

Ground Master Monitor Installation, Operation and Maintenance



Made in the
United States of America



Figure 1. SCS CTC065-5-WW Ground Master Monitor



Figure 2. SCS CTC065-RT-WW Ground Master Monitor

The Ground Master Monitor is available in three models:

Item	Description
CTC065-RT-WW	Ground Master Monitor, with Relay Output and World Wide Power Adapter
CTC065-RT-T	Ground Master Monitor, with Relay Output, No Power Adapter
CTC065-5-WW	Ground Master Monitor, with MODBUS Output and World Wide Power Adapter

The following accessory is available for the Ground Master Monitor:

Item	Description
CTC065-C	Extension Cable Unit for Ground Master Monitor

Description

The Ground Master Monitor determines whether equipment is properly grounded, helping to ensure the ESD safety of a process.

The Ground Master Monitor is a comprehensive real-time ground monitor that checks the connection of equipment to grounds in accordance with the ANSI/ESDA S.20.20 standard. It also monitors the presence of electromagnetic interference (EMI) on ground, signaling a possible functionality problem, such as tool lockup, erratic behavior, parametric error and more.

Features and Components

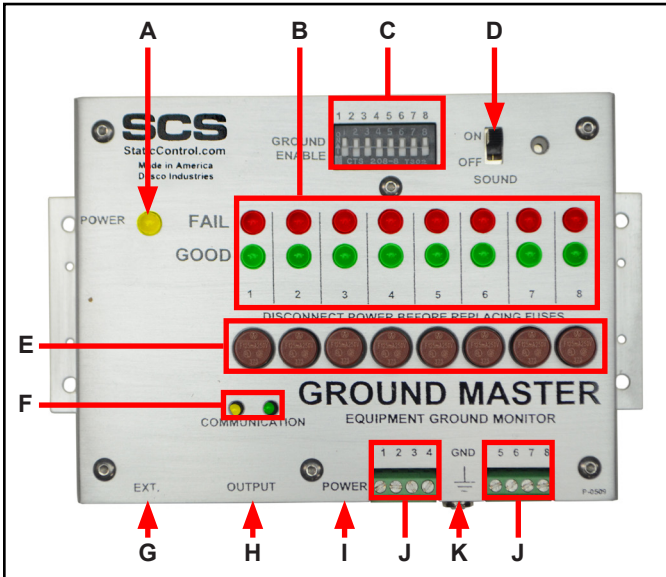


Figure 3. CTC065-5 Ground Master Monitor features and components

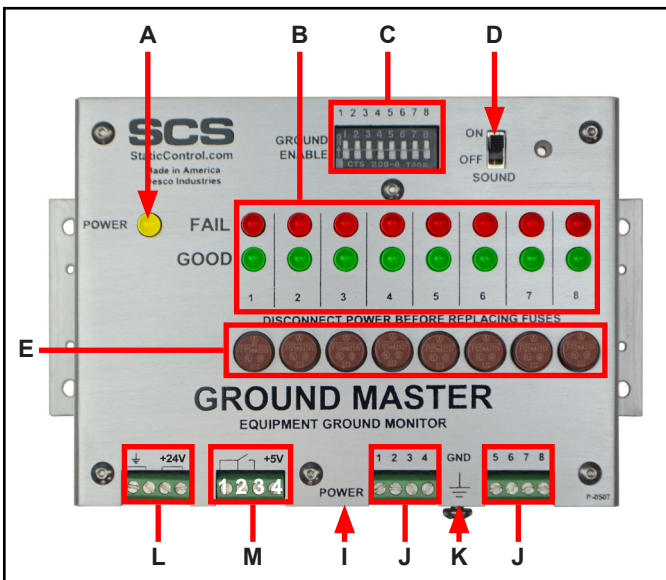


Figure 4. CTC065-RT Ground Master Monitor features and components

A. Power LED: Illuminates yellow when the monitor is powered.

B. Tool LEDs: Illuminates green when its respective tool is within the impedance and electromagnetic interference (EMI) voltage test limits. Blinks red when its respective tool exceeds the EMI voltage limit. Illuminates solid red and audible alarm sounds when its respective tool exceeds the impedance test limit.

C. Tool Monitor Switches: Slide the switch up to enable its respective tool monitor circuit. Slide the switch down to disable its respective tool monitor circuit.

