

RoHS  
Ready 



## MFINITY Modular Hard Wired Fuse and Relay Box



INDUSTRIAL & COMMERCIAL  
TRANSPORTATION



# Industrial & Commercial Transportation

When every connection counts, TE Connectivity delivers reliable connectivity products designed to withstand harsh environmental conditions for on and off-highway vehicles and recreational transportation. As a world leader in rough and rugged connectivity, you can depend on TE Connectivity to provide innovative solutions for field applications where failure is not an option.

## We go to extremes to make every connection count

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The Industrial & Commercial Transportation business unit of TE Connectivity is a world leader in connectors and interconnect systems for use in the toughest and harshest environments. From trucks to tractors, from motorcycles to recreational vehicles, we offer products that work just as hard as the vehicles in which they are installed.

Our intelligent yet robust solutions and technologies function reliably in applications with high vibration and extreme temperature characteristics. The new business unit combines the service portfolios of DEUTSCH and TE Connectivity under one roof. The DEUTSCH brand is a global leader in interconnect solutions for use in heavy equipment and harsh industrial environments.

TE Connectivity has been among the world leaders in interconnect systems for automotive and system manufacturers for over 50 years. We offer you one of the world's most comprehensive connector product portfolios.

Thanks to the breadth of our product range, our global presence and our innovative strength, we are able to develop targeted solutions for the most demanding requirements of a rapidly changing market.

We engineer tough products for your application needs. We know that dependability is a must in the field or at the site. That's why our engineers designed rugged, high vibration resistant connector solutions to meet your application requirements.

## Support

We provide options to meet your needs. TE Connectivity offers sales options to service all Industrial & Commercial Transportation customers, including factory direct, LADD Distribution and third party distribution. Contact your local sales representative for more information.

Please note our global contacts on page 21.



## ***Industrial & Commercial Transportation Markets***

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### ***On-Highway Vehicles***

These include trucks (class 6 – 8, and utility), buses (city buses, coaches, school buses) and emergency vehicles.



### ***Off-Highway Vehicles***

In this segment, we equip construction vehicles such as front-loaders, dump trucks, excavators and bulldozers. In agriculture vehicles, our products are widely used in tractors and combine harvesters, for example. This segment also includes special vehicles like industrial lifts or material handling vehicles.



### ***Recreational Transportation***

From boats (including personal watercraft) to motorcycles, scooters, snowmobiles, ATVs and recreational vehicles, the range of recreational vehicles is broad.

Whatever the application, we have a connector to match.





# Industrial & Commercial Transportation

Industrial & Commercial Transportation has the ideal product series for every harsh environment. Our time-tested, high vibration resistant products and technologies provide the right solution for your applications and requirements.

## *We go to extremes to make every connection count*

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### *Interconnection Systems*

TE Connectivity's electrical and electronic interconnection products and solutions are used to electrically and mechanically join wires and cables, printed circuit boards, integrated circuit packages and batteries.



### *Cable Assemblies*

TE Connectivity is your partner for vehicle-specific cable assemblies. We offer research and development capabilities, prototypes and samples, as well as manufacturing facilities for special cable assemblies.



### *Hybrid & Electric Mobility Solutions*

Electric mobility is changing the way engineers think about vehicles. The way they're designed and engineered. The way they're fueled. Even the way the fuel is delivered. And we're right there with you helping complete the connections for current and next generation hybrid and electric mobility and the charging infrastructure. TE Connectivity's complete portfolio of connection and protection systems includes battery connectivity systems, connectors, cable assemblies, high-voltage relays and contactors, power distribution units and customer-specific designs.





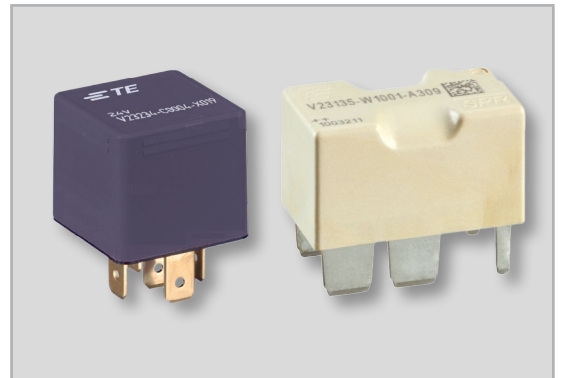
## Sensors

TE Connectivity provides contactless and electromechanical sensor products with robust housing technologies, connection systems and temperature-resistant design for use in a variety of industrial and commercial transportation applications.



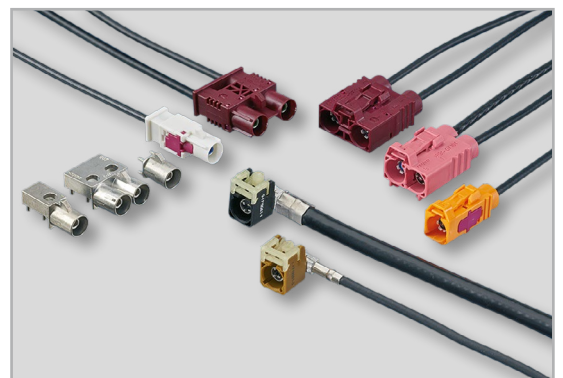
## Relays

TE Connectivity's 24 V relay product line includes a broad range of robust and versatile relays for many diverse applications within trucks, buses, agricultural tractors, construction equipment and other heavy duty commercial vehicles. With increased contact gaps and other key design features, these relays are designed for use in challenging environments where they may regularly encounter extended periods of shock and vibration.



## Infotainment

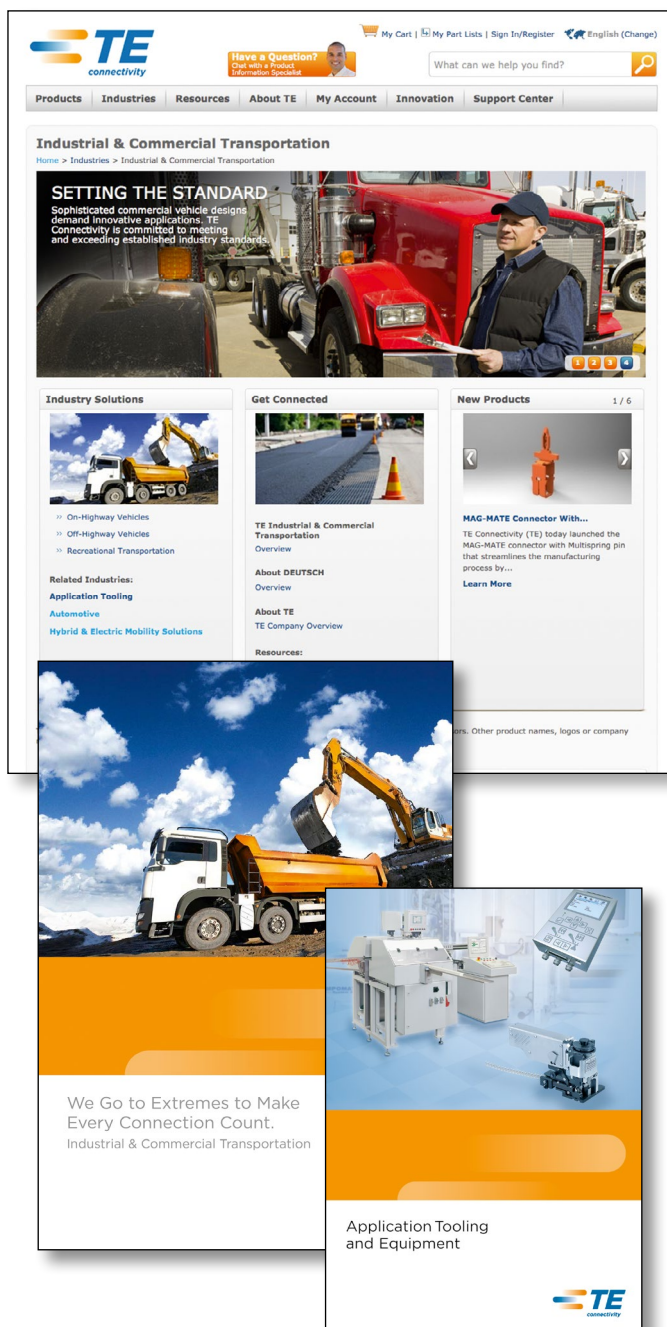
TE Connectivity offers a wide variety of infotainment solutions for consumer port connections, high data rate applications, next-generation harness architecture, board-to-board connections and vehicle-to-vehicle communication.



# Industrial & Commercial Transportation

The TE Connectivity Industrial & Commercial Transportation website is an innovative and interactive source for application information, product updates and technical solutions.

## Industrial & Commercial Transportation online



### Product and Machine Literature

TE Connectivity Industrial & Commercial Transportation offers a variety of product specific catalogs, brochures and high impact flyers to help better serve you!

For more information on literature for TE Connectivity Industrial & Commercial Transportation, please contact your local organization or go to [www.te.com/en/industries/industrial-commercial-transportation.html](http://www.te.com/en/industries/industrial-commercial-transportation.html)

### TE Products

[www.te.com/en/products/product-landing.html](http://www.te.com/en/products/product-landing.html)

### Product Information Center (PIC)

You can rely on TE Connectivity's PIC Team to provide you support for answers to your general information or technical questions in an efficient and effective manner.

To reach our PIC staff, please contact your local organization or see our Global Contacts page. Please contact us at [www.te.com/support-center](http://www.te.com/support-center)



## ***Every connection counts***

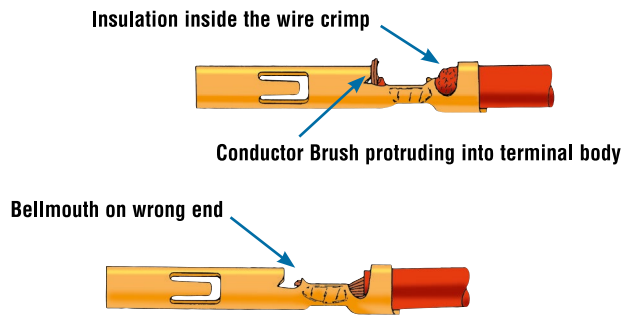
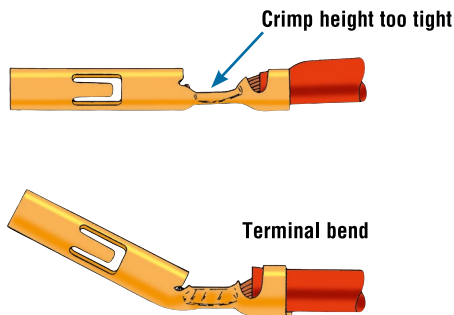
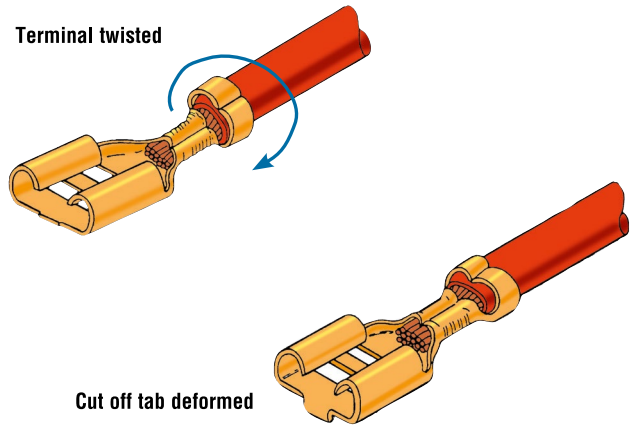
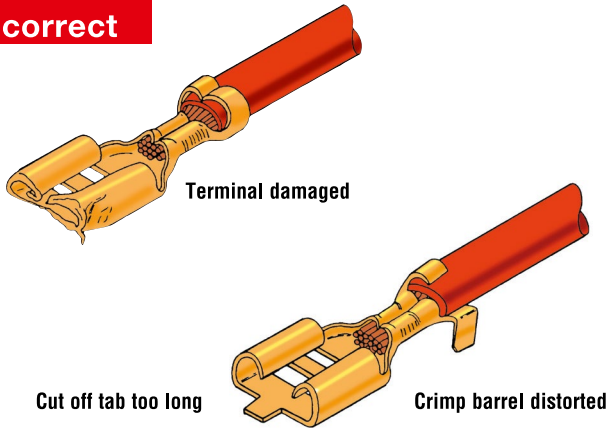
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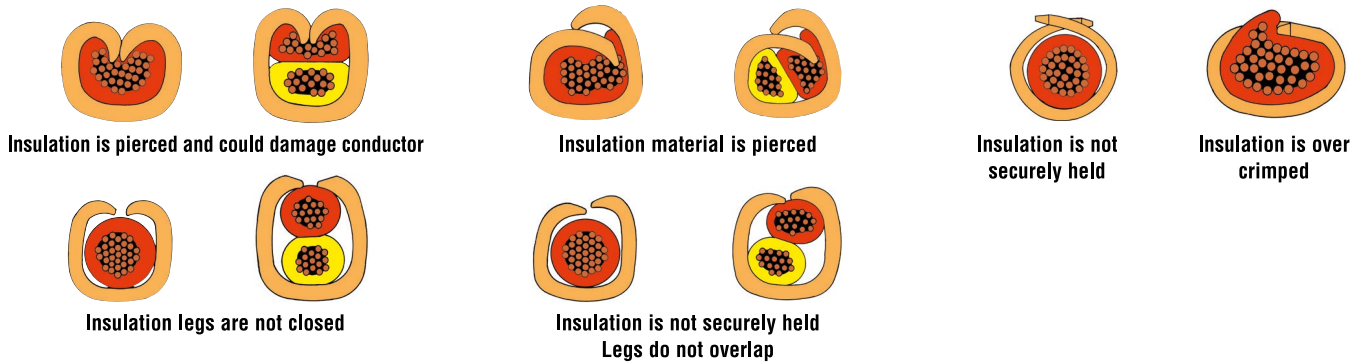
***We are worldwide the right connection  
for the toughest jobs***

