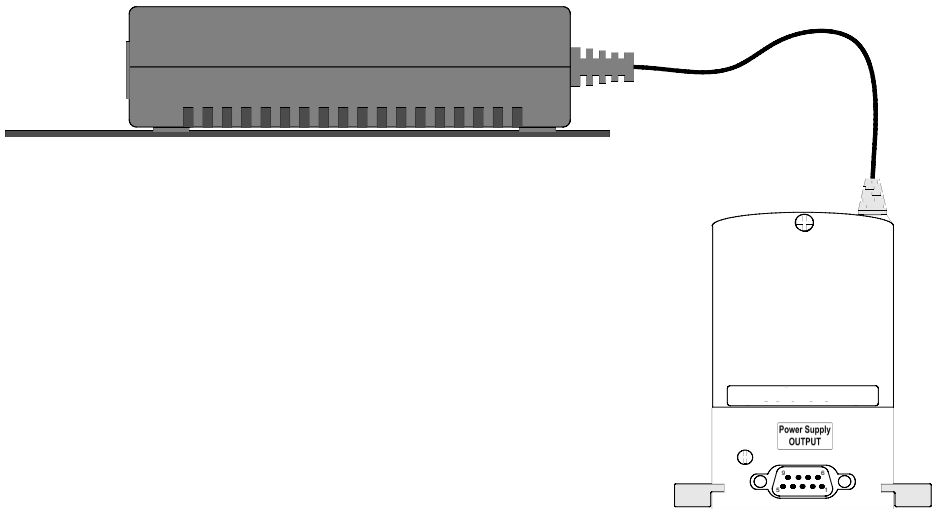

LDN-PS

User's Guide

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Index

PSIM-AC PSIM-DC PSIM-5V

1.0: Introduction

PSIM-AC PSIM-DC PSIM-5V

Introduction

The Power Supply Interface Module (PSIM) is part of the Orbit Measurement System. The PSIM provides local power to the network when required. Example uses:

- Power via the communications cable is not sufficient due to cable voltage drops.
- The controlling computer is not suitable to supply the Orbit Network.
- An RS232 Interface Module is used to control the Orbit Network.

This Manual

The manual describes the three types of PSIM. Technical specifications, safety information and application notes are detailed for each type.

PSIM-AC

PSIM-AC Universal mains input to regulated 5V output.

PSIM-DC 10 - 30 Vdc input to regulated 5V output.

PSIM-5V 5 Vdc input (from user regulated supply).

Note:

Throughout this manual the Orbit System is referred to as requring a 5V power supply. For any applications, actual voltages or power supplies may be within the 4.75 to 5.25V range according to configuration. PSIM-AC and PSIM-DC has a nominal 5.1V output no load voltage. This allows for voltage drops across cables when Orbit Modules are added.

2.0: Safety Information

This equipment is designed as safety Class 1 apparatus to comply with EN61010-1.

Service Safety

This equipment has been designed and tested to meet the requirements of the Low Voltage Directive (1997) and has been supplied in a safe condition. This manual contains information and warnings that must be followed by the user to ensure safe operation and to retain the apparatus in a safe condition.

Terms and Symbols in this Manual

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.

This symbol indicates where applicable cautionary or other information is to be found.

CAUTION: Power Source. The PSIM-AC unit should be connected to the mains supply via a suitable lead with a IEC320 socket. The user should fuse this connection with a suitable fuse. Refer to Specification. Apply no more than 265V rms. (AC) between supply conductors and ground.

WARNING: Do not operate in an explosive atmosphere.

WARNING: Do not remove covers or panels. To avoid personal injury, do not remove covers and panels. Do not operate the equipment without the covers and panels fitted. There are no internal adjustments required during the commissioning of the equipment.

2.0: Safety Information (continued)

WARNING: Danger arising from loss of ground. During a fault condition and upon loss of protective ground (earth), all accessible conducting parts - including controls that might appear to be insulated - can render an electric shock.

WARNING: Grounding the equipment. The unit is grounded through the mains lead: to avoid electric shock, plug the power lead into a properly-wired receptacle before connecting to the input or output terminals. A protective ground connection by way of the grounding conductor in the power lead is essential for safe operation.

CAUTION

This equipment contains no user serviceable parts. This equipment must be returned to original supplier for all service and repair. Dismantling the unit will invalidate the warranty.

CAUTION

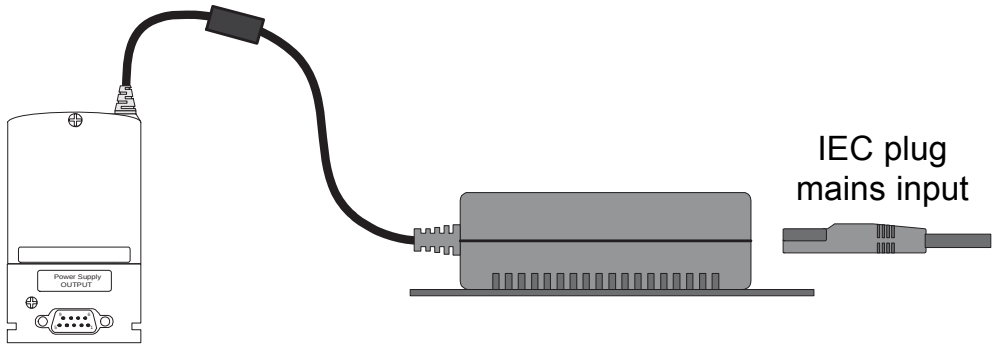
To avoid a fire hazard, use the correct fuse type, voltage and current rating as specified for the equipment. Refer fuse replacement to qualified personnel.

3.0: General Information

PSIM Variants

PSIM-AC

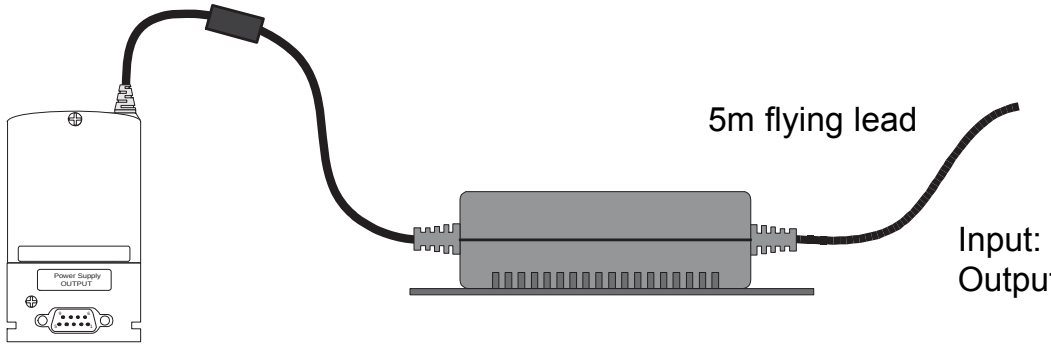
To power Orbit Modules from a local mains supply



Input: 90 - 230 VAC
Output: 5 VDC to Orbit Network

PSIM-DC

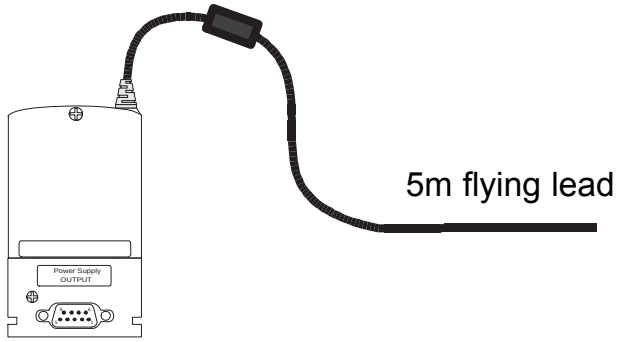
To power Orbit Modules from a local DC supply, such as 24V



