

# MCS-8

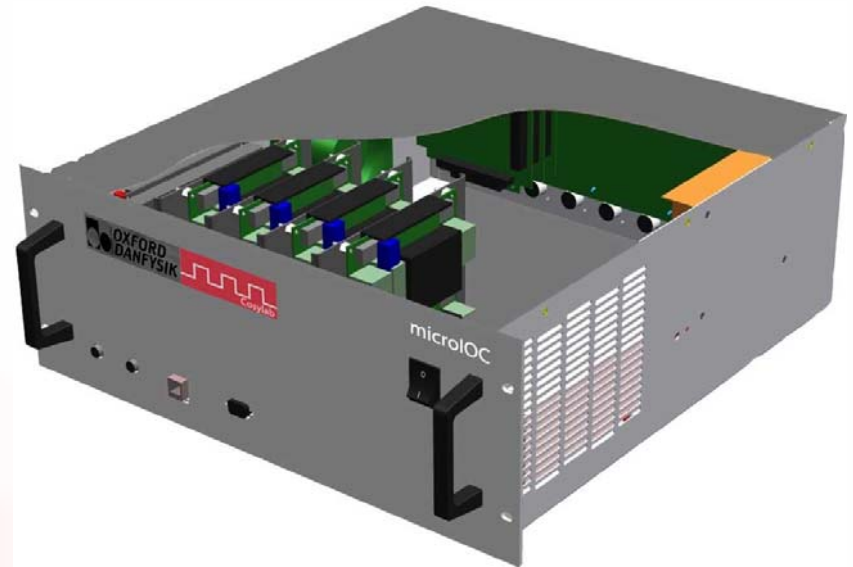
## The 8 axes motion control system

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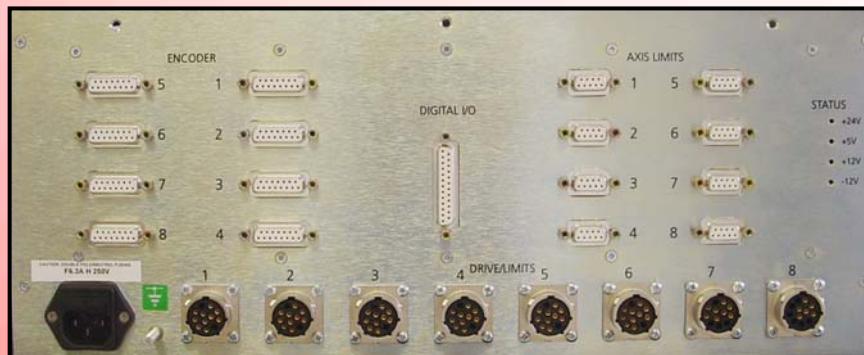
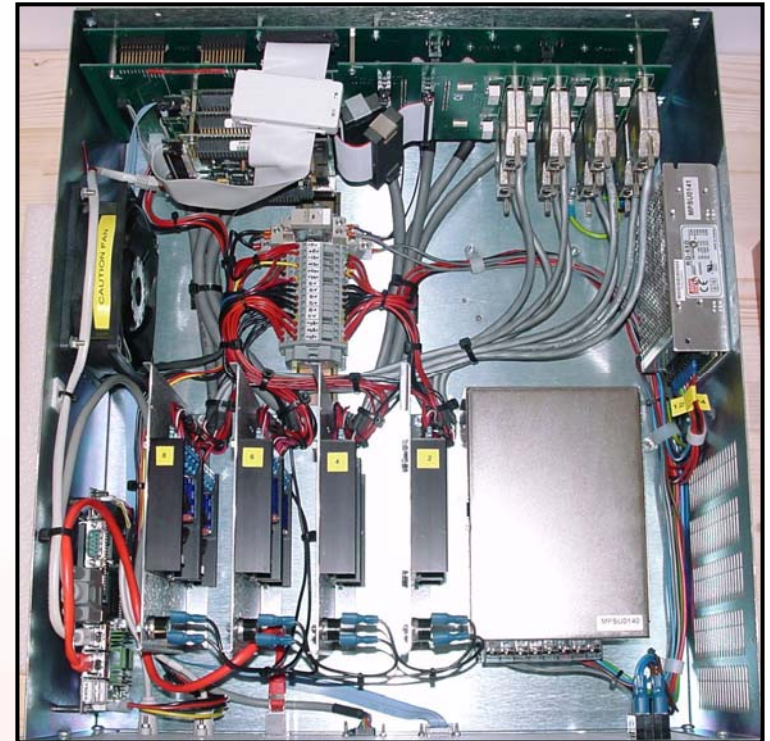


## What is the MCS-8?

- 8-axes motion controller box (developed by Oxford Danfysik (UK) and Cosylab)
- Includes:
  - Commercial motion controller (Delta Tau Turbo PMAC2)
  - Embedded **Cosylab microIOC**
  - All the I/O units, including power drivers
- What can we do with it?
  - All kinds of motors: stepper, servo, pico, piezo...
  - Inputs for limit switches, home switches, encoders
  - Control or monitor digital and analog I/O

