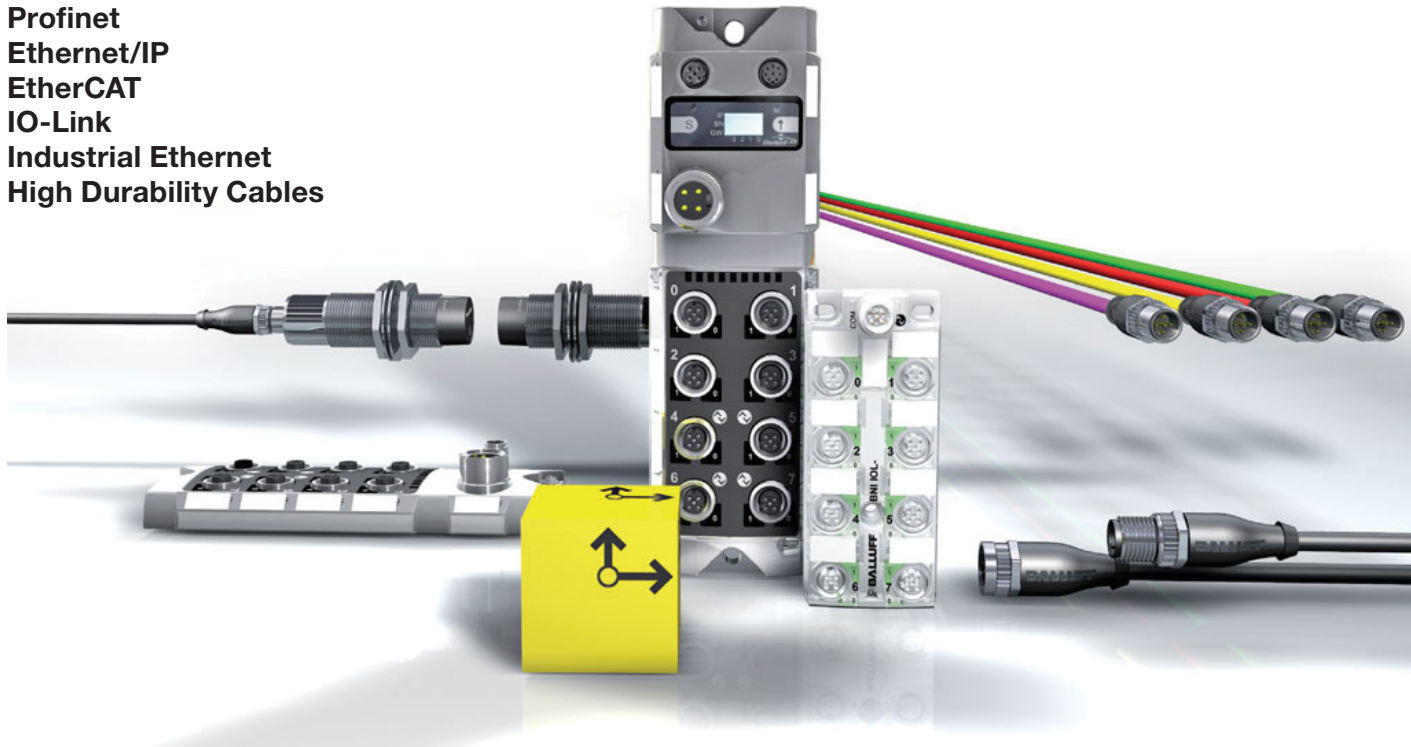
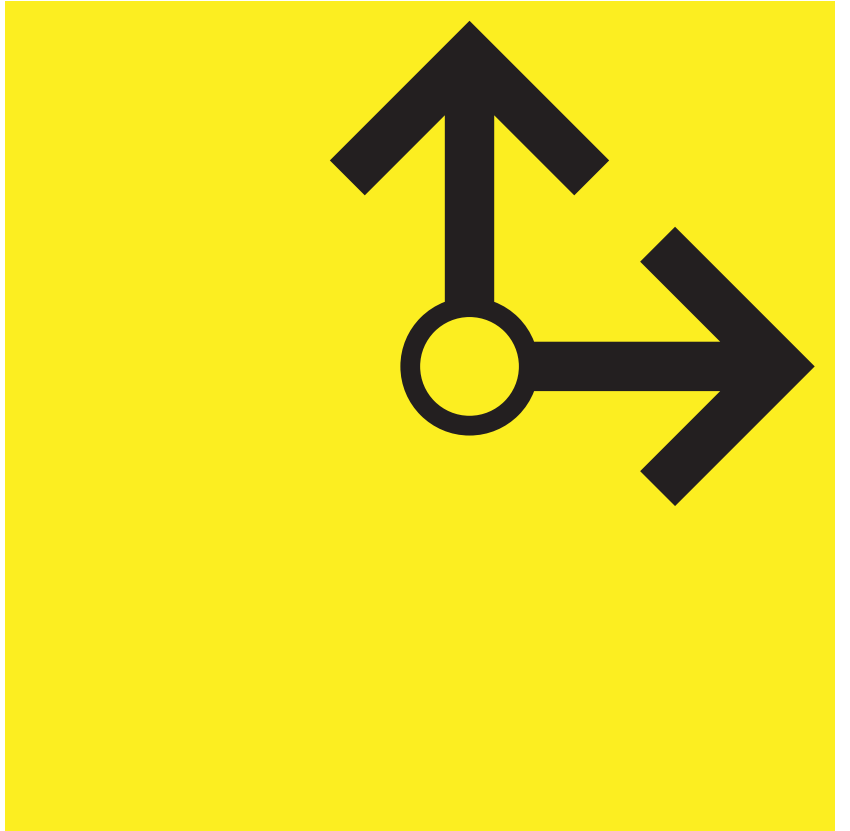


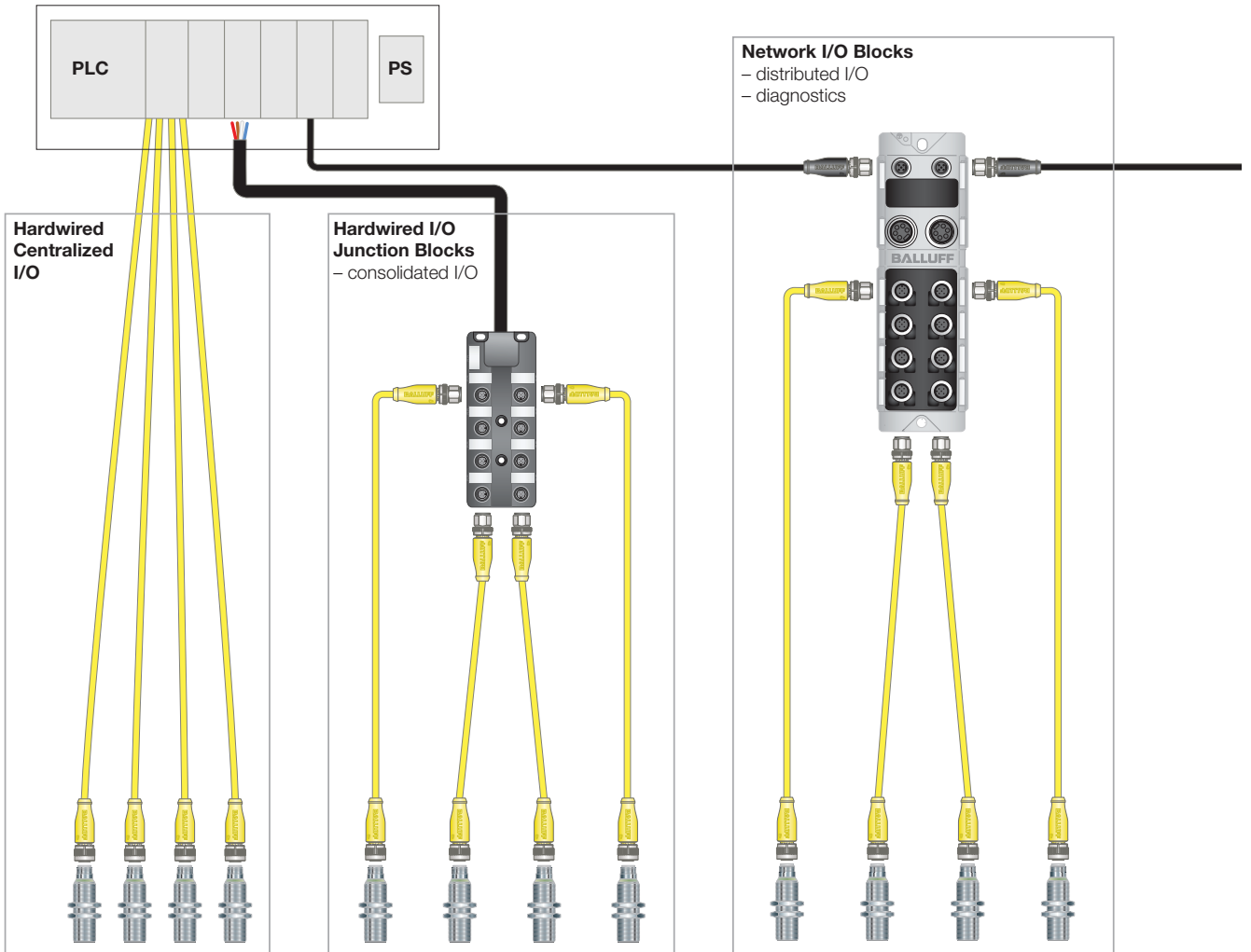
# Industrial Networking and Connectivity

