

MX150L INDUSTRIAL SEALED CONNECTOR SYSTEM





The MX150L Industrial Sealed Connector System is IP67 rated and conforms to UL 1977, but it is NOT suitable for automotive applications with requirements such as USCAR-2, USCAR-25, GMW3191, AK Testing, J2030, Volvo Technology Requirements and Toyota Connector Spec (TCS).

The MX150L sealed connector system is designed to meet the need for a rugged, environmentally sealed connector system supporting low-level signal applications as well as power applications up to 40.0A, from marine applications to off-road construction equipment applications. The system is comprised of wire-to-wire, wire-to-panel and wire-to-board configurations.

These innovative mat-sealed connectors are based upon the 1.50 and 2.50mm (.059 and .098") blade-type terminals. This design eliminates the need to purchase, handle and crimp individual wire seals, lowering the applied cost. The mat-seal design is a single silicone-based seal with individual wire openings and a seal cap to protect, securely retain, and provide strain relief to the seal. The cost-effective connector design features all-in-one plug and receptacle housings with pre-assembled mat-wire and interfacial connector seals. Integral terminal position assurance (TPA) and optional connector position assurance (CPA) components eliminate time-consuming and costly assembly operations. Completing the application is as simple as crimping the appropriate terminal, inserting the crimped terminal lead and seating the TPA to its final locked position. No additional components are required.

Tooling solutions include FineAdjust crimp press applicators for high-volume production, as well as hand tools for low-volume production and field repairs.

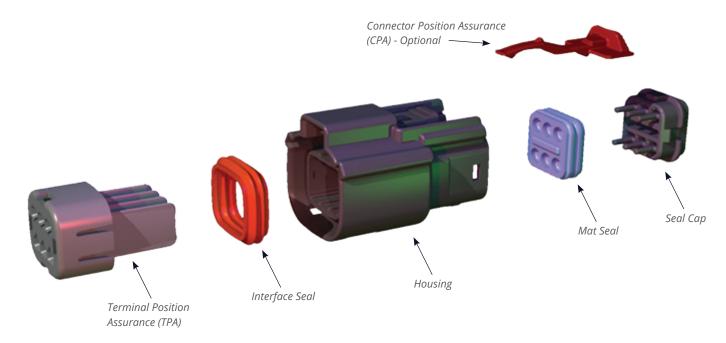
Features and Benefits

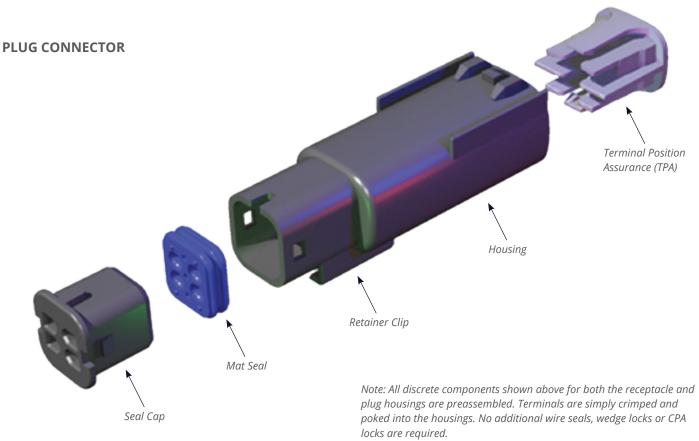
- Pre-assembled connector housings, seals, TPA components and mat-seal cap shipped in one piece to provide applied labor and cost savings
- Integral TPA assures that crimped terminal leads are properly locked into connector (TPA will not seat into final lock position and connector system will not latch if terminal is not locked properly into position)

- Conforms to UL 1977, which allows for a UL recognized sealed connector system for use in data, signal, control and power applications
- Superior electrical and mechanical performance capabilities surpass performance of most mature competitive products in market
- Audible and tactile feedback clicks on insertion, extraction and mating facilitate reliable mating and terminal loading and removal
- Unused circuits can be blocked using plastic seal plugs, which facilitates flexibility of sealing unused circuits without adding complexity to part numbers and customer inventory
- Integral locking latch with secondary, pre-loaded CPA option assures that connector system is properly latched. CPA will not move to final locked position if connector is not latched. Confirms positive mating of connector
- Sealed panel-mount plugs are equipped with a blind hole boss feature which reduces extra hardware while improving the sealing process during assembly by eliminating a leak path
- Integral, two-way mat and interface seals designed and tested to IEC IP67 standards exceeds "waterproof" demands as a true sealed connector system tested under submersed conditions in various fluids
- Easy terminal insertion and extraction provides quick, low-cost field repairs using common screw driver, needle-nose pliers and terminal extraction tool
- Protective mat-seal cap protects, securely retains, and provides strain relief to wire seal interface
- Simple crimp, poke and plug application eliminates need to crimp individual wire seals

MX150L Industrial Sealed Connector System – Exploded View

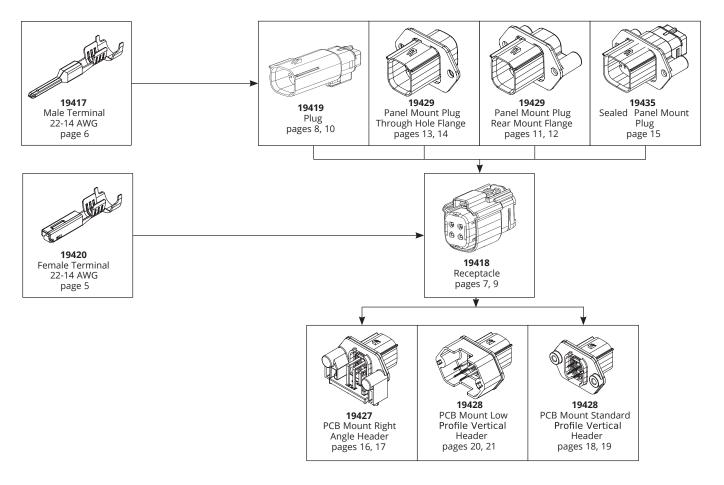
RECEPTACLE CONNECTOR



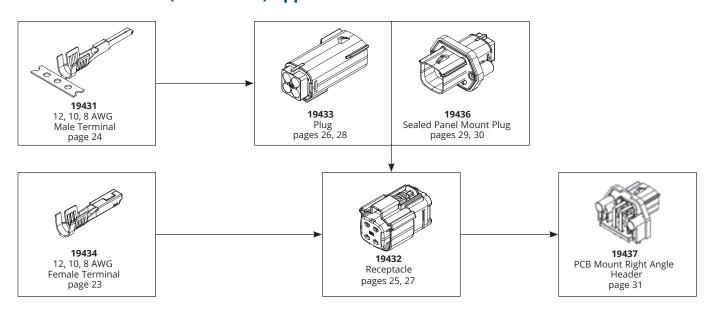


MX150L Industrial Product Overview

22 to 14 AWG Wire-to-Wire and Panel-Mount Applications



12, 10 and 8 AWG Wire-to-Wire, Panel-Mount and Wire-to-Board (PCB Mount) Applications



5.84mm (.230") Pitch MX150L Industrial Terminal –

19420 Female



Features and Specifications

Features and Benefits

Mat seal friendly design features center seam and coined edges

Anti-over stress beam geometry feature

Low insertion force

Reference Information

UL File No.: E152602 Designed In: Inches Used With: 19418 **Electrical** Current: 18.0A

Mechanical

Contact Insertion Force: 1.0 lb. max.

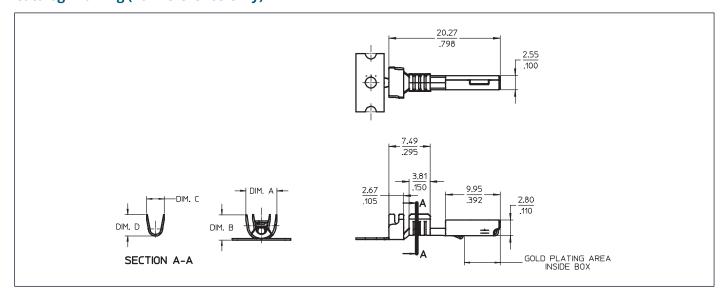
Durability:

Tin Plating—25 cycles Gold Plating—100 cycles

Physical

Contact: Copper Alloy Plating: Tin or Gold

Catalog Drawing (For Reference Only)



	Insulation	Order No.			Dimension			
Wire Range (AWG)	Diameter mm (in.)	Pre-Tin		Gold	mm (in.)			
		Strip	Loose	Strip	Α	В	С	D
22 to 18	2.36 to 2.74 (.093 to .108)	19420-0002	19420-0010	19420-0004	4.60 (.181)	3.63 (.143)	2.50 (.098)	2.70 (.106)
16 to 14	12.87 to 3.53 (.113 to .139)	9420-0001	19420-0009	19420-0003	5.66 (.223)	4.62 (.182)	3.58 (.141)	3.94 (.155)

5.84mm (.230") Pitch MX150L Industrial Terminal –

19417 Male



Features and Specifications

Features and Benefits

Mat seal friendly design features center seam and coined edges

Low insertion force

Reference Information

UL File No.: E152602 Designed In: Inches

Used With: 19419, 19429 and 19435

Electrical Current: 18.0A

Mechanical

Contact Insertion Force: 1.0 lb. max.

