Data sheet

QUANTUM X

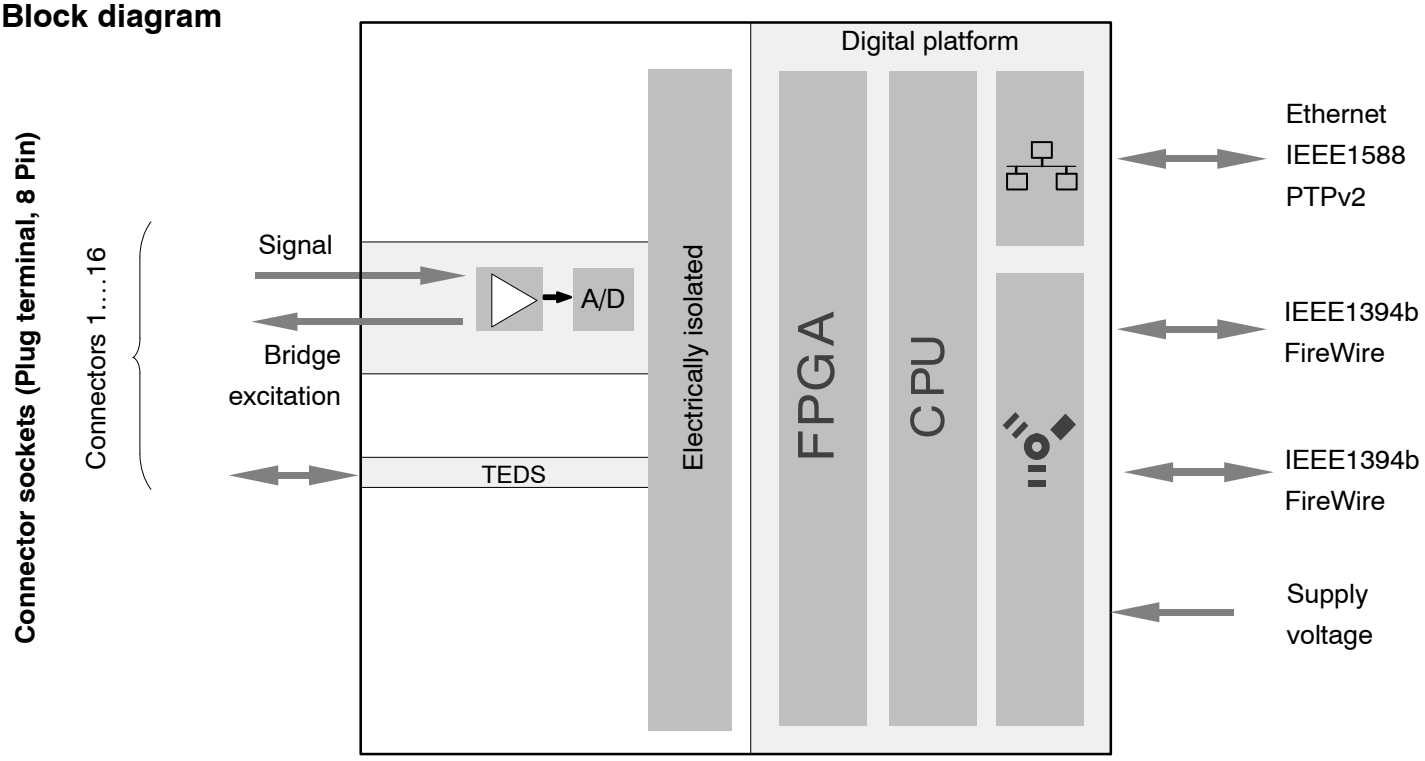
MX1615B

Bridge/strain gauge amplifier

Special features

- **16 individually configurable inputs**
- **Connection of strain gauges in quarter- , half- and full-bridge**
- **Bridge excitation : DC or carrier frequency**
- **Internal shunt resistor**
- **Connection of standard voltage, PT100, resistor, Potentiometer**
- **Individual data rates up to 20 kS/sec per channel, active low pass filter**
- **24–bit A/D converter per channel for synchronous, parallel measurements**

