QUANTUM X

One Data Acquisition System. Unlimited Solutions.

HBM

Chongqing PACO Sci. & Tech. Development Co., Ltd.
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Reliable Data Acquisition for Every Task

Mobile data acquisition

Typical applications:

Acquiring mechanical load data (RLDA), testing vehicle dynamics in compliance with standards (lane change, brakes, etc.), acceptance tests, advanced driver-assistance systems, and autonomous driving

QuantumX benefits:

- **Sensor fusion:** Sensors, vehicle buses, position/speed (GNSS, IMU), and video
- **Efficient:** Automated sequences for testing and analysis (scripting)
- **Robust:** Integration into the vehicle, shock- and vibration-proof, and an extended temperature range
- **Networked:** Scalability and server/cloud integration

Infrastructure monitoring

Typical applications:

Preventive or predictive maintenance of bridges, tunnels, wind turbines, railway tracks, and vehicles

QuantumX benefits:

- **Universal:** All sensor types, weather, and video
- **Cost efficient:** Distributed, with short sensor lines
- **Multi-recorder:** Long-term and triggered events
- **Scalable:** Unlimited number of channels, smart data recorder, and server-based analysis
- **Notification:** Alarms and status

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Lab and bench testing

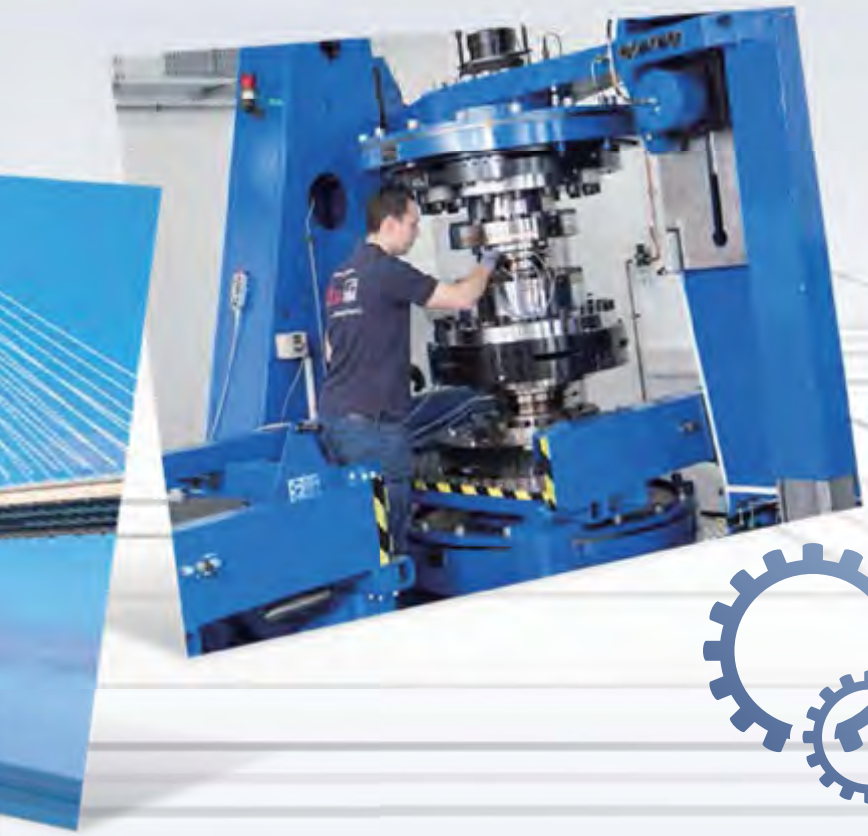
Typical applications:

Testing of powertrains and energy storage systems, mechanical and thermal durability, aerodynamics, and component functionality

QuantumX benefits:

- **Plug & Play:** Universal inputs + TEDS
- **Freely scalable:** High channel count and high data throughput
- **Reliable results:** High accuracy and noise suppression
- **Easy to integrate:** Rack, real-time, and any PC software

More than 30,000 modules in use worldwide



Service/Maintenance

Typical applications:

Calibration of machinery components, fault investigation, and diagnostics

QuantumX benefits:

- **Portable:** Small and light-weight
- **Results you can trust:** Highly accurate inputs
- **Traceable quality:** Onboard calibration certificate
- **Quick on-site service:** Universal input + TEDS, and an individual user interface in any language

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Seamless. Reliable. Traceable.

