

Electronic Steerable Beam (ESB) Traffic Signal Heads

Part of the Intelight Complete Traffic Framework



Electronically Steerable Beam traffic signal head



LED array that provides illumination and steerable beam



Optional Internal Stop Bar Detection Camera.

Easily Adjust Light Beams Without Getting up in a Bucket Truck

The Electronically Steerable Beam (ESB) traffic signal features an electronically programmable signal head with an array of LEDs as the illumination source. LEDs can be programmed to electronically steer the light beam as well as raise and lower light intensity for turning pocket signals using a Wi-Fi enabled PDA. Both vertical and horizontal viewing angles can be programmed for typical turn pockets plus restrict viewing for far side indications. The Intelight ESB signal saves hours of staff time and dramatically reduces exposure to traffic dangers. Power consumption averages 8 Watts compared to the 150 watts required by legacy incandescent programmable vehicle heads.

Key Electronic Steerable Beam Traffic Signal Head Benefits

- Provides a visibility zone of red, yellow, and green without requiring louvers or other external blocking devices
- Signal illumination is remotely programmable to desired area of visibility
- Signals are complete head replacements and part of the Intelight Complete Traffic Framework
- Reduces energy and maintenance costs by 95%

Unique Electronically Steerable Beam traffic signal features

- 100% intelligent LED traffic signal
- Thermally enhanced modular housing - improves operational life
- Ambient Light Adjustment - signal light intensity varies automatically with changes in ambient light. No killer-greens.
- Upgradeable design - cost efficient future software and hardware features
- 7-year warranty - longest in the industry

Advanced Optional Intelight ITS Platform Features

- Embedded 4-way video cameras - enables real time and stored color and black/white images and part of the Intelight ITS Platform
- Battery Backup Capability - operates directly from a 120V AC or 48V DC power source
- Built-in communications - power line modem with communications over existing signal wires
- Sensors - providing improved transportation mobility, enhanced public safety and Homeland Security features

Compliance and Approvals

Intelight meets or exceeds traditional traffic signal specifications. Independent laboratory test results of Intelight's products are available on request.

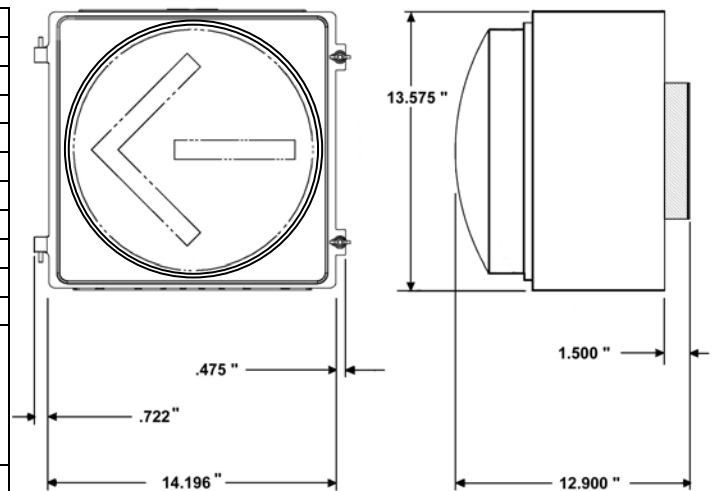
Contact sales@signalcontrol.com for distribution in NJ & Eastern PA



ESB Traffic Signal Head Configuration

Size	12 inches (300mm)
LED Types	Red/Amber/Green: AlInGaP
LEDs per Arrow	Mask defined arrow
Lens Materials	Polymeric
Lens Description	Clear lenses standard, tinted available
Lens Configuration	Fresnel and refractive Lenses
Reflector Materials	Polycarbonate
Reflector Description	Custom parabolic
Reflector Configuration	Integrated with housing
Housing Materials	Reinforced, UV resistant polycarbonate
Gaskets	Silicone foam
Mounting	ESB horizontal and vertical stacks Arrows horizontal and vertical placements: <ul style="list-style-type: none"> • Mast arms • Stabilized Span • Top of post • Side of pole

