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# INTECH Micro

## 2100-D REV. 1.1



# Installation Guide.

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**Section A:**  
**2100-D Installation Guide Index.**

**Section A. Description, Ordering and Specifications.**

Index.	Page 2
Features and Ordering Information.	Page 3
Specifications.	Page 4
Terminals and layout.	Page 5
Dimensions.	Page 6

**Section B: Jumpers and LED Functions Tables.**

S1 Function Settings.	Page 6
H1 Power Supply Settings.	Page 6
H2 Comms Settings.	Page 6
LED Descriptions.	Page 6

**Section C. Connection Diagrams.**

Connection Example Diagram for Digital Outputs.	Page 7
Connection Example Diagram for Digital Inputs.	Page 7

**Section D: Comms Connection Diagrams and Software Settings.**

RS485 Serial Connection.	Page 8
RS422 Serial Connection.	Page 8
RS232 Serial Connection.	Page 9
Communication Protocols	Page 9
Station Number Programming and Serial Number.	Page 10
Station Software Programming.	Page 10
TXE and TX Delay Settings and Table.	Page 10

**Section E. Wiring and Installation.**

Mounting.	Page 11
Cover Removal and Fitting	Page 11
Power Supply Wiring.	Page 11
RS422/485 Comms Signal Cabling.	Page 11
Analogue Signal Wiring.	Page 12
Commissioning.	Page 12

# INTECH Micro

## 2100-D Rev 1.1

12 Channel, Isolated  
Digital Inputs.

12 Channel, Isolated  
Digital Outputs.

### Features.

- 12 Digital, Isolated, Optocoupler Inputs.
- 12 Digital, Isolated, Relay Outputs.
- RS422/RS485 Upto 1200m.
- RS232 Cost Effective Radio Installation.
- RS232 Cost Effective PC IO Expansion.
- Selectable Baud Rates.
- Digital Inputs:
  - State or Count.
  - Speeds to 500Hz.
- Easy Programming Via Microscan Maps.
- Programmable Station Number.
- Scaled Rate Value Via Microscan Recorder.
- Scaled Totaliser Value Via Microscan Recorder.
- Programmable Relay States - NO or NC.
- Comms Failure Time-out Using Relay 12.
- 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.



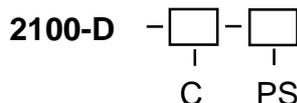
2100 models include:  
2100-4S : RS422 to RS485 Converter.  
2100-A16 :16AI, 4DI, 2 Relay Out, 2 AO.  
2100-A4 :4AI, 4DI, 4 Relay Out, 2 AO.  
2100-A4e :4AI, 4DI, 8 Relay Out, 2 AO.  
2100-AO :8 AO, 8 AI, 12 DI, 2 Relay Out.  
2100-D :12DI, 12 Relay Out.  
2100-IS :Isolated RS232 to RS422/485.  
2100-M :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-R :16 Relay Expansion for 2100-A.  
2100-RL2 :2 Relay Expansion for 2100-A.

### Ordering Information.

**2100-D-X** Standard Unit: 12 Digital Inputs and 12 Digital Outputs. RS485 COMMS, 85~264Vac/dc Power Supply.

**2100-DI-X** 12 Digital Inputs: RS485 COMMS, 85~264Vac/dc Power Supply.

**2100-DO-X** 12 Digital Outputs: RS485 COMMS, 85~264Vac/dc Power Supply.



Ranging Options for 2100-D			
COMMS	C	Power Supply	PS <sup>(3)</sup>
RS232	232 <sup>(1)</sup>	85~264Vac/dc	H
RS422	422	23~90Vdc	M
RS485	485	10~28Vac/dc	L

Note 1: The RS232 Comms. version comes complete with a RS232 kit, required for connecting the 2100-D to a PC, etc. The kit contains: 1 x 5m RS232 cable; (2,10 & 15m available.) 1 x 9pin D type (25pin D type available).

Note 2: The 2100-D is factory set to RS232 or RS422/485. The 2100-D-X is field selectable for RS422 or RS485, and H or M power supply.

Note 3: Power supply 'H' is field selectable for 'M', and 'M' for 'H'. Power supply 'L' must be ordered separately.

