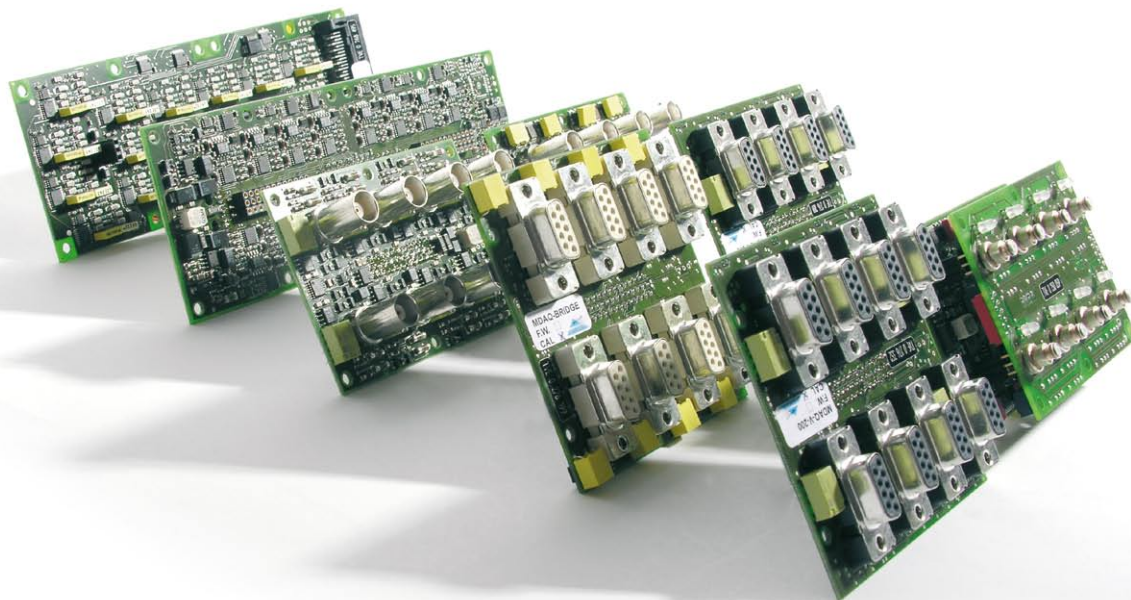


Automotive
Energy & Power Analysis
Aerospace & Defense
Transportation
General Test & Measurement



Differential Amplifiers

MDAQ Series

MDAQ series modules are dynamic differential signal amplifiers with high bandwidth.

All are multi-channel and have an analog voltage output. The configuration is done via RS-485 interface. Models with multi-pin connectors offer sensor supply for single cable sensor connection.

MDAQ series modules are cost-effective and space saving, thus the ideal solution for applications requiring hundreds of dynamic input channels. The modules fit into many DEWETRON instruments.

Configuring MDAQ inputs

MDAQ modules are configured according a building block system. There is a MDAQ-BASE, the "motherboard" which holds up to two MDAQ-SUB modules. The MDAQ-BASE defines whether the conditioned signal output is ± 5 V or ± 10 V. A range of MDAQ-SUB modules define the supported input signals. Finally a filter board MDAQ-FILT can be added.

Key Features

- Multi channel
- High bandwidth up to 300 kHz
- ± 5 V or ± 10 V conditioned signal output
- Differential inputs
- Easy configuration

Standard Models

Instruments

For Your Computer

Signal Conditioning

Components

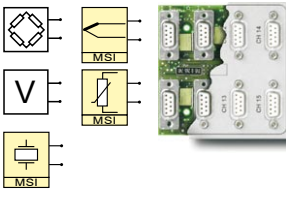
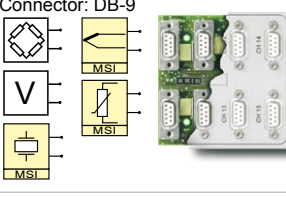
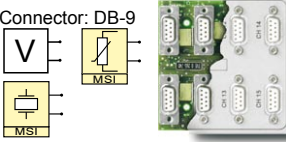


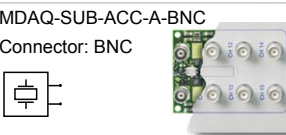



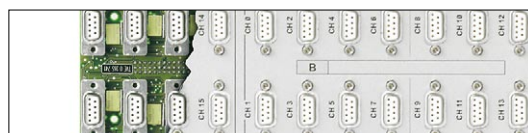
MDAQ Series Amplifiers

- Multi channel
- Small form factor for high channel density
- Cost effective
- High bandwidth up to 300 kHz
- Support of MSI (Modular Smart Interface)