D. Audible Alarm Switch: Enables and disables the monitor's audible alarm.

E. Protective Fuses: Protects the spread of harmful voltage to other tools via the Ground Master Monitor should one of the tools become exposed to excessive voltage. The appropriate fuse will disconnect the faulty tool from the Ground Master Monitor and from the other connected tools.

F. Communication LEDs: Blinks when the monitor is powered and communicating to SMP Server.

G. Ext. Jack: Slave port for serial daisy-chaining.

H. Modbus Output: Provides communication between the Ground Master Monitor and [Static Management Program \(SMP\)](#).

I. Power Jack: Connect the included 12VDC power adapter here.

J. Monitored Tool Terminals: Monitors metal tools for proper conductive impedance and electromagnetic interference (EMI) voltage. Use 18 AWG wire to connect the metal tools to these terminals.

K. Ground Terminal: Common ground point for the monitor.

L. Power Input Terminals: Accepts 12-24VDC input from an external source for powering the Ground Master Monitor.

M. Optical Relay Terminals and +5V Output: The Ground Master Monitor features one optical relay terminal that can be integrated with electronic tools, lights, buzzers, etc. The relay opens when the monitor enters a ground alarm condition, and it remains closed otherwise.

Relay Parameter	Rating
Peak Blocking Voltage	400 V _P
Load Current	140 mA _{rms} / mA _{DC}
On-Resistance (max)	22 ohms

Terminals 1 & 2 = Always Closed
 Terminals 2 & 3 = Normally Open
 Terminal 4 = Logic Output

Controls and Indicators

Power LED	Indicates the power is provided for operation of the Ground Master Equipment Monitor.
Pass/Fail LED	Indicates which ground is being monitored and the status of each ground.
Enable Switches	Enables/disables the monitoring of each individual ground connection.
Sound On/Off	Enables/disables alarm buzzer.
Fuses	Replaceable safety fuses for each individual ground connection.
Equipment Terminals	Screw Terminals for connection of the individual equipment grounds.
Ground Connection	Terminal for connection to reference ground.
Power	Jack for power adapter.
Output	SCS Static Management Program (SMP) hardware
Ext.	Pins are connected in parallel with the Output jack

Overview

The Ground Master Equipment Ground Monitor continually monitors the grounding status of equipment. It provides independent ground monitoring of up to eight tools. Monitoring of ground connection is done according to the ANSI/ESDA S.20.20 standard. Specific limits are set to the customer requirements. If no requirements are specified, default ground impedance is set at the factory to 10 ohms.

In addition to monitoring the connection to the ground, the Ground Master Equipment Ground Monitor offers monitoring of electromagnetic interference (EMI) voltage on the ground wires often present in a factory environment. Such interference causes problems with the operation of equipment.

The Ground Master Equipment Ground Monitor provides indication and alarm of the status of each ground and local alarms.

In addition, this monitor provides digital output to a facility monitoring or data acquisition system for monitoring.

To extend monitoring by eight points, another Ground Master Equipment Ground Monitor can be connected to the extension port. Connected units provide one combined output to a Facility Monitoring System.

Safety First

While ensuring proper ESD grounding is a purpose of using the Ground Master Equipment Ground Monitor, before connecting equipment make sure that the equipment itself is properly grounded. The Ground Master Equipment Ground Monitor only monitors proper connection to the ground. Do not ground equipment through this monitor.

Installation and Connections

Placement

Mount the Ground Master Equipment Ground Monitor on a wall or on a side of equipment where it's stable placement and access to all connections is ensured. DIN-rail mounting is available as well. Place the Ground Master Equipment Ground Monitor so that the length of wires to the monitored equipment is minimized

Mounting

Depending on the mounting option that you have ordered, the Ground Master Equipment Ground Monitor comes with a bracket to mount it on a flat surface. An optional DIN bracket to mount it on a standard DIN rail is available.

Connecting Reference Ground

The Ground Master Equipment Ground Monitor must be connected to a proper facility ground using its GND connection. This ground will serve as a reference. No monitoring is possible without this connection.

Make sure that this reference ground is a true ground and is properly connected to both facility (power) ground and to ESD ground, should these be separate at your factory.

Crimp an 18 AWG (1 mm diameter) wire to the supplied ring terminal and connect it to the GND terminal of the unit. Connect the other end of this wire to the proper facility ground. Minimize the length of this wire since the impedance of this wire will be a significant factor in measuring ground impedance of all connections. Do not coil the extra length of this wire.

