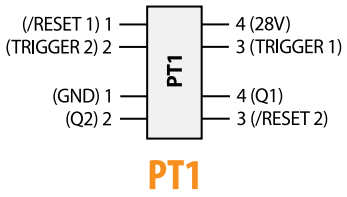
VIVISUN®

LOGIC Series

PULSE/TIMER

SENSORS & DETECTORS

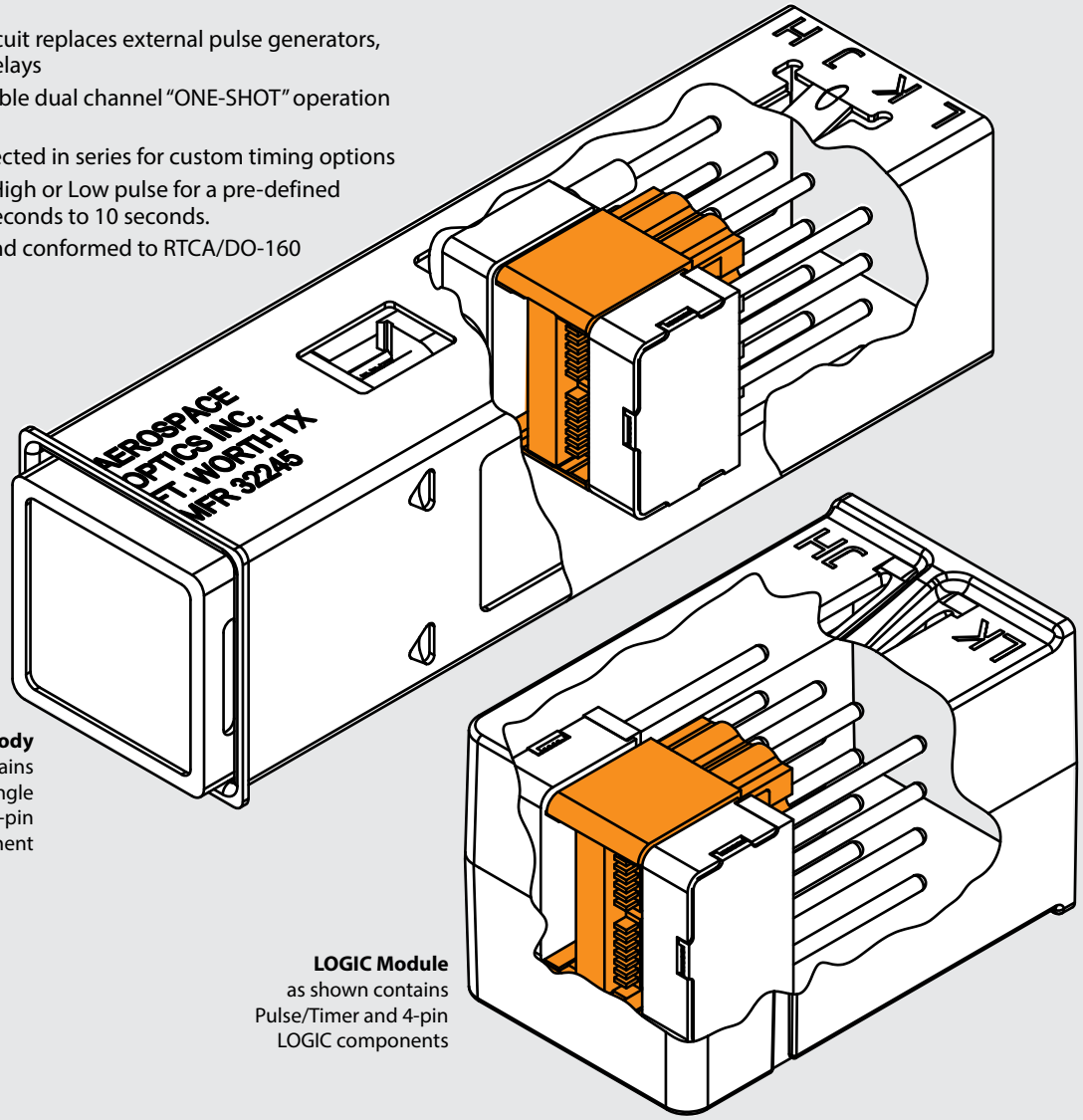


PT1

The Pulse/Timer component is an 8-pin sensing and detecting device developed as a part of the LOGIC Series by VIVISUN. The Pulse/Timer acts as a dual-channel edge detector and can output two distinct timed outbound signals. A Pulse/Timer can be integrated into a traditional 4-pole switch housing, creating a LOGIC Body (LB), or can be included in a stand-alone LOGIC Module (LM) for use behind the panel. Pulse/Timer can also be combined with electromechanical switches and other LOGIC Series components to create a custom configuration that uniquely addresses the designer's specific functional requirements. The Pulse/Timer is designed and tested in accordance with MIL-PRF-22885 and DO-160.

Pulse/Timer

- Dual channel positive (rising) or negative (falling) edge detection
- Timed device activation via pulse output (horn, buzzer or blinking indicators)
- Integrated electrical circuit replaces external pulse generators, timers and time delay relays
- Independent retriggerable dual channel "ONE-SHOT" operation and control
- Channels may be connected in series for custom timing options
- Generate an outgoing High or Low pulse for a pre-defined interval from 125 milliseconds to 10 seconds.
- Approved, witnessed and conformed to RTCA/DO-160



High Capacity LOGIC Body as shown contains Pulse/Timer, single switch pole and 4-pin LOGIC component

LOGIC Module as shown contains Pulse/Timer and 4-pin LOGIC components

Data Sheet: DS-PT1-12

www.vivisun.com

VIVISUN®

Manufactured by Aerospace Optics, Inc.

