

***CS-SRM
Short Range Modem
Package***

User Guide

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This equipment is guaranteed against defects in materials and workmanship. This guarantee applies for twelve months from date of delivery. We will repair or replace products which prove to be defective during the guarantee period provided they are returned to us prepaid. The guarantee will not apply to:

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- Batteries
- Any product which has been subjected to misuse, neglect, acts of God or damage in transit.

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CS-SRM Short Range Modem Package

The CS-SRM short range modem package is used for direct communication between a Campbell Scientific datalogger and a computer over distances up to 12km (depending on baud rate and wire gauge). The package consists of:-

- 2 off RAD-SRM Asynchronous Short Range Modems*
- 1 off RAD-SP In-line Surge Protector*
- 1 off RAD-SP Station Surge Protector*
- 1 off SC932C Compact RS232 Interface*
- 1 off 9-Pin to 25-Pin Cable.*

The standard RAD-SRM ensures integrity of data transmission using unconditioned 4-wire links at data rates of up to 19,200 baud. The CS-SRM is supplied specifically to connect the CS I/O part of a Campbell Scientific Datalogger to a RS232 COM port on a PC. The use of USB-RS232 converters may be possible, if power to the RAD-SRM modem is on continually. For other connection requirements, please contact Campbell Scientific for advice.



1. Description

The CS-SRM can operate without an external supply, the small amount of current required being drawn from the RS232 circuits. A switch-selectable DCE/DTE option allows the RAD-SRM modem to operate as a DTE-type device for connection to another piece of DCE equipment without the need for a cross-over cable (see Figure 2).

The RAD-SRM has transformer coupling between itself and the 4-wire cable which, in conjunction with electronic circuitry, protects it from AC or DC overvoltages up to 1500V RMS and provides isolation for the two ends of the link.

The standard modem is not BABT approved and should therefore not be used in the UK on leased lines. Please contact Campbell Scientific if you require a BABT approved modem.

2. Specifications

Data rate:	Up to 19,200 baud (dependent on datalogger)
Transmission line:	4-wire unconditioned cable (two twisted pairs)
Transmission mode:	Asynchronous, full duplex
Transmission level:	0dBm
Terminal interface:	RS232, 9-way D-type female connector (25-way D-type female on the RAD-SRM)
Transmission range:	Up to 12km (see Table 1)
Line Interface:	5-way (four wires and ground) via terminal block
Power Requirements:	No external power required. Takes less than 2.5mA quiescent, 10-15mA active with SC932C
Protection:	AC/DC over-voltage protection circuits are connected via isolation transformers rated at 1,500V RMS
Operating temperature:	0°C to +50°C (extended temperature testing available)
Humidity:	Up to 90%, non-condensing
Length:	52mm
Width:	53mm
Height:	18mm
Weight:	38g



Figure 1 Typical Installation of CS-SRM in logger enclosure

3. Installation

Use the SC932C 9-Pin to RS232-DCE Interface between the RAD-SRM and the datalogger.

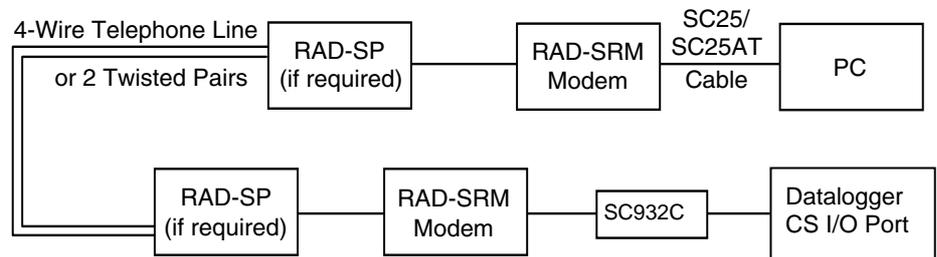


Figure 2 Block Diagram of CS-SRM Installation

Install the modems as follows:

1. Set the DCE/DTE switch in the RAD-SRM to DCE. (This is the default setting and all CS-SRM modems are supplied with the switch in this position.) To gain access to this switch and the line interface terminal block, separate the two halves of the plastic cover by pressing the marked places on the sides starting at the cable end.
2. Select a suitable cable with two twisted pairs (see Section 4).
3. Connect the four conductors to the screw terminal block, with the transmit pair connected to the terminals labelled 'XMT' and the receive pair to the terminals labelled 'RCV'. (See Figure 2; note that the wires labelled A and B are one twisted pair of the cable, and the wires labelled C and D are the other twisted pair.) A ground terminal is provided to connect the cable shield (if present) at one end of the link only.

