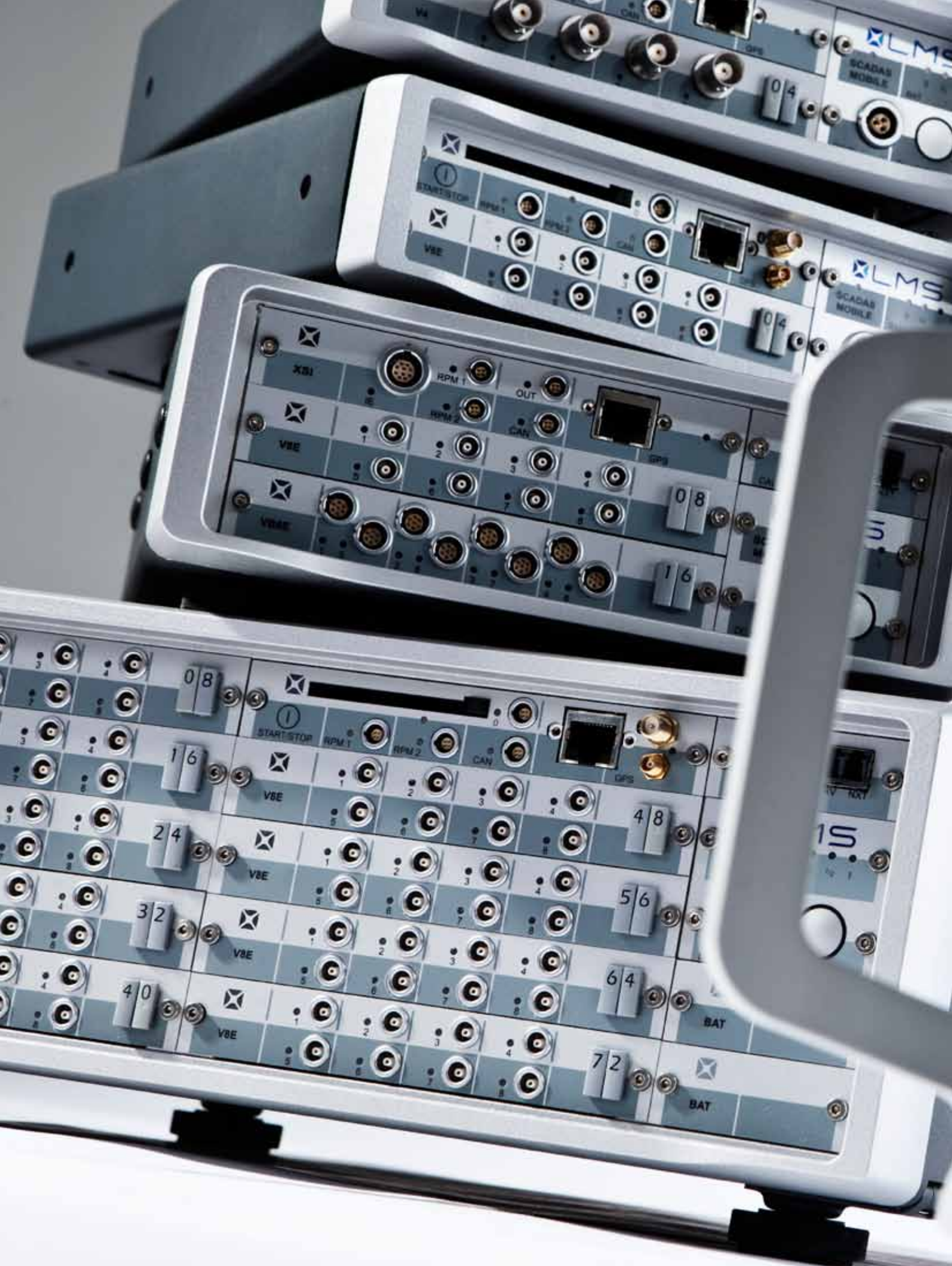


# LMS SCADAS

Flexibility. Performance. Precision.





# LMS SCADAS family

## Take your mind off the deadline Focus on the test

Test engineers around the world count on LMS SCADAS systems to deliver the data quality and format required to get the job done right the first time – in the lab, in the field, with a PC or recording autonomously. Add in seamless integration with LMS Test.Lab and LMS Test.Xpress software for accelerated measurement set-up and correctly formatted results. Then you'll see why the LMS SCADAS system is your guaranteed tool to deliver reliable results and optimal testing productivity.

### LMS SCADAS Mobile

- Accommodates 8, 16, 40 or 72 channels in a single frame
- Compact size and low weight for optimal mobility
- Rugged design qualified for rough conditions and high temperatures

### LMS SCADAS Recorder

Incrementing on the LMS SCADAS Mobile

- On-the-spot validation prevents errors and annoying reruns
- Autonomous recording on CompactFlash card
- Wireless PDA remote control with Bluetooth communication

### LMS SCADAS Durability Recorder

Incrementing on the LMS SCADAS Recorder

- Top performer in tough conditions: water and dust protected
- Vibration-resistant cable connections
- Strain, vibration and displacement measurements in one single measurement module

### LMS SCADAS Lab

- Easy 19" rack mounting mainframe
- Configurable from 8 to 2000+ channels
- Up to 160 input channels in a single frame
- Arbitrary mix & match with additional SCADAS Lab/Mobile/Recorder mainframes



## Productivity and Flexibility

### **Lab-Mobility - your testing scenario on a whole new level**

Thanks to Lab-Mobility, you can mix-n-match all types of LMS SCADAS systems and connect a LMS SCADAS Mobile or LMS SCADAS Recorder directly to your LMS SCADAS Lab unit. You save time by using your LMS SCADAS Mobile to take measurements in the field. And when you get back to the lab, all you have to do is connect your LMS SCADAS Mobile to the LMS SCADAS Lab to take more measurements. There's no need at all to spend valuable time on a new test set-up, even on the roller bench or in the anechoic chamber.

