Automotive
Energy & Power Analysis
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DAQP-BRIDGE-B Module (Rev. 2)

Technical reference manual

ISO9001

Re-inventing Data Acquisition

worldwide
DEWETRON
www.dewetron.com

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Printing History:

Please refer to the page bottom for printing version.

Notice

Safety symbols in the manual

	*Indicates hazardous voltages.*

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 Messgeraete Ges.m.b.H. assumes no liability for the customer's failure to comply with these requirements.

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

Safety instructions for DEWETRON amplifiers

- The DEWETRON data acquisition systems and amplifiers may only be installed by experts.
- Read your manual carefully before operating.
- Observe local laws when using the amplifiers.
- 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.
- 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 amplifiers.
- 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.
- DO NOT touch internal wiring!
- DO NOT use higher supply voltage than specified!
- Use only original plugs and cables for harnessing.
- Safety of the operator and the unit depend on following these rules.

Support

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

For Asia and Europe, please contact:

DEWETRON Ges.m.b.H.
Parkring 4
A-8074 Graz-Grambach
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Tel.: +43 316 3070
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The telephone hotline is available Monday to Friday between 08:00 and 12:00 CET (GMT -1:00) and Monday to Thursday between 13:00 and 17:00 CET.

For the Americas, please contact:

DEWETRON, Inc.
10 High Street, Suite K
Wakefield, RI 02879
U.S.A.
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Toll-free: +1 877 431 5166
Fax: +1 401 284 3755
Email: support@dewamerica.com
Web: http://www.dewamerica.com

The telephone hotline is available Monday to Friday between 08:00 and 17:00 GST (GMT +5:00)

Calibration information

All DEWETRON modules are calibrated at 25 °C after a warmup time of 30 minutes 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 for the DAQ series modules available. The CAL-KIT contains the required cables, software and instructions.

General module specifications

Module dimensions:	20 x 65 x 105 mm (W x H x D without front cover and connectors)	(0.79 x 2.56 x 4.13 in.)
Frontcover:	20 x 87 x 2 mm (W x H x D without connector)	(0.79 x 3.43 x 0.08 in.)
Environmental:		
Temp. range storage:	-30 °C to +85 °C	(-22 °F to 185 °F)
Temp. range operating:	-5 °C to +60 °C	(23 °F to 140 °F)
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 specifications within this manual are valid at 25 °C!

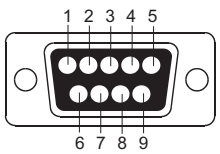
All modules are produced according ISO9001 and ISO14001.

Module connectors

Frontpanel connector: Accessable to the user. The connector type and pin assignment varies from module to module. Detailed pin assignment of each module is shown in the appropriate module description.

Rear connector: 9-pin male SUB-D, interface to the DEWE-System, not accessable to the user.

HSI/DAQx and PAD module rear view



9-pin male SUB-D connector

Interface pin assignment:

1 Module output (±5 V)
2 RS-485 (A)
3 RS-485 (B)
4 GND
5 +9 V power supply
6 +12 V power / sensor supply
7 Module input (from D/A converter of the A/D board)[1)]
8 reserved
9 -9 V power supply

[1)] Triggerout at DAQP-FREQ-A

General Module Information

RS-232/485 interface

HSI/DAQP modules can be configured via RS-485 interface, PAD modules require this interface for all data transfers.

For all DEWETRON systems, an internal RS-232/485 converter is available (standard with DEWE-800, -2000, -2500, -3000, -4000, -5000 series systems). This converter allows communication with HSI/DAQP and PAD modules.

To communicate with the modules, the RS-232 interface has to be set to the following parameters:

baud rate:	9600 bps
data bits:	8
parity:	no parity
stop bits:	1
handshake:	not required

HSI/DAQP module configuration

1. Push button selection

All ranges and filters can be selected directly by pressing the push buttons on the module. Approx. 15 sec. after changing range and / or filter, the range and filter information is stored in an EEPROM. This procedure increases the livetime of the EEPROM.

