

DUO-TOUCH Run Bar with STB Buttons



Self-checking ergonomic actuating devices

For complete technical information about this product, including dimensions, accessories, and specifications, see www.BannerEngineering.com and search for 131634_web.



-RB1E02 without E-Stop



WARNING: Not a Stand-Alone Safeguarding Device
This Banner device is not a stand-alone point-of-operation guarding device, as defined by OSHA regulations. It is necessary to install point-of-operation guarding devices, such as safety light screens and/or hard guards, to protect personnel from hazardous machinery. Failure to install point-of-operation guards on hazardous machinery can result in a dangerous condition which could lead to serious injury or death.



-RB1E02 with E-Stop

Models	Run Bar Description	Touch Button Description	E-Stop Button	Connections
STBVP6-RB1	DUO-TOUCH Run Bar, IP20 metal construction	Two model STBVP6 optical touch buttons (solid-state complementary PNP outputs, polyetherimide upper housing)	Not included	Terminal strip connection
STBVP6-RB1E02			Model SSA-EBM-02L E-stop button (two N.C. safety contacts)	
STBVP6-RB1Q8			Not included	8-pin Mini-style QD
STBVP6-RB2	DUO-TOUCH Run Bar, IP65 metal construction		Not included	Terminal strip connection
STBVP6-RB2E02			Model SSA-EBM-02L E-stop button (two N.C. safety contacts)	
STBVP6-RB2Q8			Not included	8-pin Mini-style QD
DUO-TOUCH® Run Bar Kits	Call for assistance and availability			

Important . . . Read This Before Proceeding!

In the United States, the functions that the Banner DUO-TOUCH Two-Hand Control Module is intended to perform are regulated by the Occupational Safety and Health Administration (OSHA). Whether or not any particular DUO-TOUCH Two-Hand Control Module installation meets all applicable OSHA requirements depends upon factors that are beyond the control of Banner Engineering Corp. These factors include the specific ways the safety module is applied, installed, wired, operated, and maintained.

Banner Engineering Corp. has attempted to provide complete application, installation, operation, and maintenance instructions. In addition, we suggest that any questions regarding the use or installation of this two-hand control safety system be directed to the factory applications department at the telephone numbers or address shown on the back cover of this manual.

The user of this Two-Hand Control safety module must ensure that all machine operators, maintenance personnel, electricians, and supervisors are thoroughly familiar with and understand all instructions regarding the installation, maintenance, and use of this system, and with the machinery upon which it is installed.

The user and any personnel involved with the installation and use of this safety module must be thoroughly familiar with all applicable OSHA regulations and ANSI standards. The regulations and standards, listed below, directly address the use of two-hand control sys-



tems. Banner Engineering Corp. makes no claim regarding a specific recommendation of any organization, the accuracy or effectiveness of any information provided, or the appropriateness of the provided information for a specific application.

The user has the responsibility to ensure that all local, state, and national laws, rules, codes, and regulations relating to the use of this Two-Hand Control module are satisfied. Extreme care is urged that all legal requirements are met and that all installation and maintenance instructions contained in this manual are followed.

