1. **GENERAL DATA AND INFORMATION**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Bay no. |  |  | Designation |  |
| Bay Name |  |  | Aux Voltage |  |
| MAKE |  |  | VT Ratio |  |
| Serial No. |  |  | Rated current |  |
| Frequency |  |  |  |  |

1. **RELAY CHECKS (With Relay De-energized):**

|  |  |  |
| --- | --- | --- |
| **Item** | **Relay Checks** | **Result** |
| **1** | Inspection for physical damage / defects. |  |
| **2** | Case Earthing. |  |
| **3** | Verify connections as per approved drawings |  |
| **4** | Watchdog contacts (J11, J12 CLOSED, J13, J14 OPEN) |  |

1. **RELAY CHECKS (With Relay Energized):**

|  |  |  |
| --- | --- | --- |
| **Item** | **Relay Checks** | **Result** |
| **1** | Watchdog contacts (J11,J12 CLOSED, J13, J14 OPEN) |  |
| **2** | Date & Time - Set clock to local time  - Time maintained when Aux. Supply removed |  |
| **3** | Alarm (yellow) LED – to check make Test Mode enable under Commissioning Test menu. |  |
| **4** | Out of service (yellow) LED – to check make Test Mode enable under Commissioning Test menu. |  |
| **5** | Trip (red) LED – apply any fault to produce any trip condition |  |
| **6** | All programmable LEDs – apply Test LEDs under Commissioning test menu. |  |
| **7** | Disturbance recorder checked for correct operation. |  |
| **8** | Event recorder checked for correct operation. |  |

1. **RELAY BURDEN:**

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Applied voltage (VDC)** | **Measured current (mA)** | **Power cons. (Watt)** |
| **Without fault** |  |  |  |
| **With fault** |  |  |  |

Burden less than 19.29 Watt.

1. **INPUT OPTO-ISOLATORS CHECKS**

Go to Commissioning Test, Test mode (test mode), then go to system data column to check the Status of the binary inputs.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **OPTO Input No.** | **V DC Applied Terminal No.** | | **Function** | **Result** | **Remark** |
| **+Ve Terminal No.** | **-Ve Terminal No.** |
| OPTO-1 | D2 | D1 |  |  |  |
| OPTO-2 | D4 | D3 |  |  |  |
| OPTO-3 | D6 | D5 |  |  |  |
| OPTO-4 | D8 | D7 |  |  |  |
| OPTO-5 | D10 | D9 |  |  |  |
| OPTO-6 | D12 | D11 |  |  |  |
| OPTO-7 | D14 | D13 |  |  |  |
| OPTO-8 | D16 | D15 |  |  |  |
| OPTO-9 | F2 | F1 |  |  |  |
| OPTO-10 | F4 | F3 |  |  |  |
| OPTO-11 | F6 | F5 |  |  |  |
| OPTO-12 | F8 | F7 |  |  |  |
| OPTO-13 | F10 | F9 |  |  |  |
| OPTO-14 | F12 | F11 |  |  |  |
| OPTO-15 | F14 | F13 |  |  |  |
| OPTO-16 | F16 | F15 |  |  |  |

1. **OUTPUT RELAYS CHECKS (With Relay Energized)**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Output Relay No.** | **Output Contact No.** | **Function** | **Relay status** | **Remarks** |
| RL1 | H1 – H2 |  |  |  |
| RL2 | H3 – H4 |  |  |  |
| RL3 | H5 – H6 |  |  |  |
| RL4 | H7 – H8 – H9 |  |  |  |
| RL5 | H10 – H11 – H12 |  |  |  |
| RL6 | H13 – H14 – H15 |  |  |  |
| RL7 | H16 – H17 – H18 |  |  |  |
| RL8 | G3 – G4 |  |  | HIGH BREAK CONTACTS |
| RL9 | G7 – G8 |  |  |
| RL10 | G11 – G12 |  |  |
| RL11 | G15 – G16 |  |  |

1. **LEDs FUNCTION CHECK**

|  |  |  |  |
| --- | --- | --- | --- |
| **LED no.** | **Function** | **Check** | **Remarks** |
| **1** |  |  |  |
| **2** |  |  |  |
| **3** |  |  |  |
| **4** |  |  |  |
| **5** |  |  |  |
| **6** |  |  |  |
| **7** |  |  |  |
| **8** |  |  |  |
| **F1** |  |  |  |
| **F2** |  |  |  |
| **F3** |  |  |  |
| **F4** |  |  |  |
|  |  |  |
| **F5** |  |  |  |
|  |  |  |
| **F6** |  |  |  |
| **F7** |  |  |  |
| **F8** |  |  |  |
| **F9** |  |  |  |
| **F10** |  |  |  |

1. **MEASURMENTS CHECK**

- To check secondary values go to measurement 1.

- To check primary values go to measurement setup, set local values to: primary values, then Go to measurement 1.

* 1. **VOLTAGE INPUTS CHECK**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Voltage | Applied Voltage (V) | VT Ratio | Displayed Primary Value (KV) |
| LINE VOLT | VA-N |  |  |  |
| VB-N |  |  |  |
| VC-N |  |  |  |
| BUS VOLT | VB-N |  |  |  |

The measurement voltage accuracy of the relay is ± 2 %.

