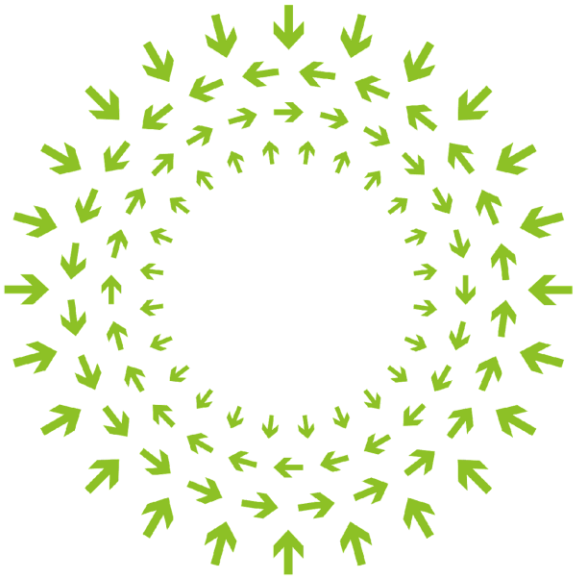

OPEN

Compute Project

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Open Rack v3 Power Shelf Universal Input Power Connector

V1.0

Author: Steve Mills, Meta
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1. License

1.1. OCP CLA

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Notes:

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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

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

Date	Version #	Author	Description
5 JUL 19	0.1	Steve Mills and Hamid Keyhani	Initial Release
12 JUL 19	0.2	Steve Mills	Extensive updates from the JDA group
1 AUG 19	0.3	Ben Kim	Added detail to section 7 and created Appendix 1
22 SEP 20	0.4	Natesh Kannan	Extensive updates including new modular connector design and drawings
24 MAR 22	0.9	Dmitriy Shapiro	Grammar and wording fixes Section 5: - Updated new format drawings with added dimensions - Renamed section to “Connector Details” - Removed mention of PCB straight pin, no longer an option - Redid description paragraph to make it clearer. - Added pin designations - Added note about 2-28 screws Section 6: - Updated new format drawings - Added nominal contact position dimensions Section 7: Moved connector details to Section 5 Section 10: Removed hot swap requirement Appendix 1: Removed 20A rating and changed column to “Max”
17MAY 22	0.91	Steve Mills	Add Positronic Trademark info
8 JUN 22	0.92	Will Stewart	Add HARTING part numbers
09 SEP 2022	1.0	Will Stewart	Updated format. Added Section 2.

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

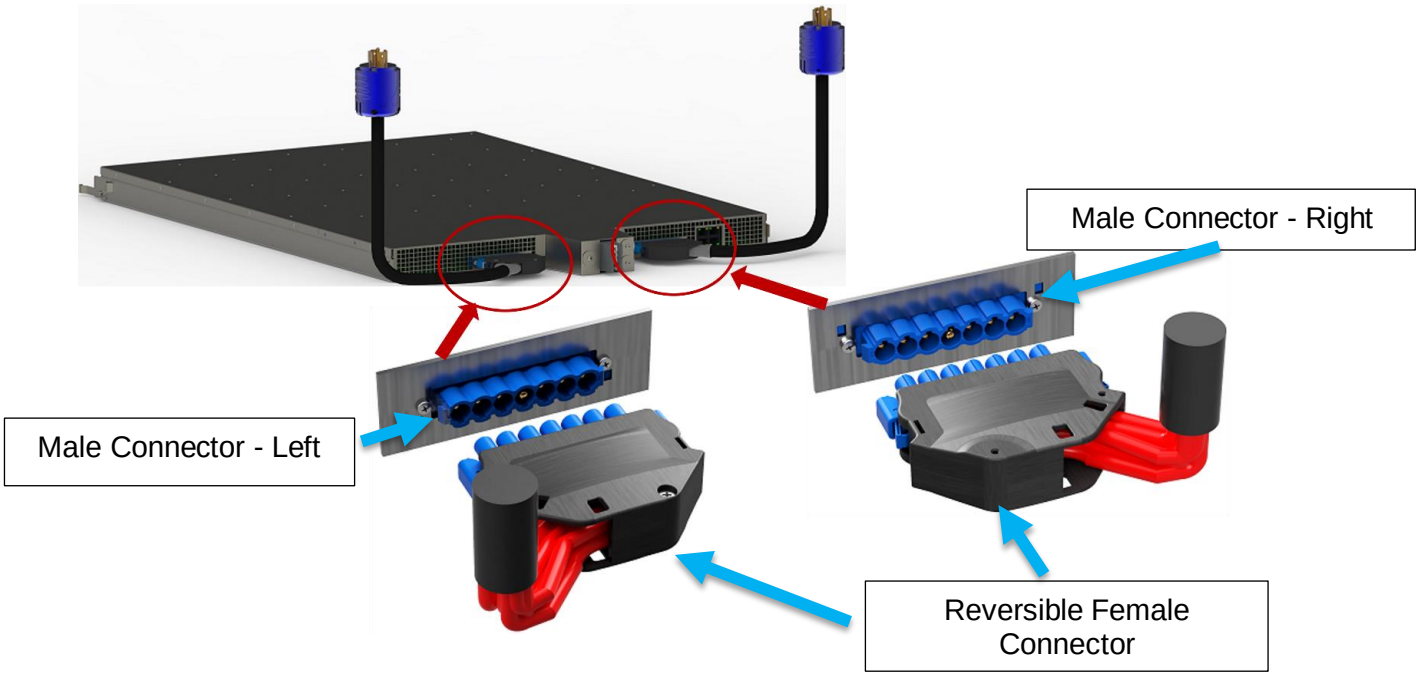


Figure 2.2 Detail of open rack shelf connectors

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

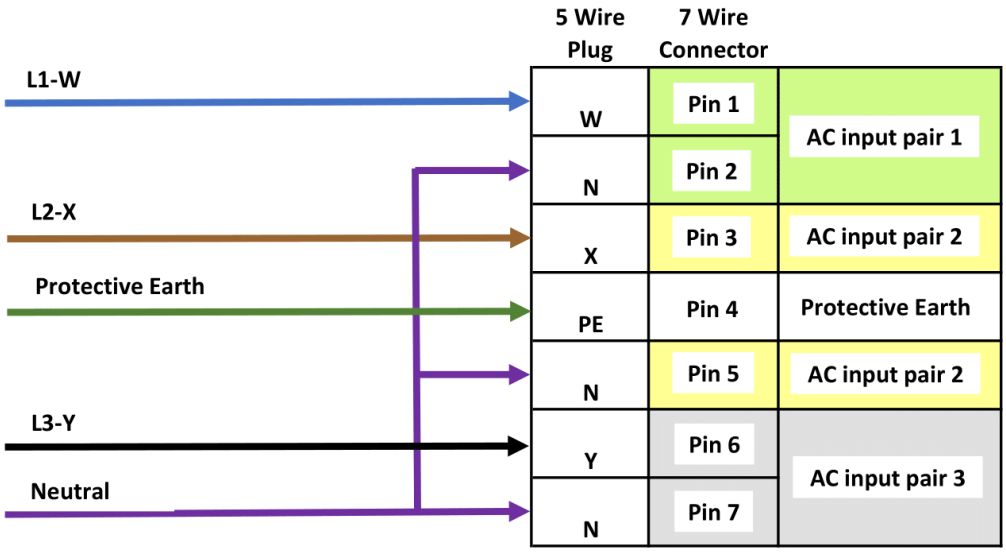
- Seven pin connector with three inputs, three returns, and one Ground (Earth).
- Nominal Voltage (rms) rating:
  - Pin to pin 480V AC
  - 380V DC
  - Frequency: DC, 50 Hz, 60 Hz
- Current Rating: 32A @ 30C temperature rise in still air
- Inrush current:
  - 10X for 100 micro sec
  - two times rated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

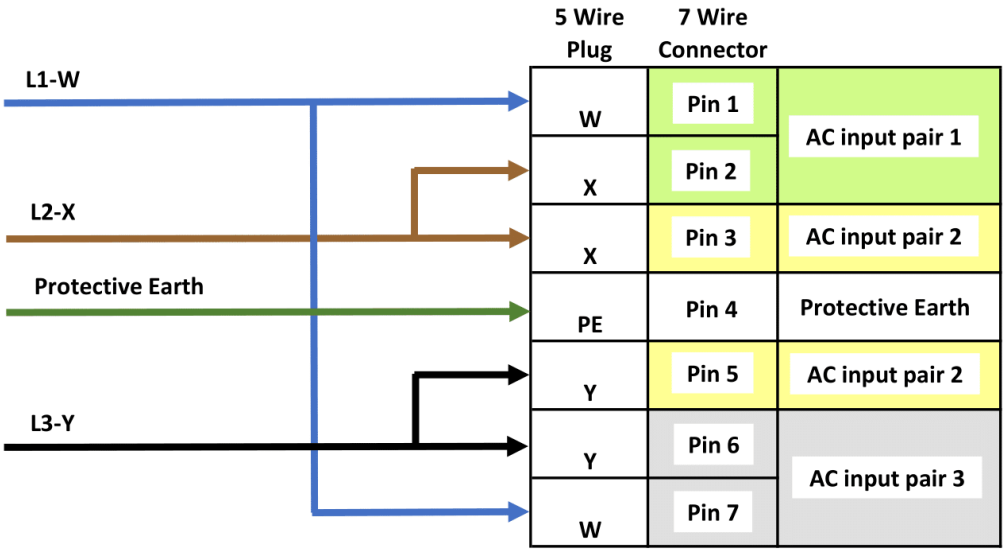
1.1 Connector wiring

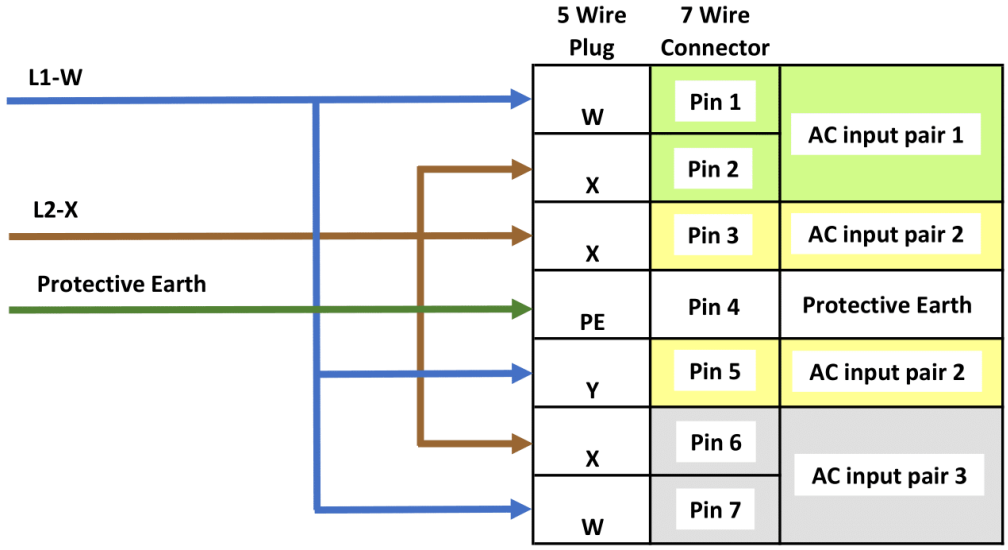
Connector shall take the following input wiring:

- 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.

