solartron metrology

orbit3

DIGITAL NETWORK

ORBIT®3 SYSTEM MANUAL

502913

AMETEK
ULTRA PRECISION TECHNOLOGIES

1.1 DOCUMENTATION CROSS REFERENCE

502914	Orbit3 Modules Manual	Details on installation and electrical requirements.
502915	Orbit3 Software Manual	Details on programming and using the Orbit System
502920	Orbit3 Catalogue	Describes the Orbit system and provides details of the products including specifications and dimensions.
502922	Digital Probe User Leaflet	Detailing the specific requirements for using the Digital Probe such as mounting details
502923	Digital Mini Probe User Leaflet	Detailing the specific requirements for using the Digital Mini Probe such as mounting details
502924	Digital Block Gauge User Leaflet	Detailing the specific requirements for using the Digital Block Gauge such as mounting details
502925	Digital Lever Probe User Leaflet	Detailing the specific requirements for using the Digital Lever Probe such as mounting details
502906	Digital Flexure Gauge User Leaflet	Detailing the specific requirements for using the Digital Flexure Gauge such as mounting details

1.2 TRADEMARKS AND COPYRIGHTS

1.3 CONTACT INFORMATION

For updated information, troubleshooting guide and to see our full range of products, visit our website:
http://www.solartronmetrology.com

2 TABLE OF CONTENTS

3 INTRODUCTION

3.1 SCOPE

The Orbit®3 Measurement System is a modular measurement system that can be put together quickly, easily and is cost effective. It allows different types of sensors to be easily mixed and integrated on a single network independent of sensor technology. In addition to linear probes and linear displacement transducers, third party sensors can easily be integrated, this, combined with programmable input and output modules for interfacing to external equipment makes the Orbit®3 Measurement System a flexible solution for measurement applications.

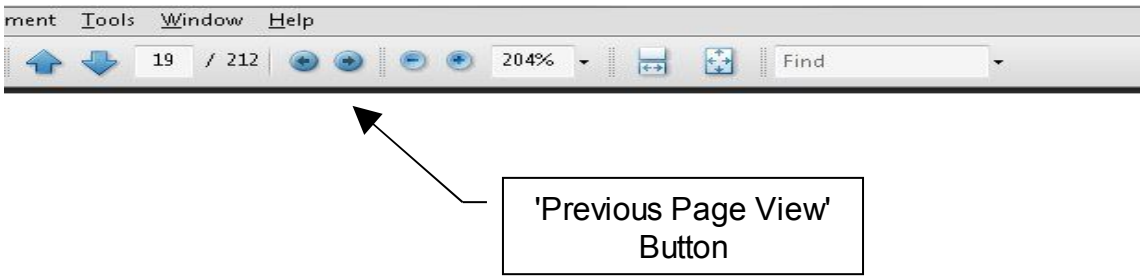
Typically an Orbit®3 Measurement System will consist of four elements, Measurements Modules with T-Connectors, Measurement System controllers, power supplies and cables. All of which can be obtained from the same supplier thus guaranteeing compatibility and accelerating system integration.

This document addresses, functionality, mechanical installation, electrical installation, controllers and then proceeds to show examples of Measurement Systems.

The Orbit®3 Measurement System also includes a range of readouts for stand alone measurement systems these also can be used as a basic interface to a PLC.

3.2 NAVIGATE THIS DOCUMENT

This is a large document, which is a useful reference when writing Orbit applications. To aid navigating the document, the following Navigation tip may be useful:
It is often necessary to jump to another item and then go back to where you jumped from.
This can be done in Adobe Reader by using the ‘Previous Page View’ button:



Other PDF readers will have a similar 'Previous Page View' option.

4 SAFETY SUMMARY

WARNING statements identify conditions or practices that could result in personal injury or loss of life. **CAUTION** statements identify conditions or practices that could result in damage to the equipment or other property **Symbols in this manual**  Indicates cautionary or other information	**Warnings and Cautions** **Warning:** Do not operate in an explosive atmosphere. **Warning:** this equipment is not intended for safety critical applications **Warning:** do not exceed maximum ratings as specified in this document under individual modules. **Caution: Low Voltage** This equipment operates below the SELV and is therefore outside the scope of the Low Voltage Directive **Service and Repair**  CAUTION: This equipment contains no user serviceable parts. Return to supplier for all service and repair

All of the Orbit®3 Products are CE marked and comply with EN50081-1 Electrical Emissions and EN50081-2 Electrical Immunity

5 GLOSSARY OF TERMS AND BASIC SYSTEM INFORMATION

5.1 TERMS ASSOCIATED WITH THE ORBIT3 MEASURMENT SYSTEM HARDWARE

Orbit Measurement System

A system of Orbit controllers, modules, cables and interface software, that are connected together, to form a Measuring System.

Orbit Module

An Orbit Module which can be connected to the Orbit system as part of a Network Channel. Orbit modules perform various measurement and interfaces to the external world.

Orbit Controller

Orbit hardware which controls a network of Orbit modules and is used for communicating with the modules. The controller provides the link between the Orbit Network and a PC or PLC.

Orbit Network

Term used to describe a group of Orbit Modules connected to one channel of an Orbit Controller. Networks are numbered within a measurement system from 0 to 11. A network may consist of a mixture of different Orbit Modules.

Orbit3 Channel

A Channel of an Orbit Controller that is capable of supporting a Network of Modules. Channels are numbered either Channel 1 or Channel 2. Note (Channel 2 only exists depending on the type of Orbit Controller).

Digital Probe
A special case of Orbit product where a linear measurement probe , (usually a gauging probe) is permanently attached to an Orbit Module. This module is known as the Probe Interface Electronics (PIE).

TCON
A 3 way connector housed in a case which allows an Orbit Measurement System to be easily installed. The TCONs are connected together to form the backbone of a network and Orbit Modules plugged into the TCONS. See MECHANICAL INSTALLATION for more details.

Orbit®3 Support pack for Windows®

A suite of software, COM drivers and DLL's which allow the user to interface to the Orbit Measurement System using modern development systems in most common software languages.

5.2 TERMS ASSOCIATED WITH ORBIT MEASUREMENT MODES

Orbit Measurement Mode.

The method by which the Orbit Measurement System takes measurement data from the Orbit Network (group of modules). There are three modes of measurement Standard Mode, Buffered Mode and Dynamic Mode. Refer to the Orbi3 Measurement System Software Manual for further details of the measurement modes and how to use them.

Standard Measurement Mode

Orbit Modules are communicated with on an individual basis. Each module is asked for its measurement data by the controller as required. This mode is suited to measuring static parts where the measurement is not related to other parameters

Buffered Measurement Mode

Orbit Modules (those with buffered capability) are told by the controller to take a series of measurements and store them in internal module memory. This data is then extracted in one block by the controller when the required measurements have been taken.

Dynamic Measurement Mode

Orbit Modules take a measuring on receipt of a common synchronization pulse sent to the modules from the controller. Each module in turn sends its data back to the controller within a specific time frame. This process continues until the required number of measuring have been taken.

Dynamic Mode Data Time Frame

A 256µS time window in which the modules that are performing a Dynamic Measurement return their data. This time frame defines the data rate and number of modules that can perform a dynamic measurement.

Dynamic Mode Reading Rates

The table below explains the reading rate and module relationships

Reading Rate Readings/second	Number of Modules	Term used to describe
3906	8	4k Mode
1953	16	2k Mode
976	31	1k Mode

Dynamic Synchronization Pulse

Pulse sent from a Dynamic capable Orbit Controller which tell the Orbit Modules to take a reading. This pulse is either generated by an Orbit3 controller or by another Orbit Module which is given authority to generate the synchronization pulses by the controller. This is particularity useful when using the Encoder Input Modules allowing synchronized measurements between angular and linear measurement – e.g. profiling.

See Orbit Software Manual for details on using the different Orbit3 Measurement Modes

5.3 THE DIFFERENT ORBIT MEASURMENT SYSTEMS ORBIT1, ORBIT2 AND ORBIT3

Orbit1

The original Orbit® system which consisted of just Digital Probes and some controllers.

Orbit2

Introduced improved measurement capability, higher speeds and other Orbit® Modules

Orbit3

Orbit2 compatible but with many improved features.

For details of compatibility between different products please refer to the 'Orbit Compatibility Roadmap' section in the Orbit Software Manual.

Abbreviations

AIM	Analogue Input Module
DP	Digital Probe (e.g. DP10)
DIOM	Digital Input Output Module
EIM	Encoder Input Module
LE	Linear Encoder
DIM	Digimatic Interface Module
M	(Orbit) Module
PIE	Probe Interface Electronics
RS232IM	RS232 Interface Module
RS485IM	RS485 Interface Module
ORBIT®	Orbit communication protocol
OSPW	Orbit Support Pack for Windows
TDM	Time Division Multiplexing
USBIM	USB Interface Module
4K MODE	Synchronised Measurement at 3096 readings per second
2K MODE	Synchronised Measurement at 1953 readings per second
1K MODE	Synchronised Measurement at 976 readings per second

5.4 OVERVIEW OF ORBIT MODULES

MODULE	DESCRIPTION
Digital Probe (DP)	A Linear Measurement Probe hard wired to an Orbit®3 Conditioning Module which provides improved accuracy and a simple method of constructing a Gauging System. The conditioning module that is fitted to the DP is called a PIE module.
Analogue Input Module (AIM)	A module that can take in 3rd party sensors with either voltage of current outputs (E.g. pressure, load cells). A Special variant is available for a PT100 temperature sensor
Encoder Input Module (EIM)	A module that can take in a square wave signal from a rotary encoder or line scale. This allows angular position to be easily brought into the Orbit3 measurement system for profiling. The EIM can also act as a pseudo controller for Dynamic measurement applications.
Digital Input Output Module (DIOM)	This module can read discrete inputs and set discrete outputs for control functions.
Digimatic Interface Module	This module reads equipments with a digimatic interface such as a Vernier Caliper.
Digital Displacement	A displacement sensor hard wired to an Orbit3 Conditioning Module, allowing Displacement sensors to be easily networked and data collected from them,
PSIM	Power Supply Interface Module used to power the Orbit3 Network.

For further information of the Orbit Modules refer to the Orbit Modules Documentation supplied on the OSPW CD.

