K50 Pro Indicator with Modbus®
Product Manual

Original Instructions
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Chapter Contents

1.1 Models 3

Chapter 1 Features

50 mm Programmable Multicolor RGB Indicator

- Modbus® control allows access to full color and advanced animations
- Bright, uniform indicator light
- Translucent polycarbonate dome
- Rugged IP66, IP67, IP69K per ISO 20653 and UL Type 4X and UL Type 13 design

1.1 Models

Family	Style	Color and Input	Connector[1]
K50	**PSL**	**S**	**Q**
	PSL = Pro Indicator	S = Modbus	Q = Integral 4-pin M12 male quick-disconnect connector

[1] Models with a quick-disconnect connector require a mating cordset.

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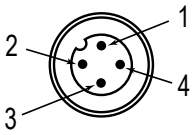
Chapter 2 Wiring

Pinout	Pin	Wire Color	Connection
	1	brown	10 V DC to 30 V DC
	2	white	RS-485 (+)
	3	blue	DC common
	4	black	RS-485 (-)

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Chapter 3 Overview of Modbus and PICK-IQ

3.1 Communications

These devices are powered by PICK-IQ®, a purpose-built, Modbus RTU compatible serial bus protocol that uses a Common ID to reduce the typical latency that results from polling multiple devices.

The standard Modbus protocol structure does not offer the performance required to operate medium to large sized pick-to-light systems with low latency response times. Adding more devices to a pick-to-light system running standard Modbus protocol eventually makes a pick-to-light system unusable because of the request/response nature of the protocol. The communication latency to and from the master device is too slow.

Using PICK-IQ adds a simple change to the devices that allow the Modbus master controller to run standard Modbus protocol, but achieve the performance required by a medium to large sized pick-to-light system. This change is the addition of a common ID addressing scheme.

3.2 Common ID

PICK-IQ devices each have an individual Modbus address called the device ID. PICK-IQ devices also have another address called the common ID.

By adding a common ID, the device responds to an additional address that can be shared among all devices in the system. For example, if a device has a device ID of 5 and a common ID of 195, then the device responds to all messages addressed to ID 5, regardless of actuation status, and messages are addressed to ID 195 when the device is actuated. The addition of this common address functionality allows the overall system to run much faster than a standard polling Modbus network.

When the Modbus master in the system is looking for an actuated device somewhere in the network, it only needs to poll the common ID instead of the entire system. When a device is actuated, it responds to the common ID. Through the common ID, the master can read the unit's device ID stored in register 7940. When polling the common ID, Banner recommends reading a minimum of the device ID register 7940. This register holds the device ID of the device. When reading information from the common ID, only register 7940 is accessible. All other registers should be accessed through the device IDs.

Summary of registers:

- 7940—Defines the unique device ID
- 8810—Defines the common ID

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Chapter 4 Modbus Register Map

4.1 Holding Register Column Definitions

Base 0 Address

Registers are addressed with the first register starting at zero

Base 1 Address

Registers are addressed with the first register starting at one

Description

Lists the functionality of the register

Holding Register Representation

Lists the allowed values of the register and the definition of those values

Default Value

Lists the factory default value of the register

Saved

Yes: The register value is stored in non-volatile memory, and is preserved when power is cycled
No: The register value is stored in volatile memory, and is reset to the default value when power is cycled

Access

Read Only (RO): The register can be read, but not written to
Read and Write (RW): The register can be read and written to

4.2 Device Information

The following registers list the model name and other device-specific information.

Base 0 Address	Base 1 Address	Description	Holding Register Representation	Default Value	Saved	Access
1000	1001	Low word model number	Example: 0x0002A734 (hex) = 173876 (dec) High word = 0x0002 Low word = 0xA734	See Device	Yes	RO
1001	1002	High word model number			Yes	RO
1002	1003	Model version (BCD)		See Device	Yes	RO
1003-1018	1004-1019	Model name, string		See Device	Yes	RO
1019	1020	Low word configuration number	Example: 0x00016D43 (hex) = 93507 (dec) High word = 0x0001 Low word = 0x6D43	See Device	Yes	RO
1020	1021	High word configuration number			Yes	RO
1021	1022	Configuration version (BCD)		See Device	Yes	RO
1022-1037	1023-1038	Serial number/date code, string		See Device	Yes	RO

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Base 0 Address	Base 1 Address	Description	Holding Register Representation	Default Value	Saved	Access
1038-1053	1039-1054	Serial number, string		See Device	Yes	RO

4.3 Modbus Configuration

Use these registers to configure Modbus communications.

Base 0 Address	Base 1 Address	Description	Holding Register Representation	Default Value	Saved	Access
6100	6101	Device ID: the Modbus individual node ID	1-247	1	Yes	RW
6101	6102	Baud rate	12 = 1200 24 = 2400 48 = 4800 96 = 9600 192 = 19200	192	Yes	RW
6102	6103	Parity	0 = none 1 = odd 2 = even	0	Yes	RW
6103	6104	Stop Bits	1 = 1 2 = 2 3 = 1.5	1	Yes	RW
6120	6121	Saving: When the Saving value is 0, affected registers are saved immediately after every change. When Saving is set to 1, those registers are not saved until the Saving register is set to 0.	0 = Registers are saved to non-volatile memory (including this register) 1 = Registers are not saved to non-volatile memory (including this register)	0	0 = Yes 1 = No	RW

4.4 Operation Mode

Use this register to select the main operation mode of the device.