The current input range setting is shown all the time by LED. To change the range just press ***RANGE*** button a few times until the required range is displayed.

To see the current filter setting just press the ***FILTER*** button once. The corresponding LED is flashing for approx. 3 seconds. Within this time, the filter can be selected by pressing the ***FILTER*** button again. Approx. 3 seconds after the last key activity, the information will be stored, the LED stops flashing and shows the input range again.

CAUTION: Power loss during this time leaves the module in the former settings.

2. RS-232/485 programming

All ranges and filters can also be selected via RS-232/485 interface. All new DEWE-800, -2000, -2500, -3000, -4000, -5000 series systems are prepared as a standard to work with HSI/DAQP modules.

The easiest way to change the configuration is to use the DEWEConfig software, which comes as a standard with the DEWETRON data acquisition system.

Detailed information about HSI/DAQP modules programming for customer applications is available in the *DEWE-Modules Programmers Reference Manual*.

CAUTION: All range and filter changes which are done via RS-232/485 interface are not stored in the EEPROM of the HSI/DAQP modules! You have to store this information in a separat initialisation file to keep settings information for next system start!

PAD module communication

All PAD modules are only working through the RS-232/485 interface. All new DEWE-800, -2000, -2500, -3000, -4000, -5000 series systems are prepared as a standard to work with PAD modules. The easiest way to change the configuration is to use the DEWEConfig software, which comes as a standard with the DEWETRON data acquisition system.

Detailed information about PAD modules programming for customer applications is available in the *DEWE-Modules Programmers Reference Manual*.

Strain gage amplifier (Replaced by DAQP-STG)

- Input sensitivity: 0.05 mV/V to 1000 mV/V
- Bandwidth, filter: 200 kHz, 9 selectable lowpass filters (10 Hz to 100 kHz)
- Bridge offset: Automatic offset adjustment (approx. ±200 % of range)
- Bridge completion: Internal completion for ½ and ¼ bridge (120 and 350 Ohm) supports 3- and 4-wire ¼ bridge connection
- Shunt calibration: Two internal shunts or external shunt calibration possible
- Custom range: Programmable range for sensitivity, excitation and offset
- TEDS-Support: Support for TEDS sensors
- Signal connection: 9-pin SUB-D or 8-pin LEMO connector

Module specifications

	DAQP-BRIDGE-B (revision 2)
Gain	10 to 10 000
Input ranges @ 5 V_{DC} excitation	±0.5[1], ±1, ±2.5, ±5, ±10, ±25, ±50, ±100, ±250, ±500 mV ±0.1[1], ±0.2, ±0.5, ±1, ±2, ±5, ±10, ±20, ±50, ±100 mV/V
Range selection	Push button or software
Input impedance	> 100 MOhm
Input noise	3.5 nV * √Hz
Accuracy @ 5 V_{DC} excitation	±0.05 % F.S.
Gain drift @ 5 V_{DC} excitation	10 ppm/K of range ±0.02 µV/V/K
Excitation voltage Accuracy Drift Protection	0.25, 0.5, 1, 2.5, 5 and 10 V_{DC} software programmable (5 V_{DC} = default setting) ±0.05 % ±0.7 mV ±10 ppm/K ±50 µV/K Continuous short to ground
Bridge types	4- or 6-wire full bridge 3- or 5-wire ½ bridge with internal completion (software programmable) 3- or 4-wire ¼ bridge with internal resistor for 120 and 350 Ohm (software programmable)[1]
Bridge resistance	87 Ohm to 10 kOhm @ ≤ 5 V_{DC} excitation (120 Ohm to 10 kOhm @ 10 V_{DC} excitation)
Shunt calibration	Two internal shunt resistors
Zero adjust	Full automatic, ±200 % of F.S. (via push button or software)
Bandwidth (-3 dB)	200 kHz (±1.5 dB @ f0)[1]
Filters (lowpass)	10 Hz, 30 Hz, 100 Hz, 300 Hz, 1 kHz, 3 kHz, 10 kHz, 30 kHz, 100 kHz (±1.5 dB @ f0)
Filter selection	Push button or software
Filter characteristics	Bessel or Butterworth (software programmable) 40 dB / decade (12 dB / octave)
Typ. SNR @ 100 kHz [1 kHz] and 5 V_{DC} excitation	66 dB [84 dB] @ 1 mV/V 82 dB [100 dB] @ 50 mV/V
Typ. CMRR @ 0.1 mV/V [1 mV/V] and 5 V_{DC} excitation	125 dB [120 dB] @ DC 115 dB [110 dB] @ 400 Hz 110 dB [105 dB] @ 1 kHz
Max. common mode voltage	±6 V
Overvoltage protection	±10 V_{DC}
Output voltage	±5 V
Output resistance	< 10 Ohm
Output current	Max. 5 mA
Output protection	Continuous short to ground
RS-485 interface	Yes
TEDS Supported TEDS chips	Hardware support for TEDS (Transducer Electronic Data Sheet) DS2406, DS2430A, DS2432, DS2433
MSI support	Automatic MSI-BR-TH-x support
Power supply voltage	±9 V_{DC} (±1 %)
Power consumption	Typ. 1 W @ 350 Ohm, 1.3 W @ 120 Ohm (both full bridge @ 5 V_{DC} excitation) Max: 2 W (depending on sensor)

