



Product Specifications for Type VS Voltage Sensors

1. General

- a) This specification covers the design and manufacture of voltage only sensors, which function as light weight monitoring insulators (data collection devices) capable of reproducing an in phase proportional sinusoidal voltage wave for communication with customer devices (relays, rtu's, etc.).
- b) All sensors furnished shall conform to applicable IEEE, NEMA and ANSI standards
- c) The sensor manufacturer shall furnish all parts required to perform a complete installation including the Sensor Unit(s), Output Unit, Power Source and Enclosure, Communication Cable(s).
- d) The pole or mounting structure, bus conductor, terminal connectors and grounding materials, through bolts and miscellaneous pole or structure hardware will be provided by others unless specifically identified in the RFQ.

2. Materials and Workmanship

- a) The equipment shall be new and of standard commercial, first-grade quality as to materials, workmanship, and design, in accordance with the best engineering practice, and shall be such as has been proven suitable for the intended purpose.

3. Environmental Conditions

- a) Temperature - Equipment supplied shall be adequate for an operating range of -40 degrees C to +85 degrees C.
- b) Humidity - Equipment supplied shall be operable under humidity of up to 95% at a temperature of 40 degrees C
- c) Environment - Equipment supplied shall provide reliable performance in environments with high exposure to salt, minerals, chemicals, or windborne particulate.

4. Ratings and Type

- a) Type - Sensors shall be single phase devices providing voltage sensing.
- b) Ratings - Sensors shall meet or exceed the following ratings

Rated Voltage	7.5 kV through 500 kV (line to line)
Rated Frequency	50 or 60 Hz
Rated Withstand Voltage	95kV through 1470kV BIL
Rated Accuracy	+/- 1% (non-condensing)

5. Sensor Unit Design and Construction

- a) Sensor Units shall be light weight in design. Maximum weight of Sensor Unit shall not exceed 175 lbs for any BIL rating.
- b) Sensor Units shall be capable of mounting or installation in any orientation including vertical (upright), horizontal (cantilever) and underhung.
- c) Silicone polymer station post insulators shall be used for bushings; porcelain is not acceptable.



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- d) Voltage sensing shall be accomplished through an induction process, which will accurately reproduce an in phase proportional sinusoidal voltage wave.
 - 1) Voltage sensing mechanism shall provide 40+ times over sampling of primary frequency per cycle
 - 2) Voltage sensing mechanism shall provide safe, low voltage outputs
 - 3) Voltage sensing mechanism shall incorporate significant over-voltage and lightning protection
- e) Devices that employ dielectrics such as SF6 or oil that are flammable, explosive, or require special material handling or disposal procedures are not acceptable.
- f) Disconnection of communication cable shall not result in catastrophic failure of the sensor, cause damage to any equipment or impose a safety hazard.
- g) Sensor Units shall be provided with a single NEMA 2 hole aluminum terminal pad. Terminal pad to be tin dipped for connection to copper conductor when specified by the customer.
- h) Sensor Units shall have digital outputs allowing communication up to 4,000 feet

6. Output Unit

- a) Voltage Output Signal Formats - The Output Unit shall be provided with one of the following voltage output signal formats:
 - 1) 0-115 or 0-67 VAC (standard)
 - 2) 0-10 VAC (optional)
 - 3) Standard VA shall be 1.44; optional 15 and 25 VA shall be available for both the 0-115 and 0-67 VAC formats
- b) Voltage pots (potentiometers) shall be provided to permit customer field adjustment of the voltage output signals.
- c) Two selectable form A or form B contacts shall be included to provide positive indication of a sensor malfunction; one contact will provide remote indication of the sensor malfunction while the other contact will be used to disable an associated local device (motor operator, relay, etc.).

7. Enclosure and Power Source

- a) The Output Unit shall be capable of operating with any one of the following power sources: 24, 48, or 125 VDC or 120 VAC.
 - 1) When 120 VAC is to be used as the primary service, an optional 24 VDC power source with battery backup shall be available from the manufacturer. The battery backup will provide continuing operation of the sensor in the event of loss of 120 VAC.
 - 2) For geographically remote applications, an optional solar power source with battery backup shall be available from the manufacturer.
- b) Enclosures are to be provided for all installations where the equipment will be subjected to the elements.
 - 1) The enclosure shall be sized to accommodate the Output Unit and other associated equipment as specified by the customer to complete each application.
 - 2) An optional mounting bracket or structure for mounting of the enclosure shall be provided by the manufacturer when requested.



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8. Communication Cable

- a) Communication cable shall be provided for each Sensor Unit and will be specified up to a maximum length of 4,000 feet.
- b) Cable length shall have no effect on the analog output in terms of accuracy or output power.
- d) Cable shall have a UV resistant black PVC jacket suitable for outdoor exposed applications. Cable to be suitable for direct burial.
- e) Cable shall have MS style connectors at both ends to allow quick and easy connection to both the Sensor and Output Unit devices.