Input: 10 - 30 VDC (customer supply)
Output: 5 VDC to Orbit Network

PSIM-5V

To power Orbit Modules from a local 5V regulated supply



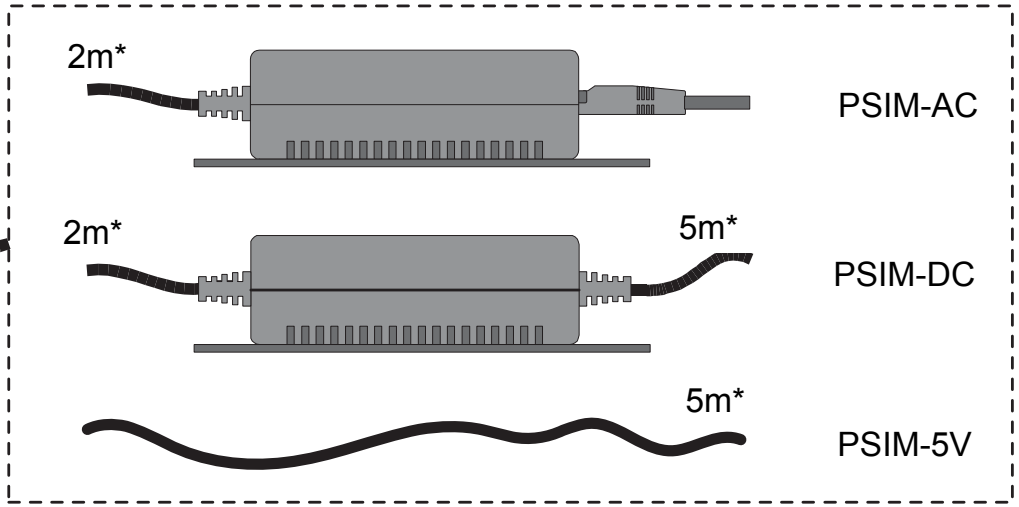
Input: 5 VDC (customer supply)
Output: 5 VDC to Orbit Network

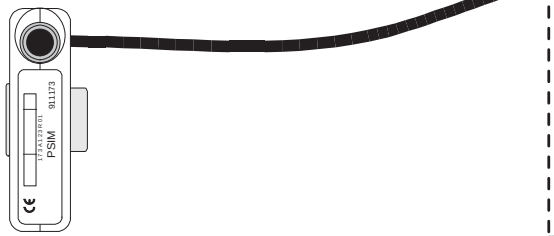
3.0: General Information (continued)

PSIM General Layout

*Cable Lengths

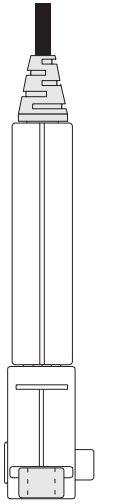
- PSIM-AC and PSIM-DC have a fixed 2m cable between PIE and power supply.
- PSIM-DC and PSIM-5V input cables are supplied 5m long. This may be cut to length as required.

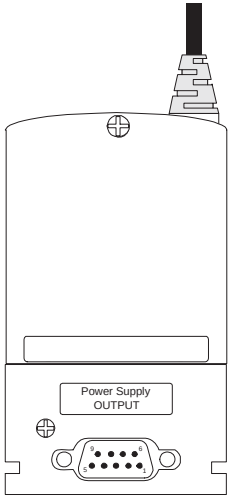




Plug side 5V connection is interrupted

Socket side 5V from external power supply introduced



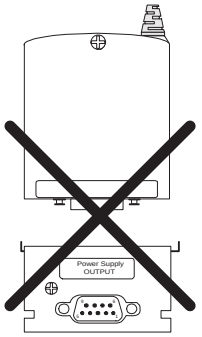


Orbit Network

Orbit Network

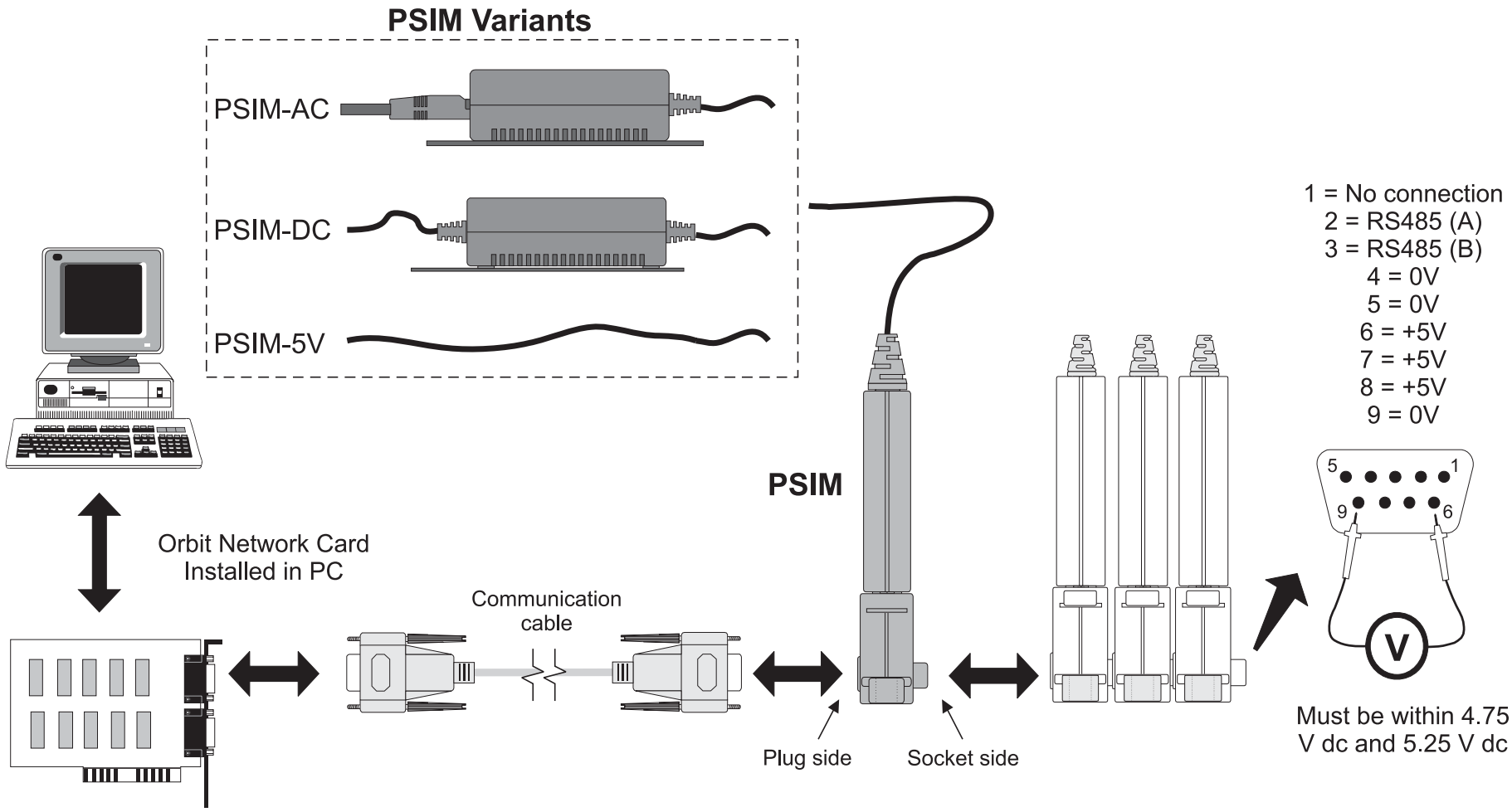
Power Supply Interface Module (PSIM)

