Software
- Other test automation software

Contact ETS-Lindgren for ordering information.

Optional Items

- **Transport Case—**Designed for on-site and facility transports. The EMField must be stored in the transport case when it is shipped between locations. If the transport case is not used, the customer must provide an alternative and equal-or-better method of protection for the EMField.

WARNING: The transport case is designed for short-distance transportation. It does not provide sufficient protection for air travel or other long-distance shipping. Additional or different (protective) packaging is needed in those situations The EMField might be damaged if the transport case is handled in a rough manner.

- **Antenna Stinger Mount Boom—**A custom-made antenna boom can be mounted on the back. It is 50 cm long and has a diameter of 40 mm.

- **Coaxial N-Type Cable—**A coaxial cable is used to connect the plug-in card with the EMField. The coaxial cable needs to be fitted with an N-type connector on both sides. The maximum allowed attenuation of the cable for proper system operation is 10 dB at 6 GHz. The selected cable also needs to be able to handle a DC current of 8 amps.

Service Procedures

Contacting ETS-Lindgren

Note: Please see www.ets-lindgren.com for a list of ETS-Lindgren offices, including phone and email contact information.

Sending a Component for Service

1. Contact ETS-Lindgren Customer Service to obtain a Service Request Order (SRO).

2. Briefly describe the problem in writing. Give details regarding the observed symptom(s) or error codes, and whether the problem is constant or intermittent in nature. Please include the date(s), the service representative you spoke with, and the nature of the conversation. Include the serial number of the item being returned.

3. Package the system or component carefully. If possible, use the original packing materials or carrying case to return a system or system component to ETS-Lindgren.

CALIBRATION SERVICES

- **Annual Calibration—**For reliable and repeatable long-term performance, annual recalibration of your measuring device by an ETS-Lindgren experienced technician is recommended. The ETS-Lindgren calibration team will calibrate most any type or brand of measuring device. Additional information is available at www.ets-lindgren.com.

- **Calibration Services Plus!™—**Calibration Services Plus! is a customized, optional program to help you expertly maintain your test and measurement assets. It is designed to address the challenges of managing the calibration and repair of test and measurement components, including scheduling and planning to ensure peak performance. Additional information is available at www.ets-lindgren.com.

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2.0 Specifications

Power Specifications

Supply Voltage:	115 VAC / 230 VAC
Max Power Consumption:	• **7008-001:** 400 W • **7008-002:** 300 W • **7008-003:** 300 W • **7008-004:** 200 W

Performance Specifications

	7008-001	**7008-002**	**7008-003**	**7008-004**
Frequency Range:	1 GHz – 6 GHz	1 GHz – 6 GHz	1 GHz – 3 GHz	1 GHz – 3 GHz
TME Field*:	10 V/m	3V/m	10 V/m	3V/m
Input Connector:	N-Type			
Max Input Power to Reach TME Field:	0 dBm			
Number of Internal Power Meters:	2 (Forward & Reflected)			
Power Meter Type:	Integrated EMPower			
Directional Coupler:	Integrated			

* Three Meter Equivalent (TME) Field: 1.5m x 1.5m homogeneous field @ 3m according to IEC 61000-4-3

Safety Specifications

Safety Circuit:	Safe start & shutdown
Cable (Dis)connect:	Intrinsically safe
Voltage:	50 VDC (Safe Voltage)
Interlock:	Hardware interlock

Physical Specifications

Connections:	Tripod mount, 1/4–20 UNC Thread
Length:	860 mm (33.8 in)
Width:	250 mm (9.8 in)
Height:	250 mm (9.8 in)
Weight:	• **7008-001:** 11 kg (24.2 lb) • **7008-002:** 10 kg (22.0 lb) • **7008-003:** 10 kg (22.0 lb) • **7008-004:** 9 kg (19.8 lb)

Environmental Specifications

Temperature Range:	10ºC – 40ºC (50ºF – 104ºF)
Relative Humidity:	10% – 90% (non-condensing)

3.0 Installation

CAUTION: Before connecting any components, follow the information provided in *Safety Information* on page vi.

Plug-In Card Installation

CAUTION: The EMField plug-in card requires a protective earth connection. The mains power source for the equipment must supply an uninterrupted safety ground to the IEC input connector.

Note: Due to the width of the EMField plug-in card, two consecutive empty slots are required for installation.

1. Determine in which empty slot(s) in the EMCenter™ Modular RF Platform you want to install the EMField™ Plug-in Card. Looking at the back of the EMCenter, the slots are numbered 1 through 7 from left to right.
2. 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
3. Carefully insert the EMField card into the slot(s) of the EMCenter. Tighten the four screws.
4. Turn on the EMCenter. The EMCenter will automatically detect the newly-installed EMField card.
5. Depending on the test setup requirements, connect coaxial cables to the relay connections on the back panel of the EMCenter.
6. Connect the EMCenter to a personal computer using USB, RS 232, Ethernet, or IEEE (optional).
7. Plug the interlock into the connector on the back of the EMCenter.

   The card installation is complete. You can control EMField through the EMCenter touchscreen, with ETS-Lindgren TILE!™ (Totally Integrated Laboratory Environment), ETS-Lindgren EMQuest™ Data Acquisition and Analysis Software, and other test automation software packages. Contact ETS-Lindgren for additional information.

Hardware Configuration

The hardware configuration is carried out in the following steps:

1. Make sure that all connections to the plug-in card are made:

   Connect a suitable N-type coaxial cable from the plug-in card to the Model 7008 Series EMField Generator and connect a coaxial cable from a RF signal generator to the RF input of the plug-in card.

   Please note that the maximum field is reached at an input power between -10 dBm and 0 dBm, depending on the frequency response and attenuation of the N-type cable used.

2. Make sure that the remote interlock connection of the EMCenter is closed.

3. Plug the mains cords into the mains inlet of the EMCenter and the mains inlet of the plug-in card.

4. Switch the main power switches on both mains inlets to the ON position.

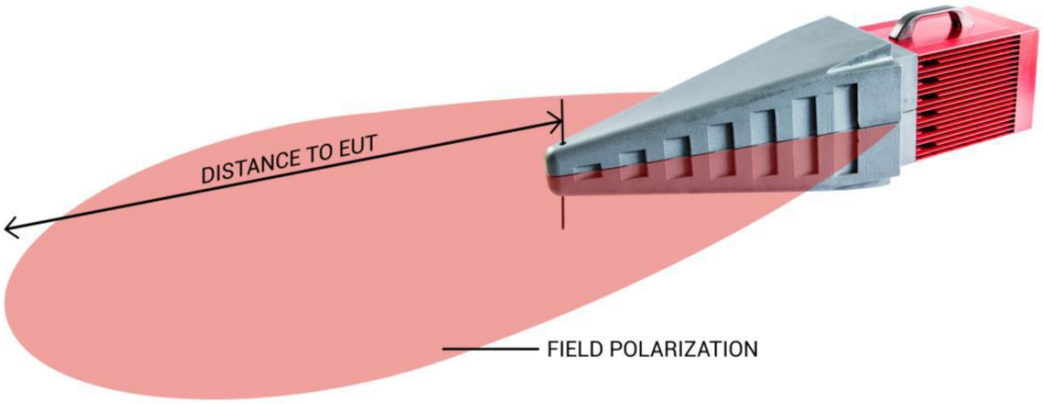
5. Touch the touchscreen on the front panel of the EMCenter to activate the EMField.

   The system is now ready to be used.

Field Polarization and Reference Point

In order to perform radiated immunity measurements, standards require a certain distance from the field generating antenna to the Equipment Under Test (EUT). In most immunity setups the tip of the transmitting antenna is used to determine the distance to the EUT. Since the actual antenna of the EMField is not visible, a small hole in the nose of the is used as a reference point to determine this distance.

For most test setups it is also necessary to know the polarization of the field generated by the antenna.



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4.0 Operation

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

Operations: Warnings & Precautions

CAUTION: Never use the EMField without a protective earth connection.

CAUTION: Please make sure that the airflow through the in- and outlets of the EMField are not restricted to maintain a constant temperature. The cooling system is designed to operate in the specified operating temperature range.

CAUTION: Verify that your mains voltage is within the operating range of the equipment.

CAUTION: To maximize safety, the EMField will only power on when all connections are properly made.

In addition, the EMField will shut down if the interlock of the EMCenter is triggered.

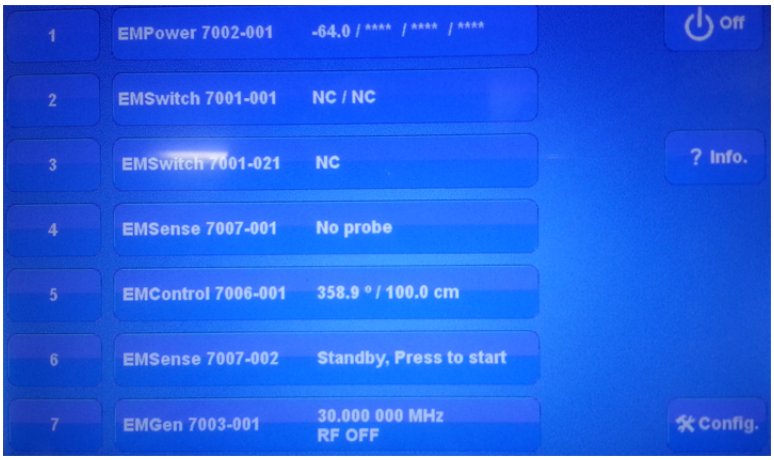
CAUTION: Please use a suitable coaxial cable to connect the PSU plug-in card with the EMField: fitted with an N-type connector on both sides, maximum allowed attenuation of 10dB at 6GHz and able to handle a DC current of 8 amps.