Quality Guidelines

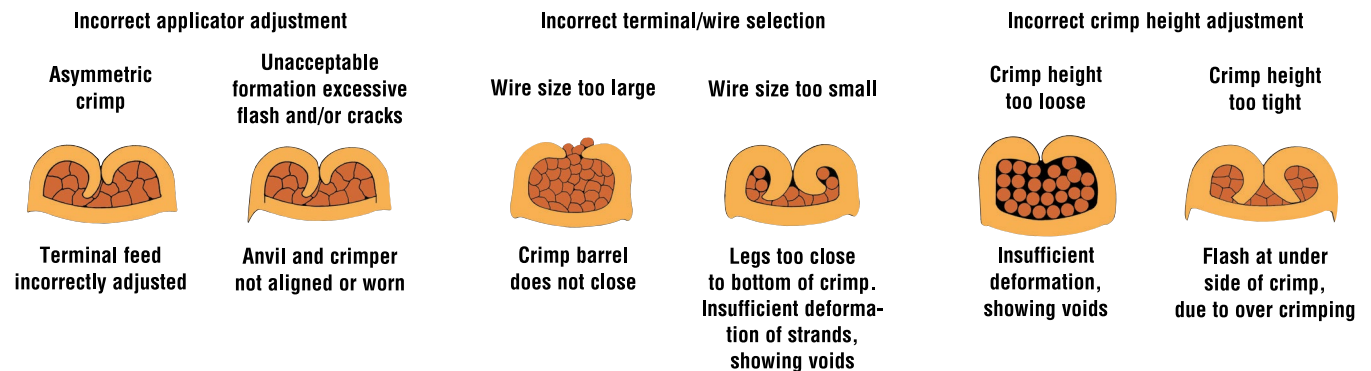
**Incorrect**



**INSULATION CRIMP**



**WIRE CRIMP**

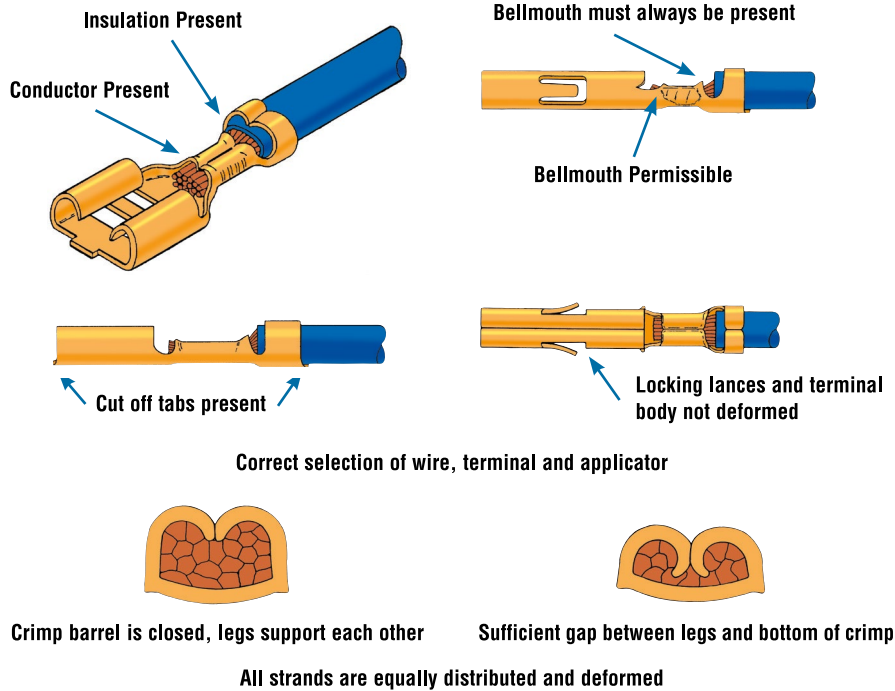




Quality Guidelines

**Correct**

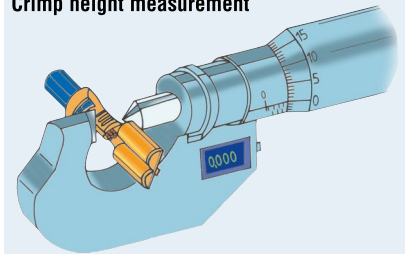
**WIRE CRIMP**



**Test**

**WIRE CRIMP**

Crimp height measurement



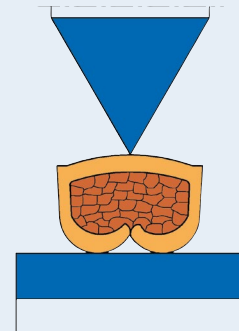
Crimp heights and tolerances

For crimp height tolerances for any given contact, please refer to the relevant application specification.

Examples:

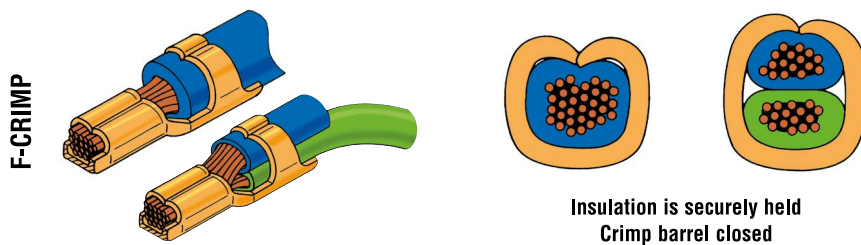
Con- tact	Part No.	Wire Range (mm <sup>2</sup> )	Toler- ance (mm)	Appli- cation Spec.
MQS	962885 962886	0.2–0.5	±0.03	114-18025
JPT	927775	0.5–1.0	±0.05	114-18050
JPT	927773	1.5–2.5	±0.05	114-18050

Digital Crimp Height Micrometer  
(0.001 mm increments) acc. to DIN ISO 9001  
Part No. 547203-1

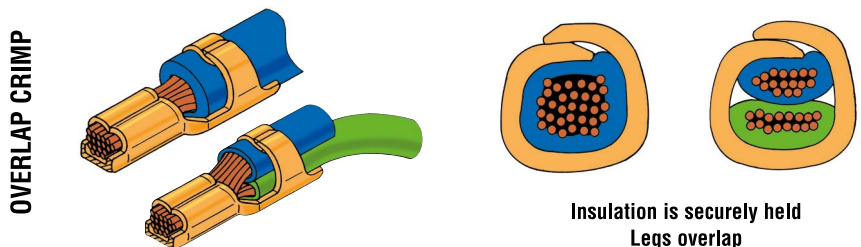


**INSULATION CRIMP**

Correct Insulation Diameter, Applicator and Terminal

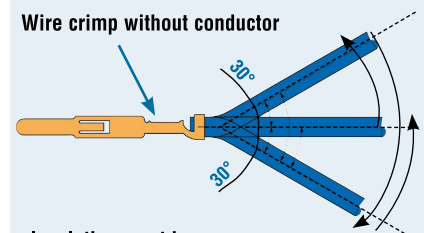


For double wire applications with different size wires always place wire with smallest outer diameter in the bottom





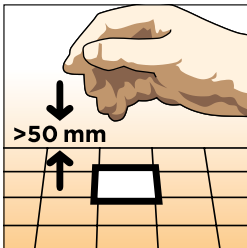
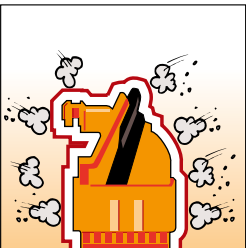
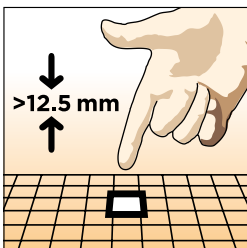
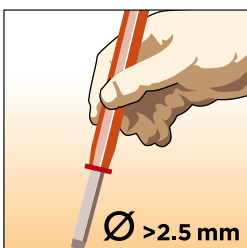
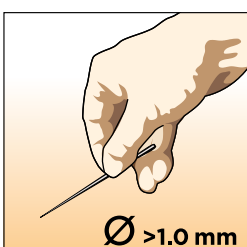
**INSULATION CRIMP**

Wire crimp without conductor




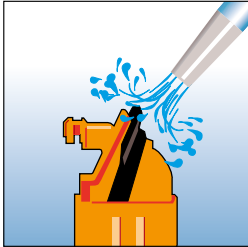
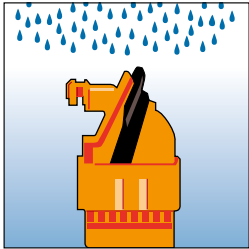

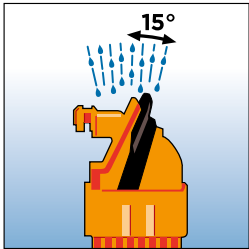

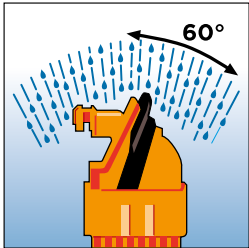
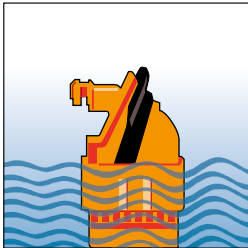
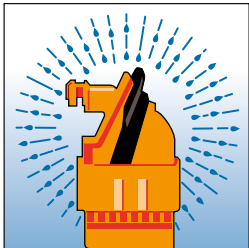
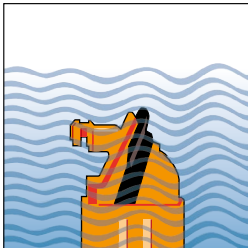
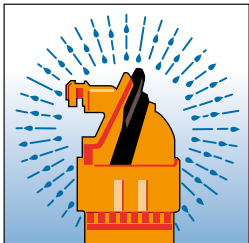

Insulation must be securely held after bend test

IP Code (Elements and Significance acc. to IEC 60529 and DIN 40050)

1st Digit	Against Foreign Objects (incl. Dust)	1st Digit	Against Foreign Objects (incl. Dust)
0	 <p>Not protected.</p>	5K	 <p>Dust protected.</p>
1	 <p>Protected against solid objects greater than 50 mm (ex. back of hand).</p>	6K	 <p>Dust tight.</p>
2	 <p>Protected against solid objects greater than 12.5 mm (ex. finger).</p>		
3	 <p>Protected against solid objects greater than 2.5 mm (ex. tool).</p>		
4	 <p>Protected against solid objects greater than 1.0 mm (ex. wire).</p>		



IP Code (Elements and Significance acc. to IEC 60529 and DIN 40050)

2nd Digit	Against Water	2nd Digit	Against Water
0	 <p>Not protected.</p>	5	 <p>Protected against jetting water.</p>
1	 <p>Protected against vertically dripping water.</p>	6	 <p>Protected against powerfully jetting water.</p>
2	 <p>Protected against dripping water when tilted up to 15°.</p>	6K	 <p>Protected against powerfully jetting water with increased pressure (Automotive).</p>
3	 <p>Protected against spraying water (up to 60° inclination).</p>	7	 <p>Protected against the temporary effects of immersion up to 1 meter.</p>
4	 <p>Protected against splashing water.</p>	8	 <p>Protected against continuous submersion agreed with customer, but more severe than code 7.</p>
4K	 <p>Protected against splashing water with increased pressure.</p>	9K	 <p>Protected against high-pressure/steam-jet cleaning (Automotive).</p>

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## Restriction on the Use of Hazardous Substances (RoHS)

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### Restriction on the use of Hazardous Substances (RoHS)

At TE Connectivity, we're ready to support your RoHS requirements. We've assessed more than 1.5 million end items/components for RoHS compliance, and issued new part numbers where any change was required to eliminate the restricted materials. Part numbers in this catalog are identified as:

#### RoHS Compliant

Part numbers in this catalog are RoHS Compliant, unless marked otherwise.

These products comply with European Union Directive 2002/95/EC as amended 1 January 2006 that restricts the use of lead, mercury, cadmium, hexavalent chromium, PBB, and PBDE in certain electrical and electronic products sold into the EU as of 1 July 2006.

**Note:** For purposes of this Catalog, included within the definition of RoHS Compliant are products that are clearly "Out of Scope" of the RoHS Directive such as hand tools and other non-electrical accessories.

