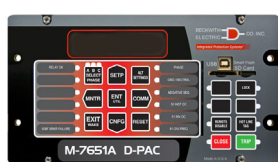
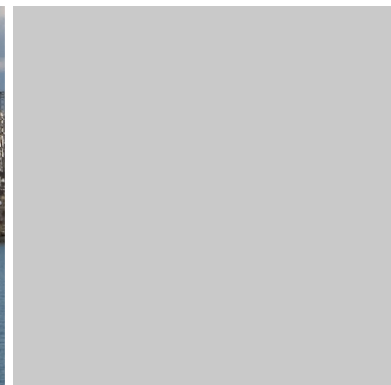
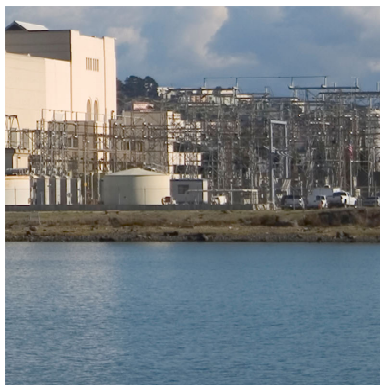
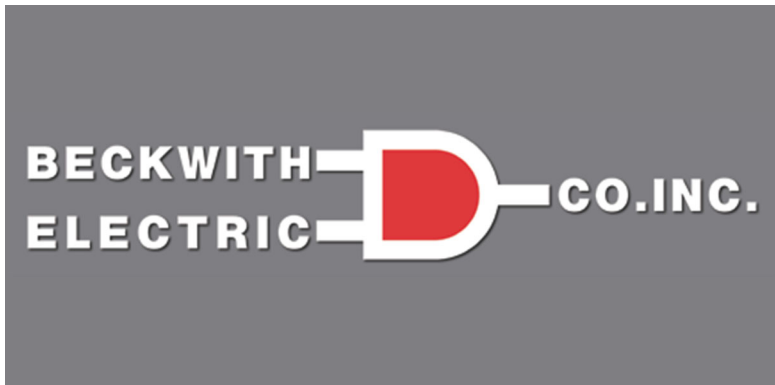
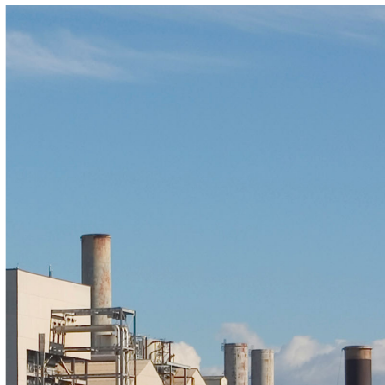


Power System Protection Solutions

Security and dependability for your most valuable power assets.



Generator Protection | Transformer Protection

Distributed Energy Resource Protection

Distribution Protection | Motor Bus Transfer | Synchronizing

Beckwith Electric, founded in 1967, is a premier provider of innovative and high quality products, technical services and solutions that meet the needs of customers involved in the production, transmission, and distribution of electric power.

Beckwith Electric introduced the first solid state tapchanger control in 1968, and was the first to develop the microprocessor protective relay in 1981. Today, Beckwith Electric has thousands of protection and control units in service worldwide, with a reputation for cutting-edge technology, defined by its customers and refined by Beckwith. This success starts with Beckwith Electric Employees and their commitment to quality in the products, all 100% designed and manufactured in Largo, Florida, U.S.A.

Beckwith creates solutions that protect power systems around the world. Beckwith's field-proven smart distribution automation controls for transformers, regulators and capacitor banks incorporate unique control strategies, advanced microprocessor architecture and cyber security compliant communications. Power systems protection solutions include generator, transformer, feeder, recloser and distributed energy resources. Additionally, Beckwith's fast motor bus transfer systems provide continuous, reliable motor protection, working to preserve process reliability. Beckwith also offers advanced synchronization systems for the automatic synchronizing of a generator with the best accuracy in the industry to assure safety for your most expensive asset.

Beckwith is the leading provider of innovative solutions for Smart Grid Volt/VAr Optimization (VVO) and Conservation Voltage Reduction (CVR). The capacitor controls and regulator/LTC controls designed by Beckwith Electric incorporate advanced features to enable maximum benefits to be derived from an Integrated Volt/Var Management (IVVM) system. With Smart Voltage Reduction and Smart Reverse Power, these can be applied as stand-alone controls with no communications, or as a critical part of an overall centralized IVVM system with extensive communications.

At Beckwith Electric, we believe that the essential Smart Grid application with the quickest payback for our customers is voltage reduction. By coordinating capacitor bank controls with regulator and LTC controls, a flatter voltage profile can be obtained across the entire distribution circuit. This enables greater levels of voltage and load reduction, either continuously or on command. On command voltage reduction reduces system peaks and the amount of reserve capacity required. This can delay the necessity for additional generating units. During emergency conditions, the utility can reduce load temporarily while procuring additional generation. Another benefit is the ability to use voltage reduction in lieu of starting up additional generating units when short-term demand overtakes online generation capacity. Long-term voltage reductions, performed regionally, can help extend the life of transformers and other equipment that would otherwise be forced to operate at full load capacity. This postpones the need for capital expenditures to upgrade transformers, distribution and transmission circuits, and construction of new substations and generating facilities.

Much of Beckwith's success comes from listening to customer feedback and using that information to influence the design features of its products. Even with over 25 patents, our core principal continues to be "Products defined by you, refined by Beckwith."

For additional company or product information, please browse our website or contact a local Beckwith Sales Partner or Regional Sales Manager office near you.

6190 118th Avenue North
Largo, FL 33773-3724 U.S.A.

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Distribution Protection

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- ♦ M-7679 R-PAC.....Page 8



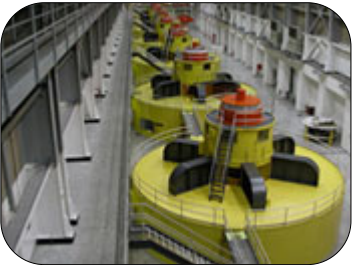
Generator Protection

- ♦ M-3425A Comprehensive Generator Relay.....Page 10
- ♦ M-3410A Small Generator Relay.....Page 14



Transformer Protection

- ♦ M-3311A (2, 3, or 4-Winding) Relay.....Page 12



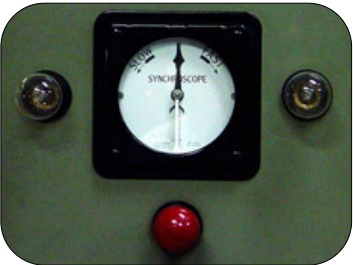
Distributed Energy Resource Protection

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- ♦ M-3520 Intertie Protection Relay.....Page 16



Motor Bus Transfer (MBT)

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Synchronizing

- ♦ M-5625 Syncrocloser® Digital Synchronizing System.....Page 22

Protection Quick Reference Guide

Function	Description	M-3311A	M-3410A	M-3425A	M-3520	M-7651A	M-7679
21	Phase Distance			S	○		
24	Overexcitation	○		S			
25	Sync Check		S	S	S	S	S
27	Undervoltage	○	S	S	S	S	S
27B	Bus Side Voltage Supervision					S	S
27G	Undervoltage (Neutral)		S		S		
27PP	Phase to Phase Undervoltage					S	S
27TN	Third Harmonic Undervoltage (Neutral)			S			
32	Directional Power		S	S	S	S	S
40	Loss of Field		S	S		S	
46(DT/IT)	Negative Sequence Overcurrent	S	S	S	S	S	S
47	Negative Sequence Overvoltage		S		S	S	S
49	Winding thermal protection	S		S			
50/27	Inadvertent Energizing			S			
50BF	Breaker Failure	S		S		S	S
50DT	Definite time overcurrent for split-phase differential			S			
50(G/N)	Instantaneous/Definite Time Overcurrent (Neutral)	S		S	S	S	S
50GS	Sensitive Ground Pickup					○	○
50P	Instantaneous/Definite Time Overcurrent	S		S	S	S	S
50PAF	Arc Flash Overcurrent					○	
51G	Inverse Time Ground Overcurrent	S			S	S	S
51N	Inverse Time Residual Overcurrent	S	S	S		S	S
51GS	Sensitive Ground Inverse Time Overcurrent					○	○
51P	Phase Inverse Time Overcurrent	S				S	S
51V	Inverse Time Overcurrent (3-Phase with Voltage Control or Restraint)		S	S	S	S	S
59	Phase Overvoltage	○	S	S	S	S	S
59D	Third Harmonic Voltage Differential			S			
59G	Ground Overvoltage	○	S		S	as 59Vz1	
59N	Residual Overvoltage			S		S	S
59I	Peak Overvoltage		S		S	S	S

