

GRID SOLUTIONS

# MULTILIN AGILE

P14N, P14D, P94V

## Feeder Management Series

Multilin Agile offers versatile protection and control, making it suitable for utilities, industrial plants, onshore and offshore renewable collectors, and more. This advanced feeder relay supports text or integrated graphical color display option allowing direct device interaction. The graphical color display option presents custom-drawn Single Line Diagrams (SLD) that enables bay monitoring and control.

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 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

- Smaller footprint for easy retrofitting of aging infrastructure
- Intuitive graphical display for effective monitoring, communications & troubleshooting
- Advanced functions addressing the challenges of renewable integration
- Advanced Cybersecurity to prevent unauthorized access and cyber attacks
- High impedance (HiZ) fault detection to protect people, property, livestock
- Draw-out design for simplified testing, commissioning & maintenance
- Cost savings on engineering time & wiring due to traditional hardwired control scheme replacement

### Applications

- Applicable to distribution and industrial feeders
- Distribution feeder protection for detection of downed conductors, faults on compensated networks and load encroachment on heavily loaded lines
- Renewable integration requiring advanced protection, harmonic monitoring and accurate recording
- Fast load-shedding schemes using advanced frequency functions
- High reliability in coastal, industrial and polluted environments thanks to harsh environmental coating of PCBs (printed circuit boards) as standard



GE VERNOVA



### Advanced Protection & Control

- Fast protection execution, scan rate 8 times / cycle
- Advanced protection including rate of change, autoreclose, synchrocheck, high impedance fault, 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

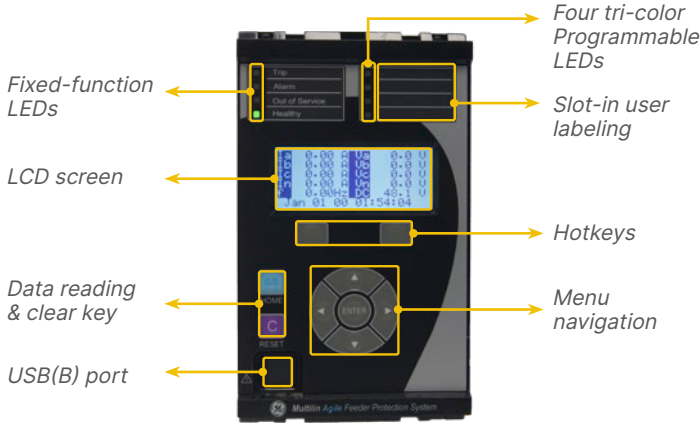
- Supports IEC 61850 Ed. 2, IEC 62439 (PRP/ HSR), Modbus RTU/TCP, IEC 60870- 5-103, DNP 3.0 serial/ethernet protocols
- IEEE 1588 (PTP), IRIG-B and SNTP time synchronization
- Ethernet and serial protocols capable to operating concurrently

### Ease of Use

- Compact and withdrawable design with 4" and 6" case size options
- Configurable single line diagram for bay monitoring & control (30TE)
- Push buttons and direct function keys for connected switchgear (30TE)
- Select-before-operate, breaker health checks and interlocking capabilities
- Single Setting file for relay configuration

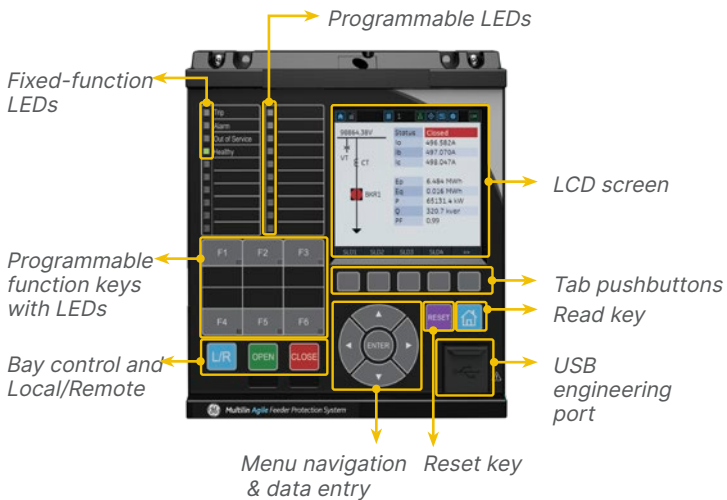
### Intuitive User Interface

The 20TE (4") front HMI hosts a multi-line text display which allows direct device interaction. Smart dependencies within the menu ensure that settings for unused elements are hidden. Four tricolor LED lamps are available, freely configurable, in addition to four fixed-function LEDs which provide a cost-effective solution for annunciation.



Front panel interface 20TE (4")

The 30TE (6") version 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.



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

Both 20TE & 30TE version support multiple languages 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.

### 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 20TE (4") / 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

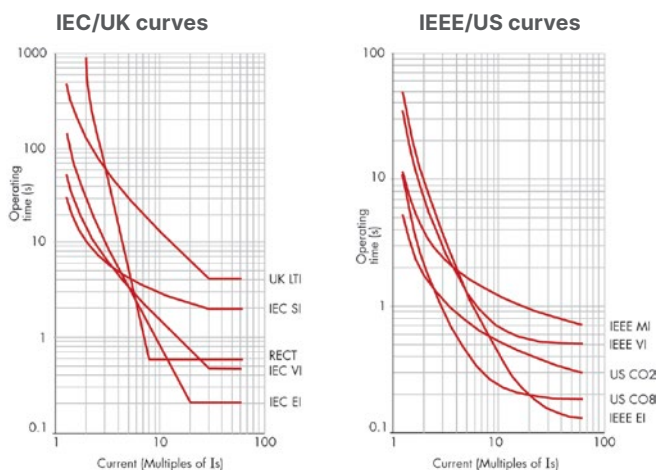


## Feeder Protection

### 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.

### High Impedance & Transient Ground Fault Detection (HIF & TGFD)

Innovative high impedance ground fault algorithms improve the detection of downed conductors which have fallen on surfaces with high resistivity (e.g., sand, dry scrubland, trees). This helps the utility to save human lives, protect nearby animals and lessen the risk of vegetation fires caused by prolonged arcing.

