Reliable Signal Transmission Solutions for Mission-Critical Industrial Applications

Only Belden® Delivers Signal Transmission Products that Perform Reliably in Any Environment with Service that Satisfies Any Requirement

Be Certain with Belden

Featured Brands

Belden
Hirschmann
Lumberg Automation
You can be Confident of Optimum Signal Performance with Belden Products and Systems
**Can You Meet the Signal Transmission Needs of Your Mission-Critical Application?**

You can with Belden. Only Belden ensures that its products will be available where and when you need them, that they will be of consistent high quality, and that any and all of your service needs will be met.

You need a partner with these distinct capabilities because a majority of all communication system failures occur in the signal transmission space—an area where troubleshooting is extremely difficult, yet uptime is essential. You need a signal transmission partner that elicits confidence in the availability, integrity and performance of its signal transmission solutions for any application, in any type of environment. That partner is Belden.

**Optimum Signal Availability**

Belden ensures signal availability with its Hirschmann™ brand of wired and wireless Ethernet switches and active networking devices. These products not only provide maximum network availability in harsh and mission-critical environments, they also meet stringent industry standard, protocol and certification requirements.

Hirschmann networking devices:
- Manage virtually every communication connection requirement among the various layers of the network: information, control and device
- Include products that support both copper and optical fiber media
- Provide data speeds up to 10 Gigabits/second
- Enable redundant, or HIPER Ring, device topologies to assure peak availability and performance with a guaranteed failover in less than 500ms

**Reliable, Best-in-class Signal Integrity**

Because of their efficacy, virtual private networks (VPNs) and firewalls are increasingly used in the industrial environment. Belden offers two top-performing security device families to fulfill your security needs:

- The Hirschmann Eagle 20 Firewall/Router can be deployed at the edge of the industrial network, production cell, machine, or at the subsystem level to offer local security for the full range of industrial applications, adjacent processes and remote operations and maintenance.
- The Hirschmann Eagle 20 Tofino Security Appliances provide Zone Level Security™ throughout your control network, with stateful inspection firewall and alarm capabilities that help protect your most critical and/or vulnerable system components.

Eavesdropping is far more difficult in Ethernet 1000Base-LX, -SX, 100Base-FX and 10Base-F applications with Belden FiberExpress® optical fiber cabling and connectivity. For the more demanding or hazardous environments, heavy-duty TrayOptic® optical fiber cables with Laser Optimized Fiber provide for secure Gigabit Ethernet data transmissions.

*Source: Omnicom Study, 2009.*
Belden Signal Transmission Products
Serve Many Diverse Industries

Best-ever Signal Performance
Belden designs its cable to reduce any attenuation loss, thereby allowing for optimum signal purity over the life of the cable installation. Belden's patented Bonded-Pair unshielded twisted pair (UTP) cable design, offered in many DataTuff® and IBDN Ethernet cables, affixes the conductor insulations of the cable pairs along their longitudinal axes to ensure that no performance-robbing gaps can develop between the conductor pairs. This unique construction facilitates the cable's consistently reliable signal transmission performance and helps to extend cable life.

Extremely Durable Industrial-grade Connectivity
Belden completes its end-to-end solutions set with a wide range of Lumberg Automation™ connectivity products that have been special-built to withstand the harsh environmental conditions of shock, vibration, dust and washdown. A sampling of these products can be seen on the pages that follow and include: distribution/junction boxes, Fieldbus systems and modules, cordsets, receptacles, field-attachable connectors, valve connectors, splitters, and cable plugs and sockets.

When these products are used in conjunction with Belden cabling and active devices you can rely on outstanding signal transmission quality and reliability.

Providing a Comprehensive Line of Signal Transmission Solutions for Any Environment
Belden is the premier signal transmission solutions provider – offering wired and wireless Ethernet networking switches and active devices and both fiber optic and copper cabling and connectivity products for Open System Interconnection (OSI) Layers 1, 2 and 3 (the physical, data link and network layers). Only Belden possesses the know-how, the technologies, the breadth of product, and the commitment to service to ensure consistently reliable, end-to-end signal transmission performance for your mission-critical application.

At right, and on the following pages, are examples of some of the industries that have implemented our signal transmission solutions to keep their operations running reliably.

When you need to be certain, be certain with Belden.
Processing Industries

Discrete Manufacturing

Infrastructure
Power Transmission & Distribution

Product Applications

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</table>

APPLICATION LEGEND: A = Substations  B = Control Room
Product Features and Benefits

**Ethernet Switches**

- **Compact RS20/30/40**
  - Hardened managed and unmanaged compact switches with Gigabit capability
  - Various media connection options
  - Meets/exceeds NERC CIP and ANSI/ISA-99
  - Extensive security, media redundancy, alarming and advanced management capabilities
  - 4 to 26 ports with fiber options
  - IEC 61850 Compliant

- **Modular MICE MS20/30**
  - Modular managed switch family for up to 28 ports of any copper/fiber mix
  - Port configuration achieved via hot-plug media modules
  - IEC 61850 Compliant

- **RSR**
  - Compact ruggedized DIN Rail Switches
  - Extremely high EMI resistance
  - -40°C to +85°C and AC/DC operation
  - IEC 61850 Compliant

- **MACH100**
  - Modular fanless Industrial Ethernet rack-mount switch
  - Hot-swappable modules
  - Optional redundant power supply

- **MACH1000**
  - Rack-mount ruggedized switch
  - Extended temperature range: -40°C up to +85°C
  - Hundreds of copper/fiber combinations, up to 28 ports
  - IEC 61850 Compliant

- **MACH4000**
  - Gigabit backbone routing switches
  - Up to 48 Gigabit Ethernet ports and three 10 Gigabit Ethernet ports
  - Highly redundant

- **BAT System (Wireless)**
  - 802.11 a/b/g/n wireless Ethernet
  - Access Points and Clients
  - Bridge functionality
  - Redundant WLAN links for reliable data transfer
  - DIN rail and IP67/outdoor models

