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User Guide

Gigabit Ethernet Fiber Switch

FRM220A-1002ES



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Introduction

FRM220A-1002ES is an industrial temperature grade, dual copper to dual fiber, Gigabit Ethernet managed switch designed to make conversion between 10/100/1000Base-T and 100/1000Base-SX/LX with SFP transceiver. Using SNMP and Web-based management in the **FRM220** or **FRM220A** chassis, the network administrator can monitor, configure and control the activity of each chassis installed **FRM220A-1002ES** switch card. The functions include Auto Laser Shutdown, Link Fault Forwarding, bandwidth control, VLAN, Q-in-Q, duplex and speed configuration.

Features

- -40 to +85°C “industrial” operating temperature range
- 10/100/1000Base-T to 100/1000Base-X (dual fiber rate)***
- Network management via terminal, web or SNMP in FRM220 chassis
- Stand-alone local console management via CH01M console port
- Auto or Forced Ethernet mode; Auto MDI/MDIX
- MTU 10.24K bytes (jumbo packets)
- Supports 802.1Q tagging (16 groups) and 802.1ad Q-in-Q
- VLAN port mapping feature
- Supports Link Fault Pass Through (LFP) function
- Supports Auto Laser Shutdown (ALS)
- Digital Diagnostic Monitor of supported SFP modules
- Provides 1Gb backplane Ethernet uplink in **FRM220A**

FRM220A-1002ES SFP sockets support a wide range of standard SFP modules to address any network situation. Such as: Single-mode, Multi-mode, Multi-rate, Single fiber bi-directional, Coarse and Dense Wave Division Multiplexing (CWDM and DWDM).

*****Dual Rate Notice:** When configuring for 100Base-FX, the SFP must support Fast Ethernet data rate (e.g. 155Mbps). For Gigabit Ethernet, the SFP must support 1.25Gbps data rate. A multi-rate SFP may also be used, assuming it can cover both data rates.

WARNING: Fiber optic equipment may emit laser or infrared light that can injure your eyes. Never look into an optical fiber or connector port. Always assume that fiber optic cables are connected to an active laser light source.

Specifications

Optical Interface

- Connector** 2 x SFP cage (dual rate 100/1000)
- Data rate** GbE (1.25Gbps optical rate), FE (125Mbps optical)
- Duplex mode** Full duplex, Ethernet
- Fiber Mode** Depends on SFP
- Distance** Depends on SFP
- Wavelength** Depends on SFP

Electrical Interface

- Connector** 2 x RJ-45, shielded
- Data rate** 10m/100m/1000mbps, Auto or Forced
- Duplex mode** Auto, Forced Full or Half
- Cable** Cat 5e or better
- Distance** 100meters maximum
- Indications** LED (PWR, RFP, LFP, Link)
RJ45 indicators (Link, Full)
(Card supports hot-swapping)

- Power**
- Input** Card : 12VDC, Standalone : AC, DC options
- Consumption** <8W
- Dimensions** 155 x 88 x 23mm (D x W x H)
- Weight** 120g
- Temperature** -40 ~ 85°C (Operating), -40 ~ 85°C (Storage)
- Humidity** 0 ~ 95% non-condensing
- Certification** CE, FCC, LVD, RoHS
- MTBF** 75000 hrs

Management Features

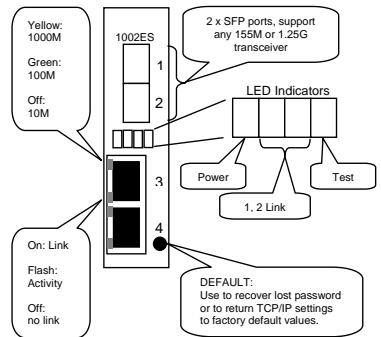
This model has no DIP Switch setting. When placed in **FRM220-CH01M** with DB9 RS-232 console port, the card can be stand-alone configured using an easy to use text menu system. When placed in a managed chassis, the card is configured and monitored through the chassis NMC (network management controller) via console, Telnet, Web HTTP or SNMP. (When placed in **FRM220A** 2 slot chassis with **GSWSNMP** aggregate card, this card supports gigabit Ethernet uplink.