Base 0 Address	Base 1 Address	Description	Holding Register Representation	Default Value	Saved	Access
3200	3201	Operation Mode	0 = Multicolor Mode 1 = Reserved 2 = Advanced Mode 3 = LED Control Mode 4 = Demo Mode 5 = PICK-IQ Mode	5	Yes	RW

4.4.1 Multicolor Mode

Use one register to activate the defined device state. Use additional non-volatile registers to define color, intensity, flash, and other animation types for State 1, State 2, State 3, and State 4.

Base 0 Address	Base 1 Address	Description	Holding Register Representation	Default Value	Saved	Access
3001	3002	Current Multicolor Mode Animation State	0 = State 1 1 = State 2 2 = State 3 3 = State 4	0	No	RO
3020	3021	Set Multicolor Mode Animation State	0 = State 1 1 = State 2 2 = State 3 3 = State 4	0	No	RW
3300	3301	State 1 Animation Type	0 = Off 1 = Steady 2 = Flash 3 = Two Color Flash 4 = 50/50 5 = 50/50 Rotate 6 = Chase 7 = Intensity Sweep 8 = Color Sweep 9 = Sequence 10 = Wave 11 = Double Wave	1	Yes	RW
3301	3302	State 1 Animation Direction	0 = Counter Clockwise, 1 = Clockwise	0	Yes	RW
3302	3303	State 1 Animation Pattern	0 = Flash 1 = Strobe 2 = Three Pulse 3 = SOS 4 = Random	0	Yes	RW
3303	3304	State 1 Animation Speed	0 = Slow 1 = Medium 2 = Fast 3 = Custom	1	Yes	RW
3304	3305	Reserved				
3305	3306	Reserved				
3306	3307	Reserved				
3307	3308	Reserved				
3308	3309	State 1 Static Sequence Value	0-255	0	Yes	RW

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Base 0 Address	Base 1 Address	Description	Holding Register Representation	Default Value	Saved	Access
3309	3310	State 1 Sequence Start Location	0 = LED1 1 = LED2 2 = LED3 3 = LED4 4 = LED5 5 = LED6 6 = LED7 7 = LED8	0	Yes	RW
3310	3311	State 1 Color 1	0 = Green 1 = Red 2 = Orange 3 = Amber 4 = Yellow 5 = Lime Green 6 = Spring Green 7 = Cyan 8 = Sky Blue 9 = Blue 10 = Violet 11 = Magenta 12 = Rose 13 = White 14 = Custom 1 15 = Custom 2	0	Yes	RW
3311	3312	State 1 Color 1 Intensity	0 = High 1 = Medium 2 = Low 3 = Custom 4 = Off	0	Yes	RW

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Base 0 Address	Base 1 Address	Description	Holding Register Representation	Default Value	Saved	Access
3312	3313	State 1 Color 2	0 = Green 1 = Red 2 = Orange 3 = Amber 4 = Yellow 5 = Lime Green 6 = Spring Green 7 = Cyan 8 = Sky Blue 9 = Blue 10 = Violet 11 = Magenta 12 = Rose 13 = White 14 = Custom 1 15 = Custom 2	0	Yes	RW
3313	3314	State 1 Color 2 Intensity	0 = High 1 = Medium 2 = Low 3 = Custom 4 = Off	0	Yes	RW
3320	3321	State 2 Animation Type	0 = Off 1 = Steady 2 = Flash 3 = Two Color Flash 4 = 50/50 5 = 50/50 Rotate 6 = Chase 7 = Intensity Sweep 8 = Color Sweep 9 = Sequence 10 = Wave 11 = Double Wave	1	Yes	RW
3321	3322	State 2 Animation Direction	0 = Counter Clockwise, 1 = Clockwise	0	Yes	RW
3322	3323	State 2 Animation Pattern	0 = Flash 1 = Strobe 2 = Three Pulse 3 = SOS 4 = Random	0	Yes	RW

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Base 0 Address	Base 1 Address	Description	Holding Register Representation	Default Value	Saved	Access
3323	3324	State 2 Animation Speed	0 = Slow 1 = Medium 2 = Fast 3 = Custom	1	Yes	RW
3324	3325	Reserved				
3325	3326	Reserved				
3326	3327	Reserved				
3327	3328	Reserved				
3328	3329	State 2 Static Sequence Value	0-255	0	Yes	RW
3329	3330	State 2 Sequence Start Location	0 = LED1 1 = LED2 2 = LED3 3 = LED4 4 = LED5 5 = LED6 6 = LED7 7 = LED8	0	Yes	RW
3330	3331	State 2 Color 1	0 = Green 1 = Red 2 = Orange 3 = Amber 4 = Yellow 5 = Lime Green 6 = Spring Green 7 = Cyan 8 = Sky Blue 9 = Blue 10 = Violet 11 = Magenta 12 = Rose 13 = White 14 = Custom 1 15 = Custom 2	1	Yes	RW
3331	3332	State 2 Color 1 Intensity	0 = High 1 = Medium 2 = Low 3 = Custom 4 = Off	0	Yes	RW

