BALLUFF

BIC 1I3-P2A50-Q40KFU-EPXO-002-M4CA
BIC 2I3-P2A50-Q40KFU-EPXO-002-M4CA

User´s Guide

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1 Safety

1.1. Installation and Startup

Attention!
Installation and startup are to be performed by trained technical personnel only. Skilled specialists are people who are familiar with the work such as installation and the operation of the product and have the necessary qualifications for these tasks. Any damage resulting from unauthorized manipulation or improper use voids warranty and liability claims against the manufacturer. The operator is responsible for ensuring that the valid safety and accident prevention regulations are observed in specific individual cases.

1.2. General Safety Notes

Commissioning and inspection
The operating company shall be responsible for observance of locally applicable safety regulations.
Before commissioning, carefully read the operating manual.
The system must not be used in applications where the safety of persons depends on the function of the device.

Intended use
Warranty and liability claims against the manufacturer are rendered void by:

- Unauthorized tampering
- Improper use
- Use, installation or handling contrary to the instructions provided in this operating manual.

Obligations of the Operating Company
The device is a piece of equipment in accordance with EMC Class A. Such equipment may generate RF noise. The operator must take appropriate precautionary measures. The device may be used only with a power supply approved for this. Only approved cables may be used.

Malfunctions
In the event of defects and device malfunctions that cannot be rectified, the device must be taken out of operation and protected against unauthorized use.

Hazardous voltage

Attention!
Before working on the device, switch off its power supply.

Intended use

Attention!
Inductive coupling systems (BIC) are devices for contact-free energy and signal transmission in industrial environments.

Use is particularly not allowed:

- In environments with explosive atmospheres,
- In an application where the safety of people or machines can be affected by transmitted signals. (Safety-related circuits).

1.3. Safety Notes

Attention!
Risk of burning on hot surfaces! The sensing surface heats up even under normal operating conditions. Keep hands and objects away from the sensing surface. Metallic objects must not get in Zone A, B or between the sensing surfaces of the Base and Remote. Fire hazard!

Protection from electromagnetic fields

Protection from electromagnetic fields during operation and assembly
At a distance of 300 mm the magnetic field strength of a BIC is less than 0.092 µT. Based on the EU Council recommendation 1999/519/EC, in accordance with EN 62311:2008, this distance is regarded as the basic limit value or reference value for the safety of persons in electromagnetic fields.
For persons with live medical implants, additional (operational) limit values may apply.

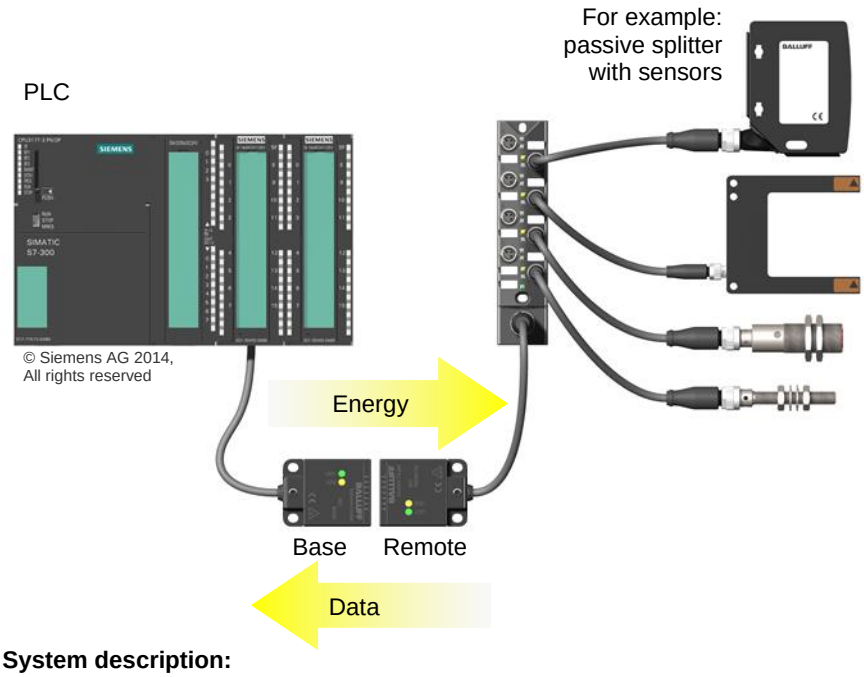
1.4. Resistance to aggressive substances

Attention!
The BIC modules generally have a good chemical and oil resistance. When used in aggressive media (eg chemicals, oils, lubricants and coolants each in high concentration (ie, low water content)) must be checked prior application-related material compatibility. In the event of failure or damage to the BIC modules due to such aggressive media are no claims for defects.

