

Modular, flexible data acquisition system



QUANTUM^X

Ready to measure ...

Universal. Powerful. Reliable.

The new-generation data acquisition system



HBM

QUANTUMX

Increased efficiency in testing, verification

Time is money. This applies to your test and measurement tasks, too. With QuantumX, the innovative data acquisition system from HBM, your measurement projects will be more streamlined and efficient. You will obtain precise results faster – and with the complete assurance that your measurement data is reliable.

Research and development

- Flexible with universal inputs
- Modular and freely scalable
- Stand-alone data recording.

Monitoring, maintenance and service

- Compact
- Modular solution
- Mobile use worldwide.



Test stand engineering

Functionality, performance and endurance testing

- Increased efficiency
- Flexible
- Real-time integration.

and measurement

Flexible use – for your measurement applications

- ___ Ready to measure – out of the box – as a single, compact instrument
- ___ Flexibility with synchronized operation through a scalable network of modules for many different applications
- ___ Capable of being operated as a stationary or mobile device
- ___ Automatic support and identification of all common types of transducers and sensors
- ___ High measurement quality through electrical isolation, compensation of cable lengths and interference frequencies, plus high EMC and cyclical auto adjustment
- ___ Instant and easy use with catman[®]AP software from HBM and open interfaces for EtherCAT, LabVIEW^{*}, DIAdem^{*}, Visual Studio[®].



Automotive



Marine



Railroad technology



Aerospace



Machine construction



Research and laboratory



Power and energy



Consumer goods



Civil engineering

^{*}LabVIEW and DIAdem are trademarks of National Instruments Corporation



Well tried and tested...

QUANTUMX

QuantumX at work: What our custo

Thousands of customers throughout the world trust in measurement acquisition using QuantumX by HBM – in a wide range of different applications. However varied the requirements may be, user feedback on QuantumX has been unanimously positive. See for yourself how QuantumX has proved its worth in practice:

Ensuring maximum safety ...



Aerospace company AgustaWestland has opted for HBM's QuantumX data acquisition system to ensure optimal landing performance in operation. Test series are being performed on the Future Lynx helicopter landing gear.

" We selected the MX840 because we could plug many different sensors into it quite easily and it has an excellent recording capacity both in terms of measuring range and data rate. **"**

Matt Williams, Senior Structural Test Engineer, Agusta Westland

Implementing innovative test stand concepts ...

An innovative universal test stand for the first time enables the complex interplay of its hydraulic components to be tested. The test stand developed by adt-Rinck for Internationale Hydraulik-Akademie uses HBM's complete measuring chain based on the QuantumX data acquisition system.

" We have been using HBM measurement technology in our test stands in Germany and abroad for over 10 years and have always made the best experiences. We have been convinced by the products' technical features, reliability and quality. HBM just offers the right package. **"**

Torsten Sigmund, Project Manager, adt-Rinck



Customers say



Providing outstanding performance ...

It is the fastest sailing boat in the world: The trimaran Hydroptère achieves a maximum speed of over 54 knots (100 km/h).

L'Hydroptère: Pure technical fascination. The design of the entire boat is based on scientific know-how and the use of ultra-modern, high-tech materials. Reliable and precise measurement results are prerequisite for achieving technological excellence. Therefore, Alain Thébault and his Hydroptère team put their trust in HBM measurement technology on board their boat – including the QuantumX amplifier system and its CX22W data recorder.

“The whole Hydroptère team is consistently pushing the limits of technical feasibility. Materials and components need to deliver peak performance. We rely on HBM measurement technology on board Hydroptère to ensure our future success. Only HBM is able to provide the reliability and precision required for our tests.”

Damien Colegrave, Engineer, L'Hydroptère



Meeting legal requirements ...

Del Equipment, the UK-based tail-lift manufacturer, relies on the complete measuring chain from HBM. The test and measurement equipment used enables Del Equipment's range of products to be adapted to future UN/ECE regulations for type approvals of vehicles. A clear competitive advantage.

“We felt HBM's equipment was superior to the competition and helped us to achieve our objectives within a tight framework.”

Amir Tabatai, Mechanical Development Engineer, Del Equipment UK



Go to www.hbm.com/quantumX to read the complete case studies. There you will also find many other practical examples for QuantumX applications.



Convincing performance features...

QUANTUM^X

Fascinating, new opportunities.

Universal and fast

- Universal channels: Supports all current transducer technologies
- Fast: High sampling rates, parallel, synchronized data recording
- Efficient: Automatic transducer identification, channel configuration and display with TEDS
- Easy to use: Minimal training required
- High data throughput: catman[®]EASY enables over 5 million measured values per second to be acquired.

