

MR3003C

Vibration & Motion Measurement System



The MR3003C in SYSCOM's rugged RED BOX is a compact vibration/motion measurement system. As such it meets all user expectation in a state-of-the-art device and thus is a highly reliable and efficient tool for many applications. It is suitable for structural monitoring and for human comfort evaluations based on VDV - Vibration Dose Values and RMS values.

Applications

- **Civil Engineering and Human comfort**
Industrial Vibrations - Construction Site Monitoring - Tunneling
- Truck and Rail Traffic - Blasting Monitoring - Model Verification
- **Earthquake Engineering**
Building Monitoring - Monitoring of Structures (Dams and Bridges)
- **Geology**
Soil Characterization
- **Earth Science**
Earthquake Monitoring (seismic intensity)
Continuous data stream in MiniSeed/SeedLink format

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Major features

- Compact unit containing sensor, digital recorder and communication
- Dual core ARM processor
- Internal 4G modem, fallback 3G/2G
- Internal 4GB memory
- Embedded Web Server for easy configuration and control
- Precise timing (GPS)
- Power over Ethernet (PoE)
- Wide dynamic range
- Wireless connectivity

Internet connectivity

- Mobile, user to put a SIM card
- Wi-fi, with firmware version 3.2.0 or more recent
- Ethernet, connected to an external modem



MR3003C with 4G module and mounting plate, lateral view.

Data acquisition

This subsection is not applicable to the internal digital sensor MS2010+. Please refer to the dedicated section in the next page

Resolution	24 bits
Sampling-rate	250, 500, 1'000, 2'000, 4'000 sps
Number of channels	3
Channel to channel skew	None – simultaneous sampling on all channels
Dynamic range	Typ. 130dB@250 sps, 124dB@1000 sps
Data Filter	FIR & IIR digital filters
Trigger Filter	Digital IIR filter: 0.5 - 15 Hz band-pass (only for accelerometer)

Trigger and de-trigger

Principle	Level trigger or STA / LTA
Trigger voting logic	Predefined AND or OR combinations, individual channel votes
Level trigger	0.003 to 100% full scale
STA / LTA (for accel.)	STA: 0,1 to 25s, LTA: 1 to 250s, Ratio: 0,1 to 25.
Smart Trigger / De-Trigger	Automatic adjustment of trigger level

Microprocessor

Recording principle	Event recording (time history), continuous time recording, manually triggered or timed recording
Header	Contains status information at time of trigger and event summary
Pre-event recording	1-99 seconds (@250Hz), others depending on sampling rate
Post-event recording	1-100 seconds
Data memory	Removable SD card (4Gb)

Alarm triggers

Principle	Two alarm levels independently settable as: threshold levels, curves defined by the main standards or user-defined curves
Alarm level range	0.1 % to 100% full scale
Alarm based on standards	Different built-in standards: DIN 4150-3 (Germany), SN 640312 (Switzerland), Circulaire du 23/07/1986 (France), Önorm S 9020 (Austria)
User-defined alarm	Thresholds and frequencies individually settable for each axis
Notifications	Various notification options, individually settable for each axis

Precision timing

System Clock	1 ppm, this clock is disciplined by GPS, NTP
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Data/user interface

Intelligent Alerting	System initiates communications or sends text message (SMS) or e-mail when an event is detected
Web Interface	Easy to use command & control through embedded web server
FTP	Built-in client protocol supporting FTP, SFTP, FTPS able to push to a server

Display

3 LED	Run, Recording, Warning / Error
LCD-Display	Status information, important settings, event-related information

Wireless Communication

WiFi	IEEE 802.11 b/g/n compliant
Mobile Network (option)	Internal 4G modem, fallback 3G/2G

Power Supply

Supply Voltage	9 - 14.5VDC or 48V PoE
Power Consumption	From 1 W to 1.4 W depending on the configuration (velocitymeter) From 1.3 W to 1.7 W depending on the configuration (accelerometer)

I/O and Connectors

Type	Metallic self-latching push-pull connectors with positioning key (LEMO)
Power	Metallic connector with protective GND
GPS	Connector for external GPS
LAN / PoE	Communication with PC or network - Ethernet 100BaseT

Sensors (Internal)

Users can choose an internal triaxial sensor among those proposed below, or an external sensor.

