#### GENERAL DATA AND INFORMATION:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Panel No. |  |  | Designation | 87B/95B |
| Serial No. |  | Rated Voltage | 125 VDC |
| Make |  | Aux. Voltage | 110 – 250 VAC/DC |
| CT Ratio | 2000/1A | Frequency | 50 – 60 Hz |

#### MECHANICAL CHECKS AND VISUAL INSPECTION:

|  |  |  |  |
| --- | --- | --- | --- |
| ITEM | DESCRIPTION | CHECKED | |
| 1 | Inspect for physical damage / defects. | ❑ Yes | ❑ N/A |
| 2 | Verify Connections as per approved drawings. | ❑ Yes | ❑ N/A |
| 3 | Check tightness of all connections. | ❑ Yes | ❑ N/A |
| 5 | Check apparatus lists. | ❑ Yes | ❑ N/A |
| 6 | Check ferrules | ❑ Yes | ❑ N/A |
| 7 | Test Switch checked for correct function. | ❑ Yes | ❑ N/A |
| 8 | Check case earthing. | ❑ Yes | ❑ N/A |
| 9 | Watchdog contact (X319:3 , X319:2) | ❑ Yes | ❑ N/A |

#### ELECTRICAL TESTS: With relay energized condition

|  |  |  |  |
| --- | --- | --- | --- |
| ITEM | DESCRIPTION | CHECKED | |
| 1 | Measured auxiliary supply. | ❑ Yes | ❑ N/A |
| 2 | Clock set at local time. | ❑ Yes | ❑ N/A |
| 3 | Time maintained when auxiliary supply removed. | ❑ Yes | ❑ N/A |
| 5 | Relay healthy (green) LED working. | ❑ Yes | ❑ N/A |
| 6 | Trip (red) LED working. | ❑ Yes | ❑ N/A |

#### INPUTS AND OUTPUTS TESTS:

**INPUT OPTO-ISOLATORS CHECKS (With Relay Energized):**

Go to CONFIGURATION - MONITORING,

I/O STATUS,

then go to BINARY INPUTS VALUES ( X120 (AIM) – X110 (BIO) )

to check the values after giving pulse on each BI.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **OPTO INPUT NO.** | **TEST METHOD**  **(Energize only one at a time with**  **125V DC Station Battery voltage)** | **RESULT**  **Display FALSE to TURE** | | **REMARKS** |
| **X324** | | | | |
| BI 1 | ENERGIZE TB NO. X324 : 2 – 1 | ❑ Yes | ❑ N/A | **BB-CH PROT OUT** |
| BI 2 | ENERGIZE TB NO. X324 : 5 – 4 | ❑ Yes | ❑ N/A | **BB-CH PROT IN** |
| BI 3 | ENERGIZE TB NO. X324 : 6 – 4 | ❑ Yes | ❑ N/A | **BB-CH CT SHORTED** |
| BI 4 | ENERGIZE TB NO. X324 : 9 - 8 | ❑ Yes | ❑ N/A | **BB-CH IN/OUT DC FAIL** |
| BI 5 | ENERGIZE TB NO. X324 : 10 – 8 | ❑ Yes | ❑ N/A | **RESET DC FAIL** |
| BI 6 | ENERGIZE TB NO. X324 : 13 – 12 | ❑ Yes | ❑ N/A | **INDICATION DC FAIL** |
| BI 7 | ENERGIZE TB NO. X324 : 14 – 12 | ❑ Yes | ❑ N/A | **AC SUPPLY FAIL** |
| BI 8 | ENERGIZE TB NO. X324 : 17 – 16 | ❑ Yes | ❑ N/A | SPARE |
| BI 9 | ENERGIZE TB NO. X324 : 18 – 16 | ❑ Yes | ❑ N/A | SPARE |
| **X329** | | | | |
| BI 10 | ENERGIZE TB NO. X329 : 2 – 1 | ❑ Yes | ❑ N/A | SPARE |
| BI 11 | ENERGIZE TB NO. X329 : 5 – 4 | ❑ Yes | ❑ N/A | SPARE |
| BI 12 | ENERGIZE TB NO. X329 : 6 – 4 | ❑ Yes | ❑ N/A | SPARE |
| BI 13 | ENERGIZE TB NO. X329 : 9 - 8 | ❑ Yes | ❑ N/A | SPARE |
| BI 14 | ENERGIZE TB NO. X329 : 10 – 8 | ❑ Yes | ❑ N/A | SPARE |
| BI 15 | ENERGIZE TB NO. X329 : 13 – 12 | ❑ Yes | ❑ N/A | SPARE |
| BI 16 | ENERGIZE TB NO. X329 : 14 – 12 | ❑ Yes | ❑ N/A | SPARE |
| BI 17 | ENERGIZE TB NO. X329 : 17 – 16 | ❑ Yes | ❑ N/A | SPARE |
| BI 18 | ENERGIZE TB NO. X329 : 18 – 16 | ❑ Yes | ❑ N/A | SPARE |