Reliable

- Best-in-class data acquisition with proven high quality
- Traceable: Calibration data stored in each module
- Reliability of an established system – thousands of modules already working successfully

Integrable

- Standard interface (Ethernet TCP/IP)
- Easy integration into your software: LabVIEW¹⁾, DIAdem¹⁾, CANape²⁾, customized software (.NET/COM programming interface)
- Real-time integration: EtherCAT
- Synchronization with other systems: NTP, IRIG, distributed clock (EtherCAT)
- Direct signal output: analog, CANbus
- catman[®]AP: synchronous measurement using QuantumX, interrogators (optical strain gages) or MGCplus.



¹⁾ LabVIEW and DIAdem are trademarks of National Instruments Corporation

²⁾ Vector Informatik GmbH

Thanks to its innovative features, QuantumX is a genuine advance in the world of measurement data acquisition. Its outstanding performance is characterized by proven certainty, reliability, and accuracy.

QuantumX is the professional and expandable solution for your measurement tasks. Suited to even the most difficult of conditions. It is also fully prepared for your future needs.

Proven reliability

- Precise: Secure measurement results with 24-bit analog-to-digital converter for each channel
- Direct: LED status displays indicate system and transducer status as direct feedback
- Global service and support network
- 60 years of HBM measurement technology experience.

Flexible

- Extended modularity: From a single device to a networked system
- Variable topologies: Install modules close to the measuring point, benefit from short sensor lines
- Many interfaces: EtherCAT (real time), analog, CANbus, and more...
- Stand-alone data logger: Data recording and analysis without a PC connected
- Compact modules, minimal space required
- Stationary or mobile application.



Future-proof

- Absolute protection of your investment due to scalability, continuous development and use of modern interfaces



An integrated solution...

QUANTUMX

A perfectly matched measurement

To enable you to trust your measurement results, your data acquisition system must interact perfectly with transducers and software. In HBM you have a competent partner for the complete measurement chain.



Powerful transducers...

Rugged, precise, reliable

Use HBM transducers and sensors to measure physical quantities, e.g. strain, force, torque, pressure or displacement.

Integrate your own sensors and upgrade them with TEDS functionality.

...simply connect...

Advanced Plug and Measure™:

The exclusive technology for immediate success in measurement

- QuantumX identifies your transducer as soon as you connect it and automatically configures the universal channel
- Fully TEDS¹⁾ compatible: APM™ uses TEDS, the Transducer Electronic Data Sheet. Your advantage: you can start measuring immediately.

TEDS
by HBM™

¹⁾ TEDS: Transducer Electronic Data Sheet

chain



...start measuring immediately...

... professional visualization and analysis

QuantumX Assistant

The free software that enables you to start measuring immediately

- ___ Fast system analysis, channel configuration and visualization
- ___ Integrated sensor database and TEDS editor.

QuantumX driver

Integrate QuantumX into your software

- ___ LabVIEW, DIAdem²⁾
- ___ CANape³⁾
- ___ Programming interface for customized software (API for .NET or COM).

Software packages from HBM

- ___ catman®EASY for professional data acquisition
- ___ nCode GlyphXE™ for professional analysis.

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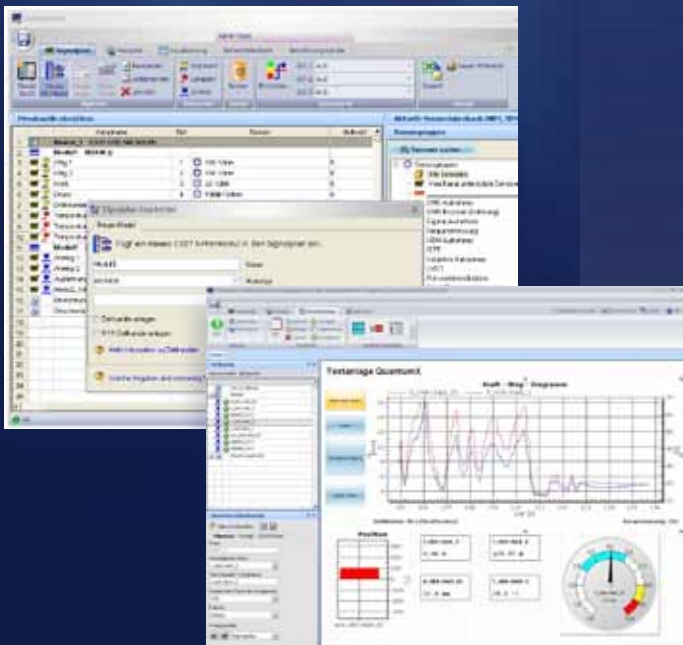


QUANTUM^X

Professional measurement, visualization,

Powerful software is crucial to the success of your test and measurement tasks. The following applies for software too: HBM provides a perfectly matched solution for your test and measurement tasks – from configuration through measurement and visualization to recording and analysis of measurement data.

