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HARWiN

Component Specification

C04809

M300 Series 3.00mm Pitch Power Connectors
March 2023

1. DESCRIPTION OF CONNECTOR AND INTENDED APPLICATION

The M300 connector series is a range of 3mm pitch male and female rectangular, fully shrouded, unsealed connectors. The range covers Single Row and Double Row connectors, capable of board-to-board, cable-to-board, and cable-to-cable configurations. All female connectors have recessed contacts, and are available in Cable and Vertical PC Tail versions. Male connectors use Ø1mm contacts to achieve up to 10A per contact and are also available in Cable and Vertical PC Tail versions.

The connectors are gold plated for high performance and long service life, with a hard acid gold at 98% purity. Cable contacts are barrel-crimp style, and are replaceable in the housing. The cable housings have a low-profile potting wall for backpotting - this provides additional strain relief and some sealing.

The M300 Connectors are designed as a 5 to 10A power connector for high-reliability applications. Connector housings are fitted with jackscrews for secure interconnection and polarised to prevent mis-mating.

2. RATINGS

2.1. Materials

All materials are listed on individual drawings.

Female Contacts:
- Contact Clip ..... Beryllium Copper, Gold finish
- Contact Shell ..... Brass, Gold finish

Male Contacts ..... Brass, Gold finish
Housing ..... 30% Glass Filled Thermoplastic, UL94 V-0
Locking Hardware ..... Stainless Steel

2.2. Electrical Characteristics

Current Rating (EIA-364-70A: Temperature Rise Versus Current, Method 2):
- All Contacts with 18AWG wire and 30°C rise ..... 10A max
- All Contacts with 22AWG wire and 30°C rise ..... 5A max

Contact Resistance (Low Level, EIA-364-23B) ..... 6mΩ max
Dielectric Withstanding Voltage (EIA-364-20C, Method B):
- Condition I: Sea Level (913/1050mb) ..... 1800V min DC or AC Peak
- Condition IV: 21,336m/70,000ft (44mb max) ..... 450V min DC or AC Peak

Working Voltage (1/3 of Withstanding Voltage):
- Condition I: Sea Level (913/1050mb) ..... 600V max DC or AC Peak
- Condition IV: 21,336m/70,000ft (44mb max) ..... 150V max DC or AC Peak

Insulation Resistance (EIA-364-21C) ..... 100MΩ min at 100V DC

2.3. Environmental Characteristics

Environmental Classification ..... 65/175/56 days at 90%RH
Humidity (EIA-364-31B Condition D Method II) ..... 56 Days, 90% RH at 40°C
Temperature Life (EIA-364-17B Method A) ..... +175°C, 1000 Hours
Thermal Shock (EIA-364-32C Condition V) ..... -65°C to +175°C Temperature Range
Vibration (EIA-364-28D Condition II) ..... 10Hz to 500Hz, 1.52mm, 98.1m/s² (10G), 9 hours
Shock (BS EN 60068-2-27, EIA-364-27B) ..... 981m/s² (100G), 6ms, 3 axis
Bump (BS EN 60068-2-27, EIA-364-27B) ..... 390m/s² (40G), 6ms, 3 axis, total 4,000 bumps
Acceleration (EIA-364-01B Condition A) ..... 490m/s² (50G), 5 minutes, 3 axis

2.4. Mechanical Characteristics

Durability (EIA-364-09C).....1,000 operations
Insertion force (per contact, EIA-364-13C Method B).....9.0N max
Withdrawal force (per contact, EIA-364-13C Method B).....1.0N min
Contact Insertion force into cable housing (EIA-364-05B) .....75N max
Contact Removal force into cable housing (EIA-364-05B) .....15N min
Contact Replacement in cable housing.....5 times min

2.5. Wire Termination Range

Wire Type (recommended) .....BS 3G 210 Type A, MIL-16878E Type E or M22759/11
Wire Type (possible alternatives) .....MIL-W-16878/4E Type E, UL AWN 1213, NEMA HP3-EXBFBE
Insulation Strip Length 2.00mm
Recommended Tooling:
Hand Crimp Tool.....M22520/2-01
Positioner Z80-058

AWG Wire Size	Qty & Nominal diameter (mm) of strands	Conductor Diameter (mm)	Area (mm^2)	Circular MIL Area (CMA)	M22520/2-01 Crimp tool setting	Max Insulation Diameter	Minimum Pull-Out Force (N) (EIA-364-08B)
18	19/0.25	1.28	0.96	1840	8	Ø1.80mm	140
20	19/0.20	1.00	0.60	1178		Ø1.80mm	80
22	19/0.15	0.75	0.34	663		Ø1.40mm	50

