

Automotive
Energy & Power Analysis
Aerospace
Transportation
General Test & Measurement



EPAD2/CPAD2 modules

The EPAD2 and CPAD2 series are multichannel modules and combine analog signal conditioning and A/D converter in an extremely rugged box. All have one 24 bit A/D converter per channel, synchronized sampling, channel to channel and channel to system isolation. The sampling rate is 12 samples per second and the target applications are

- precision measurement of slow signals in rough environments, e.g. in an engine bay of a vehicle
- distributed monitoring of slow signals in industrial plants
- high quality logging of environmental conditions
- quasi-static channel expansion of dynamic DEWETRON instruments

EPAD2 and CPAD2 series modules can be daisy-chained to achieve a high channel count even over very long distances. Data output of CPAD2 series is available on CAN bus while EPAD2 series has a RS485 interface.

For EPAD2 series there is an interface module – EPAD-BASE2 –available which converts the RS485 data to USB, RS232 or CAN.

Key Features:

- Extremely rugged
- 24 bit A/D converter per channel
- Channel to channel isolation
- Channel to system isolation
- Flexible connectivity, CAN, USB, RS232, RS485
- Flexible mounting
- High channel count by daisy-chaining

Online Information:

<http://www.dewetron.com/int/products/components/can-and-rs485-modules/>

Mounting examples

The EPAD2 and CPAD2 series modules are extremely rugged and offer a wide range of mounting options.

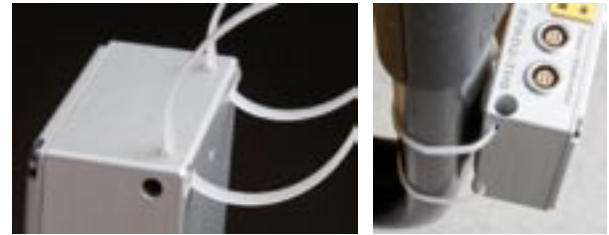
■ DIN rail

By ordering option XPAD-DIN-RAIL an adapter to snap EPAD2 and CPAD2 modules onto a DIN rail is included. A typical application for this is using EPAD2/CPAD2 inside 19" cabinets.



■ Cable strap

All modules have four trenches to provide maximum flexibility, most popular is fixing the modules by means of cable straps. A typical application for this is installing modules inside an engine bay of a vehicle.



■ Bolt down

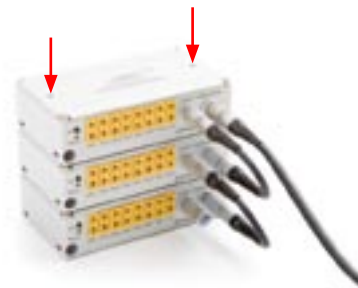
All modules offer two holes which allow bolting them down onto wooden or metal sheets. This kind of fixing modules is mainly used for quick instrumentation of single tests.

Note: No screws are provided with the modules, 2x 4.2 mm wood or sheet metal screws are required



■ Stack




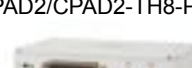
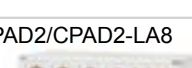
A unique mechanism to stack any number of modules is provided. Simply put one module on top of the other, take an adequate Allen key, press down the integrated screw and fasten it. Do the same for the 2nd screw and the two modules are locked. Making a stack is useful if more than eight channels need to be measured in a portable configuration.



EPAD2/CPAD2 modules

- Extremely rugged
- 24 bit A/D converter per channel
- Channel to channel isolation
- Channel to system isolation
- Flexible connectivity, CAN, USB, RS232, RS485
- Flexible mounting
- High channel count by daisy-chaining