### Ordering Examples.

- 1/ 2100-D-232-M                    2100-D; RS232 COMMS; 23~90Vdc Power Supply.  
2/ 2100-D-485-L                    2100-D; RS485 COMMS; 10~28Vac/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-D Rev1C Specifications.

<b>Inputs:</b>	12 Individually Isolated Inputs with LED Indication of Each Input.	
-Input Voltage	5~30Vdc.	
-Threshold	4.6V typical.	
-Load @ 5V	1.1mA per Channel.	
@ 12Vdc	4.2mA per Channel.	
@ 24Vdc	9.6mA per Channel.	
-Frequency -Low	0~20Hz. Debounce - 50msec.	
-High	0~500Hz. Debounce - 2msec.	
<b>Outputs:</b>	12 Individually Isolated Relays with LED Indication of Each Output.	
-Functions	12 Relay Contact - 10 Change Over; 2 Normally Open.	
-Contact Material	Silver Alloy	
-Relay Ratings	Maximum Rating	Approved to Standard
	250Vac, 2A	UL
	125Vac, 2A	CSA
	110Vdc, 0.3A	
	30Vdc, 2A	
	1/6hp, 250Vac	
	1/10hp, 125Vac	
-Number of Operations	2 x 10 <sup>5</sup> Min, at 1A, 250Vac Resistive Load.	
<b>Comms:</b>	-Protocols RS422/RS485 or RS232.	
	-Baud Rate Selectable 2400, 4800, 9600. (Default = 9600).	
	-Format 8 bit, No Parity, 1 Stop.	
<b>Power :</b>	-H 85~264Vac/dc; 50/60Hz; 10VA.	
	-M 23~90Vdc; 10VA.	
	-L 10~28Vac/dc; 50/60Hz; 10VA.	
	Refer to '2100-D H1 Power Supply Settings' for voltage selection instructions.	

### 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 & Outputs:	3000Vac 50Hz for 1min.
	-To Earth	1500Vac 50Hz for 1 min.
Input/Output Isolation Test Voltages	-Between Inputs	1000Vdc for 1min.
	-Comms to Inputs	1000Vdc for 1min.
	-Relay Outputs to All Other Terminals:	3000Vac 50Hz for 1min.
	-Between Relay Outputs	1500Vac 50Hz for 1min.

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

RF Immunity	<±1% Effect FSO Typical.	
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	900g. Includes Packaging.	

