

# XPS-C8 controller firmware

## XPS-C8 Controller Installer Pack Number 10005 (released Sep. 2011)

### **Firmware (V2.6.3)**

- ✓ Add **DACSet.Value** action to the action list.
- ✓ Add support for "XPS-DRV03H" motor drive card.
- ✓ Improve Gantry initialization and Homing procedure to take into account the encoders misalignment.
- ✓ Modify positioner driver status strings to include DRVP1 piezo driver status.
- ✓ Put message in *Error.log* when a Piezo stage smart EEPROM is not programmed.
- ✓ Put message in *Error.log* in case of error during AutoTuning initialization.
- ✓ Set analog outputs to zero for DRV00 and DRV00P driver when executing KillGroup() or KillAll().
- ✓ Fix problem of setpoint position value in case of XY or XYZ mapping in use.
- ✓ Fix problem of frequency limit value for lowpass, notch and second order lowpass filters.

### **Configuration files**

- ✓ Add line to the [GENERAL] section of *system.ref*:
  - GantrySecondaryMotorEnableDelay =                   ; seconds

### **Web site (V2.5.4)**

- ✓ Set maximum parameters number for each API function to 30 (instead of 20).

### **RC module (V2.5.2)**

- ✓ No change.

### **VxWorks kernel (V1.2.7)**

- ✓ No change.

### **Module versions**

- ✓ Remote Control revision XPS-RC-V2.0.0
- ✓ Driver revision V2.6.x (TCL, LabView, Matlab, C, Basic, Python, executables and source codes)
- ✓ Stage data base revision V2.6.7

# XPS-C8 controller firmware

## XPS-C8 Controller Installer Pack Number 10004 (released Mar. 2011)

### **Firmware** (V2.6.2)

- ✓ No change.

### **Configuration files**

- ✓ No change

### **Web site** (V2.5.3)

- ✓ No change.

### **RC module** (V2.5.2)

- ✓ No change.

### **VxWorks kernel** (V1.2.7)

- ✓ No change.

### **Module versions**

- ✓ Remote Control revision XPS-RC-V2.0.0
- ✓ Driver revision V2.6.x (TCL, LabView, Matlab, C, Basic, Python, executables and source codes) :  
=> Increase buffer size to 65535 for *GatheringDataMultipleLinesGet()* function.
- ✓ Stage data base revision V2.6.5

# XPS-C8 controller firmware

## XPS-C8 Controller Installer Pack Number 10003 (released Jan. 2011)

### **Firmware** (V2.6.2)

- ✓ Add the *HomingSensorOffset* parameter to displace the Home position away from the sensor edge when using End of Runs as Homing sensors.
- ✓ Add *CONTROLLER\_STATUS\_CORRECTOR\_OVER\_CALCULATED* status bit in ControllerStatus that can be read using ControllerStatusGet() function to catch corrector period overlap.
- ✓ Add *CONTROLLER\_STATUS\_PROFILER\_OVER\_CALCULATED* status bit in ControllerStatus that can be read using ControllerStatusGet() function to catch profiler period overlap.
- ✓ Improve synchronization management between correctors, profile generators and servitudes threads.
- ✓ Patch the Profiler to keep output constant in case of Profiler overrun, this patch can be enabled using the *ProfilerPriorityOverrunPatch* parameter.
- ✓ Improve controller homing processes to take into account stage backlash or hysteresis in all configurations.
- ✓ Change from *MinimumJerkTime* value to *MaximumJerkTime* value for the non LMI motor interfaces initialization process to avoid high frequency excitations.
- ✓ Fix problem of controller boot with configuration of multi-axes groups (XY, XYZ or MultipleAxes) containing a piezo positioner.
- ✓ Allow HardwareDriverAndStageGet() to work in case of the controller failed boot .

### **Configuration files**

- ✓ System.ref : add following lines :
  - [GENERAL]
  - *HomingSensorOffset* = ; units
  - *ProfilerPriorityOverrunPatch* = ; Disabled or Enabled

### **Web site** (V2.5.3)

- ✓ Add user confirmation before killing groups in the concerned menu.

### **RC module** (V2.5.2)

- ✓ No change.

### **VxWorks kernel** (V1.2.7)

- ✓ Fix problem of Mutex delete.
- ✓ Fix problem of 99 days reboot.
- ✓ Change priority of exception task and log task to avoid 2ms hole for Corrector task.

### **Module versions**

- ✓ Remote Control revision XPS-RC-V2.0.0
- ✓ Driver revision V2.6.x (TCL, LabView, Matlab, C, Basic, Python, executables and source codes).
- ✓ Stage data base revision V2.6.5

# XPS-C8 controller firmware

## XPS-C8 Controller Installer Pack Number 10002 (released Oct. 2010)

### **Firmware** (V2.6.1)

- ✓ Improve *DeadBand* treatment for *PIDFFVelocity* corrector.
- ✓ Correct *ISRProfilerTimeUsage*, *ISRServitudesTimeUsage* values (remove *ISRCorrectoTimeUsage* time occupation from *ISRProfilerTimeUsage*, *ISRServitudesTimeUsage*).
- ✓ Fix problem of *GroupInitialize()* error (both EOR activated) for ESP-compatible stages.
- ✓ Fix problem of *HardwareDriverAndStageGet()* generating *EmergencyStop* if the group is enabled (solution : return error if the group is not in NOTINIT state).

### **Configuration files**

- ✓ No change.

### **Web site** (V2.5.2)

- ✓ FRONT PANEL / Auto configuration : add kill all groups before open the page.

### **RC module** (V2.5.2)

- ✓ No change.

### **VxWorks kernel** (V1.2.5)

- ✓ Remove WDB agent to secure VxWorks kernel from external attacks (virus, malwares, ...)
- ✓ Fix page fault problem in executing a TCL program (stack size increased).

