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| 1. **GENERAL INFORMAYION :**  |  |  |  |  |  | | --- | --- | --- | --- | --- | | Serial No. |  |  | Rated Voltage | 100/110/120 VAC | | Make |  | Aux. Voltage | 80 – 265 VAC/DC | | ORDER NO. | RS 454 004 - AA | MODEL NO. | SPAU 341 C3 | | Frequency | 60 Hz | VT Ratio | 13.8 kV/120V | | Rated Current | 5A |  | CT Ratio | 2510/1A |   Reference Voltage Us Ud = Um - Up  Bandwidth ΔUs Up = Us ± Uz ± Uci = Urev  Time delay T1 Us = Reference Voltage  Time delay T2 Uz = Line Drop Compensation  Overcurrent blocking I> Uci = Circulating Current compensation  Undervoltage blocking U< Urev = Reduce Set Voltage value  Overvoltage detection U> Ud = Difference Voltage  Ur line drop compensation Up = Control Voltage  Ux line drop compensation  Checksum of switchgroup SGF1  Checksum of switchgroup SGF2  Reduce Set Voltage (RSV)   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. |  | | 5 | Relay healthy (green) LED working. |  | | 6 | OUT (Yellow) LED working. |  |  1. **OPERATING VALUE CHECK:**   Rated Voltage = 100 V  CAL ∆Us = (U2-U1)/(U1+U2) \*100  REG=(U1+U2)/2  **SGF1/7= 0 & SGF1/8 = 0 ( Un=100 V )**  SGF1/7= 1 & SGF1/8 = 0 ( Un=110 V )  SGF1/7= 0 & SGF1/8 = 1 ( Un=120 V )   |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | | **SET VALUE** | | **OPERATE VALUE (V)** | | **EXPECTRED VALUE** | | **REG** | **CAL ∆Us** | | **REF. VOLT**  **( Us )** | **BANDWIDTH ∆Us** | **RAISE (U1)** | **LOWER (U2 )** | **RAISE** | **LOWER** | | **0.9 Un=90 V** | **2%** |  |  | **88** | **92** |  |  | | **I.0 Un=100V** | **4%** |  |  | **96** | **104** |  |  | | **1.1 Un=110 V** | **6%** |  |  | **104** | **116** |  |  |  OPERATING TIME CHECK (T1): ∆Us = 2% x Un T2 = 0 Un = 100 V Us = 1.0 x Un  Inverse time calculation : T1 /2(B-1)  B=Ud / ∆Us  SGF1/5= 0 Definite Time & SGF1/5= 1 Inverse Time     |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | | **SET TIME T1 SEC** | **OPERATION** | **APPLIED**  **( V )** | **OPERATING TIME (SEC)** | | **EXPECTED TIME**  **(SEC)** | | **INV.dif.**  **Limits msec** | **LIMITS**  **msec** | | **DEFINITE** | **INVERSE** | **DEFINITE** | **INVERSE** | | **10 SEC** | **RAISE** | **97** |  |  | **10** | **7.99** | **+/-3% of set value** | **+/-1% of set value** | | **LOWER** | **103** |  |  | **10** | **6.37** | **+/-3% of set value** | **+/-1% of set value** | | **20 SEC** | **RAISE** | **97** |  |  | **20** | **15.74** | **+/-3% of set value** | **+/-1% of set value** | | **LOWER** | **103** |  |  | **20** | **12.78** | **+/-3% of set value** | **+/-1% of set value** |  OPERATING TIME CHECK (T2): ∆Us = 2% x Un T1 = 15 Un = 100 V  Us = 1.0 x Un  Inverse time calculation : T1 /2(B-1)  B=Ud / ∆Us   |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | | **SET TIME T1 SEC** | **OPERATION** | **APPLIED**  **( V )** | **OPERATING TIME (SEC)** | | **EXPECTED TIME**  **(SEC)** | | **INV.dif.