
INTECH Micro

2100-A₁₆ REV 1.3



Installation Guide.

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2100-A₁₆ Installation Guide Index.

Section A. Description, Ordering and Specifications.

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Features.

- 16 Universal Analogue Inputs.
- Each Input Individually Selected & Scaled.
- 16 Bit Resolution.
- Differential Input for T/C, mV, V, & mA.
 - T/C: B, E, K, J, N, R, S, T.
 - RTD: 0~25C to -200~850C.
 - mV: 0~25mV to ± 500 mV.
 - V: 0~1V to ± 15 V.
 - mA: 0~1mA to ± 100 mA.
- 2 Analogue Outputs.
- Four Digital, Isolated, Optocoupler Inputs.
- Two Digital, Isolated, Relay Outputs.
- RS422/RS485 Up to 1200m.
- RS232 Cost Effective Radio Installation.
- RS232 Cost Effective PC or PLC AI Expansion.
- Modbus RTU and Modbus TCP Options Available.
- Clock/Reset Drive up to Four 2100-MS.
- Selectable Baud Rates.
- Digital Inputs:
 - State or Count.
 - Speeds to 50Hz.
- Interface for 2100-R2 (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



Z985



2100 models include:

- 2100-4S : RS422 to RS485 Converter.
- 2100-A16 :16AI, 4DI, 2 Relay Out, 2 AO.
- 2100-A4 :4AI, 4DI, 4 Relay Out, 2 AO.
- 2100-A4e :4AI, 4DI, 8 Relay Out, 2 AO.
- 2100-AO :8 AO, 8 AI, 12 DI, 2 Relay Out.
- 2100-D :12DI, 12 Relay Out.
- 2100-IS :Isolated RS232 to RS422/485.
- 2100-M :16AI Multiplexer.
- 2100-ME :Memory Expansion for 2100-A.
- 2100-NET :Isolated Ethernet to RS232/422/485.
- 2100-NS :Non-Isolated RS232 to RS422/485.
- 2100-R2 :16 Relay Expansion for 2100-A.
- 2100-RL2 :2 Relay Expansion for 2100-A.

Ordering Information.

2100-A16 Rev1 -X Standard Unit: Analogue Inputs Pt100, 0~100C; Analogue Outputs, 4~20mA; RS485 Comms; 85~264Vac/dc Power Supply.

2100-A16 Rev1 - ☐ - ☐ - ☐ - ☐
O AO C PS

Ranging Options for 2100-A16							
Supplied with Option	O	Analogue Out	AO	COMMS	C	Power Supply ⁽⁴⁾	PS
No Options	N	4~20mA	A1	RS422	422	85~264Vac/dc	H
2100-R2 16 Relay Expander	R2	0~20mA	A2			23~90Vdc	M
		2~10V	V1	Ethernet	NET		
		0~10V	V2				

Note 1. The RS232 Comms. version is no longer available.

Note 2: The 2100-A16 is factory set to RS422/485. The 2100-A16-X is field selectable for RS422 or RS485, and H or M power supply.

Note 3: The Microscan, PLC Message and Modbus RTU Comms Protocols come standard on all units.

Note 4: Power supply 'H' is field selectable for 'M', and 'M' for 'H'.

Ordering Example.

2100-A16-N-V2-485-H 2100-A16; 0~10V AO; RS485 Comms; 85~264Vac/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.

2100-A16 Input Specifications.

Note: Each input can be individually software selected & scaled within the span limits listed below.

Input Resolution	16 Bits, 50,000 Steps Average. (Some ranges may differ.)
Input Differential	18Vac/dc peak (sum of ac + dc) between any two channels.
	Note: RTD Pt100/Pt1000 are single ended.

mV / V Inputs:

- Input Impedance	>1M Ω @ 10V to >100k Ω @ 25mV.
- Maximum Over-range	18Vdc Continuous.
- mV Ranges	0~25mV, 0~50mV, 0~100mV, 0~250mV, 0~500mV. ± 25 mV, ± 50 mV, ± 100 mV, ± 250 mV, ± 500 mV.
- V Ranges	0~1V, 0~2.5V, 0~5V, 0~10V, 0~15V. ± 1 V, ± 2.5 V, ± 5 V, ± 10 V, ± 15 V.

mA Inputs: note 2

- Input Resistance	25 Ω .
- Maximum Over-range	100mAdc Continuous.
- mA Ranges	0~1mA, 0~2mA, 0~4mA, 0~10mA, 0~20mA, 4~20mA, 0~40mA, 0~100mA. ± 1 mA, ± 2 mA, ± 4 mA, ± 10 mA, ± 20 mA, ± 20 mA, ± 40 mA, ± 100 mA.

3-wire RTD Inputs: note 3

All temperature probes must be isolated from each other and earth.

- Inputs	16 Single Ended RTD Inputs. All 2nd 'B' Terminals Connected.
- Pt100 RTD Type	3 Wire Pt100 RTD DIN 43760:1980 Standard Input.
- Pt1000 RTD Type	3 Wire Pt1000 RTD Standard Input.
- Sensor current	1mA Multiplexed.
- Lead resistance	10 Ω /Lead Maximum Recommended. 100 Ω /Lead Absolute Maximum.
- Sensor Fail	Upscale Drive.
- RTD Ranges	0~25C (32~75F), 0~50C (32~120F), 0~100C (32~200F), 0~250C (32~475F), 0~500C (32~930F), 0~850C (32~1550F). ± 25 C (-10~75F), ± 50 C (-50~120F), ± 100 C (-140~200F), -200~250C (-320~475F), -200~500C (-320~930F), -200~850C (-320~1550F).

Thermocouple Inputs: note 3

Mineral Insulated Thermocouples With Isolated Junction Recommended.

- Cold Junction Comp.	0~60C.
- CJC Drift	<0.03C/C Typical for Input 1.
- Sensor open Circuit	Refers to notes under 2100-A16 Input Connection Diagram for T/C Inputs. Refers '2100-A16 Input Connection Diagram for Thermocouple Upscale (US) / Downscale (DS) Drive.'
- T/C Lead Resistance	100 Ω Maximum.
- Input Impedance	>100k Ω Minimum.
- Accuracy	< $\pm 0.1\%$ FSO ± 1 C Typical.
- Type B Ranges	0~1800C (32~3250F). Accurate Range 250~1800C
- Type E Ranges	0~300C (32~570F), 0~600C (32~1100F), 0~900C (32~1650F), ± 200 C (-320~390F).
- Type J Ranges	0~400C (32~750F), 0~800C (32~1450F), 0~1200C (32~2150F), ± 200 C (-320~390F).
- Type K Ranges	0~500C (32~930F), 0~1000C (32~1800F), 0~1300C (32~2370F), ± 200 C (-320~390F).
- Type N Ranges	0~600C (32~1100F), 0~1300C (32~2350F), ± 200 C (-320~390F).
- Type T Ranges	0~400C (32~720F), ± 200 C (-320~390F).
- Type R Ranges	0~1700C (32~3050F).
- Type S Ranges	0~1700C (32~3050F).

Digital Inputs:

-Functions	4 Opto Isolated Inputs with LED Indication of Each Input. ON / OFF, Count, and Flow Metering. 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.
@ 20Vdc	8mA per Channel.
@ 24Vdc	9.6mA per Channel.
-Frequency	0~50Hz.
-Channel Selection	CLOCK & RESET Pulse Length = 20msec Minimum. Settling Time Before Reading = 100msec. (Multiple readings with averaging recommended.)

Intelligent Multiplexer:

-Channel Selection	Clock and Reset or Binary. (Refer Digital Inputs)
-Cycle Time	4sec. minimum to cycle through all 16 inputs.
-Resolution	12bits, 4000 steps typical.

2100-A₁₆ Output Specifications.

Dual Analogue Outputs:		Analogue Outputs supplied from factory as mA. V must be factory fitted.
-Resolution	2 Outputs, 12bits, 4000 Steps Typical. (Some ranges may differ.)	
-V Ranges	0~10V, 2~10V. Output Drive = 4mA Maximum. (2k5 @ 10V)	
-mA Ranges	0~20mA, 4~20mA. Output Drive = 12V Maximum. (600Ω @ 20mA)	
Digital Outputs:		2 Isolated Relays with LED Indication of Each Output.
-Functions	2 on Board Controllers (16 with 2100-R2), Can be used as Set Point (SV) Switching Differential, Auto/Manual, Manual Output Setting, Dual Action Control, Single Action Control, Heat/Cool, Cool Only, Heat Only.	
-Contact Material	Gold Clad Silver.	
-Relay Ratings	30Vac/dc, 1A Maximum.	
-Approved to Standard	UL & CSA:.	
-Number of Operations	1 x 10 ⁵ Min, at 30Vac/dc, 1A, Resistive Load.	

2100-A₁₆ General Specifications.

Comms:	-Protocols	Intech Scada; PLC Message; Modbus RTU; RS422/RS485 or RS232
	-Baud Rate	Selectable 2400, 4800, 9600. (Default = 9600).
	-Format	8 bit, No Parity, 1 Stop. (Not selectable.)
	-Modbus RTU	Refer to Modbus section, Page 20, for more details.
	-Ethernet 10/100	Refer to Ethernet 10/100 section, Page 23, for more details.
Power:	-H	85~264Vac/dc; 50/60Hz; 10VA.
	-M	23~90Vdc; 10VA.
	-L	10~28Vac/dc; 50/60Hz; 10VA.
		Refer to '2100-A ₁₆ H1 Power Supply Settings' for voltage selection instructions.
Transmitter Power Supply		20Vdc±5%; Max. Load=50mA; Ripple<20mVrms; Common to Analog Inputs. Transmitter power supply is not available with Ethernet 10/100 comms option.

Safety and EMC Compliances:

Safety and EMC Compliances:		
EMC Compliances	Emissions EN 55022-A. Immunity EN 50082-1.	
Safety Compliance	EN 60950.	
Mains Isolation	250Vac.	
Mains Isolation Test Voltage	-To all Inputs and Outputs:	3000Vac 50Hz for 1 min.
	-To Earth	1500Vac 50Hz for 1 min.
Input/Output Isolation Test Voltages	-Digital Input to Analogue Input/Output:	1000Vdc for 1 min.
	-Digital Input to Digital Output:	1000Vdc for 1 min.
	-Analogue Input/Output to Digital Output:	100Vdc for 1 min.
	-Comms to Analogue Input/Output:	1000Vdc for 1 min.
	-Comms to Digital Input/Output:	1000Vdc for 1 min.

General Specifications: (Unless otherwise stated in other input specifications.)

Accurate to		<±0.1% FSO Typical.
Linearity & Repeatability		<±0.1% FSO Typical.
Channel Separation		<±0.1% FSO Typical.
Ambient Drift		<±0.01%/C FSO Typical.
Noise Immunity		125dB CMRR Average Differential Input 18Vpeak.
RF Immunity		<±1% Effect FSO Typical.
A01 & AO2		25msec. Nominal Pulse Length.
-(used as CLOCK and RESET)		20mA Nominal Current.
		Settling Time and Averaging Software Selectable.
Permanent Memory (E ² ROM)		10,000 Writes per Input Parameter.
-(2100-ME fitted)		10 Year Data Retention.
Operating Temperature		0~60C.
Storage Temperature		-20~80C.
Operating Humidity		5~85%RH Max. Non-Condensing.
Housing	-Material	ABS Inflammability V0 (UL94)
	-Dimensions	L=195, W=120, H=70mm.
	-Mounting	35mm Symmetrical Mounting Rail.
	-Weight	800g. Includes Packaging.

Note 1. Contact INTECH INSTRUMENTS for more detailed programming information.

Note 2. For mA inputs a 2 pin jumper must be installed for each input.

Note 3. The 2100-A₁₆ is C and F selectable. This selection affects all temperature readings. (CJC must be calibrated in C.)

Product Liability. This information describes our products. It does not constitute guaranteed properties and is not intended to affirm the suitability of a product for a particular application. Due to ongoing research and development, designs, specifications, and documentation are subject to change without notification. Regrettably, omissions and exceptions cannot be completely ruled out. No liability will be accepted for errors, omissions or amendments to this specification. Technical data are always specified by their average values and are based on Standard Calibration Units at 25C, unless otherwise specified. Each product is subject to the 'Conditions of Sale'.

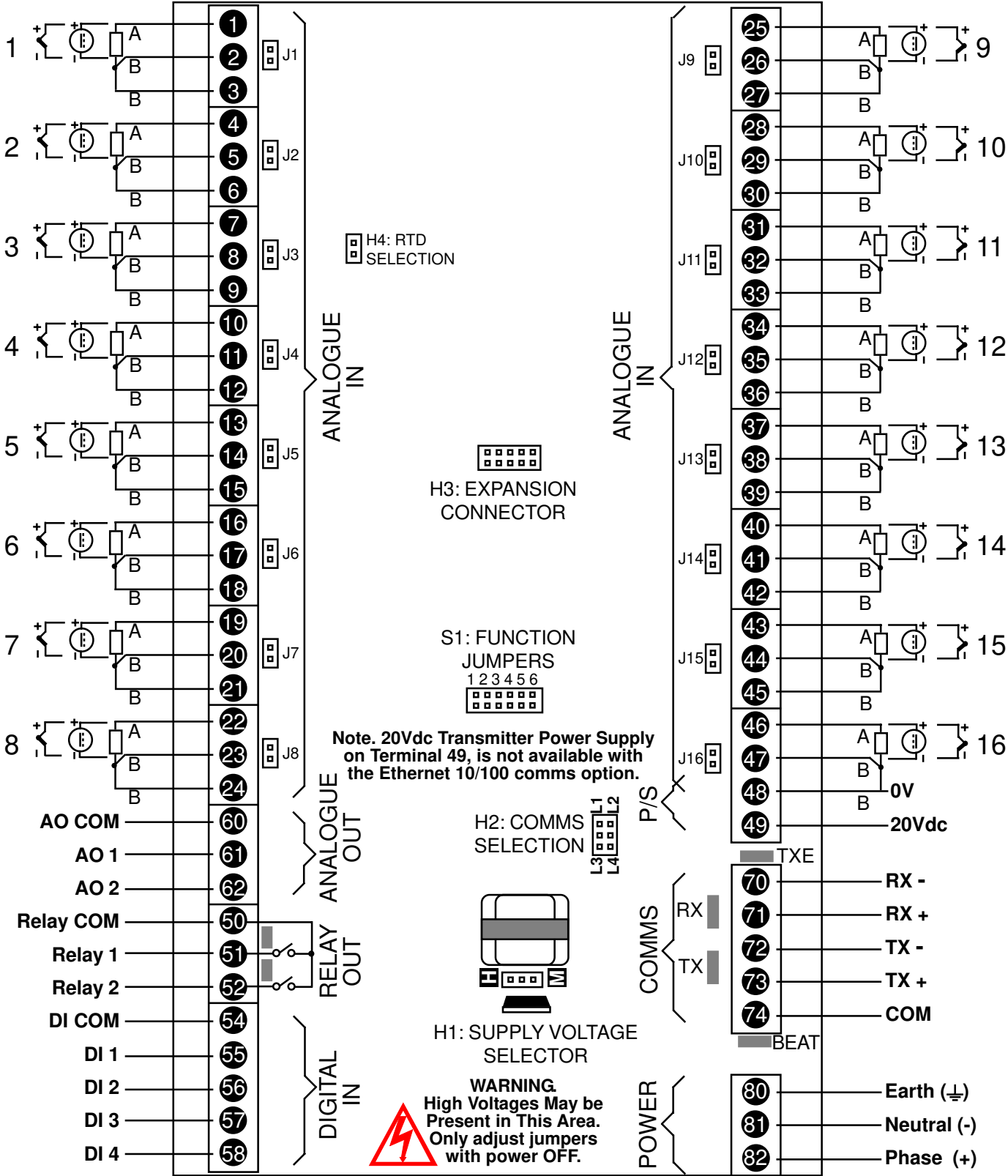
Warning: These products are not designed for use in, and should not be used for patient connected applications. In any critical installation an independant fail-safe back-up system must always be implemented.