### **Module versions**

- ✓ Remote Control revision XPS-RC-V2.0.0
- ✓ Driver revision V2.6.x (TCL, LabView, Matlab, C, Basic, Python, executables and source codes).
- ✓ Stage data base revision V2.6.1

# XPS-C8 controller firmware

## XPS-C8 Controller Installer Pack Number 10001 (released Aug. 2010)

### Firmware (V2.6.0)

- ✓ Add functions for Piezo driver control :
  - *PositionerDriverFiltersGet()*.....// get piezo driver filters parameters.
  - *PositionerDriverFiltersSet()*.....// set piezo driver filter parameters.
  - *PositionerDriverPositionOffsetsGet()*.....// get piezo driver stage and gage position offsets.
- ✓ Add function *ControllerMotionKernelTimeLoadGet()* to get CPU time load ratio.
- ✓ Add *CPUTotalLoadRatio* in gathering configuration list.
- ✓ Add command error ERR\_FUNCTION\_ONLY\_ALLOWED\_IN\_DISABLED\_STATE (-117)
- ✓ Add command error ERR\_NOT\_ALLOWED\_DRIVER\_NOT\_INITIALIZED (-118)
- ✓ Add support for new CIE08 board ("E4492").
- ✓ Improve linear motor initialization LMI process to be able to move out from dead position.
- ✓ Improve "Fatal internal error" status detection: do not latch it if *FatalFollowingError* has been detected before.
- ✓ Fix problem of *GroupMoveRelative()* with full stage travel distance (-EOR => +EOR and return).
- ✓ Fix problem of trajectory synchronization pulses generated outside of trajectory.

### Configuration files

- ✓ In the **Stages.ini** file, new parameters and values are added (colored in red)

```
; Driver command interface
MotorDriverInterface=AnalogPositionPiezo
; Motor driver model
DriverName = XPS-DRVP1
; Driver parameters
DriverKI = 0 ; float value >= 0
DriverNotchFrequency = 1000.0 ; Hz, float value >= 0 and <= 5000
DriverNotchBandwidth = 50.0 ; Hz, float value >= 0 and <= 5000
DriverNotchGain = 1.0 ; float value >= 0
DriverLowpassFrequency = 1000.0 ; Hz, float value >= 0 and <= 5000
DriverFatalFollowingError = 1.0 ; units, float value > 0
DriverStagePositionOffset = -100.0 ; units, float value
DriverTravelCorrection = 0 ; ppm , float value > -1e6 and < 1e6
; Limit sensors input plug
ServitudesType = Piezo
```

### Web site (V2.5.1)

- ✓ Update FRONT PANEL / Driver status page for DRVP1 driver.
- ✓ Change compiler options (-O2 optimization) to improve execution time.
- ✓ Optimize and secure source code.

### RC module (V2.5.2)

- ✓ Modify save error function: only one error is saved in RCError.log.

### VxWorks kernel (V1.2.4)

- ✓ Change compiler options (-O2 optimization) to improve execution time.
- ✓ Review code to consolidate buffers from overflow situation.

### Module versions

- ✓ Remote Control revision XPS-RC-V2.0.0
- ✓ Driver revision V2.6.x (TCL, LabView, Matlab, C, Basic, Python, executables and source codes).
- ✓ Stage data base revision V2.6.0

# XPS-C8 controller firmware

## XPS-C8 Controller Installer Pack Number 10000 (released Jul. 2009)

### **Firmware** (V2.5.1)

- ✓ Fix problem of *PositionerExcitationSignalSet()* execution in open loop.

### **Configuration files**

- ✓ No change.

### **Web site** (V2.5.0)

- ✓ No change.

### **RC module** (V2.5.1)

- ✓ Fix problem of detection of groups and positioners.

### **VxWorks kernel** (V1.2.3)

- ✓ No change.

### **Module versions**

- ✓ Remote Control revision XPS-RC-V2.0.0
- ✓ Driver revision V2.5.x (TCL, LabView, Matlab, C, Basic, Python, executables and source codes).
- ✓ Stage data base revision V2.5.0

# XPS-C8 controller firmware

## XPS–C8 controller Installer Pack Version 2.5.x

XPS-C8 controller Installer Pack Version 2.5.0 (released June 2009)

### Firmware (V2.5.0)

- ✓ Add new functions:
  1. *ControllerStatusGet()*..... to get controller status bits (e.g.: initialization OK or not).
  2. *ControllerStatusStringGet()* ..... to get controller status string.
  3. *GatheringExternalDataGet()*
  4. *GatheringDataMultipleLinesGet()*
  5. *GatheringRunAppend()*
  6. *GroupAccelerationSetpointGet()*
  7. *GroupCurrentFollowingErrorGet()*
  8. *GroupPositionPCORawEncoderGet()* ..... for an XY group only
  9. *XYZGroupPositionCorrectedProfilerGet()*..... for an XYZ group only
  10. *HardwareDateAndTimeSet() / Get()*
  11. *PositionerExcitationSignalSet()/Get()* ..... for PIDFFAcceleration, PIDFFVelocity and PIDDualFF
  12. *PositionerPositionCompareAquadBAlwaysEnable()*
  13. *PositionerPositionCompareAquadBWindowedSet() /Get()*
  14. *PositionerRawEncoderPositionGet()*
  15. *TCLScriptExecuteWithPriority()*
- ✓ Add possibility to set the controller boot time period (new parameter in the “system.ref” configuration file).
- ✓ Add a new parameter “TimeFlasherBaseFrequency” in the system.ini configuration file
- ✓ Add support for new card CIE08 (“E4412”).
- ✓ Correct the *HardwareDriverAndStageGet()* function to return always two separate strings.
- ✓ Correct the *ErrorStringGet()* function for BOTH\_ENDS\_OF\_RUN\_ACTIVATED (-113) error.
- ✓ Fix problem of response “multiple” with *MoveAbort()* function.
- ✓ Manage the number of opened sockets exceeds 80.
- ✓ Manage the received strings exceeds 500 characters and the function name longer than 100 characters.
- ✓ Suppress motor disable at the end of linear motor initialization.
- ✓ Modify the “HomePreset” condition at the controller reboot :  
 $MinimumTargetPosition \leq HomePreset \leq MaximumTargetPosition$

