

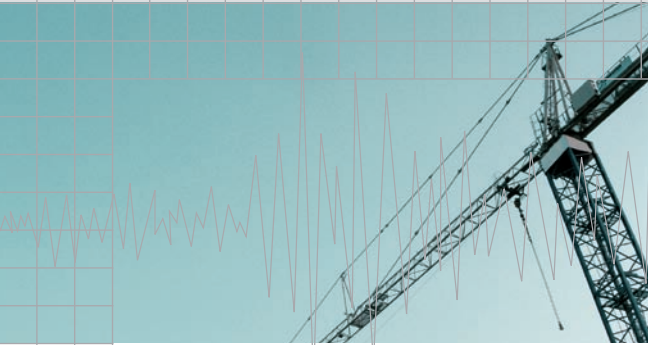


MR2002-CE Civil Engineering System

The MR2002-CE RED BOX is a complete vibration monitoring system of rugged and modular design.

- Buildings
- Construction sites
- Tunneling
- Blasting monitoring
- Truck and rail traffic
- Industrial quality assurance
- Bridges
- Site evaluation
- Industrial vibrations
- Conforms to DIN 45669 C3HV 315/1

Technical Specification

MR2002-CE**Civil Engineering System****Data Acquisition**

Principle	3 individual delta-sigma modulators and digital filtering (32 bit DSP)
Recording	16 bit signed (2 bytes), optionally 24 bit signed (3 bytes)
Resolution	20 bit
Sampling-rate	50, 100, 200, 500, 800 sps, others on request
Number of channels	3 (X,Y,Z) data channels, 4 auxiliary channels (10 bit resolution)
Channel to channel skew	None
Dynamic range	> 114 dB @ 500 sps (RMS noise / RMS clip)
Data Filter	Digital CIC and FIR filter cut-off at 80% of Nyquist frequency -default
Additional Pre-defined filters	50 Hz low pass (200 sps), 156 Hz low pass (400 sps) 315 Hz low pass (800 sps) 1-100 Hz band pass (400 sps) 4-80 Hz band pass (400 sps) - KB-filter according to DIN 4150 Possibility to set-up user-defined filters
Trigger Filter	None - default Optional: User defined FIR or IIR digital filters

Trigger and De-trigger:

Principle	Level trigger
Channels	X,Y or Z axis, software- or external trigger
Trigger voting logic	Predefined AND or OR combinations
Level trigger	0.003 to 50% full scale
Smart Trigger /De-Trigger	Automatic adjustment of trigger level: - Increment / decrement - Decrement time 1-3600 seconds

Microprocessor**Recording**

Principle	Event recording (full waveform) with on-line data compression AND continuous background recording mode (peak per period)
Optional	- Recording of KBFT (weighted peak values according to DIN 4150 part II), 30 second period length - Recording of 'Frequency versus Peak' histogram (with real-time FFT), 20 second period length

- Recording of ‚Frequency versus Peak‘ with weighted frequency (SBR Dutch Code)
- Recording of peaks and peak vector sum (1-255 second period length)

Header	Contains status information at time of trigger and event summary
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, optionally split into files of 1-255 seconds length

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

Primary Clock	20 ppm (10 min / year) with Lithium back-up battery (> 5 years autonomy)
Time code receiver	DCF

Firmware

Principle	Multitasking environment, simultaneous data acquisition and communication (data retrieval or parameter setting)
Intelligent Alerting	System initiates communications or sends text message (SMS) when an event is detected or if the self-test feature detects a malfunction

Display

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

Memory

Primary Memory	Internal 2 MByte SRAM with backup battery
Organisation	Flat or ring-buffer (oldest recordings are overwritten by new ones) - or - Buffer memory for the mass storage device
Optional	Mass storage: removable CF disk (Compact Flash) (32 MByte up to 1 GByte), FAT formatted - directly readable by PC
Organisation	Read after write verification and retry in case of failure or removal of CF card
Recording capacity	Approx. 30 min/MByte (at 200s ⁻¹)

Power Supply

Battery	Internal lead-acid gel cell 9 Ah, optionally additional external battery
Supply Voltage	AC 230 V, optionally AC 115 V, built-in battery charger
Power consumption	Approx. 200 mA @ 12 V (standard modules)
Autonomy (with int. battery)	Approx. 40 hours

I/O and Connectors

Type	Metallic self-latching push-pull connectors with positioning key (LEMO)
Sensor	Bipolar input (0 ± 4 V)
RS-232	Communication with PC or Modem with full galvanic separation
External	Alarm relay output: Alarm 1, Alarm 2, Error Pushbutton for manual trigger
Printer / DCF	2nd RS-232 for printer Master-/Slave interconnection - or - DCF time code receiver
Line Power	Metallic connector with protective GND - internal power line filter

Options/Ordering Information

		Product Codes
MR2002-CE	With AC supply 230 V	14.11.1060
	With AC supply 115 V: add kit	93.11.2110
Alarm Box	3 power relays to switch on /off external alarm devices with AC supply 85-253 V Includes internal MR relay board with 3 low voltage relays Power consumption approx. 40 mA @ 12 V	93.11.1041
DCF timing	Sets time information, accuracy 5 ms Power consumption approx. 4 mA @ 12 V	93.11.1080
Master-/Slave	Interconnects up to 4 MRs in a daisy chain network Current-loop interface 4-20 mA Tx/Rx, distance up to 1 km Power consumption approx. 40 mA @ 12 V	93.11.1100
Printer	Thermo transfer printer, powered by MR, incl. cable	93.11.1060
Red Safe	Mass-Storage on Compact Flash (CF-card), includes 32 MByte CF card Power consumption approx. 10 mA @ 12 V (average)	93.11.1070
Deep Red	Amplification option for MS2003+	78.00.0070
Red Alert	External GSM/GPRS 900/1800 MHz engine, powered by MR, incl. cable and antenna Includes MR Firmware option to send text messages (SMS) and dial-up Power consumption approx. 40 mA @ 12 V (average)	93.11.1050
LAN / WAN	External Ethernet interface (10/100 BASE-T - ISO 8877) Configuration via WEB Browser (remote configuration via https or SNMP) Power consumption approx. 75 mA @ 12 V	14.11.0171
WLAN (Wifi)	External WLAN interface (802.11b/g) Configuration via WEB Browser (remote configuration via https or SNMP) Power consumption approx. 75 mA @ 12 V	14.11.0175
Calibration certificate	In compliance with DIN 45669 part 3	30.10.0001

Dimensions

Housing	Aluminum, 200 x 230 x 110 mm (250 x 230 x 110 with handles)
Weight	7.5 kg
Protection degree	IP 65 (splash-proof)

Compliance with standards and regulations

Conformity	DIN 45669 - meets class 1 requirement SBR Dutch Code
Electrical Safety	In compliance with EN 50 081 and EN 50 082
EMI/RFI	In compliance with EN 61010
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	CE