**OUTPUT RELAYS CHECKS (With Relay Energized):**

Test Procedure:

Go to IED CONFIGURATION,

TESTS, IED TEST, TEST MODE : ON,

then go to BINARY OUTPUTS-CHANGE THE POSITION OF EACH BO FROM FULSE TO TURE FROM HMI,

then check contact resistance.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **OUTPUT RELAY No.** | **TEST METHOD**  **(Energize only one relay at a time by**  **Test ON in ‘IED TEST’)** | **RESULT**  **Contact Checked**  **≤ 0.2Ω** | | **REMARKS** |
| **X317** | | | | |
| BIO1 | CONTACT OPERATED X317 : 1 – 2 (N/O) | ❑ Yes | ❑ N/A | SPARE |
| BIO2 | CONTACT OPERATED X317 : 3 – 4 (N/O) | ❑ Yes | ❑ N/A | SPARE |
| BIO3 | CONTACT OPERATED X317 : 5 – 6 (N/O) | ❑ Yes | ❑ N/A | SPARE |
| BIO4 | CONTACT OPERATED X317 : 7 – 8 (N/O) | ❑ Yes | ❑ N/A | **CT SUPVN. ALARM** |
| BIO5 | CONTACT OPERATED X317 : 9 – 10 (N/O) | ❑ Yes | ❑ N/A | **BB-CH OPTD** |
| BIO6 | CONTACT OPERATED X317 : 11 – 12 (N/O) | ❑ Yes | ❑ N/A | SPARE |
| BIO7 | CONTACT OPERATED X317 : 13 – 14 (N/O) | ❑ Yes | ❑ N/A | SPARE |
| BIO8 | CONTACT OPERATED X317 : 15 – 16 (N/O) | ❑ Yes | ❑ N/A | SPARE |
| BIO9 | CONTACT OPERATED X317 : 17 – 18 (N/O) | ❑ Yes | ❑ N/A | SPARE |
| **X321** | | | | |
| BIO10 | CONTACT OPERATED X321 : 1 – 2 (N/O) | ❑ Yes | ❑ N/A | SPARE |
| BIO11 | CONTACT OPERATED X321 : 3 – 4 (N/O) | ❑ Yes | ❑ N/A | SPARE |
| BIO12 | CONTACT OPERATED X321 : 5 – 6 (N/O) | ❑ Yes | ❑ N/A | SPARE |
| BIO13 | CONTACT OPERATED X321 : 7 – 8 (N/O) | ❑ Yes | ❑ N/A | SPARE |
| BIO14 | CONTACT OPERATED X321 : 9 – 10 (N/O) | ❑ Yes | ❑ N/A | SPARE |
| BIO15 | CONTACT OPERATED X321 : 11 – 12 (N/O) | ❑ Yes | ❑ N/A | SPARE |
| BIO16 | CONTACT OPERATED X321 : 13 – 15 (N/C) | ❑ Yes | ❑ N/A | SPARE |
| BIO17 | CONTACT OPERATED X321 : 14 – 15 (N/O) | ❑ Yes | ❑ N/A | SPARE |
| BIO18 | CONTACT OPERATED X321 : 16 – 18 (N/C) | ❑ Yes | ❑ N/A | SPARE |
| BIO19 | CONTACT OPERATED X321 : 17 – 18 (N/O) | ❑ Yes | ❑ N/A | SPARE |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **X326** | | | | |
| BIO20 | CONTACT OPERATED X321 : 1 – 2 (N/O) | ❑ Yes | ❑ N/A | SPARE |
| BIO21 | CONTACT OPERATED X321 : 3 – 4 (N/O) | ❑ Yes | ❑ N/A | SPARE |
| BIO22 | CONTACT OPERATED X321 : 5 – 6 (N/O) | ❑ Yes | ❑ N/A | SPARE |
| BIO23 | CONTACT OPERATED X321 : 7 – 8 (N/O) | ❑ Yes | ❑ N/A | SPARE |
| BIO24 | CONTACT OPERATED X321 : 9 – 10 (N/O) | ❑ Yes | ❑ N/A | SPARE |
| BIO25 | CONTACT OPERATED X321 : 11 – 12 (N/O) | ❑ Yes | ❑ N/A | SPARE |
| BIO26 | CONTACT OPERATED X321 : 13 – 15 (N/C) | ❑ Yes | ❑ N/A | SPARE |
| BIO27 | CONTACT OPERATED X321 : 14 – 15 (N/O) | ❑ Yes | ❑ N/A | SPARE |
| BIO28 | CONTACT OPERATED X321 : 16 – 18 (N/C) | ❑ Yes | ❑ N/A | SPARE |
| BIO29 | CONTACT OPERATED X321 : 17 – 18 (N/O) | ❑ Yes | ❑ N/A | SPARE |

