AMPSEAL
Sealed Connector Series

Tyco Electronics

Driver
Information

Powertrain
Systems

Convenience

Safety & Security
Systems

Body & Chassis
Systems

Tyco Electronics

INNOVATIVE TECHNOLOGIES

The automotive division follows the globalization goals of our customers, speeds up the integration of new technologies and enables our customers access to our vast product portfolio and services.

TERMINALS & CONNECTORS

Tyco Electronics offers a broad range of high quality terminals and connectors. Our electrical/electronic interconnection products and solutions are used to electrically and mechanically join wires and cables, printed circuit boards, integrated circuit packages and batteries. Tyco Electronics expanding capabilities include new copper and fiber-optic connectors, wires, cables/cable management systems that are designed to meet automotive industry demands. Our brands encompass the broadest range of connectors in the world, including high-density, high-speed designs for leading-edge communications equipment.

ALTERNATIVE POWER SYSTEMS
COMPONENTS FOR HYBRID, ELECTRIC AND FUEL CELL TECHNOLOGY

Tyco Electronics is a leader in next-generation transportation technologies and products for hybrid and electric vehicles. The Automotive Division is your source for high voltage power distribution, high current contacts, high voltage connectors and cables, high voltage relays, sensors and temperature protection devices for hybrid and other alternative powered vehicles.

CABLE ASSEMBLY SYSTEMS

Tyco Electronics is your partner for special cable assemblies.
We offer research and development capabilities, prototyping, samples as well as manufacturing facilities for special cable assemblies. This includes overmold technology, semi/fully automatic manufacturing, testing equipment and appliances for handling of high volume production.

SENSORS

Contact-less measuring eliminates interference effects, wear and tear, and provides increased reliability. Tyco Electronics, one of the largest technology providers for the automobile industry, offers contact-less sensors for a variety of applications.

As sensor manufacturer and processing partner, Tyco Electronics also provides project planning support for new sensor applications, assistance in the selection of the appropriate sensor technology for the respective application, and assistance with defining the corresponding mechanical, electrical and magnetic interface.

Tyco Electronics has a broad electro-mechanical portfolio that includes robust housing technologies, connector systems, and temperature stable designs based on foil and cable networks. This combination of technologies and experience ensures that reliable and cost effective sensor solutions are available for all application types.

HIGH SPEED DATA NETWORKING

High speed data networking within the automobile is becoming more predominant. What was till now restricted to the high end of the market utilizing system such as the MOST network, high speed data transmission based on optical fibers, now with the introduction of MP3 player, display screens and cameras results in the need for high speed networking throughout all platforms.

MOST IS A TRADEMARK

INDUCTIVE SYSTEMS

The Automotive Division is your source for interconnection technologies for automotive, truck and off-highway OEMs and Tier 1 suppliers. With the design competency center in Oostkamp (Belgium), and strategic production centers in Evora (Portugal), Bangalore (India), Shuzhou (China), Oostkamp (Belgium), and others, Tyco Electronics' Inductive Systems group is ready to offer you any coil module required in the automotive industry.

The Inductive System group focus lies on the customer requirement, in order to design to the exact demand. This is achieved by highly technical, intelligent and cost-efficient engineering.

In order to be a leader in design, Tyco Electronics' Inductive Systems group has a vast product portfolio, which consists out of antennas, actuators, resolvers, and integrated coil modules. Next to that, several specific applications are designed.
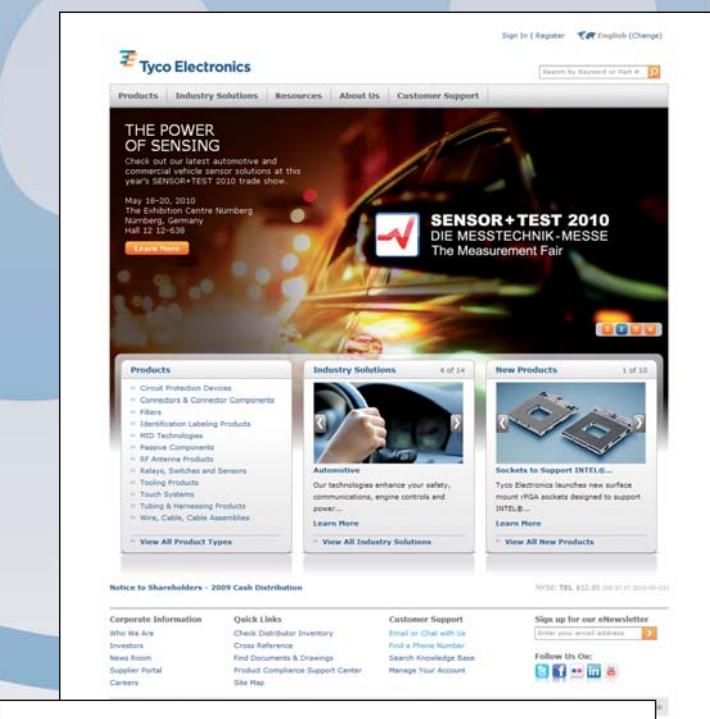
Tyco Electronics Online

The Tyco Electronics website is an innovative and interactive source for application information, product updates and technical solutions.
Our step-by-step software makes our website intuitive and user-friendly to better serve you!
Please contact us at:
www.tycoelectronics.com/automotive

## Internet

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Product and Machine Literature

Tyco Electronics offers a variety of product specific catalogs, brochures and high impact flyers to help better serve you!
For more information on literature for Tyco Electronics' Automotive Division, please contact your local Tyco Electronics Organization or go to www.tycoelectronics.com/automotive

Global Application Tooling and Equipment

Terminals and Connector Systems for the Automotive Industry

Product Information Center (PIC)

You can rely on Tyco Electronics 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 Tyco Electronics organization.
See our Global Contacts page.

Quality Guidelines

Incorrect

Terminal twisted

Terminal damaged

Cut off tab too long   Crimp barrel distorted
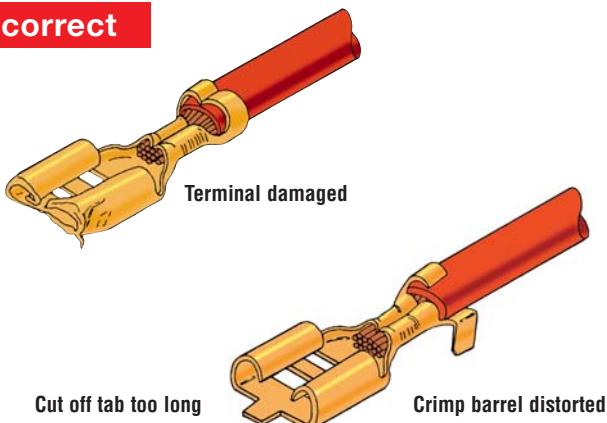
Cut off tab deformed
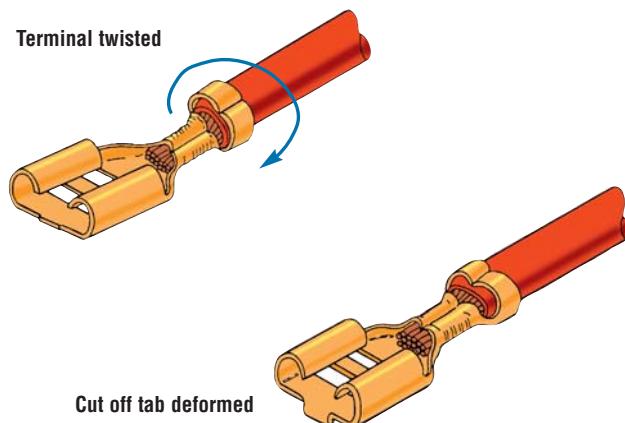
Crimp height too tight

Insulation inside the wire crimp

Conductor Brush protruding into terminal body

Terminal bend
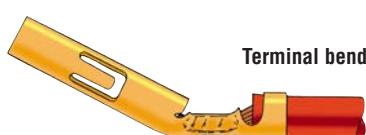
Bellmouth on wrong end

INSULATION CRIMP
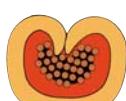
Insulation is pierced and could damage conductor

Insulation material is pierced

Insulation is not securely held
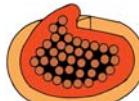
Insulation is over crimped

Insulation legs are not closed

Insulation is not securely held
Legs do not overlap

WIRE CRIMP

Incorrect applicator adjustment

Asymmetric crimp

Unacceptable formation excessive flash and/or cracks

Incorrect terminal/wire selection

Wire size too large

Wire size too small

Incorrect crimp height adjustment

Crimp height too loose

Crimp height too tight

Terminal feed incorrectly adjusted
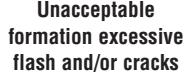
Anvil and crimper not aligned or worn

Crimp barrel does not close

Legs too close to bottom of crimp. Insufficient deformation of strands, showing voids

Insufficient deformation, showing voids

Flash at under side of crimp, due to over crimping

Quality Guidelines

Correct

WIRE CRIMP

Insulation Present
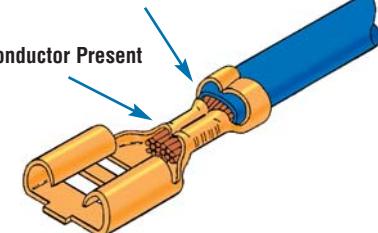
Conductor Present

Bellmouth must always be present

Bellmouth Permissible

Cut off tabs present

Locking lances and terminal body not deformed
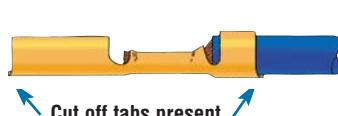
Correct selection of wire, terminal and applicator
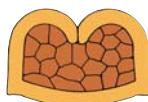
Crimp barrel is closed, legs support each other

Sufficient gap between legs and bottom of crimp

All strands are equally distributed and deformed

INSULATION CRIMP

Correct Insulation Diameter, Applicator and Terminal

**F-CRIMP**
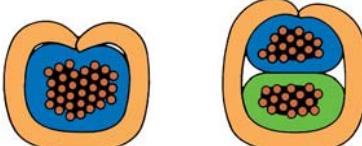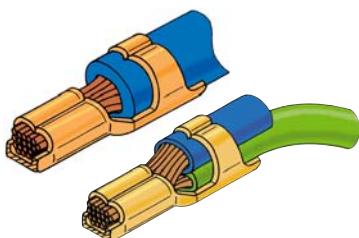
**Insulation is securely held
Crimp barrel closed**

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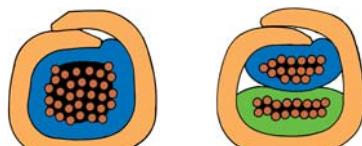
OVERLAP CRIMP

**Insulation is securely held
Legs overlap**

WRAP OVER CRIMP
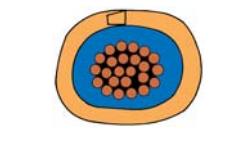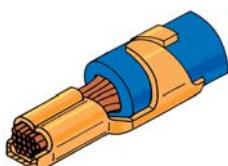
**Insulation securely held
Legs must pass each other**

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 (mm²)	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**
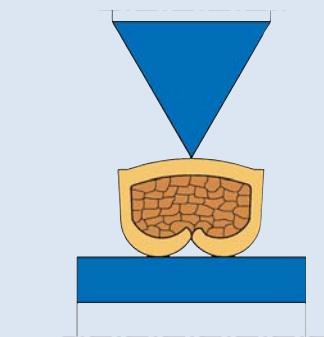
INSULATION CRIMP

Wire crimp without conductor

30°

30°
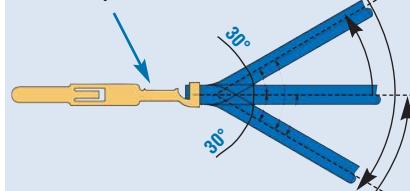
Insulation must be securely held after bend test

All specifications subject to change. Consult Tyco Electronics for latest specifications.

VII

Restriction on the Use of Hazardous Substances (RoHS)

Restriction on the Use of Hazardous Substances (RoHS)

At Tyco Electronics, 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://ecommas.tycoelectronics.com/commerce/alt/RohsAltHome.do

■ Downloadable Technical Data Customer Information Presentation

■ More detailed information regarding the definitions used above

RoHS Customer Support Center

So whatever your questions when it comes to RoHS, we've got the answers at www.tycoelectronics.com/leadfree

All specifications subject to change. Consult Tyco Electronics for latest specifications.

AWG Conversion Table (Average Value)

Conversion Tables

Most of the wire size ranges are mentioned in mm², 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 (mm²)
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:
• **F**ahrzeug **L**eitung **K**unststoff

In English:
• Vehicle Cable Plastic

FLR means:

In German:
• **F**ahrzeug **L**eitung **R**eduziert

In English:
• Thin Walled Cable (reduced insulation thickness)

Remark: Starting from 0.03 mm² (AWG 32) a wire can be crimped.

All specifications subject to change. Consult Tyco Electronics for latest specifications.

IX

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	19.7886
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	24.5812	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

All specifications subject to change. Consult Tyco Electronics for latest specifications.

XI

Powertrain Systems ✓

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Sealed Receptacle Housing Wire Reliefs	29-20	✓
Application Tooling	29-21 – 29-68	✓
Numerical Index	29-69	✓
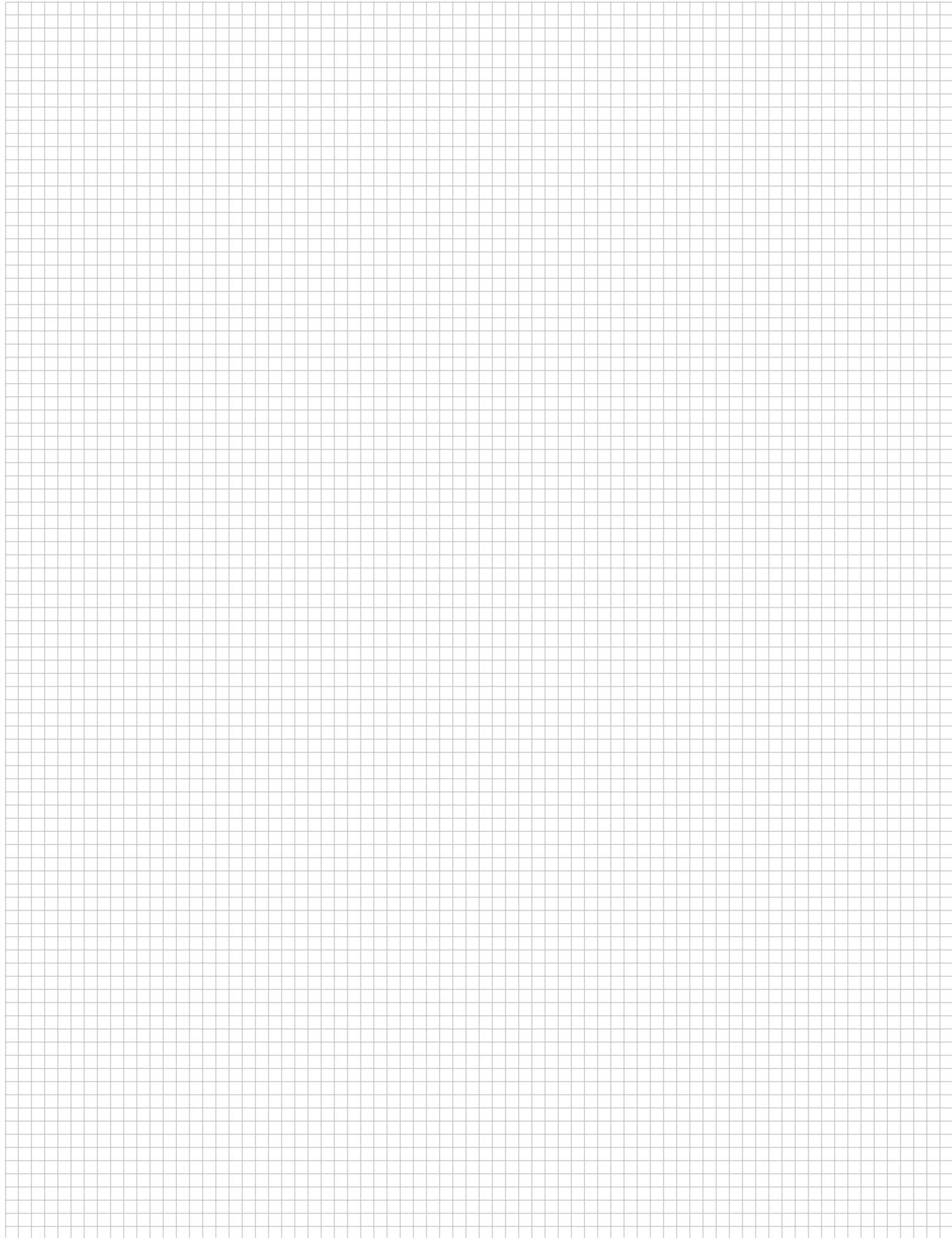
Safety & Security Systems	Convenience	Driver Information	Body & Chassis Systems
✓			✓
✓			✓
✓			✓
✓			✓
✓			✓
✓			✓
✓			✓
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Tyco
Electronics

AMPSEAL Sealed Connector Series

Catalog 1654285-3
Revised 9-2010

Engineering Notes

Introduction

Rugged Reliability, Easy Use and Superior Environmental Sealing
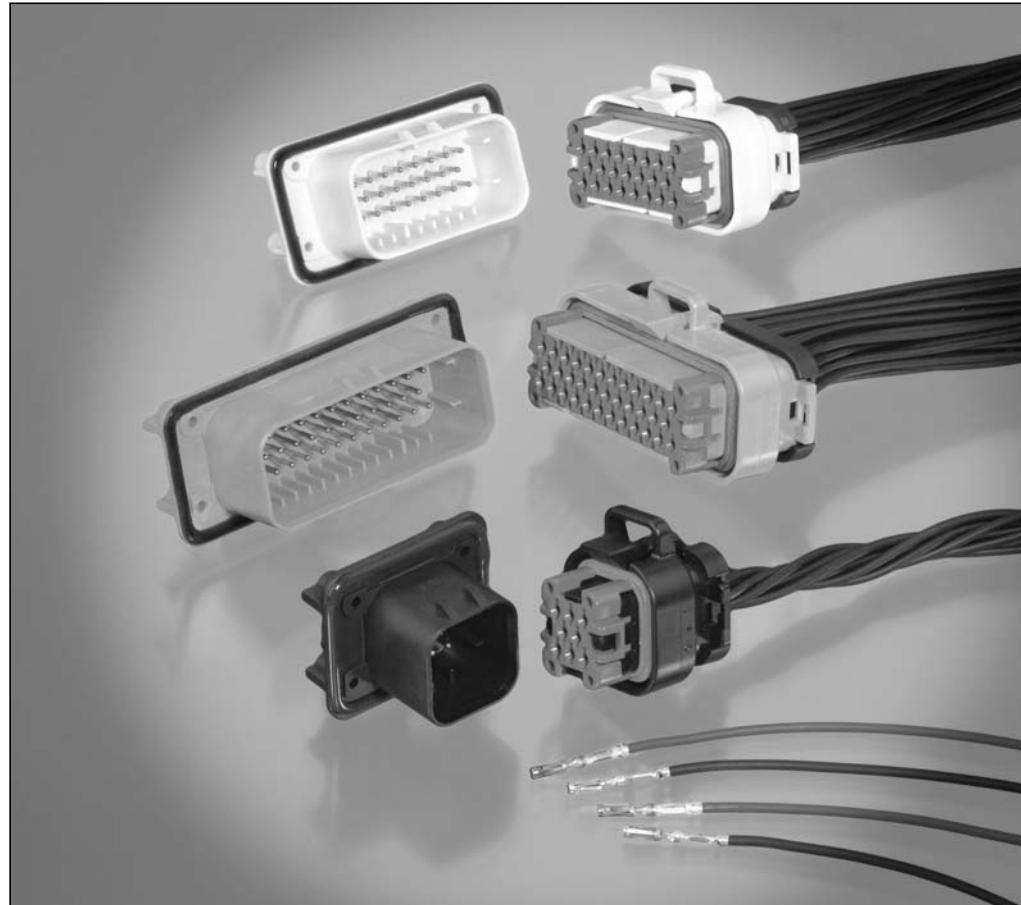
AMPSEAL automotive connectors provide rugged reliability, easy use and superior environmental sealing. They are available in cable plugs and pc board-mounting headers that are designed to stand up to high-temperature underhood applications.