Block diagram



HBM

Specifications MX1615B

General specifications		
Inputs	Number	16, electrically isolated from the supply
Transducer technologies, can be adjusted individually		Strain gauges in full- , half- or quarter-bridge configuration. Selectable bridge excitation voltage : DC voltage or carrier frequency (AC/CF, 1200 Hz)
		SG-quarter bridges SG-half bridges SG-full bridges — Three wire and four wire five wire six wire
		Resistor, Resistance thermometer (PT100), connection in four-wire configuration
		Potentiometric transducers
		Voltage (±10 V differential, 0 … 30 V unipolar) without transducer supply
A/D converter per channel		24 Bit Delta Sigma converter
Sample rates (Domaine adjustable by software, Factory setting is „HBM Classic)	S/s	Dezimal: 0,1 …20.000 HBM Classic: 0,1 … 19 200
Bandwidth	kHz	3.0 0.4 using carrier frequency
Aktive low-pass filter	Hz	Bessel, Butterworth, linear phase 0.01 ... 3000 (–3 dB), Filter OFF
Transducer identification (TEDS, IEEE 1451.4) max. distance of the TEDS module	m	100
Transducer connection		Phönix Contact FMC–1,5/8–ST–3,5–RF plug terminal Plug included
Supply voltage range (DC)	V	10 ... 30 (24 V nominal (rated) voltage)
Supply voltage interruption		max. 5 ms at 24 V
Power consumption	W	< 12
Ethernet (data link)		10Base-T / 100Base-TX
Protocol/addressing	–	TCP/IP (direct IP address or DHCP)
Connection	–	8P8C plug (RJ-45) with twisted pair cable (CAT-5)
Max. cable length to module	m	100
Synchronization options EtherCAT®[1] IRIG–B (B000 to B007; B120 to B127) IEEE1588 (PTPv2), NTP		IEEE1394b FireWire (only QuantumX, automatically, recommended) via CX27 via MX440A - or MX840A input channel Ethernet based Network Time Protocol
IEEE1394b FireWire (module synchronization, data link, optional supply voltage)		IEEE 1394b (HBM modules only)
Baud rate	MBaud	400 (approx. 50 MByte/s)
Max. current from module to module	A	1.5
Max. cable length between the nodes	m	5
Max. number of modules connected in series (daisy chain)	–	12 (=11 hops)
Max. number of modules in a IEEE1394b FireWire system (including hubs[2], backplane)	–	24
Max. number of hops[3]	–	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 EN 60529
Mechanical tests[4]		
Vibration (30 min)	m/s^2	50
Shock (6 ms)	m/s^2	350
EMC requirements		per EN 61326–1
Max. input voltage at transducer socket to ground, transient free Pin 6 and 7 to Pin 1, 2, 3, 4 or 5	V	±18
Dimensions, horizontal (W x H x D)	mm	52.5 x 200 x 122 (with case protection) 44 x 174 x 119 (without case protection)
Weight, approx.	g	980

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

2) Hub: IEEE1394b FireWire node or distributor

3) Hop: Transition from module to module or signal conditioning / distribution via IEEE1394b FireWire (hub, backplane)

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/s^2 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/s^2 for 6 ms, half sine pulse shape, with 3 shocks in each of the 6 possible directions.

Specifications MX1615B (Continued)

Strain gauge full and half bridge, 4 mV/V CF measuring range, AC / carrier frequency, bridge excitation		
Accuracy class		0.05 [1]
Carrier frequency (square)	Hz	1,200 ±2
Bridge excitation voltage (effective)	V	1; 2.5; 5 (±5 %)
Transducers that can be connected		Strain gauge full and half bridges
Permissible cable length between MX1615BB and transducer	m	< 100
Measuring ranges at 5 V excitation at 2.5 V excitation at 1 V excitation	 mV/V mV/V mV/V	 ±4 ±8 ±20
Additional shunt resistor can be connected (control signal)	kΩ	100 ± 0,1% [2] (typ. – 0.886 mV/V at 350Ω)
Measurement frequency range (–3 dB)	Hz	0 ... 400
Transducer impedance at 5 V excitation at 2.5 V excitation at 1 V excitation	 Ω Ω Ω	 300 ... 1,000 110 ... 1,000 80 … 1,000
Noise at 25 °C and 2.5 V excitation (peak to peak) with filter 1 Hz Bessel with filter 10 Hz Bessel with filter 100 Hz Bessel	 µV/V µV/V µV/V	 < 0.2 < 0.5 < 1.5
Linearity error	%	< 0.02 of full scale
Zero drift (Full bridge with 5 V excitation)	% / 10 K	< 0.01 [1] of full scale
Full-scale drift (5 V excitation)	% / 10 K	< 0.05 of measurement value

[1] 0.1 with half bridge

[2] When using a half bridge, the shunt resistor may only be used when signals 1 (Pin 6) and 4 (Pin 7) are bridged (in this case, control signal: typ. + 0.873 mV/V at 350 Ω).

Strain gauge full and half bridge, 4 mV/V measuring range, DC / DC voltage bridge excitation		
Accuracy class		0.1 [1]
Bridge excitation voltage (DC)	<	1; 2.5; 5; (±5 %)
Transducers that can be connected		strain gauge half and full bridges
Permissible cable length between MX1615B and transducer	m	< 100
Measuring ranges at 5 V excitation at 2.5 V excitation at 1 V excitation	 mV/V mV/V mV/V	 ±4 ±8 ±20
Additional shunt resistor can be connected (control signal)	kΩ	100 ± 0,1% [2] (typ. – 0.886 mV/V at 350Ω)
Measurement frequency range (–3 dB)	Hz	0 ... 3,000
Transducer impedance at 5 V excitation at 2.5 V excitation at 1 V excitation	 Ω Ω Ω	 300 ... 5,000[3] 300 ... 5,000[3] 80 ... 5,000[3]
Noise at 25 °C and 2.5 V excitation (peak to peak) with filter 1 Hz Bessel with filter 10 Hz Bessel with filter 100 Hz Bessel with filter 1 kHz Bessel	 µV/V µV/V µV/V µV/V	 < 0.2 < 0.4 < 1 < 3
Linearity error	%	< 0.02 of full scale
Zero drift (Full bridge with 5 V excitation)	% / 10 K	< 0.1 [1] of full scale
Full-scale drift (5 V excitation)	% / 10 K	< 0.05 of measurement value

[1] with 10 V/m electromagnetic field strength (EN61000–4–3) : 0.2

[2] When using a half bridge, the shunt resistot may only be used when signals 1 (Pin 6) and 4 (Pin 7) are bridged (in this case, control signal: typ. + 0.873 mV/V at 350 Ω).