Dependable results require optimal matching of transducers, data acquisition system, and software. HBM is the solution provider that supplies the complete measuring chain: **connect – visualize and save – analyze**.

Sensors/Signals → QuantumX modules

Robust and precise

Acquire strain, force, torque, pressure, displacement, or acceleration using the precise transducers from HBM.

Integrate any type of analog signals such as voltage, current, or resistance, as well as sensors or systems from other manufacturers.

Acquire the digital bus signals from CAN FD, MVB, ARINC-429, or MIL-STD1553, as well as video/image, position (GNSS, IMU), or weather.

Universal and fast

QuantumX provides universal inputs and supports TEDS*, the standardized electronic data sheet in the sensor for automatic channel configuration.

*Transducer Electronic Datasheet (IEEE standard 1451): The device identifies the transducer and automatically configures the channel as soon as it has been connected.

From 2 to 10,000 channels: QuantumX makes it happen

Software/Data analysis

Distributed or centralized

Install your modules as close to the measuring points as possible or combine distributed and centralized modules, building up a synchronized data acquisition network.

Integrate acquired signals in real time via EtherCAT or PROFINET, and analyze them in parallel using HBM's powerful PC software.

Intuitive and fast

Store the measured data locally on the QuantumX data recorder or transfer them to the PC or server.

HBM software allows easy visualization, calculation, storage, analysis, and automation of your workflows.

QuantumX can be integrated into any software such as

→ LabVIEW

→ Your proprietary software in Visual Studio .NET

→ And many more

Professional and Project-Oriented: Data Processing Using EVIDAS® or catman®

acquire – control – automate – visualize – analy

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A single tool allows full parameterization, visualization and control of test and measurement tasks, as well as fundamental data analysis.

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EVIDAS® or catman®: It's your choice

Professional software for data acquisition and processing:
EVIDAS – modern, multilingual, and cloud-oriented
catman – established

- Fast and reusable channel configuration (sensor database, TEDS, CAN, dbc)
- Comprehensive signal calculations using a formula editor
- Intelligent triggering of recording
- Individual visualization
- Event monitoring
- Storage in the stable, standardized binary format; export to MATLAB, ASCII, Excel, DIAdem, or MDF
- Cloud integration capability
- Powerful data analysis

More information:
www.hbm.com/evidas

Flexible Concept. High Quality.

Small or large numbers of channels? Connected to a PC or standalone with a data recorder? Integrated in real time? Stationary or mobile? Centralized or distributed? QuantumX provides a solution in all cases.

Every measuring task has different system requirements. What remains constant is that high measurement quality is essential.

The modules can be combined in an individual system that meets your requirements. This enables solutions for a wide range of applications to be implemented. Flexible and without any compromise. Versatile and dependable.

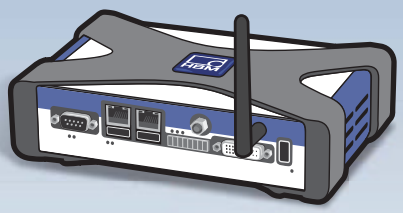
Operator level

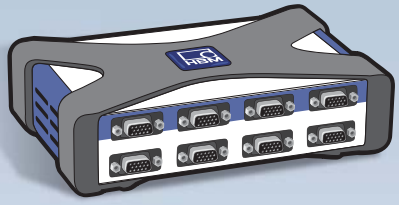
- Configuration
- Visualization & Control
- Automation
- Recording
- Analysis
- Presentation

