Automotive
Energy & Power Analysis
Aerospace & Defense
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*

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*

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.

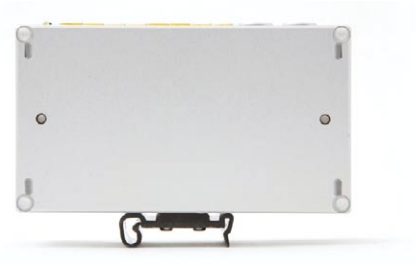
worldwide DEWETRON

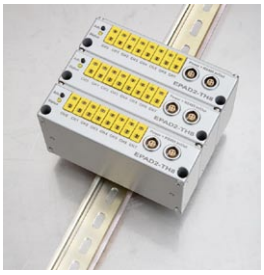
Mounting examples

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

DIN rail

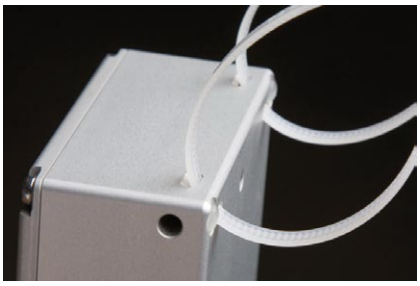
By ordering option XPAD-DIN-RAIL an adapter to snap EPAD2 and CPAD2 modules onto a DIN rail is included. A typical application for this is using EPAD2/CPAD2 inside 19" cabinets.





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.



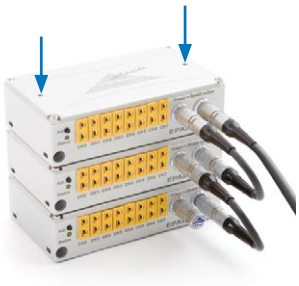
Bolt down

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

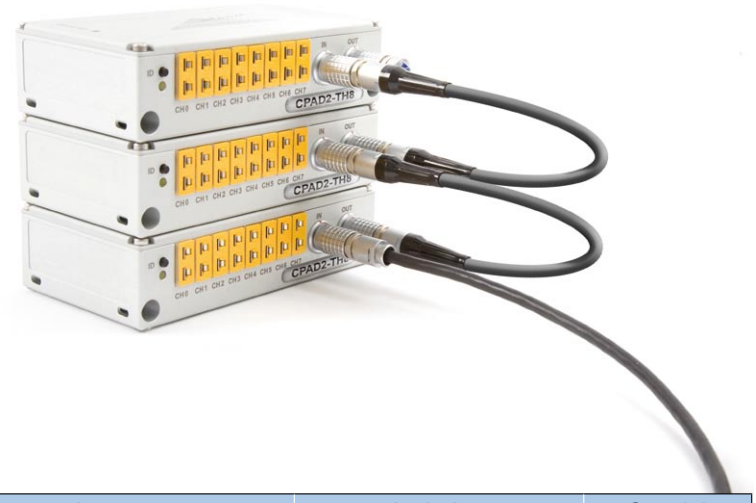
A unique mechanism to stack any number of modules is provided. Simply put one module on top of the other, take an adequate Allen key, press down the integrated screw and fasten it. Do the same for the 2nd screw and the two modules are locked. Making a stack is useful if more than eight channels need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



Selection Guide

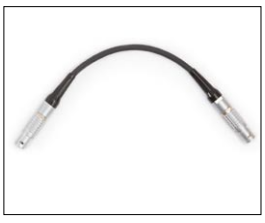
EPAD2/CPAD2 modules

- *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*



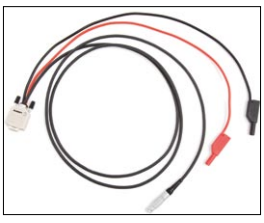
Module	Input type	Input ranges	Isolation	Special
EPAD2/CPAD2-TH8-x 	8 thermocouple connectors Type J: xPAD2-TH8-P-J Type K: xPAD2-TH8-P-K Type T: xPAD2-TH8-P-T	Type J: -210 to 1200 °C Type K: -270 to 1372 °C Type T: -270 to 400 °C	350 V_{DC} (channel to channel and channel to BUS, power and chassis)	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-x: K, J, T standard type
  xPAD2-TH8-UNIVERSAL: Universal type
- *CPAD2-TH8-x: CAN interface*
- *EPAD2-TH8-x: RS485 interface (optional USB, RS232, CAN via EPAD-BASE2 interface)*

