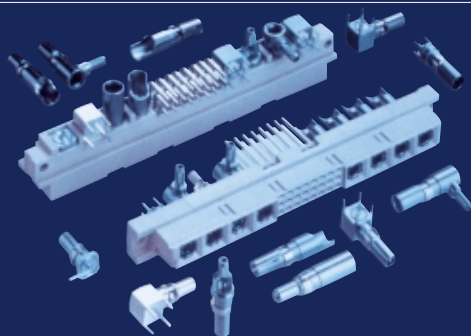
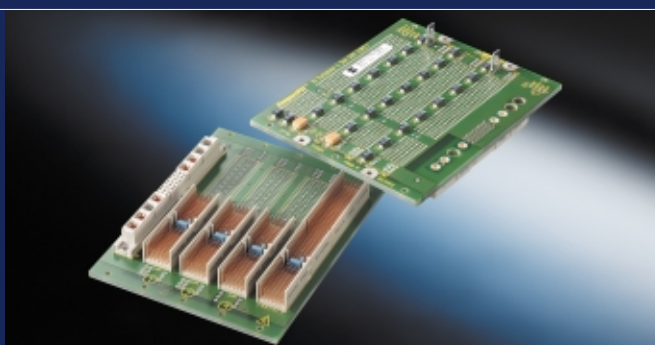
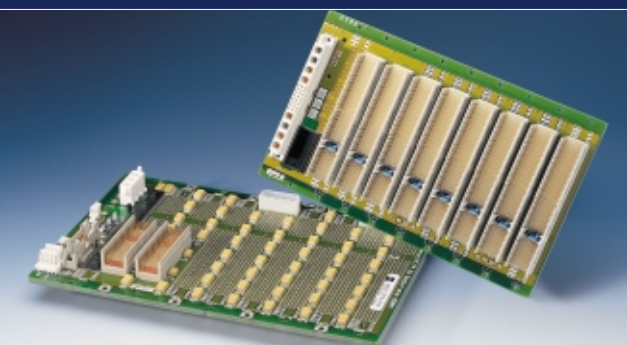




Connectors Type M

DIN 41612 / IEC 60603-2



Contents

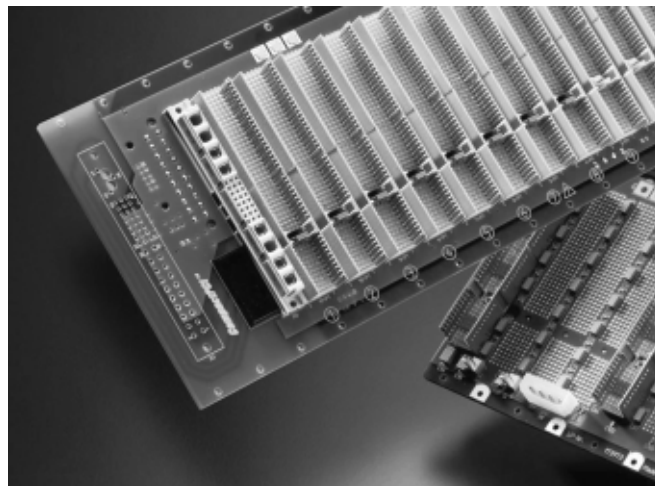
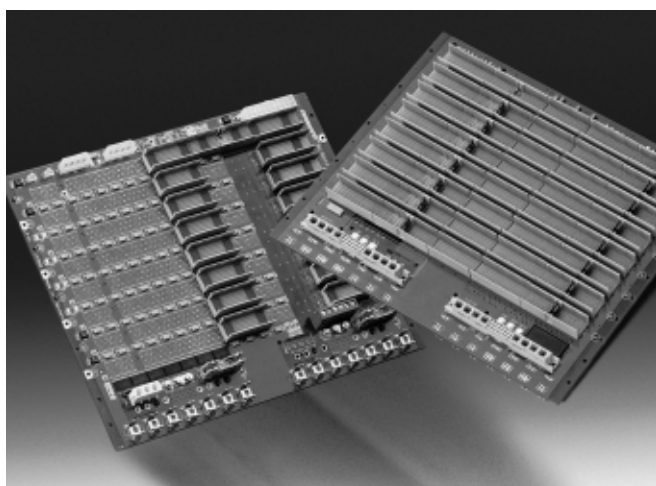
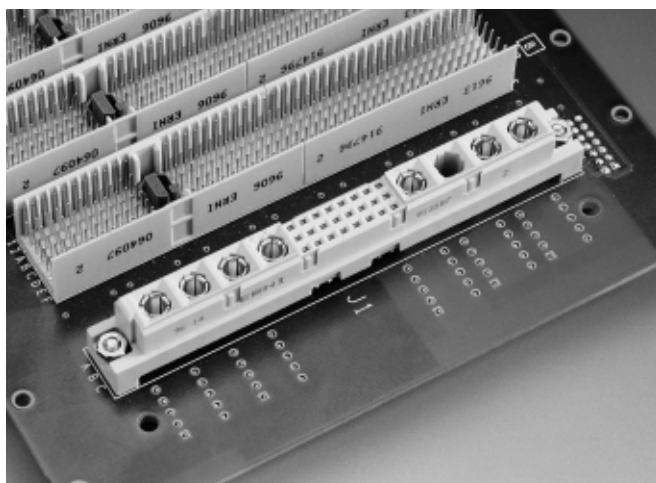
General Information	3
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General Information

The Type M hybrid connector series is on a .100" (2.54mm) grid and manufactured in accordance with the DIN 41612 / IEC 60603-2 specification. This series of connectors is designed to accommodate a variety of coaxial and high power contacts which are also used in other popular connector systems such as the 2mm Hard Metric Type M connectors. The signal contacts are rated up to 4 amps. It is also possible to add high power contacts that can handle up to 40 amps and a variety of coaxial contacts available in both 50 and 75 ohm. The male and the female connectors have 2, 4, 6, 8, or 10 empty "cavities" to accommodate the special contacts. The versatility of mixing both signal and either high power or coax considerably increases the usage of this connector in telecommunication and data processing applications.

