



Products for Medical Device Manufacturers

Introduction

In the operating suite, doctor's office or at the bedside, medical equipment resides in unique environments. Diagnostic, treatment and monitoring devices have critical power and signal requirements. Components must be durable, rugged and always reliable.

Tyco Electronics understands the vital connections that dependably deliver images, data and power. From antennas to Z-series filters, Tyco Electronics components...batteries, cable, connectors, contacts, displays, filters, motors, heat shrink, labels, molded parts, relays, passive components, printed circuits, sensors, tubing, touchmonitors, wireless devices... assemblies and capabilities provide the innovative electronics that medical device OEMs require for their mission critical products.

And if the solution doesn't already exist, Tyco Electronics engineers take on the challenge—providing parts, packaging and program solutions for the next generation of medical equipment.



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Connect physicians to patients with cable

Hand-held cable assemblies

Cable assemblies that connect hand-held devices to diagnostic, surgical or monitoring equipment must supply unique electrical, mechanical and environmental qualities.



Intuitive grip area on PI Plastic Medical Connector

On ultrasound transducers, video arthroscopes, surgical instruments and patient monitors, Precision Interconnect cable assemblies are built on a history of solutions for hand-held requirements.

Patient Comfort

The pull of a cable against the skin, a tug on the bed clothes...caregivers know how little things can be uncomfortable for patients. Low profile, custom molded components; lightweight, flexible cables; and soft-touch and low friction surfaces add value understood by the end-user.

Ergonomics

The ideal hand-held medical device is light, comfortable and easy to handle. Size, weight and flexibility are part of a well designed cable assembly.



Ergonomic COMFORT cable assemblies



Low profile ERGOLINE ECG patient cable and lead wires



Durable grabber clips for snap electrodes



assemblies for hand-held medical devices.



Hand-held cable assemblies

Sterilization

Whether destined for use in the O.R., treatment room or clinic, cable assemblies must be suitable for appropriate disinfection and/or sterilization procedures. Depending on the application, materials and seals are selected to be compatible with EtO, autoclave, low temperature cycles (such as STERIS and STERRAD), CIDEX soaks or IPA wipe down.

Durability

Nicked by scalpels...rolled over by gurneys...twisted and torqued...cable assemblies in the hospital or clinic must be resilient and reliable. Tough, yet flexible cable jackets, molded components and connector hardware are designed to withstand this demanding environment.

Electrical requirements

Data for critical care decisions cannot be compromised. Designing for the application, Tyco Electronics engineers understand high noise environments, RFI/EMI compliance, high voltage devices, capacitance/impedance consistency and tight tolerances on electrical characteristics.

Economics

In the world of medical devices, single-use and limited-use components need to be as thoughtfully designed and manufactured as reusable products. With proper design, material selection and manufacturing around the globe, disposable and limited reuse assemblies are fully engineered and efficiently manufactured.