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Panel

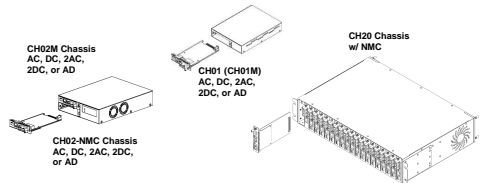
- Figure 1. Front Panel of **FRM220A-1002ES**



Installation

- Figure 2. Slide-in Card mounting of **FRM220A-1002ES**

Note: This converter card can be placed in CH01, CH01M 1-slot w/console, CH02M 2-slot w/console, CH02-NMC 2-slot with NMC or the full CH20 chassis.

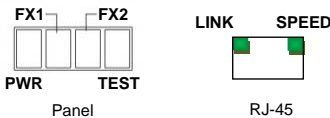


Follow all ESD precautions when handling the card and SFP modules.

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LED Indicators

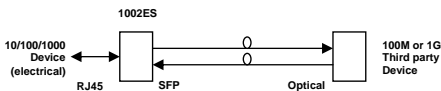


LED	Color	State	Status
PWR	(Green)	On	Power on
		Off	No Power or Card Disabled
FX1	(Green)	On	Fiber Port 1 Link is OK
		Off	Fiber Port 1 Link is down
FX2	(Green)	On	Fiber Port 2 Link is OK
		Off	Fiber Port 2 Link is down
TEST	(Red)	On	Loop back test is active
		Flash	During upgrade (rapid flashing)
		Off	Normal Operation
LINK (RJ-45)	(Green)	On	UTP link is OK
		Flash	UTP link has active traffic
		Off	No UTP link
SPEED (RJ-45)	(Yellow)	On	1000Base-T
		(Green)	100Base-TX
		(Off)	10Base-T

Applications

With its two optical and two electrical ports, **FRM220A-1002ES** works as a copper to fiber or fiber to fiber converter, either as a stand-alone or when placed in FRM220-CH20 managed rack.

Media Converter



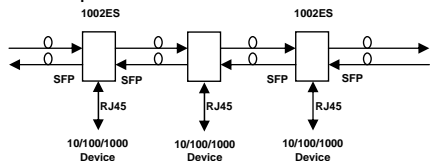
Install OC3 or gigabit SFP module appropriate for the fiber distance.

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FRM220A-1002ES converter works in point-to-point applications, either as a stand-alone or when placed in FRM220-CH20 managed rack.

Linear Fiber Drops



Install OC3 or gigabit SFP modules appropriate for the fiber distance.

Console Management

When placed in the 1-slot CH01M or 2-slot CH02M chassis, this card can be locally managed by connecting a simple serial terminal such as a notebook computer that has an RS232 port or via a commonly available USB to RS232 adapter. In Windows XP, HyperTerminal™ is an application available for emulating a serial terminal. You can also search for TeraTerm or PuTTY which are free alternatives, especially if your operating system does not include HyperTerminal.

Settings

Baud Rate: 38,400 | Data bits: 8 | Parity bits: none | Stop bits: 1
Handshaking: none | Emulation: VT-100 | **Default PASSWORD admin**

Connect the serial cable to the CH01/2M's DB9. Run the terminal emulation program. With power on, press [ESC], [space] or [Enter] to login and display the "Main Menu" screen. The following is an example.

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```

*****
*** CTC UNION TECHNOLOGIES CO.,LTD ***
*** FRM220A-1002ES Manager ***
*****
Ver:[1.000-1.100-0.000-0.000] [CH-01M ]

<1> FX 1 Status and Configure
<2> FX 2 Status and Configure
<3> UTP 3 Status and Configure
<4> UTP 4 Status and Configure
<5> Device Status and Configure
<6> VLAN Tag Status and Configure
<7> Port VLAN Status and Configure
<8> Link Fault Pass-Through Status and Configure
<P> Password change

<ESC> Logout

```

Example of Main Menu Console Screen, FRM220A-1002ES

Operation

Select any of the menu items by keying in the menu item number or letter. Use the [ESC] to return to a previous menu. Any setting is immediately applied to the transponder's circuitry but not saved in non-volatile ram. After all of the parameter settings have been selected, go to the **Device Status** sub-menu "5" from the main menu and press "5" to store the configuration in non-volatile RAM (NVRAM).

Main Menu Navigation

- <1>. Go to the sub menu for the Fiber port #1
- <2>. Go to the sub menu for the Fiber port #2
- <3>. Go to the sub menu for the UTP port #3
- <4>. Go to the sub menu for the UTP port #4
- <5>. Go to the Device setting menu
- <6>. Go to the VLAN setting sub menu
- <7>. Go to the port VLAN setting menu
- <8>. Go to and configure the Link Fault Pass-thru settings
- <P>. Modify the login password

FX Port Explanation of Settings

