VR9030B

Ground Fault Relay

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varixx

Description

VR9030B is a member of the family of low-cost, dedicated-function relays for applications in control and protection systems for Synchronous Motors and Generators. Unlike multi-function relays, the use of several relays with dedicated functions allows only the required functions to be chosen, reducing complexity. In addition, if one of the relays in the system fails, it can be replaced or removed from the system by “By Pass” for emergency operation.

VR9030B is a relay designed to monitor any first occurrence of an Ground Fault (current leakage to earth) in the machine field. A single point of leakage in a first occurrence, without monitoring, does not normally interfere with the operation of the system, but if a second point of leakage occurs, the system (field or exciter) could be damaged.

VR9030B relay uses a voltage isolated from the supply to circulate a current in the event of a fault, including one occurring on the negative field terminal, so it does not depend on the excitation voltage to detect the fault. In the event of a momentary Ground Fault (>0.5 sec. or >5 sec.), the relay activates and remains activated even if the fault has disappeared.

A Front Reset button and a Remote Reset Input with “Normally Open” dry contact allow the relay to be reset in the event of a fault detection. A Front button and a Remote Trip/Test Input with a “Normally Open” dry contact allow the relay to be remotely triggered for testing purposes. Three front LEDs (Light Emitting Diode) indicate the status of the relay: Power On; Armed and Trip. The first signals the presence of power, the second the armed condition, i.e. monitoring the system, and the third the fault occurrence condition.

Two terminals allow the selection of two internally pre-programmed activation delays (0.5 seconds or 5 seconds). The fault signal is available on SPDT type dry contacts (NC, Commom, NO). VR9030B relay can be used in fields with a maximum voltage of 600 VDC.

VR9030B is a relay from the VR90XX family, designed to integrate excitation systems for Synchronous Motors or Generators. This type of application requires the field to be monitored in order to detect a first occurrence of earth leakage in the field, thus preventing a second fault at another point from damaging the system.

The relay can detect Ground Faults even when the machine is stopped and the excitation is switched off, and does not depend on the excitation voltage to detect the fault.

› 110VAC or 220VAC power supply, specified in the order.

› 1000V isolation between supply and field.

› Can be used in fields up to 600VDC.

› Minimum sensitivity of 500 ohms for a fault on the negative terminal of the field.

› Maximum sensitivity depending on the portion of the field in which the fault occurs.

› Front Test/Trip button.

› Front Reset button.

› Remote Test/Trip dry contact input.

› Remote Reset dry contact input.

› N.A/N.C dry contact output (SPDT).

› Delay time selection of 0,5 sec ou 5 sec.

› LED status and actuation indication.

› DIN box 100 x 75 mm, for rail or screw fixing.

› Has internal current limitation in the event of an Ground Fault, protecting the relay.

› Main Features

› **Construction:** In DIM box for use on rail or with screws.

› **Power Supply:** 110VAC ou 220VAC/ 3VA selected on order.

› **Permissible excitation voltage range:** 0 to 600VDC.

› **Current Sensing Range (B14 and B15):** 30mA to 1,5A.

› **Delay Selection:** 0,5 sec with terminals 15/16 Open and 5 sec with terminals 15/16 Closed.

› **Output Relay:** Dry contacts for up to 2A/250VAC or 0,5A/50VDC.

› **Monitoring Output Voltage:** 25VDC.

› **Current Limitation:** 10mA.

› **LED Indication:** Power On; Armed; Tripped.