Specifications

	xPAD2-TH8-x		
Input channels	8 isolated Thermocouple Channels		
Input signals xPAD2-TH8-x xPAD2-TH8-UNIVERSAL	 Thermocouple type K, J, T (others on request) Thermocouple type K, J, T, R, S, N, E, C, U, B		
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* Standard models xPAD2-TH8-K /-J / -T Type K (-270 to 1372 °C): Type J (-210 to 1200 °C): Type T (-270 to 400 °C): Special models on request xPAD-TH8-x Type R, S (-50 to 1760 °C): Type N (-270 to 1300 °C): Type E (-270 to 1000 °C): Type C (0 to 2300 °C): Type U (-200 to 600 °C): Type B (0 to 1820 °C): *) +1.0 °C when using xPAD2-TH8-UNIVERSAL.	 ±1.0 °C @ -200 to -25 °C ±1.0 °C @ -210 to -100 °C ±1.0 °C @ -250 to -150 °C ±1.6 °C @ -50 to 0 °C ±1.2 °C @ -200 to -100 °C ±1.0 °C @ -200 to -50 °C ±0.6 °C @ 0 to 800 °C ±1.0 °C @ -200 to -50 °C ±20 °C @ 0 to 400 °C	 ±0.4 °C @ -25 to 1000 °C ±0.3 °C @ -100 to 760 °C ±0.4 °C @ -150 to 400 °C ±1.0 °C @ 0 to 100 °C ±0.5 °C @ -100 to 1300 °C ±0.4 °C @ -50 to 1000 °C ±0.8 °C @ -800 to 1500 °C ±0.4 °C @ -50 to 200 °C ±0.6 °C @ 400 to 1000 °C	 ±0.5 °C @ 1000 to 1372 °C ±0.4 °C @ 760 to 1200 °C ±0.4 °C @ 100 to 1760 °C ±1.5 °C @ 1500 to 2300 °C ±0.3 °C @ 200 to 600 °C ±0.5 °C @ 1000 to 1800 °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) Mounting holes distance:	 129 x 72 x 34.2 mm (5.1 x 2.8 x 1.3 in.) incl. mounting holes 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)*

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 µV for all ranges
DC accuracy	±0.02 % of reading ±900 µV
Temperature drift	typically 25 ppm/°C
Linearity	0.001 %
Input impedance	1 MΩ
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) Mounting holes distance	 129 x 72 x 34.2 mm (5.1 x 2.8 x 1.3 in.) incl. mounting holes 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)*

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	Pt100 a = 0.00385 ±0.25 °C @ -200 to 100 °C ±0.4 °C @ 100 to 400 °C ±0.8 °C @ 400 to 800 °C	Pt100 a = 0.003916 ±0.25 °C @ -200 to 100 °C ±0.4 °C @ 100 to 400 °C ±0.8 °C @ 400 to 800 °C	Pt200 a = 0.00385 ±0.25 °C @ -200 to 100 °C ±0.4 °C @ 100 to 400 °C ±0.5 °C @ 400 to 630 °C
	Pt500 a = 0.00385 ±0.25 °C @ -200 to 100 °C ±0.4 °C @ 100 to 250 °C	Pt1000 a = 0.00385 ±0.25 °C @ -200 to 100 °C ±0.4 °C @ 100 to 400 °C ±0.8 °C @ 400 to 600 °C	Pt2000 a = 0.00385 ±0.25 °C @ -200 to 100 °C ±0.4 °C @ 100 to 400 °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) Mounting holes distance	 129 x 72 x 34.2 mm (5.1 x 2.8 x 1.3 in.) incl. mounting holes 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 PAD-CB8-x-M PAD-CB8-RTD	standard thermocouple breakout box small size thermocouple breakout box 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) Mounting holes distance	 129 x 72 x 34.2 mm (5.1 x 2.8 x 1.3 in.) incl. mounting holes 119 x 7 mm (4.7 x 0.3 in.), 4.2 mm (0.165 in.) diameter	
Weight	typical 310 g	