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 cost. 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

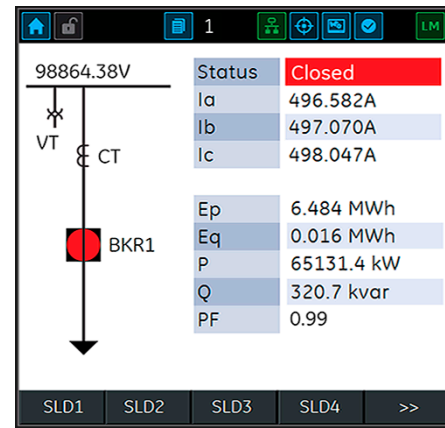
Multilin Agile offers comprehensive switchgear control aided by a configurable SLD & breaker control. A total of 8 switchgear elements can be controlled. Circuit Breaker control is available through dedicated Open/Close push buttons, graphical HMI interface, optically isolated inputs and remotely via 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 – 30TE (6") version

## 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 to 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 and no spurious pickup during battery ground faults or capacitive discharges, thereby making them perfect for plant status monitoring.



Binary inputs immunity to inductive fields

## Measurement, Recording and Post-Fault Analysis

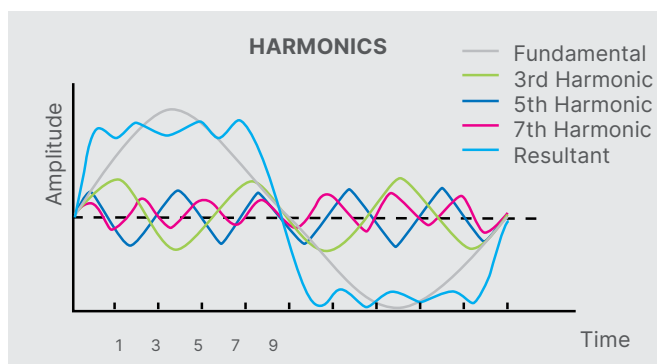
Multilin Agile offers unmatched power system analytics through the advanced features and monitoring and recording tools.

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.

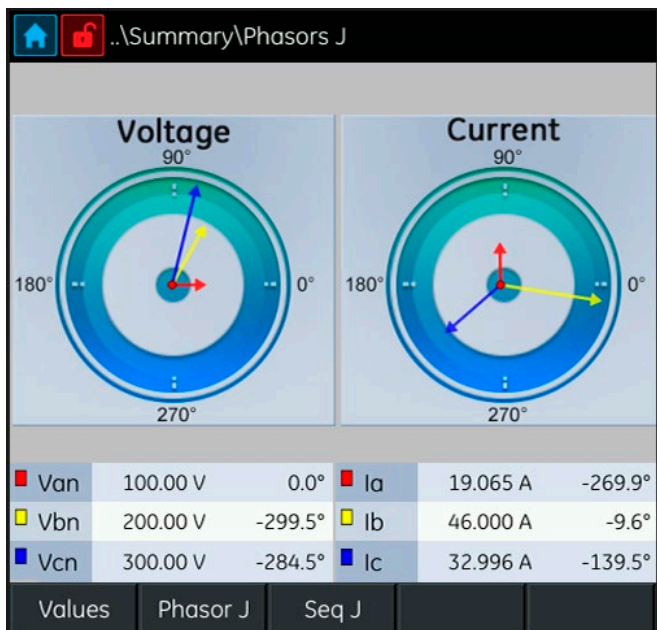
The relay offers comprehensive Power Quality metering by measuring up to the 21st harmonic for both currents and voltages including total harmonic distortion (THD).

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.



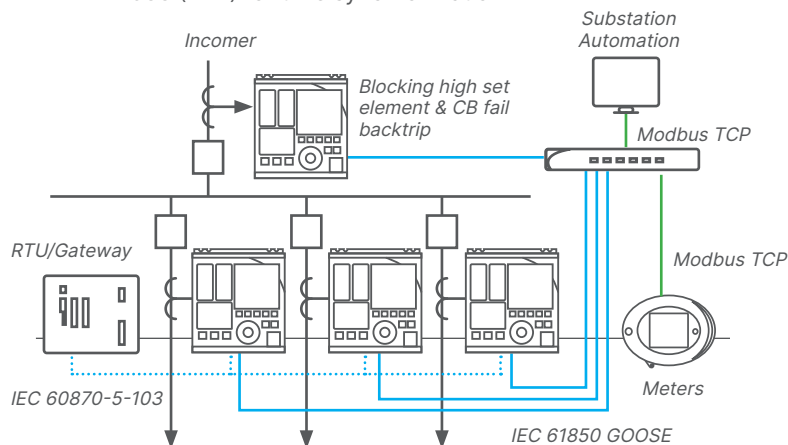
Phasor view for effective monitoring, commissioning & troubleshooting

## 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.

## Advanced Cybersecurity

Multilin Agile helps prevent unauthorized access and malware by delivering host of cybersecurity features compliant with NIS and NERC CIP guidelines, or other security regulations.

