NANOSCAN OP400 QUICK START INSTRUCTIONS

PLEASE READ THE INSTRUCTIONS BEFORE ATTEMPTING TO USE THE NANOSCAN OP400 SYSTEM

- Save this manual as it contains important safety information and operating instructions.
- Before using the system, please follow and adhere to all warnings, safety and operating instructions located on the product and in this user manual.
- Do not expose the product to open flames, extreme hot or cold temperatures, water or moisture.
- Do not allow objects to fall on or liquids to spill on the product.
- Connect the AC power cord only to designated power sources as marked on the product.
- Make sure the electrical cord is located so that it will not be subject to damage.
- To reduce the risk of damage, unplug the product from the power source before connecting the components together.
- **DANGER** - never alter the AC cord or plug. If the plug will not fit into the outlet, have a proper outlet installed by a qualified electrician.
- Use only the proper type of power supply cord set (provided with the system) for this unit.
- Do not attempt to disassemble the product. Doing so will void the warranty. This product does not contain consumer serviceable components. Service should be performed by authorized service centers.

IDENTIFYING YOUR SYSTEM COMPONENTS

The standard NanoScan OP400 system consists of:
(1) - NanoScan OP400 Piezo Objective Scanner
(1) - NPC-D-6110 Controller and power supply
(1) - Microscope Thread Adapte
(1) - 1.3mm (0.05 inch) Hex Key + (1) tightening key
(1) - Objective Lens Thread Adapter (optional)
(1) - Objective Lens Spacers (optional)
(1) - 9 pin gender changer for RS232C QG-0494-SK-200001
(1) - USB Cable QGPA0096-SK-102 + (1) 1.2 metre BNC to BNC
cable QGBNCCAB + (1) RS232C QG-0494-SK-200002
(1) - USB stick containing manuals and test reports

NanoScan OP400 Piezo Objective Scanner

Gender changer for RS232C

Tightening Key

Microscope Thread Adapter

Objective Lens Thread Adapter

Parfocal Objective Spacer

INSTALLING YOUR SYSTEM

Please take care with the cabling. **Under no circumstances use the cabling to hold the stage.**
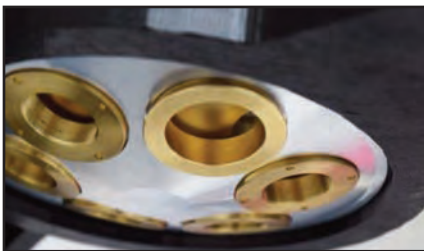
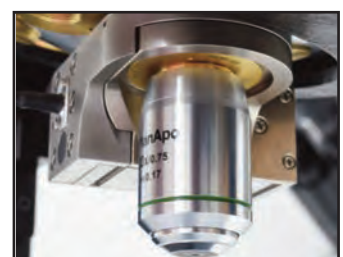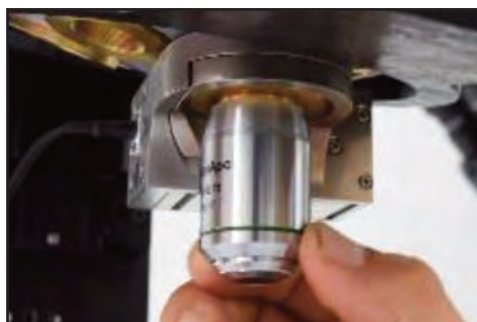**STEP 1:** Select the position for the OP400 on the nosepiece.

