

## 7 Technical Specifications

### 7.1 General

Most of the VersaNet2 I/O Modules have been upgraded to the 300 series adding galvanic isolation, transient suppression and arc suppression across relays.

During the redesign, the size of the cards has been slightly reduced to allow mounting in a standard 4u rack. Special versions of the cards (with an 'R' suffix) are available that have a 32 way DIN41612 connector for back plate connection, in place of the standard IDE ribbon connectors.

The size of the main Communications Controller card has not been changed but for the 'R' rack mount version, it is mounted on an aluminium carrier that allows it to fit the runners of the 4u rack.

#### 7.1.1 Mechanical

The physical size and layout of the VersaNet2 I/O cards is as follows: -

##### IRDN300 Series

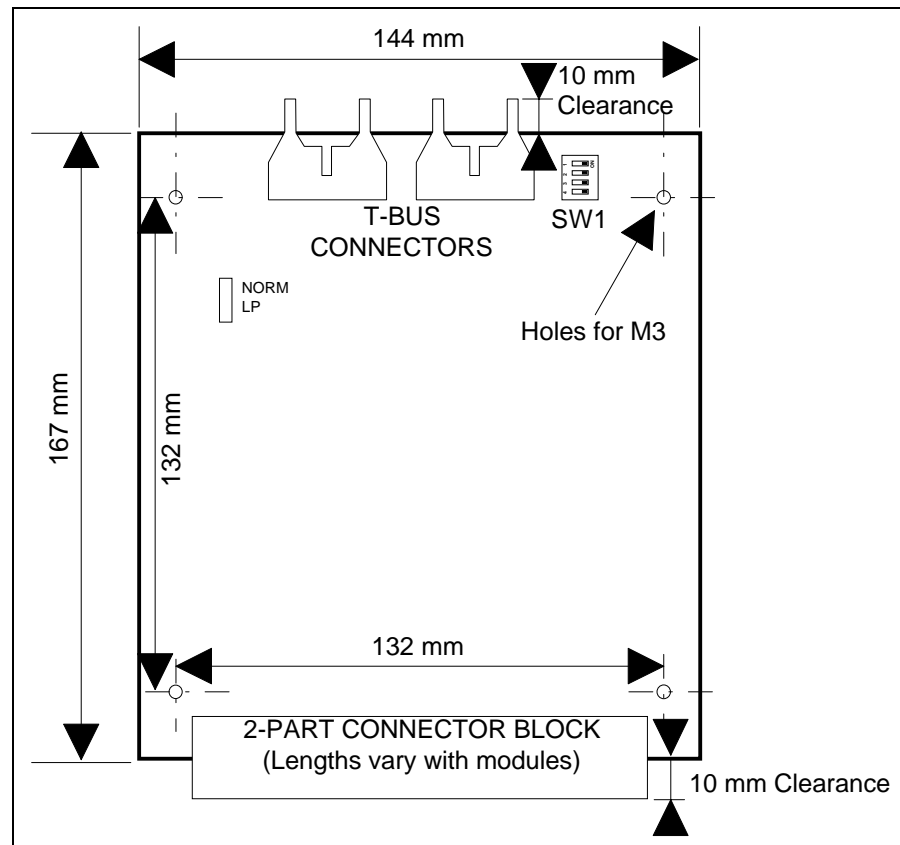


Figure 11 Mechanical Drawing of a Module

## IRDN300R Series

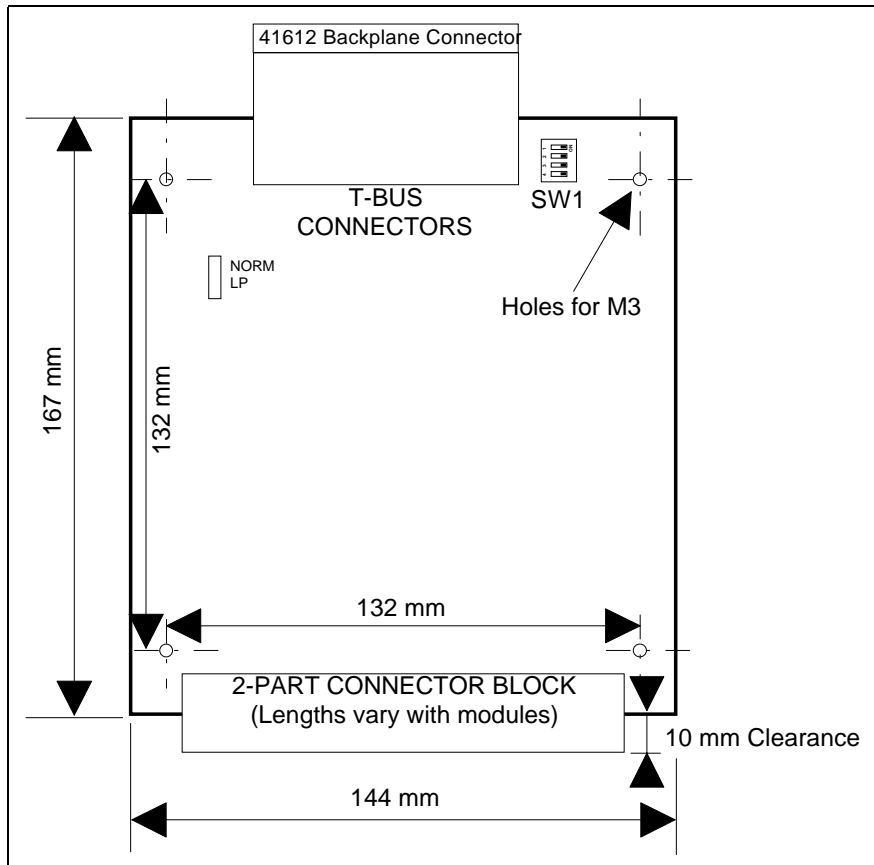


Figure 11a

## IRDN200 Series

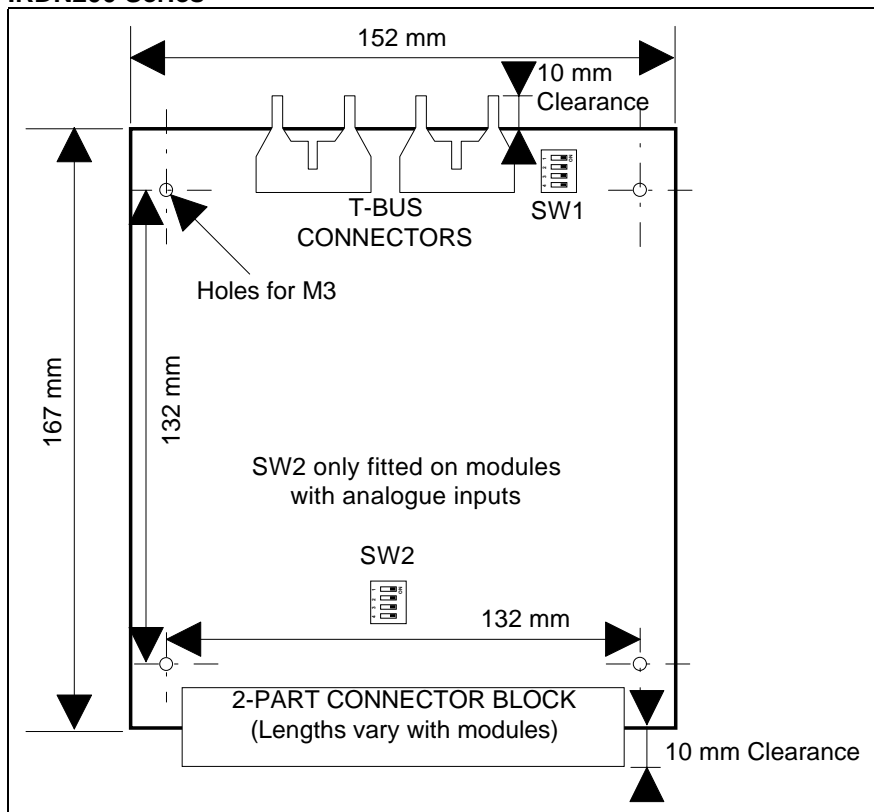


Figure 11b

## Configuration of I/O Cards

Each expansion I/O module should be set to a unique address using DIP switch SW1. See section 3.7 of this manual for full configuration details.

SW1 Setting				Address
1	2	3	4	
on	on	on	on	1
off	on	on	on	2
on	off	on	on	3
off	off	on	on	4
on	on	off	on	5
off	on	off	on	6
on	off	off	on	7
off	off	off	on	8
on	on	on	off	9
off	on	on	off	10
on	off	on	off	11
off	off	on	off	12
on	on	off	off	13
off	on	off	off	14
on	off	off	off	15
off	off	off	off	16

