

745 FREQUENTLY ASKED QUESTIONS

1 I get a communication error with the relay when I try to store a setpoint.

This error can occur for several different reasons. First of all, verify that the address is valid. Ensure that you are not attempting to store to an option which is not installed, eg. Analog In/Out, or Restricted Ground Fault. Verify that the values is within the valid setpoint range for that address. Verify that communication write access is enabled. To enable write access, enter the passcode as characters into the memory address location 0x0081. Note: you cannot enable communication write access by entering in the passcode from the front panel, and vice-versa. Note: after three unsuccessful attempts at writing the passcode, the relay will enter a Self-Test-Error state taking the relay out of service. To reset this condition, you must cycle power to the relay.

2 There are two ground current inputs (G10/H10 and E12/F12). Which of these inputs should I connect my ground CT to?

Using the Table of Transformer Types in the Instruction Manual (Table 5.1), find the Transformer Type that applies to your application. Under each wye and zig-zag winding you will find a "gnd 1/2" or "gnd 2/3" message (SR745 assumes delta windings are not grounded). This message denotes which input that windings ground CT should be connected to. Gnd 1/2 refers to terminals G10/H10, Gnd 2/3 refers to terminals E12/F12. For example: considering a D / Y0 / D30 transformer, winding 2 or the wye windings ground CT should be connected to Gnd 1/2 or terminals G10/H10.

3 Many Percent Differential settings are programmable in multiples of CT (x CT). What CTs are they talking about?

Conventional differential protection, in basic terms, consists of 2 CTs secondary currents electrically summed and connected to an overcurrent relay. In this arrangement during a differential fault, it cannot be determined (from the relays point of view) which side of the protected device is resulting in the differential current flow. For this reason when the choice for differential pickup value is made, it is selected as a multiple of the nominal secondary current. Similarly, the SR745s "CT" refers to nominal secondary values. The SR745 has one significant advantage over conventional differential relaying that requires mention on this point. The SR745 "normalizes" Winding2 and Winding3 secondary currents to Winding1, eliminating the need to include any CT mismatch factor in the differential pickup values. See the Auto Configuration section in Chapter 5 of the Instruction Manual, specifically Dynamic CT Ratio Mismatch Correction

4 What should my current vectors (angles) look like if I have my CT wiring correct?

If wired correctly, current angles for Winding 2 will lag Winding 1 angles by 180 plus the transformer shift. The 180 degree shift reflects the opposing CT wiring between windings. The same relationship exists between Winding 1 and 3 if applicable. Winding 1 Phase A is always 0 degrees since it is used as a reference. For example, on a Delta-Wye-30 (DY1) transformer, the following are the expected angles in degrees listed in the sequence A/B/C: W - 0 / 120 / 240 W2 - 210 / 330 / 90

5 How do I set my differential element?

The PICKUP level is the minimum differential current required for operation. This setting is chosen based on the amount of differential current that might be seen under normal operating conditions. A setting of 0.2 to 0.3 x CT is generally recommended. (The factory default is 0.3 x CT.)

The KNEEPOINT setting defines the boundary between SLOPE 1 and SLOPE 2. The kneepoint should be set just above the maximum (normal) operating current level of the transformer. This level will be somewhere between the maximum forced-cooled rated current of the transformer and the maximum emergency overload current level. (The factory default is 2.0 x CT.)

The SLOPE 1 setting is applicable for restraint currents of zero to the kneepoint, and defines the ratio of differential to restraint current above which the element will operate. This slope is set to ensure sensitivity to internal faults at normal operating current levels. The criteria for setting this slope are: (1) to allow for mismatch when operating at the limit of the transformers onload tap-changer range; and (2) to accommodate for CT errors. The first criterion contributes up to about 20% to the slope setting. With the onload tap changer monitoring feature enabled, the mismatch is corrected dynamically, and this contribution is reduced to the error resulting from a ± 1 tap discrepancy (during a tap change). The second criterion contributes up to 5% to slope setting. (The factory default is 25%, which assumes tap position monitoring is not available.)

The SLOPE 2 setting is applicable for restraint currents above the kneepoint. This slope is set to ensure stability under heavy through fault conditions which could lead to high differential currents as a result of CT saturation. A setting of 80 to 150% is generally recommended. (The factory default is 100%.)

The specific settings selected for the differential element are established by the application engineer responsible for the installation based on experience and engineering judgment.

6 Can I remove the SR745 from the Drawout case with the transformer still in service?

Removing the relay from the drawout case may OR may not trip your transformer, it depends upon the external wiring of your trip circuit. Output relays R1 through R5 are Form A contacts and R6 through R8 and the Self Test are Form C contacts. If your trip circuit is connected to the NC contacts of R6, R7 or R8 the contacts will open when the unit is removed and, therefore, a trip will occur. Similarly, the Self Test relay will trip the transformer if the trip circuit is connected to the Self Test Relay contacts. If only R1 through R5 are used in the trip circuit, the SR745 can be removed from the drawout case and the transformer will remain in service. NOTE: Be aware that when the SR745 is removed, the transformer is running unprotected!!

7 How many event records can be stored in the event recorder at the same time?

No more than 128. A First In First Out methodology is used. Event numbering will go up to 65000 before resetting to 1. Event numbering will also reset to 1 when event recording data is cleared.

