

TETRA 42x0

Four Channel Digital Video Multiplexer with Two-Way Data

USER MANUAL

1. General description

TETRA 42x0 (4210 for multimode, and 4250 for single-mode) digital-optical multiplexer/demultiplexer systems can transmit signals through four unidirectional, independent composite video channels and one bi-directional data channel using one optical fiber per system. Video and data/audio input signals are sampled and digitised with 10-bit accuracy.

TETRA 42x0 TX unit receives input via the four BNC connectors. It then converts and combines the four channels of composite video with the data channel into one digital data stream. This, in turn, is converted into an optical signal, with a wavelength of 1310 nm. The TETRA 42x0 TX also converts and decodes an incoming 1550 nm digital optical signal from the mating RX unit that includes the data in the opposite (return) direction.

The TETRA 42x0 RX receives, converts and decodes the video and data signals arriving through the optical fiber via a 1310 nm optical carrier. It also converts and serializes the incoming data signal and transmits this information optically in the opposite direction towards the complementary TX, using an optical wavelength of 1550 nm.

The composite video channels are digitally clamped after being AC coupled at the inputs. The digital clamp is compatible with NTSC and PAL sync timing. The video channels are not compatible with non-video (NTSC and PAL) signals.

The data channel I/O compatibility (RS-232, RS-422, RS-485-4W, and RS-485-2W) and termination configuration is selectable via an on board 10 position dip-switch. *See Data Configuration.*

Front panel status LEDs indicate DC power OK, video signal presence, local and remote link synchronisation.

TETRA 42x0 units are single-width (7TE) Eurocard-sized modules and should be used in combination with MC 11 or similar power supply cabinets.

Stand-alone models (/SA option, see supplementary /SA-2 manual) need separate 12 Vdc power supplies. A TKH Security PSA 12 DC-25 would be suitable.

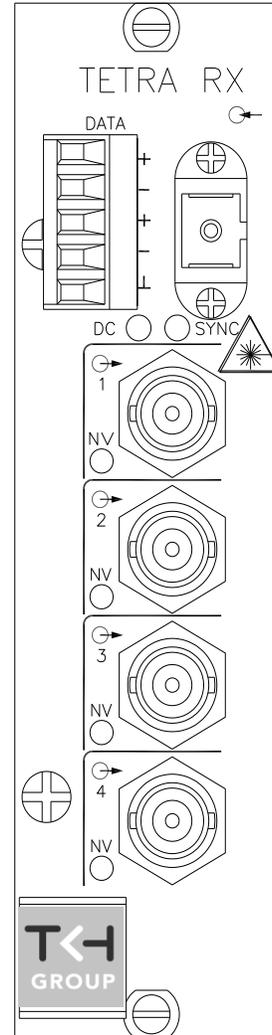


Figure 1. Tetra 42x0 RX Front Panel. TX panels look similar, with video inputs instead of outputs. See Table 1.

2. Indications and connectors

Table 1 lists the front panel features of TETRA 42x0 modules (refer to figure 1). Connector pin assignments are detailed in section 4.

TETRA 42x0 TX		
	(SC/UPC connector)	Optical video/data out, optical data in
	(BNC connector) 1-8	Composite video in
TETRA 42x0 RX		
	(SC/UPC connector)	Optical video/data in, optical data out
	(BNC connector) 1-8	Composite video out
TETRA 42x0 TX and RX		
	(2x)	Front panel screws
Status indicator LEDs		
SYNC	(red)	No sync from optical in or no internal sync
	(orange)	No sync from remote optical in
	(green)	All sync OK
DC	(green)	DC power OK
NV	(red)	TX: no video in RX: no video out

Table 1. TETRA 42x0 front panel features

3. Configuration

To access the internal Data Type Select, Line Bias, and Termination Dipswitch, remove the two screws on the front panel as indicated in figure 3, and slide out the circuit card assembly.

