

Automotive

Energy & Power Analysis

Aerospace & Defense

Transportation

General Test & Measurement

# ***DEWE-EPAD2/CPAD2 modules***

*Technical reference manual*



Re-inventing Data Acquisition



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## Warranty Information

A copy of the specific warranty terms applicable to your DEWETRON product and replacement parts can be obtained from your local sales and service office.

## Support

For any support please contact your local distributor first or DEWETRON directly.

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08:00 and 17:00 GST (GMT -5:00)

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## Printing History

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# Safety instructions

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## Safety symbols in the manual

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*Indicates hazardous voltages.*

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**WARNING** *Calls attention to a procedure, practice, or condition that could cause bodily injury or death.*

---

**CAUTION** *Calls attention to a procedure, practice, or condition that could possibly cause damage to equipment or permanent loss of data.*

---

### WARNINGS

*The following general safety precautions must be observed during all phases of operation, service, and repair of this product. Failure to comply with these precautions or with specific warnings elsewhere in this manual violates safety standards of design, manufacture, and intended use of the product. DEWETRON Elektronische Messgeräte Ges.m.b.H. assumes no liability for the customer's failure to comply with these requirements.*

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**All accessories shown in this document are available as option and will not be shipped as standard parts.**

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*For safety reasons max. 50 V may be applied to the BNC input-connectors!  
Refer to the regulation of maximum allowable touch potential.*

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# Safety instructions

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## Safety instructions for all DEWETRON systems

- The DEWETRON data acquisition systems may only be installed by experts.
- Read your manual before operating the system.
- Observe local laws when using the instrument.
- Ground the equipment: For Safety Class 1 equipment (equipment having a protective earth terminal), a non interruptible safety earth ground must be provided from the mains power source to the product input wiring terminals or supplied power cable.
- DO NOT operate the product in an explosive atmosphere or in the presence of flammable gases or fumes and do not bring the system in contact with water.
- DO NOT operate damaged equipment: Whenever it is possible that the safety protection features built into this product have been impaired, either through physical damage, excessive moisture, or any other reason, REMOVE POWER and do not use the product until safe operation can be verified by service-trained personnel. If necessary, return the product to a DEWETRON sales and service office for service and repair to ensure that safety features are maintained.
- Keep away from live circuits: Operating personnel must not remove equipment covers or shields. Procedures involving the removal of covers or shields are for use by service-trained personnel only. Under certain conditions, dangerous voltages may exist even with the equipment switched off. To avoid dangerous electrical shock, DO NOT perform procedures involving cover or shield removal unless you are qualified to do so.
- No modifications are allowed at the instrument. The fuse in the power module has to be replaced by the same type. For continued protection against fire, replace the line fuse(s) only with fuse(s) of the same voltage and current rating and type. DO NOT use repaired fuses or short-circuited fuse holder labels and print on the power module may not be removed.
- DO NOT service or adjust alone. Do not attempt internal service or adjustment unless another person, capable of rendering first aid and resuscitation, is present.
- DO NOT substitute parts or modify equipment: Because of the danger of introducing additional hazards, do not install substitute parts or perform any unauthorized modification to the product. Return the product to a DEWETRON sales and service office for service and repair to ensure that safety features are maintained.
- Before opening the instrument (experts only) or exchanging the fuse in the power module disconnect power!
- Don't touch internal wiring!
- Don't use higher supply voltage than specified and take care of the correct polarity, otherwise the system will be damaged!
- Use only original plugs and cables for harnessing.
- Install filler-panels in unused slots.
- The power-cable and -connector serve as Power-Breaker. The cable must not exceed 10 feet, disconnect function must be possible without tools.
- Keep the ventilation slots free and check them frequently to avoid an overheating of the system. The cleaning interval of the filter pads depends on the environmental conditions.
- Safety of the operator and the unit depend on following these rules.
- DEWETRON is not responsible for any damage or injury that could result from improper connection or misuse!

# General Information

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## Environmental Considerations

Information about the environmental impact of the product.

### Product End-of-Life Handling

Observe the following guidelines when recycling a DEWETRON system:

### System and Components Recycling

Production of these components required the extraction and use of natural resources. The substances contained in the system could be harmful to your health and to the environment if the system is improperly handled at it's end of life! Please recycle this product in an appropriate way to avoid an unnecessary pollution of the environment and to keep natural resources.



This symbol indicates that this system complies with the European Union's requirements according to Directive 2002/96/EC on waste electrical and electronic equipment (WEEE). Please find further informations about recycling on the DEWETRON web site [www.dewetron.com](http://www.dewetron.com)

### Restriction of Hazardous Substances

This product has been classified as Monitoring and Control equipment, and is outside the scope of the 2002/95/EC RoHS Directive. This product is known to contain lead.

# General module information

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## Calibration information

All DEWETRON modules are calibrated at 25 °C and meet their specifications when leaving the factory. The time interval for recalibration depends on environmental conditions. Typically, the calibration should be checked once a year.

Calibration certificates are available from DEWETRON as an option. DEWETRON offers two types:

- ISO traceable DEWETRON certificate
- Calibration certificate according to ÖKD (equivalent to DKD)

This manual contains no calibration information. For self calibration, there is a separate calibration kit available. The CAL-KIT contains the required cables, software and instructions.

## General module specifications

Environmental:

Temp. range storage:	-30 °C to +85 °C	(-30 °F to 185 °F)
Temp. range operating:	-5 °C to +60 °C	(-4 °F to 140 °F)
Enhanced temp. range:	on request	
Relative humidity (MIL202):	0 to 95 % at 60 °C, non-condensing	
RFI susceptibility:	±0.5 % span error at 400 MHz, 5 W, 3 m	

All modules are produced according ISO9001 and ISO14001.

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## Notes

# EPAD2/CPAD2-TH8-x Module

## 8 channel thermocouple amplifier

- 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
- RS-485 or CAN interface

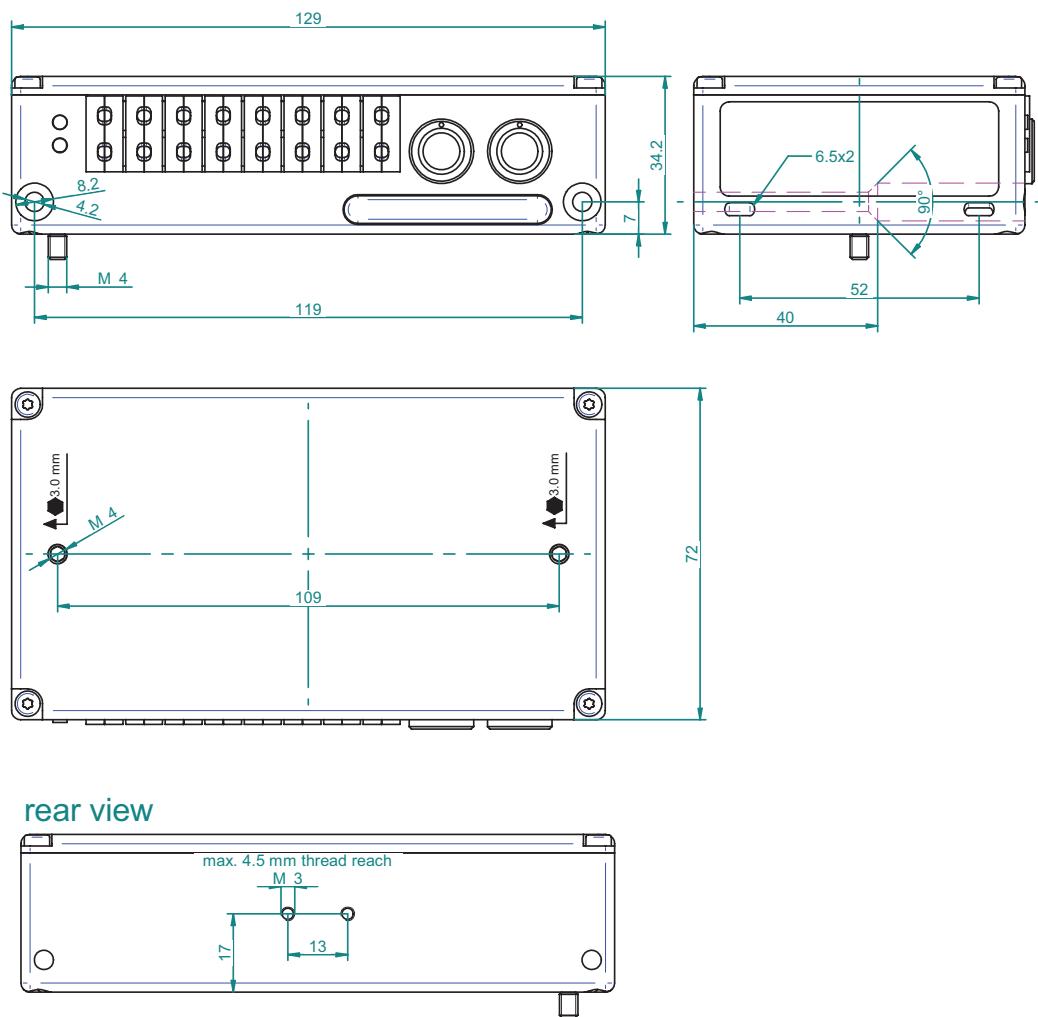


## Module specifications

xPAD2-TH8-x			
Input channels	8 isolated Thermocouple Channels		
Input signals			
xPAD2-TH8-x	Thermocouple type K, J, T (others on request)		
xPAD2-TH8-UNIVERSAL	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*			
Type K (-270 to 1372 °C):	±1.0 °C @ -200 to -25 °C	±0.4 °C @ -25 to 1000 °C	±0.5 °C @ 1000 to 1372 °C
Type J (-210 to 1200 °C):	±1.0 °C @ -210 to -100 °C	±0.3 °C @ -100 to 760 °C	±0.4 °C @ 760 to 1200 °C
Type T (-270 to 400 °C):	±1.0 °C @ -250 to -150 °C	±0.4 °C @ -150 to 400 °C	
Type R, S (-50 to 1760 °C):	±1.6 °C @ -50 to 0 °C	±1.0 °C @ 0 to 100 °C	±0.4 °C @ 100 to 1760 °C
Type N (-270 to 1300 °C):	±1.2 °C @ -200 to -100 °C	±0.5 °C @ -100 to 1300 °C	
Type E (-270 to 1000 °C):	±1.0 °C @ -200 to -50 °C	±0.4 °C @ -50 to 1000 °C	
Type C (0 to 2300 °C):	±0.6 °C @ 0 to 800 °C	±0.8 °C @ -800 to 1500 °C	±1.5 °C @ 1500 to 2300 °C
Type U (-200 to 600 °C):	±1.0 °C @ -200 to -50 °C	±0.4 °C @ -50 to 200 °C	±0.3 °C @ 200 to 600 °C
Type B (0 to 1820 °C):	±20 °C @ 0 to 400 °C	±0.6 °C @ 400 to 1000 °C	±0.5 °C @ 1000 to 1800 °C
*) +1.0 °C when using xPAD2-TH8-UNIVERSAL.			
Temperature drift	typically 20 ppm/°C		
Isolation voltage	350 V <sub>DC</sub> (channel to channel and channel to Bus, Power and Chassis)		
Oversupply protection	15 V <sub>DC</sub>		
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-TH8-x Module

