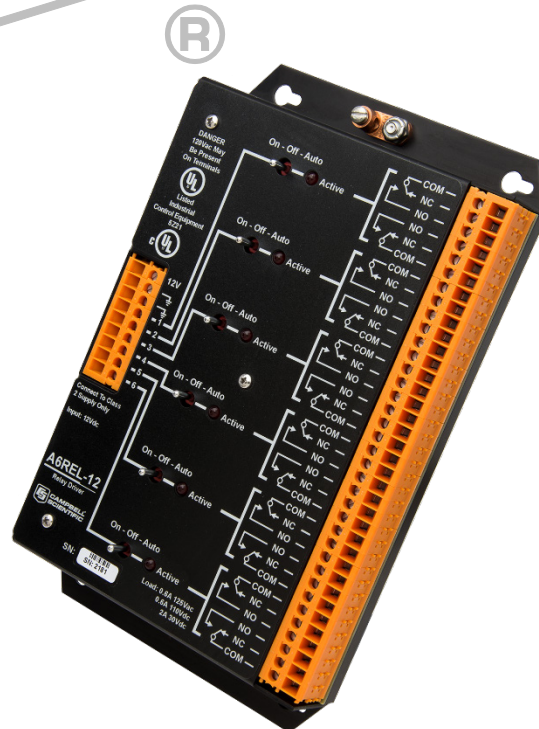


# INSTRUCTION MANUAL



## A6REL-12 Relay Driver

Revision: 4/17



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# Guarantee

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This equipment is guaranteed against defects in materials and workmanship. We will repair or replace products which prove to be defective during the guarantee period as detailed on your invoice, provided they are returned to us prepaid. The guarantee will not apply to:

- Equipment which has been modified or altered in any way without the written permission of Campbell Scientific
- Batteries
- Any product which has been subjected to misuse, neglect, acts of God or damage in transit.

Campbell Scientific will return guaranteed equipment by surface carrier prepaid. Campbell Scientific will not reimburse the claimant for costs incurred in removing and/or reinstalling equipment. This guarantee and the Company's obligation thereunder is in lieu of all other guarantees, expressed or implied, including those of suitability and fitness for a particular purpose. Campbell Scientific is not liable for consequential damage.

Please inform us before returning equipment and obtain a Repair Reference Number whether the repair is under guarantee or not. Please state the faults as clearly as possible, and if the product is out of the guarantee period it should be accompanied by a purchase order. Quotations for repairs can be given on request. It is the policy of Campbell Scientific to protect the health of its employees and provide a safe working environment, in support of this policy a "Declaration of Hazardous Material and Decontamination" form will be issued for completion.

When returning equipment, the Repair Reference Number must be clearly marked on the outside of the package. Complete the "Declaration of Hazardous Material and Decontamination" form and ensure a completed copy is returned with your goods. Please note your Repair may not be processed if you do not include a copy of this form and Campbell Scientific Ltd reserves the right to return goods at the customers' expense.

Note that goods sent air freight are subject to Customs clearance fees which Campbell Scientific will charge to customers. In many cases, these charges are greater than the cost of the repair.



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# PLEASE READ FIRST

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## About this manual

Please note that this manual was originally produced by Campbell Scientific Inc. primarily for the North American market. Some spellings, weights and measures may reflect this origin.

Some useful conversion factors:

<b>Area:</b> 1 in <sup>2</sup> (square inch) = 645 mm <sup>2</sup>	<b>Mass:</b> 1 oz. (ounce) = 28.35 g 1 lb (pound weight) = 0.454 kg
<b>Length:</b> 1 in. (inch) = 25.4 mm 1 ft (foot) = 304.8 mm 1 yard = 0.914 m 1 mile = 1.609 km	<b>Pressure:</b> 1 psi (lb/in <sup>2</sup> ) = 68.95 mb
	<b>Volume:</b> 1 UK pint = 568.3 ml 1 UK gallon = 4.546 litres 1 US gallon = 3.785 litres

In addition, while most of the information in the manual is correct for all countries, certain information is specific to the North American market and so may not be applicable to European users.

Differences include the U.S standard external power supply details where some information (for example the AC transformer input voltage) will not be applicable for British/European use. *Please note, however, that when a power supply adapter is ordered it will be suitable for use in your country.*

Reference to some radio transmitters, digital cell phones and aerials may also not be applicable according to your locality.