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

**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'.

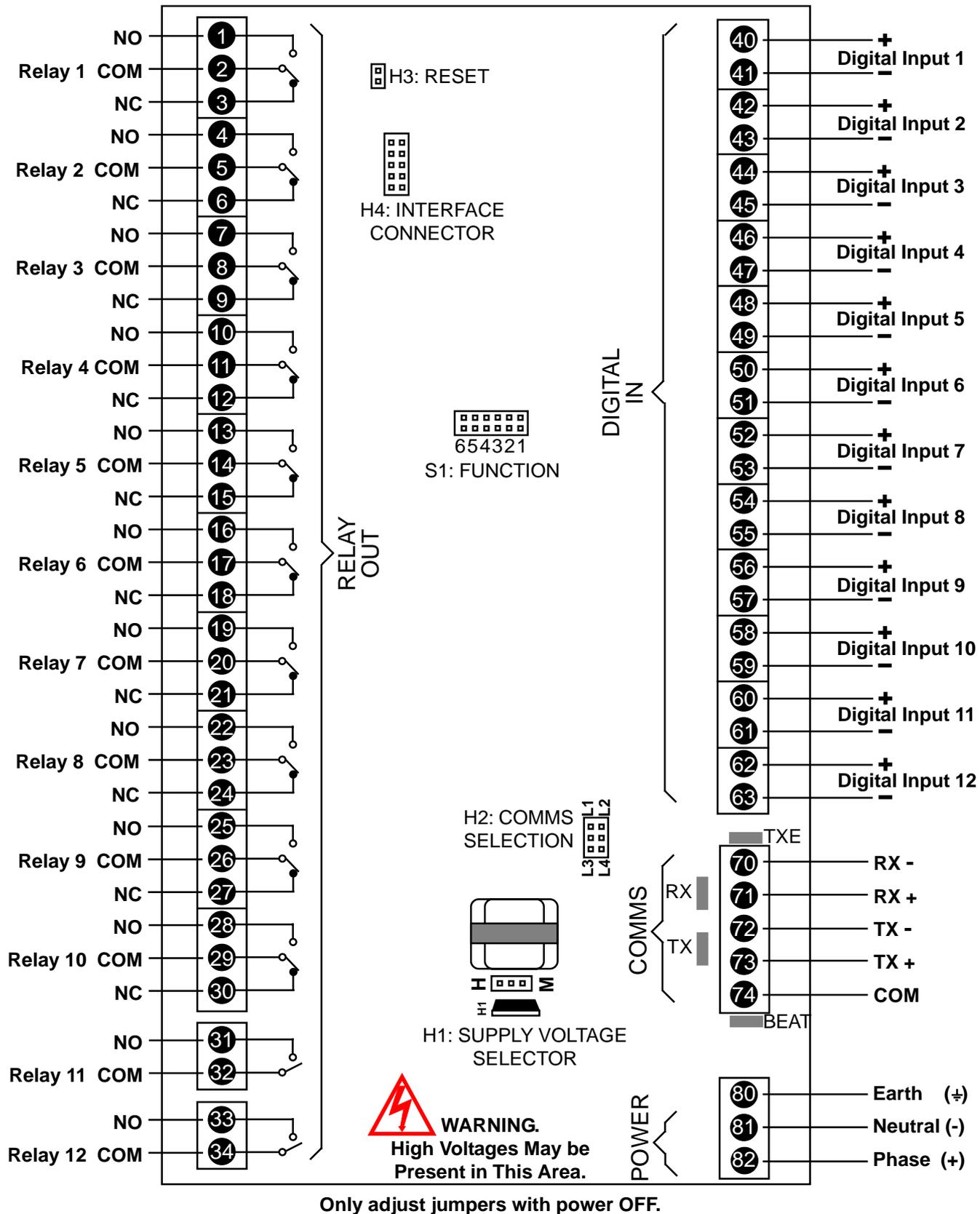
**Warning: These products are not designed for use in, and should not be used for patient connected applications. In any critical installation an independant fail-safe back-up system must always be implemented.**



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

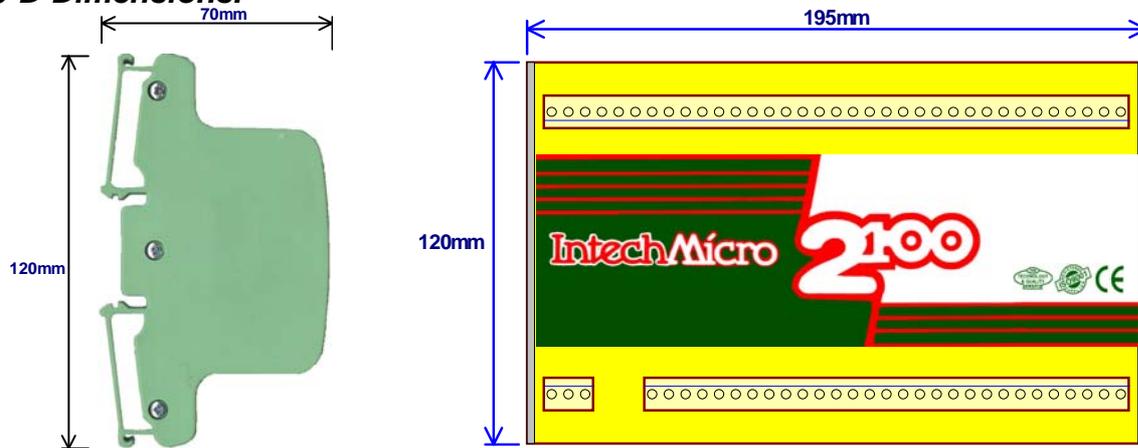


## 2100-D Terminals and Layout.



- Notes;
1. The 2100-D has 12 Digital Inputs and 12 Relay Outputs.
  2. The 2100-DI has 12 Digital Inputs. The 12 Relay Outputs are not fitted.
  3. The 2100-DO has 12 Relay Outputs. The 12 Digital Inputs are not fitted.

## 2100-D Dimensions.



### Section B.

#### 2100-D Jumpers and LED Functions Tables.

**CAUTION:** Dangerous voltages may be present. The 2100-D 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-D Terminals and Layout' for the location of the following jumpers .