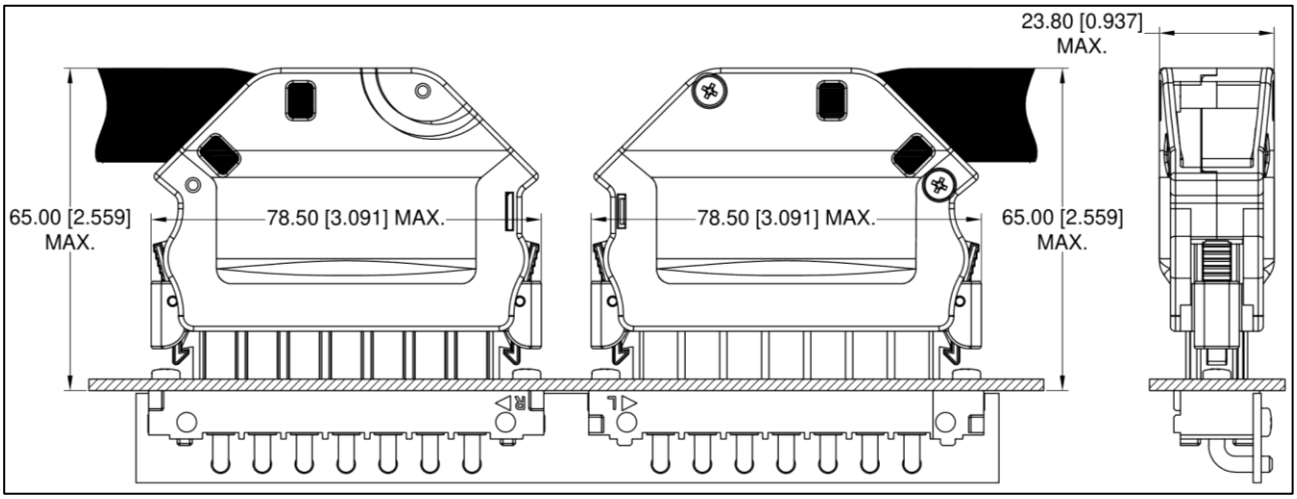


Figure 8.1 Mating Connector Maximum Dimension

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.

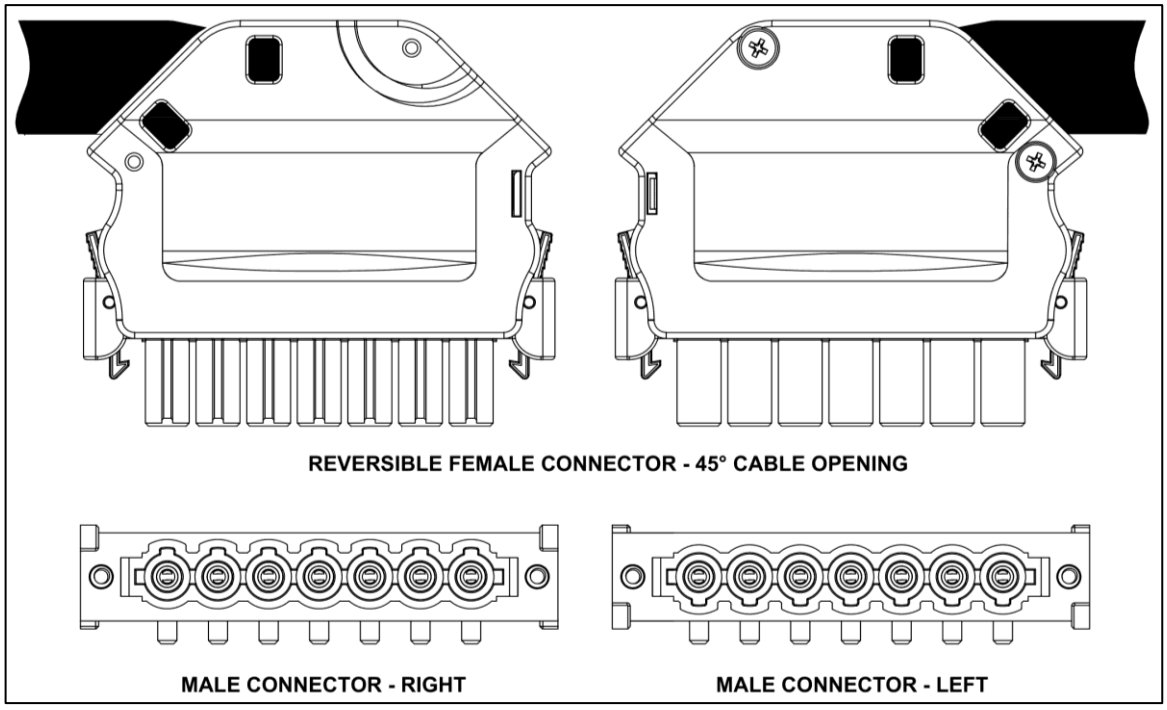


Figure 8.2 Reversible Female Connector (45° Cable Opening) w/ Male Connector – Right and Left

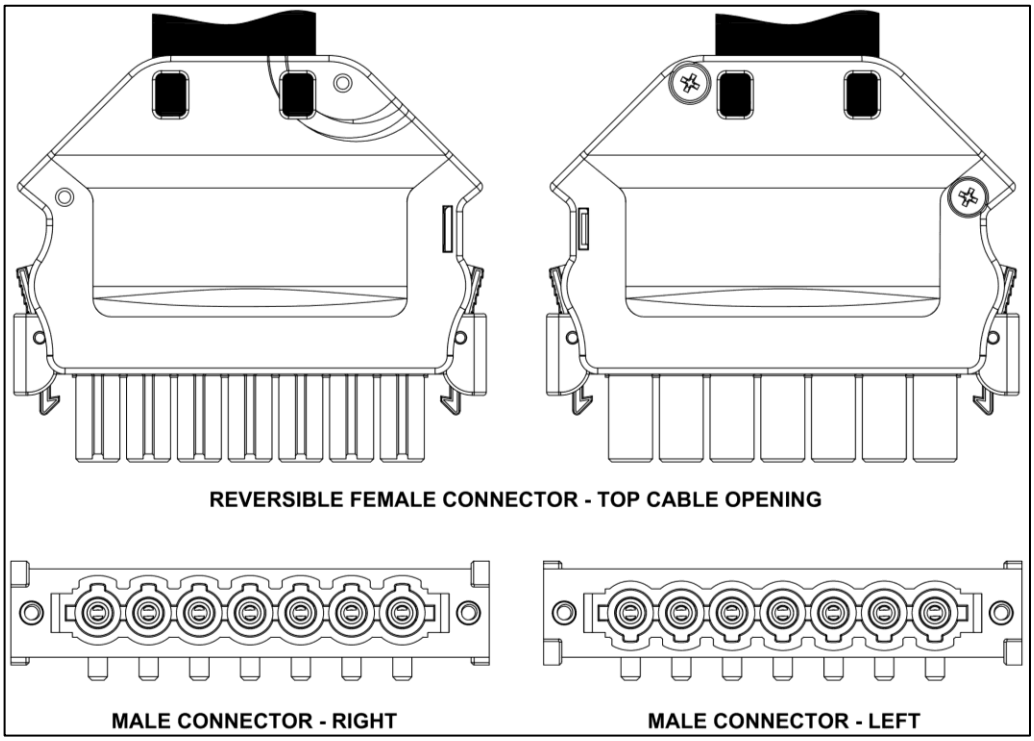


Figure 8.3 Reversible Female Connector (Top Cable Opening) w/ Male Connector – Right and Left

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

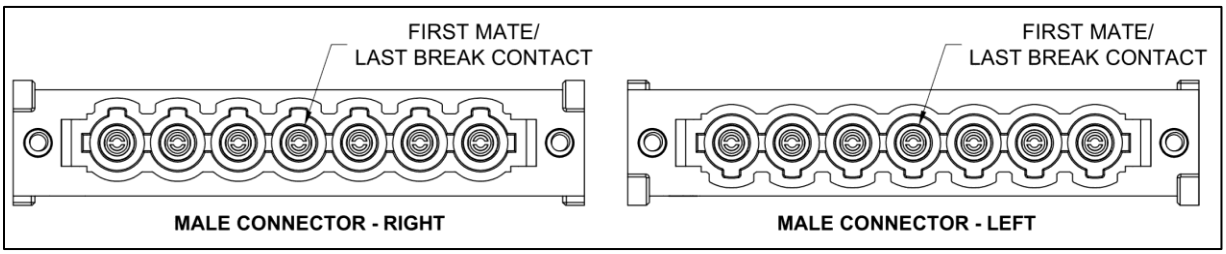


Figure 9.1 Male connector first mate / last break contacts

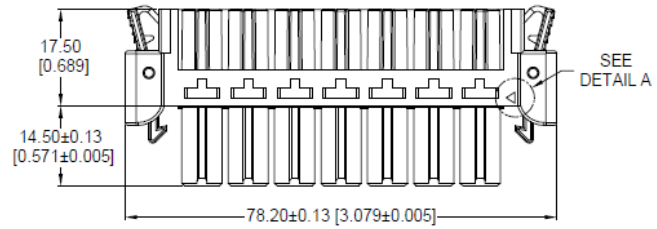
Mounting Screws:

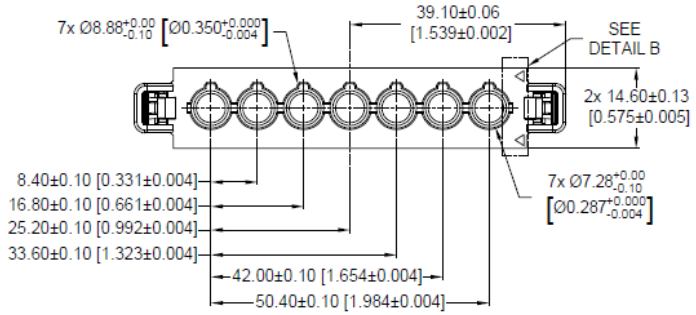
Thread Type	Material	Part Number	Thread Length	Recommended PCB or Panel Thickness	Recommended Torque Value
4-40 UNC-2A	Steel	A2076-22-1-36	6.35±0.76 [0.250±0.030]	PCB Thickness 1.60mm to 2.00mm Panel Thickness: 1.50mm to 2.30mm	2.5 in-lb to 3.5 in-lb
	Stainless Steel	A2076-22-3-4			
Self-Tapping 2-28 Trilobular*	Steel	A4546-7-1-97			1.3 in-lb to 1.5 in-lb
	Stainless Steel	A4546-7-6-4			

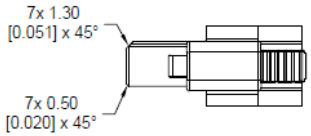
*Used for securing PCB mounted connector when no threaded insert is present. See Section 7, Mounting Options and Locking Systems, Code 0.

- 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).

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







NOTES:

1) MATERIALS AND FINISHES:
   INSULATOR : GLASS-FILLED POLYESTER, UL 94V-0. COLOR: BLUE (HALOGEN-FREE).
   LATCH: PPO, UL 94V-0. COLOR: BLACK (HALOGEN-FREE).
   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.

