***Region of York Station Name***

**Control Panel CP-*x***

**Panel Factory Acceptance Test Document**

**Section 13311**

**APPROVAL OF EXECUTED FAT**

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| --- | --- | --- | --- |
| ***Region of York Station Name* Control Panel CP-*x***  **Factory Acceptance Test (FAT) Plan Approval** | | | |
| **Responsible**  **Department** | **Responsible**  **Person** | **Signature** | **Date**  **(MM/DD/YYYY)** |
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**Panel Factory Acceptance Test**

**(FAT)**

***Station Name***

**Date**

***DD/MM/YYYY***

**Prepared By: *Name***

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# [Control panel layout and As-built drawings](#TOC)

**Procedure:**

Verify that the panel has been constructed as per the approved shop drawings.

Verify that the as-built drawings are present in the control panel.

Verify the control panel major components match the bill of materials.

Verify all components are tagged and wiring is labeled as per the drawings.

Verify CSA label on enclosure.

If any comments are necessary, enter a note number in the test form column and record the comment in the comments form at the end of this document.

**Acceptance Criteria:**

Control panel construction and labeling shall match the as-built drawings.

|  |  |  |  |
| --- | --- | --- | --- |
| **As built drawings verification** | | | |
| **Item No.** | **Description** | **Results**  **Pass(ü)/Fail(O)** | **Notes** |
| 1 | As built drawings present |  |  |
| 2 | Bill of materials correct |  |  |
| 3 | Layout correct |  |  |
| 4 | All components tagged as per built drawings |  |  |
| 5 | All wiring labeled as per built drawings |  |  |
| 6 | Wires on PAC card are labeled |  |  |
| 7 | Machine printed labels used |  |  |
| 8 | Stud welds used, no drill holes through the exterior panel |  |  |
| 9 | All labels installed, both outside and inside the panel, all warning labels installed |  |  |
|  |  |  |  |
| 10 | Proper terminal block jumpers have been used |  |  |
| 11 | Laptop tray installed at proper height, OIT installed at proper height |  |  |
| 12 | Lamps are LED type, not incandescent |  |  |
| 13 | Pushbuttons are mounted correctly and at proper height |  |  |
| 14 | Panel is clean and dust free |  |  |
| 15 | Wiring is separated by signal type and voltage |  |  |
| 16 | Labels on inside of PAC covers are applied |  |  |
| 17 | Verify correct processor firmware version |  |  |
| 18 | Fuse Chart on door |  |  |
| 19 | All fuses labeled |  |  |
| 20 | All circuit breakers labeled |  |  |
| 21 | Upon completion racks and I/O cards removed prior to shipping |  |  |
| 22 |  |  |  |
| 23 |  |  |  |
| 24 |  |  |  |
| 25 |  |  |  |
| 26 |  |  |  |
| 27 |  |  |  |

# [Power and Fusing Verification](#TOC)

**Procedure:**

Verify that the indicated circuit breaker or fuse is installed and labeled with the indicated rating. Refer to as built control panel wiring diagrams for the required circuit protection and rating. Record the installed protection device rating.

Verify fuse chart is applied to the panel door.

If the indicated installed circuit protection device matches the required rating enter PASS or ü in the test form column.

If any comments are necessary, enter a note number in the test form column and record the comment in the comments form at the end of this document.

**Acceptance Criteria:**

Installed fuses and circuit breakers shall match the required specifications. The correct equipment is powered by the fuse and/or circuit breaker as shown on the as-built electrical drawings.

## [Control Panel AC Fusing/Circuit Breakers](#TOC)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Control Panel AC Power & Fusing Verification** | | | | | |
| **Circuit Breaker Or Fuse Identification** | **Description** | **Required**  **Rating** | **Installed**  **Rating** | **Result**  **Pass(ü)/Fail(O)** | **Notes** |
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## [Control Panel DC Fusing/Circuit Breakers](#TOC)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Control Panel DC Power & Fusing Verification** | | | | | |
| **Circuit Breaker Or Fuse Identification** | **Description** | **Required**  **Rating** | **Installed**  **Rating** | **Result**  **Pass(ü)/Fail(O)** | **Notes** |
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# [Grounding & Bonding Verification](#TOC)

**Procedure:**

Verify that the indicated component is properly connected to electrical ground.