T-CON is permanently attached, module does not separate



3.0: General Information (continued)

PSIM used in a small network configuration



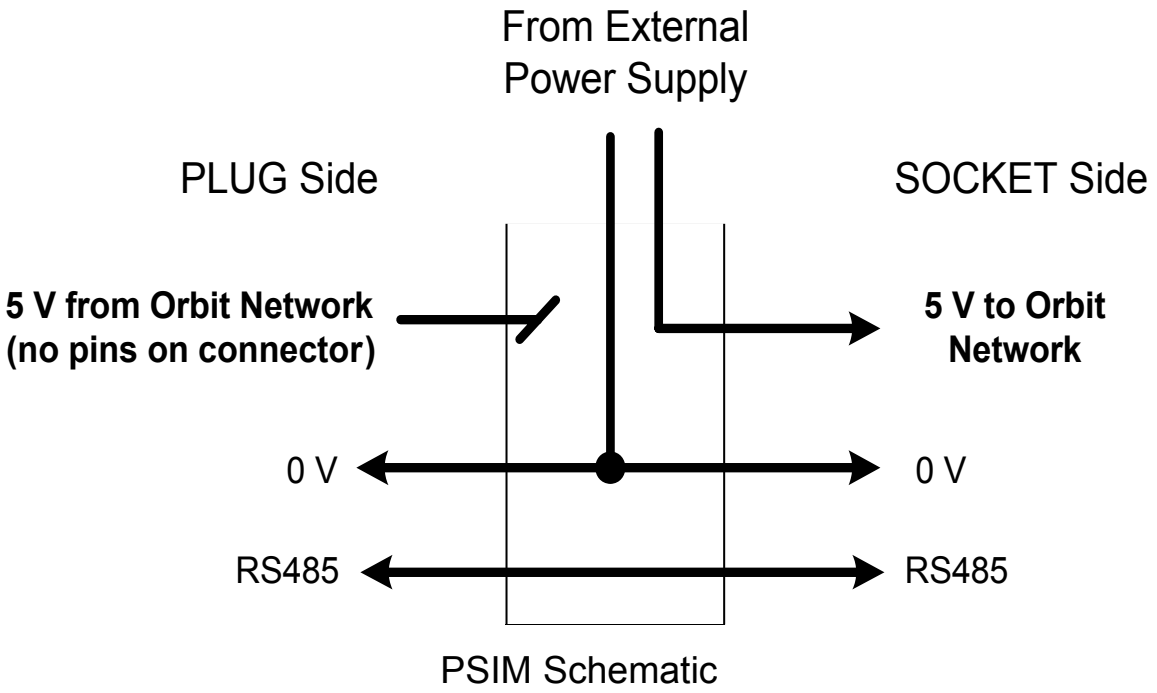
4.0: PSIM Schematic and Pin-out

PSIM-AC PSIM-DC PSIM-5V

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

All modules before the PSIM are powered from the network. Example: Orbit Network Card.

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

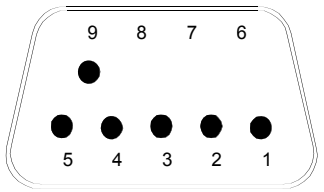


PSIM Schematic

4.0: PSIM Schematic and Pin-out (continued)

PSIM-AC **PSIM-DC** **PSIM-5V**

View into plug



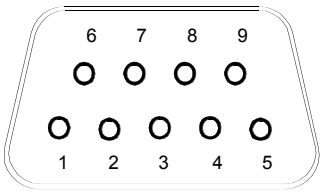
Connection to PSIM from Orbit Network

Plug Pin-out

1 = No connection
2 = RS485 (A)
3 = RS485 (B)
4 = 0V
5 = 0V
6 = No connection (no pin)
7 = No connection (no pin)
8 = No connection (no pin)
9 = 0V
shell = case / 0V

Power Supply OUTPUT

View into socket



Connection from PSIM to Orbit Network

Socket Pin-out

1 = No connection
2 = RS485 (A)
3 = RS485 (B)
4 = 0V
5 = 0V
6 = +5V
7 = +5V
8 = +5V
9 = 0V
shell = case / 0V

The PSIM will only supply power to the Orbit Modules that follow the PSIM. Some typical configurations are shown. For more information about PSIM and Orbit Network connection, refer to the Applications section.

Orbit Modules are designed to work from a supply voltage of 4.75 to 5.25 Vdc and care must be taken to ensure that all modules have the right working voltage applied. See application notes.

5.0: Dimensions and Mechanical Installation

PSIM-AC PSIM-DC PSIM-5V

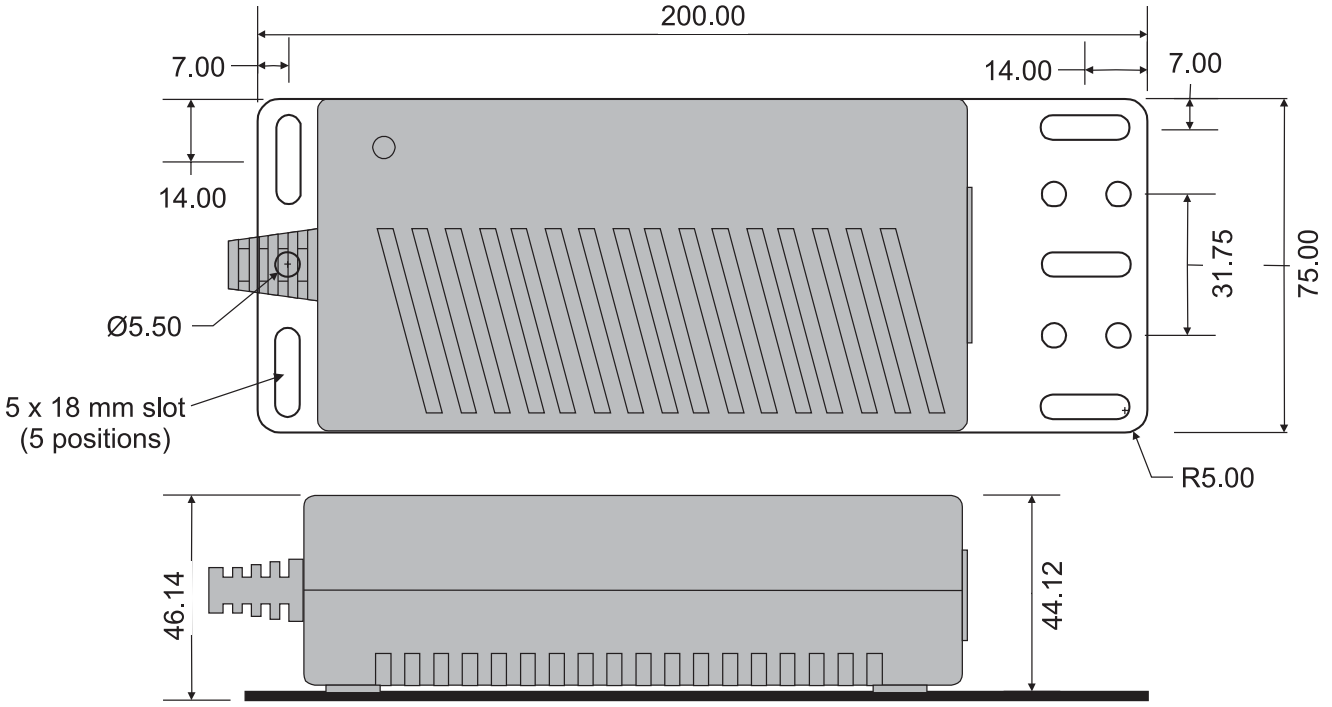
5.1 Power Supply

The mounting plate must not be removed. The mounting plate is isolated and does not need to be at earth potential.

