KAD/ADC/114

Full-bridge ADC (voltage excitation, strain gages, 3kHz b/w) - 16ch at 12ksps

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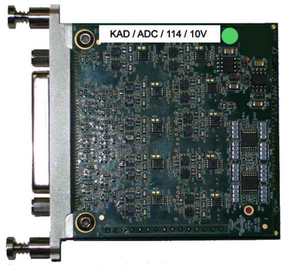

Key Features

- 16 full or ½bridge, potentiometer or differential ended input channels
- Ordering input range (±100mV, ±1V,±10V)
- High accuracy (0.01% FSR typical for /1V, /10V variant, 0.02% FSR for /100mV variant)
- Programmable voltage excitation per two channels and balance adjust per channel
- Shorts only affect channels sharing excitation
- 16-bit simultaneous sampling on each channel

Applications

- Bridge sensors and strain gage measurement
- Differential voltage measurement

Overview

The KAD/ADC/114 is used to condition and digitize up to 16 differential ended analog channels using a 16-bit A/D per channel. At the heart of the KAD/ADC/114 is a hard-wired state-machine that oversamples all channels at a rate between 48ksps and 96ksps and digitally filters any noise above the user-programmable cutoff frequency.

This is achieved using cascaded, half-band, Finite-Impulse-Response (FIR) filters followed by an 8th order Butterworth Infinite-Impulse-Response (IIR) filter with a default cutoff point set at one quarter of the sampling frequency ($f_c = f_s / 4$). All signals are sampled simultaneously. Thus, when several channels are sampled at different sampling rates, at the start of an acquisition cycle all channels are aligned.

Excitation on the KAD/ADC/114 is programmable using four D/A converters, each of which is connected to two pairs of drivers. If more than eight excitations are required, each excitation output can be connected to two bridges.

The KAD/ADC/114 is available with three different input ranges (±10V, ±1V, and ±100mV). The input range must be specified when ordering.

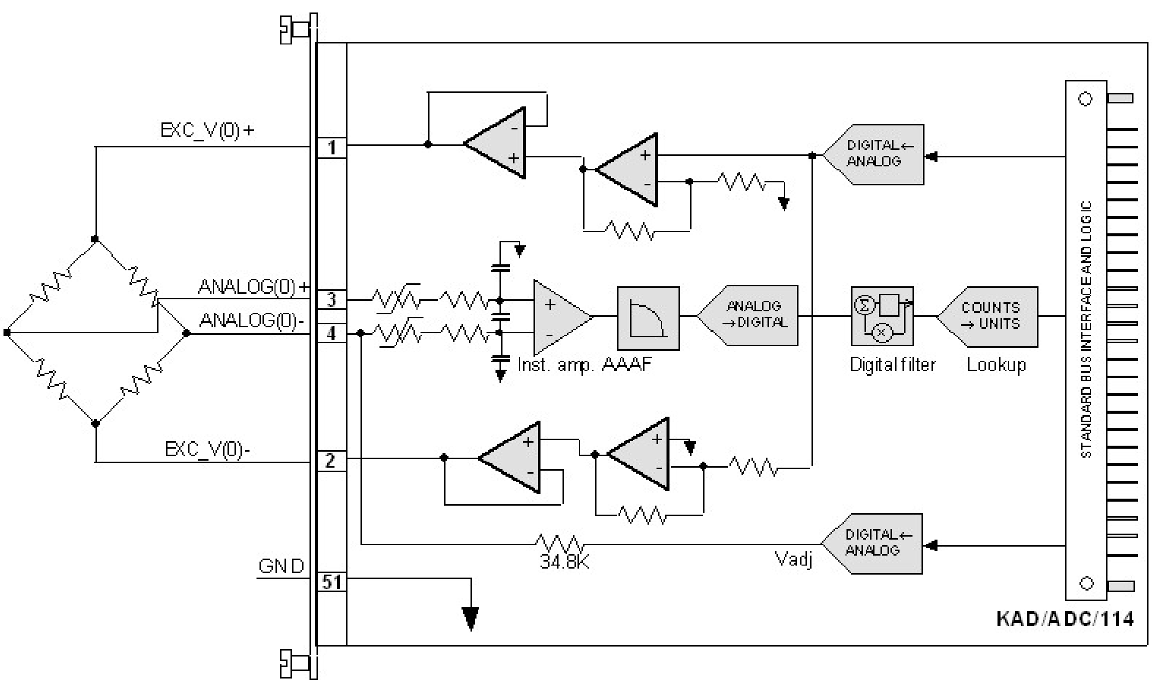

Figure 1: First of 16 channels on the KAD/ADC/114

Specifications

All values provided in the following specification tables are valid within the operating temperature range specified under "Environmental ratings" in the "General specifications" table.