Mechanical Installation

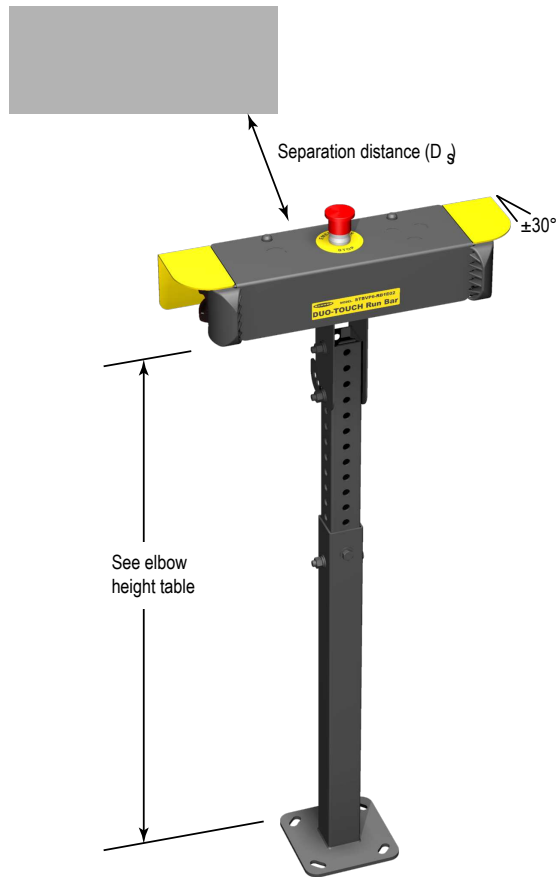


Figure 1. Run Bar Location

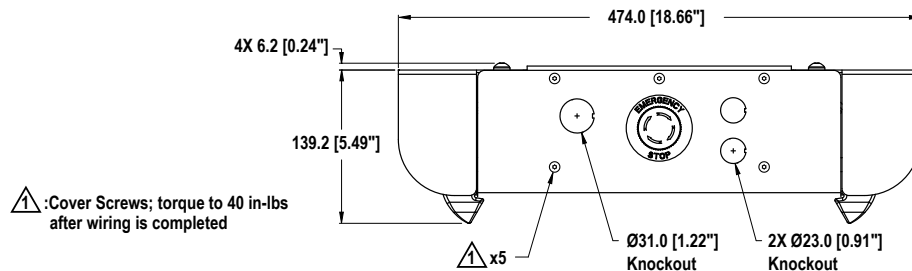
Mount the DUO-TOUCH Run Bar to maximize its ergonomic design and minimize the possibility of defeat.

To minimize the possibility of defeat, ISO 13851 (EN 574) recommends that the hand controls be arranged on a horizontal (or nearly horizontal) surface, 1100 mm (43.3") above the floor. The Run Bar makes this installation easy.

To maximize ergonomics, ANSI B11.TR1 recommends that for light to normal work the position should be 50 to 100 mm (2" to 4") above or below elbow height. Elbow height should be determined and adjusted for each individual operator. Anthropometric tables provide a range for guidance (see ANSI B11.TR1 Annex A):

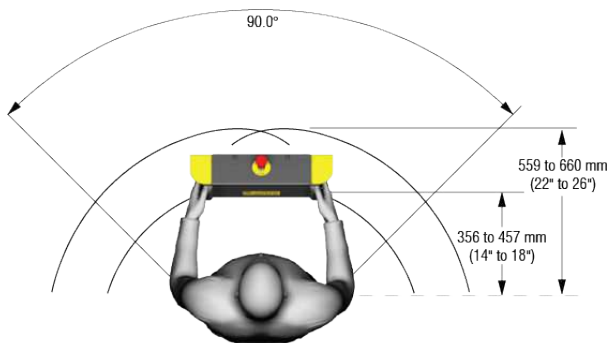
Tilting the run bar (using the bracket's multiple-hole adjustment) allows for varying operator heights while maintaining a neutral wrist position. This rotation should not exceed $\pm 30^\circ$, especially when an emergency stop button is mounted on the top of the run bar. Hand and wrist posture is considered to be neutral when the hand is neither flexed nor extended beyond about 15° of the normally relaxed position.

Torque Spec for RB2



Elbow Height (to floor, without shoes)	5%	95%
	Male/Female	Male/Female
Inches	39.2" / 36.5"	45.4" / 42.3"

Elbow Height (to floor, without shoes)	5%	95%
	Male/Female	Male/Female
Millimeters	995 / 926 mm	1153 / 1074 mm



Per ANSI B11.TR1, the most desirable location for controls used by a standing operator is a position directly in front of the operator, and at a height between chest and waist level. Frequent reaches should nominally be made within 350 to 450 mm (14" to 18") from the center of the shoulder to the run bar. Only occasional reaches should be made within 550 to 650 mm (22" to 26"); avoid reaches farther than 650 mm (26"), see Figure 2.

