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GMS-5040Z

Digital Continuity Ground Monitoring System

With 4DZ Technology™

P/N: 1100-1050



Operation Manual & Data Sheet

PATENT PENDING



Intermountain Electronics, Inc.

For over 30 years, Intermountain Electronics has innovated, engineered, produced, and serviced world-class electrical distribution and control equipment for a wide variety of applications. IE is an industry pioneer and leader, boasting best-in-class expertise and a stellar reputation across a range of industries including mining, oil and gas, tunneling, power generation/distribution, and municipal/government.

Businesses from these and other industries rely on Intermountain Electronics to provide quality products and exceptional service. The industry experts at Intermountain pride themselves on exceeding the needs and expectations of our customers.

As a long-time provider of products and services ranging from large-scale one-off custom power systems to standard off-the-shelf electronic/electro-mechanical components, Intermountain Electronics understands the stringent environmental conditions, operating requirements, and government regulations that our customers must contend with.

Every Intermountain Electronics product is carefully designed, manufactured, and tested to ensure world-class performance and reliability.

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Important Notice

This document contains information intended to aid in the proper installation, operation, and maintenance of the product described. Although this information will prove useful to the properly trained and qualified user, it is not practical to cover every possible situation, installation contingency, or other detail.

It is imperative that proper engineering and techniques are adhered to in the installation, operation, and maintenance of this product. It is the responsibility of the user to ensure that any system utilizing this product is safe, and that all personnel involved with the selection, installation, maintenance, and use of this product are properly qualified. This product must not be used in situations where its ratings are exceeded.

While every effort has been made to make sure the information in this document is accurate, IE cannot guarantee that there are no errors. Users of this product should verify any aspects of the product's design or performance that are critical to their application, and in particular, any aspects that may affect the safety of the overall system or installation.

Product design and specifications may change without notice.



I: GENERAL INFORMATION

General Overview:

The GMS-504DZ is a state-of-the-art digital ground monitoring system that combines the most sophisticated continuity Ground Monitor (GM) available (featuring 4DZ Technology™) with a fully programmable digital Ground Fault Relay (GFR).

The GM and GFR of the GMS-504DZ are microprocessor-based, and both use cutting-edge Digital Signal Processing (DSP), resulting in unrivaled performance.

The GMS-504DZ is appropriate for applications with system voltages up to 5kV, and it is designed for world-class safety and reliability. The GMS-504DZ boasts redundant key circuits for reliability, continuous on-board self-test and monitoring, and advanced fail-safe design.

The Ground Monitor:

The GM is a continuity-type monitor. This type of GM monitors the impedance of the ground conductor, in combination with a pilot wire (the pilot and ground conductors constitute the "pilot/ground loop"). If the total impedance of the pilot/ground loop exceeds an unsafe level (greater than 50 ohms), the GM trips.

The GMS-504DZ is the first GM to feature patent-pending 4DZ Technology™, which greatly reduces sensitivity to real-world issues, such as interference or surges, that often cause traditional ground monitors to nuisance trip, or to fail to trip.

In addition, the GM also features a Parallel Path Protection mode which, when enabled, enhances safety by ensuring that "parallel path" ground currents cannot mask a bad ground conductor.

This mode also prevents crosstalk between multiple GMS-504DZs when used in a single system. As with other GMs, this crosstalk could happen if parallel paths allow test signals from one GM to be picked up by another. Note: Because of the special nature of the 4DZ test signal, the GMS-504DZ can not be affected by other types of GMs, even if parallel paths exist.

To utilize Parallel Path Protection mode, a Ground Wire Device (GWD) and Current Transformer (CT) must be used. Two GWD/CT options are available for use with the GMS-504DZ:

- 1100-6010 Saturable-Coil (Coil-Type) GWD plus 2000-1367 GM CT
- 1100-6021 Anti-parallel diode GWD with an integrated CT

No GWD or CT are required if Parallel Path Protection mode is not used.



4DZ Technology™ is a sophisticated, patent-pending Ground Monitor (GM) technology implemented using Digital Signal Processing (DSP) technology:

A complex test signal is digitally created and transmitted through the ground conductor. This signal is made up of multiple components designed to minimize the effect of different interference sources, such as power surges or harmonics, that can degrade the performance of other ground monitors.

The level of each signal component is constantly monitored independently, and an advanced 4DZ logic algorithm uses these levels to decide when to, and when not to, trip.

The 4DZ system prevents the frequent nuisance trips and, more importantly, failures to trip, that occur with traditional ground monitor technologies.

A specially-designed Pilot Wire Device (PWD) is included with the GMS-504DZ. This PWD (part number 1020-0052) is mounted in the equipment being powered, and is required for proper operation. The PWD allows the GM to verify that the pilot and ground conductors are not shorted together. This is a condition that could prevent the GM from monitoring the ground conductor.

The GM can be set to operate in Latching or Non-Latching mode. When set for Latching mode, a GM trip will remain latched until it is manually reset. In Non-Latching mode, the GM automatically resets itself if the condition causing the trip is cleared.

The Ground Fault Relay

The digital GFR of the GMS-504DZ is fully programmable, with five selectable current trip levels ranging between 0.5A and 6A, and with selectable trip delay times ranging from instant (no added delay) to two seconds.

The GFR operates in either "Normal" or "VFD" mode. Normal mode is designed for 50/60 Hz power systems. In this mode, highly selective digital filters ensure that the GFR only reacts to 50/60 Hz fault currents. This prevents nuisance trips due to interference, such as power supply harmonics or other noise sources.

In VFD mode, the GFR uses a different digital filtering algorithm to detect ground faults in the frequency range in which Variable Frequency Drives (VFDs) operate. This digital filter also ensures the GFR does not react to other frequencies that could cause nuisance trips.

A rear-panel switch is used to select between VFD and Normal GFR modes.