Professional measurement



catman[®]AP:

Professional software for data acquisition and visualization

- Easy system and channel configuration (sensor database, CAN dbc, TEDS Editor, data rate, filter, etc.)
- Adding virtual channels computed online (algebra, FFT, strain gage rosette analysis, etc.)
- Individual options for visualization and control (full-screen and multiple layers, strip chart, digital display/table, analog meter, function key, etc.)
- Smart data recording (trigger pre / post, cyclic storage, long duration measurement, etc.)
- Wide range of storage and export formats (catman BIN, Excel, ASCII, DIAdem, MAT, RPC III, MDF, etc.)
- Powerful data analysis (signal-to-signal, zoom, magnifier, ruler, Min/Max, cutting, elimination of outliers, etc.)
- Limit value switches and event monitoring
- Automation of measurement sequences (predefined functions, simple lines or VBA scripts)
- Automatic reporting or export of measurement data and displays (Microsoft[®] Word, Excel).

and analysis ...

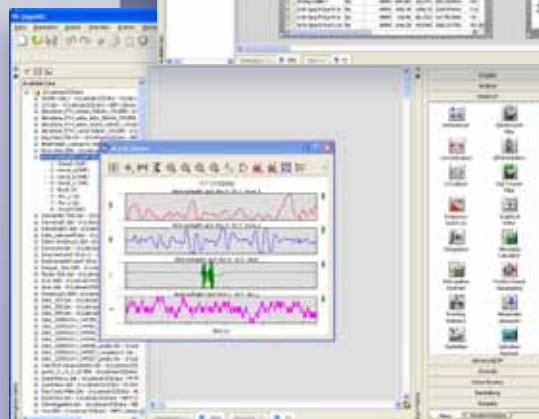
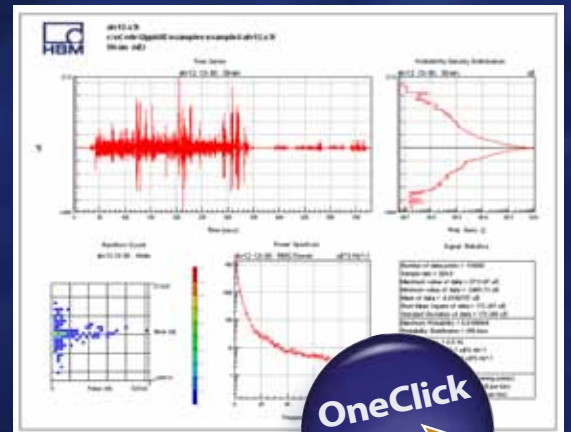
Professional analysis



nCode GlyphXE™:

Innovative software for mathematical analysis of your measurement data

- ___ Graphical data flow analysis
- ___ Comprehensive library of functions
 - Filters
 - Statistics, time-at-level, joint distribution, level crossing, peak valley slice
 - Frequency analysis, amplitude distribution
 - MATLAB m-Script
- ___ Reproducible analyses
- ___ Support of multiple data formats (import and export)
- ___ Powerful visualization and display options
(visualization over time or measured quantity, video and GPS data, 3D histograms, etc.)
- ___ Processing of huge amounts of data
- ___ "One-click" reporting
- ___ Easy to learn thanks to practical examples
- ___ Can be upgraded with additional libraries.



QUANTUMX

Future-proof and expandable: The QuantumX

Although every measurement project has its own requirements, high measurement quality is always a prerequisite. Whether you operate small or large numbers of channels – either stationary or mobile – with QuantumX you are prepared for every test and measurement task.

QuantumX offers real flexibility and freedom of choice. Decide for yourself how to perform your measurements: Using a stand-alone data recorder or via Ethernet or FireWire connected to the PC. With distributed or compact, bundled modules. Even real-time measurements are possible... QuantumX is ready to measure!

