INSTRUCTION MANUAL

C1701 Relay Kit

December 2011

WARRANTY AND ASSISTANCE

The **C1701 RELAY KIT** is warranted by CAMPBELL SCIENTIFIC (CANADA) CORP. ("CSC") to be free from defects in materials and workmanship under normal use and service for **twelve (12) months** from date of shipment unless specified otherwise. CSC's obligation under this warranty is limited to repairing or replacing (at CSC's option) defective products. The customer shall assume all costs of removing, reinstalling, and shipping defective products to CSC. CSC will return such products by surface carrier prepaid. This warranty shall not apply to any CSC products which have been subjected to modification, misuse, neglect, accidents of nature, or shipping damage. This warranty is in lieu of all other warranties, expressed or implied, including warranties of merchantability or fitness for a particular purpose. CSC is not liable for special, indirect, incidental, or consequential damages.

Products may not be returned without prior authorization. To obtain a Return Merchandise Authorization (RMA), contact CAMPBELL SCIENTIFIC (CANADA) CORP., at (780) 454-2505. An RMA number will be issued in order to facilitate Repair Personnel in identifying an instrument upon arrival. Please write this number clearly on the outside of the shipping container. Include description of symptoms and all pertinent details.

CAMPBELL SCIENTIFIC (CANADA) CORP. does not accept collect calls.

Non-warranty products returned for repair should be accompanied by a purchase order to cover repair costs.

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C1701 Relay Kit

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C1701 Relay Kit

1. Overview

The C1701 Relay Kit provides the ability to use a Campbell Scientific Datalogger to switch power to sensors and controls with high current requirements (up to 7 amps). The relay was specifically chosen for a number of properties that make it well suited for use with Campbell Scientific databggers such as extremely low turn on current, high output current, and panel mount packaging for installation in Campbell Scientific enclosures.

1.1 Physical Dimensions

Length:	2.3 inches
Width:	1.8 inches
Height:	1 inch

The two mounting holes are spaced in-line two inches apart and can be mounted with two 6-32 screws.

1.2 Specifications

Operating Temperature:	-20 to 80^0 C

Output Specifications:

Operating Range:	0 to 100 VDC
Max Load Current:	7 Amps DC
Min Load Current:	20 mA DC
Max On-State Drop:	2.0 VDC
Max On-State Resistance:	0.29 Ohms
Max Off State Leakage:	0.1 mA
Max Turn On Time:	100 usec
Max Turn Off Time:	1.0 msec

Input Specifications

Control Voltage Range:	3.5 to 32 VDC
Minimum Turn On Voltage:	3.5 VDC
Minimum Turn Off Voltage:	1.0 VDC
Maximum Input Current:	1.6 mA (5 VDC), 28mA (32 VDC)

SPECIAL CAUTIONARY NOTES

When switching inductive loads such as pumps and motors, a transient diode may need to be installed between Load (+) and Ground. Please refer to the Crydom data sheet in Appendix A, and consult Campbell Scientific Canada if required.

Applications where a device that is drawing a lot of current and have a long "ON" cycle require a heat-sink to prevent overheating. Please refer to the Crydom data sheet in Appendix A for details.

2. Installation

2.1 Wiring

The C1701 has four connections that are wired to provide isolated switching of a load using a datalogger control port. The control port and datalogger ground are input to the relay and the load circuit is the relay output as shown below:

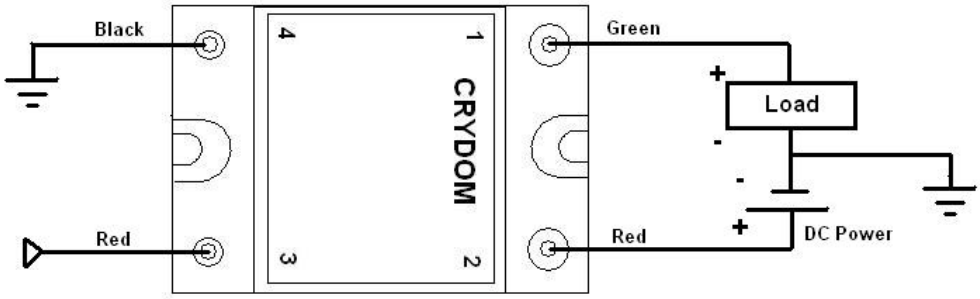


Figure 1: Relay Wiring Diagram

TABLE 1. Sensor Wiring

Colour	Pin	Function	CR10(X), CR510, CR23X	21X, CR7
Green	1	Output (-)	Load (+)	Load (+)
Red	2	Output (+)	Power Supply (+)	Power Supply (+)
Red	3	Input (+)	Control Port	Control Port
Black	4	Input (-)	G	⏚

2.2 Programming

To activate the load circuit, the control port to which the relay is connected should be set to high (5V) using an appropriate datalogger program control instruction (eg. P86 or P92).

To turn the load circuit off, toggle the control port low (0V) using a similar instruction. Be careful with your control logic, it is not good for many AC powered devices to be turned off/on too quickly. For this reason, users will often turn a device on and after it is turned off, not turn it on again for a set period of cool-down time.

See the program example below. In this example, an irrigation pump is turned on for 10 minutes when the soil moisture goes below 10%. Then , it can not be turned on again for another 5 minutes.

```
;{CR10X}
;
*Table 1 Program
  01: 60            Execution Interval (seconds)

;If soil moisture goes to 10% or less, turn on irrigation pump for 10 minutes.
1:  If Flag/Port (P91)
 1: 12      Do if Flag 2 is High
 2: 30      Then Do

    2:  Z=Z+1 (P32)
     1: 2       Z Loc [ COUNTER1  ]

3:  End (P95)

4:  If (X<=>F) (P89)
 1: 2       X Loc [ COUNTER1  ]
 2: 3       >=
 3: 300     F ; = 5 minutes
 4: 30      Then Do

    5:  Z=F x 10^n (P30) ; Reset COUNTER1 to zero.
     1: 0       F
     2: 0       n, Exponent of 10
     3: 2       Z Loc [ COUNTER1  ]

    6:  Do (P86)
     1: 22      Set Flag 2 Low

7:  End (P95)

8:  If Flag/Port (P91) ; FLAG 2 prevents the pump from going on too soon
 1: 22      Do if Flag 2 is Low
 2: 30      Then Do

;If soil moisture goes too low, turn on an irrigation pump for 10 minutes.

    9:  If (X<=>F) (P89)
     1: 1       X Loc [ SOIL_MOIS ]
     2: 4       <
     3: 10      F
     4: 30      Then Do
```

```
        10:  Do (P86)
         1: 41       Set Port 1 High

        11:  Do (P86)
         1: 11       Set Flag 1 High

    12:  End (P95)

    13:  If Flag/Port (P91)
     1: 11       Do if Flag 1 is High
     2: 30       Then Do

        14:  Z=Z+1 (P32)
         1: 3        Z Loc [ COUNTER2  ] ; adds 1 count per scan.

    15:  End (P95)

;If the pump was on for 10 minutes, turn it off.
    16:  If (X<=>F) (P89)
     1: 3        X Loc [ COUNTER2  ]
     2: 3        >=
     3: 600      F ; = 10 minutes
     4: 30       Then Do

        17:  Do (P86) ; Turn off pump
         1: 51       Set Port 1 Low

        18:  Do (P86) ; Set FLAG #1 low
         1: 21       Set Flag 1 Low

        19:  Do (P86)
         1: 12       Set Flag 2 High

        20:  Z=F x 10^n (P30) ; Reset COUNTER2 to zero.
         1: 0        F
         2: 0        n, Exponent of 10
         3: 3        Z Loc [ COUNTER2  ]

    21:  End (P95)

22:  End (P95)
```

