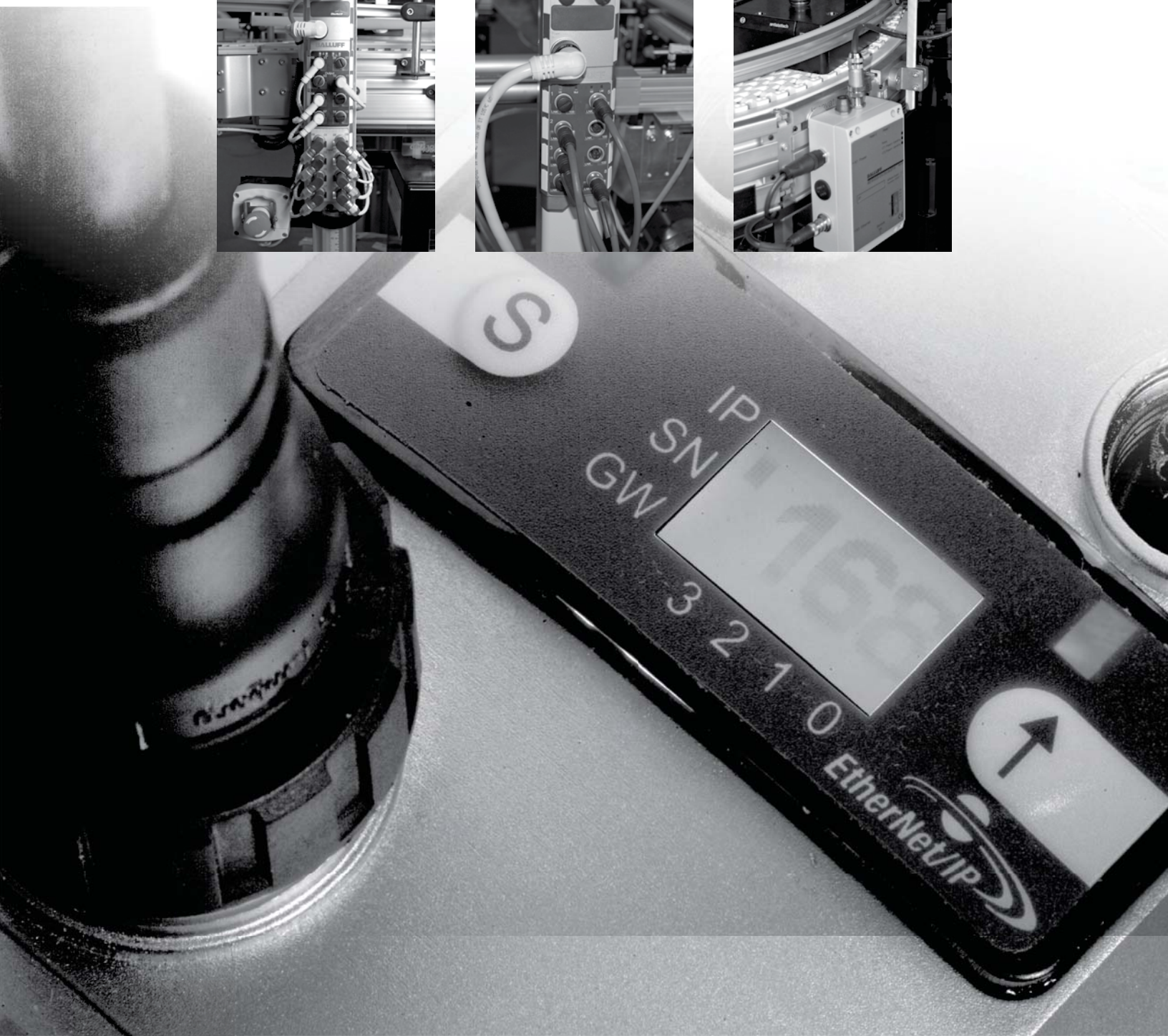
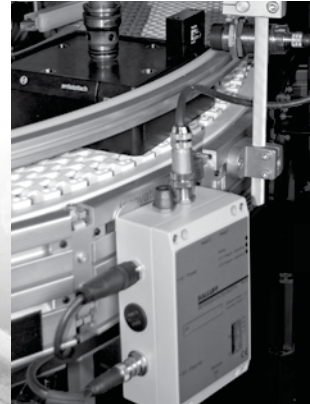
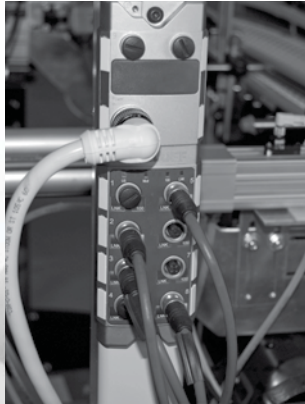
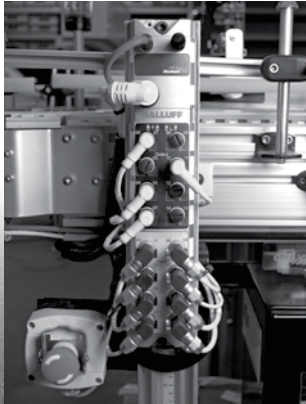




