

# Earth-Rite® DGS Dual Grounding system

## Installation & Operating Instructions



The safety of any system incorporating the equipment referred to in this manual is the responsibility of the installer of the system.

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

Any warranty is made void if the equipment is not installed, or used, in accordance with the manufacturers instructions.

# INSTALLATION & OPERATING INSTRUCTIONS

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## PRODUCT OVERVIEW

The problem of static electricity in hazardous atmospheres is ever present in many sectors of the processing industries. Effective grounding and bonding procedures are always the first step in controlling static, with special techniques being called for to suit individual applications.

The Earth-Rite DGS system allows one or two plant items to be grounded, and the grounding connections to be monitored. The system can then be interlocked with control circuits so as to shut off pumps or solenoids, or initiate alarms, in the event of a earthing fault.

The system has cCSAus, ATEX and IECEx Approval for use in hazardous atmospheres and meets all current EC directives.

## Important Safety Precautions



This symbol, wherever it appears, alerts you to important instructions; and applies to all instructions in this section.

### DETAILED SAFETY INSTRUCTIONS:

Read these instructions.

Keep these instructions.

Heed all warnings.

Follow all instructions.

Install in accordance with the manufacturer's instructions.

Do not install near any heat sources.

Do not allow water to enter any of the enclosures.

Refer all servicing to qualified service personnel. Servicing is required when the apparatus has been damaged in any way, such as if liquid has been spilled or objects have fallen into any of the Earth-Rite DGS enclosures, or the equipment does not operate as intended, or has been dropped.

All wiring should be as shown in this manual. Alternative wiring arrangements are not recommended as they may infringe the certification requirements.

The installation must comply with the installation requirements of the country of use. e.g.

**Canada:** CSA C22.2 No. 0-M (General Requirements - Canadian Electrical Code, Part II) & CSA C22.1 Part I Appendix F.

**USA:** ANSI/ISA RP12.06.01 Recommended Practice for Wiring Methods For Hazardous (Classified) Locations) Instrumentation Part 1: Intrinsic Safety.

In addition, the installation must be in accordance with the manufacturer's guidelines.

**WARNING** - Substitution of components may impair Intrinsic Safety.

The cable connecting the Monitoring Unit to the Junction Boxes must be rated at 500V and have a flammability classification of VW-1, equivalent or better.

The Earth-Rite DGS should be taken out of service if it shows signs of damage or liquid/dust ingress.

### **DO NOT OPEN THE EARTH-RITE DGS ENCLOSURE WHEN AN EXPLOSIVE GAS AND/OR DUST ATMOSPHERE MAY BE PRESENT**

The Earth-Rite DGS Ground Monitoring Circuit must have a connection to a verifiable ground point in order to dissipate static electricity.

Connector PL7, Line Power Input Terminals on the Power Supply PCB, should be accessed only in an unclassified location (safe area).

The Monitoring Unit enclosure must be connected to ground in order to dissipate any charge safely away from the enclosure.

**The system shall be installed as per the control drawing X DGS-Q-17051 cCSAus.**

### **Disposal of the Earth-Rite DGS**

At the end of its life the Earth-Rite DGS should be disposed of in a safe, considerate, environmentally friendly manner.

Wiring methods must be in accordance with the CEC Part I, Section 18 for Canada and NEC, ANSI/NFPA 70, Article 504 for US. For additional information refer to ANSI/ISA RP12.6. Wiring methods must also be in accordance with the NEC, ANSI/NFPA 70, Article 501.

Care must be taken to guarantee the separation of non-intrinsically safe and intrinsically safe wiring.

Cable must be rated at a minimum of 212°F (100°C).

**Warning: Keep the Monitoring Unit cover tightly closed when circuits are alive.**

After disconnecting power supply, wait 15 minutes before removing cover.

### **ALWAYS DISCONNECT SUPPLY CIRCUITS BEFORE OPENING ENCLOSURE**

#### **Conduit Seals**

In hazardous locations, seals are needed in the following instances:

Where the conduit enters an enclosure that houses arcing or high-temperature equipment. (A seal must be within 18 inches of the enclosure it isolates.)

Where the conduit leaves a Division 1 area or passes from a Division 2 hazardous area to a non hazardous location.

The ambient operating temperature (Tamb) for the Monitoring Unit is -40°F to +122°F (-40°C to +50°C).

Ensure that the non Intrinsically Safe wiring, inside the Monitoring Unit enclosure cannot come into contact with any Intrinsically Safe wiring or terminals.

All wiring entering the monitoring unit must do so using an approved method.

The system should be connected as per the enclosed installation drawings.

The Earth-Rite DGS Monitoring Unit shall be powered from a supply voltage of 90Vac to 264Vac, 50/60Hz.

The unit should be protected using a 2A Quick Acting Glass Tube Fuse, or miniature circuit breaker, mounted in the distribution board / fuse box.

#### **Instructions for protective earthing:**

The Protective Conductor Terminal, of the Earth-Rite DGS Monitoring Unit, shall be connected to a suitable low impedance Ground (Earth) point in accordance with the wiring regulations of the country of installation.




In accordance with IEC 61010-1, PERMANENTLY CONNECTED EQUIPMENT and multi-phase equipment shall employ a switch or circuit-breaker as the means for disconnection.

In order to install the Earth-Rite DGS system in accordance with IEC 61010-1, the following applies:

- a) a switch or circuit-breaker must be included in the installation;
- b) it must be suitably located and easily reached;
- c) it must be marked as the disconnecting device for the equipment.

In addition, the switch must be suitably approved for use in the intended atmosphere.

The following warning symbols are used on the equipment. Reference shall be made to the table below.

	Documentation must be consulted in all cases where this symbol is marked
	Caution, possibility of electric shock
	Electrical earth connection point

The Earth-Rite DGS Monitoring Unit should be mounted, sheltered from direct sunlight, at a convenient location, visible to the operator.

**Note:** It is recommended that the transfer or mixing operation is interlocked with the contacts of the Earth-Rite DGS unit. This will ensure that the operation is stopped if the ground connection is inadvertently lost.

## Other Approvals

### Electromagnetic Compatibility

The Earth-Rite DGS has been tested and shown conformity to European Directive 2004/108/EC, and FCC Part 15 Emissions.

Conformity has been proven to BS EN 61000-6-2, Immunity and BS EN 61000-6-3, Emissions.

#### Notes relating to FCC Part 15:

Changes or modifications to the equipment, not approved by the responsible party, will void the user's authority to operate the equipment.

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules.

These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause

harmful interference to radio communications.

Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

The Earth-Rite DGS ground monitoring circuit is intended for use with any conductive metal item such as a rail tanker, tank truck, drum, mixing vessel, etc. It is set to show permissive only when the system detects that the connection to the plant item, and to the ground bus, is less than 10 Ohms nominal resistance. Until this condition is achieved, the system remains non-permissive.

The lid of the Monitoring Unit enclosure is removed by rotating it in an anti-clockwise direction. A pair of tools, which locate in the two holes in the lid, are provided to assist in this operation.

After installation of wiring, secure the cover to the body making sure it is fully tightened.

**Maintenance:** Periodically check exterior of enclosure for damage or deterioration.

**IF YOU HAVE ANY QUERIES REGARDING THE ABOVE POINTS THEN PLEASE CONTACT NEWSON GALE, OR THEIR APPROVED DISTRIBUTOR, WITHOUT DELAY.**

#### Important Note

The grounding clamp should be fitted prior to any other operation as per the recommendations of NFPA 77 and API RP 2003.

## Intrinsically Safe Output Parameters

The equipment has the following output parameters at the Earth-Rite DGS Monitor board:

Parameter	Output Parameter Value
	Connections to the Ground Clamps and Ground Bar (PL4, PL2 and PL3 combined)
Uo	8.61V
Io	17mA
Po	36mW
Co	5.87µF
Lo	123mH
Lo/Ro	990µH/ohm

## INSTALLATION OVERVIEW

The installation shall be carried out by suitably trained personnel.

All cables entering the Earth-Rite DGS Monitoring Unit, must be connected through approved cable glands or approved conduit system.

Threaded entries into enclosures must be fitted with the right sized cCSAus certified cable glands or conduit system or thread adaptors/reducers or blanking elements.

The glands/conduit should be fitted in such a way as to maintain the ingress protection rating of the enclosure.

Cables connected within the Earth-Rite DGS Monitoring Unit shall have a flammability classification of VW-1, equivalent or better.

The system should be connected as per the enclosed installation drawings.

Unused cable entries must be fitted with approved stopper plugs.

The Earth-Rite DGS Monitoring Unit shall be powered from a supply voltage or 90Vac to 264Vac, 50/60Hz.

The Earth-Rite DGS should be protected using a 2A fast blow fuse, or circuit breaker, mounted in the distribution board / fuse box.

The Earth-Rite DGS Monitoring Unit should be mounted, with the indicators facing away from direct sunlight, at a convenient location, visible to the operator.

After installation of wiring, replace the enclosure covers, making sure they are tight.

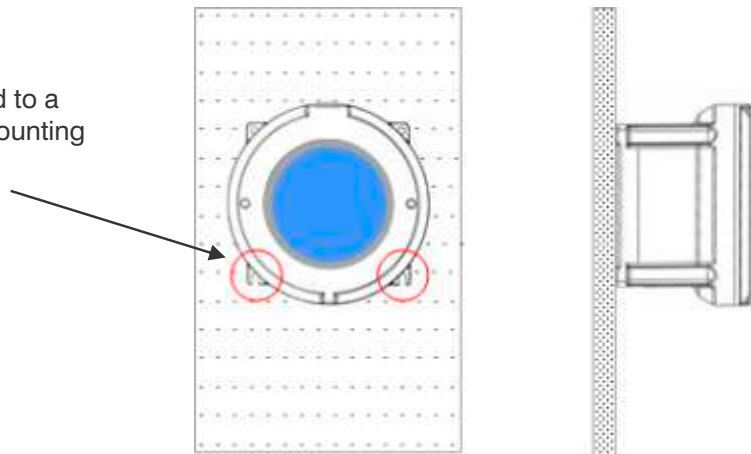
**NOTE:** Cables must be secured close to the Monitoring Unit enclosure in order to prevent them being accidentally pulled out.

