ARTISAN®
TECHNOLOGY GROUP

Your **definitive** source for quality pre-owned equipment.

Artisan Technology Group
(217) 352-9330 | sales@artisantg.com | artisantg.com

Full-service, independent repair center
with experienced engineers and technicians on staff.

We buy your excess, underutilized, and idle equipment
along with credit for buybacks and trade-ins.

Custom engineering
so your equipment works exactly as you specify.

- Critical and expedited services
- In stock / Ready-to-ship
- Leasing / Rentals / Demos
- ITAR-certified secure asset solutions

Expert team | Trust guarantee | 100% satisfaction

All trademarks, brand names, and brands appearing herein are the property of their respective owners.

Find the *VIAVI Solutions / JDSU PR2000* at our website: *Click HERE*

PR2000 SERIES
POLARIZATION CONTROLLER

User's Manual



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Contents

Safety Information, Instructions, and Symbols **1**

Safety Information 1

Classification 1

Disconnecting from Line Power 1

Line Power Requirements 1

Fuse Type 1

Safety Instructions 1

Before Initializing and Operating the Unit 1

Operating the Unit 2

Safety Symbols 3

General Information and Specifications **4**

General Information 4

..... 5

..... 5

..... 5

..... 6

..... **8**

..... 8

..... 8

..... 8

..... 8

..... 9

..... 9

..... 9

..... 9

..... 9

..... 10

..... **12**

..... 12

..... 13

..... 14

..... 14

..... 14

..... 15

..... 15

..... 16

..... 17

..... 17

..... 18

..... 18

..... 19

..... 19

..... **20**

JDS Uniphase

This product is subject to one or more of the following US patents listed under the applicable Product Series for the product:

For Product Series AC, AC0, ACF, AC-PM, WD-PM, LD, FA, FB, PL, PLR, PB, DCM:

US Patents
5,172,271 ; 5,222,171 ; 5,539,577 ; 5,594,825 ; 5,657,155 ; 5,701,375 ; 5,717,801 ; 5,745,626 ;
5,793,916 ; 5,757,993 ; 5,832,153

For Product Series IS (ISxxyy; xxISyy; xxyyIS), CR:

US Patents
5,172,271 ; 5,222,171 ; 5,539,577 ; 5,594,825 ; 5,657,155 ; 5,701,375 ; 5,717,801 ; 5,745,626 ;
5,793,916 ; 5,757,993 ; 5,832,153 ; 2,148,317 ; 5,471,340 ; 5,574,596 ; 5,588,078 ; 5,594,821 ;
5,768,005 ; 5,825,950 ; 5,608,825 ; 5,608,825 ; 5,748,363 ; 5,706,375

For Product Series GF, TB (except TB9), DC, WL, COADM:

US Patents
5,172,271 ; 5,222,171 ; 5,539,577 ; 5,594,825 ; 5,657,155 ; 5,701,375 ; 5,717,801 ; 5,745,626 ;
5,793,916 ; 5,757,993 ; 5,832,153 ; 5,283,845 ; 5,481,402 ; 5,557,468 ; 5,612,824 ; 5,615,289 ;
5,629,995 ; 5,657,155 ; 5,666,225 ; 5,680,237 ; 5,719,989 ; 5,748,363 ; 5,754,718 ; 5,790,314 ;
5,798,859 ; 5,799,121 ; 5,808,763 ; 5,841,918

For Product Series FBG, FBGDC, TB9, WDFG:

US Patents
5,172,271 ; 5,222,171 ; 5,539,577 ; 5,594,825 ; 5,657,155 ; 5,701,375 ; 5,717,801 ; 5,745,626 ;
5,793,916 ; 5,757,993 ; 5,832,153 ; 5,615,289 ; 5,754,718 ; 5,778,119 ; 5,608,825 ; 5,699,468 ;
5,608,825 ; 5,706,375 ; 5,748,363 ; 5,841,908

For Product Series OA, OAB, ErFA, BNS:

US Patents
5,172,271 ; 5,222,171 ; 5,539,577 ; 5,594,825 ; 5,657,155 ; 5,701,375 ; 5,717,801 ; 5,745,626 ;
5,793,916 ; 5,757,993 ; 5,832,153 ; 2,148,317 ; 5,283,845 ; 5,471,340 ; 5,481,402 ; 5,557,468 ;
5,574,596 ; 5,588,078 ; 5,600,468 ; 5,608,825 ; 5,612,824 ; 5,615,289 ; 5,629,995 ; 5,657,155 ;
5,666,225 ; 5,680,237 ; 5,699,468 ; 5,706,375 ; 5,719,989 ; 5,748,363 ; 5,754,718 ; 5,768,005 ;
5,778,119 ; 5,790,314 ; 5,594,821 ; 5,798,859 ; 5,799,121 ; 5,808,763 ; 5,825,950 ; 5,841,918

For Product Series SB, SC, SK, SL, SN, SP, SR, SV, SW, SG, OXC, COADM:

US Patents
5,172,271 ; 5,222,171 ; 5,539,577 ; 5,594,825 ; 5,657,155 ; 5,701,375 ; 5,717,801 ; 5,745,626 ;
5,793,916 ; 5,757,993 ; 5,832,153 ; 5,239,599 ; 5,546,180 ; 5,594,820 ; 5,629,993 ; 5,781,672 ;
5,706,375

For Product Series MV, VCA, VCB, IA, HA, MTA:

US Patents
5,172,271 ; 5,222,171 ; 5,539,577 ; 5,594,825 ; 5,657,155 ; 5,701,375 ; 5,717,801 ; 5,745,626 ;
5,793,916 ; 5,757,993 ; 5,832,153 ; 1,249,152 ; 4,702,549 ; 5,506,731

RM, PS, PR, PE, HD:

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

General Information 20
Selecting the Remote Interface and Setting the GPIB Address 20
GPIB Interface 21
RS232C Interface 21
Null Modem Configurations 22
Interface Command Sets 23
GPIB Command Set 23
RS232 Command Set 25

For sales and service information,
contact JDS Uniphase or your local representative.

JDS Uniphase Corporation
570 West Hunt Club Road
Nepean, Ontario, Canada
K2G 5W8
Phone: 613 727-1303
Fax: 613 727-8284
E-mail: sales@jdsunph.com
Website: http://www.jdsunph.com

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

PRODUCT WARRANTY

JDS Uniphase Inc. warrants only to the original Buyer that all products, other than Software, made by JDS Uniphase Inc. are free from defects in material and workmanship for a period of one (1) year from the date of shipment. The Furukawa Electric Co., Ltd., ("FEC") and Seikoh Giken Co. Ltd. ("SG") guarantee their products sold by JDS Uniphase Inc., to be free from defects in material and workmanship for a period of one (1) year from the date of shipment from JDS Uniphase Inc. All other products sold by JDS Uniphase Inc. as distributor carry only the original manufacturer's warranty.

