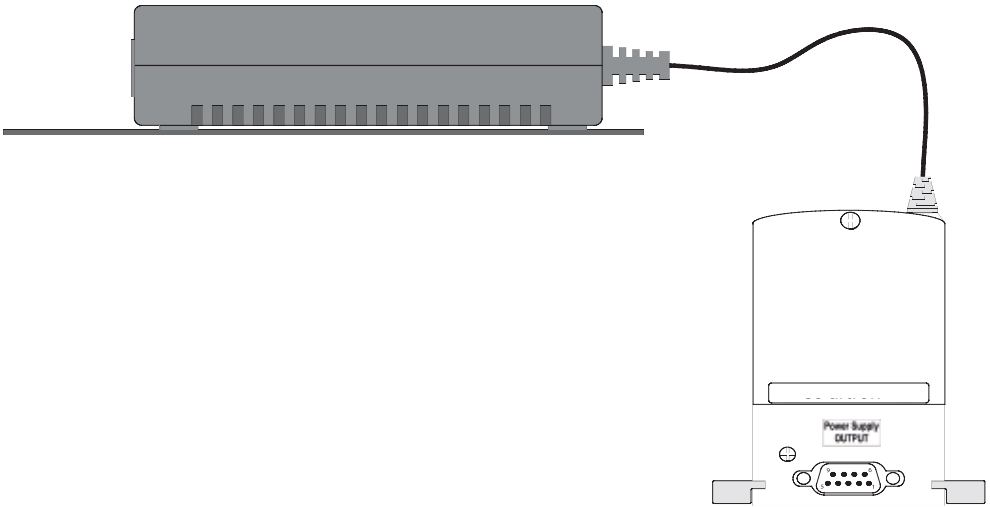
Power Supply Inteface Module (PSIM)



User & Installation Manual

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 PSIMDC 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 commissioning 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.

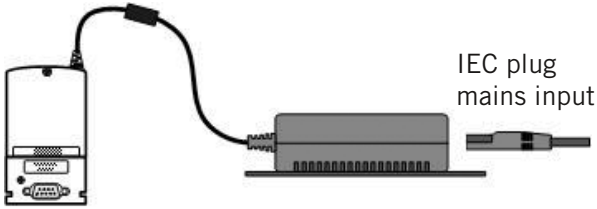
CAUTION
This equipment contains no user serviceable parts. This equipment must be returned to a Solartron Dealer for all service and repair. Dismantling the unit will invalidate the warranty.

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

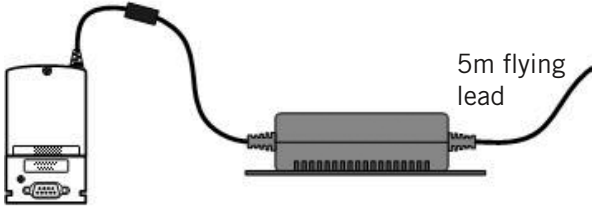
PSIM Variants

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

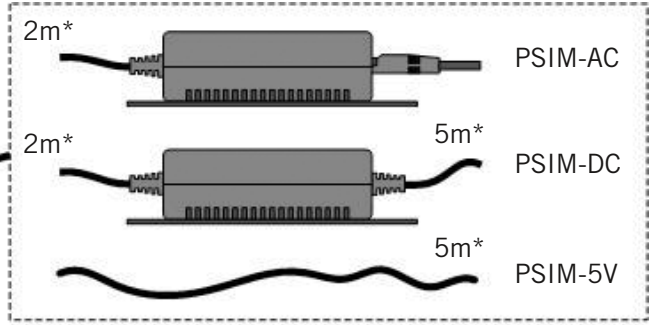
PSIM-5V
To power Orbit Modules from a local 5V regulated supply

