Open Rack v3 Power
Shelf Universal Input
Power Connector

V1.0

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1. License

1.1. OCP CLA

Contributions to this Specification are made under the terms and conditions set forth in Open Compute Project Contribution License Agreement (“OCP CLA”) (“Contribution License”) by:

Meta, HARTING, Amphenol, and Positronic

You can review the Contributor License(s) for this Specification on the OCP website at https://www.opencompute.org/legal-documents. For actual executed copies of either agreement, please contact OCP directly.

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Notes:

1) The above license does not apply to the Appendix or Appendices. The information in the Appendix or Appendices is for reference only and non-normative in nature.
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1.2 Acknowledgements

The Contributors of this Specification would like to acknowledge the following individuals for their feedback:

- Ben Kim, Meta
- Hamid Keyhani, Meta
- Glenn Charest, Meta
- Harsha Bojja, Meta
- Wade Fournier, Harting
- Maximilian Tischler, Harting

Date: 9 September 2022
2. Compliance with OCP Tenets

2.1. Openness

This Universal Input Power Connector was designed and created with the collaboration of multiple suppliers, manufacturers, and end users/operators. The concept was created with all parties working together to design the ideal connector for this application. In addition, this specification will allow for all manufacturers to build this connector and participate in the OCP ecosystem.

2.2. Efficiency

The Universal Input Power Connector was designed to promote data center installation efficiency. First, connecting the input power whip directly into the Power Shelf eliminates the need for the gPDU from ORv2 - eliminating a point of failure and increasing installation efficiency. Next, this design allows for one Power Shelf design to be used universally, which increases efficiency of the supply chain. Finally, the input power assemblies will be able to be re-used when data halls are refreshed and racks are replaced. This will allow faster replacements with a reduced cost impact.

2.3. Impact

The impact of the Universal Input Power Connector will be demonstrated in a decreased time-to-market and greater supply chain efficiency. The rack input power cable is dependent on the power requirements of the region the data center is located in. Implementing this connector means that the Power Shelf is unlocked from these regional requirements. The data center rack can now be a global design, with only the input power cable assembly being sourced on site. The result is data center operators who can capitalize on increased economies of scales for their rack and utilize inventory more effectively. Additionally, the input power cable assembly can be retained upon data hall refresh. This will simplify the supply chain of the data center, reduce OPEX, and reduce long term CAPEX.
## 3. Version Table

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<th>Version #</th>
<th>Author</th>
<th>Description</th>
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<td>0.1</td>
<td>Steve Mills and Hamid Keyhani</td>
<td>Initial Release</td>
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<td>12 JUL 19</td>
<td>0.2</td>
<td>Steve Mills</td>
<td>Extensive updates from the JDA group</td>
</tr>
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<td>1 AUG 19</td>
<td>0.3</td>
<td>Ben Kim</td>
<td>Added detail to section 7 and created Appendix 1</td>
</tr>
<tr>
<td>22 SEP 20</td>
<td>0.4</td>
<td>Natesh Kannan</td>
<td>Extensive updates including new modular connector design and drawings</td>
</tr>
<tr>
<td>24 MAR 22</td>
<td>0.9</td>
<td>Dmitriy Shapiro</td>
<td>Grammar and wording fixes Section 5:</td>
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<td>- Removed mention of PCB straight pin, no longer an option</td>
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<td>- Redid description paragraph to make it clearer.</td>
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<td>- Added pin designations</td>
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<td>- Added note about 2-28 screws</td>
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<td>Steve Mills</td>
<td>Add Positronic Trademark info</td>
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<tr>
<td>8 JUN 22</td>
<td>0.92</td>
<td>Will Stewart</td>
<td>Add HARTING part numbers</td>
</tr>
<tr>
<td>09 SEP 2022</td>
<td>1.0</td>
<td>Will Stewart</td>
<td>Updated format. Added Section 2.</td>
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4. Scope

This document defines the technical specifications for an OpenRack V3 Power Shelf Universal Input Connector used in the Open Compute Project.