```

<< FX 1 Status and Configuration >>
FX Link [ Up ]
SFP [ Exist ] D/D Function [ Yes ]
<1> Port Active [ Enable ]
<2> Speed [ 1000 ]
<3> Auto Laser Shutdown [ Disable ]
<4> Loop Back Function [ Disable ]
<5> Ingress Limit [ Unlimited ]
<6> Egress Limit [ Unlimited ]
<7> SFP Digital Diagnostics

<ESC> Go to previous menu.

```

FX status show "Link UP" with SFP that supports DOM

- <1>. **Port Active:** This allows disabling the fiber port, stopping all transmissions through it.
- <2>. **Speed:** This switch supports dual rate with selected optics for either 100Base-FX or 1000Base-X. This is a manual setting.
- <3>. **Auto Laser Shutdown:** ALS is a safety mechanism that will turn off laser transmission in the event received optical signal is lost. ALS may be enabled or disabled with this option.
- <4>. **Loop Back Function:** Loop back is a diagnostic utility to help isolate link issues.
- <5>. **Ingress Limit:** Incoming packets can be limited with granularities of 64K, 1M and 10M.
- <6>. **Egress Limit:** Outgoing packets can be limited with granularities of 64K, 1M and 10M.
- <7>. **SFP Digital Diagnostics:** DOM or just DD are extra readable parameters within the SFP module. Display those parameters here.

Example of reading Digital Diagnostics Information display.

```

<< Fiber D/D Function Status >>
Vendor Name [ FIBERCON INC. ]
Vendor Part Number [ FRM-3125C-L40 ]
Fiber Type [ Single ]
Wave Length [ 1310 nm ]
Link Length [ 0040 Km ]
Tx Power [ 01 dBm ]
Rx Power [ -12 dBm ]
Rx Sensitivity [ 00 dBm ]
Temperature [ 050 C ]

```

UTP Port Explanation of Settings

```

<< UTP 3 Status and Configuration >>
<1> Port Active [ Enable ] Link [ Link Up ]
<2> Negotiation [ Auto ]
<3> Speed [ 1000 ] Status [ 1000 ]
Duplex [ Full ] Status [ Full ]
<5> Loop Back Function [ Disable ]
<6> Ingress Limit [ Unlimited ]
<7> Egress Limit [ Unlimited ]

<ESC> Go to previous menu.

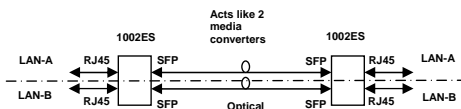
```

UTP status show "Link UP" with 1000/Full connection

- <1>. **Port Active:** This allows disabling the UTP port, stopping all transmissions through it.
- <2>. **Negotiation:** This brings up the sub-menu to set auto or forced mode for the UTP port.
- <3>. **Speed:** This switch supports three rates. When Auto Negotiation is enabled, speed is auto detected. If forced mode is set, the speed can be manually set here as 10M, 100M or 1000M.
- <4>. **Duplex:** When set to Forced mode, the FX port can be configured to either Full or Half Duplex. If speed is 1000, only Full Duplex is supported.
- <5>. **Loop Back Function:** Loop back is a diagnostic utility to help isolate link issues.
- <6>. **Ingress Limit:** Incoming packets can be limited with granularities of 64K, 1M and 10M.
- <7>. **Egress Limit:** Outgoing packets can be limited with granularities of 64K, 1M and 10M.

Port VLAN

FRM220A-1002ES supports a simple internal port mapping scheme.



Example settings for Port VLAN, acting as two converters

```

<< Port VLAN Status and Configuration >>
Group A B
<1> :Fiber 1 [*] [ ]
<2> :Fiber 2 [ ] [*]
<3> :UTP 3 [*] [ ]
<4> :UTP 4 [ ] [*]

