Brad® Ethernet

Brad® ethernet products provide solutions that enable the world’s most popular Local Area Network to be reliably utilized on the factory floor or in harsh commercial environments. The Brad line offers a large choice of products including physical media, IP67 I/O modules, unmanaged and managed switches, powerful network interfaces, industrial gateways and protocol development kits to connect the most popular Ethernet industrial networks and fieldbuses. Brad Ethernet products give the user a complete communication and connectivity solution to design a large scope of industrial applications—PC-Based control, supervision, data storage, protocol bridging, etc.—to suit all industry sectors.
Brad® Ethernet Software Development Kit for PROFINET IO

112106
IO-Controller and IO-Device

Features and Benefits
- Master and slave protocol stacks can address both controller (master) or device (slave) manufacturers who want to implement PROFINET networks
- Brad stacks have no hardware and OS dependencies and can be easily implemented on a large range of hardware system platforms or software operating systems
- Sample applications with source codes are provided and can be quickly and easily implemented
- Brad stacks are successfully tested with PNO conformance test tools
- Molex can provide stack training, technical support and engineering development for both hardware and software design

Description
- PROFINET IO Class-A/Class-B (RT Class-1, RT Class-2)
- Portable on any real time or not operating systems implementing multithread (Windows, VxWorks, Linux, QNX, ThreadX, eCOS, etc)
- Hardware: Compatible with 32-bit microprocessors
- Multiplatform (Intel, ARM, PowerPC, Fido, Texas DSP, etc)
- Support of Intel and Motorola formats
- Consistent IO data access through shared memory (configurable or automatic) or messaging access (API)

Conformance
- Conforms to PROFINET IO specifications v2.2
- Molex is an active member of PROFINET technical working groups

Included Hardware/Software
- PROFINET IO—Controller Stack
  - Supported Services: Context management, configuration, IO data, alarm, and diagnostic
  - Manage up to 128 IO-Devices
  - Cyclic Data Exchange: Up to 1440 Input bytes and 1440 Output bytes per IO-Device slot
  - IP Device Configuration: DCP or Local
  - LLDP (PROFINET MIB)
  - SDK initialization via XML file
  - CD Deliverable: Single product line licensing (with royalties), ANSI C source code, electronic documentation, application samples
- PROFINET IO Device Stack
  - IO Data: Up to 1440 Input bytes and 1440 Output bytes per IO-Device slot
  - GSD File: Yes
  - IP Device Configuration: DCP or Local
  - LLDP (PROFINET MIB)
  - Allows design of fixed and modular device
- OEM Engineering Console
  - Generate IO-Controller stack configuration files (XML format)
  - Automatic IO-Device network detection including module configuration
  - GSD device library management
  - IO-Device commissioning (Set Name, Device blinking, etc.)
  - Integrated diagnostic
  - Windows 32-bit (XP/Vista)
  - OEM customization
  - USB dongle protection
- MRP Client/Manager Stack
  - Manage media redundancy for Ethernet ring topology according PROFINET Class-B
  - CD Deliverable: Single product line licensing (no royalty), ANSI C source code, electronic documentation
  - Does not include PNO MRP patent

Ordering Information

<table>
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<tr>
<th>Engineering No.</th>
<th>Standard Order No.</th>
<th>Description</th>
</tr>
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<tbody>
<tr>
<td>SDK-PFN-DEV</td>
<td>112106-5001</td>
<td>PROFINET IO-Device Software Development Kit</td>
</tr>
<tr>
<td>SDK-PFN-DEV-UPD</td>
<td>112106-5002</td>
<td>PROFINET IO-Device SDK Maintenance Update</td>
</tr>
<tr>
<td>SDK-PFN-COR</td>
<td>112106-5005</td>
<td>PROFINET IO-Controller Software Development Kit—1 License Fee included</td>
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<tr>
<td>SDK-PFN-COR-UPD</td>
<td>112106-5006</td>
<td>PROFINET IO-Controller SDK Maintenance Update</td>
</tr>
<tr>
<td>SDK-PFN-COR-L</td>
<td>112106-5010</td>
<td>PROFINET IO-Controller License Fee</td>
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<tr>
<td>SDK-PFN-COR-CNF-U</td>
<td>112106-5012</td>
<td>PROFINET IO-Controller OEM Configuration Console, USB Dongle, 1 license</td>
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<tr>
<td>SDK-PFN-MRP</td>
<td>112106-5007</td>
<td>Client/Manager Media Redundancy Protocol SDK for PROFINET IO</td>
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Support/Training Information

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<th>Engineering No.</th>
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<tr>
<td>SDK-PFN-EDS</td>
<td>860000-0142</td>
<td>Engineering Development Support for PROFINET stack</td>
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<tr>
<td>SDK-PFN-TRY</td>
<td>860000-0144</td>
<td>Training Support for PROFINET stack</td>
</tr>
</tbody>
</table>
Brad® Ethernet Software Development Kit for EtherNet/IP

112106 Scanner and Adapter

Features and Benefits
- Master and slave protocol stacks can address both controller (master) or device (slave) manufacturers who want to implement EtherNet/IP networks.
- Brad stacks have no hardware and OS dependencies and can be easily implemented on a large range of hardware system platforms or software operating systems.
- Sample applications with source codes are provided and can be quickly and easily implemented.
- Brad stacks are successfully tested with ODVA conformance test tools.
- Molex can provide stack training, technical support and engineering development for both hardware and software design.

Description
- Portable on any real time or not operating systems implementing multithread (Windows, VxWorks, Linux, QNX, ThreadX, eCOS, etc).
- Hardware: Compatible with 32-bit microprocessors.
- Multi platform (Intel, ARM, PowerPC, etc).
- Support of Intel and Motorola formats.
- Consistent process data image access through messaging access (API).

Conformance
- Conforms to ODVA specifications v1.4 and CIP v3.3.
- Molex is an active member of ODVA technical working groups.

Included Hardware/Software
EtherNet/IP Scanner and Adapter
- CIP Features:
  - IO messaging (process data).
  - Explicit messaging (configuration/diagnostic).
- Supported Objects according to CIP Standard:
  - Identity Object.
  - Message Router Object.
  - Assembly Object.
  - Connection Manager Object.
  - Connection Configuration Object.
  - TCP/IP Interface Object.
  - Ethernet Link Object.
- Stack Resolution: Timing resolution in microseconds.
- Application Watchdog.
- Rack Optimization for best performances with PointIO and FlexIO devices.
- CD Deliverable: single product line licensing (no royalties), ANSI C source code, electronic documentation, application samples.

EtherNet/IP Adapter
- CIP Features:
  - IO messaging (process data).
  - Explicit messaging (configuration/diagnostic).
- Supported Objects according to CIP Standard:
  - Identity Object.
  - Message Router Object.
  - Assembly Object.
  - Connection Manager Object.
  - Connection Configuration Object.
  - TCP/IP Interface Object.
  - Ethernet Link Object.
- Stack Resolution: Timing resolution in microseconds.
- Application Watchdog.
- EDS file.
- CD Deliverable: single product line licensing (no royalties), ANSI C source code, electronic documentation, application samples.

OEM Engineering Console
- Generate EtherNet/IP stack configuration files.
- Automatic EtherNet/IP network detection including module configuration.
- ESD device library management.
- Device commissioning.
- Integrated diagnostic.
- Windows 32-bit (XP, Vista).
- OEM customization.
- USB dongle protection.

Ordering Information

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<td>SDK-EIP-ADP</td>
<td>112106-0000</td>
<td>EtherNet/IP Adapter Software Development Kit</td>
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<tr>
<td>SDK-EIP-ADP-UPD</td>
<td>112106-5000</td>
<td>EtherNet/IP Adapter SDK Maintenance Update</td>
</tr>
<tr>
<td>SDK-EIP-SCA</td>
<td>112106-5003</td>
<td>EtherNet/IP Scanner/Adapter Software Development Kit—1 License Fee included</td>
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<tr>
<td>SDK-EIP-SCA-UPD</td>
<td>112106-5004</td>
<td>EtherNet/IP Scanner/Adapter SDK Maintenance Update</td>
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<tr>
<td>SDK-EIP-SCA-L</td>
<td>112106-5009</td>
<td>EtherNet/IP Scanner/Adapter License Fee</td>
</tr>
<tr>
<td>SDK-EIP-CON-CNF-U</td>
<td>112106-5011</td>
<td>EtherNet/IP Scanner OEM Configuration Console, USB Dongle, 1 license</td>
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</table>

Support/Training Information

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<tr>
<td>SDK-EIP-EDS</td>
<td>860000-0141</td>
<td>Engineering Development Support for EtherNet/IP stack</td>
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<tr>
<td>SDK-EIP-TRN</td>
<td>860000-0143</td>
<td>Training Support for EtherNet/IP stack</td>
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</tbody>
</table>
Brad®
Windows Compatible Explicit Messaging Driver for EtherNet/IP
112106
EtherNet/IP EM Driver

Features and Benefits
• Fastest and easiest solution to implement EtherNet/IP Explicit Messaging communication on PC-based systems
• User friendly library, no EtherNet/IP knowledge required
• Typical applications:
  - Engineering tool
  - Commissioning console
  - Diagnostic and Monitoring tools
  - HMI/Scada applications
  - Custom software

Description
• EIP_Driver provides an Application Programming Interface (API) that simply send/receive buffer of data on the network with remote EtherNet/IP EM Server devices
• The EIP_Driver manages the complete CIP communication (connection/reconnection, etc) so the developer needs no special expertise in the EtherNet/IP protocol.

Included Hardware/Software
• IO Data: Up to 1440 Input bytes and 1440 Output bytes per IO-Device slot
• Automatic generation of GSD file based on user configuration ready to use in PROFINET I/O-Controller engineering software
• Allows design of fixed and modular device
• IP Device configuration: DCP or Local
• Software Protection

Conformance
• Fully compatible with EtherNet/IP Conformance Test Suite Version A7
• Molex is an active member of ODVA (Open DeviceNet® Vendor Association) technical working groups

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<tr>
<td>SDK-EIP-EML</td>
<td>112106-5008</td>
<td>EtherNet/IP Explicit Messaging DLL library, Client mode</td>
</tr>
</tbody>
</table>

Brad®
Windows Compatible Multi-Slave Driver for PROFINET
112027
PROFINET Multi IO-Device

Features and Benefits
• Connect a PC under Windows to PROFINET controller
• Use standard Ethernet card
• Support PROFINET I/O Real-Time communication
• Support multi-slave functionality on single PC by using multiple Ethernet ports
• Typical applications:
  - HMI/Operator panel
  - Workbench
  - I/O simulation

Description
• Conform to PROFINET I/O v2.2 specifications
• Support up to 32 IO-Device connections in a single PC
• Support PROFINET Alarms
• Engineering Tools:
  - Configuration console
  - Test and diagnostic tools
• Includes Windows Library (DLL)

Included Hardware/Software
• Send and receive explicit messages
• Client mode (Server mode on request)
  - Supports connected and unconnected messages
  - Supports synchronous and asynchronous modes
• Support of ListIdentify service to detect all EtherNet/IP stations connected to the network
• DLL library for Windows 32-bit (Seven/XP/Vista)
  - Designed to be used in multi-threaded applications
  - Several applications can use the EIP_Driver simultaneously
• DLL library can be statically or dynamically linked with the target application
• CD Deliverable: single product line licensing (no royalty), ANSI C source code, electronic documentation, application samples

Conformance
• Conform to PNO conformance test tool (PN Tester)
• Molex is an active member of PROFINET technical working groups

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<tbody>
<tr>
<td>DRL-EPN-SWF-S</td>
<td>112027-5007</td>
<td>Windows PROFINET Multi IO-Device Driver, Software protection key</td>
</tr>
</tbody>
</table>
Brad® Direct-Link®
Windows Compatible
Protocol Drivers

112027
Ethernet TCP/IP and Serial

Features and Benefits
• Direct-Link™ SW1000 provides data acquisition between Windows PC-based applications and industrial devices connected to Ethernet TCP/IP
• Economic solution; well suited for embedded and light architecture (laptop, panel PC, MMI)
• 100% software solution; use PC COM port or integrated Ethernet interface (3COM, NE2000)
• Wide variety of open and vendor specific industrial protocols
• 1000 tags, full tags and Siemens (S5, S7, TI) versions

Description
• Based on Windows TCP/IP socket
• All Ethernet protocols can run simultaneously
• All Ethernet protocols can run Client and Server modes
• Database (32 Kbits, 32 Kwords) for Server mode to exchange data with applications