EtherNet/IP™



In many areas, EtherNet/IP is replacing DeviceNet and has become a globally recognized standard for network technology. Based on Ethernet, EtherNet/IP is considerably faster than DeviceNet and facilitates the integration of drive technology. Furthermore, EtherNet/IP can be quickly installed and integrated in existing networks.

In addition to time savings and considerable cost savings comes the added benefit of ease of operation. Only Balluff products can program IP addresses of the Ethernet blocks with a display and the display can be locked to protect against accidental changes. The innovative address plug also guarantees simple exchange of modules.

Use the extensive line of EtherNet/IP products for your high-performance system, because only an optimized network guarantees maximum efficiency.



Technology	1.12
Diagnostics and Applications	1.14
Addressing Methods	1.15
Product Topology	1.16
Ethernet/IP Modules	1.17
Cables	1.18
Accessories	1.19



EtherNet/IP Technology

EtherNet/IP™ has become a popular network for connecting field devices to centralized control solutions from Allen Bradley™ and other suppliers. EtherNet/IP allows designers to seamlessly integrate a broad range of compatible connectivity products from many manufacturers.

Balluff has developed a comprehensive line of EtherNet/IP products that include two versions of machine-mount I/O blocks, unmanaged switches, network cables and accessories. At the heart of the line are the I/O blocks. These blocks have a low initial cost per point and are designed to save money over the life of the system with maximum up time and easy maintenance.

I/O Block Network Features:

- Certified by ODVA to ensure reliable operation and complete interoperability
- Operates at 10 Mbit/s and 100 Mbit/s speeds for maximum throughput (auto-negotiate)
- Rugged M12 (D-coded) Ethernet connector
- Supports star topology for increased reliability, accurate troubleshooting, and fast commissioning