Triaxial Velocity meter MS2003+ Type

Principle	Velocity sensor with linearized frequency response
Measuring range full scale	A3HV 315/1 (triaxial) (according to DIN 45669)
Frequency range	Geophone
Case-to-coil motion	± 100 mm/s
Dynamic range	1 - 350 Hz
Linearity/Phase	4 mm p-p
Cross axis sensitivity	> 130 dB
Orientation	According to DIN 45669 (class 1)
	According to DIN 45669 (<5%)
	Horizontal (floor) mounting or vertical (wall mounting)

Triaxial Accelerometer MS2008+

Principle	The MEMS accelerometer consists in a micro-machined capacitive sensing element (MEMS) and a custom low-power mixed-signal integrated circuit (ASIC) that includes an amplifier and differential output stage.
Hysteresis	None
Dynamic range (100 Hz BW)	typ. 100 dB (± 4 g)
Noise (10 to 1000 Hz)	typ. 7 $\mu\text{g}_{\text{rms}}/\sqrt{\text{Hz}}$
Frequency response	0 - 600 Hz
Measuring range	± 4 g
Orientation	Horizontal (floor) mounting or vertical (wall mounting)
Self test	Test-pulse

Triaxial Accelerometer MS2010+ (digital)

Principle	Quartz crystal micro machined technology with built-in temperature compensation.
Sampling rate	250, 500, 1000 sps
Hysteresis	None
Number of channels	3 orthogonal (x, y, z)
Noise	Typ. < 0.2 mg RMS/ $\sqrt{\text{Hz}}$ (refer to PSD plot)
Dynamic range	Typ. > 139dB @200sps
Frequency response	DC to 460Hz
Orientation	Horizontal, vertical or ceiling, self-adapting

Dimensions

Housing	Aluminum, 120 x 180 x 100 mm
Weight	1.5 kg
Protection degree	IP 65 (splash-proof)

Regulation

Electrical Safety	In compliance with IEC 61010
EMI/RFI	In compliance with EN 61000
Environmental	Shock: 30 g/11 ms half-sine
	Heat: -20°C up to +70°C
	Humidity: up to 100% RH
	Vibration: up to 5 g (operating)

Conformity	CE
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Norm Compliance

Structural damage

- DIN 4150-3 (Germany)
- SN 640312 (Switzerland)
- Circulaire du 23/07/1986 (France)
- Onorm S 9020 (Austria)
- SBR-A (The Netherlands)
- Others available on SCS cloud software

Human comfort

- DIN 4150 -2 (Germany)
- ISO 2631-1 (International)
- ISO 2631-2 (International)
- BS 6472-1 (UK)
- UNI 9614 (Italy)
- SBR-B (The Netherlands)

Other

- Calculation of 1/3 octave bands in successive background periods

Syscom Cloud Software (SCS)

The MR3003C can be connected to the Syscom Cloud Software (SCS) in order to simply visualize the data recorded and manage different projects.

The main features of the SCS include:

- plug & play M2M communications
- management by projects
- different access levels (admin, read/write, view only)
- visualization of events/background monitoring
- comparison with reference standards
- automatic reporting

Please visit scs.syscom-instruments.com for more information.

SCS

scs.syscom-instruments.com

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Ordering information

Description	Part number	Internal triaxial velocity meter MS2003+	Internal triaxial accelerometer MS2008+	Internal triaxial accelerometer MS2010+
MR3003C kits Example: 93106309-A-EU				
Kits MR3003C with: MR3003C recorder - 4GB Memory - WiFi - Ethernet connectivity - Embedded web server for configuration and control - 3 m Ethernet cable - Battery pack with internal AC/DC & cable to MR - External AC/DC converter - Carrying case				
Standard Vel: MR3003C mounting plate - Internal triaxial velocity sensor MS2003+ - horizontal mounting	93106309	x		
Standard Acc: MR3003C mounting plate - Internal triaxial accelerometer MS2008+ - horizontal mounting	93106327		x	
Standard Acc: MR3003C mounting plate- Internal triaxial accelerometer MS2010+ - horizontal/vertical/ceiling mounting	93106354			x
Standard Ext Vel: Compatibility with external velocity sensor MS2003+	93106310			
Standard Ext Acc: Compatibility with external accelerometer MS2008+	93106341			
4G module for Europe, Middle East, Africa and Asia	A			
4G module for North America	B			
4G module for Australia, New Zealand and South America	C			
Without 4G module	X			
Cables to Swiss power grid	CH			
Cables to European power grid	EU			
Cables to US power grid	US			

MR3003C main units Example: MR3003C-2003I-H-A-X		
Main unit with: 4GB Memory - WiFi - Ethernet connectivity - Embedded web server for configuration and control	MR3003C	
External triaxial velocity sensor MS2003+	2003E	
Internal triaxial velocity sensor MS2003+	2003I	
External triaxial acceleration sensor MS2008+	2008E	
Internal triaxial acceleration meter MS2008+	2008I	
Internal triaxial High Dynamics acceleration sensor MS2010+	2010I	
Horizontal mounting (only with 2003I)	H	
Vertical mounting (only with 2003I)	V	
Horizontal mounting, ± 4 g (only with 2008I)	H4	
Vertical mounting, ± 4 g (only with 2008I)	V4	
Horizontal/vertical/ceiling, ± 14 g (only with 2010I)	14	
External sensor	EX	
4G module for Europe, Middle East, Africa and Asia	A	
4G module for North America	B	
4G module for Australia, New Zealand and South America	C	
Without 4G module	X	
Compatibility with external kit GPS	G	
No compatibility with external kit GPS	X	