Applications





Electrical And Mechanical Specifications

Standard				Male and Female Connectors
Contact positions for signal				6, 24, 42, 60, 78
Technical Specifications				
Temperature Range				DIN EN 60068-1 -55/125 °C
Permissible humidity				DIN EN 60068-1 Yearly average ≤ 80% max. 100%
Current rating @ Ambient Temperature				IEC60512-3 test 5b 4.0 A 2.0 A 1.0 A
Creepage (C) and air (A) distance in mm	Contact	C	IEC 60 664	3.0 mm
	to ground	A	IEC 60 664	2.5 mm
	within	C	IEC 60 664	2.5 mm Contact to contact
	a row	A	IEC 60 664	1.2 mm Contact to contact
	between	C	IEC 60 664	1.2 mm Contact to contact
	the rows	A	IEC 60 664	1.2 mm Contact to contact
Test voltage 50 Hz, 1 min				IEC60512-2 Test 4a 1000 V _{eff} Contact to contact
Contact resistance				IEC 60512-2 Test 2a ≤ 20 mΩ
Insulation resistance				IEC 60512-2 Test 3a ≥ 10 ¹² mΩ 100 V DC
Shock and vibration resistance				IEC 60512-4 Text 6d, Performance Level 7 No contact interruption at 20 g and 10 ... 2000 Hz
Performance to IEC 60603-2				Class 1 ≥ 500 mating cycles Class 2 ≥ 400 mating cycles
Pull-out force per contact (test pin)				IEC 60512-8 16e ≥ 0.15 N

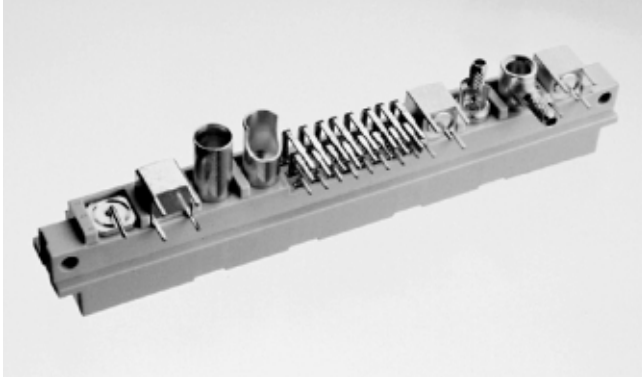
PERFORMANCE CLASSES

- Class 107 Meets the requirements of DIN 41612 / IEC 60603-2 performance level 1. 500 mating cycles. Mating areas gold-plated, terminal areas tin-plated (signal contacts).
- Class 207 Meets the requirements of DIN 41612 / IEC 60603-2 performance level 2. 400 mating cycles. Mating areas gold-plated, terminal areas tin-plated (signal contacts).

Electrical And Mechanical Characteristics

	Standard	Male and Female Connectors
Contact positions for signal		6, 24, 42, 60, 78
Process-conditions		
Solder temperature max.	IEC 68-2-20	
Dip soldering temperature max.	IEC 60512-6 Test 12d	10s at 260°C
Warning		soldering of press-fit connectors is not recommended
Materials		
Housing: plastic material (symbol)		PBT 30% GF
CTI value	IEC 112	CTI 275 / CTI 175 M
UL flame rating		UL 94 V-0
Contact and mating area		
Base material		Cu alloy
Plating		Au over Ni
Termination area		
Base material		Cu alloy
Plating		Sn
Enviroment compatibility		
recycling	no flame-retardent additives and no toxic additives allow for easy recycling	
Product-approval and customer specific tests		
UL		file E 84703
CSA		in preparation

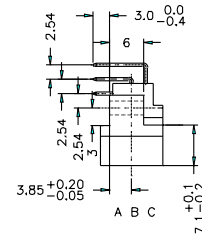
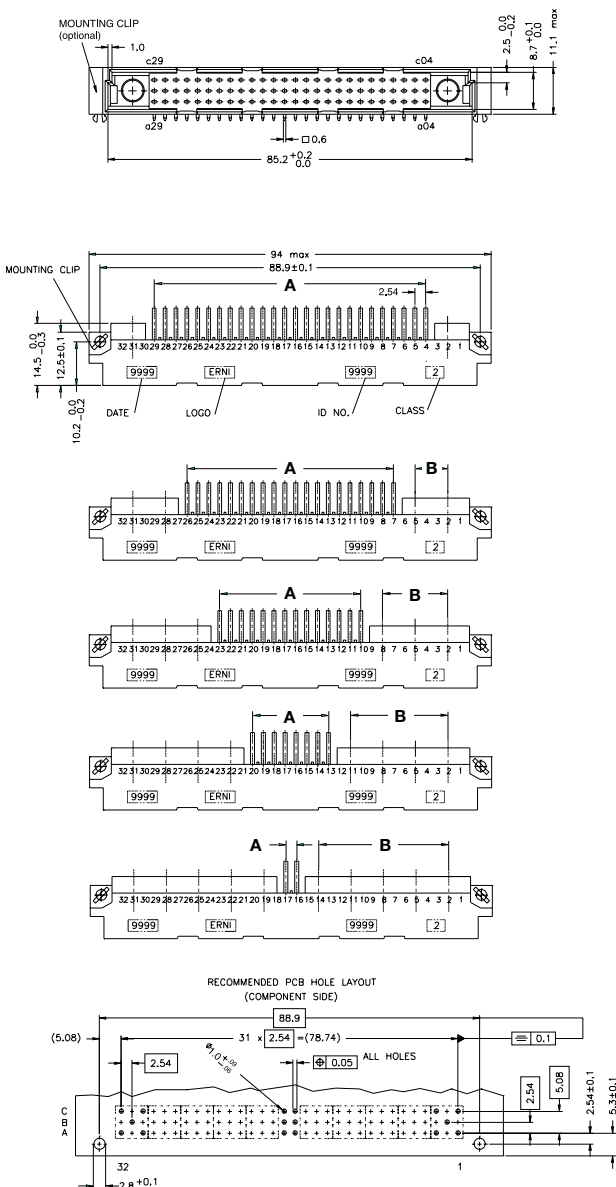
Standard Male Connectors for Daughtercards