DeviceNet  
Profinet  
Ethernet/IP  
EtherCAT  
IO-Link  
Industrial Ethernet  
High Durability Cables





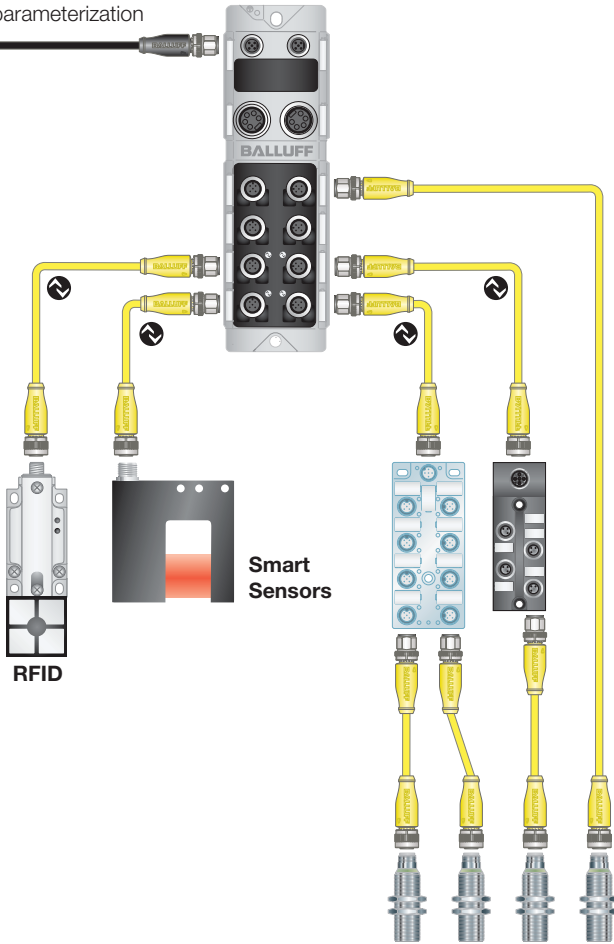
Industrial Networking and Connectivity  
System technology networked with intelligence





### Network Blocks with IO-Link

- distributed I/O
- diagnostics
- scalable
- parameterization



www.balluff.com

### Hardwired Centralized I/O

#### Advantages

- Low component cost
- Basic electrical knowledge needed
- Low MRO costs

#### Disadvantages

- No diagnostics
- Hard to troubleshoot
- High maintenance cost
- Large number of cables routed to controls cabinet
- Long sensor cables
- Long downtime

### Hardwired I/O with Junction Blocks

#### Advantages

- Low component cost
- Basic electrical knowledge needed
- Low MRO costs
- Fewer multi-conductor cables back to controls cabinet

- Shorter sensor cables

#### Disadvantages

- No diagnostics
- Hard to troubleshoot
- High maintenance cost
- Long downtime

### Network I/O Blocks

#### Advantages

- Diagnostics
- Faster troubleshooting
- One cable back to the controls cabinet
- Lower maintenance cost
- Shorter sensor cables
- Higher up time

#### Disadvantages

- Higher component costs
- Network knowledge needed

### IO-Link Modular Network I/O

#### Advantages

- Diagnostics
- Faster troubleshooting
- One cable back to the controls cabinet
- Lower maintenance cost
- Shorter sensor cables
- Higher up time

- Scalable

- Parameterization

#### Disadvantages

- Higher component costs
- Network knowledge needed

## IO-Link DeviceNet IO-Link master



### DeviceNet – Second generation with display

In use for years, DeviceNet stands for well-engineered fieldbus technology and reliably supports modern manufacturing. As a full-service provider, Balluff offers a wide range of components for optimum DeviceNet use. Regardless of controller manufacturer, users can choose their ideal solution for efficient field and process communication with simple wiring and fast integration through direct installation in their system and the possibility of fast modifications - even in harsh environments.

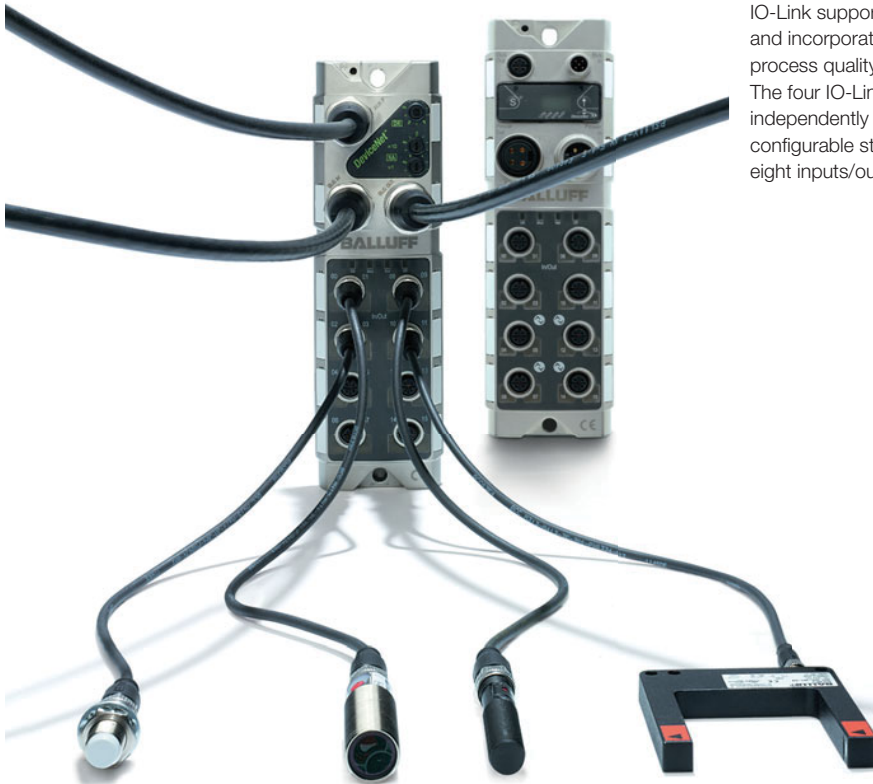
The second generation of our DeviceNet module has a more user-friendly display. Station numbers can be set on the block or module information, such as hardware and software status, can be called up. This increases security and simplifies maintenance.

### DeviceNet modules with IO-Link functionality

Balluff DeviceNet modules provide IO-Link, so that all the advantages of the high-performance communications standard extend down into the lowest level. IO-Link not only ensures freedom of installation, but also guarantees simplified wiring, integrated diagnostics and central configuration.

System failures can be prevented more reliably and systems restarted more quickly if a failure occurs. Thus DeviceNet with IO-Link supports optimum operation. Users gain time, save costs and incorporate intelligent connection technology to improve process quality.

The four IO-Link master ports are to be configured and used fully independently of one another. This makes four additional, freely configurable standard I/O ports available, which provide a further eight inputs/outputs for standard sensors and actuators.



 **IO-Link**  
Version 1.1



Fieldbus	DeviceNet
Design	4x IO-Link, 16x I/O
<b>Ordering code</b>	<b>BNI005A</b>
Part number	BNI DNT-502-100-Z001
Supply voltage $U_B$	18...30 V DC
Indicators/input	Display/pushbutton
Function indicator	BUS/RUN
Module status indicator: Mod LED	Yes
Network status indicator: Net LED	Yes
Port status indicator	Black, red, yellow
Connection: Fieldbus	M12, B-coded, socket/plug
Connection: AUX power	7/8", male, 5-pin
Connection: I/O ports	M12, A-coded, female
No. of I/O ports	8
Number of inputs	Max. 16
Number of outputs	Max. 16
Configurable inputs/outputs	Yes
Max. load current sensors/channel	200 mA
Max. output load current	1.6 A/2 A
Port status indicator (signal status)	Yellow LED
Port diagnostic indicator (overload)	Red LED
Total current $U_{Actuator}$	< 9 A
Total current $U_{Sensor}$	< 9 A
Degree of protection as per IEC 60529	IP 67 (when screwed into place)
Operating temperature $T_a$	-5...+70 °C
Storage temperature	-25...+70 °C
Mounting	2 mounting holes
Dimensions (LxWxH)	225x68x36.9 mm
Housing material	Nickel-plated die-cast zinc

