— DATASHEET —

AUTOMATIC DATA ACQUISITION SYSTEM

MODEL EDAS-10

INTRODUCTION

The EDAS-10 is a rugged data acquisition system that delivers accurate and reliable measurements in a variety of applications.

FEATURES

- **Multiple analog, digital, and pulse counting channels:** Expandable with peripherals.
- **Measurement and logical control functions:** Measure and/or control virtually any device.
- **Internal data processing:** Math functions, max., min., avg., worst case, etc.
- **Measures virtually any sensor:** Commonly used sensors include:
  o Vibrating wire
  o Potentiometers
  o Strain gages and load cells
  o Thermocouples, RTDs and thermistors
  o Pressure and flow
  o Accelerometers and tilt
  o Pulse pickups
  o LVDTs

- **Precision measurement:** Analog resolution to 0.66 microvolt.
- **Programmable scan rates:** From few times per second to once every few hours.
- **Low power consumption:** Typically less than 50 mA during measurement.
- **Internal Data memory:** Standard storage capacity 2MB in non volatile RAM.
- **Internal real-time clock:** Time stamped data.
- **PC support software:** Datalogger programming and communication functions supported by Windows 2000 / XP.
- **Wide operating temperature range:** -25°C to +50°C.
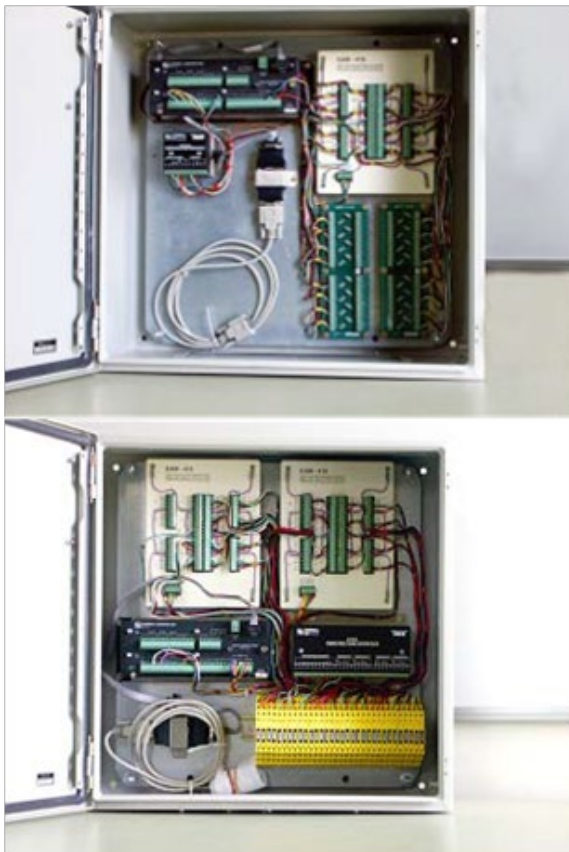- **Multiple methods of Data retrieval:** Storage modules, direct to computer, telephone, RF modem, etc.

It features wide operating temperature ranges, durable construction, dependable stand- alone operation, low power consumption, compatibility with many telecommunications options, and the flexibility to support a variety of measurement and some simple control applications. It is most suitable for unattended or network applications.

MEASUREMENT & CONTROL MODULE

The EDAS-10 data acquisition system is built around the Campbell Scientific's CR1000 programmable measurement and control module that provides sensor measurement, communication, data reduction, data/program storage and control functions. A battery backed clock assures accurate time keeping. The multi tasking operating system allows simultaneous measurement and communications functions.

The EDAS-10 can scan the data channels from a few times per second to once every few hours. The instruction set includes 44 measurement, 52 processing/math, and 18 program control instructions. Data and programs are stored either in non-volatile flash memory or battery-backed RAM. The standard memory stores 26,000 data points in final storage area.

EDAS-10's digital output ports in combination with suitable device drivers can interface with many commercially available control devices like valve actuators, motors, solenoids, relays, etc. They can also be used to control external alarm annunciators like lamps and buzzers.

MULTIPLEXERS

Multiplexers allow a number of sensors to be measured by a single CR1000. The EAM416 multiplexer module sequentially multiplexes 16 groups of four lines or 32 groups of two lines at a time. Compatible sensors include vibrating wires, thermistors, thermocouples, potentiometers, load cells, strain gages, and soil moisture blocks.

Several multiplexers can be controlled by a single CR1000. However, each multiplexer is generally dedicated to a single type of sensor.

SURGE PROTECTORS

The input lines to the multiplexer can be protected against lightning induced high voltage transients using the ESP-216 surge protector card.

Each ESP-216 card can protect up to 16 differential channels. Each channel is provided with a three terminal 90 V gas discharge tube (GDT) with the common terminal connected to the protective ground bus.

SIGNAL CONDITIONERS FOR VIBRATING WIRE SENSORS

A separate signal conditioning module is provided for vibrating wire transducers. It contains resistors required for completing measurement for most thermistor equipped vibrating wire transducers and provides amplification and signal conditioning for frequency measurement.

DATA STORAGE AND TRANSFER SOFTWARE

PC208W datalogger support software allows telecommunications, programming, and data processing functions. With an appropriate communication link, PC208W provides two-way communication between EDAS-10 dataloggers and IBM compatible computers running Microsoft Windows 98SE/NT4.0 or later operating system.

DIRECT LINE OPTIONS

Direct Datalogger to Computer Interface

The RS-232 Interface supplies an optically isolated connection between the EDAS-10 and a computer over distances up to 15 m.

Short Haul Modem

Short haul modems provide local communication between the EDAS-10 and a computer with an RS-232 serial port. The modem transmits data up to 8 km over four wire unconditioned line (two twisted pair).

