#### 1. GENERAL DATA AND INFORMATION:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Panel No. | **AVC-1** |  | Designation |  |
| Relay Type | TAPCON®260 | Serial No. |  |
| Rated Voltage | 120 V | Nominal Current | 5 A |
| Aux. Voltage | 125 VDC |  |  |

#### 2. GENERAL INSPECTION CHECKS:

#### Relay Case connected to local earth bar.

1. Set Date and Time

#### LED checked.

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| T/C in Remote | T/C Auto | T/C Manual | Raise | Lower | Over voltage  U> | Under voltage  U< | Over  Current I> | NORM  SET | Relay  energized |
|  |  |  |  |  |  |  |  |  |  |

#### 3. CT & VT SETTING:

|  |  |
| --- | --- |
| PRIMARY VLOTAGE | 13.8 kV |
| PRIMARY CURRENT | 2510 A |
| Desired Voltage Level (REF. VOLT) | 120 V |

#### 4. INPUTS AND OUTPUTS TESTS:

Measured Value Test:

Test Set Up



**Test Procedure :**

Observe the reading on the relay display in secondary values and in primary values.

Inject Current in Terminal:

and Apply Voltage in Terminal:

* 1. **Voltage Measurements:**

|  |  |  |  |
| --- | --- | --- | --- |
| Applied  Voltage(V)  In Terminal | Measured Values In AVR (AVC Panel) | | |
| Expected Voltage (KV) | Voltage Displayed In AVR Relay (KV) | Error % |
| **60** | **6.9** |  |  |
| **120** | **13.8** |  |  |

* 1. **Current Measurements:**

|  |  |  |  |
| --- | --- | --- | --- |
| Injected Current(A)  In Terminal | Measured Values In AVR | | |
| Expected Current (A) | Current Displayed In AVR Relay (A) | Error % |
| **2.5** | **1255** |  |  |
| **5.0** | **2510** |  |  |

* 1. **Power Measurements: At Phase Angle 0°**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Applied  Voltage (kV) | Injected Current (A) | Expected Power (MW) | Power Displayed In AVR Relay (MW) | Error % |
| **6.9** | **1255** | **14.99** |  |  |
| **13.8** | **2510** | **59.99** |  |  |

**Acceptance Norms:** Displayed Current & Voltage as per Setting Value

#### 5. CALIBRATION OF VOLTAGE CONTROL:

**Test Procedure :**

* 1. **Band Width adjustment set at 4 (%) and Measure AC Volts for Raise / Lower to be**

**Switched ON.**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Voltage Inducted  at VT (V) | Set  Bandwidth  (%) | Voltage To Raise (V) | | Voltage to lower (V) | |
| Expected | Measured | Expected | Measured |
| **120** | **±4.0** | **115.2** |  | **124.8** |  |
| **90** | **86.4** |  | **93.6** |  |
| **60** | **57.4** |  | **62.4** |  |

* 1. **Band width adjustment with voltage setting at 120 V:**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Set bandwidth  (%) | Voltage To Raise (V) | | Voltage to lower (V) | | Expected bandwidth (%) | | Measured bandwidth (%) | |
| Expected | Measured | Expected | Measured |
| Raise | Lower | Raise | Lower |
| **±3.0** | **116.4** |  | **123.6** |  | **3** | **3** |  |  |
| **±2.0** | **117.6** |  | **122.4** |  | **2** | **2** |  |  |

1. **Under Voltage Blocking (T1 Linear and set to 10 Sec) :**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Setting Value(V) | Voltage for pickup(V) | | Voltage for  drop off(V) | Timing test(sec) | |
| Expected | Measured | Measured |
| Setting | Measured |
| **70%** | **84.0** |  |  | **6** |  |
| **80%** | **96.0** |  |  | **10** |  |

1. **Over Voltage Detection (AVR lowering fast when over voltage detected)**

|  |  |  |  |
| --- | --- | --- | --- |
| Setting  Value (%) | Voltage for Activation (V) | | Voltage for deactivation (V) |
| Expected | Measured | Measured |
|
| **110%** | **132.0** |  |  |
| **120%** | **144.0** |  |  |

1. **Operating Time test for Timer: T1 Linear without T2 :**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Set bandwidth (%) | Time-delay  T1 (Sec) | Operating time  Expected (sec) | | Operating time  Measured (sec) | |
| Raise | Lower | Raise | Lower |
| **±3.0** | **10** | **10** | **10** |  |  |
| **30** | **30** | **30** |  |  |
| **50** | **50** | **50** |  |  |

