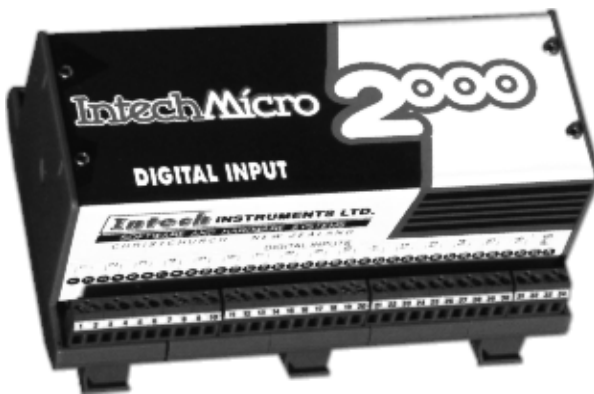


# INTECH Micro 2000 Industrial SCADA Hardware.



## ***Intech Micro 2000 Installation Guide Index.***

IN-2000-AI Analogue Input Remote Station.	page 2
IN-2000-AO Analogue Output Remote Station.	page 4
IN-2000-DI Digital Input Remote Station.	page 6
IN-2000-DO Digital Output Remote Station.	page 8
Mode and Address DIP Switch Settings.	page 10
LED Description, Commissioning and Maintenance	page 11
Data Cabling and SCADA Layout.	page 12

# Installation Guide.

# IN-2000-AI. Analogue Input Remote Station.

## Specifications.

Inputs		8 single ended. (Expandable to 53 by using INTECH EXPO-3 Multiplexer.)
	-Programmable	0~20mA
		4~20mA - Factory Set.
Input Resistance		250Ω
Input scan rate	-IN-2000-AI	600msec. (Cycle time.)
	-2100-M-I,R,V	8sec. (Cycle time.)
	-2100-M-T	30sec (Cycle time.)
Outputs		3 Digital open collector.
	-Max. load	100mA.
	-Max. voltage	30Vdc.
Communications	-Standard	RS422
	-Optional	RS485
Comms baud rate		4800\9600 baud, 8bit, no parity, 1 stop bit.
Comms isolation		1.5kVAC\DC input \ output for 60sec.
Power	-Standard Linear	230\115VAC, 50\60Hz.
	-Low Voltage Linear	24±2VAC, 50\60Hz.
	-Standard Universal	20~380VDC and 30~270VAC 50\60Hz 4VA.
	-Low Voltage Universal	8~30VDC and 8~30VAC 50\60Hz 4VA.
	-Circuit Sensitivity	<±0.001%/V FSO Typical.
Accurate to		<±0.1% FSO Typical.
Linearity & Repeatability		<±0.1% FSO Typical.
Resolution		10bit ADC.
Channel Separation		<±0.1% FSO Typical.
Ambient Drift		<±0.012%/C FSO Typical.
Calibration		20-turn ZERO & SPAN trimpots.
Operating Temperature		0~70C.
Storage Temperature		-20~80C.
Operating Humidity		90%RH Max. Non-Condensing.
Housing		DIN & EN rail mount. L=182, W=127, H=100mm.
Weight		610g.

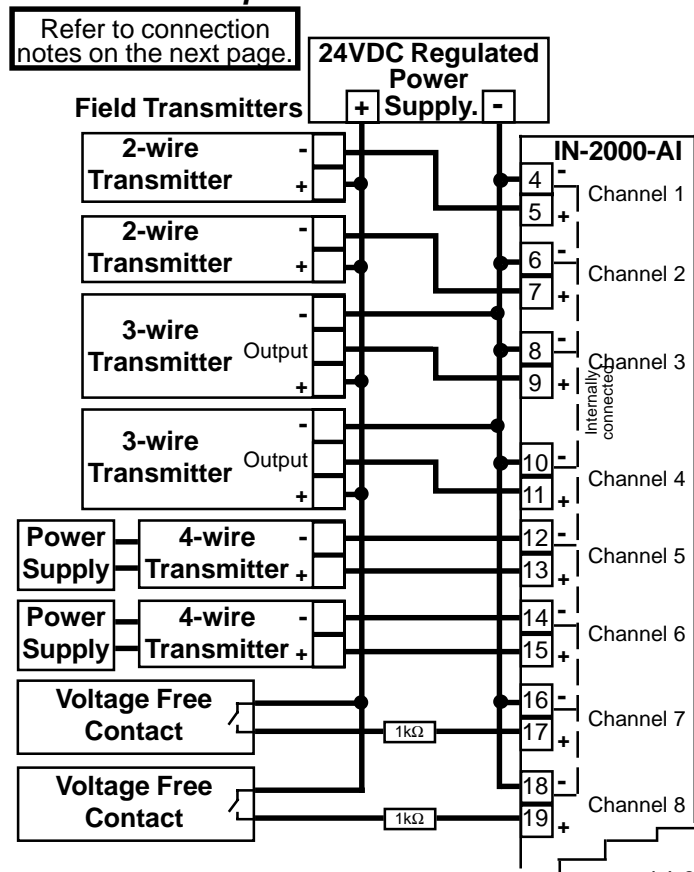
Note 1. Contact INTECH INSTRUMENTS for more detailed programming information.

Note 2. Specifications based on Standard Calibration Units, unless otherwise specified.

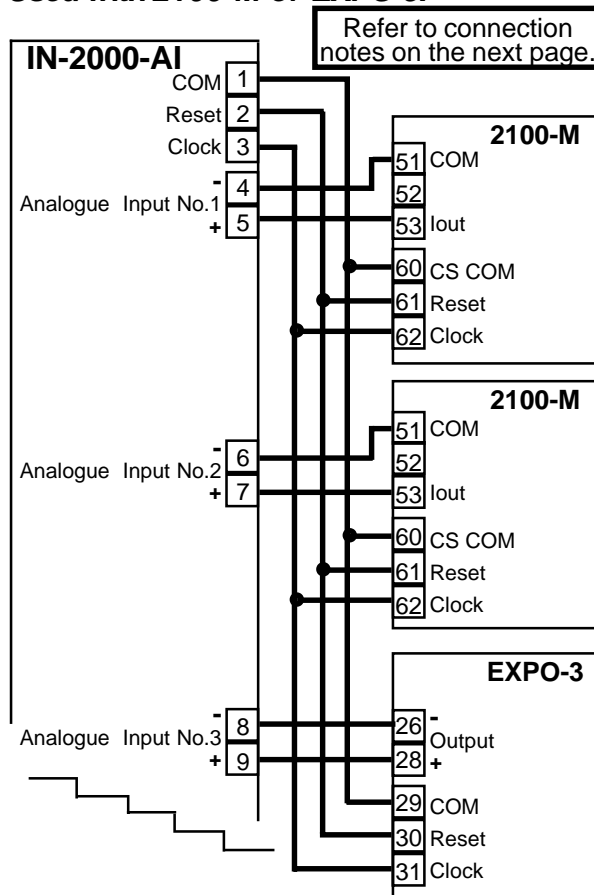
Note 3. Due to ongoing research and development, designs, specifications, and documentation are subject to change without notification.