**EAGLE**

- High-speed VPN, firewall and routing solution
- Transparent and routing mode
- Various media connection options
- Meets/exceeds NERC CIP and ANSI/ISA-99

**Connectivity**

- **FiberExpress Optical Fiber Connectivity**
  - Single-mode and multimode patch cords and pigtails
  - Brilliance® field-installable connectors for fast, secure and reliable fiber termination (single-mode or multimode)
  - Patch panels and connectivity managers
  - Linking panel (FiberExpress bar)
  - Single-mode and multimode breakout kits

- **Industrial HiVision**
  - Maps, commissions, manages and maintains the network
  - OPC and ActiveX for SCADA integration

**Cable**

- **FiberExpress Optical Fiber Cables**
  - Tight-buffered single-mode or multimode fiber cables
  - Outside plant, single-mode and multimode versions (12-fiber or more) available in different jacketing and armoring constructions

- **TrayOptic Optical Fiber Cables**
  - Heavy-duty single-mode and multimode cables
  - Indoor/outdoor
  - Utilize Laser Optimized Fiber for Gigabit Ethernet

- **Industrial Ethernet Cables**
  - DataTuff Category 6 and 5e copper cables
  - Unshielded and shielded
  - Bonded-Pair performance advantage
  - Heavy-duty oil- and UV-resistant jackets
  - Many Ethernet/IP compliant; upjacketing and armoring available

- **Industrial Ethernet Connectivity**
  - DataTuff Category 5e RJ45 cordsets, jacks, plug kits for IP67 or IP20 installations
  - DataTuff IP67 surface mount boxes and faceplates
  - Category 5e RJ45 jacks and M12 plugs for harsh environments

- **Other Application**
  - Industrial protocol data cables (Fieldbus, DeviceNet, RS-485, etc.)
  - Instrumentation and control cables
  - Extensive line of VFD cables
  - Security: alarm, access control and CCTV cables

Belden actively participates with the International Electrotechnical Commission (IEC) standards committee and where applicable, products have been designed and tested to comply with IEC 61850 - standard for substation communications.
# Oil & Gas

![Diagram of oil & gas infrastructure]

## Product Applications

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**APPLICATION LEGEND:**

- **A** = Separator Station  
- **B** = Metering Station  
- **C** = Pumping/Compressor Station  
- **D** = LNG Processing Plant  
- **E** = Transportation/Storage  
- **F** = Refining Facilities  
- **G** = Offshore Rig/Control Room  
- **H** = Shipboard
Product Features and Benefits

**Ethernet Switches**

**Compact RS20/30/40**
- Hardened managed and unmanaged compact switches with Gigabit capability
- Extensive security, media redundancy, alarming and advanced management capabilities
- 4 to 26 ports with fiber options

**Modular MICE MS20/30**
- Modular managed switch family for up to 28 ports of any copper/fiber mix
- Port configuration achieved via hot-plug media modules

**OCTOPUS**
- IP67 Ethernet switch with industry-standard M12 D-code Ethernet connections
- Extended management by SNMP
- Redundancy via HIPER-Ring/MRP and Rapid Spanning Tree
- Access control via IEEE 802.1X

**EAGLE**
- High-speed VPN, firewall and routing solution
- Transparent and routing mode
- Various media connection options
- Meets/exceeds NERC CIP and ANSI/ISA-99

**Fieldbus Interface/Gateway Devices**
- Hardened copper-fiber modems with industrial approvals
- Reliable serial and fieldbus communication over (redundant) fiber

**MACH1000**
- Rack-mount ruggedized switch
- Extended temperature range: -40°C up to +85°C
- Hundreds of copper/fiber combinations, up to 28 ports

**MACH4000**
- Gigabit backbone routing switches
- Up to 48 Gigabit Ethernet ports and three 10 Gigabit Ethernet ports
- Highly redundant

**BAT System (Wireless)**
- 802.11 a/b/g/n wireless Ethernet
- Access Points and Clients
- Bridge functionality
- Redundant WLAN links for reliable data transfer
- DIN rail and IP67/outdoor models

**Connectivity**

**Range of Industrial Connectors (Valve Connectors, M8, M12)**
- Connectivity designed to withstand extremes of temperature, pressure, impact and environment

**FiberExpress Optical Fiber Connectivity**
- Single-mode and multimode patch cords and pigtails
- Brilliance® field-installable connectors for fast, secure and reliable fiber termination (single-mode or multimode)
- Patch panels and connectivity managers
- Linking panel (FiberExpress bar)
- Single-mode and multimode breakout kits

**Industrial Ethernet Connectivity**
- DataTuff Category 6 and 5e copper cables
- Unshielded and shielded
- Bonded-Pair performance advantage
- Heavy-duty oil- and UV-resistant jackets
- Many Ethernet/IP compliant; upjacketing and armoring available

**Other Application**
- Industrial protocol data cables (Fieldbus, Profinet, RS-485, etc.)
- Instrumentation and control cables
- ABS-approved (shipboard) fiber optic and copper cables
- Extensive line of VFD cables
- Security: alarm, access control and CCTV cables

**Cable**

**FiberExpress Optical Fiber Cables**
- Tight-buffered single-mode or multimode fiber cables
- Outside plant, single-mode and multimode versions (12-fiber or more) available in different jacketing and armoring constructions

**TrayOptic Optical Fiber Cables**
- Heavy-duty single-mode and multimode cables
- Indoor/outdoor
- Utilize Laser Optimized Fiber for Gigabit Ethernet

**Industrial Ethernet Cables**
- DataTuff Category 6 and 5e copper cables
- Unshielded and shielded
- Bonded-Pair performance advantage
- Heavy-duty oil- and UV-resistant jackets
- Many Ethernet/IP compliant; upjacketing and armoring available
# Alternate Power Generation — Wind Power Solutions

