

# CIRCULAR CONNECTORS



SIGNAL // POWER // INDUSTRIAL ETHERNET



# HUMMEL — smart & reliable





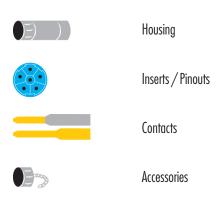
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## Further information can be found in our Technical Centre at www.hummel.com



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- // Crimping, assembly, disassembly
- // Crimping tool instructions for use
- // Crimp settings
- // Coding
- // Certificates & approvals
- // Derating curves

https://www.hummel.com/en/circular-connectors/technical-center



HUGE RANGE: M 12 - M 40



M 12 Power

M 23 Signal Connectors **Power Connectors** 

# CIRCULAR CONNECTORS

PROFINET

Customized Solutions

Industrial Ethernet M 16 M 23 RJ 45

M 40

M 23 Hybrid

TWILOCK

Moulded Cordsets











File-No. E 213337

# (Hummel) TWILOCK / TWILOCK-S

- // Quick Connect with Polygon Lock
- // Multi functional: Ideal with TWILOCK and screw connection
- // Easy handling, exceptional functionality
- // Resistant to vibration



Clearly defined: OPEN — CLOSE



Multi functional: Special thread allows use of TWILOCK and screw connection



Locking with a slight rotation or release of the connection









## M16 HC: Same performance, less space required

Efficiency, sustainability and miniaturization are present industrial trends. Applications are getting more compact while in decreasing installation spaces the same or even more power has to be accommodated. The high performance-connector M16 HC fully meets these performance requirements. This connector is about one third smaller than the comparable M23 connectors, but at the same time capable of transmitting the same power-currents. The M16-HC-Connectors are available in numerous housing designs such as overmoulded, PCB or stainless steel versions.

- // High power transmission up to 25 A
- // Less space required
- // Cost-optimised assembly directly on the PCB possible
- // UL approval
- // Higher energy efficiency

	Signal	Power DC	Power AC
Number of contacts	4	4	3+PE
Contact-Ø [mm]	0,8	1,6	1,6
AWG [mm²]	0,08 - 0,34	2,5	2,5
Nominal current	5 A	25 A	25 A
Nominal voltage	48 V	48 V	320 V





#### **TWINTUS: Connector 4 small Drives**

The TWINTUS connectors combines high power performance with low space requirements in only one housing. Herewith TWINTUS offers an economically attractive solution even to the smallest servomotors. Based on the dimensions of only 22 mm height and with a width of 41 mm it can be assembled in tight and limited spaces, fully fullfilling the requirements of the miniaturization trend.

The connector-systems of HUMMEL are offering a modular setup. Housing and inserts can be combined within their particular product line. For TWINTUS this results in plenty of combinations with the available M16 inserts. In addition, M12 sockets are available for signal transmission in 8-pin or 12-pin version.

- // Minimized Size
- // Free choice of Signal and Power Inserts
- $/\!\!/$  Flange 20 x 20 and 25 x 25





## TECHNICAL INFORMATION

#### Rated curren

The rated current is the current that each contact of a connection can simultaneously transfer continuously.

#### Rated voltage

The **rated voltage** is the voltage for which a connector is designed. In operation, the rated voltage is the maximum continuously applied voltage.

#### Functional earth (FE)

Functional earth is an electrical conductor to ensure the functions and thus normal operation of installations and devices.

Functional earthing conductor: Earthing conductor provided for functional earthing.

**Functional earthing:** Earthing a point or points in a system or in an installation or in equipment, for purposes other than electrical safety.

#### Protective earth (PE)

Protective earth is an electrical conductor provided for the purposes of sofety, for protection against electric shock. It is also called an earth conductor, earthing or "earth" for short. Its task in electric systems is to protect living beings in case of a fault.

PE conductor: Protective earth for the purposes of protective earthing

**Protective earthing:** Earthing a point or points in a system or in an installation or in equipment for purposes of electrical safety.

#### Contact overlapping

The **contact overlapping** or wipe length of connectors generally denotes the possible overlap area of the pin and receptacle. The greater this area, the more reliable the connection is due to higher possible tolerance allowance (tolerance compensation)

To ensure the IP degree of protection and the necessary contact overlapping, at HUMMEL the cable and coupling connectors must be fully engaged and locked.

