GRID SOLUTIONS

MULTILIN AGILE

Compact Feeder Protection & Bay Controller

Featuring a graphical color display for presenting custom-drawn Single Line Diagrams (SLD) that enables bay monitoring and control, Multilin Agile offers advanced protection and control, making it suitable for utilities, industrial plants, onshore and offshore renewable collectors, and more.

Applied as primary or backup feeder protection and equipped with advanced communication options along with extensive monitoring capabilities, it delivers advanced functionalities including high-performance protection, flexible configuration, and comprehensive power quality monitoring.

This powerful yet compact device also provides extensive data-logging capabilities, oscillography, and event capture, empowering users to make informed power network decisions swiftly and effectively, thereby enhancing service reliability and availability.

Key Benefits

- Small footprint for easy retrofitting of aging infrastructure
- Intuitive graphical display for effective monitoring, communications, and troubleshooting
- Draw-out design for simplified testing, commissioning & maintenance
- Advanced functions addressing the challenges of renewable integration
- CyberSentry™ Advanced Cybersecurity to prevent unauthorized access and cyber attacks
- Cost savings on engineering time & wiring due to traditional hardwired control scheme replacement

Applications

- Applicable to distribution and industrial feeders
- Distribution feeder protection for the faults on compensated networks and load encroachment on heavily loaded lines
- Enhanced reliability and efficiency for renewable integration through advanced protection, harmonic monitoring and accurate recording capabilities
- Utilization of advanced frequency functions for fast load-shedding schemes
- High reliability in coastal, industrial and polluted environments due to harsh environmental coating of PCBs (printed circuit boards) as the standard

Advanced Protection & Control

- Fast protection execution, scan rate 8 times / cycle
- Advanced protection including rate of change, autoreclose, synchrocheck, load encroachment, transient ground, and fault location
- Renewable integration features (27Q, 27T)

Advanced Monitoring & Metering

- Harmonics and THD up to the 21st order
- Extensive recording – 2048 events, 25 fault records, up to 128 samples/cycle oscillography
- Built-in supervision for equipment health monitoring

Advanced Communications

- Supports IEC 61850 Ed. 2, IEC 62439 (PRP/ HSR), Modbus RTU/TCP, IEC 60870- 5-103, DNP 3.0 serial/ethernet protocols
- IEEE 1588 (PTP), IRIG-B and SNTP time synchronization
- Ethernet and serial protocols capable to operating concurrently

One Box Concept

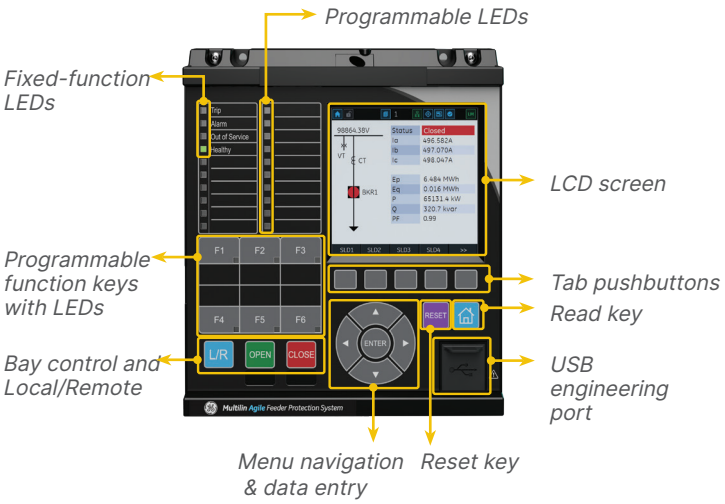
- Configurable single line diagram for bay monitoring & control
- Push buttons and direct function keys for connected switchgear
- Select-before-operate, breaker health checks and interlocking capabilities

GE VERNOVA

Intuitive User Interface

The front HMI hosts a fully graphical color screen that supports open, close, local/remote and direct function key access facilitating the control of connected switchgear. Sixteen tricolor LED lamps are available, and freely configurable, in addition to four fixed-function LEDs. Multiple languages are supported with easy switching between English and an additional language on the local display without uploading new firmware.

A USB front port offers ready access by field personnel laptops.



Front panel interface 30TE (6") - ANSI version

Environmental Responsibility

The relays are manufactured in a lead-free soldering process using lead-free components. Power dissipation is very low as it minimizes the burden on station batteries Even the product weight (including packaging) is optimized to lessen the transit carbon footprint. Such actions boost the eco-responsibility demonstrated in the Product Environment Profile (PEP). The product does not require any resident battery.