ESB Product Overall Dimensions



ESB Traffic Signal Head Product Features

Model Number	Description	Beam Color	Power (Watts)	Chromaticity in Dominant Wavelength (nm)	Luminosity in Candelas *
100001	Flood	Red	22**	626	365
100001	Flood	Yellow	22**	589	910
100001	Flood	Green	22**	500	475
100001	Arrow	Yellow	22**	589	910
100001	Arrow	Green	22**	500	475

- Ambient Light Adjustment feature adjusts for external levels.
- 100% Power and all rows and columns on. Typical usage is <35% or 8 watts

ESB Operating Specifications**

Temperature Range	- 40° C to + 74° C
Voltage Range AC	80 VAC to 135 VAC / 60Hz ± 3Hz
IP Rating Unenclosed / Enclosed	IP 34 / IP 65
Power Factor	> 0.90%
Voltage Typical AC	120 VAC / 60Hz
Voltage Typical DC	48 VDC
Voltage Protection	6000 V
Voltage Conversion	AC or DC operations with the change of a single wire
Total Harmonic Distortion (THD)	< 20%
Offstate Impedance	< 1K ohm

** Specs & typical values tested under laboratory conditions, Ta= 25°C

ESB Performance Values

Functional Characteristics	Compliance
Chromaticity (Color)	ITE VTCSH-STD Part 2, Part 3
Luminous Intensity Values	ITE VTCSH-STD Part 2, Part 3
Transient Immunity	NEMA TS-2
Transient Protection	ITE VTCSH-STD Part 2, Part 3
Water/Moisture Resistance	NEMA STD 250 1991 Type IV Encl. IEC 60529
Vibration Resistance	NEMA MIL-STD-833 Test Method 2007
Electronic Noise	FCC Title 47 Sec. 15 Sub B, Class A
Dust/Solid Objects	IEC 60529
Temperature Cycling	MIL-STD 883 Test Method 1010
Temperature Resistance	NEMA
Controller Compatibility	170, 2070, NEMA TS-1, TS-2 1992
Voltage Spikes/Protection	IEEE/ANSI C62.41 Cat. C Level 2
Wiring	National Electric Code 18 AWG



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12 Inch (300 Mm) Electronically Steerable Field of View Signal Heads (ESFVSH)

1. DESCRIPTION:

- 1.1. This document defines minimum standards for product performance and composition relating to 12 INCH (300 MM) LED VEHICLE SIGNAL HEADS, hereinafter referred to as ESFVSH.

2. GENERAL:

- 2.1. The ESFVSH shall provide an indication to the field of view through the use of an electronic steerable beam providing a visibility zone of red, yellow and green, without requiring louvers or other external blocking devices to achieve the end result. No indication shall result from external illumination nor shall one section illuminate another. In order to achieve the long life objectives, the signal housings shall accommodate a thermal transfer device.
- 2.2. All ESFVSH major components shall be manufactured from glass reinforced polycarbonate material. The housing/sections shall be weatherproof and dust-tight. The signal shall display indications of red, yellow, and green - balls or arrows. The ESFVSH when configured shall operate directly from 120-volt, 60 Hz power source. All ESFVSH components including lenses, reflectors, wiring, and materials used in the construction of ESFVSH assemblies shall meet or exceed all applicable ITE and Caltrans Specifications with exceptions outlined in these specifications.