### Configuration files

- ✓ In the **System.ref** file, a new parameter is added:  
`DelayBeforeStartup = 0 ; seconds (0 by default)`
- ✓ In the **System.ini** file, a new parameter is added:  
`TimeFlasherBaseFrequency = 40e6 ;Hz`

### Web site (V2.5.0)

- ✓ No display of Web pages after a controller reboot error :
  - Administrator login: Pages “FrontPanel” and “Tuning” don’t work.
  - User login: Pages “FrontPanel”, “Terminal” and “FunctionalTests” don’t work.
- ✓ Fix the problem of “page fault” when the “Terminal” page is using just after a controller’s reboot: an introduction page is opened to invite user to login once again.
- ✓ Add new codes of group status.
- ✓ System build / Manual configuration: fixe problem of “system.ini” file creation (file truncated).
- ✓ System / Manual configuration menu: Add the possibility to erase a BootScriptTCL if it is already chosen.
- ✓ Correction of the “Tuning” page.
- ✓ Secure sources code to avoid problem of memory buffers overflow.

### RC module (V2.5.0)

- ✓ If the controller boot failed, the remote control panel (RC) goes directly to the controller IP setting page.

### System version

- ✓ VxWorks kernel V1.2.3

# XPS-C8 controller firmware

## **Module versions**

- ✓ Controller version : XPS-C8 Firmware V2.5.0
- ✓ Web server version : WebServer V2.5.0
- ✓ Remote Control version : XPS-RC-V2.0.0, RC-Module-V2.5.0
- ✓ Drivers version : V2.5.x (TCL, LabView, Matlab, C, Basic, Python, executables and source codes).

# XPS-C8 controller firmware

## XPS-C8 controller Installer Pack Version 2.4.x

XPS-C8 controller Installer Pack Version 2.4.1 (released Oct, 2008)

### *Firmware (V2.4.1)*

- ✓ Corrections for the spindle:
  - "Glong" sound due to the "ResetSpindle" in "DigitalStepperPositionMotorInterface"
  - Glitch on current velocity due to the "ResetSindle" in the "FirstOrderFilter"
  - Check "SpindlePeriod" (must be a multiple of DisplacementPerFullStep, EncoderResolution or EncoderScalePitch)
- ✓ "GroupMoveAbort" correction for the groups with several positioners (XY, XYZ, MultipleAxes). After the function "GroupMoveAbort", the target positions were not corrects at end of the move abort.
- ✓ Events&Actions: Correct multiple action execution when trigger linked to Always or Timer

### *Web site (V2.4.0)*

- ✓ No change.

### *Configuration files*

- ✓ No change.

### *System version*

- ✓ VxWorks kernel V1.2.2

### *Module versions*

- ✓ Controller version : XPS-C8 Firmware V2.4.1
- ✓ Web server version : WebServer V2.4.0
- ✓ Remote Control version : XPS-RC-V2.0.0, RC-Module-V2.3.0

# XPS-C8 controller firmware

**XPS-C8 controller Installer Pack Version 2.4.0** (ECO released Jul, 2008)

## *Firmware (V2.4.0)*

- ✓ Add new PositionerError type : **FatalInternalError**.
- ✓ Add new feature **CIE08** cards (**E4323**) :
  - Programmable filter for encoder signals to avoid multiple PCO when stage moves at low speed
  - Add **PositionerPositionComparePulseParametersSet()**
  - Add **PositionerPositionComparePulseParametersGet()**
  - Add new error **ERR\_HARDWARE\_FUNCTION\_NOT\_SUPPORTED** (-115)
- ✓ Events&Actions: Fix problem when **ExecuteTCLScript** action is attached to **Always** or **Timer** event
- ✓ Events&Actions: Fix **EventExtendedGet()** and **EventExtendedAllGet()** functions to have correct return.
- ✓ Events&Actions: Fix **EventRemove()** function.
- ✓ Interpolated encoder : Fix **PositionerEncoderCalibrationParametersGet()** initialization.
- ✓ Fix stages run away issue.
- ✓ Add security, add tests to avoid configuration of exclusive modes gantry and slave.
- ✓ Improve **StopAndSaveGathering()** function.
- ✓ NotchFilter: Increase the maximum limit of **NotchGain** to 100 (old value : 1).

## *Web site (V2.4.0)*

- ✓ Add **FatalInternalError** bit in **<Move><Positioner Error>** window
- ✓ Increase **MAX\_WRITER\_RESULT\_PAGE\_LINES** to 2000.
- ✓ Fix issue of **Front Panel** and **Functional Tests** without Terminal previously used.

## *Configuration files*

- ✓ No change.

## *System version*

- ✓ VxWorks kernel V1.2.2

## *Module versions*

- ✓ Controller version : XPS-C8 Firmware V2.4.0
- ✓ Web server version : WebServer V2.4.0
- ✓ Remote Control version : XPS-RC-V2.0.0, RC-Module-V2.3.0 (correct EOR display)

# XPS-C8 controller firmware

## XPS-C8 controller Installer Pack Version 2.3.x

**XPS-C8 controller Installer Pack Version 2.3.0** (ECO released May, 2008)

### *Firmware (V2.3.0)*

- ✓ General: add DoubleGlobalArray (Get and Set)
- ✓ Gathering: new functions GatheringRun, GatheringStop
- ✓ Gathering: improve GatheringStopAndSave error handling
- ✓ Gathering: action & function GatheringStop also stops ExternalGathering
- ✓ XY group: add GroupPositionCorrectedProfilerGet function
- ✓ Events & Actions: correct EventExtendedRemove
- ✓ Events & Actions: correct ExecuteTCLScript action
- ✓ General: correct \*ListGet functions

### *Web site (V2.3.0)*

- ✓ No change.

