BALLUFF

Distributed
Modular I/O

IO-LINK FOR MACHINE BUILDERS

innovating automation

IO-Link

CONTENTS

EtherNet/IP DeviceNet PROFINET PROFIBUS EtherCAT CC-Link CC-Link IE

HOW IO-LINK WORKS

Utilizing a widely accepted and open vendor neutral technology for point to point communication, IO-Link offers an architecture that is fieldbus independent. 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.

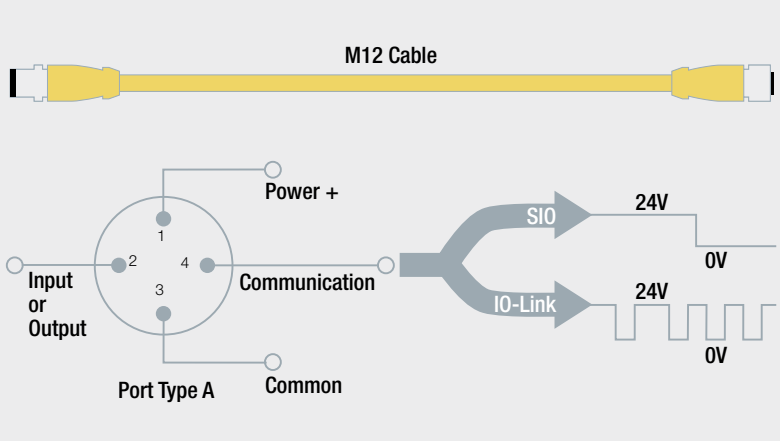
IO-Link

M12 4-WIRE CONNECTION – POWER & COMMUNICATION

The digital signal is carried over pin 4 of a standard sensor 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.

Features

- Standard unshielded M12 cables
- 20 meter maximum connection
- Simple or smart sensors



UNIVERSAL, SMART, EASY

IO-Link technology allows for multiple intelligent field devices to be installed on any industrial network without the costly overhead of switches and routers. IO-Link uses existing infrastructure to connect a variety of intelligent devices on a single IP address, and enables Industrial IoT applications.

Features

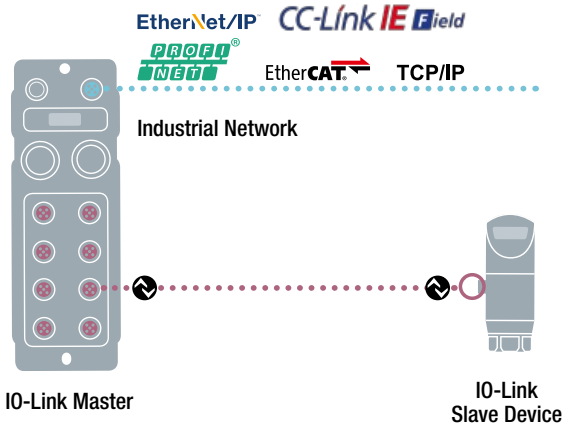
- Universal – Open Vendor Neutral Standard (IEC 61131-9) that works with existing industrial protocols
- Smart – Flexibility and visibility down to the individual sensor with diagnostics and parameterization
- Easy – Simple maintenance and quick setup of new devices

USE YOUR EXISTING NETWORK ARCHITECTURE

IO-Link technology utilizes your existing network infrastructure. Addressing is point-to-point with a master/slave relationship.

Features

- High noise resistance due to the 24V-step serial signal
- Utilizes low cost unshielded 4-wire standard sensor cables
- Cable runs can be as long as 20 meters



