SYSCOM

MRSK2002
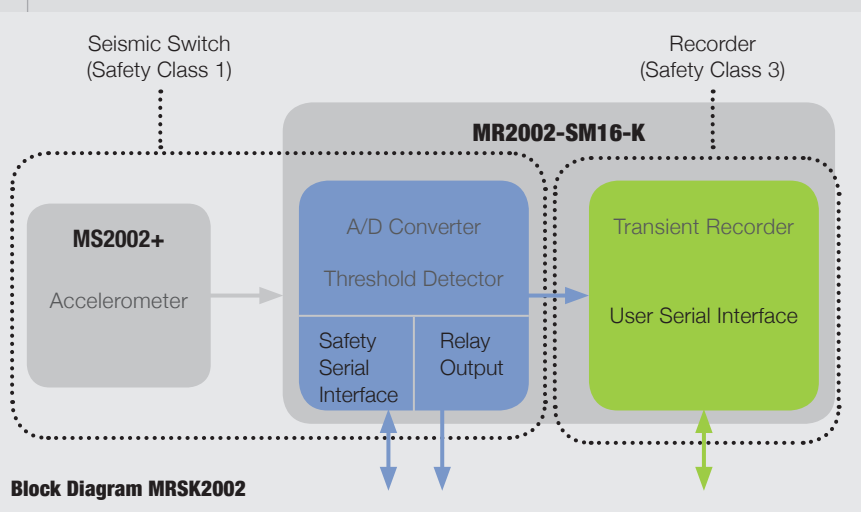# Seismic Switch and Strong Motion Recorder

The MRSK2002 is the first instrument in the market to meet the certified safety standards for Nuclear applications. It combines the functionality of a seimic switch for "Class 1" trip systems with the functionality of a strong motion recorder in a monitoring network.

As such it is part of the Syscom Seismic Monitoring Solution for safety related applications in Nuclear Power Plants, Nuclear Fuel Storage Plants, Nuclear Fuel Enrichement Plants, Liquid Natural Gas Terminals and others.

The MRSK2002 provides outstanding features:

☐ Rugged design
☐ Superb quality, extremely reliable
☐ Calibrated for a lifetime
☐ 1 GByte event memory (500 hours)
☐ Suitable for trip systems in NPPs
☐ Designed for use in monitoring network
☐ Certified to meet
   IEC 60780 / IEC 60980
   IEC 61513 Class 1/ IEC 61226 Cat.A
   IEC 61508 SIL2
   IEC 60880

SYSCOM Instruments
A Pleasure to Measure

Technical Specification

MRSK2002
Seismic Switch and Strong Motion Recorder

Seismic Switch
(Safety Class 1)

Recorder
(Safety Class 3)

MR2002-SM16-K

MS2002+

Accelerometer

A/D Converter

Threshold Detector

Transient Recorder

User Serial Interface

Safety Serial Interface

Relay Output

Block Diagram MRSK2002

Technical Specifications MR2002-SM16-K

Data Acquisition

Principle	Linear "track and hold" A/D-Converter, analog filtering
Resolution	16 bit
Sampling-rate	200 sps
Number of channels	3 (X,Y,Z) data channels
Dynamic range	96 dB (RMS)
Analog Filters	• 6 Pole Butterworth low-pass, -3 dB @ 50 Hz
	120 dB/decade (anti-alias filter)
	• 1 - 10 Hz band-pass-pass (trigger filter)

Trigger	
Principle	Level trigger
Channels	X,Y or Z axis, software
	OR combinations
Range	0.1 % to 50 % full scale

Microprocessors

Recording	
Principle	Event recording (time history) with on-line data compression
Header	Contains status information at time of trigger
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, (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

Clock

Accuracy	20 ppm (10 min / year) or network Time synch. to master clock
Autonomy	> 5 years with backup battery

Firmware

Principle	Multitasking environment, simultaneous data acquisition and communication (data download or parameter setting)
User interface	RS-232 up to 115200 Baud
- Parameter setting	Packetized protocol with check-sum and one level password
- File-transfer	XMODEM / YMODEM 1K
- Firmware upgrade	(non safety) Download via RS-232
- User Interface Parameters:	Trigger level, Post event trigger, Pre event trigger, Time synchronization and others
Safety Interface (Internal)	RS-232
- Parameter setting	Packetized protocol with check-sum and one level password
- File-transfer	XMODEM / YMODEM 1K
- Safety Interface Parameters:	Alarm Levels, Test Parameters
Autodiagnostics	Continuous monitoring of all important functions Fully comprehensive periodic self-test

Display

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

Memory

Primary Memory	Internal 2 MByte SRAM
Secondary Memory	Removable SD Flash Card 1 GByte, FAT formated
Recording capacity	Approx. 500 hours (at 200sps)

Power Supply

Battery	Internal lead-acid gel cell 7 Ah, optionally 9 Ah
Battery Charger	Integrated
Supply Voltage	DC 10-36 V
Power consumption	Approx. 200 mA @ 12 V
Autonomy (with internal battery)	Approx. 35 hours

I/O and Connectors

Type	Metallic self-latching push-pull connectors with positioning key (LEMO)
Sensor	Bipolar input 0±2V (MS2002+)
Safety RS 232 (Internal)	Communication PC
User Serial Interface	Fiberoptic with NCC Network Control Center or PC, (opt.: 4-20 mA)
Power	Metallic connector - internal line filter
Safety Alarm Relay	2 low voltage relays (Seismic Switch) - rating 2 A @ 30 V DC, nc or no configurable by user Power consumption approx. 40 mA @ 12 V
Error Alarm Relay	1 low voltage relay - rating 2 A @ 30 V DC, nc or no configurable by user
Power consumption	approx. 40 mA @ 12 V

Ordering Information

		Product Codes
Seismic Switch with sensor	MRSK2002	93.11.4000

Dimensions

Casing	Aluminium, 230 x 200 x 110 mm,	opt.: Stainless Steel Casing
Weight	7.5 kg	
Protection degree	IP 65 (splash-proof),	opt.: IP 67

Regulations

RMI/RFI	In compliance with IEC 61000
Environmental	In compliance with IEC 60068
	Heat: -20° up to +70°C
	Humidity: up to 100% rh
Conformity	C€

Technical Specifications MS2002+

Performance

Principle	MEMS capacitive accelerometer with electronical signal conditioning
Full Scale Range	± 2 g
Hysteresis	none
Sensitivity	1mV/mg
Non linearity	< 0.8% of F.S.
Frequency Response	0 - 100 Hz
Temperature Coefficient	typ. < 0.1 mg/°C
Resolution	< 0.1 mg
Noise	typ. 18 µV / $\sqrt{Hz}$, max. 24 µV / $\sqrt{Hz}$
Dynamic Range	typ. 85 dB

Mechanical	
Shock Survival	6000 g
Vibrations	20 g rms, 20 - 2000 Hz
Cross Axis Sensitivity	30 mV/g
Operating Temperature Range	-20 to 70 °C
Power Supply	± 5 VDC
Power Consumption	Typ. 6 mA@5V, 4mA@-5V

Physical Characteristics

Housing	Aluminum, 80 x 75 x 57 mm (W x L x H)	opt.: Stainless Steel Casing
Connector	Metallic self-latching push-pull connector with positioning key (LEMO)	
Weight	*0.5 kg*	
Protection degree	IP 65 (splash-proof)	opt.: IP 67

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