
OPTICAL

SYSTEMS

DESIGN

OPERATOR MANUAL

OSD2175MP SERIES

GIGABIT ETHERNET

MEDIA CONVERTERS

OPTICAL SYSTEMS DESIGN

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1 TECHNICAL SUMMARY

1.1 BRIEF DESCRIPTION

1.1.1 OVERVIEW

The OSD2175MP is a media converter designed to convert between 10/100/1000Base-T copper cabling and 100Base-FX / 1000Base-X fiber cabling with the added feature of Link Loss Forwarding and disabled Auto Negotiation. It has one SFP port (Port 1) and one Combo port providing the user a choice to employ either the SFP or a fixed RJ45 copper port on Port 2. The SFP ports can be specified by the user for one or two fiber configuration. The OSD2175MP has Power over Ethernet (PoE) function and operates as a Power Source Equipment (PSE) fully compliant with IEEE 802.3at and IEEE 802.3af standards. The OSD2175MP PoE can provide up to 30W to Powered Devices (PD).

The OSD2175MP incorporates Link Loss Forwarding (LLF) function providing fault detection and shut down when a link fails. Network diagnostic is enhanced by the OSD2175MP wire speed Layer 2 loopback function. Jumbo Frames are also supported by the OSD2175MP.

The unit will operate on either singlemode or multimode fiber. Operation over at least 500m of multimode fiber or 50km of singlemode fiber is possible by use of the appropriate SFP optical devices.

A major benefit of the OSD2175MP is its reliable operation over the -20°C to +65°C temperature range which allows it to be used in environments such as cabinets both inside and outside buildings.

1.1.2 APPLICATIONS

- ▲ Any network utilising a mix of copper and fiber
- ▲ Industrial IP communications
- ▲ Can function as a fiber/copper media converter or as a multimode/singlemode converter
- ▲ Secure, noise immune extensions of networks using Power over Ethernet such as intercoms, access control, telephones, picocells etc

1.1.3 FEATURES AND BENEFITS

- ▲ Complies with IEEE802.3i/802.3u/802.3ab 10/100/1000Base-T, IEEE802.3z 1000Base-Lx/Sx standards.
- ▲ Supports network traffic of 100Mbps or 1000Mbps.
- ▲ Has one SFP optical port supporting 100BaseFx/1000BaseLx/Sx and one combo port (SFP priority) comprised of a 100/1000 SFP and a 10/100/1000 RJ45 copper port.
- ▲ Automatic TP setup: no need for crossover cables.
- ▲ Supports 10KB jumbo frames.
- ▲ Provides up to 30W PoE
- ▲ Complies with the IEEE 802.3at and 802.3af standards.
- ▲ Small and robust module versions; -48V_{DC} model and 240V_{AC} model
- ▲ Operates over the temperature range of -20 to +65°C
- ▲ Advanced features like Link Loss Forwarding to detect the link status of link partners either on the fiber and/or copper port.
- ▲ Ethernet Pause frames can be discarded
- ▲ Ethernet loopback testing using MAC-address swapping (wire-speed)
- ▲ Optional Synchronous Ethernet
- ▲ User selectable auto-negotiation
- ▲ SFP module(s) sold separately.

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1.2 TYPICAL CONFIGURATION

Figure 1 below indicates the typical set-up for an OSD2175MP system.

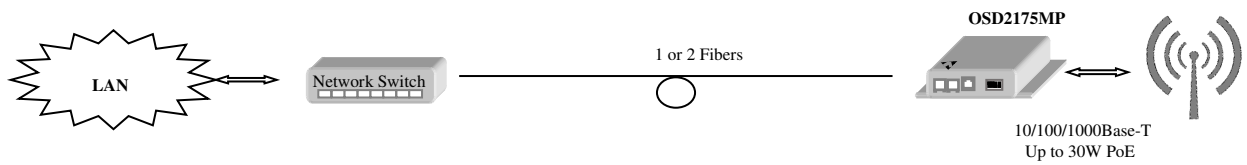


FIGURE 1: OSD2175MP TYPICAL CONFIGURATIONS

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1.3 TECHNICAL SPECIFICATIONS

