

QUANTUM^X

Data Acquisition System - Universal and Distributable



Engineering of High-Quality Products



Mobile data acquisition

Typical applications:

Acquiring load on mechanical components on bad road surfaces or track; testing vehicle dynamics (ride and handling); brake or acceptance tests

QuantumX benefits:

- **High performance:** Correlate sensors, vehicle bus, position (GPS, GNS) and video
- **Reproducible and efficient:** Script automatic routines
- **Robust and reliable:** Shock, vibration, temperature
- **Easy integration:** Cloud, remote access



Structural health monitoring

Typical applications:

Preventive or predictive maintenance of bridges, tunnels, railway tracks, etc.

QuantumX benefits:

- **Universal:** All sensor types, noise, weather and video
- **Reduced installation cost:** Distributable, short sensor lines
- **Individual jobs at the same time:** Long-term, triggered
- **Quick results:** Full data process (local recorder, server based analytics)
- **Always up to date:** Notification services (push-message, log book)



Lab and bench testing

Typical applications:

Structural durability and powertrain testing in dynos; system and component testing and verification

QuantumX benefits:

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



More than
20,000 modules
in use worldwide



Service/Maintenance

Typical applications:

Calibration of machinery components

QuantumX benefits:

- **Portable:** Small and light-weight
- **Results you can trust:** Highly accurate inputs
- **Traceable quality:** On-board calibration protocol
- **Quick on-site service:** Individual user interface in any language



A Reliable Measuring Chain ...

Dependable results require optimal matching of transducers, data acquisition system and software. HBM provides you with the complete measuring chain: **connect – visualize and save – analyze.**

Sensors and transducers

Measuring modules

TEDS



Rugged and precise

Acquire strain, force, torque, pressure or displacement using precise sensors and transducers from HBM.

Integrate sensors or systems from other manufacturers.

Acquire any signal quantity such as voltage, current or resistance.

Universal and fast

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

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

Software



Distributable

Install your QuantumX modules at the measuring points and connect the modules in a distributable synchronized network.

Integrate the measurement signals in real-time and analyze them in parallel using PC software.

Intuitive and fast

Store data locally in the data recorder or PC.

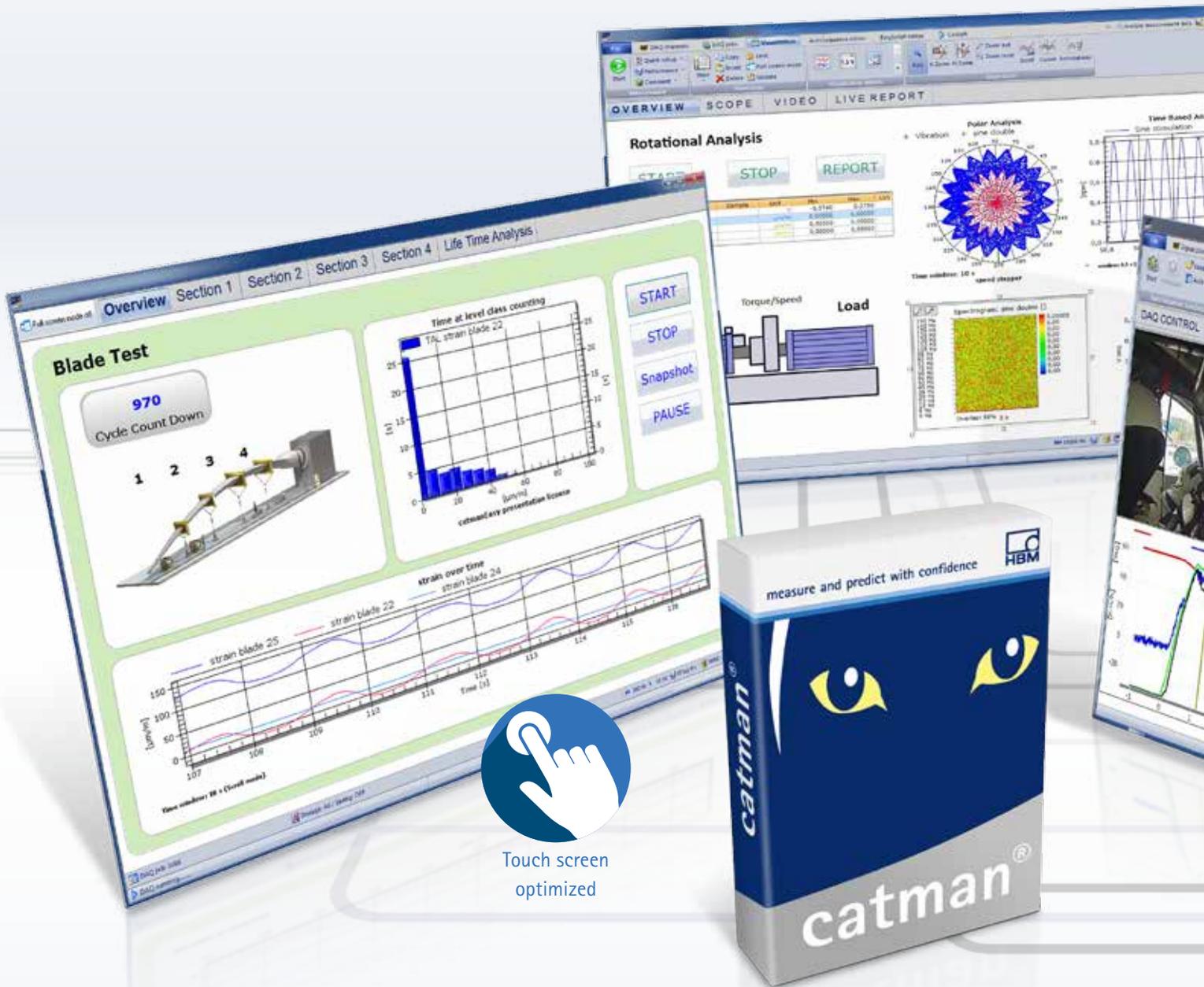
catman® allows easy computation, visualization, storage and analysis of measured values and signals.

