

LMS SCADAS

Versatile, high-performance data acquisition systems





Versatile LMS SCADAS data acquisition systems

High-performance quality that you can take anywhere

Today's faster product development cycles mean one thing to most test engineers: less time. Testing departments around the world are under pressure to test more products and design variations in significantly less time and with fewer resources. Thanks to the flexibility, high-performance and efficiency of the versatile LMS SCADAS systems, engineering teams will certainly maximize their in-house testing processes and resources and, most importantly, save time.

Known for swift performances and superior quality, every LMS SCADAS system delivers optimal measurement quality and precision practically anywhere - in the lab and in the field. The seamless integration with the LMS Test.Lab and LMS Test.Xpress software accelerates measurement set-up, delivering a maximal performance while guaranteeing optimal data quality. With all these benefits, it is no wonder that thousands of users around the world rely daily on their LMS SCADAS system to obtain mission-critical data for their testing process.



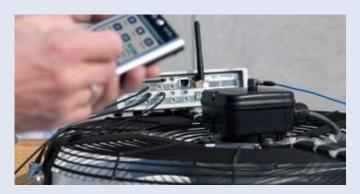


A tailor-made LMS SCADAS solution that works perfectly every time

One major advantage with the LMS SCADAS system is its flexibility and configurability. With a wide and diverse product line, there is certain to be 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, acoustic and durability testing. On top of that, with the LMS SCADAS systems' focus on versatility, you can be sure of an excellent return on investment. It is completely feasible to use your lab system as a mobile front-end or even a stand-alone recorder in the field. Perhaps you need a single system solution for acoustic tests and for durability data acquisition in tough conditions? Whatever its purpose, there is a LMS SCADAS system made to match your testing needs.

- One single platform for laboratory, mobile and autonomous data acquisition
- Optimally tuned for noise, vibration, acoustic and durability
- Delivering maximum user comfort, flexibility and test data consistency
- Superior modularity and scalability protects your hardware investments
- Parallel signal processing safeguards system performance for high-channel counts

"With the LMS SCADAS systems' focus on versatility, you can be sure of an excellent return on investment."







Focus on flexibility: LMS SCADAS solutions made to match your requirements

Designed for noise, vibration and durability data acquisition engineering

Whether you want to capture rpm, acceleration, speed, force, displacement, strain, temperature, sound, torsion, pressure, CAN, or GPS data - singularly or combined - the LMS SCADAS offers a flexible, off-the-shelf solution.

One system for lab, mobile or autonomous data acquisition and recording

The LMS SCADAS front-end offers system configurations for laboratory, mobile and autonomous data acquisition. Most importantly, it is possible to standardize laboratory and mobile testing on the same hardware system. Operators and technicians appreciate the tight integration of the LMS SCADAS system with the LMS data acquisition and analysis software, providing just one integrated system for all their testing tasks.

Maximum modularity - from 4 to more than a 1000 channels

Highly modular, a LMS SCADAS data acquisition solution can be expanded from an inexpensive unit with only four channels to a high-channel density portable solution, ranging from 4 to 192 channels in a single frame, up to a distributed high-end system with over a thousand channels. Truly versatile, you can configure each LMS SCADAS system to your exact testing requirements adding more channels, swapping signal conditioning modules and boosting the signal processing power as you wish.

Optimal scalability - full measurement quality

Scalable, the LMS SCADAS system let users apply a high number of measurement channels for extensive testing campaigns, using a daisy-chained master/slave configuration or dividing the channels over multiple separate testing systems. This distributed approach means that you can minimize costly transducer cabling - and obtain much higher quality measurements.

Professional support for full productivity

To reach maximum productivity and maintain a competitive edge, you need high-quality technical support. LMS offers access to highly responsive support centers around the world hardware calibration services ensure that your system remains calibrated according to ISO and other international standards. LMS also offers a full hardware maintenance contract, which guarantees minimum downtime in case of hardware failure. A software service gives you free software upgrades and privileged access to the on-line support section, and direct access to our support center for expert assistance.

Superior hardware quality - maximum investment protection

The LMS SCADAS system achieves its high-level reliability through rigorous design standards, efficient quality control and a strong service organization. Our quality standards are the outcome of more than a 30-year accumulation of practical knowledge in signal conditioning and processing. Careful tracking of each and every system module allows our service organization to carry out preventive maintenance for our customers so that downtime for calibration or repair is reduced to an absolute minimum. Front-end calibration, either in house or on site, in line with the international ISO17025 standard.



LMS SCADAS III

Superior performance for lab-based data acquisition

The LMS SCADAS III range offers complete, high quality and cost-effective solutions for high-speed data acquisition and signal conditioning in laboratory conditions. The LMS SCADAS III front-end is tightly integrated with the LMS Test.Lab software and optimally tuned to meet the specific needs of noise, vibration and acoustic engineering. It offers a flexible choice of hardware frames and modules and outstanding performance.

A modular set of frames and modules

The modular LMS SCADAS III frame allows you to configure a base system and gradually expand it from 4 channels into a higher channel count unit. The LMS SCADAS 310 is a compact all-in-one lab system that can accommodate up to 120 channels. The top-of-the-line LMS SCADAS 316 can be configured up to 192 channels in a single frame. The LMS SCADAS 302VB offers a dedicated configuration for vibration control applications. The LMS SCADAS III accepts up to 14 different module types, including any combination of input/output cards, specialty inputs for thermal, acoustic head, tacho and torsional applications and a variety of signal conditioning modules.

