

KM-Ringer

DC Feed and Ring Power Supply Module for Voice/Fax and ISDN Modules Installation and Operation Manual

Notice

This manual contains information that is proprietary to RAD Data Communications. No part of this publication may be reproduced in any form whatsoever without prior written approval by RAD Data Communications.

No representation or warranties for fitness for any purpose other than what is specifically mentioned in this manual is made either by RAD Data Communications or its agents.

For further information contact RAD Data Communications at the address below or contact your local distributor.

**International Headquarters
RAD Data Communications Ltd.**

24 Raoul Wallenberg St.
Tel Aviv 69719 Israel
Tel: 972-3-6458181
Fax: 972-3-6498250
E-mail: rad@rad.co.il

**U.S. Headquarters
RAD Data Communications Inc.**

900 Corporate Drive
Mahwah, NJ 07430 USA
Tel: (201) 529-1100
Toll free: 1-800-444-7234
Fax: (201) 529-5777
E-mail: market@radusa.com

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 KM-Ringer 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: **KM-RINGER**

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, January 23rd, 1997



Haim Karshen
VP Quality

European Contact: RAD Data Communications GmbH, Lyoner Strasse 14, 60528 Frankfurt am Main, Germany

Contents

CHAPTER 1 INTRODUCTION

1.1 Overview	1-1
Purpose	1-1
Versions.....	1-1
1.2 Physical Description	1-2
1.3 Functional Description	1-3
Functional Block Diagram	1-3
Using the Ring Output Voltage	1-4
1.4 Technical Data.....	1-4

CHAPTER 2 INSTALLATION AND OPERATION

2.1 Introduction	2-1
2.2 Site Requirements	2-1
AC Power	2-1
DC Power.....	2-1
Grounding.....	2-1
Module Handling Precautions	2-2
Ambient Requirements	2-2
2.3 Equipment Needed.....	2-2
2.4 KM-Ringer Front Panels.....	2-3
KM-Ringer Front Panels.....	2-3
2.5 Installation Procedure	2-4
General	2-4
Mechanical Installation.....	2-4
Input Power Connection	2-4
Connection of Output Voltages	2-4
2.6 Operating Procedures	2-5
Turn On	2-5
Turn Off	2-5

CHAPTER 3 TROUBLESHOOTING

3.1 Introduction	3-1
3.2 Troubleshooting	3-1

List of Figures

Figure 1-1 KM-Ringer, General View	1-2
Figure 1-2 KM-Ringer, Functional Block Diagram.....	1-3
Figure 2-1 KM-Ringer Front Panels	2-3

List of Tables

Table 3-1 Troubleshooting Instructions	3-1
--	-----

Chapter 1

Introduction

1.1 Overview

Purpose

The KM-Ringer is a 3U-high DC feed power supply (ringer) module for the Kilomux-2000 and Kilomux-2100 family of multiplexers.

The KM-Ringer module is completely encased in a protective metal case, and therefore it can also be used as a stand-alone unit to provide feed voltages to other equipment, e.g., Megaplex-2100, Megaplex-2100H, MAXcess-3000, etc.

Note

*In this manual, the generic term **Kilomux** is used when the information is applicable to both the Kilomux-2000 and Kilomux-2100. The complete equipment designation is used for information applicable to a specific equipment version.*

The KM-Ringer supplies all the voltages required by voice/fax and ISDN basic rate access modules: -24 VDC or -48 VDC for feed, as well as +60/+72 VDC for generating the ring signal (required by certain FXS interface modules). The KM-Ringer can provide DC power for up to 32 voice/fax 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 gage and line length).

The connection of the DC voltages generated by the KM-Ringer module is made by a cable connected to its front-panel connector.

