Human Machine Interfaces

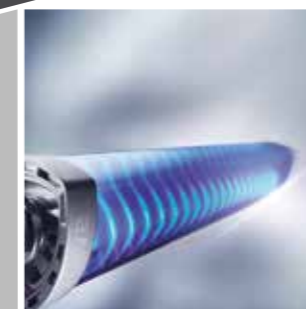# THE FUTURE OF TOWER LIGHTS AND PROCESS VISUALIZATION

BALLUFF

B *innovating automation*

CONTENTS

All the information you need at a glance

MULTI-PURPOSE SMARTLIGHT TOWER LIGHT AND SMARTLIGHT INDICATOR

innovating automation

SmartLight is the first programmable LED tower light. With a rich color spectrum, adjustable light intensity and the ability to program individual configurable segments, the Balluff SmartLight can display various machine or process status information instantaneously. The mode of operation can be switched based on programmed conditions so that a single SmartLight can be used as a multi-function tower light.

Solutions at the cell level
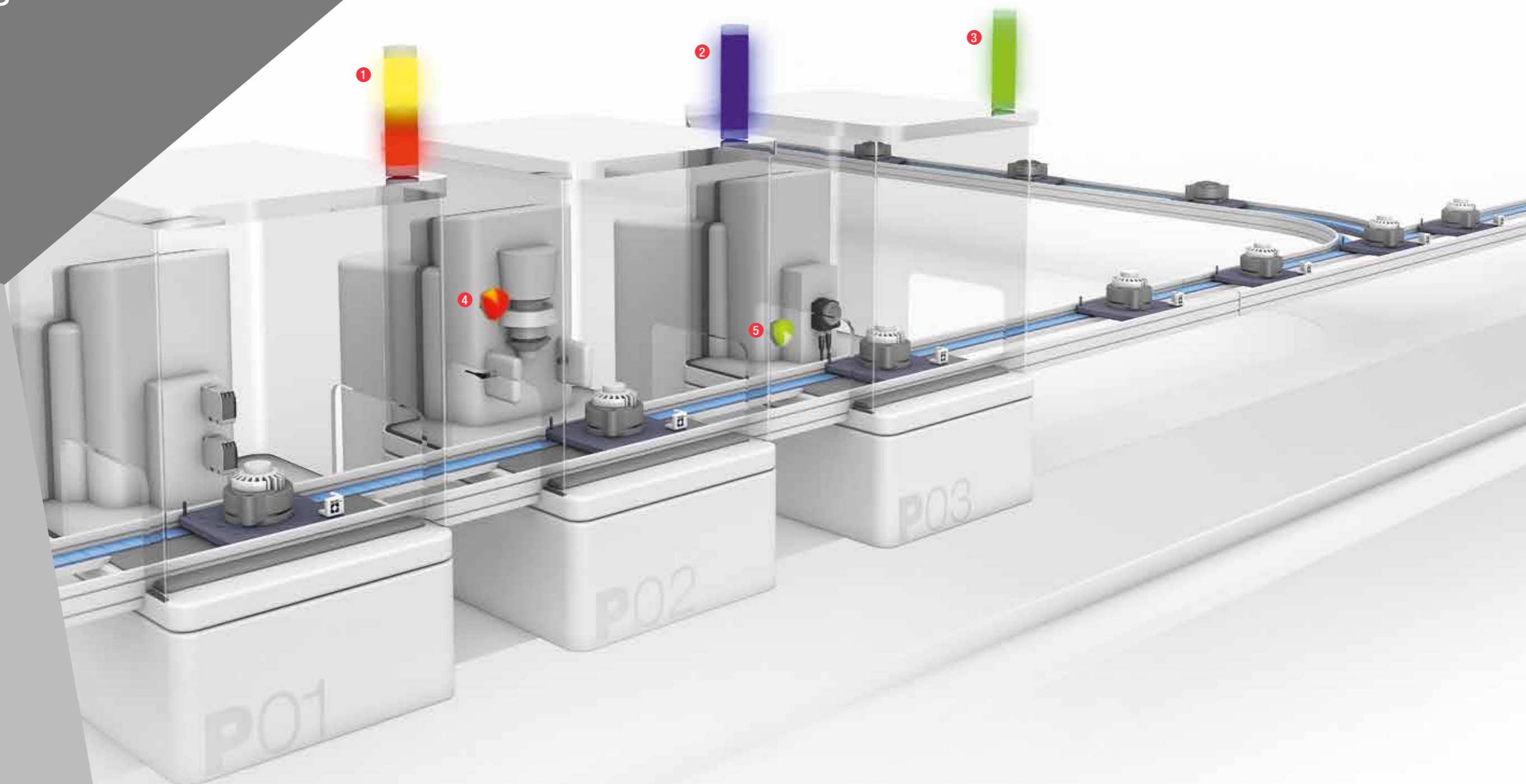
Process monitoring and machine status at the cell level is an integral part of manufacturing operations. Instantaneous visual feedback enables plants to operate efficiently. SmartLight adds tremendous value to the plant floor as it combines multiple modes of operations and functions in a single programmable tower light. With the SmartLight tower light and SmartLight indicator there are unlimited possibilities!

