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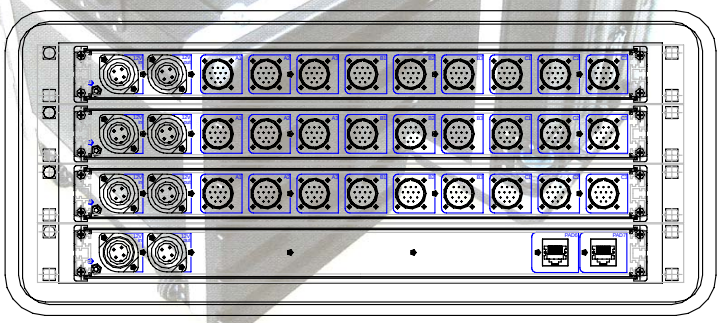
CR-5P Modular / Portable Structural Monitoring System

Features

- PC based central recording system Internet / Network ready
- Cable saving distributed data acquisition nodes
- Upto 99 dynamic & > 200 static channels
- 16 or 20 Bit resolution
- Sampling rates 50 - 250 SPS
- Alarm Relays, SMS / Email messenger
- External 12 VDC Power Supply
- Rugged industrial portable housing
- Galvanic isolation and over voltage protection
- GPS synchronised recording available
- Real-time display of dynamic channels
- Large capacity data storage options
- On-line surveillance, diagnostics, self checking and reporting system

FRONT VIEW



REAR VIEW

Outline

The CR-5P was developed out of years of experience in monitoring civil engineered structures such as dams, nuclear power plants, pipelines, tunnels, bridges, tall buildings and unique structures all over the world. This modern multichannel central recording monitoring system provides engineers with a valuable tool to fully understand and analyse the dynamics of structures in the operating environment. With a CR-5P system the dynamics affecting the structure including but not limited to acceleration, velocity, displacement, temperature, current, wind speed, wind direction, stress and pressure may be monitored and recorded.

Dynamic channel sample rates of 50, 100, 200, and 250 SPS can be provided. The system bases on synchronised multi-channel A/D converters. After hardware anti-aliasing filtering the signals are digitised using the over-sampling and decimation technique resulting in superior data quality.

The heart of the CR-5P software is GeoDAS, a proven data logger and data analysis package developed by GeoSIG Ltd. GeoDAS is frequently used in large seismic networks. GeoDAS integrated into the CR-5P central recording monitoring system provides a richly configured set of user-friendly capabilities, displays and analytical tools running under Windows XP operating system.

In addition to the near real-time display of the dynamic channels the system provides static data like mean, max, min, and peak values. The CR-5P monitors the real-time data generated by each of the sensors attached to the system and compares the measured data to five fully independent alarm trigger criteria. The ring buffer size, the post event time, trigger thresholds and relay alarm on/off times may be selected by the customer.

A comprehensive surveillance, diagnostics reporting system through alarm relays, SMS and Email is provided.

Specifications CR-5P Modular / Portable Structural Monitoring System

Set-up and Configuration
All the necessary parameter and configuration settings are selectable using the CR-5P software interface. The configuration of the CR-5P stored in non volatile system memory to allow automatic restart in case of a system failure or manual hard reset.

Data Analysis
The GeoDAS program provides extended time history data evaluation. Once an event file has been opened the analysis menu is available for analysis functions like FFT, response and terzband spectras, etc. for determination of mode and natural frequencies of structures. Any customary in trade evaluation software package can of course be used as well using the available ASCII files.

