

# INTECH Micro 2100-AO Installation Guide.

8 Analogue Inputs, 12 Digital Inputs.  
8 Analogue Outputs, 2 Relay Outputs.

## Features.

- Cost Effective PLC Analogue Output Expansion.
  - 8 AO Require Only 7 PLC Digital Outputs.
  - Each Additional 2100-AO Used Requires Only 1 Extra PLC Digital Output.
  - 4, 8, or 12 bit AO Resolution Selectable.
  - BCD or Clock/Reset AO Channel Selectable.
- 8 Analogue Outputs: mA or V Selectable.
- 8 Analogue Inputs: mA or V Selectable.
- 8 PID on Board Controllers - Future Development.
- 12 Bit Resolution.
- 12 Digitally Isolated, Optocoupler Inputs.
  - 4 Digital Inputs
    - State or Count.
    - Speeds up to 50Hz.
- 2 Digital, Mains Isolated, Relay Outputs.
- 1 AI can be Demultiplexed to 8 AO.
- 8 AI can be Multiplexed to 1 AO.
- RS422/RS485 Up to 1200m.
- RS232 Cost Effective Radio Installation.
- RS232 Cost Effective PC or PLC AI or AO Expansion.
- Selectable Baud Rates.
- Interface for 2100-R (16 Relays) or 2100-ME (Memory).
- Easy Programming Via Microscan Maps.
- Programmable Station Number.
- Programmable Relay States - NO or NC.
- Comms Failure Time-out Using Relay 2.
- Comms TXE and TX Delay Programming.
- Programming Information Retained on Power Down.
- Universal AC/DC Power Supply.
- Easy to Install.
- Compact DIN Rail Mount Enclosure



Other 2100 models include:  
 2100-A16 :16AI, 3DI, 2 Relay Out;  
 2100-A4 :4AI, 4DI, 4 Relay Out, 2 AO;  
 2100-A4e :4AI, 4DI, 8 Relay Out, 2 AO;  
 2100-D :12DI, 12 Relay Out;  
 2100-IS :Isolated RS232 to RS422/485;  
 2100-ME :Memory Expansion for 2100-A;  
 2100-M :16AI Multiplexer;  
 2100-NS :Non-Isolated RS232 to RS422;  
 2100-R :16 Relay Expansion for 2100-A.

## Ordering Information.

**2100-AO-X** Standard Unit: All Analogue Inputs and Outputs 4~20mA,  
RS422 Comms, 80~265Vac/dc Power Supply.

**2100-AO** -  -  -  -  -   
                   O    AO    AI    C    PS

Ranging Options for 2100-AO													
Supplied with Option	O	Analogue Output AO			Analogue Input AI			COMMS	C	Power Supply	PS		
2100-ME Memory Board	ME	mA		V	mA		V	RS232*	232	80~265Vac/dc	H		
2100-R 16 Relay Expander	R	0~20mA	A	0~10V	C	0~20mA	A	0~10V	C	RS422	422	23~90Vdc	M
No Options	N	4~20mA	B	2~10V	D	4~20mA	B	2~10V	D	RS485	485	10~28Vac/dc	L

\*Note 1. The RS232 Comms. version comes complete with a RS232 kit, required for connecting the 2100-AO to a PC, etc. The kit contains: 1 x 5m RS232 cable; (2,10 & 15m can be ordered) 1 x 9pin D type; 1 x 25pin D type.  
 Note 2: The 2100-AO is factory set to RS232 or RS422/485. The 2100-AO-X is field selectable for RS422 or RS485, and H or M power supply.

## Ordering Examples.

- 1/ 2100-AO-N-A-B-232-L      2100-AO; 0~20mA Out; 4~20mA In; RS232 Comms; 10~28Vac/dc Power Supply.  
 2/ 2100-AO-N-D-C-485-H      2100-AO; 2~10V Out; 0~10V In; RS485 Comms; 80~265Vac/dc Power Supply.

## Quality Assurance Programme.

The modern technology and strict procedures of the ISO9001 Quality Assurance Programme applied during design, development, production and final inspection grant long term reliability of the instrument. This instrument has been designed and built to comply with EMC and Safety Standards requirements.

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## 2100-AO Analogue Output Specifications.

The eight analogue outputs can be individually software and hardware selected & scaled within the span limits listed below.

Output Resolution	8 Outputs, 12bits, 4000 Steps Typical. (Some ranges may differ.)
Output Type	All Inputs are single ended. (ie all '-' commoned.)

### V Outputs:

-Ranges	0~10V, 2~10V.
-Output Drive	4mA Maximum. (2.5kΩ @ 10V)

### mA Outputs:

-Ranges	0~20mA, 4~20mA.
-Output Drive	12V Maximum. (600Ω @ 20mA)

### Digital Outputs:

-Functions 2 Individually Isolated Changeover Relays with LED Indication of Each Output. The on Board Controllers (16 additional relays with 2100-R), Can be used as Set Point (SV), Switching Differential, Auto/Manual, Manual Output Setting, Dual Action Control, Single Action Control, Heat / Cool, Heat Only, Cool Only.

-Contact Material	Silver Alloy	
-Relay Ratings	Rating	Approved to Standard
	250Vac, 2A	UL:E43028
	125Vac, 2A	CSA:LR26550
	110Vdc, 0.3A;	
	30Vdc, 2A;	
	250Vac, 1/6hp;	
	125Vac, 1/10hp.	

-Number of Operations 2 x 10<sup>5</sup> Min, at 1A, 250Vac

## 2100-AO Analogue Input Specifications.

The eight analogue inputs can be individually software and hardware selected & scaled within the span limits listed below.

Input Resolution	12 Bits, 4,000 Steps Typical. (Some ranges may differ.)
Input Type	All Inputs are single ended. (ie all '-' commoned.)

### V Inputs

- Input Impedance	>200kΩ.
- Maximum Over-range	30Vdc Continuous.
- V Ranges	0~10V, 2~10V.

### mA Inputs

- Input Resistance	120Ω.
- Maximum Over-range	30mAdc Continuous.
- mA Ranges	0~20mA, 4~20mA.

### Digital Inputs:

-Functions	12 Opto Isolated Inputs with LED Indication of Each Input. ON / OFF. DI 9, DI 10, DI 11 & DI 12 Only: Count, and Flow Metering. 50Hz Maximum. Count to 16383 & Rolls Over. Over Flow Detection.	
-Input Voltage	5~30Vdc.	
-Threshold	4.6V Typical.	
-Load	@ 5V	1.1mA per Channel.
	@ 12Vdc	4.2mA per Channel.
	@ 24Vdc	9.6mA per Channel.


## 2100-AO Specifications.

<b>Comms:</b>		RS422/RS485 or RS232
	-Baud Rate	Selectable 2400, 4800, 9600. (Default = 9600).
	-Format	8 bit, No Parity, 1 Stop.
<b>Power:</b>		
	-H	80~265Vac/dc; 50/60Hz; 10VA.
	-M	23~90Vdc; 10VA.
	-L	10~28Vac/Vdc; 50/60Hz; 10VA.
		Refer to '2100-AO H1 Power Supply Settings' for voltage selection instructions.


<b>Isolation Voltages:</b>		
	-Digital Input to Analogue Input/Output:	1000Vdc/ac peak for 1 min.
	-Comms to Analogue Input/Output:	1000Vdc/ac peak for 1 min.
	-Comms to Digital Input:	1000Vdc/ac peak for 1 min.
	-Digital Output to Rest of Circuit:	Mains Isolation

<b>General Specifications:</b>	
EMC Emissions Compliance	EN 55022-A
EMC Immunity Compliance	EN 50082-1
Safety Compliance	EN 60950
Transmitter Power Supply	20Vdc±5%. Maximum. Load 100mA, Ripple <20mV RMS Typical.
Accurate to	<±0.1% FSO Typical. (Unless otherwise stated in input specifications.)
Linearity & Repeatability	<±0.1% FSO Typical.
Channel Separation	<±0.1% FSO Typical.
Ambient Drift	<±0.01%/C FSO Typical.
RF Immunity	<±1% Effect FSO Typical.
Permanent Memory (E <sup>2</sup> ROM)	10,000 Writes per Input Parameter. 10 Year Data Retention.
Operating Temperature	0~60C.
Storage Temperature	-20~80C.
Operating Humidity	5~85%RH Max. Non-Condensing.
Housing	DIN & EN Rail Mount. L=184, W=127, H=100mm.
Weight	900g, Including Packaging and RS232 Kit.