The PEP shows claims for raw material, energy and water depletion, global warming potential, ozone depletion, photochemical ozone creation, air acidification, and hazardous waste production.

Quality Built-in

Quality Built-In methodology is applied throughout the development and manufacturing processes. The product is designed with an IEC62443-4-1:2018 certified secure development lifecycle process. Parts stress analysis in R&D, rigorous component supplier selection and a shipping carton compliant with ISTA protection requirements are examples of the best practice to maximize long-life reliability. All circuit boards have harsh environmental coating to resist moisture, salt, corrosive atmosphere and industrial ambient pollution as standard. Circuit board production uses in-circuit tests, boundary scanning, built-in self-test, automated optical inspection, and X-ray scanning to achieve 100% test coverage.

Manufacturing of the product is at an ISMS 27001 certified plant.

Retrofitting

In addition to new-build, Multilin Agile can be used to refurbish legacy protection schemes. Having lower depth than most 4U relays or electromechanical disk relays in the installed base makes retrofitting within the existing footprint and AC/DC schematic an easy task.

Multilin Agile with Graphical HMI Offers:

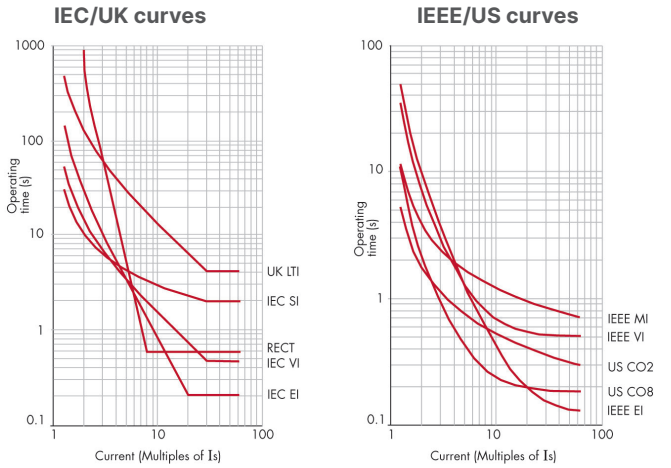
- Space-saving 4U height (177 mm) and 30TE (6") width case size
- Terminals with IP20 protection, safer within the panel
- A front USB port and rear RS485 and RJ45 ports
- Power-up diagnostics and continuous self-monitoring
- Freely programmable opto-isolated binary I/O relays
- Watchdog health contact
- Field upgradeable via firmware upgrade to change relay model avoiding costly hardware change

Feeder Protection

Phase and Ground Fault Overcurrent

Six independent stages are available for each phase overcurrent element. Additional to the definite time and predefined IDMT curve selection, programmable curves for customized operation and resetting are available.

Standard ground fault elements are available, with four independent stages. The sensitive ground fault (SEF) order option allows application on systems whose ground fault currents are constrained.



IEC and ANSI/IEEE inverse-time curve profiles

Special Applications

Load encroachment (blinder), cold load pick-up, broken conductor protection, wattmetric ground fault, fault location, auto reclose, switch on to fault, rate of change of frequency elements and check synchronizing are built-in depending on the selected model number.

Transient Ground Fault Detection (TGFD)

Transient ground fault detection benefits from an advanced and innovative algorithm to detect the direction of single-phase faults in compensated power systems.

Distributed Generation Protection

Undervoltage Reactive Power (27Q)

More and more distributed energy resources (DER) are fitted in the MV grid. National grid codes and regulations require these units must support the mains voltage of a network failure. If a voltage drops and an inductive, reactive power flows in the direction towards the generating unit, the affected one will be switched off. The restoration function reconnects when grid is healthy.

Timed Undervoltage Protection (27T)

In certain scenarios, during a voltage drop, the power plants are sometimes required to continue supporting the grid and not to be disconnected. The Multilin Agile relay provides one Timed Phase Undervoltage (UV) protection element that can be used for protection against transient voltage drops and low voltage ride through applications.

Voltage Controlled and Voltage Restrained Overcurrent

Voltage-dependent protection boosts sensitivity, and reduces tripping times for faults on weaker systems, such as those with a high prevalence of distributed generation. The timing characteristics can be set as either definitive time or IDMT inverse.

Power

Underpower and overpower elements are available that can be configured to operate as forward or reverse directional and active or reactive. This element can be used for reverse power and low forward power applications for synchronous machines or interconnections involving co-generation.

Under / Over voltage

Under/over voltage protection may be configured to operate from phase-phase or phase-neutral quantities. Four independent stages can be configured for definite time, inverse time or user defined characteristics.

