

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



Analog Isolation Amplifiers

DAQ Series Modules

DEWETRON high precision signal conditioning amplifiers are available for almost any sensor to measure

- | | |
|---------------|----------------|
| ■ Voltage | ■ Acceleration |
| ■ Current | ■ Strain |
| ■ Pressure | ■ Force |
| ■ Temperature | ■ Distance |
| ■ Position | ■ RPM |
| ■ Torque | ■ Resistance |
| ■ Velocity | ■ and more |

Key Features

- Full isolation
- Single channel modularity
- High bandwidth
- High accuracy
- Integrated sensor supply
- DEWE-30 chassis for any AD card or Recorder
- Simple sensor connection

DAQP series modules are signal conditioners featuring high accuracy, programmable input ranges, signal filtering and full isolation. DAQP modules are highest quality and offer best comfort in all applications by single channel modularity and convenient sensor connection.

Due to their isolation these modules are almost indestructible and the user does not need to worry about details like common mode voltage, ground system etc – **just simply connect the signal and measure! This is saving a lot of time and money.**

Monitor e.g. temperature on a circuit breaker with cheap non-isolated thermocouples. Even current measurements using shunt resistors in the power line are no problem. There are unlimited applications where isolation is the key for success.

As a perfect supplementation to the dynamic DAQP modules DEWETRON offers quasi static PAD modules with integrated 24 bit A/D converters and typically 8 channels per module for slow signals.





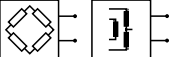

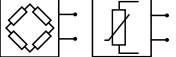



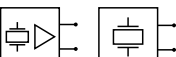









Selection Guide

DAQ Series Modules

- Single channel
- High bandwidth - for dynamic signals
- Isolation (most models)
- Analog signal output (± 5 V)
- Single channel modularity
- For DEWETRON systems with built-in DAQ rack
- Pure signal conditioning solution in conjunction with DEWE-30 series racks



Module	Input type	Ranges	TEDS	Bandwidth (BW), Filters (LP = lowpass, HP = highpass)	Isolation (ISO), Overvoltage protection (OP)
Universal measurement					
DAQP-STG 	Strain gauge, bridge sensors	± 0.1 to ± 1000 mV/V (@ 5 VDC _{exc})	✓	BW: 300 kHz LP: 10 Hz to 300 kHz	ISO: 350 V _{DC} OP: ± 50 V _{DC}
	Piezoresistive bridge	± 0.5 to 10000 mV/mA (@ 1 mA _{exc})			
	Voltage	± 500 μ V to ± 10 V			
	Resistance	25 m Ω to 100 k Ω			
	Pt100, Pt200, Pt500, Pt1000, Pt2000	-200° C to 850° C			
	IEPE® via MSI-BR-ACC	± 2.5 to ± 10000 mV			
	Thermocouple via MSI-BR-TH-x	full range of TC type			
Charge via MSI-BR-CH-50	up to 50000 pC				
Voltage via MSI-BR-V-200	up to ± 200 V				
DAQP-MULTI 	Thermoresistors	Pt100, Pt200, Pt500, Pt1000 and Pt2000, free programmable range	✓	BW: 3 kHz LP: 3, 10, 30, 100, 300, 1000 Hz	ISO: 1 kV _{RMS}
	Thermocouple	Type K, J, T, R, S, N, E, B, L, C, U free programmable range			
	Resistance	1 Ohm to 1 MOhm			
	Piezoresistive bridge	13 ranges (± 0.5 to 5000 mV/mA)			
	Voltage	10 ranges from ± 5 mV to ± 5 V depending on external shunt			
Current (with external shunt)					
High voltage measurement					
DAQP-HV 	High voltage	± 20 to ± 1400 V	-	BW: 300 kHz LP: 10 Hz to 300 kHz	ISO: 1.8 kV _{RMS}
DAQP-HV-S3 	High voltage	± 20 to ± 1400 V	-	BW: 700 kHz LP: 10 Hz to 700 kHz	ISO: 1.8 kV _{RMS}
DAQP-DMM 	High voltage	± 10 to ± 1000 V	-	BW: 20/30 kHz LP: 10 Hz to 30 kHz	ISO: 1.5 kV _{RMS}
Voltage & current measurement					
DAQP-LV 	Voltage	± 10 mV to ± 50 V	✓	BW: 300 kHz LP: 10 Hz to 300 kHz	ISO: up to 1 kV _{RMS} OP: 350 V _{DC}
	Current with external shunt	20 mA / 5 A			
	IEPE® via MSI-V-ACC	± 10 mV to 10 V			
	Pt100, Pt200, Pt500, Pt1000, Pt2000 and resistance via MSI-V-RTD	-200° C to 1000° C and 0 to 6.5 kOhm			
Charge via MSI-V-CH-50	up to 50000 pC				
DAQP-V 	Voltage	10 mV to 50 V	-	BW: 50 kHz LP: 10 Hz to 50 kHz	ISO: up to 1 kV _{RMS} OP: ± 500 V _{DC}
	Current with external shunt	20 mA / 5 A			
DAQN-AIN 	Voltage	± 10 V (1:1 input)	-	-	OP: < ± 500 V (jumper selectable)

Module	Input type	Ranges	TEDS	Bandwidth (BW), Filters (LP = lowpass, HP = highpass)	Isolation (ISO), Overvoltage protection (OP)
Current measurement					
DAQP-LA-SC 	 Current <i>Note:</i> 5 A _{RMS} continuous	0.1 A to 30 A peak max. 5 A _{RMS} contin. current	-	BW: 300 kHz LP: 10 Hz to 300 kHz	ISO: 1.4 kV _{RMS}
DAQP-LA-B 	 Current <i>Note:</i> typ. 20 mA application	2 mA to 600 mA	-	BW: 300 kHz LP: 10 Hz to 300 kHz	ISO: 1.4 kV _{RMS}
Bridge / strain gauge and carrier frequency amplifier					
DAQP-CFB 	 AC bridge, strain gauge <i>Note:</i> 5 kHz sine wave excitation Inductive sensors, LVDT	Bridge: 0.1 to 1000 mV/V Inductive: 5 to 1000 mV/V	-	BW: DC to 2.3 kHz LP: 10 Hz to 1 kHz	OP: ±10 V _{DC}
DAQP-BRIDGE-A 	 Strain gauge, bridge sensors Potentiometric sensors	±1 to ±50 mV/V (@ 5 VDC) 200 Ω to 10 kΩ	-	BW: 20 kHz LP: 10 Hz to 20 kHz	ISO: 350 V _{DC} OP: ±10 V _{DC}
Charge / IEPE® measurement					
DAQP-ACC-A 	 IEPE® sensors	±50 mV to ±5 V	-	BW: 0.5 Hz to 300 kHz LP: 1 to 300 kHz HP: 0.5 Hz and 5 Hz	-
DAQP-CHARGE-A 	 Charge sensors IEPE® sensors <i>Note:</i> selectable integration and double integration	Charge: 5 to 50000 pC IEPE®: ±5 mV to 5 V	-	BW: 0.1 Hz to 50 kHz LP: 100 Hz to 50 kHz HP: 0.1 Hz to 10 Hz	-
DAQP-CHARGE-B 	 Charge sensors <i>Note:</i> selectable time constant for static sensors	±100 to ±1 000 000 pC	-	BW: DC to 100 kHz LP: 10 Hz to 100 kHz HP: DC, 0.001 Hz to 0.5 Hz	ISO: 350 V _{DC}
Temperature measurement					
DAQP-THERM 	 Thermocouple <i>Note:</i> internal CJC and linearisation	Type K, J, T, R, S, N, E, B, L, C and U selectable free programmable range	-	BW: 3 kHz LP: 3, 10, 30, 100, 300, 1000 Hz	ISO: 1 kV _{RMS}
Frequency measurement					
DAQP-FREQ-A 	 Frequency	100 Hz to 200 kHz	-	BW: according to range Output response: 1.5 ms 30 ms 500 ms	ISO: 350 V _{DC}
Voltage output module					
DAQP-V-OUT 	 Voltage output	1:1 output module with isolation Input voltage: ±10 V Output voltage: ±10 V	-	BW: 400 Hz	ISO: 240 V _{DC}

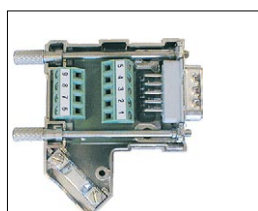
¹⁾ TEDS support for DAQP-BRIDGE-B revision 2 only



ADAP-D9M-BNCF:
DSUB to BNC adapter for DAQP-V series and DAQP-FREQ modules



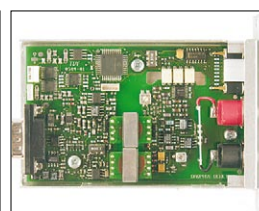
BNC to Microdot adapter
(included as a standard with DAQP-CHARGE-A modules)



CONN-DSUB-9:
Screw terminal adapter for all modules with 9-pin DSUB connector



BNC to banana and banana to BNC adaptors



Isolated high-voltage amplifier: DAQP-HV

DAQP-STG

- **Strain gauge, bridge sensors:** ± 0.1 to ± 1000 mV/V (@ 5 V_{DC} excitation)
- **Piezoresistive bridge:** ± 0.5 to ± 10000 mV/mA (@ 1 mA excitation)
- **Voltage input:** ± 500 μ V to ± 10 V
- **RTD** Resistance Temperature Detector (Pt100 to Pt2000)
9 resistance ranges (8 to 4000 Ω)
- **Resistance:** 25 m Ω to 100 k Ω
- **Isolation:** 350 V_{DC}
- **Signal connection:** 9-pin SUB-D connector

