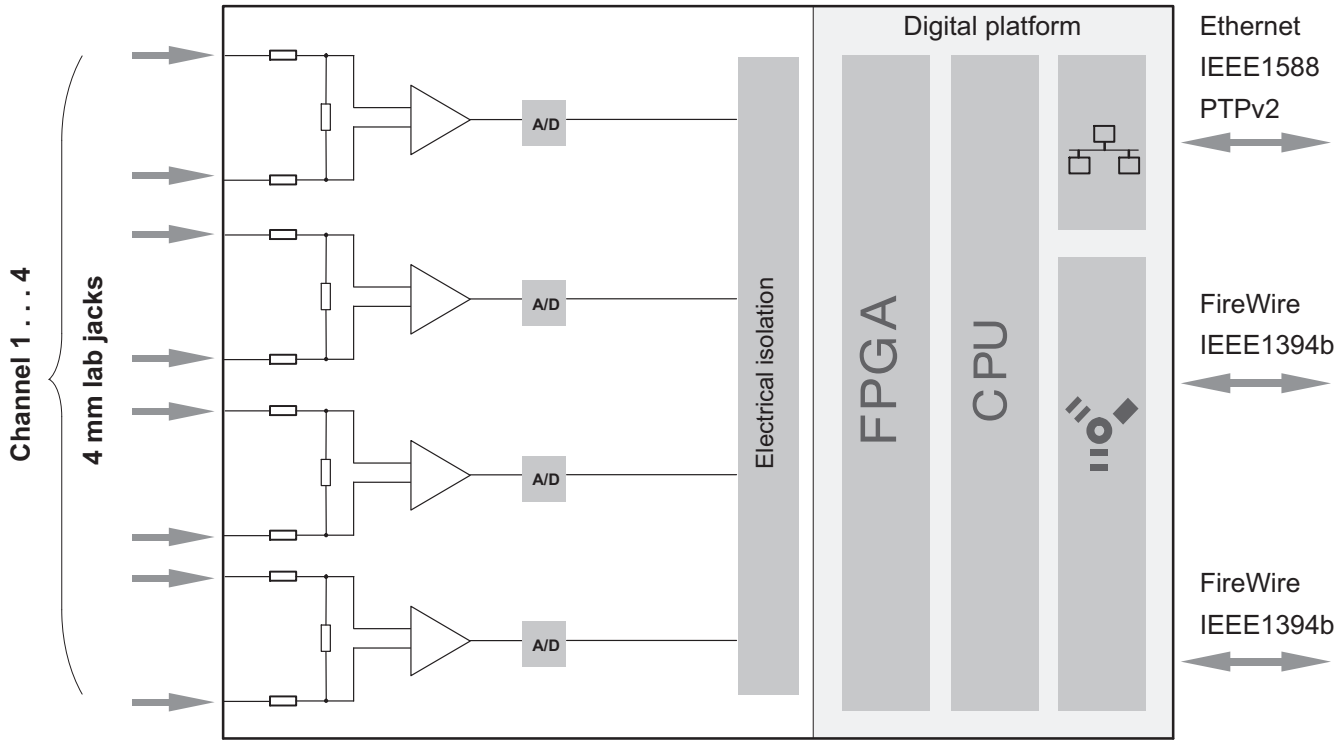
DATA SHEET

QuantumX MX403B
Voltage measurement module 1000 V CAT II, 600 V CAT III

SPECIAL FEATURES

- 4 individually configurable inputs: ±1000 V, ±100 V, ±10 V
- Sampling rate up to 100 kS/sec per channel
- VDE-certified safety
- Measurement categories: 1000 V CAT II / 600V CAT III
- 4 differentially electrically isolated inputs
- 24 bit A/D converter per channel for synchronous, parallel measurements

BLOCK DIAGRAM



SPECIFICATIONS

General specifications		
Certification		VDE (mark of conformity and report numbers)
Channels		4, electrically isolated from each other, from the supply and from the data link
Measurement categories Within measurement category **CAT II** as per EN 61010 Maximum voltage to ground potential Maximum voltage to other channels Maximum differential voltage	 V V V	 ±1000 DC or 1000 AC rms ±1000 DC or 1000 AC rms ±1000 DC or 1000 AC rms
Within measurement category **CAT III** as per EN 61010 Maximum voltage to ground potential Maximum voltage to other channels Maximum differential voltage	 V V V	 ±600 DC or 600 AC rms ±600 DC or 600 AC rms ±600 DC or 600 AC rms
Outside the measurement categories as per EN 61010 Maximum voltage to ground potential Maximum voltage to other channels Maximum differential voltage Maximum additional transient overvoltage Maximum occasional overvoltage Minimum loop impedance	 V V V V V mΩ	 ±1250 DC or 1250 AC rms ±1250 DC or 1250 AC rms ±1250 DC or 1250 AC rms ±3000 None 100
Measuring ranges (coverage)	V	±1000 (±2000) ±100 (±200) ±10 (±20)
Sample rates (domain can be set via the software, factory setting is "HBM Classic")	kS/s	Decimal: 0.1 … 100000, individually programmable per channel 0.1 … 200000 in dual-channel mode HBM Classic: 0.1 … 96 000 individually programmable per channel 0.1 … 192 000 in dual-channel mode
Active low-pass filter (Bessel/Butterworth, can be disabled)	Hz	0.1 ... 20000
Signal bandwidth (-3 dB)	kHz kHz	38 78 in dual-channel mode
A/D conversion per channel	Bit	24 (delta-sigma converter)
Input impedance	MΩ II pF	8 II <100
Measurement signal connections		4 mm lab jack for rigid insulating sleeve, 19 mm pitch between pos. and neg. connection
Nominal supply voltage (DC) (SELV in accordance with IEC / EN / DIN EN 60950-1)	V	10 … 30
Permissible supply voltage interruption, max.	ms	5, for 24 V DC
Supply voltage range	V	9 … 33
Power consumption (MX403B module only, no other modules also supplied)	W	< 10
Current consumption, max.	A	5
Data links		Ethernet 10Base-T, 100Base-TX, IEEE1394b (FireWire)
Synchronization options FireWire Ethernet EtherCAT®[1)] IRIG-B (B000 to B007; B120 to B127)		 IEEE1394b (2 per device) IEEE1588 (PTPv2) or NTP via CX27B EtherCAT gateway IRIG-B (B000 to B007; B120 to B127) via MX440B/MX840B measurement channel
Contamination level		2
Nominal (rated) temperature range	°C	-20 … +65