#### Test voltage

The **test voltage** is the voltage that a connector must withstand under certain specifications without flashover or disruptive discharge via or through the insulation and at least corresponds to the r.m.s. withstand voltage in EN 61984.

The value of the test voltage is higher than the rated withstand voltage and serves to verify the dielectric strength of the connector.

#### Connector

Connectors that are designed to be engaged or disengaged in normal use when live or under load. These are also called connectors with breaking capacity (CBC). A classic example in households is the SCHUKO plug (earthed 2-pin plug).

Connectors that are not deemed to be engaged or disengaged in normal use when under load or live are also named COC (connectors without breaking capacity).

HUMMEL connectors are usually classified as COC, i.e. they may not be engaged or disengaged when live or under load!

#### **Mating Cycles**

One insertion and withdrawal (engaging and disengaging) of connectors is called a mating cycle (also called a cycle of mechanical operation or engaging cycle). The number of mating cycles is an important characteristic for connectors and plugs. It defines the life of a connector during which there is no loss in its transfer/transmission quality. The number of mating cycles is influenced above all by the quality of the contact surface. Use of high-quality and durable contact coatings reduces surface abrasion on mating.

#### Pollution degree

The **pollution degree** is a numerical value that indicates the level of pollution expected in the micro-environment and is a parameter used in the design of clearances and creepage distances of electrical equipment. It denotes the potential pollution of an open, unengaged connector in a specific environment. The EN 60664-1 standard differentiates between four categories:

- Pollution degree 1: No pollution or only dry, non-conductive pollution occurs. The pollution has no influence
- Pollution degree 2: Only non-conductive pollution occurs. Occasionally, however, a temporary
  conductivity caused by condensation must be expected. (typical for households, business premises,
  laboratories or test greas.).
- Pollution degree 3: Conductive pollution occurs or dry non-conductive pollution occurs, which becomes
  conductive due to condensation which is to be expected. (typical for industrial firms or workshops.)
- Pollution degree 4: Continuous conductivity occurs due to conductive dust, rain or other wet conditions.
   If connectors are used under a higher pollution degree, the voltage values must be reduced. Contact our technical specialists to find out more.

#### Safety note

In case of operating voltages greater than 50 volt, the connectors listed in this catalogue must be used with conducting housing parts in accordance with the safety provisions of DIN VDE 0100-410; IEC 60364-4-41. These safety provisions specify that relevant connectors may not be engaged or disengaged when live. Otherwise, no protection against electric shock is ensured.

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#### Further information is available on our website:

https://www.hummel.com/en/circular-connectors/technical-center-circular-connectors/aeneral-technical-information



HUMMEL connectors may not be engaged or disengaged when live or under load. To ensure the IP degree of protection (IP rating) and the necessary contact overlapping, the cable and coupling connectors must be fully engaged and locked.



# M 16 CONNECTORS

Traditionally M 16 Connectors are very popular with its users. The reason for that is high capability with a low space requirement. A special version is TWINTUS. This compact connector is able to combine signal and power for small drives within one housing.

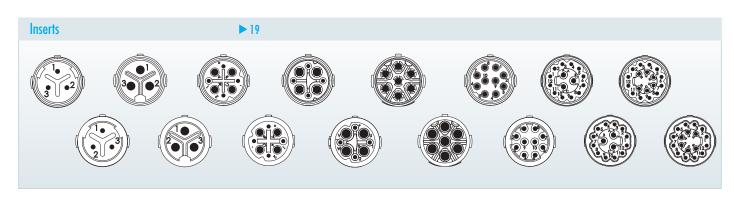
- // M 16 power connector
- // M 16 signal connector
- // TWILOCK, quick release fastener
- // TWINTUS Connector 4 small drives





## **Product overview**









## Technical Data

Mechanical Data	Materials and Technical Data
Housing	Copper-Zinc alloy Die Cast
Housing surface	Nickel plated (Standard), other surface upon request
Inserts (for contacts)	Thermoplastic Polyamid PA 6 (Nylon 6/6), PBT Fire protection class V-0
Contacts	Brass Alloy
Contact surface at point of contact	Nickel and gold plated (0,25 µm)
Minimum mating cycles	>1000*
Seals / O-Rings	Buna-N standard, optional Viton® (FPM/FKM) (Viton is a registered trademark of DuPont)
Temperature range	-40 °C − 125 °C (-40 °F − 257 °F)
Type of contacts	Crimp, dip-solder (PCB) (for printed circuit boards)
Protection	IP 67 / IP 69K per EN 60 529 (connected)
Cable diameter range	2 - 11 mm (.0843")