Figure 2. ANSI B11.TR1 Recommended Maximum Reach Distances



WARNING: Location of Touch Button Controls

Hand controls must be mounted a safe distance from moving machine parts, as determined by the appropriate standard. It must not be possible for the operator or other non-qualified persons to relocate them. Failure to establish and maintain the required safety distance could result in serious injury or death.

Two-Hand Control Separation (Safety) Distance

Both hand controls must be located far enough away from the nearest hazard point that the operator cannot reach the hazard with a hand or other body part before the hazardous motion ceases. This is the "separation distance" ("safety distance"), and may be calculated as follows. The formulas differ slightly between U.S. and EU-Certified installations, but the concepts are similar.

Formulas for U.S. Installations

For Part-Revolution Clutch Machinery where the machine and its controls allow the machine to stop motion during the hazardous portion of the machine cycle, use the following formula:

$$D_s = K \times (T_s + T_r + T_h)$$

For Full-Revolution Clutch Machinery where the machine and its controls are designed to complete a full machine cycle, once activated, use the following formula:

$$D_s = K \times (T_m + T_r + T_h)$$

Formula for EU-Certified Installations

The formula used to calculate the minimum safety distance (S) from the nearest actuator to the danger zone is:

$$S = (K \times T) + C$$

In all cases, where:

D_s = the separation (safety) distance in inches

S = the minimum safety distance in millimeters

K = OSHA/ANSI and ISO 13855 hand speed constant of 1600mm/s (63" per second) (NOTE 1 below)

T = the overall stop time of the machine, measured from the actuation of the sensing function to the final ceasing of all motion.

T_s = the stop time (in seconds) of the machine, measured from the application of the "stop" signal to the final ceasing of all motion, including stop times of all relevant control elements, and measured at maximum machine velocity (see NOTE 2)

T_r = 0.035 seconds (the response time of the Module as measured from the time either hand disengages a hand control.

T_h = the response time of the slowest hand control (from the time when a hand disengages that control until the switch opens; see NOTE 3)

T_m = the maximum time (in seconds) the machine takes to cease all motion after it has been tripped. For full-revolution clutch presses with only one engaging point, T_m is equal to the time necessary for one and one-half revolutions of the crankshaft. For full-revolution clutch presses with more than one engaging point, T_m is calculated as follows:

$$T_m = (1/2 + 1/N) \times T_{cy}$$

where:

N = number of clutch engaging points per revolution

T_{cy} = time (in seconds) necessary to complete one revolution of the crankshaft

C = the added distance due to depth penetration factor: 250 mm, per ISO 13855. The ISO 13855 "C" factor can be reduced to 0 if the risk of encroachment is eliminated, but the safety distance must always be 100 mm or greater.

NOTES:

1. The hand-speed constant (K) has been determined by various studies, and although these studies indicate speeds of 1600 mm/s (63"/second), 2000 mm/s (79"/second), to more than 2540 mm/s (100"/second), they are not conclusive determinations. The employer should consider all factors, including the physical ability of the operator, when determining the value of K to be used.
2. T_s is usually measured by a stop-time measuring device. If the specified machine stop time is used, add at least 20% as a safety factor to account for brake system deterioration. If the stop-time of the two redundant machine control elements is unequal, the slower of the two times must be used for calculating the separation distance.
3. T_h is usually insignificant for purely mechanical switches. However, T_h should be considered for safety distance calculation when using electronic or electromechanical (i.e. powered) hand controls. For Banner Self-checking Touch Buttons (STBs), response time = 0.02 seconds.