**INDICATION LED TEST**

**LED Checks:**

Go to hardware test to view the physical position of the LED.

|  |  |  |  |
| --- | --- | --- | --- |
| **OPTO Input Number** | **Result Display On or Off** | | **Function** |
| LED 1 | ❑ Yes | ❑ N/A | **PROT IN/OUT** |
| LED 2 | ❑ Yes | ❑ N/A | **CT ALARM** |
| LED 3 | ❑ Yes | ❑ N/A | **R-PHASE ALARM** |
| LED 4 | ❑ Yes | ❑ N/A | **Y-PHASE ALARM** |
| LED 5 | ❑ Yes | ❑ N/A | **B-PHASE ALARM** |
| LED 6 | ❑ Yes | ❑ N/A | **87BB-CH TRIP** |
| LED 7 | ❑ Yes | ❑ N/A | **R-PHASE TRIP** |
| LED 8 | ❑ Yes | ❑ N/A | **Y-PHASE TRIP** |
| LED 9 | ❑ Yes | ❑ N/A | **B-PHASE TRIP** |
| LED 10 | ❑ Yes | ❑ N/A | SPARE |
| LED 11 | ❑ Yes | ❑ N/A | SPARE |
| LED 12 | ❑ Yes | ❑ N/A | SPARE |
| LED 13 | ❑ Yes | ❑ N/A | SPARE |
| LED 14 | ❑ Yes | ❑ N/A | SPARE |
| LED 15 | ❑ Yes | ❑ N/A | SPARE |

#### SERIES & SHUNT RESISTOR MEASUREMENTS:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **PHASE** | **SERIES RESISTOR** | | **SHUNT RESISTOR** | |
| SETTING (Ω) | MEASURED (Ω) | SETTING (Ω) | MEASURED (Ω) |
| R – N |  |  |  |  |
| Y – N |  |  |  |  |
| B – N |  |  |  |  |

1. **PICK UP & DROP OFF TEST FOR CT SHORTING:**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **CURRENT SETTING** | **R – PHASE** | | **Y - PHASE** | | **B -PHASE** | |
| Pickup V | Drop-off V | Pickup V | Drop-off V | Pickup V | Drop-off V |
|  |  |  |  |  |  |  |

1. **OPERATING TIME TEST FOR CT SHORTING:**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **TIME SETTING** | **APPLIED**  **VOLTAGE** | **R – PHASE** | **Y - PHASE** | **B -PHASE** |
| Pickup (sec) | Pickup (sec) | Pickup (sec) |
|  |  |  |  |  |

1. **PICK UP & DROP OFF TEST FOR HIGH IMPEDANCE DIFFERENTIAL:**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **CURRENT SETTING** | **R – PHASE** | | | **Y - PHASE** | | | **B -PHASE** | | |
| Pickup mA | Drop-off mA | Pickup V | Pickup mA | Drop-off mA | Pickup V | Pickup mA | Drop-off mA | Pickup V |
|  |  |  |  |  |  |  |  |  |  |

1. **OPERATING TIME TEST FOR HIGH IMPEDANCE DEFFIERENTIAL:**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **TIME SETTING** | **APPLIED**  **VOLTAGE** | **R – PHASE** | **Y - PHASE** | **B -PHASE** |
| Pickup (msec) | Pickup (msec) | Pickup (msec) |
|  |  |  |  |  |

|  |  |  |
| --- | --- | --- |
| 1 | Communication with PC |  |
| 2 | Event Record Check |  |
| 3 | Disturbance Record Check |  |