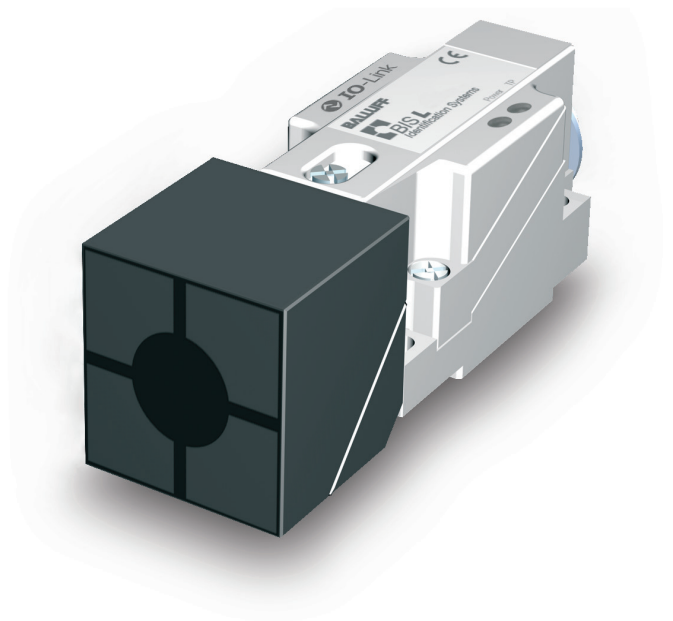
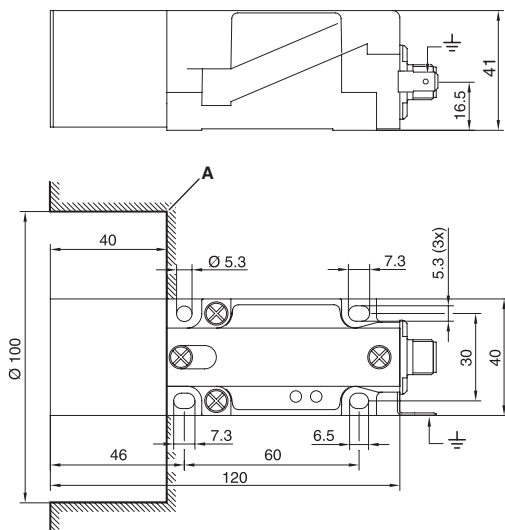


## BIS L-409-045-00x-07-S4

Quick Guide



**[www.balluff.com](http://www.balluff.com)**

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## 1 Notes to the user

### 1.1 About this manual

This manual describes processors in the series BIS L-409-... identification system as well as startup instructions for immediate operation.

### 1.2 Structure of the manual

The manual is organized so that the sections build on one another.

- Section 2: Basic safety information.
- Section 3: The main steps for installing the identification system.
- Section 4: Introduction to the material.
- Section 5: Technical data for the processor.
- Section 6: Mechanical and electrical connection.
- Section 7: Basics for the IO-Link communications standard.
- Section 8: User-defined processor settings.
- Section 9: Integration into a fieldbus system using Profibus as an example.
- Section 10: Processor and host system interaction.

### 1.3 Typographical conventions Enumerations

The following conventions are used in this manual.

Enumerations are shown in list form with bullet points.

- Entry 1,
- Entry 2.

#### Actions

Action instructions are indicated by a preceding triangle. The result of an action is indicated by an arrow.

- ▶ Action instruction 1.  
⇒ Action result.
- ▶ Action instruction 2.

#### Syntax

##### Numbers:

- Decimal numbers are shown without additional indicators (e.g. 123),
- Hexadecimal numbers are shown with the additional indicator `hex` (e.g. `00hex`).

##### Parameters:

Parameters are shown in italics (e.g. *CRC\_16*).

##### Directory paths:

References to paths in which data are stored or are to be saved to are shown in small caps (e.g. `PROJECT:\DATA TYPES\USER DEFINED`).

#### Cross-references

Cross-references indicate where additional information on the topic can be found (see [“Technical data” starting page 16](#)).

### 1.4 Symbols



#### Attention!

This symbol indicates a security notice which must be observed.

---



#### Note, tip

This symbol indicates general notes.

---

**1** Notes to the user

**1.5 Abbreviations**

BIS	Balluff Identification System
CRC	Cyclic Redundancy Code
DPP	Direct Parameter Page
EMC	Electromagnetic Compatibility
LSB	Least Significant Bit
MSB	Most Significant Bit
PC	Personal Computer
SIO	Standard IO
SPDU	Service Protocol Data Unit
PLC	Programmable Logic Controller
TCP	Transmission Control Protocol

## **2** Safety

### **2.1 Intended use**

BIS L-409-... processors together with the other components of the BIS L system comprise the identification system.  
They may be used only for this purpose in an industrial environment corresponding to Class A of the EMC Law.  
This description applies to the compact processors in the BIS L-409-... series.

### **2.2 General safety notes**

#### **Installation and startup**

Installation and startup are to be performed only by trained specialists. Any damage resulting from unauthorized manipulation or improper use voids the manufacturer's guarantee and warranty.  
When connecting the processor to an external controller, observe proper selection and polarity of the connection as well as the power supply.  
The processor must be powered only using approved power supplies (see "Technical data" starting on page 16).



#### **Attention!**

This is a Class A device. This device may cause RF disturbances in residential areas; in such a case the operator may be required to take appropriate countermeasures.