General specifications		
Storage temperature range	°C	-40 … +70
Relative humidity, max.	%	≤ 80 (at 31 °C, decreasing linearly to 50% at 40°C)
Altitude, max., as per EN 61010	m	2000
Equipment protection level		IP20 per EN 60529
EMC requirements		per EN 61326
Housing		QuantumX, metal
Application position		as required
Dimensions, without leads (H x W x D)	mm	53 x 200 x 128 (with case protection) 44 x 174 x 119 (without case protection)
Weight, approx.	g	1000
Measuring range 1000 V		
Accuracy class		0.05
Noise		
Filter: Bessel 1 Hz	mV	± 2.0
Filter: Bessel 10 Hz	mV	± 3.0
Filter: Bessel 100 Hz	mV	± 6.0
Filter: Bessel 1 kHz	mV	± 20.0
Filter: Bessel 10 kHz	mV	± 50.0
Filter: OFF with 9600 values/s	mV	± 90.0
Non-linearity of full scale value	%	< 0.01
Temperature drift		
Zero point	%/10K	< 0.05
Full scale	%/10K	< 0.04
Common-mode rejection, CMRR	dB	> 90 at 80 Hz, 707 V RMS
Measuring range 100 V		
Accuracy class		0.05
Noise		
Filter: Bessel 1 Hz	mV	± 1.5
Filter: Bessel 10 Hz	mV	± 2.0
Filter: Bessel 100 Hz	mV	± 3.0
Filter: Bessel 1 kHz	mV	± 5.0
Filter: Bessel 10 kHz	mV	± 12.0
Filter: OFF with 9600 values/s	mV	± 18.0
Non-linearity of full scale value	%	< 0.01
Temperature drift		
Zero point	%/10K	< 0.05
Full scale	%/10K	< 0.04
Common-mode rejection, CMRR	dB	> 90 at 80 Hz, 707 V RMS
Measuring range 10 V		
Accuracy class		0.05
Noise		
Filter: Bessel 1 Hz	mV	±1.0
Filter: Bessel 10 Hz	mV	±1.5
Filter: Bessel 100 Hz	mV	±2.0
Filter: Bessel 1 kHz	mV	±2.5
Filter: Bessel 10 kHz	mV	±10.0
Filter: OFF with 9600 values/s	mV	±15.0
Non-linearity of full scale value	%	< 0.02
Temperature drift		
Zero point	%/10K	< 0.05
Full scale	%/10K	< 0.04
Common-mode rejection, CMRR	dB	> 90 at 80 Hz, 707 V RMS

[1] EtherCAT® is a registered brand and patented technology, licensed by Beckhoff Automation GmbH, Germany

