



Chipsmall Limited consists of a professional team with an average of over 10 year of expertise in the distribution of electronic components. Based in Hongkong, we have already established firm and mutual-benefit business relationships with customers from,Europe,America and south Asia,supplying obsolete and hard-to-find components to meet their specific needs.

With the principle of “Quality Parts,Customers Priority,Honest Operation,and Considerate Service”,our business mainly focus on the distribution of electronic components. Line cards we deal with include Microchip,ALPS,ROHM,Xilinx,Pulse,ON,Everlight and Freescale. Main products comprise IC,Modules,Potentiometer,IC Socket,Relay,Connector.Our parts cover such applications as commercial,industrial, and automotives areas.

We are looking forward to setting up business relationship with you and hope to provide you with the best service and solution. Let us make a better world for our industry!



Contact us

Tel: +86-755-8981 8866 Fax: +86-755-8427 6832

Email & Skype: info@chipsmall.com Web: www.chipsmall.com

Address: A1208, Overseas Decoration Building, #122 Zhenhua RD., Futian, Shenzhen, China



65° REF
[116.5mm]

DESIGNER'S GUIDE



2.87" REF. [72.9mm]

BRAD HARRISON[®]
From Woodhead Connectivity

65° REF
[116.5mm]
30° REF
[33.0mm]
mPm[™]

Woodhead Connectivity

A Dynamic Force in Industrial Automation and Controls

A dynamic new entity has emerged... Woodhead Connectivity.

The leading industrial communications and connectivity brands, Brad Harrison, mPm, and SST, are now united with a single vision – to be the preferred global resource for industrial automation, communications and connectivity.

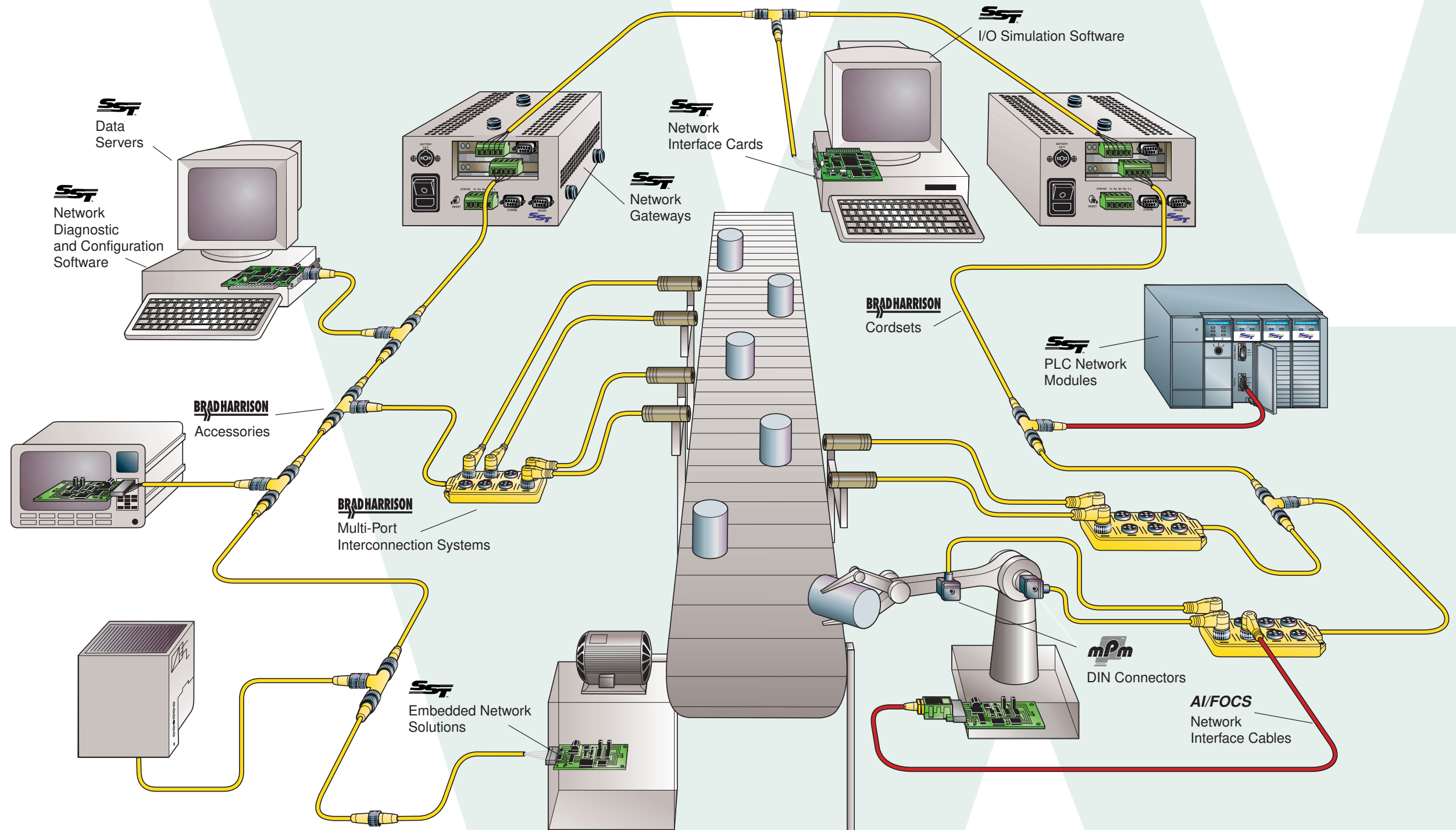
Delivering innovative solutions for complete connectivity, Woodhead Connectivity combines the products, expertise, and service to address the unique and evolving demands of industry. Our worldwide distribution and support infrastructure is committed to your success, with product-centric solutions that fulfill myriad industrial requirements and custom-designed applications to satisfy the more uncommon situations that arise.

The products behind the Woodhead Connectivity name are widely recognized for innovation and reliability. For nearly 30 years Brad Harrison has been the leading connector brand worldwide, offering the first and broadest selection of quick disconnect solutions. And mPm, in addition to being the world leader for output connectivity solutions for solenoids and valves, offers easy to use, cost-effective molded DIN connectors. Together, mPm molded DIN connectors and molded Brad Harrison connectors can plug into Multi-port interconnection systems for a complete, economical, plug-and-play input and output interwiring solution.

SST provides solutions for network connectivity to the ever-expanding number of industrial communication protocols. SST brings the expertise and superior reputation of the world's leading independent supplier of industrial communications technology to Woodhead Connectivity.

As demand increases for Brad Harrison and mPm products, we are striving to make it easier to do business with Woodhead Connectivity. Within the Designer's Guide we have introduced a simplified part numbering system to more clearly designate the type of specialty cordset or DIN molded product you specify. Our local area distributors, the cornerstone to effectively delivering Woodhead Connectivity products worldwide, are working hard to ensure the products you need are conveniently available. And, at the core of our operation is a well-stocked and flexible manufacturing operation striving to meet your delivery requirements for catalogued products.

By uniting for your success, Woodhead Connectivity is focused on being the preferred global resource for industrial automation, communications and connectivity.





You design it, we'll connect it

With over 30 years in the industrial connector business, the Brad Harrison® and mPm® brands have probably provided a solution for your “unique” application requirements. While these specialty applications have, in many cases, become standard catalog items, they are too numerous to include in a single publication. Whether you need a specialty cable requiring EMI/RFI shielding at GHz frequencies or a brand-labeling solution, Woodhead Connectivity, encompassing Brad Harrison® and mPm® brand names has the experience to solve your connector application needs.

Experienced designers using advanced design tools are at your disposal

Our specials engineers, dedicated to getting you the answers you need, are at your service. Quick turnaround capabilities such as three-dimensional modeling and rapid prototype tooling make for a quick answer to machine or design concept prototyping needs. In addition to AutoCAD® design tools and PRO-E modeling software, our specials engineering group can then take these concepts and rapidly turn them into SLA, SLS, LDM or FDM models. Advanced communication systems, such as videoconferencing and E-mail, make communications direct and fast. We challenge you to tap into this design resource!



Overmolding of existing sensors and output devices

Brad Harrison® offers several capabilities of which OEM manufacturers of input or output devices can take advantage. Brad-Harrison can tailor an overmolding program to suit your needs on proximity, UV, pressure, flow and other types of sensors. Send us your pre-leaded sensor and your quick-disconnect pin out requirements, and we'll send you a cost estimate followed by an approval print as well as molded samples. This capability allows you to take advantage of the business opportunities presented in the food, beverage and automotive markets – markets where the Brad-Harrison name is well known and the concept of quick disconnects is well accepted.

Custom Capabilities

Brad Harrison and mPm custom product engineering capabilities extend further by providing a full team of design and manufacturing engineers to assist you in “connectorizing” your unique input and output devices. Specialty cable requirements from halogen-free to outdoor-rated can extend the types of equipment which can have a “quick-disconnect” feature. Specialty connector requirements such as pin configurations to prevent mis-mating or combining several connection points together into an environmentally secure overmolded system are possible. Specialty Multi-port configurations, such as series-wired safety devices and light curtains can eliminate the hassle, cost and potential miss-wiring associated with junction boxes.

Table of Contents

OEM Specials/Brad Capabilities	2-3	Cable Jacket Chemical Resistance Chart	340
Table of Contents	4-5	AWG – Stranded Wire Specifications	341
Softwiring Advantages	6-7	Cross Reference: mm ² to Strand Count – mm ² to AWG	342
Typical Applications/Installations	8-17	Brad Harrison® Standard Cable Length Tolerances	342
Application Guide to Product Families	18-19	Approval Codes	343-348
New Product Highlights	20-23	Glossary of Terms	349-356
360° Complete Connector Shielding	334-337	Alpha Numeric Part Number to Page Number Cross-Reference	357-363
Cable Selection Guide	338	Conditions of Sale	364
Brad Harrison Catalog Cable Codes Specifications ..	339		

Mini-Change® Cordsets

New Products/Quick Finder Guide	24-25
Cross-Reference Old Part Number to 13 Digit Part Number	26-39
Cordset and Receptacle Catalog Number Matrix	40-41
2P to 6P Cordsets With #16 AWG STOOW Cable	42-45
2P to 6P Receptacles	46-47
3P to 5P Cordsets Cable Types: SOO, #18 PVC, TPE, Automotive, IEC	48-67
3P to 5P Cordsets Specialty Types LED, Coil Cord NEW	68-71
6P to 8P Cordsets with #16 AWG STOOW Cable	72-75
6P to 8P Receptacles	76-77
9P to 12P Cordsets with #16 AWG STOOW Cable	78-81
9P to 12P Receptacles	82-83
19P Cordsets with PUR Cable and Mating Receptacles NEW	84-85
3P and 5P Attachable Connectors	86-87
2P to 12P Accessories: Closure Caps, Liquid Tight Adapters, 90° Adapters	88-89

Micro-Change® Cordsets

New Products/Quick Finder Guide	90-91
Cordset and Receptacle Catalog Number Matrix	92-93

Single Keyway M12 Thread D.C. Color Code

3P to 5P Cordsets Cable Types: PVC, STOOW, High Flex Pur	94-103
3P/4P/3P Cordsets Specialty Types: LED, TPE, Coil-PUR, PUR	104-111
4P and 5P Attachable Connectors	112-115
3P to 5P Receptacles	116-117
3P to 5P Receptacles – Back Panel Mount	118-119

Dual Keyway 1/2"-20 UNF Thread Auto Color Code

2P to 6P Cordsets Cable Types: PVC, High Flex PUR, Automotive	120-129
3P and 5P Cordsets Specialty Types, Coil-PUR NEW	130-131
3P Attachable Connectors NEW	132-133
2P to 6P Receptacles	134-135
2P to 5P Receptacles - Back Panel Mount	136-137

