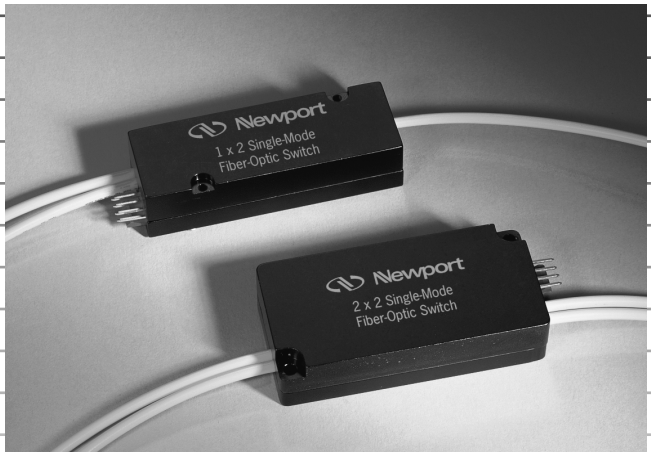
Fiber Optic Prism Switch



USER'S
MANUAL

Newport®

Warranty

Newport Corporation warrants this product to be free from defects in material and workmanship for a period of one year from the date of shipment. If found to be defective during the warranty period, the product will either be repaired or replaced at Newport's option.

To exercise this warranty, write or call your local Newport office or representative, or contact Newport headquarters in Irvine, California. You will be given prompt assistance and return instructions. Send the instrument, transportation prepaid, to the indicated service facility. Repairs will be made and the instrument returned transportation prepaid. Repaired products are warranted for the balance of the original warranty period or at least 90 days.

Limitation of Warranty

This warranty does not apply to defects resulting from modification or misuse of any product or part. This warranty also does not apply to fuses, batteries, or damage from battery leakage.

This warranty is in lieu of all warranties, expressed or implied, including any implied warranty of merchantability or fitness for a particular use. Newport Corporation shall not be liable for any indirect, special, or consequential damages.

First Printing September 1999

This manual has been provided for information only and product specifications are subject to change without notice. Any change will be reflected in future printings.

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P/N 28989-01, Rev. A (IN-06999) (9/99)

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Section 1
Introduction

1.1 Scope

This manual provides descriptions and operating information for the Fiber Optic Prism Switch.

Section 1, Introduction includes safety considerations, conventions and definitions, and a product overview.

Section 2, Switch Control includes specific information, non-latching two-pin control description and schematic, and related tables.

Section 3, Specifications defines product optical, electrical, environmental specifications, and housing dimensions for the 1x2 and 2x2 Prism Switch.

Section 4, Handling Fiber Optic Components and Cables for the product are defined, and also storing, cleaning, and mating of optical connectors.

Section 5, Factory Service information and a service form are included.

1.2 Safety Considerations

The following general safety precautions must be observed during all phases of operation of the product. Failure to comply with these precautions or with specific warnings elsewhere in this manual violates safety standards of design, manufacture, and intended use of the product.

To protect the product from damage and avoid hazardous situations, follow these recommendations:

- Do not make modifications to the product.
- Return the product to Newport Corporation for service and repair.
- Keep liquids away from the product.
- Do not expose the product to excessive moisture (>90% humidity).

1.3 Conventions and Symbols

This section provides a list of symbols and their definitions, and commonly used terms found in the manual.

1.3.1 Safety and General Symbols/Definitions

The following is a definition of safety and general symbol used in this manual.

CAUTION

Calls attention to a procedure, practice, or condition which, if not correctly adhered to, could result in damage to the product (e.g., refer to accompanying documents).

1.3.2 Terminology

The following is a brief description of the terms specific to the Fiber Optic Prism Switch.

Bandwidth The range of operating wavelengths over which performance parameters are specified.

Directivity	The ratio of the power returned to any other input port to the launched power, expressed in dB.
Excess Loss	The ratio of the total power at all output ports to the launched power, expressed in dB.
Isolation	The ratio of the power at an output port in the transmitted wavelength band to that in the extinguished wavelength band.
Non-Latching	These style of switches require no power to maintain one position and a constant +5 VDC drive current to maintain the other position.
Polarization-Dependent Loss (PDL)	The maximum (peak to peak) variation in insertion loss as the input polarization varies, expressed in dB.
Port Configuration	Number of input ports x number of output ports (e.g., 2x2).
Return Loss	The ratio of the power returned to the input port to the launched power expressed in dB.
Uniformity	The difference between maximum and minimum insertion losses.