## 7.2 Communications Controller – IRDN300

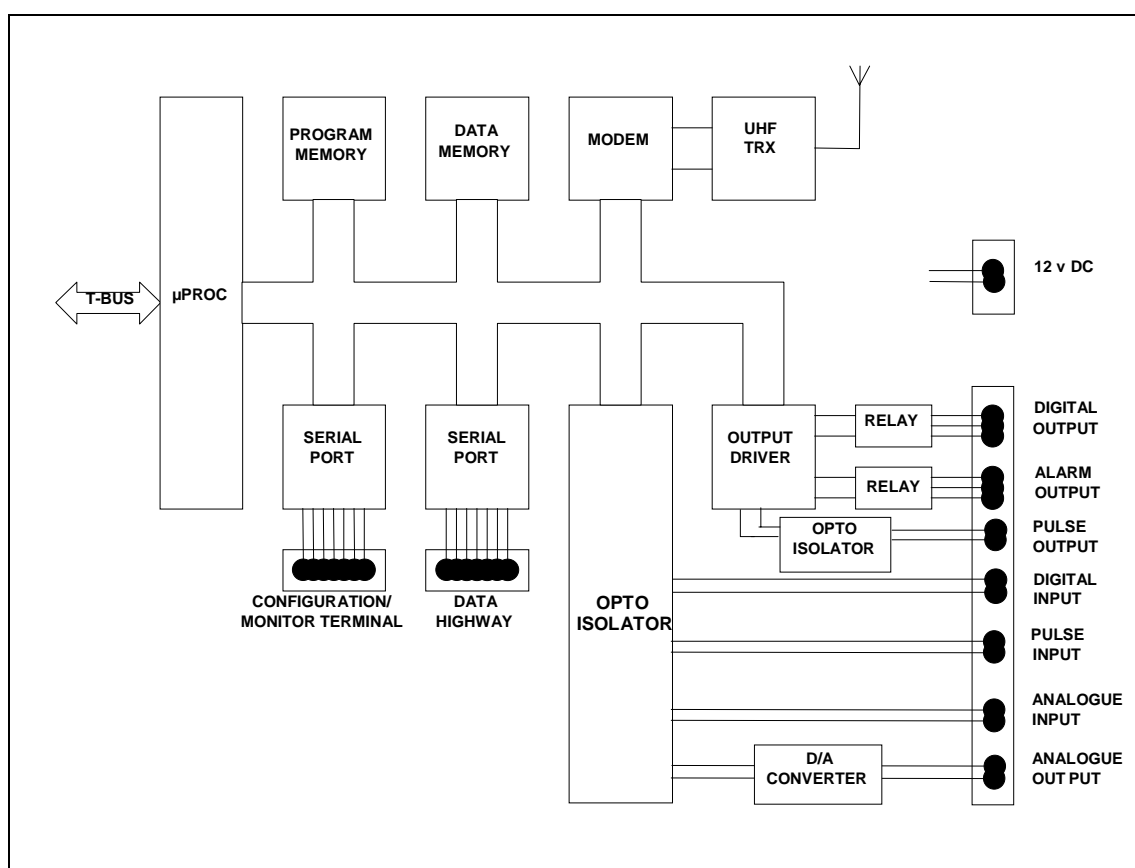


Figure 12

This module is at the heart of every Node, containing the main micro controller circuitry and modem. It handles the Node management, data security, health checks and retains the Node configuration in RAM. The module also has I/O capability in the form of a Digital input and output, Analogue input and output, Pulse input and output, Alarm output and RS232 serial data highway.

The IRDN300 is normally fitted with a UHF radio (part number IRDN334) for communication between Nodes. It is also possible to add a GSM, Leased Line or Dialup modem option. These can be used as the main method of communication in place of the radio, or as an addition to the radio acting as a back up system.

### Technical Specifications

Module Name	Communications Controller
Part Number	IRDN300 (with Digital I/O only) IRDN300A (with Digital + Analogue I/O) IRDN334 (Digital I/O and UHF Radio) IRDN334A (Digital + Analogue I/O and UHF Radio)
No. of Modules per Node	1
Processor	Hitachi H3048
Internal Interface	2 x T2-BUS Master
Digital Inputs	1 opto-isolated, volt free
Digital Outputs	1 changeover relay, 8A @ 250V AC, 8A @ 30V DC
Alarm Outputs	1 changeover relay, 5A @ 250V AC, 5A @ 30V DC Arc suppression on all relay contacts
Analogue Input (IRDN300A)	1, 0-5V DC or 0-20mA
Precision	12 bit
Scan rate	<1S

Analogue Output(IRDN300A)	1, 0-20mA
Precision	10 bit
Load resistance	250 Ohms
Output settling time	500mS max
Pulse Input	1
Input pulse width	5mS min
Input pulse frequency	100 Hz max
Maximum pulse count	65535
Scan rate	<1S
Pulse Output	1
Serial Ports	1 x RS232 Serial Data Highway 1 x RS232 Configuration ASCII Port
Power Supply	+11 to 14V DC via JP3
Current consumption	Operating (RX) 380mA Operating (TX) 650mA @ 500mW 600mA @ 250mW 550mA @ 100mW 520mA @ 50mW
Operating Temperature Range	-10° to +55° C
User Connection	Configuration Port – 9 way 'D' Male Serial Data Highway – 9 way 'D' Male
Dimensions	152 x 167 x 42 ( with radio )
Weight	0.6kg

### Radio Specification

Frequency	10MHz band in the range 406 – 470MHz
Channel Spacing	12.5kHz
<i>Transmitter</i>	
RF Output Power	500mW max. (adjustable)
Modulation	FFSK
Adjustable Channel Power	< -37 dBm
Spurious Emissions	< -36 dBm 0-1 GHz
Intermod Attenuation	> 40 dB
Frequency Tolerance	+/- 1kHz
FM Deviation	+/- 2kHz
<i>Receiver</i>	
RF Sensitivity	- 110 dBm for 10 <sup>-4</sup> BER
Adjustable Channel Selectivity	> 60 dB
Spurious Response Rejection	> 70 dB
Intermod Response Rejection	> 70 dB
Blocking	> 84 dB (> 50kHz from tuned frequency)
Spurious Emissions	< -57dBm 0-1 GHz

Meets the European R&TTE Directive 1999/5/EC and most worldwide radio standards for both radio performance and EMC regulations such as ETS 300 220, ETS 300 113 and ETS 300 683.

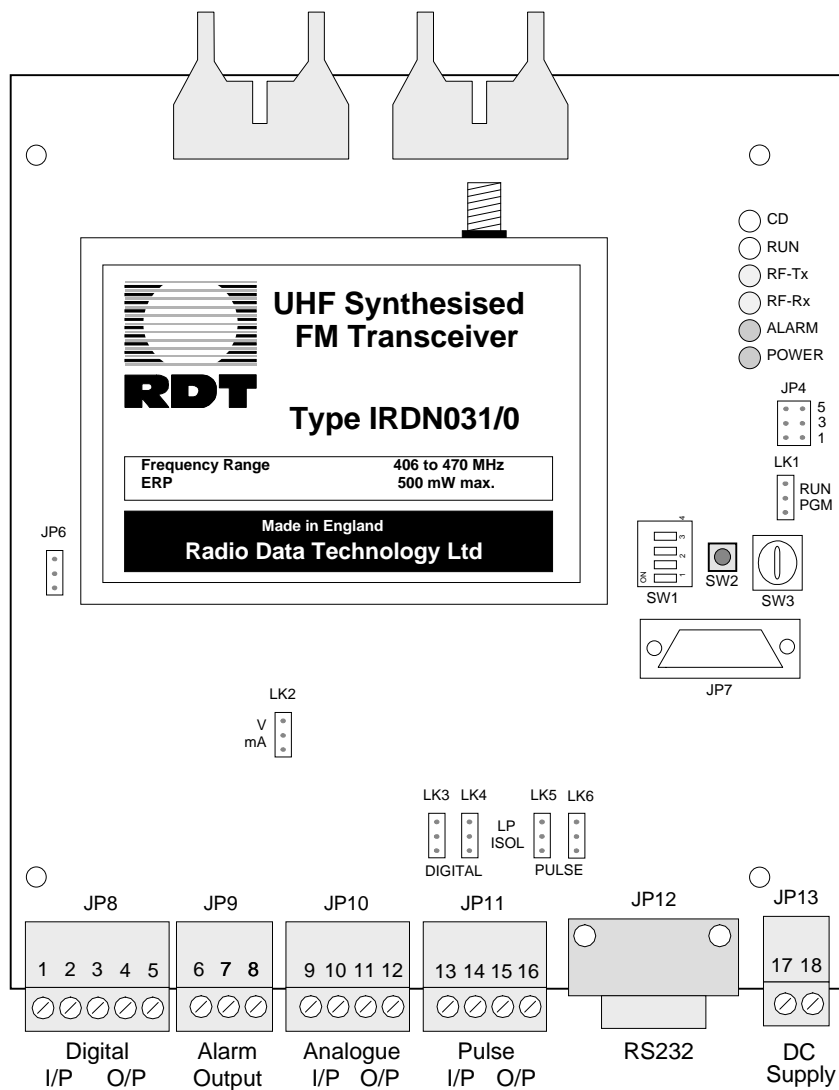


Figure 13 Communications Controller

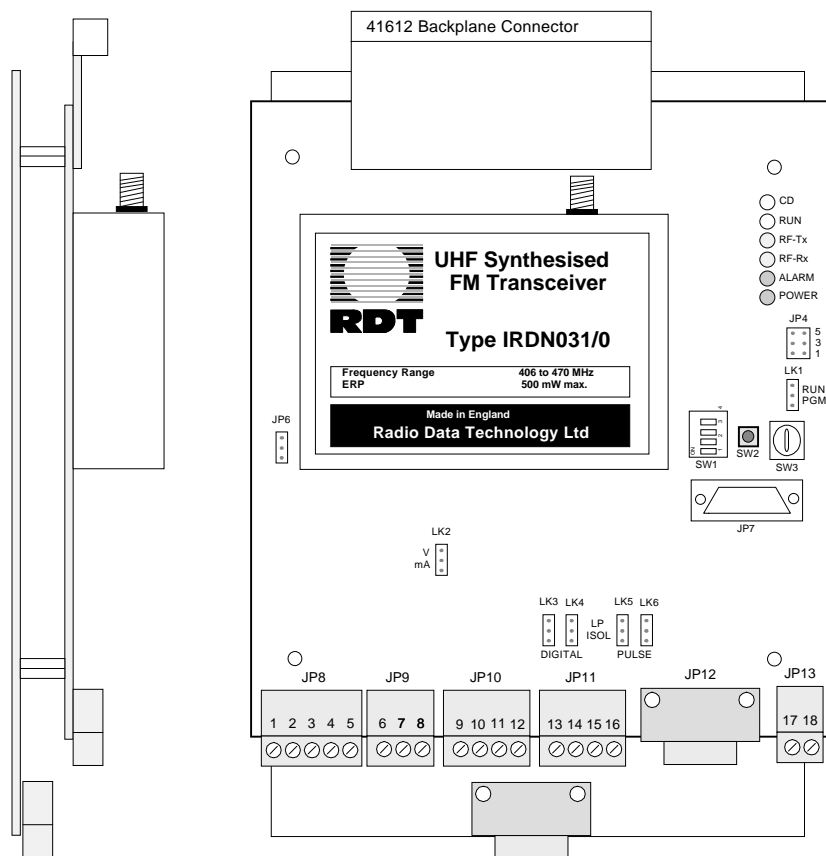


Figure 13a

## Connections

Connectors JP8 to JP12 are the input connections as labelled above.