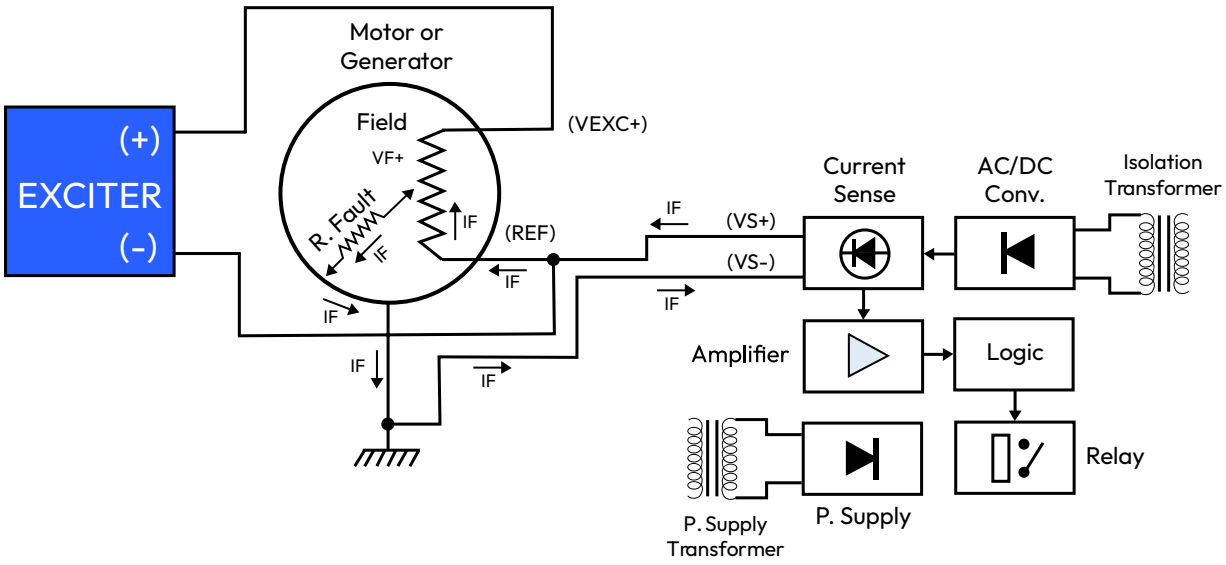
› **Activation Time:** 0,5 sec ou 5 sec.

› **Voltage Present at Test and Reset Input:** 12VDC.

Selection of Length of Service

DELAY CONTROL	POLAR ANGLE SENSING
B15/B16 ON	0,5 sec
B15/B16 OFF	5 sec

> Principle of Operation



The principle diagram above shows how it works. An internal DC voltage source has its positive connected to the negative terminal (or zero according to convention) of the field. The negative of this same source is connected to the system ground (where the machine housing is grounded).

In the event of a fault (current leakage between the field and the generator housing), the direct current circuit of the relay continues (closes), and a DC current occurs which is detected and causes the internal fault relay to switch after the selected time. If the fault occurs on the negative field terminal, the current whose path and direction can be seen in the diagram will be:

IF = VS/RFault

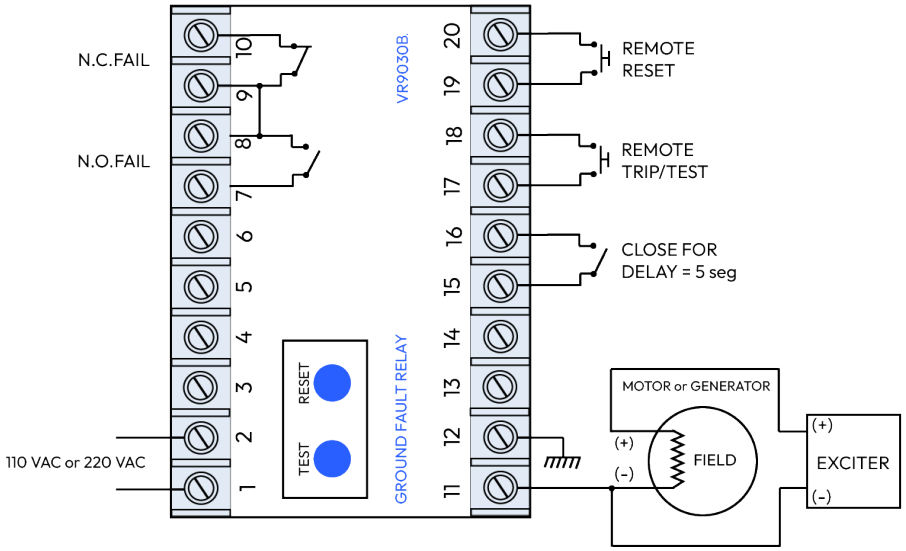
In this case the sensibility is minimal, being equal to 500 Ohms.
If a fault occurs at any other point in the field, the voltage at that point during operation, coming from the unbalance exciter, is added to the voltage generated internally in the relay, increasing its sensitivity, as shown in the curves in the graph on page 6. The IF current for the percentage P% at which the fault occurs, where 0% refers to Negative Lid and 100% refers to Positive Lid, will be:

IF = (VS + (VEXC x P% /100)) / RFaul

It can then be seen that the sensitivity increases as the fault occurs closer and closer to the field's Positive Lid. Once the presence of current has been detected for the selected time, the relay's logic will trigger it.

