

MULTILIN 850

Feeder and Bay Controller Solutions for Industrial and Utility Applications

The Multilin™ 850 relay is a member of the Multilin 8 Series protective relay platform and has been designed for the management, protection and control of feeder applications. The Multilin 850 is used to provide primary (main) or backup protection for underground and overhead single or dual feeders for utility and industrial power networks.

With 11 Switchgear control elements, fully configurable Single Line Diagram on a large color graphical display, 36 alarm integrated annunciator panel and 20 push buttons makes the 850 the ideal choice for bay control and protection as a “One Box Solution”.

Designed with advanced communications options and detailed asset monitoring capabilities, the Multilin 850 provides advanced functionality, including high-performance protection, extensive programmable logic and flexible configuration capabilities. With support for industry leading communications protocols and technologies, the 850 provides easy integration into new or existing SCADA or DCS for enhanced situational awareness.

Key Benefits

- One Box Solution with advanced logic and configuration flexibility, providing primary or backup protection for up to 2 feeders or feeders with 2 sets of voltage inputs
- User configurable Single Line Diagram on color display for local control, system status, and metering
- Advanced breaker diagnostics with comprehensive fault and disturbance recording
- Integrated arc flash detection using light sensors supervised by overcurrent to reduce incident energy and equipment damage
- Advanced cyber security features including AAA, Radius, RBAC, and Syslog enabling NERC® CIP requirements
- Draw-out design simplifies testing, commissioning and maintenance, increasing process uptime
- Patented environmental monitoring, providing visibility to changes in environmental conditions that can affect relay life

Applications

- Single/dual feeder applications for utility, oil & gas, mining & metals, process industry, commercial, and waste water segments
- Fast protection pass enabling load shedding schemes
- Reliable automatic bus transfer & autoreclose schemes
- Bay controller for wide range of switchgear applications
- High speed fault detection for arc flash mitigation



Innovative Technology & Design

- Advanced feeder One Box Solution for protection, control monitoring and diagnostics of single/dual feeder applications
- Patented environmental monitoring and diagnostics
- Advanced, flexible and embedded communications: IEC® 61850 Ed2, IEC 62439/PRP, Modbus® RTU & TCP/IP, DNP3.0, IEC 60870-5-104, IEC 60870-5-103
- Single setup and configuration software across the 8 Series platform
- Field swappable power supply
- Enhanced relay draw-out construction
- Elimination of electrolytic capacitors

Exceptional Quality & Reliability

- IPC A-610-E Class 3 manufacturing standards
- Highest reliability standards for electronics testing
- 100% Environmental Stress Screening and full functional testing
- Rated for IP54 (front) applications
- Harsh Environment Coating

Uncompromising Service & Support

- Covered under GE Vernova's 10 year warranty plan
- Designed, tested and assembled by GE Vernova



GE VERNOVA

Multilin 850 Overview

The Multilin 850 is an advanced feeder protection device designed for high performance, protection, control and monitoring of incoming and outgoing feeders.

With up to 57 digital inputs and 22 digital outputs in a compact box, the 850 provides a versatile and cost effective control, protection, measurement & monitoring solution. Flexelements and Flexlogic enable users to customize schemes to meet a variety of applications.

From dual main to main-standby configurations, the Multilin 850D delivers a more economical and reliable solution, enabling customers to reduce hardware requirements and simplify device integration, including safe and secure Wi-Fi communications for system configuration and diagnostics.

Bay Controller/One Box Solution

The 850 offers comprehensive switchgear control aided by a configurable Single Line Diagram & breaker control. A total of 10 switchgear elements can be displayed and 8 elements controlled. The integrated solution for protection, control, monitoring and diagnostics eliminates the need for other external devices thus offering an integrated solution for switchgear systems. The device supports 6 user programmable pages. The Multilin 850 is an integrated solution that performs protection, control & monitoring of assets, and ease of retrieval of fault & event records. Coordinating remotely with SCADA over multiple communication protocols gives the Multilin 850 an added advantage for fast and efficient management of fault isolation and service restoration.

The Multilin 850 is a cost-effective retrofit solutions where individual components of protection, metering, control switches,

annunciator & panel mimic can be replaced by only one relay.

Distribution Feeder

With support for up to 8 CT inputs & 2 sets of 4 traditional VT inputs, the 850 can be used for 2 feeders or feeders with 2 sets of voltage inputs, simplifying system architectures and operational costs.

