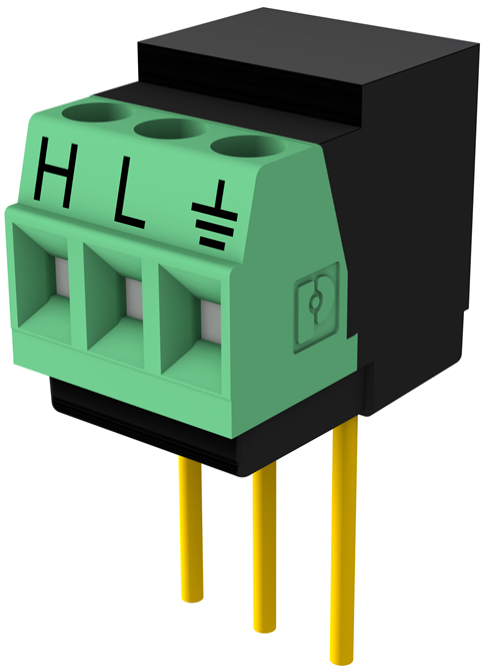
Product Manual

Measurement & Control Peripheral

VDIV10:1 and VDIV2:1

Voltage Divider Terminal Input Modules



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RELIABLE SINCE 1974 MONITORING

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1. Function

Voltage dividers are a type of terminal input module that reduce voltage to a fraction of the original voltage. Reducing voltage output is necessary if an expected output is greater than the maximum range a data logger can measure.

The VDIV10:1 and VDIV2:1 are compatible with GRANITE 6, VOLT 108, VOLT 116, CR6, CR3000, CR1000X, CR800-series, and CR300-series data loggers. Each voltage divider module may be used to measure one differential voltage or two single-ended voltages.

As the VDIV10:1 is a 10:1 voltage divider, the output voltage is one-tenth the input voltage. This allows a maximum of ±50 volts to be measured on data loggers with a ±5000 mV range (GRANITE 6, VOLT 108, VOLT 116, CR6, CR3000, CR1000X, and CR800-series data loggers). The VDIV2:1 is a 2:1 voltage divider, allowing a maximum of ±10 volts to be measured on data loggers with a ±5000 mV range.

The CR300-series data loggers have an input range of –100 to +2500 mV. This allows a maximum of 25 volts to be measured with the VDIV10:1, or 5 volts with the VDIV2:1.

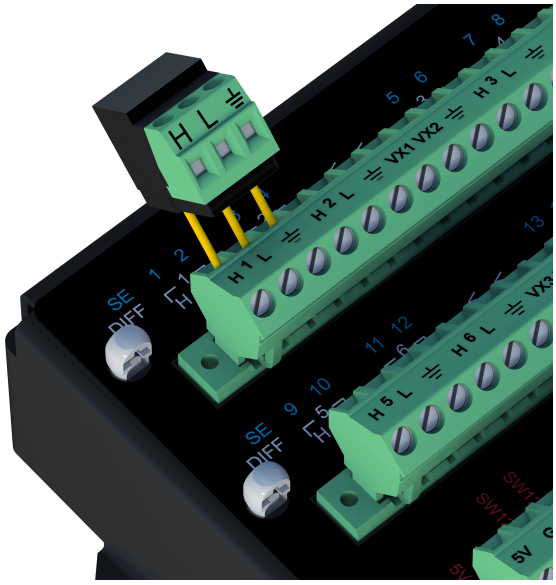

FIGURE 1-1. Terminal input module

2. Specifications

2.1 VDIV10:1

10:1 resistive divider

Resistors:	90 kW/10 kW
Ratio tolerance @ 25 °C:	±0.02%
Ratio temperature coefficient:	2 ppm/°C
Power rating:	0.1 W per element (@ 70 °C)
Maximum input voltage:	50 volts

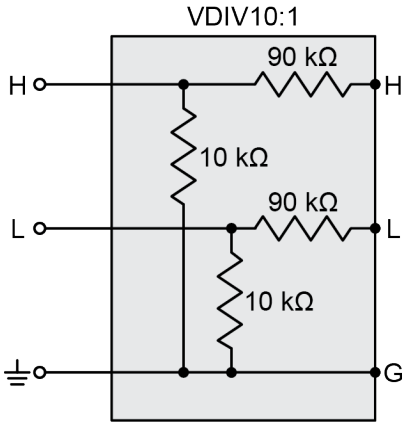

FIGURE 2-1. VDIV10:1 schematic

2.2 VDIV2:1

2:1 resistive divider

Resistors:	10 kW/10 kW
Ratio tolerance @ 25 °C:	±0.02%
Ratio temperature coefficient:	2 ppm/°C
Power rating:	0.1 W per element (@ 70 °C)