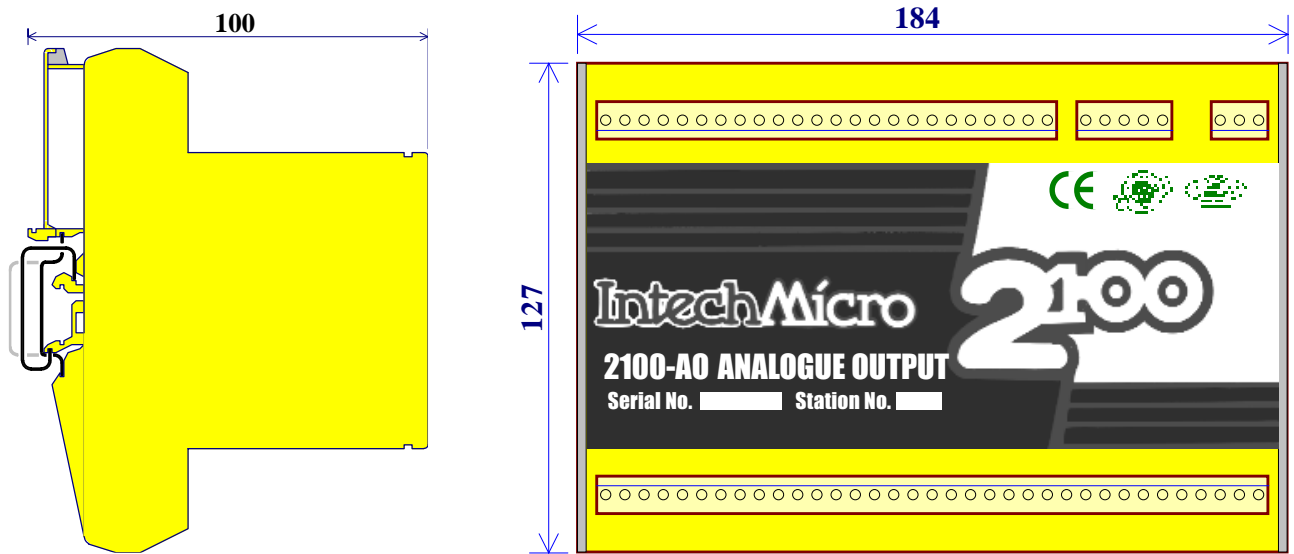
- Note 1. Contact INTECH INSTRUMENTS for more detailed programming information.  
 Note 2. Specifications based on Standard Calibration Units, unless otherwise specified.  
 Note 3. Due to ongoing research and development, designs, specifications, and documentation are subject to change without notification.  
 No liability will be accepted for errors, omissions or amendments to this specification.



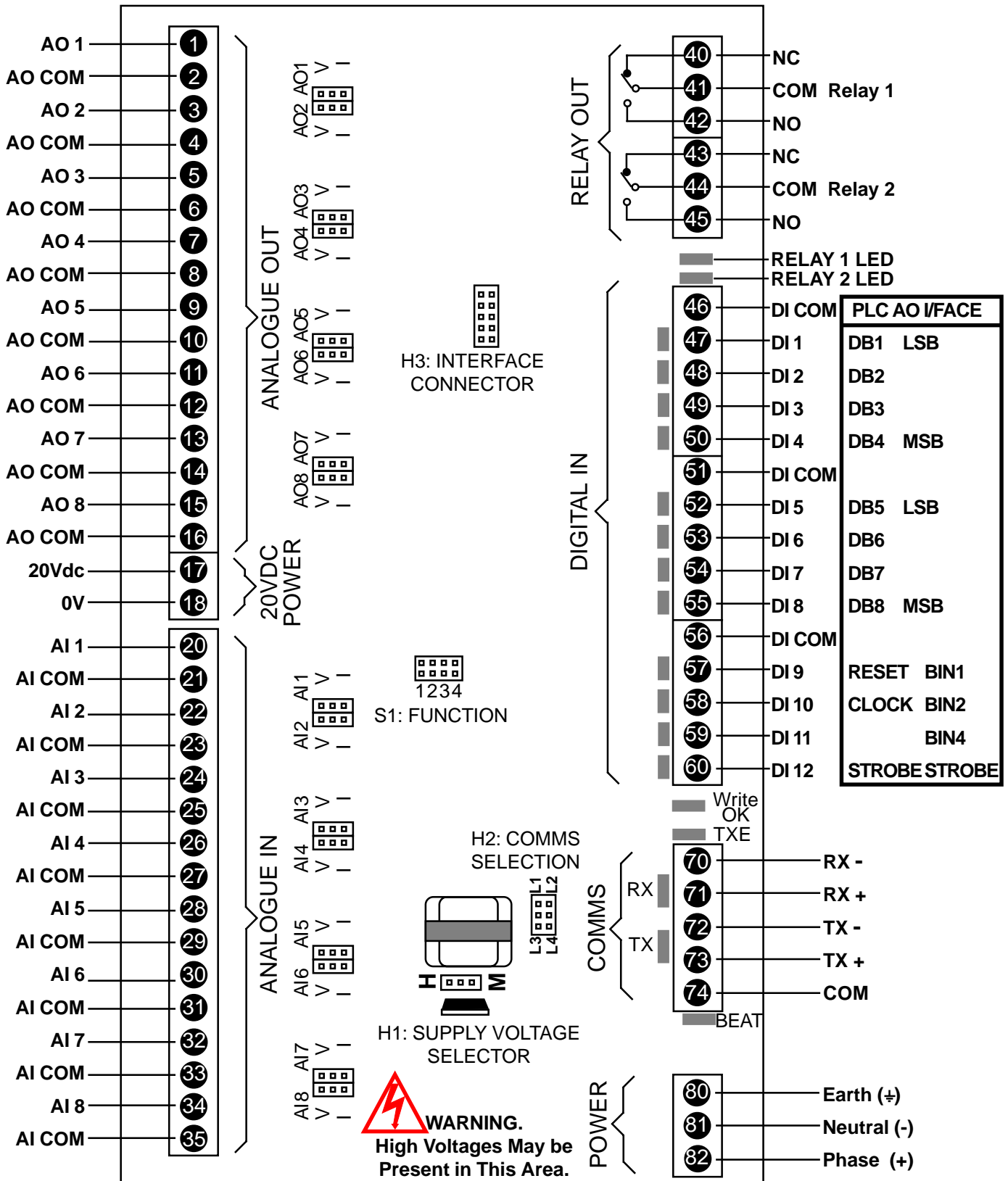
**CAUTION: Dangerous voltages may be present. The 2100-AO has no user serviceable parts. Protective enclosure only to be opened by qualified personnel. Remove ALL power sources before removing protective cover.**



## 2100-AO Dimensions.





2100-AO Terminals and Layout.



Only adjust jumpers with power OFF.

## 2100-AO Jumpers and LED Functions Tables.

	<b>CAUTION:</b> Dangerous voltages may be present. The 2100-AO has no user serviceable parts. Protective enclosure only to be opened by qualified personnel. Remove ALL power sources before removing protective cover.	
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\* For ALL programming tables. Jumper Status: 0=JUMPER NOT INSERTED 1=JUMPER INSERTED.

\* Refer to '2100-AO Terminals and Layout' for the location of the following jumpers.

### 2100-AO S1 Function Settings.

Function Jumper Settings				
Function	S1-1	S1-2	S1-3	S1-4
9600baud <small>note1</small>	0	0	0	0
4800baud	0	1	0	0
2400baud	1	1	0	0
Test Mode <small>note2</small>	0	0	1	0

Note 1. Factory Default.  
 Note 2. Factory use ONLY.

### 2100-AO H1 Power Supply Settings.

Power Supply Jumper Settings	
H1	Power Supply Voltage Range
H	Jumper for 80~265Vac/dc
M	Jumper for 23~90Vdc

Note 1. Power must be OFF before changing H1's position.  
 Note 2. Exceeding these parameters may damage the unit.  
 Note 3. Ensure the enclosure label is correctly labelled for the jumper position.  
 Note 4. Low Voltage Power Supply version is fixed, and has no jumper. This must be ordered separately.

### 2100-AO H2 Comms Settings.

COMMS Jumper Selection				
Protocol	L1	L2	L3	L4
RS232 STD	0	0	1	0
RS232 RADIO	1	0	0	0
RS422	1	1	0	0
RS485	0	0	1	1

Note 1. RS232 must be ordered separately to RS422/485.  
 Note 2. RS422 can be jumpered for RS485, and vice versa.

### 2100-AO LED Descriptions Settings.

LED Descriptions	
LED Name	LED Function
RX	Active when Station is receiving serial data.
TX	Active only when Station is transmitting serial data.
TXE	Active only when Station is ready to transmit data.
BEAT	Heart beat. Continual flashing indicates Station healthy
WRITE OK	Active when a write command has been actioned.
Digital Output	Indicates when their respective output relay is energized.
Digital Input	Indicates when their respective input is energized, or counting.

### 2100-AO Analogue Output Programming.

AO1, AO2, AO3, AO4, AO5, AO6, AO7 & AO8 Analogue Output Programming		
Input Type	I	V
Volts (0~10V & 2~10V)	0	1
millAmps (0~20mA & 4~20mA)	1	0

Note 1. Each output can be programmed to a different range.  
 Note 2. Output ranges also need to be selected in software.