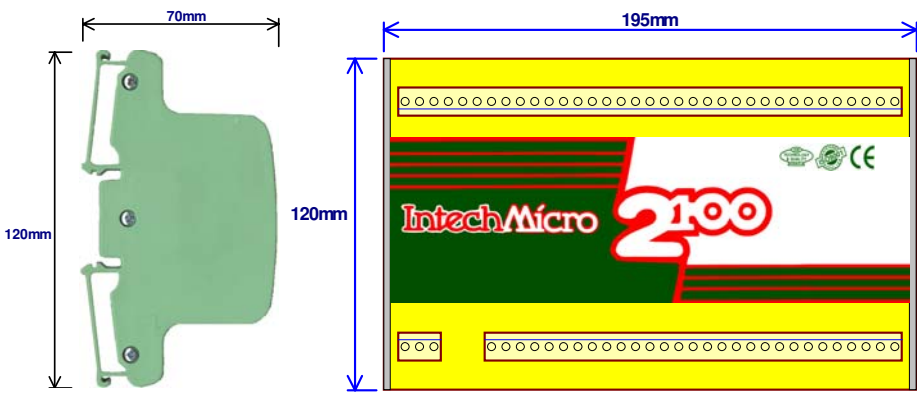
CAUTION: Dangerous Voltages may be present. The 2100-A₁₆ has no user serviceable parts. Protective enclosure only to be opened by qualified personnel. Remove ALL power sources before removing protective cover.



2100-A16 Terminals and Layout.



2100-A16 Rev1.1 Dimensions.



Section B: 2100-A₁₆ Jumpers and LED Functions Tables.



CAUTION: Dangerous Voltages may be present. The 2100-A₁₆ has no user serviceable parts. Protective enclosure only to be opened by qualified personnel. Remove ALL power sources before removing protective cover.



* For ALL programming tables. Jumper Status: 0=JUMPER NOT INSERTED 1=JUMPER INSERTED.

* Refer to '2100-A₁₆ Terminals and Layout' for the location of the following jumpers and switches.

2100-A₁₆ S1 Function Jumper Settings.

Function Dip Switch Settings						
Function	S1-1	S1-2	S1-3	S1-4	S1-5	S1-6*
9600baud ^{note1}	0	0	0	0	0	0
4800baud	0	1	0	0	0	0
2400baud	1	1	0	0	0	0
Test Mode ^{note2}	0	0	1	0	0	0
2100-ME	x	x	0	1	0	0
Modbus TCP ^{note4}	0	0	0	0	1	0
Modbus RTU ^{note5}	x	x	0	0	0	1

- Note 1. Factory Default.
 Note 2. Factory use ONLY.
 Note 3(*). When using Modbus RTU Protocol S1-6 is '1'. Refer Modbus Section.(Rev 1.2)
 Note 4. For use with Ethernet (Rev 1.3).
 Note 5. For use with 232/422/485 (Rev 1.3).

2100-A₁₆ H1 Power Supply Settings.

Power Supply Jumper Settings	
H1	Power Supply Voltage Range
H	Jumper for 85~264Vac/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-A₁₆ H2 Comms Settings.

COMMS Jumper Settings				
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

Linking for RS422



Linking for RS485



- Note 1. The orientation of this drawing is with P/S terminal to the top side (Standard Mounting)
 Note 2. RS232 must be ordered separately to RS422/485.
 Note 3. RS422 can be jumpered for RS485, and vice versa.

2100-A₁₆ H4 RTD Settings.

H4 RTD Jumper Setting	
Pt100	1
Pt1000	0

- Note 1. The H4 jumper affects ALL RTD channels.
 Note 2. The appropriate RTD must be selected in the Scada software.

2100-A₁₆ LED Descriptions.

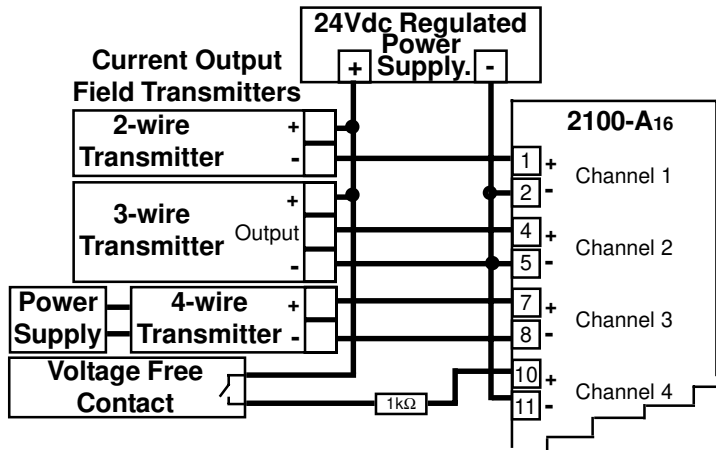
LED Descriptions	
LED Name	LED Function
RX	Active when Station is receiving serial data.
TX	Active only when Station is transmitting serial data.
TXE	Active only when Station is ready to transmit data.
BEAT	Heart beat. Continual flashing indicates Station healthy
Digital Output 1~2	Indicates when their respective output relay is energized.
Digital Input 1~4	Indicates when their respective input is energized, or counting.
Clock / Reset	Indicates when respective Clock or Reset for multiplexer is active.

Section C. Input and Output Connection Diagrams.

2100-A16 Input Connection Diagram for mA Inputs.

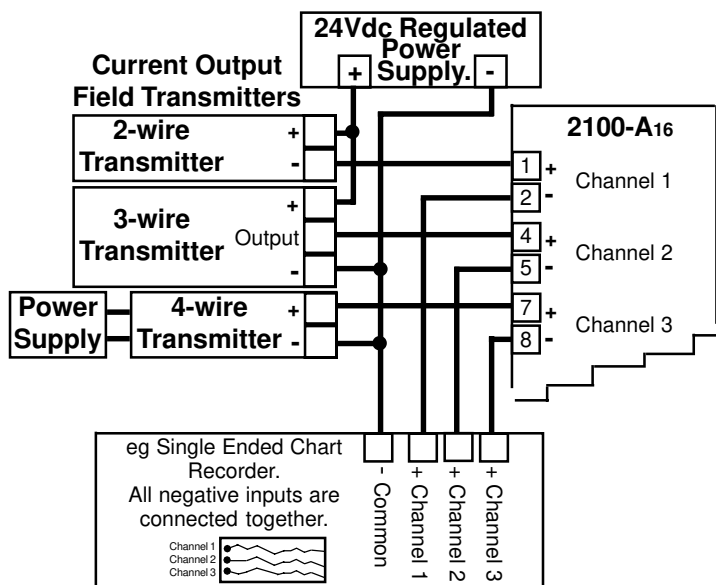
Connection configuration for 2 wire, 3 wire and 4 wire transmitters, and digital inputs.

Connection Example 1.



- Note 1. All 2100-A16 analogue inputs are differential. Exceeding 18V peak between any 2 inputs, or any single input will cause errors on ALL channels.
In example 2, the peak voltage is calculated by multiplying the max mA out of any transmitter, by the sum of the resistances in the transmitter loop, then adding any common peak voltages.
eg: (refer to Connection Example 2)
If the transmitter has a 35mA max, the 2100-A16 has 25Ω input resistance; and if a chart recorder has 250Ω input resistance:
There is a 2V peak common voltage.
 $\Rightarrow 35\text{mA} \times (25\Omega + 250\Omega) + 2\text{V} = 11.63\text{V peak.}$
This is fine, as it is less than 18V.

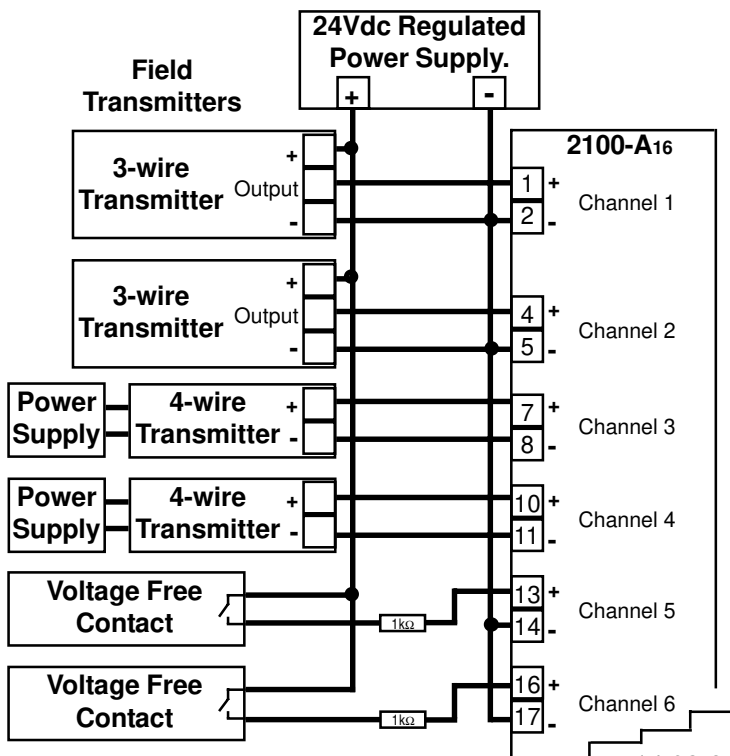
Connection Example 2.



- Note 2. For mA inputs a jumper must be installed. Failure to install a jumper will cause errors on ALL channels. J1 for channel 1, J2 for channel 2, etc. The jumpers are located directly behind the 3 terminals for each respective channel. They can be installed without removing the cover.
- Note 3. Inputs can be used as digital inputs for sensing a clean, voltage free, field contact.
- Note 4. All cables must be screened, and the screens earthed at one end only.
- Note 5. Voltage free contact values must be brought in through 'tags' in the Scada Software.

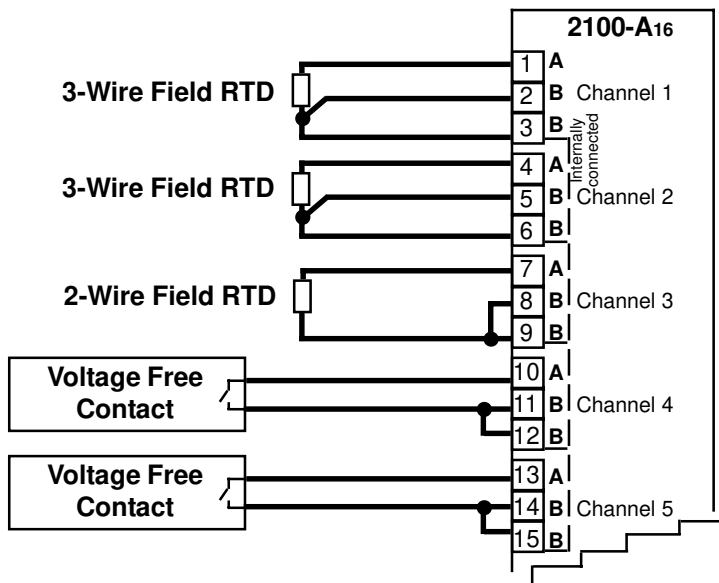
2100-A16 Input Connection Diagram for Millivoltage and Voltage Inputs.

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



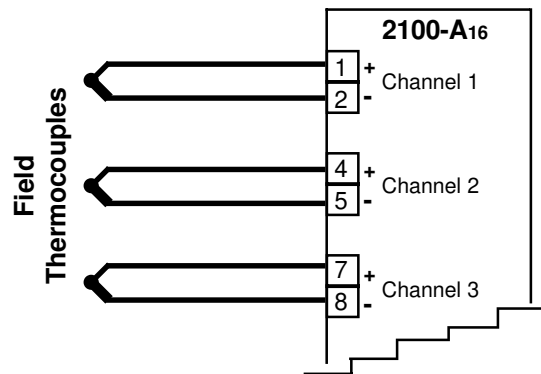
- Note 1. All millivolt and volt inputs are differential. Exceeding 18V peak between any 2 inputs, or any single input will cause errors on ALL channels.
- Note 2. Inputs can be used as digital inputs for sensing a clean, voltage free, field contact.
- Note 3. All cables must be screened, and the screens earthed at one end only.
- Note 4. Input voltages must not exceed 18V.
- Note 5. For digital inputs the mA jumper must be installed.
- Note 6. Voltage free contact values must be brought in through 'tags' in the Scada Software.

2100-A16 Input Connection Diagram for RTD Inputs.



- Note 1. All RTD inputs are single ended. ie all the 2nd 'B' terminals are internally connected.
- Note 2. It is recommended that the RTDs be isolated from each other and earth.
- Note 3. Inputs can be used as digital inputs for sensing a clean, voltage free, field contact.
- Note 4. All RTD cables must be screened, and the screens earthed at one end only. All the three wires must be the same resistance. (ie. the same type and size.) Refer to 'Wiring and Installation' for recommended types.
- Note 5. To minimise lead resistance errors, 3 wire RTDs should be used. If 2 wire RTDs are used small offset errors can be compensated for in software.
- Note 6. For voltage free contacts use RTD6 0 to 850 for pseudo digital input in the Scada Software.

2100-A16 Input Connection Diagram for Thermocouple (T/C) Inputs.



* Refer to Wiring & Installation.

Note 1. All T/C inputs are differential. Exceeding 18V peak between any 2 inputs, or any single input will cause errors on ALL channels.

Note 2. It is recommended that the T/C's be isolated from each other and earth. Isolated junction, mineral insulated T/C's are recommended.