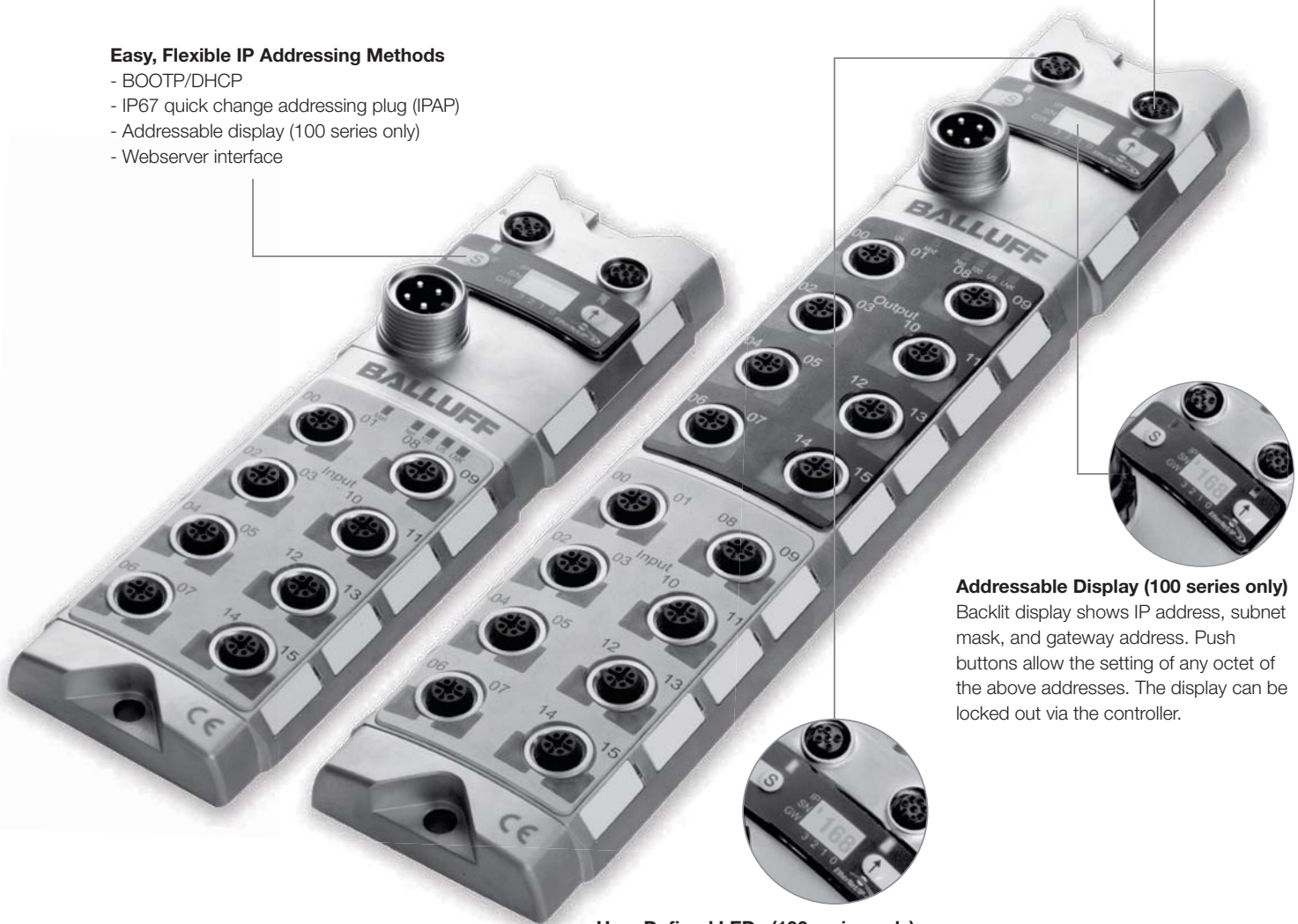
Easy, Flexible IP Addressing Methods

- BOOTP/DHCP
- IP67 quick change addressing plug (IPAP)
- Addressable display (100 series only)
- Webserver interface



Local Storage of IP Address

Unique IP67 Address Plug (IPAP) stores the block's IP address, subnet mask, and gateway address. The IPAP has the additional features of user defined LEDs (which can aid in troubleshooting) and has an attachment strap to fix the IPAP to the network cable.



Addressable Display (100 series only)

Backlit display shows IP address, subnet mask, and gateway address. Push buttons allow the setting of any octet of the above addresses. The display can be locked out via the controller.

User Defined LEDs (100 series only)

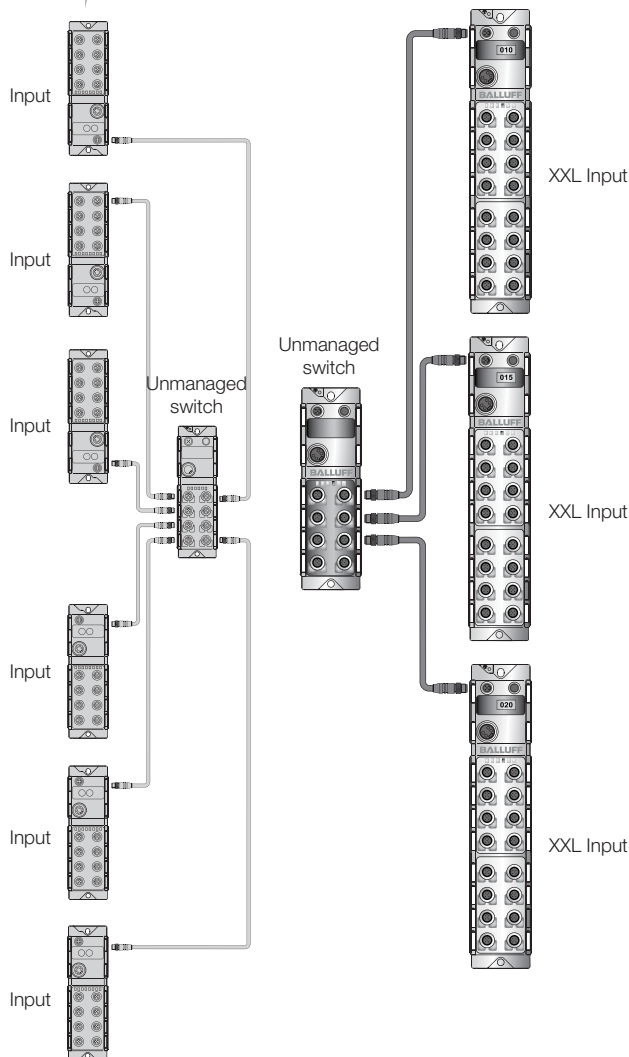
Similar to the IPAP, the display has the additional feature of red and green LEDs, which aid in troubleshooting.