1.4 Product Overview

Newport's 1x2 and 2x2 Prism Switch provides channel selection from one or two input fibers to two output fibers, using a moving prism between fixed collimators.

Newport's 1x2 and 2x2 switches are actuated electrically and require +5 VDC to switch position. The switches are housed in a compact, environmentally stable package designed for mounting on printed circuit boards or within a module.

Key Features:

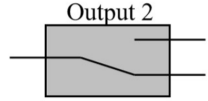
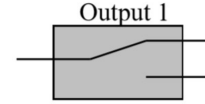
- Single and multimode fiber optic switch design
- 1x2 and 2x2 configurations are available
- Low insertion loss and low back reflection
- High durability – greater than 10 million cycles.

Figure 1.1: Fiber Optic Prism Switch

Section 2
Switch Control

The four-pin electrical interface is used to control and monitor switch position. The electrical connector is Molex P/N 22-23-2041, and mates with Molex P/N 22-01-3047 or equivalent.

Pin 4 is the position sensor output. The output alternates between normal open contact and normal close contact (low or high signal) depending on the switch position. The position sensor is powered with +5 VDC on pin 3. Pins 1, 2 and 3 are used for control and power supply. Pin behavior depends upon the electrical configuration of the user's switch. The electrical configuration is described in the following section, and summarized in **Table 2.1,** and **Table 2.2.**

Actuation Style	1x2 Switch Output 2 				1x2 Switch Output 1 			
	Pin 1	**Pin 2**	**Pin 3**	**Pin 4**	**Pin 1**	**Pin 2**	**Pin 3**	**Pin 4**
Non-Latching 2-Pin	GND	GND	+5VDC	Low*	GND	+5VDC	+5VDC	High**

* Normal open contact
** Normal close contact

Table 2.1: Switch Control

Actuation Style	Input 1 / Input 2 — Output 1 / Output 2				Input 1 / Input 2 — Output 1 / Output 2			
	Switch Control		Position Sensor		Switch Control		Position Sensor	
	Pin 1	Pin 2	Pin 3	Pin 4	Pin 1	Pin 2	Pin 3	Pin 4
Non-Latching 2-Pin	GND	GND	+5 VDC	Low *	GND	+5 VDC	+5 VDC	High **

* Normal open contact

** Normal close contact

Table 2.2: Switch Control

2.1 Non-Latching Two-Pin Control

Switches configured for non-latching two-pin control require no power to maintain one position and a constant +5 VDC across pins 1 and 2 to maintain the other position (See Electrical Schematic in **Figure 2.1**).

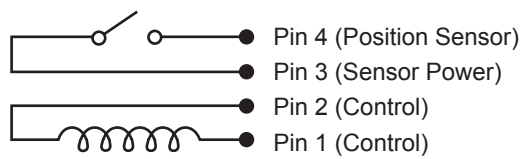


Figure 2.1: Two-Pin Control Electrical Schematic

Section 3
Specifications

Parameter	Minimum	Typical	Maximum	Units
Wavelength range	1290		1570	Nm
Insertion loss	-	0.6	1.1	DB
Back-reflection (single-mode)	-	-	-55	DB
Back-reflection (multimode)	-	-	-20	DB
Switching time	-	10	15	Ms
Cross-talk	-	-	-80	DB
Durability	10			Megacycles
Repeatability **	-	-	± 0.01	DB
PDL ***			0.05	DB

***** All specifications referenced without connectors
****** Repeatability for 100 cycles at constant temperature
******* Single-mode only. Measured at 1550 nm

Table 3.1: Optical Specifications

Parameter	Actuation Style	Minimum	Maximum	Units
Switching voltage	-	4.5	6.0	VDC
Switching current	Non-latching 2-Pin	36	48	mA
Coil resistance	Non-latching 2-Pin	112.5	137.5	Ohm
Sensor input voltage	-	4.3	6.0	VDC
Sensor input current	-	90	120	mA

Table 3.2: Electrical Specifications

Parameter	Minimum	Typical	Maximum	Units
Operating temperature	-20	-	75	°C
Storage temperature	-40	-	85	°C
Humidity	60°C / 90% RH / 14 days	60°C / 90% RH / 14 days	60°C / 90% RH / 14 days	-

Table 3.3: Environmental Specifications

3.1 Housing Dimensions

The following illustrations, **Figure 3.1** and **Figure 3.2** show the Housing Dimensions for 1x2 and 2x2 Prism Switch.