5. Overview

This power from the data center enters the power shelf through this connector set. The set is designed to allow the shelf to adjust to a wide range of input power types while allowing the cabling to the data center to adapt to regional regulatory needs.

![Figure 2.1 Layout of open rack power shelf in the rack assembly](image1)

![Figure 2.2 Detail of open rack shelf connectors](image2)
6. Rack Compatibility

The Input Power Connector is compatible with the OpenRack v3, with the intention to be compatible with future versions.

7. Electrical Specifications

- Seven pin connector with three inputs, three returns, and one Ground (Earth).
- Nominal Voltage (rms) rating:
  - Pin to pin 480V AC
  - 380V DC
  - Frequency: DC, 50 Hz, 60 Hz
- Current Rating: 32A @ 30C temperature rise in still air
- Inrush current:
  - 10X for 100 micro sec
  - two times rated current for 5mS

1.1 Connector wiring
Connector shall take the following input wiring:
- 3 phase, 5 wire in Star configuration
- 3 phase, 4 wire in Delta configuration
- 1 phase, 3 wire configurations
- High-voltage DC, 3 wire configurations

The following diagrams show the wiring of different configurations the connector shall support:
8. Mechanical Specifications

Height must fit within the envelope of a 1 RU EIA chassis (44.45mm) and pass through a cable trough of 23.8 mm minimum width.

Height and width of the connector shall be sized so that a connector and a whip wire bundle of max diameter (7 X 8 AWG, high strand count) will fit into the Open Rack channel at the same time. This will allow the whip cable to be replaced without moving the rack.

The distance from the rear surface of the power shelf to the tangent of the bend radius for the worst-case cable bundle supported entering the cable side connector shall be less than 65mm as shown in Figure 8.1. This is to ensure the whip cable will always remain inside the rack frame.
The Female cable hood shall be reversible so the cable can exit the hood towards either side of the rack as shown in Figure 8.2 (for 45° cable exit) and Figure 8.3 (for top cable exit). The cable hood is designed to accommodate 7 X 8 AWG to 7 X 16 AWG wires.
Figure 8.3 Reversible Female Connector (Top Cable Opening) w/ Male Connector – Right and Left
9. Connector Details

Details of the Female Connector are in the following figures:
- **Figure 9.2**: Female connector without hood
- **Figure 9.3**: Female connector with 45° cable opening hood
- **Figure 9.4**: Female connector with top cable opening hood

Details of the Male Connector are in the following figures:
- **Figure 9.5**: Male connector, Right Angle PCB Contact w/ Threaded Insert Mount, Right Side
- **Figure 9.6**: Male connector, Right Angle PCB Contact w/ Threaded Insert Mount, Left Side
- **Figure 9.7**: Male connector, Panel Mount Crimped Version w/ Threaded Insert Mount, Universal

Details regarding the mating of male and female connectors: **Figure 9.8**

Details regarding pin layout of all connectors: **Figure 9.9**

Male Connector PCB Mounting:
- Details and dimensions of the male connector PCB footprint are included in the individual connector drawings.
- Recommended PCB Thickness: 1.60mm to 2.20mm
- Note: Connectors can be customized for different PCB thickness.

Male Connector Sheet Metal Mounting:
- Details and dimensions of the male connector chassis panel cut out are included in the individual connector drawings.
- Recommended Panel Thickness: 1.50mm to 2.30mm

Ground Pins:
- Connector system shall provide for a ground pin that will make first mate/last break.
- Ground pin should be first mate / last break under all entry angles.
- First mate / last break contact position is shown below in Figure 9.1 for left and right connector

![Figure 9.1 Male connector first mate / last break contacts](image)
Open Compute Project • <Power Shelf Input Power Connector>

Mounting Screws:

<table>
<thead>
<tr>
<th>Thread Type</th>
<th>Material</th>
<th>Part Number</th>
<th>Thread Length</th>
<th>Recommended PCB or Panel Thickness</th>
<th>Recommended Torque Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>4-40 UNC-2A</td>
<td>Steel</td>
<td>A2076-22-1-36</td>
<td></td>
<td>PCB Thickness</td>
<td>2.5 in-lb to 3.5 in-lb</td>
</tr>
<tr>
<td></td>
<td>Stainless Steel</td>
<td>A2076-22-3-4</td>
<td>6.35±0.76</td>
<td>1.60mm to 2.00mm</td>
<td></td>
</tr>
<tr>
<td>Self-Tapping</td>
<td>Steel</td>
<td>A4546-7-1-97</td>
<td></td>
<td>Panel Thickness:</td>
<td>1.3 in-lb to 1.5 in-lb</td>
</tr>
<tr>
<td>2-28 Trilobular*</td>
<td>Stainless Steel</td>
<td>A4546-7-6-4</td>
<td>[0.250±0.030]</td>
<td>1.50mm to 2.30mm</td>
<td></td>
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*Used for securing PCB mounted connector when no threaded insert is present. See Section 7, Mounting Options and Locking Systems, Code 0.

- The female connector shall have a positive retention latch that can be unlatched with a finger release force less than 15 N.
- The positive retention latch on the female connector needs to be protected when the cable is extracted through the rack cable trough.
- The insertion force of the female cable connector shall be less than 156 N.
- Field replaceable terminals are not required.
- Connector set shall be polarized.
- Provision for an optional protective cover for the connector when the cable is removed. Cover should provide a warning ISO 7010-W012 (shock warning).
Open Compute Project • <Power Shelf Input Power Connector>

Female Connector without Hood – Reversible for Right side and Left side

NOTES:
1) MATERIALS AND FINISHERS:
   - INSULATOR: GLASS-FILLED POLYESTER, UL 94V-0, COLOR: BLUE (HALOGEN-FREE).
   - LATCH PP: UL 94V-0, COLOR: BLACK (HALOGEN-FREE).
   - CONTACTS: ORDER CONTACTS SEPARATELY.
2) COMPLIANT TO THE CURRENT ROHS DIRECTIVE.
3) THIS MOD ALLOWS FOR THE CONNECTOR TO BE SUPPLIED WITH SPECIAL CONTACTS MODULES WHICH ALLOWS FOR TOUCH SAFE FEATURE.

Dimensions in mm (inches):
Figure 9.2 SP10RSSS1F0001/AA-2268
Female Connector with Hood (45° Cable Opening) – Reversible for Right side and Left side

**NOTES:**
1. MATERIALS AND FINISHES:
   - INSULATOR: GLASS-FILLED POLYESTER, UL 94V-0, COLOR: BLUE (HALOGEN-FREE)
   - HOOD: GLASS-FILLED POLYESTER, UL 94V-0, COLOR: BLACK (HALOGEN-FREE), KIT SEPARATELY.
   - LATCH: PPO, UL 94V-0, COLOR: BLACK (HALOGEN-FREE), KIT SEPARATELY.
   - SCREWS: STEEL ZINC PLATE WITH CHROMATE SEAL, KIT SEPARATELY.
   - CONTACTS: ORDER CONTACTS SEPARATELY.
2. COMPLIANT TO THE CURRENT RoHS DIRECTIVE.
3. THIS MOS ALLOWS FOR THE CONNECTOR TO BE SUPPLIED WITH SPECIAL CONTACTS MODULES WHICH ALLOWS FOR TOUCH SAFE FEATURE.
4. THIS MOS ALSO ALLOWS FOR SPECIAL HOOD DESIGNED FOR OCP WHICH HAS 45° CABLE OPENING.
Hood and screws: kit separately.
Open Compute Project • <Power Shelf Input Power Connector>
Female Connector with Hood (Top Cable Opening) – Reversible for Right side and Left side