#### IO-Link Version 1.1

No. of IO-Link master ports	4x master
Operating modes (3-wire)	SIO, COM 1, COM 2, COM 3
Indicators	Communication
	Error
Max. load current for IO-Link device	1.6 A

## 8-fold IO-Link Master

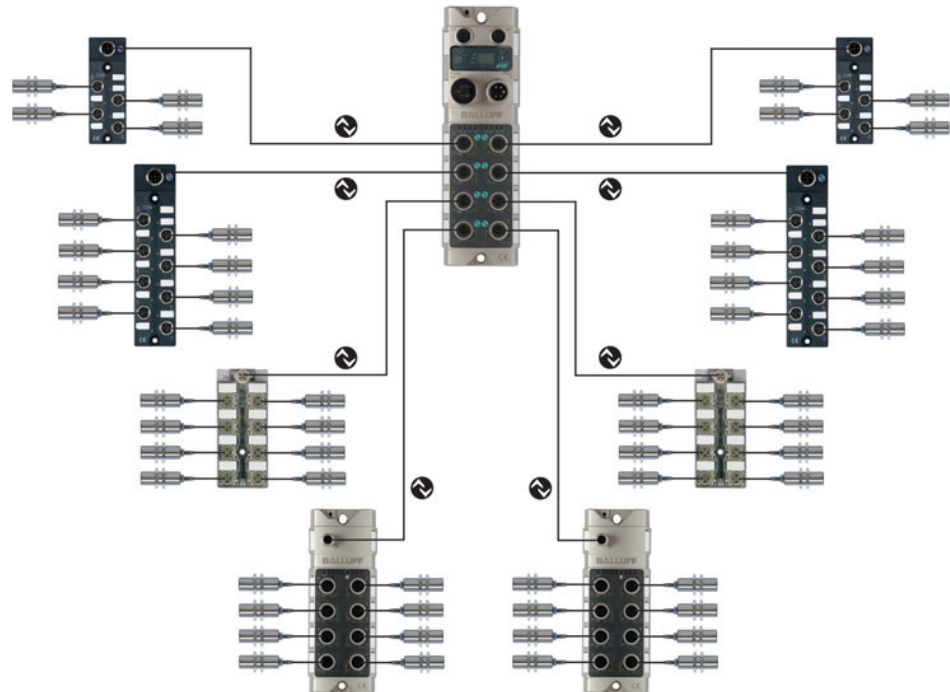
### Profinet, Ethernet/IP, and EtherCAT fieldbus modules with eight IO-Link ports

#### 128 IOs on a module

#### Balluff IO-Link solutions save cash money

Until now, at least 8 fieldbus modules had to be used in order to be able to activate 128 IOs. Today, a single Profinet module is sufficient. In connection with our extremely cost-effective sensor/actuator hubs, now up to 128 IO signals can be processed with the most efficiency. In this way, compared to the standard fieldbus modules, there is a high cost savings of 15 to 20% per input. If you add the savings from the fieldbus and power cables to that, you can even achieve a 30 to 40% savings.

A cost-effective M12 BCC standard cable is sufficient to switch on a sensor/actuator hub. Furthermore, sensor hubs need just one bus address so that they can variably group sensor signals together within an area of 20 m and ensure exceptional efficiency.

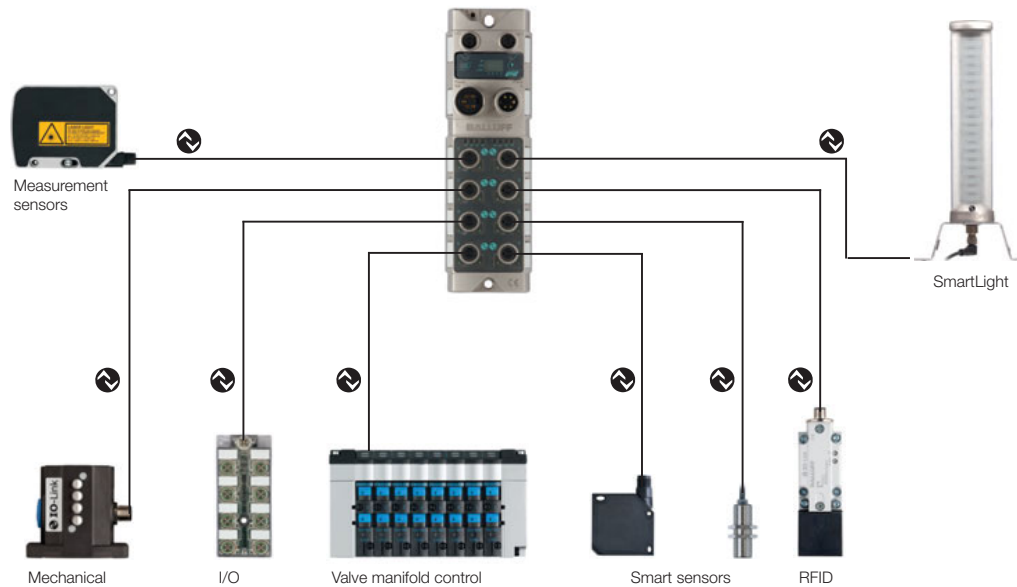


**1000 tasks, one module:**

**The industrial Ethernet modules with eight IO-Link ports**

Whether position measurement, object detection, identification, fluid sensor applications, temperature or pressure measurement—IO-Link makes the industrial Ethernet modules module suitable for every job. IO-Link provides nothing but advantages for installing standard sensors; it can also integrate intelligent devices via the same interface. With that, the module provides a uniform interface from the signal to the control level.

There are frequently high costs associated with field installation of intelligent devices, as shielded cable and intelligent interface cards such as analog input cards are used in the controller. IO-Link not only makes error-prone analog inputs unnecessary, it also reduces the wiring, inspection and hardware effort. With simple plug-and-play of unshielded, cost-effective M12 lines, the system is quickly and securely brought into operation.





## Profinet and Ethernet/IP Innovations from Balluff

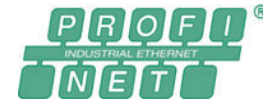
### Second generation with display, integrated switch and Web server

Profinet is increasingly becoming the communications medium of the future for mechanical and plant engineering. In some areas, it has already incrementally replaced Profibus. Based on Ethernet, communication over Profinet is significantly faster, and the volume of data is significantly higher than with classic fieldbus systems and allows the connection of time-critical drive technology. Furthermore, Profinet is quick to install and integrates easily into existing networks. In addition to time savings and considerable cost savings comes the added benefit of ease of operation. This is because only Balluff provides Profinet modules with a display that allows IP addresses to be blocked, protecting the modules from accidental changes. This increases security and simplifies maintenance.

IO-Link plays a major role in the second generation of these Profinet modules. The Profinet module with IO-Link functionality has four or eight IO-Link master ports, which the user can configure and use completely independently of one another. In addition to the IO-Link functionality, each port can simultaneously be used as an input or output for standard sensors and actuators.

As a new feature, the second generation of Profinet provides an integrated 2-port Ethernet switch that makes it possible to install a linear topology in the system without an additional external switch.

The integrated Web server is also a new feature of this second product generation.



Fieldbus	Profinet	
Design	8x IO-Link, 16x DI/DO	
<b>Ordering code</b>	<b>BNI005H</b>	
Part number	BNI PNT-508-105-Z015	
Supply voltage $U_s$	18...30 V DC	
Function indicator	BUS/RUN	
Indicators/input	Display/pushbutton	
Module current consumption		
AUX input/output power status UO LED		
Module status indicator: Mod LED	Yes	
Network status indicator: Net LED	Yes	
Port status indicator	Black, red, yellow	
Connection: Fieldbus	M12, D-encoded, female	
Connection: AUX power	7/8", male, 5-pin	
Connection: I/O ports	M12, A-coded, female	
No. of I/O ports	8	
Number of inputs	Max. 16 PNP	
Number of outputs	Max. 16 PNP	
Configurable inputs/outputs	Yes	
Max. load current sensors/channel	200 mA	
Max. output load current	1.2 A/2 A	
Port status indicator (signal status)	Yellow LED	
Port diagnostic indicator (overload)	Red LED	
Total current $U_{\text{actuator}}$	≤ 9 A	
Total current $U_{\text{sensor}}$	≤ 9 A	
Degree of protection as per IEC 60529	IP 67 (when screwed into place)	
Operating temperature $T_a$	-5...+70 °C	
Storage temperature	-25...+70 °C	
Mounting	2 mounting holes	
Dimensions (LxWxH)	225x68x36.9 mm	
Housing material	Nickel-plated die-cast zinc	

#### IO-Link Version 1.1

No. of IO-Link master ports	8x master	
Operating modes (3-wire)	SIO, COM 1, COM 2, COM 3	
Indicators	Communication	Green LED
	Error	Red LED
Max. load current for IO-Link device	1.2 A	



8x  
IO-Link



EtherNet/IP
8x IO-Link, 16 DI/DO PNP
<b>BNI006A</b>
BNI EIP-508-105-Z015
18...30 V DC
120 mA...130 mA
US/no
Yes
Yes
Black, red, yellow
M12, D-encoded, female
7/8", male, 4-pin
M12, A-coded, female
8
Max. 16 PNP
Max. 16 PNP
Yes
200 mA
1.6 A/2 A
Yellow LED
Red LED
≤ 9 A
≤ 9 A
IP 67 (when screwed into place)
-5...+70 °C
-25...+70 °C
2 mounting holes
225x68x36.9 mm
Nickel-plated die-cast zinc

8x master
SIO, COM 1, COM 2, COM 3
Green LED
Red LED
1.6 A

### Ethernet/IP with IO-Link functionality

Now IO-Link communicates not only with Profibus, Profinet and CC-Link, but now also with Ethernet/IP, so that all the benefits of IO-Link are available right down to the lowest level.