No liability will be accepted for errors, omissions or amendments to this specification.

### Connection Diagram of IN-2000-AI with 4~20mA Inputs



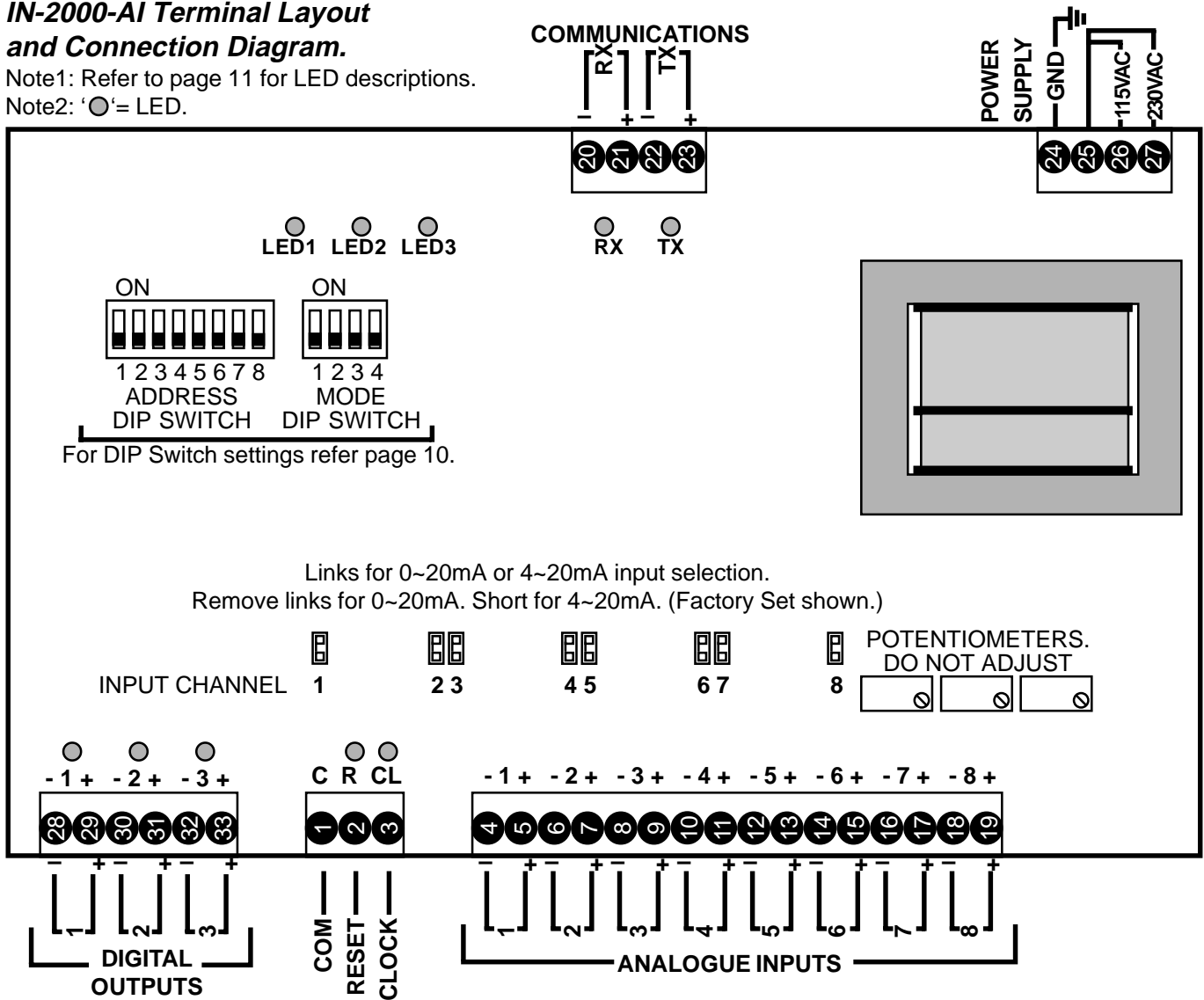
### IN-2000-AI Input Connection & Control Lines Used with 2100-M or EXPO-3.



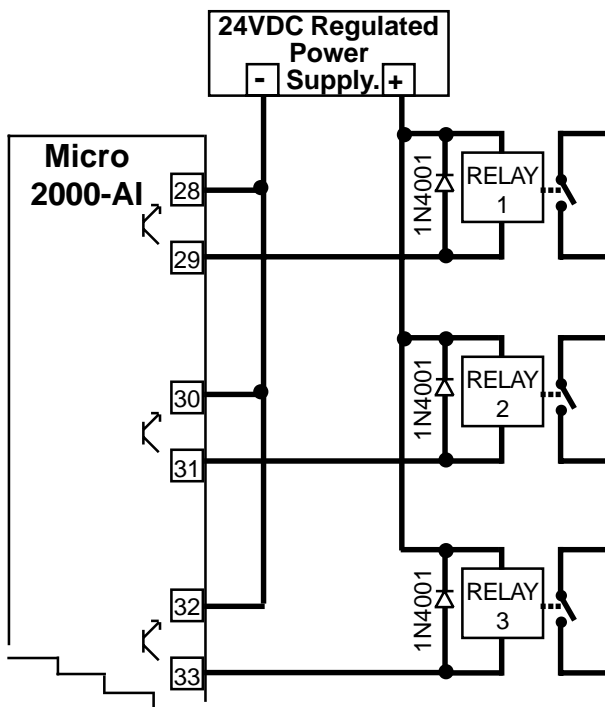
# IN-2000-AI Terminal Layout and Connection Diagram.

