GE
Grid Solutions

# Safety and Regulatory Information for GE Grid Solutions Products


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REGISTERED ISO 9001 GE MULTILIN

WORLDWIDE 10 YEAR WARRANTY

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Safety and Regulatory Information for GE Grid Solutions Products.



Part number: GET-8538C (April 2023)

# Safety and Regulatory Information

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# Safety and Regulatory Information

# Chapter 1: Introduction

This document outlines safety symbols and information used for GE Grid Solutions products. Use it with the product instruction manual and similar documents, which are provided with the product or available for ordering or viewing at www.gegridsolutions.com

Customers are responsible for ensuring that they adhere to all safety information in this document, the instruction manual(s), and similar documents.

This chapter outlines the symbols used and information that applies to all products. Subsequent chapters provide information specific to each product. The last chapter outlines the Declaration of Conformity for the European Union.

## Safety symbols and definitions

The following safety and equipment symbols can appear on the product or in the product documentation.


**Danger**

**Indicates a hazardous situation which, if not avoided, will result in death or serious injury.**


**Warning**

**Indicates a hazardous situation which, if not avoided, could result in death or serious injury.**



**Caution**

**Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.**



**Notice**

Indicates practices not related to personal injury.

**Risk of electric shock**

Arc flash or shock hazard. Appropriate PPE (personal protective equipment) required.

**Battery, general**

Identifies a device related to the supply of power to equipment by means of a (primary or secondary) battery, for instance a battery test button, the location of the connector terminals, and so on.

This symbol is not intended to indicate polarity.

**Positioning of cell**

Identifies the battery holder itself and to identifies the positioning of the cell(s) inside the battery holder.

**AC/DC converter, rectifier, substitute power supply**

Identifies an AC/DC converter and, in case of plug-in devices, identifies the relevant receptacles.

**Plus; positive polarity**

Identifies the positive terminal(s) of equipment that is used with, or generates direct current.

The meaning of this symbol depends upon its orientation.



**Minus; negative polarity**

Identifies the negative terminal(s) of equipment that is used with, or generates direct current.

The meaning of this symbol depends upon its orientation.



**"On" (power)**

Indicates connection to the mains, at least for mains switches or their positions, and all those cases where safety is involved.

The meaning of this symbol depends upon its orientation.

**"Off" (power)**

Indicates disconnection to the mains, at least for mains switches or their positions, and all those cases where safety is involved.

The meaning of this symbol depends upon its orientation.

**Stand-by**

Identifies the switch or switch position by means of which part of the equipment is switched on in order to bring it into the standby condition.

**"On/Off" (push-push)**

Indicates connection to or disconnection from the mains, at least for mains switches or their positions, and all those cases where safety is involved. Each position, "ON" or "OFF", is a stable position.

**"On/Off" (pushbutton)**

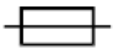
Indicates connection to the mains, at least for mains switches or their positions, and all those cases where safety is involved. "OFF" is a stable position, while the "ON" position only remains during the time the button is pressed.

**Lamp; lighting; illumination**

Identifies switches that control light sources, for example room lighting, lamp of a film projector, and dial illumination of a device.

**Air impeller (blower, fan, and so on)**

Identifies the switch or control that operates the air impeller, for example a fan of a film or slide projector, a room fan.



**Fuse**

Identifies fuse boxes or their location.

**Earth (ground)**

Identifies an earth (ground) terminal in cases where neither the following **Noiseless (clean) earth (ground)** nor the **Protective earth (ground)** symbols are explicitly required.

**Noiseless (clean) earth (ground)**

Identifies a noiseless (clean) earth (ground) terminal, for example of a specially designed earthing (grounding) system to avoid causing malfunction of the equipment.

**Protective earth (ground)**

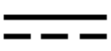
Identifies any terminal that is intended for connection to an external conductor for protection against electric shock in case of a fault, or the terminal of a protective earth (ground) electrode.

**Frame or chassis ground**

Identifies the frame or chassis ground terminal.

**Equipotentiality**

Identifies the terminals that, when connected together, bring the various parts of equipment or a system to the same potential, not necessarily being the earth (ground) potential, for example for local bonding.

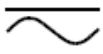


**Direct current**

Identifies on the rating plate that the equipment is suitable for direct current only; to identify relevant terminals.

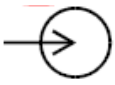
**Alternating current**

Indicates on the rating plate that the equipment is suitable for alternating current only; to identify relevant terminals.



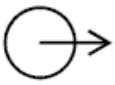
**Both direct and alternating current**

Indicates on the rating plate that the equipment is suitable for both direct and alternating current (universal); to identify relevant terminals.



**Input**

Identifies an input terminal when it is necessary to distinguish between inputs and outputs.



**Output**

Identifies an output terminal when it is necessary to distinguish between inputs and outputs.

**Dangerous voltage**

Indicates hazards arising from dangerous voltages.

In case of application in a warning sign, follow the rules of ISO 3864.

**Caution, hot surface**

Indicates that the marked item can be hot and should not be touched without taking care.

The inner symbol is standardized in ISO 7000-0535 “Transfer of heat, general”. Warning signs are standardized in ISO 3864.

**Not to be used in residential areas**

Identifies electrical equipment that is not suitable for a residential area (for example equipment that produces radio interference when in operation).

**Signal lamp**

Identifies the switch with which the signal lamp(s) is (are) switched on or off.

**Electrostatic sensitive devices**

On packages containing electrostatic-sensitive devices and on the devices themselves.

For information, see IEC 60747-1.

**Non-ionizing electromagnetic radiation**

Indicates elevated, potentially dangerous, levels of non-ionizing radiation.

In case of application in a warning sign, adhere to the rules of ISO 3864.

**Radiation of laser apparatus**

Identifies the radiation of laser products.

In case of application in a warning sign, adhere to the rules of ISO 3864.

**Transformer**

Identifies switches, controls, connectors or terminals that connect electrical equipment to the mains through a transformer. It also can be used on an envelope or a case to indicate that it contains a transformer (for example in the case of a plug-in device).

**Class II equipment**

Identifies equipment meeting the safety requirements specified for Class II equipment according to IEC 60536.

The position of the double-square symbol is such that it is obvious that the symbol is part of the technical information and can in no way be confused with the manufacturer's name or other identifications.

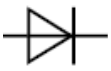
**Test voltage**

Identifies equipment that can withstand a test voltage of 500 V.

Other values of test voltage can be indicated in accordance with relevant IEC standards: see for example IEC 60414.


**Class III equipment**

Identifies equipment meeting the safety requirements specified for class III according to IEC 60536.



**Rectifier, general**

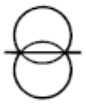
Identifies rectifying equipment and its associated terminals and controls.

**DC/AC converter**

Identifies a DC/AC-converter and its associated terminals and controls.

**Short-circuit-proof transformer**

Identifies a transformer that can withstand a short-circuit, inherently or non-inherently.



**Isolating transformer**

Identifies an isolating type transformer.

**Safety isolating transformer**

Identifies a safety isolating transformer.

**Non-short-circuit-proof transformer**

Identifies a transformer that cannot withstand a short-circuit.

**Converter with stabilized output current**

Identifies a converter supplying a constant current.

**Alarm, general**

Indicates an alarm on control equipment.

The type of alarm can be indicated inside the triangle or below the triangle.

**Urgent alarm**

Indicates an urgent alarm on control equipment.

The type of alarm can be indicated inside the triangle or below the triangle.

The urgency of the alarm can be indicated by varying a characteristic of the alarm, such as flashing rate of a visual signal or coding of an audible signal.

**Alarm system clear**

On alarm equipment.

Identifies the control with which the alarm circuit can be reset to its initial state.

The type of alarm can be indicated inside the open triangle or below the triangle.

**Alarm inhibit**

Identifies the alarm inhibit on control equipment.

The type of alarm can be indicated inside the triangle or below the triangle.

# Instructions applicable to all products

## Environmental instructions

This product contains a battery that cannot be disposed of as unsorted municipal waste in the European Union. See the product documentation for specific battery information. The battery is marked with this symbol, which may include lettering to indicate cadmium (Cd), lead (Pb), or mercury (Hg). For proper recycling return the battery to your supplier or to a designated collection point. For more information see: www.recyclethis.info.

- Batteries are marked with a symbol, which can include lettering to indicate cadmium (Cd), lead (Pb), or mercury (Hg).
- Dispose of used batteries according to the manufacturer's instructions.
- Do not dispose of the battery in a fire or with household waste.
- For proper recycling, return the battery to your supplier or contact your local waste disposal agency for the address of the nearest battery disposal site.
- Unless otherwise noted, this is a Class A product for use in industrial environments only.
- Electromagnetic compatibility (EMC) performance in certain environments can be compromised due to conducted and/or radiated disturbances.