Note
In the interest of continuous improvement of the product,
Balluff GmbH reserves the right to change the technical data of the product and the content of these instructions at any time without notice.

2 Construction

2.1. System Overview



System description:
The system is designed for applications with up to 8 sensors. It consists of two components: Base (control system side) and Remote (sensor side).

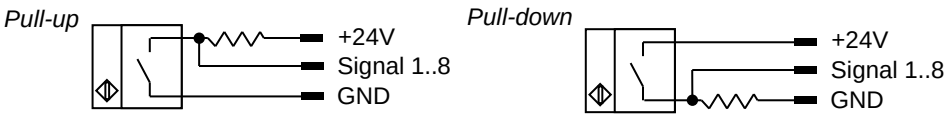
2.2. Notes about Function

This system transfers power with an inductive method from the Base to the Remote via an air bridge. The signal from the sensors is transmitted to the Base by the Remote.

The energy available for the sensors depends on the distance and offset between Base and Remote and is, therefore, limited. For this reason, the total current consumption of the connected sensors must not exceed the maximum power output of the Remote.

Sensors
For the standard version of electronic sensors, observe the following:

- Make certain that the total power consumption of the sensors is not greater than 500 mA and the cable length is less than 20 m.
- Only use sensors with a voltage of 24 V DC.
- 2-wire sensors are possible to use with a pull-up or pull-down resistor.



Mechanical switches
For the standard version of mechanical switches, observe the following:

- Use switches for small load currents and make sure the cable length is less than 20 m.
- Use switches with a residual current I <0.1 mA in the open switching state.
  The total resistance of the circuit should be less than 10 kΩ to reliably detect the signal state.

2 Construction

2.3. Features

- The cable length between the Remote and consumer is limited depending on the cable resistance.
- LED indicator on the Remote and Base for operational readiness and operating voltage
- An angular offset is possible between Base and Remote
- Simple wiring of e.g. rotary tables, replaceable punch heads, etc.
- Control of capacitive loads
- The INZONE signal of the Base is "high" as soon as the connection to the Remote is OK.
- The BIC system cyclically transmits the input image of the Remote to the Base and outputs it there. The typical cycle time for this is 3.3 ms and equals the typical dead time of the system.

2.4. Indicator

If the supply voltage is applied correctly, the green LED on the Base flash. If the Base connected with the Remote the green LEDs illuminate at the Base and the Remote. If the supply voltage is too low the yellow LED flashes fast.

2.5. Connection Time

The time needed to establish the connection of Base and Remote is affected by different variables. The startup speed and angle have an impact on the connection time. These variables are application-specific and therefore cannot be generalized.

The measurements made by Balluff to determine the connection time represent typical values. The system's connection times can deviate from these typical values.
The distance from Base to Remote in the test setup was 5 mm without axis and angular offset. A total of 100,000 connection cycles comprising a variety of directions and speeds were evaluated. The time in which the BIC transmitted a valid signal from the Remote to the Base was recorded; in other words, the INZONE signal also assumed the High state.

Base variant (order code)	Typical connection time in milliseconds
BIC007J	30

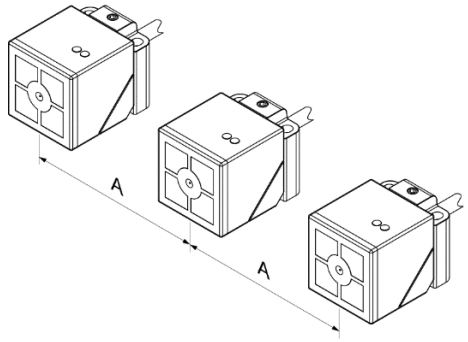
Note
The typical connection times specified here correspond to the arithmetic mean of 100,000 connection times.