It is recommended that the transfer or mixing operation is interlocked with the contacts of the Earth-Rite DGS. This will ensure that the operation is stopped if the static ground connection is inadvertently lost.

**Maintenance:** Periodically check exterior of all enclosures for damage or deterioration.

## Earth-Rite DGS - Monitoring Unit Mounting Orientation

Ensure the Monitoring Unit is fixed to a vertical surface with the slotted mounting brackets facing downwards.



**IF YOU HAVE ANY QUERIES REGARDING THE ABOVE POINTS THEN PLEASE CONTACT NEWSON GALE, OR THEIR APPROVED DISTRIBUTOR, WITHOUT DELAY.**

Please contact Newson Gale Ltd if you require a translation of this manual.

# Earth-Rite DGS System Configuration

## Applications

Duplex Grounding only

Simplex Grounding only

## ACTIVATING THE CHANNELS AND THE MASTER RELAY

The RED selector switch SW2, is located towards the middle of the Monitoring PCB.

The switches are ON when moved towards the switch numbers.

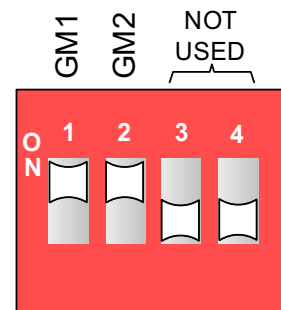
The switches can be operated by carefully sliding the switch actuator towards, or away from, the switch numbers.



Do not operate the switches unless the Earth-Rite DGS has been disconnected from the supply.

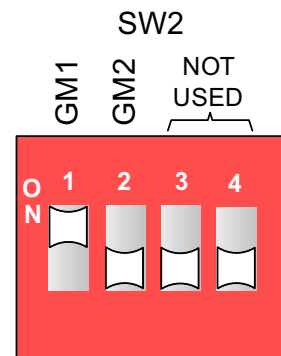
### Duplex Grounding

With both of the switches in the ON position both of the grounding circuits are active. Connection of either grounding circuit will activate the individual relay interlock and the Master relay will operate if both circuits are permissive. The LED's for each grounding channel will operate as normal.



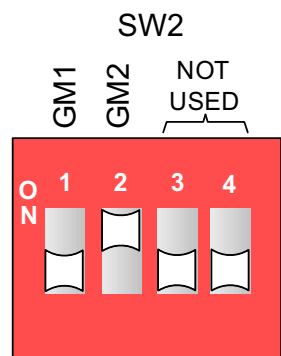
### Simplex Grounding

With switch 2 in the OFF position grounding channel GM2 will no longer be active. The LED's for this channel will not show and the channel relay will not operate. Channel GM1 will operate as normal and the Master relay will operate with channel GM1.



### Simplex Grounding

With switch 1 in the OFF position grounding channel GM1 will no longer be active. The LED's for this channel will not show and the channel relay will not operate. Channel GM2 will operate as normal and the Master relay will operate with channel GM2.



**Note:** Switches 3 and 4 are not used and should be left in the **OFF** position.

SW2



## Earth-Rite DGS

### Monitoring Unit Access - Enclosure Lid Removal

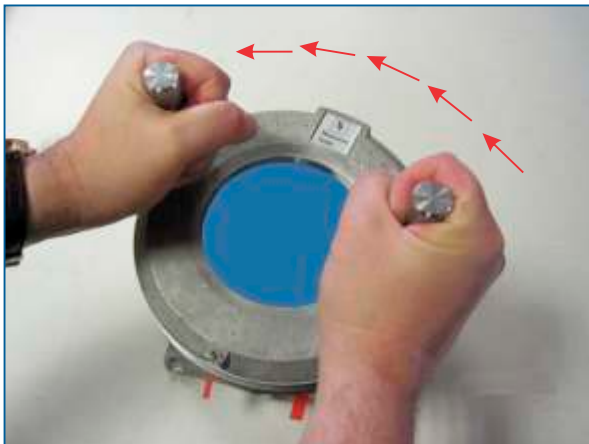


Remove lid keys from packaging



Place lid keys into the two  
Earth-Rite DGS lid holes

Make sure that the grub screw is loose  
before trying to remove the lid



Lid Removal: With lid keys securely located  
in holes, rotate counter-clockwise to loosen  
the lid from the enclosure



Lid fitting: With lid keys securely located  
in holes, rotate lid clockwise to tighten  
the lid onto the enclosure



## Earth-Rite DGS

### Internal Component Assembly

#### Avoiding Electrostatic Discharge (ESD) damage to the Earth-Rite DGS Monitoring PCB / Card

Always take precautions to ensure that you are not electrostatically charged whilst handling the Monitoring PCB / Card.

Always handle the PCB / Card by the edges, or terminal block, and avoid touching the components.

When not fitted inside the Earth-Rite DGS enclosure, always keep the PCB / Card in the static dissipative bag provided.

1. Remove the lid of the enclosure using the lid key tools provided.

Remove the blue approval label by unscrewing the 4 screws. Carefully store these screws for use later.

2. Disconnect the 5 wires of the ribbon cable from the terminal block of the Monitoring PCB.

Remove the Monitoring PCB by unscrewing the 4 hexagonal metal pillars.

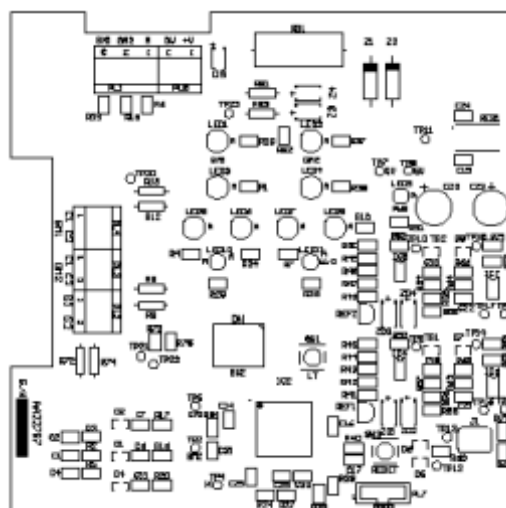
Place the Monitoring PCB in the anti-static bag provided, and keep it safe.

3. Make the connections to the Power Supply PCB.
4. Replace the Monitoring PCB and secure using the 4 hexagonal metal pillars.

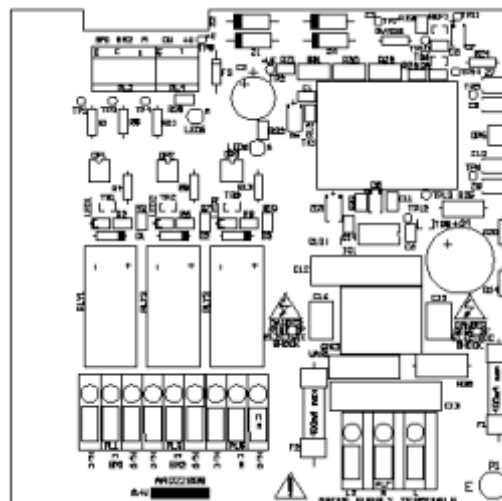
Re-connect the ribbon cable and make the external I.S. wiring connections into the Terminal block.

5. Replace the blue approval label and secure using the 4 screws provided.

Replace the lid of the enclosure securely.



Monitoring  
PCB



Power Supply  
PCB

## Environmental Conditions

The Monitoring Unit is designed to be used both indoors and outdoors in hazardous atmospheres. The Earth-Rite DGS is permanently connected, Equipment Class 1, Pollution Degree 2, Overvoltage Category 2

Mode of operation	Continuous
Altitude up to	2000m
Ambient Temperature Range	-40°C to +50°C
Maximum Relative Humidity	100%
Mains supply Voltage Fluctuations	Up to +/- 10% of the nominal voltage
Transient Over-Voltages Levels	Up to the levels of Category II of IEC 61010-1: 2010 Clause 6.7
Temporary Over-Voltages	In accordance with IEC 61010-1: 2010 Clause 6.7
Applicable Pollution Degree	Degree 2

**The Ingress Protection ratings of the various parts of the equipment are as follows:**

Earth-Rite DGS Monitoring Unit	IP66, NEMA 4X
Junction Box	IP66

**Note:** The tightening torque for the GREEN Ex e terminals, of the Earth-Rite DGS Monitoring Unit, is 0.4 Nm minimum to 0.5 Nm maximum.

**IF YOU ARE IN ANY DOUBT REGARDING THE INSTALLATION THEN PLEASE CONTACT  
NEWSON GALE, OR THEIR APPROVED DISTRIBUTOR, WITHOUT DELAY.**

## Maximum Cable Length Considerations for the Earth-Rite DGS Intrinsically Safe Circuits

The Intrinsically Safe cables connected to the Earth-Rite DGS are restricted in length by three I.S. Parameters, namely C (capacitance), L (inductance) and the L/R ratio. The cable parameters correspond to the output parameters of the equipment (Co, Lo & Lo/Ro).

The IEC code of practice (IEC 60079-14 Section 16.2.2.2 Part c) Electrical Parameters of Cable) suggests practical maximum cable parameters, for C, L and the L/R ratio, as 200pf/m, 1μH/m and 30 μH/W respectively. However, cable manufacturers generally publish specific data for their cables.

This data can be used by the installer, in conjunction with the table below, to determine the maximum allowed cable length.

Consideration must also be given to the resistance of the cable loops as the Earth-Rite DGS monitors to a maximum resistance of 10 Ohms per clamp circuit.

In addition, all installations must be carried out in accordance with any relevant national standards and requirements.