NOTE: Pull-Out Force Guidelines change depending on Industry recognised standards:

- *UL 486A: 18AWG = 89.0N, 20AWG = 57.9N and 22AWG = 35.6N*
- *VW 60330: 18AWG = 85.0N, 20AWG = 60.0N and 22AWG = 50.0N*
- *SAE USCAR-21: 18AWG = 88.9N, 20AWG = 75.2N and 22AWG = 49.8N*
- *IEC 60352-2: 18AWG = 101.3N, 20AWG = 73.1N and 22AWG = 51.2N*
- *NASA-STD-8739-4: 18AWG = 142.0N, 20AWG = 93.4N and 22AWG = 57.8N*
- *SAE AS7928/MIL-T-7928: 18AWG = 169.0N, 20AWG = 84.5N and 22AWG = 67.2N*

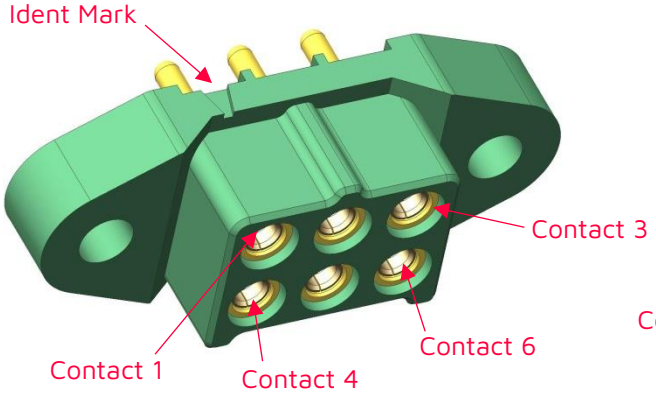
2.6. Crimping and Assembly Methods

- For information on crimping contacts, refer to **Tooling Instruction Sheet IS-01 – Hand Crimp Tool M22520/2-01.**
- For information on assembling and removing contacts from connector housing, refer to **Tooling Instruction Sheet IS-40 – Assembly Tool Z300-902.**
- Visit www.harwin.com/harwintv for crimping instruction videos.
- Recommended potting compound for backpotting is **EPOXIES® 50-3122 (not available separately from Harwin).**

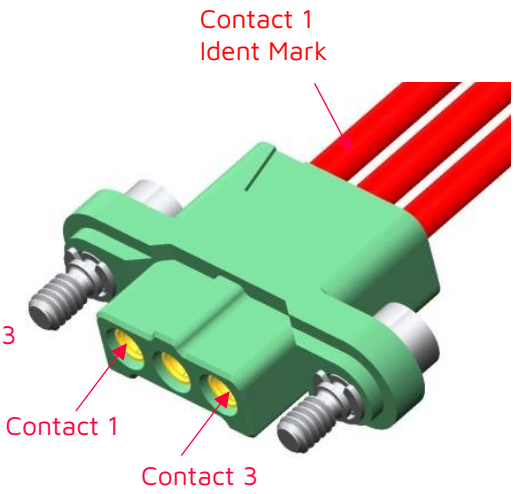
APPENDIX 1 – CONTACT NUMBERING

Contact 1 identification mark is present on all connectors.