Appendix “A”

Series 1-DC

- D1D to D5D series SSRs; MOSFET output
- Ratings from 7A to 40A @ 200 VDC, and from 7A to 10A @ 500 VDC
- DC Control
- Relays are easily paralleled for higher-current applications

PRODUCT SELECTION

Load Voltage	7A	10A	12A	20A	40A
100 VDC	D1D07		D1D12	D1D20	D1D40
200 VDC	D2D07		D2D12		D2D40
400 VDC	D4D07		D4D12		
500 VDC	D5D07	D5D10			

OUTPUT SPECIFICATIONS (1)

Description	7A	12A	20A	40A	7A	12A	40A	7A	12A	7A	10A
Operating Voltage Range	0-100	0-100	0-100	0-100	0-200	0-200	0-200	0-400	0-400	0-500	0-500
Maximum Off-State Leakage Current @ Rated Voltage [mArms]	0.1	0.2	0.3	0.3	0.1	0.3	0.3	0.3	0.3	0.2	0.3
Maximum Load Current (3) [Adc]	7	12	20	40	7	12	40	7	12	7	10
Minimum Load Current [mA]	0	0	0	0	0	0	0	0	0	0	0
Maximum Surge Current (16.6ms) [Apk]	15	28	42	106	22	27	106	17	36	19	29
Maximum On-State Voltage Drop @ Rated Current [Vpk]	2.0	1.6	2.1	2.1	2.0	2.8	2.1	4.2	4.2	5.7	5.5
Thermal Resistance Junction to Case (Rjc) [°C/W]	2.2	1.34	1.06	0.83	1.5	1.06	0.83	1.06	0.8	1.0	0.8
Maximum On-State Resistance [RDS-ON][Ohms]	0.29	0.13	0.10	0.05	0.29	0.23	0.05	0.6	0.35	0.8	0.55

INPUT SPECIFICATIONS (1)

Description	DC Control
Control Voltage Range	3.5-32 VDC
Minimum Turn-On Voltage	3.5 VDC
Minimum Turn-Off Voltage	1.0 VDC
Maximum Input Current (1-DC only)	1.6 mA (5 VDC), 28 mA (32 VDC)
Nominal Input Impedance	See Note 4
Maximum Turn-On Time [µsec]	100
Maximum Turn-Off Time [msec]	1.0

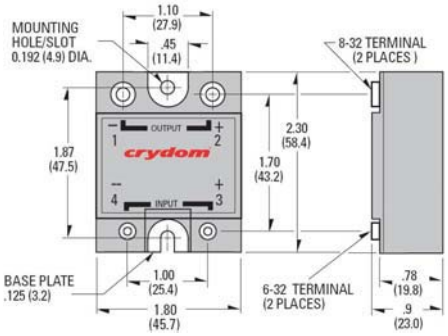
GENERAL SPECIFICATIONS

Description	Parameters
Dielectric Strength, Input/Output/Base (50/60Hz)	2500 VRMS
Minimum Insulation Resistance (@ 500 V DC)	10^9 Ohm
Maximum Capacitance, Input/Output	50 pF
Ambient Operating Temperature Range	-20 to 80°C
Ambient Storage Temperature Range	-20 to 125 °C
Weight (typical)	3.0 oz (86.5g)
Encapsulation	Thermally conductive Epoxy
Terminals	Screws and Saddle Clamps Furnished, Unmounted
Recommended Terminal Screw Torque Range:	6-32 Screws - 10 in lbs. 8-32 and 10-32 Screws -20 in. lbs. (Screws dry without grase)