The power supply may be mounted in any orientation.

The power supply must not be exposed to fluids or excessive dust.

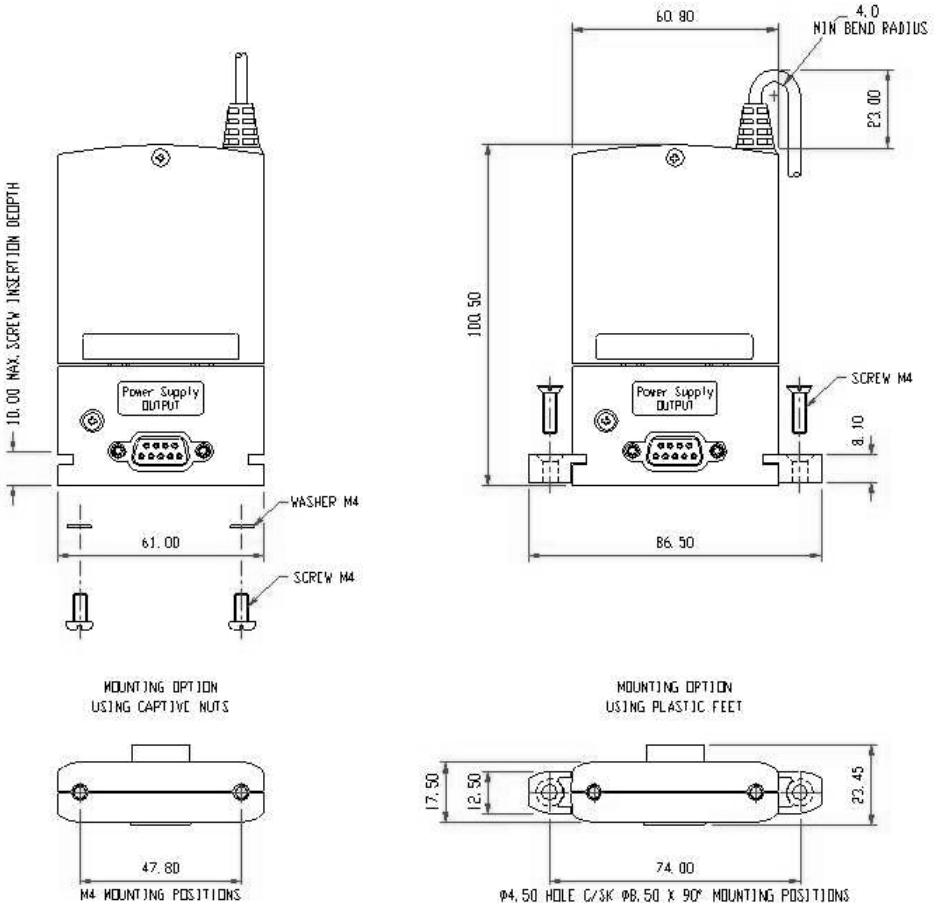
Power supply cooling is by convection; allow room for air to flow around the unit.



5.0: Dimensions and Mechanical Installation (continued)

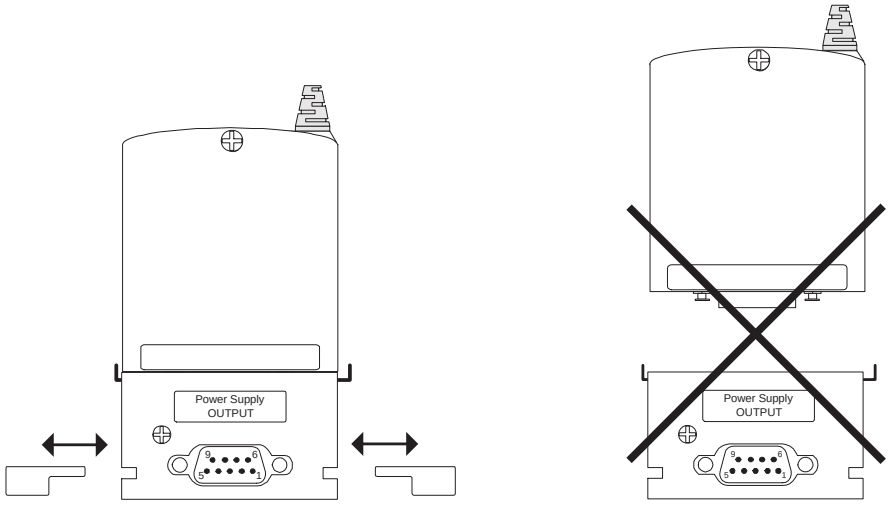
PSIM-AC PSIM-DC PSIM-5V

5.2 PSIM



T-CON is permanently attached, module does not separate.

For more information on mounting, refer to the Orbit Measurement System Manual.



6.0: Specification

All specifications are for a PSIM supplying a full network of probes.

PSIM-AC

Input

Voltage	85 to 264 Vac @ 47 Hz to 440 Hz.
Current	0.8 A
Connection	via IEC320 connector
Isolation	2500 Vac input/output
Protection	Input fuse and filter (not user replaceable)
Recommended Line Fuse	2A T (slo-blo) 250 V rating

DC Output

Output Voltage	5.1 Vdc Nominal
Output Current	1.8 A max (i.e. 31 Orbit Modules)
Output Regulation	3% (Line / Load)
Transient Response	Max. 4% deviation recovers to 1% within 500 ms
Ripple and Noise	< 1% p-p
Efficiency	65% to 70% typical
Protection see note 2	
Thermal Derating	The output current shall be derated from 40 °C to 60 °C by 50%. (ie. Max. output at 60 °C is 0.9A or 15 Orbit Modules.)

6.0: Specification (continued)

All specifications are for a PSIM supplying a full network of probes.

PSIM-DC

Input

Line Voltage		10 to 30 Vdc.
Current		1.1 A @ 12 Vdc; 0.5 A @ 24 Vdc (nominal).
Connection	see note 3	5m flying lead (Red = positive, White = negative)
Isolation		>500 VDC input/output
Protection		Input fuse and filter (not user replaceable) Over voltage and under voltage shut down Reverse connection

DC Output

Output Voltage		5.1 Vdc. Nominal
Output Current		1.8 A max. (i.e. 31 Orbit Modules)
Output Regulation		3% (Line / Load)
Transient Response		200us to 1% (FL to 1/2L)
Ripple and Noise		< 1% p-p
Efficiency		80% to 86% typical
Protection	see note 2	

Thermal Derating	The output current shall be derated from 40 °C to 60 °C by 50%. (ie. Max. output at 60 °C is 0.9A or 15 Orbit Modules.)

