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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1. **GENERAL INFORMAYION :**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Serial No. |  |  | Rated Voltage | 100/110/120 VAC  |
| Make |  | Aux. Voltage | 80 – 260 VAC/DC |
| ORDER NO. | RS 611 051 - DA | MODEL NO. | SPAJ 160 C |
| Frequency |  60 Hz | Designation | 50/51/51NUB |
| Rated Current | 1A & 5A |  | Neu. CT Ratio | 10/5A |

1. **MECHANICAL CHECKS AND VISUAL INSPECTION:**

|  |  |  |
| --- | --- | --- |
| ITEM | DESCRIPTION | CHECKED |
| 1 | Inspect for physical damage / defects. |  |
| 2 | Check tightness of all connections. |  |
| 3 | Test Switch checked for correct function. |  |
| 4 | Watchdog contact.  |  |

ELECTRICAL TESTS: With relay energized condition

|  |  |  |
| --- | --- | --- |
| ITEM | DESCRIPTION | CHECKED |
| 1 | Measured auxiliary supply. |  |
| 2 | Clock set at local time. |  |
| 3 | Time maintained when auxiliary supply removed. |  |
| 4 | Relay healthy (green) LED working. |  |
| 5 | Trip (red) LED working. |  |

1. **ELECTRICAL TESTS:**
	1. **MEASUREMENT TEST:**

|  |  |  |  |
| --- | --- | --- | --- |
| Phase | Applied Current (A) | Measured Current (A) | %Error |
| R | 1 A |  |  |
| Y | 1 A |  |  |
| B | 1 A |  |  |

PHASE OVERLOAD PICKUP & DROP OFF TSET:OVERLOAD PROTECTION STAGE Ib> PICKUP & DROP OFF:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| PHASE | SET CURRENT (Ib>) | PICKUP (A) | DROP OFF (A) | DROP OFF/PICKUP RATIO | LIMITS |
| R | 0.3 In |  |  |  | > 0.95 |
| Y | 0.3 In |  |  |  | > 0.95 |
| B | 0.3 In |  |  |  | > 0.95 |

* + 1. **OVERLOAD PROTECTION STAGE Ib> OPERATING TIME TEST (INVERSE DMT):**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| SET CURRENT (Ib>) | K VALUE | INJECTEDCURRENT (2xIb>) | MEASURED TIME (ms) | LIMITS |
| R | Y | B |
| 0.3 In | 0.2 | 0.6 |  |  |  | 35 – 135 (ms) |

Accuracy: Ib> Operating Time Accuracy: ±10% of theoretical value or ±50msOVERLOAD PROTECTION STAGE Ia> PICKUP & DROP OFF:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| PHASE | SET CURRENT (Ia>) | PICKUP (A) | DROP OFF (A) | DROP OFF/PICKUP RATIO | LIMITS |
| R | 80% Ia |  |  |  | > 0.95 |
| Y | 80% Ia |  |  |  | > 0.95 |
| B | 80% Ia |  |  |  | > 0.95 |

* + 1. **OVERLOAD PROTECTION STAGE Ia> OPERATING TIME TEST (DEFINITE TIME):**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| SET CURRENT (Ib>) | TIME SET (min) | INJECTEDCURRENT (2xIa>) | MEASURED TIME (sec) | LIMITS |
| R | Y | B |
| 80% Ia | 0.5 | 0.6 |  |  |  | 29.4 – 30.6  |

 Accuracy: Ia> Operating Time Accuracy: ±2% of set value.UNDERCURRENT (37) PICKUP & DROP OFF TSET:UNDERCURRENT PROTECTION PICKUP & DROP OFF:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| PHASE | SET CURRENT  | PICKUP (A) | DROP OFF (A) | DROP OFF/PICKUP RATIO | LIMITS |
| R | 0.4 In |  |  |  | < 1.1 |
| Y | 0.4 In |  |  |  | < 1.1 |
| B | 0.4 In |  |  |  | < 1.1 |

* + 1. **UNDERCURRENT PROTECTION OPERATING TIME TEST:**

|  |  |  |  |
| --- | --- | --- | --- |
| SET CURRENT (Ib>) | TIME SET (sec) | MEASURED TIME (sec) | LIMITS |
| R | Y | B |
| 0.3 In | 3.0 |  |  |  | 2.94 – 3.06 (sec) |

Accuracy: I< Operating Time Accuracy: ±2% of SET value or ±75ms* + 1. **RECONNECTION INHBIT TIMING TEST:**

|  |  |
| --- | --- |
| RECONNECTION INHBIT TIME SET (sec) | MEASURED TIME (sec) |
| 30.0 |  |

NEUTRAL UNBALANCE CURRENT (NUB) PICKUP & DROP OFF TSET:NEUTRAL UNBALANCE STAGE-1 (ΔI1) PICKUP & DROP OFF:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| PHASE | SET CURRENT (ΔI1) | PICKUP (A) | DROP OFF (A) | DROP OFF/PICKUP RATIO | LIMITS |
| **IN** | 10 % In |  |  |  | > 0.9 |

* + 1. **NEUTRAL UNBALANCE STAGE-1 (ΔI1)** **TIME TEST (DMT):**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| SET CURRENT (ΔI1) | SET TIME (sec) | INJECTEDCURRENT (2xΔI1) | MEASURED TIME (sec) | LIMITS |
| 10% In | 10 | 1 |  | 9.8 – 10.2 (sec) |

Accuracy: ΔI1 Operating Time Accuracy: ±2% of set value or ±75msNEUTRAL UNBALANCE STAGE-2 (ΔI2) PICKUP & DROP OFF:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| PHASE | SET CURRENT (ΔI2) | PICKUP (A) | DROP OFF (A) | DROP OFF/PICKUP RATIO | LIMITS |
| **IN** | 20 % In |  |  |  | > 0.9 |

* + 1. **NEUTRAL UNBALANCE STAGE-1 (ΔI1)** **TIME TEST (DMT):**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| SET CURRENT (ΔI1) | K VALUE | INJECTEDCURRENT (2xΔI2) | MEASURED TIME (msec) | LIMITS |
| 20% In | 0.5 | 2 |  | 465 - 535 (msec) |

T(s) = K x 101.2 / (100 x ΔI / ΔI2) – 97) + 0.02Accuracy: ΔI2 Operating Time Accuracy: ±7.5% of set value or ±35ms |