MICROLINK 303x

Analogue Outputs

User Manual

Biodata Limited

Analogue Outputs

The 303x range gives the computer analogue output control. There are 4 modules in the range with various voltage and current output options.

The 3030 and 3031 have 37-way D sockets. If you wish you can use them with the 390x screw terminal cards. These also provide extra facilities, such as non-standard voltage ranges, if optional components are added. See Chapter 11 for details. The 3032 and 3033 have BNC connectors.

5.1   3030—Four D-A Converters

The 3030 provides 4 independent digital-to-analogue converters of 12-bit resolution. Each converter produces a voltage output.

At power-up or reset the output is always 0 V; or in the case of bipolar ranges, outputs can be set to either 0 V or the full scale negative output. Each output can supply 20 mA of current and is short circuit protected.

5.1.1   Connection Notes

Connection Groups

Each D-A converter appears at the D connector as a group of 8 pin connections. These are named:

> OUTPUT
> GAIN
> BIPOLAR
> REF IN
> POWER UP
> VREF
> 5 V
> 0 V

The first 5 signals are specific to each channel. The final 3 are common signals supplied on multiple pins for connection convenience.

OUTPUT

This is the channel output. It can swing in the range ±13 V and can supply 10 mA of output current. It is short circuit protected.

GAIN

With this pin open circuit the channel span (difference in output voltage between minimum and maximum settings) is twice the REF IN value. When GAIN is connected to OUTPUT the span is equal to the REF IN value.

BIPOLAR

With this pin open circuit the channel output is unipolar. This means that a minimum setting of the D-A converter will produce 0 V at the output. If this pin is connected to REF IN then the channel output is bipolar: 0 V at the output will be produced by a mid-way setting of the D-A converter.

REF IN

This is the high impedance reference input of the D-A converter channel. Any voltage in the range ±12 V can be applied here. The output span of the channel will be equal either to the REF IN voltage or to twice the REF IN depending on the GAIN connection. If an AC signal is applied here the circuit can be used as a programmable attenuator.

POWER UP

With this pin left open circuit the channel will power up set to its most negative value, ie 0 V on a unipolar range. If this pin is connected to 5 V then the channel will power up at its mid-way value, ie 0 V on a bipolar range.

VREF

This is a stable reference voltage set to 10.240 Volts. Up to 10 mA can be taken from this pin. The output is short circuit protected. Note that throughout this manual output voltage ranges are referred to, for convenience, as 0–10 V etc. They are in fact 0–10.240 etc. This over-range capability has the advantage that it is possible to actually set 10 V on a 0–10 V range. This is not possible with a D-A converter calibrated to a 0–10 V range.

5 V and 0 V
   These are the unit power supply and output ground.

Connections to make	Output Modes			
	0–10 V	±10 V	±5 V	Attenuator
VREF to REF IN	yes	yes	yes	no
BIPOLAR to REF IN	no	yes	yes	no
GAIN to OUTPUT	yes	no	yes	yes
Power up to 5 V	no	yes	yes	no

NB When used as an attenuator the input signal is applied to REF IN.

Table 5.1 3030 Standard Connections

Other Ranges
   Other voltage ranges can be produced by dividing down the VREF. Since REF IN is a high impedance input a simple resistive divider can be used. For example if VREF were halved ranges of 0–5 V and ±2.5 V could be produced.

3900 Screw Terminals
   You can connect the 3030 to a 3900. This means that signals can be permanently wired whilst allowing the 3030 to be easily discon- nected for servicing; or the rest of the MICROLINK system to be moved to a new set of signals. Resistive dividers or output protection devices could also be mounted here.

Readback
   Due to a component being discontinued by its manufacturer, it is no longer possible to read back the programmed value of the D-A con- verter. See the 3031 Section for information about how this affects you.