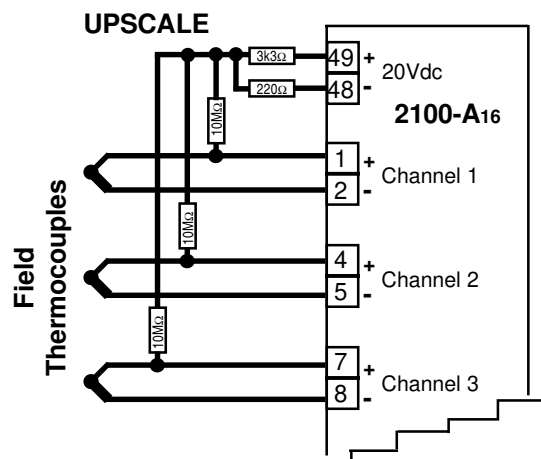
Note 3. For accurate T/C measurement, especially low temp: *The cover must be fitted. *Avoid drafts and temperature differences across terminals. *Once installation is complete, close the cabinet door and allow the cabinet to reach equilibrium. This may take several hours. *Place all the T/C probes into a calibrated thermal bath at temperature of interest. Any errors can be zeroed out in software.

Note 4. All T/C's are referenced to the on board cold junction compensation (CJC) temperature sensor. Prior to Rev 1.3 the CJC sensor is located behind terminal 24. From Rev 1.3 onwards the CJC temperature sensor is located behind terminal 1. Alternatively one of inputs 1 to 8 can be selected in the Scada software as an RTD CJC for inputs 1 to 8, and one of inputs 9 to 16 can be selected in the Scada software as an RTD CJC for inputs 9 to 16. The mounting orientation of the 2100-A16, (eg vertical or horizontal) affects the CJC accuracy of different inputs. The affects are more noticeable on small temperature ranges. For example mounting the 2100-A16 horizontal will cause the all the upper terminals to be warmer compared to all the the lower terminals. Any errors can be zeroed out in software.

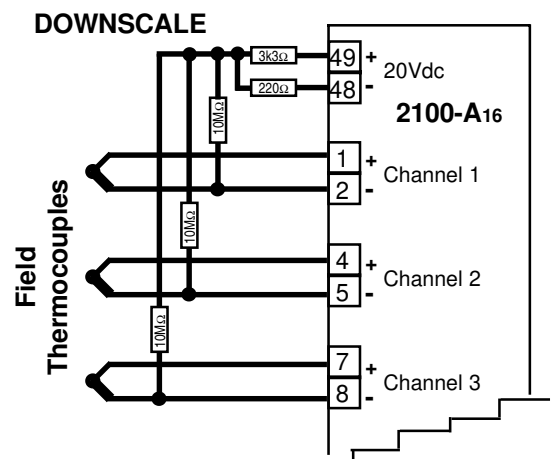
Note 5. Cables must be screened & screens earthed at one end only.

2100-A16 Input Connection Diagram Thermocouple Upscale (US) / Downscale (DS) Drive.

To achieve US or DS drive on T/C open circuit resistors must be fitted externally, as shown below.

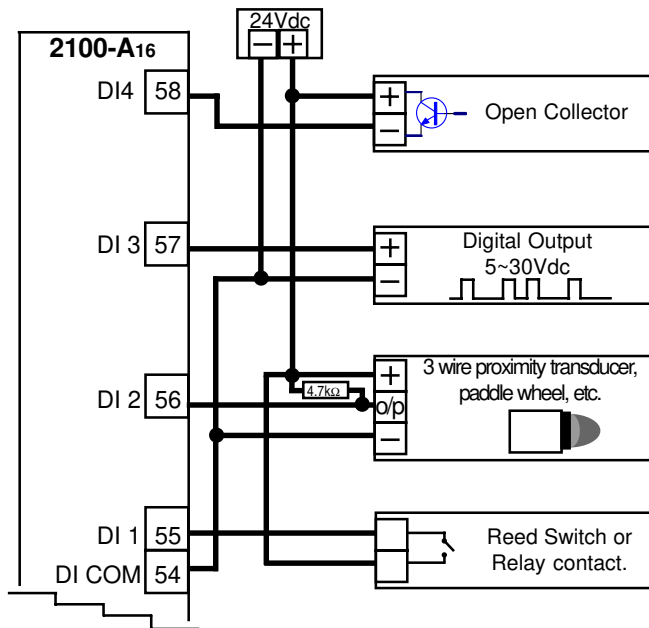


For US drive: Fit 10MΩ resistors to +ve terminals. Refer to Wiring and Installation.



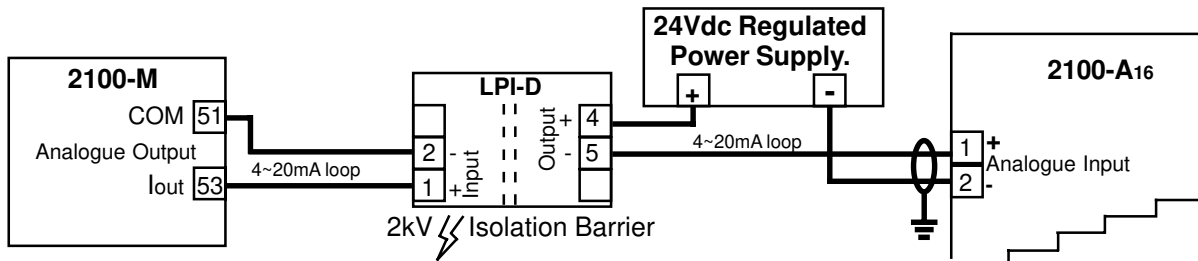
For DS drive: Fit 10MΩ resistors to -ve terminals. Refer to Wiring and Installation.

2100-A₁₆ Connection Example Diagram for Digital Inputs.

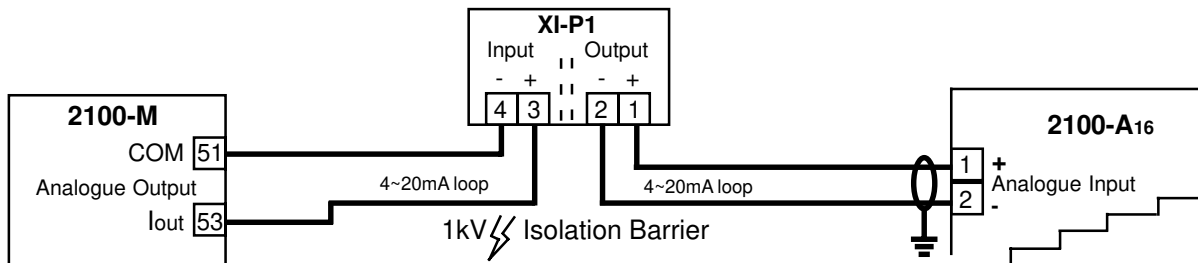


- Note 1. Inputs can be:
State - i.e. ON or OFF.
Count - 0~50Hz
- Note 2. LED indication per input. LED intensity depends on voltage level at the input terminals. Refer to 'Specifications' for input loads.
- Note 3. For scaling of counter inputs, totalising and flow data conversion, refer to Microscan 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-A₁₆.'
- Note 5. Do not fit the 4K7 resistor for 3 wire PNP transducers.
- Note 6. Digital Inputs are not available when used as an intelligent multiplexer.

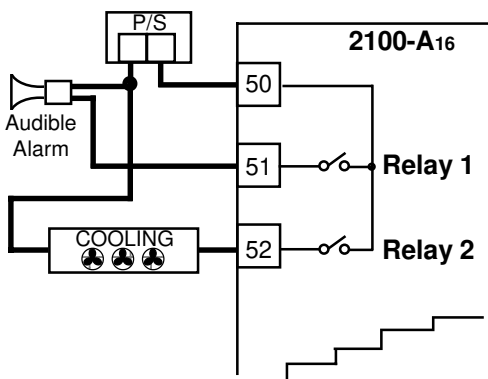
2100-A₁₆ Connection Diagram Using an LPI-D Current Loop Isolator on the Input.



2100-A₁₆ Connection Diagram Using an XI-P1 Current Loop Isolator on the Input.



2100-A₁₆ Connection Example Diagram for Digital Outputs.



- Note 1. Both relays are Normally Open, and share a common.
- Note 2. 30Vac/dc, 1A maximum contact rating. For individual relay outputs (ie not sharing a common) and/or a contact rating of 250Vac, use a 2100-RL2. This is a 2 relay slave board that can be wired directly to the 2100-A₁₆.
- Note 3. Each relay 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. Refer to MicroScan Configuration Manual.
- Note 4. Relay 2 can be selected as a Comms failure time-out alarm. The relay is normally active and deactivates after 5mins if no Comms messages are received. This function does not detect microprocessor failure. When used for this function the relay cannot be used for any other function.
- Note 5. LED indication on each output when relay is energized.
- Note 6. For additional Relay Expansion refer 2100-R2.
- Note 7. Digital Outputs are not available when used as an intelligent multiplexer.

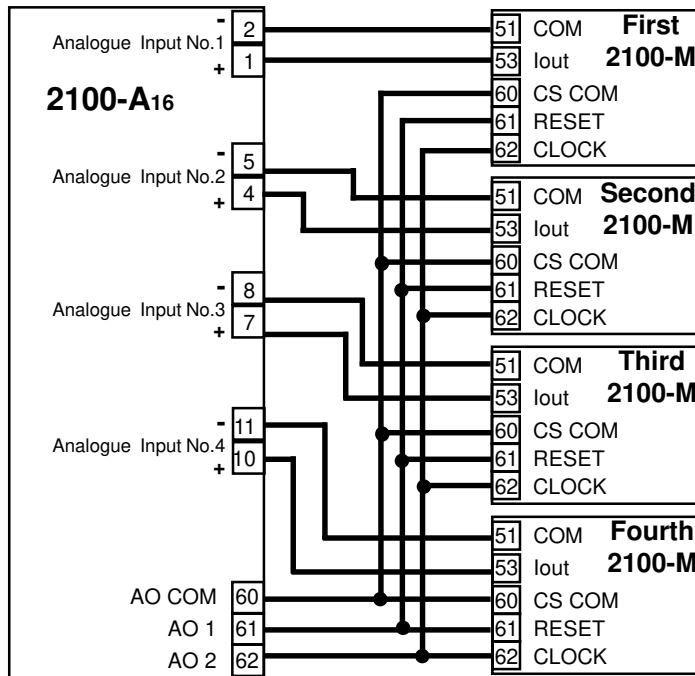
Section D. Connecting to a Microscan Scada System.

2100-A16 Analogue Input Expansion - Using 2100-M Analogue Input Multiplexer.

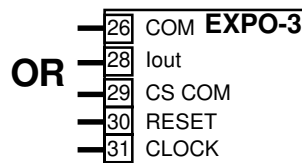
Analogue input expansion can be achieved using up to four 2100-M, 16 Channel, Analogue Input Multiplexers. This gives a total of 76 analogue inputs. Control for the 2100-M is through the AO1 and AO2 on the 2100-A16. (Refer Note 4 below.) One analogue input is required per 2100-M, and each 2100-M input must be of the same type and range. The remaining 2100-A16 analogue inputs can be used for any other type of input.

Option 1. 5 Wire Connection Diagram.

This uses 5 wires for the first 2100-M, with 2 additional wires for each additional 2100-M. In this configuration the analogue inputs are differential. The maximum peak input voltage is 18V.



- Note 1. The 2100-A16 resolution on 2100-M multiplexer inputs is 12 bits (4096 steps)
- Note 2. All cables must be screened, and the screens earthed at one end only.
- Note 3. Analogue Input expansion is also possible using the EXPO-3. Refer to the connection diagram below.
- Note 4. When 2100-M multiplexers are used:
AO COM connects to CS COM;
AO 1 is used for the RESET pulse;
AO 2 is used for the CLOCK pulse.
AO 1 & AO 2 are not available for any other use.



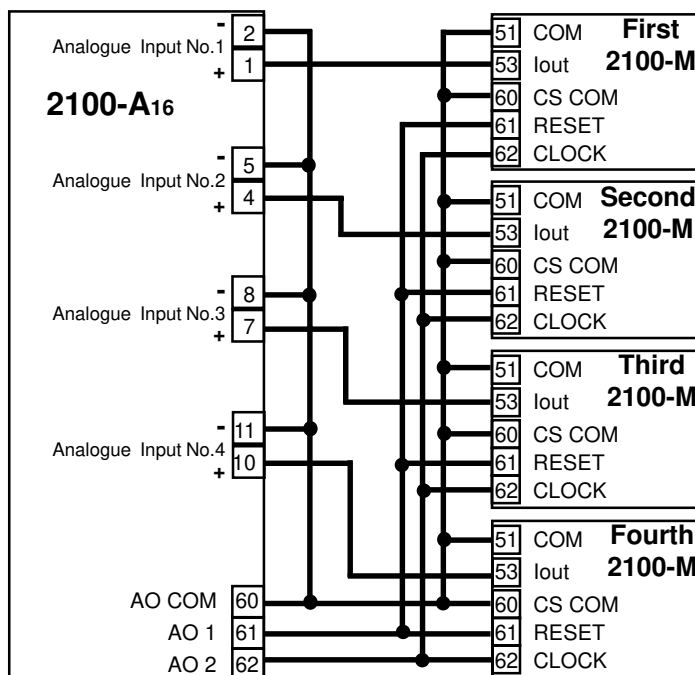
The analogue output mode is set in the Station Advanced Dialog Box 'AO 1 & AO 2 button'.

For 2100-M Driver select Mode 1.

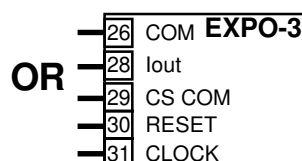
For detailed programming info, refer to 'Programming 2100-Series Remote Station' in the Microscan Manual.

Option 2. 4 Wire Connection Diagram.

This uses 4 wires (2 pair) for the first 2100-M, with 1 additional wire for each additional 2100-M. In this configuration the analogue inputs single ended. i.e. All the -ve inputs are all commoned.



- Note 1. The 2100-A16 resolution on 2100-M multiplexer inputs is 12 bits (4096 steps)
- Note 2. All cables must be screened, and the screens earthed at one end only.
- Note 3. Analogue Input expansion is also possible using the EXPO-3. Refer to the connection diagram below.
- Note 4. When 2100-M multiplexers are used:
AO COM connects to CS COM;
AO 1 is used for the RESET pulse;
AO 2 is used for the CLOCK pulse.
AO 1 & AO 2 are not available for any other use.



The analogue output mode is set in the Station Advanced Dialog Box 'AO 1 & AO 2 button'.

For 2100-M Driver select Mode 1.

For detailed programming info, refer to 'Programming 2100-Series Remote Station' in the Microscan Manual.

2100-A₁₆ Analogue Outputs Controlled by Scada.

The analogue output mode is set in the Station Advanced Dialog Box 'AO 1 & AO 2 button'.

For Scada outputs select Mode 2.

For detailed programming info, refer to 'Programming 2100-Series Remote Station' in the Microscan Manual.

AO 1 & AO 2 are controlled by the Scada Software.