TABLE 1	General specifications				
PARAMETER	MIN.	TYP.	MAX.	UNITS	CONDITION/DETAILS
Slots	–	–	1	–	Can be placed in any user-slot in any combination.
Mass					
	–	95	–	g	
	–	3.35	–	oz	Design metric is grams.
Height above chassis					For recommended clearance requirements see the *CON/KAD/002/CP* data sheet.
bare connector	–	–	11	mm	
bare connector	–	–	0.43	in.	Design metric is millimeters.
Access rate	–	–	2	Msps	Maximum combined access rate for read and write.
Power consumption					To attain these figures for ±12V, see Unused differential ended inputs and "Unused differential ended inputs" on page 11.
+5V	100	–	160	mA	
±7V	30	–	60	mA	Excludes current used by excitation.
±12V	30	–	70	mA	No floating inputs. See "Unused differential ended inputs" on page 11.
total power	1.64	–	3.32	W	Particular combinations of chassis and Acra KAM-500 modules may have power or current limitations. For details, see *TEC/NOT/016 - Power dissipation, TEC/NOT/049 - Power estimation*, and the relevant chassis data sheet.
Environmental ratings					See *Environmental Qualification Handbook*.
operating temperature	-40	–	85	°C	Chassis base/side plate temperature.
storage temperature	-55	–	105	°C	

TABLE 2	Differential ended analog inputs				
PARAMETER	MIN.	TYP.	MAX.	UNITS	CONDITION/DETAILS
Inputs	–	–	16	–	
Sampling rate					While the sampling rate can be set individually, each must have a power of two times any other (¼, ½ ...2, 4).
Channel[11:0]	2	–	12000	sps	
Input voltage					
operating range (KAD/ADC/114/10V)	-10	–	10	V	Primary gain = 1.
operating range (KAD/ADC/114/1V, KAM/ADC/114/1V)	-1	–	1	V	Primary gain = 10.
operating range (KAD/ADC/114/100M)	-100	–	100	mV	Primary gain = 100.
overvoltage protection	-40	–	40	V	Voltages outside of this range can damage input.

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TABLE 2	Differential ended analog inputs (continued)				
PARAMETER	MIN.	TYP.	MAX.	UNITS	CONDITION/DETAILS
DC error					DC signal averaged over 200 samples without excitation.
gain = 1	–	0.01	0.05	%FSR	KAD/ADC/114/10V, KAD/ADC/114/1V, KAM/ADC/114/1V
gain = 2	–	0.02	0.08	%FSR	KAD/ADC/114/10V, KAD/ADC/114/1V, KAM/ADC/114/1V
gain = 4	–	0.04	0.14	%FSR	KAD/ADC/114/10V, KAD/ADC/114/1V, KAM/ADC/114/1V
gain = 8	–	0.08	0.25	%FSR	KAD/ADC/114/10V, KAD/ADC/114/1V, KAM/ADC/114/1V
gain = 1	–	0.02	0.08	%FSR	KAD/ADC/114/100M.
gain = 2	–	0.04	0.14	%FSR	KAD/ADC/114/100M.
gain = 4	–	0.08	0.25	%FSR	KAD/ADC/114/100M.
gain = 8	–	0.16	0.44	%FSR	KAD/ADC/114/100M.
AC gain error					AC gain error figures are based on simulated/theoretical results.
for 0Hz < f_{in} ≤ 300Hz	–	0.02	0.1	%FSR	Gain = 1, f_s = 12kHz, f_c = f_s / 4 (f_{in} : input signal frequency; f_s : sampling frequency; f_c : filter cutoff frequency).
for 300Hz < f_{in} ≤ 1kHz	–	0.1	0.25	%FSR	Gain = 1, f_s = 12kHz, f_c = f_s / 4.
for 1kHz < f_{in} ≤ 2kHz	–	0.2	1	%FSR	Gain = 1, f_s = 12kHz, f_c = f_s / 4.
Effective number of bits					
KAD/ADC/114/10V, KAD/ADC/114/1V, KAM/ADC/114/1V	13	14	–	bits	Secondary gain of 1.
KAD/ADC/114/100M	12.5	13.5	–	bits	Secondary gain of 1.
Crosstalk	–	-90	-80	dB	
Common mode					
voltage range	-10	–	10	V	Operational voltage range.
rejection ratio (KAD/ADC/114/10V)	72	80	–	dB	Applies within the above common mode voltage range, 0 ≤ f ≤ f_c.
rejection ratio (KAD/ADC/114/1V, KAM/ADC/114/1V, KAD/ADC/114/100M)	90	100	–	dB	Applies within the above common mode voltage range, 0 ≤ f ≤ f_c.
Analog filter					Analog filter is Butterworth.
poles	–	–	4	–	
filter cutoff -3dB	5.7	6	6.3	kHz	
Digital filter					Digital filter is Butterworth.
poles	–	–	8	–	
filter cutoff -3dB	0.25	–	16	f_s	The maximum value is limited to 3kHz.
0.1dB bandwidth	–	0.8	–	f_c	
aliasing to 0.1dB band	–	–	-72	dB	
aliasing to f_c	–	–	-74	dB	
Filter delay	–	0.66	–	ms	Measured for f_{in} = f_c = 3kHz (f_{in} : input signal frequency). "Understanding filter delays" on page 11.