BASIS cable assemblies suitable for sterilization



Single-use assembly for disposable application



Fiber optic light tube in custom assembly



Satisfy unique requirements with connectors,



Connectors and custom cables



High density CPC-Medical connectors



Robust, sealable PI CIRCULAR connectors



156 and 260 AMP M-ZIF connectors



6 pin AAMI style connector for ECG equipment



Secure latching on PI Plastic Medical Connectors

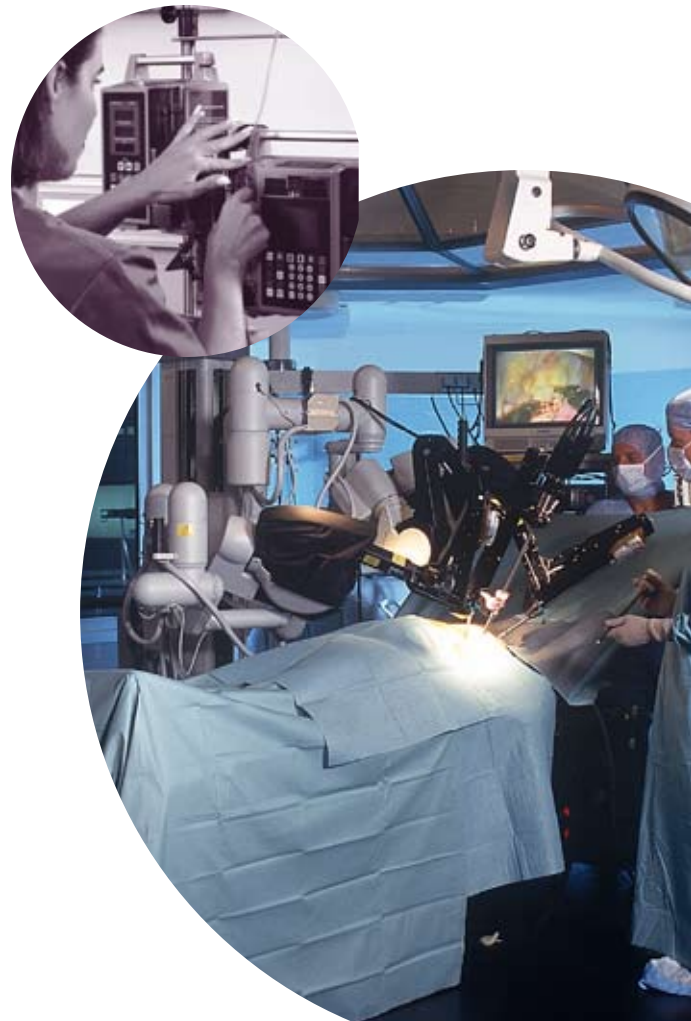


Next generation density AMP TC-ZIF connectors

Engineered for medical equipment...

Tyco Electronics connectors designed for medical applications provide the densities, durability and options desired by equipment designers and equipment users.

Plastic or metal round connectors are available in a variety of shell sizes, pin counts and configurations—including contacts for combined power and signal applications. Keying, polarization, sealing capability and molded strain reliefs are features selectable within specific families. Some families are compatible with existing interfaces. Mating receptacles suitable for panel mount are available for most families. Some connectors are terminated to cable and furnished as a complete assembly.



cables and options too numerous to mention.



Connectors and custom cables

The power, data and signal connection...

It all begins with cable from Tyco Electronics brands like **Madison Cable**, **Precision Interconnect** and **Raychem**. A wide range of cable configurations are used to move scanners, video surgeries, power scalpels and transmit vital signs on imaging, treatment and monitoring equipment.

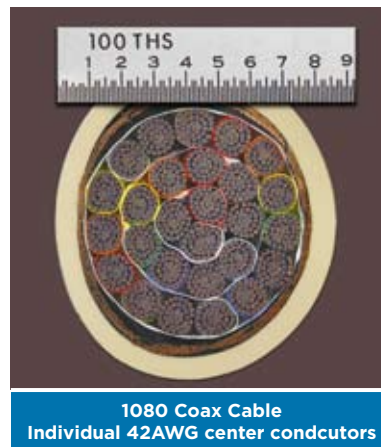
Madison Cable composite cables provide power and control to MRI, x-ray and other imaging equipment. Combinations of coaxes, singles and twisted pairs are cabled to suit a variety of non-invasive medical applications including imaging, monitoring and power distribution.

Flexible yet rugged, lightweight and flame retardant **Raychem** SPEC 44 and SPEC 55 cables are suited to the challenging environments of medical equipment. Both products are also available as multi-conductor, shielded, jacketed cables.

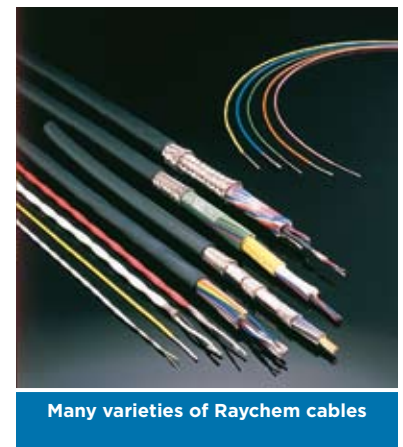
Some applications require very small cables. Intracoronary and intravascular imaging devices present the ultimate in micro-packaging challenges. **Precision Interconnect** cables use signal conductors as small as 50 AWG in insulated singles, coaxes or twisted pairs. Other **Precision Interconnect** cables include multiconductor coaxial, composites and hybrids for imaging, surgical and monitoring devices.



