

QuantumX MX430B

Full Bridge amplifier

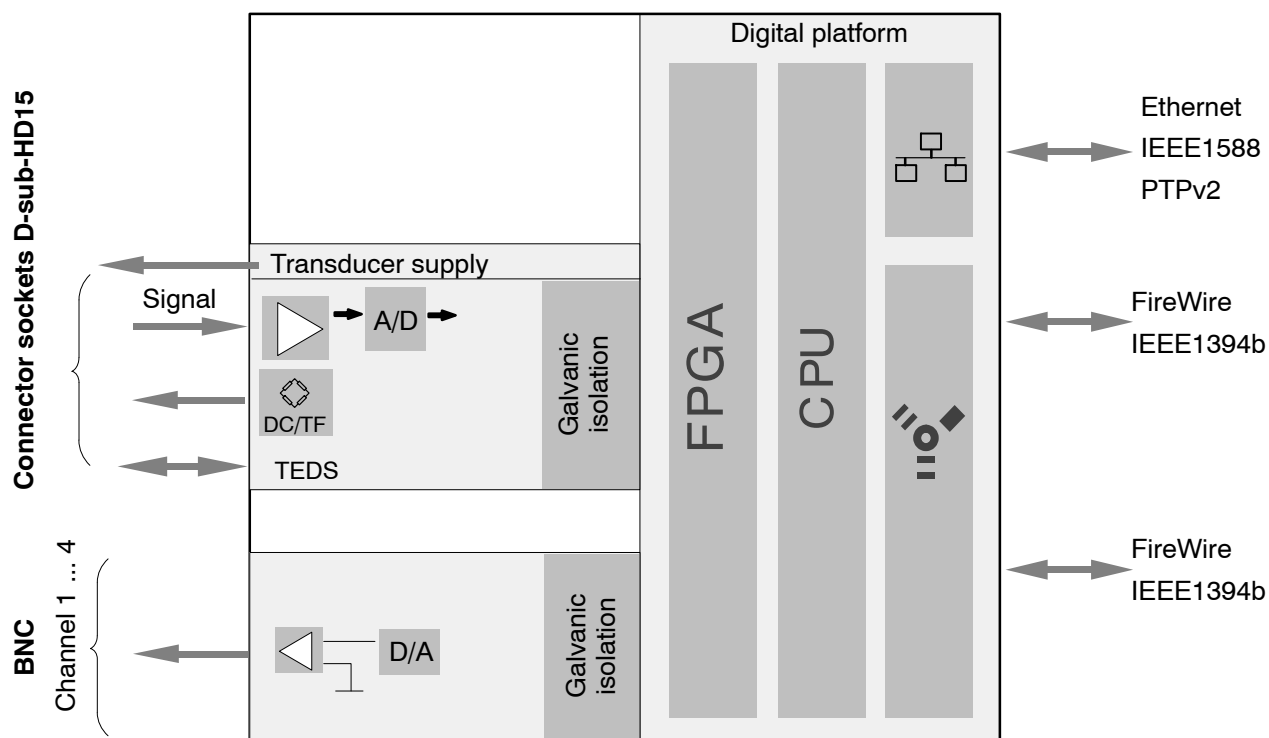


Special features

- 4 precise strain gauge full bridge inputs (accuracy class 0.01)
- Variable bridge excitation: DC or carrier frequency (600 Hz sine)
- 6-wire configuration and AutoCal
- 24-bit A/D converter per channel
- Electrically isolated channels
- Automatic channel parameterization via TEDS
- Quick sensor test (shunt)
- Real-time matrix compensation calculation to allow for connection of multicomponent sensors
- 4 low-latency analog outputs