BY: JH	CHK: JH		POSITRONIC BELIEVES THE DATA ON THE DRAWING TO BE RELIABLE. THE USER EXPLORES SUCH INFORMATION AT HIS OWN DISCRETION AND RISK. POSITRONIC ASSUMES NO RESPONSIBILITY FOR RESULTS OBTAINED OR DAMAGES INCURRED FROM USE OF SUCH INFORMATION IN WHOLE OR IN PART.
APP: EH	RELEASED DATE: 25-02-2022		
TOLERANCES: ± 0.03mm [.001 INCHES] FOR MALE CONTACT MATING DIAMETERS ± 0.08mm [.003 INCHES] FOR CONTACT TERMINATION DIAMETERS ± 0.13mm [.005 INCHES] FOR ALL OTHER DIAMETERS ± 0.38mm [.015 INCHES] FOR ALL OTHER DIMENSIONS ± 5° FOR ALL ANGLES DIMENSION ARE IN MILLIMETERS [INCHES]		SCALE: NTS	Positronic
		PART NUMBER: SP10RSSS1F0001/AA-2268	SERIES: SP
		TITLE: FEMALE CONNECTOR	
		DRAWN ON: 24-02-2022	SHEET: SHEET 1 OF 2 REV: B

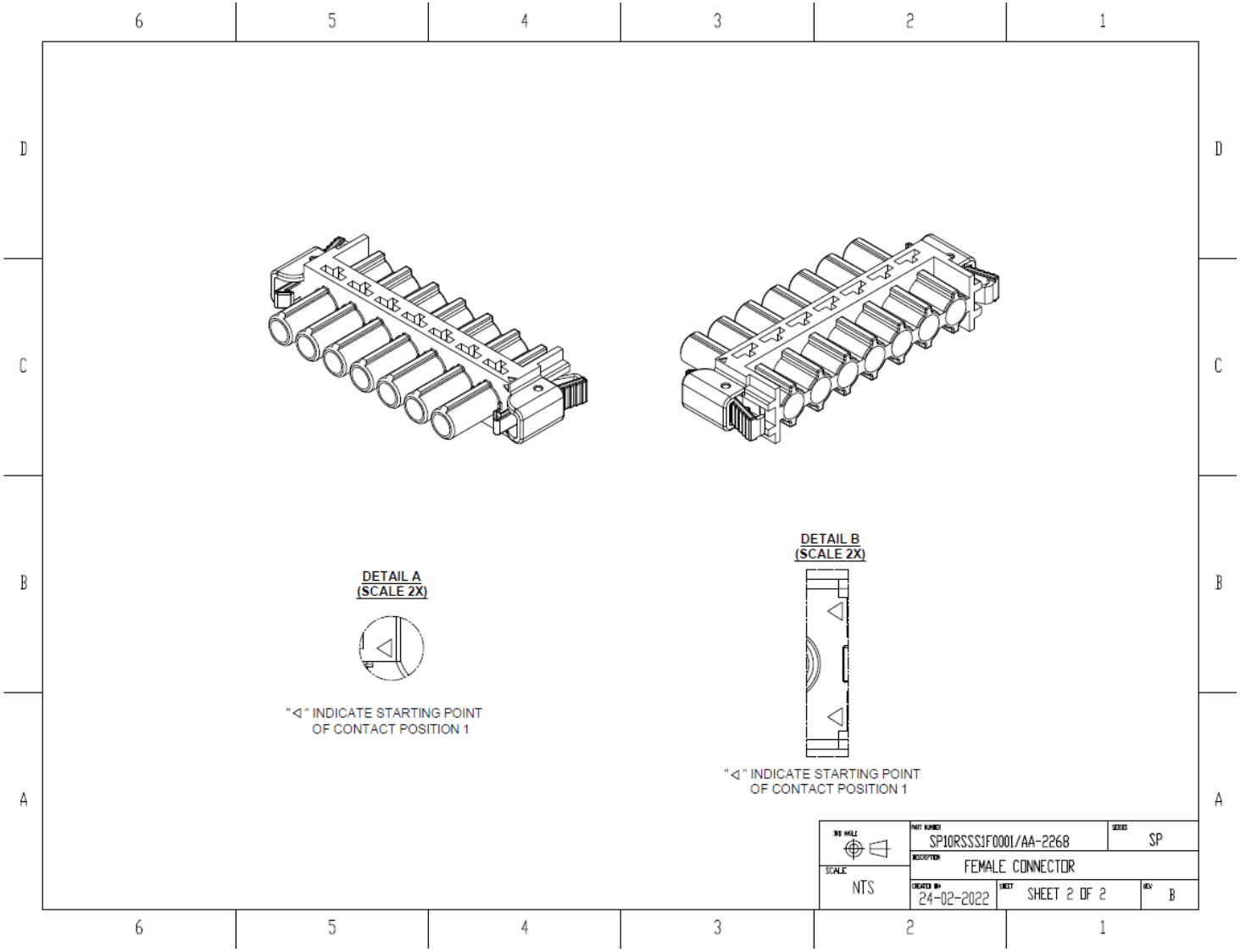
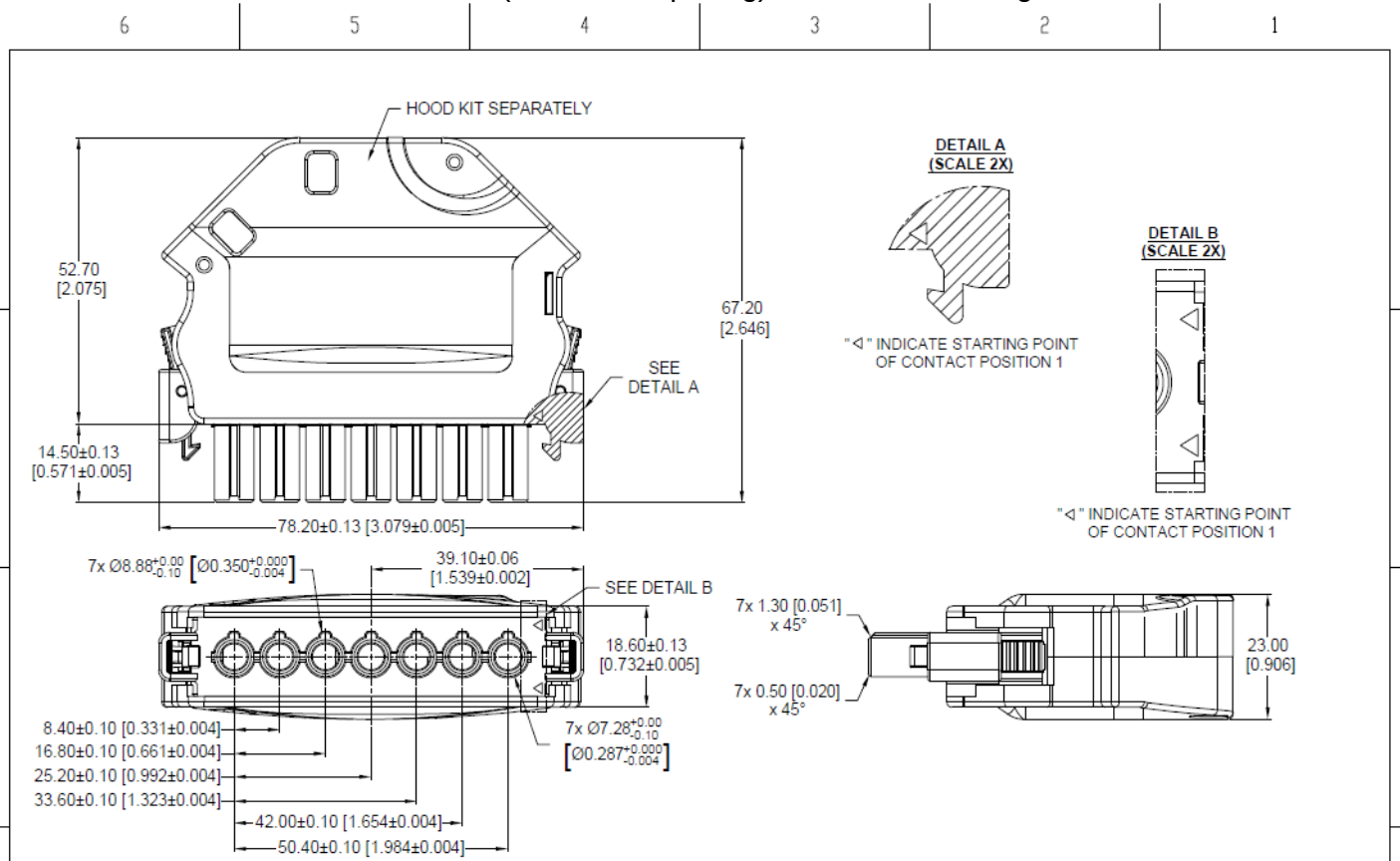


Figure 9.2 SP10RSSS1F0001/AA-2268

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).
   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 45° CABLE OPENING.

BY	JH
CHK	JH
APP	EH
RELEASED DATE	25-02-2022
TOLERANCES	±0.05mm [.001 INCHES] FOR MALE CONTACT MATING DIAMETERS ±0.08mm [.003 INCHES] FOR CONTACT TERMINATION DIAMETERS ±0.13mm [.005 INCHES] FOR ALL OTHER DIAMETERS ±0.38mm [.015 INCHES] FOR ALL OTHER DIMENSIONS ±5° FOR ALL ANGLES DIMENSION ARE IN MILLIMETERS [INCHES]
SCALE	NTS
PART NUMBER	SP10RSSS1FOW01/AA-2268
SERIES	SP
TITLE	FEMALE CONNECTOR
ORDER ON	24-02-2022
SHEET	SHEET 1 OF 2
REV	E

