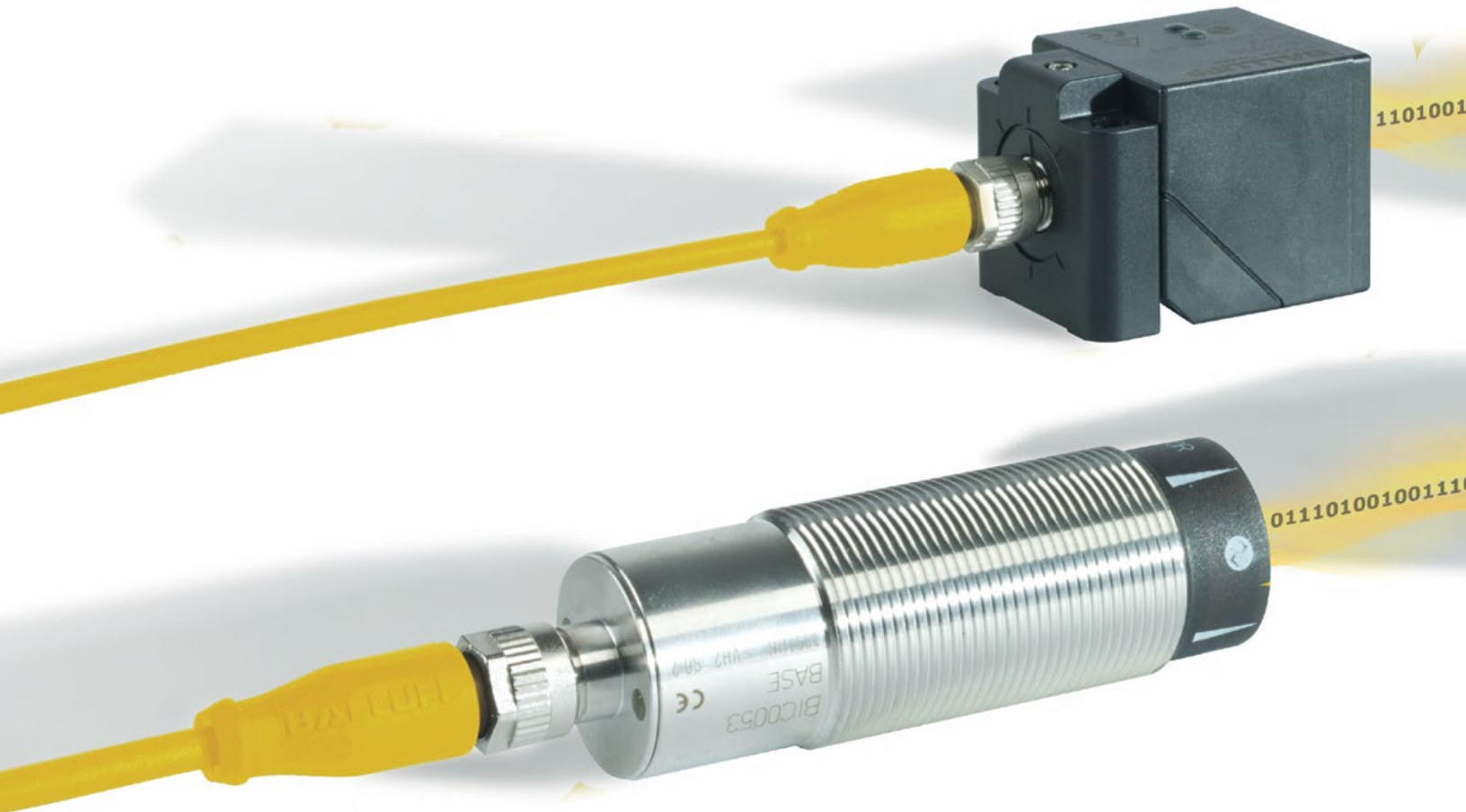


Inductive Couplers

Inductive Couplers

Balluff non-contact connectors are extremely suitable for the quick connection and disconnection of modules without disturbing communication at the fieldbus levels. New requirements can be implemented within a very short period and with maximum flexibility.

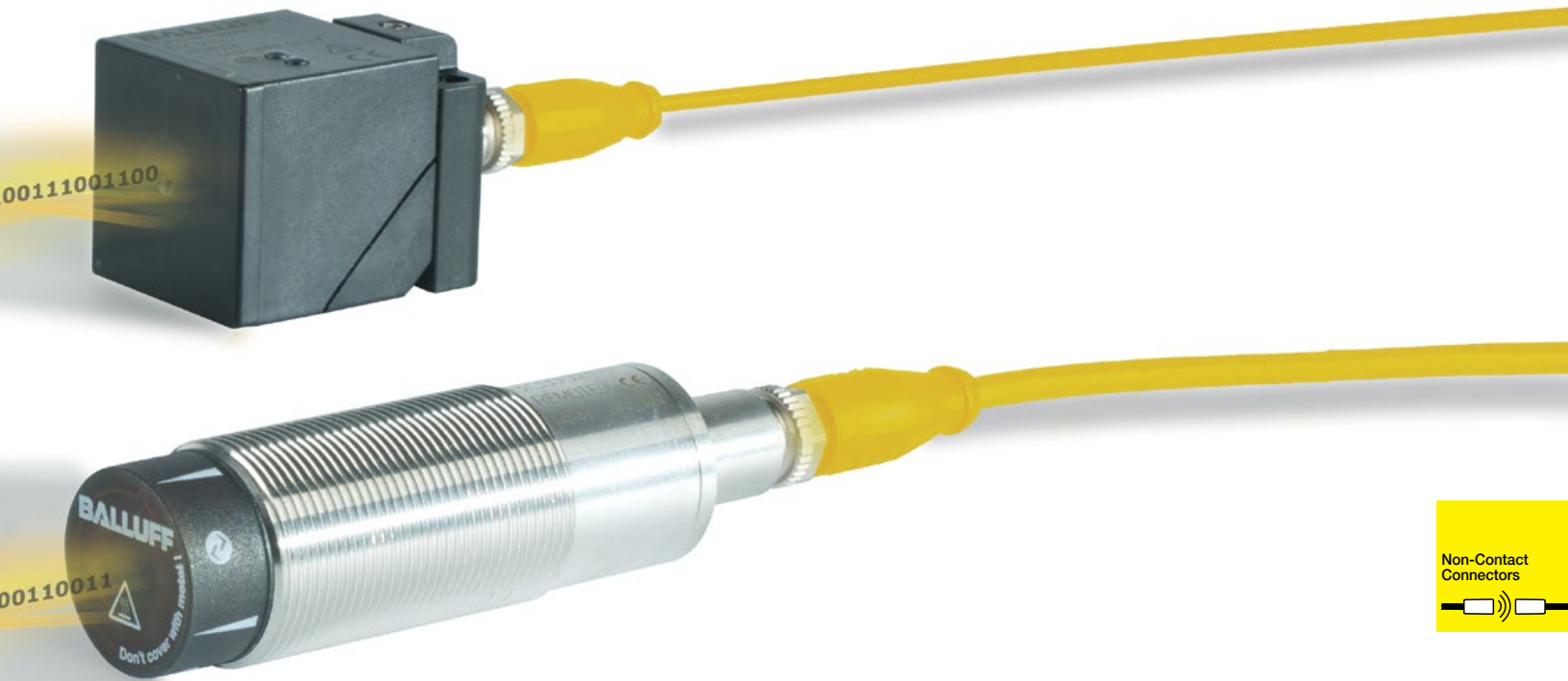
Non-contact connectors are installed via plug-and-play, making retrofitting extremely simple. Even maintenance is much easier. Cable breaks and mechanical wear are a thing of the past. Units are easy to disconnect, safe and powerful. Power and signals are transferred reliably over an air gap.



