MR3003DMS
Dam Monitoring System

The MR3003DMS is a dedicated strong-motion monitoring system for dams. Up to 32 units can be connected together to have a complete and reliable seismic monitoring system.

Market Segments

Strong motion
- All types of dams
- Dynamic behaviour assessment of large complex structures under seismic constraints

SYSCOM Instruments

MR3003DMS Dam Monitoring System

The MR3003DMS seismic monitoring system is the most compact, integrated and reliable system for dams, ensuring the highest level of safety and sustainability. Automatic earthquake detection and structural monitoring will ensure the dam full integrity over its lifetime.

The MR3003DMS is extremely versatile and easy to install, thanks to its state of the art Ethernet master-slave connectivity and the command & control access through embedded web server.

3 relays output (alarm 1, alarm 2, device error) can be directly connected to the control room for a centralized overview and an automatic logic response in case of any seismic event.

Major features

- Compact unit containing sensor, recorder, battery and communication
- Fiber optics communication
- Internal AC/DC with Overvoltage protection, type I + II
- Embedded Web server for easy configuration and control
- Optional accurate timing (GPS)
- 3 output relays
- Industrial cable glands and internal terminals (no additional junction box needed)

MR3003DMS

Panel mount RJ45 connector with cap for LAN kit

Technical specifications

Data acquisition

General

Principle	4th order delta-sigma ADC per channel
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	Anti-aliasing filters
Trigger Filter	Digital IIR filter: 0.5 – 15 Hz band-pass (Strong Motion Applications)

Trigger and de-trigger

Principle	Level trigger or STA/LTA or automatic adjustment of trigger level
Trigger voting logic	Predefined AND or OR combinations, individual channel votes
Trigger level	0.1 mg to 4 g
STA / LTA	STA: 0.1 to 25s, LTA: 1 to 250s, ratio 0.1:25
Smart Trigger / De-Trigger	Automatic adjustment of trigger level

Microprocessor

Recording

Principle	Event recording (time history), continuous time recording or manually triggered
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
Max. recording time	Unlimited
Memory Removable	SD flash card (4GB)

Timing

System clock	1ppm, could be disciplined by GPS or NTP

Data / User Interface

Web interface	Easy to use command & control through embedded web server
Intelligent Alerting	System initiates communications and sends e-mail when an event is recorded
FTP Built-in	Built-in client protocol supporting FTP, SFTP, FTPS able to push to a server

Alarm triggers

Principle	Two alarm levels independently settable as threshold levels or user-defined curves, with various notification options (individually settable for each axis)
Alarm level range	0.1 % to 100% full scale
User-defined alarm	Thresholds and frequencies individually settable for each axis
System status	3 LEDs Run, Recording, Warning/Error. Internal LCD with status info and important settings

Network capabilities

Common trigger and common alarm	Configurable with AND/OR logic, for every device within the same network
Sync. in LAN network	Typically 1 ms with NTP protocol
Max. number of MR3003DMS	32, in Master/slave configuration
Remote control	VPN, DDNS

Power Supply

Power supply	100 - 240 V AC, 50 - 60 Hz, OVP protected, type I and II. Optional DC power 10-36 V DC
Internal battery	12 V, 12 Ah
Consumption	4 W (with charged battery), 25 W (AC max. and battery in charge)
Battery autonomy	Typ. 40 hours

I/O (glands and connectors)

Relays (3)	M16 cable gland 7-11mm / Terminals
Power	M16 cable gland 4-11mm / Terminals
Kit LAN	On request, 3 m Ethernet cable
Kit GPS	On request, connector and GPS antenna with 5 m cable for time synchronization
FO	M20 cable gland 6-13 mm / ST connectors