TABLE 2	Differential ended analog inputs (continued)				
PARAMETER	MIN.	TYP.	MAX.	UNITS	CONDITION/DETAILS
Input resistance					
between inputs	10	–	–	MΩ	Module powered on/off.
each input to GND	–	34.8	–	kΩ	Module powered on/off (measured on ANALOG(x)- input).
Input impedance					
each input to ground	–	35	–	MΩ	Module powered off (measured at 3kHz on ANALOG(x)- input).
each input to ground	–	35	–	kΩ	Module powered on (measured at 3kHz on ANALOG(x)- input).
between inputs	–	2	–	MΩ	Module powered off (measured at 3kHz).
between inputs	–	300	–	kΩ	Module powered on (measured at 3kHz).

TABLE 3	Bipolar DC voltage excitation outputs				
PARAMETER	MIN.	TYP.	MAX.	UNITS	CONDITION/DETAILS
Outputs	–	–	8	–	Each output shared between two channels. Applied in groups of four channels.
Output voltage					
operating range	0	–	5.1	V	Bi-polar excitation: 5V is 10V across the bridge.
resolution	–	1.8	–	mV	
compliance	–	–	15	mA	Per channel. Note that 30mA is shared per two channels. See “KAD/ADC/114 shared excitations” on page 8.
short circuit current	–	–	125	mA	
short circuit duration	∞	–	–	s	Short on one channel affects the other channel, which uses the same excitation driver.
DC error					
error	–	0.1	0.2	%FSR	With a constant 175Ω load (loaded with two 350Ω bridges).
noise (KAD/ADC/114/10V)	–	–	0.5	mV_{rms}	As measured on analog input.
noise (KAD/ADC/114/1V, KAM/ADC/114/1V)	–	–	0.05	mV_{rms}	As measured on analog input.
noise (KAD/ADC/114/100M)	–	–	0.01	mV_{rms}	As measured on analog input.
Output resistance	–	0.3	–	Ω	

TABLE 4	Balance current outputs[1]				
PARAMETER	MIN.	TYP.	MAX.	UNITS	CONDITION/DETAILS
Outputs	–	–	16	–	Internally connected with corresponding ANALOG(x)- input.
Output current					
operating range	-71	–	71	µA	
resolution	–	560	–	nA	
DC error					
error	–	–	2	%FSR	With a constant 175Ω load. The impact of this error on the channel reading is less than 0.01%FSR (200 times lower than the error specified here).
drift	–	–	0.15	%FSR	Over temperature.
noise (KAD/ADC/114/10V)	–	–	0.5	mV_{rms}	As measured on analog input.
noise (KAD/ADC/114/1V, KAM/ADC/114/1V)	–	–	0.05	mV_{rms}	As measured on analog input.
noise (KAD/ADC/114/100M)	–	–	0.01	mV_{rms}	As measured on analog input.
Output resistance	–	34.8	–	kΩ	

1. The balance is permanently connected to ANALOG(x)- input. The line is intended for balancing strain gages, so the module should not be used for asymmetric bridge transducers such as accelerometers or pressure transducers unless sensor re-calibration is carried out on a channel-by-channel basis.

Setting up the KAD/ADC/114

All module setup can be defined in XML using XidML® schemas (see http://www.xidml.org).