JP 13 is the 12V DC supply. (12V pin 17 , 0V pin 18)

JP7 is the programming port for VersaNet Manager

JP4 position 5 Sets a 'brown out'. Node will switch off at 10.5V

JP4 position 1 or 3 at 10.5V will give a low battery alarm, but continue working.

JP6 factory test only.

## Switches

SW1 For factory test only (default should be, 1 to 4 - off, off, off, on)

SW2 and 3 not used.

## LED's

Red	Power.	On all the time indicating 12V supply present
Red	Alarm.	Flashes to indicate alarm condition
Yellow	RX	Indicates radio is in receive mode
Yellow	TX	Indicates radio is transmitting
Bi-colour	Run	Green indicates normal operating mode Red, only when downloading new software
Tri-colour	CD	Red indicates a carrier has been detected Orange indicates data has been detected but not for this node Green indicates valid data being received

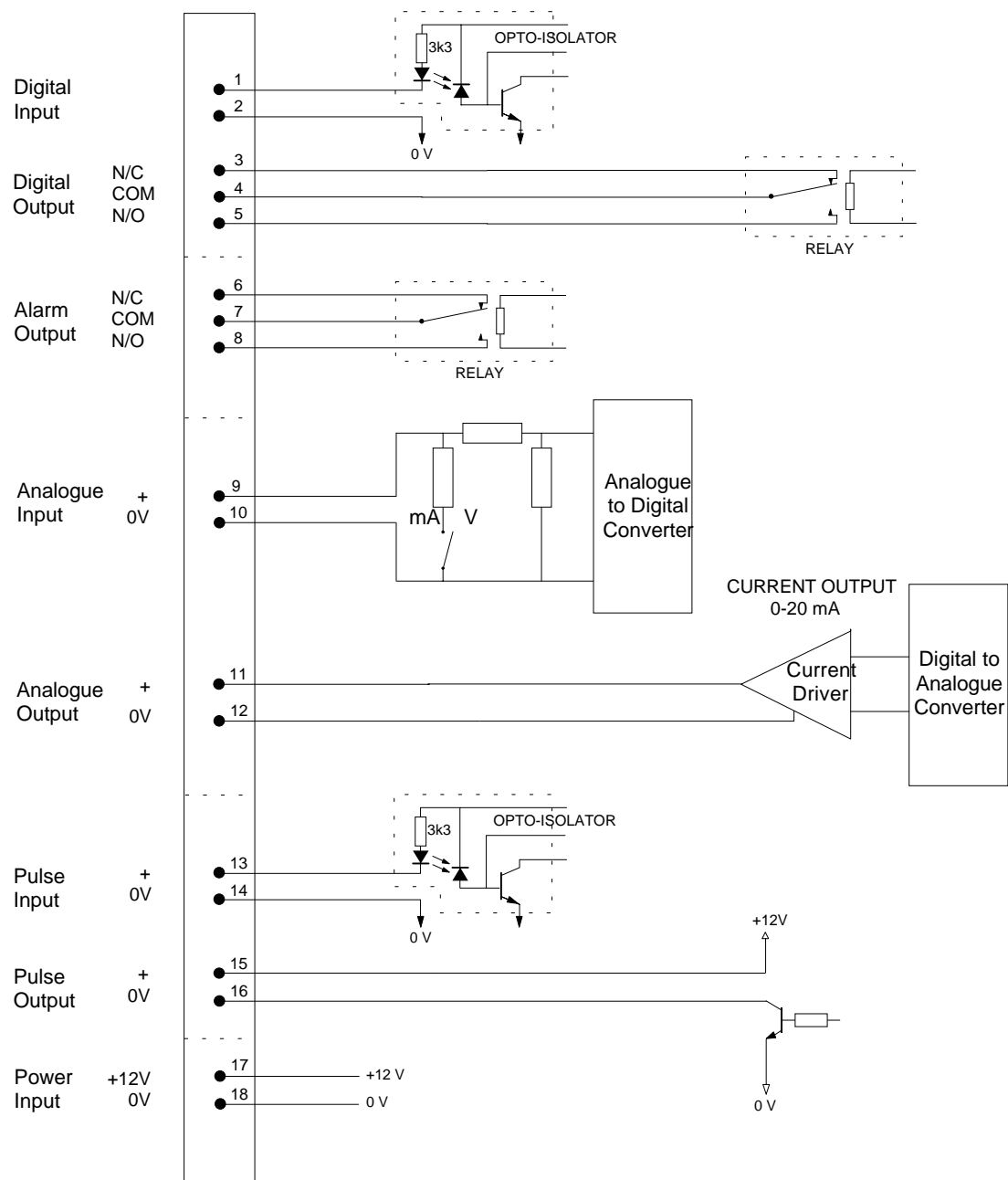


Figure 14 Communications Controller Connection Chart



### 7.3 Digital Output Module – IRDN301

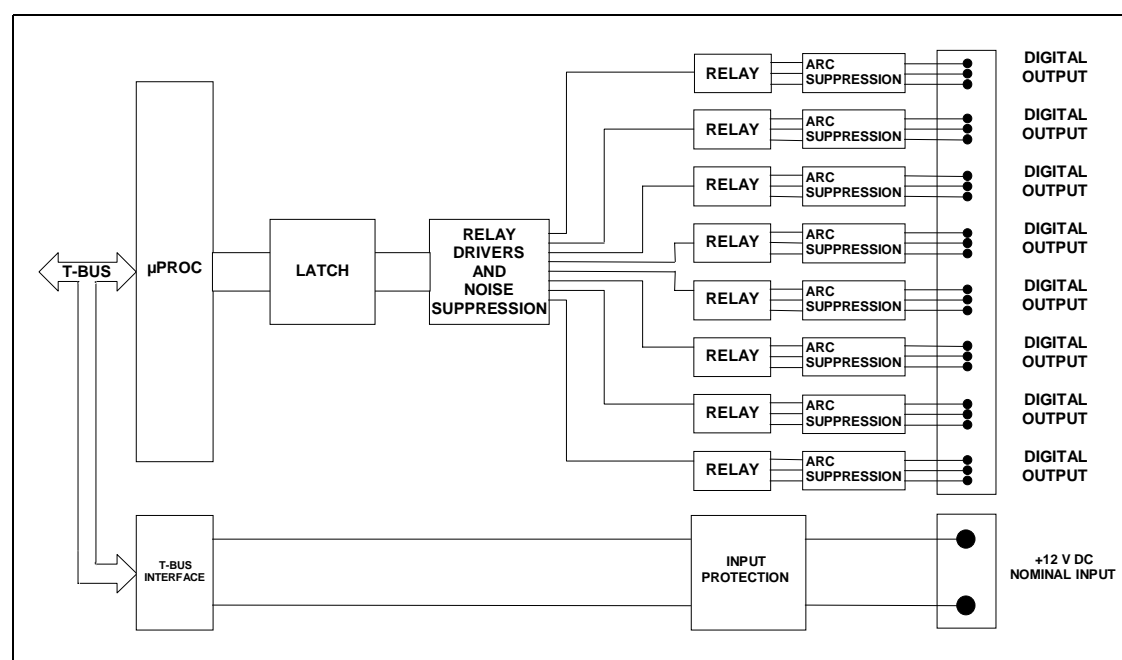


Figure 15 Digital Output Module Block Diagram

This module provides eight digital outputs to external devices in the form of changeover relays, fitted with arc suppression networks. Digital outputs change state based upon instructions received from the Communications Controller (IRDN300). These instructions may originate from a Digital Input at another Node or via the Serial Data Highway for MODBUS applications.

#### Technical Specifications

Module Name	Digital Output
Part Number	IRDN301
Number of Modules per Node	16 max.
Processor	80C31
Internal Interface	T2-BUS Slave Peripheral
Relay Outputs	8 changeover, with arc suppression
Loading	Minimum 1mA @ 1v DC
	Maximum 8A @ 240v AC
	8A @ 120v AC
	8A @ 30v DC
Output Settling Time	20 ms per channel from receipt of T-bus command
Contact Life Expectancy (mechanical)	1 x 10 <sup>7</sup>
Power Supply	11 – 14v DC through T2-BUS
Current Consumption	Minimum 30mA
	Typical 130mA
	Maximum 250mA
Operating Temperature	-10°C to +55°C
User Connection	2 part screw terminals
Dimensions	144 x 167 x 32mm
Weight	0.3kg