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Base 0 Address	Base 1 Address	Description	Holding Register Representation	Default Value	Saved	Access
3332	3333	State 2 Color 2	0 = Green 1 = Red 2 = Orange 3 = Amber 4 = Yellow 5 = Lime Green 6 = Spring Green 7 = Cyan 8 = Sky Blue 9 = Blue 10 = Violet 11 = Magenta 12 = Rose 13 = White 14 = Custom 1 15 = Custom 2	0	Yes	RW
3333	3334	State 2 Color 2 Intensity	0 = High 1 = Medium 2 = Low 3 = Custom 4 = Off	0	Yes	RW
3340	3341	State 3 Animation Type	0 = Off 1 = Steady 2 = Flash 3 = Two Color Flash 4 = 50/50 5 = 50/50 Rotate 6 = Chase 7 = Intensity Sweep 8 = Color Sweep 9 = Sequence 10 = Wave 11 = Double Wave	1	Yes	RW
3341	3342	State 3 Animation Direction	0 = Counter Clockwise, 1 = Clockwise	0	Yes	RW
3342	3343	State 3 Animation Pattern	0 = Flash 1 = Strobe 2 = Three Pulse 3 = SOS 4 = Random	0	Yes	RW

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Base 0 Address	Base 1 Address	Description	Holding Register Representation	Default Value	Saved	Access
3343	3344	State 3 Animation Speed	0 = Slow 1 = Medium 2 = Fast 3 = Custom	1	Yes	RW
3344	3345	Reserved				
3345	3346	Reserved				
3346	3347	Reserved				
3347	3348	Reserved				
3348	3349	State 3 Static Sequence Value	0-255	0	Yes	RW
3349	3350	State 3 Sequence Start Location	0 = LED1 1 = LED2 2 = LED3 3 = LED4 4 = LED5 5 = LED6 6 = LED7 7 = LED8	0	Yes	RW
3350	3351	State 3 Color 1	0 = Green 1 = Red 2 = Orange 3 = Amber 4 = Yellow 5 = Lime Green 6 = Spring Green 7 = Cyan 8 = Sky Blue 9 = Blue 10 = Violet 11 = Magenta 12 = Rose 13 = White 14 = Custom 1 15 = Custom 2	4	Yes	RW
3351	3352	State 3 Color 1 Intensity	0 = High 1 = Medium 2 = Low 3 = Custom 4 = Off	0	Yes	RW

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Base 0 Address	Base 1 Address	Description	Holding Register Representation	Default Value	Saved	Access
3352	3353	State 3 Color 2	0 = Green 1 = Red 2 = Orange 3 = Amber 4 = Yellow 5 = Lime Green 6 = Spring Green 7 = Cyan 8 = Sky Blue 9 = Blue 10 = Violet 11 = Magenta 12 = Rose 13 = White 14 = Custom 1 15 = Custom 2	0	Yes	RW
3353	3354	State 3 Color 2 Intensity	0 = High 1 = Medium 2 = Low 3 = Custom 4 = Off	0	Yes	RW
3360	3361	State 4 Animation Type	0 = Off 1 = Steady 2 = Flash 3 = Two Color Flash 4 = 50/50 5 = 50/50 Rotate 6 = Chase 7 = Intensity Sweep 8 = Color Sweep 9 = Sequence 10 = Wave 11 = Double Wave	1	Yes	RW
3361	3362	State 4 Animation Direction	0 = Counter Clockwise, 1 = Clockwise	0	Yes	RW
3362	3363	State 4 Animation Pattern	0 = Flash 1 = Strobe 2 = Three Pulse 3 = SOS 4 = Random	0	Yes	RW

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Base 0 Address	Base 1 Address	Description	Holding Register Representation	Default Value	Saved	Access
3363	3364	State 4 Animation Speed	0 = Slow 1 = Medium 2 = Fast 3 = Custom	1	Yes	RW
3364	3365	Reserved				
3365	3366	Reserved				
3366	3367	Reserved				
3367	3368	Reserved				
3368	3369	State 4 Static Sequence Value	0-255	0	Yes	RW
3369	3370	State 4 Sequence Start Location	0 = LED1 1 = LED2 2 = LED3 3 = LED4 4 = LED5 5 = LED6 6 = LED7 7 = LED8	0	Yes	RW
3370	3371	State 4 Color 1	0 = Green 1 = Red 2 = Orange 3 = Amber 4 = Yellow 5 = Lime Green 6 = Spring Green 7 = Cyan 8 = Sky Blue 9 = Blue 10 = Violet 11 = Magenta 12 = Rose 13 = White 14 = Custom 1 15 = Custom 2	9	Yes	RW
3371	3372	State 4 Color 1 Intensity	0 = High 1 = Medium 2 = Low 3 = Custom 4 = Off	0	Yes	RW

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Base 0 Address	Base 1 Address	Description	Holding Register Representation	Default Value	Saved	Access
3372	3373	State 4 Color 2	0 = Green 1 = Red 2 = Orange 3 = Amber 4 = Yellow 5 = Lime Green 6 = Spring Green 7 = Cyan 8 = Sky Blue 9 = Blue 10 = Violet 11 = Magenta 12 = Rose 13 = White 14 = Custom 1 15 = Custom 2	0	Yes	RW
3373	3374	State 4 Color 2 Intensity	0 = High 1 = Medium 2 = Low 3 = Custom 4 = Off	0	Yes	RW

4.4.2 Advanced Mode

Use volatile registers to control color, intensity, flash, and other animation types. Use custom registers to create custom colors, intensity, and speeds.