Under warranty, JDS Uniphase Inc. will repair returned products or provide a replacement product at its sole option, for any product made by it, which upon inspection by JDS Uniphase Inc. and in the sole opinion of JDS Uniphase Inc., is determined to be defective in workmanship or material and has in fact failed. JDS Uniphase Inc. will accept for repair, replacement or credit under warranty products made by FEC and SG, and products made by third parties if authorized to do so. All products repaired or replaced under warranty are only warranted for the remaining unexpired period of time in the original warranty for the particular defective product. JDS Uniphase Inc., FEC and SG all reserve the right, at their sole option, to issue a credit note for any defective product as an alternative to repair or replacement. These warranties shall extend to any product which has proved defective and has failed through normal use, but excludes and does not cover any products or parts thereof which have been accidentally damaged, disassembled, modified, misused, used in applications which exceed their specifications or ratings, neglected, improperly installed or otherwise abused. Buyer must claim under the warranty in writing not later than thirty (30) days after the claimed defect is discovered. All claims under this warranty must be made by the Buyer and no claim will be accepted from any third party.

JDS Uniphase Inc. will only accept returns for which an approved Return Material Authorization (RMA) has been issued by JDS Uniphase Inc. Defective products shall be returned prepaid and insured to JDS Uniphase Inc. at the address shown herein. All products which have been returned to JDS Uniphase Inc. but which are found to meet all previously applicable specifications for such products, shall be subject to JDS Uniphase Inc.'s standard examination charge in effect at the time, which shall be charged to the Buyer. All products returned to JDS Uniphase Inc. which are not accompanied by an itemized statement of defects, shall be returned to the Buyer at the Buyer's expense and no evaluation of such products shall be carried out by JDS Uniphase Inc.

Where Goods contain software ("Software"), JDS Uniphase Inc. does not transfer ownership but only grants the Buyer a perpetual, non-exclusive license to use Software but restricted only to use related to the operation of the products. Such license is transferable only with the transfer of ownership of the product in which it is used. Except for backup copies as permitted by law, Buyer shall not (i) modify, reproduce, copy, reverse engineer, decompile or disassemble all or any portion of the Software, (ii) distribute, market, disclose, rent, lease or sublicense the use of the Software to any third party, or (iii) permit or authorize anyone within Buyer's reasonable control to do any acts in (i) or (ii). JDS Uniphase Inc. warrants that Software under normal use and service as originally delivered to Buyer will function substantially in accordance with the functional description set out in the product specification and/or user manual supplied with the Software for a period of 90 days from the date of shipment. JDS Uniphase Inc.'s sole liability and Buyer's sole remedy for a breach of this warranty shall be JDS Uniphase Inc.'s good faith efforts to rectify the nonconformity or, if after repeated efforts JDS Uniphase Inc. is unable to rectify the non-conformity, JDS Uniphase Inc. shall accept return of the Software and shall refund to you all amounts paid in respect thereof. This warranty is void if failure of the Software has resulted from accident, misuse, abuse, misapplication or modification.

SD000031 Rev. H July 1999

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Safety Information, Instructions, and Symbols

Safety Information

Classification

The unit consists of an exposed metal chassis that is connected directly to earth via a power cord and, therefore, is classified as a Class 1 instrument. Class 1 refers to equipment relying on ground protection as a means of shock protection.

The following symbol is used to indicate a protective conductor terminal in the unit.



Disconnecting from Line Power

Some of the circuits are powered whenever the unit is connected to the AC power source (line power). To ensure that the unit is not connected to the line power, disconnect the power cord from either the power inlet on the unit's rear panel or from the AC line-power source (receptacle). The power cord must always be accessible from one of these points. If the unit is installed in a cabinet, the operator must be able to disconnect the unit from the line power by the system's line-power switch.

Line Power Requirements

The unit can operate from any single-phase AC power source that supplies between 100 and 240 V AC at a frequency range of 50 to 60 Hz. The maximum power consumption is 30 VA.

Fuse Type

The fuse type used by the unit is 1A, 250 V AC, 32 mm (1.25 in).

Safety Instructions

The following safety instructions must be observed whenever the unit is operated, serviced, or repaired. Failure to comply with any of these instructions or with any precaution or warning contained in the user's manual is in direct violation of the standards of design, manufacture, and intended use of the unit. JDS Uniphase assumes no liability for the customer's failure to comply with any of these safety requirements.

Before Initializing and Operating the Unit

☑ Inspect the unit for any signs of damage, and read the user's manual thoroughly.

☑ Install the unit as specified in the **Getting Started** section.

☑ Ensure that the unit and any devices or cords connected to it are properly grounded.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com



Warning

To avoid the risk of injury or death, always observe the following precautions before initializing the unit:

- If using a voltage-reducing autotransformer to power the unit, ensure that the common terminal connects to the earthed pole of the power source.
- Use only the type of power cord supplied with the unit.
- Connect the power cord only to a power outlet equipped with a protective earth contact. Never connect to an extension cord that is not equipped with this feature.
- Willfully interrupting the protective earth connection is prohibited.
- Turning off the power to the device does not always block the externally supplied radiation to the connector at the output of the unit.
- Do not use the unit outdoors.
- To prevent potential fire or shock hazard, do not expose the unit to any source of excessive moisture.
- Do not operate the unit when its covers or panels have been removed.
- Do not interrupt the protective earth grounding. Any such action can lead to a potential shock hazard that can result in serious personal injury.
- Do not operate the unit if an interruption to the protective grounding is suspected. In this case, ensure that the unit remains inoperative.
- Do not attempt any adjustment, maintenance, or repair procedure to the unit's internal mechanism if immediate first aid is not accessible.
- Use only the type of fuse specified by the manufacturer as appropriate for this unit. Do not use repaired fuses, and avoid any situations that can short-circuit the fuse.
- Repairs are to be carried out only by a qualified professional.
- Unless absolutely necessary, do not attempt to adjust or perform any maintenance or repair procedure when the unit is opened and connected to a power source.
- Disconnect the power cord from the unit before adding or removing any components.
- Operating the unit in the presence of flammable gases or fumes is extremely hazardous.
- Do not perform any operating or maintenance procedure that is not described in the user's manual.
- Some of the unit's capacitors can be charged even when the unit is not connected to the power source.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Safety Symbols

The following symbols and messages can be marked on the unit (Table 1). Observe all safety instructions that are associated with a symbol.

Table 1: Safety Symbols

Symbol	Description
	Laser safety. See the user's manual for instructions on handling and operating the unit safely.
	See the user's manual for instructions on handling and operating the unit safely.
	Electrostatic discharge (ESD). See the user's manual for instructions on handling and operating the unit safely.
	Frame or chassis terminal for electrical grounding within the unit.
	Protective conductor terminal for electrical grounding to the earth.
WARNING	**The procedure can result in serious injury or loss of life if not carried out in proper compliance with all safety instructions. Ensure that all conditions necessary for safe handling and operation are met before proceeding.**
CAUTION	The procedure can result in serious damage to or destruction of the unit if not carried out in compliance with all instructions for proper use. Ensure that all conditions necessary for safe handling and operation are met before proceeding.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

General Information and Specifications

General Information

This manual for the PR2000 Series Polarization Controller contains complete operating instructions. The PR2000 controller, with an operating wavelength range of 1530 to 1560 nm, and the PR2070 controller, with an operating wavelength range of 1200 to 1600 nm, are operated in the same manner.