TABLE 1: TECHNICAL SPECIFICATIONS

SPECIFICATION	PERFORMANCE	
Electrical		
Electrical Data Interface	IEEE802.3i/802.3u/802.3ab 10/100/1000Base-T Ethernet	
Electrical Data Rate	10, 100, 1000Mbps with energy detect, auto negotiate, auto MDIX	
Jumbo Frame Support	10KB	
Optical Data Interface	IEEE802.3z 1000Base-Lx/Sx/Zx	
Optical Data Rate	100Mbps or 1000Mbps	
Operating Mode	Half or full duplex for 10/100 Full duplex for 1000	
Electrical Data Connector	RJ45	
User Controls	<ol style="list-style-type: none"> 1. 100/1000BASE-X for Port 1 2. 100/1000BASE-X for Port 2 3. Port 2 Auto-Negotiation On/Off 4. Half-duplex/Full duplex for copper port 5. Flow control for copper port 6. Link Loss Forwarding On/Off 7. Synchronous Ethernet Master Select * 8. Synchronous Ethernet On/Off * 9. Push Button: MAC-Address Swap Loopback Function <p>* Not Used for non-SyncE version</p>	
Combo Port Selection	SFP used when plugged in, otherwise RJ45	
Optical		
Optical Port Connectors	Two SFP	
SFP Options	Short haul, long haul, single fiber operation, etc Please consult OSD datasheet #102100002 (1000Mbps) and 10210003 (100Mbps) or contact OSD	
Physical		
Operating Temperature	-20°C to +65°C	
Relative Humidity	0 to 95% non-condensing	
	-48VDC Module Version	240VAC Module Version
Power Requirements	-44 to -56V _{DC} @ 8W plus up to an extra 30W for PoE operation (attached powered device dependant)	100 to 264VAC @ 8W plus up to 45W with PoE operation (attached powered device dependent)
Power Connection	2-Way 5.08mm Terminal Block	2-pin male IEC C7 figure 8
Isolation (Module versions)	>3kV	>3kV
Dimensions (mm)	114W x 105D x 32H	173W x 114D x 32H
Weight	0.4kg	0.8kg
Reliability (calculated using the Military Handbook MIL HDBK 217F in a Ground Benign Environment at 30°C.)		
	-48VDC Module Version	240VAC Module Version
Normal operation	> 484,000 hours	> 178,000 hours
Operation with Loopback Test	> 350,000 hours	> 156,000 hours

Ref: 1022175A05, 102175B05

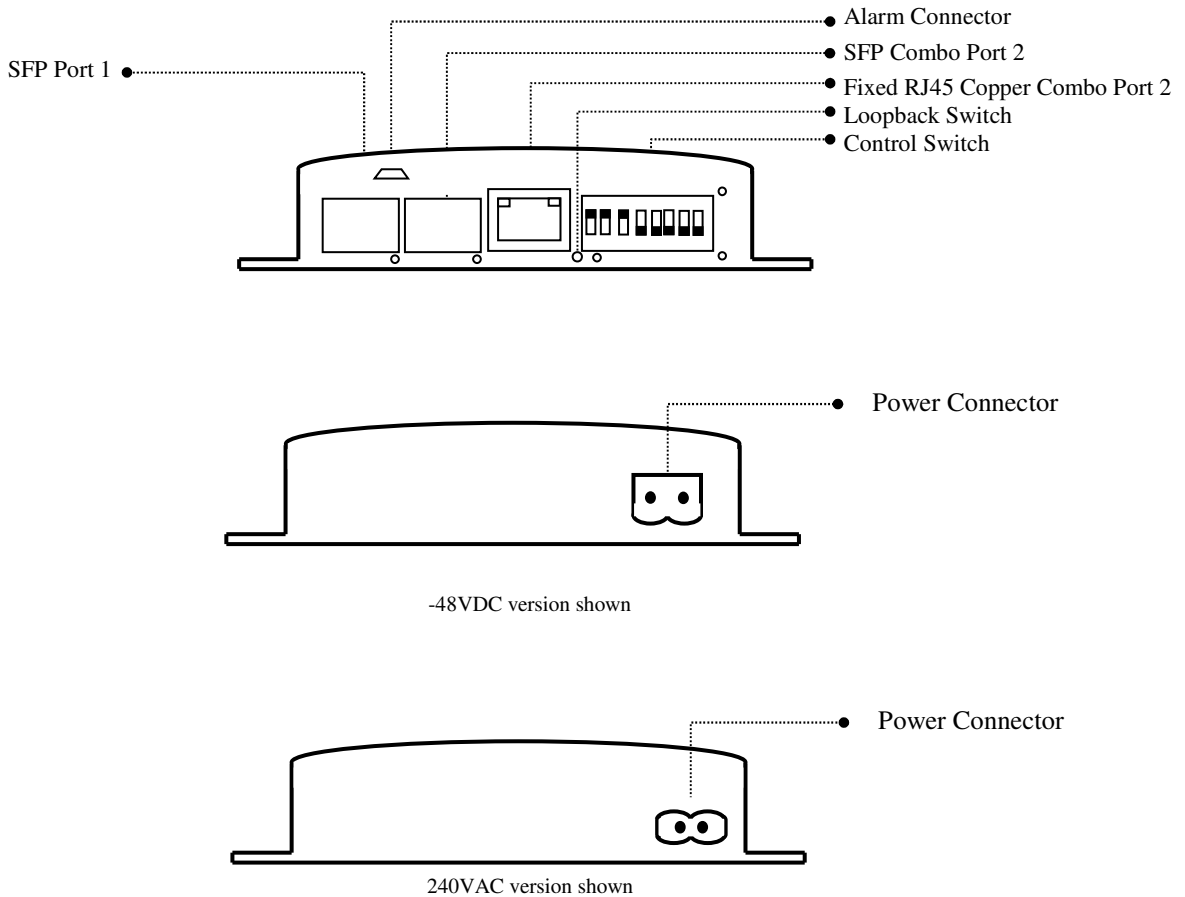
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1.4 OSD2175MP FRONT AND REAR PANELS

There are two SFP ports and one fixed copper port for 10/100/1000Base-T on the front panel. The SFP device is sold separately giving the user choice to use either one or two fiber communications with various optical power outputs depending on the distance required. Port 2 is the Combo Port where the user has the option to either fit an SFP into Port 2 or use the fixed RJ45 Port. The OSD2175MP will automatically detect which of the two connections is employed. Note: only one connection can be used on Combo Port 2. The OSD2175MP has a PoE PSE function and can supply the PD through Port 2. Note that the PoE function is always available on the OSD2175MP copper port even when the Port2 SFP is used.

