



Automotive
Energy & Power Analysis
Aerospace & Defense
Transportation
General Test & Measurement

DAQN-THERM Module

Technical reference manual



Re-inventing Data Acquisition



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Austria

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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 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.
Tel.: +1 401 284 3750
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)

General Module Information

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 (0.79 x 2.56 x 4.13 in.)
(W x H x D without front cover and connectors)

Frontcover: 20 x 87 x 2 mm (0.79 x 3.43 x 0.08 in.)
(W x H x D without connector)

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.

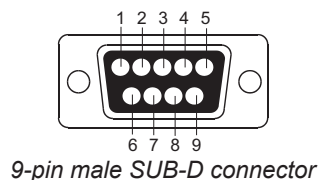
Module connectors

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 accessible to the user.



HSI/DAQx and PAD module
rear view



Interface pin assignment:

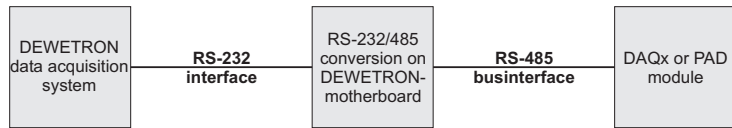
- 1 Module output (± 5 V)
- 2 RS-485 (A)
- 3 RS-485 (B)
- 4 GND
- 5 +9 V power supply
- 6 +12 V power / sensor supply
- 7 Module input (from D/A converter of the A/D board)¹⁾
- 8 reserved
- 9 -9 V power supply

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 lifetime 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*.

Thermocouple isolation amplifier (Replaced by DAQP-THERM)

- Input protection: Isolated
- Thermocouple types: K or J
- Temperature ranges: Depending on module (see table below)
- Cold junction comp.: Internal
- Signal connection: Standard miniature thermocouple connector according to TC type



Module specifications

DAQN-THERM	
Thermocouple types:	K or J (available ranges on next page)
CJC:	Internal
Linearisation:	Through software according to sensor type
Overall accuracy:	±0.5 % of span
Stability vs. ambient temp.:	
Gain:	±50 ppm of reading / °C
Input resistance:	> 1 MOhm
Bandwidth (-3 dB):	4 Hz (±1.5 dB @ f ₀), up to 300 Hz on request
Isolation:	1 kV _{RMS} , input to output
CMRR:	> 130 dB @ 50 Hz
Open input response:	Upscale
Output voltage	±5 V (non linearized)
Output resistance:	< 10 Ohm
Output protection:	Continuous short to ground
RS-485 interface:	No
Power supply voltage:	±9 V _{DC} (±10 %)
Power consumption:	Typical 0.6 W

Module and range overview:

Module type	TC type	Temperature range		Appropriate voltage		Connector color
		lower end	higher end	lower end	higher end	
DAQN-THERM-1	K (NiCr-Ni)	-30 °C -22 °F	170 °C 338 °F	-1.156 mV	6.939 mV	yellow
DAQN-THERM-2	K (NiCr-Ni)	-30 °C -22 °F	370 °C 698 °F	-1.156 mV	15.132 mV	yellow
DAQN-THERM-3	K (NiCr-Ni)	0 °C 32 °F	1000 °C 1832 °F	0 mV	41.269 mV	yellow
DAQN-THERM-4	K (NiCr-Ni)	-100 °C -148 °F	1350 °C 2462 °F	-3.553 mV	54.125 mV	yellow
DAQN-THERM-5	J (Fe-CuNi)	-100 °C -148 °F	760 °C 1400 °F	-4.632 mV	42.922 mV	black

Conversion formulas:

Conversion °C to °F:

$$Temperature[°F] = Temperature[°C] \times 1.8 + 32$$

Conversion °C to °F:

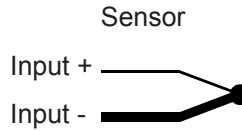
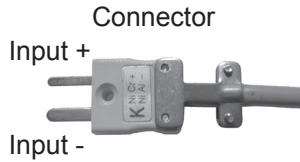
$$Temperature[°C] = \frac{Temperature[°F] - 32}{1.8}$$

