NEX[DAQ]

DEWETRON

Robust signal conditioning frontend

- Portable data acquisition system
- Rugged industrial design
- 8 versatile analog input channels
- 4 counter, 2 CAN-FD interfaces
- Programmable sensor supply 2 to 24 V
- TEDS and MSI support
- 24-bit; 200 kS/s or 1 MS/s

System specifications

General specifications	
Synchronization	Via Ethernet; PTP/IEEE1588
Cooling	Passive; no fan
Isolation	Ethernet, USB and power supply are isolated from input channels
Channel-to-channel isolation	No
Data rate	40 MB/s
MTBF (MIL-HDBK-217 F, GB)	137,215 h
Dimensions (l x w x h)	242 x 120 x 43.3 mm (9.52 x 4.72 x 1.7 in)
Weight	1250 g (2.76 lbs)
Interfaces	
Ethernet – Ethernet topology – Ethernet connector – LAN configuration	10/100/1000BASE-TX Gigabit Ethernet (2x) Dasychain; Star Industrial Ethernet M12 X-coded DHCP or static IP
USB – USB connector	USB 2.0; USB 3.0; USB-C USB-C with screw terminals
Configuration	
Analog in	8 channels with: bridge excitation; sensor supply; TEDS/MSI support; 9-pin D-SUB female
Counter	4 encoder input at LEMO 1B 8 auxiliary counter for frequency measurement on DIO connector (37-pin D-SUB female)
Digital in	8 on DIO connector
Digital out	4 on DIO connector
CAN	2 CAN-FD; 9-pin D-SUB male
Environmental specifications	
Operating temperature	-20 °C to +70 °C
Humidity	10 % to 90 %, non condensing

Tab. 1: General specifications

Ingress protection class according to EN 60721-3-2:2018	IP67 (see *IP rating on page 71*)	
Vibration test EN 60068-2-6:2008	Shape	Sine
	Frequency range	10–150 Hz
	Acceleration	20 m/s^2
	Sweep rate	1 oct./min.
	Duration	20 cycles each axis (X, Y, Z)
Vibration test EN 60721-3-2:2018 Class 2M5	Shape	Random
	Total frequency range	10–2000 Hz
	Acceleration spectral density	1–20 Hz: 3 (m/s^2) 2/Hz
		500–2000 Hz: 1 (m/s^2) 2/Hz
	RMS value of acceleration	5.015 g
	Duration	30 min per axis
Shock test EN 60068-2-27:2009	Pulse shape	Half-sine
	Acceleration amplitude	30 g
	Duration of the pulse	11 ms
	Number of shocks	18 (3 shocks in two directions of x, y and z axis each)
Shock test EN 60068-2-27:2009	Pulse shape	Half-sine
	Acceleration amplitude	50 g
	Duration of the pulse	6 ms
	Number of shocks	18 (3 shocks in two directions of x, y and z axis each)

Tab. 1: General specifications

Power supply		
Power supply inlets		USB-PD, PoE, Lemo
Power buffer		0.5 s
Power consumption		Typ. 12 W without sensor supply; up to 20 W with sensor supply
LEMO	Connector	LEMO 1B
	Isolated power supply	10 to 32 V; buffered for 0.5 s in case of voltage drop
	Rated input voltage	DC (9 to 36 V_{DC})
USB-PD	Connector	USB-C Type “PD-IN”
	Standard	USB-PD 3.0
	Power supply requirements	USB-PD 3.0 compliant power supply with 12 V, 15 V or 20 V; at least 36 W
PoE	Supported standards	PoE Plus (802.3at-2009); PoE (802.3bt-2018)
	Power supply requirements	PoE Plus (802.3at-2009); PoE (802.3bt-2018) compliant with at least 24 W

Tab. 2: Power supply

Digital in	
Digital input	8 CMOS/TTL compatible digital inputs; weak pull-up via 100 kΩ
Overvoltage protection	±30 V, 50 V (for 100 ms)