## Earth-Rite DGS

### Approved Cable Parameters

External Capacitance (Monitoring PCB terminals PL2, PL3 & PL4 combined) Co	5.87μF
External Inductance (Monitoring PCB terminals PL2, PL3 & PL4 combined) Lo	123mH
External Lo/Ro (Monitoring PCB terminals PL2, PL3 & PL4 combined) Lo/Ro	990μH/ohm

#### Cable resistance values

The resistance figure shown should be multiplied by 2 to give the loop resistance.

Length	Cable Size and Type	Ohms
100m	of 1.0mm sq solid copper cable has a resistance of	1.72
100m	of 1.5mm sq solid copper cable has a resistance of	1.21
100m	of 2.5mm sq solid copper cable has a resistance of	0.741
100m	of 4.0mm sq solid copper cable has a resistance of	0.461
100ft	of 18 AWG solid copper cable has a resistance of	0.64
100ft	of 14 AWG solid copper cable has a resistance of	0.25
100ft	of 12 AWG solid copper cable has a resistance of	0.16

## Earth-Rite DGS

### Customer Supplied Cable Specification

#### Recommended Specification

##### Cable from Earth-Rite DGS Unit to Pump Starter or Control Circuit

2 conductor + Electrical Ground Conductor, 16 AWG approved cable, or 2# 16 AWG wires in steel conduit.

**Please note:** there are 3 sets of output contacts, which may be connected to suit the customer requirements.

##### Cable from Supply to the Earth-Rite DGS Unit

2 conductor + Electrical Ground Conductor, 16 AWG approved cable, or 2# 16 AWG wires in steel conduit.

##### The GROUND BUS Cables (G1 & G2)

2# 12 AWG Single conductor Insulated Sheathed cables terminated at the Site Ground Bus. The recommended sheath color for these cables is ORANGE.

The **Ground Bus Cables** should be terminated on the same Ground Bus at a distance of 1 to 12 inches (25-300 mm) apart.

#### NOTES:

Unprotected cables must be secured close to the enclosure in order to prevent them being accidentally pulled out.

When using flexible/intrinsically safe cable, utilize the Compression Gland for cable entry into the Junction Boxes – alternatively if using sealed/rigid conduit, take out and discard the cable gland, drill out and fit a suitable ¾" NPT conduit entry fitting.

#### Insulation of cables connected to the Earth-Rite DGS Monitoring Unit

All external cables connected to the Earth-Rite DGS Monitoring Unit shall have adequate insulation to suit the voltage and the environmental conditions. The insulation for all cables should be rated to at least 500V.

## Earth-Rite DGS

### Approved Cable Parameters

#### Canada/USA:

Class I, Div. 1, Groups A, B, C, D;  
 Class II, Div. 1, Groups E, F, G;  
 Class III, Div. 1

Class I, Zone 0, Group IIC; Class II, Zone 20, Group IIIC

#### Canada/USA:

Class I, Div. 1, Groups A, B, C, D;  
 Class II, Div. 1, Groups E, F, G;  
 Class III, Div. 1;

#### Canada:

Ex db[ia Ga] IIC T6 Gb  
 Ex tb[ia Da] IIIC T135°C Db

#### USA:

Class I, Zone 1, AEx db[ia Ga] IIC T6 Gb  
 Zone 21, AEx tb[ia Da] IIIC T135°C Db

Field Connections. See table below.

**Earth-Rite DGS  
Monitoring Unit**

#### Earth-Rite DGS - Approved Cable Parameters

External Capacitance (Monitoring PCB terminals PL2, PL3 & PL4 combined) Co	5.87μF
External Inductance (Monitoring PCB terminals PL2, PL3 & PL4 combined) Lo	123mH
External Lo/Ro (Monitoring PCB terminals PL2, PL3 & PL4 combined) Lo/Ro	990μH/ohm

# Earth-Rite DGS

## System Plan - Two Junction Boxes

### Canada/USA:

Class I, Div. 1, Groups A, B, C, D;  
Class II, Div. 1, Groups E, F, G;  
Class III, Div. 1

Class I, Zone 0, Group IIC; Class II, Zone 20, Group IIIC

### Canada/USA:

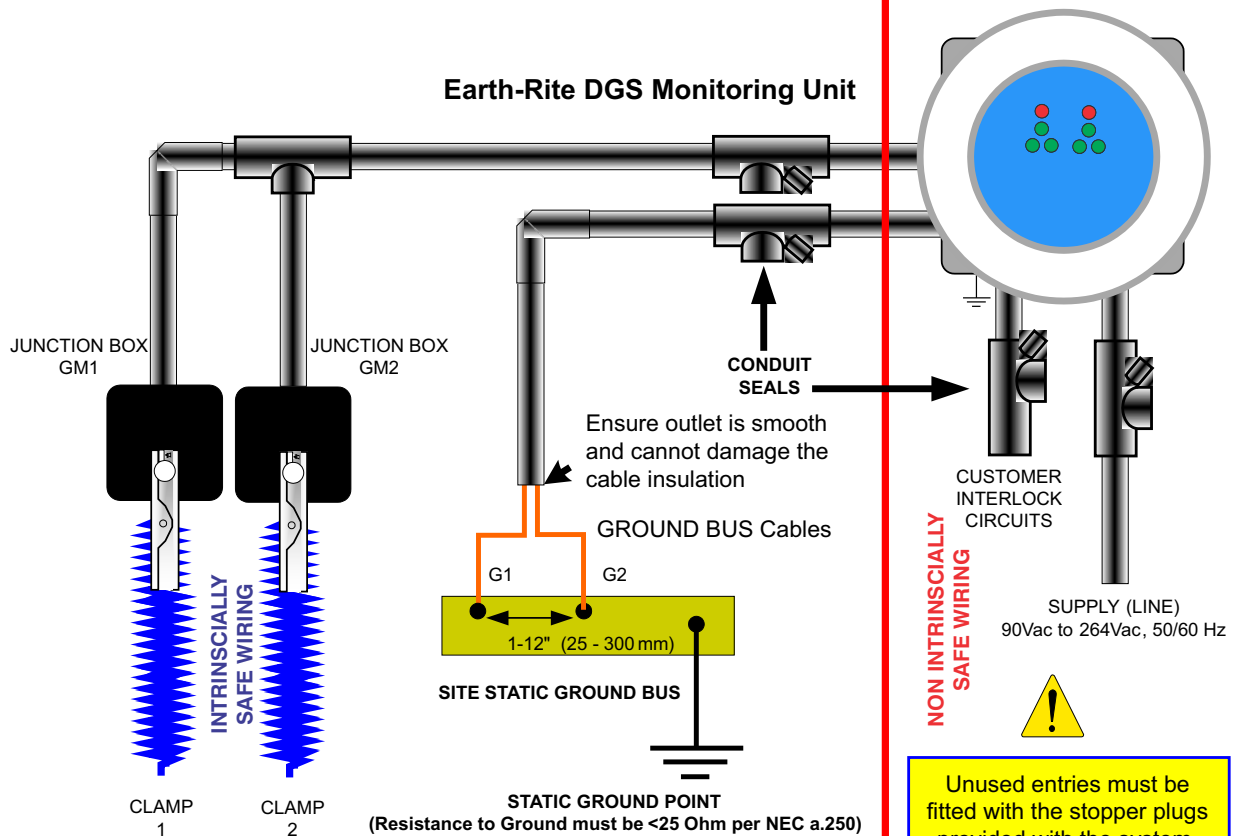
Class I, Div. 1, Groups A, B, C, D;  
Class II, Div. 1, Groups E, F, G;  
Class III, Div. 1

### Canada:

Ex db[ia Ga] IIC T6 Gb  
Ex tb[ia Da] IIIC T135°C Db

### USA:

Class I, Zone 1, AEx db[ia Ga] IIC T6 Gb  
Zone 21, AEx tb[ia Da] IIIC T135°C Db



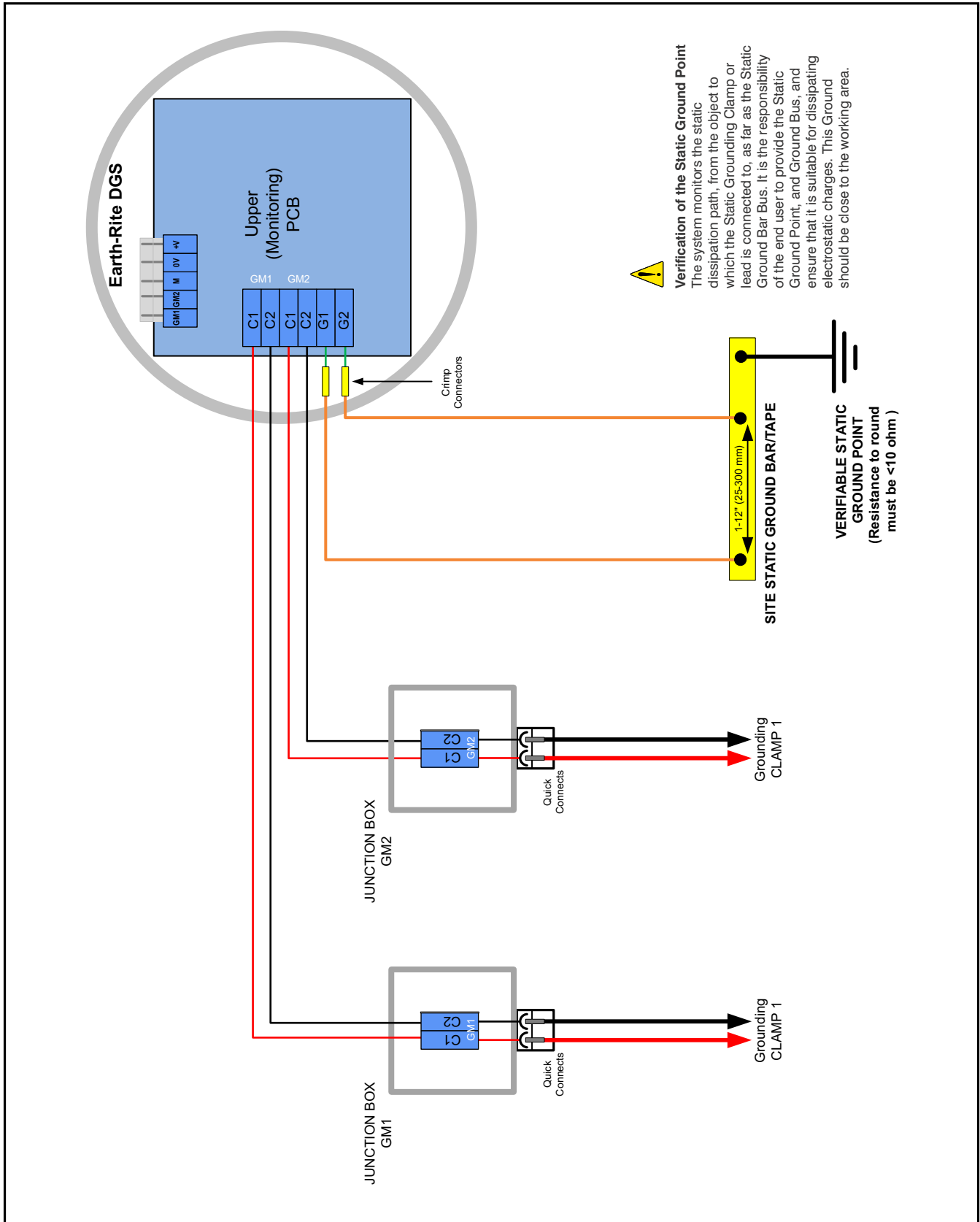
### Verification of the Static Earth Point