NOTE It is vital that the +XMT and -XMT terminals on one modem are connected to the +RCV and -RCV terminals, respectively, on the other modem.

4. Transients induced on the communication line may damage electronic equipment connected at either end of the line. To decrease the chances of damage, install earthed surge protectors as shown in Figure 2. Suitable protectors are supplied in the CS-SRM package (model RAD-SP). The wiring is straight through such that pin to pin continuity exists between the two modems.

NOTE If the modems are installed entirely within a building the surge protectors are not needed, unless the cable length exceeds 200m. Campbell Scientific will not accept any warranty claims where damage to the CS-SRM has occurred because the recommended surge protectors were not used.

5. Close the unit by pressing the two halves of the cover together. Connect one modem directly to the RS232 port on the computer and connect the other to the SC932C interface.
6. Referring to the SC932C manual, check that its internal jumpers are set in the correct position for use with the CS-SRM modem.
7. This modem requires no specific set up in the latest version of PC400 or LoggerNet, as the software will be aware of its presence.

3.1 Connection to a Remote Printer

Please refer to the SC932C Manual for details of connection to a remote printer.

3.2 Protection from Transients

CAUTIONThe RAD-SP spark-gaps provide protection both for the datalogger and RAD-SRM units from induced voltage transients in the interconnecting cable. Please be aware that the RAD-SRM linked to the computer can still be damaged by transients coming from the PC, and in such circumstances considerable damage is also often done to the PC itself. These transients can come from the AC power lines to the PC or its peripherals and/or connections to other remote peripherals (e.g. via network links) and are typically caused when lightning strikes overhead power lines. As the RAD-SP units and the datalogger protection devices act as low resistance clamps to ground, the PC may offer the path of least resistance to ground compared to other equipment.

To protect the PC and the RAD-SRM from this type of damage fit the power supply lines to the PC with good quality surge arrestors. These should also be fitted to any network or serial connections to other devices. Please contact your computer dealer for the supply of such devices.