IO-Link not only ensures freedom of installation, but also guarantees simplified wiring, integrated diagnostics and central configuration. System failures can be prevented more reliably and systems restarted more quickly if a failure occurs.

Thus Ethernet/IP with IO-Link supports optimum operation. Users gain time, save costs and incorporate intelligent connection technology to improve process quality.

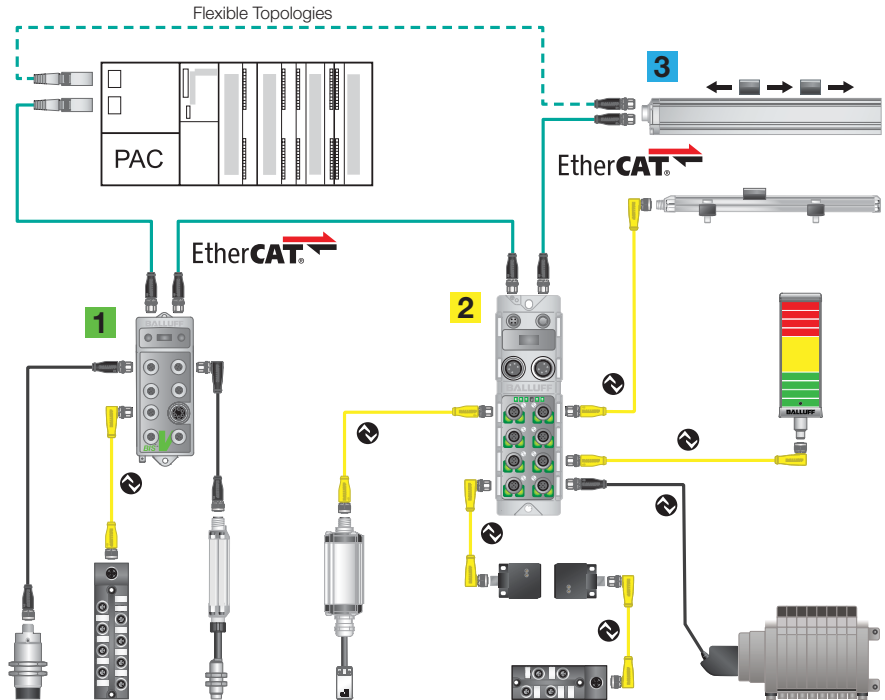
The Ethernet/IP module with IO-Link includes four or eight IO-Link master ports that can be configured and used fully independently of one another. In addition to the IO-Link functionality, each port can simultaneously be used as an input or output for standard sensors and actuators.



# IO-Link

## Expanding the value of EtherCAT

When implementing EtherCAT into automation equipment, Balluff adds a unique set of benefits to the existing portfolio in the market. Whether you are in assembly automation, packaging, plastics, research, energy or any other industry, there is a need for tracking and communicating data. Requirements demand flexibility for change down the road, which Balluff brings with linear position monitoring, traceability and distributed modular I/O.



**1**

### Traceability with EtherCAT

Traceability is the act of documenting every step in a process chain. Manufacturers use this information to gain visibility to achieve on-time delivery, lean manufacturing, enhanced quality and regulatory compliance. It is also used to track assets, logistics and material movement. Traceability can be easily implemented over EtherCAT in a variety of ways. Using RFID systems native on EtherCAT with proven technology from Balluff makes traceability easy to integrate into any system or process. See page 55.

**2**

### Distributed Modular I/O over EtherCAT

Distributed Modular I/O with IO-Link gives EtherCAT access to many powerful technologies already available on the market from a variety of vendors. The universal, smart and easy IO-Link technology works like USB for industrial automation and is easily configured in the engineering software with simple byte selections. Key Balluff technologies available with IO-Link are: RFID, non-contact couplers, valve manifold connectors, the SmartLight indicator and smart sensors like linear transducers and pressure sensors.

**3**

### Position Monitoring with EtherCAT

Position monitoring is a key technology utilized in automation designs. This is a necessity when working in precise and synchronized applications. EtherCAT is an ideal network for this. Linear transducers can be used to provide closed loop motion control or provide basic position measurement for applications that don't require closed loop control. Balluff offers linear transducers for mounting inside a hydraulic cylinder or externally mounting adjacent to the axis of motion. See page 98.

# EtherCAT®

CE  
IO-Link



Fieldbus	EtherCAT
Design	8× IO-Link, 16× I/O
<b>Ordering code</b>	<b>BNI0077</b>
Part number	BNI ECT-508-105-Z015
Supply voltage $U_B$	18...30 V DC
Indicators/input	Display/pushbutton
Function indicator	BUS/RUN
Module status indicator: Mod LED	Yes
Network status indicator: Net LED	Yes
Port status indicator	Black, red, yellow
Connection: Fieldbus	M12, D-coded, socket
Connection: AUX power	7/8", male, 5-pin
Connection: I/O ports	M12, A-coded, female
No. of I/O ports	8
Number of inputs	Max. 16
Number of outputs	Max. 16
Configurable inputs/outputs	Yes
Max. load current sensors/channel	200 mA
Max. output load current	1.2 A/2 A
Port status indicator (signal status)	Yellow LED
Port diagnostic indicator (overload)	Red LED
Total current $U_{Actuator}$	< 9 A
Total current $U_{Sensor}$	< 9 A
Degree of protection as per IEC 60529	IP 67 (when screwed into place)
Operating temperature $T_a$	-5...+70 °C
Storage temperature	-25...+70 °C
Mounting	2 mounting holes
Dimensions (L×W×H)	225×68×36.9 mm
Housing material	Nickel-plated die-cast zinc

### IO-Link Version 1.1

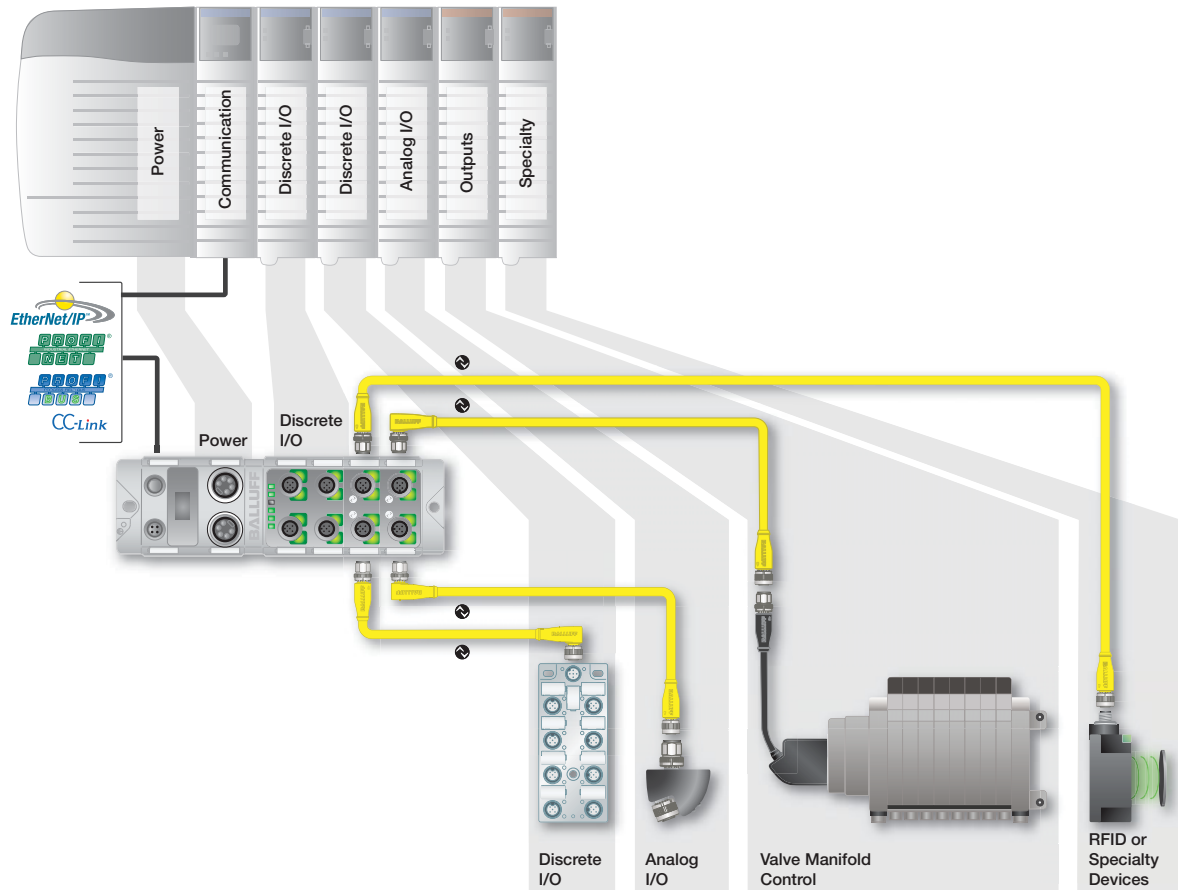
No. of IO-Link master ports	8× master
Operating modes (3-wire)	SIO, COM 1, COM 2, COM 3
Indicators	Communication
	Error
Max. load current for IO-Link device	1.2 A