Data sheet

Block diagram



Specifications MX430B

General specifications		
Inputs	Number	4, galvanically isolated from each other and from the supply voltage ¹⁾
Transducer technologies per connector		Strain gauge full bridge (6-wire and 4-wire configuration)
A/D converter per channel		24 Bit Delta Sigma converter
Signal bandwidth (-3 dB)	Hz	6,000 (with 6,000 Hz Butterworth filter), in DC mode, 200, in carrier frequency mode
Active low-pass filter	Hz	Bessel, Butterworth, 0.01... 6,000 Filter OFF
Data rates (adjustable by software, default: HBM Classic)	S/s	Dezimal: 0.1 ... 40,000 HBM Classic: 0.1 ... 19,200
Transducer identification max. distance of the TEDS module	m	TEDS, IEEE 1451.4 100
Transducer connection		D-sub-HD15
Supply voltage range (DC)	V	10 ... 30 (24 V nominal (rated) voltage)
Supply voltage interruption		max. 5 ms at 24 V
Power consumption without adjustable transducer excitation with adjustable transducer excitation	W W	< 11 < 14
Transducer Excitation (active transducers) Adjustable supply voltage (DC) Maximum output power	W W	5 ... 24; adjustable for each channel 0.7 each channel / a total of 2
Ethernet (data link) Protocol/addressing Connection Max. cable length to module	- - - m	10Base-T / 100Base-TX TCP/IP (direct IP address or DHCP) 8P8C plug (RJ-45) with twisted pair cable, Streaming (CAT-5) 100
Synchronization options Firewire Ethernet EtherCAT ^{®5)} IRIG-B (B000 bis B007; B120 bis B127)		IEEE1394b IEEE1588 (PTPv2) or NTP via CX27B EtherCAT Gateway module IRIG-B (B000 up to B007; B120 up to B127) via MX440B / MX840B input channel
IEEE1394b FireWire (module synchronization, data link, optional supply voltage) Baud rate Max. current from module to module Max. cable length between the nodes Max. number of modules connected in series (daisy chain) Max. number of modules in a IEEE1394b FireWire system (including hubs ²⁾ , backplane) Max. number of hops ³⁾	MBaud A m - - -	IEEE 1394b (HBM modules only) 400 (approx. 50 MByte/s) 1.5 5 12 (=11 Hops) 24 14
Nominal (rated) temperature range	°C [°F]	-20 ... +65 [-4 ... +149]
Storage temperature range	°C [°F]	-40 ... +75 [-40 ... +167]
Rel. humidity	%	5 ... 95 (non condensing)
Protection class		III
Degree of protection		IP20 per EN60529
Mechanical tests⁴⁾ Vibration (30 min) Shock (6 ms)	m/s ² m/s ²	50 350
EMC requirements		per EN 61326
Max. input voltage at transducer socket to ground PIN 1, 2, 3, 4, 5, 7, 8, 10, 13, 15 to Pin 6 PIN 14 (voltage) to Pin 9	V V	+ 5.5 (no transients) ± 60 (no transients)/
Dimensions, horizontal (W x H x D)	mm	52.5 x 200 x 121 (with case protection) 44 x 174 x 116.5 (without case protection)
Weight, approx.	g	850

¹⁾ When the variable transducer supply is used, there is no electrical isolation from the supply voltage.

²⁾ Hub: IEEE1394b FireWire node or distributor

³⁾ Hop: Transition from module to module/signal conditioning

⁴⁾ Mechanical stress is tested according to European Standard EN60068-2-6 for vibrations and EN60068-2-27 for shock. The equipment is subjected to an acceleration of 50 m/s² in a frequency range of 5...65 Hz in all 3 axes. Duration of this vibration test: 30min per axis. The shock test is performed with a nominal acceleration of 350 m/s² for 6 ms, half sine pulse shape, with 3 shocks in each of the 6 possible directions.

⁵⁾ EtherCAT[®] is a registered trademark and patented technology, licensed by Beckhoff Automation GmbH, Germany

Specifications MX430B (Continued)

Strain gauge full bridge, carrier-frequency bridge excitation (600 Hz sine)		
Accuracy class		0.01 ¹⁾
Carrier frequency (sine wave)	Hz	600 ± 1.5
Bridge excitation voltage (effective)	V	2.5; 5.0 (± 5 %)
Transducers that can be connected		strain gage full bridges
Permissible cable length between module and transducer	m	100
Measuring ranges at 5 V excitation at 2.5 V excitation	mV/V mV/V	± 2.5; ± 5.0 ± 2.5; ± 5.0
Additional shunt resistor can be connected (transducer test)	kΩ	100 ± 0.1% (typ. – 0.886 mV/V at 350Ω)
Measurement frequency range	Hz	0 ... 200
Transducer impedance at 5 V excitation at 2.5 V excitation	Ω Ω	150 ... 5,000 75 ... 5,000
Input resistance	MΩ	> 100
Noise at 25 °C , 350 Ω Impedanz for 2 Sigma (95%), (peak to peak) with filter 1 Hz Bessel with filter 10 Hz Bessel with filter 100 Hz Bessel	μV μV μV	< 0.07 < 0.22 < 0.7
Linearity error	%	< 0.0025 of full scale
Common-mode rejection	dB	> 120
Zero drift	% / 10 K	< 0.0025 ¹⁾ of full scale
Full-scale drift	% / 10 K	< 0.005 ¹⁾ of measurement value
Short time drift	% / 24h	< 0.002 ¹⁾
Long time drift	% / a	< 0.005 ¹⁾

Strain gauge full bridge, bridge excitation DC voltage		
Accuracy class		0.01 ¹⁾
Bridge excitation voltage (effective)	V	2.5; 5.0; 10.0 (± 5 %)
Transducers that can be connected		strain gauge full bridges
Permissible cable length between module and transducer	m	100
Measuring ranges at 10 V excitation at 5 V excitation at 2.5 V excitation	mV/V mV/V mV/V	± 2.5; ± 5.0 ± 2.5; ± 5.0 ± 2.5; ± 5.0
Additional shunt resistor can be connected (control signal)	kΩ	100 ± 0.1% (typ. – 0.886 mV/V at 350Ω)
Measurement frequency range	Hz	0 ... 6,000
Transducer impedance at 10 V excitation at 5 V excitation at 2.5 V excitation	Ω Ω Ω	300 ... 5,000 150 ... 5,000 75 ... 5,000
Eingangswiderstand	MΩ	> 100
Noise at 25 °C, 350 Ω Impedanz for 2 Sigma (95%) (peak to peak) with filter 1 Hz Bessel with filter 10 Hz Bessel with filter 100 Hz Bessel with filter 1 kHz Bessel	μV μV μV μV	< 0.12 < 0.38 < 1.20 < 3.79
Linearity error	%	< 0.0025 of full scale
Common-mode rejection	dB	> 120
Zero drift	% / 10 K	0.01 ¹⁾ of full scale
Full-scale drift	% / 10 K	< 0.01 ¹⁾ of measurement value
Short time drift	% / 24h	< 0.005 ¹⁾
Long time drift	% / a	< 0.005 ¹⁾