Versions

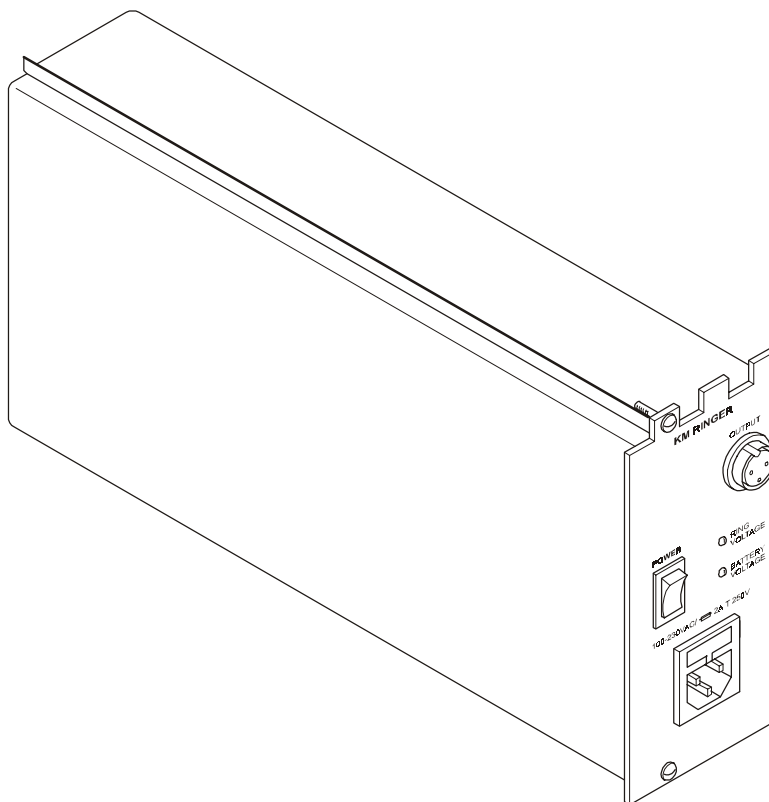
The KM-Ringer can be ordered in AC and DC input voltage versions:

- The AC input option is for 115 to 230 VAC ($\pm 10\%$). The AC-powered KM-Ringer provides -48 VDC feed voltage and +72 VDC ring voltage.
- The DC input options are -24 VDC and -48 VDC:
 - KM-Ringer operating on -24 VDC provides -24 VDC feed voltage and +60 VDC ring voltage.
 - KM-Ringer operating on -48 VDC provides -48 VDC feed voltage and +60 VDC ring voltage.

1.2 Physical Description

The KM-Ringer is a three-slot wide module, intended for installation in a Kilomux chassis. Module height is 3U. *Figure 1-1* shows a general view of a typical AC-powered KM-Ringer. The DC-powered KM-Ringer version is similar, except for the POWER connector.

Figure 1-1 KM-Ringer, General View



The KM-Ringer has a protective case, and can also be operated as a stand-alone unit, provided it is properly grounded.

The KM-Ringer front panel includes two indicators that light when the module provides normal battery (feed) and ring output voltages.

The external power connector and the POWER on/off switch are located on the module panel. The connection of the output voltages is made through a 3-pin circular OUTPUT connector, also located on the module front panel.

The KM-Ringer does not include cooling fans. To improve cooling and reduce heat transfer to adjacent modules, it is recommended to install the KM-Ringer in the three rightmost slots of the Kilomux chassis.

1.3 Functional Description

Functional Block Diagram

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

The AC-powered KM-Ringer includes two AC/DC converters powered from 115 to 230 VAC ($\pm 10\%$) input.