1. **Operating Time test for Timer: Linear with time delay T2:**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Set bandwidth (%) | Time-delay  T1 (Sec) | Time – delay  T2 (Sec) | Operating time expected (sec) (T2) | Operating time measured (sec) |
| **±3.0** | **10** | **5** | **5** |  |
| **10** | **8** | **8** |  |
| **10** | **10** | **10** |  |

1. **Operating Time test for Timer: Integral (Desired voltage level 120V) T2 off :**

**FOR LOWER**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Set  Bandwidth (%) | Applied Volts (V) | Measured ΔU% | Time – delay  (Sec) | Operating time Expected (sec) | Operating time Measured (sec) |
| **±2.0** | **130** |  | **10** | **3.33** |  |
| **125** |  | **40** | **20.67** |  |

**FOR RAISE**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Set  Bandwidth (%) | Applied Volts (V) | Measured ΔU% | Time – delay  (Sec) | Operating time Expected (sec) | Operating time Measured (sec) |
| **±2.0** | **110** |  | **10** | **3.33** |  |
| **105** |  | **40** | **7.33** |  |

1. **Over Current Blocking**

|  |  |  |  |
| --- | --- | --- | --- |
| Setting (%) In | Pick up | | Drop off |
| Expected (A) | Measured (A) | Measured(A) |
| **110** | **5.5** |  |  |
| **120** | **6.0** |  |  |

1. **Pulse Duration Time**

|  |  |  |
| --- | --- | --- |
| Set Value (Sec) | Expected (Sec) | Measured (Sec) |
|
| **2** | **2** |  |
| **3** | **3** |  |

1. **Binary Output Checks**

|  |  |  |  |
| --- | --- | --- | --- |
| No. | Binary Output | | |
| Terminal No. | Purpose | Check |
| 1 | I/O-X1: 08-09 (NC) | MANUAL (OUTPUT) | Ok |
| 2 | I/O-X1: 08-10 | AUTO (OUTPUT) | Ok |
| 3 | I/O-X1: 04-05 | RAISE (OUTPUT) | Ok |
| 4 | I/O-X1: 06-07 | LOWER (OUTPUT) | Ok |
| 5 | I/O-X1: 18,19 (NC) | <U,>U,>I (OUTPUT) | Ok |
|  | I/O-X1: 18,20 | <U,>U,>I (OUTPUT) | Ok |
| 6 | I/O-X1: 14 | LOWER (INPUT) | Ok |
| 7 | I/O-X1: 13 | RAISE (INPUT) | Ok |
|  | I/O-X1: 11 | MANUAL (INPUT) | Ok |
| 8 | I/O-X1: 12 | AUTO (INPUT) | Ok |
| 9 | I/O-X1: 29 | MOTOR PRO. OFF (INPUT) | Ok |
| 10 | I/O-X1: 28 | MOTOR DRIVE UNIT OPER. (INPUT) | Ok |
| 11 | I/O-X1: 16 | DESIRED VOL.2 (INPUT) | Ok |
| 12 | I/O-X1: 17 | DESIRED VOL.3 (INPUT) | Ok |
| 13 | I/O-X1: 33 | FREE PARAMETRABLE (INPUT) | Ok |
| 14 | I/O-X1: 23,24 | DESIRED VOL.3 (OUTPUT) | Ok |
| 15 | I/O-X1: 25,26 | DESIRED VOL.2 (OUTPUT) | Ok |

1. **Binary Input UC1 Checks**

|  |  |  |  |
| --- | --- | --- | --- |
| No. | Binary I/O | | |
| Terminal No. | Purpose | Check |
| 1 | UC1-X1: 1,2 | PARALLEL FAILURE (OUTPUT) | Ok |
| 2 | UC1-X1: 3,4 | PARALLEL ON (OUTPUT) | Ok |
| 3 | UC1-X1: 5,6 | TAP POSITION BCD 1 (OUTPUT) | Ok |
| 4 | UC1-X1: 7,8 | TAP POSITION BCD 2 (OUTPUT) | Ok |
| 5 | UC1-X1: 9,10 | TAP POSITION BCD 4 (OUTPUT) | Ok |
| 6 | UC1-X1: 19,18 | TAP POSITION BCD 8 (OUTPUT) | Ok |
| 7 | UC1-X1: 21,20 | TAP POSITION BCD 10 (OUTPUT) | Ok |
| 8 | UC1-X1: 23,22 | TAP POSITION BCD 20 (OUTPUT) | Ok |
| 9 | UC1-X1: 24,25 | TAP POSITION BCD + (OUTPUT) | Ok |
| 10 | UC1-X1: 26,27 | TAP POSITION BCD - (OUTPUT) | Ok |
| 11 | UC1-X1: 11 | PARALLEL GROUP-1 | Ok |
| 12 | UC1-X1: 12 | PARALLEL GROUP-2 | Ok |
| 13 | UC1-X1: 33 | TAP POSITION BCD1 (INPUT) | Ok |
| 14 | UC1-X1: 32 | TAP POSITION BCD2 (INPUT) | Ok |
| 15 | UC1-X1: 31 | TAP POSITION BCD4 (INPUT) | Ok |
| 16 | UC1-X1: 30 | TAP POSITION BCD 8 (INPUT) | Ok |
| 17 | UC1-X1: 17 | TAP POSITION BCD 10 (INPUT) | Ok |
| 18 | UC1-X1: 16 | TAP POSITION BCD 20 (INPUT) | Ok |
| 19 | UC1-X1: 15 | TAP POSITION BCD + (INPUT) | Ok |
| 20 | UC1-X1: 14 | TAP POSITION BCD - (INPUT) | Ok |