¹⁾ with background calibration activated

Specifications MX430B (Continued)

Analog output, ± 10 V electric voltage		
Accuracy class		0.05
Number of outputs	4	4 (one Output per Input)
Type of connection	-	BNC
Permissible cable length	m	< 30
Bandwidth	kHz	defined by the input signal filter
Max. measurement output rate	kHz	576
Nominal (rated) voltage	V	± 10
Reference signal		Common ground for all outputs, electrically isolated from supply and housing
D/A converter resolution	Bit	16
Noise (peak to peak)	mV	< 10
Permissible load impedance	Ω	> 2,000 / < 2 nF
Crosstalk attenuation	dB	> 65
Min. Setting time	μ s	10
Zero drift	% / 10K	< 0.05 of full scale value
Full-scale drift	% / 10K	< 0.05 of output value

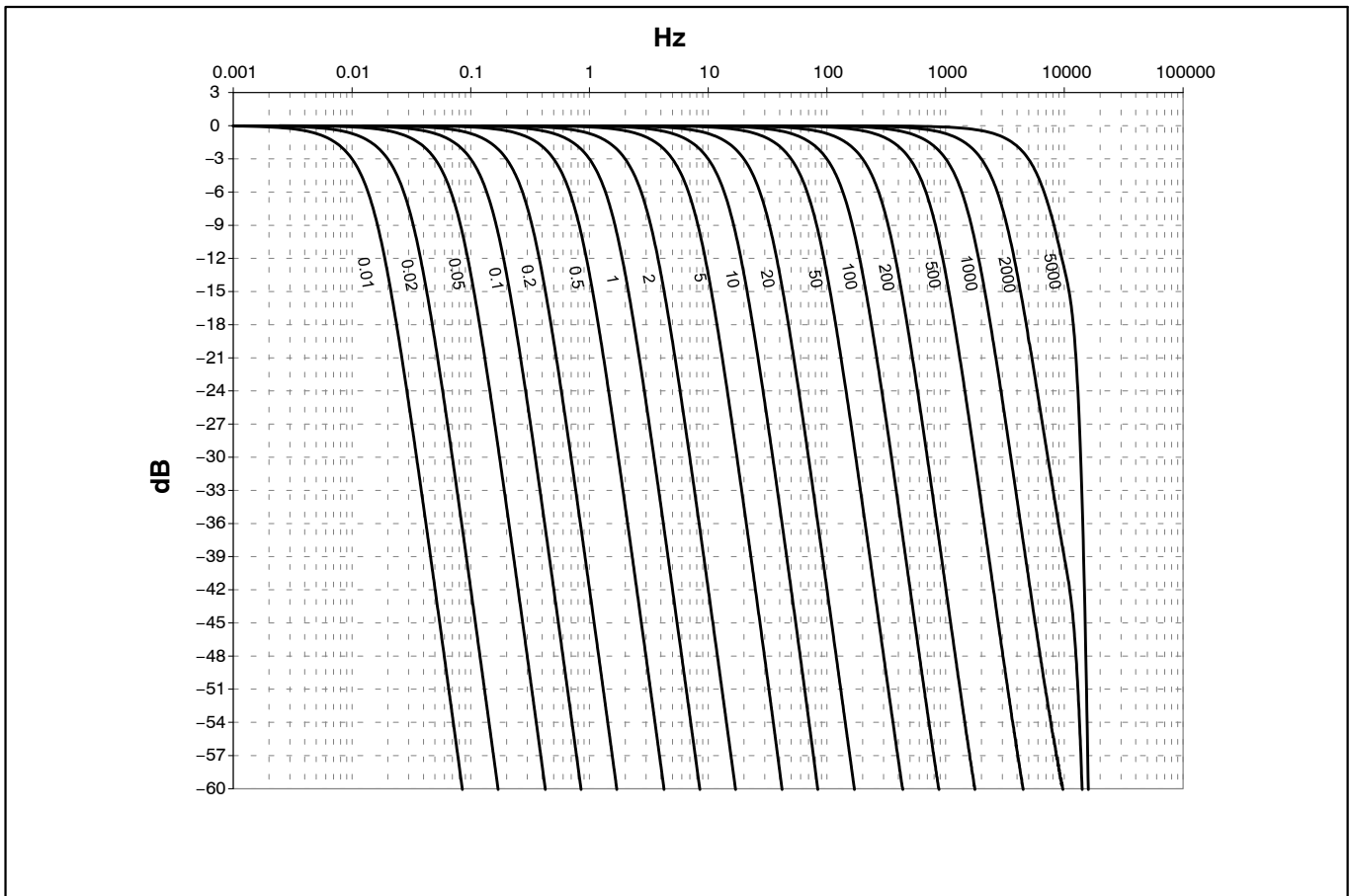
Real-time computation in the module for output to analog output or system bus, e.g. EtherCAT (CX27B) or CANbus (MX471B)		
Mathematics unit		
Number of computations		4
Max. input rate	kS/s	5
Max. output rate	kS/s	5
Matrix computation (e.g. for compensation calculation when multicomponent sensors are connected)		
Number of input signals		4
Number of output signals		4
Number of coefficients		16