### *Configuration files*

- ✓ No change.

### *System version*

- ✓ VxWorks kernel V1.2.2

### *Module versions*

- ✓ Controller version : XPS-C8 Firmware V2.3.0
- ✓ Web server version : WebServer V2.3.0
- ✓ Remote Control version : XPS-RC-V2.0.0, RC-Module-V2.2.0

# XPS-C8 controller firmware

## XPS-C8 controller Installer Pack Version 2.2.x

XPS-C8 controller Installer Pack Version 2.2.0 (released Mar., 2008)

### Firmware (V2.2.0)

- ✓ Add **DACSet.CurrentPosition** and **DACSet.CurrentVelocity** action to the action list.
- ✓ Add PlusEndOfRun HomeSearch for stages without encoder.
- ✓ Add new **error code** -113 (Both ends of run activated).
- ✓ Add Master-Slave capability during homing.
- ✓ Add Tab and Space separators for trajectory files.
- ✓ Add support for CIE08 board.
- ✓ Fix TCP-IP messages reconstruction in multi-packet transmission.
- ✓ Modify GroupMotionEnable() / GroupMotionDisable() to fix the problem of some configurations where the stage runs away during initialization.
- ✓ Fix problem of XY initializing and homing in gantry configuration.
- ✓ Fix problem of PositionerDriverStatusGet() function call in the READY state.
- ✓ Fix problem of wrong status returned by the DriverStatusGet() in MultipleAxes group.
- ✓ Fix problem of encoder resolution in regard of software limits, *HomePreset must be greater than MinimumTargetPosition and less than MaximumTargetPosition.*
- ✓ Fix problem of execution of an invalid trajectory file.
- ✓ Improve master-slave safety.

### Web site (V2.2.0)

- ✓ Fix spindle group generation in system.ini file from System/Manual configuration menu..
- ✓ Fix TCP-IP messages reconstruction in multi-packet transmission.

### Configuration files

- ✓ No change.

### System version

- ✓ VxWorks kernel V1.2.2

### Module versions

- ✓ Controller version : XPS-C8 Firmware V2.2.0
- ✓ Web server version : WebServer V2.2.0
- ✓ Remote Control version : XPS-RC-V2.0.0, RC-Module-V2.2.0

# XPS-C8 controller firmware

## XPS-C8 controller Installer Pack Version 2.1.x

XPS-C8 controller Installer Pack Version 2.1.5 (released Dec, 2007)

### *Configuration files*

- ✓ No change.

### *Firmware (V2.1.5)*

- ✓ Correct problem of TCP timeout error (-2) by GroupReferencingActionExecute() with MoveRelative action (problem occurs for Spindle group only)
- ✓ Correct problem of glitch / following error by PositionerDriverStatusGet() execution in READY state.

### *Web site (V2.1.2)*

- ✓ No change.

### *System version*

- ✓ VxWorks kernel V1.2.2

### *Module versions*

- ✓ Controller version : XPS-C8 Firmware V2.1.5
- ✓ Web server version : WebServer V2.1.2
- ✓ Remote Control version : XPS-RC-V2.0.0, RC-Module-V2.1.0

# XPS-C8 controller firmware

## XPS-C8 controller Installer Pack Version 2.1.4 (released Nov, 2007)

### Configuration files

- ✓ Stages.ini : DriverName : XPS-DRV00-2 is changed to XPS-DRV00P.

### Firmware (V2.1.4)

- ✓ Correct problem of glitch / following error with TCLScripExecute action.
- ✓ Correct problem of home search in gantry configuration (slave error).
- ✓ Correct problem of I2C bus, reintroduce delay 1s after driver DSP configuration.
- ✓ Add support for new driver card DRV02P (stages.ini: DriverName = XPS-DRV02P).
- ✓ Correct bug of MotionDone in the case of successive single-member moves (XY, XYZ, Multiple groups).
- ✓ Correct bug of Spline trajectory verification in the XYZ group.
- ✓ Correct bug EmergencyBrake/EmergencyStop (or KillAll) during home search for gantry systems (XY or Single group).

### Web site (V2.1.2)

- ✓ No change.

### System version

- ✓ VxWorks kernel V1.2.2

### Module versions

- ✓ Controller version : XPS-C8 Firmware V2.1.4
- ✓ Web server version : WebServer V2.1.2
- ✓ Remote Control version : XPS-RC-V2.0.0, RC-Module-V2.1.0

# XPS-C8 controller firmware

**XPS-C8 controller Installer Pack Version 2.1.3** (released Sep, 2007)

*Configuration files*

- ✓ No change.

*Firmware (V2.1.3)*

- ✓ Add support for INT03 without FPGA (E4224A)
- ✓ Remove 1 second delay after writing driver DSP parameter (issues with DRV03 velocity)

*Web site (V2.1.2)*

- ✓ No change.

*RC-Module (V2.1.0)*

*Module versions*

- ✓ Controller version : XPS-C8 Firmware V2.1.3
- ✓ Web server version : WebServer V2.1.2
- ✓ Remote Control version : XPS-RC-V2.0.0, RC-Module-V2.1.0

# XPS-C8 controller firmware

**XPS-C8 controller Installer Pack Version 2.1.2** (released Sep, 2007)

## *Configuration files*

- ✓ No change.