### **On demand channel and signal conditioning**

Lab-Mobility lets you rethink your lab set-up. Install a high-performance LMS SCADAS Lab system for day-to-day testing at each testing station. And supplement that with a selection of LMS SCADAS Mobile units for additional channel capacity and specialty work. So, instead of depending on separate systems when you need a few extra

channels or special conditioning, just grab your LMS SCADAS Mobile and hook it up for more capacity or more exotic testing.

### **Simplify your set-ups**

The days when data acquisition hardware solutions only had to collect the data are long gone. The LMS SCADAS systems are real one-in-all multi-taskers that can handle all types of applications. The highly flexible LMS SCADAS hardware features integrated signal conditioning for a variety of transducers, like strain gauges and accelerometers. The hardware accepts a variety of digital signals, from digital audio to CAN-bus, FlexRay, GPS and digital wheel-force sensors. State-of-the-art synchronization guarantees seamless real-time integration of these signals in the data acquisition process. The LMS SCADAS family also includes a single universal module. With this one flexible module, you can take all types of noise, vibration and durability measurements. There is no need for separate devices.



## Measurement Power and Precision

### No limits to what you can do

More channels at higher rates translates to mega-data at your fingertips. Maybe you don't need several hundreds of channels right now or a 14 MSamples/s data transfer rate, but with the trend towards more complex tests and more upfront simulation, you might need this performance level shortly. And that is the beauty of a LMS SCADAS system, it is an investment that grows with you.

### Superior data quality for effective testing

A LMS SCADAS system offers much more than supreme data quality. It offers built-in process understanding. Test engineers who use LMS SCADAS hardware are more efficient because the system lets them skip classic steps like auto-ranging. Not only does this save time, it eliminates risk factors as well. The data is delivered in the purest state possible. Low noise, no unnecessary conversion and, best of all, minimal human error. Quality cables and rugged connectors ensure no-compromise data acquisition security.

## Optimized Investment and Reliability

### A tailor-made solution that works perfectly every time

There is a LMS SCADAS data acquisition and signal conditioning system to match your exact requirements - from compact mobile units, autonomous smart recorders up to high-channel-count laboratory systems. With a large variety of supported transducers and signal conditioning, the LMS SCADAS systems are optimally tuned to meet the specific needs of noise, vibration and durability testing.

### The quality leader in data acquisition

With its range of signal conditioning, choice of connectors and high throughput rate, the LMS SCADAS family brings years of proven technology into the lab environment. High precision data is guaranteed, including best-in-class limiting of harmonic distortion and best-in-class interchannel specifications with a phase match better than  $0.2^\circ$  at a frequency of 10 kHz. The LMS SCADAS system achieves its high-level reliability through rigorous design standards, efficient quality control and a strong service organization.

# A LMS SCADAS for every testing job

Covering a wide range of industry applications

## LMS SCADAS Mobile

Maximum mobile measurement power

- Accommodates 8 to 16, 40 or 72 channels in a single frame
- Compact size and low weight for optimal mobility
- Rugged design qualified for rough conditions and high temperatures

### Available as

LMS SCADAS Mobile 01 **1**

LMS SCADAS Mobile 02 **2**

LMS SCADAS Mobile 05 **3**

LMS SCADAS Mobile 09 **10**

All LMS SCADAS Mobile are available **8**  
in a vibration control version

## LMS SCADAS Recorder

PC-less recording and intelligent mobile data acquisition system

- On-the-spot validation prevents errors and annoying reruns
- Autonomous recording on CompactFlash card
- Wireless PDA remote control with Bluetooth communication

### Available as

SCADAS Recorder 01 – 4 to 8 channels **5**

SCADAS Recorder 02 – 4 to 16 channels

SCADAS Recorder 05 – 8 to 40 channels **6**

SCADAS Recorder 09 – 8 to 72 channels **4**



## LMS SCADAS Durability Recorder

Designed for the extreme

- Water and dust protected (IP54 and MIL-STD 810F qualified)
- Strain, vibration and displacement measurements in one single measurement module
- High-channel density (from 8 to 72 channels expandable to hundreds of channels)

### Available as

SCADAS Durability Recorder 07 – 8 to 56 channels **9**

SCADAS Durability Recorder 09 – 8 to 72 channels **4**

## LMS SCADAS Lab

Fit-for-purpose laboratory solution

- Easy 19" rack mounting mainframe
- Configurable from 8 to 2000+ channels
- Arbitrary mix & match with additional SCADAS Lab/Mobile/Recorder mainframes

### Available as

LMS SCADAS Lab 20-SIG optimized for rotating machinery applications – 8 to 160 channels **7**

LMS SCADAS Lab 20-STR optimized for structural dynamics applications – 8 to 160 channels

LMS SCADAS Lab 20-ENV optimized for vibration control applications – 8 to 160 channels



# LMS SCADAS Mobile

## Power and flexibility for mobile and lab testing

The LMS SCADAS Mobile front-ends pack the quality and acquisition power of the renowned LMS SCADAS system into a compact and rugged design, offering versatile signal-conditioning and data-acquisition capabilities. Designed for high measurement and testing productivity, LMS SCADAS Mobile represents one of the most powerful systems in its class. LMS SCADAS Mobile is supported by both LMS Test.Lab and LMS Test.Xpress for a wide range of noise, vibration and durability applications. With connectivity for hardware emergency stop, the LMS SCADAS Mobile becomes a dedicated modular front-end for vibration control applications.