Decimal sample rates and digital low pass filter, type Bessel 4th order

Type	-1dB (Hz)	-3dB (Hz)	-20dB (Hz)	Phase delay ^{*)} (ms)	Rise time (ms)	Overshoot (%)	Sample rate (Hz)
Bessel	3,041	5,000	9,935	0.043	0.08	3.6	40,000
	1,188	2,000	5,141	0.13	0.2	0.9	40,000
	594	1,000	2,561	0.29	0.3	0.85	40,000
	296	500	1,273	0.62	0.7	0.8	40,000
	118	200	508	1.6	1.7	0.8	40,000
	59	100	254	3.2	3.5	0.8	40,000
	30	50	127	6.5	7	0.8	40,000
	12	20	51	16.4	17.5	0.8	40,000
	6	10	25	34.5	35	0.8	20,000
	3	5	13	69	70	0.8	10,000
	1.2	2	5.1	168	175	0.8	10,000
	0.6	1	2.5	332	350	0.8	5,000
	0.3	0.5	1.3	663	700	0.8	1,000
	0.1	0.2	0.5	1,652	1,750	0.8	1,000
	0.06	0.1	0.25	3,299	3,500	0.8	500
	0.03	0.05	0.13	6,598	7,003	0.8	100
0.01	0.02	0.05	16,495	17,508	0.8	100	
0.006	0.01	0.02	32,989	35,016	0.8	50	

^{*)} The delay time of A/D converter and prefilter is 2,6 ms for all data rates and has not been accounted for in the "Phase delay" column!