5.5 OVERVIEW OF ORBIT®3 CONTROLLERS

The Orbit3 Measurement System Controller Products which are suitable for different applications as summarized below

Controller Type	Description	Measurement Modes Supported	Orbit Bus Speed (Baud Rate)
PCI Card	PCI card that fits inside a PC and can control two Orbit Measurement channels. 6 cards can be installed in one PC controlling up to 12 Orbit Measurement Channels.	Dynamic Buffered Normal	9600 Baud 187.5kBaud 1.5MBaud
PC104 Card	PCI Card in PC104 Format	Dynamic Buffered Normal	9600 Baud 187.5kBaud 1.5MBaud
USB Controller	Connects to a USB port and can control one Orbit Measurement Channel.	Buffered Normal	187.5kBaud
RS232 Interface Module	Connects to a serial port and can control one Orbit Measurement Channel. (Often used with a PLC)	Buffered Normal	9600 Baud 187.5kBaud
Ethernet Module	Coming Soon	Dynamic Buffered Normal	
RS485 Interface Module	Uses same commands as RS232 but RS485 levels, for use with PLCs	Buffered Normal	9600 Baud 187.5kBaud

The PCI Cards and RS232IM can control up to 100 modules on a single channel with Orbit3. Orbit 2 and lower can only accommodate 31 modules per channel. Refer to the network examples .EXAMPLES OF ORBIT NETWORKS

Refer to the Orbit Measurement System Software Manual for further details of the controllers and how to use them.

6 NEW FEATURES WITH ORBIT3

The Orbit3 system provides the following improvements over Orbit2, while still retaining backward compatibility.

6.1 MECHANICS

- DIN Rail Mounting on all Modules as standard.
- Improved Sealing
- Improved locking between TCON/PIE , resulting in improved performance in high vibration applications.
- New plastic construction is lighter by a third , reducing the weight of the overall system significantly.
- Optional Earthing arrangements, enabling the TCON bus to be isolated or non-isolated from ground.

6.2 ORBIT3 HOT SWAP

- Allows compatible models to be changed without the need to reconfigure the computer .
- TCON remembers the Probe address .
- PLC users can now easily configure their system beforehand with a PC.
- Diagnostic LEDs indicate HOT SWAP error.

Requires: PCI Card MK3, OSPW Version 5 and Orbit3 compatible TCONS and Modules.

A feature of Orbit3 is the ability to change a module in a network without having to edit the network configuration table.

A faulty module can be replaced by another, compatible module (e.g. DP2 can be replaced by DP2 but not a DP10), the original identity and address are ‘assumed’ by the new module. This means that the operating software does not need to change, since all module identities are effectively the same.
A compatible module is the same module type and stroke. For example a 2mm Digital probe is only compatible with another 2mm Digital Probe. Incompatible modules indicate this by flashing the red status LED.

6.3 DIAGNOSTICS

6.3.1 GENERAL STATUS INDICATION

The Orbit modules have a blue and red LED which is used to indicate the Module status.

STATUS	BLUE	RED
Orbit network Idle, No faults on modules	Off	Off
Orbit network active. No faults with modules	Blink. (for each command that is transmitted)	Off
Orbit Voltage Warning. (<4.7V) The Orbit voltage is low but the modules are still operating correctly.		Medium Flash 0.2 secs on 0.8 secs off
Orbit Voltage Error. (<4.5V) or (> 5.5) The Orbit voltage is outside of specification and the modules return an error code, they do continue to communicate unless the voltage becomes so low that they stop.		Slow Flash 0.8 secs on 0.2 secs off
Hardware Fault The modules return an error code		On

The red LED's which indicate a fault condition will stay active as long as the fault exists, they are not cleared by a reset or cycling the power unless the fault is cleared.

6.3.2 HOT SWAP ERROR INDICATION

STATUS	BLUE	RED
Not Present		
Faulty	Off	4 flashes per second
Module not compatible	Off	4 flashes per second

The Red LED will either fast flash if there is a Hot Swap error or stay on following an OrbitSetAddr command if there is a Hot Swap hardware error.

6.3.3 EIM ERROR INDICATION

The EIM is a special case and does not have the Orbit Voltage Warning indication. All other error conditions are reported.

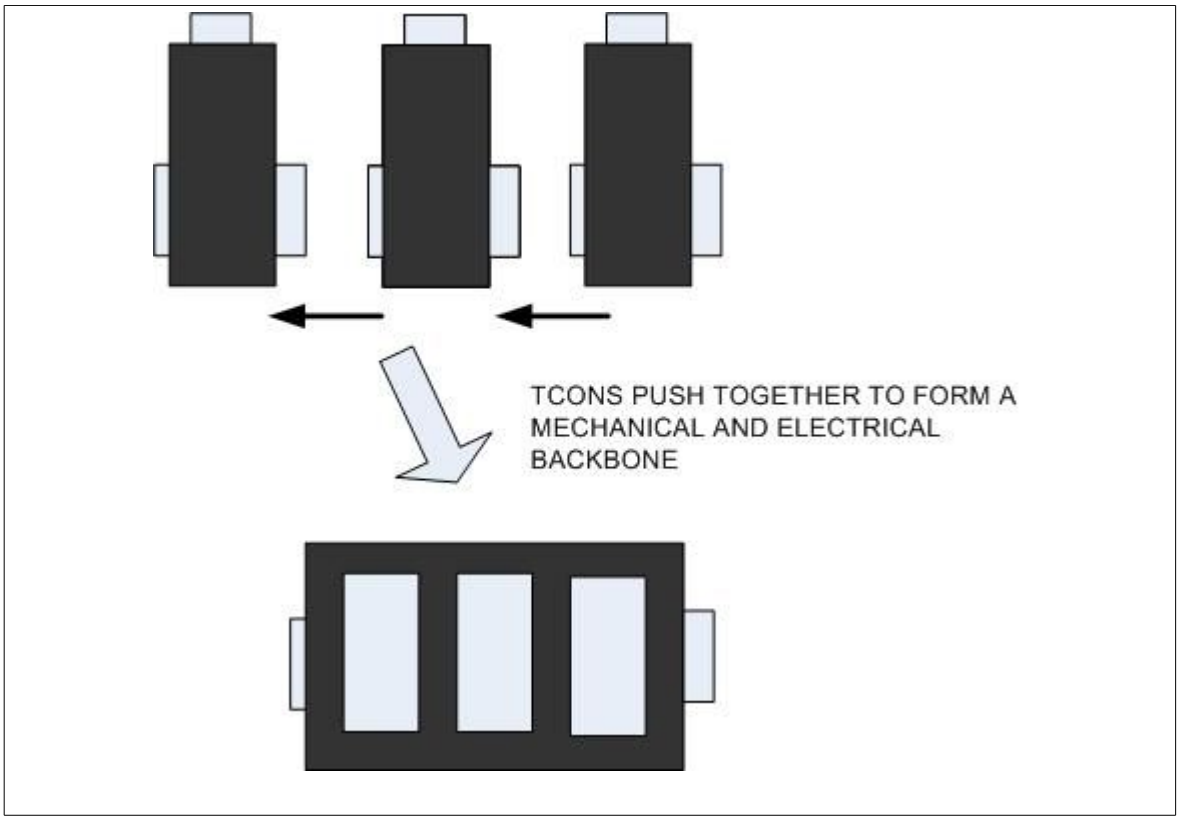
7 MECHANICAL INSTALLATION

All Orbit Modules comprise of an electronic module, sensors are either hard wired into the electronics module or a cable is provided for connection to external elements. The electronics modules are formed into an easy mechanical system using T-connectors (TCONS) for rapid installation and simple maintenance.

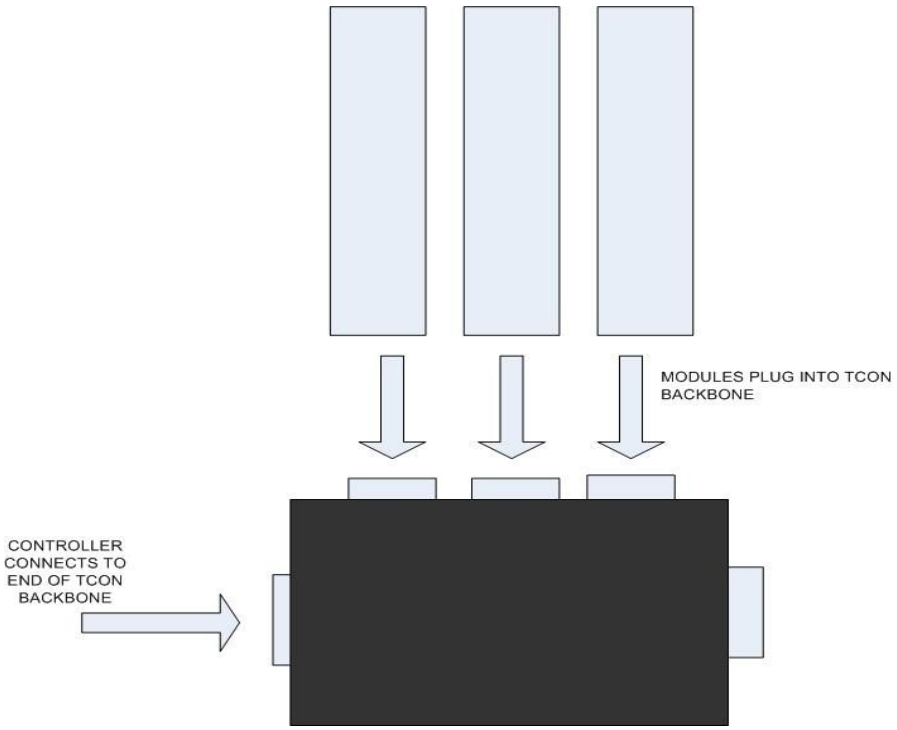
The Orbit Electronics Module comprises a plastic molding with a nine way D Type connector, two recesses for connection to a mating TCON and two diagnostic LED indicators.

The TCON contains three nine way D Type connectors for connection to other TCONS and to an Orbit Electronics Module. TCONS are plugged together to form a backbone for the Orbit Electronics Modules. The TCONS are designed to be DIN Rail mounted however the DIN Rail mount may be removed to allow the modules to be mounted via screws through the base or using feet.