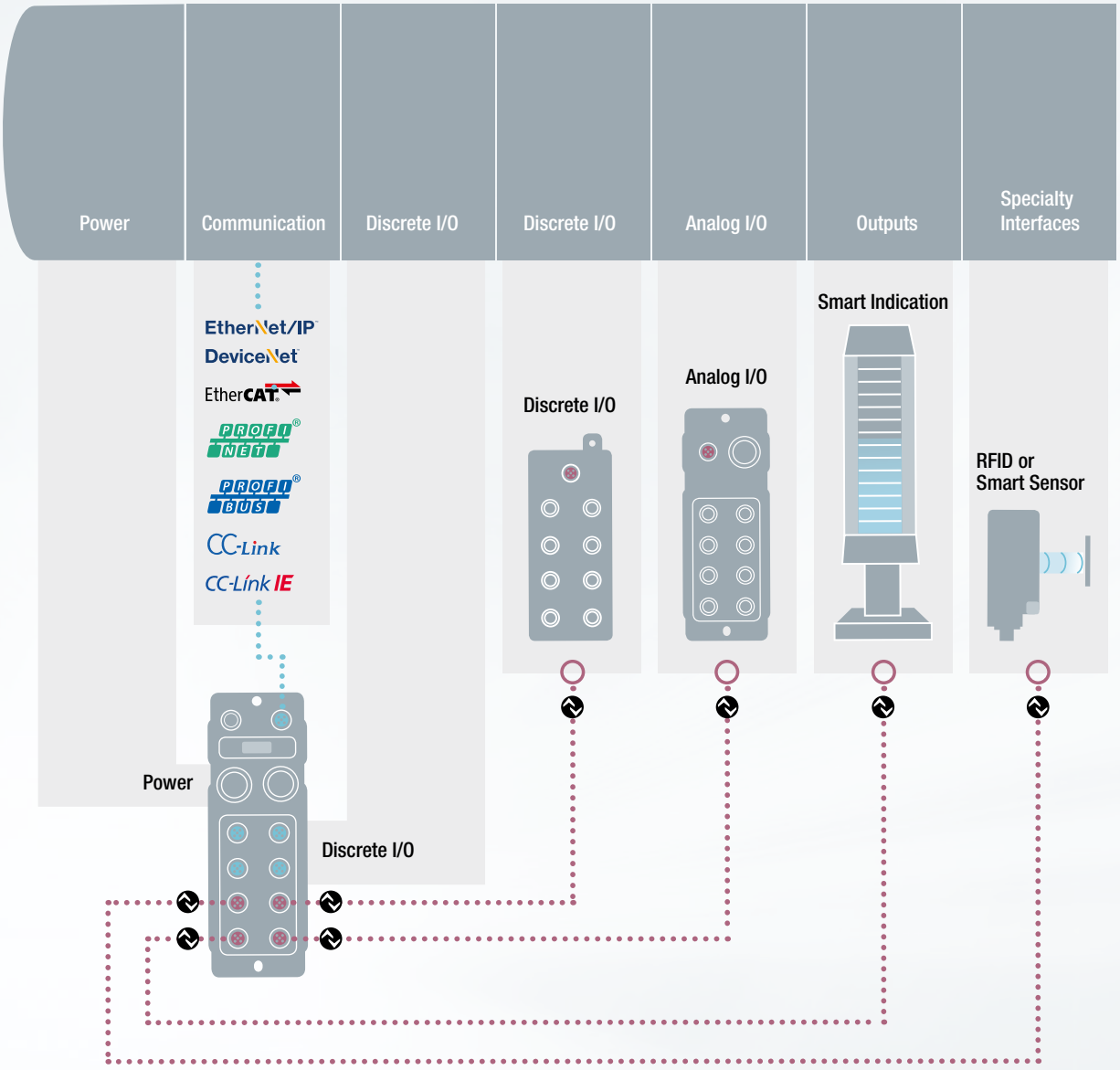
What is IO-Link?

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 the right hand side acts as a data collector. In lieu of a backplane, each device is connected to an industry standard M12 port utilizing a basic 4-wire sensor cable for IO-Link communication. With the ability to be installed within a 20 meter radius from the master, devices can be easily distributed across the machine.

IO-Link


Power
Communication
Discrete I/O
Discrete I/O
Analog I/O
Outputs
Specialty Interfaces
EtherNet/IP
DeviceNet
EtherCAT
PROFINET
PROFIBUS
CC-Link
CC-Link IE
Power
Discrete I/O
Discrete I/O
Analog I/O
Smart Indication
RFID or Smart Sensor