Sensor
The CR-5P offers the most flexible adaptation of sensors to meet the needs of structural measuring. More than 90 dynamic and 200 static channels may be logically configured. The sensors offered but not limited to are:

GeoSIG AC-xx accelerometer:	
AC-2x frequency response:	0.1 to 100 Hz, ± 2 to ± 0.25 g
AC-6x frequency response:	DC to 100 Hz, ± 2 to ± 0.25 g
GeoSIG VE-xx seismometers / velocity sensors:	
VE-1x frequency response:	1 to 100 Hz, ± 100 to ± 1 mm/s
VE-2x frequency response:	4.5 to 100 Hz, ± 100 to ± 1 mm/s
VE-3x frequency response:	4.5 to 315 Hz, 27.3 Vs/m
VE-5x frequency response:	1 to 315 Hz, 100 to 1'000 Vs/m
Strain Gauge	±1500 μStrain
Weather Station	Wind direction & speed, humidity, air pressure, temperature
Temperature	-40°C to +70°C

Digitizer

A/D Converter:	24 Bit (synchronised) per dynamic channel
A/D Sampling rate:	250 kSPS / 9 channels (over sampling)
Noise:	<1 LSB (Peak) <0.4 LSB (RMS)
Effective Bits:	>16 @ 200 SPS Optionally >20 @ 100 SPS
Sampling Rate:	50, 100, 200, 250 SPS
Configurable input Voltages:	differential +/- 1, 5, 10, 20 V single ended +/- 1, 5, 10 V single ended 2.5 V +/- 2.5 V current loop: 0 … 20 mA

PC Based Recording Options

External Computer:	Minimum performance: Pentium IV 1.7 GHz 1 GByte RAM, 80 GByte HDD USB, COM and LPT ports Mouse*, Keyboard* VGA display* *not required for normal operation
Internal Computer:	Embedded PC with storage on Compact Flash: 1 – 4 GByte or Hard Disk: 40 – 160 GByte or Compatible In-Rack Laptop
Communication	Ethernet TCP/IP Modem: 56 kBaud external
Data Logger Software	GeoDAS

Remote Acquisition System:

Communications:	Ethernet TCP/IP RS-422

Data Recording

Pre-event-Time:	1 to 100 seconds
Post-event-Time:	1 to 100 seconds

Triggering

Level Triggering:	
Lower band limit:	0.1 Hz (40 dB / decade)
Upper band limit:	100 Hz @ 200 SPS (40 dB / decade)
Range:	0.003 to 100 % of full scale
STA/LTA Triggering:	
STA-Base:	0.1 to 100 seconds
LTA-Base:	5 to 100 seconds
STA/LTA-Ratio:	1 to 60 dB

Power Supply

AC Power:	230 VAC / 50 Hz or 115 VAC / 60 Hz std.
Solar Panels:	Optional
External battery:	1 Rechargeable, 12 VDC, 70 Ah Lead battery std. 2nd optional
Autonomy:	Depends on the system configuration.
DC voltage:	12 VDC
Power consumption:	approx. 0.25 W/channel (depending on sensors)

Time Base

External Code Compatible:	NMEA	
Standard clock accuracy:	10-20ppm (5-10 min / year)	
External time interfaces:	GPS System	< ±1/2 sample
	RS-422	< ±1/2 sample
	Ethernet (NTP)	< ±10 ms
Power for GPS receiver:	12 VDC (power cycled every 15 min) Surge Protected	

Environment / Housing

Operational temperature:	- 20 °C to + 60 °C
Storage temperature:	- 40 °C to + 90 °C
Humidity:	0 % to 100 % RH (non condensing)
Type:	Polyethylene/Aluminium stacking portable case, vibration protection optionally available Painted Steel Casing optionally available
Size:	Dimensions vary due to the size/protection
Width:	530 – 550 mm
Depth:	330 – 530 mm add 150 mm on depth for connectors
Height:	160 – 340 mm add height of multiple cases
	Local PE connection recommended
Weight:	20 kg typical for 9 channel unit
Protection:	IP65, EMI & Earthquake resistant Should be protected from direct environmental effects (sunlight, rain, etc).

Self Test

Sensor test:	Square pulse
GPS:	Signal lock
Visual Indicators:	LED Indicators - for the channel network activity - on each channel connector - on each 9 channel module
System Status:	Checked on the continuous basis through the data interrogation (AC power, Battery Voltage, Time Sync Source)

Alarm Option

Alarm levels:	0.003 to 100 % of full scale (User programmable per axis)
Method:	SMS (GSM Short Message Service) e-mail

Specifications subject to change without notice