Note1: Refer to page 11 for LED descriptions.

Note2: '●' = LED.



## Connection Diagram of IN-2000-AI Open Collector Digital Outputs to 24VDC Relay Coils.



## Notes for Input and Output Connections to the IN-2000-AI.

- Up to three 2100-M or EXPO-3 multiplexers can be connected to one IN-2000-AI, and any remaining IN-2000-AI inputs can be used for normal 4~20mA input signals.
- Do not use the 2100-M or EXPO-3 power supply to power up any transmitter or other equipment.
- All cables must be screened, and the screen earthed at one end only
- All IN-2000-AI inputs are single ended. (ie, all negative inputs are internally connected.)
- Inputs can be used as digital inputs for sensing a clean, voltage free, field contact.
- When using the IN-2000-AI digital outputs, an external relay and DC power supply can be used to provide a contact output, as the IN-2000-AI outputs are open collector transistors.

# IN-2000-AO. Analogue Output Remote Station.

## Specifications.

Outputs		4 single ended. (All negatives internally connected.)
	-Programmable	0~20mA 800Ω load maximum.
		4~20mA 800Ω load maximum. - Factory Setting.
	-Non-programmable	0~10mA 1600Ω load maximum.
	(to be ordered)	2~10mA 1600Ω load maximum.
		0~5VDC Maximum output drive = 5mA.
		1~5VDC Maximum output drive = 5mA.
		0~10VDC Maximum output drive = 5mA.
		2~10VDC Maximum output drive = 5mA.
		0~-5VDC Maximum output drive = 5mA.
Communications	-Standard	RS422
	-Optional	RS485
Comms baud rate		4800\9600 baud, 8bit, no parity, 1 stop bit.
Comms isolation		1.5kVAC\DC input \ output for 60sec.
Power	-Standard Linear	230\115VAC, 50\60Hz.
	-Low Voltage Linear	24±2VAC, 50\60Hz.
	-Standard Universal	20~380VDC and 30~270VAC 50\60Hz 4VA.
	-Low Voltage Universal	8~30VDC and 8~30VAC 50\60Hz 4VA.
	-Circuit Sensitivity	<±0.001%/V FSO Typical.
Accurate to		<±0.1% FSO Typical.
Linearity & Repeatability		<±0.1% FSO Typical.
Resolution		12bit ADC.
Channel Separation		<±0.1% FSO Typical.
Ambient Drift		<±0.012%/C FSO Typical.
Calibration		20-turn ZERO & SPAN trim pots.
Operating Temperature		0~70C.
Storage Temperature		-20~80C.
Operating Humidity		90%RH Max. Non-Condensing.
Housing		DIN & EN rail mount. L=182, W=127, H=100mm.
Weight		610g.

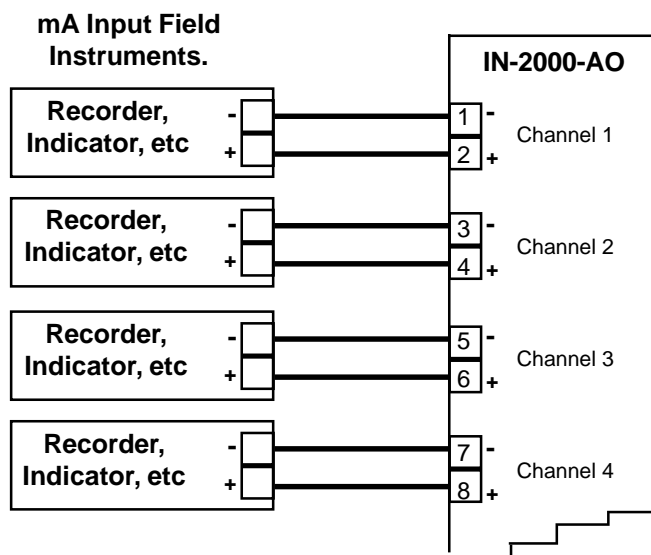
Note 1. Contact INTECH INSTRUMENTS for more detailed programming information.

Note 2. Specifications based on Standard Calibration Units, unless otherwise specified.

Note 3. Due to ongoing research and development, designs, specifications, and documentation are subject to change without notification.

No liability will be accepted for errors, omissions or amendments to this specification.