## *Firmware (V2.1.2)*

- ✓ Add CIE05 E3920C support
- ✓ Correcting bug in referencing
- ✓ Correcting bug of spindle reset function
- ✓ Correcting bug of driver DRV00-2 detection
- ✓ Remove SlaveError lost messages
- ✓ Correst KForm handling for homing and referencing all groups
- ✓ Correct JogTrapezoidalMotionProfileGenerator
- ✓ Auto tuning function corrected for XYZ group
- ✓ Correct AnalogInterpolated encoder counting bug

## *Web site (V2.1.2)*

- ✓ Improve string handling

## *RC-Module (V2.1.0)*

## *Module versions*

- ✓ Controller version : XPS-C8 Firmware V2.1.2
- ✓ Web server version : WebServer V2.1.2
- ✓ Remote Control version : XPS-RC-V2.0.0, RC-Module-V2.1.0

# XPS-C8 controller firmware

## XPS-C8 controller Installer Pack Version 2.1.1 (released Jul, 2007)

### Configuration files

- ✓ No change.

### Firmware (V2.1.1)

- ✓ Time flasher : Add round in the PositionerTimeFlasherSet() function.
- ✓ Correct the event "always" and all state events
- ✓ Remove the lost "SlaveError" message.
- ✓ Correct functions EventExtendedWait and EventWait
- ✓ Improve TCLScriptKill
- ✓ Improve TCL command interpretation for function with unknown parameter number
- ✓ Improve variable PID handling in HomeSearch & Referencing sequences

### Web site (V2.1.1)

- ✓ Correct the function Tool\FileTools\copyFile().
- ✓ Menu System\Auto configuration and Stage\Add from database : Search stage problem is corrected.
- ✓ System\Manual configuration : the "Create new system.ini" button is disabled if no positioner added.

### RC-Module (V2.1.0)

### Module versions

- ✓ Controller version : XPS-C8 Firmware V2.1.1
- ✓ Web server version : WebServer V2.1.1
- ✓ Remote Control version : XPS-RC-V2.0.0, RC-Module-V2.1.0

# XPS-C8 controller firmware

**XPS-C8 controller Installer Pack Version 2.1.0** (released Mar, 2007)

## Configuration files

- ✓ Stages.ini : For acceleration stages, remove **InitializationAcceleration** parameter and replace it by **InitializationAccelerationLevel** (percentage of ScallingAcceleration)

## Firmware (V2.1.0)

- ✓ Add Gantry functionality (secondary positioner) for SingleAxis and XY groups (with XY ratio)
- ✓ Add Auto-tuning and Auto-scaling functionalities
- ✓ Add Time Flasher functionality : **CIE05 board**
- ✓ Add "Login" function
- ✓ Add "CloseAllOtherSockets" function (protected by Login function)
- ✓ Add "PositionerStageParameterSet" function (protected by Login function)
- ✓ Add "PositionerErrorRead" function
- ✓ Add "GatheringDataGet" function
- ✓ Add new actions: "GatheringStop" and "GatheringRunAppend"
- ✓ Add new motor interface: AnalogSinAccelerationLMI (LMI = Large Motor Initialization) for linear motors
- ✓ Add GPIO2 ADC and DAC 5 to 8 handling : **second INT board**
- ✓ Correct "EventExtendedRemove" function
- ✓ Correct reset of counter for Spindle positioners (for stages with weird encoder resolution)
- ✓ Correct gathering (correction of the number of data lines gathered)
- ✓ Events : Correct Sgamma.ConstantVelocityEnd event and trajectory pulse events
- ✓ Correct PVT pulse generation stop and re-start
- ✓ End of run are disabled in Slave profile during home search
- ✓ Slave profile modification (master correction from mapping)
- ✓ Maximum number of sockets set to **80** (NOTE: a TCL socket is counted as 2 sockets)
- ✓ Software drivers: Improve DLL code; Add comments for all functions; Add Matlab help for all functions
- ✓ Correct Position Compare Output (PCO) for even plug numbers
- ✓ Add [AUTOTUNING] section (parameters of auto-tuning and auto-scaling) in "system.ref"
- ✓ Remove InitializationAcceleration parameter from standard stages database.

## Web site (V2.1.0)

- ✓ Add auto-tuning and auto-scaling to System → Tuning page (Administrator mode)
- ✓ Improve TCL auto-generation from Terminal
- ✓ Add gantry configuration in System → Manual Configuration page
- ✓ Modify Newport branding
- ✓ Remove old Events & Actions functions from Terminal (use Extended functions now)
- ✓ Improve parameter configuration from a list in Terminal page
- ✓ Display a description for each selected function from Terminal.
- ✓ The velocity setting is corrected in the move page from Front Panel.
- ✓ "Front Panel" is added in the "Administrator" menu.
- ✓ "New Browser" menu is deleted.

## RC-Module (V2.1.0)

- ✓ Page Move : Correct the setting of moving velocity and moving acceleration
- ✓ Updated with new group status and new error codes

## Module versions

- ✓ Controller version : XPS-C8 Firmware V2.1.0
- ✓ Web server version : WebServer V2.1.0
- ✓ Remote Control version : XPS-RC-V2.0.0, RC-Module-V2.1.0

# XPS-C8 controller firmware

## XPS-C8 controller Installer Pack Version 2.0.x

### *Version history :*

**XPS-C8 controller Installer Pack Version 2.0.1** (released Dec, 2006)

#### *Firmware (V2.0.1)*

- ✓ Correct pulses on PVT trajectory
- ✓ Correct the trajectory reading
- ✓ Correct the management of TCL arguments and the number of executions
- ✓ Number of TCP connections is setting to 100
- ✓ DLL memory handling
- ✓ TCL execution memory handling
- ✓ Allow more than 10 use of an event of one class
- ✓ Correct the XYZ mapping reading

