

INDUSTRY BROCHURE

# Installation Solutions

## Robotics and automation industry



- Providing a complete hose package solution for the Robotics industry, including conduits, fittings and accessories
- Cable protection systems
- Wire and cable management

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**With over 500,000 robots installed worldwide, ABB leads the way in the field of industrial robots, satisfying the productivity and safety requirements of its customers. In addition, ABB's range of installation products includes individual equipment components for robots. ABB cable protection systems and ABB wire and cable management solutions help to ensure overall quality and reliability.**

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## **ABB Installation Products Division**

Solutions for robotics and automation

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From original design and manufacturing excellence to world-class service, the ABB Installation Products division meets the demands of rapidly changing industries with value-added solutions. That's why we are one of the world's largest providers of electrical components.

Our pioneer brands in cable protection and wire cable management offer you state-of-the-art materials and the latest technologies for robotics, machine and factory automation. ABB's installation solutions helped influence the development of the international standards through the years. Extensive research, development and testing enable our engineers to achieve the highest standards to boost their productivity, while preserving safety and product quality.

**PMA**

**Adaptaflex**

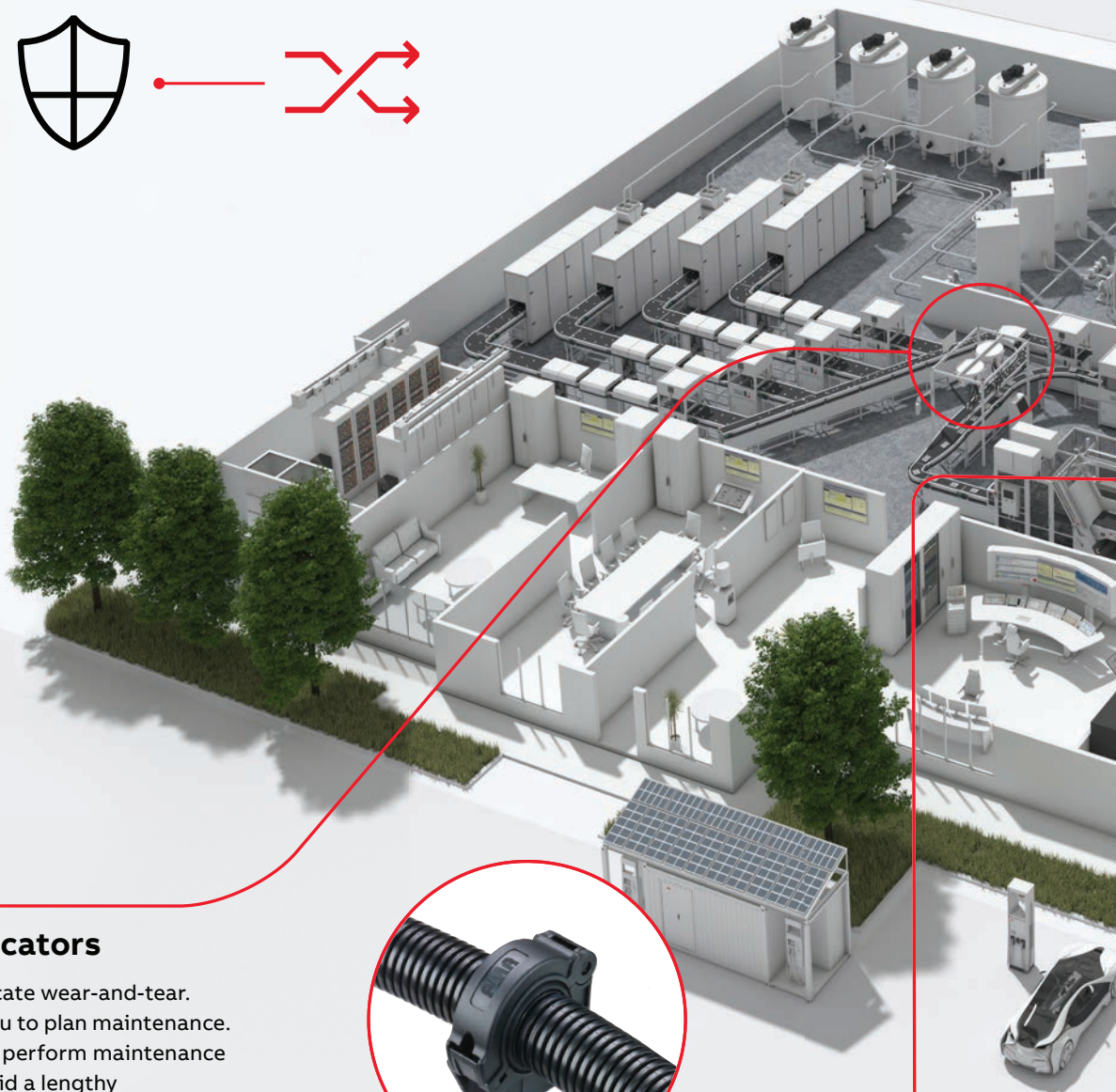
**Ty-Rap**

**ABB Wiring Duct**





# Boosting productivity, preserving safety across production cycles.



## Maintenance indicators

Smart functionalities indicate wear-and-tear. The yellow layer notifies you to plan maintenance. The red layer urges you to perform maintenance as soon as possible to avoid a lengthy production downtime.



## Easy-to-replace

ABB helps to reduce costly downtime in robotics operation by offering easy to replace installation products.





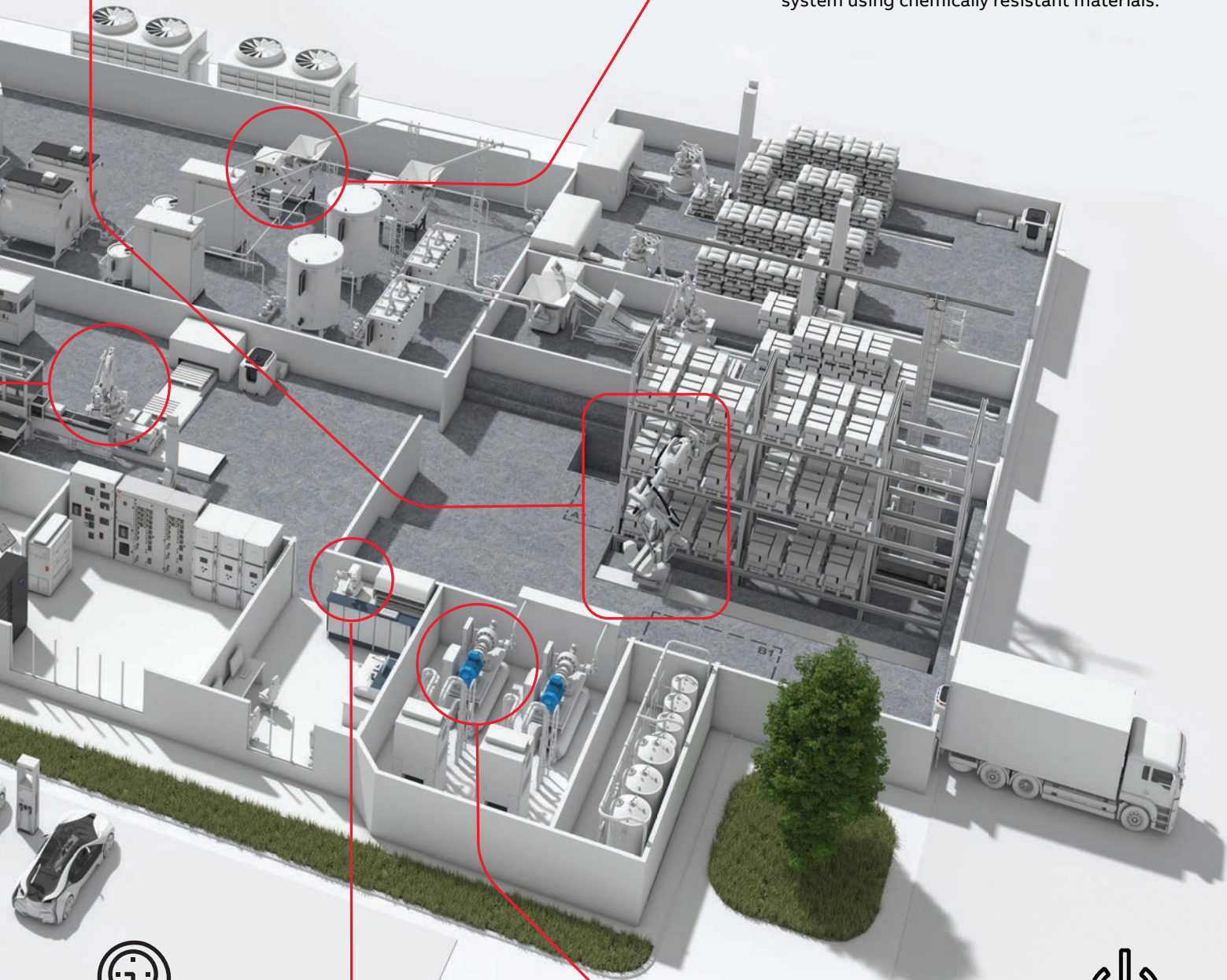
## Maximum flexibility

PMA's hose pack systems for cobots allow the holder a high degree of movement freedom. This enables the cobot movements to be frictionless, resulting in increased uptime and productivity.



## Chemical resistance

Cleaning and sanitation crews in F&B often use high-pressure wash down cleaning equipment with high-temperature chemical solutions. With these processes in mind, ABB constructed a food and beverage system using chemically resistant materials.



## Industry specific solutions

A broad and extensive portfolio has dedicated solutions for product applications operating directly in the field. To balance costs and regulatory pressures, operations should be viewed holistically. Adaptability is essential for complex and constantly changing industries.



## Reliability

Processing plants require a high reliability level from their electrical systems, because shutdowns can cost from minutes' to days' worth of production if a batch must be scrapped.



**Engineered solutions** to deliver the highest performances for a variety of challenging operating conditions.



**Ty-Rap® detectable cable ties** Successfully tested for direct food contact.

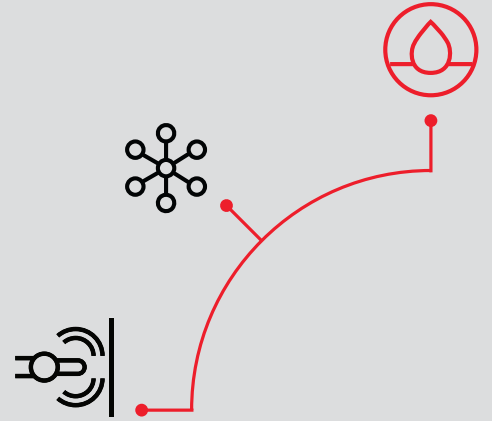




# Food & Beverage

## Robotics and automation

Every touchpoint across food and beverage production is held to high standards of safety.



### Corrosion resistance, antimicrobial and ingress protection

Every touchpoint across food and beverage production is held to high standards of safety, from personnel and practices to preparation and packaging. Not only can downtime in F&B cost thousands of dollars per line per hour, it can result in significant food waste. Overlaying the entire operations are production schedules that factor in added or extended shifts, maintenance, and cleaning and sanitation, while assuring minimal downtime.

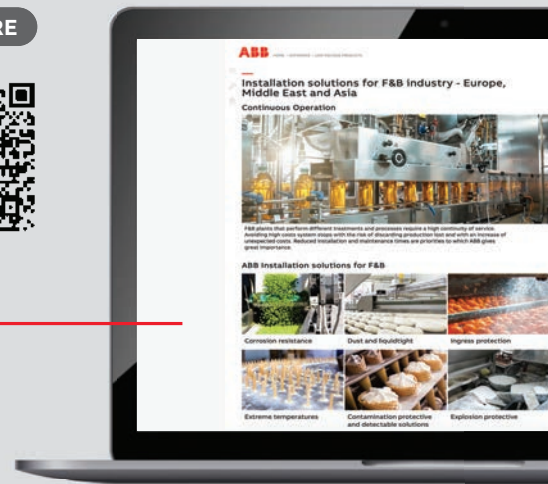
**ABB Wiring Duct®**  
Secure support with minimal onsite modification in non-washdown areas.



### ABB Installation Products Division

offers production facility plants dependable solutions to address issues like corrosion, liquid ingress, condensation, washdown and temperature transitions, both as SKU reduction and standardisation, while incorporating antimicrobial and hygienic designs across key segments and applications.

SEE MORE

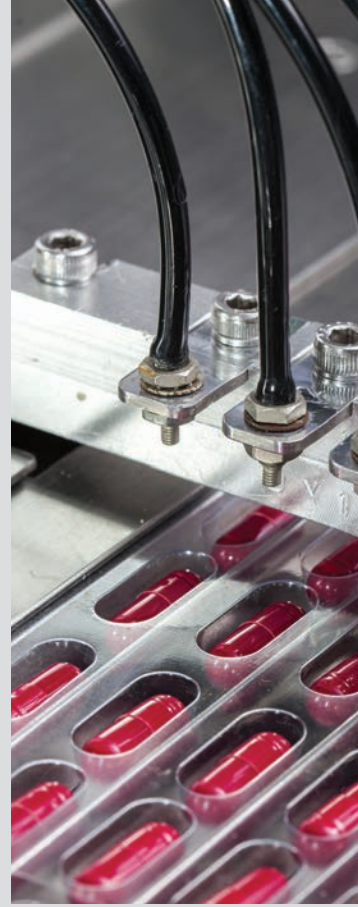
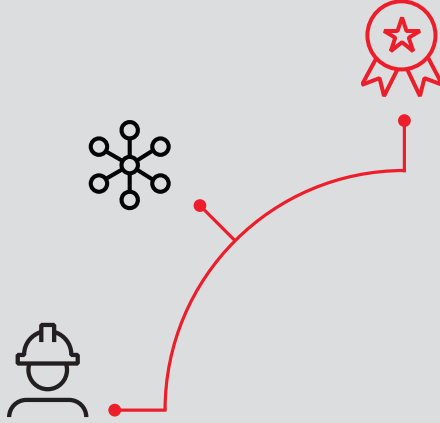


Whether targeting specific zones or the entire facility, F&B applications require wire management and cable protection, that comply with electrical and reliability standards that encompass sanitation, such as NSF certifications. Providing third-party accreditation, NSF certifications help protect food, water and consumer products, as well as the environment.

# Pharmaceutical

## Robotics and automation

Healthcare continues to be in the spotlight.



### Safety, quality and efficiency

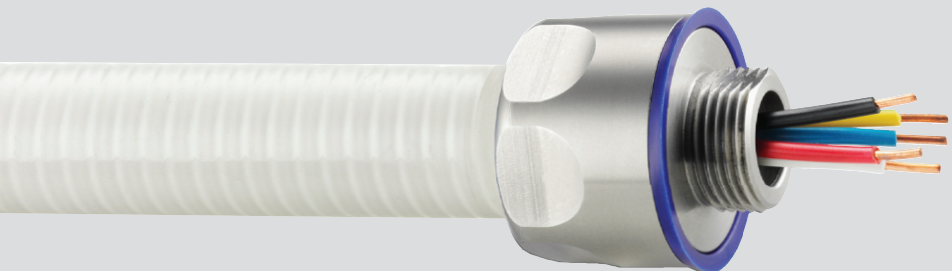
Healthcare is under more scrutiny than ever before. From pharmaceutical and medical device production to medical and research laboratories, Robotics solutions support the safety of human workforce and help transform quality, capacity and cost of operations.

