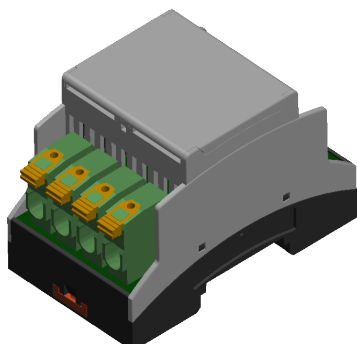


Entube QE

Three Phase plus Neutral
Voltage Sensor



OVERVIEW

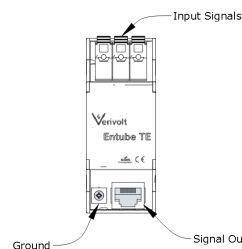
The Entube-QE series is designed for high quality three-phase plus Neutral measurements in a very compact form factor without need for power supplies. This series covers the ranges of $\pm 100V$, $\pm 200V$, $\pm 300V$, $\pm 400V$, $\pm 500V$, $\pm 750V$ and $\pm 1000V$, with up to 85kHz bandwidth and 0.2% accuracy. The Entube-QE sensor operates as a differential divider network with an anti-aliasing filter on its output. It generates a $\pm 5V$ or $\pm 10V$ scaled down version of the line-to-line or line-to-neutral voltage on its input terminals. Depending on the software configuration, the sensor outputs phase-to-phase voltages for Delta configuration, or phase-to-neutral for Wye configurations. This signal can then be processed by most computer based measurement platforms. One Entube-QE replaces 4 differential sensors, and only requires one cable for all four signals. This allows for very high channel densities, while delivering high performance for a low cost.

SPECIFICATION

| Entube TE | 100V | 200V | 300V | 400V | 500V | 750V | 1000V |
|--|----------------|--------------|----------------|---------------|---------------|----------------|---------------|
| Bandwidth (-3dB point) | 85kHz | | 50kHz | | | 25kHz | |
| Integrated sensor noise (Referenced to input) | < 30 μV | < 60 μV | < 100 μV | < 130 μV | < 170 μV | < 220 μV | < 290 μV |
| Gain (Using 10V standard output voltage) | 10 | 20 | 30 | 40 | 50 | 75 | 100 |
| Input Impedance | > 1 M Ω | | > 2 M Ω | | | > 3 M Ω | |
| Line Output Impedance | 50k Ω | 25k Ω | 33k Ω | 25k Ω | 20k Ω | 20k Ω | 15k Ω |

HARDWARE DESCRIPTION

The Entube-TE is a differential voltage down-converter designed for 3-phase systems. It outputs all line-to-line and line-to-ground signal pairs. Delta or Wye measurements can be made depending on the input configuration of the digitizer being used (NRSE or Differential).



Signal Layout

The four inputs (3 phases + neutral) connect to the sensor via a Spring-cage, while the conditioned signals from the sensor come out on a standard Ethernet jack. The Entube-QE can be mounted anywhere between the signal source and the data acquisition system. A female-screw on the low voltage side of the sensor allows for DIN rail mounting, and serves as a safety ground.

A standard Ethernet cable is used to carry the conditioned signals from the sensor. The orange, brown and blue pairs carry phase voltages; the green connects to ground and DAQ reference. To avoid limiting the signal bandwidth and to eliminate cross-talk between pairs, a shielded STP Ethernet cable with a maximum length of 100m (330') should be used. This will keep good resolution beyond the 10th harmonic on a typical 60Hz system

Electrical

Accuracy (percentage of reading) $\pm 0.2\%$
($\pm 0.1\%$ Typical)

Gain (Using 10V standard output voltage)

Max total phase shift at 60Hz < 0.05°

Common mode rejection $\pm 2000V$

Withstanding differential mode surge voltage $\pm 1000V$

Mechanical

Mounting Type DIN Rail

Connectivity (Connector for power in and signal out to/from the sensor) RJ45 Ethernet jack

Outer Dimensions 1.4" x 1.4" x 4.5"

Weight 198 g (7.0 oz)

Integrated sensor noise (Referenced to input)