### 2100-AO Analogue Input Programming.

AI1, AI2, AI3, AI4, AI5, AI6, AI7 & AI8 Analogue Input Programming		
Input Type	I	V
Volts (0~10V & 2~10V)	0	1
millAmps (0~20mA & 4~20mA)	1	0

Note 1. Each input can be programmed to a different range.  
 Note 2. Input ranges also need to be selected in software.

## 2100-AO Analogue Outputs Driven by PLC Digital Outputs.

2100-AO Control Signals		
Digital Input	Data Entry and Channel Selection	
	Clock/Reset	BCD
DI 1	Data Bit 1, LSB	Data Bit 1, LSB
DI 2	Data Bit 2	Data Bit 2
DI 3	Data Bit 3	Data Bit 3
DI 4	Data Bit 4, MSB	Data Bit 4, MSB
DI 5	Data Bit 5, LSB	Data Bit 5, LSB
DI 6	Data Bit 6	Data Bit 6
DI 7	Data Bit 7	Data Bit 7
DI 8	Data Bit 8, MSB	Data Bit 8, MSB
DI 9	Reset	BCD 1
DI 10	Clock	BCD 2
DI 11		BCD 4
DI 12	Strobe	Strobe

### Writing Data.

The Strobe signal is used to write data to the analogue outputs. When a write is actioned the 'WRITE OK' LED will light up on the 2100-AO. The data must be presented on the data lines before the strobe pulse is issued, and the PLC must allow enough time for the outputs to stabilise before issuing a strobe pulse. The strobe pulse must be long enough to satisfy the Control Signal Debounce period set below.

### Data Entry Modes.

The PLC Data entry has two configuration options: The PLC Channel Selection; and Input Data Size. The PLC Channel Selection determines the channel selection method, and the Input Data Size determines how the data is written to the Analogue Outputs and the resolution. The data presented on DI 1 to DI 8 must be binary. A resolution of 4bits = 16steps, 8bits = 256steps and 12bits = 4096steps.

### PLC Channel Selection.

#### Mode A: Clock / Reset Channel Selection.

DI 9 = Reset Pulse. To reset to channel 1 issue a Reset Pulse.

DI 10 = Clock Pulse. To advance to the next channel, issue a Clock Pulse.

Channels may be skipped by issuing several Clock/Reset pulses in sequence.

The test dialog box can be used to see what channel is currently selected.

#### Mode B: BCD Channel Selection.

The address on DI 9, DI 10 and DI 11 are used as a BCD address to select the channel.

The BCD address must be set up by the PLC before the Strobe Pulse is issued.

2100-AO BCD Signals			
Analogue Output Channel	DI 9 BCD1	DI 10 BCD2	DI 11 BCD4
1	0	0	0
2	1	0	0
3	0	1	0
4	1	1	0
5	0	0	1
6	1	0	1
7	0	1	1
8	1	1	1

The test dialog box can be used to see what channel is currently selected.

### Input Data Size.

This selects the resolution of the incoming data and data entry method.

This setting applies to all outputs on the 2100-AO. It is not individually selectable.

#### Mode 1. 4 Bit DI 1 ~ DI 4, One Strobe.

The data is set up on inputs DI 1 to DI 4, and a strobe pulse is issued.

The data is loaded to the analogue output, and the 'WRITE OK' LED flashes.

A new channel can be selected, or the write sequence repeated.

## **2100-AO Analogue Outputs Driven by PLC Digital Outputs Continued.**

### **Mode 2. 8 Bit DI 1 ~ DI 4, Two Strobes.**

The High 4 bits of data is set up on inputs DI 1 to DI 4, and the first strobe pulse is issued.

The Low 4 bits of data is set up on inputs DI 1 to DI 4, and the second strobe pulse is issued.

The data is loaded to the analogue output, and the 'WRITE OK' LED flashes.

A new channel can be selected, or the write sequence repeated.

If a reset or clock pulse is issued before the second strobe is issued, the write will be cancelled.

### **Mode 3. 12 Bit DI 1 ~ DI 4, Three Strobes.**

The High 4 bits of data is set up on inputs DI 1 to DI 4, and the first strobe pulse is issued.

The Middle 4 bits of data is set up on inputs DI 1 to DI 4, and the second strobe pulse is issued.

The Low 4 bits of data is set up on inputs DI 1 to DI 4, and the third strobe pulse is issued.

The data is loaded to the analogue output, and the 'WRITE OK' LED flashes.

A new channel can be selected, or the write sequence repeated.

If a reset or clock pulse is issued before the second strobe is issued, the write will be cancelled.

### **Mode 4. 8 Bit DI 1 ~ DI 8, One Strobe.**

The 8 bits of data is set up on inputs DI 1 to DI 8, (low bits DI 1~DI 4, high bits DI 5~DI 8) and the strobe pulse is issued.

The data is loaded to the analogue output, and the 'WRITE OK' LED flashes.

A new channel can be selected, or the write sequence repeated.

### **Control Sequence Debounce.**

The debounce allows for noisy signals to be rejected from the 2100-AO control lines.

Selections are: NONE; 2.5msec; 5msec; 10msec; 25msec; 50msec; 100msec; & 200msec.

The signal is actioned on the first transition from low to high. (LED off to LED on) Any further transitions during the selected time period will be rejected. If the 2100-AO is communicating via COMMS to the MicroScan or the station is being programmed, approximately 50msec extra must be allowed for the serial messaging to be processed.

The Clock, Reset and Strobe signals all fall under this timing requirement.

## **Example Channel Selection Sequences.**

Note: Small delay refers to delay as set by Control Signal Debounce.

### **1. 4 bit output, Clock/Reset channel selection.**

\* PLC Input Selection = Mode A: Clock/Reset channel selection.

\* Data input size = Mode 1: 4 bit DI 1~DI 4, One strobe.

1. Power up or start up. Issue a Reset pulse.
2. Load the data for the channel to bits DI 1~DI 4.
3. Small delay.
4. Turn Strobe on.
5. Small delay.
6. Turn Strobe off. Data written to output and the 'WRITE OK' LED flashes.
7. Issue Clock to advance to the next channel or issue a Reset to go back to channel 1.

### **2. 8 bit output, Clock/Reset selection.**

\* PLC Input Selection = Mode A: Clock/Reset channel selection.

\* Data input size = Mode 2: 8 bit DI 1~DI 4, Two strobes.

1. Power up or start up. Issue a Reset pulse.
2. Load the high data bits for the channel to bits DI 1~DI 4.
3. Small delay.
4. Turn Strobe on.
5. Small delay.
6. Turn Strobe off.
7. Load the low data bits for the channel to bits DI 1~DI 4.
8. Small delay.
9. Turn Strobe on.
10. Small delay.
11. Turn Strobe off. Data written to output and the 'WRITE OK' LED flashes.
12. Issue Clock to advance to the next channel or issue a Reset to go back to channel 1.

### **3. 4 bit output, BCD selection**

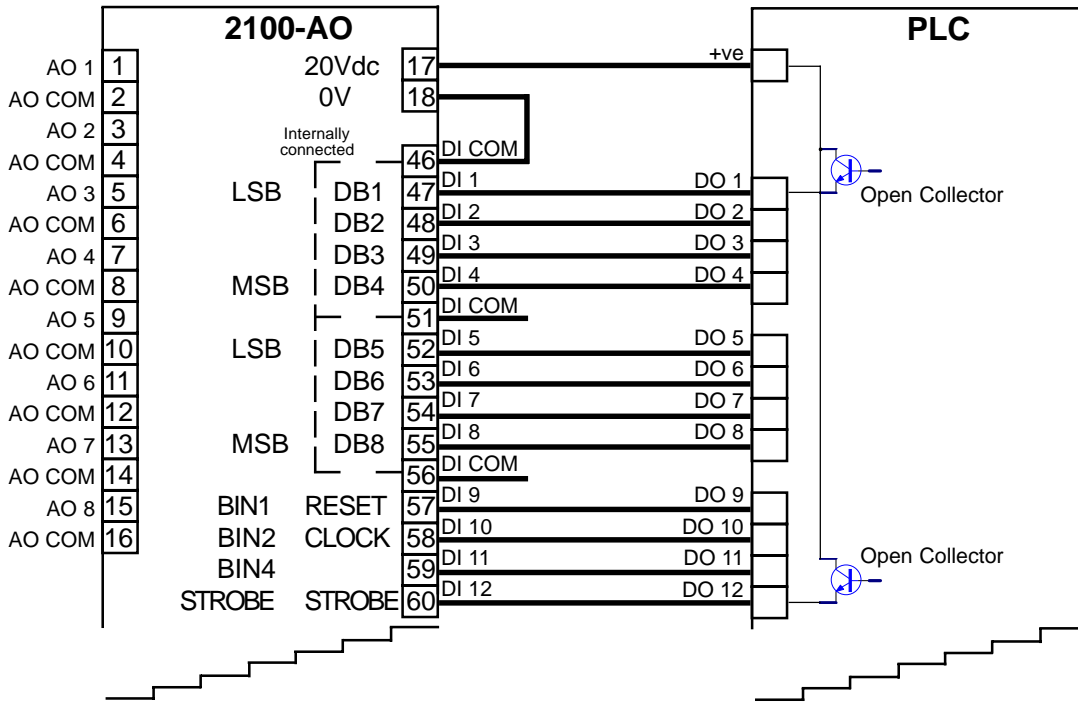
\* PLC Input Selection = Mode B: BCD channel selection.