LAN

Data Recorder

- Configuration
- Visualization
- Recording
- Analysis

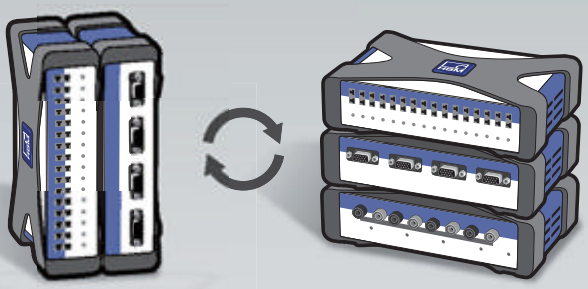




Ethernet/Internal bus

System

Sync via an internal bus or Ethernet



Single device

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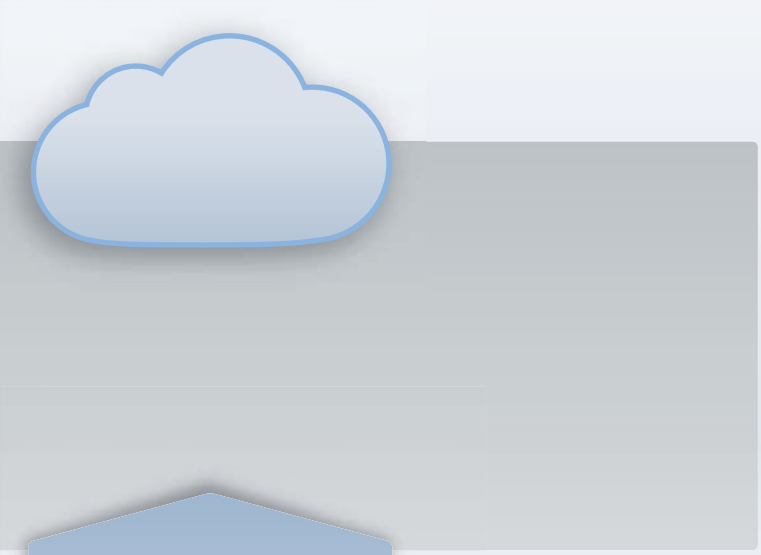
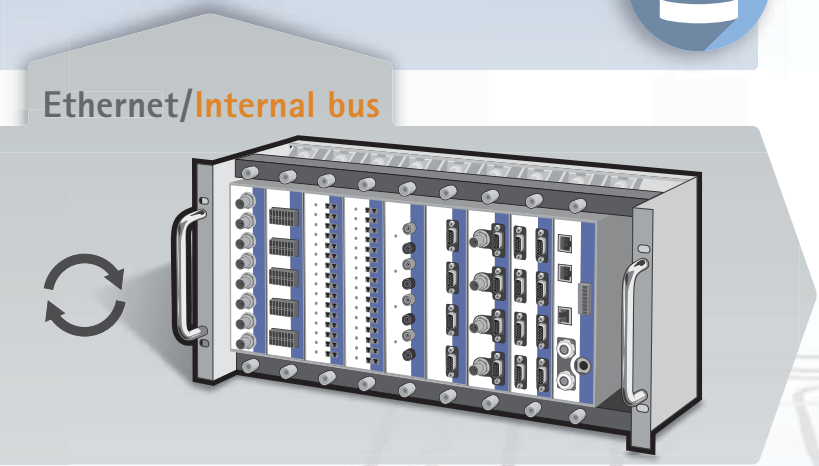
The strengths at a glance

- Acquires all common mechanical, electrical, and thermal quantities owing to the wide range of sensors that are supported
- Fully time synchronized, and at the same time distributed
- High accuracy due to active noise suppression (24-bit ADC, galvanic isolation, 6/5/4-wire circuit with AutoCal and carrier frequency)
- Up to 100 kS/s per channel, individual filters, and scaling
- Standalone with a data recorder
- Maximum data throughput
- 100 % digital: Calibration data are stored on every MX module
- Wide temperature range: -20°C to 65°C (-4°F to 150°F)