#### 2100-D S1 Function Dip Switch Settings

Function Dip Switch Settings						
Function	S1-1	S1-2	S1-3	S1-4	S1-5	S1-6
9600baud <small>note1</small>	0	0	0	0	0	0
4800baud	0	1	0	0	0	0
2400baud	1	1	0	0	0	0
Test Mode <small>note2</small>	0	0	1	0	0	0

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

#### 2100-D 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-D 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



- Note 1. RS232 must be ordered separately to RS422/485.

#### Linking for RS485

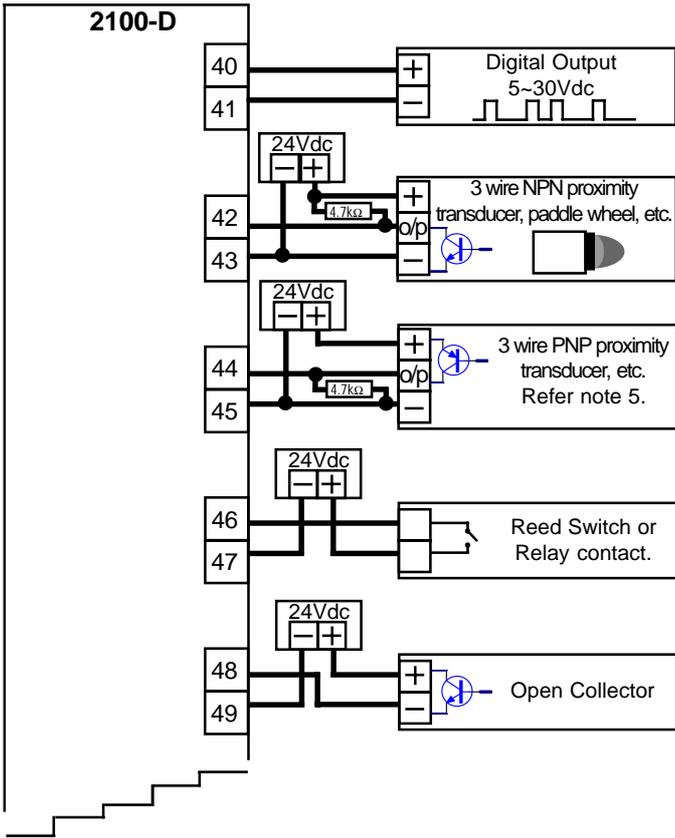


- Note 2. RS422 can be jumpered for RS485, and visa versa.

#### 2100-D LED Descriptions.

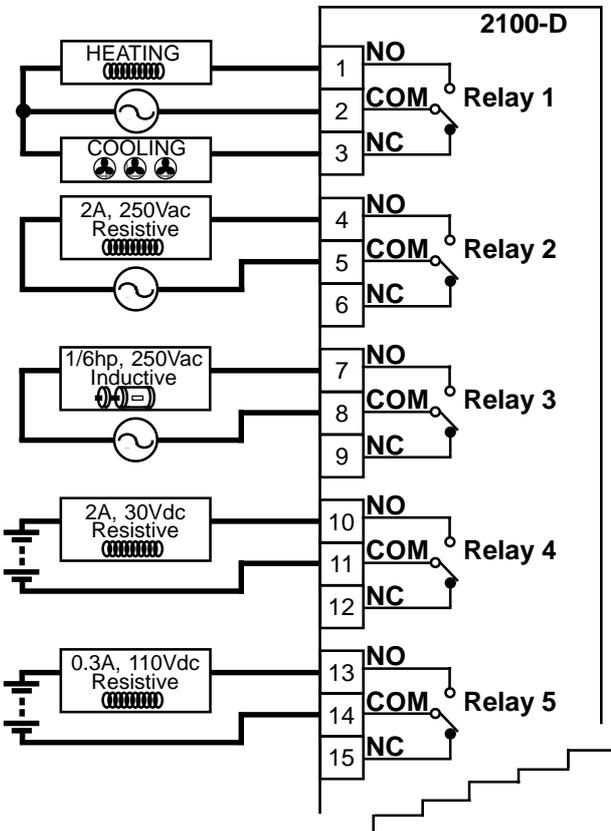
LED Descriptions	
LED Name	LED Function
RX	Active when Station is receiving serial data.
TX	Active only when Station is transmitting serial data.
TXE	Active only when Station is ready to transmit data.
BEAT	Heart beat. Continual flashing indicates Station healthy
Output 1~12	Indicates when their respective output relay is energized.
Input 1~12	Indicates when their respective input is energized, or counting