Additional signal input using MSI

- **IEPE®** Constant current powered sensors (accelerometers, microphones); 12 ranges (± 2.5 mV to 10 V); requires MSI-V-ACC
- **THERMOCOUPLE** full range of TC type requires MSI-BR-TH-x
- **CHARGE** Charge up to 50000 pC requires MSI-V-CH-50
- **VOLTAGE** up to ± 200 V requires MSI-BR-V-200

Isolated universal input module



Module specifications

	DAQP-STG
Gain	0.5 to 10 000
Voltage input ranges	$\pm 0.5, \pm 1, \pm 2.5, \pm 5, \pm 10, \pm 25, \pm 50, \pm 100, \pm 250, \pm 500$ mV, ± 1 V, ± 2 V, ± 5 V, ± 10 V
Sensitivity @ 5 V _{DC} excitation	$\pm 0.1, \pm 0.2, \pm 0.5, \pm 1, \pm 2, \pm 5, \pm 10, \pm 20, \pm 50, \pm 100, \pm 200, \pm 400, \pm 1000$ mV/V
Resistance	25 mOhm to 100 kOhm
Input impedance	>100 MOhm (power off: 50 kOhm)
Input noise	3.5 nV * $\sqrt{\text{Hz}}$
Voltage input accuracy	± 0.05 % of reading ± 0.02 % of range ± 10 μ V
Gain drift	typical 10 ppm/K max. 20 ppm/K
Offset drift	typical 0.3 μ V/K + 10 ppm of range, max 2 μ V/K + 20 ppm of range
linearity	typical 0.02 %
Excitation voltage	0, 0.25, 0.5, 1, 2.5, 5, 10 and 12 V _{DC} software programmable (16 Bit DAC)
Accuracy	± 0.03 % ± 1 mV
Drift	± 10 ppm/K ± 50 μ V/K
Current limit	100 mA
Protection	Continuous short to ground
Excitation current	0.1, 0.2, 0.5, 1, 2, 5, 10 and 20 mA software programmable (16 Bit DAC)
Accuracy	0.05% ± 2 μ A
Drift	15 ppm/K
Compliance voltage	12 V
Output impedance	>1 MOhm
Supported sensors	4- or 6-wire full bridge 3- or 5-wire $\frac{1}{2}$ bridge with internal completion (software programmable) 3- or 4-wire $\frac{1}{4}$ bridge with internal resistor for 120 and 350 Ohm (software programmable) ¹⁾ 4-wire full bridge with constant current excitation (piezoresistive bridge sensors) Potentiometric Resistance Resistance Temperature Detection: Pt100, Pt200, Pt500, Pt1000, Pt2000
Bridge resistance	80 Ohm to 10 kOhm @ ≤ 5 V _{DC} excitation
Shunt calibration	Two internal shunt resistors 59.88 kOhm and 175 kOhm
Shunt and completion resistor accuracy	0.05 % ± 15 ppm/K
Automatic bridge balance	Input range 500 μ V to 1 V: ± 200 % of Range 2.5 V to 5 V : ± 20 % of Range
Bandwidth (-3 dB)	300 kHz
Filters (low pass)	10 Hz, 30 Hz, 100 Hz, 300 Hz, 1 kHz, 3 kHz, 10 kHz, 30 kHz, 100 kHz
Filter characteristics	10 Hz to 100 kHz: Butterworth or Bessel 40 dB/dec (2nd order; ± 1.5 dB @ f ₀) 300 kHz: Bessel 60 dB/dec (3rd order; 0 to -3 dB @ 300kHz)

Typical SNR @ 100 kHz [1 kHz] and 5 V _{DC} excitation	66 dB [84 dB] @ 1 mV/V 82 dB [100 dB] @ 50 mV/V
Typical CMRR @ 0.1 mV/V [1 mV/V] and 5 V _{DC} excitation	160 dB [160 dB] @ DC 115 dB [110 dB] @ 400 Hz 110 dB [105 dB] @ 1 kHz
Isolation	±350 V _{DC} continuous (for input, excitation and TEDS interface)
Common mode voltage	±350 V _{DC} input to housing
Over voltage protection	±50 V _{DC} input (+) to input (-)
Output voltage	±5 V
Output resistance	< 1 Ohm
Output current	Max. 5 mA; short to ground protected for 10 seconds
RS-485 interface	Yes
Supported TEDS chips	DS2406, DS2430A, DS2431, DS2432, DS2433
MSI support	MSI-BR-TH-x, MSI-BR-ACC, MSI-BR-V-200, MSI-BR-CH-50
Power supply voltage	±9 V _{DC} (±1 %)
Power consumption	Typ. 1.7 W @ 350 Ohm, 2.15 W @ 120 Ohm (both full bridge @ 5 V _{DC} excitation) Absolute max.: 3 W (maximum excitation @ maximum current)

DAQP-MULTI

- **Thermocouple:** Free programmable ranges within full thermocouple input span
- **Bridge:** ± 0.5 to ± 1000 mV/mA
- **Voltage input:** ± 5 mV to ± 5 V (free programmable within ± 5 V)
- **RTD** Resistance Temperature Detector (Pt100 to Pt2000), free programmable ranges within full RTD input span
- **Resistance:** 1Ω to $1 \text{ M}\Omega$ (free programmable between 1Ω and $1 \text{ M}\Omega$)
- **Bandwidth:** 3 kHz
- **Isolation:** $1000 V_{\text{RMS}}$ continuous
- **Signal connection:** Standard miniature thermocouple connector, 9-pin SUB-D connector



Module specifications

DAQP-MULTI	
Input types	Thermocouple (TC); Resistance Temperature Detector (RTD); Voltage; Resistance; Bridge with constant current excitation
Thermocouple	
Type	K, J, T, R, S, N, E, B, L, C, U, others on request
Range	Min. to max. of the input range is free programmable within the full thermocouple input span
CJC absolute accuracy	± 0.2 °C
CJC stability	0.01 °C/°C ambient temperature change
Accuracy	Typical 0.3° for type K including CJC error; details see table „Input ranges and detailed specifications for thermocouple“.
Linearization	DSP based linearization
Nonlinearity	> 0.01°C
Open thermocouple detection	100 M Ω pull up; software selectable
Connector	Mini thermocouple connector with integrated cold junction compensation sensor
RTD	
Type	Pt100, Pt200, Pt500, Pt1000, Pt2000, others on request
Range	Min. and max. of the input range is free programmable within the full RTD input span
Constant current	Pt100: 1 mA; Pt200, Pt500: 0.5 mA; Pt1000, Pt2000: 0.2 mA
Accuracy	Typical accuracy 0.15 °C for Pt100, details see table „Input ranges and detailed specifications for RTD“
Linearization	DSP based linearization
Nonlinearity	> 0.01 °C
Voltage	
Input range	± 5 mV, ± 10 mV, ± 20 mV, ± 50 mV, ± 100 mV, ± 200 mV, ± 500 mV, ± 1 V, ± 2 V, ± 5 V, free programmable within ± 5 V
Accuracy	0 to ± 100 mV Range: 0.02 % of reading ± 0.01 % of Range ± 5 μ V > ± 100 mV to ± 5 V Range: 0.02 % of reading ± 0.01 % of Range ± 100 μ V
Offset drift	Typical ± 0.3 μ V/°K ± 10 ppm of range/°K
Gain drift	Typical 15 ppm/°K
Input impedance	> 100 M Ω (power off: 50 k Ω)
Input noise	8 nV * $\sqrt{\text{Hz}}$
Resistance	
Range	1, 3, 10, 30, 100, 300, 1k, 3k, 10k, 30k, 100k, 1M, free programmable between 1Ω and $1 \text{ M}\Omega$
Accuracy	According to table „Input ranges and detailed specifications for resistance“
Drift	Typical 15 ppm/°K
Constant current	From 5 μ A to 5 mA depending on range
Bridge	
Range	0.5, 1, 2, 5, 10, 20, 50, 100, 200, 500, 1000 mV/mA
Accuracy	0.02 % of reading ± 0.01 % of Range ± 5 μ V
Offset drift	typical ± 0.3 μ V/°K ± 10 ppm of range/°K
Gain drift	typical 15ppm/°K
Input impedance	> 100 M Ω (power off: 50 k Ω)
Input noise	8 nV * $\sqrt{\text{Hz}}$
Automatic bridge balance	± 200 % of range
Supported sensors	4 wire full bridge
Connector	DSUB9; DEWETRON bridge type pinout