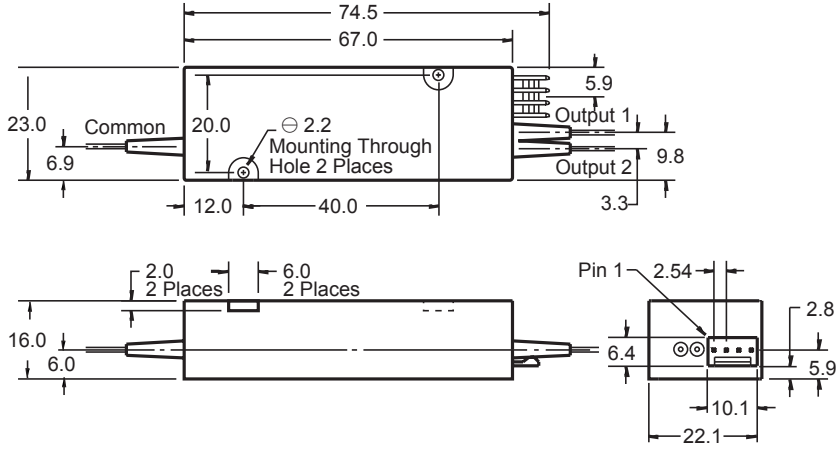


Figure 3.1: Housing Dimensions for 1x2 Prism Switch

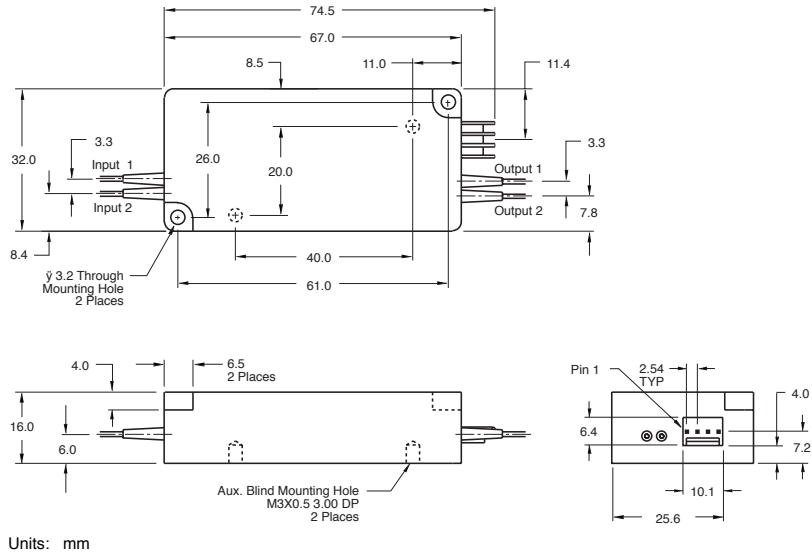


Figure 3.2: Housing Dimensions for 2x2 Prism Switch

Section 4
Handling Fiberoptic Components and Cables

4.1 Handling Fiber Optic Cables

The user's switch may come with fiber pigtail outputs. Treat cables with care to avoid cable damage and minimize optical loss. The minimum bend radius for most optical cables is 35mm. Never bend an optical cable more sharply than this specification. Optical performance will degrade and the cable may break.

- Avoid bending the optical cable near a cable strain relief boot. Bending an optical cable near a strain relief boot is one of the easiest ways to permanently damage the optical fiber.
- Avoid bending the optical cable over a sharp edge.
- Avoid using cable tie wraps to hold optical cable. Tie wraps when tightened can create micro-bends or break an optical cable. Micro-bends can cause a dramatic reduction in optical performance.
- Do not pull on the bare fiber as this can break the fiber inside the component.
- Avoid using soldering irons near optical cable. Accidental damage can easily occur when a soldering iron is used near an optical cable. In addition, solder splatter can contaminate and permanently damage optical fiber connectors.