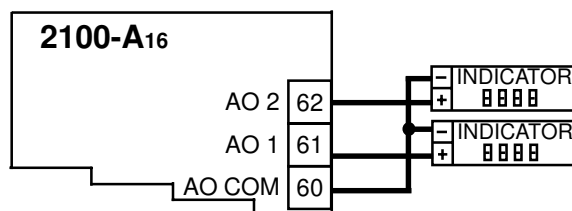
12 bit output nominally = 0~4095 for 4~20mA (or 0~10V etc.) out:

0bit = 4mA (0V);

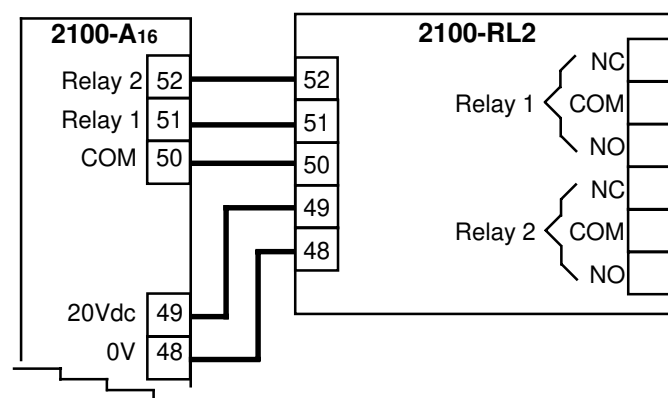
2048 = 12mA (5V);

4095 = 20mA (10V).

For 4~20mA output, Loop Powered Indicators can be used. 12V maximum at 20mA (600Ω at 20mA)



2100-A₁₆ Connection Example Diagram for Using the 2100-RL2, 2 Relay Slave Board.



2100-RL2 Relay Specifications:

-Contact Material Silver Alloy

-Relay Ratings

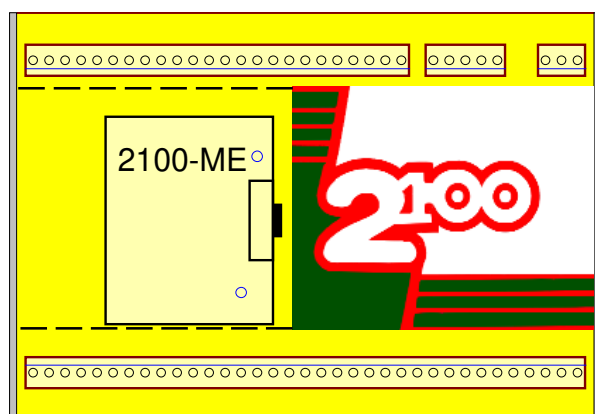
Rating	Approved
250Vac, 2A	UL
125Vac, 2A	CSA
110Vdc, 0.3A;	
30Vdc, 2A;	
250Vac, 1/6hp;	
125Vac, 1/10hp.	

-Number of Operations 2 x 10⁵ Min, at 1A, 250Vac

Note 1. Activating Relay 1 on the 2100-A₁₆ activates Relay 1 on the 2100-RL2. Activating Relay 2 on the 2100A₁₆ activates Relay 2 on the 2100-RL2.

2100-A₁₆ Memory Expansion - Using 2100-ME Memory Expansion Card.

The 2100-ME Memory Expansion Card is designed to allow the 2100A₁₆ to stand alone, retaining the data collected for intermittent download. Data is held in permanent memory.



Connecting the 2100-A₁₆ to the 2100-ME.

- 1/ Only fit 2100-ME-32 to 2100-A₁₆ Rev.1.3.
- 2/ Power must be off before installing the 2100-ME.
- 3/ Remove the cover off the 2100-A₁₆.
- 4/ 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-A₁₆, and the 10 pin connector. Once all three are aligned, push the 2100-ME firmly into the 2100-A₁₆.
- 5/ Install a link in position 4 of the 2100-A₁₆ S1 Function jumper.
- 6/ Replace the 2100-A₁₆ cover.
- 7/ When the 2100-A₁₆ is used with the 2100-ME, the 2100-M and 2100-R expansion options are unavailable.
- 8/ The 2100-ME can only be fitted to a 2100-A₁₆ REV 1.3.

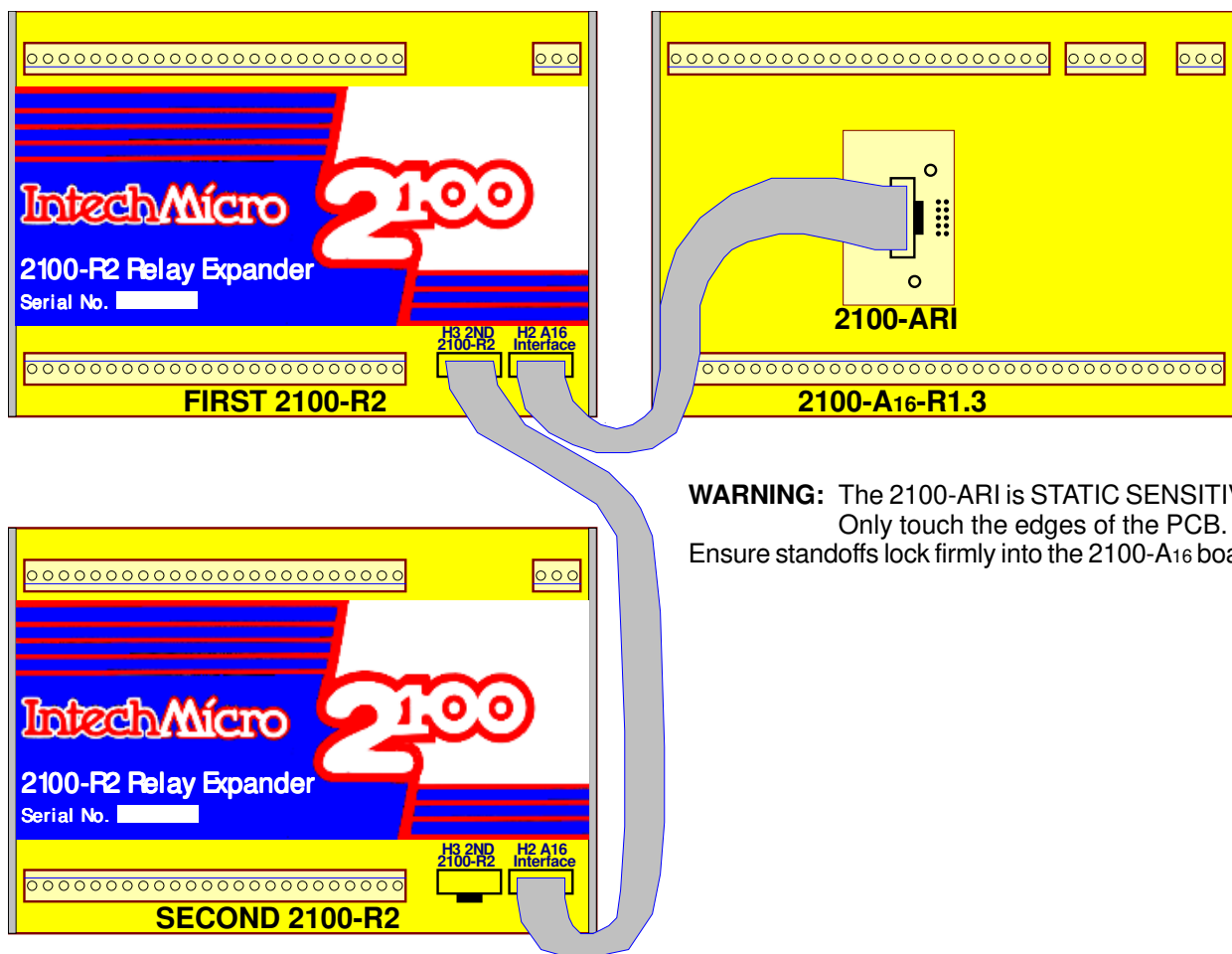


CAUTION: Dangerous Voltages may be present. The 2100-A₁₆ has no user serviceable parts. Protective enclosure only to be opened by qualified personnel. Remove ALL power sources before removing protective cover.



2100-A₁₆ Rev1.3 Relay Output Expansion - Using 2100-R2 Relay Expansion.

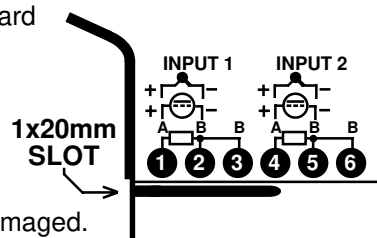
Output relay expansion is available using the 2100-R2, 16 relay output expansion module. This allows the 2100-A₁₆ to stand alone as a 16 channel controller / alarm unit. The 2100-R2 relay outputs can be used for any combination of control and alarm functions. The control parameters for each of the 16 controllers is downloaded from user friendly Microscan Software, and stored in permanent memory on the 2100-A₁₆. 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 16 controller / alarms will operate unaffected by computer power downs, reboots, etc. The relay outputs can also be accessed directly from the Scada.



WARNING: The 2100-ARI is STATIC SENSITIVE.
Only touch the edges of the PCB.
Ensure standoffs lock firmly into the 2100-A₁₆ board.

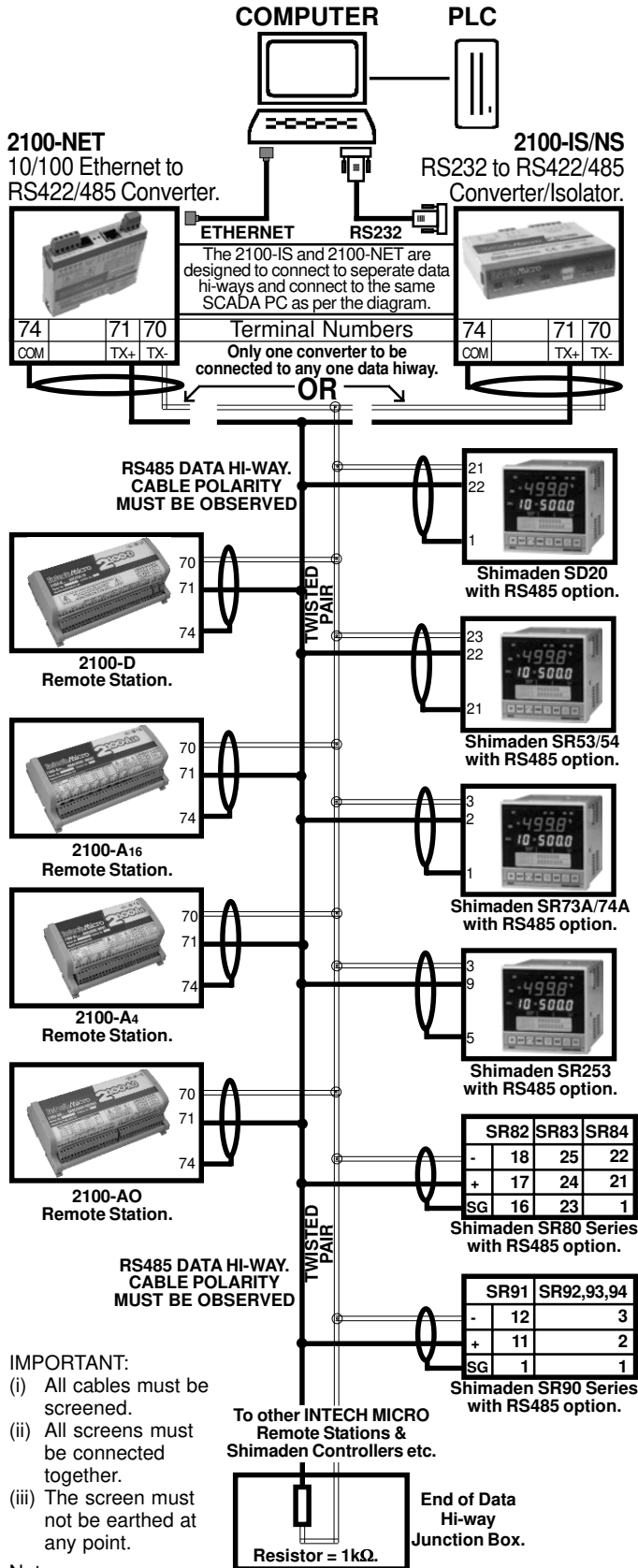
Connecting the 2100-A₁₆ to the 2100-R2.

- 1/ Power must be off before installing the 10 way ribbon cable and 2100-ARI board supplied with the 2100-R2.
- 2/ Remove the cover off the 2100-A₁₆.
- 3/ An exchange cover, with a precut slot for the ribbon cable, is available free of charge from your supplier. P/N: 2100-A₁₆-COVERSLOT.
Alternatively you may wish to modify the existing cover:
Cut a 1mm slot, 20mm deep, just below terminal numbers 1, 2 & 3.
Carefully smooth the edges of the cut so the ribbon cable does not get damaged.
- 4/ The 2100-ARI is supplied with the ribbon cable attached. Use antistatic precautions when installing. Carefully orientate the 2100-ARI board as shown above. Locate the two plastic standoffs over the corresponding holes in the 2100-A₁₆, and the 10 pin connector. Once all three are aligned, push the 2100-ARI firmly into the 2100-A₁₆.
- 5/ Connect the other end of the cable to the 2100-R2. Ensure both ends of the cable are firmly connected.
- 6/ Slide the cable into the slot, and replace the cover on the 2100-A₁₆.
- 7/ The 2100-R2 must be enabled in the programming dialogue boxes. Advanced '2100-R 2 Relay Expander' options.
For detailed programming info, refer to 'Programming 2100-Series Remote Station' in the Microscan Manual.
- 8/ A 2100-R2 connected to the 2100-A₁₆ 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.



DO NOT GUESS TX OR RX CONNECTIONS. FOLLOW THE TERMINAL NUMBERS IN THE SERIAL CONNECTION DIAGRAMS EXACTLY.

OUTSTATION LAYOUT. 2-Wire RS485 Serial Connections.



IMPORTANT:

- All cables must be screened.
- All screens must be connected together.
- The screen must not be earthed at any point.

