

CR10X Data Acquisition System

Introduction

A complete data acquisition system consists of data logger components, data retrieval components, and software components.

Data Logger Components

Data Loggers: The CR10X data logger has proved itself to be very reliable for geotechnical applications and is compatible with a wide range of sensors and data retrieval options.

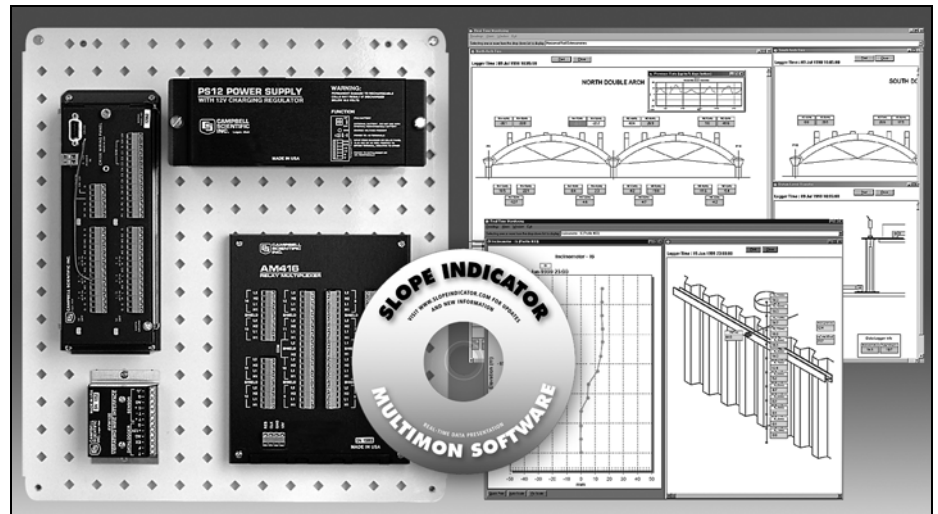
A single data logger can read a large number of sensors provided they are concentrated into a small area. Additional loggers should be deployed if sensors are distributed over a wide area. This keeps signal cables short, reduces problems with noise, and minimizes the potential for damage from construction activities and electrical transients. Cost savings on cable can sometimes pay for the additional loggers.

Interface Modules: Certain types of sensors require additional interfaces. For example, vibrating wire sensors require a VW interface, which is connected between the data logger and a multiplexer.

Multiplexers: Multiplexers increase the number of sensors that can be monitored by a data logger. The CR10X can control up to seven multiplexers, each capable of handling 16 to 32 sensors. In practice, the data logger usually controls one or two multiplexers, and additional loggers and multiplexers are employed if there are more sensors.

Power Supplies: A power supply provides regulated power to the logger and sensors. Power is drawn from a battery that is charged from AC mains power or a solar panel.

Weatherproof Enclosures: All field components must be housed in weatherproof enclosures.



Data Retrieval Options

Wired Links: Wired links for data retrieval include direct connection to the PC, telephone modems, short haul modems, and multidrop networks.

Wired links are usually less expensive and easier to set up. They are also better for real-time data retrieval.

Wireless Links: Wireless links for data retrieval include cell modems, spread-spectrum radio modems, and licensed frequency radio modems.

Wireless links are useful when distances, site traffic, or other obstacles make wired links impractical. Also, to the degree that wireless links eliminate surface runs of cable, they also reduce problems caused by electrical transients. However, before investing in wireless links, check that high-voltage power lines or radio transmission towers do not make the site too noisy for wireless links.

Software Components

Logger Control Software: Logger-Net software is used to create monitoring programs and to retrieve data from logger to PC.

Custom Programming: Slope Indicator offers custom monitoring programs for the CR10X. The programs, which are created with LoggerNet, significantly reduce the time and expense required to deploy the data acquisition system.

Web-Based Monitoring: Processing and distribute the data collected by data loggers can be a daunting task. Argus Monitoring Software provides an efficient and cost-effective solution to this problem.

Argus automatically processes readings, checks for alarms, displays graphs, and generates reports. Distribution is immediate because Argus works on the internet. With only their web browsers, users can view and download data, whether they are at work, at home, at a client's office, or half-way around the world.

See the Argus data sheet or visit www.slopeindicator.com for more information on Argus.