Expansion Options

Like many other IE products, the GMS-504DZ includes an IE-exclusive accessory port. This port accepts expansion modules (available separately), which greatly enhance connectivity and signal monitoring capabilities.

Compatible Products

Figure 1 includes accessories and other products that are compatible with the GMS-504DZ.



Figure 1: Compatible Products

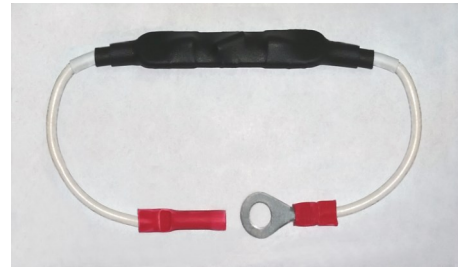
GFR Current Transformers (CTs)
(Required for GFR use)



1100-0006
2.5" window

1100-0007
4.2" window

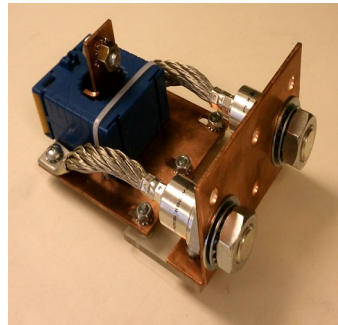
Pilot Wire Device (PWD)
(Required, Included with GMS-504DZ)



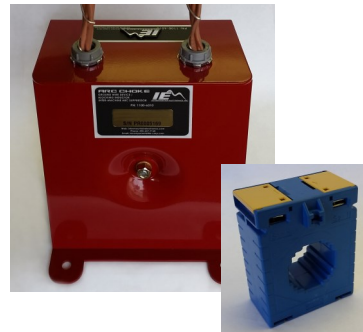
1020-0052
Pilot Wire Device

Optional GWD/CTs

(Required for Parallel Path Protection Mode)



Option 1:
1100-6021 GWD/CT



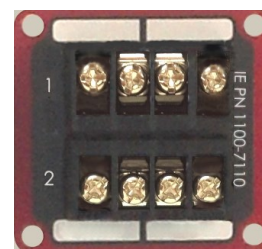
Option 2:
1100-6010 GWD &
2000-1367 CT

Remote Control

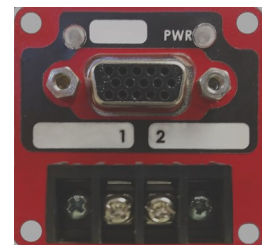


1100-4001
IRC-1 Remote Control

Optional Expansion Modules



1100-7110
2 Barrier Strips



1100-7100
Barrier Strip & D-Sub

II: FEATURES, CONTROLS & CONNECTIONS

Key features of the GMS-504DZ include:

- Cutting-edge design, using Digital Signal Processing (DSP) and modern components.
- Digital ground monitor with **4DZ Technology™** for accurate, reliable performance, and dramatically improved immunity from interference or turn-on surges.
- 4DZ technology completely eliminates the need for the polarity switches used with traditional ground monitors.
- Optional Parallel Path Protection Mode improves safety by preventing parallel ground paths from masking a bad ground conductor.
- Latching or non-latching ground monitoring operation.
- Fully programmable, DSP-based Ground Fault Relay with settable trip current level and delay time.
- “Normal” GFR Mode with DSP harmonic filter to eliminate nuisance trips that can otherwise occur due to harmonics or interference.
- “VFD Mode” for accurate ground fault monitoring when used with Variable Frequency Drives (VFDs).
- On-board diagnostics continuously monitor GMS-504DZ operation. Redundant key circuits ensure reliability.
- Fail-safe design ensures the GMS-504DZ trips if power fails, or if any failure is detected.
- Compatible with IE Expansion Modules (such as the 1100-7100, 1100-7110), which provide additional interconnection / monitoring capabilities.
- Mode selection switches are protected under a clear window to prevent accidental changes. These switches are illuminated to make checking settings simple, even in poor light.
- Designed for power systems operating at up to 5kV.

The front and rear panels for the GMS-504DZ ground monitor system are shown in Figure 2.