Excitation current	
Excitation current	1, 2, 4 mA; software programmable
Accuracy	0 to 200 μ A: 0.02 % \pm 50 nA 200 μ A to 5 mA: 0.02 % \pm 1 μ A
Drift	15 ppm/ $^{\circ}$ K
Compliance voltage	15 V
Source resistance	>150 k Ω
Bandwidth (-3dB)	3 kHz
Filters	3 Hz, 10 Hz, 30 Hz, 100 Hz, 300 Hz, 1 kHz
Group delay	300 μ s with highest filter
Filter characteristics	Butterworth or Bessel, 2nd, 4th, 8th order programmable
Typ. CMRR @ 3kHz	>160 dB
Isolation	\pm 1000 V _{RMS} continuous (for input excitation and TEDS interface)
Over voltage protection	\pm 100 V between inputs (clamping voltage: 5 V @ TC input; 11 V @ Voltage input)
Output voltage	\pm 5 V; 0 to 5V; (\pm 10 V and 0 to 10 V with special DEWE-30)
Output resistance	22 Ω
Output current	Max. 5 mA
Output protection	Continuous short to ground
RS-485 interface	Yes
Supported TEDS chips	DS2406, DS2430A, DS2431, DS2432, DS2433, DS28EC20
MSI support	No
Power supply voltage	\pm 9 V _{DC} (\pm 1 %)
Power consumption	1 W typical

Input ranges and detailed specifications for thermocouple

Thermocouple									
Type	Standard	Input range		Accuracy					
		min [°C]	max [°C]	-270 to -200 °C [°C]	-200 to -100 °C [°C]	-100 to 0 °C [°C]	0 to 100 °C [°C]	100 °C to fullscale [% of reading + °C]	
K	DIN EN 60584-1	-270	1372	6.70	0.70	0.35	0.26	0.027	0.26
J	DIN EN 60584-1	-210	1200	0.68	0.60	0.32	0.25	0.019	0.25
T	DIN EN 60584-1	-270	400	4.37	0.69	0.37	0.26		0.23
R	DIN EN 60584-1	-50	1760			0.85	0.59	0.009	0.44
S	DIN EN 60584-1	-50	1760			0.77	0.58	0.012	0.45
N	DIN EN 60584-1	-270	1300	9.14	0.77	0.37	0.28	0.017	0.27
E	DIN EN 60584-1	-270	1000	4.25	0.60	0.33	0.24	0.018	0.23
L	DIN 43710	0	900				0.25		0.33
C	ASTM E988-96	0	2310				0.36	0.045	0.33
U	DIN 43710	-200	600		0.64	0.37	0.26		0.24
B	DIN EN 60584-1	0	1820				0 to 500 °C 10	>500 °C	0.44

Input ranges and detailed specifications for RTD

RTD									
Type	Standard	Input range		Current [mA]	Accuracy				
		min [°C]	max [°C]		-200 to -100 °C [°C]	-100 to 0 °C [°C]	100 °C to fullscale [% of reading + °C]		
Pt100 (385)	DIN EN 60751	-200	850	0.2	0.14	0.21	0.07	0.21	
Pt200 (385)	DIN EN 60751	-200	850	0.1	0.18	0.27	0.10	0.27	
Pt500 (385)	DIN EN 60751	-200	850	0.2	0.34	0.42	0.09	0.42	
Pt1000 (385)	DIN EN 60751	-200	850	0.2	0.22	0.29	0.09	0.29	
Pt2000 (385)	DIN EN 60751	-200	850	0.2	0.25	0.35	0.12	0.36	
Pt100 (3926)		-200	850	0.2	0.14	0.21	0.07	0.21	

Input ranges and detailed specifications for resistance

Resistance			
Range [Ω]	Current [mA]	Accuracy	
		[% of reading]	[% of range]
1000000	0.005	0.04	1.02
300000	0.015	0.04	0.35
100000	0.05	0.04	0.11
30000	0.1	0.04	0.07
10000	0.1	0.04	0.08
3000	0.2	0.04	0.07
1000	0.5	0.04	0.25
300	1	0.04	0.18
100	1	0.04	0.12
30	2	0.04	0.08
10	4	0.04	0.06
3	5	0.04	0.10
1	5	0.04	0.23

Detailed specifications for excitation current

Excitation		
	[% of reading]	[μA]
0 to 200 μA	0,02	0,05
>0.2 to 5 mA	0,02	1

DAQP-HV(-S3)

- **Input ranges:**
- **Bandwidth:**
- **Isolation:**
- **Signal connection:**

Isolated high voltage module

7 ranges (± 20 V to ± 1400 V)
 300 kHz, (version DAQP-HV-S3: 700 kHz)
 1.8 kV_{RMS} line to line
 1.4 kV_{RMS} line to ground
 Banana sockets
 Screw terminals

**Module specifications**

DAQP-HV	
Input ranges unipolar and bipolar	20 V, 50 V, 100 V, 200 V, 400 V, 800 V, 1400 V
DC accuracy	
20 V and 50 V	± 0.05 % of reading ± 40 mV
100 V to 1400 V	± 0.05 % of reading ± 0.05 % of range
Gain linearity	0,03 %
Gain drift range	Typically 20 ppm/ $^{\circ}$ K (max. 50 ppm/ $^{\circ}$ K)
Offset drift	
20 V to 100 V	typical 0.5 mV/ $^{\circ}$ K max. 4 mV/ $^{\circ}$ K
200 V to 1400 V	typical 5 ppm/ $^{\circ}$ K max. 20 ppm of Range/ $^{\circ}$ K
Long term stability	100 ppm/sqrt (1000 hrs)
Input resistance	10 MOhm
-3 dB Bandwidth (DAQP-HV)	300 kHz ⁽²⁾
-3 dB Bandwidth (DAQP-HV-S3)	700 kHz ⁽²⁾
Filter selection	Push button or software
Filter (lowpass)	10, 30, 100, 300, 1k, 3k, 10k, 30k, 100k, 300 kHz ^(1,2) , 700 kHz ⁽³⁾
Filter type	Bessel or Butterworth 40 dB/decade
Typical SFDR and SNR	
	300 kHz 100 kHz 10 kHz
	SFDR SNR SFDR SNR SFDR SNR
50 V	98 76 101 81 dB 108 90 dB
200 V	98 84 101 89 dB 108 91 dB
1400 V	98 86 102 91 dB 107 92 dB
Typical CMRR	>80 dB @ 50 Hz 70 dB @ 400 Hz 60 dB @ 1 kHz 48 dB @ 10 kHz
Isolation voltage	Line to Ground 1.4 kVrms Line to Line 1.8 kVrms
Protection	CAT III 600 CAT IV 300
Surge (1.2/50)	± 4000 V
Burst (5 kHz)	± 4000 V
Output voltage	± 5 V
Output resistance	<10 Ohm
Output current	5 mA
Output protection	Short to ground for 10 sec.
Power supply	± 9 V _{DC} ± 1 %
Power consumption	0.7 W
Power On default settings	Software programmable
Interface	RS-485

⁽¹⁾ 300 kHz exclusively for Bessel filter characteristic

⁽²⁾ 180 kHz exclusively for DAQP-HV Revision 1.00

⁽³⁾ 700 kHz exclusively for Bessel filter characteristic

DAQP-DMM

- **Input ranges:**
- **Bandwidth:**
- **Isolation:**
- **Signal connection:**

Isolated high voltage module

- 6 ranges from ± 10 V to ± 1000 V
- 30 kHz max.
- 1.5 kV_{RMS}
- Safety banana sockets



DAQP-DMM

Module specifications

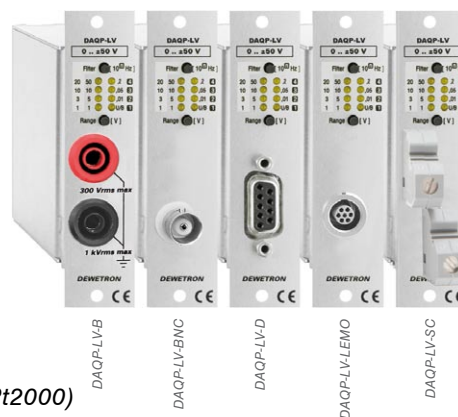
DAQP-DMM	
Input ranges	$\pm 10, \pm 40, \pm 100, \pm 200, \pm 400, \pm 1000$ V
Range selection	Push button or software
DC accuracy	0.1 % of reading ± 0.1 % of range
Gain linearity	Better than ± 0.03 %
Gain drift	Typ. 20 ppm/ $^{\circ}$ K, max. 40 ppm/ $^{\circ}$ K
Input resistance	10 MOhm (± 0.1 %)
Bandwidth (-3 dB ± 1.5 dB @ f ₀)	
10 V to 40 V range	Typical 20 kHz
100 V to 200 V range	Typical 25 kHz
400 V to 1000 V range	30 kHz
Filters (lowpass)	10 Hz, 100 Hz, 1 kHz, 3 kHz (± 1.5 dB @ f ₀)
Filter selection	Push button or software
Filter characteristics	Butterworth
@ 0.01, 0.1, 1, 3 kHz	40 dB / decade (12 dB / octave)
@ 30 kHz	100 dB / decade (30 dB / octave)
Typ. SNR @ max. bandwidth	
10 V range	60 dB
100 V range	76 dB
1000 V range	81 dB
Typical CMRR	73 dB @ 0 Hz 70 dB @ 50 Hz 57 dB @ 400 Hz
Isolation voltage	1.5 kV _{RMS}
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 _{DC} (± 10 %)
Power consumption	Typical 0.65 W

DAQP-LV

- Voltage input:
- Current input:
- Bandwidth:
- Isolation:
- IEPE®
- RTD
- CHARGE

