Model 7002-001

EMPower™
Meter Plug-In Card

User Manual

ETS·LINDGREN®
An ESCO Technologies Company

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Revision Record

MANUAL, EMPOWER CARD | Part #399345, Rev. A

Revision	Description	Date
A	Initial Release	March, 2015

Table of Contents

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

OR

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.

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1.0 Introduction

The **ETS-Lindgren EMPower™ Meter Plug-In Card** is a broadband, continuous wave (CW), diode-type power meter. The EMPower card for the EMCenter™ Modular RF Platform can control up to four EMPower sensors simultaneously. One EMCenter unit can contain up to eight EMPower cards, resulting in a maximum of 32 sensors per EMCenter.

Note: The EMPower USB RF Power Sensor must be ordered separately. For ordering information, see page 9; please specify model when ordering.

The EMPower USB RF Power Sensor is optimized for EMC measurements, where high dynamic range and fast measurements are required, even at low power levels. Where most power sensors require long measurement times at low RF levels, the EMPower sensor is able to perform accurate power measurements with a measurement speed of 10 ms per sample at power levels as low as -55 dBm.

EMPower is fully supported by 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.

EMCenter Modular RF Platform (Required)

The Model 7001-001 EMCenter 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.

2.0 Maintenance

CAUTION: Before performing any maintenance, follow the information provided in *Safety Information* on page v.

WARNING: Maintenance of the EMPower card is limited to external components such as cables or connectors.

If you have any questions concerning maintenance, contact ETS-Lindgren Customer Service.

Maintenance of Fiber Optics (If Used)

Fiber optic connectors and cables can be damaged from airborne particles, humidity and moisture, oils from the human body, and debris from the connectors they plug into. Always handle connectors and cables with care, using the following guidelines.

CAUTION: Before performing any maintenance, disconnect the fiber optic cables from the unit and turn off power.

When disconnecting fiber optic cables, apply the included dust caps to the ends to maintain their integrity.

Before connecting fiber optic cables, clean the connector tips and in-line connectors.

Before attaching in-line connectors, clean them with moisture-free compressed air.

Failure to perform these tasks may result in damage to the fiber optic connectors or cables.

Replacement and Optional Parts

Note: ETS-Lindgren may substitute a similar part or new part number with the same functionality for another part/part number. Contact ETS-Lindgren for questions about part numbers and ordering parts.

Following are the part numbers for ordering replacement or optional parts for the EMPower™ Meter Plug-In Card.

Part Description	Part Number
EMPower USB RF Power Sensor	• **7002-002:** EMPower 6 GHz RF Powerhead, USB • **7002-003:** EMPower 6 GHz Burst/Pulse Powerhead, USB • **7002-004:** EMPower 18 GHz RF Powerhead, USB • **7002-005:** EMPower 18 GHz Burst/Pulse Powerhead, USB

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.

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3.0 Specifications

Note: For complete EMPower™ USB RF Power Sensor specifications, see the *EMPower™ USB RF Power Sensor User Manual*.

Mechanical Specifications

Data Connector:	• **Sensor side:** USB type B • **Card side:** USB type A
Max Number of Sensors per Card:	4
Form Factor:	Occupies one slot in EMCenter

Environmental Specifications

Temperature Range:	• **Operating:** 0°C to 40°C (32°F to 104°F) • **Storage:** -20°C to 85°C (-4°F to 185°F)
Relative Humidity:	10% to 90% (non-condensing)

Supply Specifications

Supply Voltage:	Through EMCenter
Power Consumption (mW):	Less than 200 mW

Interface Specifications

Communication:	USB 1.0

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4.0 EMPower Plug-In Card Installation

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

CAUTION: The EMPower card is designed to be used ONLY with the EMCenter. Do not use the card in combination with any other system.

1. Determine in which empty slot in the EMCenter™ Modular RF Platform you want to install the EMPower™ Meter Plug-in Card. You may use slots 1 through 7, numbered from left to right as you look at the back of the EMCenter.
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 EMPower card into the slot of the EMCenter. Tighten the four screws.
4. Turn on the EMCenter. The EMCenter will automatically detect the newly-installed EMPower card.

Note: To allow the EMCenter time to accurately auto-detect, you must wait at least 10 seconds after connecting an EMPower sensor. Otherwise, this may result in incorrect power sensor detection. If this occurs, restart the EMCenter to allow re-detection of all connected power sensors.

5. Connect the EMPower USB RF Power Sensor to the EMPower card using the included USB cable. The EMCenter will automatically detect the EMPower sensor when it is connected to one of the four USB slots on the EMPower card.
6. Plug the interlock into the connector on the back of the EMCenter.

The card installation is complete. You can control EMPower 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.

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5.0 Operation

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.

Powering On and Off EMCenter

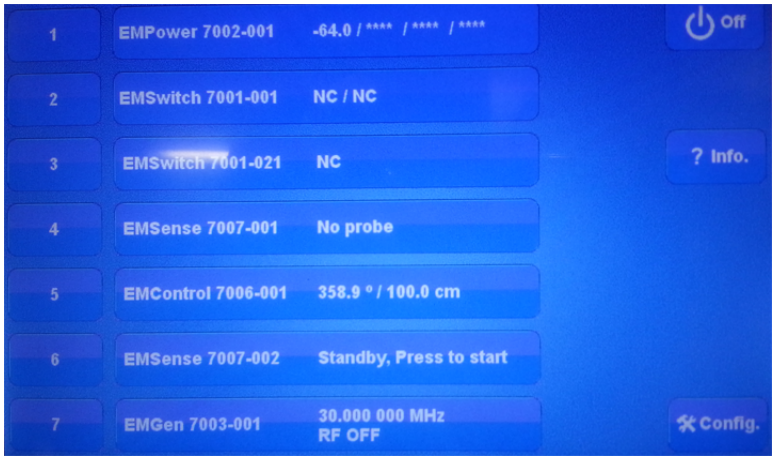
Note: For information on using the EMCenter touchscreen, see the *EMCenter Modular RF Platform User Manual*.