The pre-assembled receptacle connector features built-in contact sealing to eliminate individual wire-sealing grommets, while an integral interfacial seal protects mated connectors.

Product Features

■ Sealing of interface, wires and panel provides for environmental integrity

■ Secondary contact locking and lanceless contacts ensure positive contact seating

■ High temperature materials available to withstand surface mount applications

■ Lanceless receptacle contacts reduce tangling during storage and handling

■ Wire with insulation diameter of 1.7–2.7 mm

■ Available in tin or gold

■ Housings available in 8-, 14-, 23-, and 35 positions

All specifications subject to change. Consult Tyco Electronics for latest specifications.

29-1

Introduction

Product Features

- 1.3 mm Pin and Socket System (Lanceless)
- Socket terminals have 3 contact beams
- Wire Size Range 0.5–1.25 mm² (20–16 AWG)
- Wire Insulation 1.7–2.7 mm

- Terminal Plating Tin or Gold
- Current Rating up to 17 A (16 AWG with Gold)
- Temperature Range
  Gold: −40 °C to +125 °C
  Tin: −40 °C to +105 °C

All specifications subject to change. Consult Tyco Electronics for latest specifications.

29-3

Receptacle Contacts

Product Features

Contact Material:
Cu-Alloy

Contact Finish:
Tin plated, gold plated

Current Rating:
Up to 17 amps

Temperature Range:
−40 ºC to +105 ºC (tin plated)
−40 ºC to +125 ºC (gold plated)

Wire Size Range:
Accept 0.5−1.25 mm^2
(20−16 AWG) wire with
insulation diameter of
1.7−2.7 mm

Product Specification:
108-1329

Application Specification:
114-16016
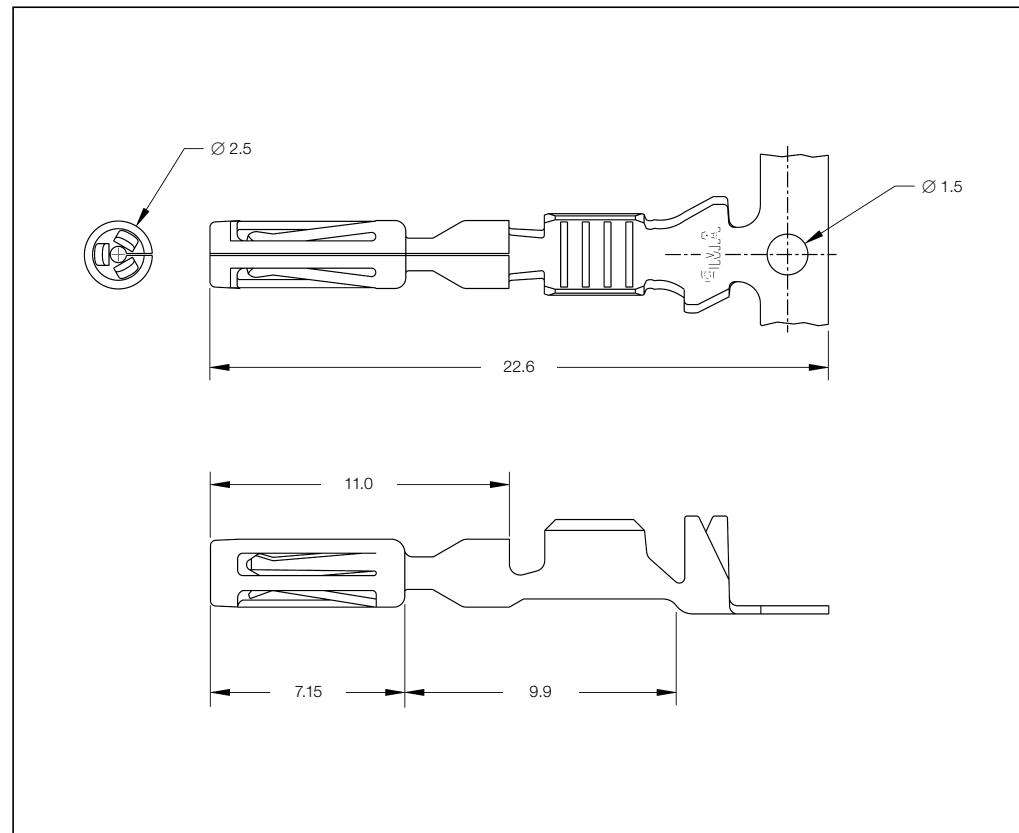
Receptacle Contacts

Wire Size Range		Insulation Diameter (mm)	Material and Finish	Part Numbers					
(mm²)	(AWG)			Strip Form	Package Quantity	Loose-Piece	Package Quantity	Applicator	Hand Tool
0.5−1.25	20−16	1.7−2.7	Cu-Alloy, pre-tin plated	770520-1	5,000	770854-1	1,000	567333-2	58440-1
			Cu-Alloy, selective gold plated	770520-3	5,000	770854-3	1,000		

Note: All Part Numbers are RoHS and ELV compliant.

All specifications subject to change. Consult Tyco Electronics for latest specifications.

Tyco
Electronics

AMPSEAL Sealed Connector Series
Contact System

Catalog 1654285-3
Revised 9-2010

AMPSEAL Seal Plug

All circuits are sealed by a diaphragm in the rubber wire seal. During plug connector assembly, the diaphragm is pierced as the contact passes through it. Unused circuit cavities, unless accidentally perforated will remain sealed.
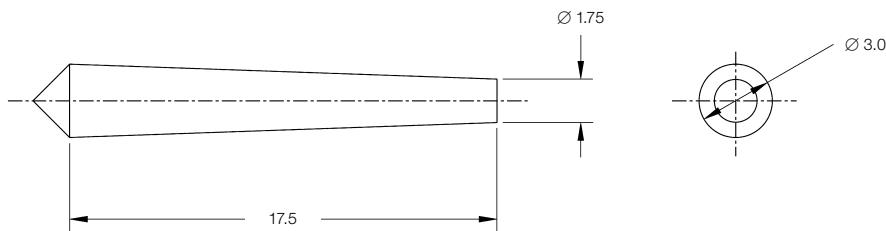
AMPSEAL Seal Plug

Material	Color	Part Number	Package Quantity
Nylon 6/6	Natural	770678-1	1,000

Note: All Part Numbers are RoHS and ELV compliant.

All specifications subject to change. Consult Tyco Electronics for latest specifications.

29-5

AMPSEAL Sealed Connector Series

Catalog 1654285-3
Revised 9-2010

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Electronics

Engineering Notes
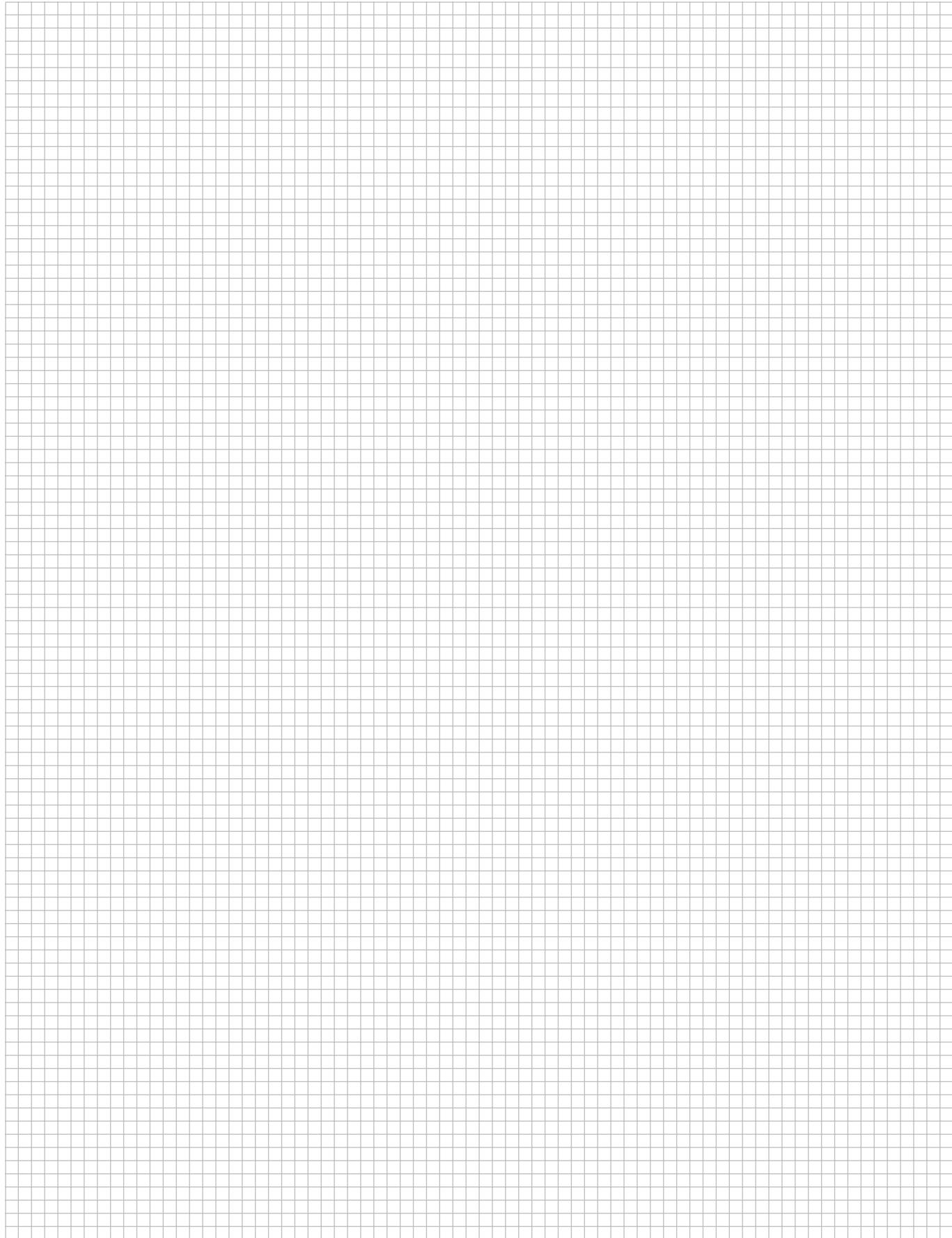
Introduction
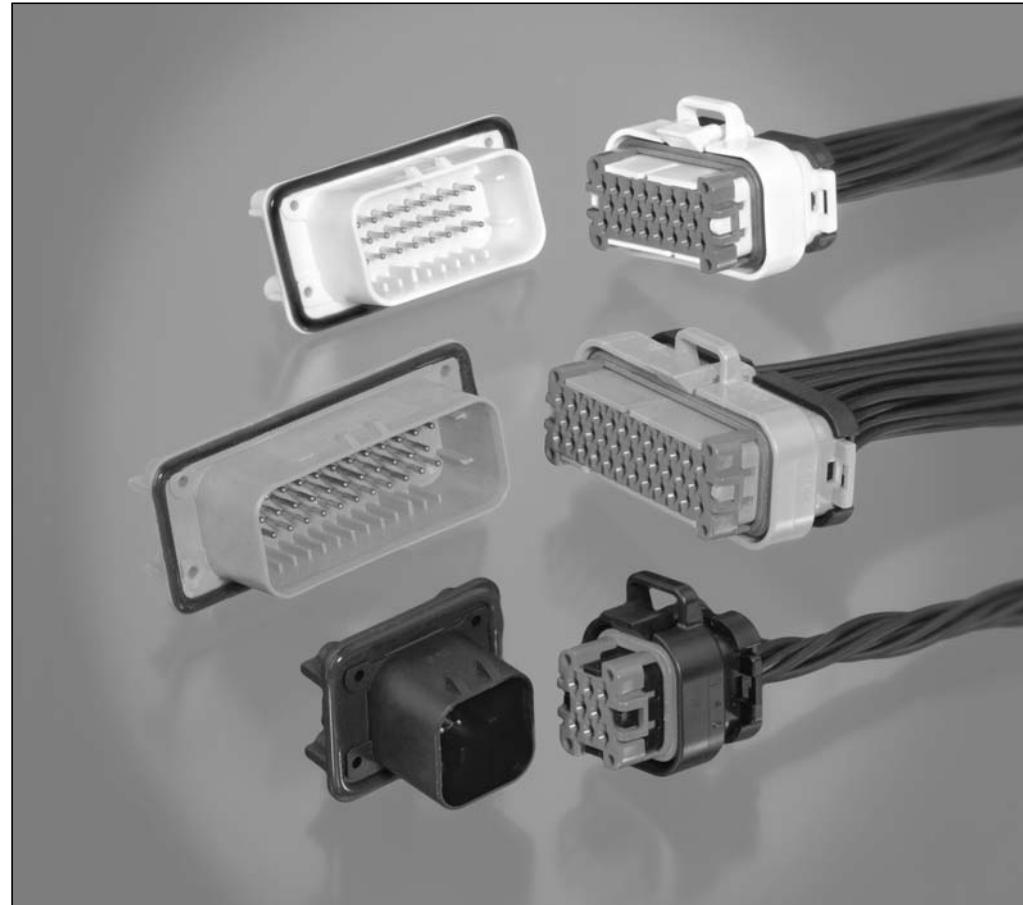
The housings use a two-piece contact-holding design that provides secondary locking which protects against contact backout.

After contacts are inserted into the housing, the locking wedge is seated to firmly position all contacts.

The connectors use three-row contact grid on 4.0 centerlines. Mat seals contain a sealing diaphram within each circuit cavity which is broken when terminals are inserted. If terminal is removed a sealing plug should be installed to reseal the circuit.

The pc board-mounting connector is designed to be flange mounted.

Available with or without a formed in place flange seal.

Product Features

- Mechanical and colored keying

- UL 94 V-0 rated materials

- Integrated terminal position assurance

- Fully sealed and submersible IP67 rating

- Available in vertical or right-angle

- Contains integrated PCB retention feature

- IEC IP67 rated

All specifications subject to change. Consult Tyco Electronics for latest specifications.

29-7

Sealed Receptacle Housings

Product Features

No. of Positions:
8 Positions

**Housing Material:**
Glass reinforced PBT

Wire Size Range:
0.5–1.25 mm² (20–16 AWG)

Product Specification:
108-1329

Application Specification:
114-16016

Locking Wedge

Wire Seal

13.1

8.0

9.8

34.6

33.6 / 32.1

Cover

Mating Seal — Housing

27.4

8 Position Receptacle Housings

No. of Positions	Keying Options	Housing Color	Contact Finish	Part Numbers				
				Receptacle Housing	Mating PCB Header			
					Right-Angle		Vertical	
					Without Seal	With Seal	Without Seal	With Seal
8	–	Black	Tin plated	776286-1	776279-1	776280-1	776275-1	776276-1
			Gold plated		1-776279-1	1-776280-1	1-776275-1	1-776276-1
		Natural	Tin plated	776286-2	776279-2	776280-2	776275-2	776276-2
			Gold plated		1-776279-2	1-776280-2	1-776275-2	1-776276-2

Note: All Part Numbers are RoHS and ELV compliant.

All specifications subject to change. Consult Tyco Electronics for latest specifications.

Sealed Receptacle Housings

Product Features

No. of Positions:
14 Positions

Housing Material:
Glass reinforced PBT

Wire Size Range:
0.5–1.25 mm² (20–16 AWG)

Product Specification:
108-1329

Application Specification:
114-16016

Locking Wedge — Wire Seal

7.0

12.5

8.0

27.6

9.8

Cover

33.6 / 32.1

Mating Seal — Housing

35.4

14 Position Receptacle Housings

No. of Positions	Keying Options	Housing Color	Contact Finish	Part Numbers				
					Mating PCB Header			
				Receptacle Housing	Right-Angle		Vertical	
					Without Seal	With Seal	Without Seal	With Seal
14	–	Black	Tin plated	776273-1	776266-1	776267-1	776261-1	776262-1
			Gold plated		1-776266-1	1-776267-1	1-776261-1	1-776262-1
		Natural	Tin plated	776273-2	776266-2	776267-2	776261-2	776262-2
			Gold plated		1-776266-2	1-776267-2	1-776261-2	1-776262-2
		Gray	Tin plated	776273-4	776266-4	776267-4	776261-4	776262-4
			Gold plated		1-776266-4	1-776267-4	1-776261-4	1-776262-4
		Blue	Tin plated	776273-5	776266-5	776267-5	776261-5	776262-5
			Gold plated		1-776266-5	1-776267-5	1-776261-5	1-776262-5

Note: All Part Numbers are RoHS and ELV compliant.

All specifications subject to change. Consult Tyco Electronics for latest specifications.

29-9

Sealed Receptacle Housings

Product Features

No. of Positions:
23 Positions

Housing Material:
Glass reinforced PBT

Wire Size Range:
0.5–1.25 mm^2 (20–16 AWG)

Product Specification:
108-1329

Application Specification:
114-16016

23 Position Receptacle Housings

No. of Positions	Keying Options	Housing Color	Contact Finish	Part Numbers				
					Mating PCB Header			
				Receptacle Housing	Right-Angle		Vertical	
					Without Seal	With Seal	Without Seal	With Seal
23	–	Black	Tin plated	770680-1	770669-1	776087-1	776200-1	776228-1
			Gold plated		1-770699-1	1-776087-1	1-776200-1	1-776228-1
		Natural	Tin plated	770680-2	770669-2	776087-2	776200-2	776228-2
			Gold plated		1-770669-2	1-776087-2	1-776200-2	1-776228-2
		Gray	Tin plated	770680-4	770669-4	776087-4	776200-4	776228-4
			Gold plated		1-770669-4	1-776087-4	1-776200-4	1-776228-4
		Blue	Tin plated	770680-5	770669-5	776087-5	776200-5	776228-5
			Gold plated		1-770669-5	1-776087-5	1-776200-5	1-776228-5

Note: All Part Numbers are RoHS and ELV compliant.

29-10

All specifications subject to change. Consult Tyco Electronics for latest specifications.

