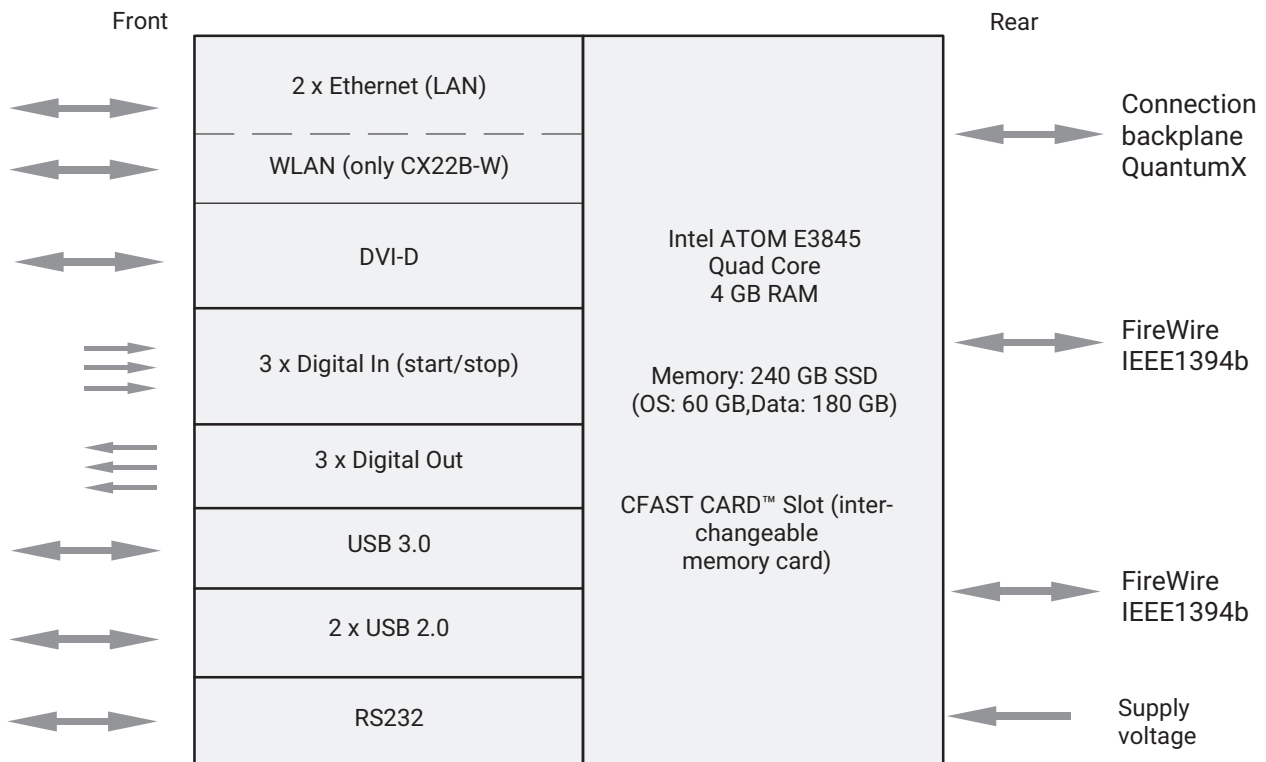DATA SHEET

QUANTUM X

CX22B-W, CX22B
Data recorder

SPECIAL FEATURES

- Autonomous measurement data collection
- Gateway: MX signals on the Ethernet
- Connection of QuantumX modules, GPS, camera, touchscreen
- Easy system configuration: Trigger, computation, virtual channels, online signal analysis
- Extensive interfaces:
  LAN, WLAN (CX22B-W), USB, digital I/O
- Supply voltage (DC):
  10 V ... 30 V, no fan

BLOCK DIAGRAM

Front		Rear
2 x Ethernet (LAN)		Connection backplane QuantumX
WLAN (only CX22B-W)	Intel ATOM E3845 Quad Core 4 GB RAM	
DVI-D		
3 x Digital In (start/stop)	Memory: 240 GB SSD (OS: 60 GB, Data: 180 GB)	FireWire IEEE1394b
3 x Digital Out		
USB 3.0	CFAST CARD™ Slot (inter-changeable memory card)	
2 x USB 2.0		FireWire IEEE1394b
RS232		Supply voltage