[3] Up to 1 % absolute zero error at 5,000 W

Specifications MX1615B (Continued)

Strain gauge single bridge, 4 mV/V CF measuring range, AC / carrier frequency bridge excitation		
Accuracy class		0.1
Carrier frequency (square)	Hz	1200 ± 2
Bridge excitation voltage (effective)	V	0.5; 1; 2.5; 5 (± 5 %)
Transducers that can be connected		SG quarter bridge in four wire circuit
Permissible cable length between MX1615B and transducer	m	< 100
Measuring ranges at 5 V excitation (only at 350 Ohm strain gauge) at 2.5 V excitation at 1 V excitation at 0.5 V excitation	 mV/V mV/V mV/V mV/V	 ± 4 ± 8 ± 20 ± 40
Additional shunt resistor can be connected (control signal)	kΩ	100 ± 0,1% (typ. + 0.873 mV/V at 350Ω)
Measurement frequency range (–3 dB)	Hz	0 ... 400
Internal completion resistors	Ω	120 and 350
Noise at 25 °C and 5 V excitation (peak to peak) with filter 1 Hz Bessel with filter 10 Hz Bessel with filter 100 Hz Bessel	 µV/V µV/V µV/V	 < 0.3 < 0.6 < 1.5
Linearity error[1)]	%	< 0.05 of full scale
Zero drift[1)] (5 V excitation)	% / 10 K	< 0.1 of full scale
Full-scale[1)] drift (5 V excitation)	% / 10 K	< 0.1 of measurement value

1) With 350 ohm resistor

Strain gauge single bridge 4 mV/V measuring range, DC / DC voltage bridge excitation		
Accuracy class		0.1[1)]
Bridge excitation voltage (DC)	V	0.5; 1; 2.5; 5 (± 5 %)
Transducers that can be connected		SG quarter bridges in four wire or three wire circuit
Permissible cable length between MX1615B and transducer	m	< 100
Measuring ranges at 5 V excitation (only at 350 Ohm strain gauge) at 2.5 V excitation at 1 V excitation at 0.5 V excitation	 mV/V mV/V mV/V mV/V	 ± 4 ± 8 ± 20 ± 40
Additional shunt resistor can be connected (control signal)	kΩ	100 ± 0,1% (typ. + 0.873 mV/V at 350Ω)
Measurement frequency range (–3 dB)	Hz	0 ... 3,000
Internal completion resistors	Ω	120 and 350
Noise[2)] at 25 °C and 5 V excitation (peak to peak) with filter 1 Hz Bessel with filter 10 Hz Bessel with filter 100 Hz Bessel with filter 1 kHz Bessel	 µV/V µV/V µV/V µV/V	 < 0.4 < 0.6 < 1.5 < 3
Linearity error[2)]	%	< 0.05 of full scale
Zero drift[2)] (5 V excitation)	% / 10 K	<0.1 of full scale
Full-scale[2)] drift (5 V excitation)	% / 10 K	< 0.05 of measurement value

1) with 10 V/m electromagnetic field strength (EN61000–4–3) : 0.2
The accuracy class does not take into account measurement errors resulting from asymmetrical cable resistances when using a three-wire circuit.

2) With 350 ohm resistor and connection using a four-wire circuit.

Specifications MX1615B (Continued)

Potentiometric transducer		
Accuracy class		0.1
Excitation voltage (DC)	V	1 (±5 %)
Transducers that can be connected		Potentiometric transducers (5-wire circuit)
Permissible cable length between module and transducer	m	100
Measuring range	mV/V	±500
Measurement frequency range (–3 dB)	Hz	0 ... 3,000
Transducer impedance	Ω	100 ... 50,000
Noise at 25 °C (peak to peak) with filter 1 Hz Bessel with filter 10 Hz Bessel with filter 100 Hz Bessel with filter 1 kHz Bessel	 µV/V µV/V µV/V µV/V	 < 2 < 4 < 10 < 30
Linearity error	%	< 0.05 of full scale
Zero drift	% / 10 K	< 0.1 of full scale
Full-scale drift	% / 10 K	< 0.1 of measurement value

±10 V (DC) standardized voltage		
Accuracy class		0.05
Transducers that can be connected		Voltage transmitter ±10 V
Permissible cable length between MX1615B and transducer	m	100
Measuring range	V	±15 differential
Measurement frequency range (–3 dB)	Hz	0 ... 3,000
Internal resistance of the connected voltage source	Ω	< 500
Input impedance (symmetrical)	MΩ	> 1.5
Noise at 25 °C (peak to peak) at 1 Hz Bessel filter at 10 Hz Bessel filter at 100 Hz Bessel filter at 1 kHz Bessel filter	 µV µV µV µV	 150 300 600 2000
Linearity error	%	< 0.02 of full scale
Common-mode rejection at DC common-mode at 50 Hz common-mode, typically	 dB dB	 > 100 75
Max. common-mode voltage Channel from housing and supply ground Channel from channel	 V V	 ±60 ±5
Zero drift	% / 10 K	< 0.03 of full scale
Full-scale drift	% / 10 K	< 0.05 of measurement value

Specifications MX1615B (Continued)

Resistance		
Accuracy class		0.1
Transducers that can be connected		PTC, NTC, KTY, TT-3, resistances generally (connection with four wire configuration)
Permissible cable length between MX1615B and transducer	m	< 100
Measuring range	Ω	0 ... 1,000[1)]
Excitation current	mA	0.37 ... 1.43
Measurement frequency range (–3 dB)	Hz	0 ... 3,000
Noise at 25 °C (peak to peak)		
with filter 1 Hz Bessel	K	< 0.1
with filter 10 Hz Bessel	K	< 0.2
with filter 100 Hz Bessel	K	< 0.5
with filter 1 kHz Bessel	K	< 1.5
Linearity error	%	< 0.05 of full scale
Zero drift	%/10K	< 0.02 of full scale
Full-scale drift	% / 10 K	< 0.1 of measurement value