Sealed Receptacle Housings

Product Features

No. of Positions:
35 Positions

Housing Material:
Glass reinforced PBT

Wire Size Range:
0.5–1.25 mm^2 (20–16 AWG)

Product Specification:
108-1329

Application Specification:
114-16016
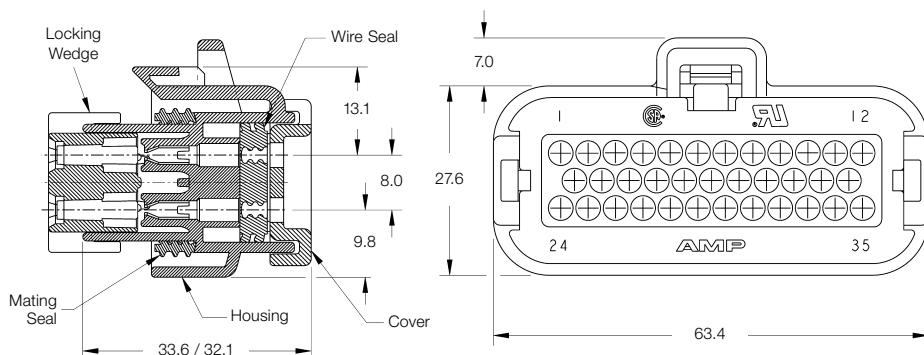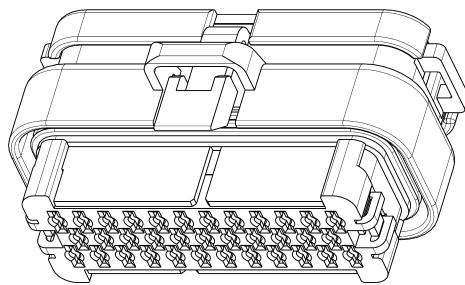
35 Position Receptacle Housings

No. of Positions	Keying Options	Housing Color	Contact Finish	Receptacle Housing	Mating PCB Header			
					Right-Angle		Vertical	
					Without Seal	With Seal	Without Seal	With Seal
35	–	Black	Tin plated	776164-1	–	–	776230-1	776231-1
			Gold plated		1-776180-1	1-776163-1	1-776230-1	1-776231-1
		Natural	Tin plated	776164-2	–	–	776230-2	776231-2
			Gold plated		1-776180-2	1-776163-2	1-776230-2	1-776231-2
		Gray	Tin plated	776164-4	–	–	776230-4	776231-4
			Gold plated		1-776180-4	1-776163-4	1-776230-4	1-776231-4
		Blue	Tin plated	776164-5	–	–	776230-5	776231-5
			Gold plated		1-776180-5	1-776163-5	1-776230-5	1-776231-5
		Orange	Gold plated	776164-6	1-776180-6	1-776163-6	–	–

Note: All Part Numbers are RoHS and ELV compliant.

All specifications subject to change. Consult Tyco Electronics for latest specifications.

29-11

Printed Circuit Board Headers for Sealed Receptacle Housings

Product Features

No. of Positions:
8 Position Header Assembly

Housing Material:
Glass reinforced PBT

Material and Finish:
Contacts are made from either
Tin or Gold Plated Brass

Product Specification:
108-1329

Application Specification:
114-16016

40.8

23.4

A

32.1   23.6

1 0   0 3
4 0   0 5
6 0   0 8

A

without Flange Seal

40.8

23.4

32.1   23.6

1 0   0 3
4 0   0 5
6 0   0 8

with Flange Seal

19.3

18.6

Section **A–A**

Seal: Silicone Rubber

8 Position Right-Angle PCB Headers

No. of Positions	Keying Options	Housing Color	Contact Finish	Part Numbers		Mating Receptacle Housing
				PCB Header		
				Right-Angle without Flange Seal	Right-Angle with Flange Seal	
8	–	Black	Tin plated	776279-1	776280-1	776286-1
			Gold plated	1-776279-1	1-776280-1	
		Natural	Tin plated	776279-2	776280-2	776286-2
			Gold plated	1-776279-2	1-776280-2	

Note: All Part Numbers are RoHS and ELV compliant.

All specifications subject to change. Consult Tyco Electronics for latest specifications.

Printed Circuit Board Headers for Sealed Receptacle Housings

Product Features

No. of Positions:
8 Position Header Assembly

Housing Material:
Glass reinforced PBT

Material and Finish:
Contacts are made from either
Tin or Gold Plated Brass

Product Specification:
108-1329

Application Specification:
114-16016

without Flange Seal

with Flange Seal

Section View

Seal: Silicone Rubber

8 Position Vertical PCB Headers

No. of Positions	Keying Options	Housing Color	Contact Finish	Part Numbers		Mating Receptacle Housing
				PCB Header		
				Vertical without Flange Seal	**Vertical with Flange Seal**	
8	–	Black	Tin plated	776275-1	776276-1	776286-1
			Gold plated	1-776275-1	1-776276-1	
		Natural	Tin plated	776275-2	776276-2	776286-2
			Gold plated	1-776275-2	1-776276-2	

Note: All Part Numbers are RoHS and ELV compliant.

All specifications subject to change. Consult Tyco Electronics for latest specifications.

29-13

≡ Tyco
Electronics

AMPSEAL Sealed Connector Series
Housings and Connectors

Catalog 1654285-3
Revised 9-2010

Printed Circuit Board Headers for Sealed Receptacle Housings

Product Features

No. of Positions:
14 Position Header Assembly

Housing Material:
Glass reinforced PBT

Material and Finish:
Contacts are made from either
Tin or Gold Plated Brass

Product Specification:
108-1329

Application Specification:
114-16016

48.8
31.4
32.1   23.6

without Flange Seal

48.8
31.4
32.1   23.6

19.3
18.6

Section View

with Flange Seal

Seal: Silicone Rubber

14 Position Right-Angle PCB Headers

No. of Positions	Keying Options	Housing Color	Contact Finish	Part Numbers		Mating Receptacle Housing
				PCB Header		
				Right-Angle without Flange Seal	Right-Angle with Flange Seal	
14	–	Black	Tin plated	776266-1	776267-1	776273-1
			Gold plated	1-776266-1	1-776267-1	
		Natural	Tin plated	776266-2	776267-2	776273-2
			Gold plated	1-776266-2	1-776267-2	
		Gray	Tin plated	776266-4	776267-4	776273-4
			Gold plated	1-776266-4	1-776267-4	
		Blue	Tin plated	776266-5	776267-5	776273-5
			Gold plated	1-776266-5	1-776267-5	

Note: All Part Numbers are RoHS and ELV compliant.

All specifications subject to change. Consult Tyco Electronics for latest specifications.

Printed Circuit Board Headers for Sealed Receptacle Housings

Product Features

No. of Positions:
14 Position Header Assembly

Housing Material:
Glass reinforced PBT

Material and Finish:
Contacts are made from either
Tin or Gold Plated Brass

Product Specification:
108-1329

Application Specification:
114-16016

without Flange Seal

with Flange Seal

Section View

Seal: Silicone Rubber

14 Position Vertical PCB Headers

No. of Positions	Keying Options	Housing Color	Contact Finish	Part Numbers		Mating Receptacle Housing
				PCB Header		
				Vertical without Flange Seal	Vertical with Flange Seal	
14	–	Black	Tin plated	776261-1	776262-1	776273-1
			Gold plated	1-776261-1	1-776262-1	
		Natural	Tin plated	776261-2	776262-2	776273-2
			Gold plated	1-776261-2	1-776262-2	
		Gray	Tin plated	776261-4	776262-4	776273-4
			Gold plated	1-776261-4	1-776262-4	
		Blue	Tin plated	776261-5	776262-5	776273-5
			Gold plated	1-776261-5	1-776262-5	

Note: All Part Numbers are RoHS and ELV compliant.

All specifications subject to change. Consult Tyco Electronics for latest specifications.

29-15

Printed Circuit Board Headers for Sealed Receptacle Housings

Product Features

No. of Positions:
23 Position Header Assembly

Housing Material:
Glass reinforced PBT

Material and Finish:
Contacts are made from either
Tin or Gold Plated Brass

Product Specification:
108-1329

Application Specification:
114-16016

without Flange Seal

with Flange Seal

Section **A–A**

Seal: Silicone Rubber

23 Position Right-Angle PCB Headers

No. of Positions	Keying Options	Housing Color	Contact Finish	Part Numbers		Mating Receptacle Housing
				PCB Header		
				Right-Angle without Flange Seal	Right-Angle with Flange Seal	
23	–	Black	Tin plated	770669-1	776087-1	770680-1
			Gold plated	1-770669-1	1-776087-1	
		Natural	Tin plated	770669-2	776087-2	770680-2
			Gold plated	1-770669-2	1-776087-2	
		Gray	Tin plated	770669-4	776087-4	770680-4
			Gold plated	1-770669-4	1-776087-4	
		Blue	Tin plated	770669-5	776087-5	770680-5
			Gold plated	1-770669-5	1-776087-5	

Note: All Part Numbers are RoHS and ELV compliant.

All specifications subject to change. Consult Tyco Electronics for latest specifications.

≡ Tyco
Electronics

AMPSEAL Sealed Connector Series
Housings and Connectors

Catalog 1654285-3
Revised 9-2010

Printed Circuit Board Headers for Sealed Receptacle Housings

Product Features

No. of Positions:
23 Position Header Assembly

Housing Material:
Glass reinforced PBT

Material and Finish:
Contacts are made from either
Tin or Gold Plated Brass

Product Specification:
108-1329

Application Specification:
114-16016

without Flange Seal

with Flange Seal

Section View

Seal: Silicone Rubber

23 Position Vertical PCB Headers

No. of Positions	Keying Options	Housing Color	Contact Finish	Part Numbers		Mating Receptacle Housing
				PCB Header		
				Vertical without Flange Seal	Vertical with Flange Seal	
23	–	Black	Tin plated	776200-1	776228-1	770680-1
			Gold plated	1-776200-1	1-776228-1	
		Natural	Tin plated	776200-2	776228-2	770680-2
			Gold plated	1-776200-2	1-776228-2	
		Gray	Tin plated	776200-4	776228-4	770680-4
			Gold plated	1-776200-4	1-776228-4	
		Blue	Tin plated	776200-5	776228-5	770680-5
			Gold plated	1-776200-5	1-776228-5	

Note: All Part Numbers are RoHS and ELV compliant.

All specifications subject to change. Consult Tyco Electronics for latest specifications.

29-17

Printed Circuit Board Headers for Sealed Receptacle Housings

Product Features

No. of Positions:
35 Position Header Assembly

Housing Material:
Glass reinforced PBT

Material and Finish:
Contacts are made from either Tin or Gold Plated Brass

Product Specification:
108-1329

Application Specification:
114-16016

76.9
59.4
A
32.1 23.6
I 12
13 23
24 35
A

without Flange Seal

76.9
59.4
32.1 23.6
I 12
13 23
24 35

with Flange Seal

19.3 18.6
Section **A–A**

Seal: Silicone Rubber

35 Position Right-Angle PCB Headers

No. of Positions	Keying Options	Housing Color	Contact Finish	Part Numbers		Mating Receptacle Housing
				PCB Header		
				Right-Angle without Flange Seal	Right-Angle with Flange Seal	
		Black	Gold plated	1-776180-1	1-776163-1	776164-1
		Natural	Gold plated	1-776180-2	1-776163-2	776164-2
35	–	Gray	Gold plated	1-776180-4	1-776163-4	776164-4
		Blue	Gold plated	1-776180-5	1-776163-5	776164-5
		Orange	Gold plated	1-776180-6	1-776163-6	776164-6

Note: All Part Numbers are RoHS and ELV compliant.

All specifications subject to change. Consult Tyco Electronics for latest specifications.

Printed Circuit Board Headers for Sealed Receptacle Housings

Product Features

No. of Positions:
35 Position Header Assembly

Housing Material:
Glass reinforced PBT

Material and Finish:
Contacts are made from either Tin or Gold Plated Brass

Product Specification:
108-1329

Application Specification:
114-16016

76.9
59.4
32.1 23.6

without Flange Seal

76.9
59.4
32.1 23.6

with Flange Seal

19.3
15.0

Section View

Seal: Silicone Rubber

35 Position Vertical PCB Headers

No. of Positions	Keying Options	Housing Color	Contact Finish	Part Numbers		Mating Receptacle Housing
				PCB Header		
				Vertical without Flange Seal	Vertical with Flange Seal	
35	–	Black	Tin plated	776230-1	776231-1	776164-1
			Gold plated	1-776230-1	1-776231-1	
		Natural	Tin plated	776230-2	776231-2	776164-2
			Gold plated	1-776230-2	1-776231-2	
		Gray	Tin plated	776230-4	776231-4	776164-4
			Gold plated	1-776230-4	1-776231-4	
		Blue	Tin plated	776230-5	776231-5	776164-5
			Gold plated	1-776230-5	1-776231-5	

Note: All Part Numbers are RoHS and ELV compliant.

All specifications subject to change. Consult Tyco Electronics for latest specifications.

29-19

Sealed Receptacle Housing Wire Reliefs

Product Features

Wire Relief Material:
Glass reinforced PBT

Product Specification:
108-1329

Application Specification:
114-16016

25.2

47.1

38.0

23 Positions

33.2

47.1

38.0
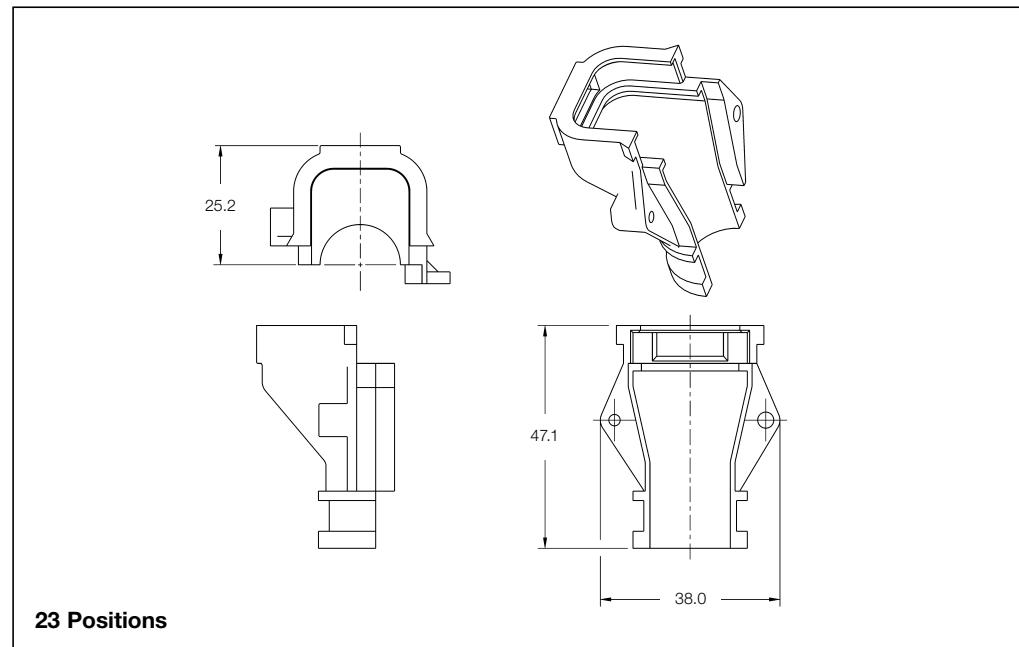
35 Positions

Remarks:

1. Wire relief part numbers represents one-half of a wire relief. Two wire reliefs required per receptacle housing.

2. Accepts #4 self trapping screw (Elco Hi-Lo Thread Cutting Style or Equivalent).
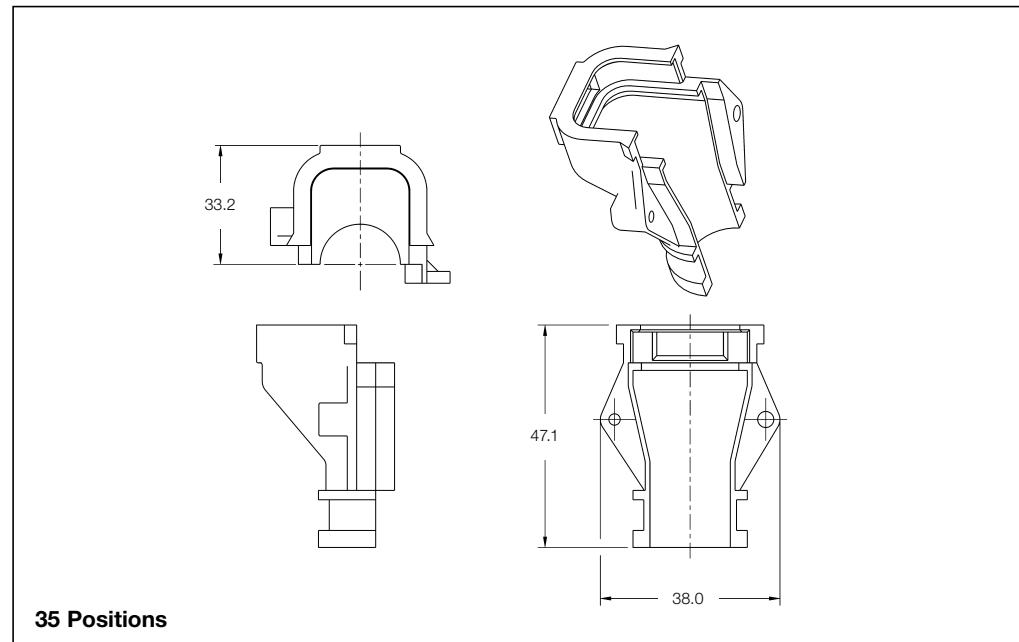
No. of Positions	Part Number	Package Quantity
23	776464-1	500
35	776463-1	500

Note: All Part Numbers are RoHS and ELV compliant.

All specifications subject to change. Consult Tyco Electronics for latest specifications.

Introduction

Tyco Electronics Tooling
for the Automotive Industry

Tyco Electronics' Global Application Tooling Division (GATD) is dedicated to providing high quality equipment options to meet all levels of your connector product specifications. We are also able to provide a broad range of equipment for other manufacturer's products.

Our equipment range is vast and unmatched by others operating in the same industry segments, as is our global presence and support network in the form of field service engineers and product managers. You will see from browsing this catalog; we supply everything from simple hand tools to the most complex automated systems – you name it, we supply it!
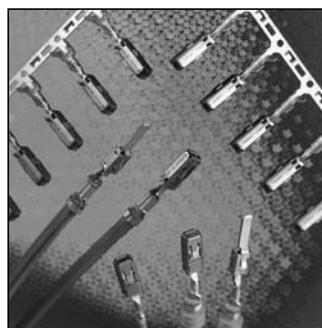
Equipment is segregated into two categories:

Generic Equipment

Where we can supply you with sufficient information referenced by Part Number such that you can identify and order what you need yourself.

Specialized Equipment

Where you will need help from our specialist product managers to identify what's just right for your application.

Finding Equipment Online

Powerful search functions are available to identify appropriate tooling:

● Applicators — www.tooling.tycoelectronics.com/europe/applicator.asp
● Hand Tools — www.tooling.tycoelectronics.com/europe/handtools.asp

All specifications subject to change. Consult Tyco Electronics for latest specifications.