**ABB Installation Products** provides a comprehensive range of cable protection systems designed to withstand chemical impact and eliminate microbial threats on the surface – improving the efficiency and quality of health care operations with clean, long-lasting equipment.

Given the volume of mechanical process equipment involved in the food, pharmaceutical and chemical industries, combined with the shift toward increased automation through conveyor and feeder systems, there are often thousands of power and data cables that need to be protected. However, cable protection systems like conduits and fittings, could become a home for bacteria and pose a potential threat to safe processing unless specifically created for these applications.



**PMA® Over-extruded conduit**  
Smooth and easy-to-clean flexible conduit.



**Adaptaflex® Antimicrobial conduit**  
Reducing the level of microbes on the conduit surface by up to: 80% in the first 15 minutes, 99% in just 2 hours.





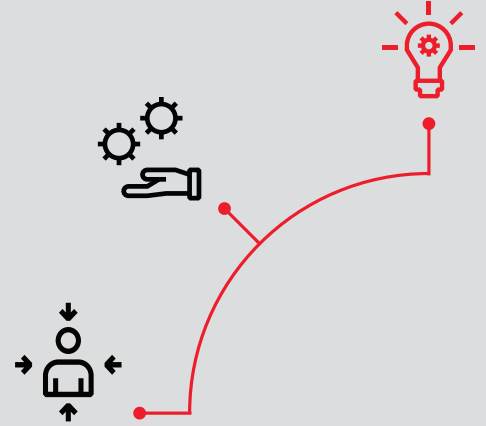
**PMA® Cable protection solutions**  
From pioneer to market leader. High performance, reliability and safety in cable protection for the automotive industry.



# Automotive industry

## Robotics and automation

The ability to adjust technology to meet the market demand.



### Performance, quality and technical support

Today's automotive business demands high-quality product output, increased profitability, and the ability to adjust technology to meet business needs and market demand.

In the automotive industry, growing global competition requires flexibility from manufacturers who need production and logistic systems to serve the ever-increasing demand for model diversity. To further meet that demand, auto manufacturers must expand and even redefine their core competencies in order to adapt to Industry 4.0 developments, demographic change and data-driven production.

**PMA® Cable Protection System for Automation** applications has been developed to protect cables and wires in extreme automation and robotic installations. Through different conduit types for various requirements, system supports and a range of special accessories, torsion can be avoided and the stresses upon the cables reduced to a minimum.



Ty-Rap® cable ties for automotive

**Ty-Rap® cable ties Heat stabilised**  
Heat stabilised for applications up to 105°C.

**Ty-Rap® cable ties Extra high temperature**  
Extreme continuous temperature rating: -40°C to +150°C (in air).



SEE MORE

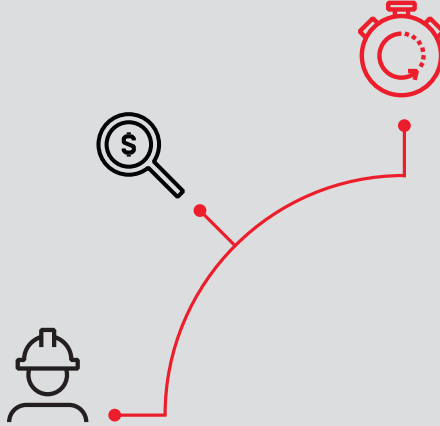


# New construction methods

## Robotics and automation

Meeting the specific needs of construction.

SEE MORE



### Construction industry

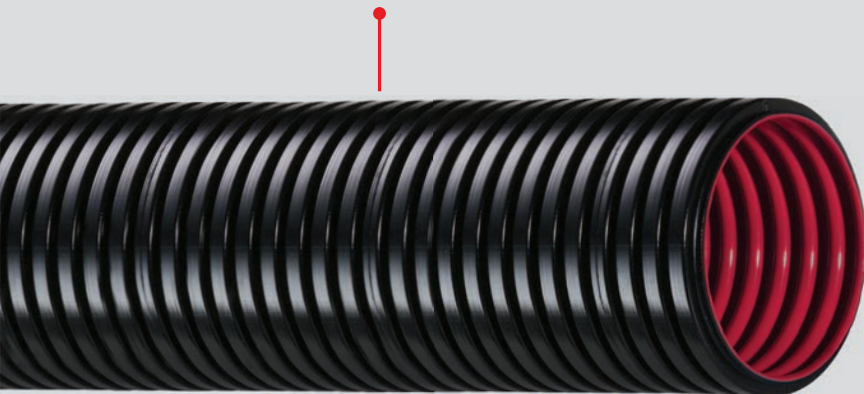
In construction environments, there are ever-increasing demands for solutions that are faster and easier to install. These solutions must also meet safety, technical performance and the specific requirements of municipal buildings and infrastructure projects.

**PMA®** helps to develop new construction methods. Digital fabrication technologies from the research stage to their practical architectural application.

As part of the DFAB HOUSE construction project, researchers at ETH Zurich are working together with experts and planning specialists from the building industry to research and test how digital fabrication can alter the design and construction process. ABB Robotics and ABB **PMA®** cable protection are both playing an important role in this new digital fabrication technology.



**The cable protection solutions developed by PMA®** for automation applications satisfy the demanding mechanical requirements in key aspects.



**PMA® Multilayer conduit**  
The abrasion indicator allows maintenance to be scheduled without incurring lengthy production downtimes.





—  
Wooden building modules are pre-fabricated in ETH's Robotic Fabrication Laboratory by two ABB robots equipped with PMA's cable protection products.



**A complete cable protection system for automation solutions**

Specially designed conduits, clamps and abrasion protection sleeves provide highly effective protection for all moving parts, massively reducing torsional forces.

Gramazio Kohler Research, ETH Zurich.



Copyright Roman Keller / NCCR Digital Fabrication.



Copyright Roman Keller / NCCR Digital Fabrication.

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The 'Spatial Timber Assemblies' process was used during construction. The wooden building modules were pre-fabricated in ETH's Robotic Fabrication Laboratory by two ABB robots equipped with PMA's cable protection products.



## Next generation cable protection for robotics and automation

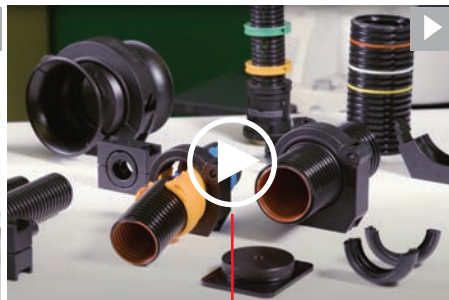
PMA® cable protection system for automation has been developed to protect cables and wires in extreme automation and robotic installations. Different conduit types are available for various requirements, system supports and a range of special accessories, so torsion and cable stress can be minimised. Special conduit designs, supports and abrasion protection sleeves provide optimal protection along the entire length of moving elements, enabling engineers to significantly reduce torsion forces.



SEE MORE



**PMA® Conduits for robotic applications**  
Protecting cables and wires in extreme automation and robotic installations.



SEE MORE



**PMA® Accessories for cable protection in robotic applications**  
Dependable protection against abrasion and preventing wearing through insulation.





### Worldwide recognitions

All PMA products are rigorously tried and tested to meet the demands of industries worldwide.



# PMA® the next generation of cable protection for robotics and automation



**3**  
Layers



**Multilayer conduit**

**Consists of 3 protective layers**

PMA Multilayer conduit provides optimal cable protection in robotics and all of your automation applications, including dependable protection:

- Holds up against abrasion
- Prevents insulation wear
- Provides maximum flexibility and
- Extends service life in motion-intensive applications.



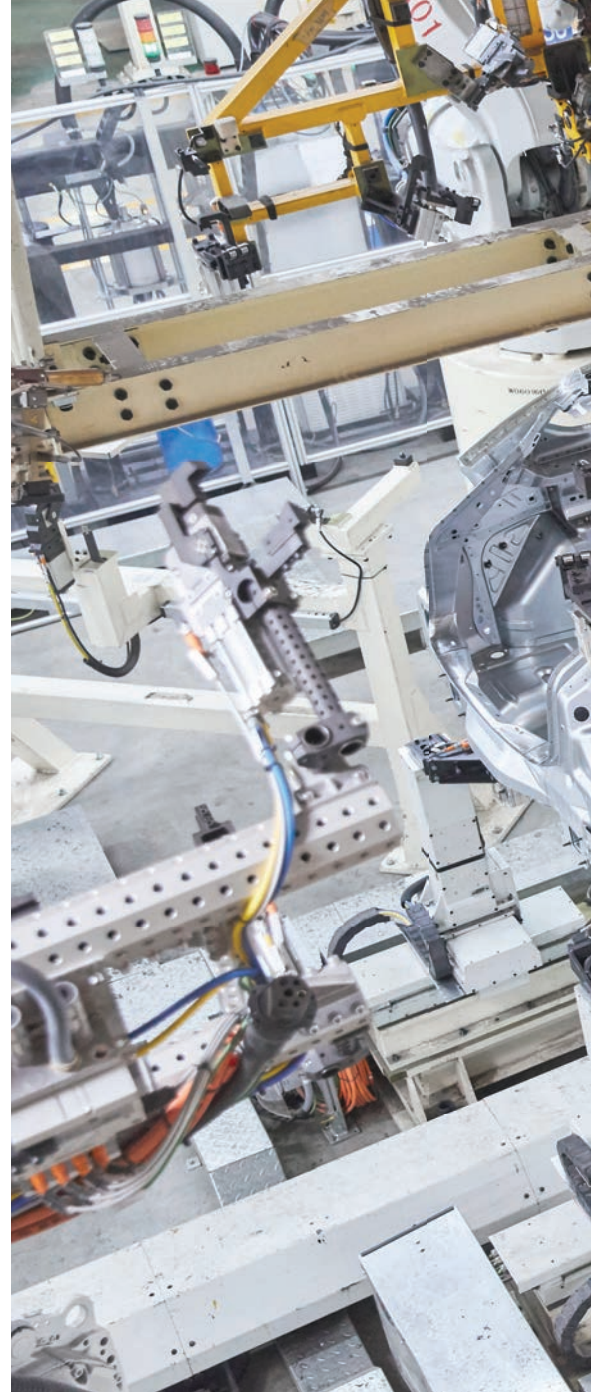
**PMAFIT Pro fittings**

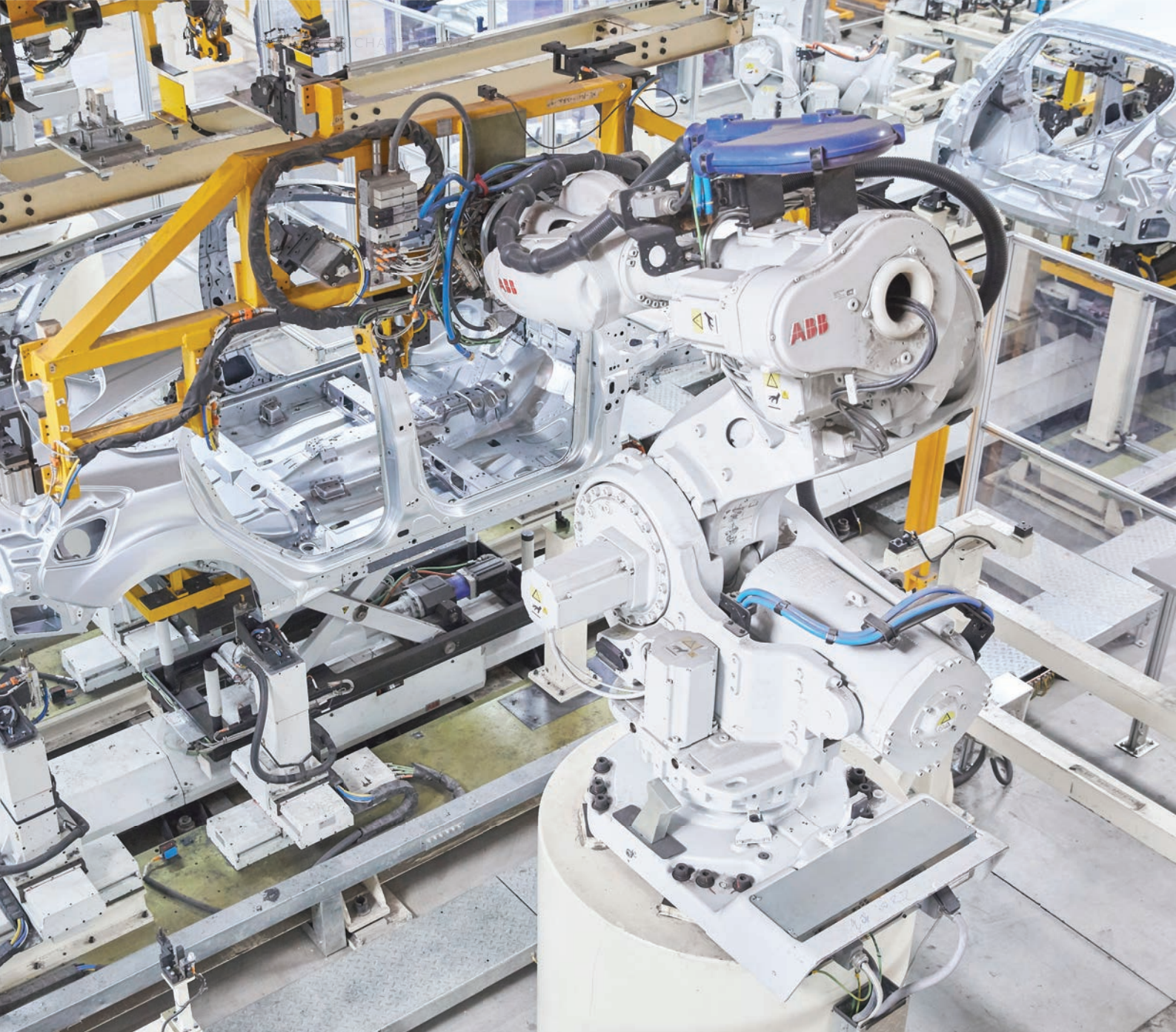
The PMAFIT Pro has two components, an outer body and an inner sealing element. The sealing element functions both as a seal and as a locking mechanism providing all ingress protection grades up to IP68 and IP69K, even in applications where there is long term continuous movement. PMAFIT Pro is manufactured by using a multiple component injection moulding process.



**Tube clamps, ball-joints, and half shell inserts**

The range includes the BSH tube clamp, which serves as a fixation for functional inserts. The BTK ball joint sleeve offers additional flexibility and reduces mechanical stress on the conduit. BSSK ball joint half shells provide additional freedom of movement for corrugated conduits fixed in BSH automation tube clamps.





#### **Abrasion sleeves and other accessories**

Accessories include the BSS/BSV abrasion protection sleeve, providing abrasion protection for corrugated conduits in positions exposed to chafing. The BKS cable stars are tailored and designed-to-order.





**XR90 very flexible multilayer conduit** for robotics and automation applications subject to mechanical wear and elongation created by the movement of axis 2 and/or 5, featuring wear indication function.