#### *Web site (V2.0.0)*

- ✓ None

#### *Module versions*

- ✓ Controller version : XPS-C8 Firmware V2.0.1
- ✓ Web server version : WebServer V2.0.0
- ✓ Remote Control version : XPS-RC-V0.0.0, RC-Module-V2.0.0

# XPS-C8 controller firmware

**XPS-C8 controller Installer Pack Version 2.0.0** (released Nov, 2006)

## *Firmware (V2.0.0)*

- ✓ New CIE05 board and XPS-DRV00-2 driver integration
- ✓ Two new stepper position motor interfaces are added : "Pulse and Direction" and "Pulse + / Pulse -"
- ✓ Plus end of run home search (+ referencing action) is added
- ✓ Index home search is modified to make it "failure proof" (with CIE05)
- ✓ Add a new API to read stage configuration parameters from stages.ini in relation to a positioner
- ✓ Add a pulse generation on trajectories (LineArc, PVT)
- ✓ Add two new events in relation to pulses on trajectories
- ✓ Add a new action to acquire one data in the gathering buffer on trigger
- ✓ Add a new API to acquire manually one data in the gathering buffer
- ✓ Add a new API to reset the internal buffer of the gathering
- ✓ Add a new API to read the driver status of a positioner
- ✓ Correct bug in referencing (killall after referencingStart for multipleAxis, XY, XYZ groups)
- ✓ Correct EventAdd function return value (remove returned identifier to fit prototype)
- ✓ Correct bug in TCP socket handling
- ✓ Do not read PositionerMappingFileName if not needed
- ✓ Add DRVM in Configurator
- ✓ Do not take into account of "M-" for stages name in stages.ini and in EEPROM anymore
- ✓ Allow a master to do his home search with a slave connected without trouble for the slave
- ✓ Correct bug in asynchronous MoveAbort for XY, XYZ and MultipleAxis groups
- ✓ Correct velocity saturation for tracking motion profilers (position and velocity)
- ✓ Correct TCL arguments handling when used with Events&Actions (use ; to separate TCL arguments)

## *Web site (V2.0.0)*

- ✓ New "Driver status" page is added in front panel menu
- ✓ In configuration mode : FTP session must be closed to reboot controller
- ✓ History from Terminal mode is saved
- ✓ IO View and IO Set pages in FrontPanel modified (in the case there is more than one INT board)
- ✓ Maximum number of stages in a family set to 300
- ✓ Correct bug in TCP socket handling
- ✓ Correct bug in Auto Configuration (was not taking driver into account)

## *Module versions*

- ✓ Controller version : XPS-C8 Firmware V2.0.0
- ✓ Web server version : WebServer V2.0.0
- ✓ Remote Control version : XPS-RC-V0.0.0, RC-Module-V2.0.0

# XPS-C8 controller firmware

## XPS-C8 controller Installer Pack Version 1.6.x

### *Version history :*

#### **XPS-C8 controller Installer Pack Version 1.6.2** (released Jul, 2006)

##### *Firmware (V1.6.2)*

- ✓ Correct reboot when moving in MultipleAxis and XYZ
- ✓ Correct KillAll after ReferencingStart
- ✓ Remove EventAdd return value (to fit function prototype)

##### *Web site (V1.6.1)*

- ✓ none

##### *Module versions*

- ✓ Controller version : XPS-C8 Firmware V1.6.2
- ✓ Web server version : WebServer V1.6.1
- ✓ Remote Control version : XPS-RC-V0.0.0, RC-Module-V1.5.1

#### **XPS-C8 controller Installer Pack Version 1.6.1** (released Jun, 2006)

##### *Firmware (V1.6.1)*

- ✓ Correction of following error handling in referencing mode
- ✓ Improve TCL scripts handling (concerning parameters)
- ✓ Change error number for same TCL task name
- ✓ Correction of KillAll or GroupKill handling in referencing mode
- ✓ Correction of backlash compensation : cumul is updated to zero in "enable" function.

##### *Web site (V1.6.1)*

- ✓ Correction of "driver" list in "Add stage from database"
- ✓ Add "stdout" in the first "puts" in the generated TCL script from history
- ✓ Remove extra \r in auto generated TCLs
- ✓ Correct TCLScriptExecute(AndWait) handling for parameters in auto generated TCLs

##### *Module versions*

- ✓ Controller version : XPS-C8 Firmware V1.6.1
- ✓ Web server version : WebServer V1.6.1
- ✓ Remote Control version : XPS-RC-V0.0.0, RC-Module-V1.5.1

# XPS-C8 controller firmware

**XPS-C8 controller Installer Pack Version 1.6.0** (released Jun, 2006)

## *Firmware (V1.6.0)*

- ✓ DRV03 driver integration.
- ✓ “Events and actions” structure modification. New APIs, events and actions (Old APIs are compatibles)
- ✓ Groups with multiple axis can receive asynchronous abort APIs for different positioners
- ✓ Abort move transition is added in JOG mode
- ✓ Correction of asynchronous move APIs for different positioners : a request is possible just after a move
- ✓ Correction of “TclScriptKill” API to clean memory properly
- !! **NOTE : TCL\_API\_Drivers.out must be updated (major modification)**
- ✓ Correction of group initialization : clear all positioner errors about end of runs
- ✓ Correction of “Spin” category when the full event name is returned
- ✓ Correction of “SpindleModeStop” when the velocity is null
- ✓ Add “GatheringBufferSize” key in “System.ref” file to define the maximum of buffer size for gathering.