DAQN-THERM

Signal connection

DAQN-THERM module

Thermocouple measurement
via standard miniature thermocouple connector

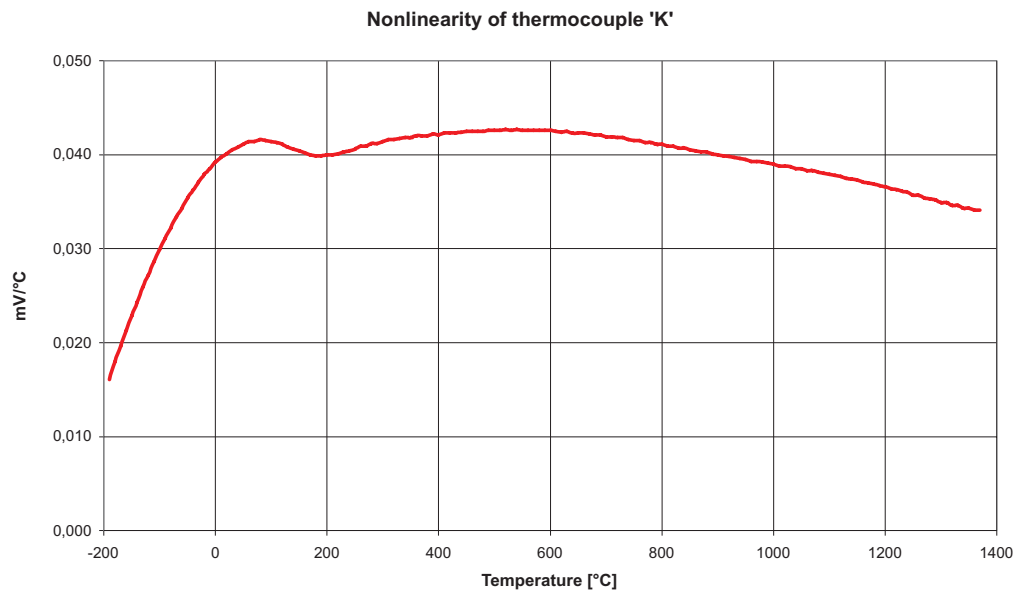


Linearisation table for thermocouple 'K'

Temp. [°C]	Thermocouple 'K' [mV]	Thermocouple 'K' [mV/°C]	Temp. [°C]	Thermocouple 'K' [mV]	Thermocouple 'K' [mV/°C]	Temp. [°C]	Thermocouple 'K' [mV]	Thermocouple 'K' [mV/°C]	Temp. [°C]	Thermocouple 'K' [mV]	Thermocouple 'K' [mV/°C]
-200	-5,891	-	200	8,137	0,040	600	24,902	0,043	1000	41,269	0,039
-190	-5,730	0,016	210	8,537	0,040	610	25,327	0,043	1010	41,657	0,039
-180	-5,550	0,018	220	8,938	0,040	620	25,751	0,042	1020	42,045	0,039
-170	-5,354	0,020	230	9,341	0,040	630	26,176	0,042	1030	42,432	0,039
-160	-5,141	0,021	240	9,745	0,040	640	26,599	0,042	1040	42,817	0,038
-150	-4,912	0,023	250	10,151	0,041	650	27,022	0,042	1050	43,202	0,038
-140	-4,669	0,024	260	10,560	0,041	660	27,445	0,042	1060	43,585	0,038
-130	-4,410	0,026	270	10,969	0,041	670	27,867	0,042	1070	43,968	0,038
-120	-4,138	0,027	280	11,381	0,041	680	28,288	0,042	1080	44,349	0,038
-110	-3,852	0,029	290	11,793	0,041	690	28,709	0,042	1090	44,729	0,038
-100	-3,553	0,030	300	12,207	0,041	700	29,128	0,042	1100	45,108	0,038
-90	-3,242	0,031	310	12,623	0,042	710	29,547	0,042	1110	45,486	0,038
-80	-2,920	0,032	320	13,039	0,042	720	29,965	0,042	1120	45,863	0,038
-70	-2,586	0,033	330	13,456	0,042	730	30,383	0,042	1130	46,238	0,038
-60	-2,243	0,034	340	13,874	0,042	740	30,799	0,042	1140	46,612	0,037
-50	-1,889	0,035	350	14,292	0,042	750	31,214	0,041	1150	46,985	0,037
-40	-1,527	0,036	360	14,712	0,042	760	31,629	0,042	1160	47,356	0,037
-30	-1,156	0,037	370	15,132	0,042	770	32,042	0,041	1170	47,726	0,037
-20	-0,777	0,038	380	15,552	0,042	780	32,455	0,041	1180	48,095	0,037
-10	-0,392	0,039	390	15,974	0,042	790	32,866	0,041	1190	48,462	0,037
0	0,000	0,039	400	16,395	0,042	800	33,277	0,041	1200	48,828	0,037
10	0,397	0,040	410	16,818	0,042	810	33,686	0,041	1210	49,192	0,036
20	0,798	0,040	420	17,241	0,042	820	34,095	0,041	1220	49,555	0,036
30	1,203	0,041	430	17,664	0,042	830	34,502	0,041	1230	49,916	0,036
40	1,611	0,041	440	18,088	0,042	840	34,909	0,041	1240	50,276	0,036
50	2,022	0,041	450	18,513	0,043	850	35,314	0,041	1250	50,633	0,036
60	2,436	0,041	460	18,938	0,042	860	35,718	0,040	1260	50,990	0,036
70	2,850	0,041	470	19,363	0,043	870	36,121	0,040	1270	51,344	0,035
80	3,266	0,042	480	19,788	0,043	880	36,524	0,040	1280	51,697	0,035
90	3,681	0,042	490	20,214	0,043	890	36,925	0,040	1290	52,049	0,035
100	4,095	0,041	500	20,640	0,043	900	37,325	0,040	1300	52,398	0,035
110	4,508	0,041	510	21,066	0,043	910	37,724	0,040	1310	52,747	0,035
120	4,919	0,041	520	21,493	0,043	920	38,122	0,040	1320	53,093	0,035
130	5,327	0,041	530	21,919	0,043	930	38,519	0,040	1330	53,439	0,035
140	5,733	0,041	540	22,346	0,043	940	38,915	0,040	1340	53,782	0,034
150	6,137	0,040	550	22,772	0,043	950	39,310	0,040	1350	54,125	0,034
160	6,539	0,040	560	23,198	0,043	960	39,703	0,039	1360	54,466	0,034
170	6,939	0,040	570	23,624	0,043	970	40,096	0,039	1370	54,807	0,034
180	7,338	0,040	580	24,050	0,043	980	40,488	0,039			
190	7,737	0,040	590	24,476	0,043	990	40,879	0,039			