360° Shielded Cordsets **NEW**

3P to 5P Single Keyway M12 Cordsets and Mating Receptacles	138-143
2P to 6P Dual Keyway 1/2" - 20 UNF Cordsets and Mating Receptacles	144-147

Reverse Keyway M12 Thread IEC Color Code

3P and 4P Cordsets with PVC Cable	148-149
3P and 4P Receptacles	150-151

Specialty Products - Single Keyway and Dual Keyway

3P to 5P Splitters	152-161
2P to 6P Accessories: Closure Caps, Mini-Change Adapters	162-163

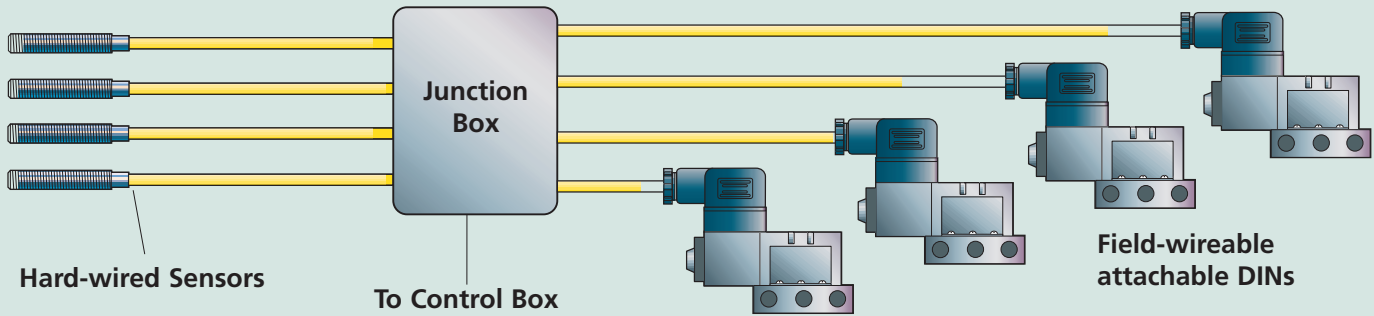
Nano-Change® Cordsets

New Products/Quick Finder Guide	164-165
Cordset and Receptacle Catalog Number Matrix	166-167

Table of Contents

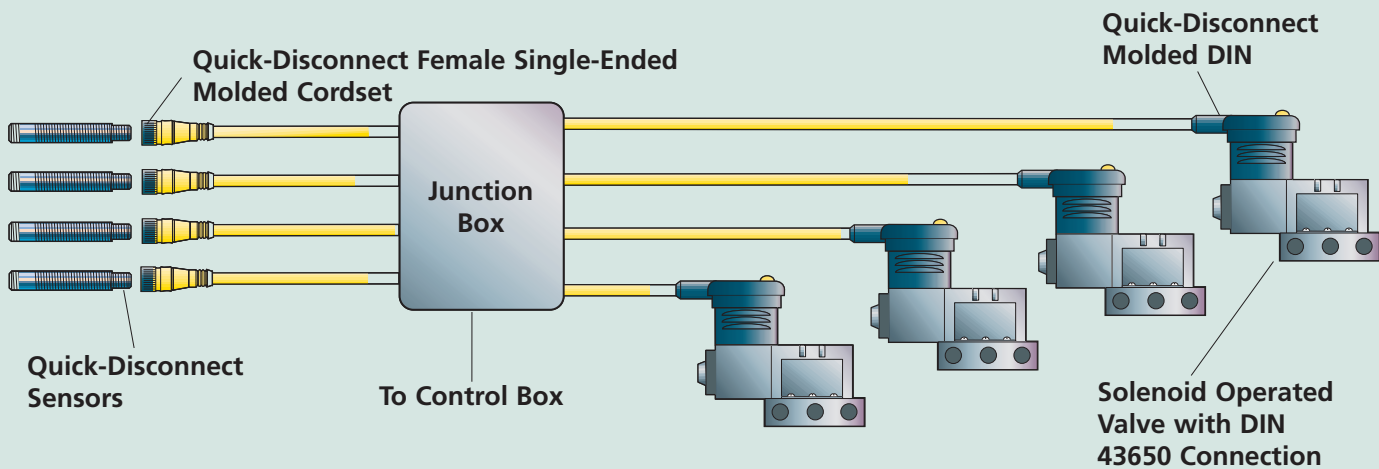
Snap Connection – M8		
3P and 4P	Cordsets with PVC or PUR Cable	168-169
3P LED	Cordsets with PVC or PUR Cable – NPN or PNP	174-175
Threaded Connection – M8		
3P to 5P	Cordsets with PVC or PUR Cable	170-173
3P LED	Cordsets with PVC or PUR Cable – NPN or PNP	174-175
3P and 4P	Attachable Connectors and Splitters NEW	178-181
Receptacles Snap and Threaded Connection		
3P to 5P	Receptacles	176-177
mPm DIN® 43650 Cordsets		
New Products/Quick Finder Guide		182-183
Cordset Catalog Number Matrix.....		184-185
18mm, 11mm, 10mm, 9.4mm and 8.0mm DIN Cordsets		
Single-Ended Molded Cordsets with Leads Only		186-197
Double-Ended Molded Cordsets with Brad Harrison, Mini-Change or Micro-Change M12 Cordset		198-211
Field Wired Connectors		212-221
Adapter Suppressor Modules		222-223
MULTI-PORT INTERCONNECTION SYSTEM MPIS®		
New Products/Quick Finder Guide		224-225
Mini-Change MPIS® Junction Boxes		
4, 6, 8 Port	3P and 4P Parallel Wiring with and without LED's	226-249
4, 6, 8 Port	3P Series Wiring	250-257
4 Port	5P Solenoid and Limit Switch Wiring	258-261
Accessories	Shorting Plugs, Closure Caps.....	298
Micro-Change MPIS® Junction Boxes		
Single Keyway M12 Top Mount 10-30V DC		
4 and 8 Port	4P Single Input with LED's	262-271
4, 6, 8 Port	5P Twin Wired with LED's NEW	272-273
4 and 8 Port	5P Twin-Wire with LED's NEW	274-279
Splitters	5P Single Keyway M12	300
Single Keyway M12 Side Mount 10-30V DC		
4, 6, 8 Port	4P Single Input with LED's	280-285
Dual Keyway 1/2"-20UNF Side Mount 120V AC		
4 and 8 Port	3P Series Wiring	286-289
4, 6, 8 Port	3P Parallel Wiring	290-297
Single and Dual Keyway MPIS® Junction Boxes		
Accessories	Shorting Plugs, Closure Caps	299
Nano-Change M8 MPIS® Junction Boxes NEW		
4, 6, 8, 10 Port	3P Threaded Single Input with LED's - Connector Home Run	302-305
4, 6, 8, 10 Port	3P Threaded Single Input with LED's - Cable Home Run	306-313
16 Port	3P Snap Single Input Connector Home Run	314-315
Accessories	Closure Caps, Attachable Connectors	301
Quick-Change® Cordsets		
Product Features/Applications.....		316-317
2P to 4P	Cordsets with SOW Cable and Mating Receptacles	318-321
Other Molded® Products		
Product Features/Applications.....		322-323
2P and 4P	Safety Plugs and Receptacles	324-325
3P to 12P	Control Connectors and Receptacles	326-329
9P to 12P	Dual Round Connectors and Receptacles.....	330-333

SOFT WIRING – A REVOLUTION IN INDUSTRIAL CONTROL WIRING



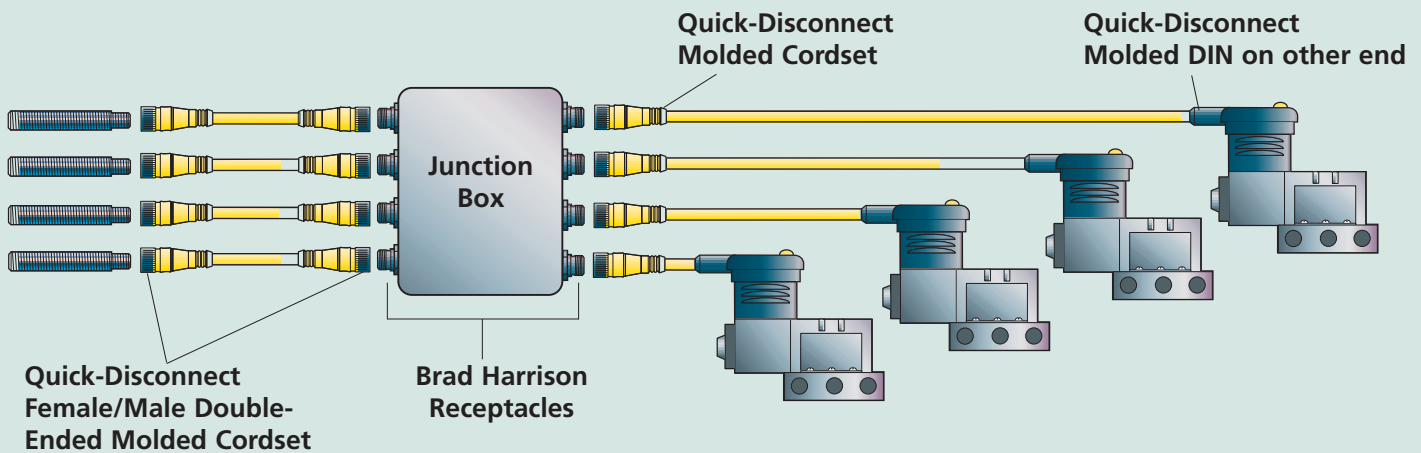
HARD-WIRING

- Time-consuming installation
- Longest down-time to rewire failed inputs or outputs



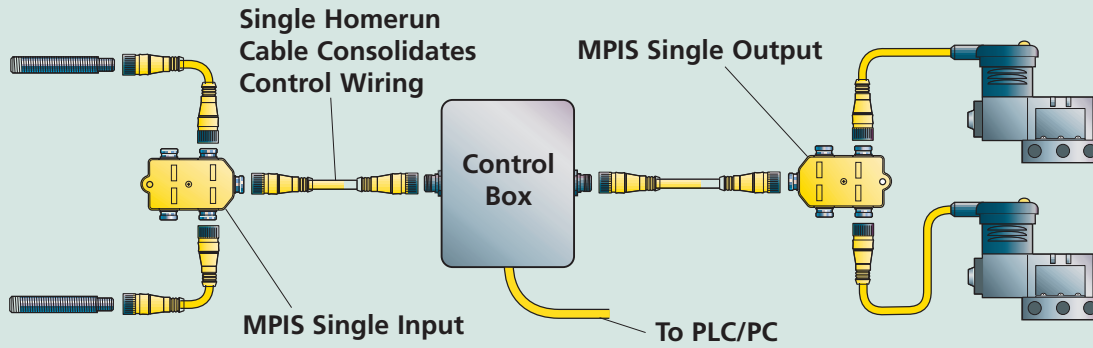
QUICK-DISCONNECTS ON INPUTS AND OUTPUTS

- Time savings on installation
- Quick-disconnect for faster time to replace failed inputs or outputs
- Cable failures/breaks are time consuming to replace



