K50 Pro Devices with IO-Link

Features

50 mm IO-Link Controlled Multicolor RGB Devices (Touch Button, Push Button, and Optical Sensor)

- IO-Link gives full access to color, flashing, rotating, and dimming settings as well as advanced animations such as dynamic sequence mode and LED control
- Output settings, including on and off delays, output function, and output state are also available with IO-Link
- 18 V DC to 30 V DC operation

Standard Model: Touch Button

Compact Model: Touch Button

Optical Sensor

Push Button

WARNING:

- **Do not use this device for personnel protection**
- Using this device for personnel protection could result in serious injury or death.
- This device does not include the self-checking redundant circuitry necessary to allow its use in personnel safety applications. A device failure or malfunction can cause either an energized (on) or de-energized (off) output condition.

Models

Touch Button Models

- Excellent immunity to false triggering by water spray, oils, and other foreign materials
- Rated IP67 and IP69K per ISO 20653
- Vibration feedback models available for an unmistakable touch confirmation
- Can be actuated with bare hands or gloves; adjustable sensitivity
- Compact models available for lower profile applications
- Models constructed from FDA-grade materials available

Family	Style	Activation Method	Housing	Control	Connector[1]
K50	**P**	**T**	**C**	**K**	**QP**
K50	P = Pro	T = Touch TF = Touch, FDA-grade TV = Touch, Vibration Feedback TFV = Touch, FDA-grade, Vibration Feedback	C = Compact[2] Blank = Standard Dome	K = IO-Link	Q = Integral 4-pin M12 male quick-disconnect connector[3] QP = 150 mm (6 in) PVC-jacketed cable with a 4-pin M12 male quick-disconnect connector

To order the touch button with an alternate laser marking than the touch icon, see Standard Laser Marking Options.

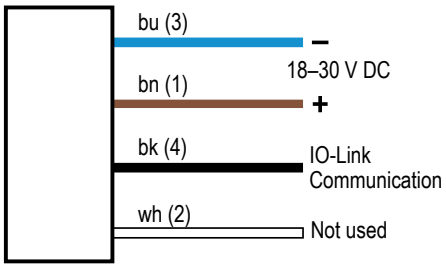
Push Button and Optical Sensor Models

- Fixed-field models are immune to ambient light, EMI and RFI interference
- Fixed-field models rated IP67 and IP69K per ISO 20653
- Push Button models rated IP65

Family	Style	Activation Method	Control	Connector[1]
K50	**P**	**FF50**	**K**	**Q**
K50	P = Pro	FF50 = 50 mm Fixed Field[4] FF100 = 100 mm Fixed Field[4] FF200 = 200 mm Fixed Field[4] PB = Push Button	K = IO-Link	Q = Integral 4-pin M12 male quick-disconnect connector QP = 150 mm (6 in) PVC-jacketed cable with a 4-pin M12 male quick-disconnect connector QPMA = 150 mm (6 in) PUR-jacketed cable with a 4-pin M12 male quick-disconnect connector

[1] Models with a quick-disconnect connector require a mating cordset.
[2] Not available in FDA-grade material or with vibration feedback.
[3] Not available in FDA-grade material.
[4] Cutoff distance will vary from specified range based on target and tolerances.

Wiring Diagram



IO-Link®

IO-Link® is a point-to-point communication link between a master device and a sensor and/or light. It can be used to automatically parameterize sensors or lights and to transmit process data. For the latest IO-Link protocol and specifications, please visit www.io-link.com.

For the latest IODD files, please refer to the Banner Engineering Corp website at: www.bannerengineering.com.

IO-Link Process Data In (Device to Master)

Use process data to read the device output state. When the device is in Four State Full Logic mode, use process data to read the device logic state in addition to the output state.

Name	Description
Output State	Output state follows touch, optical sensor, or push button inputOutput state follows touch button input
Device State	Current state (State 1, State 2, State 3, State 4). Only available with Operation Mode set to Four State Full Logic or Multicolor

IO-Link Process Data Out (Master to Device)

Use process data out to define device states. Use parameter data to define device modes, states, touch settings, output settings, vibration feedback, and custom colors.

Advanced Mode

Use process data to control delays, color, intensity, flash, and other animation types. Process data is also used to control the sequence value dynamically. Use parameter data to create custom colors, intensity, speeds, and to define output and touch settings.