## Dimensions\*



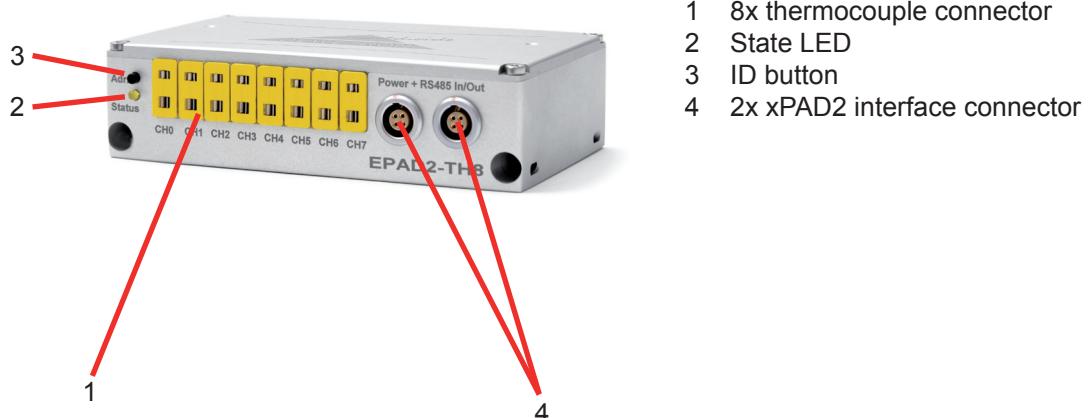
\* Dimensions in mm  
(1 inch = 25.4 mm)

# EPAD2/CPAD2-TH8-x Module

## Push button

Use the ID button to define the module address via software. Detailed information how to use the button is available in chapter: "Installing EPAD2/CPAD2 modules in DEWEsoft, Module reset".

## Connection



## Thermocouple connectors

The xPAD2-TH8-x module supports up to 8 thermocouples. Connect only thermocouple types which match with the connector types. If the module is equipped with type K connectors, you are allowed to connect type K thermocouples only. The white universal connector supports all types of thermocouple connectors.



Thermocouple types						
Type	IEC color code	ANSI color code	Temperature range °C [°F]	Alloy combination +	-	Comments
K	green	yellow	-270 to 1372 [-454 to 2501]	Ni	CrNi	Wide temperature range, most popular calibration
J	black	black	-210 to 1200 [-346 to 2193]	Fe	CuNi	Used in vacuum, reduced and inert atmosphere
T	brown	blue	-270 to 400 [-454 to 752]	Cu	CuNi	Low temperature & cryogenic applications
R	orange	green	-50 to 1760 [-58 to 3214]	Pt13Rh	Pt	High temperature
S	orange	green	-50 to 1760 [-58 to 3214]	Pt10Rh	Pt	High temperature
U	orange	green	-200 to 600 [-328 to 1112]	Cu	CuNi	Also known as RX & SX extension wire.
N	rose	orange	-270 to 1300 [-450 to 2372]	NiCrSi	NiSi	Alternative to type K. More stable at high temp.
E	purple	purple	-270 to 1000 [-454 to 1832]	NiCr	CuNi	Highest EMF change per degree
B	grey	grey	0 to 1820 [32 to 3308]	Pt30Rh	Pt6Rh	High temperature. Common use in glass industry
C*	no standard IEC color	red*	0 to 2310 [32 to 4208]	W5Re	W26Re	Highest temperature range

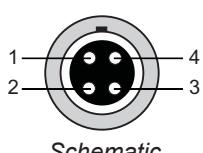
\* no official symbol or standard designation

## xPAD2 interface connector

This connector can be used to connect the module to the EPAD2-BASE module or other xPAD2 series modules.



4 pin LEMO series connector



Schematic

### Pin assignment EPAD2:

- 1 RS-485 (A)
- 2 RS-485 (B)
- 3 Power supply (+)  
(standard: +15 V)
- 4 GND

### Pin assignment CPAD2:

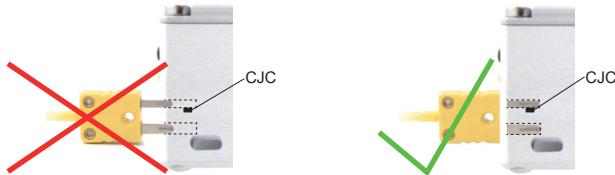
- 1 CAN high
- 2 CAN low
- 3 Power supply (+)  
(standard: +15 V)
- 4 GND

# EPAD2/CPAD2-TH8-x Module

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## CJC

The xPAD2-TH8-x comes with an integrated cold junction compensation sensor with an absolute accuracy of  $\pm 0.2$  °C. In order to achieve this accuracy the sensor has to be connected for at least 2 minutes to the thermocouple connector (CJC equilibrium time).



---

*NOTE: With the xPAD2-TH8-UNIVERSAL it is possible to get almost the same accuracy under laboratory conditions compared to the xPAD2 with dedicated TC-connectors. If the environmental temperature is rapidly changing, the accuracy may decrease three times more compared to the standard thermocouple types! So the XPAD2-TH8-UNIVERSAL is not recommended for automotive measurements!*

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## Programming information

The xPAD2-TH8-x programming information is available in the *DEWE-MODULES Programmers Reference Manual*.

# EPAD2/CPAD2-V8 Module

## 8 channel voltage amplifier

- Intelligent amplifier with integrated 24-bit A/D conversion
- 8 channel isolated data acquisition
- RS-485 or CAN interface

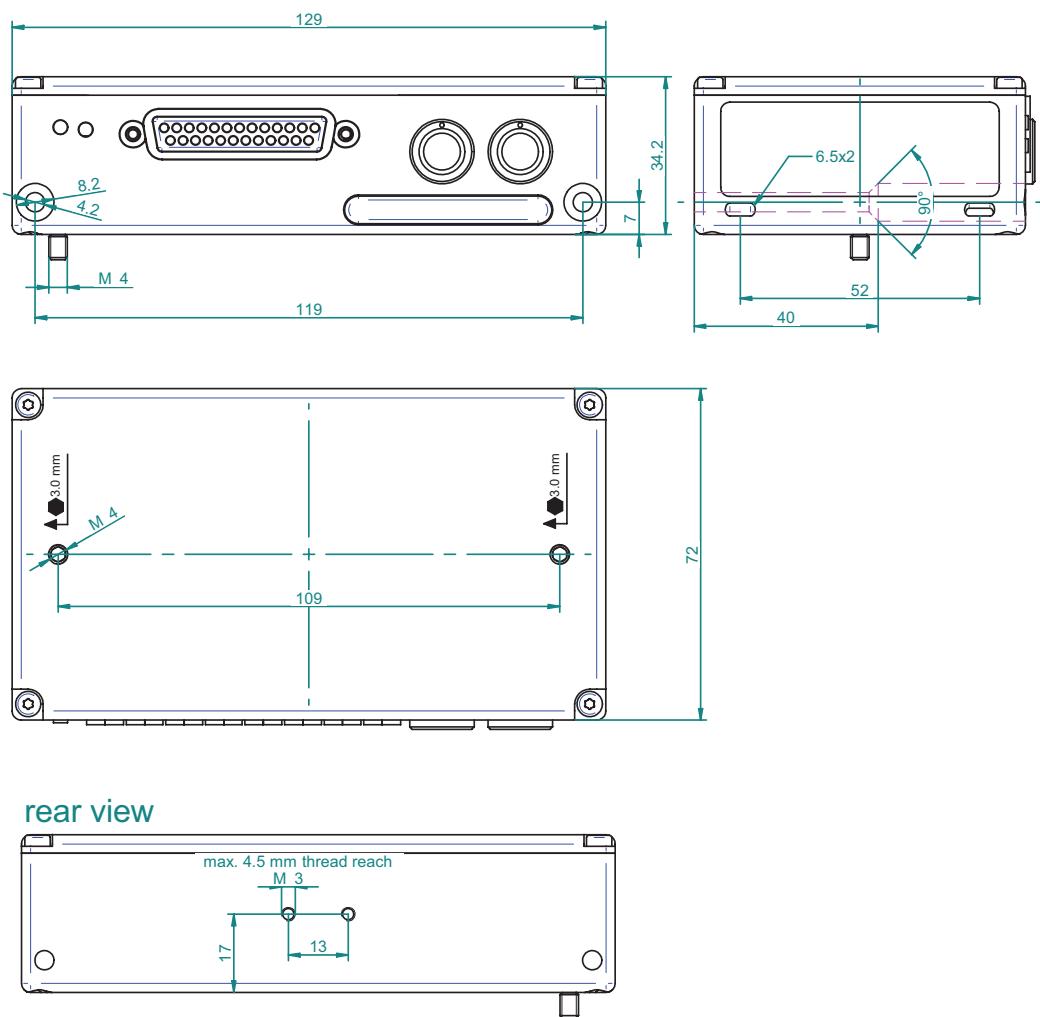


## Module specifications

xPAD2-V8	
Input channels	8 isolated voltage input channels
Input ranges	Physical input range: $\pm 50$ V Software selectable: $\pm 100$ mV, $\pm 500$ mV, $\pm 1$ V, $\pm 2.5$ V, $\pm 5$ V, $\pm 10$ V
Resolution	10 $\mu$ V for all ranges
DC accuracy	$\pm 0.02$ % of reading $\pm 900$ $\mu$ V
Temperature drift	typically 25 ppm/ $^{\circ}$ C
Linearity	0.001 %
Input impedance	1 M $\Omega$
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 <sub>DC</sub> (channel to channel and channel to Bus, Power and Chassis)
Oversupply protection	350 V <sub>DC</sub>
Common mode voltage	350 V <sub>DC</sub> / 250 V <sub>AC</sub> @ 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-V8 Module

## Dimensions\*



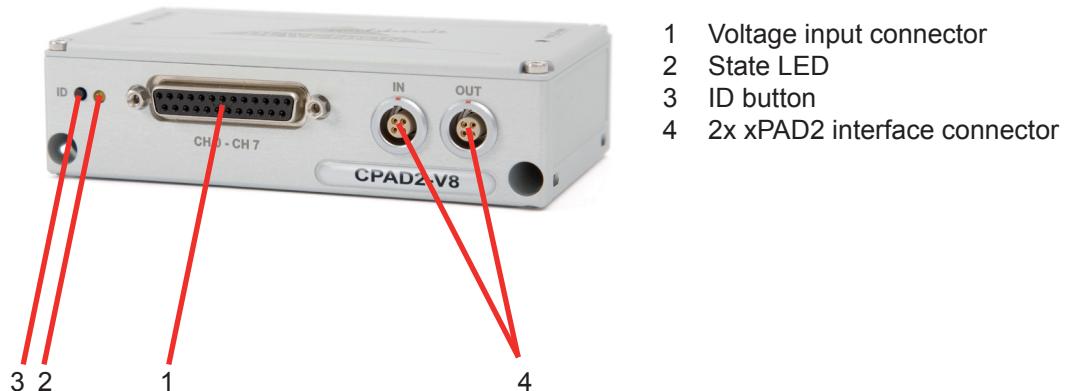
\* Dimensions in mm  
(1 inch = 25.4 mm)

# EPAD2/CPAD2-V8 Module

## Push button

Use the ID button to define the module address via software. Detailed information how to use the button is available in chapter: "Installing EPAD2/CPAD2 modules in DEWEsoft, Module reset".

