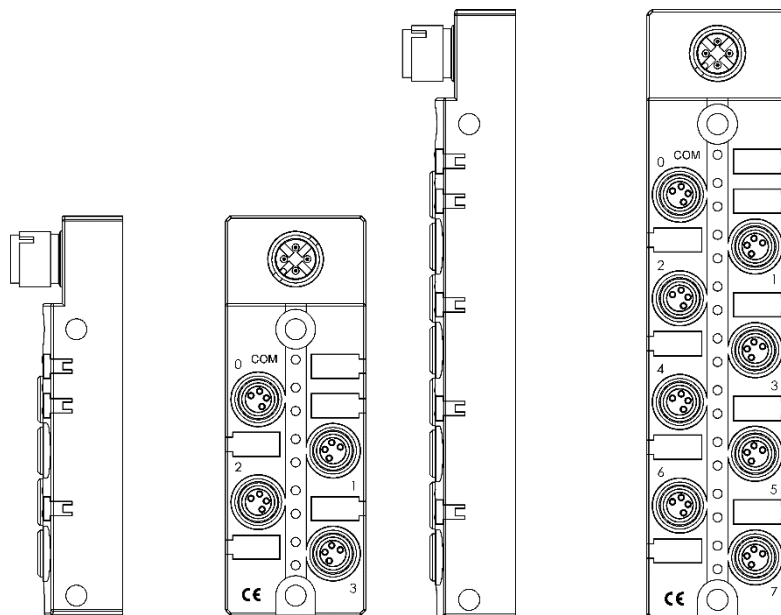


BNI IOL-102-000-K020 BNI IOL-104-000-K021 BNI IOL-102-S01-K020 BNI IOL-104-S01-K021



User's Guide



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1 Notes

- 1.1. Structure of the guide** The guide is organized so that the sections build on one another. Section 2: Basic safety information.
.....
- 1.2. Typographical conventions** The following typographical conventions are used in this guide.
- Enumerations** 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).
- Cross references** Cross references indicate where additional information on the topic can be found.
-
- 1.3. Symbols**
-  **Note**
This symbol indicates general notes.
-
-  **Attention!**
This symbol indicates a security notice which must be observed.
-
- 1.4. Abbreviations**
- | | |
|--------|-------------------------------|
| BNI | Balluff Network Interface |
| O-Port | Standard output port |
| DPP | Direct parameter page |
| IOL | IO-Link |
| EMC | Electromagnetic compatibility |
| FE | Function earth |
| SPDU | Service Protocol Data Unit |
- 1.5. Deviating views** Product views and illustrations in this user's guide may differ from the actual product. They are intended only as illustrative material.

2.1. Intended use

This guide describes the Balluff IO-Link sensor collector module, also called Sensor Hub. Connection to the host interface master is made through the IO-Link protocol. Functionally this compact, cost-effective module is comparable with a passive splitter box: It takes conventional sensor signals and passes them over the IO-Link interface.

2.2. Installation and startup



Attention!

Installation and startup are to be performed only by trained specialists. Qualified personnel are persons who are familiar with the installation and operation of the product, and who fulfill the qualifications required for this activity. Any damage resulting from unauthorized manipulation or improper use voids the manufacturer's guarantee and warranty. The Operator is responsible for ensuring that applicable safety and accident prevention regulations are complied with.

2.3. General safety notes

Commissioning and inspection

Before commissioning, carefully read the operating manual.

The system must not be used in applications in which the safety of persons is dependent on the function of the device.

Authorized Personnel

Installation and commissioning may only be performed by trained specialist personnel.

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 from EMC Class A. Such equipment may generate RF noise. The operator must take appropriate precautionary measures. The device may only be used with an approved power supply. 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.

Intended use is ensured only when the housing is fully installed.

2.4. Resistance to aggressive substances



Attention!

The BNI 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 BNI modules due to such aggressive media are no claims for defects.

Hazardous voltage



Attention!

Disconnect all power before servicing equipment.



Note

In the interest of product improvement, the Balluff GmbH reserves the right to change the specifications of the product and the contents of this manual at any time without notice.