Check Synchronizing

The check synchronizing feature ensures that the CB contacts touch at the instant of synchronism, minimizing the stress on plant assets when paralleling.

Transformer Protection

Current protection with second harmonic blocking, thermal overload, negative sequence overcurrent and an instantaneous restricted ground fault element (REF) with high or low impedance are supported. The Volts per Hertz protection prevents damage to generators and transformers due to overexcitation.

Load Shedding

Nine stages each of frequency protection are available (except P14N). Each may measure in over-, under-, rate of change, and frequency supervised rate of change modes. Fast underfrequency element is supported for performing fast load-shedding. The wide range of setting options permits application of any frequency-based load shedding or islanding scheme.

Advanced Logic and Control Capabilities

Multilin Agile incorporates advanced automation capabilities that reduce the need for additional programmable controllers or discrete control relays by including programmable logic, communication, and HV bay / MV cell monitoring, thereby reducing equipment and engineering costs. Advanced automation also enables seamless integration into other protection or process systems (SCADA or DCS).

FlexElements™

FlexElement™ is a universal comparator that can be programmed to respond either to a signal level or to a rate-of-change (delta) over a pre-defined period. FlexElements™ can be used to generate special protection or monitoring functions. The relay supports up to 8 FlexElements™.

Digital Counters

Multilin Agile provides sixteen identical digital counters. A digital counter counts the number of state transitions from logic 0 to logic 1. The counters are generally used to count operations such as pickups of an element, changes of state of an external contact (e.g., breaker auxiliary switch), or pulses from a watt-hour meter.

FlexLogic™

FlexLogic™ is the powerful programming logic engine that provides the ability to create customized protection and control schemes logic for feeder control interlocking schemes with adjacent protection and dynamic setting group changes, minimizing the need for and the associated costs of auxiliary components and wiring.

Switchgear Control and Configurable SLD

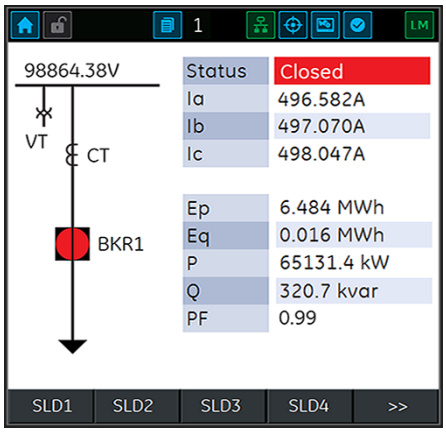
Multilin Agile offers comprehensive switchgear control aided by a configurable SLD & breaker control. A total of 8 switchgear elements can be controlled. Circuit Breaker control is available through dedicated Open/Close push buttons, graphical HMI interface, optically isolated inputs and remotely via the substation communication.

Up to six (6) pages of configurable SLD are supported which can be configured to show breakers, switches, metering, and status items. The device allows double point status and control over the IEC 61850 protocols for various types of switches and disconnectors.

Supervisory and Condition Monitoring Functions

Depending on the hardware base, two stage circuit breaker failure protection, CT/VT supervision, circuit breaker condition monitoring and trip circuit supervision are available.

The optically isolated inputs and programmable scheme logic enable supervision of the trip circuit in both open and closed states. Multilin Agile claims full compliance with the benchmark H7 supervision scheme.



Enhanced Bay visualization & control aided by single line diagram display

Breaker Health Monitoring

The breaker is monitored by the relay not only for detection of breaker failure, but also for the overall "breaker health" which includes:

- Breaker close and breaker open times
- Trip circuit monitoring
- Spring charging time
- Per-phase arcing current
- Trip counters

DC Supply Monitoring

Multilin Agile measures the DC auxiliary supply infeed to the device, to determine whether the supply is within acceptable operational limits. Three DC supply monitoring zones are available, for under and overvoltage alarming. The DC auxiliary supply value can be displayed on the front panel LCD. This measurement also assists in auto configuration of binary input pickup thresholds to provide accurate pickup and drop-off.

Active Impedance Binary Inputs

Multilin Agile binary inputs comply with the ESI 48-4 EB2 standard and are immune to inductive fields created in substations where wiring runs for hundreds of meters in the yard, and neighboring wires, busbars and power conductors create strong fields. The inputs support programmable pickup and drop-off, ensuring no spurious pickups during battery ground faults or capacitive discharges, thus making them ideal for plant status monitoring.