Note: For information on using the EMCenter touchscreen, see the *EMCenter Modular Test System User Manual*.

POWER ON

Note: Verify all cards are installed correctly in the EMCenter.

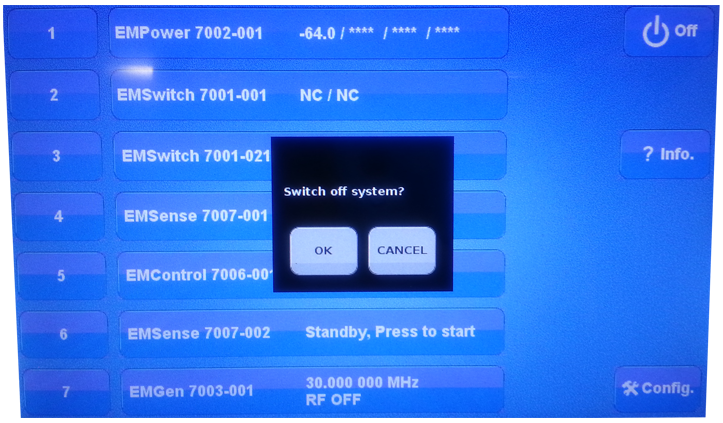
1. Plug the power cord from the mains inlet on the back panel of the EMCenter™ Modular RF Platform into a power outlet.
2. Plug the interlock jack into the interlock connector on the back panel of the EMCenter.
3. Turn the power switch located on the back panel of the EMCenter to the on position.
4. Touch anywhere on the EMCenter screen. It will take approximately 20 seconds to boot. The Information screen will flash, and then the Home screen will display.



Sample EMCenter Home Screen

POWER OFF

1. Press the Off button located on the EMCenter screen.



2. Press OK to switch off the system.

   The standby light located on the front panel of the EMCenter will flash, and then will illuminate steadily.

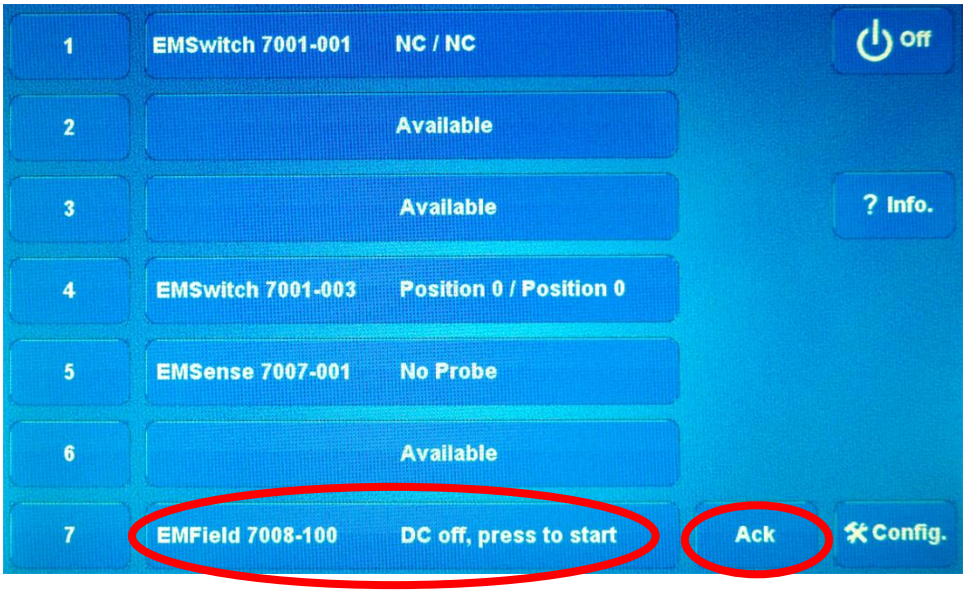
Note: When the EMCenter is in standby mode, touch the screen anywhere to reboot.

