



XPS Controller

**Universal High-Performance
Motion Controller/Driver**



 **Newport®**

Quick Start

Warranty

Newport Corporation warrants that this product will be free from defects in material and workmanship and will comply with Newport's published specifications at the time of sale for a period of one year from 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 product, freight prepaid, to the indicated service facility. Repairs will be made and the instrument returned freight prepaid. Repaired products are warranted for the remainder of the original warranty period or 90 days, whichever comes first.

Limitation of Warranty

The above warranties do not apply to products which have been repaired or modified without Newport's written approval, or products subjected to unusual physical, thermal or electrical stress, improper installation, misuse, abuse, accident or negligence in use, storage, transportation or handling. This warranty also does not apply to fuses, batteries, or damage from battery leakage.

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Preface

Confidentiality & Proprietary Rights

Reservation of Title

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Sales, Tech Support & Service

North America & Asia

Newport Corporation
1791 Deere Ave.
Irvine, CA 92606, USA

Sales

Tel.: (877) 835-9620
e-mail: sales@newport.com

Technical Support

Tel.: (800) 222-6440
e-mail: tech@newport.com

Service, RMAs & Returns

Tel.: (800) 222-6440
e-mail: service@newport.com

Europe

MICRO-CONTROLE Spectra-Physics S.A.S
9, rue du Bois Sauvage
91055 Évry CEDEX
France

Sales France

Tel.: +33 (0)1.60.91.68.68
e-mail: france@newport.com

Sales Germany

Tel.: +49 (0) 61 51 / 708 – 0
e-mail: germany@newport.com

Sales UK

Tel.: +44 (0)1635.521757
e-mail: uk@newport.com

Technical Support

e-mail: tech_europe@newport.com

Service & Returns

Tel.: +33 (0)2.38.40.51.55

Service Information

The user should not attempt any maintenance or service of the XPS Series Controller/Driver system beyond the procedures outlined in this manual. Any problem that cannot be resolved should be referred to Newport Corporation. When calling Newport regarding a problem, please provide the Tech Support representative with the following information:

- Your contact information.
- System serial number or original order number.
- Description of problem.
- Environment in which the system is used.
- State of the system before the problem.
- Frequency and repeatability of problem.
- Can the product continue to operate with this problem?
- Can you identify anything that may have caused the problem?

Newport Corporation RMA Procedures

Any XPS Series Controller/Driver being returned to Newport must have been assigned an RMA number by Newport. Assignment of the RMA requires the item serial number.

Packaging

XPS Series Controller/Driver being returned under an RMA must be securely packaged for shipment. If possible, re-use the original factory packaging.



Universal High-Performance Motion Controller/Driver XPS Controller

1.0 Introduction

1.1 Scope of the Manual

The XPS is an extremely high-performance, easy to use, integrated motion controller/driver offering high-speed communication through 10/100 Base-T Ethernet, outstanding trajectory accuracy and powerful programming functionality. It combines user-friendly web interfaces with advanced trajectory and synchronization features to precisely control from the most basic to the most complex motion sequences. Multiple digital and analog I/O's, triggers and supplemental encoder inputs provide users with additional data acquisition, synchronization and control features that can improve the most demanding motion applications.

To maximize the value of the XPS Controller/Driver system, it is important that users become thoroughly familiar with available documentation:

The **XPS Quick Start** and **XPS User's Manual** are delivered with the controller.

XPS User's Manual, TCL Manual, Software Drivers Manual and Stage Configuration Manual are PDF files accessible from the XPS web site.

DLLs and corresponding sources are available from the controller disk in the folder Public/Drivers/DLL. DLLs can also be downloaded through FTP.

LabView VIs with examples are also available on the controller disk in the folder Public/Drivers/LabView. They can be downloaded through FTP.

The **Quick Start** is the getting-started part of the system. It serves as an introduction and as a reference. It includes:

1. Unpacking and Handling
2. Inspection for Damage
3. Packing List
4. System Setup
5. Connecting the XPS

1.2 Definitions and Symbols

The following terms and symbols are used in this documentation and also appear on the XPS Series Controller/Driver where safety-related issues occur.

