Ringer-2000

DC Feed and Ring Power Supply Unit for Voice/Fax and ISDN Modules

Installation and Operation Manual

Notice

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Publication No. 760-220-03/01

Warranty

This RAD product is warranted against defects in material and workmanship for a period of one year from date of shipment. During the warranty period, RAD will, at its option, either repair or replace products which prove to be defective. For warranty service or repair, this product must be returned to a service facility designated by RAD. Buyer shall prepay shipping charges to RAD and RAD shall pay shipping charges to return the product to Buyer. However, Buyer shall pay all shipping charges, duties and taxes for products returned to RAD from another country.

Limitation of Warranty

The foregoing warranty shall not apply to defects resulting from improper or inadequate maintenance by Buyer, Buyer-supplied firmware or interfacing, unauthorized modification or misuse, operation outside of the environmental specifications for the product, or improper site preparation or maintenance.

Exclusive Remedies

The remedies provided herein are the Buyer's sole and exclusive remedies. RAD shall not be liable for any direct, indirect special, incidental, or consequential damages, whether based on contract, tort, or any legal theory.

Regulatory Information

FCC-15 User Information

This equipment has been tested and found to comply with the limits of the Class A digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to the radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Warning per EN 55022

This is a Class A product. In a domestic environment, this product may cause radio interference, in which case the user may be required to take adequate measures.

Safety Warnings

The exclamation point within a triangle is intended to warn the operator or service personnel of operation and maintenance factors relating to the product and its operating environment which could pose a safety hazard.

Always observe standard safety precautions during installation, operation and maintenance of this product. Only a qualified and authorized service personnel should carry out adjustment, maintenance or repairs to this instrument. No adjustment, maintenance or repairs should be performed by either the operator or the user.

Telecommunication Safety

The safety status of each of the ports on the RINGER-2000 is declared according to EN 41003 and is detailed in the table below:

Ports	**Safety Status**
-24 VDC, -48 VDC, +60 VDC	SELV*
+72 VDC	Secondary hazardous

* Safety Extra-Low Voltage

Declaration of Conformity

Manufacturer's Name: RAD Data Communications Ltd.

Manufacturer's Address: 12 Hanechoshet St.
Tel Aviv 69710
Israel

declares that the product:

Product Name: **RINGER-2000**

Conforms to the following standard(s) or other normative document(s):

EMC:	EN 55022 (1994)	Limits and methods of measurement of radio disturbance characteristics of information technology equipment.
	EN 50082-1 (1992)	Electromagnetic compatibility - Generic immunity standards for residential, commercial and light industry.
Safety:	EN 60950 (1992/93)	Safety of information technology equipment, including electrical business equipment.

Supplementary Information:

The product herewith complies with the requirements of the EMC Directive 89/336/EEC and the Low Voltage Directive 73/23/EEC. The product was tested in a typical configuration.

Tel Aviv, November 21st, 1996

Haim Karshen
VP Quality

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Chapter 1
Introduction

1.1 Overview

The Ringer-2000 is a stand-alone power supply unit, that provides the DC feed power required to support voice/fax and ISDN modules.

The Ringer-2000 generates all the voltages required by these modules: -24 VDC or -48 VDC for feed, and +72/+60 VDC for generating the ring signal. ISDN basic rate access modules can use the ring output voltage for increasing the feed voltage.

The Ringer-2000 can be ordered in AC and DC input voltage versions:

- The AC input options are 115 VAC and 230 VAC.
- The DC input options are -24 VDC and -48 VDC.

The following output versions are available for the Ringer-2000:

- Ringer-2000/24/72: provides both -24 VDC feed and +72 or +60 VDC ring voltage.
- Ringer-2000/48/72: provides both -48 VDC feed and +72 or +60 VDC ring voltage.
- Ringer-2000/48: provides only -48 VDC for the DC feed (no ring voltage).

Note *AC-powered Ringer-2000 units generate a ring voltage of +72 VDC; DC-powered units generate a ring voltage of +60 VDC.*

The unit has ten output connectors, for connection to separate equipment units or modules. One Ringer-2000 can provide the DC power for up to 60 voice channels; the number of ISDN channels that can be supported depends on the required current and the ISDN DC loop resistance, determined by the pair gauge and line length.

