SOMAT XR

Data acquisition and testing in harsh environments

HBM

Acquire Data in Virtually Any Harsh Environment

Rugged mobile data acquisition

As the next generation of rugged mobile data acquisition systems, the powerful HBM SomatXR amplifier system was specially developed for applications in harsh environments. The rugged modules acquire a wide range of physical measurands from strain, vibration, displacement to voltage, current and temperature. All modules are protected against moisture, dust, shock, and vibrations and feature an impressively wide temperature range. It is ideal for use in mobile vehicle tests or stationary measurements under extreme conditions.

SomatXR consists of two main units – the CX23-R data recorder with a web interface as well as the CX22B-R data recorder with pre-installed HBM measurement software catman. While CX23-R has been developed for unattended long-term tests to save the measured data in an ultra-rugged format, CX22B-R has been optimized for interactive vehicle tests and enables comfortable data analysis.

Rugged features:

- Designed to the degree of protection IP65/IP67 (dust, water)
- Extended temperature range from -40 to +80 °C (dew-point proof)
- Vibration resistant up to 10 g (MIL-STD202G, Method 204D, Test condition C)
- Shock resistant up to 75 g (MIL-STD202G, Method 213B, Test condition B)
- Robust software and data format for secure and efficient measured data storage

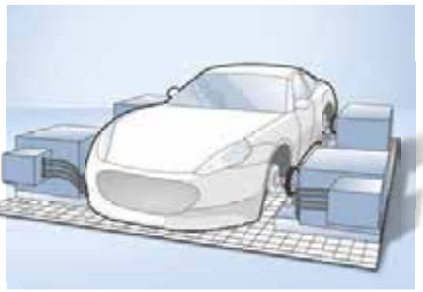
Wide-Ranging Applications

SomatXR is designed for a wide range of applications and environments such as when laptops or other amplifiers reach their limit and fail. Due to its rugged design and flexible system configuration, it is suited for mobile vehicle tests, structural monitoring, stationary measurements, and much more.

Vehicle Testing

Railway Testing

Lab / Bench Testing



Benefits at a glance:

- Backed by Somat's 40 years of testing experience in harsh environments
- Data recorders for stand-alone measurements with web-interfaces or for interactive testing with comfortable data analysis options
- Proven signal conditioning from HBM's QuantumX family including high noise immunity (carrier frequency, AutoCal, galvanic isolation)
- Modular system with universal inputs to adapt to different measurement tasks
- Precision Time Protocol (IEEE1588 - PTPv2) for a highly accurate synchronization between the different modules, which can be distributed via Ethernet over 100 m
- Quick channel and signal setup by Transducer Electronic Data Sheet (TEDS), sensor data base and DBC database for CAN signals

CX23-R: Access your Data Anytime and Anywhere

You can sit back and monitor the test independently of the measuring point: Using the CX23-R data recorder, data can be viewed and processed directly via the data recorder's **web interface by a standard web browser from any device without any software installation – anytime and anywhere**.

Parameterize channels, monitor measurement jobs and visualize data in just a few clicks. It communicates via the standard network Ethernet technology. Wireless access to the web server is also possible via mobile devices.

Other advantages of the CX23-R web interface:

- User management with different access rights (administrator, operator, etc.)
- Multiple clients have access to one system to visualize only the data important for the corresponding users
- Runs on all major operating systems for computers and tablets

CX23-R data recorder with web interface

For unattended testing

CX23-R Authorization

System

Authorized and secured access

CX23-R Test Configuration

Setup

Setup test configuration as module view or in a spreadsheet-like table

CX23-R Dashboard and Test Control

Control

Easy test control and multiple visualization options

CX22B-R: Fast Measurement Results in the Field

The ultra-rugged SomatXR CX22B-R data recorder is intended for use in harsh environments and reliably stores the measured data in applications, such as vehicle tests. The integrated uninterruptible power supply (UPS) enables the fail-safe operation in the vehicle. The recorder acquires data from other SomatXR modules using a FireWire or Ethernet connection. At the same time, it is allowed to use it as a gateway for direct data transmission via Ethernet to the PC. Both centralized and distributed measurement systems can thus be implemented.