3 Getting started

3.1. Connection overview 8 port module

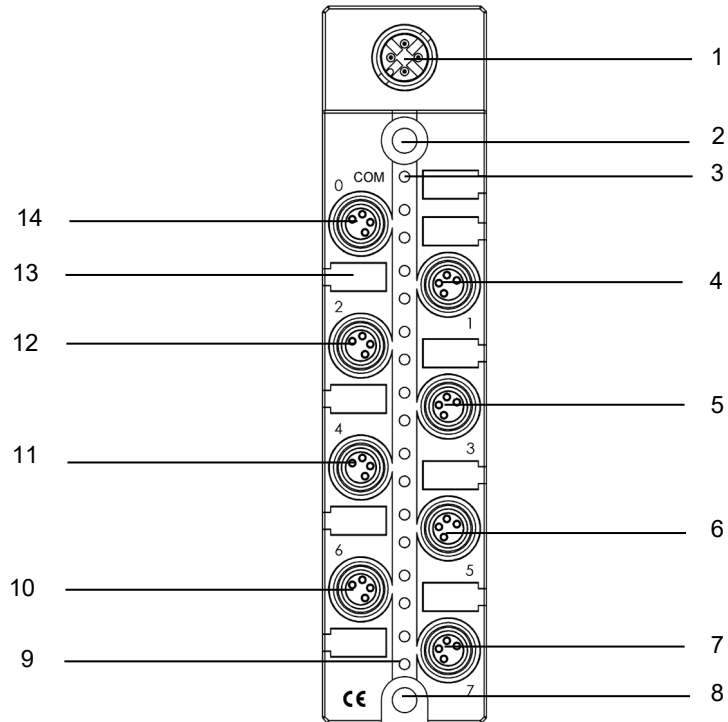


Figure 3-1: BNI IOL-104-000-K021 / BNI IOL-104-S01-K021

- | | |
|--------------------------------------|--|
| 1 IO-Link interface | 8 Mounting hole |
| 2 Mounting hole | 9 Port LED: Standard input port 7, Pin 4 |
| 3 Status LED: Communication / module | 10 Standard input port 6 |
| 4 Standard input port 1 | 11 Standard input port 4 |
| 5 Standard input port 3 | 12 Standard input port 2 |
| 6 Standard input port 5 | 13 Label |
| 7 Standard input port 7 | 14 Standard input port 0 |

3.2. Connection overview 4 port module

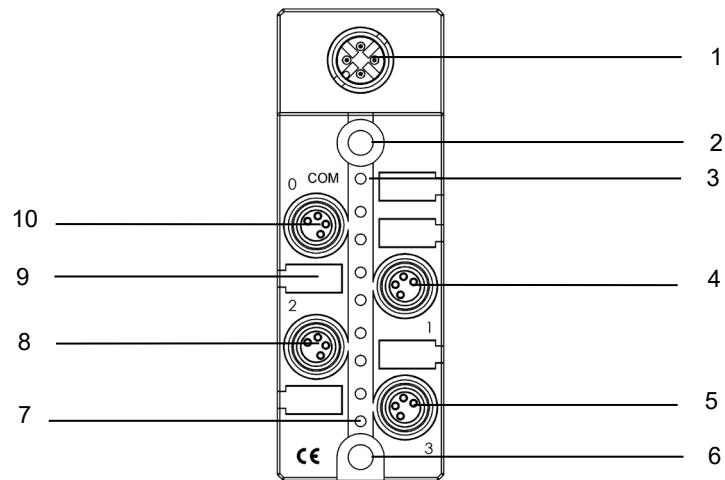


Figure 3-2: BNI IOL-102-000-K020 / BNI IOL-102-S01-K020

- 1 IO-Link interface
- 2 Mounting hole
- 3 Status LED: Communication / module
- 4 Standard input port 1
- 5 Standard input port 3
- 6 Mounting hole
- 7 Port LED: Standard input port 3 Pin 4
- 8 Standard input port 2
- 9 Label
- 10 Standard input port 0

3 Getting started

3.3. Mechanical connection

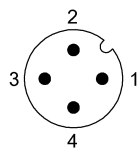
The Module BNI IOL ... modules are attached by using 2 M4 screws and 2 spacers.