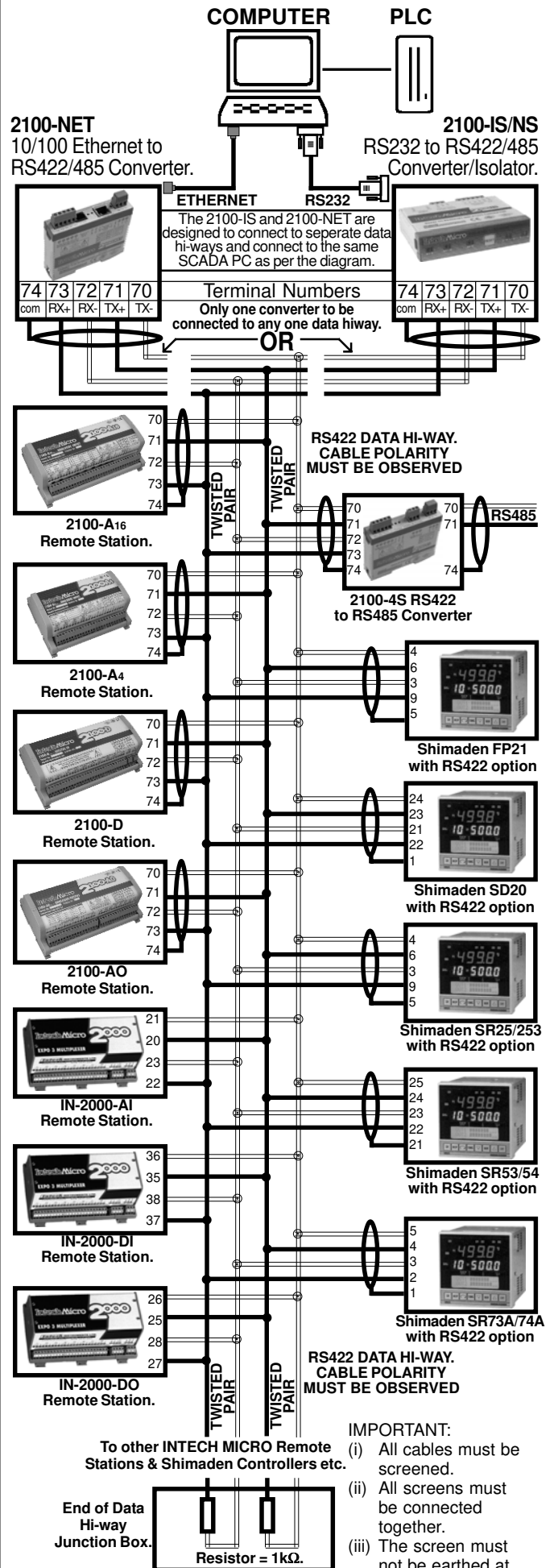
Notes:

- RS485 can only be used with software release Ver. 4.02 onwards.
- 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. Use a 2100-4S to interface an RS485 Data Hi-way to an existing RS422 Data Hi-way

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

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 for RS485 operation.

OUTSTATION LAYOUT. 4-Wire RS422 Serial Connections.

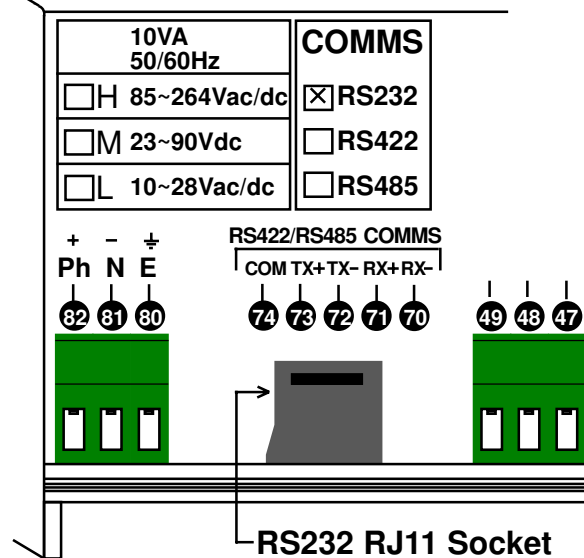


2100-A₁₆ RS232 Serial Connection.

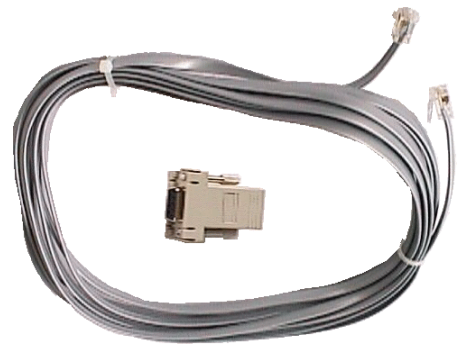
The 2100-A₁₆ with RS232 comes complete with:

- 1 x 5m RJ11 RS232 Cable. (2, 10 & 15m available.)
- 1 x 9 Pin D-type Connector. (25 pin D-type available.)
- USB to RS232 convertor available. Part No. BF-810.

Location of RJ11 Socket on 2100-A₁₆ Series.



COMMS Pinout Table		
RJ11	DB9	DB25
1:RTS	8	5
2:GND	5	7
3:TX	2	3
4:CTS	7	4
5:n/c	1	1
6:RX	3	2



RS232 COMMS Hardware.



Do Not cut RS232 Cable to extend the length.

Installation.

Plug one end of the RS232 Comms cable into the RS232 RJ11 Socket on the 2100 Module. Plug the other end into either the 9 or 25 pin D-type connector. (Check for the correct D-type connector on the computer (or Omron PLC) RS232 port being used.) For further software and hardware information, Refer to the Microscan Manual 'Programming the 2100 Series Remote Station.'

2100-RS232 Kit-Omron

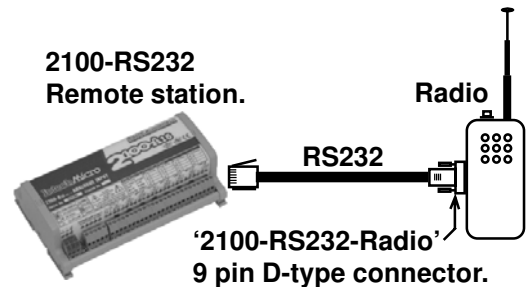
RS232 Kit for Omron PLC. Includes 2m cable & 9 pin D-type connector.

2100-A₁₆ RS232 Radio Modem Serial Connection.

Note: The '2100-RS232-Radio' 9 pin D connector differs from the 2100-RS232 9 pin D supplied, and must be ordered separately. It can be exchanged at no charge for the 9 pin and 25 pin D connectors supplied with the 2100-RS232 Remote Station.

1. Refer to Installation paragraph above.
2. Fit the '2100-RS232-Radio' 9 pin D connector between the Radio end of the RS232 comms cable, and the Radio. This connector will work with most types of radio, but this is not guaranteed. Pin2=TX; Pin3=RX; Pin5=GND; Pin7=RTS.
3. Refer to 'H2 Comms Settings.' to jumper as per RS232 Radio.
4. Refer to radio manual for hardware handshaking settings for TX control. TXE & TX delay may need to be altered in the Scada Station Advanced Dialog box to suit the radio. Best case TX speed is one transmission per second. (Depends on Radio.) Default settings are: TXE = 25ms; TX = 0ms.
5. If using more than one station at a remote radio site, **2100-RS422** Remote Stations with a 2100-IS with an adaptor kit must be used. (Do not use 2100-RS485.) Refer to 2100-IS installation Guide.

2100-RS232 Remote station.



2100-A₁₆ Station Number Programming and Serial Number.

Important: When commissioning remote stations, you must programme a unique station number before using the programme setup button in the Scada Software. Requires Microscan Version 4.02 onwards.

For detailed programming info, refer to 'Programming 2100-Series Remote Station' in the Microscan Manual.

1. Close the Microscan Scada down and turn the power off to the 2100 422/485 converter. Connect the new Remote Station, referring to 'Wiring and Installation' and 'Commissioning'
2. Turn power back on to the 2100 422/485 converter, and start the 'Setup Manager' in the Microscan Scada.
3. Select 'Recorder Setup', or 'Tag Setup'.
4. Select 'Program Address'. (Located in 'Station Programming Panel', at the bottom right of the window.
5. Enter the 2100-A₁₆ serial number. (Written both on the 2100-A₁₆ cover and the circuit board behind the power supply terminals. 80, 81 & 82. If the cover has been removed, the number on the circuit board is always correct. Replace with the correct cover to avoid future confusion.) Then enter the desired station number.
6. Select 'Program'. The station number will now be stored in 2100-A₁₆ permanent memory.
7. A new station number will be created on the outstation map. This is ready for connection to tags or lines.
8. Restart the Microscan Scada.

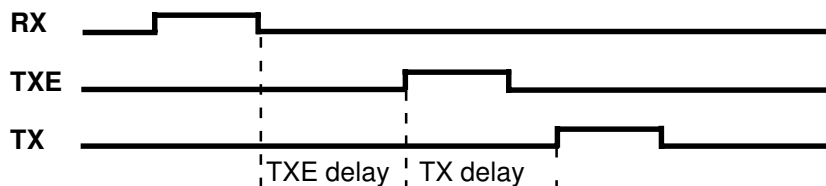
2100-A₁₆ Station Software Programming.

*Requires Microscan Version 4.02 onwards.

1. If the system is already running, close the Scada down. Start the 'Setup Manager'.
2. Select 'Recorder Setup', or 'Tag Setup'.
3. Move to the required station number, using 'next' or 'prev' buttons.
4. Select 'Program Setup'. The serial number of the 2100-A₁₆ will be recalled automatically. The software recalls the settings from the outstation, and displays them in the dialogue box.
5. Enter the required options and select 'Program' to write the data to the station.

2100-A₁₆ 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-A₁₆ Delay Settings Table.

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

Note. All TXE and TX Delays are Software Selectable. The Factory Default TXE Setting is 10(25ms).

Section E. Connecting to a PLC.

Connecting to a PLC as an Intelligent Multiplexer.

To set up the 2100-A₁₆ as an intelligent multiplexer a free software CD is available from Intech Instruments. Place the CD into the drive and follow the instructions. The analogue output mode must be selected as either Mode 3 or Mode 4. This is set in the Station Advanced Dialog Box 'AO 1 & AO 2 button'. For detailed programming info, refer to 'Programming 2100-Series Remote Station' in the Microscan Manual.

Mode 3. 2100-A₁₆ Clock and Reset Channel Selection Mode, PLC Installation Guide.

Mode 3. PLC RTX, CLOCK & RESET Channel Select.

DI COM = CS COM

DI 1 = RESET input.

DI 2 = CLOCK input.

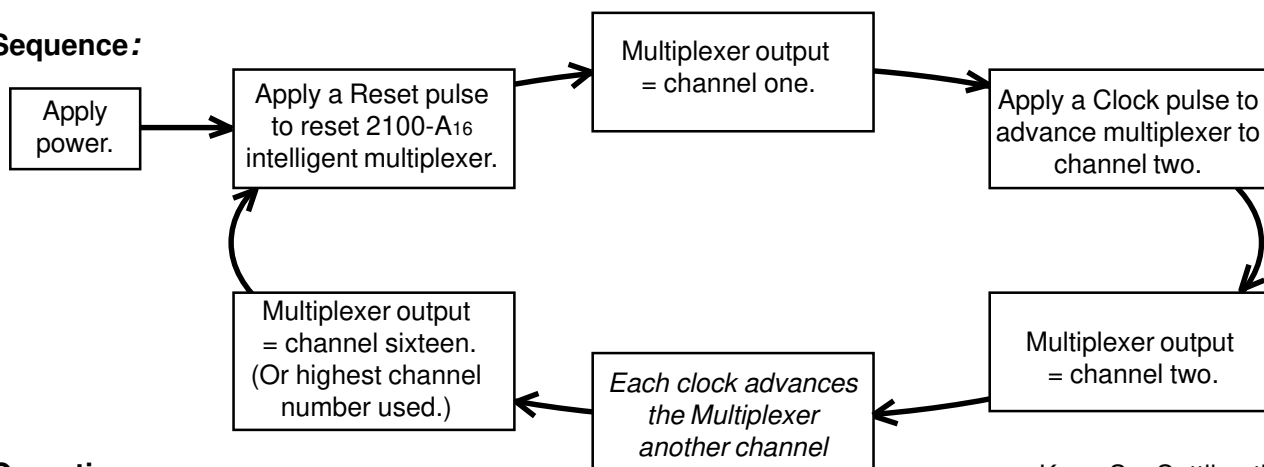
Issue a RESET pulse to select channel 1.

Issue a CLOCK pulse to advance to the next channel.

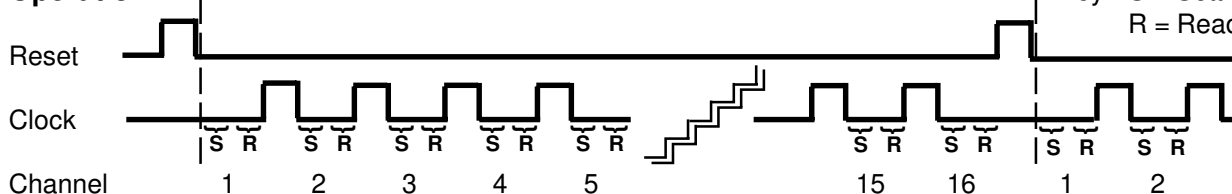
Specifications.

Clocking speed	-Reset pulse length	20msec.
	-Clock pulse length	20msec.
Settling times before reading	100msec Min. Multiple readings with averaging recommended.	
	-Note. Longer times may be required for longer cable lengths and higher resolution.	
Binary signal magnitude	-All models	5~30Vdc.
Cycle Time	4sec minimum to cycle through all 16 inputs.	
Resolution	12bits, 4000 steps typical.	

Sequence:



Operation.



Key: S = Settling time.
R = Read value.

Mode 4. 2100-A₁₆ Binary Channel Selection Mode, PLC installation Guide.

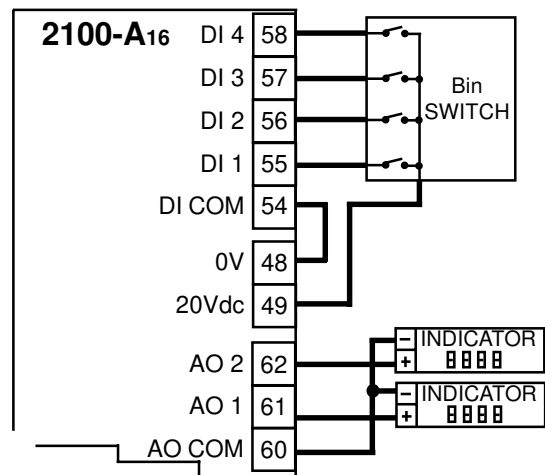
Mode 4. PLC RTX, Bin Channel Select.
 Bin channel selection is by digital inputs 1~4.
 DI COM = CS COM
 DI 1 = BIN 1.
 DI 2 = BIN 2.
 DI 3 = BIN 4.
 DI 4 = BIN 8.

Specifications.

Settling times before reading	-All models	100msec Min. Multiple readings with averaging recommended.
	-Note.	Longer times may be required for longer cable lengths and higher resolution.
Binary signal magnitude	-All models	5~30Vdc.
Cycle Time		4sec minimum to read all 16 inputs.
Resolution		12bits, 4000 steps typical.

2100-A₁₆ Binary Channel Selection Mode Table.