8 How can the SR745 s Output Relays be set for Failsafe operation?

A. Failsafe operation implies that a failure in the control system have the same affect as a power system failure. The SR745 has extensive self checking diagnostic algorithms, that if failed, will activate (de-energize) the Form C contacts at terminals F10/E11/F11. These contacts are energized at SR745 power up, therefore a SR745 failure (relay not executing protection code) will also cause these contacts to de-energize. These contacts can be used to indicate relay failure or loss of control power to the relay. The Trip and Auxiliary Output Relays can be programmed to a Failsafe mode of operation by including a NOT gate to the output of the Output Relays Flex Logic equation. See Instruction Manual for Flex Logic equation syntax.

9 Can my 2 winding relay be converted to 3 winding model in the field (Relay option addition / changes)?

No. The Analog I/O (A), Loss of Life calculation (L), and Restricted Ground Fault (R) options can all be added in the field by purchasing an access code that is entered into the relay (see S1\745 Setup\Upgrade Options). Converting between 2 and 3 winding models required hardware additions and can be done only at an authorized service center

10 Why is the SR745 showing a "Flex Eqn. Error"?

Part of the SR745s self checking routine involves checking the validity (or syntax) of each of the Flex Logic equations. These equations can be found under S5 Outputs. There is one equation for each Output Relay, Virtual Output, Trace Trigger, and Timer. If any of these equations is not written according to the syntax in SR745 Instruction Manual, the relay will present this error message. By far, the most common error is made in the equation(s) for Output Relays, specifically not using a logic gate with the correct number of inputs. For example, a flex log equation written to cause output relay 1 to pickup on any of three elements operations should be ended with a 3 Input OR gate. Please consult the Instruction Manual for exact syntax.

11 How is power calculated with only one voltage input?

A balanced voltage source is assumed which generally would not be more than 2% off. Ideal transformation is used for determining the voltages of the unmonitored windings. The currents for all available phases and windings are always accurately monitored.

12 "Setpoints Have Not Been Programmed!" Error message

Symptoms: - "Setpoints Have Not Been Programmed!" LCD error message
Self Test Error LED

Solution: Ensure relay has been programmed, including S1 SR745 Setup\Installation set to Programmed this is the single setting responsible for the error message.

13 When I power on my relay I get a self-test error stating that my setpoints are not programmed, why is this?

This safeguards against the installation of a relay whose setpoints have not been entered and blocks the signaling to any output relay.

14 Why do I get differential currents when performing my single phase injection tests?

The SR745 automatically removes the zero-sequence current for all transformer types except 2 Winding and 3 Winding External Correction types. A single phase current injection would generate a considerable amount of zero-sequence current which will cause the differential element to operate.

15 Where can I get a software upgrade for my relay?

The latest relay firmware and PC Setup program update can be found on this homepage or you can get it by faxing a request to our literature department at GE Multilin at (905) 201-2113. This software is also available on the Digital Products CD, however it is only as current as the date of publication of the CD.

16 Why is my SR745 Transformer De-energized LED on even though my transformer is energized without load.

The method used for determining Transformer Energization is determined by settings in S4 Elements\Energization Inhibit. If current alone is used to sense energization (Sensing by Voltage set to disabled), it is most likely that the magnetizing current the transformer is drawing is less than the minimum setting for Energizing Current. The relay will recognize the transformer as Energized once loaded, however the Percent Differential element will be inhibited as the transformer is being loaded if the Energization Inhibit feature is Enabled.

17 Can a 3 winding model SR745 (SR745-W3-) be used on a 2 winding transformer?

Yes. Simply change the "Transformer Type" setting (S2 Systems Setup\Transformer) to the appropriate 2 winding type. The differential algorithm will be changed to monitor only W1 and W2 inputs. All non-applicable (W3) phase and ground overcurrent elements will be hidden and not monitored. A 2 winding relay cannot be used on a 3 winding transformer.

18 I have already wired my CTs and the polarity marks are not exactly as shown in the Instruction Manual. Will this wiring interfere with the SR745s protection

The SR745 CANNOT see polarity marking on a CT. What the SR745 CAN see is the direction of current flow in the CT secondary (or current vectors). If both primary and secondary polarity marks are connected opposite to drawings in the Instruction Manual, there will be no resultant change in current vector and therefore no interference with relay operation (since the relay is oblivious to this change). If either the primary or secondary, but not both polarity marks have been connected opposite to drawings in the Instruction Manual, there will be a resultant 180 degree shift in that current vector and therefore possible implications to some or all the relays protection and monitoring features.

19 "Bad Xfmr Settings!" Error message

Symptoms: - "Bad Xfmr Settings!" LCD Error message
- Self Test Error LED

Solution: Ensure all Transformer Setup settings are set correctly. Error will only occur when Harmonic derating (S2\Harmonics) is enabled. Most often caused by incorrect Load Loss at Rated Load or Winding x Series Three Phase Resistance.

20 Why is the SR745 showing "Bad Xfmr Settings"?

If the Winding x Harmonic Derating is set to Enabled, the SR745 will consider transformer configuration settings in its Overload Derating algorithm. The SR745 performs error checking on these settings to determine if they relate to a "realistic" physical system. By far, the two settings most commonly responsible this error are: Load Loss at Rated Load and Winding x Series Three Phase Resistance. Check these settings against transformer manufacturer data. This self check is only performed when Harmonic Derating is set to enabled (S2\Harmonics).