SPECIFICATIONS CX22B-W CX22B

General specifications		
Installed software		HBM catman®EASY as well as other tools (MX Assistant, HBM Device Manager, CX22 Shell, VNC Viewer)
Devices that can be connected		All QuantumX and SOMAT[XR] modules, GPS-Sensor (USB, RS232), CAN-Bus (via MX840B, MX471C), Wheel force sensors (Kistler KiRoad Performance/System2000 or KiRoad via Ethernet; AND, A&D/Michigan Scientific/MTS via CAN bus), Periphery: USB flash drive, keyboard + mouse, video camera, touchscreen, wireless router (e.g. 5G, LTE, UMTS)
Max. signal count Analog channels, digital protocol data		1,000
Synchronization of the MX modules		FireWire, Ethernet (NTP, PTP with PTP switch), EtherCAT (CX27), IRIG-B (MX840B input)
Data saving		
System configuration / data access		Remote access via software "HBM device Manager", direct connection to a PC (LAN or WLAN), data access via Windows Explorer
Maximum cumulative recording rate **Internal SSD:** With dynamic measurement data storage[1] (*bin) in FastStream mode[2] **For the installed CFAST CARD™:** With dynamic measurement data storage[1] (*bin) in FastStream mode[2]	MS/s MS/s MS/s MS/s	4 5 3 5
Channel configuration		Manually, via integrated sensor database (all typical transducers, CAN DBC database), automatically via TEDS (data sheet in the sensor),Microsoft Excel, project file
Function as data logging device		Single or multiple parallel and independent recordings (multirecorder[3])
Trigger signals		Measured value, calculated value, bus signal, digital input, key, duration, script, system (e.g. storage full, power on)
Trigger type		Edge (rising, falling), level (upper, lower), logical operator
Trigger actions (alarms and warnings)		Start and end tests, manage data storage, configure digital output, LED, log message, send e-mail, push notification, color change, control video camera, play back sound, script
Number of data rates		4 Example: 10 S/s, 1 kS/s and 100 kS/s as well as parallel, extremely low sampling rate (example: 4 S/hour)
Online signal calculation		Arithmetic, root, root mean square, logic, trigonometry, integral, differential, exponential, logarithm, filter, rosette calculation, frequency analysis (FFT + trigger)
Scope of recording		Selected signals, metadata (sensors, measurement configuration, test parameters), statistics log
Recording mode		Standard (catman® BIN), periodic saving without data loss, long-term measurement (cycle with counter and duration, can also be used together with event-driven saving), only peak values (interval), circularbuffer (up to 10 minutes), statistical journal (ASCII)
Sequences		10 sequential recording configurations (measurement jobs), repetitions

[1] Test conditions: 14 modules (FireWire), 56 measurement channels, 8 bytes per measured value, 2 data rate groups, no visualization objects
[2] Test conditions: 14 modules (FireWire), 56 measurement channels, 8 bytes per measured value, 1 data rate group, no visualization objects
[3] catmanAP required