Isolated low voltage module

12 ranges (10 mV to 50 V)
 ±20 mA using DAQ-SHUNT-1
 ±5 A using DAQ-SHUNT-4 or DAQ-SHUNT-5
 300 kHz
 350 V_{DC} (1 kV_{RMS} with banana connector)
 Additional signal input using MSI
 Constant current powered sensors (accelerometers, microphones); 12 ranges (10 mV to 5 V); requires MSI-V-ACC
 Resistance Temperature Detector (Pt100 to Pt2000)
 9 resistance ranges (8 to 4000 Ω); requires MSI-V-RTD
 Charge up to 50000 pC requires MSI-V-CH-50



Module specifications

DAQP-LV	
Input ranges unipolar and bipolar	10 mV, 20 mV, 50 mV, 100 mV, 200 mV, 500 mV, 1 V, 2.5 V, 5 V, 10 V, 25 V, 50 V
Push button selectable ranges	10 mV, 50 mV, 200 mV, 1 V, 5 V, 10 V, 50 V
DC accuracy	Range Accuracy
Bipolar	10 mV to 50 mV ±0.02 % of reading ±40 µV
	100 mV to 50 V ±0.02 % of reading ±0.05 % of range
Unipolar	10 mV to 50 mV ±0.04 % of reading ±40 µV
	100 mV to 50 V ±0.04 % of reading ±0.05 % of range
Input coupling	DC or AC software selectable (1.5 Hz standard, custom on request down to 0.01 Hz)
Gain linearity	0.01 % of full scale
Gain drift range	Typically 10 ppm/°K (max. 20 ppm/°K)
Offset drift	Uni- and bipolar
10 mV to 200 mV	3 µV/°K
500 mV to 50 V	10 ppm of Range/°K
Long term stability	100 ppm/sqrt (1000 hrs)
Input resistance	1 MOhm
Bandwidth (-3 dB)	300 kHz
Filter selection	Push button or software
Filters (low pass)	10 Hz, 30 Hz, 100 Hz, 300 Hz, 1 kHz, 3 kHz, 10 kHz, 30 kHz, 100 kHz
Filter characteristics	10 Hz to 100 kHz: Butterworth or Bessel 40 dB/dec (2nd order; ±1.5 dB @ f ₀) 300 kHz: Bessel 60 dB/dec (3rd order; 0 to -3 dB @ 300kHz)
Typical SFDR and SNR:	300 kHz bandwidth 100 kHz bandwidth 10 kHz bandwidth
20 mV	SFDR SNR SFDR SNR SFDR SNR
1 V	100 dB 72 dB 98 dB 76 dB 97 dB 84 dB
50 V	102 dB 82 dB 99 dB 93 dB 97 dB 96 dB
Typical CMRR	10 mV to 1 V range: 2.5 V to 50 V range: >100 dB @ 50 Hz 90 dB @ 50 Hz >100 dB @ 1 kHz 65 dB @ 1 kHz 83 dB @ 10 kHz 55 dB @ 10 kHz
Input overvoltage protection	350 V _{DC}
Isolation voltage	350 V _{DC} (1 kV _{RMS} with banana connector)
Sensor supply	±9 V (±1 %), 12 V (±5 %), 200 mA resettable fuse protected ⁽¹⁾
Output voltage	±5 V
Output resistance	<10 Ohm
Maximum output current	5 mA
Output protection	Short to ground for 10 sec.
Power On default settings	Software programmable
Power supply	±9 V _{DC} ±1 %
Power consumption	0.8 W without sensor supply
RS-485 interface	Yes
TEDS	Hardware support for TEDS (Transducer Electronic Data Sheet)
Supported TEDS chips	DS2406, DS2430A, DS2432, DS2433, DS2431
Supported MSI	MSI-V-ACC; MSI-V-RTD

⁽¹⁾ Overall current should not exceed DEWE-30-xx maximum power.

Standard Models

Instruments

For Your Computer

Signal Conditioning

Components

MSI specifications

MSI-V-ACC plugged in DAQP-LV-D																					
Supported by	DAQP-LV																				
Sensor types	IEPE® sensor only																				
Sensor excitation	4 mA ±10 %																				
Input coupling	AC																				
Input impedance	1 M Ohm																				
Filter high pass	1.4 Hz																				
Input voltage range	±10 mV, 20 mV, 50 mV, 100 mV, 200 mV, 500 mV, 1 V, 2.5 V, 5 V, 10 V, 50 V																				
DC accuracy	10 mV to 50 mV range ±0.02 % of reading ±40 µV 100 mV to 50 V ±0.02 % of reading ±0.05 % of range																				
Bandwidth	1.4 to 300 kHz																				
Typical SFDR and SNR	<table border="1"> <thead> <tr> <th></th> <th>300 kHz bandwidth</th> <th>100 kHz bandwidth</th> <th>10 kHz bandwidth</th> </tr> <tr> <th></th> <th>SFDR</th> <th>SNR</th> <th>SFDR</th> </tr> </thead> <tbody> <tr> <td>20 mV</td> <td>100 dB</td> <td>72 dB</td> <td>98 dB</td> </tr> <tr> <td>1 V</td> <td>102 dB</td> <td>82 dB</td> <td>99 dB</td> </tr> <tr> <td>50 V</td> <td>102 dB</td> <td>82 dB</td> <td>99 dB</td> </tr> </tbody> </table>		300 kHz bandwidth	100 kHz bandwidth	10 kHz bandwidth		SFDR	SNR	SFDR	20 mV	100 dB	72 dB	98 dB	1 V	102 dB	82 dB	99 dB	50 V	102 dB	82 dB	99 dB
	300 kHz bandwidth	100 kHz bandwidth	10 kHz bandwidth																		
	SFDR	SNR	SFDR																		
20 mV	100 dB	72 dB	98 dB																		
1 V	102 dB	82 dB	99 dB																		
50 V	102 dB	82 dB	99 dB																		
Input connector	BNC																				
TEDS	Automatic MSI detection via TEDS interface																				

MSI-V-RTD plugged in DAQP-LV-D							
Connection types	2-, 3- or 4-wire						
Resistance ranges	8, 16, 40, 80, 160, 400, 800, 1600, 4000 Ω						
RTD types	PT100, PT200, PT500, PT1000, PT2000						
Ohm	<table border="1"> <thead> <tr> <th>Range</th> <th>Accuracy</th> </tr> </thead> <tbody> <tr> <td>8 to 40 Ω</td> <td>±0.04 Ω</td> </tr> <tr> <td>80 to 4000 Ω</td> <td>±0.05 % of reading 0.05 % of range</td> </tr> </tbody> </table>	Range	Accuracy	8 to 40 Ω	±0.04 Ω	80 to 4000 Ω	±0.05 % of reading 0.05 % of range
Range	Accuracy						
8 to 40 Ω	±0.04 Ω						
80 to 4000 Ω	±0.05 % of reading 0.05 % of range						
PT100	<table border="1"> <tbody> <tr> <td>-200 to 150 °C</td> <td>±0.5 °C</td> </tr> <tr> <td>-200 to 850 °C</td> <td>±1.1 °C</td> </tr> </tbody> </table>	-200 to 150 °C	±0.5 °C	-200 to 850 °C	±1.1 °C		
-200 to 150 °C	±0.5 °C						
-200 to 850 °C	±1.1 °C						
PT200	<table border="1"> <tbody> <tr> <td>-200 to 250 °C</td> <td>±0.6 °C</td> </tr> <tr> <td>-200 to 850 °C</td> <td>±1.1 °C</td> </tr> </tbody> </table>	-200 to 250 °C	±0.6 °C	-200 to 850 °C	±1.1 °C		
-200 to 250 °C	±0.6 °C						
-200 to 850 °C	±1.1 °C						
PT500	<table border="1"> <tbody> <tr> <td>-200 to 150 °C</td> <td>±0.5 °C</td> </tr> <tr> <td>-200 to 600 °C</td> <td>±0.9 °C</td> </tr> <tr> <td>-200 to 850 °C</td> <td>±1.7 °C</td> </tr> </tbody> </table>	-200 to 150 °C	±0.5 °C	-200 to 600 °C	±0.9 °C	-200 to 850 °C	±1.7 °C
-200 to 150 °C	±0.5 °C						
-200 to 600 °C	±0.9 °C						
-200 to 850 °C	±1.7 °C						
PT1000	<table border="1"> <tbody> <tr> <td>-200 to 150 °C</td> <td>±0.5 °C</td> </tr> <tr> <td>-200 to 600 °C</td> <td>±1.1 °C</td> </tr> <tr> <td>-200 to 800 °C</td> <td>±1.7 °C</td> </tr> </tbody> </table>	-200 to 150 °C	±0.5 °C	-200 to 600 °C	±1.1 °C	-200 to 800 °C	±1.7 °C
-200 to 150 °C	±0.5 °C						
-200 to 600 °C	±1.1 °C						
-200 to 800 °C	±1.7 °C						
PT2000	<table border="1"> <tbody> <tr> <td>-200 to 150 °C</td> <td>±0.6 °C</td> </tr> <tr> <td>-200 to 250 °C</td> <td>±0.8 °C</td> </tr> </tbody> </table>	-200 to 150 °C	±0.6 °C	-200 to 250 °C	±0.8 °C		
-200 to 150 °C	±0.6 °C						
-200 to 250 °C	±0.8 °C						
Constant current	1.25 mA						
Constant current drift	22 ppm/°C						
Linearisation	Through software (ITS 90 norm)						
Bandwidth (-3 dB)	30 kHz						
Typical noise (PT100)	fg = 10 Hz 0.003 °C						
Range (-200 to 250 °C)	fg = 1 kHz 0.009 °C						
Sensor connection	Binder subminiature circular connectors series 712, 5-pin						
Software support	Automatic MSI detection via TEDS interface						