Input-Output non-linearity < 250 ppm

Output voltage $\pm 10V$, $\pm 5V$

Gain temperature drift ± 50 ppm/°C

Differential input dynamic range

Common mode rejection 52 dB

Power Supply Voltage None

Output type Single-ended signal

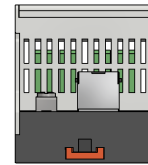
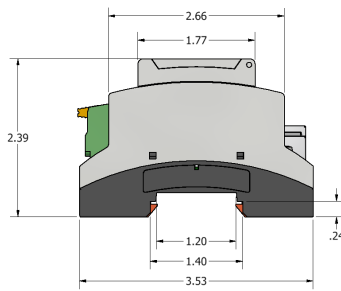
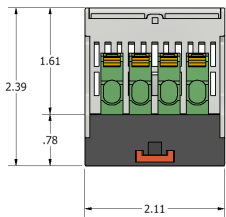
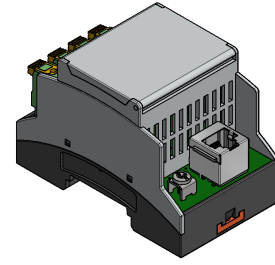
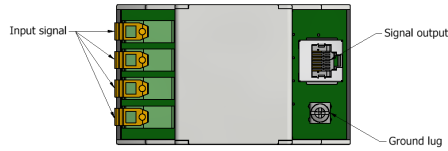
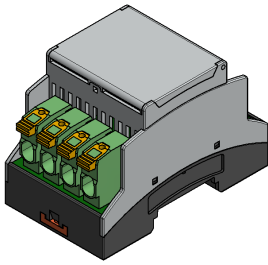
Output Offset Voltage < $\pm 10\mu V$
(on $\pm 10V$ signal)

Environmental

Operating temperature - 25 to 70 °C

Storage temperature - 40 to 80 °C

MERCHICAL DIMENSIONS

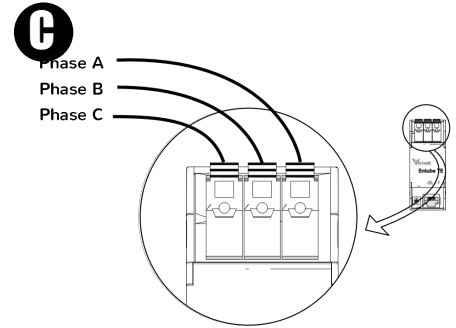
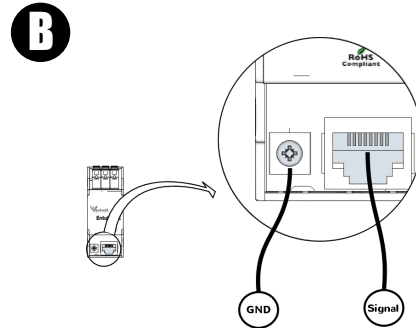
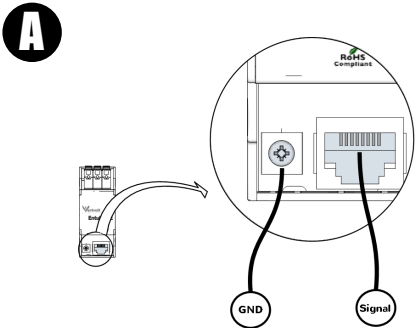


HARDWARE CONFIGURATION

A. Safely connect Data Acquisition ground to ground of sensor.

B. Securely connect one end of a RJ45 to the output terminals, and the other end to the inputs of your break-out board or data acquisition unit

C. Securely connect wire between the source of measurement and an available Entube TE's input screw terminal.



Standards and Certifications

- CE



⚠ DANGER

THIS SENSOR IS NOT A SAFETY DEVICE AND IS NOT INTENDED TO BE USED AS A SAFETY DEVICE. This sensor is designed only to detect and read certain data in an electronic manner and perform no use apart from that, specifically no safety-related use. This sensor product does not include self-checking redundant circuitry, and the failure of this sensor product could cause either an energized or de-energized output condition, which could result in death, serious bodily injury, or property damage.