NOTES:
1) MATERIALS AND FINISHES:
   INSULATOR: GLASS-FILLED POLYESTER, UL 94V-0, COLOR: BLUE (HALOGEN-FREE).
   HOOD: GLASS-FILLED POLYESTER, UL 94V-0, COLOR: BLACK (HALOGEN-FREE), KIT SEPARATELY.
   SCREWS: STEEL ZINC PLATE WITH CHROMATE SEAL, KIT SEPARATELY.
   CONTACTS: ORDER CONTACTS SEPARATELY.
2) COMPLIANT TO THE CURRENT ROHS DIRECTIVE.
3) THIS MOS ALLOWS FOR THE CONNECTOR TO BE SUPPLIED WITH SPECIAL CONTACTS MODULES WHICH ALLOWS FOR TOUCH SAFE FEATURE.
   THIS MOS ALSO ALLOWS FOR SPECIAL HOOD DESIGNED FOR OCP WHICH HAS TOP CABLE OPENING.
Figure 9.4 SP10RSSS1F0W01/AA-2372
Figure 9.5 SP10RSSS48M220A1/AA-2269
Open Compute Project • <Power Shelf Input Power Connector>

Male right angle PCB Connector with threaded insert mount – Left side

NOTES:
1) MATERIALS AND FINISHES:
   INSULATOR: GLASS-FILLED POLYESTER, UL 94V-0, COLOR: BLUE, (HALOGEN-FREE)
   POWER CONTACTS: HIGH CONDUCTIVITY COPPER ALLOY WITH GOLD FLASH OVER NICKEL PLATE
   THREADED INSERT: COPPER ALLOY
2) COMPLIANT TO THE CURRENT ROHS DIRECTIVE
3) THIS MOS ALLOWS FOR THE CONNECTOR TO BE SUPPLIED WITH SPECIAL CONTACTS AND CONTACT MODULES WHICH ALLOWS FOR TOUCH SAFE FEATURE
   THIS MOS ALSO ALLOWS FOR FIRST MATE CONTACT TO BE LOADED IN THE CENTRE CONTACT POSITION OF THE CONNECTOR
4) RECOMMENDED WIRE LENGTH FOR 1ST MATE IS 7MM AND STANDARD MATE IS 4MM.
Figure 9.6 SP10RSSS48RM220A1/AA-2269
Open Compute Project • <Power Shelf Input Power Connector>

Male connector, Panel Mount Crimped Version w/ Threaded Insert Mount, Universal

NOTES:
1) MATERIALS AND FINISHES:
   INSULATOR: GLASS-FILLED POLYESTER, UL 94V-0, COLOR: BLUE (HALOGEN-FREE)
   CONTACTS: ORDER CONTACTS SEPARATELY.
   THREADED INSERT: COPPER ALLOY
2) COMPLIANT TO THE CURRENT ROHS DIRECTIVE
3) THIS DRAWING IS COMMONLY USED FOR RIGHT AND LEFT SIDE CONNECTOR
4) THE PATTERN FOR THE CONNECTOR TO BE SUPPLIED WITH SPECIAL CONTACTS
   MODULS WHICH ALLOWS FOR TOUCH SAFE FEATURE
5) RECOMMENDED WIRE LENGTH FOR 1ST MATE IS 7MM AND STANDARD MATE IS 4MM

---

Male Connector

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Library: Coaxial Connectors, Male, Female, Panel Mount, Crimped, Threaded Insert

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GERMANY: +49 0 40 89897-0
AMERICA: +1 972 861 6100
ITALY: +39 04 943 0434
JAPAN: +81 44 775 8181
UK: +44 01344 898000
CHINA: +86 21 5088 9118
AUSTRIA: +43 1 437 373 320
FRANCE: +33 01 45 21 27 21

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Revised by: VAT 10189-62

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Sheet 1 of 3
Open Compute Project • <Power Shelf Input Power Connector>

PANEL CUTOUT (FOR RIGHT SIDE CONNECTOR)
(GENERAL TOLERANCE: ±0.13 [0.005])

REFERENCE VIEW FOR AFTER CRIMP CONTACTS ARE INSTALLED

CONTACT CONCENTRICITY WITHIN Ø1.2MM FOR ALL CONTACTS
Figure 9.7 SP10RSSS1M22001/AA-2268
Figure 9.8 Connector Mating Assembly – Female cable to Right Angle Male (Right & Left Side)
Figure 9.9: Male and Female Connector Pin Layout
10. Contacts