The measured data is acquired with the pre-installed catman Easy measurement software and stored in .bin format. The conversion to other formats is easy. The convenient catman software solution can be tailored to suit your needs and provide extensive functions for the analysis of mobile measurement tasks in harsh environments to enable the measured data to be visualized, analyzed, and stored.

Data Analysis Made Easy – with the catman measurement software

For interactive testing

Parameterize

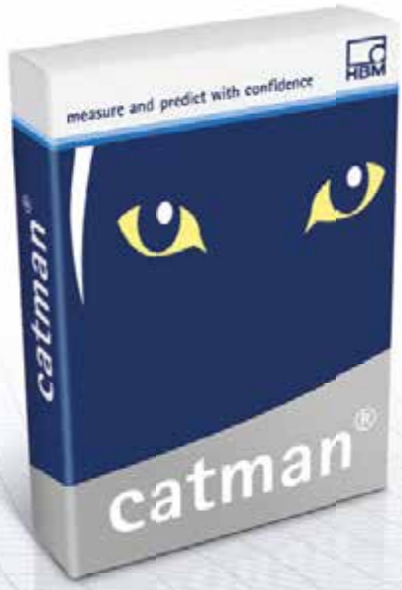
- Quick system and device setup
- Fast and reusable channel configuration (sensor database, TEDS, CAN dbc)
- Easy creation of computed channels using formula editor

Visualize and control

- Individually visualize and control on multiple pages, screens, or in full-screen format (strip chart, numeric display, table, meter, video, map, image, etc.)
- Visualize signals in the time, frequency, or angular range
- Connect positioning sensors (GPS, GNSS) or wheel force transducers

Save

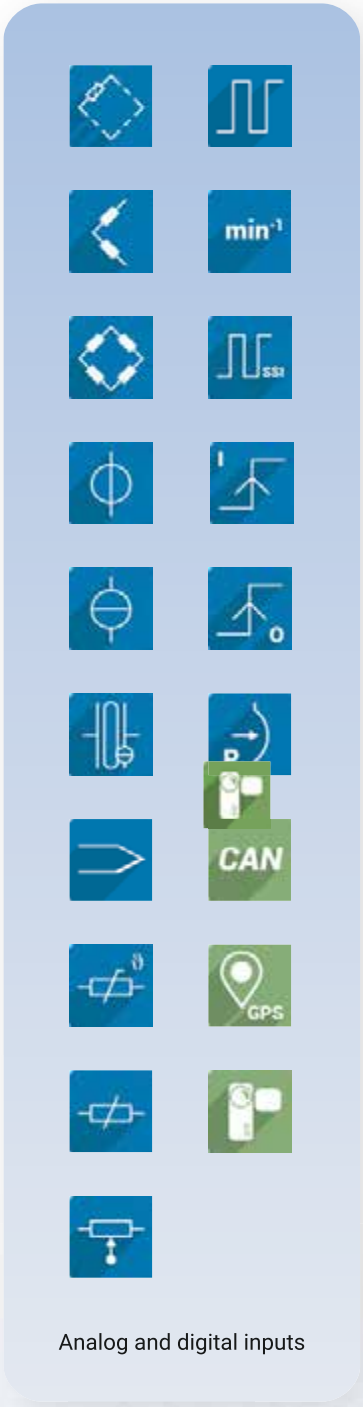
- Use signal analysis to define smart triggers
- Scale few up to 1,000 channels
- Multiple formats for storage and export available (catman BIN, Microsoft® Excel, ASCII, MDF 3/4, National Instruments DIAdem, MathWorks MATLAB, RPC III, UFF58, etc.)