## Product Applications

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**APPLICATION LEGEND:**
- A = Nacelle/Tower/Tower
- B = Tower Interconnect
- C = Substation
- D = Control Room
**Product Features and Benefits**

### Ethernet Switches

**SPIDER Family**
- Entry-level switches in many varieties
- Fast Ethernet or full gigabit
- Fiber to copper conversion
- Unmanaged
- 2 to 8 (+2) ports plus optional optical fiber ports

**Basic Switch**
- Available in 8 and 9 port versions (10/100 BASE-TX, 100 BASE-FX)
- Variety of fiber port solutions (MM, SM and SFP)
- Available with pre-configured multicast filtering (IGMP Snooping and Querier) for EtherNet/IP use
- Fanless operational temperature ranges from 0 to +60 °C or -40 to +70 °C (EEC versions)
- Redundant 12/24VDC power inputs
- Broad management functionality
- Various configuration and diagnostic functionality — standard
- Industrial standards: cUL508 and cUL1604 Class I Div. 2 and NEMA TS 2 (EEC version)

**Compact RS20/30/40**
- Hardened managed and unmanaged compact switches with Gigabit capability
- Extensive security, media redundancy, alarming and advanced management capabilities
- 4 to 26 ports with fiber options

**Modular MICE MS20/30**
- Modular managed switch family for up to 28 ports of any copper/fiber mix
- Port configuration achieved via hot-plug media modules

**RSR**
- Compact ruggedized DIN Rail Switches
- Extremely high EMI resistance
- -40° to +85° C and AC/DC operation

**OCTOPUS**
- IP67 Ethernet switch with industry-standard M12 D-code Ethernet connections
- Extended management by SNMP
- Redundancy via HIPER-Ring/MRP and Rapid Spanning Tree
- Access control via IEEE 802.1X

**MACH100**
- Modular fanless
- Industrial Ethernet rack-mount switch
- Hot-swappable modules
- Optional redundant power supply

**MACH4000**
- Gigabit backbone routing switches
- Up to 48 Gigabit Ethernet ports and three 10 Gigabit Ethernet ports
- Highly redundant

**BAT System (Wireless)**
- 802.11 a/b/g/n wireless Ethernet Access Points and Clients
- Bridge functionality
- Redundant WLAN links for reliable data transfer
- DIN rail and IP67/outdoor models

**EAGLE**
- High-speed VPN, firewall and routing solution
- Transparent and routing mode
- Various media connection options
- Meets/exceeds NERC CIP and ANSI/ISA-99

**Fieldbus Repeaters**
- For the most common Fieldbus protocols
- Predictive maintenance
- Protocol-specific Fieldbus repeaters available

**Fieldbus Systems and Distributors**
- Fieldbus modules for AS-Interface, DeviceNet, CANopen® and Profinet
- Actuator/sensor distribution box
- IP65 – IP69k protection class, vibration and shock resistant

**FiberExpress Optical Fiber Connectivity**
- Single-mode and multimode patch cords and pigtails
- Brilliance field-installable connectors for fast, secure and reliable fiber termination (single-mode or multimode)
- Patch panels and connectivity managers
- Linking panel (FiberExpress bar)
- Single-mode and multimode breakout kits

**Industrial Ethernet Connectivity**
- DataTuff Category 5e RJ45 cordsets, jacks, plug kits for IP67 or IP20 installations
- DataTuff IP67 surface mount boxes and faceplates
- Category 5e RJ45 jacks and M12 plugs for harsh environments

**Cable**
- FiberExpress Optical Fiber Cables
  - Tight-buffered single-mode or multimode fiber cables
  - Outside plant, single-mode and multimode versions (12-fiber or more) available in different jacketing and armoring constructions

**TrayOptic Optical Fiber Cables**
- Heavy-duty single-mode and multimode cables
- Indoor/outdoor
- Utilize Laser Optimized Fiber for Gigabit Ethernet

**Industrial Ethernet Cables**
- DataTuff Category 6 and 5e copper cables
- Unshielded and shielded
- Bonded-Pair performance advantage
- Heavy-duty oil- and UV-resistant jackets
- Many Ethernet/IP compliant; upjacketing and armoring available

**Other Application**
- Industrial protocol data cables (Fieldbus, DeviceNet, etc.)
- WTTC-rated instrumentation and control cables
- Extensive line of VFD cables with WTTC ratings
- Security: alarm, access control and CCTV cables
Alternative Power Generation – Photovoltaic Parks

Product Applications

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<td>Compact RS20/30/40</td>
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<tr>
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<td>MACH4000</td>
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<tr>
<td>Fiberbus Repeaters</td>
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</tbody>
</table>

APPLICATION LEGEND:  A = Connection of Solar Panels  B = Communication System  C = Substation  D = Control Room

- Ethernet Switches:
  - SPIDER
  - Basic Switch
  - Compact RS20/30/40
  - RSR
  - MACH100
  - MACH4000
  - BAT
  - EAGLE
  - Fiberbus Repeaters

- Applications:
  - A
  - B
  - C
  - D

- Connectivity:
  - Cable Plug and Socket
  - Appliance Plug and Socket
  - Y-Splitter
  - FiberExpress Optical Fiber
  - Industrial Ethernet

- Cable:
  - FiberExpress Optical Fiber
  - Industrial Ethernet

- Other Application:
  - UL Type PV (Photovoltaic)
  - Industrial Protocol (Data)
  - Instrumentation
  - Control
  - VFD
  - Alarm/Access Control/CCTV

- Product Applications:
  - Ethernet Switches
  - Connectivity
  - Cable
  - Other Application
Product Features and Benefits

**Ethernet Switches**

**SPIDER**
- Entry-level switches in many varieties
- Fast Ethernet or full Gigabit
- Fiber to copper conversion
- Unmanaged
- 2 to 8 (+2) ports plus optional optical fiber ports