1. **SYNCH CHECK:**
   1. **AUTO MODE**

|  |  |  |
| --- | --- | --- |
| MODE | AR OPERATION | CHECKED |
| Live Line / Dead Bus | CB Closed |  |
| Dead Line / Live Bus | CB Closed |  |
| Live Line / Live Bus | CB Closed |  |
| Dead Line / Dead Bus | CB Not Closed |  |

* 1. **MAX VOLTAGE**

|  |  |  |  |
| --- | --- | --- | --- |
| Mode | Setting | Pickup | drop-off |
| Bus voltage |  |  |  |
| Line voltage |  |  |  |

* 1. **VOLTAGE DIFFERENCE CHECK Pickup & Drop off Test**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Set Voltage Diff. (V) | Applied Voltage (V) | Measured voltage (V) | | | |
| Bus Side/LINE SIDE | LOWER LIMIT | | UPPER LIMIT | |
| Pick up | Drop-off | Pick up | Drop-off |
|  |  |  |  |  |  |
|  |  |  |  |  |

* 1. **ANGLE DIFFERENCE CHECK**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Set Angle Diff. | Applied angle (°) | | Measured Angle | | | |
| BUS SIDE | LINE SIDE | LOWER LIMIT | | UPPER LIMIT | |
| Pick up | drop-off | Pick up | drop-off |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |

* 1. **FREQUENCY DIFFERENCE CHECK**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Set freq Diff. | Applied frequency(hz) | | Measured frequency | | | |
| BUS SIDE | LINE SIDE | LOWER LIMIT | | UPPER LIMIT | |
| Pick up DIFF | drop-off DIFF | Pick up DIFF | drop-off DIFF |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |

* 1. **SYNCHRONISM CHECK CONDITIONS**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| lIne \ bus | lIVE LEVEL | | | dEAD LEVEL | | |
| setting Voltage | Pickup | Drop oFF | setting Voltage | Pick up | Drop oFF |
| line |  |  |  |  |  |  |
| bus |  |  |  |  |

1. **AUTORECLOSURE FUNCTION CHECK**
   1. **DEAD TIME MEASUREMENT:**

**SHOTS TIME RANGE:**

* TDead Time 1: 0.01 – 300 seconds.
* TDead Time 2: 1 – 9999 seconds.
* TDead Time 3: 1 – 9999 seconds.
* TDead Time 4: 1 – 9999 seconds.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| TDead Time 1 (Sec) | | TDead Time 2 (Sec) | | TDead Time 3 (Sec) | | TDead Time 4 (Sec) | |
| Set Time | Measured Time | Set Time | Measured Time | Set Time | Measured Time | Set Time | Measured Time |
| 5.0 |  | 10.0 |  | 10.0 |  | 10.0 |  |
| 4.0 |  |  | | | | | |

* **Time accuracy ± 20 ms or 2%, whichever is greater (Manual Ref, Page 812)**

Programmed output contact as **"AUTO CB1 CLOSE"** for timer stop (N/O) & take O/P from Freja which simulated to A/R initiate for timer start (N/C) which work at the same time while opening the CB.

* 1. **RECLAIM TIME MEASUREMENT**

|  |  |
| --- | --- |
| Set Time ( Sec) | Measured Time (Sec) |
| 10 |  |
| 20 |  |
| 60 |  |

* Time accuracy ± 20 ms or 2%, whichever is greater (Manual Ref, Page 812)

Programmed output contact as **"3P RECLAIM TIME"** for timer start (N/O) & same contact for timer stop (N/C).

* 1. **CLOSE PULSE TIME:**

|  |  |
| --- | --- |
| Set Time ( Sec) | Measured Time (Sec) |
| 1.0 |  |
| 0.5 |  |

* Time accuracy ± 20 ms or 2%, whichever is greater (Manual Ref, Page 812)

Programmed output contact as **"AUTO CB1 CLOSE"** for timer start (N/O) & and output contact **“AR LOCKOUT"** for timer stop (N/C).

* 1. **C.B IN SERVICE TIME (CB-IS TIME )**

|  |  |
| --- | --- |
| Setting (sec) | Measured Time (sec) |
| 10.0 |  |
| 5.0 |  |

* Time accuracy ± 20 ms or 2%, whichever is greater (Manual Ref, Page 812)

CB IS Time = CB in Service Time. This is a timer setting for which a CB must remain

Closed before it is considered to be "In Service"

To test this time take contact from ***“CB Close Status"*** from freja as (N/O) Start for timer And The Other Contact Is ***"CB IN SERVICE"*** as (N/C) Stop.

* 1. **FUNCTIONAL CHECK:**

|  |  |  |
| --- | --- | --- |
| Item | Function | Check |
| 1 | Breaker Status input checked for correct function |  |
| 2 | AR blocking checked during in progress |  |
| 3 | AR unsuccessful when CB not ready |  |
| 4 | AR in progress and corresponding output relay operation checked |  |
| 5 | AR blocked when 2nd trip command is issued during the dead time |  |
| 6 | AR close pulse stops as soon as the breaker is closed |  |
| 7 | AR relay blocked when issued close pulse does not close the breaker |  |
| 8 | AR relay blocked when OV & UV conditions |  |
| 9 | AR in progress master relay release o/p energized |  |
| 10 | AR blocked when 1st trip command is issued during LL &LB un sync |  |