Decimal sample rates : Amplitude response Bessel filter

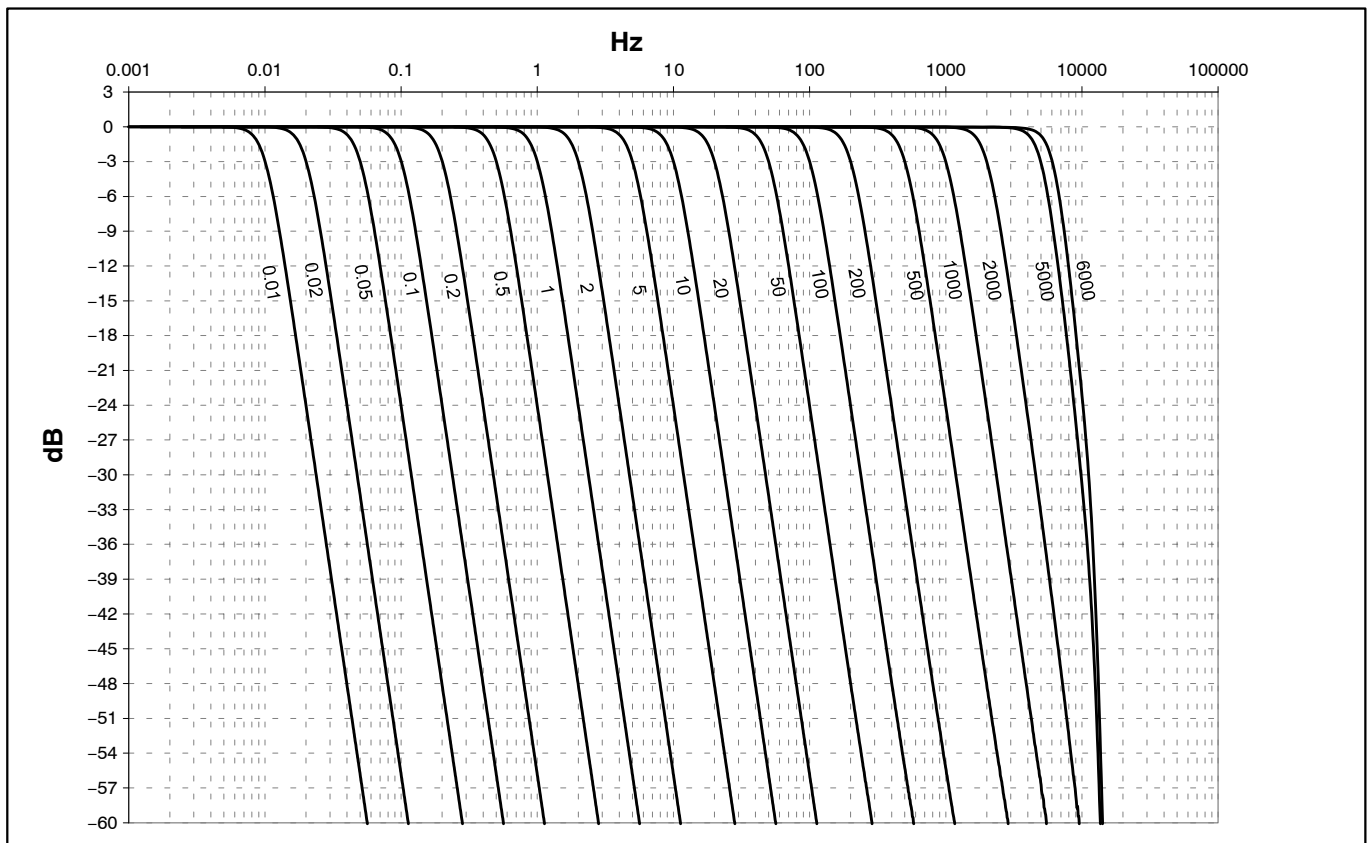


Decimal sample rates and digital low pass filter, type Butterworth 4th order

Type	-1dB (Hz)	-3dB (Hz)	-20dB (Hz)	Phase delay ^{*)} (ms)	Rise time (ms)	Overshoot (%)	Sample rate (Hz)
Butterworth	5,198	6,000	8,722	0.08	0.08	15.2	40,000
	4,274	5,000	7,667	0.10	0.09	13.7	40,000
	1,690	2,000	3,491	0.23	0.2	11	40,000
	844	1,000	1,768	0.46	0.4	10.9	40,000
	422	500	888	0.9	0.8	10.8	40,000
	169	200	355	2.2	1.9	10.8	40,000
	84	100	178	4.5	3.9	10.8	40,000
	42	50	89	9.2	7.7	10.8	20,000
	17	20	35.5	23	19.3	10.8	20,000
	8,4	10	17.8	45	39	10.8	20,000
	4	5	8.9	90	77	10.8	20,000
	1.7	2	3.5	225	193	10.9	20,000
	0.8	1	1.8	449	387	10.8	20,000
	0.4	0.5	0.9	898	774	10.8	10,000
	0.17	0.2	0.3	2,241	1,930	10.9	10,000
	0.08	0.1	0.18	4,481	3,861	10.9	5,000
	0.04	0.05	0.09	8,962	7,721	10.9	1,000
	0.02	0.02	0.03	22,405	19,303	10.9	1,000
0.008	0.01	0.02	44,810	38,606	10.9	500	

^{*)} The delay time of A/D converter and prefilter is 2,6 ms for all data rates and has not been accounted for in the "Phase delay" column!