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

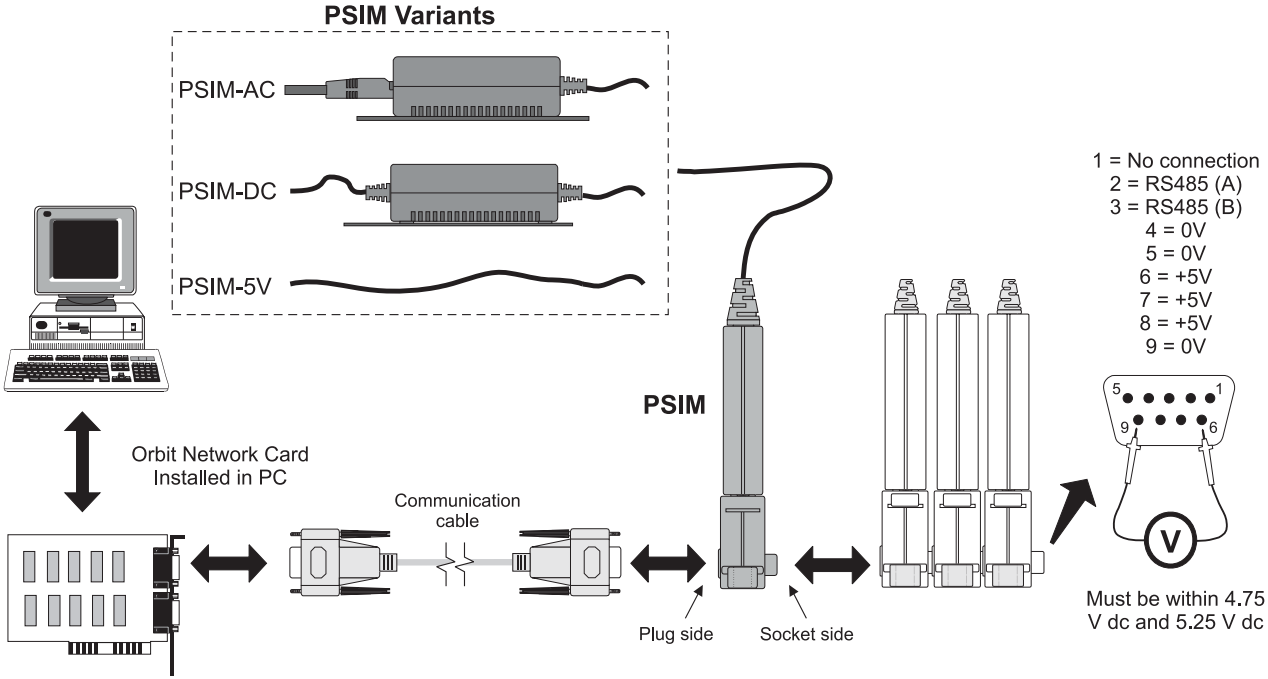
Power Supply Interface Module (PSIM)

T-CON is permanently attached, module does not separate

Orbit Network

3.0 General Information *continued*

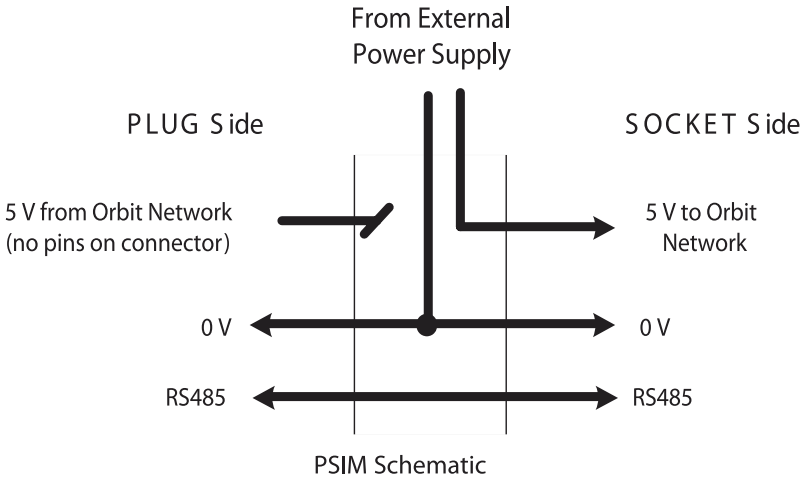
PSIM used in a small network configuration



4.0 PSIM Schematic and Pin-out

PSIM-AC PSIM-DC PSIM-5V

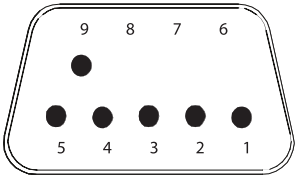
The 5V power supply line from the network is isolated at the PSIM.
All modules before the PSIM are powered from the network. Example: Orbit Network Card.
All modules after the PSIM are powered from the external power supply connected via the PSIM. 0 V is common.