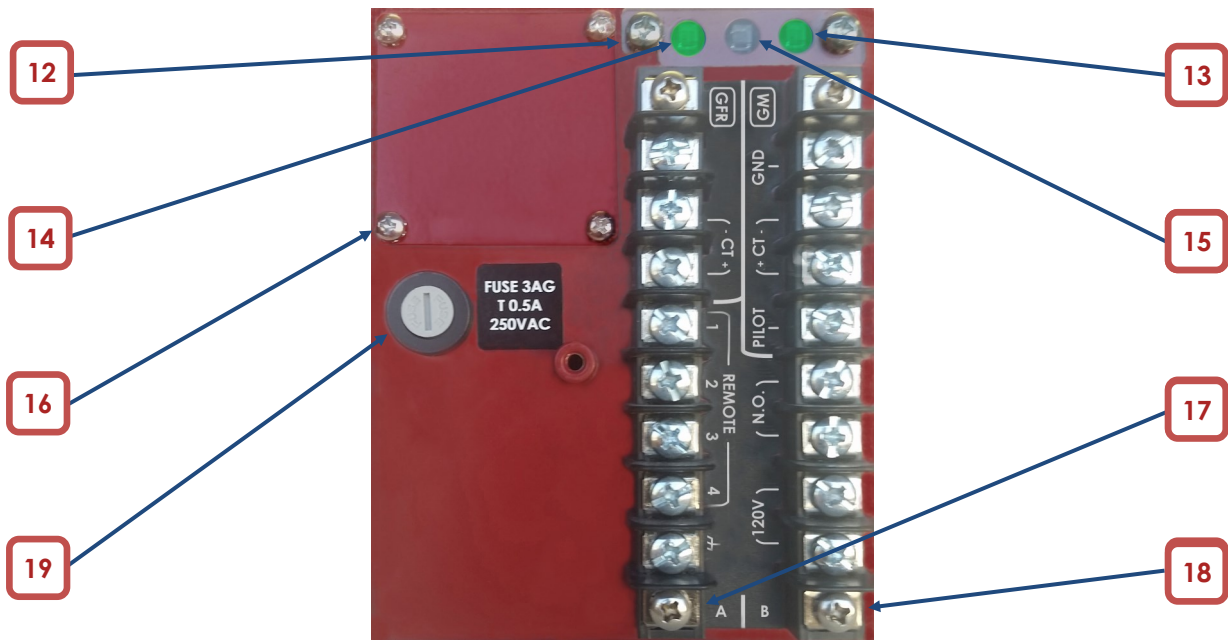
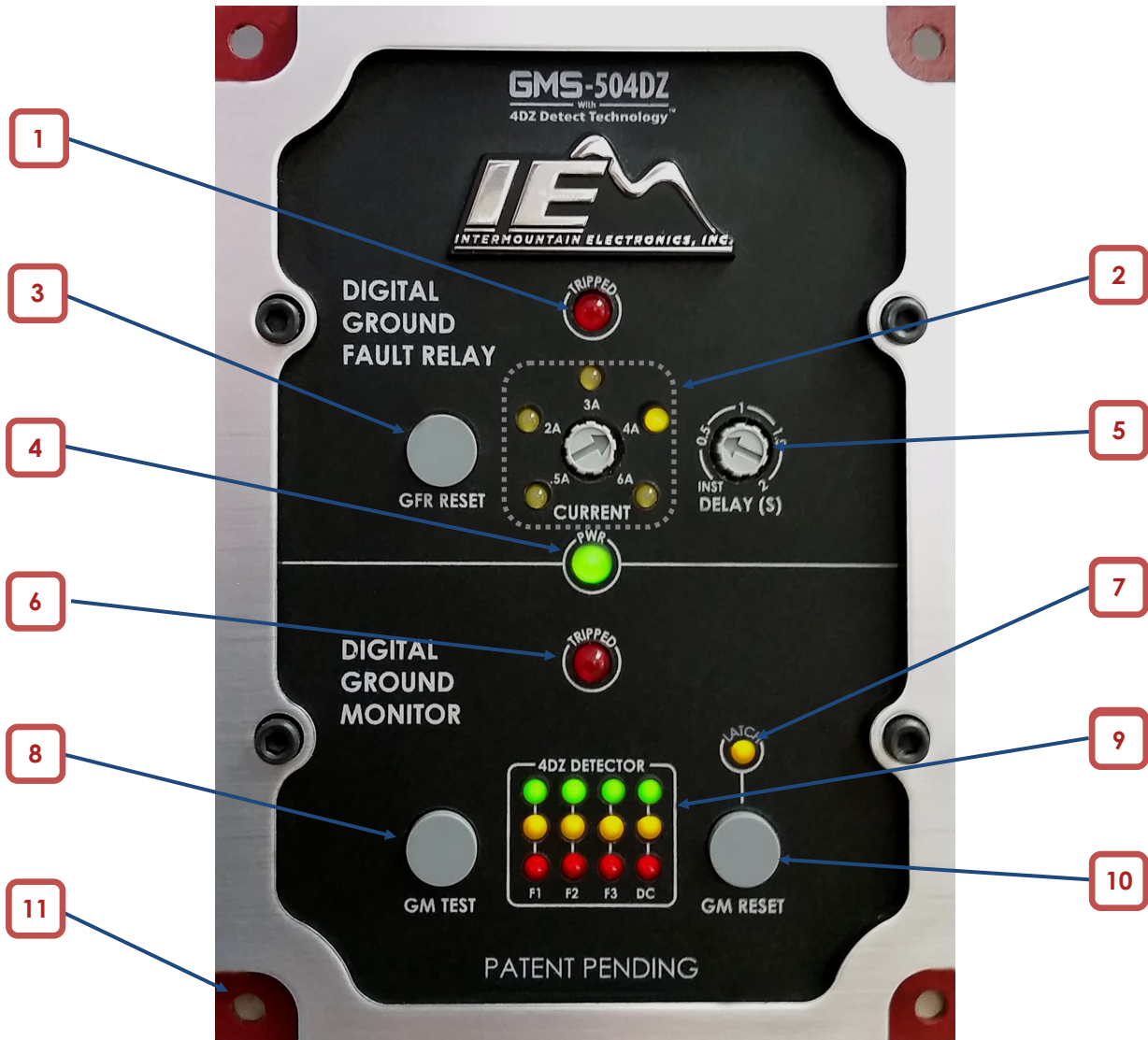


Figure 2: Front & Rear Panels

Front Panel:

- 1) GFR Trip Indicator
- 2) GFR Trip Current Selector & Indicators
- 3) GFR Reset Button
- 4) Power Indicator
- 5) GFR Delay Selector
- 6) GM Trip Indicator
- 7) GM Latching Trip Indicator
- 8) GM Test Button
- 9) 4DZ Level Indicators
- 10) GM Reset Button
- 11) Mounting Holes

Rear Panel:

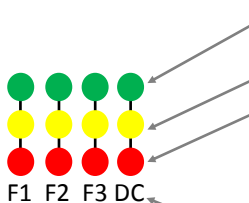
- 12) Mode Selection Protection Window
- 13) GM Latching/Non-Latching Mode Control
- 14) GFR VFD/Normal Mode Control
- 15) Parallel Path Protection Mode Enabled/Disabled Control
- 16) Expansion Module port
- 17) Barrier Strip A
- 18) Barrier Strip B
- 19) Fuse Holder (T0.5A, 250 VAC)

GMS-504DZ Indicators:

- GFR Trip** Lit (red) when the GFR is tripped due to a sensed ground fault. GFR trips are always latching, so this indicator remains lit until the GFR is reset.
- GM Trip** Lit (red) when the GM is tripped due to a ground conductor that has too much impedance. GM trips may be latching or non-latching, depending on the position of the GM Latching/Non-Latching control.
- GFR Trip Current** One of these five indicators will be lit to indicate which GFR trip current is selected. Depending on which Indicator is lit, the GFR will trip if .5A, 2A, 3A, 4A, or 6A of fault current is detected for longer than the delay selected with the delay control.