Selection Guide

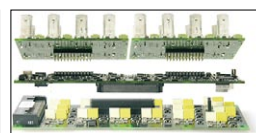
SUB Modules for MDAQ-BASE-x						
Module	# CH	Input type	Ranges	TEDS	Bandwidth (BW), Highpass filters (HP)	Excitation
MDAQ-SUB-STG-D Connector: DB-9 	8	Strain-gage (Full-, half and quarter-bridge, incl. shunt calibration) for strain gage application	14 ranges from ± 0.5 to 1000 mV/V (@ 5 V _{DC} excitation)	✓	BW: 30 kHz	0 to 12 V _{DC}
		Voltage up to ± 10 V	15 ranges from ± 2.5 mV to ± 10 V			
		ICP via MSI-BR-ACC	7 ranges from ± 0.25 mV to ± 10 V			
		Voltage up to 200 V via MSI-BR-V-200	6 ranges from ± 10 to ± 200 V			
		Thermocouple via MSI-BR-TH-x	full range of TC type			
		Pt100, Pt200, Pt500, Pt1000, Pt2000 and resistance via MSI-BR-RTD	-200 °C to 1000 °C and 0 to 6.5 kOhm			
MDAQ-SUB-BRIDGE-D Connector: DB-9 	8	Strain-gage (Full-, and half bridge) for strain gage sensors	14 ranges from ± 0.5 to 1000 mV/V (@ 5 V _{DC} excitation)	✓	BW: 30 kHz HP: 0.16 Hz	+15 V _{DC} and 0 to 12 V _{DC}
		Voltage up to ± 10 V	15 ranges from ± 2.5 mV to ± 10 V			
		ICP, via MSI-BR-ACC	7 ranges from ± 0.25 mV to ± 10 V			
		Voltage up to 200 V via MSI-BR-V-200	6 ranges from ± 10 to ± 200 V			
		Thermocouple via MSI-BR-TH-x	full range of TC type			
		Pt100, Pt200, Pt500, Pt1000, Pt2000 and resistance via MSI-BR-RTD	-200 °C to 1000 °C and 0 to 6.5 kOhm			
MDAQ-SUB-V-200-D Connector: DB-9 	8	Voltage up to ± 200 V	13 ranges from ± 0.125 to ± 200 V	✓	BW: 300 kHz	± 15 V _{DC} and 0 to 12 V _{DC}
		ICP, via MSI-V-ACC	7 ranges from ± 0.25 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			
		<i>Note: for safety reasons, max. 120 V_{DC} or 50 V_{AC} are allowed at this connector</i>				
MDAQ-SUB-V-200-BNC Connector: BNC 	8	Voltage up to ± 200 V	13 ranges from ± 0.125 to ± 200 V	-	BW: 300 kHz	-
		<i>Note: for safety reasons, max. 120 V_{DC} or 50 V_{AC} are allowed at this connector</i>				
MDAQ-SUB-ACC-BNC Connector: BNC 	8	ICP [®] or voltage up to ± 10 V	8 ranges from ± 125 mV to ± 10 V	✓	BW: 300 kHz HP: 3.4 Hz	4 / 8 mA
		Single-ended or differential input and one highpass filter 3.4 Hz highpass filter for noise and shock response measurement				
		MDAQ-SUB-ACC-BNC-S1 0,16 Hz for structural and modal analysis, human body vibration measurement (rest same as MDAQ-SUB-ACC-BNC)				
MDAQ-SUB-ACC-A-BNC Connector: BNC 	8	ICP [®] or voltage up to ± 10 V	8 ranges from ± 125 mV to ± 10 V	✓	BW: 300 kHz HP: 0.16 Hz, 3.4 Hz	4 / 8 mA
		Single-ended input and two HP filters 0.16 Hz for structural and modal analysis, human body vibration measurement 3.4 Hz for noise and shock response measurement				
MDAQ-SUB-ACC-A-MD Connector: Microdot 	8	ICP [®] or voltage up to ± 10 V	8 ranges from ± 125 mV to ± 10 V	✓	BW: 300 kHz HP: 0.16 Hz, 3.4 Hz	4 / 8 mA
		Single-ended input, two HP filters and sensor failure detection 0.16 Hz for structural and modal analysis, human body vibration measurement 3.4 Hz for noise and shock response measurement				
		Option: test signal input for all channels				



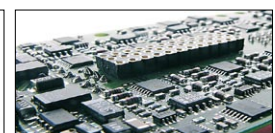
MDAQ modules - available in most of the DEWETRON multichannel systems.






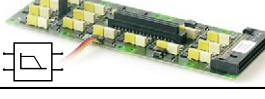
DEWE-51-USB2-32
2x MDAQ-SUB-BRIDGE-D,
2x MDAQ-SUB-ACC-A mod-
ules and USB-A/D converter





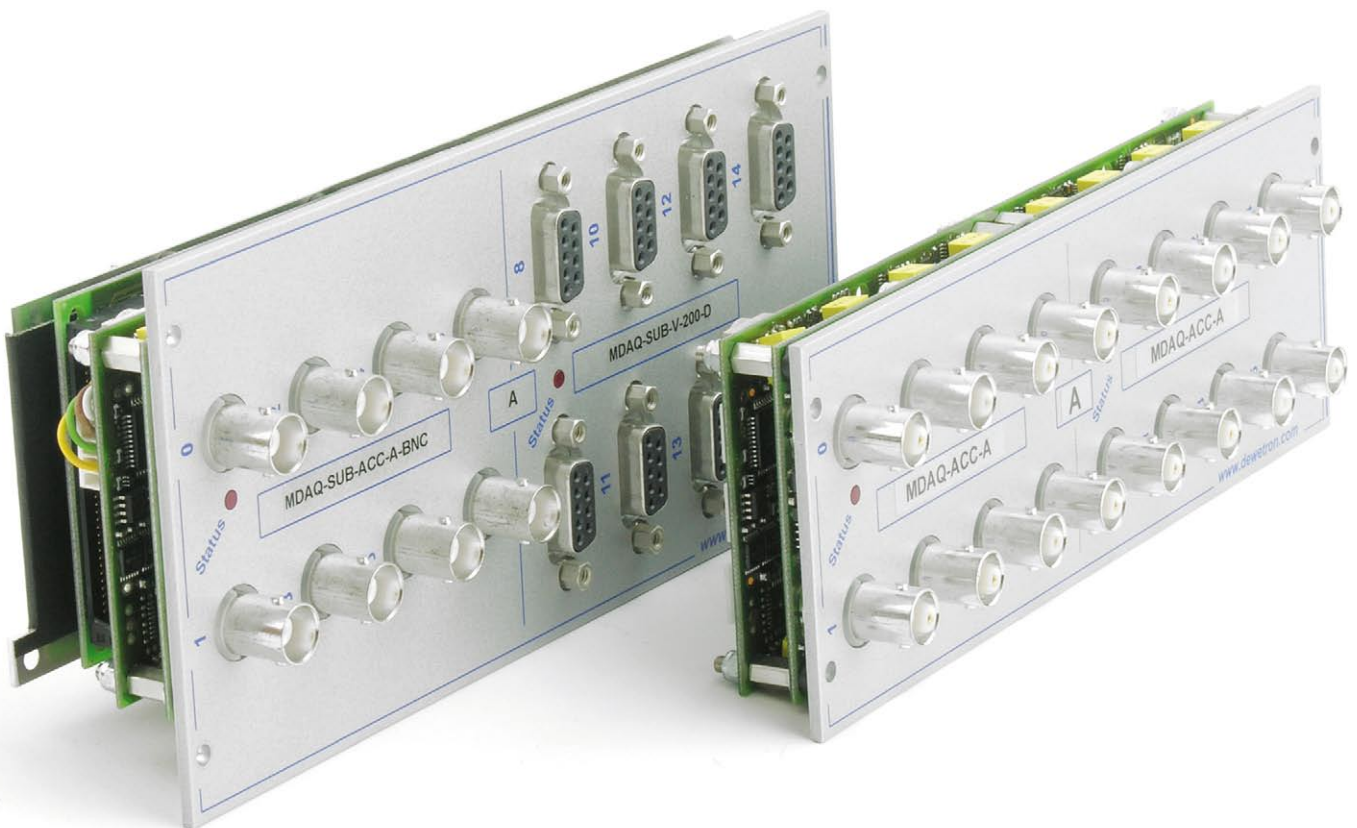
Typical combination with
two SUB modules mounted
on a BASE module, and
FILTER board (optional)