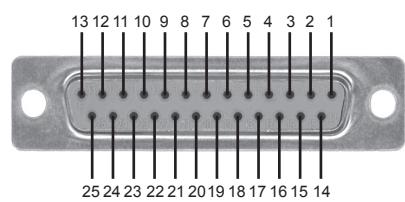
## Connection



## Voltage input connector

The xPAD2-V8 module offers 8 differential voltage input channels.

Pin assignment:



25-pin female DSUB connector

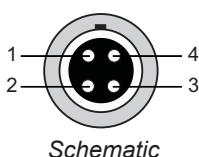
1	Channel 0	(+)	13	Channel 6	(+)
2	Channel 0	(-)	14	Channel 6	(-)
3	Channel 1	(+)	15	Channel 7	(+)
4	Channel 1	(-)	16	Channel 7	(-)
5	Channel 2	(+)	17	Reserved	
6	Channel 2	(-)	18	Reserved	
7	Channel 3	(+)	19	Reserved	
8	Channel 3	(-)	20	Power supply (+)	
9	Channel 4	(+)	21	Reserved	
10	Channel 4	(-)	22	GND	
11	Channel 5	(+)	23	Reserved	
12	Channel 5	(-)	24	Reserved	
25			25	Reserved	

## xPAD2 interface connector

This connector can be used to connect the module to the EPAD-BASE2 module or other xPAD2 series



4 pin LEMO series connector



Pin assignment EPAD2:

1	RS-485 (A)
2	RS-485 (B)
3	Power supply (+) (standard: +15 V)
4	GND

Pin assignment CPAD2:

1	CAN high
2	CAN low
3	Power supply (+) (standard: +15 V)
4	GND

# EPAD2/CPAD2-V8 Module

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## Programming information

The xPAD-V8 programming information is available in the *DEWE-MODULES Programmers Reference Manual*.

# EPAD2/CPAD2-RTD8 Module

## 8 channel Resistance Temperature Detector amplifier

- Amplifier with integrated 24-bit A/D conversion
- 8 isolated Resistance Temperature Detector channels
- RS-485 or CAN interface

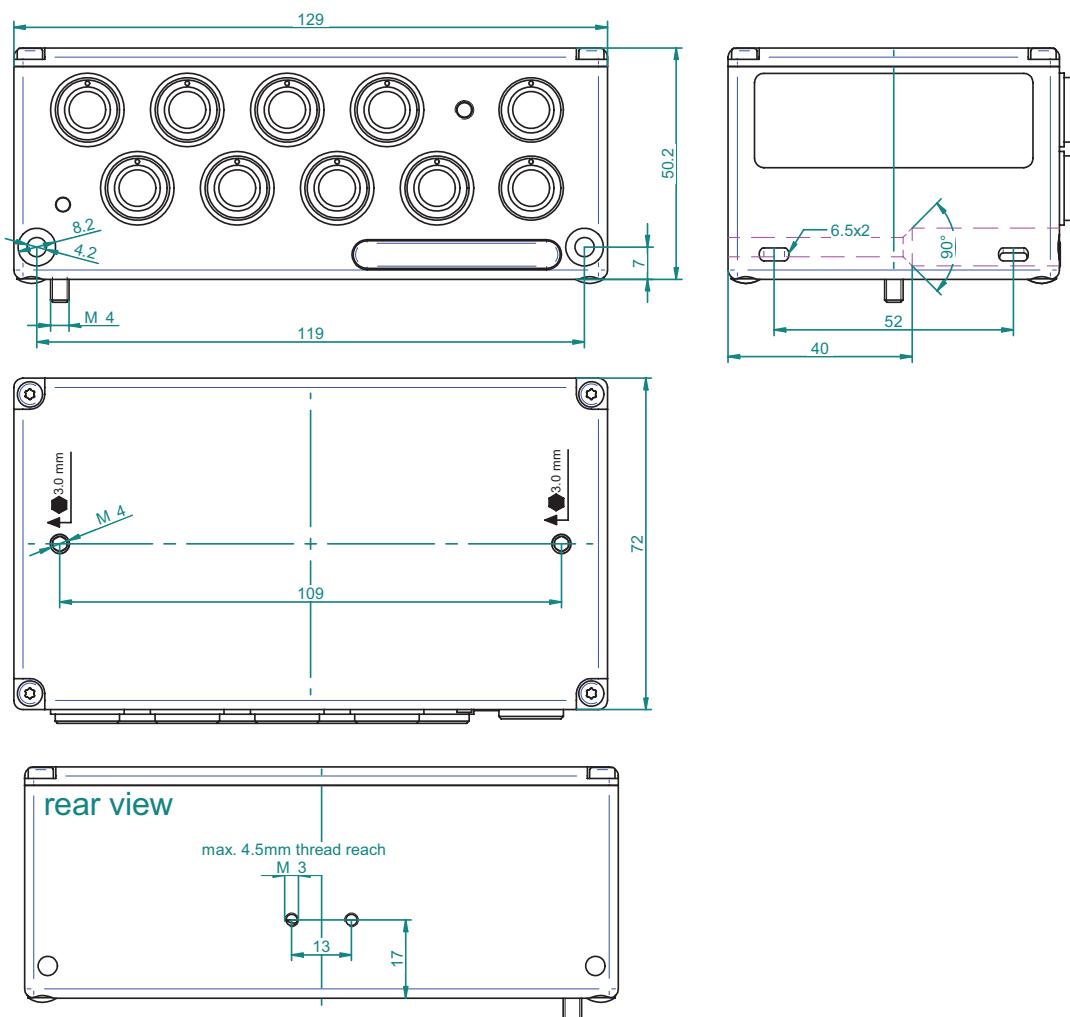


## Module specifications

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 <sub>DC</sub> (channel to channel and channel to Bus, Power and Chassis)		
Oversupply protection	15 V <sub>DC</sub>		
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-RTD8 Module

## Dimensions\*



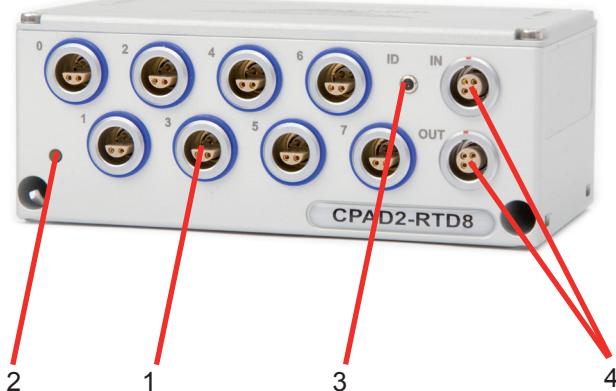
\* Dimensions in mm  
(1 inch = 25.4 mm)

# EPAD2/CPAD2-RTD8 Module

## Push button

Use the ID button to define the module address via software. Detailed information how to use the button is available in chapter: "Installing EPAD2/CPAD2 modules in DEWEsoft, Module reset".

## Connection



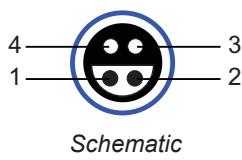
- 1 RTD input connectors
- 2 State LED
- 3 ID button
- 4 2x xPAD2 interface connector

## RTD input connector

The xPAD2-RTD8 module offers 8 isolated Resistor Temperature Detector input channels.



ERA.1S.304.CLL



Schematic

### Pin assignment:

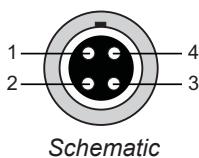
- 1 Excitation (+)
  - 2 Sense (+)
  - 3 Sense (-)
  - 4 Excitation (-)
- Shield is on housing

## xPAD2 interface connector

This connector can be used to connect the module to the EPAD-BASE2 module or other xPAD2 series



4 pin LEMO series connector



Schematic

### Pin assignment EPAD2:

- 1 RS-485 (A)
- 2 RS-485 (B)
- 3 Power supply (+)  
(standard: +15 V)
- 4 GND

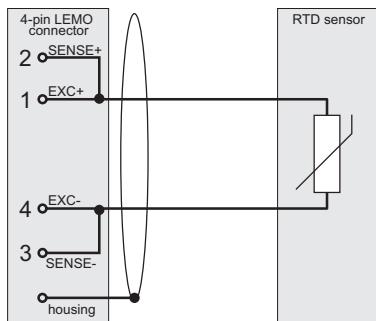
### Pin assignment CPAD2:

- 1 CAN high
- 2 CAN low
- 3 Power supply (+)  
(standard: +15 V)
- 4 GND

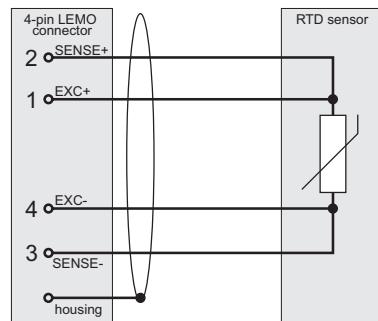
# EPAD2/CPAD2-RTD8 Module

## Sensor connection

### 2-wire connection



### 4-wire connection



## Programming information

The xPAD-RTD8 programming information is available in the *DEWE-MODULES Programmers Reference Manual*.