- 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

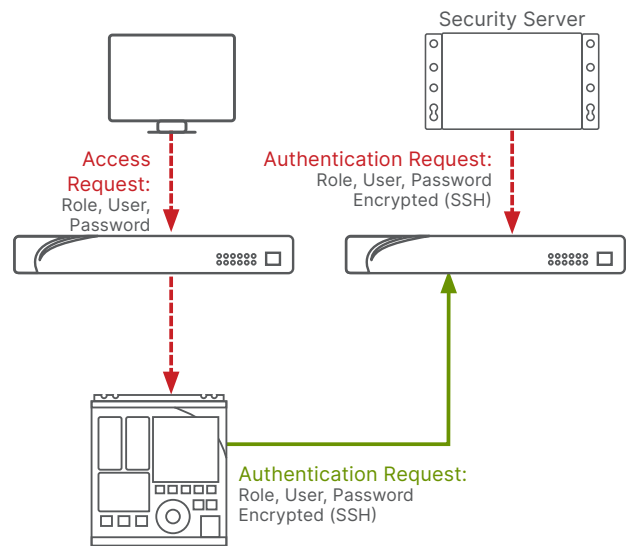
## Testing and Simulation

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   | CASE SIZE   |
|-------|---------------|--|-------------|
| P14NB | P14N          | Non-directional feeder   | 20TE / 30TE |
| P14NL | P14N          | Non-directional feeder with autoreclose  | 20TE / 30TE |
| P14NZ | P14N          | Non-directional feeder with autoreclose and HIF** downed conductor                                   | 20TE / 30TE |
| P14DB | P14D          | Directional feeder   | 20TE / 30TE |
| P14DL | P14D          | Advanced directional feeder with autoreclose and check synchronizing                                 | 20TE / 30TE |
| P14DZ | P14D          | Advanced directional feeder plus HIF** downed conductor or TGFDF*** transient ground fault detection | 20TE / 30TE |
| P94VB | P94V          | Voltage and frequency  | 20TE / 30TE |
| P94VP | P94V          | Voltage and frequency with autoreclose and check synchronizing                                       | 20TE / 30TE |

\*\* HIF (with sensitive CT, TGFDF not available)

\*\* HIF support in 30TE (6") version only

\*\*\*TGFDF (with standard CT, HIF not available)

## Hardware Overview

| FUNCTION   | NON-DIRECTIONAL                  | DIRECTIONAL   | VOLTAGE & FREQUENCY |
|--|----------------------------------|---|---------------------|
|  | 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   | 20TE (4") Case<br>30TE (6") Case | 5 to 14<br>11 to 30   |                     |
| Output relays min./max. hardware option  | 20TE (4") Case<br>30TE (6") Case | 5 to 11<br>9 to 25  |                     |
| Rear communication port (software selectable to convert into demodulated IRIG-B) |                                  | RS485   |                     |
| 2nd Rear communication port options  |                                  | Additional RS485 serial (20TE only), 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

| ANSI CODE | FUNCTION   | NON-DIRECTIONAL |       |           | DIRECTIONAL |       |           | VOLTAGE & FREQUENCY |       |
|-----------|--|-----------------|-------|-----------|-------------|-------|-----------|---------------------|-------|
|           |  | P14NB           | P14NL | P14NZ     | P14DB       | P14DL | P14DZ     | P94VB               | P94VP |
| 50        | Definite time overcurrent protection   | 6               | 6     | 6         | 6           | 6     | 6         |                     |       |
| 50N/G     | Neutral / Ground definite time overcurrent protection (Derived and Measured) | 4               | 4     | 4         | 4           | 4     | 4         |                     |       |
| 51        | IDMT overcurrent   | 3               | 3     | 3         | 3           | 3     | 3         |                     |       |
| 51N/G     | Neutral / Ground IDMT overcurrent protection                                 | 2               | 2     | 2         | 2           | 2     | 2         |                     |       |
| 50/51SEF  | Sensitive ground fault   | 4               | 4     | 4         | 4           | 4     | 4         |                     |       |
| 68        | Inrush blocking  | •               | •     | •         | •           | •     | •         |                     |       |
|           | Cold load pick up  | •               | •     | •         | •           | •     | •         |                     |       |
| YN        | Admittance protection  |                 |       |           |             | •     | •         |                     |       |
| 21BL      | Load encroachment supervision (Load blinders)                                |                 |       |           |             | •     | •         |                     |       |
| HIF       | High Impedance (HiZ) Ground Fault (downed conductor)**                       |                 |       | 30TE only |             |       | 30TE only |                     |       |
| TGFD      | Transient Ground Fault Detection***  |                 |       |           |             |       | •         |                     |       |
| 46        | Negative sequence overcurrent  | 4               | 4     | 4         | 4           | 4     | 4         |                     |       |
| 46BC      | Broken conductor   | 4               | 4     | 4         | 4           | 4     | 4         |                     |       |
| 55        | Power factor   |                 |       |           |             | •     | •         |                     |       |
|           | Programmable curves  | 4               | 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         |                     | 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                   | 6     |

\*\* HIF (with sensitive CT, TGFD not available)

\*\* HIF support in 30TE (6") version only

\*\*\*TGFD (with standard CT, HIF not available)