DATA LOGGER COMPONENTS

CR10X Data Logger56701110
 PS12LA Power Supply56703120
 AC Adapter, 90 to 260 VAC56703124
 SC32A Serial Interface56704010
 Interface Cable50306869
 ENC 16/18 Enclosure56705020
 AVW1 VW Interface56701510
 AVW100 VW Interface56701500
 AM16/32 Multiplexer56702110
 System Integration96700000

A minimum CR10X system consists of the CR10X, a power supply with an AC adapter or large capacity battery, an SC32A serial interface and interface cable for communication with PC, a weatherproof enclosure for all outdoor components, and LoggerNet software for the PC. A VW interface is required for vibrating wire sensors.

An expanded system could include additional data loggers, power supplies, multiplexers, enclosures, and data retrieval options.

The ENC 16/18 enclosure can house a CR10X with power supply, SC32A interface, VW interface, one AM16/32 multiplexer, and a communications module, such as a telephone modem. A second multiplexer can sometimes fit in the same box. Battery powered systems require a separate box for the battery.

The capacity of an AM16/32 multiplexer depends on the type of sensor connected. In general, the AM16/32 multiplexer can operate 32 two-wire sensors or 16 four-wire sensors of the same type. The table below shows multiplexer capacity for common sensors:

Sensor Type	AM16/32 Capacity
Vibrating wire sensors without RTD or thermistor readings	32
Vibrating wire sensors with RTD or thermistor readings	16
EL beam sensors and EL tiltmeters without RTD or thermistor readings	32
EL beam sensors and EL tiltmeters with signal conditioning board.	16
EL uniaxial in-place inclinometers EL uniaxial monopod tiltmeters	16
EL biaxial in-place inclinometers EL biaxial monopod tiltmeters	16

BASIC DATA RETRIEVAL OPTIONS

Com200 Telephone modem 56704410
 The COMM200 telephone modem is designed specifically for the CR10X. One modem is placed with each data logger and connected to a telephone line with a dedicated number. Communication is typically initiated by the computer which uses LoggerNet to dial the logger and retrieve the data. Real-time data transfers are possible while connected.

OTHER DATA RETRIEVAL OPTIONS

Voice Modems: Voice modems, a variation of the telephone modem, can deliver messages to preset phone numbers. Voice modems generally require extra set up time.

Short Haul Modems: Short-haul modems are placed with each logger and provide a reliable real-time link between the CR10 and a computer. The short-haul modem transmits data up to 8 km over a four-wire cable that is routed by the user.

MD9 Multidrop Interface: The MD9 is placed with each logger. A single coaxial cable links the MD9s into a network. The network can be connected to the controlling computer or to a telephone or radio modem.

Cell Phone Modems: Cell phone modems are placed with each data logger. Due to expensive connection time, periodic transfers of data are more practical than real-time links.

Spread-Spectrum Radio Modems: Spread-spectrum modems are placed with each data logger. Communication is typically initiated by the computer. Spread-spectrum radio signals can be transmitted up to 1.6 kilometers. Many countries do not require licenses for these modems.

Radio Modems: A radio modem is placed with each data logger. Communication is typically initiated by the computer. When a line-of-sight path is available, radio signals can be transmitted up to twenty-five miles. Repeater stations may be required for longer distances or when there is no line-of-sight path for transmission. Most countries require licenses for use of these modems.

SOFTWARE COMPONENTS

LoggerNet Software56708020
 Custom Programming96701000

LoggerNet Software: This software is required for each data logging system. It is used to write and compile monitoring programs, to transfer the program to the data logger, and to retrieve data by direct wire, modem, or radio telemetry.

Custom Programming: Slope Indicator offers custom programming for the CR10 written in EDLOG, a utility included with LoggerNet. A typical program excites the sensors, obtains readings, and stores data at preset intervals, but it does not perform data reduction operations. Users can modify the program as needs evolve.

ARGUS CENTRAL

Argus Central 5058801050
 Argus Central 25058801250
 Argus Central 50058801500
 Argus Central Unlimited58801600
 Activation Fee58801000

Argus Central is a web service with monthly plans based on the number of sensors to be monitored. Argus Central is the easiest, and for many, the most cost-effective way to deploy Argus.

ARGUS ENTERPRISE

Argus Enterprise Limited58802500
 Argus Enterprise Unlimited.58802600

Argus Enterprise is a version of Argus that organizations can host on their LANs or stand-alone computers. Licenses are available for use on single-projects or multiple projects. Argus Enterprise runs only on Linux computers.