Module	Input type	Input ranges	Isolation	Special
 EPAD2/CPAD2-TH8-x 8 thermocouple connectors Type J: xPAD2-TH8-P-J Type K: xPAD2-TH8-P-K Type T: xPAD2-TH8-P-T	Type J: -210 to 1200 °C Type K: -270 to 1372 °C Type T: -270 to 400 °C	350 V _{DC} (channel to channel and channel to BUS, power and chassis)	Overvoltage protection: 15 V _{DC}	
 EPAD2/CPAD2-V8 8 isolated voltage input channels	Physical input range: ±50 V Software selectable: ±100 mV, ±500 mV, ±1 V, ±2.5 V, ±5 V, ±10 V	350 V _{DC} (channel to channel and channel to BUS, power and chassis)	Overvoltage protection: 350 V _{DC}	
 EPAD2/CPAD2-RTD8 8 isolated Resistance Temperature Detector channels	Resistor: 0 to 999.99 Ω RTD: PT100(385), PT200 (385), PT500(385), PT1000 (385), PT2000(385), PT100 (3961)	350 V _{DC} (channel to channel and channel to BUS, power and chassis)	Overvoltage protection: 15 V _{DC}	
 EPAD2/CPAD2-TH8-P 8 isolated voltage inputs Supported breakout boxes: PAD-CB8-x-P2 PAD-CB8-x-M PAD-CB8-RTD	±1.5 V	350 V _{DC} (channel to channel and channel to BUS, power and chassis)	Overvoltage protection: 15 V _{DC}	
 EPAD2/CPAD2-LA8 8 isolated current input	0 to 20 mA, ±20 mA, ±30 mA	350 V _{DC} (channel to channel and channel to BUS, power and chassis)	Overcurrent protection: 70 mA cont.	

Options & accessories



xPAD-CBL-LL-x:
Connecting cable with LEMO FGG.1B.304 connector on both sides



CPAD-CBL-LD9-x:
Adapter cable to connect CPAD modules to CAN interface



CPAD-CBL-LD9-x-POW:
Adapter cable to connect CPAD modules to CAN interface, additional 2 banana plugs for power supply



EPAD-ADAP-BL:
Binder 712-series to LEMO 1B.304 converter



xPAD-TERM-L
Termination connector for the last module in a chain

EPAD2/CPAD2-TH8-x

- Intelligent amplifier with integrated A/D conversion
- 8 input channels for thermocouples
- Available thermocouple types
 - xPAD2-TH8-P-K: K type
 - xPAD2-TH8-P-J: J type
 - xPAD2-TH8-P-T: T type
- CPAD2-TH8-x: CAN interface
- EPAD2-TH8-x: RS485 interface (optional USB, RS232, CAN via EPAD-BASE2 interface)



Analog input specifications

xPAD2-TH8-x	
Input channels:	8 isolated Thermocouple Channels
Input signals:	thermocouple types depending on module
xPAD2-TH8-J:	J: -210 °C to 1200 °C
xPAD2-TH8-K:	K: -270 °C to 1372 °C
xPAD2-TH8-T:	T: -270 °C to 400 °C
	other types on request
Sampling rate:	max. 12.5 S/sec per channel
Bandwidth (-3 dB):	6 Hz
ADC type:	24 Bit Delta Sigma Converter
Input connector:	mini Thermocouple connector
Resolution:	0.01 °C for all types
Input impedance:	typically 1.4 MΩ
Bias current:	typically 10 nA
Open thermocouple detection:	module indicates fullscale if input is open
Accuracy:	
Thermocouple type J:	±1.0 °C @ -210 to -100 °C ±0.3 °C @ -100 to 760 °C ±0.4 °C @ 760 to 1200 °C
Thermocouple type K:	±1.0 °C @ -200 to -25 °C ±0.4 °C @ -25 to 1000 °C ±0.5 °C @ 1000 to 1372 °C
Thermocouple type T:	±1.0 °C @ -250 to -150 °C ±0.4 °C @ -150 to 400 °C
Temperature drift:	typically 20 ppm/°C
Isolation voltage:	350 V _{DC} (channel to channel and channel to Bus, Power and Chassis)
Overvoltage protection:	15 V _{DC}
CMRR (50/60 Hz):	130 dB
EPAD2-TH8	
Interface:	RS-485
Communication speed:	9600 bps (2400 to 115200 programmable)
Standard settings:	9600 bps, 8 data bits, 1 stop bit, no parity, module address 00 hex
Readout speed:	depending on baudrate and number of channels (typ. 80 ch/sec. @ 9600bps)
CPAD2-TH8	
Interface:	highspeed CAN
Specification:	CAN 2.0B
Communication speed:	50 kBaud to 1000 kBaud
Data Format:	16 Bit Intel or Motorola
Identifier Types:	standard; extended
Standard settings:	500 kBaud; Intel Format
Readout speed:	12.5Hz, 10Hz, 5Hz, 2Hz, 1Hz, 0.5Hz, 0.2Hz or 0.1Hz programmable
Bus/Power Connector:	LEMO EGG.1B.304
Power Supply Voltage:	7 to 40V
Power consumption:	max 0.5 W
Dimensions:	
Base module (W x D x H):	129 x 72 x 34.2 mm (5.1 x 2.8 x 1.3 in.) incl. mounting holes
Mounting holes distance:	119 x 7 mm (4.7 x 0.3 in.), 4.2 mm (0.165 in.) diameter
Weight:	typically 360 g