Positronic

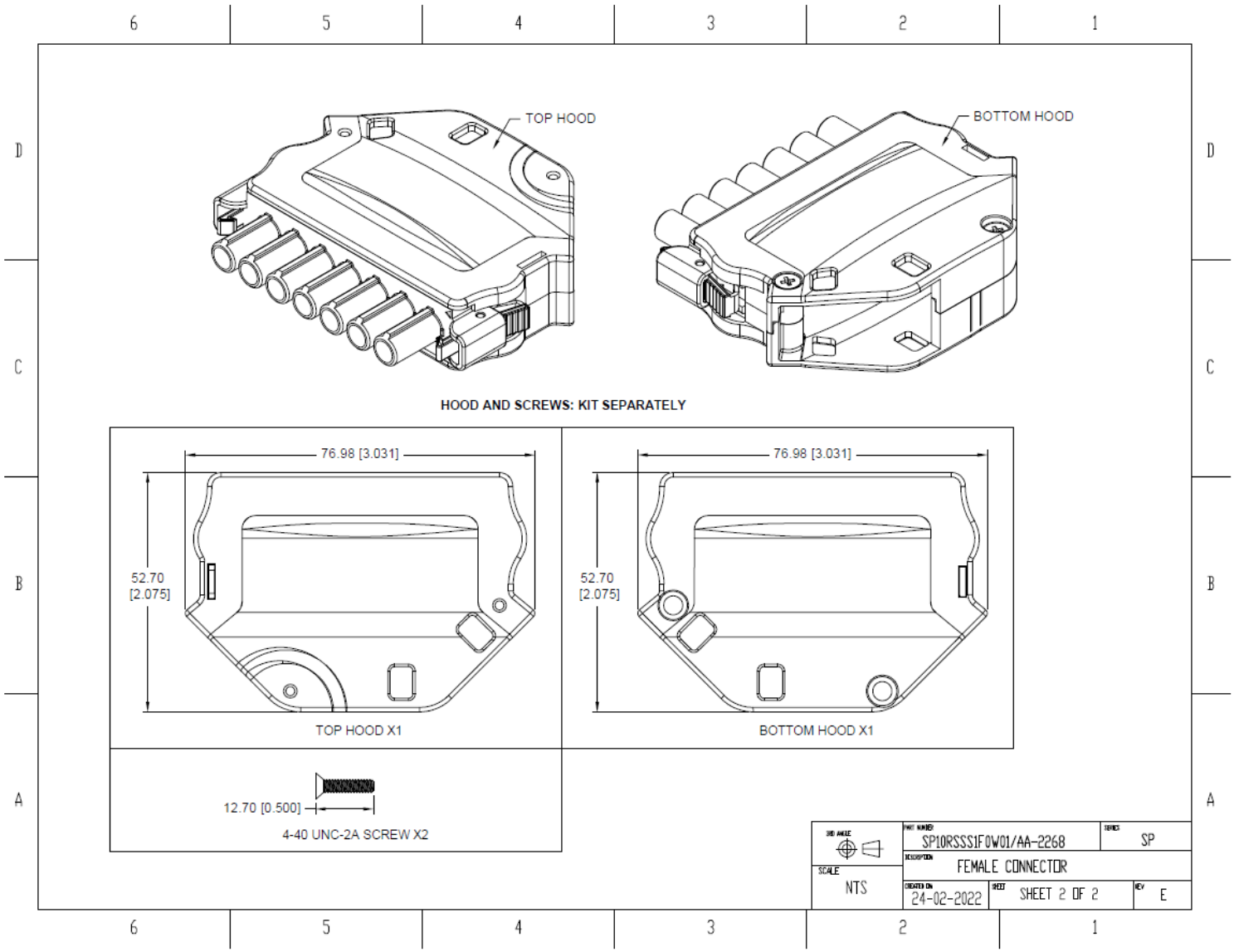
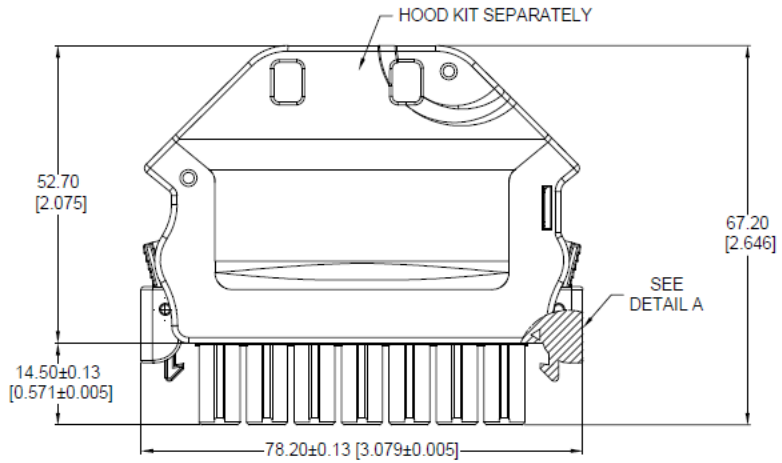
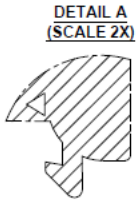
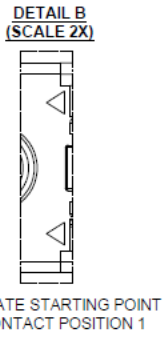


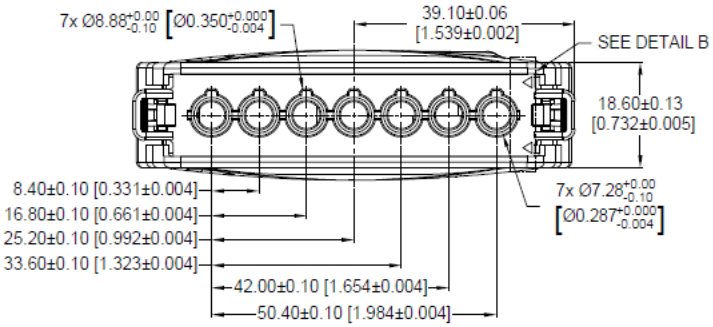
Figure 9.3 SP10RSSS1F0W01/AA-2268

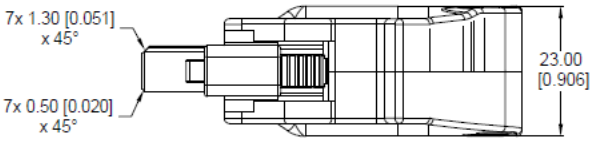
Female Connector with Hood (Top Cable Opening) – Reversible for Right side and Left side











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.
   LATCH: PPO, UL 94V-0. COLOR: BLACK (HALOGEN-FREE).
   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.

BY: JH	CHK: JH		
APP: EH	RELEASED DATE: 25-02-2022		
TOLERANCES: ±0.03mm [.001 INCHES] FOR MALE CONTACT MATING DIAMETERS ±0.08mm [.003 INCHES] FOR CONTACT TERMINATION DIAMETERS ±0.13mm [.005 INCHES] FOR ALL OTHER DIAMETERS ±0.38mm [.015 INCHES] FOR ALL OTHER DIMENSIONS ±5° FOR ALL ANGLES DIMENSION ARE IN MILLIMETERS [INCHES]	SCALE: NTS	POSITRONIC RELIEVES THE DATA ON THE DRAWING TO BE RELIABLE. THE USER EXPLOITS SUCH INFORMATION AT HIS OWN DISCRETION AND RISK. POSITRONIC ASSUMES NO RESPONSIBILITY FOR RESULTS OBTAINED OR DAMAGES INCURRED FROM USE OF SUCH INFORMATION IN WHOLE OR IN PART.	Positronic
	PART NUMBER: SP10RSSS1FOW01/AA-2372		SERIES: SP
	TITLE: FEMALE CONNECTOR		
	CREATED ON: 24-02-2022	SHEET: SHEET 1 OF 2	REV: B

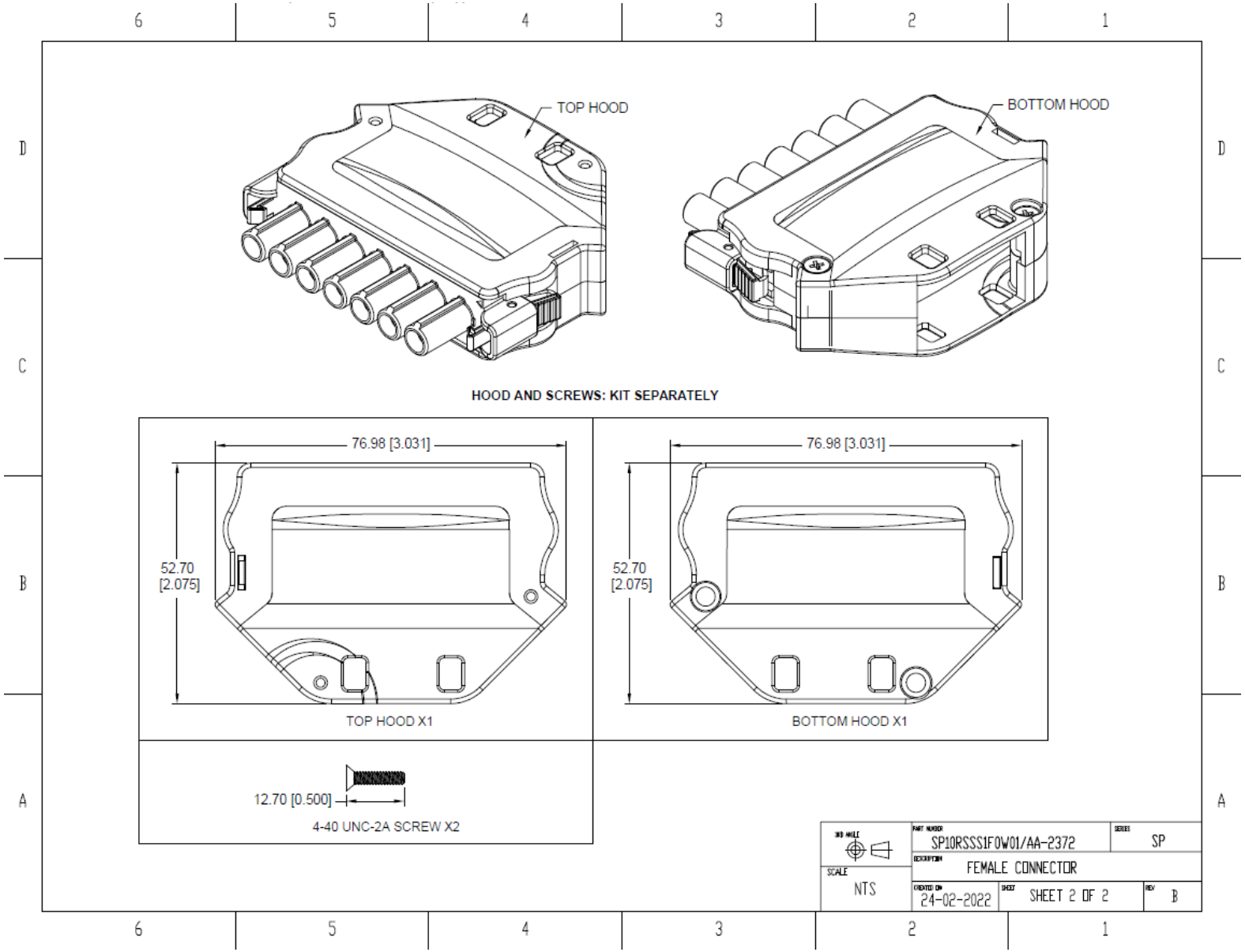
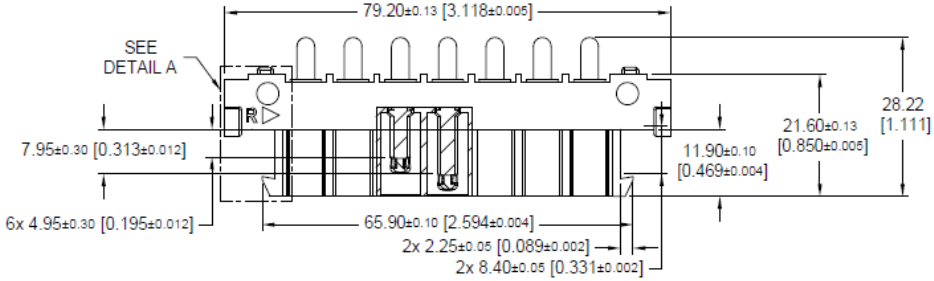
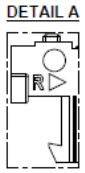


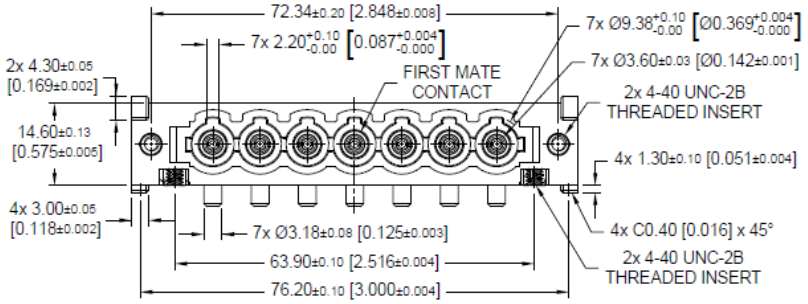
Figure 9.4 SP10RSSS1F0W01/AA-2372

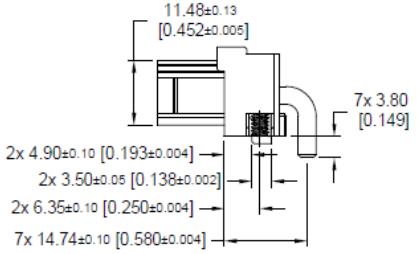
Male right angle PCB Connector with threaded insert mount – Right side





"R" INDICATE RIGHT SIDE CONNECTOR.
"▷" INDICATE STARTING POINT OF CONTACT POSITION 1.





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 WIPE LENGTH FOR 1ST MATE IS 7MM AND STANDARD MATE IS 4MM.