All MDAQ boards are
equipped with highest qual-
ity components

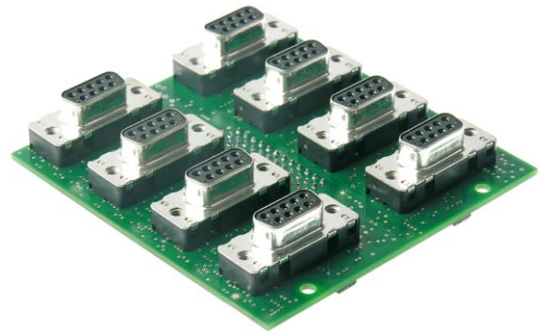
Filter modules for MDAQ				
Module	# CH	Filter characteristics	Cut-off frequencies	Order
MDAQ-AAF4-5-BU 	16	Butterworth	100 Hz, 1, 10, 30, 100 kHz, Bypass <i>Note: not possible in all system configurations. Please contact factory for details.</i>	4 th
MDAQ-FILT-5-BU 	16	Butterworth	30, 100, 300 Hz, 1, 10 kHz, Bypass	2 nd
MDAQ-FILT-5-BU-S1 	16	Butterworth	100 Hz, 1, 10, 30, 100 kHz, Bypass	2 nd
MDAQ-FILT-5-BE 	16	Bessel	30, 100, 300 Hz, 1, 10 kHz, Bypass	2 nd

MDAQ-BASE boards			
	Sub modules	Bandwidth	Output
MDAQ-BASE-5 	2	300 kHz	±5 V
MDAQ-BASE-10 	2	30 KHz	±10 V



MDAQ-SUB-STG-D

- 15 input ranges from ± 2.5 mV to ± 10 V
- 1 mV steps programmable excitation from 0 to 12 V
- Internal Bridge Completion for $\frac{1}{2}$ and $\frac{1}{4}$ Bridge
- Internal 50 k and 100 k Shunt resistor
- TEDS support