## Connection Diagram of IN-2000-AO mA Output Signals.

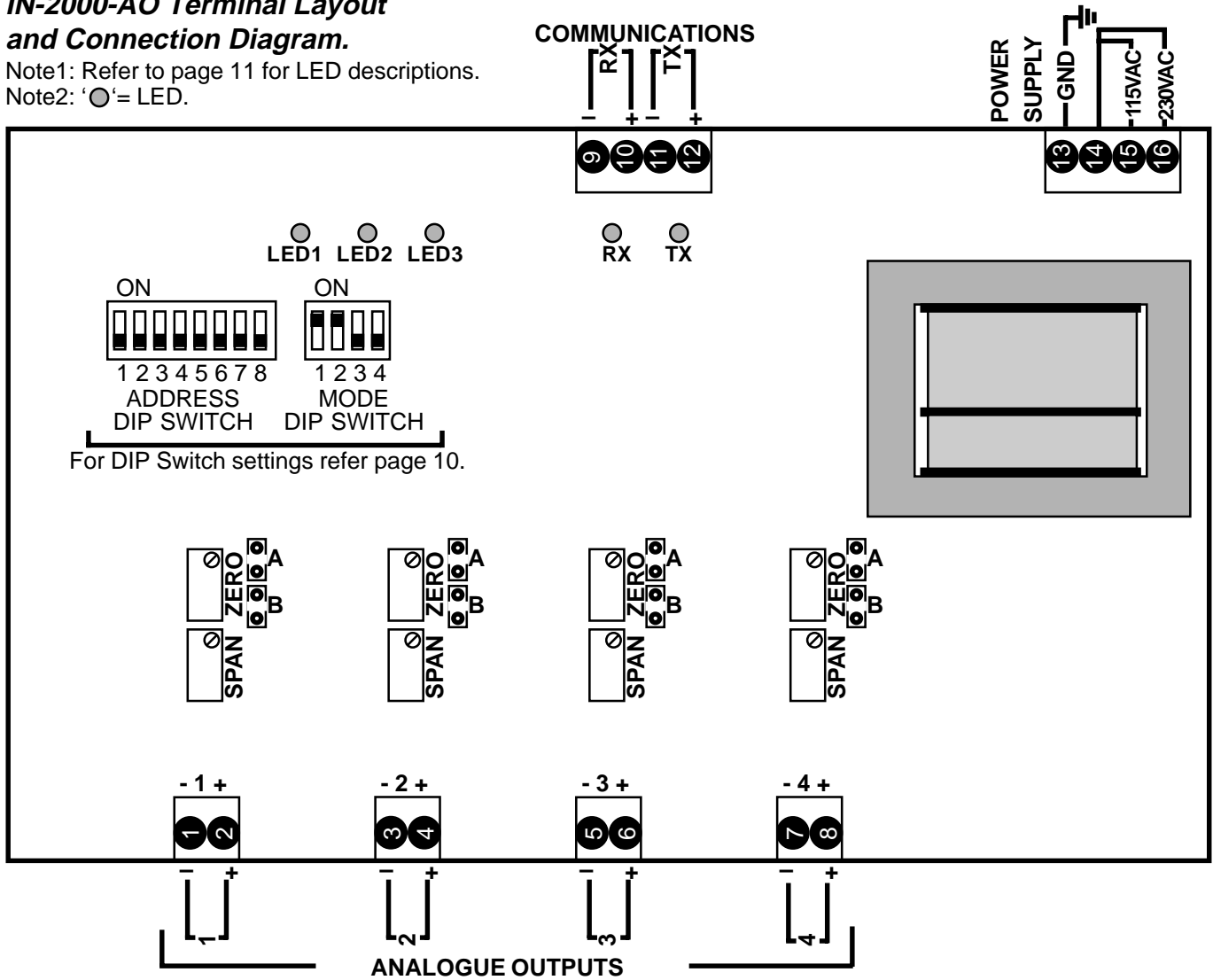


Refer to connection notes on the next page.

## IN-2000-AO Terminal Layout and Connection Diagram.

Note1: Refer to page 11 for LED descriptions.

Note2: '●' = LED.



### Output Current Programming of IN-2000-AO

Each channel can be individually programmed for either 0~20mA or 4~20mA, by placing a link in position A or B:

Link in position A = 0~20mA;

Link in position B = 4~20mA,

Each channel can be individually calibrated for zero and span, by adjusting the appropriate ZERO and SPAN pots.

### Notes for Input and Output Connections to the IN-2000-AO.

1. All IN-2000-AO outputs are single ended. (ie, all negative inputs are internally connected.)
2. All cables must be screened, and the screen earthed at one end only

# IN-2000-DI. Digital Input Remote Station.

## Specifications.

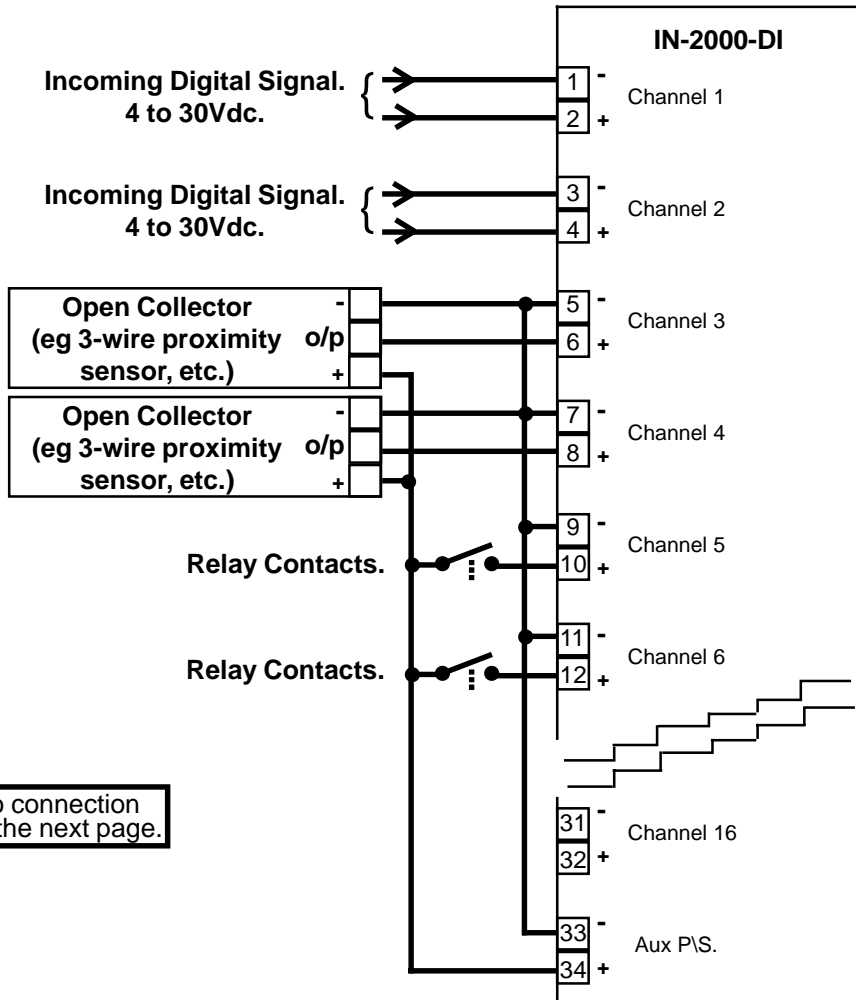
Inputs		Sixteen Isolated Digital Inputs with LED ON \ OFF indication on each input.
	-Isolation voltage	1.5kV
	-Input voltage	4 to 30Vdc.
	-Max Input	60V for 5sec.
	-Threshold	1V.
	-Load @ 5V	1.4mA. (per channel.)
	-Load @ 12V	4.2mA. (per channel.)
	-Load @ 24V	9.0mA. (per channel.)
Input scan rate	-Cycle time	5msec.
Communications	-Standard	RS422
	-Optional	RS485
Comms baud rate		4800\9600 baud, 8bit, no parity, 1 stop bit.
Comms isolation		1.5kVAC\DC input \ output for 60sec.
Power	-Standard Linear	230\115VAC, 50\60Hz.
	-Low Voltage Linear	24±2VAC, 50\60Hz.
	-Standard Universal	20~380VDC and 30~270VAC 50\60Hz 4VA.
	-Low Voltage Universal	8~30VDC and 8~30VAC 50\60Hz 4VA.
	-Circuit Sensitivity	<±0.001%/V FSO Typical.
Integral auxiliary power supply		20Vdc nom.
	-Max Current	120mA.
Operating Temperature		0~70C.
Storage Temperature		-20~80C.
Operating Humidity		90%RH Max. Non-Condensing.
Housing		DIN & EN rail mount. L=182, W=127, H=100mm.
Weight		670g.

