INSTRUCTION MANUAL

CS10-L Current Transformer

Revision: 10/08

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Figure

CS10-L Current Transformer

1. General Description

The CS10-L uses CR Magnetic's CR8459 Current Transformer to measure the approximate current over a range of 0 to 200 A. The CS10-L outputs a millivolt signal allowing it to be directly connected to a Campbell Scientific datalogger. Compatible dataloggers include the CR800, CR850, CR1000, CR3000, CR510, CR10(X), and CR23X. It is not compatible with the CR200-series, but a similar device, the CS15, is compatible. The CS10-L is recommended for measurements that do not require high accuracy.

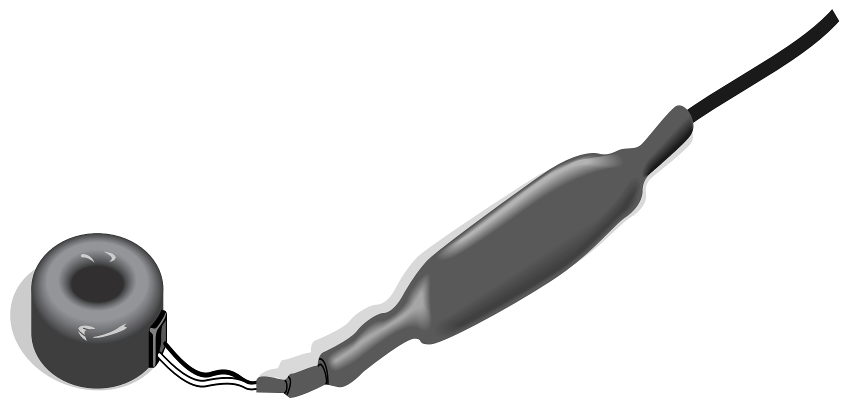

FIGURE 1. CS10-L Current Transformer

2. Specifications

Example Applications:

- Motor or generator load conditions
- Efficiency studies
- Intermittent fault detection
- Rough submetering

Manufacturer's Specifications

Frequency:	50 and 60 Hz
Insulation Resistance:	100 M ohm @ 500 VDC
High Potential:	2000 volts
Rated Current:	200 A
Storage Temperature:	-25ºC to 70ºC
Operating Temperature:	-25ºC to 55ºC
Case Material:	Polypropylene Resin
Construction:	Epoxy Encapsulated

Accuracy with 10 ohm burden max. (resistive):	typically ±5 percent of actual value with provided multiplier
Dimensions:	Outer diameter: 1.89" (4.8 cm) Inner diameter: 0.75" (1.9 cm) Height: 0.67" (1.7 cm)

3. Installation

Mount the AC load wire through the hole of the CS10-L.

4. Wiring

The CS10-L uses a single-ended analog channel.

White -------------- Single-Ended Channel
Black -------------- AG or ⏚

5. Measurement Instruction

NOTE SCWIN users: This manual was written primarily for those whose needs are not met by SCWin. Your procedure is much simpler: just add the CS10-L (it's in the Miscellaneous Sensors folder), save your program, and follow the wiring shown in Step 2 of SCWin.

The datalogger is programmed using either CRBasic or Edlog. Dataloggers that use CRBasic include our CR800, CR850, CR1000, and CR3000. Dataloggers that use Edlog include our CR510, CR10(X), and CR23X. In CRBasic, the VoltSE instruction is used to measure this sensor. In Edlog, a P1 instruction is used.

NOTE The example measurement instructions that follow do not store data to final storage. Additional instructions (DataTable and CallTable for CRBasic dataloggers, and typically P92, P77, and output processing instructions such as P70 for Edlog dataloggers) are required to store data permanently.

5.1 CR1000 Sample Program

In the CR1000 datalogger, instruction VoltSE is used.

The multiplier in this program example is representative of one application. The multiplier can be changed to match calibrated measurements. You should use a multiplier that you have validated for your purposes.

