# Relay Multiplexer
Model AM16/32A

The AM16/32A Multiplexer increases the number of sensors that can be measured by a CR800, CR850, CR10X, CR1000, CR3000, CR5000, or CR7 datalogger. The AM16/32A sequentially multiplexes 16 groups of four lines (a total of 64 lines) through four common (COM) terminals. A manual switch setting allows it to multiplex 32 groups of two lines (also a total of 64 lines) through two COM terminals. Compatible sensors include thermistors, potentiometers, load cells, strain gages, vibrating wires, water content reflectometers, and gypsum soil moisture blocks. The AM16/32A not only increases system channel capacity, it also reduces the cost of cabling individual sensors on long wire runs. The maximum distance between the datalogger and the AM16/32A is determined by the sensors used, the datalogger's scan rate, and the cable used in the application.

The AM16/32A has better ESD and surge protection than its predecessor, the AM16/32. All of the inputs of the AM16/32A are protected with gas tubes and the AM16/32A has a ground lug.
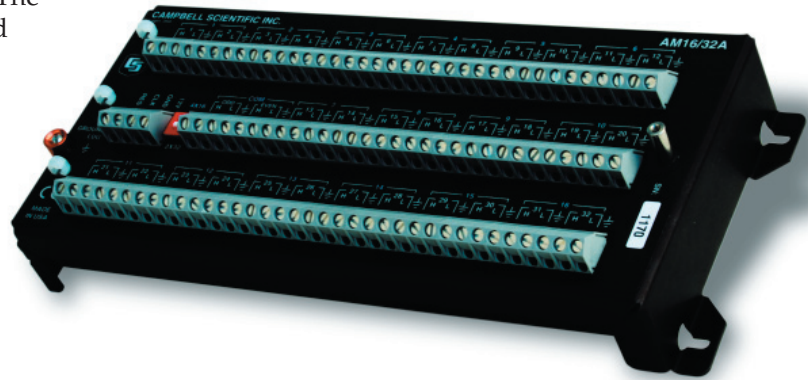
Maximum Number of Sensor Connections

The maximum number of sensors multiplexed through one AM16/32A depends on the type(s) of sensors measured. For example, assuming identical sensors, the AM16/32A can multiplex:

- Up to 32 single-ended or differential sensors that require two wires (e.g., thermistors, half bridges)

- Up to 16 single-ended or differential sensors that require four wires (e.g., full bridges, four-wire half bridges)

- Up to 48 half-bridge measurements (assumes common excitation and completion resistors at the datalogger)

- Up to 48 CS616 Water Content Reflectometers (assumes common excitation)

- Up to 32 vibrating wire sensors (16 with temperature) in conjunction with a CR800, CR850, CR10X, CR1000, or CR3000 and AVW1, AVW4, or AVW100 Vibrating Wire Sensor Interface

- Up to 32 gypsum soil moisture blocks (model 223 or 253). The AM16/32A eliminates the requirement for dc blocking capacitors, significantly reducing sensor cost

Datalogger programs written for the AM416, AM32, or AM16/32 multiplexers will work with the AM16/32A. Short Cut version 1.1 or higher (available free of charge from our Web site) supports simple programs and generates wiring diagrams for AM16/32A applications. Mixing sensor types may require special considerations. Contact Campbell Scientific for assistance.

Datalogger Connections

When used in 4 x 16 mode, a four-conductor cable (with shield) connects the measurement/excitation channels of the datalogger with the COM terminals of the multiplexer. When used in 2 x 32 mode, a two-conductor cable (with shield) is required. Campbell Scientific offers the MUXSIGNAL-L cable that supports use in either mode.

A four-conductor cable (with shield) supplies power and control signals from the datalogger to the AM16/32A. The AM16/32A requires one datalogger control port for enable (reset terminal), and a second control port to advance through the channels (clock terminal). Either the datalogger's power supply or a separate 12 V supply is used to power the multiplexer. Campbell Scientific offers the MUXPOWER-L cable to connect the AM16/32A to the datalogger's power terminals and control ports.

Scanning Multiple AM16/32As

Several AM16/32As may be connected to the same datalogger depending on the number of control ports and analog inputs available. For example, some customers have connected six multiplexers to one datalogger. This assumes adequate analog inputs, plus eight control ports, two for clock lines and six for enable lines, are available.

Environmental Enclosures

The AM16/32A operates in most field conditions but requires a non-condensing environment. A weather-resistant enclosure equipped with desiccant is required for field use. The ENC10/12 is the enclosure of choice for multiplexers housed at a distance from the datalogger.

If the AM16/32A is to be housed in the datalogger's enclosure, one AM16/32A, a CR800, CR850, CR1000, CR3000, or CR10X datalogger, and a PS100 power supply will fit in an ENC12/14. For convenience in wiring, a larger enclosure (e.g., ENC16/18) is recommended.

Specifications

Electrical

- Power: 9.6 to 16 Vdc (under load), unregulated

- Current drain: <210 µA quiescent; 6 mA active (typical)

- Reset levels: <0.9 V inactive; 3.5 to 16 V active

- Clock levels: Scan advance occurs on the leading edge of the clock pulse transition (from below 1.5 V to above 3.5 V)

- Minimum clock pulse width: 1 ms

- Maximum actuation time for relay: 20 ms

- Relay operation: break before make

- Initial relay resistance, closed: 0.1 Ohm

- Maximum switching current: 500 mA. Switching currents greater than 30 mA (occasional 50 mA acceptable) degrade the suitability of that channel for switching low-voltage signals.

- Minimum contact life: 10^7 closures

- CE Compliance:
  EN 61326: 1998
  EN 55022: 1998 Class B

- ESD
  Air Discharge: Complies with IEC61000-4-2, test level 4 (±15 kV)
  Contact Discharge: Complies with IEC61000-4-2, test level 4 (±8 kV)

- Surge: Complies with IEC61000-4-5, test level 3 (±2 kV, 2 ohms coupling impedance)

Mounting

- Enclosure to pipe: 1.25" IPS pipe (1.660" OD) 3.175 cm (4.22 cm OD)

- AM16/32A in enclosure: compatible with 1" on center hole grid (see foot print below)
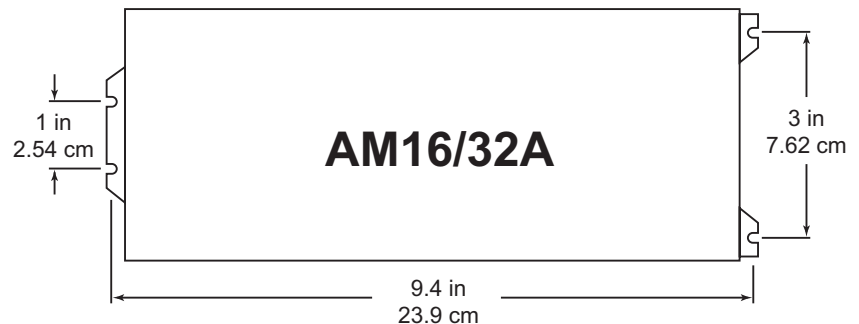
Physical

- Operating temperature: -25° to +50°C (standard) -55° to +85°C (extended)

- Operating humidity: 0 to 95%, non-condensing

- Size: 4.0"W x 9.4"L x 1.8"D (10.2 x 23.9 x 4.6 cm) Weight/shipping: 1.5 lbs/6.0 lbs (0.7 kg/2.7 kg)

If you have questions concerning the use of the AM16/32A in your application, please call Campbell Scientific at (435) 753-2342.