



TELEGRA

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ARCHITECT/ENGINEER SPECIFICATIONS

For

Prismatic Variable Message Sign Systems

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Architect/Engineer Specifications Prismatic Variable Message Sign Systems
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1. Overview

This document has been prepared for use by Architects and Engineers for the purpose of developing Prismatic Variable Message Sign System (PVMS) procurement specifications. Users may utilize information contained in this document, in whole or in part, as recommended functional and performance standards. It is assumed that users are industry professionals with a working knowledge and comprehensive understanding of PVMS products and utilization.

2. Glossary

Abbreviations used in this document are defined as follows:

DDD	Detailed Design Document
PVMS	Prismatic Variable Message Sign
EMF	Electro-Magnetic Field
FAT	Factory Acceptance Test
IP	Internet Protocol
ITS	Intelligent Transportation System
LED	Light Emitting Diode
NEMA	National Electrical Manufacturers Association
NTCIP	National Transportation Communications for ITS Protocol
PCB	Printed Circuit Board
RFC	Roadside Field Controller
VAC	Volts Alternating Current
VDC	Volts Direct Current

3. Manufacturer Qualifications

Prismatic Variable Message Sign System manufacturers shall meet the following minimum qualification criteria:

- Be a qualified manufacturer of complex technology-based hardware and software for use in the intelligent transportation industry.
- A proven track record of at least continuous ten (10) years in the manufacture of Prismatic Variable Message Sign Systems for use with advanced traffic management, intelligent transportation, electronic toll collection, highway and freeway management, transit operations, airport land-side operations, or parking facilities.
- A minimum of fifty (50) Prismatic Variable Message Sign Systems manufactured and in operation for a period of at least one (1) year utilizing National Transportation Communications ITS Protocol (NTCIP) or other communications protocols.
- Be certified by recognized international bodies including the following:

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- UL and CUL Listed
- UL48, UL1433 & UL50
- Approved for EN-12966-1, TUV, CE, ROHS, BAST and ISO 9001:2000
- Compliance with NEMA TS4, NTCIP, and ITE requirements
- EN287, ISO EN 131 (GMAW Process) and ISO EN 141 (GTAW Process)
- ANSI, IEEE, AASHTO, and AWS certification criteria
- EC60950-1, HD384.4, HD638 safety standards
- EC60529 standard for enclosure protection

4. **Documentation & Manuals**

Prismatic Variable Message Sign System manufacturers shall provide complete and comprehensive design, installation, operating and maintenance documentation proposed for use on a specific project or application as follows:

Design Documents: Detailed technical specifications, drawings, literature and documentation depicting all hardware, electronic components, parts, wiring, cables, connectors, structural components, software and procedures used in the manufacturing of Prismatic Variable Message Sign Systems.

Installation Documents: Detailed installation, handling, shipping and testing procedures for Prismatic Variable Message Sign Systems.

Operating Manuals: Detailed operating procedures for Prismatic Variable Message Sign Systems.

Maintenance Manuals: Detailed preventative maintenance, troubleshooting and repair procedures for Prismatic Variable Message Sign Systems.

5. **General Requirements**

Prismatic Variable Message Sign Systems shall be designed and manufactured based on the following general requirements:

- Ability for remote control from a traffic management center
- Ability to be integrated with any advanced traffic management system
- Ability to operate in temperature range -22°F to +185°F
- Applied digital positioning system to detect a system error and perform recovery via automatic calibration and quick positioning
- Automatic return to the default position
- Durable steel-aluminum construction with enhanced prism-bearing mechanism
- Effective use in tunnels and on open roads above traffic lanes
- Enhanced EMC immunity

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- Environmental monitoring (thermostat, hydrostat, ventilation system)
- External housing designed for harsh (extreme cold and heat) outdoor environment
- Flasher driver to activate flashing warning lights typically placed above the sign
- Flasher driver with adjustable flashing frequency
- Innovative suspension – designed for operation in high wind area
- Low cost of ownership over extended equipment lifetime
- Low cost of ownership over extended lifetime
- Low power consumption and modular design
- Measurement and monitoring of internal environmental conditions with safety alerts
- No manufacturer’s proprietary protocol applications
- Digital prism position detector to precisely detect prism position, rotation direction and the necessary speed to accurately position the sign
- Power supply 120/240 VAC, 50/60Hz
- Precise positioning of the prisms, with resolution of ± 1 degree
- Rapid change of prism position
- Robust sign design and construction
- Robust weight-bearing framework
- Simple operation and maintenance
- Three-sided prism system driven by the worm gear transmission
- Versatile connectivity options (all physical and electrical media, different protocols)