1) Measuring range can be modulated up to 5 kΩ, in this case: accuracy class 2

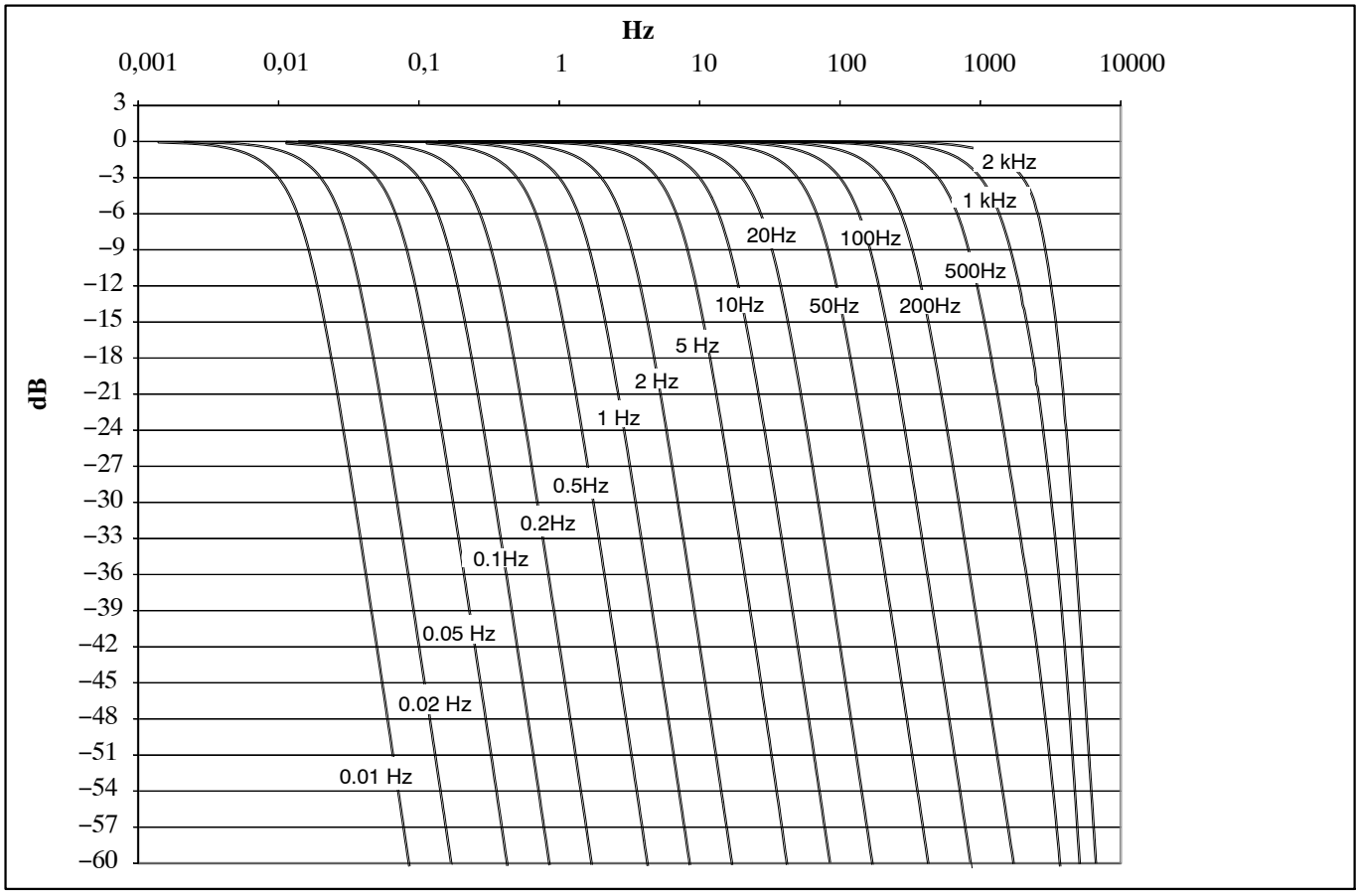
Resistance thermometer (PT100)		
Accuracy class		0.1
Transducers that can be connected		PT100 (connection with four wire configuration)
Permissible cable length between MX1615B and transducer	m	< 100
Linearization range	°C [°F]	–200 ... +848 [–328 ... +1,558.4]
Excitation current	mA	0.67 ... 1.36
Measurement frequency range (–3 dB)	Hz	0 ... 3,000
Noise at 25 °C (peak to peak)		
with filter 1 Hz Bessel	K	< 0.02
with filter 10 Hz Bessel	K	< 0.04
with filter 100 Hz Bessel	K	< 0.1
with filter 1 kHz Bessel	K	< 0.3
Linearity error	K	< ± 0.3
Zero drift	K / 10 K	< 0.2
Full-scale drift	K / 10 K	< 0.5