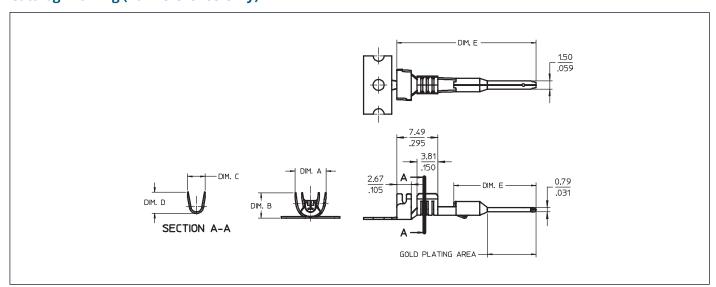
Durability:

Tin Plating—25 cycles Gold Plating—100 cycles

Physical

Contact: Copper Alloy Plating: Tin or Gold

Catalog Drawing (For Reference Only)



Wire	Insulation			Dimension							
Range	Diameter	Pre-Tin		Gold	Pin Length	•					
(AWG)	(AWG) mm (in.)	Strip	Loose	Strip		Α	В	C	D	Е	
22 to 18	2.36 to 2.74 (.093 to .108)	19417-0024	19417-0048	19417-0026	Standard	4.60 (.181)	3.63 (.143)	2.50 (.098)	2.70 (.106)	25.40 (1.00)	
16 to 14	2.87 to 3.53 (.113 to .139)	19417-0011	19417-0047	19417-0025	Standard	5.66 (.223)	4.62 (.182)	3.58 (.141)	3.94 (.155)	25.40 (1.00)	
22 to 18	2.36 to 2.74 (.093 to .108)	19417-0028	-	19417-0030	Long	4.60 (.181)	3.63 (.143)	2.50 (.098)	2.70 (.106)	26.16 (1.03)	
16 to 14	2.87 to 3.53 (.113 to .139)	19417-0027	-	19417-0029	Long	5.66 (.223)	4.62 (.182)	3.58 (.141)	3.94 (.155)	26.16 (1.03)	

5.84mm (.230") Pitch MX150L Industrial Receptacle –

19418 Single Row



Features and Specifications

Features and Benefits

Environmentally sealed to IP67

Integrated mat wire seal

Integrated interface seal and TPA

Optional CPA

Simple crimp-and-poke application

Field serviceable contact removal system

Tactile and audible mating feedback

Reference Information

UL File No.: E152602 Designed In: Inches

Mates With: 19419, 19429

Electrical

Dielectric Withstanding Voltage:

2200V AC min.

Insulation Resistance: 1000 Megohms

Voltage: 600V

Mechanical

Mating force: 75N max. Unmating force: 75N max.

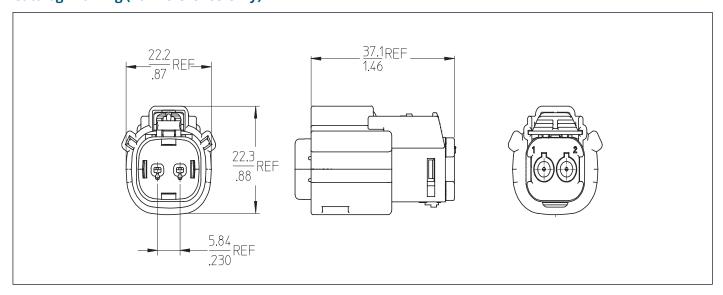
Physical

Housing: SPS Glass-Filled

Crystalline Polymer

Operating Temperature: -40 to +125°C

Catalog Drawing (For Reference Only)



Cinavita	Wire Range	Mad Saal Salaw	Order No.			
Circuits	(AWG)	Mat Seal Color	with CPA	without CPA		
2	22 to 18	Red	19418-0008	19418-0016		
2	16 to 14	Blue	19418-0007	19418-0017		

5.84mm (.230") Pitch MX150L Industrial Plug –

19419 Single Row



Features and Specifications

Features and Benefits

Environmentally sealed to IP67
Integrated mat seal and TPA
Simple crimp-and-poke application
Field serviceable contact removal system
Tactile and audible mating feedback

Reference Information

UL File No.: E152602 Designed In: Inches Mates With: 19418

Electrical

Dielectric Withstanding Voltage:

2200V AC min.

Insulation Resistance: 1000 Megohms

Voltage: 600V

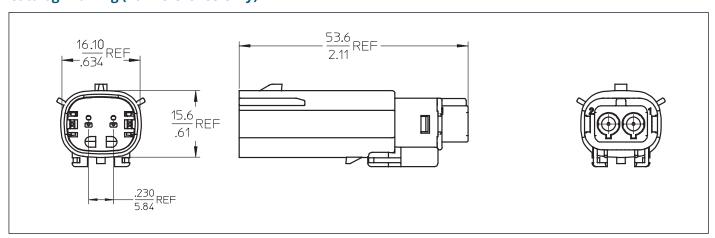
MechanicalMating force: 75N max.
Unmating force: 75N max.

Physical

Housing: SPS Glass-Filled Crystalline Polymer

Operating Temperature: -40 to +125°C

Catalog Drawing (For Reference Only)



Circuits	Wire Range (AWG)	Mat Seal Color	Order No.
2	22 to 18	Red	19419-0008
2	16 to 14	Blue	19419-0007

5.84mm (.230") Pitch MX150L Industrial Receptacle –

19418 Dual Row



Features and Specifications

Features and Benefits

Environmentally sealed to IP67 Integrated mat wire seal and TPA Optional CPA

Simple crimp-and-poke application

Field serviceable contact removal system
Tactile and audible mating feedback

Reference Information

UL File No.: E152602 Designed In: Inches

Mates With: 19419, 19429 and 19435

Electrical

Dielectric Withstanding Voltage:

2200V AC min.

Insulation Resistance: 1000 Megohms

Voltage: 600V **Mechanical**

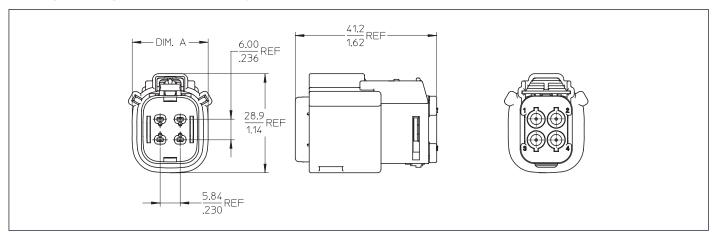
Mating force: 75N max.
Unmating force: 75N max.

Physical

Housing: SPS Glass-Filled Crystalline Polymer

Operating Temperature: -40 to +125°C

Catalog Drawing (For Reference Only)



Cincuita	Wire Range	Man Carl Calan	Orde	r No.	Dimension A	
Circuits	(AWG)	Mat Seal Color	with CPA	without CPA	mm (in.)	
4	22 to 18	Red	19418-0005	19418-0018	22.15 (.872)	
4	16 to 14	Blue	19418-0004	19418-0019	22.15 (.872)	
6	22 to 18	Red	19418-0011	19418-0020	27.99 (1.102)	
6	16 to 14	Blue	19418-0010	19418-0021	27.99 (1.102)	
8	22 to 18	Red	19418-0001	19418-0022	33.83 (1.332)	
8	16 to 14	Blue	19418-0002	19418-0023	33.83 (1.332)	
10	22 to 18	Red	19418-0014	19418-0024	39.67 (1.562)	
10	16 to 14	Blue	19418-0013	19418-0025	39.67 (1.562)	
12	22 to 18	Red	19418-0026	19418-0038	45.51 (1.792)	
12	16 to 14	Blue	19418-0027	19418-0037	45.51 (1.792)	
16	22 to 18	Red	19418-0029	19418-0040	57.19 (2.252)	
16	16 to 14	Blue	19418-0030	19418-0039	57.19 (2.252)	

5.84mm (.230") Pitch MX150L Industrial Plug –

19419 Dual Row



Features and Specifications

Features and Benefits

Environmentally sealed to IP67
Integrated mat wire seal and TPA
Simple crimp-and-poke application
Field serviceable contact removal system
Tactile and audible mating feedback

Reference Information

UL File No.: E152602 Designed In: Inches Mates With: 19418

Electrical

Dielectric Withstanding Voltage:

2200V AC min.

Insulation Resistance: 1000 Megohms

Voltage: 600V **Mechanical**

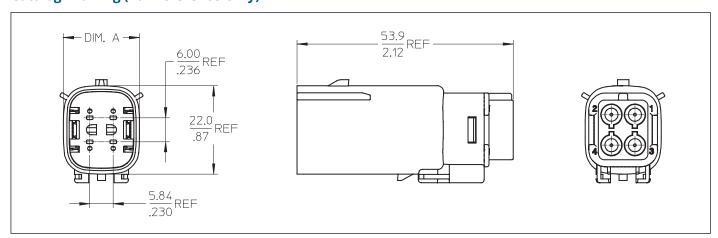
Mating force: 75N max.
Unmating force: 75N max.