Note: In the event that the self-diagnostic system detects a problem, these LEDs will all flash, indicating that the unit should be serviced or replaced.

- 4DZ Detector** Red, Yellow, and Green LEDs indicate the level of each 4DZ GM test signal being detected. The 4DZ test signal has four components, and the level of each is individually indicated:

- 
- Green: Indicates that the test signal component is detected at full level, indicating a low impedance (good) ground conductor.
 - Yellow: Indicates a higher, but still safe impedance.
 - Red: Indicates a high-impedance (bad) ground conductor.
 - All off: Indicates a very high impedance (likely broken) ground conductor

These LEDs may also flash to indicate other trip conditions:

Flashing DC Indicator indicates a trip has occurred because no PWD is being detected (likely omitted or shorted). This trip could also occur if large stray DC currents are flowing in the ground conductor—a condition that could make it impossible to verify the presence of the PWD. A stray DC current of the opposite polarity can also result in a low (red) reading on the DC indicator, which may also cause a trip.





Flashing AC Indicators (F1, F2, and F3) indicate that a Parallel Path trip has occurred. (Parallel Path Protection must be enabled for this to occur.) A parallel path trip means that even though the 4DZ test current is being detected, it is coming through a “parallel” (unintended) path, such as the earth, rather than through the ground conductor. The GMS-504DZ includes this parallel path protection mode because parallel paths are not reliable or safe grounds.

- GM Latch** Lights when the GM trips, and stays lit until the GM is reset with the GM Reset button. (See the GM Reset Button below for more information.)

- Power** Lights when control power (120VAC) is applied to the GMS-504DZ.



Front and Rear Panel Controls:

- GFR Reset:** When a ground fault is detected, the GFR trips and stays tripped (latches) until the ground fault is cleared, and the GFR is reset by pressing this button.
- GFR Current:** This control selects between 5 available GFR trip current thresholds: 0.5A, 2A, 3A, 4A, and 6A. The GFR will trip if a ground fault current is detected that remains above this threshold for longer than the delay time selected with the GFR Delay control.
- GFR Delay:** This control allows the GFR delay to be set to any time between Instant (no added delay) and 2 seconds. This setting determines how long a ground fault must be detected before the GFR will trip.
- GM Test:** Pressing this button inserts a test resistance in line with the pilot/ground loop, which will cause the GM to trip if everything is set up and working properly.
- GM Reset:** When the GM is in Latching mode, any GM trip stays latched until this button is pressed. In Non-Latching mode, GM trips are automatically reset if the condition causing the trip is cleared, but the GM Latch LED will remain lit to indicate that a trip has occurred until this button is pressed.
- GM Latching/
Non-Latching** **ON REAR PANEL:** Selects whether the GM is in Latching, or Non-Latching mode. This mode determines what happens after a GM trip occurs:
-  Latching Mode (LED lit): The GM remains tripped, even if the condition that caused the trip is cleared, until the GM Reset button is pressed.
 -  Non-Latching Mode (LED not lit): The GM remains tripped only as long as the ground conductor issue remains. If the issue is cleared, the GM trip will automatically reset. However, the GM Latch LED will remain lit until the GM Reset button is pressed to indicate that a trip did occur.
- GFR Normal/
VFD** **ON REAR PANEL:** Selects whether the ground fault relay is in Normal Mode or VFD Mode:
-  VFD Mode (LED lit): The GFR will detect ground fault currents at frequencies where VFDs generally operate, while DSP-based filtering rejects higher frequencies to prevent nuisance tripping. This mode should be used any time VFD powered systems are being monitored.
 -  Normal Mode (LED not lit): The GFR will detect ground fault currents only at standard power supply frequencies (50/60 Hz). DSP-based filtering is used to reject other frequencies to prevent nuisance tripping.



P. Path Enabled/
Disabled

ON REAR PANEL: Selects whether Parallel Path Protection Mode is enabled or disabled for the ground monitor:



Parallel Path Protection Mode (LED lit): In this mode, the GM monitors ground currents with its internal sensors as well as an external CT and Ground Wire Device (GWD). This CT and GWD allow the GM to differentiate between the ground conductor and any possible parallel ground paths (e.g. through the earth) that could “short circuit” and mask a bad ground conductor.

This mode can also protect against interference from other GMs that could occur if there are parallel paths. For this reason, this mode is recommended for systems using multiple GMS-504DZs.

Note: Other GMs without 4DZ technology cannot interfere with the GMS-504DZ, regardless of whether Parallel Path Protection Mode is used or not.



Disabling this mode (LED not lit) causes the GM to monitor the returning test signal using only its internal sensor. This is a common, low cost implementation, but it is not as safe as using Parallel Path Protection mode.

Figure 3: Pinout, Terminal Strips A & B

Terminal Strip A		Terminal Strip B	
Pin	Function	Pin	Function
1	Do not Use	1	GM GND
2	GFR CT -	2	GM CT -
3	GFR CT +	3	GM CT +
4	Remote 1	4	GM PILOT
5	Remote 2	5	TRIP CONTACT (NO)
6	Remote 3	6	TRIP CONTACT (NO)
7	Remote 4	7	120V (Line)
8	Chassis Gnd (⏏)	8	120V (Neutral)

Connections, Terminal Strip A:

GFR CT

These terminals should be attached to the GFR Current Transformer (CT). The GFR-504DZ is designed to operate with the following CTs:

- 1100-0006: 350:5, 2.5" window
- 1100-0007: 350:5, 4.2" window

Note: The GMS-504DZ can be used as a ground monitor only (no Ground Fault Relay) by simply not connecting a GFR CT to these terminals.