BY: JH	CHK: JH		POSITRONIC BELIEVES THE DATA ON THE DRAWING TO BE RELIABLE. THE USER EMPLOYS SUCH INFORMATION AT HIS OWN DISCRETION AND RISK. POSITRONIC ASSUMES NO RESPONSIBILITY FOR RESULTS OBTAINED OR DAMAGES INCURRED FROM USE OF SUCH INFORMATION IN WHOLE OR IN PART.	Positronic
APP: EH	RELEASED DATE: 25-02-2022			
TOLERANCES: ± 0.03mm [.001 INCHES] FOR MALE CONTACT MATING DIAMETERS ± 0.08mm [.003 INCHES] FOR CONTACT TERMINATION DIAMETERS ± 0.13mm [.005 INCHES] FOR ALL OTHER DIAMETERS ± 0.38mm [.015 INCHES] FOR ALL OTHER DIMENSIONS ± 5° FOR ALL ANGLES DIMENSION ARE IN MILLIMETERS [INCHES]		SCALE: NTS	PART NUMBER: SP10RSSS48M220A1/AA-2269	SERIES: SP
			TITLE: MALE CONNECTOR - RIGHT	
			DRAWN ON: 24-02-2022	SHEET: SHEET 1 OF 2 REV: F

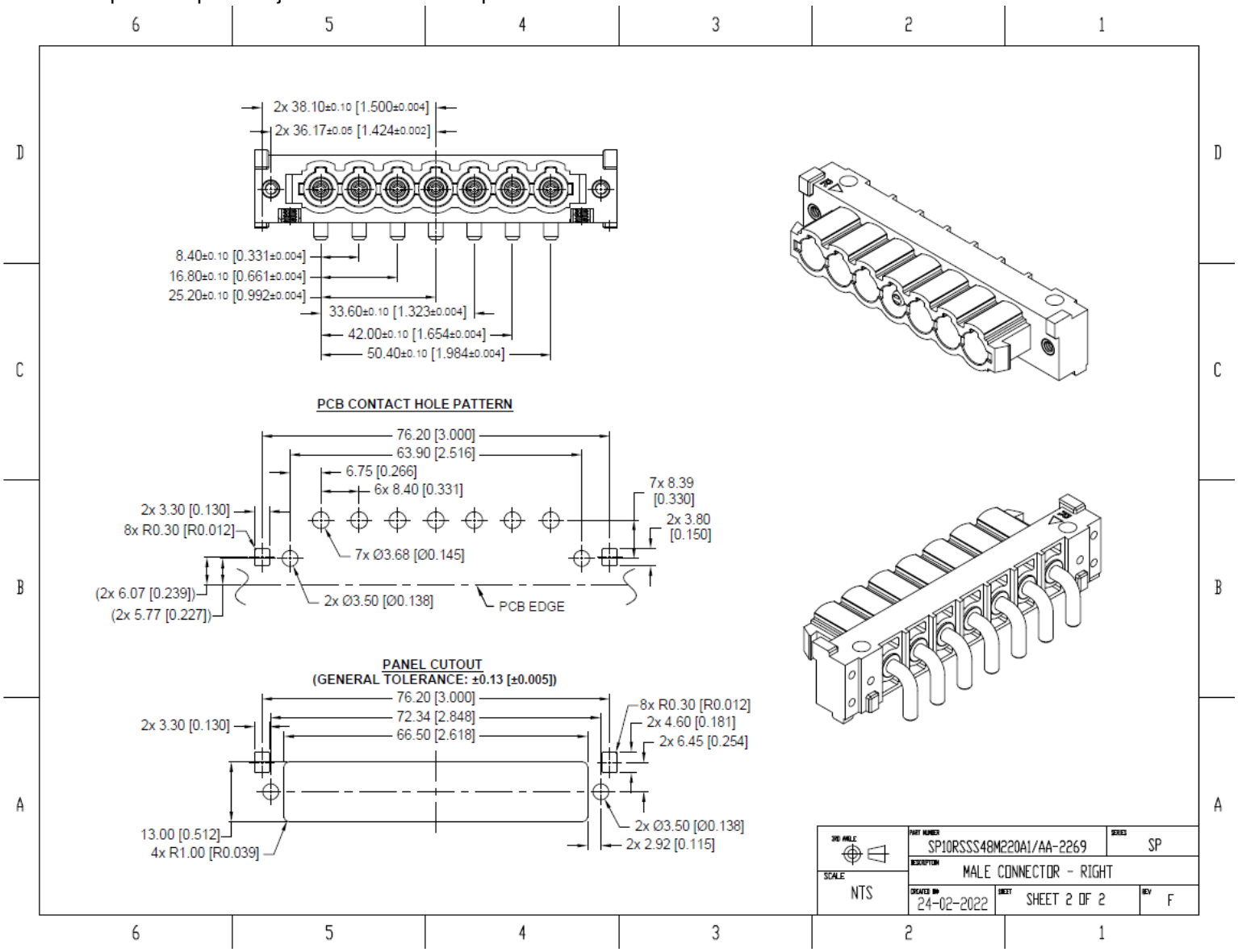
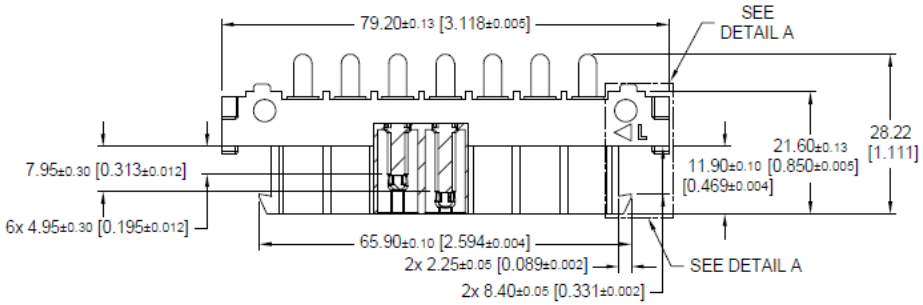
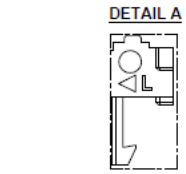


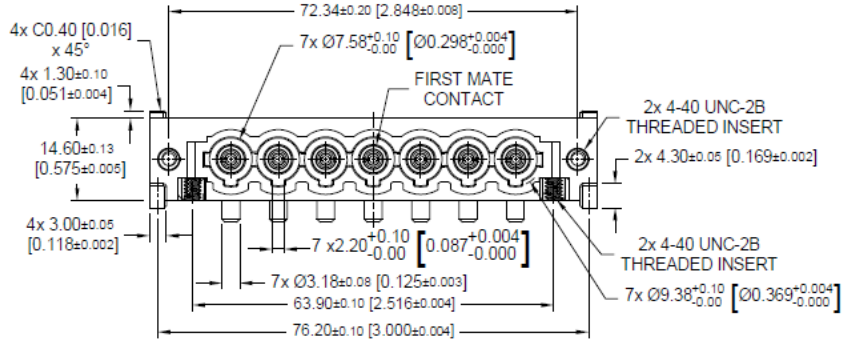
Figure 9.5 SP10RSSS48M220A1/AA-2269

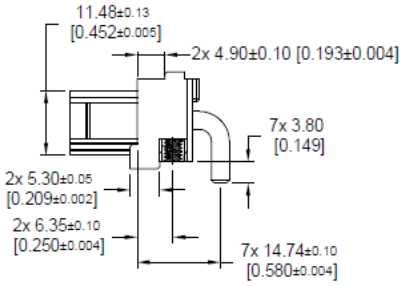
Male right angle PCB Connector with threaded insert mount – Left side





"L" INDICATE LEFT SIDE CONNECTOR.
"◁" INDICATE STARTING POINT OF CONTACT POSITION 1.





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 WIPE LENGTH FOR 1ST MATE IS 7MM AND STANDARD MATE IS 4MM.

BY: JH	CHK: JH		Positronic
APP: EH	RELEASED DATE: 25-02-2022		
TOLERANCES: ±0.03mm [.001 INCHES] FOR MALE CONTACT MATING DIAMETERS; ±0.08mm [.003 INCHES] FOR CONTACT TERMINATION DIAMETERS; ±0.13mm [.005 INCHES] FOR ALL OTHER DIAMETERS; ±0.38mm [.015 INCHES] FOR ALL OTHER DIMENSIONS; ±5° FOR ALL ANGLES; DIMENSION ARE IN MILLIMETERS [INCHES]	SCALE: NTS	POSITRONIC BELIEVES THE DATA ON THE DRAWING TO BE RELIABLE. THE USER EMPLOYS SUCH INFORMATION AT HIS OWN DISCRETION AND RISK. POSITRONIC ASSUMES NO RESPONSIBILITY FOR RESULTS OBTAINED OR DAMAGES INCURRED FROM USE OF SUCH INFORMATION IN WHOLE OR IN PART.	
	PART NUMBER: SP10RSSS48RM220A1/AA-2269		SERIES: SP
	TITLE: MALE CONNECTOR - LEFT		
	CREATED ON: 24-02-2022	SHEET: SHEET 1 OF 2	REV: F

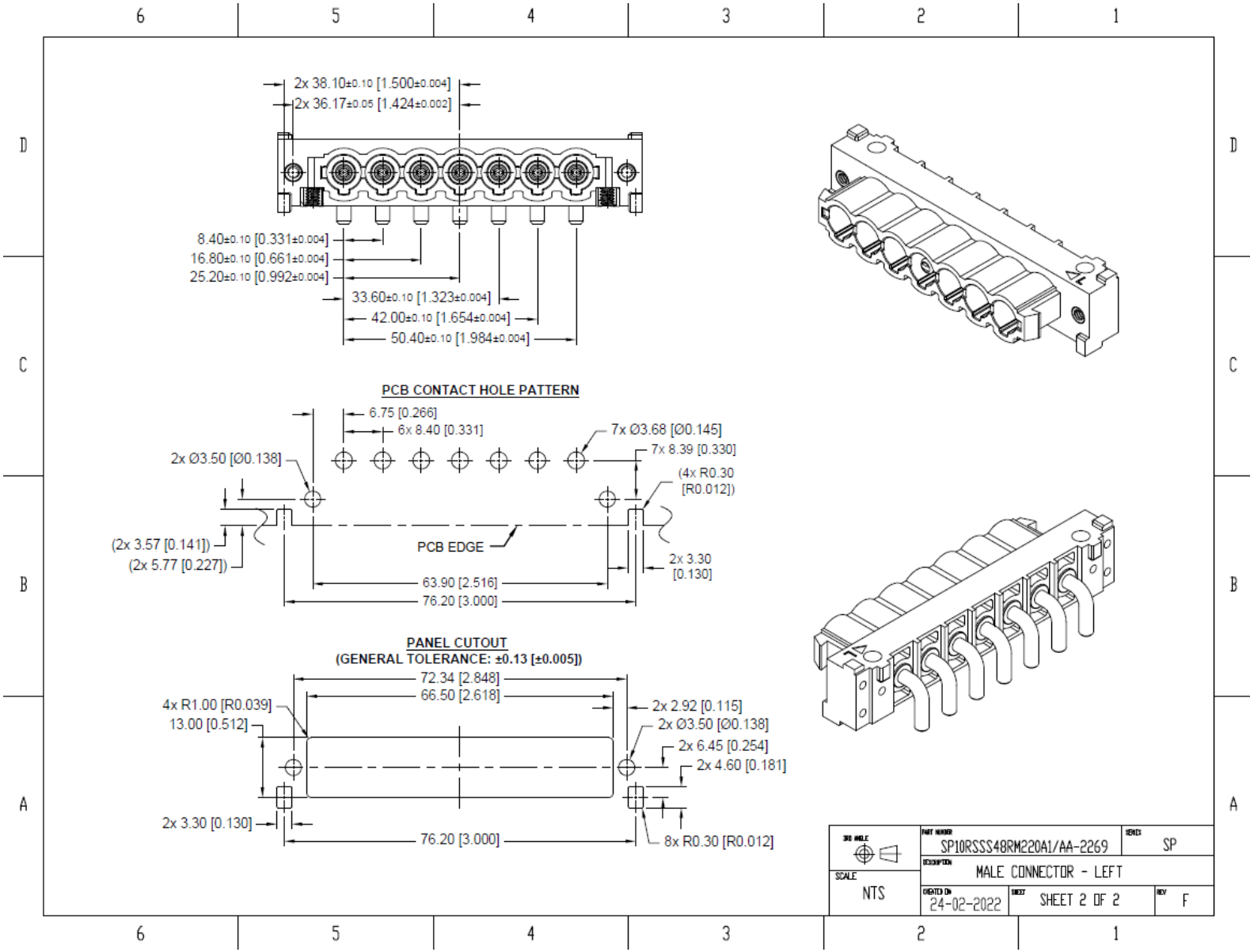
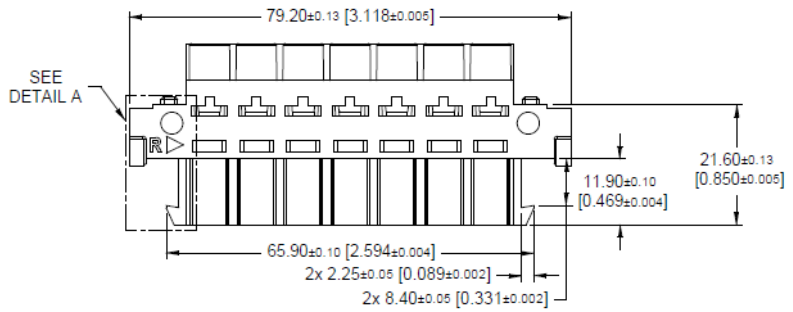
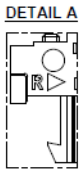