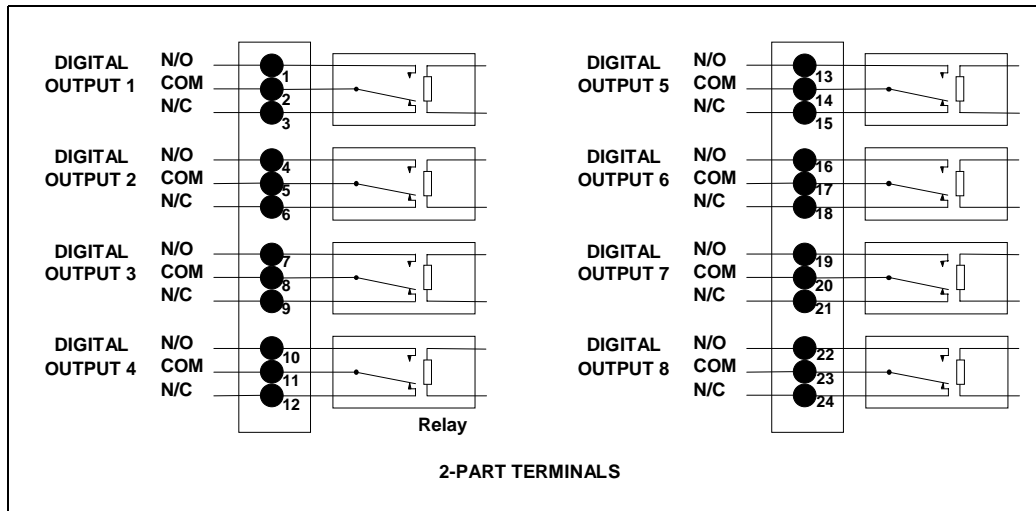


Figure 16 Digital Output Module Connection Chart

## 7.4 Digital/Pulse Input Module – IRDN302

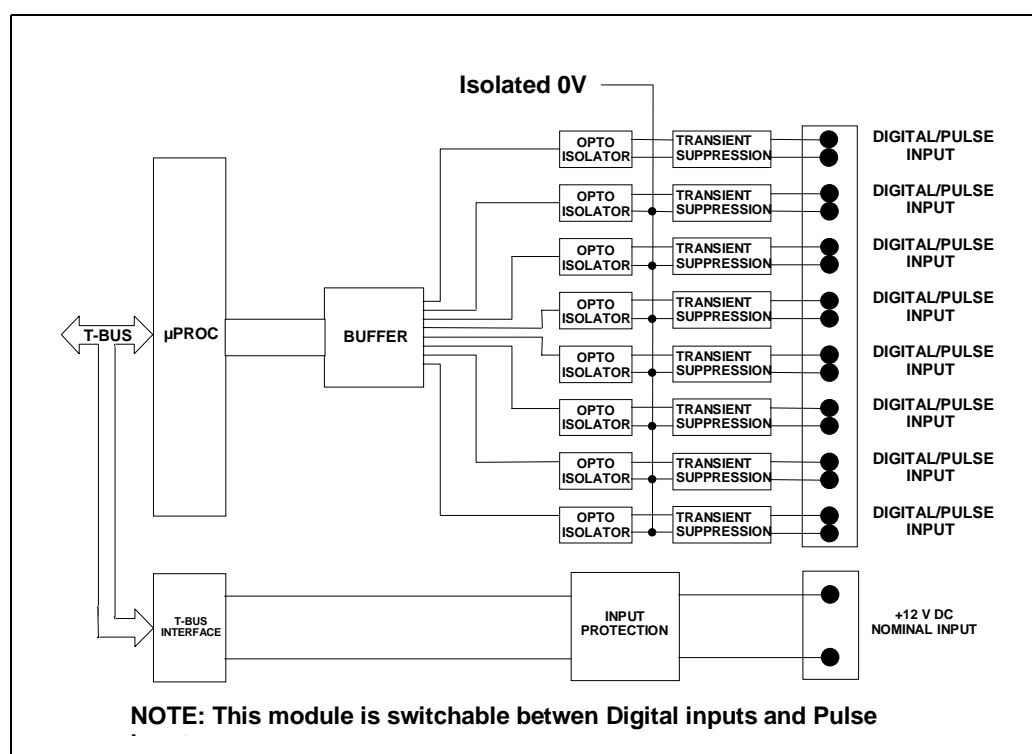


Figure 17 Digital/Pulse Input Module Block Diagram

This module is used to collect eight channels of either volt free digital contacts or pulse counting inputs into a VersaNet2 Node. Each individual channel on the module may be configured as a Pulse or Digital input, giving the module a dual function. A maximum of sixteen modules may be used in one Node with any combination of digitals and pulses.

Each input channel consists of an opto-isolated DC supply for connection to the users volt free contacts or open collector transistor outputs. Transient suppression is provided on every input to protect against spikes and surges. The DC supply on these terminals is isolated from the VersaNet power supplies, but is common to all input channels.

When used for pulse counting, only pulses wider than 5mS will be detected. Each input channel has a counter capable of storing a maximum count of 65535. The user must ensure that an appropriate transmission interval is selected to avoid counter overflow between transmissions as no indication of such an overflow is provided.

### Low Power Option

The IRDN302 can be used as a low power digital input card by selecting the option with link 2 on the PCB. (Note that it cannot be used for pulse input in low power mode). In conjunction with a Communications Controller, a Low Power Node can be configured for use in locations without mains power supplies.

### Technical Specifications

Module Name	Digital/Pulse Input
Part Number	IRDN302
Number of Modules per Node	16 max
Processor	80C31
Internal Interface	T2-BUS Slave Peripheral
Input Channels	8 (programmable for Digital or Pulse)
Input Terminal Voltage	+10v DC
Input Pulse Width	5 mS minimum

Input Pulse Frequency	100Hz maximum
Maximum Pulse Count	65535
Scan Rate (Digital i/ps)	1 second
Power Supply	11-14v through T2-BUS
Current Consumption	Minimum 30mA
	Typical 50mA
	Maximum 70mA
	300uA in low power mode
Operating Temperature	-10°C to +55°C
User Connection	2 part screw terminals
Dimensions	144 x 167 x 22mm
Weight	0.2kg

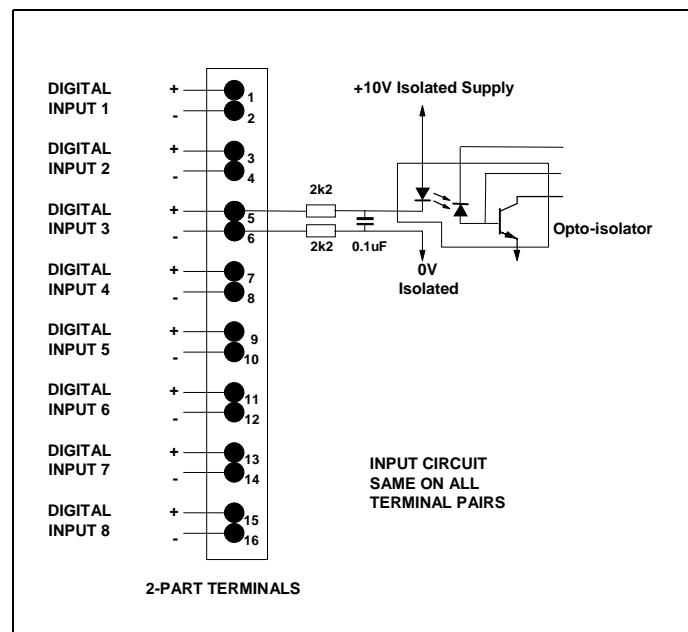


Figure 18 Digital/Pulse Input Module Connection Chart

## 7.5 Analogue Input Module – IRDN307

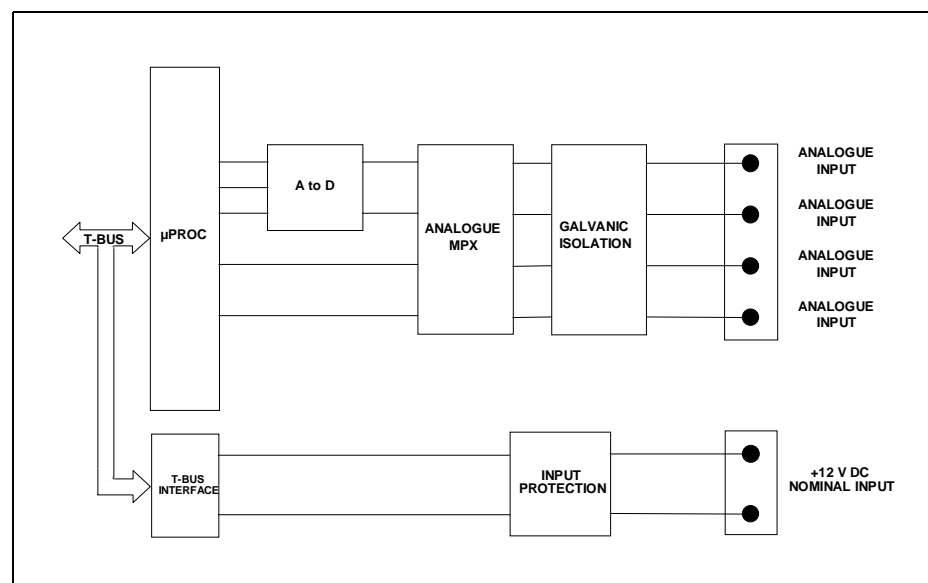


Figure 19 Analogue Input Module Block Diagram

The analogue input module is used to collect up to four analogue readings into a Node. Each input has galvanic isolation offering 1000v isolation between input channels and earth. There is also additional transient suppression on each channel to protect against spikes and surges. The data may be in the form of DC voltage in the range of 0-5v or a DC current of 0-20mA. This is switchable for each input channel individually.

Analogue input values can be programmed to transmit on a time interval, % change or combination of both, using the configuration port on the Communications Controller of the Node.

### Low Power Option

The IRDN307 can be used as a low power analogue input card by selecting the option with link 6 on the PCB. In conjunction with a Communications Controller, a Low Power Node can be configured for use in locations without mains power supplies.

### Technical Specifications

Module Name	Analogue Input
Part Number	IRDN307
Number of Modules per Node	16 max
Processor	80C32
Internal Interface	T2-BUS Slave Peripheral
Analogue Inputs	4
	0-5v DC or 0-20mA DC (selectable) with 1000v isolation to earth
Precision	12 bit
Scan Rate	1 second for 4 channels
Power Supply	11-14v DC through T2-BUS
Current Consumption	Minimum 10mA
	Typical 50mA
	Maximum 100mA
	300uA in low power mode
Operating Temperature	-10°C to +55°C
User Connection	2 part screw terminals
Dimensions	144 x 167 x 22mm
Weight	0.2kg