Radio Frequency (RF) Communication

RF communication system uses an RF modem and a low powered transceiver at the remote station(s), and a transceiver connected to an RF base station at the computer site. Up to 255 stations can be interrogated over a single UHF or VHF frequency. Any station can serve as a repeater to extend the line of sight transmission of the base station. The user needs to seek local government/regulatory body approval for using this option. This option may not be available for some countries.

Telephone Networks

Telephone communications via landline or cellular transceiver are supported. A user supplied Hayes-compatible modem is required at the base station computer.

ENCLOSURES

The EDAS-10 is housed in an enclosure that protects it from dust, water, sunlight, or environmental pollutants. Type, size and number of enclosures required depends upon type and number of channels to be monitored and environmental requirements. Encardio-rite series ENC4X IP-65 (NEMA 4X) rated enclosures are available to cater to various applications.

POWER SUPPLIES

Standard power supply consists of one 12 V, 7 Ah rechargeable lead-acid SMF battery and an in-built battery charger. The battery is float-charged with 220 V AC power or optionally a solar panel.

SOLAR PANELS

Solar panels with voltage regulators/12 V battery chargers can be supplied for remote sites where 220 V AC mains power is not available.

CR-10X CONTROL MODULE SPECIFICATIONS

Analog Inputs

The basic CR1000 measurement and control module can be configured through software to provide full scale input voltage ranges from ± 2.5 mV to ± 2500 mV. Measurement resolution is 1 part in 3750 of full scale range. Accuracy of voltage measurement is ± 0.1 % of full scale for all ranges.

DC and AC Excitation output

3 switched excitations active during measurement, with one output active at a time. Non-active outputs are high impedance.

Range: ± 2.5 V DC

Output current: ± 25 mA

Frequency sweep function: A swept frequency, square wave output between 0 & 2.5 V is provided for vibrating wire transducers.

Timing and frequency range are specified by software instruction (factory configured).

Frequency Measurement

To measure frequency accurately the time period for a specified number of cycles 'n' of the input frequency is measured. It is then divided by 'n' to obtain the average period 'T' of a single cycle. The frequency is then obtained by calculating the inverse of 'T' (i.e. frequency = 1/T).

Reference accuracy:

± 80 ppm between - 25°C to 0°C, ± 30 ppm between 0°C to 50°C.

Resolution:

100 nanosecond divided by the number of cycles measured. Resolution is reduced by signal noise and for signals with a slow transition through the zero voltage thresholds.

Digital I/O Ports

Ports, software selectable as binary inputs or control outputs. 3 ports can be configured to count switch closures up to 40 Hz. One I/O port is required for each multiplexer used in the system.

Output voltages: (no load): high 5.0 V ± 0.1 V; low < 0.1 V.

Output resistance: 500 Ohm high 3.0 V to 5.5 V; low - 0.5 V to 0.8 V

Input resistance: 100 kOhms.

SDI-12 Interface Standard

This communication protocol, developed for microprocessor based hydrologic and environmental sensors, is available in the CR1000.

Sensor connections:

Any digital I/O port (for asynchronous communication), 12 V power, and ground. Up to ten SDI -12 sensors can be connected to each port.

CPU and interface

Processor: Renesas H8S-232Z (16 bit CPU with 32 bit internal core).

Memory: 2MB flash and 2MB battery backed SRAM standard. Additional 2 MB RAM is available as an option.

Peripheral interface:

Pin D-type connector for keyboard display, storage module, modem, printer, card storage module, and RS-232 adapter. Baud rates selectable at 300, 1200, 9600 and 76,800. ASCII communication protocol is one start bit, one stop bit, eight data bits, and no parity.

Clock accuracy: 1 minute per month.

CR1000 power requirement

Voltage: 9.6 to 16 V

Typical current drain: 1 mA quiescent, 13 mA during processing, and 46 mA during analog measurement for CR1000 measurement and control module only. Additional modules draw extra current depending on datalogger configuration.

Power supply: Any 12 V battery can be connected as a primary source. Several power supply options are available. An internal type CR2430 lithium battery with a capacity of 270 mAh is provided for clock and RAM backup.

Peripheral interface

9 pin D type connector for keyboard display, storage module, modem, printer, card storage module and RS 232 adapter. Baud rates selectable at 300, 1200, 9600 and 76800. ASCII communication protocol is one start bit, one stop bit, 8 data bits (no parity).

Built-in calculations and data processing

The CR1000 has a lot of computational power and can be programmed to calculate the parameter directly in terms of required engineering units from measured sensor output value.

It can do most of the data reduction to save storage space and post-processing work (e.g., maximum, minimum, total, average, standard deviation, etc.)

Communications between CR1000 and PC (Optional)

Optional software is available which fully support communications between CR1000 and PC - connect to the datalogger directly, or via telephone, radio, MD9 network, cellular phone, short haul modem, or practically any combination of these to retrieve data, send and retrieve programs, or set the datalogger clock. Transmissions between datalogger and PC are automatically error-checked to ensure accurate transfer. Alternatively, storage modules can be used to transport data between field and office.

Contact factory for more information and available options.

Operating temperature range

– 25°C to + 50°C.

Factory wired options

The EDAS-10 is a customized data acquisition system that is specifically configured for each application. Most hardware options are factory wired and generally cannot be changed in the field. The data acquisition system is supplied with a suitable customized program downloaded to the CR1000 control module. The sensor setup and calibration parameters can be modified in the field using the PC208W software, if required.

Host PC

The EDAS-10 requires a suitable PC for configuration and downloading programs and retreival of logged data. The PC has to be provided by the user. Any PC with a spare RS-232 serial communications port running Microsoft Windows 98SE/Me/NT4.0/2000/XP or later operating system is required.