The perfect fit for high-channel lab testing

Using the LMS SCADAS 310 or 316, 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 1000 channels. Individual master frames can be configured into master/slave configurations and easily operated as one unit through a simple master station. LMS SCADAS III offers channel-count independent real-time processing and excellent throughput performance. This makes LMS SCADAS III the ideal solution for high-channel count modal testing, aircraft ground vibration testing or turbine testing applications.

Full measurement power in the lab

The outputs from the various signal-conditioning modules are routed to the SP92 A/D and DSP cards in a very flexible and software controlled manner. Digitization incorporates state-of-the-art delta-sigma techniques that combine an ultra-low noise floor with fully linear 24-bit system performance at up to 204.8kHz sampling per channel. The combination of a high throughput capacity host interface with 24-bit fixed point DSPs on each four-channel or twelve-channel module enables a maximum distribution of processing power for true real-time operations on a large number of channels. Processing functions include calibration, digital filtering and decimation, order tracking and harmonic extraction, as well as real-time 1/3rd or 1/12th octave filtering.

LMS SCADAS III at a glance

LMS SCADAS 316 & 317S: top-of-the-line lab systems

- Accommodates 4 to 192 channels
- Expandable to 2000 measurement channels
- Prepared for 19" rack mounting
- Easily interchangeable signal conditioning modules
- Industry standard 1Gbit Ethernet host interface
- Maximum sustained throughput performance of 8MSamples/sec
- · Built-in calibration source for easy system and module calibration

LMS SCADAS 310: the compact all-in-one lab system

- Compact-frame for lab and field use
- Industry standard 1Gbit Ethernet host interface
- Accommodates 4 to 120 measurement channels
- Master/slave configuration
- Easily interchangeable signal-conditioning modules
- Built-in calibration source for easy system and module calibration

LMS SCADAS 302VB: the cost-effective bundle for vibration control

- Cost-effective ready-to-go low-channel count VibCo bundle
- Dual source module and a four-channel V/ICP input module (standard)
- Expandable to an eight-channel configuration
- Industry standard 1Gbit Ethernet host interface
- Built-in calibration source for easy system and module calibration













	LMS SCADAS 316	LMS SCADAS 317S	LMS SCADAS 310	LMS SCADAS 302VB
	mainframe	slave frame	mainframe	mainframe
Number of slots	16	17	10	3
Max. number of channels per frame	64 (192 with V12 modules)	68 (204 with V12 modules)	40 (120 with V12 modules)	8
Max. total channel count (master/slave combined)	1920 (5760 with V12 modules)	n.a.	1840 (5520 with V12 modules)	n.a.
Dimensions (W x H x D)	448 x 183 x 461 mm	448 x 183 x 461 mm	336 x 183 x 461 mm	336 x 183 x 461 mm
Weight	20 kg (fully equipped)	20 kg (fully equipped)	13 kg (fully equipped)	8 kg (fully equipped)
AC power input	88 to 264VAC	88 to 264VAC	88 to 264VAC	88 to 264VAC
Max. power consumption	220W	220W	160W	55W
Host interface	Ethernet	n.a.	Ethernet	Ethernet
Master/Slave interface	Optical	Optical	Optical	n.a.

LMS SCADAS III data acquisition and signal conditioning modules

Designed as a stand-alone or system component, the LMS SCADAS III accepts up to 14 different module types, including any combination of input/output cards, specialty inputs for thermal, acoustic head, tacho and torsional applications and a variety of signal conditioning modules.

The 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, calibration is on a module-by-module basis. It is entirely digital to ensure the highest quality data over an extended period as well as to permit easy card swapping.

LMS SCADAS III Input Modules - Amplifiers

Programmable Quad Amplifier (PQA-II)

The PQA-II is a basic four-channel voltage/ICP® conditioning module. Each channel has an individually programmable input range with AC/DC/ICP coupling and an analog A-weighting filter. The PQA-II has grounded BNC inputs.

- Input range ±0.5mV to ±10V
- 4mA ICP® supply
- Analog A-weight filter



Programmable Quad Floating Amplifier (PQFA)

The PQFA adds a number of features to the basic PQA-II module. Floating inputs eliminate the risk of ground loops and an analog programmable high-pass filter removes unwanted low frequency components. Smart transducers (TEDS) can be connected directly to the PQFA module. This drastically reduces set-up time and even more important, avoids cabling errors, which can possibly lead to measurement reruns.

- Input range ±0.8mV to ±10V
- Floating / single-ended inputs
- 4mA ICP supply
- 5 to 75Hz programmable high-pass filter
- TEDS support



Programmable Quad Microphone Amplifier (PQMA)

Ideal for vibro-acoustic measurements, the PQMA can connect four conventional, pre-polarized or ICP microphones as well as force transducers or voltage inputs. The analog high-pass filter optimizes the ADC's dynamic range.

- Input range ±0.5mV to ±25V
- Semi-differential inputs
- 4mA ICP supply
- 1 to 255Hz programmable high-pass filter
- 200V polarization voltage
- 30V preamplifier supply



Programmable 12-channel module (V12)

The V12 is a twelve-channel voltage, ICP conditioning and data acquisition module that can triple a conventional channel count in a LMS SCADAS III frame. Because of its high-channel density, the V12 is ideally suited for connecting triaxial accelerometers. AC, DC and ICP coupling is supported as well as out-going smart sensors. The V12 is a one-board solution, incorporating 24 bits ADCs with a maximum sample rate of 51.2kHz. A high performance on-board DSP allows real-time embedded processing such as decimation and order tracking.