1.2.1 General Warning or Caution



Figure 1: General Warning or Caution Symbol.

The Exclamation Symbol in Figure 1 may appear in Warning and Caution tables in this document. This symbol designates an area where personal injury or damage to the equipment is possible.

1.2.2 Electric Shock



Figure 2: Electrical Shock Symbol.

The Electrical Shock Symbol in Figure 2 may appear on labels affixed to the XPS Series Controller/Driver. This symbol indicates a hazard arising from dangerous voltage. Any mishandling could result in damage to the equipment, personal injury, or death.

1.2.3 European Union CE Mark



Figure 3: CE Mark.

The presence of the CE Mark on Newport Corporation equipment means that it has been designed, tested and certified as complying with all applicable European Union (CE) regulations and recommendations.

1.2.4 “ON” Symbol



Figure 4: “ON” Symbol.

The “ON” Symbol in Figure 4 appears on the power switch of the XPS Series Controller/Driver. This symbol represents the “Power On” condition.

1.2.5 “OFF” Symbol



Figure 5: “OFF” Symbol.

The “Off” Symbol in Figure 5 appears on the power switch of the XPS Series Controller/Driver. This symbol represents the “Power Off” condition.

1.3 Warnings and Cautions

The following are definitions of the Warnings, Cautions and Notes that may be used in this manual to call attention to important information regarding personal safety, safety and preservation of the equipment, or important tips.



WARNING

Situation has the potential to cause bodily harm or death.



CAUTION

Situation has the potential to cause damage to property or equipment.

NOTE

Additional information the user or operator should consider.

1.4 General Warnings and Cautions

The following general safety precautions must be observed during all phases of operation of this equipment.

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 equipment.

- Heed all warnings on the unit and in the operating instructions.
- To prevent damage to the equipment, read the instructions in this manual for selection of the proper input voltage.
- Only plug the Controller/Driver unit into a grounded power outlet.
- Assure that the equipment is properly grounded to earth ground through the grounding lead of the AC power connector.
- Route power cords and cables where they are not likely to be damaged.
- The system must be installed in such a way that power switch and power inlet remains accessible to the user.
- Disconnect or do not plug in the AC power cord in the following circumstances:
 - If the AC power cord or any other attached cables are frayed or damaged.
 - If the power plug or receptacle is damaged.
 - If the unit is exposed to rain or excessive moisture, or liquids are spilled on it.
 - If the unit has been dropped or the case is damaged.
- If the user suspects service or repair is required.
- Keep air vents free of dirt and dust.
- Keep liquids away from unit.
- Do not expose equipment to excessive moisture (>85% humidity).
- Do not operate this equipment in an explosive atmosphere.
- Disconnect power before cleaning the Controller/Driver unit. Do not use liquid or aerosol cleaners.
- Do not open the XPS Controller/Driver stand-alone motion controller. There are no user-serviceable parts inside the XPS Controller/Driver.
- Return equipment to Newport Corporation for service and repair.
- Dangerous voltages associated with the 100–240 VAC power supply are present inside Controller/Driver unit. To avoid injury, do not touch exposed connections or components while power is on.
- Follow precautions for static-sensitive devices when handling electronic circuits.

2.0 Getting Started

2.1 Unpacking and Handling

It is recommended that the XPS Controller/Driver be unpacked in your lab or work site rather than at the receiving dock. Unpack the system carefully; small parts and cables are included with the equipment. Inspect the box carefully for loose parts before disposing of the packaging. You are urged to save the packaging material in case you need to ship your equipment.

2.2 Inspection for Damage

XPS Controller/Driver has been carefully packaged at the factory to minimize the possibility of damage during shipping. Inspect the box for external signs of damage or mishandling. Inspect the contents for damage. If there is visible damage to the equipment upon receipt, inform the shipping company and Newport Corporation immediately.

WARNING



Do not attempt to operate this equipment if there is evidence of shipping damage or you suspect the unit is damaged. Damaged equipment may present additional hazards to you. Contact Newport technical support for advice before attempting to plug in and operate damaged equipment.