STEP 2: Insert the microscope thread adapter using the key provided. Insert parfocal spacer if other objectives are to be used.
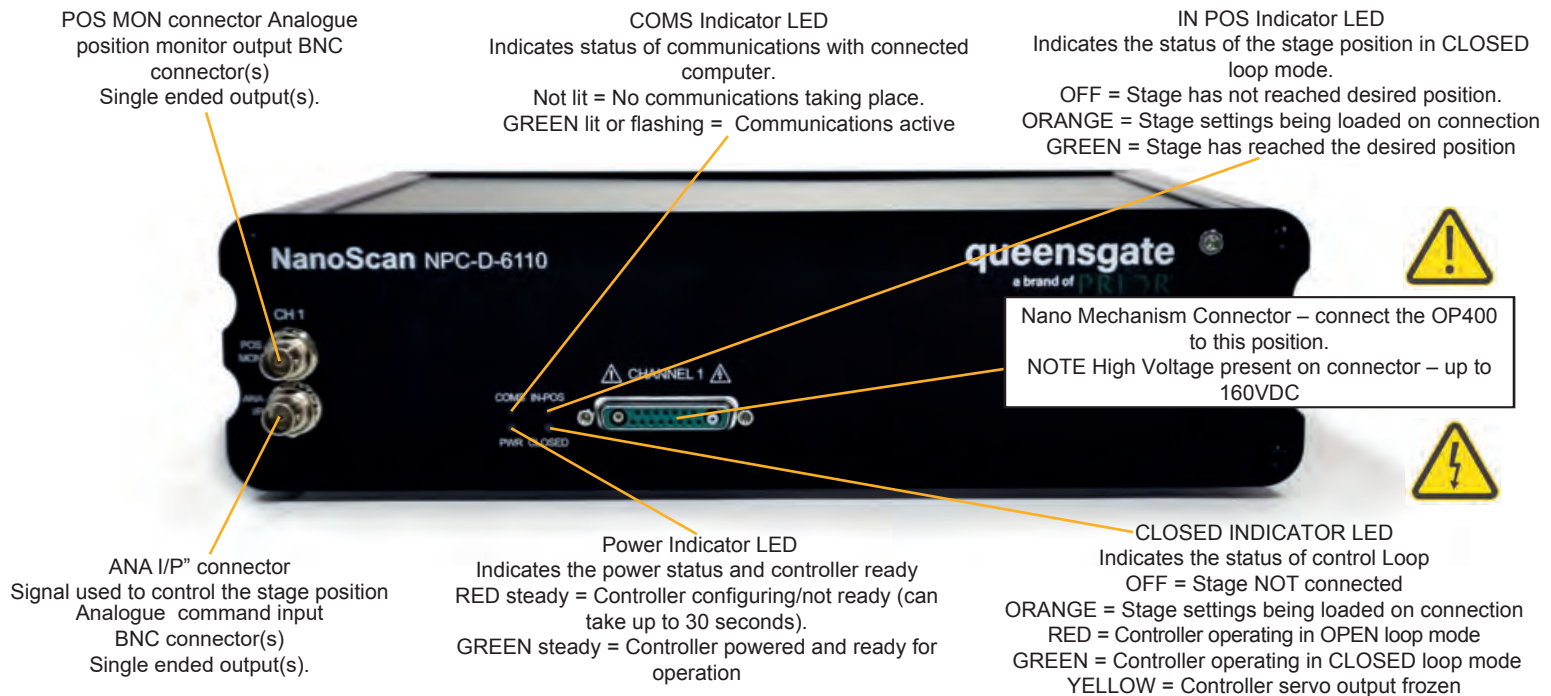
STEP 3: Connect the OP400 to the nosepiece. Tighten both grub screws with the hex key.

