



High Water Intelligent Warning System
BlinkerSign[®], Solar Charged Battery,
Fiberoptic Activated Three Pole System

Specification Guide



Ver 1.0, May 9, 2018

Primary Function:

The primary function of the TAPCO High Water Detecting Intelligent Warning System (IWS) is to provide a highly visible, enhanced warning to alert road users from both traffic directions that high water is present on the roadway ahead.

Description of Components:

The Manufacturer shall provide components for two solar charged, battery powered Advance Warning BlinkerSigns® mounted on poles facing each traffic approach to a section of road that is being monitored by a fiber optic high water sensor in the flood prone area. When high water is detected, the BlinkerSigns are triggered wirelessly from the sensor activation cabinet. Components include:

BlinkerSigns, Solar Panels, BlinkerSign Control Cabinets containing Flash Controllers with integrated Wireless Transceivers, Solar Charge Controllers and Batteries, Pole or Curb Mount Water Sensor, Activation Control Cabinet containing Photoelectric Sensor, Flash Controller with Wireless Transceiver, Solar Charge Controller and battery. Mounting Hardware is included for pole mounting all components. Optional Static Signage and Pole Packages provided as needed to meet requirements.

The High Water IWS shall consist of three pole assemblies. Two pole assemblies shall each have the Warning BlinkerSigns, Solar Panels and BlinkerSign Control Cabinets. The third pole assembly shall have the high water sensor along with its Activation Control Cabinet and Solar Panel.

Active vehicle warning indications shall be visible in a direct line of sight at distances over 1000 feet during the day, and over 1 mile at night.

General Requirements:

The BlinkerSign® Manufacturer shall have a minimum of ten years of relevant intelligent traffic product manufacturing experience, as well as a minimum of three years of BlinkerSign manufacturing experience.

Specific Functional and Electrical Hardware Requirements:

System

- Each High Water Warning System shall consist of the following:
 - Two Warning BlinkerSigns® Assemblies
 - Two BlinkerSign Control Cabinets, each with Solar Charge Controller, Battery, Flash Controller and integrated Wireless transceiver
 - One Pole or Curb mounted High Water Sensor
 - One Activation Control Cabinet with Solar Charge Controller, Battery, Photoelectric Sensor, Flash Controller and integrated Wireless transceiver
 - Three Solar Panels
- When water reaches a preset level above the ground surface, the High Water sensor shall trigger the activation controller to, in turn, wirelessly activate the remote Warning BlinkerSigns simultaneously. BlinkerSigns shall flash synchronously and then cease operation after the water has receded.

Activation and BlinkerSign Control Cabinets

- Shall be NEMA 3R Type
- Shall be 15.0" tall x 12.5" wide x 9.9" deep and constructed of minimum 0.080" thick aluminum.
- To promote airflow for internal components, the cabinet shall be vented with screening included on all vents and drains to prevent insects and other foreign matter from entering.
- For security, the cabinet must include at least two tamper-resistant stainless steel hinges and a replaceable #2 traffic lock with keys.
- To facilitate maintenance or repairs, the cabinet shall include a removable control panel to which all control circuit components either mount or connect.
- For easy installation on a wide range of pole sizes and types, the cabinet shall utilize four 5/16"-18 stainless steel mounting studs that mate to a range of bracket options. To ensure a secure mount to the supporting post, two banding style brackets that fit poles with a 2-3/8" or larger diameter shall be included as standard equipment. Mounting brackets also available for square pole, wooden post, and wall mount applications.
- To prevent corrosion, all materials used in the construction or mounting of the control cabinet shall be either aluminum or stainless steel. Anti-vandal mounting hardware shall be available as an option.
- A UV resistant label shall be applied to the exterior of the cabinet and include system specific information including model number, serial number, date of manufacture, as well as any applicable regulatory compliance information.