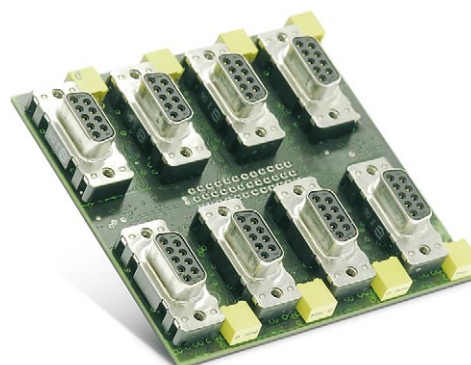
Specifications

MDAQ-SUB-STG-D combined with MDAQ-BASE-5				
Gain	0.5 to 2000			
Input ranges	$\pm 2.5, 5, 10, 20, 25, 50, 100, 200, 250, 500, 1000, 1250, 2500, 5000, 10\ 000$ mV			
@ 5 V _{DC} excitation	$\pm 0.5, 1, 2, 4, 5, 10, 20, 40, 50, 100, 200, 250, 500, 1000$ mV/V			
Input impedance	>100 MOhm			
Input noise	3.5 nV * $\sqrt{\text{Hz}}$			
Typ. input offset drift	0.5 $\mu\text{V/K}$ (for ranges < 200 mV)			
DC Accuracy	High Gain			Without software correction table
± 2.5 mV; 5 mV/V; 10 mV/V; ± 25 mV		$\pm 0.03\%$ of reading	± 15 μV [± 3 $\mu\text{V/V}$ @5 V _{EXC}]	$\pm 0.15\%$ of reading
20 mV		$\pm 0.03\%$ of reading	$\pm 0.12\%$ of range	$\pm 0.15\%$ of reading
50 mV		$\pm 0.03\%$ of reading	$\pm 0.06\%$ of range	$\pm 0.15\%$ of reading
± 100 mV to ± 200 mV		$\pm 0.03\%$ of reading	$\pm 0.03\%$ of range	$\pm 0.15\%$ of reading
± 0.250 to ± 1 V	Low Gain	$\pm 0.03\%$ of reading	400 μV [± 80 $\mu\text{V/V}$ @5 V _{EXC}]	$\pm 0.15\%$ of reading
± 1.25 V; ± 2.5 V		$\pm 0.03\%$ of reading	± 1 mV	$\pm 0.15\%$ of reading
± 5 ; 10 V		$\pm 0.02\%$ of reading	$\pm 0.03\%$ of range	$\pm 0.15\%$ of reading
Gain drift @ 5 V _{DC} excitation	10 ppm/K of range ± 0.02 $\mu\text{V/V/K}$			
Excitation voltage	0 to 12 V programmable in 1 mV steps. (5 V default)			
Excitation accuracy	$\pm 0.05\%$ ± 0.7 mV			
Excitation drift	± 10 ppm/K ± 50 $\mu\text{V/K}$			
Excitation protection	Continuous short to ground			
Excitation current limit	50 mA/Channel			
Bridge Types	4- or 6-wire full bridge 3- or 5-wire $\frac{1}{2}$ bridge with internal completion (software programmable) 3- wire Quarter bridge with internal 120 Ohm and 350 Ohm completion (software programmable)			
Shunt Resistor	Internal 100 k and 50 k Resistor (software programmable)			
Completion and Shunt resistor accuracy	0.05% 5ppm/°K			
Bridge resistance	120 Ohm to 10 k Ohm			
Automatic bridge balance ¹⁾		absolute Voltage	mV/V @ 5 V _{EXC}	$\mu\text{m/m}$ @ 5V _{EXC} k=2 Quarter bridge
2.5 mV to 20 mV		± 10 mV	± 2 mV/V	± 4000 $\mu\text{m/m}$
25 mV to 200 mV		± 100 mV	± 20 mV/V	± 40000 $\mu\text{m/m}$
250 mV to 1 V		± 0.5 V	± 100 mV/V	$\pm 200,000$ $\mu\text{m/m}$
2 V to 10 V		± 5 V	± 1000 mV/V	$\pm 2,000,000$ $\mu\text{m/m}$
Bandwidth (-3 dB)	30 kHz			
Filters (lowpass)	In combination with MDAQ-FILT-xx			
Typ. SNR @ 30 kHz [1 kHz]	64 dB [82 dB] @ 1 mV/V			
and 5 V _{DC} excitation	82 dB [96 dB] @ 50 mV/V			
Typ. CMR @ 0.1 mV/V [1 mV/V]	125 dB [120 dB] @ DC			
and 5 V _{DC} excitation	115 dB [110 dB] @ 400 Hz			
	110 dB [105 dB] @ 1 kHz			
Max. common mode voltage range	± 12 V			
Input overvoltage protection	± 25 V _{DC}			
Output voltage	± 5 V (± 10 V with MDAQ-BASE-10)			
Output resistance	< 10 Ohm			
Output current	Max. 5 mA			
Output protection	Continuous short to ground			
TEDS	Hardware support for TEDS (Transducer Electronic Data Sheet)			
Supported TEDS chips	DS2406, DS2430A, DS2432, DS2433			
Power consumption				
@ 5 VDC excitation	350 Ohm 16 Channels typ. 8 W 120 Ohm 16 Channels typ. 15 W			
@ 10 VDC	350 Ohm 16 Channels typ. 15 W			
Standard operating temperature	0 °C to 70 °C (32 °F to 158 °F)			

¹⁾ MDAQ-BASE-10A has the half offset adjustment range

MDAQ-SUB-BRIDGE-D

- High accuracy (0.05%) full bridge amplifier
- Internal half bridge completion
- Input short-circuit function for measuring absolute strain
- Bridge and voltage measurement mode
- AC/DC coupling (0.16 Hz high pass filter)
- TEDS support