1. Switch off system power.
2. Verify the installation of the ground connection between the grounding bus or common ground terminal and the indicated component.
3. Measure the resistance between the grounding bus or common ground terminal and the indicated component.
4. Record the measured resistance between the ground connection and the component.

If the indicated grounding connection is installed and meets the maximum resistance specification enter a PASS or ü in the test form column.

If any comments are necessary, enter a note number in the test form column and record the comment in the comments form at the end of this document.

**Acceptance Criteria:**

The grounding or bonding conductor is installed and the resistance measurement must be less than or equal to 0.2 Ω between termination points.

## [Control Panel Grounding & Bonding](#TOC)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Control Panel Grounding & Bonding Verification** | | | | |
| **Grounding Point** | **Ground Conductor**  **Visual Inspection** | **Resistance** | **Results**  **Pass(ü)/Fail(O)** | **Notes** |
| Control Panel Main Chassis |  | Ω |  |  |
| Control Panel Door |  | Ω |  |  |
| PAC General Power Supply |  | Ω |  |  |
| 24 VDC Power Supply |  | Ω |  |  |
| Ethernet switch dedicated chassis ground |  | Ω |  |  |
| Remote I/O chassis |  | Ω |  |  |
| Surge Suppressor |  | Ω |  |  |
| UPS |  | Ω |  |  |
| Service Receptacle |  | Ω |  |  |
| Door combination receptacle |  | Ω |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |

# Panel Construction

**Procedure:**

Verify that the panel hardware supplied in the control panel follows the Region specification.

If the indicated wire on the Regions standard bill of material matches the required type enter PASS or ü in the test form column.

If any comments are necessary, enter a note number in the test form column and record the comment in the comments form at the end of this document.

Perform wire pull test on each wire.

**Acceptance Criteria:**

Installed wire and hardware shall match the required specifications.

## [Wire](#TOC) Verification

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Wire Verification** | | | | | | |
| **Wiring** | **Wire Type**  **Pass(ü)/Fail(O)** | **Wire Colour**  **Pass(ü)/Fail(O)** | **IO Card Type**  **Pass(ü)/Fail(O)** | **Terminals**  **Pass(ü)/Fail(O)** | **Relay Types**  **Pass(ü)/Fail(O)** | **Notes** |
| Digital Inputs (DC) |  |  |  |  |  |  |
| Digital Outputs |  |  |  |  |  |  |
| Analog Inputs |  |  |  |  |  |  |
| Analog Outputs |  |  |  |  |  |  |
| 120 VAC Power |  |  |  |  |  |  |
| 24 VDC Power |  |  |  |  |  |  |

## Panel Components

|  |  |  |
| --- | --- | --- |
| **General Panel Components** | | |
| **Wiring** | **Wire Type**  **Pass(ü)/Fail(O)** | **Notes** |
| 24 VDC Power Supply |  |  |
| 24 VDC PS Redundancy Module |  |  |
| UPS |  |  |
| UPS Ethernet Module |  |  |
| Communications Surge Arrestor |  |  |

# [Discrete I/O Verification](#TOC)

**Procedure:**

Verify, using RSLogix software, that PAC Input register status changes according to the input source device status and that digital PAC Output register status changes actuate the appropriate output device.

1. **Digital Inputs:** Verify PAC input register status changes when the input source device state is changed. Record a description of the input source for the test. For example:

* Simulated field input
* Local pushbutton
* Local hand switch

1. **Digital Outputs:** Place the PAC Digital Output register into a ‘Forced’ state and change the output using the programming software and verify the corresponding output device status change. Record a description of the output device for the test. Functional test is to include the interposing relay contact status. For example:

* Dry contact output
* Powered output
* Local indicator
* Local annunciator

Change the state of the input source from OFF to ON and record the state of the PAC input. Repeat the test for the ON to OFF transition. If the PAC input register status change is consistent with the input source device and the as-built drawings then enter PASS or ü in the test form column.