QuantumX also can be integrated into your own programs

→ LabVIEW → .NET → CANape

Professional and Project-Oriented: Data Handling Using catman[®]

visualize - save - analyze



A single tool allows full **parameterization** of all channels, visualization and control of test and measurement tasks, as well as fundamental **data analysis**: catman®. Work in a project-oriented way and describe your measuring equipment and task.

catman®

Professional software for data acquisition and processing

- Easy integration of measuring devices
- Fast and reusable channel configuration (sensor database, TEDS, CAN dbc)
- Easy creation of computed channels using formula editor
- Plug-ins for signal analysis of rotating mechanical shafts, combustion engines, electric propulsion systems, mechanical stress and fatigue life analysis
- Smart triggers based on signal analysis
- Individual visualization and control on multiple pages, screens or full-screen (chart recorder, digital display, table, analog meter, function key, text, video, image, test track, etc.)
- Signal visualization in time, frequency or angular domain
- Event monitoring (limit value switches, push notification / email, logbook, etc.)
- Multiple formats for storage and export (catman BIN, Microsoft® Excel, ASCII, MDF 3/4, National Instruments DIAdem, MathWorks MATLAB, RPC III, UFF58, ...)
- Automatic file transfer to server / cloud
- Powerful data analysis (statistics, editing, matching, etc.)
- Automation of sequences using predefined functions, VBA script or AutoSequence
- Reporting (direct or using Microsoft® Word, Excel)



Every day more than
10,000 users
rely on catman

Flexible Concept, Consistent Quality

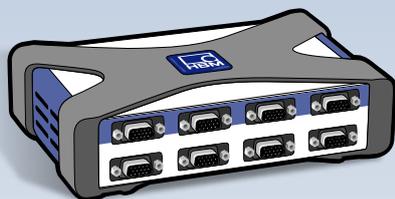
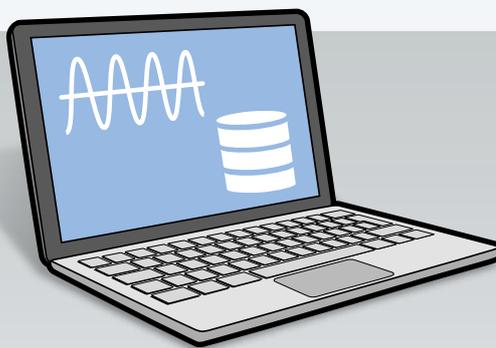
Small or large numbers of channels? Connected to a PC or stand-alone with a data recorder? Integrated in real-time? Stationary or mobile? Centralized or distributed? QuantumX provides a solution in all cases.