The PR2000 Series Polarization Controller is a precision, automated polarization rotator that is capable of rotating input light through all polarization states. High rotational resolution and speed are obtained using micro-stepped motors and advanced driving circuitry.

The PR2000 controller provides an efficient method to create any polarization state at any point on a single-mode fiber. The controller can be combined with other instruments to complete a measurement test system, such as erbium doped fiber amplifier (EDFA) and single-mode component testing for polarization sensitivity. The controller can also be part of a polarization state analyzer, used to calculate Stokes vectors for input polarization states.

The PR2000 controller provides a higher extinction ratio and more accurate polarization control than a simple fiber coil design. Changes to the state of polarization (SOP) are achieved using three rotating optical elements in two bidirectional fiber ports: a high extinction ratio polarizer, a quarter-wave retardation plate, and a half-wave retardation plate. Each element can be controlled locally from the front panel or through an IEEE 488.1 or RS232C interface. The two ports can be used for in-line connection in a test system. The ports are equipped with plain or connectorized fiber pigtails.

Figure 1 shows the in-line arrangement of the lenses between port 1 and port 2. Light from the single-mode fiber at port 1 is collimated by a microlens (L1) through the polarizer (POL), the 1/4 wave retarder (1/4 λ), and the 1/2 wave retarder (1/2 λ). The polarizer linearly polarizes the light to a high extinction ratio, the quarter-wave plate converts the SOP from linear to elliptical or circular, and the half-wave plate rotates the direction of polarized light. Another microlens (L2) focuses the collimated light into the single-mode fiber at port 2. With this combination of elements, every possible SOP can be produced.

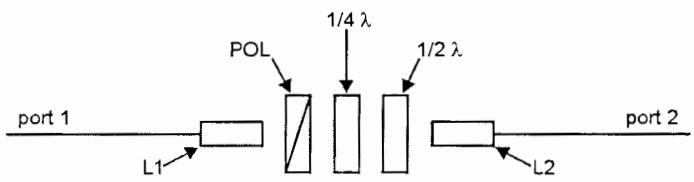


Figure 1: Polarization of Light through the Optics

Bidirectional optics allow the user to couple light from port 1 through to port 2 or from port 2 through to port 1.

The polarizer, the 1/4 wave retarder, and the 1/2 wave retarder are mounted in a rotary stage that is controlled by a micro-stepped stepper motor. The rotation resolution is 0.075° and the maximum rotation speed is 144° per second. When all the optical elements are at home

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

position, the fast axes of the 1/4 wave retarder and the 1/2 wave retarder are aligned with the fast axis of the polarizer.

To move to an absolute position, the PR2000 controller rotates the optical element up in position for highest positional accuracy. To move to a relative position, the direction of rotation depends on the sign in the command. For example, a special algorithm reduces backlash when moving down in position. The positions of the elements are marked in motor steps rather than degrees; for example, one motor step equals 0.075° and 4,800 motor steps equal 360°.

The alignment of the optical elements at home position can be adjusted to suit a particular application.

When looking from the polarizer through to the 1/2 wave retarder, the plates appear to rotate in a clockwise direction when scanning up in degrees and in a counterclockwise direction when scanning down in degrees.

Key Features

- Provides complete polarization control
- Output polarized to >40 dB
- Accurate control of polarization state
- Includes GPIB and RS232C remote control

Applications

- Polarization sensitivity measurements for single-mode fiberoptic components
- Signal-to-noise measurements in fiber amplifiers
- Analysis of polarization state changes
- Compensation for changes in birefringence in systems

Standard Accessories

- AC power cord
- User's manual

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Specifications

The following optical specifications describe the warranted characteristics of the units (Table 2). Supplementary specifications (Table 3) describe the typical non-warranted performance of the units.

Table 2: Optical Specifications

Parameter	PR2000	PR2070
Operating wavelength	1530 to 1560 nm	1200 to 1600 nm
Insertion loss[1]	<1.5 dB	<3.0 dB
Insertion loss variation with wavelength[1]	±0.1 dB	
Insertion loss variation with rotation[1]	±0.1 dB	±0.35 dB
Extinction ratio[2]	>40 dB	
Fast axis alignment accuracy at home position	±1°	±2°
Angular accuracy of one step over 360°	±0.03° 0.25° p/p	
Rotational resolution	0.075°	
Maximum rotational speed	144° per second (24 RPM)	
Return loss	>45 dB	>40 dB
Maximum optical input power	100 mW	
Optical power handling	100 mW	
Remote interface	RS232C and GPIB 488.1	

[1] For linearly polarized light aligned with axis of internal polarizer.
[2] Measured with a narrow spectral line width source polarized to >45 dB.

Table 3: Other Specifications

Electrical	
Input voltage	100 to 240 V AC, 50 to 60 Hz
Power consumption	30 VA
Physical	
Dimensions (W x H x D)	18.5 x 14.7 x 31.2 cm
Weight	7 kg

(table continued)

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Environmental	
Operating temperature	10 to 40 °C
Storage temperature	-40 to 60 °C
Humidity	Maximum 95% relative humidity, from 10 to 40 °C

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Getting Started

The PR2000 Series Polarization Controller consists of the controller and a power cord.

Before Initializing and Operating the Unit

☑ Inspect the unit for any signs of damage.

☑ Read the user's manual thoroughly, and become familiar with all safety symbols and instructions to ensure that the unit is operated and maintained safely.

Initial Inspection



Warning

To avoid electrical shock, do not initialize or operate the unit if it bears any sign of damage to any portion of its exterior surface, such as the outer cover or panels.

Check that the unit and contents are complete:

1. Wear an anti-static wrist strap, and work in an electrostatic discharge (ESD) controlled area.
2. Inspect the shipping container for any indication of excessive shock to the contents, and inspect the contents to ensure that the shipment is complete.
3. Inspect the unit for structural damage that can have occurred during shipping.
4. Ensure that the power switch is set to **O** (off).
5. Connect the unit to a power source, using the AC power cord provided.
6. Set the power switch to **I** (on).
7. Keep the packaging.

Immediately inform JDS Uniphase and, if necessary, the carrier if the contents of the shipment are incomplete, if the unit or any of its components are damaged or defective, or if the unit does not pass the initial inspection.

Operating Environment

In order for the unit to meet the warranted specifications, the operating environment must meet the following conditions for temperature, humidity, and ventilation.

Temperature

The unit can be operated in the temperature range of 10 to 40 °C.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Humidity

The unit can be operated in environments with up to 95% humidity (10 to 40 °C). Do not expose it to any environmental conditions or changes to environmental conditions that can cause condensation to form inside the unit.

