

# SAFETY IS OUR PRIORITY

## MRSK2002 / SEISMIC SWITCH AND STRONG MOTION



### APPLICATIONS

Seismic Monitoring Solutions for safety related applications in :

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

### DATASHEET : MRSK2002

The MRSK2002 is the first instrument in the market to meet the certified safety standards for Nuclear applications.

## 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 seismic switch for "Class 1" trip systems with the functionality of a strong motion recorder in a monitoring network.

### Major features are

- Rugged design
- Superb quality, extremely reliable
- Calibrated for a lifetime
- 1 GB event memory (500 hours)
- Suitable for trip systems in NPPs
- Designed to be used in monitoring networks
- Certified to meet  
IEC 60780 / IEC 60980  
IEC 61513 Class 1 / IEC 61226 Cat. A  
IEC 61508 SIL 2\*  
IEC 60880

\*SIL 3 with triple redundancy



MR2002-SM16-K



MS2002+

### Technical Specifications

#### 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)
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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	Download via RS-232 (non safety)
- 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
- Parameters	Alarm Levels, Test Parameters

Autodiagnosics	Continuous monitoring of all important functions Fully comprehensive periodic self-test
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Display	4 LED
	Power Supply, Run, Recording / Memory use, Warning / Error

#### Memory

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

**Power Supply**

Battery	Internal lead-acid gel cell 8.5 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	Fiber optic with NCC Network Control Center or PC,
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**

Seismic Switch with sensor MRSK2002

93114000

**Dimensions**

Casing	Aluminium, 230 x 200 x 110 mm
Weight	7.5 kg
Protection degree	IP 65 (splash-proof)

**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	CE



## Technical Specifications MS2002+

Performance principle	MEMS capacitive accelerometer with electrical signal conditioning
Full Scale Range	± 2 g
Hysteresis	none
Sensitivity	1mV/mg
Non linearity	< 0.8% of FS
Frequency Response	0 - 100 Hz
Temperature Coefficient	typ. < 0.1 mg/°C
Resolution	< 0.1 mg
Noise	typ. 18 µV / √Hz, max. 24 µV / √Hz
Dynamic Range (RMS)	> 84 dB (DC to 50 Hz)

### Mechanical

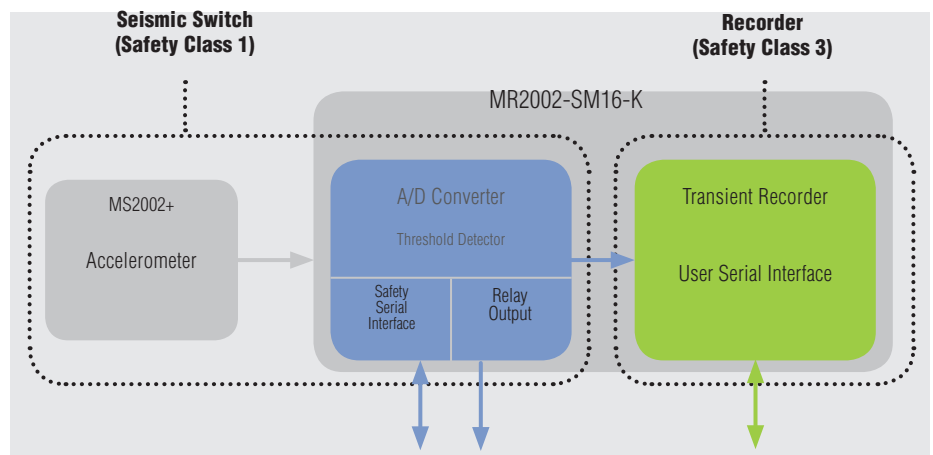
Shock Survival	6000 g
Vibrations	20 g rms, 20 - 2000 Hz
Cross Axis Sensitivity	30 mV/g
Operating Temperature	-20 to 70 °C
Power Supply	± 5 VDC
Power Consumption	Typ. 6 mA@5V, 4mA@-5V

### Physical Characteristics

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



## Block Diagram MRSK2002



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