Change the state of the PAC output register from OFF to ON and record the state of the output device. Repeat the test for the ON to OFF transition. If the output device actuation is consistent with the PAC forced output and the as-built drawings then enter PASS in the test form column.

If any comments are necessary, enter a note number in the test form column and record the comment in the comments form at the end of this document.

**Acceptance Criteria:**

PAC digital inputs and outputs must be consistent with the input source devices and output devices as shown on the as-built drawings. Changing the state of the input source device must produce a consistent change in the PAC input register. Forcing a change in the state of a PAC output register must produce a consistent change in the output device.

## [Digital](#TOC) Inputs

### [Rack](#TOC) [00, Slot 02, Points 00](#TOC) - 15

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **I/O Verification (Digital Inputs)** | | | | |
| **Wire Tag** | **I/O Point Tag and Description** | **PAC I/O Point**  **Status Change** | **Result**  **Pass(ü)/Fail(O)** | **Notes** |
| I00200 | XXXXXXXXXXXXX (Tagname) | OFF (0) ~ ON (1) |  |  |
| XXXXXXXXXXXXX (Description) | ON (1) ~ OFF (0) |  |  |
| I00201 |  | OFF (0) ~ ON (1) |  |  |
|  | ON (1) ~ OFF (0) |  |  |
| I00202 |  | OFF (0) ~ ON (1) |  |  |
|  | ON (1) ~ OFF (0) |  |  |
| I00203 |  | OFF (0) ~ ON (1) |  |  |
|  | ON (1) ~ OFF (0) |  |  |
| I00204 |  | OFF (0) ~ ON (1) |  |  |
|  | ON (1) ~ OFF (0) |  |  |
| I00205 |  | OFF (0) ~ ON (1) |  |  |
|  | ON (1) ~ OFF (0) |  |  |
| I00206 |  | OFF (0) ~ ON (1) |  |  |
|  | ON (1) ~ OFF (0) |  |  |
| I00207 |  | OFF (0) ~ ON (1) |  |  |
|  | ON (1) ~ OFF (0) |  |  |
| I00208 |  | OFF (0) ~ ON (1) |  |  |
| ON (1) ~ OFF (0) |  |  |
| I00209 |  | OFF (0) ~ ON (1) |  |  |
|  | ON (1) ~ OFF (0) |  |  |
| I00210 |  | OFF (0) ~ ON (1) |  |  |
|  | ON (1) ~ OFF (0) |  |  |
| I00211 |  | OFF (0) ~ ON (1) |  |  |
|  | ON (1) ~ OFF (0) |  |  |
| I00212 |  | OFF (0) ~ ON (1) |  |  |
|  | ON (1) ~ OFF (0) |  |  |
| I00213 |  | OFF (0) ~ ON (1) |  |  |
|  | ON (1) ~ OFF (0) |  |  |
| I00214 |  | OFF (0) ~ ON (1) |  |  |
|  | ON (1) ~ OFF (0) |  |  |
| I00215 |  | OFF (0) ~ ON (1) |  |  |
|  | ON (1) ~ OFF (0) |  |  |