- In order to obtain the most stable, repeatable optical performance, immobilize optical cables using wide pieces of tape or some form of mechanical cushion after the optical cables have been connected.

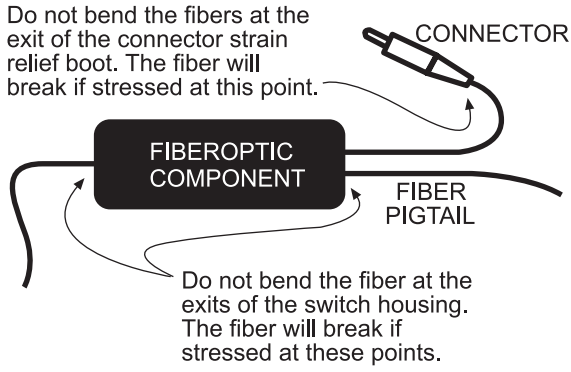


Figure 4.1: Fiber Optic Component

4.2 Storing Optical Connectors

All switches are shipped with dust caps in place covering all optical connectors. Optical connectors should remain covered at all times when the instrument is not in use.

4.3 Cleaning Optical Connectors

Clean any exposed connector using a cleaning kit supplied by the connector manufacturer or high-grade isopropyl alcohol and a cotton swab.

To clean with alcohol and a swab, dab the tip of a cotton swab in alcohol and then shake off any excess alcohol. The tip should be moist, *not* dripping wet. Stroke the swab tip gently across the surface of the connector and around the connector ferrule. Either allow the connector a minute to dry, or blow dry the connector using compressed air. Be careful when using compressed air because improper use may deposit a spray residue.

4.4 Mating Optical Connectors

- Clean both connectors prior to mating. Any small particles trapped during the mating process can permanently damage the connector.
- Insert the appropriate connector ferrule into the adapter smoothly. Do not allow the fiber tip to contact any surface. If the tip accidentally contacts a surface before mating, *stop.* Re-clean the connector and try again.
- Tighten the connector until it is finger tight, or to the torque specified by the connector manufacturer. Do not over-tighten the connector as this can lead to optical loss and connector damage.
- Check the optical insertion loss. If the loss is unacceptable, remove the connector, re-clean both ends of the mate, and reconnect. The user may have to repeat this process several times before a low-loss connection is made.
- After the user makes the connection, they should monitor the stability of the optical throughput for a few minutes.

Optical power trending (slowly increasing or decreasing) is caused by the slow evaporation of alcohol trapped in the connection. Continue to monitor optical power until it stabilizes. If the loss is unacceptable, re-clean the connector and start again.

Section 5
Factory Service

This section contains information regarding factory service for the Fiber Optic Prism Switch product. The user should not attempt any maintenance or service of the product. Any problem that cannot be resolved should be referred to Newport Corporation. Technical Customer Support contact information is listed in **Table 5.1.**

Telephone	1-800-222-6440
Fax	1-949-253-1479
Email	rma.service@newport.com
Web Page URL	www.newport.com/srvc/service.html

Table 5.1: Technical Customer Support Contacts

Contact Newport to obtain information about factory service. Telephone contact number(s) are provided on the Service Form (see next page). Please have the following information available:

- Equipment model number (Fiber Optic Prism Switch)
- Equipment serial number (for the Fiber Optic Prism Switch)
- Problem description (document using the Service Form, on the next page)

If the product is to be returned for repair, the user will be given a Return Authorization Number (RMA) that should be referenced in their shipping documentation. Complete a copy of the Service Form on the next page and include it with your shipment.

Service Form

Newport Corporation
U.S.A. Office: 949/863-3144
FAX: 949/253-1800

Name _____ RETURN AUTHORIZATION # _____
(Please obtain prior to return of item)

Company _____

Address _____ Date _____

Country _____ Phone Number _____

P.O. Number _____ FAX Number _____

Item(s) Being Returned:

Model # _____ Serial # _____

Description: _____

Reason for return of goods (please list any specific problems) _____

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