Tab. 3: Digital in specifications

Input types		Input	Sensor excitation	Band-width	Accuracy	Sensor connection
Direct	Voltage	100 mV to 100 V	2 to 24 V	DC to 250 kHz	±0.05 %	D-SUB-9
	Bridge	1 mV/V to 100 mV/V full bridge; half bridge	1 to 10 V	DC to 130 kHz	±0.05 %	D-SUB-9
	Counter	Event counting, waveform timing, encoder mode (X1, X2 and X4)	12 V	-	-	LEMO 1B
	CAN	CAN 2.0B / CAN-FD	12 V	-	-	D-SUB-9
	Digital in	TTL	12 V/5 V	-	-	D-SUB-37
MSI	MSI2-250R-20mA	4 to 20 mA sensors	2 to 24 V	DC to 250 kHz	±0.1 %	Miniature spring terminals
	MSI2-STG	Bridge-type sensors; full-bridge, half-bridge, quarter bridge 120 Ω and 350 Ω	5 V and 10 V	60 kHz	±0.1 %	Miniature spring terminals
	MSI2-LVDT	LVDT and RVDT sensors, 5- or 6-wire connection	3 V at 2.5, 5 or 18 kHz	1 kHz	±0.1 %	Soldering pads
	MSI-BR-ACC	IEPE® sensors, typ. accelerometer, microphone	4 mA	1.4 Hz to 250 kHz	±0.2 %	BNC
	MSI2-CH-x	Charge type sensors up to 100 000 pC	n/a	0.08 Hz to 250 kHz	±0.5 %	BNC
	MSI2-TH-x	Thermocouple sensors; Standard models for type K, J, T, others on request	n/a	DC to 250 kHz	±1 °C	Mini TC socket
	MSI2-V-600	Voltage up to 600 VDC	n/a	DC to 60 kHz	±0.1 %	Banana sockets
	MSI-BR-RTD	RTD sensors; Pt100, Pt200, Pt500, Pt1000, Pt2000; 2, 3 and 4 wire connection	1.25 mA	DC to 10 kHz	±0.1 %	Binder 712 series 5-pin socket

Tab. 4: Input specifications

Analog channel specification			
Input connector	8x 9-pin female D-SUB		
Rated input voltage	33 V_{RMS}, 46.7 V_{PEAK}, 70 V_{DC}		
Input range	100 mV to 100 V; freely programmable		
Sampling	200 kS/s, 24-bit (optional: 1 MS/s, 24-bit)		
Voltage input accuracy[1)]	≤10 V	DC to 1 kHz	±0.05 % of reading ±0.02 % of range ±50 µV
		>1 kHz to 10 kHz	±0.5 % of reading ±0.02 % of range ±50 µV
	≥10 V	DC to 1 kHz	±0.05 % of reading ±0.02 % of range ±50 µV
		>1 kHz to 10 kHz	±1 % of reading ±0.02 % of range ±50 µV
Gain drift	Typ. 20 ppm/°C; max. 40 ppm/°C		
Offset drift	Typ. 1 µV/°C + 10 ppm of range; max. 3.5 µV/°C + 20 ppm of range		