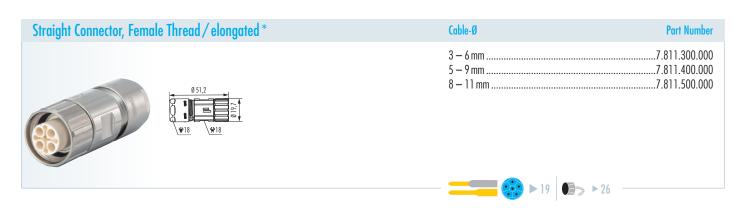
Number of positions	3 (3 x 1 mm)	3 (3 x 2 mm)	4 + 3 + F	PE/320V	4+3+1	PE/600V
Number of contacts	3	3	4	4	4	4
Contact-Ø [mm]	1	2	0,8	1,6	0,8	1,25
AWG [mm <sup>2</sup> ]	0,14 - 1	0.5 - 2.5	0.08 - 0.34	0,34 - 1,5	0.08 - 0.34	0.5 - 1.5
Nominal current 1) [A]	8	20	5	16	5	16
Nominal voltage 2) [V~] *)	250	250	160	320	160	600
Rated Surge Voltage [V~]	2500	2500	2500	2500	2500	4000
Test voltage (Breakdown voltage) 3) [V~]	1500	1500	1500	1500	1500	2500
Insulation resistance $[\Omega]$	>108	>108	>1	108	>	08
Max. contact resistance $[m\Omega]$	3	3	3	3	3	3
Number of positions		6+PE	10	12 -	+ 3	18
Number of contacts		7	10	12	3	18
Contact-Ø [mm]		1,25	1	0,8	1,25	0,8
AWG [mm <sup>2</sup> ]		0,5 - 1,5	0,14 - 0,75	0.08 - 0.34	0.5 - 1.5	0.08 - 0.34
Nominal current 1) [A]		16	8	3	10	3
Nominal voltage 2) [V~] *)		500	40	24	60	24
Rated Surge Voltage [V~]		2500	800	800	1500	800
Test voltage (Breakdown voltage) 3) [V~]		1500	500	400	840	400
Insulation resistance $[\Omega]$		>108	> 108	>1		>108
Max. contact resistance $[m\Omega]$		3	3	3	3	3
Number of positions Milet			4 + 3 +	PE / 320 V (HC)	4 + 4	(HC)
Number of contacts			4	4	4	4
Contact-Ø [mm]			0,8	1,6	0,8	1,6
AWG [mm <sup>2</sup> ]			0.08 - 0.34	2,5	0.08 - 0.34	2,5
Nominal current 1) [A]			5	25	5	25
Nominal voltage <sup>2)</sup> [V~] *)			48	320	48	48 (DC)
Rated Surge Voltage [V~]			2500	2500	2500	2500
Test voltage (Breakdown voltage) 3) [V~]			1500	1500	1500	1500
Insulation resistance $[\Omega]$			>1	108	>	08
Max. contact resistance $[m\Omega]$			3	3	3	3