Maximum input voltage: 10 volts

Compliance: View the EU Declaration of Conformity at https://s.campbellsci.com/documents/us/compliance/eudoc_terminal-input-modules.pdf

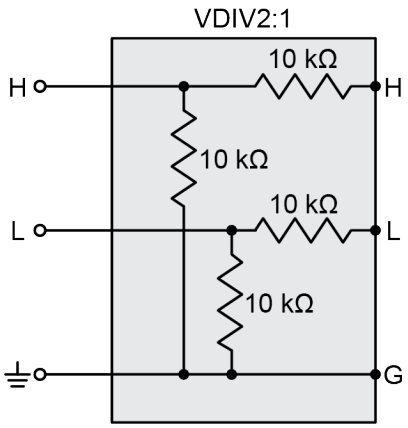

FIGURE 2-2. VDIV2:1 schematic

3. Wiring

Each voltage divider module may be used to measure one differential voltage (FIGURE 3-1 (p. 4)) or two single-ended voltages (FIGURE 3-2 (p. 4)).

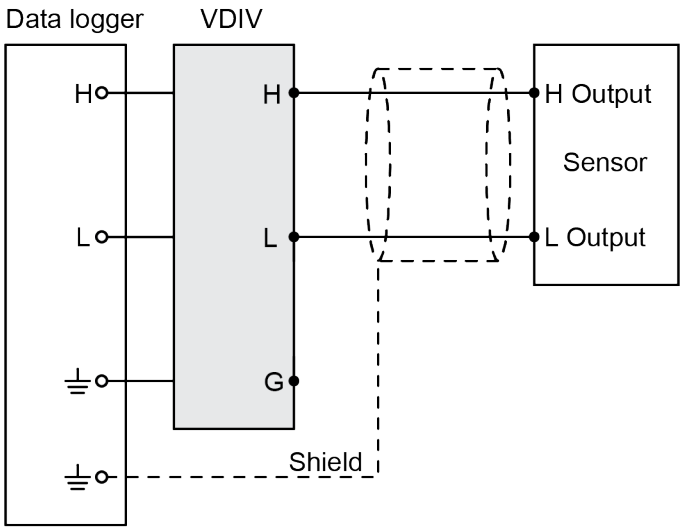

FIGURE 3-1. Wiring for differential voltage measurement

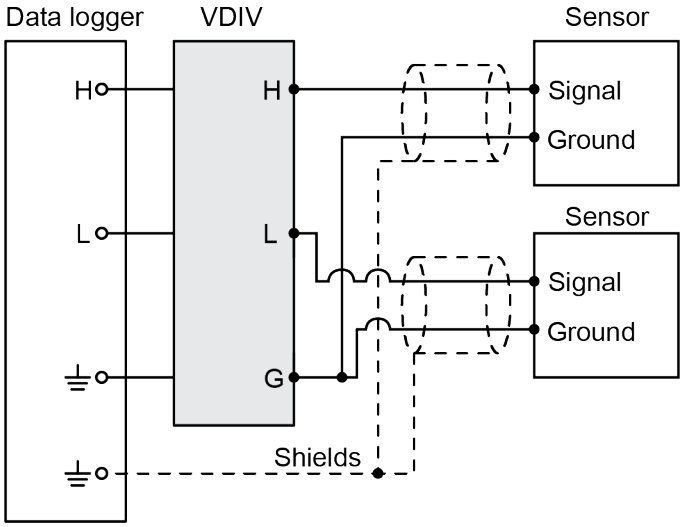

FIGURE 3-2. Wiring for single-ended voltage measurements

Table 3-1: Data logger wiring

Function	VDIV	CR3000, CR1000X, CR800 series, CR300 series	GRANITE 6, CR6
Output high	H	H	U (odd)
Output low	L	L	U (even)
Ground	⏚	⏚	⏚

4. Programming

The output of the voltage divider is measured with the appropriate voltage measurement instruction. A differential input is measured with the `VoltDiff()` instruction. A single-ended input is measured with the `VoltSE()` instruction. Select the smallest input voltage range that will accommodate the maximum expected output. Using the smallest possible range provides the best measurement resolution.

The following is a typical voltage divider measurement using the `VoltDiff()` instruction for the CR1000X data logger. In this example, the instruction can safely measure a voltage of up to 50 VDC using the mV5000 input range and the VDIV10:1.

```
VoltDiff(DiffVolt,1,mV5000,1,True,500,60,.01,0)
```

4.1 Example

A downloadable example program is available at www.campbellsci.com/downloads/vdiv-example-program. The program is written for the CR1000X. Other data loggers will be very similar.