A1.1. Female Connectors

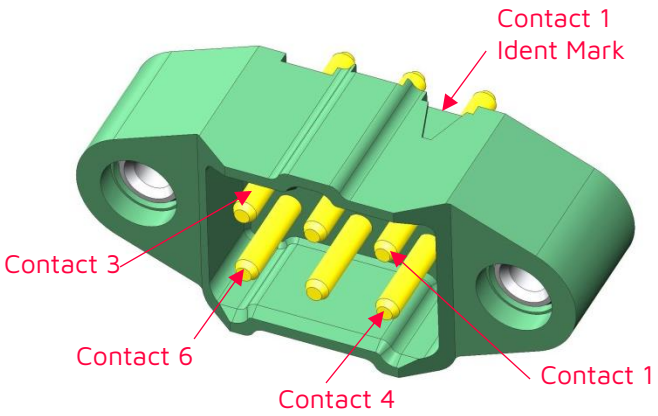


Double Row layout

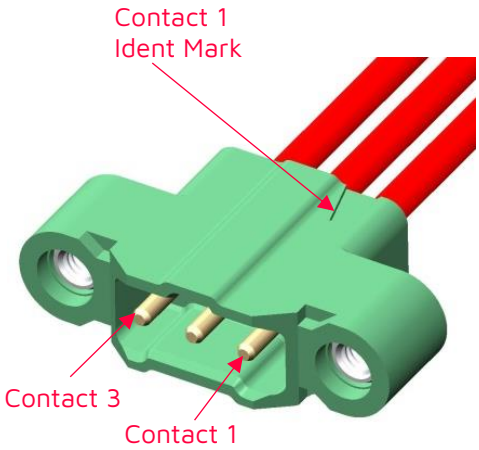


Single Row layout

A1.2. Male Connectors



Double Row layout



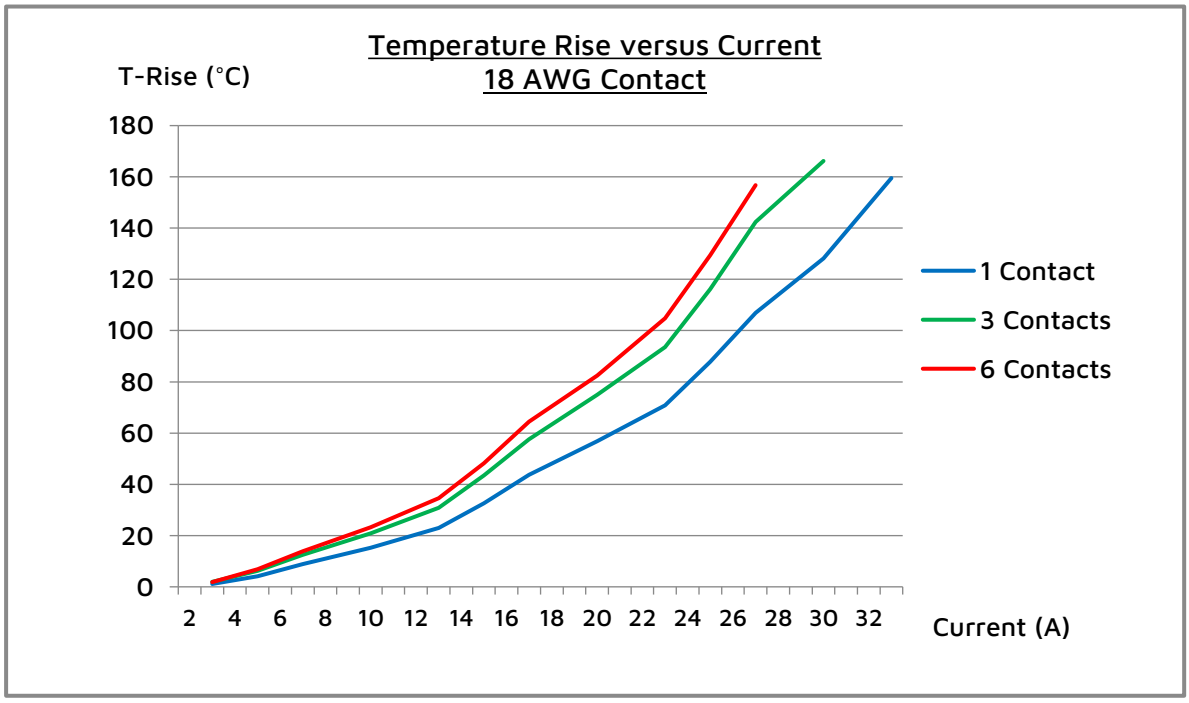
Single Row layout

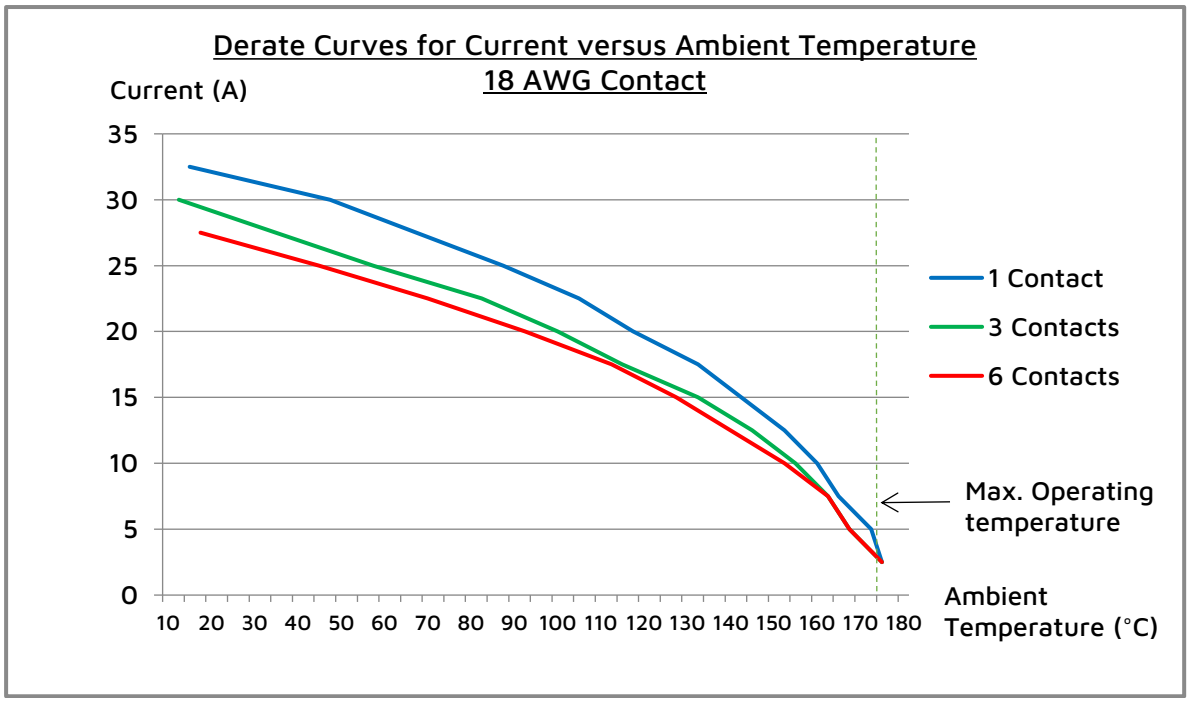
APPENDIX 2 – POWER DERATING CURVES