2.3 Packing List

Included with each XPS controller are the following items:

- User's Manual and Motion Tutorial.
- XPS controller.
- Cross-over cable, gray, 3 meters.
- Straight-through cable, black, 5 meters.
- Power cord.
- Rack mount ears and handles.

If there are missing hardware or have questions about the hardware that were received, please contact Newport.



CAUTION

Before operating the XPS controller, please read chapter 1.0 very carefully.

2.4 System Setup

This section guides the user through the proper set-up of the motion control system. If not already done, carefully unpack and visually inspect the controller and stages for any damage. Place all components on a flat and clean surface.



CAUTION

No cables should be connected to the controller at this point!

First, the controller must be configured properly before stages can be connected.

2.4.1 Installing Driver cards



Figure 6: Installing Driver cards.

Due to the high power available in the XPS controller (300 W for the CPU and 500 W for the drives), ventilation is very important.

To ensure a good level of heat dissipation, the following rules must be followed:

1. It is strictly forbidden to use the XPS controller without the cover properly mounted on the chassis.
2. Driver boards must be inserted from the right (driver 1) to the left (driver 8) when looking at the controller from the back.
3. If 8 boards or less are used, the remaining slots must be disabled with the appropriate covers that were delivered with the controller.
4. The surrounding ventilation holes at the sides and back of the XPS rack must be free from obstructions that prevent free flow of air.

2.4.2 Power ON

- Plug the AC line cord supplied with the XPS into the AC power receptacle on the rear panel.
- Plug the AC line cord into the AC wall-outlet. Turn the Main Power Switch to ON (located on the Rear Panel).
- The system must be installed in such a way that power switch and power connector remain accessible by the user.
- After the main power is switched on, the LED on the front panel of the XPS will turn green.
- There is an initial beep when the switch is pushed. Once the controller completes booting up there is a second beep. It can take 1 to 2 minutes for the controller to boot up.
- There is also a STOP ALL button on the front panel that is used for an Emergency Stop of the system and will shut down all the motors.

2.5 Connecting to the XPS

The Newport's XPS Controller/Driver is a multi-axis motion controller system that is based on a high performance 10/100 base T Ethernet connection using CAT5 cable.

The controller can be connected in 2 different ways:

1. Direct connection-PC to XPS through a cross over cable (gray).
2. Corporate Network connection – requires input from Network Administrator (black).

Two cables are provided with the motion controller:

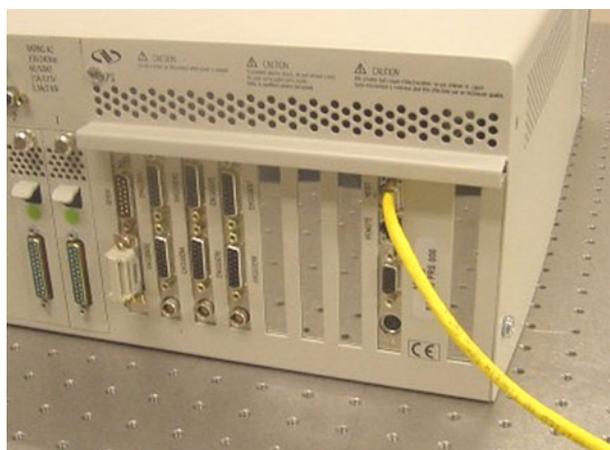
- Cross-over cable – used when connecting XPS directly to a PC.
- Straight Ethernet cable – used when connecting XPS through an intranet.

NOTE

For Network connection, please refer to the XPS User's manual.

2.5.1 Direct Connection to the XPS controller

Plug a cross-over Ethernet cable (gray) between your computer and the HOST connector at the back of the XPS mainframe.