DAQP-V**Isolated low voltage module**

- **Input ranges:** $\pm 10, \pm 100 \text{ mV}, \pm 1, \pm 5, \pm 10, \pm 50 \text{ V}$
- **Bandwidth:** 50 kHz
- **Isolation:** $350 \text{ V}_{\text{DC}}$ ($1 \text{ kV}_{\text{RMS}}$ with banana connector)
- **Signal connection:** Safety banana sockets
BNC connector
9-pin SUB-D connector
8-pin LEMO connector

**Module specifications**

	DAQP-V
Input ranges	$\pm 0.01, \pm 0.1, \pm 1, \pm 5, \pm 10, \pm 50 \text{ V}$
Range selection	Push button or software
DC accuracy	
10 mV range	0.05 % of reading $\pm 40 \mu\text{V}$
100 mV range	0.05 % of reading $\pm 100 \mu\text{V}$
1 V to 50 V ranges	0.05 % of reading $\pm 0.05 \%$ of range
Gain linearity	Better than $\pm 0.03 \%$
Gain drift	Typ. 20 ppm/ $^{\circ}\text{K}$, max. 40 ppm/ $^{\circ}\text{K}$
Input resistance	1 MOhm ($\pm 0.1 \%$)
Bandwidth (-3 dB)	50 kHz ($\pm 1.5 \text{ dB @ } f_0$)
Filters (lowpass)	10 Hz, 100 Hz, 1 kHz, 10 kHz ($\pm 1.5 \text{ dB @ } f_0$)
Filter selection	Push button or software
Filter characteristics	Butterworth
@ 0.01, 0.1, 1, 10 kHz	40 dB / decade (12 dB / octave)
@ 50 kHz	100 dB / decade (30 dB / octave)
Typ. SNR @ max. bandwidth	
10 mV range	61 dB
10 V range	78 dB
50 V range	78 dB
Typical CMRR	90 dB @ 0 Hz 78 dB @ 50 Hz 60 dB @ 400 Hz
Isolation voltage	$350 \text{ V}_{\text{DC}}$ ($1 \text{ kV}_{\text{RMS}}$ with banana connector)
Overvoltage protection	$\pm 500 \text{ V}_{\text{DC}}$ or $300 \text{ V}_{\text{RMS}}$
Output voltage	$\pm 5 \text{ V}$
Output resistance	< 10 Ohm
Output current	Max. 5 mA
Output protection	Continuous short to ground
RS-485 interface	Yes
Power supply voltage	$\pm 9 \text{ V}$ ($\pm 10 \%$)
Power consumption	typical 0.85 W

DAQN-AIN

- **Input ranges:**
- **Bandwidth:**
- **Isolation:**
- **Signal connection:**

Direct input module

Voltage signals up to $\pm 10\text{ V}$
with overvoltage protection

Typ. 35 kHz (High input protection)
Full system bandwidth (Low input protection)

none

Safety banana sockets
BNC connector
9-pin SUB-D connector



Module specifications

DAQN-AIN	
Input signal	1:1 voltage input to A/D board
Accuracy	According to A/D board
High input protection	
Max. input voltage	$\pm 10\text{ V}$, higher voltages up to $\pm 500\text{ V}$ will be cut off
Max. output voltage	$\pm 10\text{ V}$
Accuracy	Typ. better than $\pm 0.25\%$
Bandwidth (-3 dB)	Typ. 35 kHz ($\pm 1.2\text{ dB @ } f_0$)
Low input protection	
Max. input voltage	$\pm 10\text{ V}$, higher voltages will destroy the protection resistor
Max. output voltage	$\pm 10\text{ V}$
Accuracy	Typ. better than $\pm 0.02\%$
Bandwidth (-3 dB)	Full system bandwidth
Protection resistor	10 Ohm
RS-485 interface	No
Power supply	$\pm 9\text{ V}$

DAQP-LA

- **Input ranges:**
- **Bandwidth:**
- **Isolation:**
- **Signal connection:**

Isolated current module

DAQP-LA-SC: 0.1 A, 0.3 A, 1 A, 3 A, 10 A peak, 30 A peak,
 DAQP-LA-B-S1: 2 mA, 6 mA, 20 mA, 60 mA, 200 mA, 0.6 A,
 300 kHz
 1.4 kV_{RMS} Input to ground
 Screw terminals
 Safety banana plugs



Module specifications

	DAQP-LA-SC	DAQP-LA-B-S1
Input resistance (Shunt)	0.1 Ohm	5 Ohm
Shunt inductance	<10 nH	<10 nH
Input ranges	0.1 A, 0.3 A, 1 A, 3 A, 10 A peak, 30 A peak	2 mA, 6 mA, 20 mA, 60 mA, 200 mA, 0.6 A
Continuous current	max. 5 A _{RMS}	max. 0.6 A
Peak current	30 A max. 10 ms; 10 A max. 100 ms	
DC accuracy		
100 mA and 300 mA	±0.05 % of reading ±200 µA	±0.05 % of reading ±4 µA
1 A to 30 A	±0.05 % of reading ±0.05 % of range	±0.05 % of reading ±0.05 % of range
2 mA and 6 mA		
20 mA and 600 mA		
Offset drift	typ. max.	typ. max.
100 mA and 300 mA	12 20 µA/°K	0.24 0.4 µA/°K
1 A to 30 A	20 40 ppm of Range/°K	20 40 ppm of Range/°K
2 mA and 6 mA		
20 mA to 600 mA		
Gain linearity	0.03 %	
Gain drift range	Typically 20 ppm/°K (max. 50 ppm/°K)	
Long term stability	100 ppm/sqrt (1000 hrs)	
-3 dB Bandwidth	300 kHz	
Filter selection	Push button or software	
Filter (low pass)	10, 30, 100, 300, 1k, 3k, 10k, 30k, 100k, 300 kHz ⁽¹⁾	
Filter type	Bessel or Butterworth 40 dB/decade	
Typical SFDR and SNR	300 kHz	100 kHz
	SFDR SNR	SFDR SNR
100 mA	95 dB 64 dB	95 dB 67 dB
1 A	102 dB 82 dB	103 dB 85 dB
30 A	104 dB 89 dB	103 dB 89 dB
		10 kHz
		SFDR SNR
		95 dB 77 dB
		113 dB 90 dB
		117 dB 91 dB
Isolation voltage	Input to Ground 1.4 kV _{RMS}	
Protection	CAT III 150 V CAT IV 100 V	
Output voltage	±5 V	
Output resistance	<10 Ohm	
Output current	5 mA	
Power On default settings	Software programmable	
Output protection	Short to ground for 10 sec.	
Power supply	±9 V _{DC} ± 1%	
Power consumption	0.7 W	
Interface	RS-485	

⁽¹⁾ 300 kHz exclusively for Bessel filter characteristic

DAQP-CFB

- **Input ranges:**
- **Bandwidth:**
- **Isolation:**
- **Signal connection:**

Carrier frequency module

- 0.1 mV/V to 1000 mV/V**
- 2.3 kHz**
- none**
- 9-pin SUB-D connector**



Module specifications

DAQP-CFB	
Input ranges	0.1 mV/V to 1000 mV/V
Inductive input ranges	5 mV/V to 1000 mV/V (inductive range is limited from 20 mV _{RMS} to 1000 mV _{RMS} input voltage)
Input voltage ranges	0.2 mV _{RMS} to 1000 mV _{RMS}
Bridge resistance	60 - 1,000 Ohm depending on excitation voltage
Excitation voltage level	1, 2, 5 V _{RMS}
Excitation voltage frequency	5 kHz sine wave ±20 Hz
Maximum excitation current	30 mA _{RMS} short circuit protected
Excitation voltage synchronisation	Internal or external
Excitation voltage accuracy	5 V _{RMS} ±5 mV _{RMS} ; 2 V _{RMS} ±2.5 mV _{RMS} ; 1 V _{RMS} ±2.5 mV _{RMS}
Excitation voltage drift	typically 50 ppm/°K
Excitation frequency drift	typically 20 ppm/°K
Nonlinearity	±0.02 % FS
Accuracy	±0.2 % of reading ±0.1 % of range
Offset drift	±0.003 µV/V/K ±40 ppm of Range/°K
Gain drift	within ±30 ppm/°K
Balance adjusting range	±400 % of Range (±200 % at 1 V excitation)
Capacitive imbalance compensation	approx. 1000 pF
Phase adjustment range	±40° (inductive mode only)
Balance adjusting accuracy	within ±0.1 % FS
Supported sensors	full bridge half bridge quarter bridge 120 Ohm quarter bridge 350 Ohm inductive full bridge inductive half bridge (typically LVTD Sensors)
Shunt calibration	internal 50 kOhm and 100 kOhm Shunt
Completion and shunt resistor accuracy	±0.05 %
-3 dB Bandwidth	DC - 2.3 kHz
Filters (lowpass)	10, 30, 100, 300, 1 kHz
Filter characteristics	2 nd order Bessel, 2 nd order Butterworth (40 dB/ decade)
Typ. SNR @ 1000 Hz [100 Hz] and 2 V _{RMS} excitation	78 dB [85 dB] @ 1 mV/V 80 dB [87 dB] @ 100 mV/V
Over voltage protection	±10 V
Output voltage	±5 V
Out current	±5 mA
Output protection	continuous short to ground
Power consumption	max. 1.5 W
Supported TEDS chips*	DS2406, DS2430, DS2432, DS2433, DS2431
Weight	within 250 (±30) g