3 Installation

3.1. Mutual Interference

To prevent mutual interference with adjacent Bases or Remotes, the specified minimum distances must be adhered to:

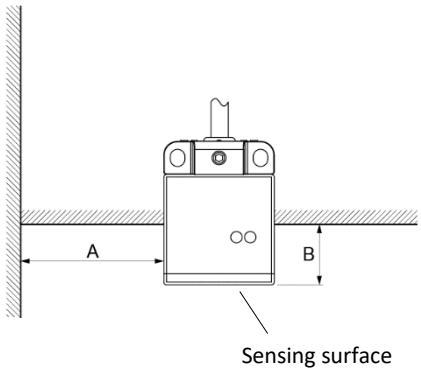
Type	A (mm)
BIC 1I3-P2A50-Q40KFU-EPX0-002-M4CA	≥ 70
BIC 2I3-P2A50-Q40KFU-EPX0-002-M4CA	≥ 70



3.2. Installation in Metal

There is a risk in metallic environments to damage the device due to induction effects!
The sensing surface is marked by the crosshairs on the housing.
Metallic objects on the coil cap cause the sensing surface to be heated.
Install the components so that no metallic objects are in the zone produced by distances A and B.

Type	A (mm)	B (mm)
BIC 1I3-P2A50-Q40KFU-EPX0-002-M4CA	≥ 30	≥ 20
BIC 2I3-P2A50-Q40KFU-EPX0-002-M4CA	≥ 30	≥ 20



A: Lateral distance

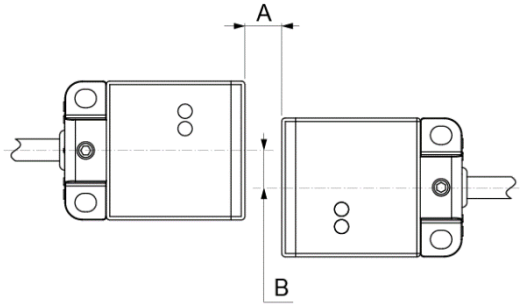
B: Distance active area to the rear mounting surface

3 Installation

3.3. Distances / Offset

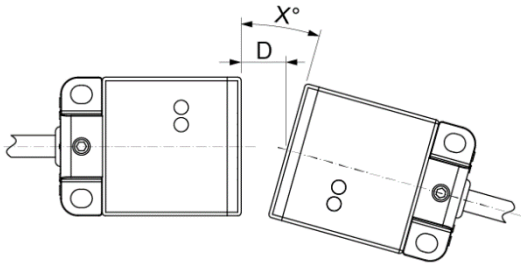
Permitted distances / offset of the axes

Type	A (mm)	B (mm)
BIC 1I3-P2A50-Q40KFU-EPX0-002-M4CA	≤ 5	≤ 5
BIC 2I3-P2A50-Q40KFU-EPX0-002-M4CA	≤ 5	≤ 5



3.4. Permitted Angle Offset

D [mm]	X [°]
1	11
2	8
3	6
4	3
5	0



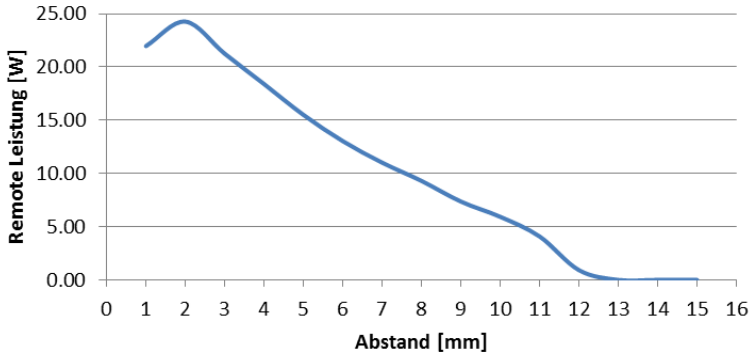
4 Energy Transmission

The maximum power that can be transmitted with the BIC system depends on distance, lateral axis offset and angular offset (see Section 3.3 and 3.4) between Base and Remote. At a distance of 5 mm, a lateral offset of 5 mm and no angular offset, the output current of 500 mA to the Remote, which is specified in the electrical data under Section 6.2, is guaranteed.