Reduce Point Costs with High-Density XXL I/O Blocks

Using high density I/O blocks reduces the cost per point by consolidating the costs of communication hardware into one unit. For example, by replacing two 16-point input blocks with one 32-point input block, the cost per point is reduced by 20% for the I/O blocks alone! And the savings go on...

- Reduce switch utilization by 50% (eliminating one port)
- Eliminate one network cable
- Eliminate one auxiliary power cable
- Reduce mounting space by 20%

30%
overall cost
reduction



6 DeviceNet Sins Not to Repeat with EtherNet/IP

Here are six topics to consider in your new EtherNet/IP installations:

- 1. Topology** – Star, Linear (Daisy Chain), Ring, which one is the best for your application? Star allows for quick troubleshooting where one cordset or device can easily be identified as faulty, but has a high usage of Ethernet switch ports. Linear is a great topology for applications with long network runs, like conveyors, but one faulty cordset or device will kill all devices down the line. Ring topology brings the advantage of one fault tolerance. One cordset problem will not bring the network to a halt, but there are added expenses to this feature, as well as product availability for such a topology.
- 2. Document, Document, and Document** – This should be #1, but in the sequence of events, this comes after choosing a topology. How can you troubleshoot, add new devices, or do preventive maintenance without knowing what you have in your application? You need to know your cordset lengths, device locations, switch locations, cordset flexing locations, and known problem areas. Once you have this, make sure it's available - make multiple copies, keep one at the machine, save it on your server, and be able to access it from your HMI.
- 3. Cable Routing** – Remember these are network cordsets, they carry a lot of data at a high speed. Stay away from high noise locations. Use the right cable jacket for the environment. Do not use standard cordsets in flexing applications. Use the correct cordsets at the beginning because it's always a pain to go back and fix it later.
- 4. Diagnostics** – Many DeviceNet users ignored diagnostic data in their PLCs from either the communication cards and/or the individual devices in the field. Use what EtherNet/IP diagnostics are available to you via the communications cards, PLC, field devices and managed switches. Making this data available on your HMIs is also a big plus. Don't forget that many devices, PLCs, and switches have their own built in web servers.
- 5. Establish Procedures** – Define procedures early. How do I swap out a device? If the switch is dead, how do I replace it and reconfigure it? Can I use a longer cordset to replace a shorter bad one? All these questions will come up at some point, be proactive and have a procedure in place.
- 6. Bandwidth and Packet Usage** – “Just add another device, it will be fine.” Sometimes this statement starts a network down the wrong path making it unreliable. Know what a new device will do to your network traffic. Yes, EtherNet/IP is faster, yes it can pass more packets, but it does have its limits. Know where your funnel point is in your network, for most industrial Ethernet networks it is at the communication card in the PLC chassis. Know its limitations; be able to calculate its bandwidth and packet usage. Document your calculations and have a procedure to update these values when anything changes.



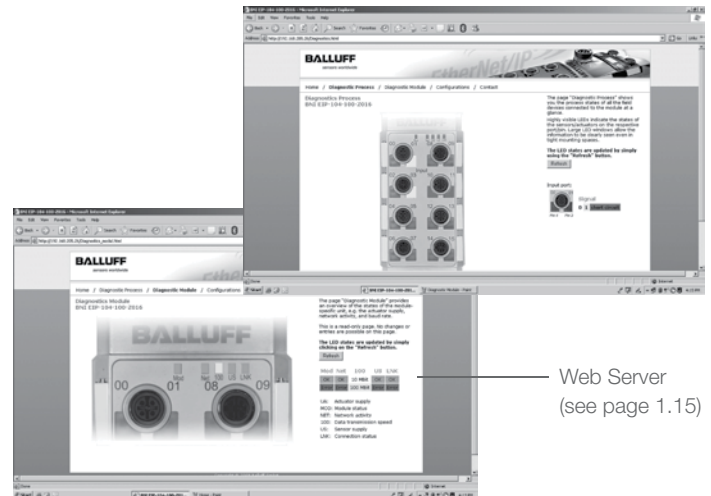
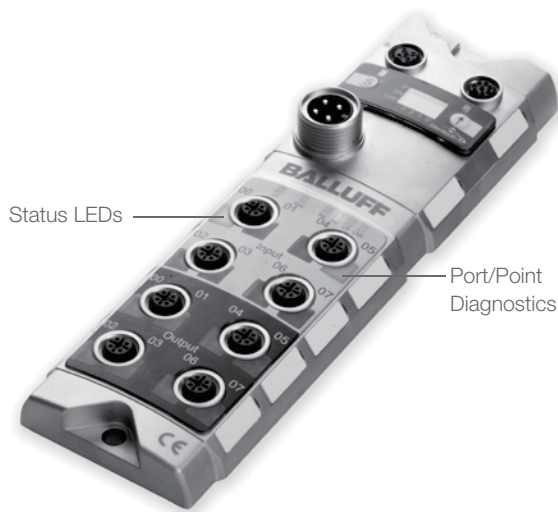
EtherNet/IP

