

Westinghouse



Ground Fault Protection System

Ratings

Ground Current Detection Range
5-60 or 100-1200 amps

Voltage

Current Monitor: 600 Volts Max., 50/60 HZ. Ac only.

Sensor: 40 to 120 Volts Ac or Dc

Sensor Output Switching Capacity
2.5 amps max., Ac or Dc

Temperature Range
-20°C to 85°C.

Time Delay Adjustment
Instantaneous to 60 Cycles.

Description

The Westinghouse Ground Fault Protection System consists of a static ground fault sensor, a current monitor and a shunt trip. Together they insure fast, sensitive detection of ground faults.

Static sensor units are available with ground fault detection ranges of 5-60 amps. and 100-1200 amps. Each unit has an adjustable time delay range from instantaneous to 60 cycles and have repeatability of $\pm 5\%$.

Static sensors are also available with interlock circuitry which overrides the time delay of the sensor by allowing the sensor to immediately signal the shunt trip to trip the protective device when a ground fault occurs. The sensor simultaneously sends a signal to sensor units upstream from the fault to either time delay or block their operation completely.

Current monitors are available in a variety of sizes and window configurations to facilitate installation over standard bus or cable installations. The monitors are available in ratings of 5-60 and 100-1200 amps.

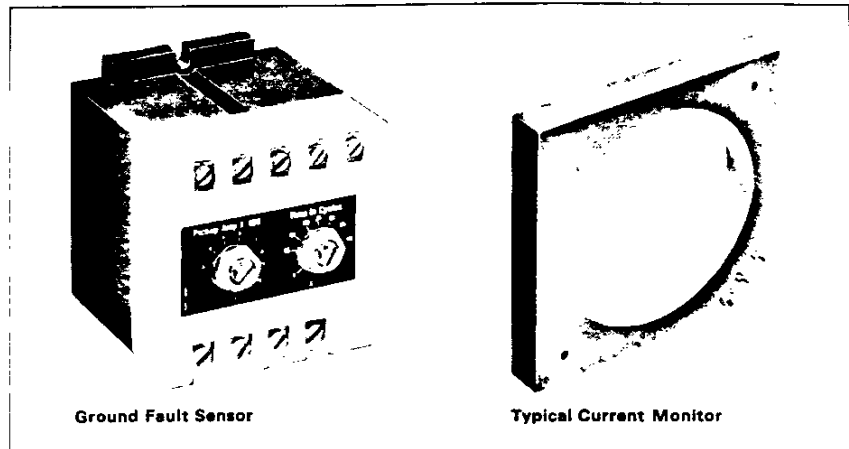
The shunt trip is the same one as used with Westinghouse molded case breakers and 800 and 1200 amp FDP switches.

Selection of sensor units and current monitors is independent of the current rating of the system on which it is applied. The sensor is selected on the basis of ground fault detection range desired, while selection of the current monitor is based on "window" size.

Application

The Westinghouse Ground Fault Protection System offers maximum flexibility in coordinating ground fault protection through the selection of different ratings of ground fault sensors, by varying time delay and/or ground current detection settings of the sensor, by using sensors with interlock circuitry, or by any combination of these. Typical systems are described in the following paragraphs.

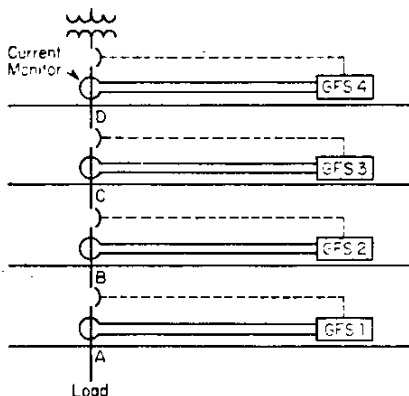
② Select the shunt trip to match the voltage to be used with the sensor as they operate from the same source. (Must be 120/60 if Test Panel is used.)



Typical System Using Standard Sensor
Figure 1 is an example of a protection system using a standard sensor with pre-selected ground current detection and time delay settings.

Figure 1: Typical System (Standard Sensor)

Ground Fault Sensor (GFS)	Ground Current Detection Setting	Time Delay Setting
4	1000 Amps	30 Cycles
3	500 Amps	20 Cycles
2	100 Amps	10 Cycles
1	50 Amps	5 Cycles



In Figure 1, four sensors are used, each having different ground current detection and time delay settings. If a ground fault occurs at A, GFS 1 will detect the fault when it reaches 50 amps, the ground current detection setting. GFS 1 will then delay 5 cycles (its time delay setting) before signaling its associated shunt trip to trip the protective device and clear the ground fault. For a ground fault at A, GFS 2, 3 and 4 provide auxiliary protection.

If a ground fault occurs at B, GFS 1 will have no knowledge of the fault and thus will not be involved. However, GFS 2 will detect the fault when it reaches 100 amps, its ground current detection setting. GFS 2 will then delay 10 cycles (the time delay setting) before it signals the associated shunt trip to trip the protective device and clear the fault. GFS 3 and 4 provide auxiliary protection for a fault at B.

Sensor units 3 and 4 operate the same for faults occurring at C and D, as units 1 and 2 did for faults at A and B. For any sensor unit to operate, the ground fault must reach the pre-selected current detection point of the sensor.

