

THE AMA-RM-044 SIGNAL CONDITIONING UNIT

GENERAL

The RM-044 has been designed as a low cost stand alone unit to provide signal conditioning for strain gauge type transducers such as Pressure transducers and Load Cells.

The electronics is housed in a 100 x 115 x 20 mm plastic housing.

Four, three 3 pin connectors are provided for signal, transducer and power connections.

The RM-044 is normally supplied to provide + 10 volts output for the full range of the transducer but the output will drive over the full range of ± 10 volts. The output is also configured to provide 4 to 20 mA signals if required.

SPECIFICATIONS

POWER SUPPLY:	+24 V NOM. (18 TO 30 V) .
TRANSDUCER SUPPLIES:	± 15 VOLT @ 35 mA MAX +1.3 -> +10 VOLT @ 50 mA MAX.
INPUT IMPEDANCE:	> 100 M Ω (DIFFERENTIAL)
CMRR:	100 dB @ 50 Hz TYP.
LINEARITY:	0.01% TYP.
ZERO STABILITY:	0.001% / $^{\circ}$ C OF F.R.O.
GAIN STABILITY:	0.001% / $^{\circ}$ C.
EXCITATION STABILITY:	0.02%/ $^{\circ}$ C.
GAIN RANGE:	120 TO 3200.
ZERO SUPPRESSION:	± 10 VOLTS RTO
FREQUENCY RESPONSE:	20 Hz OR 1 KHz 2 POLE MAX FLAT
OUTPUTS:	± 10 VOLTS @ 5 mA MAX. 4 TO 20 mA (500 Ω MAX).
OUTPUT NOISE:	1 mV RMS .
ENVIRONMENT:	0 TO 70 $^{\circ}$ C 90% R.H. N/C.
PHYSICAL:	100 x 115 x 20 mm (LWH) 4 MOUNTING POINTS.

NOTE: SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE

MODULE CALIBRATION DETAILS

Module S/N	B05213 A+B
Transducer Type	DACELL UM-K100
Transducer S/N	D041001+D041003
Input	0-100kgf
Output	0-10 Volts
Frequency Response	-3 dB @ 20Hz
Cable/Transducer connections	
TRANSDUCER	RM044
TERMINAL/WIRE COLOUR	TERMINALS
Black	7 - SIGNAL +
Green	8 - SIGNAL -
Shield	9 - SHIELD
Red	10 - EXCITATION +
White	12 - EXCITATION -

GETTING STARTED

Listed overleaf are the terminal numbers and descriptions, refer to below text and diagrams for all connection and configuration details.

Connecting power:

Listed in table one are the power connection details for 24 volt operation . The unit can be configured for 12V operation by placing LK12 in position A (see fig 1 for link positions). In this configuration the maximum signal output and excitation available is 5 volt.

Table 1 POWER CONNECTIONS

TERMINAL NUMBER	DESCRIPTION
1	+ 24 V in
2	COMMON
3	EARTH

Connecting output:

There are two options for output configurations, voltage output terminals 4 and 6 and current output, terminals 5 and 6. (see table below). Both outputs may be used simultaneously but their calibration is not independently adjustable ie when using the 4 – 20 mA output, the voltage output will be 0 – 10V +/- 1%.

Table 2 OUTPUT CONNECTIONS

TERMINAL NUMBER	DESCRIPTION
4	VOLTAGE OUT
5	CURRENT OUT
6	COMMON

Transducer connections:

The RM044 module can be configured for a variety of transducers , for specific transducer connections see transducer manufactures data sheet.

Excitation configuration:

The excitation can be configured two ways:

1. Variable supply mode (variable excitation) with LK 11 in B position, connect transducer to terminals 10 and 12 (see table 3). In this configuration a regulated voltage output of 1.3 – 10 volt is available to the user and is adjustable from the front panel EXC control.
2. Fixed supply mode, +/- 15 volts is available on terminals 10, 11 and 12 with LK11 in position A +15V terminal 10, COMMON terminal 12 and -15V terminal 11.