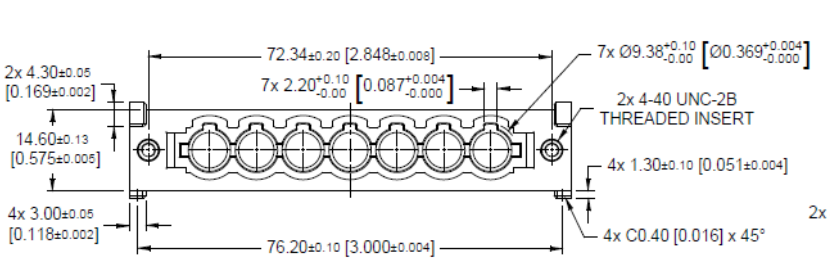
Figure 9.6 SP10RSSS48RM220A1/AA-2269

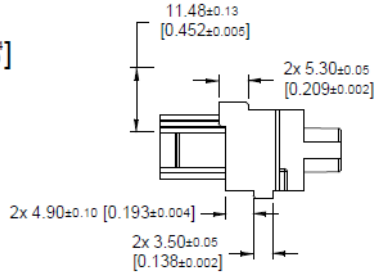
Male connector, Panel Mount Crimped Version w/ Threaded Insert Mount, Universal





"R" INDICATE RIGHT SIDE CONNECTOR.
"▷" INDICATE STARTING POINT OF CONTACT POSITION 1.
FOR LEFT SIDE CONNECTOR, PLEASE REFER TO DETAIL B ON SHEET 3.

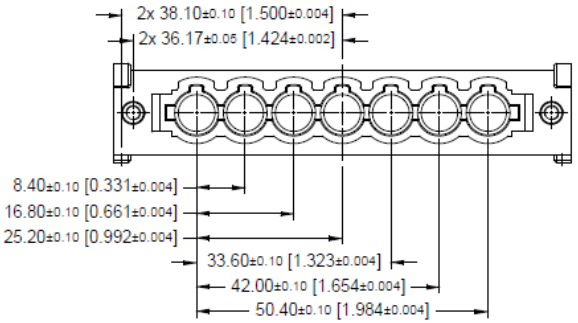




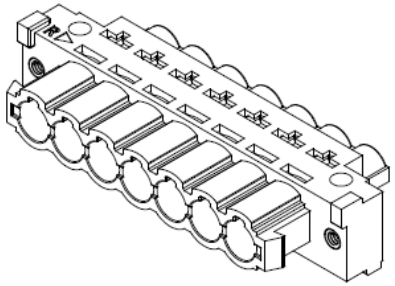
NOTES:

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) THIS MOS ALLOWS FOR THE CONNECTOR TO BE SUPPLIED WITH SPECIAL CONTACTS MODULES WHICH ALLOWS FOR TOUCH SAFE FEATURE.
5) RECOMMENDED WIPE LENGTH FOR 1ST MATE IS 7MM AND STANDARD MATE IS 4MM.

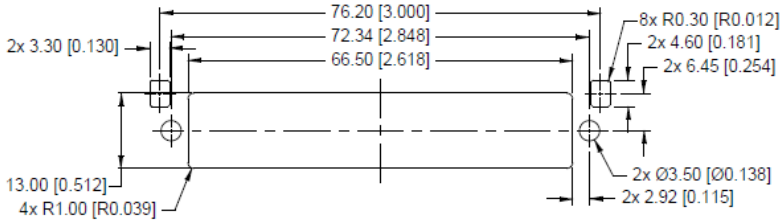
BY: JH	CHK: EH		
APP: CM	RELEASED DATE: 29-09-2022		
TOLERANCES: ±0.03mm [.001 INCHES] FOR MALE CONTACT MATING DIAMETERS ±0.08mm [.003 INCHES] FOR CONTACT TERMINATION DIAMETERS ±0.13mm [.005 INCHES] FOR ALL OTHER DIAMETERS ±0.38mm [.015 INCHES] FOR ALL OTHER DIMENSIONS ±5° FOR ALL ANGLES DIMENSION ARE IN MILLIMETERS [INCHES]	SCALE: NTS	POSITRONIC BELIEVES THE DATA IN THE DRAWING TO BE RELIABLE. THE USER UPLOADS SUCH INFORMATION AT ITS OWN DISCRETION AND POSITRONIC ASSUMES NO RESPONSIBILITY FOR RESULTS ARISING OR DAMAGES INCURRED FROM USE OF SUCH INFORMATION IN WHOLE OR IN PART.	Positronic
	PART NUMBER: SP10RSSS1M2001/AA-2268		SERIES: SP
	TITLE: MALE CONNECTOR		
	CREATED ON: 28-09-2022	SHEET: SHEET 1 OF 3	REV: F

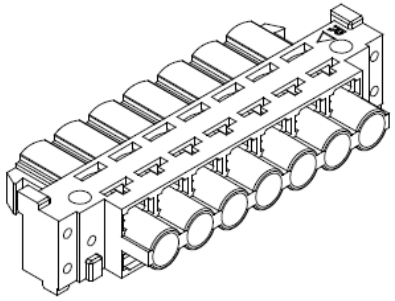


3D VIEW FOR RIGHT SIDE CONNECTOR

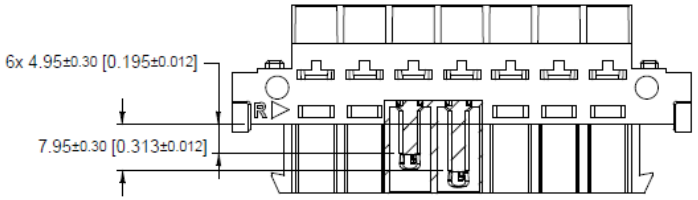


PANEL CUTOUT (FOR RIGHT SIDE CONNECTOR)
(GENERAL TOLERANCE: ±0.13 [±0.005])





REFERENCE VIEW FOR AFTER CRIMP CONTACTS ARE INSTALLED



CONTACT CONCENTRICITY
WITHIN Ø1.2MM FOR ALL CONTACTS

3RD ANGLE	PART NUMBER: SP10RSSS1M2001/AA-2268	SERIES: SP
	DESCRIPTION: MALE CONNECTOR	
SCALE: NTS	DRAWN ON: 28-09-2022	SHEET: SHEET 2 OF 3
		REV: F