Data format / storage format		HBM catman® binary form (BIN), FastStream for highly dynamic measurements. Resilient against sudden disruptions (no more than the last data block will be lost).
Data export/storage format		ASCII, Microsoft Excel, MTS (RPC III) MathWorks MATLAB (MAT), HBM nCode (DAC), ASAM MDF 3.0/4.0, NI DIAdem (DAC)
Automation		Function keys on the keyboard,automatic tests: Easy Script based on VBA (required for author stage: EasyScript upgrade or on the host PC. No software upgrade required for running on the data recorder)
Data storage		Internal SSD (240 GB, 60 GB of it reserved for OS), interchangeable CFAST CARDS™ 2.0 (8 GB included in the package, can be replaced), USB flash drive, external USB hard drive (USB 2.0 or 3.0)
Data transfer		Backed-up to a data server via (S)FTP service (pre-installed client)
Gateway		
System configuration		Access via Ethernet/WLAN to all signals of MX modules connected via FireWire
Data throughput[1]	MS/s	3
Screen or remote control		
Online display **Screen recommendation**		Freely configurable display and control levels (panels) in full-screen mode 1,024 x 768 pixels DVI digital
Keyboard		Control via function keys
Display, operation and remote access		
Operation		Via "remote desktop connection" with computer with Windows operating system or OS-X via a direct Ethernet connection (cable or WLAN) or via LAN/WAN/hotspot. Via directly connected peripheral devices (monitor, keyboard, mouse), Via remote access using a wireless gateway (VPN/Team Viewer installation possible)
Screen recommendation (direct connection) **Screen connection** **Display and operation (catman)**		DeltaVarioMon DMXX1140 or ASUS MB168B+ touchscreen, generally 1024 x 768 pixels DVI digital or USB 3. 0 Freely configurable display and control levels, multiple levels (panels), full-screen mode
Display elements		Digital display, strip chart recorder (y-t, x-y, y-f), polar diagram, frequency diagram/ color spectrogram (FFT), table (universal, simple), indicator, bar graph, LED (multi, uni), sensor/switch (button), check box, drop-down menu, background and text
Keyboard and mouse		Standard, control via function keys
General specifications		
Operating system		Windows 10 IoT Enterprise 2019 LTSC
Secure access to the CX22B-W		Mechanisms provided by Windows or added, such as VPN access via remote desktop connection (login and password)

[1] Test conditions: 9 modules, 36 channels with 96,000 Hz in BIN format

Processor		Intel®Atom, E3845 Quad Core, 1.9 GHz
Internal storage medium		
Type	-	Solid state disk (SSD)
Storage capacity	Gbyte	240 (60 for C/operating system, 180 for D/data)
Exchangeable storage medium		
Type	-	CFAST CARD™ Card 2.0
Storage capacity	Gbyte	8, CFast included in package. Standard memory cards available: 8, 16, 32, 64, 128 (SANDISK, SWISSBIT)
Module starting time	sec	30
Module interfaces		2 x Gigabit Ethernet only CX22B-W: Antenna included in package 2 x FireWire 1 x terminal strip for installation in backplane BPX 1 x USB 3.0 2 x USB 2.0 1 x RS232 1 x DVI-D 3 x digital In (start/stop key) and 3 x digital Out
Supply voltage range (DC) SELV in accordance with IEC60950-1	V	10 ... 30, nominal (rated) voltage 24
Maximum current consumption	W	20, no fan
Ethernet Protocol (addressing) Plug connection Max. cable length to module	 m	1000Base-TX/100Base-TX/10Base-T TCP/IP (static IP/DHCP, IPv4/IPv6) 8P8C plug (RJ-45) with twisted-pair cable (CAT-5) 100
WLAN (only CX22B-W) Conformity Wireless standard Maximum data transfer rate Safety protocols Frequency carrier Antenna	 MBit GHz	 CE, FCC, IC IEEE 802.11 n/ and a/b/g, ad hoc support 300 WEP, WPA, WPA2, TKIP, AES 2.4 and 5 Standard SMA jack, type RF Coax, in accordance with the stated standards with the supplied antenna
FireWire (module synchronization, data link, optional power supply) Baud rate Max. current from module to module Max. cable length between nodes Max. number of modules connected in series (daisy chain) Max. number of modules in a FireWire system (including hubs[1]), backplane) Max. hops in a chain[2]	 MBaud A m	IEEE 1394b (HBM modules only) 400 1.5 5 (optical: 100) 12 (= 11 hops) 24 14
USB Version / connection Version / connection Cable length, max. Devices	 m	2 x 2.0/standard high speed (host) compatible with Version 1.1 1 x 3.0/standard (host) 5 GPS, keyboard, mouse, touchscreen, memory stick, external hard disk, printer

[1] Hub: FireWire node or distributor
[2] Hop: Transition from module to module/signal conditioning