Ventilation

The unit contains a built-in cooling fan. Do not install it in any location where the ventilation is blocked. For optimum performance, the unit must be operated from a location that provides at least 75 mm (3 in) of clearance at the rear and at least 13 mm (0.5 in) of clearance at the bottom. Blocking the air circulation around the unit can cause the unit to overheat, compromising its reliability.



Warning

- Do not use the unit outdoors.
- To prevent potential fire or shock hazard, do not expose the unit to any source of excessive moisture.

Storing and Shipping

To maintain optimum operating reliability, do not store the unit in locations where the temperature falls below -40 °C or rises above 60 °C. Avoid any environmental condition that can result in internal condensation. Ensure that these temperature and humidity requirements can also be met whenever the unit is shipped.

Claims and Repackaging

Immediately inform JDS Uniphase and, if necessary, the carrier, if

- The contents of the shipment are incomplete
- The unit or any of its components are damaged or defective
- The unit does not pass the initial inspection

In the event of carrier responsibility, JDS Uniphase will allow for the repair or replacement of the unit while a claim against the carrier is being processed.

Returning Shipments to JDS Uniphase

JDS Uniphase only accepts returns for which an approved Return Material Authorization (RMA) has been issued by JDS Uniphase sales personnel. This number must be obtained prior to shipping any material to JDS Uniphase. The owner's name and address, the model number and full serial number of the unit, the RMA number, and an itemized statement of claimed defects must be included with the return material.

Ship return material in the original shipping container and packing material. If these are not available, packaging guidelines are as follows:

1. Wear an anti-static wrist strap and work in an ESD controlled area.

2. Cover the front panel, if applicable, with a strip of cardboard.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

3. Wrap the unit in anti-static packaging. Use anti-static connector covers, if applicable.

4. Pack the unit in a reliable shipping container.

5. Use enough shock-absorbing material (10 to 15 cm or 4 to 6 in on all sides) to cushion the unit and prevent it from moving inside the container. Pink poly anti-static foam is the best material.

6. Seal the shipping container securely.

7. Clearly mark FRAGILE on its surface.

8. Always provide the model and serial number of the unit and, if necessary, the RMA number on any accompanying documentation.

9. Ship the unit only to the address given at the beginning of this document.

Cleaning Connectors



Caution

- Connecting damaged or dirty fibers to the unit can damage the connectors on the unit.
- Never force an optical connector. Some connectors have a ceramic ferrule that can easily be broken.

Optical cable ends need to be cleaned before using them with the unit.

The following items are required for cleaning:

- Filtered compressed air or dusting gas (for example, Tech Spray Envi-Ro-Tech Duster 1671 gas, available from http://www.techspray.com/1671.htm)
- Lint-free pipe cleaners (for example, from 3M[1]) or lint-free swab
- Lint-free towels (for example, 10 x 10 cm or 4 x 4 in HydroSorb III wipers, available from http://www.focenter.com/acctech/hydrosobr_wipers.htm)
- Optical grade isopropyl alcohol or optical grade 200° ethanol (do not use rubbing alcohol, which contains 30% water)

To clean the connectors:

1. Blow the sleeve with filtered compressed air (Figure 2).

[1] 3M is a trademark of 3M.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

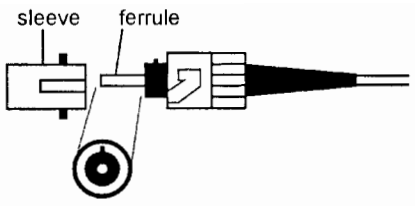


Figure 2: Connector Cleaning (connector type can vary)

2. Apply optical grade isopropyl alcohol or optical grade ethanol (do not use rubbing alcohol) to a small area of a lint-free towel and rub the end of the ferrule over the wet area.

3. Wipe the ferrule on a dry area of the lint-free towel.

4. Using the dusting gas or compressed air, blow the end of the ferrule.

5. Apply the alcohol or ethanol to a lint-free pipe cleaner or swab and wipe off the remaining parts of the connector.

6. With the other end of the pipe cleaner or swab, dry the areas cleaned.

7. Using the dusting gas or compressed air, blow the areas cleaned.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Front Panel

The front of the unit is shown in Figure 3 and described in Table 4 to Table 6.

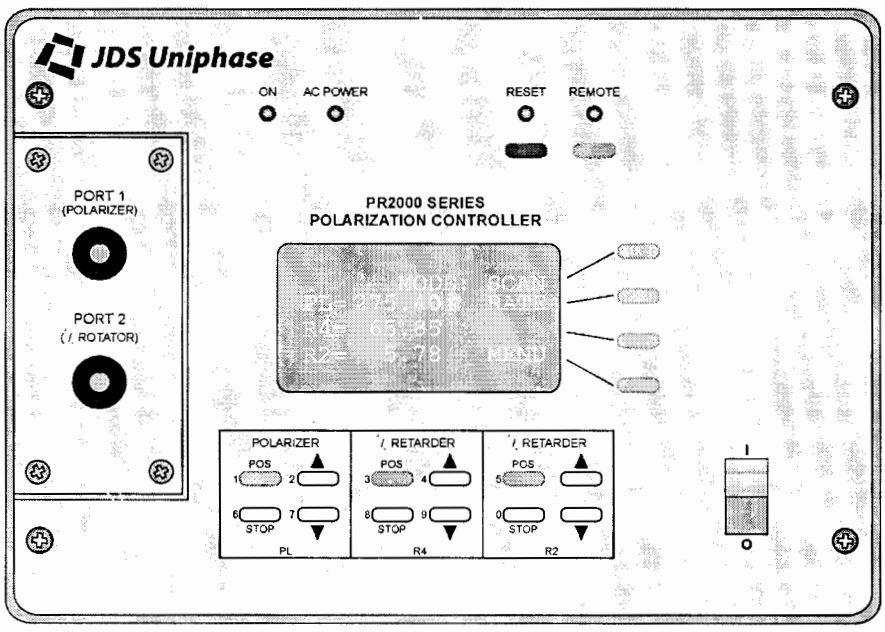


Figure 3: PR2000 Polarization Controller Front Panel

Table 4: Operating Keys

Key	Description
I/O	Power on (**I**) /off (**O**) switch
Position and function display	Displays the position of each optical element in degrees and the available functions that can be selected or controlled with the keys
[redacted]	Keys used to access functions
REMOTE	Returns the PR2000 controller to LOCAL mode from REMOTE mode
RESET	Returns all optical elements to their respective home positions when the PR2000 controller is operating in either LOCAL or REMOTE operating modes. Resets all movement control parameters, such as step size and scan rate, to their default values when held for at least two seconds.
PORT 1 (POLARIZER)	Connects the fiber pigtail to the polarizer
PORT 2 (1/2 λ)	Connects the fiber pigtail to the 1/2 wave retarder

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Table 5: Movement Control Keys

Key	Description
POS	Sets the absolute or relative position of the corresponding optical element or returns it to home position
STOP	Stops the scanning of the corresponding optical element
0 to 9	Numbered keys
π/θ	Steps or scans the corresponding optical element up or down

Table 6: Status LEDs

LED	Description
ON	Lights when the power switch is set to **I** (on)
AC POWER	Lights when the AC power cord is connected to the controller and to the power source
RESET	Lights when the controller is resetting
REMOTE	Lights when the controller is operating in REMOTE mode

Rear Panel

The back of the unit is shown in Figure 4 and described in Table 7.