\* Data input size = Mode 1: 4 bit DI 1~DI 4, One strobe.

1. Set the BCD address for the channel on DI 9~DI 11.
2. Load the data for the channel to bits DI 1~DI 4.
3. Small delay.
4. Turn Strobe on.
5. Small delay.
6. Turn Strobe off. Data written to output and the 'WRITE OK' LED flashes.
7. Set the BCD address for the another channel.

### 2100-AO and PLC Connection Example 1.

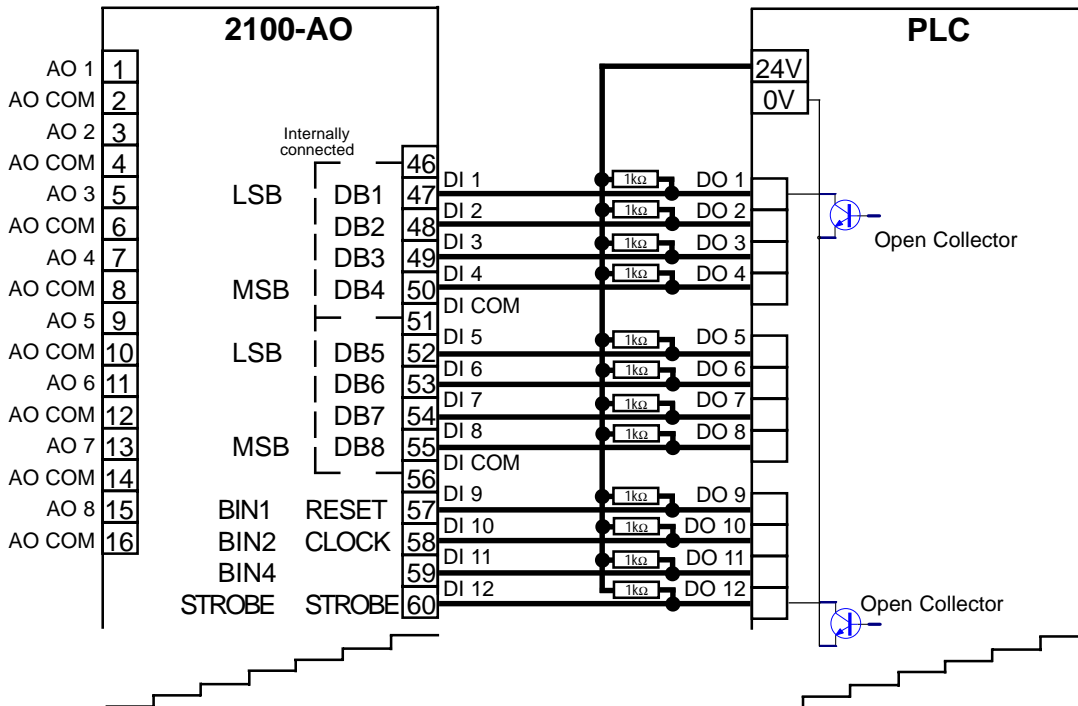
2100-AO analogue outputs driven by PLC digital outputs with commoned +ve open collectors.



- Note 1. For Mode A, & Modes 1 or 2 or 3, PLC requires 7 digital outputs: DO 1~DO 4 & DO 9, DO 10 & DO 12.
- Note 2. For Mode B, & Modes 1 or 2 or 3, PLC requires 8 digital outputs: DO 1~DO 4 & DO 9~DO 12.
- Note 3. For Mode A, & Mode 4, PLC requires 11 digital outputs: DO 1~DO 4, DO 5~DO 8 & DO 9, DO 10 & DO 12
- Note 4. For Mode B, & Mode 4, PLC requires 12 digital outputs: DO 1~DO 4, DO 5~DO 8 & DO 9~DO 12.
- Note 5. Using the 2100-AO 20Vdc P/S negates the digital input to analogue input/output isolation.

### 2100-AO and PLC Connection Example 2.

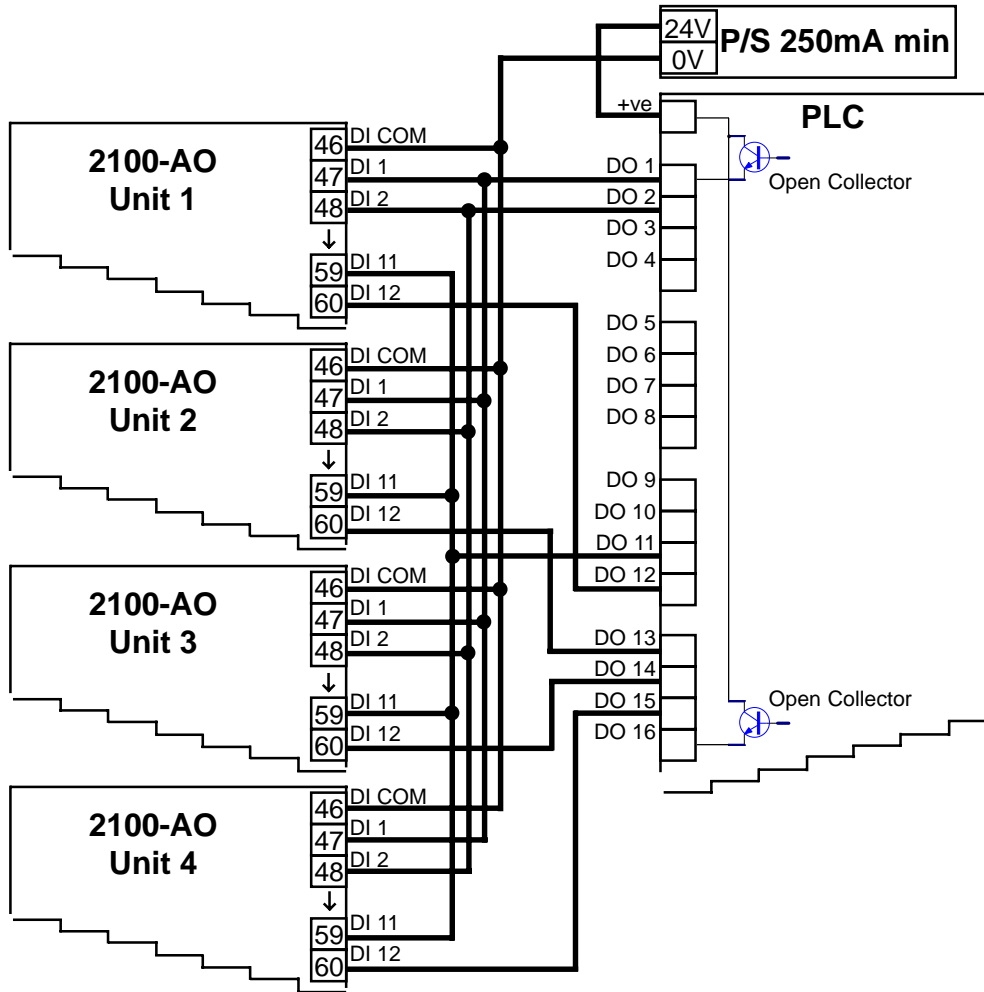
2100-AO analogue outputs driven by PLC digital outputs with commoned 0V open collectors. Important: Reverse logic for Digital Outputs.



- Note 1. For Mode A, & Modes 1 or 2 or 3, PLC requires 7 digital outputs: DO 1~DO 4 & DO 9, DO 10 & DO 12.
- Note 2. For Mode B, & Modes 1 or 2 or 3, PLC requires 8 digital outputs: DO 1~DO 4 & DO 9~DO 12.
- Note 3. For Mode A, & Mode 4, PLC requires 11 digital outputs: DO 1~DO 4, DO 5~DO 8 & DO 9, DO 10 & DO 12
- Note 4. For Mode B, & Mode 4, PLC requires 12 digital outputs: DO 1~DO 4, DO 5~DO 8 & DO 9~DO 12.
- Note 5. Using the 2100-AO 20Vdc P/S negates the digital input to analogue input/output isolation.
- Note 6. Using 1k resistors the PLC can drive upto 4 2100-AO in parallel. To drive more, reduce the value of the resistors. At 24Vdc each resistor uses 24mA. Thus in the case of Note 1, 7 digital outputs will use 168mA. Ensure that the P/S can handle the load of any connection configuration chosen.