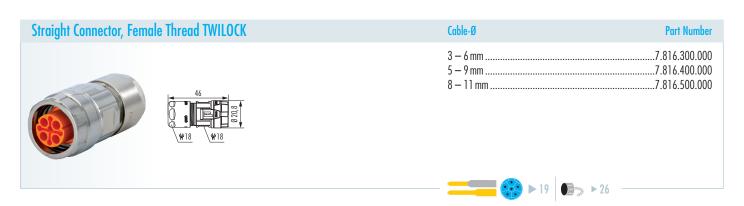




### **Housings**













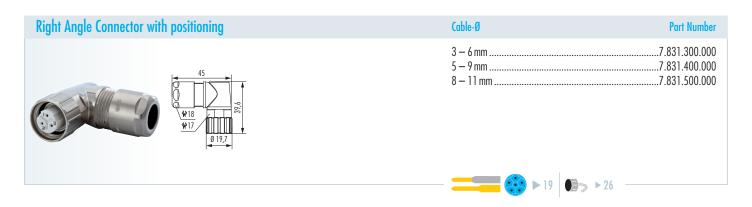


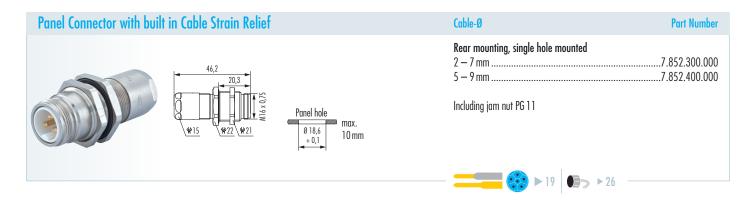


## Housings





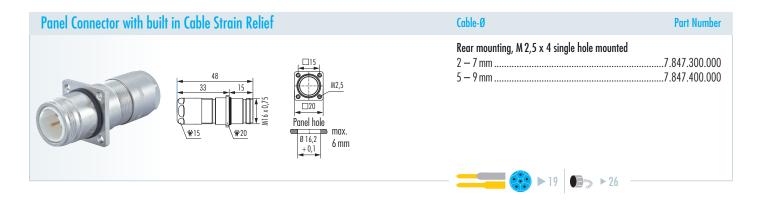


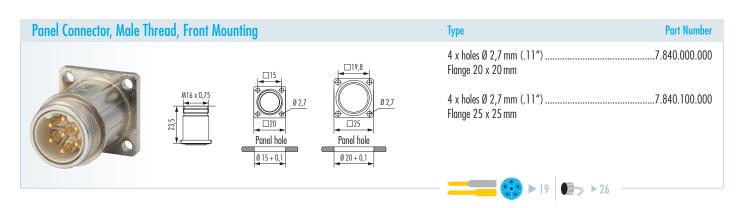


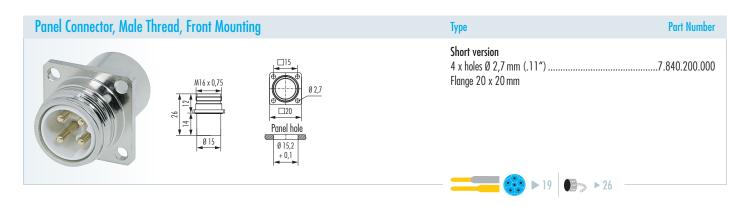


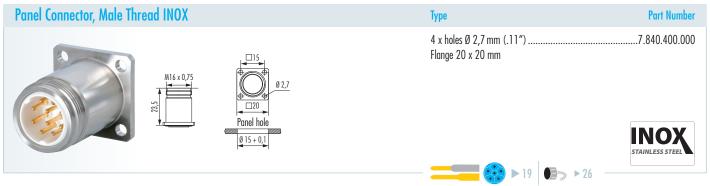


## **Housings**









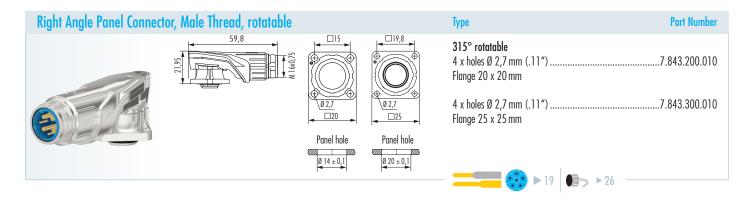


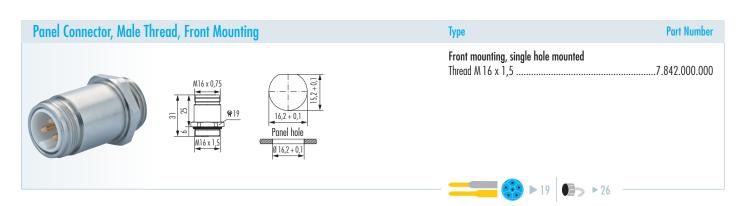


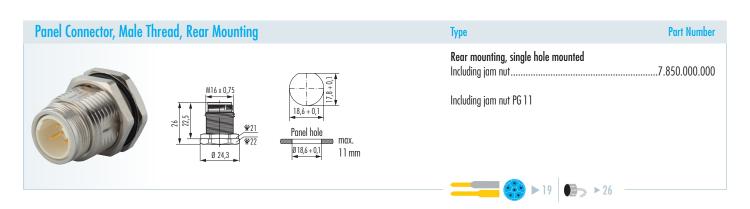


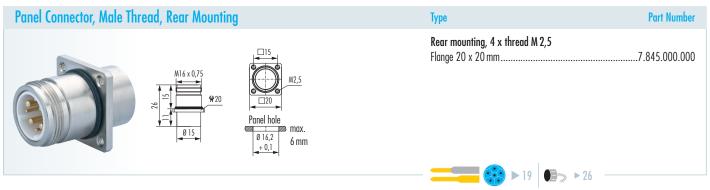


### Housings





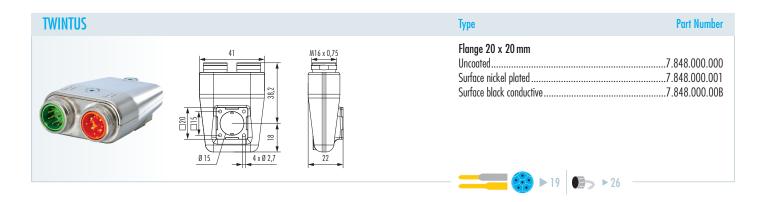


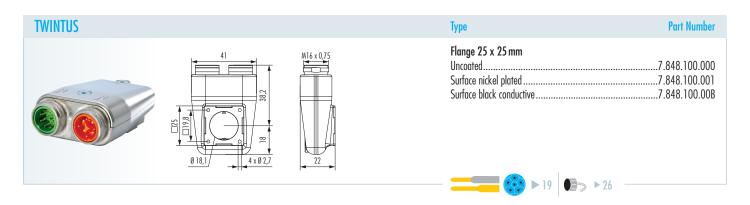


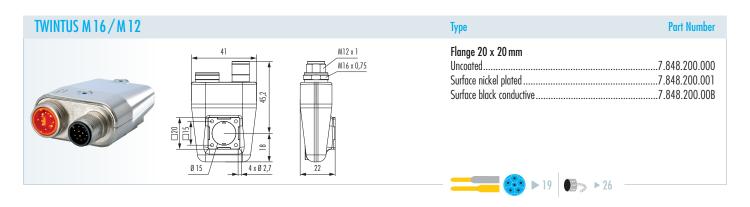




## **Housings M 16**















Inserts 3-pole (3 x 1 mm)	Туре	Part Number	Part Number
	Insert without contacts	<b>Pins</b> 7.003.903.101	Sockets7.003.903.102
Insert pin mating view	Insert with dip solder contacts Length 10 mm	7.001.903.127	7.001.903.108
	Insert with dip solder contacts Length 17 mm	7.001.903.137	7.001.903.118
Insert socket mating view	Required Contacts 3 x 1 mm	7.010.901.0017.010.9	01.002/7.010.901.012
σ, ω, μ, ω,			
	<b>→</b> 24		







Inserts 4+3+PE, 320 V	Туре	Part Number	Part Number
	Insert without contacts	Pins 7.003.943.101	<b>Sockets</b> 7.003.943.102
Insert pin	mating view Insert RAL 2003 (DESINA orange) without con	ntacts7.053.943.101	7.053.943.102
	Insert with dip solder contacts Length 10 mm	7.001.943.127	7.001.943.108
	Insert with dip solder contacts Length 17 mm	7.001.943.137	7.001.943.118
Insert soci	Required Contacts           4 x 0,8 mm	7.010.980.8017.010.981.601	7.010.980.802 7.010.981.602
	Version HC — Required Contacts		
7,6	4 x 0,8 mm4 x 1,6 mm	7.010.980.8017.011.981.601	7.010.980.802 7.011.981.602
7 4 4 5 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6			M16HC