Decimal sample rates : Amplitude response Butterworth filter

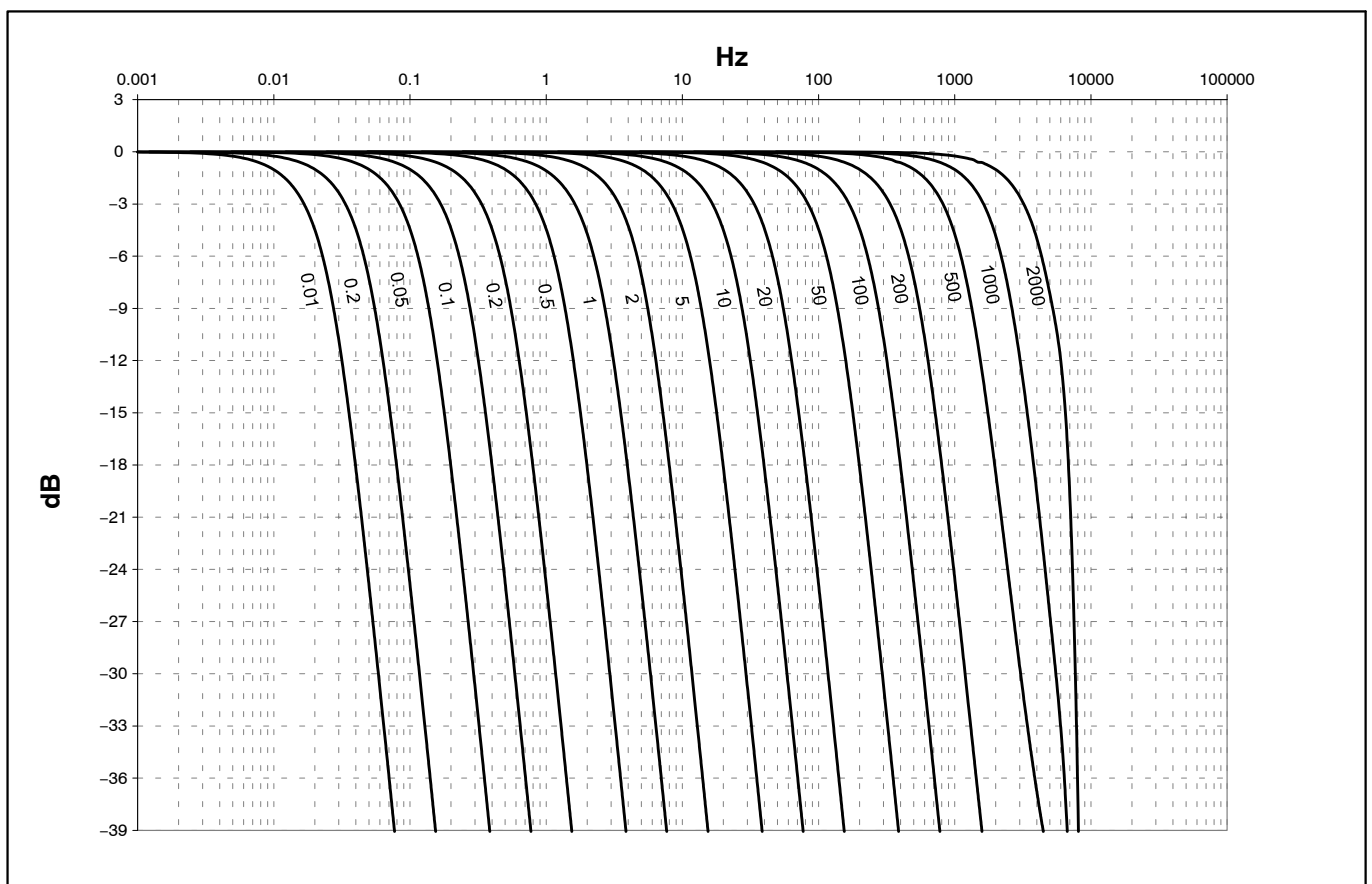


Classic HBM sample rates and digital low pass filter, type Bessel 4th order

Type	-1dB (Hz)	-3dB (Hz)	-20dB (Hz)	Phase delay (ms) ^{*)}	Rise time (ms)	Overshoot (%)	Data rate (Hz)
Bessel	2,000	3,210	8,100	0.15	0.1	1.5	19,200
	1,000	1,630	4,050	0.24	0.2	1.4	19,200
	1,000	1,640	5,150	0.21	0.2	0.7	9,600
	500	820	2,120	0.4	0.43	1.4	9,600
	200	335	860	1	1.04	1	9,600
	100	167	430	2	2.1	0.8	9,600
	50	83	215	4	4.28	0.8	9,600
	20	33.7	85	10	10.6	0.8	9,600
	10	16.5	42	20	21.3	0.8	9,600
	5	8.4	21	40	41.6	0.8	2,400
	2	3.4	8.5	99	104	0.8	2,400
	1	1.6	4.2	200	214	0.8	2,400
	0.5	0.83	2.1	400	420	0.8	300
	0.2	0.34	0.85	1,000	1,060	0.8	300
	0.1	0.17	0.43	2,000	2,130	0.8	300
	0.05	0.084	0.21	3,940	4200	0.8	20
	0.02	0.033	0.085	10,000	10,600	0.8	20
0.01	0.017	0.042	20,100	21,300	0.8	20	

*) The delay time of A/D converter and prefilter is 2.5 ms for all data rates and has not been accounted for in the "Phase delay" column!