Physical

Housing: SPS Glass-Filled Crystalline Polymer

Operating Temperature: -40 to +125°C

Catalog Drawing (For Reference Only)



Circuits	Wire Range (AWG)	Mat Seal Color	Order No.	Dimension A mm (in.)
4	22 to 18	Red	19419-0005	16.10 (.634)
4	16 to 14	Blue	19419-0004	16.10 (.634)
6	22 to 18	Red	19419-0012	24.78 (.976)
6	16 to 14	Blue	19419-0011	24.78 (.976)
8	22 to 18	Red	19419-0001	30.62 (1.206)
8	16 to 14	Blue	19419-0002	30.62 (1.206)
10	22 to 18	Red	19419-0015	36.47 (1.436)
10	16 to 14	Blue	19419-0014	36.47 (1.436)
12	22 to 18	Red	19419-0017	42.31 (1.666)
12	16 to 14	Blue	19419-0018	42.31 (1.666)
16	22 to 18	Red	19419-0020	53.99 (2.126)
16	16 to 14	Blue	19419-0021	53.99 (2.126)

5.84mm (.230") Pitch MX150L Industrial Panel Mount Plug – 19429 Rear Mount Flange Single Row



Features and Specifications

Features and Benefits

Environmentally sealed to IP67 when mated Integrated TPA

Simple crimp-and-poke application
Field serviceable contact removal system
Tactile and audible mating feedback

For inside panel mount applications with sufficient sealing area

Use with molded silicone panel gasket Blind hole boss feature eliminates leak path and reduces extra sealing process during assembly

Reference Information

UL File No.: E152602 Designed In: Inches Mates With: 19418

Electrical

Dielectric Withstanding Voltage:

2200V AC min.

Insulation Resistance: 1000 Megohms

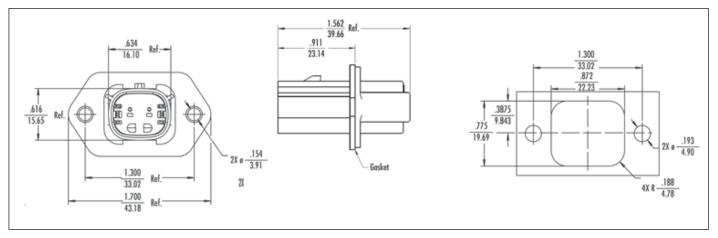
Voltage: 600V **Mechanical**

Mating force: 75N max. Unmating force: 75N max.

Physical

Housing: SPS Glass-Filled Crystalline Polymer Operating Temperature: -40 to +125°C

Catalog Drawing (For Reference Only)



Recommended Mounting Hardware: (2) #10 x .62/18.9 long, plastic thread cutting screws. Suggested Source: ITW Shakeproof BosScrew $^{\text{m}}$ or equivalent

Civavita	Wire Range		Order No.	
Circuits	(AWG)	with Gasket	without Gasket	Gasket
2	22 to 14	19429-0033	19429-0005	19427-0025

5.84mm (.230") Pitch MX150L Industrial Panel Mount Plug – 19429 Rear Mount Flange Dual Row



Features and Specifications

Features and Benefits

Environmentally sealed to IP67

Integrated TPA

Simple crimp-and-poke application

Field serviceable contact removal system

Tactile and audible mating feedback

For inside panel mount applications with

sufficient sealing area

Use with molded silicone panel gasket

Blind hole boss feature eliminates leak path and reduces extra sealing process

during assembly

Reference Information

UL File No.: E152602

Designed In: Inches Mates With: 19418

Electrical

Dielectric Withstanding Voltage: 2200V AC min.

Insulation Resistance: 1000 Megohms

Voltage: 600V

Mechanical

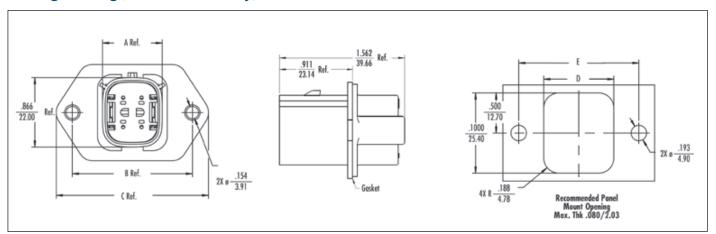
Mating force: 75N max. Unmating force: 75N max.

Physical

Housing: SPS Glass-Filled Crystalline Polymer

Operating Temperature: -40 to +125°C

Catalog Drawing (For Reference Only)



Recommended Mounting Hardware: (2) #10 x .62/18.9 long, plastic thread cutting screws Suggested Source: ITW Shakeproof BosScrew $^{\text{TM}}$ or equivalent

	Wire		Order No.		Dimensions – mm (in.)					
Circuits	s Range with without (AWG) Gasket Gasket		Gasket	Α	В	С	D	E		
4	22 to 14	19429-0035	19429-0009	19427-0024	18.94 (.746)	38.10 (1.500)	48.26 (1.900)	22.23 (.875)	38.10 (1.500)	
6	22 to 14	19429-0036	19429-0010	19427-0021	24.78 (.976)	41.92 (1.650)	52.08 (2.050)	28.07 (1.105)	41.92 (1.650)	
8	22 to 14	19429-0037	19429-0011	19427-0022	30.62 (1.206)	48.26 (1.900)	58.42 (2.300)	33.88 (1.334)	48.26 (1.900)	
10	22 to 14	19429-0038	19429-0014	19427-0029	36.47 (1.436)	54.61 (2.150)	64.75 (2.549)	39.75 (1.565)	54.61 (2.150)	
12	22 to 14	19429-0039	19429-0015	19427-0030	42.31 (2.400)	60.96 (2.400)	70.97 (2.794)	45.59 (1.795)	60.96 (2.400)	
16	22 to 14	19429-0040	19429-0016	19427-0023	53.99 (2.126)	73.67 (2.900)	83.83 (3.300)	57.28 (2.255))	73.67 (2.900)	

5.84mm (.230") Pitch MX150L Industrial Panel Mount Plug – 19429 Through Hole Flange Single Row



Features and Specifications

Features and Benefits

Environmentally sealed to IP67 when mated Integrated TPA

Simple crimp-and-poke application
Field serviceable contact removal system
Tactile and audible mating feedback
For outside or inside panel mount
applications with sufficient sealing area
Use with molded silicone panel gasket

Reference Information

UL File No.: E152602 Designed In: Inches Mates With: 19418

Electrical

Dielectric Withstanding Voltage: 2200V AC min. Insulation Resistance: 1000 Megohms

Voltage: 600V

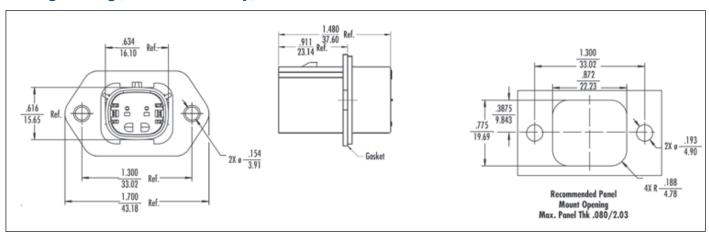
Mechanical

Mating force: 75N max. Unmating force: 75N max.

Physical

Housing: SPS Glass-Filled Crystalline Polymer Operating Temperature: -40 to +125 $^{\circ}$ C

Catalog Drawing (For Reference Only)



Circuits	Wire Range	Order No.				
Circuits	(AWG)	with Gasket	without Gasket	Gasket		
2	22 to 14	19429-0041	19429-0026	19427-0025		

5.84mm (.230") Pitch MX150L Industrial Panel Mount

Plug – **19429 Through Hole Flange Dual Row**



Features and Specifications

Features and Benefits

Environmentally sealed to IP67

Integrated TPA

Simple crimp-and-poke application

Field serviceable contact removal system

Tactile and audible mating feedback

For outside or inside panel mount

applications with sufficient sealing area Use with molded silicone panel gasket

Reference Information

UL File No.: E152602 Designed In: Inches

Mates With: 19418

Electrical

Dielectric Withstanding Voltage: 2200V AC min.

Insulation Resistance: 1000 Megohms

Voltage: 600V

Mechanical

Mating force: 75N max.

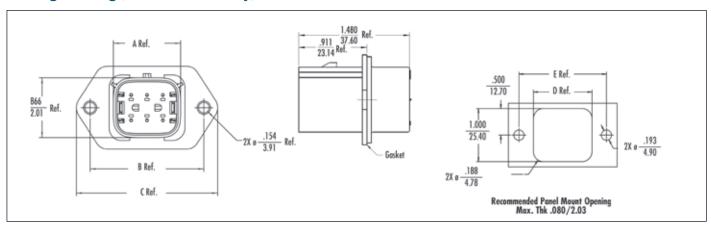
Unmating force: 75N max.