6.0: Specification (continued)

PSIM-5V

Line Voltage	see note 1	5.1 Vdc Nominal as supplied by user 5.25 Vdc MAX
Input Current		1.8 A MAX
Connection	see note 3	5m flying lead (Red = positive, White = negative)
Isolation		None
Protection	see note 2	Current limiting resettable fuse Over voltage 112% to 132% of nominal Reverse connection Transient

Note 1: No isolation or regulation is provided by the PSIM-5V. The voltage required should be set as required to ensure correct operating voltage for each PIE that follows the PSIM-5V. See application notes for further information.

Note 2: If there is a fault condition caused, for example, by a short circuit or transient, the protection circuits will operate. The power must be removed and the fault corrected before the power is reinstated. Under a fault condition, Orbit modules will not function correctly and a power on reset is required. See application notes for further information.

Note 3: Supplied with 5m input cable as standard. This may be cut to length as required.

6.0: Specification (continued)

Environmental

Operational temperature	0 to 60 °C
Storage temperature	-20 to 60 °C
Humidity	5% to 95% non-condensing
Cooling	Convection

Protection Rating	Power supply unit	IP40
Protection Rating	PSIM module	IP53

Approvals

EMC	Susceptibility	EN 50082-1
EMC	Emission	EN 50081-2 (note: ferrite block on cable must not be removed)
Safety		EN61010-1

7.0: Applications

Orbit Network Power Supply Requirements

All Orbit Modules are designed to work from a supply voltage of 4.75V to 5.25 Vdc. When power is applied to a module its current consumption will cause a slight voltage drop across cables. Care must be taken to ensure that all modules have the right working voltage applied.

This section is for guidance only. Since every application is different, it is not possible to give precise information that covers all installations.

Your original supplier will be able to provide further advice, if required.

Orbit Network Protection

Each PSIM provides a high level of protection for an Orbit Network. Protection for mis-connection, over voltage and transients is provided.

If a transient or other over voltage occurs, the protection circuits will short circuit (crow bar) the power supply. At this time, the voltage levels to each Orbit Module will be below the working limit. When the fault condition has been removed, Orbit power must be removed and re-applied to allow a full hardware reset to take place. A software reset is not possible under these conditions.

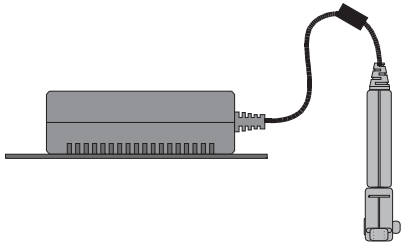
Note:

Throughout this manual the Orbit System is referred to as requring a 5V power supply. For any applications, actual voltages or power supplies may be within the 4.75 to 5.25V range according to configuration. PSIM-AC and PSIM-DC has a nominal 5.1V output no load voltage. This allows for voltage drops across cables when Orbit Modules are added.

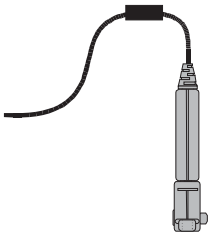
7.0: Applications (continued)

Voltage Drop Estimation

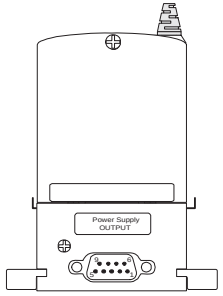
The following information is for guidance only when planning an installation. Voltage measurements must still be made to ensure the right working voltage for each Orbit Module.



PSIM-AC
PSIM-DC see note 1
volt drop
(from no load output)
V = 5.3 x N (mV)



PSIM-5V
volt drop
V = 2 x N x (L+1) (mV)



Orbit Module with T-CON
volt drop
V = 0.04 x 1+2+3+...+N see note 2

Standard 2m Comms cable see note 3
volt drop
V = 15.2 x N (mV)

Where N = number of Orbit Modules with T-CON following any particular part above

L = cable length for PSIM-5V input cable

Note 1 Input cable length has no affect on this calculation.

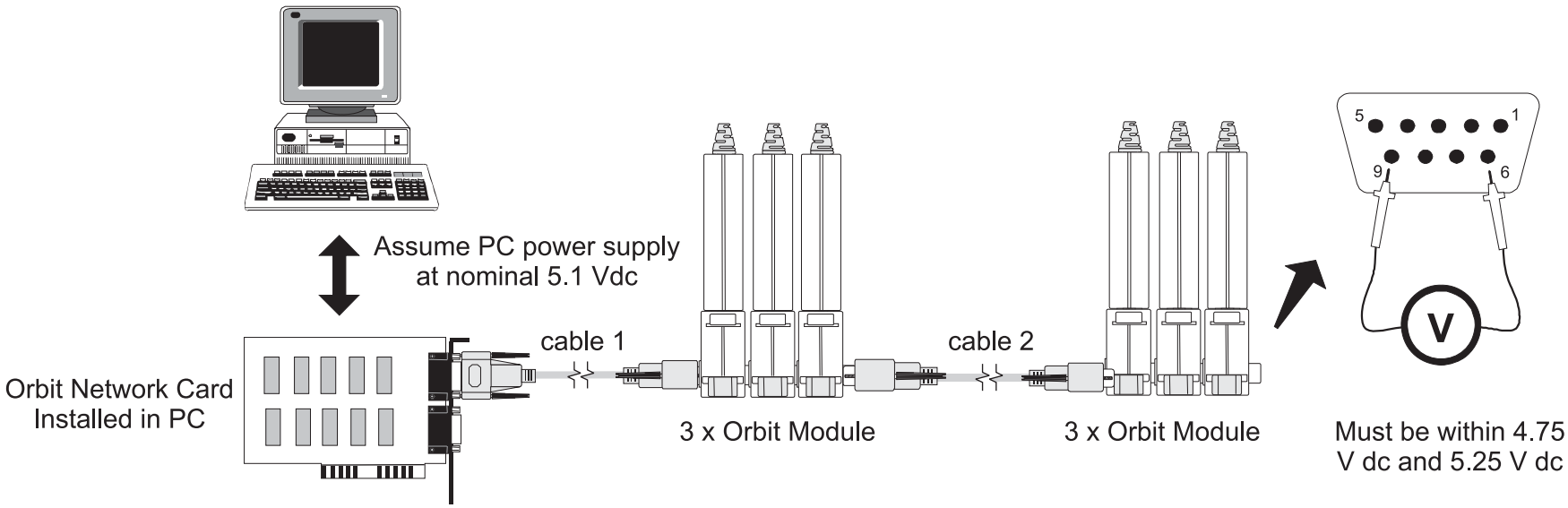
Note 2 1 + 2 + 3 + ... + N = N(N+1)/2.

Note 3 The cable supplied with the Orbit Network Card.

7.0: Applications (continued)

Application 1: Basic Small Network Connection.

- Power supplied to network from PC via network card, no PSIM used.
- Modules connected using standard communication cables.