**Basic Switch**
- Best cost-performance ratio
- Feature range ideal for redundant networks
- Variants from fixed 8TX ports up to the flexible version with 3 FE SFP uplink ports
- Comprehensive redundancy software features

**Compact RS20/30/40**
- Hardened managed and unmanaged compact switches with Gigabit capability
- Extensive security, media redundancy, alarming and advanced management capabilities
- 4 to 26 ports with fiber options

**RSR**
- Compact ruggedized DIN Rail Switches
- Extremely high EMI resistance
- -40º to +85º C and AC/DC operation

**MACH100**
- Modular fanless Industrial Ethernet rack-mount switch
- Hot-swappable modules
- Optional redundant power supply

**MACH1000**
- Rack-mount ruggedized switch
- Extended temperature range: -40ºC up to +85ºC
- Hundreds of copper/fiber combinations, up to 28 ports

**MACH4000**
- Gigabit backbone routing switches
- Up to 48 Gigabit Ethernet ports and three 10 Gigabit Ethernet ports
- Highly redundant

**BAT**
- Wireless access points and clients
- Bridge functionality
- Redundant WLAN links for reliable data transfer
- IP67 protection class

**EAGLE**
- High-speed VPN, firewall and routing solution
- Transparent and routing mode
- Various media connection options
- Meets/exceeds NERC CIP and ANSI/ISA-99

**Fieldbus Repeaters**
- For the most common Fieldbus protocols
- Predictive maintenance
- Protocol-specific Fieldbus repeaters available

**Connectivity**

**SunCon1 – Cable Plug and Socket**
- Cable plug and socket
- Robust, elastic, insulating body with locking
- 1000 VDC
- IP68

**SunCon1 – Appliance Plug and Socket**
- 1000 VDC
- IP68

**Y-Splitter**
- 1000 VDC
- IP68

**FiberExpress Optical Fiber Connectivity**
- Single-mode and multimode patch cords and pigtails
- Brilliance® field-installable connectors for fast, secure and reliable fiber termination (single-mode or multimode)
- Patch panels and connectivity managers
- Linking panel (FiberExpress bar)
- Single-mode and multimode breakout kits

**Industrial Ethernet Connectivity**
- DataTuff Category 6 and 5e copper cables
- Unshielded and shielded
- Bonded-Pair performance advantage
- Heavy-duty oil- and UV-resistant jackets
- Many Ethernet/IP compliant; upjacketing and armoring available

**Other Application**
- UL Type PV (Photovoltaic) cables
- Security: alarm, access control and CCTV cables
- Instrumentation and control cables
- Extensive line of VFD cables
- Industrial protocol data cables (Fieldbus)

**Cable**

**FiberExpress Optical Fiber Cables**
- Tight-buffered single-mode or multimode fiber cables
- Outside plant, single-mode and multimode versions (12-fiber or more) available in different jacketing and armoring constructions

**TrayOptic Optical Fiber Cables**
- Heavy-duty single-mode and multimode cables
- Indoor/outdoor
- Utilize Laser Optimized Fiber for Gigabit Ethernet

**Industrial Ethernet Cables**
- DataTuff Category 6 and 5e copper cables
- Unshielded and shielded
- Bonded-Pair performance advantage
- Heavy-duty oil- and UV-resistant jackets
- Many Ethernet/IP compliant; upjacketing and armoring available

**Other Application**
- UL Type PV (Photovoltaic) cables
- Security: alarm, access control and CCTV cables
- Instrumentation and control cables
- Extensive line of VFD cables
- Industrial protocol data cables (Fieldbus)
Water/Wastewater

Product Applications

<table>
<thead>
<tr>
<th>Ethernet Switches</th>
<th>Applications</th>
<th>Connectivity</th>
<th>Applications</th>
<th>Cable</th>
<th>Applications</th>
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</table>

APPLICATION LEGEND:  
1. Master Control Center  
2. Administration Office  
3. Chemical Storage Tanks  
4. Motor Control Centers/Pumping Stations  
5. Water Storage Tanks/Controls  
6. Filtration Ponds/Pads  
7. Retention Pond  
8. Security Gates/Monitoring Areas
Product Features and Benefits

**Ethernet Switches**

**Basic Switch**
- Available in 8 and 9 port versions (10/100 BASE-TX, 100 BASE-FX).
- Variety of fiber port solutions (MM, SM and SFP).
- Available with pre-configured multicast filtering (IGMP Snooping and Querier) for EtherNet/IP use.
- Fanless operational temperature ranges from 0 to +60 °C or -40 to +70 °C (EEC versions).
- Redundant 12/24VDC power inputs.
- Broad management functionality.
- Various configuration and diagnostic functionality — standard.
- Industrial standards: cUL508 and cUL1604 Class I Div. 2 and NEMA TS 2 (EEC version).

**Compact RS20/30/40**
- Hardened managed and unmanaged compact switches with Gigabit capability.
- Extensive security, media redundancy, alarming and advanced management capabilities.
- 4 to 26 ports with fiber options.

**Modular MICE MS20/30**
- Modular managed switch family for up to 28 ports of any copper/fiber mix.
- Port configuration achieved via hot-plug media modules.

**RSR**
- Compact ruggedized DIN Rail Switches.
- Extremely high EMI resistance.
- -40° to +85°C and AC/DC operation.

**OCTOPUS**
- IP67 Ethernet switch with industry-standard M12 D-code Ethernet connections.
- Extended management by SNMP.
- Redundancy via HIPER-Ring/MRP and Rapid Spanning Tree.
- Access control via IEEE 802.1X.

**MACH1000**
- Rack-mount ruggedized switch.
- Extended temperature range: -40°C up to +85°C.
- Hundreds of copper/fiber combinations, up to 28 ports.

**MACH4000**
- Gigabit backbone routing switches.
- Up to 48 Gigabit Ethernet ports and three 10 Gigabit Ethernet ports.
- Highly redundant.