❶ Light and sound indicators
- Programmable intensity and customizable bright colors
- Audible 95db sound modules

❷ Simplified use
- Standard M12 sensor cable connection reduces need for special spare parts, no assembly required
- Mount exactly where needed with wall, ceiling or pole mounting options

❸ Maintenance friendly design
- Mainentance-free, long work life with LED segments to power the lights
- Built-in diagnostics with IO-Link

❹ Point-of-use pressure indicator

❺ Point-of-use reject indicator

# Flexible, scalable, intelligent tower light for cell level information

The SmartLight tower light offers four programmable modes of functionality: segment or stack light, level indication, run light, and flexible mode. Additionally, a SmartLight tower light with a buzzer option is available for audible feedback.
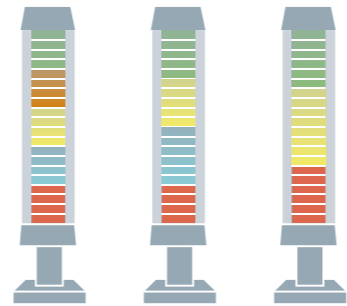
STACK LIGHT MODE

SmartLight's segment or stack light mode is feature-rich compared to a standard stack light. The number of segments and color for each segment can be programmed and changed on demand. Individual segments can be set for blinking or flashing mode, and the frequency of blinking can be programmed as well.

- 1 to 5 segments
- Programmable, customizable colors for each segment
- Blinking mode with programmable frequency
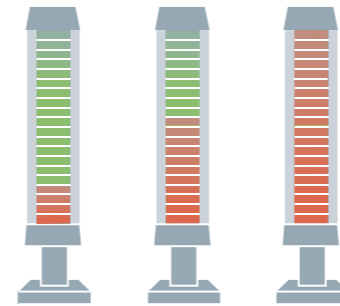
LEVEL MODE

When using the SmartLight as a level indicator, the resolution of input level can be mapped from an 8-bit to a 16-bit integer number and displays a bar graph.

The input could be a position of an object on a linear track or liquid level in a tank. Colors of the LEDs can be changed to signify the importance of the level as well. For example, if the level or the pressure in the tank is closer to the extreme, the SmartLight will display in red.

- Individual LEDs light up to display level
- Level input mapped directly to SmartLight
- Programmable, customizable colors for level indication

RUN LIGHT MODE

SmartLight, in a run light mode, allows using different programmable colors for the background and for the running segment. The length of the running segment and the speed of the running mode is configurable and can be switched to express different conditions.

As with any other mode, the intensity or brightness can be configured to ensure noticeable performance.

- Complete module displays the running light effect
- Programmable colors of running segment and background
- Programmable speed for running segment
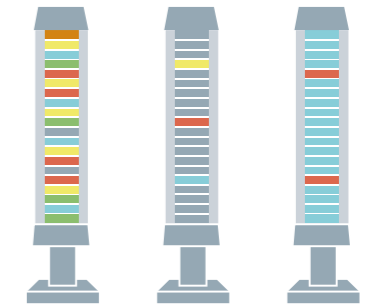
FLEXIBLE MODE

Flexible mode allows every LED segment to be controlled individually. The color and intensity of each LED element can be individually defined. Patterns and moving functions are then handled by the control system. This mode allows for the most creativity and unique indication solutions available.

- Complete control of each LED element
- Define your own segment structure (i.e., six segments)
- Program unique movement patterns (in control system)

Flexible, scalable, intelligent pick-to-light indication

At the heart of most lean initiatives is the desire for more flexibility with increased productivity. Traditional pick-to-light systems can provide that productivity but fall short on flexibility … until now.

The SmartLight indicator with integrated photoelectric sensors is the most innovative pick-to-light product available. All the functions from the indicator only unit are available in this unit. Integrated into flow-racks and supermarkets on the manufacturing floor, it can direct different types of personnel including multiple assemblers, part runners, maintenance and others. One indicator can orchestrate an entire assembly cell or kitting station. All at an affordable price due to the innovative use of IO-Link.