## LMS SCADAS Mobile at a glance

- Accommodates 8 to 16, 40 or 72 channels in a single frame
- Compact size and low weight for optimal mobility
- Rugged design qualified for rough conditions and high temperatures
- MIL-STD 810F qualified for shock and vibration
- Master-slave configurations for distributed systems and channel expansion
- DC Automotive compliant
- Ultra-quiet operation, no fan cooling, ideal for acoustic measurements
- Supports GPS receiver, IRIG-B and CAN-bus
- Up to 204.8 kHz sampling rate per channel
- 24-bit ADC technology
- 150 dB dynamic range
- On-board dual tacho and signal generator
- High-speed Ethernet host interface



### LMS SCADAS Mobile SCM01

#### Practical and ultra portable unit

- Accommodates 4 or 8 channels
- Ultra-lightweight and robust frame
- Nominal 2.5 hour battery autonomy



### LMS SCADAS Mobile SCM02

#### Optimal flexibility in 16 channels

- Modular system for up to 16 input channels
- Compact and robust frame with optimal channel density
- Nominal 1.5 hour battery autonomy



### LMS SCADAS Mobile SCM05

#### Maximum mobile measurement power

- SCM05 accommodates 8 to 40 channels
- Laptop-size robust frame with extensive channel density
- Nominal 1-hour battery autonomy



### LMS SCADAS Mobile SCM09

#### High-channel density mobile unit

- SCM09 accommodates 8 to 72 channels
- Laptop-size robust frame with extensive channel density
- Nominal 1-hour battery autonomy



### LMS SCADAS Mobile slave frames

#### Expand mobile measurement to hundreds of input channels

- SCM03S accommodates 8 to 24 channels
- SCM06S accommodates 8 to 48 channels
- SCM10S accommodates 8 to 80 channels
- True master/slave configuration beyond clock synchronization: fully synchronized data is saved in one measurement file
- Easy mechanical locking of frames in to one unit
- Distributed acquisition through optical cabling



### LMS SCADAS Mobile Vibration Control

#### Incrementing on the LMS SCADAS Mobile

- 24-bit effective DAC output with tapered start-up and shut-down
- Status output for advanced synchronization purposes
- Safety control via hardware emergency stop and power watchdog



## LMS SCADAS Recorder

Go anywhere reliability

### PC-less recording and intelligent mobile data acquisition system

The LMS SCADAS Recorder can be used as an autonomous recorder, as a smart recorder with a wireless PDA connection or as a front-end system for in-field and laboratory applications. The integration of data acquisition and analysis considerably improves data consistency and allows users to reliably compare data sets. This extends the LMS platform to the broadest possible range of data acquisition and analysis tasks.

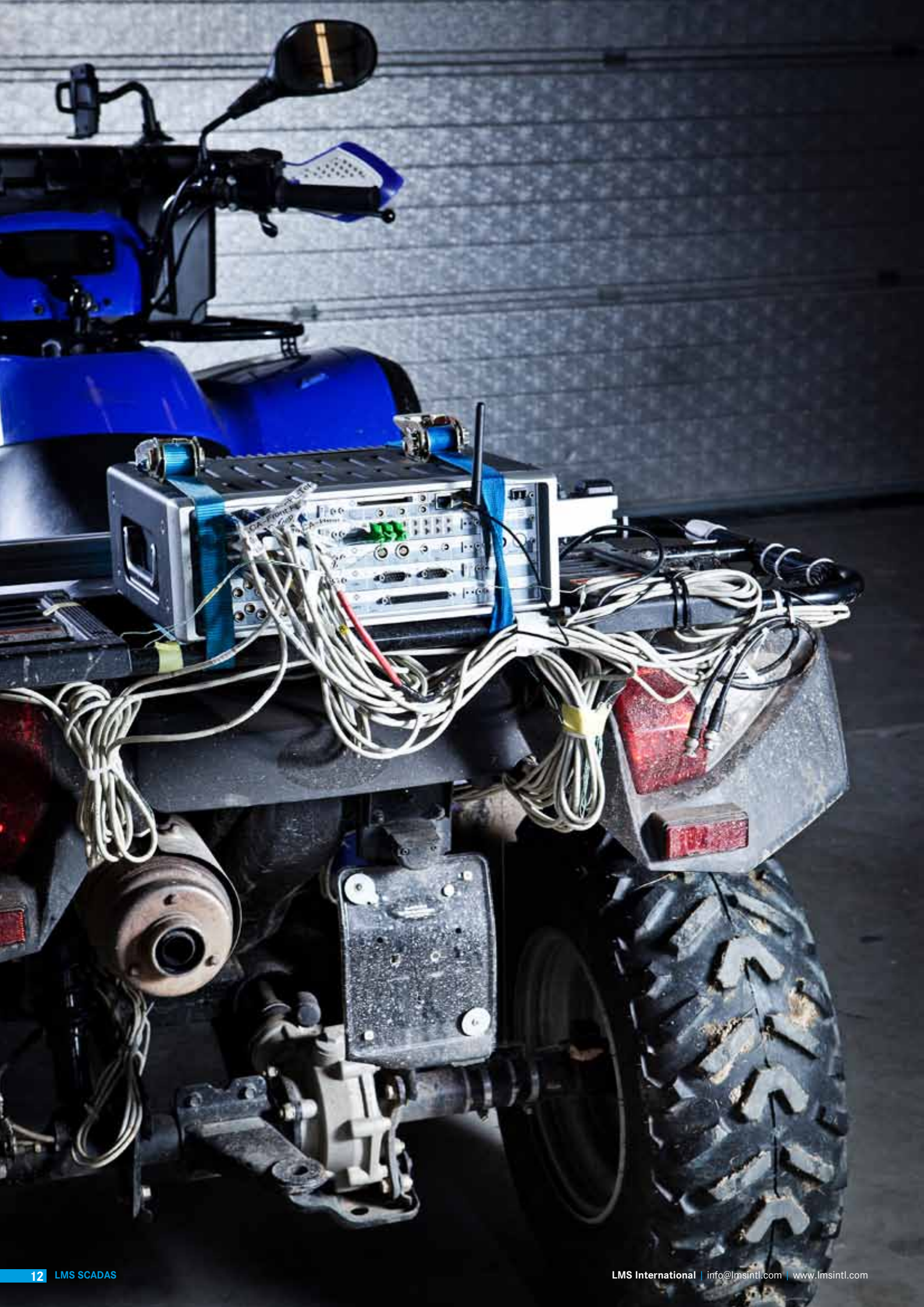
A Bluetooth connection with a PDA wireless remote control provides instant data validation during the measurement process. This state-of-the-art remote control allows you to visualize and monitor real-time data recording, and change settings in the field if required. By eliminating blind recording, the LMS SCADAS Recorder not only saves you time, it makes sure that the data you acquire is exactly what you need to get the job done. The embedded LAN interface also allows the operation of the LMS SCADAS Recorder as a PC front-end system for in-field or laboratory applications. It can be configured as a regular front-end streaming the data in parallel to a CompactFlash card and a PC through the embedded LAN interface. The data can be visualized, processed and saved on the hard disc in real-time.