Tab. 5: Analog channel specifications

Analog channel specification																
Linearity	<50 ppm															
CMRR	Typ. CMRR at 10 V range: 90 dB @ 50 Hz; 90 dB @ 1kHz; 70 dB @ 10 kHz; 50 dB @ 100 kHz															
Crosstalk	Typ. better 110 dB															
Input noise	0 to 10 Hz	1.5 μV_{PP}														
	Noise density	19 nV/$\sqrt{Hz}$														
Signal-to-noise ratio; spurious free SNR	**100 mV range**				**1 V range**				**10 V range**				**100 V range**			
Effective number of bits[2]; filter=auto	SNR	SFDR[3]	ENOB[4]	Noise	SNR	SFDR[3]	ENOB[4]	Noise	SNR	SFDR[3]	ENOB[4]	Noise	SNR	SFDR[3]	ENOB[4]	Noise
Sample rate	[dB]	[dB]	[Bit]	[mV_{pp}]	[dB]	[dB]	[Bit]	[mV_{pp}]	[dB]	[dB]	[Bit]	[mV_{pp}]	[dB]	[dB]	[Bit]	[mV_{pp}]
1 kS/s	105	125	17.1	0.0028	123	145	20.1	0.0035	129	150	21.2	0.016	126	144	20.6	0.24
10 kS/s	100	125	16.3	0.006	117	145	19.1	0.008	122	147	19.9	0.045	118	144	19.3	0.6
100 kS/s	92	125	15.0	0.015	109	145	17.8	0.021	112	147	18.3	0.16	109	144	17.8	2.4
200 kS/s	89	125	14.6	0.02	106	145	17.3	0.032	109	147	17.8	0.23	106	144	17.3	3.4
Filter = OFF	86	120	14.1	0.033	99	138	16.1	0.09	100	143	16.3	0.7	99	140	16.1	8.3
Input impedance	0 to 10 V range	200 MΩ														
	>10 to 100 V range	2 MΩ														
Input configuration	Differential															
Input coupling	DC															
Common mode voltage	<1 V range	±10 V_{DC}														
	1 to 10 V range	±15 V_{DC}														
	>10 to 100 V range	±100 V_{DC}														
Overvoltage protection	0 to 10 V range	±50 V_{DC}														
	>10 to 100 V range	±200 V_{DC}														
Analog bandwidth	1 to 100 V range	250 kHz														
	100 mV range	130 kHz (bridge mode)														
Low pass filter (-3 dB, digital)	1 Hz to 40 % of sample rate; freely programmable or OFF															
	Characteristic	Bessel or Butterworth														
	Filter order	2^{nd}, 4^{th}, 6^{th}, 8^{th}														
	Filter setting AUTO	30 % of sample rate with 8^{th} order Bessel														

Tab. 5: Analog channel specifications

1) 1 year accuracy 23 °C ±5 °C 2) LP filter in auto mode 3) SFDR excluding harmonics 4) ENOB calculated from SNR

Bridge functions		
Supported bridge types	Full bridge	4 or 6 wire
	Half bridge	3 or 5 wire
	Quarter bridge	With optional MSI2-STG 120 Ω and 350 Ω
Bridge resistance	5 V excitation	120 to 10 kΩ
	10 V excitation	300 to 10 kΩ
Autom. bridge balance	±400 % of range	

Tab. 6: Bridge functions

Sensor excitation		
Bridge excitation	V bridge	1 to 10 V freely programmable; balanced around ground; remote sense support
	1 year accuracy	±1 mV
	Drift	25 ppm/°C
	Current limit	40 mA
	Protection	Continuous short to ground
	Load and line regulation error	±0.002 % with sense lines connected
Sensor supply	V sensor	2 to 24 V freely programmable in 100 mV steps; referenced to GND
	Accuracy	±3 %
	Limit	Max. 100 mA; max. 0.5 W
	Protection	Continuous short to ground
	Total sensor supply limit	All sensor supplies combined, including Counter and CAN bus sensor supply, must not exceed 5 W.

Tab. 7: Sensor excitation

CAN	
CAN bus	2x CAN bus at male 9-pin D-SUB
CAN specification	CAN 2.0B; CAN FD 1.0
CAN physical layer	High-speed
Bus pin fault protection	±36 V
Termination	Programmable: high impedance or 120 Ω

Tab. 8: CAN specifications

Counter		
4x full featured counter	Connector	4x LEMO connector female, EGG.1B.307.CLL
	Input signal	8 CMOS/TTL compatible digital inputs; weak pullup via 100 kΩ
	Sensor supply	12V ±5 % 100 mA
	Modes	Event counting; gated event counting; up/down counting; frequency; dutycycle; edge seperation; encoder (x1, x2, x4)
	Filter	0.1 to 100 µs
8x basic counter	Connector	Shared with Digital IN on 37-pin D-SUB
	Modes	Event counting; Frequency;
	Filter	0.1 to 100 µs