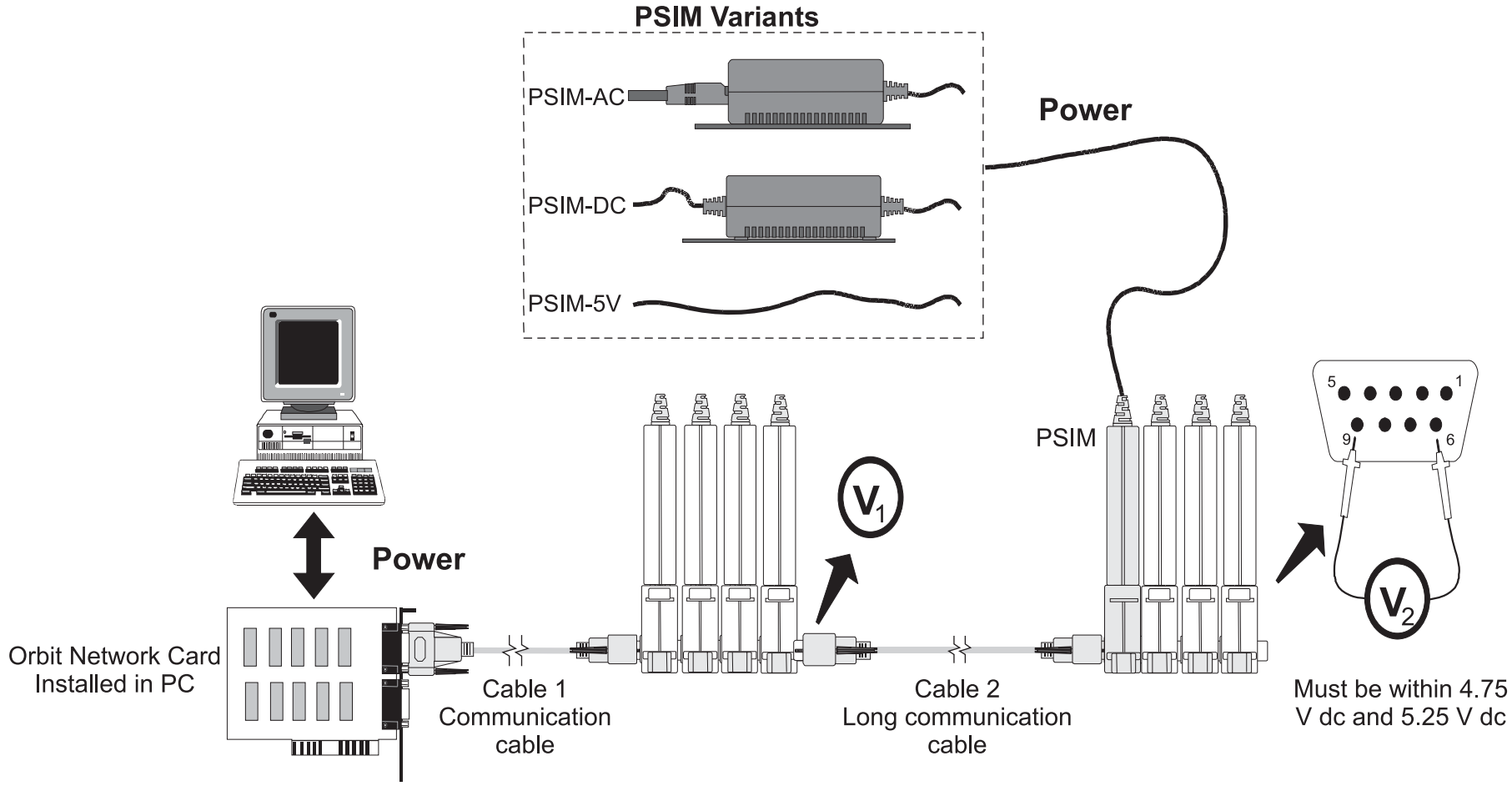


Volt drop total in mV	=	cable 1 + module (3 off) + cable 2 + module (3 off)
	=	(15.2 x 6) + 0.04(6+5+4+3+2+1) + (15.2 x 3) + 0.04(3+2+1)
	=	138 mV
Then approximate voltage at end of network	=	nominal supply voltage - calculated volt drop
	=	5.1 - 0.138
	=	4.96 V

7.0: Applications (continued)

Application 2: Large network with modules close to computer and at a distance.

- Power supplied from PC and PSIM (located at a distance from PC).
- Communications via standard communications cable and custom cable.



7.0: Applications (continued)

Volt drop V_1 is calculated in a similar way to the previous example except there is only a single cable and 3 Orbit modules. The PSIM supplies power to remaining modules and are calculated separately. The long communications cable does not carry supply current and so has no affect on volt drops.

Calculation for V_1 volt drop = cable + module (3 off)
= (15.2 x 3) + 0.04(3+2+1)
= 46 mV

Then approximate voltage at end of network = nominal supply voltage - calculated volt drop
= 5.1 - 0.046
= 5.054 V

i.e. greater than 4.75 Vdc; the minimum working voltage.

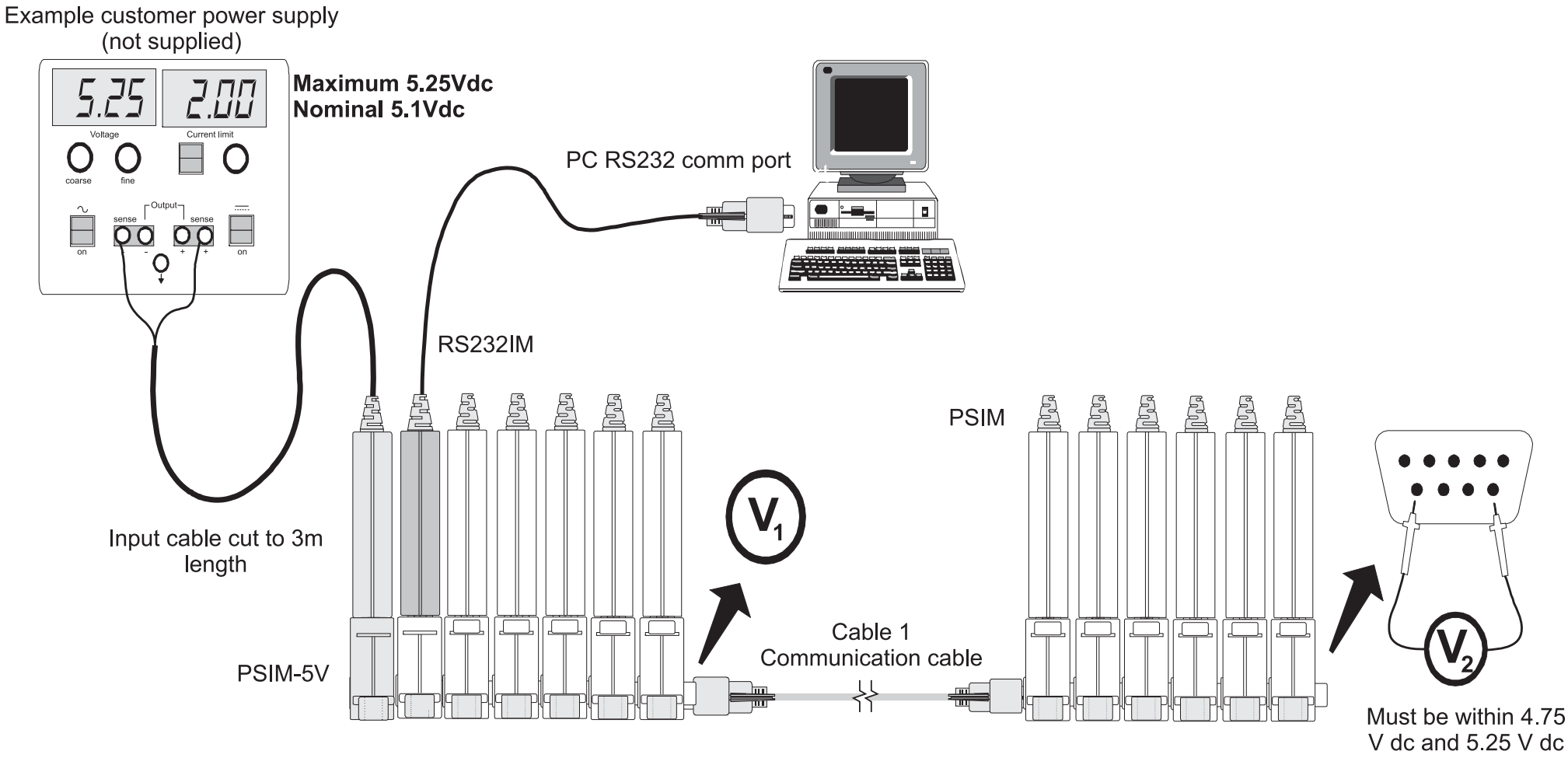
Calculation for V_2 volt drop = PSIM + module (3 off)
= (5.3 x 3) + 0.04(3+2+1)
= 16 mV