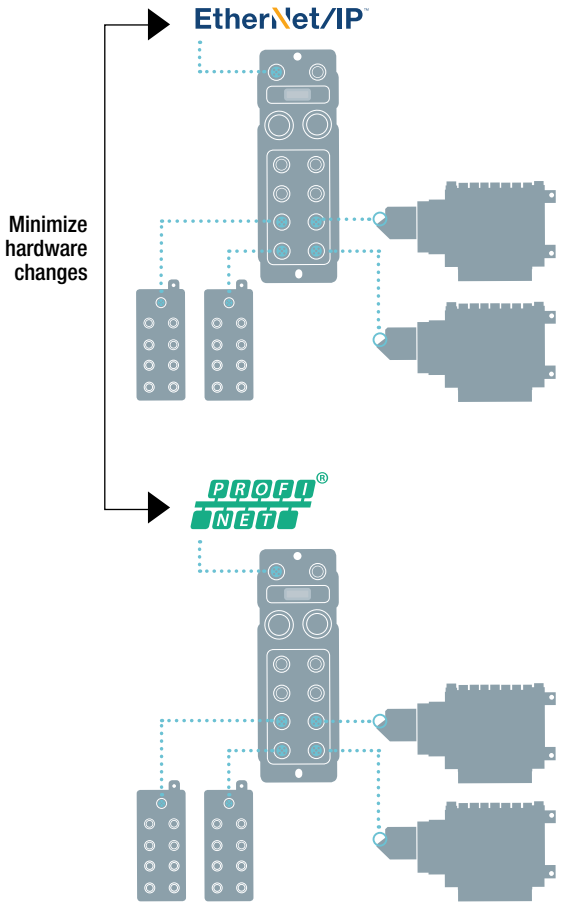
Why use IO-Link?

ADVANTAGES OF DISTRIBUTED MODULAR I/O

IO-Link

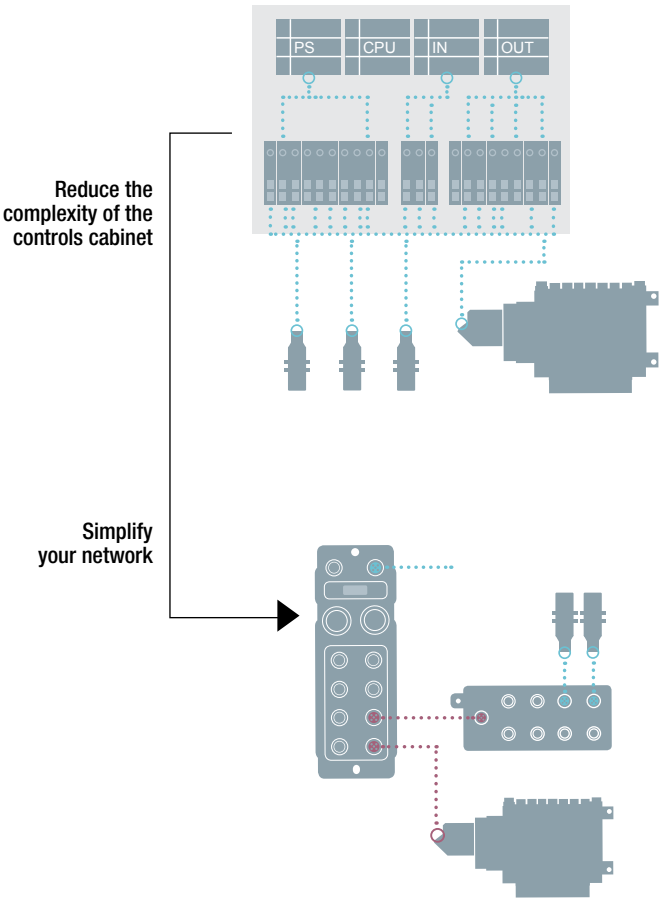
SIMPLIFY CONTROLS QUOTATION PROCESS

Utilize the same components for I/O regardless of the PLC brand or industrial network selected. Bills of material for controls equipment can be standardized from machine to machine and calculations are easily expandable.