6. Communication Module Technical Data

Communication Module shall be designed and manufactured based on the following attributes:

- Communication Interface: RS485/422/232, Ethernet, GSM/GPRS, Bluetooth, wireless; SM/MM fiber, twisted Cu pairs, radio
- Communication Protocol: NTCIP, TLS, PROFIBUS, MODBUS, TCP/IP
- Indicators: LED for +5VDC indication and serial port communication indication
- Power Supply: 120/240VAC, 50-60Hz
- Technology: 8-bit controller core with communication interfaces for peripherals
- Working Temp: -22° to +185° F

7. Controller Module

Controller Module shall be designed and manufactured based on the following attributes:

- Environmental Monitoring: Temperature control system with adjustable temperature sensor switch and heater
- Error Detection: Motor over-current detection; self-recovery in case of mechanical malfunction
- Indicators: LED indicators on the front plate for prism position +5VDC motor direction

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- Manual Control Interface: Push-button on the front plate for prism position change; LED Indicators
- Technology: MOS-FET bridge for motor speed and direction control using PWM modulation
- Working Temp: -22° to +185° F

8. Sign Enclosure Construction

Sign enclosure and mechanical components shall be designed and manufactured based on the following attributes:

- Carrier: Welded steel construction (St 37-2) Prism-bearing mechanism Zinc-plated
- Exterior Finish: Housing and service doors feature electrostatic powder coating with chemical preparation using TIGER Drylac matte (based on polyester)
- Housing: Welded profile construction (AlMgSi0,5); Housing plates (AlMg2/3) enables opening of entire device; Service doors (AlMg2/3) are positioned at the top side; Surface protection: exterior quality electro statically powder coated
- Mechanism: Enhanced prism-bearing mechanism which simplifies mechanical construction and operates efficiently
- Transient Protection: Varistors, fuses, opto-couplers, suppressors, gas dischargers

9. Three-Sided Prism Data

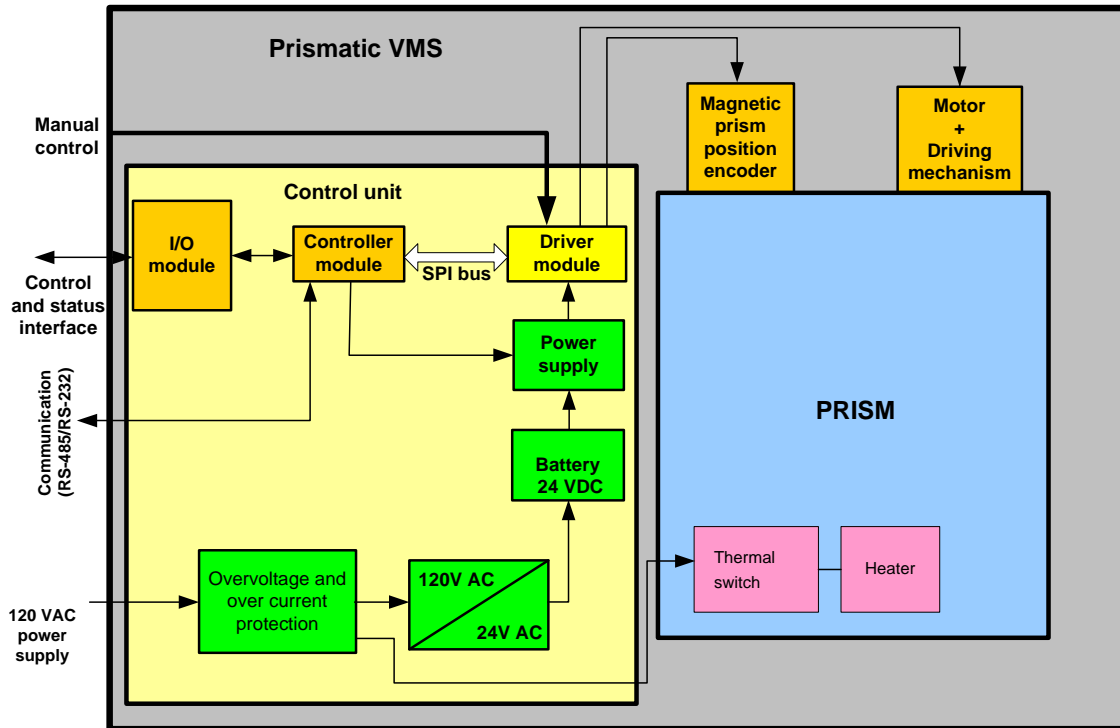
Three-sided prisms shall be designed and manufactured based on the following attributes:

- Drive: Worm gear motor DC 24V, IP 54; Manual operation available in case of emergency
- Electromagnetic Interference: Meets electromagnetic interference immunity levels defined in EN 50293:2000 standard; EN 55022: terminal disturbance voltage, class: B; EN 55022: radiated emissions, class: B; EN 55014-1: terminal disturbance voltage, discontinuous, clicks
- EN 61000-3-2 : limits for harmonic current emissions, class: A; EN 61000-3-3: limitation and voltage fluctuations and flicker low voltage supply system; EN 61000-4-2: immunity to electrostatic discharge; failure criteria: B; EN 61000-4-3: immunity to radiated electromagnetic fields; failure criteria: A; EN 61000-4-4: immunity to fast transients (burst), failure criteria: B; EN 61000-4-5: immunity to surges; failure criteria: B; EN 61000-4-6: immunity to conducted high frequency interference; failure criteria: A; EN 61000-4-11: immunity to voltage drops, short interruptions and voltage variations; HD 638 point 4.5
- Wiggle feature to assure prism movement during cold weather icing conditions
- Power Requirements: 120/240VAC, 50-60Hz – Low power consumption
- Prisms: Extruded, three-sided; standard five inches wide (other dimensions available) (AlMgSi0,5); Each prism can be replaced without dismantling the rest of the device; covered with highly reflective foil
- Sign Character Heights: Continuous graphics display using retro-reflective film
- Transmission: Worm gear transmission on drive shaft; adjustable prism bearings

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10. System Block Diagram

The following block diagram represents the logical structure of a typical Prismatic Variable Message Sign System and communications with field controller equipment:



11. EMF Compliance & Power Data

Prismatic Variable Message Sign Systems shall be designed based on the following EMF requirements:

- Compliant with EN 50293:2000: electromagnetic interference immunity levels
- Compliant with EN 55014-1: terminal disturbance voltage, discontinuous, clicks
- Compliant with EN 55022: radiated emissions, class: B
- Compliant with EN 55022: terminal disturbance voltage, class: B
- Compliant with EN 61000-3-2: limits for harmonic current emissions, class: A
- Compliant with EN 61000-3-3: voltage fluctuations and flicker low voltage supply system
- Compliant with EN 61000-4-11: voltage drop immunity, interruptions & voltage variations
- Compliant with EN 61000-4-2: immunity to electrostatic discharge, failure criteria: B
- Compliant with EN 61000-4-3: radiated electromagnetic field immunity, failure criteria: A
- Compliant with EN 61000-4-4: fast transient immunity (burst), failure criteria: B
- Compliant with EN 61000-4-5: surge immunity, failure criteria: B
- Compliant with EN 61000-4-6: high frequency interference immunity, failure criteria: A

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- EMC filter shall be connected to the power supply to filter electro-magnetic disturbances
- Over-voltage protection connected directly to the main power supply lines to conduct charge caused by lightning or any over-voltage disturbance directly to the ground
- Power Requirements 120-240VAC, 50-60Hz; low power consumption; power consumption for walk-in model signs may vary due to environmental factors
- Signal lines protected in three stages using discharge tubes, varistors & suppressor diodes
- Stabilized DC Power Supply @ 5VDC-12VDC

12. Testing & Support

The Prismatic Variable Message Sign System manufacturer shall provide comprehensive technical support during all factory acceptance testing and field acceptance testing activities, as may be designated for specific projects and applications.

13. Quality Control & Assurance

All Prismatic Variable Message Sign Systems shall be manufactured using state-of-the-art programmable manufacturing techniques and utilize quality control and assurance practices in accordance with ISO 9001-2000 requirements.

14. Warranty

All Prismatic Variable Message Sign Systems shall be furnished with a ten (10) year warranty on the enclosures and a two (2) year warranty on electronic components and services.

** End of Text **