Remote 1-4

Used to connect the IRC-1 remote control (PN 1100-4001). IRC-1 allows basic control of the GMS-504DZ, but not parameter adjustments. Thus, the GMS-504DZ can be mounted in a secure location to prevent unauthorized parameter changes, while the IRC-1 is conveniently located for every day operation.

Chassis Gnd (⏏)

Connected to the chassis of the GMS-504DZ.



Connections, Terminal Strip B:

GM PILOT	Attached to the pilot conductor going to the equipment being powered. The GMS-504DZ applies the 4DZ test signal to this conductor, and it then measures how much of the test signal returns to the GM GND terminal after passing down the power cable, through the Pilot Wire Device (PWD), and back through the ground conductor (this path is called the pilot/ground loop).
GM GND	Attached to the ground conductor going to the equipment being powered. This terminal is where the 4DZ test signal returns from the pilot/ground loop.
	Note: The GMS-504DZ will always remain tripped if the ground monitor Pilot and Ground are disconnected. Because of this, if a GMS-504DZ is to be used as a GFR only (without the GM function), the supplied PWD must be connected (in the correct polarity) between the GM pilot and ground connections.
GM CT	These terminals must be attached to the GM CT (2000-1367), or to the CT integrated into the 1100-6021 GWD/CT when Parallel Path Protection mode is enabled. When parallel path protection is not used, these terminals can be left disconnected.
120V (2 terminals)	Attach 120V AC Control Voltage to these two terminals
NO TRIP CONTACTS (2 terminals)	These terminals are the relay output for the GMS-504DZ. When either the GM or the GFR trips, these contacts will be open. When neither is tripped, these contacts will be closed. Since the GMS504-DZ is a fail-safe design, these contacts will also be open when control power is off, or if some error is detected.



III: OPERATION AND SPECIFICATIONS

GMS-504DZ Overview:

The GMS-504DZ is a digital Ground Monitor (GM) combined with a programmable Ground Fault Relay (GFR). Both the GM and the GFR functions utilize cutting edge Digital Signal Processing (DSP) technology.

As a complete ground monitoring system, the GMS-504DZ can detect any of these issues:

- Ground fault
- High-impedance ground conductor (or pilot conductor)
- High-impedance ground conductor (or pilot conductor) in the presence of parallel ground paths (if Parallel Path Protection Mode is enabled)
- Short circuit between pilot and ground conductors
- Missing or defective PWD
- Missing or inadequate control voltage
- Excess DC current in the ground conductor (such as might be caused by a fault to a DC source)
- Any problem detected by on-board self-diagnostics

A typical system block diagram including a source, such as switch-gear or a power center with the GMS-504DZ installed, and a load with the Pilot Wire Device [PWD] installed is shown in Figure 4.

GM Operation:

The Ground Monitor (GM) in the GMS-504DZ is a digital continuity-type GM using patent-pending 4DZ technology to sense the impedance of the pilot and ground conductors between a power source and load. The GM trips when the combined impedance of the pilot and ground conductors (the “pilot/ground loop”) approaches 50 ohms, which is considered the limit for safe operation.

4DZ Technology utilizes a 4DZ test signal which is a complex signal made up of four independent components. The 4DZ test signal is applied to the pilot conductor, where it travels to the load, goes through the PWD and returns on the ground conductor (the “Pilot/Ground Loop” shown in Figure 4).

The 4DZ test signal components are resistant to the effects of interference and turn on/off surges. These are issues which often cause nuisance trips or failures to trip in traditional GMs. Because of the special nature of the 4DZ test signal, there is no need for the polarity switch used with traditional GMs to reduce trips due to turn on/off surges.

A 4DZ signal detector individually measures the current level of each signal component to determine the pilot/ground impedance. Based on these individual levels, the GM determines if the impedance is too high for safe operation, and if it is, the GM will trip. Additionally, if the impedance is very high (e.g. a broken or disconnected conductor), the GM is automatically reconfigured to a high-impedance state. This limits the available energy to prevent a spark when the loop is reconnected. Once the GM detects that the impedance has returned to normal levels, the GM resumes normal operation.

A Pilot Wire Device (PWD), is installed at the load between the pilot and ground conductors. This PWD can be detected by the GM, and it provides proof that the pilot and ground conductors are not shorted together—a condition, that, if undetected, would prevent the GM from working properly. If the PWD is not detected, the GM will trip.