3. Turn the power switch located on the back panel of the EMCenter to the off position.

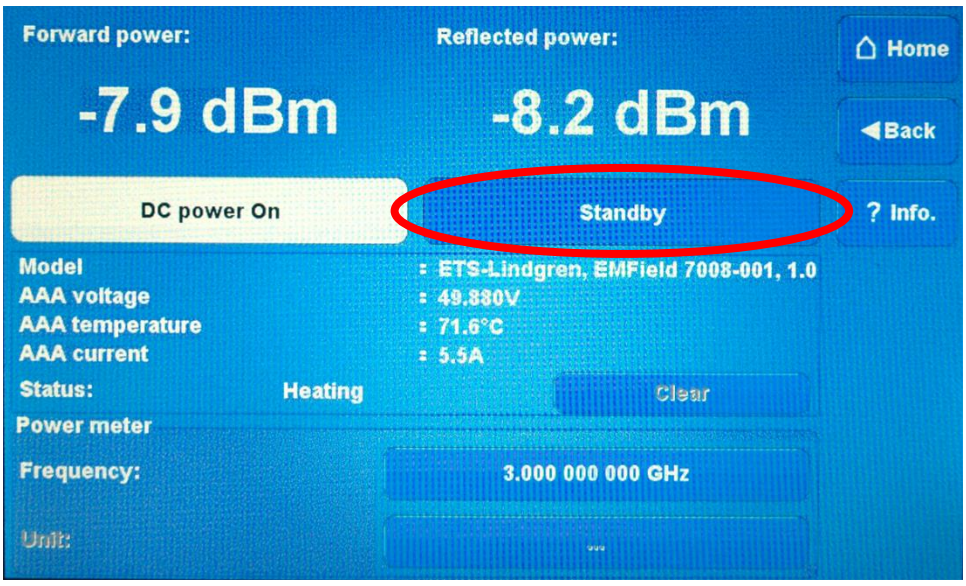
4. Remove the power cord from the power connector on the back panel of the EMCenter.

5. Remove the interlock jack from the interlock connector on the back panel of the EMCenter.

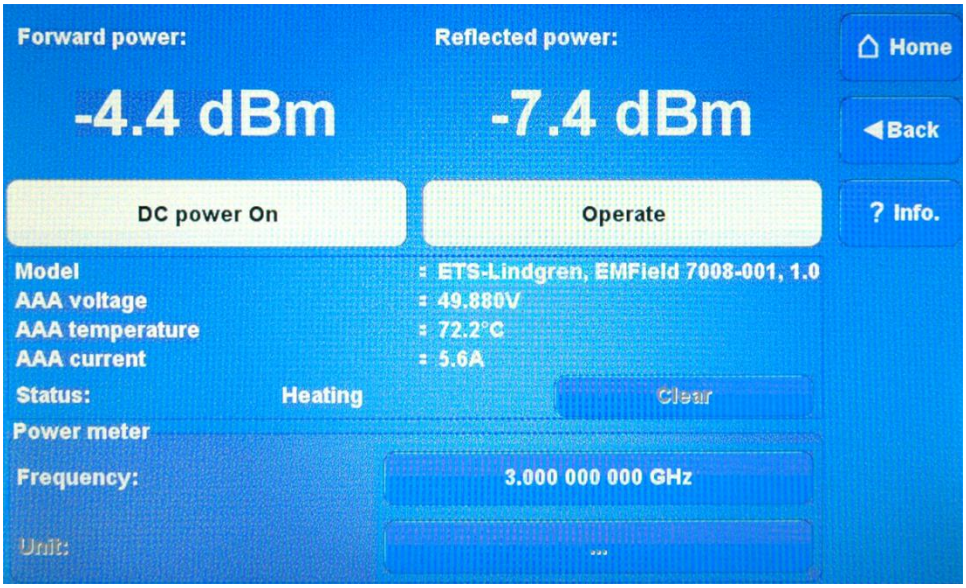
Once the EMCenter is switched on, the Model 7008 Series EMField™ Generator can be activated from the main screen.



By pressing the status-button proceeded by the Ack-button, the start-up procedure of the EMField will begin. Once this procedure has been completed successfully, the amplifiers in the EMField will be powered.



The system is now heating up to its final temperature of 75°C. It will be ready to be switched to operate once it has reached a temperature above 50°C.



In the EMField control screen, the parameters of the system can be read. In order to generate an EM-field, the system must be switched to operate. It is important to enter the frequency of the generator driving the EMField to read the correct power meter level. Entering the actual frequency will automatically correct for the frequency dependent coupler and power meter response inside the amplifiers.

Normal operating parameters are:

- **Amplifier temperature:** 75°C +/- 5°C
- **EMField DC voltage:** +50Vdc
- **EMField current:** 5 to 8 A max

Remote Control of the EMField

The EMField can be controlled remotely through the interfaces of the EMCenter. The exact communication protocol can be found in the *EMCenter Modular Test System User Manual*. The specific commands for the EMField begin on page 25.