Base 0 Address	Base 1 Address	Description	Holding Register Representation	Default Value	Saved	Access
3060	3061	Animation Type	0 = Off 1 = Steady 2 = Flash 3 = Two Color Flash 4 = 50/50 5 = 50/50 Rotate 6 = Chase 7 = Intensity Sweep 8 = Color Sweep 9 = Sequence 10 = Wave 11 = Double Wave	0	No	RW
3061	3062	Animation Direction	0 = Counter Clockwise, 1 = Clockwise	0	No	RW

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Base 0 Address	Base 1 Address	Description	Holding Register Representation	Default Value	Saved	Access
3062	3063	Animation Pattern	0 = Flash 1 = Strobe 2 = Three Pulse 3 = SOS 4 = Random	0	No	RW
3063	3064	Animation Speed	0 = Slow 1 = Medium 2 = Fast 3 = Custom	0	No	RW
3064	3065	Reserved				
3065	3066	Reserved				
3066	3067	Reserved				
3067	3068	Reserved				
3068	3069	Set Sequence Value	0-255 = 0-100% Filled	0	No	RW
3069	3070	Sequence Start Location	0 = LED1 1 = LED2 2 = LED3 3 = LED4 4 = LED5 5 = LED6 6 = LED7 7 = LED8	0	No	RW
3070	3071	Color 1	0 = Green 1 = Red 2 = Orange 3 = Amber 4 = Yellow 5 = Lime Green 6 = Spring Green 7 = Cyan 8 = Sky Blue 9 = Blue 10 = Violet 11 = Magenta 12 = Rose 13 = White 14 = Custom 1 15 = Custom 2	0	No	RW
3071	3072	Color 1 Intensity	0 = High 1 = Medium 2 = Low 3 = Custom 4 = Off	0	No	RW

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Base 0 Address	Base 1 Address	Description	Holding Register Representation	Default Value	Saved	Access
3072	3073	Color 2	0 = Green 1 = Red 2 = Orange 3 = Amber 4 = Yellow 5 = Lime Green 6 = Spring Green 7 = Cyan 8 = Sky Blue 9 = Blue 10 = Violet 11 = Magenta 12 = Rose 13 = White 14 = Custom 1 15 = Custom 2	0	No	RW
3073	3074	Color 2 Intensity	0 = High 1 = Medium 2 = Low 3 = Custom 4 = Off	0	No	RW

4.4.3 LED Control Mode

Use volatile registers to define the color and intensity of each individual LED. Use custom registers to define customer colors and intensities.

Base 0 Address	Base 1 Address	Description	Holding Register Representation	Default Value	Saved	Access
3080	3081	LED 1 Color	0 = Green 1 = Red 2 = Orange 3 = Amber 4 = Yellow 5 = Lime Green 6 = Spring Green 7 = Cyan 8 = Sky Blue 9 = Blue 10 = Violet 11 = Magenta 12 = Rose 13 = White 14 = Custom 1 15 = Custom 2	0	No	RW
3081	3082	LED 1 Intensity	0-10 = 0-100%	0	No	RW
3082	3083	LED 2 Color	0 = Green 1 = Red 2 = Orange 3 = Amber 4 = Yellow 5 = Lime Green 6 = Spring Green 7 = Cyan 8 = Sky Blue 9 = Blue 10 = Violet 11 = Magenta 12 = Rose 13 = White 14 = Custom 1 15 = Custom 2	0	No	RW
3083	3084	LED 2 Intensity	0-10 = 0-100%	0	No	RW

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Base 0 Address	Base 1 Address	Description	Holding Register Representation	Default Value	Saved	Access
3084	3085	LED 3 Color	0 = Green 1 = Red 2 = Orange 3 = Amber 4 = Yellow 5 = Lime Green 6 = Spring Green 7 = Cyan 8 = Sky Blue 9 = Blue 10 = Violet 11 = Magenta 12 = Rose 13 = White 14 = Custom 1 15 = Custom 2	0	No	RW
3085	3086	LED 3 Intensity	0-10 = 0-100%	0	No	RW
3086	3087	LED 4 Color	0 = Green 1 = Red 2 = Orange 3 = Amber 4 = Yellow 5 = Lime Green 6 = Spring Green 7 = Cyan 8 = Sky Blue 9 = Blue 10 = Violet 11 = Magenta 12 = Rose 13 = White 14 = Custom 1 15 = Custom 2	0	No	RW
3087	3088	LED 4 Intensity	0-10 = 0-100%	0	No	RW

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Base 0 Address	Base 1 Address	Description	Holding Register Representation	Default Value	Saved	Access
3088	3089	LED 5 Color	0 = Green 1 = Red 2 = Orange 3 = Amber 4 = Yellow 5 = Lime Green 6 = Spring Green 7 = Cyan 8 = Sky Blue 9 = Blue 10 = Violet 11 = Magenta 12 = Rose 13 = White 14 = Custom 1 15 = Custom 2	0	No	RW
3089	3090	LED 5 Intensity	0-10 = 0-100%	0	No	RW
3090	3091	LED 6 Color	0 = Green 1 = Red 2 = Orange 3 = Amber 4 = Yellow 5 = Lime Green 6 = Spring Green 7 = Cyan 8 = Sky Blue 9 = Blue 10 = Violet 11 = Magenta 12 = Rose 13 = White 14 = Custom 1 15 = Custom 2	0	No	RW
3091	3092	LED 6 Intensity	0-10 = 0-100%	0	No	RW