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

Note 2. Specifications based on Standard Calibration Units, unless otherwise specified.

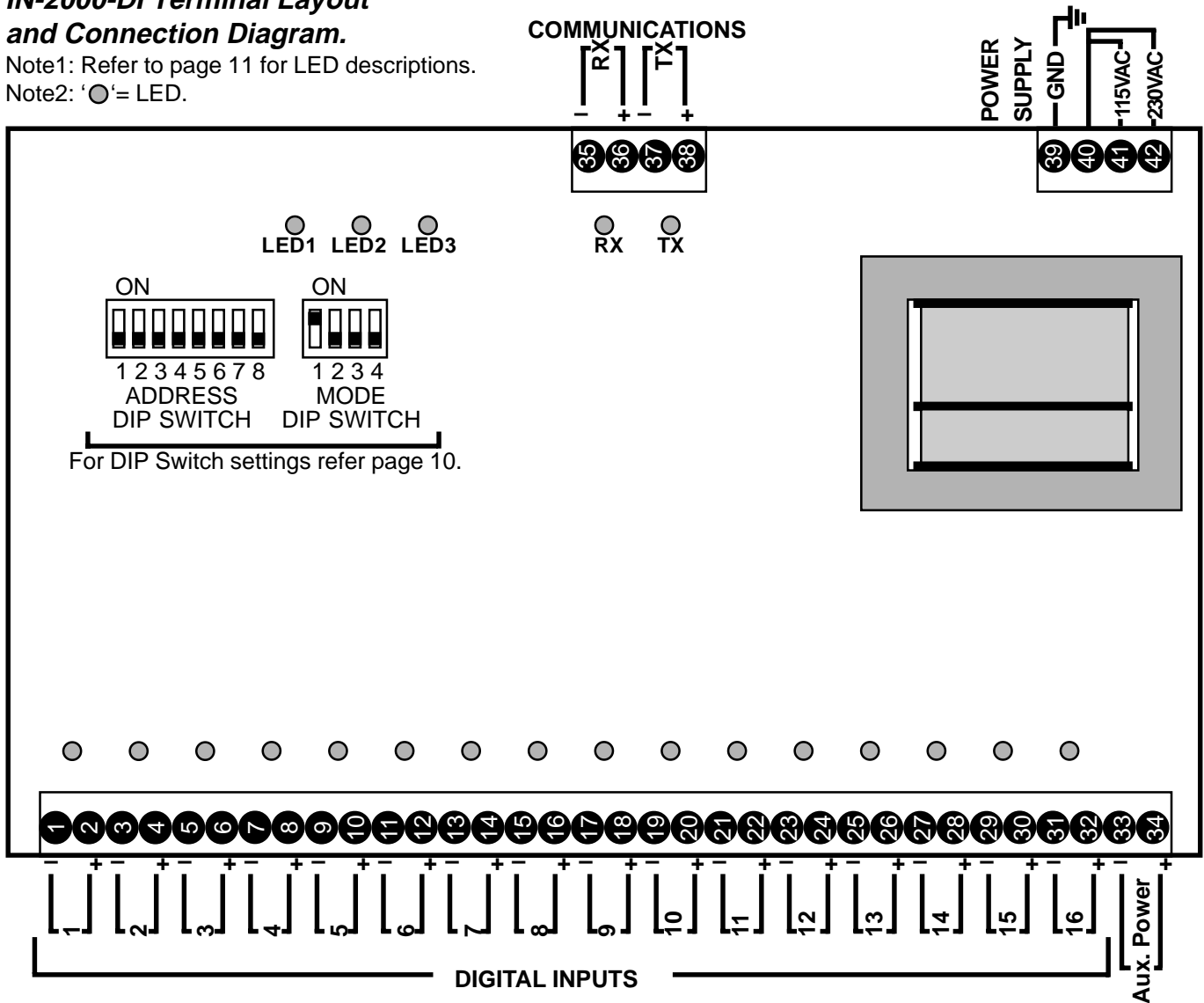
Note 3. Due to ongoing research and development, designs, specifications, and documentation are subject to change without notification.  
No liability will be accepted for errors, omissions or amendments to this specification.

## Connection Diagram of IN-2000-DI Digital Inputs and Auxiliary Power Supply.



**IN-2000-DI Terminal Layout  
and Connection Diagram.**

Note1: Refer to page 11 for LED descriptions.  
Note2: '○' = LED.



**Notes for Input and Output Connections to the IN-2000-DI.**

1. All inputs to be ON \ OFF states from relay contacts, or DC HI \ LO levels, etc.
2. LED ON \ OFF indication on each input.
3. LED intensities will vary depending on the voltage level present at the input terminals. Refer to specifications for input current drawings.
4. A **total** maximum load of 120mA can be drawn from the Auxiliary Power Supply.
5. All cables must be screened, and the screen earthed at one end only

# IN-2000-DO. Digital Output Remote Station.

## Specifications.

Outputs		Twelve SPST Relay Contacts, with LED ON \ OFF indication on each output.
	-Programmable	Each relay independently selectable NO or NC.
	-Contact rest state	Contacts NO. (Power fail)
Relays.	-Action	SPST.
	-Contact rating	250VAC, 3A, resistive 30VDC, 3A, resistive. 250VAC, 1A, inductive. 30VDC, 1A, inductive.
	-Max Contact voltage	265VAC max. 30VDC max.
	-Dielectric strength	4kVAC 1min max.
	-Insulation resistance	100MΩ min. (500V)
Communications	-Standard	RS422
	-Optional	RS485
Comms baud rate		4800\9600 baud, 8bit, no parity, 1 stop bit.
Comms isolation		1.5kVAC\DC input \ output for 60sec.
Power	-Standard Linear	230\115VAC, 50\60Hz.
	-Low Voltage Linear	24±2VAC, 50\60Hz.
Operating Temperature		0~70C.
Storage Temperature		-20~80C.
Operating Humidity		90%RH Max. Non-Condensing.
Housing		DIN & EN rail mount. L=182, W=127, H=100mm.
Weight		730g.