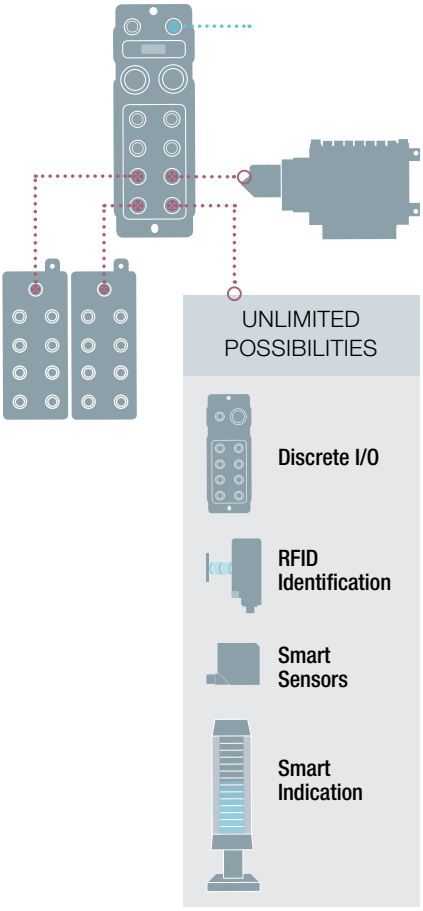
ELIMINATE CLUTTER AND SIMPLIFY CONTROLS CABINET

Simplify the labor involved in parallel wiring a valve manifold or terminating a set of discrete sensors. Analog devices can get costly with shielded cable runs and expensive four channel analog input cards, especially when there is only a need for one analog channel. Distributed Modular I/O reduces hardware setup labor and can be customized to reduce I/O hardware costs.



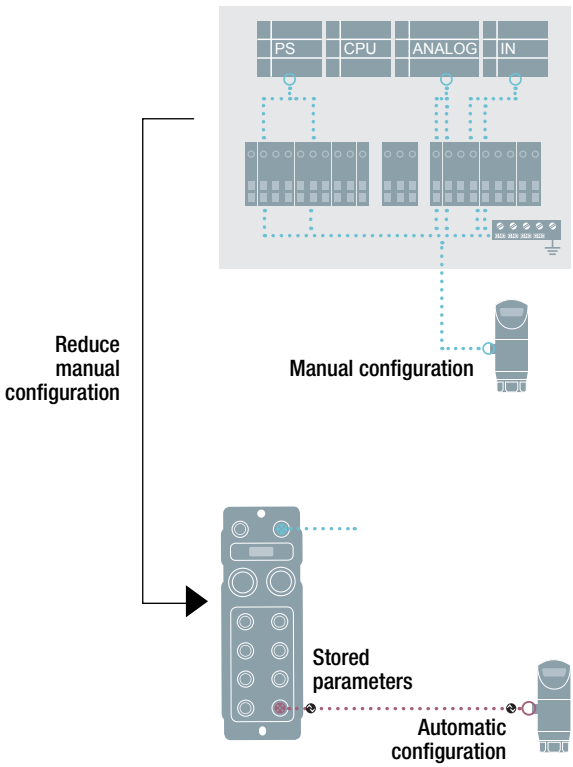
MAXIMIZE SPARES

Most initial designs include a set of spare I/O points for later development or modifications. Whether the customer wants to add a few discrete sensors to the design or there is a need to add a single channel of analog to the machine, spares and additions to the design can add major cost to the control's bill of materials. With this solution, spare connections can be a flexible placeholder for any type of I/O until the need arises.



EXPEDITE THE BUILD PROCESS ERROR FREE

When working with intelligent devices on industrial equipment, they typically require configuration. It can become a frustrating and time consuming task to ensure all values are programmed correctly project to project when reusing parts of a machine design like a hydraulic power unit. By utilizing a Distributed Modular I/O architecture with IO-Link, the device configuration can be stored or written into the code, downloaded to the device and no one has to program it. In addition, with the use of standard sensor cordsets, machine mount hardware and a point-to-point architecture, the assembly of the control equipment can be done with minimal experience and time.



Why use IO-Link?

EASE OF INTEGRATION

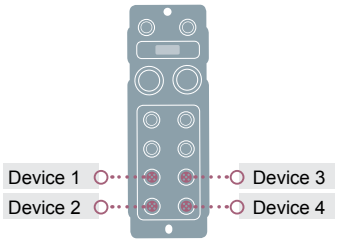
While hardware selection is important to the success of a project, if the hardware is not easily integrated into the engineering software, any benefits gained could be lost. However, IO-Link is integrated into typical engineering software with an easy three step process.