#### Non-RoHS Compliant

These part numbers are identified with a "◆" symbol. These products do not comply with the material restrictions of the European Union Directive 2002/95/EC.

#### 5 of 6 Compliant

A "●" symbol identifies these part numbers. These products do not fully comply with the European Union Directive 2002/95/EC because they contain lead in solderable interfaces (they do not contain any of the other five restricted substances above allowable limits). However, these products may be suitable for use in RoHS applications where there is an application-based exception for lead in solders, such as the server, storage, or networking infrastructure exemption.

**Note:** Information regarding RoHS compliance is provided based on reasonable inquiry of our suppliers and represents our current actual knowledge based on the information provided by our suppliers. This information is subject to change. For latest compliance status, refer to our website referenced below.

#### Getting the information you need

Our comprehensive on-line RoHS Customer Support Center provides a forum to answer your questions and support your RoHS needs. A RoHS FAQ (Frequently Asked Questions) is available with links to more detailed information. You can also submit RoHS questions and receive a response within 24 hours during a normal work week. The Support Center also provides:

- Cross-Reference from Non-compliant to Compliant Products
- Ability to browse RoHS Compliant Products in our on-line catalog: <http://www.te.com/commerce/alt/RohsAltHome.do>
- Downloadable Technical Data Customer Information Presentation
- More detailed information regarding the definitions used above

So whatever your questions when it comes to RoHS, we've got the answers at <http://www.te.com/customersupport/rohssupportcenter/>

RoHS  
Customer  
Support  
Center 



AWG Conversion Table (Average Value)

**Conversion Tables**

Most of the wire size ranges are mentioned in mm<sup>2</sup>, as well as the insulation diameters which are in many cases only in mm's.

We therefore included the conversion tables on page X and page XI.

Please note that wire and insulation sizes are for guidance only.

Consult the customer drawing for precise detail.

AWG Code	Diameter (Inch)	Diameter (mm)	F (mm <sup>2</sup> )
000000	0.5800	14.733	170.0
00000	0.5165	13.13	135.0
0000	0.4600	11.684	103.8
000	0.4096	10.40	79.0
00	0.3648	9.27	67.5
0	0.3249	8.25	53.4
1	0.2893	7.34	42.2
2	0.2576	6.55	33.7
3	0.2294	5.82	26.6
4	0.2043	5.18	21.0
5	0.1819	4.62	16.9
6	0.1620	4.115	13.25
7	0.1443	3.66	10.25
8	0.1285	3.26	8.34
9	0.1144	2.90	6.6
10	0.1019	2.59	5.27
11	0.0907	2.30	4.15
12	0.0808	2.05	3.3
13	0.0720	1.83	2.63
14	0.0641	1.63	2.08
15	0.0571	1.45	1.65
16	0.0508	1.29	1.305
17	0.0453	1.14	1.01
18	0.0403	1.02	0.79
19	0.0359	0.91	0.65
20	0.0320	0.81	0.51
21	0.0285	0.72	0.407
22	0.0253	0.64	0.32
23	0.0226	0.57	0.255
24	0.0201	0.51	0.205
25	0.0179	0.455	0.162
26	0.0159	0.40	0.125
27	0.0142	0.36	0.102
28	0.0126	0.320	0.08
29	0.0113	0.287	0.0646
30	0.0100	0.254	0.0516
31	0.0089	0.226	0.04
32	0.0080	0.203	0.0324
33	0.0071	0.180	0.0255
34	0.0063	0.160	0.02
35	0.0056	0.142	0.0158
36	0.0050	0.127	0.0127
37	0.0045	0.114	0.01
38	0.0040	0.101	0.008
39	0.0035	0.089	0.0062
40	0.0031	0.079	0.0049
41	0.0028	0.071	0.00395
42	0.0025	0.064	0.00321
43	0.0022	0.056	0.00246
44	0.00198	0.050	0.00196
45	0.00176	0.045	
46	0.00157	0.040	
47	0.00140	0.036	
48	0.00124	0.031	
49	0.00110	0.028	
50	0.00099	0.025	

**FLK/FLR Cable**

FLK and FLR stand for German DIN (72551) abbreviations.

**FLK means:**

- In German:  
  - Fahrzeug Leitung Kunststoff
 In English:  
  - Vehicle Cable Plastic

**FLR means:**

- In German:  
  - Fahrzeug Leitung Reduziert
 In English:  
  - Thin Walled Cable (reduced insulation thickness)

**Remark:** Starting from 0.03 mm<sup>2</sup> (AWG 32) a wire can be crimped.

Conversion Table – Inch/mm

Inch	0	0.001	0.002	0.003	0.004	0.005	0.006	0.007	0.008	0.009
0	0	0.0254	0.0508	0.0762	0.1016	0.1270	0.1524	0.1778	0.2032	0.2286
0.010	0.2540	0.2794	0.3048	0.3302	0.3556	0.3810	0.4064	0.4318	0.4572	0.4826
0.020	0.5080	0.5334	0.5588	0.5842	0.6096	0.6350	0.6604	0.6858	0.7112	0.7366
0.030	0.7620	0.7874	0.8128	0.8382	0.8636	0.8890	0.9144	0.9398	0.9652	0.9906
0.040	1.0160	1.0414	1.0668	1.0922	1.1176	1.1430	1.1684	1.1938	1.2192	1.2446
0.050	1.2700	1.2954	1.3208	1.3462	1.3716	1.3970	1.4224	1.4478	1.4732	1.4986
0.060	1.5240	1.5494	1.5748	1.6002	1.6256	1.6510	1.6764	1.7018	1.7272	1.7526
0.070	1.7780	1.8034	1.8288	1.8542	1.8796	1.9050	1.9304	1.9558	1.9812	2.0066
0.080	2.0320	2.0574	2.0828	2.1062	2.1336	2.1590	2.1844	2.2098	2.2352	2.2606
0.090	2.2860	2.3114	2.3368	2.3622	2.3876	2.4130	2.4384	2.4638	2.4892	2.5146
0.100	2.5400	2.5654	2.5908	2.6162	2.6416	2.6670	2.6924	2.7178	2.7432	2.7686
0.110	2.7940	2.8194	2.8448	2.8702	2.8956	2.9210	2.9464	2.9718	2.9972	3.0226
0.120	3.0480	3.0734	3.0988	3.1242	3.1496	3.1750	3.2004	3.2258	3.2512	3.2766
0.130	3.3020	3.3274	3.3528	3.3782	3.4036	3.4290	3.4544	3.4798	3.5052	3.5306
0.140	3.5560	3.5814	3.6068	3.6322	3.6576	3.6830	3.7084	3.7338	3.7592	3.7846
0.150	3.8100	3.8354	3.8608	3.8862	3.9116	3.9370	3.9624	3.9878	4.0132	4.0386
0.160	4.0640	4.0894	4.1148	4.1402	4.1656	4.1910	4.2164	4.2418	4.2672	4.2926
0.170	4.3180	4.3434	4.3688	4.3942	4.4196	4.4450	4.4704	4.4958	4.5212	4.5466
0.180	4.5720	4.5974	4.6228	4.6482	4.6736	4.6990	4.7244	4.7498	4.7752	4.8006
0.190	4.8260	4.8514	4.8768	4.9022	4.9276	4.9530	4.9784	5.0038	5.0292	5.0546
0.200	5.0800	5.1054	5.1308	5.1562	5.1816	5.2070	5.2324	5.2578	5.2832	5.3086
0.210	5.3340	5.3594	5.3848	5.4102	5.4356	5.4610	5.4864	5.5118	5.5372	5.5626
0.220	5.5880	5.6134	5.6388	5.6642	5.6896	5.7150	5.7404	5.7658	5.7912	5.8166
0.230	5.8420	5.8674	5.8928	5.9182	5.9436	5.9690	5.9944	6.0198	6.0452	6.0706
0.240	6.0960	6.1214	6.1468	6.1722	6.1976	6.2230	6.2484	6.2738	6.2992	6.3246
0.250	6.3500	6.3754	6.4008	6.4262	6.4516	6.4770	6.5024	6.5278	6.5532	6.5786
0.260	6.6040	6.6294	6.6548	6.6802	6.7056	6.7310	6.7564	6.7818	6.8072	6.8326
0.270	6.8580	6.8834	6.9088	6.9342	6.9596	6.9850	7.0104	7.0358	7.0612	7.0866
0.280	7.1120	7.1374	7.1628	7.1882	7.2136	7.2390	7.2644	7.2898	7.3152	7.3406
0.290	7.3660	7.3914	7.4168	7.4422	7.4676	7.4930	7.5184	7.5438	7.5692	7.5946
0.300	7.6200	7.6454	7.6708	7.6962	7.7216	7.7470	7.7724	7.7978	7.8232	7.8486
0.310	7.8740	7.8994	7.9248	7.9502	7.9756	8.0010	8.0264	8.0518	8.0772	8.1026
0.320	8.1280	8.1534	8.1788	8.2042	8.2296	8.2550	8.2804	8.3058	8.3312	8.3566
0.330	8.3820	8.4074	8.4328	8.4582	8.4836	8.5090	8.5344	8.5598	8.5852	8.6106
0.340	8.6360	8.6614	8.6868	8.7122	8.7376	8.7630	8.7884	8.8138	8.8392	8.8646
0.350	8.8900	8.9154	8.9408	8.9662	8.9916	9.0170	9.0424	9.0678	9.0932	9.1186
0.360	9.1440	9.1694	9.1948	9.2202	9.2456	9.2710	9.2964	9.3218	9.3472	9.3726
0.370	9.3980	9.4234	9.4488	9.4742	9.4996	9.5250	9.5504	9.5758	9.6012	9.6266
0.380	9.6520	9.6774	9.7028	9.7282	9.7536	9.7790	9.8044	9.8298	9.8552	9.8806
0.390	9.9060	9.9314	9.9568	9.9822	10.0076	10.0330	10.0584	10.0838	10.1092	10.1346
0.400	10.1600	10.1854	10.2108	10.2362	10.2616	10.2870	10.3124	10.3378	10.3632	10.3886
0.410	10.4140	10.4394	10.4648	10.4902	10.5156	10.5410	10.5664	10.5918	10.6172	10.6426
0.420	10.6680	10.6934	10.7188	10.7442	10.7696	10.7950	10.8204	10.8458	10.8712	10.8966
0.430	10.9220	10.9474	10.9728	10.9982	11.0236	11.0490	11.0744	11.0998	11.1252	11.1506
0.440	11.1760	11.2014	11.2268	11.2522	11.2776	11.3030	11.3284	11.3538	11.3792	11.4046
0.450	11.4300	11.4554	11.4808	11.5062	11.5316	11.5510	11.5824	11.6078	11.6332	11.6586
0.460	11.6840	11.7094	11.7348	11.7602	11.7856	11.8110	11.8364	11.8618	11.8872	11.9126
0.470	11.9380	11.9634	11.9888	12.0142	12.0396	12.0650	12.0904	12.1158	12.1412	12.1666
0.480	12.1920	12.2174	12.2428	12.2682	12.2936	12.3190	12.3444	12.3698	12.3952	12.4206
0.490	12.4460	12.4714	12.4968	12.5222	12.5476	12.5730	12.5984	12.6238	12.6492	12.6746
0.500	12.7000									
Inch	0	0.001	0.002	0.003	0.004	0.005	0.006	0.007	0.008	0.009



Conversion Table – Inch/mm (continued)