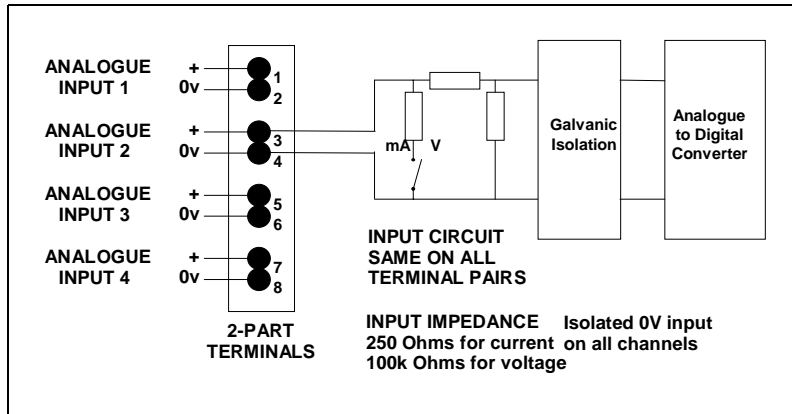


Figure 20 Analogue Input Module Connection Chart

## 7.6 Analogue Output Module – IRDN308

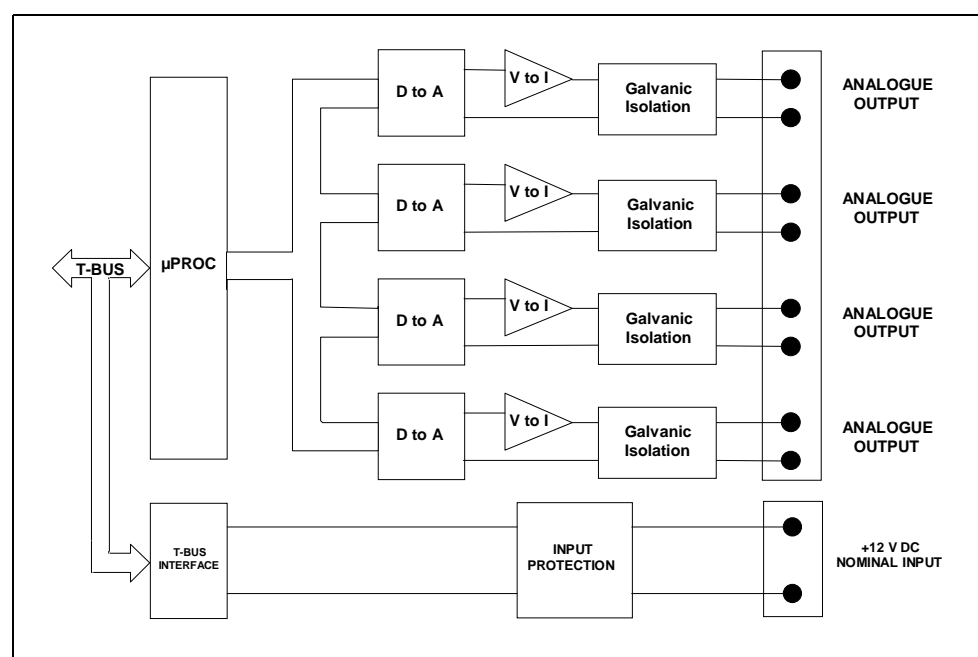


Figure 21 Analogue Output Module Block Diagram

The Analogue Output module provides four channels of DC analogue output for connection to external devices. All outputs have galvanic isolation offering 1000v isolation between output channels and earth. There is also additional transient suppression on each channel to protect against spikes and surges. The signals are in the form of DC currents between 0-20mA. A DC voltage output may be obtained by adding external resistors to each channel. Up to sixteen of these modules may be used in a single VersaNet Node.

### Technical Specifications

Module Name	Analogue Output
Part Number	IRDN308
Number of Modules per Node	16 max
Processor	80C31
Internal Interface	T2-BUS Slave Peripheral
Analogue Outputs	4 x 0-20mA current devices with 1000v isolation to earth
Precision	12 bit
Load Resistance	250 ohms
Output Settling Time	500mS maximum from receipt of T2-BUS command
Power Supply	11-14v DC via T2-BUS
Current Consumption	Minimum 10mA Typical 50mA Maximum 100mA
Operating Temperature	-10°C to +55°C
User Connection	2 part screw terminals
Dimensions	144 x 167 x 22mm
Weight	0.2kg

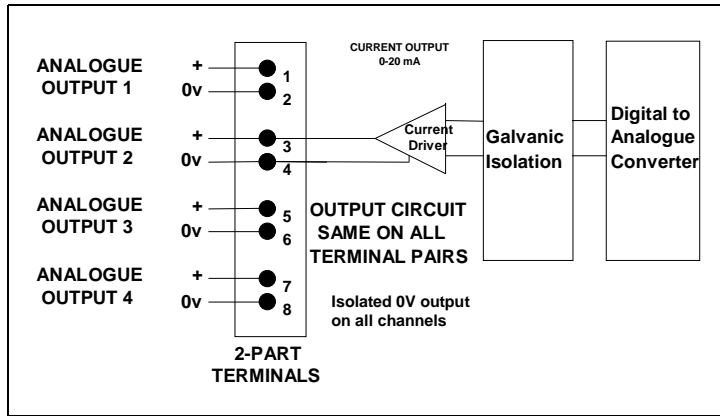


Figure 22 Analogue Output Module Connection Chart



## 7.7 Combination Output Module – IRDN310

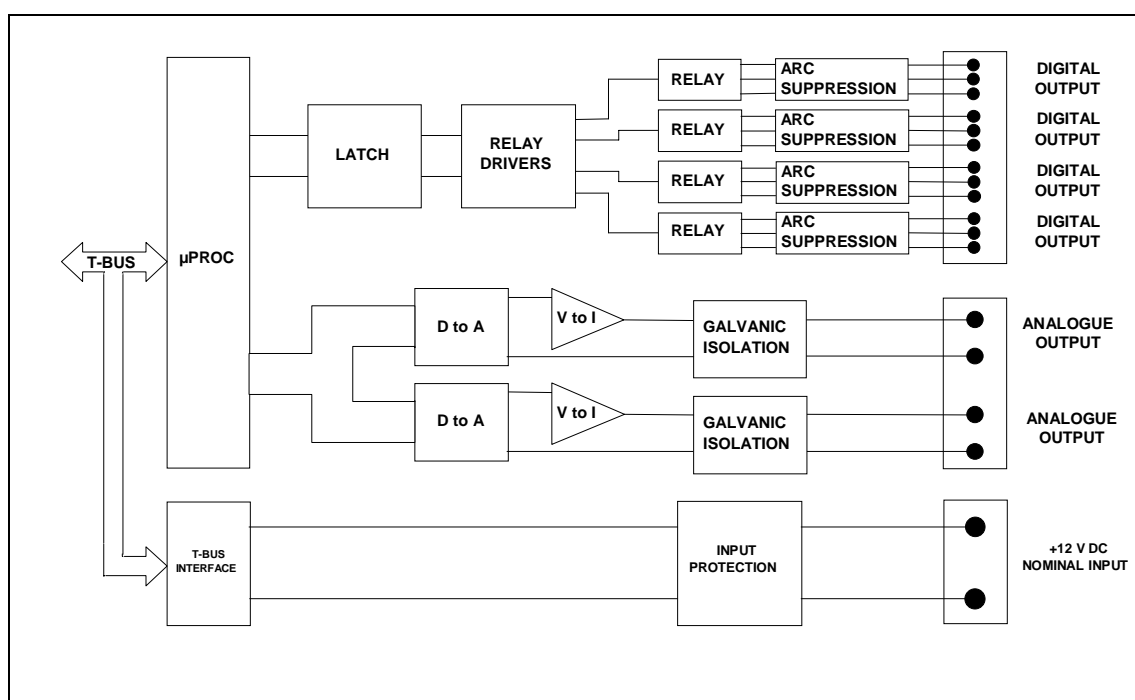


Figure 23 Combination Output Module Block Diagram

The Combination Output Module provides four digital outputs through changeover relays and two channels of DC analogue data. The analogues are 0-20mA DC current outputs and may be converted to DC voltage using external precision resistors. The analogue outputs have galvanic isolation offering 1000v isolation between output channels and earth. There is also arc suppression across the relays of each digital channel.

The module should be used with a Communications Controller, Mains Power Supply and/or DC Adaptor, but with no other VersaNet module. Only one of these modules may be used in a Node.

### Technical Specifications

Module Name	Combination Output
Part Number	IRDN310
Number of Modules per Node	1 max
Processor	80C31
Internal Interface	T2-BUS Slave Peripheral
Relay Outputs	4 changeover, with arc suppression
Loading	Minimum 1mA @ 1v DC
	Maximum 1A @ 240v AC
	3A @ 120v AC
	3A @ 30v DC
Output Settling Time	500mS maximum
Analogue Output	2 x 0-20mA current devices with 1000v isolation to earth
Precision	12 bit
Load Resistance	250 ohms
Power Supply	11-14v DC through T-BUS
Current Consumption	Minimum 50mA
	Maximum 120mA
Operating Temperature	-10°C to +55°C
User Connection	2 part screw terminals
Dimensions	144 x 167 x 32mm
Weight	0.6kg