## General safety precautions

- Failure to practice safe working procedures is likely to damage the equipment, cause severe injury, and/or death.
- The use of appropriate safety gloves, safety glasses, and protective clothing are recommended during equipment installation, maintenance, and service of the equipment.
- All procedures must be strictly adhered to.
- Failure to observe and follow the instructions provided in the equipment manual(s) can cause irreversible damage to the equipment and can lead to property damage, personal injury, and/or death.
- Before attempting to use the equipment, review all danger and caution indicators in the instruction manual or similar documents.
- If the equipment is used in a manner not specified by the manufacturer or functions abnormally, proceed with caution. Otherwise, the protection provided by the equipment can be impaired and can result in impaired operation and injury.
- Beware of potential hazards, wear personal protective equipment, and carefully inspect the work area for tools and objects that can have been left inside the equipment.
- Hazardous voltages can cause shock, burns, or death.
- Test personnel must be familiar with general device test practices, safety precautions and follow standard electrostatic discharge (ESD) precautions to avoid personal injury or equipment damage.
- Before performing visual inspections, tests, or periodic maintenance on this device or associated circuits, isolate or disconnect all hazardous live circuits and sources of electric power.
- Failure to shut equipment power off prior to removing the power connections can expose you to dangerous voltages causing injury or death.

- All recommended equipment that need to be grounded must have a reliable and un-compromised grounding path for safety purposes, protection against electromagnetic interference, and proper device operation.
- Bond equipment grounds together and connect to the facility's main ground system for primary power.
- Keep all ground leads as short as possible.
- At all times, equipment ground terminal must be grounded during device operation.
- Where applicable, only expose batteries to storage conditions that meet the manufacturer's recommendation.
- While the equipment manual can suggest several safety and reliability steps, safety precautions must be used in conjunction with the safety codes in force at your location.
- LED transmitters are classified as IEC 60825-1 Accessible Emission Limit (AEL) Class 1M. Class 1M devices are considered safe to the unaided eye. Do not view directly with optical instruments.
- Consider contact outputs unsafe to touch when the device is energized.
- If the output relay contacts are required for low voltage accessible applications, ensure proper insulation levels.
- Hazardous voltage can cause severe injury or death.
- Turn off all power before installation, adjustment, or removal of a transfer switch or any of its components.
- Due to hazardous voltage and current, GE recommends that a GE certified technician or a qualified electrician must perform the installation and maintenance of the switch.

## Assembly instructions

- Installation must be performed according to the national and regional electric code of the appropriate country. This can require additional field marking or labeling to define the appropriate level of personal protection equipment to reduce the risk of arc-flash related injuries.
- Ensure that the equipment is installed, operated, and used for its intended function in the manner specified by GE.
- To avoid the potential for personal injury due to fire hazards, ensure that the unit is mounted in a safe location and/or within an appropriate enclosure.
- Do not install if the device is damaged. Inspect the box for obvious defects, such as cracks in the housing.
- Turn off the electric power before making any electrical connections, and ensure a proper ground connection is made prior to connecting facility power to the device.
- Do not apply more than the maximum electrical rating that the device can withstand.
- See the equipment labels and/or manual(s) before applying voltages. Failure to do so can result in property damage, personal injury, and/or death.
- Any and all wires not immediately used must be properly insulated to ensure that an accidental turning on of the power does not cause a short or electrical hazard.
- To avoid equipment malfunction or mis-operation, it is recommended that all metallic conduits or cable shields be connected to the ground at one point.
- Render all meter terminals inaccessible after installation.
- Ground all phase and ground current transformers (CTs).
- The potential difference between the CTs ground and the ground bus is to be minimal (ideally zero).

- If the secondary windings are not grounded, capacitive coupling can allow the secondary voltage to float up to the voltage of the mains. This can pose a serious safety hazard.
- Ensure that the logic input wet contacts are connected to voltages below the maximum voltage specification, for example 300 V DC.
- Do not run signal wires in the same conduit or bundle that carries power mains or high-level voltage or currents.
- Do not connect filter ground to safety ground during any production tests.
- Use of shorting blocks and fuses is recommended for voltage leads and power supply to prevent hazardous voltage conditions or damage to current transformers.
- Where applicable, the shorting link between the filter ground and safety ground must be removed prior to the dielectric strength test to protect the transient suppression circuitry of the power supply.
- Before wiring, de-energize the CT secondary by shorting it via a shorting block.
- All external current transformer secondary windings must be grounded to the ground bus.
- Under no circumstances are the CT secondary windings to be left open-circuited, when primary current is flowing.
- Connecting engine start can cause the generator to start. Before connecting, turn the generator off.

## Use instructions

- Ensure the operating conditions (that is, electrical and environmental) are within the specifications listed in the equipment manual(s). Failure to do so can cause abnormal equipment operation, equipment damage, and/or personal injury.
- Do not operate the equipment with safety shields or covers removed that have been installed to prevent accidental contact.
- When connecting to a desktop computer, ensure that the devices share the same ground reference. When connecting to a portable computer, it is recommended to have it powered with its internal battery.
- Beware of the possibility of losing communication during firmware change processes.
- If applicable, ensure the dust covers are installed when the fiber is not in use.
- Dirty or scratched connectors can lead to high losses on a fiber link.
- Never short-circuit the secondary terminal.
- In resistance grounded systems, there is a resistance in series with the supply ground connection to limit ground current and to allow the system to continue operating for a short time under fault conditions. Locate the fault and correct it as soon as possible, since a second fault on another phase results in a very high current flow between the phases through the two ground fault paths.
- In addition to damaging the motor, a ground fault can place the motor casing above ground potential and present a safety hazard.
- All work must be done in accordance with local utility safety practices and the procedures outlined in the current edition of the Handbook for Electricity Metering.
- Never open the secondary circuit of a live CT. The high voltage produced can result in a situation dangerous to both personnel and equipment.
- A defect in insulation can allow the relay case to come in contact with conductors that can deliver dangerous ground voltages.

## Maintenance instructions

- There are no user-serviceable parts inside. Only qualified personnel are to work on this equipment.
- Beware of working around this equipment when the voltage is live.
- Use caution and follow all safety rules when handling, testing, or adjusting the equipment.
- Always disconnect the power source before and remove all voltage inputs prior to servicing the equipment.
- Since voltages can be present inside the device even if the equipment is powered off, maintenance personnel need to be familiar with the hazards associated with electrical equipment.
- Attempting to resolve equipment problems using methods not recommended by the manufacturer can result in damage or injury to persons and property.
- If required and to avoid electric shock, disconnect power before attempting to replace fuses and/or batteries. Only replace fuses or batteries with the same or equivalent type recommended by the manufacturer.
- A new battery can explode if it is incorrectly installed.
- Battery installation must conform to national and local codes.
- Handle a damaged or leaking battery with extreme care—do not disassemble, incinerate, puncture, crush or short-circuit the battery. If you touch the electrolyte, wash the exposed skin with soap and water. If the electrolyte contacts your eye, flush the eye with water for 15 minutes. If you have inhaled the electrolyte, move to fresh air, and monitor breathing and circulation. In each case, seek immediate medical attention.
- Aging and thermal cycling can eventually cause a lowering of the dielectric strength of the winding insulation in the stator winding. This can produce a low impedance path from the supply to ground resulting in ground currents, which can be quite high in solidly grounded systems. These can quickly cause severe structural damage to the motor stator slots.
- Dangerous voltages can be present after the power supply chassis has been removed from the device. Wait 10 seconds for stored energy to dissipate.
- There is no required preventive maintenance or inspection necessary for safety. However, have the factory perform any repair or maintenance.
- Disconnect and lockout all power sources before servicing and removing components and short all current transformer primaries before servicing.

## For further assistance

For product support, contact the information and call center as follows:

GE Grid Solutions
650 Markland Street
Markham, Ontario
Canada L6C 0M1
Europe/Middle East/Africa telephone: +34 94 485 88 54
North America toll-free: 1 800 547 8629
Fax: +1 905 927 5098
Worldwide e-mail: multilin.tech@ge.com
Europe e-mail: multilin.tech.euro@ge.com
Website: http://www.gegridsolutions.com/multilin

# Safety and Regulatory Information

# Chapter 2: Products

This chapter outlines the safety information specific to each product, arranged alphabetically.

## 269Plus Motor Management Relay

To avoid electrical shock, discharge J201 by shorting across the pins before reconnecting the J201 jumper. This option should be used only when an immediate restart after a lockout trip is required for process integrity or personnel safety.

Discharging the thermal memory of the 269Plus gives the relay an unrealistic value for the thermal capacity remaining in the motor and it is possible to thermally damage the motor by restarting it. Thus, complete protection may be compromised in order to restart the motor using this feature.

## 350/345/339 Feeder/Transformer/Motor Protection System

### General safety precautions

Caution: Hazardous voltages can cause shock, burns or death.

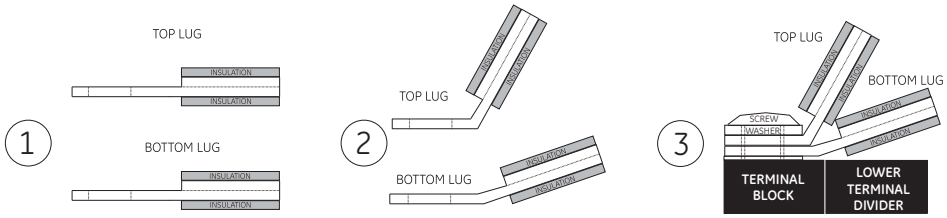
Installation/service personnel must be familiar with general device test practices, electrical awareness and safety precautions must be followed.