Below are examples of how to integrate industrial ethernet solutions. These steps can also be easily implemented on industrial bus networks.

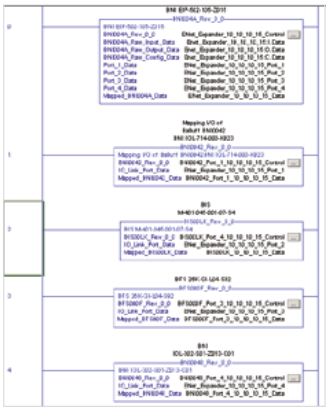
Since IO-Link is controller agnostic, Balluf IO-Link masters have been successfully integrated into many control platforms including robot controllers and PC integrations.

EtherNet/IP™

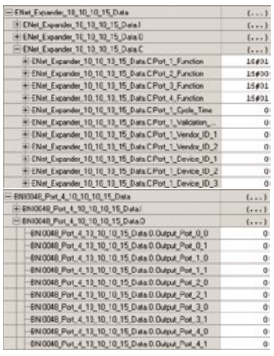
STEP 1
Select hardware



STEP 2
Import add on instructions (AOI)

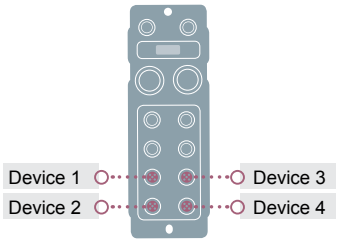


STEP 3
Create user defined tags (UDTs)

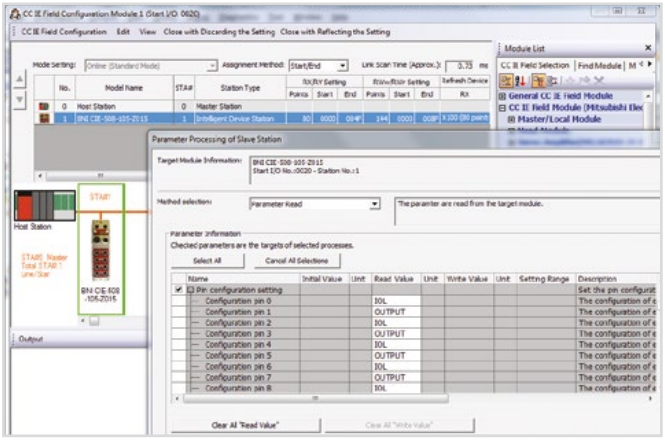


CC-Link IE

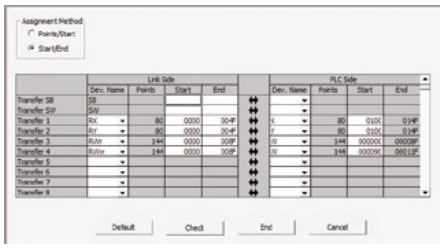
STEP 1
Select hardware



STEP 2
Configure IO-Link Ports using CSP+ File



STEP 3
Assign IE-Field Data to designated memory in GX-Works

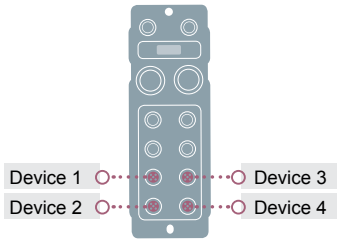


Visit our website for software tools like:
- AOIs (add-on instructions)
- Faceplates
- Function blocks
- Example code

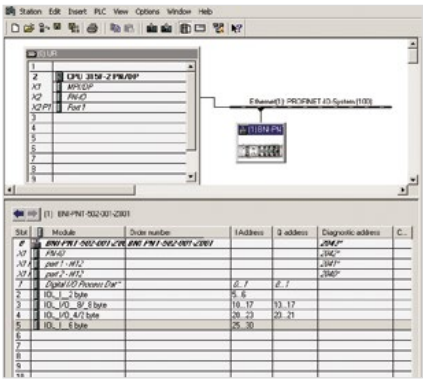
IO-Link

PROFINET®

STEP 1
Select hardware



STEP 2
Configure Profinet expander and expansion devices from one screen using GSD and GSDML files