The system monitors the static dissipation path, from the object to which the Static Earthing Clamp or lead is connected to as far as the Static Earth Bar/Tape. It is the responsibility of the end user to provide the Static Earth Point and Earth Bar/Tape, and ensure that it is suitable for dissipating electrostatic charges. This Earth should be close to the working area.

Unused entries must be fitted with the stopper plugs provided with the system. Stopper plugs must be fitted in accordance with relevant NEC/CEC standards

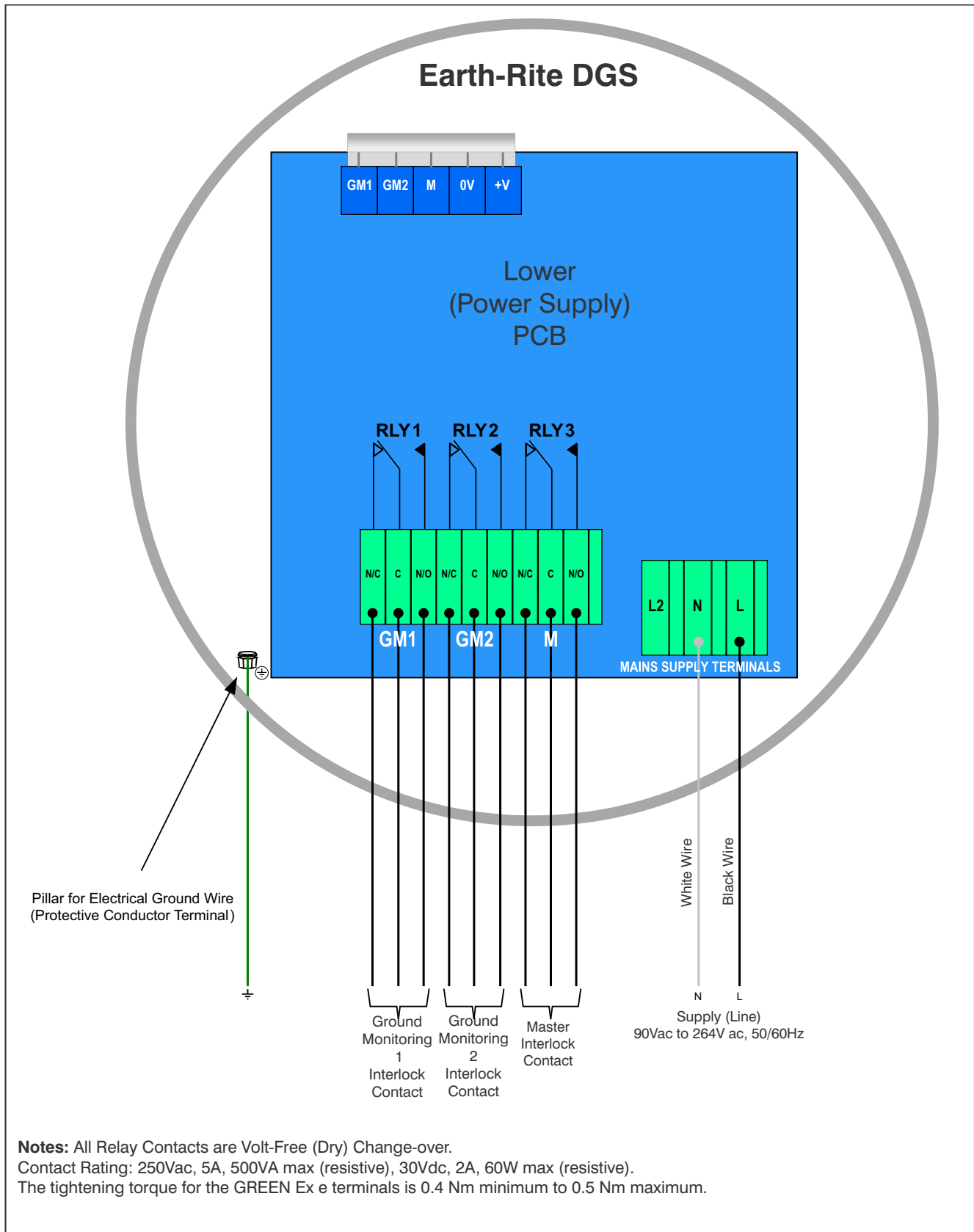
## Earth-Rite DGS

### Cable Connections Two Junction Boxes - Intrinsically Safe Field Wiring



# Earth-Rite DGS

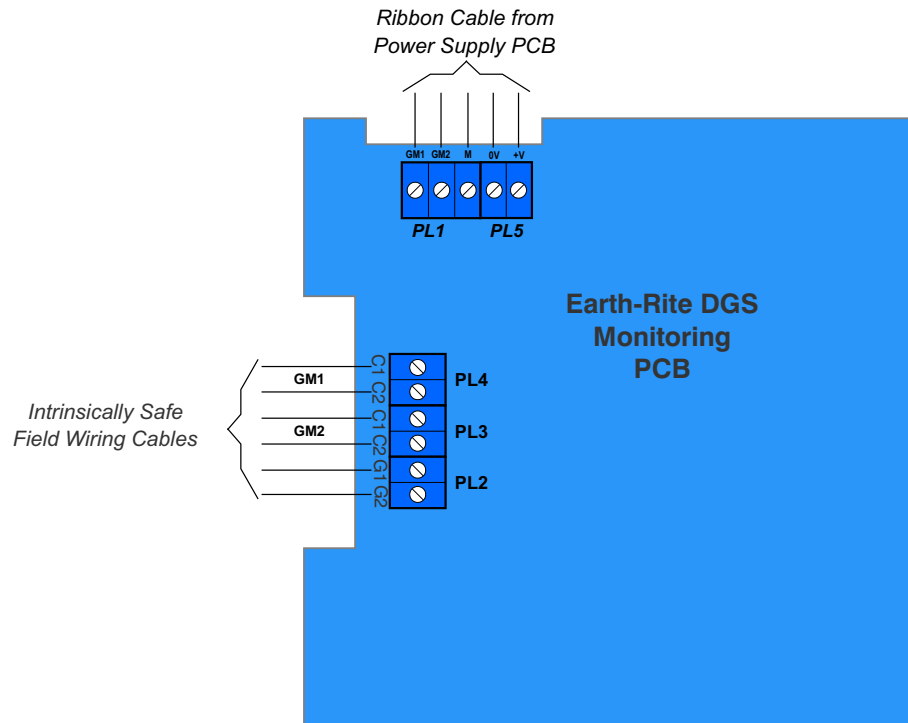
## Cable Connections - Non-Intrinsically Safe Wiring



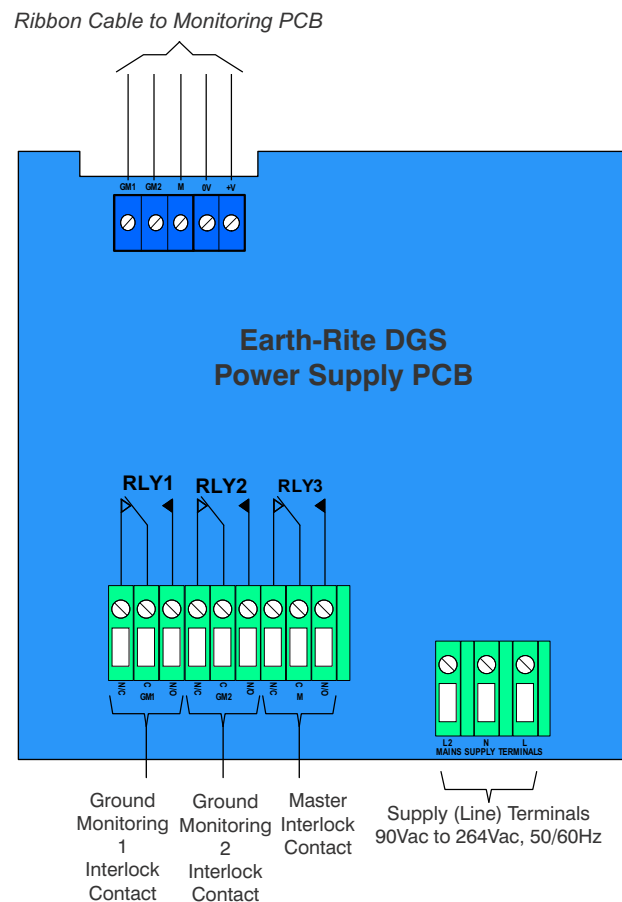


# Earth-Rite DGS Cable Connections

## Monitoring PCB



## Power Supply PCB



**Notes:** All Relay Contacts are Volt-Free (Dry) Change-over. Contact Rating: 250Vac, 5A, 500VA max (resistive), 30Vdc, 2A, 60W max (resistive). The tightening torque for the GREEN Ex e terminals is 0.4 Nm minimum to 0.5 Nm maximum.