In addition to the safety precautions mentioned all electrical connections made must respect the applicable local jurisdiction electrical code.

Before working on CTs, they must be short-circuited.

### Terminal identification

When installing two lugs on one terminal, both lugs should be "right side up" shown in the following figure. This is to ensure the adjacent lower terminal block does not interfere with the lug body.




NOT TO SCALE

CAUTION: Before working on CTs they MUST be short circuited.

CAUTION: Verify that the relay's nominal input current of 1A or 5A matches the secondary rating of the connected CTs. Unmatched CTs may result in equipment damage or inadequate protection.

### Control power

CAUTION: Control power supplied to the relay must match the installed power supply range. If the applied voltage does not match, damage to the unit may occur. All gorunds MUST be connected for safe, normal operation regardless of control power supply type. The label found on the relay specifies its order code or model number. The installed power supply's operating range will be one of the following:

LO: 24 to 48 V DC (Nominal Range: 20 to 60 V DC)
HI: 125 to 250 V DC/ 120 to 240 V AC (Nominal Range: 84 to 250 V DC/60 to 300 V AC)

CAUTION: The relay chassis ground terminals should be connected directly to the ground bus, using the shortest practical path. A tinned copper, braided, shielding and bonding cable should be used. As a minimum, 96 strands of number 34 AWG should be used. Belden catalog number 8660 is suitable.

CAUTION: Isolate power prior to servicing.

CAUTION: Ensure correct polarity on contact input connections and do not connect any contact input circuits to ground or else relay hardware may be damaged.

CAUTION: To ensure that all devices in a daisy-chain are at the same potential, it is imperative that the common terminals of each RS485 port are tied together and grounded only once, at the master or the slave. Failure to do so may result in intermittent or failed communications.

## 8 Series Protection and Control Relay Platform (845/850/850R/869/889)

DANGER:

Ensure that all connections to the product are correct so as to avoid accidental risk of shock and/or fire, for example such as can arise from high voltage connected to low voltage terminals.

Follow the requirements of this manual, including adequate wiring size and type, terminal torque settings, voltage, current magnitudes applied, and adequate isolation/clearance in external wiring from high to low voltage circuits.

Use the device only for its intended purpose and application.

Ensure that all ground paths are uncompromised for safety purposes during device operation and service.

Ensure that the control power applied to the device, the AC current, and voltage input match the ratings specified on the relay nameplate. Do not apply current or voltage in excess of the specified limits.

Only qualified personnel are to operate the device. Such personnel must be thoroughly familiar with all safety cautions and warnings in this manual and with applicable country, regional, utility, and plant safety regulations.

Hazardous voltages can exist in the power supply and at the device connection to current transformers, voltage transformers, control, and test circuit terminals. Make sure all sources of such voltages are isolated prior to attempting work on the device.

Hazardous voltages can exist when opening the secondary circuits of live current transformers. Make sure that current transformer secondary circuits are shorted out before making or removing any connection to the current transformer (CT) input terminals of the device.

For tests with secondary test equipment, ensure that no other sources of voltages or currents are connected to such equipment and that trip and close commands to the circuit breakers or other switching apparatus are isolated, unless this is required by the test procedure and is specified by appropriate utility/plant procedure.

When the device is used to control primary equipment, such as circuit breakers, isolators, and other switching apparatus, all control circuits from the device to the primary equipment must be isolated while personnel are working on or around this primary equipment to prevent any inadvertent command from this device.

Use an external disconnect to isolate the mains voltage supply.

NOTICE: Turn off control power before drawing out or re-inserting the relay to prevent mal-operation.

CAUTIONS: Inserting an incorrect module type into a slot may result in personal injury, damage to the unit or connected equipment, or undesired operation.

CAUTIONS: Verify that the relay's nominal input current of 1 A or 5 A matches the secondary rating of the connected CTs. Unmatched CTs may result in equipment damage or inadequate protection.

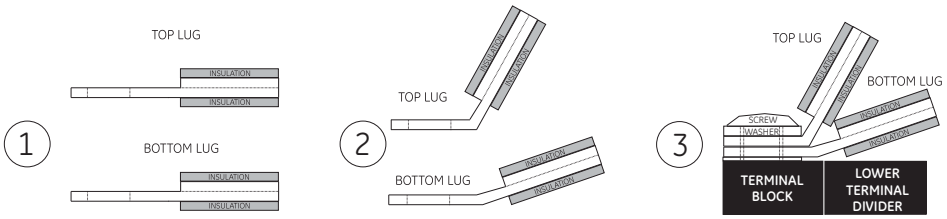
CAUTION:

IMPORTANT: The phase and ground current inputs correctly measure up to 46 times the current input nominal rating. Time overcurrent curves become horizontal lines for currents above 20 x PKP.

CAUTION:

Make sure that the first character on the terminal strip corresponds to the slot location identified on the chassis silkscreen.

NOTICE: When installing two lugs on one terminal, both lugs must be "right side up" as shown in the "Orient the Lugs Correctly" figure below. This is to ensure the adjacent lower terminal block does not interfere with the lug body.




NOT TO SCALE

CAUTION: Control power supplied to the relay must match the installed power supply range. If the applied voltage does not match, damage to the unit may occur. All grounds MUST be connected for normal operation regardless of control power supply type.

CAUTION: The relay should be connected directly to the ground bus, using the shortest practical path. A tinned copper, braided, shielding and bonding cable should be used. As a minimum, 96 strands of number 34 AWG should be used. Belden catalog number 8660 is suitable.

## A60 Arc Flash System

CAUTION:

Installation/service personnel must be familiar with general device test practices, electrical awareness and safety precautions must be followed.

In addition to the safety precautions mentioned all electrical connections made must respect the applicable local jurisdiction electrical code.

It is recommended that a field external switch, circuit breaker be connected near the equipment as a means of power disconnect. The external switch or circuit breaker is selected in accordance with the power rating of the A60.

WARNING:

This product itself is not a substitute for Personal Protective Equipment (PPE). However, it can be used in the computation of site specific Arc flash analysis to determine a new appropriate Hazard Reduction Category code for the installation.
The A60 product is designed to meet protective relay standards as described in the product data sheet.

- The alarm relay output must be connected to external equipment to monitor the condition of the A60.
- Install the A60 in a locking enclosure to avoid any tampering of settings.

CAUTION: A60 unit must be installed in the low voltage compartment of the switchgear.

NOTICE: AFS device must be installed in an electrical enclosure with authorized access.

CAUTION: It is recommended that a field external switch, circuit breaker be connected near the equipment as a means of power disconnect. The external switch or circuit breaker shall be selected in accordance with the power rating of the A60.

NOTICE: All protective earth connections to be terminated with green and yellow wire.

## B95$^{Plus}$ Bus Protection System

CAUTION:

The use of Omega-level safety shoes, safety gloves, safety glasses, and protective clothing are recommended during equipment installation, maintenance, and service.

Failure to observe and follow the instructions provided in the instruction manual can cause damage to the equipment and can lead to property damage, personal injury, and/or death.

Before attempting to use the equipment, review all danger and caution indicators.

If the equipment is used in a manner not specified by the manufacturer or functions abnormally, proceed with caution. Otherwise, the protection provided by the equipment can be impaired and can result in damage and/or injury.

Hazardous voltages can cause shock, burns, or death.

Installation/service personnel must be familiar with general device test practices and electrical awareness. Safety precautions must be followed.

Before performing visual inspections, tests, or periodic maintenance on this device or associated circuits, isolate or disconnect all live circuits and sources of electric power.

Failure to power equipment off prior to removing the power connections can lead to exposure to dangerous voltages causing injury or death.

All recommended equipment that can be grounded should be and must have a reliable and uncompromised grounding path for safety purposes, protection against electromagnetic interference, and proper device operation.

Equipment grounds should be bonded together and connected to the facility's main ground system for primary power.

Keep all ground leads as short as possible.

The equipment ground terminal must be grounded at all times during device operation and service.

In addition to the safety precautions mentioned, all electrical connections made must respect the applicable local jurisdiction electrical code.

LED transmitters are classified as IEC 60825-1 Accessible Emission Limit (AEL) Class 1M. Class 1M devices are considered safe to the unaided eye. Do not view directly with optical instruments.

Before working on current transformers (CTs), short-circuit them.

Laser class: Class 1. See figure below.


Class 1 devices are considered safe to the unaided eye. Do not view directly with optical instruments.

WARNING: Ensure that power is not live when connecting the wires to the unit, else injury or death can result.

## BUS2000 Busbar Protection

The busbar differential protection utilizes bi-stable relays to redirect trip signals according to a changing substation topology. In case of several cabinets for the relay installation, it is very important to ensure that only one power source (the substation's battery) is used for the bus bar protection. If two DC sources are used, this must be indicated in the specifications in order to analyze all of the possible states of the substation and to ensure that the poles of the batteries never come into electrical contact. Failure to do so can damage the bus protection, substation cabling, batteries or cause injury to the personnel. The manufacturer will not assume any liabilities, for any claim of any kind, derived from misuse of the system.

# C264

## Electrical Safety Requirements

Insulation testing may leave capacitors charged to dangerous voltage levels. Discharge capacitors by reducing test voltages to zero before disconnecting leads.