The GMS-504DZ features a Parallel-Path Protection mode. When this op-



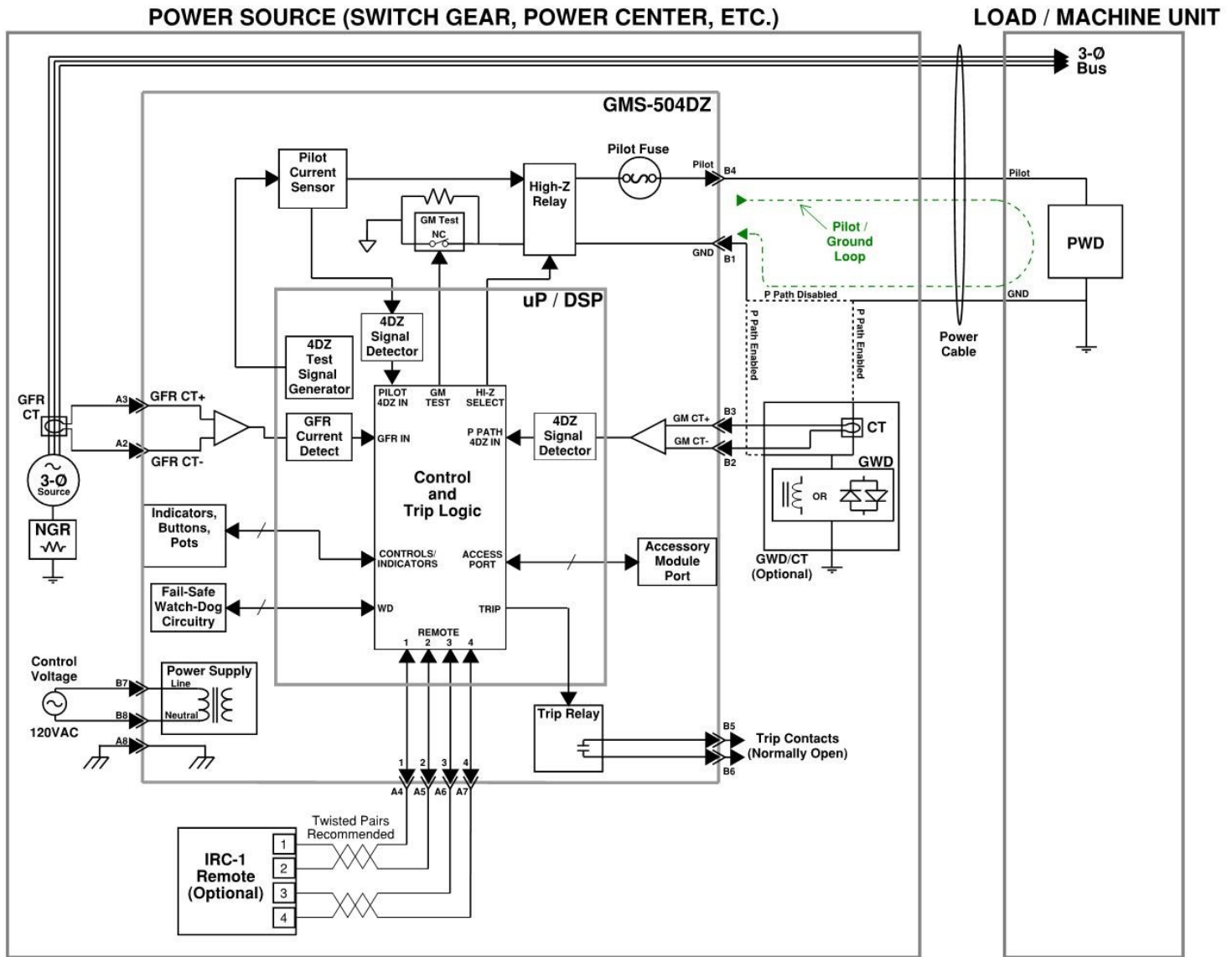


Figure 4: Typical System Block Diagram

tional mode is enabled, an external CT and GWD allow the GM to verify that the 4DZ test current being monitored is actually returning on the ground conductor, rather than on some parallel path.

Typical parallel ground paths include the earth, or incidental connections between pieces of equipment that come in contact with each other. Without parallel path protection, a parallel path could mask a bad ground wire by conducting the 4DZ signal around the defective ground conductor, preventing the GM from sensing the ground conductor problem.

Additionally, a GMS-504DZ GM could be affected by other 4DZ GMs operating in the same system, if test signals are allowed to mix due to parallel paths. Parallel Path Protection mode prevents this problem.

Other types of GMs that do not use 4DZ technology will not interfere with the GMS-504DZ, even if parallel paths exist. Therefore Parallel Path Protection Mode is not required to prevent issues due to non-4DZ GMs.

To use Parallel Path Protection Mode, a compatible CT and Ground Wire Device (GWD) are required. The CT measures the 4DZ test signal on the ground conductor. The GWD, which may be an anti-parallel diode, or a saturable reactor (coil-type) GWD, isolates the ground conductor from other grounds in normal operation, but still provides an effective connection for safety in the event of a ground fault.

Two GWD/CT options are available for the GMS-504DZ: PN 1100-6021 integrates a compatible CT and diode-type GWD together in one compact unit. Alternatively, IE's coil-type GWD (PN 1100-6010) and a separate CT (PN 2000-1367) can be used. This option is less compact, but offers better arc suppression. Other CTs and GWDs may not be compatible, and are not recommended.

If Parallel Path Protection mode is not enabled, the GM will ignore the GM CT inputs, and no GWD or GM CT is required.

GFR Operation:

When installed properly in a power center or switch-gear, the digital GFR of the GMS-504DZ uses the GFR Current Transformer (CT) to monitor the sum of the currents in the phase conductors of the 3-phase bus.

In a balanced system, the instantaneous sum of these currents should be close to zero. However, if a ground fault occurs, the sum of the currents will be equal to the fault current, and this fault current will be sensed by the GFR CT.

The GFR measures these ground fault currents, and if the current is over a selected threshold for longer than the set time delay, the GFR will trip. The trip current threshold and delay setting are both programmable:

The GFR trip current threshold is set using the GFR Current control on the front panel. Five thresholds are available, ranging from 0.5A to 6A. Similarly, the delay time is set by the GFR Delay control, and this setting is variable from instant (i.e. no delay added) to 2 seconds.

The GFR can operate in either Normal Mode or VFD Mode.

- In Normal Mode, the GFR monitors only currents occurring at standard power supply frequencies (50 Hz/60 Hz). To prevent nuisance tripping, a digital filter causes the GFR to ignore currents at other frequencies, which may be due to interference or power supply harmonics.
- In VFD mode, the GFR monitors a broader frequency range of currents ranging up to 400Hz. A digital filter eliminates higher frequencies to prevent nuisance tripping. The VFD is not rated to work at 0 Hz (DC); however, it is generally able to detect a DC fault that occurs rapidly.

Self-Monitoring:

The GMS-504DZ is designed with a sophisticated self-monitoring system to protect against the unlikely event of a circuit or software failure. This system includes software and circuitry that continuously monitor key functions of the system.

The GMS-504DZ is designed to be fail-safe, so a trip will occur if the self-monitoring system detects a problem, or if a power outage happens.