Included Hardware/Software
• Engineering Tools:
  • Engineering console
  • Test and diagnostic tools
• Compatible Data Servers:
  • OPC DA v3.0, 2.05 and 1.0a
  • Wonderware® DAServer (XP only)
  • Wonderware I/O (SuiteLink/FastDDE) (XP only)
• Includes Development Libraries
• Software or Dongle (Parallel or USB) Protection

Compatible Protocols
Ethernet TCP/IP
• Altus® Alnet II (AL200x, webgate); Client/Server
• Altom® SRTP (C80-35, C80-75); Client/Server
• Allen-Bradley® Logix5000 (ControlLogix and FlexLogix); Client/Server
• GE Fanuc® SRTP (C90-30, C90-70); Client/Server
• Mitsubishi® Melsec (A and Q); Client/Server
• Omron® FINS (C, CV, CS); Client/Server
• Schneider® Modbus TCP and UDP; Client/Server
• Schneider® UNI-TE (Premium and Micro); Client/Server
• Siemens® Industrial Ethernet (S5, S7, TI); Client/Server

Serial
• Modbus Master (ASCII and RTU)
• Modbus Slave (ASCII and RTU)
• GE Fanuc® SNPX Master (90-xx and 80-xx Series)
• Schneider® Uni-Telway Slave (TSX 7 Series)
• Siemens® AS511 Master (Simatic S5 Series)
• Siemens® PPI/PPI+ Master (Simatic S7-200 Series)
• Siemens® Ti-Dir Master (Simatic TI-505 Series)

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<tr>
<td>DRL-ALL-SWL-S</td>
<td>112027-0005</td>
<td>SW1000 software drivers, 1000 tags, Software key protection.</td>
</tr>
<tr>
<td>DRL-ALL-SWF-S</td>
<td>112027-0002</td>
<td>SW1000 software drivers, Full tags, Software key protection.</td>
</tr>
<tr>
<td>DRL-SIE-SWF-S</td>
<td>112027-5014</td>
<td>SW1000 for Siemens (S5, S7, TI), Full tags, Software key protection.</td>
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<tr>
<td>DRL-ALL-SWL-P</td>
<td>112027-0004</td>
<td>SW1000 software drivers, 1000 tags, Parallel dongle protection</td>
</tr>
<tr>
<td>DRL-ALL-SWF-P</td>
<td>112027-0001</td>
<td>SW1000 software drivers, Full tags, Parallel dongle protection</td>
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<tr>
<td>DRL-SIE-SWF-P</td>
<td>112027-5013</td>
<td>SW1000 for Siemens (S5, S7, TI), Full tags, Software key protection.</td>
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<tr>
<td>DRL-ALL-SWL-U</td>
<td>112027-0006</td>
<td>SW1000 software drivers, 1000 tags, USB dongle protection.</td>
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<tr>
<td>DRL-ALL-SWF-U</td>
<td>112027-0003</td>
<td>SW1000 software drivers, Full tags, USB dongle protection.</td>
</tr>
<tr>
<td>DRL-SIE-SWF-U</td>
<td>112027-5015</td>
<td>SW1000 for Siemens (S5, S7, TI), Full tags, Software key protection.</td>
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<tr>
<td>DRL-UPS-SWF</td>
<td>112027-0010</td>
<td>SW1000 upgrade from 1000 tags to Full tags</td>
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</tbody>
</table>
Brad® applicom®
Network Interface Card
112000
Industrial Ethernet

Features and Benefits
- Fast data acquisition between PC-based applications and industrial devices connected to Ethernet TCP/IP
- On board co-processor eliminates data bottlenecks, ensuring delivery of time critical information
- All protocols are included
- Best choice for Supervision/HMI/SCADA applications
- Equipment redundancy via OPC server
- Combo offer:
  - Ethernet + PROFIBUS (1.5 Mbps)
  - Ethernet + Serial (38.4 Kbps)

Description
- Engineering Tools:
  - Engineering console
  - Test and diagnostic tools
- Compatible Data Servers:
  - OPC DA v3.0
  - Wonderware® DAServer (XP only)
  - Wonderware IO (SuiteLink/FastDDE) (XP only)
- Includes Development Libraries
- Supported OS:
  - Others: Linux, VxWorks, RTX VenturCom

Included Hardware/Software
- Bus Format
  - PCI Universal bus 3.3V/5V (PCI-X compatible)
  - PCI Express 1x
- Hardware plug and play
- AMD SC520
- 16 Mb SDRAM
- 4 Mb Flash Memory
- One Ethernet port
  - Fast Ethernet 10/100 Mbps, auto Negotiating
  - Base-T (RJ45), 4 leds (Rx, Tx, Link, 10/100)

Compatible Protocols
- Ethernet TCP/IP (Client/Server modes)
  - Altus® Alnet II (AL200x, Webgate)
  - Alstom® SRTP (C80-35, C80-75)
  - Allen-Bradley® EtherNet/IP (Logix, PLC 5 and SLC 500)
  - GE Fanuc® SRTP (90-30, 90-70)
  - Mitsubishi® Melsec (A, Q)
  - Omron® FINS (C, CV, CS)
  - Schneider Electric® Open Modbus TCP
  - Schneider Electric® UNI-TE (Premium and Micro)
  - Siemens® Industrial Ethernet (SS, ST, Ti)
  - UDP Send/Receive (Free messaging)

Ethernet ISO
- Schneider Electric® Ethway
- Siemens® Industrial Ethernet ISO (SS, ST, TF and Ti)

Conformance
- RoHS compliant
- CE
- OPC certified
- Rockwell Encompass™
- Schneider Collaborative

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<th>Engineering No.</th>
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<tbody>
<tr>
<td>APP-ETH-PCU-C</td>
<td>112000-0005</td>
<td>PCI2000ETH PCI Network Interface Card for Ethernet</td>
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<tr>
<td>APP-ETH-PCIE</td>
<td>112000-5026</td>
<td>PCIe2000ETH PCI Express Network Interface Card for Ethernet</td>
</tr>
<tr>
<td>APP-EPB-PCU-C</td>
<td>112000-0001</td>
<td>PCIe2000ETH PCI Network Interface Card for Ethernet + Profibus</td>
</tr>
<tr>
<td>APP-EPB-PCIE</td>
<td>112000-5028</td>
<td>PCIe2000ETH PCI Express Network Interface Card for Ethernet + Profibus</td>
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<td>APP-ESR-PCU-C</td>
<td>112000-0003</td>
<td>PCIe2000ETH PCI Network Interface Card for Ethernet + Serial</td>
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<td>APP-ESR-PCIE</td>
<td>112000-5027</td>
<td>PCIe2000ETH PCI Express Network Interface Card for Ethernet + Serial</td>
</tr>
</tbody>
</table>
Features and Benefits

- Deterministic data acquisition for real time PC-based control applications
- On board co-processor eliminates data bottlenecks, ensuring delivery of time critical information
- Very Easy-to-Use; no knowledge of protocol required
- Remote Access via TCP/IP connection; to able configuration and diagnostic when using real time OS (VxWorks, QNX, etc)

Included Hardware/Software

- PCI Universal bus 3.3V/5V (PCI-X compatible)
- Hardware plug and play
- AMD SCS20
- 16 Mb SDRAM; 4 Mb Flash Memory
- 1 Digital Input + 1 Digital Output
- 1 Ethernet port
  - Fast Ethernet 10/100 Mbps, auto negotiating
  - Base-T (RJ45), 4 LEDs (Rx, Tx, Link, 10/100)

Compatible Protocols

**Modbus TCP and UDP**

- Client mode
- Up to 127 simultaneous devices

**EtherNET/IP**

- Scanner and adapter
- Explicit messaging (Client/Server)
- Up to 128 simultaneous CIP connections
- EtherNet/IP Devices supported: Generic and Rockwell IO through EDS files (FlexIO, CompactLogix, etc)
- IP address settings configurable via the console or DHCP/BOOTP server
- Client DNS Supported

**PROFINET IO-Controller**

- RT Class-1
- Up to 127 IO-Devices; max. IO size 14K
- Cyclic Data Exchange (IO): up to 1437 In and 1437 Out per device
- Acyclic Data Exchange (for Configuration + Diagnostic)
- Minimum cycle time 1 ms
- Alarm handling
- IP Address manager
- Commissioning tool (set name, set IP address, device blinking, etc)

**PROFINET IO-Device**

- RT Class-1
- Up to 1437 In and 1437 Out; 1 slot for Inputs + 1 slot for Outputs
- Instructions and Maintenance 0, 1, 2, 3
- 1x Record for user custom diagnostics
- Process- and Diagnostic Alarm
- GSD file

Conformance

- RoHS compliant
- CE
- OPC certified
- ODVA conformance tested
- Rockwell Encompass™

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<tbody>
<tr>
<td>DRL-EMB-PCI</td>
<td>112000-5029</td>
<td>PCI-ETHIO PCI Network Interface Card for Modbus TCP/IP</td>
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<tr>
<td>DRL-EMB-PCIE</td>
<td>112000-5034</td>
<td>PCI-ETHIO PCI Express Network Interface Card for Modbus TCP/IP</td>
</tr>
<tr>
<td>DRL-EP-PCIE</td>
<td>112000-5033</td>
<td>PCI-ETHIO PCI Express Network Interface Card for EtherNet/IP</td>
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<tr>
<td>DRL-EPN-PCI</td>
<td>112000-5031</td>
<td>PCI-ETHIO PCI Network Interface Card for PROFINET IO</td>
</tr>
<tr>
<td>DRL-EPN-PCIE</td>
<td>112000-5032</td>
<td>PCI-ETHIO PCI Express Network Interface Card for PROFINET IO</td>
</tr>
</tbody>
</table>

www.molex.com
Brad® SST™
Communication Module for Rockwell ControlLogix
112073
Modbus TCP and Serial

Features and Benefits
• Connects your Allen-Bradley® ControlLogix to a Modbus Ethernet or Serial network
• Direct IO Mapping, no Ladder Logic to write for configuration and data transfer between module and CLX processor
• Fully integrated into the Rockwell® Automation environment
• User-friendly configuration tool with intuitive graphical interface

Description
• RLL support: remote configuration and monitoring via RSLinx
• Add-On-Profile for Rockwell® RSLogix5000
• USB port for user configuration and firmware upgrade
• Engineering console simplified user configuration and diagnostic
• Support multiple modules in a chassis
• Support Local and Remote chassis
• Easy diagnostics: Built-in LEDs and 4 characters display

Included Hardware/Software
• 128 MB of onboard memory
• 8 MB of flash memory (user configuration data and firmware)
• CPU Data exchange:
  - 496 Inputs bytes + 496 Output bytes
  - 32.000 Words Registers (CIP messaging)
• Type A, USB 2 and 1.1 compatible
• Communication Ports
  - 1x Ethernet, 10/100 Mbps, RJ45
  - 2x Serial, 110 bps to 115.2 kbps, RS232/RS485/RS422, RJ45 (DB9 male supplied cable)

Compatible Protocols
• Modbus Master (RTU or ASCII)
• Modbus Slave (RTU or ASCII)
• Modbus TCP and UDP Client and Server

Conformance
• RoHS compliant
• CE, UL, cUL
• Class 1 Div 2
• Rockwell Encompass™

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<tr>
<td>SST-ESR2-CLX-RLL</td>
<td>112073-0001</td>
<td>Modbus communication module for Rockwell ControlLogix</td>
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</tbody>
</table>
Brad® applicom®
Industrial Multi-Protocol Gateway
112034
Ethernet, Serial and PROFIBUS

Features and Benefits
- Allows simultaneous communication between industrial devices using up to 20 different Ethernet TCP/IP, PROFIBUS and Serial protocols
- Typical architectures: data translator, data concentrator, industrial firewall
- No programming, just configuring (tools included)
- Supports unsolicited data exchange from Client device

Description
- Real-Time data exchange through internal database (32 Kbits/32 Kwords)
- Upload/Download configuration and diagnostic through Remote TCP/IP
- Up to 128 PLCs on Ethernet TCP and 126 PROFIBUS devices
- Full management of Read/Write cyclic access through word status commands
- Engineering Tools:
  - Configuration console
  - Test and diagnostic tools

