#### GENERAL DATA AND INFORMATION:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Panel No. |  |  | Designation | 25S |
| Serial No. |  | Rated Voltage | 50 – 130 VDC |
| Relay Model | **SYNCHROTACT® 5** | Firmware Ver. | Syn5-AUTO-50/60 V2.2 |
| Make |  | Frequency | 60 Hz |
| VT Ratio | 132kV /115V | Line/ Busbar Voltage | 115 / 66.4 V |

#### MECHANICAL CHECKS AND VISUAL INSPECTION:

|  |  |  |
| --- | --- | --- |
| ITEM | DESCRIPTION | CHECKED |
| 1 | Inspect for physical damage / defects. |  |
| 2 | Verify Connections as per approved drawings. |  |
| 3 | Check tightness of all connections. |  |
| 5 | Check apparatus lists. |  |
| 6 | Check ferrules |  |
| 7 | Check case earthing. |  |

#### ELECTRICAL TESTS: With relay energized condition

|  |  |  |
| --- | --- | --- |
| ITEM | DESCRIPTION | CHECKED |
| 1 | Test Switch checked for correct function. |  |
| 2 | Clock set at local time. |  |
| 3 | Indication checked. |  |
| 4 | Relay Ready (green) LED working. |  |
| 5 | Outputs contacts checked. |  |

1. **ΔU TEST:**

Set F1 & F2 =60HZ φ1 & φ2 = 0

|  |  |
| --- | --- |
| **SET VALUE ΔU%** | MEASURED VALUE |
| U1 FIXED at 66.4V,U2= Controlled | U2 FIXED at 66.4V,U1 = Controlled |
| PICK UP | DROP OFF | PICK UP | DROP OFF |
| **+5%** |  |  |  |  |
| **-5%** |  |  |  |  |
| **+10%** |  |  |  |  |
| **-10%** |  |  |  |  |

1. **TEST FOR PHASE ANGLE:**

Set U1 & U2 =66.4V F1 & F2 = 60 HZ

|  |  |
| --- | --- |
| **SET VALUE** **Δφ** | MEASURED VALUE |
| φ1=0,φ2= Controlled | φ2=0,φ1= Controlled |
| PICK UP | DROP OFF | PICK UP | DROP OFF |
| **+10°** |  |  |  |  |
| **-10°** |  |  |  |  |
| **+15°** |  |  |  |  |
| **-15°** |  |  |  |  |

1. **TEST FOR FREQUNCY CHECK:**

Set φ1 & φ2 = 0, U1 & U2 =66.4V

|  |  |  |
| --- | --- | --- |
| **SET VALUE** | MEASURED VALUE | RELAYSETTINGVALUE |
| F1 FIXED at 60HZ ,F2= Controlled | F2 FIXED at 60HZ,F1 = Controlled |
| PICK UP | DROP OFF | PICK UP | DROP OFF |
| **+100 mHZ** | HZ | HZ | HZ | HZ |  |
| **-100 mHZ** | HZ | HZ | HZ | HZ |  |
| **+200 mHZ** | HZ | HZ | HZ | HZ |  |
| **-200 mHZ** | HZ | HZ | HZ | HZ |  |

1. **MAXIMUM VOLTAGE BLOCKING:**

|  |  |
| --- | --- |
| **Max. Voltage setting (%)** | **Measured blocking voltage (%)** |
| **110** |  |
| **120** |  |

1. **MINIMUM VOLTAGE BLOCKING:**

|  |  |
| --- | --- |
| **Min. Voltage setting (%)** | **Measured blocking voltage (%)** |
| **70** |  |
| **80** |  |

1. **OPERATE TIME TEST :**

Total Paralleling Time ttot :

Connect: Output of Synchrotact Operating (X8: 6 – 7) to TM200 start (N/O) &

Synchrotact Error (X8:1 – 3) to Stop (N/O)

Test it as per the following table.

Set U1 & U2 =66.4V, φ1 & φ2=0, f1 & f2 =60Hz

|  |  |
| --- | --- |
| **SETTING TIME (Min.)** | **MEASURED TIME (Min.)** |
| **0.5** |  |
| **1** |  |

1. **TESTING OF DEAD BUS CONDITIONS:**

Set F1 & F2 =60HZ φ1 & φ2 = 0 UN = 66V

Set Release U2 (No-Volt) = ON.

|  |  |  |
| --- | --- | --- |
| **SET VALUE ΔU%** | MEASURED VALUE | CALCULATED VALUE % |
| U1 FIXED at 66.4V,U2= Controlled | $\frac{U\_{1}-U\_{2}}{U\_{N}}\%$, U1 = FIXED |
| PICK UP | DROP OFF |
| **30%** |  |  |  |

1. **DEAD BUS FUNCTION TEST:**

Set F1 & F2 =60HZ φ1 & φ2 = 0 UO max = 80%

Keep U1, U2 above 80% of 66 V.