# EPAD2/CPAD2-TH8-P Module

## 8 channel thermocouple and RTD amplifier

- Intelligent amplifier with integrated 24-bit A/D conversion
- 8 galvanically isolated input channels
- External CJC
- Automatic sensor block detection
- Signal connection via 25-pin SUB-D connector
- 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

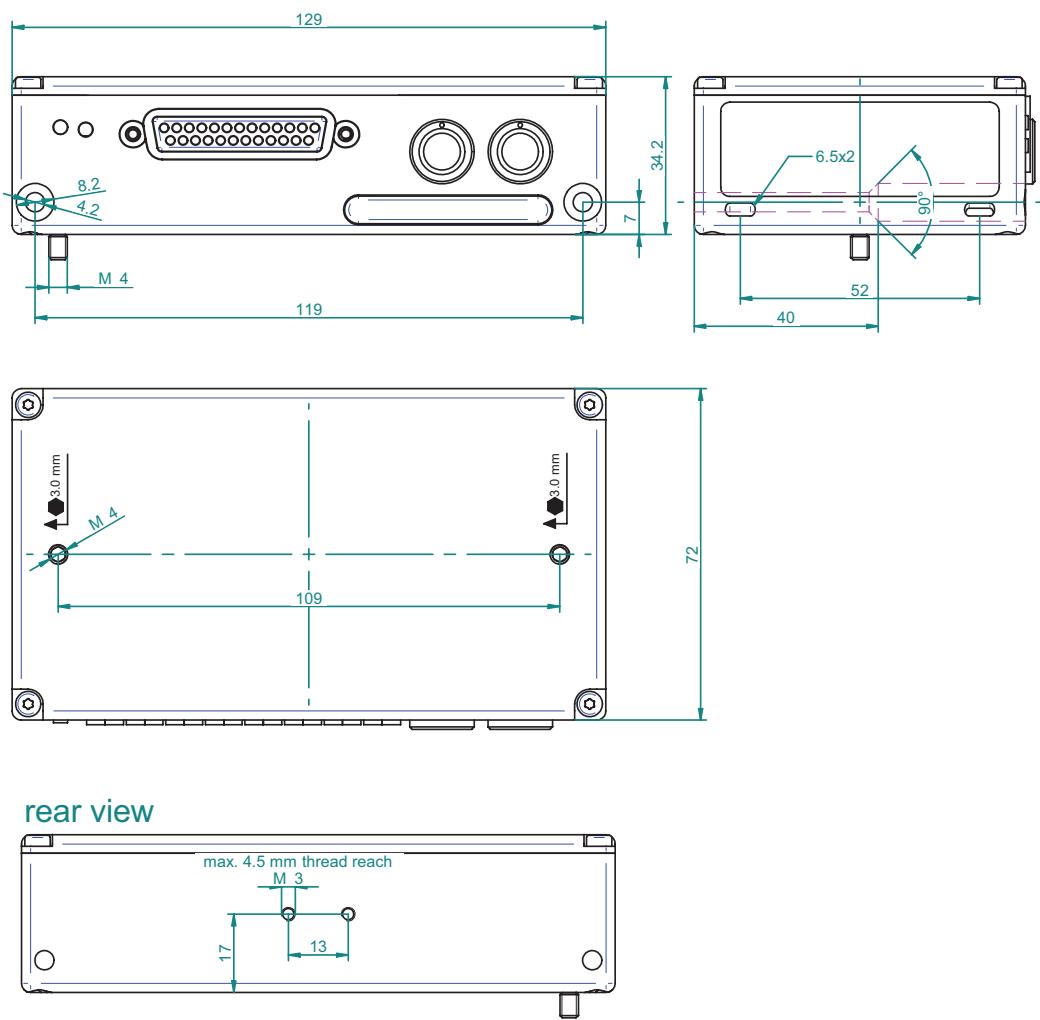


## Module specifications

xPAD2-TH8-P	
Input channels	8 isolated voltage inputs
Input range	$\pm 1.5 \text{ V}$
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 $\mu\text{V}$
Input impedance	typically 1.4 $\text{M}\Omega$
Bias current	typically 10 nA
Temperature drift	typically 20 ppm/ $^{\circ}\text{C}$
Isolation voltage	350 $\text{V}_{\text{DC}}$ (channel to channel and channel to bus, power and chassis)
Overshoot protection	15 $\text{V}_{\text{DC}}$
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)	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-TH8-P Module

## Dimensions\*



\* Dimensions in mm  
(1 inch = 25.4 mm)

# EPAD2/CPAD2-TH8-P Module

## General

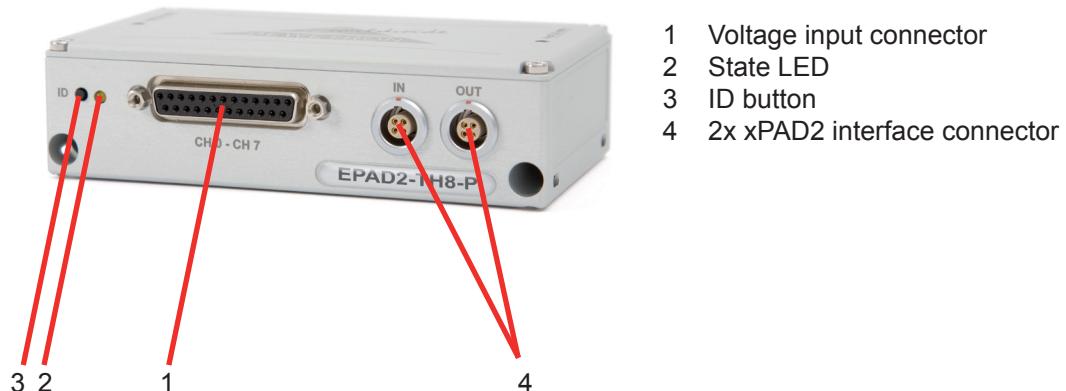
To use the full power of the xPAD2-TH8-P module, a supported breakout box for RTD and thermocouple sensors should be ordered together with the module.

Supported breakout boxes:	PAD-CB8-x-P2	standard thermocouple breakout box
	PAD-CB8-x-M	small size thermocouple box
	PAD-CB8-RTD	RTD breakout box

## Push button

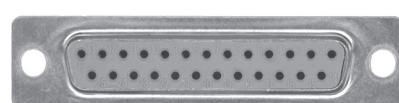
Use the ID button to define the module address via software. Detailed information how to use the button is available in chapter: "Installing EPAD2/CPAD2 modules in DEWEsoft, Module reset".

## Connection

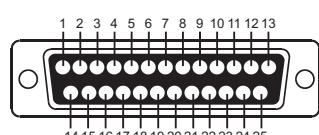


## Voltage input connector

The xPAD2-TH8-P module offers 8 differential voltage input channels.



Pin assignment:



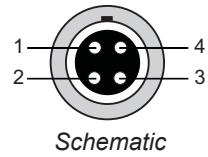
Schematic

1	Channel 0	(+)	13	Channel 6	(+)
2	Channel 0	(-)	14	Channel 6	(-)
3	Channel 1	(+)	15	Channel 7	(+)
4	Channel 1	(-)	16	Channel 7	(-)
5	Channel 2	(+)	17	Reserved	
6	Channel 2	(-)	18	Reserved	
7	Channel 3	(+)	19	Reserved	
8	Channel 3	(-)	20	Power supply (+)	
9	Channel 4	(+)	21	Reserved	
10	Channel 4	(-)	22	GND	
11	Channel 5	(+)	23	Reserved	
12	Channel 5	(-)	24	Reserved	
			25	Reserved	

# EPAD2/CPAD2-TH8-P Module

## xPAD2 interface connector

This connector can be used to connect the module to the EPAD-BASE2 module or other xPAD2 series



Schematic

### Pin assignment EPAD2:

1	RS-485 (A)
2	RS-485 (B)
3	Power supply (+) (standard: +15 V)
4	GND

### Pin assignment CPAD2:

1	CAN high
2	CAN low
3	Power supply (+) (standard: +15 V)
4	GND

## Programming information

The xPAD2-TH8-P-x programming information is available in the *DEWE-MODULES Programmers Reference Manual*.

# EPAD2/CPAD2-LA Module

## 8 channel high precision amplifier for 4 to 20 mA sensors

- Intelligent amplifier with integrated 24-bit A/D conversion
- 8 galvanically isolated input channels
- RS-485 or CAN interface

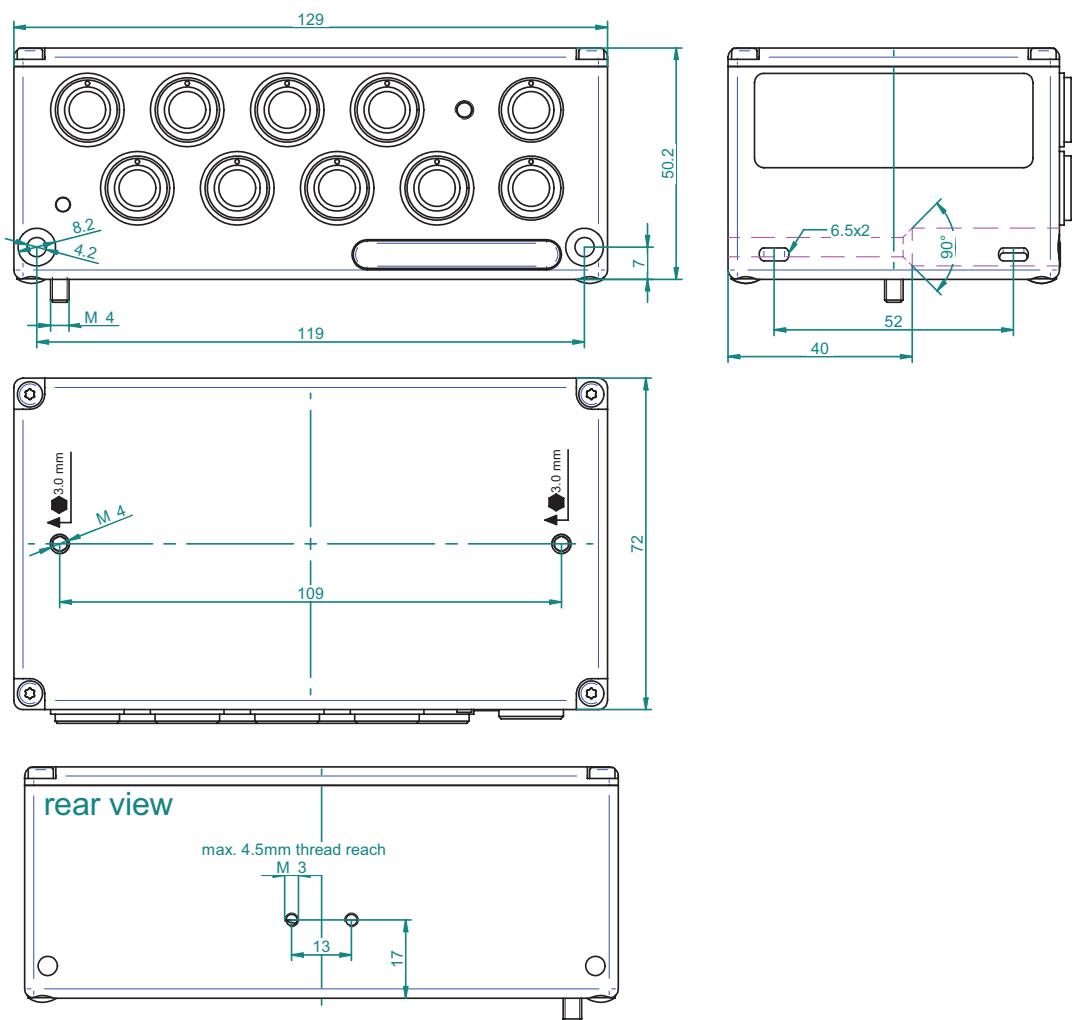


## Module specifications

xPAD2-LA8	
Input channels	8 isolated current inputs
Input range	0 to 20 mA, $\pm 20$ mA; $\pm 30$ mA
Accuracy	0.03 % of reading $\pm 0.3$ $\mu$ 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 $\mu$ A
Input impedance	50 $\Omega$ 0.1 %
Temperature drift	typically 20 ppm/ $^{\circ}$ C
Isolation voltage	350 V <sub>DC</sub> (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