3. CONSTRUCTION:

3.1. MATERIAL:

- 3.1.1. All major signal components, shall be one-piece molded and manufactured from Ultra-Violet stabilized, Makrolon 9417 or equivalent.
- 3.1.2. The material formulation used in the manufacture of the major signal components shall meet or exceed the minimum standards listed below:

3.1.3. <u>Property</u>	<u>Required</u>	<u>Method</u>
Tensile stress, yield	0.125" 9400 psi	ASTM D638
Flexural stress, yield	0.125" 15,000 psi	ASTM D790
Flexural Modulus	0.125" 500,000 psi	ASTM D790
Impact strength, notched izod, 73 degrees Fahrenheit	2.0 ft-lb/inch	ASTM D256
Heat Deflection Temperature 264 psi, 0.250", unannealed	284 ⁰ F	ASTM D648

3.2. COLOR:

- 3.2.1.** The exterior of each signal housing shall be colored (specified color (standard colors are YELLOW, GREEN or BLACK or a combination thereof)) with a lusterless finish unless otherwise specified.
- 3.2.2.** External color of the housing shall be completely impregnated in the resin material so that scratches will not expose uncolored material.

3.3. HOUSING:

- 3.3.1.** Each housing section shall be one-piece molded and manufactured from Ultra-Violet stabilized Makrolon 9417 or equivalent.
- 3.3.2.** Housings containing electronic components shall be made of UL94VO flame retardant materials. The Lens/Door of the signal shall be excluded from this requirement.
- 3.3.3.** The housing shall be a minimum of .090 inch thick, and have a 5-inch square maximum opening in the rear. The opening shall accommodate a thermal transfer device that shall dissipate heat to the outside of the housing and physically connected to the LED's within.
- 3.3.4.** The housing shall utilize ribbing to enhance the structural strength while reducing weight.
- 3.3.5.** The top and bottom exterior of the housing shall be parallel to insure alignment of assembled section, and shall have a common vertical centerline.
- 3.3.6.** The top and bottom of the housing shall have an opening to permit the entrance of 1-1/2 inch (38.1 mm) N.P.T. fittings and standard traffic signal mounting hardware.
- 3.3.7.** The top opening of each housing section shall have a raised serrated type boss integrally molded to allow proper joining of stacked sections and to marry with a recessed serrated type boss.
- 3.3.8.** The bottom opening of each housing section shall have a recessed serrated type boss integrally molded to allow proper joining of stacked sections and to marry with a raised serrated type boss.

The dimensions of the boss shall be:

Outside diameter:	2.625 inches
Inside diameter:	1.970 inches
Number of teeth:	72
Angle of teeth:	60 degrees
Depth of teeth:	0.050 inches

The teeth shall be clean and sharp. The radial angular grooves of the serrated fittings shall provide positive positioning of the entire signal head to eliminate rotation or misalignment.

3.4 DOOR ASSEMBLY:

- 3.4.1** The door shall be a single molded piece with integrated dome eliminating the need for a lens/door gasket, and shall be manufactured from Ultra-Violet stabilized new polymer resin.
- 3.4.2** The door shall have two evenly spaced latch slots.
- 3.4.3** The door shall pivot from the left side on stainless steel hinge pins.
- 3.4.4** The door shall latch at the right side using stainless steel hardware.
- 3.4.5** The door shall have four stainless steel threaded inserts for retaining the visor.
- 3.4.6** The door shall be fitted with a gasket that will form a dust and moisture resistant seal between the door and housing.

3.5 OPTICS,LENS:

- 3.5.1** The integrated dome shall be clear, circular, convex, scratch resistant, hard coated and UV stabilized.
- 3.5.2** The 12 inch dome shall have a diameter between 11-15/16 (11.9375) inches and 12 1/32 (12.03125) inches.
- 3.5.3** The lens shall diffuse the light emanating from the LED's to provide light disbursement across the outer dome. In no instance shall individual LED's be visible in the field of vision when the signal section is energized.
- 3.5.4** The ESFVSH shall be designed to allow the light output through the lens to be directed or steered into a specific viewing zone. Steering shall be accomplished electronically, the need for mechanical devices or tape shall not be allowed.
- 3.5.5** The design of the ESFVSH shall accommodate light output steering in both the vertical and horizontal direction.