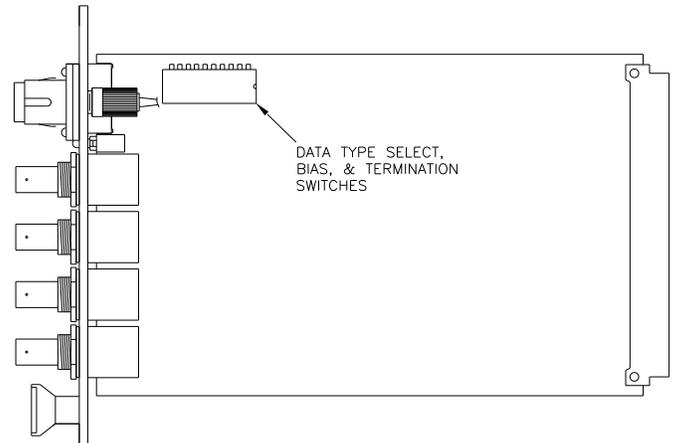


Figure 2: Location of Data Type Select, Line Bias, and Termination Dipswitch

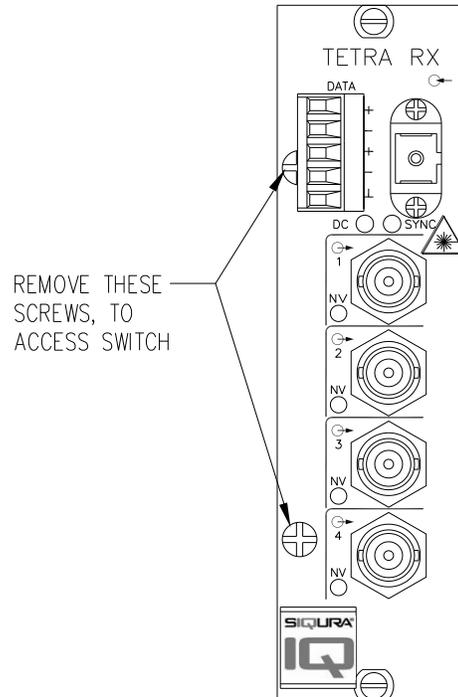


Figure 3. Access to internal configuration dipswitch

Data Type Select, Line Bias, and Termination Dipswitch Settings:

Data Interface Compatibility Selection: Set switch positions 1 through 5 of the *Data Type Select, Line Bias, and Termination Dipswitch* to determine whether the data port operates in RS-232, RS-422, RS-485 4W, or RS-485 2W compatibility mode. Refer to Table 2.

	1	2	3	4	5
RS-232	OFF	OFF	ON	OFF	OFF
RS-422	ON	OFF	OFF	ON	ON
RS-485 4W	OFF	ON	OFF	ON	ON
RS-485 2W	ON	ON	OFF	ON	ON

Table 2. Selecting the Data Port Interface Compatibility

Note: The Factory Default Setting is RS-485 4W Up is OFF, and Down is ON.

RS-422, RS-485 2W, and RS-485 4W Manchester Line Bias and, Termination: In addition to selecting the data interface compatibility above, set positions 6 through 10 to satisfy the proper line bias and termination conditions to insure proper operation. Refer to table 3.

	6	7	8	9	10
RS232	OFF	OFF	OFF	OFF	OFF
RS422	ON	BR	BR	OFF	OFF
RS485-4W	T	BR	BR	BD	BD
RS485-2W	T	BR	BR	OFF	OFF

Table 3. Data I/O Configuration, Termination, and Biasing for the Data Port. See text for the definition of “T”, “BR”, and “BD”.

Note: The Factory Default Setting is All switches ON (RS485 4W, Terminated and Biased) Up in Off ,and Down is On

RS-485 Termination (T): When switch position #6 is OFF, the RS-485 input is unterminated. When it is the ON position, the differential input is terminated with 120 ohms resistance.

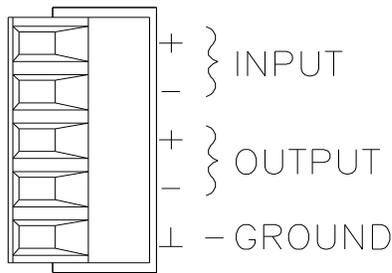
For RS-485 installations, there might be a number of RS-485 devices anywhere from 2 to 32 attached to the differential bus. Normally, the devices at the two extremes of the bus are terminated (switch #6 ON), while intermediate devices are not (switch #6 OFF).

RS-485 2W and 4W Line Receiver Input Bias (BR): Switch positions 7 and 8, when ON, connect 390 ohm bias resistors on the (+) and (-) inputs. The (+) input is biased towards (+V) and the(-) input is biased towards

(-V / GND). This bias ensures that the input line receiver interprets the state of the differential bus as a logical “zero” while all the drivers attached to the differential bus are in a Hi-Z state. There must be at least one device on the differential bus with the Line Receiver Input Bias (BR) enabled (Switch #s 7 and 8 ON). Typically, BR is enabled along with the termination at one end (only) of the bus. However, if other devices occupy the end positions on the bus, and are terminated, it needs to be ensured that there is adequate bias on the bus for proper operation. Sometimes other devices provide bias. If not, enable BR on one of the TETRA 42x0 units on the bus. To determine if adequate bias is present, while there is no data activity on the bus (disable the master unit if required) attach the (+) lead of a VOM to the (+) lead of the bus and connect the (-) lead to the (-) lead of the bus and take a voltage measurement. For optimum operation, the reading should be at least +200 mV. If it is less, and there are operation problems, enable BR by setting switches 7 and 8 in the ON position on one TETRA 42x0 connected to the bus.

