Data Sheet

QUANTUMX

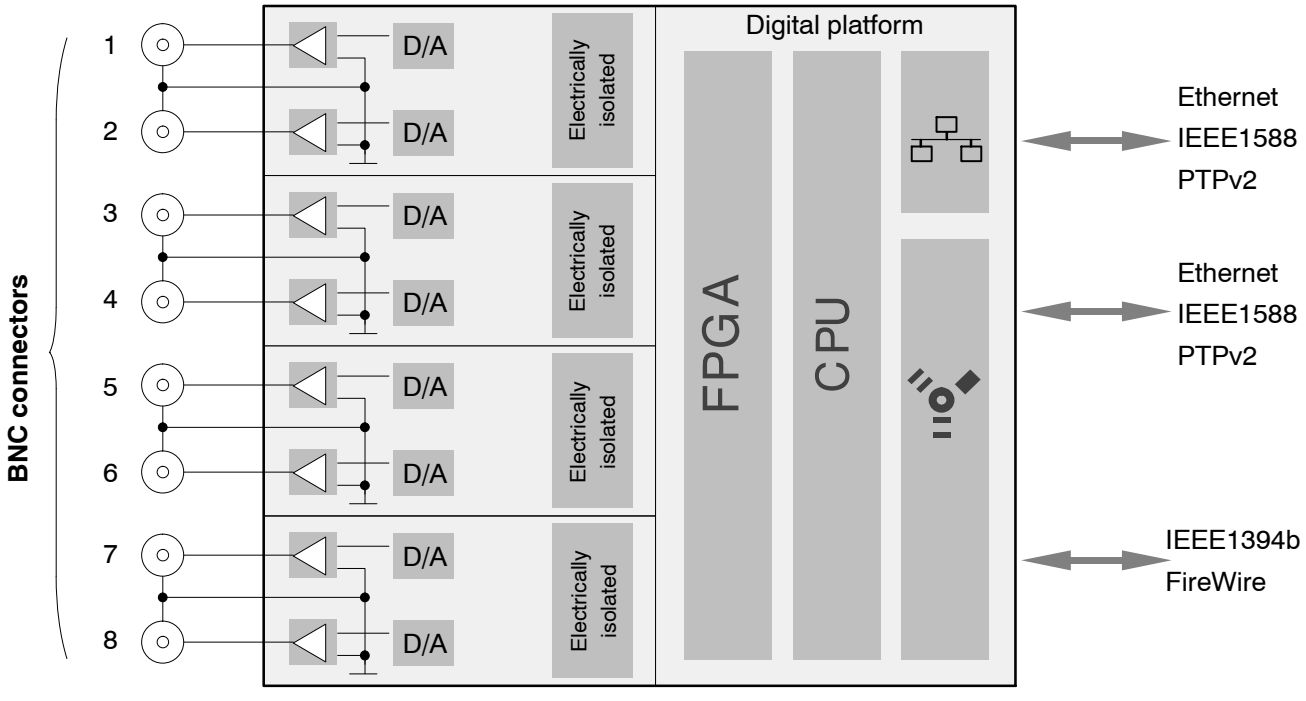
MX878B

Analog output module

Special features

- **8 individually configurable analog voltage outputs**
- **Mathematics unit Real-time computation**
- **Signal generator: Standard types or arbitrary (load profile)**
- **PID controller**

Block diagram



Specifications MX878B

General specifications		
Supply voltage range (DC)	V	10 ... 30 (24 V nominal (rated) voltage)
Supply voltage interruption		max. für 5 ms at 24 V
Power consumption	W	7
Module functions		Analog outputs, digital I/O, mathematics unit real-time computation
Analog outputs	Number	8, electrically isolated from each other and from the supply
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
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 FireWire system (including hubs[1], backplane)	–	24
Max. chain of hops[2]	–	14
Synchronization options EtherCAT®[4] IRIG–B (B000 bis B007; B120 bis B127) IEEE1588 (PTPv2), NTP		IEEE1394b FireWire (only QuantumX, automatically) via CX27/B EtherCAT Gateway Via any MX840/B channel Ethernet
Nominal (rated) temperature range	°C [°F]	–20 .. +60 [–4 ... +140]
Operating 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 tests[3]		
Vibration (30 min)	m/s^2	50
Shock (6 ms)	m/s^2	350
EMC requirements		per EN 61326
Dimensions, horizontal (W x H x D)	mm	52,5 x 200 x 122 (with case protection)
	mm	44 x 174 x 119 (without case protection)
Weight, approx.		880

1) Hub: FireWire node or distributor

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

3) 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.

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

Specifications MX878B (Continued)

Analog outputs		
Accuracy class		0.1
Number of outputs	–	8
Signal sources	–	**Real–time output:** QuantumX system signals, e.g. inputs (analog, digital, CANbus), internal signal generator (sine, rectangle, triangle), internal buffer (replay of any data / arbitrary), computed signals (see functions) **Online output:** Default signals from PC level (observe min. latency of 50 ms)
Type of connection	–	BNC
Nominal (rated) voltage	V	± 10
Reference signal		2 output each with common ground, electrically isolated from supply and housing. Max. potential difference 60V
D/A converter resolution	Bit	16
Max. Update rate (intern)	kS/s	100
Min. Update rate (extern)	kS/s	5
Noise (peak to peak)	mV	< 4
Permissible load impedance	Ω	> 2,000 / <2 nF
Crosstalk attenuation	dB	> 90
Zero drift	% / 10K	< 0.05 of full scale value
Full-scale drift	% / 10K	< 0.05 of output value
Cut–off frequency (–1 dB)	kHz	10
Additional adjustable filter	Hz	0.1 ... 10 000
Output resistance	Ω	< 2

Real-time computation on the module		
Mathematics unit		
Number of computations		4
Max. input rate	kS/s	5
Max. output rate	kS/s	5
Root mean square value (RMS), adjustable observation period		
with 4,800 Hz input rate	ms	2 ... 1,200
Matrix computation (e.g. compensation matrix of customized HBM transducers)		
Number of input signals		6
Number of output signals		6
Number of coefficients		36
Add&Multiply		
Number of input signals		2
Number of output signals		1
Number of coefficients		4
Formula		a0+a1*S1+a2*S2+a3*S1*S2
Peak-value unit		
Number of peak values		4
Max. input rate	kS/s	5
Max. output rate	kS/s	5
Signalgenerator		
Standard mode		
Signalt ype		Constant, sine, rectangle, triangle
Max. Output rate	kS/s	5
Parameter		Amplitude, frequency, duty rations
Arbitrary mode		
Signal type / format		Any (ASCII)
Data format		Float
Number of buffers		2
Number of signal values per buffer		10.000
Max. output rate	kS/s	100
Parameter		Repeat, trigger, continuous, buffer change
PID controller		
Number of		4
Max. input rate	kS/s	5
Max. output rate	kS/s	5

Specifications Power pack NTX001 (Continued)

30 W AC / DC power pack (1-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 MX878B, to be ordered separately

MX878B accessories		
Article	**Description**	**Order No.**
Power		
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 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
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 (Rack)	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
Plug		
Push-In connector (8 Pins), Gold	10 push-In-connectors, Phönix Contact, 8 pins Gold	1-CON-S1015

Accessories MX878B, 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
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

[1)] More drivers and partners at www.hbm.com\quantumX\

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