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

Typ	-1dB (Hz)	-3dB (Hz)	-20dB (Hz)	Phase delay*) (ms)	Rise time (ms)	Overshoot (%)	Data rate (Hz)
Bessel	1203	2000	3830	0.11	0.19	2.10	20000
	596	1000	2494	0.26	0.35	1.0	20000
	298	502	1278	0.58	0.70	0.8	20000
	119	200	509	1.56	1.75	0.8	20000
	59	100	254	3.21	3.50	0.8	20000
	29.6	49,9	127,1	6.50	7.00	0.8	20000
	11,8	20,0	50,8	16.4	17.51	0.8	20000
	5,9	10,0	25,4	32.9	35.00	0.8	20000
	2,96	4,99	12,70	69.0	70.0	0.8	10000
	1,18	2,00	5,08	168	175	0.8	10000
	0,59	1,00	2,54	333	350	0.8	5000
	0,295	0,498	1,271	663	700	0.8	1000
	0,118	0,200	0,508	1651	1750	0.8	1000
	0,059	0,100	0,254	3300	3500	0.8	500
	0,0295	0,0498	0,1271	6610	7000	0.8	100
	0,0118	0,0200	0,0508	16500	17500	0.8	100
	0,0059	0,0100	0,0254	33000	35000	0.8	50

*) The analog-to-digital converter's delay time is 128 µs for all data rates and has not been accounted for in the "Phase delay" column! The anti-aliasing filter's delay time (160 µs) is not accounted for as well. Hence. 288 µs need to be added to the "Phase delay".

Decimal sample rates : Amplitude response Bessel filter

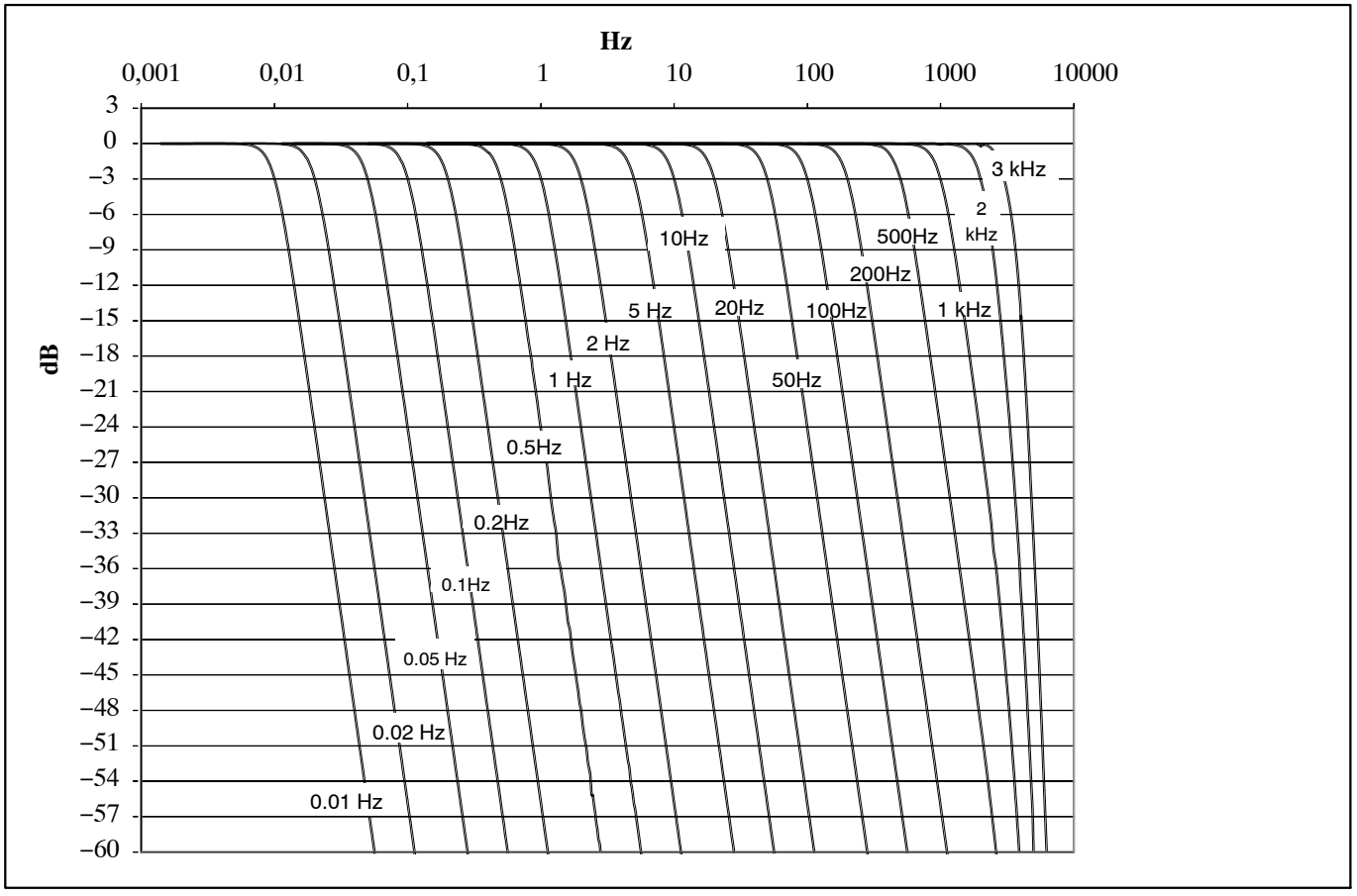


Decimal sample rates and digital low pass filter, type Butterworth 4th order

Typ	-1dB (Hz)	-3dB (Hz)	-20dB (Hz)	Phase delay*) (ms)	Rise time (ms)	Overshoot (%)	Data rate (Hz)
Butterworth	2612	3000	4316	0,16	0,16	16,0	20000
	1703	2000	3600	0,24	0,22	12,7	20000
	838	1000	1746	0,46	0,40	11,2	20000
	430	500	890	0,90	0,78	11	20000
	169	200	355	2,26	1,94	11	20000
	84	100	178	4,50	3,87	11	20000
	42,2	50,0	88,8	9,00	7,74	11	20000
	16,9	20,0	35,5	22,5	19,35	11	20000
	8,4	10,0	17,8	45	38,71	11	20000
	4,22	5,00	8,88	90	77,43	11	20000
	1,68	2,00	3,55	225	194	11	20000
	0,84	1,00	1,78	449	387	11	20000
	0,423	0,500	0,888	898	774	11	10000
	0,169	0,200	0,356	2240	1930	11	10000
	0,084	0,100	0,178	4480	3860	11	5000
	0,0422	0,0500	0,0888	8979	7734	11	1000
	0,0168	0,0200	0,0356	22400	19300	11	1000
	0,0085	0,0100	0,0178	44813	38600	11	500