7.1 BASIC TCON CONNECTION



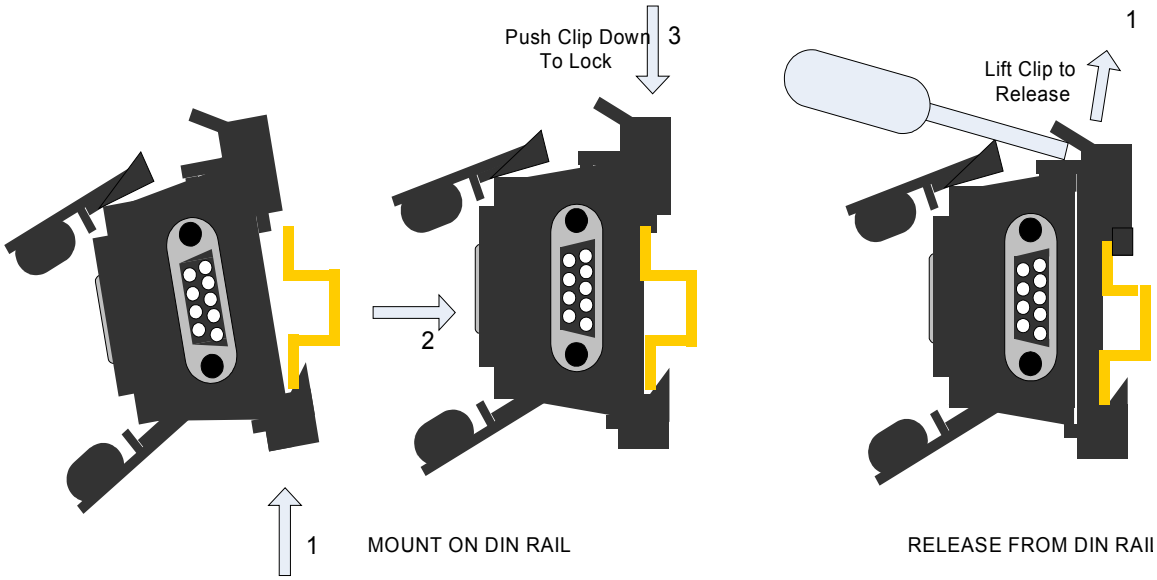
7.2 BASIC MODULE TO TCON MOUNTING (BACKBONE)



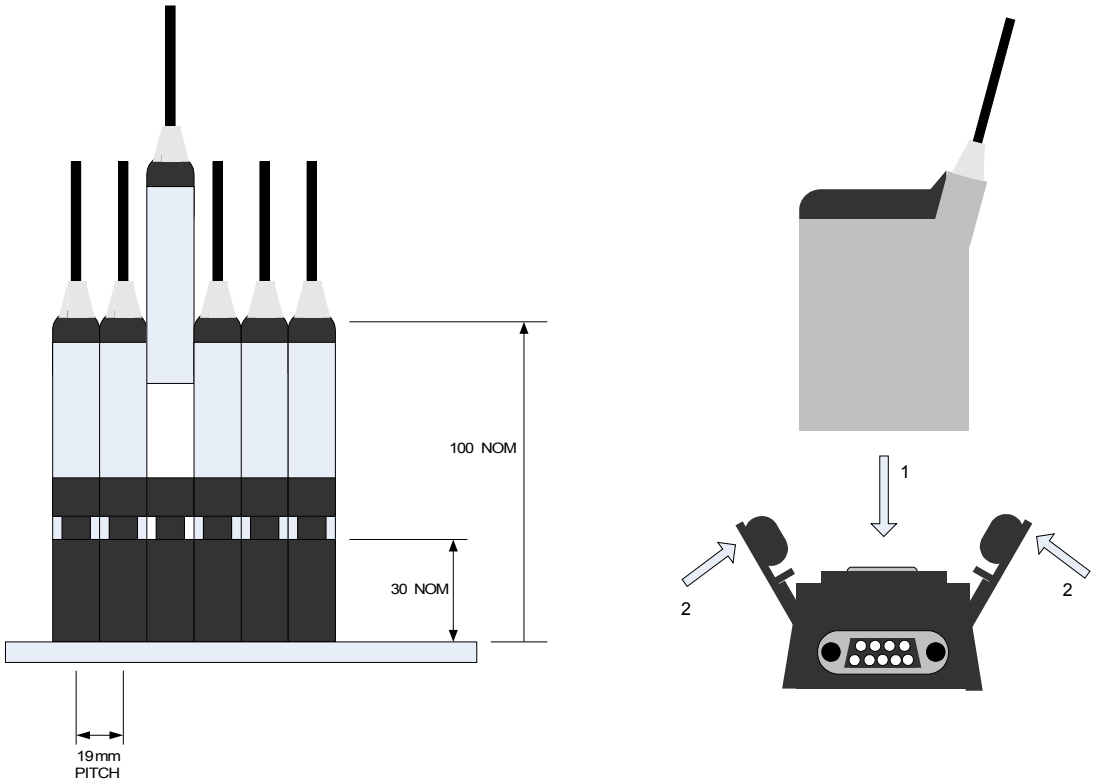
Please see the Orbit3 Sales Dimensional Drawings supplied on the OSPW CD for precise dimensions of the Orbit Modules and TCONS.

Detailed mounting guidelines are shown in the remainder of this section

7.3 TCON DIN RAIL MOUNTING

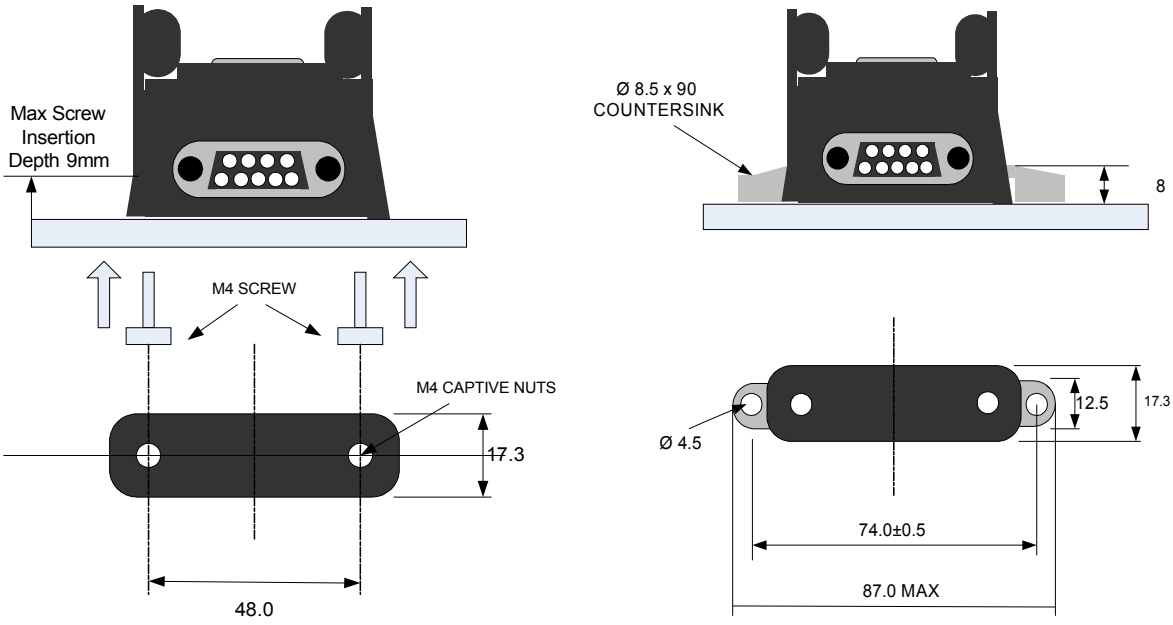


7.4 MODULE (OR PIE) TO TCON MOUNTING

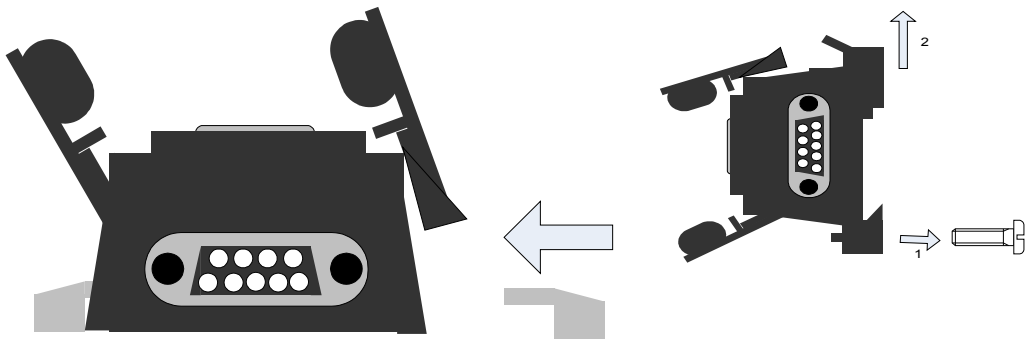


Note. The 19mm pitch also applies to fitting an Orbit3 TCON to an Orbit2 TCON.
Note. The Orbit2 TCON to Orbit2 TCON pitch is 17.8mm.

7.5 OPTIONAL SCREW MOUNTING (DIN RAIL REMOVED)



7.6 REMOVAL OF DIN RAIL FITTING OF FEET



Place foot into recess
and push down to
locate

3

8 ELECTRICAL INSTALLATION

This section describes power requirements, cables recommendations and grounding.

8.1 OPERATING VOLTAGE AND CURRENTS

The Orbit Measurement system operates from DC input voltage of 4.75V to 5.25V. It is essential that the correct operating voltage is maintained we recommend using special Orbit cables and PSIMs. For advise on checking the Orbit Voltage refer to CHECKING ORBIT VOLTAGES

The Modules take different amounts of power; refer to the Orbit Modules Manual for specification of specific modules or use the Orbit Network Power Calculator Spreadsheet supplied on the OSPW CD. This application allows Orbit networks to be simulated to calculate the number of PSIM modules needed and the effect of cable lengths.

The available Orbit Controllers have different power supply schemes as covered under the section on each controller

All Orbit Modules are fitted with a 9 way D Type Connector with the Pin designation detailed below. This connector provides the interface to the Orbit Network.