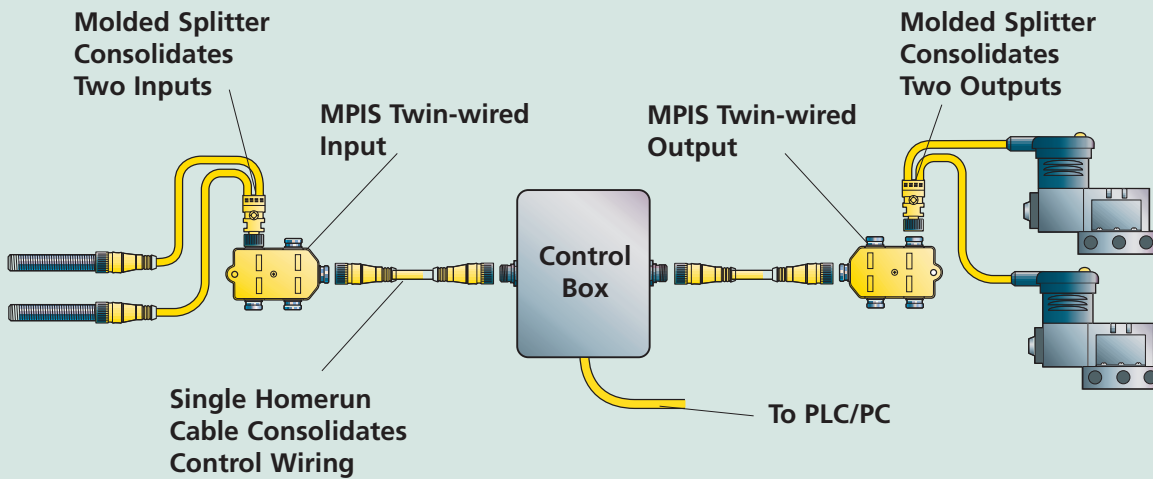
QUICK-DISCONNECTS: BOTH ENDS

- Saves further time during installation
- Quick-disconnects for either input/output or cable failure
- Saves time replacing either inputs or outputs



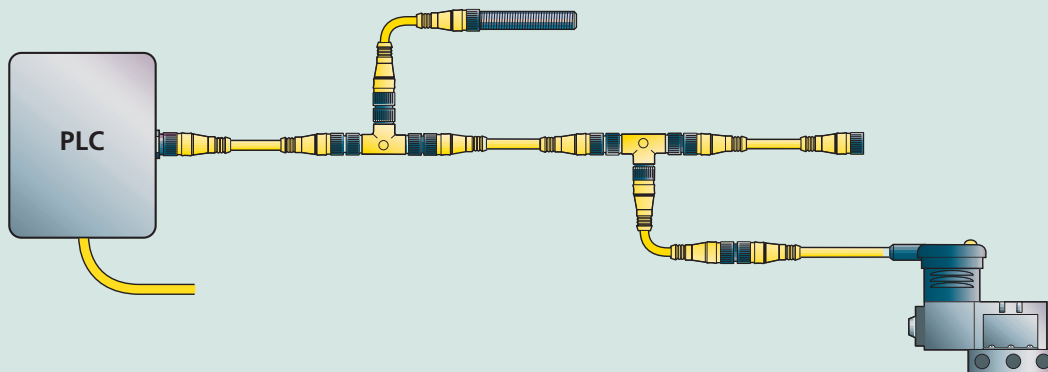
QUICK-DISCONNECT MULTI-PORTS WIRE CONSOLIDATION

- ° Saves time on installation – especially wiring errors associated with increased I/O complexity
- ° Single “homerun” cable rating simplifies installation



DUAL INPUTS/OUTPUTS FURTHER WIRE CONSOLIDATING

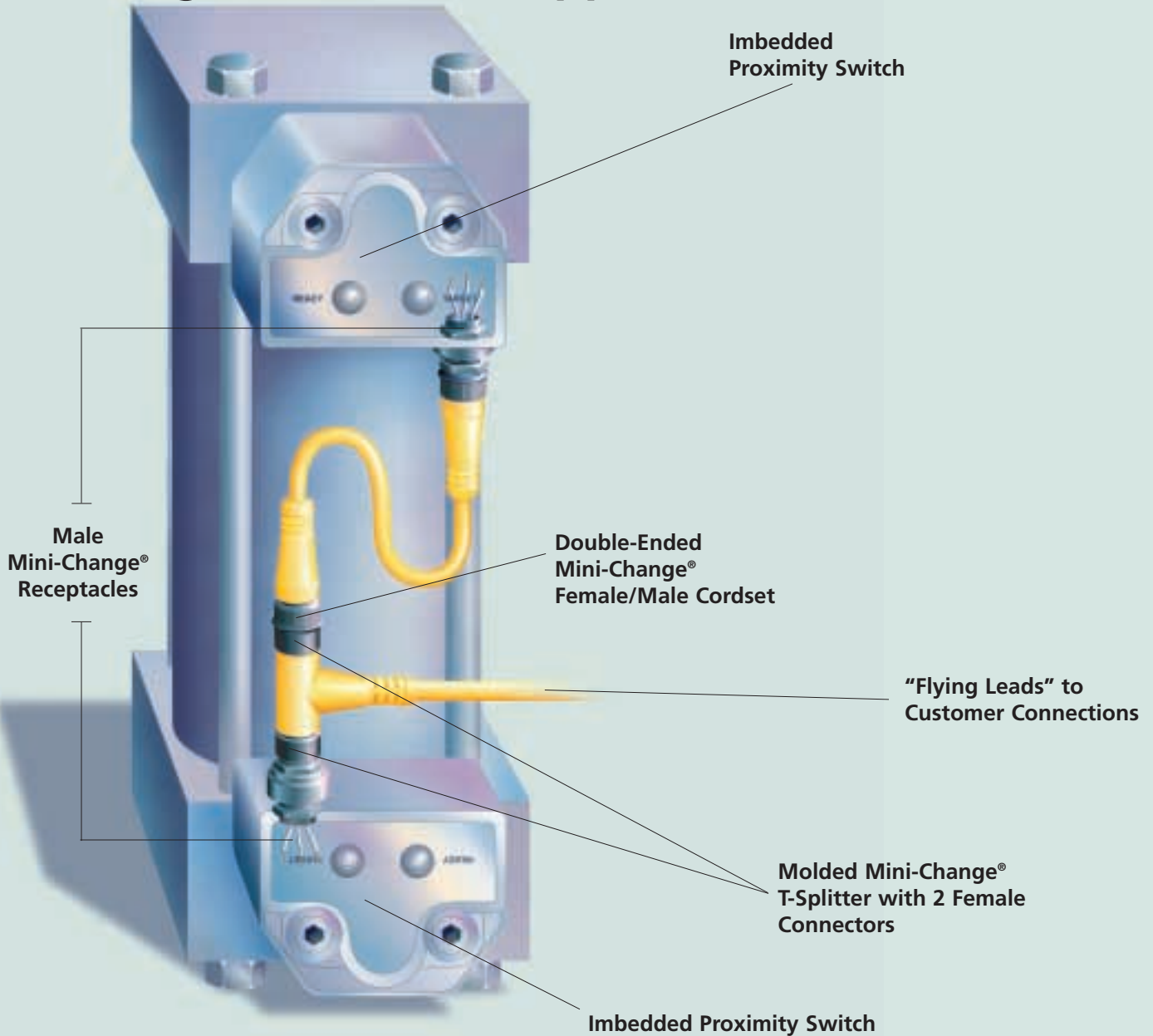
- ° Saves further space, installed cost/material, and labor as number of inputs/outputs per port is doubled
- ° Saves additional MPIS costs



SENSOR BUS NETWORKS

- ° Single bus cable system further reduces system components
- ° Status monitoring and signaling of each point available for simpler, more meaningful diagnostic indication

Mini-Change® Connector Applications

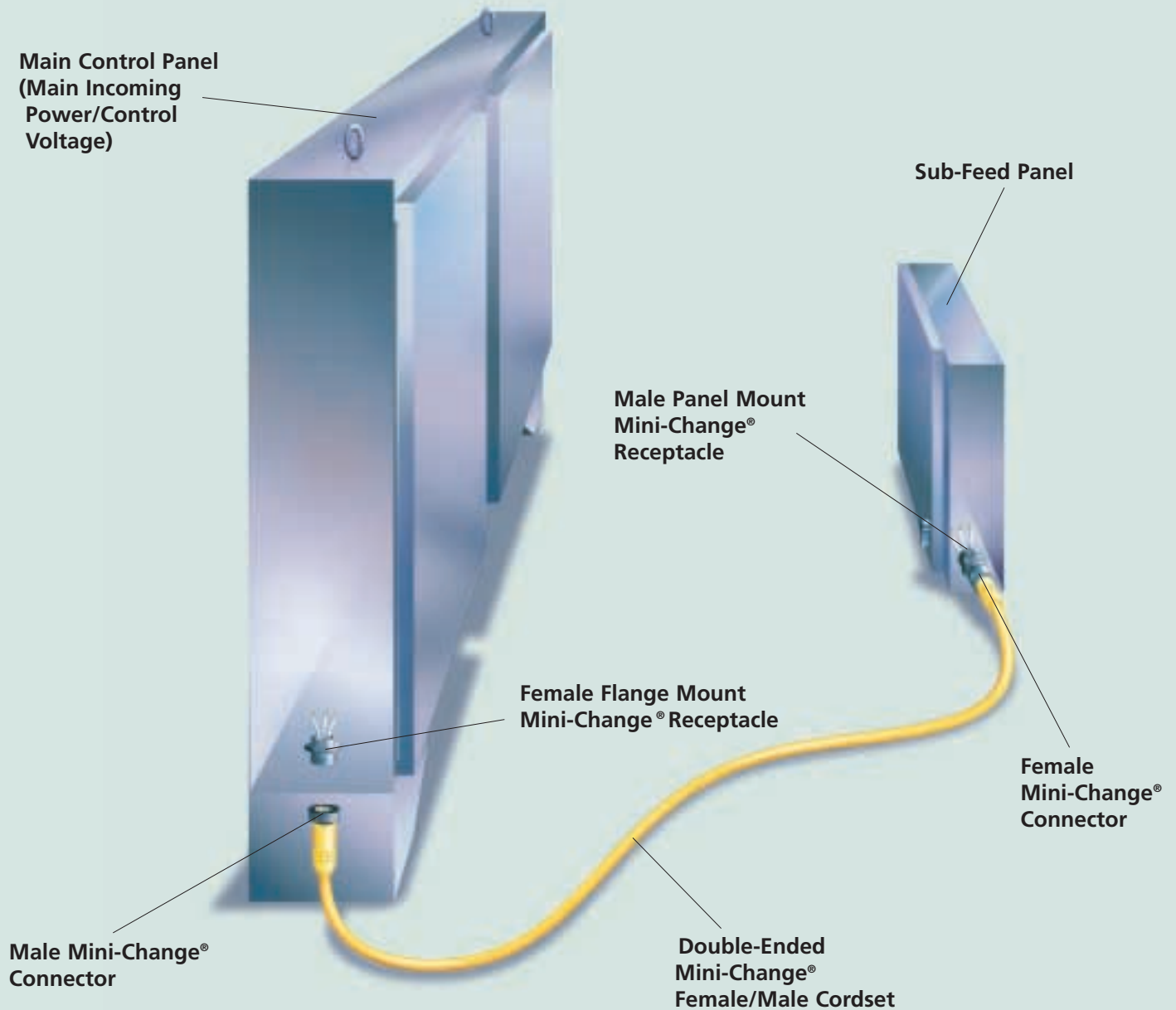


Wiring Consolidation and Fast Change Outs in Cylinder Proximity Switches

Clamp cylinder proximity switches are generally located in tough environments where corrosive hot chips and cutting fluids exist on CNC milling centers. Mini-Change connectors are designed for such environments. A Mini-Change "T" device connects two clamp cylinder proximity switches to a single user input thereby consolidating machine wiring. This allows the machine to be quickly built while at the same time allowing maintenance and troubleshooting to be quickly accomplished – a must for any piece of capital equipment. If any of the cabling is accidentally severed, any of the quick change components can be simply unmated and replaced, optimizing machine uptime.