Specifications:**Ground Fault Relay:**

Current Trip Levels	Selectable to any of these values: 0.5A, 2A, 3A, 4A, 6A
Trip level accuracy	(Not including cabling impedances, using 1100-0006 or 1100-0007 CTs) Normal mode: +/- 5% (50 or 60 Hz, any trip level setting) VFD mode: +/- 5% (20-400 Hz, 2-6A trip level settings) VFD mode: +10%/-5% (10-20 Hz, 2-6A trip level setting) VFD mode: +/- 20% (10-20 Hz, 0.5A trip level setting)
Delay Time	Selectable to from Instant (no added delay) to 2 Seconds Trip delay (measured at 3x selected trip current): Normal mode: 55 ms (max) (50 or 60 Hz, delay set to Instant) Normal mode: 2 S, +/- 2.8% (50 or 60 Hz, delay set to 2 S) VFD mode: 55 ms (max) (10-400 Hz, delay set to Instant) VFD mode: 2 S, +/- 3% (10-400 Hz, delay set to 2 S)
Current Transformer	350:5 Current ratio, IE CT Part Numbers: 1100-0006 (2.5"ID) 1100-0007 (4.2" ID)
Maximum Current Detection Frequency	Designed to operate with IE CTs above in systems NGR-limited to 25A or less Digital filtering used to set detected frequency ranges: Normal mode: 50 or 60 Hz VFD mode: 10-400 Hz

Ground Monitor:

GM Trip Level:	Pilot-Ground impedance above 45 ohms (nominal)
GM Delay:	Min: 150ms Max: 250ms
Required PWD:	IE PN 1020-0052 (Included with GMS-504DZ)
Optional GWD/CT:	Required when Parallel Path Mode is enabled. Two options available: IE PN 1100-6021 (CT and Diode-type GWD), <u>or</u> IE PN 1100-6010 Coil-type GWD <u>plus</u> 2000-1367 CT
System Voltage:	Up to 5kV
Control Voltage:	120VAC, 60Hz. Nominal Power Draw: 13 VA

Part Numbers:

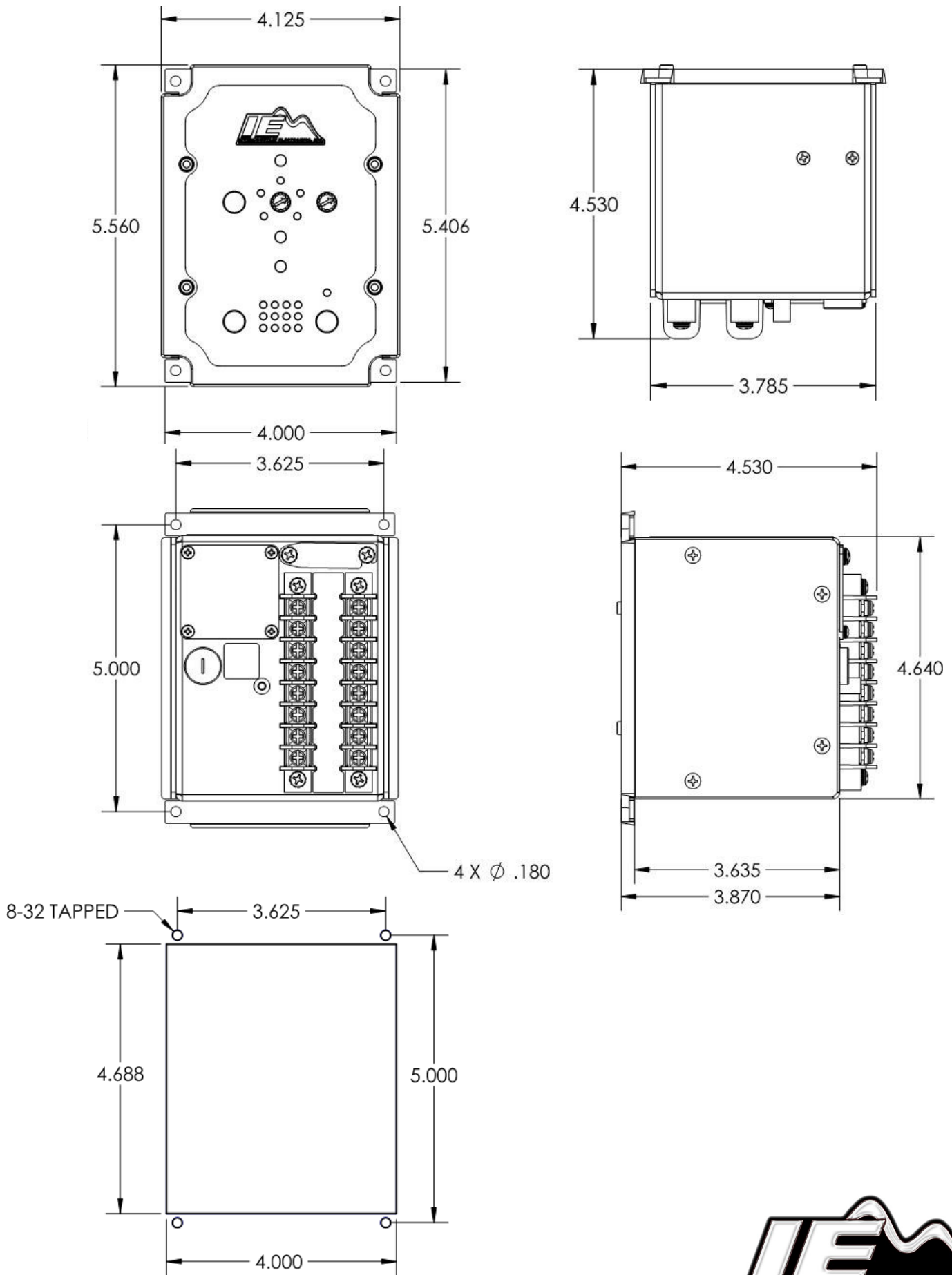
1100-1050	GMS-504DZ Ground Monitor / Ground Fault Relay
1020-0052	Required Pilot Wire Device (PWD). Included with 1100-1050
1100-6010	Optional Coil-type Ground Wire Device (GWD). Also use 2000-1367 CT.
2000-1367	Optional ground monitor CT. Required when 1100-6010 GWD is used.
1100-6021	Optional diode-type Ground Wire Device (GWD), plus integrated GM CT
1100-0006	Ground Fault Relay CT, 2.5" ID
1100-0007	Ground Fault Relay CT, 4.2" ID
1100-4001	Optional IRC-1 Remote Control
1100-7100	Optional expansion module, with D-SUB and 2-pin barrier Strip
1100-7110	Optional expansion module with two 2-pin barrier strips