Interfaces to

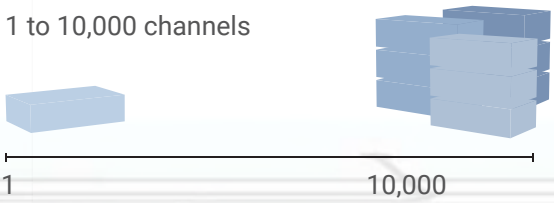
- GPS/GNSS and IMUs
- Video cameras
- Wheel force sensors (Kistler, A&D, MTS)

Synchronous

Ethernet IEEE1588:2008 (PTP), internal bus, NTP, IRIG-B, EtherCAT, PROFINET

Scalable

1 to 10,000 channels



Real-time

- Analog/Digital outputs
- EtherCAT™/CAN FD/ PROFINET IRT

QuantumX: The Facts

QuantumX is the freely scalable measuring system from HBM. Get a quick overview of the modules' flexibility.

Universal

MX840B/MX440B

8-channel/4-channel universal amplifier

Sampling rate per channel: 40 kS/s
Signal bandwidth: 7 kHz

Transducer technologies

- SG half or full bridge (DC or CF with 4.8 kHz)
- Current-fed piezoelectric transducers (IEPE/ICP®)
- Piezoresistive full bridge
- Resistance thermometers (Pt100, Pt1000)
- Thermocouples (types K, N, R, S, T, B, E, J, C)
- Ohmic resistor
- Potentiometric transducers
- Inductive half or full bridge, LVDT
- Voltage (±100 mV, ±10 and ±60 V)
- Current (0/4...20 mA)
- Channel 5-8, in addition: Frequency, pulse counter, rotary encoder (incremental with/ without index), SSI
- CAN MX840B channel 1, in addition: High speed CAN (ISO 11898, read 128 signals, transmit 7 channels)

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

Connector
D-Sub HD 15-pin

Accessories
Thermocouples: 1-SCM-TCK/J/T/E
SG quarter bridge: 1-SCM-SG120/350/700/1000
10 or 300 V CAT II: 1-SCMHV
BNC adapter: 1-SUBHD15-BNC

MX410B

4-channel high-dynamic universal amplifier

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

Transducer technologies

- SG half or full bridge (DC or CF with 4.8 kHz)
- Current-fed piezoelectric transducers (IEPE/ICP®)
- Piezoresistive full bridge
- Inductive half or full bridge
- Voltage (±10 V)
- Current (0/4...20 mA)

Real-time: RMS, PEAK

Scalable voltage output: BNC socket, ±10 V, 16 bit

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

Connector
D-Sub HD 15-pin
BNC (voltage output)

Accessories
SG quarter bridge: 1-SCM-G120/350/700/1000
10 or 300 V CAT II: 1-SCMHV
BNC adapter: 1-SUBHD15-BNC

Precision

MX430B

4-channel precision SG full bridge amplifier

Sampling rate per channel: 40 kS/s
Signal bandwidth: 6 kHz

Accuracy class: 0.01
Transducer technologies

- SG full bridge
  DC or carrier frequency mode (600 Hz)
  Bridge excitation: 2.5/5/10 V
  Measuring ranges: 2.5 or 5 mV/V
  Transducer impedance: up to 5000 ohms

Real-time: Matrix calculation, RMS

Scalable voltage output: BNC socket, ±10 V, 16 bit

Connector
D-Sub HD 15-pin
BNC (voltage output)

Accessories
1-KAB416: SubD-2-DSubHD adapter
1-KAB144: MS-2-DSubHD adapter
1-SUBHD15-SAVE: Socket saver

High precision

MX238B

2-channel high-precision SG full bridge amplifier

Sampling rate per channel: 40 kS/s
Signal bandwidth: 50 Hz

Accuracy class: 0.0025
Transducer technologies

SG full bridge
6-wire circuit
Carrier frequency (225 Hz)
Bridge excitation: 2.5 or 5 V
Measuring ranges: 2.5 or 5 mV/V
Transducer impedance: up to 5000 ohms