Four State Full Logic Mode

Use process data to define the Job Input state and to read the touch, optical sensor, or push button state and device state (State 1, State 2, State 3, State 4). See below for more information about how to achieve legacy logic types (C, D, E, and H). Use parameter data to change color, intensity, flash, speed, select animation type, and define output settings.

Multicolor Mode

Use process data to activate the defined device state. Use parameter data to define output settings, control delays, color, intensity, flash, and other animation types for State 1, State 2, State 3, and State 4.

Definitions for device states in Advanced Mode, Four State Full Logic Mode, and Multicolor Mode

Name	Description
Animation Type	
Off	Indicator is off
Steady	Color 1 is solid on at defined intensity
Flash	Color 1 flashes at defined speed, color intensity, and pattern
Two Color Flash	Color 1 and Color 2 flash alternately at defined speed, color intensities, and pattern
50/50	Color 1 is displayed on 50% of the indicator and Color 2 is displayed on the other 50% of the indicator at the defined color intensities
50/50 Rotate	Color 1 is displayed on 50% of the indicator and Color 2 is displayed on the other 50% of the indicator while rotating at the defined speed, color intensities, and rotational direction
Chase	Color 1 is displayed as a single spot against the background of Color 2 while rotating at the defined speed, color intensities, and rotational direction
Intensity Sweep	Color 1 repeatedly increases and decreases intensity between 0% to 100% at defined speed and color intensity
Color Sweep	Color 1 and Color 2 transition alternately at defined speed and color intensities
Sequence	Color 1 increments against the background of Color 2 at defined Dynamic or Static Sequence Value (Advanced mode and other modes respectively)
Animation Direction	Defines the direction of rotation for the 50/50 rotate, chase, and sequence animations (CW or CCW)
Animation Pattern	Defines the flash pattern for flash and two color flash animations (normal, strobe, three pulse, SOS, or random); also defines the pattern of the vibration feedback

Continued on page 3

Continued from page 2

Name	Description
Animation Speed	Defines the animation speed (slow, medium, fast, or custom); also defines the speed of the vibration feedback pattern
Vibration Feedback	Defines the type of vibration response when the button is touched (Off, On, Animation Pattern) (Touch models with vibration only)
Off Delay Type	Defines if the Off Delay should be measured from when the conditions for the State began (Leading Edge) or from when the conditions ended (Trailing Edge)
Off Delay (ms)	The duration of the animation Off Delay. Leading Edge Off Delays can be used to ensure the animation is active for at least a minimum amount of time.
Dynamic/Static Sequence Value	Defines the span of Color 1 in the Sequence animation [0-255]. 0 means no portion of the animation will be Color 1, and it increases in a circular manner to 255 which indicates the full circumference will be Color 1. In Advanced Mode, this is in process data and is called Dynamic Sequence Value. In the other modes, this is in parameter data and is called Static Sequence Value.
Sequence Shift	Shifts the beginning of the sequence animation to the specified LED (LED1 at 12 o'clock continuing in the direction indicated by the Animation Direction parameter
Color 1	Defines Color 1 of defined animation
Color 1 Intensity	Defines the intensity of Color 1 in the animation (high, medium, low, off, or custom)
Color 2	Defines Color 2 of defined animation
Color 2 Intensity	Defines the intensity of Color 2 in the animation (high, medium, low, off, or custom)

Four State Full Logic Mode State Descriptions

Use process data job input and the touch button, optical sensor, or push button input to dictate which one of these states the device should be in. Use parameter data to define the state characteristics.
State 1: Process Data job input off and touch, optical sensor, or push button inactive
State 2: Process Data job input on and touch, optical sensor, or push button inactive
State 3: Process Data job input off and touch, optical sensor, or push button active
State 4: Process Data job input on and touch, optical sensor, or push button active

Four State Full Logic		
	Not Actuated	**Actuated**
No Input	State 1	State 3
Job Input	State 2	State 4

Legacy Logic Definitions (Four State Full Logic)	
C Logic	State 1 is Off. State 2 is Color 1/Job Input. State 3 is Color 2/Acknowledge. State 4 is defined the same as State 3
D Logic	State 1 is Off. State 2 is Color 1/Job Input. State 3 is Off. State 4 is defined the same as State 2
E Logic	State 1 is Off. State 2 is Color 1/Job Input. State 3 is Color 2/Mispick. State 4 is defined the same as State 2
H Logic	State 1 is power, defined as Color 1. State 2 is defined the same as State 1. State 3 is Color 2/Sense. State 4 is defined the same as State 3

LED Control Mode

Use process data to define the color and intensity of each individual LED. Use parameter data to define customer colors and intensities. LED1 is oriented at the 12 o'clock position continuing clockwise through LED8 near 11 o'clock position.

