

Fast Ethernet Fibre Converter

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Revision history

Current revision of this document is the uppermost in the table below.

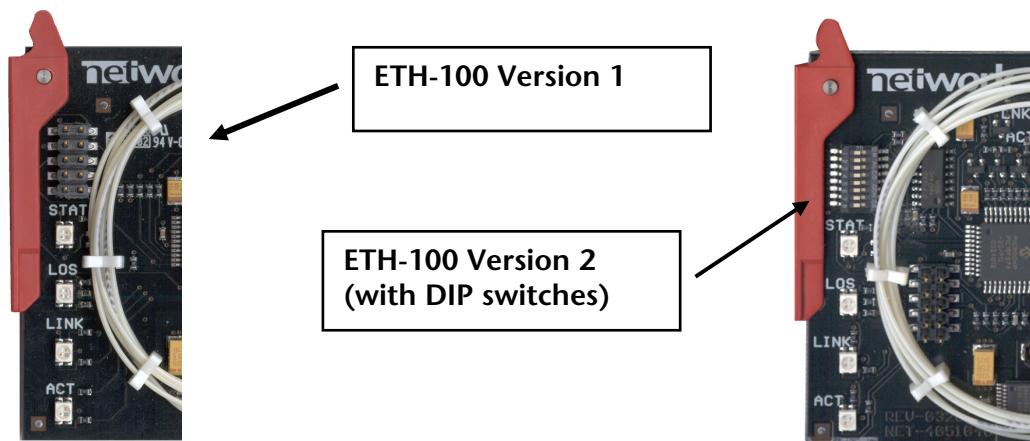
Revision	Replaces	Date	Change description
7	6	2007-10-26	New front page
6	5	2007-10-05	Added Materials Declaration and EFUP; updated EC Declaration of Conformity
5	4	2006-12-15	Changed maximum optical input
4	3	2006-11-08	Changed Optical Sensitivity
3	2	2006-03-13	Corrected <i>Optical Sensitivity</i> in Chapter 5.
2	1	2006-02-06	Updated CWDM laser options.
1	0	2003-09-30	Description of changes in rev.1 (DIP. Sw)
0	-	2002-10-03	<i>Initial version</i>

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1 Product versions

There are two different hardware versions of the ETH-100 card which are referred to as "Version 1" and "Version 2" in this manual. The figures below show how to distinguish the two versions from each other. The only difference is the DIP switch row, which is implemented on Version 2, this described in chapter 7.3.



2 Product overview

The Flashlink ETH100 is a 10Base-T/100BaseTX to fibre converter module in the Network Flashlink family. The module converts a standard 10 or 100 Mbit/s Ethernet signal on copper to fibre suitable for long haul applications. The module has two electrical Ethernet ports. The ports are independent of each other, and can be used for 10 or 100Mbit/s Ethernet. Both ports can be used simultaneously. The fibre link is always 100Mbit/s, and can be used in one or two fibre installations, or occupy two wavelengths in a WDM, CWDM or DWDM installation.

For DWDM applications the module has an electrical output which can be connected to a standard DWDM E/O converter (e.g. SDI-EO-D15xx.xx) together with the optical input. The module is designed to replace a receiver card in a standard DWDM frame, giving the system designers flexibility in customising their systems.

3 Specifications

Optical input:

Sensitivity:	Better than -32dBm
Optical wavelength:	1200nm – 1610nm
Transmission circuit fibre:	Multi mode 50/125 um, single mode 9/125um compatible
Return loss:	>40dB with single mode fibre
Detector damage threshold:	>+1dBm
Max input power:	-6 dBm
Connector:	SC/UPC

Optical output:

Transmission circuit fibre:	Single Mode
Light source:	F-P/DFB Laser
Optical wavelength :	See <i>Laser Options</i> below

Ethernet:

2 x 10BaseT/100BaseTx on RJ-45 connectors, compliant with IEEE 802.3 and IEEE 802.3u, speed auto sensing, auto MDI/MDI-X

Electrical:

Power:	+5V DC/4W and -15VDC/0.1W
Control:	Control system for access to setup and module status with BITE (Built-In Test Equipment)

4 Laser options

The ETH100 card is available in the following versions:

ETH100-13T -7.5dBm		1310± 40nm -7.5 dBm F-P laser	
ETH100-13T 0 dBm		1310± 40nm 0 dBm F-P laser	
ETH100-15T 0 dBm		1550± 40nm 0 dBm DFB laser	
CWDM (DFB lasers)			
ETH100-C1470	1470± 6nm 0dBm	ETH100-C1270	1270± 6nm 0dBm
ETH100-C1490	1490± 6nm 0dBm	ETH100-C1290	1290± 6nm 0dBm
ETH100-C1510	1510± 6nm 0dBm	ETH100-C1310	1310± 6nm 0dBm
ETH100-C1530	1530± 6nm 0dBm	ETH100-C1330	1330± 6nm 0dBm
ETH100-C1550	1550± 6nm 0dBm	ETH100-C1350	1350± 6nm 0dBm
ETH100-C1570	1570± 6nm 0dBm	ETH100-C1370	1370± 6nm 0dBm
ETH100-C1590	1590± 6nm 0dBm	ETH100-C1390	1390± 6nm 0dBm
ETH100-C1610	1610± 6nm 0dBm	ETH100-C1410	1410± 6nm 0dBm

5 Switch operation

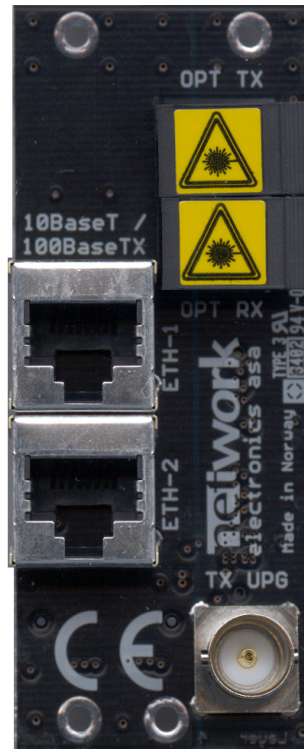
The ETH100 contains a complete non blocking 3 port Ethernet switch. One port is the fibre port; the two other ports are the electrical ports. The fibre port is always running in 100 Mbit/s full duplex operation, the two electrical ports can run in 10 or 100Mbit/s, full or half duplex. The switch incorporates a high performance MAC address lookup engine, which learns which devices are connected to each port, and minimises traffic on each port.

The switch learns what port an end station is connected to, by remembering each packet source address (MAC address) and what port the packet came from. Once a MAC address to port mapping is learnt, all other packets to that MAC address are directed to the correct port only. If a packet is sent to a new (currently unlearnt) address, the packet will be transmitted to all ports except the one that the packet came from. This insures the packet will be received by the correct end station (if it exists), and when the end station responds back, its address will be learnt by the switch for the next series of packets. The switch will learn up to 4096 MAC addresses. An address mapping will be removed after 10 minutes without packet traffic from that node.

Important: If you move an end station (e.g. a PC or a router) from one port to another, you might have to wait for up to 10 minutes before the switch recognises that the node has moved, and all traffic to that node will be sent to the wrong port. As soon as the moved end station sends out a packet, the switch will detect that the node has moved, and the address/port mapping is updated, and the traffic will continue as before.

6 Connector module

The ETH100 has a dedicated connector module: ETH100-C1. This module is mounted at the rear of the sub-rack.



6.1 Mounting the connector module

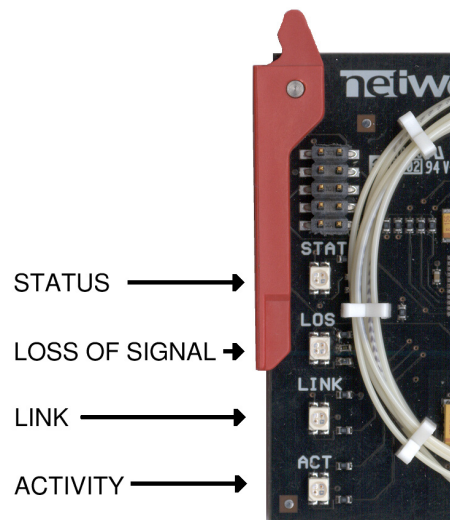
The details of how the connector module is mounted, is found in the user manual for the Flashlink frame FR-2RU-10-2.

This manual is also available from our web site: <http://www.network-electronics.com/>.

7 Status indicators

7.1 Front Panel LEDs

The status of the module can be easily monitored visually by the LEDs at the front of the module.

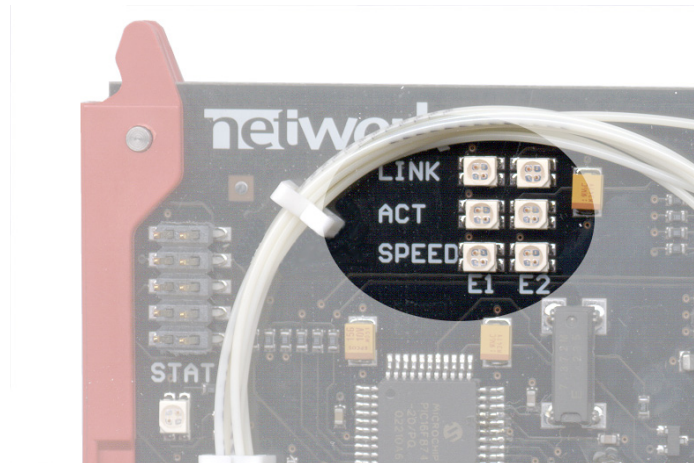


LED	Description	Green light	Red light	No light
STAT	Module status	Module self-test is OK and power is present.	Module initialising (takes approx. 2 sec). The laser is turned off. Module is faulty (fuse blown, laser failure, laser APC out of lock, etc). The card needs factory repairation.	Module has no power.
LOS	Loss of optical signal	Optical input signal present. Note: This is an optical measurement; a green light does not imply that there exists a valid Ethernet signal on the optical input.	No optical input signal. Check fibre connection. Check card in opposite end.	
LINK	Ethernet link	Ethernet link to opposite end established.		Ethernet link to opposite end not established.
ACT	Ethernet activity	Flashes when Ethernet packets are sent over the fibre link. When the Ethernet activity is high, this will be on continuously.		The fibre link is idle, no packets are sent on the link.

7.2 Indicators for electrical Ethernet ports

The status of the electrical Ethernet ports is indicated with 6 Light Emitting Diodes (LEDs), 3 for each electrical port. The LEDs are located in the upper left corner of the ETH100 board, so you have to remove the front cover of the sub rack to inspect them.

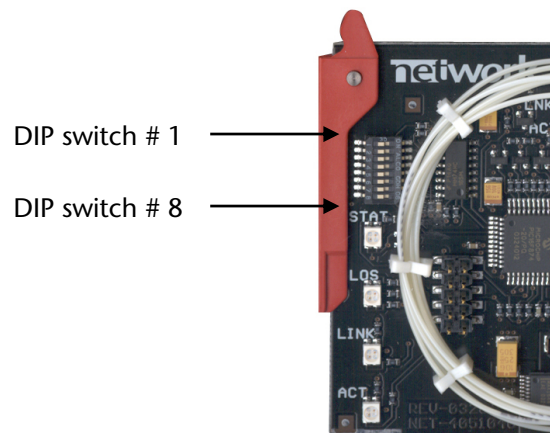
The LEDs are labelled E1 and E2 for electrical port #1 and electrical port #2.



LED	Description	On (green light)	Off (no light)
LINK	Ethernet link	The Ethernet link is established.	No link (Is the cable connected, and is the equipment in the other end of the cable switched on?)
ACT	Activity	Flashes when Ethernet packets are sent over the Ethernet port. When the Ethernet activity is high, this will be on continuously.	The Ethernet port is idle, no packets are sent.
SPEED	Ethernet speed	The link is established in 100Base-TX mode (100Mbit/s).	The link is established in 10Base-T mode (10Mbit/s).

7.3 DIP switches - Version 2

The tables, on the next page, explain the functionality of the DIP switches shown in the figure below.



DIP switch #	Description
1	Auto
2	
3	MDI/ MDIX
4	Reserved
5	Reserved
6	Reserved
7	Reserved
8	Sensitivity Limitation

7.3.1 DIP switch # 1 & 2 Auto

Only valid for port E1, port E2 is always AUTO.

DIP sw#1	DIP sw#2	Description
ON	ON	Auto-negotiation + Auto, MDI/MDIX (cross-over). DEFAULT
OFF	ON	100Mbps, Full duplex. Do not use against Auto-neg. Link partner
ON	OFF	100Mbps, Half duplex
OFF	OFF	10Mbps, Half duplex

In case of doubt leave in AUTO mode (DIP switch 1 & 2 to "ON")

7.3.2 DIP switch # 3 MDI/MDIX

DIP switch # 1 & 2 to "ON" gives AUTO mode => gives auto crossover. All other modes utilize DIP switch # 3 for setting crossover.

DIP sw#3	Description
ON	MDI (Media Depended Interface) DEFAULT
OFF	MDIX (Media Depended Interface-crossover)

7.3.3 DIP switch # 8 Sensitivity limitations

DIP sw#8	Description
ON	Max sensitivity DEFAULT
OFF	Sensitivity limitations, max sensitivity limited to -27dBm (to be used when integrating the ETH-100 module in multi-channel systems (CWDM & DWDM))

8 Laser safety precautions

These are guidelines to limit hazards from laser exposure.

All the available EO (including ETH100) units in the Flashlink range include a laser.

Therefore this note on laser safety should be read thoroughly.

The lasers emit light at wavelengths from 1270nm up to 1610nm. This means that the human eye cannot see the beam, and the blink reflex cannot protect the eye. (The human eye can see light between 400 nm to 700 nm).

A laser beam can be harmful to the human eye (depending on laser power and exposure time). Therefore:

BE CAREFUL WHEN CONNECTING / DISCONNECTING FIBRE PIGTAILS (ENDS).
NEVER LOOK DIRECTLY INTO THE PIGTAIL OF THE LASER/FIBRE.
NEVER USE MICROSCOPES, MAGNIFYING GLASSES OR EYE LOUPES TO LOOK INTO A FIBRE END.
USE LASER SAFETY GOGGLES BLOCKING LIGHT AT 1310 nm AND AT 1550 nm

Instruments exist to verify light output power: Power meters, IR-cards etc.

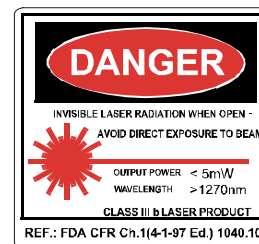
Flashlink features:

All the laser module cards in the Flashlink product range, are Class 1 laser products according to IEC 825-1 1993, and class I according to 21 CFR 1040.10 when used in normal operation.

More details can be found in the user manual for the FR-2RU-10-2 frame.

Maximum output power¹: 5 mW

Operating wavelengths: > 1270 nm



¹ Max power is for safety analysis only and does not represent device performance.

General environmental requirements for Network Electronics equipment

1. The equipment will meet the guaranteed performance specification under the following environmental conditions:
 - Operating room temperature range: 0°C to 40°C
 - Operating relative humidity range: Up to 90% (non-condensing)
2. The equipment will operate without damage under the following environmental conditions:
 - Temperature range: -10°C to 50°C
 - Relative humidity range: Up to 95% (non-condensing)

Product Warranty

The warranty terms and conditions for the product(s) covered by this manual follow the General Sales Conditions by Network Electronics ASA. These conditions are available on the company web site of Network Electronics ASA:

www.network-electronics.com

Materials declaration and recycling information

Materials declaration

For product sold into China after 1st March 2007, we comply with the “Administrative Measure on the Control of Pollution by Electronic Information Products”. In the first stage of this legislation, content of six hazardous materials has to be declared. The table below shows the required information.

組成名稱 Part Name	Toxic or hazardous substances and elements					
	鉛 Lead (Pb)	汞 Mercury (Hg)	鎘 Cadmium (Cd)	六价铬 Hexavalent Chromium (Cr(VI))	多溴联苯 Polybrominated biphenyls (PBB)	多溴二苯醚 Polybrominated diphenyl ethers (PBDE)
ETH100	X	O	O	O	O	O
O: Indicates that this toxic or hazardous substance contained in all of the homogeneous materials for this part is below the limit requirement in SJ/T11363-2006. X: Indicates that this toxic or hazardous substance contained in at least one of the homogeneous materials used for this part is above the limit requirement in SJ/T11363-2006.						

Environmentally-friendly use period

The manual must include a statement of the “environmentally friendly use period”. This is defined as the period of normal use before any hazardous material is released to the environment. The guidance on how the EFUP is to be calculated is not finalised at the time of writing. See

<http://www.aeanet.org/GovernmentAffairs/qfLeOpAaZXaMxqGjSFbEidSdPNtpT.pdf> for an unofficial translation of the draft guidance. For our own products, Network Electronics has chosen to use the *50 year figure* recommended in this draft regulation.

Network Electronics suggests the following statement on An “Environmentally Friendly Use Period” (EFUP) setting out normal use:

EFUP is the time the product can be used in normal service life without leaking the hazardous materials. We expect the normal use environment to be in an equipment room at controlled temperature range (0°C - 40°C) with moderate humidity (< 90%, non-condensing) and clean air, not subject to vibration or shock.

Further, a statement on any hazardous material content, for instance, for a product that uses some tin/lead solders:

Where a product contains potentially hazardous materials, this is indicated on the product by the appropriate symbol containing the EFUP. The hazardous material content is limited to lead (Pb) in some solders. This is extremely stable in normal use and the EFUP is taken as 50 years, by comparison with the EFUP given for Digital Exchange/Switching Platform in equipment in Appendix A of “General Rule of Environment-Friendly Use Period of Electronic Information Products”. This is indicated by the product marking:



It is assumed that while the product is in normal use, any batteries associated with real-time clocks or battery-backed RAM will be replaced at the regular intervals.

The EFUP relates only to the environmental impact of the product in normal use, it does not imply that the product will continue to be supported for 50 years.

Recycling information

Network Electronics provides assistance to customers and recyclers through our web site <http://www.network-electronics.com>. Please contact Network Electronics' Customer Support for assistance with recycling if this site does not show the information you require.

Where it is not possible to return the product to Network Electronics or its agents for recycling, the following general information may be of assistance:

- Before attempting disassembly, ensure the product is completely disconnected from power and signal connections.
- All major parts are marked or labelled to show their material content.
- Depending on the date of manufacture, this product may contain lead in solder.

Some circuit boards may contain battery-backed memory devices.

EC Declaration of Conformity

network

MANUFACTURER	Network Electronics ASA P.B. 1020, N-3204 SANDEFJORD, Norway	
AUTHORISED REPRESENTATIVE (Established within the EEA)	Not applicable	
MODEL NUMBER(S)	ETH100	
DESCRIPTION	Fast Ethernet Fibre Converter	
DIRECTIVES this equipment complies with	LVD 73/23/EEC EMC 89/336/EEC	
HARMONISED STANDARDS applied in order to verify compliance with Directive(s)	EN 55103-1:1996 EN 55103-2:1996 EN 60950-1:2006	
TEST REPORTS ISSUED BY	Notified/Competent Body	Report no:
	Nemko	10689
TECHNICAL CONSTRUCTION FILE NO	Not applicable	
YEAR WHICH THE CE-MARK WAS AFFIXED	2004	
TEST AUTHORIZED SIGNATORY		
MANUFACTURER	AUTHORISED REPRESENTATIVE (Established within EEA)	Date of Issue
		2007-10-05
		Place of Issue
		Sandefjord, Norway
Name	Thomas Øhrbom	
Position	Quality Manager (authorised signature)	