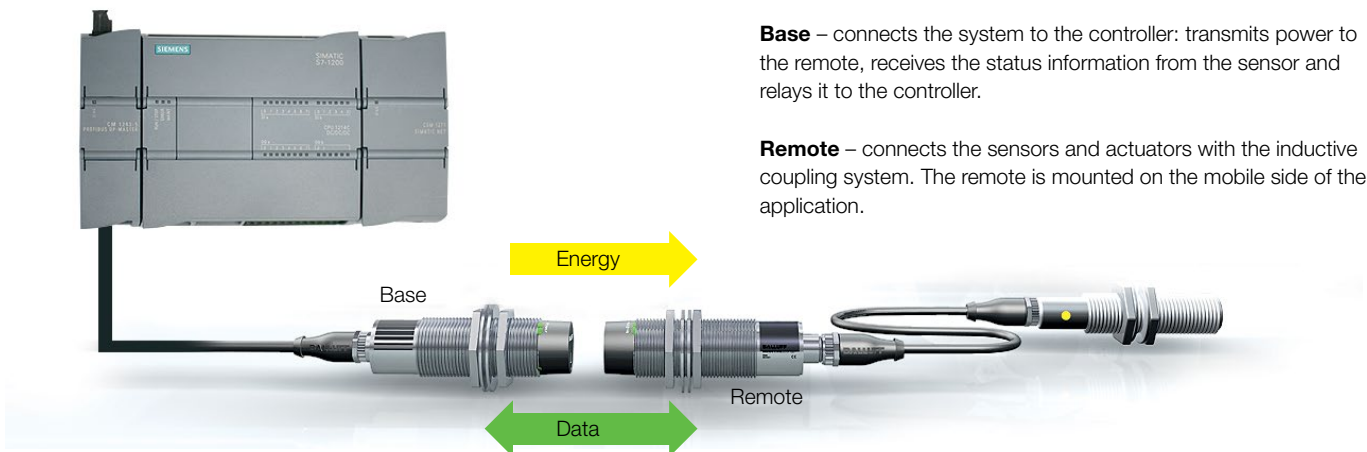
Non-Contact Connectors

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Principles of operation



How Non-Contact Connectors Work

Balluff non-contact connectors use a magnetic induction principle with resonant circuit that enables transfer of power and data over an air-gap without any physical contact. When connected, power goes out to the devices and signals come back from the devices. Depending on the specific product of interest, different information can be passed. Power only, discrete inputs and outputs, can be sent across the connectors as well as analog signals. Each base head is mounted on the controller side of the application and as many remote heads as needed are mounted on the sensor/actuator side of the application. Balluff inductive coupling (non-contact) connectors are also available with IO-Link to enable transfer of even more data or to connect smart devices on the remote side.

The benefits at a glance

Inductive couplers increase flexibility

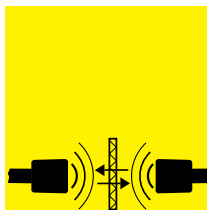
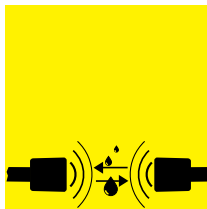
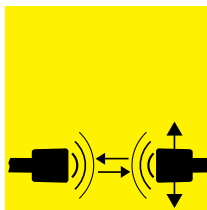
- Simplify cable routing
- Radial coupling and axial rotation permissible
- Data transmission to previously inaccessible machine parts

Inductive couplers offer a reliable connection

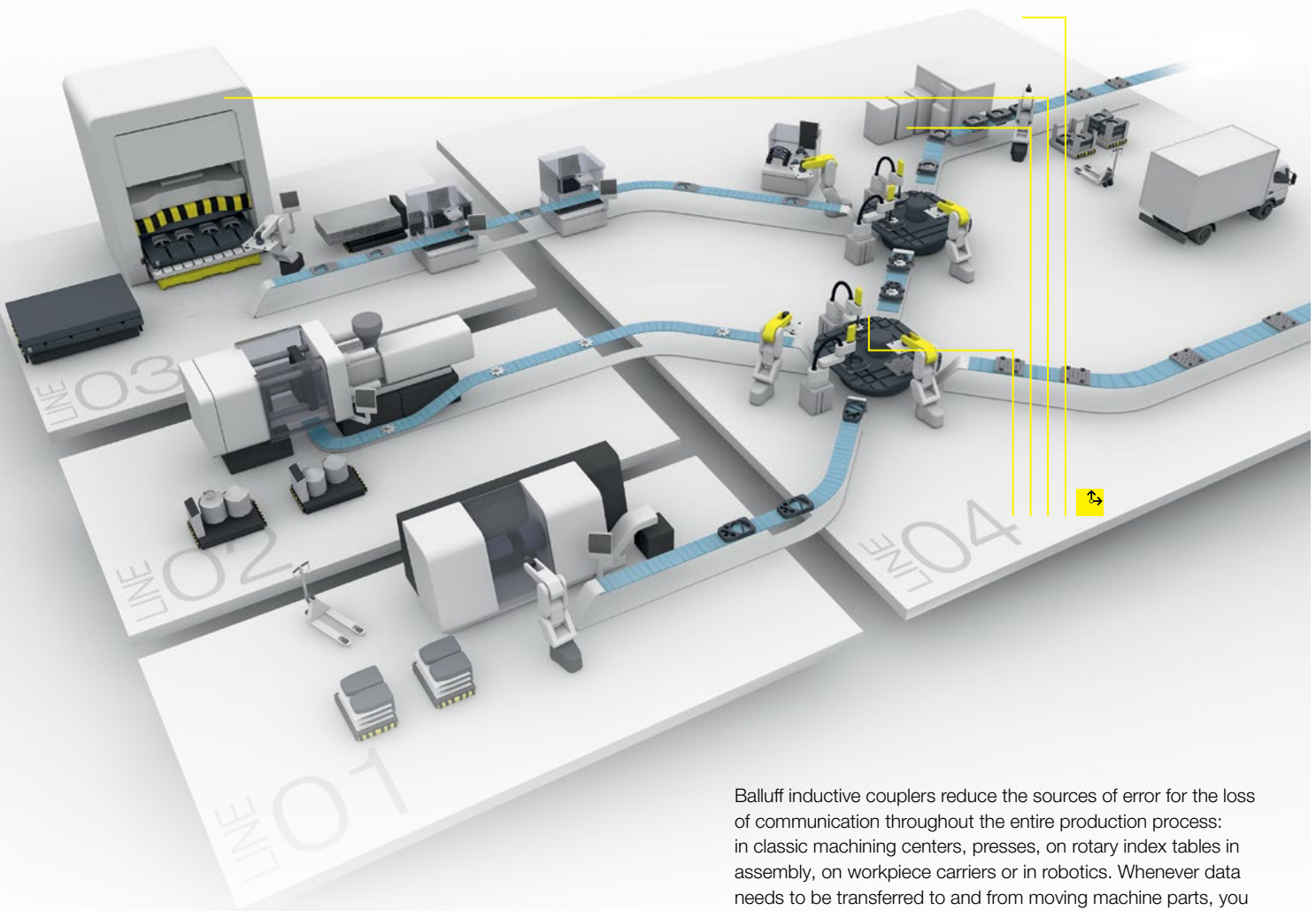
- Digital data exchange, optimum signal quality
- Insensitive to vibrations or contact chatter
- Can be used in harsh environments, in humidity, dust and oil (IP 67)

Inductive couplers overcome obstacles

Connection can be established across non-metallic obstacles – such as plexiglass or a thin wall.