## [Digital Outputs](#TOC)

### [Rack 00, Slot 03, Points 00 - 15](#TOC)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **I/O Verification (Digital Outputs)** | | | | |
| **Wire Tag** | **I/O Point Tag and Description** | **PAC I/O Point**  **Status Change** | **Result**  **Pass(ü)/Fail(O)** | **Notes** |
| O00300 | XXXXXXXXXXXXX (Tagname) | OFF (0) ~ ON (1) |  |  |
| XXXXXXXXXXXXX (Description) | ON (1) ~ OFF (0) |  |  |
| O00301 |  | OFF (0) ~ ON (1) |  |  |
|  | ON (1) ~ OFF (0) |  |  |
| O00302 |  | OFF (0) ~ ON (1) |  |  |
|  | ON (1) ~ OFF (0) |  |  |
| O00303 |  | OFF (0) ~ ON (1) |  |  |
|  | ON (1) ~ OFF (0) |  |  |
| O00304 |  | OFF (0) ~ ON (1) |  |  |
|  | ON (1) ~ OFF (0) |  |  |
| O00305 |  | OFF (0) ~ ON (1) |  |  |
|  | ON (1) ~ OFF (0) |  |  |
| O00306 |  | OFF (0) ~ ON (1) |  |  |
|  | ON (1) ~ OFF (0) |  |  |
| O00307 |  | OFF (0) ~ ON (1) |  |  |
|  | ON (1) ~ OFF (0) |  |  |
| O00308 |  | OFF (0) ~ ON (1) |  |  |
|  | ON (1) ~ OFF (0) |  |  |
| O00309 |  | OFF (0) ~ ON (1) |  |  |
|  | ON (1) ~ OFF (0) |  |  |
| O00310 |  | OFF (0) ~ ON (1) |  |  |
|  | ON (1) ~ OFF (0) |  |  |
| O00311 |  | OFF (0) ~ ON (1) |  |  |
|  | ON (1) ~ OFF (0) |  |  |
| O00312 |  | OFF (0) ~ ON (1) |  |  |
|  | ON (1) ~ OFF (0) |  |  |
| O00313 |  | OFF (0) ~ ON (1) |  |  |
|  | ON (1) ~ OFF (0) |  |  |
| O00314 |  | OFF (0) ~ ON (1) |  |  |
|  | ON (1) ~ OFF (0) |  |  |
| O00315 |  | OFF (0) ~ ON (1) |  |  |
|  | ON (1) ~ OFF (0) |  |  |

# [Analog I/O Verification](#TOC)

**Procedure:**

Verify, using RSLogix software, that PAC Input register status changes according to the input source device status and that digital PAC Output register status changes actuate the appropriate output device.

1. **Analog Inputs:** Verify PAC I/O register binary value changes in relation to the field device output value.
2. **Analog Outputs****:** Place the PAC I/O Analog Output register into a ‘Forced’ state and enter a range of output values using the programming software and verify the field device status change.

For each analog input channel record the expected values corresponding to 0%, 25%, 50%, 75%, and 100% of the input signal range. Using an appropriate signal generator, set the input signal 0%, 25%, 50%, 75%, and 100% of full range and record the raw decimal value in the PAC input register. If the PAC input register value is within +/- 0.1% (full scale) of the desired value then enter PASS or ü in the test form column.

For each analog input channel record the expected values corresponding to 0%, 25%, 50%, 75%, and 100% of the raw PAC output range. Using the programming software, set the output signal to 0%, 25%, 50%, 75%, and 100% of full range and record the actual signal. If the measured signal is within +/-0.1% (full scale) of the desired value then enter PASS or ü in the test form column

If any comments are necessary, enter a note number in the test form column and record the comment in the comments form at the end of this document.

**Acceptance Criteria:**

PAC analog inputs and outputs must be consistent with the input source signals and output signals as shown on the as-built drawings. Changing the state of the input source signal must produce a consistent change in the PAC input register value. Forcing a change in the value of a PAC output register must produce a consistent change in the output signal.