[1] 4-wire ¼ bridge or ±0.5 mV input range will limit the bandwidth to 30 kHz

LED state

The DAQP-BRIDGE-B series module has a set of 8 LEDs showing the current input range (constant active) and filter range (flashing) setting. Further functions are described below.

Input range and filter selection

The DAQP-BRIDGE-B series module has two push buttons with multiple functions.

Standard functions:

- Range button: Push the ***RANGE*** button several times shortly until the LED displays the desired input range.
- Filter button: Push the ***FILTER*** button once - the LEDs will flash for approx. 3 seconds and display the current filter setting.

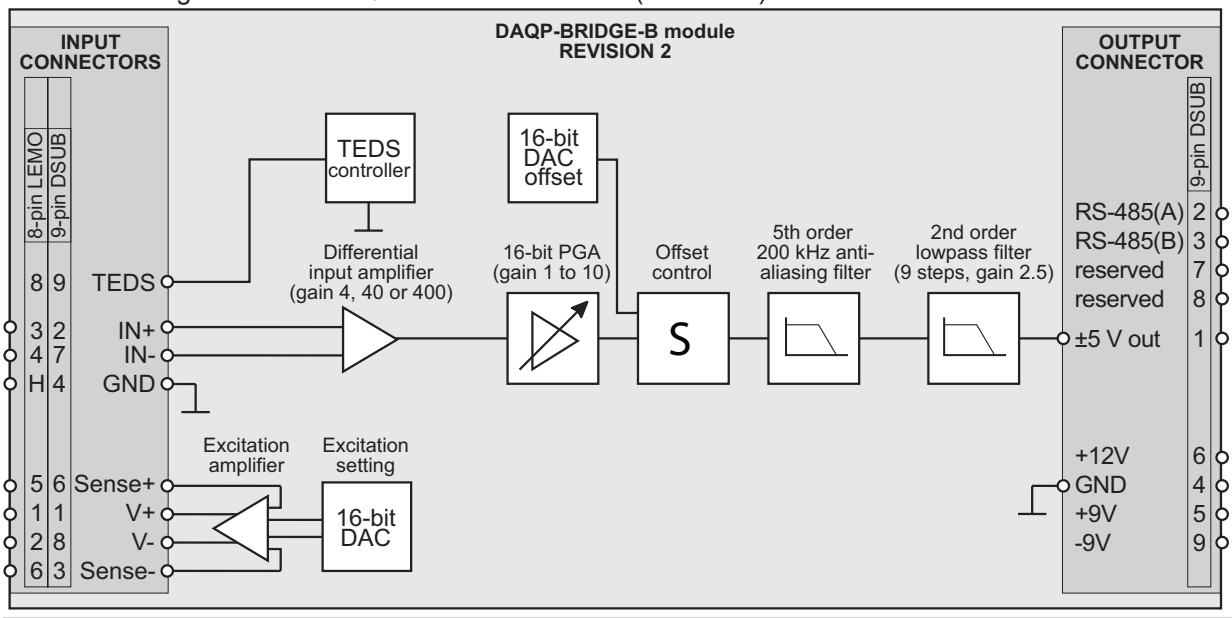
  Push the ***FILTER*** button within the three seconds several times until the flashing LED displays the desired filter range.