1.2 Physical Description

The Ringer-2000 is a stand-alone unit, intended for installation on shelves or in 19" racks. Unit height is 1U. *Figure 1-1* shows a general view of the unit with the supplied rack-mount handles attached.

The Ringer-2000 front panel includes two indicators that light when the unit provides battery (feed) and ring output voltages. All the connectors and the POWER on/off switch are located on the rear panel.

The Ringer-2000 does not include a fan, and is cooled by free air convection.

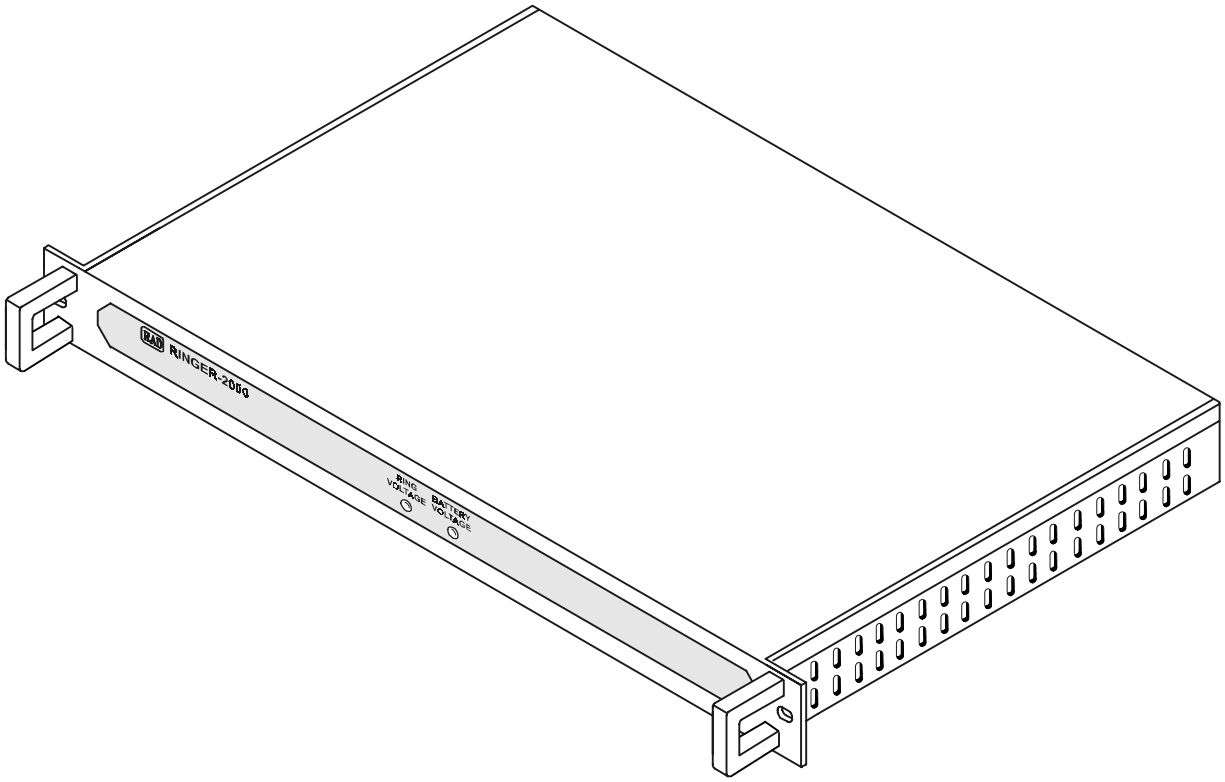


Figure 1-1 Ringer-2000, General View

1.3 Functional Description

Functional Block Diagram

Figure 1-2 shows the functional block diagram of an AC-powered Ringer-2000, which provides -48 VDC and +72 VDC outputs.

The AC-powered Ringer-2000 includes two AC/DC converters powered from 115 VAC or 230 VAC, in accordance with order.

The AC input voltage passes through a protection fuse located in the AC input connector, and through the POWER on/off switch.