Inch	0	0.001	0.002	0.003	0.004	0.005	0.006	0.007	0.008	0.009
0.500	12.7000	12.7254	12.7508	12.7762	12.8016	12.8270	12.8524	12.8778	12.9032	12.9286
0.510	12.9540	12.9794	13.0048	13.0302	13.0556	13.0810	13.1064	13.1318	13.1572	13.1826
0.520	13.2080	13.2334	13.2588	13.2842	13.3096	13.3350	13.3604	13.3858	13.4112	13.4366
0.530	13.4620	13.4874	13.5128	15.5382	13.5636	13.5890	13.6144	13.6398	13.6652	13.6906
0.540	13.7160	13.7414	13.7668	13.7922	13.8176	13.8430	13.8684	13.8938	13.9192	13.9446
0.550	13.9700	13.9954	14.0208	14.0462	14.0716	14.0970	14.1224	14.1478	14.1732	14.1986
0.560	14.2240	14.2494	14.2748	14.3002	14.3256	14.3510	14.3764	14.4018	14.4272	14.4526
0.570	14.4780	14.5034	14.5288	14.5542	14.5796	14.6050	14.6304	14.6558	14.6812	14.7066
0.580	14.7320	14.7574	14.7828	14.8082	14.8336	14.8590	14.8844	14.9098	14.9352	14.9606
0.590	14.9860	15.0114	15.0368	15.0622	15.0876	15.1130	15.1384	15.1638	15.1892	15.2146
0.600	15.2400	15.2654	15.2908	15.3162	15.3416	15.3670	15.3924	15.4178	15.4432	15.4686
0.610	15.4940	15.5194	15.5448	15.5702	15.5956	15.6210	15.6464	15.6718	15.6972	15.7226
0.620	15.7480	15.7734	15.7988	15.8242	15.8496	15.8750	15.9004	15.9258	15.9512	15.9766
0.630	16.0020	16.0274	16.0528	16.0782	16.1036	16.1290	16.1544	16.1798	16.2052	16.2306
0.640	16.2560	16.2814	16.3068	16.3322	16.3576	16.3830	16.4084	16.4338	16.4592	16.4846
0.650	16.5100	16.5354	16.5608	16.5862	16.6116	16.6370	16.6624	16.6878	16.7132	16.7386
0.660	16.7640	16.7894	16.8148	16.8402	16.8656	16.8910	16.9164	16.9418	16.9672	16.9926
0.670	17.0180	17.0434	17.0688	17.0942	17.1196	17.1450	17.1704	17.1958	17.2212	17.2466
0.680	17.2720	17.2974	17.3228	17.3482	17.3736	17.3990	17.4244	17.4498	17.4752	17.5006
0.690	17.5260	17.5514	17.5768	17.6022	17.6276	17.6530	17.6784	17.7038	17.7292	17.7546
0.700	17.7800	17.8054	17.8308	17.8562	17.8816	17.9070	17.9324	17.9528	17.9832	18.0086
0.710	18.0340	18.0594	18.0848	18.1102	18.1356	18.1610	18.1864	18.2118	18.2372	18.2626
0.720	18.2880	18.3134	18.3388	18.3642	18.3896	18.4150	18.4404	18.4658	18.4912	19.5166
0.730	18.5420	18.5674	18.5928	18.6182	18.6436	18.6690	18.6944	18.7198	18.7452	18.7706
0.740	18.7960	18.8214	18.8468	18.8722	18.8976	18.9230	18.9484	18.9738	18.9992	19.0246
0.750	19.0500	19.0754	19.1008	19.1262	19.1516	19.1170	19.2024	19.2278	19.2532	19.2786
0.760	19.3040	19.3294	19.3548	19.3802	19.4056	19.4310	19.4564	19.4818	19.5072	19.5326
0.770	19.5580	19.5834	19.6088	19.6342	19.6596	19.6850	19.7104	19.7358	19.7612	19.7866
0.780	19.8120	19.8374	19.8628	19.8882	19.9136	19.9390	19.9644	19.9898	20.0152	20.0406
0.790	20.0660	20.0914	20.1168	20.1422	20.1676	20.1930	20.2184	20.2438	20.2692	20.2946
0.800	20.3200	20.3454	20.3708	20.3962	20.4216	20.4470	20.4724	20.4978	20.5232	20.5486
0.810	20.5740	20.5994	20.6248	20.6502	20.6756	20.7010	20.7264	20.7518	20.7772	20.8026
0.820	20.8280	20.8534	20.8788	20.9042	20.9296	20.9550	20.9804	21.0058	21.0312	21.0566
0.830	21.0820	21.1074	21.1328	21.1582	21.1836	21.2090	21.2344	21.2598	21.2852	21.3106
0.840	21.3360	21.3614	21.3868	21.4122	21.4376	21.4630	21.4884	21.5138	21.5392	21.5646
0.850	21.5900	21.6154	21.6408	21.6662	21.6916	21.7170	21.7424	21.7678	21.7932	21.8186
0.860	21.8440	21.8694	21.8948	21.9202	21.9456	21.9710	21.9964	22.0218	22.0472	22.0726
0.870	22.0980	22.1234	22.1488	22.1742	22.1996	22.2250	22.2504	22.2758	22.3012	22.3266
0.880	22.3520	22.3774	22.4028	22.4282	22.4536	22.4790	22.5044	22.5298	22.5552	22.5806
0.890	22.6060	22.6314	22.6568	22.6822	22.7076	22.7330	22.7584	22.7838	22.8092	22.8346
0.900	22.8600	22.8854	22.9108	22.9362	22.9616	22.9870	23.0124	23.0378	23.0632	23.0886
0.910	23.1140	23.1394	23.1648	23.1902	23.2156	23.2410	23.2664	23.2918	23.3172	23.3426
0.920	23.3680	23.3934	23.4188	23.4442	23.4696	23.4950	23.5204	23.5458	23.5712	23.5966
0.930	23.6220	23.6474	23.6728	23.6982	23.7236	23.7490	23.7744	23.7998	23.8252	23.8506
0.940	23.8760	23.9014	23.9268	23.9522	23.9776	24.0030	24.0284	24.0538	24.0792	24.1046
0.950	24.1300	24.1554	24.1808	24.2062	24.2316	24.2570	24.2824	24.3078	24.3332	24.3586
0.960	24.3840	24.4094	24.4348	24.4602	24.4856	24.5110	24.5364	24.5618	24.5872	24.6126
0.970	24.6380	24.6634	24.6888	24.7142	24.7396	24.7650	24.7904	24.8158	24.8412	24.8666
0.980	24.8920	24.9174	24.9428	24.9682	24.9936	25.0190	25.0444	25.0698	25.0952	25.1206
0.990	25.1460	25.1714	25.1968	25.2222	25.2476	25.2730	25.2984	25.3228	25.3492	25.3746
1.000	25.4000									
Inch	0	0.001	0.002	0.003	0.004	0.005	0.006	0.007	0.008	0.009

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## Engineering Notes

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Table of Contents

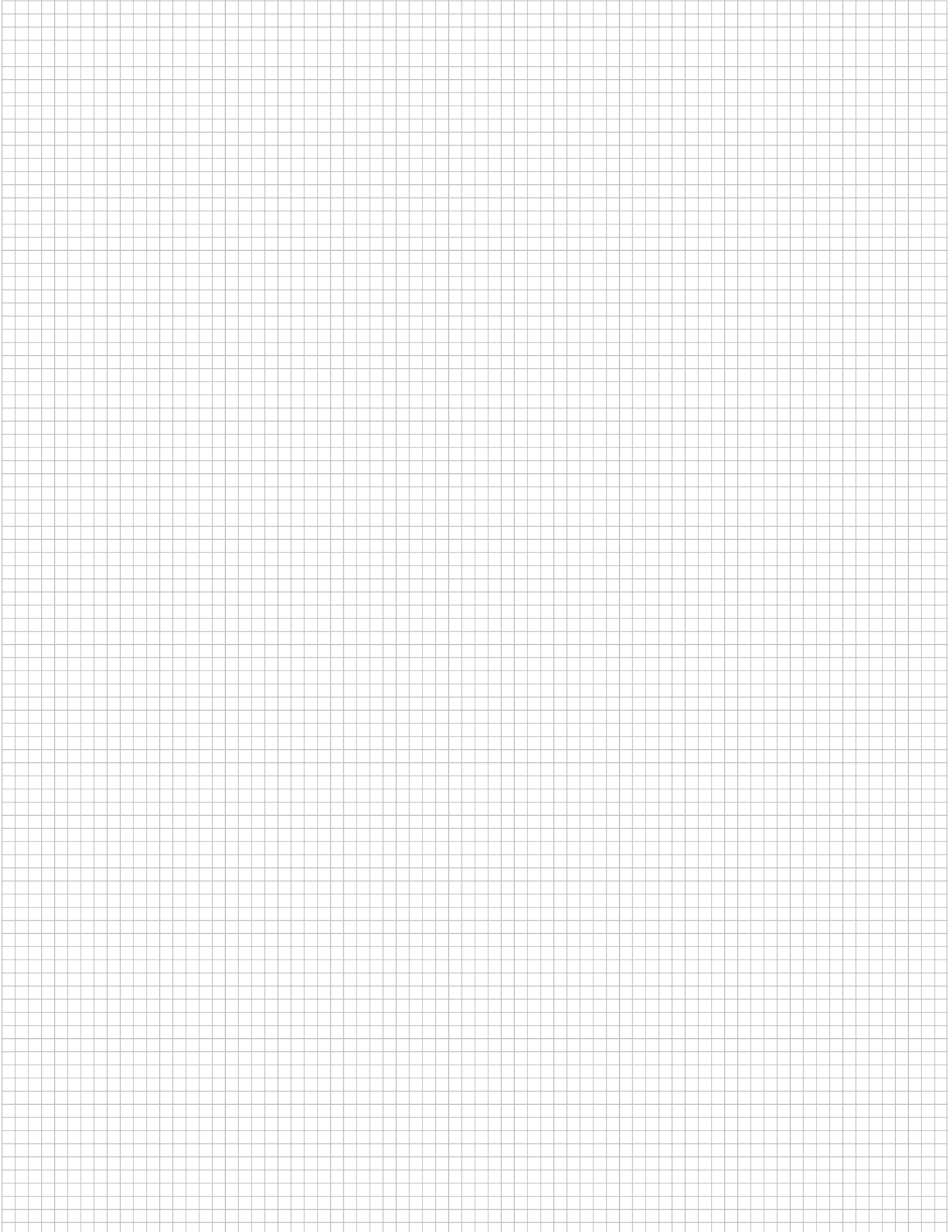


	Page			
<b>Modular Hard Wired Fuse and Relay Box</b>				
Introduction	1			
<b>Modules for Relays</b>				
Mini Relay Module, 2 Positions	2	✓	✓	✓
Micro Relay Module, 4 Positions	3	✓	✓	✓
Maxi Relay Module, 2 Positions	4	✓	✓	✓
<b>Relays</b>				
Micro ISO Micro Relay A / VFMA, Mini ISO Power Relay B, Maxi ISO Power Relay F7	5	✓	✓	✓
<b>Modules for Fuses</b>				
Medium Fuse Module, 12 Positions	6	✓	✓	✓
Miniature Fuse Module, 16 Positions	7	✓	✓	✓
Spare Fuse Module	8	✓	✓	✓
<b>Modules for Pre-Fuses</b>				
Type A Fuse Module, 14 Positions – Busbar Version	9	✓	✓	✓
Type A Fuse Module, 14 Positions – Wire-by-Wire Version	10	✓	✓	✓
Pre-Fuse – SF30 – Module, 8 Positions	11	✓	✓	✓
<b>Recommended Parts</b>				
Cover for Pre-Fuse Module – SF30	12	✓	✓	✓
Cover for Fuse Module Type A	13	✓	✓	✓
<b>Bracket Module and Interface</b>				
Bracket Module, 180°	14	✓	✓	✓
Bracket Module, 90°	15	✓	✓	✓
<b>Application Tooling</b>				
M2000MC Automatic Insertion Machine	16 – 17			
<b>Disclaimer   Trademarks</b>				
Disclaimer   Trademarks	20			

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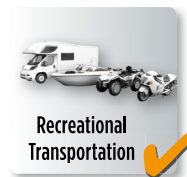
## Engineering Notes

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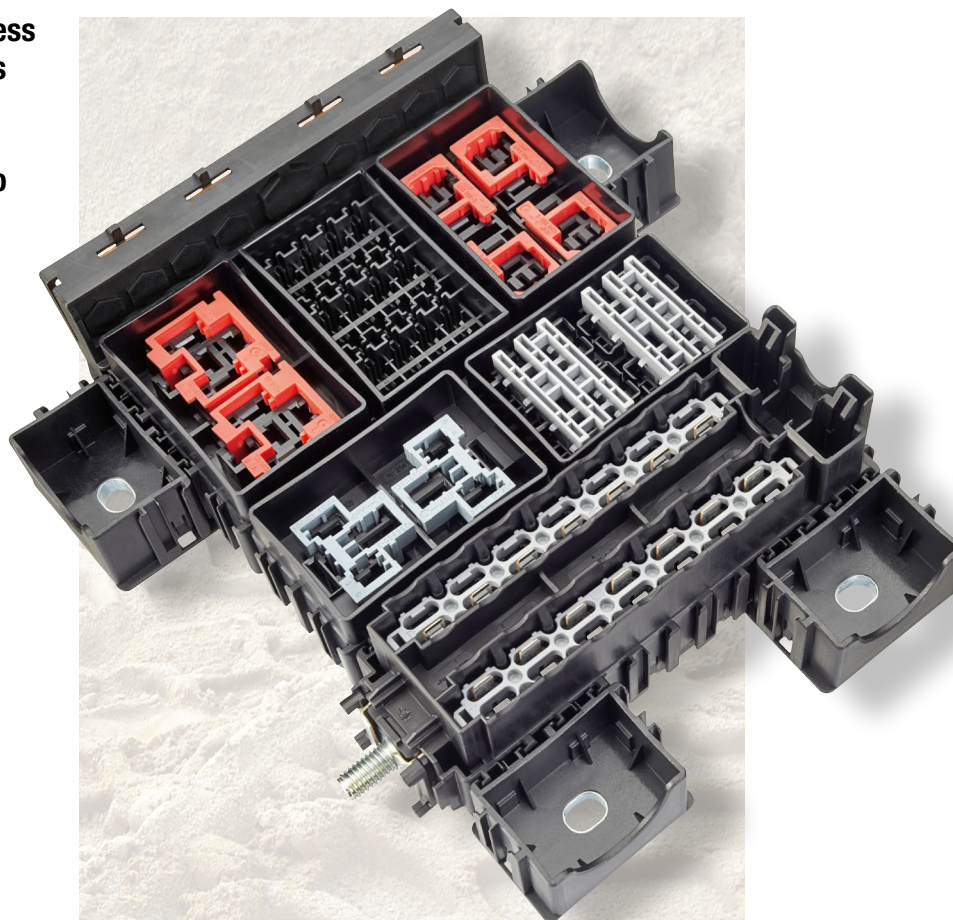


Introduction



**MFINITY offers limitless combinations with its various modules.**

**Easily assembled into a complete power distribution panel, without any tooling cost.**



All modules and accessories shown in this catalogue are standard products. Upon request, TE Connectivity (TE) will design and manufacture custom modules, wire dress, frame or cover to meet specific customer requirements.