Equipment should be cleaned only when de-energized using a lint free cloth dampened with water only.

The front serial USB port is intended for maintenance purpose only. It is isolated to ELV level and is not intended for user connection. ESD precautions should be taken when accessing it.

## Installation

Always use insulated crimp terminations for voltage and current connections.

Only two wires can be screwed together on any one connector.

The AC and DC signal and communication wires should use separate shielded cable.

Wires should be connected with the power supply connectors unplugged. Each wired signal must be tested before plugging and fixing the connectors. The connectors must be fixed on the case with the screws available at each extremity of the connector.

## Grounding

The PCT (Protective Conductor Terminal) minimum wire size is 2.5 $mm^2$ for countries whose mains supply is 230 V and 3.3 $mm^2$ for countries whose mains supply is 110 V. This may be superseded by local or country wiring regulations.

Use of a locknut or similar mechanism to ensure the integrity of stud-connected PCT.

To maintain the safety features of the equipment it is essential that the protective conductor (earth) is not disturbed when connecting or disconnecting functional earth conductors such as cable screens, to the PCT stud.

## Voltage Fuses

For external fuse protection, an HRC fuse type with a maximum current rating of 16A and a minimum DC rating of 220V DC may be used for the auxiliary supply (for example red Spot type NIT or TIA).

Digital input circuits should be protected by a high rupture capacity NIT or TIA fuse with maximum rating of 16 A. Current transformers must never be fused since open circuiting them may produce lethal hazardous voltages. Other circuits should be appropriately fused to protect wire used.

## Decommissioning

Before decommissioning, completely isolate the equipment power supplies (both poles of any DC supply). The auxiliary supply input may have capacitors in parallel, which may still be charged. To avoid electric shock, discharge the capacitors using the external terminals before decommissioning.

## Upgrading / Servicing

Do not insert or withdraw modules, PCBs or expansion boards from the equipment while energized, as this may result in damage to the equipment. Hazardous live voltages would also be exposed, endangering personnel.

Internal modules and assemblies can be heavy and may have sharp edges. Take care when inserting or removing modules into or out of the IED.

Only qualified personnel may carry out maintenance operation. Always hold boards by their sides: Do not touch either the component side or the soldering side and observe anti-static precautions.

## C90Plus Automation Logic Controller

Prior to removal of the AC module, the CT secondary circuit must be shorted in order to prevent an open-circuit condition on a CT.

Qualified service personnel may only perform module withdrawal and insertion, when control power has been removed from the unit. Failure to ensure that power has been disconnected can permanently damage the device and result in personal injury.

Inserting an incorrect module type into a slot may result in personal injury, damage to the unit or connected equipment, or undesired operation!

## D.20 RIO

Follow all safety precautions and instructions in the D.20 manual.

Only qualified personnel should work on the D.20 DNA, Maintenance personnel should be familiar with the technology and hazards associated with electrical equipment.

Never work alone.

Before performing visual inspections, tests, or maintenance on this equipment, isolate or disconnect all hazardous live circuits and sources of electric power. Assume that all circuits are live until they have been completely de-energized, tested, and tagged. Pay particular attention to the design of the power system. Consider all sources of power, including the possibility of back feed.

Turn off all power supplying the equipment in which the D.20 DNA is to be installed before installing and wiring the D.20 DNA.

Operate only from the power source specified on the installed power supply module.

Beware of potential hazards and wear personal protective equipment.

The successful operation of this equipment depends upon proper handling, installation, and operation. Neglecting fundamental installation requirements may lead to personal injury as well as damage to electrical equipment or other property.

All AC voltage terminals are protected from accidental contact by a mechanical safety shield.

All electronic components within the D.20 DNA are susceptible to damage from electrostatic discharge. To prevent damage when handling this product use approved static control procedures.

Hazardous voltages can cause shock, burns or death. To prevent exposure to hazardous voltages, disconnect and lock out all power sources before servicing and removing components.

If the D.20 DNA is used in a manner not specified in this manual, the protection provided by the equipment may be impaired.

Changes or modifications made to the unit not autorized by GE Digital Energy could void the warranty.

CAUTION, HOT SURFACE: When the unit is operating above 68 °C ambient temperature, safe handling precautions are recommended to prevent burns.

CAUTION: Review the manufacturer-provided documentation that accompanies your power supply unit before installation. Ensure that you are in compliance with all safety instructions provided.

CAUTION: The Auxiliary terminals and/or power through the D.20 port should not be loaded by peripherals to exceed 165 W.

# DGC C/V/M Capacitor Bank Controller/Voltage Regulator Controller/Field RTU

## General safety precautions

Thoroughly and carefully read this instruction sheet and the product manual before programming, operating, or maintaining the DGC Controller. Familiarize yourself with "SAFETY INFORMATION" on this page.

The equipment covered by this publication must be installed, operated, and maintained by qualified personal who are knowledgeable in the installation, operation, and maintenance of overhead electric power distribution equipment along with the associated hazards.

The user shall be responsible for ensuring the integrity of any Protective conductor connections before carrying out other actions.

It is the responsibility of the user to check the equipment ratings and operating Instructions / installation Instructions prior to commissioning, service.

Prior to servicing / commissioning ensure the Protective earth (PE) conductor is connected to Earth Ground prior to conducting any work

This product requires an external disconnect to isolate the mains voltage supply.

Ensure that the protective earth (PE) terminal is suited with a recommended wire size of 14 awg minimum. The (PE) terminal lug must be fastened with a #8 stud with a required torque of 18-20 in/lb.

Prior to commencing work on CTs' ccts these shall be short circuited.

This product is rated to Class A emissions levels and is to be used exclusively in Utility or Substation environments. Not to be used near electronic devices rated for Class B levels.

Integrating an untested radio into the OEM module may result in functional performance deterioration due to unknown RF immunity effects. At a minimum the Radio must comply with the R&TTE directive and FCC and Industry Canada registered respecting the local RF regulations For Europe and North America. The radios maximum primary rating cannot exceed 13.8 VDC 12W continuous operation and @2A max transmitting current.

The antenna provided must not be replaced with a different type. Attaching a different antenna will void the FCC and IC approval and the FCC /IC ID can no longer be considered.

When Equipped with a Radio rated for North America

- For MDS iNETII radio Contains Transmitter with FCC ID: E5MDS-INETII/CAN 3738A-INETII
- For MDS TransNet Radio Contains Transmitter with FCC ID: E5MDS-EL805/IC: 3738A 12122
- For MDS SD4 radio Contains Transmitter with FCC ID: E5MDS-SD4/IC: 101D-SD4

CAUTION:

- Ensure that this product is suited with an external disconnect that is protected by adequate branch circuit protection.

- Prior to power ensure that the PE stud is connected to earth ground as per the general safety precautions in this manual.
- Replace any fuses with the correct rating and type as per the diagram terminal or as specific under product manual. Caution: Prior to changing fuses ensure the external disconnect switch is safely disconnected.

DANGER:

Use sheath banana plugs, see following "Banana plugs" figure, when supplying voltage to power the DGC Controller via the external (front panel) power terminals.

### Fuses

Fuses Used:

Internal Voltage Source: FUSE 3A/250V 1/4" X 1-1/4" CARTRIDGEGE P/N: 0901-0015, COPPER BUSHMANN P/N: AGC-3

External Voltage Source: FUSE 3A/250V 1/4" X 1-1/4" CARTRIDGE GE P/N: 0901-0015, COPPER BUSHMANN P/N: AGC-3

Switch Mechanism: FUSE FAST ACTING 6.3MMX32.0MM 250V 6A GE P/N: 0901-0086, COPPER BUSHMANN P/N: AGC-6-R

## DGCM

CAUTION:

Use a lift system with side rails/bucket to reduce a fall hazard as opposed to other means when installing or servicing.

Do not disconnect power connectors on the DGCM when the system is on LIVE.

WARNING: Installers must follow regional requirements and or company policies regarding SAFE WORK PRACTICES. The use of proper and adequate PPE is mandatory. When mounting this unit on a pole or at heights greater than 6 ft adequate lift equipment must be used to decrease the fall hazard possibility.

## DGCS/R Switch Controller/Recloser

### General safety precautions

CAUTION:

Thoroughly and carefully read this instruction sheet and the product manual before programming, operating, or maintaining the DGC Controller. Familiarize yourself with “SAFETY INFORMATION” on this page.

The equipment covered by this publication must be installed, operated, and maintained by qualified personal who are knowledgeable in the installation, operation, and maintenance of overhead electric power distribution equipment along with the associated hazards.

The user shall be responsible for ensuring the integrity of any Protective conductor connections before carrying out other actions.

It is the responsibility of the user to check the equipment ratings and operating Instructions / installation Instructions prior to commissioning, service.

Prior to servicing / commissioning ensure the Protective earth (PE) conductor is connected to Earth Ground prior to conducting any work

This product requires an external disconnect to isolate the mains voltage supply.

Ensure that the protective earth (PE) terminal is suited with a recommended wire size of 14 awg minimum. The (PE) terminal lug must be fastened with a #8 stud with a required torque of 18-20 in/lb.

Prior to commencing work on CTs' ccts these shall be short circuited.