Connector
D-Sub HD 15-pin

Accessories
1-KAB416: SubD-2-DSubHD adapter
1-KAB144: MS-2-DSubHD adapter
1-SUBHD15-SAVE: Socket saver

Torque/Rotational speed

MX460B

4-channel high-dynamic universal amplifier

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 variants

Rotary 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)

Real-time: Torsional vibration analysis

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

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

Connector
D-Sub HD 15-pin

CAN FD

MX471C

CAN FD/Classic CAN module

Signal acquisition per channel: RAW/128
Signal transmission: 200

Interfaces

Receive
Acquisition of all CAN signals on the bus (RAW) and decoding on the PC, or decoding of up to 200 signals in real time.
Database: DBC
Other buses: J1939, CANopen, OBD-2

Send/Gateway
Packet generation and transmission of measurement signals via CAN FD to any data logger or the test-bench software.
Port-2-Port gateway for galvanic isolation of buses.
MX Assistant software can generate DBC database.

Receive
XCP-on-CAN FD/
CAN or CCP signals
Seed & Key (SKB) support

Selectable bus termination

Ethernet gateway to the PC or recorder for all the modules connected to the MX471C.

Connector
D-Sub 9-pin, male, assignment per CiA
RJ45, Ethernet, PTPv2

QuantumX: The Facts

High channel count

MX1601B

16-channel standard amplifier

Sampling rate per channel: 20 kS/s
Signal bandwidth: 3 kHz

Transducer technologies

- Current-fed piezoelectric transducers (IEPE/ICP®)
- Voltage (±100 mV, ±10 and ±60 V)
- Current (0/4...20 mA)

Connector
Phoenix Push-In (8-pin)

Accessories
10 plugs: 1-CON-S1015

MX1615B/MX1616B

16-channel bridge amplifier

Sampling rate per channel: 20 kS/s
Signal bandwidth: 3 kHz

Transducer technologies

- SG full bridge
- SG half bridge
- MX1615B: SG quarter bridge with integrated 120- and 350-ohm completion resistors
- MX1616B: SG quarter bridge with integrated 350- and 1000-ohm completion resistors
- Bridge excitation: DC or CF (1200 Hz)
- Internal shunt resistor (100 kiloohms)
- Voltage (±10 V)
- Resistance thermometers (Pt100)
- Ohmic resistor
- Potentiometric transducer

Connector
Phoenix Push-In (8-pin)

Accessories
10 plugs: 1-CON-S1015

MX1609KB/MX1609TB

16-channel thermocouple amplifier Type K/T

Sampling rate per channel: 300 S/s
Signal bandwidth: 15 Hz

Transducer technologies

- Thermocouple
  - Type K: MX1609KB
  - Type T: MX1609TB
  - Measuring point identification/Wireless TEDS (RFID) in the Thermo-Mini from HBM

Connector
Thermo-Mini (green/brown)

Accessories
10 plugs type K: 1-THERMO-MINI
10 plugs type T: 1-THERMO-MINI-T

High voltage

MX809B

8-channel amplifier for thermocouples and cell voltages (VDE-tested safety)

Sampling rate per channel: 600 S/s
Signal bandwidth: 15 Hz

Transducer technologies

Thermocouple
Type K, J, T, E, B, N, R, S

Voltage: ±5 V

Differential, galvanically isolated inputs

Insulation: 1000 V RMS (2500 V Peak)

Measurement category: 600 V CAT II/300 V CAT III

Real-time: RMS

Connector
Standardized Thermo-Mini connector with an insulating cap from HBM

Accessories
Voltage measurement line: ITC-U1001
Thermocouple, type K: ITC-K1000
4 insulating caps: 1-CON-A1018
4 Thermo-Mini type K: 1-CON-S1016
4 Thermo-Mini for voltage 1-CON-S1017