Name	Description
LED 1 Color…LED 8 Color	Defines the color of the designated LED.
LED 1 Intensity…LED 8 Intensity	Defines the intensity of the designated LED [Values: 0-10]
Vibration Feedback	Defines the type of vibration response when the button is touched (Off, On, Pattern) (Touch models with vibration only)
Vibration Pattern	Defines the pattern of the vibration feedback (normal, strobe, three pulse, SOS, or random) (Touch models with vibration only)
Vibration Speed	Defines the speed of the vibration feedback pattern (slow, medium, fast, or custom) (Touch models with vibration only)

Demo Mode

Cycles through color spectrum, 50/50 rotate, intensity sweep, and sequence mode. Touch, optical sensor, or push button speeds cycle rate up or down (can be either Momentary or Latching). Touch, optical sensor, or push button initiates state showing individually colored LEDs. When set to demo mode, the device will cycle through the defined sequence when power is applied regardless of its connection to an IO-Link master.

Touch Settings

Use Parameter Data to define the following settings.

Setting	Description
Touch Sensitivity	Defines the sensitivity of the touch button as either Standard, High or Low. Low sensitivity resists false activation. High sensitivity can be used for improved touch response (Touch models only)
Function	Latching or Momentary Options. Momentary function toggles output on only during a touch, optical sensor, or push button input. Latching function toggles output on or off for each touch, optical sensor, or push button input
Mute Enable	Turning on mute disables the touch, optical sensor, or push button input
On Delay (ms)	Length of time the button needs to be pressed or the sensor needs to be blocked to trigger an active state. 0-60,000 ms

Output Settings

Use Parameter Data to define the following settings.

Setting	Description
Output State	Normally Open or Normally Closed. Normally Open turns the output on with a touch, optical sensor, or push button input. Normally Closed turns the output off with a touch, optical sensor, or push button input
Off Delay Type	Leading Edge or Trailing Edge. Leading Edge delays will begin once a touch, optical sensor, or push button has been sensed. Trailing edge delays will begin once the touch, optical sensor, or push button has been released
Off Delay (ms)	Length of time before the output state returns to a touch, optical sensor, or push button inactive state after the button has been released or sensor has been unblocked. 0-60,000 ms

Specifications

Supply Voltage

18 V DC to 30 V DC

Supply Current

132 mA maximum current at 18 V DC

Touch Models: 93 mA typical at 24 V DC

Optical Models: 75 mA typical at 24 V DC

Push Button Models: 65 mA typical at 24 V DC

Supply Protection Circuitry

Protected against reverse polarity and transient voltages

Touch Dwell Time

If touch dwells for longer than 60 seconds, the output will revert to the untouched state

Vibration Feedback Characteristics

Max Total On-Time Per Touch: 3 seconds

Mechanical Life: 500,000 cycles

For all touch conditions, the default Vibration Feedback is On and the type of vibration feedback is Steady

Touch Response Time

Input Response: 5 ms minimum

Touch Response: 300 ms maximum (Standard Sensitivity touch response)

Optical Sensor Emitter LED

Infrared, 870 nm

Operating Conditions

–40 °C to +50 °C (–40 °F to +122 °F)

Humidity: 90% at +50 °C maximum relative humidity (non-condensing)

Storage: –40 °C to +70 °C (–40 °F to +158 °F)

Environmental Rating

Touch and Optical Models: IP67, IP69K per ISO 20653[5]

Push Button Models: IP65

Mounting

M30 × 1.5 threaded base, maximum torque 4.5 N·m (40 in·lbf)

Construction

Standard Model Base, Dome, and Nut: Polycarbonate

FDA Model Base, Dome, and Nut: FDA-grade copolyester

Push Button: Thermoplastic

Vibration and Mechanical Shock

Meets IEC 60068-2-6 requirements (Vibration: 10 Hz to 55 Hz, 1.0 mm amplitude, 5 minutes sweep, 30 minutes dwell)

Meets IEC 60068-2-27 requirements (Shock: 30G 11 ms duration, half sine wave)

IO-Link Interface

Supports Smart Sensor Profile: No

Baud Rate: 38400 bps (COM2)

Process Data In: 16 bits (2 bytes)

Process Data Out: 80 bits (10 bytes)

IODD Files: Provides all programming options, plus additional functionality

[5] QP models must be installed to protect the cable and cable entrance from high-pressure spray to meet IP69K.