Additional functions:

- Apply shunt resistor: Press the ***FILTER*** button for more than 3 seconds to apply the internal shunt resistor as long as you keep the button pressed.
- Zero reference: Press the ***RANGE*** button for more than 3 seconds to shortcut the module input as long as you keep the button pressed.
- Zero amplifier offset: Press the ***RANGE*** button for more than 3 seconds (Zero reference). Keep the ***RANGE*** button pressed and push in addition the ***FILTER*** button. This will set the module offset to zero. The calibration values will be stored in the module! This function is independend from the sensor and takes approx. 2 seconds!
- Zero sensor offset: Press both ***RANGE*** and ***FILTER*** button at together for more than 2 seconds. This will set the offset of a connected sensor to zero. The sensor offset correction is working within ±200 % of full scale range.
- Factory default: Press both ***RANGE*** and ***FILTER*** button at power up for approx. 3 seconds to set the amplifier to factory default settings (full bridge, 100 mV/V, 5 V_{DC}, Bessel, module address 0x00, 175 kOhm shunt, power-on-default off, man. control).

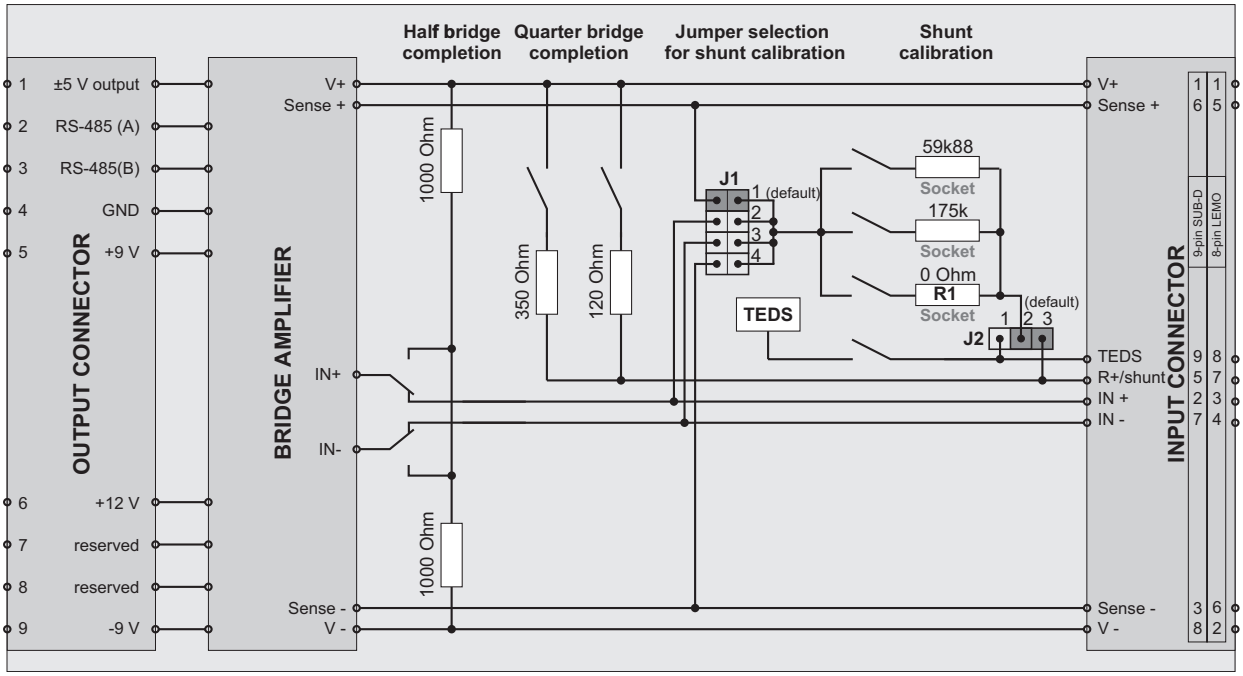
Block diagram

Base block diagram of the DAQP-BRIDGE-B module (revision 2):