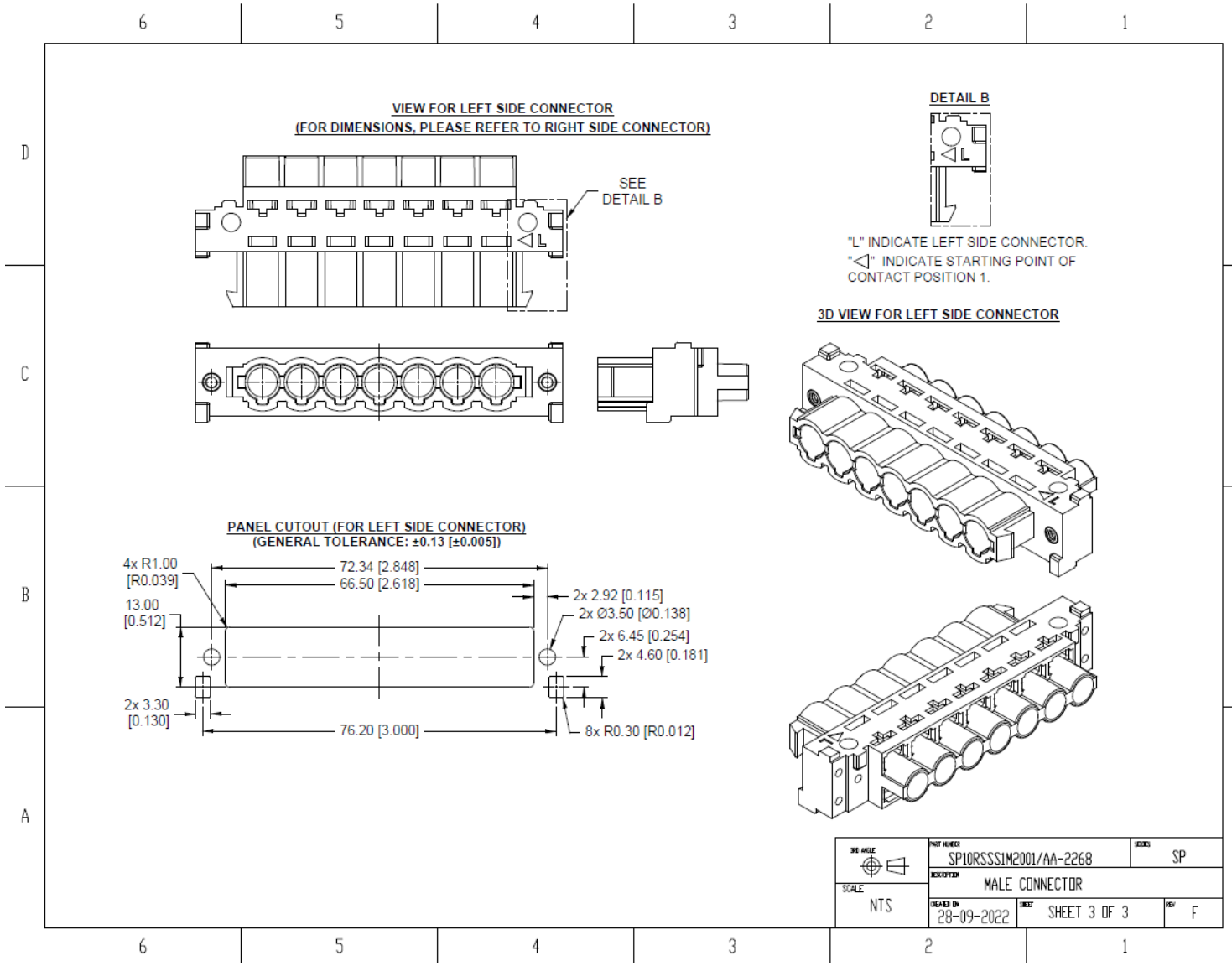


Figure 9.7 SP10RSSS1M22001/AA-2268

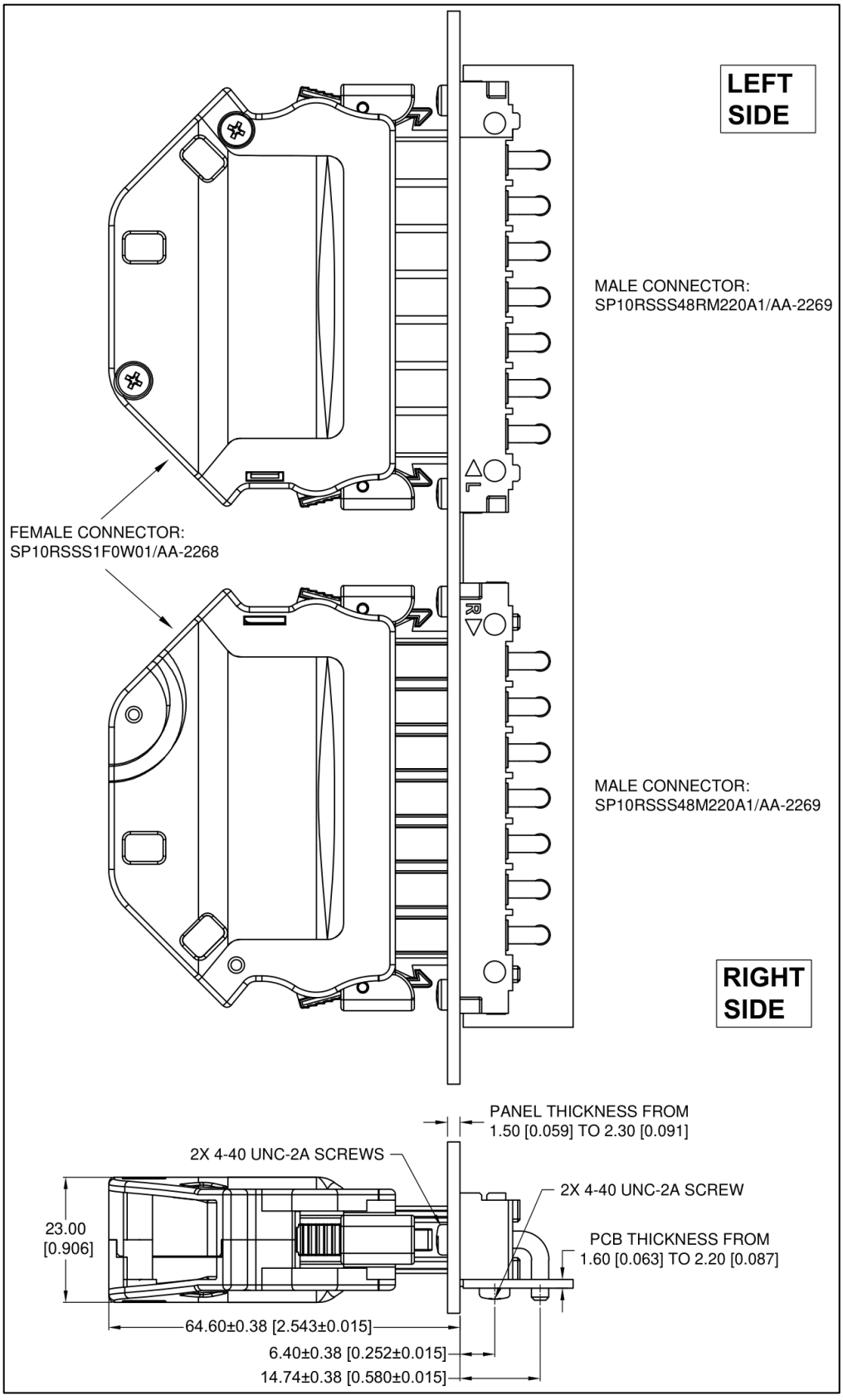


Figure 9.8 Connecter Mating Assembly – Female cable to Right Angle Male (Right & Left Side)

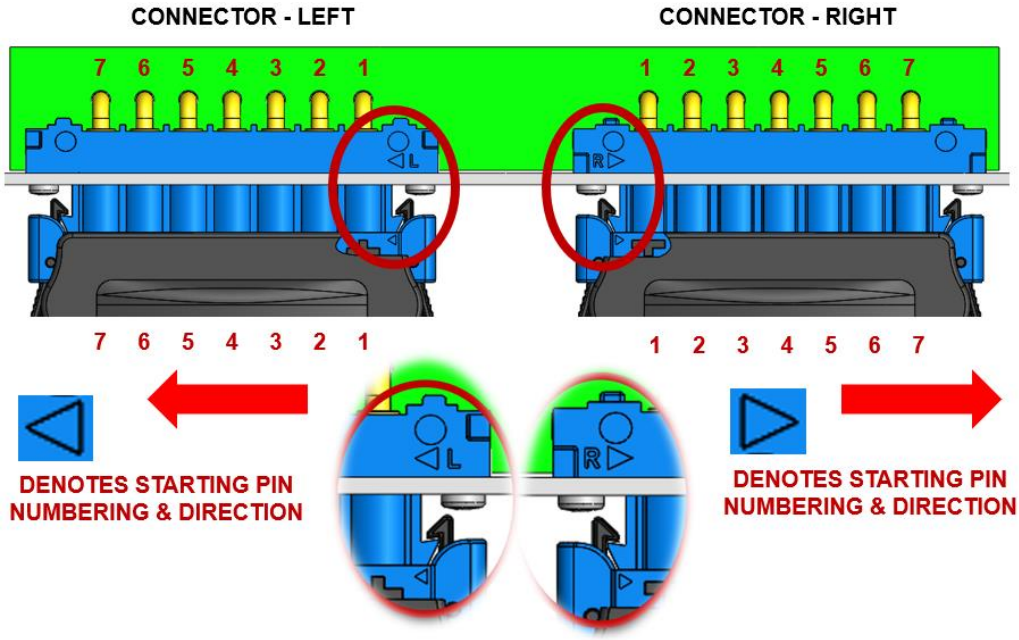


Figure 9.9: Male and Female Connector Pin Layout

10. Contacts

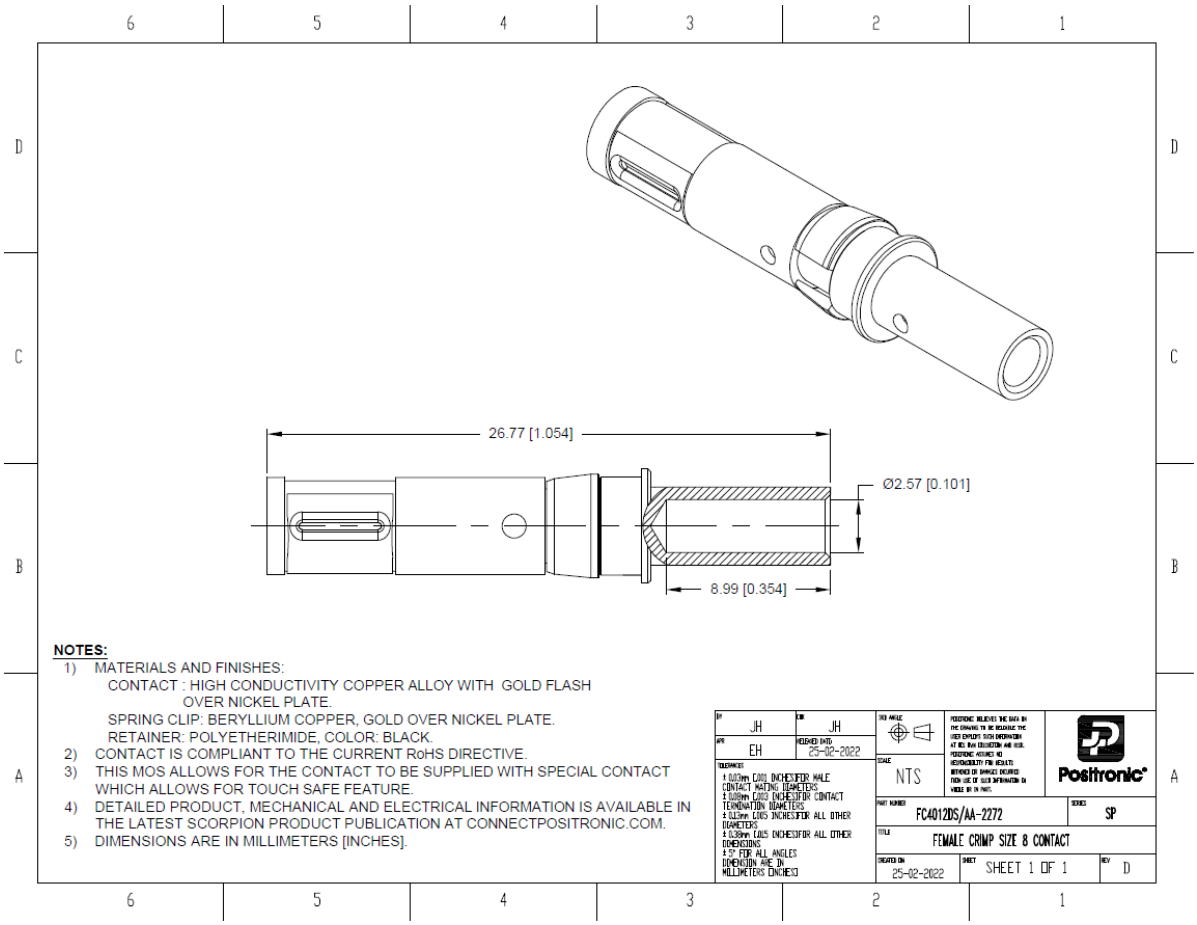
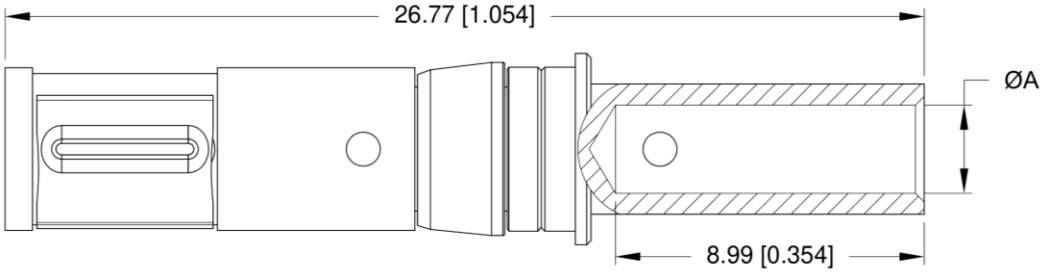