**BAT System (Wireless)**
- 802.11 a/b/g/n wireless Ethernet Access Points and Clients.
- Bridge functionality.
- Redundant WLAN links for reliable data transfer.
- DIN rail and IP67/outdoor models.

**EAGLE**
- High-speed VPN, firewall and routing solution.
- Transparent and routing mode.
- Various media connection options.

**Media Converters**
- Broad line of Ethernet, Profibus, MODBUS+, Genius and RS-485 media converters.
- Class 1 Div 2 rated.

**Connectivity**

**FiberExpress Optical Fiber Cables**
- Single-mode and multimode patch cords and pigtails.
- Brilliance® field-installable connectors for fast, secure and reliable fiber termination (single-mode or multimode).
- Patch panels and connectivity managers.
- Linking panel (FiberExpress bar).
- Single-mode and multimode breakout kits.

**Industrial Ethernet Connectivity**
- DataTuff Category 5e RJ45 cordsets, jacks, plug kits for IP67 or IP20 installations.
- DataTuff IP67 surface mount boxes and faceplates.
- Category 5e RJ45 jacks and M12 plugs for harsh environments.

**Industrial Ethernet Cables**
- DataTuff Category 6 and 5e copper cables.
- Unshielded and shielded.
- Bonded-Pair performance advantage.
- Heavy-duty oil- and UV-resistant jackets.
- Many Ethernet/IP compliant; upjacketing and armoring available.

**Other Application**
- Industrial protocol data cables (Fieldbus, Profibus, RS-485, etc.).
- Instrumentation and control cables.
- Extensive line of VFD cables.
- Security: alarm, access control and CCTV cables.
Public Transport

Product Applications

<table>
<thead>
<tr>
<th>Ethernet Switches</th>
<th>Applications</th>
<th>Connectivity</th>
<th>Applications</th>
<th>Cable</th>
<th>Applications</th>
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<tbody>
<tr>
<td>RSR</td>
<td>A  B  C  D  E  F</td>
<td>Connectivity Solutions</td>
<td>A  B  C  D  E  F</td>
<td>FiberExpress Optical Fiber</td>
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<td>A  B  C  D  E  F</td>
<td>Receptacle Connectors</td>
<td>A  B  C  D  E  F</td>
<td>TrayOptic Optical Fiber</td>
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<td>A  B  C  D  E  F</td>
<td>Other Application</td>
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<td>Industrial HiVision</td>
<td>A  B  C  D  E  F</td>
<td>Control</td>
<td>A  B  C  D  E  F</td>
<td>Alarm/Access Control/CCTV</td>
<td>A  B  C  D  E  F</td>
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</tbody>
</table>

APPLICATION LEGEND:  
- A = In Between Wagon Communication  
- B = Video Surveillance  
- C = Passenger Information System  
- D = Train-to-Ground Communication  
- E = Signaling Technology  
- F = Control Room
Be Certain with Belden

Product Features and Benefits

Ethernet Switches

- **RSR**
  - Compact ruggedized DIN Rail Switches
  - Extremely high EMI resistance
  - -40º to +85º C and AC/DC operation

- **OCTOPUS**
  - IP67 Ethernet switch with industry-standard M12 D-code Ethernet connections
  - Extended management by SNMP
  - Redundancy via HIPER-Ring/MRP and Rapid Spanning Tree
  - Access control via IEEE 802.1X

- **MACH**
  - Modular fanless Industrial Ethernet rack-mount switch
  - Hot-swappable modules
  - Optional redundant power supply
  - Up to 48 Gigabit Ethernet ports and three 10 Gigabit Ethernet ports
  - Highly redundant

- **BAT System (Wireless)**
  - 802.11 a/b/g/n wireless Ethernet Access Points and Clients
  - Bridge functionality
  - Redundant WLAN links for reliable data transfer
  - DIN rail and IP67/outdoor models

- **EAGLE**
  - High-speed VPN, firewall and routing solution
  - Transparent and routing mode
  - Various media connection options
  - Meets/exceeds NERC CIP and ANSI/ISA-99

- **Industrial HiVision**
  - Topology Discovery
  - SNMP Trap support
  - Auto Discovery
  - Configuration and extended diagnosis are provided via interfaces, including HiVision 6.4, Web browser and TELNET

Connectivity

- **Connectivity Solutions**
  - Actuator/sensor connecting and interconnecting cables
  - Field attachable connectors
  - M8, M12, M23, 7/8’’
  - Valve connectors A, B and C design
  - IP65 – IP69K protection class

- **Receptacle Connectors**
  - Standard connectors or individual solutions “straight out of a construction kit”
  - Multiple options for external chassis threads

- **FiberExpress Optical Fiber Connectivity**
  - Single-mode and multimode patch cords and pigtails
  - Brilliance field-installable connectors for fast, secure and reliable fiber termination (single-mode or multimode)
  - Patch panels and connectivity managers
  - Linking panel (FiberExpress bar)
  - Single-mode and multimode breakout kits

- **Industrial Ethernet Connectivity**
  - DataTuff Category 5e RJ45 cordsets, jacks, plug kits for IP67 or IP50 installations
  - DataTuff IP67 surface mount boxes and faceplates
  - Category 5e RJ45 jacks and M12 plugs for harsh environments

Cable

- **FiberExpress Optical Fiber Cables**
  - Tight-buffered single-mode or multimode fiber cables
  - Outside plant, single-mode and multimode versions (12-fiber or more) available in different jacketing and armoring constructions

- **TrayOptic Optical Fiber Cables**
  - Heavy-duty single-mode and multimode cables
  - Indoor/outdoor
  - Utilize Laser Optimized Fiber for Gigabit Ethernet

- **Industrial Ethernet Cables**
  - DataTuff Category 6 and 5e copper cables
  - Unshielded and shielded
  - Bonded-Pair performance advantage
  - Heavy-duty oil- and UV-resistant jackets
  - Many Ethernet/IP compliant; upjacketing and armoring available