Included Hardware/Software
- RAM 32 Mbytes; Flash Disk 32 Mbytes
- Diagnostic LEDs
- Communication Ports
  - 1x Serial, 2400 bps up to 115.2 Kbps, RS485/422 (2-wire or 4-wire), DB9 male
  - 1x Ethernet, 10/100 Mbits, RJ45
  - 1x PROFIBUS, 9.6 Kbps up to 12 Mbps, DB9 female
- Embedded 6 Digital Inputs/2 Digital Outputs
- Desktop or DIN Rail mounting

Competible Protocols
- Ethernet TCP/IP (Client/Server modes)
  - Altus® Alnet II (AL 200x, Webgate)
  - Alstom® SRTP (C80-35, C80-75)
  - Allen-Bradley® EtherNet/IP (Logix, PLC-5 and SLC 500)
  - GE Fanuc® SRTP (90-30, 90-70)
  - Mitsubishi® Melsec (A, Q)
  - Omron® FINS (C, CV, CS)
  - Schneider Electric® Open Modbus TCP and UDP
  - Schneider Electric® Uni-TE (Premium and Micro)
  - Siemens® Industrial Ethernet (S5, S7, Ti)
- PROFIBUS
  - DP-V0 Master
  - DP-V0 Slave
  - S7/MPI Client
  - FDL S5 Client
- Serial
  - Allen-Bradley® DFI Master
  - GE Fanuc® SNP-X Master
  - Modbus Master/Slave (ASCII and RTU)
  - Schneider Electric® Uni-Telway Slave
  - Siemens® ASS11 Master
  - Siemens® TI-Dir Master

Conformance
- RoHS compliant
- CE

<table>
<thead>
<tr>
<th>Engineering No.</th>
<th>Standard Order No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>APP-ESP-GTW</td>
<td>112034-0001</td>
<td>Ethernet to PROFIBUS/Ethernet/Serial Gateway</td>
</tr>
<tr>
<td>APP-ESR-GTW</td>
<td>112034-0002</td>
<td>Ethernet to Ethernet/Serial Gateway</td>
</tr>
</tbody>
</table>
Brad® HarshIO 600

112095

Digital IP67 IO module

**Features and Benefits**
- Reliable solution for connecting industrial controllers to IO devices in harsh duty environments.
- Accepts M12 threaded connectors or Brad Ultra-Lock® Push-Pull connection system.
- Standard hole housing pattern allows for interchangeability with popular IO modules.
- User configurable versions; user can set up each digital channel as either an input or output.
- Scrolling 4 characters and visible LEDs provide maintenance personnel with the ability to easily determine IO, module and network status.

**Description**
- Rated IP67 for harsh environments.
- Designed for direct machine mount applications.
- Sixteen digital input/output per module.
- Supports PNP and NPN input devices.
- IP addressing via BootP, DHCP or static (through web interface, push button and PLC Scanner command).
- Built-in 2-port Ethernet switch for daisy chain topology.
- Configurable IO capability (through web interface and PLC Scanner commands).
- Watchdog with output reply state.
- Built-in web server for remote configuration and diagnostics.

**Compatible Protocols**
- Modbus TCP and UDP Server.
- EtherNet/IP Adapter.
- PROFINET IO-Device.

**Conformance**
- IP67 according to IEC 60529.
- NEMA 6P.
- Vibration: MIL-STD-202F, method 204D, condition A.
- Thermal Shock: MIL-STD-1344A.
- CE, UL, cUL.
- RoHS compliant.
- ODVA certified.
- PNO certified.

**Included Hardware/Software**
- IO Configurations:
  - 16 inputs
  - 14 inputs + 2 outputs
  - 12 inputs + 4 outputs
  - 8 inputs + 8 outputs
  - Universal
  - User configurable.
- IO Connectors: 8x M12 ports, Ultra-Lock® M12 female 5-pole, internally threaded.
- Ethernet Connectors: Ultra-Lock M12 female, 4-pole D-coded act as a switch, crossover capability.
- Power Connectors:
  - Power In—Male Mini-Change®, 4- or 5-pole.
  - Power Out—Female Mini-Change, 4- or 5-pole.
- Power Requirements:
  - Module Input Power—24V DC.
  - Module Output Power—24V DC, 2.0A max. per channel, 8.0A max. per module.
- Communication Rate: 10/100 Mbps auto-sensing, auto-crossing, half/full duplex.
- Input Type:
  - Compatible with dry contact and PNP or NPN 3-wire switches.
  - Electronic short circuit protection.
- Input Delay: 2.5ms default or configurable (through web interface and PLC Scanner commands).
- Input Device Supply: 200mA per port at 25°C.
- Output Load Current: 2.0A max. per channel, electronic short circuit protection.
- Maximum Switching Frequency: 200 Hz.
- Housing Dimensions: 60.00mm (2.36”) by 220.00mm (8.66”) by 20.00mm (.78”).
- Mounting Dimensions:
  - 37.50mm (1.48”) horizontal on centers.
  - 210.00mm (8.27”) vertical on centers.
  - Center hole.
- Operating Temperature: -25 to +70°C.
- Storage Temperature: -40 to +85°C.

**Modbus TCP**

<table>
<thead>
<tr>
<th>Engineering No.</th>
<th>Standard Order No.</th>
<th>No. of Power Pins</th>
<th>IO Configuration</th>
<th>Input Channel Type</th>
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<tr>
<td>TCDEM-B00N-D1U</td>
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### EtherNet/IP

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### PROFINET I0

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<th>Engineering No.</th>
<th>Standard Order No.</th>
<th>No. of Power Pins</th>
<th>IO Configuration</th>
<th>Input Channel Type</th>
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<td>16 User Configurable</td>
<td>User Configurable</td>
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</table>
As our world becomes more connected, an increasing number of manufacturers and installers are specifying Ethernet devices for their harsh applications. The Brad family of rugged connectivity products is a leading product line provider of Ethernet infrastructure for Molex.

The Molex Direct-Link, harsh-duty, Ethernet switches have been developed to allow customers to convert from traditional in-cabinet to on-machine mounting, moving the switch closer to the machine and thereby reducing cabling. The Molex Ultra-Lock® system of connectors and cordsets complete the Direct-Link Harsh-Duty Switches line.

Features and Benefits
- **Ultra-Lock® Connection system**—faster, simpler and more secure connections than any other system on the market
- **NEMA 6 and IP69K rated environmental Protection**—withstands dust, pressure-wash and submersion in water
- **Class 1, Division 2 rated**—suitable for Oil and Gas markets where hazardous gases may be present
- **Operating temperature** -20 to +75°C enables installation in extreme temperature applications
- **30mm and 60mm formats with standard hole patterns**—allows use of standard machine extrusion members
- **Auto-learning with no software or configuration required**—plug-and-play capabilities means less-skilled labor is able to install systems

Characteristics and Performance
**Switch Type**: Unmanaged (Store and Forward)
**Ports**: 10BaseT/100BaseTx M12
**Latency (10Mb)**: 16μs + frame time
**Latency (100Mb)**: 5μs + frame time
**Duplex Operation**: Full or half
**Mounting**: Screw mount
**Power Input**: Redundant input terminals
**Input Power**: 2.0W max. (DRL-750), 2.4W max. (DRL-78x)
**Voltage**: 9-36VDC (continuous)
**Isolation**: 1500 VRMS 1 minute
**Dimensions**: 176 x 30 x 34 (DRL-750), 220 x 60 x 37 (DRL-78x)
**Weight**: 230g (DRL-750), 580g (DRL-78x)

Environmental
**Humidity**: 5–95% RH non condensing

References
- Vibration: 7g (IEC68-2-29)
- Shock: 50g (IEC68-2-29)
- Electrical Safety: EN61010-1 (IEC61010)
- EMI Emissions: FCC part 15, ICES 003, EN55011 Class A (DRL-78x), Class B (DRL-750)
- EMC Immunity: EN61326, EN61000-4-4, EN61000-4-5, EN61000-4-2; 8Kv contact/16Kv Air (DRL-750), 4Kv contact/8Kv Air (DRL-78x)
- UL: File number pending

Hazardous Rating: Class 1, Division 2 certification

Physical
**Operating Temperature**: -20 to +75°C
**Storage Temperature**: -40 to +85°C

<table>
<thead>
<tr>
<th>Engineering No.</th>
<th>Standard Order No.</th>
<th>Description</th>
<th>Ports</th>
<th>Power</th>
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</thead>
<tbody>
<tr>
<td>DRL-750</td>
<td>112111-5001</td>
<td>IP67 Fast Ethernet Unmanaged Switch</td>
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<td>M12</td>
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<td>DRL-780</td>
<td>112105-5002</td>
<td>IP67 Fast Ethernet Unmanaged Switch</td>
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<td>Mini-Change® (5-pin)</td>
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<td>DRL-781</td>
<td>112105-5004</td>
<td>IP67 Fast Ethernet Unmanaged Switch</td>
<td>8</td>
<td>Mini-Change (4-pin)</td>
</tr>
</tbody>
</table>
Molex demonstrates market leadership with the comprehensive CIP Safety Stack software solution, allowing industrial-device manufacturers to embed CIP Safety Stack technology quickly and economically within their products.

Common Industrial Protocol (CIP) Safety is a protocol extension developed by the ODVA. The CIP Safety protocol offers a set of highly-integrated safety services which leverage the underlying communications stacks of the standard CIP networks to transport data from a source to a destination. CIP Safety allows end-users to implement safety systems in a more integrated, cost-effective manner. The Molex CIP Safety Software Kit (also called Stack) is offered as a tool kit, with the stack provided as modular "C" code that is pre-tested. The software allows a manufacturer of intelligent industrial products to implement the necessary safety-application layer that enables products to comply with the CIP Safety specification (Edition 2.1) from ODVA. The CIP Safety Stack is available for both DeviceNet® and EtherNet/IP®, and both are endorsed by Rockwell Automation under the Value Added Design Partner program.

The CIP Safety Stack is approved by TUV for SIL 3 applications and it has been conformance tested using the ODVA Conformance Test. Molex can support customers that request assistance with design implementation and/or guidance through TUV approval.

### Features and Benefits

- Meets IEC 61508, SIL 3 ensuring international market acceptance
- Approved by TUV and tested by ODVA means a high-quality solution for minimal project risk and faster time-to-market
- Pre-tested modular ANSI C code is easy to compile using standard compilers; faster time-to-market
- Molex engineers can support protocol-integration requests minimizing investment required for in-house resources
- Designed for use with other Molex/Brad offerings: Hardware (DeviceNet network interface cards), Software (DeviceNet or EtherNet/IP software stacks) which results in a complete CIP communication solution

### Specifications

- ANSI C code is provided for the safety portion of the Stack (Compliant with CIP Safety Specification 2.1)
- ANSI C code for black-channel components (NET_CTRL_IO)
- Interface specification for high-integrity and black-channel environments
- Safety integration manual (including safety measure requirements)
- Optionally, modified standard CIP stacks (software/firmware) for DeviceNet (Slave) or EtherNet/IP (Adapter)
- Optionally, ANSI C code for the Platform Adaptation Layers (both safety and non-safety)
- Documentation required by certification bodies (TÜV, ODVA)
- Support during certification process of vendor's final product

### Markets and Applications

- Industrial Device Manufacturers
  - I/O blocks
  - Valves
  - Drives
  - Complex machines (OEM)
- End-Users
  - Automotive
  - Consumer goods
  - Heavy industries

### Engineering No. Standard Order No. Device Type Network Description

<table>
<thead>
<tr>
<th>Engineering No.</th>
<th>Standard Order No.</th>
<th>Device Type</th>
<th>Network</th>
<th>Description</th>
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<td>Slave</td>
<td>DeviceNet</td>
<td>Stack Development Kit (Standard Source Code)</td>
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<td>SDK-DNS-SAF-O</td>
<td>12115-0002</td>
<td>Slave</td>
<td>DeviceNet</td>
<td>Stack Development Kit (Source Code Obfuscation)</td>
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<td>SDK-DNS-SAF-L</td>
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<td>Royalty</td>
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<td>Adapter</td>
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<td>Stack Development Kit (Standard Source Code)</td>
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<td>Adapter</td>
<td>EtherNet/IP</td>
<td>Stack Development Kit (Source Code Obfuscation)</td>
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*CIP Safety Software Stack Concept for a Slave (Adapter) Application

Note: Source code obfuscation means that the "C" code is protected, but the compiler can process it.
Brad® Direct-Link®
In-Cabinet Ethernet Switches

112036
Series 200 and 300

A complete line of industrial Ethernet switches for managed or unmanaged applications.