Figure 10.1 Female Crimp Size 8 contact for 12 AWG wire

NOTES:
1) MATERIALS AND FINISHES:
   CONTACT: HIGH CONDUCTIVITY COPPER ALLOY WITH GOLD FLASH
   OVER NICKEL PLATE
   SPRING CLIP: BERYLLIUM COPPER, GOLD OVER NICKEL PLATE
   RETAINER: POLYETHERIMIDE, COLOR BLACK
2) CONTACT IS COMPLIANT TO THE CURRENT ROHS DIRECTIVE.
3) THIS MOQ ALLOWS FOR THE CONTACT TO BE SUPPLIED WITH SPECIAL CONTACT
   WHICH ALLOWS FOR TOUCH SAFE FEATURE.
4) DETAILED PRODUCT, MECHANICAL AND ELECTRICAL INFORMATION IS AVAILABLE IN
   THE LATEST SCORPION PRODUCT PUBLICATION AT CONNECTPOSITRONIC.COM.
5) DIMENSIONS ARE IN MILLIMETERS [INCHES].
The female crimp contacts ordering part numbers as follows:

<table>
<thead>
<tr>
<th>CONTACT PART NUMBER</th>
<th>WIRE SIZE AWG [mm²]</th>
<th>ØA</th>
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<tr>
<td>FC4008DS/AA-2272</td>
<td>8 [10.0]</td>
<td>4.60 [0.181]</td>
</tr>
<tr>
<td>FC4010DS/AA-2272</td>
<td>10 [5.3]</td>
<td>3.10 [0.122]</td>
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<tr>
<td>FC4012DS/AA-2272</td>
<td>12 [4.0]</td>
<td>2.57 [0.101]</td>
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</tbody>
</table>

Contact material to be High Conductivity Copper Alloy with Gold Flash over Nickel Plate.

Nominal Contact Positions Inside Connectors:

- Nominal Wipe for First Mate: 7mm
- Nominal Wipe for Second Mate: 4mm
## 11. Ordering Information

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<thead>
<tr>
<th>Positronic P/N</th>
<th>HARTING P/N</th>
<th>Amphenol P/N</th>
<th>TE P/N</th>
<th>Remarks</th>
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<td>SP10RSSS1F0W01/AA-2268</td>
<td>09930060301</td>
<td>10156980</td>
<td>2399132</td>
<td>Female Cable Connector with Hood</td>
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<tr>
<td>SP10RSSS48RM220A1/AA-2269</td>
<td>10156982</td>
<td>2394885-2</td>
<td>Male Right Angle PCB Connector – Left Side</td>
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<tr>
<td>SP10RSSS48M2LN0A1/AA-2269</td>
<td>10156983</td>
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<td></td>
<td>Male Right Angle PCB Connector with Angle Brackets, Boardlocks – Right Side</td>
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<td>SP10RSSS48RM2LN0A1/AA-2269</td>
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<td>Female Cable Connector with Hood (Top Cable Opening)</td>
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<td></td>
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<td>MC4012DS/AA-2271</td>
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<td>10165438-002</td>
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<td>Male Crimp Contact – 10 AWG wire, first mate</td>
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<tr>
<td>MC4008DS/AA-2270</td>
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<td>10165437-003</td>
<td></td>
<td>Male Crimp Contact – 8 AWG wire, first mate</td>
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### Ordering Information - Code Numbering System

Specify complete connector by selecting a code from each option.