29-21

Insertion Machines for Single Contacts

Pin Insertion Machine

Tyco Electronics Insertion Machine platforms combined with performance enhancing accessories provide the flexibility to meet a wide range of customer requirements in the manufacturing of printed circuit boards.
Our goal is to provide the optimal solution for the production needs of our customers.

Our representatives can help you select the optimal machine configuration.
The benefit to you is a low cost investment that more than your requirements of output and quality.
Tyco Electronics Field Service is available to service and support the machines to help maximize uptime.

Our full line of Insertion Machines have been designed to deliver highest quality and maximum performance within their range of applications.

AccuSerter 2 Pin Insertion Machine

AccuSerter 2 is a semi-automatic machine and the newest addition to the line of Tyco Electronics pin insertion systems. Designed and manufactured with a focus on mid-volume level production, the AccuSerter 2 machine provides a broad range of features at a very competitive price. With the ability to apply both Tyco Electronics' and other manufacturer's products, the AccuSerter 2 machine does not limit your production to "Tyco Electronics only" applications and provides flexibility to address both current and future tooling needs.
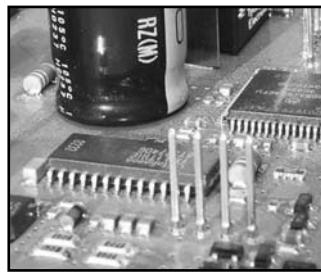
The AccuSerter 2 machine uses a pneumatic power unit together with product specific "quick change" tooling packs.

The insertion heads can be supplied with a rotary insertion finger that can apply products at different angles without decreasing the insertion rate. The tooling packs can be exchanged within 30 minutes

to meet your full range of application requirements. The operator interface is an easy to use touch-screen which allows simple programming and automatic setup.

For more detailed information please visit our websites:
www.tooling.tycoelectronics.com • www.tooling.tycoelectronics.com/europe • www.tooling.tycoelectronics.com/china

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Insertion Machines for Single Contacts

P 200 Semi-Automatic Bench Machine for PCB Processing
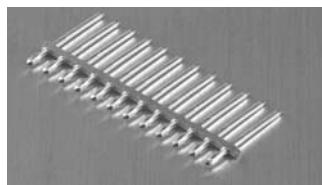
The P 200 semi-automatic bench machine positions manual loaded PCBs under an installed tool. The tool may be a solder head, a camera for automatic inspection, or an insertion head for the application of Tyco Electronics products. Insertion tools for Tyco Electronics products are composed of an insertion head (upper tooling), an anvil (lower tooling) and a product feeding mechanism.
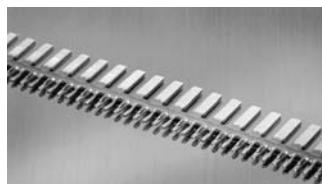
These tools are product specific and the PCB holder interface is designed according to the customer application.
A rotary insertion finger allows the insertion of pins at different angles. Because of simple mechanical and electrical interface, other tools can easily be integrated into the machine. The excellent performance of a multi-tasking control system allows easy programming and operation of the machine.

P 300 Fully-Automatic Machine for PCB Processing
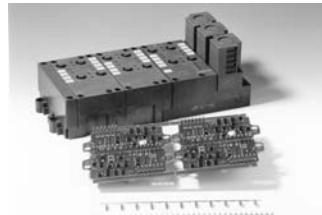
For the automatic assembly of printed circuit boards, the basic P 300 fully-automatic machine is equipped with a product specific insertion head. A speciality is the rotary insertion finger which allows the products to be inserted in different angles of rotation. A stepper-motor driven XY table positions the printed circuit boards under the insertion head. The control and monitoring of the insertion process is carried out by a multi-tasking control unit. There are three possibilities for programming the machines: off-line on a connected PC, by entering coordinates on the control panel of the machine or by converting CAD data. A series of options also allows the P 300 fully-automatic machine to be adapted to the most varied manufacturing tasks.
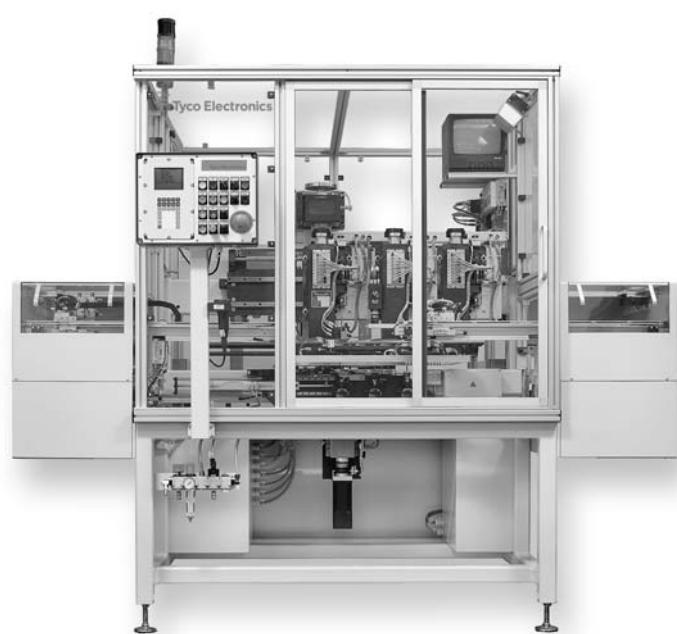
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All specifications subject to change. Consult Tyco Electronics for latest specifications.

29-23

Insertion Machines for Single Contacts

P 350 Fully-Automatic Insertion Machine for High Volumes
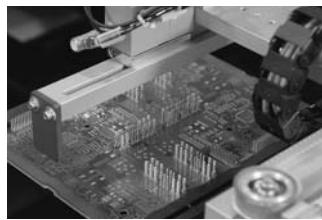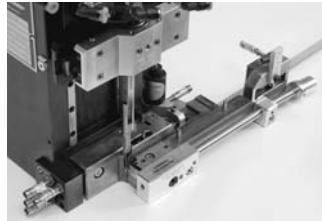
The P 350 is a fully-automatic insertion machine with the ability to handle a large variety of Tyco Electronics terminals as well as customer specific terminals. A standard P 350 machine comes with 3 base insertion tools mounted onto an automatic tool changer. The tool changer can take up to 4 insertion tools/support tools. These base tools can easily be equipped with existing or customer specific conversion kits for a large range of terminals.

All heads are equipped with rotary insertion fingers to allow the insertion of terminals at different angles without the need to rotate the board. The PCB transfer belts enable the machine to be incorporated into an automatic production line.

A standard Insertion Force Monitoring system allows for real-time force monitoring for 100% quality assurance for each press-fit terminal. Its operator interface has been

designed for easy use and provides the insertion force and a variety of production data to be collected at an open interface. With a maximum insertion rate of 4.5 cycles per second we provide a production capacity which is difficult to match in the market place. The programmable insertion of two 0.63 mm pins per cycle doubles the output.

Single Pin Repair Station

A loose-piece pin or tab is placed in the product specific insertion finger of the arbor press, the PCB is placed on the support anvil and the pin or tab is manually pressed into the board.

Also available is the P 50 Manual Handpress and Insertion System. More details available upon request.

For more detailed information please visit our websites:
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IWS 188
IDC Workstation

The IDC workstation produces electrical connections for harness assemblies specifically intended for the use within dashboard applications in the automotive industry. The proven insulation displacement technology ensures a high level of reliability.

The software allows the production of different harness configurations featuring up to 11 connectors. The work-station is compatible with IDC connectors with a 2.54 mm and a 3.5 mm pitch. It is intended for medium to large volume production.

MT-E2 F Semi-Automatic Machine
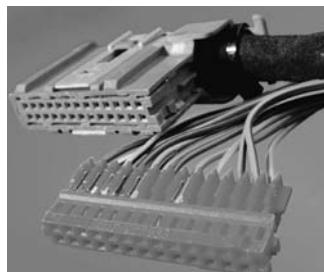
The development of this termination machine was necessary to be able to process high cavity-count female connectors in IDC technology. The new multi-cavity motor-control interface connectors are used in damp areas in cars and must be completely water-proof, hence the use of a family seal over the insulation displacement contacts.

The pitch of the cavities in the family seal corresponds to that of the connectors with their insulation displacement contacts.

The cavities in the family seal are closed by a membrane. An integrated program controlled unit pierces the membrane, prior to the IDC termination.
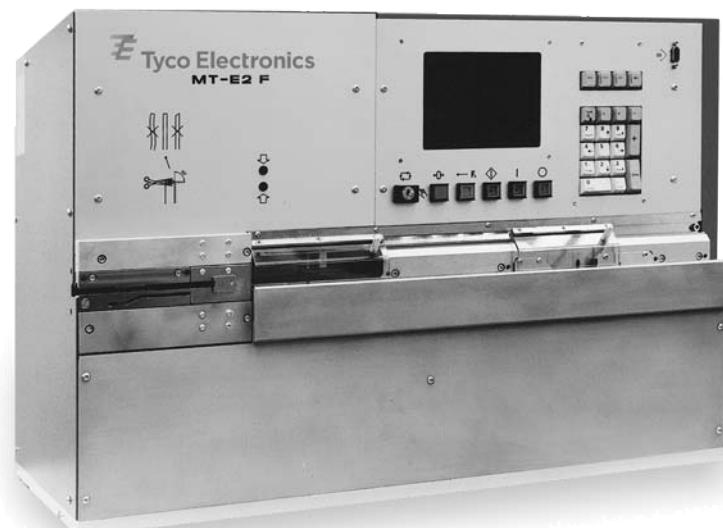
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All specifications subject to change. Consult Tyco Electronics for latest specifications.

29-25

Lead Makers

System III Applicator
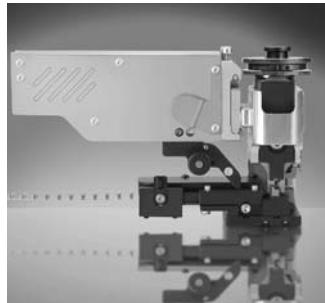
The System III Applicator revolutionizes the traditional applicator market by separating the feed and the termination.
When the feeder is attached to the applicator, the system reads the specific terminal information from the onboard iButton™ data module permitting the automation of many manual adjustments such as crimp height, feed pitch, etc.

Precision Controller

The new Precision Controller provides an upgrade path for already installed equipment. By installing the Precision Controller onto a bench terminator or a Komax Gamma 333 PC lead maker, the System III-FA Applicator can be used. An integrated LCD screen allows the user to view the information contained on the iButton™ data module and the controller also allows the operator to accurately position the terminal feed and make fine adjustments.

iButton is a trademark of Maxim Integrated Products, Inc.

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All specifications subject to change. Consult Tyco Electronics for latest specifications.

Lead Makers

**Gamma 255
Lead Maker
Processing of
Small Wire Sizes**

The Gamma 255 Lead Maker is a flexible fully-automatic crimping machine for efficient wire processing. It processes cross sections in a range from 0.013 mm² to 2.5 mm² in excellent quality. The entire cross section is processed using programmable, highly dynamic servo-drives and V stripping blades. As part of its standard equipment, the machine has a pre-feeder, splice, wire-end and knot detection, as well as two wire straightening units.

**Gamma 333 PC
Lead Maker Flexible
Wire Processing**

Ultra short conversion times, additional applications and a user-friendly interface with multiple-language capability. The Gamma 333 PC machine makes it all possible! With its additional processing station on side 1, the Gamma 333 PC machine now enables you to crimp both ends of the wire, to create double crimp connections with three different contacts, to carry out one-ended seal application, tinning or ink-jet marking. In addition, process monitoring is integrated to ensure that the wire is cut to length and stripped perfectly to specifi-ca-tion and that quality control is optimized.
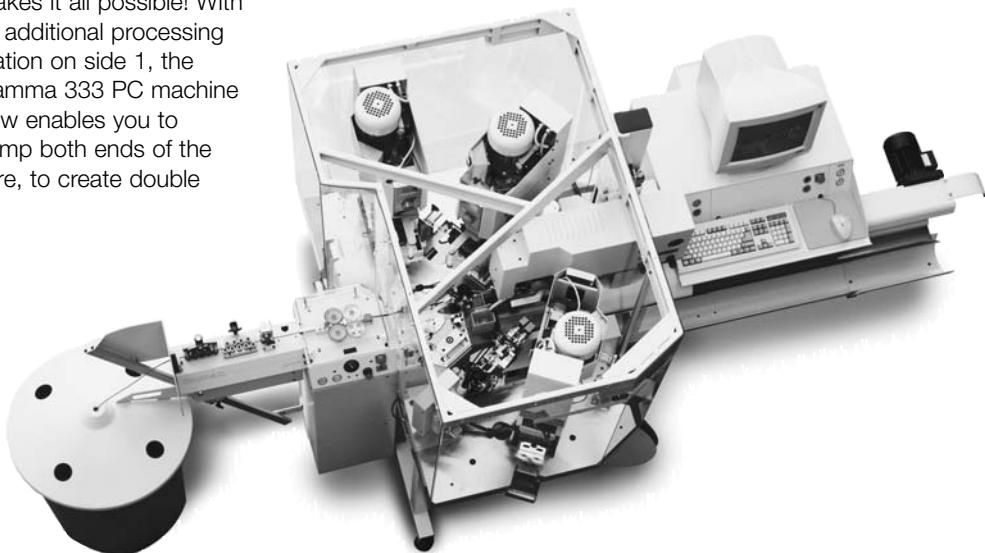
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All specifications subject to change. Consult Tyco Electronics for latest specifications.

29-27

Lead Makers

**Alpha 355 / 355 S
Lead Makers**

The Alpha 355 and 355 S are four Station Lead Makers. The dual channel cutting head allows for a large range of wire sizes without blade changes. The drive unit for the cutting head is positioned beneath the wire line to give the machine an uncluttered and ergonomic design.

All processing stations are readily accessible through the vertically opening safety covers. Applicators, terminal reels and other parts for specific applications can be changed without tools. Controls are positioned locally,

allowing the corresponding machine functions to be triggered during set-up. All setting and adjustment procedures can be controlled from the TopWin™ user software in over 20 different languages.

**Alpha 356
Multi-Functional
Fully-Automatic
Crimping Machine**

The Alpha 356 fully-automatic crimping machine has room for up to seven processing stations. A wide variety of configurations are possible, in fact, almost any combination of crimping, seal loading, fluxing / tinning, twisting, fitting with insulating sleeves and end sleeves for strands as well as bulk turned contacts and customer-specific processes.
The Alpha 356 is designed for using the broadest selection of different processing modules, including special customer-specific modules.

TopWin is a trademark of Komax AG

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Lead Makers

Alpha 358 Fully-Automatic Crimping Machine

The Alpha 358 fully-automatic crimping machine is designed for two-sided crimping and seal loading and sets new standards in the processing of long cables. Cables up to 35 meters (27.34 yards) in length can now be processed at high speed on a machine just four meters (4.37 yards) long. Coiling and binding cables directly in the fully-automatic crimping machine frees up substantial space and offers considerable quality advantages.
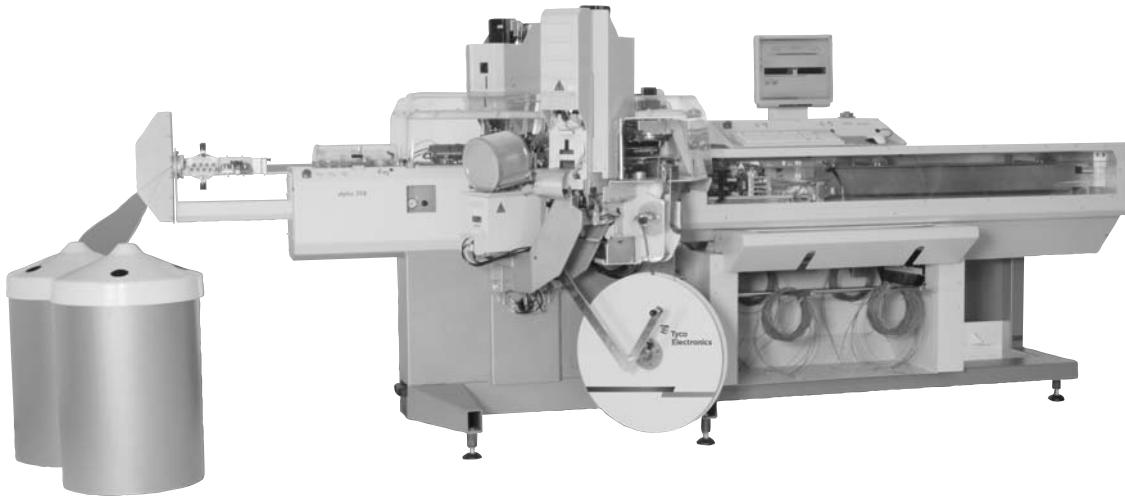
Alpha 455 Fully-Automatic Crimping Machine

The Alpha 455 crimping machine is designed especially for just-in-time production. Downtimes become crucial for companies that produce relatively small production batches requiring frequent conversions of the machine. With the Alpha 455 machine, engineers set out to minimize the time lost on set-up and conversion while guaranteeing high quality standards.

The mci 722R is the product that guarantees the efficient set-up of the fully-automatic Alpha 455 crimping machine. This innovative new rotary press table was specially developed for the Alpha 455 machine and allows the latter to be converted while production is still going on. The tools and terminals for the next two jobs are set-up while the current batch is still being produced.

Optional Measuring Devices

■ Integrated crimp height measurement
■ Integrated measurement of pull-out force
■ Integrated referencing of wire lengths

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All specifications subject to change. Consult Tyco Electronics for latest specifications.

29-29

Lead Makers

Alpha 477 Lead Maker Double Crimp Connections with two different wires

The Alpha 477 machine allows the processing of a wide variety of wire combinations from a double crimp up to three different contacts, two different seals and two different wire sections.

The arrangement of six processing stations plus a double gripper unit make for highly diverse processing possibilities. As a result, the Alpha 477 machine can grow and expand to meet your future needs. Individual wires with cross section of 0.22 mm^2 to 4 mm^2 can be processed. The maximum total cross sections of a double crimp can be as large as 6 mm^2.
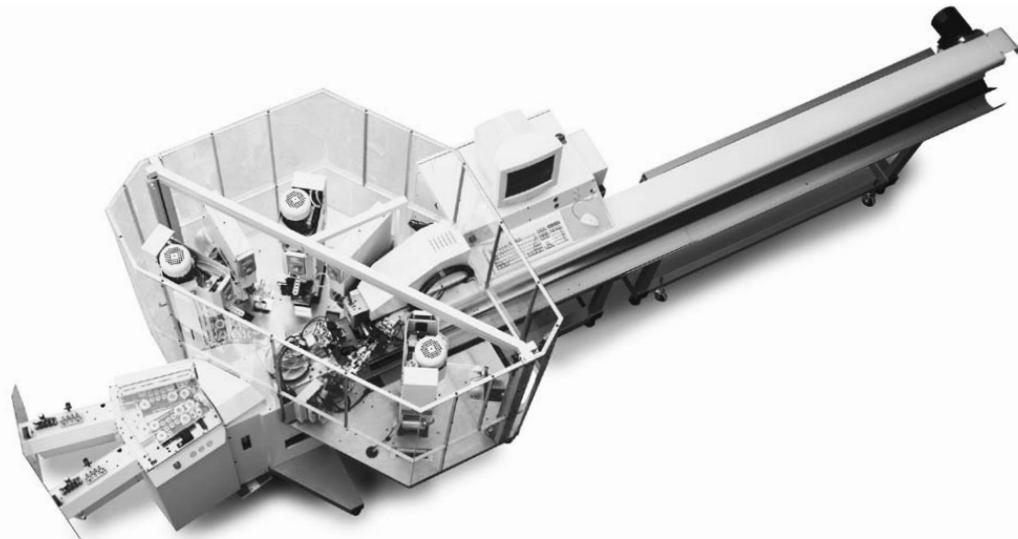
Alpha 488 Lead Maker Processing of Twisted Pairs

The Alpha 488 machine was designed for the economical processing of twisted pairs, consistently combining as it does state of the art technology with proven system elements like TopWin™ user-interface, the mci 712 or mci 722 crimp module.