EXAMPLE 1

```
'\\\\\\\\\\\\\\\\\\\\\\\\\ DECLARATIONS /////////////////////////
Public STDFlag
Public RMSvalue
Public Counter
Public CS10_L, i, Samples

'\\\\\\\\\\\\\\\\\\\\\\\\ OUTPUT SECTION ////////////////////////
DataTable(STD,STDFlag,1)
StdDev (1,CS10_L,IEEE4,False)
EndTable

'\\\\\\\\\\\\\\\\\\\\\\\\\\\ PROGRAM ////////////////////////////
BeginProg
    samples = 25
    Scan(1,Sec, 3, 0)
        Counter = 0
'Sensor #1
    For i = 1 to samples
        Counter = Counter + 1
        VoltSE(CS10_L, 1, mV250, 1, False, 0, 250, .195, 0)
        If Counter = samples then STDFlag=true
        CallTable STD
        STDFlag = false
        If (STD.output(1,1)) Then GetRecord(RMSvalue,STD,1)
    Next i

    NextScan
EndProg
```

5.2 CR10X Sample Program

Measures a single CS10-L Current Transformer directly connected to the SE 1 channel of the CR10X.

The multiplier in this program example is representative of one application. The multiplier can be changed to match calibrated measurements. You should use a multiplier that you have validated for your purposes.

EXAMPLE 2

```
*Table 1 Program
  01:  1              Execution Interval  (seconds)

1:  Z=F x 10^n (P30)
  1:   0.0            F
  2:   00             n, Exponent of 10
  3:   3              Z Loc [ Counter   ]

2:  Beginning of Loop (P87)                        ; Sensor #1
  1:   0              Delay
  2:   25             Loop Count

     3:  Z=Z+1 (P32)
       1:   3              Z Loc [ Counter   ]

     4:  Volt (SE) (P1)
       1:   1              Reps
       2:   14             500 mV Fast Range       ; Range dependent on current
       3:   1              SE Channel
       4:   4              Loc [ Sens_1    ]
       5:   0.195          Mult                    ; Multiplier dependent on current transformer
       6:   0              Offset

     5:  If (X<=>F) (P89)
       1:   3              X Loc [ Counter   ]
       2:   1              =
       3:   25             F
       4:   10             Set Output Flag High

     6:  Set Active Storage Area (P80)
       1:   3              Input Storage
       2:   2              Loc [ RMS_value ]

     7:  Standard Deviation (P82)^11050
       1:   1              Reps
       2:   4              Sample Loc [ Sens_1    ]

8:  End (P95)
```

5.3 CR1000 with Multiplexer Sample Program

This program uses the CR1000 and an AM16/32-series multiplexer to read 10 CS10-L current transformers.

```
Public STDFlag
Public BatVolt
Public RMSvalue, Count
Public Counter, AMPavg(16)
Public CS10_L, i, j, Samples

DataTable(STD,STDFlag,1)
StdDev (1,CS10_L,IEEE4,False)
EndTable

Sub TC
    Samples = 25
    Counter = 0
    For i = 1 to samples
        Counter = Counter + 1
        VoltSE(CS10_L, 1, mV250, 5, False, 0, 250, .195, 0)
        If Counter = samples then STDFlag=true
        CallTable STD
        STDFlag = false
        If (STD.output(1,1)) Then GetRecord(RMSvalue,STD,1)
    Next i
EndSub

'\\\\\\\\\\\\\\\\\\\\\\\\\\ PROGRAM //////////////////////////

BeginProg
    Scan(10,Sec, 0, 0)
    Battery(BatVolt)
    'Turn AM16/32 Multiplexer On
        PortSet(4,1)
        Count=1
        SubScan(0,uSec,16)
            'Switch to next AM16/32 Multiplexer channel
            PulsePort(5,10000)
            'Call Sub:
            Call TC
            AMPavg(Count) = RMSvalue
            Count=Count+1
        NextSubScan
        'Turn AM16/32 Multiplexer Off
        PortSet(4,0)

    NextScan
EndProg
```