EPAD2/CPAD2-V8

- Intelligent amplifier with integrated 24-bit A/D conversion
- 8 isolated voltage input channels
- RS-485 or CAN interface
- CPAD2-V8: CAN interface
- EPAD2-V8: RS485 interface (optional USB, RS232, CAN via EPAD-BASE2 interface)



Analog input specifications

xPAD2-V8	
Input channels:	8 isolated voltage input channels
Input ranges:	Physical input range: ± 50 V Software selectable: ± 100 mV, ± 500 mV, ± 1 V, ± 2.5 V, ± 5 V, ± 10 V
Resolution:	10 μ V for all ranges
DC accuracy:	± 0.02 % of reading ± 900 μ V
Temperature drift:	typically 25 ppm/ $^{\circ}$ C
Linearity:	0.001 %
Input impedance	1 M Ω
Input connector	SUB-D 25
Sampling rate:	max. 12.5 S/sec per channel
Bandwidth (-3 dB):	6 Hz
ADC Type	24 Bit Delta Sigma Converter
Isolation voltage:	350 V _{DC} (channel to channel and channel to Bus, Power and Chassis)
Overvoltage protection:	350 V _{DC}
Common mode voltage:	350 V _{DC} / 250 V _{AC} @ 50 Hz
CMRR (50/60 Hz):	110 dB (140 dB @ DC)
EPAD2-V8	
Interface:	RS-485
Communication speed:	9600 bps (2400 to 115200 programmable)
Standard settings:	9600 bps, 8 data bits, 1 stop bit, no parity, module address 00 hex
Readout speed:	depending on baudrate and number of channels (typ. 80 ch/sec. @ 9600 bps)
CPAD2-V8	
Interface:	highspeed CAN
Specification:	CAN 2.0B
Communication speed:	50 kBaud to 1000 kBaud
Data format	16 Bit Intel or Motorola
Identifier types	standard; extended
Standard settings:	500 kBaud; Intel Format
Readout speed:	12.5 Hz, 10 Hz, 5 Hz, 2 Hz, 1 Hz, 0.5 Hz, 0.2 Hz or 0.1 Hz programmable
Bus/Power connector	LEMO EGG.1B.304
Power supply voltage:	7 to 40V
Power consumption:	max. 0.5 W
Dimensions:	
Base module (W x D x H):	129 x 72 x 34.2 mm (5.1 x 2.8 x 1.3 in.) incl. mounting holes
Mounting holes distance:	119 x 7 mm (4.7 x 0.3 in.), 4.2 mm (0.165 in.) diameter
Weight:	typically 310 g

EPAD2/CPAD2-RTD8

- Intelligent amplifier with integrated 24-bit A/D conversion
- 8 isolated Resistance Temperature Detector channels
- RS-485 or CAN interface
- CPAD2-RTD8: CAN interface
- EPAD2-RTD8: RS485 interface (optional USB, RS232, CAN via EPAD-BASE2 interface)