Classic HBM sample rates : Amplitude response Bessel filter

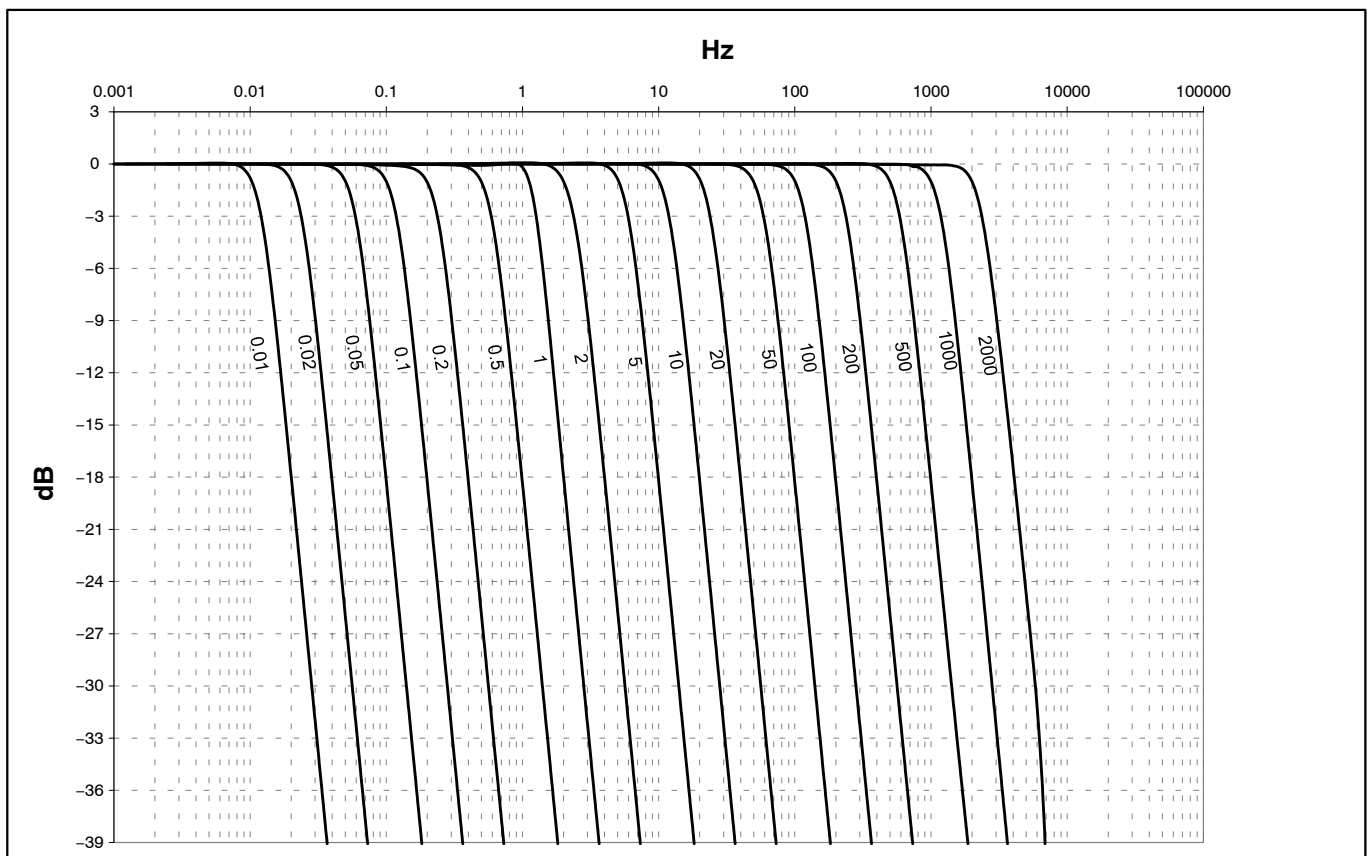


Classic HBM sample rates and digital low pass filter, type Butterworth 4th order

Type	-1dB (Hz)	-3dB (Hz)	-20dB (Hz)	Phase delay (ms) ^{*)}	Rise time (ms)	Overshoot (%)	Data rate (Hz)
Butterworth	2,000	2,360	4,331	0.2	0.15	8.5	19,200
	1,000	1,178	2,100	0.38	0.3	11	19,200
	1,000	1,168	2,140	0.32	0.32	11	9,600
	500	586	1,050	0.66	0.66	11	9,600
	200	235	420	1.7	1.6	11	9,600
	100	118	210	3.46	3.2	11	9,600
	50	59	105	6.98	6.6	11	9,600
	20	24	42	17.3	16	11	9,600
	10	12	21	34.9	32	11	9,600
	5	5.95	10.5	69	66	11	2,400
	2	2.37	4.24	173	160	11	2,400
	1	1.26	2.1	347	320	11	2,400
	0.5	0.59	1.05	701	660	11	300
	0.2	0.236	0.421	1,760	1,600	11	300
	0.1	0.118	0.21	3,510	3,200	11	300
	0.05	0.059	0.105	6,950	6,600	11	20
0.02	0.0235	0.042	17,500	1,600	11	20	
0.01	0.012	0.021	34,600	3,200	11	20	

*) The delay time of A/D converter and prefilter is 2.5 ms for all data rates and has not been accounted for in the "Phase delay" column!

Classic HBM sample rates : Amplitude response Butterworth filter



Specifications Power pack NTX001

NTX001		
Nominal input voltage (AC)	V	100 ... 240 ($\pm 10\%$)
Stand-by power consumption at 230 V	W	0.5
Nominal load		
U_A	V	24
I_A	A	1.25
Static output characteristics		
U_A	V	$24 \pm 4\%$
I_A	A	0 ... 1.25
U_{Br} (Output voltage ripple; peak to peak)	mV	≤ 120
Current limiting, typically from	A	1.6
Primary – secondary separation		galvanically, by optocoupler and converter
Creep distance and clearance	mm	≥ 8
High-voltage test	kV	≥ 4
Ambient temperature range	$^{\circ}\text{C}$ [$^{\circ}\text{F}$]	0 ... +40 [+32 ... +104]
Storage temperature	$^{\circ}\text{C}$ [$^{\circ}\text{F}$]	-40 ... +70 [-40 ... +158]

Accessories MX430B, to be ordered separately

MX430B accessories		
Article	Description	Order No.
Power		
AC-DC power supply / 24 V	Input : 100 ... 240 V AC ($\pm 10\%$), 1.5 m cable Output: 24 V DC, max. 1.25 A, 2 m cable with ODU connector	1-NTX001
3m cable – QuantumX supply	3 m cable for voltage supply of QuantumX modules; Suitable plug (ODU Medi-Snap S11M08-P04MJGO-5280) on one side and open strands on the other end.	1-KAB271-3
Communication		
IEEE1394b FireWire cable (module-to-module)	FireWire connection cable for QuantumX or SomatXR-modules; with matching plugs on both sides. Length 0.2 m/2 m/5 m Note: The cable enables QuantumX modules to be supplied with power (max. 1.5 A, from the source to the last drain).	1-KAB272-0.2 1-KAB272-2 1-KAB272-5
IEEE1394b IEEE1394b FireWire IEEE ExpressCard	FireWire IEEE 1394b ExpressCard (ExpressCard/34) to connect QuantumX modules to a notebook or PC	1-IF-002
IEEE1394b FireWire cable PC-to-module, IP20/IP68	Firewire connection cable from the PC to the first module for data transfer from QuantumX modules to the PC; With matching plugs on both sides; Length: 3 m. Connection via KAB293 not possible	1-KAB293-5
IEEE1394b IEEE1394b FireWire cable from hub to module, IP68	FireWire connection cable between HUB and module. For data transfer from QuantumX modules to the HUB. Fitted with suitable plugs at both ends. Length: 3 m	1-KAB276-3
IEEE1394b FireWire Extender SCM-FW	Package including 2 in-line elements for extension of the FireWire connection up to 40 m; Required parts: 2 x 1-KAB269-x and Industrial Ethernet cable (M12, CAT5e/6, max. 30 m). KAB270-3 connection is not possible!	1-SCM-FW
Ethernet cross over cable	Ethernet cross over cable for direct operation between a PC or Notebook and a module / device, length 2 m, type CAT5+	1-KAB239-2