Throughout the production process



Balluff inductive couplers reduce the sources of error for the loss of communication throughout the entire production process: in classic machining centers, presses, on rotary index tables in assembly, on workpiece carriers or in robotics. Whenever data needs to be transferred to and from moving machine parts, you are on the safe side with Balluff inductive couplers.



Press shop

Automatically changing and securely identifying tools

In die sensors attached to tools on the press detect the alignment of the material and help with die protection. These positioning signals from the sensors are reliably transmitted over an inductive coupler.

Inductive couplers enable automatic tool changing because manual plug-in of mechanical connectors is no longer necessary. In conjunction with a network interface, tools can be identified, allowing for automatic press configuration like shut height values by storing the value with the tool.

In addition, on transfer rail change parts, power and signal can be reliably coupled and changed with the tool.

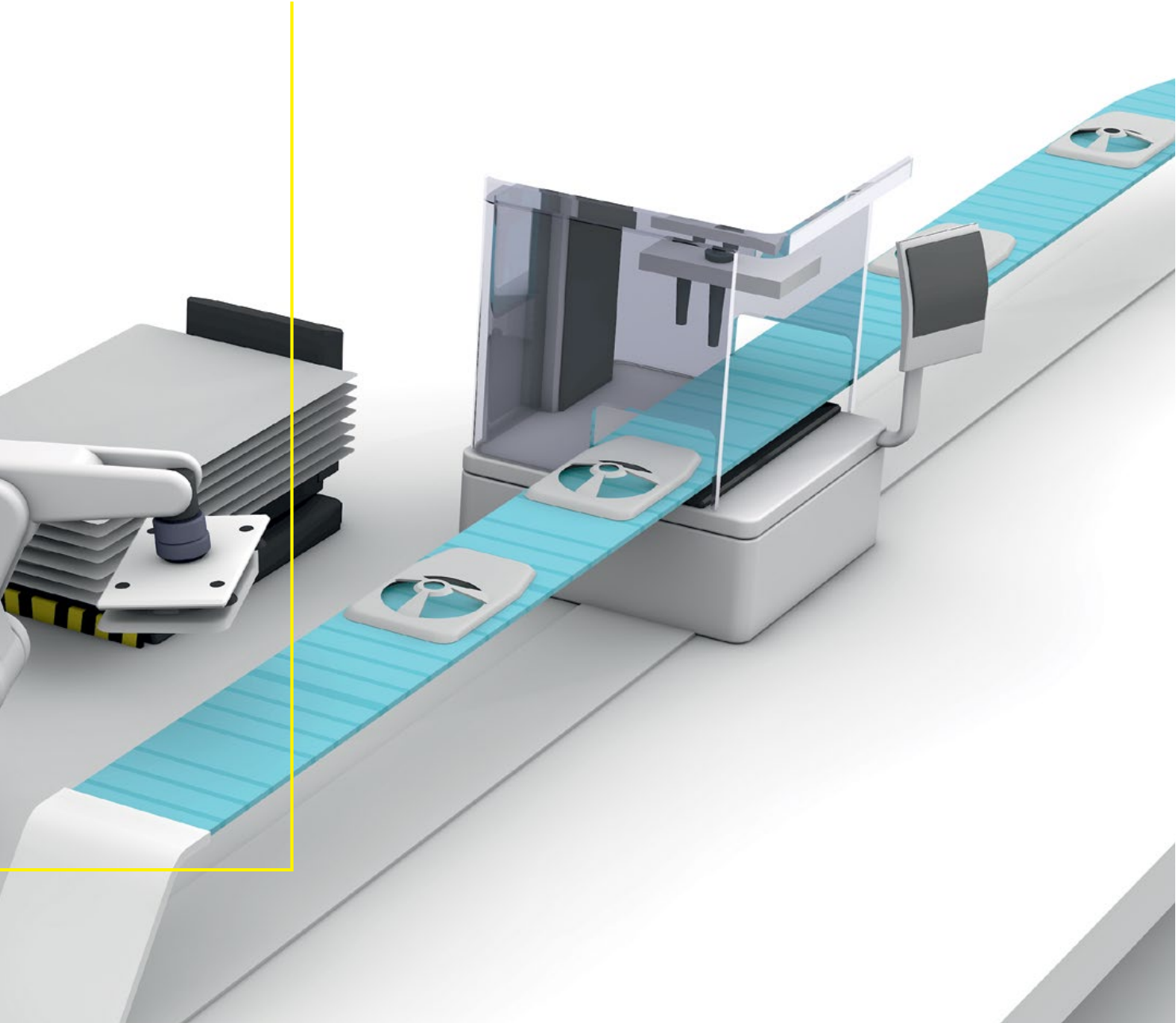


Non-Contact Connectors

Applications

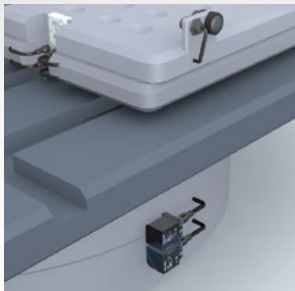
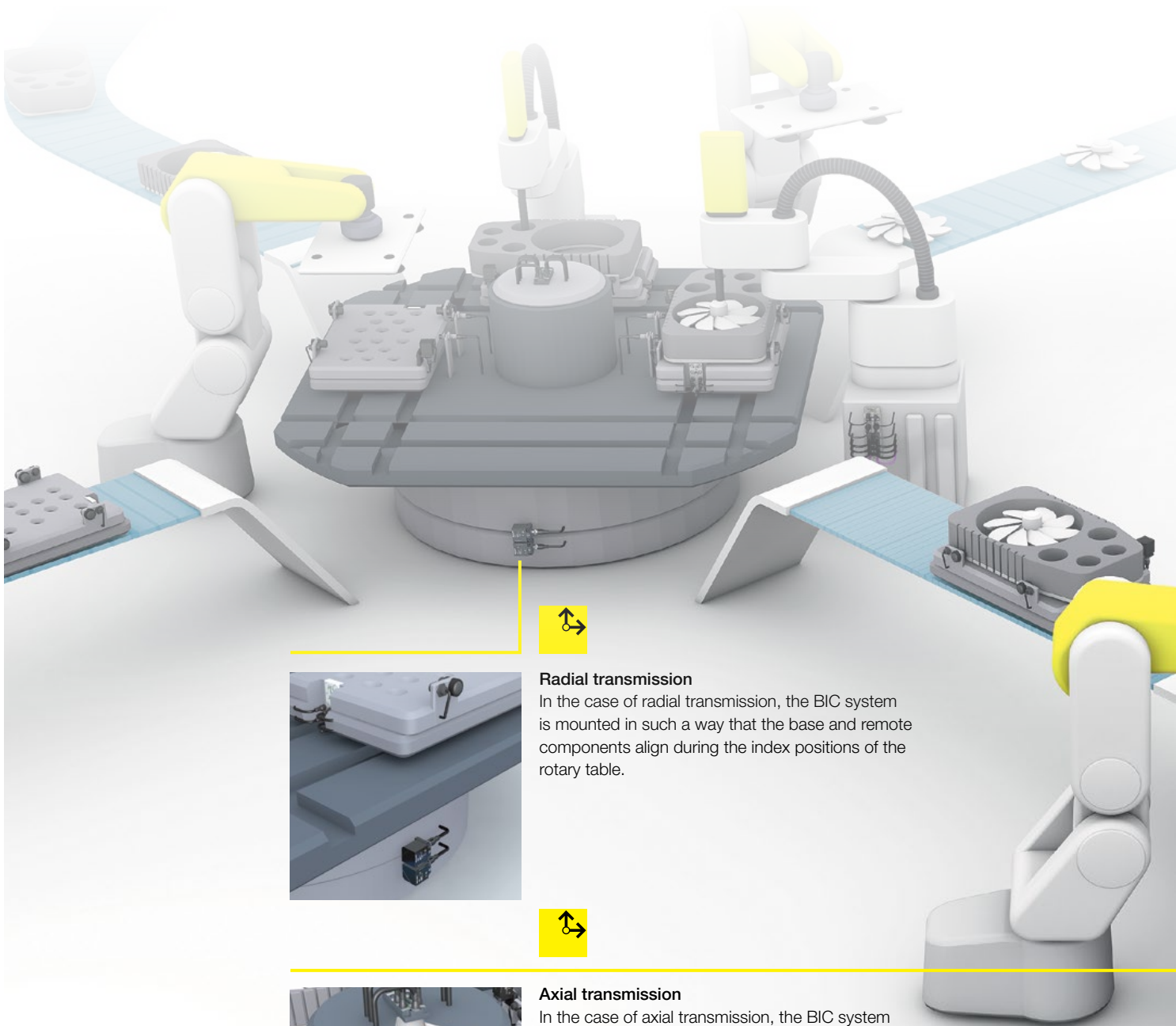


The inductive coupling system serves as a contact-free connection between the press and the tool. Typically the base is mounted in the bolster of the press in a common area.



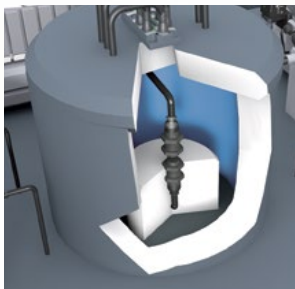
Rotary tables

Entirely without slip rings



Radial transmission

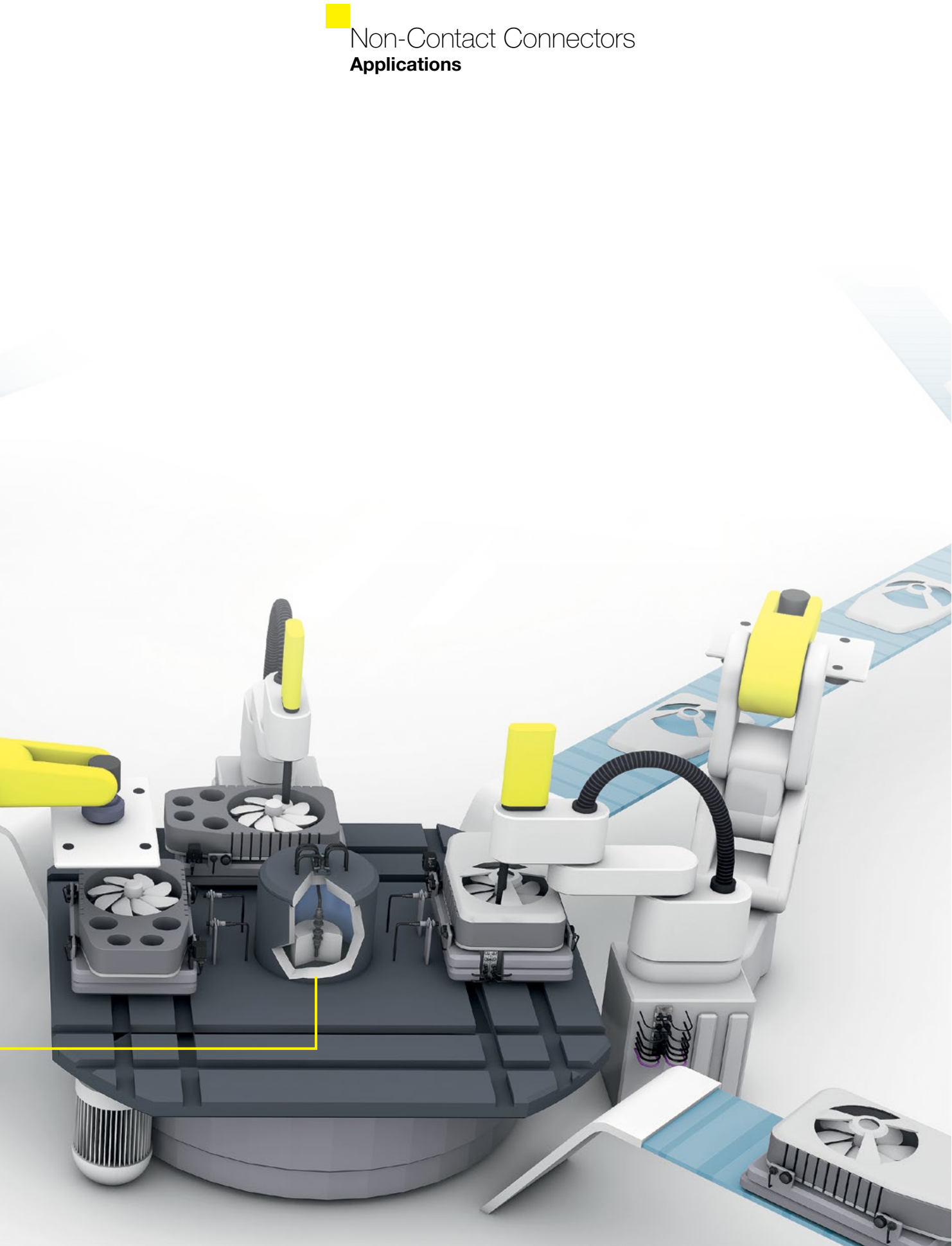
In the case of radial transmission, the BIC system is mounted in such a way that the base and remote components align during the index positions of the rotary table.