3.4. Electrical connection

The sensor hub modules require no separate supply voltage connection. Power is provided through the IO-Link interface by the host IO-Link master.

3.5. IO-Link Interface

IO-Link (M12, A-coded, male)



Pin	Requirement
1	Power supply controller, +24V, max 1.1A
2	-
3	GND
4	C/Q, IO-Link Data transmission channel

Connecting the sensor hub

- Connection protection ground to FE terminal, if present.
- Connect the incoming IO-Link line to the sensor hub.



Note

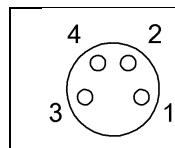
A standard 3 wire sensor cable is used for connection to the host IO-Link master.

Module versions

Sensor hub version	Digital I-port
BNI IOL-102-000-K020	8
BNI IOL-104-000-K021	16
BNI IOL-102-S01-K020	8 with single channel monitoring
BNI IOL-104-S01-K021	16 with single channel monitoring

Sensorinterface

Standard input port (M8, female)



PIN	Requirement
1	+24V, 100mA
2	Input
3	0 V, GND
4	Input



Note

For the digital sensor inputs follow the input guideline per EN61131-2, type 2.



Note

Unused I/O port socket must be fitted with cover caps to ensure IP67 protection rating.

4 IO-Link interface

4.1. IO-Link data

BNI IOL-102-000-K020	
Data transmission rate	COM2 (38,4 kBaud)
Frame type	2.1
Minimal cycle time	2.5 ms
Process data cycle time	2.5 ms, at minimal cycle time
Process data length	1 Byte

BNI IOL-104-000-K021 / BNI IOL-102-S01-K020	
Data transmission rate	COM2 (38,4 kBaud)
Frame type	2.2
Minimal cycle time	2.5 ms
Process data cycle time	2.5 ms, at minimal cycle time
Process data length	2 Bytes

BNI IOL-104-S01-K021	
Data transmission rate	COM2 (38,4 kBaud)
Frame type	1
Minimal cycle time	2.5 ms
Process data cycle time	10 ms, at minimal cycle time
Process data length	4 Byte

4.2. Process data / Output data

No output datas defined.

4 IO-Link interface

4.3. Process data / Input data

BNI IOL-102-000-K020 8 binary inputs

Byte	0							
Bit	7	6	5	4	3	2	1	0
Description	Input port 3 pin 4	Input port 2 pin 4	Input port 1 pin 4	Input port 0 pin 4	Input port 3 pin 2	Input port 2 pin 2	Input port 1 pin 2	Input port 0 pin 2

BNI IOL-102-S01-K020 8 binary inputs with single channel monitoring

Byte	0								1							
Bit	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0
Description	Input port 3 pin 4	Input port 2 pin 4	Input port 1 pin 4	Input port 0 pin 4	Input port 3 pin 2	Input port 2 pin 2	Input port 1 pin 2	Input port 0 pin 2	-	-	-	-	Error port 3 pin 4	Error port 2 pin 4	Error port 1 pin 4	Error port 0 pin 4

BNI IOL-104-000-K021 16 binary inputs

Byte	0								1							
Bit	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0
Description	Input port 7 pin 4	Input port 6 pin 4	Input port 5 pin 4	Input port 4 pin 4	Input port 3 pin 4	Input port 2 pin 4	Input port 1 pin 4	Input port 0 pin 4	Input port 7 pin 2	Input port 6 pin 2	Input port 5 pin 2	Input port 4 pin 2	Input port 3 pin 2	Input port 2 pin 2	Input port 1 pin 2	Input port 0 pin 2

4 IO-Link interface

BNI IOL-104-S01-K021

16 binary inputs with single channel monitoring

Byte	0								1							
Bit	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0
Description	Input port 7 pin 4	Input port 6 pin 4	Input port 5 pin 4	Input port 4 pin 4	Input port 3 pin 4	Input port 2 pin 4	Input port 1 pin 4	Input port 0 pin 4	Input port 7 pin 2	Input port 6 pin 2	Input port 5 pin 2	Input port 4 pin 2	Input port 3 pin 2	Input port 2 pin 2	Input port 1 pin 2	Input port 0 pin 2