1 Solid red
Bin needs to be replenished

2 Solid green
Bin is stocked and ready for a call

3 Yellow/green
Bin is ready and calling for a pick from the yellow operator

4 Blue/green
Bin is ready and calling for a pick from the blue operator

Flexible, scalable, intelligent point-of-use indication

One segment

Two segments

Three segments

Six segments

100%

75%

50%

25%

0%

Chasing tail

Fading tail

The SmartLight indicator line consists of only two parts: an indicator only version and indicator with an integrated photoelectric sensor for Pick-to-Light applications. Both share the same powerful LED indication functions and an IO-Link interface with Balluff's innovative expansion mode. This expansion mode allows two indicators to be connected to one IO-Link port.
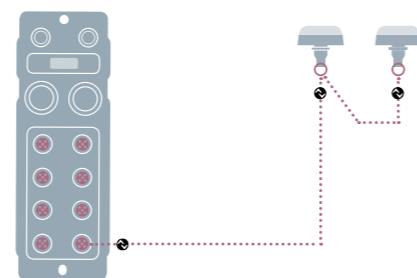
The LED indication functions are divided into six unique segments. Each segment can be individually controlled or utilize a variety of pre-programed operating modes. Due to the shape, directional indication is easily achieved.
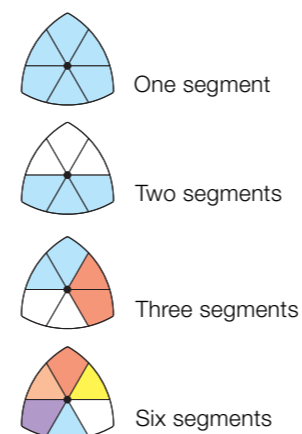
The photoelectric sensor version has an infrared, time-of-flight laser with a default 100mm range. This sensor has a sharp cutoff and tolerance to texture/color changes making it ideal for Pick-to-Light applications. The sensing range can be reduced for tighter applications or small bias.

SEGMENT MODE

In segment mode, you are in complete control over the SmartLight indicator. Each of the six segments are freely programmable for color and intensity. Operate the indicator as a segmented light or develop your own unique functions utilizing your control system.

- Operates in 1, 2, 3 or 6 segments
- Full control of color and blink mode
- Indication direction
- Mix your own color
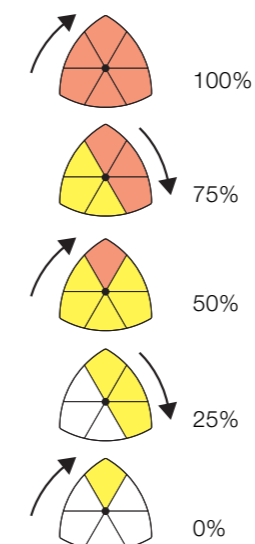
LEVEL MODE

In level mode, the resolution of input level can be mapped from an 8-bit to a 16-bit integer number. The input could be a pressure value, countdown timer, object position, tank level or any other continuously variable value.

Colors of the LEDs can be changed to signify the importance of the level as well. For example, if the level or the pressure in the tank is closer to the extreme, the SmartLight indicator will display in red.

- Dual color mode for low and high values
- Two rotations (720°) represents full swing
- Can also use one rotation (360°)
- Rotation direction control
- Fading transition control
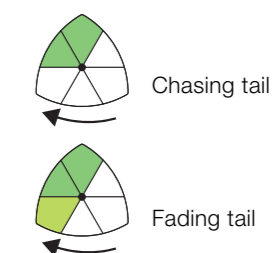
RUN LIGHT MODE

Run light mode allows different programmable colors for the background and for the running segment. The length of the running segment, speed of rotation and trailing effect is configurable and can be switched to express different conditions.

As with any other mode, the intensity or brightness can be configured to ensure noticeable performance.

- Indicate run or wait condition
- Define foreground and background color to indicate different run/wait conditions
- Fully programmable for speed, number of segments, color and direction
- Two display versions: Fading tail and chasing tail

Reduce complexity, reduce risk

Doing more with less is the foundation of our SmartLight product line. With one part number and one standard M12 cable you can fulfill nearly every task in your plant for cell level and point-of-use indication.

One part number

The days of purchasing and stocking multiple stack light segments, lamps, bases and caps are over. Building up a unit to a specific task is also over. No more wasted time configuring and building a stack light that limits flexibility and expansion.

The SmartLight tower light product line is comprised of only six part numbers—three sizes, with or without an audio alarm. That's it.

One standard M12 cable

No more wiring, period. All SmartLight products utilize IO-Link for simple, low-cost connections. The standard IO-Link interface ensures interoperability and provides unique, never-before-seen capability. The physical connection uses the industry standard M12 sensor-type cables which are economical and readily available.

Generic stack light

Reduce complexity
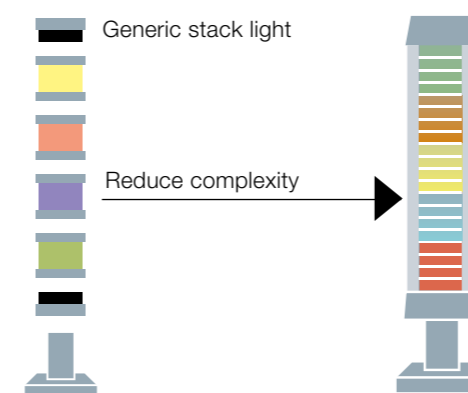
ONE PART NUMBER

No need to build your own stack light anymore. One part does it all and much more.

- Single part number
- Tamper resistant design
- Programmable colors, intensity, and blinking
- Configurable modes of operation with on-demand change of mode
- Programmable buzzer for continuous chopped or beeping sounds

Reduce complexity

ONE STANDARD M12 CABLE

No need to terminate individual wires. Simply plug in a standard M12 cable.