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Base 0 Address	Base 1 Address	Description	Holding Register Representation	Default Value	Saved	Access
3092	3093	LED 7 Color	0 = Green 1 = Red 2 = Orange 3 = Amber 4 = Yellow 5 = Lime Green 6 = Spring Green 7 = Cyan 8 = Sky Blue 9 = Blue 10 = Violet 11 = Magenta 12 = Rose 13 = White 14 = Custom 1 15 = Custom 2	0	No	RW
3093	3094	LED 7 Intensity	0-10 = 0-100%	0	No	RW
3094	3095	LED 8 Color	0 = Green 1 = Red 2 = Orange 3 = Amber 4 = Yellow 5 = Lime Green 6 = Spring Green 7 = Cyan 8 = Sky Blue 9 = Blue 10 = Violet 11 = Magenta 12 = Rose 13 = White 14 = Custom 1 15 = Custom 2	0	No	RW
3095	3096	LED 8 Intensity	0-10 = 0-100%	0	No	RW

4.4.4 Demo Mode

Cycles through color spectrum, 50/50 rotate, intensity sweep, and sequence mode. When set to demo mode, the device will cycle through the defined sequence when power is applied regardless of its connection to a Modbus master.

4.4.5 PICK-IQ Mode

Basic Mode - This operating mode is the most straightforward to configure. In basic mode, the master controls all aspects of the device. The master must communicate all logic functions by defining what the transitions will look like.

State Mode - State mode requires the configuration of the device to define the visual settings, defined below. These settings are embedded inside the device and do not require communication from the master device to change visual states after the device is actuated. This allows the device to respond immediately to any interaction and allows the communication to the master to happen simultaneously.

Base 0 Address	Base 1 Address	Description	Holding Register Representation	Default Value	Saved	Access
7940	7941	Modbus slave ID of active device, same as register 6100	1-247	1	Yes	RO
8810	8811	Common ID	1 - 247	195	Yes	RW
-	-	-	-	-	-	-
3001	3002	Current PICK-IQ Animation State	0 = Waiting State 1 = Reserved 2 = Job State 3 = Reserved	0	No	RO
-	-	-	-	-	-	-
6300	6301	Enable Basic or State Mode	0 = Basic Mode, 1 = State Mode	0	Yes	RW
			Basic Mode Registers			
8701	8702	Basic Animation Type	0 = Off 1 = Steady 2 = Flash 3 = Strobe 11-20 N-Pulse (N = Index - 10) (for example, 13 = 3 Pulse)	0	No	RW
8702	8703	Basic Color 1	0 = Off 1 = Red 2 = Green 3= Yellow 4 = Blue 5 = Magenta 6 = Cyan 7 = White 8 = Amber 9 = Rose 10 = Lime Green 11 = Orange 12 = Sky Blue 13 = Violet 14 = Spring Green	0	No	RW
6200	6201	Basic Color 1 Intensity	0 = Low 1 = Medium 2 = High	1	Yes	RW
			State Mode Registers			
8700	8701	Job State Any write to this register resets the device latch in Register 7941	0 = Waiting State, 1 = Job State	0	No	RW

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Base 0 Address	Base 1 Address	Description	Holding Register Representation	Default Value	Saved	Access
8701	8702	Job State Override Animation Active when Job State = 1. This value will then override the value in register 6323.	0 = Off 1 = Steady 2 = Flash 3 = Two Color Flash 4 = Half/Half Top/Bottom 5 = Half/Half Left/Right 6 = Half/Half Rotate 7 = Chase 8 = Intensity Sweep	0	No	RW
8702	8703	Job State Override Color 1 Active when Job State = 1. This value will then override the value in register 6324.	0 = Red 1 = Green 2 = Yellow 3 = Blue 4 = Magenta 5 = Cyan 6 = White 7 = Amber 8 = Rose 9 = Lime Green 10 = Orange 11 = Sky Blue 12 = Violet 13 = Spring Green	0	No	RW
6301	6302	Waiting State: Animation	0 = Off 1 = Steady 2 = Flash 3 = Two Color Flash 4 = Half/Half Top/Bottom 5 = Half/Half Left/Right 6 = Half/Half Rotate 7 = Chase 8 = Intensity Sweep	1	Yes	RW

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Base 0 Address	Base 1 Address	Description	Holding Register Representation	Default Value	Saved	Access
6302	6303	Waiting State: Color 1	0 = Red 1 = Green 2 = Yellow 3 = Blue 4 = Magenta 5 = Cyan 6 = White 7 = Amber 8 = Rose 9 = Lime Green 10 = Orange 11 = Sky Blue 12 = Violet 13 = Spring Green	1	Yes	RW
6303	6304	Waiting State: Color 2	0 = Red 1 = Green 2 = Yellow 3 = Blue 4 = Magenta 5 = Cyan 6 = White 7 = Amber 8 = Rose 9 = Lime Green 10 = Orange 11 = Sky Blue 12 = Violet 13 = Spring Green	1	Yes	RW
6304	6305	Waiting State: Intensity for Color 1	0 = High 1 = Medium 2 = Low 3 = Off	0	Yes	RW
6305	6306	Waiting State: Intensity for Color 2	0 = High 1 = Medium 2 = Low 3 = Off	0	Yes	RW
6306	6307	Waiting State: Animation Speed	0 = Slow 1 = Standard 2 = Fast	1	Yes	RW