Protection Quick Reference Guide

Function	Description	M-3311A	M-3410A	M-3425A	M-3520	M-7651A	M-7679
59PP	Phase to Phase Overvoltage					S	S
60FL	VT Fuse-Loss Detection		S	S	S	S	S
64(F/B)	Field Ground/Brush Lift-Off Detection			○			
64S	100% Stator Ground Fault by 20Hz Injection			○			
67P	Phase Directional Overcurrent				S	S	S
67G	Ground Directional Overcurrent					S	S
67GS	Sensitive Ground Directional Overcurrent					○	○
67N	Residual Directional Overcurrent			S	S	S	S
67Q	Negative Sequence Directional Overcurrent					S	S
78	Out of Step Protection (Mho Characteristic)			S	○		
79	Reconnect Enable Time Delay		S			○	S
81(O/U)	Overfrequency/Underfrequency	○	S	S	S	S	S
81A	Underfrequency Accumulation			S			
81R	Rate of Change of Frequency			S	○	S	S
87	Phase Current Differential	S		S			
87GD	Ground (zero sequence) Differential	S		S			
87H	Phase Differential High Set Overcurrent	S					
87T	Phase Differential (Harmonic Restrained)	S					
AR	Auto Restoration		S		S	S	S
BM	Breaker Monitoring	S		S		S	S
CCM	Close Circuit Monitoring					S	S
HLT/MM	Hot-Line Tag/Maintenance Mode					S	S
TCM	Trip (Aux Input) Circuit Monitor	S		S		S	S
TF	Through Fault	S					
THD/TDD	Total Harmonic Distortion / Total Demand Distortion					S	S



S = Standard Feature

○ = Optional Feature

M-7651A D-PAC

Protection

- ◆ Over 30 Protection Elements for optimal protection of Power Distribution Systems
- ◆ Ready to use advanced Protection Schemes for applications including Feeder Protection, Bay Control and DG Interconnection Protection
- ◆ 8 Setting Profiles
- ◆ Comprehensive I/O Matrix provides visual confirmation of enabled functions and selected outputs improving security
- ◆ Arc Flash Protection including: Maintenance Mode, Reverse Interlock Bus Protection, Optional Optical with Overcurrent Protection
- ◆ Compatible with Optical Point and Loop Sensors



Automation/Communications

- ◆ Front panel USB and SD Card ports for local programming and data transfer
- ◆ One or two optional serial ports (TIA-232, TIA-485 or Serial Fiber)
- ◆ Optional single or dual Ethernet ports (copper or fiber) with simultaneous multi-user and multi-protocol support
- ◆ Protocols supported include: MODBUS, DNP3.0, Optional: IEC61850
- ◆ Comprehensive Cyber Security tools for NERC CIP Compliance
- ◆ IEEE 1686 Compliant

Control

- ◆ (4) programmable Inputs and Outputs, expandable to (12) Inputs and (12) Outputs, plus three Virtual Inputs
- ◆ User programmable front-panel LEDs and pushbuttons

Monitoring

- ◆ Power Quality Monitoring up to the 63rd Harmonic including THD and TDD
- ◆ PQ Viewer (ITIC Curve)
- ◆ Sags, Swell and Sub-Synchronous Transient Detection
- ◆ Advanced Data Logging and Load Profile Recorder
- ◆ 3500 Event Sequence of Events (SOE) Recorder
- ◆ 100 DFR quality records of up to 480 cycles each with an adjustable sampling rate up to 128 s/c

IPScom® – Uncomplicated Software for Complex Power System Applications

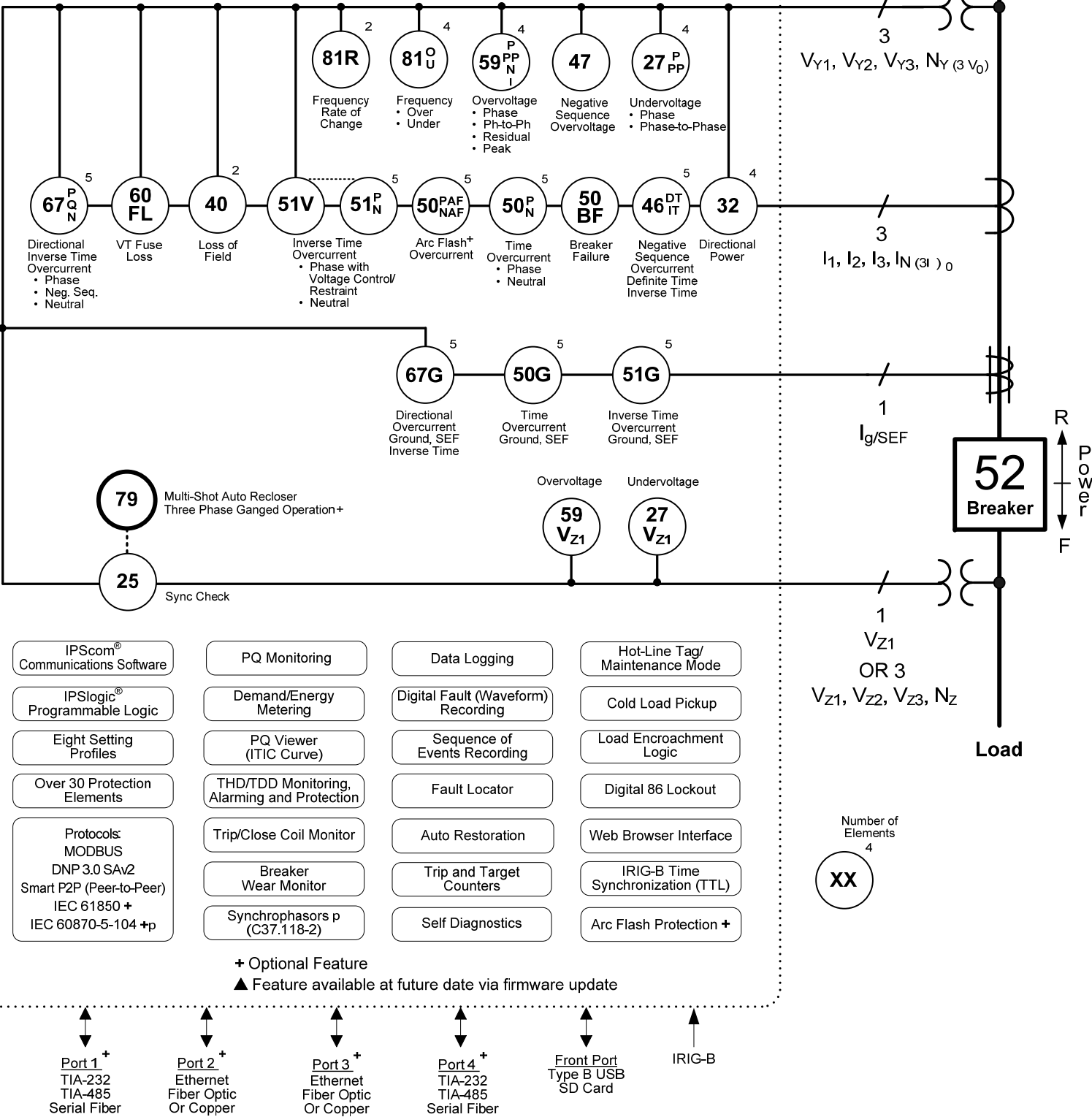
- ◆ Integrated Metering, DFR and PQ Visualization Tools
- ◆ Search and filtering tools for analysis of SOE, DFR and PQ records
- ◆ IPSlogic Programmable Logic

Flexibility

- ◆ Fast and easy retrofitting for most popular relays in existing cutouts using Beckwith's Adapter Panel Technology™
- ◆ Use the same mounting points with no panel modifications and similar connection points for analog and digital signals, eliminating the need for a complete rewire of your panel.

M-7651A D-PAC

Protection, Automation and Control System for Power Distribution Applications



M-7679 R-PAC

Protection, Automation and Control System for Recloser, Switch, Sectionalizer and Advanced Distribution Automation Applications

Protection and Control

- ◆ Over 30 Protection Elements for optimal protection of Power Distribution Systems
- ◆ Compatible with Three-Phase Ganged (Std) and Independent Phase Capable Switching devices such as Reclosers, Switches, Sectionalizers and Breakers
- ◆ Four (std) or Six (optional) Low Energy Analog (LEA) or VT voltage inputs
- ◆ Recloser Settings Wizard assists in creating file for most common settings for Recloser applications
- ◆ Comprehensive I/O Matrix provides visual confirmation of enabled functions and selected outputs improving security



Automation/Communications

- ◆ Pre-built functions for Advanced Distribution Automation Applications including Recloser, Switch, Sectionalizer, and Loop Schemes
- ◆ Comprehensive Embedded Cyber Security tools to implement NERC CIP requirements, including IPsec and Radius server security
- ◆ Front panel USB and SD Card ports for local programming and data transfer
- ◆ Optional single or dual Ethernet ports (copper or fiber) with simultaneous multi-user and multi-protocol support
- ◆ Protocols supported include: MODBUS, DNP3.0, Optional: IEC61850
- ◆ IEEE 1686 Compliant
- ◆ One or two optional serial ports (TIA-232, TIA-485 or Serial Fiber)



IPScom® – Uncomplicated Software for Complex Power System Applications

- ◆ Integrated Metering, DFR and PQ Visualization Tools
- ◆ Search and filtering tools for analysis of SOE, DFR and PQ records
- ◆ IPSlogic Programmable Logic

Monitoring

- ◆ Recloser Status Monitoring tool displays real time reclosing sequence and fault clearing time
- ◆ Power Quality Monitoring up to the 63rd Harmonic including THD and TDD
- ◆ PQ Viewer (ITIC Curve)
- ◆ Sags, Swell and Sub-Synchronous Transient Detection
- ◆ Comprehensive Suite of Advanced Diagnostic Tools
- ◆ Advanced Data Logging and Load Profile Recorder
- ◆ 3500 Event Sequence of Events (SOE) Recorder
- ◆ 100 DFR quality records (up to 480 cycles) with adjustable sampling rate up to 128 s/c