Axial transmission

In the case of axial transmission, the BIC system is located in the central axis of the rotary index table. Continuous communication is possible, independent of the position of the table.

Non-Contact Connectors Applications



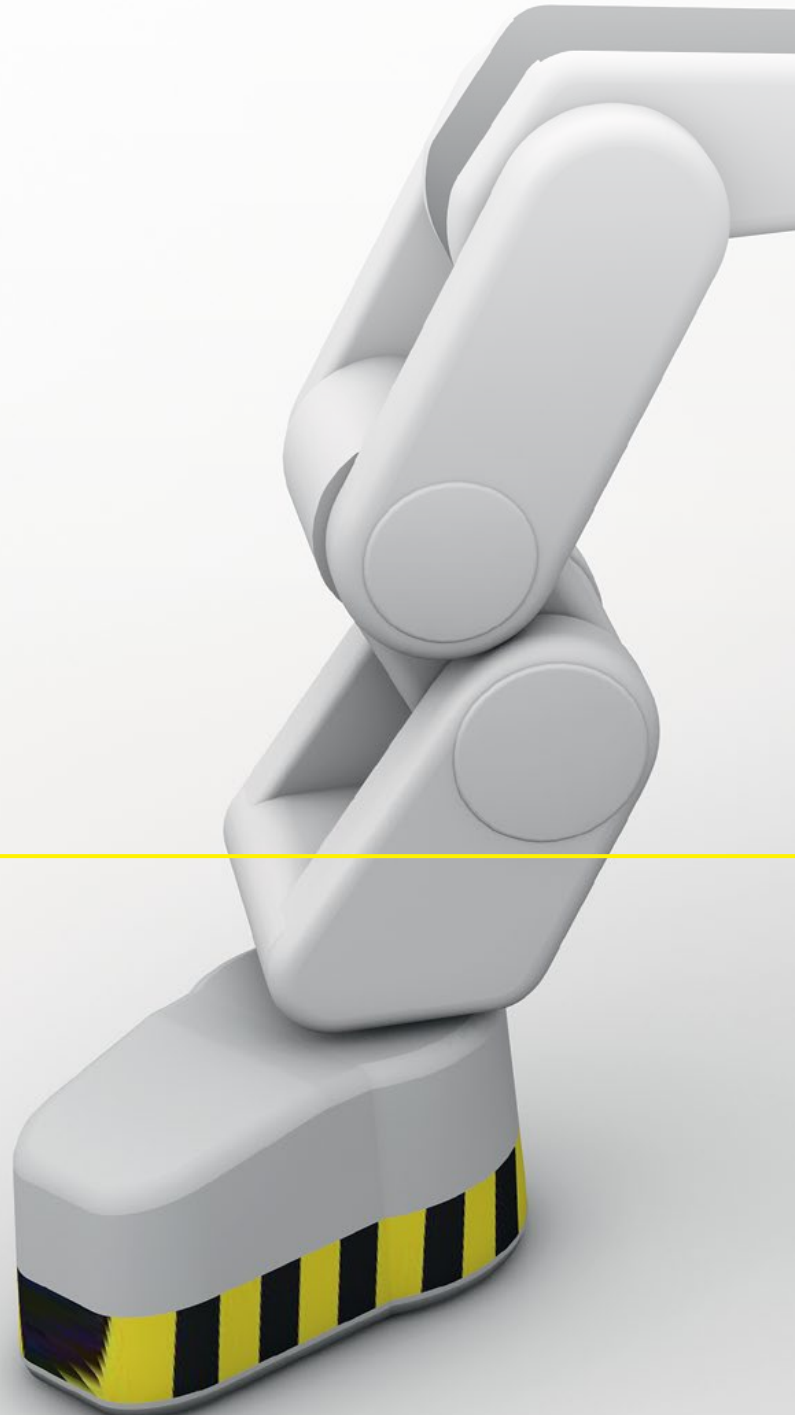
Non-Contact
Connectors



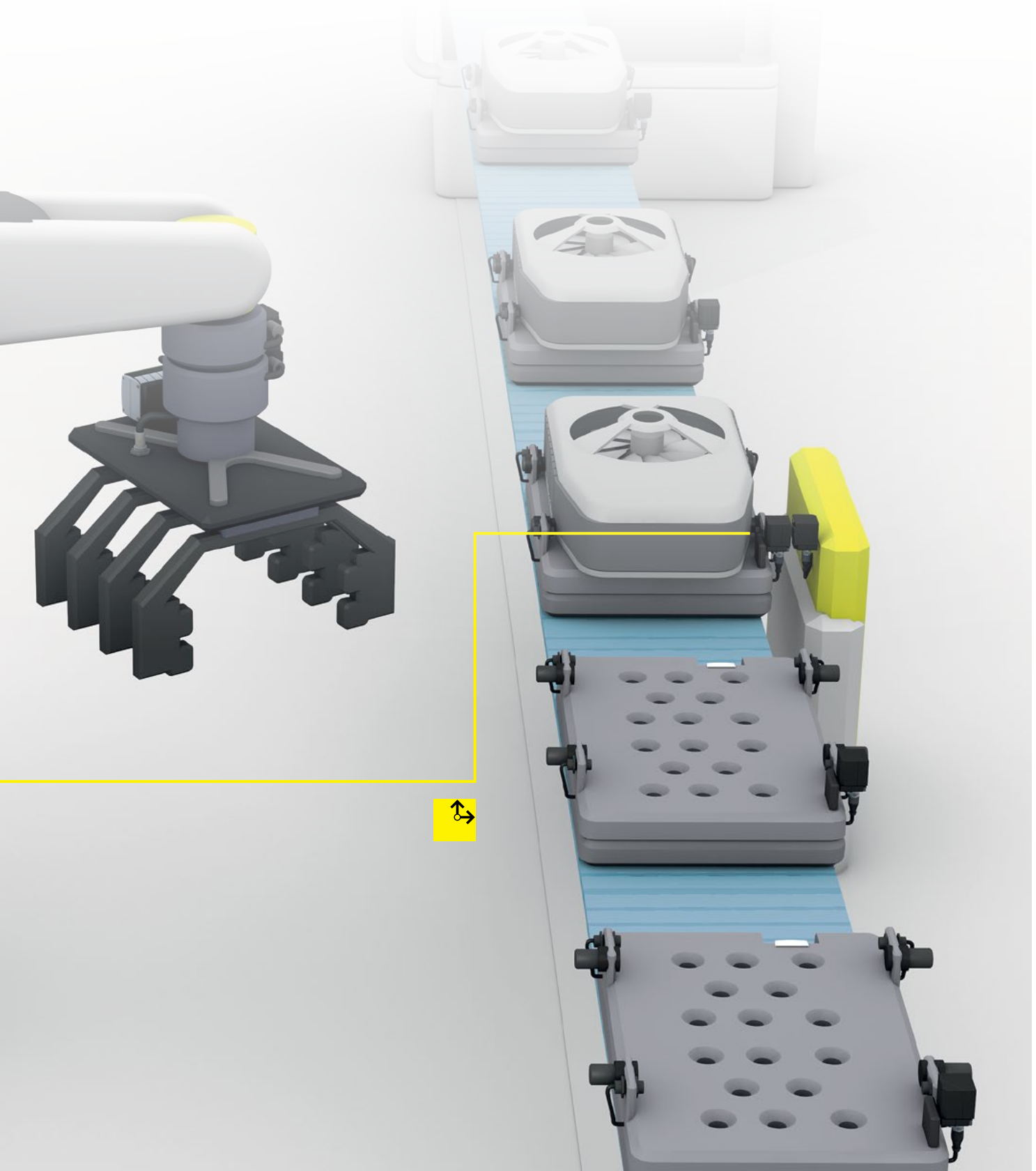
Assembly automation

Sensors are mounted on pallets that convey components from one processing station to the next processing station. They check the correct alignment of the components and monitor the position of the clamping units. The non-contact inductive coupling system is responsible for supplying the power to the sensors and transmitting the sensor signals to the control system.