IO-Link  
Version 1.1

## IO-Link Distributed Modular I/O

Think of a remote “slice” I/O solution. In a typical application, the communication head and the power supply sit on the left hand side and are followed along the backplane by the individual I/O devices, such as discrete 24V input cards or 0-10V analog cards. Usually there are a limited number of slots available in the backplane and individual slices of control components can be inserted.

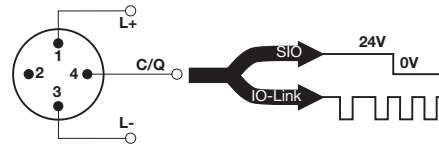
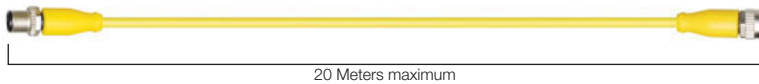
In a similar fashion, a Distributed Modular I/O system has a communications head that talks over the desired industrial network on one side and acts as a data collector on the right hand side. In lieu of a backplane, each device is connected to an industry standard M12 port utilizing a basic 3-wire sensor cable for communication. With the ability to be installed within a 20 meter radius from the data collector devices can be easily distributed across the machine.



## The backplane of Distributed Modular I/O = IO-Link

Utilizing a widely accepted and open point to point technology, IO-Link, a Distributed Modular I/O system is fieldbus independent, is easily configured and is vendor neutral. Process data shows up as simple packets of bytes in the controller for easy integration. The parameterization data allows the devices to be quickly configured using simple read/write commands, and best of all, there is no "sub-bus" to cause headaches, nor is there some new protocol to be educated on. The digital signal is carried over pin 4 of a standard cable and 24V power is provided to the device in a standard configuration. If required, the IO-Link port can be used for a standard I/O point.

### 3 Wire or 4 Wire Sensor Cable



## Types of Distributed Modular I/O devices

### Discrete I/O

M8 ports  
– Up to 16 inputs



M12 ports  
– Up to 16 inputs  
– 16 outputs  
– 16 configurable



IP20 terminals  
– Up to 16 configurable



### Analog I/O

1 channel (14 bit)  
– 0-10 V in/out  
– 4-20mA in/out  
– PT100 in



4 channels (10 bit)  
– 0-10 V in  
– 4-20mA in  
– plus 8 inputs



### Valve Manifold Control

25 pin D-sub



IP67 & Terminal



### Specialty Devices and RFID

Intelligent sensors



RFID  
– Read/write  
– Read only



Non-contact connectors  
– 3 bytes to 11 bytes



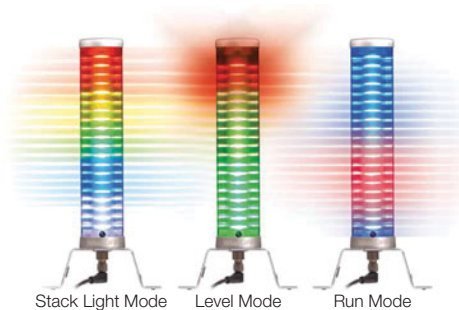
# IO-Link

## SmartLight – for signaling operating states

### Stack light & visualization functions with one configurable part number

Whether you are a machine builder interested in reducing the total cost of your machine or an end-user trying to keep your machine operational on a daily basis, the selection of control components can directly impact your success. This is even more true when it comes to the selection of status indicators in your process. It is also important for workers like operators, fork truck drivers, maintenance, and management to clearly and visually understand the status of their workstation, their next load, their next fix or understand the bottlenecks in the production. In these types of applications a stack light or HMI is typically integrated to communicate the status of the process. By using a software-configurable SmartLight to indicate machine status, you can simplify the visual indication with a single part number that costs less than most HMIs.

The Balluff SmartLight can be connected to virtually any industrial network via the open and universal standard, IO-Link. This device can be used with a variety of IP67 distributed modular I/O products offered from a variety of IO-Link vendors which eliminates the need to have a remote I/O box simply to control an indicator light. Balluff's SmartLight can function in any of three modes, can be configured on the fly, and is controlled using simple bitmaps for the outputs.



### Stack Light Mode

- Program 1-5 positions of 20 rows of 360° LEDs
- Choose from 5 standard colors or configure new
- Easily switch between solid, flashing, and blinking

### Level Mode

- Tie a bar meter type scale to an analog value
- Program high level or low level indication
- Freely configure the colors, zones, and levels

### Run Mode

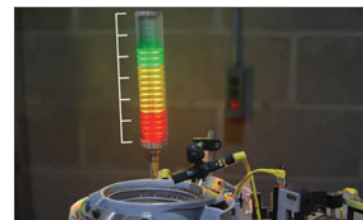
- Indicate running status with a simple scrolling light
- Signal a problem or action required
- Freely configure the color or the scrolling light, background, and speed

### Stack Light Process Indication

Stack lights in use today come in an overwhelming variety of options and configurations that can make keeping the right spare parts and light bulbs in the store room frustrating. This happens for end users because the equipment comes in with a variety of hardware or because the machine builders' customers specify all different brands and configurations. The SmartLight allows for one part number to cover all applications. Since this device uses an industry standard M12 connector and is IP54, it can be mounted right on the machine for simple and quick installation without the need for a remote I/O box or multiple terminations in the controller.

### Level Visualization

Sometimes there is a need to communicate status beyond just on/off or the need to visualize a measurement or speed. These kinds of indications can be expensive, requiring an HMI for a simple meter, a digital bar meter, or a display with analog outputs. Other costly elements like an enclosure and remote I/O devices could also be needed. The SmartLight's level mode can be used for a variety of indications such as: machine speed, throughput, output quality, operator performance to quota, position of a part, feeder bowl level, hopper level, container level, tank level, output bin level, kanban systems, or pick-to-light.





IO-Link	Device	Device
Designation	SmartLight, 1-5 zones	SmartLight, 1-3 zones
<b>Ordering code</b>	<b>BNI0072</b>	<b>BNI007F</b>
Part number	BNI IOL-802-000-Z036	BNI IOL-801-000-Z036
Supply voltage $U_B$	18...30 V DC	18...30 V DC
Function indicator IO-Link RUN	Green LED	Green LED
Power-on indicator	Green LED	Green LED
Connection: IO-Link	M12, A-coded, male	M12, A-coded, male
Connection $U_A$	via IO-Link interface	via IO-Link interface
Configurable	Yes	Yes
Max. load current of actuators	0.35 A	0.35 A
Degree of protection as per IEC 60529	IP 54 (only in plugged-in and screwed-down state)	IP 54 (only in plugged-in and screwed-down state)
Operating temperature $T_a$	-5...+70 °C	-5...+70 °C
Storage temperature	-25...+70 °C	-25...+70 °C
Mounting	M18 thread	M18 thread
Dimensions (L×W×H)	55×55×295 mm	55×55×213 mm
Housing material	Transparent polycarbonate, nickel-plated die-cast zinc	Transparent polycarbonate, nickel-plated die-cast zinc

#### IO-Link Version 1.1

Transfer rate	COM 2 (38.4 kBaud)	COM 2 (38.4 kBaud)
Cycle time	5 ms with IO-Link 1.1 Master 20 ms with IO-Link 1.0 Master	5 ms with IO-Link 1.1 Master 20 ms with IO-Link 1.0 Master
Indicators	Communication	Flashing green LED
	Power supply	Static green LED
IO-Link process data length	3 byte output	3 byte output





## IO-Link

### M12 metal sensor hubs, 16 binary inputs/outputs

The metal sensor hubs in their robust housing are suitable for installation in very harsh industrial environments, such as in machine tools or steel mills. Based on M12 connectors, metal sensor hubs are simple to install and fulfill the requirements for cost-effective installation and maintenance.

Port-specific single-channel monitoring detects short circuits, overloading at the port and offers a unique degree of selective diagnostics for devices with this functionality.