Diagnostics and applications

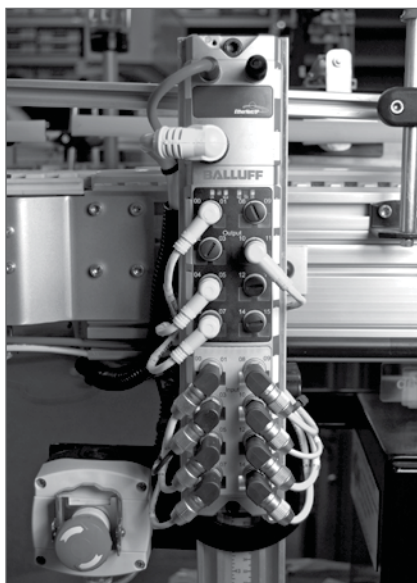
Block Diagnostics

A device's diagnostic capabilities can be used as a key to quickly diagnosing and solving problems that have stopped a production process. Balluff's EtherNet/IP™ blocks come equipped to aid support staff in pinpointing problems in a variety of manners.

- Each I/O port boasts large LEDs to distinguish which port/point has a short circuit or overload condition
- Status LEDs are also viewable to determine the overall status of the block, communication speed, and auxiliary power status
- Each block reports short circuit and overload status back to the controller via the standard I/O mapping
- Built-in web pages allow users to view the status LEDs of the block and individual ports
- Customize LED reactions to different conditions to aid in finding the effected block using user-defined LEDs in the display or IPAP



Applications

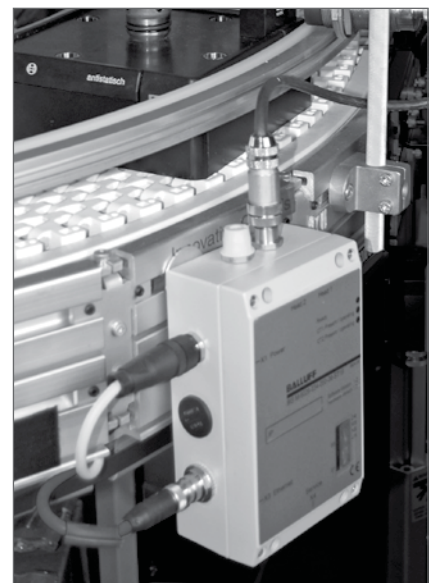


Machine Mount I/O

Your automation projects have sensors and actuators that require a large amount of I/O infrastructure. Balluff's XXL EtherNet/IP blocks allow you to have either 32 inputs or 16 inputs/16 outputs on one IP address. This reduces network costs and per sensor point costs.

Industrial RFID

With more than 25 years of experience in industrial RFID, Balluff can offer an Ethernet solution to meet your process automation needs. Ethernet protocols that Balluff supports are: EtherNet/IP™, Ethernet TCP/IP, Modbus TCP, and ProfiNet.



Addressing Methods

Below are the different methods for programming IP Address, SubNet Mask, and Gateway of the Balluff machine mount I/O blocks.

BOOTP/DHCP

Balluff's EtherNet/IP™ blocks can be set up using a standard DHCP server.