---

#### **Operation and testing**

The operator is responsible for observing local prevailing safety regulations.  
When defects and non-clearable faults in the Identification System occur, take it out of service and secure against unauthorized use.

### **2.3 Meaning of the warnings**



#### **Attention!**

The pictogram used with the word "Caution" warns of a possible hazardous situation affecting the health of persons or equipment damage. Ignoring these warnings can result in injury or equipment damage.

- ▶ Always observe the described measures for preventing this danger.
-

**3 Getting Started**

**3.1 Mechanical connection**

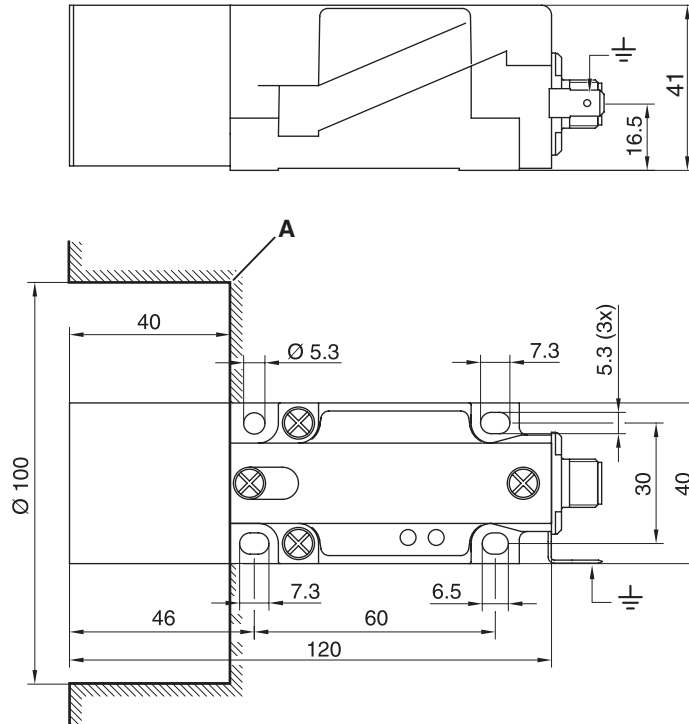


Fig. 1: BIS L-409-045-001-07-S4 with integrated read head, dimensions in mm

**A** Clear zone

- ▶ Attach the processor using 4 M4 screws.  
Note maximum tightening torque of 15 Ncm.

In addition to the processor with integrated read head, the following processors with remote read head are available.

The processors with remote read head are also tightened using 4 M4 screws to a max. tightening torque of 15 Ncm:

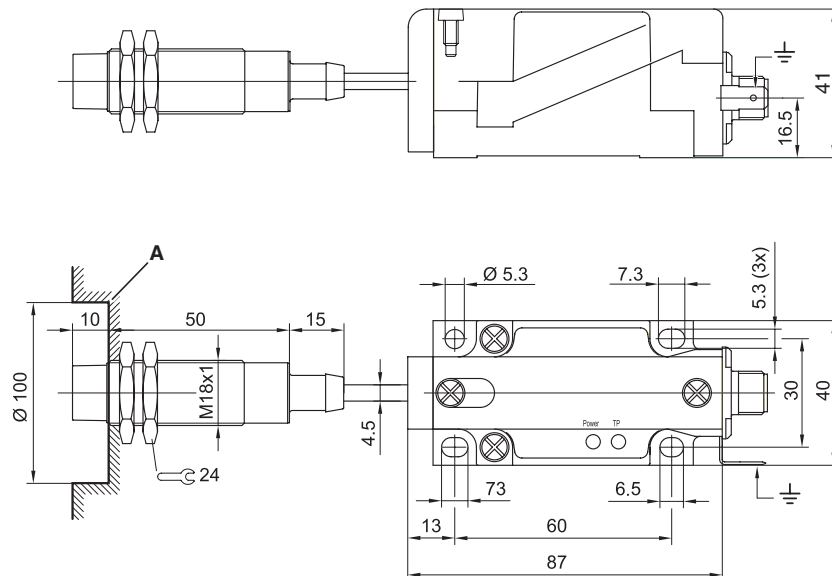


Fig. 2: Processor BIS L-409-045-002-07-S4, dimensions in mm

**A** Clear zone

**3 Getting Started**

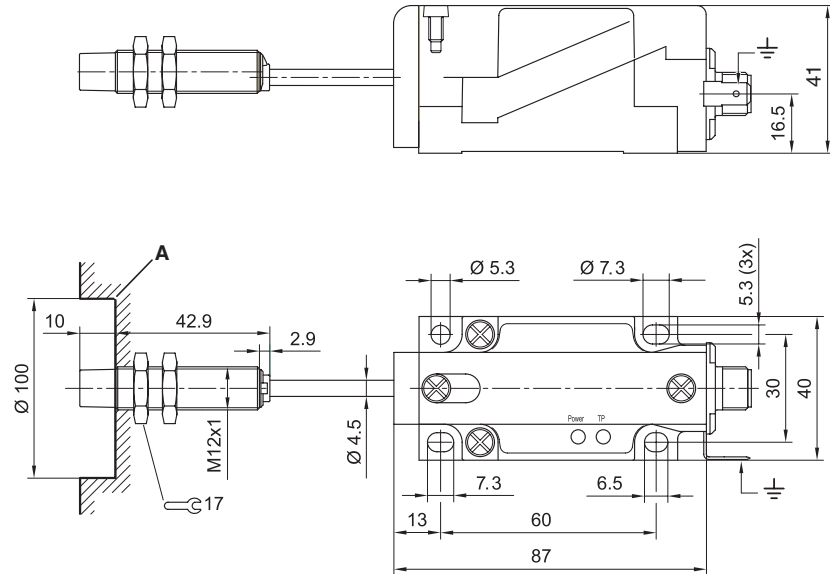


Fig. 3: Processor BIS L-409-045-003-07-S4, dimensions in mm

**A** Clear zone

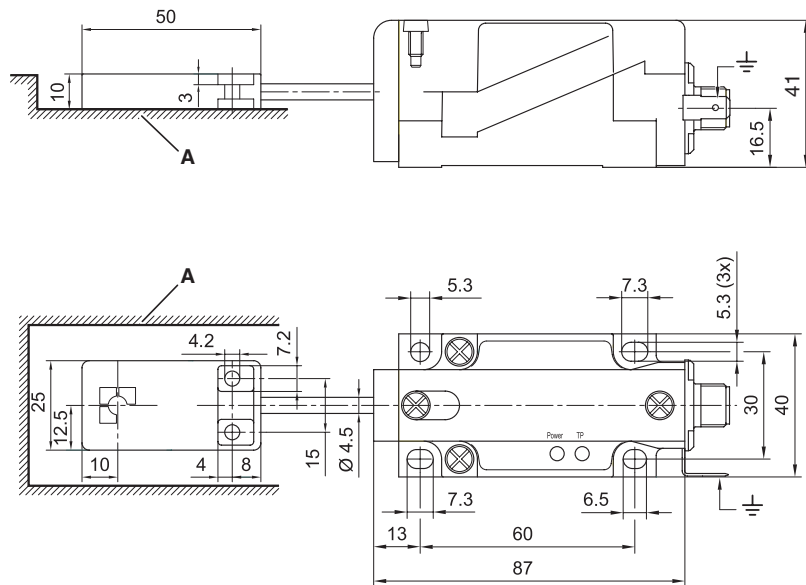


Fig. 4: Processor BIS L-409-045-004-07-S4, dimensions in mm

**A** Clear zone



## 3 Getting Started

### Distance between data carriers

Data carrier	Distance
BIS L-200-03/L	> 25 cm
BIS L-100-05/L*	
BIS L-201-03/L	> 30 cm
BIS L-101-05/L*	
BIS L-202-03/L	> 40 cm
BIS L-102-05/L*	



#### Note

\* Data carrier converted into modus read only.

### Distance between processors

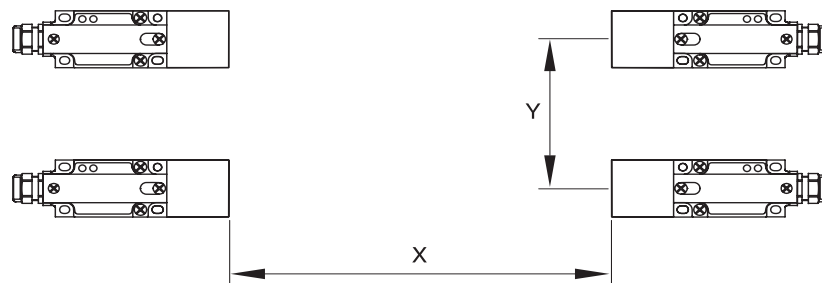


Fig. 5: Distance between two processors, see table for legend

The following distances between individual BIS L-409\_... systems must be maintained:

Processor	Distance x	Distance Y
BIS L-409-...-001- ...	1 m	1 m
BIS L-409-...-002- ...	0.5 m	0.3 m
BIS L-409-...-003- ...	0.5 m	0.3 m
BIS L-409-...-004- ...	0.5 m	0.3 m



#### Note

When installing two BIS L-409-... on metal there is normally no mutual interference. Unfavorable use of a metal frame can result in problems when reading a data carrier. In this case the read distance is reduced to 80% of the maximum value. In critical applications a pre-test is recommended.

**3 Getting Started**

**3.2 Electrical connection**

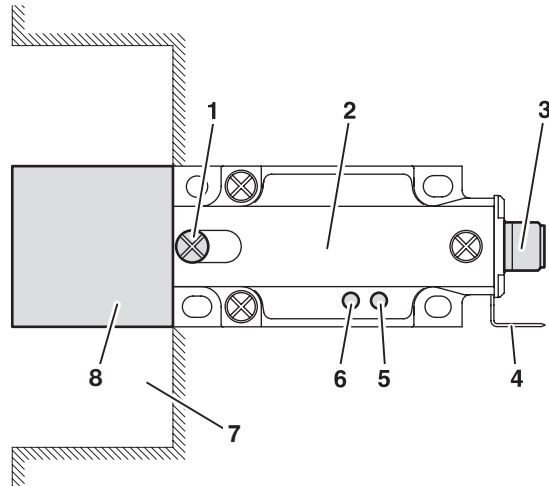


Fig. 6: Overview of processor BIS L-409-045-001-07-S4

- |                                  |                     |
|----------------------------------|---------------------|
| <b>1</b> Locking screw           | <b>5</b> LED 1      |
| <b>2</b> BIS L-409-045-001-07-S4 | <b>6</b> LED 2      |
| <b>3</b> IO-Link connection      | <b>7</b> Clear zone |
| <b>4</b> Ground connection       | <b>8</b> Read head  |