Communication is established at each station as soon as the base and remote align. A mechanical connection is no longer necessary.



Non-Contact Connectors Applications



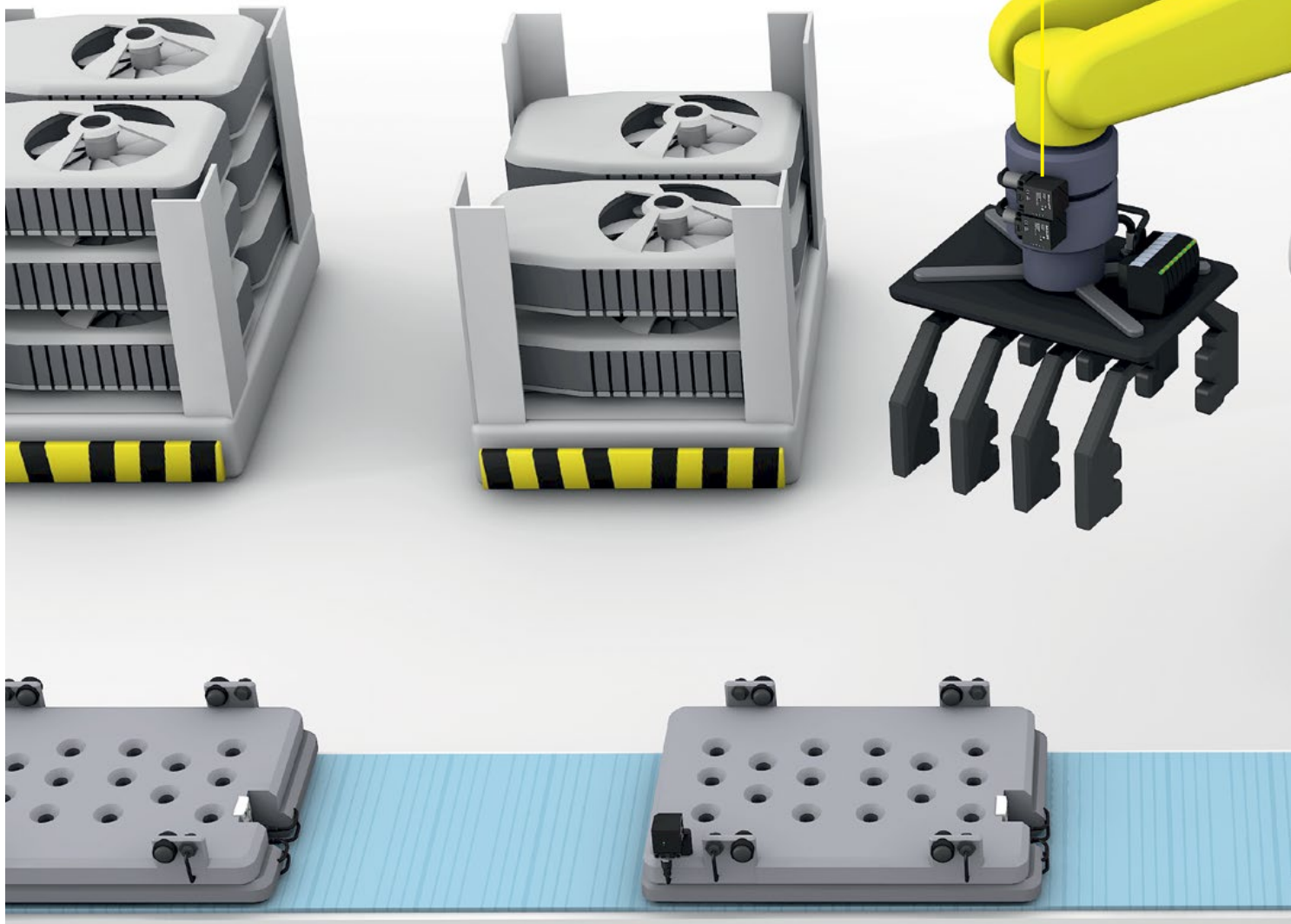
Quick tool change

Fast format changes are important for high productivity. However, plugs make it difficult to change grippers on robots.

BIC inductive couplers render mechanical connectors unnecessary. They transmit signals contact-free over an air gap. This ensures freedom from wear, guarantees tools are changed quickly and provides a large degree of flexibility.

A further benefit:

The unique identity of the tool can be ensured through an ID stored in the sensor/actuator hub. This excludes the possibility of incorrect allocation.



Non-Contact Connectors Applications



Benefits

- No warped, damaged pins
- No bending during coupling – axial offset is permissible
- No mechanical contact, no wear

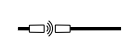
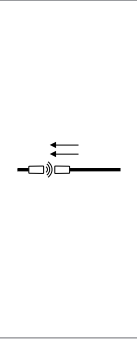
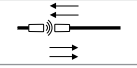
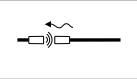



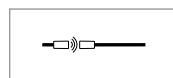
Non-Contact
Connectors



Non-Contact Connectors

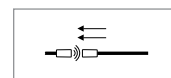
Family overview/selector

	Movement	Number of Signals	Remote Voltage	Remote Current
	Power Only			
		0	24 VDC	500 mA
	Discrete Input Only			
	Axial	1	12 VDC	30 mA
		2	12 VDC	50 mA
		4	12 VDC	30 mA
			12 VDC	40 mA
		8	12 VDC	100 mA
			12 VDC	150 mA
			12 VDC	200 mA
			24 VDC	400 mA
		24 VDC	300 mA	
Radial	8	24 VDC	500 mA	
		160 mA		
	Discrete Input/Output			
	Axial	4 In / 4 Out	24 VDC	300 mA
	Analog Input Only			
	Axial	1x 0...10 V	18 VDC	10 mA
	Axial	1x PT100 Thermocouple		
	IO-Link (see IO-Link section)			
	Axial	3 bytes (M30) In	24 VDC	500 mA
		3 bytes (Q40) In	24 VDC	500 mA
		10 bytes (M30) In	24 VDC	500 mA
		32 bytes In/32 bytes Out Parameter Data (Q40)	24 VDC	500 mA



Power Only

Only power transmitting units for actuators, load units or an energy supply.



Discrete Input Only

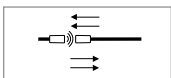
Means signal transmission in one direction. Two or three-wire sensors are connected depending on the version. The power is supplied by the remote side. 1, 4 or 8 digital signals are transmitted depending on the system. Special systems for analog signals or PT100 temperature sensors are also available.