Tested in typical laboratory conditions to EIA-364-70A Method 2.

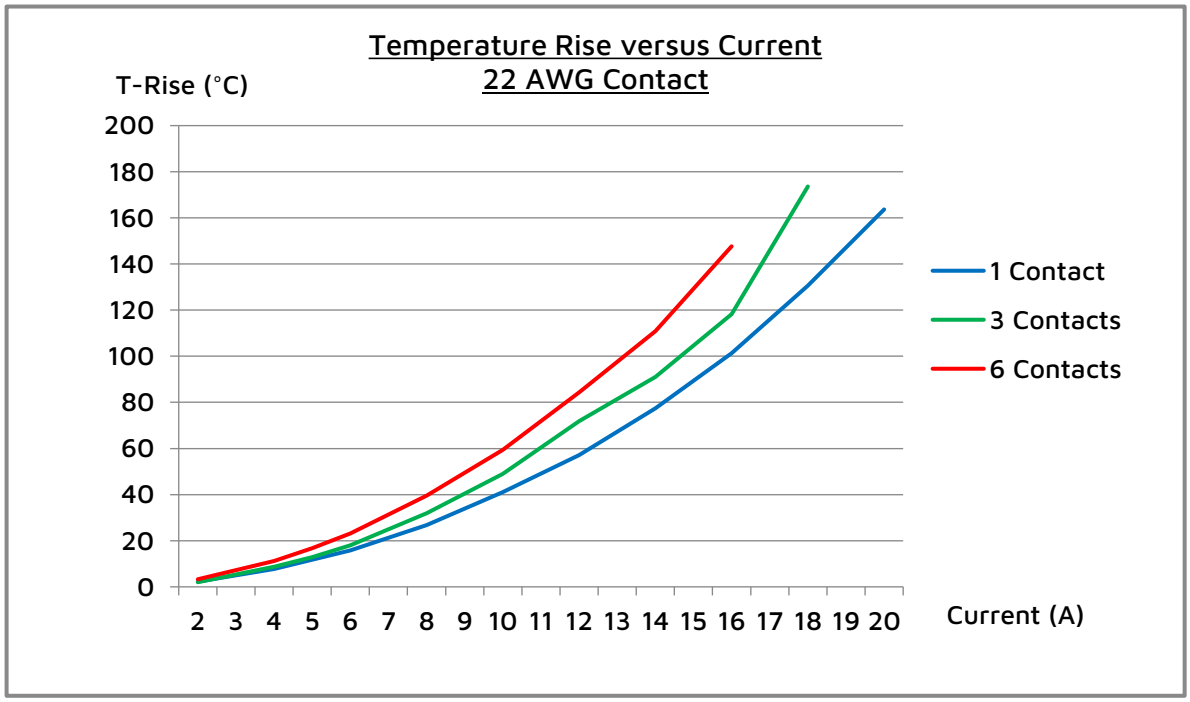
1 Contact and 3 Contact curves are the averages taken from the results of three samples of single row connectors and three samples of dual row connectors. 6 Contact curve is produced from dual row connectors only.