Amplifier input

The DAQP-BRIDGE-B series module has an internal bridge completion and shunt calibration. The internal schematic diagram below should give an idea how the module operates and make the connection easier.

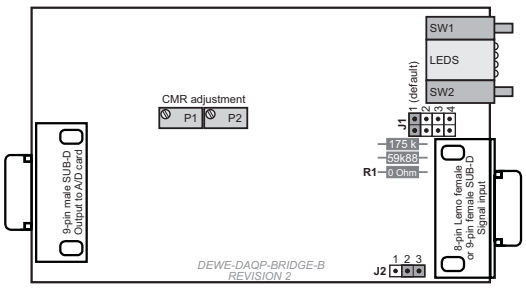


Jumper settings

J1 Four jumper positions are available to set the resistor value for shunt calibration.

J2 Two jumper positions:
- use position 2-3 (default) for TEDS support
- use position 1-2 for full compatibility to DAQP-BRIDGE-B revision 1 (except of +9 V supply)

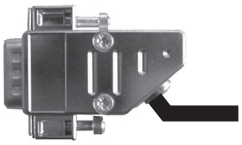
R1 Zero Ohm as a standard:
can be replaced by custom resistors



Signal connection

DAQP-BRIDGE-B module

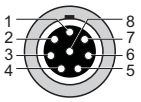
Signal connection via SUB-D connector



1 V+
2 IN+
3 Sense -
4 GND
5 R + / Shunt
6 Sense +
7 IN-
8 V-
9 TEDS

DAQP-BRIDGE-B-LEMO module

Signal connection via LEMO connector



8-pin LEMO connector female
EGG.1B.308.CLL

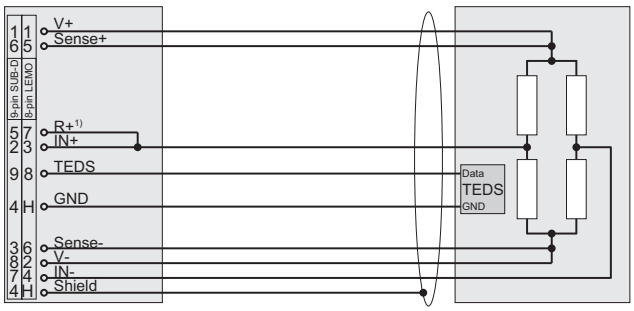
1 V+
2 V-
3 IN+
4 IN-
5 Sense +
6 Sense -
7 R + / Shunt
8 TEDS
H GND (housing)

CAUTION: The sensor shield can be connected to either pin 4 (SUB-D version only) or the housing of the 9-pin SUB-D / 8-pin LEMO connector, depending on your application.

Full bridge signal connection

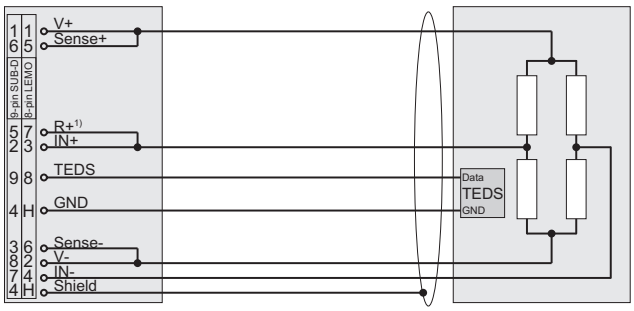
6-wire sensor connection

(Sense wired at the sensor)