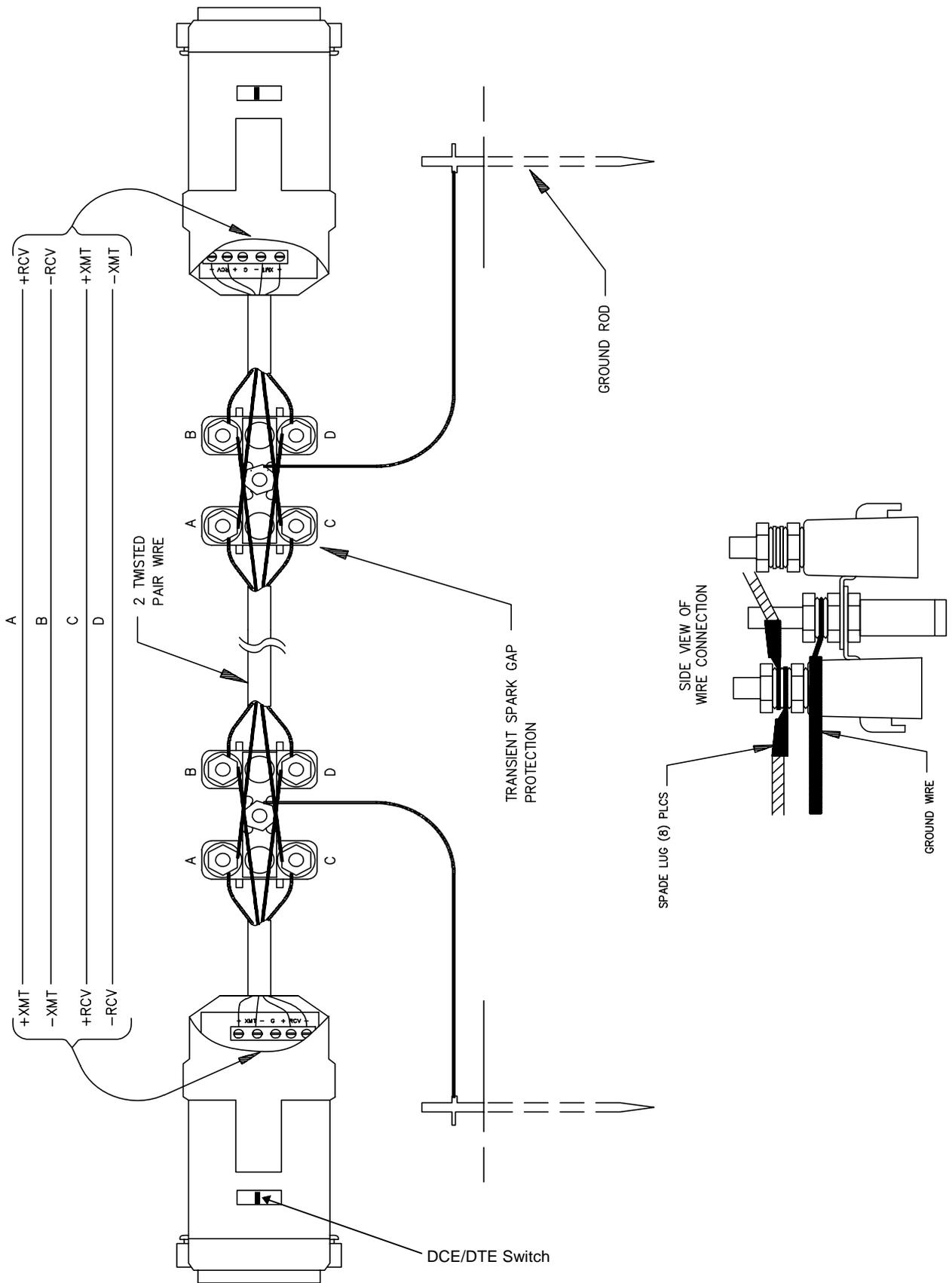


Figure 3 Wiring and Installation of Surge Protectors for a Typical CS-SRM Setup

4. Operating Distance

The distance over which the CS-SRM will operate is determined by three factors: baud rate, conductor size and cable quality. Table 1 shows the variation of maximum transmission distance with baud rate and conductor size for a good quality cable.

Baud Rate	19 AWG (0.9mm)	24 AWG (0.5mm)	26 AWG (0.44mm)
19200	5.0km	2.0km	1.5km
9600	10.0km	4.5km	3.0km
4800	11.5km	5.0km	4.0km
2400/1200	12.0km	5.5km	4.0km

For distances up to 100m, twin twisted pair cable such as that used for normal telephone installations will suffice. For greater distances, an overall screened twin twisted pair such as Belden type 9302 is required. If you need to operate RAD-SRMs at maximum range and baud rate, then a low loss cable such as IBM cable reference 4716748 is suggested; if the cable has to be buried then Belden 1048A or IBM cable reference 4716734 should be used.

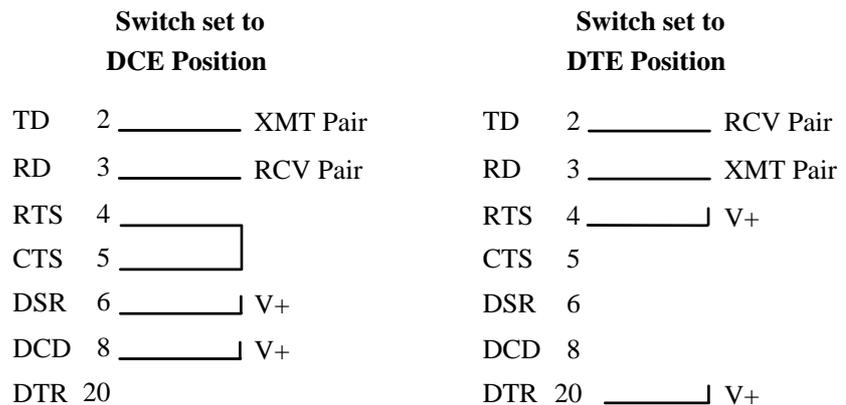


Figure 4 Switch Settings for DCE/DTE

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