## Earth-Rite DGS System

### Troubleshooting at the time of installation

Before contacting Newson Gale please refer to the table below.

**Caution - Ensure all Health & Safety precautions are taken when undertaking any troubleshooting procedures.**

SYMPTOM	PROCEDURE / SOLUTION
Neither RED nor GREEN LEDs are showing	Check that the system is installed in accordance with the supplied manual. Check that the "PWR" LED 9 is ON to signify that the Monitoring PCB has power. Check that there is power to the monitoring unit, and that it is within the specified Voltage range.
Both Clamps are attached to metal but GM1 and GM2 LEDs show RED	Check that the system is installed in accordance with the supplied manual. Carefully check the cable connections between the Monitoring Unit and the Junction Boxes to ensure that the cables are connected to the correct terminals. Check that there are no breaks in the Grounding Clamp cable conductors. Check that the Grounding Clamps are in good condition: that the tip points are level with each other, sharp and not loose. Refer to the page entitled <b>Checking the Intrinsically Safe Clamp-circuit wiring.</b>
Both Clamps are attached to metal but either GM1 or GM2 LEDs show RED	Check that the system is installed in accordance with the supplied manual. Carefully check the cable connections between the Monitoring Unit and the Junction Boxes to ensure that the cables are connected to the correct terminals. Check that there are no breaks in the Grounding Clamp cable conductors. Check that the Grounding Clamps are in good condition: that the tip points are level with each other, sharp and not loose.
Both GM LEDs are showing GREEN but the system does not go permissive. In other words, the output contacts do not change state as expected.	Check that the individual relay contacts for each Grounding Clamp circuit are changing state when each clamp is attached to metal. The Master contact will change state, when both GM LEDs are GREEN, only if it has been factory configured to do so. Check that the "WD" LED is showing to signify that the Monitoring PCB is communicating with the Power Supply PCB.

**If the system still does not Function as expected please contact Newson Gale and confirm the following:-**

Serial number:

Company which ordered the system:

Date of order:

Any other information:

**Please contact Newson Gale Ltd if you require a translation of this manual.**

# Earth-Rite DGS System

## Troubleshooting at the time of installation

### - Checking the Intrinsically Safe Clamp-circuit wiring

**Caution - Ensure all Health & Safety precautions are taken when undertaking any troubleshooting procedures.**

The wiring between the Monitoring Unit and the Junction Boxes can be checked by inserting temporary wire links between relevant terminals within the Junction Boxes. This requires the removal of the Junction Box lid. This procedure can be carried out without having to ensure the area is unclassified as the wiring within the Junction Boxes and out to G1/G2 are at an Intrinsically Safe energy level (ia).

This procedure is also useful for eliminating faults on the Grounding Clamp cables etc.

Connect two temporary wire links as follows:

One first link between terminals

C1 and C2 in Junction Box GM1

The second link between terminals

C1 and C2 in Junction Box GM2

Make sure there is continuity between terminals

G1 and G2 and the Site Static Ground Bus

With the two links in position and GM1 and G1/G2 installed correctly the GREEN LEDs of GM1 and GM2 should be flashing.

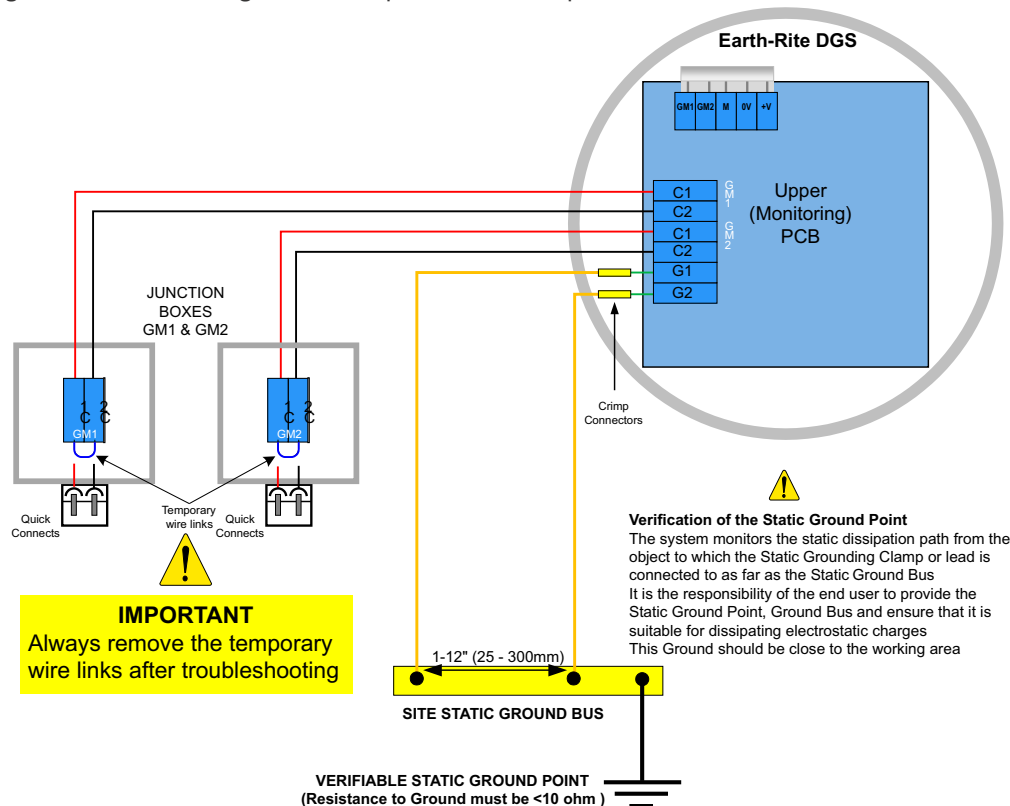
When only the GM1 wire link is removed, the RED GM1 LED should show (the GREEN GM2 LED should remain flashing).

When only the GM2 wire link is removed, the RED GM2 LED should show (the GREEN GM1 LED should remain flashing).

When only the G1 or G2 wires are removed from the earth bar/tape, both the RED GM1 and GM2 LEDs should be ON.

If the above LED indication conditions are not observed then it will be necessary to check the cable connections between the Monitoring Unit and the Junction Boxes.

If the above LED indication conditions are observed, with wire links in place, but the LEDs do not show as expected when the normal operational mode connections are made then it will be necessary to check the condition of the G1 and G2 ground bus wiring as well as the wiring to the clamps and the clamp contacts.



## **cCSAus INSTRUCTIONS FOR SAFE SELECTION, INSTALLATION, USE, MAINTENANCE AND REPAIR**

### **User Instructions in compliance with IEC 60079-32-0:2011, Clause 30 - Instructions**

The following instructions apply to the Earth-Rite DGS Dual Grounding System, covered by certificate numbered CSA 70010644.



#### **Instructions for safe selection, installation, use, maintenance and repair**

The Earth-Rite DGS Monitoring Unit may be used in Class I, Div. 1, Groups A, B, C, D; Class II, Div. 1; Groups E, F, G; Class III, Div. 1 hazardous locations with flammable gas and dust atmospheres.

The equipment may be used in the presence of metal, carbonaceous, non-conductive dusts and ignitable fibers and flyings.

The equipment is certified for use in ambient temperatures in the range of  $-40^{\circ}\text{C}$  to  $+50^{\circ}\text{C}$  and should not be used outside this range.

The equipment is to be installed by suitably trained personnel in accordance with the applicable code of practice of IEC 60079-14.

Regular periodic inspection of the equipment should be performed by suitably trained personnel in accordance with the applicable code of practice or IEC 60079-17 to ensure it is maintained in a satisfactory condition.

No user adjustment is required.

The equipment is not intended to be repaired by the user. Repair of the equipment is to be carried out by the manufacturer, or their approved agents, in accordance with the applicable code of practice.

The equipment contains no user-replaceable parts.



**The system shall be installed as per the control drawing X DGS-Q-17051 cCSAus.**



**The Earth-Rite DGS should be used by trained, competent persons only.**

# Earth-Rite DGS

## Typical Operation - Duplex Earthing



### IMPORTANT NOTE:

The grounding clamps should be fitted to the designated grounding points before the start of process or any other operation takes place as per the recommendations of NFPA 77 and API RP 2003 and IEC TS 60079-32-1.

### Normal "rest" state

Both Grounding Clamps stowed on the insulated pins.

#### Indication:

GM1 and GM2 GREEN **Good** LEDs will be switched OFF (RED **Bad** LEDs will be ON).

#### Switch Contact Status:

Ground Monitor 1: c-no contact will be open.

Ground Monitor 2: c-no contact will be open.

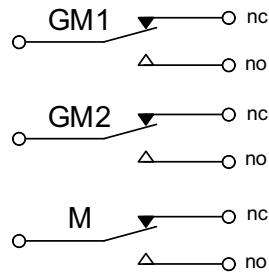
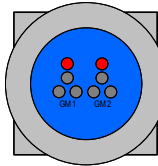
Master: c-no contact will be open.

Clamp 1 controls contact GM1.

Clamp 2 controls contact GM2.

The M contact (Master) will change state when GM1 and GM2 GREEN LEDs are flashing.