Connections

Integral 4-pin M12 male quick-disconnect connector or 150 mm (6 in) PVC-jacketed cable with a 4-pin M12 male quick-disconnect connector, depending on model

Models with a quick disconnect require a mating cordset

Certifications

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IO-Link®

Default Indicator Characteristics

Color	Dominant Wavelength (nm) or Color Temperature (CCT)	Color Coordinates[6]		Lumen Output for Touch Models (Typical at 25 °C)[7]
		x	y	
Green	522	0.154	0.700	16.5
Red	620	0.689	0.309	8.3
Yellow	576	0.477	0.493	23.8
Blue	466	0.140	0.054	4.6
White	5700K	0.328	0.337	25.1
Cyan	493	0.170	0.340	18.4
Magenta	–	0.379	0.172	11.1
Amber	589	0.556	0.420	15.7
Rose	–	0.515	0.220	9.1
Lime Green	562	0.388	0.561	21.4
Sky Blue	486	0.155	0.247	19.5
Orange	599	0.616	0.370	12.1
Violet	–	0.217	0.089	9.7
Spring Green	508	0.177	0.536	17.0

[6] Refer to the CIE 1931 (x,y) Chromaticity Diagram to show equivalent color with indicated color coordinates. Actual coordinates may differ ± 5%.

[7] Values shown apply to touch dome models only. Lumen output for compact models is 20% lower, optical sensor models is 14% lower, and push button models is 10% lower.

Required Overcurrent Protection

WARNING: Electrical connections must be made by qualified personnel in accordance with local and national electrical codes and regulations.

Overcurrent protection is required to be provided by end product application per the supplied table.

Overcurrent protection may be provided with external fusing or via Current Limiting, Class 2 Power Supply.

Supply wiring leads < 24 AWG shall not be spliced.

For additional product support, go to www.bannerengineering.com.

Supply Wiring (AWG)	Required Overcurrent Protection (A)	Supply Wiring (AWG)	Required Overcurrent Protection (A)
20	5.0	26	1.0
22	3.0	28	0.8
24	1.0	30	0.5

FCC Part 15 Class B for Unintentional Radiators

(Part 15.105(b)) This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in

accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

(Part 15.21) Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

Industry Canada ICES-003(B)

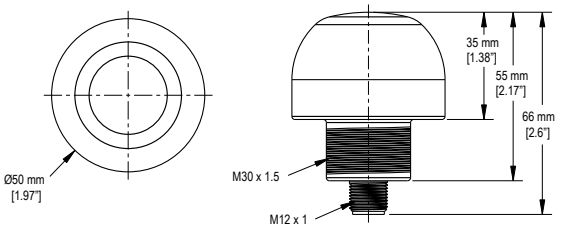
This device complies with CAN ICES-3 (B)/NMB-3(B). Operation is subject to the following two conditions: 1) This device may not cause harmful interference; and 2) This device must accept any interference received, including interference that may cause undesired operation.

Cet appareil est conforme à la norme NMB-3(B). Le fonctionnement est soumis aux deux conditions suivantes : (1) ce dispositif ne peut pas occasionner d'interférences, et (2) il doit tolérer toute interférence, y compris celles susceptibles de provoquer un fonctionnement non souhaité du dispositif.

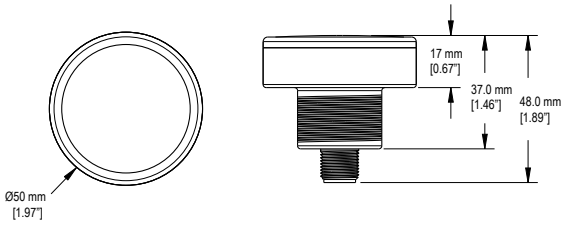
Dimensions

All measurements are listed in millimeters [inches], unless noted otherwise. The measurements provided are subject to change.