RS-485 4W Line Driver Output Bias (BD): Switch positions 9 and 10, when ON, connect 390 ohm bias resistors on the (+) and (-) outputs. The (+) output is biased towards (+V) and the (-) output is biased towards (-V / GND). This bias ensures that the input line receivers in other RS-485 4W devices connected to the bus interpret voltage level on the bus as a logical “zero” while the TETRA 42x0 RS-485 4W output is in the Hi-Z state. Sometimes other devices provide this bias. If not, enable BD on one of the TETRA 42x0 units on the bus by setting switches 9 and 10 in the ON position. To determine if adequate bias is present, while there is no data activity on the bus (disable the master unit if required), attach the (+) lead of a VOM to the “A” lead of the bus and connect the (-) lead to the “B” lead of the bus and take a voltage measurement. For optimum operation, the reading should be at least +200 mV. If it is less, and there are operation problems, enable BD by setting switches 9 and 10 in the ON position on one TETRA 42x0 connected to the bus.

4. Data Port Connector Pin Assignments



Terminal ID	RS232	RS422	RS485-4W	RS485-2W
INPUT +	IN	IN (+)	IN (+)	IN (+)
INPUT -	NC	IN (-)	IN (-)	IN (-)
OUTPUT +	OUT	OUT (+)	OUT (+)	OUT (+)
OUTPUT -	NC	OUT (-)	OUT (-)	OUT (-)
GROUND	COM	GROUND	GROUND	GROUND

Table 4. Pin assignments for the Data I/O port (five position pluggable screw terminal)

5. Installation

1. Plug the modules into the appropriate power supply cabinet (or hook up the /SA-2 models to corresponding power supplies) and connect suitable video and optical fiber equipment using appropriate cabling.

CLEAN THE OPTICAL FIBER CONNECTORS PRIOR TO INSERTION INTO THE OPTICAL PORT. For long electrical data links, twisted pair wiring should be used. Through-connecting the signal ground lines is recommended; equipment and cabling should be installed and earthed such that protection is provided against lightning and similar influences.

2. Upon powering up, the green DC LEDs and SYNC LEDs should glow green, indicating link integrity. If a SYNC LED shines red on either unit, there is no incoming link synchronisation at that unit. If SYNC problems occur after powering up, first check the received optical power arriving at the unit with the red SYNC LED using an optical power meter.

3. With the optical link in good order, connecting a video signal should make the corresponding channel's TX and RX NV (no video) LEDs go out. An RX NV LED still lit would indicate that no decodable video signal is arriving through the associated channel.

6. Technical specifications

In the following Optical Specifications section:

- a) 4210 refers to an TETRA 4210 TX and TETRA 4210 RX pair for multimode operation
- b) 4250 refers to an TETRA 4250 TX and TETRA 4250 RX pair for single-mode operation

Optical	4210	4250	Unit
TX Output Wavelength	1310	1310	nm
RX Output Wavelength	1550	1550	Nm
No. of fibers, fiber type	1, MM	1, SM	
TX Output Power	>-4	>-4	dBm
RX Min. Input Power	-22	-28	dBm
TX to RX Link Budget	18	24	dB
Rx Output Power	-7	-7	dBm
TX Min. input power	-22	-25	dBm
RX to TX Link Budget	23	27	dB
Link Length, Max	4*	52	km

*Range may be limited by fiber bandwidth.

Table 5. TETRA 42x0 TX/RX Optical Specifications

The technical specifications of the TETRA 42x0 system are listed in table 6 below.

TETRA 42x0	4210	4210
Video		
No. of channels	4	
Video format	PAL/NTSC	
Input/Output level	1, nominal	Vpp
DC restore(clamping)	Yes	
Bandwidth (-3 dB)	6	MHz
Sampling res @ freq.	10 bit @ 56 MHz	
Differential gain	<2	%
Differential phase	<1	°
Group delay	<20	ns
SNR	>63 (wtd.)	dB
Data		
Number of channels	1, full duplex	
Data format	Asynchronous, serial	
Data interfaces	RS-232, RS-422, RS485 (2W or 4W)	
Data rate	DC to 256 kbit/s (RS-422/RS-485) DC to 115,2 kbit/s (RS-232)	
Sampling Rate	3 MSamples/s	
Environmental and Safety		
Operating temp.	-40 to +74	°C
Relative humidity	< 95 % (no condensation)	
MTBF	>100,000	hrs
Electrical safety	AL / IEC / EN 60950-1	
UL recognition file	E242498	
Laser safety	IEC 60825-1, IEC 60825-2	
EMC immunity	EN 55024, EN 50130-4, EN 61000-6-2	
EMC emission	EN 55022 (Class B) FCC 47 CFR 15 (Class B)	
Electrical		
Supply voltages	12-15 (/SA)	Vdc
Power consumption	<2.6	W
Current	200 @ 12 V	mA
Mechanical		
Optical connector	ST/PC	SC/UPC
Video connector	BNC 75 Ω	
Data connectors	5-pin screw terminal	
Dimensions	HxWxD = 128 x 35 x 190	
Weight (approx.)	480	