(, = decimal point)

Nonlinearity of thermocouple 'K'



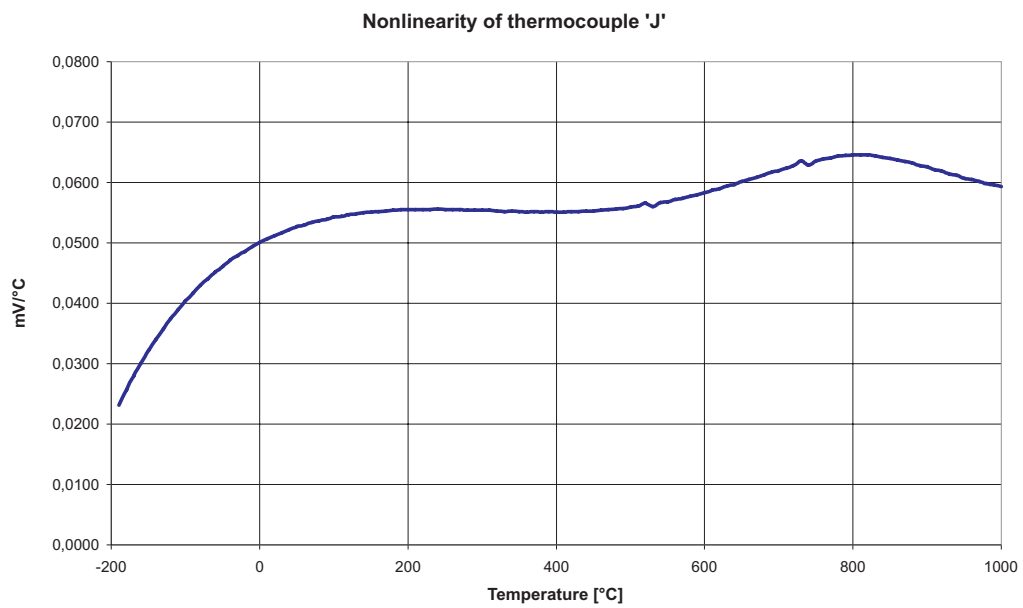
Linearisation table for thermocouple 'J'