Application Example

The diagram below shows the relay's basic connections. Terminals 11 and 12 must be connected to the Negative Lid of the Field and the Ground of the system respectively. They must not be connected inverted. Normally select a time of 5 seconds for the relay to activate, as this fault does not require immediate activation, thus avoiding activation due to noise or spurious induced currents.



Start Up

› **1.** Select the required delay by opening (0,5 sec) or closing (5 sec) terminals 15 and 16.

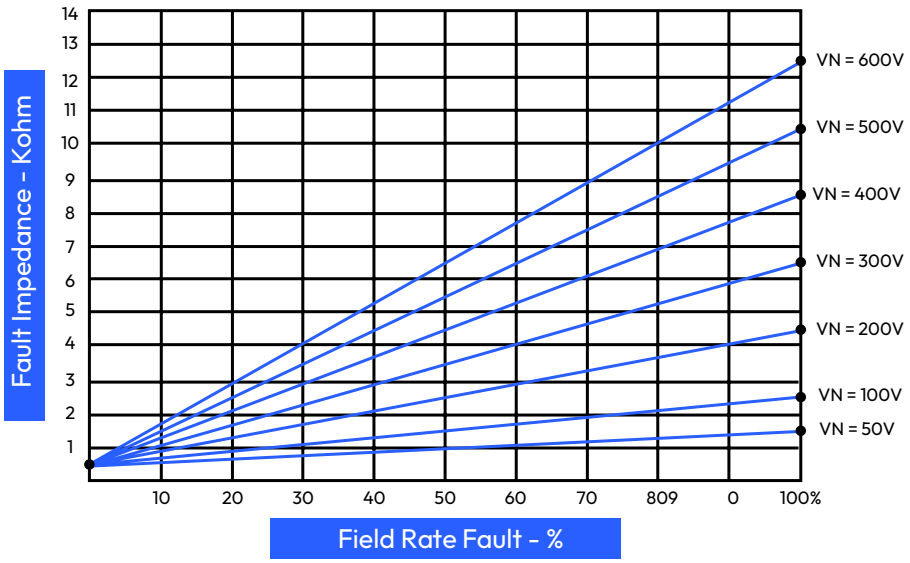
› **2.** Wire as shown in the diagram above, using suitable cables. Note that the housing of the generator or rotary exciter must be grounded to the same ground connected to terminal 12. Terminal 11 must be connected to the field's zero (or negative, depending on the nomenclature used) voltage terminal.

› **3.** With the machine stopped, perform a test by pressing the test button for the required time (0,5 or 5 sec).

› **4.** If the test is positive, carry out a second test by momentarily connecting a 450 Ohms/0.25 Watt resistor between Field (-) and Ground.

› **5.** If the above tests are positive, the relay is OK and operational. Repeat the tests in items 3 and 4 with the machine rotating and excited.

› **6.** During the tests, the output contacts must be checked to ensure that they are working properly. Be careful not to trip the system during the test.



> User Manual

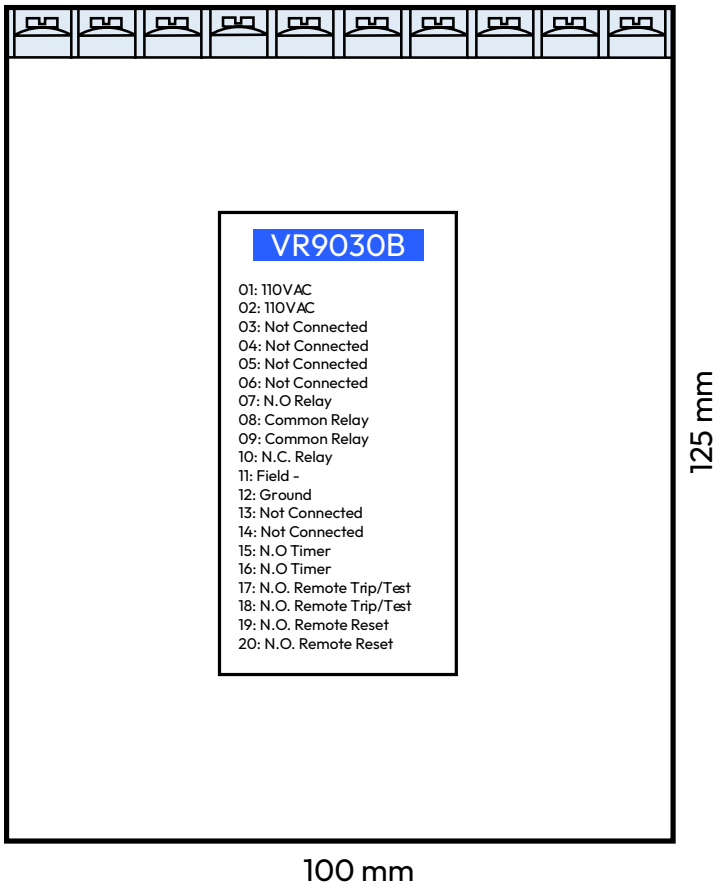
This bulletin accompanies the user manual, together with the Relay Data Sheet, containing the data relating to the specific type purchased, as well as useful information for the future, such as order number, date of purchase and serial number, in addition to the Varixx standard terms of delivery and warranty terms. This set forms the user manual for this equipment.