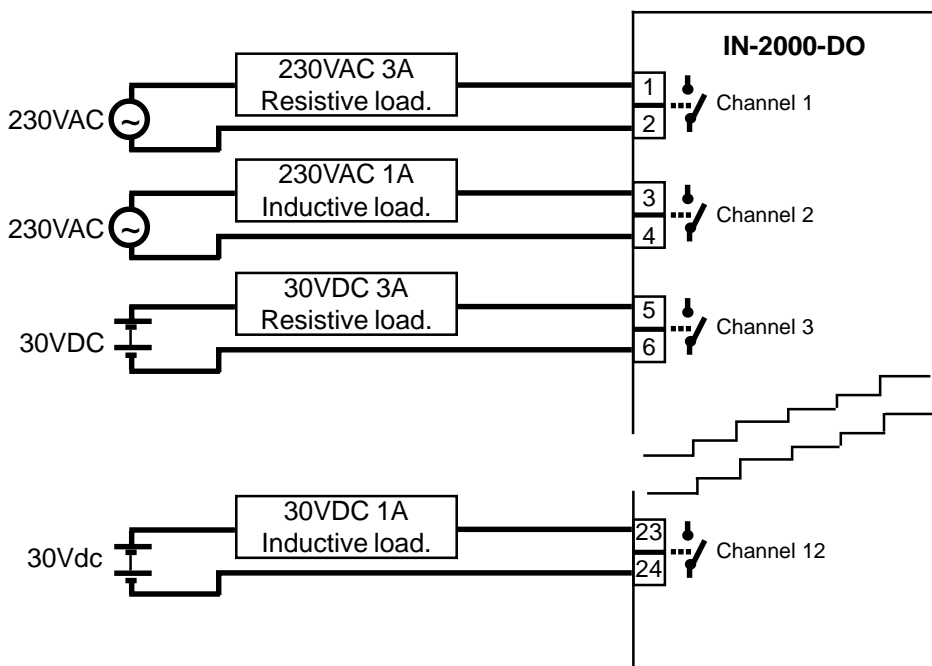
Note 1. Contact INTECH INSTRUMENTS for more detailed programming information.

Note 2. Specifications based on Standard Calibration Units, unless otherwise specified.

Note 3. Due to ongoing research and development, designs, specifications, and documentation are subject to change without notification.

No liability will be accepted for errors, omissions or amendments to this specification.

## Connection Diagram of IN-2000-DO Clean Contact Relay Outputs.

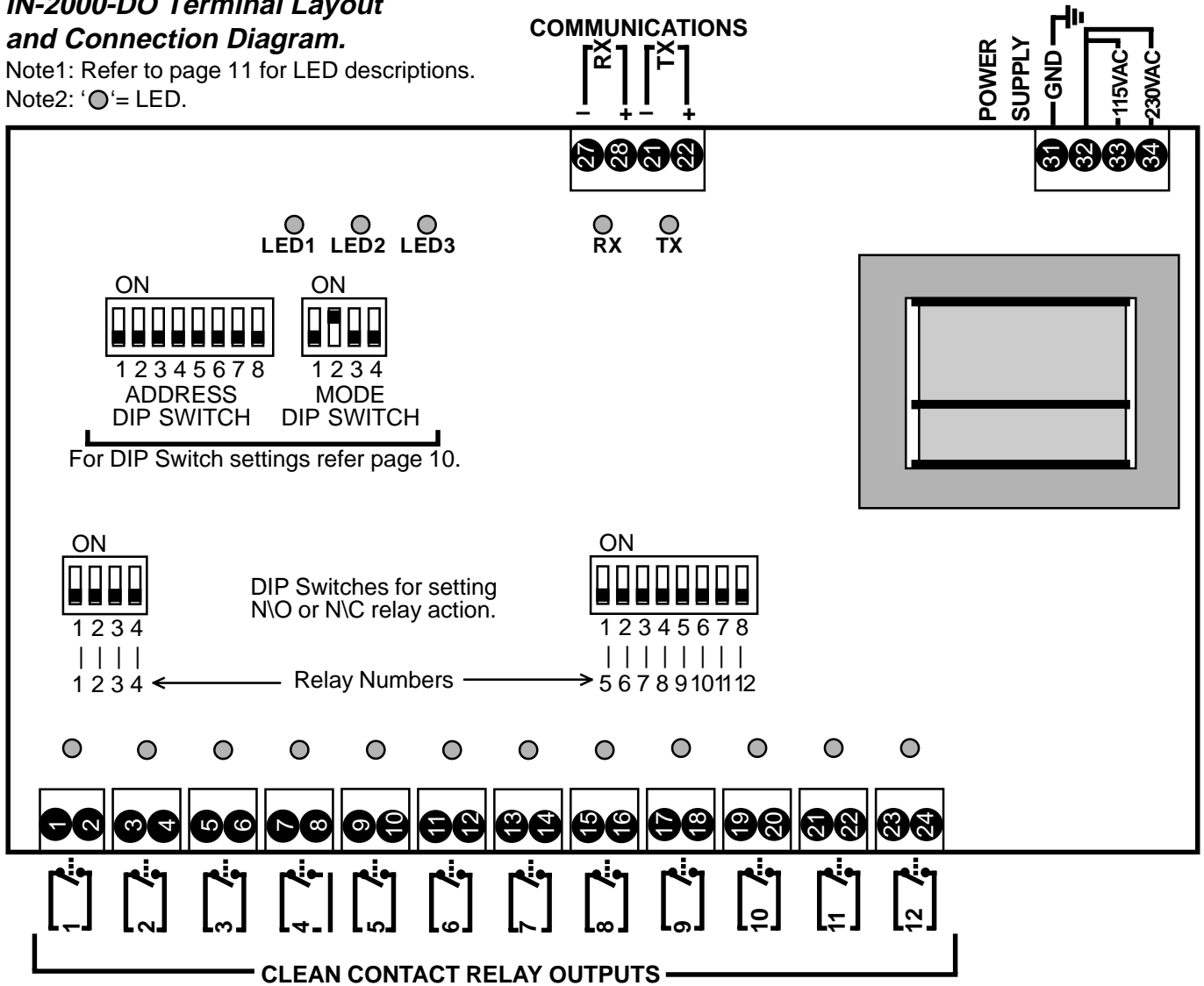


Refer to connection notes on the next page.