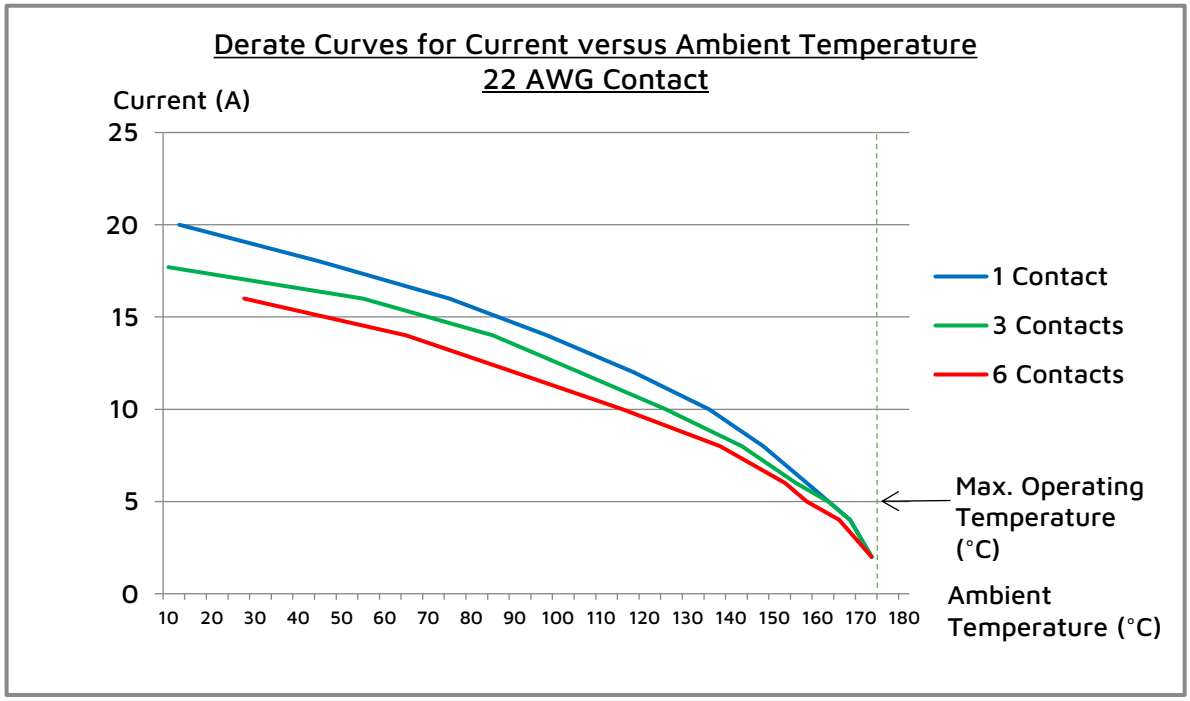
A2.1. 18AWG Contact / Cable





A2.2. 22AWG Contact / Cable





APPENDIX 3 – INSTRUCTIONS FOR THE USE OF CONNECTORS FITTED WITH JACKSCREWS

Connectors are fitted with jackscrews where it is considered necessary to provide mechanical assistance in ensuring a satisfactory engagement and separation of the connector. This may apply in cases where engagement and separation forces are so high as to prevent satisfactory hand engagement, or where access to connector is restricted. Jackscrews also provide a locking feature, preventing the connector from disengaging under adverse conditions.

To obtain maximum effectiveness from the jackscrew system, the following rules for their use should be observed.

1) The connector with board mount jackscrews should be fixed to the PCB with fixings and tightened to a torque of **21±2cmN.**

   Board mount fixings must be fitted before Wave soldering.

   Board mount fixings can be fitted before or after reflow soldering, as preferred by customer. If fitted before soldering, check that the fixings remain tight after soldering.

   NOTE: Care must be taken when aligning male and female threads, to avoid cross-threading and possible failure of parts.

2) On engaging the two halves of the connector after ensuring correct polarity, lightly push home the floating half until the jackscrews touch. Then, maintaining the pressure, turn one of the floating jackscrews clockwise, until it engages with the fixed screw. Repeat with the other screw.

   Then screw in each jackscrew, ensuring even loading by applying a maximum of one turn to each screw in sequence until the connector is bottomed. This will be evident by a sudden increase in the torque required on the screw. This torque should not exceed **23cmN.**

   Finger pressure exerted at the centre of the connectors may be required to achieve full engagement of both halves.

   NOTE: Care must be taken when aligning male and female threads to avoid cross-threading and possible failure of parts.

3) On disengaging the two halves of the connector turn each of the floating jackscrews anti clockwise. Again, ensure even loading by turning each screw in sequence for a maximum of one turn until the jackscrew disengage. The connector can then be easily pulled apart.