Instrument settings

SETUP DATA	CHOICE	DEFAULT	NOTES
Manufacturer	-	-	-
Name	ACRA CONTROL	ACRA CONTROL	Name of manufacturer.
PartReference	KAD/ADC/114/10V	KAD/ADC/114/10V	The instrument part reference.
SerialNumber	AB1234	AB1234	Unique name for each module.
Channels	-	-	-
Analog(15:0) Analog Input	-	-	-
Settings	-	-	-
Filter Cutoff	0.25 0.5 1 2 4 8 16	0.25	Required cutoff point for the filter is the chosen value multiplied by the user sampling frequency. 0.25 is recommended as any higher may lead to aliasing. 1 is the sampling rate.
Excitation Amplitude	0 to 5.1	5	Required excitation (in V) for the top of the bridge. Excitation is bipolar so entering 5V means 10V across the bridge.
Balance.Type	CurrentShunt	CurrentShunt	Specifies the balance type to be carried out on the bridge.
Balance.Applied	-71e-6 to 71e-6	0	Shunt current (in A) applied to the bridge.
Balance.BalanceThisTime	True False	False	Specifies if balancing should be carried out this time by software.
Balance.Tolerance	0.01 to 99.99	0.1	Specifies acceptable tolerance of achieved value versus target value, expressed as percentage of defined input range.
Balance.Target	-10 to 10	0	Specifies a value that the channel should be balanced to.
ShuntCurrent.Applied	-71e-6 to 71e-6	0	Shunt mode current (in A) added to the bridge.

Parameter definitions

NAME/DESCRIPTION	BASE UNIT	DATA FORMAT	BITS	REGISTER DEFINITION
Analog(15:0) Parameters				
Analog Analog signal data	Volt	OffsetBinary	16	R[15:0]

Configurable parameters

Analog(15:0)

SETUP DATA	CHOICE	DEFAULT	NOTES
Range Maximum	-10 to 10	10	Range maximum for analog channel
Range Minimum	-10 to 10	-10	Range minimum for analog channel

NOTE: It is recommended that names are less than 20 characters, have no white space or contain any of the following five characters "/><\.

Getting the most from the KAD/ADC/114

Wiring configurations

Figures 2 to 5 show possible wiring configurations for the KAD/ADC/114.