## LMS SCADAS Recorder at a glance

### Incrementing on the LMS SCADAS Mobile

- On-the-spot validation prevents errors and annoying reruns
- Autonomous recording on CompactFlash card
- Wireless PDA remote control with Bluetooth communication
- Easy-to-use recorder software for acquisition, measurement set-up, instant data validation and data export
- On-board GPS receiver and CAN
- Available as LMS SCADAS Recorder 01, 02, 05 and 09



# LMS SCADAS Durability Recorder

## Designed for the extreme

### High-channel count measurements in tough environments

Durability data acquisition equipment needs to be rugged and robust to handle all the water, dust, dirt, shocks and jolts associated with real-life testing scenarios on public roads and proving grounds. That's why using a PC is not convenient and autonomous recording with on-the-spot validation is a must. For long and repetitive acquisitions requiring high-channel counts and large data-set storage, you can easily see the need for a dedicated solution like the reliable LMS SCADAS Durability Recorder.

### Rugged and durable

Durability measurements start with quality cables and rugged connectors for no-compromise data acquisition security. The LEMO connectors on the LMS SCADAS Durability Recorder ensure vibration-resistant cable connections. The LMS SCADAS Durability Recorder is a rugged instrument with true MIL-STD-810F compliancy. Its sturdy and robust design can stand up to the most diverse external climate conditions from -20°C to +55°C and is tested for 60gpk shock and 7.7grms vibration. The LMS SCADAS Durability recorder contains no moving parts such as fans or hard discs. It is also available in a sealed version to resist dust and water according ingress protection code IP54.

### PC-less data recording

The LMS SCADAS Durability Recorder operates 100% autonomously and is particularly suited for challenging test applications, where using a PC-based data acquisition unit is unpractical or not even possible. With direct 24-bit streaming, it stores the acquired data on high performance, fast read/write solid-state CompactFlash memory cards. The data is perfectly ready for on-site analysis or further study back at the lab.

### Validate measured data on the spot

Using the Bluetooth antenna and a PDA, LMS SCADAS Recorder users can control and monitor the entire measurement process. Measurement control includes starting and stopping the acquisition as well as selecting the appropriate measurement set-up or even changing measurement settings. After the measurement, a quick overview of relevant statistics (min, max, rms, mean) as well as the time series instantly validates measured data. The LMS SCADAS Durability Recorder can also be used as a PC front-end system for laboratory and mobile in-field testing. The LMS SCADAS Durability Recorder is seamlessly integrated with the LMS software for durability testing and analysis, delivering optimal data quality and consistency.



## LMS SCADAS Durability Recorder at a glance

### Incrementing on the LMS SCADAS Recorder

- Top performer in tough conditions: water and dust protected – ingress protection code IP54 and MIL-STD 810F qualified for shock and vibration
- Vibration-resistant cable connections
- High-channel density (from 8 to 72 channels expandable to hundreds of input channels) without compromising speed or quality
- Strain, vibration and displacement measurements in one single measurement module
- On-the-spot validation prevents errors and annoying reruns
- Available as LMS SCADAS Durability Recorder 07 and 09



SCADAS Lab

# LMS SCADAS Lab

## Fit-for-purpose laboratory solution

The LMS SCADAS Lab features a dedicated 19" rack-mountable frame with a channel count range from 8 to 2000+ and AC power supply. Top data acquisition performance is standard thanks to a constantly high throughput of 14 MSamples/s and high-channel density of up to 160 input channels per frame.

Highly flexible, the system comes with various signal conditioning modules and a choice of connectors, such as BNC, CAMAC (LEMO) and Sub-D for patch panel configuration. Full-color LEDs indicate channel status and dynamic displays automatically show the active channel numbers.