STEP 4: Insert the objective lens using the appropriate objective lens adapter. Note no adapter is necessary for M32. Other objectives can be inserted into the nose piece using option parfocal spacers.
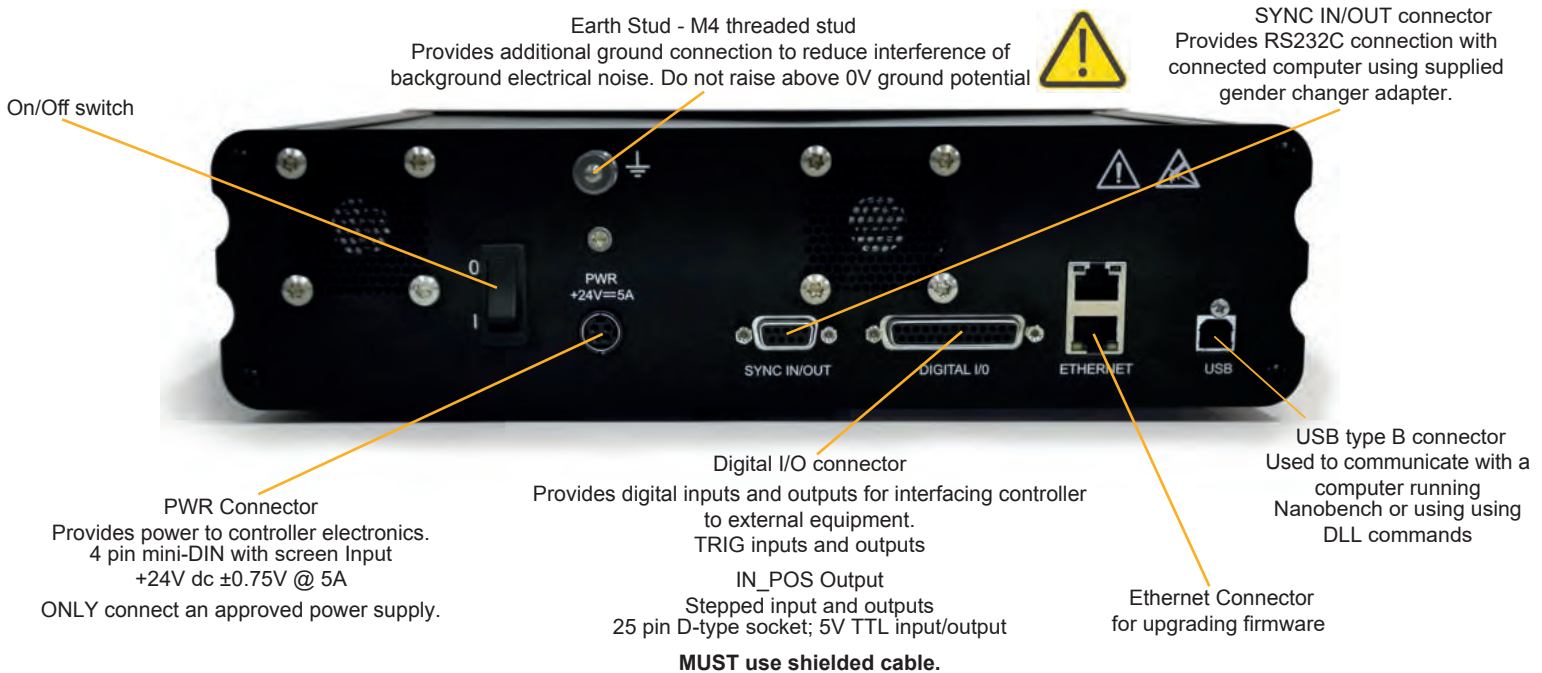
STEP 5: The OP400 unit is now properly installed.

CONNECTING YOUR SYSTEM - FRONT OF UNIT

POS MON connector Analogue position monitor output BNC connector(s) Single ended output(s).

COMS Indicator LED
Indicates status of communications with connected computer.
Not lit = No communications taking place.
GREEN lit or flashing = Communications active

IN POS Indicator LED
Indicates the status of the stage position in CLOSED loop mode.
OFF = Stage has not reached desired position.
ORANGE = Stage settings being loaded on connection
GREEN = Stage has reached the desired position

Nano Mechanism Connector – connect the OP400 to this position.
NOTE High Voltage present on connector – up to 160VDC

ANA I/P" connector
Signal used to control the stage position
Analogue command input
BNC connector(s)
Single ended output(s).