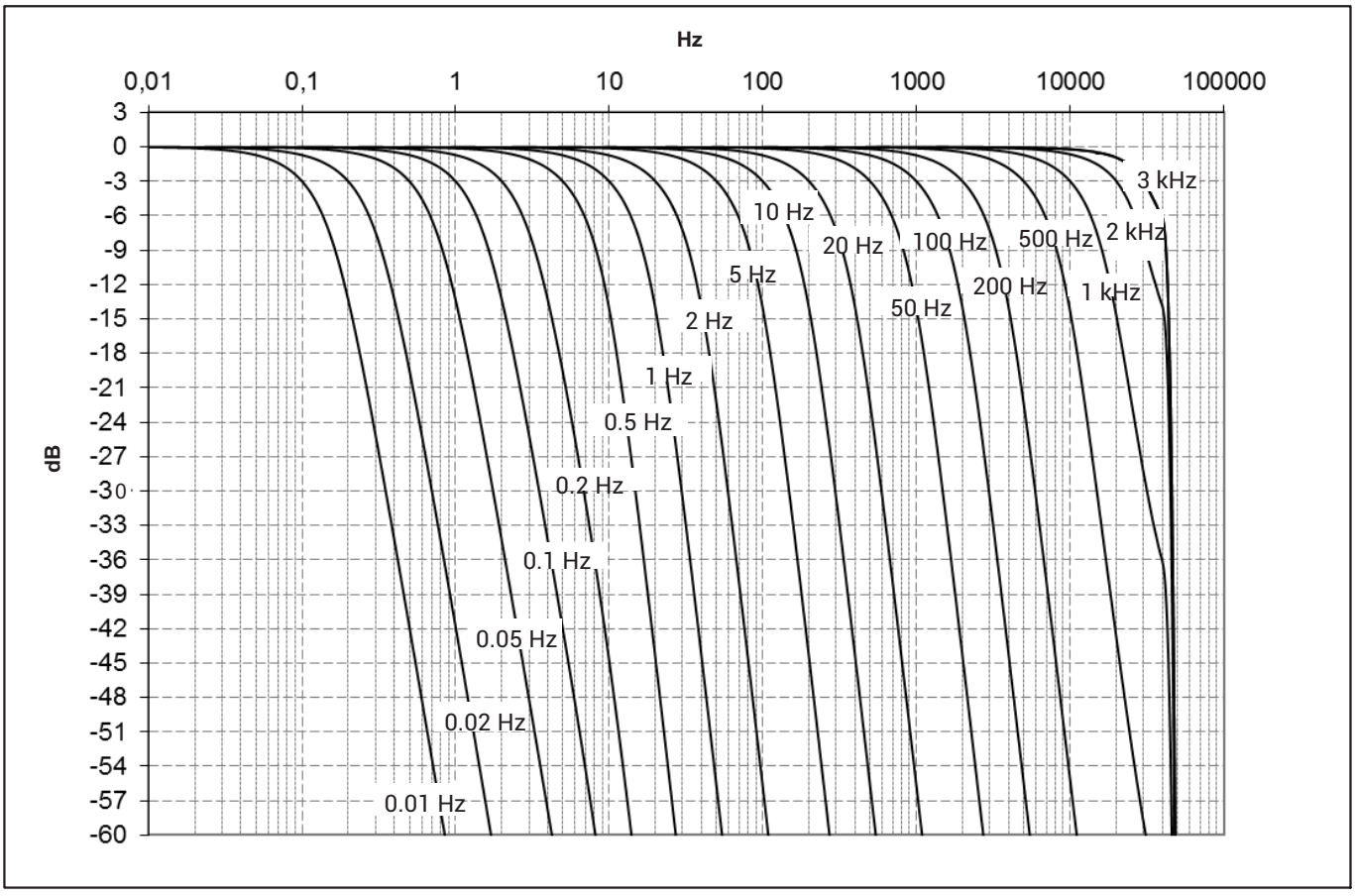
DECIMAL SAMPLE RATES AND BESSEL DIGITAL LOW-PASS FILTERS

(4th order for sample rates < 100000 Hz; 6th order for sample rate = 100000 Hz)

Type	-1 dB (Hz)	-3 dB (Hz)	-20 dB (Hz)	Phase delay*) (ms)	Rise time (ms)	Overshoot (%)	Sampling rate (Hz)
Bessel	20616	30000	44600	0.002	0.01	2.8	100000
	12373	20000	43000	0.005	0.02	1.0	100000
	5917	10000	23465	0.021	0.04	0.8	100000
	2929	5000	11715	0.06	0.07	0.8	100000
	1164	2000	4700	0.095	0.2	0.8	100000
	584	1000	2350	0.20	0.3	0.6	100000
	292	500	1175	0.41	0.7	0.6	100000
	117	200	470	1.05	1.7	0.6	100000
	58	100	235	2.1	3.5	0.6	100000
	29.2	50	117.5	4.25	7	0.6	100000
	11.7	20	47	10.65	17	0.6	100000
	5.8	10	23.5	21.35	35	0.6	100000
	2.91	5	11.74	42.75	70	0.6	100000
	1.19	2	5.04	93.5	175	0.9	1000
	0.59	1	2.54	175.5	350	0.8	1000
	0.30	0.5	1.27	340	700	0.8	1000
	0.12	0.2	0.51	834	1751	0.8	1000
	0.06	0.1	0.25	1757	3499	0.8	1000

*) The A/D converter delay time for all sampling rates is 293 µs, and is not taken into account in the "Phase delay" column!