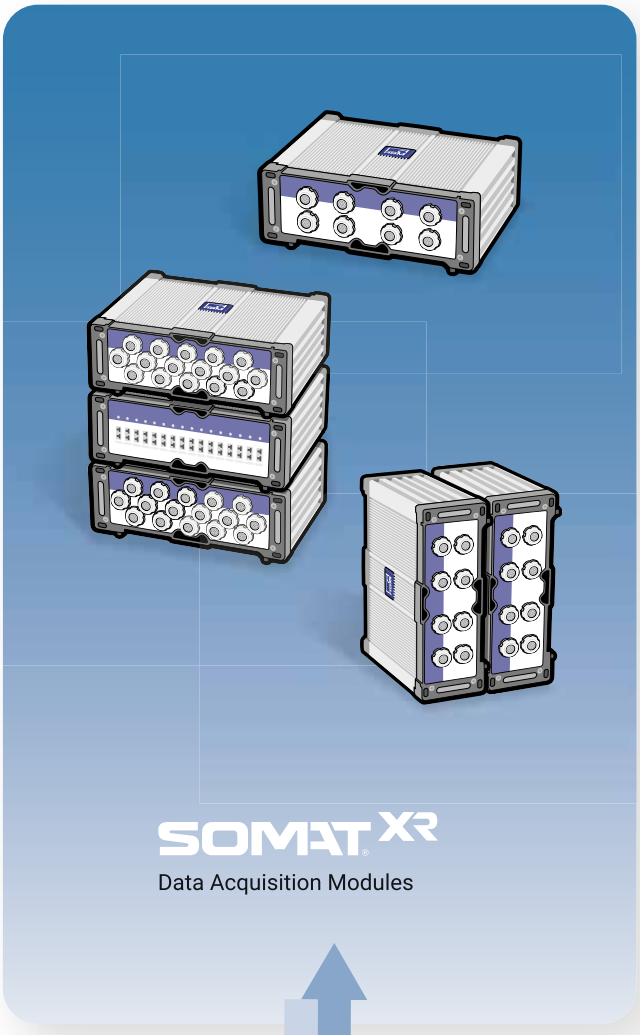
CX22B-R data recorder with
pre-installed catman measurement software

Flexible Concept, Consistent Quality

The modular architecture of the SomatXR system allows you to implement your own measurement system – with a data recorder and web interface, a data recorder and catman or even a connected PC and catman. In addition, SomatXR modules can be integrated in the universal QuantumX amplifier system for test stand applications.



Analog and digital inputs



SOMAT XR
Data Acquisition Modules

QUANTUM X
Data Acquisition Modules

interactive

unattended

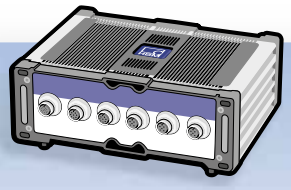
Synchronous

Ethernet PTPv2,
FireWire,
NTP, IRIG-B

Scalable

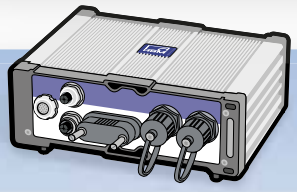
1 to 10,000 channels

1 — 10,000



SOMAT XR
CX23-R
Data Recorder

eDAQ XR
EXRCPU
Data Processor



SOMAT XR
CX22B-R
Data Recorder

QUANTUM X
CX22B
Data Recorder

Web Application

Data acquisition software is running on the recorder.
Access recorder via the browser of any device without any installation.

Monitor

Data acquisition software catman is running on the recorder.
Local access via monitor or remote access is possible.

Desktop Application

Data acquisition software is running on a dedicated PC:
- catman (HBM)
- LabVIEW* (NI)
- CANape* (Vector)
- DIAdem* (NI)
- others via .NET* API

* LabVIEW and DIAdem are registered trademarks of National Instruments Corporation.
* CANape is a registered trademark of Vector Informatik GmbH.
* .NET is a registered trademark of Microsoft Corporation.