BlinkerSign® Flash Controllers

The BlinkerSign Programmable Flash Controller is housed within the NEMA 3R type Control Cabinet, and shall:

- Include integrated constant-current LED drivers with a minimum of two-channel output for driving one or two BlinkerSign units.
- Flash the BlinkerSign LEDs 50 to 60 flashes per minute.
- Have multiple programmable function options:
 - Run 24 hours per day, 7 days per week
 - Run from dusk to dawn
 - Run for a programmable time period when activated via switch, button contact closure or when triggered from an external sensor such as a wireless transmitter, radar, presence detector or loop detector with a compatible sensor output.
 - Run on a timeclock schedule that is programmed to the controller and determines days of the week and times of the day that the sign flashes.
- Provide multiple levels of BlinkerSign LED brightness through LED drive current control
- If specified, automatically adjust the BlinkerSign LED drive current control to optimize brightness for the ambient lighting conditions.
- If specified, automatically adjust the BlinkerSign LED duty cycle to save battery during nighttime operation.
- Have the BlinkerSign LED drive outputs reach the full output current as programmed within the duration of the 100ms on-time.
- Include an integrated Real Time Clock (RTC) with on-board battery backup.
- Have the capability of RS232 communication for programming with Windows-based software.
- Include a minimum of two General Purpose Inputs and Outputs (GPIO).
- Seamlessly integrate with the 900 MHz FHSS wireless transceiver to form a network of connected devices.
- Be internally housed in its own IP67 type enclosure.
- Be independently replaceable of other control panel components
- Be able to monitor internal temperature.
- Operate between the temperatures of -40° to +176°F (-40° to +80°C).

900 MHz FHSS Wireless Transceiver

- Shall be housed inside the IP67 rated Flash Controller Cabinet
- Shall seamlessly integrate with any of the system controllers to ensure sequential activation of other radio-equipped devices in the system
- Shall include an integrated LCD and two user-interface buttons for setup and troubleshooting, including readouts of flash duration (timeout), battery conditions, and LED testing functionality
- Shall include two LED indicators for status and troubleshooting
- Shall be capable of operating as a Transmitter or Receiver
- Shall be capable of providing site-survey data for verification of signal strength between network devices

- Shall include network-wide modification of sign controller settings and output durations, using programmability from any networked transceiver without the use of additional equipment or software
- Shall synchronize the system components to activate the indications within 120msec of one other and remain synchronized throughout the duration of the flash (timeout) cycle.
- Shall have an antenna connector for easily connecting to multiple antenna options
- Shall operate on the license-free ISM band
- Shall comply with part 15 of FCC rules
- Shall operate from 3.3VDC to 15VDC
- Shall be, in the unlikely event of failure, replaceable independently of other components.

Solar Charge Controller

The Solar Charge Controller in each of the three control cabinets shall:

- Utilize an intelligent 4-stage algorithm and Pulse Width Modulation (PWM) for battery charging
- Automatically provide Low Voltage Disconnect (LVD) to protect batteries when needed
- Automatically provide Load-Reconnection once battery levels have been restored to an acceptable value
- Supply 12VDC power 24 hours a day, 7 days a week
- Protect against and automatically recover from: short circuit, overload, reverse polarity, high temperature, lightning and transient surge, as well as voltage spikes
- Be independently replaceable of other control panel components
- Operate from -40° to +140°F (-40° to +60°C)

Battery Power

- The BlinkerSign and Activation Control Cabinets shall each contain a valve regulated, Gel type battery with a nominal output voltage of 12VDC and a capacity of 48Ah at a C/100 discharge rate
- Shall be sealed and spill proof
- Shall have terminals that accept screw or bolts for secure wiring connections.
- Shall be replaceable independently of other components.
- Shall be fused for short circuit protection

Solar Panel

The solar panel provided for each of the three poles shall:

- Be IEC61215, TUV, and UL 1703 certified.
- Operate at 12VDC nominal
- Include an IP65 rated junction box with terminals sized for 8-16AWG wire.
- Be constructed of an anodized aluminum frame, high-transmission 1/8" tempered glass, with silicon cells encapsulated in double-layer EVA, and with a white polymer backing.
- Be affixed to an aluminum plate and bracket, adjustable at an angle of 45°- 60° to facilitate adjustment for maximum solar collection to optimize battery charging.