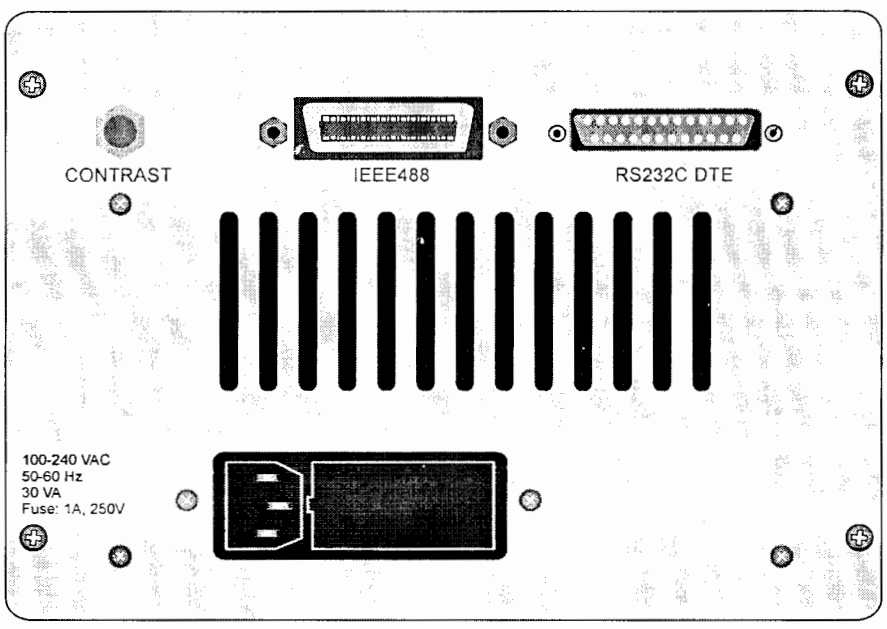


Figure 4: PR2000 Polarization Controller Rear Panel

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Table 7: Rear Panel Connectors

Connector	Description
CONTRAST	Controls the contrast of the front panel display
IEEE488	Port for the IEEE 488.1 connector
RS232C DTE	Port for the RS232C serial port connector

Powering Up the Controller

To power up the controller:

1. Connect the PR2000 controller to a power source, using the AC power cord provided.

2. Set the power switch to I (on), and observe the power-up sequence. The ON and RESET LEDs light. All motors return to their home positions.

Setting Step Size and Speed

In STEP mode, the step size is selected for stepping each optical element. The π/θ keys are used to step the elements up in degrees (clockwise) or down in degrees (counterclockwise). The PR2000 controller is automatically set to STEP mode on power-up.

Changing the Step Size

To change the step size:

1. Press the SIZE key. The step size for each element can be set individually, using the corresponding π/θ keys.

```
          MODE:STEP
PL=   0.00    SIZE
R4=   0.00    SLOW
R2=   0.00    MENU
```

2. Press the key corresponding to the required optical element. Press the PL key for polarizer, the R4 key for 1/4 wave retarder, or the R2 key for 1/2 wave retarder. The available step sizes are displayed in degrees: 0.075 (displayed as 0.08), 0.15, 0.30, 0.60, and 1.20.

```
STEP SIZE (deg)
PL=   0.08
R4=   0.08
R2=   0.08    EXIT
```

3. Press the π or θ key corresponding to the selected optical element and scroll to the required step size.

4. Press the EXIT key to confirm the selection.

The display range is 0 to 359.99°. A step of -0.15° is displayed as 359.85° and a step of 365.00° is displayed as 5.00°.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Changing the Stepping Speed

The optical elements can be set to step continuously at a slow (SLOW), medium (MEDM), or fast (FAST) rate. At slow speed, the stepping rate is approximately three steps per second; at fast speed, the rate is nine steps per second; at medium speed, the rate is approximately six steps per second.

To activate stepping:

1. To activate continuous stepping at a slow, medium, or fast rate, press and hold the π/θ keys corresponding to the optical element required.

To set the stepping speed:

1. Press the SLOW key to toggle between the SLOW, MEDM, and FAST selections, and to select the required stepping speed.

```
          MODE:STEP
PL=  0.00    SIZE
R4=  0.00    SLOW
R2=  0.00    MENU
```

2. If the PR2000 controller is set to SCAN mode, press the MODE:SCAN key to set the PR2000 controller to STEP mode.

Setting Scan Rate

In SCAN mode, the scan rate is selected for continuous clockwise or counterclockwise scanning of each optical element. The π/θ keys are used to scan the elements up in degrees (clockwise) or down in degrees (counterclockwise). In SCAN mode, the PR2000 controller can scan over all polarization states with a set resolution and different scanning rates for the 1/4 wave and 1/2 wave elements.

1. If the PR2000 controller is set to STEP mode, press the MODE:STEP key to set the PR2000 controller to SCAN mode.

A typical scan is shown in Figure 5.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

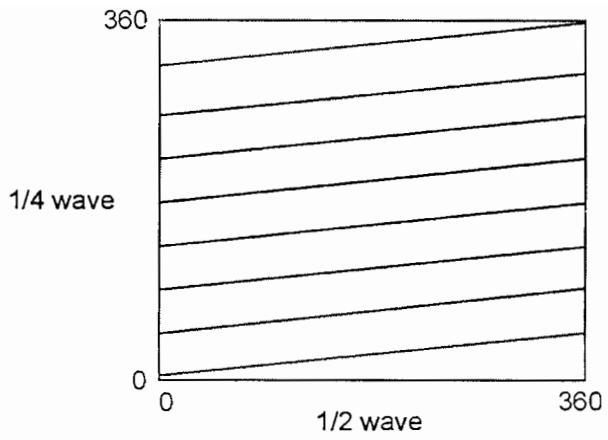


Figure 5: Typical Scan

The polarization states repeat after a 90° rotation of the 1/2 wave element and a 180° rotation of the 1/4 wave element; therefore, the 1/4 wave element needs only to cover 180°. The effective spacing between the lines along the 1/4 wave axis is four times less than shown in Figure 5 because the 1/2 wave element repeats after 90° rather than 360°.

If the 1/4 wave element is rotated at 4.5° per second and the 1/2 wave element is rotated at 144° per second, all polarization states are covered in 40 seconds (for example, 180 ÷ 4.5). The step spacing is approximately 0.075° for the 1/2 wave element and the line spacing is approximately 2.81° (for example, 90 x 4.5 ÷ 144) for the 1/4 wave element.