Other Application

- Industrial protocol data cables (Fieldbus, Profinet, DeviceNet, RS-485, etc.)
- Instrumentation and control cables
- Security: alarm, access control and CCTV cables
Traffic Control

Product Applications

<table>
<thead>
<tr>
<th>Ethernet Switches</th>
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<tr>
<td>Compact RS20/30/40</td>
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</table>

APPLICATION LEGEND:  ● = Traffic Control Systems  ● = Traffic Redirection  ● = Emergency Telephones
                      ● = Safety Lighting  ● = Signaling Technology  ● = Control Room
Product Features and Benefits

**Ethernet Switches**

- Compact RS20/30/40
  - Hardened managed and unmanaged compact switches with Gigabit capability
  - Extensive security, media redundancy, alarming and advanced management capabilities
  - 4 to 26 ports with fiber options

- Modular MICE MS20/30
  - Modular managed switch family for up to 28 ports of any copper/fiber mix
  - Port configuration achieved via hot-plug media modules

- RSR
  - Compact ruggedized DIN Rail Switches
  - Extremely high EMI resistance
  - -40° to +85° C and AC/DC operation

- OCTOPUS
  - IP67 Ethernet switch with industry-standard M12 D-code Ethernet connections
  - Extended management by SNMP
  - Redundancy via HIPER-Ring/MRP and Rapid Spanning Tree
  - Access control via IEEE 802.1X

- MACH100
  - Modular fanless Industrial Ethernet rack-mount switch
  - Optional redundant power supply
  - Hot-swappable modules
  - Highly redundant

- MACH1000
  - Rack-mount ruggedized switch
  - Extended temperature range: -40°C up to +85°C
  - Hundreds of copper/fiber combinations, up to 28 ports

**EAGLE**

- High-speed VPN, firewall and routing solution
- Transparent and routing mode
- Various media connection options
- Meets/exceeds NERC CIP and ANSI/ISA-99

**Industrial HiVision**

- Topology Discovery
- SNMP Trap support
- Auto Discovery
- Configuration and extended diagnosis are provided via interfaces, incl. HiVision 6.4, Web browser and TELNET

**Fieldbus Repeaters**

- For the most common Fieldbus protocols
- Predictive maintenance
- Protocol-specific Fieldbus repeaters available

**Connectivity**

- **FiberExpress Optical Fiber Connectivity**
  - Single-mode and multimode patch cords and pigtails
  - Brilliance field-installable connectors for fast, secure and reliable fiber termination (single-mode or multimode)
  - Patch panels and connectivity managers
  - Linking panel (FiberExpress bar)
  - Single-mode and multimode breakout kits

- **Industrial Ethernet Connectivity**
  - DataTuff Category 5e RJ45 cordsets, jacks, plug kits for IP67 or IP20 installations
  - DataTuff IP67 surface mount boxes and faceplates
  - Category 5e RJ45 jacks and M12 plugs for harsh environments

**Cable**

- **FiberExpress Optical Fiber Cables**
  - Tight-buffered single-mode or multimode fiber cables
  - Outside plant, single-mode and multimode versions (12-fiber or more) available in different jacketing and armoring constructions

- **TrayOptic Optical Fiber Cables**
  - Heavy-duty single-mode and multimode cables
  - Indoor/outdoor
  - Utilize Laser Optimized Fiber for Gigabit Ethernet

- **Industrial Ethernet Cables**
  - DataTuff Category 6 and 5e copper cables
  - Unshielded and shielded
  - Bonded-Pair performance advantage
  - Heavy-duty oil- and UV-resistant jackets
  - Many Ethernet/IP compliant; upjacketing and armoring available

- **Other Application**
  - Industrial protocol data cables (RS-485, Fieldbus, etc.)
  - Security: alarm, access control and CCTV cables
  - Instrumentation and control cables
  - IMSA traffic signal cables

**BAT System (Wireless)**

- Wireless access points and clients
- Bridge functionality
- Redundant WLAN links for reliable data transfer
- IP67 protection class
### Machine Building – Robotics

**Product Applications**

<table>
<thead>
<tr>
<th>Ethernet Switches</th>
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<th>Connectivity</th>
<th>Applications</th>
<th>Cable</th>
<th>Applications</th>
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</tbody>
</table>

**APPLICATION LEGEND:**
- ● = I/O and Motion Control
- ○ = Robot Base
- ○ = Robot Grip

- ■ = Ethernet Switches
- ■ = Connectivity
- ■ = Cable

**Other Applications:**
- ■ = Industrial Ethernet
- ■ = Other Application
- ■ = Industrial Protocol (Data)
- ■ = Belden Infinity Flexible Automation
- ■ = Instrumentation
- ■ = Control
- ■ = VFD
Product Features and Benefits

Ethernet Switches

**SPIDER**
- Entry-level switches in many varieties
- Fast Ethernet or full Gigabit
- Fiber to copper conversion
- Unmanaged
- 2 to 8 (+2) ports plus optional optical fiber ports

**Basic Switch**
- Available in 8 and 9 port versions (10/100 BASE-TX, 100 BASE-FX)
- Variety of fiber port solutions (MM, SM and SFP)
- Available with pre-configured multicast filtering (IGMP Snooping and Querier) for EtherNet/IP use
- Fanless operational temperature ranges from 0 to +60°C or -40 to +70°C (EEC versions)
- Redundant 12/24VDC power inputs
- Broad management functionality (see page 17 for details)
- Various configuration and diagnostic functionality — standard
- Industrial standards: cUL508 and cUL1604 Class I Div. 2 and NEMA TS 2 (EEC version)

**Compact RS20/30/40**
- Hardened managed and unmanaged compact switches with Gigabit capability
- Extensive security, media redundancy, alarming and advanced management capabilities
- 4 to 26 ports with fiber options