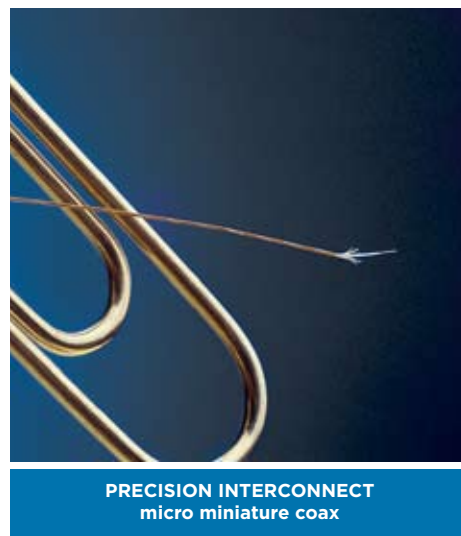
MADISON CABLE
imaging cable



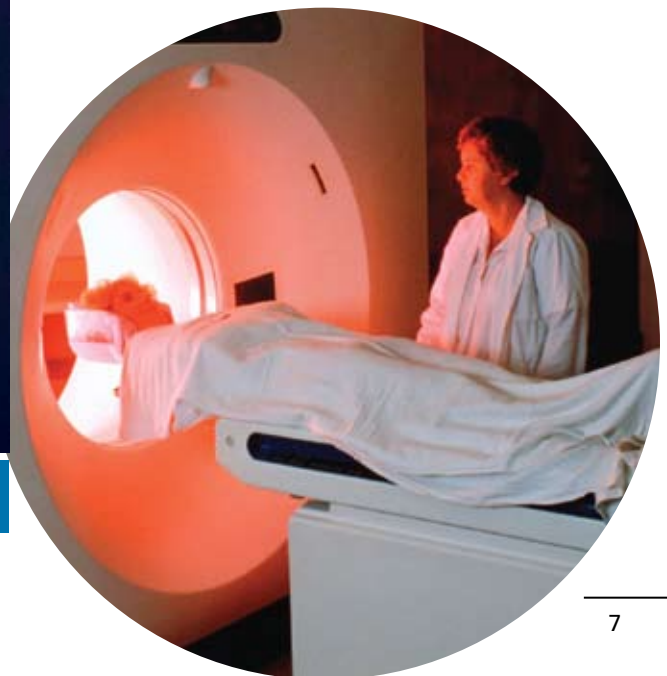
1080 Coax Cable
Individual 42AWG center conductors



Many varieties of Raychem cables



PRECISION INTERCONNECT
micro miniature coax





Custom components solve circuitry and footprint challenges.

Custom solutions

From its depth of experience in component design and global manufacturing capabilities, Tyco Electronics is prepared to create a solution where one doesn't yet exist.

Progressive products demand innovative components. Precision metal forming, precious metal plating, thermoplastic injection and overmolding...capabilities in connector research, cable design and printed circuits...and skilled labor for component subassemblies and complete interconnect systems...Tyco Electronics is ready for the next generation of medical devices.



Stamped and formed contacts



MID molded integrated components



Custom overmolded connectors for disposables



Reusable cable with EIA 232/422 interface

Leveraging its experience in connector manufacture, Tyco Electronics meets packaging and functionality challenges with **AMP** stamped and formed blades, holders (and many, many other possibilities) as well as custom contacts to meet specific demands. Integrated **MID** components of thermoplastic and conductive materials can reduce package size and improve functionality by combining features into a single device.

Pair a single-use cable with overmolded housing and strain relief and an **AMP** D-sub assembly with custom receptacle to create an efficient system of disposable $S_{p}O_2$ sensors and reusable $S_{p}O_2$ trunk cables for a monitoring application.



Printed circuits, spring pin contacts and overmolded housings

Size, durability and compatibility with cleaning solutions are important issues when connecting a temperature probe to its hand-held unit. This turnkey solution involves thermoplastic over-molding, spring pin contacts, printed circuitry and a sealed header.

With its materials, design and manufacturing experience and facilities, Tyco Electronics goes beyond the standard in providing product innovations and custom solutions.



The key to reliability is the right connection.



Peripheral interconnects

As a vertically integrated manufacturer, Tyco Electronics matches the right cable, the right connector, and the right standard to connect monitors, instruments and foot switches to their controlling devices.

AMP Subminiature D cable assemblies with shielded cable and AMPLIMITE connectors—the industry's most extensive and versatile—support a variety of data protocols.

Tyco Electronics produces a wide range of **AMP** standard cable assemblies for connecting devices including USB, FIREWIRE, DVI, SCSI Ultra, PC Card, SATA, Ethernet, coaxial and fiber optic.

With its extensive engineering resources, cable and connector manufacturing expertise and global manufacturing facilities, Tyco Electronics can adapt, modify or create a custom cable assembly for current and next generation box-to-box interconnects.

Data integrity, image reliability—make the connection with Tyco Electronics cable assemblies.

Every cable interconnect must support unique electrical, programming and mechanical requirements—whether signal speed, shielding, contact density, keying, latching or appearance.