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, without any compromise. Versatile and dependable.

Operator level

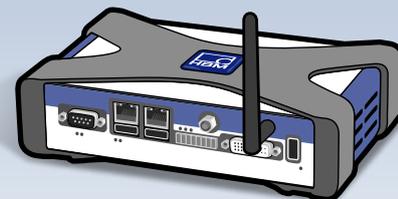
- Configuration
- Visualization & Control
- Automation
- Recording
- Analysis
- Presentation



Single device

Data recorder

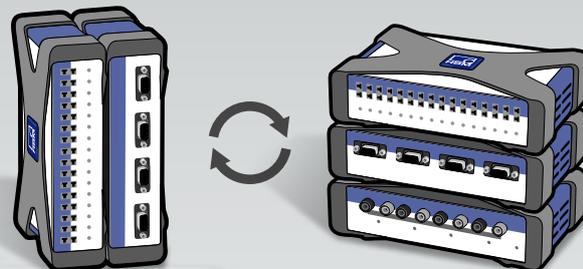
- Configuration
- Visualization
- Recording
- Analysis



Ethernet/**FireWire**

System

Sync via FireWire or Ethernet



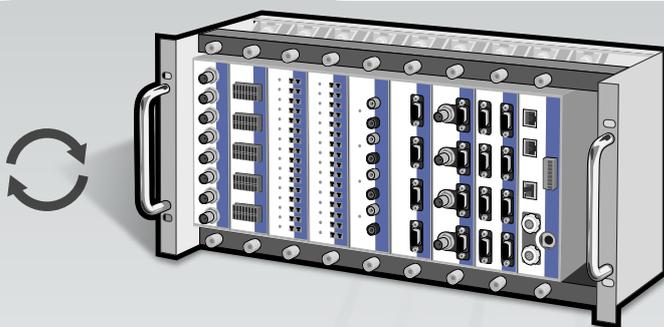


UMTS/LTE

WLAN/LAN



Ethernet/**FireWire**



The benefits at a glance

- Acquires all common mechanical, electrical and thermal quantities
- Fully time synchronized while distributed
- High accuracy (24 bit AD, electrical isolation, AutoCal, 6/5/4-wire circuit, carrier frequency)
- Up to 100 kS/s per channel, individual filters and scaling
- Standalone with data recorder
- Store up to 12 MS/s with catman®
- Calibration certificate saved to every measurement module

Interfaces to

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



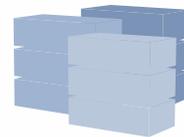
Synchronous

Ethernet PTPv2,
FireWire,
NTP, IRIG-B



Scalable

1 to 10,000 channels



1

10,000

Real-time

Real-time modules,
analog / digital outputs,
EtherCAT™ / CANbus



QuantumX: The Facts

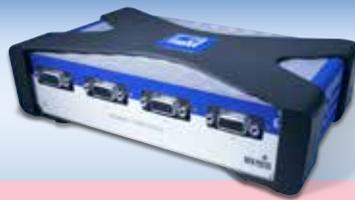
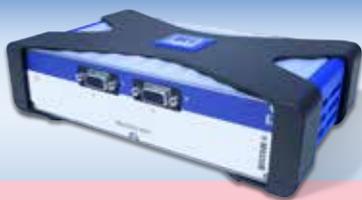
QuantumX is the freely scalable measuring system from HBM. Get a quick overview of the modules' flexibility.