The POWER switch includes an internal indicator which lights when the Ringer-2000 is turned on.

Each AC/DC converter of the Ringer-2000 generates a single DC output voltage, which is connected in parallel to all the output connectors.

The DC output voltage depends on the Ringer-2000 version (see *Section 1.1*). Note that the output voltages generated by the Ringer-2000 are referenced to a common ground.

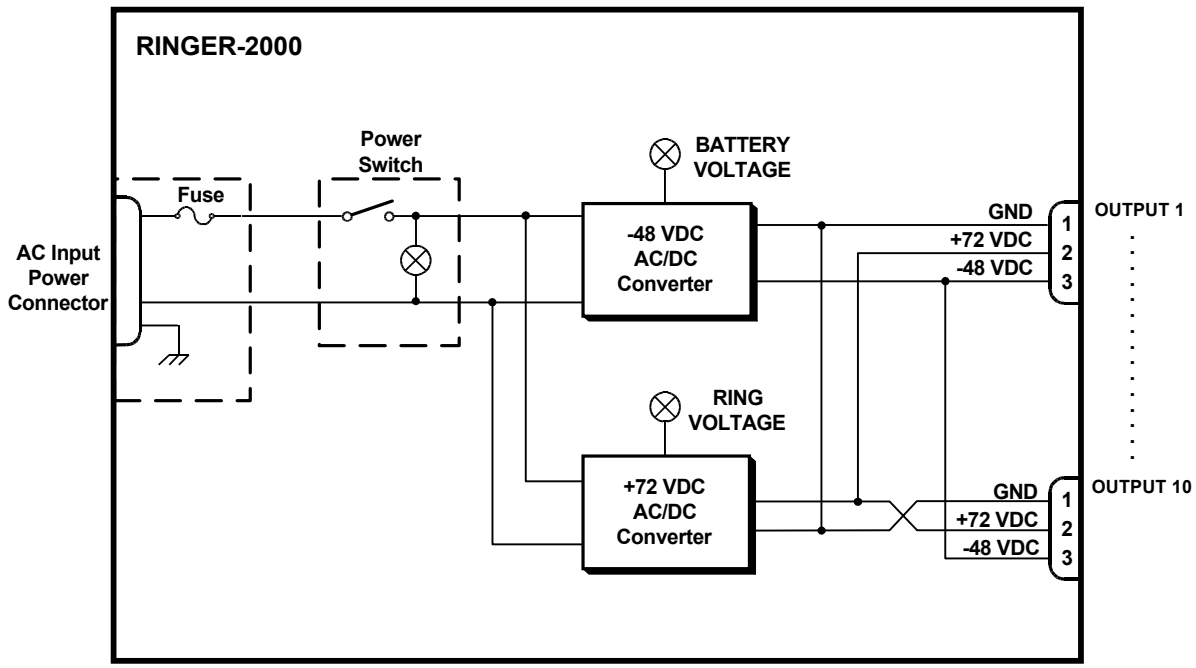


Figure 1-2 Ringer-2000, Functional Block Diagram

Warning

If the Ringer-2000 is connected at the same time to other equipment, e.g., Megaplex-2100, the common lead of the -24V/-48V and +60V/+72V supplies is short-circuited to the protective earth.

Each output voltage is monitored by means of an indicator, located on the indicator board.

The DC-powered Ringer-2000 includes DC/DC converters, which operate directly from the DC input voltage.

Using the Ring Output Voltage

The ring output voltage of the Ringer-2000 (+60 VDC or +72 VDC) can be used in two ways:

- To provide an independent positive DC voltage. Voice modules with FXS interfaces can use this voltage to generate the 20 Hz ringing voltage.
- To increase the line feed voltage generated by certain ISDN basic rate access modules such as the Megaplex HS-U (instead of the basic -24 VDC or -48 VDC feed voltage).

  In this case, the feed voltage is generated by combining the -24/-48 VDC and the +60/+72 VDC outputs, that is, by using the voltage appearing between pins 2 (positive terminal) and 3 (negative terminal) of the 3-pin

output connector. The maximum feed current is then determined by the current rating of the +60/+72 VDC output.