4. ELECTRICAL:

4.1 GENERAL:

- 4.1.1** All wiring and terminal blocks shall meet the requirements of the ITE VTSCH specification. The ESFVSH shall operate from 120V AC source voltage. The ESFVSH can be ordered with a special controller board that will operate from 48VDC power source.

4.2 48VDC Operation:

- 4.2.1** The ESFVSH shall operate from a DC powered supply over a voltage range from 40V DC to 60V DC, 48V optimal with a minimum start-up voltage of 40V nominal. The ESFVSH shall also be capable of operating from a DC float charged battery rack up to 60V.
- 4.2.2** ESFVSH shall illuminate to full brightness within 75ms when nominal voltage is applied.
- 4.2.3** The LED circuitry shall prevent flicker of the LED output at frequencies less than 100 HZ over the voltage range specified. In no circumstances shall the signal indication flicker either during the energized or de-energized state.
- 4.2.4** The ESFVSH shall extinguish (no illumination) within 75ms when nominal voltage is removed.
- 4.2.5** The ESFVSH shall be compatible with DC load switches, flashers and DC Conflict Monitors used with signal controllers: NEMA (TS-1 or later), Model 170 (1989 or later) and model 2070 (all).

4.3 120VAC Operation:

- 4.3.1** The ESFVSH shall operate from a 60 ± 3 cycle AC line power over a voltage range from 80 VAC RMS to 135 VAC RMS. The current draw shall be sufficient to ensure compatibility and proper triggering and operation of load switches and conflict monitors in signal controller units: NEMA (TS-1 or later), Model 170 (1989 or later) and model 2070 (all).
- 4.3.2** The nominal operating voltage shall be 120 ± 3 volts rms.
- 4.3.3** Fluctuations in line voltage over the range of 80VAC to 135 VAC shall not affect luminous intensity by more than ± 10 percent.
- 4.3.4** The ESFVSH circuitry shall prevent flicker at less than 100 Hz over the voltage range of 80 VAC RMS to 135 VAC RMS.

4.4 TRANSIENT VOLTAGE PROTECTION:

4.4.1 The ESFVSH shall include voltage surge protection to withstand high repetition noise transients and low-repetition, High-Energy Transients as stated in section 2.1.6, and Non Destruct Transient Immunity 2.1.8 NEMA Standard TS-2, 1998. In addition, the ESFVSH shall comply to the following:

4.4.1.1 The ESFVSH shall withstand at least 10 strikes of 6kV 1.2/50uS as defined in IEEE/ANSI C62.41 Category "C" exposure Level 2.

4.4.1.2 The ESFVSH shall meet a one time strike at both polarities at 4KV as cited in NEMA TS-2, 1998, Section 2.1.8.

4.5 LED DRIVE CIRCUITRY:

4.5.1 The individual LED light sources shall be wired so that a catastrophic failure of one LED light source will result in the loss of not more than 10 percent of the signal light output.

4.6 AMBIENT LIGHT ADJUST:

4.6.1 Ambient Light Adjust shall be provided and shall be designed to adjust the intensity of the light output in response to ambient light levels. Adjustments shall be accomplished in a smooth manner in response to ambient light levels and corresponding to two internal levels described as (Day, and Night).

4.7 ELECTRONIC NOISE:

4.7.1 The LED signal and associated onboard circuitry shall meet Federal Communications Commission (FCC) Title 47, Sub Part B, Section 15 regulations concerning the emission of electronic noise.

4.8 AC POWER FACTOR (PF):

4.8.1 The LED signal shall provide a power factor of 0.90 or greater when operated at nominal operating voltage, and 77 degrees "F" (25 degrees "C").

4.9 AC HARMONICS:

4.9.1 The total harmonic distortion induced into an ac power line by an LED signal, operated at nominal operating voltage, with power consumption equal to or greater than 15 watts at 77 degrees "F" (25 degrees "C") shall not exceed 20 percent. Total harmonic distortion induced into an ac power line by an LED signal, operated at nominal operating voltage; with power consumption less than 15 watts at 77 degrees "F" (25 degrees "C") shall not exceed 40 percent.