Physical

Housing: SPS Glass-Filled Crystalline Polymer

Operating Temperature: -40 to +125°C

Catalog Drawing (For Reference Only)



Recommended Mounting Hardware: (2) #10 x .62/18.9 long, plastic thread cutting screws Suggested Source: ITW Shakeproof BosScrew™ or equivalent

	Wire		Order No.		Dimensions – mm (in.)						
Circuits	Range (AWG)	with Gasket	without Gasket	Gasket	А	В	С	D	E		
4	22 to 14	19429-0043	19429-0025	19427-0024	16.10 (.634)	38.10 (1.500)	48.26 (1.900)	22.23 (.875)	38.10 (1.500)		
6	22 to 14	19429-0044	19429-0028	19427-0021	24.78 (.976)	41.92 (1.650)	52.08 (2.050)	28.07 (1.105)	41.92 (1.650)		
8	22 to 14	19429-0045	19429-0029	19427-0022	30.62 (1.206)	48.26 (1.900)	58.42 (2.300)	33.88 (1.334)	48.26 (1.900)		
10	22 to 14	19429-0046	19429-0030	19427-0029	36.47 (1.436)	54.61 (2.150)	64.75 (2.549)	39.75 (1.565)	54.61 (2.150)		
12	22 to 14	19429-0047	19429-0031	19427-0030	42.31 (2.400)	60.96 (2.400)	70.97 (2.794)	45.59 (1.795)	60.96 (2.400)		
16	22 to 14	19429-0048	19429-0032	19427-0023	53.99 (2.126)	73.67 (2.900)	83.83 (3.300)	57.28 (2.255)	73.67 (2.900)		

5.84mm (.230") Pitch MX150L Industrial Sealed Panel Mount Plug – 19435 Rear Mount Flange Dual Row



Features and Specifications

Features and Benefits

Environmentally sealed to IP67
Mates with existing MX150L receptacles
Supports non-closed in panels
Field serviceable contact removal system
Tactile and audible mating feedback
Blind hole boss feature eliminates leak path

and reduces extra sealing process during

Reference Information

UL File No.: E152602 Designed in: Inches Mates with: 19418

assembly

Electrical

Dielectric Withstanding Voltage: 2200V AC min Insulation Resistance: 1000 Megohms min.

Voltage: 600V

MechanicalMating force: 75N max.

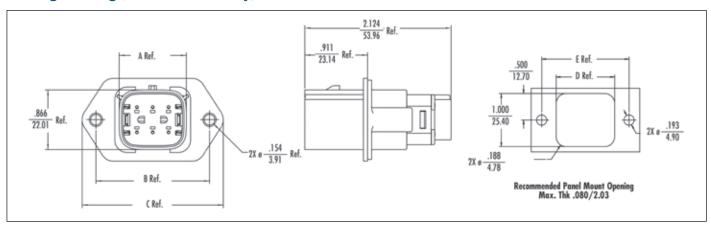
Unmating force: 75N max.

Physical

Housing: Glass-Filled PBT

Operating Temperature: -40 to +125°C

Catalog Drawing (For Reference Only)



Recommended Mounting Hardware: (2) #10 x .62/18.9 long, plastic thread cutting screws Suggested Source: ITW Shakeproof BosScrew™ or equivalent

	Wire		Orde	r No.	Dimensions – mm (in.)					
Circuits		Range (AWG)	with Gasket	without Gasket	А	В	С	D	E	
6	22 to 18	Red	19435-0612	19435-0614	24.78 (.976)	41.92 (1.650)	52.08 (2.050)	28.07 (1.105)	41.92 (1.650)	
6	16 to 14	Blue	19435-0611	19435-0613	24.78 (.976)	41.92 (1.650)	52.08 (2.050)	28.07 (1.105)	41.92 (1.650)	
8	22 to 18	Red	19435-0812	19435-0814	30.62 (1.206)	48.26 (1.900)	58.42 (2.300)	33.88 (1.334)	48.26 (1.900)	
8	16 to 14	Blue	19435-0811	19435-0813	30.62 (1.206)	48.26 (1.900)	58.42 (2.300)	33.88 (1.334)	48.26 (1.900)	
10	22 to 18	Red	19435-1012	19435-1014	36.47 (1.436)	54.61 (2.150)	64.75 (2.549)	39.75 (1.565)	54.61 (2.150)	
10	16 to 14	Blue	19435-1011	_	36.47 (1.436)	54.61 (2.150)	64.75 (2.549)	39.75 (1.565)	54.61 (2.150)	
12	22 to 18	Red	19435-1212	19435-1214	42.31 (1.67)	60.96 (2.40)	70.97 (2.794)	45.59 (1.795)	60.96 (2.40)	
12	16 to 14	Blue	19435-1211	19435-1213	42.31 (1.67)	60.96 (2.40)	70.97 (2.794)	45.59 (1.795)	60.96 (2.40)	
8	22 to 18	-	19435-1219	-	-	-	-	-	-	
12	22 to 18	_	-	19435-1219	-	-	-	-	-	

5.84mm (.230") Pitch MX150L Industrial PCB Header –

19427 Right Angle Without PCB Flange Single Row



Features and Specifications

Features and Benefits

Environmentally sealed to IP67

Mates with existing MX150L receptacles

Molded silicone panel gasket included

Available in Tin or Gold plating Supports 22 to 14 AWG receptacle

Tactile and audible mating feedback

Blind hole boss feature eliminates leak path and reduces extra sealing process during

assembly

Reference Information

Packaging: Tray
UL File No.: E152602
Designed in: Inches
Mates with: 19418

Electrical

Dielectric Withstanding Voltage: 2200V AC min Insulation Resistance: 1000 Megohms min.

Voltage: 600V

Mechanical

Durability:

Tin Plating—25 cycles

Gold Plating—100 cycles

Physical

Housing: Glass-Filled PBT Contact: Copper Alloy

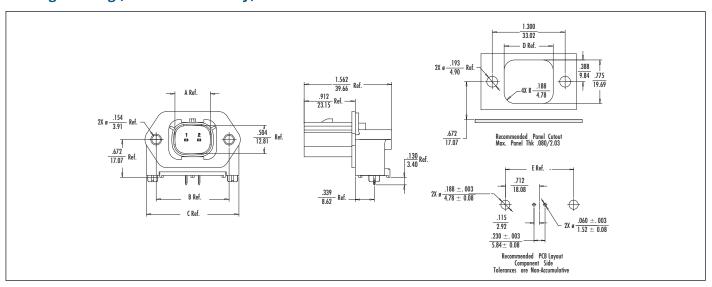
Plating:

Contact Area—Tin or Gold

Solder Tail Area—Tin

PCB Thickness: 1.60mm (.062") max. Operating Temperature: -40 to +125°C

Catalog Drawing (For Reference Only)



Recommended Mounting Hardware: (2) #10 x .62/15.9 long, plastic thread cutting screws Suggested Source: ITW Shakeproof BosScrew™ or equivalent

	Orde	r No.	Dimensions – mm (in.)						
Circuits	Tin	Select Gold/Tin	Α	В	С	D	E		
2	19427-0040	19427-0109	16.04 (.632)	33.02 (1.300)	41.90 (1.649)	22.23 (.875)	36.14 (1.423)		

5.84mm (.230") Pitch MX150L Industrial PCB Header –

19427 Right Angle Without PCB Flange Dual Row



Features and Specifications

Features and Benefits

Environmentally sealed to IP67

Mates with existing MX150L receptacles

Molded silicone panel gasket included

Available in Tin or Gold plating

Supports 22 to 14 AWG

Tactile and audible mating feedback

Blind hole boss feature eliminates leak path and reduces extra sealing process during

assembly

Reference Information

Packaging: Tray
UL File No.: E152602
Designed in: Inches
Mates with: 19418

Electrical

Dielectric Withstanding Voltage: 2200V AC min

Insulation Resistance: 1000 Megohms min.