Analog input specifications

xPAD2-RTD8																									
Input channels:	8 isolated Resistance Temperature Detector channels																								
Input ranges:	Resistor: 0 to 999.99Ohm RTD: PT100(385); PT200(385); PT500(385); PT1000(385); PT2000(385); PT100(3961)																								
Accuracy:	<table border="0"> <tr> <td>Pt100 a = 0.00385</td> <td>Pt100 a = 0.003916</td> <td>Pt200 a = 0.00385</td> </tr> <tr> <td>±0.25 °C @ -200 to 100 °C</td> <td>±0.25 °C @ -200 to 100 °C</td> <td>±0.25 °C @ -200 to 100 °C</td> </tr> <tr> <td>±0.4 °C @ 100 to 400 °C</td> <td>±0.4 °C @ 100 to 400 °C</td> <td>±0.4 °C @ 100 to 400 °C</td> </tr> <tr> <td>±0.8 °C @ 400 to 800 °C</td> <td>±0.8 °C @ 400 to 800 °C</td> <td>±0.5 °C @ 400 to 630 °C</td> </tr> <tr> <td>Pt500 a = 0.00385</td> <td>Pt1000 a = 0.00385</td> <td>Pt2000 a = 0.00385</td> </tr> <tr> <td>±0.25 °C @ -200 to 100 °C</td> <td>±0.25 °C @ -200 to 100 °C</td> <td>±0.25 °C @ -200 to 100 °C</td> </tr> <tr> <td>±0.4 °C @ 100 to 250 °C</td> <td>±0.4 °C @ 100 to 400 °C</td> <td>±0.4 °C @ 100 to 400 °C</td> </tr> <tr> <td></td> <td>±0.8 °C @ 400 to 600 °C</td> <td>±0.8 °C @ 400 to 600 °C</td> </tr> </table>	Pt100 a = 0.00385	Pt100 a = 0.003916	Pt200 a = 0.00385	±0.25 °C @ -200 to 100 °C	±0.25 °C @ -200 to 100 °C	±0.25 °C @ -200 to 100 °C	±0.4 °C @ 100 to 400 °C	±0.4 °C @ 100 to 400 °C	±0.4 °C @ 100 to 400 °C	±0.8 °C @ 400 to 800 °C	±0.8 °C @ 400 to 800 °C	±0.5 °C @ 400 to 630 °C	Pt500 a = 0.00385	Pt1000 a = 0.00385	Pt2000 a = 0.00385	±0.25 °C @ -200 to 100 °C	±0.25 °C @ -200 to 100 °C	±0.25 °C @ -200 to 100 °C	±0.4 °C @ 100 to 250 °C	±0.4 °C @ 100 to 400 °C	±0.4 °C @ 100 to 400 °C		±0.8 °C @ 400 to 600 °C	±0.8 °C @ 400 to 600 °C
Pt100 a = 0.00385	Pt100 a = 0.003916	Pt200 a = 0.00385																							
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±0.8 °C @ 400 to 800 °C	±0.8 °C @ 400 to 800 °C	±0.5 °C @ 400 to 630 °C																							
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±0.25 °C @ -200 to 100 °C	±0.25 °C @ -200 to 100 °C	±0.25 °C @ -200 to 100 °C																							
±0.4 °C @ 100 to 250 °C	±0.4 °C @ 100 to 400 °C	±0.4 °C @ 100 to 400 °C																							
	±0.8 °C @ 400 to 600 °C	±0.8 °C @ 400 to 600 °C																							
Sampling rate:	max. 12.5 S/sec per channel																								
Bandwidth (-3 dB):	6 Hz																								
ADC type:	24 Bit Delta Sigma Converter																								
Input connector:	ERA.1S.304																								
Connection type:	2-wire, 4wire																								
Noise:	typically 0.01 °C																								
Resolution:	0.01 °C for all types																								
Constant current:	190 µA																								
Input impedance:	typically >100 MΩ																								
Bias current:	typically 10 nA																								
Sensor fault detection:	module indicates fullscale if input is open																								
Temperature drift:	typically 15 ppm/°C																								
Isolation voltage:	350 V _{DC} (channel to channel and channel to Bus, Power and Chassis)																								
Overvoltage protection:	15 V _{DC}																								
CMRR (50/60 Hz):	130 dB																								
EPAD2-RTD8																									
Interface:	RS-485																								
Communication speed:	9600 bps (2400 to 115200 programmable)																								
Standard settings:	9600 bps, 8 data bits, 1 stop bit, no parity, module address 00 hex																								
Readout speed:	depending on baudrate and number of channels (typ. 80 ch/sec. @ 9600 bps)																								
CPAD2-RTD8																									
Interface:	highspeed CAN																								
Specification:	CAN 2.0B																								
Communication speed:	50 kBaud to 1000 kBaud																								
Data Format:	16 Bit Intel or Motorola																								
Identifier Types:	standard; extended																								
Standard settings:	500 kBaud; Intel Format																								
Readout speed:	12.5 Hz, 10 Hz, 5 Hz, 2 Hz, 1 Hz, 0.5 Hz, 0.2 Hz or 0.1 Hz programmable																								
Bus/Power Connector:	LEMO EGG.1B.304																								
Power Supply Voltage:	7 to 40 V																								
Power consumption:	typically 0.5 W																								
Dimensions:																									
Base module (W x D x H):	129 x 72 x 34.2 mm (5.1 x 2.8 x 1.3 in.) incl. mounting holes																								
Mounting holes distance:	119 x 7 mm (4.7 x 0.3 in.), 4.2 mm (0.165 in.) diameter																								
Weight:	typical 420 g																								