- Eliminate wiring problems
- Enable the convenience of quick disconnect
- Gain functionality
- Reduce the volume of I/O points required in the PLC

IO-Link distributed modular I/O

IO-Link is a fieldbus and manufacturer independent communications standard defined by the international communications standard IEC 61131-9. IO-Link enables seamless integration of a variety of actuators while maintaining scalability for future adaptability in the controls architecture. IO-Link is universal and adaptable to any major industrial network protocol, such as Ethernet/IP, Profinet, EtherCAT, CC-Link IE Field, Devicenet, Profibus, or CC-Link.

A multitude of actuators or devices can be connected without complex wiring. Devices include discrete I/O (e.g., prox switches), analog I/O devices, smart sensors (e.g., pressure sensors, linear position sensors), and specialty devices (e.g., RFID, non-contact connections).

IO-Link has built in scalability to add more devices to the existing network without adding more network nodes in the architecture thus providing ease of operation and a cost-effective solution for automation.

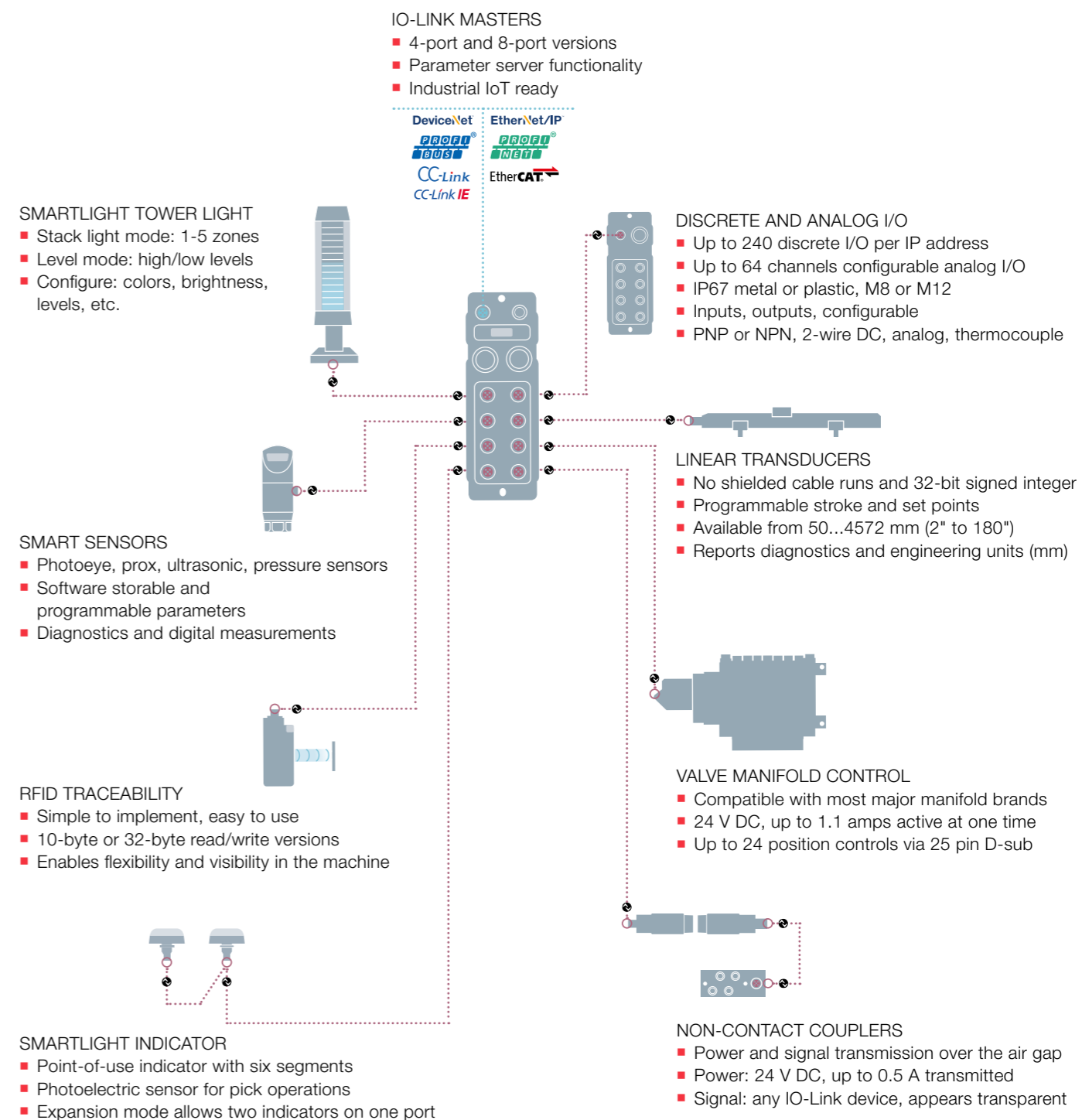### IO-LINK MASTERS
- 4-port and 8-port versions
- Parameter server functionality
- Industrial IoT ready