Bin Channel Selection				Retransmission Channel
DI 1 BIN 1	DI 2 BIN 2	DI 3 BIN 4	DI 4 BIN 8	
0	0	0	0	1
1	0	0	0	2
0	1	0	0	3
1	1	0	0	4
0	0	1	0	5
1	0	1	0	6
0	1	1	0	7
1	1	1	0	8
0	0	0	1	9
1	0	0	1	10
0	1	0	1	11
1	1	0	1	12
0	0	1	1	13
1	0	1	1	14
0	1	1	1	15
1	1	1	1	16



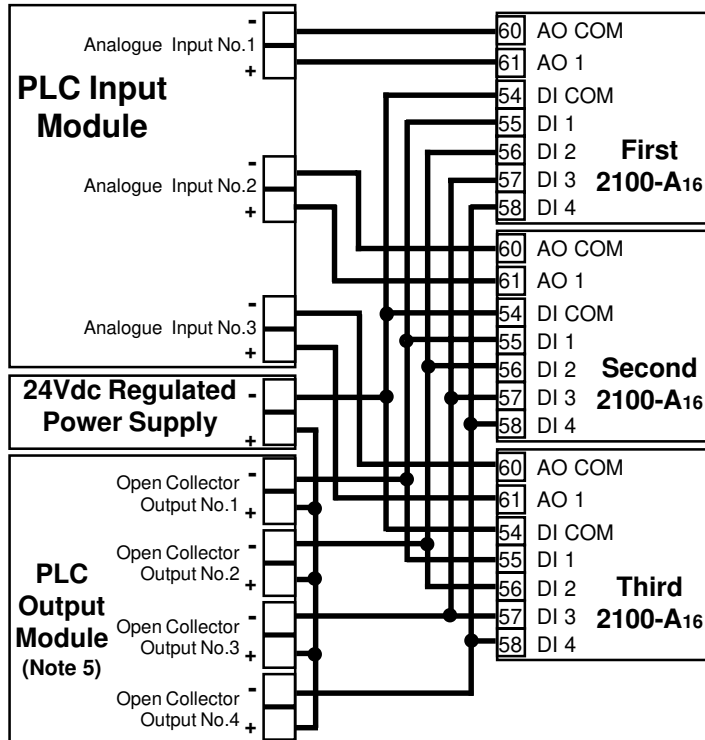
Notes

- Note 1. '0' = No voltage on the terminal.
 '1' = 5~30Vdc on the terminal.
- Note 2. Ensure that if the analogue output from each 2100-A₁₆ is fed into the same unit (eg PLC), then it is recommended the analogue inputs to the PLC, etc, be isolated.
- Note 3. AO 1 = retransmission of input process value 1~16.
 AO 2 = retransmission of controller setpoints 1~16.
- Note 4. The input and output always share the same range. Eg. If input 1 is ranged 0~100C and retransmission channel 1 is selected on DI 1 ~ 4, then AO 1 & AO 2 are both transmitted as 4~20mA (or 0~10V etc) = 0~100C. Similarly if input 2 is ranged for 0~250C, then AO 1 & AO 2 are transmitted as 0~250C.
- Note 5. If AO 1 process value or AO 2 setpoint are transmitted to an indicator, then all the inputs must be ranged the same, unless the indicator is ranged to 0~100%.
- Note 6. In the PLC RTX modes, AO 2 always retransmits the controller setpoint regardless if the controller is enabled or not.
- Note 7. The PLC RTX modes can operate simultaneously with the Scada COMMS, allowing a PLC to read back data that the Scada will be showing.
- Note 8. Digital inputs and digital outputs are not available in this mode.

2100-A₁₆ Used as an Intelligent Multiplexer.

Connection Example 1.

Connection of a 2100-A₁₆ to a PLC with open collectors, commoned to 24V of an external power supply.



Note 1. In this configuration the 2100-A₁₆ DI COM and Digital inputs are isolated from the 2100-A₁₆ inputs and outputs. The 24V external power supply can therefore be used to power transmitters connected to the 2100-A₁₆ inputs.

Note 2. There is no limit to the number of 2100-A₁₆s that can be connected, except the power supply and open collector outputs must be able to handle the load.

Note 3. Each digital input draws 10mA at 24Vdc.

Note 4. All cables must be screened, and the screens earthed at one end only.

Note 5. For Clock/Reset Channel Selection DO NOT connect PLC outputs 3 and 4 to DI 3 and DI 4 of the 2100-A₁₆.

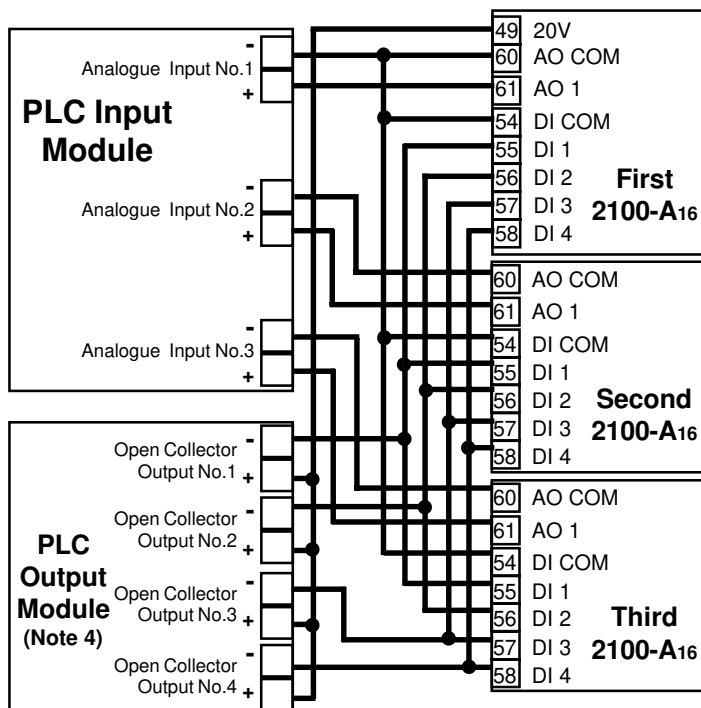
Important: Do not use the 2100-A₁₆ power supply to power up any transmitter or other equipment. An external power supply must be used for this purpose. The 20V supply is for the 2100A₁₆ Digital Inputs/Outputs only.

* For PLC RTX, CLOCK & RESET Channel Selection refer to Section D, Mode 3.

* For PLC RTX, Bin Channel Selection refer to Section D, Mode 4.

Connection Example 2.

Connection of a 2100-A₁₆ to a PLC with open collectors, commoned to the 20V of the first 2100-A₁₆ power supply.



Note 1. Using this configuration, up to four 2100-A₁₆s can be connected using Clock/Reset mode, or 2 using Binary Channel Selection mode, provided the open collector outputs can handle the load.

Note 2. Each Digital input draws 8mA at 20Vdc.

Note 3. All cables must be screened, and the screens earthed at one end only.

Note 4. For Clock/Reset Channel Selection DO NOT connect PLC outputs 3 and 4 to DI 3 and DI 4 of the 2100-A₁₆.

Important: Do not use the 2100-A₁₆ power supply to power up any transmitter or other equipment. An external power supply must be used for this purpose. The 20V supply is for the 2100A₁₆ Digital Inputs/Outputs only.

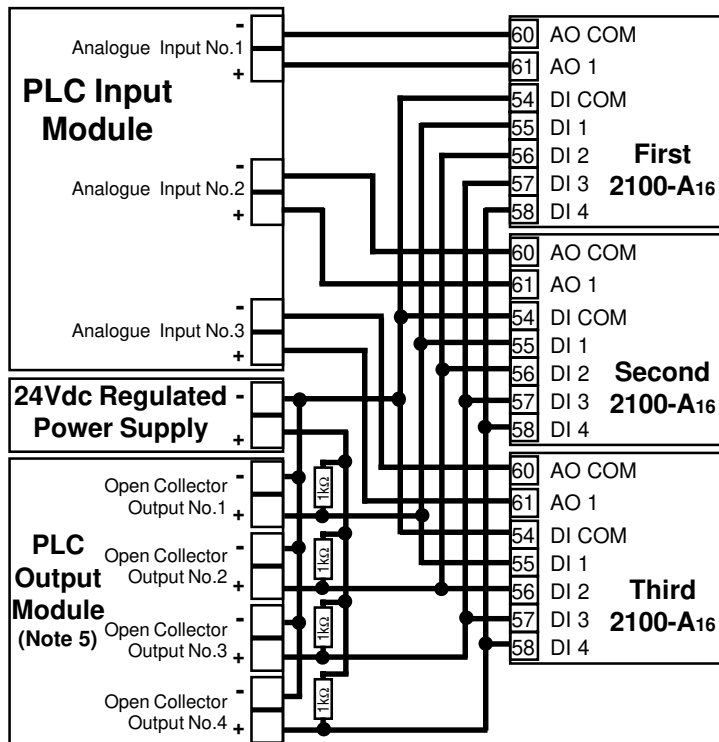
* For PLC RTX, CLOCK & RESET Channel Selection refer to Section D, Mode 3.

* For PLC RTX, Bin Channel Selection refer to Section D, Mode 4.

2100-A₁₆ Used as an Intelligent Multiplexer.

Connection Example 3.

Connection of a 2100-A₁₆ to a PLC with open collectors commoned to 0V of an external power supply.



- Note 1. This configuration reverses the logic so when the PLC digital output is off, the 2100-A₁₆ is on.
- Note 2. With 1kΩ resistor, up to four 2100-A₁₆ can be connected in this configuration, provided the open collector outputs can handle the load.
- Note 3. Each digital input draws 10mA at 24Vdc.
- Note 4. All cables must be screened, and the screens earthed at one end only.
- Note 5. For Clock/Reset Channel Selection DO NOT connect PLC outputs 3 and 4 to DI 3 and DI 4 of the 2100-A₁₆.

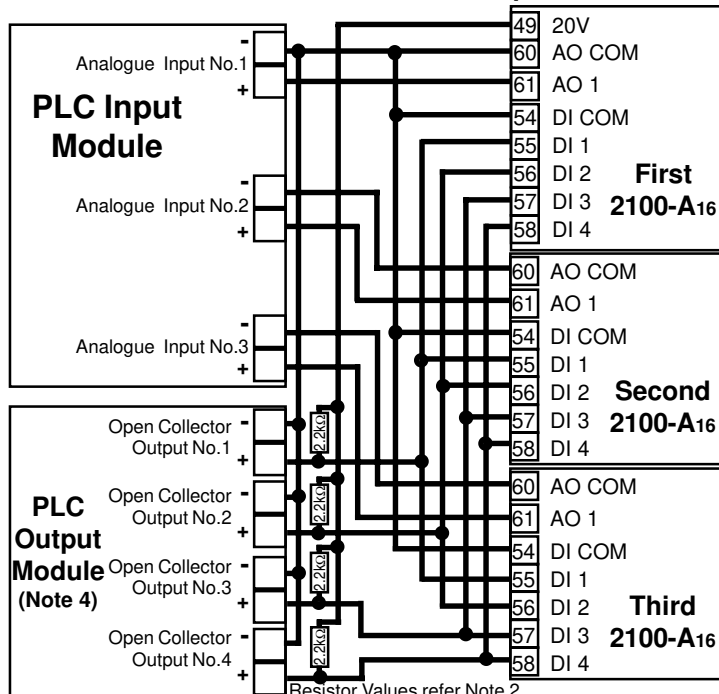
Important: Do not use the 2100-A₁₆ power supply to power up any transmitter or other equipment. An external power supply must be used for this purpose. The 20V supply is for the 2100A₁₆ Digital Inputs/Outputs only.

* For PLC RTX, CLOCK & RESET Channel Selection refer to Section D, Mode 3.

* For PLC RTX, Bin Channel Selection refer to Section D, Mode 4.

Connection Example 4.

Connection of a 2100-A₁₆ to a PLC with open collectors, commoned to the COM of the first 2100-A₁₆.



- Note 1. This configuration reverses the logic so when the PLC digital output is off, the 2100-A₁₆ is on.
- Note 2. For Clock/Reset Channel Selection the resistors = 1kΩ. Up to four 2100-A₁₆ can be connected in this configuration provided the open collectors can handle the load. For Binary Channel Selection the resistor = 2.2kΩ. Up to two 2100-A₁₆ can be connected in this configuration provided the open collectors can handle the load.
- Note 3. All cables must be screened, and the screens earthed at one end only.
- Note 4. For Clock/Reset Channel Selection DO NOT connect PLC outputs 3 and 4 to DI 3 and DI 4 of the 2100-A₁₆.

Important: Do not use the 2100-A₁₆ power supply to power up any transmitter or other equipment. An external power supply must be used for this purpose. The 20V supply is for the 2100A₁₆ Digital Inputs/Outputs only.

* For PLC RTX, CLOCK & RESET Channel Selection refer to Section D, Mode 3.

* For PLC RTX, Bin Channel Selection refer to Section D, Mode 4.

2100-A₁₆ Rev. 1 PLC RTX Fail Safe System

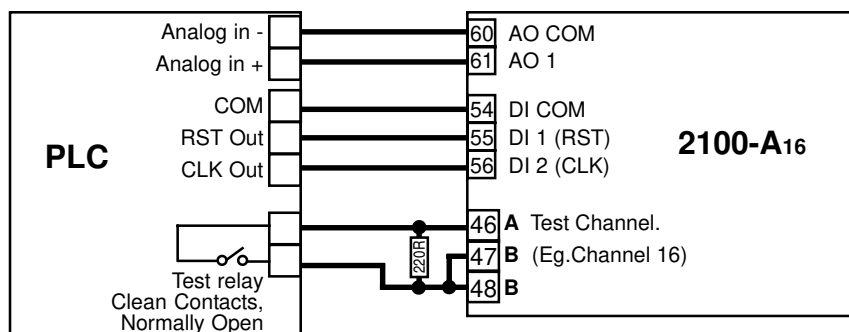
The PLC uses one channel of the 2100-A₁₆ to verify that the A16 is reading the channel correctly, AO1 is working and the clock and reset/BCD channel select is working.

Test Channel = spare channel on 2100-A₁₆, set to RTD 0-850C. This has a PLC relay connected which is used to short out A-B, under the PLCs command. Do not use channel 1 as the test channel.

Sequence of operation.

1. The PLC reads the required channels as normal.
2. The PLC then advances to the test channel (the next free channel or channel 16)
3. The test channel is read.
4. The relay changes state to alter the reading of the test channel.
5. 1. to 4. are repeated. If the reading on the test channel does not alternate between 4 mA and 10 mA as the relay changes state, within the specified tolerances as listed below then there is a fault in the system. The PLC software should be setup to detect these values as the relay changes state.

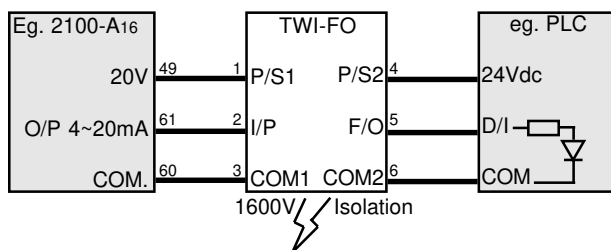
Relay State	Test Channel Reading	Output Value	PLC Test Value
Closed	Less than -15C	4mA	Test for 5mA and below.
Open	Approx 320 +/-10C	10mA	Test for above 9.5mA and below 10.5mA.