**Section C:**  
**Connection Example Diagram for Digital Inputs.**



- Note 1. Inputs can be:  
 State - i.e. ON or OFF  
 Count - low speed: 0~20Hz; 50ms debounce  
 Count - high speed: 0~500Hz; 2ms debounce
- 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-D.'
- Note 5. 4K7 resistor not required for most types of 3 wire PNP transducers.

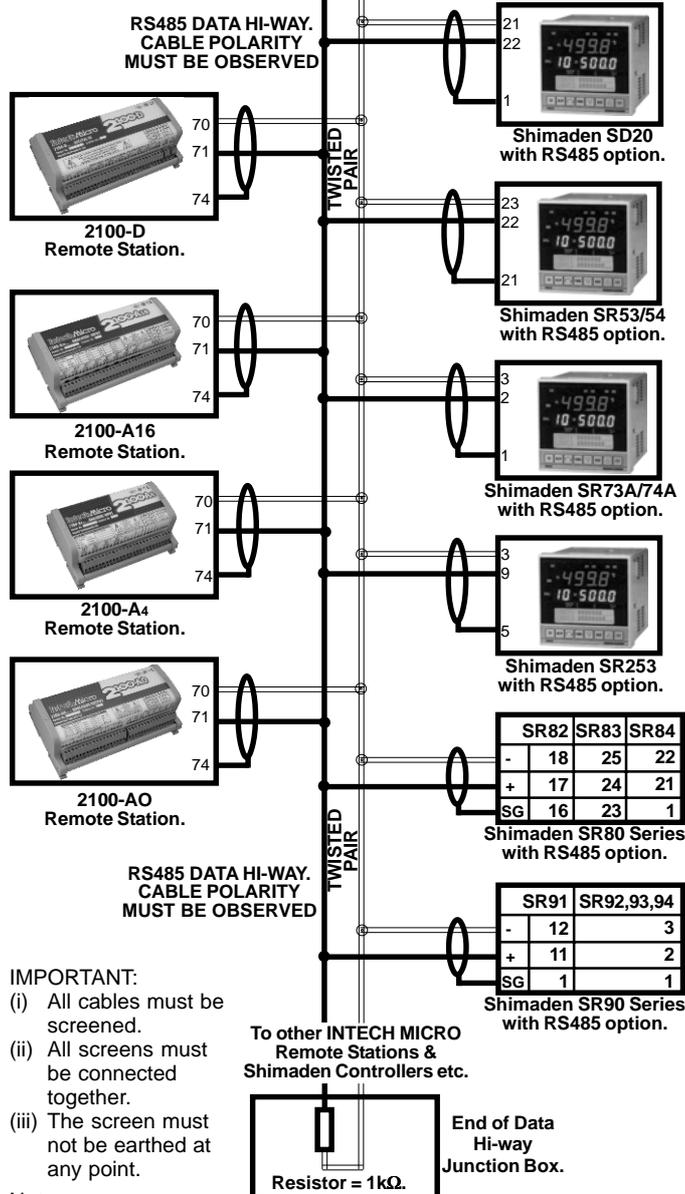
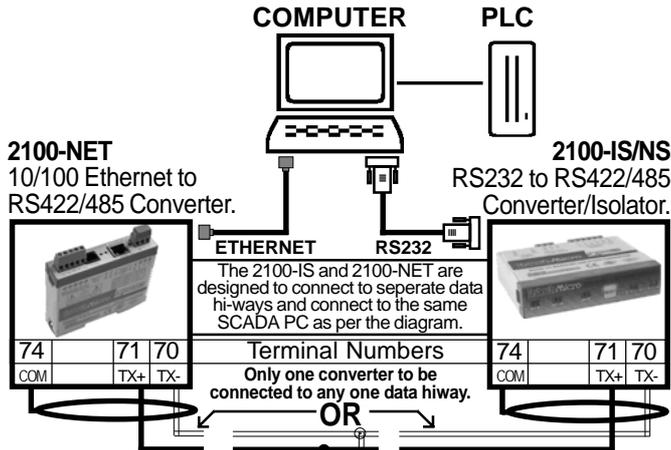
**Connection Example Diagram for Digital Outputs.**



- Note 1. With relays NOT energized:  
 NO = Normally Open.  
 COM = Common.  
 NC = Normally Closed.
- Note 2. The first ten relays are change-over. The last two (11 and 12) are Normally Open.
- 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 12 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 each relay is energized.