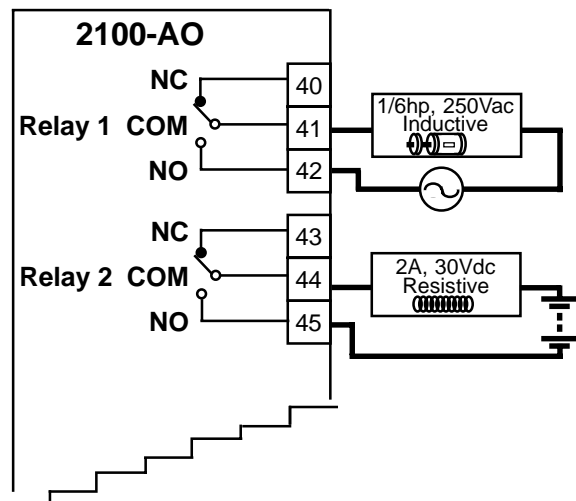
### 2100-AO and PLC Connection Example 3.

Parallel Connection of multiple 2100-AO control signals driven by PLC digital outputs with commoned +ve open collectors.



- Note 1. For each extra 2100-AO the PLC requires one extra digital output to drive the strobe input. As long as the strobe input is held low the 2100-AO ignores data on any other digital inputs. So in this connection example if Mode A and Modes 1 or 2 or 3 were used then the PLC would require 10 digital outputs. (6 paralleled digital inputs, and 1 strobe per 2100-AO.)
- Note 2. This connection example requires a 24Vdc, 250mA P/S minimum.  
 At 24Vdc each digital input draws 9.6mA. 4 units, with 6 parallel lines, plus 4 strobes = 28 digital inputs.  
 $28 \times 9.6\text{mA} = 250\text{mA}$  approx.  
**Do not use the 2100-AO 20Vdc 100mA maximum P/S.**

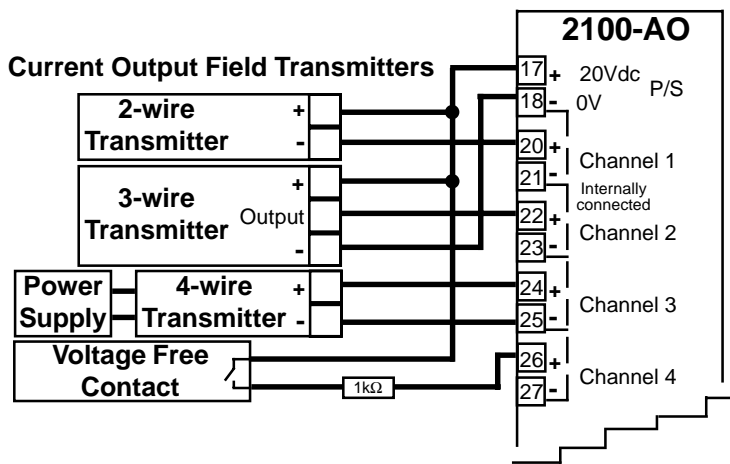
### 2100-AO Relay Output Connection Example for Single Action Controllers.



- Note 1. With relays NOT energized, and 'Normally Off' state selected (refer Note 3)  
 NO = Normally Open.  
 COM = Common.  
 NC = Normally Closed.  
 Heating Relay: NO, closes when heating required.  
 Cooling Relay: NO, closes when cooling required.
- Note 2. Both relays are change-over.
- Note 3. The relays can be configured for a 'Normally ON' or 'Normally OFF' output state. (E.g. for fail safe operation.) The 'Normally ON/OFF' settings are retained in software on power down, but the relays are de-energized. The 'Normally ON/OFF' state of the relay can be changed in the Advanced dialog box for the onboard relays, or using the Relay States dialog box for the 2100-R. Refer to MicroScan Configuration Manual.
- Note 4. LED indication on each output when each relay is energized.
- Note 5. Single Action Setting is a global setting for the station.

## 2100-AO Input Connection Diagram for mA Inputs.

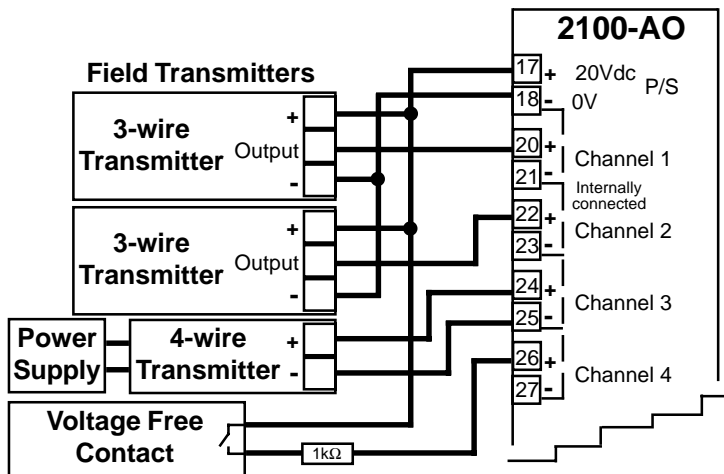
Connection configuration for 2 wire, 3 wire and 4 wire transmitters, and digital inputs.



- Note 1. Maximum load on 20V P/S = 100mA.
- Note 2. All inputs need to be programmed. Refer to Analogue Input Programming.
- Note 3. Inputs can be used as digital inputs, for sensing voltage free field contacts.
- Note 4. All cables must be screened, and the screens earthed at one end only.
- Note 5. All 2100-AO inputs are single ended. (ie, all negative inputs are internally connected).
- Note 6. Voltage free contact values must be brought in through 'tags' in the Scada Software.

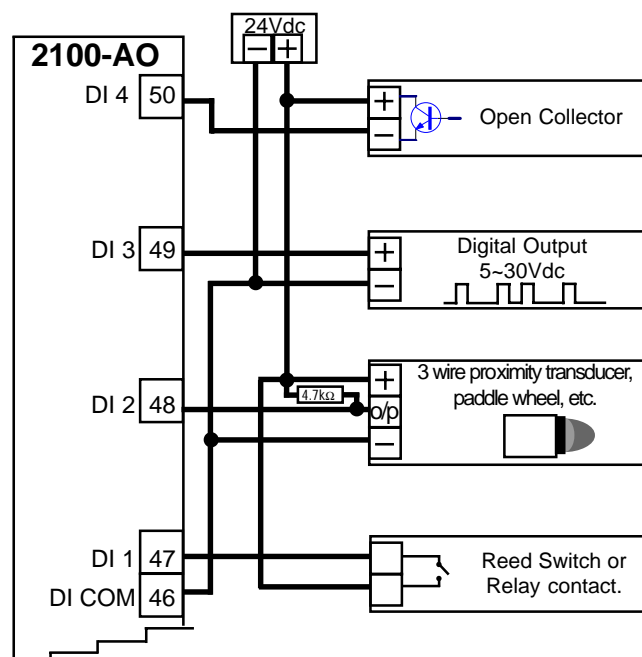
## 2100-AO Input Connection Diagram for Voltage Inputs.

Connection configuration for 3 wire and 4 wire transmitters, and digital inputs.



- Note 1. Maximum load on 20V P/S = 100mA.
- Note 2. All inputs need to be programmed. Refer to Analogue Input Programming.
- Note 3. Inputs can be used as digital inputs, for sensing voltage free field contacts.
- Note 4. All cables must be screened, and the screens earthed at one end only.
- Note 5. Input voltages must not exceed 30V.
- Note 6. All 2100-AO inputs are single ended. (ie, all negative inputs are internally connected).
- Note 7. Voltage free contact values must be brought in through 'tags' in the Scada Software.

## 2100-AO Connection Example Diagram for Digital Inputs.



- Note 1. Inputs can be:  
State - i.e. ON or OFF.  
Count - 0~50Hz (DI 9~DI 12 Only)
- Note 2. LED indication per input. LED intensity depends on voltage level at the input terminals. Refer to 'Specifications' for input loads.
- Note 3. For scaling of counter inputs, totalising and flow data conversion, refer to Microscan Configuration Manual, line setup/counter scaling.
- Note 4. All cables must be screened, with screen earthed at one end only. Refer 'The Proper Installation & Wiring of the 2100-AO.'
- Note 5. Do not fit the 4K7 resistor for 3 wire PNP transducers.