Binary inputs immunity to inductive fields

Measurement, Recording and Post-Fault Analysis

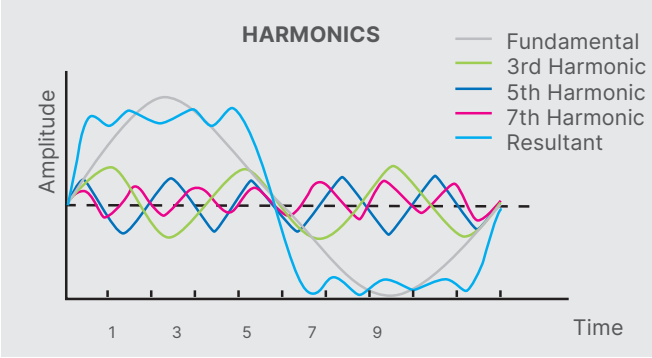
Multilin Agile offers unmatched power system analytics through advanced features and monitoring and recording tools.

Up to 2048 time-tagged event records are stored in non-volatile memory and can be extracted using the communication ports or viewed on the front panel display. Records of the last 25 faults are stored, and fault data is also available via the IEC 61850 protocol.

The internal disturbance recorder has up to 16 analog oscillograph channels and 64 digital channels, with a 30 second capacity.

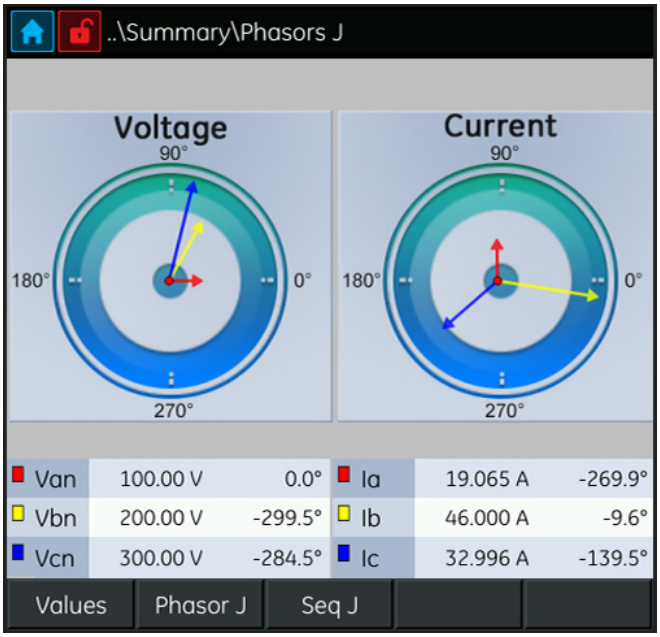
The relay offers comprehensive Power Quality metering by measuring up to the 21st harmonic for both currents and voltages including total harmonic distortion (THD).

A voltage interruption monitoring element displays the number of voltage interruptions and the duration of voltage interruption for a selected period.



Power Quality Monitoring & Custom Schemes

Multilin Agile provides a comprehensive datalogging facility where the average values of analog metering can be recorded at a user selectable interval. The datalogger can store information from up to 16 analog channels, selected from any analog values calculated by the relay.



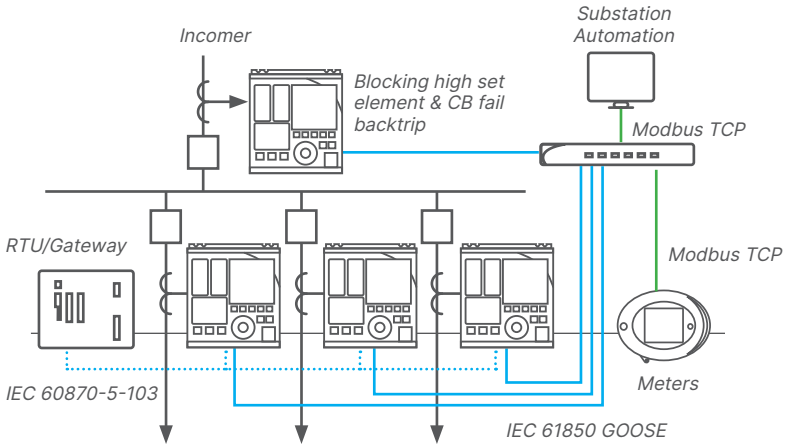
Phasor view *for effective monitoring, commissioning & troubleshooting*

Local and Remote Communication

Multilin Agile provides advanced communication technologies for remote data and engineering access, making it easy and flexible to use and integrate into new and existing networks. Providing several Ethernet and serial port formats and supporting a wide range of industry standard protocols, the relay can be integrated directly into DCS and SCADA systems.

