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| Site ACCEPTANCE TEST REPORT FOR PSS0:  REMOTE I/O RACK BLUE SYSTEM  ACC.F01.K01.U10 |
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|  | Name | Role/Title |
| --- | --- | --- |
| Owner | Stuart Birch | Senior Engineer, Personnel Safety Systems |
| Author | Alberto Toral Diez | Technician for Protection Systems |
| Reviewer | Mattias Eriksson  Morteza Mansouri | Technician for Protection Systems  Lead integrator Engineer for safety critical systems |
| Approver | Annika Nordt | Protection Systems Group Leader |

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| **VALIDATION DATA** |  |

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| Facility Breakdown Structure (FBS):  **=ACC.F01.K01.U10**  Location Breakdown Structure (LBS):  **+ESS.G01.090.5005.101.002**  ESS name:  **FEB-020Row: CnPw-U-002** | | | |
| **CONTACTS**  **Test and Validation Coordinator:** **Stuart Birch**  **Test Leader:** **Mattias Eriksson**  **PLC Programmer:** **Morteza Mansouri** | | | |
| **ROLES & RESPONSIBILITIES** | | | |
| **ROLES** | **RESPONSIBILITIES** | | |
| **Tests to be performed** | **SIGNATURE** | **DATE** |
| **Test team** | **clause** |  |  |
| 1. *Test and Validation Coordinator* | *7* |  | *2018-06-06* |
| 1. *Test Leader* | *1, 2, 3, 4 & 5* |  | *2018-06-06* |
| 1. *PLC Programmer* | *6* |  | *2018-06-06* |
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| **LIST OF REFERENCE DOCUMENTATION** |  |

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| 1. *PSS0 Electrical Circuit Diagram (ESS-0151602)* |
| 1. *ESS Rules for electrical design (ESS-0015433)* |
| 1. *ESS Generic requirements for marking and labelling (ESS-009409)* |
| 1. *SS-EN 62381 Automation systems in the process industry – FAT, SAT and SIT.* |
| 1. *SS-EN 60204-1 Safety of machinery – Electrical equipment of machines – Part 1: General requirements.* |
| 1. *ESS Site Acceptance Test template (ESS-0113711)* |
| 1. *ESS Guideline for Validation Factory Acceptance Test and Site Acceptance Test (ESS-0094204)* |
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| **LIST OF TEST EQUIPMENT** |
| 1. *Windows laptop with TIA portal installed (V14 SP1)* |
| 1. *FLUKE 705 Current Loop Calibrator 24mA* |
| 1. *FLUKE 375 FC Clamp Meter* |
| 1. *FLUKE 789/IR3000FC Multi Function Calibrator 1A* |
| 1. *FLUKE 1507 Insulation Tester* |
| 1. *Flexible measurement probes* |
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| **VALIDATION APPROVAL** | | | | |
| APPROVED | REJECTED | | | |
| SIGN: | SIGN: | | | |
| DATE: *2018-06-06* | DATE: | | | |
| **TESTS TO BE PERFORMED**  ***Tests to be performed may be adjusted as applicable*** | | **SUMMARY FINDINGS** | | |
| **Passed** | **Not Passed** | **NA** |
| * + - 1. ***Check that the electrical equipment complies with the documentation for manufacturing. (according SS EN 60204-1)*** | |  |  |  |
| * + - 1. ***Check that conditions for protection against indirect contact by automatic disconnection are fulfilled. (according SS EN 60204-1)*** | |  |  |  |
| * + - 1. ***Check insulation resistance. (according SS EN 60204-1)*** | |  |  |  |
| * + - 1. ***Check for disruptive discharge occurrence by voltage tests. (according SS EN 60204-1)*** | |  |  |  |
| * + - 1. ***Check for residual voltages. (according SS EN 60204-1)*** | |  |  |  |
| * + - 1. ***Check functions. (according SS EN 60204-1)*** | |  |  |  |
| * + - 1. ***Punch list.*** | |  |  |  |
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| **DETAILED FINDINGS APPROVAL**  ***Check that the electrical equipment complies with the documentation for manufacturing*** | |
| APPROVED | REJECTED |
| SIGN: | SIGN: |
| DATE: *2018-06-06* | DATE: |