# EPAD2/CPAD2-LA Module

## Dimensions\*



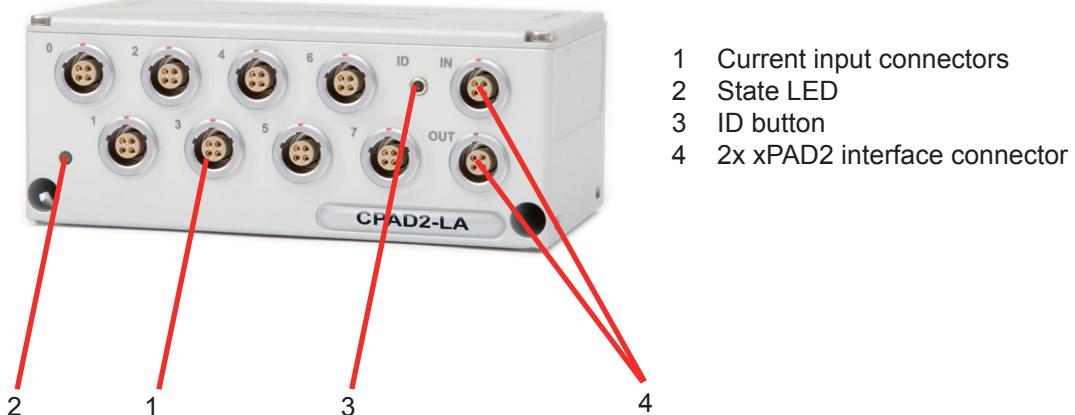
\* Dimensions in mm  
(1 inch = 25.4 mm)

# EPAD2/CPAD2-LA Module

## Push button

Use the ID button to define the module address via software. Detailed information how to use the button is available in chapter: "Installing EPAD2/CPAD2 modules in DEWEsoft, Module reset".

## Connection

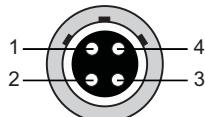


## LA input connector

The xPAD2-LA module offers 8 isolated current input channels.



EGB.1B.304



Schematic

### Pin assignment:

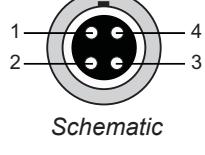
- |   |                  |
|---|------------------|
| 1 | Power supply (+) |
| 2 | Current (+)      |
| 3 | Current (-)      |
| 4 | Power supply (-) |
- Shield is on housing

## xPAD2 interface connector

This connector can be used to connect the module to the EPAD-BASE2 module or other xPAD2 series



4 pin LEMO series connector



Schematic

### Pin assignment EPAD2:

- |   |                                       |
|---|---------------------------------------|
| 1 | RS-485 (A)                            |
| 2 | RS-485 (B)                            |
| 3 | Power supply (+)<br>(standard: +15 V) |
| 4 | GND                                   |

### Pin assignment CPAD2:

- |   |                                       |
|---|---------------------------------------|
| 1 | CAN high                              |
| 2 | CAN low                               |
| 3 | Power supply (+)<br>(standard: +15 V) |
| 4 | GND                                   |

## Programming information

The xPAD2-RTD8 programming information is available in the *DEWE-MODULES Programmers Reference Manual*.

# EPAD2/CPAD2-LA Module

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## Notes

# Installing CPAD2 modules

## Installing CPAD2 modules in DEWEsoft 7.x

### Activate CPAD2 modules

Click on "Settings" > "Hardware Setup" > "CAN"

- Select the CAN device you are using
- Set the CAN Port you use for the CPAD to acknowledge
- Set the CAN Port to CPAD2 in the special devices section.

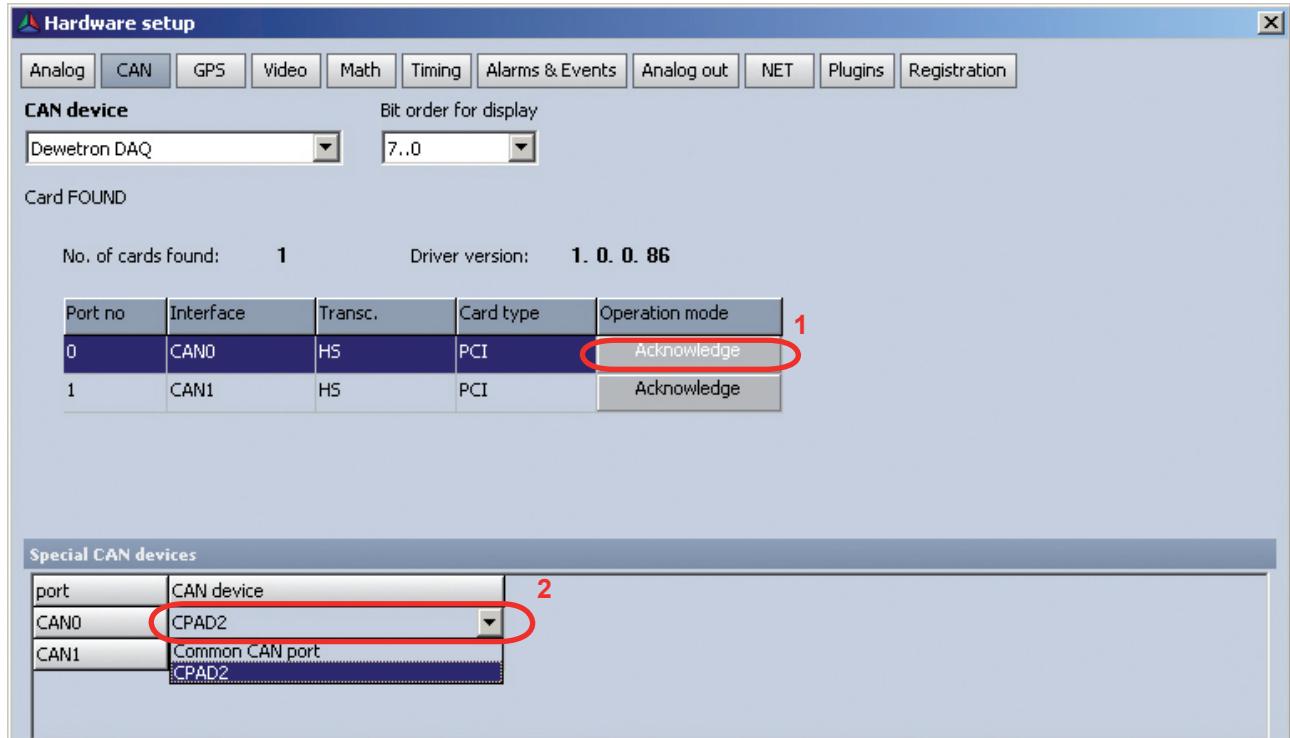


Figure 1: Activate CPAD2 modules

### Configuring CPAD2 modules

Click on "CH. Setup" > "CAN" > "CANx" > "Config"

Here it is possible to configure your can modules. Automatically all connected CPAD modules should be found in one of the two sections. You can move modules with "drag and drop" from the used to the unused section.

The status LED of the modules will help you to configure the modules:

- LED is on: Module is in the used section
- LED is off: Module is in the unused section
- LED is blinking: Module is selected with the mouse.

# Installing CPAD2 modules

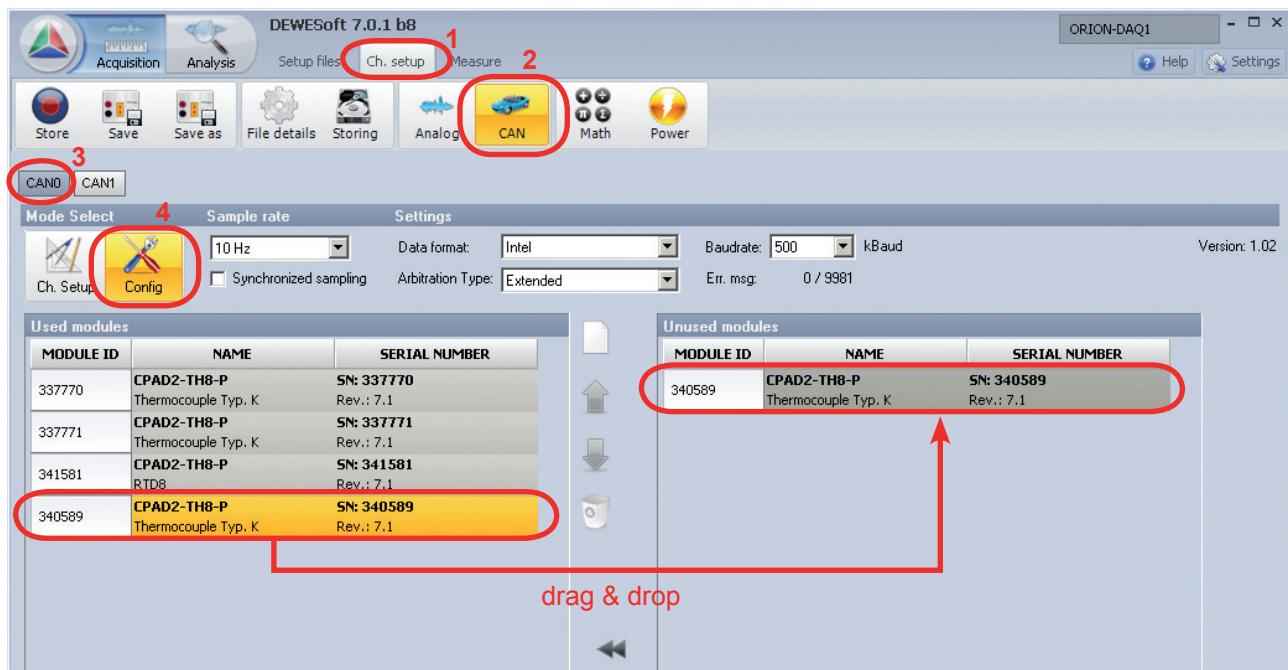


Figure 2: configuring CPAD2 modules

Unused modules do not send any data. The sample rate is 0.