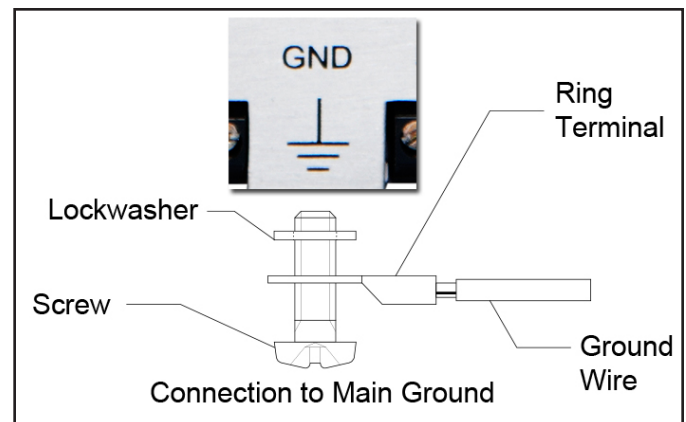


Figure 5. Connecting to main ground.

Connecting Equipment Grounds

Use 18 AWG (1 mm diameter) wires to connect them to the screw terminals of the unit. Connect the other end of the wire to the grounded connection of your equipment. Shorten the wires and do not coil or loop the extra wire. The longer the wire, the higher its impedance and the more influence it will make on the monitored parameters.

Connecting Power

The Ground Master Equipment Ground Monitor can be powered in the following ways:

- By a separate power adapter
- Via its RJ45 cable from Facility Monitoring System for the Ground Master
- Via terminal block for the Ground Master Equipment Ground Monitor RT

IMPORTANT: Provide power via one way only.

The Ground Master Equipment Ground Monitor needs 12-24VDC. If two monitors are connected together, the slave monitor gets power from the master unit and the current requirements double.

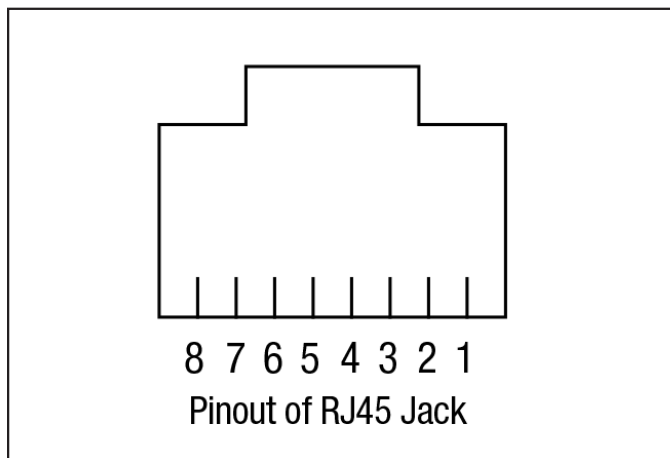
- Power Jack A 2.1 mm barrel connector, center positive.
- RJ45 Jack See pinouts for your configuration.

Power must be reasonably clean of spikes and EMI.

Important: Use only the adapter provided by the manufacturer. Operation with a power supply not provided by or expressly approved by SCS will void the warranty.

Data Output (Ground Master)

The Ground Master Equipment Ground Monitor provides intelligent information to the facility monitoring or data acquisition system. In this configuration, the Ground Master Equipment Ground Monitor can be powered by Facility Monitoring System (FMS) via its data cable.



Pinout of RJ45 Jack for MODBUS

Pin	Signal
1	+12 to +24 VDC
2	Ground
3	+12 to +24 VDC
4	TXD1/D1
5	TXD0/D0
6	Ground
7	+12 to +24 VDC
8	Ground

Operation

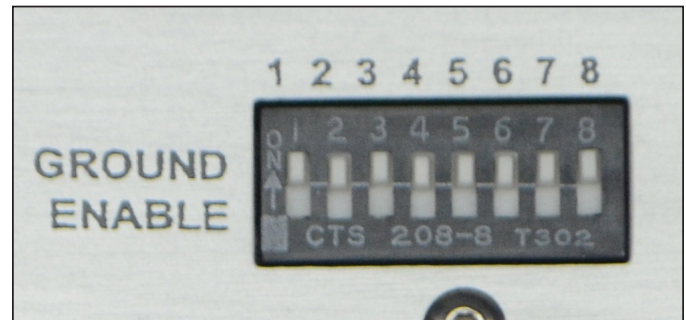


Figure 6. Monitoring Enable Switches.