1. **Binary Input UC2 Checks**

|  |  |  |  |
| --- | --- | --- | --- |
| No. | Binary I/O | | |
| Terminal No. | Purpose | Check |
| 1 | UC2-X1:1,2 | MASTER (OUTPUT) | Ok |
| 2 | UC2-X1:3,4 | IND. (OUTPUT) | Ok |
| 3 | UC2-X1:5,6 | SPARE (OUTPUT) | Ok |
| 4 | UC2-X1:7,8 | SPARE (OUTPUT) | Ok |
| 5 | UC2-X1:9,10 | SPARE (OUTPUT) | Ok |
| 6 | UC2-X1:19,18 | SPARE (OUTPUT) | Ok |
| 7 | UC2-X1: 21,20 | SPARE (OUTPUT) | Ok |
| 8 | UC2-X1:23,22 | SPARE (OUTPUT) | Ok |
| 9 | UC2-X1:24,25 | SPARE (OUTPUT) | Ok |
| 10 | UC2-X1:26,27 | SPARE (OUTPUT) | Ok |
| 11 | UC2-X1:11 | SPARE (INPUT) | Ok |
| 12 | UC2-X1:12 | SPARE (INPUT) | Ok |
| 13 | UC2-X1:33 | MASTER (INPUT) | Ok |
| 14 | UC2-X1:32 | IND. (INPUT) | Ok |
| 15 | UC2-X1: 31 | FOLL. (INPUT) | Ok |
| 16 | UC2-X1:30 | U<,U>,>I (INPUT) | Ok |
| 17 | UC2-X1:17 | SPARE (INPUT) | Ok |
| 18 | UC2-X1: 16 | SPARE (INPUT) | Ok |
| 19 | UC2-X1:15 | SPARE (INPUT) | Ok |
| 20 | UC2-X1:14 | SPARE (INPUT) | Ok |

1. **Power Consumption :**

|  |  |  |
| --- | --- | --- |
| Applied Voltage | Measured Current (mA) | Measured Power (W) |
|
| **125 VDC** |  |  |

Consumption Power approx. : 25 VA

#### 1. GENERAL DATA AND INFORMATION:

|  |  |
| --- | --- |
| Panel No. | **AVC-1** |
| Relay Type | TAPCON®260 |
| Rated Voltage | 120 V |
| Aux. Voltage | 125 VDC |
| Nominal Current | 5 A |

#### 2. FINAL SETTING TEST RESULTS:

**2.1. Bandwidth adjustment with voltage setting at 120 V:**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Set bandwidth  (%) | Voltage To Raise (V) | | Voltage to lower (V) | | Expected bandwidth (%) | Measured bandwidth (%) |
| Expected | Measured | Expected | Measured |
|  |  |  |  |  |  |  |

**2.2. Under Voltage Blocking 80%**

|  |  |  |  |
| --- | --- | --- | --- |
| Setting value (%V) | Voltage for pick up (V) | | Voltage for drop off (V) |
| Expected | Measured | Measured |
|
|  |  |  |  |

**2.3. Over Voltage Detection 110% (**AVR lowering fast when over voltage detected**)**

|  |  |  |  |
| --- | --- | --- | --- |
| Setting value  (%) | Voltage for Activation | | Voltage for deactivation(V) |
| Expected (V) | Measured (V) | Measured |
|
|  |  |  |  |

**2.4. Operating Time test for Timer:**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Set bandwidth  (%) | Time-delay  T1 (Sec) | Time – delay T2 (Sec) | Operating time measured **T1** | Operating time measured **T2** |
|  |  |  |  |  |

**2.5. Over Current Blocking:**

|  |  |  |  |
| --- | --- | --- | --- |
| Setting (%) In | Pick up | | Drop off |
| Expected (A) | Measured (A) | Measured (A) |
|  |  |  |  |

**Test Equipment’s :**

1. FREJA300 **Serial No. :**
2. Multi-meter (FLUKE) **Serial No. :**