The resulting nominal feed voltages that can be obtained in this way are as follows:

Negative Voltage	Positive Voltage	Resulting Feed Voltage
-24 VDC	+60 VDC	84 VDC
	+72 VDC	96 VDC
-48 VDC	+60 VDC	108 VDC
	+72 VDC	120 VDC

All voltages above 60 VDC are considered to be hazardous, that may cause electrical shock or bodily injury.

1.4 Technical Data

This section lists the main Ringer-2000 technical characteristics.

Model	Input Voltage	Feed (Battery) Voltage Output	Ring Voltage Output
115 or 230 VAC with 24/72 VDC outputs	115 or 230 VAC ±10%, 50/60 Hz	-24 VDC ±5%, 3.0A max	+72 VDC ±5%, 0.7A max
115 or 230 VAC with 48/72 VDC outputs	115 or 230 VAC ±10%, 50/60 Hz	-48 VDC ±5%, 3.0A max	+72 VDC ±5%, 0.7A max
115 or 230 VAC with 48 VDC output (no ring voltage)	115 or 230 VAC ±10%, 50/60 Hz	-48 VDC ±5%, 3.0A max	None
-24 VDC	-24 VDC ±5%	-24 VDC ±5%, 3.0A max	+60 VDC ±5%, 0.85A max
-48 VDC	-48 VDC ±5%	-48 VDC ±5%, 3.0A max	+60 VDC ±5%, 0.85A max

Number of Output Connectors	Ten 3-pin female
Mechanical Data	
Height	4.4 cm/1.75 in (1U)
Width	48.2 cm/19.0 in (including integral rack mounting brackets)
Depth	31.0 cm/12.2 in
Weight	2.1 kg/4.6 lb
Operating Temperature	32 to 113°F (0 to +45°C)
Storage Temperature	0 to 150°F (-20 to +70°C)
Humidity	Up to 90%, non-condensing

Chapter 2
Installation and Operation

2.1 Introduction

This chapter provides installation and operation instructions for the Ringer-2000.

2.2 Site Requirements

AC Power

AC-powered Ringer-2000 units should be installed within 1.5m (5 feet) of an easily-accessible grounded AC outlet capable of furnishing 115 VAC or 230 VAC (in accordance with the nominal mains voltage of the ordered unit).

DC Power

DC-powered Ringer-2000 units require a -24 VDC or -48 VDC power source (in accordance with the nominal voltage of the ordered unit).

Grounding

The case of the Ringer-2000 unit must be properly grounded at all times. This is for your protection, to prevent possible injury to yourself and damage to equipment when a fault condition, e.g., a lightning stroke or contact with high-voltage power lines, occurs on the lines which receive feed voltage from the Ringer-2000 outputs.

Any interruption of the protective (grounding) connection inside or outside the equipment, or the disconnection of the protective ground terminal can make this equipment dangerous. Intentional interruption is prohibited.

Before switching on this equipment and before connecting any other cable, the protective ground terminals of the equipment must be connected to a protective ground. The grounding connection is made through the power cable, which must be inserted in a power socket (outlet) with protective ground contact. Therefore, the power plug must always be inserted in a socket outlet provided with a protective ground contact, and the protective action must not be negated by use of an extension cord (power cable) without a protective conductor (grounding).

Whenever Ringer-2000 units are installed in a rack, make sure that the rack is properly grounded, and connected to a reliable, low-resistance grounding system.

Front and Rear Panel Clearance

Allow at least 90 cm (36 inches) of frontal clearance for operator access. Allow the same clearance at the rear of the unit for cable connections.

Ambient Requirements

The ambient operating temperature range of the Ringer-2000 is 32 to 113°F (0 to +45°C), at a relative humidity of up to 90%, non-condensing.

The Ringer-2000 is cooled by free air convection. Do not obstruct the free flow of air around the unit.

When the Ringer-2000 is installed in a 19" rack, allow at least 1U of space below and above the unit.