DECIMAL SAMPLE RATES: BESSEL FILTER AMPLITUDE RESPONSE



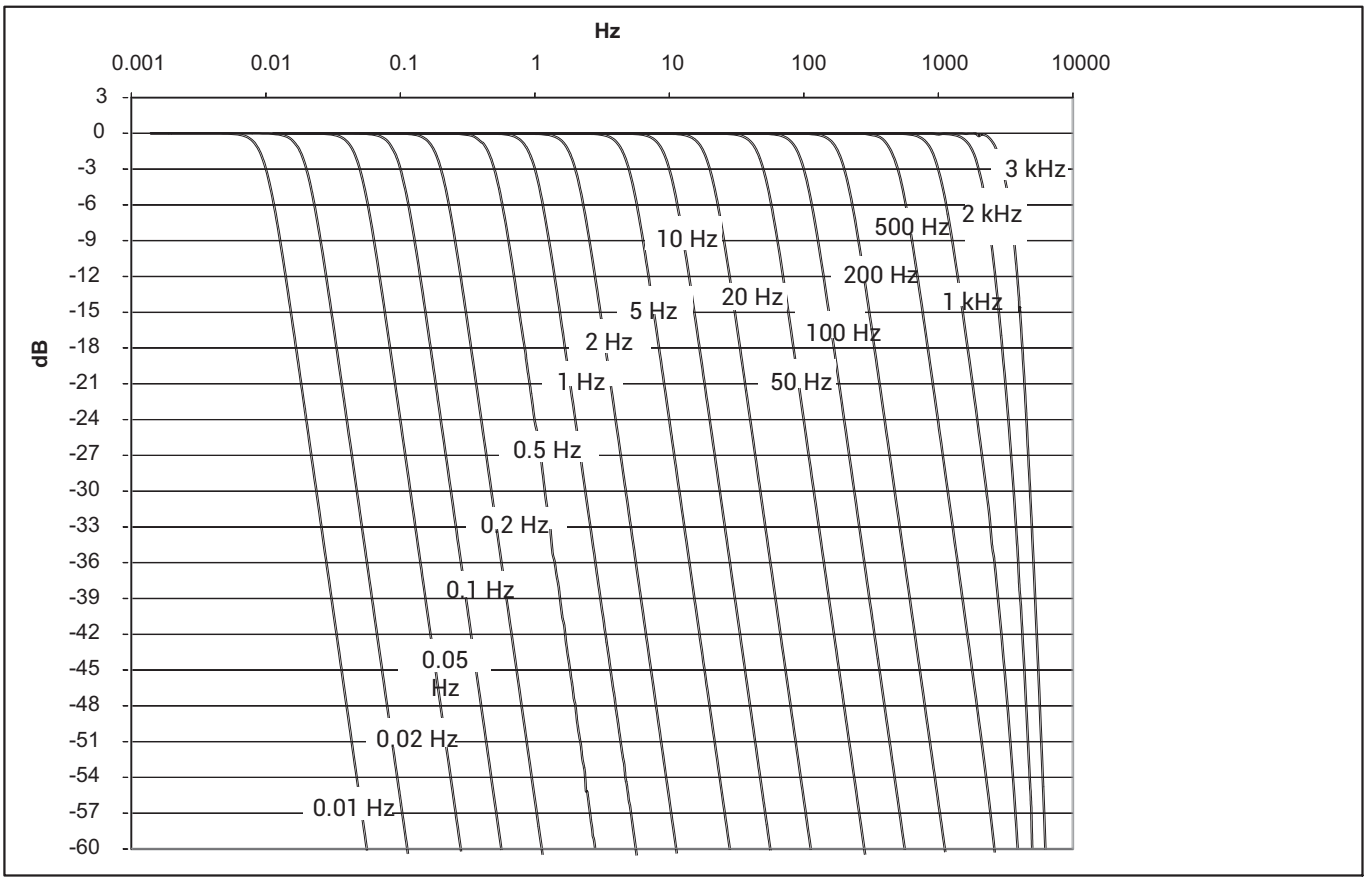
DECIMAL SAMPLE RATES AND BUTTERWORTH DIGITAL LOW-PASS FILTERS

(4th order for sample rates < 100000 Hz; 6th order for sample rate = 100000 Hz)

Type	-1 dB (Hz)	-3 dB (Hz)	-20 dB (Hz)	Phase delay*) (ms)	Rise time (ms)	Overshoot (%)	Sampling rate (Hz)
Butterworth	28269	30000	35359	0.02	0.02	193	100000
	18328	20000	26009	0.03	0.03	17.6	100000
	8994	10000	14155	0.06	0.04	15.5	100000
	4475	5000	7265	0.1	0.09	15	100000
	1787	2000	2929	0.3	0.2	14	100000
	894	1000	1466	0.7	0.4	14	100000
	447	500	733	1.3	0.8	14	100000
	179	200	293	3.3	2	14	100000
	89	100	147	6.6	4	14	100000
	44.7	50	73.3	13	8	14	100000
	17.9	20	29.3	33	21	14	100000
	8.9	10	14.7	66	43	14	100000
	4.47	5	7.33	132	85	14	100000
	1.69	2	3.55	248	194	11	1000
	0.84	1	1.78	471	387	11	1000
	0.42	0.5	0.89	921	774	11	1000
	0.17	0.2	0.35	2266	1934	11	1000
	0.08	0.1	0.18	4510	3869	11	1000

*) The A/D converter delay time for all sampling rates is 128 µs, and is not taken into account in the "Phase delay" column! The phase delay of the analog anti-aliasing filter (160 µs) is not taken into account either. This means that 288 µs has to be added to the "Phase delay".

DECIMAL HBM SAMPLING RATES: BUTTERWORTH FILTER AMPLITUDE RESPONSE



DECIMAL SAMPLE RATES AND LOW-PASS FILTERS (HIGH-SPEED MODE), BESSEL

(4th order for sample rates < 200000 Hz; 6th order for sample rate = 200000 Hz)

Type	-1 dB (Hz)	-3 dB (Hz)	-20 dB (Hz)	Phase delay*) (ms)	Rise time (ms)	Overshoot (%)	Sampling rate (Hz)
Bessel	41232	60000	89200	0.001	0.005	2.8	200000
	24746	40000	86000	0.0025	0.01	1.0	200000
	11834	20000	46930	0.01	0.02	0.8	200000
	5858	10000	23430	0.03	0.035	0.8	200000
	2328	4000	8400	0.09	0.1	0.8	200000
	1168	2000	4700	0.40	0.15	0.6	200000
	584	1000	2350	0.82	0.35	0.6	200000
	234	400	940	2.1	0.85	0.6	200000
	116	200	470	4.2	1.75	0.6	200000
	58.4	100	235	8.5	3.5	0.6	200000
	23.4	40	94	21.3	8.5	0.6	200000
	11.6	20	47	42.7	17.5	0.6	200000
	5.82	10	23.48	85.5	35	0.6	200000
	2.38	4	10.08	187	87.5	0.9	1000
	1.18	2	5.08	351	175	0.8	1000
	0.60	1	2.54	680	350	0.8	1000
	0.24	0.4	1.02	1669	875	0.8	1000
	0.12	0.2	0.50	3315	1750	0.8	1000

*) The A/D converter delay time for all sampling rates is 128 µs, and is not taken into account in the "Phase delay" column!
The phase delay of the analog anti-aliasing filter (160 µs) is not taken into account either. This means that 288 µs has to be added to the "Phase delay".

DECIMAL SAMPLE RATES AND LOW-PASS FILTERS (HIGH-SPEED MODE), BUTTERWORTH

(4th order for sample rates < 200000 Hz; 6th order for sample rate = 200000 Hz)

Type	-1 dB (Hz)	-3 dB (Hz)	-20 dB (Hz)	Phase delay*) (ms)	Rise time (ms)	Overshoot (%)	Sampling rate (Hz)
Butterworth	56538	60000	70718	0.01	0.01	193	200000
	36656	40000	52018	0.015	0.015	17.6	200000
	17988	20000	28310	0.03	0.02	15.5	200000
	8950	10000	14530	0.05	0.045	15	200000
	3576	4000	5858	0.15	0.1	14	200000
	1788	2000	2932	0.35	0.2	14	200000
	894	1000	1466	0.65	0.4	14	200000
	358	400	586	1.65	1	14	200000
	178	200	294	3.3	2	14	200000
	89.4	100	147	6.5	4	14	200000
	35.8	40	59	16.5	10.5	14	200000
	17.8	20	29.4	33	21.5	14	200000
	8.94	10	14.66	66	42.5	14	200000
	3.38	4	7.1	124	97	11	1000
	1.68	2	3.6	235	193	11	1000
	0.84	1	1.78	460	387	11	1000
	0.34	0.4	0.70	1133	967	11	1000
	0.16	0.2	0.36	2255	1934	11	1000

*) The A/D converter delay time for all sampling rates is 128 µs, and is not taken into account in the "Phase delay" column!
The phase delay of the analog anti-aliasing filter (160 µs) is not taken into account either. This means that 288 µs has to be added to the "Phase delay".