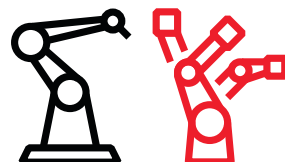


**XR90, XTPC conduits**

These new conduits provide previously unattained performance levels. The XR90 & XTPC ranges offer multilayer conduits for demanding technical applications and special requirements. The new PMAFLEX multilayer conduits (X-Series) are based upon advanced multi-layer-extrusion technology allowing the manufacture of three-layer corrugated conduits combining the best characteristics of different materials on inner and outer layers.

Over  
**500,000**

Robots installed  
worldwide



**Automation/Robotics**

In the field of automation, there is a need for products that can withstand the stress of motion-intensive applications. Solutions developed by ABB for the automation industry fully meet these requirements. Special conduit designs, supports and abrasion protection sleeves provide optimal protection along the entire length of all moving elements, enabling engineers to achieve a reduction in torsional forces.

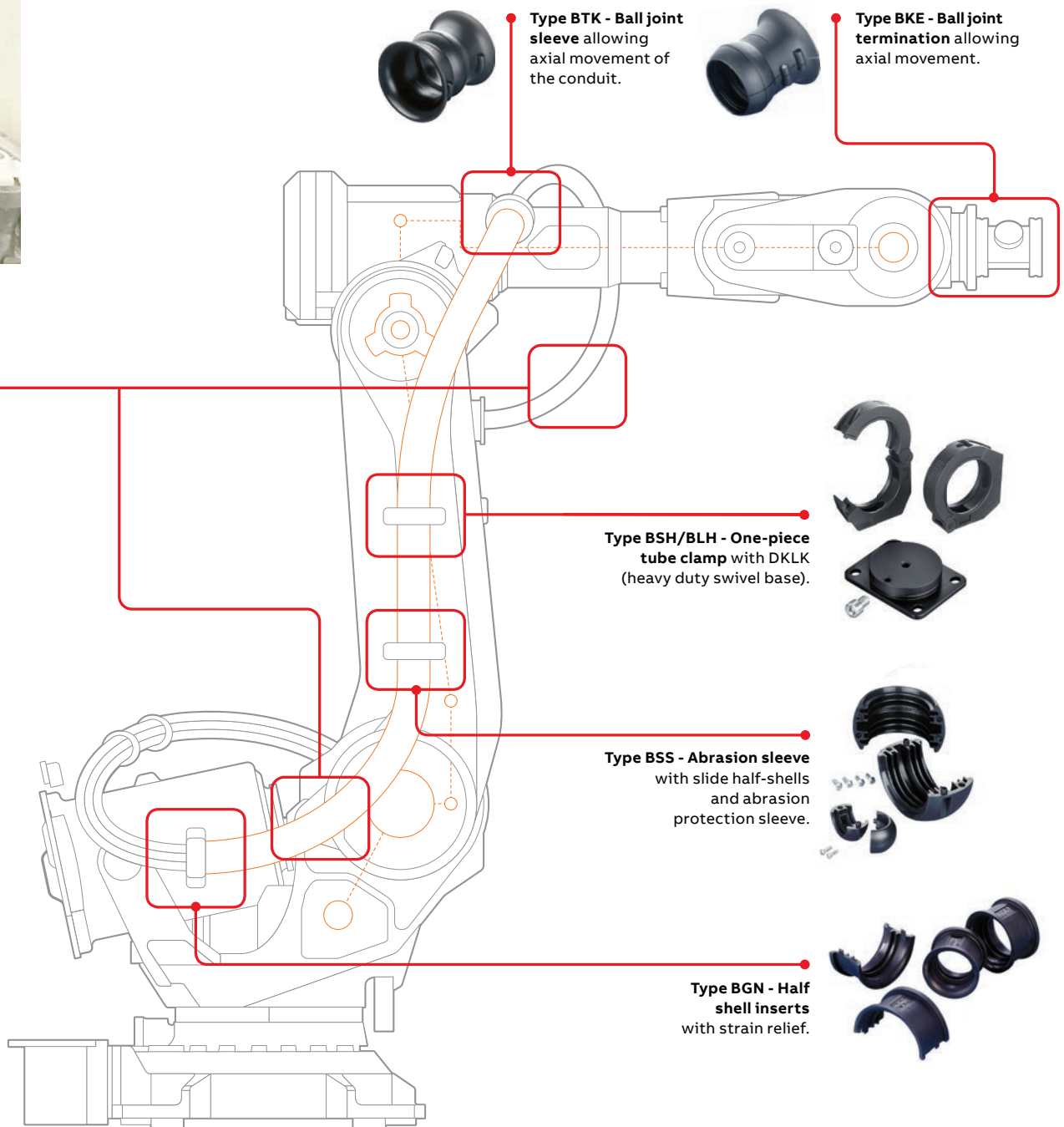
## Technical specifications

### Material

- Specially formulated polyamide 6
- Free from halogens, REACH + RoHS compliant
- Temperature range: -40 °C to +105 °C, short term to +160 °C

### Characteristics

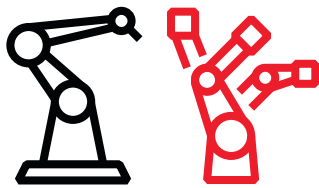
- Reduce wear to guidance and control elements
- Increase the degree of freedom of robotic installations
- Allow optimal layout of cables along moving elements
- Increase the lifetime of moving installations
- Allow quick and easy installation



# PMA® Cable protection in robotics and automation



**PMA XR90, XTPC, PIS/PIH, ESD conduits**  
Highly flexible to accommodate continuous bending, especially suitable for narrow bending radii, with abrasion resistance and wear indicator.



PMA Cable Protection System for automation is designed to protect cables and wires in extreme automation and robotic installations.



SEE MORE



Learn more about the features and benefits in this PMA® robotic animation video.



**Tube clamp with ball joint sleeve**  
Offers additional flexibility and reduces mechanical stress on the conduit.



**BKS cable star**  
Use to reduce the lateral movement and strain of the cables and prevent any debris from entering the exposed conduit end.



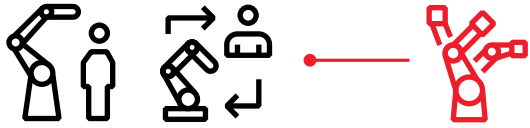
**PMA tube clamp with half-shells**  
To optimally fix and guide conduit and fixes the conduit against axial movements.



**PMA abrasion sleeve**  
Offers protection for corrugated conduits in positions exposed to chafing.



**PMAFIX connectors**  
Ingress protection grades up to IP68 and IP69, even in applications where there is long term continuous movement.



# PMAFIX Pro

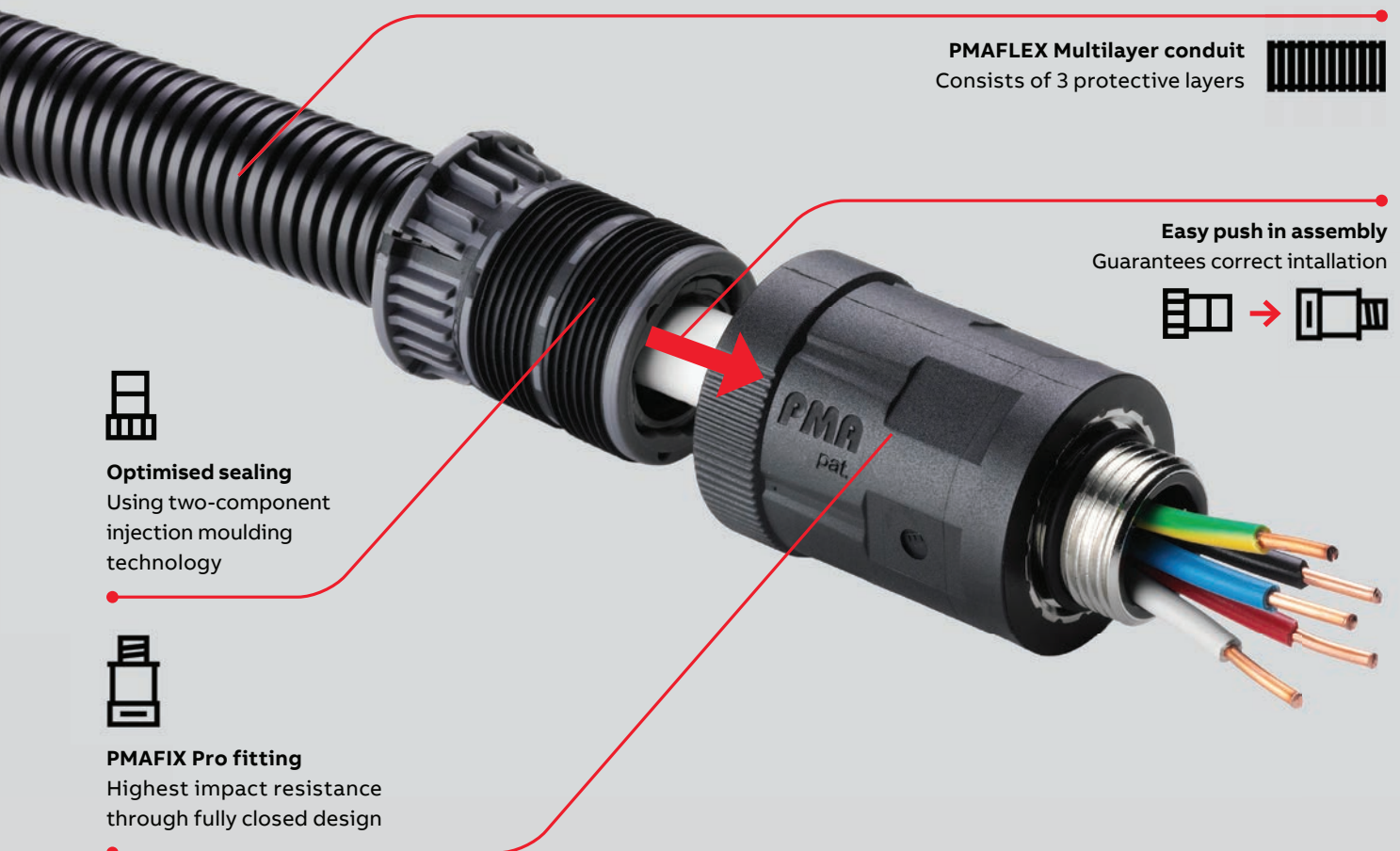
## Cable protection system

**Next generation cable protection.** The extremely successful and technically proven PMAFIX System has been developed further to create the PMAFIX Pro product range.

These new generation fittings are the product of experience gained over many years in the most varied application areas. The PMAFIX Pro has two components, an outer body and an inner sealing element. The sealing element functions both as a seal and as a locking mechanism, providing all ingress protection grades up to IP68 and IP69 even in applications where there is long term continuous movement. PMAFIX Pro is manufactured by using a multiple component injection moulding process.

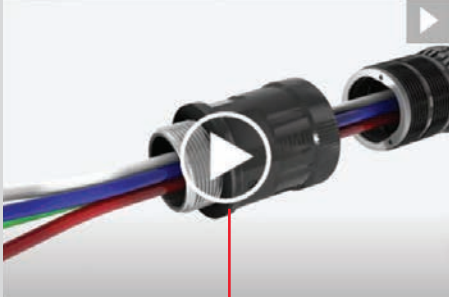
### Key features

- Meets all ingress protection categories up to and including IP68 and IP69, and when the conduit connection is continually in motion
- Manufactured with newest two-component injection moulding technology
- Fulfills highest international quality and standard requirements
- Intelligent safety locking mechanism
- Allows simple “push-in” installation of conduits
- Due to the integrated conduit supports, conduit remains centralised with little deformation even when bent sharply directly at the fitting





## Technical specifications



SEE MORE



**PMAFIX Pro fitting and PMAFLEX multilayer conduit**  
ABB offers a comprehensive state-of-the-art cable protection solution.



SEE MORE



**PMAFIX Pro metal thread fittings assembly**  
Demonstrating an easy way to install and disassemble PMAFIX Pro metal thread fittings.



SEE MORE



**PMAFIX Pro polyamide thread assembly**  
Demonstrating an easy way to install and disassemble PMAFIX Pro polyamide thread fittings.

### Material

- Fittings made from specially modified polyamide 6
- Threads made from nickel-plated brass or polyamide 6
- Sealings made from cross linked polyester elastomer
- Self-extinguishing
- Free from halogens, REACH + RoHS compliant
- Temperature range: -50°C to +105°C, short-term to +160°C

### Characteristics

- High assembly reliability – the fitting only locks when the sealing element is fully inserted
- Operational safety assured through visual and acoustic correct assembly controls
- Excellent resistance to ultraviolet rays and weathering
- High impact resistance through fully closed design
- High conduit pull out strength
- Vibration-proof connection to PMA conduits
- Fits conduit profiles – fine (T) and coarse (G)
- To avoid accidental opening, disassembling only possible with a screwdriver

### Static + dynamic

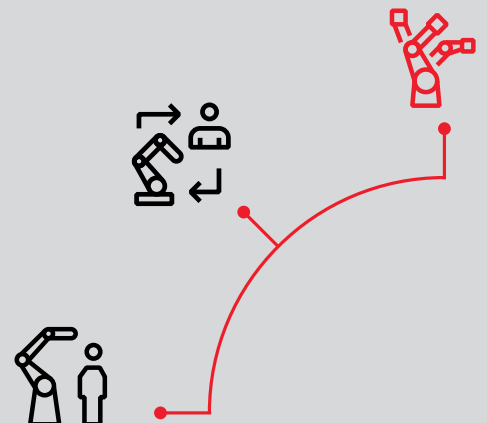
- Highest sealing through fully closed system, also in the highest dynamic applications
- Extra long ribbed sealing areas (cross linked material)
- 360° locking and sealing element shields against high pressure water jets (up to 100 bar)
- Content of delivery: Locking and sealing element and thread seal for male threads (O-Ring and/or flat gasket)



# IP68/69

## Ingress protection

Fully closed static + dynamic seal on fittings



IP68 + IP69

# Type XR90

## PMAFLEX multilayer conduit



**Highly flexible, medium-duty conduit**

For dynamically moving conduit systems in robotics and automation industry.

Highly flexible conduit with a unique wear indication function, especially suitable for applications with a pullback system.