Then approximate voltage at end of network = nominal supply voltage - calculated volt drop
= 5.1 - 0.016
= 5.084 V

i.e. greater than 4.75 Vdc; the minimum working voltage.

7.0: Applications (continued)

Application 3: Large Network using PSIM-5V and RS232IM for network control.



7.0: Applications (continued)

The PSIM-5V is powering the whole Orbit Network. PSIM-5V volt drop is calculated using 12 as the total number of Orbit modules; the RS232IM is included in this number.

Total Voltage drop = PSIM-5V + modules (6 off) + Cable 1 + Modules (6 off)

= (2 x 12 x [3+1]) + 0.04 (1+2+3+4+5+6+7+8+9+10+11+12)+ (15.2 x 6) + 0.04 (1+2+3+4+5+6)

= 96 + 3.12 + 91.2 + 0.84

= 191 mV

Then approximate voltage at end of network = nominal supply voltage - calculated volt drop

= 5.25 - 0.191

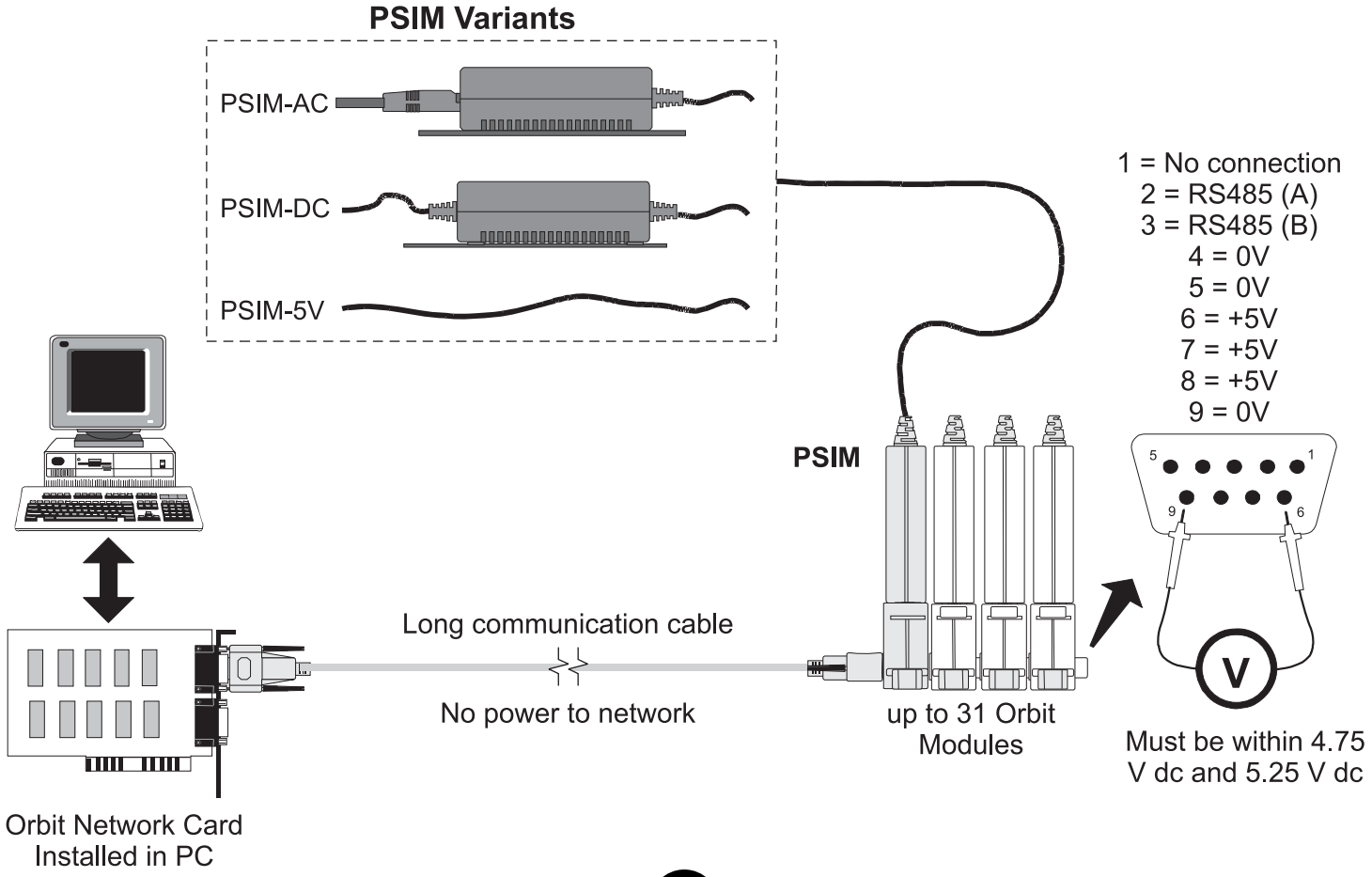
= 5.06 V

i.e. greater than 4.75 Vdc the minimum working voltage. In this example the input supply to the PSIM-5V could be reduced to 5.1 V (the Orbit nominal value).

7.0: Applications (continued)

Application 4: Modules located a long distance from computer.