MANAGEMENT SYSTEM CERTIFICATION
ISO 9001 = AS9100 C
DNV

Pulse/Timer

The **Pulse/Timer** includes two independent edge detector channels with the ability to generate two independent outgoing signals. The Pulse/Timer eliminates the need for many common relays and timing devices found in advanced avionics and ground control electrical designs. See *Figure 1* for Pulse/Timer block diagram and complete details on inputs and outputs.

Benefits: The Pulse/Timer functionality allows, within the existing switch envelope, the ability to:

- Respond to reciprocal transitions such as "Weight On/Off," "Wheels Open/Close" or "Power On/Off",
- Initiate independent channel control with Reset lines, and
- Produce a delayed outgoing pulse by connecting channels in series.

How it works: The Pulse/Timer's two independent channels can be individually selected to:

- Respond to a positive (rising) or negative (falling) edge input, and
- Generate an outgoing High or Low pulse for defined intervals from 125 milliseconds to 10 seconds.

Applications: In addition to the technical and qualification information on the following pages, typical applications for the Pulse/Timer are shown in Application Examples. See *Figure 2* for full part number coding information. Operating parameters are listed in *Table 1*.

Compatibility: The LOGIC Series Pulse/Timer is compatible with a wide range of proven VIVISUN products, including:

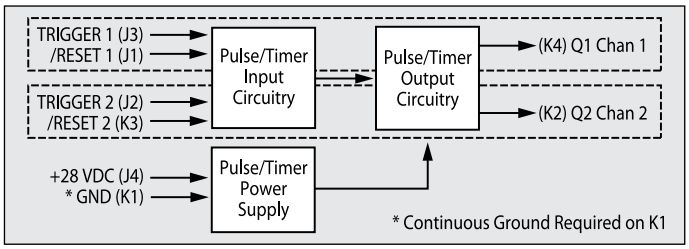
- Indicators, switches and modules,
- 3/4" LED caps and 1" x 1.2" LR3 LED caps,
- 95 Series incandescent caps, and
- the Quik-Connect™ solderless termination system *(see Table 4)*.