Accessories MX430B, to be ordered separately (continued)

Accessories MX430B		
Article	Description	Order No.
Mechanic		
Connecting elements for QuantumX modules	Connecting elements (clips) for QuantumX modules; Set comprising 2 case clips including mounting material for fast connection of 2 modules.	1-CASECLIP
Connecting elements for QuantumX modules	Fitting panel for mounting of QuantumX modules using case clips (1-CASECLIP), lashing strap or cable tie. Basic fastening by 4 screws.	1-CASEFIT
QuantumX Backplane (Standard)	QuantumX Backplane – Standard for a maximum of 9 modules, General: - Mounting on wall or control cabinet (19") - Connection of external modules by FireWire possible; - Power supply: 24 V DC / max. 5 A (150 W);	1-BPX001
QuantumX Backplane	QuantumX Backplane – Rack for maximum 9 modules - 19" rack mounting with handles left and right; - Connection of external modules via FireWire possible; - Power supply: 24 V DC / max. 5 A (150 W).	1-BPX002
Transducer side		
D-sub-HD15 pole-to-D-sub 15 pole adapter	D-sub-HD15 pole-to-D-sub 15 pole adapter for connection of transducers with pre-wired D-sub plug (length approx. 0.3 m); Note: Pre-wired for full bridge (6-wire).	1-KAB416
D-sub-HD15 jack adapter to MS socket	Two adapters for strain gauge full bridge transducers in 6-wire configuration with MS plug. Design: MS socket, 30 cm cable, 6-wire, D-sub-HD15 plug	1-KAB144
120 ohm strain gauge quarter bridge module	Signal conditioning of strain gauge quarter bridge at QuantumX full bridge input. Integrated 120-ohm completion resistor; soldering points for transducer cable (3 wire); TEDS; D-sub-HD device connection.	1-SCM-SG120
350 ohm strain gauge quarter bridge module	Signal conditioning of strain gauge quarter bridge at QuantumX full bridge input. Integrated 350-ohm completion resistor; soldering points for transducer cable (3 wire); TEDS; D-sub-HD device connection.	1-SCM-SG350
700 ohm strain gauge quarter bridge module	Signal conditioning of strain gauge quarter bridge at QuantumX full bridge input. Integrated 700-ohm completion resistor; soldering points for transducer cable (3 wire); TEDS; D-sub-HD device connection.	1-SCM-SG700
1000 ohm strain gauge quarter bridge module	Signal conditioning of strain gauge quarter bridge at QuantumX full bridge input. Integrated 1000-ohm completion resistor; soldering points for transducer cable (3 wire); TEDS; D-sub-HD device connection.	1-SCM-SG1000
D-sub-HD15-pole connector kit with TEDS chip	D-sub-HD15-pole connector kit (male) with TEDS chip for storage of a sensor data sheet; Housing: Metallized plastic with knurled screws. Note: The TEDS chip comes blank.	1-SUBHD15-MALE
Port saver, sub-HD 15 pol.	4 x D-sub-HD15 pin male to female port savers; protecting the wear and tear for frequent plugging and unplugging. Extends contact durability by min. 500. Adaptor attaches securely with screws 4-40 UNC.	1-SUBHD15-SAVE
TEDS-Package	Package of TEDSDS chips. Package of 10 1-wire-EEPROM DS24B33 (IEEE 1451.4 TEDS)	1-TEDS-PAK

Accessories MX430B, to be ordered separately (continued)

Accessories MX430B		
Article	Description	Order No.
Software and product packages		
MX430B + catman [®] EASY	Package including: - amplifier - Power supply (1-NTX001) - 8 transducer plugs with TEDS (1-Sub-15HD-MALE) - Ethernet Cross-over cable (1-KAB239-2) - catman [®] Easy software from HBM (1-CATMAN-EASY) - Including software maintenance for the first 12 months	1-MX430-PAKEASY
MX430B + catman [®] AP	Package including: - amplifier - Power supply (1-NTX001) - 8 transducer plugs with TEDS (1-Sub-15HD-MALE) - Ethernet Cross-over cable (1-KAB239-2) - catman [®] AP software from HBM (1-CATMAN-AP) - Including software maintenance for the first 12 months	1-MX430-PAKAP
LabVIEW [™] -Treiber ¹⁾	Universal driver from HBM for LabVIEW [™] .	1-LabVIEW-DRIVER
CANape [®] driver	QuantumX driver for the software CANape [®] from Vector Informatik. CANape versions from 10.0 are supported.	1-CANAPE-DRIVER

Subject to modifications.
All product descriptions are for general information
only. They are not to be understood as a guarantee
of quality or durability.

Hottinger Baldwin Messtechnik GmbH
Im Tiefen See 45 · 64293 Darmstadt · Germany
Tel. +49 6151 803-0 Fax +49 6151 803-9100
Email: info@hbm.com · www.hbm.com

measure and predict with confidence

