1. **GENERAL DATA AND INFORMATION**

|  |  |  |  |
| --- | --- | --- | --- |
|  Designation No | : 50/51-50N/51N | Rated Current  | :  |
|  Manufacturer  | : GE |  |  |
|  Model No. | : F650 | CT Ratio | :  |
|  Sl.No. | :  | VT Ratio | :  |
|  Frequency | : 60.00 Hz | Aux. Supply | : 100-240V AC ,48- 250V DC |

[..\WorkInstructions\64.pdf](../WorkInstructions/64.pdf)

**For Mechanical Check/Visual Inspection and Electrical Tests Use C.L. of W.I.64**

**2. SECONDARY INJECTION TEST**

 2.1. MEASUREMENT CHECKS

CURRENT CHECKS

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Phase | Terminals | Injected current (A) | Measured Current (A) | Remarks |
| RN | B1-B2 |  |  |  |
| YN | B3-B4 |  |  |  |
| BN | B5-B6 |  |  |  |

VOLTAGE CHECKS

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Phase | Terminals | Injected Voltage (V) | Measured Voltage (V) | Remarks |
| RN | A5-A6 |  |  |  |
| YN | A7-A8 |  |  |  |
| BN | A9-A10 |  |  |  |
| AUX.VOLTAGE | A11-A12 |  |  |  |

**2.2 PHASE TIMED OVERCURRENT PROTECTION (51PH/51PL):**

Procedure:

Set the Relay to trip for the protection element being tested. Configure any of the outputs to be activated only by the protection element being tested.

Apply 0.9 times the Pickup current and check that the relay does not trip.

Apply 1.5 times the pickup current . The relay should trip according to the time corresponding to its set curve.

Apply 5 times the pickup current. The relay should trip according to the time corresponding to its set curve.

 **ELEMENT : 51PH**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| PHASE | SETTING (A) | PICK UP (A) | DROP OFF (A) | DROP OFF / PICKUP | REMARKS |
| A | 1.0 |  |  |  |  |
| B |  |  |  |  |
| C |  |  |  |  |

 Limits: Drop off/ Pickup Ratio should be between 97% to 98%.

 Pickup Accuracy ±0.5 % or ±10 mA which is greater

 **ELEMENT : 51PL**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| PHASE | SETTING (A) | PICK UP (A) | DROP OFF (A) | DROP OFF / PICKUP | REMARKS |
| A | 1.0 |  |  |  |  |
| B |  |  |  |  |
| C |  |  |  |  |

 Limits: Drop off/ Pickup Ratio should be between 97% to 98%.

 Pickup Accuracy ±0.5 % or ±10 mA which is greater

 OPERATING TIME STAGE (1&2)

 TMS=1.0 Limit : ±3% of set time or 50 ms. (Whichever is greater)

|  |  |  |  |
| --- | --- | --- | --- |
| Curve | Cal. time@ 3\* IS | Measured time (sec) | Limit |
| Phase  | 51PH | 51PL |
| IEC standard inverse | 6.3 | A |  |  | 5.985 – 6.615 |
| IEC very inverse | 6.75 | B |  |  | 6.413 – 7.087 |
| IEC ext. inverse | 10 | C |  |  | 9.5 – 10.5 |
| IEC Long time inverse | 60 | A |  |  | 57.0 – 63.0 |
| IEC Definite time | 1.0 | B |  |  | 0.95 – 1.05 |

**2.3 INSTANTANEOUS PHASE OVERCURRENT PROTECTION (50PH / 50PL):**

Procedure:

Set the relay to trip for the protection element being tested. Configure any of the outputs to be enabled only by the protection element being tested.

Apply 0.9 times the pickup current and check that the relay does not trip.

Gradually increase the current value and verify that the relay operates between 1 and 1.1 times the set pickup current. The relay must trip by instantaneous in a time frame of 10 to 55 ms. All the relay trip contacts must operate as well as the contact set as 50.

Remove current and apply it again suddenly to a value of 4 times the pickup current. The relay should trip instantaneously in a time frame of 10 to 45 ms.

Test one point for each phase and group of the protection element.