**IN-2000-DO Terminal Layout and Connection Diagram.**

Note1: Refer to page 11 for LED descriptions.

Note2: '○' = LED.



**N/O, N/C Output Programming for the IN-2000-DO.**

Each of the 12 outputs can be individually programmed for N/O or N/C operation.

There is one DIP Switch per output relay, to set the N/O or N/C condition. Refer to the drawing above.

DIP SWITCH SETTING: ON = N/C  
OFF = N/O

Factory Default setting = N/O.

Contact rest state (power failure) = N/O

**Notes for Input and Output Connections to the IN-2000-DO.**

1. LED ON \ OFF indication on each output.
2. All cables must be screened, and the screen earthed at one end only

### IN-2000 Remote Station Mode Settings.

Notes: (For ALL programming tables.)

1. Switch Status: '0'=OFF, '1'=ON, 'X'=DON'T CARE, '-'=DOES NOT APPLY.
  2. Mode DIP Switches 1, 2, & 3 are factory set, and should not be changed.
  3. When set at 9600 baud, LD3 will flash once when powered up.
  4. When set at 4800 baud, LD3 will flash twice when powered up.
- } Software version 1.1 or later.
- \* Slow scan rate required to allow settling time for the thermocouple transmitter.

Remote Station Type Version 1.3	Mode Dip Switch				Comments
	1	2	3	4	
2000-AI Analogue Input (EXPO-3I,R,V.)	0	0	0	-	Fast scan
2000-AI Analogue Input (EXPO-3T only.)	1	0	1	-	Slow scan *
2000-AO Analogue Output.	1	1	0	-	<b>Do not alter switches 1, 2 &amp; 3.</b>
2000-DI Digital Input.	1	0	0	-	<b>Do not alter switches 1, 2 &amp; 3.</b>
2000-DO Digital Relay Output.	0	1	0	-	<b>Do not alter switches 1, 2 &amp; 3.</b>
Baud Rate = 9600	-	-	-	0	
Baud Rate = 4800	-	-	-	1	FP21 controller

### IN-2000 Remote Station Address Dip Switch Settings.

Set the address the computer recognises the Remote Station by. The address can be any number between 0 and 63. For further data refer to the 'MICROSCAN 2000 Software Manual'.

**Important: No two Remote Stations can have the same address.**

- Note 1. Dip switches 7 & 8 are not used and **MUST** be left in the OFF position.  
 Note 2. Factory set to Remote Station 1.

Remote Station Address	Dip Switch						Remote Station Address	Dip Switch					
	1	2	3	4	5	6		1	2	3	4	5	6
0	0	0	0	0	0	0	32	0	0	0	0	0	1
1 (Note2)	1	0	0	0	0	0	33	1	0	0	0	0	1
2	0	1	0	0	0	0	34	0	1	0	0	0	1
3	1	1	0	0	0	0	35	1	1	0	0	0	1
4	0	0	1	0	0	0	36	0	0	1	0	0	1
5	1	0	1	0	0	0	37	1	0	1	0	0	1
6	0	1	1	0	0	0	38	0	1	1	0	0	1
7	1	1	1	0	0	0	39	1	1	1	0	0	1
8	0	0	0	1	0	0	40	0	0	0	1	0	1
9	1	0	0	1	0	0	41	1	0	0	1	0	1
10	0	1	0	1	0	0	42	0	1	0	1	0	1
11	1	1	0	1	0	0	43	1	1	0	1	0	1
12	0	0	1	1	0	0	44	0	0	1	1	0	1
13	1	0	1	1	0	0	45	1	0	1	1	0	1
14	0	1	1	1	0	0	46	0	1	1	1	0	1
15	1	1	1	1	0	0	47	1	1	1	1	0	1
16	0	0	0	0	1	0	48	0	0	0	0	1	1
17	1	0	0	0	1	0	49	1	0	0	0	1	1
18	0	1	0	0	1	0	50	0	1	0	0	1	1
19	1	1	0	0	1	0	51	1	1	0	0	1	1
20	0	0	1	0	1	0	52	0	0	1	0	1	1
21	1	0	1	0	1	0	53	1	0	1	0	1	1
22	0	1	1	0	1	0	54	0	1	1	0	1	1
23	1	1	1	0	1	0	55	1	1	1	0	1	1
24	0	0	0	0	1	1	56	0	0	0	0	1	1
25	1	0	0	1	1	0	57	1	0	0	1	1	1
26	0	1	0	1	1	0	58	0	1	0	1	1	1
27	1	1	0	1	1	0	59	1	1	0	1	1	1
28	0	0	1	1	1	0	60	0	0	1	1	1	1
29	1	0	1	1	1	0	61	1	0	1	1	1	1
30	0	1	1	1	1	0	62	0	1	1	1	1	1
31	1	1	1	1	1	0	63	1	1	1	1	1	1

## LED Description for the Intech Micro IN-2000 Series.

LED Descriptions					
LED Name	IN-2000 Model				Function
	-AI	-AO	-DI	-DO	
RX	√	√	√	√	Active when station is receiving serial data.
TX	√	√	√	√	Active only when station is transmitting serial data.
LED1	√	√	√	√	Heart Beat. Continuous flashing indicates station healthy.
LED2	√	√	√	√	Active only after the station has been addressed, and will stay lit until another is addressed
LED3	√	√	√	√	On power-up flashes once when set to 9600baud & twice for 4800b (Software V1.1 or later.)
R	√				Active when EXPO-3 Multiplexers are being reset to channel 1.
CL	√				Active when EXPO-3 Multiplexers are being clocked to the next channel.
1	√				Active when Digital Output 1 is on.
2	√				Active when Digital Output 2 is on.
3	√				Active when Digital Output 3 is on.
1 to 12				√	Indicate when their respective output relay is energised.
1 to 16			√		Indicate when their respective digital input is energised.