<P> :Port VLAN [Enable]
<ESC>:Go to Previous Menu.

```

802.1Q VLAN

```

<< 802.1Q VLAN status and Configuration >>
Port 1: <1> :VID [1] <2> :QinQ Support [Disable]
Port 2: <3> :VID [1] <4> :QinQ Support [Disable]
Port 3: <5> :VID [1] <6> :QinQ Support [Disable]
Port 4: <7> :VID [1] <8> :QinQ Support [Disable]
<V> VLAN Tag Function [ Disable ]
<T> Tag Type (Hex) [8100]
<2> Go to VLAN Table Configuration Page.

```

The VID settings above for each port determine the tag that is added to all incoming packets on that port. If the packets are already tagged, they may be double tagged by enabling QinQ for that port. The actual VLAN function will start when using the "V" menu item to "Enable" VLAN. The tag type for normal c-tag (customer or inner tag) defaults to 0x8100. 802.1Q recommends 0x88a8 for s-tag (service provider or outer tag). The "Z" item will open the static VLAN table that determines the action taken on packets leaving ports.

Item	VLAN ID	Port 1	Port 2	Port 3	Port 4
< 0 >	1	Unmodified	Unmodified	Unmodified	Unmodified
< 1 >	1	Unmodified	Unmodified	Unmodified	Unmodified
< 2 >	1	Unmodified	Unmodified	Unmodified	Unmodified
< 3 >	1	Unmodified	Unmodified	Unmodified	Unmodified
< 4 >	1	Unmodified	Unmodified	Unmodified	Unmodified
< 5 >	1	Unmodified	Unmodified	Unmodified	Unmodified
< 6 >	1	Unmodified	Unmodified	Unmodified	Unmodified
< 7 >	1	Unmodified	Unmodified	Unmodified	Unmodified
< 8 >	1	Unmodified	Unmodified	Unmodified	Unmodified
< 9 >	1	Unmodified	Unmodified	Unmodified	Unmodified
< a >	1	Unmodified	Unmodified	Unmodified	Unmodified
Snip %>					

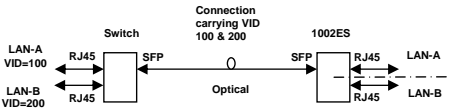
<ESC>:Go to Port VID Configuration Page.

There are 16 VLAN groups available. For a group, enter the VID and then select how the packet is sent out of that port (two fiber and two electrical). The packet can be sent un-modified, sent untagged (meaning tag will be removed), sent tagged or dropped as a non-member.

```
-----
Egress mode Select :
<1>: Unmodified <2>: Untagged <3>: Tagged <4>: Nonmember
<ESC> Go to previous menu. Please select an item.
-----
```

If a packet is double tagged, the untag process will only remove the outer tag. The packet will still egress with the original inner tag.

Application Example



Step 1. Configure the FRM220A-1002ES Ethernet LAN ports to add tag for packets coming from LAN A and LAN B.

```
<< 802.1Q VLAN status and Configuration >>
Port 1: <1> :VID [1] <2> :QinQ Support [Disable]
Port 2: <3> :VID [1] <4> :QinQ Support [Disable]
Port 3: <5> :VID [100] <6> :QinQ Support [Disable]
Port 4: <7> :VID [200] <8> :QinQ Support [Disable]
<> VLAN Tag Function [ Enable ]
<T> Tag Type (Hex) [8100]
<Z> Go to VLAN Table Configuration Page.
```

Step 2. Go to the static VLAN menu (menu item "Z").

Item	VLAN ID	Port 1	Port 2	Port 3	Port 4
< 0 >	100	Tagged	Unmodified	Untagged	Nonmember
< 1 >	200	Tagged	Unmodified	Nonmember	Untagged
< 2 >	1	Unmodified	Unmodified	Unmodified	Unmodified
Shp < >					
< e >	1	Unmodified	Unmodified	Unmodified	Unmodified
< f >	1	Unmodified	Unmodified	Unmodified	Unmodified
<ESC>:Go to Port VID Configuration Page.					

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Link Loss Forwarding

Link Loss Forwarding (LLF) is a method to report loss of Rx from any fiber or UTP port and effectively stop Tx on any other fiber or UTP port. Since FRM220A-1002ES has 4 ports, the LLF function is configured via a 4x4 matrix table and with 'and' or 'or' logic operations.

