

MiCOM H6xx

H6xx/EN GL/B11

Global Documentation

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1. SAFETY & HANDLING

1.1 Introduction

The present document describes the safety, handling, packing and unpacking procedures applicable to MiCOM H6xx Ethernet Switch Range and associated equipments.

1.2 Safety

WARNING: THIS SAFETY SECTION SHOULD BE READ BEFORE COMMENCING ANY WORK ON THE EQUIPMENT.

1.2.1 Health and Safety

The information in the Safety Section of the product documentation is intended to ensure that products are properly installed and handled in order to maintain them in a safe condition. It is assumed that everyone who will be associated with the equipment will be familiar with the contents of the Safety Section.

1.2.2 Explanation of symbols and labels

The meaning of symbols and labels may be used on the equipment or in the product documentation, is given below.

NOTE: The term earth used throughout the product documentation is the direct equivalent of the North American term ground.

1.2.3 Installing, Commissioning and Servicing



Equipment connections

Personnel undertaking installation, commissioning or servicing work on this equipment should be aware of the correct working procedures to ensure safety. The product documentation should be consulted before installing, commissioning or servicing the equipment.

Terminals exposed during installation, commissioning and maintenance may present a hazardous voltage unless the equipment is electrically isolated.

If there is unlocked access to the rear of the equipment, care should be taken by all personnel to avoid electrical shock or energy hazards.

Voltage and current connections should be made using insulated crimp terminations to ensure that terminal block insulation requirements are maintained for safety. To ensure that wires are correctly terminated the correct crimp terminal and tool for the wire size should be used.

Before energising the equipment it must be earthen using the protective earth terminal, or the appropriate termination of the supply plug in the case of plug connected equipment.

Omitting or disconnecting the equipment earth may cause a safety hazard.

The recommended minimum earth wire size is 2.5mm², unless otherwise stated in the technical data section of the product documentation.

Before energising the equipment, the following should be checked:

- Voltage rating and polarity;
- CT circuit rating and integrity of connections;
- Protective fuse rating;
- Integrity of earth connection (*where applicable*)

**Equipment operating conditions**

The equipment should be operated within the specified electrical and environmental limits.

**Current transformer circuits**

Do not open the secondary circuit of a live CT since the high level voltage produced may be lethal to personnel and could damage insulation.

**External resistors**

Where external resistors are fitted to MiCOM product, these may present a risk of electric shock or burns, if touched.

**Insulation and dielectric strength testing**

Insulation testing may leave capacitors charged up to a hazardous voltage. At the end of each part of the test, the voltage should be gradually reduced to zero, to discharge capacitors, before the test leads are disconnected.

**Insertion of modules and boards**

These must not be inserted into or withdrawn from equipment whilst it is energised since this may result in damage.

**Fibre optic communication**

Where fibre optic communication devices are fitted, these should not be viewed directly. Optical power meters should be used to determine the operation or signal level of the device.

1.2.4 Decommissioning and Disposal

**Decommissioning:**

The auxiliary supply circuit in the MiCOM H6xx may include capacitors across the supply or to earth. To avoid electric shock or energy hazards, after completely isolating the supplies to the MiCOM H6xxx (both poles of any dc supply), the capacitors should be safely discharged via the external terminals prior to decommissioning.

**Disposal:**

It is recommended to avoid incineration and disposal to. The product should be disposed of in a safe manner. Any products containing batteries should have them removed before disposal, in order to avoid short circuits. Particular regulations within the country of operation may apply to the disposal of lithium batteries.

1.3 Specification upon Device/People protection

The recommended maximum rating of the external protective fuse for this equipment is 16A, Red Spot type of equipment, unless otherwise stated in the technical data section of the product documentation.

1. Fuse rating is dependent of auxiliary voltage.
2. Differential protective switch on DC power supply is recommended
3. Differential protective switch on AC power supply is mandatory (printers, PACiS workstation...)

Insulation class	IEC 601010-1: Class I	1990/A2:	1995	This equipment requires a protective (safety) earth connection to ensure user safety.
	EN 61010-1: Class I	1993/A2:		
Insulation Category (Overvoltage):	IEC 601010-1: Class III	1990/A2:	1995	Distribution level, fixed installation. Equipment in this category is qualification tested at 5kV peak, 1.2/50µs, 500Ω. 0.5J, between all supply circuits and earth and also between independent circuits.
	EN 61010-1: Class III	1993/A2:		
Environment:	IEC 601010-1: Pollution degree 2	1990/A2:	1995	Compliance is demonstrated by reference to generic safety standards.
	EN 61010-1: Pollution degree 2	1993/A2:		
Product Safety:	72/23/EEC			Compliance with the European Commission Law Voltage Directive.
	EN 61010-1:	1993/A2:	1995	Compliance is demonstrated by reference to generic safety standards.
	EN 60950:	1992/A11:	1997	

1.4 Handling of Electronic Equipments

A person's normal movements can easily generate electrostatic potentials of several thousand volts.

Discharge of these voltages into semiconductor devices when handling circuits can cause serious damage, which often may not be immediately apparent but the reliability of the circuit will have been reduced.

The electronic circuits of Schneider Electric products are immune to the relevant levels of electrostatic discharge when housed in their cases. Do not expose them to the risk of damage by withdrawing modules unnecessarily.

Each module incorporates the highest practicable protection for its semiconductor devices. However, if it becomes necessary to withdraw a module, the following precautions should be taken in order to preserve the high reliability and long life for which the equipment has been designed and manufactured.

1. Before removing a module, ensure that you are at the same electrostatic potential as the equipment by touching the case.
2. Handle the module by its front-plate, frame, or edges of the printed circuit board. Avoid touching the electronic components, printed circuit track or connectors.
3. Do not pass the module to any person without first ensuring that you are both at the same electrostatic potential. Shaking hands achieves equipotential.
4. Place the module on an antistatic surface, or on a conducting surface, which is at the same potential as you.
5. Store or transport the module in a conductive bag.

More information on safe working procedures for all electronic equipment can be found in IEC 60147-0F and BS5783.

If you are making measurements on the internal electronic circuitry of any equipment in service, it is preferable that you are earthen to the case with a conductive wrist strap.

Wrist straps should have a resistance to ground between 500k – 10M Ohms. If a wrist strap is not available you should maintain regular contact with the case to prevent the build up of static. Instrumentation which may be used for making measurements should be earthen to the case whenever possible.

Schneider Electric strongly recommends that detailed investigations on the electronic circuitry, or modification work, should be carried out in a Special Handling Area such as described in IEC 60147-0F or BS5783.

1.5 Packing and unpacking

All MiCOM H6xx Ethernet Switches are packaged separately in their own cartons and shipped inside outer packaging. Use special care when opening the cartons and unpacking the device, and do not use force. In addition, make sure to remove from the inside carton the supporting documents supplied with each individual device and the type identification label.

The design revision level of each module included with the device in its as-delivered condition can be determined from the list of components. This list should be carefully saved.

After unpacking the device, inspect it visually to make sure it is in proper mechanical condition.

If the MiCOM H6xx Ethernet switch needs to be shipped, both inner and outer packaging must be used. If the original packaging is no longer available, make sure that packaging conforms to ISO 2248 specifications for a drop height $\leq 0.8\text{m}$.

1.6 Guaranties

The media on which you received Schneider Electric software are guaranteed not to fail executing programming instructions, due to defects in materials and workmanship, for a period of 90 days from date of shipment, as evidenced by receipts or other documentation. Schneider Electric will, at its option, repair or replace software media that do not execute programming instructions if Schneider Electric receive notice of such defects during the guaranty period. Schneider Electric does not guaranty that the operation of the software shall be uninterrupted or error free.

A Return Material Authorisation (RMA) number must be obtained from the factory and clearly marked on the package before any equipment acceptance for guaranty work. Schneider Electric will pay the shipping costs of returning to the owner parts, which are covered by warranty.

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1.8 Warnings regarding use of Schneider Electric products

Schneider Electric products are not designed with components and testing for a level of reliability suitable for use in or in connection with surgical implants or as critical components in any life support systems whose failure to perform can reasonably be expected to cause significant injuries to a human.

In any application, including the above reliability of operation of the software products can be impaired by adverse factors, including -but not limited- to fluctuations in electrical power supply, computer hardware malfunctions, computer operating system, software fitness, fitness of compilers and development software used to develop an application, installation errors, software and hardware compatibility problems, malfunctions or failures of electronic monitoring or control devices, transient failures of electronic systems (hardware and/or software), unanticipated uses or misuses, or errors from the user or applications designer (adverse factors such as these are collectively termed "System failures").

Any application where a system failure would create a risk of harm to property or persons (including the risk of bodily injuries and death) should not be reliant solely upon one form of electronic system due to the risk of system failure to avoid damage, injury or death, the user or application designer must take reasonably steps to protect against system failure, including -but not limited- to back-up or shut-down mechanisms, not because end-user system is customised and differs from Schneider Electric testing platforms but also a user or application designer may use Schneider Electric products in combination with other products. These actions cannot be evaluated or contemplated by Schneider Electric; Thus, the user or application designer is ultimately responsible for verifying and validating the suitability of Schneider Electric products whenever they are incorporated in a system or application, even without limitation of the appropriate design, process and safety levels of such system or application.

2. INTRODUCTION

MiCOM Ethernet range is designed to address the needs of a wide range of electric plant. Emphasis has been placed on strong compliance to standards, scalability, modularity and openness architecture.

These facilitate use in a range of applications from the most basic to the most demanding. They also ensure interoperability with existing components.

Schneider Electric philosophy is to provide a range of Ethernet products like switch that match all general requirements needed in electric substation: power supply, immunity to environmental constraints.

It provides also solutions to specific requirement like for example network redundancy management.

Each of these products can be used independently, or can be integrated to form a PACiS system, a Digital Control System (DCS) or a SCADA system.

2.1 MiCOM Switches

Driven by the requirements around the world for advanced applications in SCADA, Digital Control Systems, Automation, Control and Monitoring, Schneider Electric has designed and still develop a complete range of products that communicate via Ethernet links.

The specificity of electric plant leads to constraints that are rarely full-filled by standard Ethernet products : environmental, power supply, redundancy...

This new MiCOM range of Ethernet switch, the MiCOM Hxxx has been specially tailored for the PACiS system. The MiCOM Hxxx range is designed to address the needs of a wide range of installations, from small to large and customer applications.

2.2 MiCOM Ethernet Switch names

Basically the naming of Ethernet devices is composed of its mechanical arrangement and its number of port copper or optical.

The existing mechanical are :

- MiCOM H3xx DIN mounting case and power supply
- MiCOM H1xx PCI Board (getting power supply from PCI BUS into a PC)
- MiCOM H6xx 19' Rack with up to 4 boards switch and power supply

Reference	Description	Ethernet		Housing
		Tx	Fx	
MiCOM H 140	Switch "simple" Copper	6	0	PCI board
MiCOM H 141	Switch "simple" multi-mode	6	1	PCI board
MiCOM H 340	Switch "simple" Copper	6	0	DIN Rack
MiCOM H 341	Switch "simple" multi-mode	6	1	DIN Rack
MiCOM H 342	Switch "simple" multi-mode	6	2	DIN Rack
MiCOM H 343	Switch "simple" single-mode	6	1	DIN Rack
MiCOM H 344	Switch "simple" single-mode	6	2	DIN Rack
MiCOM H 352	Switch for ring architecture multi-mode	6	2	DIN Rack
MiCOM H 354	Switch for ring architecture single-mode	6	2	DIN Rack

Reference	Description	Ethernet		Housing
		Tx	Fx	
MiCOM H 60x	Optical Star 19' rack with from 1 to 4 x H64x and H62x boards			19' 2U Rack
MiCOM H 631	Optical Multi-mode star-switch board	2	6	Double Europe
MiCOM H 633	Optical Single-mode star-switch board	2	6	Double Europe
MiCOM H 621	Double Multi-mode switch board	2*4	2*1	Double Europe
MiCOM H 623	Double Single-mode star switch board	2*4	2*1	Double Europe

TABLE 1 - MiCOM ETHERNET AVAILABLE DEVICE LIST

2.3 MiCOM H6xx

The MiCOM H6xx range is composed of unmanaged switches boards (MiCOM H62x and H63x), extremely easy to install and operate, designed to be integrated in an 19" rack MiCOM H6ox with ou without redundant power supply and implemented in electric plant environment (IEC 61000-4 & 60255-5).

On the media side, MiCOM H62x and H63x board supports 10BaseT, 100BaseTX and 100BaseFX as specified by the IEEE 802.3 committee. With the full duplex and 100BaseTx or 100BaseFx communications, each port can provide theoretically a full 200 Mbps of data throughput (2 times in duplex the 100Mbps of one link).

The MiCOM H6xx is plug and play devices. It can running with the factory setting. To adapt the switch to your applicationyou simply configure using the jumpers the necessary parameters. No supervisory processor is requires to operate properly.

3. FUNCTIONAL DESCRIPTION

The MiCOM H6xx is designed to be an Ethernet switch solution. The MiCOM H6xx solution is based on various elements (rack, redundant power supply, Ethernet boards) to be combined together.

3.1 MiCOM H6xx Range

The MiCOM H6xx range is defined by :

- The rack and the power supply
- The kind of Ethernet connection. All MiCOM H62x and H63x boards have Copper connection 5 4 or 6) through RJ45, with speed automatically adjusted from external emitters to 10 or 100 Mbps.

Copper Ethernet link is limited in distance and subject to perturbation. For long distance and higher noise immunity Ethernet optical ports are added to the range. One or two optical port can be added. To increase Ethernet link length the optical port can have a laser emitter in Single Mode.

Model	Description	Connectors
MiCOM H 60x	Optical Star 19' rack with from 1 to 4 x H64x and H62x boards	
MiCOM H 631	Optical Multi-mode 1300 nm star-switch board	2 x RJ45 6 x ST
MiCOM H 633	Optical Single-mode star-switch board	2 x RJ45 6 x ST
MiCOM H 621	Double Multi-mode 1300 nm switch board	2*4 x RJ45 2*1 x ST
MiCOM H 623	Double Single-mode star switch board	2*4 x RJ45 2*1 x ST

3.2 MiCOM H60x functional composition

This manual will help you install and maintain the rack MiCOM H600. This rack is 1U height 19" rack mounting chassis. It makes it possible to do optical stars to add 1 to 4 MiCOM H63x. Redundant power supply are possible. Designed without fan. For particular applications it is possible to use MiCOM H62x (double switches with 1100BaseFx port and 4 10/100Tx ports).

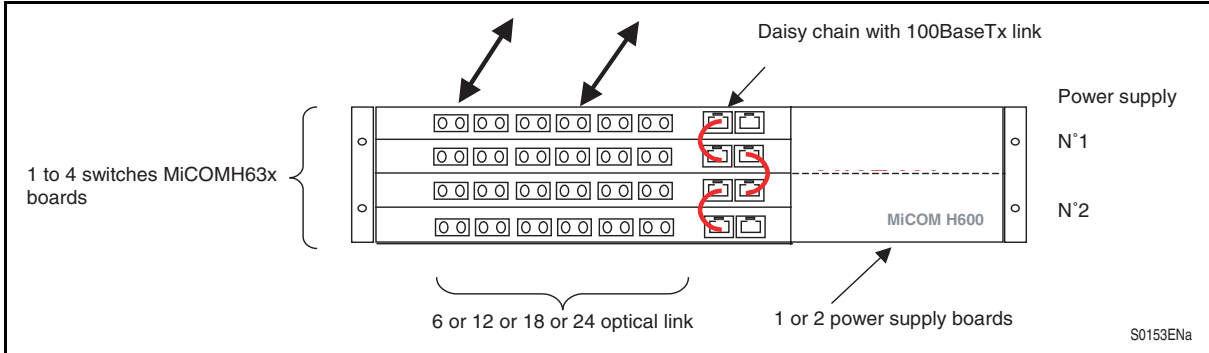


FIGURE 1 - MiCOM H60X FRONT VIEW

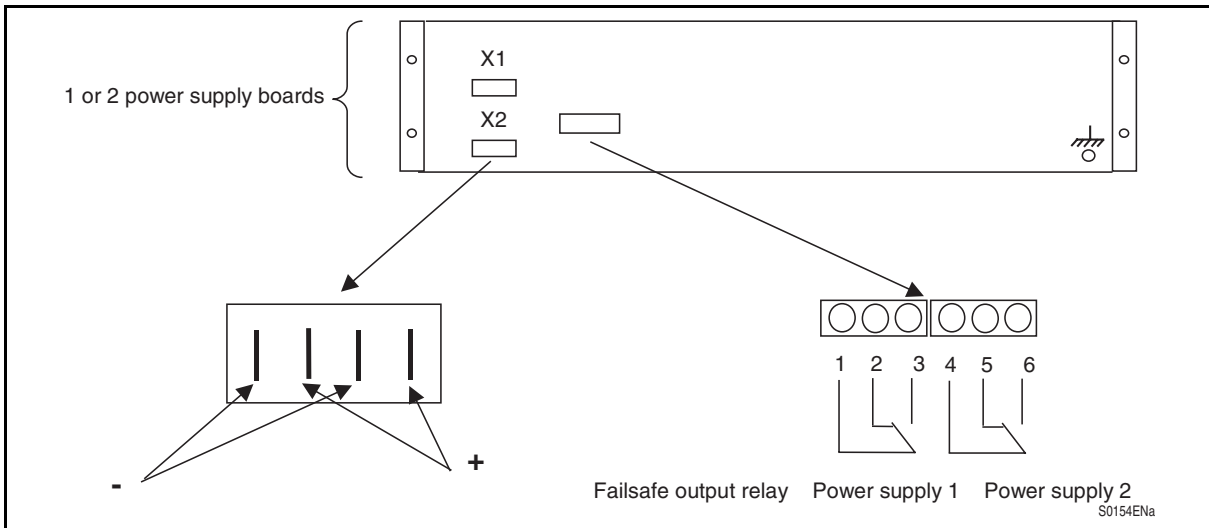


FIGURE 2 - MiCOM H60X REAR VIEW

3.3 MiCOM H62x functional composition

The MiCOM H62x. unmanaged switch board is extremely easy to install and operate. On the media side, MiCOM H62x supports 10BaseT, 100BaseTX and 100BaseFX as specified by the IEEE 802.3 committee. With the full duplex and 100BaseTx or 100BaseFx communications, each port can provide a full 200 Mbps of data throughput. The MiCOM H62x is plug and play devices. It can running with the factory setting. To adapt the switch to your application, it will be possible to configure some parameters with internal jumpers or with the EEPROM. No supervisory processor is requires to operate properly.

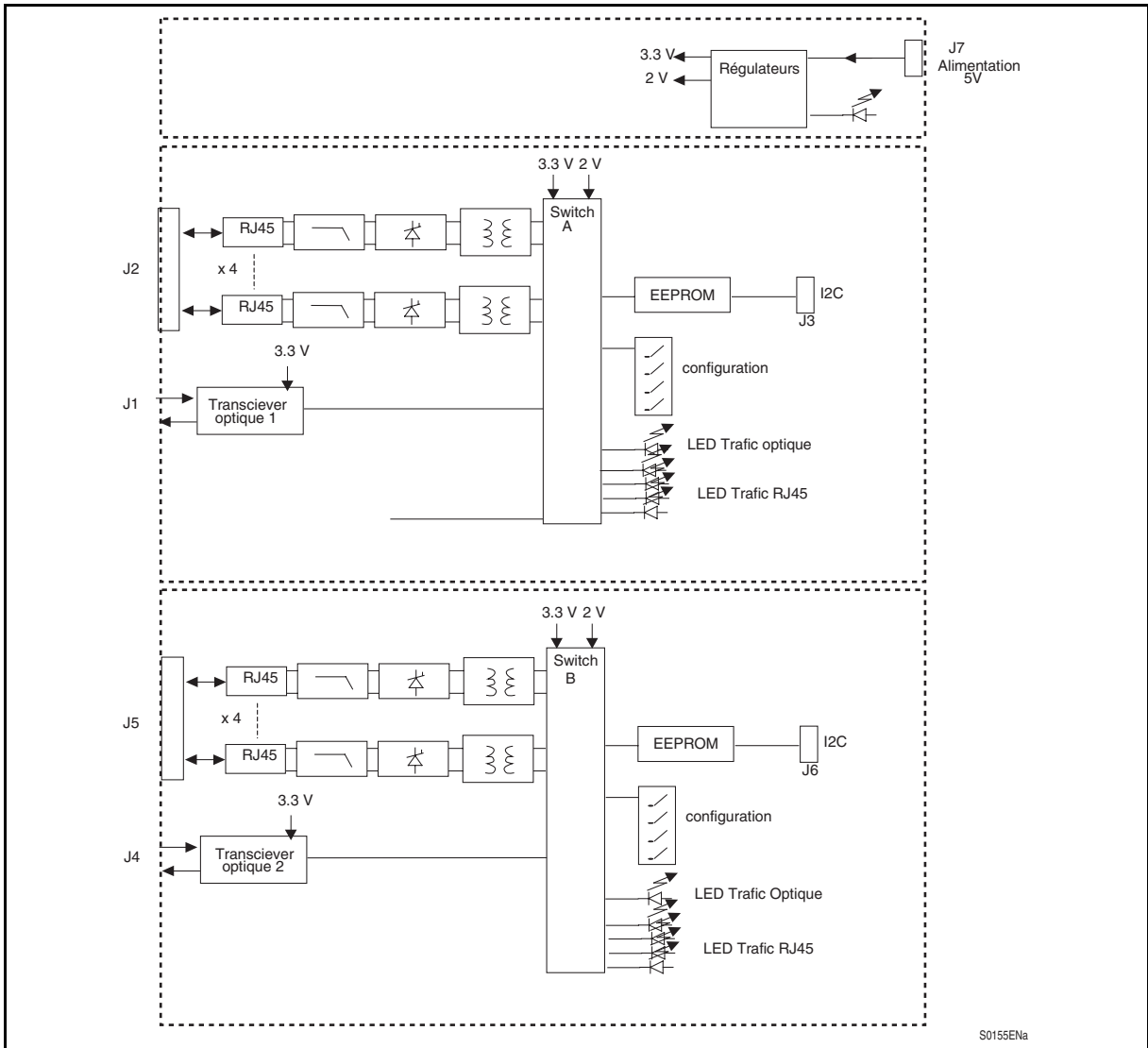


FIGURE 3 - MiCOM H62X

The central part is composed by switching component managing up to 2 time 5 Ethernet links. An EEPROM stores the switching algorithm and manages (via jumpers) minimum parameters of Ethernet switching algorithm.

2 x 4 copper connection are defined in standard. 2 optic connections are defined in the range. Depending of the model these Optical fibber connection are single or multi-mode.

3.4 MiCOM H63x functional composition

The MiCOM H63x unmanaged switch board is extremely easy to install and operate. On the media side, SWITCH MiCOM H63X supports 10BaseT, 100BaseTX and 100BaseFX as specified by the IEEE 802.3 committee. With the full duplex and 100BaseTx or 100BaseFx communications, each port can provide a full 200 Mbps of data throughput. The SWITCH MiCOM H63X is plug and play devices. It can running with the factory setting. To adapt the switch to your application, it will be possible to configure some parameters with internal jumpers or with the EEPROM. No supervisory processor is requires to operate properly.

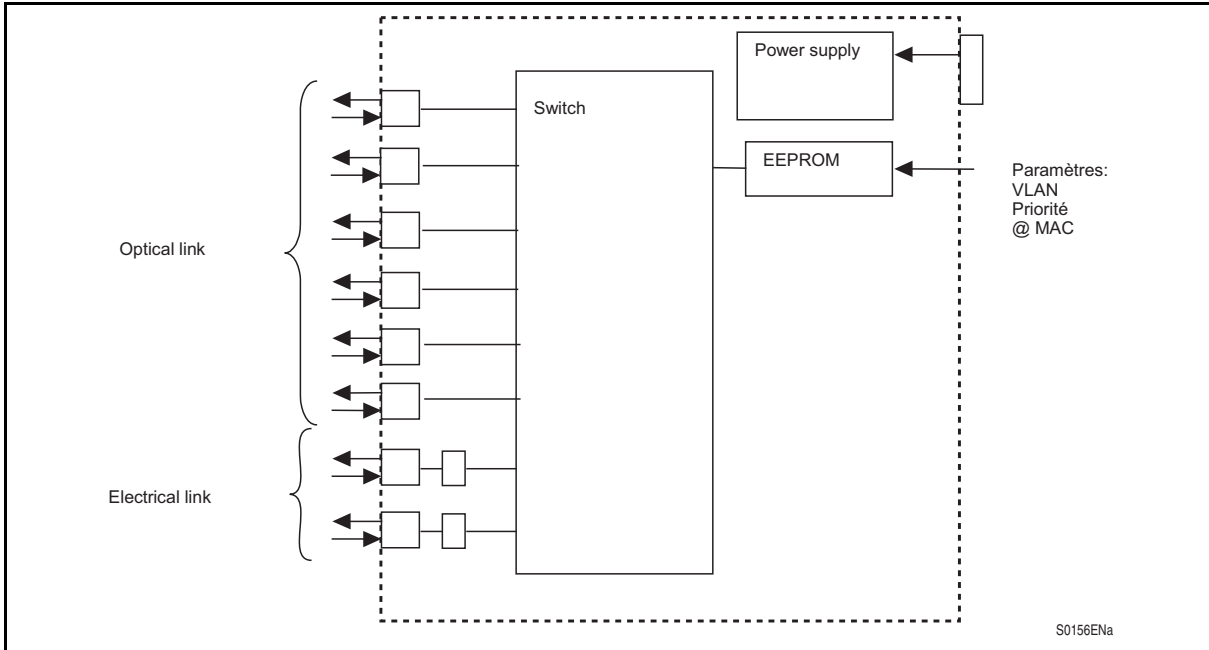


FIGURE 4 - MiCOM H63X

4. CONNECTION

4.1 Ethernet Wiring

4.1.1 Ethernet cable type

Use data quality twisted pair shielded cable rated category 5 with standard RJ45 connectors.

The maximum cable length for 10/100BaseT(x) is typically 100 meters.

The MiCOM H62x & H63x boards support star or tree network topology.

4.1.2 Ethernet cable type

Only the cable insulated category 5 (FTP: Foil Twisted Pair) or insulated (STP - Shielded Twisted Pairs) with RJ45 connectors must be used.

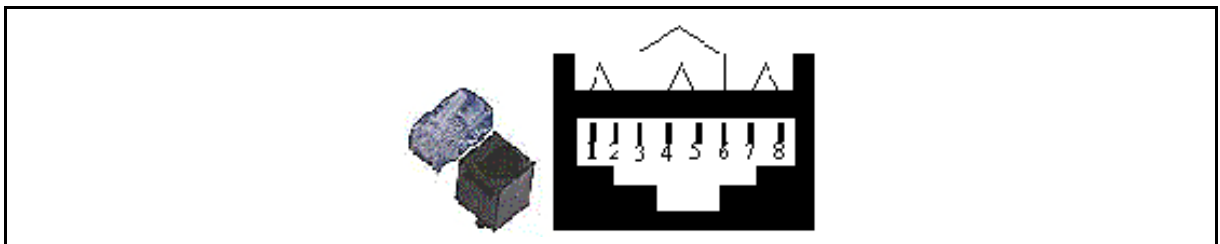


FIGURE 5 - RJ45 CONNECTOR

The norm is:

1 = white / orange

2 = orange

3 = white / green

4 = blue (non used)

5 = white / blue (non used)

6 = green

7 = white / brown (non used)

8 = brown (non used)

The RJ45 connector when seen face on, flat side on bottom, side tab on top, then pin 1 is on the left and pin 8 on the right.

The MiCOM H14x support star or tree network topology.

The maximum cable length for 10/100BaseTx is typically 100 meters.

4.1.3 Ethernet optical fiber

The FO cable are connected to the corresponding FO elements. The connector type for the multi mode fiber or single mode is ST.

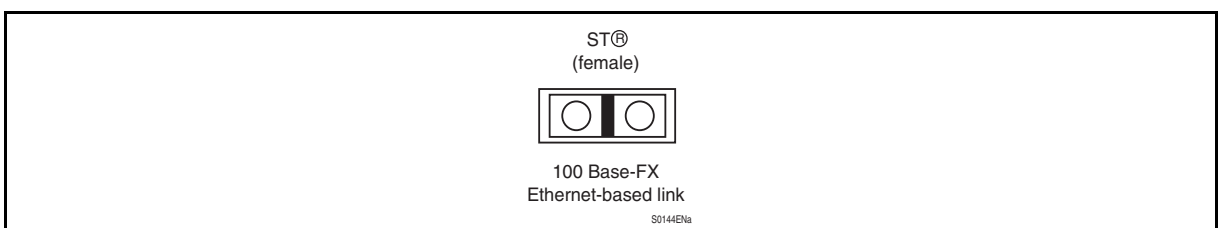


FIGURE 6 - ETHERNET OPTICAL FIBER

5. TECHNICAL DATA

5.1 MiCOM H60x

General	
Auxiliary power	
Required supply voltage	48 to 60 V dc 110 to 125V (ac or dc) 220 to 250V (ac or dc)
Power consumption	50W with 4 MiCOM H63x
Fault signal output	
Connector	2 NC contact potential free
DC voltage	250 Vcc
Continuous current	5 A
Switching current	100A / 30ms
Power breaking with time constant	10W under 48v with $\tau = \tilde{2}ms$
Dimension (mm)	483 (W) * 85 (H) * 320 (D)
Weight	
Mounting	19" Rack mounting chassis

Environmental		
Electric	level	Normes
Voltage tolerance	DC -20 to + 20% AC -20 to + 15%	IEC 60255 - 6
DC Supply interruption	30 & 60% for 100ms	IEC 61000 – 4 - 29
AC Supply interruption	Level A	IEC 61000 – 4 - 11
AC Supply interruption Harmonics immunity	Level A	IEC 61000 – 4 - 13
Main frequency voltage	Level4	IEC 61000 – 4 – 16
Main frequency voltage	Level3	IEC 61000 – 4 – 17
Overcurrent protection		

Isolation			
Dielectric strength	Power ports	2 kV – 50 Hz for 1 minute	IEC 60255-5
	I/O ports	2 kV – 50 Hz for 1 minute	
	Com. ports	1,5 kV dc for 1 minute	
Insulation resistance	Power ports	100 MΩ at 500 V	IEC 60255-5
	I/O ports	100 MΩ at 500 V	
	Com. ports	100 MΩ at 500 V	
Impulse voltage	Power ports	5 kV CM 3 kV DM	IEC 60255-5
	I/O ports	5 kV CM 3 kV DM	
	Com. ports	1 kV CM	

Climatic		
Low temperature	-25°C	IEC 60068-2-1
High temperature	+ 55°C	IEC 60068-2-2
Damp heat	+ 40°C, 93% 48h	IEC 60068-2-3
Temperature variation	-10°C to +55°C 65°C/h stage : 5h duration : 168h	IEC 60068-2-14
Storage temp. range	-40°C +85°C	
Degree of protection	IP 20	IEC 60529

Electromagnetic Compatibility			
Electrostatic discharge	Level 4 (8kV contact 15 kV air)		IEC 61000 – 4 – 2
Radio frequency impulse	Level 4 (35V/m)		IEC 61000 – 4 – 3
Fast transient burst	Power ports	Level 4 (4 kV)	IEC 61000 – 4 – 4
	I/O ports	Level 4 (4 kV)	
	Com. ports	Level 4 (4 kV)	
Surge Immunity	Power ports	Level 4 (4kV/2kV)	IEC 61000 – 4 – 5
	I/O ports	Level 4 (4kV/2kV)	
	Com. ports	Level 4 (4kV/2kV)	
Conducted disturbances	Power ports	Level 3 (10V)	IEC 61000 – 4 – 6
	I/O ports	Level 3 (10V)	
	Com. ports	Level 3 (10V)	
50Hz magnetic field	Level 5 (100A/m continuous)		IEC 61000 – 4 – 8
Pulse magnetic field	Level 5 (1000A/m)		IEC 61000 – 4 – 9
Damped oscillatory magnetic field	Level 5 (100 A/m 100kHz – 1 MHz)		IEC 61000 – 4 – 10
Damped oscillatory wave (100kHz – 1 MHz)	Power ports	Level 3 (2,5kV/1kV)	IEC 61000 – 4 – 12
	I/O ports	Level 3 (2,5kV/1kV)	
	Com. ports	Level 3 (2,5kV/1kV)	
Electromagnetic compatibility	Class A		EN 55022

Mechanical		
Handling Drops	Class 1 2 falls 0,5m	IEC 60068-2-31
Vibration response power on	class 2 (1g 2 to 150 Hz)	IEC 60255 – 21 – 1
Vibration response power off	class 2 (2g 2 to 500 Hz)	IEC 60255 – 21 – 1
Vibration endurance	class 2 (1g 10 to 500 Hz)	IEC 60068-2-6
Shock power off	Class 1 (15g 11ms)	IEC 60255 – 21 – 2
Shock power on	Class 2 (10g 11ms)	IEC 60255 – 21 – 2
Bump	Class 1 (10g 16ms)	IEC 60255 – 21 – 2

5.2 MiCOM H62x & H63x

MiCOM H621 (multi mode)	
10/100BaseT(x) Ports	4
100 BaseFx ports	1
Fiber port mode	multi mode

MiCOM H623 (single mode)	
10/100BaseT(x) Ports	4
100 BaseFx ports	1
Fiber port mode	Single mode

MiCOM H631 (multi mode)	
10/100BaseT(x) Ports	2
100 BaseFx ports	6
Fiber port mode	multi mode

MiCOM H633 (single mode)	
10/100BaseT(x) Ports	2
100 BaseFx ports	6
Fiber port mode	Single mode

10/100BaseT(x) Ports	
Connector type	Shielded RJ45 jack
Twisted pair cable	Cat 5
Max cable length with Cat 5	100 m

100BaseFx Ports multi mode	
Fiber port connector	ST
Optimal fiber cable	50/125 or 62,5/125 μm
Center wavelength	1310 nm
TX output power	-19 dBm
RX input sensitivity	-31 dBm
Maximum distance	2000 m (see the optical budget chapter)
Half or full Duplex	Switch selectable

100BaseFx Ports single mode	
Fiber port connector	ST
Optimal fiber cable	9/125 or 10/125 μm
Center wavelength	1310 nm
TX output power	-15 dBm
RX input sensitivity	-34 dBm
Maximum distance	20 000m (see the optical budget chapter) *
Half or full Duplex	Switch selectable

(*) on request 40 km or 90km are possible

Ethernet	
Forwarding mode	Store and forward
Memory bandwidth	2 Gbps
MAC Address	1K
Address learning	Automatic
Address aging	Remove old address after 300s
Collision	Drops after 16 collisions
Back pressure	Automatic for half duplex
Broadcast storm protection	Limits to 5% by strap
Buffering	128 Kb
Illegal frame	Dropped per 802.3
Late collision	Dropped after 512 bit times
Latency	4 μs measured at 75% load between two ports at 100Mbps

Isolation			
Dielectric strength	Com. ports	1,5 kV dc for 1 minute	IEC 60255-5
Insulation resistance	Com. ports	100 M Ω at 500 V	IEC 60255-5
Impulse voltage	Com. ports	1 kV CM	IEC 60255-5

6. HUMAN MACHINE INTERFACE

6.1 MiCOM H62x LED

6.1.1 External LED

Some LED are used to indicate the state of the links :

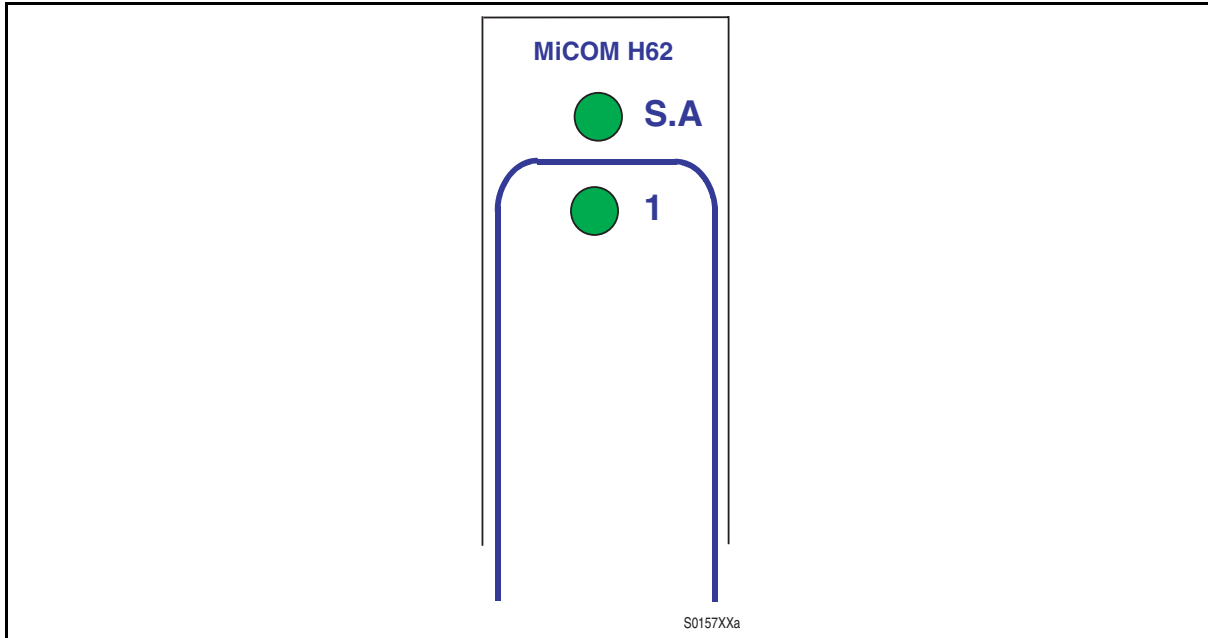


FIGURE 7 - MiCOM H62X LEDS

The table below indicates the function of each LED :

Function	LED number	Color	Description
Power Supply	S.A	GREEN	Power on
		OFF	Power off
Ports Fx	1 & 2	GREEN	Connected without activity
		GREEN fast blink	Activity
		OFF	No connection

Upon power up the switch will go through a series of self-testing. The "Ports LED" will flash a few seconds.

6.1.2 Internal LED

Some LED are used to indicate the state of the electrical links :

Function	LED number	Color	Description
Ports Tx	4 – 5 – 6 – 7	GREEN	Connected without activity
	8 – 9 – 10 - 11	GREEN slow blink (~1s)	Activity at 10 Mbps
		GREEN fast blink	Activity at 100 Mbps
		OFF	No connection

Upon power up the switch will go through a series of self-testing. The 8 “Ports LED” will flash a few seconds.

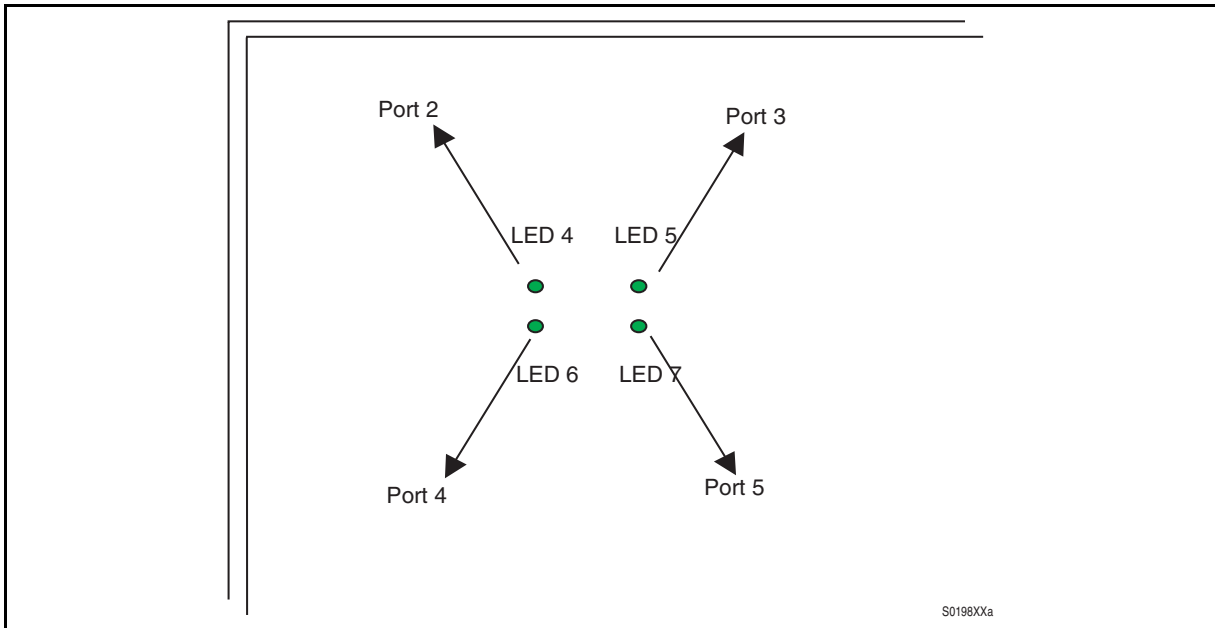


FIGURE 8 - MiCOM H62X PORT LEDES

6.2 MiCOM H63x LED

6.2.1 External LED

Some LED are used to indicate the state of the links :

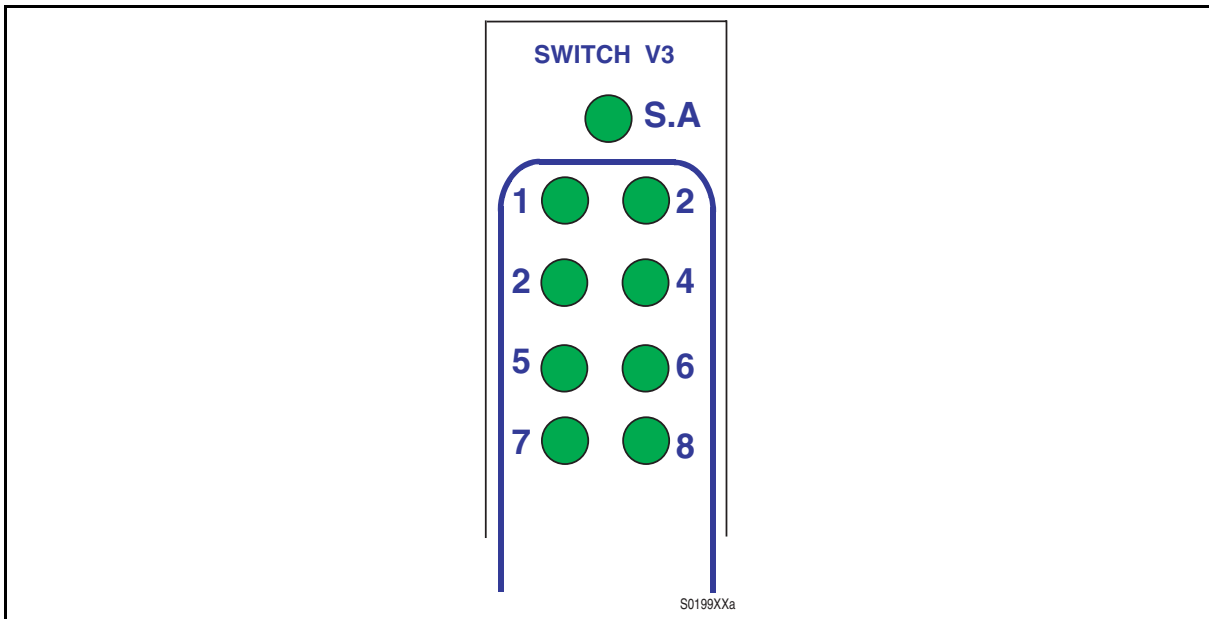


FIGURE 9 - MiCOM H63X LEDS

The table below indicates the function of each LED :

Function	LED number	Color	Description
Power Supply	S.A	GREEN OFF	Power on Power off
Ports Fx	1 2 3 4 5 6	GREEN GREEN fast blink OFF	Connected without activity Activity No connection
Ports Tx	7 8	GREEN GREEN slow blink (~1s) GREEN fast blink OFF	Connected without activity Activity at 10 Mbps Activity at 100 Mbps No connection

Upon power up the switch will go through a series of self-testing. The 8 "Ports LED" will flash a few seconds.

7. INSTALLATION

7.1 MiCOM H60x rack

The Rack MiCOM H600 can be easily mounted on a standard 19" bay.

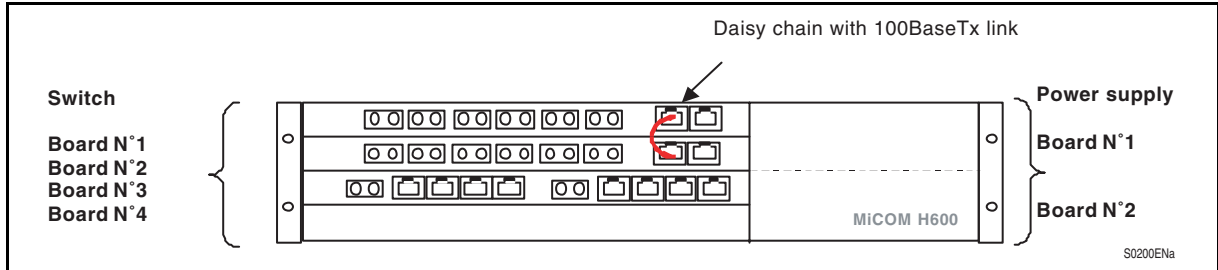


FIGURE 10 - MiCOM H60X BOARD IMPLEMENTATION

7.2 MiCOM H62x board

The SWITCH MiCOM H62x can be easily mounted in a MiCOM H60x rack up to 4 boards.

7.3 MiCOM H63x board

The SWITCH MiCOM H63x can be easily mounted in a MiCOM H60x rack up to 4 boards.

8. SETTINGS

8.1 MiCOM H62x Internal Jumper

Some jumpers are used to adapt the MiCOM H62x switch to your network :

N°	Open	Closed	Factory setting
JP1/JP12	Enable 802.1p selected by EEPROM	Enable 802.1p field for all port	closed
JP2/JP13	Enable more aggressive back-off	Enable less aggressive back-off	open
JP3/JP14	Continue sending frame regardless of number of collisions	Enable to drop frame after 16 collisions	open
JP4/JP15	Enable flow control	Disable flow control	closed
JP5/JP16	Unlimited broadcast frames	Enable 5% broadcast frame allowed	open
JP6/JP17	Share buffers up to 512 buffers on a single port	Enable equal amount of buffers per port (113 buffers)	open
JP7/JP18	Max length is 1536 byte	Enable enforce the max frame length for VLAN is 1522	open
JP8/JP19	Enable half duplex back pressure	Disable half duplex back pressure	open
JP9/JP20	Half duplex for port 1 (Fx)	Full duplex for port 1(Fx)	closed
JP10/JP21	No priority reserve	Enable 6KB priority buffer reserved	closed
JP11/JP22	Electrical port with auto-negotiation	Electrical port at 10Mbps	closed

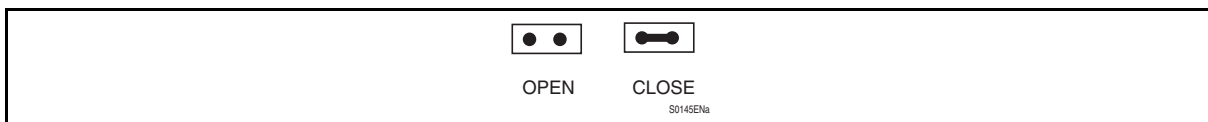


FIGURE 11 - JUMPER POSITIONS

S1 / S2	EEPROM	No EEPROM	closed
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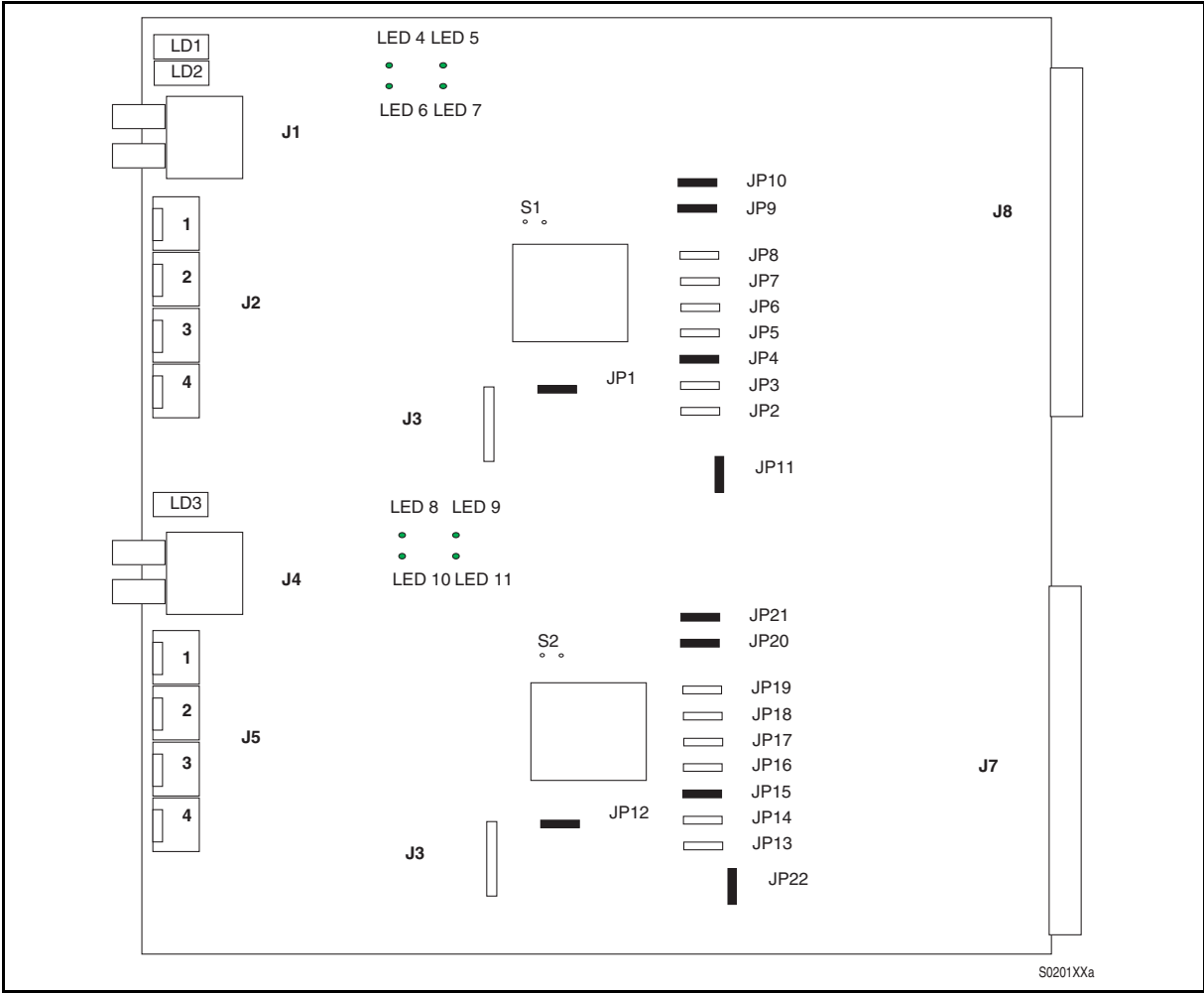


FIGURE 12 - MiCOM H62X JUMPERS

8.2 MiCOM H63x Internal Jumper

Some jumpers are used to adapt the MiCOM H63x switch to your network :

N°	Open	Closed	Factory setting
JP1	Enable 802.1p selected by EEPROM	Enable 802.1p field for all port	closed
JP2	Enable more aggressive back-off	Enable less aggressive back-off	open
JP3	Continue sending frame regardless of number of collisions	Enable to drop frame after 16 collisions	open
JP4	Enable flow control	Disable flow control	closed
JP5	Half duplex for port 1 (Fx)	Full duplex for port 1(Fx)	closed
JP6	Half duplex for port 2 (Fx)	Full duplex for port 2(Fx)	closed
JP7	Half duplex for port 3 (Fx)	Full duplex for port 3(Fx)	closed
JP8	Half duplex for port 4 (Fx)	Full duplex for port 4(Fx)	closed
JP9	Half duplex for port 5 (Fx)	Full duplex for port 5(Fx)	closed
JP10	Half duplex for port 6 (Fx)	Full duplex for port 6(Fx)	closed
JP11	Unlimited broadcast frames	Enable 5% broadcast frame allowed	open
JP12	Share buffers up to 512 buffers on a single port	Enable equal amount of buffers per port (113 buffers)	open
JP13	Max length is 1536 byte	Enable enforce the max frame length for VLAN is 1522	open
JP14	Enable half duplex back pressure	Disable half duplex back pressure	open
JP15	No priority reserve	Enable 6KB priority buffer reserved	closed
JP16	EEPROM		open

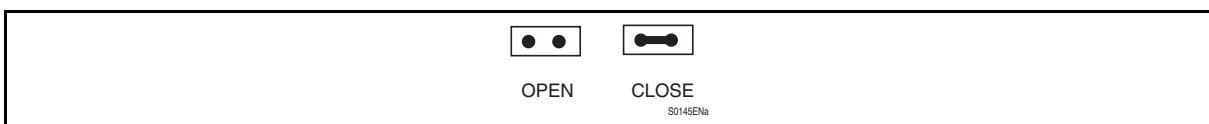


FIGURE 13 - JUMPER POSITIONS

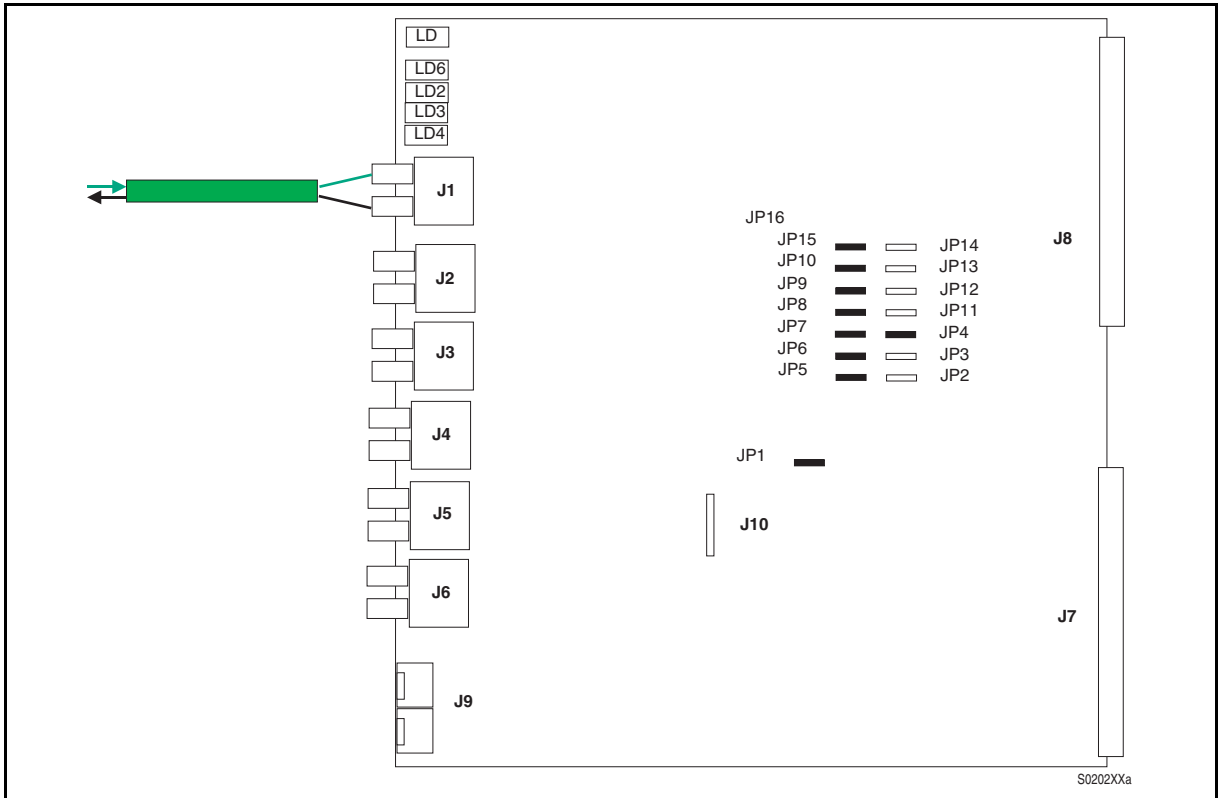


FIGURE 14 - MiCOM H63X JUMPERS

8.3 EEPROM interface

A specific cable is required :

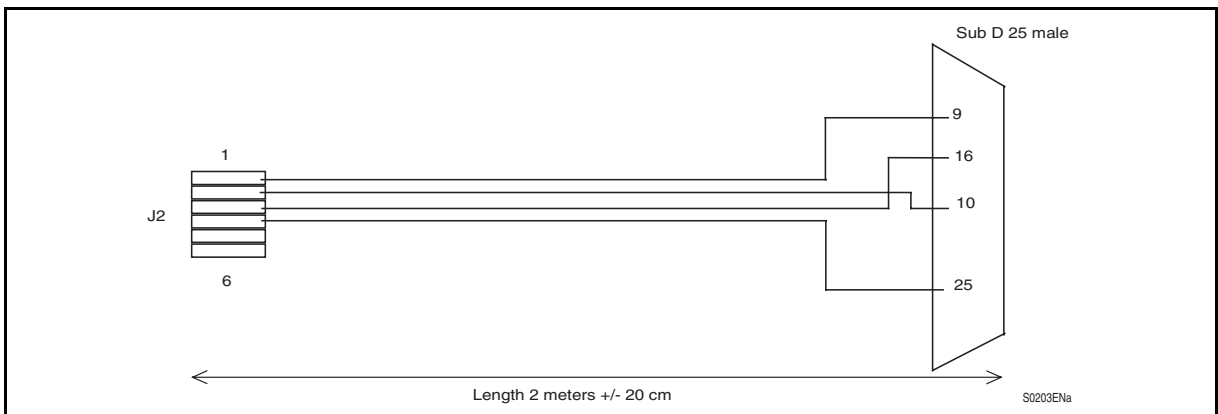


FIGURE 15 - EEPROM CABLE CONNECTION

Connect the cable to the internal connector and the PC printer port.

9. APPLICATIONS

9.1 Fiber Optic budget calculations

Optical power is expressed in Watts. However, the common unit of power measure is the dBm and defined by the following equation:

$$\text{Power (dBm)} = 10 \log \text{ Power (mW)} / 1 \text{ mW.}$$

Example :

The following example shows the calculation of the maximum range for various types of fibers.

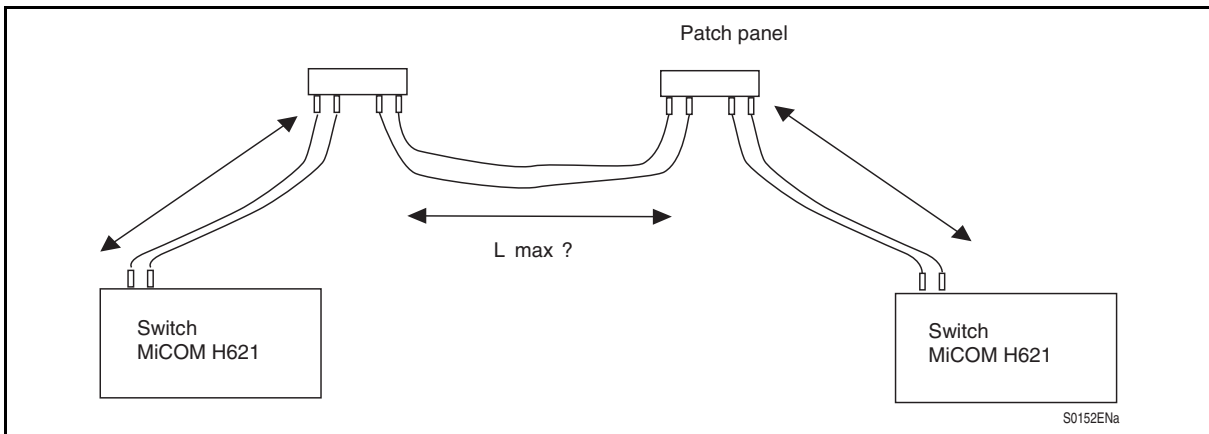


FIGURE 16 - ETHERNET OPTICAL FIBER CONNECTIONS

Fiber type	Multi mode	Single mode
	62,5/125 micron	9/125 micron
Power coupled into fiber	- 19 dBm	- 15 dBm
Sensitivity	- 31 dBm	- 34 dBm
Link budget	12 dB	19 dB
Connector loss (2)	0,8 dB	0,8 dB
Patch loss (2)	2 dB	1 dB
Safety Margin	4 dB	4 dB
Allowed link attenuation	2,4 dB	11,4 dB
Typical cable attenuation	1 dB/km	0,4 dB/km
Maximum range	2,4 km	28 km

The values given above are only approximate ones. Always use cable and connector losses as specified by the manufacturer.

10. GLOSSARY

10.1 Switching Features

10.1.1 10Base T and 100Base Tx

The copper ports are full/half duplex and auto-sense the transmission speed. They will auto-negotiate with the connected device to determinate the optimal speed. When the connected device is only capable of transmitting at 10Mbps, the switch follows the 10Mbps.

10.1.2 100Base Fx

The fiber optic ports are full/half duplex at 100Mbps only. Internal jumpers can select “half or full duplex” for the 6 optical ports.

10.1.3 Power management

If there is no cable on a port, most of the circuitry for that port is disabled to save power.

10.1.4 Address look up

Each Ethernet device inserts its unique “MAC address” into each message it send out. The port on the switch used for given MAC address is automatically learned when a frame is received from that address. Once an address is learned, the switch will route messages to only the appropriate port. A time stamp is also placed in memory when a new address is learned. This time stamp is used with the aging feature, which will remove unused MAC Addresses from table after 300 seconds. The broadcasting messages are transmit in the all ports.

Up to 1024 MAC addresses can be stored and monitored at any time.

10.1.5 Buffering

An internal buffer is used for buffering the messages. There are 1024 buffers available. The factory setting mode adaptively allocates buffers up to 512 to a single port based loading.

10.1.6 Back off operation

The MiCOM H62x or H63x will drop a packet after 16 collisions.

10.1.7 Back pressure for half duplex

The MiCOM H62x or H63x will apply « back pressure » when necessary with half-duplex operation. This «back pressure » will reduce congestion on busy networks .

10.1.8 Broadcast storm protection

Broadcasts and multicasts are limited to 5% of the available bandwidth.

10.1.9 Auto Negotiation and Speed-Sensing

All six or eight RJ45 ports independently support auto negotiation for speeds in the 10BaseT and 100BaseTx modes. Operation is according to the IEEE 802.3u standard.

10.1.10 Forwarding

The MiCOM H62x or H63x support store and forward mode. It will forward messages with know addresses out only the appropriate port. Messages with unknown addresses, broadcast messages and multicast messages will get forwarded out all ports except the source port. The switch will not forward error packets, 802.3x pause frames or local packets.

10.1.11 Priority tagging

802.1p priority is enabled on all ports. A 6 KB buffer is reserved for priority traffic.

10.1.12 Flow control

The MiCOM H62x or H63x automatically supports standard flow control frames on both the transmit and receive sides.

On the receive side, if the switch receives a pause control frame it will not transmit the next normal frame until the timer, specified in the pause control frame, expires. If another pause frame is received before the current timer expires, the timer will be updated with the new value in the second pause frame. During this period (being flow controlled), only flow control packets from the switch will be transmitted.

On the transmit side, the switch has intelligent and efficient ways to determine when to invoke flow control. The flow control is based on availability of the system resources, including available buffers, available transmit queues and available receive queues. The switch will flow control a port, which just received a packet, if the destination port resource is being used up. The switch will issue a flow control frame (XOFF), containing the maximum pause time defined in IEEE standard 802.3x. A hysteresis feature is provided to prevent flow control mechanism from being activated and deactivated too many times.

The switch will flow control all ports if the receive queue becomes full.

10.1.13 VLAN Operation

The VLAN's are setup by programming the VLAN Mask Registers in the EEPROM. The perspective of the VLAN is from the input port and which output ports it sees directly through the switch. For example if port 1 only participated in a VLAN with ports 2 and 9 then one would set bits 0 and 7 in register 13 (Port 1 VLAN Mask Register). Note that different ports can be setup independently. An example of this would be where a router is connected to port 9 and each of the other ports would work autonomously. In this configuration ports 1 through 8 would only set the mask for port 9 and port 9 would set the mask for ports 1 through 8. In this way the router could see all ports and each of the other individual ports would only communicate with the router. All multicast and broadcast frames adhere to the VLAN configuration. Unicast frame treatment is a function of register 2 bit 0. If this bit is set then unicast frames only see ports within their VLAN. If this bit is cleared unicast frames can traverse VLAN's. VLAN tags can be added or removed on a per port basis. Further, there are provisions to specify the tag value to be inserted on a per port basis. The table below briefly summarizes VLAN features. For more detailed settings see the EEPROM register description.

Register(s)	Bit(s)	Global/Port	Description
4-12	2	Port	Insert VLAN Tags – If specified, will add VLAN tags to frames without existing tags
4-12	1	Port	Strip VLAN Tags If specified, will remove VLAN tags from frames if they exist
2	0	Global	VLAN Enforcement – Allows unicast frames to adhere or ignore the VLAN configuration
13-21	7-0	Port	VLAN Mask Registers – Allows configuration of individual VLAN grouping.
22-39	7-0	Port	VLAN Tag Insertion Values – Specifies the VLAN tag to be inserted if enabled



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