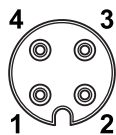
**LED indicators**

LED indicators on the processor:

Item	LED	Display	Function
3	LED 1	green	Supply voltage present
4	LED 2	yellow	Tag Present

**Data line**

**IO-Link port (M12, A-coded, female)**



PIN	Function
1	+24 V
2	NC
3	GND
4	C/Q

- ▶ Connect data line to IO-Link Master.  
(See Balluff IO-Link catalog for connection cable and accessories)

**3 Getting Started**

**Operating mode/  
baud rate**

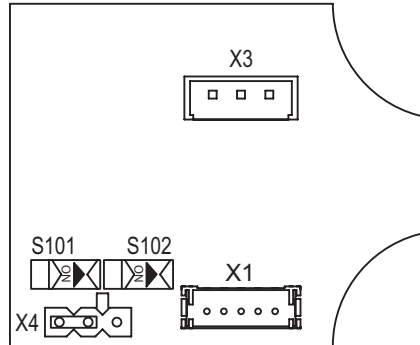


Fig. 7: Overview of BIS L-409-... processor

- |  |  |
|--|--|
| <p><b>1 X1 - Device terminal</b></p> <p><b>2 X3 - Read head terminal</b></p> | <p><b>3 X4 - Jumper for operating mode</b></p> <p><b>4 S101/S102 - baud rate setting</b></p> |
|--|--|

The operating mode is set using jumpers in the processor (X4):

- IO-Link mode, jumper setting as shown in Fig. 7 (factory default setting)
- Service mode - to be used only by Balluff service

The baud rate is set using two DIP switches S101 and S102:

S102	S101	Baud rate
OFF	OFF	<b>com1</b> 4k8
OFF	ON	<b>com1</b> 4k8
ON	OFF	<b>com2</b> 38k4 *)
ON	ON	<b>com3</b> 230k4

\*) Factory default setting

## 4 Basic knowledge

### 4.1 Function principle of Identification Systems

The BIS L-409-... Identification System is a non-contact read-only system. The compact processor consists of processing circuitry with a fixed read head.

The system may be used to read information which has been permanently programmed into the data carrier and to send current status messages to the controller.



#### Note

It is not possible to write data on the data carrier with the identification system BIS L-409 -...

The main components of the BIS L-409-... Identification System are:

- Processor,
- read head,
- data carriers.

Data transmission to the controlling system is accomplished using an IO-Link Master.

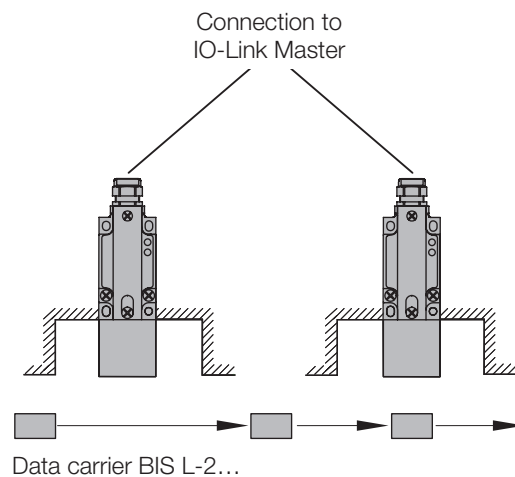


Fig. 8: Schematic representation of an identification system

The data carrier is an autonomous unit which is supplied with power by the read head. The read head continuously sends a carrier signal which is picked up by the data carrier from within a certain distance. As soon as the data carrier is powered up by the carrier signal, a static read operation takes place.

The processor manages the data transfer between read head and data carrier, serves as a buffer storage device, and sends the data to the host controller.

The data are passed to the IO-Link Master using IO-Link protocol, and the Master then passes them to the controlling system.

Host systems may be the following:

- A control computer (e.g. industrial PC),
- a PLC.

The main areas of application are:

- In production for controlling material flow (e.g. in model-specific processes), in workpiece transport with conveying systems, for acquiring safety-relevant data.
- warehousing for monitoring material movement,
- transportation, and
- conveying technology.