### The perfect fit for high-channel lab testing

With the LMS SCADAS Lab, it is easy to connect additional slave frames in a master/slave configuration using optical fiber cables. Ideal for noise and vibration laboratories, this modular solution lets operators easily configure a multi-frame system for 200 or more channels.

Additionally, it is relatively simple to take the set-up to more than 2000 channels. Individual master frames can be configured into master/slave configurations and easily run as one unit using a simple master station. The LMS SCADAS Lab offers channel-count-independent real-time processing and excellent throughput performance. This makes the LMS SCADAS Lab the ideal solution for high-channel count modal testing, aircraft ground vibration testing, high speed throughput or turbine testing applications.

### Combining lab performance with optimal mobility

Each LMS SCADAS Lab set-up can be supplemented with a selection of portable LMS SCADAS Mobile units for additional channel capacity and specialty work, basically eliminating the need for dedicated systems and separate devices and strengthening a company's overall hardware investment. LMS calls this Lab-Mobility – allowing users to mix-n-match all types of LMS SCADAS systems together to save time and effort between the field and the lab.



## LMS SCADAS Lab at a glance

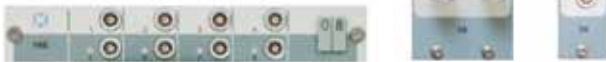
- Easy 19" rack mounting mainframe
- Configurable from 8 to 2000+ channels
- Up to 160 input channels in one frame
- Arbitrary mix & match with additional SCADAS Lab/Mobile/Recorder mainframes
- 1.25Gbit hotlink fiber optic master slave connection with long optical cables for distributed system configurations
- Built-in calibration source for easy system and module calibration
- Up to 204.8 kHz sampling rate per channel
- 24-bit ADC technology
- 150dB dynamic range
- 14 MSamples/s throughput rate using high-speed Ethernet connection
- Industrial grade components with extended temperature range for optimized reliability

# A wide range of signal conditioning modules

The LMS SCADAS data acquisition systems accept different module types, including any combination of signal conditioning modules. Integrated signal conditioning and direct connection of each transducer to the inputs eliminates interconnection problems associated with multiple units or breakout boxes, such as hum, noise, and ground loops. The entire measurement chain is continuously monitored during testing for open or short circuits. Overload checks are carried out on several places in the signal paths, including full bandwidth checks in front of the anti-alias filters. Finally, with locally-stored correction factors, it is entirely digital to ensure the highest quality data over an extended period as well as permit easy card swapping.

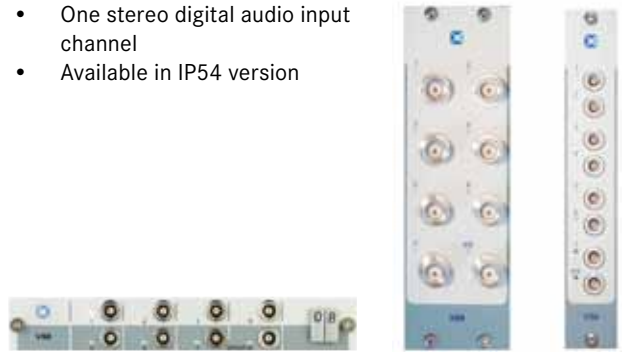
## Eight-channel Voltage / ICP input module (V8-E)

- Single-ended input via BNC or high-quality CAMAC connectors
- Voltage and ICP modes selectable per channel
- Analog anti-alias and digital re-sampling filter
- 24-bit  $\Sigma\Delta$  ADC with up to 204.8kHz sampling frequency
- Alias free bandwidth of 92kHz
- 150 dB dynamic range to eliminate range setting
- ICP sensor supply (3.5mA)
- Cable check with full color-coded LED indicator
- AC coupling 0.5Hz or 7Hz high pass filter
- TEDS smart sensor support according to IEEE 1451.4
- Input range up to  $\pm 10V$
- Available in IP54 version



## Eight-channel Voltage / ICP / Digital audio input module (VS8-E)

- Incrementing on V8-E module
- Dedicated module supporting digital audio (inputs 7 & 8)
- Support of AES/EBU and SPDIF formats with HMS data
- Alias free conversion to internal sample rate for accurate synchronization
- Supporting all standard audio sample rates (32kHz, 44.1kHz, 48kHz, 96kHz)
- One stereo digital audio input channel
- Available in IP54 version



## Eight channel Voltage / ICP differential input module (VD8-E)

- Incrementing on V8-E module
- Differential or single-ended input via BNC, high-quality CAMAC or Sub-D connectors
- ICP sensor supply (4.5mA or 9mA)
- Cable check with full color-coded LED indicator
- AC coupling 0.05Hz, 0.5Hz or 7Hz high-pass filter
- Available in IP54 version



## Eight-channel Voltage / ICP / Microphone input module (VM8-E)

- Incrementing on V8-E module
- Dedicated module supporting conventional and ICP microphones
- Industry-standard 7-pin LEMO connectors
- 200VDC polarization voltage
- 28V preamplifier supply voltage
- Additional 20Hz high-pass filter
- Available in IP54 version
- Available on LMS SCADAS Mobile



## Eight-channel Voltage / ICP / Charge input module (VC8-E)

- Incrementing on V8-E module
- Dedicated module supporting charge signal conditioning
- Industry-standard microdot connectors
- Ultra-low noise charge amplifiers with an input range up to  $\pm 10000\text{pC}$
- Available in IP54 version



## Four-channel rotational vibration input module (RV4)

- Provides tacho, torsional vibration and angular position information
- Supports any combination of analog tacho, digital tacho and incremental encoder
- Simultaneous and synchronic acquisition of rotational signals and normal analog signals
- Real-time correction for missing pulses or double pulses
- Real-time separation of static and dynamic speeds
- Ultra-high speed 820MHz counter for 1.2nsec tacho resolution
- Available in IP54 version