The hybrid male connector is configured for a right angle board mount application in accordance with the standard DIN 41612 / IEC 60603-2 specification. This hybrid connector is designed specifically for applications demanding signal, power and/or RF-coax requirements. Special cavities molded into the housing allow the reliable placement of special contacts (Power or RF) in whatever configuration your application demands. A maximum of 78 signals can be routed with 2 special contacts while a demanding power or RF application can utilize a maximum of 10 special cavities and 6 signal positions. This standard male housing design incorporates features for optional clips for board mounting during the solder process and for coding/keying in reliable and rugged systems.

Dimensional drawing

Sketch/Preliminary



Max # Signals	A	B
78	63.5	—
60	48.26	7.62
42	33.02	15.24
24	17.78	22.86
6	2.54	30.48

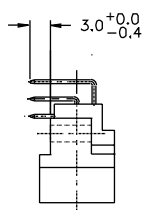
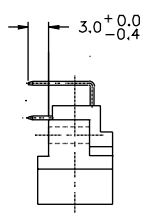
Ordering Information

Male connectors

Type

Terminal Side View

Part Number

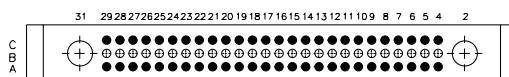


Performance Class

107

207

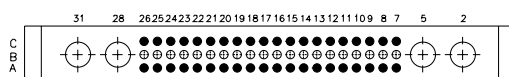
52+2, AC Loaded



594 156

594 157

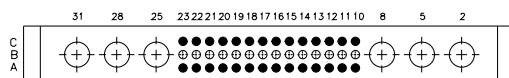
40+4, AC Loaded



594 159

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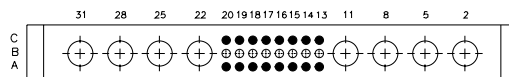
28+6, AC Loaded