The Alpha 488 machine creates fully processed twisted pairs from endless wire. This automatic twisting machine can accommodate wires with cross sections of 2 x 0.22 mm^2 to 2 x 2.5 mm^2. Four stations on side 1 and two on side 2 make for flexible processing possibilities such as double-ended seal application and crimping.
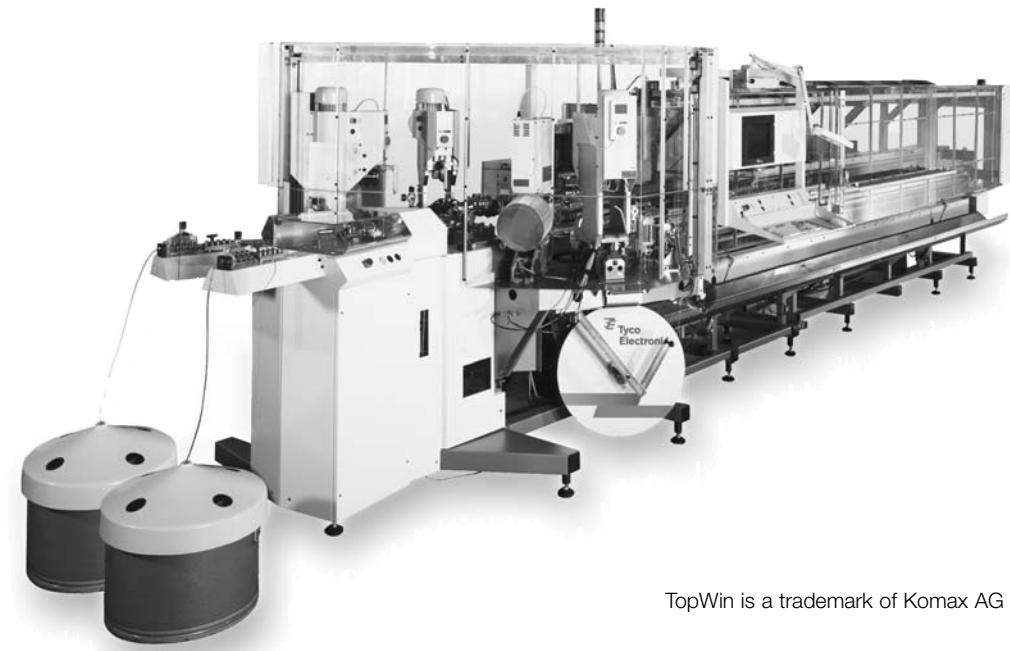
TopWin is a trademark of Komax AG

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All specifications subject to change. Consult Tyco Electronics for latest specifications.

Lead Makers

**Zeta 633 / 633 L
Fully-Automatic
Crimping Machine**

The Zeta 633 and 633 L are highly flexible fully-automatic crimping machines for just-in time production. The flexible machine concept creates an almost unlimited number of possibilities for handling small jobs or wire sequences.
The operator is able to reduce the required material change-overs and interruptions in production to a minimum.

The Zeta 633 crimping machine is ready to accom-modate five crimping presses and the 633L-Version can handle up to eight, for even more flexibility. Both Zetas can be used as stand alone machines with a bundler, as a basic machine for the block loader Zeta 651, Zeta 655 and Zeta 656 as well as for machines with an extension.
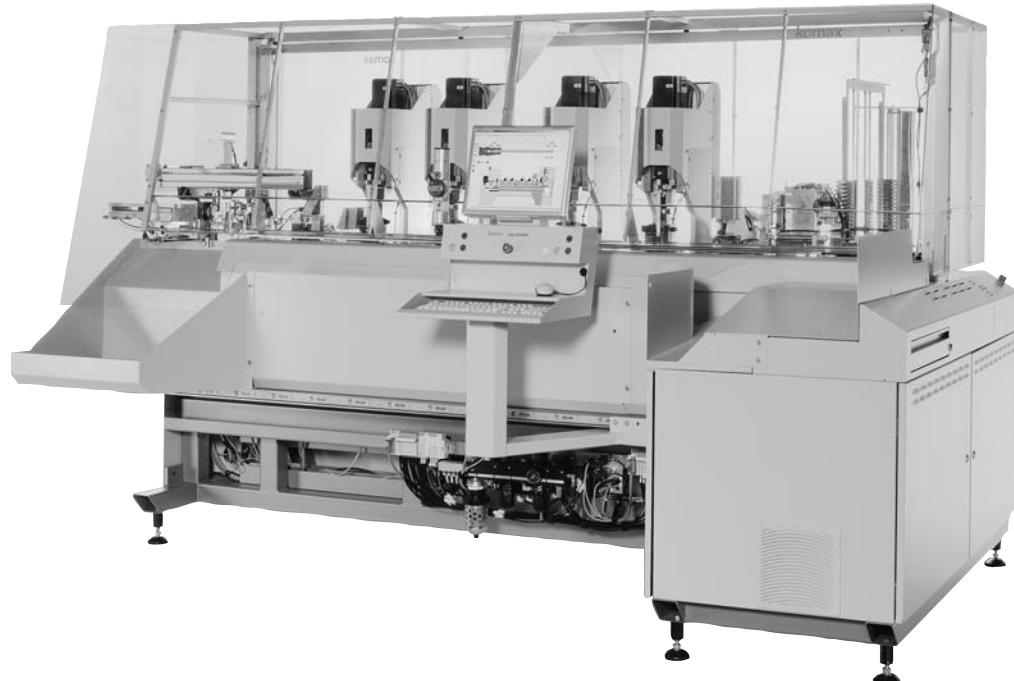

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All specifications subject to change. Consult Tyco Electronics for latest specifications.

29-31

Lead Makers

Zeta 651 Single End Block Loader

The Zeta 651 is the economical solution for the production of harnesses with single sided insertion in housings with one or two rows. This machine is especially characterized by a high degree of automation and the reliable insertion process.

The machine is used in combination with the flexible Zeta 633 base machine. By pre-centering the contacts, a reliable and precise insertion is guaranteed. By means of centering grippers, the contact can be centered and optionally rotated. The housings are fed automatically and can

be refilled without any process interruption. An integrated force sensor performs force monitoring throughout the entire insertion process and enables a high insertion quality. Operation of the Zeta 651 is via the slide console of the Zeta 633 with the user software TopWin™.
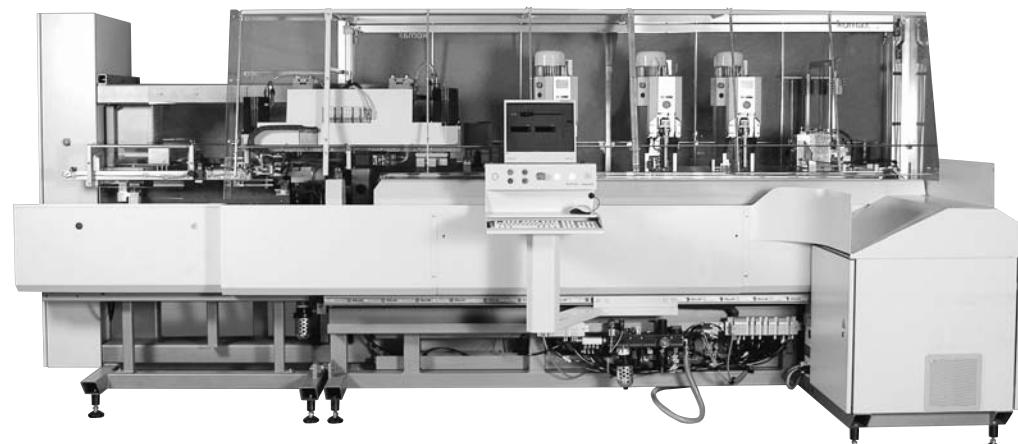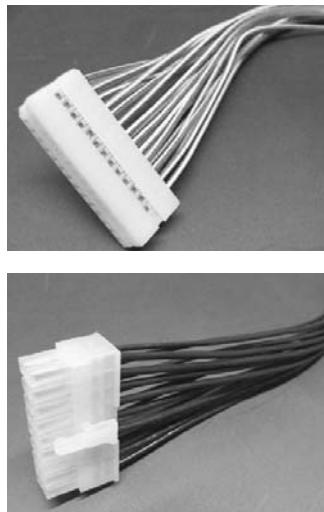
TopWin is a trademark of Komax AG

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All specifications subject to change. Consult Tyco Electronics for latest specifications.

Lead Makers

**Zeta 655 / 656
Lead Maker Double
End Block Loader**

The Zeta 655/656 Lead Maker is the flexible solution for single and double-sided housing insertion. This machine is characterized by a high degree of automation and a reliable insertion process. The precise force sensor monitors the entire insertion process to guarantee seamless, integrated process monitoring as regards collisions, loading force and contact locking. The innovative quick change pallet system can replace the harness specific insertion application and convert to another harness. The Zeta 655/Zeta 656 operates via the slide console of the Zeta 633 using TopWin™ software. The software automatically calculates the order of loading within a wire harness to make the set-up of new harnesses as simple as possible.

The fully-automatic Zeta 656 manufactures harnesses featuring conductor cross sections of 0.13 mm^2 and miniaturized housings with a pitch of 1.25 mm, doing so reliably and at high speeds.
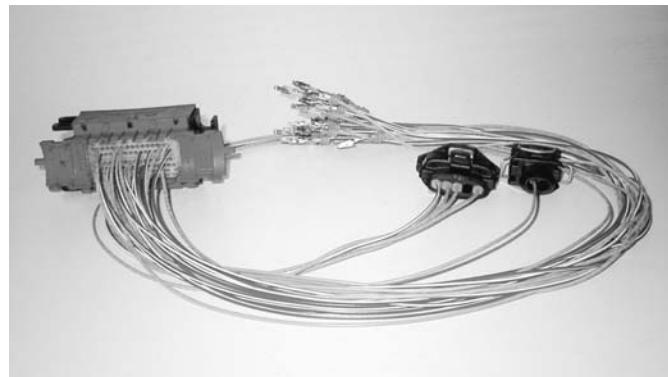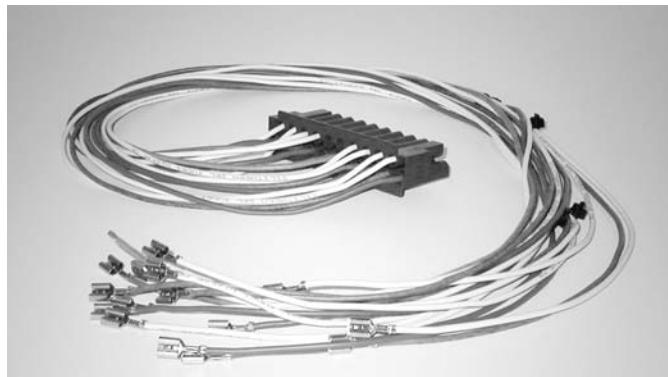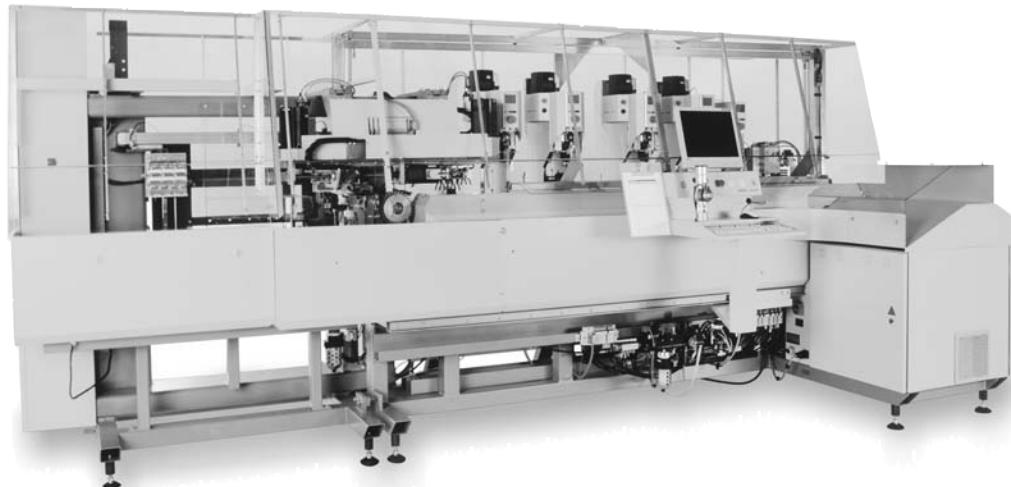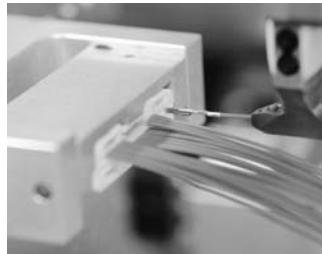
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Applicators

HD-I and HD-M Applicators with/without Fine Adjustment

A full range of applicator types is offered by Tyco Electronics. The HD-M Applicator is the standard Tyco Electronics applicator, accommodating most requirements for crimping Tyco Electronics and non-Tyco Electronics terminals.
HD-I Applicators, designed for use in both imperial (1⅛" and 1⅝") and metric (30 mm and 40 mm) stroke machines, are covering most of the terminals sold on the market worldwide. With these platforms, we offer a flexible and excellently supported tool concept for crimping of terminals to wires. You just have to inform us about the terminal you want to crimp – and we can offer you a tool. If a tool is not yet defined for a terminal (Tyco Electronics terminal or terminals from other suppliers) we are able to quickly design a new HD-I or HD-M Applicator to suit your requirements.

**HD-I Heavy Duty
Industrial Applicator**

**HD-M Heavy-Duty
Miniature Applicator**

HD-E Asian-Style Applicators

Based on traditional Tyco Electronics quality, this applicator, all metric settings, is designed to run on Asian-style terminators.

Fine crimp height adjustment for easy setup. 0.01 mm steps compared to 0.05 mm. The lightweight 4.4 kg applicator is lighter than the competition while maintaining the historic Tyco Electronics robust design.

**HD-E Heavy Duty
Applicator**

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Applicators

HD-I Air-Feed Applicator

The HDI-Air-Feed Applicator was developed to modernize and update current air-feed solutions with a focus on application flexibility and simple adjustments.
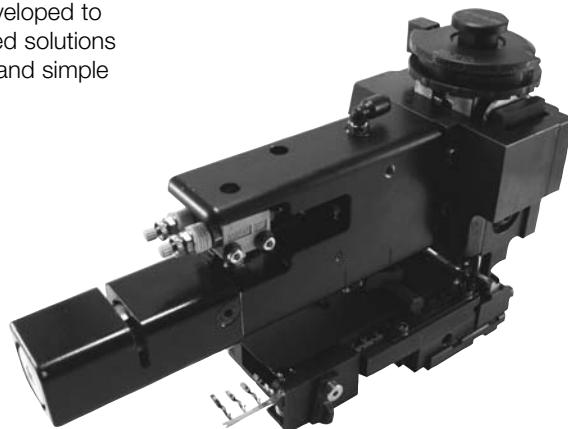
- Unique compact design easily mounts and dismounts to a keyed applicator frame
- Adjusts incrementally with steps of 0.08 mm
- Self-actuating, single air-line attachment – no terminator air valve is required
- Seals in the pneumatic cylinder can be replaced for quick and simple rebuilds
- No realignment or additional setup is required. Slide into place and reattach with two fasteners
- Side-Feed and End-Feed configurations are available
- Optional Tool or Tool-less feed adjustment

Applicator Wear Parts Stocking Program

To ensure the support of our installed Applicator base, we have established a stocking program for wear parts. Subsequently, all crimpers and anvils for your applicator are normally available ex stock, ensuring the shortest possible lead times.

Wear Tooling to Apply Stainless Steel Contacts

The application of nickel plated stainless steel terminals has always been a problem with regard to the uptime of the crimp tooling. We have developed crimpers and anvils, using special base materials and surface treatments in the crimp area. These have enabled us to significantly increased the tool life and thus reduce the applied cost of these products.

If you are experiencing specific wear problems in your production, please contact your Tyco Electronics Service representative.

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Applicators

System III Applicator with Feeder

Flexible and efficient termination of single and double wire applications, self-adjustment of the feeder and optimum quality of wire termination are the main features of our new applicator – the System III Applicator.

All crimp-related data, which are specific for the applicator and the terminal to be crimped, are contained in an iButton™, being part of the applicator.

The main feature of the System III concept is a separate electrical feeder – which is communicating with the applicator iButton on one hand and the terminator and leadmaker on the other hand – and an automatical interaction between applicator and terminator.

Once the applicator is mounted onto the press and as soon as the electrical feeder (being permanently connected to the terminator) is locked onto the applicator, the applicator iButton data are read out and transmitted to the terminator via the feeder.

Then the terminator automatically adjusts its crimp height and the feeder its feeding parameters – according to the terminal wire combination to be crimped.
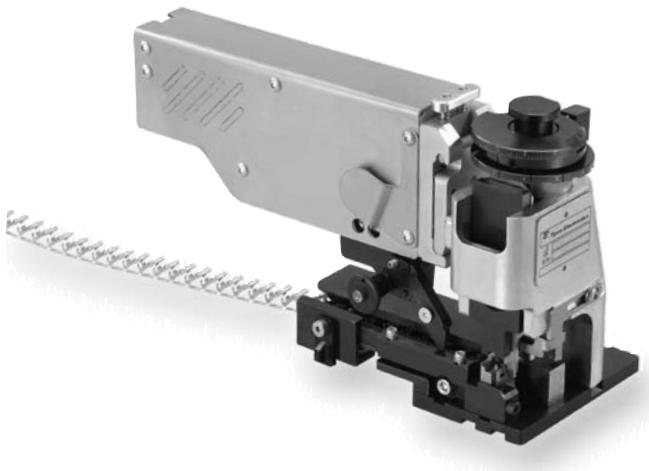
iButton is a trademark of
Maxim Integrated Products, Inc.

Applicator for Large Wire Sizes

For processing of large contacts, eg. for battery terminals, we offer heavy and solidly built tools, which are extremely precise in repetitive work for end-feed and side-feed contacts with large cross sections.