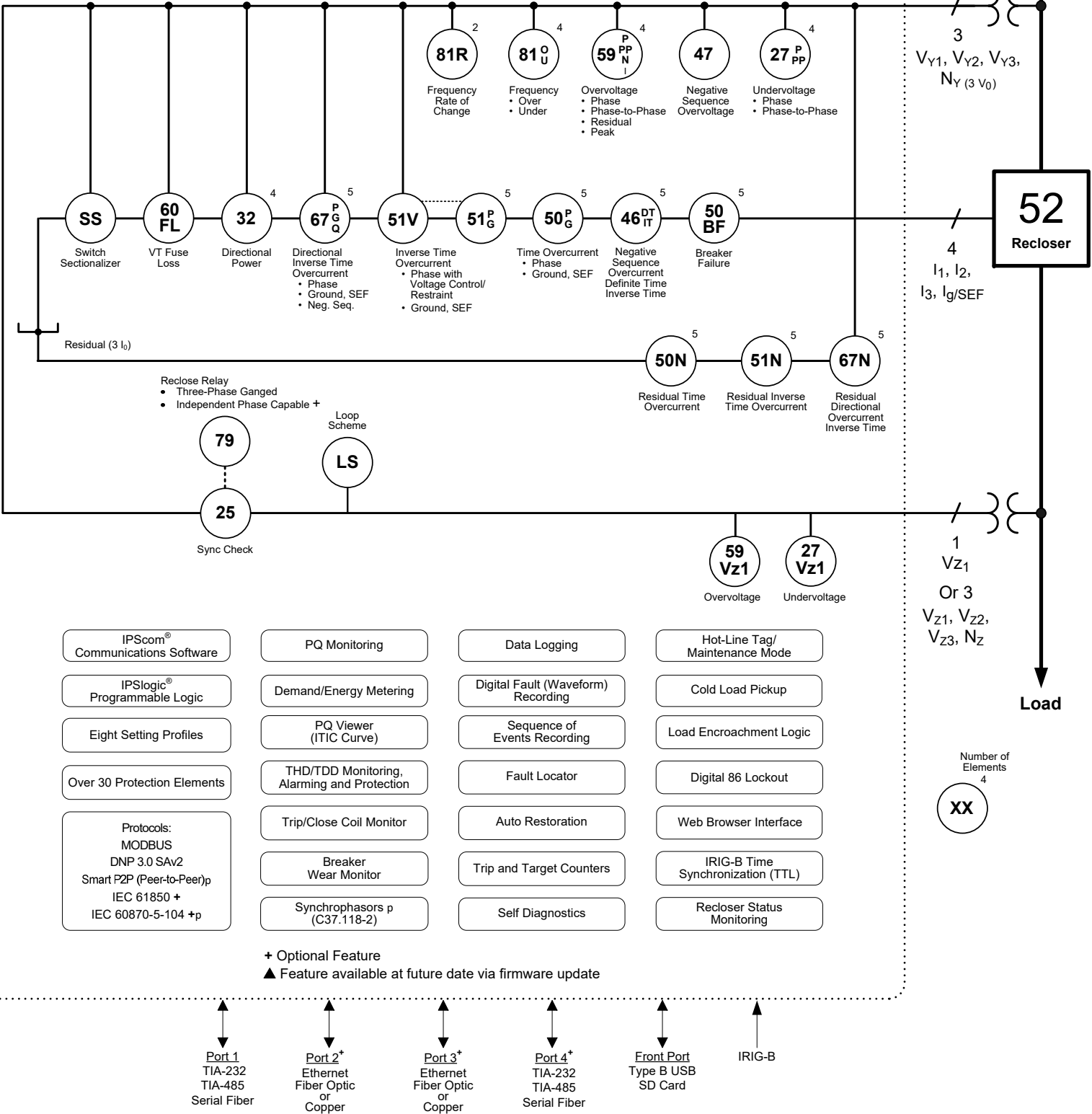
Flexibility

- ◆ Two ways to upgrade your existing control
 - ◆ M-2979 Cabinet for replacement of select complete recloser or switch controls
 - ◆ Adapters for retrofit of some of the most popular controls in the existing cabinet



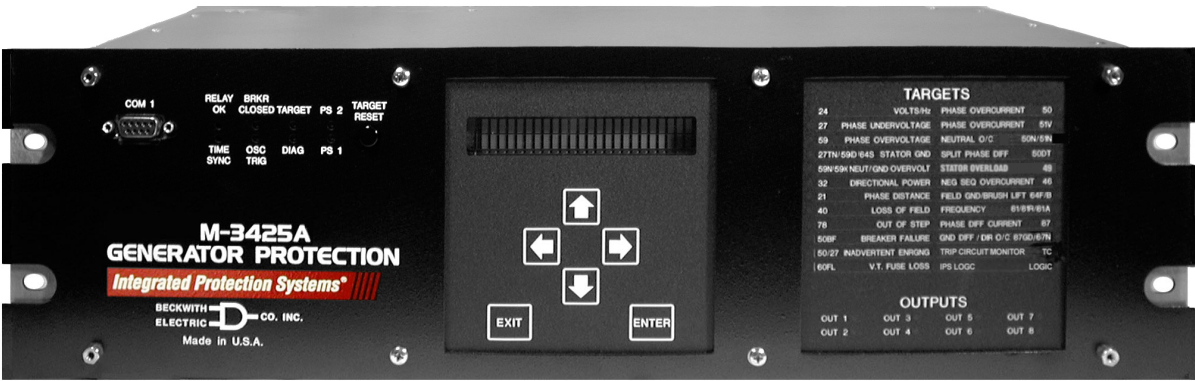
M-7679 R-PAC

Protection, Automation and Control System for Recloser, Switch, Sectionalizer and Advanced Distribution Automation Applications



M-3425A Comprehensive Generator Relay

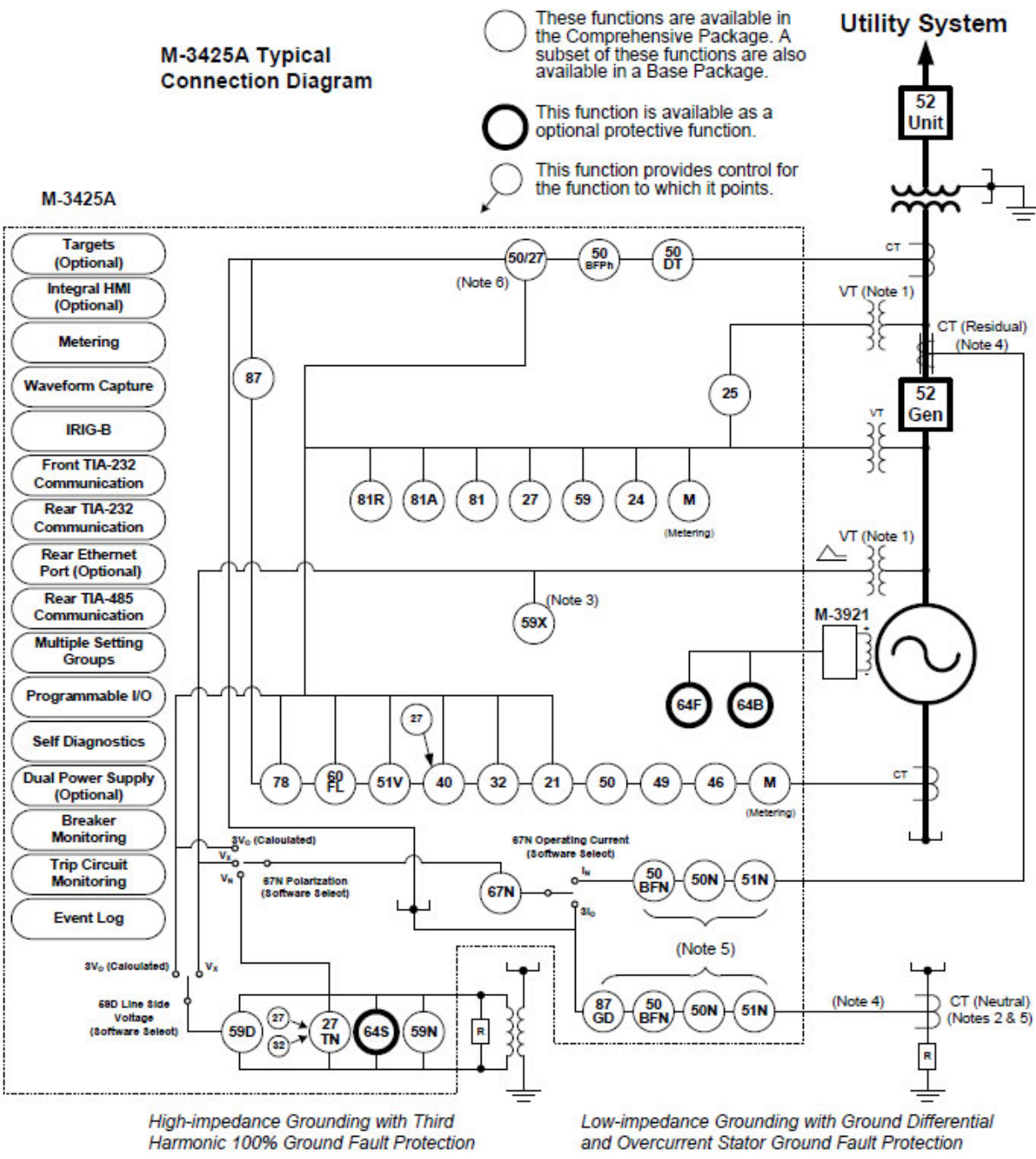
Integrated Protection System for Generators of All Sizes.