Ensure to contact the remote user prior to approaching the DGCR to conduct local work.

Use a lift system with side rails/bucket to reduce a fall hazard as opposed to other means when installing or servicing.

Do not disconnect power connectors on the DGCR when the system is on LIVE.

Ensure the DGCS/DGCR outer cabinet is re-locked after local service is completed

This product is rated to Class A emissions levels and is to be used exclusively in Utility or Substation environments. Not to be used near electronic devices rated for Class B levels.

Integrating an untested radio into the OEM module may result in functional performance deterioration due to unknown RF immunity effects. At a minimum the Radio must comply with the R&TTE directive and FCC and Industry Canada registered respecting the local RF regulations For Europe and North America. The radios maximum primary rating cannot exceed 13.8 VDC 12W continuous operation and @2A max transmitting current.

The antenna provided must not be replaced with a different type. Attaching a different antenna will void the FCC and IC approval and the FCC /IC ID can no longer be considered.

When Equipped with a Radio rated for North America

- For MDS iNETII radio Contains Transmitter with FCC ID:
  - E5MDS-INETII/CAN 3738A-INETII
- For MDS TransNet Radio Contains Transmitter with FCC ID:
  - E5MDS-EL805/IC: 3738A 12122
- For MDS SD4 radio Contains Transmitter with FCC ID:
  - E5MDS-SD4/IC: 101D-SD4

CAUTION:

BATTERY: The onboard battery can be replaced only by the same model type. Any other batteries used may not provide the safety or performance required.

## Fuses used

Internal Voltage Source:

- FUSE 3A/250V 1/4" X 1-1/4" CARTRIDGEGE P/N: 0901-0015, COPPER BUSHMANN P/N: AGC-3

Switch Mechanism

- FUSE FAST ACTING 6.3MMX32.0MM 250V 6AGE P/N: 0901-0086, COPPER BUSHMANN P/N: AGC-6-R

## Battery

Battery:

- Manufacturer: Odyssey

- Manufacturer's P/N: PC310
- Description: BATTERY DRY CELL 101X86X138MM 12V 8AH HIGH_TEMP M4_RECEPTACLE

Battery Backup:

- Voltage: 24 VDC (two 12 V batteries)
- Capacity: 8 hours
- Charging: Constantly connected to a smart charging unit
- Alarms: LED and alarm messages
- Battery Test: Programmable through system setup menu

CAUTION: Replace battery with the same model and type. When replacing ensure the metal cover is reused to harness the batteries. Ensure that the rubber battery terminal covers are reused to prevent accidental short circuits.

## DGP Digital Generator Protection

It is critical that jumpers be inserted on the system-side test plug terminals that are connected to the CT secondary. If these jumpers are left out, the resulting high voltages will present a serious hazard to personnel and may severely damage equipment.

## DGT Distributed Generation Trip Control

DGT equipment is equipped with an internal surge suppression module to protect against nearby lightning discharges or spikes on the antenna feed-line. To minimize the chances of lightning and surge damage, a good safety ground is required. This ground must bond the antenna system, the DGT unit, power supply, and all connected data equipment to a single-point ground.

## EPM Meters

### Meter safety precautions

Installation/service personnel must be familiar with general device test practices, electrical awareness and safety precautions must be followed.

Before performing visual inspections, tests, or periodic maintenance on this device or associated circuits, isolate or disconnect all hazardous live circuits and sources of electric power.

In addition to the safety precautions mentioned all electrical connections made must respect the applicable local jurisdiction electrical code.

Before working on CTs, they must be short-circuited.

To be certified for revenue metering, power providers and utility companies must verify that the billing energy meter performs to the stated accuracy. To confirm the meter's performance and calibration, power providers use field test standards to ensure that the unit's energy measurements are correct.

## Meter installation

Installation of EPM meters must be performed by only qualified personnel who follow standard safety precautions during all procedures. Those personnel should have appropriate training and experience with high voltage devices. Appropriate safety gloves, safety glasses and protective clothing is recommended.

During normal operation of EPM meters, dangerous voltages flow through many parts of the meter, including: Terminals and any connected CTs (Current Transformers) and PTs (Potential Transformers), all I/O Modules (Inputs and Outputs) and their circuits. All Primary and Secondary circuits can, at times, produce lethal voltages and currents. Avoid contact with any current-carrying surfaces.

WARNING:

Do not use the meter or any I/O Output Device for primary protection or in an energy limiting capacity. The meter can only be used as secondary protection.

Do not use the meter for applications where failure of the meter may cause harm or death.

Do not use the meter for any application where there may be a risk of fire.

The EPM7000/T must be installed in an electrical enclosure where any access to live electrical wiring is restricted only to All meter terminals should be inaccessible after installation.

All meter terminals should be inaccessible after installation.

Do not apply more than the maximum voltage the meter or any attached device can withstand. Refer to meter and/or device labels and to the Specifications for all devices before applying voltages. Do not HIPOT/Dielectric test any Outputs, Inputs or Communications terminals.

GE recommends the use of Shorting Blocks and Fuses for voltage leads and power supply to prevent hazardous voltage conditions or damage to CTs, if the meter needs to be removed from service. CT grounding is optional.

A switch breaker must be included in the end-use equipment or building installation. The switch shall be in close proximity to the equipment and within easy reach of the operator. The switch shall be marked as the disconnecting device for the equipment.

## Installation-4600

WARNING: GE Digital Energy recommends the use of fuses for voltage leads and power supply, and shorting blocks to prevent hazardous voltage conditions or damage to CTs, if the EPM 4600 unit needs to be removed from service. One side of the CT must be grounded.

NOTE: The current inputs are only to be connected to external current transformers provided by the installer. The CTs shall be Approved or Certified and rated for the current of the meter used.

## Voltage fuses-EPM 2200, 7000

GE Multilin recommends the use of fuses on each of the sense voltages and on the control power, even though the wiring diagrams in the instruction manual do not show them.

Use a 1 Amp fuse on each voltage input

Use a 3 Amp Slow Blow fuse on the power supply.

## Ground connections-EPM 2200, 7000

The meter's Ground Terminals should be connected directly to the installation's protective earth ground. Use AWG# 12/2.5 mm2 wire for this connection.

## Certification-EPM 2200, 7000

To be certified for revenue metering, power providers and utility companies have to verify that the billing energy meter will perform to the stated accuracy. To confirm the meter's performance and calibration, power providers use field test standards to ensure that the unit's energy measurement s are correct. Since the EPM 2200 is a traceable revenue meter, it contains a utility grade test pulse that can be used to gate an accuracy standard. This is an essential feature required of all billing grade meters.

## EPM 4600 Ground connections

The EPM 4600 unit's Ground terminal should be connected directly to the installation's protective earth ground. Use AWG# 12/2.5 mm2 wire for this connection.

DO NOT leave the secondary of the CT open when primary current is flowing. This may cause high voltage, which will overheat the CT. If the CT is not connected, provide a shorting block on the secondary of the CT.
GE Digital Energy highly recommends using shorting blocks to allow removal of the EPM 4600 unit from an energized circuit, if necessary (see "Removing the EPM 4600 Unit From Service/Reinstalling the EPM 4600 Unit" on page 4-39 for instructions). GE Digital Energy recommends using a three phase shorting block for every three phase load.
You need 8 shorting blocks for the 8 three phase circuits.

CAUTIONS: Shorting blocks allow you to short an installed current transformer so that the meter can be uninstalled, if necessary, for servicing. This is a highly important safety feature. See the " Typical Shorting Block (Good for 1 set of three phase CTs) " figure below.

## EPM 9900

To prevent hazardous voltage conditions, the use of fuse branch circuit protection for voltage leads and the power supply are required. To prevent CT damage and potential injuries, shorting blocks for CT circuits are required if the meter needs to be removed from service.

Branch circuit protection size should be 15 Amps.

For sustained loads greater than 10 Amps, the CT wires should be wired directly through the CT opening (pass through wiring method - see CT Leads Pass Through (No Meter Termination), using 10 AWG wire.

WARNING:

DO NOT leave the secondary of the CT open when primary current is flowing.
This may cause high voltage on open secondary CT which could be potentially lethal to humans and destructive to equipment itself.

## F650 Feeder Protection and Bay Controller

The transformer module for the VTs and CTs is already connected to a female connector screwed to the case. The current inputs incorporate shorting bars, so that the module can be extracted without the need to short-circuit the currents externally. It is very important, for safety reasons not to change or switch the terminals for CTs and VTs.

## G100 Advanced Substation Gateway

Follow all safety precautions and instructions in the G100 manual.

Only qualified personnel should install and work on the G100. Maintenance personnel should be familiar with the technology and the hazards associated with electrical equipment.

Never work alone.

Class 1 Equipment. This equipment must be earthed. The power plug must be connected to a properly wired earth ground socket outlet. An improperly wired socket outlet could place hazardous voltages on accessible metal parts.

This product contains components rated as Class 1 Laser Products.

A ground wire (18AWG) is required to be connected from the G100 chassis to protective earth.

This product is intended to be supplied by a UL listed DC power supply or DC power source which is rated for 12/24/48Vdc, 5/2.5/1.25A minimum, Tma = 70 degree C, and the altitude of operation = 5000m.