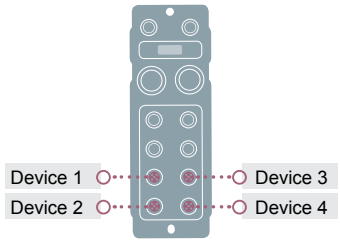


STEP 3
Assign I/O to user defined address scheme

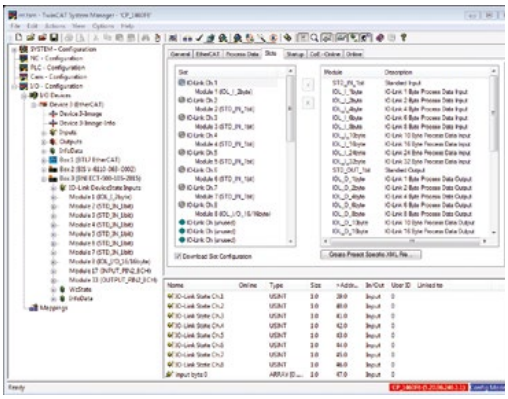
	Address	Symbol	Display format	Status value
1	IB 5		DEC	
2	IB 6		DEC	
3	IB 10		DEC	
4	ID 11		DEC	
5	QB 10		DEC	
6	QB 11		DEC	
7	IW 20		HEX	
8	QW 20		HEX	
9	IW 25		HEX	

EtherCAT®

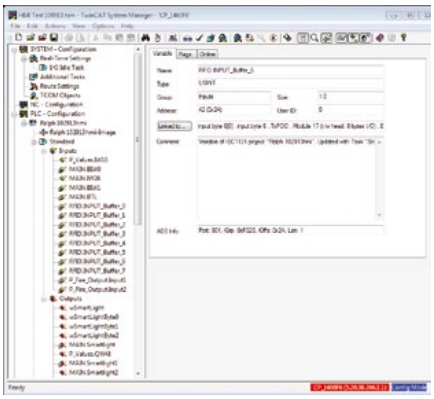
STEP 1
Select hardware



STEP 2
Configure hardware and set up I/O slots using the ESI/XML file



STEP 3
Link the used data from the program



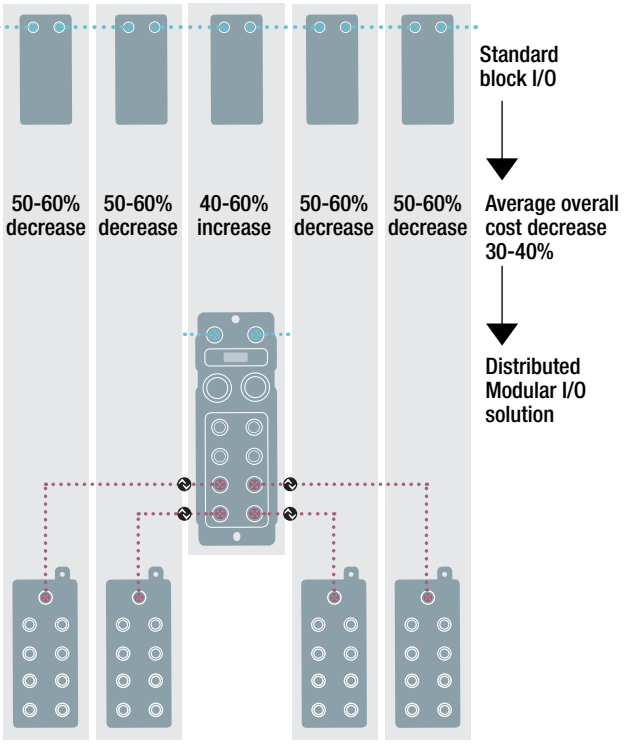
Who is Using IO-Link?