2100-A₁₆ Analogue Signal Converted to Frequency for a PLC, using a TWI-FO.

Description.

The TWI-FO converts 4~20mA from a 2100-AO to a frequency output. (Typically 10~1010Hz, but this is rangeable.) A PLC with two digital outputs and one digital input can receive sixteen multiplexed analogue inputs.



Section F. Communications.

2100-A₁₆ 'PLC Message' Communication Protocol.

'Read Only From 2100-A₁₆' and 'Read and Write to 2100-A₁₆' Protocols are both available from Intech Instruments in 'WORD' format, free of charge.

Read Message is PLC compatible read DM area. 2100-A₁₆ protocol is the protocol used by Microscan to access data in stations. Both protocols use ASCII, except 2100-A₁₆ uses IEEE754 to represent floating point numbers.

2100-A₁₆ 'Modbus RTU/TCP' Communication Protocol.

Note 1: This section only applies to an 2100-A₁₆ with Modbus RTU Protocol.

Note 2: Can be used on Modbus TCP with a Modbus TCP to RTU Bridge. ie Schneider Electric '174 CEV 300 20'.

Note 3: 2100-ME Memory Board cannot be used when Modbus RTU protocol is used.

Modbus RTU Comms Specifications:

Error Check	Standard Modbus CRC.
End of message framing delay	Min 5msec, Max 7.5msec. (Minimum spec is 3.5msec at 9600 baud). Counting is based on internal 2.5 msec timer.

Product Liability. Due to ongoing research and development, designs, specifications, and documentation are subject to change without notification.

2100-A16 Modbus RTU Station Addresses.

Station addresses 1-64. The station number is programmed via the Program Address dialog box, which ties a station number to the serial number of the station which the modbus protocol then uses. The Factory set default station number for all stations is station #1. Station 0, broadcast commands are not supported.

Station address and input range configuration etc are set using the Micro Scan Station Programming software. Setup of onboard station controllers and other station parameters supported in eeprom are also set via the programming dialog boxes. These parameters are not accessible via the protocol.

The station can be tested with the Stations test dialog box which shows the current values of the inputs and relay states, analogue output values can be set.

Using the Modbus Protocol.



CAUTION: Dangerous Voltages may be present. The 2100-A16 has no user serviceable parts. Protective enclosure only to be opened by qualified personnel. Remove ALL power sources before removing protective cover.



* **For ALL programming tables.** Jumper Status: **0=JUMPER NOT INSERTED 1=JUMPER INSERTED.**

* Refer to '2100-A16 Terminals and Layout' for the location of the following jumpers and switches.

Use the station programming dialog boxes to set the address of the unit and the ranges of inputs etc. Then power down unit, insert jumper in position S1-5/6 and power up unit. It is then ready for Modbus RTU/TCP use. RTU/TCP mode is not recognized unless a power up occurs with S1-5/6 jumper in. The station will not recognise programming message when S1-5/6=1.

To use again via programming dialog boxes, power down the unit, remove jumper S1-6, and power the unit back up.

2100-A16 S1-5 and S1-6 Jumper. Also refer S1 Function Jumper Settings.

S1-5 Jumper	
0	Standard Protocol
1	Modbus TCP Protocol Only (NET)

S1-6 Jumper	
0	Standard Protocol, Omron PLC Message
1	Modbus RTU Protocol Only RS232C/422/485

- Note 1. If using Modbus 485, put Comms jumper in 485 mode. I.e. H2; L3 & L4 jumpers in. Refer to 'H2 Comms Jumper Settings'.
- Note 2. The retransmission modes of AO1, AO2 can be used when the Modbus RTU protocol is used.
- Note 3. Rev 1.3 ONLY.

2100-A16 Modbus RTU/TCP Address Map.

Coil Addresses			
Coil (000xx)	Ouput	Coil (000xx)	Ouput
01	Internal Relay 1		
02	Internal Relay 2		
03-16	Reserved		
17	2100-R2 #1 Relay 1	33	2100-R2 #2 Relay 1
18	2100-R2 #1 Relay 2	34	2100-R2 #2 Relay 2
19	2100-R2 #1 Relay 3	35	2100-R2 #2 Relay 3
20	2100-R2 #1 Relay 4	36	2100-R2 #2 Relay 4
21	2100-R2 #1 Relay 5	37	2100-R2 #2 Relay 5
22	2100-R2 #1 Relay 6	38	2100-R2 #2 Relay 6
23	2100-R2 #1 Relay 7	39	2100-R2 #2 Relay 7
24	2100-R2 #1 Relay 8	40	2100-R2 #2 Relay 8
25	2100-R2 #1 Relay 9	41	2100-R2 #2 Relay 9
26	2100-R2 #1 Relay 10	42	2100-R2 #2 Relay 10
27	2100-R2 #1 Relay 11	43	2100-R2 #2 Relay 11
28	2100-R2 #1 Relay 12	44	2100-R2 #2 Relay 12
29	2100-R2 #1 Relay 13	45	2100-R2 #2 Relay 13
30	2100-R2 #1 Relay 14	46	2100-R2 #2 Relay 14
31	2100-R2 #1 Relay 15	47	2100-R2 #2 Relay 15
32	2100-R2 #1 Relay 16	48	2100-R2 #2 Relay 16

- Note 1: 2100-R2 must be fitted to access 2100-R2 relays 1-16, plus 2100-R2 enabled on Station Programming advanced dialog box.
- Note 2: Coils 3~16 reserved for future expansion.

2100-A16 Modbus RTU/TCP Inputs.

Digital Inputs	
Inputs (1 XXXX)	
10001	Digital Input 1
10002	Digital Input 2
10003	Digital Input 3
10004	Digital Input 4
10005-10016	Reserved

- Note: Inputs 5~16 reserved for future expansion.

2100-A₁₆ Input RTU/TCP Registers.

Input Registers			
(3XXXX, 4XXXX)		(3XXXX, 4XXXX)	
30001	Input 1 (12 Bit 000-FFF) * Note 1	30071	Mux 2 Input 7 (12 Bit 000-FFF)
30002	Input 2 (12 Bit 000-FFF) * Note 1	30072	Mux 2 Input 8 (12 Bit 000-FFF)
30003	Input 3 (12 Bit 000-FFF) * Note 1	30073	Mux 2 Input 9 (12 Bit 000-FFF)
30004	Input 4 (12 Bit 000-FFF) * Note 1	30074	Mux 2 Input 10 (12 Bit 000-FFF)
30005	Input 5 (12 Bit 000-FFF) * Note 1	30075	Mux 2 Input 11 (12 Bit 000-FFF)
30006	Input 6 (12 Bit 000-FFF) * Note 1	30076	Mux 2 Input 12 (12 Bit 000-FFF)
30007	Input 7 (12 Bit 000-FFF) * Note 1	30077	Mux 2 Input 13 (12 Bit 000-FFF)
30008	Input 8 (12 Bit 000-FFF) * Note 1	30078	Mux 2 Input 14 (12 Bit 000-FFF)
30009	Input 9 (12 Bit 000-FFF) * Note 1	30079	Mux 2 Input 15 (12 Bit 000-FFF)
30010	Input 10 (12 Bit 000-FFF) * Note 1	30080	Mux 2 Input 16 (12 Bit 000-FFF)
30011	Input 11 (12 Bit 000-FFF) * Note 1	30081	Mux 3 Input 1 (12 Bit 000-FFF)
30012	Input 12 (12 Bit 000-FFF) * Note 1	30082	Mux 3 Input 2 (12 Bit 000-FFF)
30013	Input 13 (12 Bit 000-FFF) * Note 1	30083	Mux 3 Input 3 (12 Bit 000-FFF)
30014	Input 14 (12 Bit 000-FFF) * Note 1	30084	Mux 3 Input 4 (12 Bit 000-FFF)
30015	Input 15 (12 Bit 000-FFF) * Note 1	30085	Mux 3 Input 5 (12 Bit 000-FFF)
30016	Input 16 (12 Bit 000-FFF) * Note 1	30086	Mux 3 Input 6 (12 Bit 000-FFF)
30017	Input 1 (IEEE 754 - 2 Words)	30087	Mux 3 Input 7 (12 Bit 000-FFF)
30019	Input 2 (IEEE 754 - 2 Words)	30088	Mux 3 Input 8 (12 Bit 000-FFF)
30021	Input 3 (IEEE 754 - 2 Words)	30089	Mux 3 Input 9 (12 Bit 000-FFF)
30023	Input 4 (IEEE 754 - 2 Words)	30090	Mux 3 Input 10 (12 Bit 000-FFF)
30025	Input 5 (IEEE 754 - 2 Words)	30091	Mux 3 Input 11 (12 Bit 000-FFF)
30027	Input 6 (IEEE 754 - 2 Words)	30092	Mux 3 Input 12 (12 Bit 000-FFF)
30029	Input 7 (IEEE 754 - 2 Words)	30093	Mux 3 Input 13 (12 Bit 000-FFF)
30031	Input 8 (IEEE 754 - 2 Words)	30094	Mux 3 Input 14 (12 Bit 000-FFF)
30033	Input 9 (IEEE 754 - 2 Words)	30095	Mux 3 Input 15 (12 Bit 000-FFF)
30035	Input 10 (IEEE 754 - 2 Words)	30096	Mux 3 Input 16 (12 Bit 000-FFF)
30037	Input 11 (IEEE 754 - 2 Words)	30097	Mux 4 Input 1 (12 Bit 000-FFF)
30039	Input 12 (IEEE 754 - 2 Words)	30098	Mux 4 Input 2 (12 Bit 000-FFF)
30041	Input 13 (IEEE 754 - 2 Words)	30099	Mux 4 Input 3 (12 Bit 000-FFF)
30043	Input 14 (IEEE 754 - 2 Words)	30100	Mux 4 Input 4 (12 Bit 000-FFF)
30045	Input 15 (IEEE 754 - 2 Words)	30101	Mux 4 Input 5 (12 Bit 000-FFF)
30047	Input 16 (IEEE 754 - 2 Words)	30102	Mux 4 Input 6 (12 Bit 000-FFF)
30049	Mux 1 Input 1 (12 Bit 000-FFF)	30103	Mux 4 Input 7 (12 Bit 000-FFF)
30050	Mux 1 Input 2 (12 Bit 000-FFF)	30104	Mux 4 Input 8 (12 Bit 000-FFF)
30051	Mux 1 Input 3 (12 Bit 000-FFF)	30105	Mux 4 Input 9 (12 Bit 000-FFF)
30052	Mux 1 Input 4 (12 Bit 000-FFF)	30106	Mux 4 Input 10 (12 Bit 000-FFF)
30053	Mux 1 Input 5 (12 Bit 000-FFF)	30107	Mux 4 Input 11 (12 Bit 000-FFF)
30054	Mux 1 Input 6 (12 Bit 000-FFF)	30108	Mux 4 Input 12 (12 Bit 000-FFF)
30055	Mux 1 Input 7 (12 Bit 000-FFF)	30109	Mux 4 Input 13 (12 Bit 000-FFF)
30056	Mux 1 Input 8 (12 Bit 000-FFF)	30110	Mux 4 Input 14 (12 Bit 000-FFF)
30057	Mux 1 Input 9 (12 Bit 000-FFF)	30111	Mux 4 Input 15 (12 Bit 000-FFF)
30058	Mux 1 Input 10 (12 Bit 000-FFF)	30112	Mux 4 Input 16 (12 Bit 000-FFF)
30059	Mux 1 Input 11 (12 Bit 000-FFF)	30113	Counter 1 (0-FFFF) * Note 2
30060	Mux 1 Input 12 (12 Bit 000-FFF)	30114	Counter 2 (0-FFFF) * Note 2
30061	Mux 1 Input 13 (12 Bit 000-FFF)	30115	Counter 3 (0-FFFF) * Note 2
30062	Mux 1 Input 14 (12 Bit 000-FFF)	30116	Counter 4 (0-FFFF) * Note 2
30063	Mux 1 Input 15 (12 Bit 000-FFF)	30117,40117	Analogue Out 1 (0-FFF) * Note 3
30064	Mux 1 Input 16 (12 Bit 000-FFF)	30118,40118	Analogue Out 2 (0-FFF) * Note 3
30065	Mux 2 Input 1 (12 Bit 000-FFF)	30119	Reserved
30066	Mux 2 Input 2 (12 Bit 000-FFF)	30120	Reserved
30067	Mux 2 Input 3 (12 Bit 000-FFF)	30121	Ambient Sensor (IEEE754 - 2 Words)
30068	Mux 2 Input 4 (12 Bit 000-FFF)		
30069	Mux 2 Input 5 (12 Bit 000-FFF)		
30070	Mux 2 Input 6 (12 Bit 000-FFF)		

Note: The multiplexers 1-4 cannot be used if the stations Analogue outs AO1 & AO2 are used for general purpose outputs or retransmission controls.

2100-A16 Modbus Notes.

Note 1: Analogue Inputs 1-16 scaling

0-FFF = 0-4095, which is ranged according to the range selected for each input.

For RTD -25 to +25 , then 0 =-25, 4095=+25,

For RTD 0 to +25 , then 0 =0, 4095=+25,

For DCXX range =0 to 100 %, 0=0 %, 4095= 100 %.

Note 2: Counter Inputs

Value ranges from 0-FFFF which is 0 - 65535.

Max speed 50 Hz.

Count value is reset to zero on power up.

Note 3: Analogue Outputs.

Mode is set in Station programming dialog box, Advanced, AO1 & AO2 mode.

Mode 1 is Multiplexer output (AO1, AO2 drive 2100-M only)

Mode 2 is SCADA outputs, AO1,AO2 can be set via protocol.

Mode 3 is retransmission of input to AO1, clock and reset channel selection

Mode 4 is retransmission of input to AO1, binary channel selection

If AO1 and AO2 are used for driving 2100-M units, do not write the analogue out value using the RTU messages as it will interfere with the 2100-M driver.

30117,30118=Read Only

40117,40118=Read/Write

Note 4: Analogue Input Speed.

Inputs are scanned sequentially by the A16, a read of the data locations, reads the last value read and does not force the A16 to read the inputs requested by the protocol read. The normal read speed with all sixteen inputs is 4 channels/second. Channels that are not scanned can be disabled via the station programming dialog boxes. To speed up operation for multiplexer mode, set the Scan Mode on the advanced dialog box to Multiplexer Priority.

Supported Modbus Commands.

Modbus Commands	
Command	
Read Coil	01 (0xxxx)
Force Single Coil	05 (0xxxx)
Force Multiple Coil	15 (0xxxx)
Read Input	02 (1xxxx)
Read Input Register	04 (3xxxx)
Read Holding Register	03 (4xxxx)
Write Holding Register	06 (4xxxx)
Write Multiple Holding Register	16 (4xxxx)

Notes:

Maximum length of modbus command = 32 bytes.

Maximum length of modbus reply = 80 bytes.

CITECH Floating Point Format.