Features and Benefits
- 5-, 8- and 9-port configurations support both Copper and fiber wiring
- Unique ergonomic design with DIN rail or panel mount option using a dual-clip system for quick and easy installation
- Small footprint in IP30 industrial package
- Supports all standard IEEE 802.3 protocols
- Redundant, dual-DC power inputs

Series 200—Unmanaged Switches
- Direct-Link Industrial Ethernet unmanaged switches provide enhanced performance allowing you to achieve real-time deterministic operation of your Ethernet network
- Plug-and-play—no configuration required
- Best value for reducing network collisions

Series 300—Managed Switches
- Direct-Link Industrial Ethernet managed switches offer many features to meet your network management and diagnostic needs
- Advanced Network Management
  - Rapid Spanning Tree Protocol (RSTP) for fault-tolerant loops
  - VLAN (port and tag based) for traffic segregation
  - Message filtering to stop multi-cast storms (IGMP snooping)
  - Priority queuing for real-time performance (QoS)
  - Web-browser interface
- Comprehensive Network Diagnostics
  - RMON and port mirroring
  - SNMP agent v1, v2 and v3 (for extra security)

Specifications
- Ethernet protocols supported:
  - IEEE 802.3 protocols (IEEE 802.3, 802.3u, 802.3x)
  - 10/100BaseT(x) Ports: Shielded RJ45
  - Auto-negotiating:
    - 10/100 Mbps auto-negotiation
- UL Approval:
  - UL 508 (E205563)
  - UL 1604 (E314891)
  - Class 1, Div 2
  - Group A, B, C, D hazardous locations
- Auto-crossover (Auto-mdi/mdi-x): Supported on all ports
- Flow Control: Half or full duplex
- Ethernet Isolation: 1500 VRMS 1 minute
- Forwarding Mode: Store and forward
- Latency (Typical): 5 usec (time to route a message from one port to another internally at 100 Mps)

MAC Addresses: 1K or 2K
Address Learning: Automatic
Illegal Frames: Dropped per 802.3
Late Collisions: Dropped after 512 bit times
Supply Voltage: 10–30V DC
Power Consumption (Typical): 2–5 W (dependent on model)
Power Saving: Automatic
Mounting: DIN rail or panel direct
Dimensions:
- Height—142.24mm (5.60”)
- Depth—102.36mm (4.03”)
- Width—5-port: 27.18mm (1.07”)
- 8- and 9-port: 38.74mm (1.525”)

Environmental
- Humidity: 5 to 95% (non-condensing)

Certification
- Vibration: IEC68-2-6
- Electrical Safety: EN61010-1
- EMI Emissions: FCC part 15, ICES 003, EN55011 (Class A)
- EMC Immunity: EN61326
- Packaging: IP30 protection

Physical
- Operating Temperature: -10 to +60°C
- Storage Temperature: -40 to +85°C

www.molex.com
Industrial Ethernet
Brad® RJ-Lnxx® RJ-45
Single-Ended Cordsets
130050
Male, Pigtail Straight

Features and Benefits
• RJ-45 plug, combined with industrially proven form factor provides a secure robust connection that protects against the effects of vibration and accidental disconnection
• Category 5e compliant
• Several cable options available

**ENS—Solid Core Cable**

**Physical**
- Cable: Solid core
- Conductors: 24 AWG solid bare Copper, 0.020" (0.510 mm)
- Insulation: 0.009" (0.229 mm) of Cellular Polyethylene
- 0.04" (1.00mm) nominal diameter
- Pair: Two insulated conductors twisted together, lay lengths varied between pairs to minimize cross talk
- Core: Four pairs cabled together
- Binder: Polyester tape, 20% overlay minimum
- Shield: Aluminum/Polyester tape, 20% overlay minimum
- Drain Wire: 24 AWG stranded (7/32") Tin-plated Copper
- Black Polyurethane 0.025" (.635 mm) nominal thickness
- Operating Temperature: -20 to +80°C
- Wiring Sequence: Choice of TIA/EIA, 568A/B, or 10 Base-T

**Electrical at 20°C**
- TIA/EIA Rating: Category 5e

**Cable Type** | **Cable Jacket** | **Wiring** | **Length** | **Engineering No.** | **Standard Order No.**
---|---|---|---|---|---
Shielded Stranded Proplex™ Kevlar* Wrapped (ENP) | PUR | 10 Base-T (4 wire) | 1.0m | ENP1305M010 | 130050-0105
Shielded Solid Core (ENS) | PVC | 568A (8 wire) | 1.0m | ENS2305M010 | 130050-0392
 | | 568B (8 wire) | 1.0m | ENS3305M010 | 130050-0436

Note: Sales drawings for all standard order numbers are available on molex.com
*Kevlar is a trademark of DuPont

**ENP—Kevlar Wrapped Cable**

**Physical**
- Cable: Proplex Kevlar wrapped
- Conductors: 26 AWG stranded bare Copper
- Insulation: Color coded HFFR, halogen free, 0.035" (0.90mm) nominal diameter
- Pair: Cabled with Kevlar strength member and tape wrapped
- Core: Four pairs cabled together
- Shield: Inner—Aluminum mylar, 100% coverage
- Outer—Tinned Copper
- Operating Temperature: -70 to +105°C
- Jacket: Black Urethane 0.059" (1.50mm) nominal thickness
- Diameter: 0.287" (7.30 mm) nominal
- Wiring Sequence: Choice of TIA/EIA, 568A/B, or 10 Base-T

**Electrical at 20°C**
- TIA/EIA Rating: Category 5

**Configuration Code†**
Build-a-Part Number

<table>
<thead>
<tr>
<th>Length</th>
<th>Code</th>
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<tr>
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<td>5</td>
<td>M050</td>
</tr>
<tr>
<td>10</td>
<td>M100</td>
</tr>
</tbody>
</table>

†Once an engineering number is created using the configuration code, consult Molex tech support for information regarding any part numbers.
Industrial Ethernet Brad® RJ-Lnxx RJ-45 Double-Ended Cordsets

130050 Male-Male Straight Standard RJ-45

Features and Benefits
- RJ-45 plug, combined with industrially proven form factor provides a secure robust connection that protects against the effects of vibration and accidental disconnection
- Category 5e compliant
- Several cable options available

### ENP—Shielded Standard Proplex™ Kevlar Wrapped Cable

**Physical**
- Cable: Proplex Kevlar wrapped
- Conductors: 26 AWG stranded bare Copper
- Insulation: Color coded HFFR, halogen free, 0.035" (0.90mm) nominal diameter
- Pair: Cabled with Kevlar strength member and tape wrapped
- Core: Four pairs cabled together
- Shield: Inner—Aluminum mylar, 100% coverage
- Outer—Tinned Copper braid, 80% coverage
- Operating Temperature: -70 to +105°C
- Jacket: Black urethane 0.059" (1.5mm) nominal thickness
- TIA/EIA Rating: Category 5e

### ENQ—Unshielded Stranded Cable

**Physical**
- Cable: Stranded
- Conductors: 24 AWG stranded tinned Copper
- Insulation: Polyolefin 0.037" (0.94mm) nominal diameter
- Pair: Two insulated conductors twisted together, lay lengths varied between pairs to minimize cross talk
- Core: Four pairs cabled together
- Binder: Polyester tape, 20% overlay minimum
- Operating Temperature: -20 to +80°C
- Jacket: PVC 0.025" (0.635mm) nominal thickness
- Diameter: 0.220" (5.588mm) nominal
- TIA/EIA Rating: Category 5e

### ENV—Shielded Solid Core

**Physical**
- Cable: Solid core
- Conductors: 24 AWG solid bare Copper, 0.020" (0.510mm)
- Insulation: Polyethylene, 0.042" (1.07mm) nominal diameter
- Pair: Two insulated conductors twisted together, lay lengths varied between pairs to minimize cross talk
- Core: Four pairs cabled together
- Binder: Polyester tape, 20% overlay minimum
- Shield: Aluminum/polyester tape
- Drain Wire: 24 AWG Tin Copper matt polyurethane
- Jacket: Black Polyurethane UV stable, 0.0244" (0.620mm) nominal thickness
- Diameter: 0.244" (6.200mm) nominal
- Operating Temperature: -20 to 60°C
- Wiring Sequence: Choice of TIA/EIA 568A/B or 10 Base-T
- TIA/EIA Rating: Category 5e

<table>
<thead>
<tr>
<th>Cable Type</th>
<th>Cable Jacket</th>
<th>Wire Size AWG</th>
<th>Wiring</th>
<th>Length</th>
<th>Male-Straight-to-Male Straight</th>
</tr>
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<tbody>
<tr>
<td>ENP—Shielded Standard Proplex™ Kevlar Wrapped (ENP)</td>
<td>PUR With Kevlar Wrap</td>
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<td>10 Base-T (4 wire)</td>
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<td>PUR</td>
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<td>26</td>
<td>568B (8 wire)</td>
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<td>ENQ—Unshielded Stranded (ENQ)</td>
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<td>568A (8 wire)</td>
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<td></td>
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<td>ENS—Shielded Solid Core (ENS)</td>
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<td>568A (8 wire)</td>
<td>1.0m</td>
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<td>568B (8 wire)</td>
<td>1.0m</td>
<td>ENS2335M010 130050-0507</td>
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</table>

Note: Sales drawings for all standard order numbers are available on molex.com

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**Configuration Code**

Build-a-Part Number

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</tbody>
</table>

**Wiring Option**

**Cable Option**

ENP1335M010

*Once an engineering number is created using the configuration code, consult Molex tech support for information regarding any part numbers.*

---

www.molex.com
Industrial Ethernet
Brad® Standard
RJ-45 to RJ-45
Cable Assembly
Unshielded PVC

130048
Male Plug-to-Male Plug
Straight-Wired

Features and Benefits
• RJ-45 plug combined with industrially proven form factor provides a secure robust connection that protects against the effects of vibration and accidental disconnection
• Category 5e compliant

Reference Information
UL File No.: E200650

Physical
RJ-45 Plug: Clear Polycarbonate
Boot: PVC
Operating Temperature: -20 to +75°C

Environmental
Protection: IP20

Cable
03—Unshielded PVC
Conductors: 24 AWG stranded tinned Copper wire
Pair: Two pair UTP patch cable
Outside Diameter: 0.250” (5.60mm) nominal
Jacket Material: Teal PVC
Cable Properties: Sun and oil resistant
Inner Material Insulation: HDPE
Certification: UL type CMR, CEC C(U/L) type CMR
TIA/EIA Rating: Category 5e
Operating Temperature: -40 to +75°C

<table>
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<tr>
<th>Wiring</th>
<th>Cable Type</th>
<th>Cable Jacket</th>
<th>Wire Size AWG</th>
<th>Length</th>
<th>Engineering No.</th>
<th>Standard Order No.</th>
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<tbody>
<tr>
<td>10 Base-T (4 wire)</td>
<td>Unshielded Stranded</td>
<td>PVC</td>
<td>4/24</td>
<td>1.0m (3.28’)</td>
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Note: Sales drawings for all standard order numbers are available on molex.com

Configuration Code*
Build-a-Part Number

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*Once an engineering number is created using the configuration code, consult Molex tech support for information regarding any part numbers.
Industrial Ethernet
Brad® RJ-Lnxx® RJ-45
Single-Ended Cordsets
130050
Threaded Male Straight

Features and Benefits
- RJ-45 plug, combined with industrially proven form factor provides a secure robust connection that protects against the effects of vibration and accidental disconnection
- Category 5e compliant
- Several cable options available
- Achieves IEC IP67 rates seal when mated with an RJ-Lnxx® receptacle

<table>
<thead>
<tr>
<th>Cable Type</th>
<th>Cable Jacket</th>
<th>Wire Size AWG</th>
<th>Wiring</th>
<th>Length</th>
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</thead>
<tbody>
<tr>
<td>ENS—Shielded Solid Core</td>
<td>PUR Kevlar</td>
<td>24</td>
<td>10 Base-T (4 wire)</td>
<td>1.0m</td>
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<tr>
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<td>Wrapped</td>
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<td>568A (8 wire)</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>568B (8 wire)</td>
<td></td>
</tr>
<tr>
<td>ENP—Shielded Standard Proplex™ Kevlar* Wrapped Cable</td>
<td>PUR Kevlar</td>
<td>26</td>
<td>10 Base-T (4 wire)</td>
<td>1.0m</td>
</tr>
<tr>
<td></td>
<td>Wrapped</td>
<td></td>
<td>568A (8 wire)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>568B (8 wire)</td>
<td></td>
</tr>
<tr>
<td>ENV—Shielded Solid Core</td>
<td>PVC</td>
<td>24</td>
<td>10 Base-T (4 wire)</td>
<td>1.0m</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>568A (8 wire)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>568B (8 wire)</td>
<td></td>
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</tbody>
</table>