All modules listed in the "used modules" are automatically sorted by the module ID.

By default the module ID is the serial number, but it could be changed by clicking on it.

You can change the data format, the arbitration type and the baud rate in the configuration mode.

These settings will be permanently written to the CPAD2 modules. Also after power loss they will start on their new settings.

## Error message counter:

The error counter indicates troubles on the CAN Bus. If the red number is permanently increasing instead of being zero, your CAN bus is unstable. In that case you normally also don't see any modules, or you miss a few.

- Check if the termination resistor is on the last CPAD node.
- Probably one CPAD is set to a different baud rate. Change the baud rate setting to different baud rates several times, and check if error message counter stops.
- Check the cabling. Probably your cable is too long for the baud rate. Try to reduce it.



Figure 3: Error message counter

## CAN bus lenght:

- 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

# Installing CPAD2 modules

## Virtual CPAD2 modules

If you remove a CPAD from the CAN bus it will not disappear but change into the virtual mode. They could be still used in the setup but will not show any data. Immediately when you connect them again they will deliver data again. That even works in the measuring mode. Virtual modules could be added and removed with the buttons:



That could be used for:

- Creating offline setups without the hardware.
- Creating a DBC file without the hardware.



Figure 4: Virtual CPAD2 modules

## CPAD2 Channel Setup

Click on "CH. Setup" > "CAN" > "CANx" > "Ch. Setup"

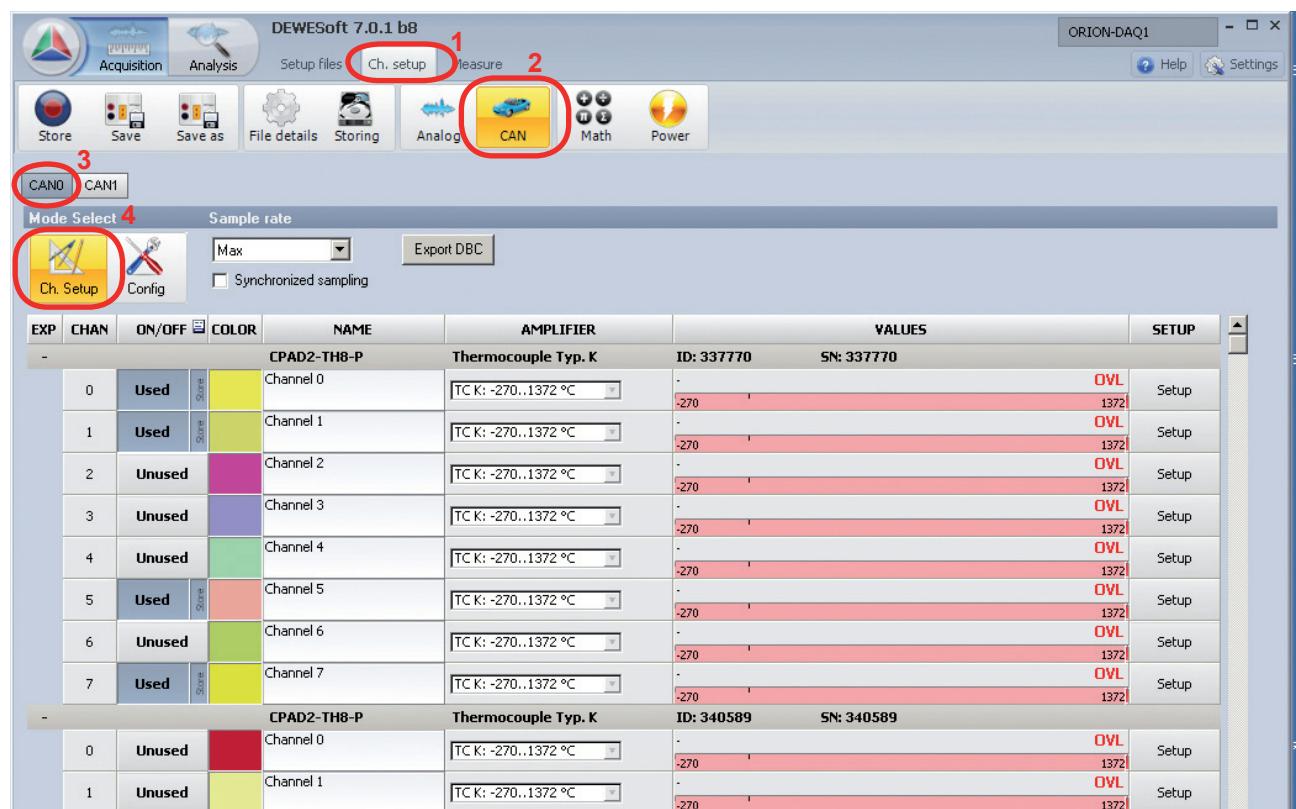


Figure 5: CPAD2 channel setup

Beside DEWEsoft standard settings following, settings could be done in the channel setup:

- The sampling rate could be changed from 0.1 S/sec to max. Max means approximately 12.5 S/sec. The status LED flashes with the sample rate during measurement.
- If synchronized sampling is selected all CPAD2 modules acquire the data at the same time. Due to higher bus traffic only 5 S/second are possible in this mode.
- Exporting a DBC will create a DBC file with the actual CPAD2 configuration. This allows you to configure your CPAD2 modules and use them on an external CAN bus easily by importing the DBC file.

# Installing EPAD2 modules

## Installing EPAD2 modules in DEWEsoft 7.x

### Activate EPAD modules

Click on "Settings" > "Hardware Setup" > "Analog"

- Select the used COM port from the list
- Check PAD modules in the Amplifier list
- Select the amount of EPAD you want to connect

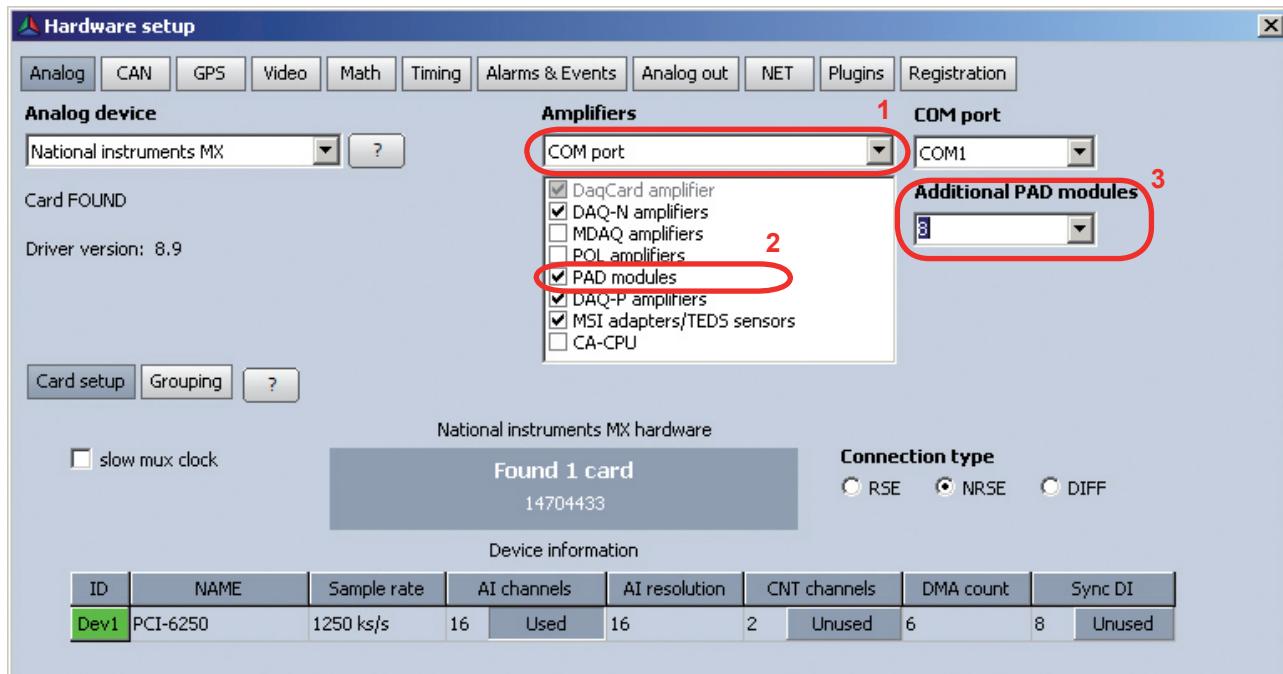


Figure 6: Activate EPAD modules

### Assign module address

- Connect the first EPAD to the RS-485 bus.
- Double click in the amplifier column on the slot where you want to assign the EPAD module.
- Press the "Fill" button.

Now the EPAD status LED on all connected EPAD modules should flash. If not, they are probably on a wrong baud rate and a module reset has to be performed. It could also be that the wrong COM port is selected.

Press on the ID button on the EPAD module which should be assigned. The EPAD should appear in the amplifier section. Connect the next EPAD and proceed in the same way.