VIVISUN LOGIC Series Overview: The Pulse/Timer is one of VIVISUN's LOGIC Series electronic components designed to enhance avionics design flexibility. The Pulse/Timer can be inserted into either a) a High-Capacity LOGIC Body (LB), based on a standard 4-pole switch body with an illuminated lens cap, or b) a stand-alone behind-the-panel electronic LOGIC Module (LM). The innovative LOGIC Series was developed to simplify operator interface and circuit complexity by providing the ability to internally integrate multiple combinations of LOGIC Series components into a single envelope, including functionality such as:

- Switch poles *(LOGIC Body only)*,
- Electronic switching,
- Electronic sensing and detecting, and
- Logic/interface devices.

A single 8-pin LOGIC Series component like the Pulse/Timer can be combined with up to two additional 4-pin LOGIC Series components (LOGIC Module or LOGIC Body) or can be combined with an additional 8-pin component (LOGIC Module only) to bring a customized solution to your application. See *Table 5* and *How to Order* for a complete description of the various configurations.

Figure 1: Block Diagram



Trigger Inputs: TRIGGER 1 and TRIGGER 2 inputs are independent and must be defined as either:

- Positive (P): rising edge detecting, or
- Negative (N): falling edge detecting.

Inputs: Each input provides:

- De-bounce and diode isolation, and
- Internal pull up to approximately 18 V.

Outputs: Q1 and Q2 are independent open drain outputs that must be defined as either:

- Active High (H): normally grounded that becomes high impedance for length of pulse, or
- Low (L): normally high impedance that becomes grounded for length of pulse.

See *Table 2* for further Pulse/Timer function information.

Pulse/Timing: Timing of each independent channel is defined at the time of order per the following timing options:

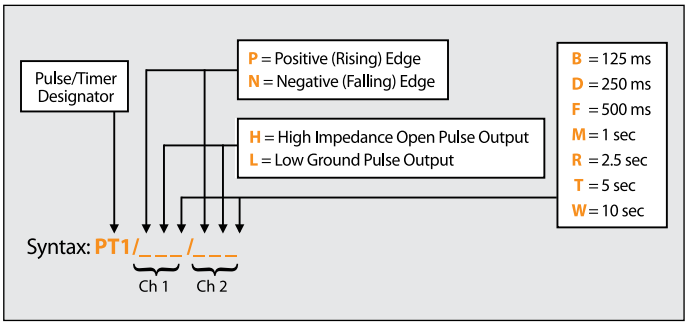
Timing Available							
Channel 1	125 ms	250 ms	500 ms	1 s	2.5 s	5 s	10 s
Channel 2	125 ms	250 ms	500 ms	1 s	2.5 s	5 s	10 s
Timing Code	B	D	F	M	R	T	W

Nominal timing: +/- 10 % at 25° C

Reset Inputs: (See *Table 2* for additional Pulse/Timer function information.)

- The reset inputs will cancel the pulse of the corresponding channel.
- The reset will also function to enable/disable if the reset line is held low, the channel is disabled.
- Internal pull up to approximately 18 V.

Figure 2: Pulse/Timer Part Numbering



Example: PT1/PHF/NLR = Pulse/Timer, Channel 1 responds to a Positive (P) input edge and generates a High (H) pulse output for 500 ms (F), Channel 2 responds to a Negative (N) input edge and generates a Low (L) pulse output for 2.5 seconds (R).

The PT1 coding above is used as a portion of an entire switch assembly part number. See *How To Order* for more information about complete numbers or use the on-line VIVISUN configurator.