**2100-AO. Eight Analogue Inputs Multiplexed to One Analogue Output.**

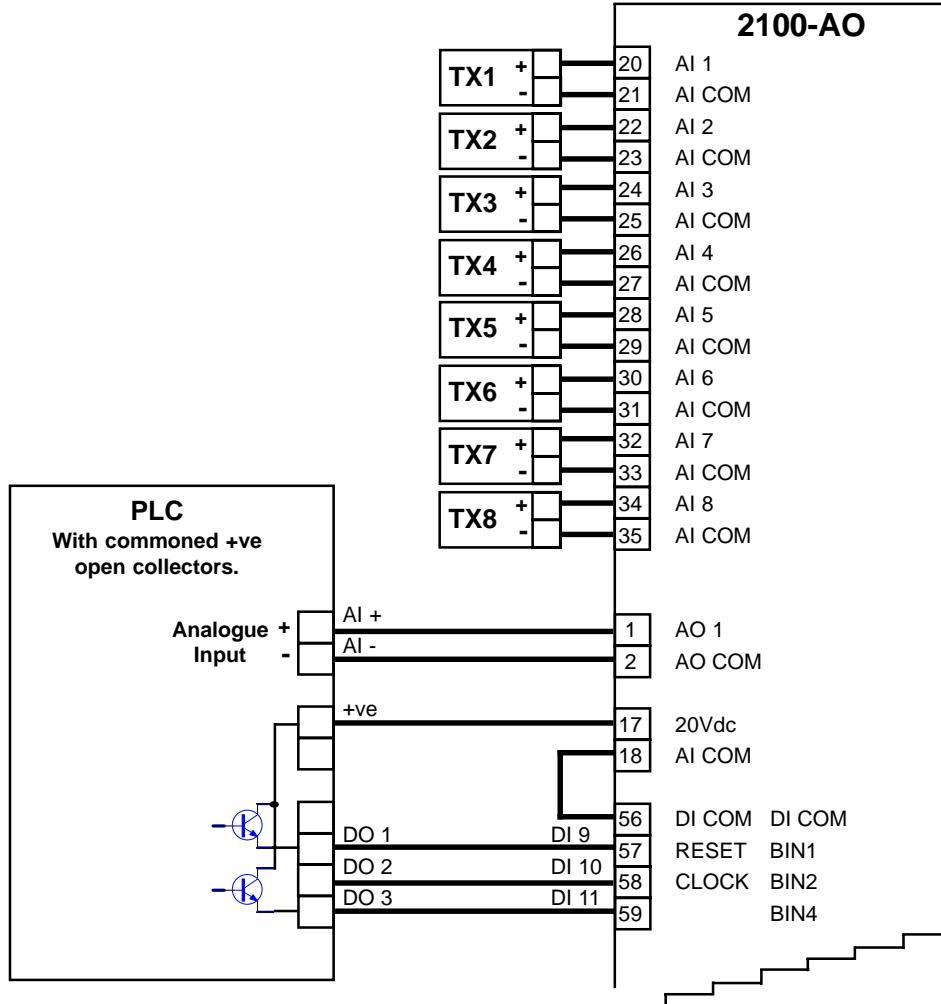
**Procedure:**

Select the analogue input channel. (Refer page 6, Mode A or Mode B channel selection.)

The analogue input is loaded to analogue output 1. (No strobe is required.)

A new analogue input channel can be selected.

**Connection Example of Eight Analogue Inputs Multiplexed to One Analogue Output.**



- Note 1. For Mode A, PLC requires 2 digital outputs.
- Note 2. For Mode B, PLC requires 3 digital outputs.
- Note 3. For PLC with commoned 0V open collectors refer Connection Example 2 on page 8.
- Note 4. Using 2100-AO 20Vdc P/S negates the digital input to analogue input/output isolation.

## 2100-AO. One Analogue Input Demultiplexed to Eight Analogue Outputs.

### Procedure:

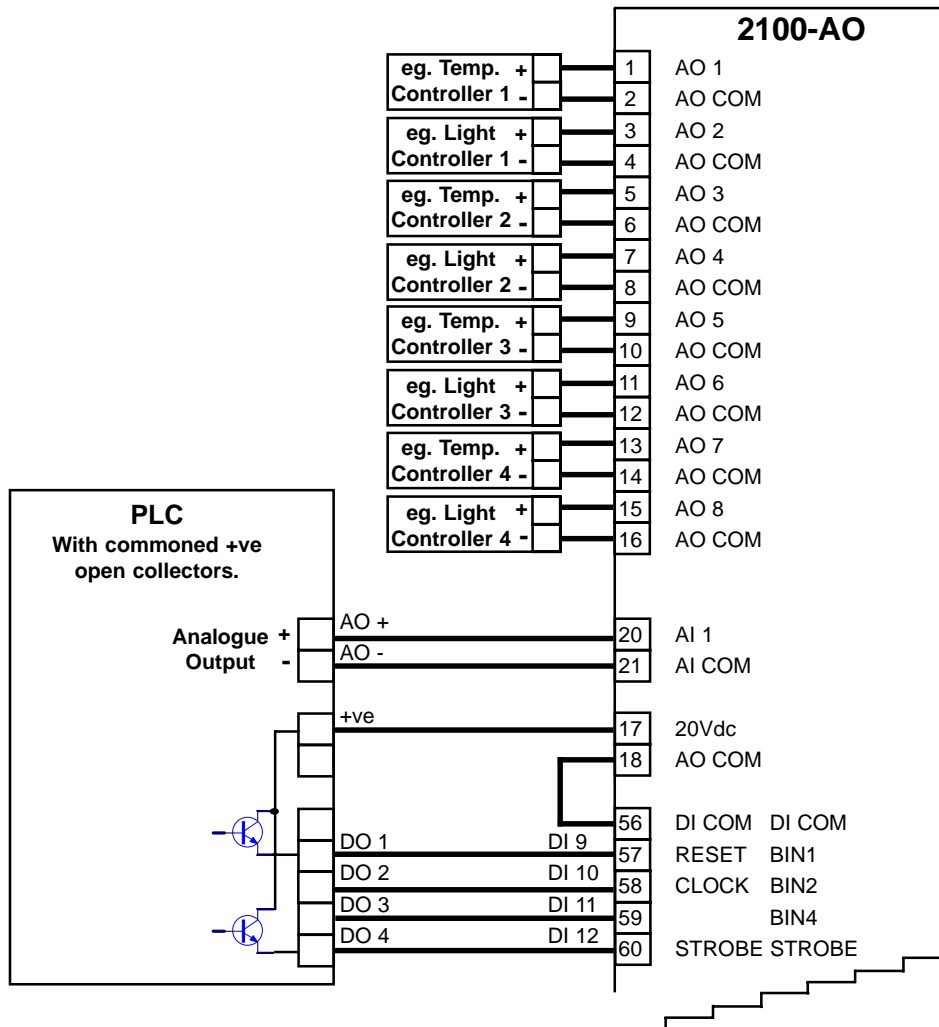
Select the analogue output channel. (Refer page 6, Mode A or Mode B Channel Selection.)

Set analogue input 1 to the appropriate value and issue a strobe pulse.

The analogue channel is loaded to the analogue output and the 'WRITE OK' LED flashes.

A new channel can be selected., or the write sequence can be repeated.

### Connection Example. One 2100-AO Analogue Input Demultiplexed to Eight Analogue Outputs.



Note 1. For Mode A, PLC requires 3 digital outputs.

Note 2. For Mode B, PLC requires 4 digital outputs.

Note 3. For PLC with commoned 0V open collectors refer Connection Example 2 on page 8.

Note 4. Using 2100-AO 20Vdc P/S negates the digital input to analogue input/output isolation.



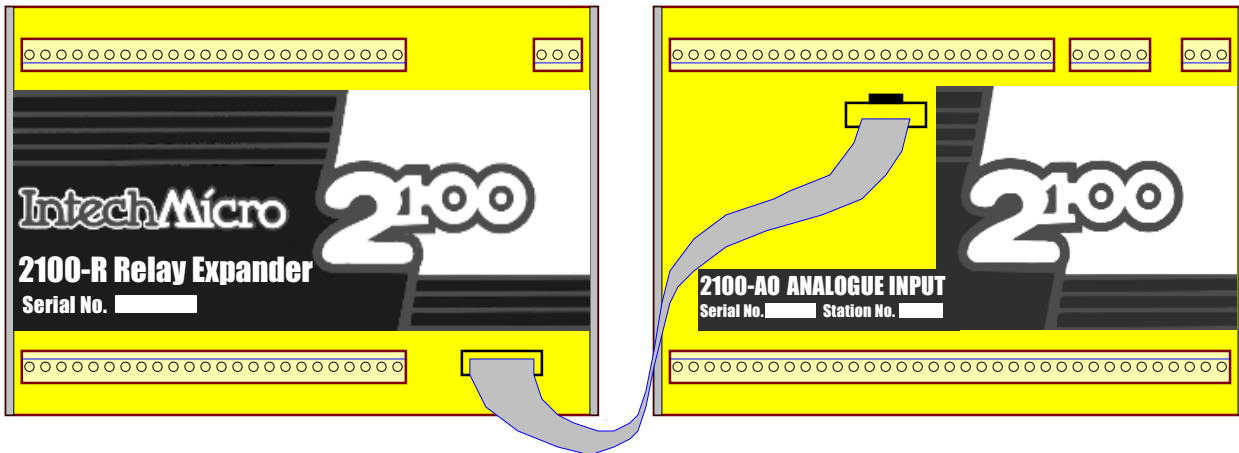
**CAUTION:** Dangerous voltages may be present. The 2100-AO has no user serviceable parts. Protective enclosure only to be opened by qualified personnel. Remove ALL power sources before removing protective cover.