RS-232-C		
Connection		DSUB 9-pin
Baud rate, max.	kBaud	115
Devices		e.g. GPS (NMEA)
DVI-D		
Type		Digital, connection of LCD monitor
Equipment protection level[1] for electrical equipment, in accordance with EN 61140 (Germany: VDE:0140-1)		III
The equipment protection level is different from the protection class defined with IP (ingress protection in accordance with IEC 60529). Equipment protection levels define measures that protect against voltages hazardous when touched, the IP protection classifications describe the level of protection the housing has against touching, foreign objects, and water.		
Equipment protection level		IP20
Mechanical tests[2]		
Vibration (30 minutes)	m/s^2	50
Shock (6 ms)	m/s^2	350
EMC requirements		per EN 61326
Application temperature range (affected by dew point)	°C	-20 °C ... +65 °C
Storage temperature range	°C	-40 °C ... +75 °C
Rel. Humidity at 31 °C	%	80 (non-condensing) linear reduction to 50 at 40 °C
Max. operating altitude	m	2,000
Weight, approx.	g	1,100
Dimensions, horizontal (H x W x D)	mm	53 x 200 x 128 (with case protection) 44 x 174 x 119 (without case protection)
Time		
Clock error		max. 1.2 minutes per month
Time buffering		Battery
Time zone (factory settings)		UTC (UUniversal Time, Coordinated)
Digital inputs and outputs		
Number of inputs/outputs		6 / 3 inputs (terminal 1, 2, 3, START/STOP switch on Terminal 3) / 3 outputs (terminal 4, 5, 6)
Type of connection		Screw terminals Plug: MC 1.5/7-ST-3.5 (Phoenix Contact)
LEDs (number) Output state		3
Cable length, max.	m	3

Cable type (required in the event of interference)		shielded
Input signal range TTL		
Max. allowed input signal range	V	-0.5 ... 5.5
Input signal range high, min.	V	4
Input signal range low, max.	V	0.7
Internal pullup resistors	kOhm	100
Output signal range TTL		
Output High	V	5
Output Low	V	0
Max. output current	mA	1

[1] A safety extra low voltage is used for Protection Class III. When power is supplied from the mains voltage, a safety isolating transformer is required in accordance with DIN VDE 0570-2-6 and EN 61558-2-6. If the voltage supplied to the batteries or accumulators is within the allowed supply range, no further measures must be taken.

[2] Mechanical stress is tested in accordance with European standards EN 60068-2-6 for vibration and EN 60068-2-27 for shock. The devices are exposed to an acceleration of 25 m/s^2 within the frequency range 5...65 Hz in all 3 axes. Duration of this vibration test: 30 minutes per axis. The shock test is implemented at a nominal acceleration of 200 m/s^2 for a duration of 11 ms, half sine and with shocks in each of the six possible directions.

ACCESSORIES CX22B-W, CX22B, TO BE ORDERED SEPARATELY

Article	Description	Ordering number
Power supply		
AC/DC power supply / 30 W	Input: 100 ... 240 V AC (± 10 %), 1.5 m cable Output: 24 V DC, max. 1.25 A, 2 m cable with ODU male connector	1-NTX001
QuantumX supply cable	3 m cable to supply power to QuantumX modules; suitable male connector (ODU Medi-Snap S11M08-P04MJGO-5280) at one end and exposed wires at the other.	1-KAB271-3
Communication		
Ethernet cable	Ethernet cable for direct operation of devices on a PC or notebook, length 2 m, type CAT5+	1-KAB239-2
IEEE1394b cable (module to module), IP68	Connection cable between the data recorder and QuantumX modules, fitted with suitable male connectors at both ends; lengths 0.2 / 2 or 5 m. Note: voltage can also be supplied to the modules via the cable (max. 1.5 A, from source to last acceptor).	1-KAB272-0.2 1-KAB272-W-0.2 1-KAB272-2 1-KAB272-5
Mechanical		
Connecting elements for QuantumX modules	Connecting elements (clips) for QuantumX modules; set comprising 2 connecting elements and including assembly material for fast connection of 2 modules.	1-CASECLIP
Connecting elements for QuantumX modules	Mounting plate for installing QuantumX modules using connecting elements (1-CASECLIP), lashing strap or cable ties. Basic fastening by 4 screws	1-CASEFIT
QuantumX backplane (large)	QuantumX backplane for a maximum of 9 modules - Wall or control cabinet installation (19") - External modules can be connected via FireWire - 24 V DC / max. 5 A (150 W) power supply	1-BPX001