**4 Basic knowledge**

**4.2 System topology**

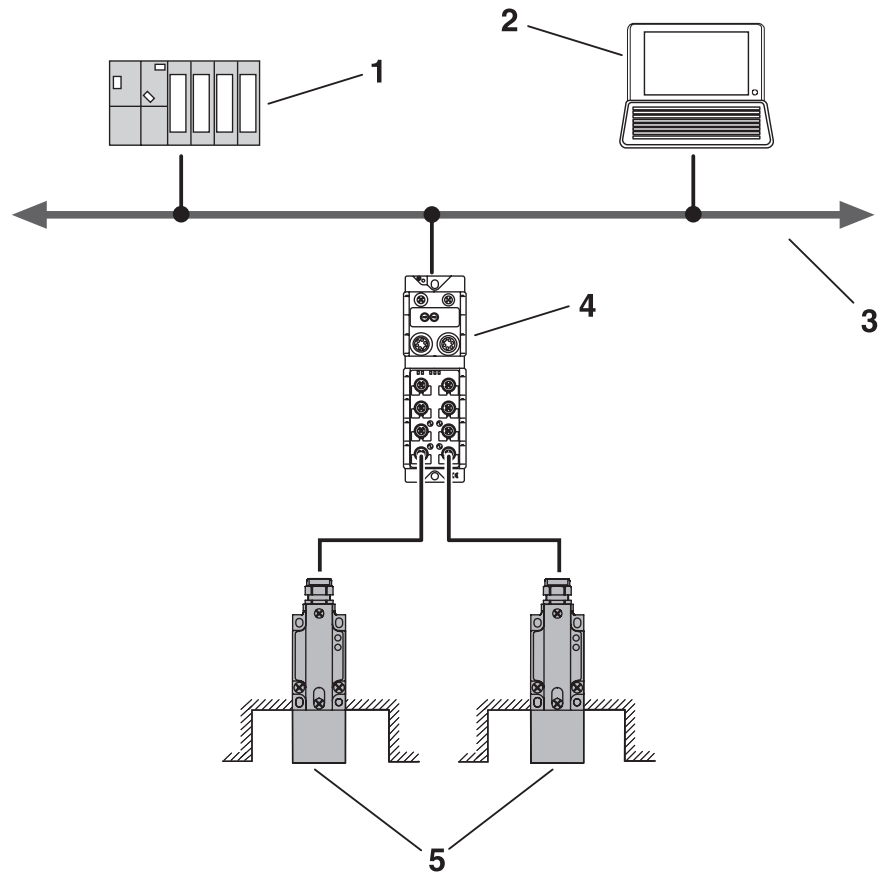


Fig. 9: BIS L-409... topology

- 1 PLC
- 2 PC

- 3 ProfiBus
- 4 IO-Link Master
- 5 Processors BIS L-409...

## **4** Basic knowledge

### **4.3 Read distance/ offset**

To ensure that data carriers are recognized without error and the data can be reliably read, do not exceed a maximum distance and maximum offset between the data carriers and read heads (see “Technical Data” starting page 16).

The “distance” specification refers to the maximum distance from the data carrier to the sensing surface of the read head.

The “offset” specification indicates the maximum offset between the center axis of the data carrier and the center axis of the sensing surface.

Data carriers can only be reliably recognized and the data reliably read within the permissible read distance and offset. In the border area an unstable condition may occur, so that a data carrier is alternately recognized and lost.

Data carrier recognition is indicated by an LED on the device (“TP – Tag Present”, see “Technical Data” starting page 16). At the same time the CP bit is set in the input buffer (“CP – Codetag Present”).

### **4.4 Product description**

Processor BIS L-409-045-...-07-S4:

- Plastic housing,
- circular connector terminations,
- reading (not writing) of data carriers of the product family BIS L,
- one read head connected,
- the read head suitable for dynamic or static operation,
- data carrier is powered by the read head using a carrier signal.

### **4.5 Data security**

In order to ensure data integrity, data transmission between the data carrier and processor can be monitored using a check procedure.

In the processor a CRC\_16 data check can be configured.

If the CRC check is enabled, the data carrier data are checked using a 2-byte CRC\_16 checksum. If the checksum does not agree with the checked data, an error message is sent.



#### **Note**

The CRC\_16 data check can only be used with data carriers of type BIS L-10X-05/L. The data carriers must be initialized using a BIS L-60\_\_ processor and the BISCOCKPIT PC software or a portable reader BIS L-81\_ (refer to the User's guide for the corresponding device for this procedure).

---

### **4.6 IO-Link basic knowledge**

The manufacturer-specific standard IO-Link sends not only the actual process signal, but also all relevant parameter and diagnostics data on the process level over a single standard cable.

Communication is based on a standard UART protocol with 24V pulse modulation; no separate power supply is required. Connection is possible using a 2-conductor or 3-conductor cable.

Advantages of IO-Link:

- Uniform, simple wiring of different devices
- Controlling system can be used to change the device parameters
- Remote querying of diagnostics information is possible
- Centralized data retention of the device parameters is possible

**5 Technical Data**

**BIS L-409-045-001-07-S4**

**Dimensions**

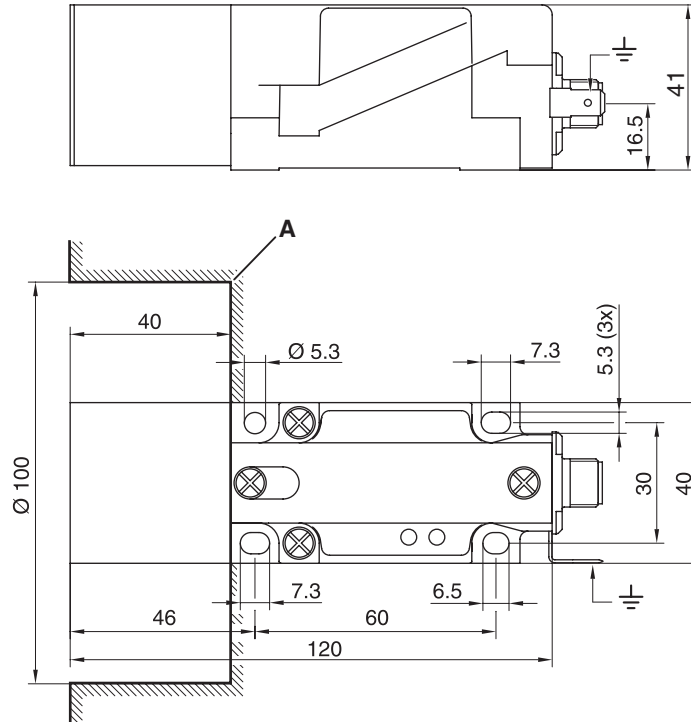


Fig. 10: Dimensions for BIS L-409-045-001-07-S4 processor [mm]