AMP USB cable assembly



Digital Visual interface cable assembly



Fiber optic components and assemblies

Printed circuits, spring pin contacts and overmolded housings



Customer-driven designs harness innovative

Internal wiring and components

Tyco Electronics puts it all together to meet the mechanical, electrical, EMI and environmental challenges faced by medical equipment designers.



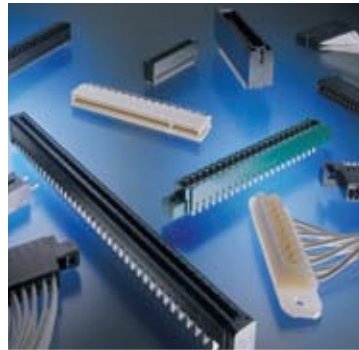
Many components create a custom wire harness

With innovative components, global capabilities and a customer-driven approach to wiring solutions, Tyco Electronics provides complete connector and harness design and production. Modeling, prototyping and testing services are available.

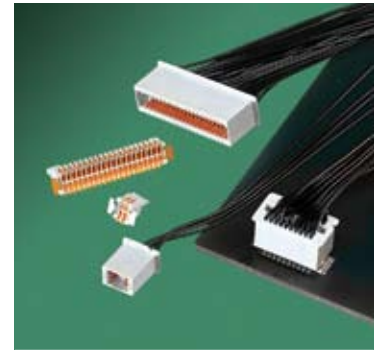
AMP board-to-board, card-edge, backplane, wire-to-board connectors and IC sockets provide configurations for connecting virtually any circuit or device.



AMP M Series pin and socket connectors



One-piece AMP PCB Connectors



Modular AMPMODU contacts, headers and assemblies



AMP MTA header and pre-loaded connectors



components for internal wiring systems.



Internal wiring and components

Raychem heat shrinkable tubing provides exceptional insulation, mechanical protection and strain relief. Used in splicing, breakouts and identification, heat shrink products are available in many forms, various shrink ratios and custom configurations.

AMP and **Madison Cable** flat ribbon and flat, multi-pair, highly flexible cables are low profile, easy routing connections suitable for a variety of low voltage requirements.

Precision Interconnect BLUE RIBBON micro coax cables for board-to-board data bus connections can be terminated to a variety of hardware including **AMP MICTOR** connectors,

AMP CHAMP connectors and .100 headers.

Supplying the part or the whole, Tyco Electronics understands the components and the connections for crucial circuitry.



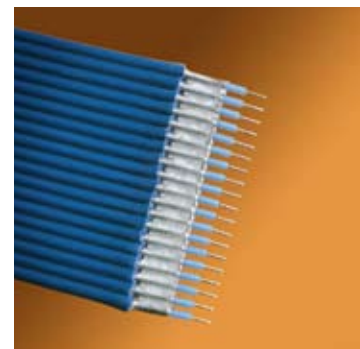
Dependable protection with RAYCHEM heat shrinkable tubing



Protect cables with RAYCHEM molded parts



PVC IDC ribbon cables



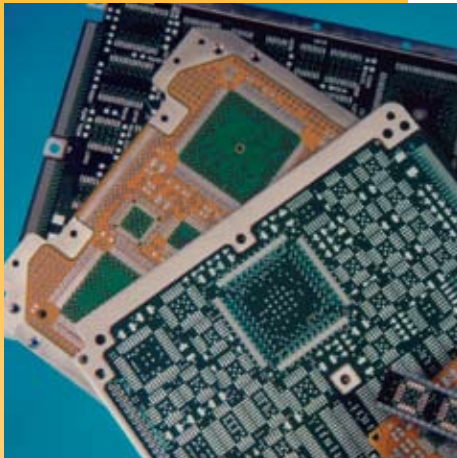
PRECISION INTERCONNECT BLUE RIBBON micro coax



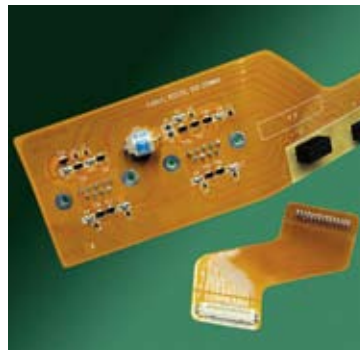
Specify components, subassemblies and

Printed circuits and devices

Circuits, components,
accessories...