5.4 CR10X with Multiplexer Sample Program

This program uses the CR10X and an AM16/32-series multiplexer to read ten CS10-L current transformers.

```
*Table 1 Program
  01:  10              Execution Interval (seconds)

; Activate AM16/32

1:  Do (P86)
  1:   44              Set Port 4 High

; Begin Measurement Loop

2:  Beginning of Loop (P87)
  1:   0               Delay
  2:   10              Loop Count

; Pulse Clock

    3:  Do (P86)
      1:   75              Pulse Port 5

; Delay

    4:  Excitation with Delay (P22)
      1:   1               Ex Channel
      2:   0               Delay W/Ex (0.01 sec units)
      3:   1               Delay After Ex (0.01 sec units)
      4:   0               mV Excitation

; Measure Amps

5:  Do (P86)
  1:   1               Call Subroutine 1

6:  Z=X (P31)
  1:   14              X Loc [ RMS      ]
  2:   4          --   Z Loc [ AMP_1    ]

7:  End (P95)

; Deactivate AM16/32

8:  Do (P86)
  1:   54              Set Port 4 Low
```

```
*Table 3 Subroutines

1:  Beginning of Subroutine (P85)
   1:    1                  Subroutine 1

2:  Z=F x 10^n (P30)
   1:    0.0                F
   2:    00                 n, Exponent of 10
   3:    2                  Z Loc [ Counter   ]

3:  Beginning of Loop (P87)
   1:    0                  Delay
   2:    25                 Loop Count

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

      5:  Volt (SE) (P1)
         1:    1                  Reps
         2:    14                 500 mV Fast Range
         3:    1                  SE Channel
         4:    3                  Loc [ CS10_L    ]
         5:    0.195              Mult
         6:    0                  Offset

      6:  If (X<=>F) (P89)
         1:    2                  X Loc [ Counter   ]
         2:    1                  =
         3:    25                 F
         4:    10                 Set Output Flag High

      7:  Set Active Storage Area (P80)
         1:    3                  Input Storage
         2:    14                 Loc [ RMS       ]

      8:  Standard Deviation (P82)^15001
         1:    1                  Reps
         2:    3                  Sample Loc [ CS10_L    ]

9:  End (P95)

10:  End (P95)

End Program
```

Campbell Scientific Companies

Campbell Scientific, Inc. (CSI)
815 West 1800 North
Logan, Utah 84321
UNITED STATES
www.campbellsci.com
info@campbellsci.com

Campbell Scientific Africa Pty. Ltd. (CSAf)
PO Box 2450
Somerset West 7129
SOUTH AFRICA
www.csafrica.co.za
cleroux@csafrica.co.za

Campbell Scientific Australia Pty. Ltd. (CSA)
PO Box 444
Thuringowa Central
QLD 4812 AUSTRALIA
www.campbellsci.com.au
info@campbellsci.com.au

Campbell Scientific do Brazil Ltda. (CSB)
Rua Luisa Crapsi Orsi, 15 Butantã
CEP: 005543-000 São Paulo SP BRAZIL
www.campbellsci.com.br
suporte@campbellsci.com.br

Campbell Scientific Canada Corp. (CSC)
11564 - 149th Street NW
Edmonton, Alberta T5M 1W7
CANADA
www.campbellsci.ca
dataloggers@campbellsci.ca

Campbell Scientific Ltd. (CSL)
Campbell Park
80 Hathern Road
Shepshed, Loughborough LE12 9GX
UNITED KINGDOM
www.campbellsci.co.uk
sales@campbellsci.co.uk

Campbell Scientific Ltd. (France)
Miniparc du Verger - Bat. H
1, rue de Terre Neuve - Les Ulis
91967 COURTABOEUF CEDEX
FRANCE
www.campbellsci.fr
info@campbellsci.fr

Campbell Scientific Spain, S. L.
Psg. Font 14, local 8
08013 Barcelona
SPAIN
www.campbellsci.es
info@campbellsci.es

Please visit www.campbellsci.com to obtain contact information for your local US or International representative.