## 2100-AO Relay Output Expansion - Using 2100-R Relay Expansion.

**Note: For relay output allocation and connection examples refer 2100-R Installation Guide.**

Output relay expansion is available using the 2100-R, 16 relay output expansion module. This allows the 2100-AO to stand alone as an 8 channel single action controller / alarm unit, or a 4 channel dual action controller. The 2100-R relay outputs can be used for any combination of control and alarm functions. The control parameters for each of the controllers is downloaded from user friendly Microscan Software, and stored in permanent memory on the 2100-AO. These parameters include Setpoint (SV), Output Switching Differential, Auto / Manual, Manual Output Setting, , Dual Action Control, Single Action Control, Heat / Cool, Heat Only, Cool Only. The controller / alarms will operate unaffected by computer power downs, reboots, etc. The relay outputs can also be accessed directly from the Scada.

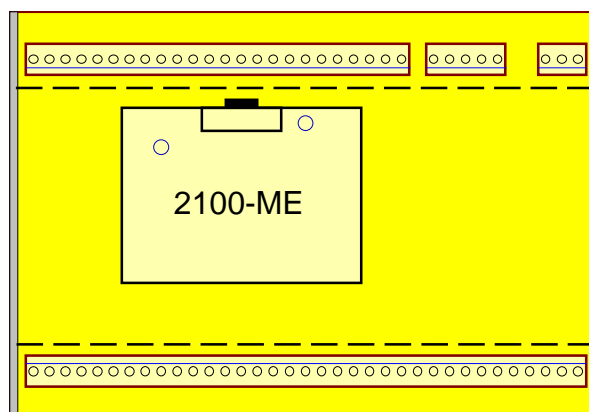


### Connecting the 2100-AO to the 2100-R.

- 1/ Power must be off before installing the 10 way ribbon cable supplied with the 2100-R.
- 2/ Remove the cover off the 2100-AO.
- 3/ Cut a 15mm wide notch just above terminal 1, in the green base side. Cut it so it is flush with the side wall of the green enclosure.  
Note. A pre-notched side may be exchanged at no charge from your supplier. Part No. UM108-NOTCH
- 4/ Connect the 10 way ribbon cable from the 2100-AO Interface Conn, H3, to the 2100-R Interface Conn, H2. Ensure both ribbon sockets are fully inserted, and the 2100-R connector clips are correctly attached.
- 5/ Replace the cover on the 2100-AO, ensuring the ribbon cable fits loosely through the notch above terminal 1 on the 2100-AO, or above Relay 7 LED on the 2100-AO.
- 6/ The 2100-R must be enabled in the programming dialog boxes. Advanced '2100-R Relay Expander' options. For detailed programming info, refer to 'Programming 2100-Series Remote Station' in the Microscan Manual.
- 7/ A 2100-R connected to the 2100-AO must share the same power supply disconnect device and over current device. Both units must be powered and unpowered at the same time to prevent indeterminate relay states.

## 2100-AO Memory Expansion - Using 2100-ME Memory Expansion Card.

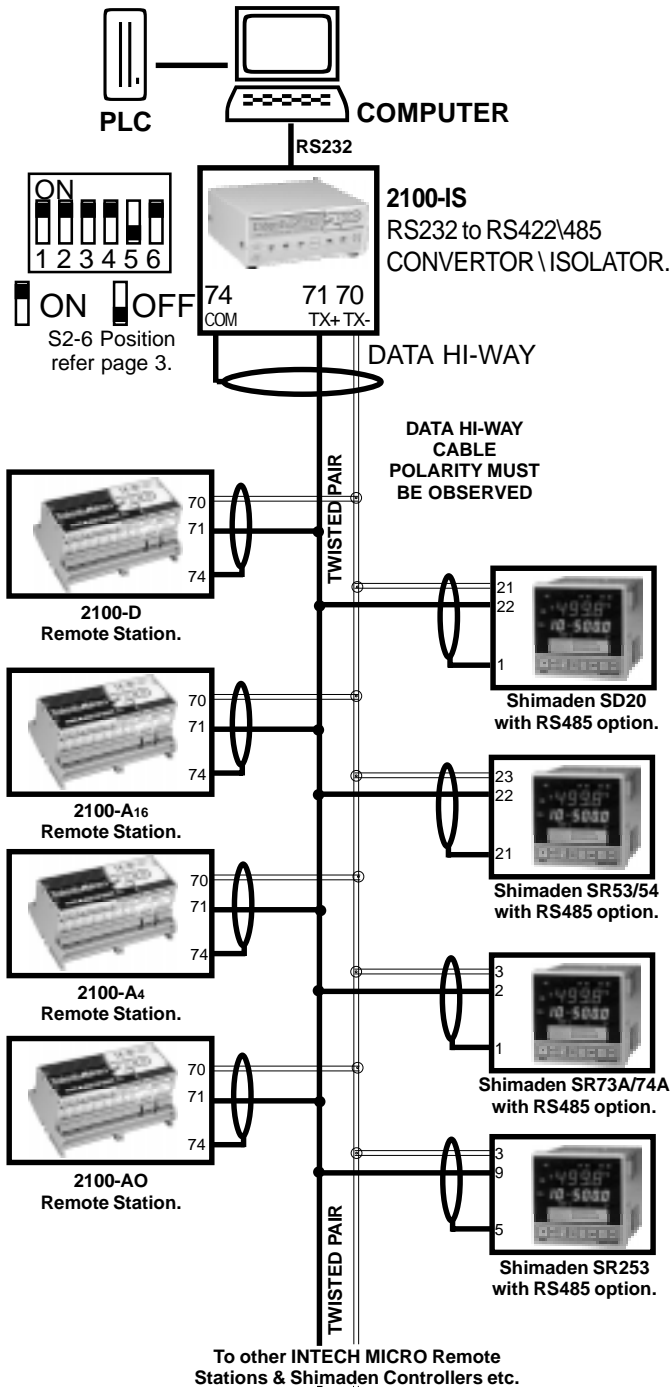
The 2100-ME Memory Expansion Card is designed to allow the 2100-AO to stand alone, retaining the data collected for intermittent download. Data is held in permanent memory.



### Connecting the 2100-AO to the 2100-ME.

- 1/ Power must be off before installing the 2100-ME.
- 2/ Remove the cover off the 2100-AO.
- 3/ Use antistatic precautions when installing the 2100-ME. Carefully orientate the 2100-ME board as shown above. Locate the two plastic stand-offs over the corresponding holes in the 2100-AO, and the 10 pin connector. Once all three are aligned, push the 2100-ME firmly into the 2100-AO.
- 4/ Replace the 2100-AO cover.
- 5/ When the 2100-AO is used with the 2100-ME, the 2100-M and 2100-R expansion options are unavailable.
- 6/ The 2100-ME is due for release 3rd Q 2000. It cannot be fitted to any 2100-AO manufactured prior to its release.

## OUTSTATION LAYOUT. 2-Wire RS485 Serial Connections.



### IMPORTANT:

- (i) All cables must be screened.
- (ii) All screens must be connected together.
- (iii) The screen must no be earthed at any point.