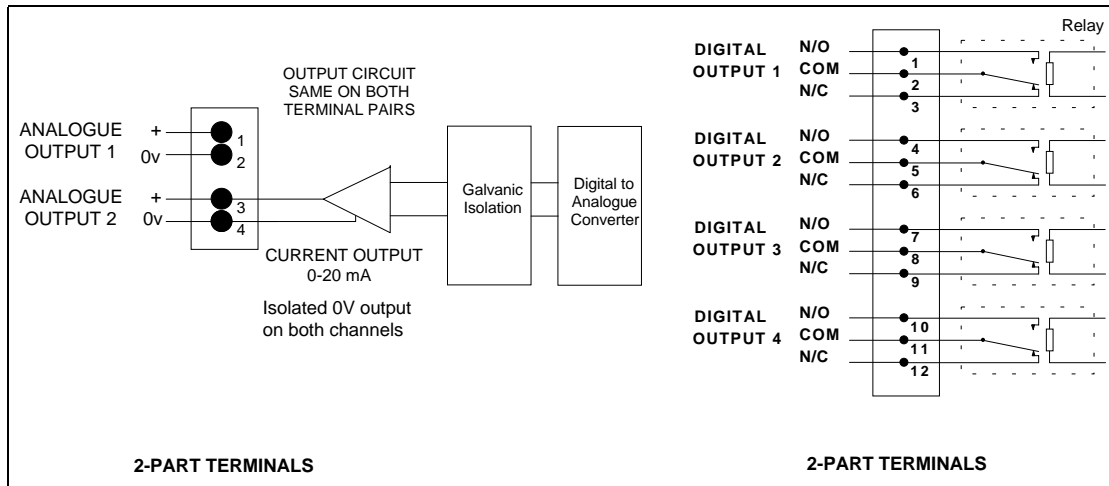


Figure 24 Combination Output Module Connection Chart

## 7.8 Combination Input Module – IRDN311

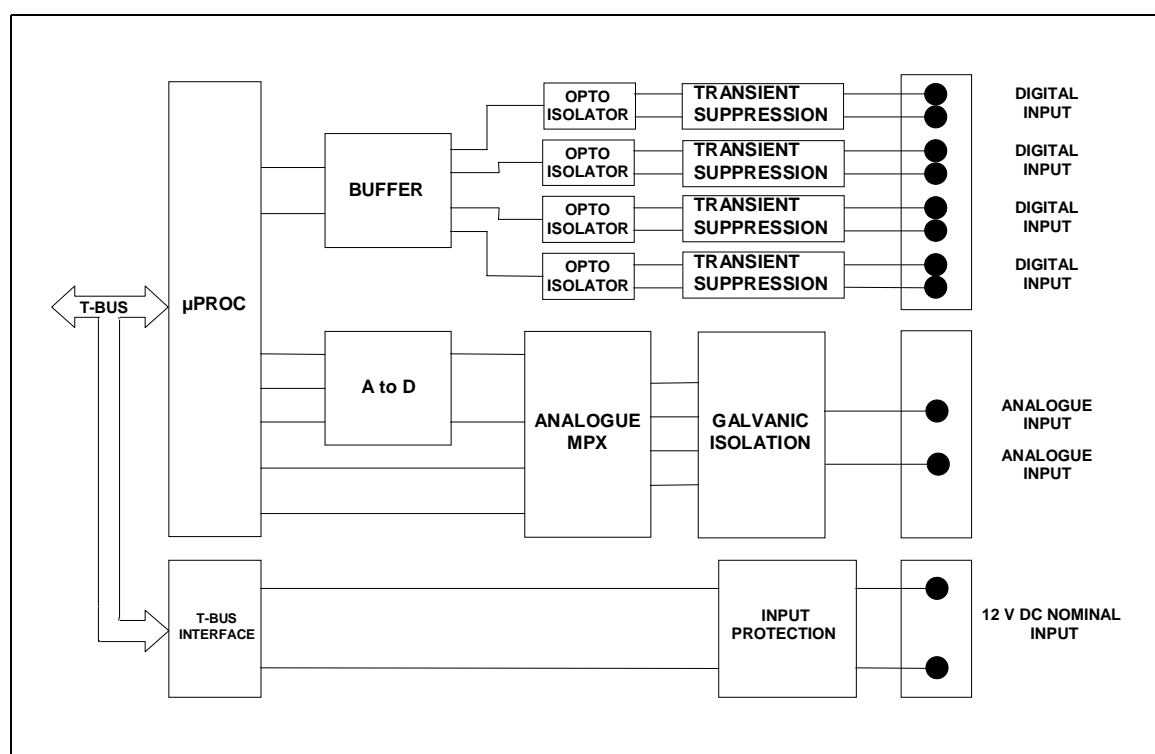


Figure 25 Combination Input Module Block Diagram

The Combination Input Module is used to collect up to four digital inputs and two analogue readings into a Node.

Each digital input channel consists of an opto-isolated DC supply for connection to the users volt free contacts or open collector transistor outputs. The DC supply on these terminals is isolated from the VersaNet power supplies, but is common to all input channels. Transient suppression is provided on every input to protect against spikes and surges. Each analogue input has galvanic isolation offering 1000v isolation between input channels and earth. The data may be in the form of DC voltage in the range of 0-5v or a DC current of 0-20mA. This is selectable for each input channel. Analogue input values can be programmed to transmit on a time interval, % change, or combination of both using the configuration port on the Communications Controller of the Node. Digital inputs can be programmed to transmit on time interval or change of state.

### Low Power Option

The IRDN311 can be used as a low power combination input card by selecting the option with link 6 on the PCB. In conjunction with a Communications Controller, a Low Power Node can be configured for use in locations without mains power supplies.

### Technical Specifications

Module Name	Combination Input Module	
Part Number	IRDN311	
Number of Modules per Node	1 max	
Processor	80C31	
Internal Interface	T2-BUS Slave Peripheral	
Digital Inputs	4 volt free	
Analogue Outputs	4 channels	0-5v DC 0-20mA switchable

Precision	12 bit
Scan Rate	1 second for all channels
Power Supply	11-14v DC direct or 11-14v DC from DC adaptor via T2-BUS
Current Consumption	Minimum 30mA
	Typical 50mA
	Maximum 100mA
	Low Power Mode 300µA
Operating Temperature	-10°C TO +55°C
User Connection	2 part screw terminals
Dimensions	144 x 167 x 32mm
Weight	0.3kg

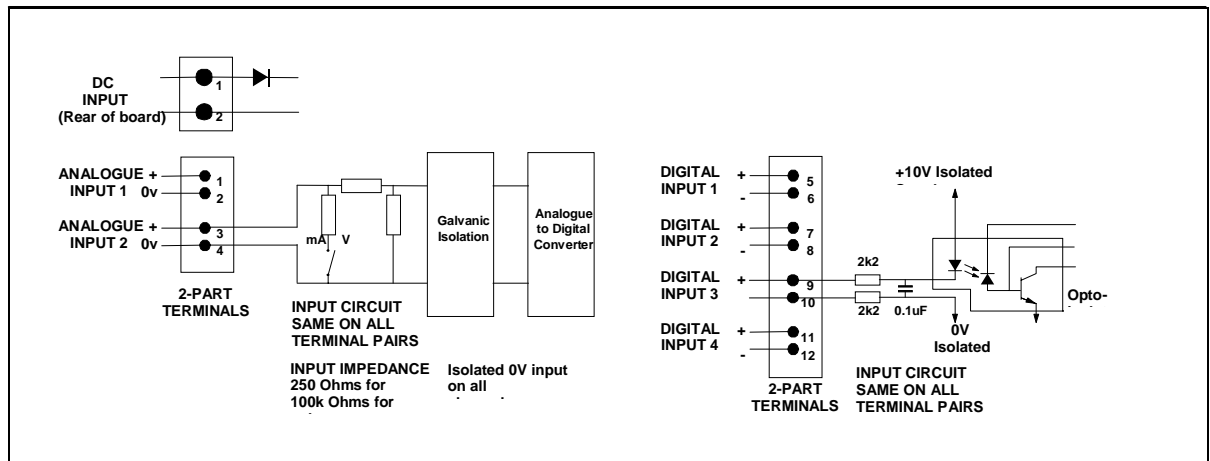


Figure 26 Combination Input Module Connection Chart

## 7.9 Alarm Output Module – IRDN314

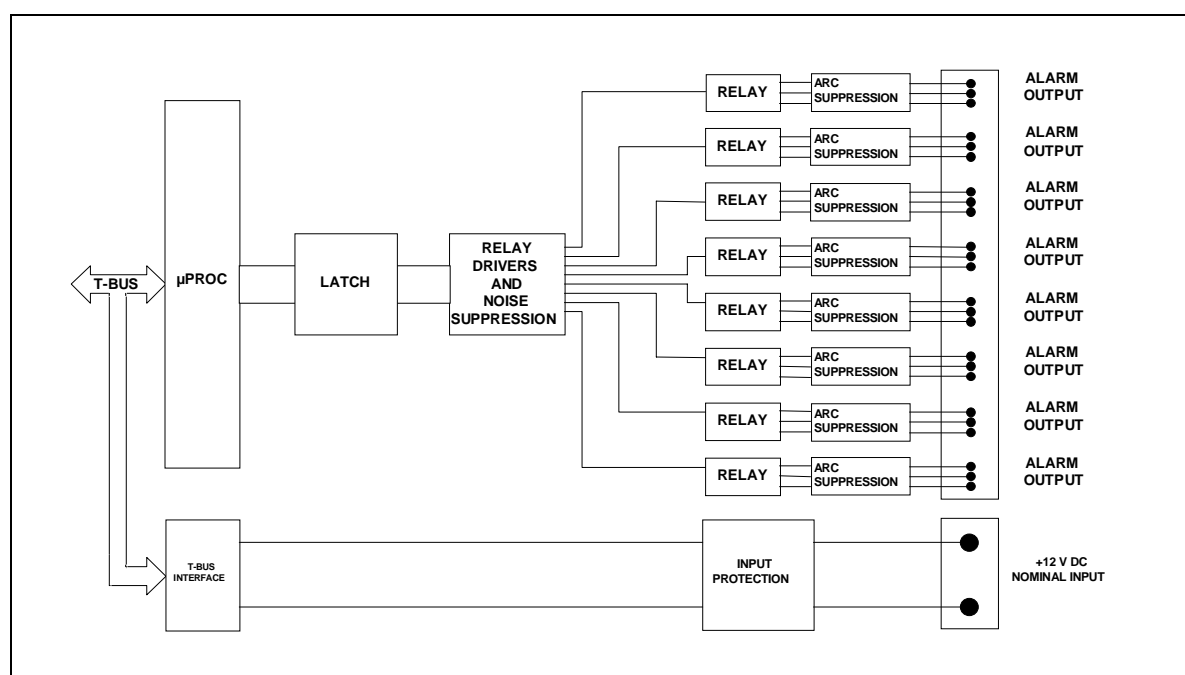


Figure 27

The alarm output module allows an individual alarm output per Node within the VersaNet2 network. The alarm occurs at the receiving end of the link being monitored. It is particularly useful in systems where the 'transmitter' is battery or solar powered. The alarm output module has identical hardware to a digital output module IRDN301 but the software is different. In the no-alarm state the relays are energised.

### Operation

On 'power up' all alarm output relays will be energised and a software timer will be started. If no message is received within 30\* minutes the relay will de-energise giving an alarm output. If a message is received at any time before the 30-minute period has elapsed the timer is restarted holding the relay in the energised no alarm state.

\* The 30 minute time is factory programmed within the EPROM. Other times can be supplied up to a maximum of 18 hours.

### Configuration

The alarm output board is installed in the receiving Node in the same way as any other Input/Output module\*. The module is set to a unique address for that Node using SW1\*. Having used an address for alarm outputs that address will no longer be available for digital outputs.