There is an 8-way DIP switch on the front panel for product configuration, a Micro Switch for Loopback Testing and a Micro-B USB Alarm connector.

The rear panel differs between the DC and AC powered versions. The DC powered unit has a 2-way 5.08mm terminal block power connector. The AC powered version has 2-pin male IEC C7 figure 8 connector. Each section will be described further throughout this manual.



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FIGURE 2: OSD2175MP FRONT AND REAR PANELS

2 INSTALLATION AND OPERATION

2.1 INTRODUCTION

This section outlines the methods required to install and operate the OSD2175MP successfully. It should be studied carefully if damage to the equipment or poor results are to be avoided.

This equipment has been fully tested prior to dispatch and is ready for immediate operation. However it is advisable to check for external transportation damage before operation. If damage is evident, return the unit with the packaging to your supplier immediately.

2.2 INSTALLATION

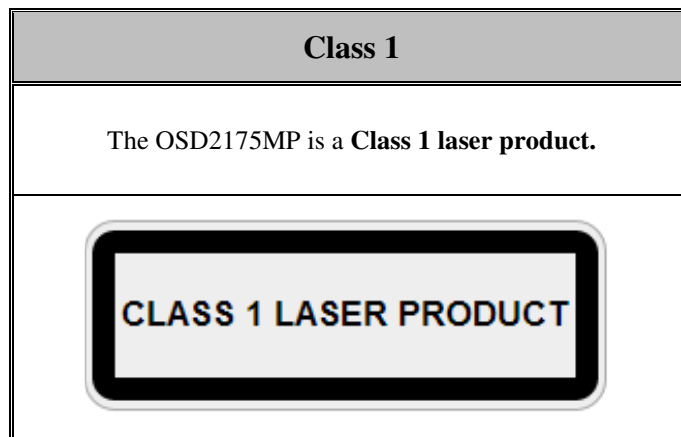
2.2.1 WARNING AND PRECAUTIONS

ELECTROMAGNETIC COMPATIBILITY

WARNING: This is a **Class A product**. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

OPTICAL OUTPUT OPERATION

WARNING: Laser Safety: Class 1 Laser Product per IEC/EN 60825-1:20011 standard.



PRECAUTIONS

- ▲ All service personnel should be provided training as to the hazards of direct viewing of laser radiation and of the precautionary measures during servicing of equipment
- ▲ Areas where laser products are installed should be restricted in access to trained service personnel only and appropriate warning signs posted in the work area.
- ▲ All laser apertures should be covered by protective covers when not connected to optical fibers. Never leave outputs uncovered.

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- ▲ Laser equipment should be positioned above or below eye level where possible. Apertures should be positioned away from personnel.
- ▲ Protective eyewear should be worn in the vicinity of laser equipment.

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2.2.2 OSD2175MP DRAWINGS AND DIMENSIONS

The OSD2175MP module versions are designed to be mounted on an even surface and to be secured by means of M4 or smaller screws.

