



Directional overcurrent protection relay

1	9
2	0

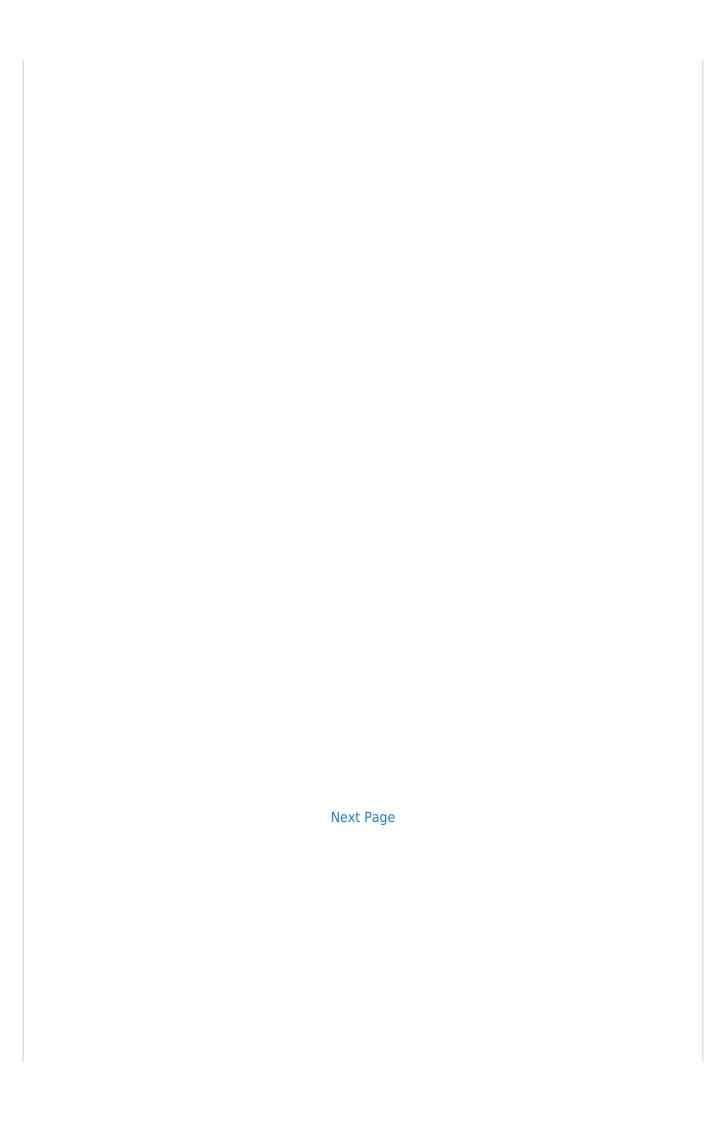
.

Bookmarks

Download this manual	Quick Links	



6 F 2 S 0-7-5-8
6 F 2 S 0 TOSHIBA INSTRUCTION MANUAL
DIRECTIONAL OVERCURRENT PROTECTION RELAY
GRD140
© TOSHIBA Corporation 2004
All Rights Reserved. (Ver.0.7)
(vCI.O.7)





Related Manuals for Toshiba GRD140

Protection Device Toshiba GRE110 Instruction Manual

Overcurrent protection relay (350 pages)

Protection Device Toshiba GR-200 Series Instruction Manual

Multi functional protection ied (1051 pages)

Protection Device Toshiba GR-200-5 Instruction Manual

Multi functional protection ied (1176 pages)

Protection Device Toshiba GR200 Series Instruction Manual

Line differential protection ied (1770 pages)

Protection Device Toshiba TMS7SERIES Manual

Electronic soft start systems (4 pages)

Summary of Contents for Toshiba GRD140

<u>Page 1</u> 6 F 2 S 0 7 5 8 INSTRUCTION MANUAL DIRECTIONAL OVERCURRENT PROTECTION RELAY GRD140 © TOSHIBA Corporation 2004 All Rights Reserved. (Ver.0.7)

Page 2 Safety Precautions Before using this product, please read this chapter carefully. This chapter describes the safety precautions recommended when using the GRD140. Before installing and using the equipment, this chapter must be thoroughly read and understood. Explanation of symbols used Signal words such as DANGER, WARNING, and two kinds of CAUTION, will be followed by important safety information that must be carefully reviewed.