The example uses the `VoltDiff()` instruction to measure the voltage of a 12 volt battery system that may actually experience voltages in excess of 14 volts. Using the VDIV10:1 10:1 voltage divider, the 14 volt output will be divided to 14/10 = 1.4 volts, or 1400 mV. Thus the voltage range on which to make the measurement is the ±5000 mV range on the GRANITE 6, VOLT 108, VOLT 116, CR6, CR3000, and CR1000X, or the ±2500 mV range on the CR800 series and CR300 series.

The multiplier to use with the voltage measurement must take into account the divisor, the calibration of the sensor, and the units desired for the result. In the example, voltage is divided by 10 and read by the data logger as millivolts (i.e., $(V/10) \times 10^3 = V \times 10^2$). To output directly in volts, use a multiplier of 0.01.

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Safety

DANGER — MANY HAZARDS ARE ASSOCIATED WITH INSTALLING, USING, MAINTAINING, AND WORKING ON OR AROUND **TRIPODS, TOWERS, AND ANY ATTACHMENTS TO TRIPODS AND TOWERS SUCH AS SENSORS, CROSSARMS, ENCLOSURES, ANTENNAS, ETC.** FAILURE TO PROPERLY AND COMPLETELY ASSEMBLE, INSTALL, OPERATE, USE, AND MAINTAIN TRIPODS, TOWERS, AND ATTACHMENTS, AND FAILURE TO HEED WARNINGS, INCREASES THE RISK OF DEATH, ACCIDENT, SERIOUS INJURY, PROPERTY DAMAGE, AND PRODUCT FAILURE. TAKE ALL REASONABLE PRECAUTIONS TO AVOID THESE HAZARDS. CHECK WITH YOUR ORGANIZATION'S SAFETY COORDINATOR (OR POLICY) FOR PROCEDURES AND REQUIRED PROTECTIVE EQUIPMENT PRIOR TO PERFORMING ANY WORK.

Use tripods, towers, and attachments to tripods and towers only for purposes for which they are designed. Do not exceed design limits. Be familiar and comply with all instructions provided in product manuals. Manuals are available at www.campbellsci.com. You are responsible for conformance with governing codes and regulations, including safety regulations, and the integrity and location of structures or land to which towers, tripods, and any attachments are attached. Installation sites should be evaluated and approved by a qualified engineer. If questions or concerns arise regarding installation, use, or maintenance of tripods, towers, attachments, or electrical connections, consult with a licensed and qualified engineer or electrician.

General

- Protect from over-voltage.
- Protect electrical equipment from water.
- Protect from electrostatic discharge (ESD).
- Protect from lightning.
- Prior to performing site or installation work, obtain required approvals and permits. Comply with all governing structure-height regulations.
- Use only qualified personnel for installation, use, and maintenance of tripods and towers, and any attachments to tripods and towers. The use of licensed and qualified contractors is highly recommended.
- Read all applicable instructions carefully and understand procedures thoroughly before beginning work.
- Wear a **hardhat** and **eye protection**, and take **other appropriate safety precautions** while working on or around tripods and towers.
- **Do not climb** tripods or towers at any time, and prohibit climbing by other persons. Take reasonable precautions to secure tripod and tower sites from trespassers.
- Use only manufacturer recommended parts, materials, and tools.

Utility and Electrical

- **You can be killed** or sustain serious bodily injury if the tripod, tower, or attachments you are installing, constructing, using, or maintaining, or a tool, stake, or anchor, come in **contact with overhead or underground utility lines**.
- Maintain a distance of at least one-and-one-half times structure height, 6 meters (20 feet), or the distance required by applicable law, **whichever is greater**, between overhead utility lines and the structure (tripod, tower, attachments, or tools).
- Prior to performing site or installation work, inform all utility companies and have all underground utilities marked.
- Comply with all electrical codes. Electrical equipment and related grounding devices should be installed by a licensed and qualified electrician.
- Only use power sources approved for use in the country of installation to power Campbell Scientific devices.

Elevated Work and Weather

- Exercise extreme caution when performing elevated work.
- Use appropriate equipment and safety practices.
- During installation and maintenance, keep tower and tripod sites clear of un-trained or non-essential personnel. Take precautions to prevent elevated tools and objects from dropping.
- Do not perform any work in inclement weather, including wind, rain, snow, lightning, etc.

Maintenance

- Periodically (at least yearly) check for wear and damage, including corrosion, stress cracks, frayed cables, loose cable clamps, cable tightness, etc. and take necessary corrective actions.
- Periodically (at least yearly) check electrical ground connections.

Internal Battery

- Be aware of fire, explosion, and severe-burn hazards.
- Misuse or improper installation of the internal lithium battery can cause severe injury.
- Do not recharge, disassemble, heat above 100 °C (212 °F), solder directly to the cell, incinerate, or expose contents to water. Dispose of spent batteries properly.

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