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5.0 EMField Command Set

Commands

GENERAL COMMANDS

Command	Description / Response
ID_NUMBER?	Returns unique identifier number. Reply (for example): ‘1.58.95.146.21.0.0.124’
LOCAL	Return to local mode, the local display is used to set items. Reply: ‘OK’
VERSION_HW?	Returns the hardware version. Reply (for example): ‘2’
*IDN?	Returns the ID of the system. Reply (for example): ‘ETS-Lindgren, EMField 7008-100, x.x.x’
RESET	Reset the module. This will: • Clear all errors • Clear all occurred crowbars • Reset the filter to filter 1 • Reset the frequency to 3 GHz • Set the amplifier to standby mode, if this fails an error is replied Reply: ‘OK’ or error code
CLEAR	All errors are cleared and crowbars are reset. Reply: ‘OK’
MAINS?	Get the state of the mains. Reply: ‘1’ = ON Reply: ‘0’ = OFF
MAINS<space><value>	Turn the main power ON or OFF. <value> = ‘ON’ or ‘OFF’ Reply: ‘OK’ or error code
STANDBY	Set the EMField in the standby mode. (FETs are biased). Reply: ‘OK’ or error code

Command	Description / Response
OPERATE	Set the EMField in the operate mode (RF path opened). Reply: ‘OK’ or error code
MODE?	Returns in which mode the EMField is. Reply (for example): ‘Operate’
CURRENT?	Returns the current measured by the plug-in card (in ampere). Reply (for example): ‘1.2’
TEMP?	Returns the temperature (in degrees Celsius). Reply (for example): ’23.6’

Command	Description / Response
STATUS?	Returns a number which indicates what kind of error is occurred. This includes the following replies: • ‘0’ = No error • ‘1’ = 3.3V error • ‘2’ = 5V error • ‘4’ = 10V error • ‘8’ = -10V error • ‘16’ = 50V error • ‘32’ = current driver 3 error • ‘64’ = current final error • ‘128’ = temperature error • ‘256’ = power error • ‘512’ = driver fet adjustment error • ‘1024’ = final fet adjustment error • ‘2048’ = Oven too cold • ‘4096’ = Oven too hot • ‘8192’ = memory error • ‘16384’ = driver vGate min limit • ‘32768’ = driver vGate max limit • ‘65536’ = driver adjustment timed out • ‘131072’ = final vGate min limit • ‘262144’ = final vGate max limit • ‘524288’ = final adjustment timed out Some numbers represent multiple (of the previously mentioned) errors occurring at ones. For example, reply: • ‘3’ = error 1 and 2 = 3.3V and 5V error • ‘5’ = error 1 and 4 = 3.3V and 10V error • ‘6’ = error 2 and 4 = 5V and 10V error • Etc.

POWER METER COMMANDS

Command	Description / Response
POW<value>?	Get measure power level (in dBm). <value> = FWD or RFL. Reply (for example): '-12.34'
FREQUENCY? MIN	Get the minimal frequency (in Hz). Reply (for example): '1000000000'
FREQUENCY? MAX	Get the maximum frequency (in Hz). Reply (for example): '6000000000'
FREQUENCY<space><value>	Set the frequency. <value> = frequency (in Hz), for example: 500000000 Reply: 'OK' or 'ERROR'
FREQUENCY?	Get the frequency (in Hz). Reply (for example): '500000000'
FILTER? MIN	Get the minimal meter filter. Reply (for example): '0'
FILTER? MAX	Get the maximum meter filter. Reply (for example): '7'
FILTER AUTO	Set filter to automatic. Reply: 'OK'
FILTER<space><value>	Set the filter. <value> = 1,2,3,4,5,6 or 7 Reply: 'OK' or 'ERROR'
FILTER?	Get the current filter. Reply (for example): '1'

Error Codes

The following tables show the generic error codes and the product specific error codes for the Model 7008 Series EMField™ Generator. This includes the error codes for the amplifier, backplane, and plug-in card that are part of the EMField system.

GENERIC ERROR CODES

Error Code	Description
1	Wrong command
2	Parameter too high
3	Parameter too low
4	Invalid parameter
5	Buffer overflow
6	Already in progress
7	Parity error

MODULE-SPECIFIC ERROR CODES: AMPLIFIER

Error Code	Description
500	Already in standby
501	Already in operate
502	Already in off
503	Not in standby
504	Hardware failure
506	Out of specification
507	Power measurement, frequency not set
508	Power measurement, over range
509	Power measurement, under range
510	Power measurement, no calibration data
511	No error logs available

Error Code	Description
512	Not for customer! (Null pointer)
513	First send the startup command
514	Already started
515	Regulating FET
516	3V3 out of range
517	5V out of range
518	10V out of range
519	-10V out of range
520	50V out of range
521	Driver current out of range
522	Final current out of range
523	Temperature out of range
524	Power out of range
525	Driver fet adjustment error
526	Final fet adjustment error
527	Going to standby
528	Going to operate
529	Going to off
530	Oven too cold
531	Oven too hot
532	Calibrating busy
533	Power not updated