- Input range ±8mV to ±10V
- 4mA ICP supply
- Available in 2 versions for AC coupled signals: 0.5 Hz and 0.05 Hz
- TEDS support



Input modules	PQA	PQFA	РОМА	V 12	
Function	Voltage and ICP	Floating voltage and ICP with TEDS	Microphone and ICP	Voltage and ICP with TEDS	
Number of channels	4	4	4	12	
Connector	4 x non-isolated BNC	4 x isolated BNC	4 x 7-pole LEMO	4 x 9-pole LEMO	
Input mode	Single-ended	Floating and single-ended	Semi-differential	Semi-ended	
Input coupling	DC/AC/ICP	DC/AC/ICP/TEDS	DC/AC/ICP	DC/AC/ICP/TEDS	
Full-scale input range	±0.5mV to ±10V	±0.8mV to ±10V	±0.5mV to ±25V	±8mV to ±10V	
Input impedance	1M Ω//50pF	1MΩ//50pF	1MΩ//50pF	1MΩ//50pF	
Analog filtering	A-weight	High-pass: 5 to 75Hz	High-pass: 1 to 255Hz	No	
Signal to noise ratio	> 90dB	> 100dB	> 88dB	> 102dB	
Total harmonic distortion	<-87dB	<-90dB	<-87dB	<-100dB	
Crosstalk	<-106dB	<-106dB	<-100dB	<-116dB	

LMS SCADAS III data acquisition and signal conditioning modules

Programmable Quad Charge Amplifier (PQCA)

The PQCA can connect four conventional piezoelectric accelerometers to the LMS SCADAS III system using microdot connectors and a built-in charge amplifier. The PQCA has an exceptionally high dynamic range for the most demanding structural measurements.

- Input range \pm 0.2pC to \pm 51200pC
- Single-ended inputs
- 0.5 or 5Hz high-pass filter
- Cable and sensor check via charge injection for day-to-day calibration



Programmable Quad Differential Charge Amplifier (PQDCA)

The PQDCA is a dedicated conditioner for differential piezoelectric charge transducers typically used for aerospace turbine testing applications. The PQDCA functionality is similar to the PQCA with the addition of truly differential (balanced) inputs.

- Input range ± 0.1pC to ± 13200pC
- Differential or single-ended inputs
- Cable and sensor check via charge injection for day-to-day calibration



Input modules	PQCA	PQDCA		
Function	Charge	Differential charge		
Number of channels	4	4		
Connector	4 x 10-32 Microdot	4 x 2-pole LEMO		
Input mode	Single-ended	Differential / single- ended		
Input coupling	n.a.	n.a.		
Full-scale input range	±0.2pC to ±51200pC	±0.1pC to ±13200pC		
Input impedance	< 0.1Ω	< 0.1Ω		
Analog filtering	High-pass: 0.5 or 5Hz	High-pass: 0.5Hz		
Signal to noise ratio	> 88dB	> 94dB		
Total harmonic distortion	<-87dB	<-87dB		
Crosstalk	<-106dB	<-102dB		

Programmable Quad Bridge Amplifier (PQBA)

The PQBA supports four channels of strain transducers - and those based on the same principle, such as piezo-resistive or variable capacitor sensors. Full, half, and guarter bridge configurations are supported with bridge completion resistors fully software switched. Automatic bridge nulling uses current injection techniques.

- Input range $\pm40\mu V$ to $\pm1V$
- Fully differential inputs
- Maximum ±5V bridge supply with sense mechanism
- Bridge nulling and calibration using accurate current injection techniques



Programmable Quad Bridge Amplifier with added functionality (PQBA-II)

The PQBA-II supports four channels of strain transducers - and those based on the same principle, such as piezo-resistive or variable capacitor sensors. Full, half, and quarter bridge configurations are supported with bridge completion resistors fully software switched. Automatic bridge nulling uses current injection techniques. In addition, the PQBA-II supports two-wire and four-wire dynamic strain measurements with AC coupling.

- Input range $\pm 244 \mu V$ to $\pm 12 V$
- Fully differential inputs
- DC and AC coupling
- Maximum ±5V bridge voltage supply with sense mechanism
- Maximum ±25mA balanced current supply with sense mechanism
- Bridge nulling and calibration using accurate current injection techniques



Input modules	PQBA	PQBA-II
Function	Full, half and quarter bridge	Full, half and quarter bridge; 2- and 4-wire dynamic strain
Number of channels	4	4
Connector	4 x 6-pole LEMO	4 x 6-pole LEMO
Input mode	Fully differential	Fully differential
Input coupling	DC	DC and AC
Full-scale input range	$\pm 40 \mu V$ to $\pm 1 V$	±244µV to ±12V
Input impedance	1GΩ//50pF	$3.2 M\Omega//1 nF$
Signal to noise ratio	> 93dB	> 93dB
Total harmonic distortion	<-87dB	<-87dB
Crosstalk	<-106dB	<-106dB
Transducer supply	Max ±5V, programmable	Max ±5V, programmable; Max ±25mA, programmable

LMS SCADAS III Input Modules for thermal, acoustic heads, tacho and torsional vibrations

Programmable Quad Thermocouple Amplifier (PQTA)

The PQTA is a four-channel thermocouple conditioner, suitable for handling a wide range of thermocouple types. This allows the user to acquire temperature values of the object undergoing testing.