Figure 10.1 Female Crimp Size 8 contact for 12 AWG wire

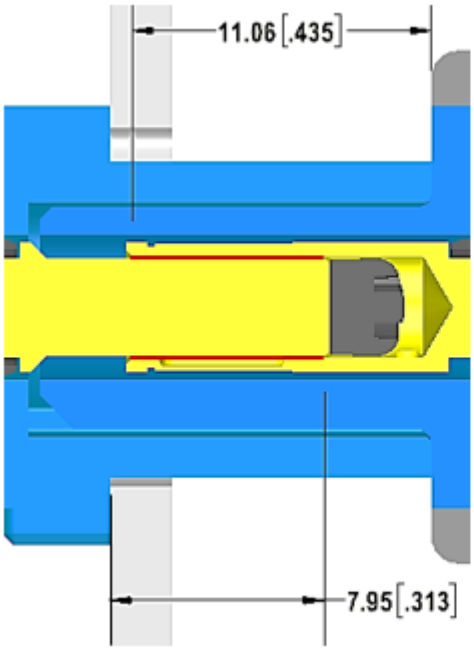
The female crimp contacts ordering part numbers as follows:



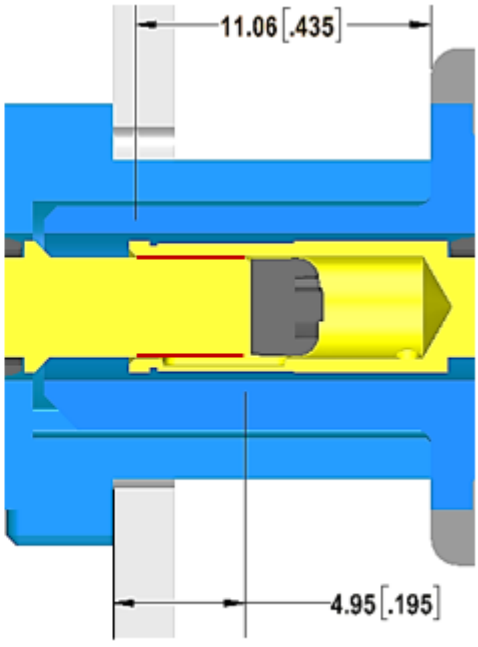
CONTACT PART NUMBER	WIRE SIZE AWG [mm^2]	ØA
FC4008DS/AA-2272	8 [10.0]	4.60 [0.181]
FC4010DS/AA-2272	10 [5.3]	3.10 [0.122]
FC4012DS/AA-2272	12 [4.0]	2.57 [0.101]

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

Nominal Contact Positions Inside Connectors:



1st Mate



Second Mate

- Nominal Wipe for First Mate: 7mm
- Nominal Wipe for Second Mate: 4mm

11. Ordering Information

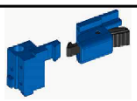
Positronic P/N	HARTING P/N	Amphenol P/N	TE P/N	Remarks
SP10RSSS1F0W01/AA-2268	09930060301	10156980	2399132	Female Cable Connector with Hood
SP10RSSS48M220A1/AA-2269		10156981	2394885-1	Male Right Angle PCB Connector – Right Side
SP10RSSS48RM220A1/AA-2269		10156982	2394885-2	Male Right Angle PCB Connector – Left Side
SP10RSSS48M2LN0A1/AA-2269		10156983		Male Right Angle PCB Connector with Angle Brackets, Boardlocks – Right Side
SP10RSSS48RM2LN0A1/AA-2269		10156984		Male Right Angle PCB Connector with Angle Brackets, Boardlocks – Left Side
SP10RSSS38M2N0A1/AA-2269		10156985		Male Straight PCB Connector with Boardlocks – Right Side
SP10RSSS38RM2N0A1/AA-2269		10156986		Male Straight PCB Connector with Boardlocks – Left Side
SP10RSSS38M200A1/AA-2269		10156987		Male Straight PCB Connector with– Right Side
SP10RSSS38RM200A1/AA-2269		10156988		Male Straight PCB Connector with– Left Side
SP10RSSS1M2001/AA-2268	09930060410	10156989	2404814	Male Connector for crimp contact termination
SP10RSSS1F0W01/AA-2373				Female Cable Connector with Hood (Top Cable Opening)
SP10RSSS1F0001/AA-2268				Female Cable Connector without Hood
FC4012DS/AA-2272	09930006242	10156991		Female Crimp Contact – 12 AWG wire
FC4010DS/AA-2272	09930006243	10165434		Female Crimp Contact – 10 AWG wire
FC4008DS/AA-2272		10165435		Female Crimp Contact – 8 AWG wire
MC4012DS/AA-2271		10165438-002		Male Crimp Contact – 12 AWG wire, standard mate
MC4010DS/AA-2271		10165438-001		Male Crimp Contact – 10 AWG wire, standard mate
MC4008DS/AA-2271	09930006144	10165438-003		Male Crimp Contact – 8 AWG wire, standard mate
MC4012DS/AA-2270		10165437-002		Male Crimp Contact – 12 AWG wire, first mate
MC4010DS/AA-2270		10165437-001		Male Crimp Contact – 10 AWG wire, first mate
MC4008DS/AA-2270		10165437-003		Male Crimp Contact – 8 AWG wire, first mate

Ordering Information - Code Numbering System

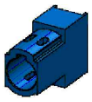
Specify complete connector by selecting a code from each option

Example:	SP	10	RSSS	48	M	2	2	0	A1	/AA	-	2269

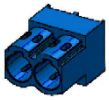
SERIES
SP : Scorpion Series



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



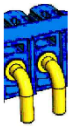
Code R



Code S

LAYOUT
Size 8 power contact module: Module R or S

Code 38



Code 48

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
38 : Solder, straight PCB mount, High 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

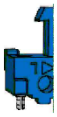
PANEL MOUNT
0 : None (for female connector only)
2 : 4-40 threaded insert

Code 2

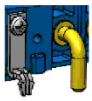
MOUNTING OPTIONS & LOCKING SYSTEMS
0 : None
2 : 4-40 threaded insert (for right angle PCB mount)
N : Boardlocks
LN : Angle brackets, boardlocks (for right angle PCB mount)
W* : Backshell
* Hood Opening (45° or Top Opening), ordering with MOS.

Code W (MOS 2372)

Code 2



Code N



Code LN

Code W (MOS 2268)

OPTIONAL FEATURES
0 : Not Vented
9 : Vented for improved cooling

Code 0

Code 9

CONTACT PLATING
1 : Wire, order contacts separately
A1 : Gold flash over 1.2µm Ni (nominal) over Cu

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

SPECIAL OPTIONS
2268 : For code 1 in "Termination" (connector supplied with special contact modules which allows for Touch Safe feature. Hood Opening 45° if ordered with hood).
2269 : For code 3/3R/38/38R/4/4R/48/48R/938/938R in "Termination" (connector supplied with special contacts 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

Test	Test Standard	Test Condition/ Method	Pass/Fail Criteria	Additional Data to Collect for Review
Durability	EIA-364-09	100 mating/un-mating cycles 30~60mm per second travel speed	Contact resistance before and after Post test surface wear examination: no exposed nickel or copper	N/A
Contact Retention	EIA-364-29	Method A With minimum 15lbs axial load for minimum 6 seconds	No visible contact to housing displacement	N/A
Vibration	EIA-364-28 EIA-364-28F Condition II	Test condition VII Test condition letter E 15 minutes duration in each of the three mutually perpendicular direction	Per standard In addition: contact resistance before and after	Post test contact wear Optical examination, SEM/EDX optional
Shock	EIA-364-27 EIA-364-27C Condition H	half-sine pulse test condition A 3 shocks * 3 perpendicular planes * 2 directions = 18 shocks	Per standard In addition: contact resistance before and after	Post test contact wear Optical examination, SEM/EDX optional
Temperature Life	EIA-364-17	Method C Test condition 1: 125+/-2C Test duration: 168hrs	Per standard, Dection 4.4 In addition: contact resistance before and after	Monitor contact voltage drop during test
Thermal Shock	EIA-364-32	Method A Test condition VII: -55C to 105C Test duration: 10cycles	Per standard, Dection 4.6	N/A

Humidity	EIA-364-31	Method IV	Contact resistance before and after Dielectric withstand voltage before and after Insulation resistance before and after	N/A
Temperature Rise	EIA-364-70	Method I Run at 32A through connector without exceeding 30°C above ambient temperature	Lower than 30C	N/A
Temperature Rise	EIA-364-70	Method 2	Meet the required current	N/A
Contact Resistance Test	EIA-364-06	@ Rated Current	Standard Conductivity Contacts material: 0.0006 ohms max. High Conductivity Contact material: 0.0004 ohms max.	NA
Crimp Tensile Strength	EIA-364-08	Per standard	8 AWG: 489 N min. 10 AWG: 489 N min. 12 AWG: 489 N min. 16 AWG: 222 N min.	Values derived using silver-tin plated copper wires
Whip Connector Pull Out Force	N/A	N/A	111 N min.	Values derived with fully loaded connector
Threaded Insert Pull Out Force	N/A	N/A	111 N min.	NA
Whip Side Connector Drop Test	UL 486A/B	Section 9.7	No mechanical damage other than cosmetic damage allowed	N/A
Voltage Proof Test	EIA-364-20	Per standard	4000 V r.m.s. typical	N/A
Insertion and Withdrawal Force Test	EIA-364-13	Per standard	Insertion force: 156 N max. Withdrawal force: 9.73 N min.	Values derived with fully loaded connector
Insulation Resistance Test	EIA-364-21	Per standard	5G ohms minimum	N/A

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	N/A

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

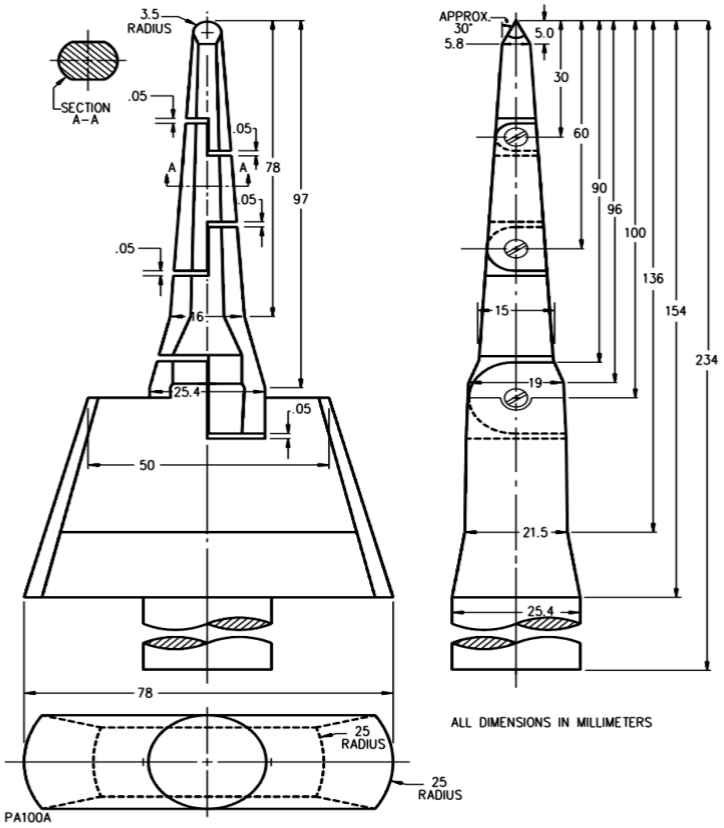
14. Compliance Requirements

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.

Standard	Parts
UL 1682	IEC 309 AC connector to the branch circuitry
UL498	NEMA AC connector to the branch circuitry
UL1977	Output connector that mates with connector in the power shelf
UL62 and UL817	Flexible power cord that can be used for AC wiring

- 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.

Max Ratings	Wire Size
50 Amps	8AWG
32 Amps	10AWG
30 Amps	12AWG

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.

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