MODULE-SPECIFIC ERROR CODES: BACKPLANE

Error Code	Description
551	Communication busy
552	Amplifier error
553	Amplifier wrong *IDN
554	Amplifier wrong answer
555	Amplifier time-out
556	Amplifier wrong mode
557	No amplifier connected
558	Received command length are no digits
559	Received command length incorrect

MODULE-SPECIFIC ERROR CODES: PLUG-IN CARD

Error Code	Description
504	Hardware failure
575	Communication busy
576	Communication time-out
577	Power supply already on
578	Power supply off
579	Incorrect impedance
580	Impedance short
581	Impedance open
582	External unit is not connected
583	Unknown error
584	SW update – 50V backplane not off
585	SW update – 50V backplane not on

Error Code	Description
586	SW update – software download not started
587	SW update – sync retries failed
588	SW update – reboot unit failed
589	SW update – amplifier to off mode error
590	SW update – transparent mode on error
591	SW update – transparent mode off error
592	SW update –binary frame error
593	SW update –binary frame header error
594	SW update – binary frame header size error
595	Illegal backplane command length
596	Length error - received command length are no digits
597	Length error - received command length incorrect
598	Mains on sequence error – BPL 50V switch error
599	Mains on sequence error – AMP startup error

Appendix A: Standards

The Model 7008-001 EMField™ Generator is a 10 V/m TME system. In other words: a field generator capable of generating 10 V/m at 3 meter with headroom for 80% AM.

The peak field strength at 3 meter is therefore 18 V/m, resulting in 54 V/m at 1 meter distance.

The tables on the following pages provide an overview of the standards for which the 10V/m TME system can be used:

Standard	Frequency band	Test frequency	Test distance	Test level	Modulation
IEC 61000-4-3 (Basic standard)	1000 – 6000 MHz	-	3 m	10 V/m	AM, 80%, 1 kHz
EN 61326-1 (laboratory equipment)	1400 – 2000 MHz	-	3 m	3 V/m	AM, 80%, 1 kHz
	2000 – 2700 MHz	-	3 m	1 V/m	
IEC 60945 (maritime)	1000 – 2000 MHz	-	3 m	10 V/m	AM, 80% or 400 Hz
IEC 60533 (maritime, electric installations on ships)	1000 – 2000 MHz	-	3 m	10 V/m	AM, 80%, 1 kHz
DNV SFC 2.4 (maritime)	1000 – 2000 MHz	-	3 m	10 V/m	AM, 80%, 1 kHz or 400 Hz
Germanische Lloyd part 1 (maritime)	1000 – 2000 MHz	-	3 m	10 V/m	AM, 80%, 1 kHz or 400 Hz
Lloyd's Register TSN1 (maritime)	1000 – 2000 MHz	-	3 m	10 V/m	AM, 80% or 400 Hz
Veritas Section 6 (maritime)	1000 – 2000 MHz	-	3 m	10 V/m	AM, 80%, 1 kHz or 400 Hz

Standard	Frequency band	Test frequency	Test distance	Test level	Modulation
EN 12016 (lifts, escalators)	1429 – 1516 MHz	-	3 m	10 V/m	AM, 80%, 1 kHz
	1710 – 1785 MHz	-			
	1840 – 2170 MHz	-			
	2300 – 2655 MHz	-			
EN 50130-4 (alarm systems)	1000 – 2700 MHz	-	3 m	10 V/m	AM, 80%, 1 kHz / Pulse 1 Hz
EN 50293 (road traffic signal systems)	1889 – 1891 MHz	-	3 m	10 V/m	200 Hz, Pulse (50%)
EN 61000-6-1 (generic, domestic)	1400 – 2000 MHz	-	3 m	3 V/m	AM, 80%, 1 kHz
	2000 – 2700 MHz	-		1 V/m	
EN 61000-6-2 (generic, industrial)	1400 – 2000 MHz	-	3 m	3 V/m	AM, 80%, 1 kHz
	2000 – 2700 MHz	-		1 V/m	
EN 61000-6-7 (EVS-EN, safety related systems)	1400 – 2000 MHz	-	3 m	10 V/m	AM, 80%, 1 kHz
	2000 – 2700 MHz	-		3 V/m	
EN 60335-1 (household)	1400 – 2000 MHz	-	3 m	10 V/m	AM, 80%, 1 kHz
EN 50121-3-2 (railway, rolling stock)	1400 – 2100 MHz	-	3 m	10 V/m	AM, 80%, 1 kHz
	2100 – 2500 MHz			5 V/m	
EN 50121-4 (railway, signalling & telecom)	1400 – 2100 MHz	-	3 m	10 V/m	AM, 80%, 1 kHz
	2100 – 2500 MHz			5 V/m	