The M-3425A provides protection, control, monitoring and user interface functions for generator protection.

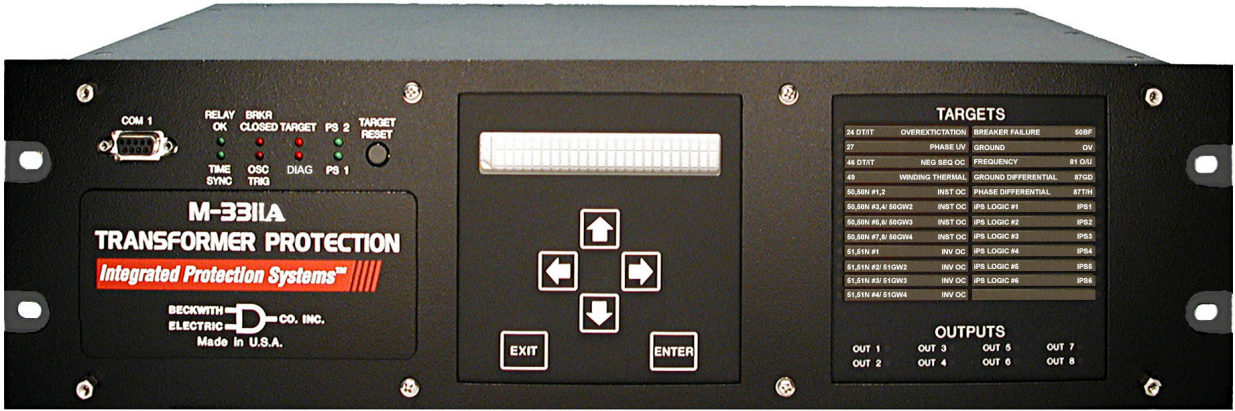
Stored targets and oscillography can be IRIG-B synchronized. Dual RS-232 ports and an RS-485 port provide user-interface communication capabilities. The S-3400 IPScom Communications Software is included for direct serial or remote communication access. Waveform data can be downloaded using the M-3801D IPSplot PLUS Oscillograph Analysis Software which allows for plotting and printing of the downloaded oscillographic data.

- ◆ Exceeds IEEE C37.102 and Standard 242 requirements for generator protection
- ◆ Protects generators of any prime mover, grounding and connection type
- ◆ Provides all major protective functions for generator protection including:
 - ◆ Out-of-Step (78)
 - ◆ Split-Phase Differential (50DT)
 - ◆ Under Frequency Time Accumulation (81A)
 - ◆ Inadvertent Energizing (50/27)
 - ◆ Turn-to-Turn Fault (59X)
- ◆ Expanded IPScom® Communications Software provides simple and logical setting and programming, including logic schemes
- ◆ Simple application with Base and Comprehensive protection packages
- ◆ Load encroachment blinders and power swing blocking for system backup protection (21) to enhance security during system abnormal conditions
- ◆ Options:
 - ◆ Ethernet Connection
 - ◆ Field Ground/Brush Lift-Off Protection (64F/B)
 - ◆ 100% Stator Ground Fault Protection by low frequency injection (64S)
 - ◆ Expanded I/O (15 additional Output Contacts and 8 additional Control/Status Inputs)



M-3311A Transformer Protection Relay

Protect Transformers and Other Important Power System Apparatus.



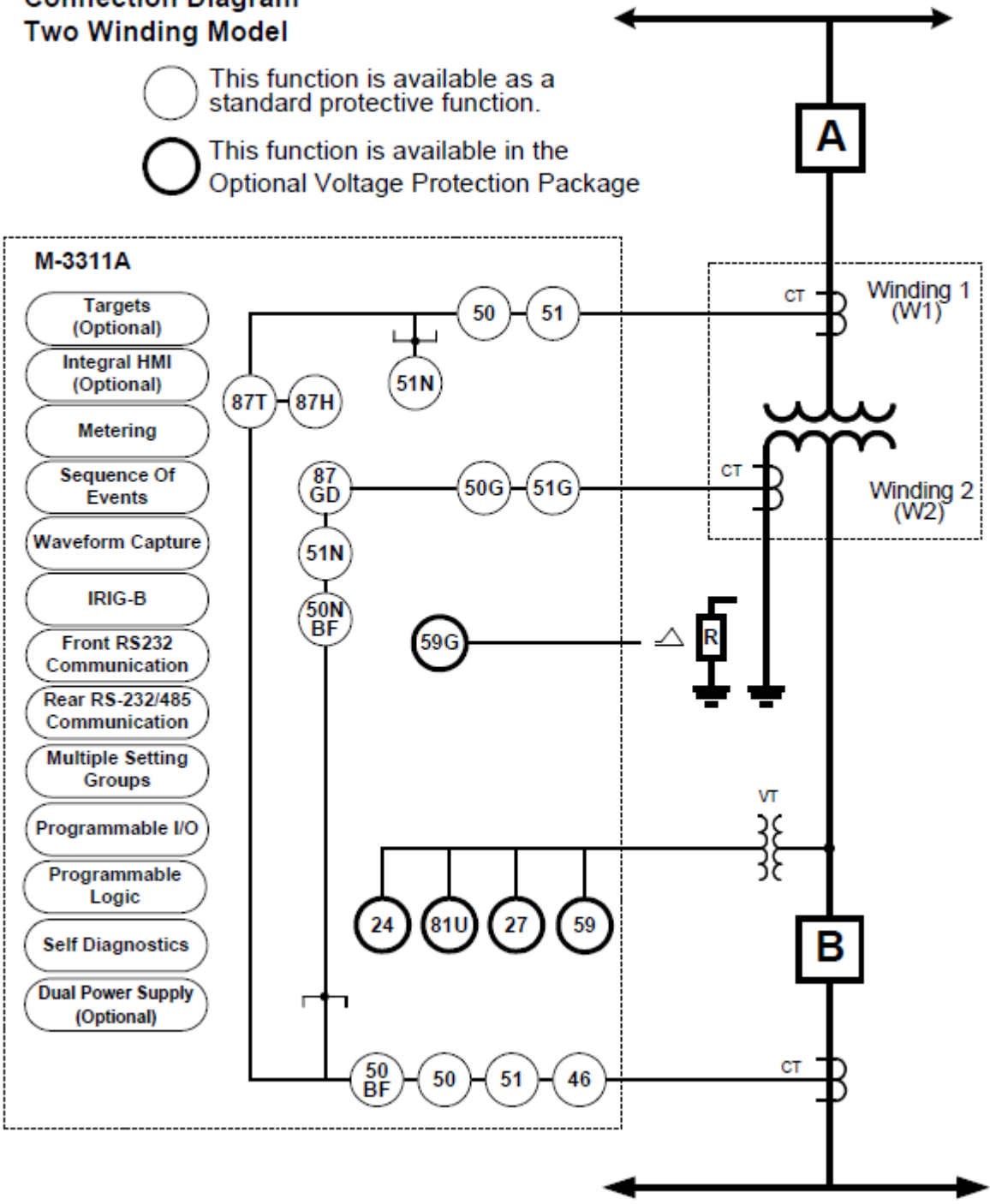
The M-3311A protects the distribution transformer, one of the most expensive and most valuable distribution assets.

The M-3311A provides protection, control, monitoring and user interface functions for two, three or four-winding transformers. Includes restrained and unrestrained differential protection, overcurrent protection, and optional voltage, and underfrequency protection. Multiple setpoint groups and user-implementable logic schemes provide flexibility. Dual RS-232 ports and an RS-485 port provide user-interface capabilities.

- ◆ For Transformers of All Sizes:
 - ◆ 2, 3 or 4 winding Transformers for Transmission and Distribution applications
 - ◆ Generator-Transformer Unit Overall Differential
 - ◆ Unit Protection of Other Electrical Apparatus and certain Bus Arrangements (including those with a transformer in the zone)
- ◆ Additional Applications:
 - ◆ System Backup Protection
 - ◆ Load Shedding (voltage and frequency)
 - ◆ Bus Protection
 - ◆ Individual Breaker Failure Protection for each winding input
- ◆ Available voltage configurations include zero, two or four voltage inputs
- ◆ Ground Differential configurations include one, two or three current inputs
- ◆ Optional Ethernet Connection and Expanded I/O
- ◆ Optional Voltage Package includes:
 - ◆ 24 Volts/Hz Overexcitation
 - ◆ 27 Phase Undervoltage
 - ◆ 59G Ground Overvoltage
 - ◆ 81O/U Over/Under Frequency

M-3311A Typical Connection Diagram Two Winding Model

- This function is available as a standard protective function.
- This function is available in the Optional Voltage Protection Package