- Support of R, S, K, T, J and E-type thermocouples
- Cold junction compensation and automatic curve linearization
- Low-noise and offset amplifier for very accurate temperature measurements



Quad Digital Audio Module (QDA)

Supporting AES/EBU and SPDIF data formats, the QDA is a dedicated audio interface module, specifically designed for artificial heads. The QDA accepts 16 or 24-bit data and all standard audio sample rates. HMS data is retrieved from the audio stream and separately sent to the host. Because the QDA resamples input data to the standard SCADAS III internal sample rates, the output data of QDA is fully compatible with data from other modules. Therefore, digital audio measurements can be done in parallel (synchronous) with other vibration or sound measurements.

- Support of AES/EBU and SPDIF input data at all standard sample rates
- Support of HMS data
- Synchronization of digital audio streams with other inputs
- All processing functions, including filtering, order tracking and 1/3rd octave available



PQTA QDA Input modules Digital audio: AES/ Thermocouple Function EBU and SP-DIF Number of channels 4 2 x stereo 2 x 3-pin LEMO and 4 x universal TC Connector cinch Input mode Single-ended Digital Input coupling R, S, K, T, J and E n.a. Full-scale input range ±50mV maximum n.a. Input impedance $1G\Omega//15nF$ TTL compatible Analog filtering None Signal to noise ratio > 85dB > 139dB Total harmonic distortion < -123dB n.a. <-100dB Crosstalk n.a.

Programmable Dual Tacho Module (PDT-II)

The PDT-II tacho module allows order tracking as well as spectral/octave acquisitions against RPM. Tacho signals up to 15kHz and 1024 pulses per rev are supported while auto-ranging inputs and programmable signal conditioning ensure that even 'industrial quality' analog tacho signals with noise and changing amplitudes will result in stable readings.

- Auto-ranging differential input
- Bias voltage compensation from -5V to +5V
- 40ns tacho counter resolution
- Tacho preview with 16-bit ADC
- Double and missing pulse compensation
- RPM smoothing filter



Quad Torsional Vibration Module (QTV)

The QTV is a four-channel tacho input module, designed for torsional vibration phenomena acquisition and analysis. Thanks to high bandwidth ADCs and dedicated embedded processing, the QTV is able to detect and represent high-frequency variations in rotational speed with a precision that exceeds any conventional (counter-based) solution. Dynamic RPM data is acquired with 24-bit precision and is perfectly synchronized with other vibration or acoustic data acquired by the front-end. The LMS SCADAS III QTV module offers a dedicated solution for highly accurate torsion analysis of rotating objects.

- Input range ±0.5mV to ±25V
- Maximum tacho frequency 50kHz
- Acquisition synchronous with all other input channels in LMS SCADAS III
- Frequency independent resolution



Tacho modules	PDT-II	ατν		
Function	Tacho acquisition	Torsional vibration		
Number of channels	2	4		
Connector	Isolated BNC	Non isolated BNC		
Principle	24-bit A/D conversion + dedicated signal processing	24-bit A/D conversion + dedicated signal processing		
Full-scale input range	Auto-ranging ±100mV to ±10V	±62.5mV to ±25V		
Input impedance	112kΩ	1ΜΩ		
Max. tacho frequency	40kHz	50kHz		

LMS SCADAS III Output Modules

Quad Digital to Analog Converter (QDAC-II)

Output signals with ultra-low distortion and noise are ensured using 24-bit digital-to-analog bit stream converters, analog and digital reconstruction filters, and up-sampling digital filters with noise shaping. The four-channel QDAC-II module includes firmware to support sine, random, burst sine or random, chirp and user-defined signal generation.

- 24-bit signal generation
- 20kHz bandwidth
- ±10V output voltage
- Short circuit protected





Dual channel output for vibration control and time waveform replication (VDAC-III)

The VDAC-III is a versatile dual-channel output module for applications, such as vibration control testing and time waveform replication, but also for Multiple Input Multiple Output (MIMO) modal testing. It can be used as an advanced signal generator or to replay signals that are generated on the host computer. To assure true replay of the original signals, ultralow distortion digital interpolation filters are used. Dedicated hardware circuits guarantee smooth output signal shutdown, even in case of power failure. This provides extra fail-safe protection for the structure being tested.

- 24-bit signal generation
- 20kHz bandwidth
- ±10V output voltage
- Fail-safe



Quad Monitor Output Amplifier (QMO)

The QMO is a four-channel output module for the LMS SCADAS III system. As an output amplifier, it provides analog output of one of the stacked signal conditioners. The output amplifier is AC coupled. The QMO modules can support parallel recording to the normal LMS SCADAS acquisition III on e.g. on a tape recorder in data reduction systems.

- Calibrated monitor output
- ±2V output voltage
- Short circuit protected



Output modules	ОМО	QDAC-II	VDAC-III
Function	Analog output for signal conditioner	General purpose signal generation	VibCo and TWR
Number of channels	4	4	2
Max. output level	±2V	±10V	±10V
Resolution	n.a.	24-bits	24-bits
Output impedance	< 1Ω	50Ω	50Ω
Output coupling	AC	DC	DC
Noise floor	<-101dB	<-110dB	<-110dB
Total harmonic distortion	<-97dB	<-96dB	<-96dB
Shutdown control	n.a.	Software	Hardware
Additional outputs	n.a.	n.a.	CLO and Status
Crosstalk	<-100dB	n.a.	n.a.