## [Analog In](#TOC)[puts](#TOC)

### [Rack 00, Slot 07, Points](#TOC) 00 - 05

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **I/O Verification (Analog Inputs)** | | | | | | |
| **Wire Tag** | **I/O Point Description** | **PAC input range** | **Expected PAC Span Value** | **Actual PAC Span Value** | **Result**  **Pass(ü)/Fail(O)** | **Notes** |
| I00700+  I00700- | XXXXXXXXXXXXX (Tagname)  XXXXXXXXXXXXX (Description) | 4 mA | 0 |  |  |  |
| 8 mA | 25 |  |  |  |
| 12 mA | 50 |  |  |  |
| 16 mA | 75 |  |  |  |
| 20 mA | 100 |  |  |  |
| I00701+  I00701- |  | 4 mA | 0 |  |  |  |
| 8 mA | 25 |  |  |  |
| 12 mA | 50 |  |  |  |
| 16 mA | 75 |  |  |  |
| 20 mA | 100 |  |  |  |
| I00702+  I00702- |  | 4 mA | 0 |  |  |  |
| 8 mA | 25 |  |  |  |
| 12 mA | 50 |  |  |  |
| 16 mA | 75 |  |  |  |
| 20 mA | 100 |  |  |  |
| I00703+  I00703- |  | 4 mA | 0 |  |  |  |
| 8 mA | 25 |  |  |  |
| 12 mA | 50 |  |  |  |
| 16 mA | 75 |  |  |  |
| 20 mA | 100 |  |  |  |
| I00704+  I00704- |  | 4 mA | 0 |  |  |  |
| 8 mA | 25 |  |  |  |
| 12 mA | 50 |  |  |  |
| 16 mA | 75 |  |  |  |
| 20 mA | 100 |  |  |  |
| I00705+  I00705- |  | 4 mA | 0 |  |  |  |
| 8 mA | 25 |  |  |  |
| 12 mA | 50 |  |  |  |
| 16 mA | 75 |  |  |  |
| 20 mA | 100 |  |  |  |

## [Anal](#TOC)[og Outputs](#TOC)

### [Rack 0, Slot 11, Points 00 - 05](#TOC)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **I/O Verification (Analog Outputs)** | | | | | | |
| **Wire Tag** | **I/O Point Description** | **PAC input range** | **Expected PAC Raw value** | **Actual PAC Raw Value** | **Result**  **Pass(ü)/Fail(O)** | **Notes** |
| O01100+  O01100- | XXXXXXXXXXXXX (Tagname)  XXXXXXXXXXXXX (Description) | 4 mA | 0 |  |  |  |
| 8 mA | 25 |  |  |  |
| 12 mA | 50 |  |  |  |
| 16 mA | 75 |  |  |  |
| 20 mA | 100 |  |  |  |
| O01101+  O01101- |  | 4 mA | 0 |  |  |  |
| 8 mA | 25 |  |  |  |
| 12 mA | 50 |  |  |  |
| 16 mA | 75 |  |  |  |
| 20 mA | 100 |  |  |  |
| O01102+  O01102- |  | 4 mA | 0 |  |  |  |
| 8 mA | 25 |  |  |  |
| 12 mA | 50 |  |  |  |
| 16 mA | 75 |  |  |  |
| 20 mA | 100 |  |  |  |
| O01103+  O01103- |  | 4 mA | 0 |  |  |  |
| 8 mA | 25 |  |  |  |
| 12 mA | 50 |  |  |  |
| 16 mA | 75 |  |  |  |
| 20 mA | 100 |  |  |  |
| O01104+  O01104- |  | 4 mA | 0 |  |  |  |
| 8 mA | 25 |  |  |  |
| 12 mA | 50 |  |  |  |
| 16 mA | 75 |  |  |  |
| 20 mA | 100 |  |  |  |
| O01105+  O01105- |  | 4 mA | 0 |  |  |  |
| 8 mA | 25 |  |  |  |
| 12 mA | 50 |  |  |  |
| 16 mA | 75 |  |  |  |
| 20 mA | 100 |  |  |  |

# [Discrete Signals](#TOC)

**Procedure:**

Verify with a multimeter and/or the PAC digital input or output that the discrete status device changes according to the input source device status.

Change the state of the devices source from OFF to ON and record the state that is registered on the device. Repeat the test for the ON to OFF transition. If the change is measured and is consistent then enter PASS or ü in the test form column.

If any comments are necessary, enter a note number in the test form column and record the comment in the comments form at the end of this document.

**Acceptance Criteria:**

Discrete devices must be consistent with the input source devices as shown on the as-built drawings. Changing the state of the input source device must produce a consistent change on the measuring device.