With its proven technology, MFINITY offers flexible, off the shelf products targeting low volume customers to create their own configurations.

**Product Facts Overview**

- ISO standard
- Modular design
- Temperature class  
-40° C to +85° C
- Vibration class on body
- Unsealed
- Overview 114-94092
- Pre-Fuse modules for SF30 (Midi) and Type A (J-Case) Fuses

**Modules for Relays**

**Mini Relay Module, 2 Positions**

**Technical Features**

**Material**

PBT

**Product Specification**

108-94263

**Application Specification**

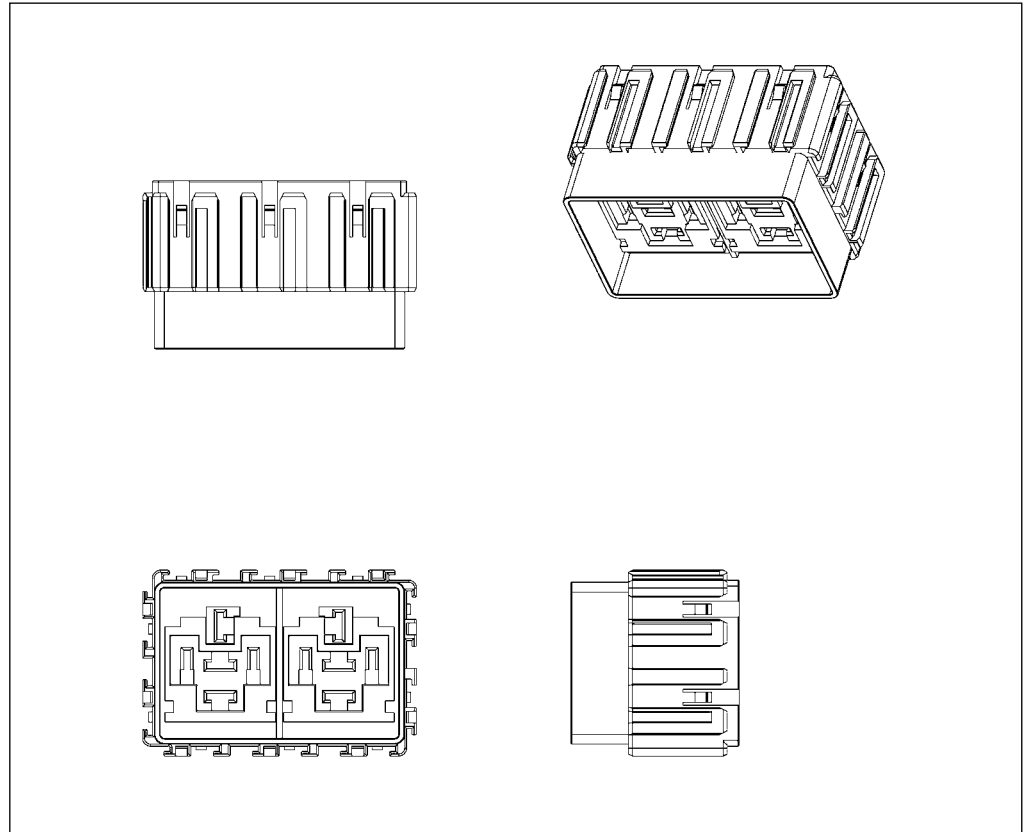
114-94090

**Order Informations**

2x ISO Mini Relays

**Part Number 2141024-1**

**Please find suitable relays  
on page 5**



**Mini Relay Module 2 Positions**

Module P/N	Name	Product Dimensions L x W x H (mm)
2141024-1	Mini Relay Module	69.3 x 47 x 42.5

**Suitable Terminals**

Terminal TE P/N	Description	Material	Plating	Wire Size (mm <sup>2</sup> )
2208343-1	LEAR - 6.3mm 361330-YF200	N/A	Pre-Tinned	0.5 – 1.5
2208343-3	LEAR - 6.3mm 361030-YF200	N/A	Pre-Tinned	3 – 5

**Modules for Relays**

Micro Relay Module, 4 Positions

**Technical Features**

**Material**

PBT

**Product Specification**

108-94263

**Application Specification**

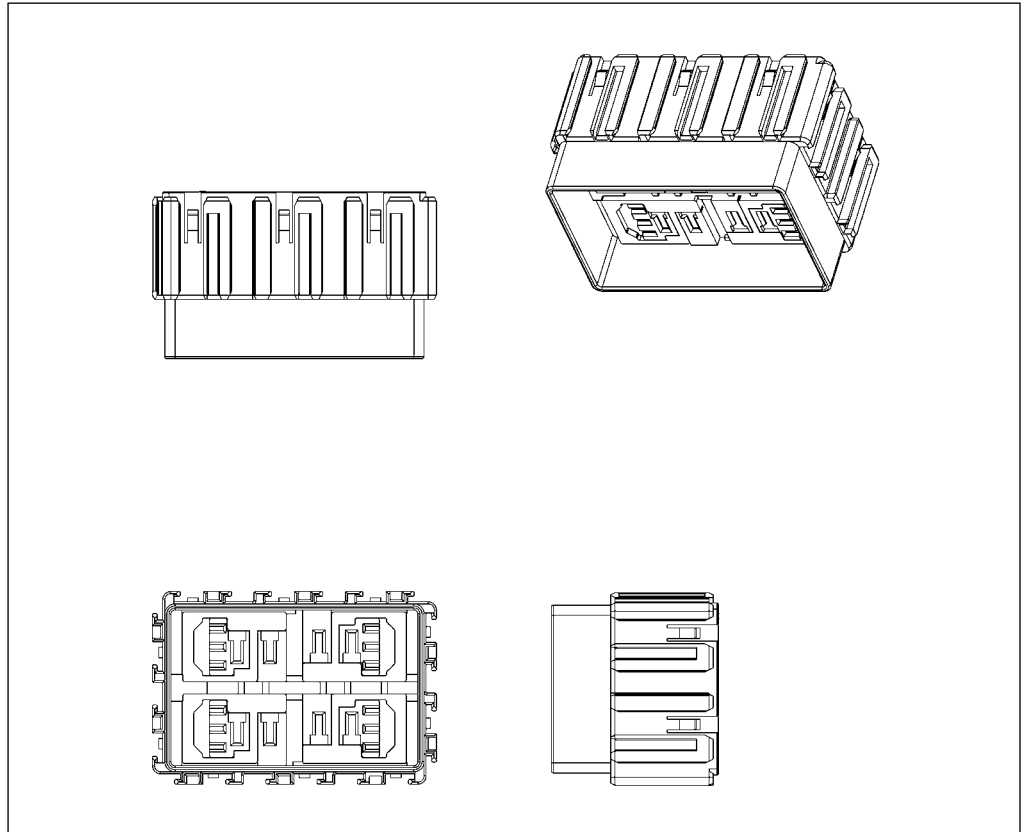
114-94090

**Order Informations**

4x ISO Micro Relays

**Part Number 2141022-1**

**Please find suitable relays  
on page 5**



**Micro Relay Module 4 Positions**

Module P/N	Name	Product Dimensions L x W x H (mm)
2141022-1	Micro Relay Module	69.3 x 47 x 40.75

**Suitable Terminals**

Terminal TE P/N	Description	Material	Plating	Wire Size (mm <sup>2</sup> )
2208343-2	LEAR - 6.3mm 361430-YF200	N/A	Pre-Tinned	1.5-2.0
2208342-2	Molex - 4.8mm 33113-0003	N/A	N/A	N/A
2208342-1	Molex - 4.8mm 33113-0005	N/A	N/A	N/A



**Modules for Relays**

**Maxi Relay Module, 2 Positions**

**Technical Features**

**Material**

PBT

**Product Specification**

108-94263

**Application Specification**

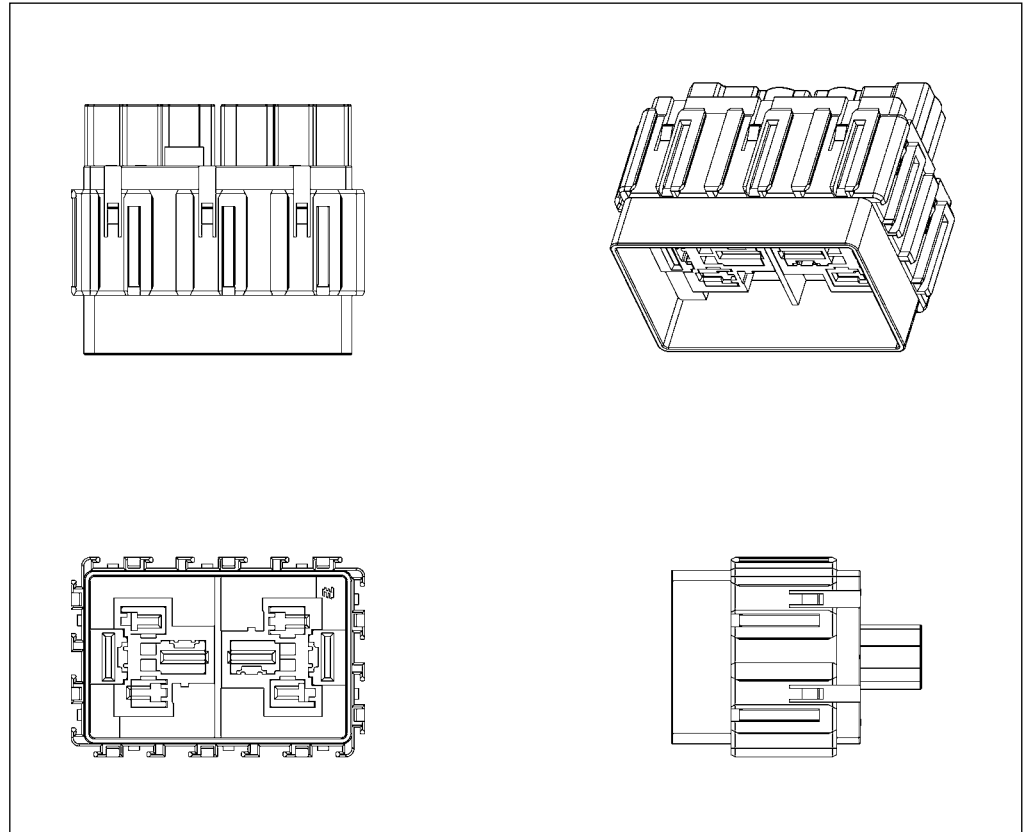
114-94090

**Order Informations**

2x ISO Maxi Relays

**Part Number 2141026-1**

**Please find suitable relays  
on page 5**



**Maxi Relay Module 2 Positions**

Module P/N	Name	Product Dimensions L x W x H (mm)
2141026-1	Maxi Relay Module	69.3 x 47 x 59

**Suitable Terminals**

Terminal TE P/N	Description	Material	Plating	Wire Size (mm <sup>2</sup> )
1-1355849-1	9.5 Single Tab	CuNiSi	Pre-Tinned	6-10
2208343-1	LEAR - 6.3mm 361330-YF200	N/A	Pre-Tinned	0.5-1.5

**Relays**

Micro ISO Micro Relay A / VFMA, Mini ISO Power Relay B, Maxi ISO Power Relay F7

**Micro ISO, Micro Relay A / VFMA (24 V)**



Arrangement	Cover	Coil. Suppr.	Part Number	
Micro Make (NO)	Standard	Diode	V23074-A2002-A402	6-1393292-2
		Resistor (680 Ω)	V23074-A1002-A402	8-1393292-9
			VFMA-11H41-S01	6-1415008-2
Micro Changeover (CO)	Standard	Diode	V23074-A2002-A403	6-1393292-3
		Resistor (680 Ω)	V23074-A1002-A403	3-1393292-8

For detailed information find our data sheets under <http://relays.te.com/telectronics.asp>

**Mini ISO, Power Relay B (24 V)**



Arrangement	Cover	Coil. Suppr.	Part Number	
Mini Changeover (C/O)	Standard	–	V23234-A0004-X055	2-1904025-6
		Diode (cathode 86)	V23234-A0004-X051	2-1904025-3
		Resistor (1400 Ω)	V23234-A0004-X053	2-1904025-5
	Bracket	–	V23234-A1004-X050	1-1904027-1
		Resistor (1400 Ω)	V23234-A1004-X054	3-1904027-2
	Mini Make (NO – 2x87)	Standard	–	V23234-C0004-X020
Resistor (1400 Ω)			V23234-C0004-X018	2-1904015-1
Bracket		–	V23234-C1004-X17	5-1904014-1
		Resistor (1400 Ω)	V23234-C1004-X085	1904015-5