Changing the Scan Rate

To change the scan rate:

1. Press the RATE key.

```
          MODE:SCAN
PL=   0.00    RATE
R4=   0.00
R2=   0.00    MENU
```

2. Press the key corresponding to the required optical element. Press the PL key for polarizer, the R4 key for 1/4 wave retarder, or the R2 key for 1/2 wave retarder.

```
SCAN RATE   (deg/
PL=   0.00   sec)
R4=   4.50
R2=144.00    EXIT
```

The available scan rates are displayed in rotations per minute (RPM) and degrees per second (deg/sec).

RPM	Deg/sec
24	144.00
12	72.00

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

6	36.00	
3	18.00	
3/2	9.00	
3/4	4.50	
3/8	2.25	
3/16	1.125	(displayed as 1.12)
0	0	

3. Press the π or θ key corresponding to the selected optical element and scroll to the required scan rate.

4. Press the EXIT key to confirm the selection.

The optical elements move in 0.075° steps regardless of the scan rate.

Selecting a Position Setting

The POS function is used to enter a position setting for each optical element. It is used in both STEP mode and SCAN mode, although all scanning stops when a POS key is pressed.

To use the POS function:

1. Press the POS key corresponding to the required optical element to activate the POS function for that element.

2. Enter the position setting, using the numbered keys. The cursor moves to the right as each digit is entered. When the position setting is entered, the optical element moves to that setting.

```
                CLR
PL=Û   .        REL
R4= 54.00       HOME
R2=114.00       EXIT
```

3. To clear all entered digits, press the CLR key.

4. To exit the POS function without changing the position of the element, press the EXIT key.

Zeroing the Controller

The REL function is used to set the position readout of each optical element to 0.00°, without moving the element from its current position. The letter R, displayed next to the position readout of the element, indicates that the element is in relative display mode.

```
          MODE:STEP
PL=   0.00R   SIZE
R4= 54.00     SLOW
R2=114.00     MENU
```

The REL function can be used in both STEP mode and SCAN mode.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

To zero the controller:

1. Press the REL key.

2. To return the position readout of the optical element to the absolute position setting, without moving the element from its present position, press and hold the REL key for two seconds.

Setting an Element to the Home Position

The HOME function is used to rotate an optical element and search for its home position. The position readout of the element is set to 0.00. The HOME function can be used in both STEP mode and SCAN mode.

To set the HOME function:

1. Press the HOME key.

Adjusting the Alignment of the Optical Elements

The alignment of the optical elements at home position is set at the factory so that the fast axes of the 1/4 wave retarder and the 1/2 wave retarder are aligned with the fast axis of the polarizer. The alignment can be reset (offset from the factory-set home position) from either SCAN mode or STEP mode.

To adjust the alignment:

1. Press the MENU key.

```
          MODE:STEP
PL=  0.00    SIZE
R4=  0.00    SLOW
R2=  0.00    MENU
```

2. Press the unlabeled key (third key).

```
REMOTE: JDS GPIB
GPIB ADDR:    05

              EXIT
```

3. Enter the code **1 6 1 1 6**, using the numbered keys. The following screen is displayed:

```
SETTING OFFSET
PL=  0.00
R4=  0.00
R2=  0.00    EXIT
```

4. Press the POS key that corresponds to the required optical element and enter the position setting, using the numbered keys.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

5. Press the EXIT key to confirm the new setting. Until the offset is manually reset, it is used each time the optical elements return to home position, even when the PR2000 controller is powered off.

6. Set the offset to 0.00 to return the alignment of an optical element to its original factory setting.

Calibration

Factory calibration every three years is recommended.

Maintenance

Clean the connector ends before every mating to increase the operating life of the connectors, minimize insertion loss, and reduce backreflection. See the **Cleaning Connectors** section.

Periodically clean the interior front panel connectors:

1. Loosen the retaining screws of the connector panel.

2. Pull the connector panel out carefully, extending it only a few centimeters or inches from the body of the PR2000 controller.

3. Remove the connectors from the mating sleeves.

4. Clean the connectors and the mating sleeves with a lint-free tissue and alcohol. See the **Cleaning Connectors** section for detailed cleaning instructions.

5. Reinstall the connectors into the mating sleeves.

6. Reinstall the connector panel, ensuring that the fiber cables are not trapped, sharply bent, or otherwise stressed.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

General Information

The PR2000 controller can be controlled remotely using the GPIB or RS232C interface. The controller is automatically set to REMOTE mode when it is addressed by the controlling computer. The selected interface and GPIB address are set in MENU mode.

The remote command set provides access to functions similar to those available when the PR2000 controller is operated locally. For example, the features and functions of both SCAN mode and STEP mode are available, with the added capability of moving to an absolute or relative position at the set scan rate.

All GPIB and RS232C commands, with the exception of the commands that set the motor of an optical element to its home position, can be executed without affecting the motion or stop status of the other motors.

Selecting the Remote Interface and Setting the GPIB Address

Set the PR2000 controller to MENU mode to select the interface required for remote operation:

1. Press the MENU key.

```
          MODE:STEP
PL=   0.00    SIZE
R4=   0.00    SLOW
R2=   0.00    MENU
```

2. Press the REMOTE key to toggle between the available selections.

3. Select the GPIB option.

4. Press the GPIB ADDR key.

```
REMOTE:       GPIB
GPIB ADDR:      05

                EXIT
```

5. Enter each digit of the GPIB address, using the numbered keys. Valid GPIB addresses are 00 to 31.

6. Press the EXIT key to confirm the selection and exit MENU mode.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

GPIB Interface

The PR2000 controller has been developed and tested with an IOTECH GP488A card (PC-compatible), a National Instruments[2] AT-GPIB card (PC-compatible), and a Hewlett-Packard[3] HP9000/216 computer. The PR2000 controller accepts the following GPIB standard or device-independent commands:

- REMOTE ENABLE
- RETURN TO LOCAL
- INTERFACE CLEAR
- ENTER (read)
- OUTPUT (send)
- SERIAL POLL

The PR2000 controller accepts the line feed <LF> or end of information (EOI) terminating characters and sends the carriage return + line feed character (↵) at the end of data sent to the computer. Any spaces that appear in commands are ignored.

RS232C Interface

The RS232C serial interface is set up as 25-pin Data Terminal Equipment (DTE) configuration. The interface operates at 1200 baud, and the communication protocol used is the ASCII character code with eight bits per character, two stop bits, and no parity bits. Table 8 shows the signal direction and the pin configuration of the RS232C interface.

Table 8: RS232C Signal Lines

Signal	Pin Number	Direction
Transmitted Data (TD)	2	⇒
Received Data (RD)	3	⇐
Request To Send (RTS)	4	⇒
Clear To Send (CTS)	5	⇐
Data Carrier Detect (DCD)	8	⇐
Data Terminal Ready (DTR)	20	⇒
Signal Ground (SG)	7	⇔

A null-modem configured cable is required whenever the PR2000 controller is used with a remote computer. The PR2000 controller is equipped with a panel-mounted, female, 25-pin, D-type connector. The following null-modem configurations are suitable for the PR2000 controller.