REAL APPLICATIONS AND CASE STUDIES

IO-Link

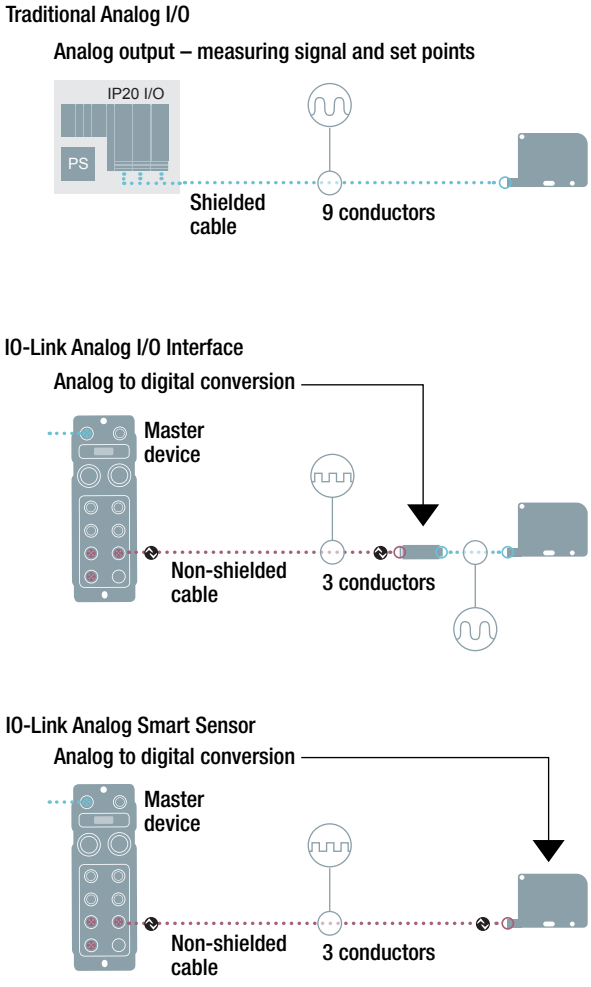
DISCRETE I/O SAVINGS

Machine builders looking to lower the cost per point for discrete I/O gain many advantages with IO-Link and Distributed Modular I/O. Reduced labor, cable and device costs have saved OEMs 15-60% over traditional I/O systems. Up to 240 I/O can be connected with an 8 port master.



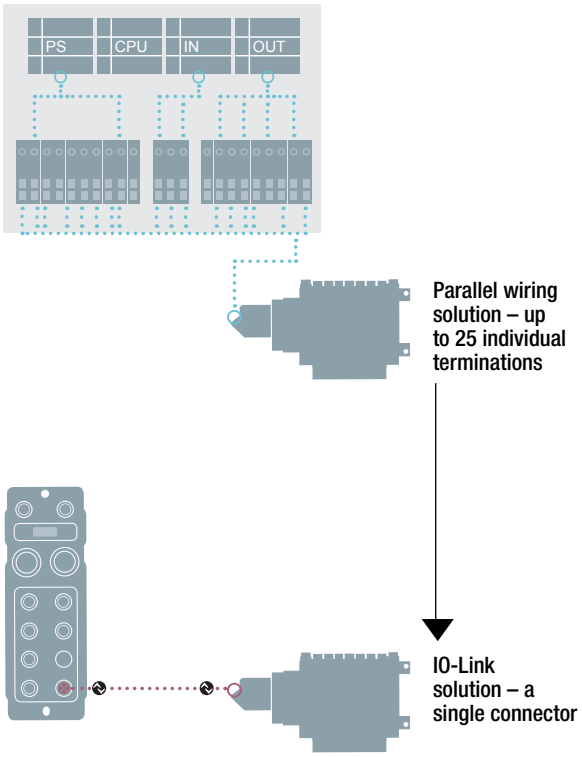
ANALOG I/O SAVINGS

One channel of analog I/O can add significant cost to a typical machine design in components, cables, and labor. By putting the analog I/O right at the signal's source, the complications and costs can be significantly reduced.