Voltage: 600V

Mechanical

Durability:

Tin Plating—25 cycles
Gold Plating—100 cycles

Physical

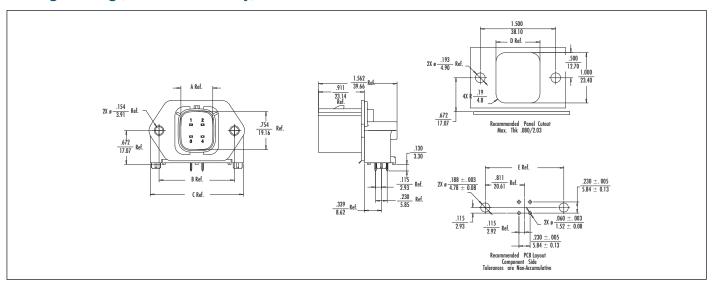
Housing: Glass-Filled PBT Contact: Copper Alloy

Plating:

Contact Area—Tin or Gold Solder Tail Area—Tin

PCB Thickness: 1.60mm (.062") max. Operating Temperature: -40 to +125°C

Catalog Drawing (For Reference Only)



Recommended Mounting Hardware: (2) #10 x .62/18.9 long, plastic thread cutting screws Suggested Source: ITW Shakeproof BosScrew™ or equivalent

	Orde	r No.		Dimensions – mm (in.)					
Circuits	Tin	Select Gold/Tin	А	В	С	D	E		
4	19427-0032	19427-0107	16.10 (.634)	38.10 (1.50)	46.99 (1.850)	22.23 (.875)	41.24 (1.624)		
6	19427-0018	19427-0106	21.94 (.864)	41.92 (1.65)	50.81 (2.0)	28.07 (1.105)	45.06 (1.774)		
8	19427-0017	19427-0105	27.74 (1.092)	48.26 (1.90)	57.15 (2.250)	33.88 (1.334)	51.41 (2.024		
10	19427-0031	19427-0104	33.62 (1.324)	54.61 (2.150)	63.50 (2.50)	39.75 (1.565)	57.75 (2.274)		
12	19427-0012	19427-0103	39.46 (1.554)	60.96 (2.40)	69.85 (2.750)	45.59 (1.795)	64.1 (2.524)		
16	19427-0049	19427-0102	51.14 (2.014)	73.67 (2.90)	82.55 (3.250)	57.28 (2.255)	76.8 (3.024)		

5.84mm (.230") Pitch MX150L Industrial PCB Header – 19428 Vertical Standard Profile Single Row



Features and Specifications

Features and Benefits

Environmentally sealed to IP67

Mates with existing MX150L receptacles Molded silicone panel gasket included

Available in Tin or Gold plating

Supports 22 to 14 AWG receptacle

Tactile and audible mating feedback

Blind hole boss feature eliminates leak path and reduces extra sealing process during

assembly

Reference Information

Packaging: Tray
UL File No.: E152602
Designed in: Inches
Mates with: 19418

Electrical

Dielectric Withstanding Voltage: 2200V AC min Insulation Resistance: 1000 Megohms min.

Voltage: 600V

Mechanical

Durability:

Tin Plating—25 cycles

Gold Plating—100 cycles

Physical

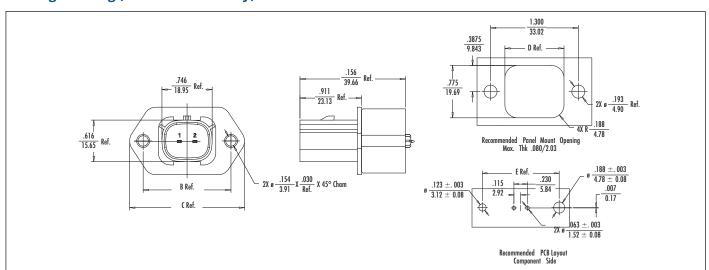
Housing: Glass-Filled PBT Contact: Copper Alloy

Plating:

Contact Area—Tin or Gold
Solder Tail Area—Tin

PCB Thickness: 1.60mm (.062") max. Operating Temperature: -40 to +125°C

Catalog Drawing (For Reference Only)



Recommended Mounting Hardware: (2) #10 x .62/18.9 long, plastic thread cutting screws Suggested Source: ITW Shakeproof BosScrew^m or equivalent

	Orde	r No.		Dii	mensions – mm (in.)		
Circuits	Tin	Select Gold/Tin	Α	В	С	D	E
2	19428-0007	19428-0017	33.01 (1.300)	33.02 (1.300)	43.18 (1.70)	22.23 (.875)	33.02 (1.30)

5.84mm (.230") Pitch MX150L Industrial PCB Header – 19428 Vertical Standard Profile Dual Row



Features and Specifications

Features and Benefits

Environmentally sealed to IP67

Mates with existing MX150L receptacles

Molded silicone panel gasket included

Available in Tin or Gold plating

Supports 22 to 14 AWG receptacle

Tactile and audible mating feedback

Blind hole boss feature eliminates leak path and reduces extra sealing process during

assembly

Reference Information

Packaging: Tray
UL File No.: E152602

Designed in: Inches Mates with: 19418

Electrical

Contact Resistance: milliohms max.

Dielectric Withstanding Voltage: 2200V AC min

Insulation Resistance: 1000 Megohms min.

Voltage: 600V

Mechanical Durability:

Durability.

Tin Plating—25 cycles

Gold Plating—100 cycles

Physical

Housing: Glass-Filled PBT

Contact: Copper Alloy

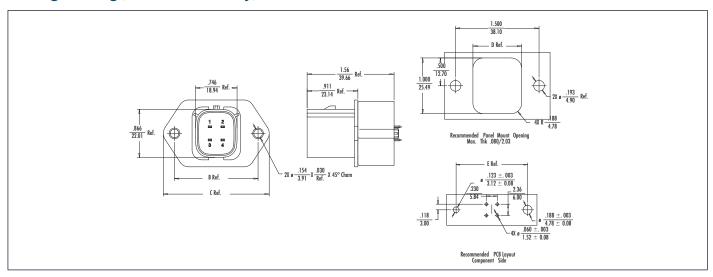
Plating:

Contact Area—Tin or Gold

Solder Tail Area—Tin

PCB Thickness: 1.60mm (.062") max. Operating Temperature: -40 to +125°C

Catalog Drawing (For Reference Only)



Recommended Mounting Hardware: (2) #10 x .62/18.9 long, plastic thread cutting screws Suggested Source: ITW Shakeproof BosScrew™ or equivalent

	Orde	Order No.			Dimensions – mm (in.)			
Circuits	Tin	Select Gold/Tin	В	С	D	E		
4	19428-0006	19428-0019	38.10 (1.50)	48.26 (1.90)	22.23 (.875)	38.10 (1.50)		
6	19428-0004	19428-0020	41.92 (1.65)	52.08 (2.050)	28.07 (1.105)	41.91 (1.65)		
8	19428-0003	19428-0021	48.26 (1.90)	58.42 (2.30)	33.88 (1.334)	48.26 (1.90)		
10	19428-0005	19428-0022	54.61 (2.150)	64.75 (2.54	39.75 (1.565)	54.61 (2.15)		
12	19428-0001	19428-0023	60.96 (2.40)	71.12 (2.80)	45.59 (1.795)	60.96 (2.40)		
16	19428-0002	19428-0024	73.67 (2.90)	83.83 (3.30)	57.28 (2.255)	73.66 (2.90)		

5.84mm (.230") Pitch MX150L Industrial PCB Header –

19428 Vertical Low Profile Single Row



Features and Specifications

Features and Benefits

Environmentally sealed to IP67
Mates with existing MX150L receptacles
Molded silicone panel gasket included
Available in Tin or Gold plating
Supports 22 to 14 AWG receptacle
Tactile and audible mating feedback

Reference Information

Packaging: Tray
UL File No.: E152602
Designed in: Inches
Mates with: 19418

Electrical

Dielectric Withstanding Voltage: 2200V AC min Insulation Resistance: 1000 Megohms min.

Voltage: 600V **Mechanical**

Durability:

Tin Plating—25 cycles
Gold Plating—100 cycles

Physical

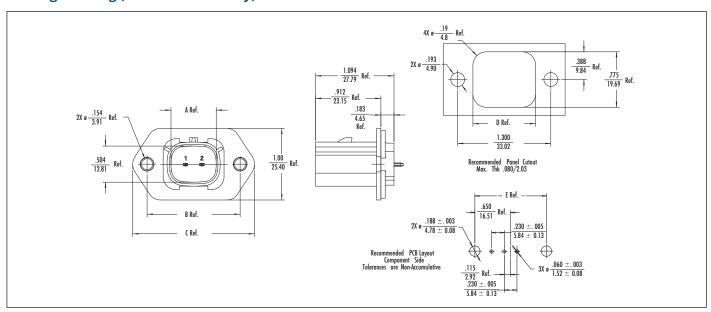
Housing: Glass-Filled PBT Contact: Copper Alloy

Plating:

Contact Area—Tin or Gold Solder Tail Area—Tin

PCB Thickness: 1.60mm (.062") max. Operating Temperature: -40 to +125°C

Catalog Drawing (For Reference Only)



	Orde	r No.		Di	Dimensions – mm (in.)		
Circuits	Tin	Select Gold/Tin	Α	В	С	D	E
2	19428-0009	19428-0025	16.10 (.634)	33.01 (1.300)	43.18 (1.70)	22.23 (.875)	33.02 (1.30)

5.84mm (.230") Pitch MX150L Industrial PCB Header –

19428 Vertical Low Profile Dual Row



Features and Specifications

Features and Benefits

Environmentally sealed to IP67
Mates with existing MX150L receptacles
Molded silicone panel gasket included
Available in Tin or Gold plating
Supports 22 to 14 AWG receptacle
Tactile and audible mating feedback

Reference Information

Packaging: Tray
UL File No.: E152602
Designed in: Inches
Mates with: 19418

Electrical

Dielectric Withstanding Voltage: 2200V AC min Insulation Resistance: 1000 Megohms min.