<u>Page 3</u> 6 F 2 S 0 7 5 8 DANGER • Current transformer circuit Never allow the current transformer (CT) secondary circuit connected to this equipment to be opened while the primary system is live. Opening the CT circuit will produce a dangerously high voltage.

Page 4 6 F 2 S 0 7 5 8 • Modification Do not modify this equipment, as this may cause the equipment to malfunction. • Disposal When disposing of this equipment, do so in a safe manner according to local regulations.

<u>Page 5</u> 6 F 2 S 0 7 5 8 Contents Safety Precautions Introduction Application Notes 2.1 Overcurrent and Undercurrent Protection 2.1.1 Non-directional Overcurrent Protection 2.1.2 Directional Overcurrent Protection 2.1.3 Scheme Logic 2.1.4 Phase Undercurrent Protection 2.1.5 Thermal Overload Protection 2.1.6 Broken Conductor Protection 2.1.7 Breaker Failure Protection 2.1.8 Cold Load Protection 2.1.9 CT Requirements...

<u>Page 6</u> 6 F 2 S 0 7 5 8 3.4 Recording Function 3.4.1 Fault Recording 3.4.2 Event Recording 3.4.3 Disturbance Recording 3.5 Metering Function 3.6 Fault locator 3.6.1 Application 3.6.2 Distance to Fault Calculation 3.6.3 Starting Calculation 3.6.4 Displaying Location 3.6.5 Setting User Interface 4.1 Outline of User Interface 4.1.1 Front Panel...

<u>Page 7</u> 6 F 2 S 0 7 5 8 6.5 Function Test 6.5.1 Measuring Element 6.5.2 Protection Scheme 6.5.3 Metering and Recording 6.6 Conjunctive Tests 6.6.1 On Load Test 6.6.2 Tripping and Reclosing Circuit Test 6.7 Maintenance 6.7.1 Regular Testing 6.7.2 Failure Tracing and Repair 6.7.3 Replacing Failed Relay Unit 6.7.4 Resumption of Service 6.7.5 Storage...

Page 8 6 F 2 S 0 7 5 8 Appendix A Programmable Reset Characteristics and Implementation of Thermal Model to IEC60255-8 Appendix B Directional Earth Fault Protection and Power System Earthing Appendix C Signal List Appendix D Event Record Items Appendix E Details of Relay Menu and LCD & Button Operation Appendix F Case Outline Appendix G Typical External Connection Appendix H Relay Setting Sheet...