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.

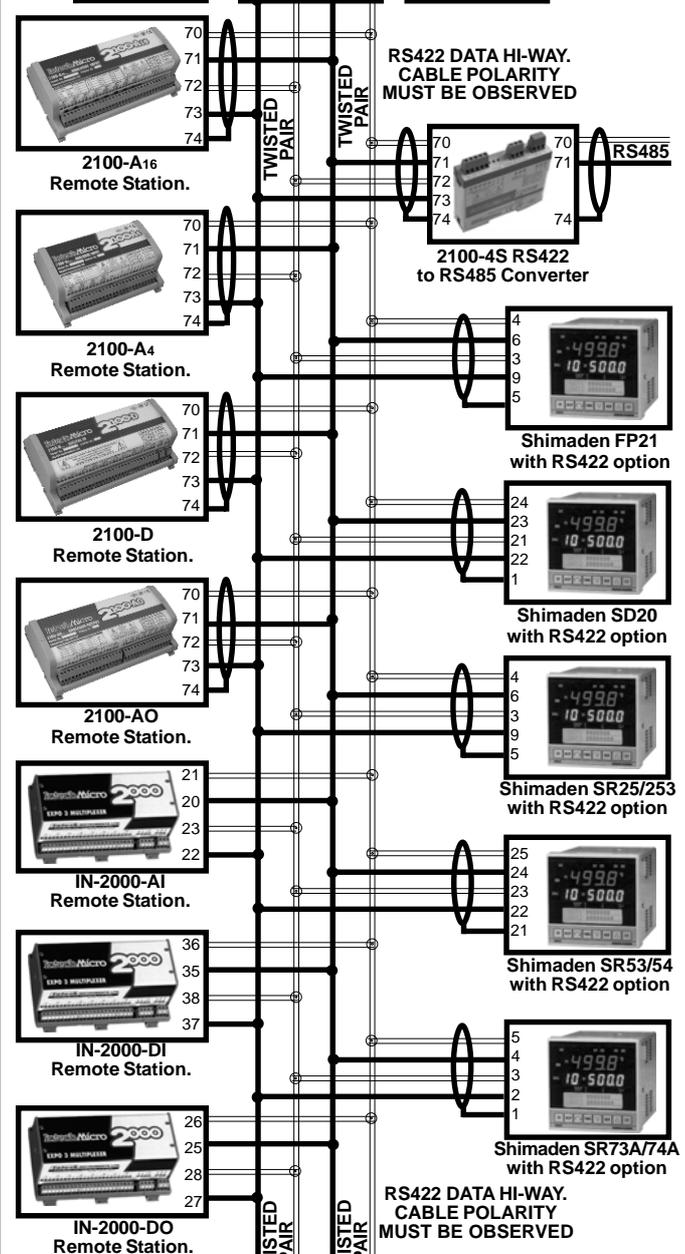
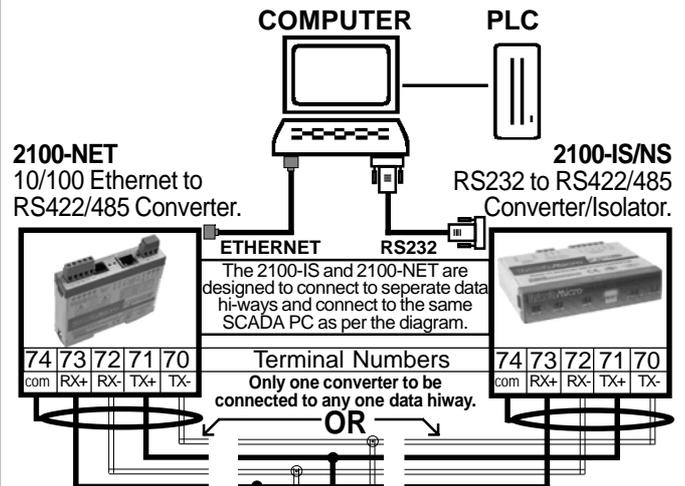
### Notes:

- 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.