Floating Point Byte Order = 1 (3,2,1,0)

CITECH.INI

[Modbus]

FloatMode=1

Set Using modbus help in Citech help file.

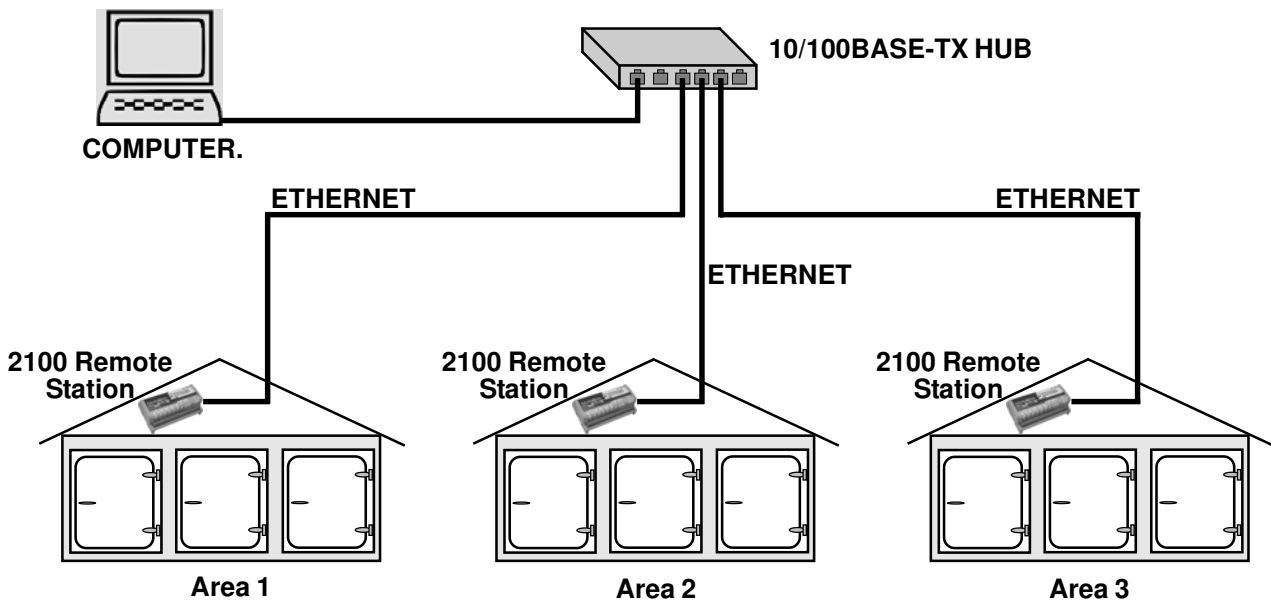
2100-A16-NET Ethernet 10/100.

The Ethernet converter on the 2100-A16-NET, the XPort, uses the Ethernet Protocol (IP) for network communications and the Transmission Control Protocol (TCP) to assure that no data is lost or duplicated, and that everything sent to the connection arrives at the correct target.

Ethernet	-Interface	RJ45 10Base-T & 100Base-TX Autosensing.
	-Compatibility	IEEE802.3
	-LEDs	10Base-T & 100Base-TX Activity; Full/Half Duplex.

Connection Example of Multiple 2100-A₁₆-NET connected to an Ethernet 10/100Base-TX Hub.

Used in situations with multiple 2100-A₁₆-NET in a plant.



2100-A₁₆-NET Software Installation.

Software for use with the 2100-A₁₆-NET is available off the Intech Website; www.intech.co.nz

The software on a separate CD can be supplied on request.

Factory Set IP Address is: 192.168.1.100

Factory Set Port is: 10001

1. Install the XPORT Installer. This is used to setup the XPORT, which is the Ethernet converter on the 2100-A₁₆-NET. This software does not need to be Installed on the end users PC, if the 2100-A₁₆-NET is setup before hand. If the 2100-A₁₆-NET is setup on site, the XPORT installer will need to be used onsite.

Note 1: This software is to be installed and/or setup by the Installer with Network IT support staff. Intech will not be able to help with the setup and operation of a TCP/IP network and assigning of IP addresses. As part of commissioning IT support staff should assign a static address to each 2100-A₁₆-NET. The 2100-A₁₆-NET should be listed as part of the Ethernet system for support by the IT support staff.

Note 2: Installed antivirus software may interfere with the sockets operations. You may need to open the IP address and port numbers for the commands to go through. We have found problems with Nortons system Works 2003, and found it necessary to disable email scanning of messages, as this was blocking the sockets requests. These problems may or may not exist on other antivirus programs.

Note 3: The Ethernet converter (XPORT) on the 2100-A₁₆-NET only allows one computer communications connection at one time. It is not possible to have multiple computers permanently communicating to the 2100-A₁₆-NET. The computers must share the 2100-A₁₆-NET by connecting and disconnecting as required.

For TCP connection; Sockets = 1.

2100-A₁₆-NET Troubleshooting.

Duplicate 0xFF Characters, port numbers 14001 -14009.

Do not use port numbers 14001-14009 with Modbus RTU/TCP protocol or other binary based protocols.

With these port numbers, the 0xFF characters get duplicated, and two 0xFF characters will appear for each 0xFF actually sent.

Description of 2100-A₁₆-NET Ethernet LED Functions.

2100-A ₁₆ -NET Ethernet L1 & L2 LED Functions		
L1 LED	Original Xport 01	New XPORT 03
Off	No 100Base Tx Link	No Activity
Solid Amber	Half Duplex 100Base Tx Link	
Blinking Amber	Half Duplex 100Base Tx Activity	Half Duplex Activity
Solid Green	Full Duplex 100Base Tx Link	
Blinking Green	Full Duplex 100Base Tx Activity	Full Duplex Activity
L2 LED	Original Xport 01	New XPORT 03
Off	No 10Base T Link	No Link
Solid Amber	Half Duplex 10Base T Link	10Base T
Blinking Amber	Half Duplex 10Base T Activity	
Solid Green	Full Duplex 10Base T Link	100Base Tx
Blinking Green	Full Duplex 10Base T Activity	

L1 LED is the LED closest to terminal 48.

L2 LED is the LED closest to terminal 80.

Cautions on Ethernet Port.

- (1) Make sure that the Ethernet cable/plug is not physically damaged before insertion into the Ethernet port.
Eg Burred on plastic edges
- (2) Damage to the Ethernet port pins is not covered under warranty.

Section G. Wiring, Installation and Maintenance.

2100-A₁₆ Wiring and Installation.

THE 2100-A₁₆ IS TO BE INSTALLED AND SERVICED BY SERVICE PERSONNEL ONLY. NO OPERATOR / USER SERVICEABLE PARTS.

All power and signals must be de-energised before connecting any wiring, or altering any Jumpers or Dip Switches. Do not start the Microscan before programming in a unique station number. Refer 'Station Number Programming and Serial Number'.

Mounting.

* Also refer to Connection Diagrams and Notes.

- (1) Mount in a clean environment in an electrical cabinet on 35mm Symmetrical mounting rail.
- (2) Draft holes must have minimum free air space of 20mm. Foreign matter must not enter or block the draft holes.
- (3) Do not subject to vibration or excess temperature or humidity variations.
- (4) Avoid mounting in cabinets with power control equipment.
- (5) To maintain compliance with the EMC Directives the 2100-A₆ 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.

Cover Removal and Fitting.

To remove 2100 covers, firmly push down the button in the middle of one endplate, and pull the end plate outwards, while pulling the cover up and out.

To fit the cover, first make sure the cover is being fitted the correct way around, (Terminal 82 on the cover is above 82 on the board.) and that the serial number on the board matches the serial number on the cover (if applicable). Slide one end of the cover into the slot in the endplate. Pull the other endplate outwards and push the cover down until it slides into the slot of this endplate. Check both ends are firmly held.

Power Supply Wiring.

- (1) A readily accessible disconnect device and a 1A, 250Vac overcurrent device, must be in the power supply wiring.
- (2) Any 2100-R2 connected to the 2100-A₁₆, 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 grey 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.

2100-A16 Wiring and Installation Continued.

RS422/485 Comms Signal 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 @ 50kHz @ 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 tested 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.
- (10) All unused twisted pairs should be terminated at both ends with 1kΩ resistors. DO NOT ground unused pairs.

Ethernet Cabling.

Category 5 (Cat 5) or better (eg Cat5e or Cat6) cable is required for 100Mbps fast Ethernet transmission. The 2100-NET uses a standard RJ45 Connector.

2100-A16-NET or 2100-NET Ethernet Port.

When powering up the 2100-A16-NET or 2100-NET, with the Ethernet plug connected, the GREEN LED or the ORANGE LED should light immediately, indicating a good network connection.

Cautions Using Differential Inputs.

All 2100-A16 analogue inputs, mA, mV, V, T/C (except RTD) are differential. Exceeding 18V peak between any 2 inputs, or any single input will cause errors on ALL channels. Failure to install a jumper on mA inputs will cause errors on ALL channels.

Inputs can be changed from differential to single ended (referenced to 0V) by shorting 'B' 'B' terminals together. For inputs with excessive noise and 3-wire AC valve motors this may help to stabilise the input signal. Use caution when doing this, as unless the inputs are at the same potential large earth currents will flow through the 0V rail causing errors on ALL channels. Refer to your distributor for more detailed information.

Where ground loops, excessive noise or excessive voltage is present between any two inputs, or on any single input, suitable isolating transmitters are required, otherwise errors in signal readings will occur on ALL channels.

Cautions Using Analogue Outputs.

If the analogue outputs connect into non-isolated other units, it is recommended that suitable isolating transmitters be used on the analogue outputs. Failure to use isolating transmitters to non-isolated other units which cannot reference to AO COM will cause errors on ALL analogue outputs and inputs. (AO COM is the same potential as 0V.)

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.

RTDs.

- (1) Avoid locating the RTD where it will be in a direct flame.
- (2) Locate it where the average temperature will be measured. It should be representative of the mass.
- (3) Immerse the RTD far enough so that the measuring point is entirely in the temperature to be measured; nine to ten times the diameter of the protection tube is recommended. Heat that is conducted away from the measuring point causes an error in reading.

Thermocouple Extension Wire.

- (1) Use the correct thermocouple extension or compensation cable. i.e. Thermocouple type, insulation type, correct colour coding.
- (2) It is recommended to install extension or compensation cable in a grounded conduit by themselves, or use overall screened cable with the screen earthed at one end only. Never run electrical wires in the same conduit.
- (3) All wires that must be spliced should be soldered, or a proper thermocouple termination block used.
- (4) Lightning arrestors should be used if there is a chance from this source.

Thermocouples.

- (1) Avoid locating the thermocouple where it will be in a direct flame.
- (2) Never insert a porcelain or refractory tube suddenly in a hot area. Pre-heat gradually while installing.
- (3) Locate it where the average temperature will be measured. It should be representative of the mass. If necessary use several thermocouples to obtain the average temperature.
- (4) Immerse the thermocouple far enough so that the measuring junction is entirely in the temperature to be measured: nine to ten times the diameter of the protection tube is recommended. Heat conducted away from the junction causes an error in reading.
- (5) If the thermocouple is mounted horizontally and the temperature is above the softening point of the tube, a support should be provided to prevent the tube sagging. Otherwise install the tube vertically.
- (6) Keep the junction head and cold junction in the approximation of the ambient temperature. Especially in the Noble Metal Class.
- (7) On open circuit thermocouples (T/C) floats to ambient $\pm 10^{\circ}\text{C}$ typical. For upscale or downscale drive resistors must be fitted externally. Refer to '2100-A16 Input Connection Diagram Thermocouple Upscale (US) / Downscale (DS) Drive.' If ground loops or excessive noise are present on the T/C inputs, or between T/C and other inputs, the readings may not be accurate, and an open circuit T/C may not drive as expected. In these situations an isolating transmitter must be used.

2100-A16 Commissioning.

- (1) Check that the 2100-A16 has been set up to the right input 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-A16, the loops, sensors, 2100-Rs and 2100-Ms. Allow a 5 minute warm-up period - longer for thermocouples - refer to Input Connection Diagram for Thermocouple Inputs, Note 3 & 4.
Note 1. There is a 15sec initialisation period when the 2100-A16 is powered up, before it will communicate.
Note 2. For maximum accuracy allow a 6 hour warm up period.
Note 3. If T/C upscale or downscale drive resistors have been fitted, check that each channel drives to the desired level on open circuit.
- (3) For Clock/Reset Channel Selection:
Check that the red LEDs on the 2100-A16 and 2100-M are flashing. The LED next to the Clock terminal (62) should flash 16 times faster than the LED next to the Reset terminal (61). For each Clock or Reset pulse received the respective LED on the 2100-A16 and 2100-M will go from OFF to ON to OFF. If a Clock or Reset line is held high, the respective LED will remain ON. If a Clock or Reset line is held low, the respective LED will remain OFF.
- (4) 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 or PLC, for that channel. Adjust for any differences in the software of the system.
- (5) Ethernet Only; The GREEN and ORANGE LEDS of the Ethernet port light up according to the devices operation. Refer to "Description of Ethernet LED Functions." Refer to Ethernet 10/100 section, page 23, for more details.
- (6) RTD Inputs only; A small error can occur due to differences in cable resistance in the RTD legs, and errors in the RTD itself. (Usually less than 0.5°C). To check the variable being measured use a calibration standard RTD at the same immersion depth. If the Zero error is large, the readings are fluctuating or a Zero error has suddenly appeared after the 2100-A16 has been operating for some time, there could be an earth loop between two or more RTD sensors on the 2100-A16 (or between 2100-Ms if connected). Disconnect each RTD sensor individually from the 2100-A16, and 'Megger' the RTD by shorting all three wires together and testing from this point to earth. If a path to earth is found repair or replace the faulty RTD sensor or probe.
Warning: Do not 'Megger' RTDs while connected to the 2100-A16. Damage to the 2100-A16 or 2100-M will result.
- (7) Thermocouple Inputs Only; Due to the limits of error in a standard thermocouple probe, and standard extension wire and compensating wire, an error can occur. For example in a type K thermocouple installation an error of 2.2°C or 0.75% FSO can occur (whichever is greater). To check the temperature being measured use a calibration standard thermocouple at the same immersion depth.

2100-A₁₆ Maintenance.

Voltage and Current Inputs.

- (1) Repeat (4) of commissioning. Do it regularly - at least once every twelve months.

RTD Inputs.

- (1) Repeat (4) of commissioning. Do it regularly - at least once every six months.
- (2) Replace defective protection tubes - even if they look good they may not be air or gas tight.
- (3) Check cables entering the RTD sensor head.

Thermocouple Inputs.

- (1) Repeat (4) of commissioning. Do it regularly - at least once a month.
- (2) Replace defective protection tubes - even if they look good they may not be air or gas tight.
- (3) Check extension and compensating cable circuits.
- (4) Do not use the same chromel-alumel (Type K) thermocouple below 540C if it was used above 860C.