- With wear indication function
- High resistance to continuous bending
- No abrupt conduit failure due to high tear propagation resistance
- High abrasion resistance
- High resistance to torsion
- Suitable for applications with a pullback system
- Long service life

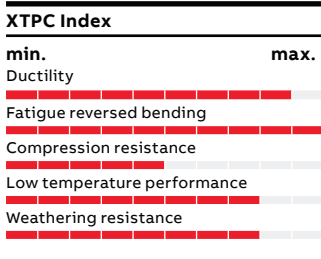
- **Material:** Outer, intermediate and inner layer made from high-grade, specially formulated polyamide 12
- **Temperature range:** -40°C to +95°C continuous, short-term to +150°C
- **Compatible with:** PMA Automation Products, PMAFIX Pro, PMAFIX fittings, PMAGRIP, PMA Accessories
- **Environmental properties:** Free from halogens and cadmium, RoHS and REACH compliant

Approvals



**Type XR90 - Highly flexible, medium-duty**

	Order no. (black/red)	Conduit size		Inside Ø (mm)	Outside Ø (mm)	Stat. radius (mm)	Dyn. radius (mm)	PU (m)
		NW	Metric					
	XR90T-17BR	17	20	16.2	21.1	30	85	50
	XR90T-23BR	23	25	22.7	28.4	40	110	50
	XR90T-29BR	29	32	28.6	34.5	50	135	50
	XR90G-17BR	17	20	15.4	21.1	35	85	50
	XR90G-23BR	23	25	21.4	28.4	45	110	50
	XR90G-29BR	29	32	27.2	34.5	55	135	50
	XR90G-36BR	36	40	35.9	42.4	65	170	30
	XR90G-48BR	48	50	47.0	54.5	85	220	30
	XR90G-56BR	56	68	56.7	67.5	110	270	30
	XR90G-70BR	70	80	67.8	79.6	130	320	30




For dynamic conduit systems in robotics and automation industry.  
 For outdoor applications with good requirements to UV and weathering resistance.  
 With wear indication function. High resistance to continuous bending.  
 No abrupt conduit failure due to high tear propagation resistance.  
 Very high abrasion resistance. High resistance to torsion.  
 Suitable for applications with a pullback system.  
 Long service life.

# Type PIS/PIH

## Highly flexible, medium- and heavy-duty conduit

Type PIS/PIH - Highly flexible, medium- and heavy-duty

	Order no. (black)	Order no. (grey)	Conduit size		Inside Ø (mm)	Outside Ø (mm)	Stat./dyn. radius (mm)	PU (m)
			NW	Metric				
 <p><b>PIS/PIH Index</b></p> <p><b>min. max.</b></p> <p>Ductility <span style="display: inline-block; width: 80%; height: 5px; background: linear-gradient(to right, red, white);"></span></p> <p>Fatigue reversed bending <span style="display: inline-block; width: 85%; height: 5px; background: linear-gradient(to right, red, white);"></span></p> <p>Compression resistance <span style="display: inline-block; width: 70%; height: 5px; background: linear-gradient(to right, red, white);"></span></p> <p>Low temperature performance <span style="display: inline-block; width: 90%; height: 5px; background: linear-gradient(to right, red, white);"></span></p> <p>Weathering resistance <span style="display: inline-block; width: 95%; height: 5px; background: linear-gradient(to right, red, white);"></span></p>	PIST-07B	PIST-07S	07	10	6.7	10.0	15/40	50
	PIST-10B	PIST-10S	10	12	9.7	12.8	20/50	50
	PIST-12B	PIST-12S	12	16	12.0	15.6	25/65	50
	PIST-17B	PIST-17S	17	20	16.7	21.1	30/85	50
	PIST-23B	PIST-23S	23	25	23.2	28.4	40/110	50
	PIST-29B	PIST-29S	29	32	28.9	34.5	50/135	50
	PIST-36B	PIST-36S	36	40	36.8	42.4	60/170	30
	PIST-48B	PIST-48S	48	50	48.0	54.5	75/220	30
	PISG-17B	PISG-17S	17	20	15.8	21.1	35/85	50
	PISG-23B	PISG-23S	23	25	22.0	28.4	45/110	50
	PISG-29B	PISG-29S	29	32	27.8	34.5	55/135	50
	PISG-36B	PISG-36S	36	40	36.2	42.4	65/170	30
	PISG-48B	PISG-48S	48	50	47.1	54.5	85/220	30
	PIHG-56B	PIHG-56S	56	68	57.0	67.5	110/270	30
	PIHG-70B	PIHG-70S	70	80	68.0	79.6	130/320	30
	PIHG-95B	PIHG-95S	95	106	92.5	107.0	170/430	30
PIHG-125B	PIHG-125S	125	146	126.9	146.0	230/580	20	

For robotics and automation applications. UL 94 V0. Excellent UV resistance and weathering characteristics. Very good reversed bending characteristics. Good mechanical characteristics even under extreme conditions, such as low temperatures and low humidity.

Highly flexible UL recognised conduits\* ideal for dynamic applications in robotic and automation industry.



**Highly flexible, medium and heavy-duty conduit**

Excellent mechanical characteristics, also under extreme climatic conditions (low temperature and low humidity).



- Very good reversed bending characteristics
- Good mechanical characteristics even under extreme conditions, such as low temperatures and low humidity
- Excellent resistance to ultra violet rays and atmospheric corrosion
- Self-extinguishing

- **Material:** High-grade, specially formulated polyamide 12
- **Temperature range:** -50 °C to +95 °C, short-term to +150 °C
- **Compatible with:** PMAFIX Pro, PMAFIX fittings, PMAGRIP flange, PMA accessories
- **Conforms to:** UL1696 (UL File E80294)
- **Environmental properties:** Free from halogens and cadmium, RoHS and REACH compliant

\* PIS: Medium-wall (Nominal width 07 to 48) / PIH: Heavy-wall (Nominal width 56 to 125).

Approvals



# Type XTPC

## Multilayer conduit



**Highly flexible, medium-duty conduit**

Especially suitable for narrow bending radii.

Highly flexible conduit for robotic applications with high resistance to abrasion and wear indication function.

- Wear indication function
- High resistance to continuous bending
- No abrupt conduit failure due to high tear propagation resistance
- Very high abrasion resistance
- High resistance to torsion
- Suitable for tight bending-radii
- Long service life

- **Material:** Outer, intermediate and inner layer made from high-grade, specially modified Thermoplastic copolyester elastomer
- **Temperature range:** -40°C to +105°C continuous, short-term to +150°C
- **Compatible with:** PMA Automation Products, PMAFIX Pro, PMAFIX fittings, PMAGRIP flange, PMA Accessories
- **Environmental properties:** Free from halogens and cadmium, RoHS and REACH compliant

Approvals

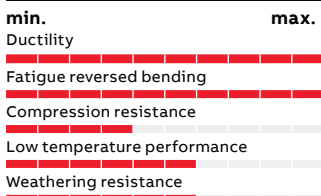


### Type XTPC - Highly flexible, medium-duty

	Order no. (black/orange)	Conduit size		Inside Ø (mm)	Outside Ø (mm)	Stat. radius (mm)	Dyn. radius (mm)	PU (m)
		NW	Metric					
	XTPCG-17BB.50	17	20	15.2	21.1	30	75	50
	XTPCG-23BB.50	23	25	21.2	28.4	40	100	50
	XTPCG-29BB.50	29	32	26.8	34.5	50	120	50
	XTPCG-36BB.50	36	40	35.5	42.4	60	150	30
	XTPCG-48BB.50	48	50	46.5	54.5	80	190	30
	XTPCG-56BB.50	56	68	56.2	67.5	105	235	30
	XTPCG-70BB.50	70	80	67.3	79.6	120	280	30

For dynamic conduit systems in robotics and automation industry.  
 For outdoor applications with good requirements to UV and weathering resistance.  
 Wear indication function. High resistance to continuous bending.  
 No abrupt conduit failure due to high tear propagation resistance.  
 Very high abrasion resistance. High resistance to torsion.  
 Suitable for tight bending-radii.  
 Long service life.

#### XTPC Index



## Type BSH

### One-piece tube clamp



**One-piece tube clamp**  
Serves as a fixation for functional inserts.

#### Approvals



To be used with BGN half-shells to optimally fix/guide conduits.

- Single-piece, robust construction
- Easy installation
- To be used in combination with standard halfshells BGN
- Space saving design allows optimum installation in applications
- Reduces mechanical stress on the cable harness extending the lifespan of the application
- Also serves as a fixation for functional inserts (BTK, BKE) reducing mechanical stresses
- **Material:** High-grade, specially formulated polyamide 6
- **Compatible with:** PMAFLEX Pro Conduits, PMAFLEX Multilayer Conduits, PMAFLEX Conduits
- **Environmental properties:** Free from halogens and cadmium, RoHS and REACH compliant

## Type BGN

### Half-Shell Inserts



**Strain relief half-shell inserts**  
Allowing axial movement of the conduit to reduce stress and torsion.

#### Approvals



Highly flexible conduit for robotic applications with high resistance to abrasion and wear indication function.

- Especially suitable for narrow bending radii
- Provide axial strain relief for conduits but allowing rotation
- Easy installation
- Especially suitable for dynamic applications
- Flexible combination with system blocks
- Variety of fixation possibilities
- Excellent impact strength
- **Material:** High-grade, specially formulated polyamide 6
- **Compatible with:** PMAFLEX Pro Conduits, PMAFLEX Multilayer Conduits, PMAFLEX Conduits, PMA Smart Line Conduits

## Type BSS

### Abrasion protection sleeve



**Abrasion protection sleeve**  
Increases the life time of moving conduits.

#### Approvals



Abrasion protection for corrugated conduits in positions exposed to chafing.

- Increases the life time of moving conduits
- Excellent chafing characteristics
- Very good chemical properties
- Fits both conduit profiles - fine (T) and coarse (G)
- Conforms to: EN 45545-2 HL3 (R22 & R23), NFPA 130, UL 94 (V0)

- **Material:** High-grade, specially formulated polyamide 6
- **Environmental properties:** Free from halogens and cadmium, RoHS and REACH compliant
- **Compatible with:** PMAFLEX Pro Conduits, PMAFLEX Multilayer Conduits, PMAFLEX Conduits, PMA Smart Line Conduits

## Type BKE

### Ball joint termination



**Strain relief ball joint termination**  
A grommet can be inserted directly into this termination to hold and strain-relief the cables.

#### Approvals



Provides additional relief to conduit and cables due to reduced mechanical stress.

- Increased degree of freedom for cable packs
- Optimum solution for cable guidance in automation applications
- Reduces mechanical stress on the cable harness extending the lifespan of the application
- Easy to install and exchange
- Strain relief of cables and wires
- A grommet can be inserted directly into this termination to hold and strain-relief the cables

- **Material:** High-grade, specially formulated polyamide 6
- **Compatible with:** PMA Automation BSH Tube clamp, PMA Automation BKS Grommets, PMAFLEX Pro Conduits, PMAFLEX Multilayer Conduits, PMAFLEX Conduits
- **Environmental properties:** Free from halogens and cadmium, RoHS and REACH compliant

## Type BTK

### Ball joint sleeve



**Strain relief ball joint sleeve**  
Allowing axial movement of the conduit to reduce stress and torsion.

#### Approvals



Ball joint sleeve used in BSH tube clamps for gliding and guiding PMA conduits.

- Increased degree of freedom for cable packs
- The ball joint offers additional flexibility and reduces mechanical stress on the conduit
- Can be used with strain relief insert TR to fix the conduit in axial direction
- Easy to install and exchange

- **Material:** High-grade, specially formulated polyamide 6
- **Compatible with:** PMA Automation BSH Tube clamp, PMAFLEX Pro Conduits, PMAFLEX Multilayer Conduits, PMAFLEX Conduits
- **Environmental properties:** Free from halogens and cadmium, RoHS and REACH compliant

## Type BTR

### Strain relief insert



**Strain relief inserts**  
Allowing axial movement of the conduit to reduce stress and torsion.

#### Approvals



Used to fix the conduit against axial movements in BTK ball joint sleeves. Rotation of the conduit remains possible.

- Increased degree of freedom for cable packs
- The ball joint offers additional flexibility and reduces mechanical stress on the conduit
- Can be used with strain relief insert TR to fix the conduit in axial direction
- Easy to install and exchange
- Used in BSH tube clamps for gliding and guiding PMA conduit

- **Material:** High-grade, specially formulated polyamide 6
- **Compatible with:** PMA Automation BSH Tube clamp, PMA Automation BKS Grommets, PMAFLEX Pro Conduits, PMAFLEX Multilayer Conduits, PMAFLEX Conduits
- **Environmental properties:** Free from halogens and cadmium, RoHS and REACH compliant

## Type BSSK

### Ball joint half shells



**Strain relief ball joint half shells**  
Allowing axial movement of the conduit to reduce stress and torsion.

Ball joint half shells provide additional freedom of movement for corrugated conduits fixed in BSH automation tube clamps.

#### Approvals



- Increases freedom of movement for conduits
- Optimum solution for cable guidance in automation applications
- Extends lifetime of conduit and cables due to reduced mechanical stress
- Easy to install and exchange
- Available for conduit sizes NW23 to NW56

- **Material:** High-grade, specially formulated polyamide 6
- **Compatible with:** PMA Automation System, tube clamp BSH
- **Environmental properties:** Free from halogens and cadmium, RoHS and REACH compliant



## Type BKS

### Cable stars



**Strain relief ball joint termination**  
Allowing axial movement of the conduit to reduce stress and torsion.

For arrangement and strain relief of a loom of hoses and leads of given dimensions in cable assemblies.

#### Approvals



- Rubber inserts that are used at the conduit end to reduce the later movement and strain of the cables
- Prevents any debris from entering the exposed conduit end
- The rubber disc is held by strain relief half shells BGS or ball joint termination BKE

- **Material:** Special polymer
- **Compatible with:** Compatible with BKE and BTK (based on sizes) and GN half shells
- **Environmental properties:** Free from halogens and cadmium





## PMACLIP Type BFH-0

### One-piece system support



**One-piece system support**  
Allowing optimal axial strain relief and impact resistance.

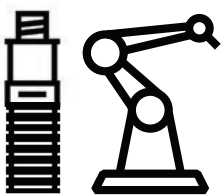


Approvals



One-piece system support, with safety lid.