CLASSIC HBM SAMPLE RATES AND DIGITAL LOW-PASS FILTERS, BESSEL

(4th order for sample rates < 96000 Hz; 6th order for sample rate = 96000 Hz)

Type	-1 dB (Hz)	-3 dB (Hz)	-20 dB (Hz)	Runtime (ms)	Rise time (ms)	Overshoot (%)	Sampling rate (Hz)
Bessel	20000	29250	43000	0.002	0.016	4.1	96000
	10000	16810	40260	0.008	0.023	1.5	96000
	5000	8510	19906	0.027	0.042	0.9	96000
	2000	3515	8275	0.094	0.1	0.6	96000
	1000	1715	4070	0.22	0.2	0.6	96000
	500	852	2008	0.47	0.41	0.6	96000
	200	341	803	1.22	1.01	0.8	96000
	100	171	402	2.5	2.01	0.8	96000
	50	84.2	215	4	4.08	1	19200
	20	33.7	86	10	10.2	1	9600
	10	16.9	43	20	20.6	1	9600
	5	8.41	21.5	40	41	1	4800
	2	3.37	8.6	98	102.8	1	1200
	1	1.58	4.3	196	206.4	1	600
	0.5	0.84	2.15	392	411.2	1	600
	0.2	0.34	0.86	982	1026	1	300
	0.1	0.17	0.43	1968	2052	1	150

*) The A/D converter delay time for all sampling rates is 293 µs, and is not taken into account in the "Phase delay" column!

CLASSIC HBM SAMPLING RATES AND DIGITAL LOW-PASS FILTERS, BUTTERWORTH

(4th order for sample rates < 96000 Hz; 6th order for sample rate = 96000 Hz)

Type	-1 dB (Hz)	-3 dB (Hz)	-20 dB (Hz)	Runtime (ms)	Rise time (ms)	Overshoot (%)	Sampling rate (Hz)
Butterworth	20000	21700	27500	0.025	0.02	15.6	96000
	10000	11100	15500	0.06	0.04	15.6	96000
	5000	5585	8100	0.13	0.08	14.5	96000
	2000	2238	3280	0.3	0.2	14.5	96000
	1000	1119	1640	0.6	0.4	14.5	96000
	500	560	820	1.2	0.8	14.5	96000
	200	237	420	2.1	1.6	11	19200
	100	118	210	4	3.3	11	19200
	50	59	105	7.8	6.6	11	19200
	20	24	42	19.4	16.1	11	4800
	10	11.8	21	38.6	32.4	11	2400
	5	5.9	10.5	76.5	65	11	1200
	2	2.4	4.2	191	163	11	600
	1	1.2	2.1	382	325	11	300
	0.5	0.59	1.05	760	653	11	300
	0.2	0.24	0.42	1900	1630	11	150
	0.1	0.12	0.21	3790	3260	11	150

*) The A/D converter delay time for all sampling rates is 293 µs, and is not taken into account in the "Phase delay" column!

CLASSIC HBM SAMPLE RATES + LOW-PASS FILTERS (HIGH-SPEED MODE), BESSEL

(4th order for sample rates < 192000 Hz; 6th order for sample rate = 192000 Hz)

Type	-1 dB (Hz)	-3 dB (Hz)	-20 dB (Hz)	Runtime (ms)	Rise time (ms)	Overshoot (%)	Sampling rate (Hz)
Bessel	40000	58500	86000	0.001	0.008	1.6	192000
	20000	33620	80520	0.004	0.012	1.5	192000
	10000	17020	39812	0.0135	0.021	0.9	192000
	4000	7030	16550	0.047	0.05	0.6	192000
	2000	3430	8140	0.11	0.1	0.6	192000
	1000	1704	4016	0.235	0.21	0.6	192000
	400	682	1606	0.61	0.51	0.8	192000
	200	342	804	1.25	1.00	0.8	192000
	100	168.4	430	2	2.04	1	19200
	40	67.4	172	5	5.1	1	19200
	20	33.8	86	10	10.3	1	19200
	10	16.82	43	20	20.5	1	9600
	4	6.74	17.2	49	51.4	1	2400
	2	3.36	8.6	98	103.2	1	1200
	1.0	1.68	4.3	196	205.6	1	1200
	0.4	0.68	1.72	491	513	1	600
	0.2	0.34	0.86	984	1026	1	300

*) The A/D converter delay time for all sampling rates is 141 ms, and this is not taken into account in the "Phase delay" column!

CLASSIC HBM SAMPLE RATES + LOW-PASS FILTERS (HIGH-SP. MODE), BUTTERWORTH

(4th order for sample rates < 192000 Hz; 6th order for sample rate = 192000 Hz)

Type	-1 dB (Hz)	-3 dB (Hz)	-20 dB (Hz)	Runtime (ms)	Rise time (ms)	Overshoot (%)	Sampling rate (Hz)
Bessel	40000	43400	55000	0.013	0.01	17.8	192000
	20000	22200	31000	0.03	0.02	15.6	192000
	10000	11170	16200	0.07	0.04	14.5	192000
	4000	4476	6560	0.15	0.1	14.5	192000
	2000	2238	3280	0.3	0.2	14.5	192000
	1000	1120	1640	0.6	0.4	14.5	192000
	400	474	840	1.05	0.8	14.5	19200
	200	236	420	2	1.65	11	19200
	100	118	210	3.9	3.3	11	19200
	40	48	84	9.7	8.05	11	9600
	20	23.6	42	19.3	16.2	11	4800
	10	11.8	21	38.3	32.5	11	2400
	4	4.8	8.4	95.5	81.5	11	1200
	2	2.4	4.2	191	162.5	11	600
	1	1.18	2.1	380	326.5	11	600
	0.4	0.48	0.84	950	815	11	300
	0.2	0.24	0.42	1895	1630	11	300

*) The A/D converter delay time for all sampling rates is 141 ms, and this is not taken into account in the "Phase delay" column!