2.3 Equipment Needed

The connection of the Ringer-2000 to the user's equipment is made by means of the following cables:

CBL-RINGER1	Cable for connecting an output connector to a single module/unit.
CBL-RINGER2	Splitter cable for connecting an output connector to up to two modules/units.
CBL-RINGER4	Splitter cable for connecting an output connector to up to four modules/units.
CBL-RINGER6	Splitter cable for connecting an output connector to up to six modules/units.

2.4 Ringer-2000 Front and Rear Panels

Front Panel

Figure 2-1 shows the Ringer-2000 front panel. The front panel includes two indicators:

RING VOLTAGE	Lights when the ring output voltage is within the allowable limits. Not used on the Ringer-2000/48 model.
BATTERY VOLTAGE	Lights when the line feed output voltage is within the allowable limits.

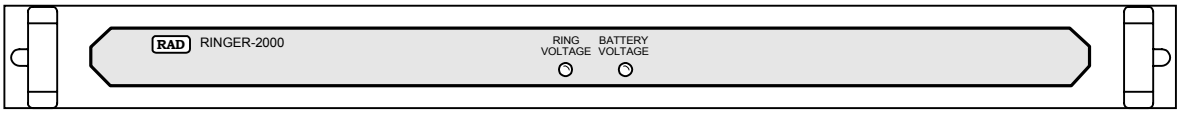


Figure 2-1 Ringer-2000 Front Panel

Rear Panel

Figure 2-2 shows rear panels of AC- and DC-powered Ringer-2000 units.

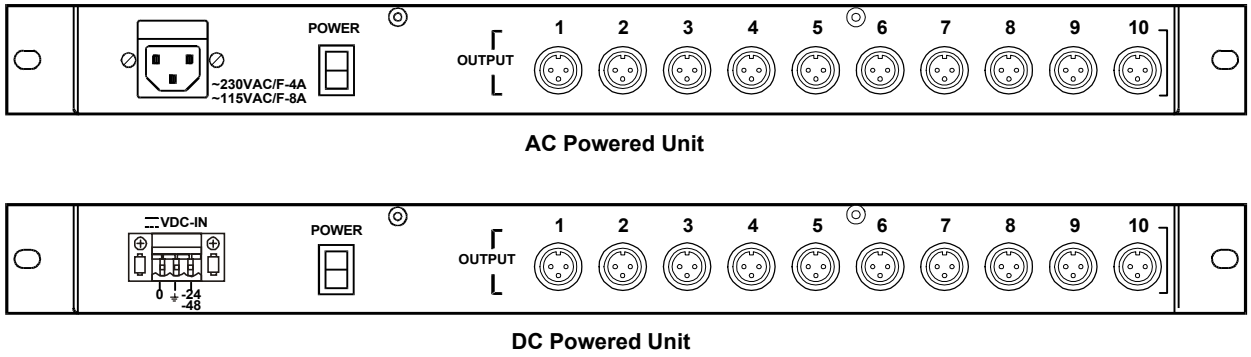


Figure 2-2 Ringer-2000 Rear Panels

The rear panel includes the following components:

Power Input Connector

AC-powered unit: includes a standard IEC socket with integral fuses. Fuse ratings are marked near the connector (8A fuse for 115 VAC version, and 4A fuse for 230 VAC version).

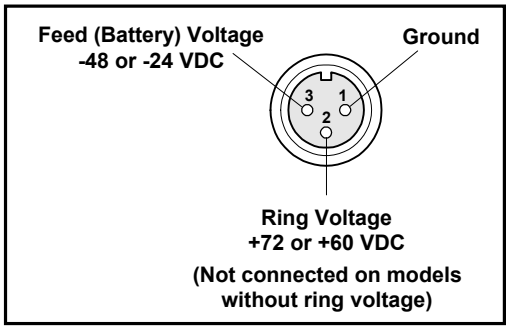
DC-powered unit: includes a plastic three-pin terminal block type connector. Refer to the *DC Power Supply Connection* supplement for wiring.

POWER Switch

Turns the Ringer-2000 on.

OUTPUT 1 through OUTPUT 10 Connectors

Ten circular three-pin female connectors for the output voltages. Connector wiring is as follows:



2.5 Installation Procedure

The Ringer-2000 is intended for installation either on shelves or in 19" racks. It should be located directly above the equipment that receives its DC outputs, e.g., a Megaplex, Kilomux, or MAXcess unit.