Quickly installed and continuously reliable, Mini-Change connectors are well suited for such harsh industrial applications. Cable options available in the Mini-Change connector family include a TPE "universal" cable, which is highly resistant to today's toughest cutting fluids as well as weld slag. There are several features of the Mini-Change which makes its reliability unquestioned. For instance the nickel-palladium gold contacts provide the ultimate in low contact resistance even after hundreds of mating/unmating cycles. The Brad-Harrison® patented Quad Beam™ contact is a spring-loaded contact which assures mating forces are kept optimal and contact resistance is kept low. This is especially crucial as input signal integrity is critical on today's serial-linked bus network systems. Fast interconnections are assured as the hardened connector face keyway makes contact alignment simple and fast. In addition an alignment arrow, which is molded right into the head of the connector, helps you align the keyway even in "blind locations".

Mini-Change® Applications

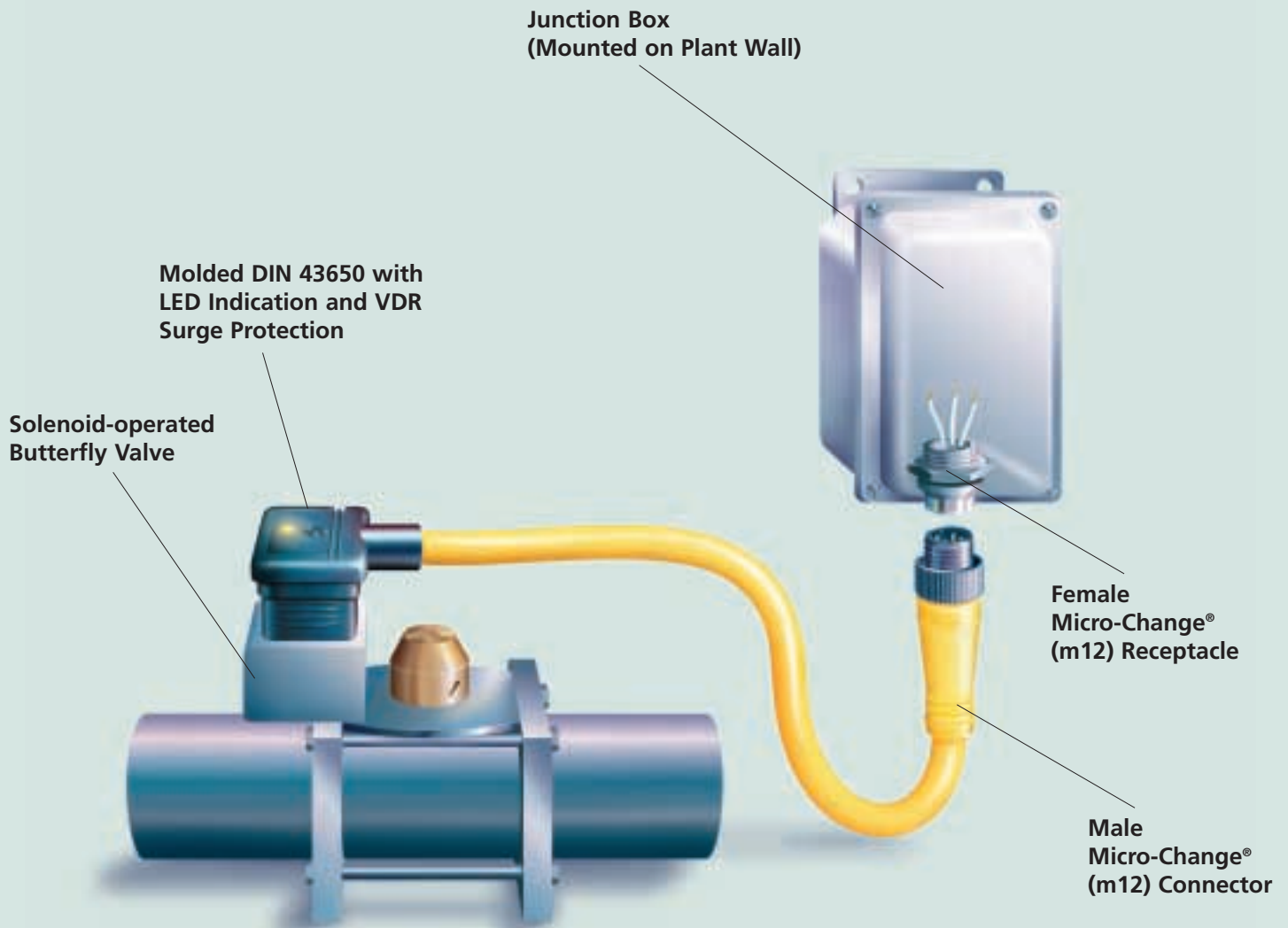


Mini-Change® Connector Solutions for Power and Control Sub-Feed to Sub Panels

Mini-Change connectors are used extensively in a variety of automation environments, including automotive assembly lines. The on-going maintenance of the line becomes more simple through the use of quick-disconnects. Mini-Change connectors allow the system designer faster automation line commissioning and debugging. Machine debugging and maintenance are simple with pre-wired overmolded connectors, as sub-panel fed machines can be easily disconnected prior to servicing. Machinery can be more easily commissioned as the designer can quickly debug machine operation during the critical acceptance phase of the project. Errors are eliminated as the pre-wired, tested connections are assured. After breakdown and shipment to the production line, the various panels and subpanels can be re-connected at the user's site with the assurance of a fast start-up.

The reliable and fast interconnection of the Mini-Change product family makes them well-suited for harsh environments found on material handling lines in automotive assembly areas. The ruggedness of the system elements, such as the cable jacketing and overmolding materials, allows the user to be continually assured of the proper interconnection of panels to sub-panels even in the presence of corrosive machinery coolants and weld slag. Mini-Change connectors feature a variety of design features which benefit the user in terms of uncompromising reliability. The nickel-palladium gold contacts provide the ultimate in low contact resistance even after several hundred mating/unmating cycles. E-coated coupling nuts prevent connector corrosion while resisting the build-up of weld slag. The uncompromising quality and fast mating and unmating of the industry-standard Mini-Change makes it the harsh-duty connector of choice for both control and power connections in these types of environments.

Micro-Change®/DIN 43650 Connector Applications

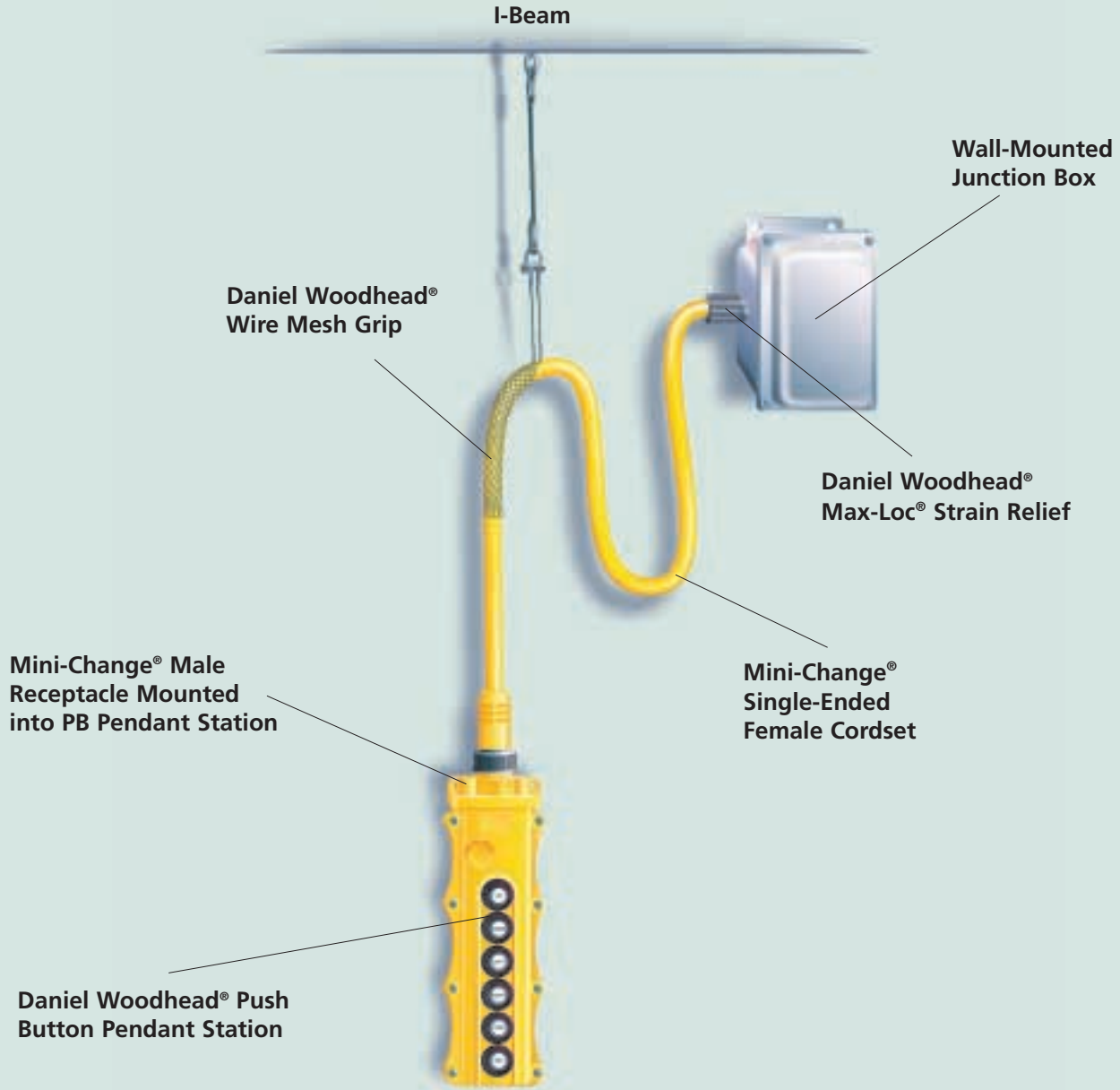


Molded DIN 43650 Saves Installation Time, Prevents Miss-wiring of Automatically Operated Valves

In many solenoid operated valves, the use of a quick-disconnect on both the valve as well as on the upstream connection points saves installation time. Fully molded pre-wired DIN 43650 valves save installation time. Field-attachable DIN connectors, where the user needs to wire the cable connection points can be time consuming. When there are a multitude of these connectors which need to be terminated, this can be a time-consuming part of wiring several outputs. Not only do they come out of the bag as “plug-and-play” connections, but they are wired then tested for correct connections, thereby eliminating field-wiring errors. By specifying an industry-standard molded m12 control connector molded onto the opposite end of the DIN, similar labor and time savings result at both connection points. Molded cordsets also provide the environmental protection needed for many industrial applications.

The mPm® DIN connectors are produced, tested and shipped to the same high quality standards as the Brad Harrison® circular line of quick-disconnect products. There are several mPm DIN 43650 features that provide the end user with the highest degree of interconnection quality. The VDR protection circuit provides for a fast response to surges thereby protecting the valve solenoid and insuring a long-lived product. Replaceable gaskets provide the environmental protection of the connector from outside grease and contaminants, even after the valve has been replaced. With its proven design, the mPm DIN 43650 style of connector has proven to be a reliable source of DIN style connectors for over 30 years.