**A** Clear zone

**Characteristic data**

<b>BIS L-409-045-001-07-S4</b>					
Characteristic data when used with data carriers (installed in clear zone)	When $v = 0$ (static)				
	Distance [mm] read	Offset from center axis at distance: [mm]			
		0 - 20	0 - 35	0 - 45	0 - 15
BIS L-200-03 / BIS L-100-05*	25	15	–	–	–
BIS L-201-03 / BIS L-101-05*	35	–	20	–	–
BIS L-202-03 / BIS L-102-05*	48	–	–	25	–
BIS L-203-03 / BIS L-103-05*	16	–	–	–	10



**Note**

\* Data carrier converted into modus read only.

**Mechanical data**

Housing material	Plastic (PBT)
Wiring	Connector, M12 4-pin, A-coded
Enclosure rating	IP65 (with connectors)
Weight	220 g

**5** Technical data

**Electrical data**

Operating voltage VS	24 V DC +10/-20 %
Ripple	≤ 10 %
Current draw	≤ 150 mA
Load current capacity in SIO mode	max. 50 mA
Output C/Q	Short circuit protected
Device interface	IO-Link

**Operating conditions**

Ambient temperature range	0 °C ... +70 °C
EMV	<ul style="list-style-type: none"> <li>– EN 301 489-1/-3</li> <li>– EN 61000-4-2/-3/-4/-5/-6</li> <li>– EN 300 330-1</li> </ul>
Vibration/shock	EN 60068 Part 2-6/27/29/64/32

Two LEDs on the communications module indicate the status:

**Function indicators**

LED indicator	Function
LED green	Supply voltage present
LED yellow	Data carrier within read range (Tag Present)



**5** Technical data

**BIS L-409-045-  
002-07-S4**

**Dimensions**

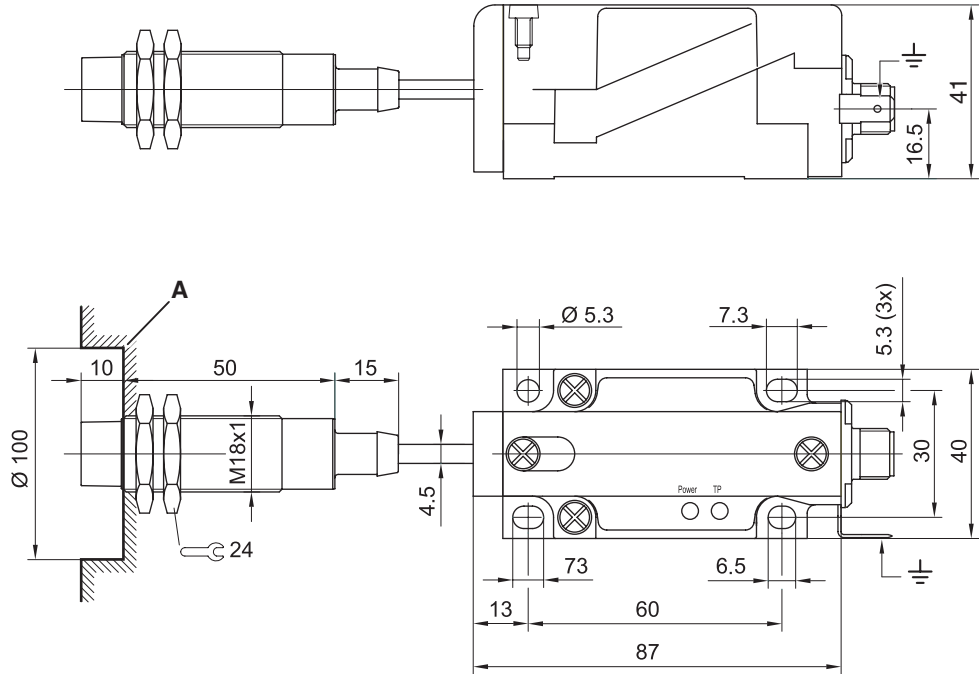


Fig. 11: Dimensions for BIS L-409-045-002-07-S4 processor [mm]

**A** Clear zone

**Characteristic  
data**

<b>BIS L-409-045-002-07-S4</b>				
Characteristic data when used with data carriers (installed in clear zone)	When $v = 0$ (static)			
	Distance [mm] read	Offset from center axis at distance: [mm]		
		0 - 10	0 - 15	0 - 20
BIS L-200-03 / BIS L-100-05*	15	10	-	-
BIS L-201-03 / BIS L-101-05*	18	12	12	-
BIS L-203-03 / BIS L-103-05*	10	4	-	-



**Note**

\* Data carrier converted into modus read only.