Each input can be programmed as normally closed or normally open using a parameter set. That provides maximum flexibility. Likewise, you can easily connect complementary sensors to the DI-16 sensor hub.

The BNI IOL-302-000/S01-Z013 version combines two modules in one and provides the greatest functionality, which is totally flexible for use. The maximum sensor load current is 500 mA, which is suitable for operating sensors with a high degree of consumption. If configured as an output, up to 2 A is available at the port. This is ideal for the use of hydraulic valves with a high consumption level.

#### Clearly visible status LEDs

Low-quality LEDs that are often difficult to identify under demanding production conditions perform poorly when used in high-speed applications. In contrast, Balluff status LEDs are large, bright, highly visible and provide maximum assistance. With Balluff modules, you can quickly handle setup and maintenance tasks and reduce downtimes.

#### Powerful and safe outputs

With an output current of up to **2 amps**, Balluff output modules are capable of driving almost any load. Each output also offers an overload protection with LED indicator and a memory feature for easy troubleshooting.

#### Robust, solid metal housing

The fully encapsulated housing can withstand impacts, debris, corrosive fluids, incorrect assembly as well as people treading on it.



#### Inputs with high density

All Balluff input blocks offer two input points for each plug connector, accessed via a V splitter.

#### Innovative housing design

The extra-flat profile reduces potential dangers posed by cables. Rounded corners offer highly visible locations for channel markers and two mounting points are sufficient to secure the robust metal housing.

IO-Link

**Metal and plastic NPN sensor hubs**



IO-Link	Device	Device
Design	16× DI	16× DI
<b>Ordering code</b>	<b>BNI0063</b>	<b>BNI0074</b>
Part number	BNI IOL-106-000-Z012	BNI IOL-106-000-K006
Supply voltage $U_b$	18...30 V DC	18...30 V
Function indicator IO-Link RUN	Green LED	Green LED
Power-on indicator	Green LED	Green LED
Connection: IO-Link	M12, A-coded, male	M12, A-coded, male
Connection: I/O ports	M12, A-coded, female	M12, A-coded, female
Connection $U_s$	via IO-Link interface	
No. of I/O ports	8	8
Number of inputs	16	16
Number of outputs	0	
Configurable	No	NC/NO
Single-channel monitoring	Yes	
Max. load current sensors/channel	100 mA	200 mA
Port status indicator	Yellow/red LED	Yellow LED
Total current $U_s$	< 1.4 A	< 1.2 A
Degree of protection as per IEC 60529	IP 67 (when screwed into place)	IP 67 (when screwed into place)
Operating temperature $T_a$	-5...+70 °C	-5...+55 °C
Storage temperature	-25...+70 °C	-25...+85 °C
Mounting	2 mounting holes	3 mounting holes
Dimensions (L×W×H)	181×68×36.9 mm	115×50×31 mm
Housing material	Nickel-plated die-cast zinc	PA6

**IO-Link Version 1.1**

Max. cycle time	10 ms	
IO-Link process data length	4 byte input	
Indicators		
Communication	Green LED, pulsing	Green LED
Error	Red LED	Red LED
Max. load current		< 1.2 A
Parameters		NC/NO per input

# IO-Link

## BIC Q40 bidirectional

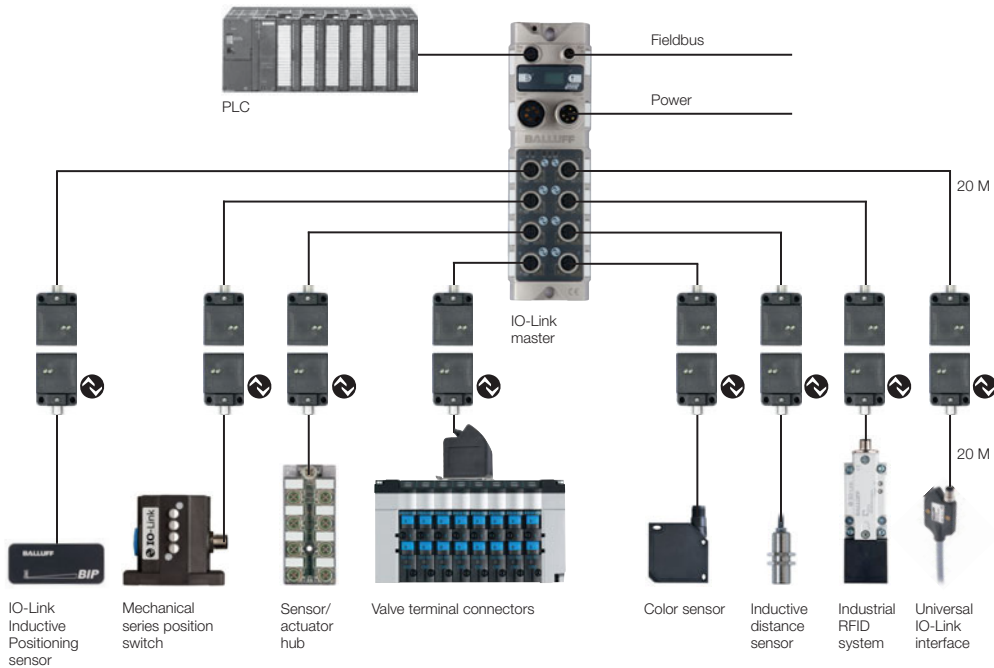
Inductive couplers make mechanical plug-in contacts unnecessary, because energy and data can be transmitted without contact via an air gap. And it does this in both directions if the new bidirectional coupling system in the 40x40 Unicomcompact housing with IO-Link is used.

The contactless data transmission with IO-Link standard has a transparent structure. This means the BIC system behaves "invisibly" and can be incorporated between master and device without configuring via plug-and-play.

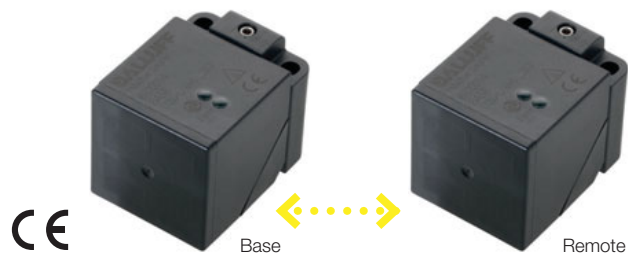
Regardless of the IO-Link revision status, the system has a full-fledged IO-Link interface. Events, parameter data and process data are directly exchanged between master and device.

### Mechanically disconnected and electrically connected: BIC bidirectional – the contactless IO-Link interface

- Simultaneous activation of actuators and collection of sensor signals
- AUX power for actuators can be switched on and off
- Simplest installation via plug-and-play
- IO-Link functionality up to the device
- Flexible process data length
- 20 meters can be run on either side for a possible 40 meter run



The new BIC Q40 bidirectional establishes a contactless connection between each IO-Link device and the master.



Size	<b>40x40x63 mm</b>	<b>40x40x63 mm</b>
Working range	1...5 mm	1...5 mm
<b>Ordering code</b>	<b>BIC0070</b>	<b>BIC0071</b>
Part number	BIC 1B0-ITA50-Q40KFU-SM4A4A	BIC 2B0-ITA50-Q40KFU-SM4A5A
Supply voltage $U_s$ , including residual ripple	24 V DC $\pm 10\%$	
Rated operating current $I_b$	1 A	
No-load supply current $I_0$ max.	100 mA	
Short-circuit protected	Yes	Yes
Remote output voltage		24 V DC $\pm 5\%$
Power supply, continuous output current		500 mA
Ambient temperature $T_a$	-5...+55 °C	-5...+55 °C
Storage temperature	-25...+70 °C	-25...+70 °C
Transmission distance	0...5 mm	0...5 mm
Permitted offset	Max. 5 mm	Max. 5 mm
Function/Power-on indicator	Yes/Yes	Yes/Yes
Weight	Approx. 160 g	Approx. 160 g
Degree of protection as per IEC 60529	IP 67	IP 67
Housing material	PBTP	PBTP
Material of sensing surface	PBTP	PBTP
Connection	M12 connector, male 4-pin, A-coded	M12 connector, female 5-pin, A-coded



#### IO-Link Version 1.1

Transfer rate	COM 1...2	COM 1...2
Cycle time min.	depends on IO-Link device	depends on IO-Link device
IO-Link process data length	1...32 byte	1...32 byte
SIO MODE	No	No

## Industrial Ethernet Unmanaged Switches

### **Ethernet Unmanaged Switches**

Ethernet-based network systems are gaining more and more importance in industrial automation. Balluff provides a wide variety of Ethernet-based systems and network components such as Profinet or Ethernet/IP for machine and plant equipment.

Balluff now offers a complete system so that you can easily link Ethernet system components with the Ethernet.

With the switch, it is now possible to connect Ethernet devices in a Star Topology. The RJ45 ports and the 10 and 100 Mbps transmission rates support this. The transfer speed is automatically set via the auto-negotiation function. Wiring errors are reliably ruled out by the autocrossing function. This is because the module identifies on its own what type of cable is being used.