Non-Contact Connectors

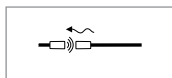
Family overview/selector

Gap Distance	Base (Stationary)		Remote (Moving)	
	PNP	NPN	PNP	NPN
0...5 mm	BIC0007		BIC0008	
0...4 mm	BIC0029	BIC002C, BIC005T	BIC002K	BIC002L, BIC005P
0...2.5 mm	BIC0077		BIC0078	
0.5...3 mm	BIC0015		BIC001N	
0...5 mm	BIC001A		BIC001T	
2...15 mm	BIC001J		BIC001Y	
2...5 mm	BIC0048		BIC0045	
3...8 mm	See page 207		See page 207	
0...5 mm	BIC0011		BIC0012	
4...12 mm	BIC0028		BIC0023	
0...5 mm	BIC0009		BIC000A	
0...2 mm	BIC003N		BIC003P	
3...11 mm	BIC003C		BIC0039	
0...2.5 mm	BIC0046		BIC0043	
1...4 mm	BIC0047		See page 209	
0...5 mm	BIC000C		BIC000E	
0...5 mm	BIC005A		BIC005C	
0...5 mm	BIC0053		BIC0054	
0...5 mm	BIC0070		BIC0071	



Discrete Input/Output

For the transmission of signals in two directions. Four sensors and four independent control signals are processed on the moving side. Power and signals are coupled inductively.



Analog Input Only

Special systems for the transmission of 1 or 4 analog inputs of the 0...10 VDC type.



Non-Contact Connectors



Non-Contact Connectors

Power only 500 mA



Power Only

Type	Power Only
Max Remote Current	500 mA
Working Range	0...5 mm
Base	BIC0007
Remote	BIC0008
Number of Signals	0
Housing Size	M30
Remote Supply Voltage	24 VDC \pm 5%
Base Current Consumption	\leq 1 A
Base Supply Voltage	24 VDC \pm 10%
Connector Type	M12 4wire



Non-Contact Connectors

Discrete input only, 1-4 signal



Single Input Only

Type	Input Only	Input Only
Number of Signals	1	2
Transmission Distance	0...4 mm	1...2.5 mm
PNP Input Base	BIC0029	BIC0077
PNP Input Remote	BIC002K	BIC0078
NPN Input Base	BIC002C* BIC005T	
NPN Input Remote	BIC002L* BIC005P	
Max. Remote Current	≤ 30 mA	≤ 50 mA
Remote Supply Voltage	12 VDC ± 1.5 VDC	12 VDC ± 1.5 VDC
Housing Size	M18	M12
Base Current Consumption	≤ 150 mA	
Base Supply Voltage	24 VDC ± 5%	24 VDC ± 5%
Connector Type	PUR 3-wire	M12 5-pin

*Consult factory for availability

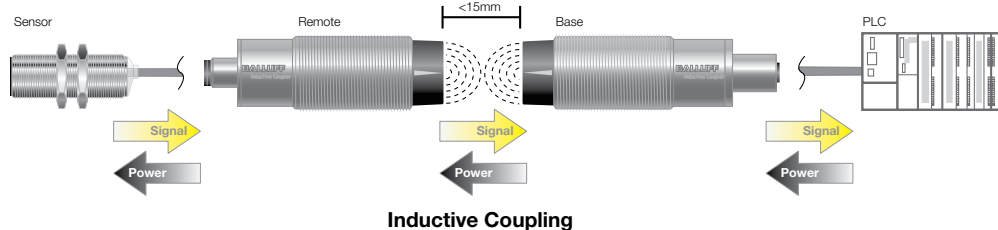


4 Input Only

Type	Input Only	Input Only
Number of Signals	4	4
Transmission Distance	0.5...3 mm	0...5 mm
PNP Input Base	BIC0015	BIC001A
PNP Remote	BIC001N	BIC001T
Max Remote Current	≤ 30 mA	≤ 40 mA
Remote Supply Voltage	12 ± 1.5 VDC	12 ± 1.5 VDC
Housing Size	M18	M30
Base Current Consumption	≤ 700 mA	≤ 200 mA
Base Supply Voltage	24 VDC ± 5%	24 VDC ± 5%
Connector Type	PUR 7-wire	PUR 7-wire

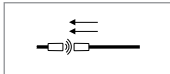
*Consult factory for availability

How Non-Contact Connectors Work



Non-Contact Connectors

Discrete input only, 8 signals



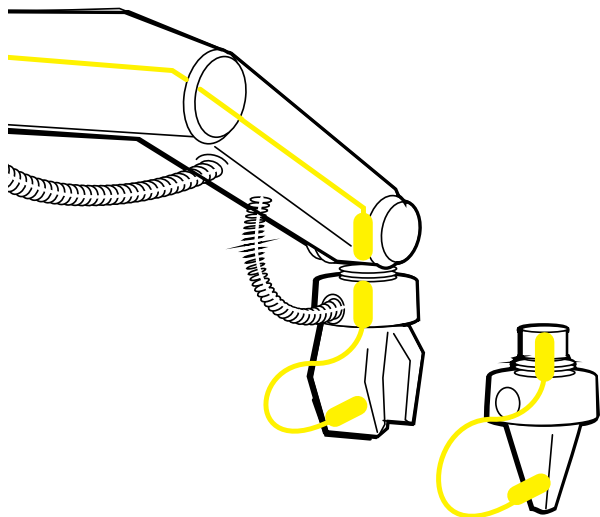
8 Input Only - Tubular Housing

Type	Input Only	Input Only
Number of Signals	8	8
Transmission Distance	2...5 mm	0...5 mm
PNP Input Base	BIC0048	BIC0009
PNP Remote	BIC0045	BIC000A
Max. Remote Current	≤ 150 mA	≤ 500 mA
Housing Size	M30	M30
Remote Supply Voltage	12 ± 1.5 VDC	24 VDC ± 5%
Base Current Consumption	≤ 1A	≤ 1A
Base Supply Voltage	24 VDC ± 10%	24 VDC ± 10%
Connector Type	PUR 11-wire	M12 12-pin
Recommended Cables, 5 m straight PUR		BCC06UL, BCC06UW



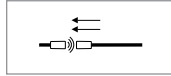
8 Input Only - Tubular Housing

Type	Input Only
Number of Signals	8
Transmission Distance	0...5 mm
PNP Input Base	BIC0011
PNP Remote	BIC0012
Max. Remote Current	≤ 400 mA
Housing Size	M18
Remote Supply Voltage	24 VDC ± 5%
Base Current Consumption	≤ 1A
Base Supply Voltage	24 VDC ± 10%
Connector Type	PUR 9-wire