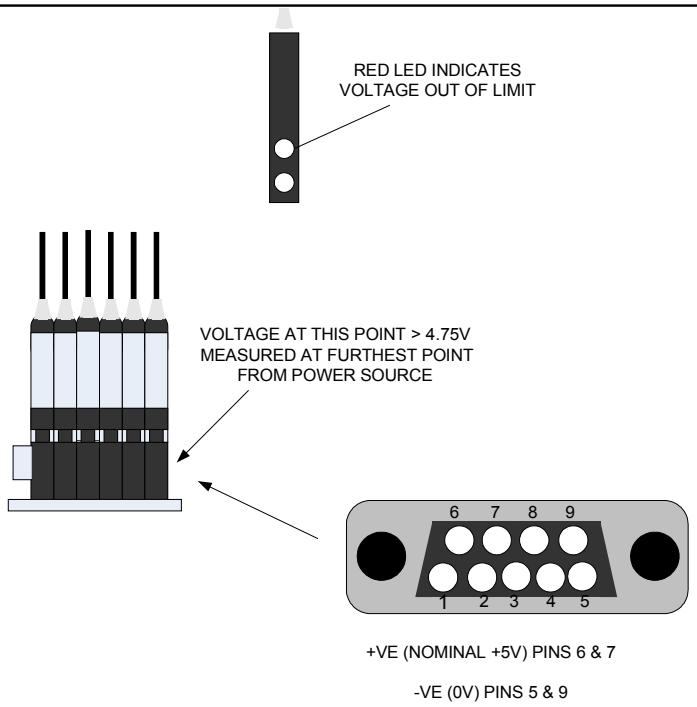
Pin Number	Signal
1	Reserved
2	Serial Data (RS485)
3	Serial Data (RS485)
4	Reserved
5	0 V
6	+5 V
7	+5 V
8	Reserved
9	0 V

8.1.1 CHECKING ORBIT VOLTAGES

If the status LEDs indicate a low operating voltage, this can be caused by

- Insufficient power supply – PC for example cannot supply enough current if using PCI card.
- Cable lengths too long.
- Use of poor quality cables (recommend using cables designed to for Orbit)
- Insufficient PSIM.
- PSIM derating not being followed if ambient temperature is high

To check the Orbit Voltage, measure the voltage at the end of the TCON stack furthest from the power source for the stack which is indicating an Orbit Voltage problem.



8.2 GROUNDING, CABLES AND POWER SUPPLIES

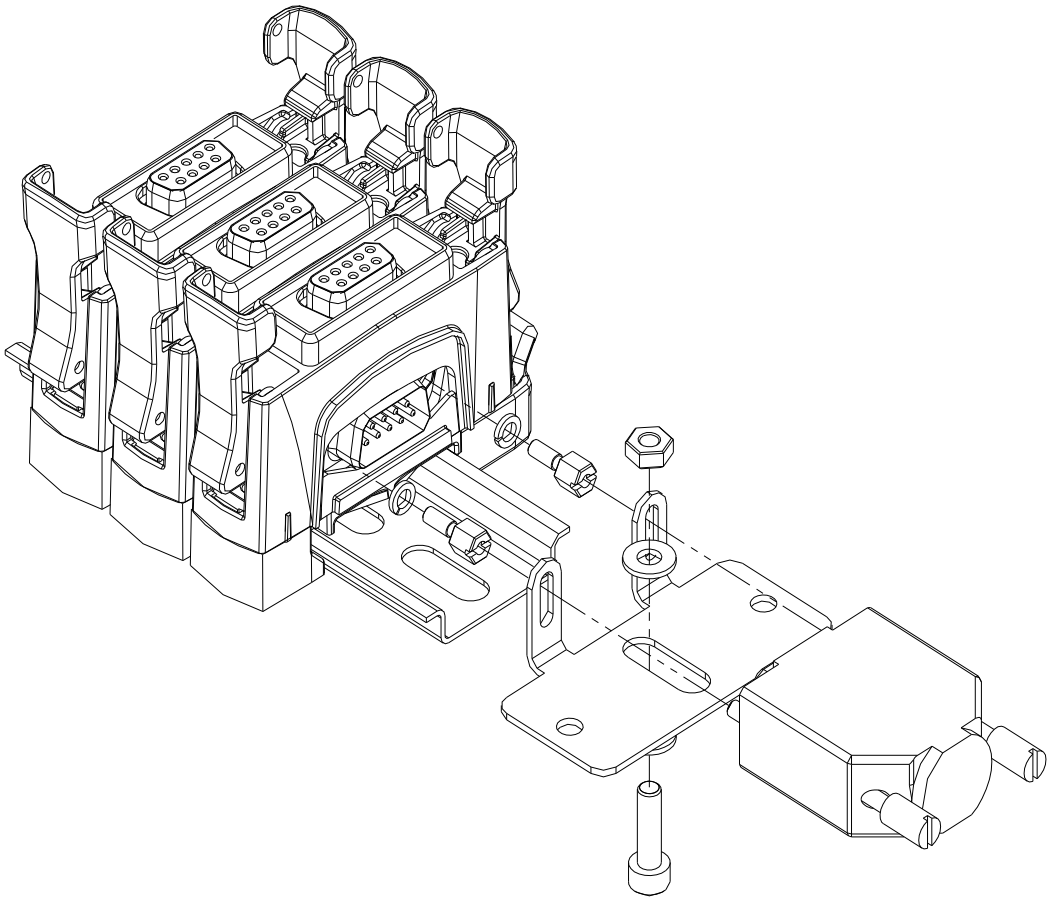
It is advisable to provide a good ground point for an Orbit installation.

Grounding of the Orbit3 product can be achieved using two methods.

Grounding the system back to the primary power source or grounding the TCON stack using a special grounding bracket. The grounding bracket can be fitted to either end of the TCON backbone using the screw lock connections on the TCON.
Note.
With Orbit3 there is no connection between the mounting screws on the TCON and the system ground. This has been done to allow alternative grounding schemes. (Previous versions of Orbit had metal TCONS and cases which forced earthing via the case).
The Digital Probes have their body connected to the cable screen. Therefore all parts of the system should be at ground potential.

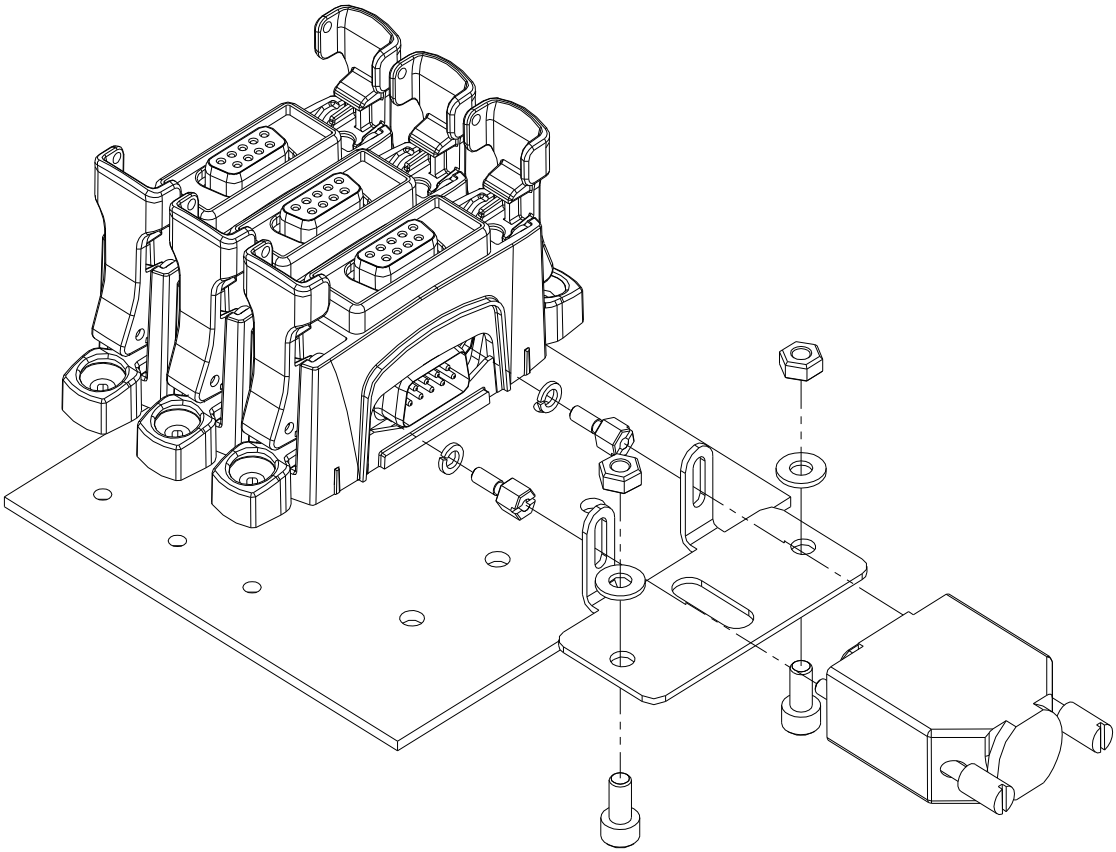
8.2.1 Grounding with DIN rail installations

For DIN rail mounted applications the bracket provides a means of locking the stack in place on the DIN rail in applications where their may be vibration and/or a local ground point is required.
See below for assembly.



8.2.2 Grounding with non-DIN rail installations.

For non-DIN rail mounted applications the bracket provides a means of locking the stack in place on a surface in applications where there may be vibration and/or a local ground point is required.
See below for assembly.