Tab. 9: Counter specifications

Connections and ports

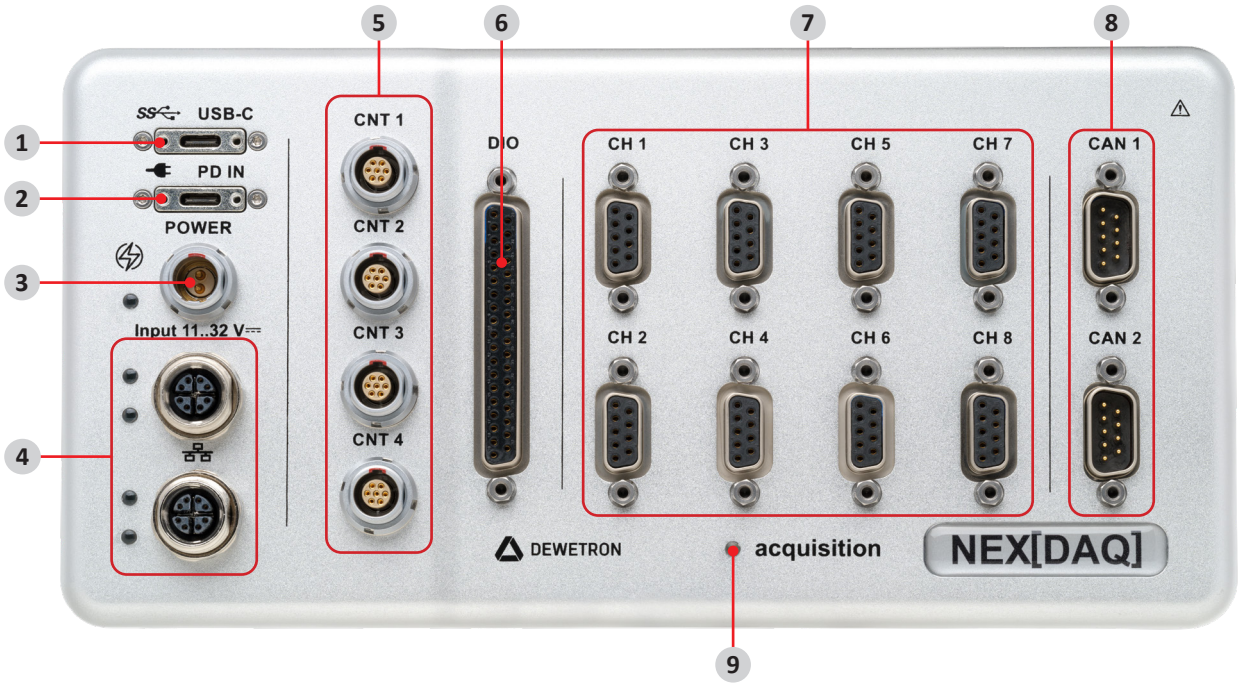


Fig. 3: NEX[DAQ] connectors and ports

1. *USB-C data*
2. *USB-C PD IN*
3. *Power*
4. *Ethernet*
5. *Counter 1–4*
6. *DIO*
7. *Channels 1–8*
8. *CAN 1–2*
9. *Acquisition LED*

USB-C data

USB-C specifications		
	Connector type:	USB-C
	Function:	Data transfer

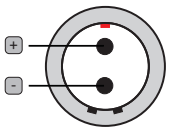
Tab. 10: USB-C specifications

USB-C PD IN

PD IN specifications		
	Connector type:	USB-C
	Function:	Power in

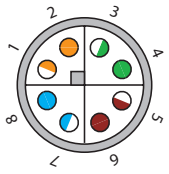
Tab. 11: PD IN specifications

Power

POWER specifications		
	Input – Rated input voltage – Input frequency – Power – Connector	 11...32 V_{DC} (max. 10...36 V_{DC}) DC 210 W 2-pin male LEMO HMJ.1B.302
	LED – Off – Green	 Power off Power on; independent from power source

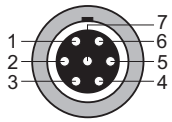
Tab. 12: POWER specifications

Ethernet

Ethernet specifications			
	Connector type:	8-pin female M12 x-coded	
	Pin assignment	**1.** DA+ **2.** DA- **3.** DB+ **4.** DB-	**5.** DD+ **6.** DD- **7.** DC- **8.** DC+
	LEDs – t.b.d.		