PCBs

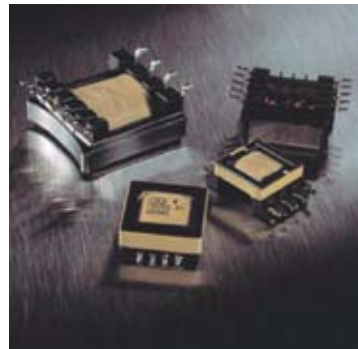


Flex circuits

◀ Tyco Electronics is one of the largest producers of printed circuits in the world. Production of PCBs (2 through 68 layers), flex and rigid flex circuits, bonded heat sink assemblies, backplane assemblies, sub and full-system assembly is supported by engineering services from concept through modeling, assurance, integration and test.



Circuit protection



Magnetic components

◀ **Raychem** Circuit Protection markets a complete line of Polyswitch resettable devices, Sibar thyristor surge protectors, ROV metal oxide varistors and protected power switches as well as magnetic components from CoEv Magnetics.



Identification and labeling systems

◀ **Raychem** identification products include a variety of stock as well as hardware, software and technical support.

Custom labels can be partially printed with logos and graphics for finishing at customer sites using printing systems also available from Tyco Electronics.



systems from antennas to Z series filters.



Printed circuits and devices

...Tyco Electronics has the most electronics including...

...capacitors, inductors, resistors, transformers and other devices... ▶



Passive devices



Relays and timers



Switches

◀...virtually any type of switch. Alcoswitch products also include knobs, boot, caps and other accessories...



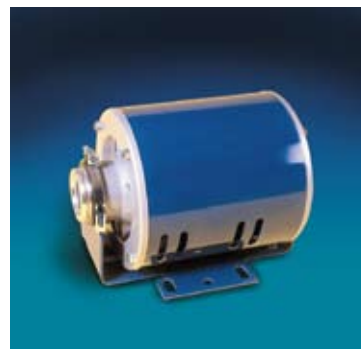
Sensors

◀...a wide range of sensors including pulse wire, PLCD, position, rotational and touch sensors...

◀...and relays, timers and contactors by **Axicom, CII, Hartman, Kilovac, OEG, and P&B**, as well as Tyco Electronics with options for enclosure, termination, input, contact arrangement and rating.



RFI/EMI filters



Small motors

◀◀ Power line filters, specifically developed for health care applications, are available in a variety of current ratings and case styles.

◀ For small pump or compressor applications, products from the **Crompton Electronic Motors** line fit where space is at a premium.

Simplify complex technology with user-friendly interfaces.

User interfaces

Put simplicity and accuracy at the user's fingertips with touchscreens, touch sensors and custom printed overlays.

In patient monitoring, information systems and education applications, **Elo TouchSystems** touchscreens and touchmonitors provide an efficient, responsive data entry mechanism, help reduce the chance of errors and allow the clinician to focus on the patient. Medical touchscreens are completely sealable, and can be activated by rubber gloves, fingertips and pens. Custom adaptations and solutions are available.

Tyco touch control technology sensors are robust, solid-state-based touch controls available on keypads or electronic control systems built to customer specifications. Tyco Electronics turnkey design and manufacture of PCBs, connectors, cable assemblies and power switching components (including relays, contactors, transformers and circuit breakers) creates a touch interface adaptable to any dielectric material suitable for harsh environments. Key sizes and graphics are designed per customer specifications.

Custom printed overlays provide durable and sealable identification for electronics devices. Screen-printed control panels, fascias and membrane switches are manufactured from a broad selection of materials with gloss or textured finishes, in various thicknesses and with adhesive backing if desired.

Custom graphics and touch technology create user-friendly interfaces and keep the focus on the patient instead of the equipment.



Ergonomic Touch Control
Technology sensors



Adaptable chassis mount
ELO LCD monitor



19" LCD Medical
Desktop touchmonitor



Custom printed overlays and fascias



Portability poses circuitry and packaging challenges.



Tyco Electronics provides solutions with devices for signal transmission, battery power and connecting components.

M/A-COM discrete and integrated products deliver breakthrough performance with RF components, handsets and antennas. **M/A-COM** devices can be combined into single and multi-function components for cost-effective, high volume solutions.

Elastomeric connectors form a compression surface-to-surface connection enabling economical, high density, high reliability connections in space constrained, hand-held electronic products. Custom solutions incorporating holders or seals can be provided.

Tyco Electronics supplies power within the constraints of small form-factor portable devices. With either lithium ion, nickel cadmium or nickel metal hydride batteries, Tyco Electronics can design custom battery packs that increase functionality while reducing size, weight and cost.

When the design requirements call for portability, Tyco Electronics components and systems connect the care to the patient.



Breakthrough performance with M/A-Com devices and antennas

Components for portables

The shrinking size of portable electronics requires more features—more functionality—in less space.



Increase functionality with custom battery packs



Where space is limited—elastomeric connectors