Power Indicator LED
Indicates the power status and controller ready
RED steady = Controller configuring/not ready (can take up to 30 seconds).
GREEN steady = Controller powered and ready for operation

CLOSED INDICATOR LED
Indicates the status of control Loop
OFF = Stage NOT connected
ORANGE = Stage settings being loaded on connection
RED = Controller operating in OPEN loop mode
GREEN = Controller operating in CLOSED loop mode
YELLOW = Controller servo output frozen

CONNECTING YOUR SYSTEM - BACK OF UNIT

Earth Stud - M4 threaded stud
Provides additional ground connection to reduce interference of background electrical noise. Do not raise above 0V ground potential

SYNC IN/OUT connector
Provides RS232C connection with connected computer using supplied gender changer adapter.

On/Off switch

PWR Connector
Provides power to controller electronics.
4 pin mini-DIN with screen Input
+24V dc ±0.75V @ 5A
ONLY connect an approved power supply.

Digital I/O connector
Provides digital inputs and outputs for interfacing controller to external equipment.
TRIG inputs and outputs

IN_POS Output
Stepped input and outputs
25 pin D-type socket; 5V TTL input/output

MUST use shielded cable.

USB type B connector
Used to communicate with a computer running Nanobench or using using DLL commands

Ethernet Connector
for upgrading firmware

TURNING ON YOUR SYSTEM

1. Once the stage is mounted, connect it to the controller ensuring that the connector screws are tightened to the controller lock posts. **On powerup, the controller will always move the stage across its range to carry out auto-calibration. It is important to ensure that there is sufficient clearance between the lens, sample and illumination to allow this to take place.** If the temperature or load change significantly the stage can 'clip at one end of the travel. Should this happen restart your system to allow autocalibration; this rebalances the stage so that the closed loop range is centred within the open loop range.

2. Connect Power to controller and the analogue input and/or USB as required.

3. Switch ON controller using switch on rear panel. After approx. 30 seconds, the relevant stage channel should show two green lights (CLOSED and IN-POS). This indicates the stage is operating in the CLOSED loop mode and IN-POS LED indicates stage has reached position within a pre-defined band.

4. The analogue input and POS MON output is 0V to +10V giving a scale factor of 40µm/volt. The analogue input is enabled by default.

5. The system has 8 memory positions for PID settling (accessible via the USB interface). The default setting is for objective loads from 150g to 500g. An optimised setting providing a faster settle time for loads up to 350g can by selected using Nanobench. The next section demonstrates how to change to other settings.
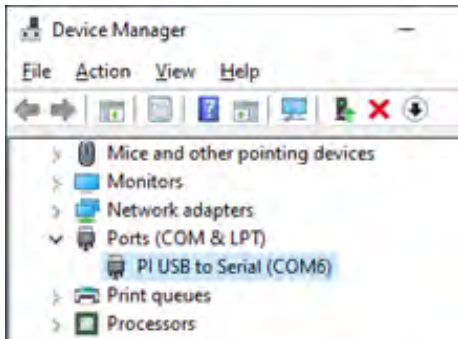
SOFTWARE