4.1. Derating

Explanations for increasing the maximum transmittable power as well as increasing the maximum transmission distance.

The maximum transmittable power can be increased by reducing distance, lateral axis offset and angular offset (see Section 3.3 and 3.4). Similarly, if the power requirements are low, the transmission distance of the BIC system, for example, can be increased.
Figure 2 shows the progression of a typical BIC system derating curve.



Derating curve: output power of the Remote at 24V-5%

Note
The measurement on which the derating curve is based was carried out without axis and angular offset. The value ranges of the derating curve are to be interpreted as typical values.

4.2. Reduction of the Power

To protect people and the environment, the Base component automatically reduces power, which is emitted in the form of electromagnetic fields, as soon as the Remote component is disconnected.
The technical utility is in the prevention of heating metallic objects that end up in front of the Base when the Remote is disconnected.

5 Connection

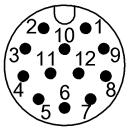
5.1 System Notes

Note
Device damage due to incorrect voltage supply possible!
Malfunctions may occur if the ripple is too high or if the output voltage is not regulated.
Use only approved, regulated voltage supplies.

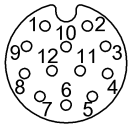
Note
The Remote may be damaged by voltage peaks if cables that are too long are used!
To satisfy the EMC requirements, the cable on the Remote must not be longer than 20 m.
If a longer cable is used nevertheless, necessary measures must be taken to protect the Remote from overvoltage peaks.

Electrical connections – Base

The Base is wired via a "type 3" characteristic acc. to IEC 61131-2.

Power (M12, 12-pin male plug)			
	**PIN**	**Signal**	**Meaning**
	1	+24 V	Input voltage
	2	GND	Ground
	3	Signal 1	Signal 1
	4	Signal 2	Signal 2
	5	Signal 3	Signal 3
	6	Signal 4	Signal 4
	7	Signal 5	Signal 5
	8	Signal 6	Signal 6
	9	Signal 7	Signal 7
	10	Signal 8	Signal 8
	11	InZone	InZone
	12	NC	Not used

Electrical connections – Remote

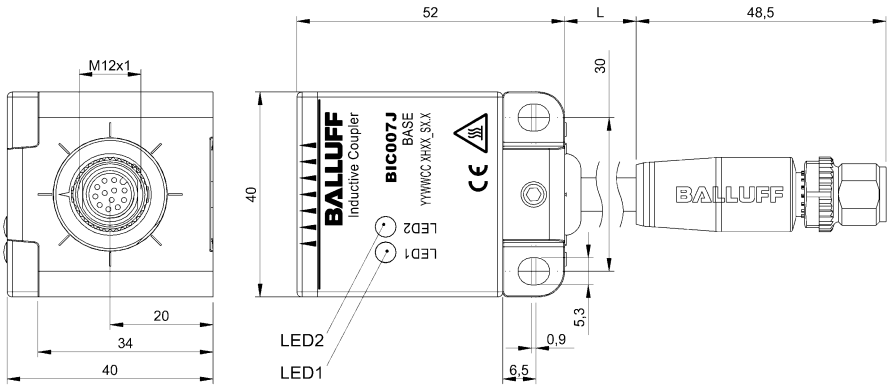
Power (M12, 12-pin female plug)			
	**PIN**	**Signal**	**Meaning**
	1	+24 V	Output voltage
	2	GND	Ground
	3	Signal 1	Signal 1
	4	Signal 2	Signal 2
	5	Signal 3	Signal 3
	6	Signal 4	Signal 4
	7	Signal 5	Signal 5
	8	Signal 6	Signal 6
	9	Signal 7	Signal 7
	10	Signal 8	Signal 8
	11	NC	Not used
	12	NC	Not used

Output InZone

The output is active as soon as the Remote is in the transmission range of the Base. As long as the signal is active, the relevant information is valid at the outputs.