Analysis Software

catman® PostProcess

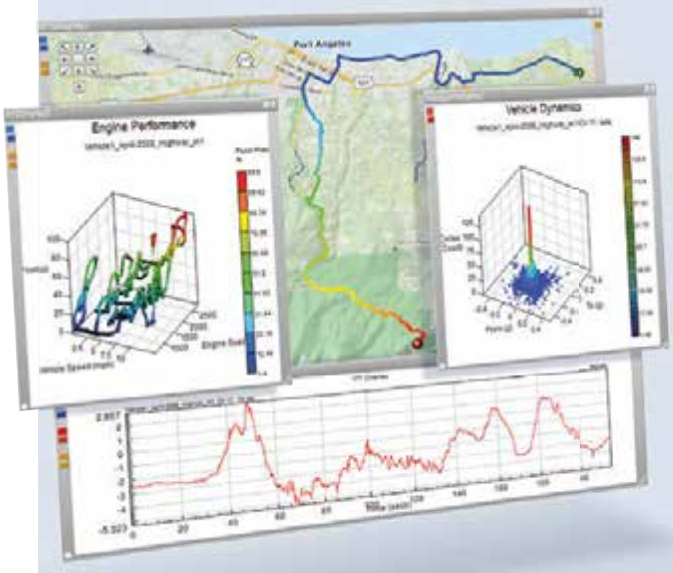
Would you like to analyze your measured data and strengthen the reliability of your measurement results? The catman PostProcess software simplifies the acquisition, visualization, and analysis of your measured data. With its intuitive interface and adaptability, the catman software will help you streamline your measurement projects.

Features:

- Graphical data visualization in the time, frequency, or angle domain
- Individual visualizations and operator controls over several panels
- Data cleansing and preparation using curve operations
- Statistics: Min, Max, Mean, RMS
- Video-based data analysis
- Powerful math libraries: standard math and application specific functions (e.g. rosette and power calculations)
- Export data in various formats (Microsoft® Excel, ASCII, MDF3/4, National Instruments DIAdem, MathWorks MATLAB, RPCIII, UFF58, ...)
- Report creation
  (Direct or using Microsoft® Word)

nCode GlyphWorks®

nCode GlyphWorks is a powerful data processing software used for analyzing engineering test data, with specialized capabilities in durability and fatigue analysis. Intrinsically multi-file, multi-channel, and multi-format, nCode GlyphWorks is optimized to handle massive and complex data efficiently while providing an intuitive graphical environment that enables users to go from raw data to results quickly and easily.



Features:

- Standardized analysis processes for setting high and low pass filters, position and time-based resampling, and calculating derived channels
- Applies world-class durability and fatigue concepts for damage accumulation and test profile generation
- Integration with nCode DesignLife to improve data correlation between test and CAE
- Complete range of tools for analysis in the time, frequency, and statistical domains
- Synchronized GPS and video displays
- Scripting capabilities to extend functionality using MATLAB® or Python programming language
- Fatigue materials database to calculate fatigue life from measured data to determine stress-life, strain life, crack growth, and creep analysis
- Optimized testing module to determine the most efficient mix of events required to match an overall target

INFIELD

Field Performance and Analysis Software

InField is a versatile field analysis software designed to enhance the field test collection and data visualization for SomatXR hardware. It has been developed with easy-to-use plotting capabilities for test and design engineers to ensure good field data and to make tough design decisions prior to leaving the test site.

Features:

- Plotting in the time or frequency domain
- Statistics to identify key test values as Max, Min, Standard Deviation, RMS, Mean, etc.
- Calculator to perform mathematical functions
- Frequency Analysis to perform FFT, Inverse FFT, and FRF analysis on the time domain data
- Rosette Analysis module to convert rosette strain gauge data

Recorder & Gateways

CX22B-R

Data recorder with catman® & gateway

Sum data rate (recorder): 5 MS/s
Data throughput (gateway): 3 MS/s

Interfaces

- 1x DIO (3 inputs, 3 outputs)
- 2x Ethernet
- 2x FireWire
- 2x USB
- 1x DVI-D

Function

- Data logging or gateway (FireWire-Ethernet)
- Connection of SomatXR and QuantumX amplifiers and modules
- Online computed channels

Special features

240 GB internal memory

catman Easy

Integrated WiFi

Integrated UPS

CX23-R

Data recorder with web interface

Sum data rate: 1.5 MS/s

Interfaces

- 1x DIO (3 inputs, 2 outputs)
- 1x GPS
- 3x CAN
- 2x Ethernet
- 1x Ethernet host
- 1x USB
- 1x AUX (eDAQ sync)