PSIM Schematic

4.0 PSIM Schematic and Pin-out
continued

View into plug

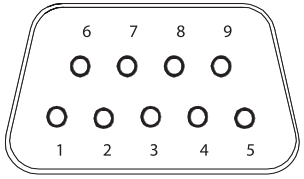


Connection to PSIM from Orbit Network

Plug Pin -out
1 = No connection
2 = RS 485 (A)
3 = RS 485 (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 = RS 485 (A)
3 = RS 485 (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

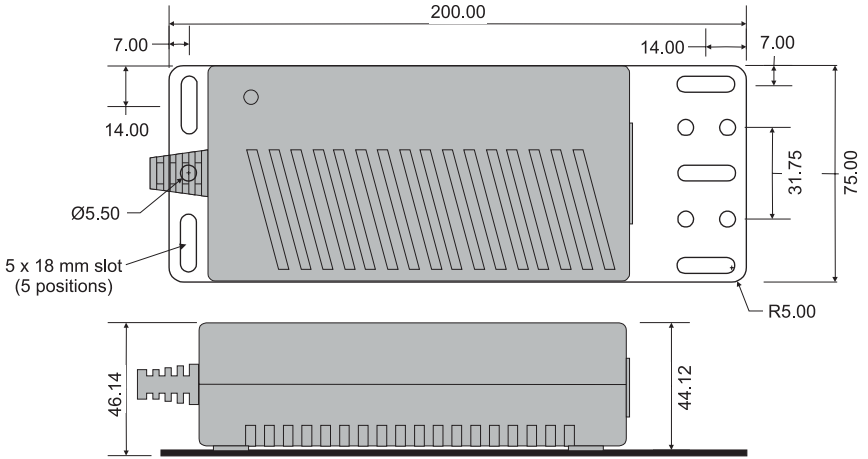
5.1 Power Supply

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.

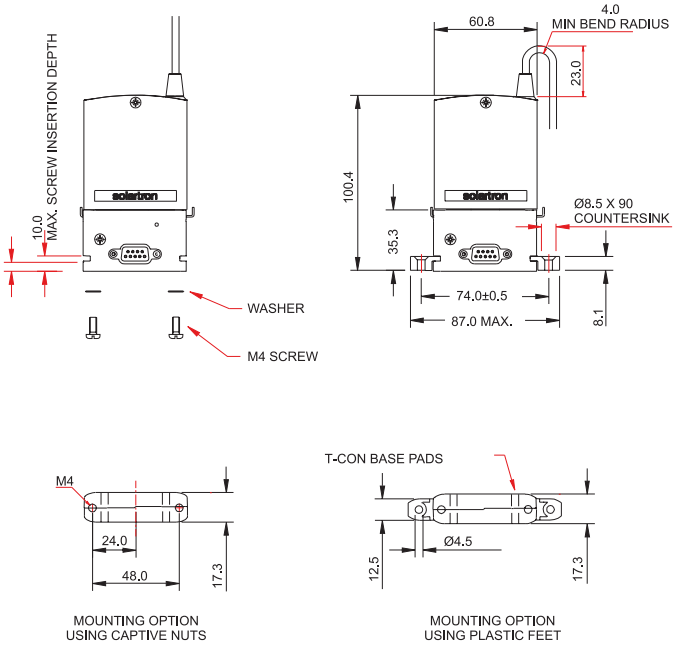
The power supply must not be exposed to fluids or excessive dust.

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



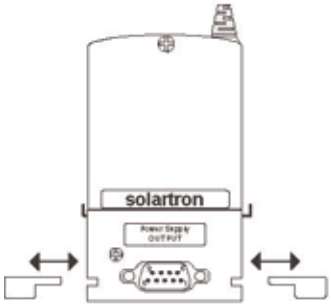
5.0 Dimensions and Mechanical Installation *continued*

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, 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

PSIM-AC PSIM-DC PSIM-5V

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 Solartron dealer 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.

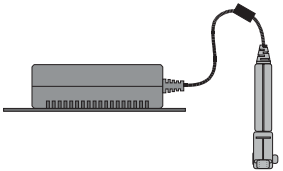
If a transient or other over voltage occurs, the protection circuits will short circuit (crow bar) the power supply. At this time, the voltage levels to each Orbit Module will be below the working limit. When the fault condition has been removed, Orbit power must be removed and reapplied to allow a full 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*

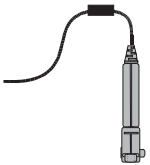
Voltage Drop Estimation

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)

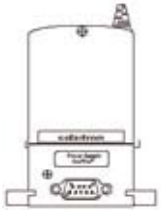
V = 5.3 x N (mV)



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 Solartron
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