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Base 0 Address	Base 1 Address	Description	Holding Register Representation	Default Value	Saved	Access
6307	6308	Waiting State: Animation Pattern	0 = Normal 1 = Strobe 2 = 3-Pulse 3 = SOS 4 = Random	0	Yes	RW
6308	6309	Waiting State: Animation Direction	0 = Clockwise, 1 = Counterclockwise	1	Yes	RW
6309	6310	Reserved				
6310	6311	Reserved				
6311	6312	Reserved				
6323	6324	Job State: Animation	0 = Off 1 = Steady 2 = Flash 3 = Two Color Flash 4 = Half/Half Top/Bottom 5 = Half/Half Left/Right 6 = Half/Half Rotate 7 = Chase 8 = Intensity Sweep	1	Yes	RW
6324	6325	Job State: Color 1	0 = Red 1 = Green 2 = Yellow 3 = Blue 4 = Magenta 5 = Cyan 6 = White 7 = Amber 8 = Rose 9 = Lime Green 10 = Orange 11 = Sky Blue 12 = Violet 13 = Spring Green	0	Yes	RW

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Base 0 Address	Base 1 Address	Description	Holding Register Representation	Default Value	Saved	Access
6325	6326	Job State: Color 2	0 = Red 1 = Green 2 = Yellow 3 = Blue 4 = Magenta 5 = Cyan 6 = White 7 = Amber 8 = Rose 9 = Lime Green 10 = Orange 11 = Sky Blue 12 = Violet 13 = Spring Green	1	Yes	RW
6326	6327	Job State: Intensity for Color 1	0 = High 1 = Medium 2 = Low 3 = Off	0	Yes	RW
6327	6328	Job State: Intensity for Color 2	0 = High 1 = Medium 2 = Low 3 = Off	0	Yes	RW
6328	6329	Job State: Animation Speed	0 = Slow 1 = Standard 2 = Fast	1	Yes	RW
6329	6330	Job State: Animation Pattern	0 = Normal 1 = Strobe 2 = 3-Pulse 3 = SOS 4 = Random	0	Yes	RW
6330	6331	Job State: Animation Direction	0 = Clockwise, 1 = Counterclockwise	1	Yes	RW
6331	6332	Reserved				
6332	6333	Reserved				
6333	6334	Reserved			Yes	RW

4.5 Custom Settings Configuration

Use these registers to configure custom colors, intensity, and speeds.

Base 0 Address	Base 1 Address	Description	Holding Register Representation	Default Value	Saved	Access
3400	3401	Custom Color 1 Green, Custom Color 1 Red	0-255, 0-255 (Two 8-bit numbers)	255, 255	Yes	RW
3401	3402	Custom Color 1 Blue	0-255	255	Yes	RW

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Base 0 Address	Base 1 Address	Description	Holding Register Representation	Default Value	Saved	Access
3410	3411	Custom Color 2 Green, Custom Color 2 Red	0-255, 0-255 (Two 8-bit numbers)	255, 255	Yes	RW
3411	3412	Custom Color 2 Blue	0-255	255	Yes	RW
3420	3421	Custom Intensity	0-100	100	Yes	RW
3421	3422	Custom Speed	5-255	15	Yes	RW
3422	3423	Restrict To Gamut	0 = Off, 1 = On	0	Yes	RW

4.6 Test Mode and Restore Factory Defaults

Use these registers to enter test mode and to restore the factory defaults of the device.

Base 0 Address	Base 1 Address	Description	Holding Register Representation	Default Value	Saved	Access
6500	6501	Enable Test Mode: Indicator flashes blue	0 = Disabled, 1 = Enabled	0	No	RW
6600	6601	Restore Factory Defaults	0 = Disabled, 1 - 65335 = Enable	0	No	RW
6601	6602	Restore Factory Defaults Key 1	43690(0xAAAA) = Enable	0	No	RW
6602	6603	Restore Factory Defaults Key 2	21845(0x5555) = Enable	0	No	RW

Chapter Contents

5.1 FCC Part 15 Class B for Unintentional Radiators 30
5.2 Industry Canada ICES-003(B) 30
5.3 Dimensions 31

Chapter 5 Specifications

Supply Voltage and Current

10 V DC to 30 V DC

- 220 mA at 10 V DC (exclusive of load)
- 190 mA at 12 V DC (exclusive of load)
- 115 mA at 24 V DC (exclusive of load)
- 100 mA at 30 V DC (exclusive of load)

Supply Protection Circuitry

Protected against reverse polarity and transient voltages

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)

Operating Conditions

–40 °C to +50 °C (–40 °F to +122 °F)

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

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

Environmental Rating

IP66, IP67, IP69K per ISO 20653

Connections

Integral 4-pin M12 male quick-disconnect connector

Mounting

M30 by 1.5 threaded base, maximum torque 4.5 N·m (40 inch-lbf)

