

SEL Wireless Protection System



Enhance distribution protection with fault transmitters, repeaters, and receivers

- Improve reliability by eliminating unnecessary coordination delays.
- Reduce stress on equipment by blocking reclosing for underground faults.
- Quickly implement fast bus tripping protection without the need of additional equipment or expensive installation.
- Enable fast recloser trip blocking while coordinating with lateral fuses.
- Easily install and commission the system devices to allow relays to make better decisions.





Overview

Enhancing a distribution protection system using the SEL Wireless Protection System helps relays make better tripping and reclosing decisions based on the location of a fault. This system augments your existing protection schemes and can be implemented without interrupting service, thereby improving the reliability and safety of your feeder.

The system's components include the SEL-FT50 Fault Transmitter, SEL-RP50 Fault Repeater, and SEL-FR12 Fault Receiver. When the SEL-FT50 detects a fault, it broadcasts fault status via 900 MHz wireless signals directly to an SEL-FR12 or via multiple SEL-RP50 repeaters to an SEL-FR12. The SEL-FR12 uses MIRRORED BITS® communications to transmit the data to a protective relay or recloser control—all in 6 ms.

The SEL-FR12 can be paired with up to 12 SEL-FT50 transmitters, and up to 5 SEL-RP50 repeaters can be used to retransmit signals from each SEL-FT50 around obstructions and obstacles back to an SEL-FR12. Each SEL-RP50 in the communications chain adds just 1.5 ms of delay to the overall system latency.

The SEL-FT50 and SEL-RP50 are rated for voltages up to 38 kV and are completely line-powered, removing the need for battery maintenance. The clamp-on, lightweight design makes them easy to install on overhead conductors with a diameter between 0.635 cm (0.25 in) and 3.175 cm (1.25 in) using a single hot stick. In addition, the SEL-FT50 provides eight fixed trip thresholds, ranging from 50 to 1,200 A. All SEL Wireless Protection System devices are backed by SEL's ten-year warranty.



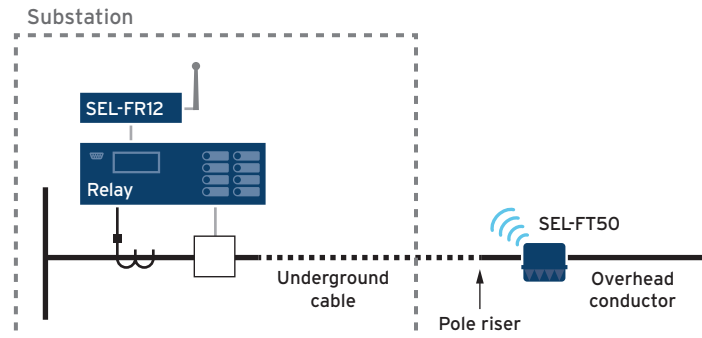
Total latency with 1 fault repeater = 1.5 ms for SEL-RP50 + 6 ms for SEL-FT50/SEL-FR12

Applications

Block Reclosing for Underground Faults

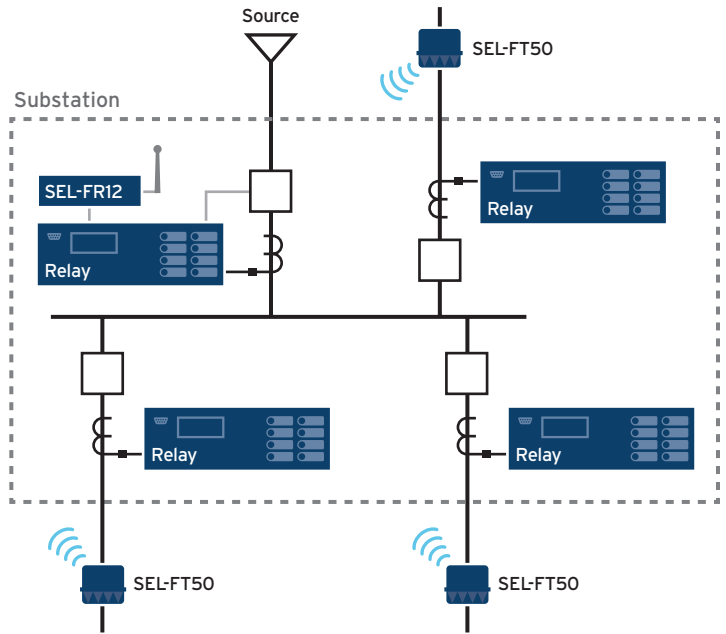
It can be challenging to determine whether a fault has occurred on the overhead or underground section of a feeder. Traditionally, utilities have had to choose between the possibility of undesired reclosing into an underground fault or blocking reclosing for a close-in overhead fault when a high-current lockout is used. By

installing the SEL-FT50 at the riser pole, the relay can receive fault status information via the SEL-FR12 before the first trip and know whether the fault is overhead or underground. The relay is then programmed to only allow reclosing when the SEL-FT50 signals that the fault is on the overhead portion of the feeder.