Universal	Precision	Precision
		
<p>MX840B/ MX440B</p>	<p>MX410B</p>	<p>MX430B</p>
<p>8-channel/4-channel universal amplifier</p>	<p>4-channel high-dynamic universal amplifier</p>	<p>4-channel precision SG full bridge amplifier</p>
<p>Sampling rate per channel: 40 kS/s Signal bandwidth: 7 kHz</p>	<p>Sampling rate per channel: 100 kS/s (200kS/s, 2-chan.) Signal bandwidth: 40 kHz (80 kHz, 2-channel)</p>	<p>Sampling rate per channel: 40 kS/s Signal bandwidth: 6 kHz</p>
<p>Transducer technologies</p> <ul style="list-style-type: none">  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 (Type 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, incremental rotary encoder (incremental with/without index), SSI  MX840B channel 1, in addition: High speed CAN (ISO 11898, read 128 signals, transmit 7 channels) <p>Sensor supply: 5...24 V, 0.7 W (module: 2 W)</p>	<p>Transducer technologies</p> <ul style="list-style-type: none">  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) <p>Real-time: RMS, PEAK</p> <p>Scalable voltage output: BNC socket, ± 10 V, 16 bit</p> <p>Sensor supply: 5...24 V, 0.7 W (module: 2 W)</p>	<p>Accuracy class: 0.01</p> <p>Transducer technologies</p> <ul style="list-style-type: none">  SG full bridge circuit <p>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</p> <p>Real-time: Matrix calculation, RMS</p> <p>Scalable voltage output: BNC socket, ± 10 V, 16 bit</p>
<p>Connector DSubHD 15 pole</p> <p>Accessories Thermocouples: 1-THERMO-MXBOARD SG quarter bridge: 1-SCM-SG120/350/700/1000 10 or 300 V CAT II: 1-SCM-HV BNC adapter: 1-SUBHD15-BNC</p>	<p>Connector DSubHD 15 pole BNC (voltage output)</p> <p>Accessories SG quarter bridge: 1-SCM-SG120/350/700/1000 10 or 300 V CAT II: 1-SCM-HV BNC adapter: 1-SUBHD15-BNC</p>	<p>Connector DSubHD 15 pole BNC (voltage output)</p> <p>Accessories 1-KAB416: SubD-2-DSubHD adapter 1-KAB144: MS-2-DSubHD adapter 1-SUBHD15-SAVE: Socket saver</p>

High precision

Torque/Rotational speed

CAN



MX238B

MX460B

MX471B

2-channel high-precision SG full bridge amplifier

4-channel high-dynamic universal amplifier

4-channel CAN module

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

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

Signal acquisition per channel: 128
Signal transmission: 200

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

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)

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)

Interfaces



- CAN 2.0 A/B (ISO 11898)
- Acquisition of CAN signals or bit stream J1939 with catman
- Individual combination and transmission of measurement signals (gateway)



- Receive CCP or XCP-on-CAN
- Software selectable internal termination resistor (120 ohms)
- MX Assistant can generate DBC file

Connector

DSubHD 15 pole

Connector

DSubHD 15 pole

Connector

DSub 9 pole, male, assignment per CiA

Accessories

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

QuantumX: The Facts

High channel count		
		
MX1601B	MX1615B	MX1609KB / MX1609TB
16-channel standard amplifier	16-channel bridge amplifier	16-channel thermocouple amplifier Type K/T
Sampling rate per channel: 20 kS/s Signal bandwidth: 3 kHz	Sampling rate per channel: 20 kS/s Signal bandwidth: 3 kHz	Sampling rate per channel: 300 S/s Signal bandwidth: 15 Hz
Transducer technologies  Current-fed piezoelectric transducers (IEPE / ICP®)  Voltage (± 100 mV, ± 10 and ± 60 V)  Current (0 / 4...20 mA)	Transducer technologies  SG full bridge  SG half bridge  SG quarter bridge with integrated 120 and 350 ohm completion resistors Bridge excitation: DC or CF (1200 Hz) Internal shunt resistor (100 kOhm)  Voltage (± 10 V)  Resistance thermometers (PT100)  Ohmic resistor  Potentiometric transducer	Transducer technologies  Thermocouple Type K: MX1609KB Type T: MX1609TB
Connector Phoenix Push-In (8 pole)	Connector Phoenix Push-In (8 pole)	Connector Thermo mini (green/brown)
Accessories 10 plugs: 1-CON-S1015	Accessories 10 plugs: 1-CON-S1015	Accessories 10 plugs type K: 1-THERMO-MINI 10 plugs type T: 1-THERMO-MINI-T