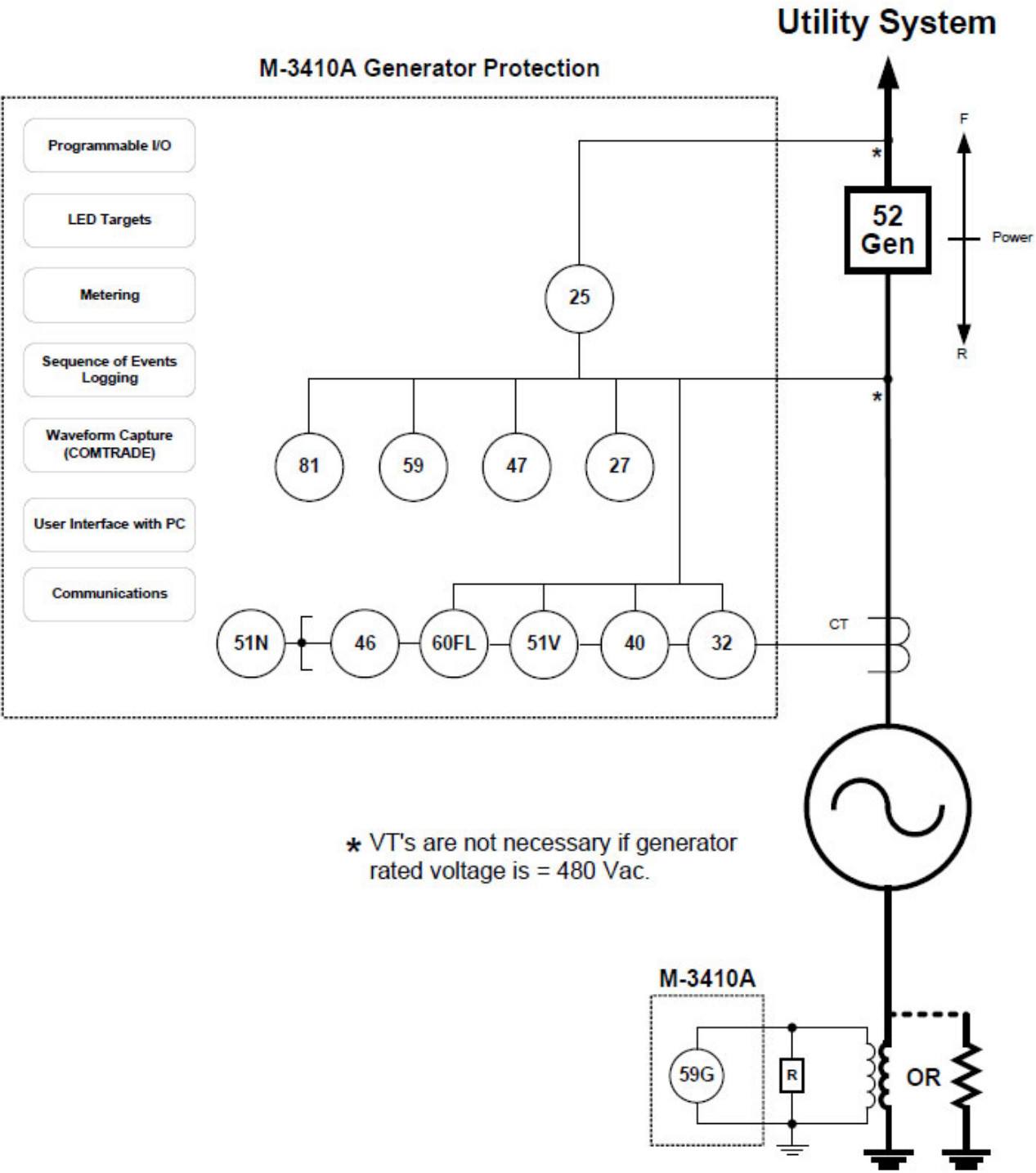
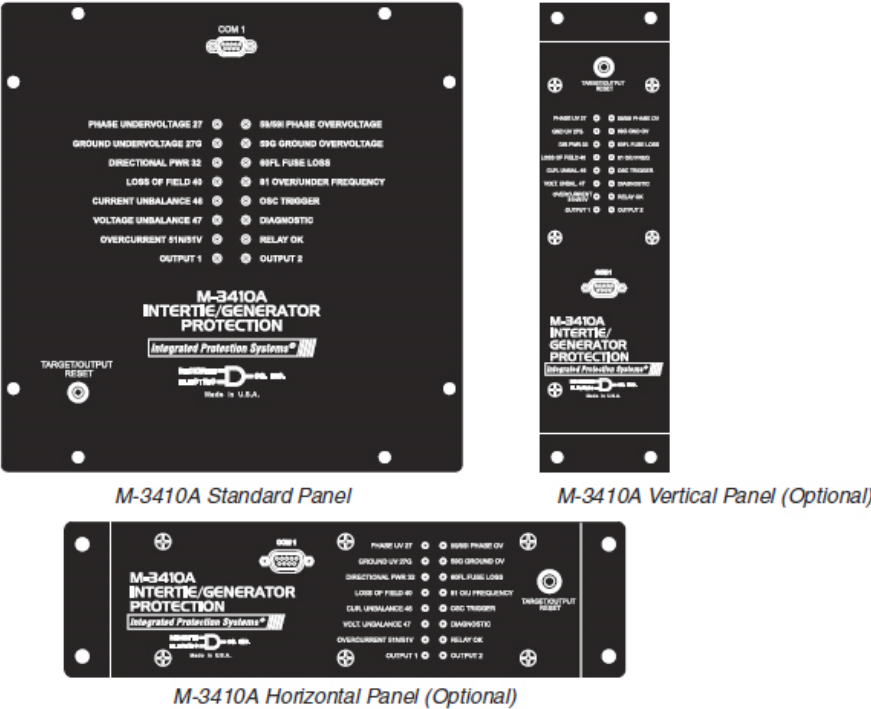


M-3410A Intertie/Generator Protection Relay

Facilitates standardization for small/medium intertie and generator protection applications.

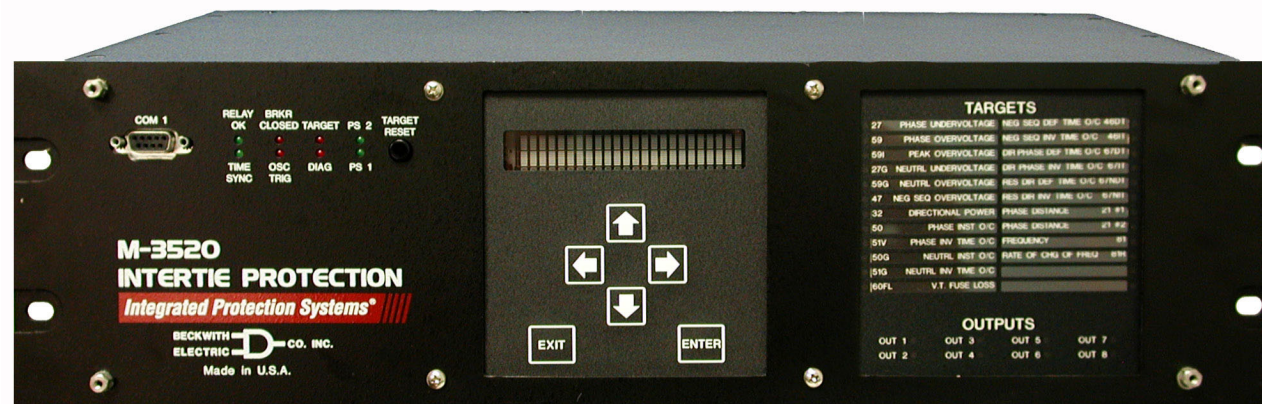
The M-3410A Intertie/Generator Protection Relay is a microprocessor-based unit that uses digital signal processing technology to provide up to twelve protective relaying functions for intertie protection or up to eleven protective relaying functions for generator protection.

- ◆ Available in four different Mounting configurations
- ◆ Facilitates standardization for small/medium intertie and generator protection applications
- ◆ Microprocessor-based relay provides 15 protective relay functions, including Sync-Check, 2 programmable outputs and 2 programmable inputs
- ◆ Relay voltage inputs can be directly connected (no VT required) for voltages 480 V or less
- ◆ Local and remote serial communications (MODBUS protocol) capability for monitoring and control functions
- ◆ Features
 - ◆ Sync-check with Phase Angle, ΔV and ΔF with dead line/dead bus options (25)
 - ◆ Phase undervoltage (27) protection
 - ◆ Ground undervoltage (27G) protection
 - ◆ Dual-setpoint, single or three phase, directional power detection that can be selected as over/under power protection (32)
 - ◆ Dual-zone, offset-mho loss-of-field for generator protection (40)
 - ◆ Sensitive negative sequence overcurrent protection and alarm (46)
 - ◆ Negative sequence overvoltage (47)
 - ◆ Inverse time neutral overcurrent (51N)
 - ◆ Phase overcurrent with voltage restraint/control (51V) protection
 - ◆ Phase overvoltage (59) protection
 - ◆ Ground overvoltage (59G) protection
 - ◆ Peak overvoltage (59I) protection
 - ◆ VT fuse-loss detection and blocking (60FL)
 - ◆ Reconnect enable for intertie protection (79)
 - ◆ Four-step over/under frequency (81) protection



M-3520 Intertie Protection Relay

Integrated Protection System for Distributed Energy Resources/Distributed Generation Intertie.