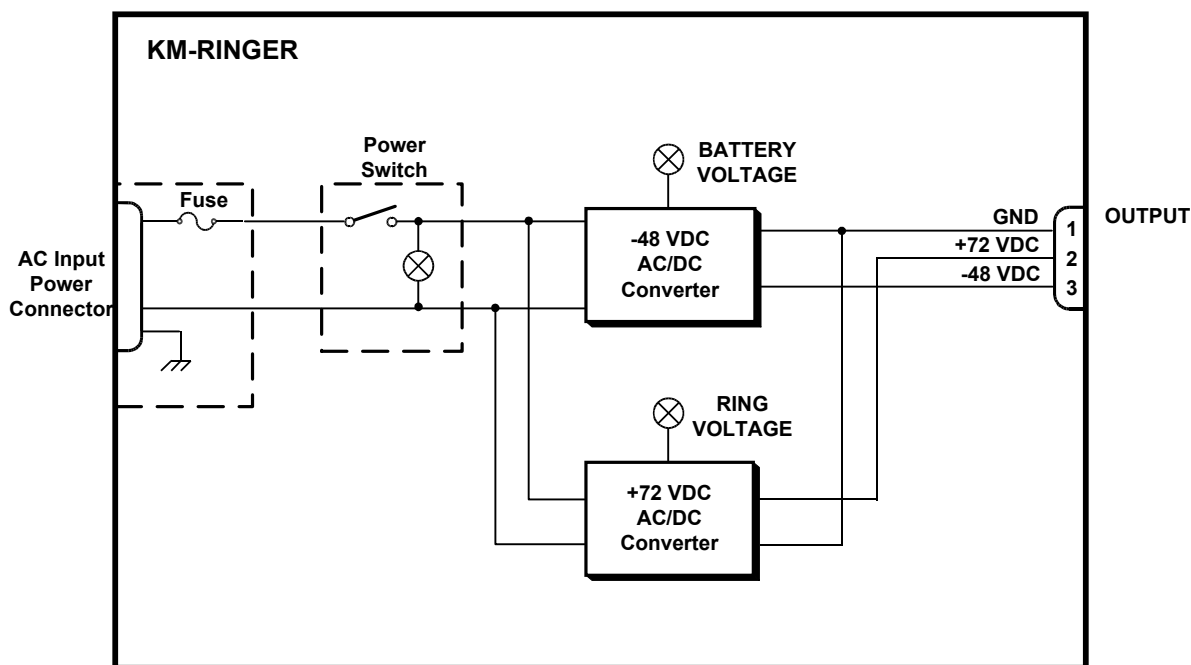


Figure 1-2 KM-Ringer, Functional Block Diagram

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 KM-Ringer is turned on.

Each AC/DC converter of the KM-Ringer generates a single DC output voltage, which is connected to a different pin on the single front-panel OUTPUT connector. The DC output voltages depend on the KM-Ringer version (see *Section 1.1*).

Note that the output voltages generated by the KM-Ringer are referenced to the common ground.

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

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

Using the Ring Output Voltage

The ring output voltage of the KM-Ringer (+60 VDC or +72 VDC) can be used to provide an independent positive DC voltage. Certain voice modules with FXS interfaces require this voltage to generate the 20 Hz telephone ringing voltage.



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 KM-Ringer technical characteristics.

Nominal Input Voltage	Input Voltage Range	Feed (Battery) Voltage Output	Ring Voltage Output
AC	115 to 230 VAC $\pm 10\%$, 50/60 Hz	-48 VDC $\pm 5\%$, 0.6 A max	+72 VDC $\pm 5\%$, 0.5A max
-24 VDC	-24 VDC (-18 to -36 VDC)	-24 VDC $\pm 5\%$, 0.6 A max	+60 VDC $\pm 5\%$, 0.5A max
-48 VDC	-48 VDC (-36 to -72 VDC)	-48 VDC $\pm 5\%$, 0.6 A max	+60 VDC $\pm 5\%$, 0.5A max

Output Voltage Connections	Circular 3-pin female connector on the front panel
Mechanical Data	3U-high module, occupies three slots of Kilomux chassis
Operating Conditions	Same as Kilomux

Chapter 2

Installation and Operation

2.1 Introduction

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

2.2 Site Requirements

AC Power

AC-powered KM-Ringer modules should be installed within 1.5m (5 feet) of an easily-accessible grounded AC outlet capable of furnishing between 115 VAC to 230 VAC ($\pm 10\%$).

DC Power

DC-powered KM-Ringer modules require a -24 VDC or -48 VDC power source (in accordance with the nominal voltage of the ordered module).

Grounding



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

The KM-Ringer is grounded through its metallic body to the Kilomux chassis, and in addition it is also grounded through the module power connector. Never operate KM-Ringer modules outside the Kilomux chassis, without providing reliable grounding arrangements.

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).

**Module Handling
Precautions**

Never connect any cables to a KM-Ringer module if it is not installed in a properly installed and grounded equipment chassis, and always disconnect all the cables from the module, before removing the module from the chassis.

When the module is operated as a stand-alone unit, always ensure that the module is properly grounded before connecting any cables, and disconnect all the cables from the module before disconnecting it from the ground.

**Ambient
Requirements**

The ambient operating conditions of the KM-Ringer are the same as for the Kilomux.

2.3 Equipment Needed

The connection of the KM-Ringer output voltages to modules installed in a Kilomux chassis, or to other external equipment, is made through the OUTPUT connector. The following types of cables can be used:

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

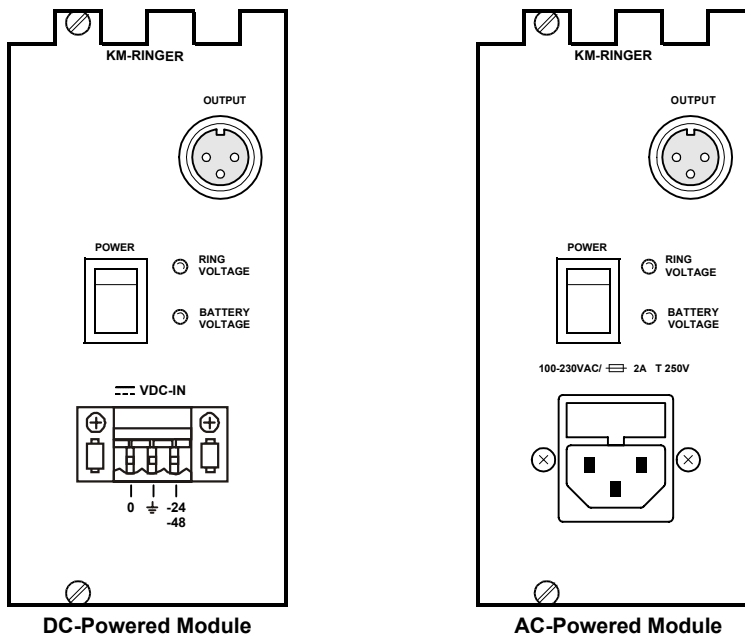
If more than six modules need to be connected, cables can be linked together.

2.4 KM-Ringer Front Panels

KM-Ringer Front Panels

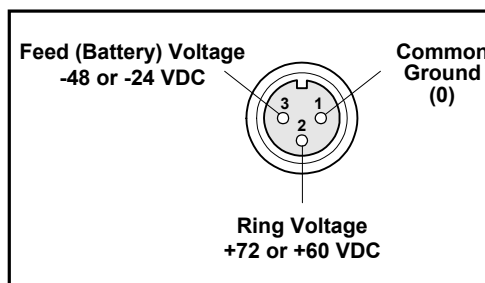
Figure 2-1 shows typical front panels of AC- and DC-powered KM-Ringer modules.

Figure 2-1 KM-Ringer Front Panels



The module panel includes the following components:

OUTPUT Connector 3-pin circular female connector for the output voltages. Connector wiring is as follows:



RING VOLTAGE Lights when the ring output voltage is within the allowable limits.

BATTERY VOLTAGE Lights when the line feed output voltage is within the allowable limits.

Power Connector **AC-powered module:** includes a standard IEC socket with integral fuses. Fuse ratings are marked near the connector (2A/250 V). **DC-powered module:** includes a plastic 3-pin terminal block type connector.

POWER Switch Turns the KM-Ringer on.

2.5 Installation Procedure

General

When the KM-Ringer is not used as a stand-alone unit, it can be installed in three adjacent slots of a Kilomux unit. Whenever possible, install the KM-Ringer module in the three rightmost slots of the chassis.

The KM-Ringer is fastened to the chassis by means of two captive screws.

Mechanical Installation

Install the KM-Ringer using the following procedure:

- Set the POWER switch to OFF.
- Insert the module in the assigned position.
- Fasten the two module screws.

Input Power Connection

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 3-pin connector of the desired connection cable (e.g., CBL-RINGER1) to the OUTPUT connector of the KM-Ringer.
- Connect the female 3-pin connector of the cable to the DC input connector of the voice or ISDN module.

Alternately, use a CBL-RINGER2, CBL-RINGER4, or CBL-RINGER6 cable to connect the KM-Ringer to several modules.

If you must connect more than six modules to the KM-Ringer output, you may use cables as splitters.

For example, to distribute the feed and ring voltages generated by one KM-Ringer to 12 modules, you need one CBL-RINGER2 and two CBL-RINGER6 cables, connected as follows:

1. Connect the male connector of the CBL-RINGER2 cable to the OUTPUT connector of the KM-Ringer.
2. Connect the male connectors of two CBL-RINGER6 cables to the female connectors at the two ends of the CBL-RINGER2 cable.

Note

To feed modules installed in chassis types that distribute 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. Check that the internal jumpers of the modules that receive the KM-Ringer voltages are set to use internal feeding.

2.6 Operating Procedures



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

Turn On

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

The KM-Ringer must always be turned on **after** the connected user's equipment, e.g., Kilomux, is already operating.

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

Turn Off

The KM-Ringer must always be turned off **before** the equipment connected to its OUTPUT connector is turned off.

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

Caution

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

Chapter 3

Troubleshooting

3.1 Introduction

This chapter provides troubleshooting instructions for the KM-Ringer.

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	<ol style="list-style-type: none">1. Check that both ends of the power cable are properly connected. In particular, check that the cable connector is fully inserted in the KM-Ringer power connector.2. Check that AC or DC power (in accordance with the KM-Ringer model) is present in the power outlet in which the KM-Ringer power cable is plugged. <p>Caution The test must be performed by trained service personnel only, due to the shock hazard.</p> <ol style="list-style-type: none">3. For AC-powered modules: Disconnect the AC power cable as follows: first disconnect the cable from the mains outlet and then disconnect it from the KM-Ringer power connector. Remove fuse compartment and check the condition of the inner fuse: if blown, replace with a fuse of the same type and ratings (2A/250V fast-blow). An appropriate fuse should be present in the other position of the fuse compartment. <p> Warning The equipment must be serviced by service personnel only, due to the shock and energy hazards. Always disconnect the power cable before replacing the fuse.</p> <ol style="list-style-type: none">4. Replace the power cable.

Table 3-1 Troubleshooting Instructions (Cont.)

No.	Symptoms	Corrective Actions
2	An output voltage indicator does not light	<ol style="list-style-type: none"> 1. Check that the POWER switch indicator lights. If not, proceed in accordance with item 1 above. 2. Turn the KM-Ringer off, disconnect the output cable, and wait for 10 minutes. 3. Turn the KM-Ringer on again: if the corresponding indicator does not light, the KM-Ringer must be serviced: <ul style="list-style-type: none"> • If the indicator lights, reconnect the output cable: in case the indicator turns off when the cable is connected, replace that cable. • If the problem occurs again, replace the equipment connected through that cable
3	The equipment or module connected to the KM-Ringer OUTPUT connector does not receive the required voltage	<ol style="list-style-type: none"> 4. Check that the required voltage indicator corresponding to the required output voltage lights. If not, proceed in accordance with item 2 above. 5. Check that the corresponding output cable is properly connected at both ends. 6. Check that the equipment or module is correctly configured for accepting the corresponding external voltage. 7. Replace the output cable

RAD

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).
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.

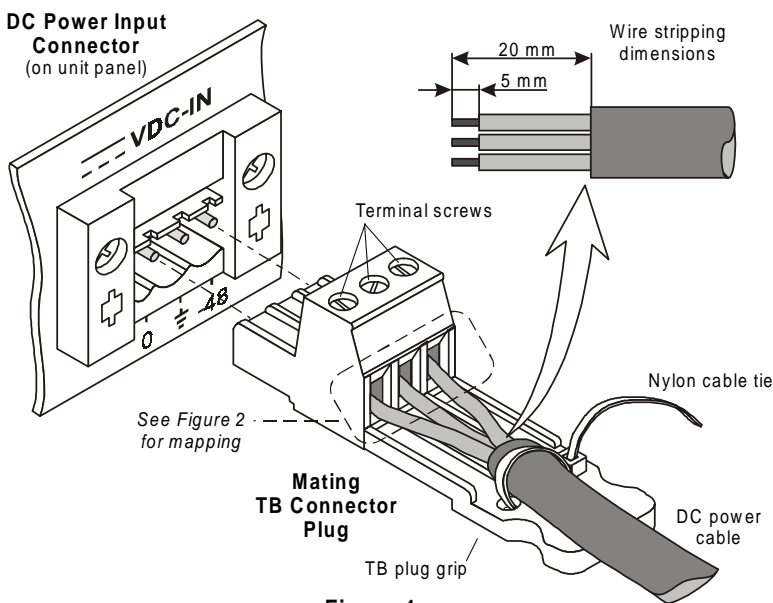


Figure 1

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!

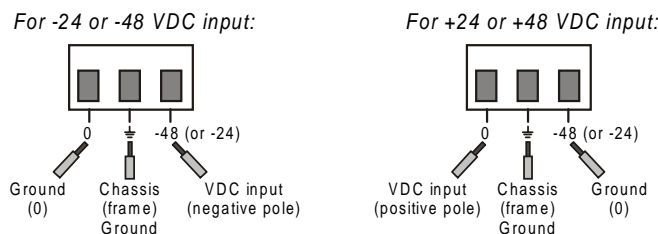


Figure 2