Wiring Diagram – 20TE (4”) Version

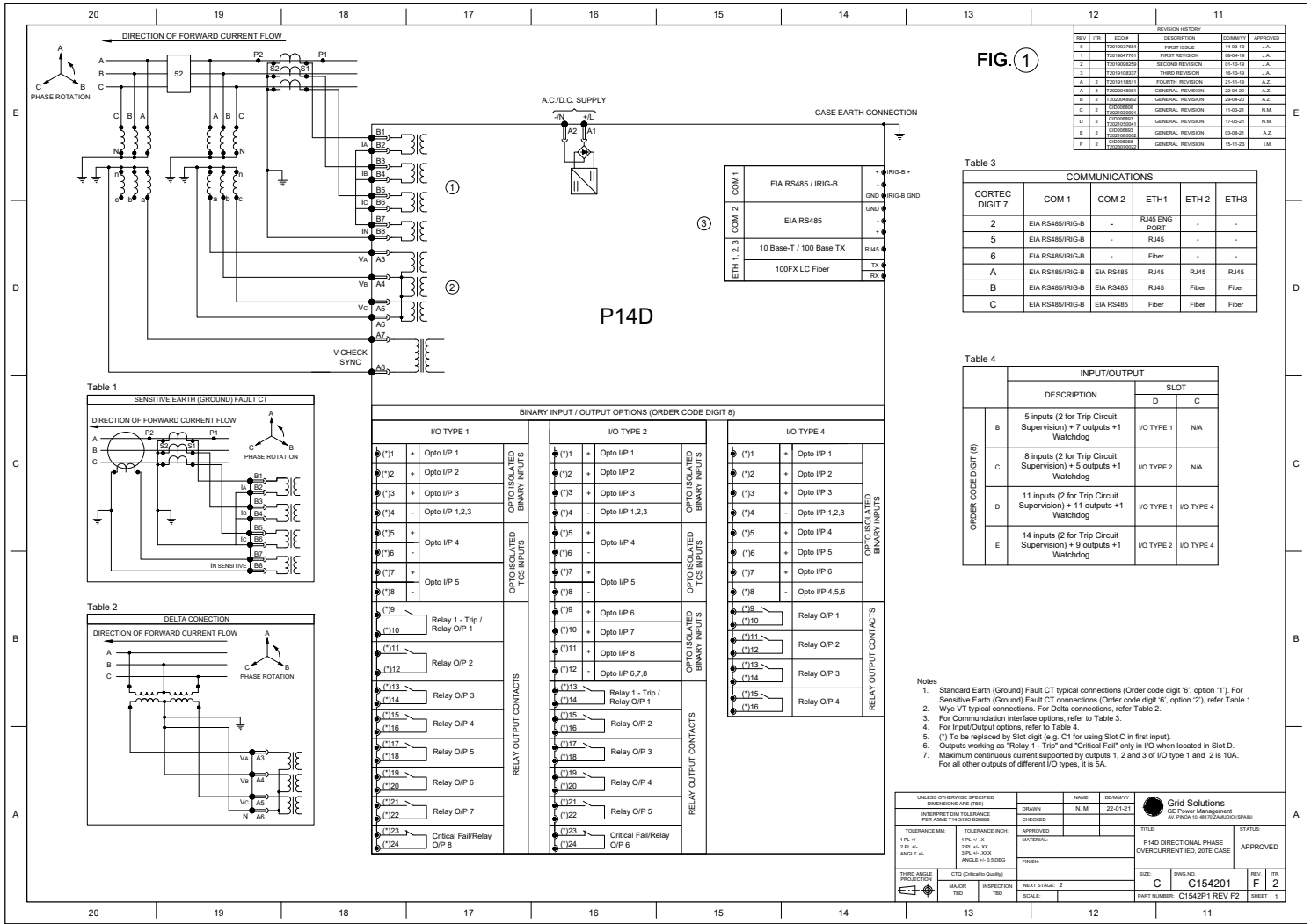


FIG. 1

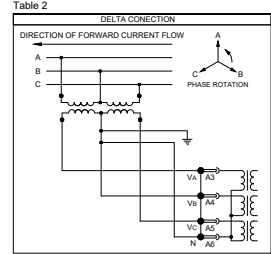
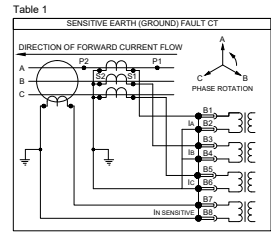
| REV | DATE       | DESCRIPTION      | DESIGNED BY | APPROVED BY |
|-----|------------|------------------|-------------|-------------|
| 1   | 02/08/2014 | FIRST ISSUE      | 140319      | J.A.        |
| 2   | 02/08/2014 | FIRST REVISION   | 080414      | J.A.        |
| 3   | 02/08/2014 | SECOND REVISION  | 05-10-14    | J.A.        |
| 4   | 02/08/2014 | THIRD REVISION   | 08-10-14    | J.A.        |
| 5   | 02/08/2014 | FOURTH REVISION  | 20-10-14    | A.Z.        |
| 6   | 02/08/2014 | GENERAL REVISION | 20-04-20    | A.Z.        |
| 7   | 02/08/2014 | GENERAL REVISION | 20-04-20    | A.Z.        |
| 8   | 02/08/2014 | GENERAL REVISION | 11-03-21    | N.M.        |
| 9   | 02/08/2014 | GENERAL REVISION | 17-05-21    | N.M.        |
| 10  | 02/08/2014 | GENERAL REVISION | 02-08-21    | A.Z.        |
| 11  | 02/08/2014 | GENERAL REVISION | 15-11-22    | N.M.        |

Table 3

| COMMUNICATIONS |                  |           |               |       |       |
|----------------|------------------|-----------|---------------|-------|-------|
| CORTEC DIGIT 7 | COM 1            | COM 2     | ETH 1         | ETH 2 | ETH 3 |
| 2              | EIA RS485/IRIG-B | -         | RJ45 ENO PORT | -     | -     |
| 5              | EIA RS485/IRIG-B | -         | RJ45          | -     | -     |
| 6              | EIA RS485/IRIG-B | -         | Fiber         | -     | -     |
| A              | EIA RS485/IRIG-B | EIA RS485 | RJ45          | RJ45  | RJ45  |
| B              | EIA RS485/IRIG-B | EIA RS485 | RJ45          | Fiber | Fiber |
| C              | EIA RS485/IRIG-B | EIA RS485 | Fiber         | Fiber | Fiber |