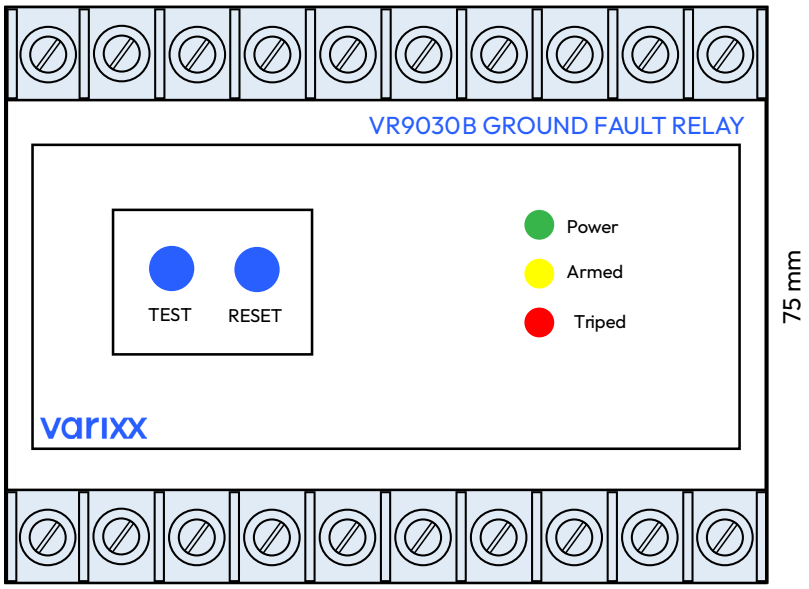
> Application

The user must fully understand the characteristics, limitations and protections before specifying and applying any equipment. Among the most important aspects are the following: maximum currents and voltages, precautions against electromagnetic noise or ripple in the signals that could interfere with them and, above all, a thorough understanding of the equipment's operating characteristics.

The application drawing in this bulletin is provided as an example. It is up to the user to correctly dimension and design the actual application. Varixx can supply all the necessary engineering as well as complete equipment and systems.

Outline





ORDER CODE		
VR9030B / X		
[X]	Power Supply	1= 110 VAC 2= 220 VAC

EXAMPLE:
VR9030B/1: Ground Fault Relay;
Power Supply 110 VAC.

Other Varixx Products

› **Static Exciters and AVRs:** Varixx has a complete range of Static Exciters for motors and generators, with dozens of models of servo drives and AVRs, including digital ones. In addition to components, Varixx also supplies complete excitation systems.

› **Large Rectifiers:** Controlled, air-cooled or water-cooled, up to 100,000 Amps.

› **Power Controllers:** Single-phase, two-phase and three-phase, up to 2000 Amps, PWM or phase angle.

› **Solid-State Contactors and Static Switches:** single-phase, two-phase and three-phase, up to 2000 Amps, for high switching frequencies.

› **Soft Starters:** Up to 1200 nominal Amps, with all the usual features avaible, such as Soft Start, Soft Stop, Energy Saver, Booster, Brake and various protections.

› **Chopper for DC Motors:** Applicable in overhead cranes, monorails, transport trolleys, etc.

› **Chopper for Ring Motors:** Replaces the various rotor resistor banks and provides linear control.

› **Protection relays for Motors and Generators:** Low-cost line, in DIM boxes, with excellent reliability and ease of application.

› **Signal Transmitters for RTD and Thermocouples:** Compact and encapsulated, with 4 to 20mA true output, two-wire, no separate power supply required.

› **Crowbar and Active Transient Suppressors:** Applicable to motor and generator excitation.

› **Programmable Digital Relay for Monitoring Circuit Breakers and Contactors:** For important loads and processes.

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TECHNICAL BULLETIN VR9030B

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