# Hardware

- 4-U case
- 500W power supply
- Sufficient cooling (fans)
- Selectable motor drivers (external drivers possible)
- Over travel limits
- Encoder loss detection



## Software

- Turbo PMAC2
  - Motion programs (capable of commanding up to eight axes of motion synchronously)
  - PLC programs (background tasks, status checking, ...)
  - User written servo algorithms (executed at more than 2 kHz)
- MicroIOC provides Linux (Debian) or Windows platform.
  - Ethernet communication to PMAC (linux ethernet driver developed by Cosylab)
  - Can be used with EPICS, TANGO, TINE, ...
- Supported third-party applications
  - SPEC

## Where is it being used?

- Optical chicane (ASP)
- Hexapod mirror control (SLS) – migrated from VME system developed for Diamond
- Protein Crystallography beamline (ASP)
- Powder Diffraction beamline (ASP)
- Non EPICS projects:
  - INDUS (SPEC)
- More than 20 pcs already sold!

Hexapod Main  
Hexapod M3 Main

Move Mirror (UCS in LCS coordinates)

	Position	Readback	Tweak size
X	0.3336	0.3336 mm	1.0000
Y	0.0000	0.0000 mm	1.0000
Z	-0.0000	-0.0000 mm	1.0000
Yaw (X)	1745.1	1745.0 deg	1745.0
Pitch (Y)	0.1	0.1 deg	1745.0
Roll (Z)	-0.0	-0.0 deg	1745.0

Move hexapod: **MOVE**

**Warning! Setpoints may not be correct.**

Linear actuators

	Position [cts]	Leg length	Status	At low	At high
S 1	788 cts	788.3360 mm	OK	OK	OK
S 2	140 cts	788.2900 mm	OK	OK	OK
S 3	846 cts	788.3360 mm	OK	OK	OK
S 4	845 cts	788.3360 mm	OK	OK	OK
S 5	161 cts	788.3100 mm	OK	OK	OK
S 6	788 cts	788.3360 mm	OK	OK	OK

Positioned

Collective motion control:

Set to nominal zero position **SET**

Stop all motors **STOP**

Homing

Struts homed

Fine pitch piezo actuator

Position 0.00 **0.00 mm**

Tweak size 1.00

To 0 Out of range

Hardware protection signals

Vacuum interlock status

Miscellaneous

Copy readbacks to setpoints **COPY**

**Exit**

Status and Axis Adjustment Screen | Calibrati...

DCM mode

Normal

Energy move

Homing

Motion program running

Bragg angle

0.0000 deq High limit 0.0000 deq Low limit 0.0000 deq Tweak size 0.0000 deq

Energy

0.0000 keV High limit 0.0000 keV Low limit 0.0000 keV Tweak size 0.0000 keV

Wavelength

0.0000 A High limit 0.0000 A Low limit 0.0000 A Tweak size 0.0000 A

Energy mode

Busy...

2nd set:

1st crystal temperature 273.00 K

2nd crystal temperature 0.0000 K

1st crystal over-temperature

3rd set:

1st crystal temperature 273.00 K

2nd crystal temperature 273.00 K

1st crystal over-temperature

DCM Vacuum ilk

DCM water flow switch

Bragg motor **ERROR** **Status**

1st roll motor **OK** **Status**

2nd perp motor **ERROR** **Status**

2nd pitch motor **OK** **Status**

2nd roll motor **OK** **Status**

Fine pitch motor **ERROR** **Status**

Fine roll motor **ERROR** **Status**

Lateral tr. motor **OK** **Status**

**START program** **STOP motors** **Exit**

## Main benefits

- Control **any** type of motor (power driver type has to be selected upon purchase)
- Plug and Play – Simplify life
- Reduce the installation **time** and **effort** (=cost)
  - Set up motor controls in a very **simple** way without giving up functionality
  - Reduced cabling (just bring in your motor, switches and encoder cables + Ethernet and power)
- All advanced features of the Delta Tau controller:
  - Fast acting PID control with multiple co-ordinate systems and a variety of flexible control algorithms.
  - Synchronized movement of multiple axes, also across several controllers
  - Forward and inverse Kinematics capability.
  - Full PLC control with programming facility as standard.

## Future plans

- EPICS
  - we want to move to asyn driver based motor record
- TANGO or TINE device server
  - anybody interested?
- All development from our projects will get fed into the MCS-8 software
- Power PMAC is a new product line from Delta Tau featuring Power PC and a RT Linux (most probably) operating system
  - We are looking how to best use it in new generations of MCS-8



## Conclusion

- A motion control solution that easily integrates into control system
- Basic functionality working out of the box
- Custom requirements are easily implemented
- Available **now**
- **For orders and enquiries please contact:**

[cs1-sales@cosylab.com](mailto:cs1-sales@cosylab.com)

<http://www.microioc.com/MCS-8.htm>

**Thank you for your attention**

*Any questions ?*