**ELEMENT :50PH**

 SET PICKUP CURRENT : 1 A SET DELAY : 0.2 SEC CURVE: IEC DEFINITE TIME

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| PHASE | PICKUP (A) | DROP OFF (A) | APPLIED TIMES (A) | TRIPPING TIMES (msec) |
| MEASURED | LIMITS |
| R |  |  | 0.9 X PICKUP | N/A | NA |
| 1.1 X PICKUP |  | 10-55 msec |
| 4 X PICKUP |  | 10-45 msec |
| Y |  |  | 0.9 X PICKUP | N/A | NA |
| 1.1 X PICKUP |  | 10-55 msec |
| 4 X PICKUP |  | 10-45 msec |
| B |  |  | 0.9 X PICKUP | N/A | NA |
| 1.1 X PICKUP |  | 10-55 msec |
| 4 X PICKUP |  | 10-45 msec |

**ELEMENT : 50PL**

 SET PICKUP CURRENT : 1 A SET DELAY : SEC CURVE: IEC DEFINITE TIME

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| PHASE | PICKUP (A) | DROP OFF (A) | APPLIED TIMES (A) | TRIPPING TIMES (msec) |
| MEASURED | LIMITS |
| R |  |  | 0.9 X PICKUP | N/A | NA |
| 1.1 X PICKUP |  | 10-55 msec |
| 4 X PICKUP |  | 10-45 msec |
| Y |  |  | 0.9 X PICKUP | N/A | NA |
| 1.1 X PICKUP |  | 10-55 msec |
| 4 X PICKUP |  | 10-45 msec |
| B |  |  | 0.9 X PICKUP | N/A | NA |
| 1.1 X PICKUP |  | 10-55 msec |
| 4 X PICKUP |  | 10-45 msec |

**2.4 UNDER VOLTAGE PROTECTION (27P / 27X)**

Procedure:

Set the relay to trip for the protection element being tested. Configure any of the outputs to be activated only by the protection element being tested.

Apply voltage as indicated on the table over the under voltage setting level and verify that the relay does not trip.

Decrease voltage level gradually and verify that the relay trips for the set voltage (with an admissible error of 5%).

**ELEMENT : 27P**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| PHASE | CURVE | SET VOLTAGE(V) | SET DELAY (sec) | APPLIED VOLTAGE (V) | TRIPPING TIMES (sec) |
| MEASURED | LIMITS |
| R | DEFINITE TIME | 50V | 2.0 | 55V | N/A |  |
| 45V |  |  |
| Y | 55V | N/A |  |
| 45V |  |  |
| B | 55V | N/A |  |
| 45V |  |  |

**ELEMENT : 27X**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| PHASE | CURVE | SET VOLTAGE(V) | SET DELAY (sec) | APPLIED VOLTAGE (V) | TRIPPING TIMES (sec) |
| MEASURED | LIMITS |
| VX | DEFINITE TIME | 50V | 2.0 | 55V | N/A |  |
| 45V |  |  |

**2.5 TRIP CIRCUIT SUPERVISIONS**

Supervision inputs will be tested as normal inputs, revising the voltage level that will be 19 Volts.

Coil 1:

|  |  |  |
| --- | --- | --- |
| S.No | Description of Function | Remarks |
| 1. | Apply 19 Vdc to both 52/a (terminals F1-F2) and 52/b (terminals F3-F4) “Coil 1” circuit supervision inputs and verify that they are activated. |  |
| 2. | Apply -19 Vdc to both 52/a (terminals F1-F2) and 52/b (terminals F3-F4) ‘Coil 1 “ circuit supervision inputs and verify that they are activated |  |
| 3. | Remove voltage from both inputs and verify that it takes them 500 msec to change state (deactivate).  |  |

Coil 2:

|  |  |  |
| --- | --- | --- |
| S.No | Description of Function | Remarks |
| 1. | Apply 19 Vdc to both 52/a (terminals F15-F16) and 52/b (terminals F17- F18) “Coil 1” circuit supervision inputs and verify that they are activated. |  |
| 2. | Apply -19 Vdc to both 52/a (terminals F15-F16) and 52/b (terminals F17-F18) ‘Coil 1 “ circuit supervision inputs and verify that they are activated |  |
| 3. | Remove voltage from both inputs and verify that it takes them 500 msec to change state (deactivate).  |  |

3. Binary Inputs checked :

4. Binary outputs checked :