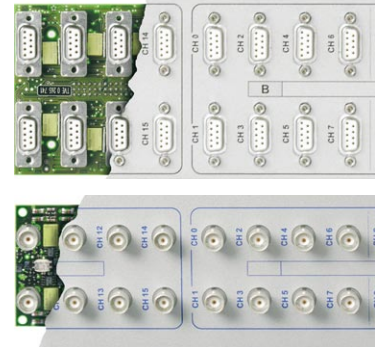
Specifications

MDAQ-SUB-BRIDGE-D combined with MDAQ-BASE-5				
Gain	0.5 to 2000			
Input ranges	±2.5, 5, 10, 20, 25, 50, 100, 200, 250, 500, 1000, 1250, 2500, 5000, 10 000 mV			
@ 5 V _{DC} excitation	±0.5, 1, 2, 4, 5, 10, 20, 40, 50, 100, 200, 250, 500, 1000 mV/V			
Input impedance	1 Mohm			
Input noise	3.5 nV * √Hz			
Typ. input offset drift	0.5 μV/K (for ranges < 200 mV)			
DC Accuracy	High Gain			Without software correction table
±2.5 mV; 5 mV/V; 10 mV/V; ±25 mV		±0.03% of reading	±15 μV [±3 μV/V@5 V _{Exc}]	±0.15% of reading ±15 μV [±3 μV/V@5 V _{Exc}]
20 mV		±0.03% of reading	±0.12% of range	±0.15% of reading ±0.12% of range
50 mV		±0.03% of reading	±0.06% of range	±0.15% of reading ±0.06% of range
±100 mV to ±200 mV		±0.03% of reading	±0.03% of range	±0.15% of reading ±0.03% of range
±0.250 to ±1V	Low Gain	±0.03% of reading	400 μV [±80 μV/V@5V _{Exc}]	±0.15% of reading 400 μV [±80 μV/V@5V _{Exc}]
±1.25V; ±2.5V		±0.03% of reading	±1 mV	±0.15% of reading ±1 mV
±5; 10V		±0.02% of reading	±0.03% of range	±0.15% of reading ±0.03% of range
Gain drift @ 5 V _{DC} excitation	10 ppm/K of range ±0.02 μV/V/K			
Excitation voltage	0.25, 0.5, 1, 2.5, 5V (default) and 10 V _{DC} software programmable			
Excitation accuracy	±0.05 % ±0.7 mV			
Excitation drift	±10 ppm/K ±50 μV/K			
Excitation current limit	50 mA/Channel			
Excitation protection	Continuous short to ground			
Sensor supply (+15 V)	Accuracy: -5% to +2%; Each output separately fused; max. current 50 mA/channel			
Bridge types	4- or 6-wire full bridge 3- or 5-wire ½ bridge with internal completion (software programmable)			
Bridge resistance	120 Ohm to 10 k Ohm			
Automatic bridge balance ¹⁾	Absolute voltage	mV/V @ 5V _{Exc}	μm/m @ 5 V _{Exc} k=2 Quater bridge	
2.5 mV to 20 mV	±10 mV	±2 mV/V	±4000 μm/m	
25 mV to 200 mV	±100 mV	±20 mV/V	±40000 μm/m	
250 mV to 1 V	±0.5 V	±100 mV/V	±200,000 μm/m	
2 V to 10 V	± 5 V	±1000 mV/V	±2,000,000 μm/m	
Bandwidth (-3dB)	30 kHz			
Filters (lowpass)	In combination with MDAQ-FILT-xx			
Typ. SNR @ 30 kHz [1 kHz]	64 dB [82 dB] @ 1 mV/V			
and 5 V _{DC} excitation	82 dB [96 dB] @ 50 mV/V			
Typ. CMR @ 0.1 mV/V [1 mV/V]	125 dB [120 dB] @ DC			
and 5 V _{DC} excitation	115 dB [110 dB] @ 400 Hz			
	110 dB [105 dB] @ 1 kHz			
Max. common mode voltage range	±12 V			
Input overvoltage protection	±25 V _{DC}			
Output voltage	±5 V, ±10 V with MDAQ-BASE-10			
Output resistance	< 10 Ohm			
Output current	Max. 5 mA			
Output protection	Continuous short to ground			
TEDS	Hardware support for TEDS (Transducer Electronic Data Sheet)			
Supported TEDS chips	DS2406, DS2430A, DS2432, DS2433			
Power consumption for 16 channels				
@ 5 V _{DC} excitation	350 Ohm @ 10 V Exc. typ. 15 W			
	120 Ohm @ 5 V typ. 15 W			
@ 10 VDC	350 Ohm max. @ 15 W max.			
	120 Ohm @ 15 W			
Standard operating temperature	0 °C to 70 °C (32 °F to 158 °F)			

¹⁾ MDAQ-BASE-10A has the half offset adjustment range

MDAQ-SUB-V-200-xx

- 16 programmable ranges from ± 0.125 V to ± 200 V
- Bandwidth 300 kHz
- Programmable sensor supply 0 to 12 V
- High signal to noise ratio
- TEDS support



Specifications

MDAQ-SUB-V-200-xx			
Input voltage range:	Divider Off	± 0.125 V, 0.25 V, 0.5 V, 1 V, 1.25 V, 2.5 V, 5 V, 10 V (common mode voltage up to 12 V)	
	Divider On	± 2.5 V, 5 V, 10 V, 20 V, 25 V, 50 V, 100 V, 200 V (common mode voltage up to 250 V)	
Input impedance		1 MOhm to GND, 2 MOhm differential	
DC accuracy	Divider Off	Without software correction table	
± 0.125 to ± 1 V		$\pm 0.03\%$ of reading ± 400 μ V	$\pm 0.15\%$ of reading 400 μ V
± 1.25 V; ± 2.5 V		$\pm 0.03\%$ of reading ± 1 mV	$\pm 0.15\%$ of reading ± 1 mV
± 5 ; ± 10 V		$\pm 0.02\%$ of reading $\pm 0.03\%$ of range	$\pm 0.15\%$ of reading $\pm 0.03\%$ of range
± 2.5 to ± 20 V	Divider On	$\pm 0.06\%$ of reading ± 8 mV	$\pm 0.25\%$ of reading ± 8 mV
± 25 V; ± 50 V		$\pm 0.03\%$ of reading ± 20 mV	$\pm 0.25\%$ of reading ± 20 mV
± 100 ; ± 200 V		$\pm 0.02\%$ of reading $\pm 0.03\%$ of range	$\pm 0.25\%$ of reading $\pm 0.03\%$ of range
Gain drift		Typ. 15 ppm/K (max. 40 ppm/K)	
Input offset drift			
125 mV to 10 V	Divider Off	Typ. 10 μ V/K (max. 20 μ V/K)	
2.5 V to 200 V	Divider On	Typ. 100 μ V/K (max. 200 μ V/K)	
Overvoltage protection		± 250 V _{DC}	
Bandwidth (-3 dB)	Divider Off	300 kHz (200 kHz at range 0.125 V and 1.25 V)	
	Divider On	300 kHz (200 kHz at range 2.5 V and 25 V) (30 kHz with MDAQ-BASE-10)	
Channel separation @ 10 kHz		> 80 dB	
CMRR @ 50 Hz (@ 1 kHz)	Divider Off	> 94 dB (> 80 dB)	
	Divider On	> 70 dB (> 56 dB)	
Typ. SNR @ 50 kHz BW	Divider Off		
± 0.125 V and ± 0.25 V		> 87 dB	
± 0.5 V to ± 10 V		> 96 dB	
± 2.5 V and ± 10 V	Divider On	> 84 dB	
± 10 V to ± 25 V		> 88 dB	
± 25 V to ± 200 V		> 93 dB	
Programmable sensor supply ⁽¹⁾		0 to 12 V short circuit protected; 50 mA current limitation	
Sensor supply accuracy ⁽¹⁾		$\pm 0.05\%$ ± 2 mV	
Fixed sensor supply ⁽¹⁾		± 15 V (50 mA)	
Output voltage		± 5 V (± 10 V with MDAQ-BASE-10)	
Output impedance		5 Ohm	
Output current		± 20 mA	
Programming interface		RS-485, RS-232, USB	
Power supply		± 15 V	
Power consumption		Typ. 4.5 W / 10 W ⁽¹⁾	
Sensor connection		BNC or DSUB ⁽¹⁾ female	
Output connector		68-pin Amplimite series (AMP Nr. 174339-6)	
Supported TEDS chips ⁽¹⁾		DS2406, DS2430A, DS2432, DS2433	
Dimensions (W x D x H)		BNC: 175 x 61 x 30 mm (6.9 x 2.4 x 1.2 in.) DSUB: 175 x 82 x 22 (6.9 x 3.2 x 0.9)	