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

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

DISCRETE AND ANALOG I/O
- Up to 240 discrete I/O per IP address
- Up to 64 channels configurable analog I/O
- IP67 metal or plastic, M8 or M12
- Inputs, outputs, configurable
- PNP or NPN, 2-wire DC, analog, thermocouple

SMART SENSORS
- Photoeye, prox, ultrasonic, pressure sensors
- Software storable and programmable parameters
- Diagnostics and digital measurements

LINEAR TRANSDUCERS
- No shielded cable runs and 32-bit signed integer
- Programmable stroke and set points
- Available from 50...4572 mm (2" to 180")
- Reports diagnostics and engineering units (mm)

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

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

SMARTLIGHT INDICATOR
- Point-of-use indicator with six segments
- Photoelectric sensor for pick operations
- Expansion mode allows two indicators on one port

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

Capture operating status with displays and SmartLight tower light

SIGNALING AND DISPLAY DEVICES

The SmartLight tower light, a LED signal light, displays physical variables that allow you to know the status of your machine at a glance. The SmartLight visualizes progressions and trends and allows you to personalize colors and modes without any mechanical modifications. Through the IO-Link interface, it is easy to install and configure.

- Flexible
- Easy to install
- No assembly required

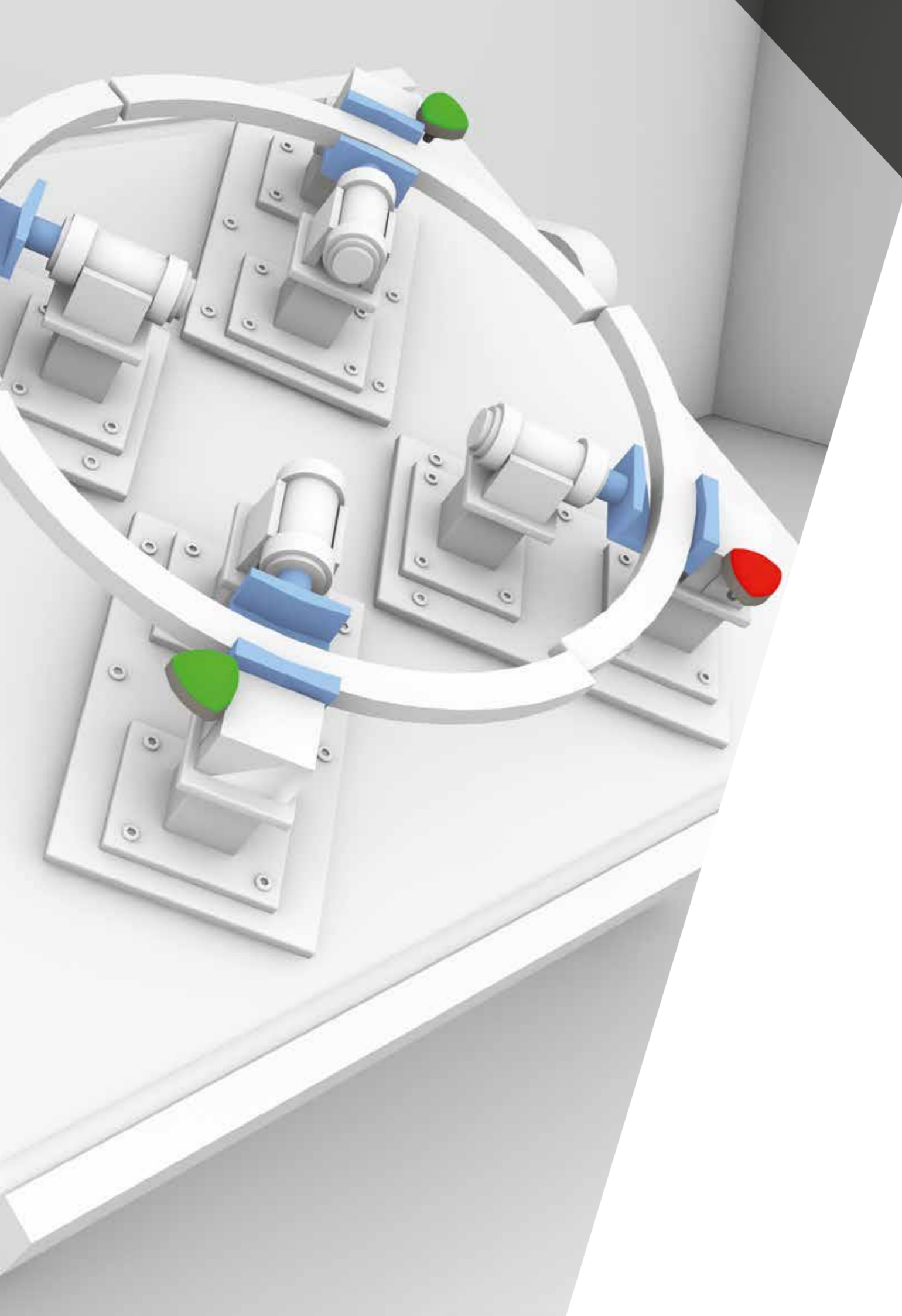**IO-Link**

SMARTLIGHT TOWER LIGHT WITH IO-LINK

	BNI0085 BNI IOL-802-102-Z037	BNI008A BNI IOL-801-102-Z037	BNI0087 BNI IOL-800-000-Z037
WITH SOUND MODULE (BUZZER)			
WITHOUT SOUND MODULE	BNI0082 BNI IOL-802-102-Z036	BNI0088 BNI IOL-801-102-Z036	BNI007T BNI IOL-800-000-Z036
Number of default segments max.	5	3	1
Number of LED segments	20	12	4
Color spectrum per segment	Red, green, yellow, blue, white, orange, user defined	Red, green, yellow, blue, white, orange, user defined	Red, green, yellow, blue, white, orange, user defined
Mode	Stack, run, level, flex	Stack, run, level, flex	Stack, run, flex
Supply voltage	18...30 V DC	18...30 V DC	18...30 V DC
Connection: IO-Link	M12, A-coded, male	M12, A-coded, male	M12, A-coded, male
Communication	IO-Link	IO-Link	IO-Link
Configurable	Yes	Yes	Yes
Max. load current	0.5 A	0.25 A	0.25 A
Degree of protection per IEC 60529	IP30 (with buzzer), IP65 (without buzzer)	IP30 (with buzzer), IP65 (without buzzer)	IP30 (with buzzer), IP65 (without buzzer)