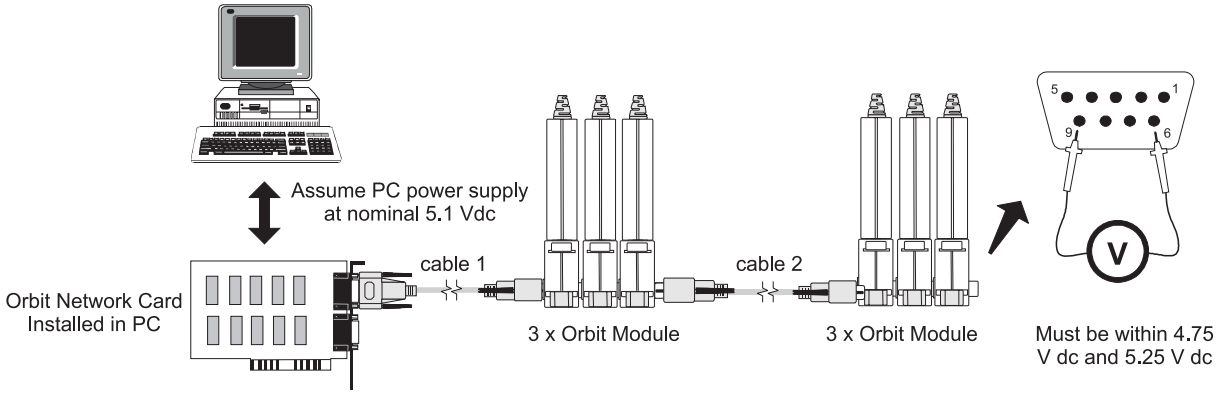
Note 1 Input cable length has no effect on this calculation.

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

Note 3 The cable supplied with the Orbit Network Card.

Application 1: Basic Small Network Connection.

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

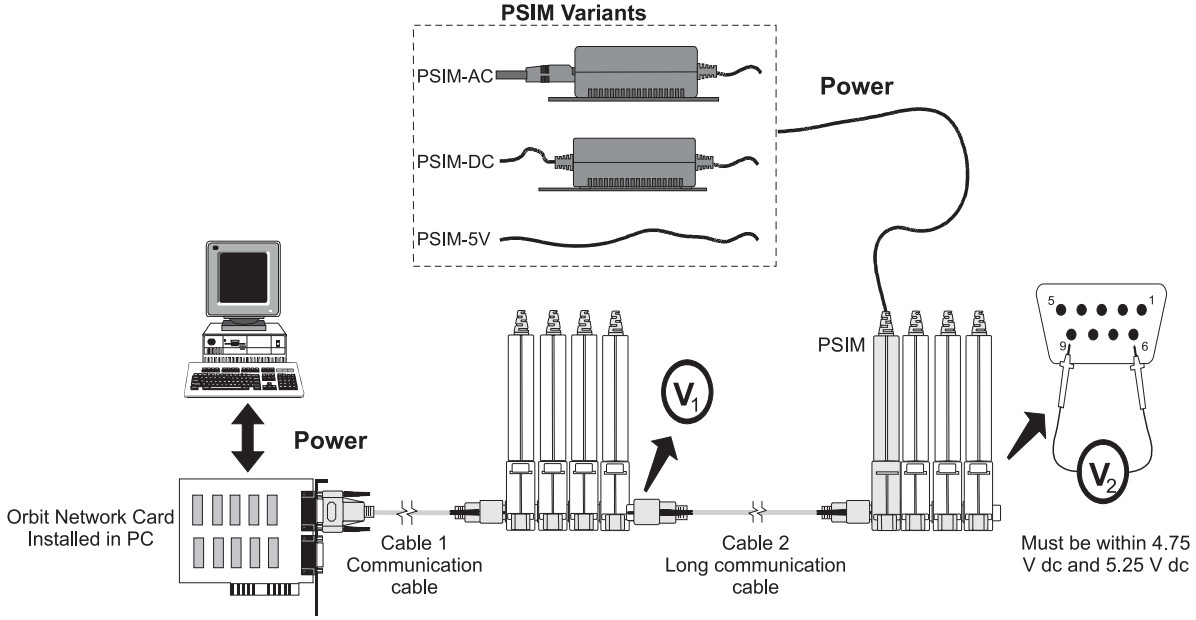


Volt drop total in mV = cable 1 + module (3 off) + cable 2 + module (3 off)
= (15.2 x 6) + 0.04(6+5+4+3+2+1) + (15.2 x 3) + 0.04(3+2+1)
= 138 mV

Then approximate voltage at end of network = nominal supply voltage - calculated volt drop
= 5.1 - 0.138
= 4.96 V

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.