## Four-channel Differential charge input module (DCH4-E)

- Dedicated conditioner for differential piezoelectric charge transducer
- Differential or single-ended inputs
- Ultra-low noise charge amplifiers with an input range of 10pC to 10,000pC
- Cable and sensor check through charge injection for day-to-day calibration
- Available on LMS SCADAS Lab



## Four-channel general purpose signal output module (DAC4)

- Ultra-low noise and distortion outputs
- 24-bit D/A converters for a dynamic range of 108 dB
- Bandwidth of up to 40kHz with 1Hz spectral resolution
- $\pm 10\text{V}$  output voltage
- Full color-coded LED indicator
- Uncorrelated basedband noise generation
- Sine and swept sine with amplitude, phase and sweep control
- Continuous output of previously measured signals
- Slow start/stop
- Smooth transition algorithm for transient-free amplitude control



## Eight-channel universal Voltage / ICP / Bridge input module (VB8-E)

- Differential or single-ended input via high quality 7-pin LEMO connectors
- Voltage, ICP and bridge modes selectable per channel
- Support of full/half/quarter bridge configuration with symmetrical supply sensing
- Bridge completion for 120 $\Omega$  and 350 $\Omega$  bridges
- Accurate bridge balancing through current injection
- Internal shunt calibration for a wide range of strain simulation
- Programmable bridge supply up to  $\pm 5V$
- Active sensor supply voltage up to 15VDC
- 24-bit  $\Sigma\Delta$  ADC with up to 204.8kHz sampling frequency
- Alias free bandwidth of 92kHz
- 150 dB dynamic range to eliminate range setting
- TEDS smart sensor support according to IEEE 1451.4
- Analog anti-alias and digital re-sampling filter
- ICP sensor supply
- Cable check with full color-coded LED indicator
- AC coupling 0.5Hz high-pass filter
- Input range  $\pm 3.16mV$  to  $\pm 10V$
- Available in IP54 version



## Eight-channel durability DC acceleration / Bridge input module (DB8)

- Differential or single-ended DC input via high quality 7-pin LEMO connectors
- Voltage and bridge modes selectable per channel
- Analog anti-alias and digital re-sampling filter
- 24-bit  $\Sigma\Delta$  ADC with up to 51.2kHz sampling frequency
- Alias free bandwidth of 20kHz
- 138 dB dynamic range to eliminate range setting
- Support of full/half/quarter bridge configuration with symmetrical supply sensing
- Bridge completion for 120 $\Omega$  and 350 $\Omega$  bridges
- Internal shunt calibration for 50k $\Omega$  and 100k $\Omega$  strain simulation
- Programmable bridge supply up to  $\pm 5V$
- Active sensor supply voltage up to 10VDC
- Input range  $\pm 3.16mV$  to  $\pm 10V$
- Support for potentiometer
- Available in IP54 version
- Available on LMS SCADAS Mobile



## Four-channel dynamic strain input module (BDS4-E)

- Support of full/half/quarter bridge configuration, including bridge completion resistors
- Support of ground isolated piezo-resistive or variable capacitive sensors
- 24-bit  $\Sigma\Delta$  ADC with up to 204.8kHz sampling frequency
- Alias free bandwidth of 92kHz
- Balanced constant current supply for single strain gauge measurements using 2 or 4 wires in a resistance configuration
- Selectable input ranges from  $\pm 3.16mV$  to  $\pm 10V$
- Selectable voltage or current bridge supply per channel
- Automatic bridge nulling using current injection
- Balanced AC-coupling to measure dynamic strain with optimum signal to noise ratio
- Built-in shunt calibration
- Available on LMS SCADAS Lab



## Eight-channel thermocouple input module (T8)

- Support for type B, E, J, K, N, R, S and T thermocouples
- Channel selectable thermocouple type
- Standard miniature thermocouple connection
- On board linearization in accordance with the ITS-90 standard, offering an accuracy of 0.1 $^{\circ}C$  or better
- On board cold junction compensation with an accuracy of 0.3 $^{\circ}C$  or better
- 24-bit oversampling SAR ADC, with an output sampling rate of 25.6kHz
- Galvanic isolation up to 70V
- Available in IP54 version



## Dual channel CAN module (CN2)

- Dual CAN-bus inputs via DB9 shielded connectors
- Connector pinning according to the DS102 standard
- Input signal levels compliant with the ISO11898-2 and ISO11898-3 standards
- Message handling compliant with CAN 2.0B and support for J1939
- Support for high-speed or low-speed CAN per CAN bus
- Color-coded LED feedback indicators
- Software selectable list of CAN channels to be measured with the dynamic channels
- Available in IP54 version
- Available on LMS SCADAS Mobile



## Wheel force interface module (WFI2)

- Supports 8 Wheel forces sensors
- Supports 2 Kistler ROADYN2000 frames per module
- Access up to 10 channel per wheel forces sensor
- Synchronous acquisition of WFT signals without loss of accuracy through clock drift
- Sample rates up to 1280Hz
- Available in IP54 version
- Available on LMS SCADAS Mobile



## Four-channel CAN-bus (CN4) and FlexRay (FR4) modules

- Interfacing with four FlexRay high-speed communication buses (FR4)
- Interfacing with four CAN-bus compliant with the CAN 2.0B message protocol (CN4)
- Synchronization of message stream with the internal LMS SCADAS acquisition rate
- Full galvanic isolation for each bus



