

Smart Ground Detector +

Smart Ground Detector + is micro controller based grounding device that effectively controls and dissipates static charge with continuous ground loop monitoring and road tanker recognition.

- Ensures that clamps are connected through Loading Vehicle only and not through a fix structure
- Easy connection to vehicles with rugged plug & socket arrangement & spiral cable
- Detects resistance in the earth loop and Monitors earth potential
- Ensures low resistance in the earth pit
- The Earthing Status can be transmitted over a remote computer via built-in serial port through Modbus RTU protocol
- Used in Terminal Automation as well as used in wide range of applications like Process, Chemical, Petrochemical, Pharmaceutical and Paint Industries



The problem of static electricity in hazardous atmospheres is ever present in many sectors of processing industries. Some materials with low electrical conductivity are the prime sources of static charge generation. Due to physical movement, some materials generate high degree of static charge; at times it is in kilovolts. Insulating materials like rubber tyres, paints, gaskets & seals do not offer sufficient low resistance path to safely dissipate any static charge generated to earth. When this happens, high level of charge may accumulate on the isolated part, posing the risk of energetic static discharges. If this occurs in hazardous atmosphere there is a chance of occurrence of explosion, fire, or ignition of hazardous material.

An Earthing Relay is used along with suitable earthing clamps to ground the vehicle. If the grounding is done effectively, the static charges are immediately discharged through ground loop & earth pit. However due to increased resistance within the loop & earth pit, the grounding, physically looks perfect, may not be effective enough to allow these charges discharged through the path. Majority of earthing relay designs are based on continuity principle therefore allows several ohms ! The situation would be even worse when the earthing clamp is connected on gantry structure and not connected on the tank-truck.

Smart Ground Detector + (SGD+) solves the aforesaid problem by ensuring that clamps from the tank-truck earth and Earthing relay are connected through tank-truck only and not through any gantry structure. It ensures this by measuring a capacitance of the object on which clamps are connected. The measured capacitance value is compared with the programmed capacitance value for road tankers. If it is found within a range of tank trucks, the device recognize it as positive connection to a tank truck.

After a connection on a tank-truck is ensured, the device ensures that a low resistance connection is made from the tank-truck through paint or rust to the reference ground point. It also monitors resistance of earth pit connection & potential level of the tanker body and only when this potential is confirmed to be at the same potential level as that of the reference ground level, the device generates interlock output to permit loading or unloading operations. For the condition remains safe the device continuously monitors the development of the static charge on the body of the vehicle and the resistance of the earth loop & earth pit till the transfer process.

The SGD+ operates with a suitable earthing clamp and does not require any special equipment to be installed on the tank truck. It may be used with all common types of tankers without special modifications.

Two sets of interlock outputs in the form of potential free relay contacts as standard are available to connect to the Batch controller, which immediately stops loading operation under the un-safe condition. The potential free contact may be interlocked with pumps, valves, PLC, alarms, etc. Using LED indicator lamps available on the front cover, Red (Earth Fail), Amber (Power ON) and Green (Earth OK) status is displayed. If remote option is available, the device can send earth status to a remote computer connected on redundant serial ports. Auxiliary earth input is also provided to monitor earthing of auxiliary devices eg. loading arm.

Specifications

Model	Smart Ground Detector + (SGD +)
Detection Principle	(a) Tank-truck recognition based on capacitance (b) Detects Resistance in the earth loop and in the earth pit / grid (c) Monitors Earth Potential limit value (d) Ensures that clamps from tank-truck earth and earthing relay are connected through tank-truck only and not through gantry structure
Operating Mode	StandAlone : Operates independently Remote(Optional) : Remote host is connected
Mode of Operation (As per the Purchase order)	Single Channel : Monitors Single earth loop ANDing : Monitors two earth loops in AND mode
Indicating Lamps	Three Nos. LED Cluster lamps (Bi-color indicating lamps are provided in Remote option) Left side : Red (Earth Fail) Center : Amber (Power ON) Right side : Green (Earth OK)
Response Time	< 100 ms
Communication Port	1 No. RS422/485 port. Up to 16 SGD+ can be multidrop over a single RS422/485 loop
Communication Parameters	Status of potential free contacts, Manually configured threshold value set for resistance & capacitance, Health status of earth relay, Communication status of earth relay, Status bit for live value of capacitance, Status of bypass of capacitance, Serial number of main board electronics
Area classification	Intrinsic Safe : Ex ia, Group IIA, IIB, IIC Flame Proof : Ex d, Group IIA, IIB
Temperature Class	T6
Ingress protection	IP 65
Environment Conditions	Op. Temp: 0 to 60°C Storage Temp: -10 to 70°C Humidity: 95% at 25°C (Non-condensing)
Supply voltage	230VAC ±10% / 115VAC ±10%, 10 W, 50 Hz & 60 Hz ± 3 Hz
Output Characteristics	Potential free 2-change over relay, Contact rating 230V, 5A, 100 VA (AC) / 230V, 5A, 100 Watt (DC)
Body	Flameproof Cast Aluminum LM6
Mechanical Dimensions	320mm(H) x 230mm(W) x 175mm(D) (Mounting holes provided at 130 x 255mm apart)
Paint / Color shade	Semi glossy, epoxy powder coated Light Grey, shade RAL 7035
Clamp Type	Crocodile type earthing clamp <u>or</u> Ball type, socket with stud connector

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Block Schematic and Typical Connections