594 162

594 163

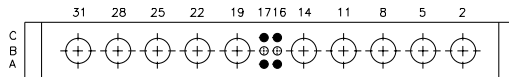
16+8, AC Loaded



594 165

594 166

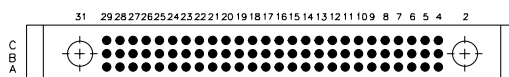
4+10, AC Loaded



023 624

023 625

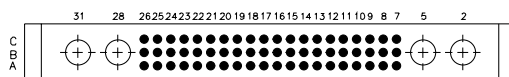
78+2, ABC Loaded



593 808

593 809

60+4, ABC Loaded



593 811

593 812

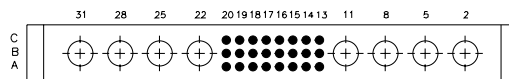
42+6, ABC Loaded



593 814

593 815

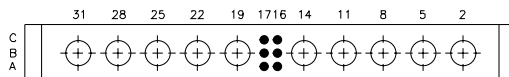
24+8, ABC Loaded



593 817

593 818

6+10, ABC Loaded



024 201

023 626

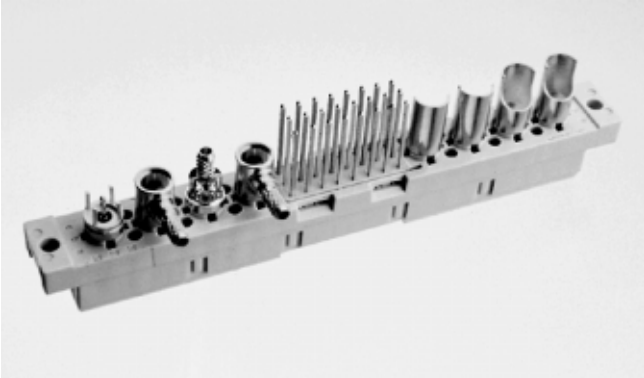
Contact Layout

⊕ = Open

● = Loaded

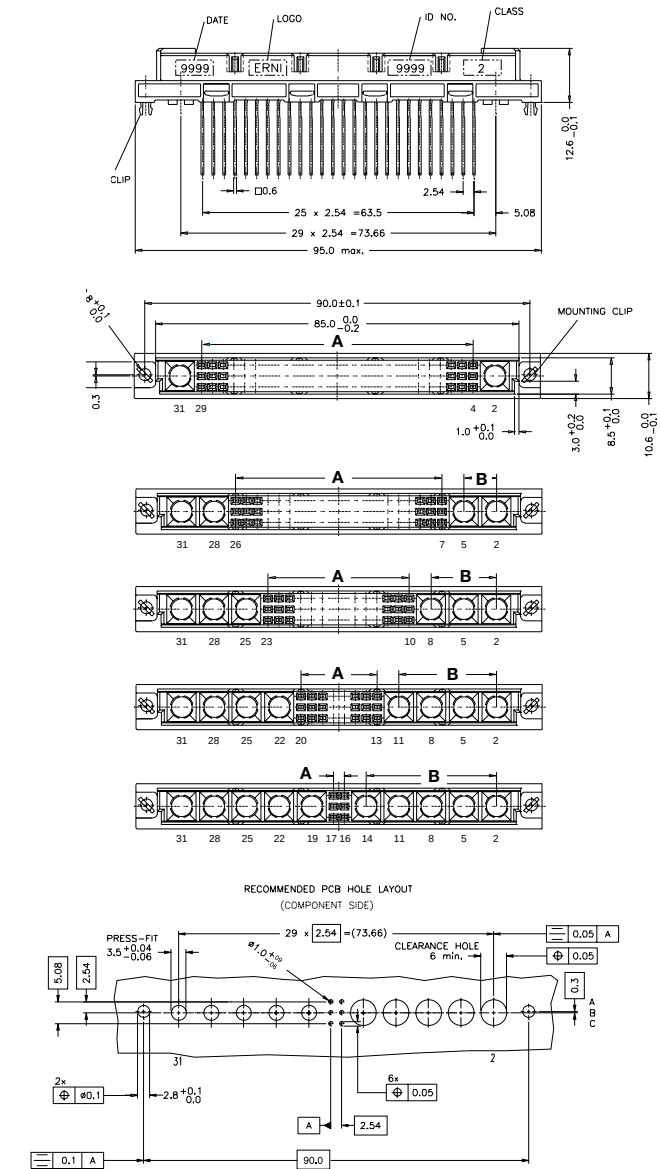
Consult factory for availability of male connectors with mounting clips.

Standard Female Connectors for Backplanes

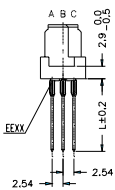


Dimensional drawing

Sketch/Preliminary



The hybrid female connector is configured for a vertical board mount application in accordance with the standard DIN 41612 / IEC 60603-2 specification. This hybrid connector is designed specifically for applications demanding signal, power and/or RF-coax requirements. Special cavities molded into the housing allow the reliable placement of special contacts (Power or RF) in whatever configuration your application demands. Board mount or feed-through special contacts makes this a very versatile backplane connector. This standard female housing design incorporates features for optional clips for board mounting during the solder process and for coding/keying in reliable and rugged systems.



Max # Signals	A	B
78	63.5	—
60	48.26	7.62
42	33.02	15.24
24	17.78	22.86
6	2.54	30.48

Clearance Holes are required at positions loaded with Cable Contacts.
Plated Wholes are required at positions loaded with PCB Contacts.
See the individual Part Drawing for Plated Drill Hole requirements.

Ordering Information

Female connectors	Type	Terminal Side View	Performance Class		Part Number	
					107	207
	52+2, AC Loaded				594 120	594 121
	40+4, AC Loaded				594 123	594 124
	28+6, AC Loaded				591 126	594 127
	16+8, AC Loaded				594 129	594 130
	4+10, AC Loaded				023 629	023 630
	52+2, AC Loaded				594 108	594 109
	40+4, AC Loaded				594 111	594 112
	28+6, AC Loaded				594 114	594 115
	16+8, AC Loaded				594 117	594 118
	4+10, AC Loaded				023 627	023 628

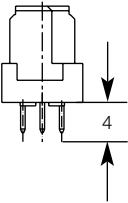
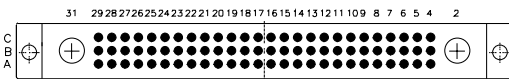
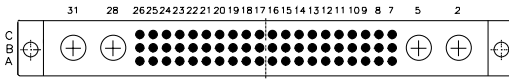
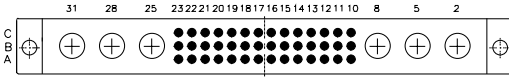
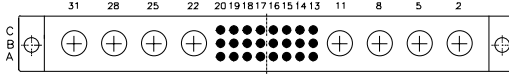
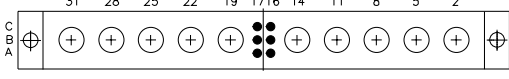
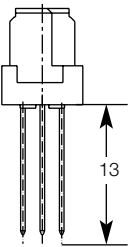
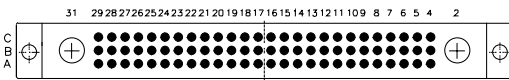
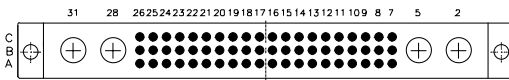
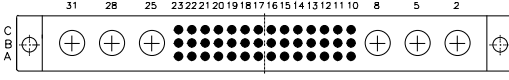
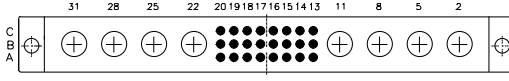
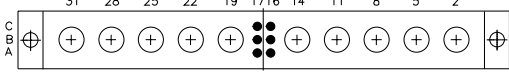
Contact Layout

⊕ = Open

● = Loaded

Consult factory for availability of male connectors with mounting clips.