---

[2] National Instruments is a trademark of the National Instruments.
[3] Hewlett Packard is a registered trademark of Hewlett-Packard Co.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Null Modem Configurations

Cable modifications, shown in Figure 6 and Figure 7, are used when the PR2000 controller is interfaced with a straight-through configuration computer.

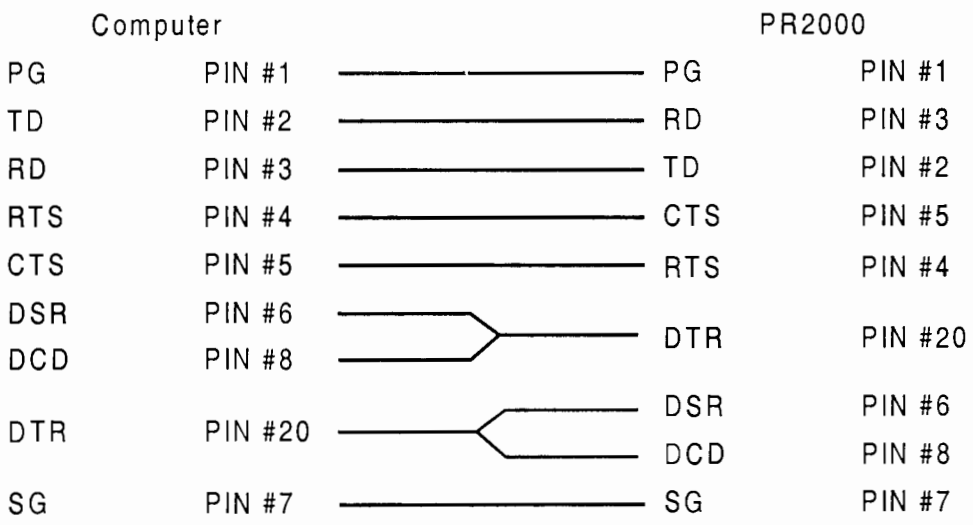


Figure 6: Null Modem Configuration One

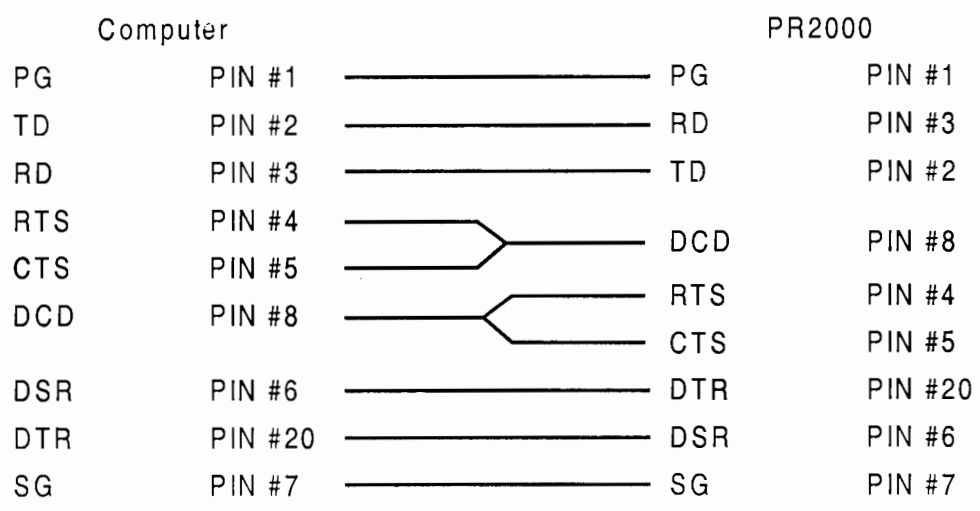


Figure 7: Null Modem Configuration Two

On power-up, the RTS and DTR signals on the PR2000 interface connector go positive, indicating that the interface is ready to communicate. For the PR2000 controller to receive commands, the DCD line must go positive. The interface controller waits for the CTS line to go positive before transmitting any response.

The PR2000 controller accepts the line feed <LF> or end of information (EOI) terminating characters and sends the carriage return + line feed character (↵) at the end of data sent to the computer. Any spaces that appear in commands are ignored.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Interface Command Sets

GPIB Command Set

Table 9 lists the device-dependent GPIB command set. All GPIB commands can be executed simultaneously, except for the commands mHP and AH (go-to-home-position). No other commands can be sent while these commands are being executed.

Table 9: GPIB Command Set

<table>
<tr><th>Format</th><th>Parameters</th><th>Examples</th><th colspan="4">Description</th></tr>
<tr><td rowspan="10">mSVn</td><td rowspan="10">m = 1,2,3
n = 1,2..8</td><td rowspan="10">1SV6
2SV4
3SV2</td><td colspan="4">Set motor #m velocity to n</td></tr>
<tr><td>n</td><td>step/s</td><td>deg/s</td><td>RPM</td></tr>
<tr><td>1</td><td>15</td><td>1.125</td><td>3/16</td></tr>
<tr><td>2</td><td>30</td><td>2.25</td><td>3/8</td></tr>
<tr><td>3</td><td>60</td><td>4.5</td><td>3/4</td></tr>
<tr><td>4</td><td>120</td><td>9</td><td>3/2</td></tr>
<tr><td>5</td><td>240</td><td>18</td><td>3</td></tr>
<tr><td>6</td><td>480</td><td>36</td><td>6</td></tr>
<tr><td>7</td><td>960</td><td>72</td><td>12</td></tr>
<tr><td>8</td><td>1920</td><td>144</td><td>24</td></tr>
<tr><td>mMV+</td><td>m = 1,2,3</td><td>2MV+</td><td colspan="4">Move motor #m at set velocity n up in position</td></tr>
<tr><td>mMV-</td><td>m = 1,2,3</td><td>3MV-</td><td colspan="4">Move motor #m at set velocity n down in position</td></tr>
<tr><td>mSM</td><td>m = 1,2,3</td><td>1SM</td><td colspan="4">Stop motor #m</td></tr>
<tr><td>mAPpppp</td><td>m = 1,2,3
pppp = 0 to 4799</td><td>2AP56
3AP 56
1AP0056
2AP4023</td><td colspan="4">Move motor #m at set velocity n up in position to absolute position pppp (leading zeros and spaces are ignored by the PR2000)</td></tr>
<tr><td>mRPsrrrr</td><td>m = 1,2,3
s = +,-
rrrr = 0 to 2400</td><td>3RP-200
1RP- 200
2RP-0200
3RP+2105</td><td colspan="4">Move motor #m at set velocity n to relative position srrrr from the current position (leading zeros and spaces are ignored by the PR2000)</td></tr>
<tr><td>mSSrrrr</td><td>m = 1,2,3
rrrr = 0 to 2400</td><td>1SS200
2SS 200
3SS2105
1SS5</td><td colspan="4">Set relative step size for motor #m to rrrr (valid only for mSPs command; leading zeros and spaces are ignored by the PR2000)</td></tr>
<tr><td>mSPs</td><td>m = 1,2,3
s = +,-</td><td>2SP+
3SP+
1SP-
2SP-</td><td colspan="4">Move motor #m to relative position srrrr from the current position, where rrrr is defined in the last command</td></tr>
<tr><td>mRS</td><td>m = 1,2,3</td><td>1RS</td><td colspan="4">Reset step counter of motor #m</td></tr>
</table>

(table continued)

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Format	Parameters	Examples	Description
mHP	m = 1,2,3	2HP	Motor #m go to home position (step counter is reset)
AH		AH	All motors go to home position
mRC response: pppp↵	m = 1,2,3 pppp = 0000 to 4799	3RC 0005↵ 0271↵ 4031↵	Read absolute position pppp of motor #m
RID response: iii.jjj.kkk↵	 iii = 000 to 999 jjj = 000 to 999 kkk = 000 to 999	RID 000.000.000↵ 001.001.000↵ 002.001.001↵	Read unit ID, version #, and options (iii = S/N, jjj = version, kkk = options)

To read the status of the PR2000 controller:

1. Perform a serial poll of the PR2000 controller. The controller returns the eight-bit binary response, shown in Table 10.