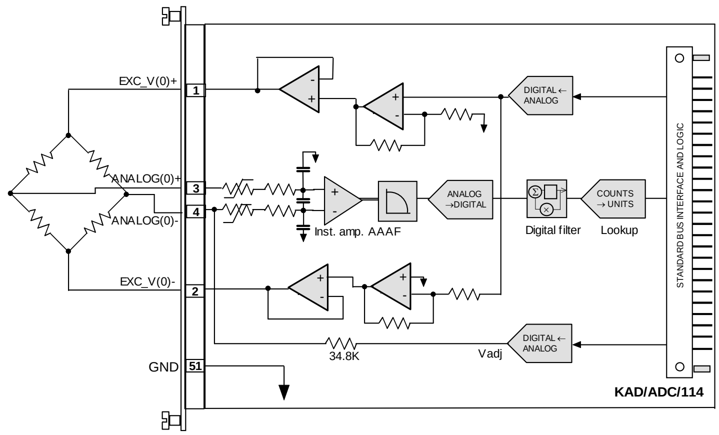


Figure 2: First of 16 channels on the KAD/ADC/114

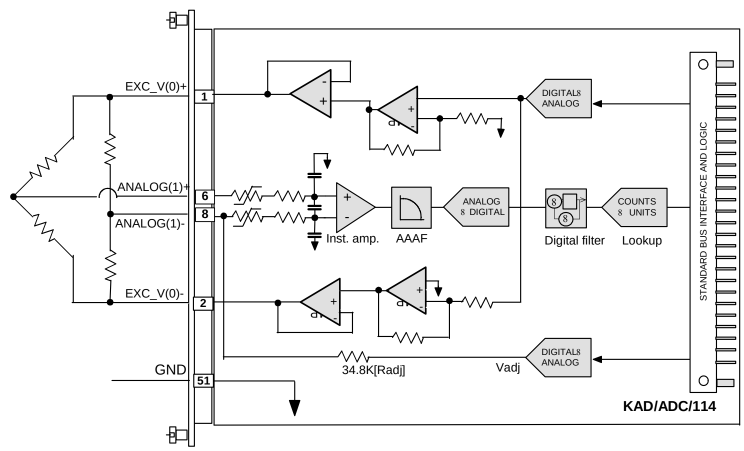


Figure 3: Second of 16 ½-bridge channels with matched pair completion resistors

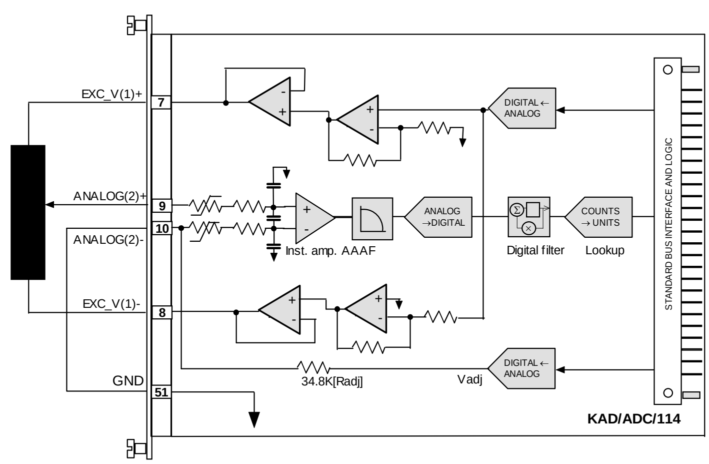


Figure 4: Third of 16 potentiometer channels

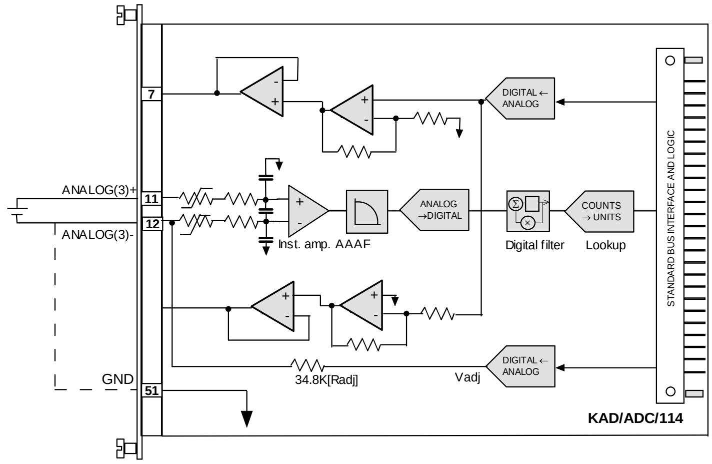


Figure 5: Fourth of 16 differential ended channels

Bias current return path

As shown in Figure 5, the analog inputs can be used as differential inputs (that is, not from a bridge). In this case, if the signal source is isolated with respect to the Acra KAM-500 (for example a battery), a common-mode resistance between the negative input and ground (GND) should be used to provide a return for bias currents and reduce common-mode noise pick-up. Because the bias currents are in the order of nAs resistors up to 10kΩ can be used. In most cases a short (0Ω) is recommended.

NOTE: When analog inputs are used as differential inputs, setting the excitation and balance to zero reduces quiescent currents of the module.

KAD/ADC/114 shared excitations

The KAD/ADC/114 has 16 differential input channels and eight symmetrical excitation channels that can each provide a total of 30mA. There are more input channels than excitations, this means that excitations must be shared across sensors if there are more sensors than excitations.

The rules for shared excitations are:

1. The same voltage must be selected for them.
2. The total current drawn must not exceed 30mA.

Example

The following example includes two 350Ω full bridges. It uses the KAD/ADC/114 inputs ANALOG(0) and ANALOG(1). It shares the excitation output EXC_V(0).

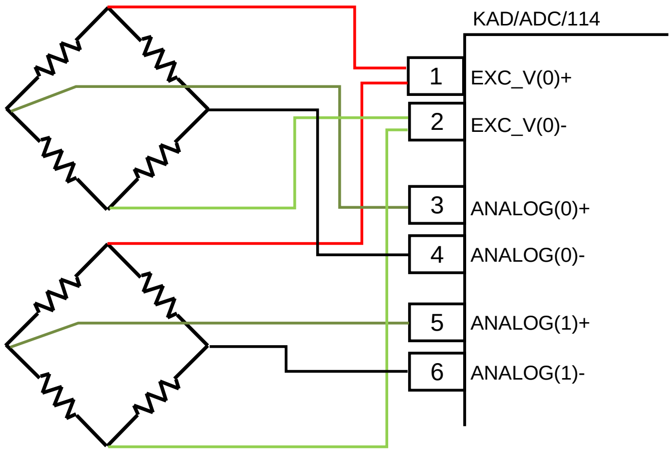


Figure 6: Sample wiring of bridge sensors with shared excitation

It is important to ensure that the current does not exceed 15mA for each bridge. If all resistors are exactly 350Ω then the current i down each bridge arm can be calculated with the following equation:

i = ((EXC_V+) – (EXC_V-)) / (350+350)

The excitation voltage must be set up in such a way that the current is less than 7.5mA per arm (there are four arms, two per sensor, and 30mA available).

Therefore the limit is nominally:

((EXC_V+) - (EXC_V-)) = 700 × 0.0075

((EXC_V+) - (EXC_V-)) = 5.25

also EXC_V+ = -EXC_V-

So maximum excitation should nominally be a maximum ±2.625V for the 350Ω bridge. Allowing 5% tolerance, 2.5V is recommended for the bridge.

Excitation setup

Excitation can contribute error to the overall measurement, so it is recommended to use as close as possible to full-scale excitation, to minimize the percentage error.