- Be attached to a panel, plate and bracket to facilitate mounting and adjustment for maximum solar collection and optimal battery strength.
- Operate from -40° to +194°F (-40° to +90°C)
- Include mounting bracket and hardware for mounting to the support pole.
- Have a maximum output rating of 55W
- Have an overall size of 26" x 25"
- Have a maximum power voltage 18.2V
- Have a maximum power current 3.1A
- Have a short circuit current 3.31A
- Have an open circuit voltage 22.1V

BlinkerSign® LED Signs

- All signs shall conform to 2009 Federal Highway Administration's MUTCD section 2A.07 on retro reflectivity and illumination.
- Each sign shall have eight quantity Day-Viz® Daylight-Visible, high power 1 watt LEDs.
- Each sign blank material shall be a minimum of 0.080" thick aluminum and sized to meet the requirements.
- Each sign face shall consist of 3M™ Diamond Grade™ DG3 reflective fluorescent yellow sheeting, as required.
- Sign sheeting shall be applied to the sign blank with a 3M™ 1160 Premium Protective Overlay film to provide an additional layer of graffiti protection.
- The BlinkerSign legend shall be a MUTCD approved unless specified otherwise.
- The LEDs shall be embedded individually into 1" diameter holes around the perimeter of the sign and shall be ultrasonically welded to the sign assembly to provide maximum strength and rigidity.
- LED color shall be amber.
- Each LED shall be sealed within a 7/8" diameter, heat-dissipating plastic enclosure to provide resistance to weather and vibration.
- LEDs shall be wired in parallel electrically so that remaining LEDs continue to flash in the unlikely event of the failure of any individual LED.
- Wiring between BlinkerSign® LEDs shall be encapsulated inside 1" x 3/8" aluminum extrusions secured to the back of each sign assembly, to provide weather resistance and protection.
- Each sign shall have adequate holes for mounting to a pole or post. Optional vandal-resistant fasteners to mount the BlinkerSign® LED sign assembly to a pole or post shall be available.
- UV-resistant label(s) shall be applied to the back of each sign assembly and shall include specific information such as the manufacturer, manufacturer phone number, model number, serial number, date of manufacture and any applicable regulatory compliance information.

Photoelectric Sensor

- Shall utilize visible red LED light transmitted through fiber cable and sense the presence, or absence of water as measured by the retroreflected light.
- Shall operate from 10 to 30VDC at less than 25mA
- Shall have reverse polarity and transient voltage protection
- Shall have dual outputs for external status monitoring
- Shall be in an IP67 rated, reinforced thermoplastic polyester housing, totally encapsulated, with stainless steel enclosure screws
- Shall have sensitivity adjustment settings that are protected by a gasketed, clear acrylic cover
- Shall have a visible LED indicator for measured light signal strength
- Operate in a relative humidity of 90% at +50°C non-condensing
- Operate from -4° to +158°F (-20° to +70°C)

Pole or Curb Mounted Water Sensor

- Shall utilize the photoelectric sensor, which is installed in the Activation Control Cabinet, in combination with fiber cable pair that is brought out to the pole or curb housing for safe, isolated detection of high water
- Shall contain the fiber cable pair ends utilized to detect high water utilizing a retroreflective photoelectric sensor installed remotely in the Activation Control Cabinet
- Shall provide a protective means for routing the fiber cable pair to the water sensor housing
- Shall be provided with all necessary pole interface hardware and 15' of fiber pair
- The Pole Mounted Water Sensor provides 14" of vertical adjustment capability for tuning the fiber ends to a specific high water depth detection
- The Curb Mounted Sensor provides a fixed means of placing the fiber ends within a curb for detection of high water near the top of the curb level.
- Housing shall be manufactured utilizing stainless steel and aluminum for protection from corrosion

Warranty

The Manufacturer shall offer a three-year unconditional warranty against all defects in material and workmanship.