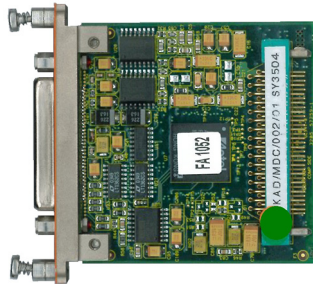


# KAD/MDC/002

Multiplexing ADC (programmable analog gain, pressure scanner, external temp. compensation) - 2ch at 12.5kps



## FEATURES

- Two differential-ended (D/E) input channels with programmable gain
- Two constant current RTD inputs with programmable excitation
- Accuracy:  $\pm 0.25\%$  (FSR) for ranges  $\pm 10V$ ,  $\pm 5V$  and  $\pm 2.5V$
- 16-bit simultaneous sampling on both channels
- Support for 64-channel external multiplexer with 5V or 12V CMOS logic
- Short to ground on one channel does not affect other channel
- $\pm 12V$  power supply lines for pressure scanners
- Up to 12,500 samples per second per multiplexer

## APPLICATIONS

- An interface to analog pressure scanners

## DESCRIPTION

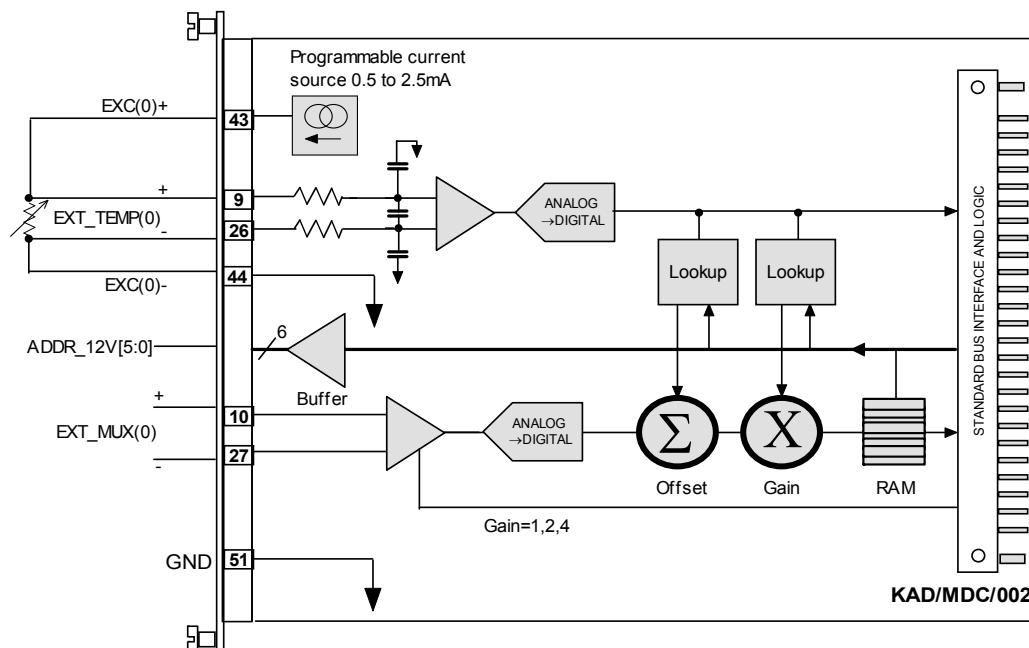
The KAD/MDC/002 is designed to interface two multiplexed analog signals such as those from analog pressure scanners.

The KAD/MDC/002 has two analog inputs and two constant current RTD inputs for differential voltages/external temperature measurements. In addition to measurement channels, the KAD/MDC/002 provides a 6-bit address bus for an external multiplexer. The KAD/MDC/002 sequentially addresses the 64 channels of an external multiplexer and measures the voltage on the multiplexer's outputs. The interval within all external channels that are addressed is programmable in the range of 5.12ms to 128ms.

In a typical operation the multiplexer's address is set to "000002" at the start of an acquisition cycle. 80 $\mu$ s later, both multiplexer's outputs are sampled. The address is then incremented to "000012" and multiplexer outputs are sampled again. After 5.12ms the address reads "111112" and all 128 channels from both inputs have been sampled.

Two four-wire constant current RTD inputs are provided to monitor the temperature of the external multiplexer. The constant current excitation for PT100 and PT500 sensors can be programmed to 0.5mA or 2.5mA.

The external temperature channels are continuously sampled and a running average maintained. These values are used to generate an additional gain and offset for each of 64 external channels per input.



First of 64 channels on the KAD/MDC/002

## Ordering Information

Part Number	Description
<b>KAD/MDC/002</b>	Multiplexing ADC (programmable analog gain, pressure scanner, external temp. compensation) - 2ch at 12.5ksps (with 52-way connector)
<b>KAM/MDC/002</b>	Multiplexing ADC (programmable analog gain, pressure scanner, external temp. compensation) - 2ch at 12.5ksps (with 51-way 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/MDC/002 refers to both the KAD and KAM version of the module.