Physical Characteristics

Weight:	2.25 lbs / 1.0 kg
Dimensions:	See Figure 5



Figure 5: Physical Dimensions and Mounting



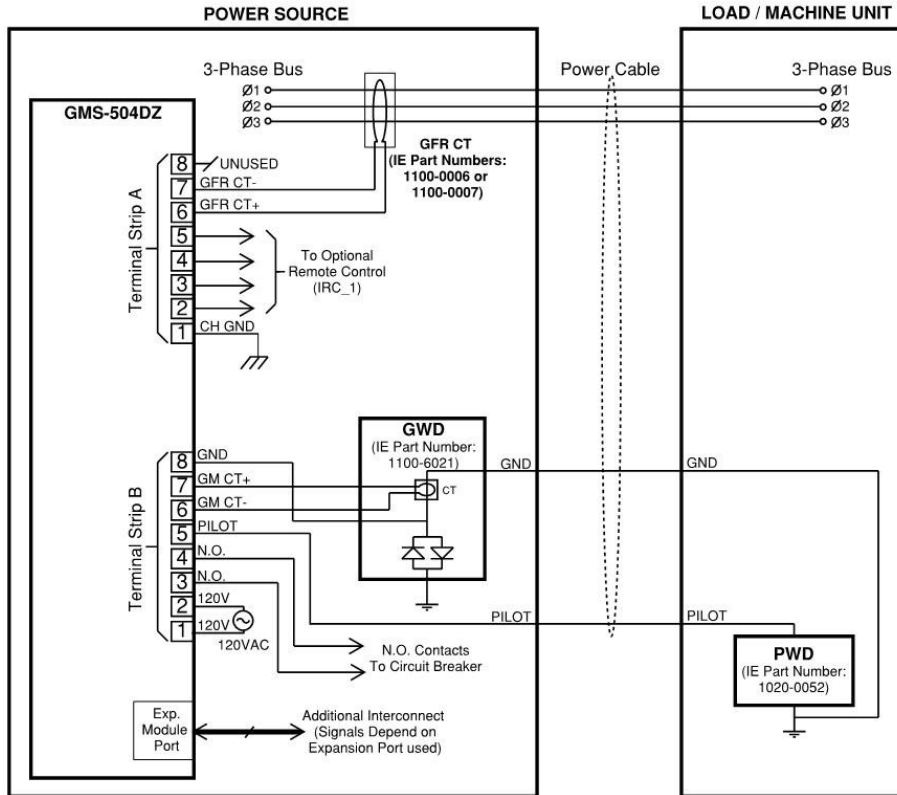


Figure 7: Installation with 1100-6021 Diode-Type GWD/CT for Parallel Path Protection (Parallel Path Protection mode should be ENABLED)

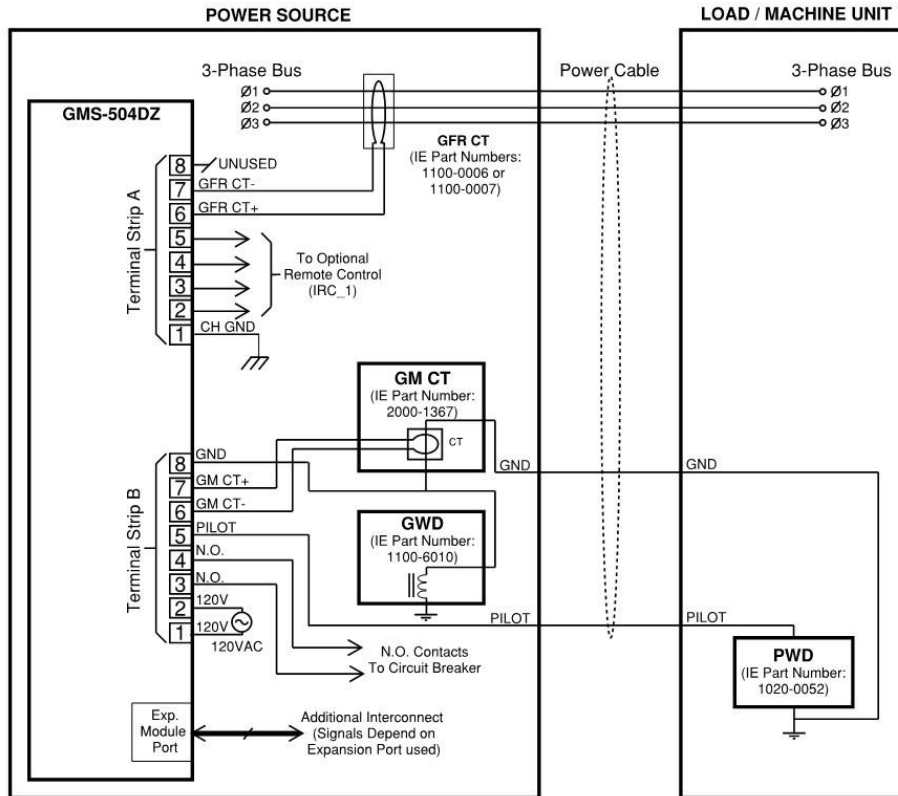


Figure 8: Installation with 1100-6010 Coil GWD and 2000-1367 CT for Parallel Path Protection (Parallel Path Protection mode should be ENABLED)





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