# Check that the electrical equipment complies with the documentation for manufacturing

**Tests to be performed may be adjusted as applicable**

1. Conductors inside control cabinets (colour, type, end sleeves) mounted according to the documentation for manufacturing   
   N/A Remark Approved
2. Marking of components shall be according to manufacturing documentation. The marking shall still be present even if the component is replaced, which means that the marking is to be located beside the component.  
   N/A Remark Approved
3. Function Markings e.g. above the actuators, operator panel, instruments, etc.  
   performed according to manufacturing documentation.  
   N/A Remark Approved
4. Components selected according to the manufacturing documentation.   
   N/A Remark Approved
5. Placement of components inside control cabinets made according to production documentation. Mounting layout shall be compared with the control cabinet. For approval the components shall be positioned so that no confusion of components can be made in comparison with the mounting layout.  
   N/A Remark Approved
6. Functional separation inside control cabinets made according to production documentation. Mounting layout shall be compared with the control cabinet. For approval conductors shall be located in the designated conduit / cable path.  
   N/A Remark Approved
7. Marking of equipment a nameplate shall be mounted adjacent to the incoming supply point (main switch or terminal), according ESS-0015433 Rules for electrical design, Clause regarding Marking of cabinets.  
   N/A Remark Approved
8. IP-class shall comply with documentation for manufacturing  
   N/A Remark Approved
9. IP-class 21 (touch-proof) shall be fulfilled inside control cabinet.  
   N/A Remark Approved
10. Functional bonding. Mounting plate shall be galvanized. Colour at connection points for functional bonding must be removed. Connection points for functional bonding shall be threaded and spring washer positioned adjacent to the screw head.   
    N/A Remark Approved
11. Cable Markings shall comply with documentation for manufacturing.  
    N/A Remark Approved
12. Routing of installed cables shall comply with documentation for manufacturing.  
    N/A Remark Approved
13. Cable types shall comply with documentation for manufacturing.  
    N/A Remark Approved
14. Connections of installed cables shall comply with documentation for manufacturing.  
    N/A Remark Approved  
      
    **Additional Remarks**

## Not approved Approved

## Not approved Approved

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| **DETAILED FINDINGS APPROVAL**  ***Check that conditions for protection against indirect contact by automatic disconnection are fulfilled.*** | |
| APPROVED | REJECTED |
| SIGN: | SIGN: |
| DATE: *2018-06-06* | DATE: |

# Check that conditions for protection against indirect contact by automatic disconnection are fulfilled.

**Tests to be performed may be adjusted as applicable**

## Check continuity of the protective bonding circuits N/A Approved Remark

## Check conditions for fault loop impedance by checking that conductor length and area comply with calculation N/A Approved Remark

## Check settings and characteristics of the associated overcurrent protective devices N/A Approved Remark

## Check conditions for protection by reducing the touch voltage below 50V by checking that conductor length and area comply with calculation. NOTE – Equipotential protective bonding conductor area do not need to be larger than 25mm2Cu. N/A Approved Remark

## Additional Remarks

## Not approved Approved

## Not approved Approved

## Not approved Approved

## Not approved Approved

## Not approved Approved

## Not approved Approved

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| **DETAILED FINDINGS APPROVAL**  ***3. Check insulation resistance.*** | |
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| DATE: | DATE: |

# Check insulation resistance.

*N/A Remark*

Note: insulation resistance check was performed in FAT and is not repeated during SAT

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| **DETAILED FINDINGS APPROVAL**  ***4. Check for disruptive discharge occurrence by voltage tests.*** | |
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| DATE: | DATE: |

# Check for disruptive discharge occurrence by voltage tests.

*N/A Remark*

Note: disruptive discharge by voltage test was performed in FAT and is not repeated during SAT

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| **DETAILED FINDINGS APPROVAL**  ***5. Check for residual voltages.*** | |
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| DATE: | DATE: |

# Check for residual voltages.

## Check for residual voltages N/A Approved Remark

Additional Remarks

## Not approved Approved

## Not approved Approved

## Not approved Approved

## Not approved Approved

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| **DETAILED FINDINGS APPROVAL**  ***6. Check functions.*** | |
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| SIGN: | SIGN: |
| DATE: *2018-06-06* | DATE: |

# Check functions.

***Tests to be performed may be adjusted as applicable***

## Test Supply disconnecting device by switching on and off. In off position, all electrical supply to the controlled equipment shall be isolated. Selected electrical points are measured and checked that no electrical voltage is present. In on position, all electrical components shall be electrically supplied, and CPU, OP, etc. shall automatically go into RUN mode. (Orange conductors are not covered by the test). N/A Approved Remark

## Emergency Stop Function shall disconnect electric supply to equipment according to risk assessment. *N/A Approved Remark*

## Active-unacknowledged, active-acknowledged, acknowledged inactive- alarm is indicated. *N/A Approved Remark*

## *Equipment shall not restart automatically after power failure. Example, if a local disconnecting device to a motor is operated, etc. N/A Approved Remark*

Additional Remarks

## Not approved Approved

## Not approved Approved

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| **DETAILED FINDINGS APPROVAL**  ***6. Check functions.*** |

## PLC Test of input/output channels by devices or functionalities N/A

## Digital inputs are activated by feedback from sensors or actuators. The activation of a digital input is monitored via the programming tool (TIA Portal) by checking its status.

Digital outputs are forced via the programming tool (TIA Portal), the corresponding external objects that are connected to the digital output are activated.

