

H10MO-120B, H10MO-120+

Fiber Optic Modem

User Manual

Revision 1.0

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Note: Every effort is made to ensure that material printed in this manual is accurate until release. However we reserve the right to make improvements without prior notice.

H10MO-120B, H10MO-120+
Fiber Optic Modem

Operation Manual

1. Introduction

H10MO-120B fiber optic modem is designed to provide transmission of (100BaseTx +4 × E1) channels over a fiber optic connection. The modem features compactness, lightweight, low power consumption and high reliability.

The main characteristics of H10MO-120B fiber optic modem:

- ◆ The E1 input tolerance is far better than ITU- T standard, because H10MO-120B fiber optic modem use lower jitter technique of our company's patent.
- ◆ The modem provides transmission of (100BaseTx +4 × E1) channels over fibers optical connection.
- ◆ The optical interfaces of modem use SC or FC adopters and use receives and transmit integral whole mold piece.
- ◆ The typical modems use a pair of single mode optical fibers, using a pair of multi mode optical fibers or using single optical fiber is optional.
- ◆ The 10/100Base-Tx Ethernet channel is 10 Base-T and 100Base-Tx self-adapted, full duplex. Transmission rate can set 1 Mbps ~100 Mbps (step 1 Mbps). Support the VLAN packets transparent transmission (support biggest length as the MAC packs of the 1536 bytes). Support the QoS manages of IEEE 802.1p. It has 64 Kbytes packets buffer.
- ◆ The 4 E1 channels satisfy the ITU- T G.703.
- ◆ There are loop test the function.
- ◆ Providing a RS485 AUX data channel, 0 kbps~19.2 kbps, when management interface is not use.
- ◆ The offering many alarm indications, can monitor the modem and fiber optics states.
- ◆ The eligibility goes together with the network supervises and control the system, realizing the remote supervise and control;
- ◆ The modem is small scaled to turn, the application is simple and agility.

H10MO-120B fiber optic modem has the two kinds of power supply: -48V DC or ~220V AC.

H10MO-120+ fiber optic modem is designed to provide transmission of (4 × E1) channels over a fiber optic connection. The only difference

between H10MO-120+ and H10MO-120B is that H10MO-120+ does not provide transmission of 100Base-Tx channel.

2. Typical model application

The basic transmission topology of H10MO-120B and H10MO-120+ fiber optic modems is point to point, such as Fig. 2-1. And H10MO-120B and H10MO-120+ fiber optic modems are also applied as star topology with H10MO-1684, such as Fig. 2-2. There are (1+1) optical protect application when collocate two optical interfaces, such as Fig. 2-3.

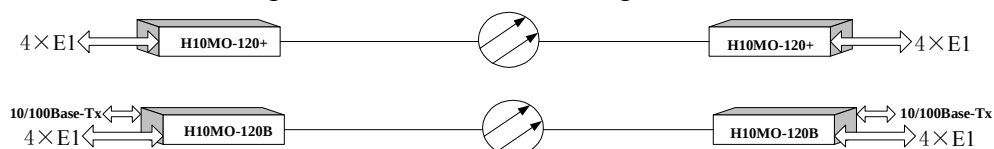


Fig. 2-1. Point to point application

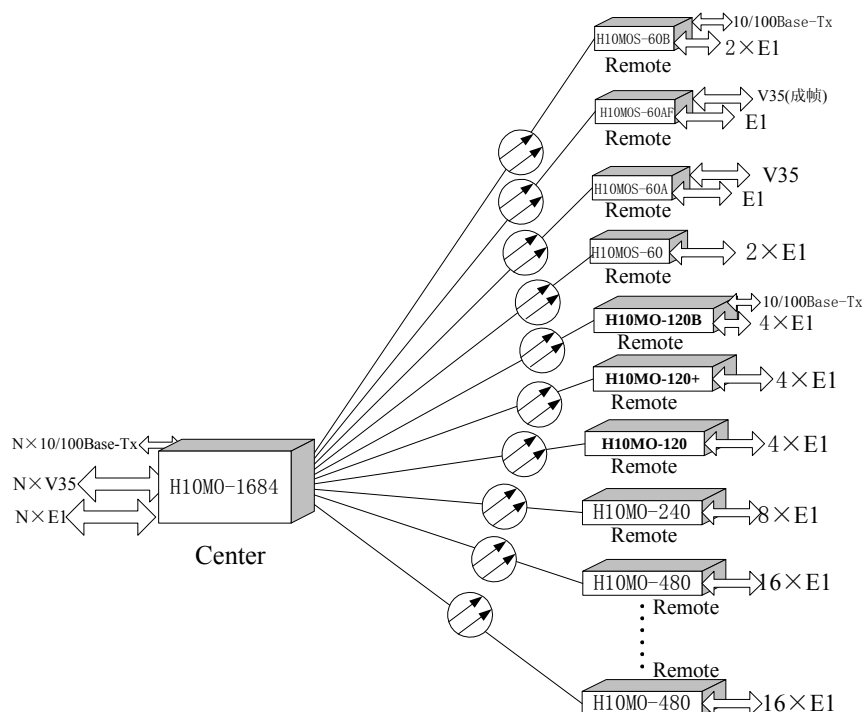


Fig.2-2. Multi point application

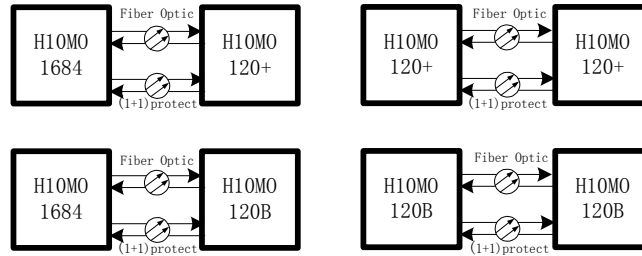


Fig.2-3. (1+1) optical protect application

3. Architecture

3.1. Block diagram

The functional block diagram of H10MO-120B optical modem is given below:

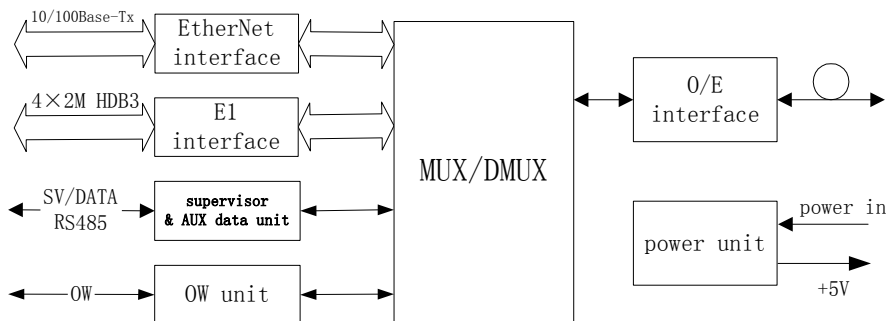


Fig. 3.1-1 Block diagram of H10MO-120B

The core of the H10MO-120B optical modem is the mux/dmux unit, which is realized with a single FPGA device. The main functions of it are main channels and aux channel multiplexing and de-multiplexing, E1 clock recovery, and alarm detection.

O/E interface unit transfers between electronic signal and optical signal for line transmission. Optical signal loss detection, clock and data recovery are also achieved in this unit.

Power unit converts ~ 220V AC or - 48V DC supply into -5V DC internal power.

Ethernet interface unit provides 10/100Mbps interfaces for transparent transmission.

E1 interface unit interfaces the HDB3 E1 signal to the FPGA, and performs impedance matching and line equalization functions.

Management interface (SV port) provides RS485 interface. Built-in micro controller unit sets the operation mode of the FPGA, reads alarm status, calculates bit error rate, and communicates with the network management system for remote supervision.

AUX data unit provides RS485 interfaces for transparent, rate free asynchronous data channels, 0~19.2 kbps.

The functions of the order wire unit include telephone hand set interface, voice coding and decoding, signaling and ringing.

3.2. Front panel arrangement

The front panel of H10MO-120B optical modem is as shown below:

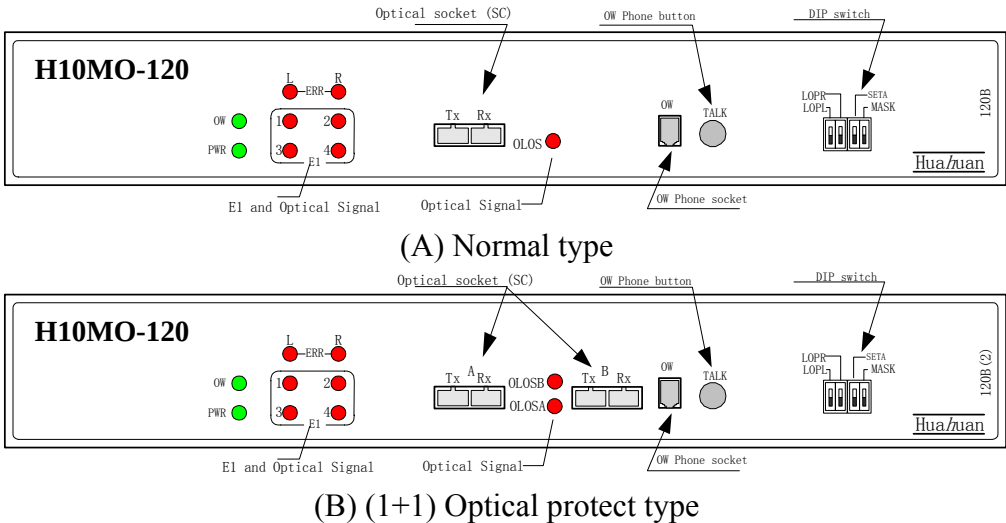


Fig. 3.2-1 Front panel of H10MO-120B

There are green , red and yellow LEDs on the front panel and the real panel of the H10MO-120B modem. The following table lists meaning of all the LEDs and possible causes.

Table 3.2-1 LED descriptions

LED	Color	Meaning when lit		Note
PWR	green	Power switch on and OK		
OW	green	OW phone indication		
ERR-L	red	Local BER in optical receiver signal		
ERR-R	red	Remote BER in optical receive signal		
E1-1	red	No.1 E1 signal	On: Los of HDB3 signal	

E1-2	red	No.2 E1 signal	Fast flicker(0.5s): AIS or BER of HDB3 Slow flicker(1s): set loop Off: OK or alarm mask	
E1-3	red	No.3 E1 signal		
E1-4	red	No.4 E1 signal		
OLOS	red	On: Los of optical signal Flicker: unsynchronization of optical signal Off: OK of optical receiver signal		Normal type
OLOS-A	red	On: Los of No.1 optical signal Flicker: unsynchronization of optical signal Off: OK of optical receiver signal		(1+1) Optical protect type
OLOS-B	red	On: Los of No.2 optical signal Flicker: unsynchronization of optical signal Off: OK of optical receiver signal		
Lnk/act	green	On: Ethernet interface connection is OK Flicker: Data rec./trans. in Ethernet interface		RJ45 Ethernet socket in the Real panel
FDX	yellow	On: Ethernet interface works at full duplex Off: Ethernet interface works at half duplex Flicker: Ethernet interface data conflict		

Use SC or FC type connectors to connect the fiber optic modem to the transmission optical fiber cable. Pay attention to the input and output relationship. Do not bend fiber to sharp angles to prevent damage. **Do not look directly into the fiber end or the Tx connector socket for extended time; it may be harmful to the eyes.**

The order wire telephone jack is on the right side of the front panel. Standard 4-wire telephone set with a RJ11 connector may be used. Note that the ringing current is not sent to the telephone set. Instead, a buzzer is inside the modem to signal the incoming call. The OW telephone works in hot line mode. When one end picks up and push OW phone button “TALK”, the other end rings. Only when both end push OW phone button “TALK”, they talk each other.

The following table lists RJ11 socket description of OW telephone set.

Table 3.2-2 RJ11 socket description of OW telephone set

Pin	1	2	3	4
Signal	Rx-	Tx+	Tx-	Rx+

OW phone button “TALK” has 2 functions. One is for OW phone ringing the other end and talk, when push down “TALK”. Another is for bell-off alarm, when push down “TALK”.

are used to set working mode of H10MO-120B. The following table lists 4-DIP switches description.

Table 3.2-3 4 DIP switches description

No. of DIP	Name of DIP	Description
K[1]	LOPL	Local end loop back control: DIP up is normal. DIP down is local end loop back — four E1 and SV/ DATA signals.
K[2]	LOPR	Remote end four E1 loop back control: DIP up is normal. DIP down is remote end loop back — four E1 signals.
K[3]	SETA	Supervisor/ data setting: DIP up is in supervisor state — RS485. DIP down is in RS485 AUX data.
K[4]	MASK	Mask alarm control: DIP up is normal. DIP down is set local alarm mask
NOTE: That both K [1] and K [2] are down shows normal state, which do not allow remotely managed by a PC to setting loop back		

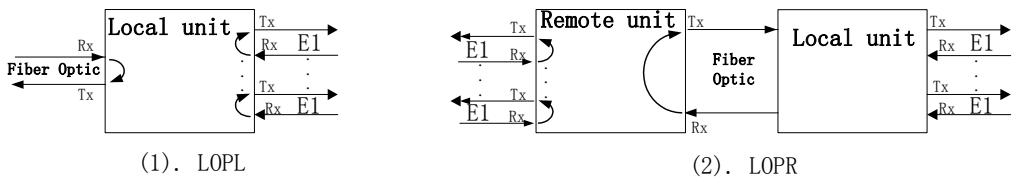


Fig. 3.2-2 Local and remote loop backs

3.3. Real panel arrangement

There are RS485 interface, Ethernet interface, E1 interfaces, power switch and power in port in real panel of H10MO-120B.

There are three types of H10MO-120B, ~220V AC and – 48V DC, according to the power supply. Their real panels show in following figures.

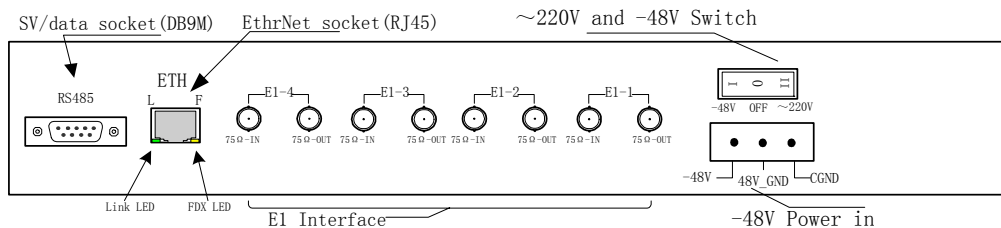


Fig. 3.3-1 Real panel(- 48V DC)

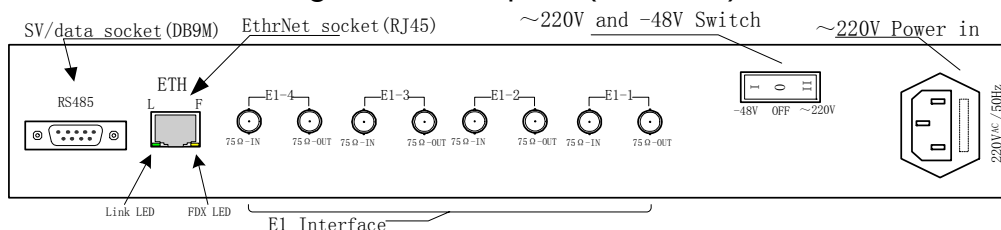


Fig. 3.3-2 Real panel(~ 220V AC)

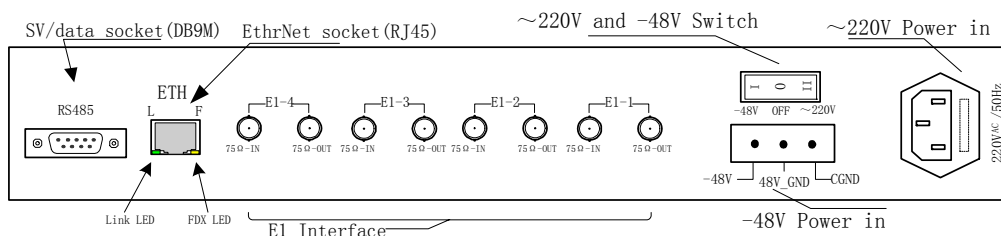


Fig. 3.3-3 Real panel(~ 220V AC and -48V DC)

SV/DATA socket is DB9. Supervisor port throw RS485 and RS485 AUX data port share the DB9.

The following table lists DB9 socket description.

Table 3.3-1 DB9 socket description

Pin	5	6	7	8	9	
Signal	GND	RxN	RxP	TxN	TxP	

The 10/100Base-Tx RJ45 Ethernet interface is 10 Base-T and 100Base-Tx self-adapted. The following table lists RJ45 socket description.

Table 3.3-2 RJ45 socket description

Pin	1	2	3	4	5	6	7	8
Signal	TxD+	TxD-	RxD+			RxD-		

The RJ45 connector plug shows in following figure.

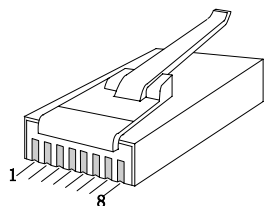


Fig. 3.3-4 RJ45 connector plug

The 75Ω E1 interfaces are BNC sockets.

4. Software monitor and control

H10MO-120B fiber optic modems can be managed by the H7GMSW management software, running on a PC platform. See operation manual of H7GMSW for operation of the software package. Only the details specific to H10MO modems are given here.

The H10MO-120B modem is represented by the following icon in the graphical management window. When any alarm condition is present, the icon flashes.

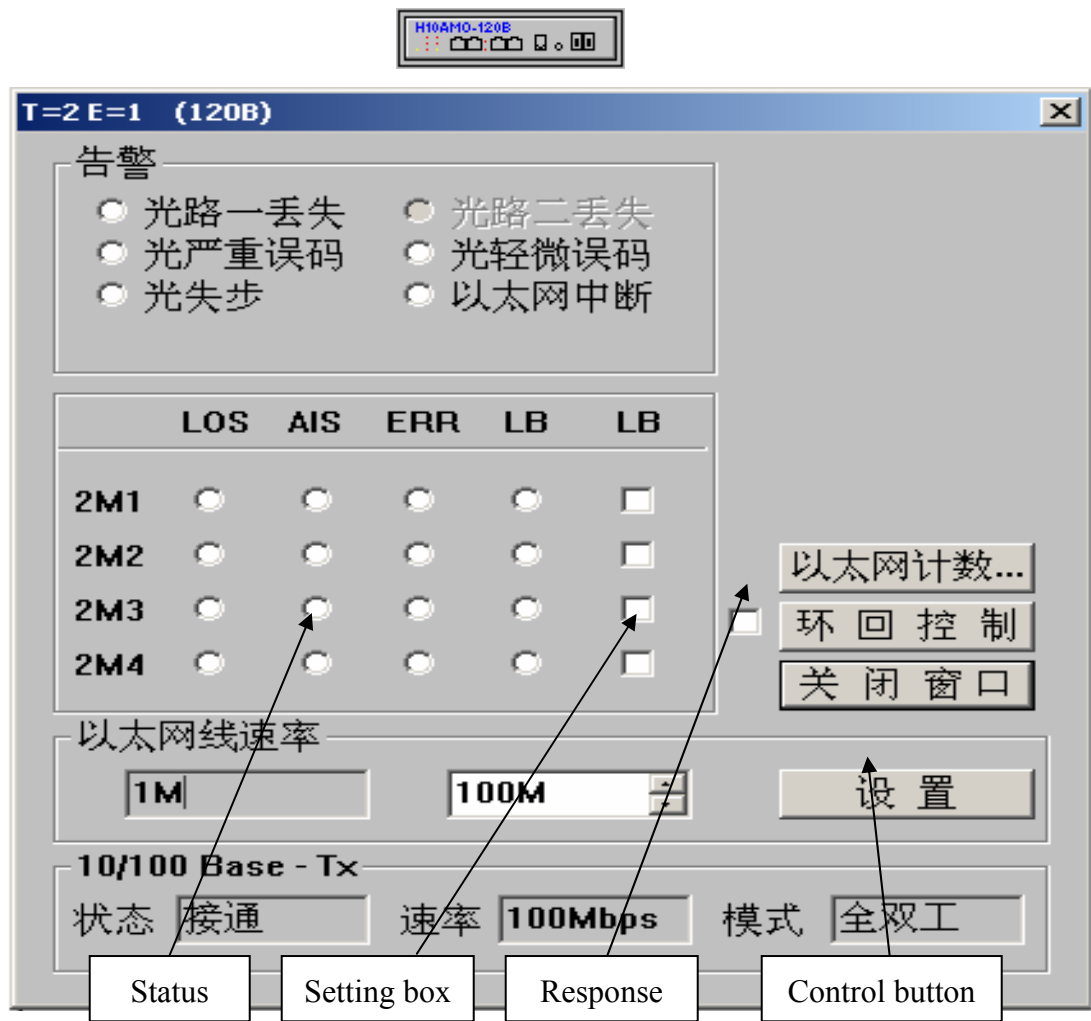


Fig.4-2 Management window for an H10MO-120B modem

Monitoring and control is performed through this window. In the window, there are status circles, setting boxes, response boxes, and control buttons. **Status circle indicates a specific status, including alarm and current loop back setting, by showing a dot inside the circle. Setting box is used to select loop back of specific channel and type, trans./rec. data rate of Ethernet. Control button is for carrying out the selected loop back, or close the window. Response box indicates, by showing a cross in the box, response from the modem under control after a control button is pressed.**

To set a specific port loop back, move the mouse cursor to the appropriate setting box, click to bring up a check sign, and click the "E1 loop back control" button. Any number of E1 loop backs can be set with a single control. To remove a loop back, click the setting box to remove the check sign, and click the "E1 loop back control" button again.



Note

H7GMSW management software can not be set the remote loop back (four E1 loop back), otherwise the loop back will block the data communication channel, and there will be no way to remove the loop back. And link dress 26 is forbidden.

H10MO-120B provides a series 0 ~ 19.2kbps an asynchronous channel when setting "RS485 AUX data channel". When "RS485 AUX data channel" is not set, RS485 can be used as management interface.

Following monitoring and control can be performed on H10MO-120B modems through the management software:

- 100M, FDX, Col, Lnk, act status of 10/100Base-Tx Ethernet port.

- Los of signal at any E1 port.

- Alarm indication (AIS) at any E1 port.

- Loop back status and types (LOPL or LOPR) of each E1 port, control of loop backs.

- Los of incoming optical signal.

- Bit error rate.

- Local loop back (both E1 loop back) status and control.

- Setting RS485 AUX data channel.

5. Installation and operation

5.1 Mechanical

The dimension of the H10MO-120B fiber optic modem is shown in Fig. 5.1-1.

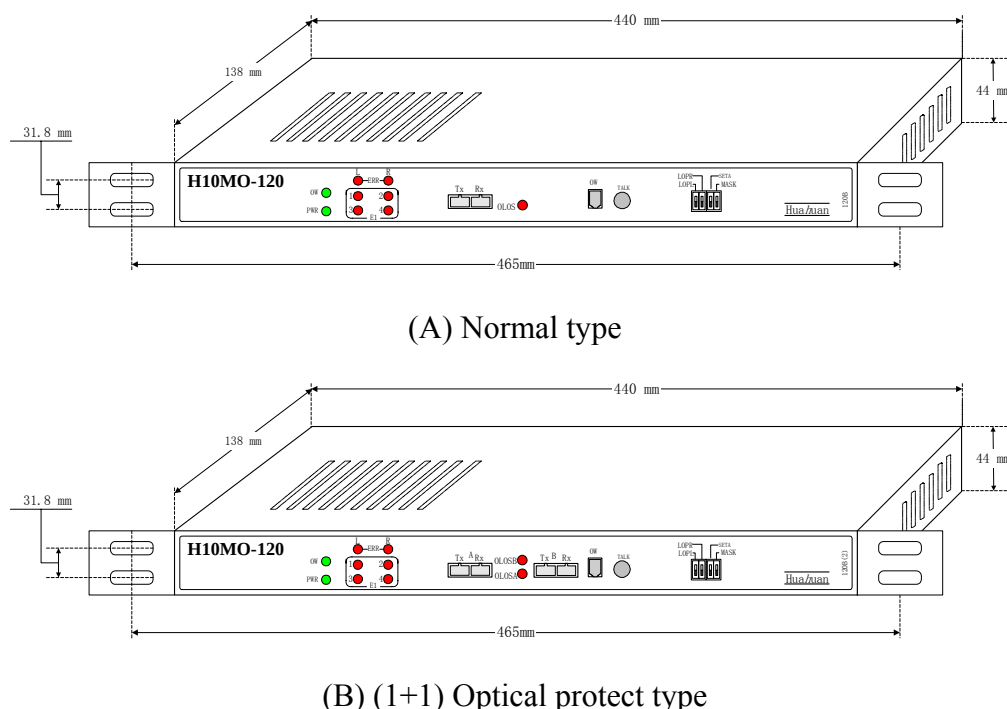


Fig. 5.1-1 Mechanical dimension of H10MO-120B

5.2 Setting and application

Following steps are installation, connecting power, E1 cable, Ethernet cable, SC or FC optical fiber, DB9M cable (SV/DATA).

According to the [Table 3.2-3](#) "4 DIP switches description", working modes of H10MO-120B fiber optic modem are set.

When all the connections are done, switch on the unit. Observe all the alarm LEDs for any possible installation errors(refer to [Table 3.2-1](#) "LED description"), after the 40 seconds. Check the output optical power using an optical power meter. The reading should be within specification.

Measure the optical power at the receiver end. Make sure that the power level is between the maximum allowable input power and sensitivity given in the specification. It is preferred to leave a margin of few dB' s for stable operation.

If software management is required, each modem pair should be given a unique network address. In addition, the local unit should be set to a node address of 0, and the remote be set to 1. If the TABS address of local unit is “x” (x=1~25), then the TABS address of remote unit is “x.1”. If software management is not used, address setting is not required. SV/DATA RS485 port can provide network management or RS485 aux data 0~19.2bps function.

Press down the local loop back (LOPL) dip switch at the front panel. Measure any E1 channel using a bit error rate tester, no error should present. Cancel the LOPL. If the remote end is already operational, press down the remote loop back (LOPR) dip, measure any E1 channel, no error should be found, that means optical fibers link is ok. Cancel the LOPR, and the modem pair should operate normally.

Connect all the E1 signals to the appropriate E1 ports, check the operation of the services provided by these E1 channels.

Connect Ethernet signal to the appropriate 10/100Base-Tx port, check the operation of the services provided by this 10/100Base-Tx channel.

That both dips of LOPL — K[1] and LOPR — K[2] are down shows normal state, which do not allow locally and remotely managed by a PC to setting loop back.

6. Specifications

6.1. Capacity

H10MO-120B: four E1 PDH signals and one 100Base-Tx Ethernet signal

H10MO-120+: four E1 PDH signals

6.2. Optical interface

Line rate:	155Mbps
Line code:	Scrambled NRZ
Wavelength:	1.3 μ m (typical) 1.5 μ m (optional)
Optical source:	LD (output: -5dBm ~ -12dBm)
Optical receiver:	PIN-FET
Connector:	SC or FC
Optical budget:	$\geq$ 25dB (typical) 29dB~35dB (optional)

Maximum input power: -5dBm

6.3. 10/100Base-Tx Ethernet interface (IEEE802)

10 Base-T and 100Base-Tx self-adapted

Transmission rate can set 1 Mbps ~100 Mbps (step 1 Mbps)

Full duplex

Support the VLAN packets transparent transmission(support biggest length as the MAC packs of the 1536 bytes)

Support the QoS manages of IEEE 802.1p

64 Kbytes packets buffer

6.4. E1 interface (ITU-T G.703)

Bit rate: 2048kbps±50ppm

Line code: HDB3

Impedance: 75Ω (unbalanced, BNC socket)

6.5. SV/DATA interface

Management interface:

RS485, 2400 bps, TABS protocol

Data bits: 8, Stop bits: 1, Parity: odd

9-pin DB9 type connector

AUX data interface:

RS485, 4-line (TxP,TxN,RxP,RxN),

asynchronous, 0~19.2 kbps,

9 pin DB9 type connector

(Only one DB9 RS485, so one of SV and AUX data interface can be used at same time.)

6.6. OW interface

The order wire telephone jack is standard 4-wire telephone set with a RJ11 connector .

6.7. Power

DC type: -48V (-38V ~ -62V)

AC type: ~ 220V (170V~260V)

Power consumption: ≤ 5W

6.8. Working environment

Temperature: (0 ~50) °C

Humidity: ≤ 90% non condensing

6.9. Dimension

Width: 440mm

Height: 44mm

Deep: 138mm.