Ordering Information

Female connectors	Type	Terminal Side View	Performance Class		Part Number	
			107	207		
	78+2, ABC Loaded		593 772		593 773	
	60+4, ABC Loaded		593 775		593 776	
	42+6, ABC Loaded		593 778		593 779	
	24+8, ABC Loaded		593 781		593 782	
	6+10, ABC Loaded		023 632		023 633	
	78+2, ABC Loaded		593 760		593 761	
	60+4, ABC Loaded		593 763		593 764	
	42+6, ABC Loaded		593 766		593 767	
	24+8, ABC Loaded		593 769		593 770	
	6+10, ABC Loaded		024 200		023 631	

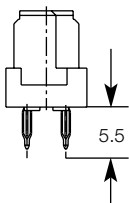
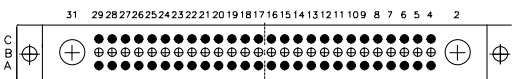
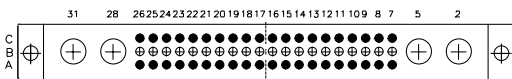
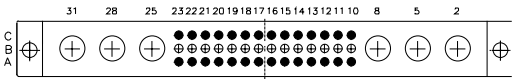
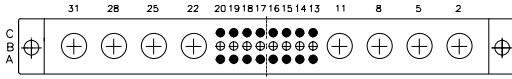
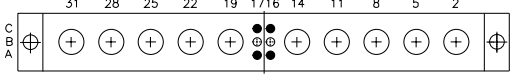
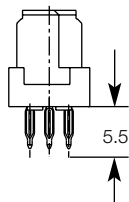
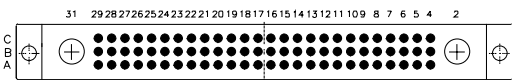
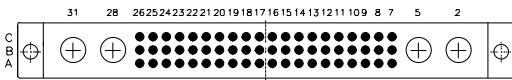
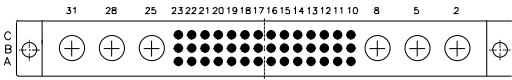
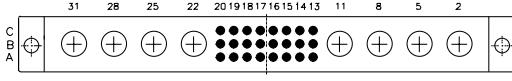
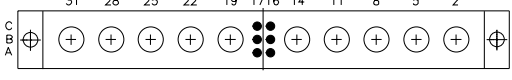
Contact Layout

⊕ = Open

● = Loaded

Consult factory for availability of male connectors with mounting clips.

Ordering Information - Pressfit

Female connectors	Type	Terminal Side View	Performance Class		Part Number	
					107	207
	52+2, AC Loaded				594 144	594 145
	40+4, AC Loaded				594 147	594 148
	28+6, AC Loaded				594 150	594 151
	16+8, AC Loaded				594 153	594 154
	4+10, AC Loaded				023 408	023 409
	78+2, ABC Loaded				593 796	593 797
	60+4, ABC Loaded				593 799	593 800
	42+6, ABC Loaded				593 802	593 803
	24+8, ABC Loaded				593 805	593 806
	6+10, ABC Loaded				023 445	023 446

Contact Layout

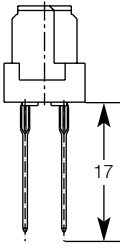
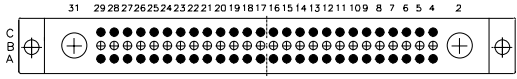
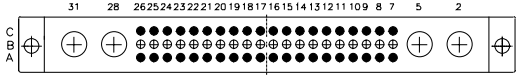
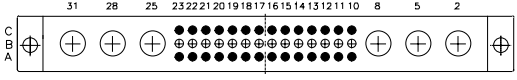
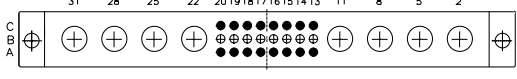
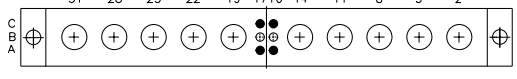
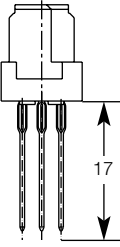
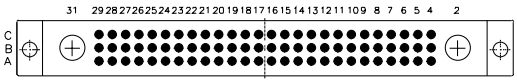
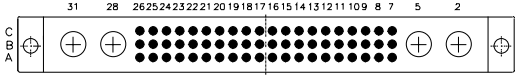
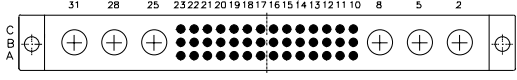
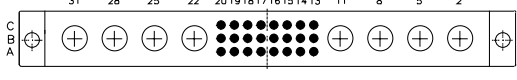
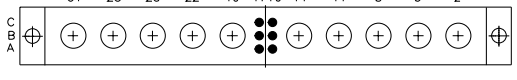
⊕ = Open

● = Loaded

Pressfit Tooling for Type M

Positions	Tool Holder	Upper Tool
78	473344	473161
60	473345	473161
42	473346	473161
24	473347	473161
6	473348	473161

Ordering Information - Pressfit

Female connectors	Type	Terminal Side View	Performance Class	
			107	207
	52+2, AC Loaded		594 132	594 133
	40+4, AC Loaded		594 135	594 136
	28+6, AC Loaded		594 138	594 139
	16+8, AC Loaded		594 141	594 142
	4+10, AC Loaded		023 501	023 502
	78+2, ABC Loaded		593 784	593 785
	60+4, ABC Loaded		593 787	593 788
	42+6, ABC Loaded		593 790	593 791
	24+8, ABC Loaded		593 793	593 794
	6+10, ABC Loaded		023 433	023 434