ACCESSORIES, TO BE ORDERED SEPARATELY

The measurement module MX403B is specified according to EN 61010 for 600 V CAT III or 1000 V CAT II. Only accessories approved for at least this category can be used and connected at the measuring connections. The DC voltage supply of the MX403B must be a SELV voltage supply, meeting the requirements of IEC / EN / DIN EN 60950-1.

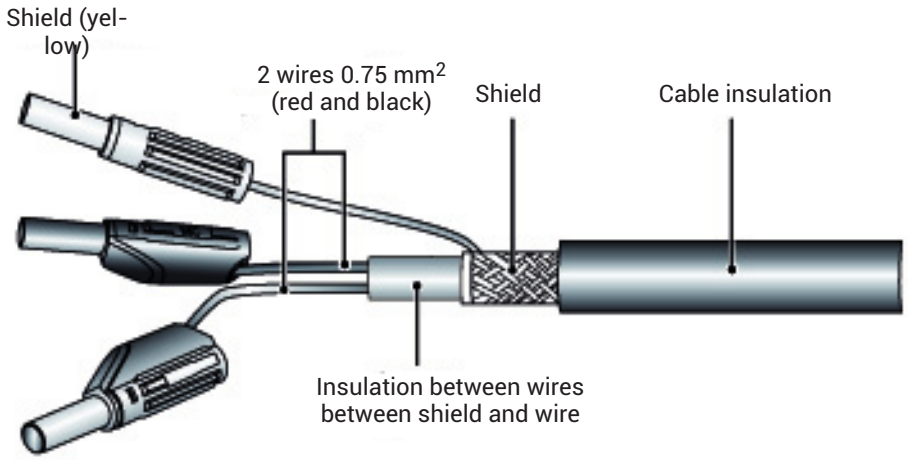
Article	Description	Ordering number
General accessories		
AC-DC power supply / 24 V	Input: 100 ... 240 V AC (±10%), 1.5 m cable Output: 24 V DC, max. 1.25 A, 2 m cable with ODU male connector	1-NTX001
Cable - QuantumX supply	3 m cable to supply power to QuantumX modules; suit- able plug (ODU Medi-Snap 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 FireWire cable (module to module)	FireWire connection cable between QuantumX modules, fitted with matching plugs on both ends; lengths 0.2 m/2 m/5 m. Note: Voltage can also be supplied to the QuantumX modules via the cable (max. 1.5 A, from source to last acceptor).	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 - Power supply 18 … 30 V DC / max. 5 A (150 W)	1-BPX001
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
Input side		
BNC-banana plug adapter 	Safety adapter BNC socket to 2 x 4 mm banana plugs, 4 per set. 1000 V CAT II, 600 V CAT III and 1 A nominal (rated) current.	1-G067
"Artificial star" adapter to banana plug 	Pluggable artificial star for attaching to the MX403B	1-G068

Article	Description	Ordering number
Insulated shielded test leads	Set of black/red wires, combined with a shielded housing (yellow). 600 V rms, CAT II, inline banana plugs with safety sheathing. Significantly reduce signal interference on GN610/GN611/GN610B/GN611B plug-in cards by using two identical signal leads with grounded shield. Do not use for 3-wire connections! Available lengths: 1.5 m (4.92 ft), 3.0 m (9.84 ft) and 6.0 m (19.69 ft)	1-KAB2139-1.5 1-KAB2139-3 1-KAB2139-6
Test leads and terminals 	Set of black/red wires, 600 V rms, CAT II, 1.5 m (4.9 ft) with banana plugs with safety sheathing and alligator clips. For better noise immunity, HBM recommends using KAB290 instead of this cable set.	1-KAB282-1.5
HBR 1 Ω, 1 W Precision burden load resistor 	High precision load resistor with low thermal drift, 1 Ω, 1 W, 0.02 %. Uses a 4-wire connection internally to reduce the inaccuracy caused by the currents flowing through the load resistor. Use of banana plugs for input connectors and output contacts. Directly compatible with input cards GN610, GN611, GN610B and GN611B.	1-HBR/1 Ohm
HBR 2.5 Ω, 1 W Precision burden load resistor 	High precision load resistor with low thermal drift, 2.5 Ω, 1 W, 0.02 %. Uses a 4-wire connection internally to reduce the inaccuracy caused by the currents flowing through the load resistor. Use of banana plugs for input connectors and output contacts. Directly compatible with input cards GN610, GN611, GN610B and GN611B.	1-HBR/2.5 Ohm
HBR 10 Ω, 1 W Precision burden load resistor 	High precision load resistor with low thermal drift, 10 Ω, 1 W, 0.02 %. Uses a 4-wire connection internally to reduce the inaccuracy caused by the currents flowing through the load resistor. Use of banana plugs for input connectors and output contacts. Directly compatible with input cards GN610, GN611, GN610B and GN611B.	1-HBR/10 Ohm

Kab290: Shielded 2-wire cable for 600 V rms CAT II

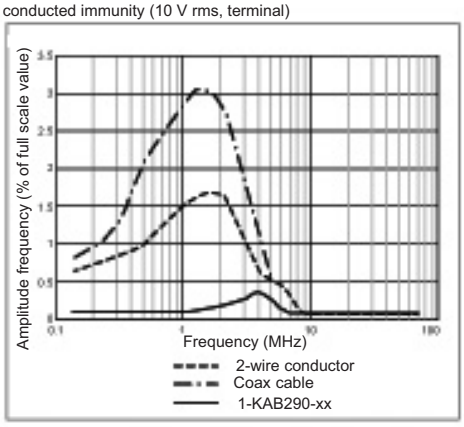
This cable is designed specially for use with the GN610, GN611 and GN610B, GN611B cards. It significantly reduces signal interference on the transducer by using two identical signal leads with a grounded shield. This cable must not be used for 3-wire measurements. The
cable shield is not a standard signal lead.