### Earth-Rite DGS



CLAMP 1

CLAMP 2

### Operational Scenario - Deployment

Attach the Grounding Clamps onto the Tank Truck / Rail Car at a suitable point which is in contact with the chassis, tank and ensure that the sharp tungsten carbide tips are positively located on the designated grounding point.

If the connections to the Tank Truck / Rail Car are good:

#### Indication:

GREEN Ground **Good** LEDs will be switched on (GREEN LEDs flashing).

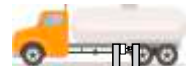
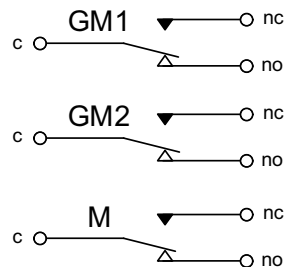
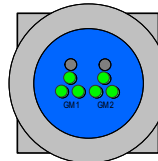
#### Switch Contact Status:

Ground Monitor 1: c-no contact will be closed.

Ground Monitor 2: c-no contact will be closed.

Master: c-no contact will be closed.

The product transfer operation can now take place.



CLAMP 2



CLAMP 1

#### Key

GM1 -----Ground Monitoring Interlock for Clamp 1

GM2 -----Ground Monitoring Interlock for Clamp 2

M -----Master Interlock

#### Notes:

"no" refers to the normally-open contact and "c" refers to the common contact.

The RED LEDs will show whenever the Earth Loop resistance is too high.

# Earth-Rite DGS

## Typical Operation - Duplex Earthing

### Operational Scenario – Clamp 1 Disconnection

If the Clamp GM1 connection is broken during the transfer operation, the respective GM1 RED Ground **Bad** LED will show and the GM1 interlock contact will open.

#### Indication:

GREEN Ground **Good** LED (GM1) will be switched OFF (Red GM1 **Bad** LED will be ON).

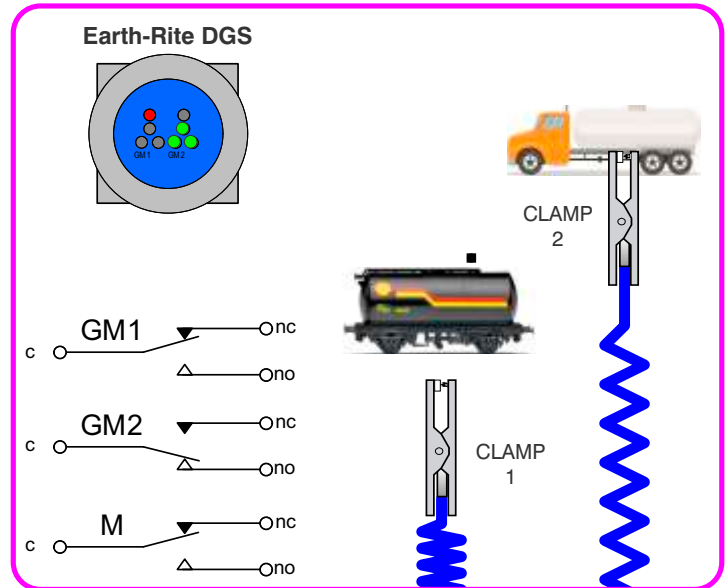
#### Switch Contact Status:

Ground Monitor 1: c-no contact will be open.

Ground Monitor 2: c-no contact will be closed.

Master: c-no contact will be open.

The product transfer operation is prevented.



### Operational Scenario – Clamp 2 Disconnection

If the Clamp GM2 connection is broken during the transfer operation, the GM2 RED Ground **Bad** LED will show and the GM2 interlock contact will open.

#### Indication:

GREEN Ground **Good** LED (GM2) will be switched OFF (RED GM2 **Bad** LED will be ON).

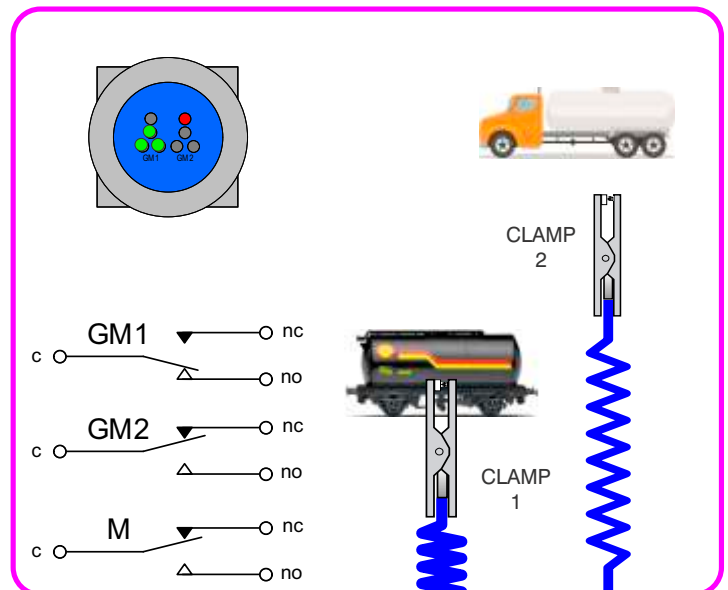
#### Switch Contact Status:

Ground Monitor 1: c-no contact will be closed.

Ground Monitor 2: c-no contact will be open.

Master: c-no contact will be open.

The product transfer operation is prevented.



#### Key

GM1 -----Ground Monitoring Interlock for Clamp 1  
 GM2 -----Ground Monitoring Interlock for Clamp 2  
 M -----Master Interlock

#### Notes:

"no" refers to the normally-open contact and "c" refers to the common contact.  
 The RED LEDs will show whenever the Earth Loop resistance is too high.

## Earth-Rite DGS

### Typical Operation - Duplex Earthing

#### Operational Scenario – Transfer Finished

On completion of the transfer the Grounding Clamps should be removed from the Tank Truck / Rail Car and placed back on their stowage point.

The GREEN Ground **Good** LEDs (GM1 and GM2) will switch OFF and the respective c-no output contacts will open.

#### Indication:

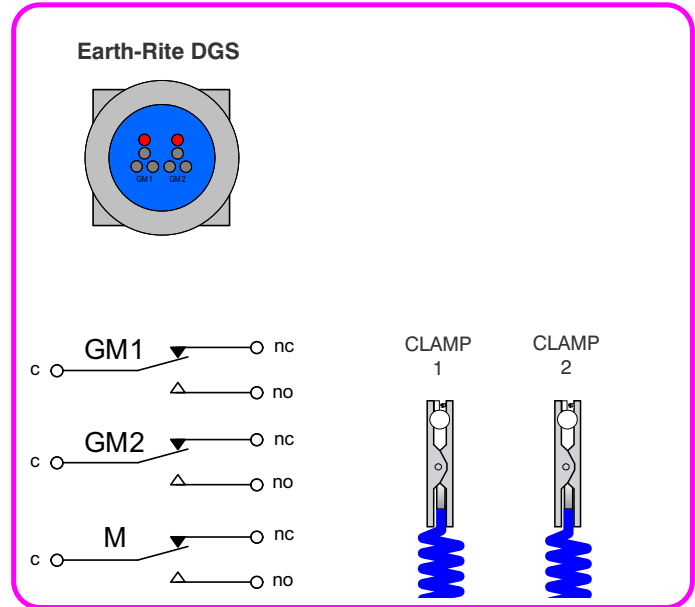
GREEN Ground **Good** LEDs (GM1 and GM2) will be switched OFF (RED **Bad** LEDs will be ON).

#### Switch Contact Status:

Ground Monitor 1: c-no contact will be open.

Ground Monitor 2: c-no contact will be open.

Master: c-no contact will be open.



#### Key

GM1 -----Ground Monitoring Interlock for Clamp 1  
GM2 -----Ground Monitoring Interlock for Clamp 2  
M -----Master Interlock

#### Notes:

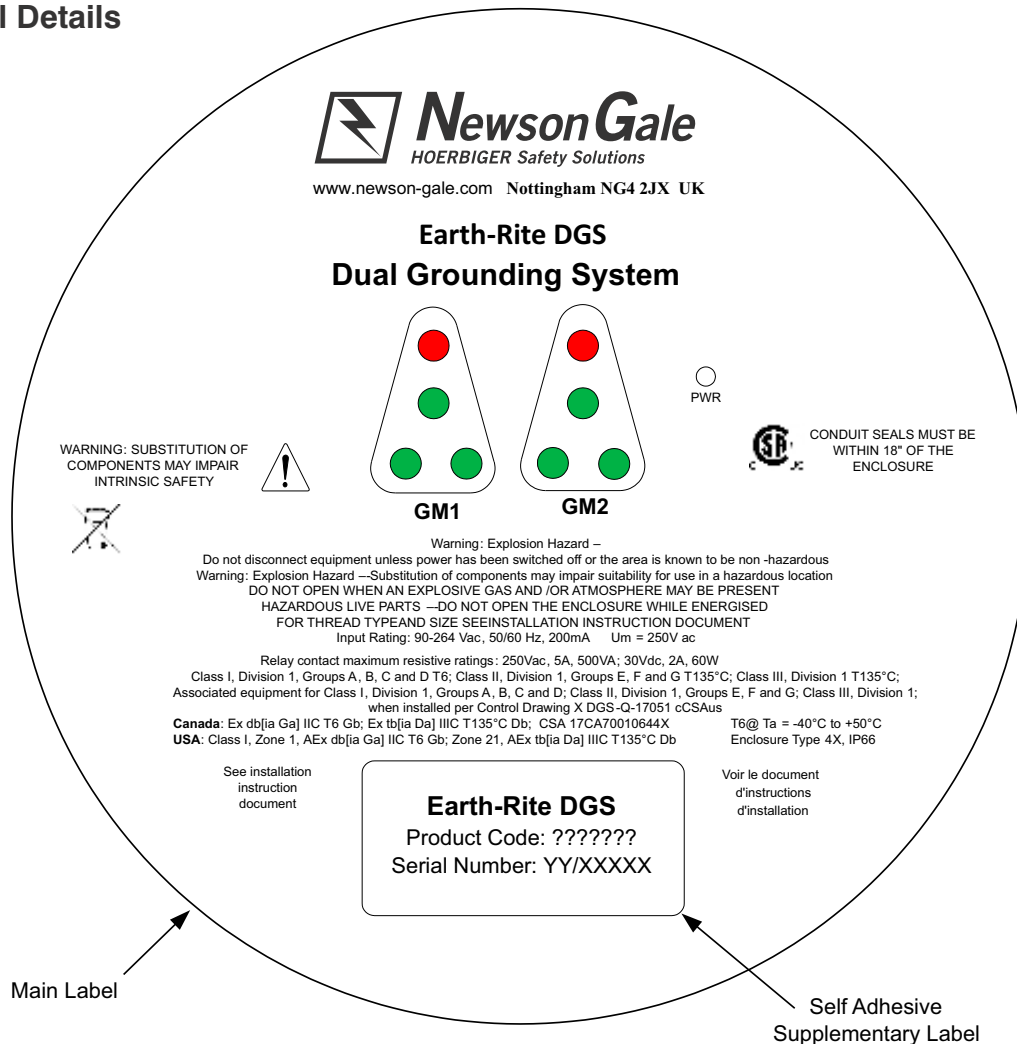
"no" refers to the normally-open contact and "c" refers to the common contact.  
The RED LEDs will show whenever the Earth Loop resistance is too high.