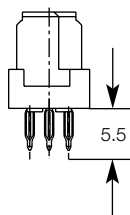
Contact Layout

⊕ = Open
● = Loaded

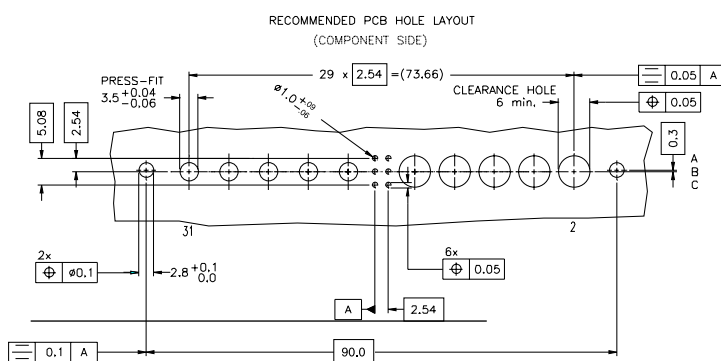
Ordering Information - Pressfit

Modified Pressfit Connectors to be used with Pressfit Power Contacts

Type	Terminal Side View	Performance Class	Part Number
78+2, ABC Loaded		207	033 715
60+4, ABC Loaded			034 792
42+6, ABC Loaded			043 438
24+8, ABC Loaded			034 789
6+10, ABC Loaded			063 569



Clearance Holes are required at positions loaded with Cable Contacts.
Plated Holes are required at positions loaded with PCB Contacts.
See the individual Part Drawing for Plated Drill Hole requirements.



Contact Layout ⊕ = Open
 ● = Loaded

Pressfit Tooling for Type M with Pressfit Power Contacts

Size	Tool Holder	Upper Tool	Lower Tool
78+2	220288	220293	471867
60+4	220288	220292	471867
42+6	220288	220291	471867
24+8	220288	220290	471867
6+10	220288	220289	471867

Special Contacts, Electrical and Mechanical Specifications

Coaxial Contacts		Standard
Technical Specifications		
Temperature Range	DIN EN 60068-1	-55/125 °C
Wave impedance		50 Ω and 75 Ω
Dielectric withstanding voltage 50 Hz	IEC 60512-2 Test 4a	750 V
Insulation resistance	IEC 60512-2 Test 3a	≥ 10 ¹⁰ Ω
Volume resistance		
Inner conductor	DIN 41640-5 Test 2b	≤ 6 mΩ
Outer conductor		≤ 3 mΩ
Working frequency		max. 3 GHz
Reflection factor	DIN 47275-3	max. 0.05 to 1 GHz max. 0.07 to 4 GHz max. 0.10 to 10 GHz
Materials		
Outer Conductor		Cu Alloy
Spring contact part		Cu Be hardened
Insulation part		PTFE
Crimp Sleeve		Cu

PERFORMANCE CLASSES

Class 1 Meets the requirements of DIN 41626. Internal conductor and external conductor gold-plated. Performance class 1 ≥ 500 mating cycles.

Class 2 As per performance class 1 but performance class 2 ≥ 400 mating cycles.

High Power Contacts	Standard	
Technical Specifications		
Temperature Range	DIN EN 60068-1	-55/125 °C
Current-Carryng Capacity	DIN 41640-3 Test 5b	30 A at 70° C
Dielectric withstanding voltage 50 Hz	IEC 60512-2 Test 4a	2500 V
Volume resistance	DIN 41640-5 Test 2b	≤ 1 mΩ
Materials		
Male Contact		Cu Alloy
Female Contact		Cu Be hardened

PERFORMANCE CLASSES

Class 1 Meets the requirements of DIN 41626. Contacts are gold-plated. Performance class 1 ≥ 500 mating cycles

Class 2 As per performance class 1 but performance class 2 ≥ 400 mating cycles.

Special Contacts, Coaxial and High Power

These special contacts, available in both Coax and High Power are inserted into the empty “power ports” provided in the Type M connector. The special contacts must be ordered separately as they are typically crimped or soldered onto the cable before insertion into the connector housing.

The coax contacts are available in 50 and 75 ohm in both right angle and straight configurations. ERNI offers contacts that can be crimped or soldered to cable or even soldered directly onto the PC board.

The power contacts are available in 10, 20 and 40 amps. They can be soldered directly to the board or soldered or crimped to cable. Again, they are offered in both right angle or straight. Special power versions are also available to pressfit into the board. The press-fit contacts are designed to be used with the modified female connectors and to sit flush on the board.

Both the coax and high power contacts are simply snapped into the housing. No special tooling is required for insertion with the exception of the pressfit power contact. A pressfit tool is required to press the entire assembly with the power contact into the board. An extraction tool is available if it would become necessary to remove any one of the special contacts.

Coaxial Contacts For DIN Backplane Connectors

P/N	RATING	CLASS	DESCRIPTION	CABLE	
053 400	50 ohm	1	Straight, double braided	RG316 DB	
594 213	50 ohm	1	Straight	RG174/U, RG188A/U, RG316/U	
053 408	75 ohm	1	Straight	RG179B/U, RG187A/U	
594 215	50 ohm	1	Right Angle	RG174/U, RG188A/U, RG316/U	
913 549	50 ohm	2	Right Angle for .125" panel	RG174/U, RG188A/U, RG316/U	
064 757	50 ohm	1	Right Angle, thick back-plane, double braided	RG316 DB	
*064 312	50 ohm	2	Straight, 3 leg (sits flush on PCB)	PCB	

* To be used with Modified Female Connectors shown on page 13.