A pneumatically driven feed which is efficient and precisely adjustable, as well as a specially robust crimping unit, produce reliable connections which are extremely stable over the long term.
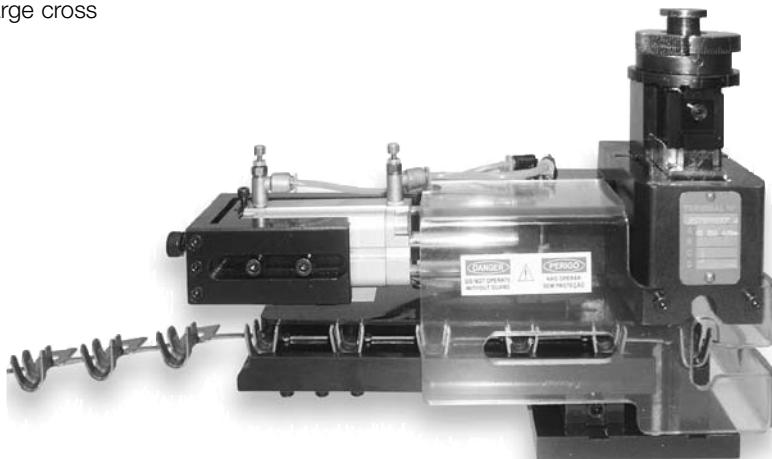
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Crimping Presses and Accessories

AMP 3K/40 and AMP 5K/40 Terminators

Based on the field proven Model "G" Terminator, the AMP 3K/40 and AMP 5K/40 Terminators are the latest in a series of machines for wire termination using reeled terminals.
The AMP 3K/40 Terminator provides 13 kN (3,000 lb) crimp force and is capable of crimping approx. 2.5 mm^2 (14 AWG) wire size.
The AMP 5K/40 Terminator provides 22 kN (5,000 lb) crimp force and is capable of crimping approx. 6.0 mm^2 (10 AWG) wire size.

As value oriented Terminators, the AMP 3K/40 and AMP 5K/40 are designed for customers that require the increased output and quality of a semi-automatic machine at a competitive price. A wide range of optional equipment is available to meet your specific application requirements.
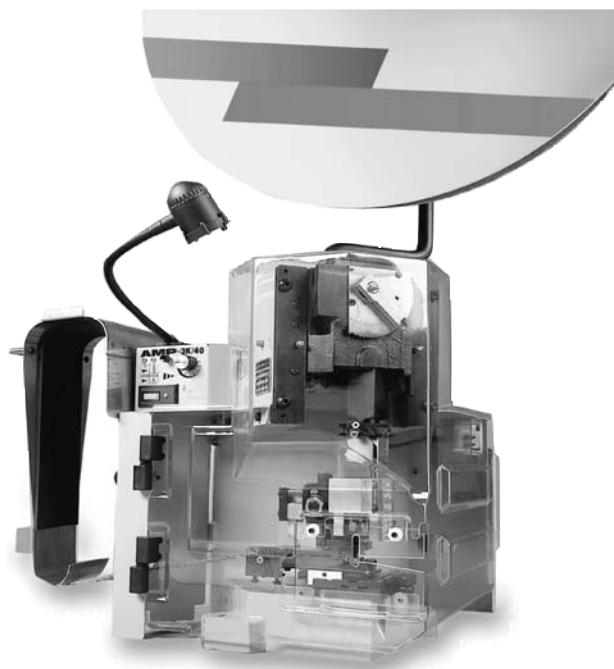
Stripping Module
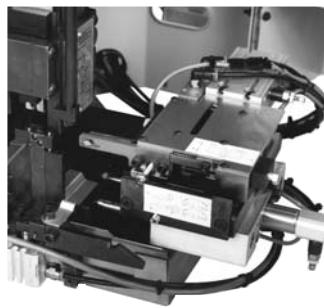
The stripping module is compatible with AMP 3K/40 and 5K/40 terminators.
A quick and flexible working process is supported by good accessibility to module adjustment and wire positioning. The stripping module was designed to produce good quality even used in the most harsh circumstances.

Following features characterize the stripping module:

■ Pre-selection Crimp only / Strip only / Strip and Crimp
■ Jog Mode
■ Pneumatic removal of insulation scraps

Defective Crimp Cutter (DCC) and Carrier Scrap Chopper (CSC)

When the CQM detects a bad crimp, the DCC unit will cut off the defective terminal. The wire will be cut close to the terminal.
■ All DCC units are equipped with a Carrier Scrap Chopper (CSC).
■ The DCC and/or CSC units can be easily hinged out of the way to allow easy access to change applicators.
■ DCC provides more consistent wire placement accuracy capability due to the use of the grip jaws, compared to hand placing the wire in a terminator.
■ DCC provides a scrap collection bin. It works with AWG 32-12 side-feed and end-feed HDM Style Applicators.
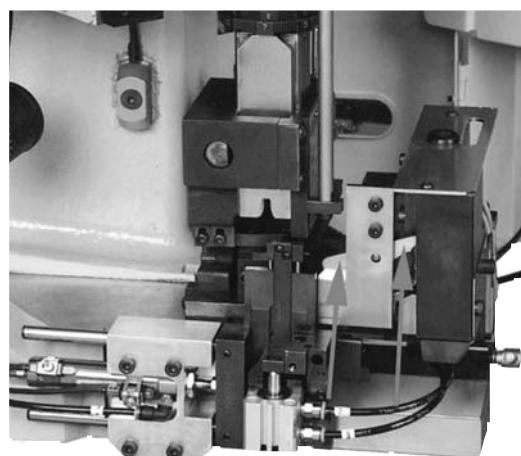
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Tyco Electronics

Crimping Presses and Accessories

SC15 Stripper Crimper
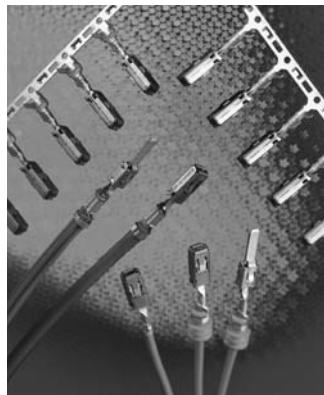
The pneumatically and electrically driven SC15 crimping machine is a particularly efficient and operator friendly crimping machine with outstanding repetitive precision, which satisfies the highest requirements. It can be adjusted to the specific requirements of any given contact/cable connection.
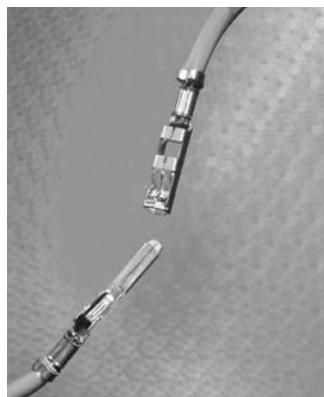
If you

■ want to strip a cable composed of many wires down to only 13 mm,

■ would like to then insulate these single wires at 2 mm to 6 mm and thereby

■ cover a wire size area of from 0.09 mm^2 to 4 mm^2 then with the Stripper Crimper SC15 machine you have made the right decision.

Further features are:

■ Automatic bare wire recognition

■ Crimp force monitoring

■ Remote diagnoses via serial interfacespecific requirements of any given contact/cable connection.

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Crimp Quality Monitor (CQM)

Crimp height is the accepted method for the most accurate and precise, non-destructive testing of crimp quality. The new Crimp Quality Monitor is a convenient, automatic, easy-to-use tool for measuring crimp height as part of a comprehensive quality management program. On-screen programmability allows flexible determination of crimp parameters and quality ranges. These monitors are compatible with several machines, including the AMP-O-LECTRIC Model G Terminating Machine, 3K/40 and 5K/40 terminators, AMP-O-MATIC Stripper-Crimper, or APT III machines. The Tyco Electronics CQM unit boasts a multi-language user interface including English, Spanish, German, Italian, French and Chinese.

It also permits the user to access many of the most common statistical tools such as yield, PPM, mean, standard deviation, Cp, and Cpk.
The Tyco Electronics CQM units utilizes a technology which is constantly measuring both ram position and force throughout the crimp cycle. As many as 3,000 data points are gathered at a 5 kHz sampling rate and analyzed on every crimp in real time. The CQM then compares the measured force/displacement curve to the base line to ensure that the forces and distances are within specification, thereby indicating a

good crimp. Other systems make a force vs. time measurement.
Calibration is performed for each part by measuring a crimp and then doing a visual inspection and acceptance of several learned crimps. Acceptable tolerances, size of calibration sample, run and batch size, and product identification are all entered on screen, for auditable controls of production.
Once the CQM is calibrated, it can display the measured crimp height with an accuracy of ± 0.013 mm [± 0.0005 in] for base plate mount.
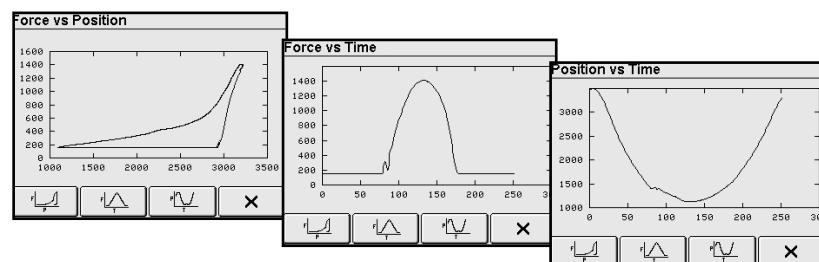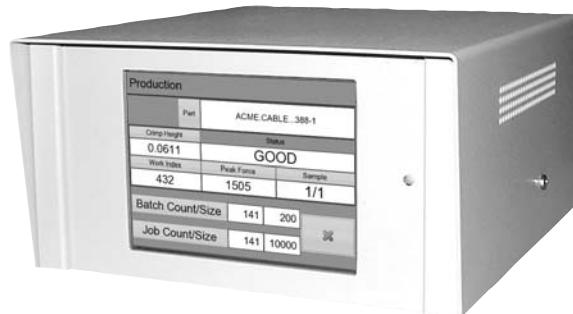
Detailed display of real time crimp data is readily available to the operator.

Setup is simple and fast. Only a few parameters need to be set to get the system up and running. All functions are controlled through the touch screen, with an easy-to use

graphical interface. When numeric or alphanumeric input is required, a keypad or full keyboard appears on the screen.

During a run, detailed data can be observed on screen, including curves of force vs. position, force vs. time, and position vs. time.

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Crimping Presses and Accessories

BT 752 Stripping, Sealing and Crimping Machine

The BT 752 crimping machine delivers three processes in a single device: stripping, seal loading and crimping. Reliability and top production performance coupled with the user friendly TopTouch interface are the features that make this semi-automatic device such a compelling product. The BT 752 crimping machine is an economical alternative to fully-automatic machines.
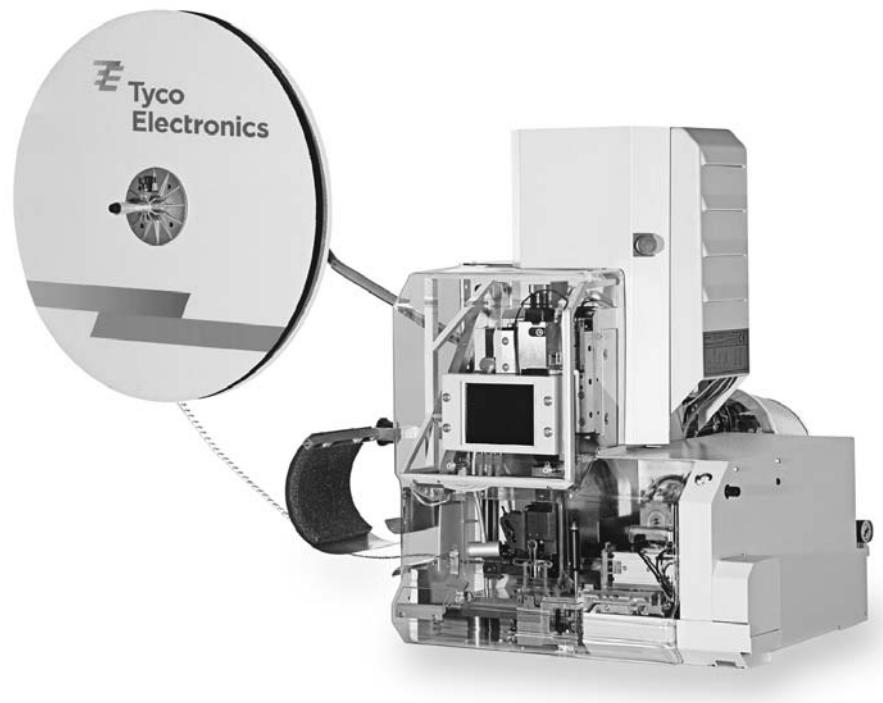
BT 711 Crimp Module

The BT 711 machine is a crimp module for the most demanding applications.

The module produces 20 kN, enough force to crimp wires up to 6 mm^2 in size, and is dimensioned to be compatible with all standard commercial crimping tools.

Options

■ SC-11 Stripper
■ Bad Terminal Cutter

Accessory

■ CFA Calibration Unit

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Crimping Presses and Accessories

**BT 722
Bench Top Press**

The BT 722 Bench Top Press is used for the manual crimping of contacts. The BT 722 Press is operated from a touch screen.

The new TopTouch user interface allows jobs to be set-up quickly and easily. Even during production set-up, the machine operator is prompted to conduct quality measurements. Following the input of the calculated values in the user interface, the crimp height is automatically corrected.

This prevents errors arising from the manual setting of the crimp height.

Only one crimp is needed for referencing the integrated crimp force monitoring.

This reduces waste material consumption and minimizes set-up time. The quality values measured during production are saved and can therefore always be called up later.

This ensures traceable quality at all times.

The programmable DigiStripper (option) is an ideal accessory to the BT 722 Bench Top Press. This can be set-up without any mechanical adjustment. Thanks to the functions zero cut and pull back, as well as the pre-programmable cutting depth, the perfect stripping is ensured.

Gauge for Presses

In order to help you to ensure that our applicators are placed correctly in the presses we recommend this press gauge. It is possible to have a misalignment between the center of the applicator and the terminator due to the way they mount in the terminator. If this happens, a side load is applied to the applicator

which can lead to pre-mature wear and/or quality problems with the crimped terminals. The use of the gauge is simple: You install the press gauge into the press like an applicator. Then you unlock the gauge head, on which is mounted a gauge ring. A spring in the gauge is now pressing the gauge head

upwards. The gauge ring should now fit easily into the press head. If this is not the case the applicator ram would not be in a centred position and the mounting plate of the press has to be adjusted. The special design of the press gauge base plate allows free access to the press mounting plate fixing screws.

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Crimping Presses and Accessories

**CRIMPMATIC 970
and 971 Crimp Presses
for Reeled or Loose
Piece Terminals**

Both machine versions permit the cost effective manu-facturing of crimp connections with a high production efficiency. The CRIMPMATIC 970 machines are cabable of processing wires of up to approx. 16 mm^2 (AWG 5), depending on the terminal stock thickness.

■ Compact, space-saving design
■ Compatible with MQC Applicators
■ Step mode during set-up

The CRIMPMATIC 971 machine is capable of processing wires of up to approx. 50 mm^2 (AWG 0), depending on the terminal stock thickness. The machines can be equipped with a quick change device for power crimp tools. MQC Applicators with a lower dead center of 135.78 mm can be mounted by means of an adapter plate. These machines can be utilized as manual work stations and can be integrated into fully-automatic processing lines.

The terminator as shown is a manual work station CRIMPMATIC 971. The unit can be supplied with or without crimp process monitoring, or it maybe retrofitted later.

Options are available upon request

■ Crimp force monitoring
■ Paper spooler
■ Adapter plate for MQC Applicator

Applicators

■ Especially designed for lar-ger wire sizes
■ Pneumatic feed
■ Can be used with both crimp presses CRIMPMATIC 970 and CRIMPMATIC 971
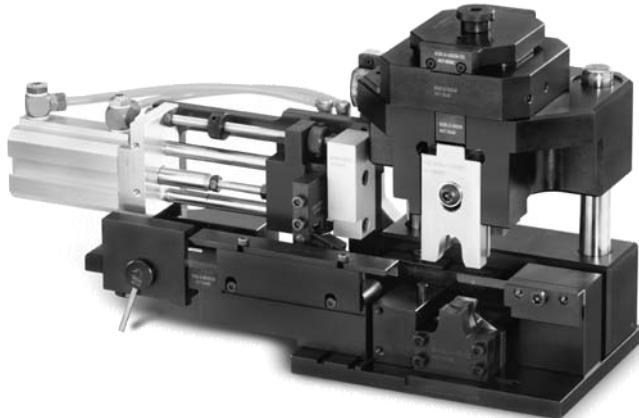
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Crimping Presses and Accessories

**SSC-2FP
Pneumatic Safety
Crimping Press**

This highly flexible crimping press, based on the widely used FMP-20 concept, features the utmost in user friendliness and process safety. The unique safety and terminal locating mechanism makes it possible to use this press without cumbersome and expensive guarding.

Additionally, a safety double foot switch provides for ease of operation because both hands can be used to position the terminal and wire in the crimping die.

This can be especially useful when processing small and open barrel terminals.

**UP / 55
Universal Pneumatic
Crimping Press**

This press will outperform most hydraulic presses with the same capacity in terms of handling and speed. Processing a 120 mm^2 copper tube lug, for example, will require about one third of the time.

We offer optional die adaptors for standard industrial U-Dies that make this machine extremely flexible across a wide range of applications. A resettable piece counter keeps track of the production run and the crimping speed

can also be adjusted. The UP / 55 can also be equipped with a cutting device to cut flat material up to 32 mm wide and cables with a max. outer diameter of 28 mm.

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Crimping Presses and Accessories

UP/66
Hydraulic Crimp Press

Designed to meet the increasing needs for flexibility in production the UP/66 Hydraulic machine is capable of crimping wire sizes up to 400 mm^2. The programmable crimp cycle and availability of various adaptor kits makes the UP/66 very adaptive to a very large application range.

The crimping process is completely programmable and controllable. Programmable features such as settable crimp height and press head return distance bring accuracy and effeciency into play.

The ability to reduce the machines travel to a minimum for each cycle increases through put.
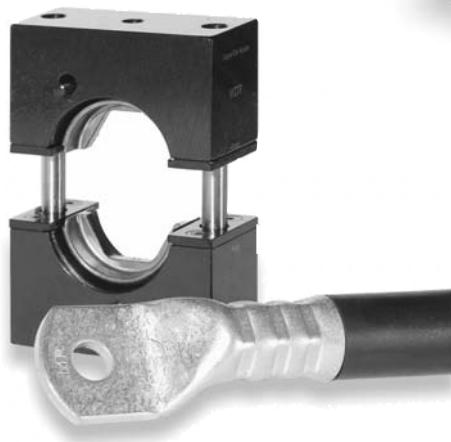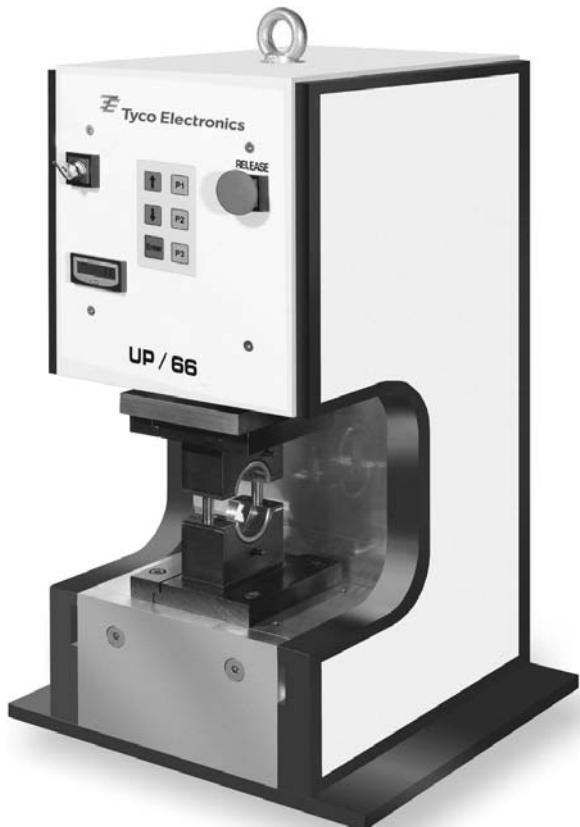
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Crimping Presses and Accessories

StripCrimp PP3 Stripping and Crimping Machine

Extremely fast stripping and crimping of wires down to a wire cross section of 0.012 mm², minimum strip lengths and a most compact overall design are the special features of StripCrimp PP3 machine, which is controlled and powered pneumatically.