Separation Distance (D_s) Calculation

The following example illustrates the use of the formula to calculate separation distance for a part-revolution clutch machine. This example uses 0.50 seconds as a typical value for T_s and 0.02 seconds for T_h :

K = 63" per second,

T_s = 0.50 seconds (measured by a stop-time measuring device)

T_r = 0.035 seconds

T_h = 0.02 seconds

$$\begin{aligned} D_s &= K \times (T_s + T_r + T_h) \\ &= 63" (0.50 + 0.035 + 0.02) \\ &= 35" \end{aligned}$$

In this example, both hand controls must be located no closer than 36" from the nearest hazard point.

Electrical Installation

Electrical installation of hand controls, the DUO-TOUCH SG Safety Module, and the interconnection to the machine control must be made by qualified personnel and must comply with NEC (National Electrical Code), ANSI/NFPA 79 or IEC 60204-1, and all applicable local standards.

It is not possible to give exact wiring instructions for a Safety Module that interfaces to a multitude of machine control configurations. The following guidelines are general in nature.



CAUTION: Disconnect Power Before Wiring

Before making any wire connections, make certain all power is disconnected from the Safety Module and the machine to be controlled.

Electrical installation of hand controls, the DUO-TOUCH SG Safety Module, and the interconnection to the machine control must be made by qualified personnel and must comply with NEC (National Electrical Code), ANSI/NFPA79 or IEC60204-1, and all applicable local standards.

Dangerous voltages may be present along the Safety Module wiring barriers whenever power to the machine control elements is ON. **Exercise extreme caution whenever machine control power is or may be present. Always disconnect power to the machine control elements before opening the enclosure housing of the Safety Module.**

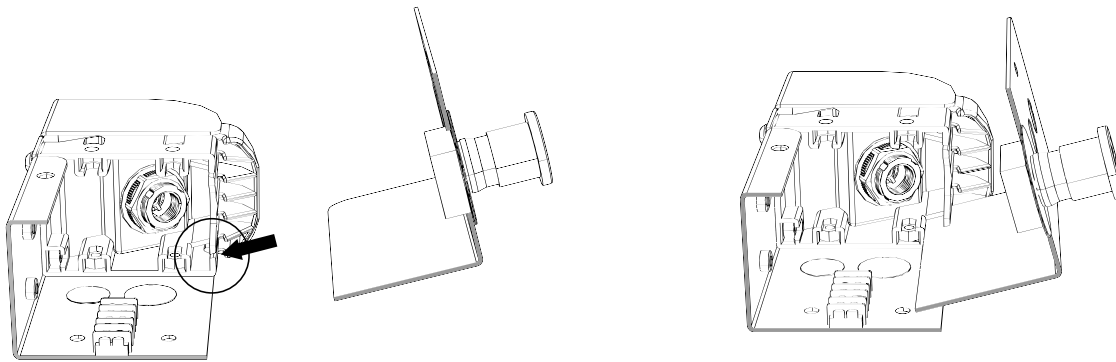
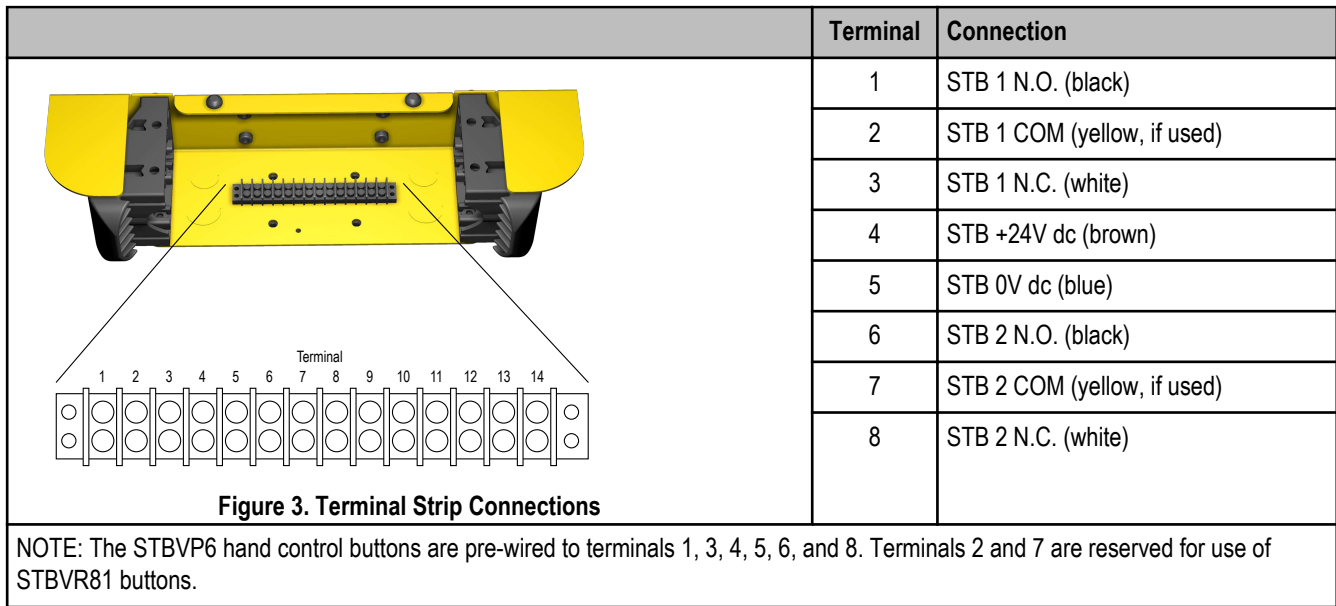