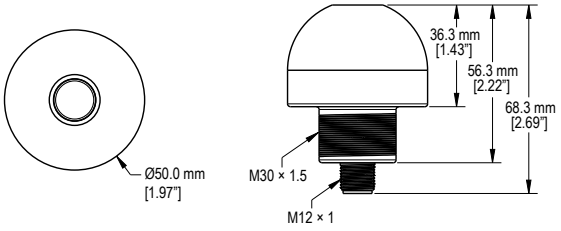
Standard Models: Touch Button



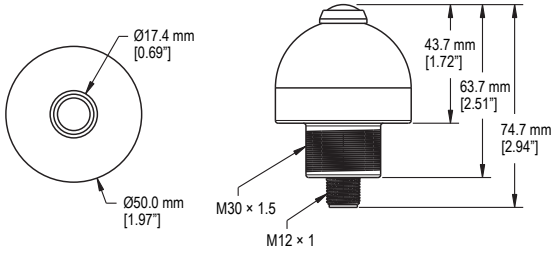
Compact Models: Touch Button



Optical Sensor

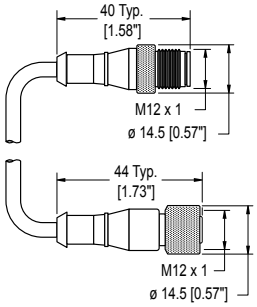
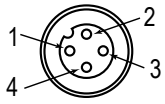
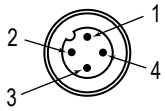


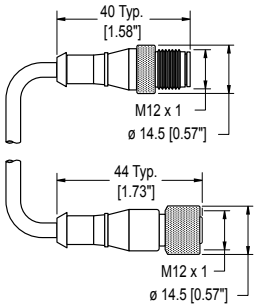
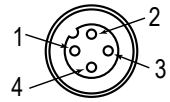
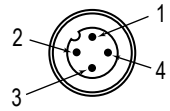
Push Button

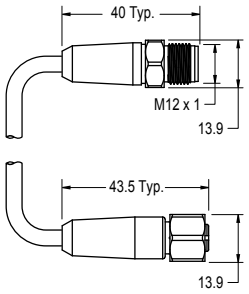
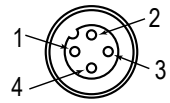
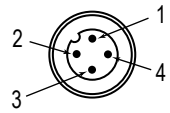


Accessories

Cordsets

4-Pin Double-Ended M12 Female to M12 Male Cordsets				
Model	**Length**	**Style**	**Dimensions**	**Pinout**
MQDEC-401SS	0.31 m (1 ft)	Male Straight/Female Straight		Female  Male  1 = Brown 2 = White 3 = Blue 4 = Black
MQDEC-403SS	0.91 m (2.99 ft)			
MQDEC-406SS	1.83 m (6 ft)			
MQDEC-412SS	3.66 m (12 ft)			
MQDEC-415SS	4.58 m (15 ft)			
MQDEC-420SS	6.10 m (20 ft)			
MQDEC-430SS	9.14 m (30.2 ft)			
MQDEC-450SS	15.2 m (49.9 ft)			

4-Pin Double-Ended M12 Female to M12 Male Oil Resistant Cordsets				
Model	**Length**	**Style**	**Dimensions**	**Pinout**
MQDEC-401SS-PUR	0.3 m (0.98 ft)	Male Straight/Female Straight		Female  Male  1 = Brown 2 = White 3 = Blue 4 = Black
MQDEC-403SS-PUR	1 m (3.28 ft)			
MQDEC-406SS-PUR	2 m (6.56 ft)			
MQDEC-415SS-PUR	5 m (16.4 ft)			
MQDEC-430SS-PUR	10 m (32.8 ft)			

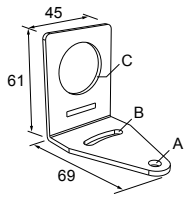
4-Pin Double-Ended M12 Female to M12 Male Washdown Stainless Steel Cordsets				
Model	**Length**	**Style**	**Dimensions**	**Pinout**
MQDEC-WDSS-401SS	0.31 m (1 ft)	Male Straight/Female Straight		Female  Male  1 = Brown 2 = White 3 = Blue 4 = Black
MQDEC-WDSS-403SS	0.91 m (2.99 ft)			
MQDEC-WDSS-406SS	1.83 m (6 ft)			
MQDEC-WDSS-412SS	3.66 m (12 ft)			

Brackets

SMB30A

- Right-angle bracket with curved slot for versatile orientation
- Clearance for M6 (¼ in) hardware
- Mounting hole for 30 mm sensor
- 12-gauge stainless steel

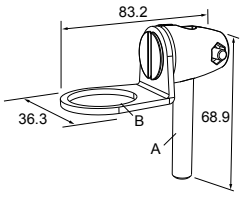
Hole center spacing: A to B=40
Hole size: A=ø 6.3, B= 27.1 × 6.3, C=ø 30.5