EPAD2/CPAD2-TH8-P

- Intelligent amplifier with integrated 24-bit A/D conversion
- 8 galvanically isolated input channels
- Automatic sensor block detection
- Signal connection via 25-pin SUB-D connector
- RS-485 or CAN interface
- CPAD2-TH8-P: CAN interface
- EPAD2-TH8-P: RS485 interface (optional USB, RS232, CAN via EPAD-BASE2 interface)



Analog input specifications

xPAD2-TH8-P	
Input channels:	8 isolated voltage inputs
Input range	±1.5 V
Sampling rate:	max. 12.5 S/sec per channel
Bandwidth (-3 dB):	6 Hz
ADC type:	24 Bit Delta Sigma Converter
Input connector:	SUB-D 25
Resolution:	1 µV
Input impedance:	typically 1.4 MΩ
Bias current:	typically 10 nA
Temperature drift:	typically 20 ppm/°C
Isolation voltage:	350 V _{DC} (channel to channel and channel to bus, power and chassis)
Overvoltage protection:	15 V _{DC}
CMRR (50/60 Hz):	130 dB
Supported breakout boxes:	PAD-CB8-x-P2 standard thermocouple breakout box PAD-CB8-x-M small size thermocouple breakout box PAD-CB8-RTD RTD breakout box
EPAD2-TH8-P	
Interface:	RS-485
Communication speed:	9600 bps (2400 to 115200 programmable)
Standard settings:	9600 bps, 8 data bits, 1 stop bit, no parity, module address 00 hex
Readout speed:	depending on baudrate and number of channels (typ. 80 ch/sec. @ 9600 bps)
CPAD2-TH8-P	
Interface:	highspeed CAN
Specification:	CAN 2.0B
Communication speed:	50 kBaud to 1000 kBaud
Data Format :	16 Bit Intel or Motorola
Identifier Types:	standard; extended
Standard settings:	500 kBaud; Intel Format
Readout speed:	12.5 Hz, 10 Hz, 5 Hz, 2 Hz, 1 Hz, 0.5 Hz, 0.2 Hz or 0.1 Hz programmable
Bus/Power connector:	LEMO EGG.1B.304
Power supply voltage:	7 to 40 V
Power consumption:	max. 0.5 W
Dimensions:	
Base module (W x D x H):	129 x 72 x 34.2 mm (5.1 x 2.8 x 1.3 in.) incl. mounting holes
Mounting holes distance:	119 x 7 mm (4.7 x 0.3 in.), 4.2 mm (0.165 in.) diameter
Weight:	typical 310 g