Standard	Frequency band	Test frequency	Test distance	Test level	Modulation
EN 50121-5 (railway, fixed power supply installations)	1400 – 2100 MHz	-	3 m	10 V/m	AM, 80%, 1 kHz
	2100 – 2500 MHz			5 V/m	
IEC 60601-1-2 (medical)	1700 – 1990 MHz GSM 1800 CDMA 1900 GSM 1900 DECT LTE Band 1,3,4,25 UMTS	1720 MHz 1845 MHz 1970 MHz	2 m	28 V/m[3]	Pulse, 217 Hz
	2400 – 2570 MHz Bluetooth WLAN 802.11 b/g/n/ RFID 2450 LTE band 7	2450 MHz	2 m	28 V/m[3]	Pulse, 217 Hz
	5100 – 5800 MHz	5240 MHz 5500 MHz 5785 MHz	3 m	9 V/m	Pulse, 217 Hz
CISPR CDV 35 2015	GSM (1 W)	1800 MHz	3 m	3 V/m	AM, 80%, 1 kHz
	WiMAX / 3G (1W)	2600 MHz			
	WiMAX (1,26W)	3500 MHz			
	Wi-Fi (1W)	5000 MHz			
Regulation10– (Automotive)	800[4] - 2000 MHz	1300 MHz 1800 MHz	1 m	30 V/m	Pulse, 577 µs / 4600 µs
EN 13309 (machines with internal power supply)	800[4] – 2000 MHz	-	1 m	24 V/m	Pulse, 577 µs / 600 µs
ETSI 301 489-1 (R&TTE)	1400 – 2700 MHz	-	3 m	3 V/m	AM, 80%, 1 kHz or 400 Hz

3 The distance between the transmitting antenna and the ME equipment or ME system may be reduced to 1 m. For compliance to EN61000-4-3 and required field amplitude it is necessary to test at a distance of 2 m.

4 EMField support measurements starting at 1000 MHz.

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Appendix B: Warranty

Scope and Duration of Warranties

Seller warrants to Buyer that the Products to be delivered hereunder will be (1) free from defects in material, manufacturing workmanship, and title, and (2) conform to the Seller's applicable product descriptions and specifications, if any, contained in or attached to Seller's quotation. If no product descriptions or specifications are contained in or attached to the quotation, Seller's applicable product descriptions and specifications in effect on the date of shipment shall apply. The criteria for all testing shall be Seller's applicable product specifications utilizing factory-specified calibration and test procedures and instruments.

All product warranties, except the warranty of title, and all remedies for warranty failures are limited to three years.

Product Warranted	Duration of Warranty Period
Model 7008 Series EMField Generator	Three Year(s)
Model 7008 Series EMField Plug-in Card	Three Year(s)

Any product or part furnished to Buyer during the warranty period to correct a warranty failure shall be warranted to the extent of the unexpired term of the warranty applicable to the repaired or replaced product.

The warranty period shall commence on the date the product is delivered to Buyer; however, if Seller assembles the product, or provides technical direction of such assembly, the warranty period for such product shall commence on the date the assembly of the product is complete. Notwithstanding the foregoing, in the event that the assembly is delayed for a total of thirty (30) days or more from the date of delivery for any reason or reasons for which Seller is not responsible, the warranty period for such product may, at Seller's options, commence on the thirtieth (30th) day from the date such product is delivered to Buyer. Buyer shall promptly inspect all products upon delivery. No claims for shortages will be allowed unless shortages are reported to Seller in writing within ten (10) days after delivery. No other claims against Seller will be allowed unless asserted in writing within thirty (30) days after delivery (or assembly if the products are to be assembled by Seller) or, in the case of alleged breach of warranty, within the applicable warranty period.

Warranty Exclusions

Except as set forth in any applicable patent indemnity, the foregoing warranties are exclusive and in lieu of all other warranties, whether written, oral, express, implied, or statutory. EXCEPT AS EXPRESSLY STATED ABOVE, SELLER MAKES NO WARRANTY, EXPRESS OR IMPLIED, BY STATUTE OR OTHERWISE, WHETHER OF MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE OR USE OR OTHERWISE ON THE PRODUCTS, OR ON ANY PARTS OR LABOR FURNISHED DURING THE SALE, DELIVERY OR SERVICING OF THE PRODUCTS. THERE ARE NO WARRANTIES WHICH EXTEND BEYOND THE DESCRIPTION ON THE FACE HEREOF.