```
<< Link Loss Forwarding Configuration >>
```

	Logical	Condition			
		Port 1 Link Loss	Port 2 Link Loss	Port 3 Link Loss	Port 4 Link Loss
Port 1 Power Off	<0>[AND]		<1>	<2>	<3>
Port 2 Power Off	<4>[AND]	<5>		<6>	<7>
Port 3 Power Off	<8>[AND]	<9>	<A>		
Port 4 Power Off	<C>[AND]	<D>	<E>	<F>	

```
<R> :Reset Settings.
<S> :Confirm and Save Settings.
<ESC>:Go to Previous Menu.
```

Example 1: FX port 1 Tx off if any port 2,3,4 Rx loss:
keyin 1,2,3 and keyin 0 to change 'and' to 'or'
Example 2: FX port 1 Tx off if all ports 2,3,4 Rx loss
keyin 1,2,3 and leave Port 1 as 'And'
Example 3: FX port 1 Tx off if port 3 Rx loss
keyin 2 (only one selected so logic doesn't care)

Press 's' key to confirm and save settings.

Device

From the Main menu, press "5" to enter the Device menu

```
<< Device Status and Configuration >>
<1> Device Active [ Enable ]
<2> Flow Control [ Enable ]
<3> Port Reset
<4> Factory Default
<5> Store Parameters
```

The entire device can be taken offline by disabling it. "Flow control" (802.3X) is enabled by default, but may be disabled here. The "Port Reset" function will warm start the switch. "Factory Default" will return all settings. "Store parameters" is required so settings are remembered at next power up.

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Upgrading

The FRM220A-1002ES card may be firmware upgraded when it is placed in the FRM220 with NMC management card. The user may use a local console connection to the NMC, a remote Telnet (IP) connection, or a Web based (HTTP) connection with any available browser. The NMC communicates to all cards through a serial control bus. The upgrade code is transferred to the NMC by way of TFTP server. All of these mentioned upgrade methods are well documented in the FRM220-NMC Operation Manual.

About SFP Units

The FRM220A-1002ES accepts any SFP unit that complies with the MSA standard and is rated for a data rate of 1.25Gbps for GbE or 125/155Mbps for FE. Follow all ESD precautions when handling the card and SFP modules. Fiber optic components and cables are very sensitive to dirt, dust and mishandling, especially in high-speed networks. Dirty or mistreated fiber may cause errors and an unwanted degradation of signal quality. Remove the dust caps on SFP and patch cables only when ready to plug in optical cables.

Installation

CTC Union supplied SFP modules are of the Bale Clasp type. The bale clasp SFP module has a bale clasp that secures the module into the SFP cage.

- Inserting a Bale Clasp SFP Module into a SFP cage
 - Step 1 Close the bale clasp upward before inserting the SFP module.
 - Step 2 Line up the SFP module with the port, and slide it into the cage.
- Removing a Bale Clasp SFP Module
 - Step 1 Open the bale clasp on the SFP module. Press the clasp downward with your index finger.
 - Step 2 Grasp the SFP module between your thumb and index finger and carefully remove it from the SFP cage.

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Troubleshooting

UTP Port link problems

The TP port of the 1002ES supports 10/100/1000Base-T. Avoid Duplex Mismatch conditions by connecting auto to auto or forced to forced.

The UTP port supports auto-polarity and auto MDI-X, so any straight Cat 5e or better cable will work.

FX Port link problems

The FX port supports FE or GbE by manual configuration only. The SFP used must support FE or gigabit Ethernet speed depending on the setting.

There is no recognized standard for automatically determining FE or GbE speed from the transceiver. For link problems please double check the speed is set according to the SFP being deployed.

Other link problems

Check if LFP is enabled. If LFP is enabled, the converter requires good link on both FX and TP ports. If either has no link, then the other will also not link. So, if link testing, please disable LFP.

FX link can be checked by using an LC simplex cable to loop the SFP Tx to Rx. **CAUTION:** Do not do this when the TP port is linked to a live network or a broadcast storm could result.

Conclusion

Once configuration has been confirmed and FX / TP ports check for link state, most problems end up being cables. Swap different UTP and fiber cables, and SFP modules before blaming the media converter.

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