For detailed information find our data sheets under <http://relays.te.com/telectronics.asp>

**Maxi ISO Power Relay F7 (24 V)**



Arrangement	Cover	Coil. Suppr.	Part Number	
Maxi Make (NO)	Standard	–	V23134-J0053-D642	9-1393303-7
		Resistor (1200 Ω)	V23134-J0056-X408	1393304-5
	Bracket	–	V23134-J1053-D642	1-1393304-1

For detailed information find our data sheets under <http://relays.te.com/telectronics.asp>

**Modules for Fuses**

**Medium Fuse Module, 12 Positions**

**Technical Features**

**Material**

PBT

**Product Specification**

108-94263

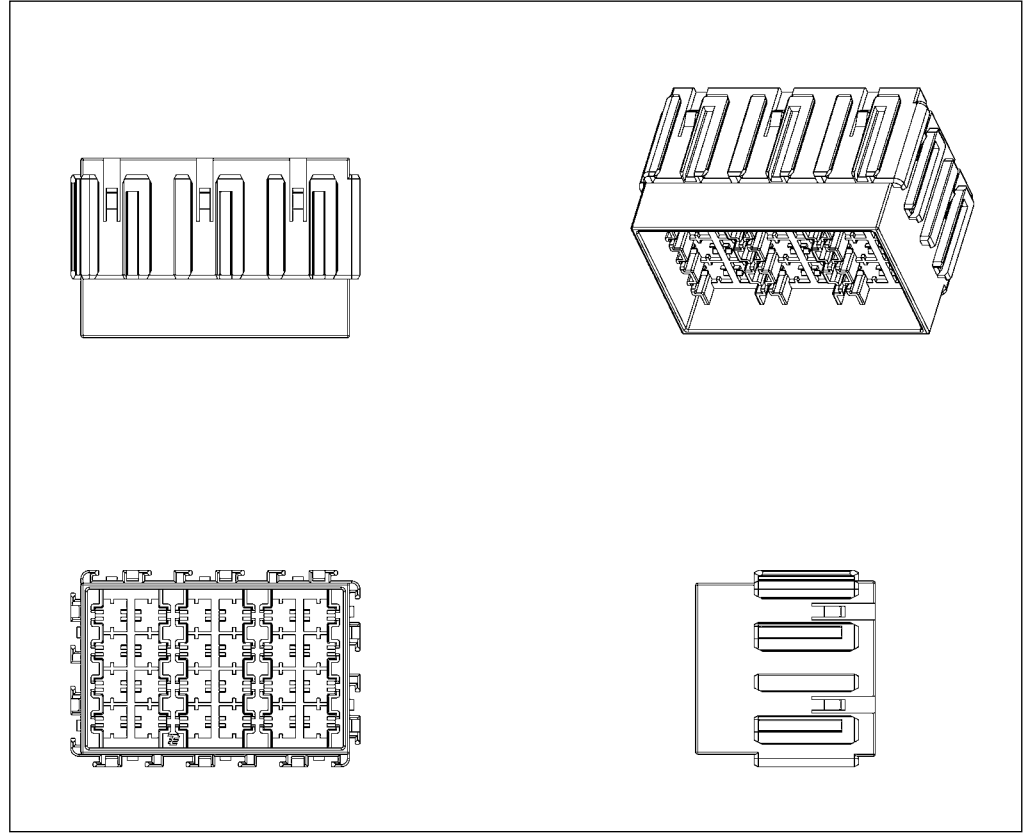
**Application Specification**

114-94090

**Order Informations**

12x (ATO) Medium Fuse

**Part Number 2141028-1**



**Medium Fuse Module 12 Positions**

Module P/N	Module Name	Product Dimensions L x W x H (mm)
2141028-1	Medium Fuse Module	69.3 x 47 x 43

**Suitable Terminals**

Terminal TE P/N	Description	Material	Plating	Wire Size (mm <sup>2</sup> )
881572-3	Fuse Contact Busbar	Brass	Pre-Tinned	4–6
880397-2	Fuse Contact Single	Brass	Pre-Tinned	0.5–1.5
880398-1	Fuse Contact Single	Brass	–	>1–2.5
880398-2	Fuse Contact Single	Brass	Pre-Tinned	>1–2.5



**Modules for Fuses**

Miniature Fuse Module, 16 Positions

**Technical Features**

**Material**

PBT

**Product Specification**

108-94263

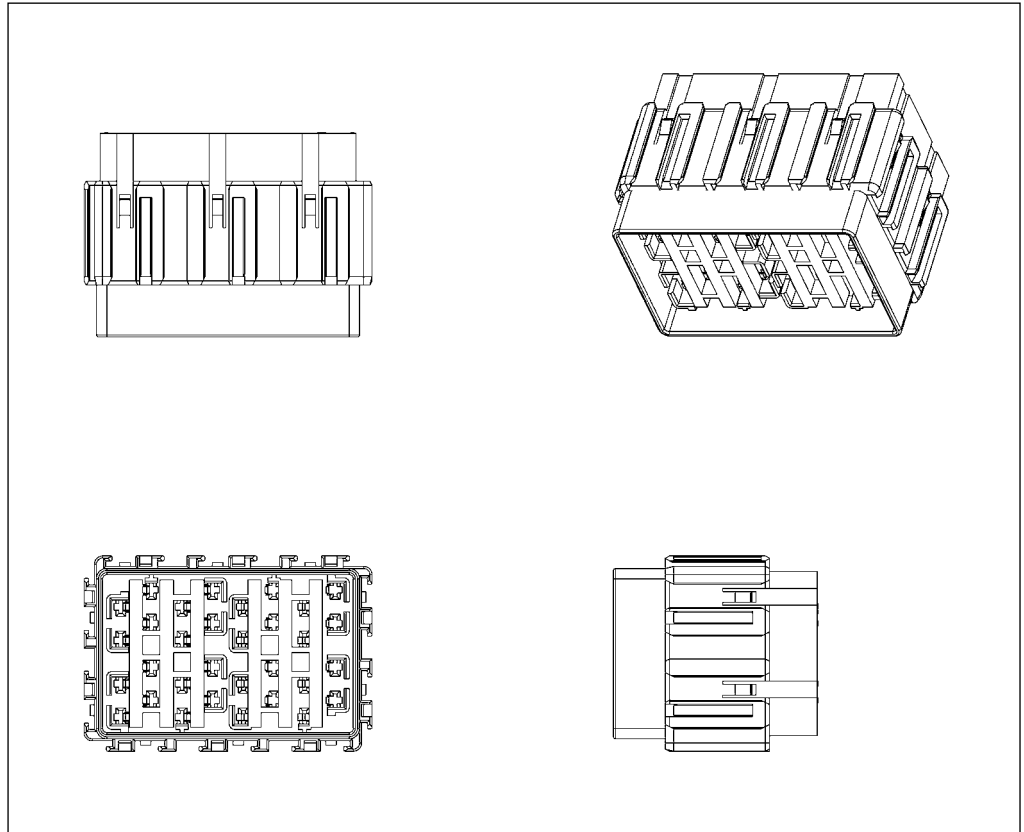
**Application Specification**

114-94090

**Order Informations**

16x Miniature (Mini) Fuse

**Part Number 2141029-1**



**Miniature Fuse Module 16 Positions**

Module P/N	Module Name	Product Dimensions L x W x H (mm)
2141029-1	Miniature Fuse Module	69.3 x 47 x 43

**Suitable Terminals**

Terminal TE P/N	Description	Material	Plating	Wire Size (mm <sup>2</sup> )
1-1355844-1	Fuse Contact Busbar	CuNiSi	Pre-Tinned	4–6
1-1355877-1	Fuse Contact Single	CuNiSi	Pre-Tinned	1–2.5
1-1355833-1	Fuse Contact Single	CuNiSi	Pre-Tinned	0.5–1.0
1-1355880-1	Fuse Contact Single	CuNiSi	Pre-Tinned	2.5–4

**Modules for Fuses**

**Spare Fuse Module**

**Technical Features**

**Material**

PBT

**Product Specification**

108-94263

**Application Specification**

114-94090

**Order Informations**

Spare Fuse Module

**Part Number 1-2141095-1**

Can contain up to:

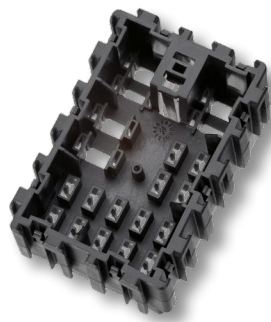
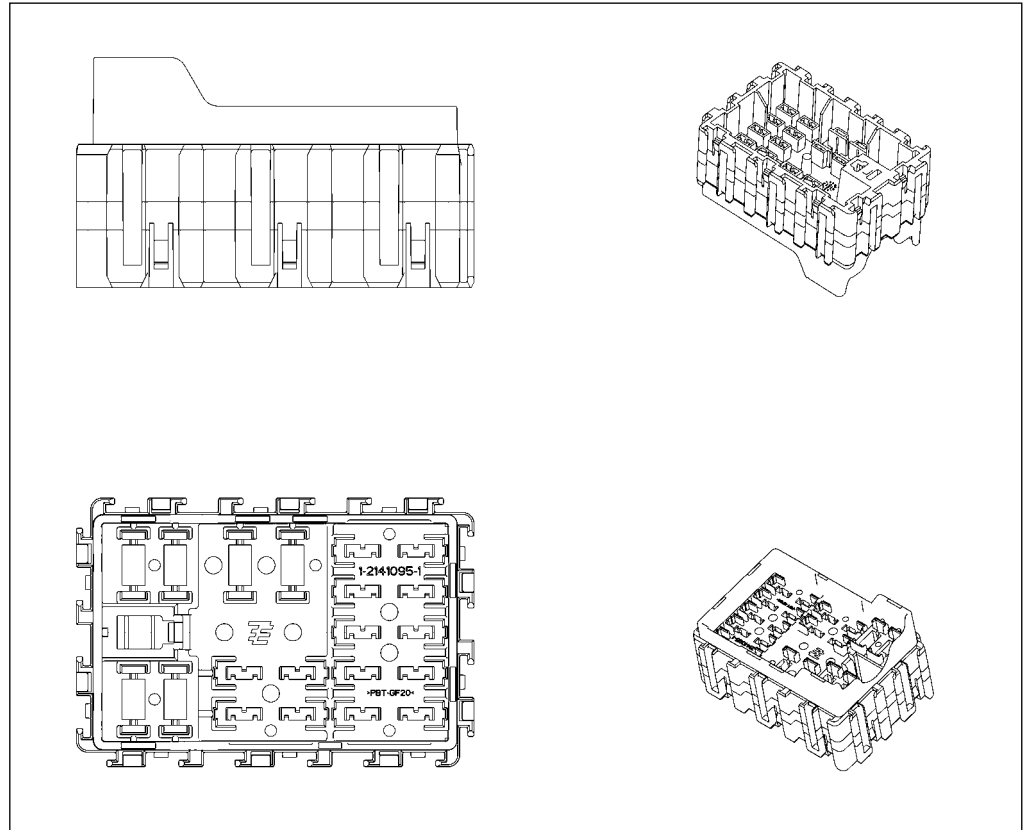
- 7x Medium (ATO) Fuses used in module

**Part Number 2141028-1**

- 6x Miniature (Mini) Fuses used in module

**Part Number 2141029-1**

- 1x Fuse Puller



**Spare Fuse Module**

Module P/N	Module Name	Product Dimensions L x W x H (mm)
1-2141095-1	Spare Fuse Module	69.1 x 46.7 x 40