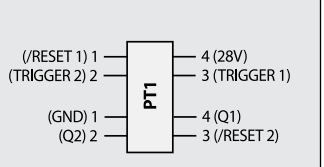
Table 1: Operating Parameters

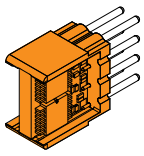
Description	Parameters
Operating Parameters	
Operating Voltage (Max. / Nom. / Min.)	+32 VDC / +28 VDC / +18 VDC
Power Supply Input Current	4 mA maximum
Reset from power loss	> 200 ms @ 25° C
Input Parameters at 25°C	
/RESET	55 ms minimum
TRIGGER	40 ms minimum
High Level Input Voltage (V_{IH})	10 VDC minimum
Low Level Input Voltage (V_{IL})	1.2 VDC maximum
Low Level Input Current (I_{IL})	1mA maximum
All signal inputs are diode isolated	
Output Load Capacity	
Resistive / Motor	2.0 A / 1.0 A
Lamp or Inductive	0.8 A
Operational Life	500,000 cycles at rated loads
Temperature	
Operating & Non-Operating	-55°C to +85°C

Table 2: Pulse/Timer Function

Input	Selected Input Option	Actual Input Received	Output Response: Q1 or Q2 Active High (H) configuration	Output Response: Q1 or Q2 Active Low (L) configuration
TRIGGER 1 OR TRIGGER 2	Positive (P)	Positive	Output transitions from ground to high impedance for the specified pulse period	Output transitions from high impedance to ground for the specified pulse period
		Negative	No Change: Output remains at ground	No Change: Output remains at High Impedance
	Negative (N)	Positive	No Change: Output remains at ground	No Change: Output remains at High Impedance
		Negative	Output transitions from ground to high impedance for the specified pulse period	Output transitions from high impedance to ground for the specified pulse period
/RESET 1 OR /RESET 2	–	Reset = (H) High	Q1 and Q2 operate as defined above	
	–	Reset = (L) Ground	Corresponding output is cancelled and is held at ground	Corresponding output is cancelled and is held at high Impedance

Table 3: Pulse/Timer (8-pin Component)





PT1

Table 4: Connector Plug

Pins*	High Capacity LOGIC Body	LOGIC Module	Connector Plug
A, B, C, D, F, G	Lamp Circuits	N/A	 P/N 18-440
H1-H4, L1-L4	Switch Contacts		
	4-Pin LOGIC Series Contacts		
J1-J4, K1-K4	Pulse/Timer Contacts (assuming a single 8-pin component)		

** Pin-out will change if two 8-pin components are configured in a LOGIC Module.*

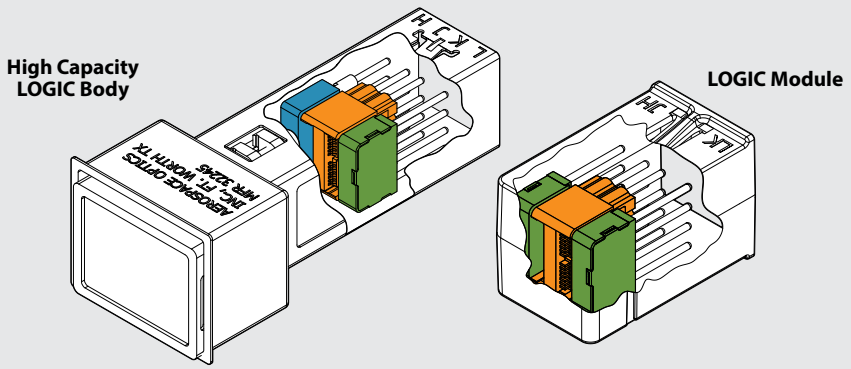
Table 5: LOGIC Series Overview

The Pulse/Timer may be used in the following packaging options:

The **LOGIC Body (LB)** expands the capabilities of a standard pushbutton switch or indicator by utilizing the 8-pin Pulse/Timer internally in 6 distinct combinations of electromechanical switches, LOGIC Series devices, and "open" spacers. The Pulse/Timer is compatible with the **High Capacity** LOGIC Body (based on a standard 4-pole housing).

The **LOGIC Module (LM)** is a stand alone behind-the-panel module that utilizes the 8-pin Pulse/Timer in 4 distinct combinations of LOGIC components and "open" spacers to provide functionality external to a standard switch envelope. The LOGIC Module may be wired directly into the harness or may mount in a bracket or rail.