Signal connections:

The signal connections can be configured in three ways:

1. Differentially – this the most common configuration used with load cells, pressure transducers and most strain gauge based transducers. In this configuration R25, R26 and LK8 are not installed.
2. Single ended – this is normally for use with transducers with a high level output ie 0 – 5V or 0 - 10V. In this configuration LK 8 should be installed.
3. Single ended ratiometric – For use with ratiometric transducers ,ie Lucas Accustar Clinometers. In this configuration LK8 is not installed and 2 1K Ω resistors are installed in positions R25 and R26

Table 3 TRANSDUCER CONNECTIONS

TERMINAL NUMBER	DESCRIPTION
7	+ SIGNAL
8	- SIGNAL
9	CABLE SHEILD
10	+ EXCITATION
11	See text not used for load cells.
12	EXCITATION COMMON

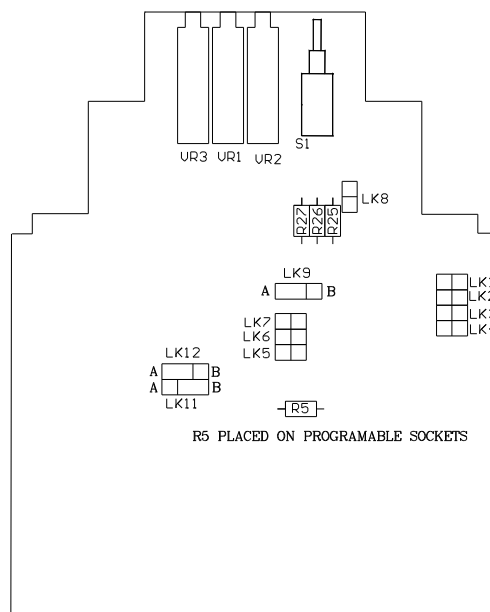


Fig 1.
PCB Overlay showing link positions and programmable resistor.

Setting Excitation Voltage:

(Only applicable for variable supply mode.)

Connect transducer, power and output connections as detailed above.

Connect multimeter probes to pins 10 and 12.

Adjust excitation voltage to desired level.

GAIN SETTING

For standard strain gauge based transducers, the Table 1 below details the link position required for various transducer sensitivities. In all link positions the full scale output is 10 volt (or 4-20mA). The table shows the mV/V range for minimum middle and maximum span potentiometer positions. If unity gain is required (ie 10 volt in for 10 volt out (or 4 – 20 mA) resistor R5 will have to be changed to 46.4 K ohms.

Installed links	mV/V RANGE	GAIN RANGE
No links	201 to 403	2 to 5
LK4	3.9 to 7.9	126 to 253
LK3	2.3 to 4.7	215 to 425
LK2	1.2 to 2.4	415 to 830
LK2&LK4	0.9 to 1.8	540 to 1080
LK1	0.4 to 0.9	1035 to 2070
LK1&LK2&LK3	0.3 to 0.6	1650 to 3300

Table 1

Zero setting

Once the gain has been set up and transducer connected the offset can be adjusted, the front panel offset control provides +/- 20% variation. Further offset adjustment range is available by using internal links, this is normally required when compensating for large gross offsets, ie when taring out the weight of an empty bin in a bin weighing application.

For ranges available see below Table 2. Note when using links for larger offsets, for positive offset LK9 is in position B and for a negative offset LK9 is in position A.

Installed links	OFFSET MIN	OFFSET MAX
No Links	-20%	+20%
LK7	--3.5%	38%
LK6	13%	55%
LK7+LK6	31%	72%
LK5	46%	88%
LK7+LK5	63%	105%

Table 2

Technical Description.

Input stage:

The input stage is formed by IC2 and associated components. IC2 is an dedicated instrumentation amplifier whose gain is set by links LK1 to LK4, when all links are removed the gain of IC2 is unity. Components L1,L2 and C1 form a filter to remove common mode EMI noise, resistors r25 and R26 are for half bridge completion when using strain gauges requiring half bridge completion or ratiometric half bridge transducers, this option is factory installed. Push button S1 and resistor R27 form the calibration circuit.

Integrated circuit IC5:B is the gain and offset stage, as shown in the table above, the offset range without links is +/- 20% and up to +/-100% zero suppression can be obtained by installing the appropriate links as detailed in the table above. Resistor R5 is a programmable resistor (nominally 6k81) which can be changed for applications which fall outside the modules normal gain requirements (consult factory).

IC5:A forms a 2pole butterworth filter which is nominally configured for a cut off frequency of 20 Hz (other frequency's available , consult factory), the rate of roll-off is 12dB per octave.

Integrated circuit ic6 and associated components form the 4-20mA current output stage.

IC6:B is the gain and offset stage and IC6:A is the voltage to current converter.

IC4 is a voltage inverter, it converts the on board + 15 Volt regulated supply to -15V.

IC1 is the regulator for the excitation circuitry, its range is adjustable from 1.3 to 11 volts.

IC's 7 and 8 are on board references for zero and offset controls.

IC3 and associated components form the on board regulation and input RFI filtering.

Please refer to the following pages for schematics and PCB overlays.