The standard customer-facing application for the system is called 'Nanobench 6000', and is included on the USB drive included in the shipment. This also includes software or links to software which must be installed before the software can be used.
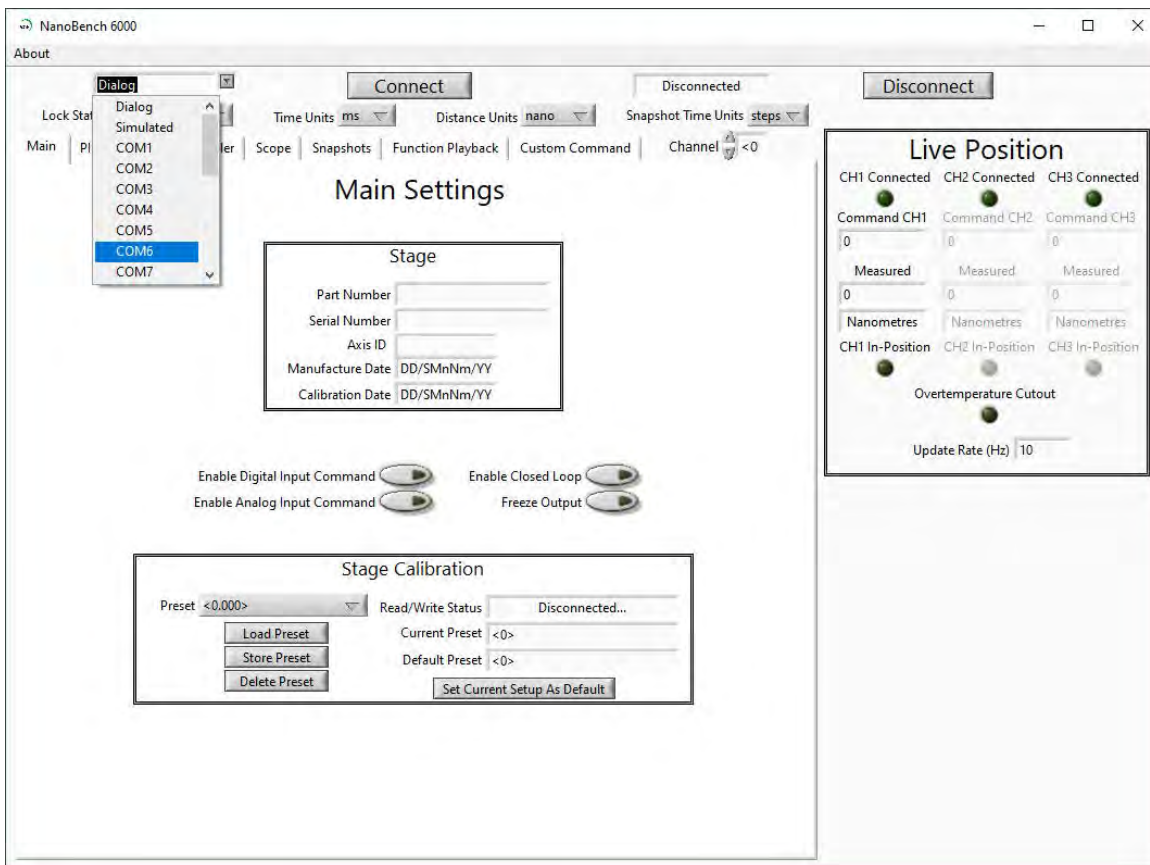
> Visual C++ Runtime
> Labview Runtime Engine 2017 SPI F3
> 'Nanobench 6000' runs on Windows XP, 7, 8, 10.
> Once Nanobench and associated software has been installed and controller functional, go to Windows Device Manager, and find the COM port that the controller is connected to (e.g. 'COM12')

Start Nanobench - the screen displayed will be similar to the one show below:

Select the correct COM port within Nanobench 6000, then click 'Connect': At this point the software should connect to the controller and begin reading the live measured position.

Dynamic Setups

The OP series stages come pre-loaded with 'dynamic setups', which allow the stage/controller to operate with a range of different objective loads, optimize step settle times and resolutions.

To swap between these setups the controller must be unlocked to at least 'User' security. The setups can then be changed by selecting a new setup in the 'Preset' dropdown, then clicking 'Load Preset':