## [Devices And Relays](#TOC)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Devices And Relays Verification** | | | | |
| **Device**  **Name** | **Dev. Tag, wire tag, function & legend plate** | **Device Point**  **Status Change** | **Result**  **Pass(ü)/Fail(O)** | **Notes** |
| Power Failure | Control panel Power Failure |  |  |  |
|  |
|  |
| DC Power Supply Failure | Control Panel DC Power Fault |  |  |  |
|  |
|  |
| Indicating lamps | Power Ok |  |  |  |
| Comms Ok |
| General Alarm |
|  |  |  |  |  |
|  |
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|  |
| UPS | Fault/Low Battery |  |  |  |
|  |
| Annunciators | Communications OK |  |  |  |
| Control Panel General Alarm |
| Autodialer Ok Status |
| Control Panel General Alarm Horn |
| Panel | Intrusion Alarm |  |  |  |
| Panel Lights |
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## [IR-JB Intrinsically Relays](#TOC)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Intrinsically Relays** | | | | | | |
| **IS Barriers** | **DI Point** | | **Range** | **Status Change** | **Result**  **Pass(ü)/Fail(O)** | **Notes** |
| **Description** | **Terminals** |
|  |  |  | 24 VDC |  |  |  |
|  |  |  |  |  |  |
|  |  |  |  |
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|  |  |  |  |
|  |  |  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  | 24 VDC |  |  |  |
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|  | OFF (0) ~ ON (1) |  |  |
|  | ON (1) ~ OFF (0) |  |  |
|  |  |  | 24 VDC |  |  |  |
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|  |  |  | OFF (0) ~ ON (1) |  |  |
|  | ON (1) ~ OFF (0) |  |  |
|  | OFF (0) ~ ON (1) |  |  |
|  | ON (1) ~ OFF (0) |  |  |

# OIT and Communications Functional Test

**Procedure:**

Verify, using the OIT, that PAC registers are communicating with the OIT via Ethernet. A sample program must be developed and loaded onto the OIT for this test and should display the time from the PAC clock. Using RSLogix software, change the PAC clock time and confirm that the change is reflected on the OIT. If the change in time is reflected on the OIT, then enter PASS or ü in the form column for the OIT and the OIT Patch Cable.

Verify using RSLogix software and the RJ45 port on the Control Panel door that the Ethernet cabling between the door port and the PAC are both functioning. If the user is able to Go Online with RSLogix while connected to the panel door RJ45 port, then enter PASS or ü in the test form column for the Panel RJ45 Jack, the RJ45 Patch Cable, the PAC SCADA Ethernet Card, and the PAC Patch Cable.

Using RSLogix software, configure at least one I/O card in the Remote I/O Rack and download the program into the PAC. Verify that the OK LED on the card configured for the Remote I/O Rack is lit green. Disconnect the patch cable between the two racks. The OK LED should begin to blink to indicate a lost connection with the processor. Connect the patch cable and if the LED lights green again, then enter PASS or ü in the test form column for the PAC Remote I/O Ethernet Card, the Remote Rack Ethernet Card, and the Remote Rack Patch Cable.

Repeat the tests listed above using all RJ45 ports available on the Panel Network Switch. If all of the ports pass for the tests above, then enter PASS or ü in the test form column for the Panel Network Switch.

If any comments are necessary, enter a note number in the test form column and record the comment in the comments form at the end of this document.

**Acceptance Criteria:**

All Patch Cables, Ethernet Cards, OIT’s, and RJ45 ports must be functioning in order for the OIT and Communications Functional Test to PASS.

## OIT and Communications Functional Test

|  |  |  |
| --- | --- | --- |
| **OIT & Comms Functional Test** | | |
| **Item** | **Functional**  **Pass(ü)/Fail(O)** | **Notes** |
| Panel RJ45 Jack |  |  |
| RJ45 Patch Cable |  |  |
| Panel Network Switch |  |  |
| OIT Patch Cable |  |  |
| OIT |  |  |
| PAC Patch Cable |  |  |
| PAC SCADA Ethernet Card |  |  |
| PAC Remote I/O Ethernet Card |  |  |
| Remote Rack Patch Cable |  |  |
| Remote Rack Ethernet Card |  |  |

# UPS Firmware and Functional Test

**Procedure:**

Verify using the appropriate software for the installed UPS, the exact firmware version in use on the UPS. If the version in use matches the latest version available from the equipment manufacturer then enter PASS or ü in the test form column for UPS Firmware. If the versions do not match, the firmware on the installed UPS must be upgraded. Note the latest firmware version available in the Notes column for the UPS Firwmare test.