Function

- Data logging
- Connection of SomatXR and some QuantumX amplifiers and modules
- Online computed channels
- Somat DataModes

Special features

64 GB internal memory

Web interface

PTPv2 support
(Precision Time Protocol IEEE 1588)

EX23-R

10-port Ethernet switch

Interfaces

- 5 Gigabit Ethernet ports
- 5 Gigabit Ethernet ports with “Power over Ethernet“ (PoE)

Function

- Gateway (Ethernet-Ethernet)
- Connection of SomatXR and QuantumX amplifiers and modules

Special features

PTPv2 support
(Precision Time Protocol IEEE 1588)

Power supply for wireless access points or cameras via PoE

Connector

M12 x-coded, 8 pole

Analog Measurement Modules

MX1601B-R

16-channel high-level amplifier

Sampling rate per channel: 20 kS/s
Signal bandwidth: 3.8 kHz

Transducer technologies

- Voltage (±100 mV, ±10 V, ±60V)
- Current (0 to 20 mA)
- Current-fed, piezoelectric transducer (IEPE / ICP®)

Special features

Sensor supply ch 1-8: 5...24 V, 0.7 W (module 2 W)

Sensor supply ch 9-16: VIN-1V, 30 mA (module 75 mA)

Connector

ODU mini snap, 14 pole

MX1609KB-R

16-channel thermocouple amplifier

Sampling rate per channel: 600 S/s
Signal bandwidth: 20 Hz

Transducer technologies

- Thermocouples type K

Special features

Measuring point detection (RFID)

Connector

Thermo mini, green

MX1615B-R

16-channel bridge amplifier

Sampling rate per channel: 20 kS/s
Signal bandwidth: 3.9 kHz

Transducer technologies

- Strain gauge full bridge circuit
- Strain gauge half bridge circuit
- Strain gauge quarter bridge circuit with integrated 120 and 350 Ohm completion resistors
- Voltage (±60 V)
- Ohmic resistor
- Potentiometer
- Resistance thermometer Pt100

Special features

Bridge excitation: DC or CF (1,200 Hz)

Internal shunt resistors: 100 kOhm

Connector

ODU mini snap, 14 pole

MX840B-R

8-channel universal amplifier

Sampling rate per channel: 40 kS/s
Signal bandwidth: 7.7 kHz

Transducer technologies

- Strain gauge half or full bridge circuit
- Current-fed piezoelectric transducers (IEPE/ICP®)
- Piezo-resistive full bridge circuit
- Resistance thermometers (Pt100, Pt1000)
- Thermocouples (types K, N, R, S, T, B, E, J, C)
- Ohmic resistor
- Potentiometers
- Inductive half or full bridge circuit, LVDT
- Voltage (±100 mV, ±10 and ±60 V)
- Current (0 to 20 mA)
- Channel 5-8, in addition: Frequency, counter, incremental rotary encoder (incremental with/without index), SSI
- Channel 1, in addition: High speed CAN (ISO 11898, read 128 signals, transmit 7 channels)

Special features

Bridge excitation: DC or CF (4,800 Hz)

Internal shunt resistors: 100 kOhm

Sensor supply: 5...24 V, 0.7 W (module 2W)

Connector

ODU mini snap, 14 pole

Measurement Modules

MX411B-R

4-channel high-dynamic universal amplifier

Sampling rate per channel: 100 kS/s (2ch: 200 kS/s)
Signal bandwidth: 40 kHz (2ch: 80 kHz)

Transducer technologies

- Strain gauge full bridge circuit
- Strain gauge half bridge circuit
- Current-fed piezoelectric transducers (IEPE/ICP®)
- Piezo-resistive full bridge circuit
- Inductive half or full bridge circuit, LVDT
- Voltage (±10 V)
- Current (0 to 20 mA)

Special features

Bridge excitation: DC or CF (4,800 Hz)