Table 4

| ORDER CODE DIGIT (6) | DESCRIPTION  | INPUT/OUTPUT |            |
|----------------------|--|--------------|------------|
|                      |  | D            | C          |
|                      |  | Slot         | Slot       |
| B                    | 5 inputs (2 for Trip Circuit Supervision) + 7 outputs + 1 Watchdog   | I/O TYPE 1   | N/A        |
| C                    | 8 inputs (2 for Trip Circuit Supervision) + 5 outputs + 1 Watchdog   | I/O TYPE 2   | N/A        |
| D                    | 11 inputs (2 for Trip Circuit Supervision) + 11 outputs + 1 Watchdog | I/O TYPE 1   | I/O TYPE 4 |
| E                    | 14 inputs (2 for Trip Circuit Supervision) + 9 outputs + 1 Watchdog  | I/O TYPE 2   | I/O TYPE 4 |



BINARY INPUT / OUTPUT OPTIONS (ORDER CODE DIGIT 8)

| I/O TYPE 1 |                              | I/O TYPE 2 |                             | I/O TYPE 4 |                           |
|------------|------------------------------|------------|-----------------------------|------------|---------------------------|
| (*)1       | + Opto I/P 1                 | (*)1       | + Opto I/P 1                | (*)1       | + Opto I/P 1              |
| (*)2       | + Opto I/P 2                 | (*)2       | + Opto I/P 2                | (*)2       | + Opto I/P 2              |
| (*)3       | + Opto I/P 3                 | (*)3       | + Opto I/P 3                | (*)3       | + Opto I/P 3              |
| (*)4       | - Opto I/P 1,2,3             | (*)4       | - Opto I/P 1,2,3            | (*)4       | - Opto I/P 1,2,3          |
| (*)5       | + Opto I/P 4                 | (*)5       | + Opto I/P 4                | (*)5       | + Opto I/P 4              |
| (*)6       | - Opto I/P 4                 | (*)6       | - Opto I/P 4                | (*)6       | + Opto I/P 5              |
| (*)7       | + Opto I/P 5                 | (*)7       | + Opto I/P 5                | (*)7       | + Opto I/P 6              |
| (*)8       | - Opto I/P 5                 | (*)8       | - Opto I/P 5                | (*)8       | + Opto I/P 4,5,6          |
| (*)9       | Relay 1 - Trip / Relay O/P 1 | (*)9       | + Relay O/P 1               | (*)9       | Relay O/P 1               |
| (*)10      | Relay O/P 2                  | (*)10      | + Relay O/P 2               | (*)10      | Relay O/P 2               |
| (*)11      | Relay O/P 3                  | (*)11      | + Relay O/P 3               | (*)11      | Relay O/P 3               |
| (*)12      | Relay O/P 4                  | (*)12      | + Relay O/P 4               | (*)12      | Relay O/P 4               |
| (*)13      | Relay O/P 5                  | (*)13      | + Relay O/P 5               | (*)13      | Relay O/P 5               |
| (*)14      | Relay O/P 6                  | (*)14      | + Relay O/P 6               | (*)14      | Relay O/P 6               |
| (*)15      | Relay O/P 7                  | (*)15      | + Relay O/P 7               | (*)15      | Relay O/P 7               |
| (*)16      | Relay O/P 8                  | (*)16      | + Relay O/P 8               | (*)16      | Relay O/P 8               |
| (*)17      | Critical Fail/Relay O/P 8    | (*)17      | + Critical Fail/Relay O/P 8 | (*)17      | Critical Fail/Relay O/P 8 |
| (*)18      |                              | (*)18      |                             | (*)18      |                           |
| (*)19      |                              | (*)19      |                             | (*)19      |                           |
| (*)20      |                              | (*)20      |                             | (*)20      |                           |
| (*)21      |                              | (*)21      |                             | (*)21      |                           |
| (*)22      |                              | (*)22      |                             | (*)22      |                           |
| (*)23      |                              | (*)23      |                             | (*)23      |                           |
| (*)24      |                              | (*)24      |                             | (*)24      |                           |

- Notes
- Standard Earth (Ground) Fault CT typical connections (Order code digit '6', option '1'). For Sensitive Earth (Ground) Fault CT connections (Order code digit '6', option '2'), refer Table 1.
  - Wye Y1 typical connections. For Delta connections, refer Table 2.
  - For Communication interface options, refer to Table 3.
  - For Input/Output options, refer to Table 4.
  - (\*) To be replaced by Slot digit (e.g. C1 for using Slot C in first input).
  - Outputs working as "Relay 1 - Trip" and "Critical Fail" only in I/O when located in Slot D.
  - 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.

|   |             |  |          |
|---|-------------|--|----------|
| UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN (MM) |             | NAME   | DATE     |
| INTERPRET DIM TOLERANCES PER ASME Y14.5M0 (2018)  |             | N. M.  | 22-01-21 |
| TOLERANCE MM                                      |             | APPROVED   |          |
| 1 PL ± .1   | 1 PL ± .1   | Grid Solutions<br>01 Power Management<br>40 PWS-16-4010-00000-00000          |          |
| 2 PL ± .15  | 2 PL ± .15  |  |          |
| 3 PL ± .2   | 3 PL ± .2   |  |          |
| TOLERANCE INCH                                    |             | TITLE: P14D DIRECTIONAL PHASE OVERCURRENT IED, 20TE CASE<br>STATUS: APPROVED |          |
| 1 PL ± .005                                       | 1 PL ± .005 | DATE: C154201<br>REV: F 2  |          |
| 2 PL ± .005                                       | 2 PL ± .005 | PART NUMBER: C1542P1 REV F2<br>SHEET: 1                                      |          |
| 3 PL ± .005                                       | 3 PL ± .005 |  |          |