Mini-Change® Connector Applications

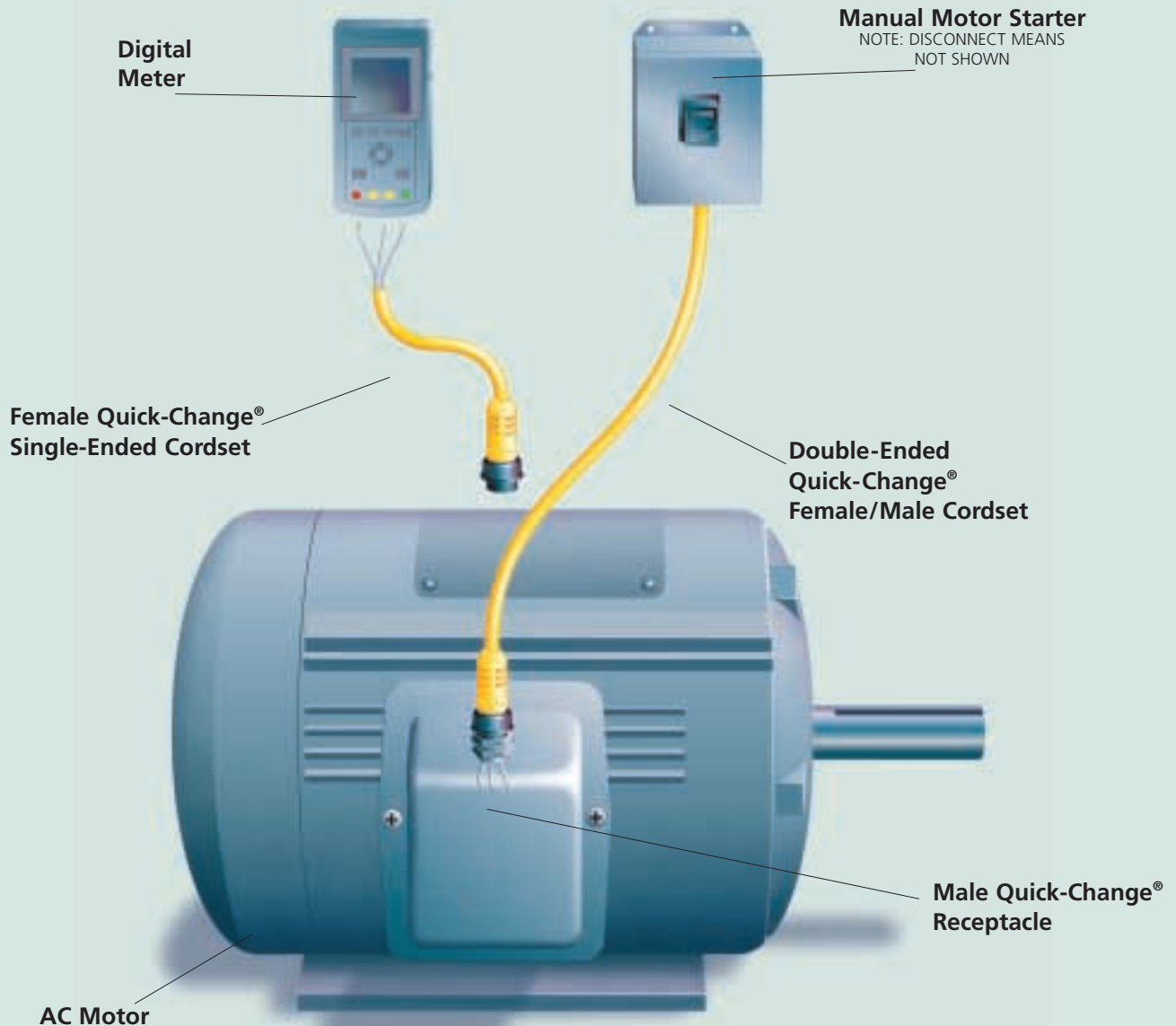


Mini-Change Power Connectors Allow Pendant Stations to be Quickly and Easily Stored Out of Operator's Way for Safety

A variety of Woodhead L. P. products, including Mini-Change style quick-disconnects, along with wire mesh grips and Max-Loc® strain relief grips, can be used to make the installation of high usage hanging electrical equipment working in heavy-duty industrial environments. By using a mated pair of Mini-Change connectors for the control connections on a hanging pushbutton pendant station, it can be easily connected and re-connected and be moved out of way of operators. These heavy-duty connectors are well-suited for rugged environments, such as hot and extremely dirty steel mills. The additional usage of a Daniel Woodhead® wire mesh grip prevents the cable from being unduly strained. Furthermore, the Max-Loc® strain relief grip makes sure that Watertite® connection integrity is made to the junction box while providing a further measure of strain relief.

Fast and continuously reliable, the Mini-Change connectors are well suited for harsh industrial applications, such as steel processing environments. Fast interconnections are assured, as the hardened connector face keyway makes contact alignment simple and fast. In addition, an alignment arrow, which is molded right into the head of the connector, helps you align the keyway even in "blind" locations. There are several features of these connectors which makes their reliability unquestioned. Proven cable and overmold materials, such as PVC, resist moisture. The overmold on the Mini-Change connector allows for cable strain relief even in inverted usage applications. Mini-Change connectors have a variety of design features which benefit the user in terms of uncompromising reliability. The nickel-palladium gold contacts provide the ultimate in low contact resistance, even after hundreds of mating/unmating cycles.

Quick-Change® Connector Applications

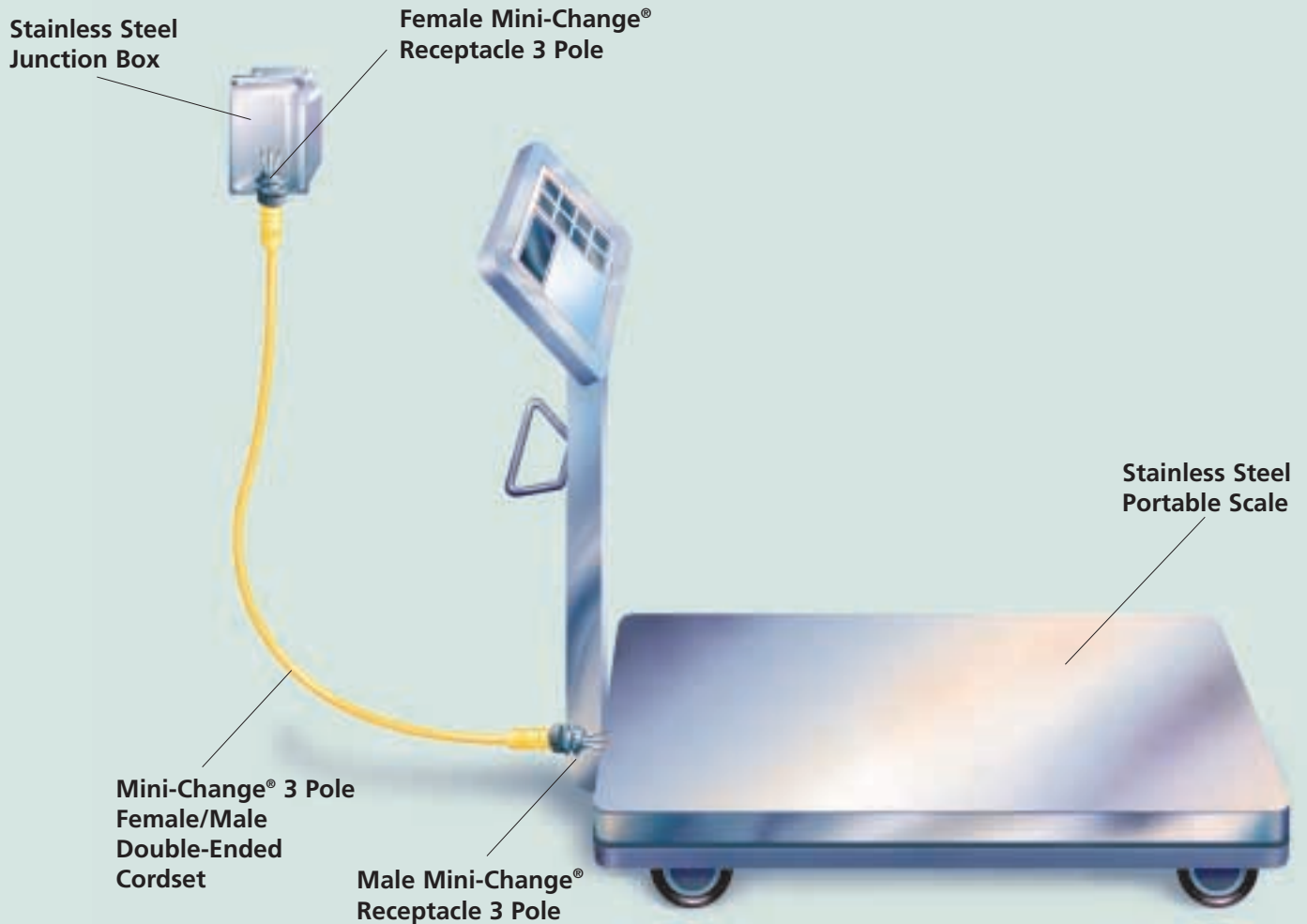


Quick-Change Connectors for Motor Quick-Disconnects Makes Wiring Faster and More Reliable

In order to quickly and easily disconnect motors which need constant monitoring and servicing, the Quick-Change family of quick-disconnect solutions is the answer. Quick-Change was designed with heavy-duty applications in mind, as it can withstand exposure to harsh base/acidic chemical solutions as well as high temperature, high pressure washdowns used in sanitation techniques found in food processing applications. By mounting a male receptacle into the incoming junction box of the motor, it can be quickly and easily disconnected when service is required on the motor, or in cases where it needs to be moved frequently between locations. As the connector is pre-wired, no problems due to miss-wiring can occur. Its washdown IP68 rating and rubber-jacketed SOOW cable allow the connection to be made indoors, such as in food processing facilities, or outdoors, such as on a rooftop fan unit. Once the receptacle is installed, motors can be simply checked for operating characteristics in seconds, as a single-ended cordset can now be plugged into a digital meter without having to go into the motor junction box.

The Quick-Change family of power quick-disconnects is well suited for food processing environments. Non-metallic coupling nuts do not become corroded over many washings. Both the connector faces' rubber overmolding as well as its rubber-jacketed cable resist moisture allowing the product to be continuously used in these harsh-duty and outdoor environments. The "cork and bottle" seal (you can actually hear a "pop" during unmating) around the pins gives the knowledge of a secure connection at the electrical interface by preventing water ingress. Built to last, the overmold provides point of cable strain relief during the mating/unmating cycles.