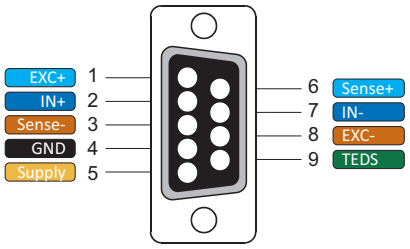
Tab. 13: Ethernet specifications

Counter 1–4

Counter specifications			
	Connector type:	7-pin female LEMO HEG.1B.307	
	Pin assignment:	**1.** Input A **2.** Input B **3.** Input Z **4.** GND power	**5.** +5 V out **6.** +12 V out **7.** GND signal

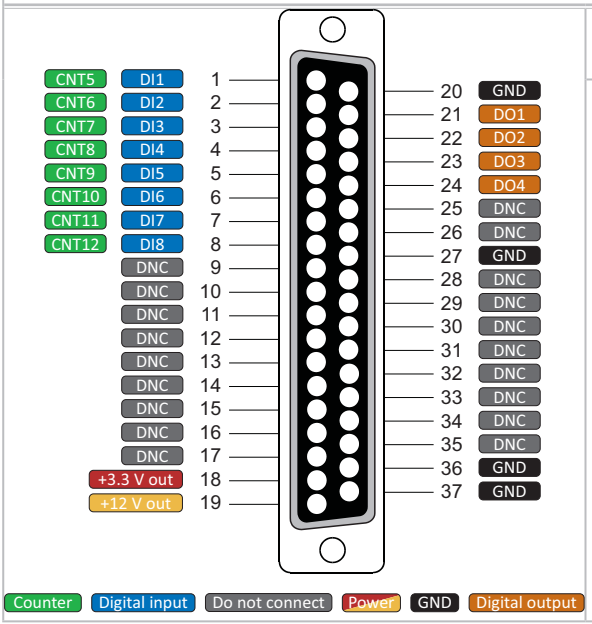
Tab. 14: Counter specifications

Channels 1–8

Channel specifications			
	Connector type:	9-pin female D-SUB	
	Pin assignment:	**1.** +EXC **2.** +IN **3.** -Sense **4.** GND **5.** Supply	**6.** +Sense **7.** -IN **8.** -EXC **9.** TEDS

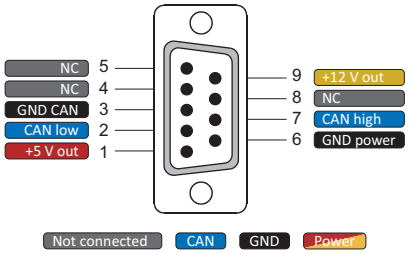
Tab. 15: Channel specifications

DIO

DIO specifications				
	Connector type:	37-pin female D-SUB		
	Pin assignment:	**1.** DI1/CNT5 **2.** DI2/CNT6 **3.** DI3/CNT7 **4.** DI4/CNT8 **5.** DI5/CNT9 **6.** DI6/CNT10 **7.** DI7/CNT11 **8.** DI8/CNT12 **9.** DNC **10.** DNC **11.** DNC **12.** DNC **13.** DNC	**14.** DNC **15.** DNC **16.** DNC **17.** DNC **18.** +3.3 V out **19.** +12 V out **20.** GND **21.** DO1 **22.** DO2 **23.** DO3 **24.** DO4 **25.** DNC **26.** DNC	**27.** GND **28.** DNC **29.** DNC **30.** DNC **31.** DNC **32.** DNC **33.** DNC **34.** DNC **35.** DNC **36.** GND **37.** GND

Tab. 16: DIO specifications

CAN 1–2

CAN specifications			
	Connector type:	9-pin male D-SUB	
	Pin assignment:	**1.** +5 V out **2.** CAN low **3.** GND CAN **4.** NC **5.** NC	**6.** GND power **7.** CAN high **8.** NC **9.** +12 V out

Tab. 17: CAN specifications

Acquisition LED

The following table gives an overview of the different types of LED lighting.

Color	Description	Comment
Static green	Ready	-
Fading green	Preparing acquisition and network interface	During firmware updating process
Flashing green	Recording	-
Fading orange	Booting	-

Tab. 18: Acquisition LED