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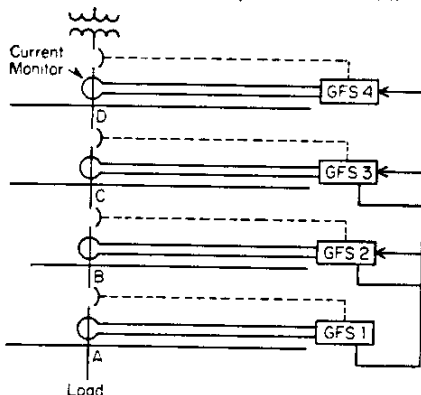
Ground Fault Protection System

Typical System Using Sensors With Interlocking Circuitry

Figure 2 illustrates a protection system using sensor units having interlocking circuitry. The current detection and time delay settings are the same as in Figure 1, except GFS 1 will be instantaneous.

Figure 2: Typical System (Interlocking Circuitry)

Ground Fault Sensor (GFS)	Ground Current Detection Setting	Time Delay Setting
4	1000 Amps	30 Cycles
3	500 Amps	20 Cycles
2	100 Amps	10 Cycles
1	50 Amps	Instant.



As in the example for Figure 1, GFS 1 will detect the ground fault at A when it reaches 50 amps. The interlocking circuitry now takes over. Instead of delaying for 5 cycles, GFS 1 will instantly signal the shunt trip to trip the protective device and clear the fault. GFS 1 simultaneously sends a restraining signal to GFS 2 and 3 to restrain their operation for the duration of their pre-selected time delay settings. GFS 2 and 3 provide auxiliary protection by operating only if GFS 1 fails to clear the fault and the ground fault current reaches their ground current detection setting. GFS 4 will receive a blocking signal and will not operate.

If a fault occurs at B and fault current reaches 100 amps, GFS 2 will instantly signal its shunt trip to trip the protective device and clear the fault. At the same time, GFS 3 receives a restraint signal and provides auxiliary protection. GFS 3 will operate only if GFS 2 fails to clear the fault, and if the fault current has reached current detection set point of 500 amps.

For ground faults at C and D, GFS 3 and 4 will operate in the same manner as GFS 1 & 2.

Operation

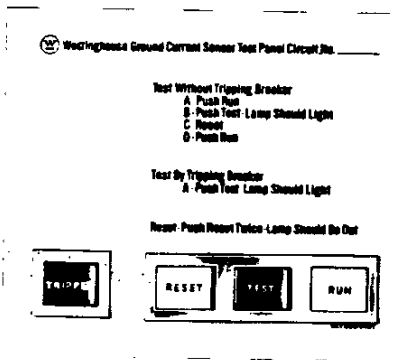
Phase and neutral conductors are placed in the circular or rectangular "window" of the current monitor. Under normal conditions (no ground fault), the output of the current monitor is zero. When a ground fault occurs, the ground fault current is reflected in the output of the current monitor and is applied to the static sensor unit which will activate a shunt trip in the circuit protective device to trip the device and clear the ground fault. The sensor unit does not pick up the fault current until it reaches a pre-selected level, and does not activate the shunt trip until the pre-set time delay point has been reached.

Reset

Once the sensor detects a fault and trips the shunt trip it must be reset by interrupting its power supply with a pilot device or the test panel.

Test Panel (120 Volts Ac Only)

The test panel is available to completely test the ground fault sensor. A signal is injected into the current monitor test winding. The ground current sensor sees this as a fault and trips the protective device. It can be used to reset the sensor and to give an indication that the sensor has tripped the breaker. The system may be tested by tripping the breaker or, if this is not desirable, without tripping the breaker. The test panel may also be used as a remote trip. See Figure 3.



The test panel is made to use with 120 volt 60 cycle Ac power. When the test panel is not used, a standard pilot device must be used to reset the system and pilot devices can be used to test the system as shown in Figure 4. S1 is used to disconnect the shunt trip to keep from tripping the breaker. R is to be adjusted to provide a 2.4 ampere Ac test signal at terminals 2 and 3 on monitor, when the momentary Switch S2 is pressed, S3, a momentary switch, is used to reset the sensor by interrupting power.

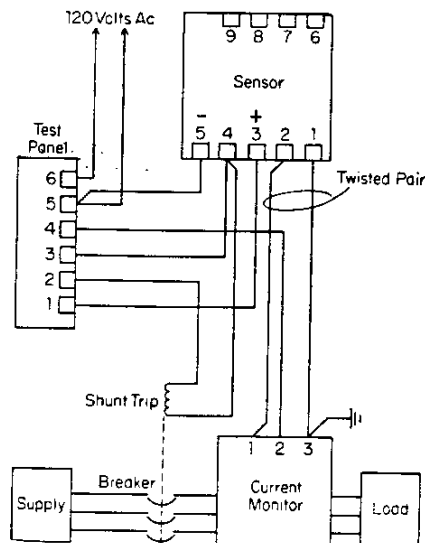


Figure 3: Wiring Diagram for Test Panel

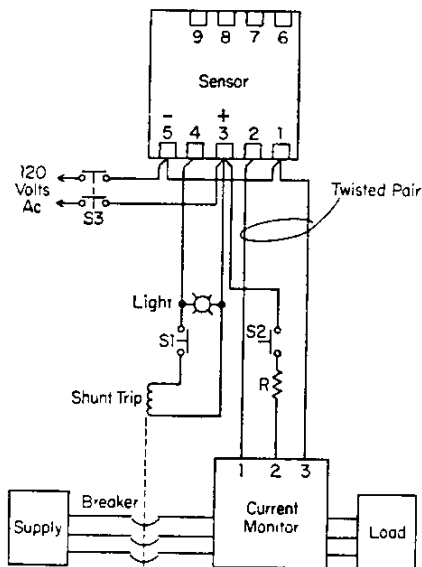


Figure 4: Wiring Diagram for Testing Without Test Panel

Further Information

Prices: Price List 29-720

Dimensions: Dimension Sheet 29-770