Temp. [°C]	Thermocouple 'J' [mV]	Thermocouple 'J' [mV/°C]	Temp. [°C]	Thermocouple 'J' [mV]	Thermocouple 'J' [mV/°C]	Temp. [°C]	Thermocouple 'J' [mV]	Thermocouple 'J' [mV/°C]	Temp. [°C]	Thermocouple 'J' [mV]	Thermocouple 'J' [mV/°C]
-200	-7,890	-	100	5,268	0,0543	400	21,846	0,0551	700	39,130	0,0620
-190	-7,659	0,0231	110	5,812	0,0544	410	22,397	0,0551	710	39,754	0,0624
-180	-7,402	0,0257	120	6,359	0,0547	420	22,949	0,0552	720	40,382	0,0628
-170	-7,122	0,0280	130	6,907	0,0548	430	23,501	0,0552	730	41,018	0,0636
-160	-6,821	0,0301	140	7,457	0,0550	440	24,054	0,0553	740	41,647	0,0629
-150	-6,499	0,0322	150	8,008	0,0551	450	24,607	0,0553	750	42,283	0,0636
-140	-6,159	0,0340	160	8,560	0,0552	460	25,161	0,0554	760	42,922	0,0639
-130	-5,801	0,0358	170	9,113	0,0553	470	25,716	0,0555	770	43,563	0,0641
-120	-5,426	0,0375	180	9,667	0,0554	480	26,272	0,0556	780	44,207	0,0644
-110	-5,036	0,0390	190	10,222	0,0555	490	26,829	0,0557	790	44,852	0,0645
-100	-4,632	0,0404	200	10,777	0,0555	500	27,388	0,0559	800	45,498	0,0646
-90	-4,215	0,0417	210	11,332	0,0555	510	27,949	0,0561	810	46,144	0,0646
-80	-3,785	0,0430	220	11,887	0,0555	520	28,515	0,0566	820	46,790	0,0646
-70	-3,344	0,0441	230	12,442	0,0555	530	29,075	0,0560	830	47,434	0,0644
-60	-2,892	0,0452	240	12,998	0,0556	540	29,642	0,0567	840	48,076	0,0642
-50	-2,431	0,0461	250	13,553	0,0555	550	30,210	0,0568	850	48,716	0,0640
-40	-1,960	0,0471	260	14,108	0,0555	560	30,782	0,0572	860	49,354	0,0638
-30	-1,481	0,0479	270	14,663	0,0555	570	31,356	0,0574	870	49,989	0,0635
-20	-0,995	0,0486	280	15,217	0,0554	580	31,933	0,0577	880	50,621	0,0632
-10	-0,501	0,0494	290	15,771	0,0554	590	32,513	0,0580	890	51,249	0,0628
0	0,000	0,0501	300	16,325	0,0554	600	33,096	0,0583	900	51,875	0,0626
10	0,507	0,0507	310	16,879	0,0554	610	33,683	0,0587	910	52,496	0,0621
20	1,019	0,0512	320	17,432	0,0553	620	34,273	0,0590	920	53,115	0,0619
30	1,536	0,0517	330	17,984	0,0552	630	34,867	0,0594	930	53,729	0,0614
40	2,058	0,0522	340	18,537	0,0553	640	35,464	0,0597	940	54,341	0,0612
50	2,585	0,0527	350	19,089	0,0552	650	36,066	0,0602	950	54,948	0,0607
60	3,115	0,0530	360	19,640	0,0551	660	36,671	0,0605	960	55,553	0,0605
70	3,649	0,0534	370	20,192	0,0552	670	37,280	0,0609	970	56,155	0,0602
80	4,186	0,0537	380	20,743	0,0551	680	37,893	0,0613	980	56,753	0,0598
90	4,725	0,0539	390	21,295	0,0552	690	38,510	0,0617	990	57,349	0,0596
									1000	57,942	0,0593

(, = decimal point)

DAQN-THERM

Nonlinearity of thermocouple 'J'



CE-Certificate of conformity



Manufacturer:

DEWETRON Elektronische Messgeraete Ges.m.b.H.

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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-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:

L V E M C	Safety	IEC/EN 61010-1:1992/93 IEC/EN 61010-2-031	IEC 61010-1:1992/300 V CATIII PoI. D. 2 IEC 1010-2-031
	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