Volt drop V1 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 V1 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

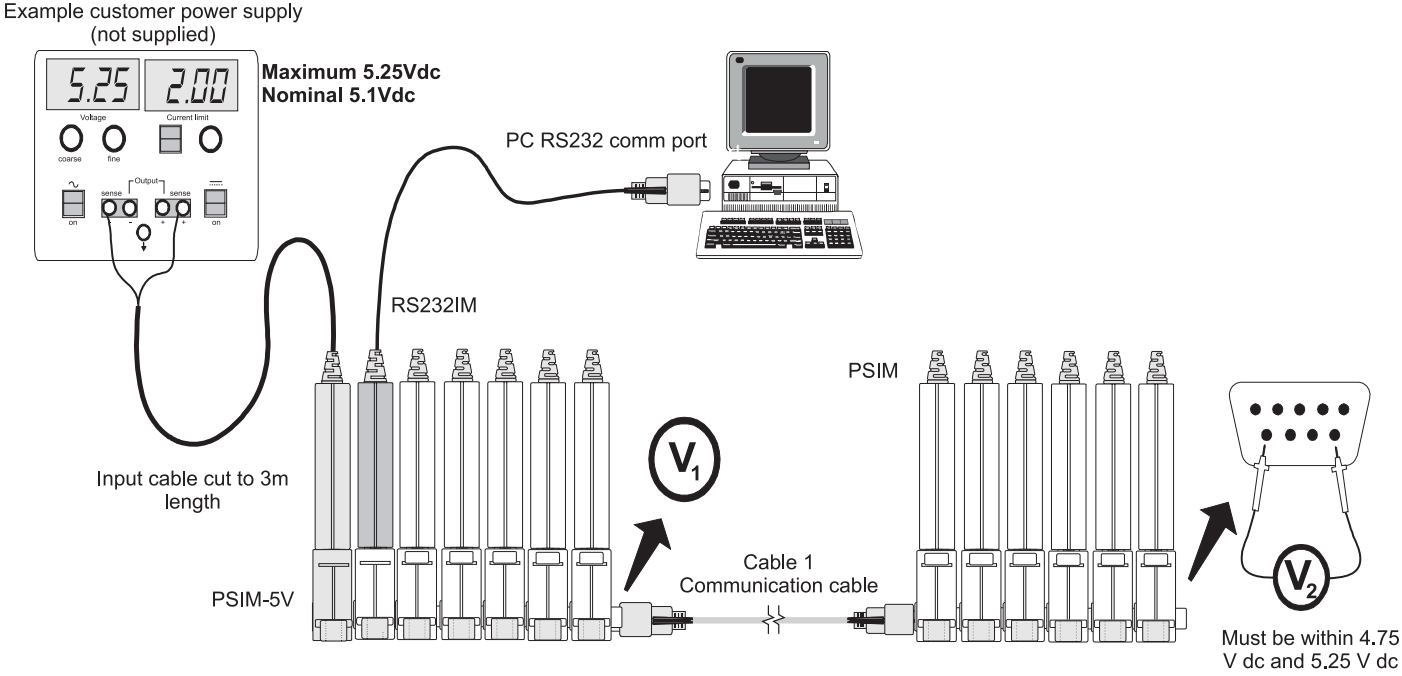
Calculation for V2 volt drop = PSIM + module (3 off)
= (5.3 x 3) + 0.04(3+2+1)
= 16 mV

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.