## *Web site (V1.6.0)*

- ✓ Add a “Reboot” button in the “Modifiy stage” page (Configuration menu)
- ✓ Correction in system auto-configuration (copy function)
- ✓ Correction in web configurator interface
- ✓ Correction in Tuning page (Go absolute move button with FireFox)
- ✓ Display the arborescence of TCL scripts correctly
- ✓ All TCL script names with prefix “\_” are not displayed in the “Functional Tests” page
- ✓ Add the “spin mode stop” management in front panel

## *Module versions (1.6.0)*

- ✓ Controller version : XPS-C8 Firmware V1.6.0
- ✓ Web server version : WebServer V1.6.0
- ✓ Remote Control version : XPS-RC-V0.0.0, RC-Module-V1.5.1

# XPS-C8 controller firmware

## XPS-C8 controller Installer Pack Version 1.5.x

### Version history :

#### XPS-C8 controller Installer Pack Version 1.5.1 (released Feb, 2006)

##### Firmware (V1.5.1)

- ✓ Backlash corrected
- ✓ Index home search re-added
- ✓ Spindle period reading corrected

##### Web site (V1.5.1)

- ✓ none

#### XPS-C8 controller Installer Pack Version 1.5.0 (released Jan, 2006)

##### Firmware (V1.5.0)

- ✓ New Spindle group : allows continuous spin for rotation stages :  
!! add "SpindleInUse = " in [GROUPS] section in "system.ini" file
- ✓ New referencing method : allows manual reference search
- ✓ Groups with multiple axis can receive asynchronous move APIs for different positioners
- ✓ Visual Basic and Visual C data types corrected in header files
- ✓ GatheringStopAndSave write error detection (when flash disk is already full)
- ✓ GatheringConfigurationSet : stupid parameters not allowed anymore (for example XPS was confused by blablablacurrentvelocity, it understood it as currentvelocity)
- ✓ CorrectorOutput available in Gathering (not hidden anymore)
- ✓ Use of tabulation in trajectory file
- ✓ Time delta zero detected for PVT trajectories
- ✓ Visual Basic and Visual C/C++ data types handling (there was confusion between many data types like Integer, Long, ...)
- ✓ I<sup>2</sup>C reading corrected for DVR02
- ✓ Mapping max line size set to 5000 character
- ✓ Mapping line reading corrected
- ✓ Correction in jog : minimum number of points of constant velocity set to 1
- ✓ Detect too long API when using TCL
- ✓ GroupCorrectorOutputGet() API added
- ✓ TCP\_ConnectToServer (visual drivers) function now detects failed connections
- ✓ Disable variable PID during home search corrected

##### Web site (V1.5.1)

- ✓ Web Configurator interface added
- ✓ Corrections in user configuration

# XPS-C8 controller firmware

## XPS-C8 controller Installer Pack Version 1.4.x

### *Version history :*

#### **XPS-C8 controller Installer Pack Version 1.4.2** (released Oct, 2005)

##### *Firmware (V1.4.2)*

- ✓ Gathering :
  - File writing verifications added
  - GatheringConfigurationSet option reading improved
- ✓ Trajectories :
  - Line-Arc, Spline and PVT : allow tabulation in trajectory file
  - PVT : verify Delta Time of elements are positive
- ✓ Jog : bug correction for live velocity change
- ✓ Visual Basic and Visual C data types corrected in header files

##### *Web site (V1.4.1)*

- ✓ none

#### **XPS-C8 controller Installer Pack Version 1.4.1** (released Aug, 2005)

##### *Firmware (V1.4.1)*

- ✓ Discontinuity angle verification in line-arc verification and execution corrected
- ✓ Code beautifying in line-arc
- ✓ APIJogParametersSet modified for all groups to test maximum values of velocity and acceleration

##### *Web site (V1.4.1)*

- ✓ Correct bug related to '@' reading in stage name when adding a new stage to config file
- ✓ Modify the "copyFile" function (binary mode) in "FileTools" class.

#### **XPS-C8 controller Installer Pack Version 1.4.0** (released May, 2005)

##### *Firmware (V1.4.0)*

- ✓ Linear motor initialization improved

##### *Web site (V1.4.0)*

- ✓ Beautifying

# XPS-C8 controller firmware

## XPS-C8 controller firmware Version 1.3.x

### *Version history :*

#### **XPS-C8 controller firmware Version 1.3.1** (released Apr, 2005)

##### *Firmware*

- ✓ DummyZM PresetEncoder corrected
- ✓ ADC differential gain EEPROM reading corrected
- ✓ Boot script task name changed to tcl\_BootScript
- ✓ plug number added to XPS-DRV02 class for frequency shift
- ✓ TCL interpreter memory leakage corrected
- ✓ Output argument list added to TCLScriptExecuteAndWait prototype
- ✓ Multiple no encoder stepper home search bug corrected
- ✓ Velocity tracking scaling corrected

##### *Web site*

- ✓ Tuning applet improved
- ✓ TCL error management in TCL generator improved

#### **XPS-C8 controller firmware Version 1.3.0** (released Jan, 2005)

##### *Firmware*

- ✓ XPS-DRV02 driver board support added
- ✓ Remote control module management added
- ✓ Reentrant flag activated in each VI
- ✓ TCP timeout management in TCL improved
- ✓ TCP timeout management in DLL corrected

##### *Web site*

- ✓ Remote control version added
- ✓ Code improvement

# XPS-C8 controller firmware

## XPS-C8 controller firmware Version 1.2.x

### Version history :

#### XPS-C8 controller firmware Version 1.2.1 (released Dec, 2004)

##### Firmware

- ✓ Stepper stand by current management corrected
- ✓ Jog profile generator corrected
- ✓ Tracking corrected
- ✓ PVT trajectories loading corrected
- ✓ ZM inconsistency detection during home search added
- ✓ dll : optimization, better timeout management and number of simultaneous sockets increased to 50
- ✓ VI : timeout value added to OpenConnection

##### Web site

- ✓ "Stage management" is corrected : bug due to alphabetic order of stages.
- ✓ TCL generator corrected
- ✓ Hardware status corrected