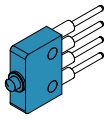
For complete descriptions of the combinations see *How To Order, LOGIC Body Configuration Guide (Data Sheet DS-LB-13)* and the *LOGIC Module Configuration Guide (Data Sheet DS-LM-13).*



Component Types

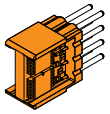
{SW} Switch Poles

High reliability MIL-PRF-8805/101 snap action switches. Gold contacts (5 or 7) are required when combining with an 8-pin module.
Single Break, Silver 1, Gold 5
Double Break, Silver 3, Gold 7



{8-Pin} Components

Electronic components, such as electronic latching, edge detectors, electronic rotary, and defined logic.

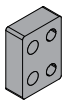


{4-Pin} Components

Electronic components, such as solid state relays and diode packs.

(0) Open Module

"Open" spacer for unoccupied pole positions. No termination pins.



See **www.vivisun.com** for all current LOGIC Series component offerings.

Table 6: Pulse/Timer Qualification Level Summary

Test Description	Specification	Section	Category	Reference Levels*
Altitude	RTCA/DO-160 MIL-STD-202 MIL-STD-810	4 105C 500	F2 B Method II	-15,000 feet, +55,000 feet
Temperature	RTCA/DO-160 MIL-STD-810	4 501	F2 Method III	-55°C and +85°C (Illuminated Indicator rated at +71°C)
Temperature Variation	RTCA/DO-160 MIL-STD-202 MIL-STD-810	5 107 503	S2 A 1	5 cycles -55°C /+85°C
High Temperature Survival (Non-operating)	MIL-STD-202	108A	A	+85°C, 96 hours (Switch Module) +125°C, 96 hours (Electronic Unit only)
Liquid Thermal Shock	MIL-STD-202	107	BB	15 cycles -65°C, +125°C (Electronic Unit Only)
Humidity	RTCA/DO-160 MIL-STD-202	6 106	B N/A	240 hours, +65°C, > 90% RH
Operational Shock and Crash Safety	RTCA/DO-160 MIL-STD-202 MIL-STD-810	7 212 516	B B N/A	20 G Sawtooth, 20 G Acceleration 75 G Half-Sine
Acceleration	RTCA/DO-160 MIL-STD-202 MIL-STD-810	7 212 513	B A Method III	20 G, 3 axis
Vibration	RTCA/DO-160 MIL-STD-202	8 204	R,U B	10-2000 Hz, 10 G 10-2000 Hz, 15 G
Explosive Atmosphere	RTCA/DO-160 MIL-STD-202	9 109C	E B	
Waterproofness Seal	RTCA/DO-160 MIL-PRF-22885	10 4.7.20	R Splashproof	15 gal/min
Sand and Dust	RTCA/DO-160 MIL-STD-202	12 110	D N/A	Silica media
Fungus Resistance	RTCA/DO-160 MIL-PRF-22885	13 3.5.2	F N/A	Compliance by material selection
Salt Fog	RTCA/DO-160 MIL-STD-202	14 101	T A	96 hour tests
Magnetic Effect	RTCA/DO-160	15	Z	1° deflection, < 0.3 m
Power Input Aircraft Power	RTCA/DO-160 MIL-STD-704	16 N/A	A & B N/A	
Spike	RTCA/DO-160 MIL-STD-461	17 CS106	A Spike 1	Power, 600 V, 10 us, 50 ohm 400 V, 5 us, 5 ohm
Audio Frequency Conducted Susceptibility	RTCA/DO-160 MIL-STD-461	18 CS101	Z Curve 1	Power Input, 4 V P-P, 1-150 KHz
Induced Signal Susceptibility	RTCA/DO-160	19	CW	10,000 V/m, 120 A/m, 350-800 Hz
RF Conducted Susceptibility	RTCA/DO-160 MIL-STD-461	20 CS114	Y Curve 5	7.5 V, 150 mA, 10K Hz-400 MHz
RF Radiated Susceptibility	RTCA/DO-160 MIL-STD-461	20 RS103	Y 200 V/m	200 V/m, 2 MHz-18 GHz
RF Emissions	RTCA/DO-160 MIL-STD-461	21 CE102	P	
Damped Sinusoidal Transient	RTCA/DO-160 MIL-STD-461	22 CS116	B3K33 N/A	Waveform 3, 600 V, 1 MHz, 10 MHz
Lightning Induced Transient	RTCA/DO-160 MIL-STD-461	22 CS115	B3K33 N/A	Waveform 5 A, 750 V, 120 us 30 ns, 5 amp
Dielectric Withstanding	MIL-STD-202	301	N/A	1000 VAC
Electrostatic Discharge	RTCA/DO-160	25	N/A	15,000 V, 150 pf, 330 ohms