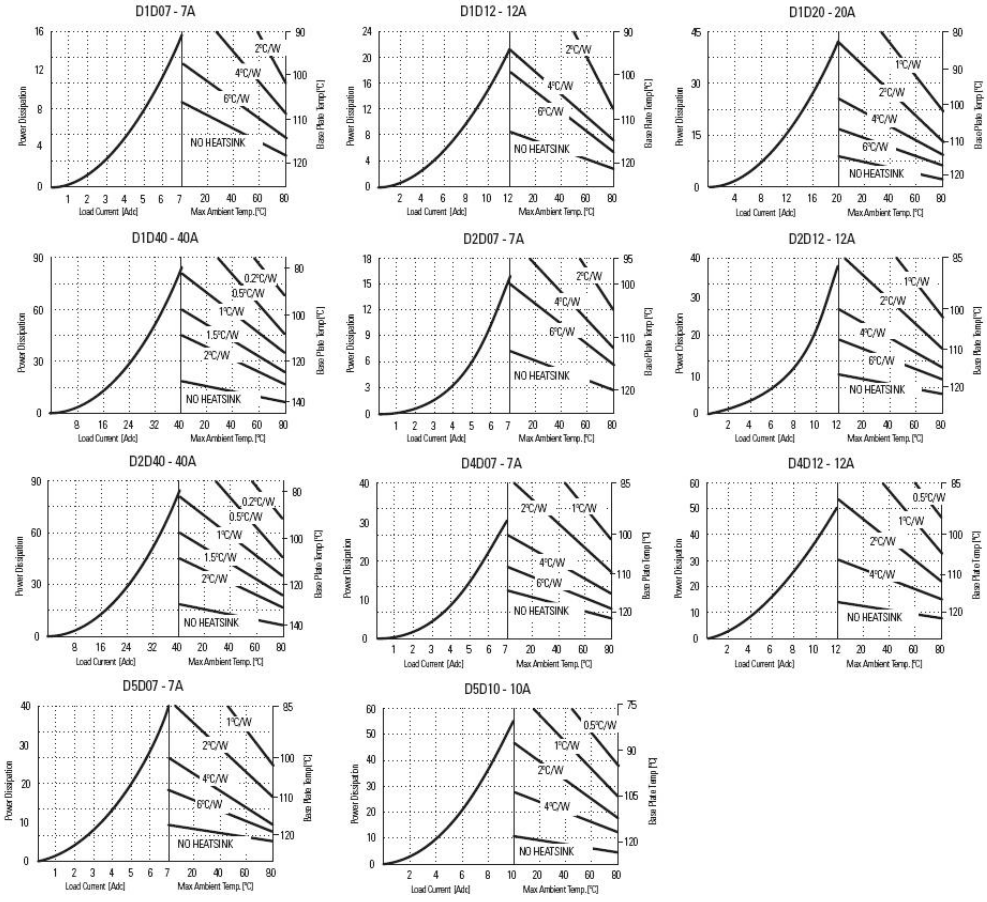
GENERAL NOTES

1) All parameters at 25°C and per section unless otherwise specified.
2) Dielectric strength and insulation resistance are measured between input and output
3) Heat sinking required, for derating curves see page 3.
4) Input circuitry version incorporates active current limiter.