**Mechanical data**

Housing material	Plastic (PBT)
Read head housing material	CuZn nickel plated
Wiring	Connector, M12 4-pin, A-coded
Enclosure rating	IP67
Weight	200 g

**5** Technical data

**Electrical Data**

Operating voltage VS	24 V DC +10/-20 %
Ripple	≤ 10 %
Current draw	≤ 150 mA
Load current capacity in SIO mode	max. 50 mA
Output C/Q	Short circuit protected
Device interface	IO-Link

**Operating conditions**

Ambient temperature range	0 °C ... +70 °C
EMV	<ul style="list-style-type: none"> <li>– EN 301 489-1/-3</li> <li>– EN 61000-4-2/-3/-4/-5/-6</li> <li>– EN 300 330-1</li> </ul>
Vibration/shock	EN 60068 Part 2-6/27/29/32/64

Two LEDs on the communications module indicate the status:

**Function indicators**

LED indicator	Function
LED green	Supply voltage present
LED yellow	Data carrier within read range (Tag Present)

**5 Technical data**

**BIS L-409-045-003-07-S4**

**Dimensions**

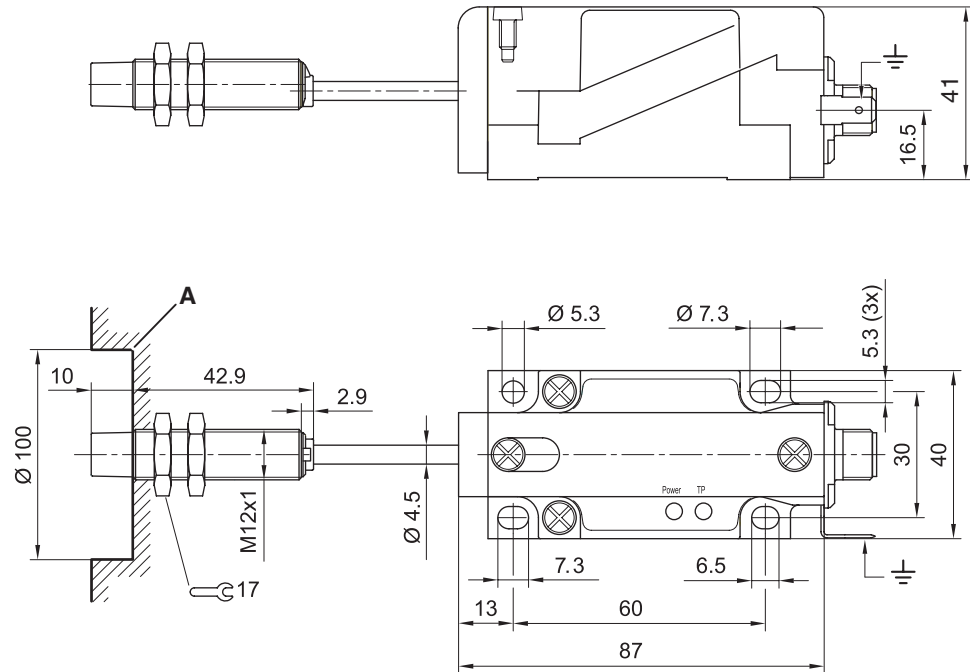


Fig. 12: Dimensions for BIS L-409-045-003-07-S4 processor [mm]

**A** Clear zone

**Characteristic data**

<b>BIS L-409-045-003-07-S4</b>				
Characteristic data when used with data carriers (installed in clear zone)	When v = 0 (static)			
	Distance [mm] read	Offset from center axis at distance: [mm]		
		0 - 5	0 - 8	0 - 11
BIS L-203-03 / BIS L-103-05*	7	4	-	-



**Note**

\* Data carrier converted into modus read only.

**Mechanical data**

Housing material	Plastic (PBT)
Read head housing material*)	CuZn nickel plated
Wiring	Connector, M12 4-pin, A-coded
Enclosure rating	IP67
Weight	170 g

**5** Technical data

**Electrical Data**

Operating voltage VS	24 V DC +10/-20 %
Ripple	≤ 10 %
Current draw	≤ 150 mA
Load current capacity in SIO mode	max. 50 mA
Output C/Q	Short circuit protected
Device interface	IO-Link

**Operating conditions**

Ambient temperature range	0 °C ... +70 °C
EMV	<ul style="list-style-type: none"> <li>– EN 301 489-1/-3</li> <li>– EN 61000-4-2/-3/-4/-5/-6</li> <li>– EN 300 330-1</li> </ul>
Vibration/shock	EN 60068 Part 2-6/27/29/32/64

Two LEDs on the communications module indicate the status:

**Function indicators**

LED indicator	Function
LED green	Supply voltage present
LED yellow	Data carrier within read range (Tag Present)