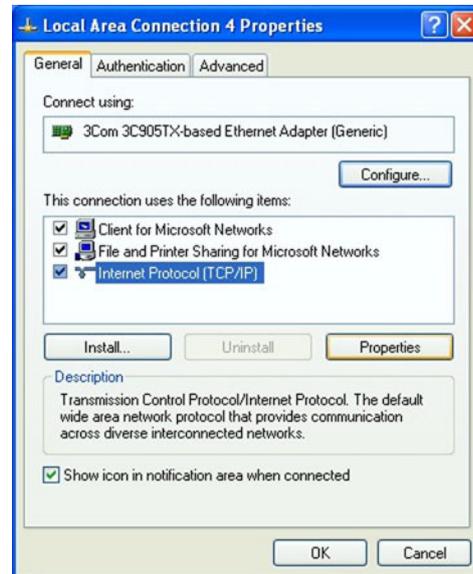


Switch on the controller and wait while the controller is booting (nearly 60 s).

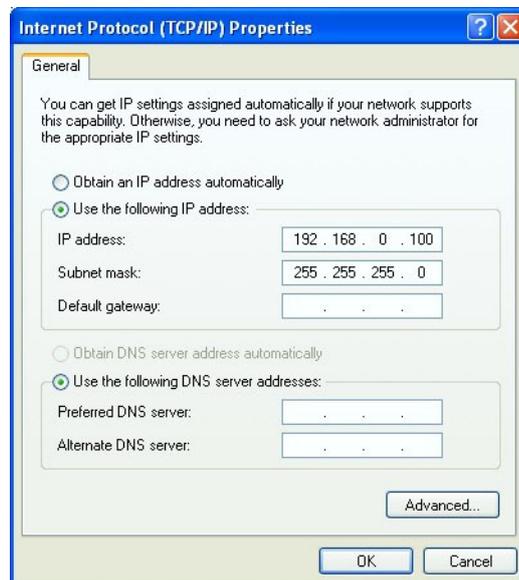
2.5.2 Ethernet Card Address Settings

In order to be able to communicate with the controller, you must set your Ethernet card in the following way (this procedure is for the Windows XP operating system):

1. Start Button > Control Panel > Network Connections.
2. Right Click on Local Area Connection Icon and select Properties.



3. Highlight Internet Protocol (TCP/IP) and click on Properties.
4. Type the following IP address and Subnet Mask as shown in the next window.



5. Click "OK".

2.5.3 Stages Configuration for Newport Stages (Auto-Configuration)



For Non Newport stages, please refer to the XPS User's Manual.

1. Open your web browser (as Internet Explorer) and connect to:

http://192.168.0.254

The welcome web page appears. Fill the following fields:

Name: **Administrator**

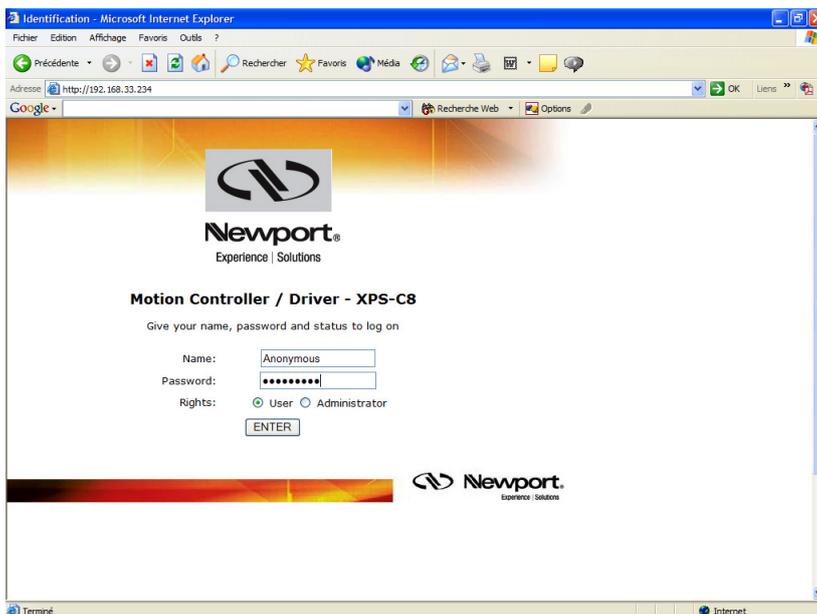
Password: **Administrator**

Rights: **Administrator**

2. Click "ENTER".
3. Click on AUTO-CONFIGURATION menu then "Generate Configuration files" button.

The XPS controller is now rebooting, you can close the web browser.