- ◆ Integrated Protection System for Distributed Energy Resources/Distributed Generation Intertie
 - ◆ Loss of parallel utility operation protections
 - ◆ Abnormal power flow protections
 - ◆ Comprehensive suite of phase and ground fault backed protections
 - ◆ Abnormal operating protections
 - ◆ Reconnect and Sync Check functions
- ◆ Microprocessor-based Intertie Protection Relay integrates protection, metering, monitoring and waveform capture
- ◆ Provides 18 base protective relay functions and 3 optional protective functions
- ◆ Local and remote serial communications capabilities, plus IIRIG-B interface

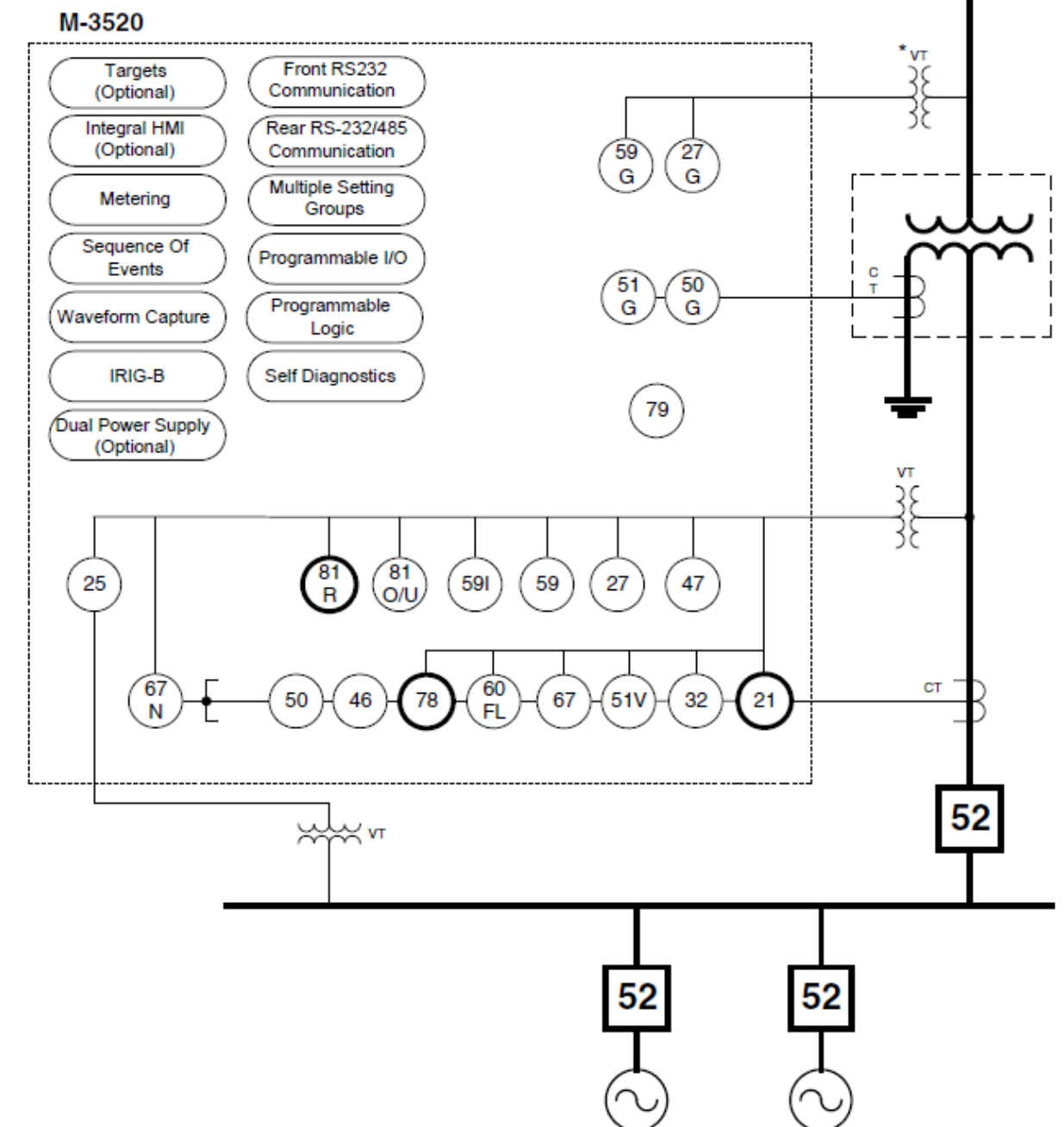
Standard Functions

- ◆ Sync check with Phase, ΔV and ΔF with deadline/deadbus options (25)
- ◆ Phase undervoltage (27) protection
- ◆ Neutral over/undervoltage (59G/27G) protection
- ◆ Sensitive dual-setpoint, reverse power detection (32)
- ◆ Sensitive negative-sequence overcurrent protection and alarm (46)
- ◆ Negative sequence voltage (47)
- ◆ Instantaneous overcurrent (50) protection
- ◆ Instantaneous neutral overcurrent (50G) protection
- ◆ Three-phase inverse time overcurrent (51V) with voltage control/voltage restraint
- ◆ Neutral inverse time overcurrent (51G) protection
- ◆ Phase overvoltage (59) protection
- ◆ Peak overvoltage (59I) protection
- ◆ VT fuse-loss detection and blocking (60FL)
- ◆ Directional inverse and definite time phase overcurrent (67)
- ◆ Directional inverse and definite time neutral overcurrent (67N)
- ◆ Reconnect enable (79)
- ◆ Over/Underfrequency (81 O/U)

M-3520 Typical Connection Diagram

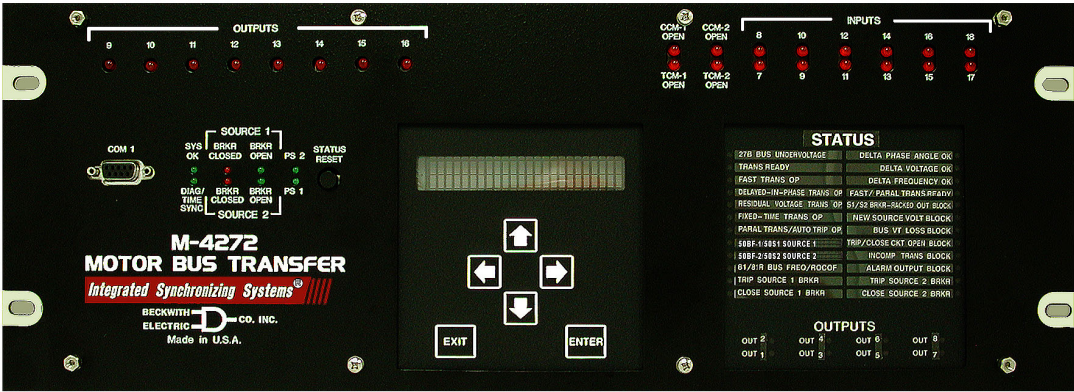
- This function is available as a standard protective function.
- This function is available as an optional protective function.

Note: M-3520 may be purchased as a base protection system with 59, 27, 81O/U, 79 and 60FL functions only.



Digital Motor Bus Transfer System for Medium Voltage (MV) and Low Voltage (LV) Switchgear Applications

Maintain your process and preserve your motor assets.



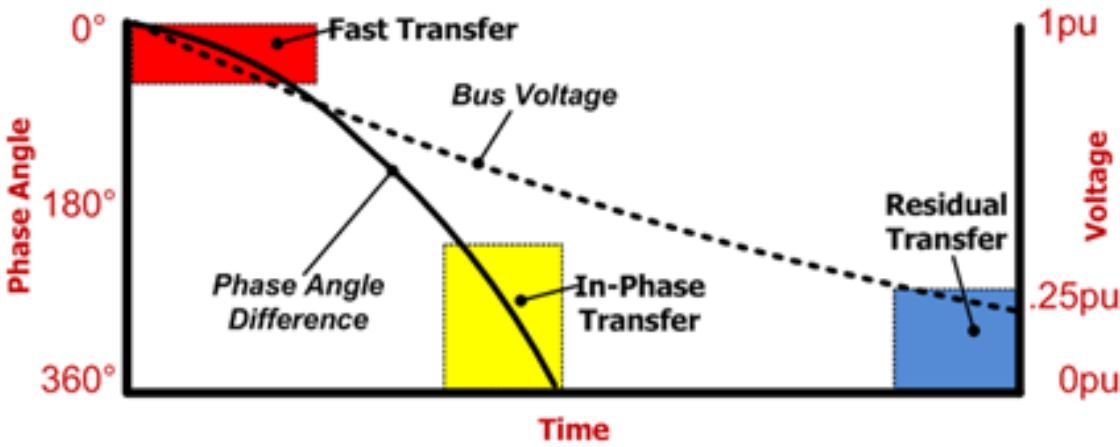
Avoid motor damage and costly shutdowns by ensuring the orderly transfer of the sources to your motors. Our complete Motor Bus Transfer System and relays properly execute the transfer of your critical motor loads.

To maintain plant operation and process continuity in power plants and industrial facilities, motor buses may require transfer from a present (old) source to a new source. Motor Bus Transfer (MBT) schemes and systems are employed to maintain process continuity in processes served by large motors or aggregates of smaller and large motors. Larger motors, of both the synchronous and induction variety, may require comprehensive, integrated source transfer strategies in order to avoid mechanical damage.

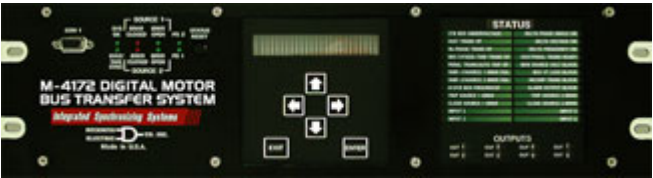
The coast down period and resultant voltage and frequency decay may take seconds, and unsupervised source transfer may cause damage. During improper transfer, mechanical damage may occur in the motor, the coupling to the load or the load itself, and is primarily caused by excessive shaft torque.