**5** Technical data

**BIS L-409-045-  
004-07-S4  
Dimensions**

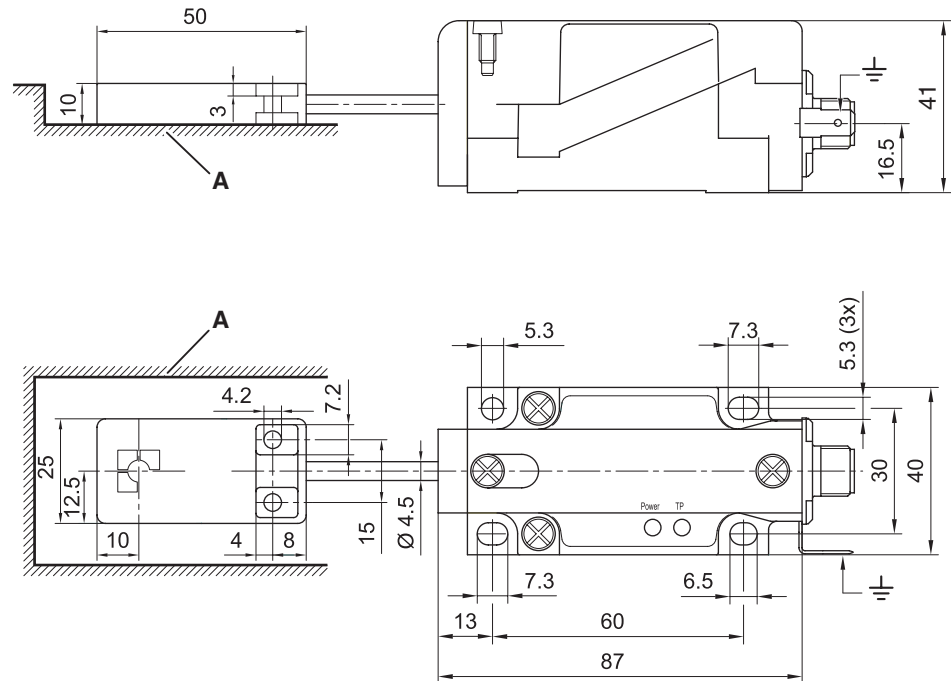


Fig. 13: Dimensions for BIS L-409-045-004-07-S4 processor [mm]

**A** Clear zone

**Characteristic  
data**

<b>BIS L-409-045-004-07-S4</b>				
Characteristic data when used with data carriers (installed in clear zone)	When $v = 0$ (static)			
	Distance [mm] read	Offset from center axis at distance: [mm]		
		0 - 10	0 - 15	0 - 20
BIS L-200-03 / BIS L-100-05*	15	10	–	–
BIS L-201-03 / BIS L-101-05*	18	12	12	–
BIS L-203-03 / BIS L-103-05*	10	4	–	–



**Note**

\* Data carrier converted into modus read only.

**Mechanical data**

Housing material	Plastic (PBT)
Read head housing material	CuZn nickel plated
Wiring	Connector, M12 4-pin, A-coded
Enclosure rating	IP67
Weight	170 g

**5** Technical data

**Electrical Data**

Operating voltage VS	24 V DC +10/-20 %
Ripple	≤ 10 %
Current draw	≤ 150 mA
Load current capacity in SIO mode	max. 50 mA
Output C/Q	Short circuit protected
Device interface	IO-Link

**Operating conditions**

Ambient temperature range	0 °C ... +70 °C
EMV – EN 301 489-1/-3 – EN 61000-4-2/-3/-4/-5/-6 – EN 300 330-1	– Class A – Level 3A/3A/4A/2A/3A – Power class 5
Vibration/shock	EN 60068 Part 2-6/27/29/32/64

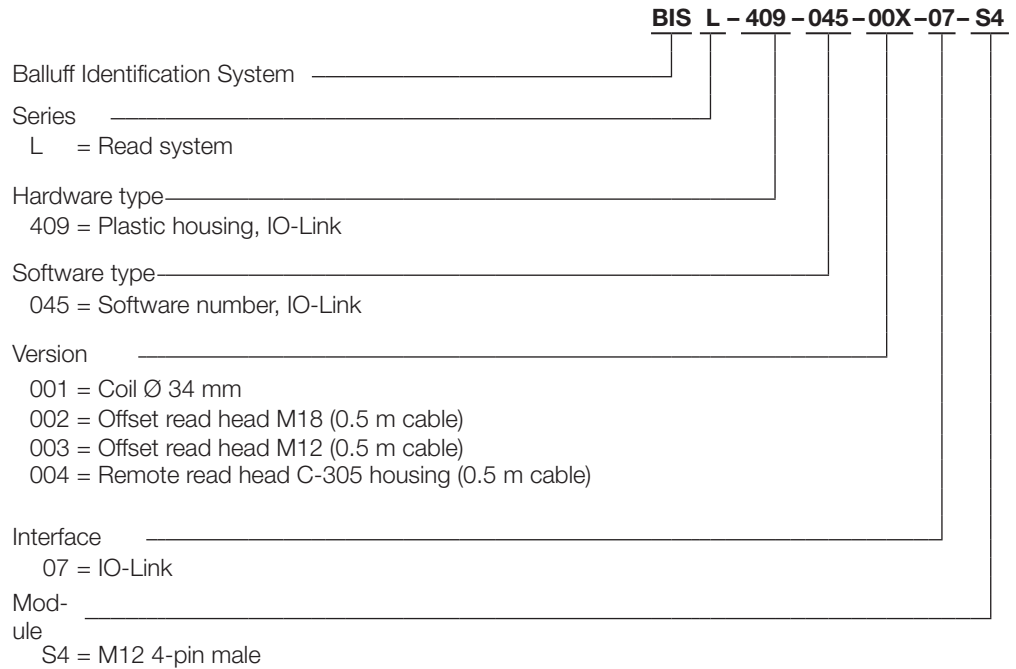
**Function indicators**

Two LEDs on the communications module indicate the status:

LED indicator	Function
LED green	Supply voltage present
LED yellow	Data carrier within read range (Tag Present)

**Appendix**

**Ordering code**



**Accessories  
(optional, not  
included)**

Accessories for the BIS L-409-... can be found in the Balluff IO-Link catalog.  
The catalog can be downloaded on the Internet at "www.balluff.de".

 **www.balluff.com**

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