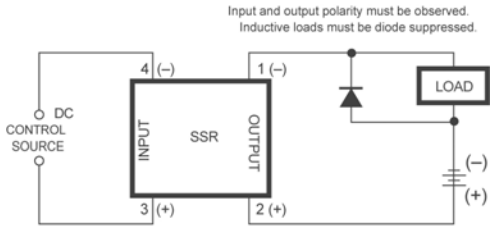
MECHANICAL SPECIFICATIONS



THERMAL DERATE INFORMATION

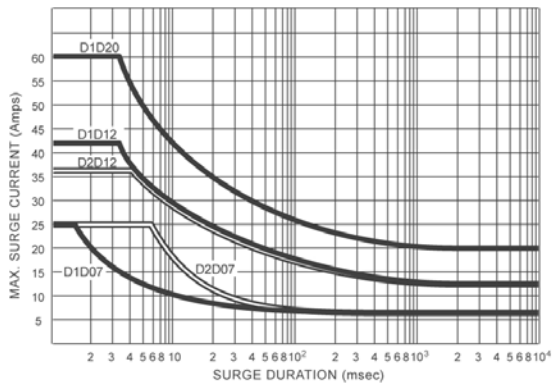


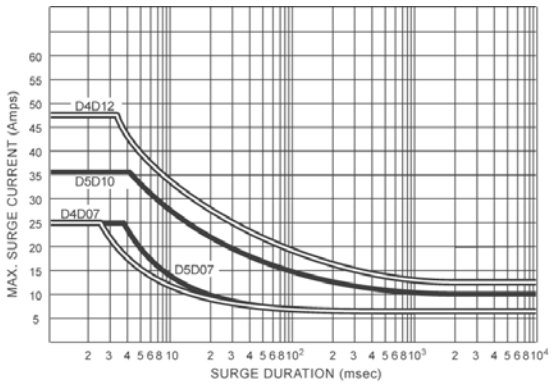
WIRING DIAGRAM

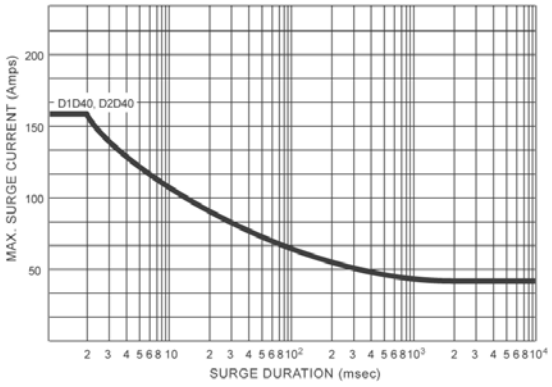


Transient Protection

MAXIMUM SURGE VS DURATION







AGENCY APPROVALS

UL E116950 (100 Volt Models 1-DC Only)

CE RoHS Compliant

Rev. 021909

⚠ DANGER / PELIGRO / DANGER /GEFAHR / PERICOLO / PERIGO

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH.

- Disconnect all power before installing or working with this equipment.
- Verify all connections and replace all covers before turning on power.

Failure to follow these instructions will result in death or serious injury.

RIESGO DE DESCARGA ELECTRICA O EXPLOSION.

- Desconectar todos los suministros de energia a este equipo antes de trabajar con este equipo.
- Verificar todas las conexiones y colocar todas las tapas antes de energizer el equipo.

El incumplimiento de estas instrucciones puede provocar la muerte o lesiones serias.

RISQUE DE DESCHARGE ELECTRIQUE OU EXPLOSION

- Eteindre toutes les sources d'énergie de cet appareil avant de travailler dessus de cet appareil
- Vérifier tous connections, et remettre tous couverts en olace avant de mettre sous

De non-suivi de ces instructions provoquera la mort ou des lésions sérieuses sérieuses.

GEFAHR EINES ELEKTRISCHE N SCHLAGES ODER EINER EXPLOSION.

- Stellen Sie jeglichen Strom ab, der dieses Gerät versorgt, bevor Sie an dem Gerät Arbeiten durchführen
- Vor der Inbetriebnahme alle Anschlüsse überprüfen und alle Gehäuseteile montieren.

Unterlassung dieser Anweisungen können zum Tode oder zu schweren Verletzungen führen.

RISCHIO DI SCOSSA ELETTRICA O DELL'ESPLOSI ONE.

- Spenga tutta l'alimentazion e che fornisce questa apparecchiatu ra prima del lavorare a questa apparecchiatu ra
- Verificare tutti i collegamenti e sostituire tutte le coperture prima della rotazione sull'alimentazi one

L'omissione di seguire queste istruz ioni provocherà la morte o di lesioni serie

RISCO DE DESCARGA ELÉTTRICA OU EXPLOSÃO

- Desconectar o equipamento de toda á energia antes de instalar ou trabalhar com este equipamen to
- Verificar todas as conexões e recolocar todas as tampas antes de religar o equipamento

O não cumprimento destas instruções pode levar á morte ou lesões sérias.