2.5.4 Using Stages



1. Open your web browser (as Internet Explorer) and connect to:

http://192.168.0.254

Fill the following fields:

Name: **Anonymous**

Password: **Anonymous**

Rights: **User**

2. Click "ENTER".
3. Click on the FRONT PANEL menu then Move submenu. Use the "Action" button to initialize and home each group. For any motion, type the absolute value and click on the corresponding "Go" button.

Now you have done the first step and you are ready to use more complex features with the XPS controller.

To achieve this, please read the **XPS User's Manual**.

3.0 XPS Controller/Driver Documentation

To maximize the value of the XPS Controller/Driver system, it is important that users become thoroughly familiar with available documentation:

The User's Manual & Motion Tutorial

The first part of this book is the getting-started part of the system. This handy introduction can be considered as a reference manual. It includes:

- System overview (Hardware, front and rear panels descriptions, Ethernet connection, programming).
- Getting started guide (unpacking, inspection, system set up, connection, configuration).
- Software tools description (web site interface).
- FTP (File Transfer Protocol) Connection.
- Maintenance and service (cleaning, service, troubleshooting).

The Motion Tutorial

The other part of the book provides an exhaustive overview of the XPS architecture, and a complete description of its features and capabilities. It is educational and it contains the following sections:

- Explanations of XPS architecture (state diagrams, motion groups, units).
- Motion modes (move, jog, master slave, analog tracking).
- Trajectories (line-arc, splines, PVT, conventions, mathematical explanations).
- Compensation (backlash, linear error correction, positioner/XY/XYZ mapping).
- Event triggers (event, actions, examples).
- Data gathering (internal and external).
- Triggers (position compare output, position capture).
- Control loops (XPS servo loops, filtering and limitation, feed forward loops and servo tuning).
- Analog encoder calibration.
- Introduction to XPS Programming.
- Appendices: hardware, general I/O description, power inhibit connector, GPIO connectors, PCO connector, motor driver boards pinning diagrams, analog encoder connector, trigger in connector.

The Programmer's Manual

This book is the general programmer's guide for the experienced user. It provides explanations of all functions and a list of all API's with complete syntax (TCL and DLL prototypes), parameters, errors, and short descriptions. It refers to the motion tutorial for more thorough explanations on some features. It details:

- TCP/IP communication explanations and functions.
- Firmware features and list of API's by groups: General features, Positioners, Single Axis groups, XY groups, XYZ groups, Multiple Axes groups, analog and digital I/O's, gathering, events and actions, TCL programming, version).
- Examples of motion processes.

The Software Drivers Manual

This book provides all information about software tools and drivers shipped with the XPS:

- Visual C++ / Visual Basic documentation (deliverable with DLL).
- LabView VI documentation (deliverable with VI).
- Matlab documentation (deliverable with m files).

The TCL Manual

This book provides a short introduction to TCL, describes all TCL commands supported by the XPS and contains TCL program examples.

In order to provide user's access to the most actual documentation, the Programmer's Manual, the Software Drivers Manual and the TCL Manual are only supplied as software copies. They can get accessed from the XPS web site or downloaded from the XPS controller via FTP.



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www.newport.com

North America & Asia

Newport Corporation
1791 Deere Ave.
Irvine, CA 92606, USA

Sales

Tel.: (800) 222-6440
e-mail: sales@newport.com

Technical Support

Tel.: (800) 222-6440
e-mail: tech@newport.com

Service, RMAs & Returns

Tel.: (800) 222-6440
e-mail: service@newport.com

Europe

MICRO-CONTROLE Spectra-Physics S.A.S
9, rue du Bois Sauvage
91055 Évry CEDEX
France

Sales

Tel.: +33 (0)1.60.91.68.68
e-mail: france@newport.com

Technical Support

e-mail: tech_europe@newport.com

Service & Returns

Tel.: +33 (0)2.38.40.51.55