Coaxial Contacts For DIN Daughter Card Connectors

P/N	RATING	CLASS	DESCRIPTION	CABLE	
053 395	50 ohm	1	Straight, double braided	RG316 DB	
594 207	50 ohm	1	Straight	RG174/U, RG188A/U, RG316/U	
053 410	75 ohm	1	Straight	RG179B/U, RG187A/U	
594 209	50 ohm	1	Right Angle	RG174/U, RG188A/U, RG316/U	
053 412	70 ohm	1	Right Angle	RG179B/U, RG 187A/U	
594 211	50 ohm	1	Right Angle, 5 leg	PCB	
914 377	75 ohm	2	Right Angle, 5 leg	PCB	



Special Contacts, Coaxial and High Power

Power Contacts For DIN Backplane Connectors

P/N	RATING	CLASS	DESCRIPTION	CABLE
594 172	10 amp	1	Solder	Awg 16-20
594 174	20 amp	1	Solder	Awg 12-16
594 176	40 amp	1	Solder	Awg 8-12
594 178	10 amp	1	Crimp	Awg 16-20
594 180	20 amp	1	Crimp	Awg 12-16
594 182	40 amp	1	Crimp	Awg 8-12
913 637	40 amp	2	Straight, 1 leg, 5.5 mm diameter	PCB

Pressfit Power Contacts For DIN Backplane Connectors

P/N	Rating	Class	Description	Plated PCB Hole Diameter	Drilled PCB Hole Diameter
034 190	20 amp	2	Straight, FD	3.0 + .04 / - .06	3.1 + 0 / - .03
*044 639	40 amp	2	Straight, Pressfit	3.5 + .04 / - .06	3.6 + 0 / - .03

* To be used with Modified Female Connectors shown on page 13.

Power Contacts For DIN Daughter Card Connectors

P/N	RATING	CLASS	DESCRIPTION	CABLE
594 221	10 amp	1	Solder	Awg 16-20
594 223	20 amp	1	Solder	Awg 12-16
594 225	40 amp	1	Solder	Awg 8-12
594 227	10 amp	1	Crimp	Awg 16-20
594 229	20 amp	1	Crimp	Awg 12-16
594 231	40 amp	1	Crimp	Awg 8-12
053 430	20 amp	1	EMLB/Crimp	Awg 12-16
913 596	20 amp	2	EMLB/Crimp	Awg 12-16
594 170	10 amp	1	Right Angle, 1 leg	PCB
594 168	40 amp	1	Right Angle, 1 leg, .200" sq. FTPT	PCB
913 716	40 amp	2	Right Angle, 4 leg, EMLB	PCB

Additional High Power contacts in Performance Class 2 on request

Tooling

High-Power Contacts

Hand tool for crimp contacts
Contact Locator

Order No. **594 184**
Order No. **914 004**



Coaxial Contacts

Hand tools for crimp contacts
Insert for crimping tools

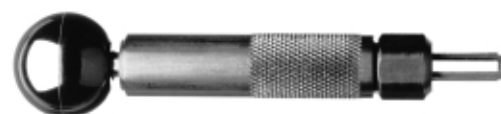
Order No. **594 219**
Order No. **594 220**



Extraction Tool For Coaxial And High-Power Contacts

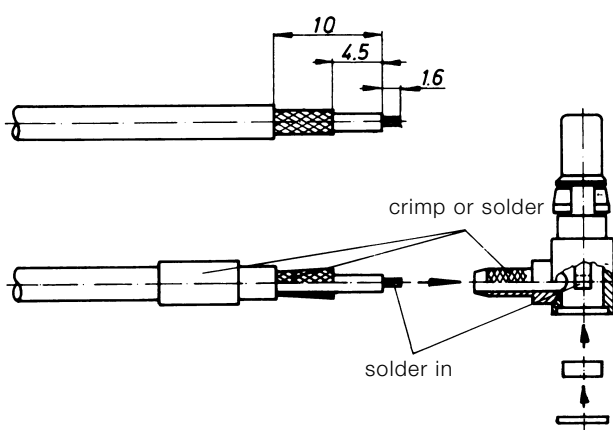
For replacing special contacts in
male or female connectors
Replacement inserts for press-out tool

Order No. **594 233**
Order No. **433 222**

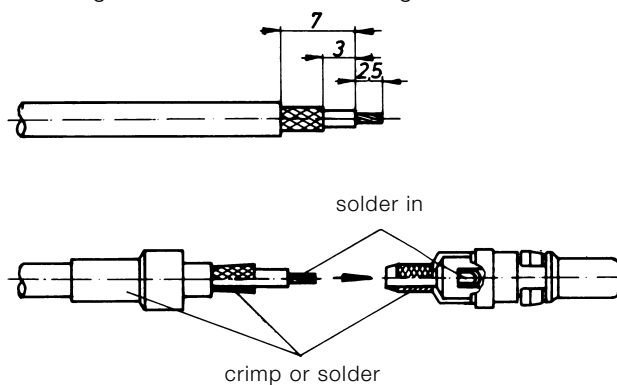


Assembly Instructions For Cable Connections

For Angled Coaxial Contacts Mounting



For Straight Coaxial Contacts Mounting



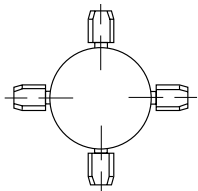
Coding Systems

ERNI's Type M connector is one of the few Type M connectors in the industry that offer a coding feature. This system was developed to eliminate the insertion of a daughter card into the wrong slot of a card cage, which could cause destruction of sensitive electronic components.

With the aid of a special tool, up to 8 recesses can be cut into the male connector half, while recesses are already provided in the female connector. Small wedges, coding tabs, can be inserted into the female to match the cutouts in the male connector.