## The Proper Installation & Wiring of the Intech Micro IN-2000 Series.

### MOUNTING.

- (1) Mount in a clean environment.
- (2) Do not subject to vibration, excess temperature or humidity variations.
- (3) To maintain compliance with the EMC Directives the IN-2000s are to be mounted in a fully enclosed steel cabinet. The cabinet must be properly earthed, with appropriate input \ output entry points, filtering, and cabling.

### ANALOGUE SIGNAL CABLING.

- (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 ground current 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.

### RS 422A COMMS CABLING.

- (1) Total length of trunk line, including spurs, is not to exceed 1000m without isolating boosters.
- (2) Terminating resistors -1kΩ.
- (3) Cabling paths should avoid sources of Radio Frequency Interferences such as fluorescent lights, variable speed motor drives, welding equipment, radio transmitters, etc.
- (4) There should be a minimum of 200mm physical separation between power cables and data cables.
- (5) Data cables should not be exposed to excessive heat or moisture, and should not be buried directly in the ground without protection.
- (6) Avoid powering a Remote Station or Controller from the same power supply as a variable speed drive.
- (7) Use only low capacitance, twisted pair, overall screened data cable. The cable must equal or better the following specifications.

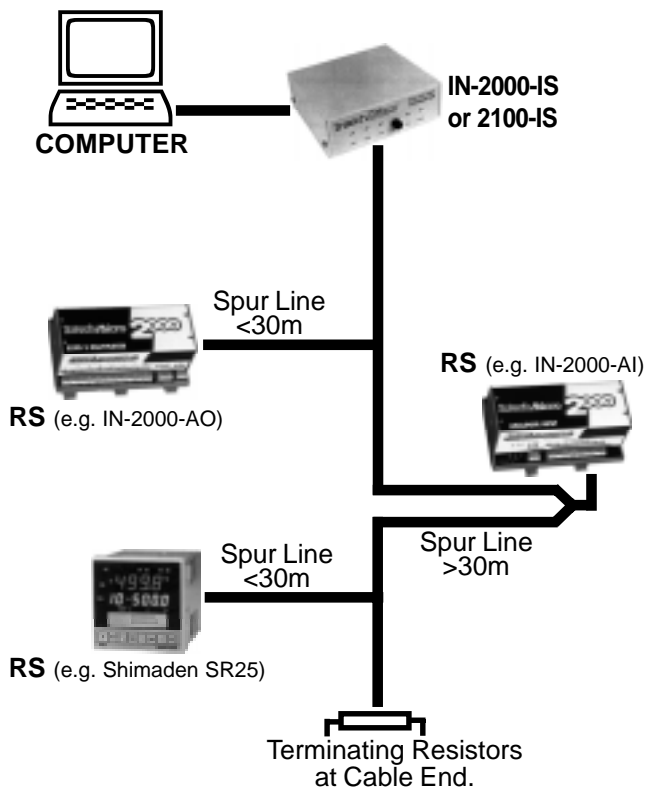
Cable Specifications.		
Conductor Size.		7/0.20mm, 24AWG
Conductor Resistance @ 20C.		8.9Ω/100m
Max. Working Voltage.		300Vrms
Capacitance between wires of a pair.		50pF/m
Capacitance between each wire to all others bunched together.		95pF/m
Cross-talk between pairs:	@ 1kHz @ 100kHz	>-90dB/100m >-50dB/100m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

**NOTE:** All cables are to be subject during manufacture to in-process spark testing @ 4kVrms.  
All cables are to be tested between conductors and conductors to screen for 1min @ 1500Vrms.

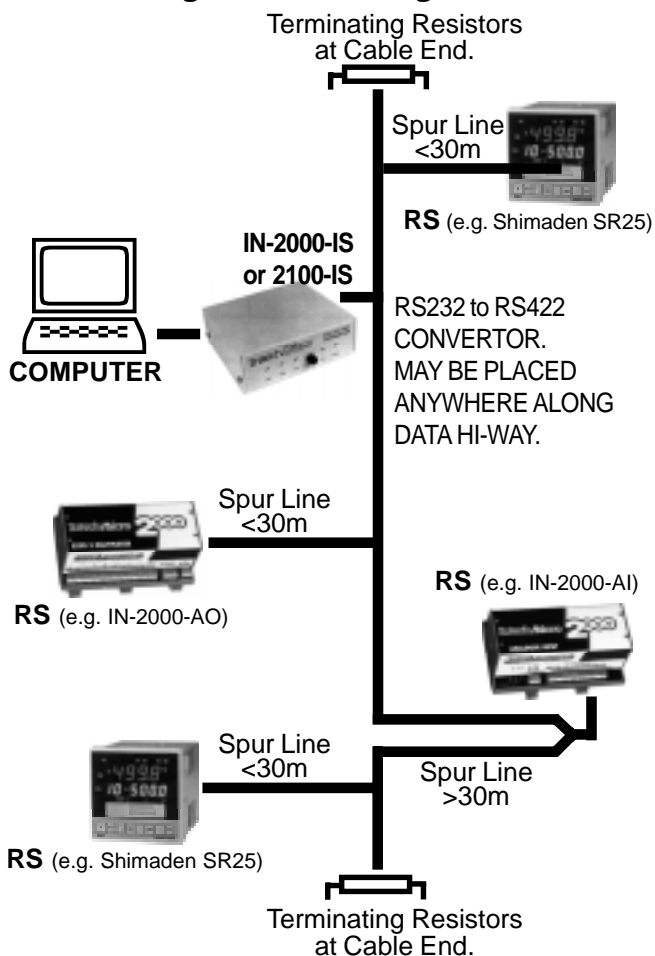
- (8) Minimum cable pairs = 2. (Plus overall screen.)
- (9) Take care not to stress or damage cables during installation.

## IN-2000 SCADA.

### Data Cabling Installation e.g. 1.



### Data Cabling Installation e.g. 2.



RS = INTECH MICRO 2000, 2100 Remote Stations, or SHIMADEN CONTROLLERS.

IMPORTANT: The accompanying Installation Instructions must be strictly adhered to.

## OUTSTATION LAYOUT.

### RS 422 Serial Connections.