**Modules for Pre-Fuses**

Type A Fuse Module, 14 Positions – Busbar Version

**Technical Features**

**Material**

PA6

**Product Specification**

108-94263

**Application Specification**

114-94090

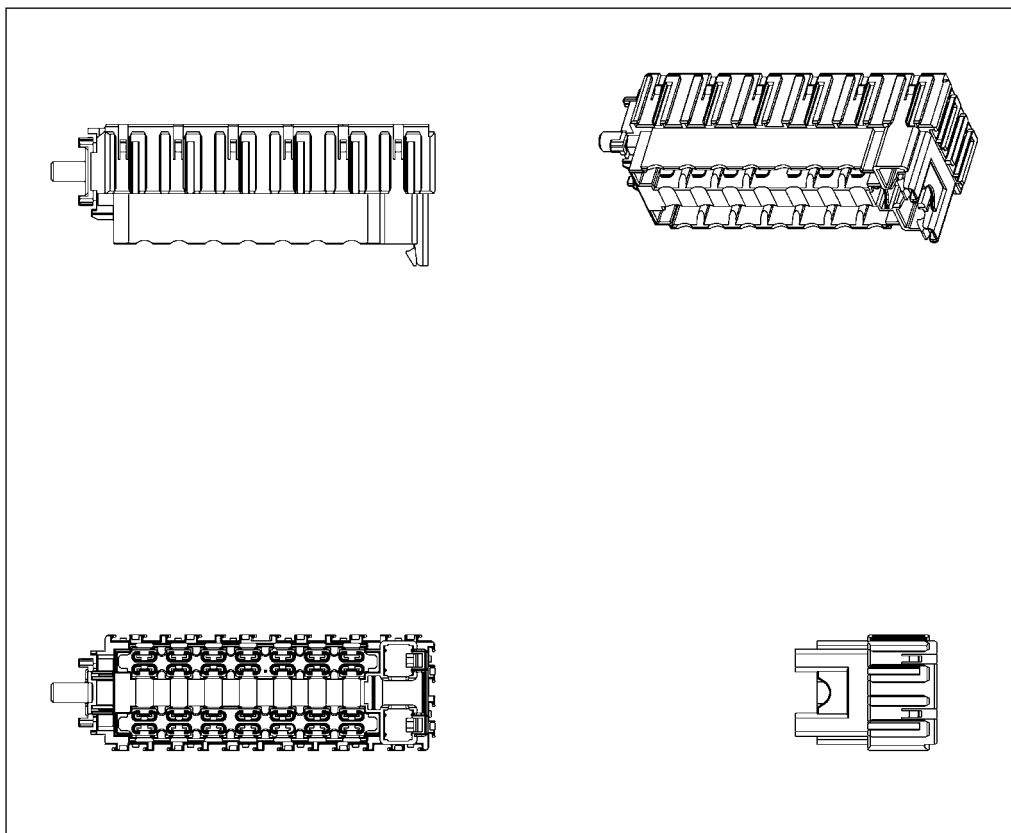
**Order Informations**

Screw M8 for B+ Connection  
with wire up to 35mm<sup>2</sup>

14x Type A Fuse (J-Case)

**Part Number 2141040-1**

2x Spare Fuse places



**Type A Fuse Module 14 Positions – Busbar Version**

Module P/N	Module Name	Product Dimensions L x W x H (mm)
2141040-1	Type A Fuse Module (Busbar Version)	155.55 x 47 x 57.3

Mating Cover see page 13  
Part Number 2141039-1





**Modules for Pre-Fuses**

Type A Fuse Module, 14 Positions – Wire-by-Wire Version

**Technical Features**

**Material**

PA6

**Product Specification**

108-94263

**Application Specification**

114-94090

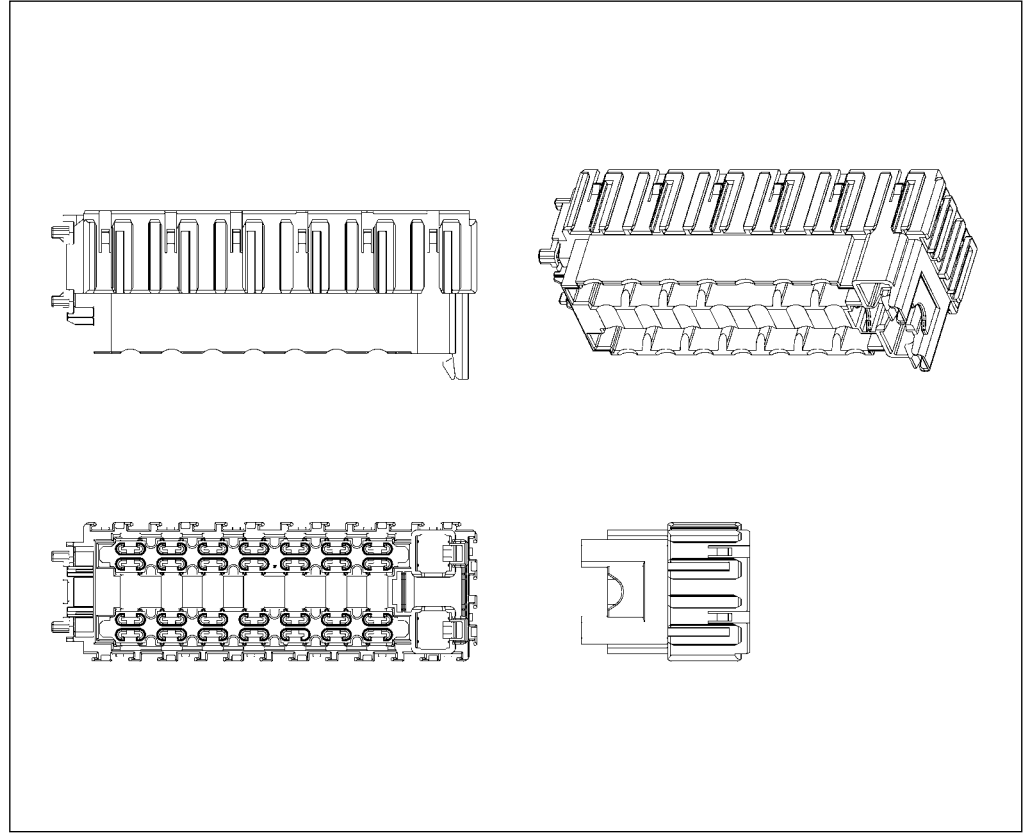
**Order Informations**

B+ Connection via  
wire to busbar – Tab

14x Typ A Fuse (J-Case)

**Part Number 2141040-2**

2x Spare Fuse places



**Type A Fuse Module 14 Positions – Wire by Wire Version**

Module P/N	Module Name	Product Dimensions L x W x H (mm)
2141040-2	Type A Fuse Module	144.55 x 47 x 57.3

**Suitable Terminals**

Terminal TE P/N	Description	Material	Plating	Wire Size (mm <sup>2</sup> )
1670225-1	6.3 Busbar & Single Tab	–	Tin Hot Dipped	4–6
963755-1	6.3 Single Tab	N/A	Pre-Tinned	2.5-4

**Modules for Pre-Fuses**

**Pre-Fuse – SF 30 – Module, 8 Positions**

**Technical Features**

**Material**

PBT

**Product Specification**

108-94263

**Application Specification**

114-94090

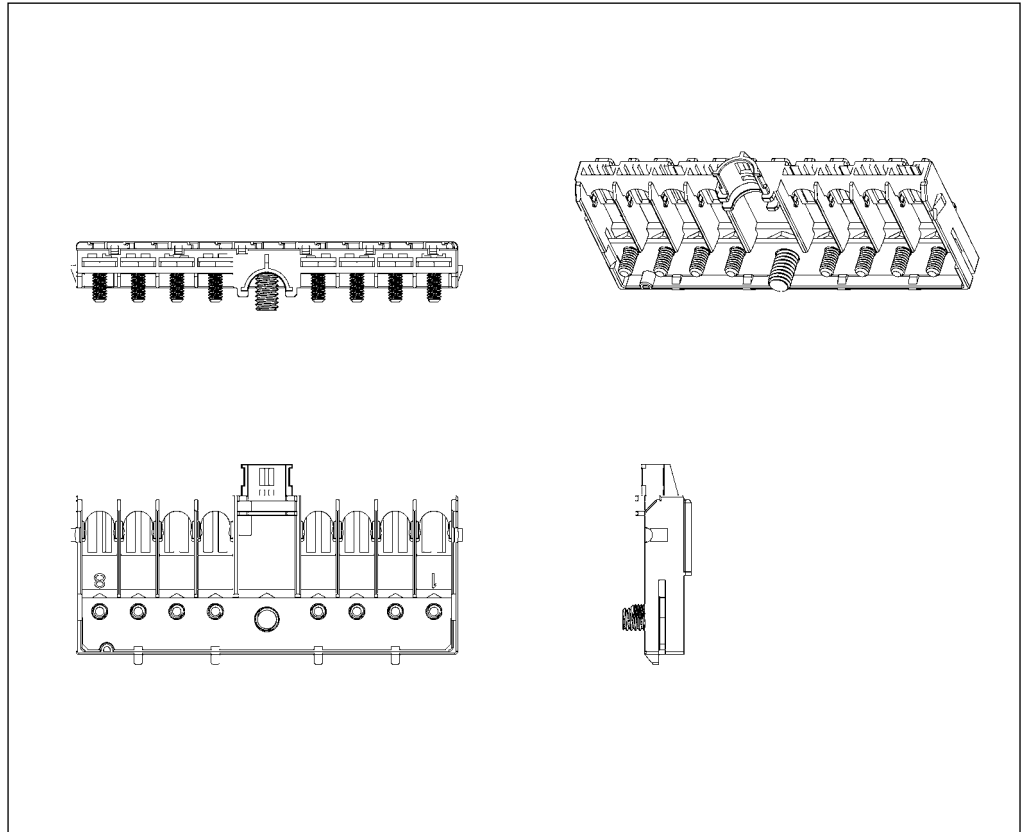
**Order Informations**

Screw M8 for B+ Connection  
with wire up to 35mm<sup>2</sup>

**Part Number 2141034-1**

Used with 8 x M5 Bolt

**Part Number 1534968-2**



**Pre-Fuse – SF30 – Module, 8 Positions**

Module P/N	Module Name	Product Dimensions L x W x H (mm)
2141034-1	Pre-Fuse SF 30 Module	137 x 70 x 24.1

Mating Cover see page 12  
Part Number 2141033-1



**Recommended Parts**

**Cover for Pre-Fuse Module – SF 30**

**Technical Features**

**Material**

PP

**Product Specification**

108-94263

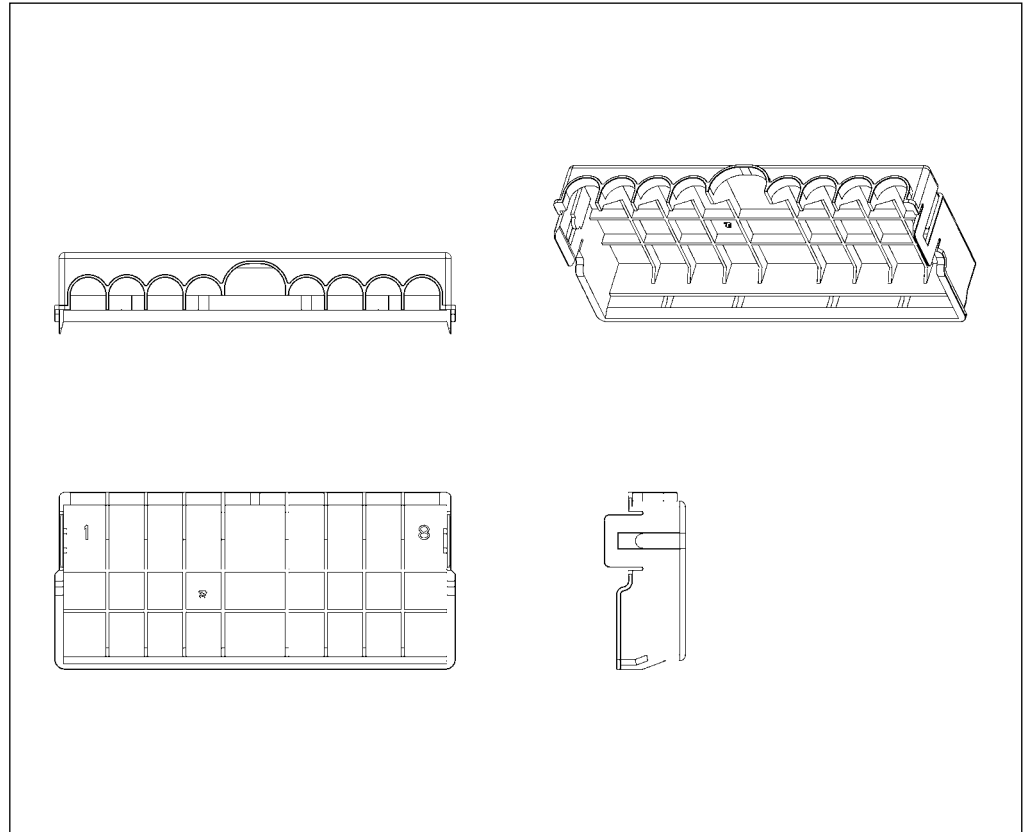
**Application Specification**

114-94090

**Order Informations**

Cover for Pre-Fuse Module

**Part Number 2141033-1**



**Cover for Pre-Fuse Module – SF 30**

Module P/N	Module Name	Product Dimensions L x W x H (mm)
2141033-1	Cover for SF30 Fuse Module	140.4 x 62 x 28.5