# Earth-Rite DGS

## Label Details

### Main Label Details



### Supplementary Label Details

**Earth-Rite DGS**

AVERTISSEMENT: LA SUBSTITUTION DE COMPOSANTS PRUT COMPROMETTRE LA SÉCURITÉ INTRINSÈQUE

AVERTISSEMENT: DANGER D'EXPLOSION – NE PAS DÉBRANCHER L'ÉQUIPEMENT S'IL N'A PAS ÉTÉ MIS HORS TENSION OU SI LA ZONE EST RÉPUTÉE ÊTRE DANGEREUSE

PIÈCES SOUS TENSION DANGEREUSES – NE PAS OUVRIR LE BOÎTIER QUAND IL EST SOUS TENSION

NE PAS OUVRIR EN CAS DE RISQUE D'ATMOSPHÈRE CONTENANT DES GAZ ET/OU DES POUSSIÈRES EXPLOSIVES

AVERTISSEMENT: UN SCÉLÈME NT DOIT ÊTRE INSTALLÉ À MOINS DE 18 POUCES (450mm) DU BOÎTIER

WARNING – POTENTIAL ELECTROSTATIC CHARGING HAZARD – SEE INSTRUCTIONS

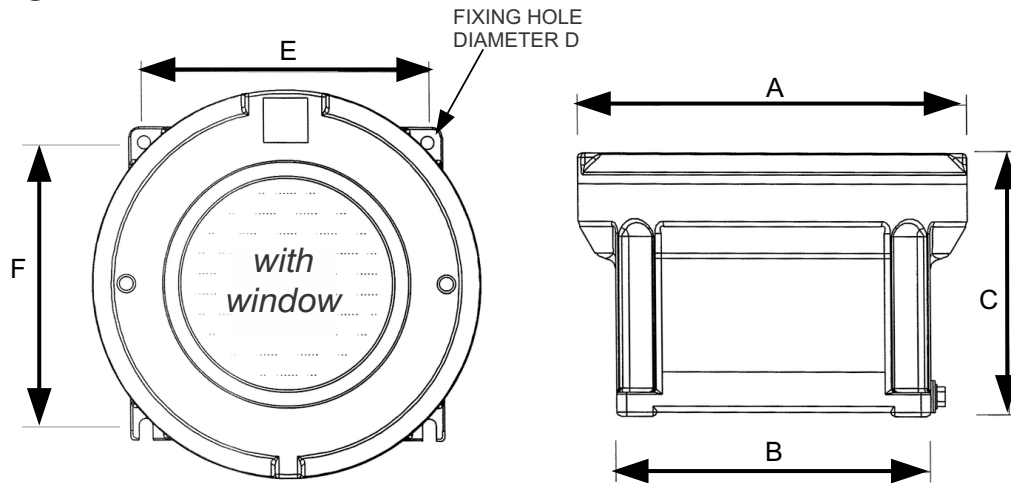
AVERTISSEMENT – DANGER POTENTIEL DE CHARGES ÉLECTROSTATIQUES – RÉFÉREZ À L'INSTRUCTION

#### NOTES

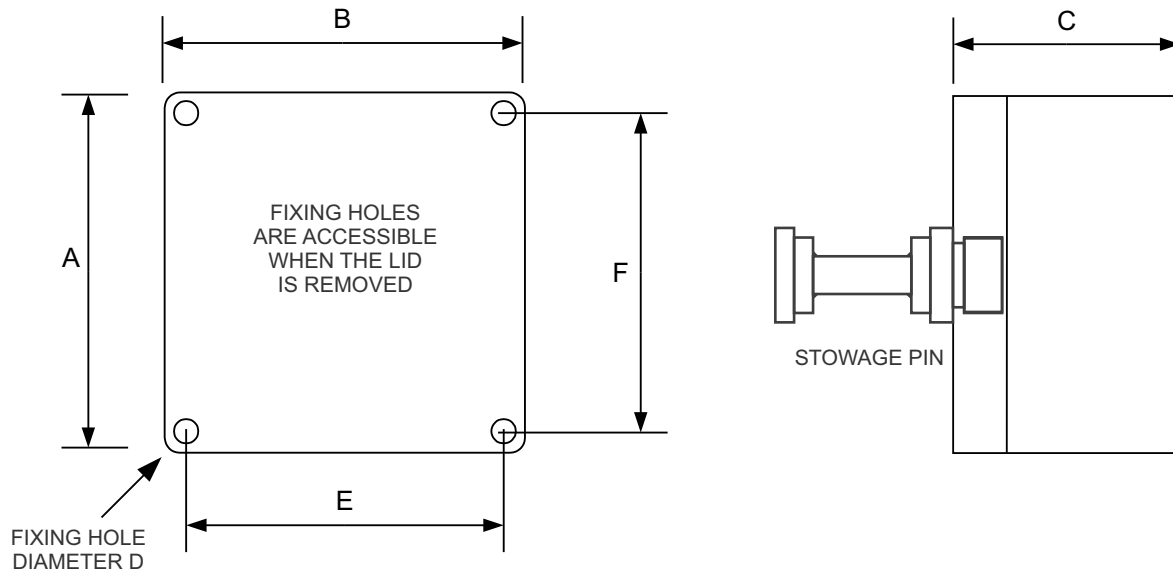
The marking is visible through the enclosure window.  
YY = Year of Manufacturer, XXXXX = Specific Serial Number

## Earth-Rite DGS Dimensions

### Monitoring Unit

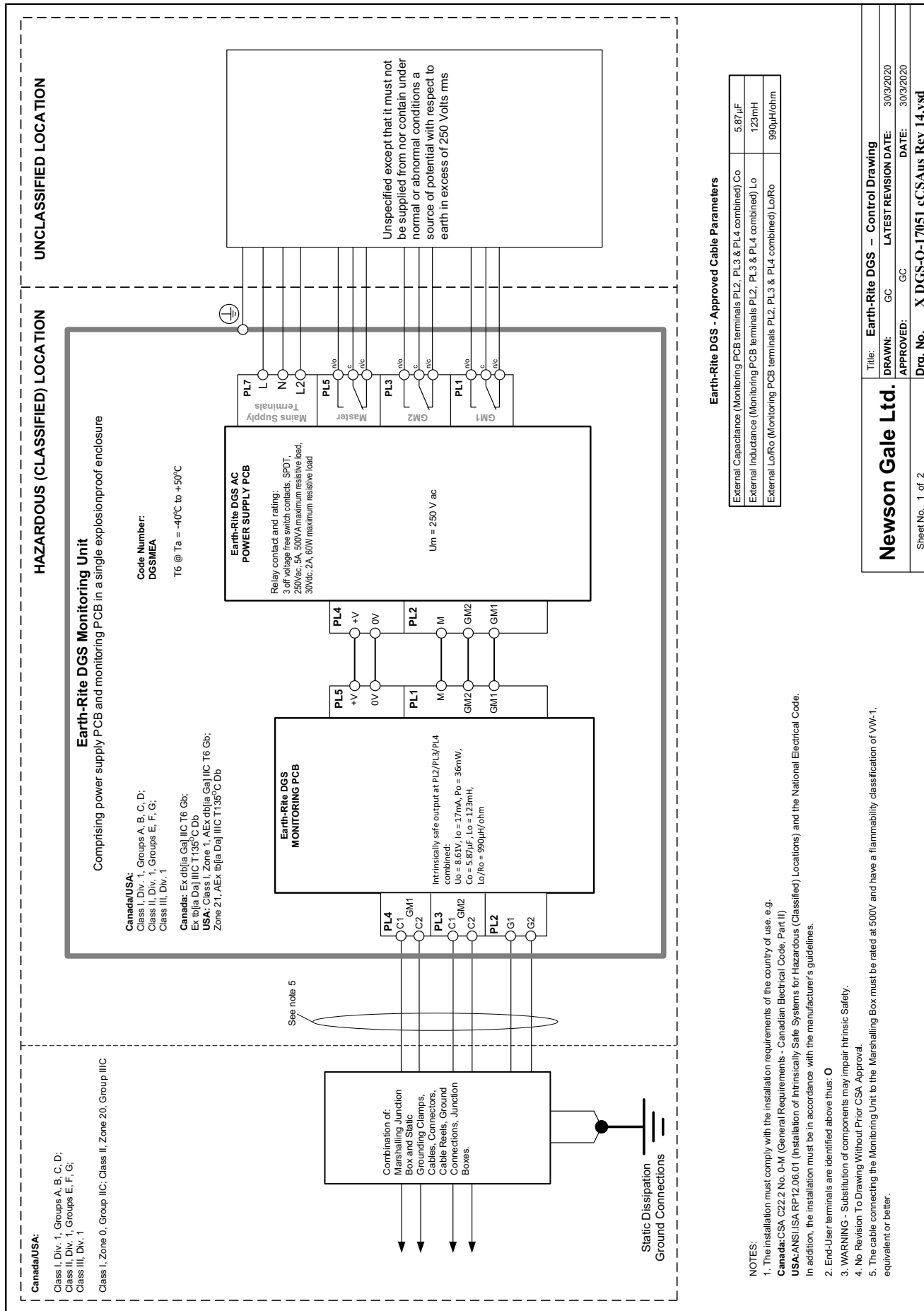


### Junction Box (Simple Apparatus)



PRODUCT DESCRIPTION	MAIN DIMENSIONS (Inches)			FIXING DIMENSIONS (Inches)		
	A	B	C	D	E	F
Exd Earth-Rite DGS Monitoring Unit	9.2	7.7	6.8	0.35	6.77	6.77
Junction Box c/w Universal Stowage Point	2.95	3.15	2.24	0.18	2.68	1.78