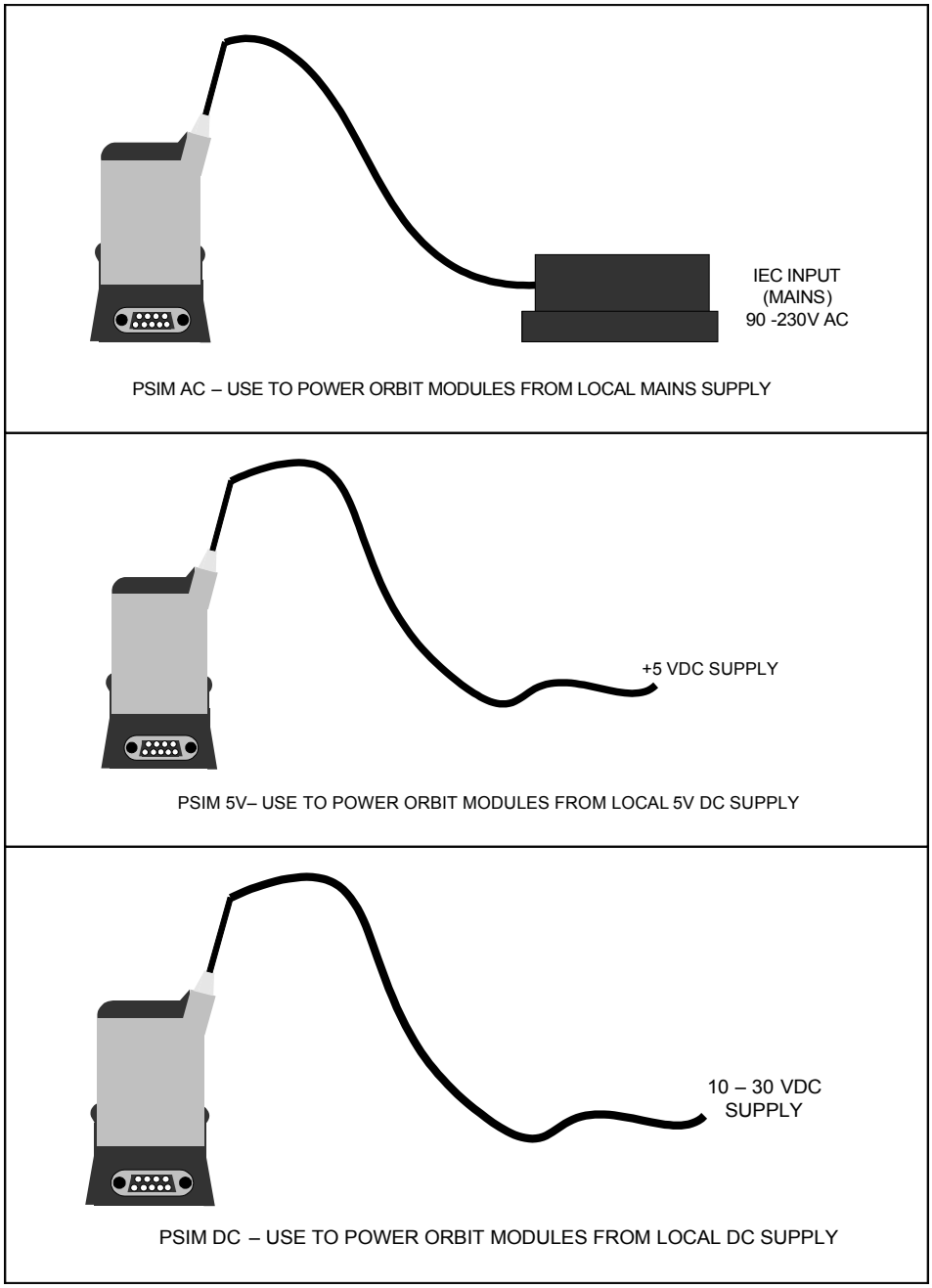
8.2.3 Orbit Cables

Special Cables, which are specifically made to reduce voltage drop and to provide adequate screening for compliance with the EMC directives are recommended,
A terminator is supplied with each controller this should be placed at the end of the network.

For accessories see ORBIT ACCESSORIES

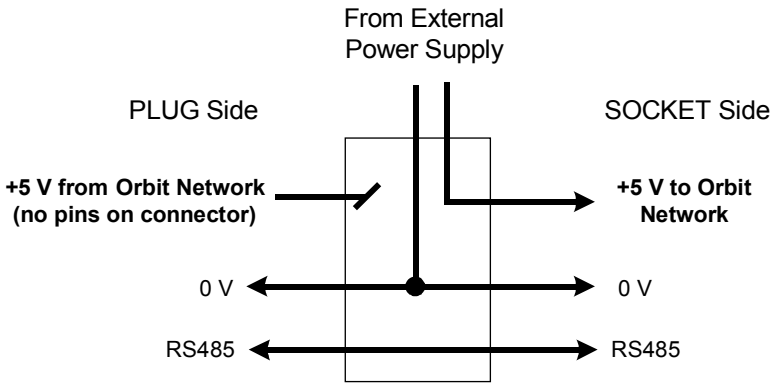
8.2.4 Power Supply Interface Modules (PSIMS)

Power Supply Modules (PSIM) are recommended for larger installations and for applications where the TCON stack is greater than 3m from the PC.
PSIMs are the preferred option for providing a quiet supply for the Orbit bus.
They must always be used with the RS232 controller and Ethernet controller.
However, the USB controller can provide power for up to four Orbit modules providing that the PC is capable of providing sufficient USB power.



The PSIM will only provide power to modules that follow the PSIM. Typical configurations are shown in the Section EXAMPLES OF ORBIT NETWORKS.
The PSIM power connections are shown in the diagram below.
Note. The USB controller must go before the PSIM

8.2.5 PSIM Schematic and Pin-out



The +5 V power supply line from the network is isolated at the PSIM.

All modules after the PSIM are powered from the external power supply connected via the PSIM.0 V is common.

When installing a PSIM the following points should be considered.

- The AC Power block may be mounted in any direction
- The AC power block should not be exposed to fluids or excessive dust.
- Cooling of the AC power block is by convection; so allow some air flow around the unit.
- When installing the DC PSIM in large Networks, it is advisable to fit a TCON between the previous Orbit Module and the PSIM to allow for cooling. In hot environments fit a TCON either side to allow air flow around the DC PSIM.
- The PSIM output current requires to be thermally derated from above 40ºC, by 50% up to its maximum working temperature of 60 ºC.

See the Orbit Dimensional Drawings supplied with the OSPW for dimensional and mounting data for the PSIM products.

9 ORBIT CONTROLLER INSTALLATION AND USE

9.1 CONTROLLER TYPES

:

See Controllers Overview

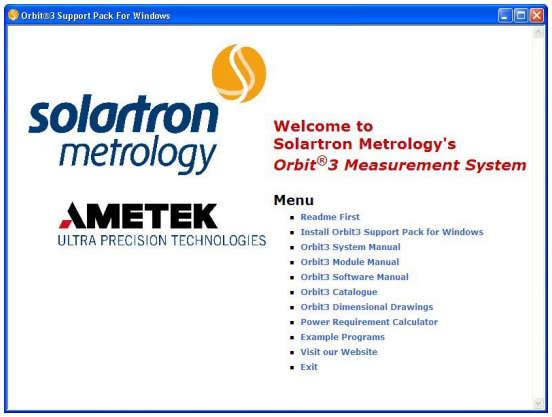
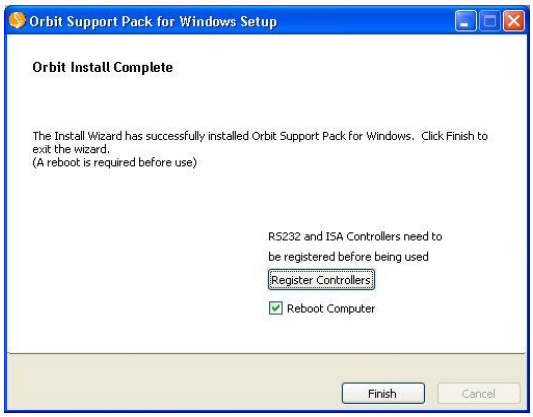
9.2 INSTALLING THE ORBIT®3 SUPPORT PACK. FOR WINDOWS® (OSPW)

The OSPW must be installed before connecting or fitting any of the Orbit Controllers

To install the OSPW, you must be an administrator on the PC.

Also, ensure the PC's power saving mode is not set to enter Standby. If this occurs and then the system re-awakes, the Orbit Controller will not respond.

To install the software, insert the Orbit®3 Measurement System and Documentation CD into the appropriate drive. The CD should run automatically; - if it doesn't, run the file 'index.hta'.

Select the option “Install Orbit3 Support Pack for Windows”, follow the instructions on the screen until the “Install Shield Wizard Completed Window” is displayed.	
	

After installing the Orbit®3 Support Pack for Windows® the following components will be loaded:

- Orbit Com Library which provides a language independent interface to the Orbit Measurement System.
- A dynamic link library (Orbit_IF.dll) that provides an interface between a 32 bit application and the Orbit Network via an Orbit Controller (Orbit3 PCI Network card, USB Controller, RSS232 Controller)
- Orbit Registration Program (OrbitRegistration.exe) which allows you to register a RS232 device (or Orbit ISA network card).

- Orbit ComTest demonstrator program using COM
- Orbit3 Demonstrator Program
- Code examples.

9.3 ORBIT PCI CARD INSTALLATION AND USER GUIDE

PC System Requirements

- PC with a Pentium Processor running at 700MHz or above with 128MB or more of RAM.
- PCI Slots (each card will require one PCI slot). (This is NOT PCI EXPRESS)
- Microsoft Windows® **32 Bit** operating system. (64 bit operating systems are not supported).
- Microsoft Windows®XP, Windows®Vista or Windows®7 (Earlier versions generally work but are not supported)

Carton Content

- Orbit PCI network Card
- Cable 2m with 9 way D Types connectors (Connects Orbit Network Card to TCON stack).
- 2 earthing and mounting brackets
- 9 Way Terminator Plug (used to terminate end of network cable)

9.3.1 Hardware Installation

The Orbit Support Pack for Windows® must be installed before fitting the Orbit PCI Network Card

Before handling the Orbit PCI Network Card, read the following information.

Static Electricity
The Orbit Network card contains components that can be damaged by static electricity. To reduce the risk of damage to the card, keep it in its conductive plastic packaging until it is required. When fitting the card handle it by its free edges and do not touch the card edge connector.

High Voltages
Before opening the cabinet of the computer, switch off the power and disconnect the power supply lead from the mains supply. Do not operate with the cover removed.

The Orbit®3 Network Card is designed to be installed into a PCI slot on the computer motherboard. Follow the steps below.

The Orbit Network Card is designed to be installed into a PCI slot on the computer motherboard. Follow the steps below.

1. Before fitting the card install the Orbit®3 Support Pack for Windows®

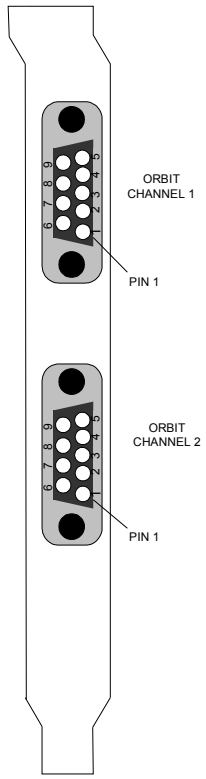
2. Turn off power, remove lead and remove the cover (Refer to the computer user manual for any special instructions)

3. Find an empty PCI slot and remove the slots blanking plate Insert the Orbit®3 Network card

4. If you are intending to use more than one PCI card for Dynamic operation then fit the Multicard Link Cable to the PCI Network cards you wish to link before refitting the case of the computer. Each Link cable can link up to 4 PCI cards. If you are linking less leave the remaining connectors disconnected, Each PCI card has two 2 way Molex connectors on the edge opposite the Orbit connectors, as you look at this edge the connector on the right is the Master connector and the one on the left nearest the 10 way header is the target connector. Use the link cable to connect one PCI card (nearest the PSU) as the master and connect the remaining as targets.

5. Replace the computer's cover and turn the power on

6. Windows® will detect the Orbit®3 Network Card(s) and automatically install the driver software.
   Note: the Network Card Firmware detects whether the cards are linked Master or target automatically – no Software settings are required.