MX403B

4-channel module for voltage and current measurement (VDE-tested safety)

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

Transducer technologies

Voltage: 10, 100, and 1000 V

Differential, galvanically isolated inputs

Measurement category:
1000 V CAT II/600 V CAT III

Real-time: RMS

Connector
4 mm safety laboratory connector

Accessories
Virtual star: 1-G068-2
Burden resistor (1/2.5/10 Ω): 1-HBR/xOhm
BNC-to-laboratory connector: 1-G067-2
Safety laboratory cables: 1-KAB282-1,5
Current probe

Fiber Bragg module (FBG)

MXFS8DI1/FC or /SC

8-channel module for all optical, FBG-based sensors

Sampling rate per sensor: 2 kS/s
Number of sensors per channel: up to 15

Transducer technologies

Strain

Force

Temperature

Acceleration

Inclination

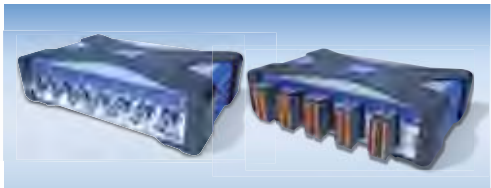
Spectral range: 1500 - 1600 nm
Automatic peak-value detection (Peak Detection) in the device

Ethernet gateway to the PC or recorder for all the modules connected to the MXFS.

Connector
FC/APC
Alternatively: SC/APC

Accessories
newLight sensors

QuantumX: The Facts

Recorder/Gateway		Multi-I/O
		
CX22B-W	**CX27**	**MX878B/MX879B**
Data recorder with catman®Easy	**EtherCAT®/PROFINET-IRT gateway**	**MX878B: 8-channel analog output** **MX879B: + 32-channel digital I/O**
Sum data rate: 5 MS/s	**Output signals:** max. 4.8 kS/s **Generate signals:** max. 96 kS/s	**Output signals:** max. 4.8 kS/s **Generate signals:** max. 96 kS/s
Interfaces 3 x Ethernet TCP/IP (LAN and WLAN) 2 x FireWire 3 x USB (keyboard, mouse, touch, GPS, etc.) 1 x DVI 3 x digital input 3 x digital output with status LED Backplane connection 1 x RS232 (GPS)	**Interfaces** EtherCAT® with CX27B PROFINET IRT with CX27C 2 x Ethernet gigabit (PTPv2) 2 x FireWire	**Outputs** Voltage (± 10 V, 16 bit) **MX879B**: Digital inputs or outputs (TTL, 24 V) **Functions** Output of system or real-time signals Real-time computation: Addition, multiplication, 6 x 6 matrix, PID controller, limit value switch Frequency generator (constant, harmonic signals, arbitrary – replay of measured data)
Function: Connection of QuantumX or SomatXR amplifiers and modules · Configuration of measurement channels using the sensor database, TEDS or EXCEL™ · Online computation and analysis of channels · Trigger for Start and Stop · Data logging to internal eSSD, removable CFast or USB 2.0/3.0 flash drive · Standalone test mode	**Function:** Real-time connection of up to 199 signals from SomatXR measuring amplifiers (EtherCAT or PROFINET) Parallel, Ethernet-based data recording using PC software	
Special characteristics Internal SSD, removable CFast, and antenna included in the package price **Accessories** 1-CATEASY-Roadload 1-CATEASY-Videocam 1-GPS-USB-18Hz		**Connector** **MX878B**: BNC **MX879B**: Phoenix Push-In (8-pin) **Accessories** **MX879B**: 10 plugs: 1-CON-S1015

HBM – Your Contact

Benefit from our worldwide service and support network and know-how for your solution.

Our competent team of engineers and technicians will support you with many services – at every stage of your test and measurement project.

More than 3,000 customers worldwide trust QuantumX

- Application and product consultancy
- Managing customized solutions
- Measurement and data analysis service
- Software development
- Training (HBM Academy)
- Calibration service (at HBM or on-site)