**Example:**

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<th>SERIES</th>
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<th>RSSS</th>
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<th>M</th>
<th>2</th>
<th>2</th>
<th>0</th>
<th>A1</th>
<th>AA</th>
<th>-</th>
<th>2269</th>
</tr>
</thead>
</table>

#### BODY STYLE

10 : Special Locking
- Latch System, for female cable to male panel/board connectors only

#### LAYOUT

Size 8 power
- contact module: Module R or S

#### TERMINATION

1 : Crimp contacts, order separately
3 : Solder, straight PCB mount, Standard conductivity power contacts
3R : Solder, Inverted straight PCB mount, Standard conductivity power contacts
38R : Solder, Inverted straight PCB mount, High conductivity power contacts
4 : Solder, right angle (90°) PCB mount, Standard conductivity power contacts
4R : Solder, Inverted right angle (90°) PCB mount, Standard conductivity power contacts
48 : Solder, right angle (90°) PCB mount, High conductivity power contacts
48R : Solder, Inverted right angle (90°) PCB mount, High conductivity power contacts
938 : Press-fit, Straight PCB mount, High conductivity power contacts, for use with PCB not thinner than 2.29 [0.090]
938R : Press-fit, Inverted Straight PCB mount, High conductivity power contacts, for use with PCB not thinner than 2.29 [0.090]

#### CONTACT GENDER

M : Male Pin
F : Female socket

#### PANEL MOUNT

0 : None (for female connector only)
2 : 4-40 threaded insert

#### MOUNTING OPTIONS & LOCKING SYSTEMS

0 : None
2 : 4-40 threaded insert (for right angle PCB mount)
N : Boardlocks
LN : Angle brackets, boardlocks (for right angle PCB mount)
VP : Backshell
- Hood Opening (45° or Top Opening), ordering with MOS

#### OPTIONAL FEATURES

0 : Not Vented
9 : Vented for improved cooling

#### CONTACT PLATING

A1 : Gold flash over 1.2μm Ni (nominal) over Cu

#### ENVIRONMENTAL COMPLIANCE

AA : RoHS 5/6 (< 4% lead)

#### SPECIAL OPTIONS

2269 : For code 1 in "Termination" (connector supplied with special contact modules which allows for Touch Safe feature. Hood Opening 45° if ordered with hood).
2269S : For code 3/3R or 38R/4/4R/48/48R/338/638R in "Termination" (connector supplied with special contact and contact modules which allows for Touch Safe feature).
2372 : For code 1 in "Termination" (connector supplied with special contact modules which allows for Touch Safe feature and with Hood Top Opening).
12. Environmental Requirements

Connectors to be stored in their original shipping cartons in a humidity-controlled environment where the relative humidity remains below 75% and the ambient temperature is between 10°C and 27°C. With the above conditions, the products will have a minimum shelf life of five (5) years from date of manufacture.

13. Quality

The following tests will be conducted with three samples each per Table 1.