- <u>Page 9</u> The GRD140 series provides the following functions for all models. Metering Fault recording Event recording Disturbance recording (available via communications ports) Table 1.1.1 shows the members of the GRD140 series and identifies the functions to be provided by each member. \square
- <u>Page 10</u> 6 F 2 S 0 7 5 8 Table 1.1.1 Series Members and Functions Model Number GRD140 Directional Phase Fault O/C OC1 OC4 (67/50P, 67/51P) Directional Earth Fault O/C EF1 EF4 (67/50N, 67/51N) Directional Sensitive Earth Fault SEF1 SEF4(67/50N, 67/51N)
- Page 11 2.1.1 Non-directional Overcurrent Protection GRD140 provides distribution network protection with four-stage phase fault and earth fault overcurrent elements OC1 to OC4, EF1 to EF4, sensitive earth fault elements SEF1 to SEF4, and two-stage negative sequence overcurrent elements NOC1 and NOC2 which can be enabled or disabled by scheme switch setting.
- <u>Page 12</u> Note: kr, b are used to define the reset characteristic. Refer to equation (2). In addition to above nine curve types, GRD140 can provide a user configurable IDMT curve. If required, set the scheme switch [M***C] to "CON" and set the curve defining constants k, a, c.
- <u>Page 13</u> 6 F 2 S 0 7 5 8 The following table shows the setting ranges of the curve defining constants. Curve defining constants Range Step $0.000 30.000 \ 0.001 \ 0.000 5.00 \ 0.001 \ 0.000 30.000 \ 0.001 \ 0.000 30.000 \ 0.001 \ 0.000 30.000 \ 0.001 \ 0.000 30.000 \ 0.001 \ 0.000 30.000 \ 0.001 \ 0.000 30.000 \ 0.001 \ 0.000 30.000 \ 0.001 \ 0.000 30.000 \ 0.001 \ 0.000 30.000 \ 0.001 \ 0.000 30.000 \ 0.001 \ 0.000 30.000 \ 0.001 \ 0.000 30.000 \ 0.001 \ 0.000 \ 0.001 \ 0.000 30.000 \ 0.001 \ 0.000 \ 0.0$
- <u>Page 14</u> 6 F 2 S 0 7 5 8 Definite time reset The definite time resetting characteristic is applied to the IEC/IEEE/US operating characteristics. If definite time resetting is selected, and the delay period is set to instantaneous, then no intentional delay is added. As soon as the energising current falls below the reset threshold, the element returns to its reset condition.
- Page 15 6 F 2 S 0 7 5 8 IEEE Reset Curves (Time Multiplier = 1) 1000.00 100.00 10.00 1.00 Current (Multiple of Setting) Figure 2.1.4 Dependent Time Reset Characteristics 2.1.1.2 Definite Time Overcurrent Protection In a system in which the fault current does not vary a great deal in relation to the position of the fault, that is, the impedance between the relay and the power source is large, the advantages of the IDMT characteristics are not fully utilised.
- Page 16 6 F 2 S 0 7 5 8 2.1.1.3 Instantaneous Overcurrent Protection In conjunction with inverse time overcurrent protection, additional overcurrent elements provide instantaneous or definite time overcurrent protection. OC1 to OC4 and EF1 to EF4 are phase fault and earth fault protection elements, respectively. Each element is programmable for instantaneous or definite time delayed operation.
- <u>Page 17</u> 6 F 2 S 0 7 5 8 Fuse GRD140 Figure 2.1.7 Feeder Protection Coordinated with Fuses Configuring the inverse time element OC1 (and EF1) and time graded elements OC2 and OC3 (or EF2 and EF3) as shown in Figure 2.1.8, the characteristic of overcurrent protection can be improved to coordinate with the fuse characteristic.
- <u>Page 18</u> In such a case, directional control should be added to overcurrent elements. GRD140 provides directional control for phase fault and earth fault overcurrent elements OC1 to OC4, EF1 to EF4, SEF1 to SEF4, NOC1 and NOC2 which can be enabled or disabled by scheme switch setting.
- Page 19 6 F 2 S 0 7 5 8 0.1s 1.0s 0.4s 0.7s GRD140 1.3s Non-directional GRD140 1.3s 0.1s Non-directional 1.0s 0.4s 0.7s Figure 2.1.10 Protection of a Ring Main Circuit Power Systems with Sources at both Line Terminals In power systems with sources at both line terminals as shown in Figure 2.1.11, the fault current flows in from both terminals.
- <u>Page 20</u> 6 F 2 S 0 7 5 8 2.1.2.2 Directional Characteristics Figure 2.1.12 illustrates the directional characteristic, with the forward operate zone shaded. The reverse zone is simply a mirror image of the forward zone. The forward operate zone or reverse operate zone is selectable by the scheme switch [OC-DIR], [EF-DIR], [SE-DIR] and [NC-DIR].