The Orbit Measurement System can have up to 6 PCI cards. Each card must be set up as defined below

Card Number	Card Channel	Network Number
1	1	0
	2	1
2	1	2
	2	3
3	1	4
	2	5
4	1	6
	2	7
5	1	8
	2	9
6	1	10
	2	11

Any number of networks can be allocated but the networks must be numbered in sequence

9.4 PC104 CONTROLLER CARD

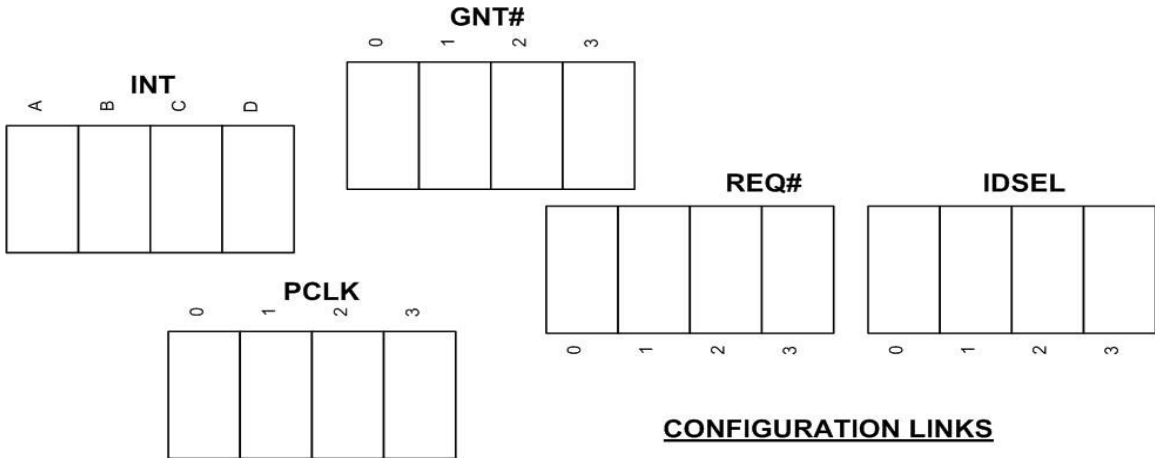
The Orbit PC104+ Network Card provides an Orbit network capability to any PC with a PC104+ bus. The card's operation is the same as the Orbit PCI MK2 Network Card, for details of this see the relevant User Manual 502566.

PC104+ Configuration Links

The units are shipped with the links in the default positions of:

INT A
GNT# 0
PCLK 0
REQ# 0
IDSEL 0

It is up to the user to configure the links for their specific system.



9.5 USB CONTROLLER

PC System Requirements

- See Section on PCI card
- PC will require a USB Port

Carton Contents

- Orbit USB Interface Module
- 9 Way Terminator Plug (used to terminate end of TCON backbone)
- Earthing and Mounting Bracket

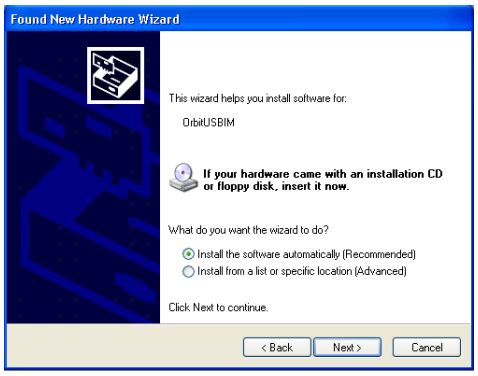
9.5.1 Hardware Installation

1. Before using and connecting the USB controller install the Orbit®3 Support Pack for Windows®
2. Insert the USB plug into any USB Type A socket on the PC
3. The PC will recognize the USBIM and on some operating systems report it has been connected. If the PC shows a message similar to the following please follow the instructions.

1

Select **No, not this time** and click the **next** button

2

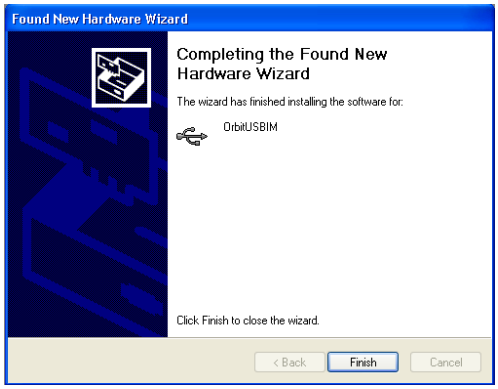


Select **Install the software automatically** and click the **next** button

3

Click the **Continue Anyway** button

4



9.5.2 Using the USB

The Orbit USB Interface Module provides a simple interface between personal computers and the Orbit Network.

When the USBIM is initially powered up (via PC power), Windows® will learn about its power requirements (bus power 500mA max) and assign the resources needed for it. If the host is not capable of supplying the required power, Windows® will display “not enough power message” and stop the assignment of resources.

Once the resources have been assigned the USBIM can be used with the Orbit Support Pack for Windows® to interface to all major programming languages. It can not be used as a separate Virtual COM port, it must be used with the Orbit COM or DLL.

The current drawn from the USBIM when controlling an Orbit Network depends on the number of Orbit modules and the type of Orbit Modules. The USBIM limits the power drawn to a maximum of 500mA. (includes the USBIM power)

The USBIM continually monitors the Orbit Network Voltage and if this drops below 4.75V then the USBIM abandons the Orbit Transfer and reports an error code to the application (See Orbit Software manual for further details)

Refer to the sections on Orbit Networks with USB, Measuring Orbit Voltage and Diagnostics for further advice.

For further information refer to the Section Setting up an Orbit Measurement System.

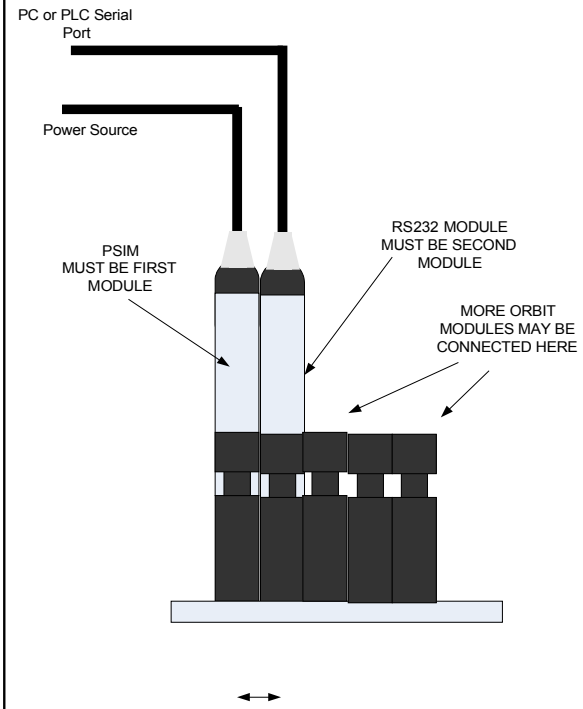
9.6 RS232IM

Hardware Installation

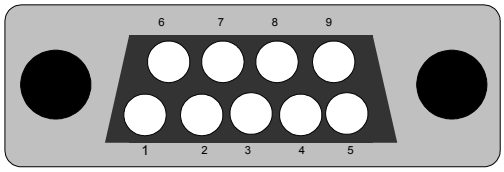
Unlike the PCI network card and the USB module the RS232IM does not require the Orbit®3 Support Pack for Windows® to be installed for basic operation. If using the RS232IM with the COM or DLL then install the Orbit®3 Support Pack for Windows®

The RS232 module needs to be used with a PSIM which provides its power.
It must be placed after the PSIM in the TCON backbone.

The RS232 module plugs directly into the PC serial port.



RS232 PIN ALLOCATIONS



1	No Connection
2	Rx (from RS232IM)
3	Tx (to RS232IM)
4	DTR (linked to DSR
5	GND
6	DSR (linked to DTR)
7	RTS (to RS232IM)
8	CTS (from RS232IM)
9	No Connection

9.6.1 Operation

The RS232 module provides a bridge between the PC / PLC and the Orbit Measurement System. The RS232IM receives a command header string and an Orbit Command string from a PC or PLC. It then sends the Orbit Command string to the Orbit network at 187.5kBaud.. The Orbit Measurement System the processes the command and responds to the RS232IM, the RS232Im adds a header and sends the data back to the PC or PLC.

Command orders must be in accordance with the standard Orbit Protocol

Please refer to the Orbit Software manual for RS232 Commands

RS232IM Default Baud Rates

Standard RS232IM	9600 Baud on Power On
Variant part No 911301	57.6 Baud on Power On
Variant part No 911338	115.2 Baud on Power On

9.6.2 Orbit Registration

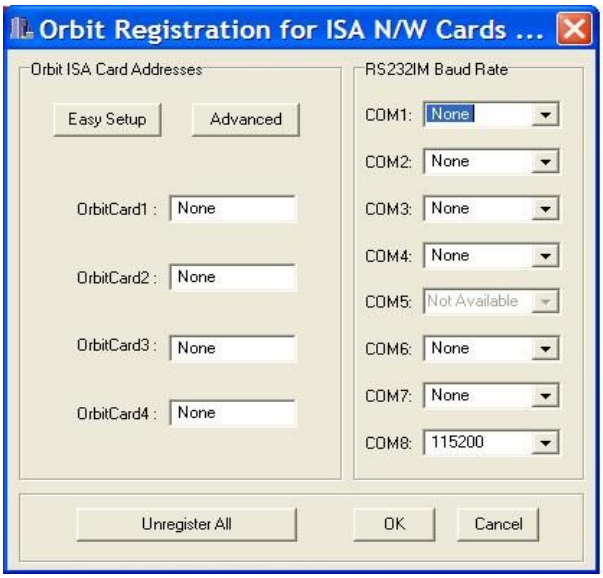
This program is used to register Orbit RS232IMs (and the now obsolete Orbit ISA network cards). Any RS232IMs (or Orbit ISA networks cards) **must** be registered with this program in order to work with the Orbit DLL and COM software. (This is not applicable to the RS485 module which is designed primarily to interface with PLC's)

Note: there is no need to register any USBIMs or PCI cards. These are handled automatically via 'Plug & Play' in Windows.

Note that this registration option is included when installing the Orbit®3 Support Pack for Windows®

When Orbit connects, the Orbit software will scan for any registered RS232IMs (or ISA cards). If a device is registered, but not found, a time-out condition will eventually occur (which may take some time). Therefore, to avoid this, remember to unregister all unused RS232IMs (or ISA cards). If all need to be unregistered, use the 'Unregister All' button.

