

# MiCOM AGILE P54A/B



## Distribution Dual and Multi-Ended Current Differential

### Network Challenges – Economical Line Differential

For many years the distribution networks have used pilot wire differential protection. Pilot wire line differential protection compares the currents entering and leaving the protected zone via a pair of pilot wires. As technology has advanced, copper pilot wires are being replaced by fibre links between substations, offering safer and higher bandwidth communications paths, with simpler inherent self-supervision. Also, as the distribution power networks evolve to transport power in evermore complex ring and multi-terminal networks, line/cable differential protection becomes increasingly attractive, with its inherent ability to address grading/selectivity challenges. Finally it offers scalability for multi-terminal circuits to accommodate many distributed generation connections or new load taps along the line.

GE Vernova's multi-ended current differential protection provides an excellent migration product when pilot wire protection is changed to fibre or multiplexed communications. The relays are ready for any protection topology from two to six terminals, whether those multi-terminals exist now, or are provisioned for connection in the future. For distribution networks, two compact, economical models, P54A and P54B are available in a half rack 40TE case size.

### MiCOM Agile P54A/B Distribution Line/Cable Differential

For applications where VT inputs are not available, or where simplicity is preferred, the P54A model is the perfect choice. The P54A backup protection operates non-directional. The sister P54B model has an additional 4 VT inputs to support autoreclose with check synchronization, and directionalised backup protection. Both models offer three-pole trippings. The P54A/B relays support IEC 61850 Edition 2, SNMP v3 and IEEE1588, opening deployment possibilities in today's digital substations. PRP, HSR and RSTP redundant Ethernet station bus communications are also supported.

- **Compact Design**  
(40TE, 8-inch design  
half rack)
- **Digital Substation Ready**  
IEC 61850 Edition 2,  
IEEE 1588



- **Sub-cycle** for 2-ended up to 4-ended schemes; 1.25 cycle for 5 and 6 ended schemes. Limits arcing time, assists DG ride-through
- **Reduced Communications Downtime**  
PRP, HSR and RSTP redundant Ethernet station bus topologies
- **Flexible Protection Communications**  
SONET/SDH, IEEE C37.94, direct fibre, MPLS ready

### Protection and Control

- Excellent migration product when pilot wire protection is changed to fibre or multiplexed comms
- Maximises connection of renewables for up to 6 line or cable ends
- Full support of SONET/SDH channel switching
- Suitable for direct fiber and multiplexed (IEEE C37.94) networks, including MPLS systems

### Application Flexibility

- Ability to take an end off-line for maintenance
- Back-up protection, reclosing, measurements and recording as per P141-P145 and P14N/D products – no need to retrain
- Easy scheme customisation with programmable scheme logic and LEDs
- Extensive binary signalling capability between ends for intertripping, breaker fail, interlocking and control/observation of remote 3<sup>rd</sup> party substations

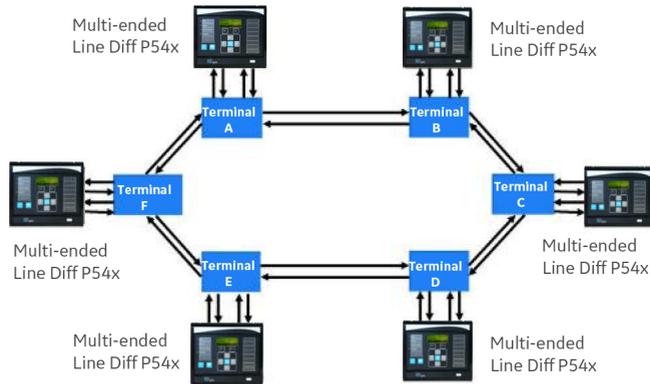
### Advanced Communications

- Advanced IEC 61850 Edition 2 implementation with IEEE1588 support
- Wide range of supported protocols: Courier/K-Bus, IEC 60870-5-103, DNP 3.0 (EAI-485 or Ethernet) and IEC 61850



## Key Benefits

- Highly-selective protection for overhead lines and underground cables with three phase tripping.
- Maximises connection of renewables or distribution tapped loads for up to 6 line or cable ends
- Fast operating time, less than 1 cycle for up to 4 ends, 1.25 cycles for 5 or 6 ended
- Economical - no GPS required
- Intuitive Programmable Scheme Logic (PSL) for building customised applications and automation schemes
- Compact size, available in a 40TE (8 inch, half-rack) case for retrofit in a horizontal or vertical case footprint
- An excellent migration product when pilot wire protection is changed to fiber or multiplexed comms



Multi-ended Line Diff P54x connection

## Programmable Scheme Logic

Powerful graphical logic allows the user to customise the protection and control functions. The logic includes 32 timers, gates (OR, AND, MAJORITY) and set/reset latch functions, with the ability to invert the inputs and outputs and provide feedback.

This logic has the ability to condition any of the eight binary logic states that can be sent between any pair of relays in the scheme. This has particular value to avoid the need to overlay separate breaker fail or intertripping schemes, or where a remote substation(s) are inaccessible by SCADA. In the latter case, binary data for control and supervision can be connected by “proxy” via an end that is accessible.

## Backup Feeder Protection

In addition to the differential protection, the P54A/B provide integrated feeder back-up protection in the same box. This makes the P54A/B a perfect one box solution for economical distribution protection applications.

- Four stages of phase and earth fault protection
- Negative sequence overcurrent
- Patented broken conductor protection
- Two stage high speed circuit-breaker failure protection with fast reset (<0.75 cycles) for improved system stability
- Phase under/overvoltage protection (P54B only)
- 4-shot auto reclose with check synchronism (P54B only)

## Communication Interfaces for System Integration

### Communications Interfaces for System Integration

To ensure compatibility with standard communications equipment, the MiCOM P54x Agile multi-ended line differential series is designed to work with IEEE C37.94™. A direct fibre optic connection to a multiplexer is possible if the MUX is IEEE C37.94™ compliant. In direct fibre optic applications, 1300 nm and 1550 nm channel options are available. Each relay also allows mixing of 850nm MUX and 1300 nm direct fibre channels, to accommodate differing teleprotection bearer choices for each leg in the scheme.

## Post-Fault Analysis

### Event Records

Up to 1024 time-tagged event records can be stored in battery backed memory. An optional modulated or demodulated IRIG-B port is available for accurate time synchronisation.

### Fault Records

The last 15 fault records are stored.

### High-Resolution Disturbance Records

The oscillography has 16 analogue channels, 64 digital and 1 time channel, all at a resolution of 48 samples/ cycle.

### Fault Location (P54B)

A fault location algorithm provides distance to fault in miles, kilometres, ohms or percentage of the line length. The proven algorithm employed tolerates pre-fault loading and fault arc resistance.

For more information, visit  
[governova.com/grid-solutions](http://governova.com/grid-solutions)

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