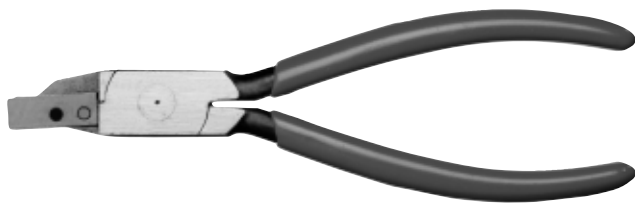
Four coding tab assembly

Part Number: **033 014**

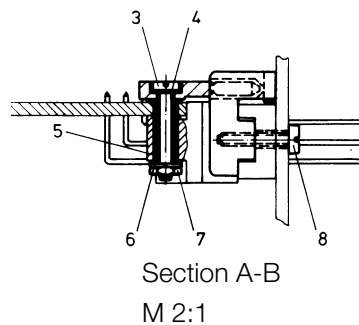
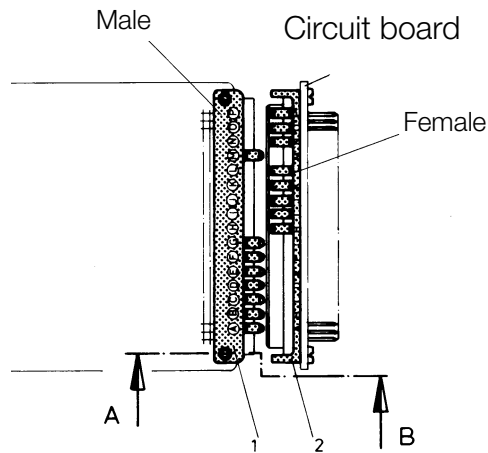


Tool for breaking out coding positions on the male connector

Part Number: **473 270**



CODING STRIPS — MALE AND FEMALE

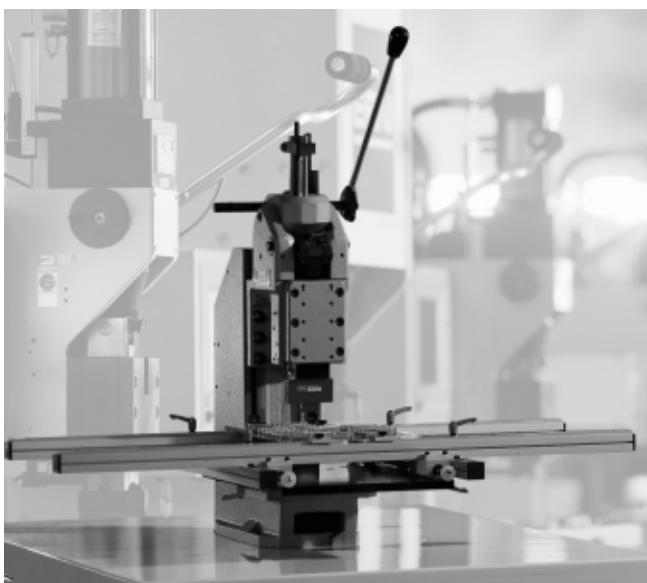


Ordering information

Pos	Description	Drg. No.	Remarks
1	Coding strip Male	083 502 (PBTB)	mount after solder assembly
2	Coding strip Female	083 506 (PBTB)	
3	Cheese-head screw	M 1.6 x 12 DIN 84	not included in supply
4	Washer	A 1.8 DIN 125	
5	Rivet		
6	Spring washer	A 1.7 DIN 137	
7	Hexagonal nut	M 1.6 DIN 934	
8	Self-tapping screw	B 2.2 x 9.5 DIN 7971	

Application Tooling

EPC 20
ERNIPRESS CENTER
Hand Lever Press



EPC 21
ERNIPRESS CENTER
Hydro Pneumatic Press



EPC 22
ERNIPRESS CENTER
Hydro Pneumatic Press With Industrial PC



EPC 24
ERNIPRESS CENTER
Hydro Pneumatic Press With Industrial PC
For Network Integration





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023 446	11	473 347	11	594 114	9	594 209	15
023 501	12	473 348	11	594 115	9	594 211	15
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023 624	7	593 761	10	594 118	9	594 215	15
023 625	7	593 763	10	594 120	9	594 219	17
023 626	7	593 764	10	594 121	9	594 220	17
023 627	9	593 766	10	594 123	9	594 221	16
023 628	9	593 767	10	594 124	9	594 223	16
023 629	9	593 769	10	594 126	9	594 224	16
023 630	9	593 770	10	594 127	9	594 225	16
023 631	10	593 772	10	594 129	9	594 227	16
023 632	10	593 773	10	594 130	9	594 229	16
023 633	10	593 775	10	594 132	12	594 231	16
024 200	10	593 776	10	594 133	12	594 232	16
024 201	7	593 778	10	594 135	12	594 233	17
033 014	18	593 779	10	594 136	12	913 549	15
033 715	13	593 781	10	594 138	12	913 637	16
034 190	16	593 782	10	594 139	12	913 596	16
034 789	13	593 784	12	594 141	12	913 716	16
034 792	13	593 785	12	594 142	12	914 004	17
043 438	13	593 787	12	594 144	10	914 377	15
044 639	16	593 788	12	594 145	10		
053 395	15	593 790	12	594 147	10		
053 400	15	593 791	12	594 148	10		
053 408	15	593 793	12	594 150	10		
053 410	15	593 794	12	594 151	10		
053 430	16	593 796	11	594 153	10		
063 569	13	593 797	11	594 154	10		
064 312	15	593 799	11	594 156	7		
064 757	15	593 800	11	594 157	7		
083 502	18	593 802	11	594 159	7		
083 506	18	593 803	11	594 160	7		
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