## Sixteen-channel analog output module (AO16)

- Conditioned and calibrated reproduction of analog copies of the acquired input signal
- Free selection of analog output from any acquired input signal
- Conditioned and calibrated analog replica
- Fine-tuned for test rig signal conditioning or monitoring applications
- 24 bit D/A converters with 51.4kHz sampling rate
- Accurate reproduction up to 5kHz bandwidth with on-board gain and offset calibration
- Normalized signal output level of  $\pm 10V$  with  $>97dB$  signal to noise ratio
- Steady latency better than 10ms
- Available in IP54 version
- Available on LMS SCADAS Mobile



# LMS SCADAS family - frames overview

Frame code	SCM01	SCR01	SCM02	SCR02	SCM03S	SCM05	SCR05	SCM06S
Usage discipline	L,M	L,M,A	L,M	L,M,A	-	L,M	L,M,A	-
Number of free slots	1	1	2	2	3	5	5	6
Max number of channels per frame	8	8	16	16	24	40	40	48
Channel expansion via slave frame	-	-	yes	yes	yes	yes	yes	yes
Transfer rate (Msamples/sec)	3,8	3,8	14	14	-	14	14	-
Embedded tachometer inputs	2	2	2	2	-	2	2	-
Embedded signal generator	2	2	2	2	-	2	2	-
Embedded CAN-bus	option	1	option	1	-	option	1	-
Embedded GPS	option	1	option	1	-	option	1	-
Embedded incremental encoder	option	-	option	-	-	option	-	-
Embedded IRIG-B	option	option	option	option	-	option	option	-
Wireless remote control	-	yes	-	yes	-	-	yes	-
Internal data storage	-	yes	-	yes	-	-	yes	-
Ethernet interface	100Mb	100Mb	1Gb	1Gb	-	1Gb	1Gb	-
Power consumption	15Watts		25Watts			40Watts		
External power mode	Auto ranging AC using external mains adapter, Auto ranging DC input from 9VDC to 42VDC							
Internal battery mode	Rechargeable Li-ion battery; rating 21.6V-1.6Ah							
Internal battery operation time (fully equipped)	150min		90min			60min		
Cooling system	Heat conduction via card guides, Cooling via heat pipes to heat sink							
Dimensions (WxHxD) mm	203x62x280		216x76x271			345x92x300		
Weight (full configuration)	2.5kg		5.3kg			6.2kg		
Operating temperature	Operating: -20°C to +55°C, Storage: -20°C to +70°C							
Relative humidity	Up to 95% non-condensing							
Vibration protection	MIL-STD-810F [20-2000Hz (random): 7.7grms]							
Shock protection	MIL-STD-810F [60gpk applying an 11ms sawtooth shock pulse; 3 shocks per direction]							
Ingress protection	IP32							

L = Laboratory • M = Mobile • A = Autonomous

SCM = LMS SCADAS Mobile • SCR = LMS SCADAS Recorder • SCD = LMS SCADAS Durability Recorder

SCL = LMS SCADAS Lab

STR = Structures • SIG = Rotating Machinery • ENV = Environmental/ Vibration Control

SCD07	SCR07	SCD08S	SCM09	SCR09	SCD09	SCM 10S	SCL20-STR	SCL20-SIG	SCL20-ENV	SCL21S
L,M,A	L,M,A	-	L,M	L,M,A	L,M,A	-	L	L	L	-
7	7	8	9	9	9	10	20	20	20	21
56	56	64	72	72	72	80	160	160	160	168
yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
3,8	14	-	14	14	3,8	-	14	14	14	-
2	2	-	2	2	2	-	-	2	-	-
2	2	-	2	2	2	-	2	-	2	-
1	1	-	option	1	1	-	-	1	-	-
1	1	-	option	1	1	-	-	-	-	-
-	-	-	option	-	-	-	-	-	-	-
option	option	-	option	option	option	-	1	1	1	-
yes	yes	-	-	yes	yes	-	-	-	-	-
yes	yes	-	-	yes	yes	-	-	-	-	-
100Mb	1Gb	-	1Gb	1Gb	100Mb	-	1Gb	1Gb	1Gb	-
65Watts						250Watts				
						Auto ranging input, 90VAC to 240VAC				
			Dual rechargeable Li-ion battery			-				
40min			64min			-				
						Rear fan cooling				
345x142x300						448x177x448				
9.6kg			10.5kg			16kg				
						Operating: 0°C to +45°C, Storage: -20°C to +70°C				
						-				
						-				
IP54			IP32			-				