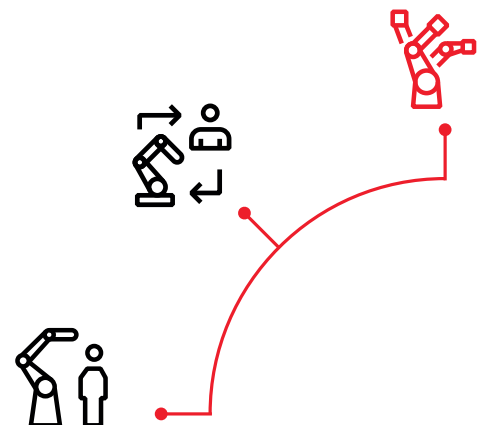
- One-piece construction
- Very high impact resistance
- Optimal axial strain relief due to integrated rib
- Suitable for overhead installations due to safety lid
- High retention forces
- Quick mounting due to single hole fixing
- Very good chemical properties
- Fits both conduit profiles - fine (T) and coarse (G)
- Fits to PMACLIP - BFHS - Rail for system support
- **Material:** High-grade, specially formulated polyamide 6
- **Compatible with:** PMAFLEX Pro Conduits, PMAFLEX Multilayer Conduits, PMAFLEX Conduits, PMA Smart Line Conduits
- **Environmental properties:** Free from halogens and cadmium, RoHS and REACH compliant

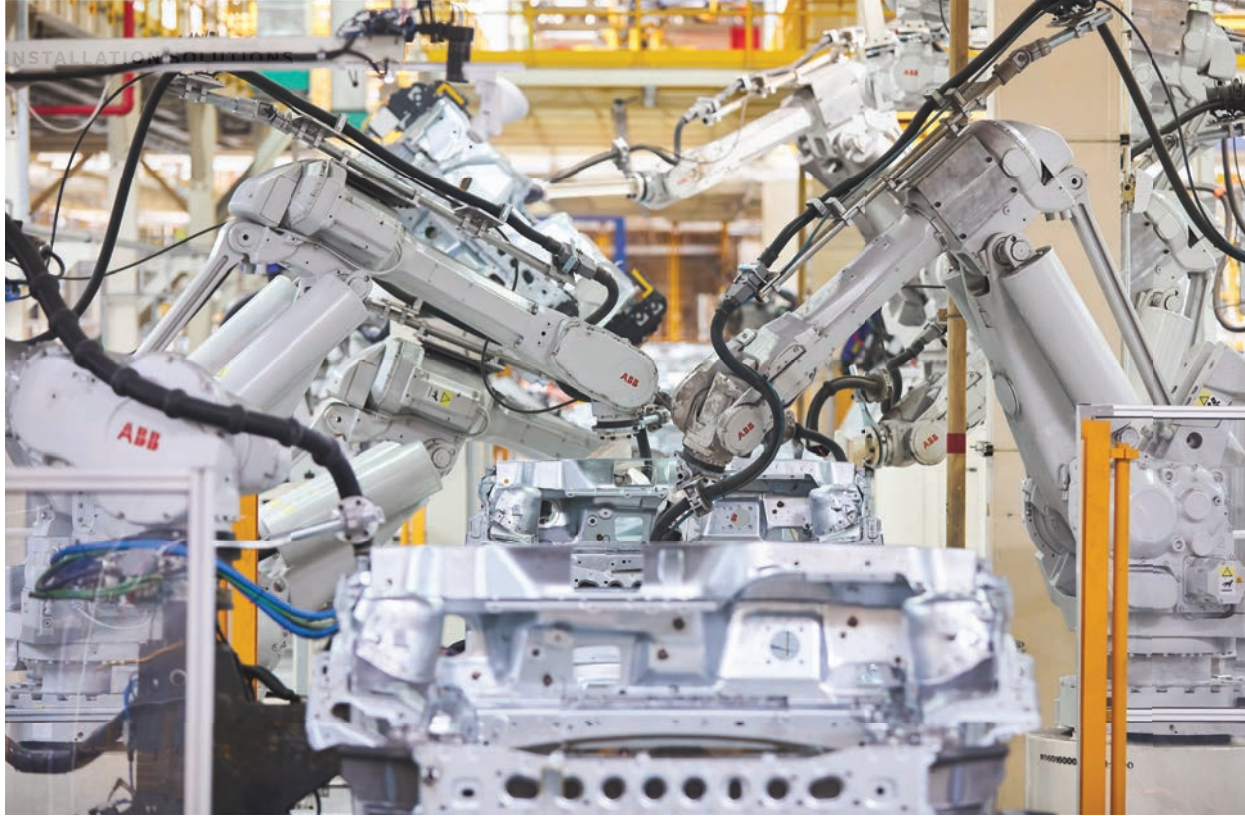


Robots equipped with

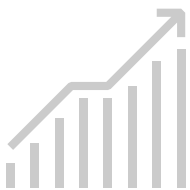
# XR90

Multi-layer corrugated conduit





# Adaptaflex® cable protection systems for robotics and automation applications



**Adaptaflex® cable protection systems are a market-leading flexible conduit brand found all over the world. Combining innovative design with dedicated manufacturing it offers customers one of the world's broadest ranges of cable protection products and solutions. With a choice of over 6000 products, the range covers metallic and non-metallic flexible conduit systems for the protection of critical power and data cable.**

**Adaptaflex® system solutions need to perform in a wide variety of environments, from high temperature to freezing conditions. The products are designed and tested to withstand constant vibrations, water ingress and offer corrosion and chemical resistance. Products are available in many different materials, including halogen free, low smoke and low toxicity materials.**



## **An extensive range of engineered solutions**

Designed to withstand the rigours of some of the most technically-demanding markets. So whatever your project involves, our experience will provide the answer, helping you to specify the correct flexible conduit system.



## **Industry standards**

As one of the world's leading flexible conduit system manufacturers, ABB has achieved many international approvals for our manufacturing as well as our product ranges. Our team uses experience and knowledge to ensure safety and quality levels are maintained now and in the future.



## **Customer support**

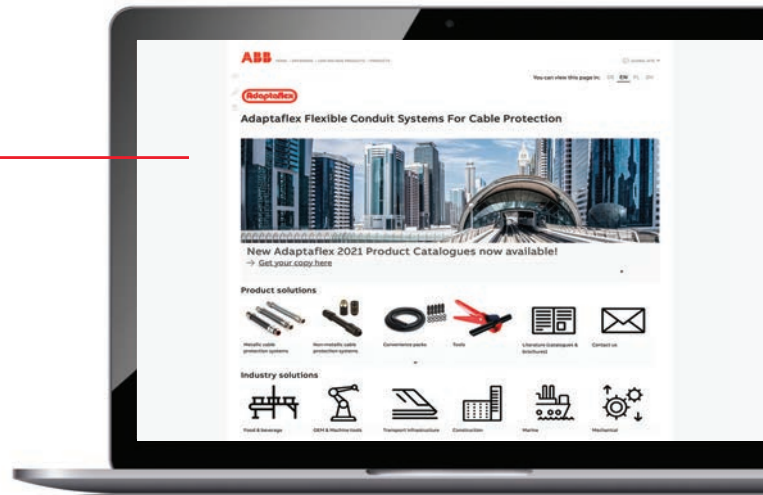
Our products are backed up by a full technical support team, sales teams, customer care team and in-house marketing specialists – dedicated experts working together to ensure you have best in class support.



SEE MORE



—  
**Visit our website**  
 Find **Adaptaflex®**  
 products at [abb.com](http://abb.com)  
 for technical  
 datasheets and  
 catalogs.



**Meeting needs**

The robotics and automation industry is driven by the need to meet the best in lean manufacturing. To achieve this, every piece of equipment in this sector is pushed for greater efficiency by working more intensely and faster. As a result, any conduit installed in these applications will need to provide excellent mechanical strength, flexibility and abrasion resistance, in order to supply the best possible solution for protection along the entire length of all the moving parts.



**Standards, approvals and certifications**

**Adaptaflex®** products are approved by a range of recognised industry standards including:

- BSI Kitemark to IEC61386
- CE marked to the Low Voltage Directive
- Fully compliant to BS7671 Wiring Regulations code of practice
- UL/UR
- CSA



  
**Liquid resistant  
 PVC**  
 General purpose.



  
**Liquidtight  
 PVC**  
 Oil resistant.

—  
**Adaptaflex®** have a wide selection of metallic conduit, suitable for robotics and automation.

—  
 Manufactured from PVC and galvanised steel, **Adaptaflex®** metallic conduits provide a wide range of different solutions for liquid resistant specifications, with further conduit options in liquidtight covered steel for especially demanding environments.

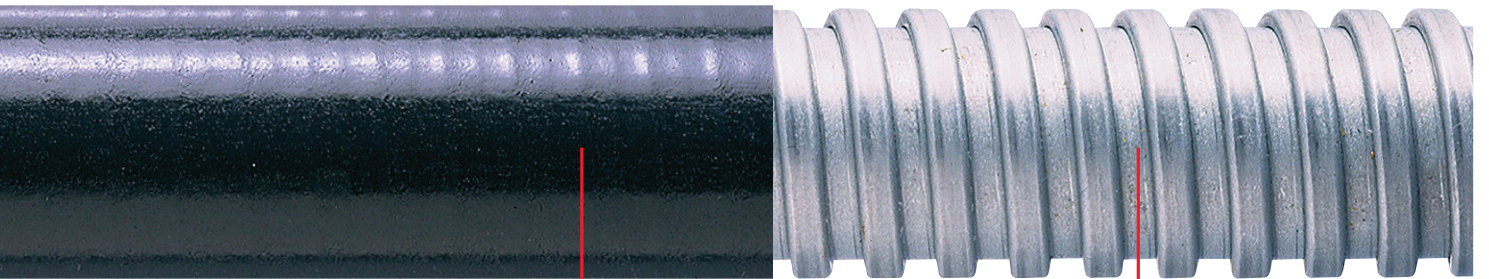
# Adaptaflex® conduit systems

## Metallic cable protection solutions for robotics and automation



The Robotics and Automation industry is driven by the needs to meet the best in lean manufacturing. To achieve this, every piece of equipment in this sector is pushed for greater efficiency by working more intensely and faster. As a result any conduit installed in these applications will need to provide excellent mechanical strength, flexibility and abrasion resistance in order to supply the best possible solution to provide protection along the entire length of the moving parts.

**Nut.** Manufactured in machined nickel plated brass or stainless steel for a better corrosion protection. Smooth hexagonal surface for a professional grip and tightening of the fitting onto the conduits.

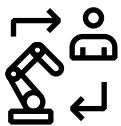


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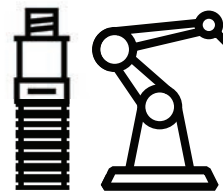
**Flexible PVC / Thermoplastic jacket**  
High and low temperature / chemical resistance.



**Stainless steel / Galvanised steel core**  
Good mechanical strength.



In this hardworking environment of both dynamic and static applications, it is essential that any cable management products continue to deliver performance in areas where resistance to oils and chemicals is paramount. Any down time in manufacturing can be very costly. Products that can offer high ingress protection are fundamental and **Adaptaflex®** conduit systems can offer a wide range of solutions to meet conduit systems of these needs.

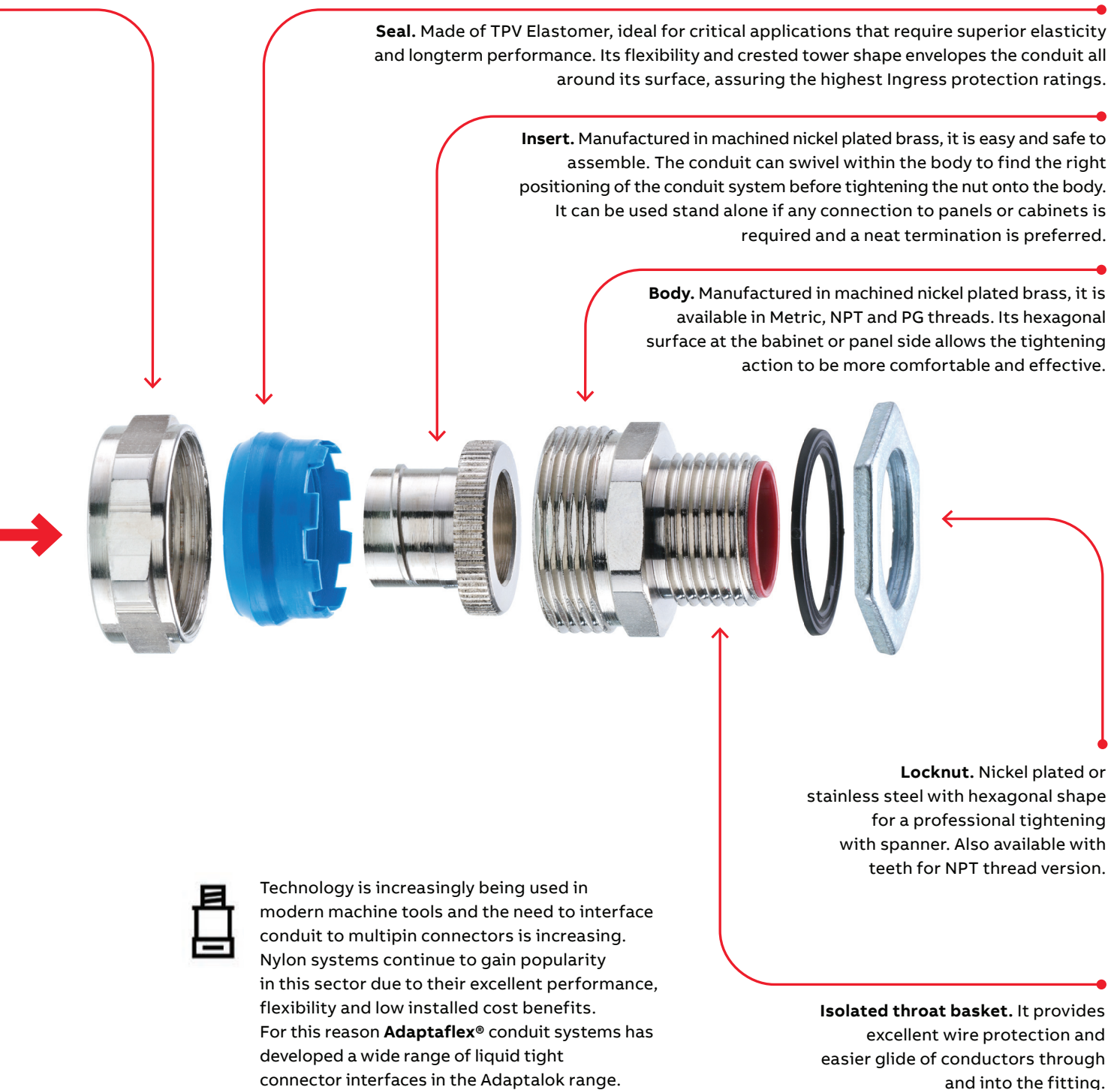


Equipped with

# Type SPL

**Liquidtight**  
oil resistant conduit

The **Adaptaflex® metallic conduit system**, has the flexibility to withstand rapid and continued movement, even in tight bending radii, maintaining its integrity and performance over extended periods.



# Type SP

## Liquid resistant general purpose conduit



- Liquid resistant PVC covered steel
- High flexibility - medium fatigue life
- IP65 rated (with appropriate fitting)
- Self extinguishing PVC

- **Material:** PVC covered galvanised steel
- **Temperature range:**
  - Static applications: -27°C to +70°C
  - Dynamic applications: -5°C to +90°C
- **Colour:** Black (BL), Grey (GR), Orange (OR)



High flexibility,  
medium fatigue  
life conduit

Liquid resistant general  
purpose covered steel  
flexible conduit.

Approvals



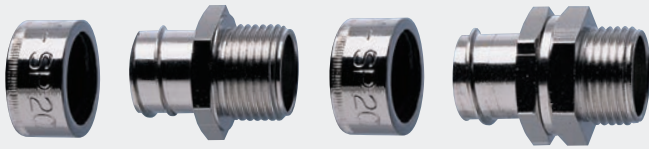
### Type SP - Liquid resistant general purpose conduit

	Part no.	Nominal conduit size (mm)	Outside diameter (mm)	Inside diameter (mm)	Min. bend radius (mm)	Reel length (m)
	SP10/BL/50M	10	10.1	7.0	25	50
	SP12/BL/50M	12	13.8	10.3	30	50
	SP16/BL/25M	16	17.2	13.0	35	25
	SP20/BL/25M	20	21.5	16.9	45	25
	SP25/BL/25M	25	26.0	21.4	55	25
	SP32/BL/25M	32	33.5	28.1	60	25
	SP40/BL/25M	40	44.5	37.7	80	25
	SP50/BL/25M	50	54.9	48.2	90	25
	SP63/BL/10M	63	64.3	57.5	115	10
	SP75/BL/10M	75	79.0	70.0	150	10

If interested in different coil lengths, please contact us.