The following protocols are supported:

- Modbus (RS485 serial and Ethernet)
- IEC 61850 Ed. 2
- IEC 60870-5-103 serial
- DNP3.0 (RS485 serial and Ethernet)
- IEC62439 (PRP/HSR) redundancy protocol
- IEEE 1588 (PTP) for time synchronization



Mixed Communication Protocols: Application Example

All serial protocols - Modbus, IEC 60870-5-103 and DNP 3.0 - are switchable in settings and site- selectable for customer use. Similarly, all the Ethernet protocols (Modbus TCP, IEC 61850 and DNP 3.0) are available for selection once ordered.

The concurrent Ethernet protocol feature allows customers to futureproof their investment for applications requiring support of multiple Ethernet protocols in a single device. Similarly, ordering the Ethernet option in a device initially connected with a serial protocol can provision for a future communications upgrade to Ethernet.

Multilin Agile offers 128 virtual inputs, and superior GOOSE performance.

CyberSentry™ Advanced Cybersecurity

Multilin Agile helps prevent unauthorized access and malware by delivering host of cybersecurity features compliant with NERC CIP, EU NIS, and other cybersecurity standards.

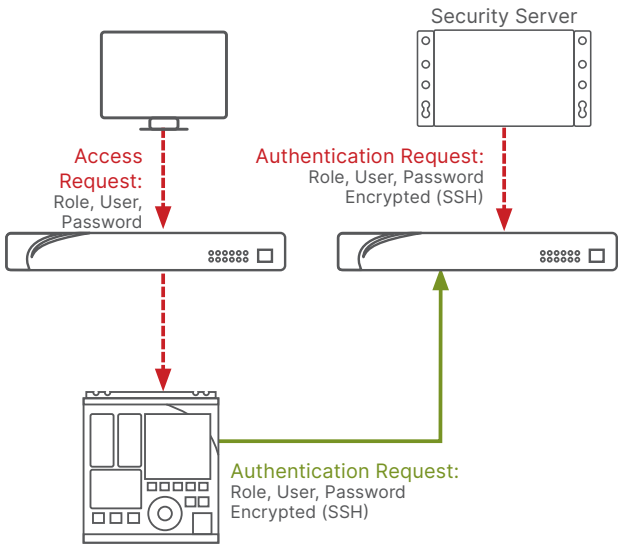
- Authentication/authorization/accounting server support (AAA-Radius)
- Role Based Access Control (RBAC)
- Non-erasable cyber event recorder (Syslog for SEM)
- Product level security
- Achilles Level 1 certified for Cyber Security penetration tests

Testing and Simulation

Multilin Agile offers the capability for simulating current and voltage inputs. Other test operations are also possible such as the LED lamp test for each color, contact input states and testing of output relays.

The simulation feature tests the response to programmed conditions, without the need of external AC voltage and current inputs. First time users will find this to be a valuable training tool. System parameters such as currents, voltages and phase angles are entered as setpoints.

When placed in simulation mode, the relay suspends reading actual AC inputs, generates samples to represent the programmed phasors, and loads these samples into the memory to be processed by the relay. Normal (pre-fault), fault and post-fault conditions can be simulated to exercise a variety of relay features.



Cybersecurity with Radius Authentication

Model Variants and Intended Application

MODEL	HARDWARE BASE	INTENDED APPLICATION
P14NB	P14N	Non-directional feeder
P14NL	P14N	Non-directional feeder with autoreclose
P14DB	P14D	Directional feeder
P14DL	P14D	Advanced directional feeder with autoreclose and check synchronizing
P14DZ	P14D	Advanced directional feeder plus *TGFD transient ground fault detection
P94VB	P94V	Voltage and frequency
P94VP	P94V	Voltage and frequency with autoreclose and check synchronizing

*Only with ground fault (SEF) CT option

Hardware Overview

	NON-DIRECTIONAL	DIRECTIONAL	VOLTAGE & FREQUENCY
FUNCTION	**P14N**	**P14D**	**P94V**
CT (AC current) inputs : 1 and 5 A software selectable	3Ph +N	3Ph +N	
VT (AC voltage) inputs : 100/120 V		4	4
Digital inputs min./max. hardware option	11 to 30		
Output relays min./max. hardware option	9 to 25		
Rear communication port (software selectable to convert into demodulated IRIG-B)	RS485		
2nd Rear communication port options	0 to 3 RJ45 Ethernet, 0 to 3 fiber Ethernet*		
Communication Protocols	IEC 103, Modbus, DNP3.0, Modbus TCP, DNP3 Ethernet, IEC 61850, IEC62439 (PRP/HSR) *		
Trip circuit supervision (H7 scheme)	Yes		