Mini-Change® Connector Applications

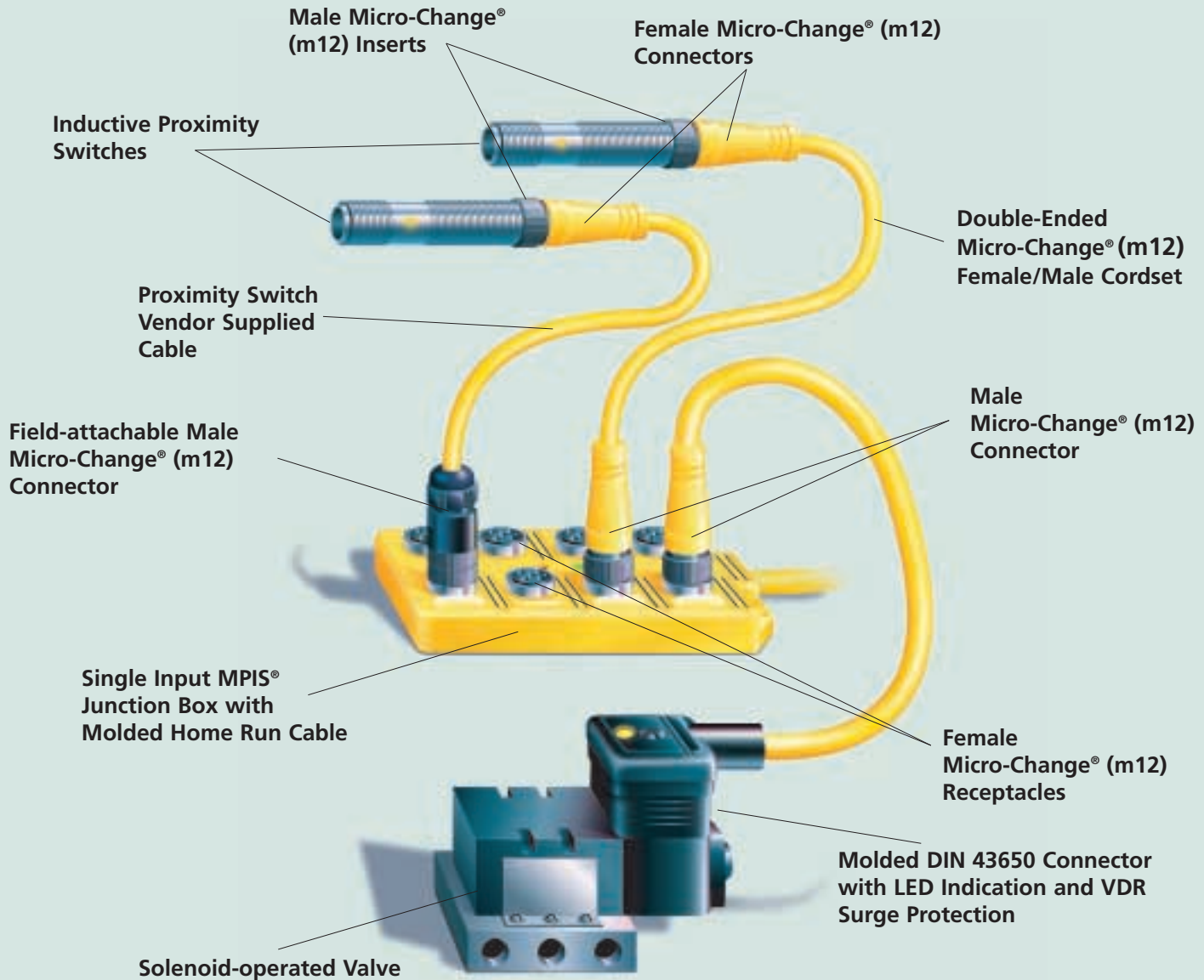


Mini-Change Connectors Allow Flexibility in the Location of Portable Scales in Food Processing Plants

The Mini-Change connector is used in a variety of food processing industries such as poultry, dairy and meat processing. Mini-Change connectors allow the user flexibility of machine location while giving the machinery builder a quick disconnect advantage in machinery design. A food processing facility may have several areas where raw materials, processed foods or byproducts of the processing line require weighing. By installing several watertight, stainless steel NEMA 4x junction boxes in these areas, the user has created several points where the portable scale may be plugged in with a Mini-Change cordset. The portable scale may now be wheeled around to plant areas where the weighing needs to be done by simply plugging into these junction boxes. Not only does this connector offer this flexibility, but the user does not have to be concerned with damaging the connector or destroying the electrical integrity as caustic washdown materials, high pressure water and dirt will not damage the interconnection. While these advantages are there for the user, the machine builder, with an integrated connector, can offer a more flexible usage scale for a variety of targeted markets. The Mini-Change connector form factor is well accepted in a variety of industries, such as the automotive, machine tool, material handling and food processing.

The fast interconnection and reliability of the Mini-Change product family makes it perfect for harsh duty environments such as the food processing industry. The fast mating and unmating of the industry-standard Mini-Change make it the harsh-duty connector of choice, quickly connecting common area machines as well as quickly swapping out failed input or output devices. Mini-Change connectors feature a variety of design features which benefit the user in terms of uncompromising reliability. The nickel-palladium gold contacts provide the ultimate in low contact resistance even after several hundred mating/unmating cycles. The anti-vibration feature on the coupling nut prevents connections from coming loose-even in very high vibration environments. Mini-Change connectors have been designed and proven to withstand the rigors of MIL testing standards including vibration, salt spray and pressure testing.

Micro-Change®/DIN 43650 Connector Applications

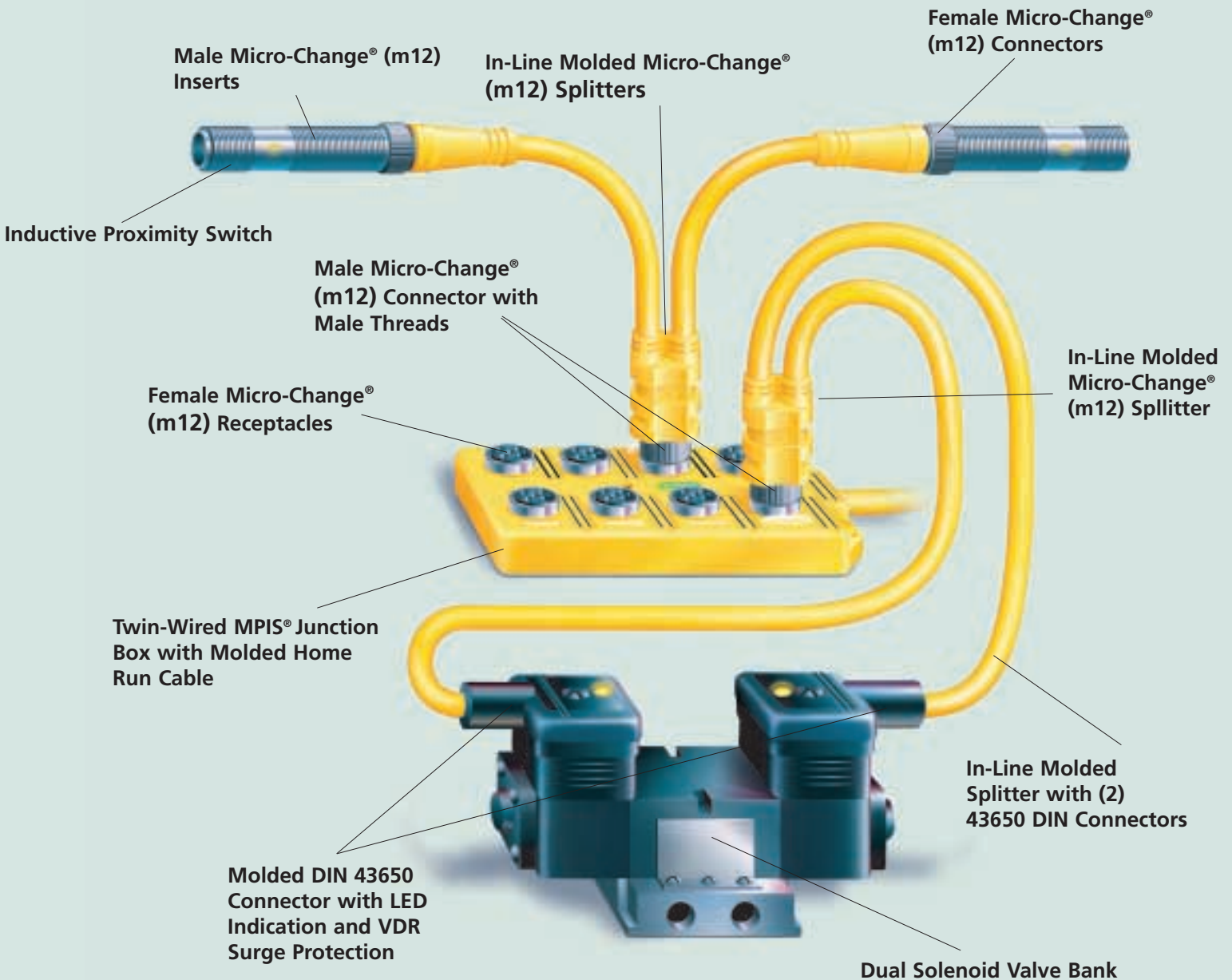


Molded Junction Box (MPIS®) Consolidates Wiring, Results in Fast Error-free Wiring

Many times machinery or packaging equipment with high-density I/O points are consolidated in a given location. These consolidated I/O points are often "hard wired" to a junction box. A more efficient and flexible solution to this consolidation of inputs and outputs is a molded junction box or Multi-port (MPIS). The MPIS gives the machinery designer cost savings as the wiring and mounting costs associated with point-to-point hard wiring as well as the costs associated with miss-wiring or re-wiring during machinery and debugging are eliminated. In the presence of cutting fluids there is an added benefit of electrical integrity and mechanical rigidity as it is a fully encapsulated junction box. Changes to the machine control in the form of upgrades are an easy migration path as the new inputs or outputs are simply "plug and play" elements into the MPIS. By using a connectorized MPIS, the main homerun control cable can be quickly disconnected and the junction box can be plugged into or out of operation. Industry standard m12, m8 or Mini style connections into the MPIS makes a variety of differing circuit configurations available to the designer for maximum flexibility.

The newly redesigned Brad Harrison® top mount Micro-Change MPIS has been upgraded to give you even more protection in harsh-duty environments while assuring unparalleled reliability. A new housing material allows even the most corrosive cutting oils to be sprayed onto the MPIS without any resulting losses in sealing integrity. O-rings and potting materials have been similarly upgraded to be more resilient to these new types of cutting fluids thereby insuring a long-lived junction box. With these product enhancements you continue to get the high quality you have come to expect from Brad Harrison – at no additional cost. High quality LEDs, with 100,000 hours of operational life, gold over palladium-nickel contacts for a high integrity, low resistance contact continue to be part of its design insuring that your machinery will be running for years to come.