EPAD2/CPAD2-LA8

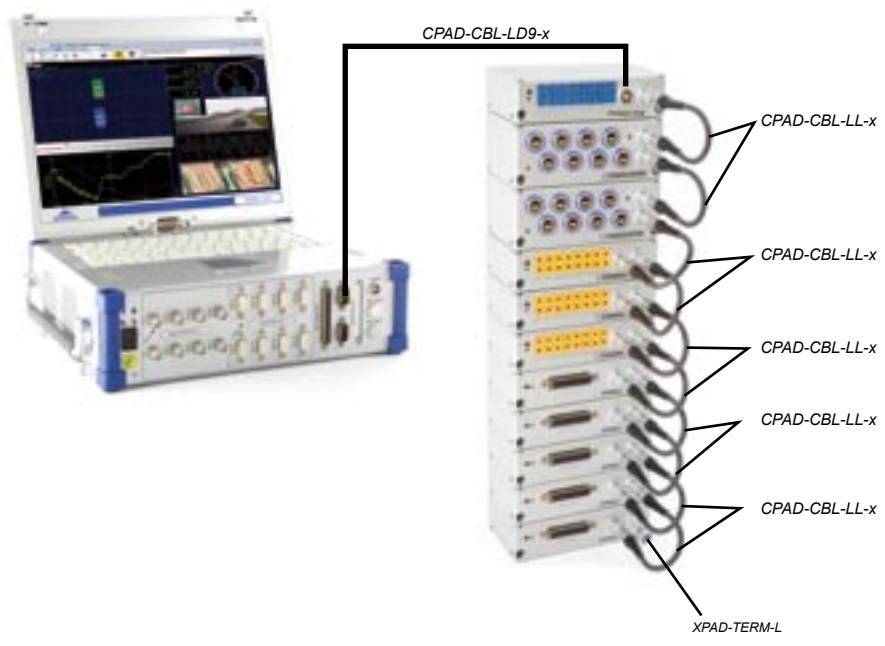
- Intelligent amplifier for 4 to 20 mA sensors
- 8 galvanically isolated current inputs
- RS-485 or CAN interface
- CPAD2-LA8: CAN interface
- EPAD2-LA8: RS485 interface (optional USB, RS232, CAN via EPAD-BASE2 interface)