Figure 4. Use the slots in the run bar housing to hold the cover for the terminal connection

8-Pin Mini-Style Output QD Connector Male Face View	Mating Cable: QDS-8..C			SAE H1738-2 Alternate Color*
	Pin	Color	Function	
<p>Figure 5. 8-pin Mini-style QD Connection</p>	1	brown	+24V dc	orange
	2	orange/black	N.O. STB2	blue
	3	orange	N.C. STB2	white/black
	4	white	N.C. STB1	black
	5	black	N.O. STB1	white
	6	blue	0V dc	red
	7	green/yellow	Gnd/PE	green
	8	violet	Not Connected (future use)	red/black

* Listed as a customer courtesy. Verify suitability of these cables for each application.

Connection of STB Touch Buttons

To maintain a Type IIIC / Category 4 connection, both the normally open and the normally closed outputs of each STB button must be connected to a two-hand control system or module (e.g., Banner model AT-FM-10K, AT-..M-13A, AT-..M-11KM or the Banner Safety

Controller SC22-3) that meets the requirements listed in the Applications section and monitors the STB outputs such that if they are not in a complementary state (one open/non-conducting and one closed/conducting) the system will lock out and prevent further operation until the fault is repaired.

The +24V dc supply power for the STB buttons must be the same supply that powers the two-hand control system or module. If a DUO-TOUCH SG safety module is used, use terminals Z1 and Z2 for supply voltage for the STB buttons.