Micro-Change®/DIN 43650 Connector Applications

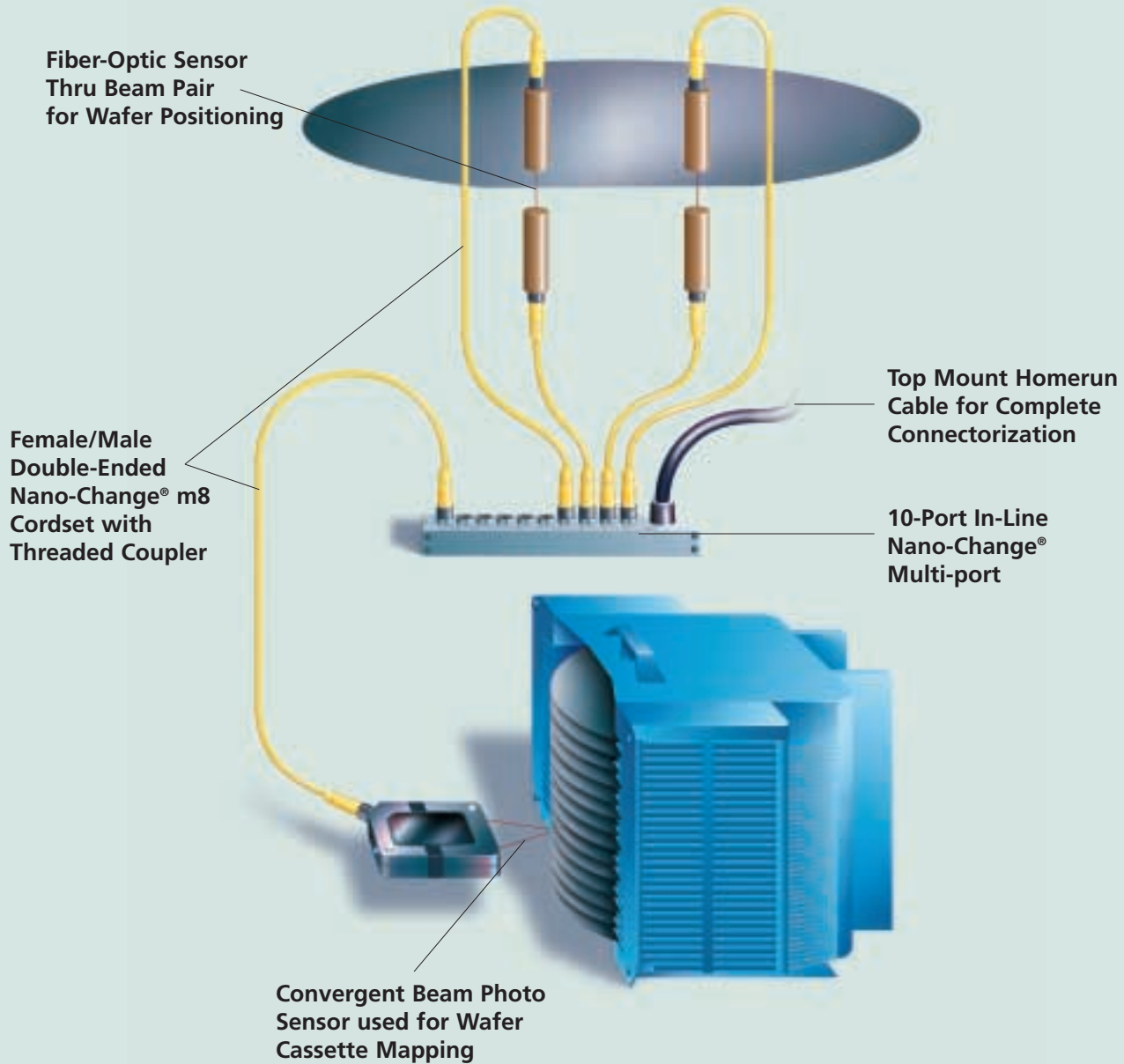


Twin-Wired Molded Junction Box (MPIS®) Maximizes Wire Consolidation, Saves Component Costs

In high-density I/O sections of a control scheme, twin-wired Multi-ports and the associated componentary give the machine design a variety of benefits. These design benefits include a reduction in number of elements which must be mounted, a reduction in the number of wiring errors and the ability to maximize wiring density. The number of inputs and outputs which can be connected to a single MPIS unit is effectively doubled with a twin-wired MPIS. Where previously two inputs or outputs consumed individual ports a single port now does the same. As all of the connections are pre-wired and tested wiring errors are eliminated. Where two MPIS units had to be mounted and the associated home-run cables had to be terminated, now only a single MPIS has to be mounted and a single cable terminated. Molded splitters, which come in a variety of configurations, essentially multiplex the inputs or outputs into a single port of the MPIS unit. Changes to the machine control in the form of upgrades is an easy migration path as the new inputs or outputs are simply "plugged and played" into the MPIS.

The new Brad Harrison® family of top mount twin-wired Micro-Change MPIS units continue the highly reliable connection scheme you have come to expect. High quality LEDs, with 100,000 hours of operational life, gold over palladium-nickel contacts for high integrity, low resistance contact continue to be part of the design, thereby insuring your machinery will be running for years to come. In addition, a variety of configurations, including the innovative field-attachable homerun cable version, allow you to attach specialty cables to the MPIS and allows the cable length and type be determined at the last minute.

Nano-Change® Connector (m8) Applications



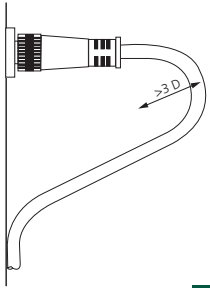
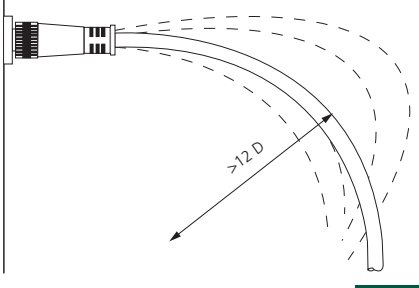
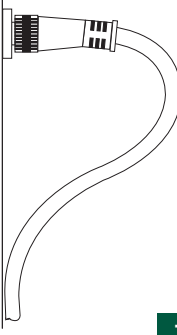
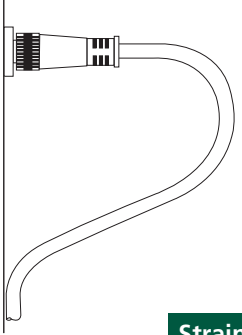
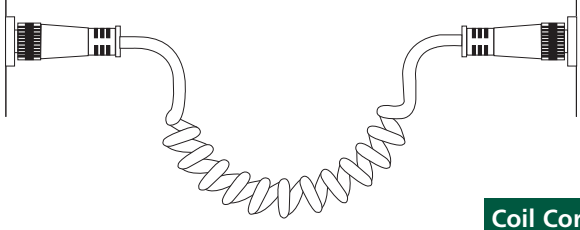
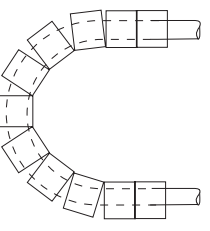
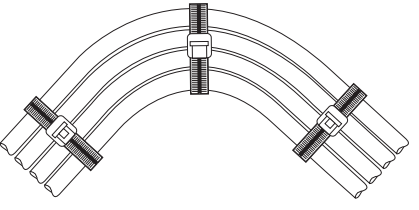
Nano-Change Connectors for Use in Semiconductor Processing and Electronics Assembly

The Nano-Change interconnect products used in wafer processing machines offer several advantages to both the machine designer as well as the end user. For the OEM, the wide variety of connector choices in the Nano-Change connector family allows a variety of inputs and outputs to be connected. The high vibration requirements of the wafer cassette mapping sensor require the security of the coupling nut version. The Multi-port reduces the machine commissioning time while reducing wiring errors. End users benefit from a “connectorized” machine as they have the ability to quickly change out failed input and output components thereby keeping the expensive machinery running.

The connector’s small size allows a multitude of input sensors, process controls such as pressure sensors and outputs to be brought together in a very small footprint. The industry-renowned Nano-Change connector family is known for its high reliability. The double-crimped connections and the gold-plated contacts of the Nano-Change connectors make them well suited for the critical uptime requirements of high valued operations in semiconductor processing such as etching and photolithography. Snap style Nano-Change connector family also make them well suited for highly automated electronics and semiconductor processing machines. Optional fast disconnection of failed components is critical to keep the capital-intensive machinery of this industry running with as little downtime as possible.

Cable Mounting, Routing and Dressing - Application Suggestions

We recommend the following application and installation guidelines for a successful, long-lived cordset installation.

<p>PROPER BEND RADIUS</p> <p>Providing sufficient bend radius will allow the cable to absorb the energy of bending over a greater portion of its length, increasing the effective working life. Even slight increases of the bend radius can substantially increase the cable life.</p>	 <p>D=Cable Diameter</p> <p>Static</p>	 <p>D=Cable Diameter</p> <p>Dynamic</p>
<p>STRESS POINT ELIMINATION AND CABLE DRESSING</p> <p>Installing cables to allow for adequate stress loops and freedom of motion increases the cable life. Brad Harrison® cordsets incorporate molded strain reliefs that will assist in cable strain relief.</p>	 <p>Tie Loops</p>	 <p>Strain Relief</p>
<p>MOTION APPLICATIONS</p> <p>Where cabling is subjected to linear, angular, or rotational motion between two points, always allow for adequate cable length to absorb the energy imparted by the motion. Secure the cable just after the overmolded strain relief in flexing applications in order for the cable to absorb the flexing motion energy. Proper specification of the cable in high stress applications, namely high flex cable, will allow for the longest possible cable life. The use of coiled cords, proper flex-rated cabling, mechanical support mechanisms or large well supported cable loops will maximize cable life.</p>	 <p>Coil Cord</p>	 <p>"C" Track</p>
<p>CABLE BUNDLING TECHNIQUES</p> <p>When bundling several cables together, always keep the bundle loose enough to move within itself. Tightly tied bundles create both compression and tension stresses when the bundle is moved.</p>	 <p>Bundling</p>	

Application Guide

PRODUCT	CONNECTED TO:	APPLICATIONS
Mini-Change® Molded Cordsets	18 and 30mm proximity switches Pressure and limit switches Rectangular photoelectric sensors Solenoids Fractional HP motors	Conveyors Pneumatic/hydraulic valves Packaging and food processing equipment Material handling systems Transfer and assembly lines
Micro-Change® Molded Cordsets M12 Single Keyway 1/2" – 20 UNF Dual Keyway	12 and 18mm tubular proximity switches Tubular photoelectric sensors Modular controls Safety light curtains and floor mats Pressure switches	Pneumatic/hydraulic valves Conveyors Pick-n-place machines Transfer and assembly lines
Nano-Change® Molded Cordsets M8	8m and smaller proximity switches Miniature photoelectric and other controls Temperature probes and sensors Printed circuit boards	Robotic End-of-arm tooling Gear tooth sensing Conveyors
Quick-Change® Molded Cordsets	Up to 5HP motors Lighting Power lines	Conveyors Mixers, grinders and choppers Pumps Industrial saws
mPm® DIN 43650 Connectors	Actuators Solenoid and coils Pressure switches	Packaging equipment Diverters on conveyor lines Pneumatic and hydraulic manifolds
Multi-Port Interconnection Systems	Proximity switches Various other sensors Solenoids	Wire consolidation
Control Connectors	Press controls/run button bars Process controls	Stamping presses Automated assembly lines
Safety Plugs	Die blocks Safety fences and gates	Stamping presses Robotic welding presses
Dual Round Connectors	Press controls/run button bars Process controls	Stamping presses Automated assembly lines

Family Descriptions

Mini-Change® Cordsets: Best selection, best choice.

The Brad Harrison® Mini-Change® connector family is the standard by which all other miniature connectors are measured. Brad Harrison pioneered the market for miniature connectors, presenting the first quick-disconnect alternative to hardwiring. Today, Brad Harrison continues to be the recognized leader for quality and durability in design, embodied in the widest selection of miniature connectors on the market.

Micro-Change® Cordsets: Small space? Big solution.

When space and time are in short supply, look no further than Brad Harrison for the best ready-made m12 connector solutions. For fast, compact migration towards softwiring, Brad Harrison Micro-Change m12 connectors are ideal connectivity solutions for 12mm to 18mm sensors and switches. For applications requiring an increased pin count in a standard m12 configuration, the Brad Harrison 8-pin Micro-Change connector family is there. A variety of Micro-Change connector configurations are available, such as DC and both American and European standard AC form factors.

Nano-Change® Cordsets m8: Compact in design, large in performance.

