



RMU Protection Relay

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ABSTRACT: Over current protection is the simplest form of power system protection of distribution line. Motor and power equipment the relay operates when the current in any circuit exceed a certain predetermined value (pickup value) a relay acquires sequential samples of the current in numeric (digital) data form. The data acquisition system (DAS) and process the data numerically to make the trip decision the relay compares the fundamental frequency component of the current with the pickup setting.

For definite time over current relay the trip signal is issued after predetermined time delay. For inverse time characteristics the relay either computes the operating time corresponding to the fault current or selects the same from look-up table.

Keywords – Data Acquisition System (DAS), Ring Main Unit (RMU), Kilo Volt (KV), Light Emitting Diode (LED), Current Transformer (CT), High Voltage (HV), Real Time Clock (RTC).

I. INTRODUCTION

In an electric power distribution system, a ring main frame unit (RMU) is a factory assembled metal enclosed set of switchgear used at the load connection point of a ring type distribution network. The main function of a ring main unit (RMU) is circuit control isolation from faulty equipment and controlling circuit to switch function. RMU is an extensible and non-extensible ring main unit for the secondary distribution network RMU can be supplied in various configurations suitable for most switching application in 24 KV distributions. RMU is a stainless- steel tank gas tight metal. Enclosure, containing all the live part, switching disconnect, earth switch fuse switches the circuit breaker.

RMU (Ring Main Unit) protection is a crucial component of electrical distribution systems. RMUs are used to distribute electrical power within a network, and their protection is essential to ensure the safe and reliable operation of the system. Protection schemes for RMUs typically involve various devices, such as fuses, circuit breakers, relays, and sensors, designed to detect and respond to electrical faults and abnormal conditions, including short circuits and overloads. Protection is a critical aspect of electrical distribution systems, and it involves a range of the network, equipment, and personnel from electrical faults and disruptions.

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II. LITERATURE SURVEY

Neliesh Chothani 2017 IEEE: A distribution network, there are mainly primary distribution system (11kV) and secondary distribution system (440V). On the primary distribution side radial feeder topology is generally establish with overhead lines. Now a day, this topology is converted to ring main system by introducing Ring Main Units (RMU) for the protection of distribution system. RMU's are used to provide multiple power sources to the load & maintain continuity of power supply at the time of fault. The main problem in ring main system is relay co-ordination because many relays are present in the system for protection purpose. If relays are not coordinated properly, mal-operation, instantaneous tripping, cascade tripping may result in such system configuration. Hence, it is required to design proper relay coordination to reduce these types of problems. This paper presents simulation of existing Indian distribution system and relay co-ordination in radial and ring main system with the function of RMU.

III. BLOCK DIAGRAM

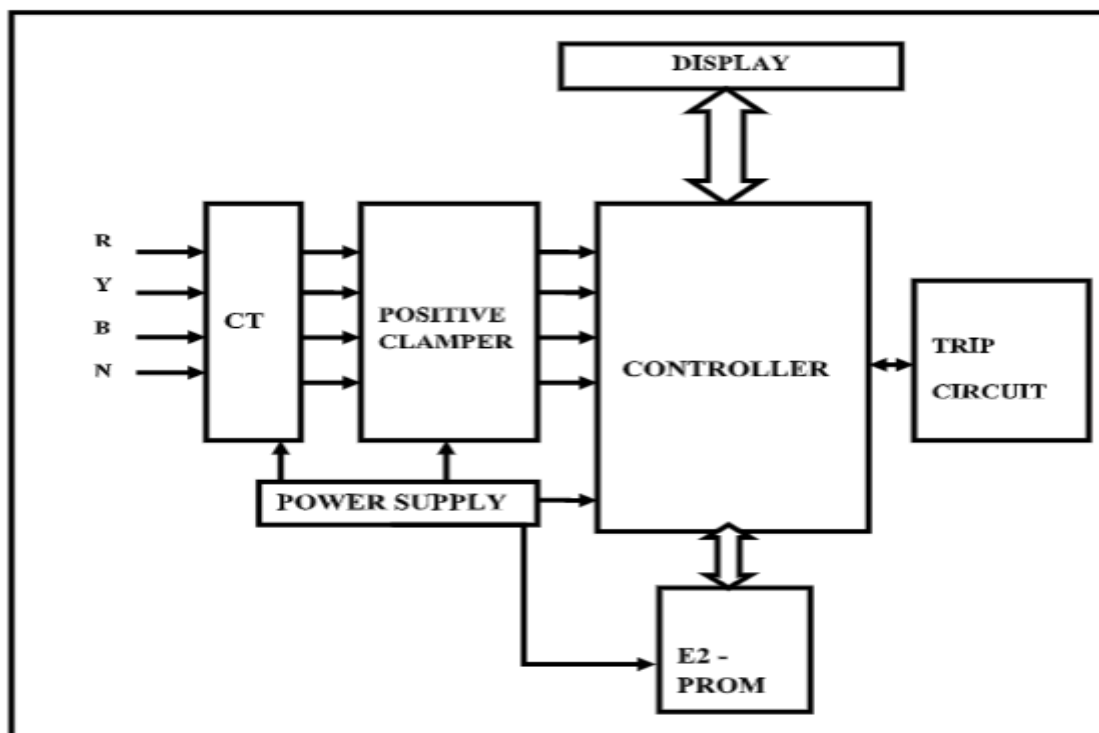


Fig. 1: Block diagram.

The above block diagram is self-power relay-based system devices like CT's, STM32, power supply, and controller are used in it. In CT's are sensing the current and the connected in positive clamper the clamp is connected in STM32 controller. The LCD display, the trip time, voltage, current etc.

IV. HARDWAER DESIGN



Fig. 2: Hardware design.

The protection relays within the RMU continuously analyze the monitored parameters. When an abnormal condition is detected, such as a short circuit, over current, overvoltage, or other faults, the protection relays initiate protective actions. Protective Actions: Depending on the type and severity of the fault detected, the protection system may take various protective actions, such as Tripping Circuit Breakers: If a fault is detected, the protection system sends a trip signal to the relevant circuit breaker to open the circuit and isolate the faulted section of the network. This action helps prevent further damage and ensures the safety of the system.

V. HARDWARE RESULT

Screen 1: Real time clock (RTC) is battery backup calendar, clock which keep record of time domain.



Fig.3: Reading RTC

Screen 2: Current trip is pickup value of trip current of RL. CT amp is set value of CT current (I). In is time of definite time of relay.



Fig.4: Current setting.

Screen 3: Showing live current in R Phase.



Fig.4: Current show(Live)

Screen 4: In over current (52 amp) is shoe in R phase and trip signal are show in above screen with date, time and over current.



Fig.5: Fault Data



Screen 5 : After reset the relay last fault date, time and over current show.



Fig.6: Show last fault data

VI. CONCLUSION

The conclusion about the effectiveness of an RMU protection relay depends on various factors such as design, functionality, and adherence to industry standards. Properly functioning protection relays help detect and isolate faults promptly, minimizing downtime and preventing damage to equipment. Regular maintenance and testing are essential to ensure the continued reliability of RMU protection relays.

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