Note: Sales drawings for all standard order numbers are available on molex.com
*Kevlar is a trademark of DuPont

**Length Code**
- M020
- M050
- M100

**Configuration Code†**
Build-a-Part Number
- ENP1105
- M010

†Once an engineering number is created using the configuration code, consult Molex tech support for information regarding any part numbers.
Industrial Ethernet
Brad® RJ-Lnx® RJ-45
Double-Ended Cordsets

130050
Threaded
Male-Male Straight
RJ-45 (Industrial)-to-
RJ-45 (Industrial) and
RJ-45 (Industrial)-to-
RJ-45 (Standard)

Features and Benefits
- RJ-45 plug, combined with industrially proven form factor provides a secure robust connection that protects against the effects of vibration and accidental disconnection
- Category 5e compliant
- Several cable options available
- Achieves IEC IP67 rates seal when mated with an RJ-Lnx™ receptacle

ENS—Shielded Solid Core Cable

Physical
- Cable: Solid Core
- Conductors: 24 AWG solid bare Copper, 0.020” (0.510mm) diameter
- Insulation: 0.009” (0.229mm) of Polyethylene
- 0.04” (1.0mm) nominal diameter
- Pair: Two insulated conductors twisted together, lay lengths varied between pairs to minimize cross talk
- Core: Four pairs cabled together
- Binder: Polyester tape, 20% overlay minimum
- Shield: Aluminum/Polyester tape, 20% overlay minimum
- Drain Wire: 24 AWG stranded (7/32") Tin-plated Copper
- Jacket: Black Polyurethane 0.059” (1.5mm) nominal thickness
- Operating Temperature: -20 to +80°C
- Diameter: 0.245” (6.223mm) nominal
- TIA/EIA Rating: Category 5e

ENQ—Unshielded Stranded Cable

Physical
- Cable: Stranded
- Conductors: 24 AWG stranded tinned Copper
- Insulation: Polyolefin 0.037” (0.94mm) nominal diameter
- Pair: Two insulated conductors twisted together, lay lengths varied between pairs to minimize cross talk
- Core: Four pairs cabled together
- Binder: Polyester tape, 20% overlay minimum
- Operating Temperature: -20 to +80°C
- Jacket: PVC 0.025” (0.635mm) nominal thickness
- Diameter: 0.220” (5.588mm) nominal
- TIA/EIA Rating: Category 5e

ENV—Shielded Solid Core

Physical
- Cable: Solid core
- Conductors: 24 AWG stranded bare Copper, 0.020” (0.510mm) diameter
- Insulation: Polyethylene, 0.042” (1.07mm) nominal diameter
- Pair: Two insulated conductors twisted together, lay lengths varied between pairs to minimize cross talk
- Core: Four pairs cabled together
- Binder: Polyester tape, 20% overlay minimum
- Shield: Aluminum/Polyester tape
- Drain Wire: 24 AWG Tin Copper matt Polyurethane
- Jacket: Black Polyurethane UV stable, 0.0244” (0.620mm) nominal thickness
- Diameter: 0.244” (6.200mm) nominal
- Operating Temperature: -20 to 60°C
- Wiring Sequence: Choice of TIA/EIA 568A/B or 10 Base-T
- TIA/EIA Rating: Category 5e


<table>
<thead>
<tr>
<th>Cable Type</th>
<th>Cable Jacket</th>
<th>Wire Size AWG</th>
<th>Wiring</th>
<th>Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shielded Stranded Proplex™ Kevlar Wrapped (EMP)</td>
<td>PUR Kevlar Wrapped</td>
<td>26</td>
<td>10 Base-T (4 wire)</td>
<td>1.0m</td>
</tr>
<tr>
<td>Shielded Solid Core (EHS)</td>
<td>PUR</td>
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<td>10 Base-T (4 wire)</td>
<td>1.0m</td>
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<tr>
<td>Shielded Solid Core (EHS)</td>
<td>PVC</td>
<td>24</td>
<td>10 Base-T (4 wire)</td>
<td>1.0m</td>
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</tbody>
</table>

Note: Sales drawings for all standard order numbers are available on molex.com

*Kevlar is a trademark of DuPont

www.molex.com
Industrial Ethernet
Brad® RJ-Lnxx® RJ-45
Sealed Receptacles
130053/130055
Female
Panel Mount
External Thread
Straight

Features and Benefits
• Simple field termination of cable using a standard punchdown tool
• Category 5e compliant
• Can be used with TIA 568A or 568B wiring sequences
• Color-coded block simplifies field wiring
• Achieves IEC IP67 rated seal when mated with RJ-Lnxx cordset—but also compatible with commercial RJ-45 patch cords

Environmental
Protection: IEC IP67
TIA/EIA Rating: Category 5e compliant

Physical
O-Ring Material: Viton
Insert Material: Acrylonitrile-Butadiene-Styrene (ABS)
Overmold Material: Polyurethane
Coupling Nut Material: Acrylonitrile-Butadiene-Styrene (ABS)
Shell Material: Acrylonitrile-Butadiene-Styrene (ABS)
Knockout Hole: 1.063
Thread Size: UNC 1″-14
Panel Thickness: .125” maximum with gasket,
.187” maximum without gasket,
.062” minimum
Operating Temperature: -20 to +80°C
Return Loss: 5 dB at 100 MHz

RJ-45 Jack
Plating: 50 μm of Gold over 100 μm of Nickel
Current Rating: 1.5A
Voltage Rating: 125V DC

<table>
<thead>
<tr>
<th>Face View</th>
<th>Description</th>
<th>Female Straight</th>
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</thead>
<tbody>
<tr>
<td>RJ-45 Receptacle W/110 Punchdown Termination</td>
<td>ENDR2FB5</td>
<td>130053-0002</td>
</tr>
</tbody>
</table>

Note: Sales drawings for all standard order numbers are available on molex.com
Industrial Ethernet
Brad® RJ-Lnxx® RJ-45
Sealed Receptacles
130053/130055
Male
Straight
Panel Mount
External Thread

Features and Benefits
• Ideal for OEMs looking to incorporate a sealed, robust connection into their field device
• Category 5 compliant
• Short depths for space constrained applications
• Achieves IEC IP67 rated seal when mated with an RJ-Lnxx cordset—but also compatible with commercial RJ-45 patch cords

Environmental
Protection: IEC IP67
TIA/EIA Rating: Category 5 compliant

Physical

- O-Ring Material: Viton
- Insert Material: Acrylonitrile-Butadiene-Styrene (ABS)
- Overmold Material: Polyurethane
- Coupling Nut Material: Acrylonitrile-Butadiene-Styrene (ABS)
- Shell Material: Acrylonitrile-Butadiene-Styrene (ABS)
- Knockout Hole: 1.063
- Thread Size: UNC 1"—14
- Panel Thickness: .125" maximum with gasket, .187" maximum without gasket, .062" minimum
- Operating Temperature: -20 to +80°C
- Return Loss: 5 dB at 100 MHz

RJ-45 Jack
- Plating: 50 μm of Gold over 100 μm of Nickel
- Current Rating: 1.5A
- Voltage Rating: 125V DC

<table>
<thead>
<tr>
<th>Face View</th>
<th>Description</th>
<th>Female Straight</th>
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<tbody>
<tr>
<td></td>
<td>Direct PC Board Mount Receptacle</td>
<td>ENPR1FF5</td>
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</tbody>
</table>

Note: Sales drawings for all standard order numbers are available on molex.com
Industrial Ethernet
Brad® RJ-Lnxx® RJ-45
Sealed Receptacles
130053/130055
Female, Male
Straight
Panel Mount
External Thread

Features and Benefits
• Highly flexible solution for OEMs or end users looking to incorporate a sealed, robust receptacle into their field device or control panel
• Achieves IEC IP67 rated seal when mated with RJ-Lnxx cordset—but also compatible with commercial RJ-45 patch cords

Environmental
Protection: IEC IP67
TIA/EIA Rating: Not rated as additional customer termination is required

Physical
O-Ring Material: Viton
Insert Material: Acrylonitrile-Butadiene-Styrene (ABS)
Overmold Material: Polyurethane
Coupling Nut Material: Acrylonitrile-Butadiene-Styrene (ABS)
Shell Material: Acrylonitrile-Butadiene-Styrene (ABS)
Knockout Hole: 1/8
Thread Size: UNC 1”-14
Panel Thickness: .125” maximum with gasket, .187” maximum without gasket, .062” minimum
Operating Temperature: -20 to +80°C
Return Loss: 5 dB at 100 MHz

RJ-45 Jack
Plating: 50 μm of Gold over 100 μm of Nickel
Current Rating: 1.5A
Voltage Rating: 125V DC

<table>
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<tr>
<th>Face View</th>
<th>Description</th>
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<tr>
<td></td>
<td>Receptacle with PC Board</td>
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<tr>
<td></td>
<td>Receptacle with PC and 12' of Cable (10 Base-T)</td>
<td>ENSR1FB5M010</td>
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Note: Sales drawings for all standard order numbers are available on molex.com

Configuration Code*
Build-a-Part Number

<table>
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<th>Meters</th>
<th>Code</th>
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<td>10</td>
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*Once an engineering number is created using the configuration code, consult Molex tech support for information regarding any part numbers.
# Industrial Ethernet
Brad® RJ-Lnxx® RJ-45
Sealed Receptacles
130055/130058
Female
Bulkhead Pass-Through
Straight
External Thread

## Features and Benefits
- Easy method for bringing an Ethernet connection in from a harsh environment to an industrial enclosure
- Category 5e compliant
- Achieves IEC IP67 rated seal when mated with RJ-Lnxx cordset—but also compatible with commercial RJ-45 patch cords

## Environmental
Protection: IEC IP67
TIA/EIA Rating: Category 5e

## Physical
O-Ring Material: Viton
Insert Material: ABS
Overmold Material: Polyurethane
Coupling Nut Material: ABS
Shell Material: ABS
Knockout Hole: 1.063
Thread Size: UNC 1”—14”
Panel Thickness: .125” max. with gasket, .187” max. without gasket, .062” min.
Operating Temperature: -20 to +80°C
Return Loss: 5 dB at 100 Mhz

### RJ-45 Jack
- Plating: 50 μm of Gold over 100 μm of Nickel
- Current Rating: 1.5A
- Voltage Rating: 125V DC

### RJ-11 Jack
- Plating: 50 μm of Gold over 100 μm of Nickel
- Current Rating: 1.5A
- Voltage Rating: 125V DC

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<th>Face View</th>
<th>Description</th>
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<tr>
<td></td>
<td>RJ-11 Bulkhead Pass-Through Receptacles with Backside Jack</td>
<td>ENSP6F5</td>
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<td></td>
<td>RJ-11 Bulkhead Pass-Through Receptacles with 12” Male RJ-45 Patch Cord</td>
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<td>RJ-11 Bulkhead Pass-Through Receptacles with Backside Jack</td>
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Note: Sales drawings for all standard order numbers are available on molex.com

## Configuration Code*
Build-a-Part Number

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<tr>
<td>M100</td>
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</tbody>
</table>

*Once an engineering number is created using the configuration code, consult Molex tech support for information regarding any part numbers.
**Features and Benefits**
- Allows either molded or field attachable male connectors to be mated together, extending overall system length
- Two M40 nylon lock nuts and threaded barrel allow the interconnected to be positively fixed to a panel or enclosure wall

<table>
<thead>
<tr>
<th>Face View (Female)</th>
<th>Description</th>
<th>Female Straight</th>
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<tbody>
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<td><img src="image" alt="Face View" /></td>
<td>In-Line—Interconnect</td>
<td>RJBG6821</td>
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<tr>
<td><img src="image" alt="Face View" /></td>
<td>Threaded—Interconnect</td>
<td>RJBG6821</td>
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</tbody>
</table>
Industrial Ethernet
Brad® RJ-Lnxx®
RJ-45 Sealed
Field Attachable Connectors

130057
Female
Straight

Features and Benefits
- Create an industrial Ethernet cordset in the field using standard crimp tools
- Achieves IEC IP67 rated seal when mated with an RJ-Lnxx receptacle