## Revision History

Revision	Differences	Status
<b>KAD/MDC/002</b>	First release	Recommended for new programs

## Supporting Software

Software	Details
<b>KSM-500</b>	This module is supported by the KSM-500 suite of software tools

## Related Documentation

Document	Details
<b>TEC/NOT/023</b>	Resistance temperature detectors
<b>DOC/MAN/018</b>	KSM-500 Databook
<b>DOC/HBK/002</b>	Environmental Qualification Handbook
<b>DOC/DBK/001</b>	Acra KAM-500 Databook

## Specifications

<b>Channels:</b>	2 inputs from 64-channel multiplexers 2 temperature sensors from multiplexer 2 constant current excitation outputs
<b>Input considerations</b>	<p><b>Mux input:</b>  <b>Range:</b> <math>\pm 10V</math>, <math>\pm 5V</math> <math>\pm 2.5V</math>  <b>Type:</b> D/E  <b>Input impedance:</b> <math>1G\Omega</math> (on)/<math>&gt;50k</math> (off)  <b>Protection:</b> <math>\pm 40V</math>  <b>Accuracy:</b> 0.25% total error from all sources for ranges <math>\pm 10V</math>, <math>\pm 5V</math>, <math>\pm 2.5V</math> and secondary gain of 1</p> <p><b>PT100, PT500 input:</b>  <b>Accuracy:</b> <math>\pm 1.2^{\circ}C/\pm 2.4^{\circ}C</math>, for the range <math>-30^{\circ}C</math> to <math>+85^{\circ}C</math></p>
<b>Output considerations</b>	<p><b>Mux Address out:</b>  12V CMOS'1' 12V (5mA)  '0' 0V (-5mA)  5V CMOS'1' 5V (5mA)  '0' 0V (-5mA)</p> <p><b>Excitation current source:</b> 0.5mA or 2.5mA (each source is independently programmable)  <b>Accuracy:</b> <math>\pm 5\mu A</math> for 0.5mA and <math>\pm 10\mu A</math> for 2.5mA  <b>Short circuit protection:</b> Indefinite to ground</p>
<b>Sampling restrictions</b>	The maximum sampling rate per channel is 195Hz

## Setting up the KAD/MDC/002

### Setting up parameters

For 128 parameters from EXT\_MUX(0) to EXT\_MUX(1) (2 x 64 channels)

Set-up data	Choice	Default/Example	Notes
<b>Name</b>	No limit to characters	MyPressure	
<b>Base Unit</b>	Pascal	<b>Pascal</b>	
maximum	-4.5 to +4.5	<b>+4.5</b>	
minimum	-4.5 to +4.5	<b>-4.5</b>	
<b>Data Format</b>	Offset binary	Offset binary	
<b>Size In Bits</b>	4 to 16	<b>16</b>	

For 2 parameters from EXT\_TEMP(0) to EXT\_TEMP(1)

Set-up data	Choice	Default/Example	Notes
<b>Name</b>	No limit to characters	MyTemperature	
<b>Base Unit</b>	Celsius	<b>Volt</b>	
maximum	-200 to +660	<b>+85</b>	
minimum	-200 to +660	<b>-40</b>	
<b>Data Format</b>	Offset binary	Offset binary	
<b>Size In Bits</b>	4 to 16	<b>16</b>	



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

### Setting up instrumentation

This module uses the X-Module-Analog-In XidML schema. (See <http://www.xidml.org>).

For 128 parameters (2 Mux x 64 channels)

Set-up Data	Choices	Default/Example	Notes
<b>Manufacturer</b>			
name	ACRA CONTROL	ACRA CONTROL	
part reference	KAD/MDC/002	KAD/MDC/002	ACRA CONTROL part number.
serial number	Fixed 6 characters	FE1234	Unique number for each module.
<b>Sub location</b>	1 to 80 characters	MyDAU	Name of DAU.
slot	3 to N	3	The DAU slot the module fits into. First user-module goes into slot 3, where N is the number of user-slots +2 in the DAU.
<b>Settings</b>			
maximum temperature	-55 to +125	<b>+85</b>	
minimum temperature	-55 to +125	<b>-40</b>	
excitation current	0.5mA	<b>0.5</b>	
<b>Instrument</b>			
address delay	80 to 2000	<b>80</b>	Address delay in $\mu$ s.
mux count to voltage conversion	float	<b>0.00010701</b>	
Mux			
calibration URL	string		Calibration file to be selected for Scanivalve pressure scanner.
maximum input volts	-10 to +10	<b>-10</b>	
minimum input volts	-10 to +10	<b>+10</b>	
temperature sensor	PT100, PT500	<b>PT500</b>	XidML references: PT100 RTD (degrees to mV) PT500 RTD (degrees to mV)

## Getting the most from the KAD/MDC/002

To get the best results for temperature compensation, it is recommended not to use a wider PT100 (PT500) temperature range than necessary.