Voltage: 600V **Mechanical**

Durability:

Tin Plating—25 cycles
Gold Plating—100 cycles

Physical

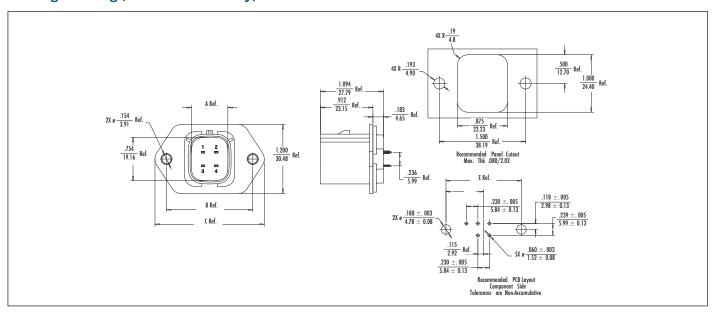
Housing: Glass-Filled PBT Contact: Copper Alloy

Plating:

Contact Area—Tin or Gold Solder Tail Area—Tin

PCB Thickness: 1.60mm (.062") max. Operating Temperature: -40 to +125°C

Catalog Drawing (For Reference Only)



Order No.			Dimensions - mm (in.)						
Circuits	Tin	Select Gold/Tin	Α	В	С	E			
4	19428-0011	19428-0027	16.10 (.634)	38.10 (1.50)	48.26 (1.90)	38.10 (1.50)			
6	19428-0012	19428-0028	21.94 (.864)	41.92 (1.65)	52.08 (2.050)	41.91 (1.65)			
8	19428-0013	19428-0029	27.74 (1.092)	48.26 (1.90)	58.42 (2.30)	48.26 (1.90)			
10	19428-0014	19428-0030	33.62 (1.324)	54.61 (2.150)	64.75 (2.54	54.61 (2.15)			
12	19428-0015	19428-0031	39.46 (1.554)	60.96 (2.40)	71.12 (2.80)	60.96 (2.40)			
16	19428-0016	19428-0032	53.99 (2.126)	73.67 (2.90)	83.83 (3.30)	73.66 (2.90)			

5.84mm (.230") Pitch MX150L Industrial Unused Cavity Circuit Plug – 19417 - 22 to 14 AWG

Features and Specifications

Features and Benefits

With the application of optional circuit plugs, the MX150L system supports the ability to implement sealed blank cavities in both plug and receptacle housings. The circuit plugs occupy and fully seal the unused cavity and can be extracted and replaced with a standard male blade or female receptacle terminal.

This feature provides the ability to plan for possible future circuit additions while maintaining the sealing integrity of the mated pair.

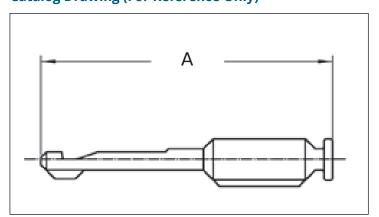
Reference Information

Use With: 19418, 19419 and 19435

Physical

Material: SPS Glass-Filled Crystalline Polymer Operating Temperature: -40 to +125°C

Catalog Drawing (For Reference Only)



Ouden No	Hausing Caries	Dimension – mm (in.)
Order No.	Housing Series	А
19417-0119	19418	38.30 (1.51)
19417-0119	19419	38.30 (1.51)
19417-0263	19418*	33.97 (1.34)
19417-0263	19435	33.97 (1.34)

^{*}For use with 19418 receptacles when mating to PCB headers or plugs with all contacts populated

7.62mm (.300") Pitch MX150L Industrial Terminal –

19417 - 12, 10, 8 AWG Female



Features and Specifications

Features and Benefits

Mat seal friendly design features center seam and coined edges

High current

Low insertion force

Reference Information

UL File No.: E152602 Designed in: Inches Use with: 19432

Electrical

12 to 10 AWG-30.0A

8 AWG-40.0A

Mechanical

Contact Insertion Force: 1 lb.

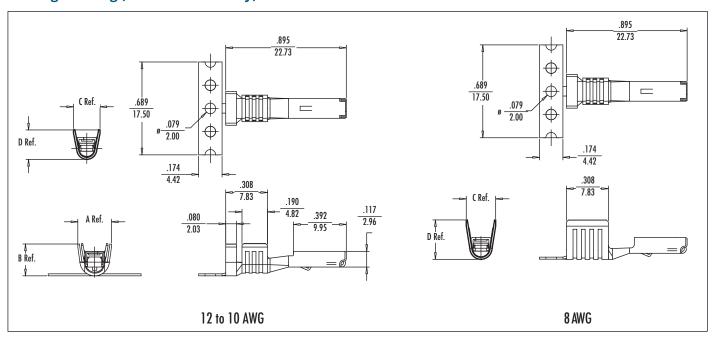
Durability: 25 cycles

Physical

Contact: Copper Alloy

Plating: Tin

Catalog Drawing (For Reference Only)



Wire Range	Wire Range Insulation Order No.		r No.	Dimension – mm (in.)			
(AWG)	mm (in.)	Loose	Strip	A	В	С	D
12 to 10	3.94 to 4.45 (.155 to .175)	19434-0003	19434-0001	6.35 (.250)	6.00 (.236)	5.00 (.197)	5.60 (.220)
8	6.02 (.237)	19434-0004	19434-0002	N/A	N/A	6.10 (.240)	7.00 (.276)

7.62mm (.300") Pitch MX150L Industrial Terminal –

19431 - 12, 10, 8 AWG Male



Features and Specifications

Features and Benefits

Mat seal friendly design features center seam and coined edges

High current Low insertion force

Mates With: 19433 and 19436

Reference Information

UL File No.: E152602 Designed in: Inches Use with: 19433 and 19436

Electrical

Current:

12 to 10 AWG-30.0A

8 AWG-40.0A

Mechanical

Contact Insertion Force: 1 lb.

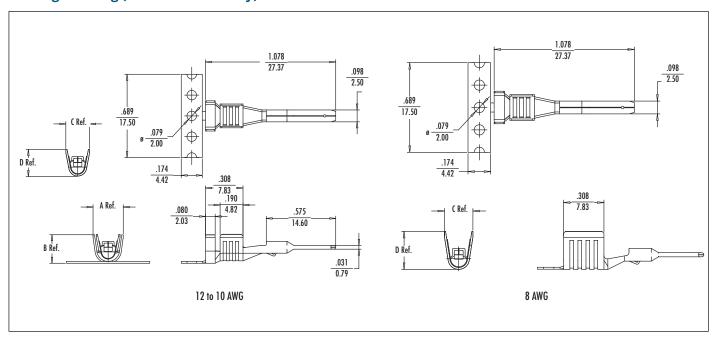
Durability: 25 cycles

Physical

Contact: Copper Alloy

Plating: Tin

Catalog Drawing (For Reference Only)



Wire Range	re Range Insulation Order No.		Dimension - mm (in.)				
(AWG)	mm (in.)	Loose	Strip	Α	В	С	D
12 to 10	3.94 to 4.45 (.155 to .175)	19431-0016	19431-0001	6.35 (.250)	6.00 (.236)	5.00 (.197)	5.60 (.220)
8	6.02 (.237)	19431-0017	19431-0015	N/A	N/A	6.10 (.240)	7.00 (.276)

7.62mm (.300") Pitch MX150L Industrial Receptacle –

19432 - 12, 10, 8 AWG Single Row



Features and Specifications

Features and Benefits

Environmentally sealed to IP67 Integrated mat wire seal and TPA High current

Field serviceable contact removal system Simple crimp-and-poke application Tactile and audible mating feedback

Reference Information

UL File No.: E152602 Designed in: Inches

Mates with: 19433 and 19436

Use with: 19434

Electrical

Dielectric Withstanding Voltage: 2200V AC min Insulation Resistance: 1000 Megohms min.

Voltage: 600V

Mechanical

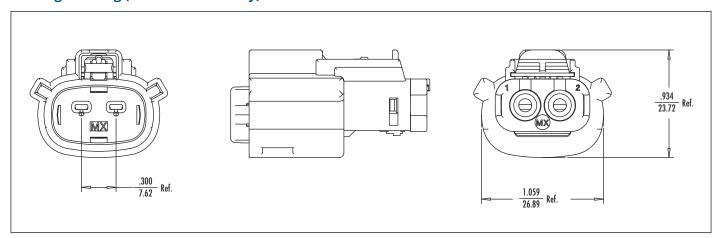
Mating Force: 75N max Unmating Force: 75N max

Physical

Housing: Glass-Filled PBT

Operating Temperature: -40 to +125°C

Catalog Drawing (For Reference Only)



Cinavita	Wise Banco (AWG)	Mat Saal Color	Order No. Mat Seal Color	
Circuits	Wire Range (AWG)	Mat Seal Color	with CPA	without CPA
2	12 to 10	Yellow	19432-0013	19432-0015
2	8	Red	19432-0014	19432-0020

7.62mm (.300") Pitch MX150L Industrial Plug –

19433 - 12, 10, 8 AWG Single Row



Features and Specifications

Features and Benefits

Environmentally sealed to IP67

Integrated mat wire seal and TPA

High current

Field serviceable contact removal system

Simple crimp-and-poke application

Tactile and audible mating feedback

Mates With: 19433 and 19436

Reference Information

UL File No.: E152602 Designed in: Inches Mates with: 19432 Use with: 19431

Electrical

Dielectric Withstanding Voltage: 2200V AC min Insulation Resistance: 1000 Megohms min.