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 data-acquisition and signal-conditioning capabilities. Designed for high measurement and testing productivity, LMS SCADAS Mobile represents one of the most powerful systems in its class. LMS SCADAS Mobile supports both LMS Test.Lab for test-based noise and vibration engineering and the LMS Test.Xpress sound vibration analyzer and data recording solution.

Scalable system configurations

The LMS SCADAS Mobile SCM05 and SCM09 systems are compact, modular front-ends that accommodate 4 to 40 or 72 channels, and even higher channel counts in a master/slave set-up. Their robust design, compact size, low weight and high autonomy make it the ideal solution for mobile testing applications. Or do you prefer an ultra-portable front-end with fewer channels? The LMS SCADAS Mobile SCM01 front-end hosts 4 or 8 channels and offers a minimum footprint and maximum portability. Each LMS SCADAS Mobile system is equipped with 4 or 8 channel input modules, which support of voltage or ICP sensors, microphones, charge transducers, digital heads and strain gauges. In addition, its built-in GPS receiver is capable of providing instant and accurate input data related to absolute time, speed and position information and its embedded CAN interface or dedicated CAN input module give you direct access to vehicle bus data.



Maximum measurement power

The LMS SCADAS Mobile front-end packs the versatile data acquisition and signal conditioning capabilities of the renowned LMS SCADAS hardware platform into a compact and robust package. Designed for high measurement and testing productivity, LMS SCADAS Mobile represents one of the most powerful analyzer configurations in its class: providing up to a 204.8 kHz sampling rate per channel, 24-bit resolution, 150 dB spurious-free dynamic range, and a throughput rate that exceeds 8 Msamples/s.

A portable and solid package

LMS SCADAS Mobile front-ends flexibly adapt to any kind of mobile or laboratory set-up. The systems are not just easy to carry, they also offer flexible cable connections. All cables plug into the front panel, which greatly facilitates installation in locations that are small or difficult to access. LMS SCADAS Mobile operates on AC/DC power or on a high-autonomy internal battery. LMS SCADAS Mobile's robust design and reliable hardware is compliant with the MIL-STD-810F standard, and is capable of operating under extreme temperatures. In addition, its innovative cooling system made fan cooling obsolete, providing absolute silence for acoustic measurements.

"Designed for high measurement and testing productivity, LMS SCADAS Mobile represents one of the most powerful analyzer configurations in its class."



LMS SCADAS Mobile at a glance

- 4 to 72 channels
- Master-slave configurations for distributed systems and channel expansion
- Up to 204.8 kHz sampling rate per channel
- 24-bit DSP technology
- 150 dB spurious-free dynamic range
- 8 Msamples/s throughput rate using high-speed Ethernet connection
- DC Automotive compliant (9-36V)
- Qualified for rough and high temperature operating conditions



LMS SCADAS Mobile SCM01 mainframe: practical and ultra portable unit

- Accommodates 4 or 8 channels
- Compact, lightweight frame (203 x 58 x 260 mm/2.5kg)
- Nominal 2.5 hour battery autonomy
- On-board dual tacho and generator
- Industry-standard Ethernet host interface
- On-board GPS receiver (optional) and CAN (optional)
- MIL-STD 810F qualified for shock and vibration





LMS SCADAS Mobile SCM05 and SCM09 mainframes: optimal channel density in a small package

- Accommodates 4 to 40 channels (SCM05)
- Accommodates 4 to 72 channels (SCM09)
- Laptop-size robust frame (345 x 92 x 300mm (SCM05) 345x118 x300mm (SCM09))
- Nominal one-hour battery autonomy
- On-board dual tacho and generator
- Industry-standard Ethernet host interface
- On-board GPS receiver (optional) and CAN (optional)
- MIL-STD 810F qualified for shock and vibration

LMS SCADAS Mobile SCM06S and SCM10S slave frames

Expand mobile measurement to hundreds of input channels

- Accommodates 4 to 48 channels (SCM06S)
- Accommodates 4 to 80 channels (SCM10S)
- True master/slave configuration beyond clock synchronization: fully synchronized data is saved in one measurement file
- Easy mechanical locking of frames to 1 unit
- Distributed acquisition through 50m optical cabling



LMS SCADAS Recorder: Go anywhere reliability PC-less recording and intelligent mobile data acquisition system

Built on LMS SCADAS Mobile technology, 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 system is compatible with major sensor types and is seamlessly integrated with the LMS Test.Lab, LMS Test.Xpress and LMS TecWare software for noise, vibration and durability analysis. 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, including autonomous data recording.

- 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 (health monitoring of the recorder measurement) 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 UTP 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 directly to PC through the embedded UTP interface. The data can be visualized, processed and saved on hard disc in real-time.
- As an all-rounder, the LMS SCADAS Recorder is seamlessly integrated with the LMS Test.Lab, LMS Test.Xpress and LMS TecWare software for noise, vibration and durability analysis.