4-wire sensor connection

(Sense wired at the connector)

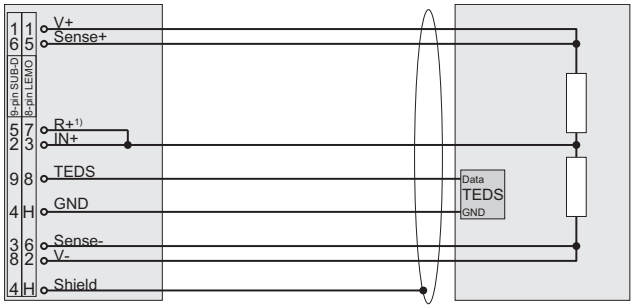


Sense leads (SUB-D: pin 3 and 6; LEMO: pin 5 and 6) have to be connected!

Half bridge signal connection

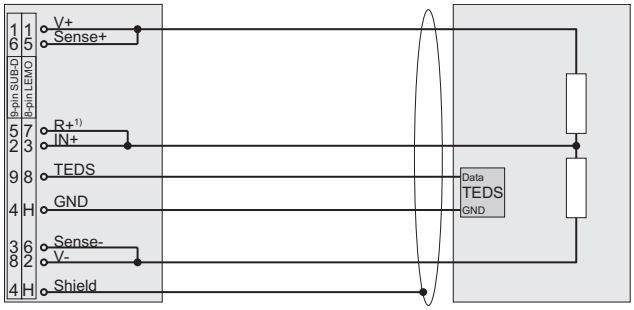
5-wire sensor connection

(Sense wired at the sensor)



3-wire sensor connection

(Sense wired at the connector)

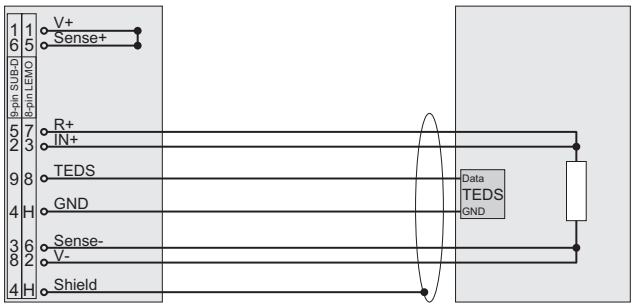


Sense leads (SUB-D: pin 3 and 6; LEMO: pin 5 and 6) have to be connected!

Quarter bridge signal connection

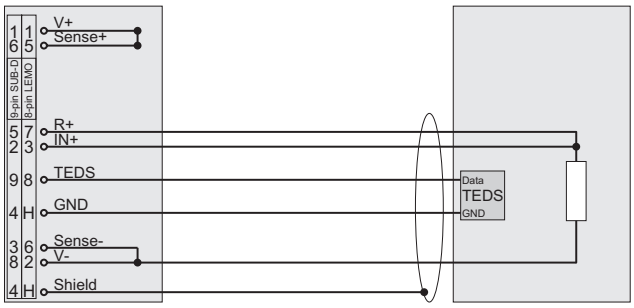
4-wire sensor connection

(Sense wired at the sensor)



3-wire sensor connection

(Sense wired at the connector)



Sense leads (SUB-D: pin 3 and 6; LEMO: pin 5 and 6) have to be connected!

1) 'R+' has to be connected only if shunt calibration is required, otherwise it can be left unconnected.

Potentiometric measurements

using DAQP-BRIDGE-A and DAQP-BRIDGE-B modules

A potentiometer can be seen similar to a half bridge sensor with ±500 mV/V sensitivity. Therefore potentiometric sensors can be measured with bridge amplifiers.

The advantages of using bridge amplifiers for potentiometric measurements: only one multifunctional module with high bandwidth and a programmable offset (by adjusting the offset and range, you can focus on a certain potentiometer position with higher resolution).