For optimal accuracy ensure each channel uses its corresponding excitation. If the excitation is not used, it should be set to the minimum value.

Excitation drift on potentiometer configurations

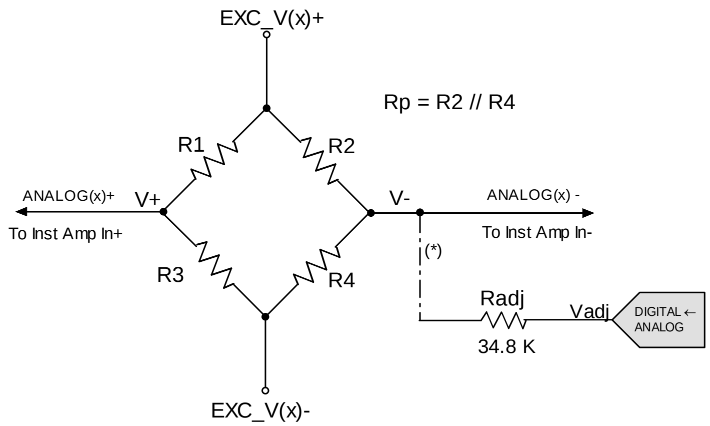
We recommend a full-bridge input configuration for the KAD/ADC/114. With this configuration the differential input amplifier removes common mode voltage or common mode pickup noise on the input lines.

For potentiometer circuits where the negative input is tied to ground, excitation drift can have a direct impact on the input signal either as a gain or an offset error. Note that excitation can drift up to 0.3% on an FSR of 5.1V. In the case where both excitation lines drift in the same direction, an offset error is seen in the measurement. The worst case offset is 0.3% of 5.1V and results in a 5.3mV offset of the measurement. This does not happen with full-bridge configurations.

We recommend that the negative input is tied to GND as shown in Figure 3 on page 7. If the negative input is floating, the drift of the digital/analog converter related to the balancing input directly adds further offset error to the measurement.

Source load error caused by the balance adjust circuit

The balance circuit has an impedance of R_{ADJ} and is connected to the ANALOG(x)- input of the module. This connection is performed internally on the module. In some bridge configurations, R_{ADJ} loads the source signal causing a quantifiable error. An example schematic for a full-bridge configuration loaded with balance resistance is shown in the following figure.



(*) Connection between V- and Radj is internal or external depending on module

Figure 7: Full-bridge configuration loaded with balance resistance

The DC error specification is checked as a differential input, so it does not include loading by R_{ADJ} which causes an additional gain error.

In the previous figure, the gain error only occurs when the active leg of the bridge is connected to ANALOG(x)-. In this situation, ANALOG(x)- is loaded by R_{ADJ}, forming a resistor divider with the resistance of bridge visible from the ANALOG(x)- input.

The gain error on ANALOG(x)- input can be quantified as follows:

$$Error = -\left(\frac{R_P}{R_P + R_{adj}}\right) \times 100\%$$

where $R_P = R_2$ in parallel with R_4

This additional gain error depends on the resistance of the bridge and can be typically -0.5% for a 350Ω bridge with its active leg connected to ANALOG(x)-, and -0.172% for a 120Ω bridge.

In the case of a full-bridge with two active legs, only one leg of the bridge is affected. Therefore the gain error of voltage across the bridge is half of the above quoted figures, that is, -0.25% for a 350Ω bridge.

For a symmetrical input range, the error can be expressed as %FSR error by further dividing the value by two, yielding to ±0.125% FSR for a 350Ω bridge.

Note that the gain error due to R_{ADJ} does not apply when:

- using a wheatstone bridge with the active elements (typically strain gages) placed only on the leg of the bridge connected to ANALOG(x)+
- the leg of the bridge connected to ANALOG(x)- is populated with completion resistors (half-bridge with completion resistors)
- using only differential ended inputs with signal source isolated from module ground
- using only inputs in single ended configuration, connecting the signal to ANALOG(x)+ (ANALOG(x)- must be connected to ground). This data sheet shows an example potentiometer application, which is not affected by this gain error.

Modules with R_{ADJ} connected externally might show this additional gain error offset but only if the balance adjust circuit is used and in the cases stated previously.

NOTE: Gain error can be compensated at post processing, as the nominal resistance of the bridge is known.

Compensation for lead resistance (Excitation Mode set to Voltage)

In bridge applications, if the lead resistance can be measured or estimated, add the voltage drop across the leads to the excitation voltage. For example, for 0.5Ω leads in a 350Ω full-bridge, where ±2.5V (5V) is desired across the bridge, the excitation should be set to 5V + (0.5 × 5 / 350) = ±2.507.

NOTE: When Excitation Mode is set to Current, the leads resistance does not need to be compensated for.