Verify, by opening the panel main breaker that the UPS is supplying power to the control panel circuitry. If all devices and instruments shown powered from the UPS on the as-built drawings remain powered while the main breaker is open, then enter PASS or ü in the test form column for UPS Connection. Close the main breaker.

Verify, using the UPS Bypass Switch that the panel circuitry remains powered when the switch is set to bypass and the UPS is turned OFF. If the panel circuitry remains power with the UPS turned OFF, then enter PASS or ü in the test form column for the UPS Bypass Switch.

Consult the equipment manufacturer’s literature regarding how to generate a Fault on the UPS for testing purposes. Confirm that the digital input signal on the PAC is turned on when a Fault is generated on the UPS. The digital input which is on must match that shown on the as-built drawings for the panel. If the Fault causes the appropriate input to change state, then enter PASS or ü in the test form column for UPS Fault.

Verify, by draining the battery on the UPS that the appropriate digital input signal on the PAC is turned on when a Low Battery condition is reached. The digital input which is on must match that shown on the as-built drawings for the panel. If the Low Battery condition causes the appropriate input to change state, then enter PASS or ü in the test form column for UPS Low Battery.

A report is to be provided both in hard copy and in electronic format (CD) containing all configuration parameters as set during the Panel FAT for reference purposes should the UPS ever require replacement.

If any comments are necessary, enter a note number in the test form column and record the comment in the comments form at the end of this document.

**Acceptance Criteria:**

If any of the above test cases do not PASS, the issues/deficiencies are to be corrected and then all tests performed again to ensure proper functionality of the UPS and associated circuitry.

## UPS Firmware and Functional Test

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| --- | --- | --- |
| **UPS Firmware & Functional Test** | | |
| **Item** | **Functional**  **Pass(ü)/Fail(O)** | **Notes** |
| UPS Firmware |  |  |
| UPS Connection |  |  |
| UPS Fault |  |  |
| UPS Low Battery |  |  |
| UPS Bypass Switch |  |  |

# [Spare Parts and loose components](#TOC)

**Procedure:**

Verify all spare parts and loose shipped components as required in the as-built drawings are present. Typical items may be fuses, lamps, programming cables, etc.

Enter PASS or ü in the test form column if parts are present with the control panel.

If any comments are necessary, enter a note number in the test form column and record the comment in the comments form at the end of this document.

**Acceptance Criteria:**

Spare parts and loose shipped components are present as required.

|  |  |  |  |
| --- | --- | --- | --- |
| **Spare Parts and Loose shipped items** | | | |
| **Item No.** | **Description** | **Results**  **Pass(ü)/Fail(O)** | **Notes** |
|  | Fuses – List type and quantity |  |  |
|  |  |  |  |
|  | I/O cards – Qty.1 of each type |  |  |
|  |  |  |  |
|  | PAC Rack – Qty. 1 |  |  |
|  |  |  |  |
|  | PAC Processor – Qty. 1 |  |  |
|  |  |  |  |
|  | Communications Cards – Qty. 1 of each type |  |  |
|  |  |  |  |
|  | PAC Battery – Qty. 1 |  |  |
|  |  |  |  |
|  | Circuit Breakers – List type and quantity |  |  |
|  |  |  |  |
|  | Patch Cables – Qty. 2 |  |  |
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|  | UPS Components – Configuration Cables |  |  |
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# [FAT Test Notes, Com](#TOC)[ments or Observations](#TOC)

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| **Test Notes, Comments or Observations** | |
| **Note Reference No.** | **Test Notes, Comments or Observations** |
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