Byte	2								3							
Bit	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0
Description	Error port 7 pin 4	Error port 6 pin 4	Error port 5 pin 4	Error port 4 pin 4	Error port 3 pin 4	Error port 2 pin 4	Error port 1 pin 4	Error port 0 pin 4	-	-	-	-	-	-	-	-

4 IO-Link interface

4.4. Parameter data/
Request data

	DPP	SPDU		Object name	Length	Range	Default value
	Index	Index	Sub-index				
Identification Data	07 _{hex} 07			Vendor ID	2 Byte	Read only	0378 _{hex}
	08 _{hex} 08						
	09 _{hex} 09			Device ID	3 Byte		0x050107 0x050109 0x050103 0x050105
	0A _{hex} 10						
	0B _{hex} 11						
		10 _{hex} 16	0	Vendor name	7 Byte		BALLUFF
		11 _{hex} 17	0	Vendor text	15 Byte		www.balluff.com
		12 _{hex} 18	0	Product name	20 Byte		BNI IOL-102-000-K020 BNI IOL-102-S01-K020 BNI IOL-104-000-K021 BNI IOL-104-S01-K021
		13 _{hex} 19	0	Product ID	7 Byte		BNI000T BNI001Z BNI0021 BNI0022
		14 _{hex} 20	0	Product text	22 Byte		Sensor-Hub digital M8 8 inputs Sensor hub digital M8 8 inputs SPC Sensor hub digital M8 16 inputs Sensor hub digital M8 16 inputs SPC
	16 _{hex} 22	0	Hardware Revision	1 Byte	-		
	17 _{hex} 23	0	Firmware Revision	23 Byte	-		

	DPP	SPDU		Object name	Length	Range	Default value
	Index	Index	Sub-index				
Parameter Data		40 _{hex} 64	0 1-8	Inversion	1 Byte	0-FF	0 _{hex}

4 IO-Link interface

Inversion of the inputs 40_{hex}

BNI IOL-102-xxx-K020

Byte	0							
Bit	7	6	5	4	3	2	1	0
Description	Inversion port 3 pin 4	Inversion port 2 pin 4	Inversion port 1 pin 4	Inversion port 0 pin 4	Inversion port 3 pin 2	Inversion port 2 pin 2	Inversion port 1 pin 2	Inversion port 0 pin 2

Inversion port (x):

0 - normal
1 - Inverted

BNI IOL-104-xxx-K021

Byte	0								1							
Bit	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0
Description	Inversion port 7 pin 4	Inversion port 6 pin 4	Inversion port 5 pin 4	Inversion port 4 pin 4	Inversion port 3 pin 4	Inversion port 2 pin 4	Inversion port 1 pin 4	Inversion port 0 pin 4	Inversion port 7 pin 2	Inversion port 6 pin 2	Inversion port 5 pin 2	Inversion port 4 pin 2	Inversion port 3 pin 2	Inversion port 2 pin 2	Inversion port 1 pin 2	Inversion port 0 pin 2

Inversion port (x):

0 - normal
1 - Inverted

4 IO-Link interface

4.5. Errors

Error Code	Additional Code
Device application error 0x80	Index not available 0x11
Device application error 0x80	Subindex not available 0x12
Device application error 0x80	Value out of range 0x30

4.6. Events

Class / Qualifier			Code (high + low)			
Mode	Type	Instance				
Appears	Error	AL	Device Hardware	Supply	Supply low voltage	U2 = Supply + 24V
0xC0	0x30	0x03	0x5000	0x0100	0x0010	0x0002
0xF3			0x5112			
Disappears	Error	AL	Device Hardware	Supply	Supply low voltage	U2 = Supply + 24V
0x80	0x30	0x03	0x5000	0x0100	0x0010	0x0002
0xB3			0x5112			
Appears	Error	AL	Device Hardware	Supply	Supply periphery	
0xC0	0x30	0x03	0x5000	0x0100	0x0060	
0xF3			0x5160			
Disappears	Error	AL	Device Hardware	Supply	Supply periphery	
0x80	0x30	0x03	0x5000	0x0100	0x0060	
0xB3			0x5160			