*) The analog-to-digital converter's delay time is 128 µs for all data rates and has not been accounted for in the "Phase delay" column! The anti-aliasing filter's delay time (160 µs) is not accounted for as well. Hence. 288 µs need to be added to the "Phase delay".

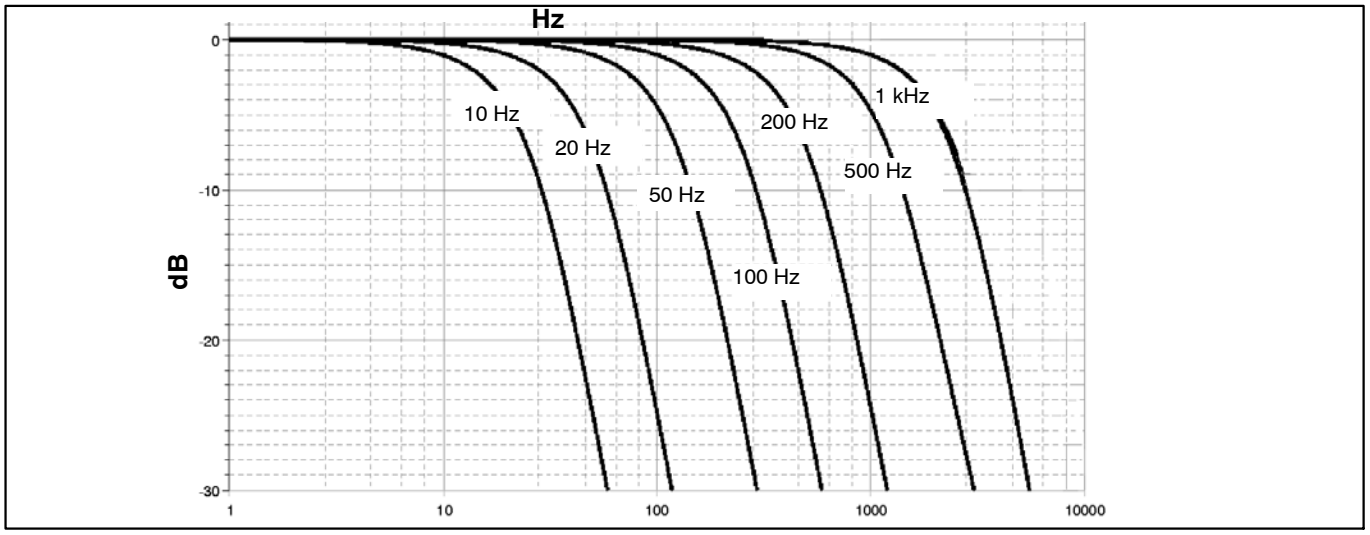
Decimal sample rates : Amplitude response Butterworth filter