⁽¹⁾ MDAQ-SUB-V-200-D only!

MDAQ-SUB-ACC

- 16 channel IEPE® amplifier
- Several voltage measurement modes (AC/DC Coupling, single ended/differential)
- Bandwidth up to 300 kHz
- Channel separation 96 dB
- TEDS support
- Ideally suited for sound and vibration measurement



Specifications

MDAQ-SUB-ACC			
Input voltage range	±0.125 V, 0.25 V, 0.5 V, 1 V, 1.25 V, 2.5 V, 5 V, 10 V		
Gain	0.5, 1, 2, 4, 5, 10, 20, 40		
Input modes Voltage modes	IEPE® or voltage Single ended or differential DC or AC coupled (3 Hz standard, on request down to 0.1 Hz)		
Input impedance	1 MOhm		
DC accuracy			without software correction table
±0.125 to ±1 V	±0.03% of reading	400 µV	±0.15% of reading 400 µV
±1.25 V; ±2.5 V	±0.03% of reading	±1 mV	±0.15% of reading ±1 mV
±5;10 V	±0.02% of reading	±0.03% of range	±0.15% of reading ±0.03% of range
Gain drift	typ. 10 ppm/K (max. 20 ppm/K)		
Input offset drift	typ. 3 µV/K (max. 12 µV/K)		
Over voltage protection	IN+ differential ±40 V IN- differential: max ±40 V IN- Single ended: max 300 mA		
Max. common mode voltage	IN differential mode: ±12 V		
Bandwidth (-3 dB)	300 kHz (200 kHz at range 1.25 V and 0.125 V) 30 kHz with MDAQ-BASE-10		
Channel separation @ 10 kHz	> 96 dB		
CMR @ 50 Hz (@ 1 kHz)	> 94 dB (> 80 dB)		
Typ. SNR @ 50 kHz bandwidth			
Range ±0.125 V	> 87 dB		
Range ±0.25 V	> 93 dB		
Range ±0.5 V to ±1.25 V	> 96 dB		
Range ±2.5 V to ±10 V	> 100 dB		
Sensor excitation	4 or 8 mA, 5 % up to 24 V _{DC}		
Current noise	150 nA * sqrt (Hz)		
Input connectors	BNC		
Output voltage	±5 V, ±10 V with MDAQ-BASE-10		
Output impedance	5 Ohm		
Output current	±20 mA		
Programming interface	RS-485, RS-232		
Power supply	±15 V _{DC}		
Power consumption:	Typ. 10 W (max 12 W @ 8 mA sensor excitation)		
Sensor connection:	BNC female		
Output connector	68-pin Amplimite series (AMP Nr. 174339-6)		
TEDS	DS 2406, DS 2430A, DS 2432, DS2433		

MDAQ-SUB-ACC-A-BNC

- 16 channel IEPE® amplifier
- AC and DC coupled voltage measurement mode
- 2 programmable high-pass filters
- Bandwidth up to 300 kHz
- Channel separation 96 dB
- TEDS support
- Ideally suited for sound and vibration measurement