4.10 PREDICTIVE FAILURE ANALYSIS:

4.10.1 Circuitry shall be provided within each section of the traffic signal that will continuously monitor the LED's in each traffic signal section. It shall be possible to communicate with each traffic signal section and be capable of obtaining the following information: the LED color, ID number of the LED module, number of hours the LED's have been in operation, and the operating temperature of the LED's; which is necessary in order to generate a report indicating when the LED's will go below specifications for light output.

4.11 Communications

4.11.1 Two way communication shall be provided between all signal indications and the traffic controller cabinet. The communications shall also be available to provide command and feedback information from each signal indication.

4.12 WIRING:

4.12.1 Each signal section shall be supplied with 2 (two) color-coded wires.

4.12.2 Wires shall be #18 AWG, stranded, type AIA, 600 volt with 2/64 inch, 105 degree centigrade rating thermoplastic insulation and color-coded in assemblies as follows:

- White - Common
- Red - Red section
- Yellow - Yellow section
- Yellow Arrow – Yellow with White tracer
- Green Ball - Brown or Green
- Green Arrow – Brown with White tracer or Green with White tracer

4.12.3 Each wire shall terminate in a quick connect (unless otherwise specified by the agency) type lug to allow easy connection to the terminal block.

4.13 TERMINAL STRIP:

4.13.1 Each 3 to 5 signal section head assembly shall be provided with a terminal block in the yellow indication compartment to provide a connection point for external wiring.

4.13.2 Terminal block shall be barrier type, capable of accommodating up to 10 AWG wire on each terminal.

4.13.3 Terminal block hardware shall be #8-32 x 5/16 (.3125) inch long binder head stainless steel screws.

5. ENVIRONMENTAL:

- 5.1. The ESFVSH, when assembled, shall be weather-proof and dust tight.
- 5.2 The ESFVSH shall operate over the temperature range of -40 degrees "F" to +165 degrees "F" (-40 degrees "C" to +74 degrees "C").

6. HARDWARE:

- 6.1 All materials used in hardware for traffic control equipment shall be BEST QUALITY first run material.
- 6.2 Recycled materials, in part or in full, shall not be used in the manufacture of hardware for mounting traffic control equipment.
- 6.3 All hardware, including but not limited to, pins, bolts, screws, threaded inserts, clips, etc., shall be type 304 or 316 stainless steel.

6.4 DOOR LATCH HARDWARE:

- 6.4.1 The door assembly shall attach to the housing assembly and shall pivot from the left side using stainless steel hinge pins.
- 6.4.2 The door assembly shall be retained such that it is not able to accidentally become detached from the housing assembly.
- 6.4.3 The door assembly shall latch to the housing assembly utilizing 2 (two) stainless steel eye-bolts, with washers and wing nuts permanently attached to the housing.
- 6.4.4 The washers and wing nuts on the eye bolts shall be retained on the eye bolt and shall not be able to become detached from the eyebolt itself.

7. IDENTIFICATION:

- 7.1. Each ESFVSH shall be marked with the manufacturer's name.
- 7.2 Each ESFVSH LED module shall be identified by a manufacturer's serial number for warranty purposes.

8. WARRANTY:

- 8.1** Manufacturer shall warrant the ESFVSH, to be free from defects in material and workmanship for a minimum of 7 (Seven) years from date of shipment from the manufacturer.
- 8.2** Warranty shall cover repair or replacement of defective parts only, and shall be at the discretion of the manufacturer.
- 8.3** Modifications of or additional electronics added to the Signal, without being certified by the signal manufacturer, shall void the warranty as stated herein.

9. UPGRADEABILITY

- 9.1.** The ESFVSH signal housing shall incorporate modularity features to facilitate electrical/sensor upgrades at a later date.