Cable construction	2 wires with shield and insulation 3 sheathed banana plugs on each side: red, black and yellow

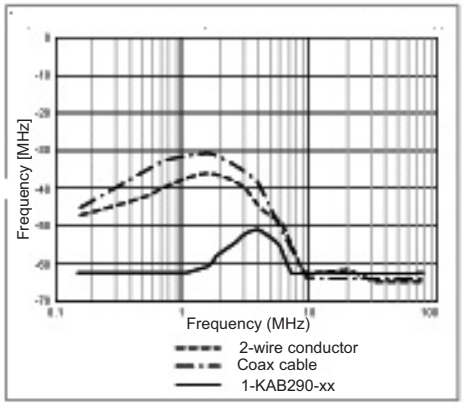


Wire cross-section	2 * 0.75 mm² (0,00116 in²)
Maximum cable resistance	0.250 Ω/m (0.0763 Ω/ft)
Weight	approx. 143 g/m (1.54 oz/ft)
Outside diameter of cable	approx. 9 mm (0.354 in)
Minimum radius of curvature	10 x cable diameter
Insulation	
Resistance	20 MΩ/km (32.19 MΩ/mile)
Voltage	600 V rms CAT II; wire to wire, wire to shield, shield to outside
Capacitance	
Core to core	approx. 110 pF/m (33.54 pF/ft)
Core to shield	approx. 150 pF/m (45.73 pF/ft)
Temperature range	
In operation	-15 °C (+5 °F) to +80 °C (+176 °F)
Not in operation (storage)	-40 °C (-40 °F) to +80 °C (+176 °F)
Available lengths	1,5 m (4.92 ft), 3,0 m (9.84 ft), 6.0 m (19.7 ft)

Typical impairment of conducted immunity (10 V rms, terminal)

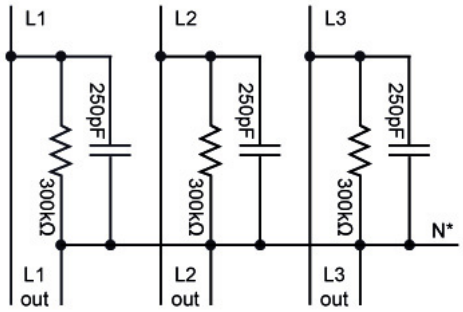


Typical impairment of conducted immunity (10 V rms, terminal)



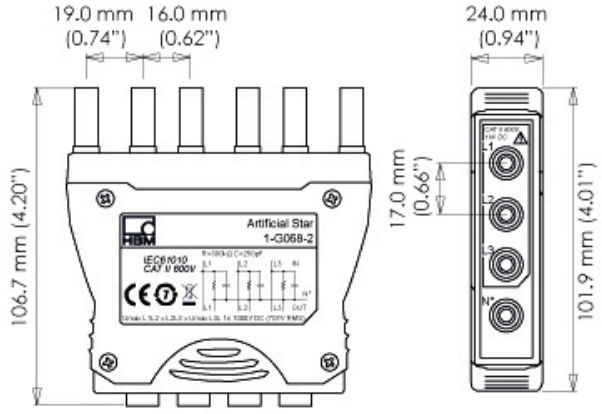
G068: Artificial star adapter

The artificial star adapter provides an artificial star point for the measurement of 3-phase signals.	
Maximum input voltage	1000 V DC (707 V rms) between each phase
Inputs	3; banana plugs, 4 mm
Outputs	6; banana plug contacts, 4 mm, for direct connection to the GN610/GN611/GN610B/GN611B cards
Artificial star	Only as reference contact. Cannot be used as input.
Safety	Conforms to IEC61010-1 600 V rms CAT II
Application	The 3-phase signals L1, L2 and L3 can be connected to inputs L1, L2, L3 of the artificial star adapter. The connection N* is the voltage connected to the artificial star.



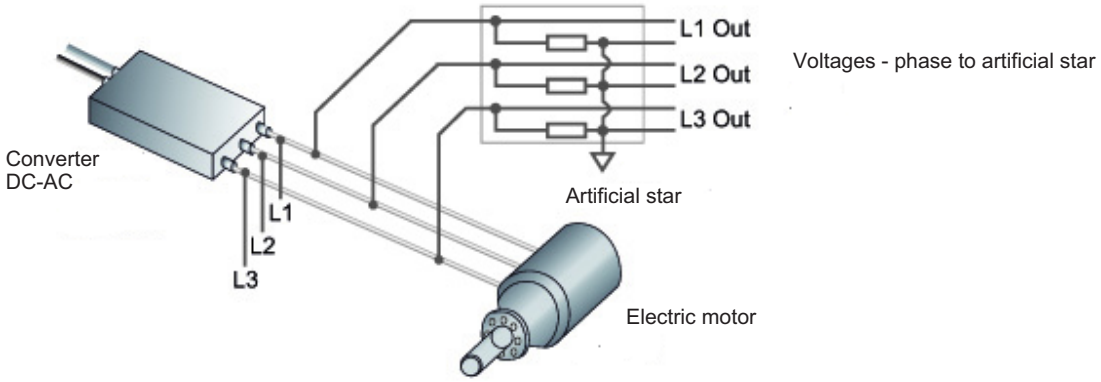
Schematic

Weight	170 g (6 oz)
Housing material	Polyurethane, vacuum-formed
Arrangement	Two adapters can be inserted into each GN610/GN611/GN610B/GN611B card. Two or more GN610/GN611/GN610B/GN611B cards with artificial star adapters can be installed side-by-side.
Temperature range	
Operating temperature	0 °C to +40 °C (+32 to +104 °F)
Not in operation (storage)	-25 °C to +70 °C (-13 °F to +158 °F)