Communication	Ethernet	Ethernet	Ethernet
Version	Ethernet unmanaged switch	Ethernet unmanaged switch	Ethernet unmanaged switch
<b>Ordering code</b>	<b>BNI005E</b>	<b>BNI0067</b>	<b>BNI000F</b>
Part number	BNI TCP-951-000-E028	BNI TCP-952-000-E029	BNI EIP-950-000-Z009
Ports	5×RJ45 Spring force clamp	8×RJ45 Spring force clamp	9×M12 D-coded
System power supply	0,2...2,5 mm <sup>2</sup>	0,2...2,5 mm <sup>2</sup>	7/8 4 pole
Supply voltage U <sub>B</sub>	12...48 V DC	2×12...30 V DC redundant	18 V...30.2 V
Transfer rate	10/100 Mbps full duplex Auto crossing	10/100 Mbps full duplex Auto crossing	10/100 Mps Auto crossing
Operating modes	Auto negotiation	Auto negotiation	Auto negotiation
Communication status	Link/run LED, (yellow/green)	Link/run LED, (yellow/green)	Link/run LED, (yellow/green)
Supply voltage	LED (green), power	LED (green), power	LED (green), power
Degree of protection	IP 20	IP 20	IP 67
Housing	Black plastic	Black plastic	GD-ZN nickel plated
Temperature range	-10...+60 °C (storage temperature -25...+70 °C)	-10...+60 °C (storage temperature -25...+70 °C)	-5...+55 °C
Mounting type	Snaps onto support rail TH35 (EN60715)	Snaps onto support rail TH35 (EN60715)	2 hole screw/mounting



# Industrial Ethernet

## M12 & RJ45, cables and accessories



Cable Type	Conductor	Jacket	Ratings	M12 Straight to M12 Straight
Unshielded, UTP 2 pair	Stranded	TPE	600V, CMX, Flex 10mio, ODVA	BCC M414-M414-6D-366-EX64N9-_-_-
Shielded , STP 2pair	Stranded	PVC	Riser, CMR, ODVA	BCC M414-M414-6D-338-VS64N8-_-_-
		TPE	Flex 5mio, ODVA	BCC M414-M414-6D-338-ES64N9-_-_-
Shielded Starquad	Stranded	PUR	Profinet	BCC M414-M414-6D-331-PS54T2-_-_-

\*Contact factory for availability

Standard lengths available:

006 = 0.6 m	100 = 10.0 m	400 = 40.0 m
010 = 1.0 m	150 = 15.0 m	500 = 50.0 m
020 = 2.0 m	200 = 20.0 m	600 = 60.0 m
050 = 5.0 m	300 = 30.0 m	



### Field Attachables

Order Code	Description
<b>BCC03WZ</b>	M12, D-coded, Straight Male
<b>BCC03Y0</b>	M12, D-coded, Right-Angle Male
<b>BCC03Y1</b>	M12, D-coded, Straight Female
<b>BCC03Y2</b>	M12, D-coded, Right-Angle Female
<b>BCC06FH</b>	RJ45, Straight Male, 8-position, 4wire



**New**



**New**



**New**

M12 Straight to RJ45	RJ45 to RJ45	Bulk Cable (100m)
BCC M414-E894-8G-695-EX64N9-__	BCC E894-E894-90-367-EX64N9-__	<b>BCC0CN3</b>
BCC M414-E894-8G-672-VS64N8-__	BCC E894-E894-90-339-VS64N8-__	<b>BCC0AZ9 - BCC0EZ8</b>
BCC M414-E894-8G-672-ES64N9-__	BCC E894-E894-90-339-ES64N9-__	<b>BCC0AUJ</b>
BCC M414-E834-8G-668-PS54T2-__	BCC E834-E834-90-334-PS54T2-__	



**Receptacles and Bulkheads**

Order Code	Description
<b>BCC03WP</b>	M12-RJ45 Receptacle, 2m, industrial Ethernet
<b>BCC06YP</b>	M12-M12 Female Bulkhead
<b>BCC085F</b>	M12-RJ45 Straight Bulkhead
<b>BCC085H</b>	M12-RJ45 Right Angle Bulkhead



## High Durability Cables

### Cordsets for use in extreme conditions in manufacturing

Every manufacturer has challenges, but typically one of the most frustrating problems is when a connector or a cable causes downtime. In addition, cable failures can be difficult to diagnose due to their installation and finding the exact failure. This can cause extended downtime due to replacement of long cable runs through cable trays and rafters. Sometimes cable failures just cause short repetitive downtime with constant replacement.

In the most extreme conditions in manufacturing, downtime is usually caused by one of these situations:

#### Physical

- Constant contact with loaded components causes physical failure
- Buildup of excess material can physically tear the connector apart



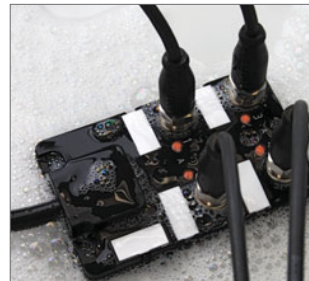
#### Temperature

- Extreme swings in temperature age materials prematurely
- Constant high-temperatures can melt standard materials



#### Washdown

- Cleaning chemicals can eat through standard materials
- High pressure washdown can destroy components



#### Weld Slag

- Hot weld sparks burn, melt and destroy cables and connectors
- Buildup of damage over time can cause shorts and failures



## Physical Problems

- Constant contact with loaded components causes physical failure
- Buildup of excess material can physically tear the connector apart

## Solution

- Abrasion resistant
- High mechanical durability



## Solution

- Crush resistant
- High mechanical durability



Type	Stainless steel braid	PVC coated steel armor (flexible conduit)
Jacket Temperature	-25...80 °C	-40...105 °C
Operational Temperature Fixed	-50...80 °C	-40...105 °C
Operational Temperature Moving	-25...80 °C	
Voltage Rating	250 V	300 V
Amperage	4 A	4 A
<b>Single-Ended</b>		
M12 Female, 4-wire, Straight		BCC M415-0000-1A-003-MX04T2-__ _
7/8" Female, 4-wire, Straight		BCC A314-0000-10-072-MX04W6-__ _
<b>M12 Double-Ended</b>		
M12 Female Straight - M12 Male Straight, 4 wire	BCC W415-W414-3A-304-MW8434-__ _	BCC M415-M414-3A-304-MX04T2-__ _
M12 Female Right Angle - M12 Male Straight, 4 wire	BCC W425-W414-3A-304-MW8434-__ _	
<b>7/8" Double-Ended</b>		
7/8" Female Straight - 7/8" Male Straight, 4 wire	BCC B314-B314-30-304-MW8434-__ _	BCC A314-A314-30-346-MX04W6-__ _
7/8" Female Right Angle - 7/8" Male Straight, 4 wire	BCC B324-B314-30-304-MW8434-__ _	

Note: M8 versions not possible

### Single-ended

Standard Lengths Available:

- 010 = 1 m
- 020 = 2 m
- 050 = 5 m
- 100 = 10 m

### Double-ended

Standard Lengths Available:

- 003 = 0.3 m
- 006 = 0.6 m
- 010 = 1 m
- 020 = 2 m

# High Durability Cables

## Washdown and Temperature

### Washdown Problems

- Cleaning chemicals can eat through standard materials
- High-pressure washdown can destroy components

### Solution

- Survived ECOLAB tests
- Caustic resistant



### Solution

- Washdown rated
- Withstands high-pressure steam cleaning



Type	ECOLAB, Stainless	IP69K rated, 1.4404 Stainless
Configuration	Stainless Nut, PUR Cable	Stainless Nut, PVC Cable
Operational Temperature	-25...80 °C	-5...105 °C (PVC)
Voltage Rating	60 V (M8 3-wire), 30 V (M8 4-wire), 250 V (M12)	60 V (M8 3-wire), 30 V (M8 4-wire), 250 V (M12)
Amperage	4 A	4 A
<b>M8 Single-Ended</b>		
M8 Female, 3-wire, Right Angle	BCC S323-0000-10-001-PX8334-__-C002	BCC S323-0000-10-001-VX43T2-__-__
M8 Female, 4-wire, Right Angle	BCC S324-0000-10-003-PX8434-__-C002	BCC S324-0000-10-003-VX44T2-__-__
<b>M12 Single-Ended</b>		
M12 Female, 4-wire, Straight	BCC S415-0000-10-003-PX8434-__-C002	BCC S415-0000-1A-003-_-_-_-_-_-_-_-_-_-
M12 Female, 4-wire, Right Angle	BCC S425-0000-10-003-PX8434-__-C002	BCC S425-0000-1A-003-_-_-_-_-_-_-_-_-_-
M12 Female, 5-wire, Straight	BCC S415-0000-10-017-PX8534-__-C002	
M12 Female, 5-wire, Right Angle	BCC S425-0000-10-017-PX8534-__-C002	
M12 Female, 5-wire, Straight, Braided Shield	BCC S415-0000-10-017-PS8534-__-C002	
M12 Female, 5-wire, Right Angle, Braided Shield	BCC S425-0000-10-017-PS8534-__-C002	
M12 Female, 8-wire, Straight, Braided Shield	BCC S418-0000-10-069-PS8834-__-C002	
<b>M12 Double-Ended</b>		
M12 Female Straight - M12 Male Straight, 4-wire	BCC S415-S414-3A-304-PX8434-__-C002	BCC S415-S414-3A-304-_-_-_-_-_-_-_-_-_-
M12 Female Right Angle - M12 Male Straight, 4-wire	BCC S425-S414-3A-304-PX8434-__-C002	BCC S425-S414-3A-304-_-_-_-_-_-_-_-_-_-
M12 Female Straight - M12 Male Right Angle, 4-wire		BCC S415-S424-3A-304-_-_-_-_-_-_-_-_-_-
M12 Female Right Angle - M12 Male Right Angle, 4-wire		BCC S425-S424-3A-304-_-_-_-_-_-_-_-_-_-