⚠ WARNING / AVERTISSEMENT / WARNUNG /ADVERTENCIA / AVVERTENZA / AVISO

RISK OF MATERIAL DAMAGE AND HOT ENCLOSURE

- The product's side panels may be hot, allow time for product to cool before touching.
- Follow proper mounting instructions including torque values.
- Do not allow liquids or foreign objects to enter this product.

Failure to follow this instruction can result in serious injury, or equipment damage.

RISQUE DE DOMMAGE MATERIEL ET DE SURCHAUFFE DU BOITIER

- Les panneaux latéraux du produit peuvent être chauds. Laisser le produit refroidir avant de le toucher.
- Respecter les consignes de montage, et notamment les couples de serrage.
- Ne pas laisser pénétrer de liquide ni de corps étrangers à l'intérieur du produit.

Le non-respect de cette directive peut entraîner, des lésions corporelles graves ou des dommages matériels.

GEFAHR VON MATERIALSCHÄDEN UND GEHÄUSEERHITZUNG

- Die Seitenwände können heiß sein. Lassen Sie das Produkt abkühlen, bevor Sie es berühren.
- Beachten Sie die Montageanweisungen,
- Führen Sie keine Flüssigkeiten oder Fremdkörper in das Produkt ein.

Die Nichtbeachtung dieser Anweisung kann Körperverletzung oder Materialschäden zur Folge haben.

RIESGO DE DAÑOS MATERIALES Y DE SOBRECALENTAMIENTO DE LA UNIDAD

- Los paneles laterales del producto pueden estar calientes. Esperar que el producto se enfríe antes de tocarlo.
- Respetar las instrucciones de montaje, y en particular los pares de apretado.
- No dejar que penetren líquidos o cuerpos extraños en el producto.

Si no se respetan estas precauciones pueden producirse graves lesiones, daños materiales.

RISCHIO DI DANNI MATERIALI E D'INVOLUCRO CALDO

- I pannelli laterali dell'apparecchio possono scottare; lasciar quindi raffreddare il prodotto prima di toccarlo.
- Seguire le istruzioni di montaggio corrette.
- Non far entrare liquidi o oggetti estranei in questo apparecchio.

La mancata osservanza di questa precauzione può causare gravi rischi per l'incolumità personale o danni alle apparecchiature.

RISCO DE DANO MATERIAL E DE AQUECIMENTO

- Os painéis laterais do produto podem estar quentes; dê tempo ao produto para arrefecer antes de lhe tocar.
- Siga devidamente as instruções de montagem.
- Não permita a entrada de líquidos e de objectos estranhos no produto.

A não observância destas precauções pode provocar a morte, ferimentos graves ou danos materiais.

ANNEX - ENVIROMENTAL INFORMATION

The environmental information disclosed in this annex including the EIP Pollution logo are in compliance with People's Republic of China Electronic Industry Standard SJ/T11364 – 2006, Marking for Control of Pollution Caused by Electronic Information Products.

Part Name	Toxic or hazardous Substance and Elements					
	Lead (Pb)	Mercury (Hg)	Cadmium (Cd)	Hexavalent Chromium (Cr (VI))	Polybrominated biphenyls (PBB)	Polybrominated diphenyl ethers (PBDE)
Semiconductor die	X	O	O	O	O	O
Solder	X	O	O	O	O	O

此附件所标示的包括电子信息产品污染图标的环保信息
符合中华人民共和国电子行业标准 SJ/T11364 - 2006,
电子信息产品污染控制标识要求

部件名称	有毒有害物质或元素					
	铅 (Pb)	汞 (Hg)	镉 (Cd)	六价铬 (Cr (VI))	多溴联苯 (PBB)	多溴二苯醚 (PBDE)
半导体芯片	X	O	O	O	O	O
焊接点	X	O	O	O	O	O