



ZLV

Distance Protection



Quick and Reliable Selective Protection for Overhead and Cable lines

ZLV relays include all protection, control and measurement functions for line bays. They include a **sub-cycle distance protection** applicable to lines of any voltage level, whether **overhead or cable**, in **single or double circuit**, with or without **series compensation**, with **double or single breaker** whether **three pole or single pole** tripping.

Six distance zones, with **Mho or quadrilateral characteristic**, together with **load limiters** and **power swing detector**, **fuse failure**, **close onto fault** and **saturation**, provide **high safety and response** even under severe conditions.

21N/21P	Distance Protection (Ground/Phase).
50SUP	Phase O/C for Distance Supervision.
68/78	Power Swing Detector / Out-of-Step.
85-21	Protection schemes for distance elements.
50/51	Phase O/C.
50N/51N	Neutral O/C.
50Q/51Q	Negative Sequence O/C.
67	Phase Directional Units.
67Q	Negative Sequence Directional Units.
67N	Neutral Directional Units.
59/27	Phase Over/Under Voltage.
59N	Neutral Overvoltage.
81M/m	Over/Underfrequency.
81ROC	Frequency Rate of Change.
49	Thermal image.
46	Open Phase Detector.
85-67N/67Q	Protection algorithms for ground overcurrent elements.

50BF	Breaker Failure Protection.
27WI	Weak infeed logic.
50SOF	Switch-onto-Fault detector.
50STUB	Stub Bus protection .
79	Recloser.
FL	Fault locator.
3	Trip Coil Supervision (up to 6 circuits).
25	Synchronism Check Unit.
2	Pole Discrepancy Detector.



Application

ZLV IEDs can be used as primary or secondary protection in transmission or subtransmission networks, in underground lines, overhead lines or mixed lines of different characteristics: Unbalance load, one or multiple sources, parallel circuits, with or without series compensation, etc. They are designed for applications with single or three phase trips and can be used with or without teleprotection schemes.

6 Distance Zones

ZLV relays include 6 distance zones, all reversible, with Mho or quadrilateral characteristic, selected separately for ground or phase-to-phase faults. Both characteristics include leading edge polarisation for load flux compensation keeping the directional element reliability under complex conditions such as voltage reversals in lines with series compensation and zero voltage faults.

Sub-Cycle Operating Time

Distance algorithms based on half cycle periods together with six robust solid state trip outputs, with operating time less than 0.5 ms and a break capacity up to 10 A, provide sub-cycle trip time for localised faults up to 75% of the zone.

Double Breaker Bay

ZLV relays can include up to 6 phase current channels and 3 synchronism voltage channels for breaker-and-a-half and ring bay applications. They include breaker and close synchronism failure protection for two breakers and a recloser for a sequential closing of the two breakers according to a master-slave scheme.

Saturation Detector

Fast distance elements relax the CT requirements, since they need less time without saturation. On the other hand, safety under external faults is kept thanks to a saturation detector, the activation of which rotates the reactance line.

Load Limiters

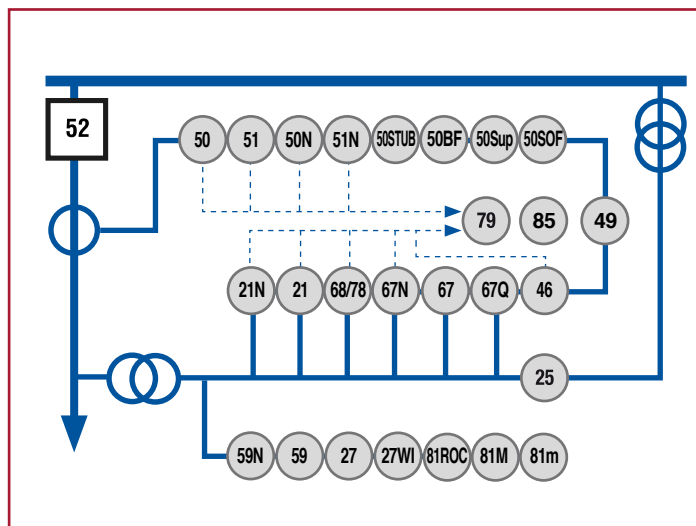
Load limiter characteristics prevent distance zone trips under high load conditions, keeping, at the same time, good resistive coverage, specially for faults near the remote end, which will amplify to a greater extent the apparent fault resistance by infeed effect.

Phase Selector

Phase selection elements, based on sequence components provide reliable indication for any type of fault, even under severe conditions, such as faults during power swing or faults with predominant zero sequence flow.

Power Swing Detector

Power Swing detectors block distance zones during power swings and generate trips upon out of step conditions.

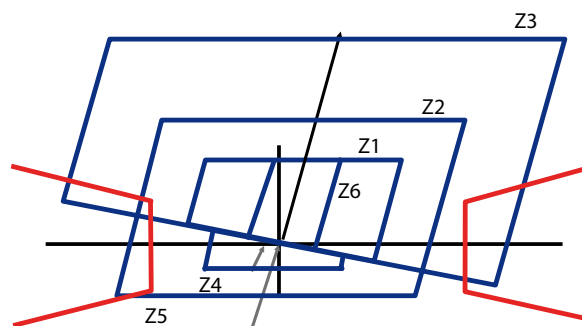


Protection Schemes

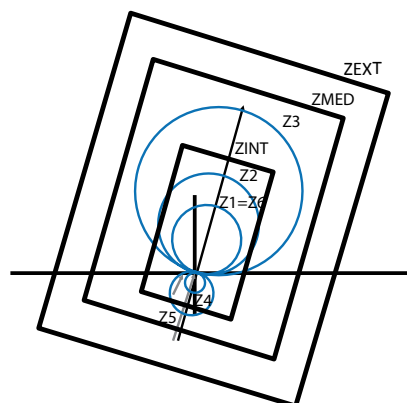
Both distance elements and overcurrent elements can operate according to the following schemes: DTT, PUTT, POTT, DCUB and DCB. Week in-feed and blocking by current reversal logic are also included.

Ethernet Ports

ZLV relays may include Ethernet ports, whether electrical or fiber optic, which support protocols DNP3.0, PROCOME, Modbus and IEC61850 standard. These ports may operate according to the following types of redundancy: Bonding, PRP and RSTP.



Distance zones with Quadrilateral Characteristic and Load Limiters



Distance zones with Mho Characteristic and Power Swing Detector Zones