The device can only be used in a fixed location. Ensure that the protective earth connection is verified by qualified personnel.

Before performing visual inspections, tests, or maintenance on this equipment, isolate or disconnect all hazardous live circuits and sources of electric power. Assume that all circuits are live until they have been completely de-energized, tested, and tagged. Pay particular attention to the design of the power system. Consider all sources of power, including the possibility of back feed.

Turn off all power supplying the equipment in which the G100 is to be installed before installing and wiring the G100.

Operate only from the power source specified on the installed power supply module.

Beware of potential hazards and wear appropriate personal protective equipment, safety shoes, eye protection and gloves.

The successful operation of this equipment depends upon proper handling, installation, and operation. Neglecting fundamental installation requirements may lead to personal injury as well as damage to electrical equipment or other property.

All electronic components within the G100 are susceptible to damage from electrostatic discharge. To prevent damage when handling this product use approved static control procedures.

Hazardous voltages can cause shock, burns or death. To prevent exposure to hazardous voltages, disconnect and lock out all power sources before servicing and removing components.

If the G100 is used in a manner not specified in this manual, the protection provided by the equipment may be impaired.

Changes or modifications made to the unit not authorized by GE could void the warranty.

Warning: Failure to observe the instructions in this manual may result in serious injury or death

CAUTION:

Hot Surface: During operation of the G100 the surface of the heat sink, can reach a temperature of 60°C and above. Therefore, be careful and do not touch it with bare fingers.

WARNING:

DO NOT apply power to the product if it has visible damage!

Doing so may cause further, possibly irreparable damage, as well as introduce a fire or shock hazard.

WARNING:

Before installing or removing any board, please ensure that the system power and external supplies have been turned off!

CAUTION:

Before you install and operate the G100, read and follow the safety guidelines and instructions in Safety precautions.

WARNING:

An improperly wired ground connection could place hazardous voltages on accessible metal parts.

## G500 Advanced Substation Gateway

Follow all safety precautions and instructions in the G500 manual.

Only qualified personnel should work on the G500. Maintenance personnel should be familiar with the technology and the hazards associated with electrical equipment.

Never work alone.

Before performing visual inspections, tests, or maintenance on this equipment, isolate or disconnect all hazardous live circuits and sources of electric power. Assume that all circuits are live until they have been completely de-energized, tested, and tagged. Pay particular attention to the design of the power system. Consider all sources of power, including the possibility of back feed.

Turn off all power supplying the equipment in which the G500 is to be installed before installing and wiring the G500.

Operate only from the power source specified on the installed power supply module.

Beware of potential hazards and wear personal protective equipment.

The successful operation of this equipment depends upon proper handling, installation, and operation. Neglecting fundamental installation requirements may lead to personal injury as well as damage to electrical equipment or other property.

All electronic components within the G500 are susceptible to damage from electrostatic discharge. To prevent damage when handling this product use approved static control procedures.

Hazardous voltages can cause shock, burns or death. To prevent exposure to hazardous voltages, disconnect and lock out all power sources before servicing and removing components.

If the G500 is used in a manner not specified in this manual, the protection provided by the equipment may be impaired.

Changes or modifications made to the unit not authorized by GE could void the warranty.

CAUTION:

Hot Surface: During operation of the G500 the surface of the heat sink, can reach a temperature of 60°C and above. Therefore, be careful and do not touch it with bare fingers.

WARNING:

DO NOT apply power to the product if it has visible damage!

Doing so may cause further, possibly irreparable damage, as well as introduce a fire or shock hazard.

WARNING:

Before installing or removing any board, please ensure that the system power and external supplies have been turned off!

CAUTION:

Before you install and operate the G500, read and follow the safety guidelines and instructions in Safety precautions.

WARNING:

An improperly wired ground connection could place hazardous voltages on accessible metal parts.

DANGER:

Electric shock can cause injury and may be fatal.

Before installing or removing any board, please ensure that the system power and external supplies as well as power to devices connected to the ALARM Relay output have been turned off and/or are unplugged from the device.

# H49

## Electrical Safety Requirements

Insulation testing may leave capacitors charged to dangerous voltage levels. Discharge capacitors by reducing test voltages to zero before disconnecting leads.

Equipment should be cleaned only when de-energized using a lint free cloth dampened with water only.

When SFP Copper Ethernet modules are used, the connected cable length shall be less than 3m length and shall not extend beyond the cabinet where the product is used. The equipment connected to both ends of the cable shall be connected directly to a common protective earth point within the same cabinet.

When optical SFP modules are used they are hot-swappable however, note that any connected fiber optic cables must be fully insulated and not contain any metal (e.g. tracers), to allow full isolation from auxiliary equipment.

Before switching on the power ensure that the auxiliary supply is within range of the unit (as specified on the rating label on the side of the unit).

## Installation

Always use insulated crimp terminations for voltage and current connections.

Only two wires can be screwed together on any one connector.

The AC and DC signal and communication wires should use separate shielded cable.

Reason H49 is designed to be mounted on standard DIN Rail only. For this purpose, two adjustable mounting brackets are located on the back of the H49, one on the top and one on the bottom of the rear face. Optional Weidmuller FM4 TS35 mounting clip can also be used.

Ensure that connections to either of the power supply inputs or the Alarm Relay connector are terminated using insulated crimp ferrules. This is to reduce the risk of wire strands from shorting to adjacent connections.

Check that any connections made to the unit are secure before applying the power.

### Grounding

The PCT (Protective Conductor Terminal) minimum wire size is 2.5 $mm^2$ for countries whose mains supply is 230 V and 3.3 $mm^2$ for countries whose mains supply is 110 V. This may be superseded by local or country wiring regulations. This must be terminated with an M4 ring crimp of the correct size for the wire used.

Use of a locknut or similar mechanism to ensure the integrity of stud-connected PCT.

This equipment requires a protective conductor (earth) to ensure user safety according to the definition in the standard BS EN 60255-27:2014 (IEC 60255-27:2013) Insulation Class 1.

The protective conductor (earth) must be as short as possible, with low resistance and inductance. The best electrical conductivity must be maintained at all times, particularly the contact resistance of the plated steel stud surface.

To maintain the safety features of the equipment it is essential that the protective conductor (earth) is not disturbed when connecting or disconnecting functional earth conductors such as cable screens, to the PCT stud.

### Voltage Fuses

For external fuse protection, a high rupture capacity (HRC) fuse type with a maximum current rating of 16A and a minimum DC rating of 220V DC may be used for the auxiliary supply (for example red Spot type NIT or TIA).

## HardFiber Process Bus System

Do not operate except with the ground terminals on Bricks and Cross Connect Panels solidly connected to ground with a copper wire sized #12 AWG or larger.

## HFA Multi-Contact Auxiliary Relay

When pilot wires are used to connect protective relays, it is possible for high voltages to appear between the pilot wires and ground at the terminals. These voltages are usually due to the differences in station ground potential but may also be due to longitudinal induction if the pilot wires are run parallel to and near power lines for any distance. Since the HFA relays are connected directly to the pilot wires, parts of the relay will be the same potential as the pilot wires, and the necessary precautions should be observed when inspecting the relay or testing it in place.

## iBOX Serial Substation Controller

Disconnect and lock out all power sources before servicing and removing components.

Short all current transformer primaries before servicing.

Avoid touching the device power supplies, since these supplies contain hazardous voltages.

## IDU Integrated Display Unit

Risk of electric shock and energy hazard: Disconnecting one power supply disconnects only one power supply module. To isolate the unit completely, disconnect all power supplies.

To meet safety requirements, install a switch between the SDIDU.

For the TM external power supply and the SDIDUTM power supplies, the switch must disconnect both poles of the power supply.

Static electricity may cause bodily harm, as well as harm electronic components inside the device. Anyone responsible for the installation or maintenance of the IDU must use an ESD wrist strap. ESD protection measures must be observed when touching the IDU. To prevent damage, before touching components inside the device, all electrostatic voltage must be discharged from both personnel and tools.

## LM10 Modular Low Voltage Motor Protection

This product shall be provided with a maximum 10 A DC listed fuse or circuit breaker in the supply circuit when connected to a 48 V centralized DC source.

When using the maintained switching feature, potential safety hazards must be considered and an appropriate setup chosen for each individual application.

## MiCOM Agile

### Electrical safety requirements

Insulation testing may leave capacitors charged to dangerous voltage levels. Discharge capacitors by reducing test voltages to zero before disconnecting leads.

Equipment should be cleaned only when de-energised using a lint free cloth dampened with water only.

Where external components such as resistors or voltage dependent resistors (VDR) are used, these may present a risk of electric shock or burns if touched.

Take extreme care when using external test blocks and test plugs such as the MMLG, MMLB and P990, as hazardous voltages may be exposed. Ensure that CT shorting links are in place before removing test plugs, to avoid potentially lethal voltages.

Data communication cables with accessible screens and/or screen conductors, (including optical fiber cables with metallic elements), may create an electric shock hazard in a substation environment if both ends of the cable screen are not connected to the same equipotential bonded earth system.

To reduce the risk of electric shock due to transferred potential hazards:

- The installation shall include all necessary protection measures to ensure that no fault currents can flow in the connected cable screen conductor.
- The connected cable shall have its screen conductor connected to the protective conductor terminal (PCT) of the connected equipment at both ends. This connection

may be inherent in the connectors provided on the equipment but, if there is any doubt, this must be confirmed by a continuity test.