6 Technical Data

6.1. Base



LED 1 / LED 2

LED	Indicator	Function
LED 1	Green, flashing	Supply voltage OK
	Green, static	Connected with Remote
	Yellow, fast flashing	Supply voltage too low
LED 2	Not used	

Mechanical data

Housing material	Black plastic, PBTP
Housing degree of protection	IP 67 (only in plugged-in and screwed-down state)
Dimensions (W x H x D in mm)	52 x 40 x 40
Weight	150 g

Mechanical data Pigtail

Number of conductors	12
Connector type	Male M12, A-coded
Number of female/male pins	12
Length Pigtail (in mm)	0,2 m
Conductor cross-section	12 x 0,25 mm²
Cable diameter	6,5 mm
Bending radius fixed cable	min. 5 x D
Bending radius tensioned cable	min. 10 x D
Bending cycles	> 2 Mio.
Grip material	PUR
Cover nut material	GD-Zn
Cable jacket material	PUR
Contact carrier material	PUR
Contact material	CuZn
Tightening torque	0,6 Nm

6 Technical Data

Operating conditions

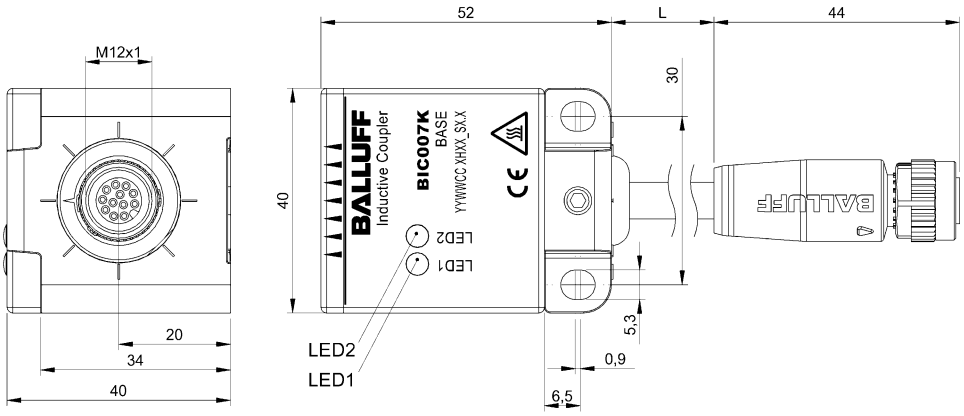
Operating temperature T_a Storage temperature	–5 °C ... 65 °C –25 °C ... 70 °C
EMC directive: Immunity tests: Emission tests: Radio spectrum tests:	R&TTE Directive 1999/5/EC, assessment procedure ANNEX II EN 301489-1 V1.9.2; EN 301489-3 V1.6.1 EN 301489-1 V1.9.2; EN 301489-3 V1.6.1 EN 300 330-2 V1.5.1
Vibration/shock	EN 60068-2-6, EN 60068-2-27; EN 60068-2-29, EN 60068-2-64

Electrical data

Supply voltage	24 V DC ±10%, corresponding to EN 61131-2
Current consumption without signal outputs: with signal outputs:	 < 1.4 A ≤ 3.0 A
No-load supply current (without remote)	≤ 0.2 A
Output current (signal output)	≤ 0.4 A
Total current (signal output)	≤ 1.6 A
Output current (InZone output)	≤ 0.2 A
Overload protection	Yes
Ripple	< 1%

6 Technical Data

6.2. Remote



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Cable diameter	6,5 mm
Bending radius fixed cable	min. 5 x D
Bending radius tensioned cable	min. 10 x D
Bending cycles	> 2 Mio.
Grip material	PUR
Cover nut material	GD-Zn
Cable jacket material	PUR
Contact carrier material	PUR
Contact material	CuSn
Tightening torque	0,6 Nm

6 Technical Data

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Vibration/shock	EN 60068-2-6, EN 60068-2-27; EN 60068-2-29, EN 60068-2-64

Electrical data

Output voltage	24 V DC -15% +20% (20,4V…28,8V)
Output current	min. 500 mA (with 5 mm system distance)
Short-circuit	Yes
Signal input curve	Type 3 (IEC 61131-2)

7 Ordering Information

Ordering information

Product ordering code	Ordering code
BIC 1I3-P2A50-Q40KFU-EPX0-002-M4CA	BIC007J
BIC 2I3-P2A50-Q40KFU-EPX0-002-M4CA	BIC007K

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No. 926213-726 EN • 04.130670 • Edition A21 • Replaces Edition K20 • Subject to modification

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