The 850 offers redundancy with the same number of devices, enabling:

Architecture Simplification - Reduced Number of Devices

- Less capital cost
- Less O&M cost

Mean Time to Repair - Less than 15 minutes

- Field swappable PSU
- Draw out construction
- Ready to consume service reports

Extended Asset and Relay Life

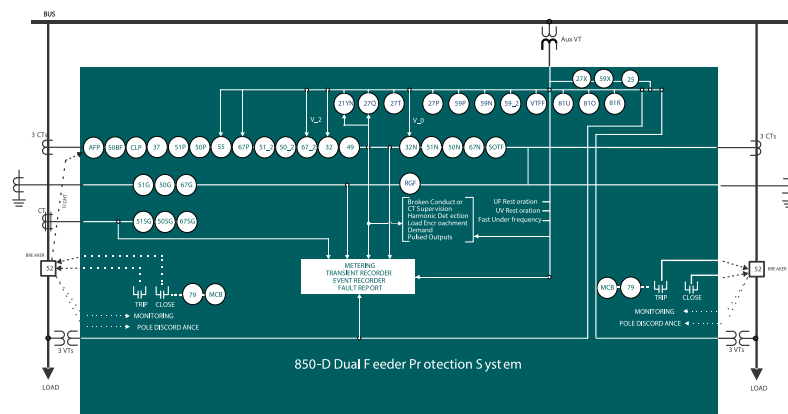
- Built-in Environmental monitoring
- Advanced breaker monitoring
- TGFD and Cable incipient fault detection/location

Simplified Management - Platform Based Solution

- Reduced training needs
- Standardized part number across systems
- Harmonized look and feel, operational experience

Functional Block Diagram

ANSI DEVICE	DESCRIPTION
YN	YN Neutral Admittance
25	Synchrocheck
27P	Phase Undervoltage
27Q	UV Reactive Power
27T	Timed Undervoltage Protection
27X	Auxiliary Undervoltage
32	Directional Power
32N	Wattmetric Ground Fault (Wattmetric zero sequence directional)
37*	Undercurrent
49	Thermal Overload
50BF	Breaker Failure
50G	Ground Instantaneous Overcurrent
50SG	Sensitive Ground Instantaneous Overcurrent
50N	Neutral Instantaneous Overcurrent
50P	Phase Instantaneous Overcurrent
50PD	Pole Discordance*
50_2	Negative Sequence Instantaneous Overcurrent
51G	Ground Time Overcurrent
51SG	Sensitive Ground Time Overcurrent
51N	Neutral Time Overcurrent
51P	Phase Time Overcurrent
51_2	Negative Sequence Time Overcurrent



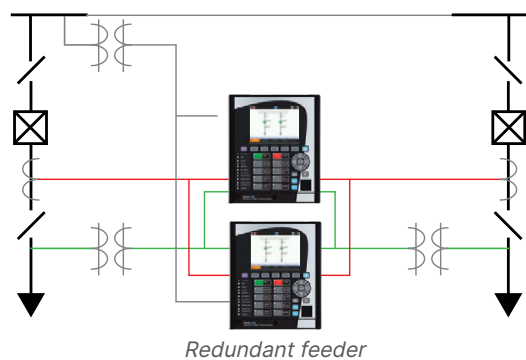
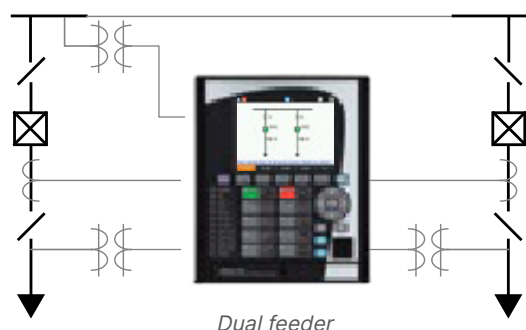
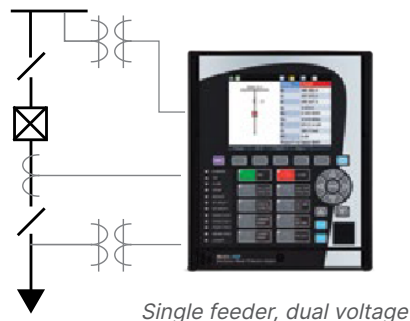
ANSI DEVICE	DESCRIPTION
55	Power Factor
59N	Neutral Overvoltage
59P	Phase Overvoltage
59X	Auxiliary Overvoltage
59_2	Negative Sequence Overvoltage
67G	Ground Directional Element
67SG	Sensitive Ground Directional Element
67N	Neutral Directional Element
67P	Phase Directional Element
67_2	Negative Sequence Directional Element
79	Automatic Recloser

ANSI DEVICE	DESCRIPTION
81O	Overfrequency
81U	Underfrequency
81R	Frequency Rate of Change
87G	Restricted Ground Fault (RGF)
AFP	Arc Flash Protection
CLP	Cold Load Pickup
I1/12	Broken Conductor
MCB	Manual Close Blocking
SOTF*	Switch Onto Fault
VTFF	Voltage Transformer Fuse Failure

* Only for 850D

Protection & Control

As part of the 8 Series family, the Multilin 850 provides superior protection and control. The 850 offers comprehensive protection and control solutions for incoming, outgoing bus-tie/bus-coupler feeders. It contains a full range of selectively enabled, self-contained protection and control elements.



The voltage and frequency protection functions detect abnormal system conditions, potentially hazardous to the system. Some of these conditions may consist of over and undervoltage, over and underfrequency, and phase reversal.