Analog input specifications

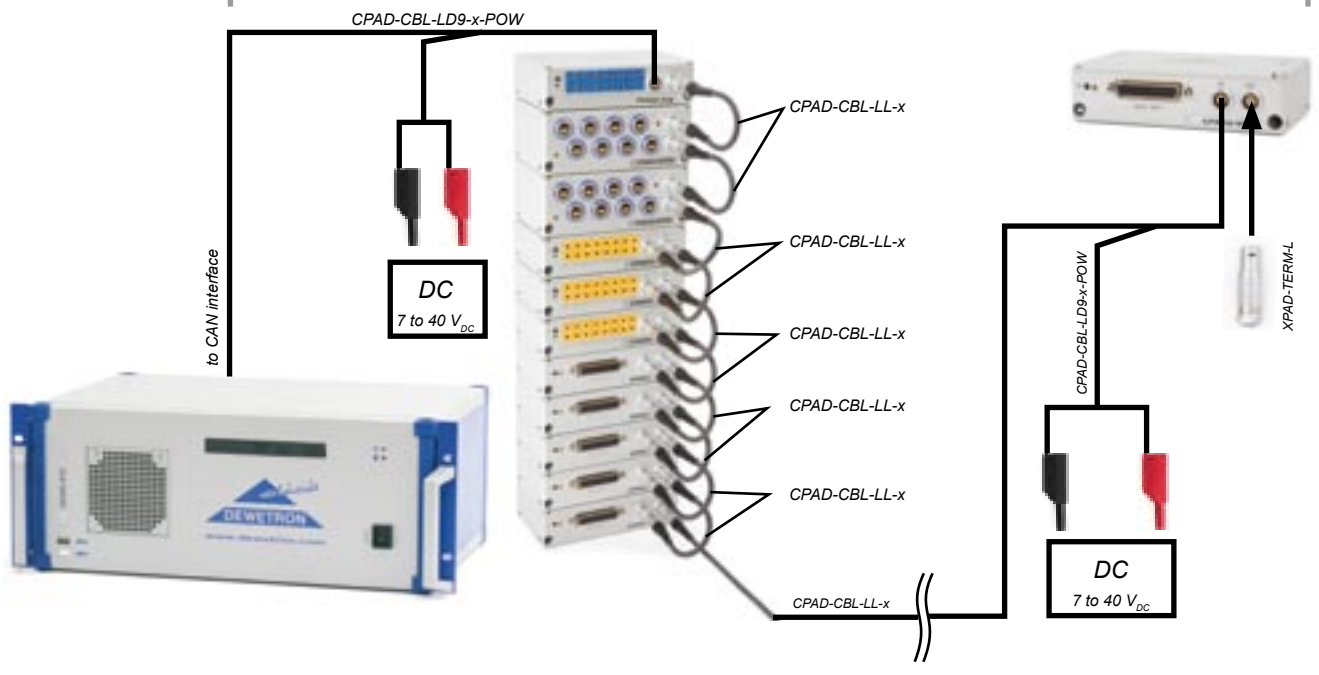
xPAD2-LA8	
Input channels:	8 isolated Current Inputs
Input range:	0 to 20 mA, ± 20 mA; ± 30 mA
Accuracy	0.03 % of reading ± 0.3 μ A
Sampling rate:	max. 12.5 S/sec per channel
Bandwidth (-3 dB):	6 Hz
ADC type:	24 Bit Delta Sigma Converter
Input connector:	LEMO EGB.1B.304
Resolution:	0.3 μ A
Input impedance	50 Ω 0.1 %
Temperature drift:	typically 20 ppm/ $^{\circ}$ C
Isolation voltage:	350 V _{DC} (channel to channel and channel to Bus, Power and Chassis)
Overcurrent protection:	70 mA continuous
CMRR (50/60 Hz):	130 dB
EPAD2-TH8-P	
Interface:	RS-485
Communication speed:	9600 bps (2400 to 115200 programmable)
Standard settings:	9600 bps, 8 data bits, 1 stop bit, no parity, module address 00 hex
Readout speed:	depending on baudrate and number of channels (typ. 80 ch/sec. @ 9600 bps)
CPAD2-TH8-P	
Interface:	highspeed CAN
Specification:	CAN 2.0B
Communication speed:	50 kBaud to 1000 kBaud
Data format :	16 Bit Intel or Motorola
Identifier types:	standard; extended
Standard settings:	500 kBaud; Intel Format
Readout speed:	12.5 Hz, 10 Hz, 5 Hz, 2 Hz, 1 Hz, 0.5 Hz, 0.2 Hz or 0.1 Hz programmable
Bus/Power connector:	LEMO EGG.1B.304
Power supply voltage:	7 to 40 V
Power consumption:	max. 0.5 W
Dimensions:	
Base module (W x D x H):	129 x 72 x 34.2 mm (5.1 x 2.8 x 1.3 in.) incl. mounting holes
Mounting holes distance:	119 x 7 mm (4.7 x 0.3 in.), 4.2 mm (0.165 in.) diameter
Weight:	typical 360 g