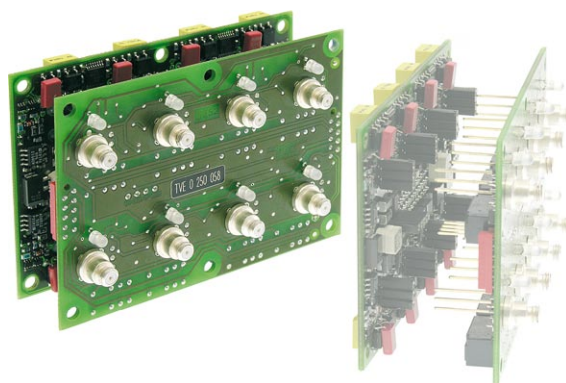


Specifications

MDAQ-SUB-ACC-A				
Input voltage range	±0.125 V, 0.25 V, 0.5 V, 1 V, 1.25 V, 2.5 V, 5 V, 10 V			
Gain	0.5, 1, 2, 4, 5, 10, 20, 40			
Input modes	ICP® or Voltage			
Voltage modes	Single ended DC or AC coupled with two selectable high pass filter (0.15 and 3.4 Hz as standard, others on request)			
Input impedance	1 MOhm			
DC accuracy ¹⁾			Without software correction table	
±0.125 V and ±0.25 V	±0.03% of reading	350 µV	±0.15% of reading	350 µV
±0.5 V to ±1.25 V	±0.03% of reading	±0.04% of range	±0.15% of reading	±0.04% of range
±2.5 V to ±10 V	±0.02% of reading	±0.03% of range	±0.15% of reading	±0.03% of range
Gain drift	Typ. 10 ppm/K (max. 20 ppm/K)			
Input offset drift	Typ. 3 µV/K (max. 12 µV/K)			
Over voltage protection	IN+ ±40 V IN- Single ended: max 300 mA			
Bandwidth (-3 dB)	300 kHz (200 kHz at range 1.25 V and 0.125 V) 30 kHz MDAQ-BASE-10			
Channel separation @ 10 kHz	> 96 dB			
CMR @ 50 Hz (@ 1 kHz)	> 94 dB (> 80 dB)			
Typ. SNR @ 50 kHz bandwidth				
Range ±0.125 V	> 87 dB			
Range ±0.25 V	> 93 dB			
Range ±0.5 V to ±1.25 V	> 96 dB			
Range ±2.5 V to ±10 V	> 100 dB			
Sensor excitation	4 or 8 mA, 5 % up to 24 V _{DC}			
Current noise	150 nA * sqrt (Hz)			
Input connectors	BNC			
Output voltage	±5 V, ±10 V MDAQ-BASE-10			
Output impedance	5 Ohm			
Output current	±20 mA			
Programming interface	RS-485, RS-232			
Power supply	15 V _{DC}			
Power consumption:	Typ. 10 W (max 12 W @ 8 mA sensor excitation)			
Sensor connection:	BNC female			
Output connector	68-pin Amplimite series (AMP Nr. 174339-6)			
Dimensions (W x D x H)	175 x 61 x 30 mm (6.9 x 2.4 x 1.2 in.)			

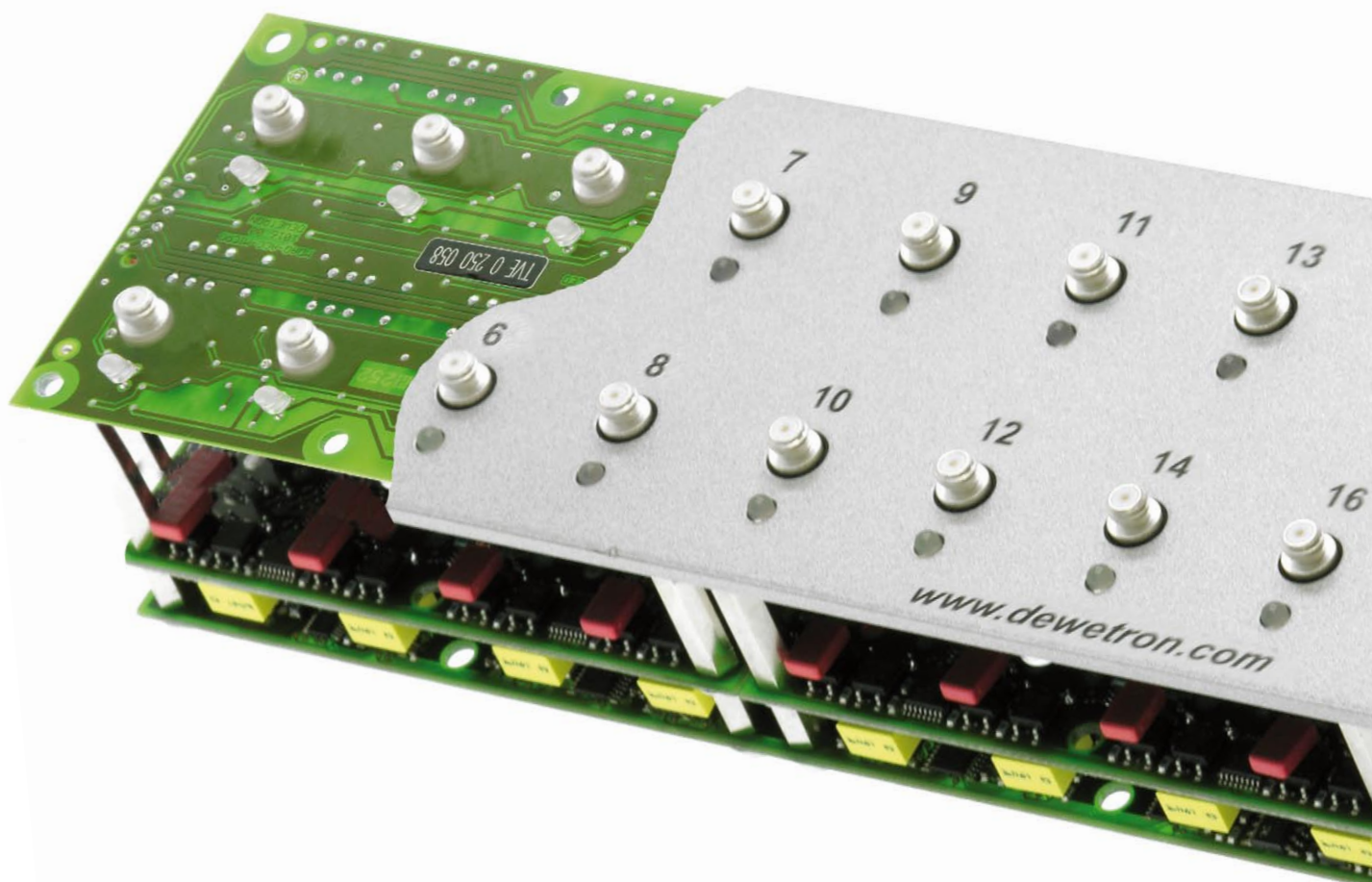
MDAQ-SUB-ACC-x-MD

- Add-on for MDAQ-SUB-ACC and MDAQ-SUB-ACC-A
- Microdot sensor input connector
- LED sensor check indication
- Input multiplexer for calibration signal