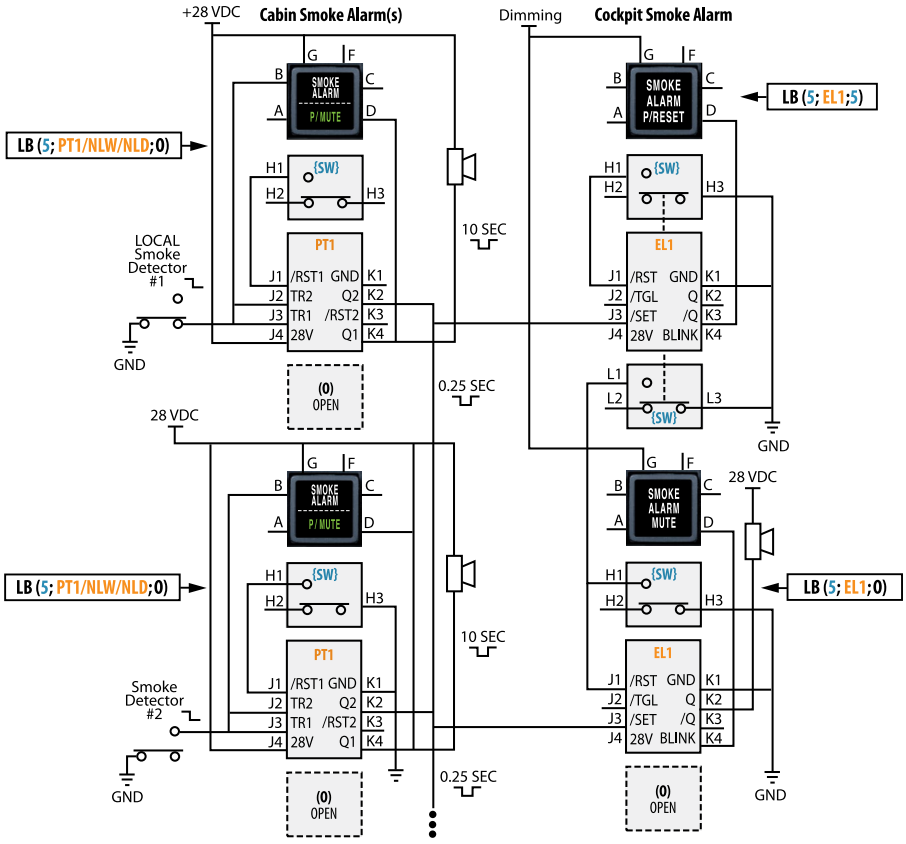
*Actual testing meets or exceeds defined test conditions.

Application Examples

Example 1 Demonstrates how multiple units may be connected in parallel to perform independent non-blocking activation of alarms or warnings. If either smoke detector is activated, it will sound a local 10 second alarm. It will also initiate a continuous alarm and indication signal in the cockpit that is controlled by VIVISUN Electronic Latching switches. The cabin alarm may be canceled by pressing the associated cabin mute button. The cockpit alarm is canceled by pressing the SMOKE ALARM MUTE switch or SMOKE ALARM reset switch. If a new smoke detection signal occurs, the alarms will be reactivated. This example uses both channels of the Pulse/Timer: one channel is configured for a 10 second pulse to activate the local alarm and the other a 0.25 second pulse to activate the alarm in the cockpit.