# Type SP

## Type A, B, C, F, M, E & C90 metallic fittings



**Type SP**  
**Type A & B fitting**

**Approvals**



**Characteristics**

- Nickel plated brass / IP54 Rated
- **Type A.** Straight fitting - Fixed external male thread
- For insertion into knockouts using a locknut
- **Type B.** Swivel external thread
- For insertion into threaded entries & knockouts using a locknut



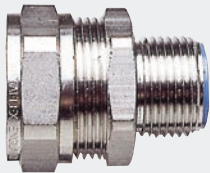
**Type SP**  
**Type C & F fitting**

**Approvals**



**Characteristics:**

- Nickel plated brass / IP54 Rated
- **Type C.** Smooth entry bush
- For locking conduit into plain holes in enclosures
- **Type F.** Straight fitting - Fixed internal female thread
- For external thread fittings



**Type SP**  
**Type M fitting**

**Approvals**



**Characteristics**

- Nickel plated brass / Liquid resistant seal
- Straight swivel fitting - External male thread
- IP65 Rated
- For insertion into threaded entries & knockouts using a locknut



**Type SP**  
**Type E terminator**

**Approvals**



**Characteristics**

- Nickel plated brass / IP54 Rated
- Type E terminator
- IP54 Rated
- Cable protection at exit point



**Type SP**  
**Type C90 liquid resistant elbow fitting**

**Approvals**



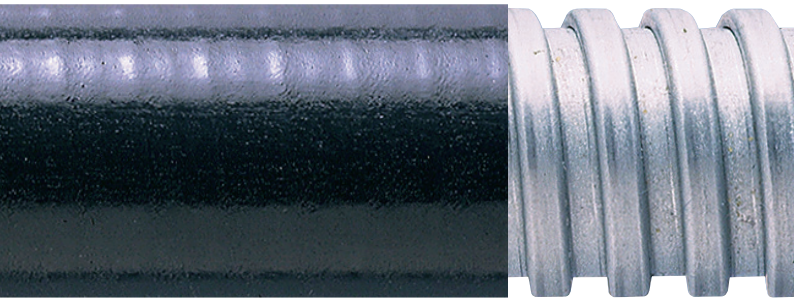
**Characteristics:**

- Nickel plated brass / IP65 Rated
- Fixed external male thread
- Liquid resistant, 90° combined fitting & elbow
- For use with liquid resistant conduit



# Type SPL

## Liquid tight, oil resistant conduit



High mechanical strength, medium flexibility & fatigue life conduit

Liquid tight, oil resistant PVC covered steel flexible conduit.

- High mechanical strength
- Medium flexibility and fatigue life
- High chemical resistance levels
- IP Rating upto IP68 & IP69 (with appropriate fitting)
- Self extinguishing PVC

- **Material:** Galvanised steel core, string packing, PVC covering
- **Temperature range:**
  - Static applications: -20°C to +105°C
  - Dynamic applications: -5°C to +105°C
- **Colour:** Black (BL), Grey (GR), Orange (OR)

Approvals



File No. E135398



NSF 14159-1-2014  
NSF 169-2009

### Type SPL - Liquid tight oil resistant conduit

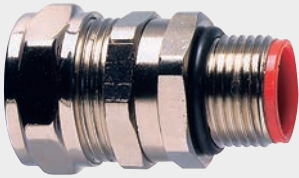
Part no.	Nominal conduit size (mm)	Outside diameter (mm)	US Conduit Size (in)	Inside diameter (mm)	Min. bend radius (mm)	Reel length (m)
SPL10/50M	10	11.8	3/4	7.0	40	50
SPL12/50M	12	14.2	5/16	10.0	45	50
SPL16/25M	16	17.8	3/8	12.5	50	25
SPL20/25M	20	21.1	1/2	15.9	80	25
SPL25/25M	25	26.4	3/4	21.0	110	25
SPL32/25M	32	33.1	1	26.7	145	25
SPL40/25M	40	41.8	1 1/4	35.3	180	25
SPL50/25M	50	47.8	1 1/2	40.4	240	25
SPL63/25M	63	60.0	2	51.6	345	25

If interested in different coil lengths, please contact us.



# Type SPL

## Type B, M, C45 & C90 metallic fittings



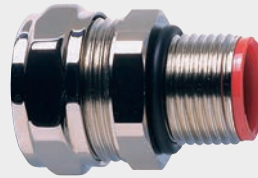
Type SPL  
Type B fitting

**Approvals**



**Characteristics**

- Nickel plated brass / Liquidtight seal
- Straight fitting - Swivel external male thread
- IP67 Rated
- For insertion into threaded entries & knockouts using a locknut



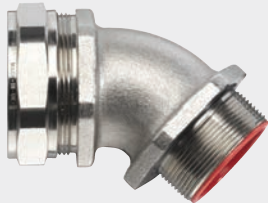
Type SPL  
Type M fitting

**Approvals**



**Characteristics**

- Nickel plated brass / Liquidtight seal
- Straight swivel fitting - External male thread
- IP66-IP69 Rated
- For insertion into threaded entries & knockouts using a locknut



Type SPL  
Type C45 fitting

**Approvals**



**Characteristics**

- Nickel plated brass / Liquidtight seal
- 45° elbow - Fixed external male thread
- UL514B File No. E60625 listed
- IP66-IP69 Rated
- For insertion into threaded entries & knockouts using a locknut



Type SPL  
Type C90 combined fitting & elbow

**Approvals**



**Characteristics:**

- Nickel plated brass / Liquidtight seal
- 90° combined fitting & elbow - Swivel external male thread
- UL514B File No. E60625 listed
- IP66-IP69 Rated
- For insertion into threaded entries & knockouts using a locknut



# Adaptaflex® conduit systems

Flexible non-metallic cable protection solutions for robotics and automation

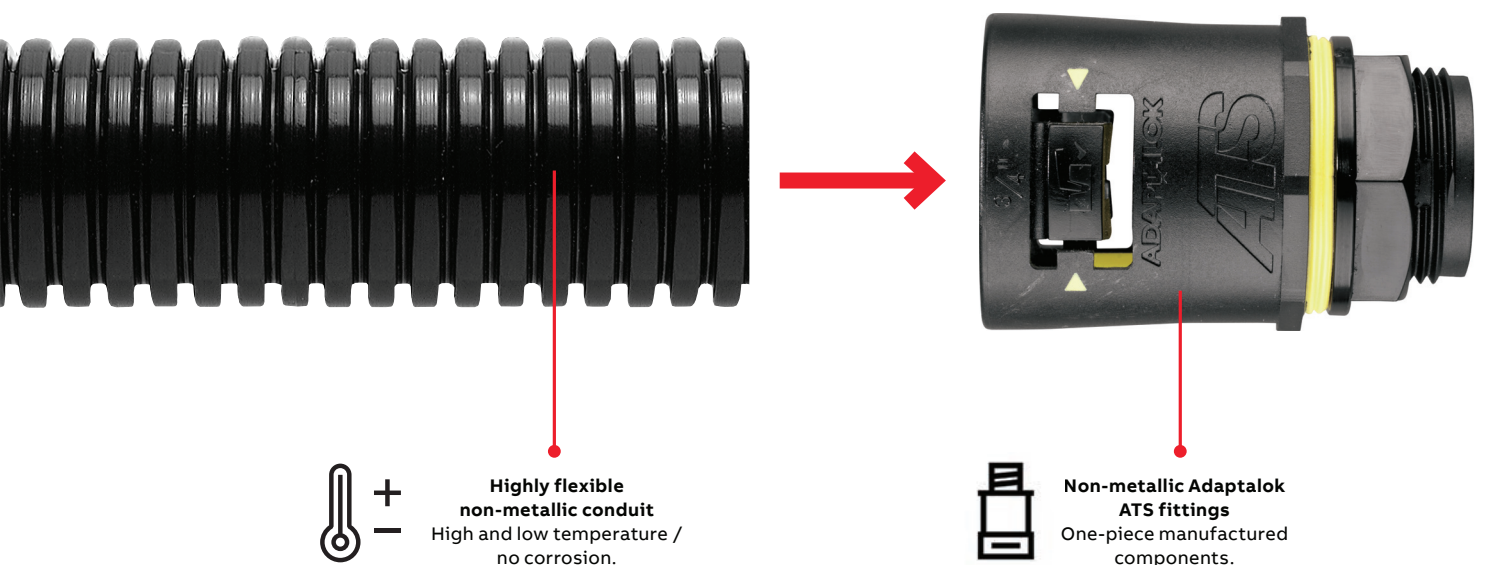
Adaptaflex® conduit systems offer more than 20 different types of non-metallic conduit systems, all providing different technical properties for your cable management applications.



#### Advantages of non-metallic:

- No corrosion
- Wide variety of fittings - much larger solution choice
- Quicker to install (once-piece fitting - push, twist and pull)
- Lighter in weight compared with metallics
- Better fatigue life
- No memory in case of impact (return to shape)

**Most of our conduit systems have industry recognised approvals** including British Kitemark, CE Approval, UL 1696, NF, LUL and DIN amongst others.



**Adaptalok ATS** flexible conduit system represents a unique and innovative solution. Manufacturers generally produce fittings and seals separately, and assemble them together, or had the customer assemble them. This increases assembly time and introduces the possibility for errors.



Adaptalok ATS uses a sophisticated moulding process to mould an internal conduit seal and a face seal washer. This makes installation times fast and reliable because the seals cannot be left out. The conduit system also benefits from the highest IP rating possible.

Specifically designed to maintain system integrity



# Adaptalok ATS

## ATS system for PA, PF & PR conduit

- One-piece manufactured component, with integrated seal and washer
- Rapid fit product - saves time
- All-in-one solution IP66, 67, 68 (4 bar for 30 minutes), 69 to DIN40050
- Highly visible for inspections
- Fit and forget, rapid disassembly with simple tools if required
- UV resistant



- **Material:**
  - Polyamide (nylon) 66/TPE
- **Temperature range:**
  - Static applications: -50°C to +120°C
  - Dynamic applications: -45°C to +120°C
- **Colour:** Black (BL) / Yellow (Y), Blue (B) Elastomer
- **Fire performance:**
  - Self extinguishing, low smoke and zero halogen

Rapid fit

Extensive range of variant fittings



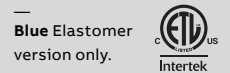
One-piece manufactured component, provides reliability and integrity in application



Adaptalok ATS system represents a unique and innovative solution in flexible conduit systems. Adaptalok ATS uses a sophisticated moulding process to mould an internal conduit seal and a face seal washer. This makes installation times fast and reliable because the seals cannot be left out. The conduit system also benefits from the highest IP rating possible.

Adaptalok ATS system  
One-piece polyamide (nylon) 66 fittings

Approvals



Characteristics

- One-piece fitting with integrated seal / Yellow (Y) / Blue (B) Elastomer
- Polyamide (Nylon) 66 / Black (BL)
- IP40, IP65, IP68 (4 bar 30mins), IP69 Rated
- Straight, 90° & 45° elbow versions
- Metric threads, PG, NPT & UNEF
- Male, female & nickel plated brass thread options
- Thermoplastic elastomers

# Adaptalok AL

## AL system for PA, PF, PR & CP conduit

- One-piece fitting, nothing to lose or break
- Fast fit - Push-Twist-Pull installation
- IP66 rating (no additional seals)
- Through bore - no restriction smooth path
- Removable only with tool - prevents accidental / unauthorised removal
- Proven design 30+ in service



- **Material:**
  - Polyamide (nylon) 66
- **Temperature range:**
  - Static applications: -20°C to +90°C
  - Dynamic applications: -5°C to +105°C
- **Colour:** Black (BL) only
- **Fire performance:**
  - Self extinguishing, low smoke and zero halogen

Push-twist-pull  
installation



One-piece fitting, for fast fit installation

Extensive range of variant fittings



### Adaptalok AL system

A range of Fast Fit, Low fire Hazard (LFH), nylon PA66 fittings. Pitch independent for suitability with all non-metallic conduit materials and types. IP66 dynamic sealing (IP68/69 upgrade available).

### Adaptalok AL system Polyamide (nylon) 66 fittings

#### Approvals

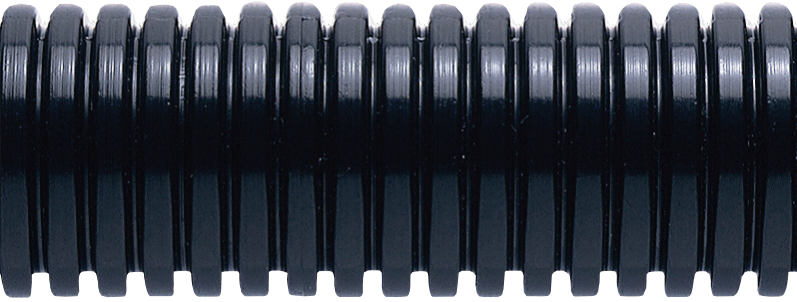


#### Characteristics

- One-piece fitting with ALS insert seal
- Polyamide (Nylon) 66 / Black (BL)
- IP66 Rated (IP68 & IP69 Rated with upgrade)
- Straight, 90° & 45° elbow versions
- Metric threads, PG, NPT & UNEF
- Male, female & nickel plated brass thread options
- Push-in, swivel flange & jumbo options

# Type PF

## Modified polyamide 12 conduit



Very high flexibility,  
very high fatigue  
life conduit

Modified polyamide 12  
standard weight flexible  
conduit, providing low fire  
hazard performance.



- Modified polyamide 12
- Flame retardant, low fire hazard performance
- Very high flexibility, very high fatigue life
- IP40 - IP69 rating (depending on fitting)
- Very high UV resistance

• **Material:**

- Modified polyamide 12
- Flame retardant, LFH (Low Fire Hazard) self extinguishing material

• **Temperature range:**

- Static applications: -50°C to +110°C
- Dynamic applications: -45°C to +120°C

• **Colour:** Black (BL) only

• **Fire performance:**

- Low Fire Hazard, self extinguishing, halogen free

### Approvals



#### Type PF - S - Standard weight conduit

Part no.	Nominal conduit size (mm)	NW conduit size	Conduit pitch	Outside diameter (mm)	Inside diameter (mm)	Minimum bend radius (mm)	Reel length (m)
PFFS10/BL/50M*	10	7.5	Fine	10.0	6.2	20	50
PFFS13/BL/50M*	13	10	Fine	13.1	9.8	30	50
PFFS16/BL/50M	16	13	Fine	15.9	11.5	35	50
PFFS21/BL/50M	21	17	Fine	21.2	16.6	40	50
PFCS28/BL/50M	28	23	Coarse	28.4	21.7	50	50
PFCS34/BL/50M	34	29	Coarse	34.5	27.5	60	50
PFCS42/BL/25M	42	36	Coarse	42.7	35.5	65	25
PFCS54/BL/25M	54	48	Coarse	54.3	46.2	75	25

If interested in different coil lengths, please contact us.  
\*These parts are not covered by the UR certification.