**OCTOPUS**
- IP67 Ethernet switch with industry-standard M12 D-code Ethernet connections
- Extended management by SNMP
- Redundancy via HIPER-Ring/MRP and Rapid Spanning Tree
- Access control via IEEE 802.1X

**Connectivity**

**LioN-Link**
- Two lines per bus head (for Profinet, Proibus, DeviceNet, CANopen®)
- Fieldbus independent I/O Modules
  - up to 100 m extension per line
- up to 15 devices per line

**LioN-Link Motion**
- Control of 24 V brushless drive technology
- Reduced amount of cabling
- Reduced installation time
- High level diagnostics
- Parameter setup

**Connectivity Solutions — Actuator/Sensor Double Ended and Single-Ended Cordsets (M8/M12)**
- Reduced installation time
- Easy to maintain
- IP67 protection class
- Torsion-suitable
- Suitable for use in drag chains
- Vibration- and shock-resistant
- Good chemical and oil resistance

**Actuator/Sensor Distribution Boxes**
- Space saving design
- Cost saving wiring
- Easy to maintain
- Shock and vibration proof
- IP67 protection class

**e2c 67**
- Modular Fieldbus station
- Flexible I/O combination
- Bus head for Proibus, Interbus, DeviceNet
- Ruggedized backplane concept
- IP67 protection class

**LioN-M/LioN-S**
- Universal I/O functionality
- Unlimited I/O combination
- Exact diagnostic
- Space saving in the cabinet
- Fieldbus protocols: Profinbus, DeviceNet

**Cable**

**Industrial Ethernet Cables**
- Continuous flex-rated Category 5e cable
- DataTuff Category 6 and 5e copper cables
- Unshielded and shielded
- Bonded-Pair performance advantage
- Heavy-duty oil- and UV-resistant jackets
- Many Ethernet/IP compliant; upjacketing and armoring available

**Other Application**
- Industrial protocol data cables (Fieldbus, Profinbus, DeviceNet, etc.)
- Belden Infinity® flexible automation cables
- Instrumentation and control cables
- Extensive line of VFD cables
Machine Building – Material Handling

**Product Applications**

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<th>Connectivity</th>
<th>Applications</th>
<th>Cable</th>
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**APPLICATION LEGEND:**
- **A** = Workstation
- **B** = Cabinet
- **C** = Forklift
- **D** = Signal Transmission
- **E** = Control Room

- **Ethernet Switches**
  - Compact RS20/30/40
  - RS PoE
  - Modular MICE MS20/30
  - MACH100
  - BAT
  - EAGLE
  - Fieldbus Repeaters

- **Connectivity**
  - Connectivity Solutions
  - Actuator/Sensor Boxes
  - Fieldbus Modules/Systems
  - Field Attachable Connectors

- **Cable**
  - Industrial Ethernet
  - Other Application
  - Industrial Protocol (Data)
  - Instrumentation
  - Control
  - VFD
  - Belden Infinity Flexible Automation
  - Alarm/Access Control/CCTV

- **Applications**
  - Workstation
  - Cabinet
  - Forklift
  - Signal Transmission
  - Control Room
Product Features and Benefits

Ethernet Switches
Compact RS20/30/40
- Hardened managed and unmanaged compact switches with Gigabit capability
- Extensive security, media redundancy, alarming and advanced management capabilities
- 4 to 26 ports with fiber options

RS PoE Switches
- Power over Ethernet (PoE)
- Redundant power inputs
- Available with conformal coating
- Extended temperature range: -40°C to +60°C

Modular MICE MS 20/30
- Modular managed switch family for up to 28 ports of any copper/fiber mix
- Port configuration achieved via hot-plug media modules

MACH100
- Modular fanless Industrial Ethernet rack-mount switch
- Hot-swappable modules
- Optional redundant power supply

BAT System (Wireless)
- Wireless access points and clients
- Bridge functionality
- Redundant WLAN links for reliable data transfer
- IP67 protection class

EAGLE
- High-speed VPN, firewall and routing solution
- Transparent and routing mode
- Various media connection options
- Meets/exceeds NERC CIP and ANSI/ISA-99

Fieldbus Repeaters
- For the most common Fieldbus protocols
- Predictive maintenance
- Protocol-specific Fieldbus repeaters available

Connectivity
Connectivity Solutions – Actuator/Sensor Cordsets (M8/M12), Valve and Field-attachable Connectors, Industrial Ethernet Connectivity
- Reduced installation time
- Easy to maintain
- IP67 protection class
- Good chemical and oil resistance

Connectivity Solutions – Actuator/Sensor Double-Ended and Single-Ended Cordsets (M8/M12)
- Reduced installation time
- Easy to maintain
- IP67 protection class
- Torsion-suitable
- Suitable for use in drag chains
- Vibration- and shock-resistant
- Good chemical and oil resistance

Actuator/Sensor Distribution Boxes
- Space saving design
- Cost saving wiring
- Shock and vibration proof
- IP67 protection class

Fieldbus – Modules/Systems
- Motion control (24 V roller conveyor motors)
- Universal I/O functionality
- Unlimited I/O combination
- Exact diagnostic
- Space saving in the cabinet
- IP67 protection class

Field-attachable Connectors
- M8, M12, 7/8", M23
- IP65/67
- Straight and angled versions, 4, 5, 8, 12, 19-poles

Cable
Industrial Ethernet Cables
- DataTuff Category 6 and 5e copper cables
- Unshielded and shielded
- Bonded-Pair performance advantage
- Heavy-duty oil- and UV-resistant jackets
- Many Ethernet/IP compliant; upjacketing and armoring available

Other Application
- Industrial protocol data cables (Fieldbus, DeviceNet, etc.)
- Belden Infinity flexible automation cables
- Instrumentation and control cables
- Extensive line of VFD cables
- Security: alarm, access control and CCTV cables
Food and Beverage