**Refer to order code for possible combinations. Please refer to the wiring diagram*

Protection & Control Functions

		NON-DIRECTIONAL		DIRECTIONAL			VOLTAGE & FREQUENCY	
ANSI CODE	FUNCTION	P14NB	P14NL	P14DB	P14DL	P14DZ	P94VB	P94VP
50	Definite time overcurrent protection	6	6	6	6	6		
50N/G	Neutral / Ground definite time overcurrent protection (Derived and Measured)	4	4	4	4	4		
51	IDMT overcurrent	3	3	3	3	3		
51N/G	Neutral / Ground IDMT overcurrent protection	2	2	2	2	2		
50/51SEF	Sensitive ground fault	4	4	4	4	4		
68	Inrush blocking	•	•	•	•	•		
	Cold load pick up	•	•	•	•	•		
YN	Admittance protection				•	•		
21BL	Load encroachment supervision (Load blinders)				•	•		
TGFD	Transient Ground Fault Detection***					•		
46	Negative sequence overcurrent	4	4	4	4	4		
46BC	Broken conductor	4	4	4	4	4		
55	Power factor				•	•		
	Programmable curves	4	4	4	4	4		
67	Directional phase overcurrent			6	6	6		
67N/G	Directional neutral/ground overcurrent			4	4	4		
	Sensitive directional ground fault			4	4	4		
67_2	Directional negative sequence overcurrent			•	•	•		
32N	Wattmetric ground fault			•	•	•		
	Blocking scheme	•	•	•	•	•		
37	Undercurrent detection (loss of load)	•	•	•	•	•		
32	Phase directional power (forward/reverse/under/over)				4	4		
49	Thermal overload (current replica)	•	•	•	•	•		
50BF	CB failure	•	•	•	•	•		
21FL	Fault locator				•	•		
24	Volts per Hertz				•	•	•	•
27Q	Undervoltage reactive power				•	•		
27T	Timed undervoltage				•	•		
27/59	Undervoltage/overvoltage			4/4	4/4	4/4	4/4	4/4
27V/59V	Positive sequence undervoltage/overvoltage			2/2	2/2	2/2	2/2	2/2
59N	Residual overvoltage			4	4	4	4	4
47	Negative sequence overvoltage			•	•	•	•	•
79	Autoreclose (number of shots)		4		4	4		4
25	Check synchronizing				•	•		•
81O	Overfrequency			9	9	9	9	9
81U	Underfrequency			9	9	9	9	9
81V	Undervoltage blocking of frequency protection			•	•	•	•	•
81 df/dt	Rate of change of frequency				9	9	9	9
	Fast underfrequency			•	•	•	•	•
	Underfrequency restoration				•	•		•
87G	Restricted ground fault (REF)	•	•	•	•			
	FlexLogic	•	•	•	•	•	•	•
86	Latching output contacts (lockout)	•	•	•	•	•	•	•
	Switch status control	•	•	•	•	•	•	•
VTS	VT supervision			•	•	•		
CTS	CT supervision			•	•	•		
	DC supply supervision	•	•	•	•	•	•	•
	CB condition monitoring	•	•	•	•	•	•	•
52PD	Pole discrepancy	•	•	•	•	•		
	Setting groups	6	6	6	6	6	6	6

