SYSCOM Instruments

MR2002-SM24-K / Strong Motion Recorder

The MR2002-SM24-K is a Strong Motion Recorder that meets the certified safety standards for safety related applications.

Applications

Seismic Monitoring Solutions for safety related applications in

- Nuclear Power Plants
- Nuclear Fuel Storage Plants
- Nuclear Fuel Enrichment Plants
- LNG Terminals
- Oil & Gas

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MR2002-SM24-K Strong Motion Recorder

The MR2002-SM24-K is a Strong Motion Recorder that meets the certified safety standards for safety related applications. Its high dynamic range and its ability to calculate Seismic Intensity (CAV) continuously makes it particularly suitable for both free field and structural monitoring.

Major features

- Rugged design
- Superb quality, extremely reliable
- Calibrated for a lifetime
  (in combination with accelerometers
  MS2002+ / MS2008+)
- 1 GB event memory (500 hours)
- High dynamic range (130 dB)
- Calculates and provides alarms
  for seismic Intensity (CAV)
- Designed to be used in monitoring network
- Certified to meet the following standards
  IEC 60780 / IEC 60980
  IEC 61513 Class 3
  IEC 61226 Cat. C

MR2002-SM24-K connected to MS2002+
sensor and cable ordered and delivered separately

Data acquisition

Principle	3 individual delta-sigma modulators and digital filtering (32 bit DSP)
Recording	24 bit signed (3 bytes)
Resolution	up to 24 bit
Sampling-rate	50, 100, 200, 500 sps, others on request
Number of channels	3 (X,Y,Z) data channels
Channel to channel skew	None
Dynamic range	130 dB @ 200 sps (RMS noise/RMS clip)
Analog Filter	2 Pole Butterworth (anti-alias filter)
Data Filter	Digital CIC and FIR filter cut-off at 80 % of Nyquist frequency Optional: User defined FIR or IIR digital filters
Trigger Filter	Digital IIR filter: 1 - 10 Hz band-pass Optional: User defined FIR or IIR digital filters

Trigger and De-trigger

Principle	Level trigger
Channels	X,Y or Z axis, software
Range	0.01 to 50 % full scale

Microprocessor

Recording principle	Event recording (time history) with on-line data compression (approx. 20 minutes/MByte @ 200 sps, 3 channels)
Header	Contains status information at time of trigger and event summary
Pre-event recording	1 - 100 seconds (in 1 sec steps)
Post-event recording	1 - 100 seconds (in 1 sec steps)
Max. recording time	Event recording: unlimited (Typ: 30 Min./event)
Alarm triggers principle	Level trigger with unlimited signal 2 levels (individually settable for each axis)
Channels	OR combination of the 3 axis
Range	0.1 % to 100 % full scale
Optional	Seismic intensity alarm, based on CAV (Cumulative Absolute Velocity)

Clock

Accuracy	20 ppm (10 min/year) with Lithium back-up battery
Autonomy	> 5 years autonomy with backup battery

Firmware principle

Multitasking environment, simultaneous data acquisition and communication (data retrieval or parameter setting)

Display

4 LED	Power Supply, Run, Recording/Memory use, Warning/Error

Memory

Primary Memory	Internal 2 MB SRAM
Secundary Memory	Removable SD Flashcard (1 GB), FAT formatted
Recording Capacity	Approx. 500 hours (at 200 sps)

Power supply

Battery	Internal lead-acid gel cell 8,5 Ah
Battery Charger	Integrated
Supply Voltage	DC 10 - 36 V
Power consumption	Approx. 170 mA @ 12 V (standard modules)
Autonomy	Typ. 48 hours (with internal battery)

I/O and connectors

Type	Metallic self-latching push-pull connectors with positioning key (LEMO)
Sensor	Bipolar input (0 ± 4 V), optional differential or pseudo-differential input (0 ± 4 V)
RS-232	Communication with PC or Modem with full galvanic isolation
Alarm/Status relay (opt.)	3 low voltage relays (Seismic Switch) - rating 2 A @ 30 V DC, NC or NO configurable by user
Power consumption	approx. 40 mA @ 12 V
Interconnection	4 - 20 mA current loop interface or fiber optic for NCC Network Control Center
Power	Metallic connector - internal line filter

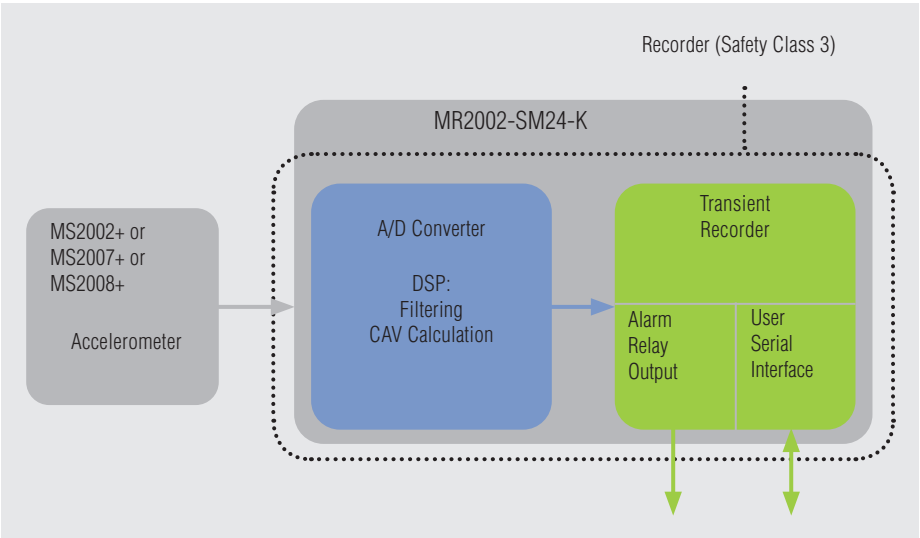
Dimensions

Casing (Aluminium)	200 x 230 x 110 mm
Casing (Stainless Steel)	255 x 262 x 131 mm
Weight	7.5 kg
Protection degree	IP 65 (splash-proof)

Regulations

EMI/RFI	in compliance with EN 61000
Environmental	in compliance with IEC 60068
Heat	-35 °C up to +50 °C (with battery) -35 °C up to +70 °C (without battery)
Humidity	up to 100 % RH
Conformity	CE

Block diagram MR2002-SM24-K



Ordering information

MR2002SM24K — **A** 2 0 0 8 I — **B** H 4 — **E** F O — **N** 3 R — **T** A

A	Sensor type
2002E	External MS2002+ accelerometer
2002I	Internal MS2002+ accelerometer
2008E	External MS2008+ accelerometer
2008I	Internal MS2008+ accelerometer
2007E	External MS2007+ accelerometer

T	External case
A	Aluminium
S	Stainless steel

N	Relays
3R	3 relays
4R	4 relays
XX	No relays

B	Mounting and range
H2	Horizontal mounted, ±2g (only for 2002I)
V2	Vertical mounted, ±2g (only for 2002I)
H4	Horizontal mounted, ±4g (only for 2008I)
V4	Vertical mounted, ±4g (only for 2008I)
EX	External accelerometer

E	Interface
CL	Current Loop
FO	Fiber Optic
XX	No communication interface

Sensors

Detailed data sheets and ordering information available on www.syscom.ch

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