Product Applications

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APPLICATION LEGEND:  
1. = Control Room  
2. = Packing/Palletizing (Cabinets)  
3. = Packing/Palletizing (Factory Floor)  
4. = PLCs/Controls  
5. = Production Line Equipment (Filling/Capping/Labeling)  
6. = Production Line Equipment (Cabinets)  
7. = Conveyor System
Product Features and Benefits

**Ethernet Switches**

Compact RS20/30/40
- Hardened managed and unmanaged compact switches with Gigabit capability
- Extensive security, media redundancy, alarming and advanced management capabilities
- 4 to 26 ports with fiber options

Modular MICE MS20/30
- Modular managed switch family for up to 28 ports of any copper/fiber mix
- Port configuration achieved via hot-plug media modules

**OCTOPUS**
- IP67 Ethernet switch with industry-standard M12 D-code Ethernet connections
- Extended management by SNMP
- Redundancy via HIPER-Ring/MPR and Rapid Spanning Tree
- Access control via IEEE 802.1X

**MACH100**
- Modular fanless Industrial Ethernet rack mount switch
- Hot-swappable modules
- Optional redundant power supply

**MACH1000**
- Rack-mount ruggedized switch
- Extended temperature range: -40°C up to +85°C
- Hundreds of copper/fiber combinations, up to 28 ports

**MACH4000**
- Gigabit backbone routing switches
- Up to 48 Gigabit Ethernet ports and three 10 Gigabit Ethernet ports
- Highly redundant

**BAT System (Wireless)**
- 802.11 a/b/g/n wireless Ethernet
- Access Points and Clients
- Bridge functionality
- Redundant WLAN links for reliable data transfer
- DIN rail and IP67/outdoor models

**EAGLE**
- High-speed VPN, firewall and routing solution
- Transparent and routing mode
- Various media connection options
- Meets/exceeds NERC CIP and ANSI/ISA-99

**Fieldbus Repeaters**
- For the most common Fieldbus protocols
- Predictive maintenance
- Protocol specific Fieldbus repeaters available

**Fieldbus Systems and Distributors**
- Fieldbus modules for AS-Interface, DeviceNet, CANopen® and Profibus
- Actuator/sensor distribution box
- IP67/IP69K protection class, vibration and shock resistant

**Fieldbus Systems – LioN-M/LioN-S, LioN-Link, LioN-Link Motion, e2e 67**
- Motion control
- (24 V roller conveyor motors)
- Universal I/O functionality
- Unlimited I/O combination
- Exact diagnostic
- Space saving in the cabinet
- IP67 protection class

**Actuator/Sensor Distribution Boxes**
- Space saving design
- Cost saving wiring
- Easy to maintain
- Shock and vibration proof
- IP67 protection class

**Field Attachable Connectors**
- M8, M12, 7/8”, M23
- Straight and angled versions, 4, 5, 8, 12, 19-poles

**Connectivity Solutions**
- Actuator/sensor connecting and interconnecting cables
- Field-attachable connectors
- Valve connectors A, B and C design
- IP65 – IP69K protection class

**Receptacle Connectors**
- Standard connectors or individual solutions “straight out of a construction kit”
- Multiple options for external chassis threads

**FiberExpress Optical Fiber Connectivity**
- Single-mode and multimode patch cords and pigtails
- Brilliance field-installable connectors for fast, secure and reliable fiber termination (single-mode or multimode)
- Patch panels and connectivity managers
- Linking panel (FiberExpress bar)
- Single-mode and multimode breakout kits

**Industrial Ethernet Connectivity**
- DataTuff Category 5e RJ45 cordsets, jacks, plug kits for IP67 or IP20 installations
- DataTuff IP67 surface mount boxes and faceplates
- Category 5e RJ45 jacks and M12 plugs for harsh environments

**Cable**
- FiberExpress Optical Fiber Cables
  - Tight-buffered single-mode or multimode fiber cables
  - Outside plant, single-mode and multimode versions (12-fiber or more) available in different jacketing and armoring constructions

- TrayOptic Optical Fiber Cables
  - Heavy-duty single-mode and multimode cables
  - Indoor/outdoor
  - Utilize Laser Optimized Fiber for Gigabit Ethernet

**Industrial Ethernet Cables**
- DataTuff Category 6 and 5e copper cables
- Unshielded and shielded
- Bonded-Pair performance advantage
- Heavy-duty oil- and UV-resistant jackets
- Many Ethernet/IP compliant; upjacketing and armoring available

**Other Application**
- Industrial protocol data cables (RS-485, Fieldbus, etc.)
- Instrumentation and control cables
- Belden Infinity robotic, flexible automation cables
- Extensive line of VFD cables
- Security, alarm, access control and CCTV cables

Be Certain with Belden
Service Overview

Belden for Complete Solutions

No solution is complete without the highest levels of support. In addition to its top-performance product offering, Belden has its own highly specialized and flexible support teams. They make sure that your system is functioning perfectly from day one – and that it stays that way. Whether you need long-term technical advice or short-term troubleshooting, Belden is there to provide the right support, around the clock, around the globe.

Network Design

The correct configuration of a network or the optimization of an existing network is more than a question of technology. Efficient network design is a matter of proper assessment, making the right choices and evaluation of key data and requirements. Belden will support you during system evaluation and technology selection, prepare migration concepts, and provide advice on the use of suitable management tools. From the analysis of your existing network to the evaluation of available technology, we will help you make an informed choice and design the best working solution.

Project Management, Testing and Maintenance

Belden is able to deliver professional implementation. Our specialist support team will not only design your system, but will also assist you with coordination, tests and technical documentation, or if you prefer, provide you with a turn-key solution, so that you can concentrate on your day-to-day business. Furthermore, after your system has been installed, Belden will support you to ensure optimum levels for critical elements like performance, security, speed and efficiency. Belden can provide a wide range of further testing and maintenance services – specifically tailored to meet your exact requirements.

Customized Training

If you need to fill knowledge gaps or require employees to be trained on your network, Belden can provide customized training: either at one of our dedicated Training Centers, or at your own premises.