Table 1

<table>
<thead>
<tr>
<th>Test</th>
<th>Test Standard</th>
<th>Test Condition/ Method</th>
<th>Pass/Fail Criteria</th>
<th>Additional Data to Collect for Review</th>
</tr>
</thead>
<tbody>
<tr>
<td>Durability</td>
<td>EIA-364-09</td>
<td>100 mating/un-mating cycles 30~60mm per second travel speed</td>
<td>Contact resistance before and after Post test surface wear examination: no exposed nickel or copper</td>
<td>N/A</td>
</tr>
<tr>
<td>Contact Retention</td>
<td>EIA-364-29</td>
<td>Method A With minimum 15lbs axial load for minimum 6 seconds</td>
<td>No visible contact to housing displacement</td>
<td>N/A</td>
</tr>
<tr>
<td>Vibration</td>
<td>EIA-364-28</td>
<td>Test condition VII Test condition letter E 15 minutes duration in each of the three mutually perpendicular direction</td>
<td>Per standard In addition: contact resistance before and after</td>
<td>Post test contact wear Optical examination, SEM/EDX optional</td>
</tr>
<tr>
<td></td>
<td>EIA-364-28F</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Condition II</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shock</td>
<td>EIA-364-27</td>
<td>half-sine pulse test condition A 3 shocks * 3 perpendicular planes * 2 directions = 18 shocks</td>
<td>Per standard In addition: contact resistance before and after</td>
<td>Post test contact wear Optical examination, SEM/EDX optional</td>
</tr>
<tr>
<td></td>
<td>EIA-364-27C</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Condition H</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Temperatur e Life</td>
<td>EIA-364-17</td>
<td>Method C Test condition 1: 125±/−2°C Test duration: 168hrs</td>
<td>Per standard, Section 4.4 In addition: contact resistance before and after</td>
<td>Monitor contact voltage drop during test</td>
</tr>
<tr>
<td>Thermal Shock</td>
<td>EIA-364-32</td>
<td>Method A Test condition VII: -55C to 105°C Test duration: 10cycles</td>
<td>Per standard, Section 4.6</td>
<td>N/A</td>
</tr>
<tr>
<td>Table Title</td>
<td>EIA-364-31</td>
<td>Method IV</td>
<td>Contact resistance before and after Dielectric withstand voltage before and after Insulation resistance before and after N/A</td>
<td></td>
</tr>
<tr>
<td>-------------</td>
<td>------------</td>
<td>-----------</td>
<td>---------------------------------------------------------------</td>
<td>---------------------</td>
</tr>
<tr>
<td>Humidity</td>
<td>EIA-364-70</td>
<td>Method I</td>
<td>Run at 32A through connector without exceeding 30°C above ambient temperature</td>
<td>Lower than 30C N/A</td>
</tr>
<tr>
<td>Temperature Rise</td>
<td>EIA-364-70</td>
<td>Method 2</td>
<td>Meet the required current</td>
<td>N/A</td>
</tr>
<tr>
<td>Contact Resistance Test</td>
<td>EIA-364-06</td>
<td>@ Rated Current</td>
<td>Standard Conductivity Contacts material: 0.0006 ohms max. High Conductivity Contact material: 0.0004 ohms max. NA</td>
<td></td>
</tr>
<tr>
<td>Crimp Tensile Strength</td>
<td>EIA-364-08</td>
<td>Per standard</td>
<td>8 AWG: 489 N min. 10 AWG: 489 N min. 12 AWG: 489 N min. 16 AWG: 222 N min.</td>
<td>Values derived using silver-tin plated copper wires</td>
</tr>
<tr>
<td>Whip Connector Pull Out Force</td>
<td>N/A</td>
<td>N/A</td>
<td>111 N min.</td>
<td>Values derived with fully loaded connector</td>
</tr>
<tr>
<td>Threaded Insert Pull Out Force</td>
<td>N/A</td>
<td>N/A</td>
<td>111 N min.</td>
<td>NA</td>
</tr>
<tr>
<td>Whip Side Connector Drop Test</td>
<td>UL 486A/B</td>
<td>Section 9.7</td>
<td>No mechanical damage other than cosmetic damage allowed N/A</td>
<td></td>
</tr>
<tr>
<td>Voltage Proof Test</td>
<td>EIA-364-20</td>
<td>Per standard</td>
<td>4000 V r.m.s. typical N/A</td>
<td></td>
</tr>
<tr>
<td>Insulation Resistance Test</td>
<td>EIA-364-21</td>
<td>Per standard</td>
<td>5G ohms minimum N/A</td>
<td></td>
</tr>
</tbody>
</table>
Screw Torque Value | N/A | N/A | 2.5 inches pound to 3.5 inches pound for the following:

- Hood Assembly
- Panel Assembly
- PCB Assembly

Note: The above tests are conducted with the connector termination with code 1 (female connector) and code 48 and code 48R (male connector).

14. Compliance Requirements

Connector shall be UL approved under UL1977, and it shall not cause any non-compliance issue with the latest amendment of the following Standards when it is integrated into the ORV3 rack.

- UL/IEC/EN 62368-1, Audio/video, information and communication technology equipment – Part 1: Safety requirements (applicable to meet anticipated effective date of December 20, 2020 for North America and Europe.)
- RoHS Directive (2011/65/EU, including proof by Declaration of Conformity and any other supporting documentation required for Deliverables, Components and Products, unless there are legal exemptions allowed); including aims to reduce the environmental impact of EEE by restricting the use of certain substances during manufacture.
- REACH Regulation (EC) No 1907/2006; registration with the European Chemicals Agency (ECHA), evaluation, authorization and restriction of chemicals.
- Halogen Free: IEC 61249-2-21, Definition of halogen free: 900ppm for Br or Cl, or 1500ppm combined requires companies using tin, tantalum, tungsten, and gold (“3TG”) in their products to verify and disclose the mineral source.