Versatile 3-in-1 functionality

Compatible with major sensor types, this innovative recorder features three-in-one functionality. For quick on-the-go data acquisition, it is a practical stand-alone data recorder that operates without a PC connection thanks to the embedded data acquisition engine and its handy CompactFlash data storage card. Integrate a Microsoft Windows Mobile PDA and it can act as an enhanced smart data recorder for on-the-spot data monitoring and measurement validation. Ever the all-rounder, it is also a perfect data acquisition front-end for lab-based and in-field measurements.

Autonomous data recording

The LMS SCADAS Recorder operates 100% autonomously. The LMS SCADAS Recorder is particularly suited for challenging test applications, where using a PC-based data acquisition unit would be unpractical or impossible. The unit simply saves the acquired data on the CompactFlash card along with the required conversion format for further analysis on-site or back at the office.

Smart recording

Using the Bluetooth antenna and a Microsoft Windows Mobile PDA, LMS SCADAS Recorder users can control and monitor the entire measurement process via the PDA's easy-to-use graphical user interface. Measurement control includes starting and stopping the acquisition as well as selecting the appropriate measurement set-up or even changing measurement settings. During the measurement, signals can be displayed in bar graphs. It even indicates errors, such as overloads or faulty cables. After the measurement, a quick overview of relevant statistics (min, max, rms, mean) as well as the time series instantly validates measured data.

Flexible data acquisition front-end

The LMS SCADAS Recorder can also be used as a PC front-end system for laboratory and in-field testing. This indoor-outdoor flexibility is the perfect way to reduce overall hardware cost and eliminate the hassle and inconvenience of switching systems. The LMS SCADAS Recorder is seamlessly integrated with the LMS software for noise, vibration and durability testing and analysis, delivering optimal data quality and consistency.







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
- High-speed Ethernet connection for direct streaming to PC
- Reduce overall hardware cost and eliminate inconvenience
- Easy-to-use recorder software for acquisition, measurement set-up, instant data validation and data export
- On-board GPS receiver and CAN (standard)



LMS SCADAS Durability Recorder: Designed for the extreme

Rugged and durable for complex, high-channel count measurements in tough environments

Built on LMS SCADAS Mobile technology, the LMS SCADAS Durability Recorder is specifically designed for mobile data acquisition for durability. 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. This is the same reasoning why using a PC is not convenient and autonomous recording and on-the-spot validation is a must. For long and repetitive acquisitions requiring high-channel counts and large data storage, you can easily see the need for a dedicated solution like the reliable LMS SCADAS Durability Recorder.



Rugged and durable from connection to the final measurement

Durable 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.

Flexible, future-proof, all-in-one system with easy instrumentation

Your average data acquisition measurement today covers a wide range of challenges from analog to digital sensor synchronization to integrated CAN bus and GPS data. Or perhaps the focus is on flexibility: measure any combination of strain, displacement, acceleration, velocity... all without swapping cards or external signal conditioning.

The universal durability card (DB8) supports it all: signal conditioning, A/D conversion and signal processing for strain gauges in full, half and quarter bridge configurations, as well as potentiometers and bridge-type capacitive, piezo-resistive or MEMSbased accelerometers. Offering the unique combination of strain, vibration and displacement measurements in one single module, the DB8 is the most versatile solution for durability-type measurement campaigns. Moreover, the card has only one pin assignment for all sensors, which means a cable error is practically impossible.

Autonomous 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 and the conversation format on highperformance, fast read/write solid-state CompactFlash memory cards. The data is perfectly ready for on-site analysis or further study back at the lab.

Smart recording

Using the Bluetooth antenna and a Microsoft Windows Mobile PDA, LMS SCADAS Recorder users can control and monitor the entire measurement process via the PDA's easy-to-use graphical user interface. Measurement control includes starting and stopping the acquisition as well as selecting the appropriate measurement set-up or even changing measurement settings. During the measurement, signals can be displayed in bar graphs. It even indicates errors, such as overloads or faulty cables. After the measurement, a quick overview of relevant statistics (min. max. rms, mean) as well as the time series instantly validates measured

Flexible data acquisition front-end

The LMS SCADAS Durability Recorder can also be used as a PC front-end system for laboratory and mobile in-field testing. This indoor-outdoor flexibility is the perfect way to reduce overall hardware cost and eliminate the hassle and inconvenience of switching systems. The LMS SCADAS Durability Recorder is seamlessly integrated with the LMS software for durability testing and analysis, delivering optimal data quality and consistency.

LMS Durability Recorder at a glance

Incrementing on the LMS SCADAS Recorder

- Top performer in tough conditions: water and dustprotected - ingress protection code IP54 and MIL-STD 810F qualified for shock and vibration
- Vibration-resistant cable connections
- High-channel density (from 4 to 72 channels expandable to hundreds of input channels) without compromising speed or quality
- Strain, vibration and displacement measurements in one single measurement card
- Standard GPS and CAN
- On-the-spot validation prevents errors and annoying reruns