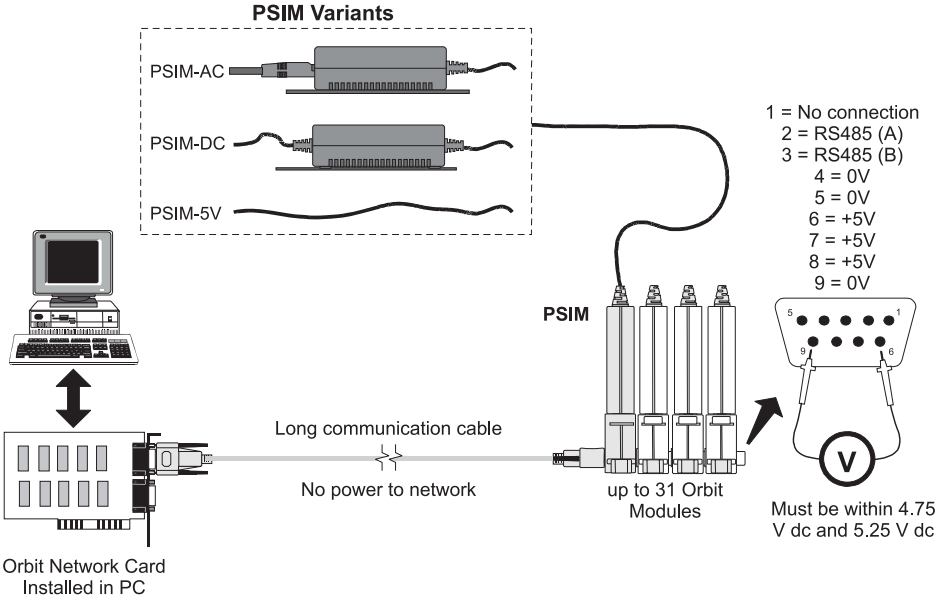
Total Voltage drop = PSIM-5V + modules (6 off) + Cable 1 + Modules (6 off)
= (2 x 12 x [3+1]) + 0.04 (1+2+3+4+5+6+7+8+9+10+11+12)+ (15.2 x 6) + 0.04 (1+2+3+4+5+6)
= 96 + 3.12 + 91.2 + 0.84
= 191 mV

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).

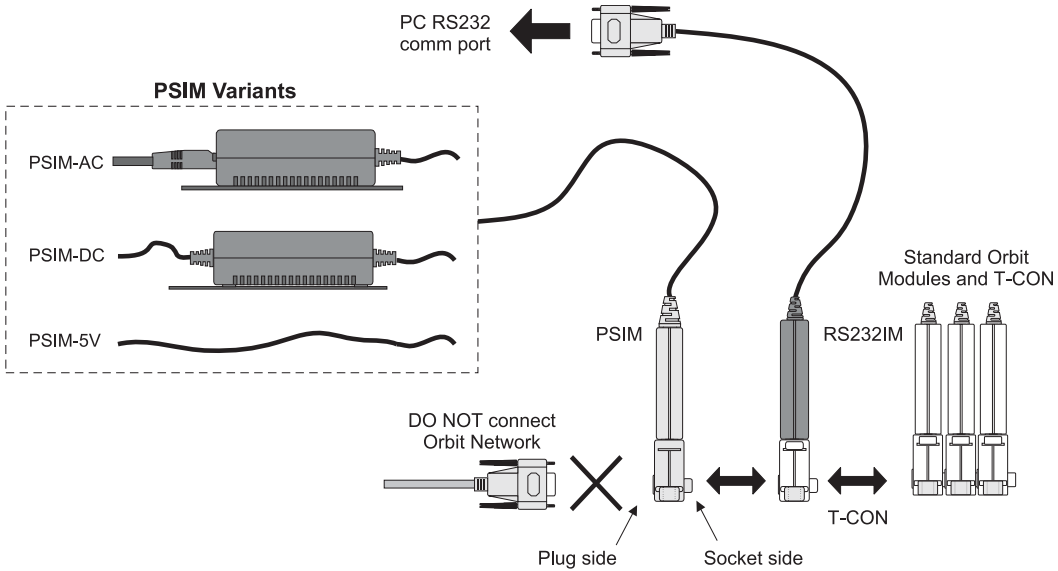
Application 4: Modules located a long distance from computer.

- 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.



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

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



Return of Goods

Devices returned for service/repair/calibration should be shipped prepaid to your distributor or, if purchased directly from Solartron Metrology, to the relevant Sales Office (see overleaf).

The shipping container should be marked: "**For the Attention of the Returns Department**"

The following information should accompany the device(s):

1. Contact details of company/person returning device, including return shipping instructions.

2. A statement of service required and purchase order.

3. Description of the device fault and the circumstances of the failure, including application environment and length of time in service.

4. Original purchase order number and date of purchase, if known.

Please note: A standard assessment charge is applicable on all non-warranty devices returned for repair. Customer damage and any device found, upon inspection, to have no fault will be considered non-warranty.

Please contact the Sales Office or Distributor for warranty terms, service options and standard charges.

Adherence to these procedures will expedite handling of the returned device and will prevent unnecessary additional charges for inspection and testing to determine the condition.

Solartron Metrology reserves the right to repair or replace goods returned under warranty.

All repairs are guaranteed for 3 months (unless otherwise stated).

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