

# 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, 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



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

### Data acquisition

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

### Trigger and de-trigger

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

### Microprocessor

<b>Recording principle</b>	Event recording (time history), continuous time recording, manually triggered or timed recording
<b>Header</b>	Contains status information at time of trigger and event summary
<b>Pre-event recording</b>	1-99 seconds (@250Hz), others depending on sampling rate
<b>Post-event recording</b>	1-100 seconds
<b>Data memory</b>	Removable SD card (4Gb)
<b>Alarm triggers</b>	
<b>Principle</b>	Two alarm levels independently settable as: threshold levels, curves defined by the main standards or user-defined curves
<b>Alarm level range</b>	0.1 % to 100% full scale
<b>Alarm based on standards</b>	Different built-in standards: DIN 4150-3 (Germany), SN 640312 (Switzerland), Circulaire du 23/07/1986 (France), Önorm S 9020 (Austria)
<b>User-defined alarm</b>	Thresholds and frequencies individually settable for each axis
<b>Notifications</b>	Various notification options, individually settable for each axis
<b>Precision timing</b>	
<b>System Clock</b>	1 ppm, this clock is disciplined by GPS, NTP
<b>Data/user interface</b>	
<b>Intelligent Alerting</b>	System initiates communications or sends text message (SMS) or e-mail when an event is detected
<b>Web Interface</b>	Easy to use command & control through embedded web server
<b>FTP</b>	Built-in client protocol supporting FTP, SFTP, FTPS able to push to a server

### Display

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

### Wireless Communication

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

### Power Supply

<b>Supply Voltage</b>	9 - 14.5VDC or 48V PoE
<b>Power Consumption</b>	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

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



## Sensors (Internal)

### Triaxial Velocitymeter Type

Velocity sensor with linearized frequency response  
A3HV 315/1 (triaxial) (according to DIN 45669)

#### Principle

Geophone

#### Measuring range full scale

± 100 mm/s

#### Frequency range

1 - 350 Hz

#### Case-to-coil motion

4 mm p-p

#### Dynamic range

> 130 dB

#### Linearity/Phase

According to DIN 45669 (class 1)

#### Cross axis sensitivity

According to DIN 45669 (<5%)

#### Orientation

Horizontal (floor) mounting or vertical (wall mounting)

### Triaxial Accelerometer

#### 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 (±4g)

#### 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

## 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

## Ordering Information (please refer to last page)

#### Measurement System

MR3003C with internal Velocitymeter

MR3003C with internal Accelerometer

#### Power supply

External battery pack with integrated AC/DC converter/charger

External AC/DC converter

#### Mounting Platform

Mounting platform for MR3003C with levelling bubble

#### GPS timing

GPS receiver and antenna

#### Carrying case

For MR3003C and battery package

## 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)

## 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 (administrator, read/write, view only)
- visualization of events/background monitoring
- comparison with reference standards
- automatic reporting

Please visit [scs.syscom-instruments.com](http://scs.syscom-instruments.com) for more information.

# SCS

[scs.syscom-instruments.com](http://scs.syscom-instruments.com)

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## Ordering information

Description	Part number	Internal triaxial velocity meter	Internal triaxial accelerometer
<b>MR3003C kits</b> Example: <b>93106309-A-EU</b>			
<b>Kits MR3003C with:</b> 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			
<b>Standard Vel:</b> MR3003C mounting plate - Internal triaxial velocity sensor MS2003+ - horizontal mounting	93106309	x	
<b>Standard Acc:</b> MR3003C mounting plate - Internal triaxial accelerometer MS2008+ - horizontal mounting	93106327		x
<b>Standard Ext Vel:</b> Compatibility with external velocity sensor MS2003+	93106310		
<b>Standard Ext Acc:</b> 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		

<b>MR3003C main units</b> Example: <b>MR3003C-2003I-H-A-X</b>			
<b>Main unit with:</b> 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		
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		
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		