Some brackets, shields and enclosure options, including wiring, are not sold as standard items in the European market; in some cases alternatives are offered. Details of the alternatives will be covered in separate manuals.

Part numbers prefixed with a “#” symbol are special order parts for use with non-EU variants or for special installations. Please quote the full part number with the # when ordering.

## Recycling information



At the end of this product's life it should not be put in commercial or domestic refuse but sent for recycling. Any batteries contained within the product or used during the products life should be removed from the product and also be sent to an appropriate recycling facility.

Campbell Scientific Ltd can advise on the recycling of the equipment and in some cases arrange collection and the correct disposal of it, although charges may apply for some items or territories.

For further advice or support, please contact Campbell Scientific Ltd, or your local agent.



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# Precautions

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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.eu](http://www.campbellsci.eu) or by telephoning +44(0) 1509 828 888 (UK). 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

- Prior to performing site or installation work, obtain required approvals and permits. Comply with all governing structure-height regulations, such as those of the FAA in the USA.
- 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, or 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.

## 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.

WHILE EVERY ATTEMPT IS MADE TO EMBODY THE HIGHEST DEGREE OF SAFETY IN ALL CAMPBELL SCIENTIFIC PRODUCTS, THE CUSTOMER ASSUMES ALL RISK FROM ANY INJURY RESULTING FROM IMPROPER INSTALLATION, USE, OR MAINTENANCE OF TRIPODS, TOWERS, OR ATTACHMENTS TO TRIPODS AND TOWERS SUCH AS SENSORS, CROSSARMS, ENCLOSURES, ANTENNAS, ETC.





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# A6REL-12 Relay Driver

## 1. Function

The A6REL-12 (FIGURE 1-1) drives six dual single pole double throw internal relays for control of up to 12 external AC or DC devices. Each of the six relays has a three position toggle switch: **ON** and **OFF** for manual override, and **AUTO** for datalogger control. In the **ON** position, the common (**COM**) and normally open (**N.O.**) contacts are shorted (FIGURE 1-2 and FIGURE 1-3). In the **AUTO** position, the state of a relay is controlled by a datalogger control port.

Please note that the A6REL-12 is not compatible with CR200(X)-series dataloggers.