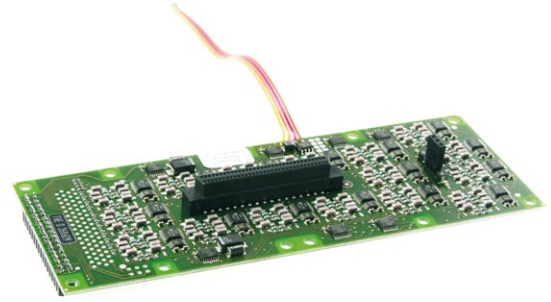
Specifications

MDAQ-SUB-ACC-x-MICRODOT	
Input connectors	Microdot No. 031-0059-0001
Sensor check (ICP® mode only)	
Open	$U_{exc} > 22 \text{ V}$: LED off
Valid	$3 \text{ V} < U_{exc} < 21 \text{ V}$: LED green
Short circuit	$U_{exc} < 2 \text{ V}$: LED red
Calibration multiplexer	Mechanical relays (NAIS TXS2)
Control connector	10-pin AMP Micro Mate
Power supply	+5 V / +12 V
Power consumption	Typ. 2 W



MDAQ-FILT-5-Bx

- MDAQ-FILT-5-BE: Bessel characteristics
MDAQ-FILT-5-BU: Butterworth characteristics
- 16 Channel 2nd order low pass filter
- 5 selectable filters including bypass function
- 5 different cut off frequencies
- Discrete low noise filter design
- Independent filter settings for each channel
- Direct control from MDAQ-xx Amplifier series



Specifications

MDAQ-FILT-5-Bx	
Filter range (-3 dB)	
Standard	MDAQ-FILT-5-Bx
Ordering option	MDAQ-FILT-5-BU-S1
	30 Hz, 100 Hz, 300 Hz, 1 kHz, 10 kHz, bypass 100 Hz, 1 kHz, 10 kHz, 30 kHz, 100 kHz, bypass other frequencies on request
Bypass bandwidth	> 700 kHz
Filter characteristics	2-Pole Bessel characteristic 2-Pole Butterworth characteristic
Attenuation slope	40 dB/decade (12 dB/octave)
Filter accuracy	± 1.5 dB @ f_c
DC gain	1 (0 dB)
Offset Error	Max. 1 mV (typ <0.2 mV) Max. 0.01% of range with MDAQ-BASE-10 Max. 0.02% of range with MDAQ-BASE-5
Input voltage range	± 10 V _{pp}
Channel separation @ 50 kHz	> 96 dB
Input configuration	Single ended, designed for use with MDAQ-V; MDAQ-BASE-5 and MDAQ-BASE-10
Output configuration	Single ended
SNR @ bandwidth	> 100 dB
Output impedance	5 Ohm
Output current	Max. ± 20 mA
Output connector	68-pin Amplimate series (AMP Nr. 174339-6), SCSI II Type
Power supply	± 7.5 V to ± 15 V direct via MDAQ-BASE or -V
Power consumption	Typ. 3 W
Dimensions (W x D x H)	175 x 61 x 14 mm (6.9 x 2.4 x 0.9 in.)

MDAQ-AAF4-5-Bx

- MDAQ-AAF4-5-BE: Bessel characteristics
MDAQ-AAF4-5-BU: Butterworth characteristics
- 16 Channel 4th order low pass filter
- 5 selectable filters including bypass function
- 5 different cut off frequencies
- Discrete low noise filter design



Specifications

MDAQ-AAF4-5-Bx	
Filter range (-3 dB) standard	100 Hz, 1 kHz, 10 kHz, 30 kHz, 100 kHz, bypass
ordering option MDAQ-AAF4-5-BU-S1	163 Hz, 500 Hz, 2.5 kHz, 10 kHz, bypass, bypass
ordering option MDAQ-AAF4-5-BU-S2	10 Hz, 100 Hz, 1 kHz, 10 kHz, 20 kHz, bypass
ordering option MDAQ-AAF4-5-BE-S1	100 Hz, 1 kHz, 10 kHz, 20 kHz, 30 kHz, bypass other frequencies on request
Bypass Bandwidth	> 700 kHz
Filter characteristics	Ordering option BE: 4-Pole Bessel characteristic Ordering option BU: 4-Pole Butterworth characteristic
Attenuation slope	80 dB/decade (24 dB/octave)
Filter accuracy	± 1.5 dB @ f_0
DC gain	1 (0 dB)
Offset Error	Max. 1 mV (typ <0.2 mV) max. 0.01% of range with MDAQ-BASE-10 max. 0.02% of range with MDAQ-BASE-5
Input voltage range ²⁾	± 10 V _{PP}
Channel separation @ 50 kHz	> 96 dB
Input configuration	Single ended; designed for use with MDAQ-V; MDAQ-BASE-5 and MDAQ-BASE-10
Output configuration	Single ended
SNR @ full Bandwidth	> 100 dB
Output impedance	5 Ohm
Output current	Max. ± 20 mA
Output connector	68-pin Amplimite series (AMP Nr. 174339-6), SCSI II Type
Power supply	± 7.5 V to ± 15 V direct via MDAQ-BASE or -V
Power consumption	Typ. 3 W
Dimensions (W x D x H)	175 x 61 x 25 mm (6.9 x 2.4 x 1 in.)