To change the security level, simply open the 'Lock Status' drop down and select the appropriate lock state. A warning is displayed to ensure the user knows that unlocking the controller exposes commands that can potentially cause damage to the stage if set incorrectly. In most cases, a security level of 'User' is best, as it allows access to most commonly needed settings while still keeping more important settings 'locked'.
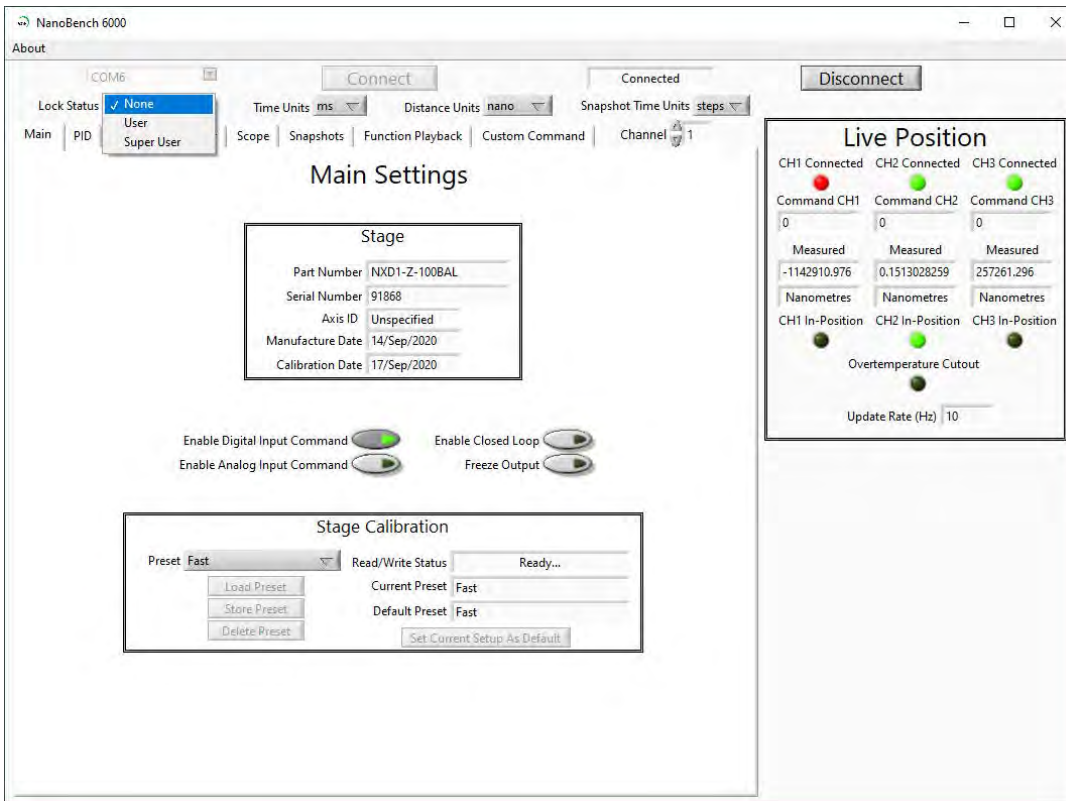
Presets

The QGOP-400-UP/QGOP-400-INV/QGOP-400UP-HL and QGOP-400-INV-HL come with stored settings which have been optimized for fast step settle times and objective loads. The presets can be changed by selecting a new preset in the 'Preset' dropdown, then clicking 'Load'. The test report provided with your OP400 provides information on the presets for your device. Please note that the presets will revert to the default preset on power-down of the controller.

Caring For Your Stage

• When the stage is not in use for long periods it is advisable to either power down the stage or leave the command at midpoint. This will help to ensure a long life.

• Avoid using the stage above 60% relative humidity for long periods.

• For loads greater than 600g please specify as the stage must be setup to support this. Default settings are optimized for 150 -500g objective lens plus sample holder with a very fast setting for objective loads to 350g objective. Higher loads can be optimized on request.

• The cable is sensitive - do not lift the stage by the cable or bend beyond the 30mm radius.

External Control

The QGOP-400-UP/QGOP-400-INV/QGOP-400UP-HL and QGOP-400-INV-HL can be controlled from Prior ProScan, Micromanager, Metamorph and Ni Elements. Quickstart guides are available.

DLL commands are available for interfacing with other software and integration into OEM systems.