5 Technical Data

5.1. Dimensions

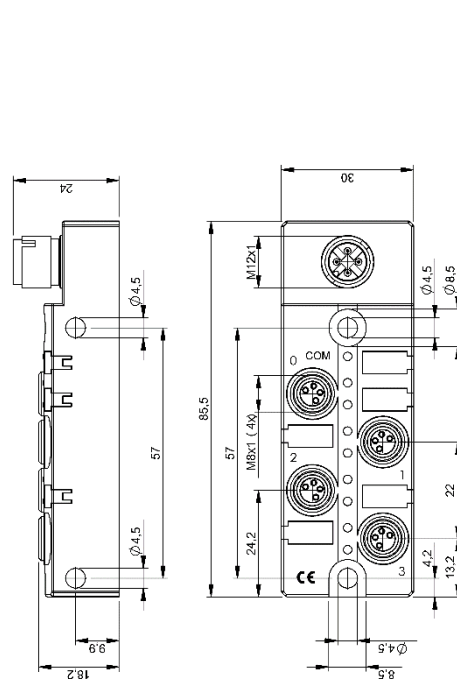


Figure 5-1: BNI IOL-102-xxx-K020

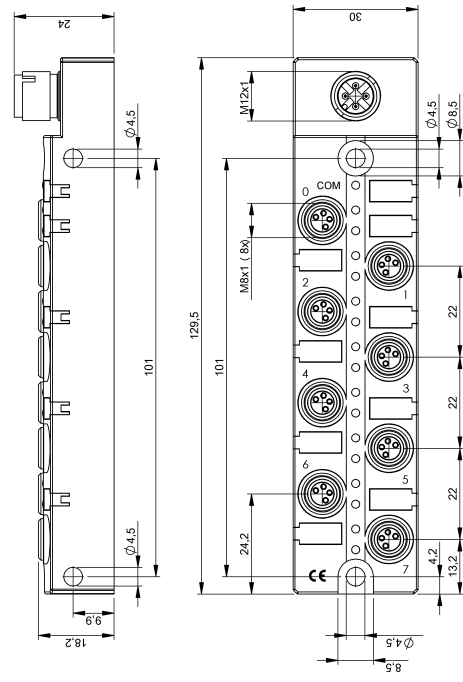


Figure 5-2: BNI IOL-104-xxx-K021

5.2. Mechanical data

Housing material	Plastic	
IO-Link port	M12, A-coded, male	
I-ports	M8, female, 4-pole	
Enclosure rating per IEC 60529	IP 67 (only when plugged and threaded in)	
Dimensions (W x H x D in mm)	BNI IOL-102-000-K020 BNI IOL-102-S01-K020	30 x 85 x 24
	BNI IOL-104-000-K021 BNI IOL-104-S01-K021	30 x 129 x 24
Weight	BNI IOL-102-000-K020 BNI IOL-102-S01-K020	65.4 g
	BNI IOL-104-000-K021 BNI IOL-104-S01-K021	96.6 g

5.3. Electrical data

Operating voltage	18...30.2 V DC, per EN 61131-2
Ripple	< 1%
Current draw without load	<= 40 mA