- Also available in  
heavyweight variant

# Adaptaring

## 360° rotation in the fitting



**Adaptaring AR**  
Type T - Rotational inspection T-piece fitting

**Approvals**



**Characteristics**

- Polyamide (nylon) 66 fitting & Acetal (POM)
- Temp. range: Static: -50°C to +120°C / Dynamic: -45°C to +120°C
- For use with: Type PA, CP, PR & PF conduit / IP40 Rated
- For connection to corrugated flexible conduit

- Polyamide (nylon) 66
- The conduit rotates in the body of the fitting allowing flexibility on the zero axis of the robot
- Designed to help maintain system integrity



**Adaptaring AR**  
Type A - Straight fitting

**Approvals**



**Characteristics**

- Polyamide (nylon) 66 fitting & Acetal (POM)
- Temp. range: Static: -40°C to +120°C / Dynamic: -5°C to +120°C
- For use with: Type PA, CP, PR & PF conduit / IP40 Rated
- For insertion into threaded entries & knockouts



**Adaptaring AR**  
Type C90 - 90° elbow fitting

**Approvals**



**Characteristics**

- Polyamide (nylon) 66 fitting & Acetal (POM)
- Temp. range: Static: -50°C to +120°C / Dynamic: -45°C to +120°C
- For use with: Type PA, CP, PR & PF conduit / IP40 Rated
- For insertion into threaded entries & knockouts

The Adaptaring connector system can be used with PF, PR, CP and PA conduits wherever no waterproofness is required. Swivel joints in combination with flexible PF conduits are widely used in automation and CCTV - they do not limit the range of motion and are mechanically strong.

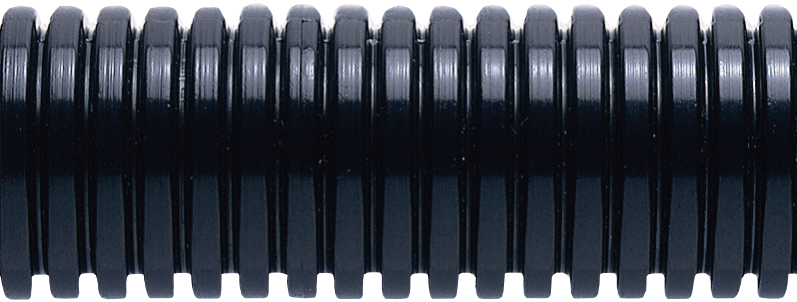


**Type AWB**  
Anti-vibration washer  
Prevents fitting loosening under vibration. Suitable for use with the Adaptaring range.



# Type PA

## Polyamide (nylon) 6 heavyweight conduit



High flexibility,  
high fatigue life  
conduit

Polyamide (nylon 6)  
heavyweight flexible conduit,  
providing low fire hazard  
performance.



- Polyamide (nylon) 6
- Flame retardant, Low Fire Hazard (LFH) performance
- High flexibility, high fatigue life
- IP40 - IP68 rating (depending on fitting)
- Very high UV resistance

• **Material:**

- Polyamide (nylon) 6
- Flame retardant, LFH (Low Fire Hazard) self extinguishing material

• **Temperature range:**

- Static applications: -40°C to +120°C
- Dynamic applications: -5°C to +120°C

• **Colour:** Black (BL), Grey (GR)

• **Fire performance:**

- Low Fire Hazard, self extinguishing, halogen free

### Approvals



### Type PA - H - Heavyweight conduit

Part no.	Nominal conduit size (mm)	NW conduit size	Conduit pitch	Outside diameter (mm)	Inside diameter (mm)	Minimum bend radius (mm)	Reel length (m)
PAFH13/BL/50M*	13	10	Fine	13.0	9.0	35	50
PAFH16/BL/50M	16	13	Fine	15.8	11.3	45	50
PACH21/BL/50M	21	17	Coarse	21.2	14.5	60	50
PACH28/BL/50M	28	23	Coarse	28.5	21.3	70	50
PACH34/BL/50M	34	29	Coarse	34.5	26.8	75	25
PACH42/BL/25M	42	36	Coarse	42.5	34.6	90	25
PACH54/BL/25M	54	48	Coarse	54.5	46.0	95	25

If interested in different coil lengths, please contact us.

\*These parts are not covered by the UR certification.



## Type PA conduit

The strength is in the variety

- Polyamide (nylon) 6
- High flexibility, high fatigue life
- General purpose application
- Very high UV resistance



**Type PA - S**  
Standard weight conduit

### Approvals



### Characteristics

- Polyamide (nylon) 6 / Low Fire Hazard (LFH) heavyweight conduit
- High flexibility - High fatigue life / IP40 - IP69 (depending on fitting)
- Temp. range: Static: -40°C to +120°C / Dynamic: -25°C to +150°C
- Very high UV resistance / Self extinguishing & halogen free
- Colour: Black (BL), Grey (GR)



**Type PAL**  
Lightweight conduit

### Approvals



### Characteristics

- Polyamide (nylon) 6 / Lightweight conduit
- High flexibility - High fatigue life / IP40 - IP68 (depending on fitting)
- Temp. range: Static: -40°C to +120°C / Dynamic : -5°C to +120°C
- Very high UV resistance / Self extinguishing & halogen free
- Colour: Black (BL), Grey (GR)



**Type PA-Slit**  
Slit conduit

### Approvals



### Characteristics

- Polyamide (nylon) 6 / Lightweight slit conduit
- High flexibility - High fatigue life
- Temp. range: Static: -40°C to +120°C / Dynamic : -5°C to +120°C
- Very high UV resistance / Self extinguishing, halogen free
- Colour: Black (BL) only

PA conduit systems, manufactured from the versatile PA6, provide an efficient solution to applications where flexibility and durability is required, together with the tough property of the polyamide. Ideal for general purpose applications.

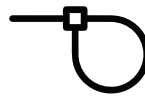


# Ty-Rap®

## High performance cable ties

**Ty-Rap®**

Ty-Rap® fastening systems include a full range of cable ties, identification ties, clamps, mounting bases, harnessing aids and installing tools.



Using Ty-Rap® fastening systems for any bundle application can help improve the reliability of the installation, effectively reducing the total cost of ownership. Ty-Rap® cable ties' carefully designed features will also speed installation and provide the highest level of precision, safety and comfort.

When strength, aesthetics, reliability and performance are required, knowledgeable professionals turn to the original and the best source for cable ties and accessories.



### Safety and reliability

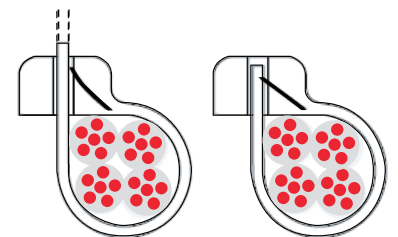
The oval head with rounded edges protects adjacent bundles and improves product life.

### Durability

Solid body construction reduces stress points, increasing durability.

### “The Grip of Steel”

Corrosion resistant marine grade stainless steel barb provides secure lock.



### Protects bundle

The smooth, rounded body with molded ribs and stipples firmly grips the bundle while protecting conductors from damage.



**Easy installation**

The specially designed thin tail with grips makes installing the **Ty-Rap®** cable ties easy, even when wearing gloves.



**Easy handling and tooling**

The turned up tail makes orientation and handling easy, even in blind installations or tight locations using **Ty-Rap®** tools.



**ERG50**  
For use with 2,3mm to 4,8mm (80N to 220N) cable ties.



**ERG120**  
For use with 4.8mm to 7,6mm (220N to 540N) cable ties.



**WT3D**  
For use with 4,8mm to 12,7mm (220N to 1110N) cable ties.

**Extensive range of approvals and certifications:**

Lloyd's Register of Shipping, DNV-GL, Mil Specification, American Bureau of Shipping (ABS), CE declaration, compliant to the low voltage directive, EN/IEC 62275, UL 62275, CSA 62275, MS3367/3368 and EN45545.



E49405



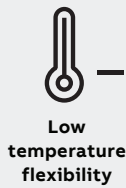
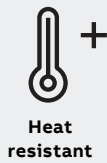
ISO 9001/ISO 14001

BUREAU VERITAS

E49405



# Demanding applications



Demanding applications					Simplicity & design	
<b>Ty-Rap® Chemical Resistant</b>	<b>Ty-Rap® Extreme Environment</b>	<b>Ty-Rap® Detectable</b>	<b>Deltec®</b>	<b>Ty-Met®</b>	<b>Ty-Rap®</b>	<b>Ty-Fast® / Col-Ty</b>
	<b>Chemical resistance</b>	<b>Contaminant resistance</b>	<b>Utilities &amp; telecom</b>	<b>Extreme environments</b>	<b>Customization &amp; performance</b>	<b>Essential</b>
Chemical processing, Autoclave sterilizing	Nuclear, Power plants, Space industry, Environments with risk of smoke generation	Food and beverage, Cosmetic, Any business using detection equipment	Utilities, Packaging	Marine, Rail, Oil & gas, Industrial	Standard applications	OEM, General bundling
Polypropylene	ETFE	DET PA6.6 DET PP	Acetal +UV	Stainless Steel	PA6.6	PA6.6
TYP*MX	TYZ*M	TY*M*-NDT TY*M-PDT	TYD-*, CSS*	YLS-*-** RS-*-** SS-*-* YLD-*-*	TY*M*	TY*
265N	540N	540N	1100N	4000N	780N	1100N
-60 to 80°C	-60 to 170°C	-60 to 85°C -40 to 85°C	-40 to 85°C	-40 to 300°C	-60 to 85°C	-40 to 85°C
360mm	360mm	360mm	305m	1400mm	1143mm	1200mm
100mm	100mm	100mm	4m	425mm	330mm	380mm
● ● ● ●	● ● ● ● ● ●	● ●	● ● ● ● ● ●	● ● ● ● ● ● ● ●	● ● ● ●	● ● ● ●
HB	V-0	HB	HB	Absolutely fireproof	V-2	V-2, V-0
● ● ● ● ● ●	● ● ● ● ● ●	● ● ● ● ● ●	● ● ● ● ● ●	● ● ● ● ● ● ● ●	● ● ● ● ● ●	● ● ● ● ● ●
ERG50 ERG120	ERG50 ERG120	ERG50 ERG120	WT3D	DAS-250 CT3	ERG50 ERG120	ERG50 ERG120

## Ty-Rap® cable ties

### High performance Polyamide 12



- Polyamide 12 UV-resistant
- Remains flexible in cold & dry environments
- Ages better and has a better chemical resistance than Polyamide 6.6

- **Material:**
  - Molding: Polyamide 12
  - Locking barb: 316 grade stainless steel
- **Temperature range:** -40°C to +105°C
- **Flammability rating:** UL 94 V-2
- **Other properties:** UV-resistant, halogen free, silicone free

#### Polyamide 12 cable ties

Product code	GID No.	Bundle ø from ... to [mm]	Length L [mm]	Width W [mm]	Min. tensile strength [N]	Quantity [pieces]
<b>Standard pack size</b>						
TYC525MX	7TCG009580R0006	3,5 - 45	186	4,70	155	100
TYC527MX	7TCG009580R0007	6 - 89	343	7,62	380	50
<b>Bulk pack size</b>						
TYC25MX	7TCG009580R0001	3,5 - 45	186	4,70	155	1000
TYC28MX	7TCG009580R0004	3,5 - 102	360	4,70	155	1000
TYC272MX	7TCG009580R0002	6 - 51	222	7,60	380	500
TYC27MX	7TCG009580R0003	6 - 89	343	7,62	380	500
TYC29MX	7TCG009580R0005	6 - 229	771	7,60	380	500

## Ty-Rap® cable ties

### High performance Polypropylene - Chemical resistant



- Polypropylene weather resistant
- Increased resistance to chemicals
- Resistant against inorganic acids, polyhydric alcohols, neutral and basic salts

- **Material:**
  - Molding: Polypropylene
  - Locking barb: 316 grade stainless steel
- **Temperature range:** -60°C to +80°C
- **Flammability rating:** UL 94 HB
- **Other properties:** UV-resistant, halogen free, silicone free

#### Polypropylene cable ties – Chemical and weather resistant

Product code	GID No.	Bundle ø from ... to [mm]	Length L [mm]	Width W [mm]	Min. tensile strength [N]	Quantity [pieces]
TYP23MX	7TAG009600R0000	2 - 16	92	2,4	50	1000
TYP25MX	7TAG009600R0001	3,5 - 45	186	4,8	130	1000
TYP28MX	7TAG009600R0003	3,5 - 102	360	4,8	130	1000
TYP27MX	7TAG009600R0002	6 - 90	340	7,0	270	500

# Ty-Rap® cable ties

## High performance Nylon detectable

- **Easy to detect** by any metal detection equipment when calibrated to detect our cable ties. We advise the metal detectors are set at a minimum 1.5 mm diameter ferrous sphere
- Help achieve the HACCP EU-Directive
- Direct food contact. The material used to produce **Ty-Rap®** detectable cable ties has recently been successfully tested for direct food contact
- The raw material to produce our polypropylene detectable cable ties has an increased metal content making those cable ties twice as detectable

- Incorporates a unique compound that can be detected by x-ray equipment, metal detectors and visual inspection equipment
- Bright blue color for an easy visual detection

- **Material:**

- Molding: Polyamide 6.6
- Locking barb: 316 grade stainless steel

- **Temperature range:** -60°C to +85°C

- **Flammability rating:** UL 94 HB

- **Other properties:** UV-resistant, halogen free, silicone free



### Detectable cable ties

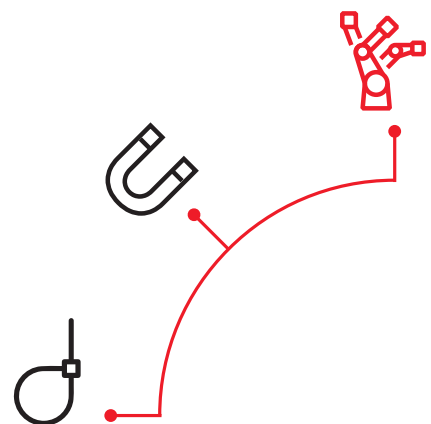
Product code	GID No.	Color	Material	Bundle ø	Length	Width	Min. tensile	Quantity	
				from ... to	L	W	strength		
				[mm]	[mm]	[mm]	[N]	[pieces]	
<b>Detectable Polyamide 6.6</b>									
TY523MR-NDT	7TCG009330R0027	Blue	Polyamide 6.6	2 - 16	93	2,3	80	100	
TY524MR-NDT	7TCG009330R0028	Blue	Polyamide 6.6	2 - 35	140	3,6	160	100	
TY525MR-NDT	7TCG009330R0026	Blue	Polyamide 6.6	3,5 - 45	186	4,6	200	100	
TY5253M-NDT	7TAG009660R0071	Blue	Polyamide 6.6	3,5 - 76	295	4,7	220	100	
TY528MR-NDT	7TCG009330R0025	Blue	Polyamide 6.6	3,5 - 102	361	4,8	220	100	
TY527MR-NDT	7TCG009330R0029	Blue	Polyamide 6.6	6 - 102	345	6,9	540	50	

### Approvals



E49405

Successfully tested  
for direct food  
contact



## Ty-Rap® cable ties

### High performance Fluoropolymer - ETFE



Approvals



- Resistant to chemicals and to radiation
- No outgassing prevents contamination of sensitive areas in a vacuum, zero gravity or radioactive environments
- Mounting base available

• **Material:**

- Molding: Fluoropolymer ETFE
- Locking barb: 316 grade stainless steel

• **Temperature range:** -60°C to +170°C

• **Flammability rating:** UL 94 V-0

- **Other properties:** Silicone free, inert to most solvents and chemicals, hydrolytically stable, radiation resistant, non-outgassing