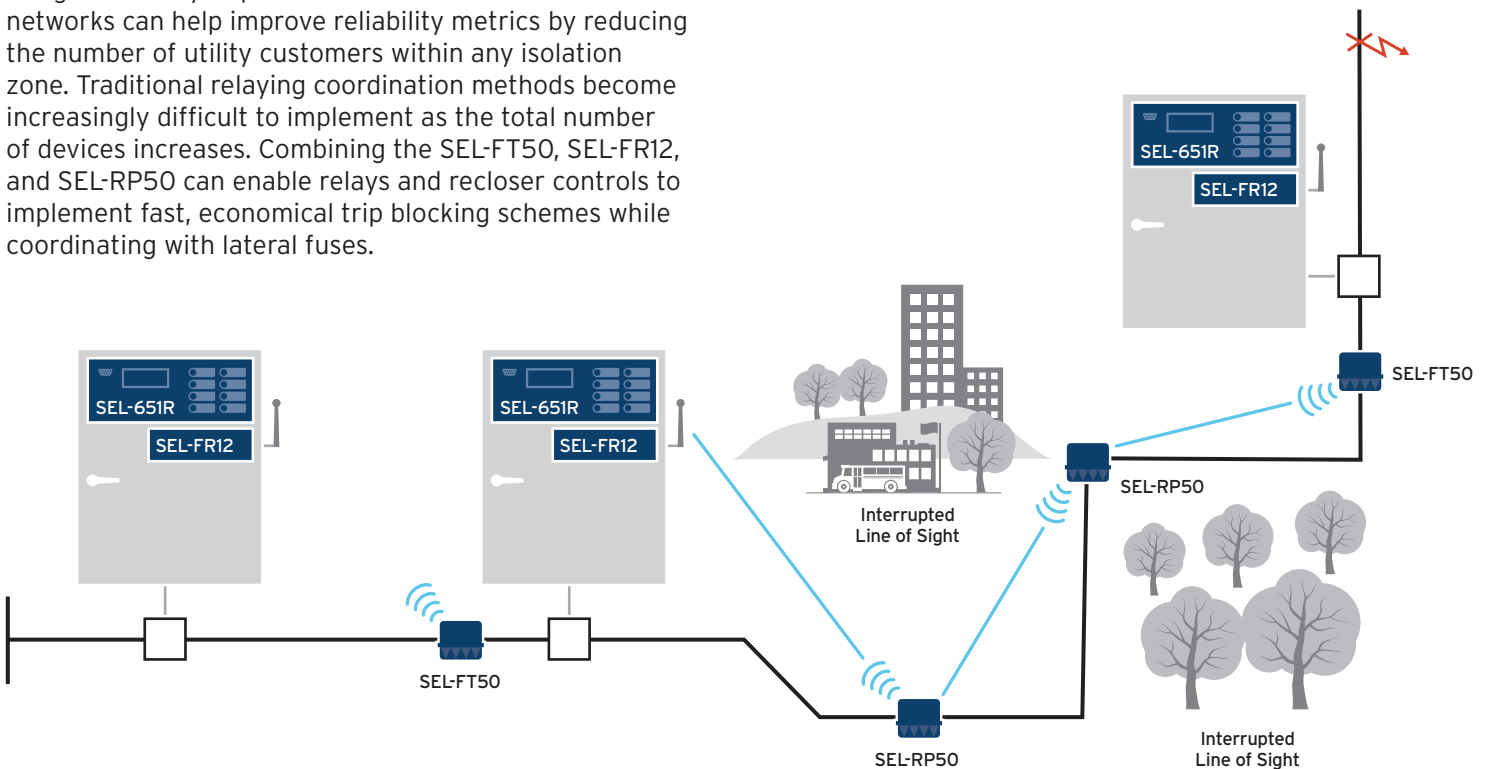
Fast Bus Tripping

Fast bus tripping schemes can provide an economical solution for substation bus protection on radial systems. However, in some cases, communication between relays may not be feasible or may be cost-prohibitive. The SEL-FT50 and SEL-FR12 install easily on substation feeders, allowing protective relays to differentiate between a fault on the feeder and a fault on the bus with fast wireless communication to speed up bus protection.