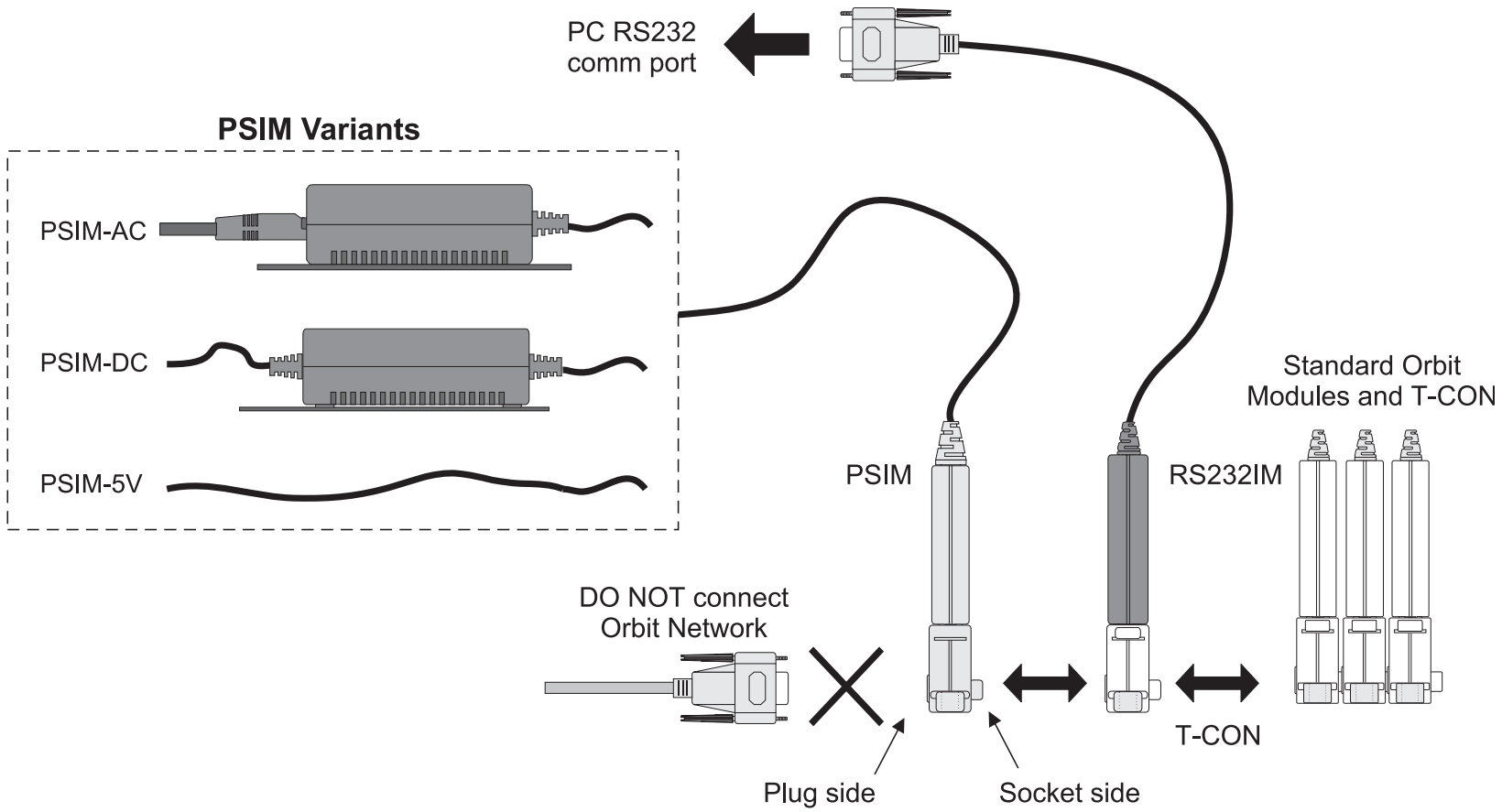
- Also for a computer that is not suitable for supplying power to Orbit Modules.
- Power supplied from PSIM to modules.
- Connection via long cable providing RS485, 0V reference and screening.



7.0: Applications (continued)

Application 5: Use with RS232 Interface Module (RS232IM).

- Communication is via a RS232IM.
- Power to the RS232IM and Orbit Modules is via PSIM.



WARRANTY/DISCLAIMER

OMEGA ENGINEERING, INC. warrants this unit to be free of defects in materials and workmanship for a period of **13 months** from date of purchase. OMEGA's Warranty adds an additional one (1) month grace period to the normal **one (1) year product warranty** to cover handling and shipping time. This ensures that OMEGA's customers receive maximum coverage on each product.

If the unit malfunctions, it must be returned to the factory for evaluation. OMEGA's Customer Service Department will issue an Authorized Return (AR) number immediately upon phone or written request. Upon examination by OMEGA, if the unit is found to be defective, it will be repaired or replaced at no charge. OMEGA's WARRANTY does not apply to defects resulting from any action of the purchaser, including but not limited to mishandling, improper interfacing, operation outside of design limits, improper repair, or unauthorized modification. This WARRANTY is VOID if the unit shows evidence of having been tampered with or shows evidence of having been damaged as a result of excessive corrosion; or current, heat, moisture or vibration; improper specification; misapplication; misuse or other operating conditions outside of OMEGA's control. Components which wear are not warranted, including but not limited to contact points, fuses, and triacs.

OMEGA is pleased to offer suggestions on the use of its various products. However, OMEGA neither assumes responsibility for any omissions or errors nor assumes liability for any damages that result from the use of its products in accordance with information provided by OMEGA, either verbal or written. OMEGA warrants only that the parts manufactured by it will be as specified and free of defects. OMEGA MAKES NO OTHER WARRANTIES OR REPRESENTATIONS OF ANY KIND WHATSOEVER, EXPRESS OR IMPLIED, EXCEPT THAT OF TITLE, AND ALL IMPLIED WARRANTIES INCLUDING ANY WARRANTY OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE HEREBY DISCLAIMED. LIMITATION OF LIABILITY: The remedies of purchaser set forth herein are exclusive, and the total liability of OMEGA with respect to this order, whether based on contract, warranty, negligence, indemnification, strict liability or otherwise, shall not exceed the purchase price of the component upon which liability is based. In no event shall OMEGA be liable for consequential, incidental or special damages.

CONDITIONS: Equipment sold by OMEGA is not intended to be used, nor shall it be used: (1) as a "Basic Component" under 10 CFR 21 (NRC), used in or with any nuclear installation or activity; or (2) in medical applications or used on humans. Should any Product(s) be used in or with any nuclear installation or activity, medical application, used on humans, or misused in any way, OMEGA assumes no responsibility as set forth in our basic WARRANTY/ DISCLAIMER language, and, additionally, purchaser will indemnify OMEGA and hold OMEGA harmless from any liability or damage whatsoever arising out of the use of the Product(s) in such a manner.

RETURN REQUESTS/INQUIRIES

Direct all warranty and repair requests/inquiries to the OMEGA Customer Service Department. BEFORE RETURNING ANY PRODUCT(S) TO OMEGA, PURCHASER MUST OBTAIN AN AUTHORIZED RETURN (AR) NUMBER FROM OMEGA'S CUSTOMER SERVICE DEPARTMENT (IN ORDER TO AVOID PROCESSING DELAYS). The assigned AR number should then be marked on the outside of the return package and on any correspondence.

The purchaser is responsible for shipping charges, freight, insurance and proper packaging to prevent breakage in transit.

FOR **WARRANTY** RETURNS, please have the following information available BEFORE contacting OMEGA:

1. Purchase Order number under which the product was PURCHASED,
2. Model and serial number of the product under warranty, and
3. Repair instructions and/or specific problems relative to the product.

FOR **NON-WARRANTY** REPAIRS, consult OMEGA for current repair charges. Have the following information available BEFORE contacting OMEGA:

1. Purchase Order number to cover the COST of the repair,
2. Model and serial number of the product, and
3. Repair instructions and/or specific problems relative to the product.

OMEGA's policy is to make running changes, not model changes, whenever an improvement is possible.
This affords our customers the latest in technology and engineering.

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