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| **Module** | **Physical address** | **Description** | **Approval** |
| **KF2** | F-DI-DI0 | Z0 MgS Ch2 NC | N/A Approved Remark |
| **KF2** | F-DI-DI1 | Z0 ESB Ch3 NC | N/A Approved Remark |
| **KF2** | F-DI-DI2 | Z0 MeL Ch2 NC | N/A Approved Remark |
| **KF2** | F-DI-DI3 | Z0 ACB Ch2 NO | N/A Approved Remark |
| **KF2** | F-DI-DI4 | Z0 MeS Ch2 NC | N/A Approved Remark |
| **KF2** | F-DI-DI5 | Z0 ESB Ch4 NC | N/A Approved Remark |
| **KF2** | F-DI-DI6 | Z0 GRly Ch2 NC | N/A Approved Remark |
| **KF2** | F-DI-DI7 | Contact. for GRly Ch2 NC | N/A Approved Remark |
| **KF3** | F-DI-DI0 | U7 ISrcExt Cont. Rly2 NC | N/A Approved Remark |
| **KF3** | F-DI-DI1 | U7 ISrcExt Power Cont. 2 NO | N/A Approved Remark |
| **KF3** | F-DI-DI2 | U7 ISrcExt Power Cont. 1 NC | N/A Approved Remark |
| **KF3** | F-DI-DI3 | U7 ISrcExt Power Cont. 2 NC | N/A Approved Remark |
| **KF3** | F-DI-DI4 | U7 ISrcExt Power Cont. 1 NO | N/A Approved Remark |
| **KF4** | DI0 | Search state #1 from Red Sys. | N/A Approved Remark |
| **KF4** | DI1 | Search state #2 from Red Sys. | N/A Approved Remark |
| **KF4** | DI2 | Red Sys. state #1 | N/A Approved Remark |
| **KF4** | DI3 | Red Sys. state #2 | N/A Approved Remark |
| **KF4** | DI6 | Surge Arrester OK | N/A Approved Remark |
| **KF4** | DI7 | PS 24VDC OK | N/A Approved Remark |
| **KF4** | DI8 | UPS 24VDC OK | N/A Approved Remark |
| **KF4** | DI9 | UPS BAT | N/A Approved Remark |
| **KF4** | DI10 | UPS Alarm | N/A Approved Remark |
| **KF4** | DI11 | UPS Ready to buffer | N/A Approved Remark |
| **KF4** | DI12 | UPS BAT > 85% | N/A Approved Remark |
| **KF4** | DI13 | Selectivity Module OK | N/A Approved Remark |
| **KF6** | F-DQ-P0 | U7 ISrcExt Cont. Rly2 A1 | N/A Approved Remark |
| **KF6** | F-DQ-M0 | U7 ISrcExt Cont. Rly2 A2 | N/A Approved Remark |
| **KF8** | DQ0 | Blue Sys. state #1 to Red. Sys | N/A Approved Remark |
| **KF8** | DQ1 | Blue Sys. state #2 to Red. Sys | N/A Approved Remark |

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| **DETAILED FINDINGS APPROVAL**  ***6. Check functions.*** |

## PLC Test of digital input/output in spare channels N/A *Approved Remark*

## The digital inputs are activated by using a tool to generate 24 V DC in the input terminals, this causes a feedback signal that enables the corresponding digital input signal. The activation of a digital input is monitored via the programming tool (TIA Portal) by checking its status.

## Digital outputs are forced via the programming tool (TIA Portal), the corresponding relays that are connected to the digital output are activated, if no relay is connected to the digital output, 24V DC shall be measured in the respective digital output terminals.

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| *Remarks:* |

***7.PUNCH LIST.***

Any incomplete work or nonconformities shall be recorded on the SAT punch list and categorized as follows:

1. To be cleared on the spot, SAT to be continue after rectification
2. Ongoing rectification during SAT
3. SAT to be repeated
4. Modifications to be made after SAT, before the system/cabinet/controllers are conciderde ready for next step
5. Remaining work to be rectified

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| ITEM | DESCRIPTION | RESPONSIBLE | TYPE | COMPLETE |
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**SAT CERTIFICATE**

ACCEPTED  NOT ACCEPTED

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| **Customer** | *European Spallation Source ERIC* | | *ICS Division, PS Group, PSS - WP14.9* | |
| **Project** | *Accelerator Personnel Safety System 0* | | | |
| **ESS Name** | *FEB-020Row:CnPw-U-002* | **High level function (FBS)** | | =ACC.F01.K01.U10 |
| **Physical location (LBS)** | *+ESS.G01.090.5005.101.002* | | | |
| **SAT finished on** | *2018-06-06* | | | |

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| **No punch list items were found** | **Punch list items were found**   (See remarks below or at punch list) |
| **Re-Check necessary** | **Re-Check NOT necessary** |
| **System ready for SIT** | **Remarks:** |

**ESS Authorized representatives:**

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| **Date** | *2018-06-06* | | |
| **Name** | *Mattias Eriksson* | *Morteza Mansouri* | *Stuart Birch* |
| **Signature** |  |  |  |