Voltage: 600V

Mechanical

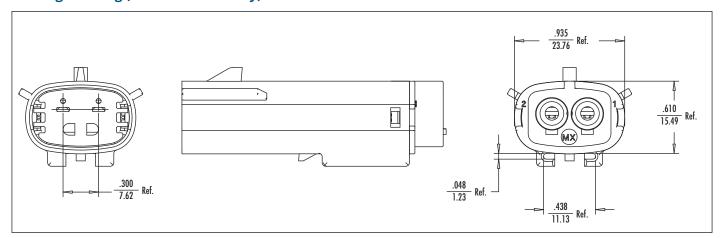
Mating Force: 75N max Unmating Force: 75N max

Physical

Housing: Glass-Filled PBT

Operating Temperature: -40 to +125°C

Catalog Drawing (For Reference Only)



Circuits	Wire Range (AWG)	Mat Seal Color	Order No.
2	12 to 10	Yellow	19433-0013
2	8	Red	19433-0014

7.62mm (.300") Pitch MX150L Industrial Receptacle –

19432 - 12, 10, 8 AWG Dual Row



Features and Specifications

Features and Benefits

Environmentally sealed to IP67 Integrated mat wire seal and TPA

High current

Field serviceable contact removal system Simple crimp-and-poke application Tactile and audible mating feedback

Reference Information

UL File No.: E152602 Designed in: Inches

Mates with: 19433 and 19436

Use with: 19434

Electrical

Dielectric Withstanding Voltage: 2200V AC min Insulation Resistance: 1000 Megohms min.

Voltage: 600V

Mechanical

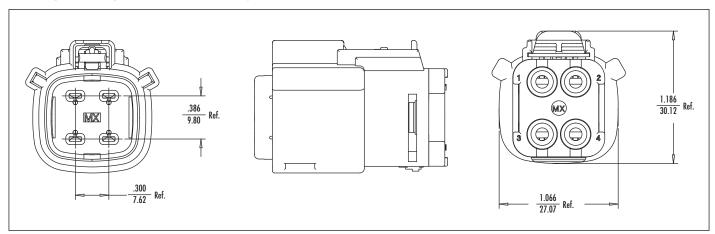
Mating Force: 75N max Unmating Force: 75N max

Physical

Housing: Glass-Filled PBT

Operating Temperature: -40 to +125°C

Catalog Drawing (For Reference Only)



Cinavita	Wire Bonce (AMC)	Order No. Mat Seal Color		er No.
Circuits	Wire Range (AWG)	Mat Seal Color	with CPA	without CPA
4	12 to 10	Yellow	19432-0001	19432-0003
4	8	Red	19432-0002	19432-0004

7.62mm (.300") Pitch MX150L Industrial Plug –

19433 - 12, 10, 8 AWG Dual Row



Features and Specifications

Features and Benefits

Environmentally sealed to IP67

Integrated mat wire seal and TPA

High current

Field serviceable contact removal system

Simple crimp-and-poke application

Tactile and audible mating feedback

Mates With: 19432

Reference Information

UL File No.: E152602 Designed in: Inches Mates with: 19432 Use with: 19431

Electrical

Dielectric Withstanding Voltage: 2200V AC min Insulation Resistance: 1000 Megohms min.

Voltage: 600V

Mechanical

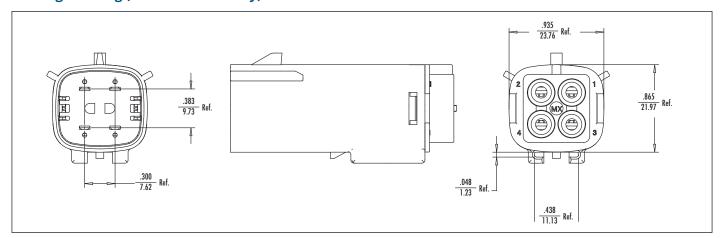
Mating Force: 75N max Unmating Force: 75N max

Physical

Housing: Glass-Filled PBT

Operating Temperature: -40 to +125°C

Catalog Drawing (For Reference Only)



Circuits	Wire Range (AWG)	Mat Seal Color	Order No.
4	12 to 10	Yellow	19433-0001
4	8	Red	19433-0002

7.62mm (.300") Pitch MX150L Industrial Sealed Panel Mount Plug – 19436 Rear Mount Flange Single Row



Features and Specifications

Features and Benefits

Environmentally sealed to IP67
Mates with existing MX150L receptacles
Supports non-closed in panels

Field serviceable contact removal system
Tactile and audible mating feedback

Blind hole boss feature eliminates leak path and reduces extra sealing process during assembly

Mates With: 19432

Reference Information

UL File No.: E152602 Designed in: Inches Mates with: 19432 Use with: 19431

ElectricalDielectric Withstanding Voltage: 2200V AC min
Insulation Resistance: 1000 Megohms min.

Voltage: 600V

Mechanical

Mating Force: 75N max

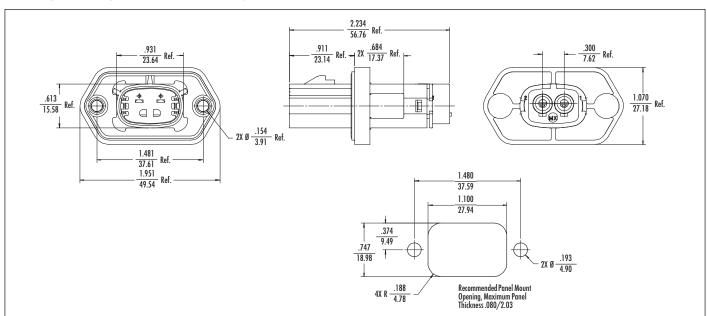
Unmating Force: 75N max

Physical

Housing: Glass-Filled PBT

Operating Temperature: -40 to +125°C

Catalog Drawing (For Reference Only)



Recommended Mounting Hardware: (2) #10 x .62/18.9 long, plastic thread cutting screws Suggested Source: ITW Shakeproof BosScrew^m or equivalent

Circuits	Wire Range (AWG)	Order No.		
		with Gasket	without Gasket	Gasket
2	12 to 10	19436-0213	19436-0211	19436-0001
2	8	19436-0214	19436-0212	19436-0001

7.62mm (.300") Pitch MX150L Industrial Sealed Panel Mount Plug – 19436 Rear Mount Flange Dual Row



Features and Specifications

Features and Benefits

Environmentally sealed to IP67
Mates with existing MX150L receptacles
Supports non-closed in panels
Field serviceable contact removal system
Tactile and audible mating feedback

Blind hole boss feature eliminates leak path and reduces extra sealing process during assembly

Reference Information

UL File No.: E152602 Designed in: Inches Mates with: 19432 Use with: 19431

Electrical

Dielectric Withstanding Voltage: 2200V AC min Insulation Resistance: 1000 Megohms min.

Voltage: 600V

Mechanical

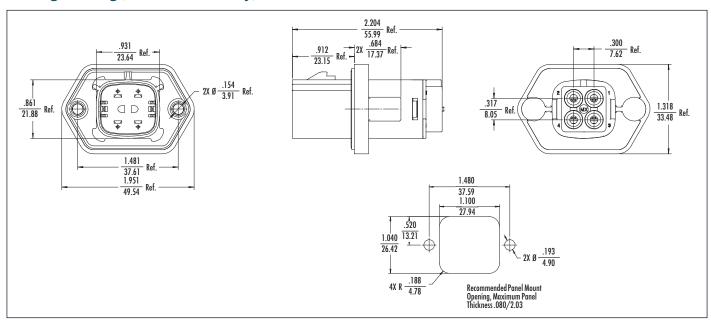
Mating Force: 75N max Unmating Force: 75N max

Physical

Housing: Glass-Filled PBT

Operating Temperature: -40 to +125°C

Catalog Drawing (For Reference Only)



Note: Recommended Mounting Hardware: (2) #10 x .62/18.9 long, plastic thread cutting screws Suggested Source: ITW Shakeproof BosScrew $^{\text{TM}}$ or equivalent

Circuits	Wire Range (AWG)	Order No.		
		with Gasket	without Gasket	Gasket
2	12 to 10	19436-0413	19436-0411	19436-0002
2	8	19436-0414	19436-0412	19436-0002

7.62mm (.300") Pitch MX150L Industrial PB Header –

19437 Right Angle Header with Panel Gasket Dual Row



Features and Specifications

Features and Benefits

Environmentally sealed to IP67

Mates with existing MX150L receptacles

Molded silicone panel gasket included

Available in tin or gold plating

Supports 12 to 8 AWG receptacle

Tactile and audible mating feedback

Blind hole boss feature eliminates leak path and reduces extra sealing process during

assembly

Electrical

Voltage: 600V AC

Current:

8 AWG — 40.0A

12 to 10 AWG — 30.0A

Dielectric Withstanding Voltage:

2200V AC min.