To register an RS232IM go to the Windows **Start Menu**
Click **Start**
Select **All Programs**
Select **Orbit Support pack for Windows**
Select **Orbit registration**
Click **Orbit registration** to launch the registration program



The above screen will appear. Select the COM port that you want to use and set up the RS232IM baud rate.

At present, only 8 COM ports (COM1 to COM8) can be registered. Note that in WinXP, an assigned port can be reassigned a different COM port number (if not already in use). If all of the 8 COM ports are not available this means the computer has already alloatted them to other devices. It can be possible to move some of these devices using the Windows Device Manager. In some cases when using a serial port adapter (e.g. USB to serial) the adapter will be set to a high COM port number . This will need to be moved to be in the range 1 to 8.

Reassigning COM ports requires some understanding of the Computer Setup and is at the users risk, If unsure seek help from your company IT department.

Re-assign a COM Port (Example for Windows XP)

To reassign a COM port go to the Windows Start Menu
Click **Start, Control Panel** and select **SYSTEM**

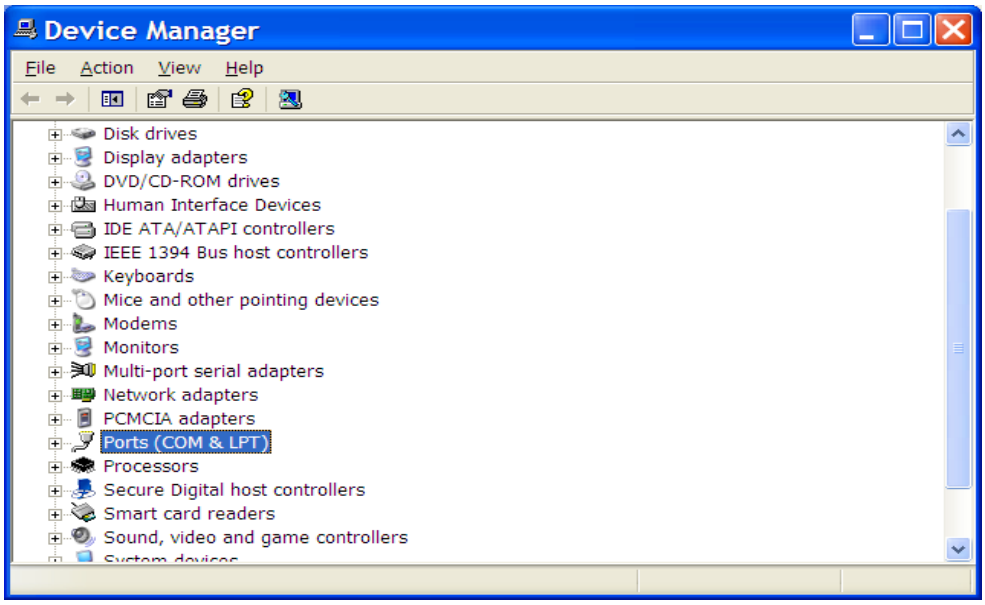
I

Click **System**

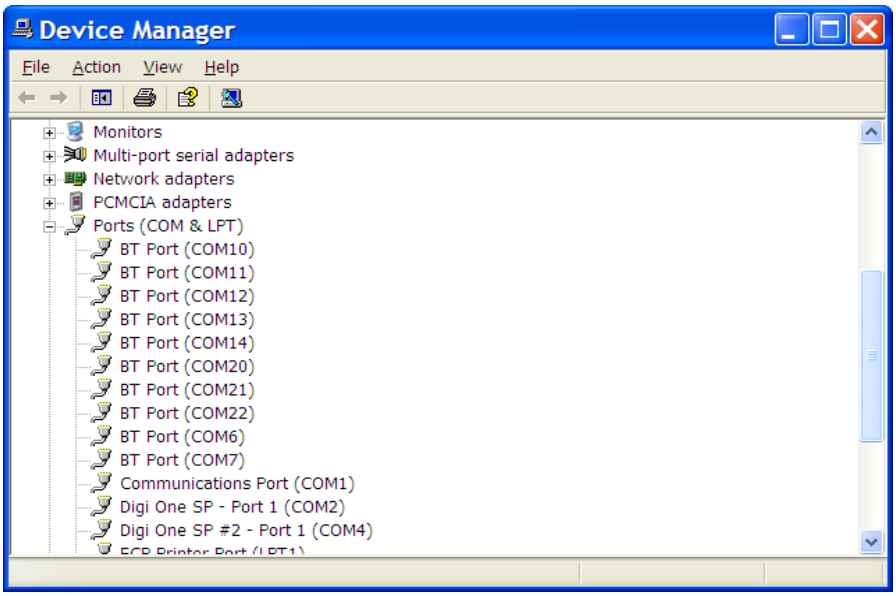
The following System Propeties screen will appear

Select **Hardware**

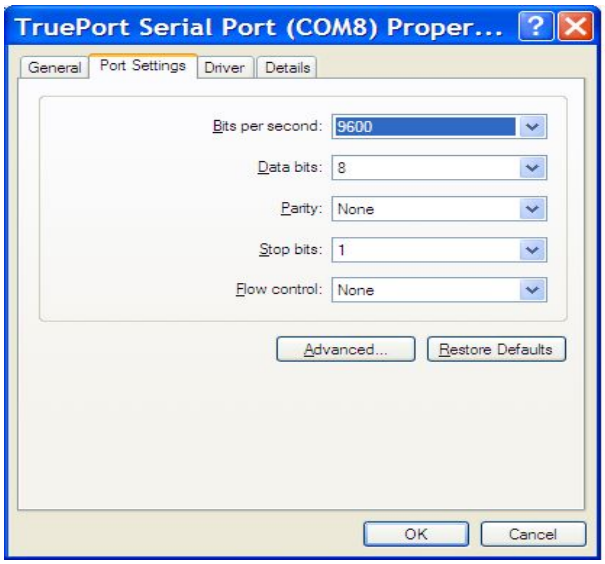
Select **Device Manager,**the following screen will appear



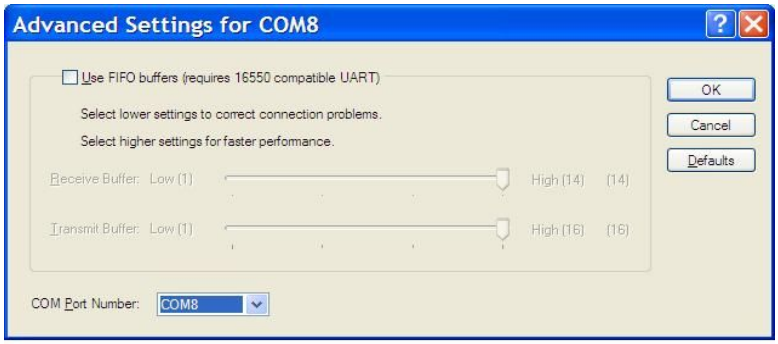
Expand the Ports (COM and LTT) heading to expose the COM ports



The COM ports can now be edited and re-alloated. Select a Port and click to open the Port. The select the **Port Settings** Tab



Click the **Advanced** button



Use the drop down menu at the bottom of the screen to change the COM Port.

9.7 RS485IM

The RS485 Interface Module (RS485IM) is functionally the same as the RS232IM the difference being the electrical signal levels used which are RS485 levels. As with the RS232IM, the RS485IM requires power from the Orbit Backbone, hence a PSIM is always required.

The module is supplied with flying leads to enable connections to be made to terminal blocks.

Wire Colour	Signal	Direction
Red	Rx (A)	To RS485IM
Yellow	Rx (B)	
White	Tx (A)	From RS485IM
Blue	Tx (B)	
Black	0V	

9.8 ETHERNET CONTROLLER

To be advised

9.9 SETTING UP AN ORBIT MEASURMENT SYSTEM

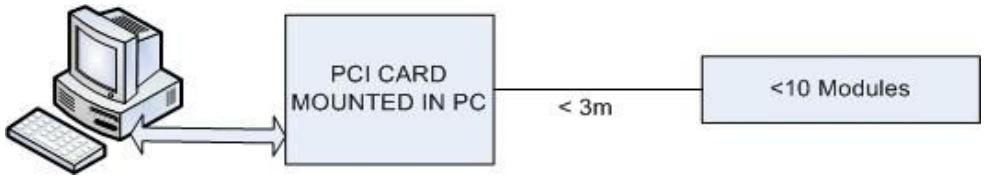
This section gives some basic set up information; it assumes that a controller has been successfully installed.

- The Orbit network must be connected before applying power to the PC or other power source.
- The TCON backbone (with modules) must be cabled to the controller.
- Ensure that there is an adequate power source available.
    - Check the PC Power capability
    - If using USB only 4 modules can be powered without a PSIM
    - If using RS232 a PSIM must be used
    - Evaluate the power requirements and use PSIMS (Refer to the Section on Electrical installation and the Section on Orbit Networks).
- Consider Cable runs and cable lengths.