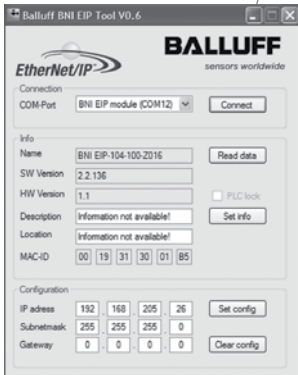
Push Button Display

With the 100 series blocks, you can gain a significant advantage by programming all the octets of the block's addresses directly on the block itself. This is the simplest means of programming because it does not require additional parts. User defined LEDs for trouble shooting and push button lockout are available from your controller.



Block USB Programming

With the block programming cable and using the provided software, you can easily program the blocks' addresses in a matter of seconds.



Note: Not used with embedded switch versions



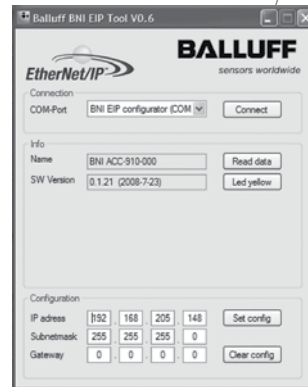
Web Server

For those who prefer a web interface, Balluff EtherNet/IP™ blocks have a simple web server built in. This webpage lets you program the addresses of the block and view port or status information.

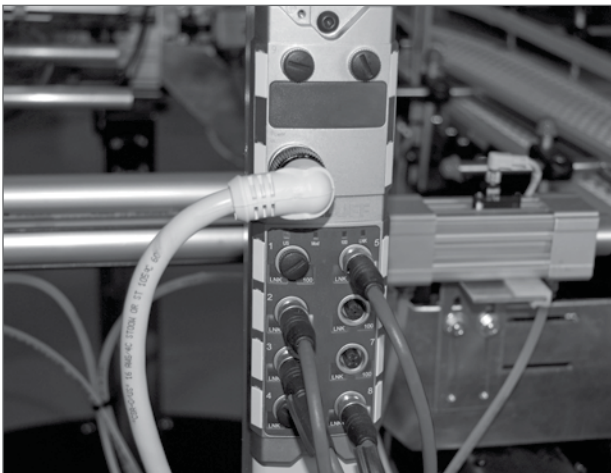


IPAP Plug

Using the provided software, combined with the IPAP programming cable, the IPAP address plug can be easily programmed. By attaching the IPAP to a block, the address configuration is downloaded to the block on power-up.



Note: Not used with embedded switch versions



Ethernet Connectivity and Switches

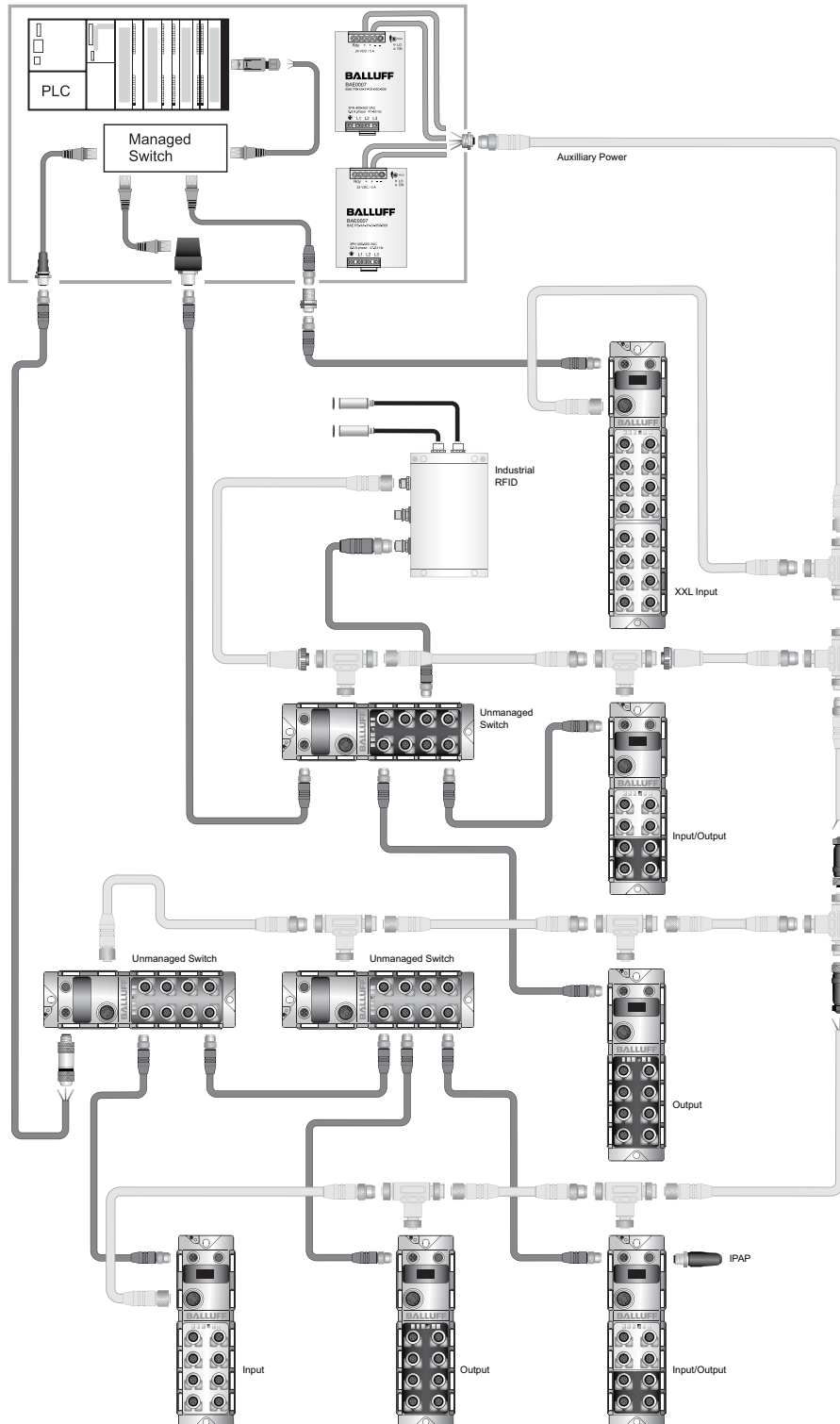
Balluff's rugged IP67 unmanaged Ethernet switch can be used on any Ethernet project. Use this unmanaged switch to network your Modbus TCP RFID processors or connect your Sharpshooter® vision sensors together. This 9 port switch can even be used with your EtherNet/IP™ discrete I/O blocks.