**  **Limits msec** | **LIMITS**  **msec** | | **DEFINITE** | **INVERSE** | **DEFINITE** | **INVERSE** | | **10 SEC** | **RAISE** | **97** |  |  | **5** | **3.19** | **+/-3% of set value** | **+/-1% of set value** | | **LOWER** | **103** |  |  | **5** | **4.04** | **+/-3% of set value** | **+/-1% of set value** | | **20 SEC** | **RAISE** | **97** |  |  | **10** | **7.95** | **+/-3% of set value** | **+/-1% of set value** | | **LOWER** | **103** |  |  | **10** | **6.37** | **+/-3% of set value** | **+/-1% of set value** |  1. **OPERATING PULSE DURATION (OPD) :**      |  |  | | --- | --- | | **SET** | **Measured Time** | | | **1.5 Sec** |  |  1. **UNDERVOLTAGE BOLCKING U<:**   ∆Us = 2% x Un T1 = 0 T2 = 0  Un = 100 V Us = 1.0 x Un  SGF2/4= 1, Binary Output Contact = X2 (5,6)   |  |  |  |  | | --- | --- | --- | --- | | **Setting % Un** | **Expected Voltage** | **Measured Values** | | | Pickup | Drop Off | | 70 % | 70 V |  |  | | 80 % | 80 V |  |  |  1. **OVERVOLTAGE DETECTION U>:**   ∆Us = 2% x Un T1 = 0 T2 = 0  Un = 100 V Us = 1.0 x Un  SGF2/5 = 1, SGF2/2 = 0, Binary Output Contact = X2 (7,8)   |  |  |  |  | | --- | --- | --- | --- | | **Setting % Un** | **Expected Voltage** | **Measured Values** | | | Pickup | Drop Off | | 110 % | 110 V |  |  | | 120 % | 120 V |  |  |  1. **OVERCURRENT BOLCKING I>:**   ∆Us = 2% x Un T1 = 0 T2 = 0  Un = 100 V Us = 1.0 x Un In = 1 A  SGF2/5 = 1, SGF2/2 = 0, Binary Output Contact = X2 (7,8)   |  |  |  |  | | --- | --- | --- | --- | | **Setting % In** | **Expected Current** | **Measured Values** | | | Pickup | Drop Off | | 1 In | 1 A |  |  | | 1.5 In | 1.5 A |  |  |  1. **LINE DROP COMPENSATION CHECK (LDC):**   ∆Us = 5% x Un T1 = 0 T2 = 0  Un = 100 V Us = 1.0 x Un In = 1 A  **UR & UX = 0**   |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | **SET COPENSATION** | **RAISE** | | **LOWER** | | **REG** | **CAL.**  **∆Us** | | **OPERATE** | **EXPECTED** | **OPERATE** | **EXPECTED** | | **UR & UX=0** |  | **95** |  | **105** |  |  |     **UX =0**   |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | **SET COPENSATION** | **RAISE** | | **LOWER** | | **REG** | **CAL.**  **∆Us** | | **OPERATE** | **EXPECTED** | **OPERATE** | **EXPECTED** | | **UR = 5%** |  | **100** |  | **110** |  |  |   Angle between V& I set at 0o for R compensation  CAL ∆Us = (U2-U1)/(U1+U2) \*100  REG=(U1+U2)/2  UNn=Un + UR  **UR =0**   |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | **SET COPENSATION** | **RAISE** | | **LOWER** | | **REG** | **CAL.**  **∆Us** | | **OPERATE** | **EXPECTED** | **OPERATE** | **EXPECTED** | | **UX = 10%** |  | **105** |  | **115** |  |  |   Angle between V& I set at 90o for R compensation  CAL ∆Us = (U2-U1)/(U1+U2) \*100  REG=(U1+U2)/2  UNn=Un +UX  **UR =0**   |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | **SET COPENSATION** | **RAISE** | | **LOWER** | | **REG** | **CAL.**  **∆Us** | | **OPERATE** | **EXPECTED** | **OPERATE** | **EXPECTED** | | **UX = 15%** |  | **80** |  | **90** |  |  |   Angle between V& I set at 270o for R compensation  CAL ∆Us = (U2-U1)/(U1+U2) \*100  REG=(U1+U2)/2  UNn=Un –UX |