****TGFD (with standard CT)*

Wiring Overview

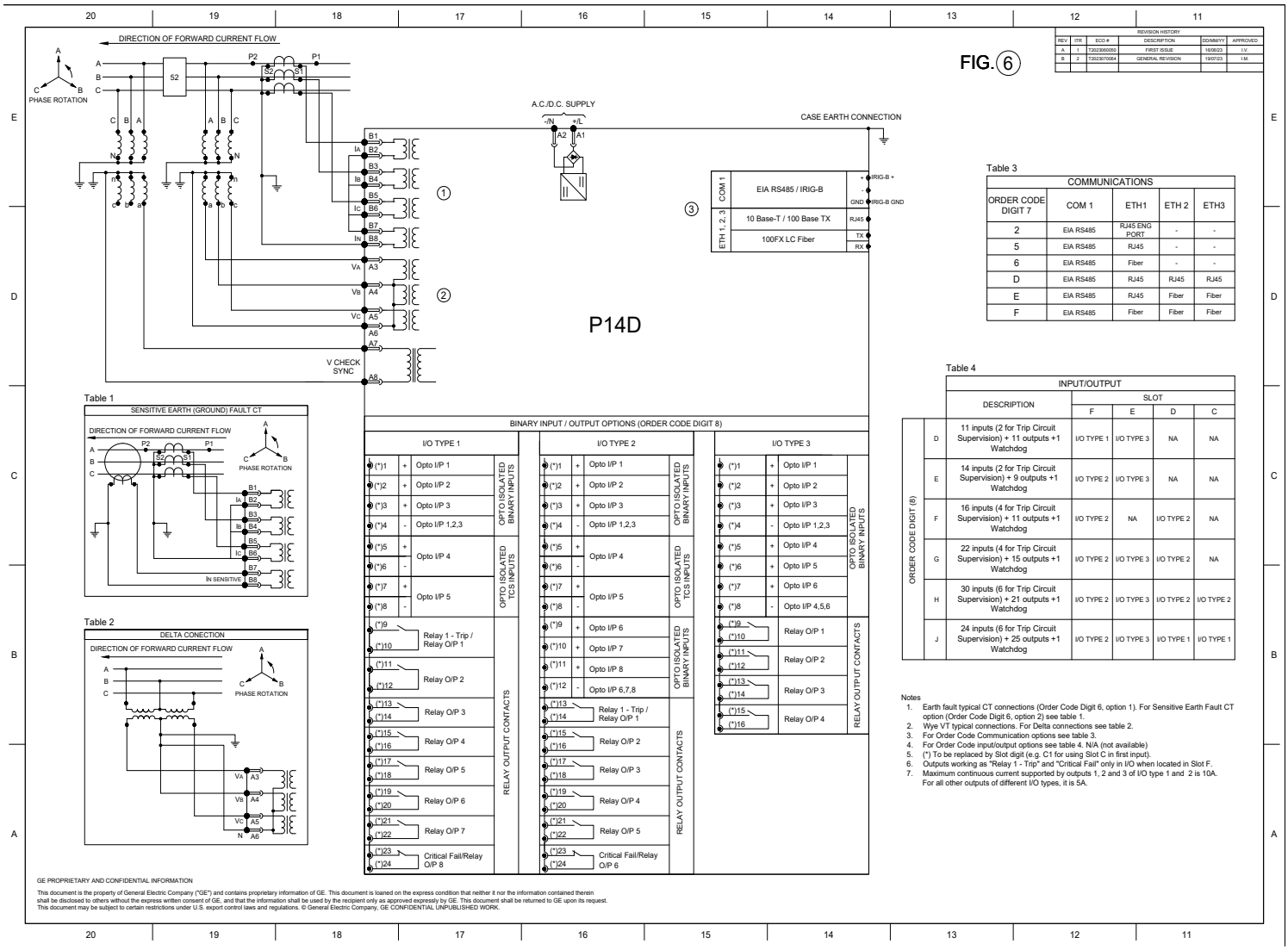


FIG. 6

REVISION HISTORY					
REV	ITR	ECO #	DESCRIPTION	DD/MM/YY	APPROVED
A	1	T2023060050	FIRST ISSUE	16/06/23	I.V.
B	2	T2023070064	GENERAL REVISION	19/07/23	I.M.

Table 3

COMMUNICATIONS				
ORDER CODE DIGIT 7	COM 1	ETH1	ETH 2	ETH3
2	EIA RS485	RJ45 ENG PORT	-	-
5	EIA RS485	RJ45	-	-
6	EIA RS485	Fiber	-	-
D	EIA RS485	RJ45	RJ45	RJ45
E	EIA RS485	RJ45	Fiber	Fiber
F	EIA RS485	Fiber	Fiber	Fiber

Table 4

ORDER CODE DIGIT (8)		INPUT/OUTPUT DESCRIPTION	SLOT F	SLOT E	SLOT D	SLOT C
	D	11 inputs (2 for Trip Circuit Supervision) + 11 outputs +1 Watchdog	I/O TYPE 1	I/O TYPE 3	NA	NA
	E	14 inputs (2 for Trip Circuit Supervision) + 9 outputs +1 Watchdog	I/O TYPE 2	I/O TYPE 3	NA	NA
	F	16 inputs (4 for Trip Circuit Supervision) + 11 outputs +1 Watchdog	I/O TYPE 2	NA	I/O TYPE 2	NA
	G	22 inputs (4 for Trip Circuit Supervision) + 15 outputs +1 Watchdog	I/O TYPE 2	I/O TYPE 3	I/O TYPE 2	NA
	H	30 inputs (6 for Trip Circuit Supervision) + 21 outputs +1 Watchdog	I/O TYPE 2	I/O TYPE 3	I/O TYPE 2	I/O TYPE 2
	J	24 inputs (6 for Trip Circuit Supervision) + 25 outputs +1 Watchdog	I/O TYPE 2	I/O TYPE 3	I/O TYPE 1	I/O TYPE 1

