Automotive
Energy & Power Analysis
Field Service
Environmental
Research & Development

DEWE-Modules

Technical Reference Manual

... the precision signal conditioning company

worldwide

DEWETRON

www.dewetron.com

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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
AUSTRIA
Tel.: +43 316 3070
Fax: +43 316 307090
Email: support@dewetron.com
Web: http://www.dewetron.com

The telephone hotline is available Monday to Friday between 08:00 and 17:00 CET (GMT -1:00)

For the Americas, please contact:

DEWETRON, Inc.
PO Box 1460
Charlestown, RI 02813
U.S.A.
Tel.: +1 401 364 9464
Toll-free: +1 877 431 5166
Fax: +1 401 364 8565
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 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.

Adjustment information are only mentioned if they are required for operation (e.g. DAQP-TRQ).

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	(-30 °F to 185 °F)
Temp. range operating:	-5 °C to +60 °C	(-4 °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	

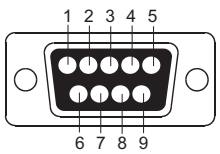
All modules are produced according ISO9001 and ISO14001.

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.

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)
8 reserved
9 -9 V power supply

General Module Information

RS-232/485 interface

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-2010, DEWE-3020, DEWE-4010 and DEWE-5000 systems). This converter allows communication with 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

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-2010, DEWE-3020, DEWE-4010 and DEWE-5000 systems are prepared as a standard to work with 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 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 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-2010, DEWE-3020 and DEWE-4010 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*.

Carrier frequency amplifier

- Input sensitivity: 1 to 640 mV/V, 6 steps selectable
- Ranges and filter: Button or software selection
- Excitation: 2.3 V / 5 kHz
- Signal connection: 9-pin SUB-D connector

Module specifications

	DAQP-TRQ
Input ranges:	1 to 640 mV/V (6 ranges selectable)
Range selection:	Push button or software
Sensors:	
Inductive sensors:	Half bridge or LVDT, 7 to 10 mH
Strain gages:	Half bridge > 300 Ohm (typ. 350 Ohm)
	Full bridge available as an option
	Quarter bridge with bridge completion (e.g. BRIDGE-COMPL-4)
Excitation voltage:	2.3 Vrms
Carrier frequency:	5 kHz
Bandwidth, -3dB:	1 kHz (5 %)
Filters (lowpass, 5 %):	10 Hz, 30 Hz, 100 Hz, 300 Hz, 1 kHz
Filter selection:	Push button or software
Filter characteristics:	Bessel (factory default)
	Butterworth (jumper selectable)
	40 dB / decade (12 dB / octave)
Output voltage:	±5 V
Output resistance:	< 10 Ohm
Output current:	max. 5 mA
Output protection:	Continuous short to ground
RS-485 interface:	Yes
Power supply voltage:	±9 V (±10 %)
Power consumption:	0.7 W to 1.45 W (depending on sensor)

LED state

The DAQP-TRQ series module has a set of 6 LEDs showing the current input range (constant active) and filter range (flashing) setting.

Input range and filter selection

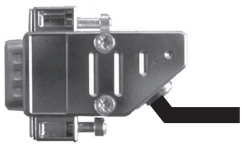
The DAQP-TRQ series module has two push buttons.

- Range button: Push the ***RANGE*** button several times 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.

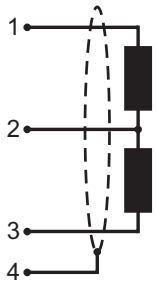
  Push the ***FILTER*** button within the three seconds several times until the flashing LED displays the desired filter range.

Signal connection

Inductive half bridge sensors

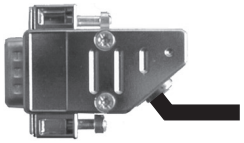


1 V + (sensor supply)
2 Input +
3 V - (sensor supply)
4 GND (shield)
5 Remote
6 V + (sensor supply)
7 (Input -)
8 V - (sensor supply)
9 GND

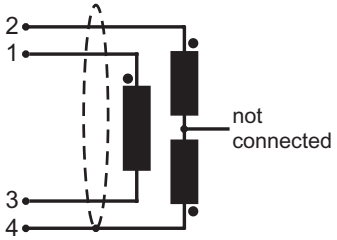


Pin 6 and 8 can be left unconnected

LVDT sensors

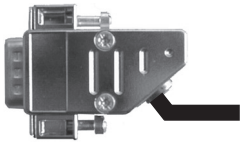


1 V + (sensor supply)
2 Input +
3 V - (sensor supply)
4 GND (shield)
5 Remote
6 V + (sensor supply)
7 (Input -)
8 V - (sensor supply)
9 GND