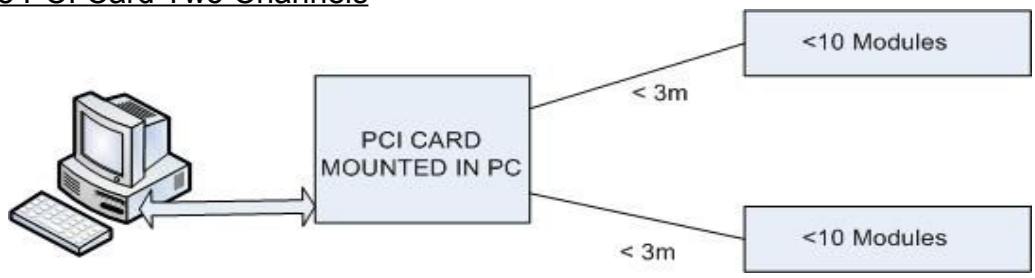
10 EXAMPLES OF ORBIT NETWORKS

10.1 SIMPLE PCI CARD NETWORKS – NO PSIM

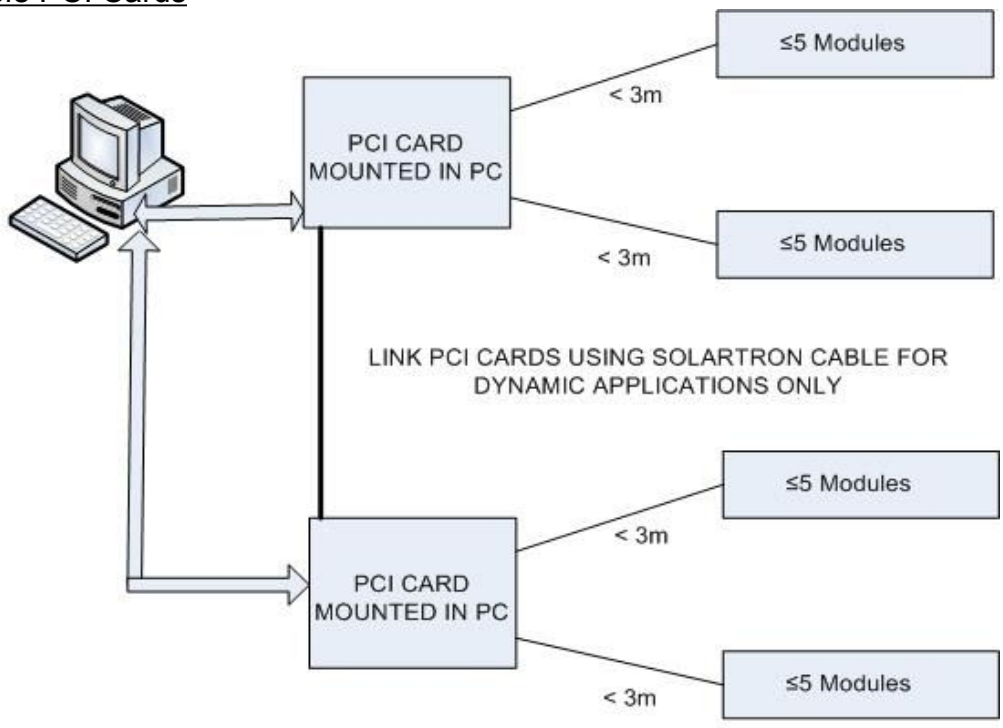
One PCI Card Single Channel



One PCI Card Two Channels



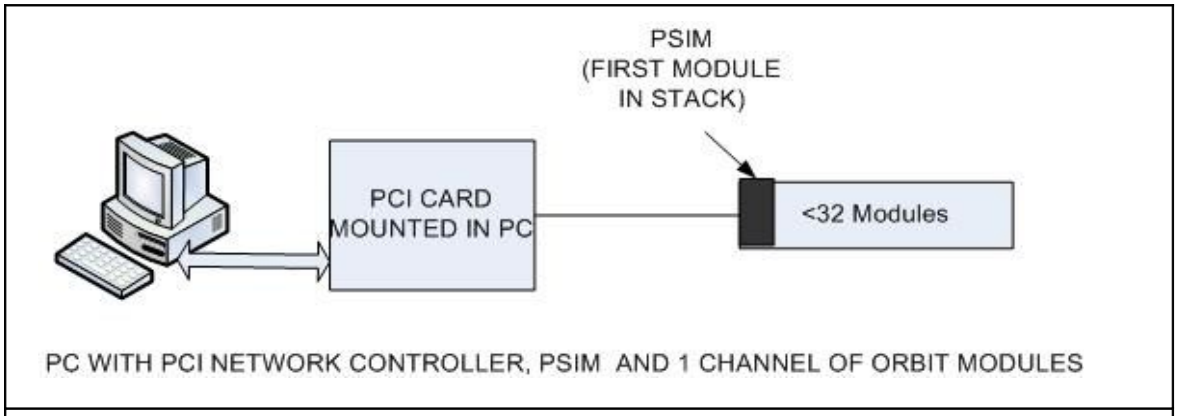
Multiple PCI Cards



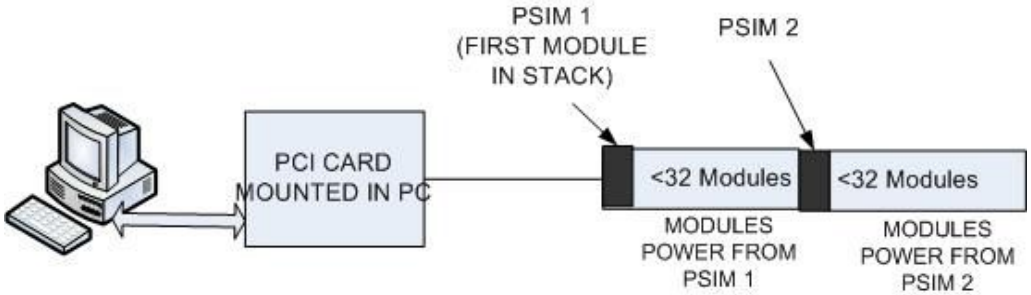
MULTIPLE PC CARDS (6 MAX) CAN BE INSTALLED IN ONE PC
FOR DYNAMIC APPLICATIONS THE PCI CARDS MUST BE LINKED TOGETHER, THE FIRST CARD IN THE NETWORK ACTS AS A MASTER

NOTE: PSIMs MAY BE REQUIRED DEPENDING ON THE PC TYPE AND ARE RECOMMENDED FOR MULTIPLE CARD NETWORS

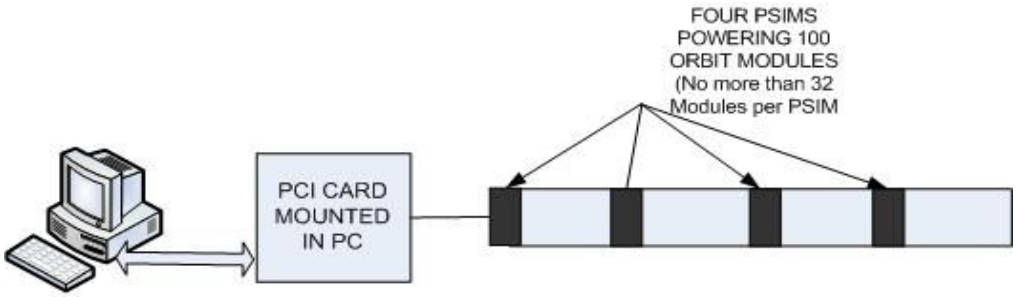
10.2 PCI CARD WITH PSIM



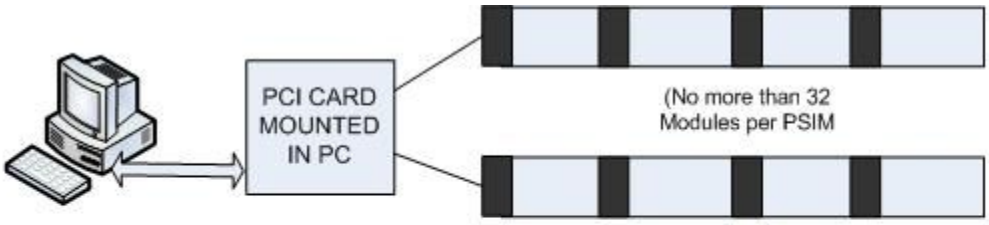
PC WITH PCI NETWORK CONTROLLER, PSIM AND 1 CHANNEL OF ORBIT MODULES



PC WITH PCI NETWORK CONTROLLER, PSIM AND 1 CHANNEL OF ORBIT MODULES

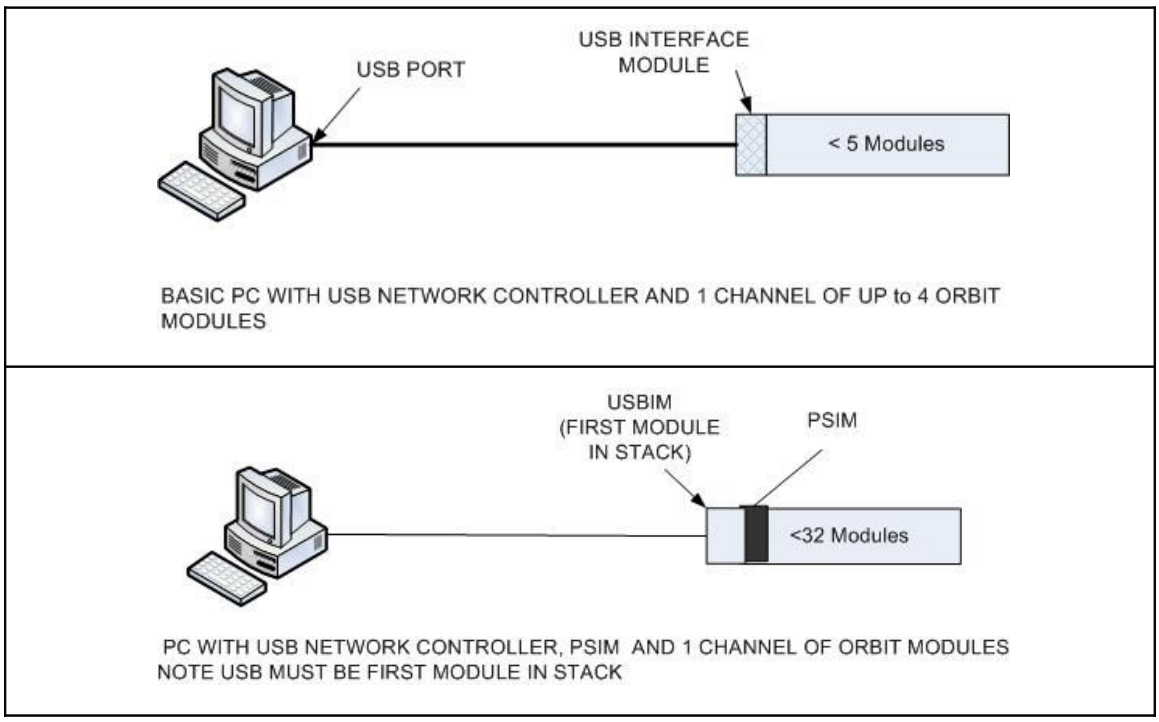


PC WITH PCI NETWORK CONTROLLER, PSIMS AND 1 CHANNEL OF 100 ORBIT MODULES



PC WITH PCI NETWORK CONTROLLER, 2 CHANNELS OF ORBIT MODULES, 8 PSIMS
200 MODULES

10.3 USBIM NETWORKS



11 COMMUNICATING WITH AN ORBIT NETWORK

Refer to the Orbit Software Manual included with the OSPW CD.

12 ORBIT ACCESSORIES

Part Number	Description
806127-xxx	Orbit cables specifically designed to ensure good system performance. Available in various lengths.
804067-3	Screwlock kit (supplied with cables).
971000-3	TCON connector
209501	Orbit3 Earth and Mounting Bracket – used to mechanically lock the TCONS together in environments subject to vibration and to produce a good earth to chassis at the TCON backbone.
802968	Terminator Connector used to provide a matched impedance and to be connected at the end of the TCON backbone

13 REVISION HISTORY

REVISION	DATE	COMMENTS
1	22/02/10	Initial Issue