Table 6. TETRA 42x0 TX/RX Technical Specifications

7. Care and maintenance

For reliable operation of TETRA 42x0 modules, observe the following precautions:

- Prevent dust from collecting on the equipment
- Protect the equipment against moisture
- Maintain sufficient free space around the equipment for cooling.

8. Safety, EMC, ESD

General

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.

Installation, adjustment, maintenance and repair of this equipment are to be performed by trained personnel aware of the hazards involved. For correct and safe use of the equipment and in order to keep the equipment in a safe condition, it is essential that both operating and servicing personnel follow standard safety procedures in addition to the safety precautions and warnings specified in this manual, and that this unit be installed in locations accessible to trained service personnel only.

Sigura assumes no liability for the customer's failure to comply with any of these safety requirements.

UL/IEC/EN 60950-1: General safety requirements

The equipment described in this manual has been designed and tested according to the UL/IEC/EN 60950-1 safety requirements.

If there is any doubt regarding the safety of the equipment, do not put it into operation. This might be the case when the equipment shows physical damage or is stressed beyond tolerable limits (e.g. during storage and transportation).

Before opening the equipment, disconnect it from all power sources. The equipment must be powered by a SELV[®] power supply.

When this unit is operated in extremely elevated temperature conditions, it is possible for internal and external metal surfaces to become extremely hot.

Optical safety

This optical equipment contains Class 1M lasers or LEDs and has been designed and tested to meet IEC 60825-1:1993+A1+A2 and IEC 60825-2:2004 safety class 1M requirements.

Optical equipment presents potential hazards to testing and servicing personnel owing to high levels of optical radiation. When using magnifying optical instruments, avoid looking directly into the output of an operating transmitter or into the end of a fiber connected to an operating transmitter, or there will be a risk of permanent eye damage. Precautions should be taken to prevent exposure to optical radiation when the unit is removed from its enclosure or when the fiber is disconnected from the unit. The optical radiation is invisible to the eye.

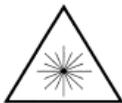
Use of controls or adjustments or procedures other than those specified herein may result in hazardous radiation exposure.

The installer is responsible for ensuring that the label depicted below (background: yellow; border and text: black) is present in the restricted locations where this equipment is installed.



The locations of all optical connections are listed in the Indications and Connectors section of this manual.

Optical outputs and wavelengths are listed in the Technical Specifications section of this manual.



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 the 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.

EMC

Warning: Operation of this equipment in a residential environment could cause radio interference.

This device has been tested and found to meet the CE regulations relating to EMC and complies with the limits for a Class A device, pursuant to Part 15 of the FCC rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) This device must accept any interference received, including interference that may cause undesired operation. These limits are designed to provide reasonable protection against interference to radio communications in any installation. The equipment generates, uses, and can radiate radio frequency energy; improper use or special circumstances may cause interference to other equipment or a performance decrease due to interference radiated by other equipment. In such cases, the user will have to take appropriate measures to reduce such interactions between this and other equipment.

Note that the warning above does not apply to TKH Security products which comply with the limits for a Class B device. For product-specific details, refer to the EU Declaration of Conformity.

Any interruption of the shielding inside or outside the equipment could make the equipment more prone to fail EMC requirements.

To ensure EMC compliance of the equipment, use shielded cables for all signal cables including Ethernet, such as CAT5E SF/UTP or better, as defined in ISO IEC 11801. For power cables, unshielded three wire cable (2p + PE) is acceptable. Ensure that *all* electrically connected components are carefully earthed and protected against surges (high voltage transients caused by switching or lightning).

ESD

Electrostatic discharge (ESD) can damage or destroy electronic components. Proper precautions should be taken against ESD when opening the equipment.

^{*)} SELV: conforming to IEC 60950-1, <60 Vdc output, output voltage galvanically isolated from mains. All power supplies or power supply cabinets available from Siquira comply with these SELV requirements.

9. Product Disposal

Recycling



The unit contains valuable materials which qualify for recycling. In the interest of protecting the natural environment, properly recycling the unit at the end of its service life is imperative.

10. EU Declaration of Conformity

The EU Declaration of Conformity for this product is available at <http://www.tkhsecurity.com/support-files>.