* TEDS support only with revision 2.0 or higher

DAQP-BRIDGE-A**Isolated strain gauge module**

- **Input ranges:** $\pm 5, \pm 10, \pm 25, \pm 50, \pm 100, \pm 250$ mV
@ 5 V_{DC} excitation: $\pm 1, \pm 2, \pm 5, \pm 10, \pm 20, \pm 50$ mV/V
- **Bandwidth:** 20 kHz
- **Isolation:** 350 V_{DC} for input and excitation
- **Signal connection:** 9-pin SUB-D connector
8-pin LEMO connector

**Module specifications**

DAQP-BRIDGE-A	
Gain	20 to 1000
Input ranges @ 5 V _{DC} excitation	$\pm 5, \pm 10, \pm 25, \pm 50, \pm 100, \pm 250$ mV $\pm 1, \pm 2, \pm 5, \pm 10, \pm 20, \pm 50$ mV/V
Range selection	Push button or software
Input impedance	> 100 MOhm
DC accuracy	± 0.1 %
Gain linearity	± 0.05 %
Excitation voltage	0.25, 0.5, 1, 2.5, 5 and 10 V _{DC} software programmable (5 V _{DC} = default setting)
Accuracy	0.05 % ± 1 mV
Drift	typ. 20 ppm (max. 40 ppm)
Protection	Continuous short to ground
Bridge types	Full bridge $\frac{1}{2}$ bridge with internal completion (software programmable) $\frac{1}{4}$ bridge with internal resistor for 120 and 350 Ohm (software programmable)
Bridge resistance	120 Ohm to 10 kOhm (down to 87 Ohm on request)
Shunt calibration	Two internal shunt resistors or external resistor for shunt calibration (175k & 59k88)
Zero adjust	Full automatic, ± 200 % of F.S. (via push button or software)
Bandwidth (-3 dB)	20 kHz (± 1.5 dB @ f ₀)
Filters (lowpass)	10 Hz, 100 Hz, 1 kHz, 5 kHz, 20 kHz (± 1.5 dB @ f ₀)
Filter selection	Push button or software
Filter characteristics	Bessel or Butterworth (software programmable) 40 dB / decade (12 dB / octave)
Typ. SNR @ max. bandwidth	71 dB @ Gain 1000 79 dB @ Gain 20
Typical CMRR	73 dB @ 0 Hz 71 dB @ 400 Hz 70 dB @ 1 kHz
Overvoltage protection	± 10 V _{DC}
Isolation	350 V _{DC} (for input and excitation)
Output voltage	± 5 V
Output resistance	< 10 Ohm
Output current	Max. 5 mA
Output protection	Continuous short to ground
RS-485 interface	Yes
TEDS support	No
MSI support	Manually support of MSI-BR-TH-x adapter
Power supply voltage	± 9 V _{DC} (± 1 %)
Power consumption	Typ. 1.44 W @ 350 Ohm, 1.83 W @ 120 Ohm (both full bridge @ 5 V _{DC} excitation) Max: 3 W (depending on sensor)*

DAQP-ACC-A

- **Input ranges:**
- **Excitation current:**
- **Bandwidth:**
- **Isolation:**
- **Signal connection:**

IEPE® module

- ±5 V, ±1.66 V, ±500 mV, ±166 mV, ±50 mV
- 4 mA or 8 mA
- 300 kHz
- none
- BNC connector


Module specifications

DAQP-ACC-A	
Ranges	±5 V, ±1.66 V, ±500 mV, ±166 mV, ±50 mV
Gain	1, 3, 10, 30, 100
Range / gain selection	Push button or software
Gain error	0.5 %
Sensor types	IEPE® sensors only
Sensor excitation	4 or 8 mA (software selection), 10 %, up to 28 V _{DC}
Input impedance	5 or 7 MOhm (depending on time constant), in parallel with 1.2 nF
Input voltage range	4 to 19 V
Voltage < 4 V	„Shortcut“ detection
Voltage > 19 V	„No sensor“ detection
Bandwidth (-3 dB)	From selected highpass filter to 300 kHz (+2 to -5 dB @ fg)
Filters (highpass)	0.5 Hz and 5 Hz (software selection)
0.5 Hz filter	0.32 s time constant
5 Hz filter	0.032 s time constant
Filters (lowpass)	1 kHz, 10 kHz, 100 kHz, 300 kHz other filter steps available as an option on request
Filter selection	Push button or software
Filter characteristics	Butterworth
up to 100 kHz	100 dB / decade (30 dB / octave)
300 kHz	80 dB / decade (24 dB / octave)
Typ. SNR @ max. bandwidth	
Gain 1 and 3	94 dB
Gain 10	91 dB
Gain 30	80 dB
Gain 100	73 dB
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 _{DC} (±10 %)
Power consumption	Typical 0.8 to 1.0 W (depending on sensor)

DAQP-CHARGE-A**Dynamic charge module**

- **Input ranges:**
 IEPE® input: 0, 20, 40, 60 dB (± 5 V, ± 500 mV, ± 50 mV, ± 5 mV)
 Charge input: 5, 50, 500, 5000, 50000 pC
- **Bandwidth:** 50 kHz
- **Isolation:** none
- **Signal connection:** BNC connector
 (adapter BNC to MICRODOT included)

**Module specifications**

DAQP-CHARGE-A	
Supported sensors	IEPE® and charge sensors
Sensor type selection	Push button or software
Input ranges	
IEPE® input	0, 20, 40, 60 dB (± 5 V, ± 500 mV, ± 50 mV, ± 5 mV)
Charge input	5, 50, 500, 5000, 50000 pC
Gain accuracy	1 % F.S.
Input range finetuning	programmable
Range selection	Push button (fixed) or software (all)
Integration	Single (velocity) or double (displacement), 0 dB at 15.9 Hz
LED indicators	
Range and filter	5 LEDs
ICP LED	Active with connected IEPE® sensor, inactive for charge input
OVL LED	Overload control (output voltage > 5 V)
A, V and D LED	Indicator for acceleration, velocity and displacement output
Constant current source	3.2 to 5.6 mA, > 24 V
Filters (highpass)	0.1 Hz, 1 Hz, 10 Hz (± 2 dB @ f ₀)
Filters (lowpass)	100 Hz, 1, 3, 10, 50 kHz (± 2 dB @ f ₀)
Filter selection	Push button or software
Filter characteristics	Butterworth 80 dB / decade (24 dB / octave)
Bandwidth (-3 dB)	0.1 Hz to 50 kHz (± 2 dB @ f ₀)
Typ. SNR @ max. bandwidth	
5000 pC	90 dB
500 pC	87 dB
50 pC	73 dB
5 pC	54 dB
5 pC	60 dB @ 10 kHz
Output voltage	± 5 V (± 6 V peak voltage)
Output noise	< 8 mV (all ranges with 50 kHz filter)
RS-485 interface	Yes
Power supply voltage	± 9 V _{DC} (± 10 %)
Power consumption	0.6 W to 1.2 W (depending on sensor)*

* **CAUTION:** The following systems only support 10 DAQP-CHARGE-A modules at once, due to high start-up current.
 DEWE-2010 series DEWE-2500 series DEWE-5000 series DEWE-30-16 with DC option DEWE-50-USB2 with DC option

DAQP-CHARGE-B

Isolated static and dynamic charge module

- **Input ranges:** ± 100 to $\pm 1\,000\,000$ pC
- **Bandwidth:** 100 kHz
- **Isolation:** 350 V_{DC}
- **Signal connection:** BNC connector



Module specifications

DAQP-CHARGE-B	
Input ranges	± 100 , ± 500 , $\pm 2\,000$, $\pm 10\,000$, $\pm 40\,000$, $\pm 200\,000$, $\pm 1\,000\,000$ pC
Range selection	Push button or software
Gain accuracy	0.5 % of range (1 % of range for 100 and 500 pC)
Gain linearity	± 0.05 %
Bandwidth (-3 dB)	100 kHz (± 1.5 dB @ f ₀)
Filters (lowpass)	10 Hz, 30 Hz, 100 Hz, 300 Hz, 1 kHz, 3 kHz, 10 kHz, 30 kHz, 100 kHz (± 2 dB @ f ₀)
Filter selection	Push button or software
Filter characteristics	Bessel or Butterworth (software programmable) 40 dB / decade (12 dB / octave)
Time constant	
Long	DC mode
Highpass filter on	2 to 1000 sec.
Drift input current @ 25 °C	< ± 0.03 pC/s
Offset drift	50 ppm of Range/°K
Amplifier reset	Push button or software
Offset after reset	± 2 mV or ± 1 pC (greater value is valid)
Typ. SNR @ max. bandwidth	
Range 100 pC	76 dB (82 dB @ 30 kHz / 85 dB @ 10 kHz)
Range > 2000 pC	81 dB (89 dB @ 30 kHz / 93 dB @ 10 kHz)
Output noise	
@ 100 kHz	$0.3 \text{ mV}_{\text{RMS}} + 0.01 \text{ pC}_{\text{RMS}}$
@ 30 kHz	$0.12 \text{ mV}_{\text{RMS}} + 0.008 \text{ pC}_{\text{RMS}}$
Cable noise	< 10^{-5} pC _{RMS} /pF
CMR	< 0.02 pC/V (difference between input and output ground)
Isolation	350 V _{DC}
Input overvoltage protection	1 kV ESD
Output voltage	± 5 V
RS-485 interface	Yes
Power supply voltage	± 9 V _{DC} (± 1 %)
Power consumption	1.5 W to 3.5 W (depending on signal range and frequency)