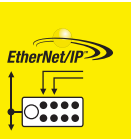
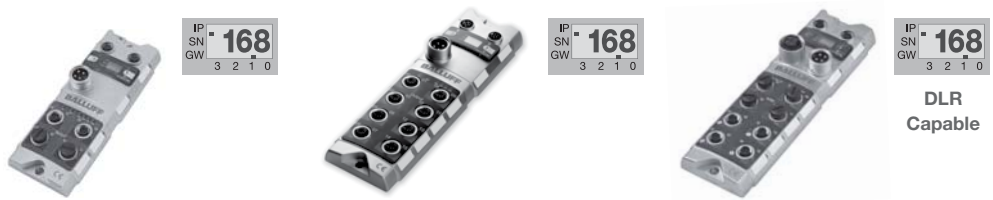


Seamless Communication Right Down to the Sensors

In line with our reputation for durability, Balluff has designed and built a powerful line of machine-mount I/O blocks, along with supporting cables and accessories.

No other industrial network has seen a growth explosion like industrial Ethernet. The rapid growth is fueled by the seamless communication from plant level down to the sensors and actuators. With high-speed, deterministic throughput and the proven reliability of the physical layer, industrial Ethernet networks will continue to grow for years to come.





Standard I/O Blocks

	Shorty with Service Port	With Service Port	With Embedded Switch
16 Input		BNI0014 BNI EIP-104-100-Z016	BNI004M BNI EIP-104-105-Z015
8 Output		BNI0015 BNI EIP-202-100-Z016	BNI EIP-202-105-Z015*
16 Output		BNI0016 BNI EIP-206-100-Z016	
8 Input / 8 Output		BNI0017 BNI EIP-305-100-Z016	
8 Configurable	BNI0044 BNI EIP-307-100-Z014		
16 Configurable		BNI0036 BNI EIP-302-100-Z016	BNI004F BNI EIP-302-105-Z015
12 Configurable, 4 IO-Link			BNI004A BNI EIP-502-105-Z015
9 Port Switch Unmanaged		BNI000F BNI EIP-950-000-Z009	

Note: For standard specifications and technical drawing, see page 1.18.
For bitmaps and pinouts, see technical reference section t.
Versions available without display, consult factory.