The total mission of a MBT system is—Maintain process continuity and Effect source transfers so as not to cause damage to motors and connected loads.



Two Motor Bus Transfer Models... Same Performance!



All Transfer Methods Supported Simultaneously

Fast Transfer | In-Phase Transfer | Residual Voltage Transfer | Fixed Time Transfer

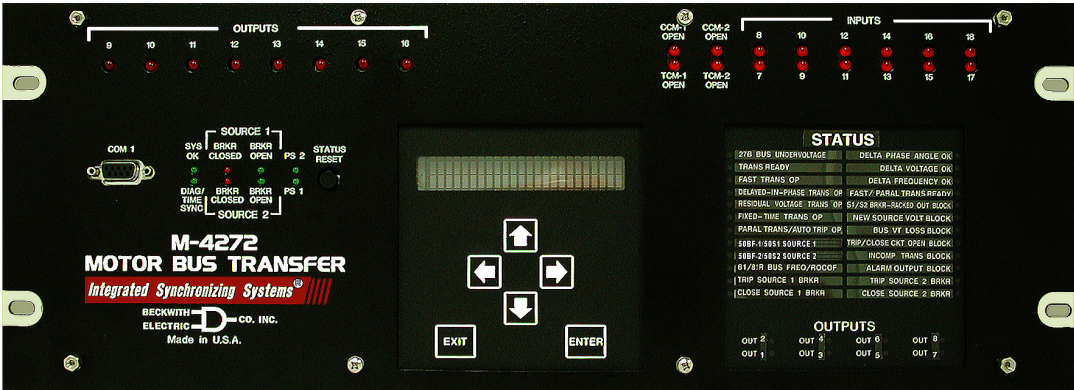
M-4172 MBT System for Low Voltage (LV) Switchgear Applications

M-4272 MBT System for Medium Voltage (MV) and Low Voltage (LV) Switchgear Applications

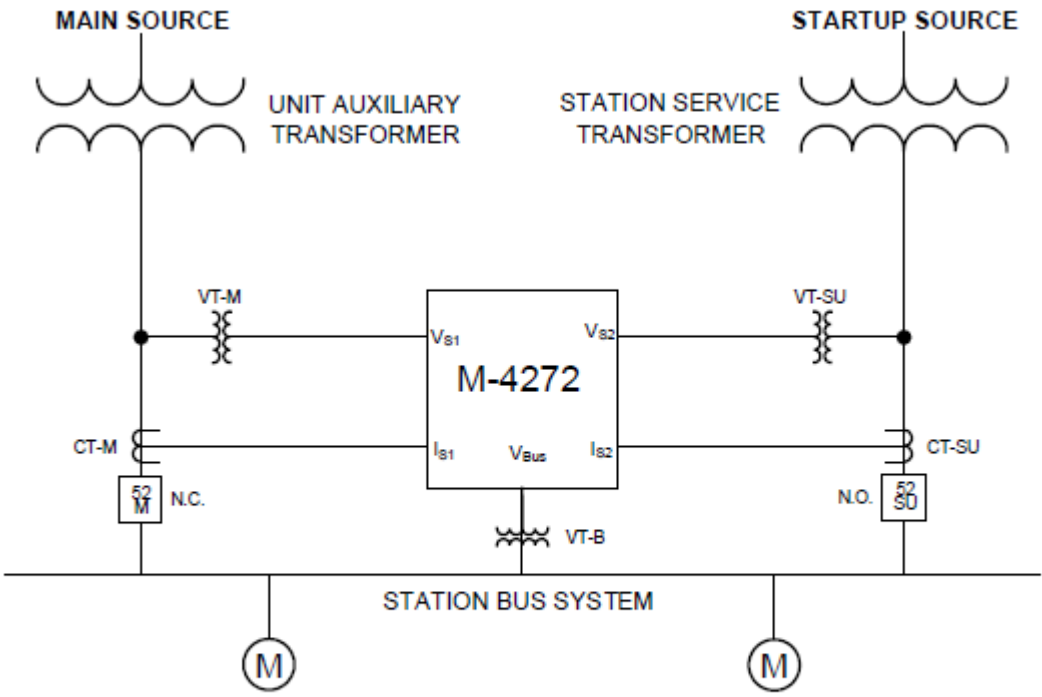
Application	
M-4172	M-4272
More economical and affordable device designed for Low Voltage switchgear motor bus transfer applications typically found in large industrial and petrochemical facilities.	Designed for both Medium Voltage and Low Voltage switchgear motor bus transfer applications in all industry types and utilities.
Inputs	
M-4172	M-4272
6 Inputs:	18 Inputs:
<ul style="list-style-type: none">2 dedicated inputs for S1 and S2 breaker status contacts: 52a or 52b4 programmable inputs	<ul style="list-style-type: none">6 dedicated inputs for S1 and S2 breaker status contacts: 52a, 52b and 52sp (TOC)12 programmable inputs
Outputs	
M-4172	M-4272
8 Outputs:	16 Outputs:
<ul style="list-style-type: none">5 dedicated outputs for Trip & Close S1 breaker, Trip & Close S2 breaker and Lockout/Blocking Alarm3 programmable outputs	<ul style="list-style-type: none">5 dedicated outputs for Trip & Close S1 breaker, Trip & Close S2 breaker and Lockout/Blocking Alarm11 programmable outputs
Power Supply	
M-4172	M-4272
1 standard power supply 1 optional redundant power supply	2 standard power supplies
Trip/Close Circuit Monitors	
M-4172	M-4272
No Trip/Close Circuit Monitors	Includes Trip/Close Circuit Monitors
Size (Height)	
M-4172	M-4272
5.21 inches (3 Rack Units)	6.96 inches (4 Rack Units)

M-4272 Digital Motor Bus Transfer System

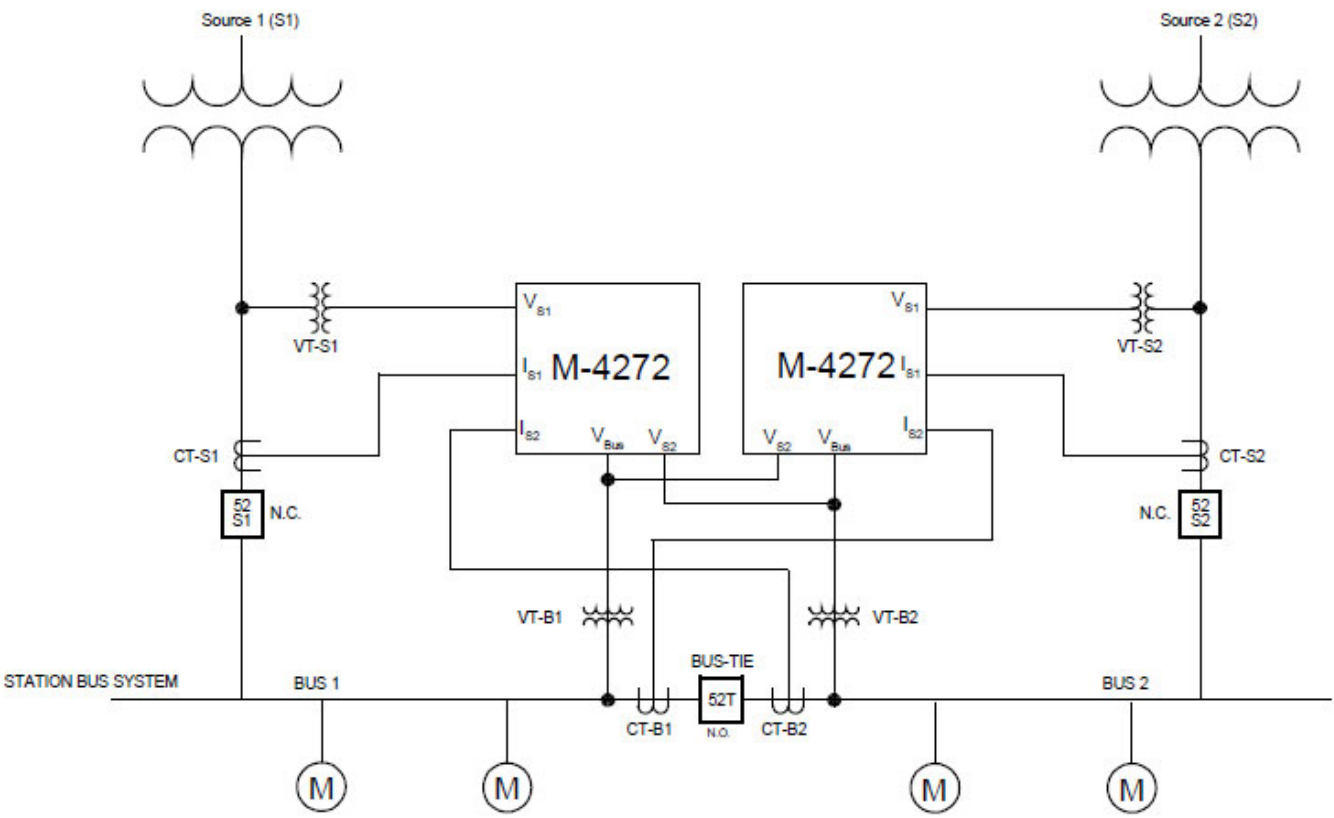
For Low Voltage (LV) and Medium Voltage (MV) Switchgear Applications.