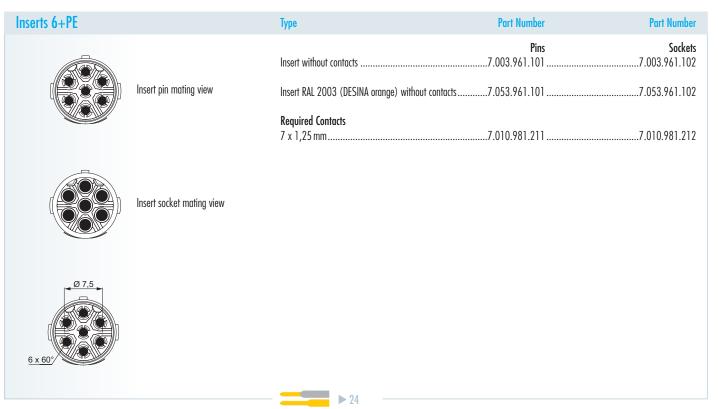




# (HIMME)

Inserts 4+3+PE, 600 V		Туре	Part Number	Part Number
		Insert without contacts	<b>Pins</b> 7.003.908.101	Sockets7.003.908.102
	Insert pin mating view	Insert RAL 2003 (DESINA orange) without contacts	7.053.908.101	7.053.908.102
		Required Contacts	7 010 000 011	7 010 000 014
		4 x 0,8 mm 4 x 1,25 mm	7.010.980.811	7.010.980.814
	Insert socket mating view			
7,6 4,5		▶ 24		

<sup>1)</sup> under development



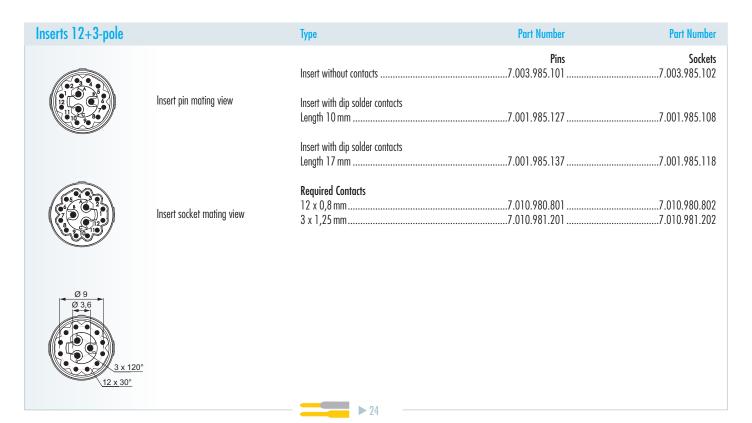
<sup>1)</sup> under development





Inserts 10-pole		Туре	Part Number	Part Number
7 0 0 0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		Insert without contacts	<b>Pins</b> 7.003.910.101	Sockets7.003.910.102
	Insert pin mating view	Insert RAL 2003 (DESINA green) without contacts	7.053.910.101	7.053.910.102
		Insert with dip solder contacts Length 10 mm	7.001.910.127	7.001.910.108
Insert s		Insert with dip solder contacts Length 17 mm	7.001.910.137	7.001.910.118
	Insert socket mating view	Required Contacts 10 x 1 mm	7.010.981.001	7.010.981.002
2,9  2,7				
2.7 4 6.05 9.05 7.05				
		▶ 24		

<sup>1)</sup> under development







# (Hummel)

Inserts 18-pole	Туре	Part Number	Part Number
	Insert without contacts	<b>Pins</b> 7.003.988.101	<b>Sockets</b> 7.003.988.102
Insert pin	mating view Insert RAL 2003 (DESINA g	green) without contacts7.053.988.101	7.053.988.102
	Insert with dip solder contac Length 10 mm	cts7.001.988.127	7.001.988.108
	Insert with dip solder contac Length 17 mm	cts7.001.988.137	7.001.988.118
Insert soci	nsert socket mating view  Required Contacts  18 x 0,8 mm	7.010.980.801	7.010.980.802
2,3			
1.6 0.6 12 x 30°	▶24		

Inserts M 12 for TW	INTUS M 16 / M 12 (8-poles)	Туре	Part Number
3 • 8 • 7 4 • • 7	Insert pin mating view	Insert with solder contacts	Pins A712-7.001.908.103

Inserts M 12 for TWINTU	IS M 16 / M 12 (12-poles)	Туре	Part Number
3 2 U 9 4 11 9 9 4 10 9 9 4 10 9 9 6 7	Insert pin mating view	Insert with solder contacts	Pins A712-7.001.912.103