Monitoring Enabled

In order for the Ground Master Equipment Ground Monitor to monitor a particular ground, it must be enabled by turning ON the appropriate DIP switch. This way, a wire jumper is not needed to simulate an unused connection, and the status of every ground connection will be known.

If a particular connection is not being monitored, turn the appropriate switch OFF.

Indication

When ground monitoring is enabled on any particular ground, one of the corresponding LEDs turns on. If the ground connection is within the specification, the green LED will be lit. If the ground impedance is higher than the limit, the red LED will be on. In case the ground connection impedance is below the alarm limit, but the particular ground has strong EMI voltage signal present, the green LED will be on and the red LED will blink.

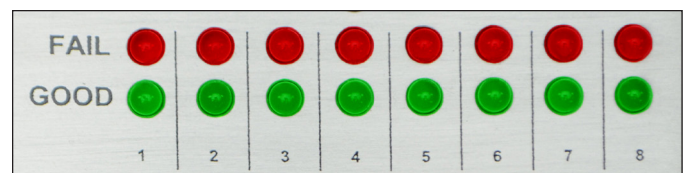


Figure 7. Ground status LED's

Alarm Limits

Each Ground Master Equipment Ground Monitor is set to provide an alarm when impedance of the equipment to the ground goes above the preset limit. This limit is set at the factory and can be changed using the rotary switch on the top of the unit with the small screwdriver.

Summary of LED Indications

Status	Green LED	Red LED	Sound
Ground Impedance Passes	On	Off	Off
Ground Impedance Fails	Off	On	On
Ground Impedance passes but strong EMI present	On	Blinks	Off
Ground Monitoring Disabled	Off	Off	Off

Sound can be turned on/off using slide switch.

Setting	Limit (Ohms)
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9
A	10
B	12
C	14
D	16
E	18
F	20

“0” Setting is reserved - do not use it.

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Fuses

If the equipment ground is disconnected for some reason, or the ground wiring is improperly connected, such equipment may receive significant damage, sometimes equal to the voltage on the AC mains (110V or 220V). In order to prevent the spread of this excessive voltage to other equipment via the Ground Master Equipment Ground Monitor, fuses are implemented for each individual ground connection. In the case of excessive voltage on the equipment, the appropriate fuse will disconnect the equipment from the Ground Master Equipment Ground Monitor and from the other connected equipment. Ground failure on that particular ground will be immediately indicated.

Before replacing the fuse, always investigate the reason for the fuse blowing and correct the problem. The fuse should never be blown under normal circumstances.

Important: Never use wire jumpers in place of fuses – use only factory-authorized fuses. Disconnect power before the replacement of fuses.

Operation with Facility Monitoring System

The Ground Master Equipment Ground Monitor provides intelligent information to a Facility Monitoring System (FMS) on the status of each individual ground it monitors.

Important: Do not plug the Ground Master Equipment Ground Monitor into your 10/100 BaseT Ethernet factory network!

Warning: Failure to follow these instructions may result in irreversible damage to the Ground Master Equipment Ground Monitor and may harm personnel and equipment. If the Ground Master Equipment Ground Monitor is connected to a Facility Monitoring System (FMS), always verify that there is zero voltage and low resistance between the FMS ground and the ground at the location where the monitor is being grounded. If ground conditions are unacceptable, correct them prior to installing the Ground Master Equipment Ground Monitor, otherwise damage to personnel, the monitor and/or FMS may occur.

Specifications

Power

Power Adapter 100-240 VAC 50-60 Hz	Output: 12 VDC @ 1.5 A Output Plug Polarization: Center Positive Output Plug: 5.5 mm O.D. x 2.1 mm I.D. x 9.5 mm L
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Metal Tool

Amount Monitored	8
Impedance Limit	10 ohms (default)
EMI Voltage Limit	223 mV average amplitude (@ 1.5 MHz)
Test Voltage	80 mV square pulse @ open circuit (80 Hz)
Test Current	<5 mA @ short circuit

Connectivity

Input	18 AWG wire terminal blocks for metal tools
Outputs	RJ45 connectors for Modbus output

General

Alarm	LEDs and buzzer
Dimensions	3.54" x 5.52" x 1.18" (90 mm x 140 mm x 30 mm)
Weight	0.4 lbs. (0.18 kg)

Limited Warranty, Warranty Exclusions, Limit of Liability and RMA Request Instructions

See the SCS Warranty -
StaticControl.com/Limited-Warranty.aspx