|  |  |  |
| --- | --- | --- |
| **INPUT****ENERGIZED** | **CONFIGURATION OF U1 & U2** | **OUTPUT STATUS** |
| **U1 (No-Volt)** | **U2 (No-Volt)** | **EXPECTED** | **ACTUAL** |
| **U1** | OFF | ON | CLOSE |  |
| **U1** | ON | OFF | OPEN |  |
| **U2** | OFF | ON | OPEN |  |
| **U2** | ON | OFF | CLOSE |  |
| **U1** | OFF | OFF | OPEN |  |
| **U2** | OFF | OFF | OPEN |  |
| **U1** | ON | ON | CLOSE |  |
| **U2** | ON | ON | CLOSE |  |
| **U1 & U2 = 0** | ON | ON | CLOSE |  |

**Note:** U1 (No Volt) = ON it means Dead Bus / Dead Line (DB or DL)

U1 (No Volt) = OFF it means Live Bus / Live Line (LB or LL)

1. **FINAL SETTNG:**

* 1. **ΔU TEST:**

Set F1 & F2 = 60 HZ φ1 & φ2 = 0

|  |  |
| --- | --- |
| **SET VALUE ΔU%** | MEASURED VALUE |
| U1 FIXED at 66.4V, U2= Controlled | U2 FIXED at 66.4V, U1 = Controlled |
| PICK UP | DROP OFF | PICK UP | DROP OFF |
| **+15%** |  |  |  |  |
| **-15%** |  |  |  |  |

* 1. **TEST FOR PHASE ANGLE :**

Set U1 & U2 =66.4V F1 & F2 = 60 HZ

|  |  |
| --- | --- |
| **SET VALUE** **Δφ** | MEASURED VALUE |
| φ1=0, φ2= Controlled | φ2=0, φ1= Controlled |
| PICK UP | DROP OFF | PICK UP | DROP OFF |
| **+10°** |  |  |  |  |
| **-20°** |  |  |  |  |

* 1. **TEST FOR FREQUNCY CHECK**

Set φ1 & φ2 = 0, U1 & U2 =66.4V

|  |  |  |
| --- | --- | --- |
| **SET VALUE** | MEASURED VALUE | RELAYSETTINGVALUE |
| F1 FIXED at 60HZ ,F2= Controlled | F2 FIXED at 60HZ,F1 = Controlled |
| PICK UP | DROP OFF | PICK UP | DROP OFF |
| **+150 mHZ** | HZ | HZ | HZ | HZ | **0.25** |
| **-150 mHZ** | HZ | HZ | HZ | HZ | **0.25** |

* 1. **Maximum voltage blocking:**

|  |  |
| --- | --- |
| **Max. Voltage setting (%)** | **Measured blocking voltage (%)** |
| **120** |  |

* 1. **Minimum voltage blocking:**

|  |  |
| --- | --- |
| **Max. Voltage setting (%)** | **Measured blocking voltage (%)** |
| **80** |  |

* 1. **OPERATE TIME TEST:**

Set U1 & U2 =66.4 V, φ1 & φ2=0, f1 & f2 =60 Hz

|  |  |
| --- | --- |
| **SETTING TIME (Min.)** | **MEASURED TIME (Min.)** |
| **5** |  |

* 1. **TESTING OF DEAD BUS CONDITIONS:**

Set F1 & F2 =60HZ φ1 & φ2 = 0 UN = 66V

Set Release U2 (No-Volt) = ON.

|  |  |  |
| --- | --- | --- |
| **SET VALUE ΔU%** | MEASURED VALUE | CALCULATED VALUE % |
| U1 FIXED at 66.4V,U2= Controlled | $\frac{U\_{1}-U\_{2}}{U\_{N}}\%$, U1 = FIXED |
| PICK UP | DROP OFF |
| **30%** |  |  |  |

* 1. **PARAMETER SETTINGS:**

**CONFIGURATION PARAMETERS**

|  |  |  |  |
| --- | --- | --- | --- |
| **PARAMETER** **NAME** | **ABBREVIATION** | **CHECKED** | **REMARKS** |
| **DIGITAL INPUTS** |
| **Digital input 1** | I1 |  | **CANCEL THE FAULT AND** **SET DEVICE TO "READY"** |
| **Digital input 2** | I2 |  | no function |
| **Digital input 3** | I3 |  | no function |
| **Digital input 4** | I4 |  | no function |
| **Digital input 5** | I5 |  | **PARALLELING POINT 1 AND** **PARAMETER SET 1** |
| **Digital input 6** | I6 |  | no function |
| **Digital input 7** | I7 |  | no function |
| **DIGITAL OUTPUTS** |
| **Digital output 1** | O1 |  | **BLOCKED** |
| **Digital output 2** | O2 |  | **READY** |
| **Digital output 3** | O3 |  | no function |
| **Digital output 4** | O4 |  | no function |
| **Digital output 5** | O5 |  | no function |
| **Digital output 6** | O6 |  | no function |
| **Digital output 7** | O7 |  | no function |