- ◆ Provides Automatic and Manual transfers of motor bus systems in power plants and industrial processing plants to ensure process continuity
- ◆ Automatically selects Fast, In-Phase, Residual Voltage, and Fixed Time motor bus transfers, based on varying system conditions
- ◆ Applicable for one way and bi-directional Manual and Automatic transfers
- ◆ Can be expanded to accommodate multiple breaker configurations
- ◆ Multiple setpoint profiles for various application requirements
- ◆ Integrated control, supervisory functions, sequence of events, and oscillograph recording in one device
- ◆ Extensive commissioning tools, including ringdown analysis
- ◆ Optional M-3919A Graphic Display Unit (GDU) and Touch Screen Human Machine Interface (HMI) for communicating with one or two M-4272 units
- ◆ Optional M-5072 Retrofit Kit for M-4272 Replacement of M-0272/M-0236B Analog Transfer Logic Controller



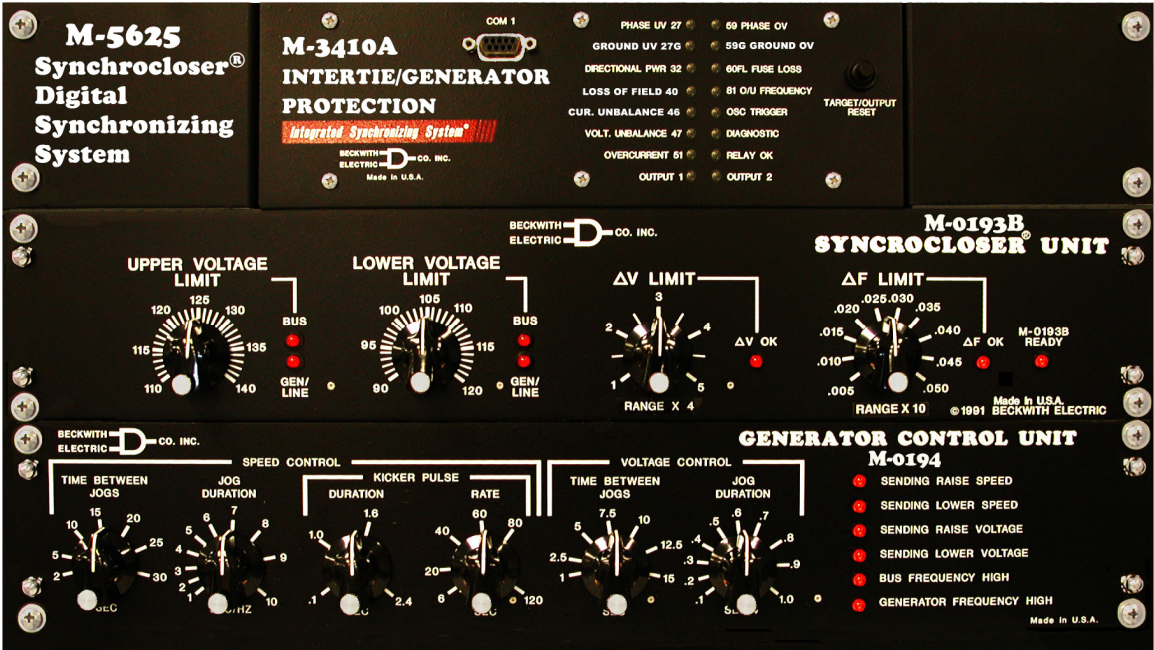
TWO-BREAKER CONFIGURATION



THREE-BREAKER CONFIGURATION

M-5625 Syncrocloser® Digital System

Integrated Synchronizing System™ for Generator and Intertie Synchronizing.



The M-5625 Syncrocloser® Digital Synchronizing System is suitable for the automatic synchronizing of a generator to the electric power network. The system provides speed and voltage "jogs" to bring a generator to proper conditions of matching voltage and frequency, prior to safely and accurately closing a breaker into a bus energized by an electric power network.

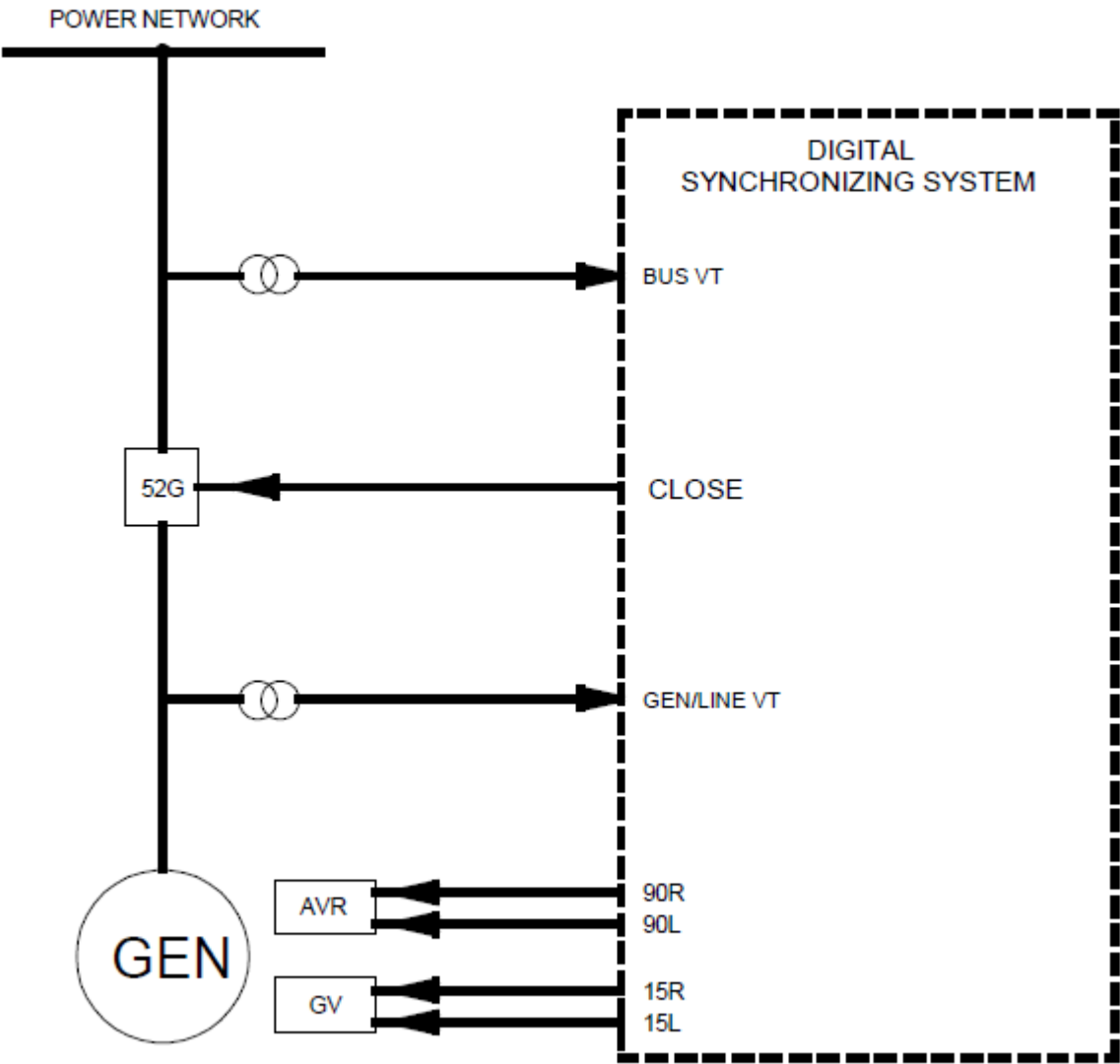
The Digital Synchronizing System is intended for three general classes of application:

- ◆ Initial connection of a generator to a power network
- ◆ Closure of a network breaker where there is a possibility of a split of the system into two isolated networks having different frequencies
- ◆ Breaker closure applications with a static phase angle
- ◆ Automatic Synchronizing
- ◆ The system can also be used for manual synchronizing application.

The M-0193B Syncrocloser Unit closes the generator breaker at the point of synchronism. It initiates the close command in advance of phase coincidence using breaker closing time and slip frequency.

The M-0194 Generator Control Unit matches the generator speed and voltage to system conditions in minimum time with output control jogs that use a proportional pulse width algorithm.

The M-0188A Syncrocloser Check Relay is used as a permissive relay for secure reclosing of a circuit breaker by verifying that voltage and phase angle conditions are within pre-set limits before allowing the breaker to close.



Digital Synchronizing System

When the M-3410A relay is connected with Line-Line voltage input, the following functions are available:

- ◆ Sync-check with Phase Angle, ΔV and ΔF with dead line/dead bus options (25)
- ◆ Reconnect enable (79) for intertie application
- ◆ Phase undervoltage (27) detection
- ◆ Dual-setpoint, single or three phase, directional power monitoring that can be selected as over power or under power (32) detection (requires current transformer input)
- ◆ Negative sequence overvoltage (47) detection
- ◆ Phase overcurrent (51) detection (requires current transformer input)
- ◆ Phase overvoltage (59) detection
- ◆ VT fuse-loss detection and blocking (60FL)
- ◆ Four-step over/under frequency (81) detection

If a line-neutral is applied to the single VT input of the M-3410A only the Synch-Check (25) Function is viable. The (51) Function may also be active for this voltage configuration if current input is connected as well.



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**6190 118th Avenue North
Largo, FL 33773-3724 U.S.A.**



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