To ensure the required precision, the PP3 machine incorporates a toggle press,

allows adjustable wire zero-cutting and can be equipped with an optional crimp force monitoring system in order that optimum crimp quality is assured.

User-friendly design, fine adjust of stripping and crimping parameters and easy-to-handle wear part change are key features of the PP3 machine as well as

a small footprint and compact size allowing it to be used in many working areas.

We offer a PP3 solution for end-feed and side-feed terminals, de-reeling from right to left or from left to right.

Efficient after sales support includes a ready availability of wear parts.

CoaxStrip 5300 Programmable Coaxial Cable Stripping Machine

The CoaxStrip 5300 machine is a semi-automatic, programmable multi-step stripping unit for coaxial, triaxial, multi-conductor cable and single conductor wire.

This benchtop unit can easily process coaxial and triaxial cables up to 7 mm (0.276") outer diameter and strips lengths up to 30 mm (1.18").

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Crimping Presses and Accessories

AVG 0160 Cable Strip and Twist Machine

The AVG 0160 is a stripping and twisting machine for wires with insulation such as PVC, Teflon™, Silicon, Fiberglass, Rubber etc. The machine can cover a wire size range from 0.03 mm^2 up to 6 mm^2 with an adjustable stripping length from 0.5 mm up to 29 mm. The machine utilizes rotary stripping blades for a smooth, 360° cutting of the insulation.

The blades are made out of a special tool steel for longevity. Optionally available is a spring kit for tighter twisting of the strands suitable for additional tinning operation.

Teflon is a trademark of E.I. DuPont de Nemours and Co.

JacketStrip 8400 Jacket Stripping Machine

The JacketStrip 8400 stripping machine enables automatic jacket stripping of round cables up to 26 mm in diameter and a stripping length of 200 mm. After the cable jacket has been cut, the piece of insulation is removed using a strong electric motor (full/partial or window strip can be selected). Pneumatically operated clamping jaws guarantee optimal cable retention during the stripping process. Waste insulation material is automatically ejected.
All functions of the machine are electronically monitored and diagnosed by means of a LCD display.

UniStrip 2015/2100 Stripping Machines

The pneumatically operated stripping machine UniStrip 2015 excels with a compact design, fast cycle times and infinite settings for conductor diameters, stripping and pull-off lengths. The UniStrip 2015 stripping machine primarily processes stranded wires and single wires. Due to the minimal distance between the acrylic safety cover and the stripping blades, this machine can perform stripping on extreme short cables.
The UniStrip 2100 is an electrically driven stripping machine. Ease of operation, fast cycle times, a powerful yet silent motor drive as well as a vast cable processing range are the main features of this machine.
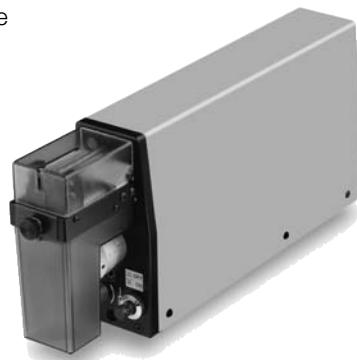
UniStrip 2500 Stripping Machine

This pneumatically driven stripping machine comes standard with V-blades, the optimum solution for any ordinary stripping of stranded wire with no blade changeover necessary. Through the use of special blades, the range of applications can be expanded to include flat ribbon cable, double-stranded wire, thin multistranded wire or demanding (though, delicate, thin) isolations. The adjustable way-back prevents the conductor from being damaged during the stripping process.
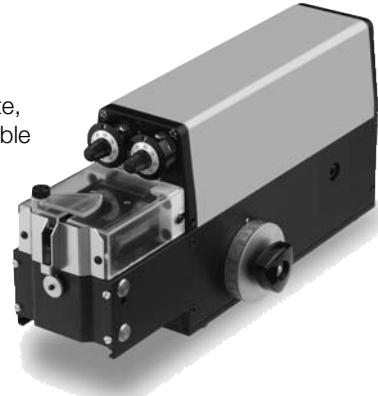
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Crimping Presses and Accessories

Kappa Cut and Strip Family

The Kappa family strippers are ideal for cutting individual and special wires to length and stripping them. They can strip in sections, allowing them to strip even extremely long length in perfect quality. The machines cover an extraordinarily broad range of cross sections.

Kappa 310, 320, 321, 330 and 350 strippers support a variety of processing options such as wire marking with hot-stamp or ink jet markers. Hot stamp marking can even be done on the Kappa 310 stripper, the entry-level model.

New Kappa Generation:

- Dynamic, flexible cutting and stripping unit
- New intelligent sensors
- New electronic and software
- Optional TopWin™ connection

TopWin is a trademark of Komax AG

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Resistance Welding Equipment

Resistance Welding Module

Tyco Electronics offers semi- and fully-automatic modules for resistance compact welding of terminals. This resistance welding process allows us to achieve minimum transitional resistance between conductor and contact, higher current capacity and long-term stability of the wire termination.

In this process, the bundle of strands in the conductor is condensed into a block by side-mounted ceramic plates. After this the strand bundle is welded to the contact by the introduction of a powerful current via an electrode.

Typical features of the resistance welding unit offered by Tyco Electronics are a very short cycle time, a long electrode life time, a fully-automatical parameter setting process and the recording of all process relevant data.
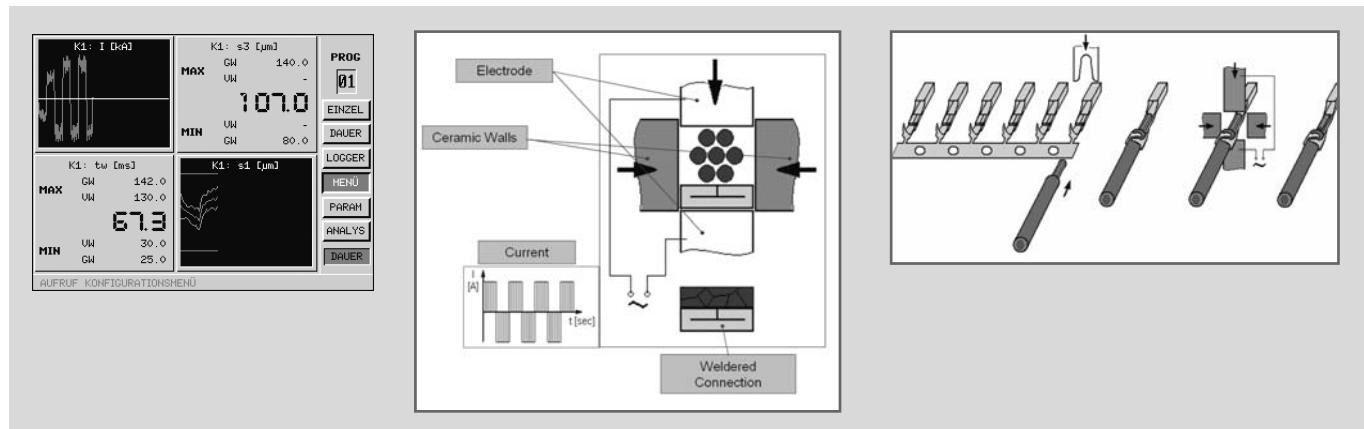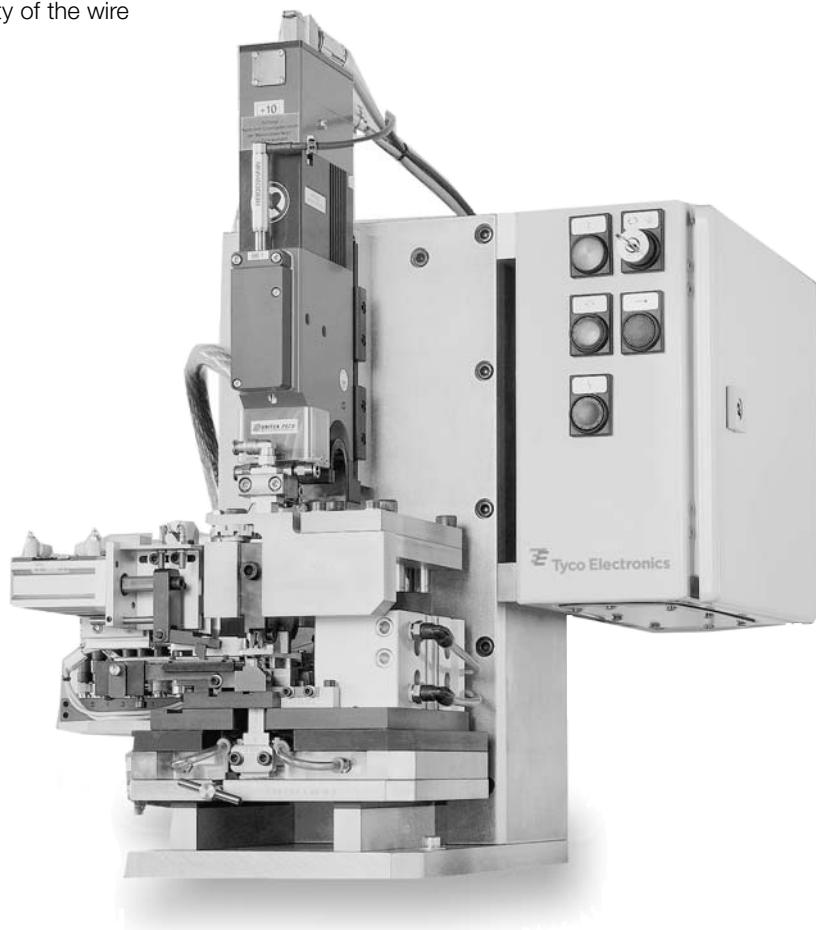
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www.tooling.tycoelectronics.com • **www.tooling.tycoelectronics.com/europe** • **www.tooling.tycoelectronics.com/china**

All specifications subject to change. Consult Tyco Electronics for latest specifications.

MOST™ Equipment

Lambda 9100 POF Fully-Automatic Processing of MOST™ Leads

For processing large quantities of plastic optical fibers (POF) with low human recourses, Tyco Electronics offers the fully-automatic machine Lambda 9100 POF. All processing steps – from feeding and preparation to testing and deposition – are fully-automatic. Functions like length measurement, integrated marker software and monitored laser welding are available and guarantee consistently high quality.

To ensure gentle handling, the fiber ends are held fixed throughout the process so that no uncontrollable bending radius occurs. The Lead Maker is equipped with a Dual Laser Module.

MOST™ Sets

The MOST™ Sets are simple and inexpensive solutions for repair work in the workshop. To meet your requirements we offer several different versions of Sets. The basic version is equipped with two hand tools. One for stripping and cutting of POF, another one for crimping of POF and an additional spare cutting unit. A further version contains such items as a 20 meters POF, some male and female contacts and one position inline couplings. Other accessories are available in different equipment versions.

MOST is a trademark of SMSC Europe GmbH

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MOST™ Measuring Devices

These devices measure the position of the prepared end of the optical fibers relative to the reference point of the insert extremely accurately.

The result is displayed clearly by means of the digital read out. The digital display can be zeroed by means of the setting gauge.

A special Digital Crimp Height Micrometer verifies the crimp height of metal inserts. Two opposed probe tips measure the crimp height of the inserts across the diameter.

Tooling and Equipment for Glass Fiber Optics (GOF/PCS) for Automotive

In the future Glass Fiber will be used in the automobile industry. To keep pace with this trend Tyco Electronics is developing process equipment for the manufacture of GOF and PCS leads. Developments are based on experience gained in processing plastic and glass

fiber for NETCONNECT communication technology products. With both GOF and PCS the primary obstacle in the process is to achieve a high quality fiber end surface. The goal of our develop-ment is to process the PCS fiber end with a Laser Module.

Further process involve joining a connector to the fiber end with a Laser welding Module. The manufacture of the GOF fiber end faces involves additional process of heat forming and polishing. A Laser Module is used finally to accomplish optical connector assembly.
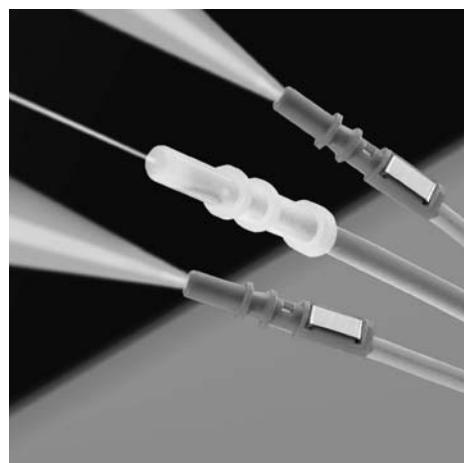
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Hand Tools

**SDE Standard
Die Envelope**

SDE die system is a flexible approach to crimp tooling that allows the use of the same dies with tooling across a range of application platforms. A large selection of die options are already available for crimping a broad range of terminals and wire sizes.

Many die sets have multiple cavities for crimping more than one wire or terminal size and we can provide custom designs where volumes permit.

SDE Crimp Tools

SDE dies are interchangeable in tools from portable hand tools (manually or battery-powered) to pneumatic hand tools and electric bench terminators.

It's a family of tools that you can take from bench to production or into the field, without the need for different dies to fit each kind of tool.

You can rely on SDE dies to provide for your long term needs because of our commitment to continued development of dies and the tool range.

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Hand Tools

IDC Hand Tools

IDC or Insulation Displacement Crimping is based on an entirely different concept to conventional crimping and requires these special types of tool.

We provide a large range of tools for connector families like:
- MQS Connectors,
- AMP DUOPLUG,
- AMP MONO-SHAPE and
- AMP multifitting

and usually based on the well proven Pistol Grip tools, featuring connector holding fixtures that crimp and index one pitch at a time.

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Hand Tools

Hand Tool Kits

Tyco Electronics provides standard kits that contain the necessary equipment to carry out specific tasks to the highest professional standards. We can also provide custom kits for volume requirements containing only tools, or a combination of tools and terminals tailored to your specific requirements.

Please visit our tooling website to view our online hand tool catalog for standard kits, or find your local contact to discuss custom kits.

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Hand Tools

Hand Tool Kits

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Hand Tools

Insertion and Extraction Tools

Insertion/Extraction Tools are used for inserting discrete terminals into connector housings or removing them, without causing damage to either the terminals or housings.

Our new standard design features a comfortable handle and snap-in/out protective cover that allows users to stow the business end of the tool to help protect from inadvertent personal injury when the tools are not in use.

Many different design types currently exist for our vast terminal product range, which we continue to convert. If you would like the tool you use converted to the new design, want a custom kit or tools in this design for other manufacturers products – contact us, and where volumes permit we will be pleased to provide you with a quotation for your requirement.

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FFC-FPC Equipment

FFC Hand Tool

The very easy-to-handle 10 position hand tool allows variable settings for both the foil stop and foil guide. A correct and repeatable crimp process is achieved by an integrated ratchet mechanism. A FFC hand tool case can be built up around your particular application requirements.

The tool allows crimp connections to be made between foil and 1 to 10 position MQS terminals. The crimp height is set for 70 mm thick foil.
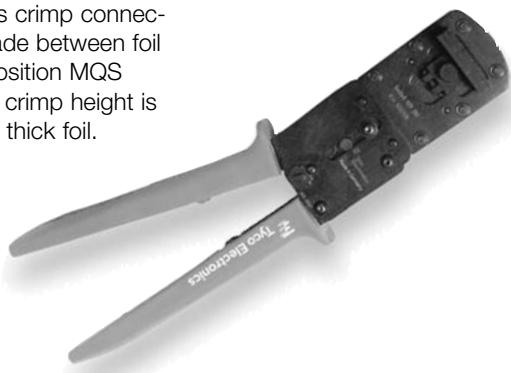
FFC Termination Machine for Flexible Sensor Foil

The Termination Machine is an electrical driven semi-automatic assembly machine that uses different applicators to terminate reel-feed FFC contacts to manually supplied FFC cables. The machine terminates a predefined number of contacts to the supplied cable end. Tyco Electronics products FFC MQS, FFC AMPMODU .100, Junior Timer, AMPMODU .50 and soldered contacts are compatible.

■ Quick-change of applicator
■ Alignment of the cable is realized in the machine
■ Interchangeable applicators available for different products
■ Number of pins can be programmed (max. 38 mm with pitch 2.54 mm)
■ Pitch 1.27 mm up to 5.08 mm can be programmed
■ Individual wire positions can be skipped
■ Operator friendly interface via touch screen
■ Integrated crimp force monitoring by CQM (optional)

FFC Applicator
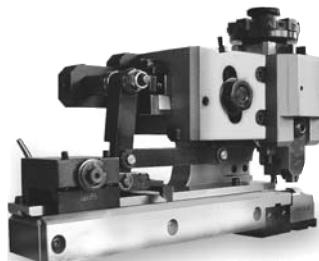
The FFC Applicator is designed for FFC and FPC terminations. It is normally delivered with a special Tyco Electronics crimp machine, but is also compatible with standard presses (press stroke 40 mm), if a wire feed is supplied.
The adjustment of the crimp hight is similar to other Tyco Electronics crimp applicators. All wear parts are easy to change.

The FFC Applicator is available for different Tyco Electronics contacts, such as:
• FFC MQS,
• FFC Junior Timer,
• FFC AMPMODU .100,
• FFC AMPMODU .050,
• FFC Card Edge,
• FFC ACTION PIN and
• FFC Soldering Pin.

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FFC-FPC Equipment

Assembly Machine to Connect FFC and PCB

This machine has been specially designed to connect a Flexible Printed Sensor with a PCB by using an ACTION PIN FFC Contact. The Flexible Printed Sensor and the PCB are manually loaded into the machine. After the cycle has been started, the insertion head is positioned above the first insertion position.

The pre-formed contact is cut off the carrier strip and gets simultaneously inserted into the PCB and crimped to the Flexible Printed Sensor. Several contacts form the complete connection between the sensor and the PCB. The force, required to insert the ACTION PIN contact with the PCB, is monitored by a force sensor.

To accommodate two types of PCBs, the PCB holder is positioned by pneumatic cylinders. The desired position is selected via the operator interface.