Understanding filter delays

The Acra KAM-500 uniquely samples all signals at the start of an acquisition cycle and at equal intervals of time thereafter. Signals sampled at the same sample rate are always sampled at the same time independently of how they are stored or transmitted. (This has significant advantages for issues such as time correlation.) However, before signals are sampled they are filtered to remove noise components that might alias. The recommended cutoff point is one quarter the sampling frequency, as this results in the maximum filtering of aliasing frequencies.

The Acra KAM-500 filters signals using over-sampling signal processing techniques. The following figure shows a delay for an 8^{th} order filter where f_c = 1kHz. All filters cause a delay inversely proportional to the filter cutoff frequency (f_c), so to calculate the delay for other f_c values, multiply the delay by (1kHz / f_c). The frequency axis then needs to be rescaled to the new f_c by dividing the frequency values by (1kHz / f_c). For example, an 8^{th} order Butterworth filter with an f_c of 1kHz delays a 1kHz signal by 1ms; a filter with an f_c of 10Hz delays a 10Hz signal by 0.1s. The delay for IIR filters (for example Butterworth) varies with the input frequency.

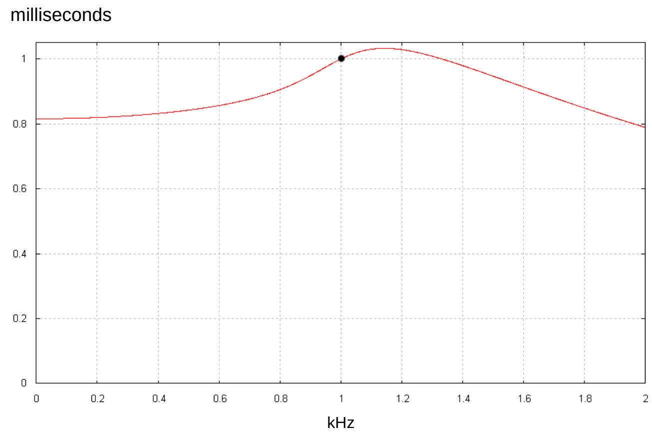


Figure 8: Filter delay for 8^{th} order Butterworth filter where f_c = 1kHz

The filter delay for the KAD/ADC/114 is:

$$T_D \approx T_A + \frac{1}{f_C} + T_{Butterworth8}(f)$$

T_D is the filter delay

T_A (analog filter delay) ≈ 0

Unused differential ended inputs

Unused inputs should not be left floating, as this may increase current consumption from the ±12V backplane lines. Floating inputs may cause the output voltage of the instrumentation amplifier to approach one of the supply rails, which causes increased quiescent currents within specific channel circuits. Each unused differential ended input should be shorted together within its pair or connected to GND.