DAQP-THERM

- Thermocouple:
- Bandwidth:
- Isolation:
- Signal connection:

Isolated thermocouple module

K, J, T, R, S, N, E, B, L, C, U (others on request)
 3 kHz
 1 kV_{RMS}
 Universal miniature thermocouple connector

**Module specifications**

DAQP-THERM	
Thermocouple types	K, J, T, R, S, N, E, B, L, C, U, others on request
Ranges	Min. to max. of the input range is free programmable within the full thermocouple input span
CJC absolute accuracy	±0.2 °C
CJC stability	0.01 °C/°C ambient temperature change
Linearization	DSP based linearization
Accuracy	Typical 0.3° for type K including CJC error; details see table „Input ranges and detailed specifications for thermocouple“.
Nonlinearity	> 0.01°C
Input resistance	> 1 MOhm
Bandwidth (-3 dB)	3 kHz
Filters	3 Hz, 10 Hz, 30 Hz, 100 Hz, 300 Hz, 1 kHz
Filter characteristics	Butterworth or Bessel, 2nd, 4th, 8th order programmable
Isolation	±1000 V _{RMS} continuous (for input excitation and TEDS interface)
Typ. CMRR @ 3kHz	>160 dB
Open thermocouple detection	100 MΩ pull up; software selectable
Output voltage	±5 V; 0 to 5 V; (±10 V and 0 to 10 V with special DEWE-30)
Output resistance	100 Ohm
Output protection	Continuous short to ground
RS-485 interface	Yes
Power supply voltage	±9 V _{DC} (±1 %)
Power consumption	Typical 1 W
Connector	Universal mini thermocouple connector

Input ranges and detailed specifications for thermocouple

Thermocouple										
Type	Standard	Input range		Accuracy						
		min [°C]	max [°C]	-270 to -200 °C [°C]	-200 to -100 °C [°C]	-100 to 0 °C [°C]	0 to 100 °C [°C]	100 °C to fullscale [% of reading + °C]		
K	DIN EN 60584-1	-270	1372	6.70	0.70	0.35	0.26	0.027	0.26	
J	DIN EN 60584-1	-210	1200	0.68	0.60	0.32	0.25	0.019	0.25	
T	DIN EN 60584-1	-270	400	4.37	0.69	0.37	0.26		0.23	
R	DIN EN 60584-1	-50	1760			0.85	0.59	0.009	0.44	
S	DIN EN 60584-1	-50	1760			0.77	0.58	0.012	0.45	
N	DIN EN 60584-1	-270	1300	9.14	0.77	0.37	0.28	0.017	0.27	
E	DIN EN 60584-1	-270	1000	4.25	0.60	0.33	0.24	0.018	0.23	
L	DIN 43710	0	900				0.25		0.33	
C	ASTM E988-96	0	2310				0.36	0.045	0.33	
U	DIN 43710	-200	600		0.64	0.37	0.26		0.24	
							0 to 500 °C	>500 °C		
B	DIN EN 60584-1	0	1820				10		0.44	

DAQP-FREQ-A

- **Input ranges:**
- **Isolation:**
- **Signal connection:**

Isolated frequency to voltage module

100 Hz, 1 kHz, 5 kHz, 20 kHz, 100 kHz, 200 kHz
 350 V_{DC}
 9-pin SUB-D connector



Module specifications

DAQP-FREQ-A	
Input ranges	100 Hz, 1 kHz, 5 kHz, 20 kHz, 100 kHz, 200 kHz
Minimum input	2 % of selected range
Range selection	Push button or software
Accuracy	±0.05 % (from 4 % to 100 % of range)
Input signal	10 mV to 300 V Be aware that the DSUB connector is only specified up to 250 V! For signals above 60 V you are not allowed to use the metal housing of the DSUB connector, which is included with shipment.
Input resistance	1 MOhm
Input filters	100 Hz, 1 kHz, 5 kHz, 20 kHz, 100 kHz, 200 kHz
Filter selection	Push button or software
Coupling	DC or AC (software programmable)
Trigger level	10 mV to 130 V (software programmable)
Sensor supply	+12 V _{DC} ; ±9 V _{DC} (not isolated)
Isolation	350 V _{DC}
Overvoltage protection	±500 V _{PEAK} / 350 V _{RMS}
Output filter	3 ranges with 1.5, 30 and 500 ms (10 - 90 %)
Filter characteristics	Butterworth, 60 dB / decade (18 dB / octave)
Selection	Automatically according to input range slow (default) or fast output filter selectable within the input range
Output signals	±5 V according to input frequency TTL level trigger output signal
Output resistance	< 10 Ohm
Output current	Max. 5 mA
Output protection	Continuous short to ground
RS-485 interface	Yes
Power supply voltage	±9 V _{DC} (±5 %)
Power consumption	Typical 1.0 W

DAQN-V-OUT

- **Input ranges:**
- **Bandwidth:**
- **Isolation:**
- **Signal connection:**

Isolated voltage output module

±10 V
 400 Hz
 1500 V_{RMS}
 Banana plugs
 BNC connector
 9-pin SUB-D connector

**Module specifications**






	DAQN-V-OUT
Input voltage ranges	±10 V
Input voltage maximum	±36 V (no damage)
Input resistance	50 MOhm
Output voltage range up to	up to ±10 V (depending on DAC output of DAQ card)
Over range capability	5 % @ 10 V output
Output drive	50 mA max.
Output resistance	0.5 Ohm
Output current under fault, max	75 mA
Output protection transient	ANSI/IEEE C37.90.1-1989
CMV, output to input, continuous	1500 V _{RMS} max.
Transient	ANSI/IEEE C37.90.1-1989
CMRR (50 / 60 Hz)	110 dB
Accuracy	±0.05 % span (0 to 5 mA load)
NMR (-3 dB @ 400 Hz)	100 dB per decade above 400 Hz
Nonlinearity	0.02 % span
Stability	
Offset	±25 ppm/°C
Span	±20 ppm/°C
Noise	
Output ripple, 1 kHz bandwidth	2 mV _{pp}
Bandwidth (-3 dB)	400 Hz
Power supply voltage	9 V _{DC} ±5 %
Power supply current	350 mA full load, 135 mA no load
Power supply sensitivity	±12.5 ppm/%

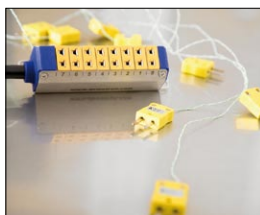
Selection Guide

PAD Series Modules

- Multi channel
- Low bandwidth - for static signals
- Isolation
- Digital output (RS-485)
- Exchangeable
- For DEWETRON systems with built-in DAQ rack



Module	# CH	Input type	Ranges	Bandwidth (BW), Filters (FILT)	Isolation (ISO), Overvoltage protection (OP)	Special functions
Voltage measurement						
PAD-V8-P 	8	Voltage, current with external shunt	up to ± 50 V ± 20 mA	BW: 6 Hz FILT: 1 / 4 / 8 values	ISO: 350 V _{DC} OP: 150 V _{DC}	separate 24 bit A/D per channel
Temperature and ohmic measurement						
PAD-TH8-P 	8	Voltage Thermocouple	$\pm 15, \pm 50, \pm 100, \pm 150$ mV, -150 mV to $+1.5$ V, Thermocouple type J, K and T	BW: 6 Hz FILT: 1 / 4 / 8 values	ISO: 350 V _{DC} OP: 15 V _{DC}	separate 24 bit A/D per channel
PAD-TH8-P + CB8-RTD 	8	Thermoresistors Resistors	Pt100, Pt200, Pt500, Pt1000, Pt2000, Ni120 up to 2 kOhm	BW: 6 Hz FILT: 1 / 4 / 8 values	ISO: 350 V _{DC} OP: 15 V _{DC}	separate 24 bit A/D per channel
Digital out, analog out						
PAD-DO7 	7	Digital output	Relay outputs (dry contacts)	-	ISO: 300 V _{DC}	max load: 0.5 A @ 60 V _{AC} 1 A @ 24 V _{DC}
Voltage output module						
PAD-AO1 	1	Voltage output current output	0 to 10 V 0 to 20 mA, 4 to 20 mA	-	ISO: 300 V _{DC}	



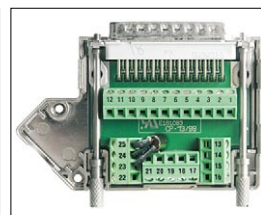
PAD-CB8-x-M
Miniature thermocouple connection block for PAD-TH8-P modules



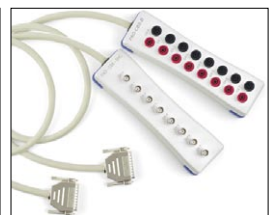
PAD-CB8-x-P2
Standard thermocouple connection block for PAD-TH8-P modules



PAD-CB8-RTD
Connect up to 8 RTD sensors (or resistors) to PAD-TH8-P modules



PAD-OPT1
Screw terminal adapter including cold junction compensation (CJC) for PAD-TH8-P modules