At the transmitting end of the link being monitored, a digital input must be configured to be sent to the specific relay for the purpose at the output end of the link.

For example in a system where:

Network Name = ABC  
 The 'Transmitter' is Node 1  
 The 'Receiver' is Node 2  
 The alarm output card is given address 2  
 Select 'IRDN300 (on board)' from available list  
 Select D0.1 from sub-tree  
 Enter '2D2.3' in Destination Output box  
 Select 'Connect' button

At 'Connection Screen'

The above will cause relay 3 on alarm output module 2 to monitor transmissions from Node 1 and to de-energise if no message is received from Node 1 in 30 minutes.

## Technical Specifications

Module Name	Alarm Output Module			
Part Number	IRDN314			
Number of Modules per Node	16 max			
Processor	80C31			
Internal Interface	T2-BUS Slave Peripheral			
Relay Outputs	8 changeover, with arc suppression			
Loading	Minimum	1mA	@	1v DC
	Maximum	8A	@	240v AC
		8A	@	120v AC
		8A	@	30v DC
Output Settling Time	20mS per channel from receipt of T-BUS command			
Contact Life Expectancy	1 x 10 <sup>7</sup> operations			
Power Supply	11 – 14v DC through T2-BUS			
Current Consumption	Minimum	30mA		
	Typical	130mA		
	Maximum	250mA		
Operating Temperature	-10°C to +55°C			
User Connection	2 part screw terminals			
Dimensions	144 x 167 x 32mm			
Weight	0.3kg			

## 7.10 Analogue Input Module – IRDN207

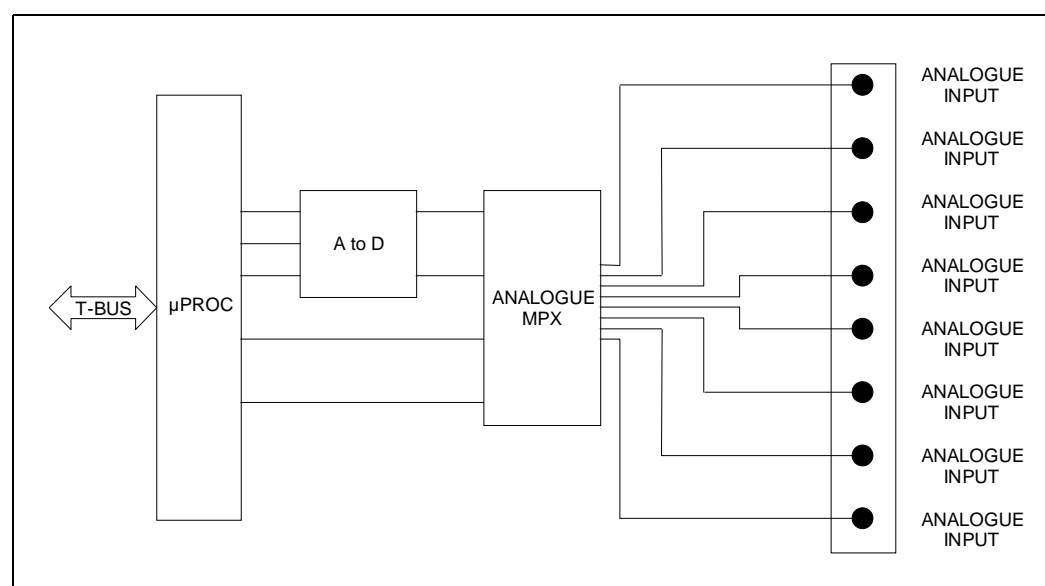


Figure 28 Analogue Input Module Block Diagram

This module is used to collect up to eight analogue readings into a Node. The data may be in the form of DC voltage in the range of 0-5v or a DC current of 0-20mA. This is switchable for each input channel individually. Up to sixteen of these modules may be used in a single Node.

The IRDN207 provides a cheaper alternative to the IRDN307 and it has eight inputs (the IRDN307 has only four). It should be noted however that the IRDN307 has galvanic isolation and additional input protection.

NOTE: The size of the IRDN207 has been changed (from issue 3 onwards) to allow rack mounting.

### Technical Specifications

Module Name	Analogue Input
Part Number	IRDN207
Number of Modules per Node	16 max
Processor	80C32
Internal Interface	T2-BUS Slave Peripheral
Analogue Inputs	8
	0-5v DC or 0-20mA DC suitable
Precision	12 bit
Scan Rate	1 second for 8 channels
Power Supply	11-14v DC through T2-BUS
Current Consumption	Minimum 10mA
	Typical 50mA
	Maximum 100mA
Operating Temperature	-10°C to +55°C
User Connection	2 part screw terminals
Dimensions	144 x 167 x 22mm
Weight	0.2kg

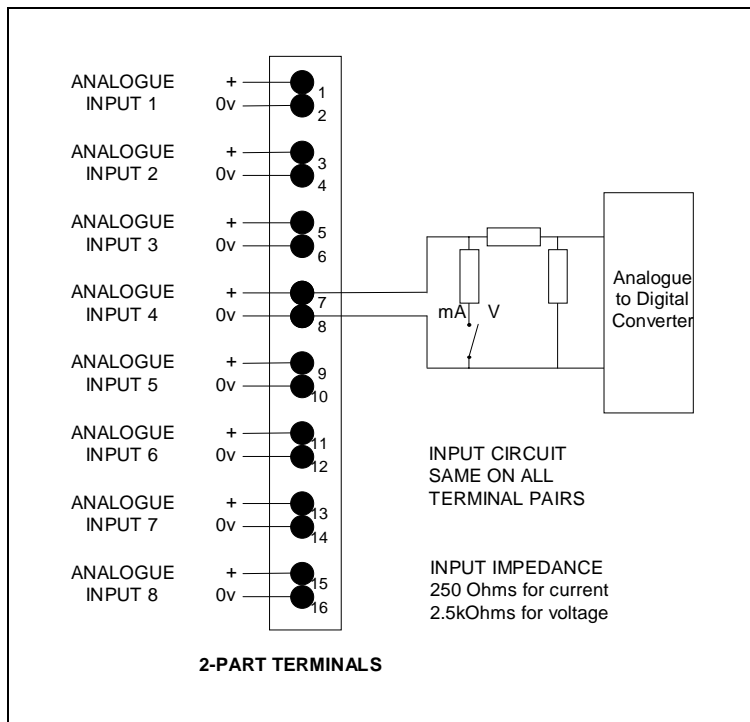


Figure 29 Analogue Input Module Connection Chart



## 7.11 Pulse Output Module – IRDN209

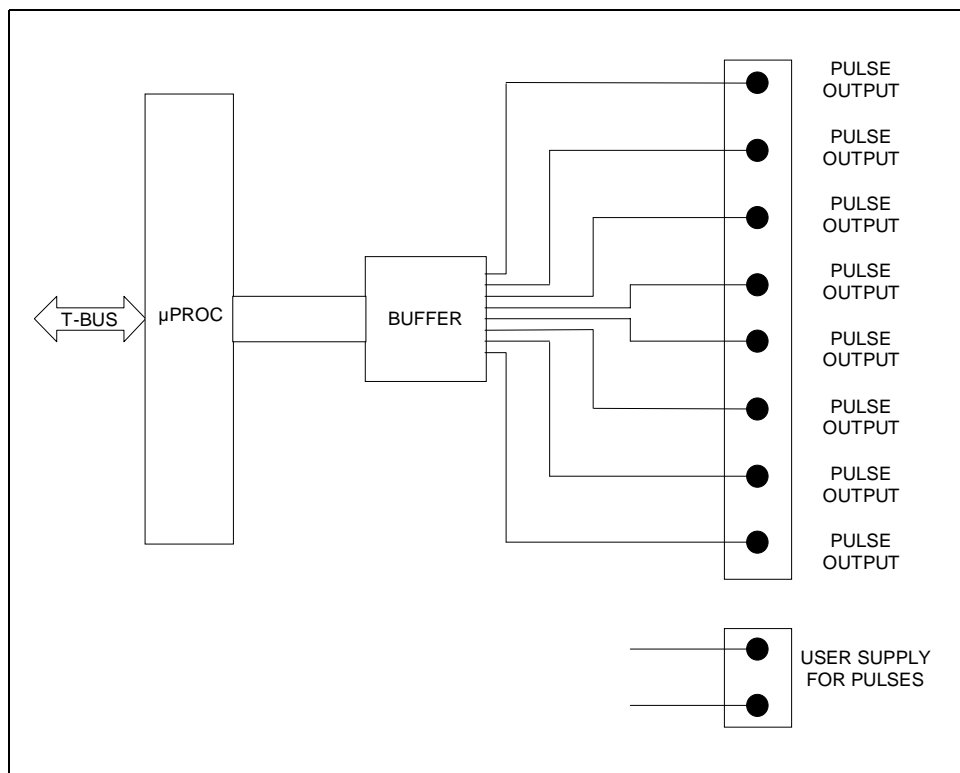


Figure 30 Pulse Output Module Block Diagram

This module provides eight solid state outputs generating pulse signals. Up to sixteen of these modules may be used in a single Node.

The outputs are compatible with most types of pulse counters requiring an input pulse width of greater than 50mS. The user should use scalers at the pulse inputs to ensure the outputs react fast enough.