Mounting nut included

Construction

Base and Dome: Polycarbonate

Mounting Nut: Polybutylene terephthalate (PBT)

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

Certifications

Banner Engineering BV
Park Lane, Culliganlaan 2F bus 3
1831 Diegem, BELGIUM

Default Indicator Characteristics

Color	Dominant Wavelength (nm) or Color Temperature (CCT)	Color Coordinates[2]		Lumen Output Per Segment (Typical at 25 °C)
		X	Y	
Green	522	0.154	0.7	26.2
Red	620	0.689	0.309	15.9
Yellow	576	0.477	0.493	37.6
Blue	466	0.14	0.054	4.1
White	5700K	0.328	0.337	42.5
Cyan	493	0.17	0.34	29.1
Magenta	-	0.379	0.172	18.5
Amber	589	0.556	0.42	26.6
Rose	-	0.515	0.22	15.9
Lime Green	562	0.388	0.561	35.1
Sky Blue	486	0.155	0.247	23.1
Orange	599	0.616	0.37	21.4
Violet	-	0.217	0.089	9.2
Spring Green	508	0.177	0.536	26.7

5.1 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.

5.2 Industry Canada ICES-003(B)

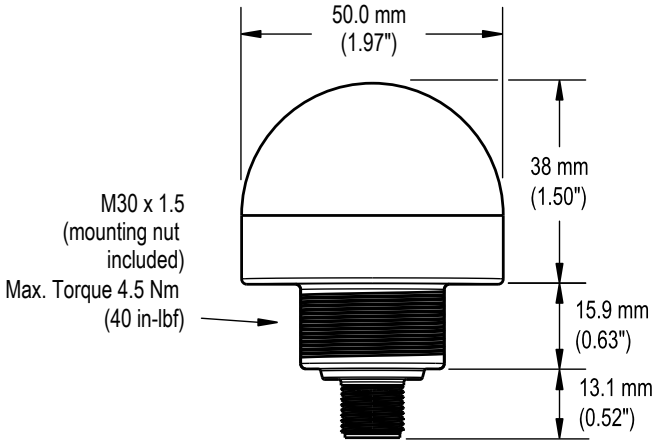
This device complies with CAN ICES-3 (B)/NMB-3(B). Operation is subject to the following two conditions: 1) This device may not cause harmful interference; and 2) This device must accept any interference received, including interference that may cause undesired operation.

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.

[2] Refer to CIE 1931 chromaticity diagram or color chart to show equivalent color with indicated color coordinates. Actual coordinates may differ by 10%.

5.3 Dimensions

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



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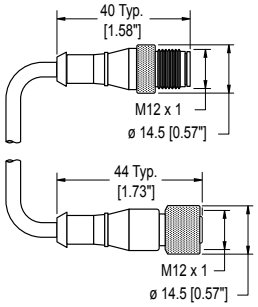
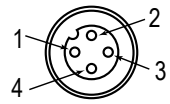
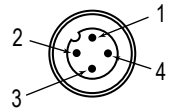
6.2 Brackets 32
6.3 Wash-Down Cover 34
6.4 Elevated Mount System 34

Chapter 6 Accessories

6.1 Cordsets

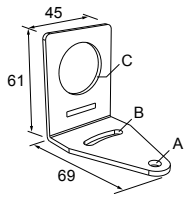
4-Pin Double-Ended M12 Female to M12 Male Cordsets				
Model	**Length**	**Style**	**Dimensions**	**Pinout**
MQDEC-401SS	0.31 m (1 ft)	Male Straight/Female Straight		Female  Male  1 = Brown 2 = White 3 = Blue 4 = Black
MQDEC-403SS	0.91 m (2.99 ft)			
MQDEC-406SS	1.83 m (6 ft)			
MQDEC-412SS	3.66 m (12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

6.2 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

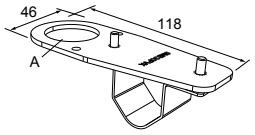
Hole center spacing: A to B=40
Hole size: A=ø 6.3, B= 27.1 × 6.3, C=ø 30.5



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

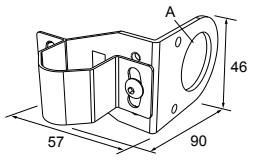
Hole size: A= ø 31



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

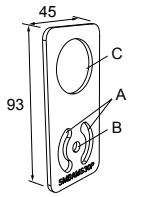
Hole size: A = ø 30.5



SMBAMS30P

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

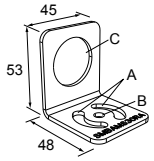
Hole center spacing: A=26.0, A to B=13.0
Hole size: A=26.8 × 7.0, B=ø 6.5, C=ø 31.0



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

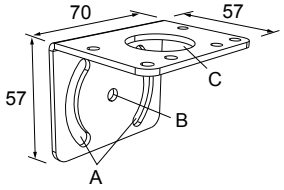
Hole center spacing: A=26.0, A to B=13.0
Hole size: A=26.8 × 7.0, B=ø 6.5, C=ø 31.0



