



**MR2002 (Red Box)  
Digitizer / Recorder**  
**MR2002-24 Seismic Recorder**  
**MR2002-16 Strong Motion Recorder**

Syscom Instruments – a pioneer in developing seismic measurement systems – have designed the MR2002 to meet and exceed your requirements. The MR2002 family provides outstanding features:

- rugged and modular design
- superb quality
- excellent reliability
- designed for use in networks
- economical memory handling
- versatility for many applications

The MR2002-24 is an economical high-performance recorder for seismic and strong motion applications.

The MR2002-16 together with the well proven MS2002+ capacitive MEMS accelerometer is best suited for industrial monitoring applications. It is approved among others by German TÜV for the use in Nuclear Power Plants.

**SYSCOM Instruments.**  
A Pleasure to Measure.

## Technical Specification MR2002

### 1. Data Acquisition

		Product Code
<b>1.1 24 bit A/D Converter / digital Filter</b>		<b>18D</b>
■ Principle	3 individual delta-sigma modulators and digital filtering (32 bit DSP)	
■ Resolution	20 bit @ 200 sps	
■ Sampling-rate	100, 200, 400, 800, 1000 sps	
■ Number of channels	3 (X,Y,Z) data channels, 4 auxiliary channels (10 bit resolution)	
■ Channel to channel skew	none	
■ Dynamic range	120 dB (RMS) @ 200 sps	
■ Filters:		
Analog Filter	- 2 Pole Butterworth (anti-alias filter)	
Digital IIR or FIR Filter	- selectable, corresponding to sampling rate (data filter) - 0.5 - 15 Hz band-pass (trigger filter)	
■ Trigger and De-Trigger:		
Principle	level trigger or STA / LTA	
Channels	X,Y or Z axis, software- or external trigger, logical AND or OR combinations	
Range	0.003 to 50% full scale	
<b>1.2 16 bit A/D Converter / analog Filter</b>		<b>16A</b>
■ 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) - 0.5 - 15 Hz band-pass-pass (trigger filter)	
■ Trigger:		
Principle	level trigger	
Channels	X,Y or Z axis, software- or external trigger, logical AND or OR combinations	
Range	0.1 % to 50 % full scale	
■ 3 additional channels	same specification as above, recording only	<b>16A6</b>

### 2. Microprocessor

<b>Recording</b>		
■ Principle	Event recording (time history) with on-line data compression	<b>PH</b>
■ Header	contains status information at time of trigger	
■ Pre-event recording	1 - 30 seconds (in 1 sec steps)	
■ Post-event recording	1 - 90 seconds (in 1 sec steps)	
■ Max. recording time	Event recording: unlimited, split into files of 1-255 seconds length	
<b>Alarm triggers</b>		
■ 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	for 18D: frequency weightend alarms	
<b>Clock</b>		
■ Accuracy	20 ppm (10 min / year)	
■ Autonomy	> 5 years with backup battery	
■ Time code receivers	DCF or GPS	

Firmware		Product Code
■ Principle	Multitasking environment, simultaneous data acquisition and communication (data download or parameter setting)	
■ User interface	RS-232 up to 115200 Baud, with full handshake	
- Parameter setting:	packetized protocol with check-sum and three level password	
- File-transfer:	XMODEM / YMODEM 1K	
- Firmware upgrade	download via RS-232	
- Real time output	packetised protocol for bi- or unidirectional digital telemetry	
- Intelligent alerting	modem dial-up or send SMS message	
■ Autodiagnosics	Continuous monitoring of all important functions Fully comprehensive periodic self-test	
<b>Display</b>		
■ 4 LED	Power supply Run / Self-test Recording / Memory use Warning / Error	
■ LC-Display	Status information, Peak values of the last event, important settings, time and sync information	
<b>3. Memory</b>		
■ Principle	internal 2 MByte SRAM with backup battery	
■ Organisation	primary memory (flat or ring-buffer) - or - ring-buffer for the mass storage device	
■ Recording capacity	approx. 36 min / MByte (at 200 s <sup>-1</sup> )	
■ Mass storage	removable flash disk (32 MByte up to 640 MByte) accessible via PC-card interface (former called PCMCIA)	<b>MS</b>
<b>4. Power Supply</b>		
■ Internal	Lead-acid gel cell 7 Ah, charged by built-in power supply	
■ External	AC 230 V or 115 V, optional DC 20 - 32 V	<b>AC or DC</b>
■ Power consumption	MR 2002-16 approx. 70 mA @ 12 V MR 2002-24 approx. 200 mA @ 12 V	
■ Autonomy (with internal battery)	MR 2002-16 approx. 60 hours MR 2002-24 approx. 20 hours	
<b>5. I/O and Connectors</b>		
■ Type	Metallic self-latching push-pull connectors with positioning key (LEMO)	
■ Sensor	- unipolar input (2.5 ± 2 V) or bipolar (0 ± 2V) for 16-Bit digitizer - bipolar input (0 ± 2 V, 0 ± 4.5 V )	
■ RS-232	Communication with PC or Modem with full galvanic separation Optional IrDA (infrared) port	
■ External		
- 2. RS-232	Real-time output, packetized digital data stream	
- Relays / Ext. Trigger	for Master/Slave trigger or alarm output (seismic switch)	
- Interconnection	4-20 mA or F/O interface for NCC Network Control Center	
■ Line power	metallic connector with protective GND - internal line power filter	

## 6. Options

		Product Code
■ Alarm-interface	3 Relays (seismic switch, Master-/Slave) power consumption: approx. 40 mA @ 12 V	IR
■ GPS-interface	internal GPS receiver, external antenna - power cycling / sets time and location information - timing accuracy better than 5 ms power consumption: approx. 60 mA @ 12 V (GPS operating) approx. 10 mA @ 12 V (standby)	GPS
■ DCF-antenna	sets time information, accuracy 5 ms power consumption approx. 4 mA @ 12 V	DCF
■ Network-interface	Connection to NCC Network Control Center - Fiber-optical interface 850 nm Tx/Rx, distance up to 3 km - current-loop interface 4-20 mA Tx/Rx, distance up to 1 km power consumption approx. 40 mA @ 12 V	IF-FO IF-CL
■ Master/Slave	Daisy chain network (up to 8 MR's)	IF-MS

## 7. Dimensions

■ Housing	Aluminum, 210 x 200 x 110 mm
■ Weight	7.5 kg
■ Protection degree	IP 65 (splash-proof)

## 8. Regulations

■ Electrical Security	in compliance with EN 61010
■ RMI/RFI	in compliance with EN 50 081 and EN 50 082
■ Environmental	in compliance with IEC 68-2 shock: 30 g / 11 ms half-sine heat: -20° up to +50°C humidity: up to 100% rh vibration: up to 5 g (operating)
■ Conformity	<b>CE</b>

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