Module configuration

DAQP-BRIDGE-A:	Excitation:	0.5 V
	Range:	500 mV/V
DAQP-BRIDGE-B:	Excitation:	1 V
	Range:	500 mV/V

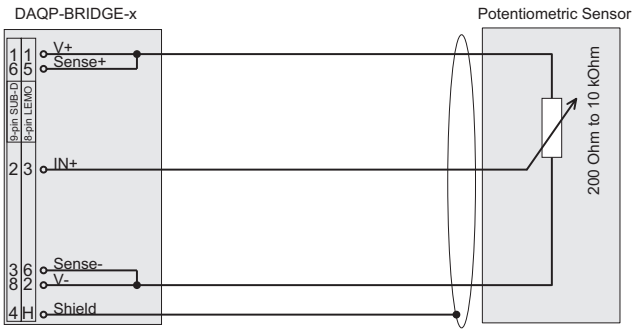
Always change the excitation voltage before changing the input range, otherwise you will not get the required 500 mV/V range.

The following table shows how the mV/V ranges are calculated. The ranges depend on the gain and the excitation voltage.

Excitation	0,25 V	0,50 V	1,00 V	2,50 V	5,00 V	10,00 V
Input Range	**Bridge module range [mV/V]**					
±500 mV	2000	1000	500	200	100	50
±250 mV	1000	500	250	100	50	25
±100 mV	400	200	100	40	20	10
±50 mV	200	100	50	20	10	5
±25 mV	100	50	25	10	5	2,5
±10 mV	40	20	10	4	2	1
±5 mV	20	10	5	2	1	0,5
±2.5 mV	10	5	2,5	1	0,5	0,25
±1 mV	4	2	1	0,4	0,2	0,1
±500 µV	2	1	0,5	0,2	0,1	0,05

(, = decimal point)

Sensor connection



µV measurements

using DAQP-BRIDGE-B modules

The differential amplifier of the DAQP-BRIDGE-B module is designed to measure small voltages (with very low offset drift and high amplification). These are exactly the same requirements than for µV amplifiers.

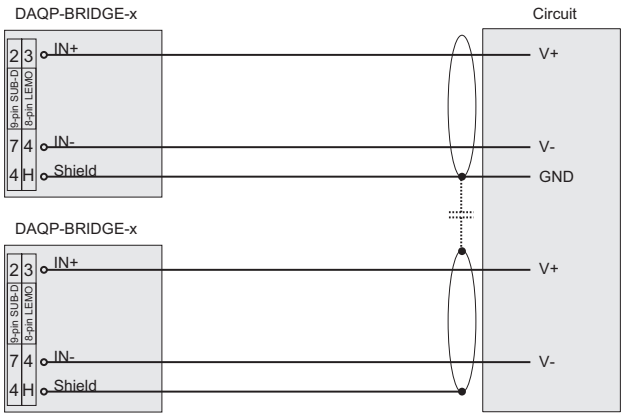
By setting the bridge input type to *Voltage* you can select input ranges from ±0.5 mV to ±500 mV.

The advantages of using bridge amplifiers for µV measurements: only one multifunctional module with high bandwidth, a lot of input and filter ranges and a programmable offset (Auto Zero).

Module configuration

DAQP-BRIDGE-B:	Input type:	Voltage
	Ranges:	±0.5 to 500 mV

Signal connection



For multi module measurement, the GND of one module should be connected to circuit GND, the other module GND connector(s) should be connected with 10 nF capacity for best results (high and low frequency shielding and sensing), but can be left open also.

CE-Certificate of conformity

CE

Manufacturer:

DEWETRON Elektronische Messgeraete Ges.m.b.H.

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A-8074 Graz-Grambach Austria

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Fax: +43 316 3070 90
e-mail: sales@dewetron.com
http://www.dewetron.com

Name of product:

DEWE-MODULES

Kind of product:

Data acquisition instrument

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:

LV	**Safety**	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
EMC	**Emissions**	EN 61000-6-4	EN 55011 Class B
	Immunity	EN 61000-6-2	Group standard

Graz, October 14, 2008

Place / Date of the CE-marking

Dipl.-Ing. Roland Jeutter / Managing director

Notes