Standard Lengths Available:  
100 = 10 m  
200 = 20 m  
250 = 25 m

Standard Lengths Available:  
020 = 2 m  
050 = 5 m  
100 = 10 m

Jacket Materials:  
Yellow PVC = VX44T2  
Grey PVC = VX8434  
Black PUR = PX0434

## Temperature Problems

- Extreme swings in temperature ages materials prematurely
- Constant high temperatures can melt standard materials

## Solution

- High temperature jacket
- Non-flammable, nonfraying



## Solution

- Good for basic applications
- UV, ozone, and thermal shock resistant



Type	Fiberglass jacket cable	Thermoplast
Jacket Temperature	-60...400 °C	
Operational Temperature Fixed	-50...80 °C	-50...130 °C
Operational Temperature Moving	-25...80 °C	-40...125 °C
Voltage Rating	250 V	250 V
Amperage	4 A	4 A
<b>M12 Single-Ended</b>		
M12 Female, 4-wire, Straight	BCC W415-0000-1A-003-FW9434-___	BCC W415-0000-1A-003-BW8434-___
M12 Female, 4-wire, Right Angle	BCC W425-0000-1A-003-FW9434-___	BCC W425-0000-1A-003-BW8434-___
<b>M8 - M12 Double-Ended</b>		
M8 Female Straight - M12 Male Straight, 3 wire	BCC W313-W413-3E-300-FW9334-___	BCC W313-W413-3E-300-BW8334-___
<b>M12 Double-Ended</b>		
M12 Female Straight - M12 Male Straight, 4 wire	BCC W415-W414-3A-304-FW9434-___	BCC W415-W414-3A-304-BW8434-___
M12 Female Right Angle - M12 Male Straight, 4 wire	BCC W425-W414-3A-304-FW9434-___	BCC W425-W414-3A-304-BW8434-___
<b>M12 Splitters</b>		
M12 Male Straight - 2 x M12 Female Straight	BCC W414-W415-W415-U2045-___	BCC W414-W415-W415-U2044-___
M12 Male Straight - 2 x M12 Female Right Angle	BCC W414-W425-W425-U2045-___	BCC W414-W425-W425-U2044-___

Note: More versions available

Single-ended	Double-ended
Standard Lengths Available:	Standard Lengths Available:
006 = 0.6 m	003 = 0.3 m
010 = 1 m	006 = 0.6 m
020 = 2 m	010 = 1 m
	015 = 1.5 m
	020 = 2 m
	Splitter
	Standard Lengths Available:
	003 = 0.3 m
	006 = 0.6 m

# High Durability Cables

## Weld Slag

### Weld Slag Problems

- Hot weld sparks burn, melt and destroy cable and connector
- Buildup of damage over time can cause shorts and failures

### Solution

- Abrasion and mechanical resistant
- Thermal shock resistant



### Solution

- Sealed tube, resistant to ingress
- Slag resistance on nut



Type	Silicone cable	Molded silicone tube	
Jacket Temperature			
Operational Temperature Fixed	-40...200 °C	-60...180 °C	
Operational Temperature Moving	-25...200 °C	-50...80 °C	
Voltage Rating	250 V	250 V	
Amperage	4 A	4 A	
<b>M12 Single-Ended</b>			
M12 Female, 4-wire, Straight	BCC W415-0000-1A-003-SW0434-__ _	BCC W415-0000-1A-003-NW0434-__ _	
M12 Female, 4-wire, Right Angle	BCC W425-0000-1A-003-SW0434-__ _	BCC W425-0000-1A-003-NW0434-__ _	
<b>M8 Double-Ended</b>			
M8 Female Straight - M8 Male Straight, 4 wire	BCC W314-W314-30-304-SW0434-__ _		
M8 Female Straight - M12 Male Straight, 3 wire	BCC W313-W413-3E-300-SW0334-__ _		
M8 Female Straight - M12 Male Straight, 4 wire	BCC W314-W414-3E-304-SW0434-__ _		
<b>M12 Double-Ended</b>			
M12 Female Straight - M12 Male Straight, 4 wire	BCC W415-W414-3A-304-SW0434-__ _	BCC W415-W414-3A-304-NW0434-__ _	
M12 Female Right Angle - M12 Male Straight, 4 wire	BCC W425-W415-3A-304-SW0434-__ _	BCC W425-W414-3A-304-NW0434-__ _	
<b>M12 Splitters</b>			
M12 Male Straight - 2 x M12 Female Straight	BCC W414-W415-W415-U2046-__ _		
M12 Male Straight - 2 x M12 Female, Right Angle	BCC W414-W425-W425-U2046-__ _		

Double-ended  
Standard Lengths Available:  
003 = 0.3 m  
006 = 0.6 m  
010 = 1 m  
015 = 1.5 m  
020 = 2 m  
050 = 5 m

Single-ended  
Standard Lengths Available:  
003 = 0.3 m  
006 = 0.6 m  
010 = 1 m  
015 = 1.5 m  
020 = 2 m  
050 = 5 m

Splitter  
Standard Lengths Available:  
003 = 0.3 m  
006 = 0.6 m

Note: M8 versions not possible  
Max 2 m

## Solution

- Low friction, high temperature
- Resistant to caustic agents



PTFE
-65...200 °C
-65...200 °C
250 V
4 A

BCC W415-0000-1A-003-TW0434-__
BCC W425-0000-1A-003-TW0434-__

	BCC M314-M314-30-304-EX44T2-__-C008
BCC W313-W413-3E-300-TW0334-__	BCC M313-M413-3E-300-EX43T2-__-C008
	BCC M314-M414-3E-304-EX44T2-__-C008

BCC W415-W414-3A-304-TW0434-__	BCC M415-M414-3A-304-EX44T2-030-C008
BCC W425-W414-3A-304-TW0434-__	BCC M425-M414-3A-304-EX44T2-030-C008

BCC W414-W415-W415-U2048-__	BCC M414-M415-M415-U2002-__-C008
BCC W414-W425-W425-U2048-__	

## Solution

- M8 and 3 meter versions
- Protection over the overmold



Extended silicone tube
-60...260 °C
-50...105 °C
-40...105 °C
125 V
4 A

BCC M314-M314-30-304-EX44T2-__-C008
BCC M313-M413-3E-300-EX43T2-__-C008
BCC M314-M414-3E-304-EX44T2-__-C008

BCC M415-M414-3A-304-EX44T2-030-C008
BCC M425-M414-3A-304-EX44T2-030-C008

BCC M414-M415-M415-U2002-__-C008

## Solution

- Repair damaged cables
- Strengthen vulnerable areas



### WeldRepel® Silicone Wrap

BAM0183	1" wide x 12 ft Clear wrap
BAM0182	2" wide x 36 ft Clear wrap

- Protect wider areas from damage

- Protect manifolds, I/O and terminations



### WeldRepel® Silicone Area Protection

BAM0179	3 ft x custom length in ft
BAM017A	3 ft x 3 ft sheet



- Protect hydraulic and pneumatic lines
- Protect standard sensor cables

### WeldRepel® Silicone Jacket

		M8	M12
BAM017E	Clear tubing, 1/4" dia. x 50 ft (15 m)		
BAM017H	Clear tubing, 3/8" dia. x 50 ft (15 m)	SE*	
BAM017L	Clear tubing, 1/2" dia. x 50 ft (15 m)	DE**	SE*
BAM017N	Clear tubing, 5/8" dia. x 50 ft (15 m)		DE**
BAM017R	Clear tubing, 3/4" dia. x 50 ft (15 m)		
BAM017U	Clear tubing, 1.5" dia. x 25 ft (7.5 m)		
BAM017Z	Clear tubing, 2" dia. x 25 ft (7.5 m)		

\* Recommended for single-ended cables

\*\* Recommended for double-ended cables