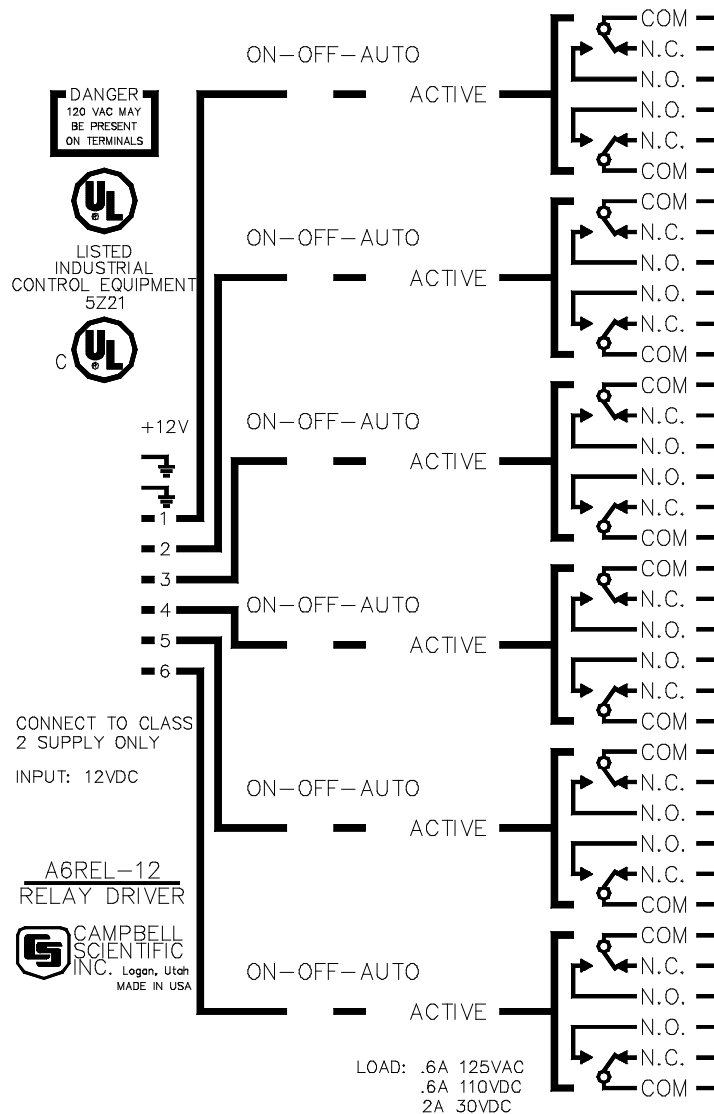


FIGURE 1-1. A6REL-12 panel view

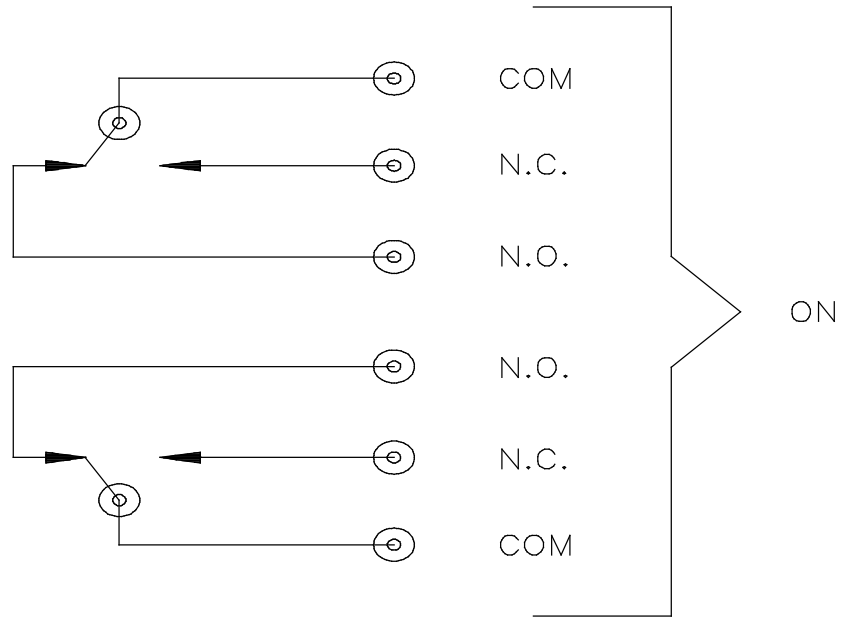


FIGURE 1-2. Position of contacts when coil IS energized (ON)

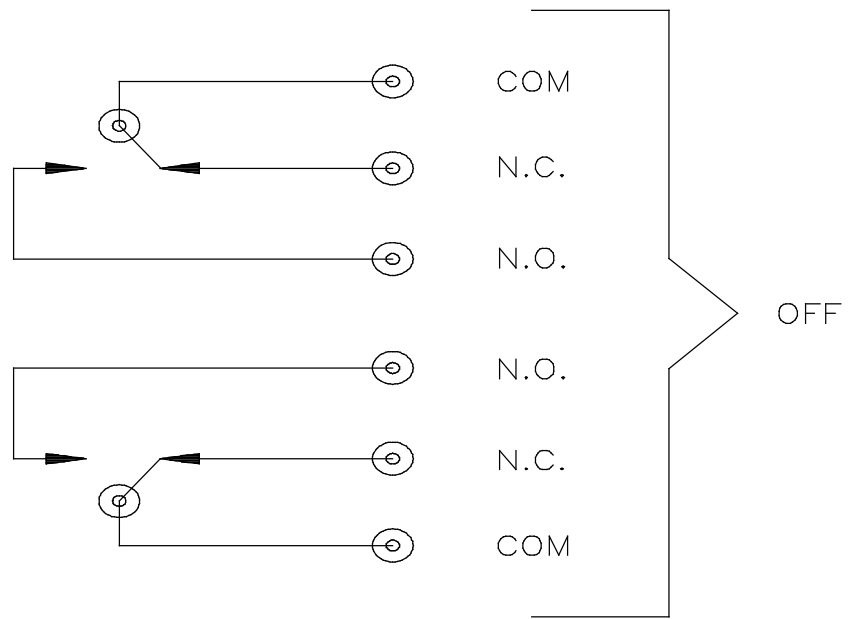


FIGURE 1-3. Position of contacts when coil IS NOT energized (OFF)

## 2. Specifications

<b>Operating voltage:</b>	12 Vdc nominal (8.4 to 24)
<b>Current drain at 12 Vdc:</b>	6 $\mu$ A quiescent; 30 mA per active LED (switch ON or AUTO active).
<b>Toggle Switch:</b>	ON/OFF manual override; AUTO for datalogger control.