Table 5.2 3030 - Four 12-Bit D-A Converters
Pin Connections for 37-Way D Plug (Wiring View)

BIPOLAR 0	37		19	0 V
VREF	36		18	GAIN 0
REF IN 0	35		17	OUTPUT 0
5 V	34		16	POWER UP 0
5 V	33		15	unused
REF IN 1	32		14	POWER UP 1
VREF	31		13	OUTPUT 1
BIPOLAR 1	30		12	GAIN 1
unused	29		11	0 V
unused	28		10	unused
BIPOLAR 2	27		9	0 V
VREF	26		8	GAIN 2
REF IN 2	25		7	OUTPUT 2
5 V	24		6	POWER UP 2
5 V	23		5	unused
REF IN 3	22		4	POWER UP 3
VREF	21		3	OUTPUT 3
BIPOLAR 3	20		2	GAIN 3
			1	0 V

Please read the Connection Notes on the previous pages before making your connections.

5.2   3031—Four 4-20 mA D-A Converters

The 3031 provides 4 independent 4-20 mA outputs, each of 12-bit resolution. At power-up or reset they are set to 4 mA.

5.2.1 Connection Notes

Each output appears as a positive current source and a negative ground return which is connected to Microlink Earth. The outputs can be powered either from the 15 V supply of the Microlink (link pins 17 and 18) or from an external supply in the range 13.5 V to 30 V (connect to pin 18).

3900 Screw Terminals

You can connect the 3031 to a 3900 module. This means that you can permanently wire outputs and yet easily move the rest of the Microlink system to a new set of signals, or disconnect the 3031 for servicing.

Readback

Due to a component being discontinued by its manufacturer, it is no longer possible to read back the programmed value of the D-A con-verter. Customers are affected as follows.

Control Board	Action
3301	Software upgrade available for control
3302	board ROM
3303	
3200	
3300	Customers writing new software should not use the facility.
	Customers with existing software that uses facility should contact the company.

Table 5.3 3031 - Four 4-20 mA D-A Converters
Pin Connections for 37-Way D Plug (Wiring View)

		19	0 V
unused	37		
		18	loop power
unused	36		
		17	+15 V supply
unused	35		
		16	unused
unused	34		
		15	+ channel 0
unused	33		
		14	unused
unused	32		
		13	0 V – channel 0
unused	31		
		12	unused
unused	30		
		11	+ channel 1
unused	29		
		10	unused
unused	28		
		9	0 V – channel 1
unused	27		
		8	unused
unused	26		
		7	+ channel 2
unused	25		
		6	unused
unused	24		
		5	0 V – channel 2
unused	23		
		4	unused
unused	22		
		3	+ channel 3
unused	21		
		2	unused
unused	20		
		1	0 V – channel 3

Please read the Connection Notes before making your connections.

5.3   3032/3—Single 12- and 16-Bit D-A Converters

The 3032 provides one D-A converter with 12-bit resolution. The output voltage ranges are set through software.

The 3033 is like the 3032 but has 16-bit resolution.

5.3.1 Connection Notes

Connector

Both modules use 50 Ω BNC sockets.

Output

The outputs are capable of supplying 10 mA of output current. They are short circuit protected. You should be aware of the resistance of connecting cables. For example if you take 1mA of current from the 3033 then, on the 0–10 V range, a one-bit error will be caused by only 150 mΩ in the cable.

Power Up

Both units power up on the ±10 V range with the output set to 0 V.

5.4   303x Specifications

5.4.1 3030 Specifications

Number of outputs	4
Output type	voltage
Resolution	12-bit
Power-up state	0 V or full scale –ve
Voltage ranges	set in hardware, max 10 V
Current available	20 mA
Maximum linearity error	±0.025%
Output impedance	0.05 Ω

5.4.2 3031 Specifications

Number of outputs	4
Output type	current
Resolution	12-bit
Power-up state	4 mA
Current available	4–20 mA
Maximum linearity error	±0.025%
Output drive	750 Ω

5.4.3 3032 and 3033 Specifications

Number of outputs		1
Output type		voltage
Resolution	3032	12-bit
	3033	16-bit
Power-up state		0 V
Voltage ranges		set in software, max ±10 V
Current available		10 mA
Maximum linearity error		
	3302	±0.013%
	3303	±0.003%
Output impedance		0.05 Ω