### Technical Specifications

Module Name	Pulse Output
Part Number	IRDN209
Number of Modules per Node	16 max
Processor	80C31
Internal Interface	T2-BUS Slave Peripheral
Solid State Outputs	8 Open Collector
Max Switching Current	500mA
Max Switching Voltage	60v
Pulse Outputs	17Hz
Pulse Width	50mSec min
Power Supply	11-14v DC through T2-BUS
Current Consumption	Minimum 10mA
	Typical 50mA
	Maximum 75mA
Operating Temperature	-10°C to +55°C
User Connection	2 part screw terminals
Dimensions	152 x 167 x 22mm
Weight	0.2kg

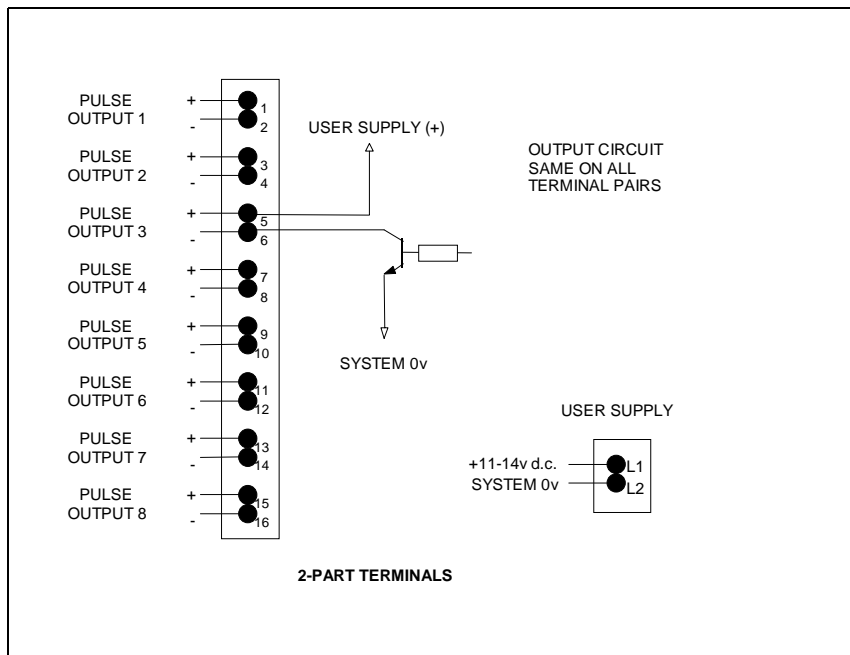


Figure 31 Pulse Output Module Connection Chart

## 7.12 Low Power Pulse Input Module – IRDN212

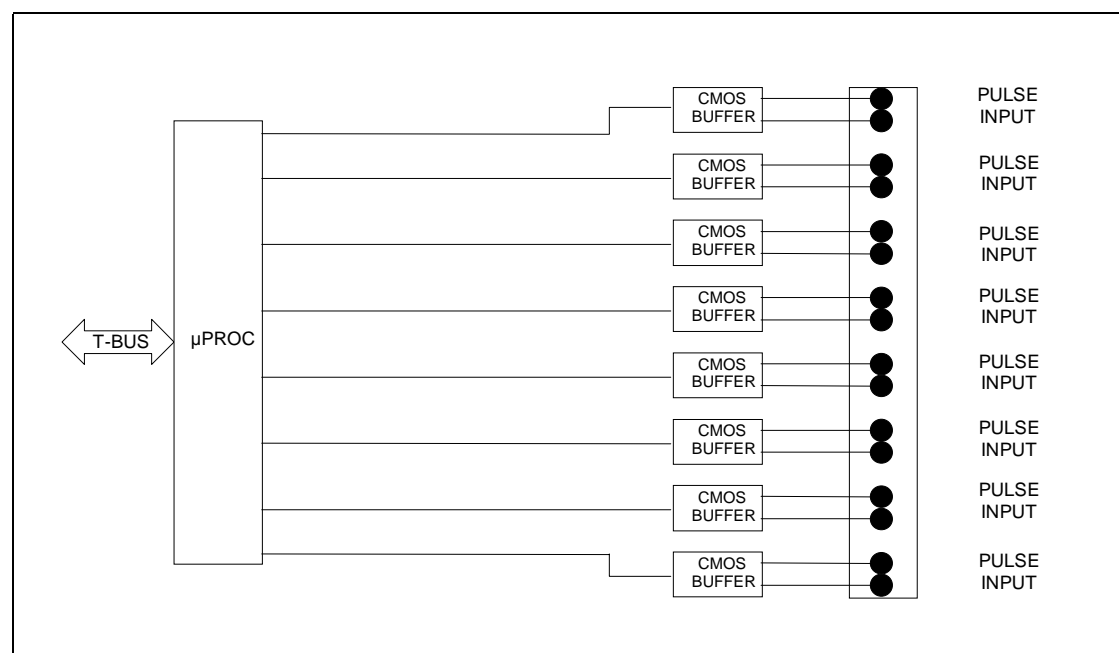


Figure 32 Low Power Pulse Input Module Block Diagram

This module is used to collect up to eight pulse counting inputs and has the added benefit of being able to be connected directly to a DC power source. This module is used with a Communications Controller, and optionally a DC Adaptor, to form a Low Power Node for locations without mains power supplies. It can also be used in conjunction with an IRDN311 Low Power Input Module.

Only pulses wider than 5mS will be detected, with each input channel having a counter capable of storing a maximum count of 65535. The user must ensure that an appropriate transmission interval is selected to avoid counter overflows between transmissions. Eight LED's are provided to indicate pulse activity on each channel. The LED's can be switched 'OFF' via the on-board DIL switch. It should be noted that each illuminated LED will add approximately 2mA to the current consumption of the module.

### Technical Specifications

Module Name	Low Power Pulse Input
Part Number	IRDN212
Number of Modules per Node	16 max
Processor	PIC16C74
Internal Interface	T2-BUS Slave Peripheral
Pulse Inputs	8
Input Pulse Width	5mS min
Input Pulse Frequency	100Hz max
Power Supply	11-14v DC direct or 11-14v DC via T2-BUS
Current Consumption	Typical 70mA Low Power Mode (LED's switched OFF) 5mA
Operating Temperature	-10°C to +55°C
User Connection	2 part screw terminals
Dimensions	152 x 167 x 32mm
Weight	0.3kg

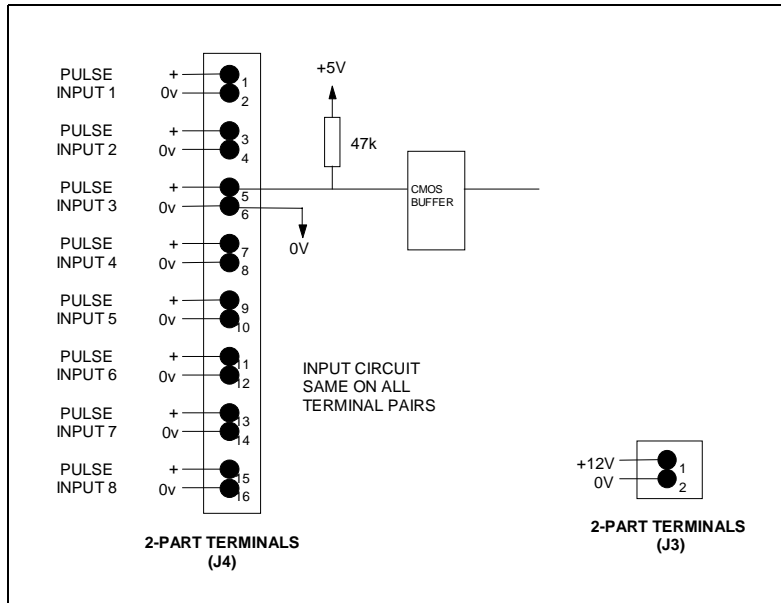


Figure 33 Low Power Pulse Input Module Connection Chart

7.13 Section removed

## 7.14 4U Subrack - ENC0010

The 300 series I/O expansion cards (and the IRDN207 issue 3 onwards) have been designed to fit a standard 4U subrack. For mounting, the 'R' version modules are required, which are fitted with a 32 way DIN41612 connected to directly plug into the subrack back-plane. e.g.

IRDN334R Communications Controller, Digital I/O, with Radio, Rack Mounting Version  
IRDN301R Digital Output Module, Rack Mounting Version

A subrack is available that can hold a Communications Controller (with or without a radio), a power supply and up to ten I/O modules of any combination. A second subrack (or more), may be added to expand the system. Each additional subrack allows for a power supply and up to twelve I/O modules.

NOTE: Only one Communications Controller is required per Node.

The subrack is fitted with a back-plane PCB, which allows direct connection of the controller and I/O modules via the 'T2-BUS' and distributes the 12v supply.

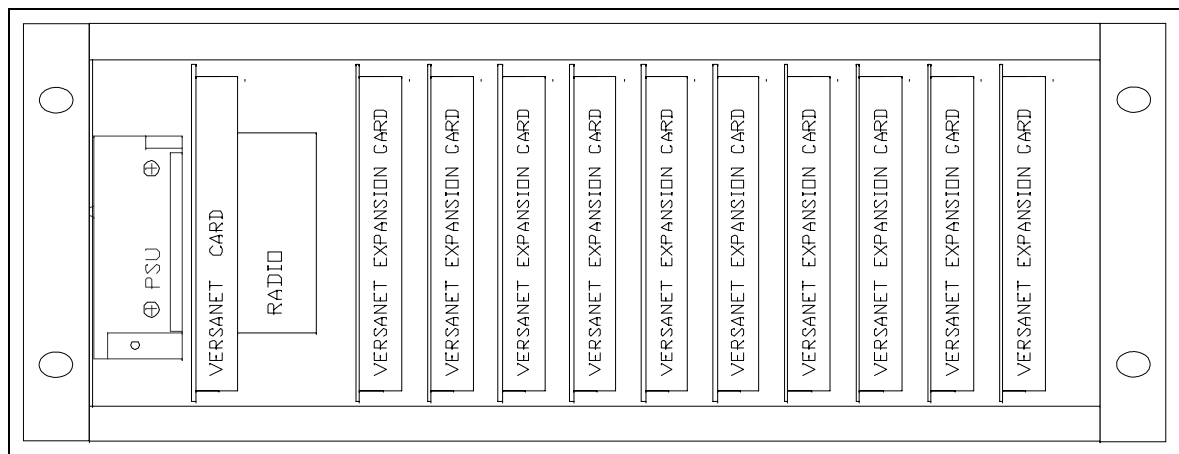


Figure 34

### Technical Specifications

Part Number	ENC0010
Capacity	PSU, Controller + 10 x I/O modules
Part Number	ENC0012
Capacity	PSU + 12 x I/O modules
Subrack Size	436 wide x 178 high x 240 deep
Power Supply	12v x 3A Switch Mode
Input Voltage	90 to 264 V AC @ 50Hz