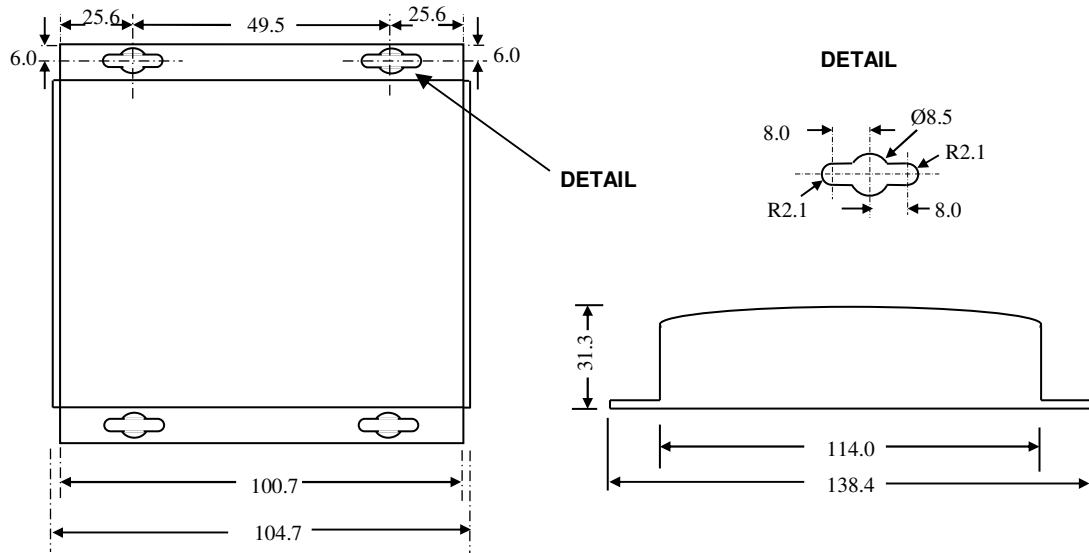


FIGURE 3: OSD2175MP/48VDC MOUNTING DIMENSIONS

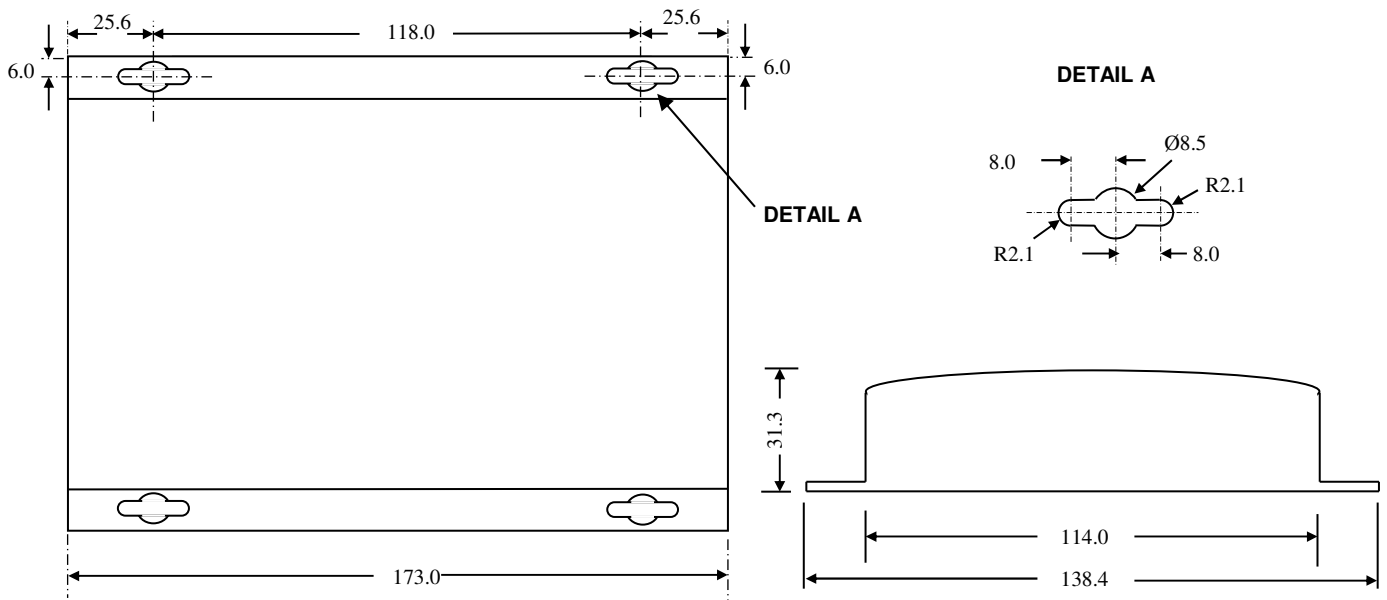


FIGURE 4: OSD2175MP/240VAC MOUNTING DIMENSIONS

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2.2.3 POWER SUPPLY CONNECTIONS

The OSD2175MP comes in two versions: 240V_{AC} module and -48V_{DC} module version.

OSD2175MP 240V_{AC} Version

The OSD2175MP 240V_{AC} module requires external 100 to 264V_{AC} @ 38W power.

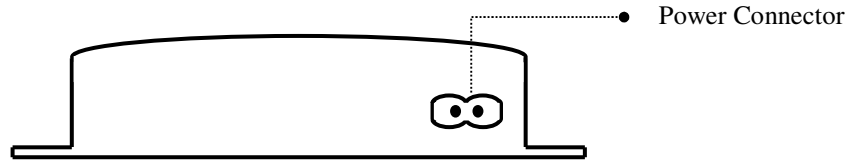


FIGURE 5: AC POWER CONNECTION

OSD2175MP -48V_{DC} Version

The OSD2175MP 48V_{DC} module requires power supply with voltage range between -44 to -56V_{DC}. The maximum power supply power is 38W. The power requirement is PD dependent if the PoE function is used. Power supply connection is a 5.08mm terminal block. Both pins are ground isolated.

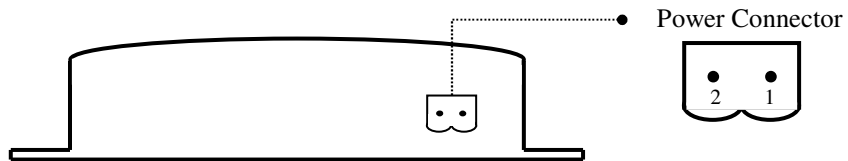


FIGURE 6: DC POWER CONNECTION

TABLE 2: DC POWER CONNECTION

External Power Pin	Specification
Pin 1	0V (Ground Isolated)
Pin 2	-44 to -56V _{DC} @ up to 38W (With PoE)

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2.2.4 ALARM CONNECTION

The alarm relay provides fail safe operation. The alarm connector pins are normally closed when the OSD2175MP has an optical link signal within its correct operating range. The alarm output goes open circuit when optical link is lost or power supply fails.

Both relay pins are isolated from the circuit ground for up to 3kVrms. The maximum commutating current and voltage rating of the OSD2175MP relay is 120mA @ 300V.

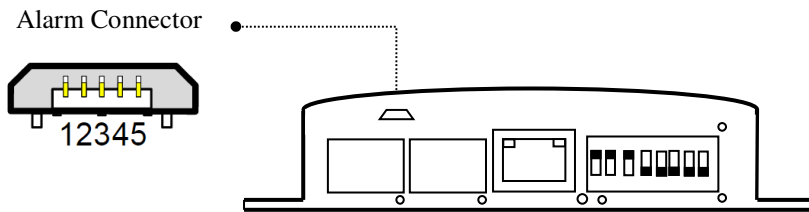


FIGURE 7: ALARM CONNECTIONS

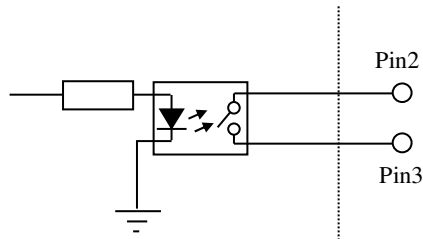


FIGURE 8: ALARM PINOUT

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2.2.5 FIXED RJ45 COPPER PORT 2 PIN ASSIGNMENT

Figure 9 shows the pin configuration for the fixed RJ45 copper port.

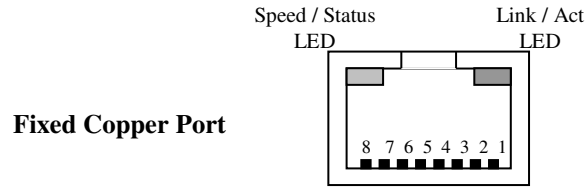


FIGURE 9: FIXED RJ45 ETHERNET CONNECTOR

2.2.6 LED INDICATORS

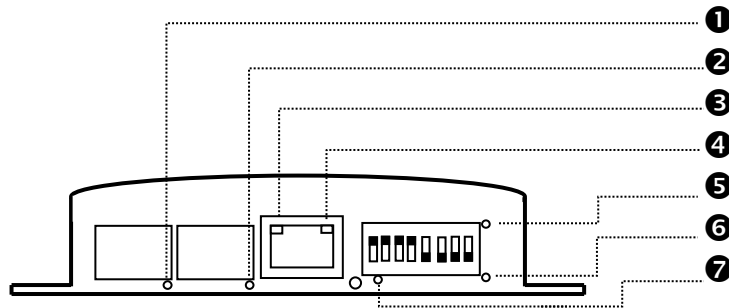


FIGURE 10: LED INDICATORS

TABLE 3: LED FUNCTION

No	LED Colour Function			
	Green	Amber	Off	Blinking
①	Port 1 Fiber Link 1Gbps	Port 1 Fiber Link 100Mbps	No Fiber Link	N/A
②	Port 2 Fiber Link 1Gbps	Port 2 Fiber Link 100Mbps	No Fiber Link	N/A
③	Port 2 1Gbps	Port 2 10/100Mbps	N/A	N/A
④	N/A	Port 2 Link OK ⁽¹⁾	No Copper Link	Activity
⑤	PoE	N/A	No PoE	N/A
⑥	Power On	Loopback On Port 1	N/A	Loopback On Port 2 ⁽¹⁾
⑦ ⁽²⁾	SE Locked	SE Unlocked	SE Disabled	N/A

Note: (1) Blinks Green and Amber
 (2) Not Used for non-SyncE version
 (3) N/A: Not Applicable

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2.2.7 CONTROLS

The OSD2175MP has a 6-way DIP switch and the OSD2175MP.SE has an 8-way DIP switch to control a number of functions. Table 4 outlines the function of each switch. For correct operation, set the required switch settings before powering the unit. If switch settings are changed while the unit is powered on, traffic will be stopped for approximately 5 seconds after which traffic will resume.

The Loopback momentary switch located on the front panel is used to activate the loopback test mode. Press and hold the switch for 1 sec to activate MAC address swap loopback on Port 1. The power LED should turn amber in this mode. Repeat this procedure to activate MAC address swap loopback on Port 2. The power LED should blink amber/green in this mode. Pressing and holding the switch for 1 sec a third time will deactivate loopback mode and power LED should be green.

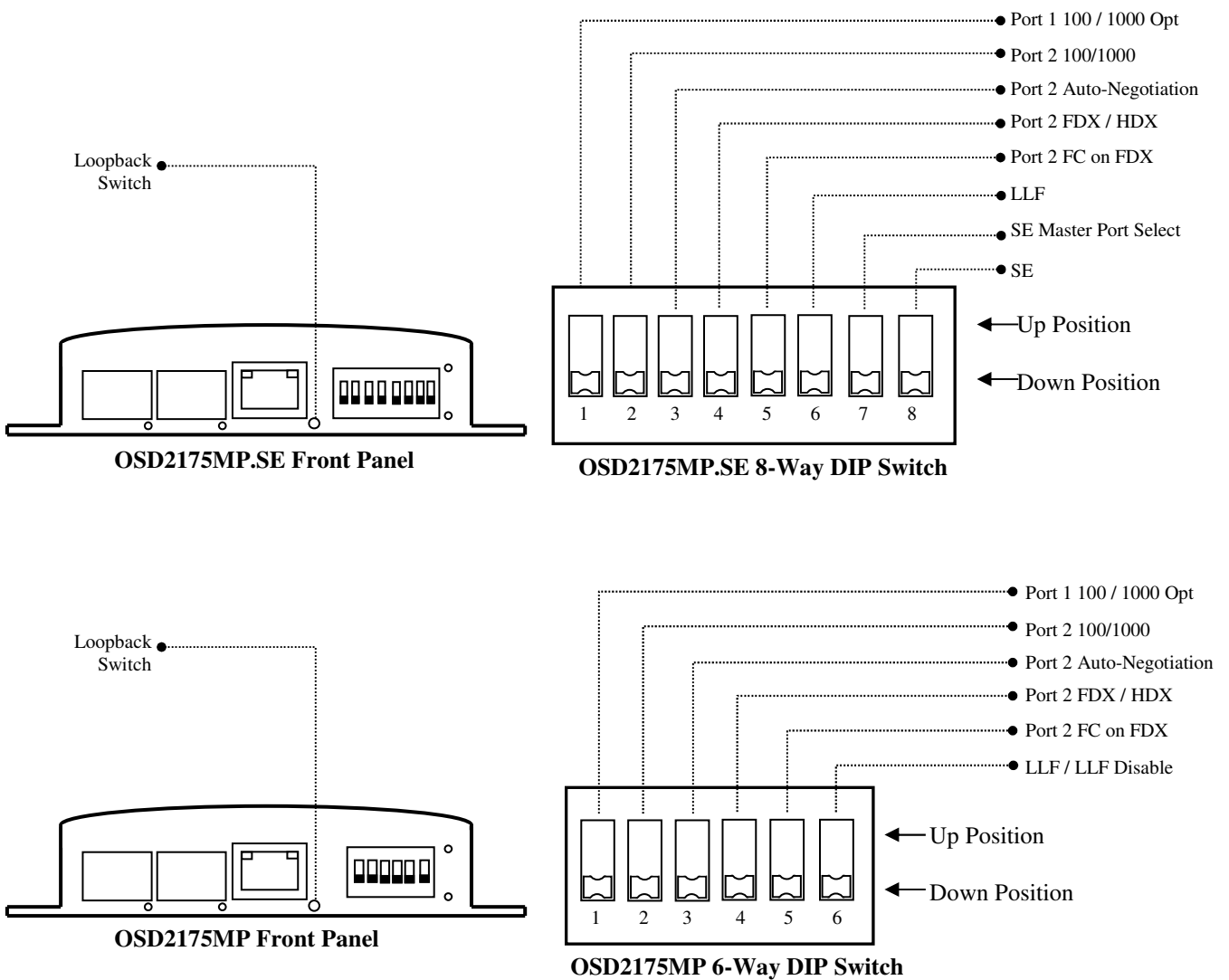


FIGURE 11: OSD2175MP DIP SWITCH

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TABLE 4: OSD2175MP 8-WAY DIP SWITCH SETTINGS

SWITCH NUMBER	DESCRIPTION	SWITCH	FUNCTION	Test	Operation Notes
1	Port 1 100 / 1000 Opt	UP	Sets optical port to 100Mbps		
		DOWN	Sets optical port to 1000Mbps		
2	Port 2 100 / 1000 [Note1]	UP	Sets Port 2 to 100Mbps		s/w detects SFP presence and controls appropriate interface
		DOWN	Sets Port 2 to 1000Mbps		s/w detects SFP presence and controls appropriate interface
3	Port 2 Auto Negotiation [Note3]	UP	Disable Auto-Negotiation on Port 2 RJ45		Affects RJ45 only
		DOWN	Auto-Negotiation on Port 2 RJ45		Affects RJ45 only
4	RJ45 FDX / HDX [Note2,3] Port 2	UP	Half Duplex on copper port	Disabled	Affects RJ45 only
		DOWN	Full Duplex on copper port		Affects RJ45 only
5	RJ45 FC on FDX [Note2,3] Port 2	UP	Flow Control on copper forced On		Affects RJ45 only
		DOWN	Flow Control on copper forced Off		Affects RJ45 only
6	LLF	UP	Link Loss Forwarding On	Disabled	
		DOWN	Link Loss Forwarding Off		
7	SE Master Select [Note4]	UP	P1 SyncE Master		Active when SW8=ON
		DOWN	P2 SyncE Master		Active when SW8=ON
8	SE [Note4]	UP	SyncE On	Disabled	
		DOWN	SyncE Off		
9	Loopback Mode[Note5]	Micro Switch	Layer 2 Loopback Test		When engaged swaps packet SA and DA addresses. Packets exit out of the same port they had entered.
		Hold 1 Sec	Loopback Test on Port 1		
		Repeat	Loopback Test on Port 2		
		Repeat	Loopback Test Off		

Note1: When Port 2 is set up as optical, i.e. SFP is in, SW2 switches between 100BaseFX and 1000BaseX.

Note2: When Port 2 is set up as copper, i.e. SFP is out, 1000Base-T will work in FDX irrespective of SW3. 100Base-Tx can be configured in both FDX and HDX.

Note3: SW4 and SW5 selection is allowed when SW3 is DOWN (i.e. Auto-Negotiation disabled)

Note4: For SyncE to function when using RJ45, SW3 must be UP (i.e. Auto-Negotiation enabled)

Note5: During Loop Back Test, Half Duplex, Link Loss Forwarding and SyncE functions are disabled.

2.2.8 FITTING SFP CONNECTORS

Care should be taken when inserting/removing the SFP connectors from the SFP port as SFP modules are Electrostatic (ES) sensitive and Electrostatic Discharge (ESD) precautions should be taken when installing. Ensure that the SFP is fully engaged and latched into position.

Inserting SFP – Ensure that the SFP lever is in the locked position and insert into appropriate SFP port. Gently push the SFP until it locks into place. Remove plastic/rubber dust cap and fit appropriate fiber cable.

Removing SFP – Remove fiber connector. Pull the SFP lever down to unlock SFP from housing. Using the lever, gently pull the SFP out.

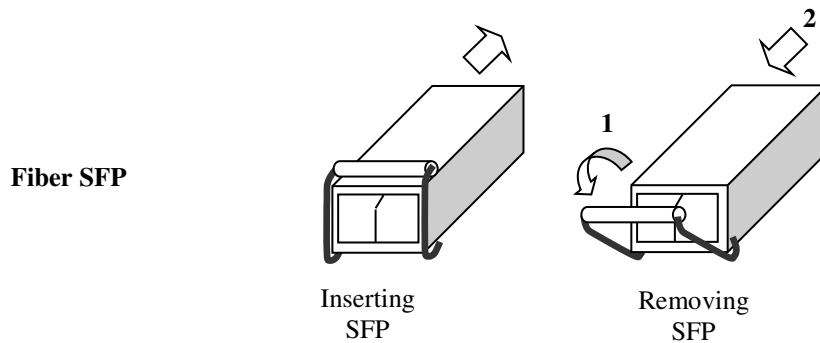


FIGURE 12: FITTING/REMOVING SFP CONNECTORS

2.3 OSD2175MP OPERATION

This section outlines the OSD2175MP connections and switch settings. Read this section carefully for trouble free set up and operation.

2.3.1 PORT OPERATION

Ports are reset after the following events.

- When power is applied;
- When DIP switch settings change;
- When port 2 interface changes, i.e. SFP is plugged in or removed;
- When LBT mode is turned off.

2.3.2 PORT 1 AND PORT 2 OPTICAL INTERFACES

P1 and P2 can operate either 100Base-FX or 1000Base-X. DIP switches control these. SFP presence is sensed in combo port and this port becomes fiber port.

When optical ports are in 1000Base-X and auto-negotiation is enabled (802.3z (Clause 37 in 802.3)):

- FDX is on.
- FDX and HDX capabilities advertised.
- Flow control is off, 00 (Table 37-2-Pause encoding).

Auto-negotiation is not a feature of 100Base-FX interface.

100Base-FX is always FDX and has far-end fault indication pattern enabled for detection of asymmetric link failures.

2.3.3 LOOPBACK TEST (LBT) MODE

The OSD2175MP Layer 2 Loopback function can be used to prove circuit connectivity, isolate faults, and analyse network diagnostics of the Ethernet data flow. The OSD2175MP Loopback function operates at wire-speed by swapping the Source MAC-Address and Destination MAC-Address of the incoming frame. Frames exit the same port they enter. Exiting frames have recalculated FCS to make them valid for the network equipment. This function is implemented by a push-button.

There can be only 1 port tested at any one time. When port 1 is under LBT, port 2 will be disabled; likewise, when port 2 is under LBT, port 1 will be disabled.

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2.3.4 LINK LOSS FORWARDING

Link Loss Forwarding (LLF) detects fault and forces transmitter shutdown on the other port when either fiber or copper link fails.

When connection is lost on port 1 (RX fiber) Link Loss Forwarding (LLF) passes loss status to port 2 and Port 2 TX optical power is turned off. As a result port 2 link partner port does not transmit signal (electrical or optical light) into a dead port. The same holds for when port 2 loses link (electrical cable or RX fiber). LLF passes loss status to port 1.

LLF works on fiber as well as copper connections. When port 2 copper link is lost port 1 SFP stops transmitting data. LLF will recover link after an asymmetric fault is cleared. When the second fiber is enabled the media converter will go back to normal operation. LLF persistence checks are in the order of tens of milliseconds.

Recovery from link loss, due to re-establishment of link and auto-negotiation, can take up to 4 seconds before LLF check will resume.

Note that gigabit Ethernet fiber interface transmits remote end receiver status to transmitting link partner. This ensures both link partners know of an asymmetric fault condition. Fiber interface for 100Base-Fx does not have an auto negotiated status exchange mechanism. However a Far-End Fault Indicator (FEFI) pattern enabled ports provide a method for detection of asymmetric link failures. For this to work customer ports have to have FEFI enabled.

2.3.5 SYNCHRONOUS ETHERNET

The OSD2175 Master Port synchronises to Slave Port's recovered clock. The OSD2175 is transparent to PTP and does not act on PTP protocol. Clock selection is done by enabling syncE via DIP switch. OSD2175M.SE operates as a standard Ethernet media converter when syncE is OFF.

Clock accuracy is the responsibility of the upstream stratum clock. OSD2175 locks to its recovered clock and the jitter cleaner improves link performance. Recovered clock lock time depends on how close the upstream clock is to the centre frequency (25.000MHz). Typically it takes about 3 seconds for frequency lock to be achieved.

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There are two possible configurations for the OSD2175MP namely Single Unit Configuration and Dual Unit configuration.

2.3.6 SINGLE AND DUAL UNIT CONFIGURATION

The single unit configuration enables the user to connect the OSD2175MP to any 1000Base-X switch via the fiber port. The fixed RJ45 copper port can be connected to a switch or PC using standard CAT5 or higher cable.

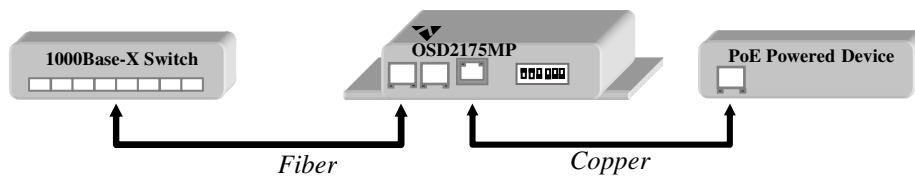


FIGURE 13: SINGLE UNIT CONFIGURATION

2.3.7 SINGLE AND DUAL UNIT CONFIGURATION

The dual unit configuration enables the user to connect the OSD2175MP in a pair.

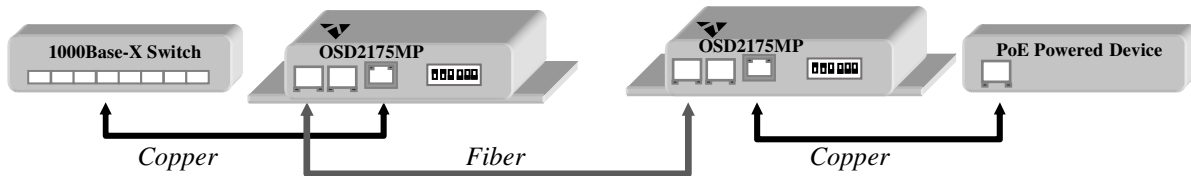


FIGURE 14: DUAL UNIT CONFIGURATION

3 MAINTENANCE

3.1 INTRODUCTION

The following section outlines the fault-finding procedure for the OSD2175MP modems. Please take note of the following:

- ▲ Personnel without appropriate training should not attempt any maintenance except that outlined below.
- ▲ If further maintenance is attempted you are warned that every care should be taken to ensure that internal measurements made while the equipment is operational are taken carefully as some components within the unit are expensive and may be damaged by failure of any portion of their support circuitry.
- ▲ Some components within the unit are Electrostatic (ES) sensitive and Electrostatic Discharge (ESD) precautions should be taken when performing maintenance upon the unit.

3.2 EXTERNAL INSPECTION

Visually check for the following:

- ▲ Check that the correct power source is connected to the power socket.
- ▲ Check that the Ethernet cables are connected to the modem correctly and that the distant OSD2175MP modem has been connected correctly to any external equipment.
- ▲ Inspect the optical connectors (for fiber SFP option) for any contamination and clean using isopropyl alcohol and a lint free tissue if any contamination is detected.

3.3 ROUTINE MAINTENANCE

- ▲ There is no routine maintenance required with the OSD2175MP.

4 WARRANTY

Thank you for purchasing equipment designed, manufactured and serviced by Optical Systems Design (OSD). OSD warrants that at the time of shipment, its products are free from defects in material and workmanship and conforms to specifications. Our Warranty conditions are outlined below:

4.1 WARRANTY PERIOD

For warranty period, please call your local OSD distributor.

4.2 REPAIRS

Optical Systems Design reserves the right to repair or replace faulty modules/units. Please obtain a "Return Material Authorisation" (RMA) form and number before returning goods.

Goods must be returned in adequate packing material to Optical Systems Design, Warriewood or its nominated authorised representative, for all repairs.

4.2.1 WARRANTY REPAIRS

Return shipments to OSD shall be at customer's expense and freight back to the customer will be at OSD expense.

4.2.2 OUT-OF-WARRANTY REPAIRS

OSD reserves the right to repair or replace any faulty goods. Freight costs and insurance for both journeys are met by the user. All equipment repaired by OSD will have a 3-Month Warranty from the date of dispatch.


4.2.3 SITE REPAIRS

By agreement site repairs may be undertaken for which out of pocket, hotel and travel expenses will be charged.

4.2.4 EXCLUSIONS

This warranty does not apply to defects caused by unauthorized modifications, misuse, abuse or transport damage to the equipment. All modifications to OSD's standard product will need written authorization and will be charged at normal repair rates. All modifications are to be carried out by OSD Technicians. Warranty is void if unauthorized removal and/or tampering with serial number and/or repair labels is evident.

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