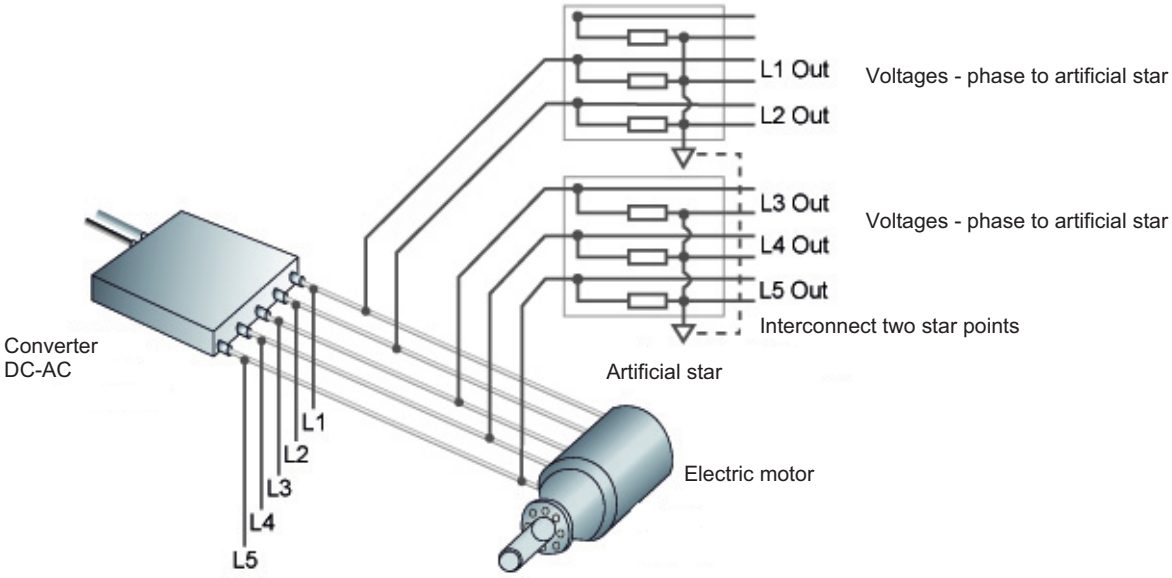


Artificial star adapter

Circuit diagram of artificial star adapter



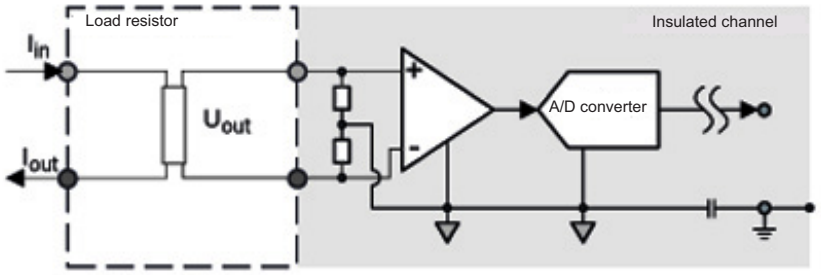
Representative use of the artificial star adapter with three phases



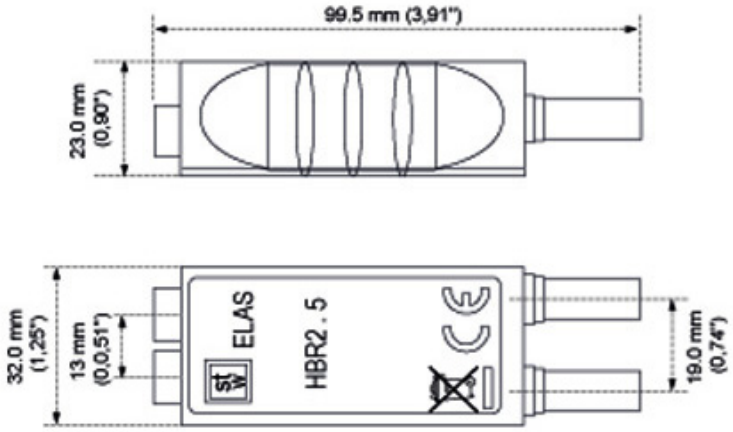
Representative use of the artificial star adapter with five or more phases

1-HBR/xOhm: High-precision load resistor

Low-ohm high-precision load resistor with low thermal drift, 1 W, 0.02 %. Its 4-wire connection reduces the inaccuracy caused by the currents flowing through the load resistor. Use of banana plugs for input connectors and output contacts. Directly compatible with input cards GN610, GN611, GN610B and GN611B.



Inaccuracy	± 0.02 %		
Temperature coefficient	±5 ppm/°C (±9 ppm/°F)		
Bandwidth	-0.5 dB at 300 kHz		
Input contacts	Banana plug contacts, 4 mm, pitch 13 mm (0.51")		
Output contacts	Banana plug contacts, 4 mm, pitch 19 mm (0.75")		
Insulation (terminals - ground)	50 V rms		
Resistance technique	Metal foil		
Maximum power loss	1 W		
Part number	1-HBR/1 Ohm	1-HBR/2.5 Ohm	1-HBR/10 Ohm
Impedance	1 Ω	2.5 Ω	10 Ω
Maximum input current	1 A	0.63 A	0.31 A
Weight	60 g (2.12 oz)		
Application temperature range	0 °C to + 40 °C (32 °F to 104 °F)		



Dimensions

Additional MX403B accessories

Article	Description	Ordering number
Software and product packages		
catman®AP 	All-inclusive package, comprising catman®Easy Functionality plus add-on modules such 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
catman®EASY 	This basic software package for data acquisition includes simple 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, analysis and processing of measurement data with many mathematical functions, data export and reporting.	1-CATEASY-PROCESS
LabVIEW™ driver[1)]	Universal driver from HBM for LabVIEW™.	1-LabVIEW-DRIVER
DIAdem® driver	QuantumX device driver for the DIAdem® software from National Instruments. German user interface.	1-DIADEM-DRIVER
CANape® driver	QuantumX device driver for CANape® software from Vector Informatik. CANape® versions 10.0 and higher are supported.	1-CANAPE-DRIVER

1) Other drivers and partners at www.hbm.com\quantumX\

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