Transducer technologies



Single module

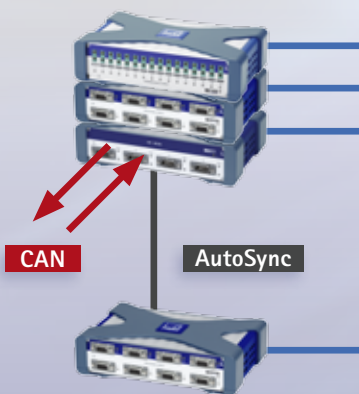
Connection via Ethernet directly on the operator's PC or integrated in the network (DHCP)



Ethernet

Networked modules

Sync via FireWire or Ethernet (NTP)



Ethernet

Networked modules

High data rate

5 m (standard)
40 m (extended)
500 m (optical)



FireWire

HighSpeed

Operator level

Configuration, visualization and control, recording, analysis



CX22W data recorder



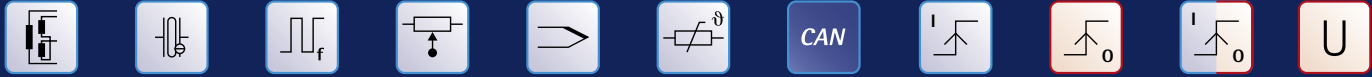
Configuration, visualization, recording, analysis

LAN / WLAN

Small number of measuring points <<<

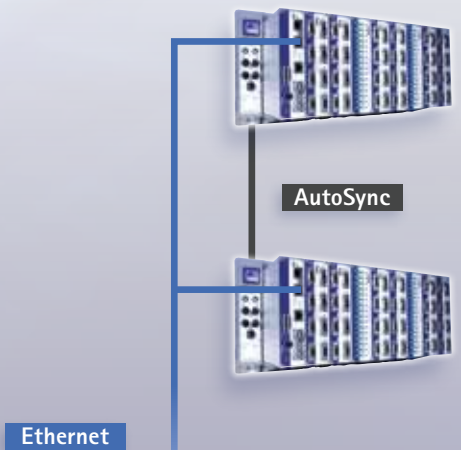
QuantumX synchronization mechanisms: FireWire (all modules, real time, power), Ethernet (measurement modules, NTP), IRIG (MX840A/MX440A input, analog / digital), EtherCAT (CX27, distributed clock)

QuantumX topologies



In the backplane

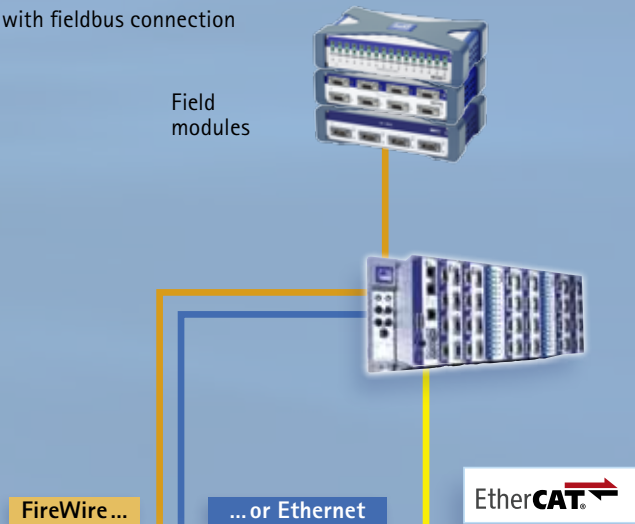
Connection via Ethernet (max. 400 kS/s) or FireWire



▶▶ Large number of measuring points

In the test bench

with fieldbus connection



Parallel measurement and analysis



Automated testing

Real-time communication



Maximum flexibility: The freely scalable

MX840A 8-channel universal amplifier



Sampling rate:
max. 19.2 kHz per channel
up to 3.2 kHz bandwidth
Resolution: 24 bit

Transducer technologies

	8 x voltage (DC: ± 100 mV, ± 10 V or ± 60 V)
	8 x current (DC: ± 20 mA)
	8 x strain gage half or full bridge (4.8 kHz carrier frequency)
	Strain gage quarter bridge via SCM-SG adapter
	8 x piezoresistive full bridge
	8 x inductive half or full bridge
	8 x LVDT
	8 x potentiometric transducer
	8 x resistor (PTC, NTC, KTY,...)
	8 x resistance thermometer (PT100, PT1000)
	8 x thermocouple (types: B, E, J, K, N, R, S, T) ¹⁾
	4 x pulse counter, rotary encoder (1, 2 tracks, zero index), HBM torque, frequency, SSI
	1 x high speed CAN bus/ISO 11898 (transmission of 7 measured values, 128 signals read-only)
Connector	D-Sub-HD15