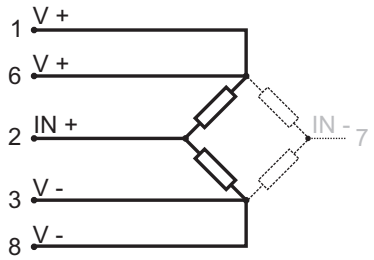


Pin 6 and 8 can be left unconnected

Bridge and strain gage sensors (half bridge)



1 V + (sensor supply)
2 Input +
3 V - (sensor supply)
4 GND (shield)
5 Remote
6 V + (sensor supply)
7 (Input -)
8 V - (sensor supply)
9 GND



Pin 6 and 8 can be left unconnected

The bridge completion (dotted line in the schematic diagram) is done inside the module.
For quarter bridge sensors, an external bridge completion is required. For full bridge call factory.

Calibration information

Each DAQP-TRQ module always has to be calibrated to the connected sensor. All possible settings are described below.

Carrier frequency

The carrier frequency (5 kHz factory default) can be adjusted with FREQ potentiometer. Normally there is no need to change this setting.

Input range

The input range is selected by push button or software.

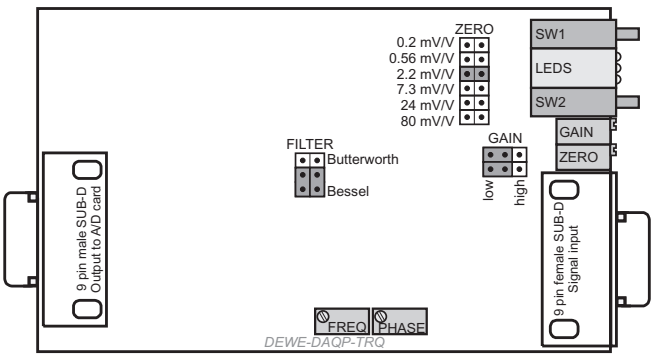
The main sensitivity can be selected with both GAIN jumpers. Low gain position offers an input range from 10 mV/V to 640 mV/V (= factory default), high gain position from 1 mV/V to 64 mV/V.

Range	Gain [mV/V] Jumper: high	Gain [mV/V] Jumper: low
A	32 mV/V to 64 mV/V	320 mV/V to 640 mV/V
B	16 mV/V to 32 mV/V	160 mV/V to 320 mV/V
C	8 mV/V to 16 mV/V	80 mV/V to 160 mV/V
D	4 mV/V to 8 mV/V	40 mV/V to 80 mV/V
E	2 mV/V to 4 mV/V	20 mV/V to 40 mV/V
F	1 mV/V to 2 mV/V	10 mV/V to 20 mV/V

Phase correction

Before using the zero and gain potentiometer, the phase should be adjusted with the PHASE potentiometer, otherwise the measurement is not linear.

Connect the sensor to the module and set it to approx. 80 % of full scale range. Turn the PHASE potentiometer into both directions until you get a maximum output signal from the module.



Zero calibration

Is done with the ZERO potentiometer (front panel access). Changing of input range may require a new zero adjustment.

The ZERO jumper can be used for changing the ZERO potentiometer sensitivity. The sensitivity can be selected from 0.2 mV/V to 80 mV/V (see module schematic above).
Factory default: 2.2 mV/V.

Filter selection

The module offers the possibility to change between bessel (= factory default) and butterworth filter characteristics.

Gain calibration

The input range can be adjusted with the GAIN potentiometer (front panel access).

Turn potentiometer left for minimum gain or right for maximum gain. As shown in table below, each range can be adjusted approximately by factor 2.

Examples:

- range F, gain jumper low: adjustable input range from 9.73 to 20.45 mV/V
- range F, gain jumper high: adjustable input range from 0.973 to 2.045 mV/V

Range	Gain Jumper setting	Gain Potentiometer	Range [mV/V]	Range [mV]
A	low	min	649,75	1476,90
		max	309,28	703,00
	high	min	64,74	147,16
		max	30,82	70,05
B	low	min	325,57	740,01
		max	154,97	352,25
	high	min	32,44	73,74
		max	15,44	35,10
C	low	min	162,73	369,88
		max	77,46	176,06
	high	min	16,21	36,85
		max	7,72	17,54
D	low	min	81,44	185,12
		max	38,77	88,12
	high	min	8,12	18,45
		max	3,86	8,78
E	low	min	40,84	92,83
		max	19,44	44,19
	high	min	4,07	9,25
		max	1,94	4,40
F	low	min	20,45	46,47
		max	9,73	22,12
	high	min	2,04	4,63
		max	0,97	2,20

(, = decimal point)