The Ringer-2000 is fastened to the rack by means of screws (not supplied) that pass through the holes in its front panel. All the cable connections are made to the rear panel.

Install the Ringer-2000 using the following procedure:

Input Power Connection

- Set the POWER switch to OFF.
- Connect the power cable to the POWER connector, and then connect the other end to the prescribed power outlet.

Connection of Output Voltages

- Connect the male three-pin connector of the CBL-RINGER1 cable to one of the OUTPUT connectors of the Ringer-2000.

Note

It is recommended, especially when connecting to a single heavy load (e.g., a chassis equipped with several voice modules), to use the OUTPUT 1 connector.

- Connect the female three-pin connector of the cable to the DC input connector of the user equipment/modules:
  - For modules installed in chassis that provide voltages through their internal power supply bus (e.g., Megaplex-2100, MAXcess-3000, etc.), connect the cable connector to the DC input connector of the chassis power supply module.
  - For modules installed in chassis that do not provide voltages through their internal power supply bus (e.g., Kilomux, Megaplex-2000, etc.), you must connect a cable to the DC input connector of each module.

    Alternately, use a CBL-RINGER2, CBL-RINGER4, or CBL-RINGER6 cable to connect a single Ringer-2000 output connector to several modules.

2.6 Operating Procedures

Warning

All voltages above 60 VDC are considered to be hazardous, that may cause electrical shock or bodily injury.

To prevent damage to connected equipment due to incorrect application of feed voltages, strictly observe the following procedures.

Turn On

The Ringer-2000 must always be turned on ***after*** the user's equipment, e.g., the Megaplex, Kilomux, or MAXcess unit is already operating.

- To turn the Ringer-2000 on, set its POWER switch to ON. The output voltage indicators must turn on and light steadily.

Turn Off

The Ringer-2000 must always be turned off ***before*** the equipment connected to its outputs is turned off.

- To turn the Ringer-2000 off, set its POWER switch to OFF. The Ringer-2000 indicators will turn off.

Caution

Always turn the Ringer-2000 off *before* removing and installing a voice/ISDN module in any connected chassis. After the module has been installed/removed, the Ringer-2000 can be turned back on.

Chapter 3
Troubleshooting

3.1 Introduction

This Chapter provides troubleshooting instructions for the Ringer-2000.

3.2 Troubleshooting

Identify the closest description of the trouble symptoms listed in *Table 3-1* and perform the corresponding corrective actions.

Table 3-1 Troubleshooting Instructions

No.	Symptoms	Corrective Actions
1	The POWER switch indicator does not light	1. Check that both ends of the power cable are properly connected. In particular, check that the cable connector is fully inserted in the Ringer-2000 power connector. 2. Check that AC power is present in the mains outlet in which the Ringer-2000 power cable is plugged. ***Caution*** The test must be performed by trained service personnel only, due to the shock hazard. 3. Disconnect the power cable: first disconnect the cable from the mains outlet and then from the Ringer-2000 power connector. Remove the fuse compartment and check the condition of the inner fuse: if blown, replace with a fuse of the same type and ratings (8A fast-blow for 115 VAC, 4A fast-blow for 230 VAC). An appropriate fuse should be present in the other position of the fuse compartment. ***Warning*** **The unit must be serviced by service personnel only, due to the shock and energy hazards.** **Always disconnect the power cable before replacing the fuse.** 4. Replace the power cable.

Table 3-1 Troubleshooting Instructions (Cont.)

No.	Symptoms	Corrective Actions
2	One of the output voltage indicator does not light	1. Check that the POWER switch indicator lights. If not, proceed in accordance with item 1 above. 2. Turn the Ringer-2000 off, disconnect the output cables, and wait for 10 minutes. 3. Turn the Ringer-2000 on again: if the output voltage indicator does not light, the Ringer-2000 must be serviced. 4. If the indicator lights, start reconnecting the output cables: • In case the indicator turns off when a cable is connected, replace the cable. • If problem occurs again, replace the equipment using that cable
3	An equipment unit connected to a Ringer-2000 output does not receive the required voltage	1. Check that the voltage indicator corresponding to the required output voltage lights. If not, proceed in accordance with item 2 above. 2. Check that the corresponding output cable is properly connected at both ends. 3. Check that the equipment unit is correctly configured for accepting the corresponding external voltage. 4. Replace the output cable.