Fiber Optics

FO type	Multimode OM2 fiber with wavelength 1300 nm, 50/125 µm, Rx/Tx

Relays

Configuration	3 output configurable relays, No/Nc
Current	2 A, 30 V DC

Acceleration sensor

Principle	Micro-machined capacity MEMS accelerometer
Hysteresis	None
Noise (10 to 1000 Hz)	Typ. 7 µg/$\sqrt{}$ Hz
Frequency range	DC to 600 Hz
Dynamic range	Typ. 100 dB @ 200 sps
Measuring range	±4 g
Sensitivity	1.25 V/g differential
Scale factor error	< 1 %
Orientation	Horizontal or vertical mounting, to be specified when ordering
Self test	Test-pulse, configurable

Housing

Dimensions	330 x 230 x 110 mm
Weight	10 Kg
Protection degree	IP66

Environmental

Shock	30 g/11 ms half-sine
Heat	-20 °C to +50°C
Humidity	up to 100% RH

Regulations

EMC	IEC 61326-1
Electrical safety	IEC 61010
Conformity	CE
Origin	Swiss Made

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SCS scs.syscom-instruments.com

Syscom Cloud Software (SCS)

The MR3003DMS 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:
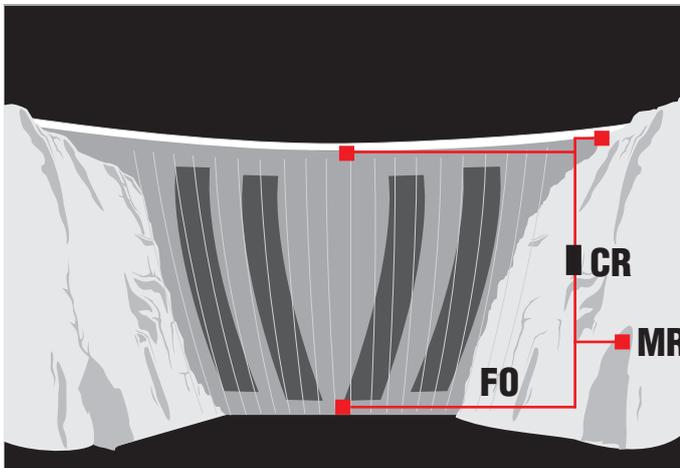
- plug & play M2M communications
- management by projects
- different access levels (administrator, read/write, view only)
- visualization of events/background monitoring
- comparison with reference standards
- automatic reporting

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

![SCS logo]

scs.syscom-instruments.com

Arch dam instrumentation

MR : MR3003DMS   FO : Fiber Optics
CR : Control Room with FO switch

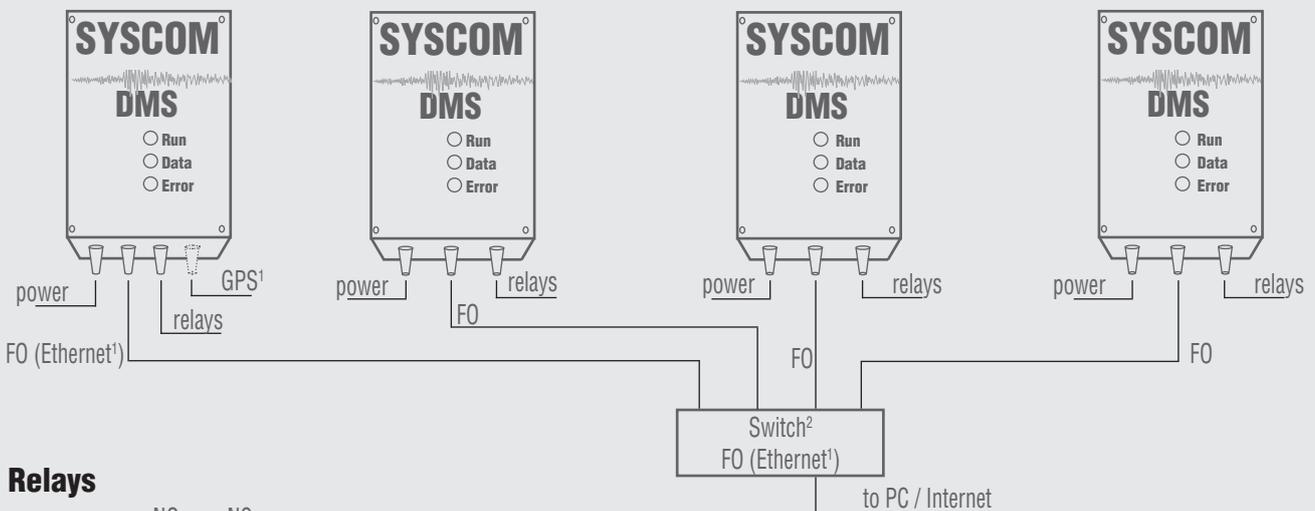## Dam Strong-motion, minimal instrumentation