Notes
1. Earth fault typical CT connections (Order Code Digit 6, option 1). For Sensitive Earth Fault CT option (Order Code Digit 6, option 2) see table 1.
2. Wye VT typical connections. For Delta connections see table 2.
3. For Order Code Communication options see table 3.
4. For Order Code input/output options see table 4. N/A (not available)
5. (*) To be replaced by Slot digit (e.g. C1 for using Slot C in first input).
6. Outputs working as "Relay 1 - Trip" and "Critical Fail" only in I/O when located in Slot F.
7. Maximum continuous current supported by outputs 1, 2 and 3 of I/O type 1 and 2 is 10A. For all other outputs of different I/O types, it is 5A.

Order Code Information

VARIANTS	ORDER NUMBER										
	1-4	5	6	7	8	9	10	11	12-13	14	15
Multilin Agile Application											
Feeder Management Protection - Directional (with voltage and current inputs)	P14D										
Feeder Management Protection - Non Directional (current inputs only)	P14N										
Voltage/Frequency Protection - (voltage inputs only)	P94V										
Application Package Options											
Base		B									
Base + 32/32N power, 79/25 reclose, df/dt frequency, 21FL fault locator	P14D	L									
P14DL / TGFD transient ground fault (standard CT only)***	P14D	Z									
Base + 79 reclose	P14N	L									
Base + 79/25 reclose	P94V	P									
Current / Voltage Inputs											
Standard Earth (Ground) CT	P14D/N		1								
Voltage Only	P94V		1								
Sensitive Earth (Ground) Fault CT	P14D/N		2								
Hardware Options											
EIA RS485 serial comms – with RJ45 Engineering Port (only)				2							
EIA RS485 serial comms and station bus Ethernet - Single channel RJ45 copper				5							
EIA RS485 serial comms and station bus Ethernet - Single channel fiber				6							
1x EIA RS485 serial, 2x RJ45 Ethernet (configurable PRP/HSR/LLA) and 1x RJ45				D							
1x EIA RS485 serial, 2x fiber Ethernet (configurable PRP/HSR/LLA) and 1x RJ45				E							
1x EIA RS485 serial, 2x fiber Ethernet (configurable PRP/HSR/LLA) and 1x fiber				F							
Binary Input / Output Options	**Case**										
11 inputs (2 for Trip Circuit Supervision) + 11 outputs + 1 watchdog	30TE				D						
14 inputs (2 for Trip Circuit Supervision) + 9 outputs + 1 watchdog	30TE				E						
16 inputs (4 for Trip Circuit Supervision) + 11 outputs + 1 watchdog	30TE				F						
22 inputs (4 for Trip Circuit Supervision) + 15 outputs + 1 watchdog	30TE				G						
30 inputs (6 for Trip Circuit Supervision) + 21 outputs + 1 watchdog	30TE				H						
24 inputs (6 for Trip Circuit Supervision) + 25 outputs + 1 watchdog	30TE				J						
Communication protocols / Cybersecurity											
DNP3.0 / Modbus / IEC 60870-5-103						2					
IEC 61850 / DNP3.0 / Modbus / IEC 60870-5-103						3					
IEC 61850 / DNP3.0 / Modbus / IEC 60870-5-103 + advanced cyber Level 2						4					
Case											
30TE Flush (6"), 6 function keys, 16 programmable LEDs and Color Graphical HMI (IEC version)*							C				
30TE Flush (6"), 6 function keys, 16 programmable LEDs and Color Graphical HMI (ANSI version)*							E				
30TE Flush (6"), 6 function keys, 16 programmable LEDs, Color Graphical HMI & Bay Control (IEC version)							G				
30TE Flush (6"), 6 function keys, 16 programmable LEDs, Color Graphical HMI & Bay Control (ANSI version)							N				
Software upgrade only (via After Sales)							0				
Language											
English (UK) / English (US) / French / Spanish / Russian / Turkish								0			
Software Version											
Unless specified the latest version will be delivered									**		
Customization / Regionalization											
Regular (IEC standards and 50Hz/1 amp based default settings)										0	
IEEE market default configuration - US English, 60Hz and 5 amp preconfiguration										6	
Customer specific										A	
Hardware design suffix											
Enhanced model											E

Note

** Offers a single line diagram for control, but with a basic, fixed bay template only. G and N options are required for a configurable mimic diagram.*

****TGFD (with standard CT)*

For more information
visit **GEGridSolutions.com**

GEA35282
English

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