¹⁾ Temperature compensation in the plug required (THERMO-MXBOARD)

MX440A 4-channel universal amplifier



Sampling rate:
max. 19.2 kHz per channel
up to 3.2 kHz bandwidth
Resolution: 24 bit

Transducer technologies

	4 x voltage (DC: ± 100 mV, ± 10 V or ± 60 V)
	4 x current (DC: ± 20 mA)
	4 x strain gage half or full bridge (4.8 kHz carrier frequency)
	Strain gage quarter bridge via SCM-SG adapter
	4 x piezoresistive full bridge
	4 x inductive half or full bridge
	4 x LVDT
	4 x potentiometric transducer
	4 x resistor (PTC, NTC, KTY,...)
	4 x resistance thermometer (PT100, PT1000)
	4 x thermocouple (types: B, E, J, K, N, R, S, T) ¹⁾
	4 x pulse counter, rotary encoder (1, 2 tracks, zero index), HBM torque, frequency, SSI
Connector	D-Sub-HD15

Typical applications

Measuring instrument for servicing assignments

¹⁾ Temperature compensation in the plug required (THERMO-MXBOARD)

DAQ system


MX410


4-channel, highly dynamic, universal amplifier





Sampling rate:
max. 96 kHz per channel
or 2 x 192 kHz
up to 38 kHz bandwidth
Resolution: 24 bit


Transducer technologies


-  4 x voltage (DC: ± 10 V)


-  4 x current (DC: ± 20 mA)

-  4 x strain gage half or full bridge
(bridge excitation: DC or 4.8 kHz carrier frequency)

-  Strain gage quarter bridge via SCM-SG adapter


-  4 x current-fed piezoelectric transducer
(IEPE / ICP®)

-  4 x piezoresistive full bridge


-  4 x inductive half or full bridge

- Connector D-Sub-HD15

Outputs

-  4 x scalable output for every input channel of the module (DC: ± 10 V, BNC), stand-alone after configuration

Mathematical functions

-  Additional real-time / on-board signals
 - Root mean square (RMS)
 - Peak value (Peak)

Typical applications

Measurement in highly dynamic, electric or mechanical systems, such as switching operations, rotation and oscillation or vibration. The perfect complement to MX460.


MX1601


16-channel amplifier with standardized inputs




Sampling rate:
max. 19.2 kHz per channel
up to 3 kHz bandwidth
Resolution: 24 bit

Transducer technologies

-  16 x voltage (DC: ± 100 mV or ± 10 V)

-  16 x current (DC: ± 20 mA)

-  16 x current-fed piezoelectric transducer
(IEPE / ICP®)

- Connector Push-in terminals

Typical applications

Module for integration:

- in the test bench with individual sockets
- application primarily with active sensors





Maximum flexibility: The freely scalable

MX460

4-channel rotation and torsion amplifier



Sampling rate:
max. 96 kHz per channel
up to 20 kHz bandwidth
Resolution: 24 bit

Transducer technologies



4 x HBM torque transducer with shunt calibration signal (T10, T12, T40)



4 x pulse counter, rotary encoder, encoder (up to 1 million pulses with/without index)



4 x inductive rotary encoder (AC coupled)



4 x frequencies, pulses (up to 1 MHz)



4 x PWM – pulse width modulated signals (pulse width, duty ratio, time)

Connector D-Sub-HD15

Mathematical functions



Additional real-time / on-board signals
· Vibration analysis / differential angle
· Peak value (Peak)

Typical applications

Highly dynamic rotation and torsion measurement, e.g. on motors or machines. The perfect complement to MX410 (vibration, strain, force measurement).

MX1609

16-channel thermocouple amplifier



Sampling rate:
max. 300 Hz per channel
up to 15 Hz bandwidth

Transducer technologies



16 x thermocouple input (type K: NiCr-NiAl)

Connector Thermo Mini sockets

Functions

- Contactless transmission of the measuring point identification (RFID)
- Storage of thermal calibration data in the plug to increase absolute accuracy



MX1609 is also available with IP65 degree of protection



Typical applications

Distributed, highly precise and dynamic temperature measurement

DAQ system

MX878

8-channel analog output module



Outputs



8 x scalable output for system signals
(DC: $\pm 10V$)

Connector BNC

Mathematical real-time functions



- Addition, subtraction, multiplication
- Matrix computation (compensating matrix)
- Peak value (Peak)
- Root mean square (RMS)
- Constant
- Harmonic signal generator
- Output of individual reference profiles (double buffer)

Computed signals can be output in real time:
as analog voltage of MX878 or via FireWire
(EtherCAT: CX27, CANbus: MX471)

Typical applications

Fast, distributed output of input signals during test bench operation, computation of signals and individual output, predefined load profiles for system tests.