High-Density Recloser Trip Blocking

A higher density of protective devices on distribution networks can help improve reliability metrics by reducing the number of utility customers within any isolation zone. Traditional relaying coordination methods become increasingly difficult to implement as the total number of devices increases. Combining the SEL-FT50, SEL-FR12, and SEL-RP50 can enable relays and recloser controls to implement fast, economical trip blocking schemes while coordinating with lateral fuses.



Line-Powered Fault Repeater Technology

Enhance distribution protection anywhere on your system. The line-powered SEL-RP50 overcomes the communications challenges of obstructions to the radio path's line of sight by repeating the link and fault status signals from the SEL-FT50. Place one or more fault repeaters between your fault transmitter and fault receiver to reach around corners, go over a hill, bend around branches, and get around other obstacles blocking the line of sight.



Country Model Guide

Use the chart below to determine which device models are right for you.

Country	SEL-FT50 Model	SEL-FR12 Model	SEL-RP50 Model
Australia	FT50-0005	FR12-0005	
Brazil	FT50-0006	FR12-0006	
Canada	FT50-0001	FR12-0001	RP50-0001
European Union	FT50-0004	FR12-0004	
Mexico	FT50-0007	FR12-0001	
New Zealand	FT50-0005	FR12-0005	
Peru	FT50-0003	FR12-0003	
United States	FT50-0001	FR12-0001	RP50-0001



FT50-0001/3/5/6



FT50-0004/7



RP50-0001

Specifications

General	
Compliance	Designed and manufactured under an ISO 9001-certified quality management system
Operating and Storage Temperature Range	−40° to +85°C (−40° to +185°F)
Operating Environment	Pollution degree: 2 Relative humidity: 5–95%, noncondensing Maximum altitude: 2,000 m (1.24 mi)
Ingress Protection	SEL-FT50/SEL-RP50 IP67
Clamp Range	SEL-FT50-0001/3/6 0.635 to 3.175 cm (0.25 to 1.25 in) SEL-FT50-0004/5/7 0.762 to 2.794 cm (0.3 to 1.1 in) SEL-RP50-0001 0.635 to 3.175 cm (0.25 to 1.25 in)
Dimensions	SEL-FT50-0001/3/6 14.17 cm (5.58 in) diameter, 17.7 cm (6.97 in) tall SEL-FT50-0004/5/7 14.503 cm (5.71 in) diameter, 14.81 cm (5.83 in) tall SEL-RP50-0001 14.17 cm (5.58 in) diameter, 17.7 cm (6.97 in) tall SEL-FR12 4.37 cm (1.72 in) tall, 24.31 cm (9.57 in) wide, 11.71 cm (4.61 in) deep
Weight	SEL-FT50-0001/3/6 0.86 kg (1.9 lb) SEL-FT50-0004/5/7 0.59 kg (1.3 lb) SEL-RP50-0001 0.86 kg (1.9 lb)
Power	SEL-FT50 and SEL-RP50 Line-powered (no batteries) SEL-FR12 Voltage: 9–30 Vdc Power consumption: <2 W

System	
Current Pickup Level	Individually configurable on each SEL-FT50 Level options: 50, 100, 200, 400, 600, 800, 1,000, and 1,200 A
Fault Detection Accuracy	SEL-FT50-0001/3/6 3% typical, 20% maximum SEL-FT50-0004/5/7 20% typical
Maximum Voltage	Up to 38 kV (L-L) for SEL-FT50 and SEL-RP50
System Latency	Fault detection (SEL-FT50) to MIRRORRED BITS communications output (SEL-FR12): 6 ms Each fault repeater (SEL-RP50) in system: Additional 1.5 ms per hop
Network Size	12 SEL-FT50 transmitters per SEL-FR12 receiver Up to 5 SEL-RP50 repeaters per SEL-FT50 transmitter 16 user-selectable network IDs

Radio		
Frequency Band	Australia:	915–928 MHz
	Brazil:	902–907.5 MHz, 915–928 MHz
	Canada:	902–928 MHz
	European Union:	863–870 MHz
	Mexico:	902–928 MHz
	New Zealand:	915–928 MHz
	Peru:	916–928 MHz
	United States:	902–928 MHz
Serial Communications	Serial protocol: MIRRORRED BITS communications Serial port: 9,600, 19,200, 38,400, 115,200 bps	
Modulation	2-FSK	
Clear Line-of-Sight Range	0.25 mi for SEL-FT50/SEL-FR12 and between SEL-RP50	

Patents pending

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