## Contacts

Contacts	Туре	Crimp Range	Part Number
	Crimp pin 0,8 mm, machined	0,08 — 0,34 mm² (AWG 28 — 22)	7.010.980.801
	Crimp socket 0,8 mm, machined	0,08 — 0,34 mm² (AWG 28 — 22)	7.010.980.802
	Crimp pin 0,8 mm, machined	0,08 — 0,34 mm² (AWG 28 — 22)	7.010.980.811
	Crimp socket 0,8 mm, machined	0,08 — 0,34 mm² (AWG 28 — 22)	7.010.980.814
	Crimp pin 1 mm, machined	0,08 — 0,75 mm² (AWG 28 — 18)	7.010.981.001
	Crimp socket 1 mm, machined	0,08 — 0,75 mm² (AWG 28 — 18)	7.010.981.002
	Crimp pin 1 mm, machined	0,14 — 1 mm² (AWG 26 — 17)	7.010.901.001
	Crimp socket 1 mm, machined	0,08 — 0,56 mm² (AWG 28 — 20)	7.010.901.012
	Crimp socket 1 mm, machined	0,34 — 1 mm² (AWG 22 — 17)	7.010.901.002
	Crimp pin 1,25 mm, machined	0,5 — 1,5 mm² (AWG 20 — 16)	7.010.981.201
	Crimp socket 1,25 mm, machined	0,5 — 1,5 mm² (AWG 20 — 16)	7.010.981.202





## Contacts

Contacts	Туре	Crimp Range	Part Number
	Crimp pin 1,25 mm, machined	0,34 — 1,5 mm² (AWG 20 — 16)	7.010.981.211
	Crimp socket 1,25 mm, machined	0,34 — 1,5 mm² (AWG 20 — 16)	7.010.981.212
	Crimp pin 1,6 mm, machined	0,34 — 1,5 mm² (AWG 22 — 16)	7.010.981.601
	Crimp socket 1,6 mm, machined	0,34 — 1,5 mm² (AWG 22 — 16)	7.010.981.602
	Crimp pin 2 mm, machined	1,0 — 2,5 mm² (AWG 17 — 14)	7.010.982.001
	Crimp socket 2 mm, machined	1,0 — 2,5 mm² (AWG 17 — 14)	7.010.982.002
	M16HC		
	Crimp pin HC 1,6 mm, machined	2,5 mm²	7.011.981.601
	Crimp socket HC 1,6 mm, machined	2,5 mm²	7.011.981.602





## Accessories

Accessories	Туре	Part Number
	Plastic protective cap for connectors with male thread with female thread	
	Brass protective cap for connectors with female thread	7.010.900.163
	INOX protective cap for connectors with female thread	7.010.904.163
	Brass protective cap for connectors with male thread	7.010.900.162
	INOX protective cap for connectors with male thread	
	Brass protective cap with chain for connectors with female thread Length 70 mm	7.010.9S0.705 <sup>1</sup>
	Brass protective cap with chain for connectors with male thread Length 70 mm	7.010.9S0.704
	Crimp tool for manual crimping of machined crimp contacts for signal connectors M 16 and M 23	7.000.900.904
	Locator for Crimping tool for crimp contact Series M16, separateLocator for Crimping tool for crimp contact Series M16, B-Positions, separate	