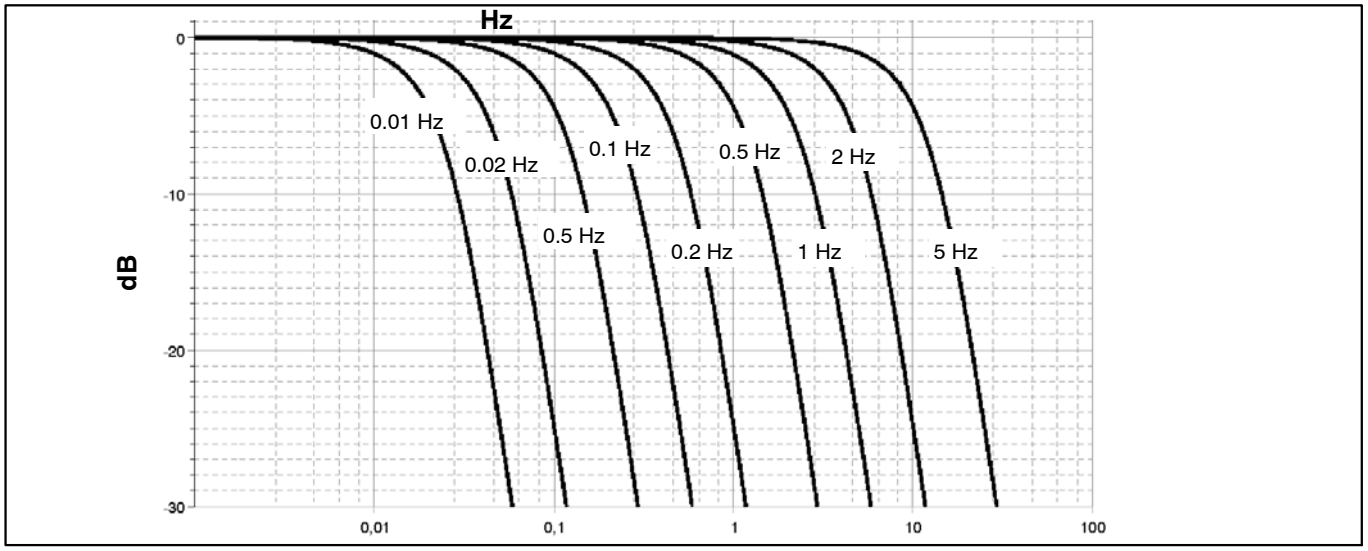


Classic HBM sample rates and digital low pass filter, type Bessel 4th order

Type	-1dB (Hz)	-3dB (Hz)	-20dB (Hz)	Phase delay (ms)*)	Rise time (ms)	Overshoot (%)	Date rate (Hz)
Bessel	1000	1575	3611	0.11	0.2	1.4	19200
	500	812	2079	0.3	0.38	1.3	9600
	200	335	860	0.9	1.05	0.8	9600
	100	168	427	1.8	2.11	0.8	9600
	50	84	213	3.9	4.18	0.8	9600
	20	33.7	85	9.5	10.4	0.8	9600
	10	16.6	43	19.5	21.0	0.8	9600
	5	8.4	21	39	41.4	0.8	2400
	2	3.4	8.6	97	102	0.8	2400
	1	1.6	4.2	197	215	0.8	2400
	0.5	0.84	2.1	390	418	0.8	300
	0.2	0.34	0.85	980	1033	0.8	300
	0.1	0.17	0.43	1950	2090	0.8	300
	0.05	0.085	0.21	3860	4170	0.8	20
	0.02	0.036	0.088	9800	10560	0.8	20
	0.01	0.017	0.044	19500	21200	0.8	20