This circuit diagram is provided by Aerospace Optics, Inc. as a general example only.

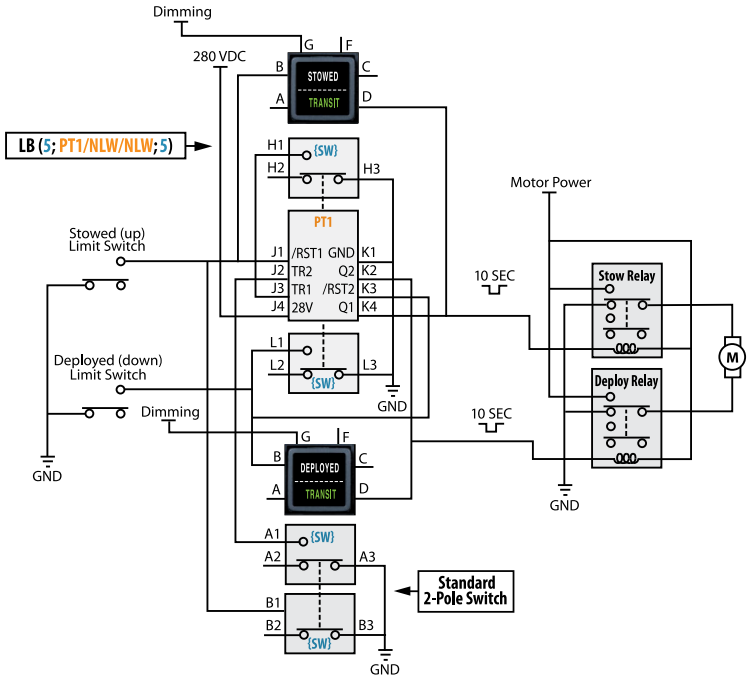
Example 1: Pulse/Timer Smoke Detector with Horn Reset



Example 2 Demonstrates an automatic motor control using the Pulse/Timer. Pressing the STOWED switch will activate the Stow relay for a maximum of 10 second causing the motor to move to the stowed position. When the stowed limit switch is reached, the Pulse/Timer will be automatically reset stopping the motor. Pressing the DEPLOYED switch will activate the deployed relay for a maximum of 10 seconds causing the motor to move to the deployed position. When the deployed limit switch is reached, the Pulse/Timer will be automatically reset stopping the motor. Note: if the motor is currently in transit, pressing the other switch will reverse the direction of movement.

This circuit diagram is provided by Aerospace Optics, Inc. as a general example only.

Example 2: Pulse/Timer Automatic Motor Stowed (Up)/Deployed (Down) Control



How To Order

We've made the accurate configuration of VIVISUN products quick and easy.

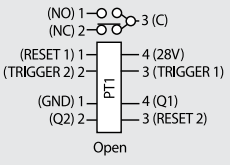
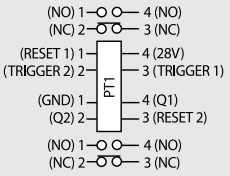
Visit the VIVISUN Configurator at: www.vivisun.com/configurator

Using the VIVISUN Configurator online will ensure that the entire LOGIC Body (including lens cap) or LOGIC Module is configured properly by assigning the selected options into the proper pole positions. You can e-mail complete part specifications and search part numbers. Registered users can also access a database of their previously configured VIVISUN parts.

For complete, manual part number configuration details on our LOGIC Body switches and indicators, refer to the *LOGIC Body Configuration Guide (DS-LB-13);* the datasheets for either the LED (3/4" square with LED lighting), the LR3 (1" x 1.2" rectangular with LED lighting) or the 95 series (3/4" square with incandescent lighting); and the datasheets for the desired LOGIC Series components.