The industry's broadest selection of space-saving m8 molded industrial connectors is available in the Brad Harrison Nano-Change family. Nano-Change m8 cordsets, receptacles, inserts, splitters and molded junction boxes are engineered for use in industrial applications where space is limited and rugged performance is required. Nano-Change products are quick to connect/disconnect, especially the snap design which is simply snapped or unsnapped from their mate. For a complete connector solution that minimizes wiring, maintenance, and downtime — while also minimizing space requirements — choose from the full selection of Nano-Change miniature quick-disconnects.

mPm® DIN 43650 Connectors: Rugged and secure alternative to hardwiring.

When it comes to output connectivity, mPm® DIN connectors are the world's leading solution provider for connectors for industrial automation equipment. For remote actuation of solenoid valves on the factory floor, no one offers a more reliable and robust "quick disconnect" alternative to hardwiring. These connectors also offer the largest selection of field-attachable DIN, molded DIN, and DIN accessories. mPm DIN devices include DIN connectors and lighted adapters/surge protectors for the 18, 11, 10, 9.4, and 8.0 mm classes of DIN 43650 standard valve designs. Connection and protection have never been easier or more cost-effective than with mPm field level DIN Devices.

Multi-port Interconnection Systems: Consolidating wiring with flexibility and ease.

Brad Harrison Multi-port Interconnection Systems (MPIS®) provide a simple, efficient solution for consolidating wiring within a control system. MPIS systems reduce up to 16 distinct connections into one single, pre-wired cable, while eliminating the need for knockouts, terminal strips and separate enclosures. Choose one of the Brad Harrison MPIS systems, and control system wiring and maintenance will never be simpler...or more flexible. MPIS junction boxes can be found installed on anything from portable lighting systems, where the natural elements are at work, to machining centers where they are under the constant spray of harsh cutting fluids.

Quick-Change® Cordsets: Rugged performance for demanding power applications.

Harsh industrial environments, such as washdown areas in food processing plants, high temperature steel mills and highly humid, caustic paper mills that present heavy-duty power requirements, demand rugged connector products. Brad Harrison Quick-Change connectors are constructed to deliver years of uninterrupted performance in power circuit quick-disconnect applications. Positive key alignment greatly reduces the possibility of mismating, thereby ensuring reverse phase protection of critical motors. Quick-Change Connectors are equipped to withstand hose-down pressures up to 1,000 psi, especially key in food processing environments. In addition, these connectors are designed to withstand up to 105°C operating temperatures while being installed in either high humidity or washdown areas.

Other Molded: Connector Products: Heavy-duty, rugged and proven.

Brad-Harrison has been providing application-specific molded connectors for a variety of harsh environments for many years. The Control Connector family designed in 3-12pole configurations, is typically used on stamping and forging presses. Safety Plugs provide electrical lockouts during maintenance while Dual Round connectors are designed to be used on press controls where a power/control connection which cannot be mismated.

New Product Highlights

Woodhead Connectivity continues to introduce innovative new products to help keep you connected. Across the connectivity marketplace, no products are better known than Brad Harrison® and mPm® connectors for their rugged reliable, patented and innovative designs. Some of the newest products are featured within this designer's guide and are highlighted on the following (4) pages:



SINGLE- AND DOUBLE-ENDED CORDSETS WITH LED INDICATION

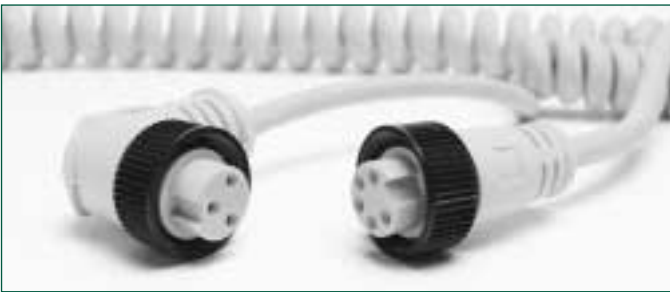
Mini-Change® Cordsets

Single- and Double-Ended Cordsets with LED Indication: Diagnostics are situated on the connector head for better troubleshooting; LED indication is bright providing visibility 360° and designed to last through 100,000+ hours of operation.



19-POLE SINGLE- AND DOUBLE-ENDED CORDSETS AND RECEPTACLES

19-Pole Single- and Double-Ended Cordsets: The pin count for the popular Mini-Change connector family has been extended to 19P; making it well suited for valve banks, and other high pin count applications, with molded, single and double-ended pre-wired cordsets. These cordsets feature: 18-gauge power and 22-gauge control conductors, oil and abrasion resistant black PUR jacket and mating receptacles are available in male and female configurations.



COIL CORDSETS

Coil Cordsets: New 3 and 5 pole Mini-Change cordsets designed for continuous flex duty applications, such as robotics, pick-place systems and grippers. For high flex operations, cord design ensures non-stop operation and high reliability in continuous-motion applications.



UNIVERSAL CORDSETS

Look for new features and options that enhance existing Mini-Change Products:

Universal Cordsets: Cordsets with TPE-jacketed cable are designed to withstand the harshest environments, including corrosive cutting fluid and weld slag. Universal cable for both welding and machine cutting environments is standard issue, reducing the need to specify different cables for different rugged automotive environments. Available in 3- and 5-pole configurations.

New Product Highlights



COIL CORDSETS



8-POLE DC SINGLE-ENDED CORDSETS AND RECEPTACLES



FULLY SHIELDED 360° CORDSETS



UNIVERSAL CORDSETS



FULLY SHIELDED 360° CORDSETS

Micro-Change® Cordsets and Receptacles

Coil Cordsets: New 4 pole single key DC cordsets are designed for continuous flex duty applications – such as robotics, pick-place systems and grippers. 22 or 18 gauge yellow PUR cable jacket is oil and abrasion resistant. These cordsets are rated for 4 million cycle operations.

8-Pole DC Single-Ended Cordsets and Receptacles:

Compact design increases the density of signals within industry-standard m12 single-ended cordsets and receptacles. Enables tighter cable routing and cleaner dressing for 8-conductor, 22-gauge wiring. Includes straight and 90 degree molded single-ended cordsets and male and female receptacles. Molded cordsets are supplied with a PUR cable jacket to withstand chemicals and provide abrasion and cut resistance.

Look for New Features and Options that Enhance Existing Micro-Change Products:

Fully Shielded Cordsets: Fully shielded 360° cordsets in both dual and single key versions provide protection in operations exposed to RF and EMI signals, including welding and communication rich environments. The unique, patented 360° conductive molded connector body carries the shielding all the way through the cable and coupling nut, making them ideal for machine designs where the goal is CE machine certification.

Universal Cordsets: The Micro-Change family of Cordsets is now available with TPE-jacketed cable, cordsets designed to withstand the harshest environments, including corrosive cutting fluid and weld slag. Universal cable comes standard for both welding and machine cutting environments. These cordsets reduce the need to specify different cables for different rugged automotive environments. Available in 3- and 5-pole configurations.

3 Pole M12 Cordsets with LED: Cordsets with LED indication for power and output; body design is clear PVC, bringing indication right onto the cordset for easier troubleshooting. LED indication is visible 360 degrees and designed to last through 100,000+ hours of operation.

New Product Highlights



TWIN-WIRED MPIS WITH MOLDED HOME RUN CABLE



TWIN-WIRED MPIS WITH MOLDED HOME RUN CONNECTOR



TWIN-WIRED MPIS WITH FIELD-ATTACHABLE CONTROL CABLES



MICRO-CHANGE SPLITTERS



UPGRADED VERSION OF DC MICRO-CHANGE TOP MOUNT MPIS

Multi-Port Interconnection System (MPIS®)

Twin-Wired DC MPIS: Allows greater density of connections; up to 16 sensors connected through 8 input/output ports within one central junction box. Two configurations (4 and 8-port versions) include NPN and PNP circuit configurations and NO LED options. Units expand applications to include analog inputs and complementary-wired switches.

There are two versions included:

- Twin-wired per port with molded home run cable: Uses a molded PVC home run cable for subsequent field termination.
- Twin-wired per port with molded home run connector: Molded 19P home run Mini-Change connector provides flexibility in extending the “soft-wiring” concept back to the control panel, thereby reducing installation time/cost for fool-proof installation and eliminating wiring errors.

Twin-Wired with Field-Attachable Control Cables:

Flexibly satisfies dense wiring applications requiring twin-wiring with a field attachable connection on a home run terminal strip. Three configurations (4, 6, and 8-port versions) offer the flexibility of field attachable home run cables, easy cable routing and increased control wiring system density. By eliminating a molded connector, home run cables, including specialty cables, can be sized right to the last minute.

Micro-Change® Splitters: Combines two sensors into one input cable, thereby allowing direct connection to twin-wired DC Micro-Change MPIS ports. Splitters are available in a variety of configurations for maximum system flexibility.

Upgraded Version of DC Micro-Change® Top Mount MPIS Feature:

- Newly formulated, chemically “bullet-proof” housing material which resists the affects of chemically corrosive cutting fluids
- Upgraded Viton® o-rings help ensure harsh cutting fluid resistance to the connector/multi-port interface
- Improved potting compound strengthens chemical and moisture resistance, insuring IP 68/NEMA 6P integrity.

New Product Highlights



"Y" MOLDED SPLITTERS

Nano-Change® Splitters

"Y" Molded Splitters: These enhanced molded splitters connect two 3-wire DC sensors or switches with threaded m8 connection into a single male 4P m8 or m12 connection in one small footprint.



MOLDED JUNCTION BOXES

MPIS® Molded Junction Boxes

Molded Junction Boxes: The industry's most versatile m8 junction boxes are available in 4-16 port versions. Connectorized and molded cable versions with a variety of cable exit options extends the designer's options.



43650 DIN CONNECTORS AND FIELD ATTACHABLE DIN DEVICES

MPM® DIN PRODUCTS

43650 DIN Connectors and Field Attachable DIN Devices: For remote actuation of solenoid valves on the factory floor. Complete offering of field attachable DIN 43650 connectors connect to all DIN standard solenoid valves and pressure switches. Available in a variety of indication and surge suppression options.



MOLDED DIN CONNECTORS

Molded DIN Connectors: Extends the "soft wiring" concept back to the output connectors-reducing installation time, eliminating troubleshooting time and providing "plug and play functionality" during valve bank replacement, all the while, these DIN connectors ensure uninterrupted service and improved environmental rating. Connection is made to industry standard Mini-Change® and Micro-Change® m12 connectors as well as being supplied with leads only.

Other New Woodhead Connectivity Innovations

AutoCAD® CD-ROM: AutoCAD® productivity tool provides the framework for specifying Brad Harrison® and mPm® connector solutions quickly and accurately. This tool features a library of application-ready AutoCAD product blocks to be directly dropped into a machine design. This CD also features a library of files, enabling product and interconnection drawings to be directly downloaded for quickly generating a Design Drawing and Bill Of Material, more accurate job estimates and builds through the use of the Promise® layout software program.

Mini-Change® Cordset Family

Best Selection, Best Choice.

The Brad Harrison® Mini-Change® connector family is the standard by which all other miniature connectors are measured. To understand why Mini-Change connectors are the choice, simply look at their evolution. We pioneered the market for miniature connectors, presenting the first quick-disconnect alternative to hardwiring. Today, Brad Harrison connectors continue to be the recognized leader for quality and durability in design, embodied in the widest selection of miniature connectors on the market.

To continuing to broaden our innovative line, the 19-pole connector consolidates power and control wiring in a molded, prewired, water-tight package.

Applications

The Brad Harrison Mini-Change connector family provides connections for 12 and 18mm proximity sensors, photoelectric sensors, limit switches, and hydraulic valves commonly found in industrial applications involving conveyors, packaging equipment, material handling equipment, and automated assembly equipment.