Mechanical

Mating Force: 75N max.

Unmating Force: 75N max.

Sealing: IEC 529 — IP67 standard

Durability: 100 cycles

Insulation Resistance: 1000 Megohms

Physical

Housing: Glass-filled PBT, Black

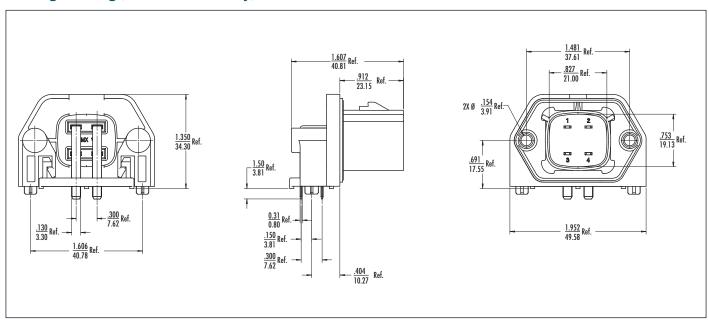
Contact: Copper Alloy

Plating: Tin

Operating Temperature: -40 to +125°C

Flammability: UL 94V-0

Catalog Drawing (For Reference Only)



Circuits	Wire Pange (AWC)	Order No	
Circuits	Wire Range (AWG)	Gasket	
4	12, 10, 8	19437-0029	

7.62mm (.300") Pitch MX150L Industrial Unused Cavity Circuit Plug – 19431 - 12, 10, 8 AWG



Features and Specifications

Features and Benefits

With the application of optional circuit plugs, the MX150L system supports the ability to implement sealed blank cavities in both plug and receptacle housings. The circuit plugs occupy and fully seal the unused cavity and can be extracted and replaced with a standard male blade or female receptacle terminal.

This feature provides the ability to plan for possible future circuit additions while main-taining the sealing integrity of the mated pair.

Reference Information

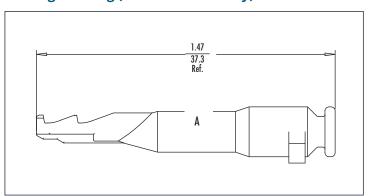
Use With: 19433 and 19432

Physical

Material: Glass-Filled PBT

Operating Temperature: -40 to +125°C

Catalog Drawing (For Reference Only)



Housing Series	Order No.
19433	19431-0013
19432	19431-0013

Semi-Automatic Bench Top Crimp Press Tooling -

FineAdjust Applicator Manual Hand Crimp Tool





Features and Specifications FINEADJUST

Features and Benefits

FineAdjust allows users to achieve target with little effort by adjusting in increments of 0.15mm (.006") for conductor crimp height and 0.063mm (.0025") for insulation height Independent adjustment rings allow users to quickly adjust the conductor or insulation crimp height without affecting each other Quick tooling removal with the push of a button for fast and easy tooling change

tab is adjusted while the applicator is in the press for fast and easy setup

Compatible with the Molex TM-2000 Universal Press and most industry standard presses, however, it does not fit into Molex TM-40/TM-42 presses Directly adapts to most automatic wire processing machines

Quick set-up time; plus the crimp height, track and feed adjustments can be preset in applicator

Applicator designed to industry standard mounting and shut height 135.80mm (5.346") FineAdjust available for most Molex brand terminals

MANUAL HAND CRIMP TOOL

Features and Benefits

Ergonomically designed soft handles
Precisely designed crimping profiles with
simple contact positioning

Easy handling due to outstanding force ratio This tool type reduces work related injuries

Tool Type	Wire Range AWG (mm²)	Terminal Type	Terminal Series No.	Order No.
FineAdjust Applicator	16 to 14 (1.30 to 2.00)	MX150L Male and Female	19417/19420	63900-8200
Perishable Tool Kit	16 to 14 (1.30 to 2.00)	MX150L Male and Female	19417/19420	63865-6070
T2 Terminator Die	16 to 14 (1.30 to 2.00)	MX150L Male and Female	19417/19420	63910-8200
FineAdjust Applicator	22 to 18 (0.35 to 0.80)	MX150L Male	19417	63900-8300
Perishable Tool Kit	22 to 18 (0.35 to 0.80)	MX150L Male	19417	63865-6170
T2 Terminator Die	22 to 18 (0.35 to 0.80)	MX150L Male	19417	63910-8300
FineAdjust Applicator	22 to 18 (0.35 to 0.80)	MX150L Female	19420	63900-8400
Perishable Tool Kit	22 to 18 (0.35 to 0.80)	MX150L Female	19420	63865-6270
T2 Terminator Die	22 to 18 (0.35 to 0.80)	MX150L Female	19420	63910-8400
OEM PremiumGrade™ Hand Too	22 to 14 (0.35 to 2.00)	MX150L Male and Female	19417/19420	63811-4400
ServiceGrade™ Hand Tool	22 to 14 (0.35 to 2.00)	MX150L Male and Female	19417/19420	64016-0035
Terminal Extraction Tool	22 to 8 (0.35 to 8.37)	MX150L Male and Female	19434/19417/19420/19431	63813-1500
FineAdjust Applicator	12 to 10 (3.94 to 4.45)	MX150L Male and Female	19431/19434	63895-8200
Perishable Tool Kit	12 to 10 (3.94 to 4.45)	MX150L Male and Female	19431/19434	63832-5070
OEM PremiumGrade™ Hand Too	12 to 10 (3.94 to 4.45)	MX150L Male and Female	19431/19434	63811-5300
FineAdjust Applicator	8 (8.37)	MX150L Male and Female	19431/19434	63832-5100
Perishable Tool Kit	8 (8.37)	MX150L Male and Female	19431/19434	63832-5170
OEM PremiumGrade™ Hand Too	8 (8.37)	MX150L Male and Female	19431/19434	63811-5400
ServiceGrade™ Hand Tool	12 to 10 (3.94 to 4.45)	MX150L Male and Female	19431/19434	64016-0170
ServiceGrade™ Hand Tool	8 (8.37)	MX150L Male and Female	19431/19434	64016-0170

Installation

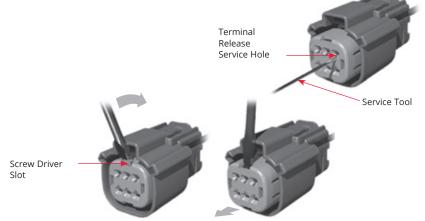
Sealed Receptacle Assembly - Servicability

1) Return TPA to pre-lock position

- Carefully insert a standard screw driver into slot on top of TPA.
- Carefully pry TPA forward and listen for audible click.
- TPA is now in pre-lock position.

2) Release terminal from connector assembly

- Insert and drive forward extractor tool to release terminal.
- Pull terminal from rear of connector.



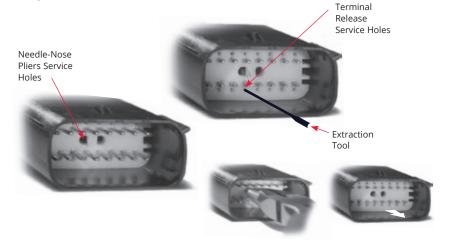
Sealed Blade Assembly - Servicability

1) Return TPA to pre-lock position

- Use standard needle-nose pliers to return TPA to pre-lock position.
- Insert needle-nose pliers into service hole and carefully pull TPA.
- Listen for loud audible click.
- TPA is now in pre-lock position.

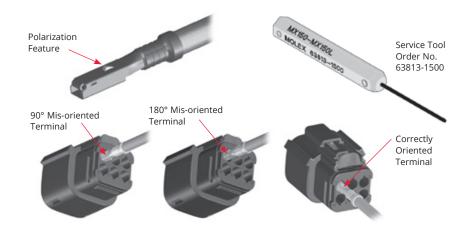
2) Release terminal from connector assembly

- Insert and drive forward extractor tool to release terminal.
- Pull terminal from rear of connector.



Terminal Installation

Assure housing TPA is in pre-lock position. Align polarization feature on terminal with keyway in seal cap. Insert terminal and push until seated. Push receptacle TPA back to locked position. Plug TPA will return to locked position when mated with receptacle housing.



Mating/Unmating





Receptacle

To Mate:



1. Firmly push connectors together until you feel them snap together. You should hear a click. This audible and tactile confirmation ensures the connectors are properly and fully mated.

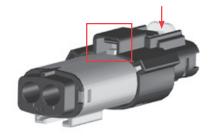


2. Press CPA towards plug to engage the secondary lock.

To Unmate:

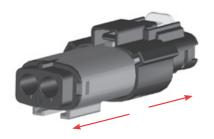


1. Pull back CPA

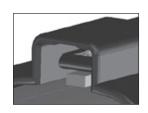


2. Fully depress locking latch.

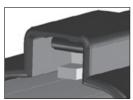
Locking latch must be fully depressed to release the locking ramp on the plug and allow the connectors to be separated.



3. Pull connectors apart



Locking latch shown down, cannot unmate connectors



Locking latch shown fully depressed, latch releases locking ramp creating connections for life

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