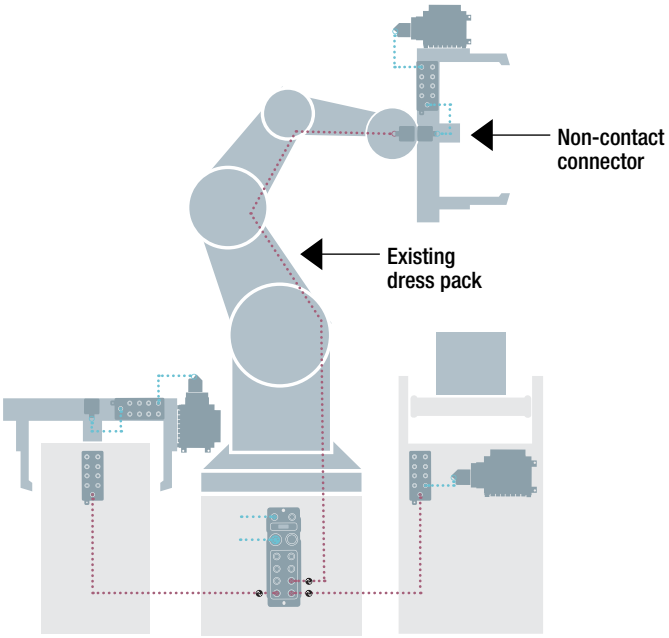
VALVE MANIFOLD CONTROL

Every pneumatic action requires valve control. The typical parallel wiring of valve manifolds can be labor intensive and add dramatically to cabinet space and setup time. Many OEMs have saved hundreds of dollars per valve in hardware and labor costs by switching to IO-Link valve control.



QUICK TOOL CHANGE

With the increasing demand for flexible manufacturing, the need to quickly change tooling on a robot or in a fixture is growing. Utilizing multiple technologies, the connection can be made quickly without failure; tool verification can be included with RFID. This effect on speed has improved our customers' throughput by 15%.



Why Partner with Balluff?

MARKET LEADING TECHNOLOGY.

innovating automation

With the largest installed base of IO-Link masters and 10 years of application experience, Balluff helps you innovate the way you automate. We have working IO-Link installations across the globe in a wide array of industries including:

- Automotive OEMs
- Automotive Tiers
- Packaging OEMs and Manufacturers
- Food and Beverage
- Welding and Stamping
- Robots and Material Handling
- Steel and Metalworking
- Plastics and Hydraulics

IO-Link

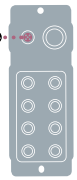
THE BALLUFF IO-LINK ADVANTAGE

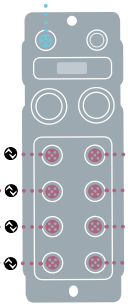
IO-LINK MASTERS
- 4 port, 8 port and 16 port versions
- Parameter server functionality
- IIoT ready, JSON objects

DeviceNet
EtherNet/IP
PROFIBUS
PROFINET
CC-Link
EtherCAT
CC-Link IE

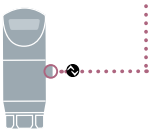
SMARTLIGHT INDICATORS
- Stack light mode: 1-5 zones
- Level mode: high/low level
- Configure: colors, brightness, levels, etc.

DISCRETE AND ANALOG I/O
- Up to 240 I/O per IP address
- IP20 or IP67, metal or plastic, M8 or M12
- Inputs, outputs, configurable
- PNP or NPN, 2-wire DC



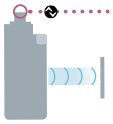


ANALOG I/O
- 1, 4, 8 channel versions
- Current, voltage, thermocouple, RTD
- Reduces shielded cable runs

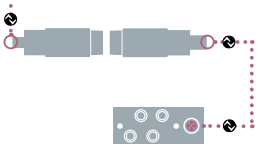


SMART SENSORS
- Photoeye, Prox, Ultrasonic, Pressure Sensors
- Software storable and programmable parameters
- Diagnostics and digital measurements

VALVE MANIFOLD CONTROL
- Compatible with most major manifold brands
- 24 VDC, up to 1.1 amps active at one time
- Up to 24 position controls via 25 pin D-sub or M25



RFID TRACEABILITY
- Simple to implement, easy to use
- 10 byte or 32 byte read/write versions
- Enables flexibility and visibility in the production



NON-CONTACT COUPLERS
- Power and signal transmission over the air gap
- Power: 24 VDC, up to 0.5 amps transmitted
- Signal: any IO-Link device, appears transparent

LINEAR MEASUREMENT
- No shielded cable runs and 32 bit signed integer
- Programmable stroke and set points
- Available from 2" to 180"
- Multiple technologies and form factors

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HOW TO REACH US

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