# LMS SCADAS family - modules overview

Module		V8-E		VD8-E			VS8-E	
Number of channels		8		8			8	
Connector type		BNC	Lemo (Camac)	BNC	Lemo (Camac)	Sub-D	BNC	Lemo (Camac)
Adapter cables (included)		n.a	Camac to BNC	n.a	Camac to BNC	n.a	n.a	Camac to BNC
Signal conditioning	Voltage	Voltage		Voltage			Voltage	
	ICP	ICP		ICP			ICP	
	TEDS	TEDS		TEDS			TEDS	
	Synchronized digital audio	-		-			Synchronized digital audio	
	Conventional microphone	-		-			-	
	Charge	-		-			-	
	Bridge	-		-			-	
	Potentiometer	-		-			-	
Input coupling	Single-ended	Voltage DC/AC, ICP		Voltage DC/AC, ICP			Voltage DC/AC, ICP	
	Differential	-		Voltage DC/AC, ICP			-	
Sensor supply	ICP	3.5mA ±15% from 28V source		4.5mA ±15% - 9mA ±15% from 28V isolated source			3.5mA ±15% from 28V source	
	Active sensors	-		-			-	
	Bridge	-		-			-	
	Microphone	-		-			-	
Cable/sensor check	ICP	Open loop & Short circuit						
	Bridge	-						
Overload	Detection	Analog (at the input) & Digital (after ADC)						
	Indication	Front panel LED & transmitted to host						
Sensor interface	TEDS (class I)	IEEE 1451.4 (ICP sensors)						
	TEDS (class II)	-						
Input voltage (max)		±10V		±10V			±10V	
AC coupling (HP filter)		0.48Hz ±6%, 7Hz ±2%		0.05Hz ±1%, 0.5Hz ±1%, 7Hz ±1%			0.48Hz ±6%, 7Hz ±2%	
Analog to digital conversion		24-bit $\Sigma\Delta$ ADC		24-bit $\Sigma\Delta$ ADC			24-bit $\Sigma\Delta$ ADC	
Maximum sampling frequency		204.8kHz		204.8kHz			204.8kHz	
Alias free bandwidth		92kHz		92kHz			92kHz	
Analog anti-alias filter		4-pole Equal Time Delay filter						
Dynamic range	Signal to noise ratio	115dB @ ≥1V		115dB @ ≥1V			115dB @ ≥1V	
	Spurious free floor	-150dB @ 10V		-150dB @ 10V			-150dB @ 10V	
Total harmonic distortion		Better than -98dB @ 3dB below full scale						
Cross talk		-123dB @ 1kHz		-123dB @ 1kHz			-123dB @ 1kHz	
Accuracy		At 1kHz better than ± 0.2%						
Residual offset		Better than ± 0.1%						
Phase match		Better than 0.2° @ 10kHz						

VM8-E	VC8-E	VB8-E	DB8
8	8	8	8
7-pole Lemo	Micro-dot	7-pole Lemo	7-pole Lemo
Lemo-Lemo & Lemo-BNC	n.a	Lemo to BNC & Lemo to pigtail	Lemo to pigtail
Voltage	Voltage	Voltage	Voltage
ICP	ICP	ICP	-
TEDS	TEDS	TEDS	-
-	-	-	-
Conventional microphone	-	-	-
-	Charge	-	-
-	-	Full, 1/2 & 1/4	Full, 1/2 & 1/4
-	-	Potentiometer	Potentiometer
Voltage DC/AC, ICP	Voltage DC/AC, ICP, Charge	Voltage DC/AC, ICP	Voltage DC
-	-	Voltage DC/AC	Voltage DC
3.5mA ± 15% from 28V source	3.5mA ± 15% from 28V source	3.5mA ± 15% from 28V source	-
-	-	+15VDC @ 10mA maximum	+10VDC @ 20mA maximum
-	-	±0.5V to ±5V (max current 20mA)	±1V, ±2.5V or ±5V (max current 20mA)
28V preamp supply & 0/200V polarization	-	-	-
		Shunt calibration (25,50,100,250kΩ)	Shunt calibration (50,100kΩ)
			Digital (after ADC)
			Transmitted to host
			-
		IEEE 1451.4 (non-ICP sensors)	-
± 10V	± 10V	± 10V	± 10V
0.48Hz ±6%, 7Hz ±2%	0.48Hz ±6%, 7Hz ±2%	0.48Hz ±6%	
24-bit ΣΔ ADC	24-bit ΣΔ ADC	24-bit ΣΔ ADC	24-bit ΣΔ ADC
204.8kHz	204.8kHz	204.8kHz	51.2kHz
92kHz	92kHz	92kHz	20kHz (-3dB)
115dB @ ≥1V	115dB @ ≥1V	115dB @ ≥1V	>106dB @ ±3.16mV to ±100mV
-150dB @ 10V	-150dB @ 10V	-150dB @ 10V	-138dB @ 10V
			Better than -100dB@3dB below full scale
-123dB @ 1kHz	-123dB @ 1kHz	-120dB @ 1kHz	
			Better than 0.1° @ 1kHz



**LMS INTERNATIONAL**

Researchpark Z1, Interleuvenlaan 68  
B-3001 Leuven [Belgium]  
T +32 16 384 200 | F +32 16 384 350  
info@lmsintl.com | www.lmsintl.com

**Worldwide**

For the address of your local representative, please  
visit [www.lmsintl.com/lmsworldwide](http://www.lmsintl.com/lmsworldwide)

LMS, the leading partner in test and mechatronic simulation in the automotive, aerospace and other advanced manufacturing industries, helps customers get better products to market faster. With a unique combination of mechatronic simulation software, testing systems and engineering services, LMS tunes into mission critical engineering attributes, ranging from system dynamics, structural integrity and sound quality to durability, safety and power consumption. With multi-domain and mechatronic simulation solutions, LMS addresses complex engineering challenges associated with intelligent system design and model-based systems engineering. More than 900 LMS professionals serve over 5,000 manufacturing companies worldwide.



© LMS 2011. All rights reserved. The materials presented here are summary in nature, subject to change, and intended for general information only. Additional details and technical specifications are available at [www.lmsintl.com](http://www.lmsintl.com). LMS INTERNATIONAL, LMS Test.Lab, LMS Virtual.Lab, LMS Virtual.Lab Designer, LMS Imagine.Lab AMESim, LMS SCADAS, LMS Test.Xpress, LMS Tec.Manager, LMS CADA-X, LMS DADS, LMS FALANGS, LMS PolyMAX, LMS TecWare, LMS TWR and LMS CDTime are registered trademarks of LMS INTERNATIONAL NV. All other trademarks acknowledged.