- The PCT of each piece of connected equipment shall be connected directly to the same equipotential bonded earthing system.
- If, for any reason, both ends of the cable screen are not connected to the same equipotential bonded earth system, precautions must be taken to ensure that such screen connections are made safe before work is done to, or in proximity to, any such cables.
- No equipment shall be connected to any download or maintenance circuits or connectors of this product except temporarily and for maintenance purposes only.
- Equipment temporarily connected to this product for maintenance purposes shall be protectively earthed (if the temporary equipment is required to be protectively earthed), directly to the same equipotential bonded earthing system as the product.

Equipment carrying UL/CSA/CUL marking intended for rack or panel mounting is for use on a flat surface if a Type 1 enclosure, as defined by Underwriters Laboratories (UL).

Equipment carrying UL/CSA/CUL marking shall be installed using UL/CSA/CUL recognized parts for: cables, protectives fuses, fuse holders and circuit breakers, insulation crimp terminals and replacement internal batteries.

## Installation

Tighten M4 clamping screws of heavy-duty terminal block connectors to a nominal torque of 1.3 Nm. Tighten captive screws of terminal blocks to 0.5 Nm minimum and 0.6 Nm maximum.

Always use insulated crimp terminations for voltage and current connections.

Watchdog (self-monitoring) contacts are provided to indicate the health of the device. We strongly recommend that these are hard wired in the substation automation system, for alarm purposes.

## Grounding

The PCT minimum wire size is 2.5 $mm^2$ for countries whose mains supply is 230 V and 3.3 $mm^2$ for countries whose mains supply is 110 V. This may be superseded by local or country wiring regulations.

Use of a locknut or similar mechanism to ensure the integrity of stud-connected PCT.

## Voltage Fuses

Where UL/CSA listing of the equipment is required for external fuse protection, a UL or CSA listed fuse must be used for the auxiliary supply. The listed protective fuse type is: Class J time delay fuse, with a maximum current rating of 15A and a minimum DC rating of 250V DC (for example type JT15).

Where UL/CSA listing of the equipment is not required for external fuse protection, a high rupture capacity (HRC) fuse type with a maximum current rating of 16A and a minimum DC rating of 250V DC may be used for the auxiliary supply (for example red Spot type NIT or TIA).

Digital input circuits should be protected by an HRC NIT or TIA fuse with maximum rating of 16 A. Current transformers must never be fused since open circuiting them may produce lethal hazardous voltages. Other circuits should be appropriately fused to protect the wire used.

### Decommissioning

Before decommissioning, completely isolate the equipment power supplies (both poles of any DC supply). The auxiliary supply input may have capacitors in parallel, which may still be charged. To avoid electric shock, discharge the capacitors using the external terminals before decommissioning.

### Upgrading/Servicing

Do not insert or withdraw modules, PCBs or expansion boards from the equipment while energized, as this may result in damage to the equipment. Hazardous live voltages would also be exposed, endangering personnel.

Internal modules and assemblies can be heavy and may have sharp edges. Take care when inserting or removing modules into or out of the IED.

## ML800 Ethernet Switch

48 V DC products shall be installed with a readily accessible disconnect device in the building installation supply circuit to the product.

The external power supply for DC units shall be a listed, direct plug-in power unit, marked Class 2, or listed ITE power supply, marked LP, which has suitably rated output voltage (that is, 24 V DC or 48 V DC) and suitable rated output current.

If the equipment is mounted in an enclosed or multiple rack assembly, verify the equipment's power requirements to prevent overloading of the building electrical circuits.

## ML810 Managed Edge Switch

### Electrical safety requirements

This product is to be installed Only in Restricted Access Areas (Dedicated Equipment Rooms, Electrical Closets, or the like).

48 V DC products shall be installed with a readily accessible disconnect device in the building installation supply circuit to the product.

This product shall be provided with a maximum 10 A DC Listed fuse or circuit breaker in the supply circuit when connected to a 48 V centralized DC source.

The external power supply for DC units shall be a Listed, Direct Plug In power unit, marked Class 2, or Listed ITE Power Supply, marked LP, which has suitably rated output voltage (i.e. 24 V DC or 48 V DC) and suitable rated output current.

Product does not contain user replaceable fuses. Any internal fuses can ONLY be replaced by GE Digital Energy.

### Installation requirements

CAUTION: Before installing equipment, it is necessary to take the following precautions:

If the equipment is mounted in an enclosed or multiple rach assembly, the steady state long-term environmental temperature around the equipment must be less than or equal to 60°C.

If the equipment is mounted in an enclosed or multiple rack assembly, adequate airflow must be maintained for proper and safe operation.

If the equipment is mounted in an enclosed or multiple rack system, placement of the equipment must not overload or load unevenly the rack system.

If the equipment is mounted in an enclosed or multiple rack system, verify the equipment's power requirements to prevent overloading of the building(s) electrical circuits.

If the equipment is mounted in an enclosed or multiple rack system, verify that the equipment has a reliable and uncompromised earthing path.

# ML3000, 3100, 3001, 3101 Ethernet Switch Series

## Electrical safety requirements

This product is to be installed Only in Restricted Access Areas (Dedicated Equipment Rooms, Electrical Closets, or the like).

48 V DC products shall be installed with a readily accessible disconnect device in the building installation supply circuit to the product.

This product shall be provided with a maximum 10 A DC Listed fuse or circuit breaker in the supply circuit when connected to a 48 V centralized DC source.

The external power supply for DC units shall be a Listed, Direct Plug In power unit, marked Class 2, or Listed ITE Power Supply, marked LP, which has suitably rated output voltage (i.e. 48 V DC) and suitable rated output current.

Product does not contain user replaceable fuses. Any internal fuses can ONLY be replaced by GE Digital Energy.

Models with a DC power source must be supplied with a DC supply source to the equipment that is derived from a secondary circuit which is isolated from the AC Mains by Double or Reinforced Insulation (eg: UL Certified ITE power supply which provides Double or Reinforced Insulation).

## General safety precautions

CAUTION:

Failure to observe and follow the instructions provided in the equipment manual(s) could cause irreversible damage to the equipment and could lead to property damage, personal injury and/or death.

Before attempting to use the equipment, it is important that all danger and caution indicators are reviewed.

If the equipment is used in a manner not specified by the manufacturer or functions abnormally, proceed with caution. Otherwise, the protection provided by the equipment may be impaired and can result in Impaired operation and injury.

Caution: Hazardous voltages can cause shock, burns or death.

Installation/service personnel must be familiar with general device test practices, electrical awareness and safety precautions must be followed.

Before performing visual inspections, tests, or periodic maintenance on this device or associated circuits, isolate or disconnect all hazardous live circuits and sources of electric power.

Failure to shut equipment off prior to removing the power connections could expose you to dangerous voltages causing injury or death.

All recommended equipment that should be grounded and must have a reliable and un-compromised grounding path for safety purposes, protection against electromagnetic interference and proper device operation.

Equipment grounds should be bonded together and connected to the facility's main ground system for primary power.

Keep all ground leads as short as possible.

At all times, equipment ground terminal must be grounded during device operation and service.

In addition to the safety precautions mentioned all electrical connections made must respect the applicable local jurisdiction electrical code.

This product contains Class I lasers.

Chassis power supply ratings must be verified for suitablility before inserting removable power supply modules.

## UL/CE requirements for DC-powered units

Minimum 18 AWG cable for connection to a centralized DC power source.

Minimum 14 AWG cable for connection to a earthing wiring.

Use only with listed 10 A circuit breaker provided in building installation, and a 20 A (maximum) branch protection for units rated 90 to 265 V.

“Complies with FDA radiation performance standards, 21 CFR sub-chapter J” or equivalent.

Fastening torque of the lugs on the terminal block: 9 inch-pound maximum.

For AC and HI powered units, use only with listed 20A circuit breaker provided in building installation. Circuit breaker shall be provided in end system or building as disconnect device.

Disconnect all power sources before servicing. Take special precautions if servicing a dual power supply unit.

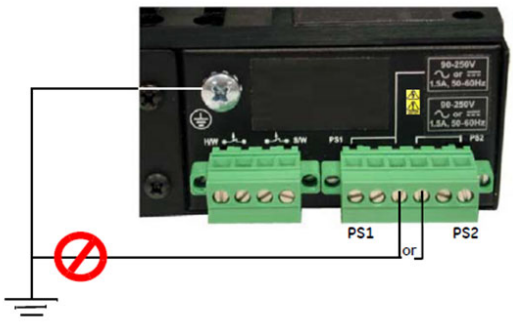
Only CE marked external power supplies must be used on the DC-powered unit.

Centralized DC power source cable securing; use at least four cable ties to secure the cable to the rack at least 4 inches apart, with the first one located within 6 inches of the terminal block.

## Dielectric strength (hi-pot) testing

CAUTION:

The shorting link between the and safety ground ⏚ must be removed prior to the dielectric strength test, as shown below, to protect the transient suppression circuitry of the power supply.