Internal shunt resistors: 100 kOhm

Sensor supply: 5...24 V, 0.7 W (module 2W)

Real time: RMS, Peak

Connector

ODU mini snap, 14 pole

MX460B-R

4-channel high-dynamic digital module

Sampling rate per channel: 100 kS/s
Signal bandwidth: 40 kHz

Transducer technologies

- Digital high-resolution timer inputs for frequency or torque measurement with HBM T10, T12, T40 and derivatives
- Encoder/incremental encoder (digital, with / without index) for rotational speed measurement
- Pulse counter
- Inductive rotary encoders, crankshaft sensors (TDC sensor with gap detection)
- Pulse-width modulated signals (PWM)

Special features

Sensor supply: 5...24 V, 0.7 W (module: 2 W)

Route channel 1 to 2 to determine crankshaft angle and rotational speed using a sensor

Real-time: Torsional vibration analysis

Connector

ODU mini snap, 14 pole

MX471B-R

4-channel CAN module

Receive: raw or decoded (*.dbc)
Transmit: sensor signals as gateway

Transducer technologies

- CAN 2.0 A/B (ISO 11898, send/receive) CCP, XCP-on-CAN receive

Special features

Internal bus termination

Configurable bit rate

MX Assistant can generate a DBC file

Connector

M12, 5 pole

MX590B-R

3, 4 or 5 sensors direct pressure amplifier

Sampling rate per channel: 40 kS/s
Signal bandwidth: 7.7 kHz

Individual transducers

- absolute pressure 0 to 4 bar
- absolute pressure 0 to 6 bar
- absolute pressure 0 to 10 bar
- relative pressure +/- 0.5 bar
- relative pressure 0 to 1.6 bar
- relative pressure -1 to 4 bar
- relative pressure -1 to 10 bar
- relative pressure -1 to 16 bar
- relative pressure 0 to 25 bar

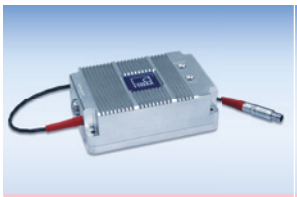
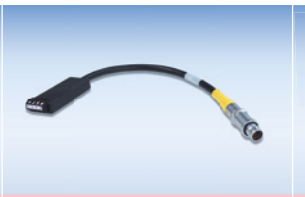
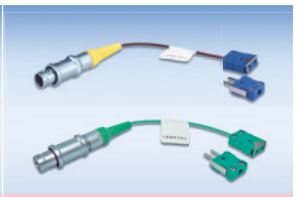
Special features

Measuring point detection (RFID)

Connector

Walther LP-004

Accessories

				
UPX002	**EGPS**	**GPS-USB-18HZ**	**SCM-R-SG**	**SCM-R-TC**
Uninterruptible Power Supply	**GPS receiver (serial)**	**GPS receiver (USB)**	**Quarterbridge adapter**	**Thermocouple adapter**
Special features · Protects against cold-crank voltage drops, short-term power drop outs and over- voltage conditions · Provides a buffer of up to 80 s · Quick recharge	**EGPS-5HZ** **Special features** · Simple GPS receiver · Update rate: 5 Hz · Serial connection **EGPS-200-B / -P** **Special features** · Advanced GPS receiver · Update rate: 200 Hz · Serial connection · Optional plus package with IMU (Inertial Measurement Unit) and RTK (Real Time Kinematic) measurements	**Special features** · Simple GPS receiver · Update rate: up to 18 Hz · EGPS-5HZ GPS and GLONASS · USB connection	**Special features** · Conditions output for quarter bridges · Available in 120 Ω, 350 Ω and 1000 Ω · Features TEDS for automatic adapter configuration	**Special features** · Conditions output for thermal elements · Available in type K and type E · Features TEDS for automatic adapter configuration
Compatible with all SomatXR modules	**Compatible with** CX23-R	**Compatible with** CX22B-R	**Compatible with** MX840B-R MX411B-R	**Compatible with** MX840B-R

Further accessories like cables, connectors, power adapters, and mounting aids are available.

www.hbm.com

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