Operating/storage temperature	−5...+55 °C/−25...+70 °C	−5...+55 °C/−25...+70 °C	−5...+55 °C/−25...+70 °C
Mounting	M18 thread	M18 thread	M18 thread
Dimension (L × W × H) mm	60 × 60 × 330.5 (with buzzer), 60 × 60 × 309 (without buzzer)	60 × 60 × 234.5 (with buzzer), 60 × 60 × 213 (without buzzer)	60 × 60 × 138.5 (with buzzer), 60 × 60 × 117 (without buzzer)
Housing material	Transparent plastic	Transparent plastic	Transparent plastic
IO-Link Version 1.1			
Transfer rate	COM 2 (38.4 kBaud)		
Cycle time	7.2 ms with IO-Link 1.1 Master		
IO-Link process data length	8-byte output, 1-byte input		
Communication indicators	Green LED		

⚠ **WARNING**

- Read, understand, and follow warnings and manual. Failure to do so could result in serious injury or death.
- NEVER USE AS A SENSING DEVICE FOR PERSONNEL PROTECTION
- Does NOT include self-checking redundancy circuitry required for use in personnel safety applications
- Does NOT meet OSHA and ANSI standards for point-of-operation devices

Balluff, Inc. · www.balluff.com · 1-800-543-8390

⬣ IO-Link

SMARTLIGHT INDICATOR
WITH IO-LINK
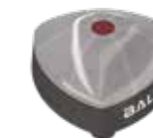
	BNI00CZ BNI IOL-803-102-R036	BNI00E0 BNI IOL-803-103-R036
Number of segments max.	6	6
Color spectrum per segment	Red, green, yellow, blue, white	Red, green, yellow, blue, white
Supply voltage	18...30 V DC	18...30 V DC
Function indicator IO-Link	Green LED or segment 1 (fail safe)	Green LED or segment 1 (fail safe)
Connection: IO-Link	M12, A-coded, male	M12, A-coded, male
Max. load current	< 100 mA	< 100 mA
Degree of protection per IEC60529	IP65	IP65
Operating/storage temperature	−5...+55 °C/−15...+70 °C	−5...+55 °C/−15...+70 °C
Mounting	M22 × 1 thread with key	M22 × 1 thread with key
Dimension (L × W × H) mm	62.42 × 61.84 × 57.5	62.42 × 61.84 × 57.5
Base housing material	Fortron	Fortron
Lens material	Polycarbonate	Polycarbonate
Sensor type	None	IR laser, time-of-flight
Sensor range	None	100 mm adjustable down
IO-Link Version 1.1		
Cycle time	8.4 ms with IO-Link 1.1 Master	8.4 ms with IO-Link 1.1 Master
IO-Link process data length	8-byte output, 2-byte input	8-byte output, 2-byte input

IO-LINK MASTERS

B *innovating automation*

Balluff offers IO-Link master blocks for all major networks and fieldbus protocols. With built-in expandability, IO-Link blocks can significantly increase the I/O count served by a single network node. Each IO-Link port is configurable to be used as either IO-Link or as input or output providing flexibility for scalable and modular controls architecture.