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

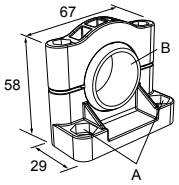
Hole center spacing: A = 51, A to B = 25.4
Hole size: A = 42.6 × 7, B = ø 6.4, C = ø 30.1



SMB30SC

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

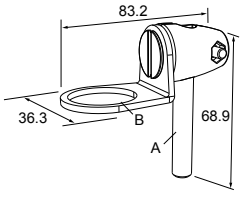
Hole center spacing: A=ø 50.8
Hole size: A=ø 7.0, B=ø 30.0

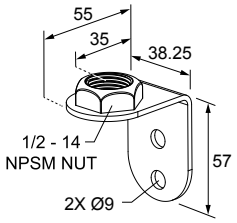
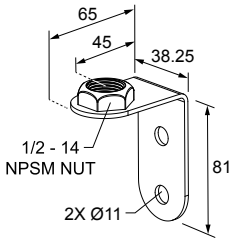


SMB30FA

- 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

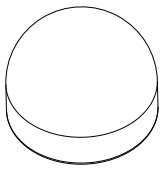
Bolt thread: SMB30FA, A= 3/8 - 16 × 2 in; SMB30FAM10, A= M10 - 1.5 × 50
Hole size: B= ø 30.1



LMBE12RA35 • Direct mounting of stand-off pipe, with common bracket type • Zinc-plated steel • 1/2-14 NPSM nut • Mounting distance from the wall to the center of the 1/2-14 NPSM nut is 35 mm **Hole center spacing:** 20.0	
LMBE12RA45 • Direct mounting of stand-off pipe, with common bracket type • Zinc-plated steel • 1/2-14 NPSM nut • Mounting distance from the wall to the center of the 1/2-14 NPSM nut is 45 mm **Hole center spacing:** 35.0	

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

6.3 Wash-Down Cover

WC-K50 Washdown Cover • FDA-grade silicone • Fits K50 indicators • IP67 and IP69K rated	

6.4 Elevated Mount System

<table>
<tr><th colspan="2">Model</th><th>Description</th><th>Components</th></tr>
<tr><td colspan="2">SA-M30E12P - Black Acetal</td><td>• Streamlined black acetal stand-off pipe adapter/cover
• Connects between 30 mm light base and ½ in. NPSM/DN15 pipe
• Mounting hardware included</td><td>  </td></tr>
<tr><td>Black Anodized Aluminum</td><td>Clear Anodized Aluminum</td><td rowspan="5">• Elevated-use stand-off pipe (½ in. NPSM/DN15)
• Polished 304 stainless steel, black anodized aluminum, or clear anodized aluminum surface
• ½ in. NPT thread at both ends: one end screws into the internal threads of the light's base, and one end screws into the mounting base adapter/cover
• Compatible with most industrial environments</td><td rowspan="5">  </td></tr>
<tr><td>SOP-E12-150A
150 mm (6 in) long</td><td>SOP-E12-150AC
150 mm (6 in) long</td></tr>
<tr><td>SOP-E12-300A
300 mm (12 in) long</td><td>SOP-E12-300AC
300 mm (12 in) long</td></tr>
<tr><td>SOP-E12-600A
600 mm (24 in) long</td><td>SOP-E12-600AC
600 mm (24 in) long</td></tr>
<tr><td>SOP-E12-900A
900 mm (36 in) long</td><td>SOP-E12-900AC
900 mm (36 in) long</td></tr>
</table>

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Chapter 7 Product Support and Maintenance

7.1 Animation Definitions

The following table describes the definitions for device states.

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)
Wave	Color 1 increments in a sweeping pattern around the perimeter of the device
Double Wave	Color 1 increments against the background of Color 2 in a sweeping pattern around the perimeter of the device
Steady Area 1	Color 1 is solid on at defined intensity on Touch Area 1 of the device
Steady Area 2	Color 1 is solid on at defined intensity on Touch Area 2 of the device
Alternate Area 1/Area 2	Color 1 and Color 2 flash alternately on the top and bottom of the device
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)
Animation Speed	Defines the animation speed (slow, medium, fast, or custom)
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.
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.
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)

7.2 Clean with Mild Detergent and Warm Water

Wipe down the device with a soft cloth dampened with a mild detergent and warm water solution. Do not use any other chemicals for cleaning.

7.3 Repairs

Contact Banner Engineering for troubleshooting of this device. **Do not attempt any repairs to this Banner device; it contains no field-replaceable parts or components.** If the device, device part, or device component is determined to be defective by a Banner Applications Engineer, they will advise you of Banner's RMA (Return Merchandise Authorization) procedure.

> **IMPORTANT:** If instructed to return the device, pack it with care. Damage that occurs in return shipping is not covered by warranty.

7.4 Contact Us

Banner Engineering Corp. headquarters is located at: 9714 Tenth Avenue North | Plymouth, MN 55441, USA | Phone: + 1 888 373 6767

For worldwide locations and local representatives, visit www.bannerengineering.com.

7.5 Banner Engineering Corp Limited Warranty

Banner Engineering Corp. warrants its products to be free from defects in material and workmanship for one year following the date of shipment. Banner Engineering Corp. will repair or replace, free of charge, any product of its manufacture which, at the time it is returned to the factory, is found to have been defective during the warranty period. This warranty does not cover damage or liability for misuse, abuse, or the improper application or installation of the Banner product.

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