Mating Module see page 11  
Part Number 2141034-1





**Recommended Parts**

**Cover for Fuse Module Type A**

**Technical Features**

**Material**

PP

**Product Specification**

108-94263

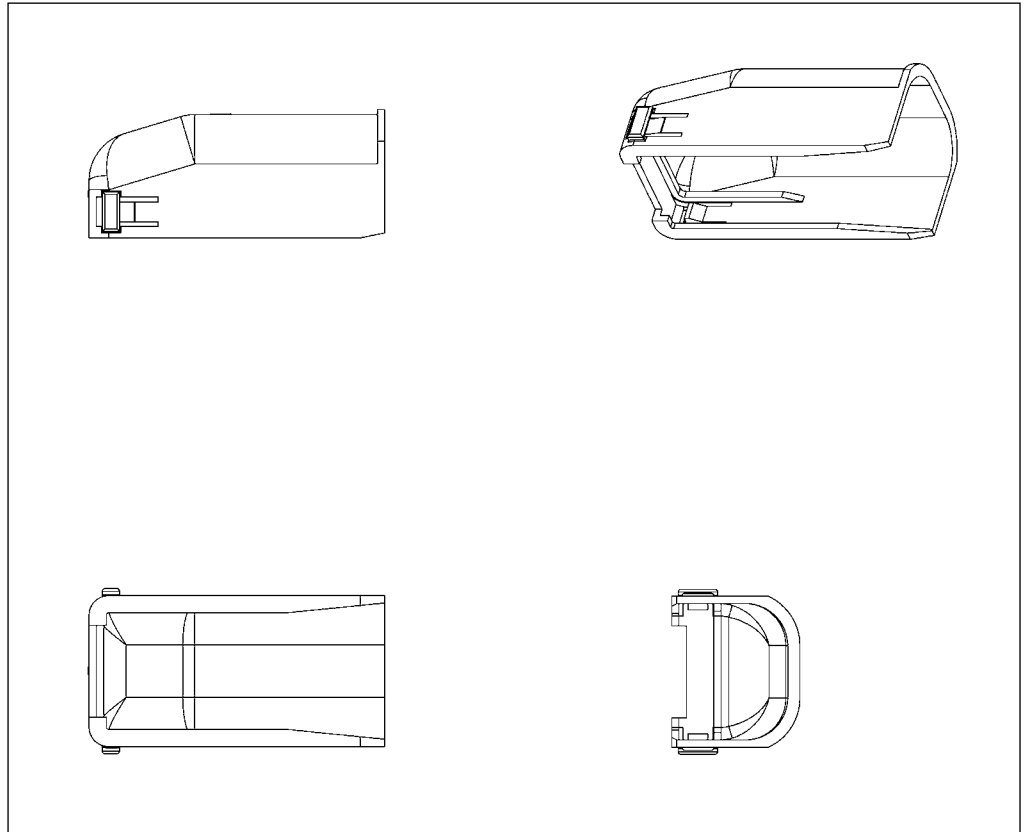
**Application Specification**

114-94090

**Order Informations**

Cover for B+ Protection

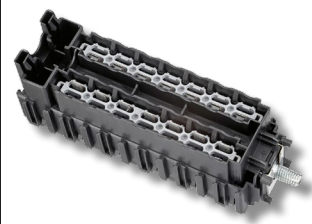
**Part Number 2141039-1**



**Cover for Fuse Module Type A**

Module P/N	Module Name	Product Dimensions L x W x H (mm)
2141039-1	Cover for Type A Fuse Module	60 x 33.4 x 26

Mating Module    see page 9  
Part Number        2141040-1



**Bracket Module and Interface**

**Bracket Module, 180°**

**Technical Features**

**Material**

PBT

**Product Specification**

108-94263

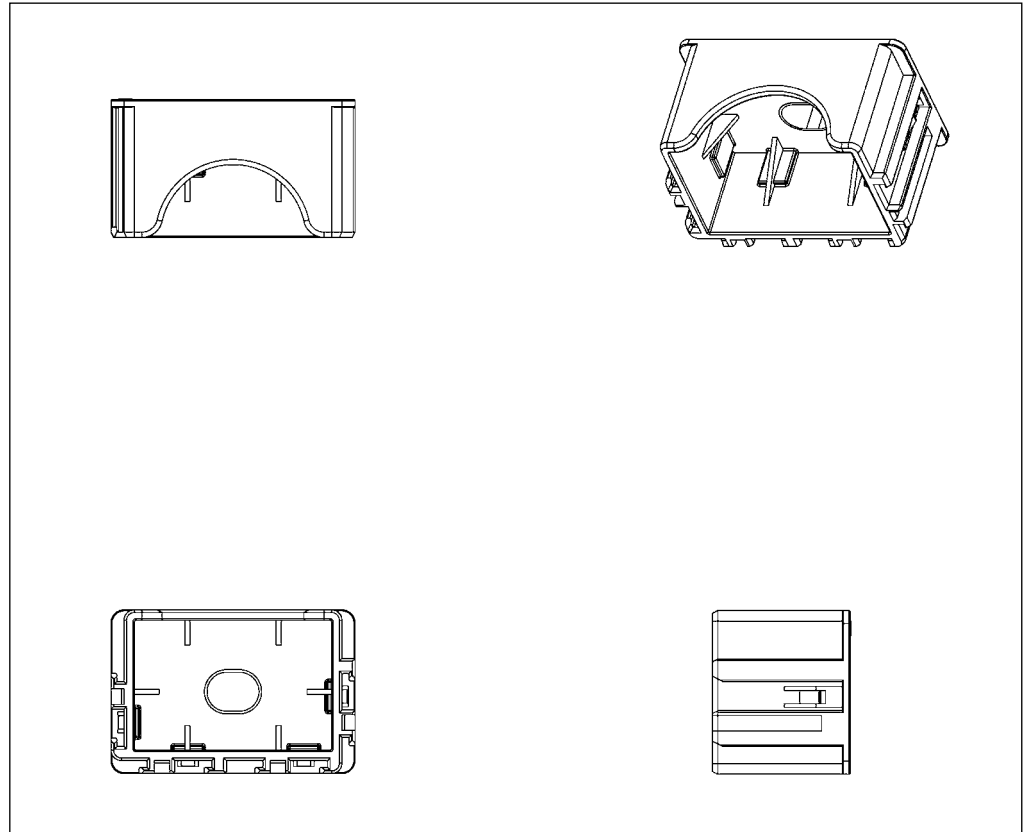
**Application Specification**

114-94090

**Order Informations**

Mounting Bracket for Screw M8

**Part Number 2141031-1**



**Bracket Module, 180°**

Module P/N	Module Name	Product Dimensions L x W x H (mm)
2141031-1	Bracket Module 180°	42 x 31.5 x 26.5

Bracket Module, 90°

**Technical Features**

**Material**

PBT

**Product Specification**

108-94263

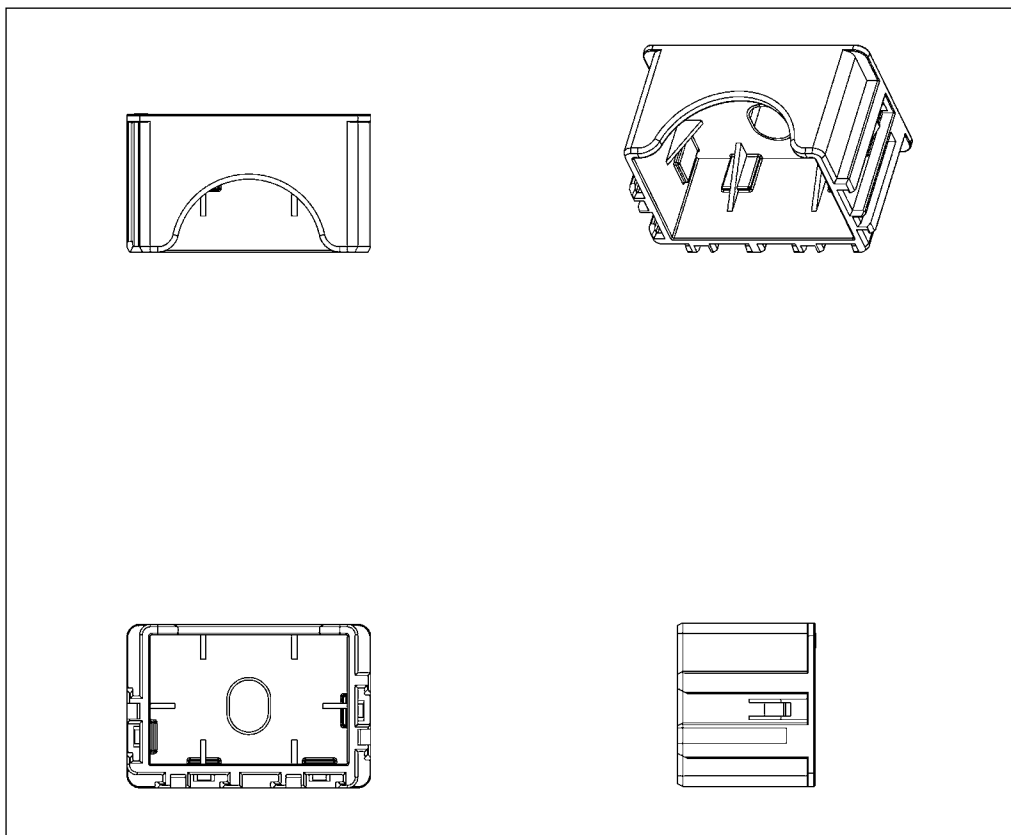
**Application Specification**

114-94090

**Order Informations**

Mounting Bracket for Screw M8

**Part Number 2141031-2**



**Bracket Module, 90°**

Module P/N	Module Name	Product Dimensions L x W x H (mm)
2141031-2	Bracket Module 90°	47 x 31.5 x 26.55

### M2000MC Automatic Insertion Machine

**High Quality.  
High Reliability.  
High Volume.**





**M2000MC Automatic Insertion Machine**

**With the CE approved M2000MC automatic insertion machine for fuses and relays, TE Application Tooling provides a high-quality solution for high-volume production within the automotive industry.**

The M2000MC automatically inserts mini fuses into a Junction Box (J/B) according to the programmed sequence, ensuring that the correct fuses are inserted in the correct location for consistent quality.

The machine reduces the number of operators required in the production process, increasing productivity in the factory, whereat the operator needs to ensure that the machine is supplied with junction boxes and fuses.

The M2000MC can also be optionally equipped with insertion force monitoring and insertion depth control.

**Outstanding features deliver tangible benefits**

- Dependable high-volume production
- Insertion depth checking by linear scale
- Insertion force monitoring – checking maximum force during insertion
- OCR of fuse before insertion to prevent wrong fuse insertion
- No stopping of production during supply to the bowl feeder
- Robot arm with ionizer that cleans inside the robot arm
- XY table positioning
- Up to 6 heads (fuse)

**Machine specification**

**Layout**

LxDxH = 1957.6 x 2584 x 1627.1mm (without tower lamp)  
– dimensions may be altered following a technical meeting.

**Machine weight**

2,500 kg (inc. blow feeders)  
– Changeable with various J/B design.

**Electrical supply**

AC 110 V, single phase, 50/60 Hz, 30 KVA – other specific requirements may be met.

**Power consumption**

2.1 kW

**Air supply**

4.5-7.0 kgf /cm<sup>2</sup>

**Air consumption**

600 l/min

**Temperature and humidity**

10~35° C, 30~70%

**Noise level**

< 75 dB(A)

**Operating system**

Windows XP Professional (Embedded POS-READY2009) Service pack3

**PC specification (incl. accessories)**

Intel Pentium(R) 2.6 GHz, 1GB RAMSSD hard disk drive by SATA (capacity: 120 GB) 17" LCD touch screen & equipped with keyboard, mouse, DVD ROM drive

**Available languages**

English and Korean

**XY table speed**

90 m/min

**Device insertion speed (per point)**

Various per component size and J/B design.

- Low profile mini fuse: 0.35~0.55 sec

- Relay: 0.8 ~ 1.0 sec

- SB fuse: 0.45~0.7 sec

**Max. J/B size**

250 x 250 mm – may be altered to meet specific customer requirements

**XY positioning accuracy**

+/- 0.01 mm

**Insertion depth monitoring**

available in 0.01 mm steps

**Insertion force monitoring**

available in 0.01 N steps

**Cmk assessment data**

>1.67 (X and Y axis)

**Machine configuration**

Stand-alone only.

Inline configuration is available on request.

**Abbreviation Explanation**

OCR: Optical character recognition. (Vision sensor checks color or characters on the components.)

SATA: Connection type between PC mother board and memory unit (CDRom or hard disk).

SB fuse: Slow Blow fuse (type of electric fuse)

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## Engineering Notes

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Numerical Index

Part Number	Page	Part Number	Page	Part Number	Page
1-1355833-1	7	880397-2	6		
1-1355844-1	7	880398-1	6		
1-1355849-1	4	880398-2	6		
1-1355877-1	7	881572-3	6		
1-1355880-1	7	9-1393303-7	5		
1-1393304-1	5	963755-1	10		
1-1904015-3	5				
1-1904027-1	5				
1-2141095-1	8				
1393304-5	5				
1534968-2	11				
1670225-1	10				
1904015-5	5				
2-1904015-1	5				
2-1904025-3	5				
2-1904025-5	5				
2-1904025-6	5				
2141022-1	3				
2141024-1	2				
2141026-1	4				
2141028-1	6, 8				
2141029-1	7, 8				
2141031-1	14				
2141033-1	12				
2141034-1	11				
2141039-1	13				
2141040-1	9				
2141040-2	10				
2208342-1	3				
2208342-2	3				
2208343-1	2, 4				
2208343-2	3				
2208343-3	2				
3-1393292-8	5				
3-1904027-2	5				
5-1904014-1	5				
6-1393292-2	5				
6-1393292-3	5				
6-1415008-2	5				
8-1393292-9	5				

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