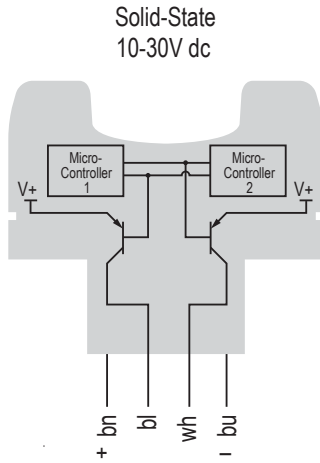


Figure 6. STB Touch Button Block Diagram

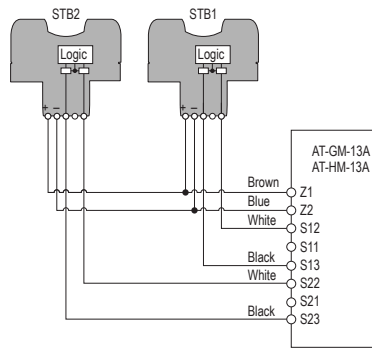


Figure 7. Connection to Two STB Touch Buttons with PNP Outputs

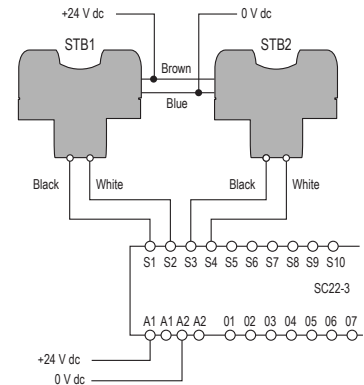


Figure 8. Connection of Two STB Buttons to the Banner Safety Controller

Connection of Emergency Stop Button

For models with an E-stop button, connection of the E-stop button is made at the screw terminals on the contact element mounted on the mounting adapter.

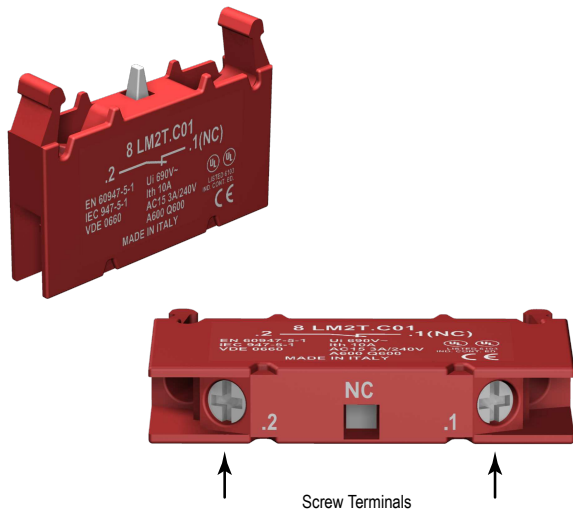


Figure 9. E-Stop Wiring Terminals

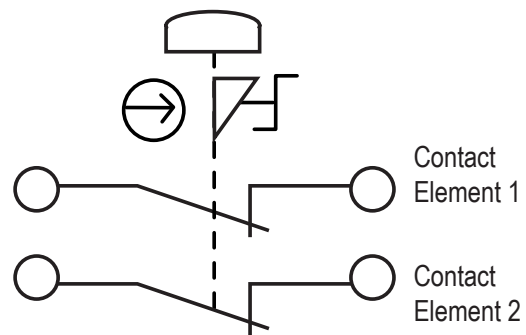


Figure 10. E-Stop Wiring Diagram



WARNING: Multiple E-Stop Switches

Whenever two or more E-stop switches are connected to the same E-stop safety module, the contacts of both switches must be connected together in series. This series combination is then wired to the respective safety module input. Never connect the contacts of multiple E-stop switches in parallel

to the E-stop safety module inputs; this defeats the switch contact monitoring ability of the safety module, and creates an unsafe condition which could result in serious injury or death.

Checkout Procedures

Checkout procedures are dependent on what two-hand control system or module is interfaced with the DUO-TOUCH Run Bar. At minimum, the procedure should include the requirements listed in the Applications section and the following steps.



WARNING: Do Not Use System Until Checkouts Are Verified

If all of the described checks cannot be verified, do not attempt to use the two-hand control safety system until the defect or problem has been corrected. Attempts to use the guarded machine under such conditions could result in serious bodily injury or death.

1. Verify that all point-of-operation guards are in place and operating properly.
2. Verify the two actuating devices must be simultaneously engaged to actuate the machine (within ½ second).
3. **For single-cycle machines:** Verify that maintained engagement of the two actuating devices results in only one machine cycle.
4. **For part-revolution clutch machines:** Verify that release of either actuating device results in the immediate arrest of the machine motion.
5. Verify that the distance from each actuating device to the closest hazard point is not closer than the calculated safety distance.