Configuration examples with CPAD2 modules

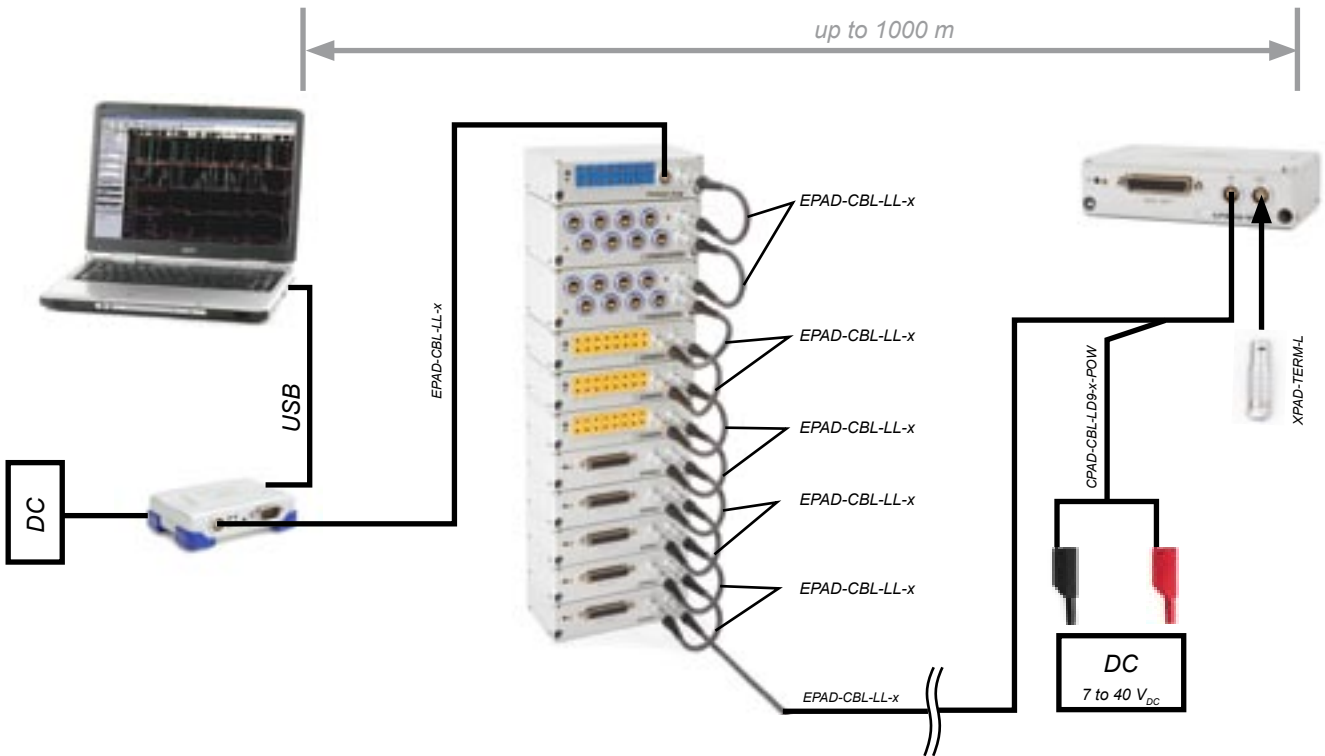
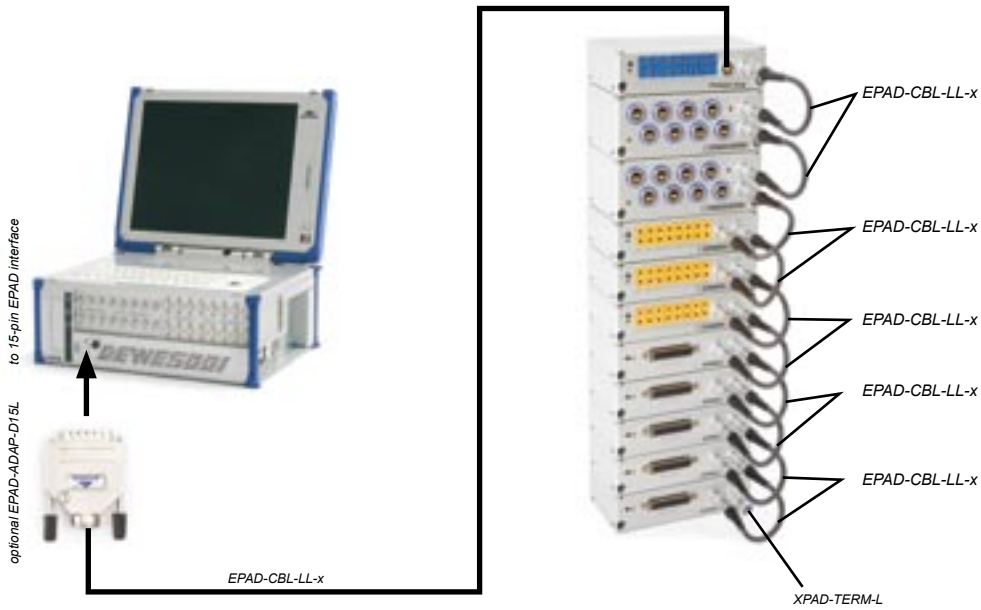


CAN bus length:

- 1 Mbit/s: 30 m
- 800 kbit/s: 50 m
- 500 kbit/s: 100 m
- 250 kbit/s: 250 m
- 125 kbit/s: 500 m
- 50 kbit/s: 1000 m



Configuration examples with EPAD2 modules



Re-inventing Data Acquisition

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