Physical
- O-Ring Material: Viton
- Insert Material: Acrylonitrile-Butadiene-Styrene (ABS)
- Overmold Material: Polyurethane
- Coupling Nut Material: Acrylonitrile-Butadiene-Styrene (ABS)
- Shell Material: Acrylonitrile-Butadiene-Styrene (ABS)
- Thread Size: UNC 1.00–14.00"
- Operating Temperature: -20 to +80°C

Environmental
- Protection: IEC IP67

---

Industrial Ethernet
Brad® RJ-Lnxx®
RJ-45 Sealed
Accessories

130058
Female, Male
Closure Caps

Features and Benefits
- Attaches to RJ-Lnxx receptacles to provide an IEC IP65 rated seal for instances when a cordset is not mated

Physical
- Material: Protective Cap—PA6 Nylon GF (UV Stabilized)
  Lanyard—EPDM Rubber
- Thread Size: UNC 1.00–14.00"
- Operating Temperature: -20 to +80°C

Environmental
- Protection: IEC IP65 (65-0300), IP67 (67-0300)

---

<table>
<thead>
<tr>
<th>Type</th>
<th>Description</th>
<th>Female</th>
<th>Male</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cap</td>
<td>IP65 Rated</td>
<td>65-0300</td>
<td>130058-0033</td>
</tr>
<tr>
<td>Cap and Lanyard</td>
<td>IP67 Rated</td>
<td>67-0300</td>
<td>130058-0035</td>
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</table>

Note: Sales drawings for all standard order numbers are available on molex.com
Industrial Ethernet
Brad® Sealed RJ-45
Overmolded
Single-Ended Cordsets
84702
Bayonet Style RJ-45 Plug

Features and Benefits
• One sealing surface reduces chance of failure
• IP67 and NEMA 6P ratings ensure cable assemblies
  for water and dust tight functional integrity
• Bayonet style latching provides audible and tactile
  confirmation of positive mating
• Category 5e specified provides high data transmission
  speeds
• Overmolded cable assemblies allow for faster
  installation

Reference Information
Packaging: Bag
Mates With: 84700 and 84702
Designed In: Inches

Electrical
Voltage: 150V AC
Current: 1.5A
Contact Resistance: 20 milliohms max.
Dielectric Withstanding Voltage:
  Adjacent Contacts—1000V AC
  Contacts to Ground—1500V AC
Insulation Resistance: 500 Megohms min.
Type: Category 5e
Transmission Performance: Category 5e
RJ-45 Connection Interface: TIA/EIA-568-B
Shielding Effectiveness: 20 dB min.

Mechanical
Durability: 200 mating cycles min.
Coupling Ring Destructive Torque: 2.26Nm (20 in. lb) or
more

Physical
Overmolded Body: PVC, black
Coupling Ring: PBT, black
Holder: PBT, black
Wedge: PBT, black
Gasket Seal: Nitrile, black
Contact: Phosphor Bronze
Plating: Contact Area—1.27μm (50μ") Gold
          Underplating—Nickel
Operating Temperature: -40 to +85°C

<table>
<thead>
<tr>
<th>Standard Order No.</th>
<th>Length</th>
<th>Lead-free</th>
</tr>
</thead>
<tbody>
<tr>
<td>84702-3001</td>
<td>0.30m (1.00')</td>
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<tr>
<td>84702-3003</td>
<td>0.91m (3.00')</td>
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<td>84702-3006</td>
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<td>84702-3009</td>
<td>2.74m (9.00')</td>
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<td>84702-3012</td>
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<td>84702-3020</td>
<td>6.10m (20.00')</td>
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<td>84702-3050</td>
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<tr>
<td>84702-3100</td>
<td>30.50m (100.00')</td>
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Industrial Ethernet
Brad® Sealed RJ-45
Overmolded
Double-Ended Cordsets
84702
Bayonet Style RJ-45
Plug-to-Bayonet Style
RJ-45 Plug

**Features and Benefits**
- One sealing surface reduces chance of failure
- IP67 and NEMA 6P ratings ensure cable assemblies are water and dust tight for functional integrity
- Bayonet style latching provides audible and tactile confirmation of positive mating
- Category 5e specified provides high data transmission speeds
- Overmolded cable assemblies allow for faster installation

**Reference Information**
Packaging: Bag
Mates With: 84700 and 84702
Designed In: Inches

<table>
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<td>84702-1006</td>
<td>1.83m (6.00’)</td>
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<td>84702-1007</td>
<td>2.73m (9.00’)</td>
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<td>84702-1009</td>
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<td>84702-1012</td>
<td>3.66m (12.00’)</td>
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<td>84702-1015</td>
<td>4.57m (15.00’)</td>
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<tr>
<td>84702-1020</td>
<td>6.10m (20.00’)</td>
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<tr>
<td>84702-1021</td>
<td>6.40m (21.00’)</td>
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</tr>
<tr>
<td>84702-1030</td>
<td>9.14m (30.00’)</td>
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</tr>
</tbody>
</table>

**Electrical**
- Voltage: 150V AC
- Current: 1.5A
- Contact Resistance: 20 milliohms max.
- Dielectric Withstanding Voltage:
  - Adjacent Contacts—1000V AC
  - Contacts to Ground—1500V AC
- Insulation Resistance: 500 Megohms min.
- Transmission Performance: Category 5e
- RJ-45 Connection Interface: TIA/EIA-568-B
- Shielding Effectiveness: 20 dB min.

**Mechanical**
- Durability: 200 mating cycles min.
- Coupling Ring Destructive Torque: 2.26Nm (20 in. lb) or more

**Physical**
- Overmolded Body: PVC, black
- Coupling Ring: PBT, black
- Holder: PBT, black
- Wedge: PBT, black
- Gasket Seal: Nitrile, black
- Contact: Phosphor Bronze
- Plating: Contact Area—1.27μm (50μ”) Gold
  Underplating—Nickel
- Operating Temperature: -40 to +85°C
Industrial Ethernet
Brad® Sealed RJ-45
Overmolded Double-Ended Cordsets

84702
Bayonet Style RJ-45
Plug-to-Standard RJ-45 Plug

Features and Benefits
- One sealing surface reduces chance of failure
- IP67 and NEMA 6P ratings ensure cable assemblies are water and dust tight for functional integrity
- Bayonet style latching provides audible and tactile confirmation of positive mating
- Category 5e specified provides high data transmission speeds
- Overmolded cable assemblies allow for faster installation

Reference Information
Packaging: Bag
Mates With: 84700 and 84702
Designed In: Inches

<table>
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<th>Lead-free</th>
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<td>84702-2006</td>
<td>1.83m (6.00’)</td>
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<tr>
<td>84702-2007</td>
<td>2.13m (7.00’)</td>
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<tr>
<td>84702-2009</td>
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<tr>
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<td>84702-2012</td>
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<tr>
<td>84702-2015</td>
<td>4.57m (15.00’)</td>
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<tr>
<td>84702-2020</td>
<td>6.10m (20.00’)</td>
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<tr>
<td>84702-2021</td>
<td>6.40m (21.00’)</td>
<td></td>
</tr>
<tr>
<td>84702-2030</td>
<td>9.14m (30.00’)</td>
<td></td>
</tr>
</tbody>
</table>

Electrical
Voltage: 150V AC
Current: 1.5A
Contact Resistance: 20 milliohms max.
Dielectric Withstanding Voltage:
  - Adjacent Contacts—1000V AC
  - Contacts to Ground—1500V AC
Insulation Resistance: 500 Megohms min.
Transmission Performance: Category 5e
RJ-45 Connection Interface: TIA/EIA-568-B
Shielding Effectiveness: 20 dB min.

Mechanical
Durability: 200 mating cycles min.
Coupling Ring Destructive Torque: 2.26Nm (20 in. lb) or more

Physical
Overmolded Body: PVC, black
Coupling Ring: PBT, black
Holder: PBT, black
Wedge: PBT, black
Gasket Seal: Nitrile, black
Contact: Phosphor Bronze
Plating: Contact Area—1.27μm (50μ”) Gold
  Underplating—Nickel
Operating Temperature: -40 to +85°C
Industrial Ethernet
Brad® Sealed RJ-45
Receptacles

84702
Bayonet Style
PCB Mount and
Punchdown Panel Mount

Features and Benefits
• One sealing surface reduces chance of failure
• Bayonet style latching provides audible and tactile confirmation of positive mating
• Punchdown version supports simple IDC termination

Reference Information
Packaging: Bag
Mates With: 84700 and 84702
Designed In: Inches

Reference Information
Packaging: Bag
Mates With: 84700 and 84702
Designed In: Inches

Standard Order No. | Description                     | Lead-free |
--------------------|---------------------------------|-----------|
84702-0005         | PCB Mount Receptacle            |           |
84702-0006         | Punchdown Panel Mount Receptacle|           |
84702-0007         | PCB Mount, Potted               |           |
84702-0008         | Punchdown Panel Mount Receptacle, Potted | |
84702-0009         | Punchdown with 100 Ohm Resistors|           |

Industrial Ethernet
Brad® Sealed RJ-45
Bulkhead Pass-Through
Receptacle

84700
Bayonet Style
Panel Mount

Features and Benefits
• Back-to-back RJ-45 pass-through brings ethernet connectivity into a control cabinet and eliminates need for conduit entry
• Bayonet style latching provides audible and tactile confirmation of positive mating
• Meets ODVA/EtherNet™ IP specification

Reference Information
Packaging: Bag
Designed in: Inches
Mates With: 84700 and 84702
Waterproof: Meets requirements of IP67 and NEMA 6P for water tightness

Reference Information
Packaging: Bag
Designed in: Inches
Mates With: 84700 and 84702
Waterproof: Meets requirements of IP67 and NEMA 6P for water tightness

Standard Order No. | Description                     | Lead-free |
--------------------|---------------------------------|-----------|
84700-0001         | Panel Mount Receptacle          |           |

*EtherNet IP and DeviceNet are trademarks of the Open DeviceNet Vendor Association.
Industrial Ethernet
Brad® Sealed RJ-45
Field Wireable Connectors
84700

Features and Benefits
• One sealing surface reduces chance of failure
• IP67 and NEMA 6P ratings ensure cable assemblies are water and dust tight for functional integrity
• Bayonet style latching provides audible and tactile confirmation of positive mating
• Superior strain relief
• Easy termination allows custom length cable to be made in the field
• Compatible with shielded and unshielded cable
• Meets ODVA/EtherNet™ IP* specification

Reference Information
Packaging: Bag
Mates With: 84700 and 84702
Designed In: Inches
Waterproof: Meets requirements of IP67 and NEMA 6P for water tightness

Electrical
Voltage: 56.5V DC
150V RMS AC (ringing voltage only)
Current: 1.5A at 25°C (77°F)
Contact Resistance: 20 milliohms max.
Insulation Resistance: 500 Megohms min.
Transmission Performance: Category 5e
RJ-45 Connection Interface: TIA/EIA-568-B
Shielding Effectiveness: 20 dB min.

Mechanical
Durability: 500 mating cycles min.

Physical
Coupling Ring: PBT, black
O-Ring: Nitrile
Gasket Seal: Nitrile, black
Plug Holder: PBT, black
Retainer Wedge: PBT, black
Wire Gauge: 24 AWG (stranded or solid conductors)
Operating Temperature: -40 to +85°C
Cable Seal Assembly: Polyamide, TPE Gland, black

<table>
<thead>
<tr>
<th>Standard Order No.</th>
<th>Description</th>
<th>Lead-free</th>
</tr>
</thead>
<tbody>
<tr>
<td>84700-0002</td>
<td>Field Attachable Plug</td>
<td>Yes</td>
</tr>
</tbody>
</table>

*EtherNet IP is a trademark of the Open DeviceNet Vendor Association.