Connector pinout of the KAD/ADC/114

PIN	NAME	SEE SPECIFICATIONS TABLE	COMMENT
1	EXC_V(0)+	Bipolar DC voltage excitation outputs	Excitation to top of bridge
2	EXC_V(0)-	Bipolar DC voltage excitation outputs	Excitation to bottom of bridge
3	ANALOG(0)+	Differential ended analog inputs	Analog input
4	ANALOG(0)-	Differential ended analog inputs	Analog input
5	ANALOG(1)+	Differential ended analog inputs	Analog input
6	ANALOG(1)-	Differential ended analog inputs	Analog input
7	EXC_V(1)+	Bipolar DC voltage excitation outputs	Excitation to top of bridge
8	EXC_V(1)-	Bipolar DC voltage excitation outputs	Excitation to bottom of bridge
9	ANALOG(2)+	Differential ended analog inputs	Analog input
10	ANALOG(2)-	Differential ended analog inputs	Analog input
11	ANALOG(3)+	Differential ended analog inputs	Analog input
12	ANALOG(3)-	Differential ended analog inputs	Analog input
13	EXC_V(2)+	Bipolar DC voltage excitation outputs	Excitation to top of bridge
14	EXC_V(2)-	Bipolar DC voltage excitation outputs	Excitation to bottom of bridge
15	ANALOG(4)+	Differential ended analog inputs	Analog input
16	ANALOG(4)-	Differential ended analog inputs	Analog input
17	ANALOG(5)+	Differential ended analog inputs	Analog input
18	ANALOG(5)-	Differential ended analog inputs	Analog input
19	EXC_V(3)+	Bipolar DC voltage excitation outputs	Excitation to top of bridge
20	EXC_V(3)-	Bipolar DC voltage excitation outputs	Excitation to bottom of bridge
21	ANALOG(6)+	Differential ended analog inputs	Analog input
22	ANALOG(6)-	Differential ended analog inputs	Analog input
23	ANALOG(7)+	Differential ended analog inputs	Analog input
24	ANALOG(7)-	Differential ended analog inputs	Analog input
25	EXC_V(4)+	Bipolar DC voltage excitation outputs	Excitation to top of bridge
26	EXC_V(4)-	Bipolar DC voltage excitation outputs	Excitation to bottom of bridge
27	ANALOG(8)+	Differential ended analog inputs	Analog input
28	ANALOG(8)-	Differential ended analog inputs	Analog input
29	ANALOG(9)+	Differential ended analog inputs	Analog input
30	ANALOG(9)-	Differential ended analog inputs	Analog input
31	EXC_V(5)+	Bipolar DC voltage excitation outputs	Excitation to top of bridge
32	EXC_V(5)-	Bipolar DC voltage excitation outputs	Excitation to bottom of bridge
33	ANALOG(10)+	Differential ended analog inputs	Analog input
34	ANALOG(10)-	Differential ended analog inputs	Analog input
35	ANALOG(11)+	Differential ended analog inputs	Analog input
36	ANALOG(11)-	Differential ended analog inputs	Analog input
37	EXC_V(6)+	Bipolar DC voltage excitation outputs	Excitation to top of bridge
38	EXC_V(6)-	Bipolar DC voltage excitation outputs	Excitation to bottom of bridge
39	ANALOG(12)+	Differential ended analog inputs	Analog input
40	ANALOG(12)-	Differential ended analog inputs	Analog input
41	ANALOG(13)+	Differential ended analog inputs	Analog input
42	ANALOG(13)-	Differential ended analog inputs	Analog input
43	EXC_V(7)+	Bipolar DC voltage excitation outputs	Excitation to top of bridge
44	EXC_V(7)-	Bipolar DC voltage excitation outputs	Excitation to bottom of bridge
45	ANALOG(14)+	Differential ended analog inputs	Analog input
46	ANALOG(14)-	Differential ended analog inputs	Analog input
47	ANALOG(15)+	Differential ended analog inputs	Analog input
48	ANALOG(15)-	Differential ended analog inputs	Analog input
49	DNC		Do not connect
50	GND	Internal ground	
51	GND	Internal ground	
52	CHASSIS	Chassis	

Ordering information

PART NUMBER	DESCRIPTION
KAD/ADC/114/10V	Full-bridge ADC (voltage excitation, strain gages, 3kHz b/w, ±10V) - 16ch at 12ksps (with 52-way double-density connector)
KAD/ADC/114/1V	Full-bridge ADC (voltage excitation, strain gages, 3kHz b/w, ±1V) - 16ch at 12ksps (with 52-way double-density connector)
KAD/ADC/114/100M	Full-bridge ADC (voltage excitation, strain gages, 3kHz b/w, ±100mV) - 16ch at 12ksps (with 52-way double-density connector)
KAM/ADC/114/1V	Full-bridge ADC (voltage excitation, strain gages, 3kHz b/w, ±1V) - 16ch at 12ksps (with 51-way micro-miniature module top connector)
KAM/ADC/114/100M	Full-bridge ADC (voltage excitation, strain gages, 3kHz b/w, ±100mV) - 16ch at 12ksps (with 51-way micro-miniature module top connector)

By default, the standard mating connector (CON/KAD/002/CP for KAD modules; or ACC/CON/008/04 for KAM modules) is included with each module in the shipment. Its part number will be added to the Confirmation of Order unless an alternative option is specified (see the *Cables* data sheet). In this data sheet, KAD/ADC/114 refers to both the KAD and KAM version of the module.

The KAD/ADC/114 uses power from the ±7V power line for excitation and therefore can not be used with KAM/CHS/04L, KAM/CHS/05F or KAM/CHS/03F. If the maximum excitation current is drawn from each channel, then the maximum number of KAD/ADC/114s per chassis is limited to five.

Revision history

REVISION	DIFFERENCES	STATUS
KAD/ADC/114	First release	Recommended for new programs

Supporting software

SOFTWARE	DETAILS
DAS Studio 3	User interface for setup and management of data acquisition, network switches, recorders and ground stations in an integrated environment
KSM-500	These modules are supported by the KSM-500 suite of software tools
kBalance	Automated balancing/nulling software tool for Acra KAM-500 modules

Related documentation

DOCUMENT	DETAILS
DOC/DBK/001	Acra KAM-500 Databook
DOC/HBK/002	Environmental Qualification Handbook
DOC/MAN/018	KSM-500 Databook
DOC/MAN/030	DAS Studio 3 User Manual
TEC/NOT/001	Strain gages and ideal bridges
TEC/NOT/016	Power dissipation
TEC/NOT/049	Power estimation

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