EtherNet/IP
IO-LINK MASTER ETHERNET/IP

4 × IO-LINK 8 × CONFIGURABLE	**BNI009T** BNI EIP-507-005-Z040		
4 × IO-LINK 12 × CONFIGURABLE		**BNI004A** BNI EIP-502-105-Z015	
8 × IO-LINK 16 × CONFIGURABLE			**BNI006A** BNI EIP-500-105-2015
Network protocol	Ethernet/IP	Ethernet/IP	Ethernet/IP
Addressing	Software	Display	Display

PROFINET
IO-LINK MASTER PROFINET

4 × IO-LINK 8 × CONFIGURABLE	**BNI0092** BNI PNT-507-005-Z040			
4 × IO-LINK 12 × CONFIGURABLE		**BNI004U** BNI PNT-502-105-Z015		
8 × IO-LINK 16 × CONFIGURABLE			**BNI005H** BNI PNT-508-105-Z015	
16 × IO-LINK 32 × CONFIGURABLE				**BNI007M** BNI PNT-509-105-Z033
Network protocol	Profinet	Profinet	Profinet	Profinet
Addressing	Software	Software	Software	Software

DeviceNet
IO-LINK MASTER DEVICENET

4 × IO-LINK 12 × CONFIGURABLE	**BNI005A** BNI DNT-502-100-Z001
Network protocol	Devicenet
Addressing	Display

PROFIBUS
IO-LINK MASTER PROFIBUS

4 × IO-LINK 8 × CONFIGURABLE	**BNI0030** BNI PBS-502-101-Z001	
4 × IO-LINK 12 × CONFIGURABLE		**BNI005R** BNI PBS-504-001-K008
Network protocol	Profibus	Profibus
Addressing	Rotary dials	Display

CC-Link

IO-LINK MASTER
CC-LINK

4 × IO-LINK 12 × CONFIGURABLE	**BNI0040** BNI CCL-502-100-Z001
Network protocol	CC-Link
Addressing	Display

EtherCAT

IO-LINK MASTER
ETHERCAT

8 × IO-LINK 16 × CONFIGURABLE	**BNI0077** BNI ECT-508-105-Z015
Network protocol	EtherCAT
Addressing	Software

CC-Link IE Field

IO-LINK MASTER
CC-LINK IE FIELD

8 × IO-LINK 16 × CONFIGURABLE	**BNI008C** BNI CIE-508-105-Z015
Network protocol	CC-Link IE Field
Addressing	Display

IO-LINK MASTER
USB INTERFACE

1 × IO-LINK	**BNI0073** BNI USB-901-013-A501
Input power	110 V AC with converter
Load current max.	40 mA via USB, 1.6 A with supply

High-quality gear for virtually any application

ACCESSORIES.

innovating automation

Balluff offers a wide variety of accessories designed specifically for the SmartLight to optimize its performance and make the most of your investment.

TOWER LIGHT MOUNTING PEDESTALS

	BAM026K BAM MB-NI-017-100-1	BAM034C BAM MB-NI-017-250-1	BAM026L BAM MB-NI-017-400-1
Description	Pedestal mounting	Pedestal mounting	Pedestal mounting
Material	Anodized aluminum	Anodized aluminum	Anodized aluminum
Dimensions (H × Ø)	110 × 70 mm	250 × 70 mm	400 × 70 mm
Mounting hardware	M5 screws	M5 screws	M5 screws

TOWER LIGHT MOUNTING BRACKET

	BAM0255 BAM MB-NI-016-800-1
Description	Angled wall mount
Material	Anodized aluminum
Dimensions	80 × 6 × 62 mm

TOWER LIGHT MOUNTING KITS

	SET016U BAV BP-PH-00105-01	SET011M BAV BP-PH-00065-01
Description	Pole or wall mounting Kit contains: 150 mm rod, knuckle, foot, sensor holder	Pole or wall mounting Kit contains: 2 × 150 mm rod, knuckle, joint, foot, sensor holder

INDICATOR MOUNTING PEDESTALS

	BAM0358 BAM MB-NI-039-100-1	BAM0359 BAM MB-NI-039-400-1
Description	Pedestal mounting	Pedestal mounting
Material	Anodized aluminum	Anodized aluminum
Dimensions (H × Ø)	100 × 70mm	400 × 70mm
Mounting hardware	M5 screws	M5 screws

INDICATOR MOUNTING BRACKETS

	BAM0353 BAM MB-NI-041-803-5	BAM0352 BAM MB-NI-040-803-5
Description	Right angle bracket with keyway	Straight bracket with keyway
Material	Stainless steel	Stainless steel
Dimensions	M22	M22

INDICATOR MOUNTING BRACKETS

	BAM0350 BAM MB-NI-042-803-5	BAM0354 BMS CS-M-D12-ID22-01
Description	Tube mount bracket with keyway	Rod system mounting bracket
Material	Stainless steel	Stainless steel
Dimensions	M22	M22

Standardized and tailor-made connection components

CONNECTIVITY.

B *innovating automation*

To make the most of your investment, Balluff offers an optional array of connectivity solutions perfectly tailored to the SmartLight.