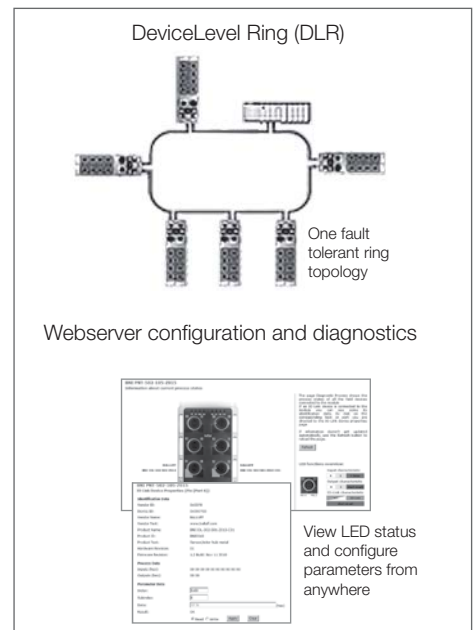
*Consult factory for availability



XXL I/O Blocks

	With Service Port
32 Input	BNI0018 BNI EIP-105-100-Z010
16 Input / 16 Output	BNI0019 BNI EIP-306-100-Z010

Note: For standard specifications and technical drawing, see page 1.18.
For bitmaps and pinouts, see technical reference section t.
Versions available without display, consult factory.

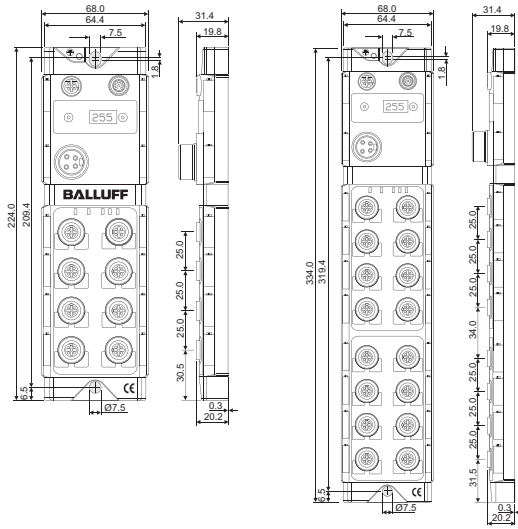


EtherNet/IP

I/O block specifications Cables

I/O Block Standard Specifications

Supply Voltage	24V
Connection: Fieldbus	M12, D-Coded
Connection: AUX Power	7/8" 4pin
Connection: I/O Ports	M12, A-Coded
Max Load Current/Channel	200mA
Rated Output Current/Channel	2A
Total Sensor Current/Block	9A
Total Actuator Current/Block	9A
Degree of Protection	IP67
Operating Temperature	-5°C...+55°C
Housing Material	GD-Zn nickel plated
Software Resettable Outputs	Yes
Overload Protected	Yes
Short Circuit Protected	Yes
Input/Output Type	PNP inputs / Sourcing outputs
Approvals	CE, ODVA, Shock & Vibration



ODVA EtherNet/IP Compliant Double-ended Cordsets

Raw Cable Rating	ODVA EtherNet/IP, Shielded
M12 Straight Male/M12 Straight Male	BCC M414-M414-6D-338-ES64N9-_-_-_-

Standard lengths available:

006 = 0.6 m 100 = 10 m 300 = 30 m
 010 = 1.0 m 150 = 15 m 400 = 40 m
 020 = 2.0 m 200 = 20 m 500 = 50 m
 050 = 5.0 m 250 = 25 m 600 = 60 m



Industrial Ethernet Double-ended Cordsets

Raw Cable Rating	Industrial Ethernet, Shielded
M12 Straight Male/M12 Straight Male	BCC M414-M414-6D-338-ES64N8-_-_-_-

Standard lengths available:

006 = 0.6 m 050 = 5.0 m 200 = 20 m
 020 = 2.0 m 100 = 10 m 300 = 30 m



Receptacles and Bulkheads

Order Code	Description
BCC03WP	M12-RJ45 Receptacle, 2m, industrial Ethernet
BCC06YP	M12-M12 Female Bulkhead
BCC085F/BCC03WW	M12-RJ45 Straight Bulkhead
BCC085H/BCC03WY	M12-RJ45 Right Angle Bulkhead



Field Attachables

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



Block Accessories

Order Code	Description
BAE00E4	IP Address Plug (IPAP) (stores IP, Subnet, Gateway)
BCC06FK	Block Programming Cable (optional)
BCC06FL	IPAP Programming Cable (optional)
BCC08KW	M12 D-coded, Shield Break Plug
BCC0AUJ	Bulk TPE Cable, 100 m



For 4-pole aux power cables and accessories, see pages 3.42-3.47