Checkout procedures should be accomplished at installation (i.e., commissioning) and at periodic intervals, such as:

- Daily Checkout, to be performed at every power-up, shift change, and machine setup change, and to be performed by a designated person, appointed and identified in writing by the employer.
- Semi-Annual Checkout, to be performed at six-month intervals. This semi-annual checkout must be performed by a qualified person.* A copy of test results should be kept on or near the machine.

* Qualified person: A person who, by possession of a recognized degree or certificate of professional training, or who, by extensive knowledge, training, and experience, has successfully demonstrated the ability to solve problems relating to the installation, maintenance and use of the Two-Hand Control System.

Repairs



CAUTION: Abuse of Module After Failure

If an internal fault has occurred and the Module will not reset, **do not tap, strike, or otherwise attempt to correct the fault by a physical impact to the housing.** An internal relay may have failed in such a manner that its replacement is required.

If the Module is not immediately replaced or repaired, multiple simultaneous failures may accumulate such that the safety function can not be guaranteed.

Do not attempt any repairs to the Module. It contains no field-replaceable components. Return it to the factory for warranty repair or replacement by contacting Banner Factory Application Engineering. They will attempt to troubleshoot the system from your description of the problem. If they conclude a component is defective, they will issue a return merchandise authorization (RMA) number for your paperwork and give you the proper shipping address.

Pack the Module carefully. Damage that occurs in return shipping is not covered by warranty.

Specifications

Power

Supply Voltage and Current: 10 to 30V dc

STB Indicators - 2 Green LEDs

Power: ON – power applied

Output/fault: ON – button is activated

Power Consumption: approx. 1.8W @ 24V dc (with no output load), for each STB

Supply Protection Circuitry: Protected against transient voltages and reverse polarity

Connections

Models STBVP6-RB1/-RB2 and -RB1E02/-RB2E02: Terminal strip connections inside run bar housing (STBs are pre-wired). E-stop button and EZ-LIGHT indicator (if used) are wired separately.

Models STBVP6-RB1Q8/-RB2Q8: 8-pin Mini-style quick-disconnect fitting

Construction

STB Buttons: Totally encapsulated, non-metallic enclosure; black polyetherimide yoke housing (see Application Note below); fiber-reinforced polyester base; electronics fully epoxy-encapsulated.

E-Stop Button: Polyamide red button with metal base.
Run Bar Housing: 13 ga (0.090") cold rolled steel with powder coat paint; polypropylene copolymer STB mount.

Ambient Light Immunity

Up to 100,000 lux

EMI/RFI Immunity

Immune to EMI and RFI noise sources, per IEC 947-5-2.

Application Notes

The STB's polyetherimide upper housing will become brittle with prolonged exposure to outdoor sunlight. Window glass effectively filters longer wavelength ultra-violet light and provides excellent protection from sunlight. Avoid contact with strong alkalis, hydrocarbons and fuels. Clean periodically using mild soap solution and a soft cloth. (Polycarbonate STB models are also available for use with the Run Bar; contact Factory for assistance.)

Output/fault: OFF – button is deactivated

Output/fault: Flashing – internal fault or blocked button on power-up detected

Outputs

Configuration: Complementary PNP (sourcing) open-collector transistors

Protection Circuitry: Protected against false pulse on power-up; overload and short-circuit protection.

Response Time: 20 milliseconds ON/OFF

Output Rating

Maximum load: 150 mA

On-state saturation voltage: Less than or equal to 15V @ full load

Off-state leakage current: Less than 1 μ A

Environmental Rating

STBVP6-RB1 Run Bar Models meet IP20

STBVP6-RB2 Run Bar Models meet IP65

Operating Conditions

Temperature: 0° to +50° C (+32° to +122° F)

Maximum relative humidity: 90% @ +50° C (non-condensing)

Certifications

STB Buttons: 

STBVP6-RB2...Run Bars: 

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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