



Optelecom 9000 Series Installation and Operation Manual

Model 4132B

RS232 Fiber Optic Transceiver

For the transport of duplex 3-wire RS232 data signals
over two optical fibers

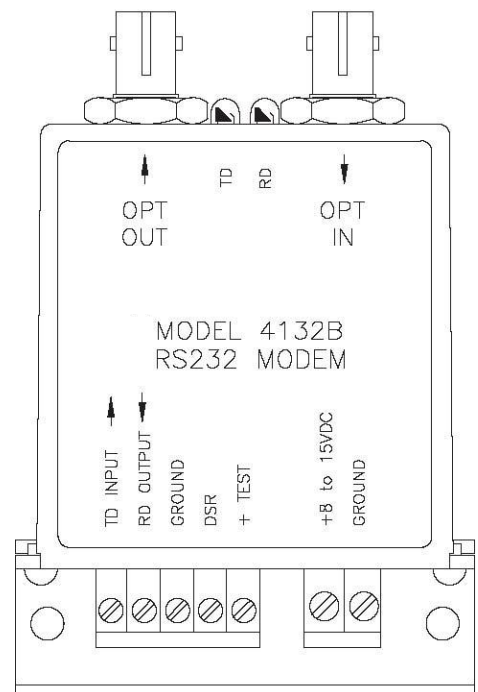
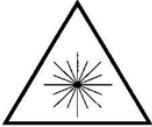


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Safety Instructions

The safety information contained in this section, and on other pages of this manual, must be observed whenever this unit is operated, serviced, or repaired. Failure to comply with any precaution, warning, or instruction noted in the manual is in violation of the standards of design, manufacture, and intended use of the unit. TKH Security Solutions USA assumes no liability for the customer's failure to comply with any of these safety requirements.



LASER RADIATION
DO NOT VIEW DIRECTLY WITH OPTICAL INSTRUMENTS (MAGNIFIERS)
CLASS 1M LASER PRODUCT

CAUTION:
DISCONNECTED OPTICAL CONNECTORS MAY EMIT OPTICAL ENERGY.
DO NOT VIEW BEAM WITH OPTICAL INSTRUMENTS (MAGNIFIERS)

This product contains Class 1M lasers or LEDs.

- Class 1M laser product according to IEC60825-1:1993+A1+A2
- **CAUTION: Use of controls or adjustments or procedures other than those specified herein may result in hazardous radiation exposure.**
- Precautions should be taken to prevent exposure to optical radiation when the unit is removed from its enclosure or when fiber is disconnected from the unit.
- Laser radiation may be present on a fiber connection to this unit even when the power has been removed from the unit.
- This unit is intended for installation in locations where only trained service personnel have access to the fiber connections.
- The locations of all optical connections are listed in the Connection Locations and Function section of this manual.
- Optical outputs and wavelengths are listed in the Specifications section of this manual.

The optical devices used in this equipment are Hazard Level 1M. As required by IEC60825-1, the installer is responsible for insuring that the label depicted below is present in the restricted locations where this equipment is installed.

Hazard Level 1M

The border shall be black and the background shall be yellow



This assembly contains parts sensitive to damage by electrostatic discharge (ESD). Use ESD precautionary procedures when touching, removing, or inserting parts or assemblies.



The DC power input connector serves as a service disconnect for this module. This module is intended for installation in locations that provide suitable access to the DC power input connector.

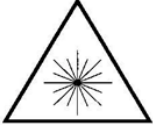


The chassis into which this unit is installed must be housed in a properly rated NEMA enclosure.



When this unit is operated in extremely elevated temperature conditions, it is possible for internal and external metal surfaces to become extremely hot. Care should be taken to insure this unit is installed in a restricted area where only properly trained service personnel have access to the unit.

Debe observarse la información de seguridad contenida en esta sección, y en otras páginas de este manual siempre que se opere, dé servicio o repare esta unidad. Si no se cumple con alguna precaución, advertencia o instrucción indicada en este manual se infringen los estándares de diseño, fabricación y el uso destinado a la unidad. TKH Security Solutions USA no asume ninguna responsabilidad si el cliente no cumple con alguno de estos requisitos de seguridad.



RADIACIÓN LÁSER
NO VER DIRECTAMENTE CON INSTRUMENTOS ÓPTICOS (DE AUMENTO)
PRODUCTO LÁSER CLASE 1M

PRECAUCIÓN:
LOS CONECTORES ÓPTICOS DESCONECTADOS PUEDEN AMITIR ENERGÍA ÓPTICA
NO VER EL HAZ CON INSTRUMENTOS ÓPTICOS (DE AUMENTO)

Este producto contiene rayos láser o diodos emisores de luz Clase 1M.

- Producto láser Clase 1M conforme a la norma IEC60825-1: 1993+A1+A2
- **PRECAUCIÓN: El uso de los controles, ajustes o procedimientos, aparte de los aquí especificados, pueden ocasionar exposición peligrosa a la radiación.**
- Deben tomarse precauciones para evitar la exposición a la radiación óptica cuando se saque la unidad de su alojamiento, o cuando se desconecte la fibra de la unidad
- Puede haber radiación laser en una conexión de fibra a esta unidad aun cuando se haya eliminado la corriente de la unidad.
- Este equipo está destinado a instalarse en lugares donde sólo el personal de servicio debidamente entrenado tenga acceso a las conexiones de fibra.
- Las ubicación de todas las conexiones ópticas se enumeran en la sección Ubicación de los conectores y funciones de este manual.
- Las salidas ópticas y longitudes de onda aparecen en la sección Especificaciones de este manual.

Los dispositivos ópticos usados en este equipo son de Nivel de Riesgo 1M. Según lo exige la norma IEC60825-1, el instalador es responsable de asegurar que la etiqueta descrita a continuación esté presente en las áreas restringidas donde se instale este equipo.



El borde debe ser negro y el fondo debe ser amarillo



Este ensamblaje contiene piezas sensibles al daño por descargas electrostáticas (ESD, por sus siglas en inglés). Use procedimientos para prevenir las descargas electrostáticas al tocar, desmontar o insertar piezas o ensamblajes.



El conector de entrada de energía de CC sirve como desconector de servicio para este módulo. Este modulo está destinado a instalarse en ubicaciones que ofrecen acceso adecuado al conector de entrada de energía de CC.

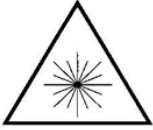


El chasis en el cual está instalada esta unidad debe estar dentro de un alojamiento debidamente calificado por NEMA.



Cuando se opera esta unidad en condiciones de temperatura sumamente elevada, es posible que las superficies internas y externas de metal se pongan extremadamente calientes. Debe tenerse cuidado para asegurar que esta unidad se instale en un área restringida donde sólo tenga acceso a la unidad el personal de servicio debidamente capacitado.

Die in diesem abschnitt und auf anderen seiten dieses Handbuchs enthaltenen Sicherheitsinformationen müssen befolgt werden, wenn diese einheit betrieben, gewartet oder repariert wird. Falls Vorsichtsmassnahmen, Warnungen oder Anweisungen in diesem Handbuch nicht befolgt werden, verstösst dies gegen die Konstruktions, und Herstellungsstandards und erfolgt im gegensatz zum vorgesehenen Verwendungszweck dieser einheit. TKH Security Solutions USA übernimmt keine Haftung für das Verabsäumen des Kunden, diese Sicherheitsanforderungen einzuhalten.



LASER-STRAHLUNG
NICHT DIREKT MIT OPTISCHEN INSTRUMENTEN (LUPEN) ANSEHEN
LASER-PRODUKT DER KLASSE 1M

VORSICHT:
ABGEKLEMMTE OPTISCHE STECKVERBINDER KÖNNEN OPTISCHE ENERGIE FREI SETZEN
NICHT MIT OPTISCHEN INSTRUMENTEN (LUPEN) IN DEN STRAHL BLICKEN.

Dieses Produkt enthält Laser oder LEDs der Klasse 1M.

- Laserprodukt der Klasse 1M gemäß IEC60825-1:1993+a1+A2
- **VORSICHT: Wenn die Bedienungselemente anders als hier beschrieben bzw. andere Einstellungen verwendet werden, kann es zu schädlicher Strahlenaussetzung kommen.**
- Es müssen Vorsichtsmaßnahmen getroffen werden, um Aussetzung an optischer Strahlung zu vermeiden, wenn die Einheit aus dem Gehäuse genommen oder die Faseroptik von der Einheit getrennt wird.
- In einer Faseroptik-Verbindung dieser Einheit kan auch dann Laserstrahlung vorhanden sein, wenn die Stromversorgung zur Einheit abgeschaltet wurde.
- Diese Einheit ist zum Einbau an Orten vorgesehen, an denen nur geschultes Personal Zugang zu den Faseroptik-Verbindungen hat.
- Die Lage aller optischen Verbindungen ist im Abschnitt über die Lage von Anschlüssen und Funktionsweise dieses Handbuchs zu finden.
- Optische Ausgänge und Wellenlängen sind im Abschnitt mit den technischen Daten dieses Handbuchs zu finden.

Die optischen Vorrichtungen in diesem Gerät haben Gefahrenstufe 1M. Wie vorgeschrieben durch IEC60825-1 ist der Installateur dafür verantwortlich, sicherzustellen, dass die unten abgebildeten Schilder an den Orten mit eingeschränktem Zugang, an denen dieses Gerät aufgestellt ist, vorhanden sind.



Diese Baugruppe enthält Teile, die durch elektrostatische Entladungen (ESD) beschädigt werden können. Vorsichtsmaßnahmen zum Schutz vor elektrostatischer Entladung treffen, wenn Teile oder Baugruppen berührt, ausgebaut oder eingefügt werden.



Der Gleichstrom-Eingangssteckverbinder dient als Unterbrechung der Stromversorgung für dieses Modul. Dieses Modul ist für den Einbau an Orten vorgesehen, an denen geeigneter Zugang zu einem Gleichstrom-Steckverbinder vorhanden ist.



Das Gestell, in dem diese Einheit eingebaut ist, muss in einem entsprechend klassifizierten NEMA-Schutzgehäuse untergebracht sein.

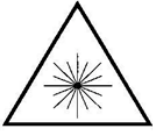


Wenn diese Einheit bei besonders hohen Temperaturen betrieben wird, können interne und externe Metallflächen extrem heiß werden. Es muss darauf geachtet werden, dass diese Einheit in einem Bereich mit eingeschränktem Zugang aufgestellt wird, damit nur geschultes Wartungspersonal Zugang zur Einheit hat.

Consignes de Sécurité

SA-1

Les consignes de sécurité contenues dans cette section et dans le reste de ce manuel doivent être respectées à chaque fois que cet appareil est utilisé ou fait l'objet d'une maintenance ou d'une réparation. Le non-respect d'une précaution, d'un avertissement ou d'une instruction figurant dans ce manuel est une violation des normes de conception, fabrication et indication d'usage de l'appareil. TKH Security Solutions USA n'est pas responsable du non-respect de ces consignes de sécurité par le client.



RAYONNEMENT LASER
NE PAS REGARDER DIRECTEMENT AVEC DES INSTRUMENTS OPTIQUES (LOUPES)
PRODUIT LASER DE CLASSE 1M

ATTENTION:
LES CONNECTEURS OPTIQUES DEBRANCHÉS PEUVENT ÉMETTRE UNE ÉNERGIE OPTIQUE.
NE PAS REGARDER LE FAISCEAU AVEC DES INSTRUMENTS OPTIQUES (LOUPES)

Ce produit contient des lasers ou diodes électroluminescentes de classe 1M.

- Produit laser de classe 1M conformément à IEC60825-1:1993+A1+A2
- **ATTENTION: L'utilisation de commandes ou réglages, ou de procédures différentes de celles indiquées ici risque de provoquer une exposition dangereuse au rayonnement.**
- Prendre des précautions pour empêcher une exposition au rayonnement optique lorsque l'appareil est retiré de son boîtier ou lorsque le câble optique fibre est débranché de l'appareil.
- Un rayonnement laser pourra être présent dans un câble optique branché sur cet appareil, même une fois l'alimentation coupée.
- Cet appareil est prévu pour une installation à des endroits où seul un personnel de maintenance formé a accès aux câbles optiques.
- Les points de branchement de tous les câbles optiques sont indiqués à la section Points de branchement et fonction de ce manuel.
- Les sorties et longueurs d'onde optiques figurant à la section Caractéristiques techniques de ce manuel.

Les appareils optiques utilisés dans cet équipement correspondent à un niveau de danger 1M. Comme exigé par la norme IEC60825-1, il incombe à l'installateur de s'assurer que l'étiquette ci-dessous est présente aux endroits d'accès limité où cet équipement est installé.

Niveau de danger 1M

La bordure doit être noire et le fond jaune



Cet ensemble contient des pièces sensibles aux décharges électrostatiques (ESD). Prendre les précautions relatives aux ESD avant de toucher, retirer ou insérer des pièces ou des ensembles.



Le connecteur d'entrée d'alimentation c.c. sert de sectionneur de maintenance pour ce module. Ce module est prévu pour une installation à des endroits donnant raisonnablement accès au connecteur d'entrée d'alimentation c.c.



Le châssis dans lequel est installé cet appareil doit être placé dans une enceinte NEMA conforme aux spécifications nominales.



Lorsque cet appareil fonctionne à une température ambiante extrêmement élevée, il est possible que les surfaces métalliques internes et externes deviennent extrêmement chaudes. S'assurer que cet appareil est installé dans une zone dont l'accès est limité à un personnel de maintenance correctement formé.

Fiber Information

This unit was manufactured with attention to fiber cleanliness by TKH Security Solutions USA. Beyond the optical safety information contained in this manual, the following guidelines should be observed when working with optical fibers.

The biggest problem is **dirt!**

It takes very little contamination to cause problems with optical fiber connections; cleanliness is extremely important to proper operation of optical equipment.

1. Protect optical connectors by leaving the connector covers in place on unused fiber connections and on the fiber tips themselves.
2. Personnel who remove and replace fibers should be equipped with a fiber cleaning kit. These are inexpensive and can be obtained from any fiber equipment supply house. If you choose to, you can use propanol and lint-free tissue to clean fibers.
 - a. Do not use isopropanol alcohol (typically called rubbing alcohol) mixed with water. This can cause additional spots. (**Caution: *Pure isopropanol is very flammable!***)
 - b. Use lintless tissues to clean fibers.
 - c. Clean the fiber with a folded tissue moistened with the propanol, pulling the connector tip across the tissue, then turn the connector 90 degrees and repeat in a different spot on the tissue.
 - d. Don't pull the fiber across and then push it back. This will put the dirt that was cleaned off back on again.
 - e. Repeat the process on a dry, folded tissue.
3. When removing fibers, ***always*** clean them when replacing them no matter how long you had them off.
4. When connecting fibers, pay attention to the bend radius of the fibers. A general rule is to have a 3-inch (8 cm) bend radius. A bend radius less than 3 inches is an attenuator and can cause optical signal loss.
5. Installers of fiber equipment should be equipped with the equipment manuals and an optical power meter to measure the optical inputs and outputs in a system. An optical power meter is an inexpensive tool that can save much time and effort in getting optical communications links up and running. Properly equipped and trained installers can quickly determine the source of any problems that occur.

Functional Description

The 4132B fiber optic modem provides full duplex, 3-wire RS232 data communications when connected to a compatible TKH Security USA modem located at the far end of a dual fiber cable. Each modem contains a transmitter and a receiver section.

The transmitter section of the modem accepts the RS232 electrical input via the removable screw terminal connector and converts it into an optical signal, which is output from the TX optical connector. The receiver section converts the optical signal received on the RX optical connector back into an RS232 signal that is output on the removable screw terminal connector.

The 4132B is optically compatible with Models 4131, 4131A, 4132, 4132A, 4141, 4141A, 4141B, 4170, 4170A, 4170B, 4185, 4185A, 5641, 9241, 9522, 9525A, 9526, and 9591.

The 4132B can operate optically with other TKH Security USA data transceivers and it is possible to use the 4132B to convert data from one type to another as part of the transport process. For example, the 4185 and 4185A data transceivers support the RS485 and RS422 data types. By using a 4132B on one end of the fiber and a 4185 or 4185A on the other end, a conversion of data type from/to RS232 and RS485/RS422 is automatically made as the data is transported in each direction.

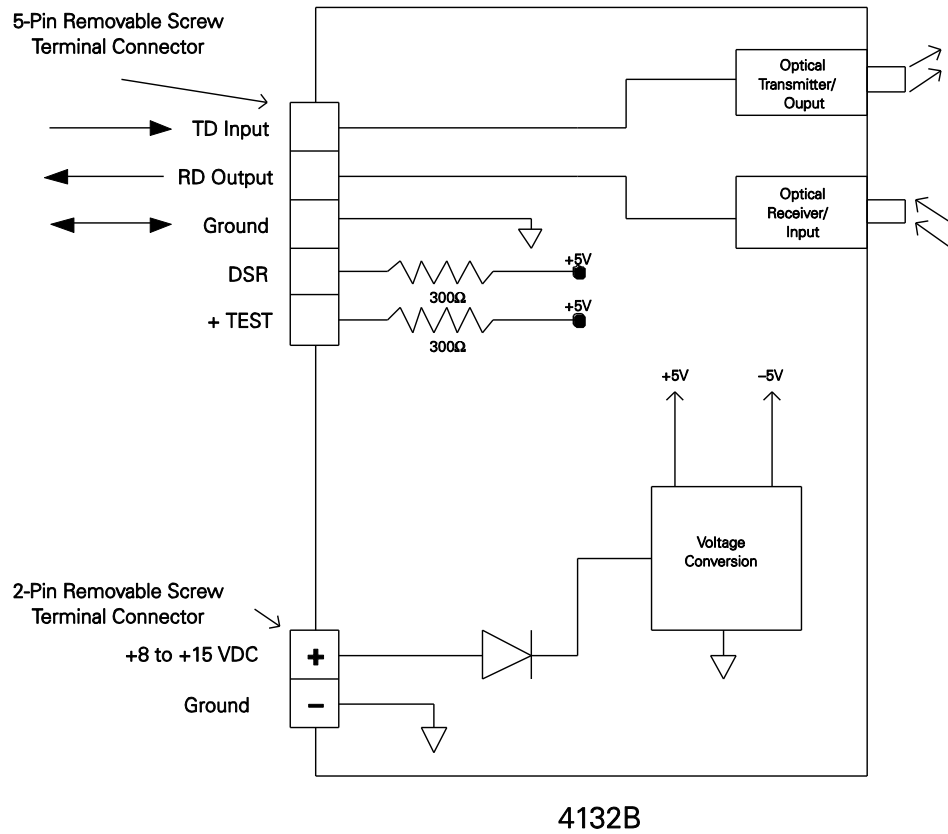
The 4132B is normally operated in duplex mode using two fibers, one fiber for each direction. The transmitter and receiver sections are independent and the unit may be operated in a simplex mode using only one fiber, connecting from the TX to the RX optical connectors. In this case, the covers should be left over the unused optical connectors.

Power requirements for the 4132B are +8 to +15 VDC @ 25 mA (during transmit). TKH Security USA power supply Model 4110B PS is designed to provide the correct power for 110 VAC 60 Hz operation. Consult the factory for power supplies that support other power mains' requirements.

The 4132B differs from the 4132A in the use of a separate 2-pin removable power supply connector and internal improvements in the design.

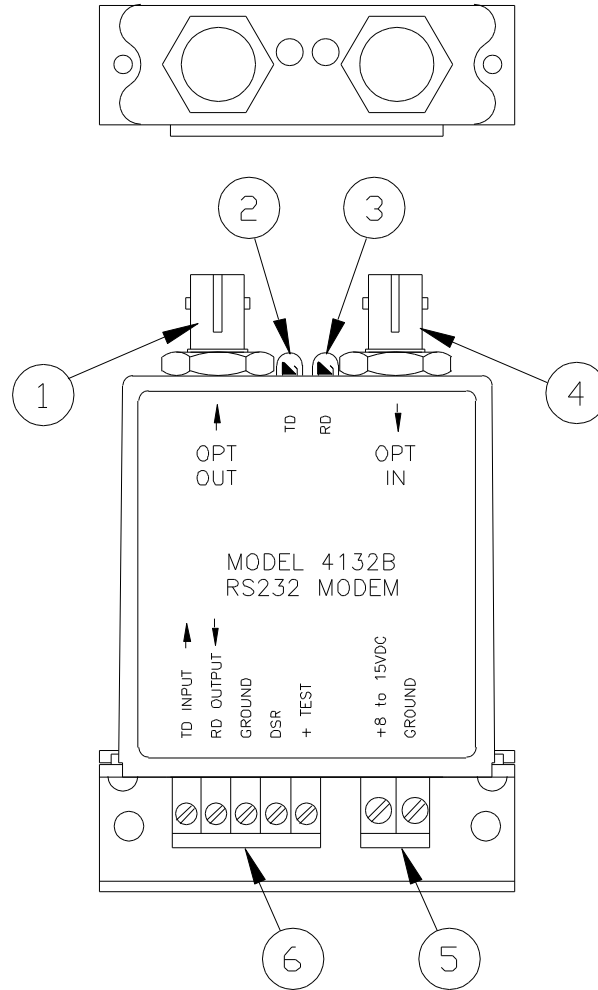
Model Number	Fiber Type/Wavelength
4132B-S-ST	Multimode/850
4132B-L-ST	Multimode/1310
4132B-LD-ST	Singlemode/1310
4132B-LD-FC	Singlemode/1310
4132B-LD3-ST	Singlemode/1550
4132B-LD3-FC	Singlemode/1550

FIGURE 1 — FUNCTIONAL DIAGRAM



4132B Connector and Switch Locations and Functions

FIGURE 2



1. OPTICAL OUTPUT CONNECTOR

The output optical fiber connection for the transmitter section is made here.

2. TD INDICATOR

This **green** LED flashes when data is being transmitted from the 4132B.

3. RD INDICATOR

This **green** LED flashes when data is being received by the 4132B.

4. OPTICAL INPUT CONNECTOR

The Input optical fiber connection for the receiver section is made here.

5. POWER CONNECTOR

The power connections are made via this connector.

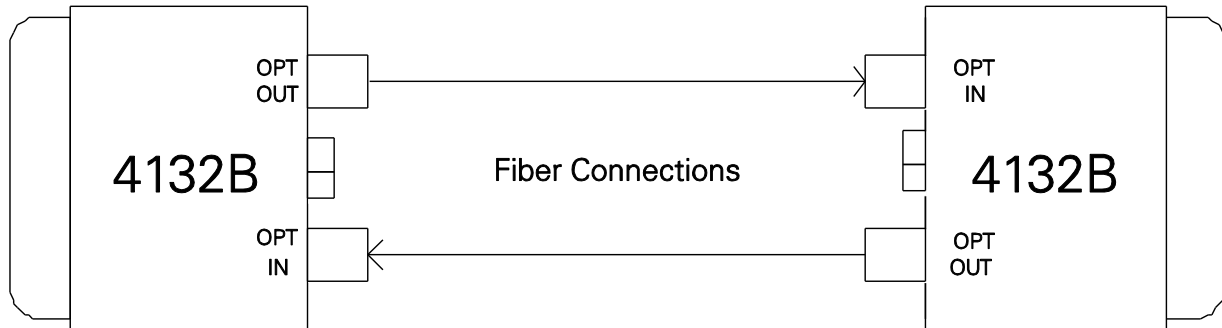
6. DATA CONNECTOR

The data connections are made via this connector. Refer to the Set Up and Operation Section of the manual for signal details.

Set Up and Operation of the 4132B

Set up of the 4132B consists of connecting the unit to a data source, connecting the power, and connecting the fibers from the mating unit.

FIGURE 2 — OPTICAL CONNECTIONS



Electrical signal connections are made via the 5-pin connector. Your system design will determine how your electrical connections are made. Pins 1 and 2 are used for the data. Refer to Table 1 for a description of pins and functions.

TABLE 1 — RS232 ELECTRICAL CONNECTIONS	
5-Pin Connector Label	Notes
TD	Input Signal (DTE)
RD	Output Signal (DTE)
Ground	Signal Common, Power Ground (–), and connected to the metal shell
DSR	Internally pulled High (Space)
TEST	Internally pulled High (Space)

Operation of the 4132B consists of applying power and verifying correct transmission of data. The TD and RD indicators will flicker as data is sent and received.

Troubleshooting 4132B Data Links

If the 4132B link does not operate correctly, follow the steps below to determine the source of the problem.

1. Check the power applied to each unit. This voltage must be between 8 and 15 volts DC for proper operation.
2. Check that the RS232 signal is coming in on the correct pin. The TD INPUT connection is the input to the modem. The incoming voltage should be a 4.5V or greater for the Space state and 0V or below for the Mark state. If the incoming signal does not meet these standards, replace the signal source.
3. To make optical measurements, the output LEDs or lasers must be in the "ON" state (emitting light). The following procedure will walk you through this process.
 - a. Disconnect any existing data connections. If doing this as a bench test, apply power (+8 to +15 volts DC) via the power connector.
 - b. Connect the + TEST connection to the TD INPUT. This will turn on the optical emitter.
 - c. Measure the optical output at the OPT OUT port on the transmitting end. It should be equal to or greater than Optical Output Power as listed in the Specifications section in this manual for the model/type of unit being tested. If the power here is below the specification, check and clean the fiber jumper and retest; if no change, replace the modem and retest.
 - d. Check the loss in the system fiber by reconnecting the system fiber to the OPT OUT port and measuring the optical output on the fiber at the receiving end (the other end of the link). The optical power at that end should not be less than the Optical Sensitivity specification as listed in the Specifications section of this manual for the type of unit being tested. If the received optical power here is too low, check the system fiber for dirty connections or poor optical splices. These cause high link losses.
4. The receiver section can also be tested in a similar manner.
 - a. During the testing of the local unit transmitter, connect a fiber jumper between the OPT OUT and the OPT IN connectors.
 - b. Check the RD OUT connection for an output of at least 5V when the TEST signal is applied. If this voltage is too low, replace the modem and retest.
5. To test the entire optical link, use a loopback test.
 - a. Connect all the system fibers and, at the far end of the link, connect the TD INPUT to the RD OUTPUT (loopback connection).
 - b. On the local modem, the RD OUT connection should have an output of at least 5V when the TEST signal is applied on the local modem. The far end should receive the input, convert it to electrical, and retransmit it back to the local unit. If this voltage is too low, check your fiber connections and optical power readings at both ends. If they appear to be within specifications, replace the modems one at a time and retest.
6. If the units pass these tests but still do not operate correctly in your system, it is most likely that the connections from the host equipment to the modem are incorrect. RS232 input and output signal descriptions and pin connections vary from equipment to equipment. Make sure the output from connected device goes to the modem input TD INPUT and the output from the modem RD OUTPUT goes to an input on the connected device. Recheck the signal names and voltages. Check to make sure that no additional handshaking signals are required for transmission of your data. The 4132B supports only the TD and RD signals on RS232.

Specifications for the 4132B

OPTICAL

Model Type	S	L	LD	LD3
Wavelength	850	1310	1310	1550
Mating RX Type	S	L	LD	LD3
Optical Power Output into 50/125 μm fiber (dBm)	-20	-21	N/A	N/A
Optical Power Output into 62.5/125 μm fiber (dBm)	-16	-17	N/A	N/A
Optical Power Output into 09/125 μm fiber (dBm)	N/A	N/A	-15	-15
Optical RX Input Sensitivity (dB)	-38	-38	-38	-38
Maximum RX Input Power	-14	-14	-14	-14
Link Budget (50/125 μm)	18	17	N/A	N/A
Link Budget (62.5/125 μm)	22	21	N/A	N/A
Link Budget (09/125 μm)	N/A	N/A	23	23
Estimated Distance (Km) (50/125 μm fiber) ¹	5	14	N/A	N/A
Estimated Distance (Km) (62.5/125 μm fiber) ¹	6.3	18	N/A	N/A
Estimated Distance (Km) (09/125 μm fiber) ¹	N/A	N/A	57	80

¹Distance specifications based on fiber losses of 3.0 dB/Km @ 850 nm on 62.5/125 fiber, 1.0 dB/Km @ 1310 nm on 62.5/125 fiber, 0.35 dB/Km @ 1310 nm on 09/125 fiber, and 0.25 dB/Km @ 1550 nm on 09/125 fiber. Actual distances will vary with the fiber type and quality.

ELECTRICAL

Signal Format	RS232
Input Impedance	3 K ohm
Signal Connector Type	Removable 5-pin screw terminal
Data Rate	DC to 64 Kbps
Pulse Width Distortion (Max.)	± 2.3 usec. (15% @ 64 Kbps)
Power Requirements	Minimum 8.0 VDC @ 25 mA (during transmit) Recommended +8 to +15 VDC @ 25mA
Recommended Power Source	Model 4110B PS (for 100-130 VAC 60 Hz operation only); consult Factory for supplies compatible with other main voltages
Power Connector Type	Removable 2-pin screw terminal

MECHANICAL AND ENVIRONMENTAL

Physical Dimensions

0.7 H x 2.1 W x 3.15 L (in inches)
 1.8 H x 5.3 W x 8.0 L (in centimeters)

Weight

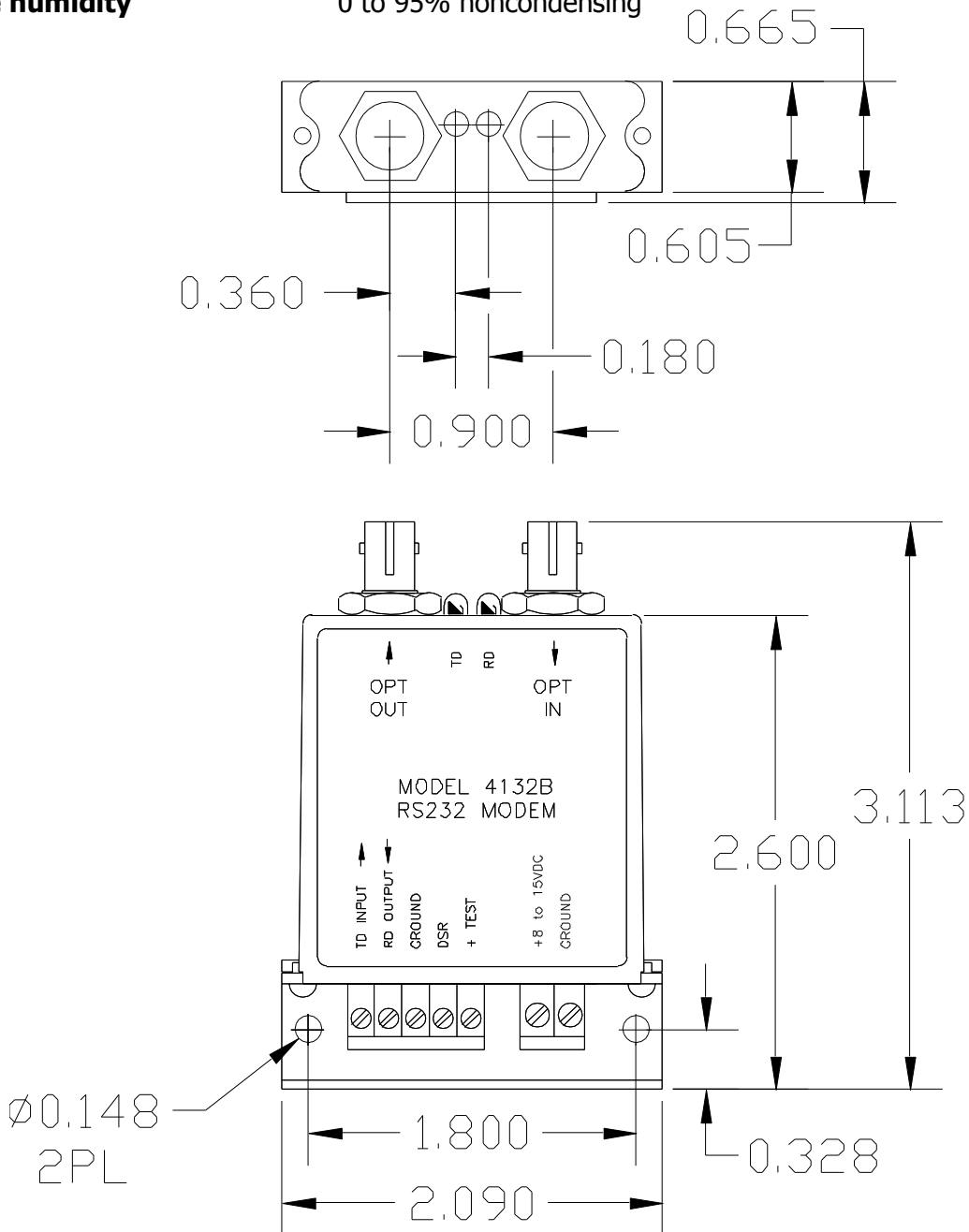
4 ounces
 0.11 kilograms

Temperature

Operating temperature -40° C to +74° C
Storage Temperature -55° C to +85° C

Relative humidity

0 to 95% noncondensing



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