5.4. Operating conditions

Ambient temperature	-5 °C ... 55 °C
Storage temperature	-25 C ... 70 °C

5 Technical Data

5.5. LED indicators

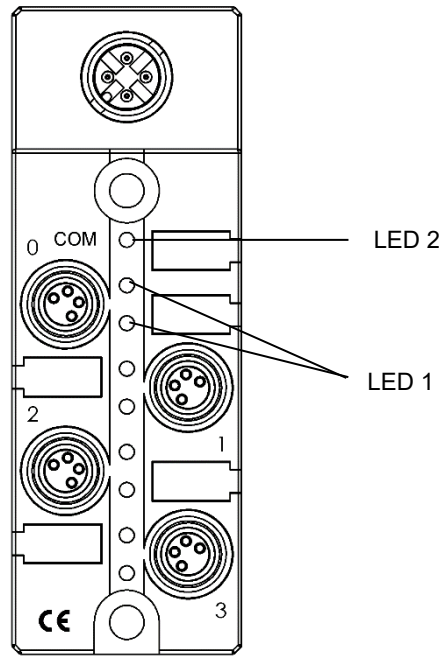


Figure 5-3: LED Anzeigen

Module status

LED 2, Communication / module supply

LED	Indication	Function
LED 2	Green	No communication, supply ok
	Green, negative pulsed	Communication ok, supply ok
	Red, flashing	Communication fault, supply undervoltage / overload

**LED I-ports
Standard**

BNI IOL-102-000-K020 / BNI IOL-104-000-K021
LED 1, I-Port Pin 4, Pin 2

Indication	Function
Yellow, static	Input signal = 1
Off	Input signal = 0

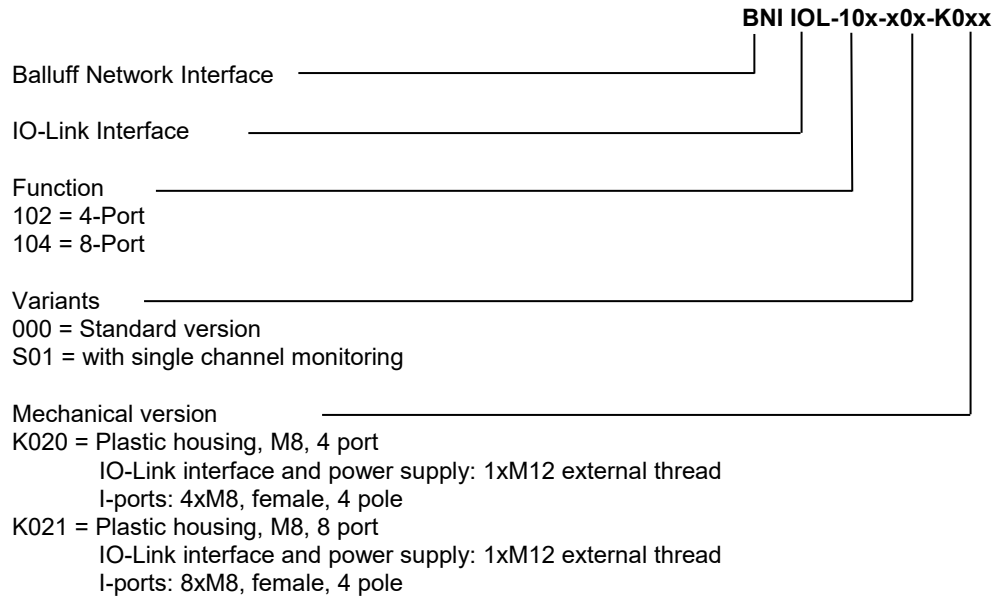
**LED I-ports with
single channel
monitoring**

BNI IOL-102-S01-K020 / BNI IOL-104-S01-K021
LED 1, I-Port Pin 4, Pin 2 with single channel monitoring

Indication	Function
Yellow, static	Input signal = 1
Off	Input signal = 0
Red	Short circuit between 24V DC und 0V, GND

6 Appendix

6.1. Product ordering code



6.2. Order information

Product ordering code	Order code
BNI IOL-102-000-K020	BNI000R
BNI IOL-102-S01-K020	BNI001Z
BNI IOL-104-000-K021	BNI0021
BNI IOL-104-S01-K021	BNI0022

6.3. Scope of delivery

- BNI IOL-.....consists of the following components:
- IO-Module
 - 2 filler plugs M8
 - 12 Labels
 - Installation guide

www.balluff.com

Balluff GmbH
Schurwaldstrasse 9
73765 Neuhausen a.d.F.
Deutschland
Tel. +49 7158 173-0
Fax +49 7158 5010
balluff@balluff.de