

MiCOM P63x

Transformer Differential Protection with CTS



Modular P63x

CURRENT TRANSFORMER SUPERVISION

Schneider Electric announces the launch of innovative new current transformer supervision (CTS) in its transformer differential protection.

The CTS feature is used to detect failure of one or more of the AC phase current inputs to the relay. Failure of a phase CT or an open circuit of the secondary wiring can lead to incorrect operation of current based protection elements. Additionally, interruption of the CT secondary wiring can induce high voltages presenting a danger to life and insulation.

In firmware version -606 an innovative CTS method has been implemented. The patent pending scheme is designed on the ratio of the negative and positive sequence current levels for all winding terminals.

The advantage of this scheme is that no additional CT or VT inputs are needed aside from those necessary for biased differential protection, therefore further secondary equipment and wiring is not required.

KEY FEATURES

- The technique allows application of CTS to any differential protection scheme. Operation is independent of the primary power system configuration and is unaffected by transformer winding configuration, load levels, single-phase load imbalance from railway traction or methods of earthing.
- Fast operating CTS detection allows the relay to desensitize the biased differential protection characteristic to avoid maloperation, while maintaining discrimination between internal and external faults.
- Indication of the faulty CT set can be programmed to block affected protection and/or alarm after a set time delay.



Customer Benefits

- Current based method - VTs not required
- Technique is independent of system configuration
- Self-resetting upon restoration of CT supplies - no need for user intervention

CTS OVERVIEW

Operating Conditions

The logic diagram illustrates the basic operation of the CTS function.

Faulty End Determination

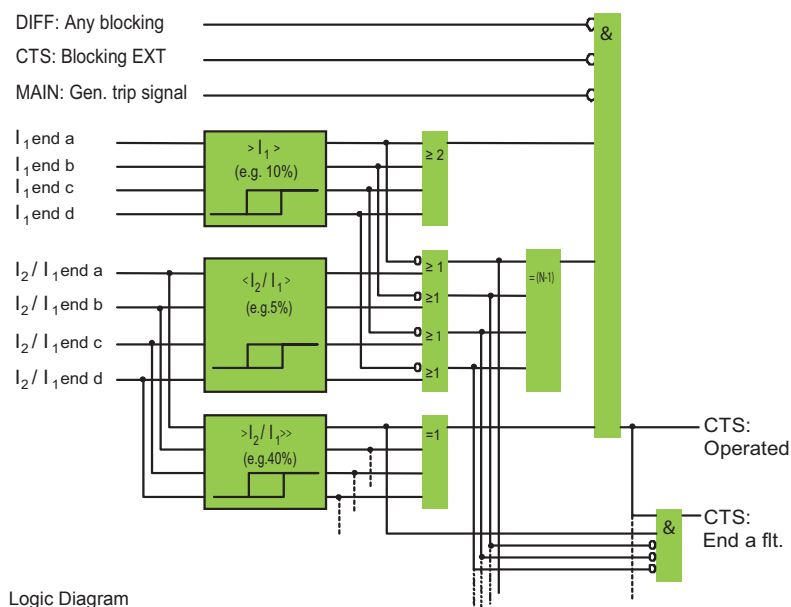
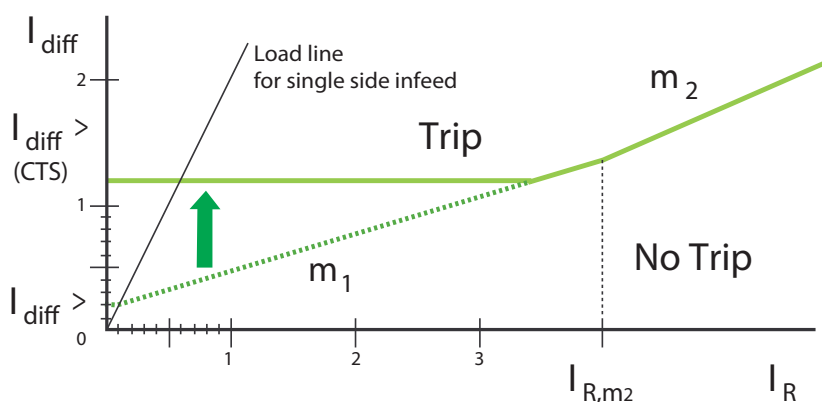
The faulty end is determined by the measurement of high negative sequence current on exactly one end and none or only low levels measured on all other ends. If at any end positive sequence current is below the pick up threshold, then the $I_2/I_1 >$ not exceeded condition is set without any measurement.

Signaling and Indication

CT failure condition signaling can be delayed by a settable delay timer to prevent signaling under transient system conditions. The signals may be latched once the failure condition has been present for a set minimum time. Signals for each end can be used to selectively block the restricted earth fault (REF) protection associated to that end.

Biased Differential Stability

As soon as a CTS condition is detected, the function will raise the low set threshold of the differential protection, to the $I_{diff} > (CTS)$ setting. This threshold should be set above maximum load current to ensure differential protection will not operate under load conditions, but remains active for higher short-circuit currents, which is predominantly the case for internal faults.



Other features in P63x relay

- Now available with Regional English data model providing Px40-style setting texts
- Biased differential protection
- Restricted earth fault protection configurable as biased or high impedance (P632-P634)
- IDMT and DT overcurrent protection
- Thermal overload protection
- Under / overvoltage protection (P632-P634)
- Under / overfrequency protection (P632-P634)
- Overfluxing protection (P632-P634)
- Broken conductor detection for up to four windings
- IRIG-B time synchronization
- Remote communications via serial protocols using EIA-485 or optical fiber (IEC60870-5-101, -103, Modbus, DNP3, Courier)
- Ethernet communications over optical fiber or copper cabling
- and more...

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This document has been printed on ecological paper

Publishing: Schneider Electric
Design: Schneider Electric
Printing: