



Optelecom 9000 Series Installation and Operation Manual

Model 9281DT Model 9281DT-EX Model 9281DR

Rack-Mount Single Channel Digital Video with
“Up-the-Coax” Control Data Transmitters and
Receivers.

9281D cards transport one simplex video signal
with reverse direction “up-the-coax” control
data over one optical fiber.

***See important notice about the application of
this manual on page 9.***

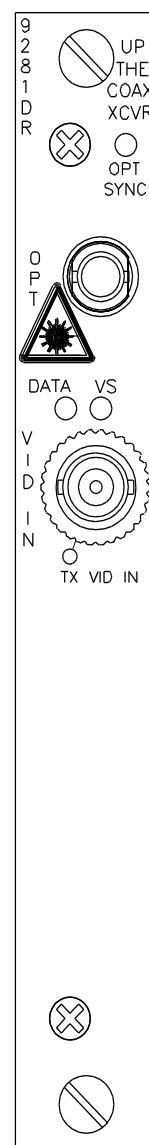
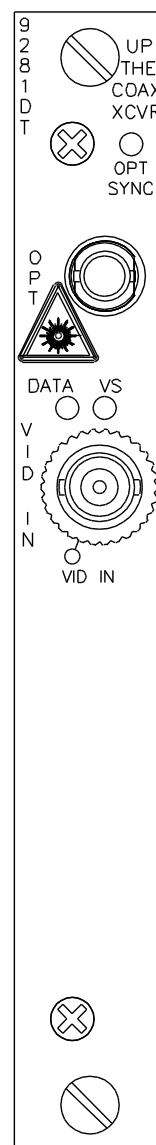


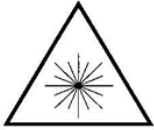
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Safety Instructions

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

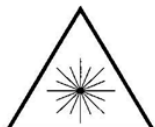


When this unit is operated in extremely elevated temperature conditions, it is possible for internal and external metal surfaces to become extremely hot. Care should be taken to insure this unit is installed in a restricted area where only properly trained service personnel have access to the unit.

Instrucciones de Seguridad

RM-1

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 láser 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.
- La 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.

Nivel de Riesgo 1M

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.

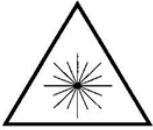


El chasis en el cual está instalada esta unidad debe estar dentro de un alojamiento debidamente calificado por NEMA.



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 kann 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.

Gefahrenstufe 1M

Schwarzer Rand und
gelber Hintergrund



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.



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

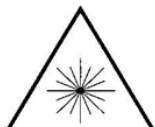


Wenn diese Einheit bei besonders hohen Temperaturen betrieben wird, können interne und externe Metallflächen extrem heiß werden. Es muss darauf geachtet werden, dass diese Einheit in einem Bereich mit eingeschränktem Zugang aufgestellt wird, damit nur geschultes Wartungspersonal Zugang zur Einheit hat.

Consignes de Sécurité

RM-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 DEBRANCHES PEUVENT EMETTRE UNE ENERGIE 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 la 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 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 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.

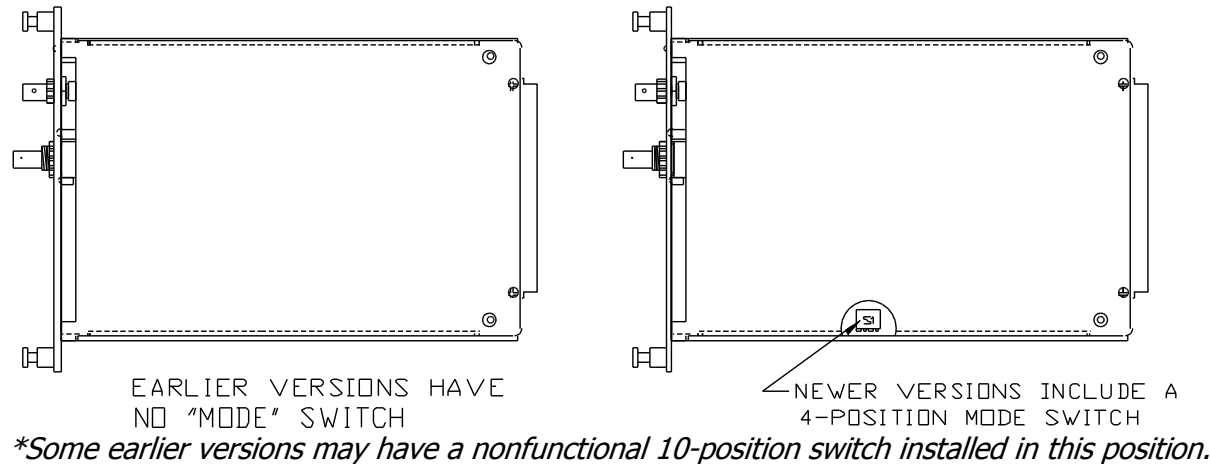
1. Protect optical connectors by leaving the connector covers in place on unused fiber connections and on the fiber tips themselves.
2. Personnel who remove and replace fibers should be equipped with a fiber cleaning kit. These are inexpensive and can be obtained from any fiber equipment supply house. 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.

External Wiring Information

Cable assemblies with lengths external to the unit not exceeding 3.05 meters, coiled or uncoiled, may be constructed of jacketed appliance wiring material suitable for the maximum voltage current and temperature, rated VW-1 or FT-1 or better. Cable assemblies with lengths external to the unit not exceeding 3.05 meters, coiled or uncoiled, and supplied by a limited power source or NEC Class 2 source of supply as defined in the National Electric Code, ANSI/NFPA 70, may be constructed of materials rated VW-1 or FT-1 or better with no additional requirements.

Important Notice Regarding New Enhancements to These Products

This manual includes complete set up and operation instructions for Models 9281DT, 9281DT-EX, and 9281DR, which have been enhanced by the addition of a 4-position "MODE" dipswitch on the rear panels. With the addition of this dipswitch comes additional flexibility, affording compatibility with a wider range of "up the coax" camera systems. This manual applies to the older units as well, as noted in the text where appropriate. All pictures beyond this page reference the newer revision units with the "MODE" dipswitch. To identify whether or not your units include these enhancements, examine the rear video I/O panels as shown here:



Functional Description

The 9281DT and 9281DT-EX transmitters have two sections: a video transmitter section and a data receiver section. The transmitter section accepts one composite video signal in NTSC or PAL format via the BNC video input port. This baseband video signal is sampled at a 16 Mhz rate by an A-to-D converter operating with nine bits of precision. The resulting digital signal is serialized and converted to an optical signal for transmission over the fiber. The receiver "up-the-coax" video sync and PTZ control signals arrive via an optical receiver that was transmitted at a second wavelength on the same fiber. The received optical signal is converted back into a serial bit stream and demultiplexed to recover the signals. These sync and control signals are then inserted onto the video input BNC. The 9281DT-EX also includes a data buffer that stores the PTZ control data when received and reinserts it onto the proper horizontal retrace line in the next video field, eliminating the link distance limitations due to the "round trip" data delay inherent in non-buffered systems.

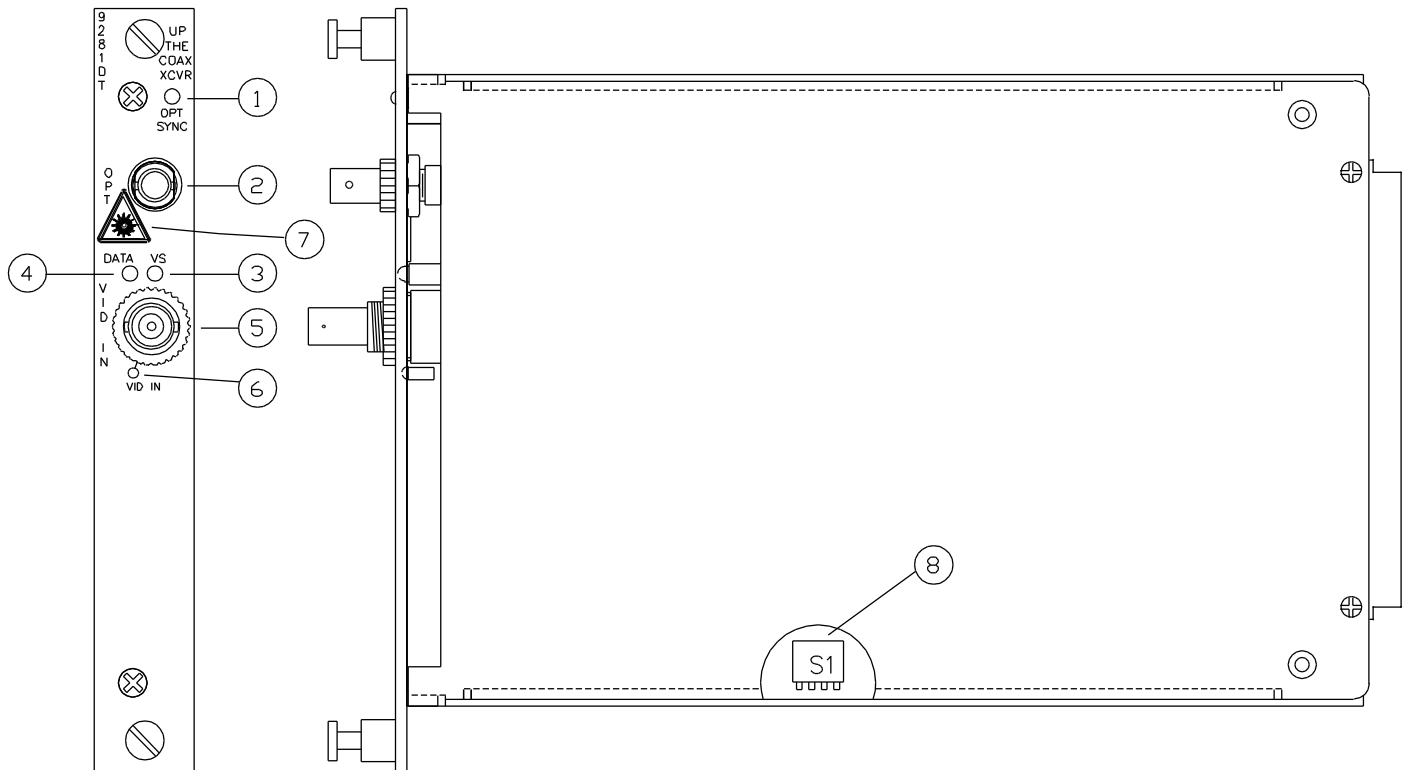
The 9281DR receiver converts the optical signal from the transmitter into a serial bit stream and processes it with a D-to-A converter to recreate the video signal, which is output on the BNC connector. The receiver also detects the video sync and "up-the-coax" control signals and converts them into data signals that are multiplexed and transmitted optically to the transmitter on a different wavelength on the same fiber.

These units, which include the 4-position MODE dipswitch, are compatible with many manufacturers' versions of "up-the-coax" protocols, including Panasonic, Pelco, TOA, and others.

All 9281D cards are optically compatible with the mating 9285D stand-alone.

9281DT and 9281DT-EX Indicator, Connector and Switch Locations, Functions, and Settings

FIGURE 1

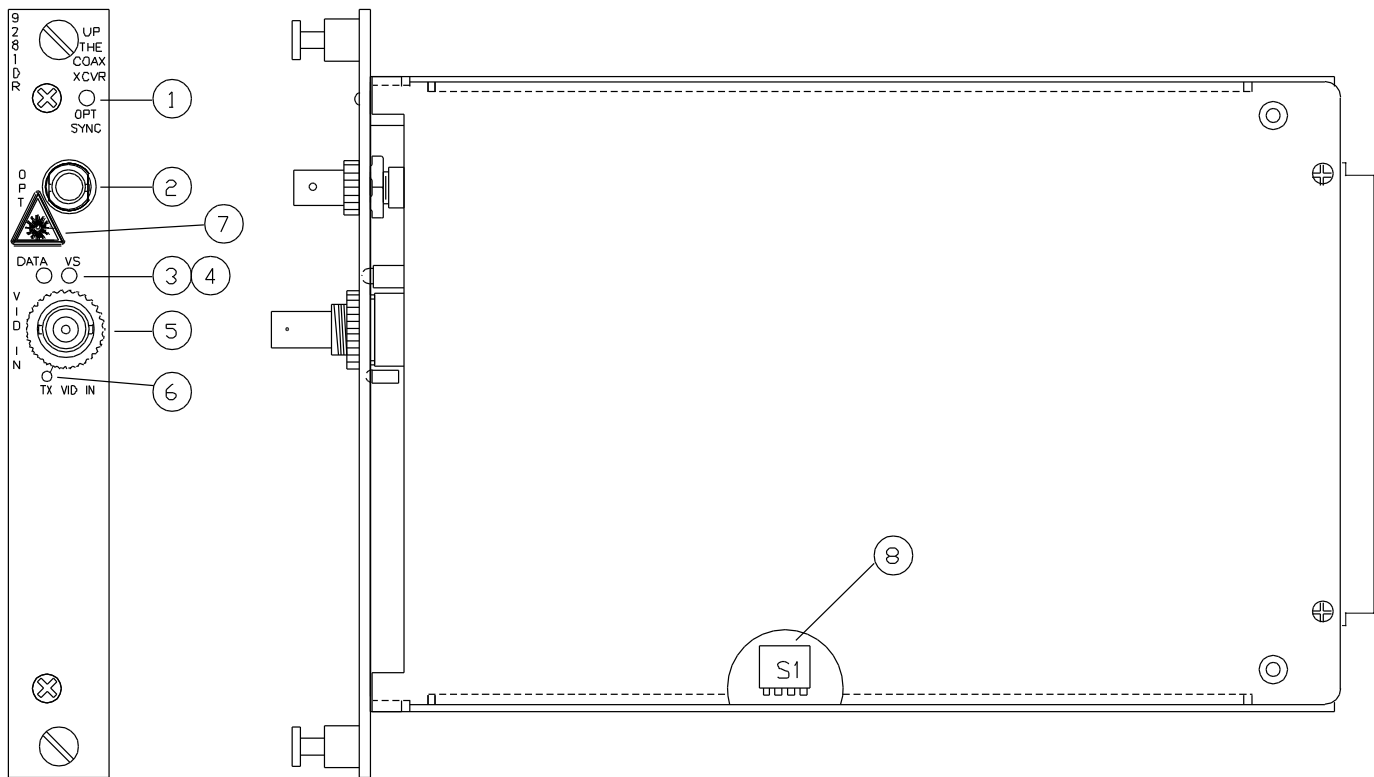


1. **SYNC INDICATOR:** This three-color LED illuminates either red, green, or yellow depending on the status of the link with the receiver.
 - When illuminated **green**, it indicates that both local (receiver) and remote (transmitter) units are communicating correctly.
 - When illuminated **red**, it indicates that there is insufficient optical input signal or that the local unit is not able to decode the signal from the transmitter end.
 - When illuminated **yellow**, it indicates that the local (receiver) unit is receiving and decoding the optical signal from the remote (transmitter) end, but that the transmitter end is reporting that it is not able to synchronize to the optical signal from the local (receiver) end correctly.
2. **OPTICAL CONNECTOR:** The optical fiber connection is made here.
3. **DATA:** This **green** indicator flashes as data is transmitted on the data channel.
4. **VS:** This **green** indicator is illuminated when the presence of the VS camera sync signal is present. This is a Panasonic-specific function and will not illuminate with other protocols. (Some transitional models may say "VD2.")
5. **VIDEO OUTPUT CONNECTOR:** The video output signal cable is connected to this BNC connector.
6. **VIDEO PRESENT INDICATOR:** This **green** LED illuminates when there is a video input signal present at the video input BNC connector.

7. **IEC LASER WARNING LABEL:** Refer to the Safety Instructions at the beginning of this manual.
8. **MODE DIPSWITCH:** This four-position switch allows the user to configure the transmitter for operation with several types of "up-the-coax" systems, including those utilizing video sync plus data (different pulse amplitude), sync plus data (same pulse amplitude), and data only. Refer to the "Installation, Set Up, and Operation" section. Earlier models did not have this mode switch. When using a later model that includes this switch along with an older mating unit, insure that this switch is set in the appropriate default (Panasonic Proteus) positions. See pages 14-15. Switch position #4 is nonfunctional.

9281DR Indicator, Connector, and Switch Locations, Functions, and Settings

FIGURE 2



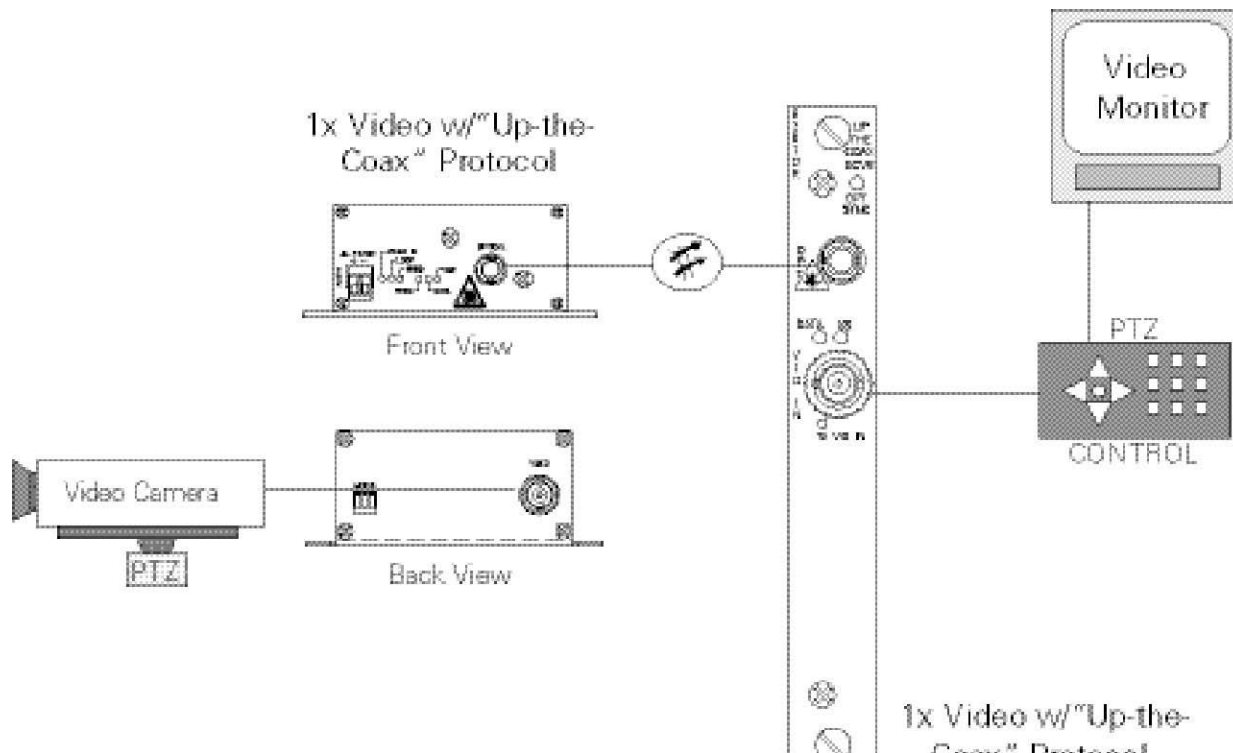
1. **SYNC INDICATOR:** This three-color LED illuminates either red, green, or yellow depending on the status of the link with the receiver.
 - When illuminated **green**, it indicates that both local (receiver) and remote (transmitter) units are communicating correctly.
 - When illuminated **red**, it indicates that there is insufficient optical input signal or that the local unit is not able to decode the signal from the transmitter end.
 - When illuminated **yellow**, it indicates that the local (receiver) unit is receiving and decoding the optical signal from the remote (transmitter) end, but that the transmitter end is reporting that it is not able to synchronize to the optical signal from the local (receiver) end correctly.
2. **OPTICAL CONNECTOR:** The optical fiber connection is made here.
3. **DATA:** This **green** indicator flashes as data is transmitted on the data channel.
4. **VS:** This **green** indicator is illuminated when the presence of the VS camera sync signal is present. This is a Panasonic-specific function and will not illuminate with other protocols. (Some transitional models may say "VD2.")
5. **VIDEO OUTPUT CONNECTOR:** The video output signal cable is connected to this BNC connector.
6. **VIDEO PRESENT INDICATOR:** This **green** LED illuminates when there is a video input signal present on the remote (transmitter) end video input BNC connector.

7. **IEC LASER WARNING LABEL:** Refer to the Safety Instructions at the beginning of this manual.
8. **MODE DIPSWITCH:** This four-position switch allows the user to configure the transmitter for operation with several types of "up-the-coax" systems, including those utilizing video sync plus data (different pulse amplitude), sync plus data (same pulse amplitude), and data only. Refer to the "Installation, Set Up, and Operation" section. Earlier models did not have this mode switch. When using a later model that includes this switch along with an older mating unit, insure that this switch is set in the appropriate default (Panasonic Proteus) positions. See page 14-15. Switch position #4 is nonfunctional.

Installation, Set Up and Operation of the 9281D

Set up consists of installing the card in the chassis and connecting the fiber and video connections. Set the MODE dipswitch per the section below.

Typical Application of the 9281D



Mode Dipswitch Set Up

UP-THE-COAX SYSTEM PROTOCOL DEFINITIONS

- **Panasonic Proteus and similar systems transmit a Video Sync and PTZ Data at two different signal amplitudes.** With this system protocol, a Video Sync Pulse (used to synchronize all camera outputs controlled from a central controller with a single sync source) and PTZ Data are both transmitted up the coax, however, the amplitude of the video sync pulse amplitude is much larger than that of the data. With this system the sync and data pulses are detected separately based on their amplitude. The signals are then sent over the fiber, and output at the camera end with similarly different pulse amplitudes. With this system, the sync pulse can easily be disabled with no consequence to the fiber transmission (i.e., transparency is maintained). In the case of Panasonic Proteus systems, the video sync is referred to as "VD2".

- **TOA (Japan) and similar systems transmit a Video Sync and PTZ Data at the same signal pulse amplitude.** With this system protocol, the Video Sync (used to synchronize all camera outputs controlled from a central controller with a single sync source) and PTZ Data are transmitted up the coax at the same amplitude, so they cannot be detected separately based on their amplitude. Therefore, they are detected and discriminated based on timing considerations. In the case of the extended distance "-EX" transmitters, the sync and data pulses must be separated because only the PTZ data is buffered for application to the next video frame, while the sync pulses are output to the camera immediately when received over the fiber. For this reason, if the video sync pulse is disabled the mode must be set to PTZ Data Only (as used by Pelco).
- **Pelco and similar systems transmit PTZ Data Only, and do not include a video sync reference transmission capability.**
- **For other "up-the-coax" systems, choose from the above three types that describes the operation of that system and set the MODE dipswitch accordingly.**

EXTENDED DISTANCE EX TRANSMITTER MODELS

Up-the-Coax systems are inherently distance-limited by the time it takes for the data to travel up the coax or the fiber to the camera or fiber transmitter. If that time is too long, the data will arrive after the end of the horizontal blanking interval in which it was first transmitted, causing the data to "fall" into the next horizontal sync pulse, making it undetectable. This usually limits the distance to about 5000 feet or 1.5 km. Model 9281DT Transmitters with the "-EX" suffix are equipped with a data buffer board that stores the PTZ data as it is received via the fiber from the receiver unit and applies it to the video input from the camera in the next video field rather than exactly as received. This eliminates the distance limitation due to this issue. The buffer function can be disabled or enabled by setting the dipswitch as desired. However, for standard non-buffered models (9281DT), the switches must be set with EX disabled or the unit will not function.

Set the Modes Switches on the Transmitter and Receiver per the following chart. NOTE: Switch position #34 is not functional.

Mode	Dipswitch #		
	1	2	3
Panasonic Proteus ¹ or similar ² , standard distance	UP	UP	UP
Panasonic Proteus ¹ or similar ² , extended distance (EX) ³	UP	UP	DN
Not Assigned	UP	DN	UP
Not Assigned	UP	DN	DN
Pelco or similar ² , standard distance	DN	UP	UP
Pelco or similar ² , extended distance (EX) ³	DN	UP	DN
TOA or similar ² , standard distance	DN	DN	UP
TOA or similar ² , extended distance (EX) ³	DN	DN	DN

¹Use only the Panasonic Proteus settings on units that are installed (mated) with earlier models that are not equipped with a Mode Dipswitch. Other settings are invalid.

²See Mode Dipswitch Set Up Definitions to help identify "up-the-coax" systems that operate similarly.

³Valid only on -EX model transmitters and on receivers used with -EX model transmitters. Select these models only when using an "-EX" transmitter.

Operation of the 9281D with the Network Management System

Operation of the 9281DT with the Network Management System consists of the following parameters:

1. Card location
2. Card Size (Number of Slots)
3. Card Name (Model Number)
4. Serial Number
5. Revision Number
6. Chronometer Value (Cumulative Hours of Operation)
7. Reset Cycles (Cumulative Number of Power Cycles)
8. Firmware Revision
9. Demux in Sync/Not in Sync
10. Remote Demux in Sync/Not in Sync
11. Video Input Present/Not Present (9281DR only)
12. Video Input at Transmitter Present/Not Present
13. VS Vertical Sync Lock Signal Present/Not Present
14. Received Optical Power (in dB)
15. Laser Drive Current (in milliamps)
16. Optical Power Output (Low, Normal, High)
17. Card Temperature

NMS users should set the Alarm Status and Alarm Limits for each parameter as required for the specific application when the NMS software is operated for the first time.

When the 9281D card is installed into an existing system already utilizing NMS system software, an upgrade of the software will be necessary to add the 9281D card to the software database in the NMS software. Consult the factory for guidance on how to download the latest version of the software from the TKH Security USA FTP download site.

Specifications for the Model 9281D

OPTICAL

Model Pair Type	MMH	MMH/EX	SM	SM/EX
Fiber Size	50/125	50/125	09/125	09/125
Txmtr Opt Out Power (dBm)	-7	-7	-7	-7
Txmtr Opt Out Wavelength (nm)	1310	1310	1310	1310
Txmtr Opt Inp Sens (dBm)	-30	-30	-32	-32
Max Txmtr Opt Input (dBm)	-5	-5	-5	-5
Rcvr Opt Out Power (dBm)	-7	-7	-7	-7
Rcvr Opt Out Wavelength (nm)	1550	1550	1550	1550
Rcvr Opt Inp Sens (dBm)	-30	-30	-32	-32
Max Rcvr Opt Input (dBm)	-5	-5	-5	-5
Txmtr Opt Bgt (dB) (Tx Out-Rx Sens)	23	23	25	25
Rcvr Opt Bgt (dB) (Rx Out-Tx Sens)	23	23	25	25
Estimated Distance (Km) 50 m	1.5 ₂	19 (5 ₃)	N/A	N/A
Estimated Distance (Km) 62.5 m	1.5 ₂	19 (5 ₃)	N/A	N/A
Estimated Distance (Km) 09 m	N/A	N/A	1.5 ₂	62 ₁ (5 ₃)

¹Range estimates is based on fiber losses of 0.35 dB/km @ 1310 nm on 09/125 fiber and include a 3 dB safety factor.

²R This distance is approximate and will vary depending on the "up-the-coax" equipment used.

³5 Km for TOA camera systems, due to other timing constraints.

Optical Bit Rate over Fiber

192 Mbps

VIDEO

Video Sampling Rate/Resolution

16 Mhz, 9-bit

Video Input/Output Signal

NTSC or PAL, 1V p-p, 75Ω

Video Input/Output Connector

BNC

Video Bandwidth

2 Hz to 6.5 Mhz, -3.0 dB

SNR

≥63 dB

Differential Phase

≤1° typical, 1.3° maximum

Differential Gain

≤1% typical, 2% maximum

POWER

Requirements

Voltage	6VDC supplied from chassis
Current	
9281DT	360 mA @ 6VDC (supplied by chassis)
9281DT-EX	420 mA @ 5VDC (supplied by chassis)
9281DR	340 mA @ 6VDC (supplied by chassis)

PHYSICAL

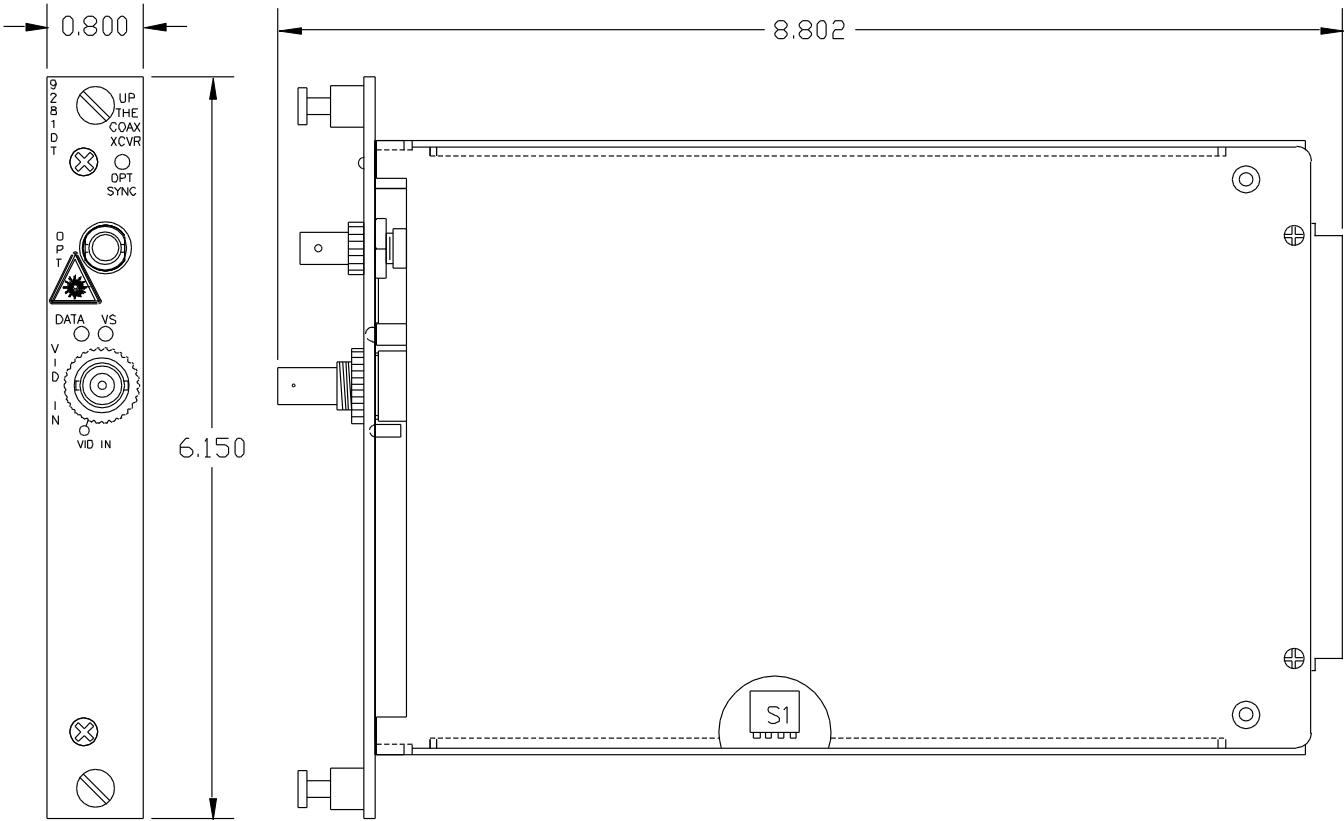
Dimensions (in inches)	6.1 H x 0.8 W x 8.6 D
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ENVIRONMENTAL

Operating Temperature	-40° C to +74° C
Storage Temperature	-55° C to +85° C
Relative Humidity	0 to 95% noncondensing

For installation in outdoor or hazardous locations, the chassis into which this unit is installed should be housed in a properly rated NEMA enclosure.

MECHANICAL



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