# Wiring Diagram – 30TE (6”) Version

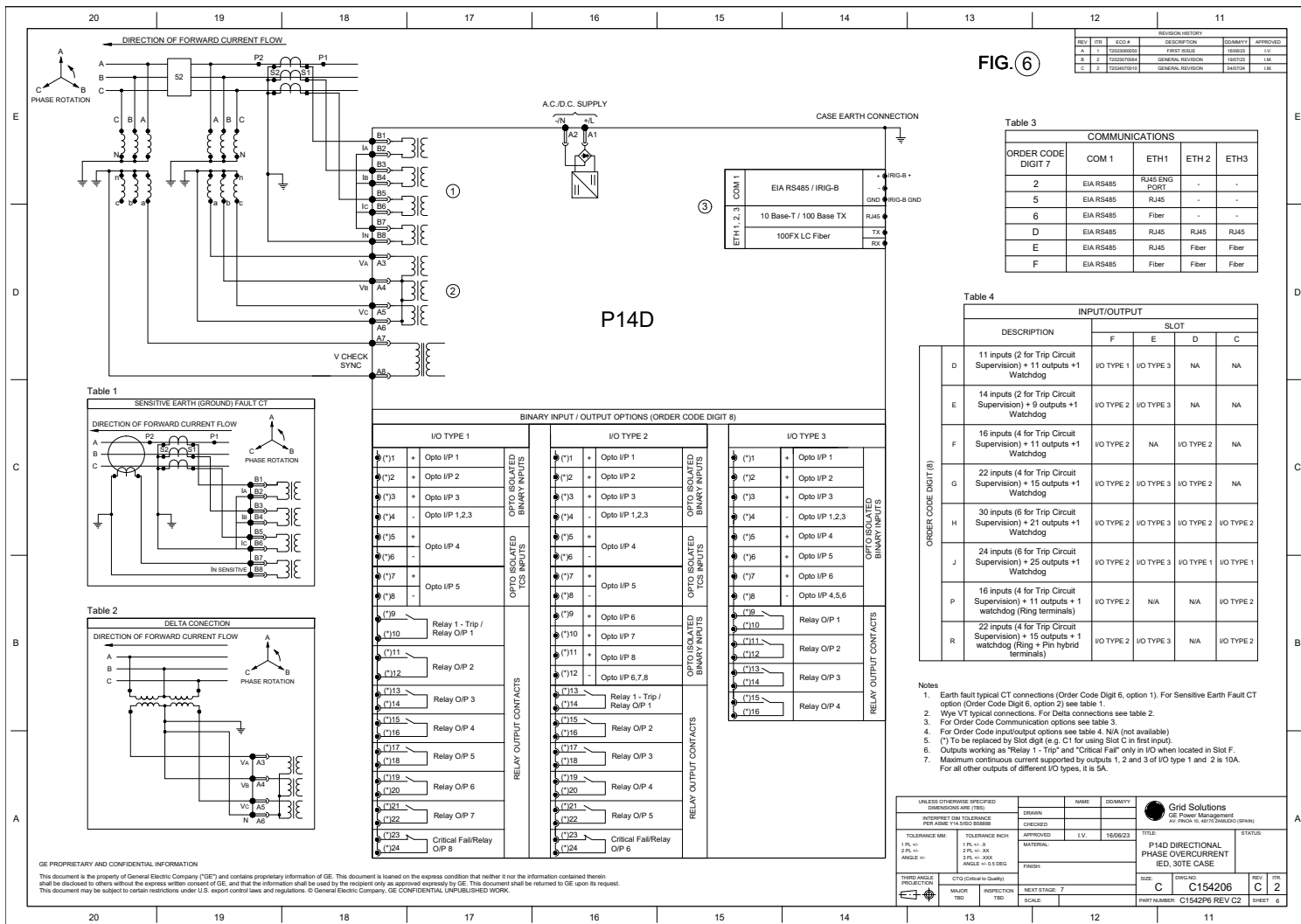


FIG. 6

| REV | DATE       | EDD #    | DESCRIPTION      | DDMANNY  | APPROVED |
|-----|------------|----------|------------------|----------|----------|
| A   | 11/11/2009 | 00000000 | FIRST ISSUE      | 16/06/23 | LV       |
| B   | 11/11/2009 | 00000000 | GENERAL REVISION | 16/06/23 | LM       |
| C   | 12/03/2010 | 00000010 | GENERAL REVISION | 04/03/08 | LM       |

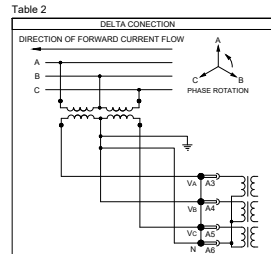
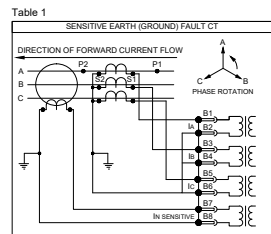
Table 3 COMMUNICATIONS

| ORDER CODE DIGIT 7 | COM 1     | ETH 1         | ETH 2 | ETH 3 |
|--------------------|-----------|---------------|-------|-------|
| 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 INPUT/OUTPUT