Industrial Ethernet
Brad® Sealed RJ-45
Tethered Dust Cap
84700
Bayonet Style

Features and Benefits
• One sealing surface means less likelihood of failure
• Attachable tether so cap never gets lost
• Maintains IP67 and NEMA 6P ratings for functional integrity when connector is not mated
• IP67 and NEMA 6P ratings ensure cable assemblies are water and dust tight for functional integrity

Reference Information
Packaging: Bag
Use With: 84700, 84702, 84729, 84730
Designed In: Inches

Physical
Dust Cap: PBT, black
Tether: PE or PP, black
Gasket Seal: Nitrile, black
Screw: Brass, #8-32
Plating: Screw—Nickel
Operating Temperature: -40 to +85°C

<table>
<thead>
<tr>
<th>Standard Order No.</th>
<th>Description</th>
<th>Lead-free</th>
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</thead>
<tbody>
<tr>
<td>84700-0003</td>
<td>Dust Cover</td>
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</table>
Industrial Ethernet
Brad® Micro-Change® (M12)
Single-Ended Cordsets

130048
Male
Threaded

Features and Benefits
• Familiar, proven M12 form factor provides robust connection
• Category 5e compliant
• IP67 rated, perfect for harsh industrial environments
• D-Code to ensure proper alignment/mating

Reference Information
UL File No.: E200650

Cables
03—Unshielded PVC
Conductors: 24 AWG stranded tinned Copper wire
Pair: Two pair UTP patch cable
Outside Diameter: 0.250" (6.50mm) nominal
Jacket Material: Teal PVC
Cable Properties: Sun and oil resistant
Inner Material Insulation: HDPE
Certification: UL Type CMR, CEC C(UL) Type CMR
TIA/EIA Rating: Category 5e
Operating Temperature: -40 to 75°C

05—Shielded PVC
Conductors: 22 AWG stranded tinned Copper wire
Pair: Two pair UTP patch cable
Outside Diameter: 0.236" (5.99mm) nominal
Jacket Material: Teal PVC
Cable Properties: Sun and oil resistant
Inner Material Insulation: HDPE
Shield Type: Foil shield, 100% coverage, 25% minimum overlap
Flex Rating: Trailing cable, 5 million bending cycles
Certification: UL Type CMR, CEC C(UL) Type CMR
TIA/EIA Rating: Category 5e
Operating Temperature: -20 to 75°C

06—Shielded PUR
Conductors: 24 AWG stranded tinned Copper wire
Pair: Two pair UTP patch cable
Outside Diameter: 0.255" (6.50mm) nominal
Jacket Material: Green PUR
Cable Properties: Sun resistant
Inner Material Insulation: FRNC
Shield Type: Foil shield—100% coverage
Braid Shield—85% coverage
Flex Rating: Trailing cable, 5 million bending cycles
Certification: UL Listed CMX
TIA/EIA Rating: Category 5e
Operating Temperature: -40 to 70°C

07—Shielded High-Flex TPE
Conductors: 26 AWG stranded tinned Copper wire
Pair: Two pair UTP patch cable
Outside Diameter: 0.236" (5.99mm) nominal
Jacket Material: Teal TPE
Cable Properties: Sun resistant
Inner Material Insulation: Foamed polypropylene
Shield Type: Foil shield, 100% coverage, 25% min. overlap
Certification: UL Type CMR, CEC C(UL) Type CMR
TIA/EIA Rating: Category 5e
Operating Temperature: -20 to 75°C

10—Shielded PUR
Conductors: 22 AWG stranded tinned wire
Pair: Two pair UTP patch cable
Outside Diameter: 0.255" (6.50mm) nominal
Jacket Material: Green PUR
Cable Properties: Sun resistant
Inner Material Insulation: FRNC
Shield Type: Foil shield—100% coverage
Braid Shield—85% coverage
Flex Rating: Trailing cable, 5 million bending cycles
Certification: UL Listed CMX
TIA/EIA Rating: Category 5e
Operating Temperature: -40 to 70°C

15—Shielded PVC
Conductors: 26 AWG stranded tinned Copper wire
Pair: Two pair UTP patch cable
Outside Diameter: 0.236" (5.99mm) nominal
Jacket Material: Teal PVC
Cable Properties: Sun and oil resistant
Inner Material Insulation: Teal PVC
Shield Type: Foil shield, 100% coverage, 25% minimum overlap
Certification: UL Type CMR, CEC C(UL) Type CMR
TIA/EIA Rating: Category 5e
Operating Temperature: -20 to 75°C

---|---|---|---|---|---|---|---|---|---|---
4 Pole | 1.5A | 30V | Unshielded | PVC | 24 | 1.0m (3.37') | E10A00603M010 | 130048-0038 | E10A00703M010 | 130048-0062
| | | Shielded | PVC | 22 | | | E10A00610M010 | 130048-0046 | E10A00710M010 | 130048-0070
| | | Shielded | PUR | 24 | | | E10A00615M010 | 130048-0054 | E10A00715M010 | 130048-0078
| | | Shielded High-Flex | TPE | 26 | | | E10A00605M010 | 120108-0186 | E10A00705M010 | 120108-0187

Configuration Code* Build-a-Part Number

Length | Code
---|---
2 | M020
5 | M050
10 | M100

Note: Sales drawings for all standard order numbers are available on molex.com

*Once an engineering number is created using the configuration code, consult Molex tech support for information regarding any part numbers.
Industrial Ethernet
Brad® Micro-Change® (M12) Double-Ended Cordsets
120049/120108/130048
Male-to-Male
Straight, Right Angle
Threaded

### Features and Benefits
- Familiar, proven M12 form factor provides robust connection
- Category 5e compliant
- D-Coded to ensure proper alignment/mating
- IP67 rated for harsh environments

### Reference Information
UL File No.: E200650

### Physical
- Connector Body: PUR
- O-Ring: Viton
- Coupling Nut: Nickel-plated Brass
- Contacts: Copper alloy with Gold over Nickel plating

### Environmental
- Protection: IP67
- NEMA Rating: NEMA 6
- Operating Temperature: -20 to +75°C

### Cables

<table>
<thead>
<tr>
<th></th>
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<tbody>
<tr>
<td>03—Unshielded PVC</td>
<td>E11A06003M010 130048-0088 E11A06004M010 130048-0095 E11A06005M010 130048-0122 E11A06006M010 130048-0153</td>
<td>E11A06007M010 130048-0189 E11A06008M010 130048-0222</td>
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<td>E11A06007M010 130048-0189 E11A06008M010 130048-0222</td>
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<td>05—Shielded TPE</td>
<td>E11A06005M010 130048-0153 E11A06006M010 130048-0189 E11A06007M010 130048-0222</td>
<td>E11A06008M010 130048-0265 E11A06009M010 130048-0308</td>
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<td>10—Unshielded PUR</td>
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<td>E11A06011M010 130048-0404</td>
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### Specifications

<table>
<thead>
<tr>
<th>Face View</th>
<th>Max. Current</th>
<th>Max. Voltage</th>
<th>Cable Type</th>
<th>Cable Jacket</th>
<th>Wire Size</th>
<th>AWG</th>
<th>Length</th>
<th>Order No.</th>
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</thead>
<tbody>
<tr>
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<td>1.5 A</td>
<td>30 V</td>
<td>Unshielded</td>
<td>PVC</td>
<td>24</td>
<td>1.0 m</td>
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<tr>
<td>05 Pole</td>
<td>2.0 A</td>
<td>30 V</td>
<td>Unshielded</td>
<td>High Flex</td>
<td>24</td>
<td>1.0 m</td>
<td></td>
<td>E11A06004M010 130048-0095</td>
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<tr>
<td>06 Pole</td>
<td>2.5 A</td>
<td>30 V</td>
<td>Shielded</td>
<td>PUR</td>
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<td>07 Pole</td>
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<td>30 V</td>
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<td>1.0 m</td>
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<td>E11A06006M010 130048-0153</td>
</tr>
</tbody>
</table>

Note: Sales drawings for all standard order numbers are available on molex.com

### Configuration Code
- Build-a-Part Number
- Length: 2, 5, 10 Meters
- Code: M020, M050, M100
Industrial Ethernet
Brad® Micro-Change® (M12) Double-Ended Cordsets

130048
Female-to-Male
Straight
Threaded

Features and Benefits
• Familiar, proven M12 form factor provides robust connection
• Category 5e compliant
• D-Coded to ensure proper alignment/mating
• IP67 rated for harsh environments

Reference Information
UL File No.: E200650

Physical
Connector Body: PUR
O-Ring: Viton
Coupling Nut: Nickel-plated Brass
Contacts: Copper alloy with Gold over Nickel plating

Environmental
Protection: IP67
NEMA Rating: NEMA 6
Operating Temperature: -20 to 75°C

Cables
03—Unshielded PVC
Conductors: 24 AWG stranded tinned Copper wire
Pair: Two pair UTP patch cable
Outside Diameter: 0.250" (6.35mm) nominal
Jacket Material: Teal PVC
Cable Properties: Sun and oil resistant
Inner Material Insulation: HDPE
Certification: UL Type CMR, CEC C(UL) Type CMR
TIA/EIA Rating: Category 5e
Operating Temperature: -40 to +75°C

15—Shielded PVC
Conductors: 26 AWG stranded tinned Copper wire
Pair: Two pair UTP patch cable
Outside Diameter: 0.236" (5.99mm) nominal
Jacket Material: Teal PVC
Cable Properties: Sun and oil resistant
Inner Material Insulation: Foamed Polypropylene
Shield Type: Foil Shield, 100% coverage, 25% min. overlap
Certification: UL Type CMR, CEC C(UL) Type CMR
TIA/EIA Rating: Category 5e
Operating Temperature: -20 to +75°C

<table>
<thead>
<tr>
<th>Face View</th>
<th>Max. Current Per Contact</th>
<th>Max. Voltage</th>
<th>Cable Type</th>
<th>Wire Size AWG</th>
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<tbody>
<tr>
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<td>30V</td>
<td>Unshielded</td>
<td>PVC</td>
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<tr>
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<td>Shielded</td>
<td>PVC</td>
<td>26</td>
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</table>

Note: Sales drawings for all standard order numbers are available on molex.com
Industrial Ethernet
Brad® Micro-Change®-to-
RJ-45 Standard Plug
Double-Ended Cordsets

130048
Female-to-Male
Straight
Threaded to RJ-45

Features and Benefits
- Familiar, proven M12 form factor provides robust connection
- Category 5e compliant
- D-Coded to ensure proper alignment/mating
- IP67 rated for harsh environments

Connectors
M12

Reference Information
UL File No.: E200650

Physical
Connector Body: PUR
O-Ring: Viton
Coupling Nut: Nickel-plated Brass
Contacts: Copper alloy with Gold over Nickel plating
Operating Temperature: -25 to +75°C

Environmental
Protection: IP67
NEMA Rating: NEMA 6

RJ-45

Reference Information
UL File No.: E200650

Physical
RJ-45 Plug: Polycarbonate, clear
Boot: PVC
Operating Temperature: -20 to +75°C

Environmental
Protection: IP20

Cables
02—Unshielded PVC
Conductors: 24 AWG stranded tinned Copper wire
Pair: Two pair UTP Patch cable
Outside Diameter: 0.250” (5.6 mm) nominal
Jacket Material: Teal PVC
Cable Properties: Sun and oil resistant
Inner Material Insulation: HDPE
Certification: UL Type CMR, CEC (UL) Type CMR
TIA/EIA Rating: Category 5e
Operating Temperature: -40 to +75°C

<table>
<thead>
<tr>
<th>Face View</th>
<th>Max. Current Per Contact</th>
<th>Max. Voltage</th>
<th>Cable Type</th>
<th>Jacket</th>
<th>Wire Size AWG</th>
<th>Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 Pole</td>
<td>1.5A</td>
<td>30V</td>
<td>Unshielded</td>
<td>PVC</td>
<td>24</td>
<td>1.0 m</td>
</tr>
</tbody>
</table>

Note: Sales drawings for all standard order numbers are available on molex.com

Configuration Code*
Build-a-Part Number

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<tr>
<th>Length</th>
<th>Code</th>
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<tbody>
<tr>
<td>2</td>
<td>M020</td>
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<tr>
<td>5</td>
<td>M050</td>
</tr>
<tr>
<td>10</td>
<td>M100</td>
</tr>
</tbody>
</table>

www.molex.com
**Industrial Ethernet**

**Brad® Micro-Change® (M12)**

**Field Attachable Connectors**

**130047**

**Female, Male**

**Straight**

**Threaded**

---

**Features and Benefits**

- Fast field termination without special tooling
- D-Code to ensure proper alignment/mating

**Mechanical**

- Coupling Nut: Zinc diecast
- Shell Material: Zinc diecast
- Contacts: Gold-plated Palladium Nickel