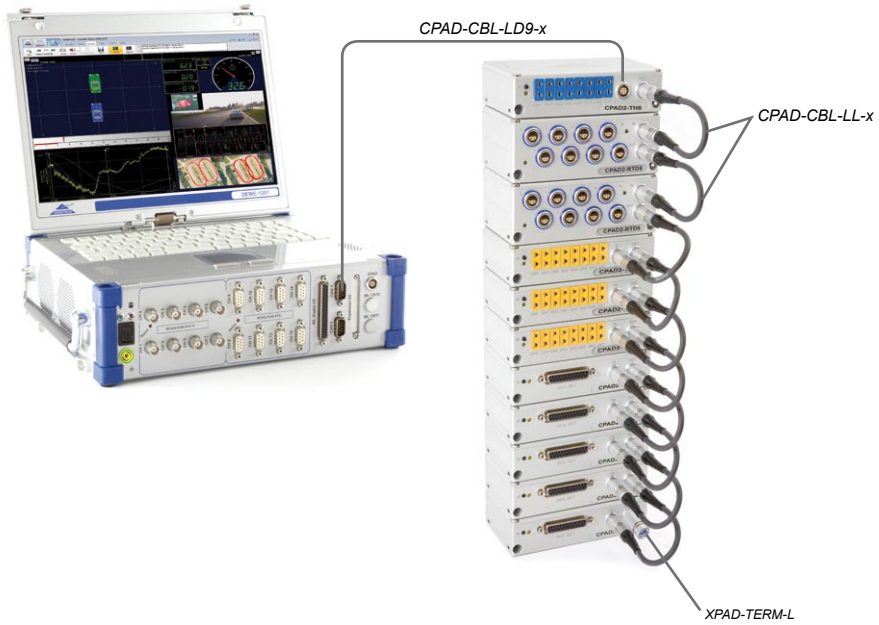
EPAD2/CPAD2-LA8

- *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

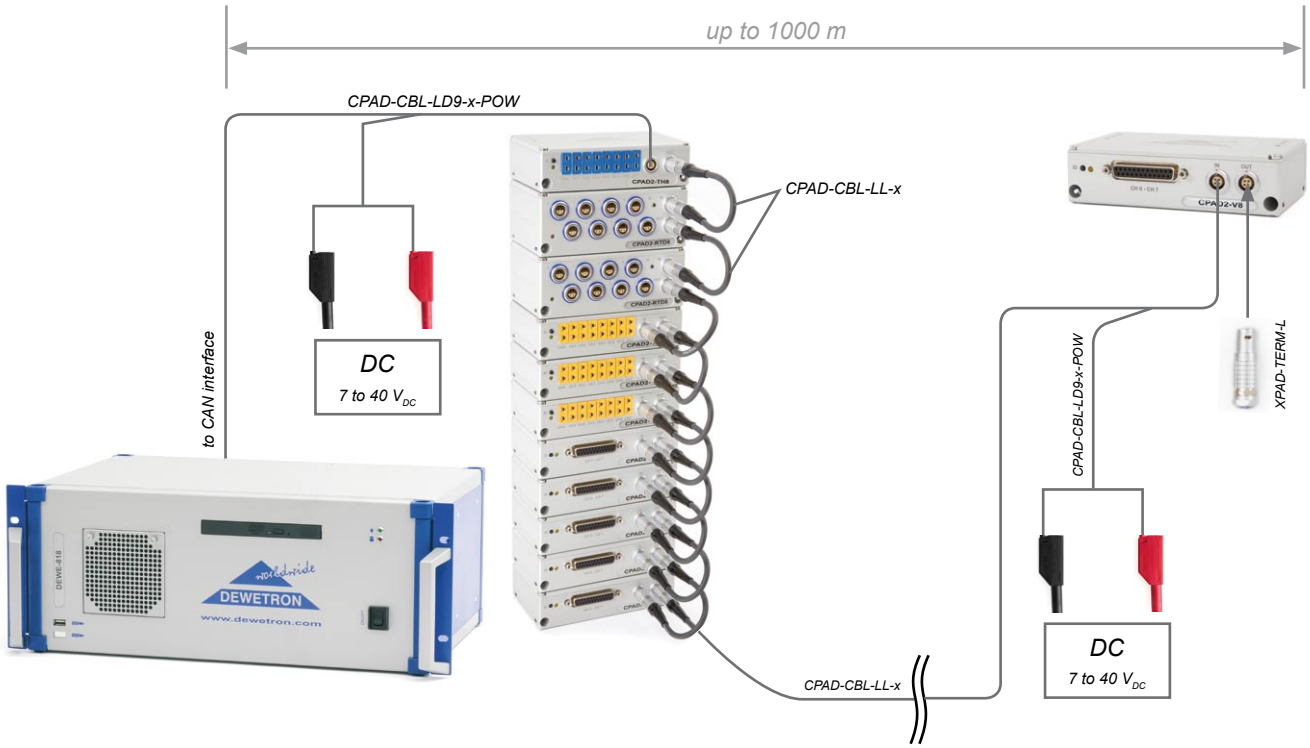
	xPAD2-LA8
Input channels	8 isolated current inputs
Input range	0 to 20 mA, ±20 mA; ±30 mA
Accuracy	0.03 % of reading ±0.3 µA
Sampling rate	max. 12.5 S/sec per channel
Bandwidth (-3 dB)	6 Hz
ADC type	24 bit Delta Sigma Converter
Input connector	LEMO EGB.1B.304
Resolution	0.3 µA
Input impedance	50 Ω 0.1 %
Temperature drift	typically 20 ppm/°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) Mounting holes distance	 129 x 72 x 34.2 mm (5.1 x 2.8 x 1.3 in.) incl. mounting holes 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