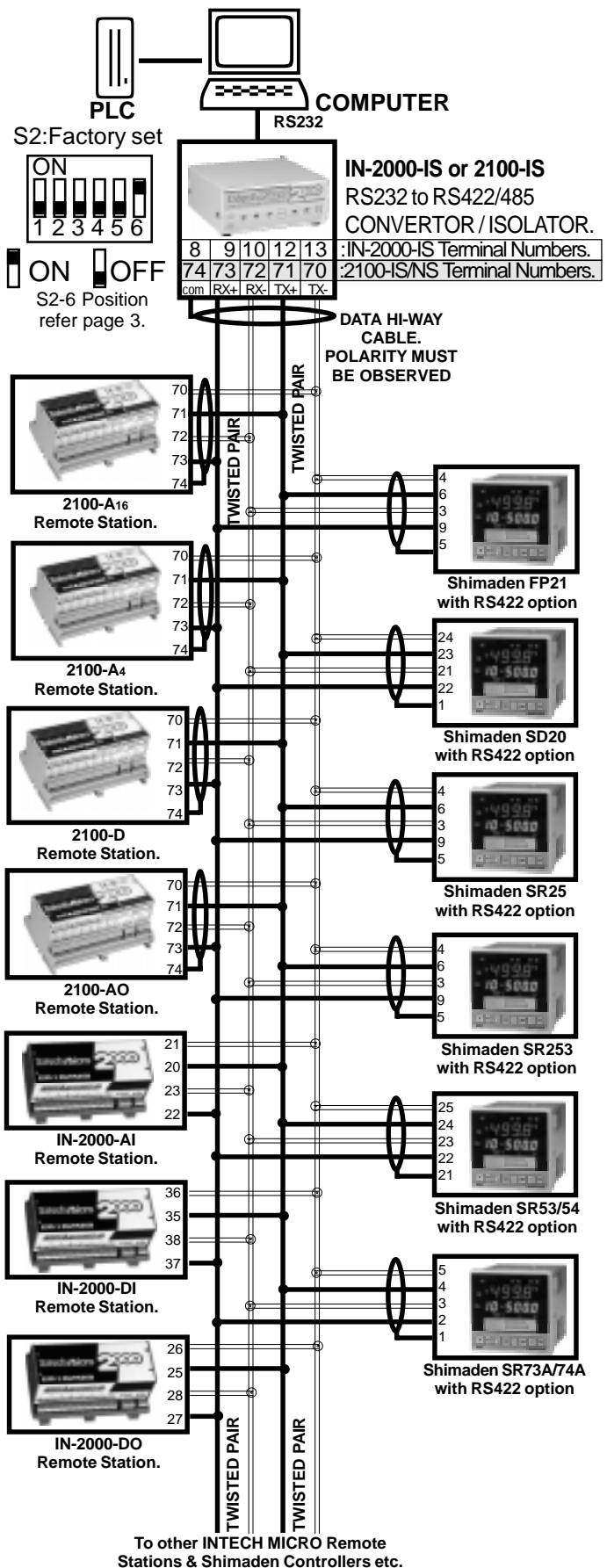
### Notes:

- (i) RS485 can only be used with software release Ver. 4.02 onwards.
- (ii) RS485 Data Hi-way is not compatible with RS422 Data Hi-way devices such as IN-2000-AI, IN-2000-AO, IN-2000-DI, IN-2000-DO, FP21, SR25, etc. The two Data Hi-ways must be run independent of each other, using two separate 2100-IS', that share the same RS232. Refer to parallel connection of RS232 into multiple 2100-IS', on page 7 of the 2100-IS Installation Manual.

**RS232:** 2100-IS convertor is not required to connect the 2100-AO-232 directly to a PC. Use the RS232 kit to connect the 2100-AO-232 directly to a PC. The PC requires one RS232 port per 2100-AO.

**RS485:** If the outstation is using RS485, it cannot be connected to the same data hi-way as an outstations using RS422. In the 'programming' box, set the 'TX delay' box to 20. Set the Dip switches on the 2100-IS and the jumpers on the 2100-AO for RS485 operation.

## OUTSTATION LAYOUT. 4-Wire RS422 Serial Connections.

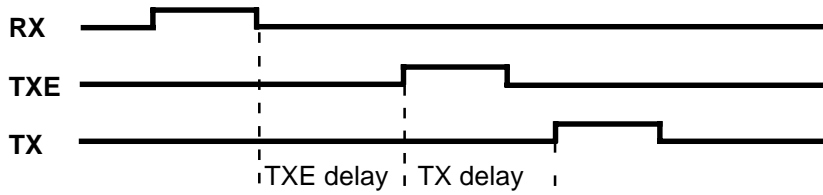


### IMPORTANT:

- (i) All cables must be screened.
- (ii) All screens must be connected together.
- (iii) The screen must no be earthed at any point.

**2100-AO TXE and TX Delay Settings.**

The TXE and TX delays are software selectable in the MicroScan Outstation Programming Box. These delays are used for RS485/RS232 operation, to control the behaviour of the transmitter on the outstation, when it is ready to send data. The TXE delay controls how long the transmitter waits before turning on. The TX delay controls how long the transmitter waits before sending data. If the TXE delay is zero, the transmitter turns on immediately. If the TX delay is zero, the data is sent immediately, upon receiving a command.



The period is specified in units of 2.5ms. i.e. 10units = 25ms

**2100-AO Delay Settings Table.**

COMMS Delays Units (time)		
Protocol	TXE Delay	TX Delay
RS232 - to suit radio	10 (25ms)	20~200 (50~500ms)
RS422	0	0
RS485	0	20 (50ms)

**2100-AO Wiring and Installation.**

**THE 2100-AO IS TO BE INSTALLED AND SERVICED BY SERVICE PERSONNEL ONLY. NO OPERATOR / USER SERVICEABLE PARTS.**

**2100-AO Mounting.**

\* Also refer to Connection Diagrams and Notes.

- (1) Mount in a clean environment in an electrical cabinet on DI N or EN mounting rail.
- (2) Do not subject to vibration or excess temperature or humidity variations.
- (3) Avoid mounting in cabinets with power control equipment.
- (4) To maintain compliance with the EMC Directives the 2100-AO is to be mounted in a fully enclosed steel fire cabinet. The cabinet must be properly earthed, with appropriate input / output entry points and cabling.

**Power Supply Wiring.**

- (1) A readily accessible disconnect device and overcurrent device must be incorporated in the power supply wiring.
- (2) Any 2100-R connected to the 2100-AO, must share the same disconnect device and overcurrent device
- (3) For power supply, connect Phase (or +ve) to terminal 82, Neutral (or -ve) to 81, and Earth to 80. To ensure compliance to CE Safety requirements, the orange terminal insulators must be fitted to ALL mains terminals after wiring is completed. (ie. Terminals 82, 81 and 80.) For Non Hazardous Voltage power supplies (not exceeding 42.4Vpeak or 60Vdc) terminals 81 and 80 may be linked together, instead of connecting an earth.

## Wiring and Installation Cont.

### RS422/485 Comms Cabling.

- (1) Use only low capacitance, twisted pair, overall screened data cable. The cable must equal or better the following specifications.

Cable Specifications.		
Conductor Size.		7/0.20mm, 24AWG
Conductor Resistance @ 20C.		8.9Ω/100m
Max. Working Voltage.		300Vrms
Capacitance between wires of a pair.		50pF/m
Capacitance between each wire to all others bunched together.		95pF/m
Cross-talk between pairs:	@ 1kHz @ 100kHz	>-90dB/100m >-50dB/100m
Characteristic Impedance .	@ 100kHz	135Ω
Attenuation of a pair:	@ 1kHz @ 10kHz @ 100kHz @ 150kHz @ 1MHz @ 1.5MHz	0.15dB/100m 0.42dB/100m 0.8dB/100m 0.9dB/100m 1.9dB/100m 2.4dB/100m

#### NOTE:

All cables are to be subject during manufacture to in process spark testing @ 4kVrms.

All cables are to be test between conductors and conductors to screen for 1min @ 1500Vrms.

- (2) Minimum cable pairs: RS422 = 2. (Plus overall screen.)  
RS485 = 1. (Plus overall screen.)
- (3) Take care not to stress or damage cables during installation.
- (4) Total length of trunk line, including spurs, is not to exceed 1200m without isolating boosters.
- (5) Terminating resistors -1kΩ.
- (6) Cabling paths should avoid sources of radio frequency interferences such as fluorescent lights, variable speed motor drives, welding equipment, radio transmitters, etc.
- (7) There should be a minimum of 200mm physical separation between power cables and data cables.
- (8) Data cables should not be exposed to excessive heat or moisture, and should not be buried directly in the ground without protection.
- (9) Avoid powering a remote station or controller from the same power supply as a variable speed drive.

### Analogue Signal Wiring.

- (1) All signal cables should be good quality overall screened INSTRUMENTATION CABLE with the screen earthed at one end only.
- (2) Signal cables should be laid a minimum distance of 300mm from any power cables.
- (3) For 2 wire current loops, 2 wire voltage signals or 2 wire current signals, Austral Standard Cables B5102ES is recommended. For 3 wire transmitters and RTDs Austral Standard Cables B5103ES is recommended.
- (4) It is recommended that you do not ground analogue signals and use power supplies with ungrounded outputs.
- (5) Lightning arrestors should be used when there is a danger from this source.
- (6) Refer to diagrams for connection information.

### 2100-AO Commissioning.

- (1) Check that the 2100-AO has been set up to the right input and output ranges, and that it's new ranges have been checked.
- (2) Once the above conditions have been met, and the wiring checked, apply power to the 2100-AO, the loops, sensors, 2100-Rs. Allow a 5 minute warm-up period.

Note 1. There is a 15sec initialisation period when the 2100-AO is powered up, before it will communicate.

Note 2. For maximum accuracy allow a 1 hour warm up period.

- (3) Take a reading of the value being measured on each channel, and ensure that this agrees with the level being indicated by the Data Logger, PLC or control equipment etc for that channel. Adjust for any differences in the software of the system.

### 2100-AO Maintenance.

#### Voltage and Current Inputs and Outputs.

- (1) Repeat (3) of commissioning. Do it regularly - at least once every twelve months.