# Installing EPAD2 modules

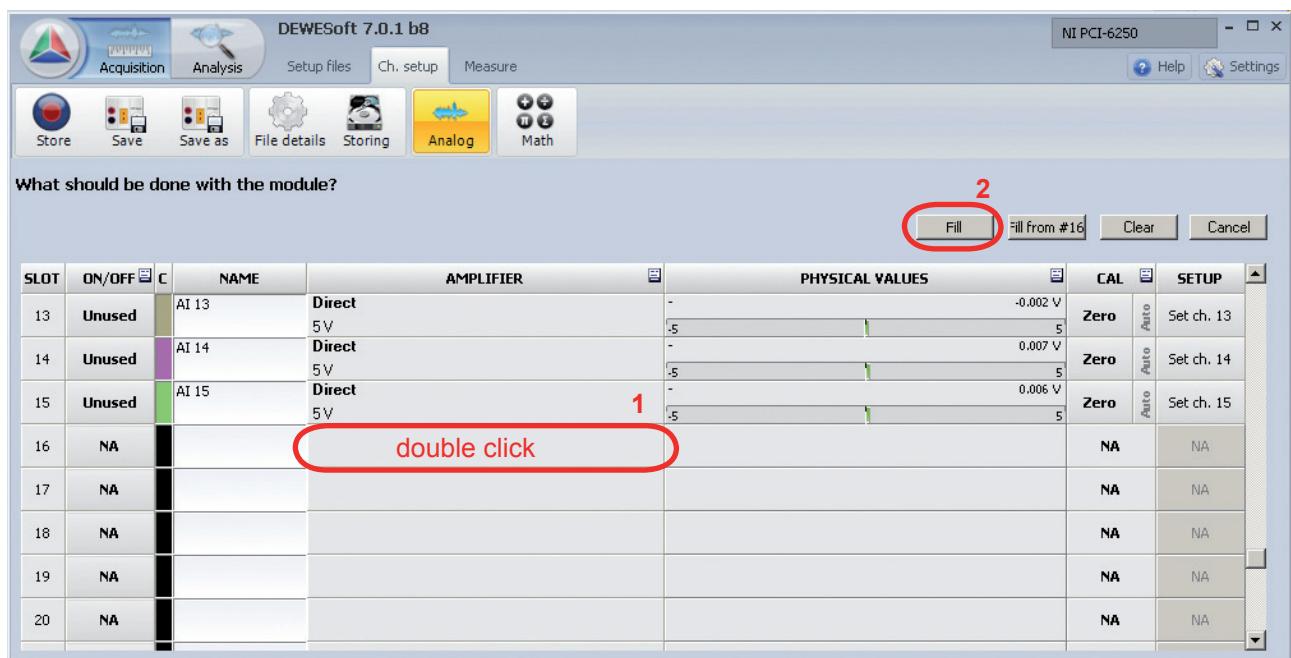


Figure 7: Assign module address

Connecting more than one unaddressed module to the RS485 bus at the same time is not recommended. It might be necessary to do the addressing several times until all modules are on the correct address. In that case it is recommended to press the ID button on the module before you click on the "Fill" button.

Found modules:

By clicking on "Set PAD" you have access to the eight channels of each module.

16	NA	<b>EPAD-TH8-P</b> SN: 00340589 TC K: -270..1372 °C	<b>EPAD-TH8-P</b> SN: 00337771 TC K: -270..1372 °C	Set PAD 16
17	NA			Set PAD 17

Figure 8: "Set PAD"

## EPAD module setup

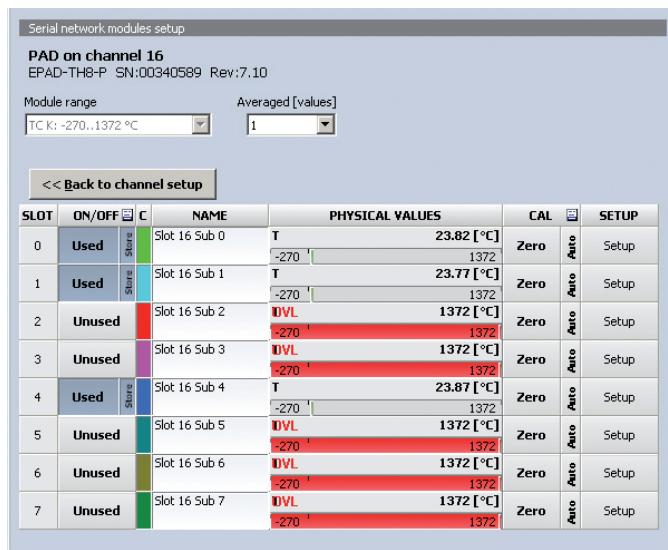


Figure 8: EPAD channel setup

# Module reset

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## EPAD2 Module reset:

If the Module could not be detected from the software anymore a possible reason could be that the module has been set to a different address or baud rate. With the reset function you can set the module back to its default settings:

Baud rate: 9600 baud  
Checksum: deactivated  
Address: 0x00 (this equals a cleared module in Dewesoft)

Procedure: Press the ID button while powering on the module, and keep it pressed for at least 5 seconds.

## CPAD2 Module reset:

If the module is not responding on the CAN bus anymore, or you have applied unwanted settings to the module it can be easily set to the default settings.

Identifier type: Extended  
Data Identifier: Bit 29 to Bit 25 = 0  
Bit 24 to Bit 1: = Module Serial Number  
Bit 0: = ChnBit (0 for Channel 0 to 3; 1 for Channel 4 to 7)  
Data Format: Intel  
Baud Rate: 500 kbaud  
Sample Rate: 1 Hz

Procedure: Press the ID button while powering on the module, and keep it pressed for at least 5 seconds. After that the module starts automatically measuring with 1 Sample/Second. The status LED will indicate that by blinking with 1 Hz. The module will send the data of the eight channels with two identifiers that differ in the last bit.

Default Data Identifier Example:

Module Serial Number: 0341581

The module will send the data of channel 0 to 3 on identifier:

341581\*2= 683162 = 0xA6C9A

Data of channel 5 to 7 on identifier:

341581\*2+1= 683163 = 0xA6C9B

For detailed information how to change the identifier refer to the Programmers manual.

## CAN bus lenght:

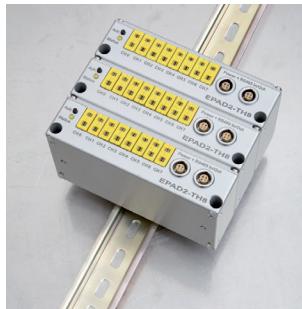
- 1 Mbit/s: 30 m
- 800 kbit/s: 50 m
- 500 kbit/s: 100 m
- 250 kbit/s: 250 m
- 125 kbit/s: 500 m
- 50 kbit/s: 1000 m

# Mounting examples

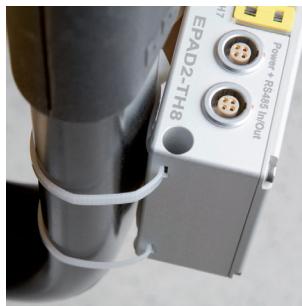
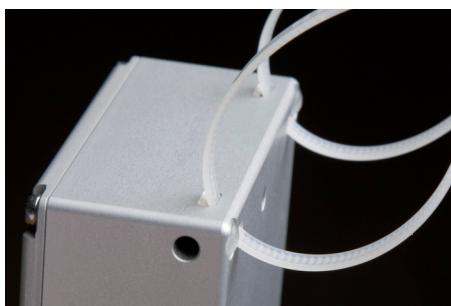
## Mounting examples

The xPAD2 modules are prepared for various mounting options:

- DIN rail



- Cable strap

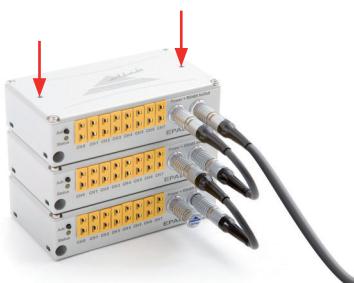


- Bolt down



For the mounting option "bolt down":  
two screws with 4.2 mm diameter are required.

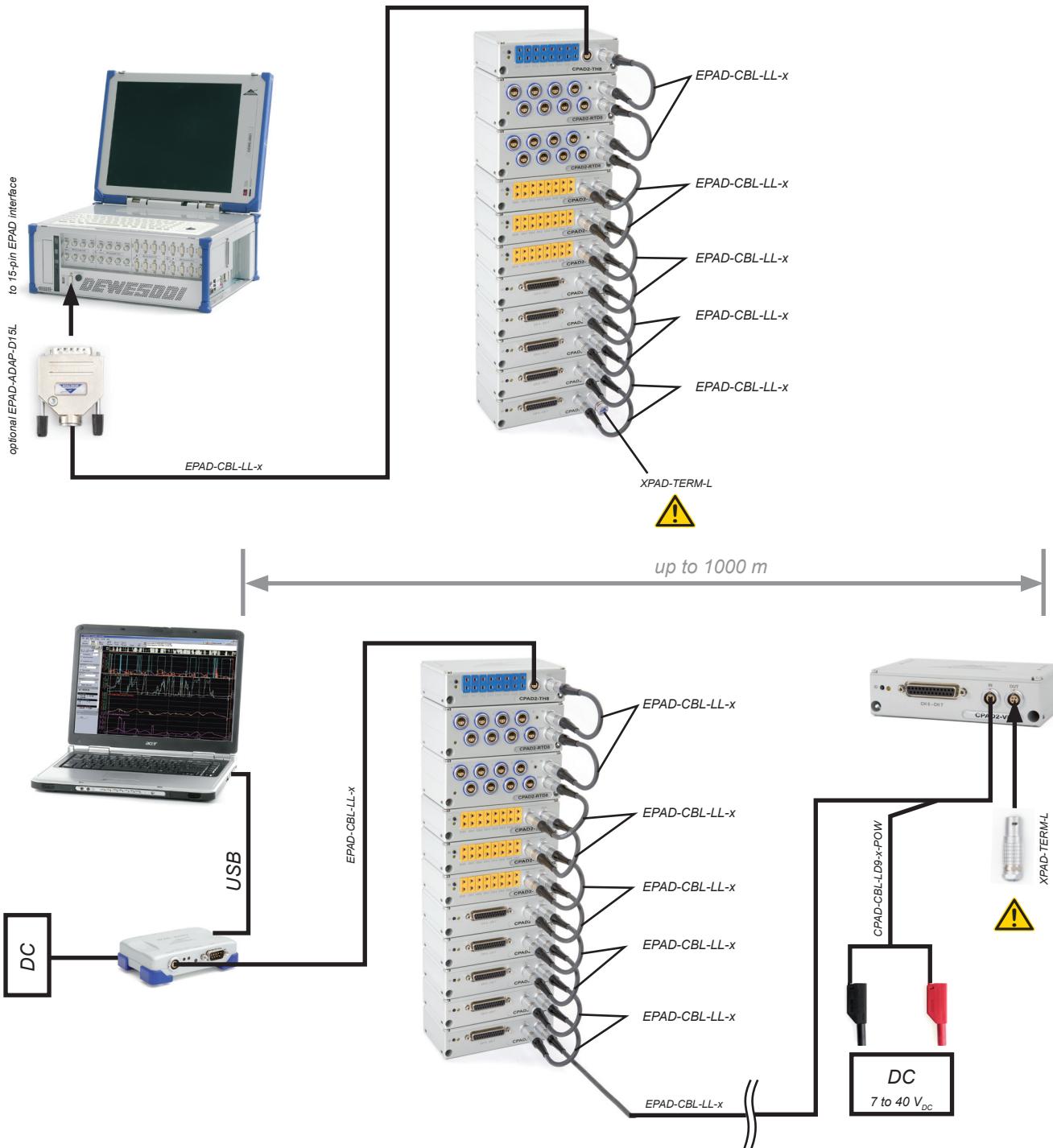
- Stack



For the mounting option "stack":  
two long M4 Allen head screws® are required.