Fast Underfrequency

The 850 has an 8 stage Fast Underfrequency element that measures frequency by detecting the consecutive voltage zero crossings and measuring the time between them. The measured frequency has a range between 20 to 70 Hz. This is useful for performing fast load-shedding when frequency variations from unbalance conditions arise due to:

- Inadequate load forecast or deficient generation capacity programming.
- Busbars, generator group or interconnection feeders trip.
- System splits into islands.

Neutral Admittance (21YN)

In medium voltage (MV) networks, the compensating reactor is used to compensate the capacitive fault current ideally to zero at the fault point. However, detection of low earth-fault current in such networks is challenging when using the conventional current-based ground fault detection methods. This element uses neutral admittance based criteria to successfully detect the earth fault in the compensated or isolated MV networks. Measured or calculated values of neutral current (I₀) and neutral voltage (V₀) are used to calculate the shunt neutral admittance (Y₀), conductance (G₀) and susceptance (B₀). The element uses one of the three modes (Y₀, G₀, B₀) to operate or block the output operands.

FlexCurves™

For applications that require greater flexibility, FlexCurves can be used to define custom curve shapes. These curves can be used to coordinate with other feeders to achieve fault selectivity.

RTD Protection

The Multilin 850 supports up to 13 programmable RTD inputs that can be configured for an Alarm or Trip.

The RTDs can be assigned to a group for monitoring ambient temperatures or any other desired temperature. The RTD voting option gives additional reliability to ignore and alarm for any RTD failures.

Inputs and Outputs

The 850 provides a max of 57 Digital inputs and 22 Digital outputs with an option for 7 Analog Outputs (dc mA), 4 Analog Inputs (dc mA), and 1 RTD input. The configurable analog inputs can be used to measure quantities fed to the relay from standard transducers. Each input can be individually set to measure 4-20 mA, 0-20 mA or 0-1 mA transducer signals.

Monitoring & Diagnostics

The Multilin 850 includes high accuracy metering and recording for all AC signals. Voltage, current, and power metering are built into the relay as a standard feature. Current and voltage parameters are available as total RMS magnitude, and as fundamental frequency magnitude and angle.

Please refer to the 8 Series brochure for more information related to Communication, metering & monitoring.

Time of Day Timer

The Time of Day Timer function provides the user with the ability to program control actions based on real time. There are two identical Time of Day Timers.

Application

Monitoring of the total accumulated energy/accumulated demand/minimum and maximum power demand at the end of an event or a shift interval.

A shift can be defined by the breaker status operand (opclosed) or operand derived from the Time of Day Timer element.

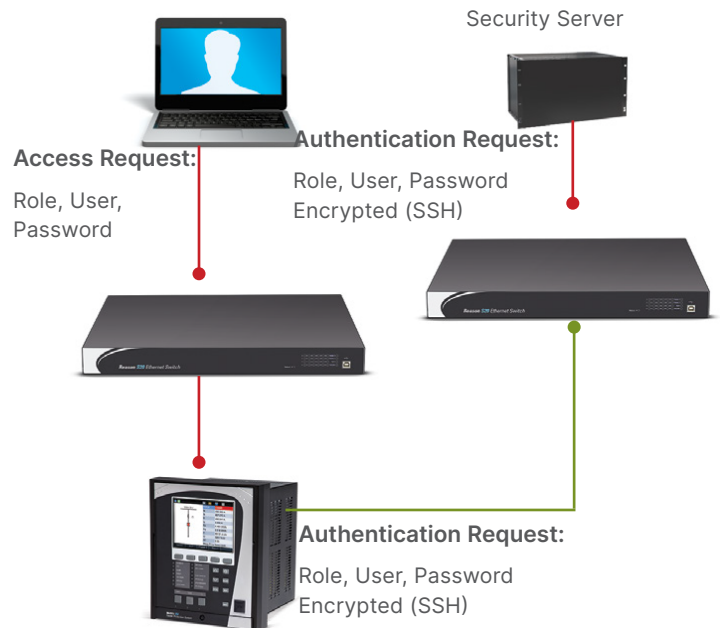
Voltage Disturbance

The Voltage disturbance function of Voltage Swell and Voltage Sag, as described in IEEE 1159-2009. When the voltage on any phase drops below this level a voltage sag condition occurs. Voltage sags are usually associated with system faults but can also be caused by switching heavy loads or starting large motors. Short duration voltage sag may cause process disruptions. Voltage swells are usually associated with system fault conditions, but they are much less common than voltage sags. An SLG fault on the system can cause a swell to occur, resulting in a temporary voltage rise on the healthy phases. Swells can also be caused by switching off a large load, load shedding, or switching on a large capacitor bank. Voltage swell may cause failure of the components depending upon the magnitude and frequency of occurrence.

Cyber Security

The 8 Series delivers a host of cyber security features that help operators to comply with NERC CIP guidelines and regulations.

- AAA Server Support (Radius/LDAP)
- Role Based Access Control (RBAC)
- Event Recorder (Syslog for SEM)\



Cyber Security with Radius Authentication

For more information, visit
gevernova.com/grid-solutions

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