Article	Description	Ordering number
QuantumX backplane (rack)	QuantumX backplane – rack for a maximum of 9 modules - 19" control cabinet installation with left and right handles - External modules can be connected via FireWire - Power supply: 18 ... 30 V DC/max. 5 A (150 W)	1-BPX002
QuantumX backplane (small)	QuantumX backplane for a maximum of 5 modules - External modules can be connected via FireWire - Power supply: 11 ... 30 V DC/max. 5 A (90 W)	1-BPX003
Periphery		
GPS receiver (USB)	Multi GNSS receiver, individually packed	1 GPS USB 18Hz
Additional software for extending data recorder functionality		
Upgrade to catman®AP	Software upgrade: catman Easy to catman AP	1-CATEASY-TO-AP
Data recorder with catman AP	Data recorder with WLAN and catman AP	1-CX22-W-PAKAP
Additional software for a control PC		
HBM Device Manager	The free PC application "HBM Device Manager" makes it easy to find data recorders in networks and establish a connection with them. The application is part of the QuantumX software package www.hbm.com\	Free
catman PostProcess	Analysis and processing of measurement data with various mathematics functions, data export and report generation. Data cleansing and processing: curve operations, statistics, video analysis.	1-CATEASY-PROCESS
catman®AP 	All-inclusive package, comprising catman®Easy Functionality plus add-on modules with the option to upload data via FTP or send messages via e-mail or push (easy monitoring) as well as video camera integration (EasyVideoCam), full post-process analysis (EasyMath), recurrent activity automation (EasyScript), measurement project preparation offline (EasyPlan), and additional functions such as electrical power calculation, special filters, frequency spectrum, etc. Details at www.hbm.com\catman\	1-CATMAN-AP

QUANTUMX MODULE OVERVIEW

	Inputs / Measurement Modules												Recorder / Bus Connection / Multi IO				
	Universal			Precision		M/n	High Channel Count			Optical	Isolated		CAN FD Gateway	Recorder /Gateway	Gateway	Multi IO	
	MX840B	MX440B	MX410B	MX430B	MX238B	MX460B	MX1601B	MX1615B	MX1609B [1]	MXFS [4]	MX809B	MX403B	MX471C	CX22B-W	CX27C	MX878B	MX879B
Channel count	8	4	4	4	2	4	16	16	16	128	8	4	4	-	-	8	8 + 32
Sample rate [kS/s]	40	40	100	40	40	100	20	20	0.5	2	0.5	100	-	-	-	-	-
El. Voltage	•	•	•				•	•									
El. Voltage, isolated 5 V (CAT II / III)	·2)	·2)	·2)								•	•					
El. Voltage 10, 100, 1000 V (CAT II / III)												•					
El. Current (0/4 … 20 mA)	•	•	•				•										
Strain gage full bridge	•	•	•	•	•			•									
Strain gage half bridge	•	•	•					•									
Strain gage quarter bridge	·3)	·3)	·3)	·3)	·3)			•									
Optical Fiber Bragg Grating(FBG)										•							
Inductive full bridge	•	•	•														
Inductive half bridge	•	•	•														
LVDT	•	•															
Potentiometer	•	•						•									
SSI absolute encoder (protocol)	•	•															
Current fed piezo electric (IEPE, ICP ®)	•	•	•				•										
Piezo resistive transducer	•	•	•														
Thermocouple	•	•							•		•						
Thermometer, RTD, PT	•	•						•									
Resistance input (R)	•	•						•									
Frequency, pulse count (timer, TTL)	•	•				•											
Incremental encoder (timer, TTL)	•	•				•											
Inductive pick-up (AC coupled), crank						•											
Pulse-width measurement (timer)						•											
Analog output (±10 V)			•	•												•	•
Digital input (static)														•	•		•
Digital output (static)														•	•		•
CAN FD / CAN (receive, transmit)	•												•				
CCP / xCP-on-CAN													•				
EtherCAT															•		
PROFINET															•		
GPS connection (RS232, USB)														•			
Data recording														•			

[1] MX1609KB supports thermocouples, MX1609TB supports thermocouple Type T.
[2] With isolated voltage adapter SCM-HV.
[3] With quarter bridge adapters SCM-SG120, SCM-SG350, SCM-SG700 or SCM-SG1000.
[4] With 8 FC/APC connectors. 16 channels per connector.