# Configuration examples

## Configuration example with EPAD2 modules

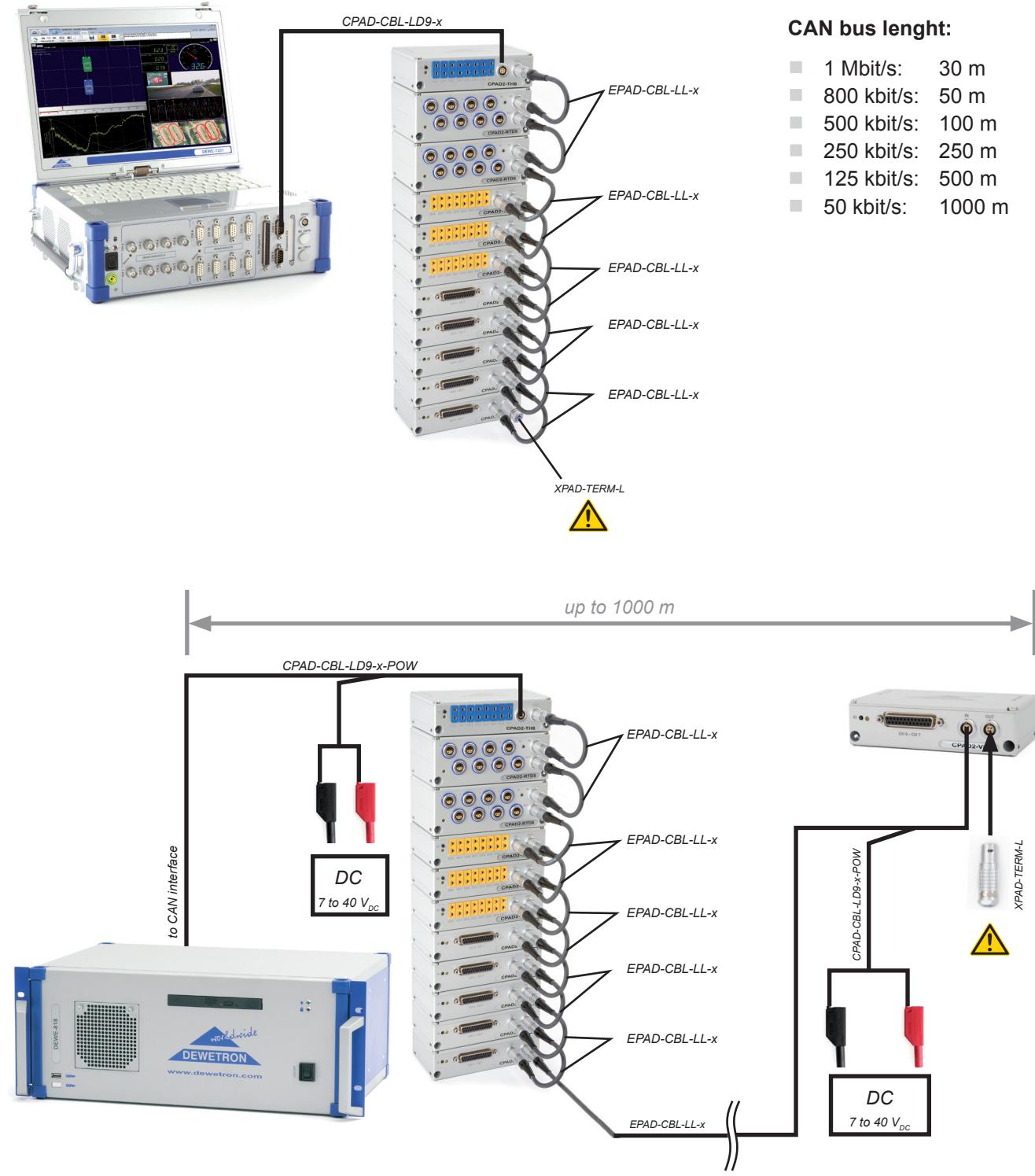


Note: In each case the last DEWE-xPAD2 module has to be terminated!

Note: Due to output resistance with longer cables an external DC power supply might be necessary. In this case, DEWETRON offers the CPAD-CBL-LD9-X-POW cable with two additional banana plugs for 7..40 V<sub>DC</sub> power supply. Further information see chapter: Accessories & Options.

# Configuration examples

## Configuration example with CPAD2 modules



*Note: In each case the last DEWE-xPAD2 module has to be terminated!*

*Note: Due to output resistance with longer cables an external DC power supply might be necessary. In this case, DEWETRON offers the CPAD-CBL-LD9-X-POW cable with two additional banana plugs for 7..40 V<sub>DC</sub> power supply. Further information see chapter: Accessories & Options.*

# Accessories

## Accessories & Options

### General accessories and options for xPAD2 modules

EPAD-BASE2



Multifunction BASE module for

- connecting EPAD modules to USB - recognizes USB communication losses and reports them back to DEWEsoft (native USB device, use with DEWEsoft only!)
- connecting EPAD modules to RS-232
- transforming EPAD / PAD data to CAN

LEMO EGG.1B.304 socket for EPAD,  
incl. external power supply 100 to 240 VAC / 15 VDC (for up to 16 EPAD modules)

XPAD-TERM-L



Termination connector for xPAD2 modules with Lemo EGG.1B.304 connector,  
the last module of the RS-485 bus must be terminated with this connector.

XPAD-CBL-LL-0.2



xPAD2 connecting cable 0.2 m with Lemo FGG.1B.304 connector on both sides,  
for daisy chaining stacked xPAD2 modules.

XPAD-CBL-LL-0.5



xPAD2 connecting cable 0.5 m with Lemo FGG.1B.304 connector on both sides,  
for connecting xPAD2 series modules to an instrument with Lemo EGG.1B.304 EPAD interface or to EPAD-BASE2 or for daisy chaining xPAD2 modules.

XPAD-CBL-LL-2



xPAD2 connecting cable 2 m with Lemo FGG.1B.304 connector on both sides,  
for connecting xPAD2 series modules to an instrument with Lemo EGG.1B.304 EPAD interface or to EPAD-BASE2 or for daisy chaining xPAD2 modules

XPAD-CBL-LL-5



EPAD2 connecting cable 5 m with Lemo FGG.1B.304 connector on both sides,  
for connecting EPAD2 series modules to an instrument with Lemo EGG.1B.304 EPAD interface or to EPAD-BASE2 or for daisy chaining EPAD2 modules

EPAD-ADAP-BL



Adapter cable 0.1 m, converts Binder 712-series plug to Lemo 1B.304 socket

- required to connect new xPAD2 modules to old instruments with Binder 712-series EPAD interface using EPAD-CBL-LL-x cables.
- required to connect EPAD modules with Binder 712-series connector to new instruments with Lemo EGG.1B.304 EPAD interface using EPAD-CBL-LL-x cables.

EPAD-ADAP-LB



Adapter cable 0.1 m, converts from Lemo 1B.304 plug to Binder 712-series socket

- required to connect existing EPAD modules with Binder 712-series connector to new instruments with Lemo EGG.1B.304 EPAD interface using existing EPAD-CBL-BB-x cables.

# Accessories

EPAD-ADAP-D15L



Adapter to convert EPAD interface from SUB-D-15 connector to Lemo 1B.304.

XPAD-DIN-RAIL



Adapter to snap EPAD2 and CPAD2 modules onto a DIN rail.

CPAD-CBL-LD9-2



Adapter cable 2 m to connect CPAD series modules to CAN interface, LEMO FGG.1B.304 plug to a SUB-D-9 socket, use only for DEWETRON systems with power supply on CAN connector.

CPAD-CBL-LD9-2-POW



Adapter cable 2 m to connect CPAD series modules to CAN interface, LEMO FGG.1B.304 plug to a SUB-D-9 socket, additional 2 banana plugs for module power supply.

PAD-OPT2

25-pin DSUB connector with screw terminal, for all PAD modules with 25-pin SUB-D socket, except xPAD2-TH8-P and xPAD2-TH8.

XPAD-OPT-EXT-TEMP

Extended operating temperature range from -40°C to +85°C for EPAD modules

## Mating connectors for xPAD2-RTD8 and xPAD2-LA8 modules

LEMO-FFA.1S.304.CLAD42Z LEMO FFA.1S.304 mating connector, cable diameter 3.1 to 4.0 mm

LEMO-FFA.1S.304.CLAD52Z LEMO FFA.1S.304 mating connector, cable diameter 4.1 to 5.0 mm

LEMO-FFA.1S.304.CLAD62Z LEMO FFA.1S.304 mating connector, cable diameter 5.1 to 6.0 mm

# CE-Certificate of conformity



Manufacturer:

**DEWETRON Elektronische Messgeräte Ges.m.b.H.**

Address:

Parkring 4  
A-8074 Graz-Grambach Austria

Tel.: +43 316 3070 0

Fax: +43 316 3070 90

e-mail: sales@dewetron.com

<http://www.dewetron.com>

Name of product:

**DEWE-XPAD2 MODULES**

Kind of product:

*Modules*

The product meets the regulations of the following EC-directives:

**73/23/EEC**

"Directive on the approximation of the laws of the Member States relating to electrical equipment designed for use within certain voltage limits amended by the directive 93/68/EEC"

**89/336/EEC**

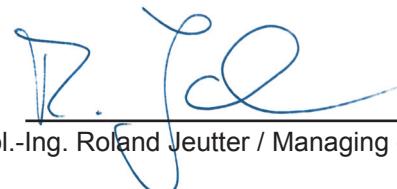
"Directive on the approximation of the laws of the Member States relating to electromagnetic compatibility amended by the directives 91/263/EEC, 92/31/EEC, 93/68/EEC and 93/97/EEC"

The accordance is proved by the observance of the following standards:

<b>L</b>	<b>Safety</b>	IEC/EN 61010-1:1992/93 IEC/EN 61010-2-031	IEC 61010-1:1992/300 V CATIII Pol. D. 2 IEC 1010-2-031
<b>E</b>	<b>Emissions</b>	EN 61000-6-4	EN 55011 Class B
<b>M</b>	<b>Immunity</b>	EN 61000-6-2	Group standard

Graz, October 14, 2008

Place / Date of the CE-marking

  
Dipl.-Ing. Roland Jeutter / Managing director

# Notes

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