| ORDER CODE DIGIT 6 | DESCRIPTION  | SLOT      |           |           |           |
|--------------------|--|-----------|-----------|-----------|-----------|
|                    |  | F         | E         | D         | C         |
| D                  | 11 inputs (2 for Trip Circuit Supervision) + 11 outputs + 1 Watchdog                               | IO TYPE 1 | IO TYPE 3 | NA        | NA        |
| E                  | 14 inputs (2 for Trip Circuit Supervision) + 9 outputs + 1 Watchdog                                | IO TYPE 2 | IO TYPE 3 | NA        | NA        |
| F                  | 16 inputs (4 for Trip Circuit Supervision) + 11 outputs + 1 Watchdog                               | IO TYPE 2 | NA        | IO TYPE 2 | NA        |
| G                  | 22 inputs (4 for Trip Circuit Supervision) + 15 outputs + 1 Watchdog                               | IO TYPE 2 | IO TYPE 3 | IO TYPE 2 | NA        |
| H                  | 30 inputs (6 for Trip Circuit Supervision) + 21 outputs + 1 Watchdog                               | IO TYPE 2 | IO TYPE 3 | IO TYPE 2 | IO TYPE 2 |
| J                  | 24 inputs (6 for Trip Circuit Supervision) + 5 outputs + 1 Watchdog                                | IO TYPE 2 | IO TYPE 3 | IO TYPE 1 | IO TYPE 1 |
| P                  | 16 inputs (4 for Trip Circuit Supervision) + 11 outputs + 1 watchdog (Ring terminals)              | IO TYPE 2 | NA        | NA        | IO TYPE 2 |
| R                  | 22 inputs (4 for Trip Circuit Supervision) + 15 outputs + 1 watchdog (Ring + Pin hybrid terminals) | IO TYPE 2 | IO TYPE 3 | NA        | IO TYPE 2 |

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



BINARY INPUT / OUTPUT OPTIONS (ORDER CODE DIGIT 8)

| IO TYPE 1 |                              | IO TYPE 2 |                              | IO TYPE 3 |                  |
|-----------|------------------------------|-----------|------------------------------|-----------|------------------|
| (*)1      | + Opto I/P 1                 | (*)1      | + Opto I/P 1                 | (*)1      | + Opto I/P 1     |
| (*)2      | + Opto I/P 2                 | (*)2      | + Opto I/P 2                 | (*)2      | + Opto I/P 2     |
| (*)3      | + Opto I/P 3                 | (*)3      | + Opto I/P 3                 | (*)3      | + Opto I/P 3     |
| (*)4      | - Opto I/P 1,2,3             | (*)4      | - Opto I/P 1,2,3             | (*)4      | - Opto I/P 1,2,3 |
| (*)5      | + Opto I/P 4                 | (*)5      | + Opto I/P 4                 | (*)5      | + Opto I/P 4     |
| (*)6      | - Opto I/P 5                 | (*)6      | - Opto I/P 5                 | (*)6      | - Opto I/P 5     |
| (*)7      | + Opto I/P 6                 | (*)7      | + Opto I/P 6                 | (*)7      | + Opto I/P 6     |
| (*)8      | - Opto I/P 7                 | (*)8      | - Opto I/P 7                 | (*)8      | - Opto I/P 4,5,6 |
| (*)9      | Relay 1 - Trip / Relay O/P 1 | (*)9      | + Opto I/P 6                 | (*)9      | Relay O/P 1      |
| (*)10     | Relay O/P 2                  | (*)10     | + Opto I/P 7                 | (*)10     | Relay O/P 2      |
| (*)11     | Relay O/P 3                  | (*)11     | + Opto I/P 8                 | (*)11     | Relay O/P 3      |
| (*)12     | Relay O/P 4                  | (*)12     | - Opto I/P 6,7,8             | (*)12     | Relay O/P 4      |
| (*)13     | Relay O/P 5                  | (*)13     | Relay 1 - Trip / Relay O/P 1 | (*)13     | Relay O/P 1      |
| (*)14     | Relay O/P 6                  | (*)14     | Relay O/P 2                  | (*)14     | Relay O/P 2      |
| (*)15     | Relay O/P 7                  | (*)15     | Relay O/P 3                  | (*)15     | Relay O/P 3      |
| (*)16     | Critical Fail/Relay O/P 8    | (*)16     | Relay O/P 4                  | (*)16     | Relay O/P 4      |
| (*)17     |                              | (*)17     | Relay O/P 5                  | (*)17     |                  |
| (*)18     |                              | (*)18     | Relay O/P 6                  | (*)18     |                  |
| (*)19     |                              | (*)19     | Relay O/P 7                  | (*)19     |                  |
| (*)20     |                              | (*)20     | Critical Fail/Relay O/P 8    | (*)20     |                  |
| (*)21     |                              | (*)21     |                              | (*)21     |                  |
| (*)22     |                              | (*)22     |                              | (*)22     |                  |
| (*)23     |                              | (*)23     |                              | (*)23     |                  |
| (*)24     |                              | (*)24     |                              | (*)24     |                  |

| UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE (INCH)                          | DRAWN      | NAME     | DDMANNY  | Grid Solutions                                      |
|---|------------|----------|----------|---|
| TOLERANCE MM: 1.PL +/- .3, 2.PL +/- .XX, 3.PL +/- .00X, ANGLE +/- 0.5 DEG | CHECKED    | LV       | 16/06/23 | GE Power Management AT FINCA 11, 4870/DIAGNO (SPAN) |
| TITLE: P14D DIRECTIONAL PHASE OVERCURRENT IED, 30TE CASE                  | APPROVED   | STATUS   | SIZE: C  | DWG NO: C154206                                     |
| DATE: 11/11/2009  | INSPECTION | REV: C   | SCALE:   | REV: 2  |
| PROJECT: C1542P6  | INSPECTION | SHEET: 6 |          |   |