PRODUCT DESCRIPTION	MAIN DIMENSIONS (mm)			FIXING DIMENSIONS (mm)		
	A	B	C	D	E	F
Exd Earth-Rite DGS Monitoring Unit	234	195	172	9	172	172
Junction Box c/w Universal Stowage Point	75	80	57	4.5	68	45



Earth-Rite DGS - Approved Cable Parameters

External Capacitance (Monitoring PCB terminals PL2, PL3 & PL4 combined) Co	5.87 $\mu F$
External Inductance (Monitoring PCB terminals PL2, PL3 & PL4 combined) Lo	123mH
External Lo/Ro (Monitoring PCB terminals PL2, PL3 & PL4 combined) Lo/Ro	990 $\mu H/\Omega/m$

- NOTES:**
- The installation must comply with the installation requirements of the country of use, e.g.  
**Canada:** CSA C22.2 No. 0-M (General Requirements - Canadian Electrical Code, Part I)  
**USA:** ANSI/ISA RP12.06.01 (Installation of Intrinsically Safe Systems for Hazardous (Classified) Locations) and the National Electrical Code.  
 In addition, the installation must be in accordance with the manufacturer's guidelines.
  - End-User terminals are identified above thus: O
  - WARNING - Substitution of components may impair intrinsic Safety.
  - No Revision To Drawing Without Prior CSA Approval.
  - The cable connecting the Monitoring Unit to the Marshalling Box must be rated at 500V and have a flammability classification of VW-1, equivalent or better.

Title: <b>Earth-Rite DGS - Control Drawing</b>	
DRAWN: GC	LATEST REVISION DATE: 30/3/2020
APPROVED: GC	DATE: 30/3/2020
Drg. No. <b>X DGS-Q-17051 cCSAus Rev 14.yrd</b>	
Sheet No. 1 of 2	

# Conversion Tables

## WIRE SIZE COMPARISON TABLES

Awg. Size Preferred Sizes	Metric Wire Size mm <sup>2</sup>	Stranding/ Wire Dia. per Strand		Approximate Overall Diameter	
		in	mm	in	mm
-	0.5	1/.032	1/.813	0.032	0.81
20	0.519	7/.0121	7/.307	0.036	0.91
-	0.75	1/.039	1/.991	0.039	0.99
18	0.823	1/.0403	1/1.02	0.04	1.02
18	0.823	7/.0152	7/.386	0.046	1.16
18(UL)	1	1/.045	1/1.14	0.045	1.14
18(UL)	1	7/.017	7/.432	0.051	1.3
16	1.31	1/.0508	1/1.29	0.051	1.29
16	1.31	7/.0192	7/.488	0.058	1.46
-	1.5	1/.055	1/1.40	0.055	1.4
-	1.5	7/.021	7/5.33	0.063	1.6
14	2.08	1/.0641	1/1.63	0.064	1.63
14	2.08	7/.0242	7/.615	0.073	1.84
-	2.5	1/.071	1/1.80	0.071	1.8
-	2.5	7/.027	7/.686	0.081	2.06
12	3.31	1/.0808	1/2.05	0.081	2.05
12	3.31	7/.0305	7/.775	0.092	2.32
-	4	1/.089	1/2.26	0.089	2.26
-	4	7/.034	7/.864	0.102	2.59
10	5.27	1/.1019	1/2.59	0.102	2.59
10	5.27	7/.0385	7/.978	0.116	2.93
-	6	1/.109	1/2.77	0.109	2.77
-	6	7/.042	7/1.07	0.126	3.21
9	6.62	1/.1144	1/2.91	0.1144	2.91
9	6.62	7/.0432	7/1.10	0.13	3.3

AWG	mm <sup>2</sup>
24	0.205
23	0.259
22	0.325
21	0.412
20	0.519
19	0.653
18	0.823
17	1.04
16	1.31
15	1.65
14	2.08
13	2.63
12	3.31
11	4.15
10	5.27
9	6.62
8	8.35

# Conversion Tables

## COMPARISON OF ENCLOSURE TYPE NUMBERS TO IEC CLASSIFICATION DESIGNATIONS

NEMA Enclosure Type Number	Approximate IEC Classification
1	IP10
2	IP11
3	IP54
3R	IP14
3S	IP54
4 and 4X	IP56
5	IP52
6 and 6P	IP67

## LENGTH CONVERSION TABLE

Length Conversion	
Length US Imperial	Length Metric
1/8"	3.175mm
1/4"	6.350mm
3/8"	10.080mm
1/2"	12.700mm
3/4"	19.050mm
1"	25.400mm
1 1/4"	31.750mm
1 1/2"	38.100mm
1 foot	304.8mm
1 yard	914.4mm

## THREAD COMPARISON TABLES

N.P.T. National Pipe Thread to ANSI/ASME:1983			ISOMETRIC ISOMETRIC Thread to BS3643:1981		
Size	Major Diameter (inches)	Major Diameter (mm)	Major Diameter (mm)	Major Diameter (inches)	Size
1/8"	0.406	10.30			
1/4"	0.540	13.72			
3/8"	0.689	17.15			
1/2"	0.840	21.34			
3/4"	1.05	26.67			
1"	1.315	33.40			
1 1/4"	1.660	42.16			
1 1/2"	1.900	48.26			
			16	0.630	M16
			20	0.787	M20
			25	0.984	M25
			32	1.260	M32

# Earth-Rite DGS - XP AC Technical Specification

## Monitoring Unit

Power Supply Voltage (Line)	90Vac to 264V ac, 50/60Hz
Power Rating	10 watt
Current Rating	200mA
Ambient Temperature range	-40°C to +50°C
Ingress Protection	IP66 / NEMA 4X
Weight	15.9 lbs (nett) 7.2 kgs
Construction	Copper-free Aluminium

### Certification

#### USA / Canada:

Associated equipment [Exia] for use in:

Class I, Div. 1, Groups A, B, C, D;

Class II, Div. 1, Groups E, F, G;

Class III, Div. 1

providing intrinsically safe circuits for:

Class I, Div. 1, Groups A, B, C, D;

Class II, Div. 1, Groups E, F and G;

Class III, Div. 1

Class I, Zone 0, Group IIC; Class II, Zone 20, Group IIC

#### Canada:

Ex db[ia Ga] IIC T6 Gb

Ex tb[ia Da] IIIC T135°C Db

#### USA:

Class I, Zone 1, AEx b[ia Ga] IIC T6 Gb

Zone 21, AEx tb [ia Da] IIIC T135°C Db

Monitoring Circuit
Operational Series Ground Resistance
Output Relay Contact Rating

Intrinsically safe (ia)

≤10 Ohm

3 voltage free change-over switch contacts (Channel Contacts),

250Vac, 5A, 500VA max resistive

30Vdc, 2A, 60W max resistive

### Cable Entries

Up to 4 x ¾" NPT

NPT ENTRIES SHALL HAVE A MINIMUM OF 5 THREADS AND CONFORM TO ANSI/ASME B1.20.1 AND GAUGE AT +1/2 TO TWO TURNS LARGE USING AN L1 PLUG-GAUGE GLAND ENTRIES MUST BE FITTED WITH A SUITABLE SIZE ATEX AND IECEx Ex db IIC, Ex tb IIIC CERTIFIED GLAND ASSEMBLY, THREAD ADAPTOR OR BLANKING ELEMENT. CANADA AND USA – ANY CONDUIT OR CABLE ENTRY DEVICE SHOULD BE SUITABLY CERTIFIED FOR THE CLASS AND DIVISION OR CLASS AND ZONE OF USE.

## External Connection Terminals

### Relay Contact Terminals

Terminal Type	Ex e
Use	For connection to customer's control and alarm circuits
Grounding Contact Terminals	6 terminals (normally closed, common, normally open)
Master Contact Terminals	3 terminals (normally closed, common, normally open)
Terminal Ratings	250Vac, 5A, 500VA max 30Vdc, 2A, 60W max
Terminal Tightening Torque	0.4 Nm minimum to 0.5 Nm maximum

# Earth-Rite DGS - XP AC Technical Specification

## Line/Supply Voltage Terminals

Terminal Type	Ex e
Use	For connection to customer's Line/Supply Voltage
Number of Terminals	3 terminals (N, L, L2)
Terminal Ratings	250Vac, 5A, 500VA max
Terminal Tightening Torque	0.4 Nm minimum to 0.5 Nm maximum

## Junction Box

Enclosure	GRP
Terminals	2 x In-Line Quick Connectors
Cable entry (from Monitoring Unit)	1 x M20
Clamp Cable Outlets	1 x Quick Connect (Female)

NB: In line with our policy of continual product development, we reserve the right to alter specifications at any time.

## Warranty

A two year manufacturer's warranty applies to Newson Gale electronic modules.  
This is subject to the general terms and conditions and correct installation / usage of the product.







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