## MLJ Digital Synchronism Check Relay

In relays with communications or if a cable with a shield is used, the shield should be connected to the terminal intended for this purpose (B11), without interrupting continuity, and not connecting to the ground. However, for personal safety, and in order to divert interference to ground, it must always be connected to the ground in at least one point. Generally the most convenient place is on the side of the communications controller. By doing this, grounding the cable is achieved as well as avoiding circulation of currents through the cable, which could affect the correct operation of communications.

In the wiring of any electrical equipment to its case, if the case is metallic, there is always a capacity, which is the sum of the interference capacity and the capacities required for filtering. Although the currents that can circulate through these capacities may not be dangerous for people, they are always startling and annoying, and made worse when the ground is wet or when lightweight footwear is used.

## MULTINET FE Serial to Ethernet converter

POWER TERMINALS: The left three power terminals are for input power. The terminals are labeled “L” and “N” for AC Line and neutral power.

The GND Terminal Must be connected to the ground to ensure adequate protection against transients

CAUTION: Control power supplied to the MultiNet must be connected to the matching power supply range. If the voltage is applied to the wrong terminals, damage may occur!

CAUTION: Observing any fiber transmitter output may cause injury to the eye!

ENVIRONMENTAL

- Ambient temperatures: Operation range: -20°C to 70°C
- Altitude: 2000 m (max)
- Insulation class: 1
- Pollution Degree: II
- Overvoltage Category: II
- Ingress protection: IP10 Front, IP40 Top, Bottom, Back, Left/Right

## P30 Phasor Data Concentrator

Failure to observe and follow the instructions provided in the equipment manual(s) could cause irreversible damage to the equipment and could lead to property damage, personal injury and/or death.

Before attempting to use the equipment, it is important that all danger and caution indicators are reviewed.

If the equipment is used in a manner not specified by the manufacturer or functions abnormally, proceed with caution. Otherwise, the protection provided by the equipment may be impaired and can result in impaired operation and injury.

Caution: Hazardous voltages can cause shock, burns or death.

Installation/service personnel must be familiar with general device test practices, electrical awareness and safety precautions must be followed.

Before performing visual inspections, tests, or periodic maintenance on this device or associated circuits, isolate or disconnect all hazardous live circuits and sources of electric power.

Failure to shut equipment off prior to removing the power connections could expose you to dangerous voltages causing injury or death.

All recommended equipment that should be grounded must have a reliable and un-compromised grounding path for safety purposes, protection against electromagnetic interference and proper device operation.

Equipment grounds should be bonded together and connected to the facility's main ground system for primary power.

Keep all ground leads as short as possible.

At all times, equipment ground terminal must be grounded during device operation and service.

In addition to the safety precautions mentioned all electrical connections made must respect the applicable local jurisdiction electrical code.

Lexan terminal block cover on power input board: Must be replaced after electrical connects are made, to reduce the probability of electrical shock.

Field crimped terminal lugs used on the P30 must be of a type which are insulated. Uninsulated body terminal lugs will pose a potential risk of shock to the end user.

WARNING: Depending on the chassis, open equipment enclosures and chassis can expose hazardous voltage which may cause electric shock to the installer. Be sure line power to the equipment is disconnected before servicing the chassis and components.

FIBER/LASER NOTICE

For fiber optic / laser devices, note the following warnings and notes:

CAUTION: Products containing Class 1 optical/laser devices comply with:

- IEC60825-1

Invisible laser radiation may be emitted from disconnected fibers or optical/laser devices. Do not stare into beams or view directly with optical instruments as this may permanently damage your eyes.

CAUTION: It is important to disconnect or remove all cables before removing or installing a board containing an optical/laser transceiver.

Do not leave an optical/laser transceiver uncovered except when inserting or removing a cable. The safety/dust plugs keep the port clean and prevent accidental exposure to laser light.

## SPM Synchronous Motor Protection and Control

Do not attempt to start the motor without the external resistor assembly wired. Severe damage to the device may result if the external resistor assembly is not properly connected.

# Universal Relay (UR)

## General Cautions and Warnings

Ensure that all connections to the product are correct so as to avoid accidental risk of shock and/or fire, for example such as can arise from high voltage connected to low voltage terminals.

Follow the requirements of the product-specific UR manual, including adequate wiring size and type, terminal torque settings, voltage, current magnitudes applied, and adequate isolation/clearance in external wiring from high to low voltage circuits.

Use the device only for its intended purpose and application.

Ensure that all ground paths are uncompromised for safety purposes during device operation and service.

Ensure that the control power applied to the device, the alternating current (AC), and voltage input match the ratings specified on the relay nameplate. Do not apply current or voltage in excess of the specified limits.

Only qualified personnel are to operate the device. Such personnel must be thoroughly familiar with all safety cautions and warnings in this manual and with applicable country, regional, utility, and plant safety regulations.

Hazardous voltages can exist in the power supply and at the device connection to current transformers, voltage transformers, control, and test circuit terminals. Make sure all sources of such voltages are isolated prior to attempting work on the device.

Hazardous voltages can exist when opening the secondary circuits of live current transformers. Make sure that current transformer secondary circuits are shorted out before making or removing any connection to the current transformer (CT) input terminals of the device.

For tests with secondary test equipment, ensure that no other sources of voltages or currents are connected to such equipment and that trip and close commands to the circuit breakers or other switching apparatus are isolated, unless this is required by the test procedure and is specified by appropriate utility/plant procedure.

When the device is used to control primary equipment, such as circuit breakers, isolators, and other switching apparatus, all control circuits from the device to the primary equipment must be isolated while personnel are working on or around this primary equipment to prevent any inadvertent command from this device.

Use an external disconnect to isolate the mains voltage supply.

Personal safety can be affected if the product is physically modified by the end user. Modifications to the product outside of recommended wiring configuration, hardware, or programming boundaries is not recommended end-use practice. Product disassembly and repairs are not permitted. All service needs to be conducted by the factory.

LED transmitters are classified as IEC 60825-1 Accessible Emission Limit (AEL) Class 1M. Class 1M devices are considered safe to the unaided eye. Do not view directly with optical instruments.

This product is rated to Class A emissions levels and is to be used in Utility, Substation Industrial environments. Not to be used near electronic devices rated for Class B levels.

# Safety and Regulatory Information

# Chapter 3: EU declaration of conformity

The following two pages contain the generic EU Declaration of Conformity documents and the generic EU Declaration of Conformity Appendix that are included with GE Grid Solutions products.

# GE Grid Solutions Conformity Template

## EC Declaration of Conformity

**Declaration No.** (Unique ID number of declaration)

CE YY

**Manufacturer Name:** Enter business name
**Address:** Address 1
Address 2

### Object of the declaration

| | |
|---|---|
| Product Name or Model # | Product Title or Description |
| Product Name or Model # | Product Title or Description |

**We (the Manufacturer) declare under our sole responsibility that the product(s) described above is/are in conformity with applicable EC harmonization Legislation.**

| Document No. | Title | Edition/Issue |
|---|---|---|
| Directive 1 | Title of Directive | Issue date |
| Directive 2 | Title of Directive | Issue date |
| Directive n | Title of Directive | Issue date |

**Harmonised standards or references to the specifications in relation to which conformity is declared:**

| Document No. | Title | Edition/Issue |
|---|---|---|
| XXXX/xx/ZZ | Title of the standard, regulation etc. | Date |
| XXXX/xx/ZZ | Title of the standard, regulation etc. | Date |
| XXXX/xx/ZZ | Title of the standard, regulation etc. | Date |
| XXXX/xx/ZZ | Title of the standard, regulation etc. | Date |
| XXXX/xx/ZZ | Title of the standard, regulation etc. | Date |

### Additional Information

(Example) - This certificate is issued in conjunction with the EC Type Examination Certificate xxxx ISSUE xxxx

### Signed for and on behalf of the Manufacturer:

**Name:** xxxxx xxxxx
**Function:** DE Engineering Manager
**Signature:**

**Name:** Kevin Fuller
**Function:** DE Technical Regulations & Standards Leader
**Signature:**

Issued Date:

# EC Declaration of Conformity Appendix

**Declaration No.** (Unique ID number of declaration) CE YY

**Object of the declaration**

| | |
|---|---|
| Product Name or Model # | Product Title or Description |
| Product Name or Model # | Product Title or Description |

*Use this page to list product options or products covered by this DoC in case single page is not sufficient.*

# Safety and Regulatory Information

# Appendix A: Miscellaneous

This chapter provides information on the revision history of this document and the abbreviations used within it.

## Revision history

**Table 1: Revision history**

| GE publication number | Release date |
|---|---|
| GET-8538A | February 2015 |
| GET-8538B | June 2019 |
| GET-8538C | April 2023 |

## Abbreviations

| | |
|---|---|
| AC | Alternating Current |
| AEL | Accessible Emission Limit |
| AWG | American Wire Gauge |
| Cd | Cadmium |
| CT | Current Transformer |
| DC | Direct Current |
| EMC | Electromagnetic Compatibility |
| ESD | Electrostatic Discharge |
| Hg | Mercury |
| HRC | High Rupture Capacity |
| IEC | International Electrotechnical Commission |
| Pb | Lead |
| PCT | Protective Conductor Terminal |
| UL | Underwriters Laboratories |