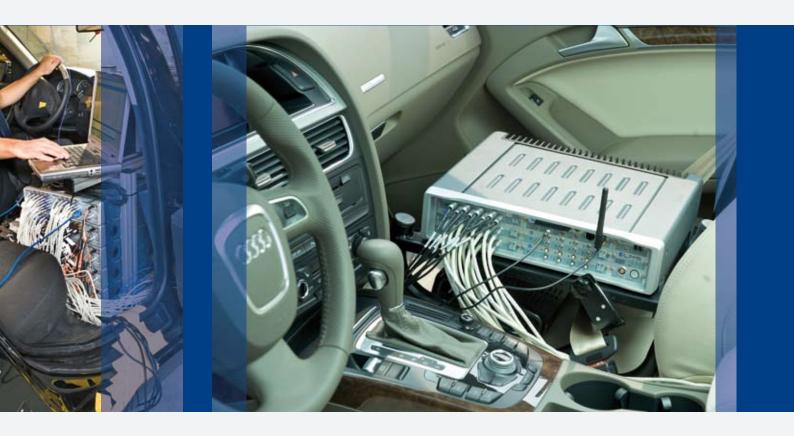
LMS SCADAS Mobile and Recorder frames

Frame code	SCM01	SCR01	SCM05	SCR05		
Usage discipline	L,M	L,M,A	L,M	L,M,A		
Engineering discipline	Noise & Vibration	Noise & Vibration	Noise & Vibration	Noise & Vibration		
Number of free slots	1	1	5	5		
Maximum number of channels per frame	8	8	40	40		
Channel expansion via slave frame	r	10	SC	CM06S and/or SCM10S		
Transfer rate (Msamples/sec)		8	8			
Embedded tacho inputs		2	2			
Embedded signal generator		2	2			
Embedded CAN-bus & GPS			1			
Wireless remote control (Bluetooth +PDA included)	no	yes	no	yes		
Internal data storage (CompactFlash)	no	yes	no	yes		
External data storage						
External power mode						
Internal battery mode						
Internal battery operation time	150)min		60min		
Cooling system						
Dimensions (WxHxD) mm	203x6	2x280		345x92x300		
Weight	2.9	5kg		6.2kg		
Operating temperature						
Relative humidity						
Vibration protection						
Shock protection						
Ingress protection			IP32			

L = Laboratory • M = Mobile • A = Autonomous



SCM06S	SCD07	SCD08S	SCM09	SCR09	SCD09	SCM 10S			
-	L,M,A	L,M,A	L,M	L,M,A	L,M,A	-			
-	Durability	Durability	Noise & Vibration	Noise & Vibration	Durability	-			
6	7	8	9	9	9	10			
48	56	64	72	72	72	80			
	with SCD	08S only		SCM06S and/or SCM10S					
-	3,8	-		8		-			
-	2	-		2		-			
-	2	-		2		-			
-	1	-		1		-			
-	yes	-	no yes yes		yes	-			
-	yes	-	no	yes	yes	-			
	PC hard disc via Ethernet								
AC using external mains	adapter, Auto ranging DC inp	out from 9VDC to 36VDC							
Rechargeab	le Li-ion MN battery; rating 2	21.6V-1.6Ah							
	40r	min		64r	min				
Heat conduction via	card guides, Cooling via hea	at pipes to heat sink							
			345x14	12x300					
	9.6	kg		10.9	5kg				
Operating: -2	20°C to +55°C, Storage: -20	°C to +70°C							
	Up to 95% non-condensing								
MIL-STD-	810F [20-2000Hz (random):	7.7grms]							
MIL-STD-810F [60gpk ap	plying an 11ms sawtooth sho	ock pulse; 3 shocks per direc	ction]						
	IP:	54		IPO	32				



Input modules for LMS SCADAS Mobile, LMS SCADAS Recorder and LMS SCADAS Durability Recorder

Universal input modules for noise & vibration and durability

Eight-channel voltage / ICP / Bridge module (VB8)

The VB8 is the most versatile of the LMS SCADAS Mobile modules, combining a fully equipped bridge amplifier with several sensor supply options and a standard voltage-ICP-TEDS input per channel. This allows the connection of a wide variety of transducers, such as ICP accelerometers, DC accelerometers (MEMS, piezo-resistive), strain gauges, force and pressure transducers, potentiometers and ICP microphones.

- High-quality 7-pin LEMO connectors
- Input mode selectable per channel
- Support of 1/1, ½ and ¼ bridge configuration with symmetrical supply sensing
- Programmable bridge supply up to 10VDC
- Accurate bridge balancing through current injection
- 120Ω and 350Ω bridge completion
- · Internal shunt calibration with a choice of four shunt resistor values
- Differential and single-ended active sensor support for DC-type accelerometers with supply voltage up to 10 VDC



Dual channel CAN module (CN2)

The CN2 module greatly expands the flexibility of your mobile data acquisition by extending it with a dual channel CAN bus. The CAN bus typically contains tens or even hundred of channels from the internal vehicle bus, providing access to a wealth of measurement data for further analysis. Each CAN input can be individually configured for high-speed or low-speed CAN. By means of a *.dbc database individual channels can be selected to be saved together with the analog input channels

- Dual CAN channel inputs
- Each CAN channel can be individually configured for high-speed or low-speed CAN
- Software selectable list of CAN channels to be measured with the dynamic channels



Eight-channel thermocouple module (T8)

The T8 extends your signal conditioning to 'slow-moving' temperature signals from thermocouple sensors. All common thermocouple types are supported: E, J, K, N, R, S and T type thermocouples can be supported on channel-by-channel basis. The high-speed ADC also allows measurement of fast changing temperature signals up to a sample frequency of 200 Hz. The accurate cold junction compensation and on-board linearization provide a high degree of accuracy over the thermocouple measurement range. The T8 module is not supported on SCD07.