MX471

4-channel CANbus module



Inputs/outputs



4 x high speed CAN bus (ISO 11898)
Input: read only
Output: send system signals

Connector 9-pin D-Sub (male)

Functions

- Easy integration
Input: parameterizing via CAN database (dbc)
Output: generating CAN database (dbc) using QuantumX Assistant
- optional CAN termination resistor that can be activated by software

Typical applications

Synchronized acquisition of analog signals and CAN messages in mobile and stationary use. Digital forwarding of measurement signals as CAN message (gateway function).




Maximum flexibility: The freely scalable


CX22W / CX22


QuantumX data recorder (with / without WLAN)




Interfaces


-  1 x Ethernet TCP/IP


-  1 x WLAN (CX22W only, incl. antenna)

-  2 x FireWire
(connection of QuantumX modules)

-  3 x USB (data storage, mouse, keyboard, touch screen, etc.)

- 1 x DVI digital (monitor, touch screen)

-  3 x digital input
(integrated Start/Stop button)

-  3 x digital output (limit values, alarms)

- 1 x RS232 (GPS / NMEA, others)

Typical applications

Stand-alone data logger for failsafe measurement acquisition, data recording and analysis without a connected PC for mobile or stationary use.

Module functions

- Stand-alone measurement acquisition/data recording
- Computing of signals
- Optional graphical visualization and creation of individual user interfaces
- Smart data recording (trigger)
- Synchronization with MGCplus or optical measurement technology (interrogator) via NTP

Communication and data storage:





- Configuration and data exchange: remote desktop connection.
Direct connection to a PC via Ethernet or WLAN, integration into LAN (DHCP)
- "QuantumX data recorder Assistant" software for easy connection
- Exchangeable data storage: CF-CARD (8 GB included, up to max. 128 GB)

DAQ system

CX27 QuantumX EtherCAT / Ethernet gateway



Inputs/outputs

	1 x EtherCAT (1 x input / 1 x output)
	2 x Ethernet (front, rear: configuration, service, data)
	2 x digital input
	2 x digital output

Additional functions

Clock	Synchronization via EtherCAT (distributed clock) Leveling with PC time Synchronization of a module chain via NTP Easy integration – generation of an EtherCAT description file (ESI) using QuantumX Assistant
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Typical applications

Module for real-time integration of the QuantumX measurement system. Measurement signals are provided in the EtherCAT network (gateway function, PDOs). Highly dynamic signals can be recorded by the PC software in parallel (FireWire, Ethernet).

Accessories

BPX001 Backplane for 9 modules



CASEFIT Mounting plate

CASECLIP Mechanical connecting elements

KAB271-3 Cable for voltage supply with free ends

NTX001 30-watt power supply with module plug

THERMO-MXBOARD Universal amplifier – Cold junction for thermocouples

Thermo-Mini MX1609 – Type K mini thermocouple plug

IEPE-MX410 MX410 – Adapter for IEPE sensors with BNC

KAB269-x Module-to-module FireWire cable (x in meter)

IF-001 PC-CARD – FireWire IEEE 1394b

SCM-SG120 Quarter bridge adapter (strain gage with 120Ω)

SCM-SG350 Quarter bridge adapter (strain gage with 350Ω)



SCM-FW FireWire extender to up to 40m



HBM – Over 60 years of experience in measurement technology

QUANTUMX

HBM enjoys a worldwide reputation for top-quality measurement technology.
Benefit from transducers, amplifiers and software from a single source.



QuantumX by HBM – measurement technology at its best

- ___ Best-in-class data acquisition when it comes to security, quality, and precision
- ___ Fast sampling rate of up to 192 kHz per channel
- ___ 24 bit analog-to-digital converter for every channel
- ___ Acquisition of over 5 million measurement values per second
- ___ Full TEDS support
- ___ Flexible system concept
(distributed, stand-alone, real-time interface)
- ___ Electrical isolation
(measurement channels, supply, outputs, communication)

2 leading software packages ...
... for parameterization, acquisition
and analysis.



www.hbm.com/quantumX



HBM Test and Measurement

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measure and predict with confidence