If the external multiplexers are powered from the KAD/MDC/002, some limitations apply. Care must be taken not to short any of the power supply outputs together because it will stop all the modules in the chassis working due to loss of supply on the backplane. Also, not all the slots in all chassis have identical current driving capability (contact Acra Business Unit support for details).

The 5V CMOS address lines may be used with the ZOC series from Scanivalve Corporation (contact Acra Business Unit support for details of compatible scanners). The 5V CMOS output may be used for changing the mode of operation for the pressure scanner. If a 32/16/8 or 4-channel external multiplexer is used, the MSB of the address lines should be used to select channels as this maximizes the settling time (for example, with 16 channels, connect the four MSBs and read multiplexer channels 3, 7, 11, and so on to 63).

If the external multiplexers are single-ended, the negative input of each of the analog inputs to the KAD/MDC/002 should be connected to KAM-500 ground (GND).

We recommend that KAM-500 GND and equipment GND be connected through a resistor in the order of 100 $\Omega$  to avoid possible common mode signal appearance. Because sampling is sequential, all channels must be sampled at the same rate.

## Connector pinout of the KAD/MDC/002

Pin	Name	I/O	Description	Comment
1	ADDR_12V(0)	Discrete S/E Out	Channel address line (12V CMOS)	LSB, active when pin 1 active
2	ADDR_12V(1)	Discrete S/E Out	Channel address line (12V CMOS)	Active when pin 1 active
3	ADDR_12V(2)	Discrete S/E Out	Channel address line (12V CMOS)	Active when pin 1 active
4	ADDR_12V(3)	Discrete S/E Out	Channel address line (12V CMOS)	Active when pin 1 active
5	ADDR_12V(4)	Discrete S/E Out	Channel address line (12V CMOS)	Active when pin 1 active
6	ADDR_12V(5)	Discrete S/E Out	Channel address line (12V CMOS)	MSB, active when pin 1 active
7	GND		KAM-500 internal ground	LSB, active when pin 1 active
8	DNC			Do not connect
9	EXT_TEMP(0)+	Analog D/E In	Analog input	From multiplexer
10	EXT_MUX(0)+	Analog D/E In	Analog input	From multiplexer
11	EXT_TEMP(1)+	Analog D/E In	Analog input	From multiplexer
12	EXT_MUX(1)+	Analog D/E In	Analog input	From multiplexer
13	NC			Do not connect
14	NC			Do not connect
15	NC			Do not connect
16	NC			Do not connect
17	AGND		KAM-500 internal ground	
18	AGND		KAM-500 internal ground	
19	AGND		KAM-500 internal ground	
20	AGND		KAM-500 internal ground	
21	DNC			Do not connect
22	DNC			Do not connect
23	DNC			Do not connect
24	DNC			Do not connect
25	DNC			Do not connect
26	EXT_TEMP(0)-	Analog D/E In	Analog input	From multiplexer
27	EXT_MUX(0)-	Analog D/E In	Analog input	From multiplexer
28	EXT_TEMP(1)-	Analog D/E In	Analog input	From multiplexer
29	EXT_MUX(1)-	Analog D/E In	Analog input	From multiplexer
30	NC			Do not connect
31	NC			Do not connect
32	NC			Do not connect
33	NC			Do not connect
34	AGND		KAM-500 internal ground	
35	AGND		KAM-500 internal ground	
36	ADDR_5V(0)	Discrete S/E Out	Channel address line (5V CMOS)	LSB, active when pin 36 active
37	ADDR_5V(1)	Discrete S/E Out	Channel address line (5V CMOS)	Active when pin 37 active
38	ADDR_5V(2)	Discrete S/E Out	Channel address line (5V CMOS)	Active when pin 38 active
39	ADDR_5V(3)	Discrete S/E Out	Channel address line (5V CMOS)	Active when pin 39 active
40	ADDR_5V(4)	Discrete S/E Out	Channel address line (5V CMOS)	Active when pin 40 active
41	ADDR_5V(5)	Discrete S/E Out	Channel address line (5V CMOS)	MSB, active when pin 41 active
42	GND		KAM-500 internal ground	
43	EXC(0)+		PT100+ excitation for sensor 0	
44	EXC(0)-		PT100- excitation for sensor 0	
45	EXC(1)+		PT100+ excitation for sensor 1	
46	EXC(1)-		PT100- excitation for sensor 1	
47	DNC			Do not connect
48	DNC			Do not connect
49	EXC_12+	Excitation source	+12V for excitation	
50	EXC_12-	Excitation sink	-12V for excitation	
51	GND		KAM-500 internal ground	
52	CHASSIS		KAM-500 chassis	Double-density connector only