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SUPPLEMENT

DC Power Supply Connection – Terminal Block Connector

Note: Ignore this supplement if the unit is AC-powered.

DC-powered units are equipped with a plastic 3-pin *VDC-IN* power input connector, located on the unit rear panel. Supplied with such a unit, is a mating Terminal Block (TB) type connector plug for attaching to your power supply cable.

Connect the wires of your power supply cable to the TB plug, according to the voltage polarity and assembly instructions provided below.

Caution: Prepare the connections to the TB plug *before* inserting it into the *VDC-IN* connector.

Preparing and Connecting the TB Plug

Refer to Figure 1 for assistance.

1. Strip the insulation of your power supply cable wires according to the dimensions shown.
2. Place each wire lead into the appropriate TB plug terminal *according to the voltage polarity mapping shown in Figure 2.* (If the terminal is not already open, loosen its terminal screw.)
3. Tighten the three terminal screws.
4. Pull a nylon cable tie (supplied) around the power supply cable to secure it firmly to the TB plug grip (pass the tie through the holes on the grip).

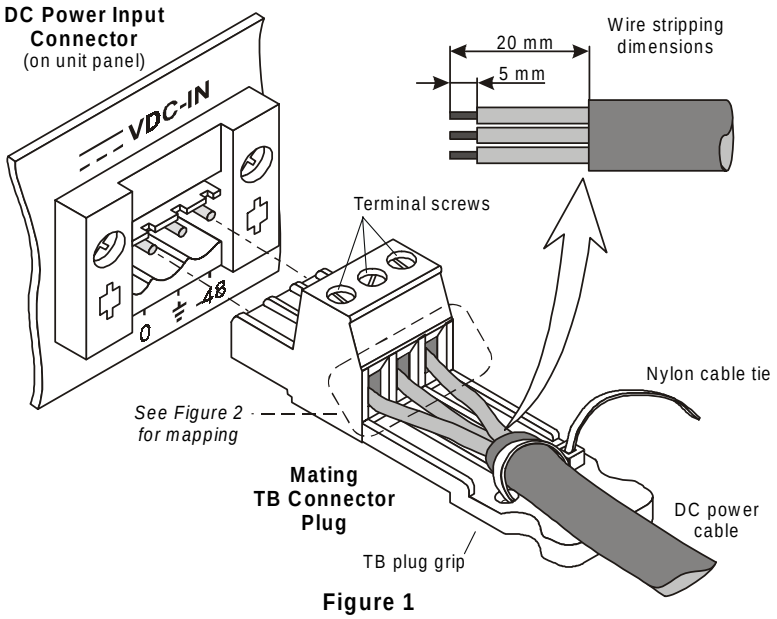

Figure 1

5. Isolate the exposed terminal screws / wire leads using a plastic sleeve or insulating tape, to prevent the possibility of short-circuit.
6. Connect the assembled power supply cable to the unit by inserting the TB plug into the unit's *VDC-IN* connector, until it snaps into place.

DC Power Supply Wire Voltage Polarity

Refer to Figure 2 for proper mapping of the power supply wire leads to the TB plug's three terminals.

> ***Warning:***
> *Reversing the wire voltage polarity can cause serious damage to the unit!*

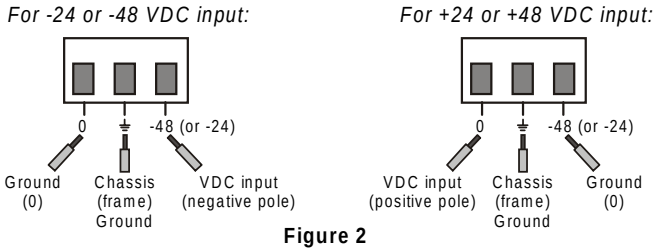

Figure 2