### RELAY SPECIFICATIONS

<b>Arrangement:</b>	Dual single pole double throw Break before make
<b>Contact material:</b>	Gold-clad silver
<b>Individual contact rating:</b>	2 A at 30 Vdc 0.6 A at 125 Vac
<b>Coil voltage:</b>	8.4 to 24 Vdc
<b>Coil resistance:</b>	720 $\Omega$ $\pm$ 10%
<b>Expected life (contact closures)</b>	
<b>Mechanical:</b>	10 <sup>8</sup>
<b>Electrical:</b>	2 A at 30 Vdc    5x10 <sup>5</sup> 1 A at 30 Vdc    2x10 <sup>6</sup>
<b>Actuation/release time:</b>	Approx. 3 ms
<b>Operating temperature:</b>	-40 to 70 °C
<b>Standards:</b>	Underwriters Laboratories (UL) listed product (E162021) Canadian Underwriters Laboratories (CUL) listed product (5Z21)
<b>Dimensions:</b>	22.4 x 13.9 x 4.1 cm (8.8 x 5.5 x 1.6 in) including switches and mounts
<b>Weight:</b>	635 g (1.4 lb)

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#### NOTE

The A6REL-12 protects each contact against voltage surges of 180 Vdc (130 V rms) or greater with a power content of 8 Watts maximum and maximum duration of 0.1 ms.

---

### 3. Installation

The A6REL-12 relay driver includes mounting flanges with keyhole slots that attach to the backplate of a Campbell Scientific enclosure.

The A6REL-12 must be in an enclosure that provides a pollution degree 2 environment (normally, only nonconductive pollution; however, a temporary conductivity caused by condensation may be expected). All Campbell Scientific enclosures meet this requirement.

TABLE 3-1 shows the cables recommended for connecting the relays. A two-foot length should be sufficient if the datalogger and A6REL-12 are housed in the same enclosure. Tightening torque should be 4.5 in/lb. A user-supplied cable can be used if the cable has:

- only copper conductors
- wire range of 26 to 14 AWG
- minimum 60/75 °C wire

Input power must be connected to a class 2 supply only. All Campbell Scientific power supplies meet the class 2 supply requirements.

<b>Number of Relays Controlled</b>	<b>Recommended Cable(s)</b>
1	(1) CABLE3CBL-L
2	(1) CABLE4CBL-L
3	(1) CABLE5CBL-L
4	(2) CABLE3CBL-L
5	(1) CABLE3CBL-L and (1) CABLE4CBL-L
6	(2) CABLE4CBL-L

### 4. Example Program

In the following programming example, temperature is being controlled between 96 and 99 °F. A copper-constantan thermocouple is measured to determine the temperature. If the temperature drops below 96 °F, terminal **C1** is set high to activate the associated relay and turn the heater on. If the temperature equals or exceeds 99 °F, terminal **C1** is set low to turn the heater off.

Although the following example is a CR1000 program, other dataloggers that use CRBasic such as the CR800 and CR3000 are programmed similarly.

**CRBasic Example 4-1. Measuring Temperature Through an A6REL-12**

```

'CR1000 Series Datalogger

'Declare Public Variables
Public PTemp, batt_volt, P, TC

'Define Data Tables
DataTable (Test,1,-1)
  DataInterval (0,15,Sec,10)
  Minimum (1,batt_volt,FP2,0,False)
  Sample (1,PTemp,FP2)
  Sample (1,TC,FP2)

EndTable

'Main Program
BeginProg
  Scan (5,Sec,0,0)
    Battery (Batt_volt)
    'Measure TC reference temperature
    PanelTemp (PTemp,250)
    'Make temperature measurement and convert it to degrees Fahrenheit
    TCDiff (TC,1,mV2_5C,1,TypeT,PTemp,True ,0,250,1.8,32)
    'If temperature is greater than 99, set Port Low
    If TC>99 then
      P=0
      'If temperature is less than 96, set Port high
    ElseIf TC<96 then
      P=1
    EndIf
    PortSet (1 ,P)
    'Call Output Tables
    'Example:
    CallTable Test
  NextScan
EndProg

```







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