- Support for type E, J, K, N, R, S and T thermocouples
- Channel selectable thermocouple type
- Standard miniature thermocouple connection
- · Linearization of thermocouple signals on the module
- Cold junction compensation
- Up to 200 Hz sample rate for fast-changing thermocouple signals



Input modules for noise & vibration measurements

The noise & vibration input modules are available in 2 versions. For classical noise & vibration measurements, you can use standard modules with a 102.4 kHz frequency span and 138dB spurious-free dynamic range. For advanced noise & vibration measurements, you can opt for enhanced modules supporting a 204.8 kHz frequency span and 150 dB spurious-free dynamic range.



Eight channel voltage / ICP module (V8)

The V8 is an LMS SCADAS Mobile input module, supporting full voltage and ICP signal conditioning and signal processing for eight channels. The V8 offers the unique combination of ultra-low power consumption with high-performance 24-bit analog to digital conversion.

- Input range ±100mV to ±10V
- 3mA ICP supply
- ICP cable check with LED indication
- 0.5Hz or 7Hz high pass filter
- TEDS smart sensor support according to IEEE 1451.4



Eight-channel voltage / ICP / Microphone module (VM8)

Next to standard voltage and ICP functionality with TEDS, the VM8 has dedicated support for conventional measurement microphones.

- Industry-standard 7-pin LEMO connectors
- 200VDC polarization voltage
- 28V preamplifier supply voltage
- Additional 20Hz high-pass filter
- Dedicated microphone TEDS support according to IEEE



Eight-channel voltage / ICP / Digital audio module (VS8)

The VS8 offers the same functionality as the V8 with additional digital audio support.

- One stereo digital audio input channel
- Support of AES/EBU and SPDIF formats with HMS data
- All standard audio sample rates are supported
- Alias free conversion to internal sample rate for perfect synchronization



Eight-channel voltage / ICP / Charge module (VC8)

The VC8 combines a voltage / ICP / TEDS input with a charge amplifier per channel to support both conventional piezoelectric and ICP sensors.

- Industry standard 10-32 Microdot connectors
- Input mode selectable per channel
- Ultra low noise charge amplifiers with an input range of 10pC to 10000pC





Input modules for durability measurements

Eight-channel voltage / Bridge module (DB8)

The DB8 offers a complete solution for all sensors typically used in mobile data acquisition for durability, combining a fully equipped bridge amplifier with several sensor supply options and a standard voltage input per channel. This allows the connection of a wide variety of transducers, such as DC accelerometers (MEMS, piezo-resistive), strain gauges, force and pressure transducers and potentiometers.

- High-quality 7-pin LEMO connectors
- Input mode selectable per channel
- Support of 1/1, ½ and ¼ bridge configuration with symmetrical supply sensing
- Programmable bridge supply of 2, 5 and 10VDC
- Accurate bridge nulling
- 120 Ω and 350 Ω bridge completion
- Internal shunt calibration with a choice of two shunt resistor values
- · Differential and single-ended sensor support for DC-type accelerometers with supply voltage up to 10 VDC



Wheel force transducer module (WFI2)

The WFI2 module adds a digital interface towards the KISTLER ROADYN 2000 Wheel Force Transducer system. By means of a UTP connection, a synchronous acquisition of all relevant wheel force signals is supported: forces, moments, angle and angle speed. One WFI2 module supports up to two ROADYN 2000 racks, providing access to up to 8 wheel force transducers simultaneously per module.

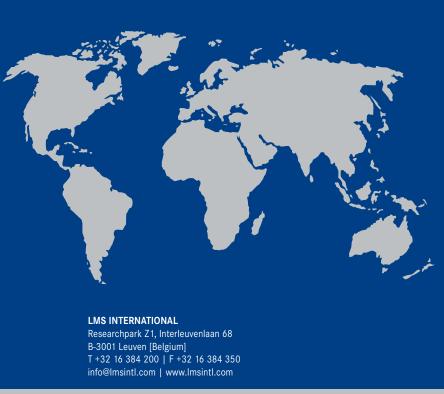
- Support of two Kistler ROADYN2000 frames per module (combining a total of 8 Wheel Force sensors)
- Access to 10 channels per Wheel Force sensor (3 forces, 3 moments, angle and angular speed, temperature and power supply voltage of WFT
- Synchronous acquisition of WFT signals without loss of accuracy through clock drifts (ROADYN system acts as slave to LMS SCADAS front-end)
- Rugged connection through LEMO connectors
- Sample rates up to 1280 Hz



LMS SCADAS Mobile, LMS SCADAS Recorder and **LMS SCADAS Durability Recorder**

Overview of input modules & signal conditioning

	% Voltage/ICP	Voltage/ICP/Digital Audio	Voltage/ICP/ Microphone	S Voltage/ICP/Charge	88 Voltage/ICP/Bridge	Woltage/Bridge	CN2	Wheel force transducer	Thermocouple	Interface
Voltage							ONE	WIII	10	
	•	•	•	•	•	•				
AC accelerometers (ICP)	•	•	•	•	•					
DC accelerometers (MEMS, piezo-resistive, capacitive					•	•				
Charge accels				•						
Microphones	•	•	•	•	•					
Conventional microphones			•							
Strain gauges					•	•				
Temperature									•	
Loads (strain based)					•	•				
Pressure (strain based)					•	•				
SPDIF digital audio		•								
Potentiometer					•	•				
Digital wheel force transducer								•		
Tacho, DAC										•
CAN-Bus							•			•
GPS										•
Bluetooth										•



Worldwide

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