DOUBLE ENDED CABLES
4-WIRE, NON-LED

	BCC M415-M414-3A-304-PW0434-_ ** _	BCC M425-M414-3A-304-PX0434-_ ** _		BCC M415-M424-3A-304-PX0434-_ ** _	BCC M425-M424-3A-304-PX0434-_ ** _
Type	M12 female – M12 male	M12 female – M12 male		M12 female – M12 male	M12 female – M12 male
Configuration	Straight – straight	Right angle – straight		Straight – right angle	Right angle – right angle
Voltage rating	250 V AC/V DC	250 V AC/V DC		250 V AC/V DC	250 V AC/V DC
Amperage	4 A	4 A		4 A	4 A
Approval/Conformity	cULus	cULus		cULus	cULus

** Standard lengths available: 003 = 0.3 m, 006 = 0.6 m, 010 = 1 m, 015 = 1.5 m, 020 = 2 m, 030=3 m, 050 = 5 m

DOUBLE ENDED CABLES
4-WIRE, NON-LED

	BCC M415-M414-3A-304-* X44T2-_ ** _	BCC M425-M414-3A-304-* X44T2-_ ** _		BCC M415-M424-3A-304-* X44T2-_ ** _	BCC M425-M424-3A-304-* X44T2-_ ** _
Type	M12 female – M12 male	M12 female – M12 male		M12 female – M12 male	M12 female – M12 male
Configuration	Straight – straight	Right angle – straight		Straight – right angle	Right angle – right angle
Voltage rating	250 V AC/V DC	250 V AC/V DC		250 V AC/V DC	250 V AC/V DC
Amperage	4 A	4 A		4 A	4 A
Approval/Conformity	cULus	cULus		cULus	cULus

* Standard cable jackets: V = PVC, P = PUR, E = TPE
** Standard lengths available: 003 = 0.3 m, 006 = 0.6 m, 010 = 1 m, 015 = 1.5 m, 020 = 2 m, 030 = 3 m, 050 = 5 m

EXPANSION PORT
WIRING CABLES
FOR INDICATOR

		BCC0K6M BCC M413-M415-M415-U2096-003/006	BCC0K6N BCC M413-M415-M415-U2096-003/010		BCC0K6P BCC M413-M415-M415-U2096-006/010	BCC0K6R BCC M413-M415-M415-U2096-010/020
Type	❶	M12 female	M12 female		M12 female	M12 female
	❷	M12 male	M12 male		M12 male	M12 male
	❸	M12 female	M12 female		M12 female	M12 female
Length	❶	0.3 m	0.3 m		0.6 m	1 m
	❸	0.6 m	1 m		1 m	2 m
Material		Black PUR	Black PUR		Black PUR	Black PUR
Voltage		250 V AC/V DC	250 V AC/V DC		250 V AC/V DC	250 V AC/V DC
Amperage		4 A	4 A		4 A	4 A

EXPANSION PORT
WIRING CABLES
FOR INDICATOR

		BCC0K7C BCC M413-M415-M415-U2095-003/006	BCC0K7E BCC M413-M415-M415-U2095-003/010		BCC0K7F BCC M413-M415-M415-U2095-006/010	BCC0K7H BCC M413-M415-M415-U2095-010/020
Type	❶	M12 female	M12 female		M12 female	M12 female
	❷	M12 male	M12 male		M12 male	M12 male
	❸	M12 female	M12 female		M12 female	M12 female
Length	❶	0.3 m	0.3 m		0.6 m	1 m
	❸	0.6 m	1 m		1 m	2 m
Material		Yellow TPE	Yellow TPE		Yellow TPE	Yellow TPE
Voltage		250 V AC/V DC	250 V AC/V DC		250 V AC/V DC	250 V AC/V DC
Amperage		4 A	4 A		4 A	4 A

WIRING DIAGRAM
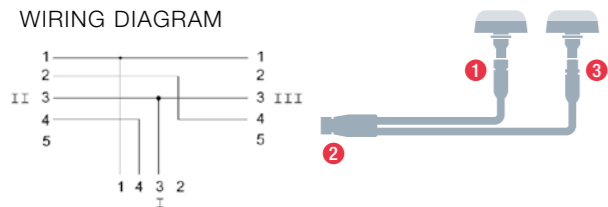
Balluff

OPENING NEW PERSPECTIVES.

🅱 *innovating automation*

🅱 *innovating automation*

Balluff is one of the leading providers of high-quality sensor, identification and network solutions as well as software for integrated system solutions for your automation requirements. Family-run for more than 90 years, the company now employs around 3600 employees in 37 subsidiaries with distribution, production and development sites worldwide, all working towards your success. Together with our branches, we guarantee the highest quality standards worldwide. This is how we empower you to always receive the best.

We give our all to provide top services for innovative solutions that increase your competitive edge. Through years of experience we bring the competence of a manufacturer and high personal engagement.

We live our motto 'innovating automation': we are automation pacesetters, developers and technological pioneers. In open interactions with associations, universities and research facilities, and in close contact with our customers, we create new industry solutions for automation. Innovative Balluff solutions prepare you for a successful future. We keep the future firmly in sight. In everything we do. With sophisticated environmental management, we protect the environment and handle our resources carefully. This creates the best conditions for sustainable action, also for you.

You can always count on us, our products and our scheduling and delivery reliability. In the spirit of a good partnership.

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

www.balluff.com

CONTACT
OUR
WORLDWIDE
SUBSIDIARIES

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