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.

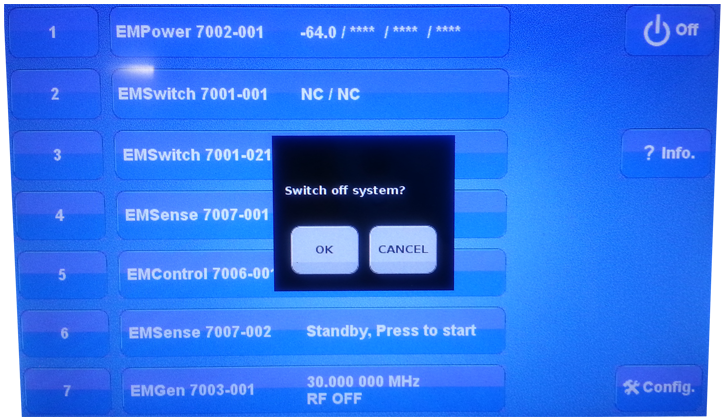
4. Touch anywhere on the EMCenter screen. It will take approximately 20 seconds to boot. The Information screen will flash, and then the Home screen will display.



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.

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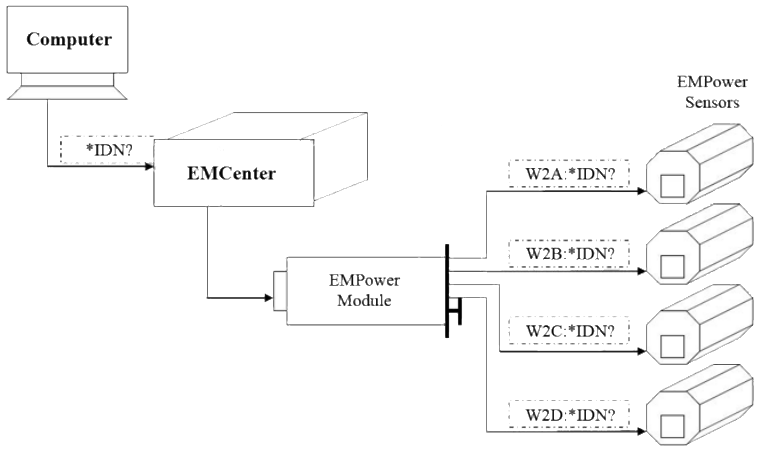
6.0 EMPower Command Set

See *Commands* on page 23 for the commands that can be used with the EMPower™ Meter Plug-in Card.

Each command must include a device ID number as the prefix. See the *EMCenter Modular RF Platform User Manual* for complete information on device ID numbers.

Note: Terminate each command with a carriage return (CR).



Examples

EXAMPLE 1: REQUEST POWER LEVEL

To request the power level of the EMPower sensor connected to port A of the EMPower card in slot 2:

```
W2A:POWER?
```

EXAMPLE 2: REQUEST FILTER SETTING

To request the filter setting of the EMPower sensor connected to port B of the EMPower card in slot 2:

```
W2B:FILTER?
```

EXAMPLE 3: REQUEST FILTER SETTING

To request the filter setting of the EMPower sensor connected to port B of the EMPower card in slot 3:

```
W3B:FILTER?
```

W = Device character of EMPower card

3 = Board number of EMPower card

B = Port of the EMPower sensor

FILTER? = Message to EMPower sensor

Commands

Note: If you receive an error code in response to a command, see page 24 for a list of error codes.

Command	Response	Description
*IDN?	ETS-Lindgren, EMPower 7002-001, 4.1.3	Request device identification
ID_NUMBER?	d.d.d.d.d.d.d.d	Request unique ID number of EMPower card
POWER?	-12.34 dBm	Request measure power level in dBm
BURST? <NUM>	-12.34 -12.35 dBm	Request multi-measure power level in dBm; the number of measurements is requested in <NUM>
FREQUENCY?	<NUM> Hz	Request the frequency in Hz
FREQUENCY <NUM> Hz	OK	Set the frequency in Hz
FREQUENCY? MIN	9000 Hz	Request the minimal frequency
FREQUENCY? MAX	6000000000 Hz	Request the maximum frequency
FILTER?	• 1 • 2 • 3 • 4 • 5 • 6 • 7 • AUTO	Request filter
FILTER <NUM>	OK	Set filter to 1,2,3,4,5,6, or 7
FILTER AUTO	OK	Set filter to auto

- IEEE commands for **Interface Clear** and **Clear** are not supported.
- IEEE status flags in either serial or parallel poll or as a service request are not supported.
- When IEEE communication is used, the first command/request should be ***IDN?\r**.

Error Codes

Error Code	Description
ERROR 1	Wrong command
ERROR 50	Argument error
ERROR 51	Argument too high error
ERROR 52	Argument too low error
ERROR_601	Error frequency not set
ERROR_602	Error over range
ERROR_603	Error under range
ERROR_604	No cal data

Appendix A: 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
EMPower™ Meter Plug-In Card	3 Years

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.

Appendix B: 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:

EMPower Meter Plug-In Card

Emission:	EN 61326-1:2006, Class B 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.

Technical Construction Files are available upon request.