High voltage

Recorder/Gateway



MX809B



MX403B



CX22B-W

8-channel thermocouple and voltage amplifier (VDE-tested safety)

4-channel module for voltage (VDE-tested safety)

Data recorder with catman®Easy

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

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

Sum data rate: 5 MS/s

Transducer technologies

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

Voltage: ± 5 V

Differential, electrically isolated inputs

Isolation: 1000 V RMS (2500 V Peak)

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

Real-time: RMS

Transducer technologies

Voltage: 10, 100 and 1000 V

Differential, electrically isolated inputs

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

Real-time: RMS

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)

Function:

- Connection of QuantumX or SomatXR amplifiers and modules
- Configuration of measurement channels using sensor data base, 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

Connector

Standardized Thermo Mini connector with insulating cap from HBM

Accessories

- Insulating cap: 1-CON-A2018
- 4 thermo mini type K: 1-CON-S1016
- 4 thermo mini for voltage: 1-CON-S1017

Connector

4 mm safety laboratory connector

Accessories

- Virtual star: 1-G068-2
- Burden resistor (1, 2.5 and 10 Ω): 1-HBR/x0hm
- BNC to laboratory connector: 1-G067-2
- Safety laboratory cables: 1-KAB282-1.5

Special features

Internal 32 GB ROM (eSSD), removable 8 GB CFast and antenna included in package

Accessories

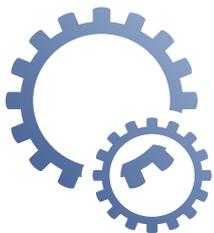
- 1-CATEASY-Roadload
- 1-CATEASY-Videocam
- 1-GPS-USB-18Hz

QuantumX: The Facts

Gateway	Multi-I/O	
		
CX27B	MX878B	MX879B
EtherCAT®/Ethernet Gateway	8-channel analog output	8-channel analog output 32-channel digital-I/O, multi-I/O module
	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
<p>Interfaces</p> <ul style="list-style-type: none"> 2 x EtherCAT®  2 x Ethernet TCP/IP  2 x FireWire  2 x digital input  2 x digital output with status LED 	<p>Output</p> <p> Voltage (± 10 V, 16 bit)</p> <p>Functions</p> <ul style="list-style-type: none"> Real-time signal output  Real-time computation: Addition, multiplication, 6 x 6 matrix, PID controller Frequency generator (constant, harmonic signals, arbitrary - replay of measurement data) 	<p>Outputs</p> <p> Voltage (± 10 V, 16 bit)</p> <p> Digital inputs or outputs (TTL, 24 V)</p> <p>Functions</p> <ul style="list-style-type: none"> Real-time signal output  Real-time computation: Addition, multiplication, 6 x 6 matrix, PID controller, limit value switch Frequency generator (constant, harmonic signals, arbitrary - replay of measurement data)
<p>Function:</p> <ul style="list-style-type: none"> · Connection of QuantumX amplifiers in real-time 		
	<p>Connector</p> <p>BNC</p>	<p>Connector</p> <p>Phoenix Push-In (8 pole)</p> <p>Accessories</p> <p>10 plugs: 1-CON-S1015</p>

QuantumX: Accessories

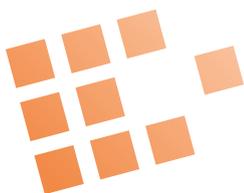
Choose the accessories that fit your test and measurement task from an extensive range of products.



Mechanical integration

- Mechanical connecting elements (CASECLIP)
- Fitting panel (CASEFIT)
- Backplane for rack mounting (BPX002)

Worldwide more than
1,300 customers
trust QuantumX



Extended functions (SubHD15)

- Cold junction electronics for thermocouple connection to SubHD15
- Quarter bridge strain gauge (3-wire) to SubHD15 adapter
- BNC to SubHD15 adapter, e.g. for connecting IEPE sensors
- 300 V CAT II to SubHD15 adapter



High-voltage series

- Insulating cap for MX809B thermocouple or voltage connection
- Burden resistor for current measurement to be plugged on safety laboratory connector
- BNC to be plugged on safety laboratory connector
- Artificial star to be plugged on safety laboratory connector





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measure and predict with confidence