Warranty coverage does not include any defect or performance deficiency (including failure to conform to product descriptions or specifications) which results, in whole or in part, from (1) negligent storage or handling of the product by Buyer, its employees, agents, or contractors, (2) failure of Buyer to prepare the site or provide an operating environmental condition in compliance with any applicable instructions or recommendations of Seller, (3) absence of any product, component, or accessory recommended by Seller but omitted at Buyer's direction, (4) any design, specification, or instruction furnished by Buyer, its employees, agents or contractors, (5) any alteration of the product by persons other than Seller, (6) combining Seller's product with any product furnished by others, (7) combining incompatible products of Seller, (8) interference with the radio frequency fields due to conditions or causes outside the product as furnished by Seller, (9) improper or extraordinary use of the product, or failure to comply with any applicable instructions or recommendations of Seller including maintenance, calibration and cleaning procedures and intervals, or (10) acts of God, acts of civil or military authority, fires, floods, strikes or other labor disturbances, war, riot, or any other causes beyond the reasonable control of Seller.

This warranty does not include (1) batteries, (2) cables, (3) gasket, (4) fingerstock, or any item that is designed to be consumable. Seller does not warranty products of others which are not included in Seller's published price lists.

Buyer's Remedies

If Seller determines that any product fails to meet any warranty during the applicable warranty period, Seller shall correct any such failure by either, at its option, repairing, adjusting, or replacing without charge to Buyer any defective or nonconforming product, or part or parts of the product. Seller shall have the option to furnish either new or exchange replacement parts or assemblies.

Warranty service shall be performed at the Seller's factory, or the Buyer's site at the sole discretion of the Seller. Within the warranty period, the Buyer shall be responsible for all transportation to the Seller's factory, and the Seller shall be responsible for transportation of goods to the Buyer's site.

Within the contiguous 48 United States, warranty service performed during the applicable warranty period will be performed without charge to Buyer during Seller's normal business hours. After the warranty period, service will be performed at Seller's prevailing service rates. Subject to the availability of personnel, after-hours service is available upon request at an additional charge.

Outside the contiguous 48 United States, travel and per diem expenses, when required, shall be the responsibility of the Buyer, or End User, whichever is applicable regardless of the warranty period.

The remedies set forth herein are conditioned upon Buyer promptly notifying Seller within the applicable warranty period of any defect or non-conformance and making the product available for correction.

The preceding paragraphs set forth Buyer's exclusive remedies and Seller's sole liability for claims based on failure of the products to meet any warranty, whether the claim is in contract, warranty, tort (including negligence and strict liability) or otherwise, and however instituted, and, upon the expiration of the applicable warranty period, all such liability shall terminate. IN NO EVENT SHALL SELLER BE LIABLE TO BUYER FOR ANY SPECIAL, INDIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES OF ANY KIND ARISING OUT OF, OR AS A RESULT OF, THE SALE, DELIVERY, NON-DELIVERY, SERVICING, ASSEMBLING, USE OR LOSS OF USE OF THE PRODUCTS OR ANY PART THEREOF, OR FOR ANY CHARGES OR EXPENSES OF ANY NATURE INCURRED WITHOUT SELLER'S WRITTEN CONSENT DESPITE ANY NEGLIGENCE ON BEHALF OF THE SELLER. IN NO EVENT SHALL SELLER'S LIABILITIES UNDER ANY CLAIM MADE BY BUYER EXCEED THE PURCHASE PRICE OF THE PRODUCT IN RESPECT OF WHICH DAMAGES ARE CLAIMED. This agreement shall be construed in accordance with laws of the State of Texas. In the event that any provision hereof shall violate any applicable statute, ordinance, or rule of law, such provision shall be ineffective to the extent of such violation without invalidating any other provision hereof.

Any controversy or claim arising out of or relating to the sale, delivery, non-delivery, servicing, assembling, use or loss of use of the products or any part thereof or for any charges or expenses in connection therewith shall be settled in Austin, Texas by arbitration in accordance with the Rules of the American Arbitration Association, and judgment upon the award rendered by the Arbitrator may be entered in either the Federal District Court for the Western District of Texas or the State District Court in Austin, Texas, all of the parties hereto consenting to personal jurisdiction of the venue of such court and hereby waive the right to demand a jury trial under any of these actions.

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Appendix C: EC Declaration of Conformity

ETS-Lindgren Inc. declares these products to be in conformity with the following standards, following the provisions of EMC Directive 2004/108/EC and Low Voltage Directive 2006/95/EC:

Model 7008 Series EMField Generator

Emission:	EN 61326-1:2006, Class A Electrical equipment for measurement, control, and laboratory use.
Immunity:	EN 61326-1:2006, 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.

Technical Construction Files are available upon request.