Classic HBM sample rates : Amplitude response Bessel filter



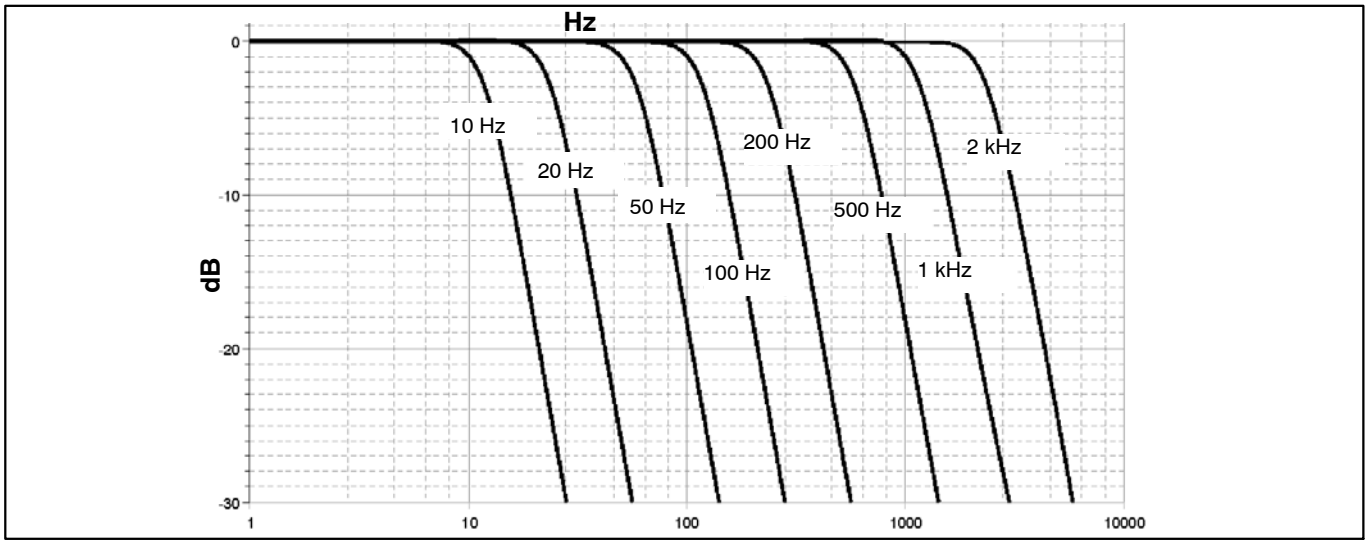


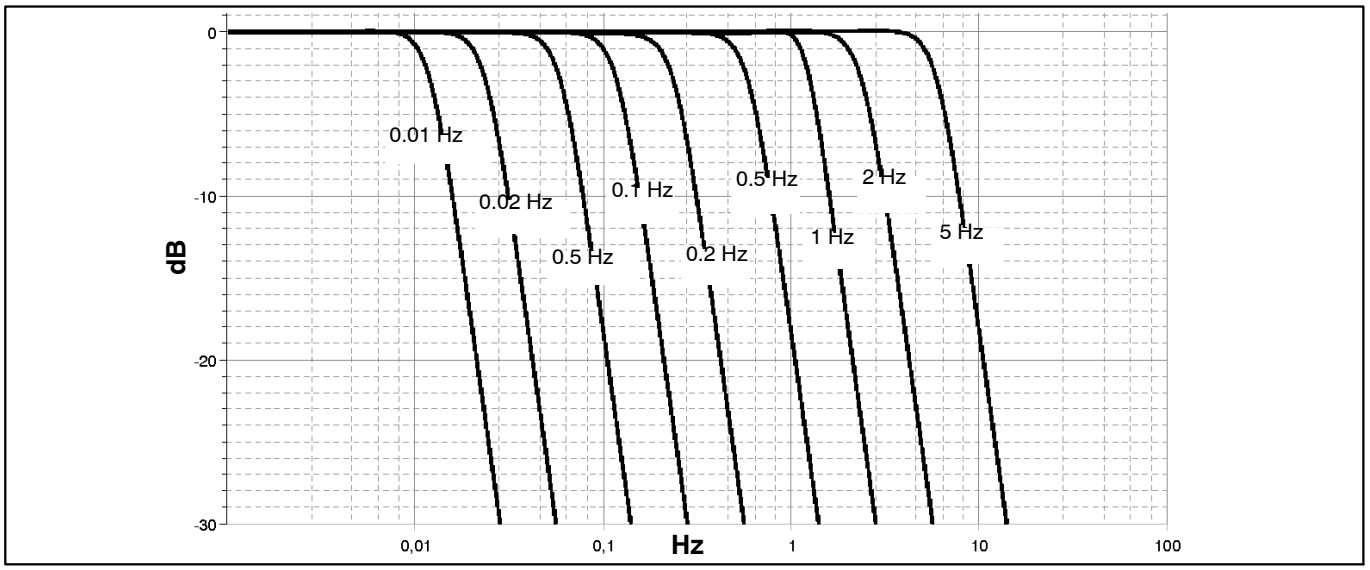
Classic HBM sample rates and digital low pass filter, type Butterworth 4th order

Type	-1dB (Hz)	-3dB (Hz)	-20dB (Hz)	Phase delay (ms)*)	Rise time (ms)	Overshoot (%)	Date rate (Hz)
Butterworth	2000	3053	5083	0	0.144	8.5	19200
	1000	1170	2077	0.27	0.344	11	19200
	1000	1171	2078	0.27	0.378	11	9600
	500	587	1048	0.64	0.652	11	9600
	200	237	420	1.76	1.64	11	9600
	100	118	210	3.65	3.28	11	9600
	50	59	105	7.49	6.29	11	9600
	20	24	42	18.8	16.15	11	9600
	10	12	21	37.7	32.29	11	9600
	5	5.95	10.5	74.9	65.92	11	2400
	2	2.37	4.24	188	163.6	11	2400
	1	1.26	2.12	370	315	11	2400
	0.5	0.59	1.05	756	656	11	300
	0.2	0.241	0.419	1900	1640	11	300
	0.1	0.122	0.210	3770	3280	11	300
	0.05	0.060	0.106	7490	6596	11	20
	0.02	0.0245	0.042	18900	16200	11	20
	0.01	0.012	0.021	37700	32383	11	20

*) The analog-to-digital converter's delay time is 128 µs 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 (±10%)
Stand-by power consumption at 230 V	W	0.5
Nominal load U_A I_A	 V A	 24 1.25
Static output characteristics U_A I_A U_{Br} (Output voltage ripple; peak to peak)	 V A mV	 24 ± 4% 0 – 1.25 ≤ 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	°C [°F]	0... +40 [+32 ... +104]
Storage temperature	°C [°F]	–40 ... +70 [–40 ... +158]

Accessories, to be ordered separately

MX1615B accessories		
Article	**Description**	**Order No.**
Voltage supply		
AC-DC power supply / 24 V	Input : 100 ... 240 V AC (±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		
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
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 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-IF002
IEEE1394b FireWire cable PC-to-module	Firewire connection cable between module and PC. With matching plugs on both sides; Length: 3 m. No voltage supply of the modules possible via KAB293.	1-KAB293-5
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. No voltage supply of the modules possible via KAB270.	1-SCM-FW

MX1615B accessories		
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
Fitting panel 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, IP 20 version; – 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 in IP 20; - 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		
Push-In connector (8 Pins), Gold	10 push-In-connectors, Phönix Contact, 8 pins Gold	1−CON−S1015
1−Wire−EEPROMS	Package of 10 pieces of 1-wire EEPROMS DS24B33 (IEEE1451.4 TEDS)	1−TEDS−PAK

Accessories, to be ordered separately (continued)

General accessories		
Article	**Description**	**Order No.**
Software and product packages		
catman®AP 	Complete package including catman®Easy functionality plus additional modules such as integration of video cameras (EasyVideoCam), complete post-process analysis (EasyMath), automation of recurring processes (EasyScript), offline preparation of measurement projects (EasyPlan) as well as additional functions such as calculating electrical power, special filters, frequency spectrum, etc. More details at www.hbm.com\catman\	1-CATMAN-AP
catman®EASY 	The basic software package for measurement data acquisition comprises convenient channel parameterization using TEDS or the sensor database, measurement job parameterization, individual visualization, data storage and reporting.	1-CATMAN-EASY
catman®PostProcess 	Post Process edition for visualization, preparation and analysis of measurement data, including many mathematical functions, data export and reporting.	1-CATEASY-PROCESS
MX1615B + catman®EASY	Package including: - MX1615B amplifier (1-MX1615B) - Power supply (1-NTX001) - 4 transducer plugs with TEDS (1-SUBHD15-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-MX1615-PAKEASY
MX1615B + catman®AP	Package including: - MX1615B amplifier (1-MX1615B) - Power supply (1-NTX001) - 4 transducer plugs with TEDS (1-SUBHD15-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-MX1615-PAKAP
LabVIEW™-Treiber[1)]	Universal driver from HBM for LabVIEW™.	1-LabVIEW-DRIVER
CANape® driver	QuantumX driver for CANape® software from Vector Informatik. CANape versions from 10.0 are supported.	1-CANAPE-DRIVER

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

B3899–3.0 en