Table 10: Controller Response when using GPIB

Format	Parameters	Examples	Description
76543210 bxmmmddd	 b = 0,1 mmm = 000 to 111 ddd = 000 to 111	76543210 00000000 00001000 00001001 10001001	 • b: 1 = busy; do not send another command 0 = OK to send a command • x: not used; set to 0 • m (for motors 1, 2, and 3 respectively): 1 = moving 0 = stopped • d (direction for motors 1, 2, and 3 respectively; not valid if motor stopped): 1 = up 0 = down

The busy bit is set while the mHP or AH command is being executed. When a command is sent to the PR2000 controller, all the bits in the status byte are set to 1, except for bit 6 (for example, 10111111), until the command is decoded and the proper status settings are determined.

A command that addresses the motor of a specific optical element can be sent while that motor is moving. When the command is received, the motor stops and the next command is executed. If the motor is not stopped before a command, such as mRPsrrrr or mSPs, is sent, the motor can go to an unexpected position. A motor can move between the time the computer sends a command to the time the PR2000 controller executes it because of the time it takes for the controller to execute a command and send a response to the computer.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

RS232 Command Set

Table 11 lists the RS232C command set.

Table 11: RS232C Command Set

Format	Parameters	Examples	Description
%mSVn	m = 1,2,3 n = 1,2..8	%1SV6 %2SV4 %3SV2	Set motor #m velocity to **n**

n	step/s	deg/s	RPM
1	15	1.125	3/16
2	30	2.25	3/8
3	60	4.5	¾
4	120	9	3/2
5	240	18	3
6	480	36	6
7	960	72	12
8	1920	144	24

%mMV+	m = 1,2,3	%2MV+	Move motor #m at set velocity n up in position
%mMV-	m = 1,2,3	%3MV-	Move motor #m at set velocity n down in position
%mSM	m = 1,2,3	%1SM	Stop motor #m
%mAPpppp	m = 1,2,3 pppp = 0 to 4799	%2AP56 %3AP 56 %1AP0056 %2AP4023	Move motor #m at set velocity n up in position to absolute position pppp (leading zeros and spaces are ignored by the PR2000 controller)
%mRPsrrrr	m = 1,2,3 s = +,- rrrr = 0 to 2400	%3RP-200 %1RP- 200 %2RP-0200 %3RP+2105	Move motor #m at set velocity n to relative position srrrr from the current position (leading zeros and spaces are ignored by the PR2000 controller)
%mSSrrrr	m = 1,2,3 rrrr = 0 to 2400	%1SS200 %2SS 200 %3SS2105 %1SS5	Set relative step size for motor #m to rrrr (valid only for mSPs command; leading zeros and spaces are ignored by the PR2000 controller)
%mSPs	m = 1,2,3 s = +,-	%2SP+ %3SP+ %1SP- %2SP-	Move motor #m to relative position srrrr from the current position, where rrrr is defined in the last mSSrrrr command
%mRS	m = 1,2,3	%1RS	Reset step counter of motor #m
%mHP	m = 1,2,3	%2HP	Motor #m go to home position (step counter is reset)

(table continued)

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Format	Parameters	Examples	Description
%AH		%AH	All motors go to home position
%mRC response: pppp↵	m = 1,2,3 pppp = 0000 to 4799	%3RC 0005↵ 0271↵ 4031↵	Read absolute position pppp of motor #m
%RID response: iii.jjj.kkk↵	 iii = 000 to 999 jjj = 000 to 999 kkk = 000 to 999	%RID 000.000.000↵ 001.001.000↵ 002.001.001↵	Read unit ID, version #, and options (iii = S/N, jjj = version, kkk = options)
%? response: hh↵	 hh = 00 to FF (hex)	%? 2C↵	Read status byte

The computer must input a response from the PR2000 controller after every command sent to the PR2000 controller. Unless the response is specified, as in the commands %mRC, %RID, and %?, the response consists of the status byte followed by the terminating character ↵.

The status byte is sent as two ASCII characters that represent the hexadecimal value of the status byte. For example, 00101100 is sent as 2C↵. Table 12 shows the controller response to an RS232C command.

Table 12: Controller Response when using RS232C

Format	Parameters	Examples	Description
bxmmmddd	b = 0,1 mmm = 000 to 111 ddd = 000 to 111	00000000 ⇒ 00↵ 00001000 ⇒ 08↵ 00001001 ⇒ 09↵ 10001001 ⇒ 89↵	• b: 1 = busy; do not send another command 0 = OK to send a command • x: not used; set to 0 • m (for motors 1, 2, and 3 respectively): 1 = moving 0 = stopped • d (direction for motors 1, 2, and 3 respectively; not valid if motor stopped): 1 = up 0 = down

The busy bit is set while a go-to-home command is being executed.

All RS232C commands can be executed simultaneously, except for the commands %mHP and %AH (go-to-home-position). No other commands can be sent while these two commands are being executed.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

A command that addresses the motor of a particular optical element can be sent while that motor is moving. When the command is received, the motor stops and the next command is executed. If the motor is not stopped before a command, such as %mRPsrrrr or %mSPs, is sent, the motor can go to an unexpected position.

A motor can move between the time the computer sends a command to the time the PR2000 controller executes it because of the time it takes for the controller to execute a command and send a response to the computer.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Artisan Technology Group is an independent supplier of quality pre-owned equipment

Gold-standard solutions

Extend the life of your critical industrial, commercial, and military systems with our superior service and support.

We buy equipment

Planning to upgrade your current equipment? Have surplus equipment taking up shelf space? We'll give it a new home.

Learn more!

Visit us at **artisantg.com** for more info on price quotes, drivers, technical specifications, manuals, and documentation.

Artisan Scientific Corporation dba Artisan Technology Group is not an affiliate, representative, or authorized distributor for any manufacturer listed herein.

We're here to make your life easier. How can we help you today?

(217) 352-9330 | sales@artisantg.com | artisantg.com

ARTISAN® TECHNOLOGY GROUP