#### XPS-C8 controller firmware Version 1.2.0 (released Oct, 2004)

##### Firmware

- ✓ Semi-columns ";" in front of the section are now taken into account
- ✓ missing trajectory file treatment corrected
- ✓ check section in stages file added
- ✓ delay added to each home search sequence (100 ms)
- ✓ position reset to home preset after initialization
- ✓ travel limits management changed : home preset not taken into account
- ✓ end of run glitch detection improved
- ✓ emergency brake dead lock corrected for XY, XYZ and MultipleAxes
- ✓ analog value check added
- ✓ variable PID disable during home search
- ✓ general parameters moved from system.ini to system.ref except BootScript
- ✓ new API to execute a script TCL and wait the end of execution : TCLScriptExecuteAndWait()
- ✓ two new APIs to filter the current velocity and the current acceleration in Gathering :
  - + PositionerCurrentVelocityAccelerationFiltersSet ()
  - + PositionerCurrentVelocityAccelerationFiltersGet ()
- ✓ tracking filters changed to avoid oscilation
- ✓ PositionerPreviousMotionTimesGet() API renamed to PositionerSGammaPreviousMotionTimesGet()
- ✓ PositionerMaximumVelocityAndAccelerationGet() API added

##### Web site

- ✓ The terminal page is modified : list API's is in alphabetic order, TCL generator and current gathering.dat view.
- ✓ "New browser" menu allows to open a new browser and to work with the old browser.
- ✓ "I/O status" menu is renamed to "I/O Review" menu.
- ✓ Add new pages in Front Panel : "I/O setting" and "Hardware status".
- ✓ Delete pages in Front Panel : "Group status" and "Positioner positions".
- ✓ "Move" page : contains group status, positioner positions, next group command and merges "Absolute move" and "Relative move" pages
- ✓ "Jog" page contains group status, positioner positions and next group command.

## XPS-C8 controller firmware

- ✓ “Hardware status” page added
- ✓ “Auto-configuration” page allows to select a stage into a list from the stages.ini file.
- ✓ “Stage add” is renamed to “Stage management” and is modified : stage list from stages.ini file and each list is in alphabetic order
- ✓ “System build” is rename to “System management” and is modified :
  - Add a screen that lists the current “system.ini”
  - Make a scroll list to select 1-8 plug number
  - Add two fields : the BootScriptFileName and the BootScriptArguments parameters
  - Purpose a default short name for each group and each positioner
- ✓ “Tuning” page is modified:
  - Only one window to configure acquisition and motion parameters
  - Delete the “Update status” button => auto update (Timer)
  - Current position is displayed (Timer)
  - Add a button to run an absolute move
  - All buttons are replaced by only one button to execute the next group command
  - Add two new parameters to filters current velocity and current acceleration
- ✓ The java applet to display the current gathering is modified :
  - Add a comment field to print
  - Add a link to download the java runtime
  - Increase the size of each selection list and redesign the page
  - Change the calculation :  $(\text{Value} - \text{offset}) * \text{gain}$

# XPS-C8 controller firmware

## XPS-C8 controller firmware Version 1.1.1

XPS-C8 controller firmware Version 1.1.1 (released Jul, 2004)

### Firmware

- ✓ XYZ reboot when move start corrected
- ✓ wrong set of parameters for SGamma profile generator corrected
- ✓ Motion done timeout positioner error reset when enable motion
- ✓ answer now sent when motion done timeout occurs at the same time on two positioner of a group : need kill command
- ✓ answer now sent to abort command when an error occurs during abort
- ✓ number of XY group increased to 4
- ✓ negative slave ratio now allowed
- ✓ Encoder calibration functionality added, with three new APIs :
  - + GroupInitializeWithEncoderCalibration()
  - + PositionerEncoderCalibrationParametersGet()
  - + PositionerEncoderAmplitudeValuesGet()

### Web site

- ✓ none

XPS-C8 controller firmware Version 1.1.0 (released May, 2004)

### Firmware

- ✓ **MicroStepFactor** parameter removed (stages.ini) – need a manual remove in older configuration file
- ✓ **EncoderZMPlug** parameter added (stages.ini)
- ✓ new ServitudesType = **StandardEOREncoderPlug** added (stages.ini)
- ✓ ServitudesType = **Standard** replaced by **StandardEORDriverPlug** (stages.ini) – need a manual replacement in older configuration file
- ✓ XYZ mapping : a **separator (#)** is added after each end of matrix – need a manual add to older mapping file
- ✓ bug mapping positioner loading corrected
- ✓ bug jog disable with XY, XYZ and MultipleAxes corrected
- ✓ bug KillAll() XYZ corrected
- ✓ software limits added for velocity tracking mode
- ✓ bug PIPosition notch filters corrected
- ✓ bug reset position compare AquadB
- ✓ position compare set only when disabled
- ✓ "Not available with this configuration" error added
- ✓ limitation of following error and integral part of the PIPosition corrector removed
- ✓ GETS TCL command available with Telnet
- ✓ error messages corrected
- ✓ Reboot() not allowed if ftp client connected
- ✓ linear motor initialization corrected
- ✓ SGamma motion profile : velocity for small displacements bug corrected
- ✓ trajectory error management corrected
- ✓ spline emergency brake bug corrected
- ✓ Voltages, temperature and fan speed measurement are added.

### Web site

- ✓ bug correction in user management (active / inactive, at least 1 administrator)
- ✓ system.old removed
- ✓ cache of hardware recognition removed
- ✓ MotionProfileGeneratorType removed

## XPS-C8 controller firmware

- ✓ Appendix A and B added to documentation
- ✓ Terminal and front panel greatly improved improvement
- ✓ Mozzila support added

# XPS-C8 controller firmware

## XPS-C8 controller firmware Version 1.0.0

### *Version history :*

#### **XPS-C8 controller firmware Version 1.0.0 :**

##### *Firmware*

✓ Initial version

##### *Web site*

✓ Initial version