SMB30FA

- Swivel bracket with tilt and pan movement for precise adjustment
- Mounting hole for 30 mm sensor
- 12-gauge 304 stainless steel
- Easy sensor mounting to extrude rail T-slot
- Metric- and inch-size bolt available

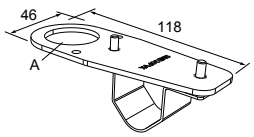
Bolt thread: SMB30FA, A= 3/8 - 16 × 2 in; SMB30FAM10, A= M10 - 1.5 × 50
Hole size: B= ø 30.1



SMB30FVK

- V-clamp, flat bracket and fasteners for mounting to pipe or extensions
- Clamp accommodates 28 mm dia. tubing or 1 in. square extrusions
- 30 mm hole for mounting sensors

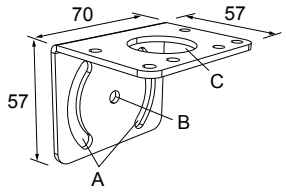
Hole size: A= ø 31



SMB30MM

- 12-gauge stainless steel bracket with curved mounting slots for versatile orientation
- Clearance for M6 (¼ in) hardware
- Mounting hole for 30 mm sensor

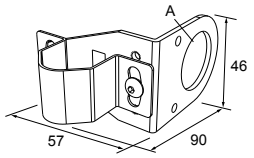
Hole center spacing: A = 51, A to B = 25.4
Hole size: A = 42.6 × 7, B = ø 6.4, C = ø 30.1



SMB30RAVK

- V-clamp, right-angle bracket and fasteners for mounting sensors to pipe or extrusion
- Clamp accommodates 28 mm dia. tubing or 1 in. square extrusions
- 30 mm hole for mounting sensors

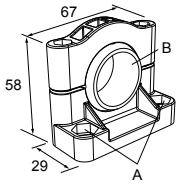
Hole size: A = ø 30.5



SMB30SC

- Swivel bracket with 30 mm mounting hole for sensor
- Black reinforced thermoplastic polyester
- Stainless steel mounting and swivel locking hardware included

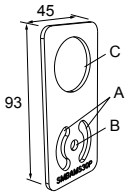
Hole center spacing: A=ø 50.8
Hole size: A=ø 7.0, B=ø 30.0



SMBAMS30P

- Flat SMBAMS series bracket
- 30 mm hole for mounting sensors
- Articulation slots for 90°+ rotation
- 12-gauge 300 series stainless steel

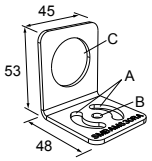
Hole center spacing: A=26.0, A to B=13.0
Hole size: A=26.8 × 7.0, B=ø 6.5, C=ø 31.0



SMBAMS30RA

- Right-angle SMBAMS series bracket
- 30 mm hole for mounting sensors
- Articulation slots for 90°+ rotation
- 12-gauge (2.6 mm) cold-rolled steel

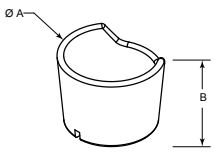
Hole center spacing: A=26.0, A to B=13.0
Hole size: A=26.8 × 7.0, B=ø 6.5, C=ø 31.0



TC-K50-CL

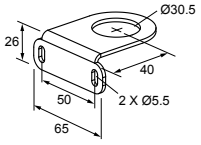
- Touch cover

Diameter: A = 67 mm
Height: B = 42.5 mm



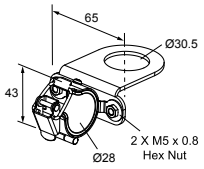
LMB30LP

- Low profile
- 30 mm mounting hole
- 300 series stainless steel

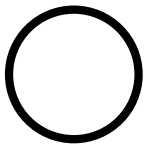


LMB30LPC

- For 28 mm tubular racking
- LMB30LP attached to clamp bracket
- Toolless mount to racking
- 30 mm mounting hole



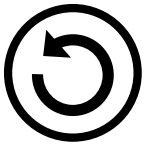
Standard Laser Marking Options



Circle Icon
(add *-CRCLI* to model number)

Power/Start Icon
(add *-STRTI* to model number)

Stop Icon
(add *-STOPI* to model number)



Reset Icon
(add *-RSETI* to model number)

Example: K50PTKQ-RSETI

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