### IMPORTANT:

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

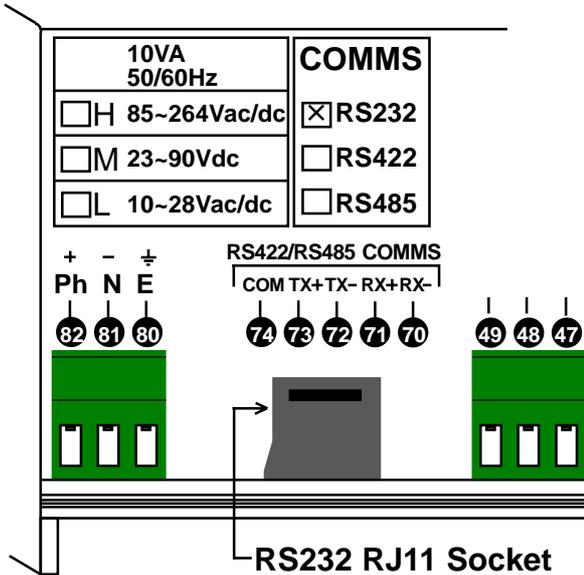
**Section D:**

**2100-D RS232 Serial Connection.**

The 2100-D 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-D 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.**

**2100-RS232 Kit-Omron**

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

**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.'

**Communication Protocols.**

Protocol is available from Intech Instruments in 'WORD' format, free of charge.

2100-D protocol is the protocol used by Microscan to access data in stations. Use EX DI, EX DO, RCn messages to access station data.

## 2100-D 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-D serial number. (Written both on the 2100-D 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-D 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-D Station Software Programming.

### Outstation setup.

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-D 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.

### Reading counter values.

1. On the station map connect the boxes marked 'count' to the line in the recorder.
2. Both totalising and rate are calculated using the MicroScan recorder. The totalise is based on the count value, and is not integrated using time.

### Reading input states.

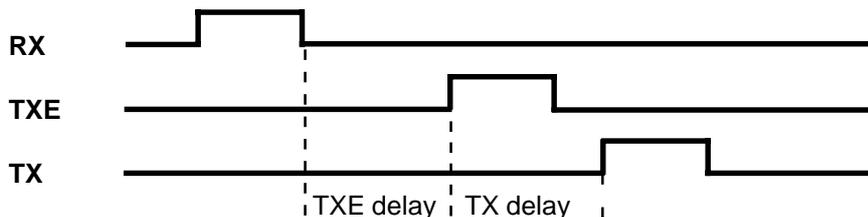
1. On the station map connect the boxes marked 'state' to the line in the recorder.

## 2100-D 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-D 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: 2100-D Wiring & Installation.

**THE 2100-D 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 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-D 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) 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.

### 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	>-90dB/100m
	@ 100kHz	>-50dB/100m
Characteristic Impedance .	@ 100kHz	135Ω
Attenuation of a pair:	@ 1kHz	0.15dB/100m
	@ 10kHz	0.42dB/100m
	@ 100kHz	0.8dB/100m
	@ 50kHz	0.9dB/100m
	@ 1MHz	1.9dB/100m
	@ 1.5MHz	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.

## **2100-D Wiring, Installation and Maintenance Cont.**

### **Analogue Signal Wiring.**

- (1) All analogue cables should be good quality, overall screened, INSTRUMENTATION CABLE, with the screen earthed at one end only. (e.g. Austral Standard Cables B5102ES.)
- (2) Analogue signal cables should be laid a minimum distance of 300mm from power and data cables.
- (3) It is recommended that you do not earth analogue signal loops or use power supplies with ungrounded outputs.
- (4) Lightning arresters should be used on inputs and outputs when there is a danger from this source.
- (5) Refer to diagrams for connection details.

### **Commissioning.**

- (1) Check that all the above conditions have been met, and the wiring checked, before applying power to the 2100-D.
- (2) Check each relay output functions correctly, and the relay specifications are not being exceeded.
- (3) Check each digital input functions correctly, and the digital input specifications are not being exceeded.