- 2 MR3003DMS at the dam top (middle and embankment)

- 1 MR3003DMS at the dam base

- 1 MR3003DMS at the free field

- Connections with fiber optics to reach the Control Room

Contact SYSCOM Instruments SA for complete dam monitoring guidelines

Block diagramm MR3003DMS
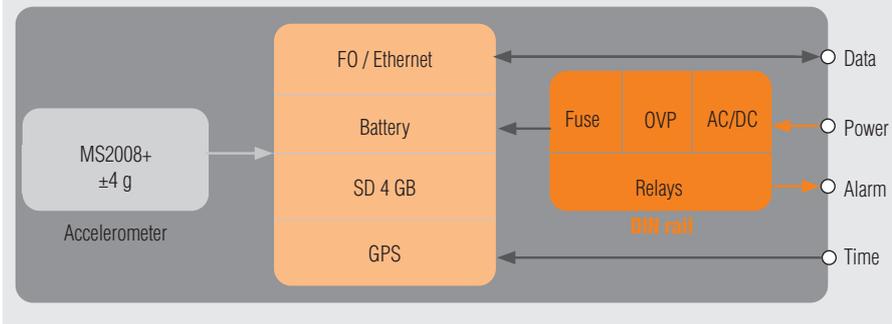
Wiring diagram

FO	1300 nm, 50/125 µm, Rx/Tx, OM2
Relays	3 alarm relays
Power	100-240 V AC 50-60 Hz, DC on request

[1] kit on request
[2] the switch is not supplied by SYSCOM

Relays

Ordering information

Sets descriptions:

MR3003DMS main unit with internal triaxial accelerometer containing: internal battery, internal AC/DC converter, Over Voltage Protection, 3 relays, 4 GB Memory, Embedded server for configuration and control with master/slave settings for Ethernet network	Part Number	AC Power supply & OVP	DC Power supply	Horizontal mounted	Vertical mounted
MR3003DMS ±4g, horizontal mounted, AC 100-240 V AC, fiber optic communication	MR3003DMS-2008I-H4-F-AC-X	x		x	
MR3003DMS ±4g, vertical mounted, AC 100-240 V AC, fiber optic communication	MR3003DMS-2008I-V4-F-AC-X	x			x
MR3003DMS ±4g, horizontal mounted, DC 10-36 V DC, fiber optic communication	MR3003DMS-2008I-H4-F-DC-X		x	x	
MR3003DMS ±4g, vertical mounted, DC 10-36 V DC, fiber optic communication	MR3003DMS-2008I-V4-F-DC-X		x		x
MR3003DMS ±4g, horizontal mounted, AC 100-240 V AC, LAN communication	MR3003DMS-2008I-H4-L-AC-X	x		x	
MR3003DMS ±4g, horizontal mounted, AC 100-240 V AC, LAN communication, GPS compatibility*	MR3003DMS-2008I-H4-L-AC-G	x		x	
KIT GPS for MR3003DMS complete (cable, connectors, GPS)	12110201				
MRs network Master/Slave firmware option**	88010003				
Mounting platform in PE-HD black with mounting screws and bolts	13000048				
IP66 plug for KIT LAN with X meter cable. Please specify length in -X meters, in standard 3m.*	81000585-X				

*to be ordered at purchase time   **Master MR to be specified at purchase time,1 MR master per network.