**Cable**

- 22 to 24 AWG
- 0.25 to 0.34mm²
- Cable Diameter: 5.50 to 7.20mm

---

### Environmental Protection

- IP67

### Physical

- Operating Temperature: -25 to +85°C

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<table>
<thead>
<tr>
<th>Poles (Female View)</th>
<th>Max. Current per Contact</th>
<th>Max. Voltage</th>
<th>Cable Diameter Range</th>
<th>Male Straight</th>
<th>Female Straight</th>
</tr>
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<tbody>
<tr>
<td>4 Pole</td>
<td>4.0A</td>
<td>32V</td>
<td>5.50-7.20mm</td>
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<td>130047-0018</td>
<td>130047-0017</td>
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</table>

**Note:** Sales drawings for all standard order numbers are available on molex.com
Industrial Ethernet
Brad® Ultra-Lock® (M12)
Double-Ended Cordsets

120108
Male-to-Male
Straight, Right Angle
Push-to-Lock

Features and Benefits
• Push-to-Lock technology assures fast, reliable connections every time
• Reliable performance in high vibration environments due to positive locking mechanism
• Ideal for wash-down and temporary submersion applications due to improved sealing design
• Ergonomic push to lock mechanisms reduce fatigue and user errors when a high number of connections need to be made
• Category 5e compliant
• D-Code to ensure proper alignment/mating
• IP67/68/69K rated for harsh environments

Reference Information
UL File No.: E200650

<table>
<thead>
<tr>
<th>Face View (Male)</th>
<th>Max. Current per Contact</th>
<th>Max. Voltage</th>
<th>Cable Type</th>
<th>Wire Size AWG</th>
<th>Length</th>
<th>Male Straight-to-Male Straight</th>
<th>Male Straight-to-Male Right Angle</th>
<th>Male Right Angle-to-Male Right Angle</th>
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</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Unshielded PVC</td>
<td>24</td>
<td>1.5A</td>
<td>EWWA06003M010</td>
<td>EWWA06203M010</td>
<td>EWWA06303M010</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Unshielded High Flex TPE</td>
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<td>30V</td>
<td>EWWA06010M010</td>
<td>EWWA06210M010</td>
<td>EWWA06310M010</td>
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<td></td>
<td></td>
<td>Shielded PUR</td>
<td>22</td>
<td>1.0m</td>
<td>EWWA06015M010</td>
<td>EWWA06215M010</td>
<td>EWWA06315M010</td>
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<td>Shielded PVC</td>
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<td>EWWA06215M010</td>
<td>EWWA06315M010</td>
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Note: Sales drawings for all standard order numbers are available on molex.com

Configuration Code*
Build-a-Part Number

<table>
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<tr>
<th>Length (Meters)</th>
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<td>5</td>
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<td>10</td>
<td>M100</td>
</tr>
</tbody>
</table>

*Once an engineering number is created using the configuration code, consult Molex tech support for information regarding any part numbers.
Industrial Ethernet
Brad® Ultra-Lock® (M12) Double-Ended Cordset
130048
Female-to-Male
Straight
Push-to-Lock
Crossover-Wired

Features and Benefits
- Brad M12 Micro-Change® Threaded to Push-to-Lock Ultra-Lock® technology assures fast, reliable connections every time
- Reliable performance in high vibration environments due to positive locking mechanism
- Ergonomic push to lock mechanisms reduce fatigue and user errors when a high number of connections need to be made
- Category 5e compliant
- D-Code to ensure proper alignment/mating
- IP67 rated for harsh environments

Reference Information
UL File No.: E200650

Physical
Connector Body: PUR
O-Ring: Viton
Coupling Nut: Nickel-plated Brass
Contacts: Copper alloy with Gold over Nickel plating
Operating Temperature: -20 to +75°C

Environmental
Protection: IP67
NEMA Rating: NEMA 6

Cables
03—Unshielded PVC
Conductors: 24 AWG stranded tinned Copper wire
Pair: Two pair UTP patch cable
Outside Diameter: 0.250" (6.50mm) nominal
Jacket Material: Teal PVC
Cable Properties: Sun and oil resistant
Inner Material Insulation: HDPE
Certification: UL type CMR, CEC C(UL) type CMR
TIA/EIA Rating: Category 5e
Operating Temperature: -40 to +75°C

10—Shielded PUR
Conductors: 22 AWG stranded tinned wire
Pair: Two pair UTP patch cable
Outside Diameter: 0.255" (6.50mm) nominal
Jacket Material: Green PUR
Cable Properties: Sun resistant
Inner Material Insulation: FRNC
Shield Type: Foil Shield—100% coverage
Braid Shield—85% coverage
Flex Rating: Trailing cable, 5 million bending cycles
Certification: UL Listed CMX
TIA/EIA Rating: Category 5e
Operating Temperature: -40 to +70°C

15—Shielded PVC
Conductors: 26 AWG stranded tinned Copper wire
Pair: Two pair UTP patch cable
 Outside Diameter: 0.236" (5.99 mm) nominal
Jacket Material: Teal PVC
Cable Properties: Sun and oil resistant
Inner Material Insulation: Foamed polypropylene
Shield Type: Foil Shield, 100% coverage, 25% min. overlap
Certification: UL type CMR, CEC C(UL) type CMR
TIA/EIA Rating: Category 5e
Operating Temperature: -20 to +75°C

<table>
<thead>
<tr>
<th>Face View</th>
<th>Max. Current per Contact</th>
<th>Max. Voltage</th>
<th>Cable Type</th>
<th>Cable Jacket</th>
<th>Wire Size</th>
<th>Length</th>
<th>M12 Micro-Change Female Straight-to-M12 Ultra-Lock Male Straight</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 Pole</td>
<td>1.5A</td>
<td>30V</td>
<td>Unshielded</td>
<td>PVC</td>
<td>24</td>
<td>1.0m</td>
<td>E1WB03003M002 130048-0207</td>
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<tr>
<td>1 - Yellow (TD+) 4 - Blue (RD-) 2 - White (RD+) 3 - Orange (TD-)</td>
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<td>Shielded</td>
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<td>1.0m</td>
<td>E1WB03003M002 130048-0208</td>
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Note: Sales drawings for all standard order numbers are available on molex.com

Configuration Code
Build-a-Part Number

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<td>M050</td>
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<td>10</td>
<td>M100</td>
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</tbody>
</table>

*Once an engineering number is created using the configuration code, consult Molex tech support for information regarding any part numbers.
Industrial Ethernet
Brad® Ultra-Lock® (M12)
Receptacles

120109
Female
Front Panel Mount
Back Panel Mount
Internal Thread

Features and Benefits
- Mates with both threaded M12 and Ultra-Lock® M12 cordsets
- Category 5e compliant
- IP67 rated, perfect for harsh industrial environments
- D-Code to ensure proper alignment/mating

Reference Information
UL File No.: E200650

Physical
Shell: Nickel-plated Brass
Insert: PUR
Conductors: Brass Gold plated/Bronze selective Gold plated
O-Ring: Viton
Operating Temperature: -20 to +80°C

Environmental
Protection: IP67
NEMA Rating: NEMA 6

<table>
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<td>120109-0004</td>
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Note: Sales drawings for all standard order numbers are available on molex.com

Configuration Code*
Build-a-Part Number
ERWAJJ3000C050

*Once an engineering number is created using the configuration code, consult Molex tech support for information regarding any part numbers.

Length Code
Centimeters
5 E050
0.3 M03
1 M10
2 M20

Configuration
Front-Panel Mount/PG9 with 50.00mm Wire Leads
Front-Panel Mount/M16 with 50.00mm Wire Leads
Back-Panel Mount/M16 with 50.00mm Wire Leads

Wire Type
PVC Leads, UL 1061
22 AWG
0.5m

Wire Size (AWG)

Environmental Protection
IP67
NEMA Rating
NEMA 6

Operational Temperature
-20 to +80°C

Features and Benefits
- Mates with both threaded M12 and Ultra-Lock® M12 cordsets
- Category 5e compliant
- IP67 rated, perfect for harsh industrial environments
- D-Code to ensure proper alignment/mating

Reference Information
UL File No.: E200650

Physical
Shell: Nickel-plated Brass
Insert: PUR
Conductors: Brass Gold plated/Bronze selective Gold plated
O-Ring: Viton
Operating Temperature: -20 to +80°C

Environmental
Protection: IP67
NEMA Rating: NEMA 6
Industrial Ethernet
Brad® Ultra-Lock® (M12)
Receptacles

120109
Female
Back Panel Mount
Front Panel Mount

Features and Benefits
- Mates with both threaded M12 and Brad Ultra-Lock® M12 cordsets
- Category 5e compliant
- IP67 rated, perfect for harsh industrial environments
- D-Coded to ensure proper alignment/mating

Mechanical
Shell: Nickel-plated Brass
Insert: PUR
Conductors: Brass Gold plated/Bronze selective Gold plated
O-Ring: Viton

Electrical
TIA/EIA Rating: Category 5e

Environmental
Protection: IP67
NEMA Rating: NEMA 6

Configuration

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<tbody>
<tr>
<td>4 Pole</td>
<td>1.5A</td>
<td>125V</td>
<td>ERWD2130</td>
<td>120109-5003</td>
<td>ERWD2230</td>
<td>120109-5004</td>
<td>ERWD2270</td>
<td>120109-5005</td>
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</tbody>
</table>

Note: Sales drawings for all standard order numbers are available on molex.com
**Industrial Ethernet**

**Brad® Ultra-Lock® (M12) Receptacles**

120109
Female
Straight
Back Panel Mount

---

**Features and Benefits**
- Mates with both threaded M12 and Ultra-Lock M12 cordsets
- Category 5e compliant
- IP67 rated, perfect for harsh industrial environments
- D-Coded to ensure proper alignment/mating

**Electrical**
- TIA/EIA Rating: Category 5e

**Environmental**
- Protection: IP67
- NEMA Rating: NEMA 6

**Mechanical**
- Shell: Nickel-plated Brass
- Insert: PUR
- Conductors: Brass Gold plated/Bronze selective Gold plated

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### Electrical Parameters

<table>
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<td>125V</td>
<td>ERWAAU4002M002</td>
<td>130054-0012</td>
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Note: Sales drawings for all standard order numbers are available on molex.com

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**Configuration Code**

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<tr>
<td>10</td>
<td>M100</td>
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</tr>
</tbody>
</table>

*Once an engineering number is created using the configuration code, consult Molex tech support for information regarding any part numbers.
Industrial Ethernet
Brad® Ultra-Lock® (M12)
Double-Ended Receptacles

120109
M12 Panel Mount Female
Receptacle-to-RJ-45 Male Plug

Features and Benefits
• Mates with both threaded M12 and Ultra-Lock M12 cordsets
• Category 5e compliant
• IP67 rated, perfect for harsh industrial environments
• D-Coded to ensure proper alignment/mating

Reference Information
UL File No.: E200650

Mechanical
Shell: Nickel-plated Brass
Insert: Nylon
Conductors: Brass Gold plated/Bronze selective Gold plated
O-Ring: Viton
Cable: PVC Jacket

<table>
<thead>
<tr>
<th>Pole (Female View)</th>
<th>Max. Current per Contact</th>
<th>Max. Voltage</th>
<th>Engineering No.</th>
<th>Standard Order No.</th>
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<tbody>
<tr>
<td>1 : (TD+) 2 : (RD+) 3 : (TD-) 4 : (RD-)</td>
<td>1.5A</td>
<td>125V</td>
<td>ERWPAU7003M006</td>
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Note: Sales drawings for all standard order numbers are available on molex.com

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<td>M050</td>
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<tr>
<td>10</td>
<td>M100</td>
</tr>
</tbody>
</table>

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Industrial Ethernet
Brad® Micro-Change® (M12)
Bulkhead Pass-Through Adapters
130054
Female Straight, Female Straight-to-Right Angle Threaded Back Panel Mount

Features and Benefits
- Mates with both threaded M12 and (M12) cordsets
- Category 5e compliant
- IP67 rated, perfect for harsh industrial environments
- D-Coded to ensure proper alignment/mating

Mechanical
Shell: Nickel-plated Brass
Insert: PUR
Conductors: Brass Gold plated/Bronze selective Gold plated
O-Ring: Viton

Electrical
Voltage Rating: 215V
Current: 4.0A
TIA/EIA Rating: Category 5e

Environmental
Protection: IP67

M12-to-RJ-45 Adapter with M16 Mounting Thread

<table>
<thead>
<tr>
<th>Poles</th>
<th>Female Straight</th>
<th>Female-Straight-to-Right Angle</th>
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</thead>
<tbody>
<tr>
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<td>ER1PADAPTER</td>
<td>130054-0009</td>
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</table>

Note: Sales drawings for all standard order numbers are available on molex.com