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Order Code Information

| VARIANTS   | ORDER NUMBER |   |   |   |   |   |    |    |       |    |    |   |
|--|--------------|---|---|---|---|---|----|----|-------|----|----|---|
|  | 1-4          | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12-13 | 14 | 15 |   |
| <b>Multilin Agile Application</b>  |              |   |   |   |   |   |    |    |       |    |    |   |
| 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         |   |   |   |   |   |    |    |       |    |    |   |
| <b>Application Package Options</b>   |              |   |   |   |   |   |    |    |       |    |    |   |
| Base   |              | B |   |   |   |   |    |    |       |    |    |   |
| Base + 32/32N power, 79/25 reclose, df/dt frequency, 21FL fault locator                                  | P14D         | L |   |   |   |   |    |    |       |    |    |   |
| P14DL + HIF** downed conductor / TGFD*** transient ground fault  | P14D         | Z |   |   |   |   |    |    |       |    |    |   |
| Base + 79 reclose  | P14N         | L |   |   |   |   |    |    |       |    |    |   |
| Base + 79/25 reclose   | P94V         | P |   |   |   |   |    |    |       |    |    |   |
| <b>Current / Voltage Inputs</b>  |              |   |   |   |   |   |    |    |       |    |    |   |
| Standard Earth (Ground) CT   | P14D/N       |   | 1 |   |   |   |    |    |       |    |    |   |
| Voltage Only   | P94V         |   | 1 |   |   |   |    |    |       |    |    |   |
| Sensitive Earth (Ground) Fault CT  | P14D/N       |   | 2 |   |   |   |    |    |       |    |    |   |
| <b>Hardware Options</b>  | <b>Case</b>  |   |   |   |   |   |    |    |       |    |    |   |
| EIA RS485 serial comms – with RJ45 Engineering Port (only)   | 20TE/30TE    |   |   | 2 |   |   |    |    |       |    |    |   |
| EIA RS485 serial comms and station bus Ethernet - Single channel RJ45 copper                             | 20TE/30TE    |   |   | 5 |   |   |    |    |       |    |    |   |
| EIA RS485 serial comms and station bus Ethernet - Single channel fiber                                   | 20TE/30TE    |   |   | 6 |   |   |    |    |       |    |    |   |
| 2x EIA RS485 serial, 2x RJ45 Ethernet (configurable PRP/HSR/LLA) and 1x RJ45                             | 20TE         |   |   | A |   |   |    |    |       |    |    |   |
| 2x EIA RS485 serial, 2x fiber Ethernet (configurable PRP/HSR/LLA) and 1x RJ45                            | 20TE         |   |   | B |   |   |    |    |       |    |    |   |
| 2x EIA RS485 serial, 2x fiber Ethernet (configurable PRP/HSR/LLA) and 1x fiber                           | 20TE         |   |   | C |   |   |    |    |       |    |    |   |
| 1x EIA RS485 serial, 2x RJ45 Ethernet (configurable PRP/HSR/LLA) and 1x RJ45                             | 30TE         |   |   | D |   |   |    |    |       |    |    |   |
| 1x EIA RS485 serial, 2x fiber Ethernet (configurable PRP/HSR/LLA) and 1x RJ45                            | 30TE         |   |   | E |   |   |    |    |       |    |    |   |
| 1x EIA RS485 serial, 2x fiber Ethernet (configurable PRP/HSR/LLA) and 1x fiber                           | 30TE         |   |   | F |   |   |    |    |       |    |    |   |
| <b>Binary Input / Output Options</b>   | <b>Case</b>  |   |   |   |   |   |    |    |       |    |    |   |
| 5 inputs (2 for Trip Circuit Supervision) + 7 outputs + 1 watchdog                                       | 20TE         |   |   |   | B |   |    |    |       |    |    |   |
| 8 inputs (2 for Trip Circuit Supervision) + 5 outputs + 1 watchdog                                       | 20TE         |   |   |   | C |   |    |    |       |    |    |   |
| 11 inputs (2 for Trip Circuit Supervision) + 11 outputs + 1 watchdog                                     | 20TE/30TE    |   |   |   | D |   |    |    |       |    |    |   |
| 14 inputs (2 for Trip Circuit Supervision) + 9 outputs + 1 watchdog                                      | 20TE/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 |   |    |    |       |    |    |   |
| 16 inputs (4 for Trip Circuit Supervision) + 11 outputs + 1 watchdog (Ring terminals)                    | 30TE         |   |   |   | P |   |    |    |       |    |    |   |
| 22 inputs (4 for Trip Circuit Supervision) + 15 outputs + 1 watchdog (Ring + Pin hybrid terminals)       | 30TE         |   |   |   | R |   |    |    |       |    |    |   |
| <b>Communication protocols / Cybersecurity</b>   |              |   |   |   |   |   |    |    |       |    |    |   |
| 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 |    |    |       |    |    |   |
| <b>Case</b>  |              |   |   |   |   |   |    |    |       |    |    |   |
| 20TE Flush (4 inch width) with text display  |              |   |   |   |   |   |    | B  |       |    |    |   |
| 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  |       |    |    |   |
| <b>Language</b>  |              |   |   |   |   |   |    |    |       |    |    |   |
| English (UK) / English (US) / French / Spanish / Russian / Turkish                                       |              |   |   |   |   |   |    |    | 0     |    |    |   |
| <b>Software Version</b>  |              |   |   |   |   |   |    |    |       |    |    |   |
| Unless specified the latest version will be delivered  |              |   |   |   |   |   |    |    |       | ** |    |   |
| <b>Customization / Regionalization</b>   |              |   |   |   |   |   |    |    |       |    |    |   |
| 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  |   |
| <b>Hardware design suffix</b>  |              |   |   |   |   |   |    |    |       |    |    |   |
| Enhanced model   |              |   |   |   |   |   |    |    |       |    |    | E |

Note

P40 Agile Enhanced (20TE) is now rebranded to Multilin Agile (20TE)

\* 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.

\*\* Only with ground fault (SEF) CT option.

\*\*\* HIF support in 30TE (6") version only.

\*\*\*TGFD (with standard CT, HIF not available).

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GEA35499  
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