#### Fluoropolymer cable ties – ETFE

Product code	GID No.	Bundle ø from ... to [mm]	Length L [mm]	Width W [mm]	Min. tensile strength [N]	Quantity [pieces]
<b>Standard pack size</b>						
TYZ523M	7TAG009620R0006	1,5 - 22	92	2,3	80	100
TYZ525M	7TAG009620R0007	3 - 48	186	4,3	220	100
TYZ528M	7TAG009620R0009	3 - 102	360	4,4	220	100
TYZ527M	7TAG009620R0008	6 - 95	340	6,8	540	50
<b>Bulk pack size</b>						
TYZ23M	7TAG009620R0000	1,5 - 22	92	2,3	80	1000
TYZ25M	7TAG009620R0002	3 - 48	186	4,3	220	1000
TYZ28M	7TAG009620R0005	3 - 102	360	4,4	220	500
TYZ27M	7TAG009620R0004	6 - 95	340	6,8	540	100

## Ty-Rap® cable ties

### Polyamide 4.6 - Extra high temperature



Approvals



- Extreme continuous temperature rating: -40°C to +150°C (in air)
- For high temperature environments

• **Material:**

- Molding: Polyamide 4.6
- Locking barb: 316 grade stainless steel

• **Temperature range:** -60°C to +150°C

• **Flammability rating:** UL 94 V-2

- **Other properties:** Extra high temperature resistant, halogen free, silicon free

#### Polyamide 4.6 cable ties – Extra high temperature

Product code	GID No.	Bundle ø from ... to [mm]	Length L [mm]	Width W [mm]	Thickness [mm]	Min. tensile strength [N]	Quantity [pieces]
TYHT23M	7TAG009590R0012	2 - 20	95	2,3	0,91	80	1000
TYHT24M	7TAG009590R0013	2 - 29	143	3,6	1,07	180	1000
TYHT25M	7TAG009590R0014	5 - 45	192	4,8	1,22	220	1000
TYHT28M	7TAG009590R0016	5 - 102	367	4,8	1,27	220	1000
TYHT27M	7TAG009590R0015	5 - 89	349	6,9	1,60	540	500
TYHT277M	7TAG009000R0326	6 - 177	617	7,0	1,60	540	500



# Ty-Rap® cable ties

## High performance

## Polyamide 6.6

## - Natural

For high volume  
in quality applications

- Designed for indoor applications
- Several lengths and six typical widths available with a tensile strength up to 780N, to cover the most demanding applications
- Mounting bases available

- **Material:**

- Molding: Polyamide 6.6
- Locking barb: 316 grade stainless steel

- **Temperature range:** -60°C to +85°C

- **Flammability rating:** UL 94 V-2

- **Other properties:** Halogen free, silicone free



**Ty-Rap® cable ties carefully designed features**

will speed installation and provide the highest level of precision, safety and comfort.



### Polyamide 6.6 cable ties – Natural

Product code	GID No.	Bundle ø from ... to [mm]	Length L [mm]	Width W [mm]	Min. tensile strength [N]	Pack quantity [pieces]
<b>Standard pack size</b>						
TY523MR	7TCG009030R0085	1,5 - 16	92	2,3	80	100
TY52315M	7TAG009020R0050	1,3 - 32	178	2,3	80	100
TY5232MR	7TCG009030R0080	1,5 - 51	203	2,3	80	100
TY5234M	7TAG009020R0052	1,5 - 102	356	2,3	80	100
TY524MR	7TCG009110R0026	2 - 35	140	3,6	180	100
TY5242MR	7TCG009110R0021	2 - 51	208	3,6	180	100
TY526MR	7TCG009450R0177	2 - 76	284	3,6	130	100
TY5244MR	7TCG009110R0023	2 - 102	368	3,6	135	100
TY525MR	7TCG009200R0021	3 - 48	186	4,8	220	100
TY5253MR	7TCG009200R0017	3 - 78	290	4,8	220	100
TY528MR	7TCG009450R0183	3 - 102	361	4,8	220	100
TY5271MR	7TCG009450R0180	6 - 31	150	6,9	540	50
TY5272MR	7TCG009460R0102	6 - 51	223	6,9	540	50
TY527MR	7TCG009310R0017	6 - 102	340	7,0	540	50
TY5275M	7TAG009290R0004	6 - 127	457	7,0	540	50
TY5277M	7TAG009290R0005	6 - 177	617	7,0	540	50
TY529M	7TAG009280R0004	6 - 229	771	6,9	540	50
TY53510M	7TCG009380R0001	to 254	889	8,2	780	50
TY54513M	7TCG009380R0003	to 330	1143	8,2	780	50

# Ty-Rap® high performance Strap on reel and reel kits

Easy to  
install



- Easy to install, low installation costs
- Available either in pre-cut and pre-assembled lengths, or on reels with separate heads for total flexibility
- Choice of specific spacers and accessories

- **Material - Strap & head:** Toughened weatherable acetal
- **Material - Locking barb:** Marine grade, corrosion-resistant copper alloy
- **Temperature range:** -40°C to +85°C
- **Flammability rating:** UL 94 HB
- **Other properties:** UV-resistant, halogen free, superior resistance to moisture and salt environments

## Strap on reel and reel kits

Product code	GID No.	Length per reel	Width	Min. tensile strength [N]	Included heads [pieces]	Reel quantity [pieces]
		L [m]	W [mm]			
TYD-50R	7TAA159090R0005	15,2	12,7	1110	0	1
696-41794	7TAA159090R0000	304,8	12,7	1110	0	1
CSS-5K	7TAA159120R0000	15,2	-	-	150	5
CSS-10K	7TAA159130R0001	15,2	-	-	300	5

Note: the recommended maximum continuous static loading for the Deltec® straps is 90 N per strap.

For best results, suggested spacing is 35 to 40cm. It is the responsibility of the user to determine if their installation provides sufficient load support.

Reel kits (CSS-5K / CSS-10K) to be assembled with Deltec® strap on reel.

## Double locking heads

Product code	GID No.	Length	Width	Height	Quantity [pieces]
		L [mm]	W [mm]	[mm]	
TYD-LH	7TAA159090R0006	21,6	19,1	12,6	25
696-41795	7TAA159090R0001	21,6	19,1	12,6	1000

To be assembled with Deltec® strap on reel.

## Pre-assembled Deltec® cable ties

Product code	GID No.	Max. bundle dia.	Length	Width	Min. tensile strength [N]	Quantity [pieces]
		[mm]	L [mm]	W [mm]		
CSS-100	7TAA159110R0000	76	254	12,7	1112	25
CSS-135	7TAA159090R0003	89	343	12,7	1112	25
CSS-160	7TAA159170R0000	102	406	12,7	1112	50
CSS-270	7TAA159080R0000	203	686	12,7	1112	10



# ABB Wiring Duct®

## Halogen free wiring ducts with vertical slots

### ABB Wiring Duct®

A reduced number of fixation points are needed

Approvals



- The special base profile allows the installation of the Fix-O-Rapid
- No drilling, no rivets, no screws needed
- Snap pin for base plates
- Metal spring for DIN rails

- The base design provides a very stiff base, with a reduced number of fixation points
- To avoid hand injuries and cable damages during the installation operations, the duct teeth are submitted to a special embossing process in order to eliminate burr or sharp edges
- Teeth, as well as side removals are easy and neat operations, due to the implementations of specific quality control procedures

- **Standard unit length:** 2 meters
- **H80 and H100:** special "kinks" stop wires and allow a tidy wiring
- **Colour:** Grey (RAL 7030)
- **Other properties:** Halogen free and PVC raw material



#### Flush cover profile

Allows an easier mounting and a firm coupling with the duct base

#### Two-point contact design

#### V-shaped slot lead-in

#### Two levels of wire service

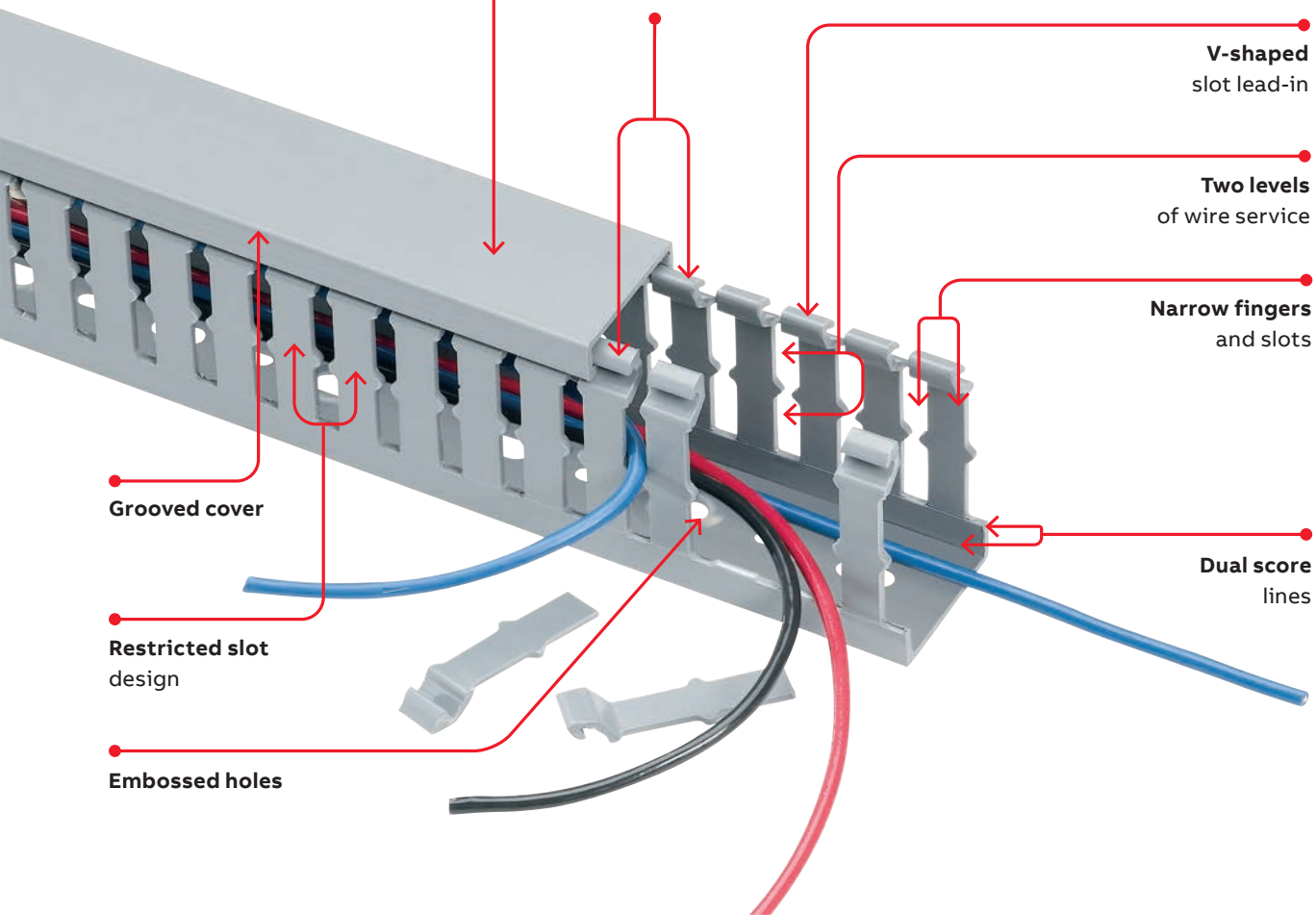
#### Narrow fingers and slots

#### Dual score lines

#### Grooved cover

#### Restricted slot design

#### Embossed holes



## ABB Wiring Duct®

### Flexible thermoplastic wiring duct



**Plastic, insulating, shock-proof material**

For applications where cabling is subject to bending and twisting.

Approvals



No covers so that cables can be constantly monitored.

- Square section
- Ribs alternate and angle slightly inwards to make it easier to insert and extract cables
- Possibility of fastening using screws and rivets or bi-adhesive tape which sticks strongly to the steel (pre-mounted)

- **Dimensions:** 12,5 - 16 - 20 - 25 - 30 - 40 - 50 mm
- **Length:** 500 mm standard
- **Color:** Grey (RAL 7040)
- **Other properties:** V2 self-extinguish category according to UL94 standards

## ABB Wiring Duct®

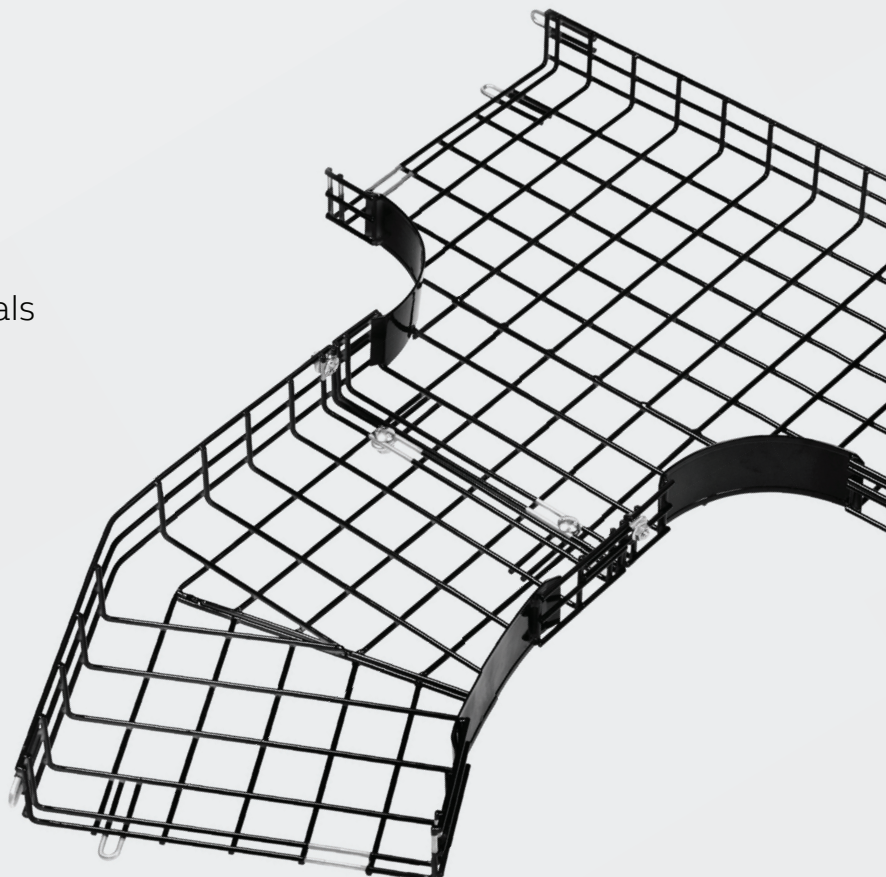
### Industrial cable tray

Preserving optimal conditions for installing, branching and inspection.

Approvals



- Steel basket trays possess very good structural characteristics for industrial applications
- Compatible with industrial trunking accessories
- The open structure reduces the overheating of cables and the accumulation of dust
- The cable trays can be branched at any point along their path
- Easy access to the conduits for inspection



**Additional information**

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