PAD-CB8-x
BNC or banana plugs for easy signal connection to PAD-V8-P modules

PAD-V8-P**8 channel voltage module**

- **Input channels:** 8 differential input channels
- **A/D conversion:** 8 internal 24 bit A/D converters
- **Bandwidth:** 6 Hz
- **Isolation:** 350 V_{DC}
- **Signal connection:** 25-pin SUB-D connector



Standard Models

Instruments

For Your Computer

Signal Conditioning

Components

Module specifications (for revision 6.00 or higher)

PAD-V8-P	
Input channels	8 differential input channels
Input signals	
Voltage	±100 mV, ±150 mV, ±500 mV, ±1 V, ±2.5 V, ±5 V, ±10 V, ±50 V, -0.15 to +1.5 V
Current	With external shunt resistor
Resolution	10 µV for all ranges
Sampling rate	Max. 12 Hz per channel
Readout speed	Typ. 80 ch/sec.*
DC accuracy	±0.02 % of reading ±900 µV
Bandwidth (-3 dB)	6 Hz (±1.5 dB @ f ₀)
Isolation voltage	350 V _{DC} (channel to channel and input to output)
Overvoltage protection	150 V _{DC}
Common mode voltage	350 V _{DC} / 250 V _{AC} @ 50 Hz
NMR	120 dB @ 50/60 Hz
CMRR	140 dB @ DC, 120 dB @ 50 Hz
RS-485 interface	Yes
Interface speed	9600 bps (2400 to 115200)
Power supply voltage	±9 V _{DC} (±10 %)
Power consumption	Typical 0.6 W
*) Depending on system and number of channels	

PAD-TH8-P**8 channel thermocouple and RTD module**

- **Input channels:** 8 differential input channels
 Thermocouple: requires PAD-CB8-x breakout box
 RTD: requires PDA-CB8-RTD breakout box
- **A/D conversion:** 8 internal 24 bit A/D converters
- **Bandwidth:** 6 Hz
- **Isolation:** 350 V_{DC}
- **Signal connection:** 25-pin SUB-D connector

**Module specifications (for revision 6.00 or higher)**

PAD-TH8-P	
Input channels	8 differential input channels
Input voltage	±1.5 V
Input resistance	1.4 MΩ
Gain linearity	0.001%
Bandwidth	6 Hz
Resolution	1 μV (24-bit)
Temperature drift	30 ppm/°K
Typical noise	2 μV
DC accuracy	Better ±0.05 % ±200 μV (typ. ±0.03 % F.S. ±20 μV)
Sampling rate	Max. 12 Hz per channel
Readout speed	Typ. 80 ch/sec.*
Isolation voltage	350 V _{DC} (channel to channel and input to output)
Overvoltage protection	15 V _{DC}
Channel to channel voltage	100 V _{DC}
NMR (50/60 Hz)	120 dB
CMRR (50/60 Hz)	130 dB
RS-485 interface	Yes
Interface speed	9600 bps (2400 to 115200)
Power supply voltage	±9 V _{DC} (±10 %)
Power consumption	Typical 0.6 W
*) Depending on system and number of channels	

PAD-CB8-RTD 8 channel RTD connector block for PAD-TH8-P

- **Input channels:** 8 RTD channels, type Pt100, Pt200, Pt500, Ni120, ...
- **Sensor supply:** galvanically isolated to PAD-TH8-P module



Specifications

PAD-CB8-RTD				
Input channels	8 RTDs			
Constant current	1250 μ A (CB8-RTD-S3: 250 μ A)			
Constant current drift	5 ppm/ $^{\circ}$ K			
Connection types	2-, 3- or 4-wire			
Standard input ranges	Resistor 0 to 999,99 Ohm, Pt100 a = 0.00385; Pt100 a = 0.003916; Pt200; Pt500; Ni120			
CB8-RTD-S3	Resistor 0 to 999,99 Ohm, Pt100 a = 0.00385; Pt100 a = 0.003916; Pt200; Pt500; Pt1000; Pt2000			
Accuracy	Pt100 a = 0.00385	Pt100 a = 0.003916	Pt200 a = 0.00385	Pt500 a = 0.00385
	± 0.25 $^{\circ}$ C @ -200 to 100 $^{\circ}$ C	± 0.25 $^{\circ}$ C @ -200 to 100 $^{\circ}$ C	± 0.25 $^{\circ}$ C @ -200 to 100 $^{\circ}$ C	± 0.25 $^{\circ}$ C @ -200 to 100 $^{\circ}$ C
	± 0.4 $^{\circ}$ C @ 100 to 400 $^{\circ}$ C	± 0.4 $^{\circ}$ C @ 100 to 400 $^{\circ}$ C	± 0.4 $^{\circ}$ C @ 100 to 400 $^{\circ}$ C	± 0.4 $^{\circ}$ C @ 100 to 250 $^{\circ}$ C
	± 0.8 $^{\circ}$ C @ 400 to 800 $^{\circ}$ C	± 0.8 $^{\circ}$ C @ 400 to 800 $^{\circ}$ C	± 0.5 $^{\circ}$ C @ 400 to 630 $^{\circ}$ C	
Accuracy	Pt1000 a = 0.00385	Pt2000 a = 0.00385	Ni120	
	± 0.25 $^{\circ}$ C @ -200 to 100 $^{\circ}$ C	± 0.25 $^{\circ}$ C @ -200 to 100 $^{\circ}$ C	± 0.3 $^{\circ}$ C @ -80 to 100 $^{\circ}$ C	
	± 0.4 $^{\circ}$ C @ 100 to 400 $^{\circ}$ C	± 0.4 $^{\circ}$ C @ 100 to 400 $^{\circ}$ C	± 0.6 $^{\circ}$ C @ 100 to 260 $^{\circ}$ C	
	± 0.8 $^{\circ}$ C @ 400 to 600 $^{\circ}$ C	± 0.8 $^{\circ}$ C @ 400 to 600 $^{\circ}$ C		
Typical noise	0.01 $^{\circ}$ C			
Operating temperature	-25 to +80 $^{\circ}$ C			
Cabel length	2m (up to 12 m on request)			
Dimensions (WxDxH)	approx. 196 x 57 x 32.2 mm (7.7 x 2.2 x 1.3 in.)			

PAD-CB8-x-M and PAD-CB8-x-P2 8 channel thermocouple connector block for PAD-TH8-P

- **Input channels:** 8 thermocouple
- **Thermocouple type:** versions for K, J, T



Specifications

PAD-CB8-x-P2 and PAD-CB8-x-M			
Input channels	8 isolated thermocouple input channels		
Accuracy	Thermocouple type J:	Thermocouple type K:	Thermocouple type T:
	± 1.0 $^{\circ}$ C @ -200 to -100 $^{\circ}$ C	± 1.0 $^{\circ}$ C @ -200 to -25 $^{\circ}$ C	± 1.0 $^{\circ}$ C @ -200 to -150 $^{\circ}$ C
	± 0.3 $^{\circ}$ C @ -100 to 150 $^{\circ}$ C	± 0.4 $^{\circ}$ C @ -25 to 120 $^{\circ}$ C	± 0.4 $^{\circ}$ C @ -150 to 400 $^{\circ}$ C
	± 0.4 $^{\circ}$ C @ 150 to 400 $^{\circ}$ C	± 0.6 $^{\circ}$ C @ 120 to 400 $^{\circ}$ C	
	± 1 $^{\circ}$ C @ 400 to 1200 $^{\circ}$ C	± 1 $^{\circ}$ C @ 400 to 1372 $^{\circ}$ C	
	Thermocouple type E, R, S, N, C or other types on request		
Typical noise	± 0.1 $^{\circ}$ C @ 6 Hz sampling; no average		
CJC	Internal		
Operating temperature	-25 to +80 $^{\circ}$ C (better on request)		
Cable length	2 m (up to 12 m on request)		

PAD-DO7**7 channel relay output module**

- **Output channels:** 7 relay output channels
- **Isolation:** 300 V_{RMS}
- **Signal connection:** 25-pin SUB-D connector

**Module specifications**

PAD-DO7	
Number of channels	7 relay output channels
Relay type	Form 'A' relay SPST N.O. with dry contacts
Max. load	0.5 A (60 V _{AC}) 1 A (24 V _{DC})
Isolation voltage	300 V _{RMS}
Relay on time	Typical 5 ms
RS-485 interface	Yes
Interface speed	9600 bps
Power supply voltage	+12 V _{DC} (±10 %)
Power consumption	Typical 1.0 W

PAD-AO1**1 channel analog output module**

- **Output channels:** 1 output channel
- **Isolation:** 300 V_{DC}
- **Signal connection:** 25-pin SUB-D connector

**Module specifications**

PAD-AO1	
Number of channels	1 output channel
Output signals	
Voltage	0 to 10 V
Current	0 to 20 mA or 4 to 20 mA
Resolution	12-bit
Accuracy	±0.1 % of FSR
Readback accuracy	±1 % of FSR
Resolution	±0.02 % of FSR
Zero drift	
Voltage output	±30 µV/°C
Current output	±0.2 µA/°C
Span temp. coefficient	±25 ppm/°C
Programmable output slope	0.125 to 1024 mA/sec or 0.0625 to 512 V/sec
Current load resistor	500 Ohm
Isolation	300 V _{DC}
RS-485 interface	Yes
Interface speed	9600 bps
Power supply voltage	+12 V _{DC} (±10 %)
Power consumption	Typical 1.2 W