FFC/FPC Machine

The FFC/FPC bench machine creates electrical connections between Tyco Electronics FFC terminals and flexible flat cables. Thanks to its adaptable circuit fixture the machine is simple and easy to load. Prior to initializing a crimp cycle, the vision system establishes the precise location of the first conductor track. A positional correction is effected as appropriate.

The equipment combines the functions of terminal feed, cutting the product off the carrier strip, crimping and chopping of the carrier strip. An integrated crimp force monitor ensures high quality crimp connections. An optional faulty crimp cut off device prevents the further use of defect circuits.
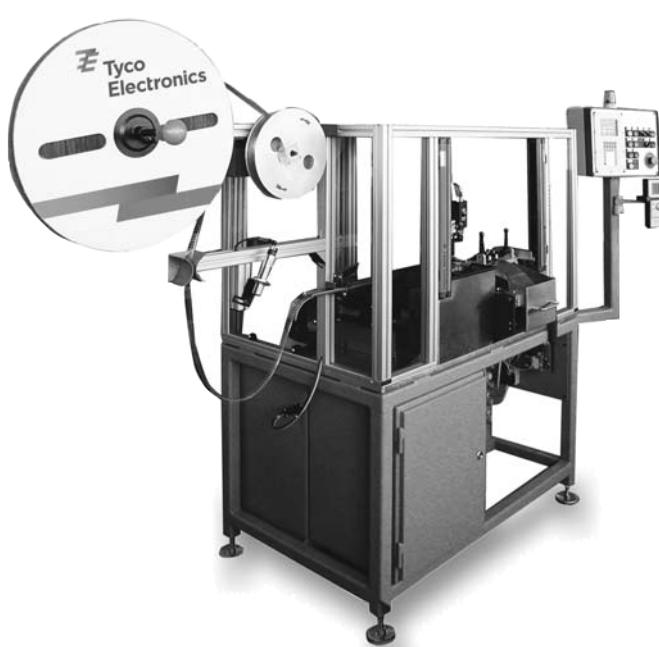
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Magnet Wire Equipment

MAG-MATE and SIAMEZE Inserter Mark II with PLC

Tyco Electronics' magnet wire terminations are a perfect connecting alternative to all soldering techniques used in a lead-free environment. Special knowledge is required to design a mass manufacturing line for insulation displacement crimps on thin lacquerd insulated wires with high yield. Design aspects of the terminal, the cavity and the machine all need to be harmonized.

With the Inserter Mark II Tyco Electronics can offer an economic solution especially

for the application of MAG-MATE and SIAMEZE terminals.

MAG-MATE Inserter Mark II with PLC and Insertion Force Control

This advanced insertion machine provides the features of the MAG-MATE Inserter Mark II with an additional force distance control system. The machine is designed to apply multiple different con-tacts and will be customized according to the customer or product specific requirement.

The contacts can be used as single contacts or in strip form (bridge function adjusted "on-the-fly"). A gauge is available to check the adjusted insertion force and to recalibrate the insertion force control sensor.
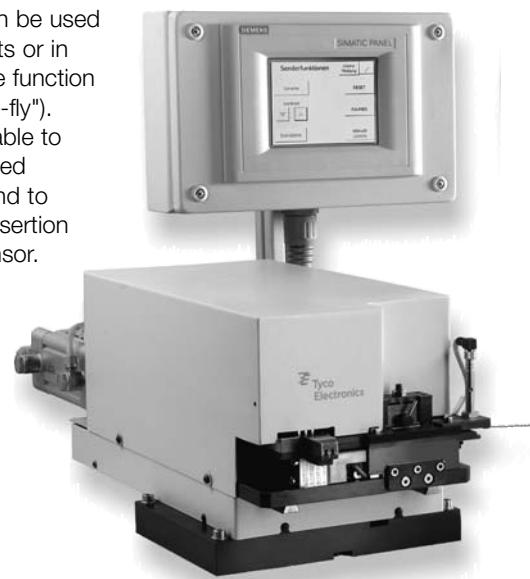
Pneumatic Insertion Tool for MAG-MATE Terminals

The pneumatic tool for MAG-MATE terminals features a rotary insertion finger to facilitate different insertion angles. This tool is designed for use in Tyco Electronics

standard insertion machines such as P 200 and P 300 but can also be integrated into customized production lines or assembly cells.
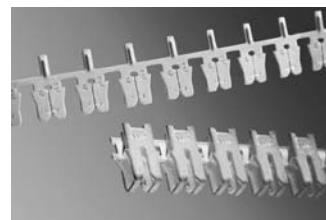
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Magnet Wire Equipment

AMPLIVAR Terminator for Parallel and End Connections

The machine was especially developed for processing magnet wire connections. Different versions for end-feed and side-feed contacts are available. The design takes into account that the motor windings and coils can be supplied directly to the connectors. The exposed crimp position permits precise handling. In case of end connections the projecting magnet wires are cut off. AMPLIVAR Splices and Terminals are specifically designed to terminate magnet wires or in combination with standard solid or stranded wire. In a one-step operation the magnet wire is automatically multiple ring stripped of its insulation as it is forced into the serrations during the precisely controlled crimping operation.

As many as three magnet wires can be terminated, simultaneously in one splice. Nearly the entire AMPLIVAR splice program can be applied with this machine in combination with suitable applicators. The comprehensive range of manufacturing possibilities demands a specific machine and applicator combination.
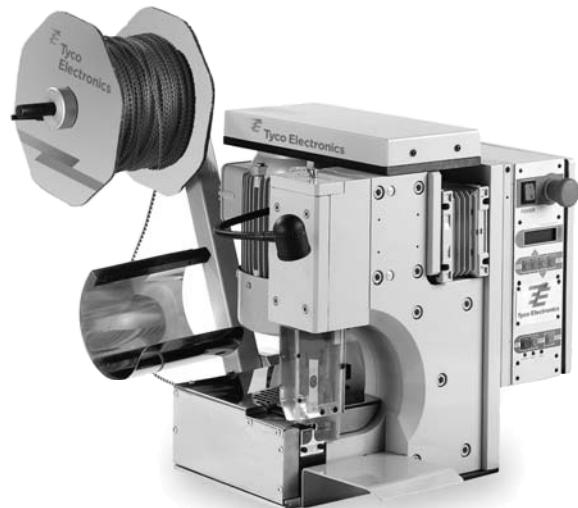
APT IIIA and APT IIE AMPLIVAR Product Terminators

APT semi-automatic bench machines are available in two versions: the APT IIIA machine with automatic precision adjustment controlled by the Crimp Quality Monitor (CQM) and the APT IIE machine with manual precision adustment. To apply a splice or contact, simply place the wires in the target area and depress the foot switch. The machine automatically shears the splice or contact from the strip, crimps it, shears off excess wire, and advances the next splice or contact into position. With CQM, the APT IIIA machine assists in achieving 6-sigma processing capability.

For operations with multiple wire sizes, the APT IIIA machine provides programm-able sequencing of different crimp-height settings, and it can store up to 2000 different programs of 7 different settings each.

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Board Processing Equipment

Press-Fit Systems

Tyco Electronics offers a complete line of manual and automatic servo-electric driven presses for the application of press-fit connectors.
Each unit is PC controlled and incorporates force feedback through load cells. The servo-electric drive can precisely control applied force, speed and travel without the "spring" effect common in pneumatic and hydraulic presses. Finally, force and SPC data for every connector pressed is stored and can be retrieved for 100% traceability of all boards produced.

This system minimizes costly scrap by assuring that the minimum force is reached, maximum force is not exceeded and the connector is gently seated to the required height.

SEP 3T
Servo-Electric Press

The SEP 3T is a servo-electric press to apply PCBs onto compliant pin connectors and housings. The system provides control and monitoring of the press cycle force, distance and speed to meet the quality and traceability essential in the safety and control applications where these components are typically used. Optional Pin Penetration Sensing (PPS) tooling can verify the correct penetration of every pin through the PCB.

PCBs are manually loaded onto the connector/housing and placed in specific support fixtures. When the press cycle is initiated by the operator, the product is shuttled into the SEP 3T and pressed to the required force and/or height.
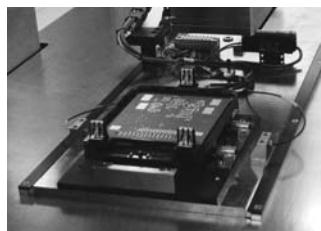
A key feature of the SEP press system is an automatic shuttle that positions the PCB and housing\connector stack up underneath the upper insertion tool.

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Board Processing Equipment

**BMEP-3T/5T
Bench Manual Electric
Press**

The benchtop press with midrange board handling and pressing capacities utilizes PC control and servo-electric drive system. Pressing capacities of 27 kN [3 tons] and 44 kN [5 tons] allow for a wide range of applications on boards up to 460 mm x 610 mm [18" x 24"]. These features and a compact footprint make this a powerful, versatile and portable press for PCB construction.

The run time screen provides complete operator interface and feedback.
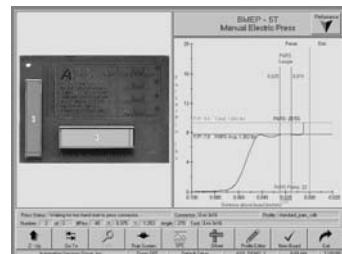
**MEP 6T/MEP 12T
Manual Electric Press**

A self-contained press on wheels that can easily be relocated almost anywhere on the production floor. The same PC controlled servo-electric drive system as the BMEP units is used to provide a precise and repeatable pressing system to lower overall applied cost. With up to 107 kN [12 tons] of pressing capacity and board handling up to 910 mm x 1220 mm [36" x 48"] on the MEP-12T machine, the MEP press line is perfectly positioned to handle almost any press-fit application with midrange volumes.
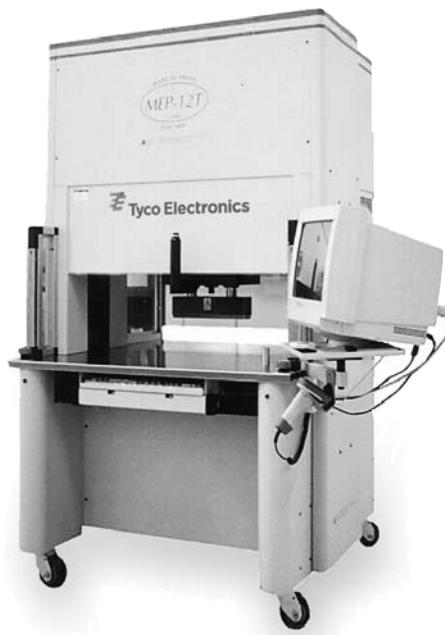
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Board Processing Equipment

CSM 100 Connector Seating Machine

The CSM 100 seating machine has been specially designed to press a PCB onto a press-fit connector. The connector gets manually loaded into a connector specific fixture and the PCB is placed on spring loaded support pins.
When the press cycle is started, the unit slides under the press ram and gets pressed. An optional pin presence check in the upper tool guarantees that all pins have been pressed through the board. The press is a Tyco Electronics BMEP-5T. The press has a PC controlled, servo-electric drive, to allow for the monitoring and control of force, speed and distance over the entire press cycle.

CSM 200 Connector Seating Machine
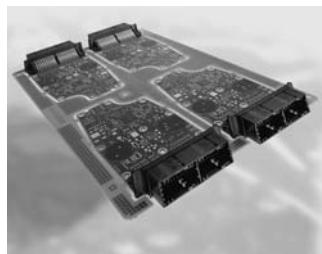
PCB and connectors are loaded manually into fixtures. When started, the machine checks the correct loading of the connectors before placing the connectors onto the PCB. The tool then moves under the press ram where the connectors get pressed one after the other onto the PCB.
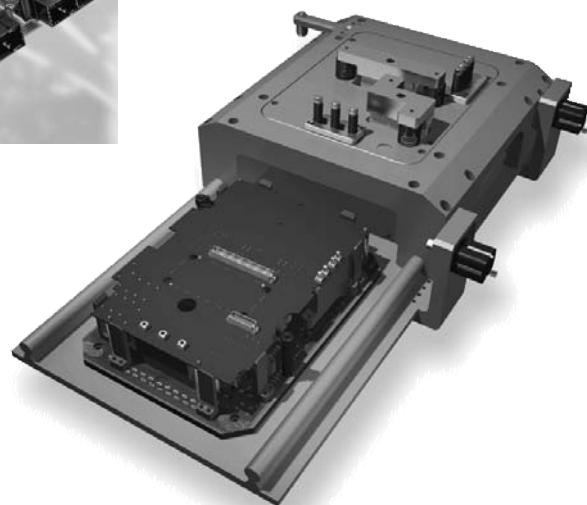
The BMEP 5-T servo-electric press is used to seat the PCB which provides a force-distance check to guarantee quality production.
A special tooling plate allows the sequential pressing of a number of different pre-loaded connectors. An intermediate

plate, positioned between the PCB with its pre-positioned connectors and the flat rock press ram contains the connector specific press tools. For each connector a force distance curve is available after completion.

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Board Processing Equipment

PCB Depanelling Systems

Tyco Electronics knows the total applied cost of your product is almost at its highest when the PCB is separated from the panel.
Protect the time and investment that has been applied to your product by using a gentle, safe and effective depanelling equipment solutions offered by Tyco Electronics.
Tyco Electronics offers equipment solutions including the 2016AT Singulation Press, SmartRouter Singulation Machine, SAR-1000-B/D, SAR-1400-L Laser Depanelling and ILR-2000 Automatic In-Line Routing Machines.
All of our equipment solutions offer effective and safe depanelling for your products. Depanelling induced stress is simply unacceptable in today's competitive market.

GAS SAR-1000-B and SAR-1000-D Depanelling Machines

The GAS SAR-1000-B and SAR-1000-D depanelling systems for printed circuit boards and bare boards offers a largely automated process for depanelling by milling and/or sawing.

The GAS depanelling systems SAR-1000-B and SAR-1000-D offer the following outstanding features:

- Very fast and precise linear motor axes for all three directions of movements (X, Y and Z).
- Fast shuttle system with short changing time <4 seconds
- Large milling area
- Flexible milling brush holder – no additional down-holding device required
- Technics tool kit including
- Broken tool control
- Automatic and continuous bit control for different levels
- Tool diameter monitoring
- Production data processing system
- Depanelling speed with disc up to 20 m/min.

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Equipment for Electrical Testing

Electrical Test Equipment for the Automotive Industry

Specialized wire harness testing for the automotive subcontracting industry is based on high volume requirements and incorporates the automatic inspection of non-electrical parameters. To this aim well thought out adaptation systems are the key factor providing a fast, reliable and user-friendly test environment.

Test benches and adaptation systems from TSK Prüf-systeme GmbH benefit from 25 years of experience in this market. Tyco Electronics is the worldwide distribution partner of TSK and can provide a large variety of harness and functional test systems to it's customers.

TSK Cable Test and Function Test

Small stand alone cable testers like the CT30 at an attractive price level already offer the full range of electrical standard testing for up to 512 internal test points. In combination with the powerful CS WIN software even more complex test programs can be created by using programmable I/O's and applied statistical functions.

Larger harnesses will use one of the many different test system types which basically provide a standard grid to implement TSK's adaptation modules.

The function test systems are designed for more complex end-of-line tests on complete subassemblies, like cockpits, automotive doors, relay boxes and control units.

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GATD Global Field Service Organization

Tyco Electronics provides Global Field Service support on our application tooling. Field Specialists are located across every continent to provide timely response to customer needs.

In addition to installation, warranty and repair service, Tyco Electronics Field Specialists can help you with equipment choices, training of maintenance and operation personnel, troubleshooting assistance and spare parts. Service contracts to cover all your application equipment needs are also available.

We have implemented a service management tool that provides standardization of reporting that gives us the ability to continuously improve our global service organization. Throughout the year we educate our field service engineers on the latest industry technologies and equipment.

See for yourselves the advantages of our professional consultation and individual services. Our qualified service teams are ready to assist you.

Service Offerings:

Standard Service
Includes troubleshooting problems, making repairs, and/or installing parts.

Equipment Installations
Providing installation, set-up and training of application equipment at the time of delivery.

Training
Providing Customers with practical training programs addressing machine operation, set-up, maintenance, inspection, and connector application. Training programs can be scheduled at the Customer's site or at a Tyco Electronics training center. A training certificate will be issued upon the completion of each formal training course.

We are proud to be able to offer a comprehensive range of customer training programs.
The following are some of the standard training programs we offer:
- The Fundamentals of Crimp Technology, 4901
- The Proper Handling of Crimping Applicators, 4902
- Crimping Training Program, 4903 (combination of 4901 and 4902)
- The Proper Handling of Crimping Hand Tools, 4904
- FFC Crimp Technology, 4906
- Fundamentals of Crimping Technology for Machine Operators, 4907
- Magnet Wire Connection Technology, 4910
- Advanced Seminar on Crimping Quality, 4911
- Advanced Seminar on Crimp Force Monitoring, 4912
- Advanced Cross Sectioning – Photos, 4913
- MAG-MATE Module, Pneumatic, 4914
- Insulation Displacement Technology, 4930

Service Contracts
Preventive Maintenance and/or Inspection Calibration

Provides service for periodic visits to perform Preventive Maintenance and/or Inspection Calibration Service on Hand Tools, Applicators, Bench and Automatic Equipment.

Comprehensive Service
Provides for a specified number of Field Specialist visits. A visit can be used for services such as standard service, installation, set-up and training for all application equipment, preventive maintenance and/or inspection calibration, spare parts management, equipment process evaluation and technical assistance on application tooling and/or product related problems or concerns.

"A customized service / training contract ensures equipment optimization"

Short Term Rental of Crimping Applicators
Applicators are being increasingly required at short notice for a limited period. This may include pre-production runs, prototype series, and the subsequent production of single part requirement or simply small series production. It is often uneconomical to purchase a crimp tool or to rent it on a long-term basis, when it is only required for a few weeks in the year. Our short-term rental service has applicators readily available for you, which you can return when complete with your rental period.

Your local Tyco Electronics representative will gladly inform you about the availability of an appropriate applicator for your specific need.

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www.tooling.tycoelectronics.com • www.tooling.tycoelectronics.com/europe • www.tooling.tycoelectronics.com/china

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GATD Americas Field Service Locations

GATD Americas Field Service Locations

Canada:
Toronto

United States:
California
Florida
Minnesota
Missouri
New Jersey
Ohio
Pennsylvania
Texas

Mexico:
Chihuahua
Guadalajara
Hermosillo
Juarez
Reynosa

Brazil

AMERICAS FIELD SERVICE
1-800-722-1111
fieldservicesnorthamerica@tycoelectronics.com

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GATD EMEA Field Service Locations

Austria	Netherlands
Czech Republic	Norway
Denmark	Poland
Finland	Russia
France	South Africa
Germany	Spain
Great Britain	Sweden
India	Switzerland
Italy	Tunisia
Morocco	

EMEA FIELD SERVICE
+49 (0) 6251 133 1376
kd-hotline.ampde@tycoelectronics.com

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GATD Asia Pacific Field Service Locations

Australia	Singapore
China	Taiwan
India	Thailand
Japan	Vietnam
Korea	

ASIA PACIFIC FIELD SERVICE

Please contact your local Sales or Service Engineer

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Numerical Index

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