Connector shall be designed to meet the following additional safety requirements

- A connector enclosure shall be constructed to reduce the risk of unintentional contact with any live parts. Live pins in the connector shall not be assessable when testing with the following pin as defined at UL standard.
• If the above requirement cannot be met, the plastic cap must be provided for use with the unused connector, so that unintentional contact to pins cannot happen.
• A connector enclosure shall be constructed not to be easily accessible by user without using special tool. User has no access to the internal wiring for AC power configurations.
• Connector shall be keyed, in such a way that prevent from mating in wrong direction.
• Cord strain relief shall be provided, and it shall have a retention latch that shall not be damaged when minimum 100N force is applied in the most unfavorable direction.
• Connector shall be designed to have a minimum of 3.2mm air-spacing between an uninsulated live and any other metal part (if any) in the connector construction.
• Any exposed non-current carrying metal part of a device that are likely to become energized shall be conductively connected to the ground.
• The following caution label should be placed near the connector.

"CAUTION – Risk of Electric Shock. Do Not Disconnect Under Load"

• Dielectric voltage-withstand tests (1000Volts + 2x rated voltage) must be performed after insertion/removal tests. There shall not be any indication of electrical or mechanical failure, electrical tracking, formation of a permanent carbon path, or ignition of material.
• Trise on the wiring terminals in the connector should not exceed 30°C when the device is carrying its maximum rated current.
• Connector plastic housing shall meet 94V0 flammability requirements.
Compliance requirements for the cable assembly for reference

- Parts used in the cable assembly shall be UL recognized or listed under the following standards.

<table>
<thead>
<tr>
<th>Standard</th>
<th>Parts</th>
</tr>
</thead>
<tbody>
<tr>
<td>UL 1682</td>
<td>IEC 309 AC connector to the branch circuitry</td>
</tr>
<tr>
<td>UL498</td>
<td>NEMA AC connector to the branch circuitry</td>
</tr>
<tr>
<td>UL1977</td>
<td>Output connector that mates with connector in the power shelf</td>
</tr>
<tr>
<td>UL62 and UL817</td>
<td>Flexible power cord that can be used for AC wiring</td>
</tr>
</tbody>
</table>

- Power cord shall meet UL/CSA SOOW and EU CENELEC <HAR> H07RN-F with +75°C temperature rating. Halogen free cord (including internal wires) must be evaluated to 150°C of Heat-shock test. The following wire size (minimum) is recommended.

<table>
<thead>
<tr>
<th>Max Ratings</th>
<th>Wire Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>50 Amps</td>
<td>8AWG</td>
</tr>
<tr>
<td>32 Amps</td>
<td>10AWG</td>
</tr>
<tr>
<td>30 Amps</td>
<td>12AWG</td>
</tr>
</tbody>
</table>
Appendix A - Checklist for IC approval of this Specification (to be completed by contributor(s) of this Spec)

Complete all the checklist items in the table with links to the section where it is described in this spec or an external document.

<table>
<thead>
<tr>
<th>Item</th>
<th>Status or Details</th>
<th>Link to detailed explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Is this contribution entered into the OCP Contribution Portal?</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Was it approved in the OCP Contribution Portal?</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Is there a Supplier(s) that is building a product based on this Spec? (Supplier must be an OCP Solution Provider)</td>
<td>Yes</td>
<td>Harting, Positronic and Amphenol will be building product, but none are OCP Solution Providers. Part numbers are in section 11 for reference.</td>
</tr>
<tr>
<td>Will Supplier(s) have the product available for GENERAL AVAILABILITY within 120 days?</td>
<td>Yes</td>
<td></td>
</tr>
</tbody>
</table>