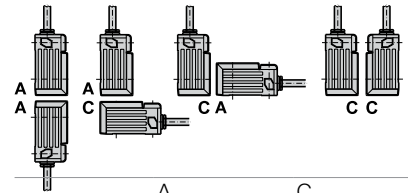
Non-Contact Connectors

Discrete input only, 8 signals



8 Input Only - Block & Radial Housings

Type	Input Only	Input Only
Number of Signals	8	8
Transmission Distance	2...15 mm	3...8 mm
PNP Input Base	BIC001J	See Chart Below
PNP Remote	BIC001Y	See Chart Below
Max Remote Current	≤ 100 mA	≤ 200 mA
Remote Supply Voltage	12 ± 1.5 VDC	12 ± 1.5 VDC
Housing Size	80x80	40x40
Base Current Consumption	≤ 950 mA	≤ 1.2 A
Base Supply Voltage	24 VDC ± 5%	24 VDC ± 10%
Connector Type	PUR 12-wire	PUR 11-wire



Base	BIC0026*	BIC0027*
Remote	BIC0021*	BIC0022*

*Consult factory for availability



8 Input Only - Block & Radial Housings

Type	Input Only	Input Only
Number of Signals	8	8
Transmission Distance	4...12 mm	0...2 mm
PNP Input Base	BIC0028	BIC003N
PNP Remote	BIC0023	BIC003P
Max Remote Current	≤ 300 mA	≤ 160 mA
Remote Supply Voltage	24 ± 1.5 VDC	24 VDC
Housing Size	90x90	Radial Mount (Ø45mm shaft)
Base Current Consumption	≤ 1.2 A	≤ 700 mA
Base Supply Voltage	24 VDC ± 5%	24 VDC ± 5%
Connector Type	PUR 11-wire	Sensors - M8 Female 3-pin Power - M16 Female 3-pin Signals - M16 Male - 12-pin (cables not included)

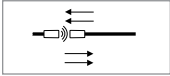


Non-Contact Connectors



Non-Contact Connectors

Discrete input/output

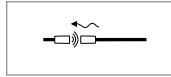


Discrete Input/Output

Type	Input/Output
Number of Signals	4 In / 4 Out
Transmission Distance	3...11 mm
Base	BIC003C
Remote	BIC0039
Max. Remote Current	300 mA
Input Type	PNP
Housing Size	M30
Remote Supply Voltage	24 VDC \pm 5%
Base Current Consumption	\leq 1500 mA
Base Supply Voltage	24 VDC \pm 10%
Connector Type	11-wire

Non-Contact Connectors

Analog input only – 1x 0...10 V, 4x 0...10 V PT100 thermocouples



Analog

Type	Analog Voltage Input
Input Type	0...10 VDC
Number of Signals	1
Transmission Distance	0...2.5 mm
Base	BIC0046*
Remote	BIC0043*
Remote Max Current	≤ 10 mA
Remote Supply Voltage	18 ± 1.5 VDC
Housing Size	M18
Base Max Current Consumption	≤ 150 mA
Base Supply Voltage	24 VDC ± 5%
Connector Type	PUR 3-wire

*Consult factory for availability

Remote sensor – non-contact transmission of temperature values

The thermal remote sensors are compatible with PT100 thermocouples for sensing temperature on moving components while they are being processed. The thermocouple detects the temperature of the object and changes its resistance value, which is processed by the transmitter. The digitized information is passed to the output sensor. The latter converts the digital values into an analog signal (4...20 mA) and transmits it to the external controller.



PT100 thermocouples

Size	M18x1	M18x1
Working range	1...4 mm	
Mounting	Not flush	Not flush
Base		BIC0047
Remote 0...+100° C	BIC0041	
Remote 0...+300° C	BIC004C	
Power supply UB incl. ripple		24 V DC ±5 %
Rated operating current Ie		≤ 200 mA
No-load supply current I0 max.		≤ 150 mA
Output signal		4...20 mA
Connection type	5 m PUR cable	5 m PUR cable
No. of wires × cross-section	3×0.3 mm ²	3×0.3 mm ²

Non-Contact Connectors



Non-Contact Connectors

Accessories



Mounting Brackets for Tubular Housings*

M18 Plastic Mount	BAM00F2
M30 Plastic Mount	BAM00HN
M30 Magnet Mount	BAM02MU

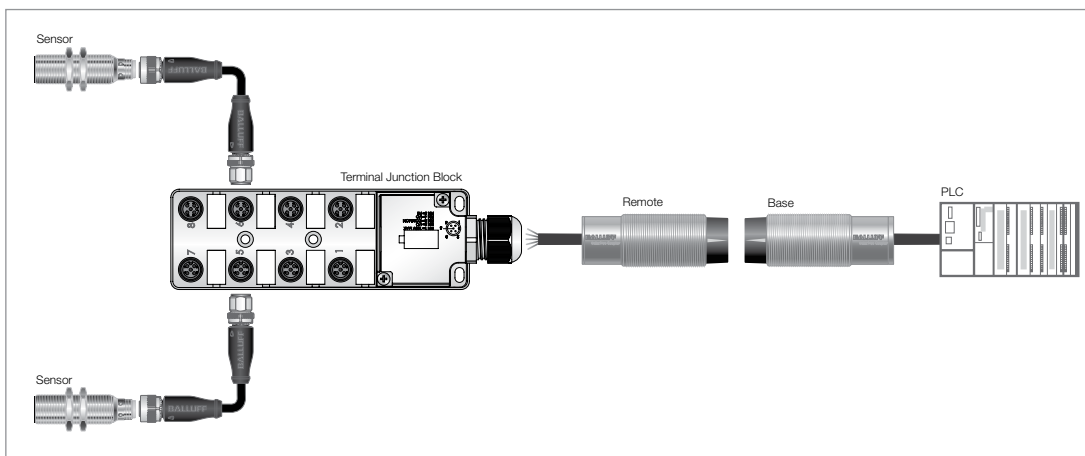
*See sensor catalog for alternate mounting options



Terminal Junction Blocks for Cable Out Remote Side BICs**

4x M12 ports, 8 signals, plastic	BPI006H
8x M12 ports, 8 signals, plastic	BPI006K

**For variations and details, see page 168.



Non-Contact Connectors Accessories



Double-Ended Cables for BICs and BPIs with Quick Disconnect Connectors

M12 Straight-M12 Straight, 12pole, 0.6m	BCC088E
M12 Straight-M12 Straight, 12pole, 1m	BCC088F
M12 Straight-M12 Straight, 12pole, 2m	BCC088H



Single-Ended Cable for BICs with Quick Disconnect Connectors

M12 Female Straight, 12pole	BCC M41C-0000-1A-049- <u> </u> - <u> </u> - <u> </u>
M12 Female Right Angle, 12pole	BCC M42C-0000-1A-049- <u> </u> - <u> </u> - <u> </u>
M12 Male Straight, 12pole	BCC M41C-0000-2A-049- <u> </u> - <u> </u> - <u> </u>
M12 Male Right Angle, 12pole	BCC M42C-0000-2A-049- <u> </u> - <u> </u> - <u> </u>

Jacket Color and Material		①	②	Lengths
Material	Color	12-wire		
PVC Shielded	Gray	VX8C25	020	= 2 meters
PUR Shielded	Black	PX0C25	050	= 5 meters
			100	= 10 meters



Cables for Radial BICs

M12, Female, 4wire, 5m	BCC05FE
M12, Female, 8-wire, shielded, 5m	BCC00YF
M16, Female, 3-wire, 5m	BCC014K
M16, Male, 12-wire, 5m	BCC014M