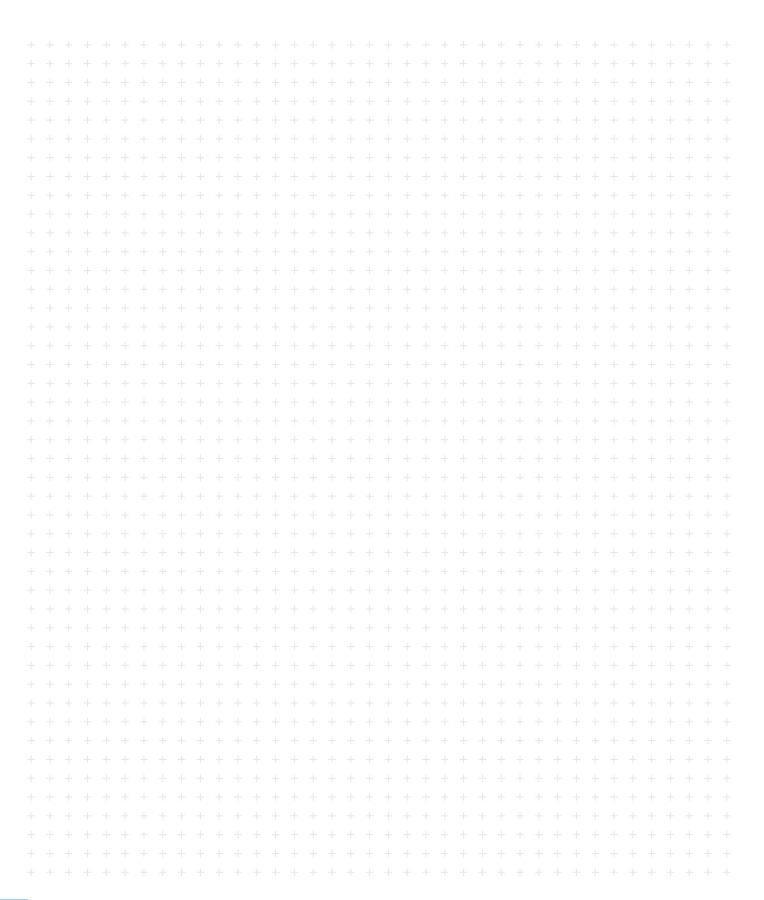


Accessories

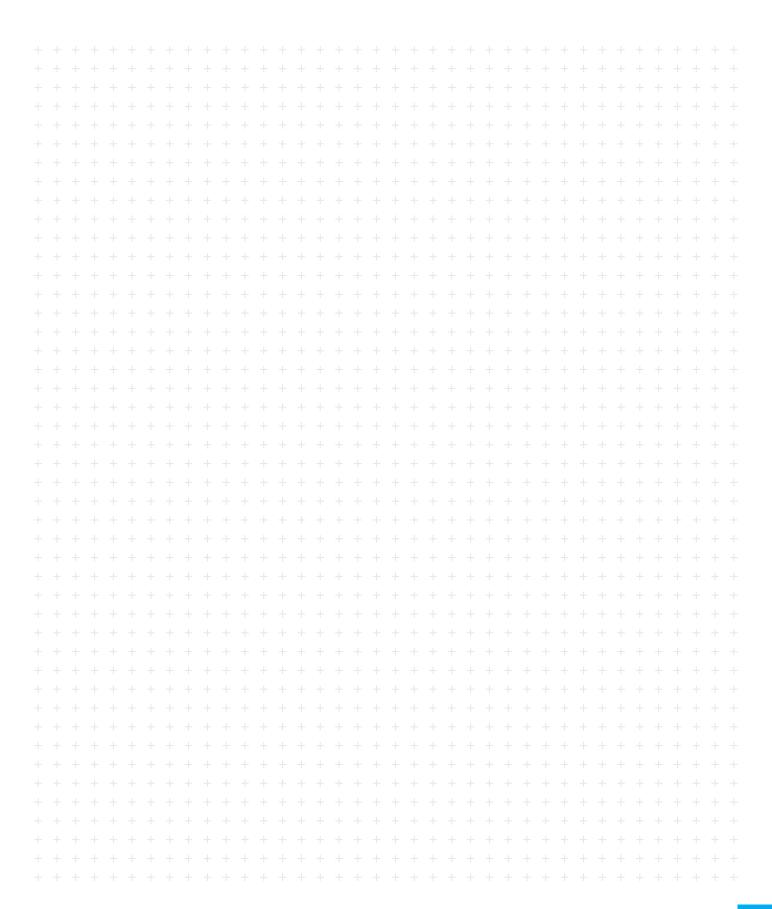


Accessories	Туре	Part Number
	Conduit adaptor Poleon DN 12	7.010.900.202
TWINTILES	Plastic protective cap for TWINTUS TWINTUS M 16 TWINTUS M 16 / M 12	
	Disassembly Tool for crimp contacts 1,25 mm	7.010.900.151
M121	Tool Adapter for tightening or loosening knurled nuts for M 12 Power/M 16	7.010.900.191
M12 t	Tool Adapter for tightening or loosening knurled nuts M12 Power, cross knurl	7.010.900.193
	Screw Tool, adjustable 0.5 — 1.7 Nm	7.010.900.190









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# **ELECTRIC COMPONENTS**

## Cable Glands

Polyamide-, Brass- and Stainless steel, EMC-connections, Protection Ex e, Ex d, Ex ta



## **Circular Connectors**

M 12 Power to M 40, INOX, TWILOCK, Industrial Ethernet, Power, Signal, Hybrid-Connector, Moulded Cordsets





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