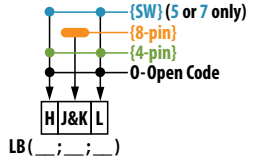
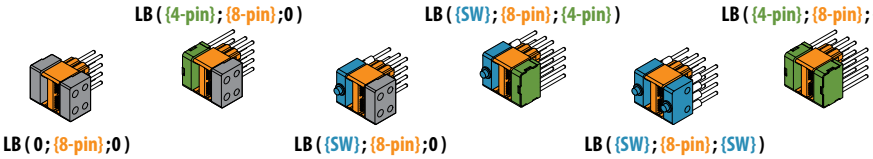
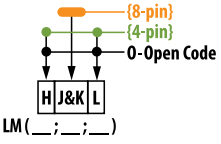
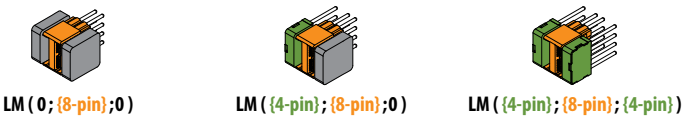
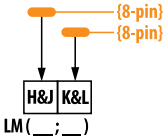
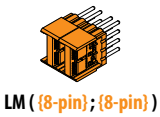
For complete, manual part number configuration details on our behind-the-panel LOGIC Module solutions, refer to the *LOGIC Module Configuration Guide (DS-LM-13)* and the datasheets for the desired LOGIC Series components.

For up-to-date information on all available LOGIC Series components, visit www.vivisun.com

Full Sample Part Numbers	Sample Descriptions	Sample Circuit Diagrams	Connector Plugs	
LED-DM-11-BB-E0YUE **(2A3 SMOKE, ALARM; 3G3 P/MUTE)** **LB(5; PT1/NLW/NLD ; 0)**	LED High Capacity LB; including (1) single break gold switch, (1) Pulse/Timer and (1) Open, without a Connector Plug		DM configurations require Connector Plug 18-440 to be ordered separately. Replacing DM with EM denotes a High Capacity LOGIC Body part number with a Connector Plug included.	
LED-EM-11-BB-E18D2 **(2A2 STOWED ;3G2 TRANSIT)** **LB(7; PT1/NLD/NLD; 7)**	LED High Capacity LB; including (2) double break gold switches, and (1) Pulse/Timer, with a Connector Plug		EM configurations denotes a High Capacity LOGIC Body part number with a Connector Plug included. Replacing EM with DM requires Connector Plug 18-440 to be ordered separately.	

** Refer to applicable Data Sheets for the LED, LR3 and 95 Series for complete part number descriptions and options for the entire switch assembly.*

Configurations with 8-pin LOGIC Series Components

Position Schematic	Configuration Combinations
High Capacity LOGIC Body (LB) - with 8-pin Component	
	
LOGIC Module (LM) - with Single 8-pin Component	
	
LOGIC Module (LM) - with Dual 8-Pin Components	
	 • Dual 8-pin configuration only available in LOGIC Module. • Compatible with any two 8-pin LOGIC Series components. • Note specific pin-out designations (H&J and K&L) in Position Schematic.

Note: LOGIC Components have specific postion priorities inside of a LOGIC Body or LOGIC Module that must be determined using the online VIVISUN Configurator.

Headquarters & USA Sales Office

Aerospace Optics, Inc.
3201 Sandy Lane
Fort Worth, TX 76112

Telephone: 1-817-451-1141
Fax: 1-817-654-3405
Toll-Free:1-888-VIVISUN (848-4786)
email: sales@vivisun.com
www.vivisun.com

International Sales Offices

See "Contact Us" at www.vivisun.com for a current listing and complete contact information for our international sales network, or email the specific country address below:

United Kingdom	sales.uk@vivisun.com	**Germany**	sales.germany@vivisun.com
Italy	sales.italy@vivisun.com	**Brazil**	sales.brazil@vivisun.com
France	sales.france@vivisun.com	**Spain**	sales.spain@vivisun.com
All Other Countries	sales@vivisun.com		

VIVISUN