POWER PMAC EtherLite Connector Layout

Fiber Optic MACRO Version

Top View

- 12VDC Logic
- Power Connector

- 3.90" (99.06 mm)

Bottom View

- Encoder
- Ethernet 1 or EtherCAT 0
- Keyboard
- USB 2
- SD Card & Mouse

- 8.05" (204.41 mm)

- Ethernet 3 or EtherCAT 2
- Ethernet 2 or EtherCAT 1
- Fiber Optic OUT
- USB 1
- Fiber Optic IN
- RS232

Worldwide Support

DELTA TAU

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POWER PMAC EtherLite

Up to 128 AXES OF CONTROL with the most power and flexibility of any controller on the planet
**The Power PMAC EtherLite**

The Power PMAC EtherLite is a compact and cost-effective product designed for control through industrial networks and fieldbuses. The network interface can be configured with Delta Tau’s MACRO fiber optic or electrical network and/or EtherCAT electrical network, as well as with one of various fieldbus options.

The Power PMAC EtherLite is a dedicated controller for driving real-time motion (servo) and I/O networks. The controller communicates to a host PC via Ethernet, or operates standalone, while providing a single-wire connection to any MACRO and/or EtherCAT drives, I/O or other peripheral devices.

The Power PMAC EtherLite utilizes the intelligence and capabilities of Delta Tau’s 7th and latest generation controller, the Power PMAC, a general-purpose embedded computer running under a hard real-time Linux OS with a sophisticated motion and machine control application built in. The software PLCs, programmable in C and/or PMAC script, and built-in motion programs allow for complete machine logic control.

Capable of controlling up to 128 axes and thousands of I/O points, the Power PMAC EtherLite employs the motion and software features of the Power PMAC family in systems with highly distributed network hardware from vendors of your choosing, resulting in a “Motion Solution” with unparalleled performance capabilities.

*For large systems where networked connections are important to simplify wiring: Power PMAC EtherLite*

**Hardware / OS**

- Up to 1.2 GHz Single/Dual Core
- Full real-time Operating System (Linux OS w/ real-time kernel)
- Full file management system (programs, data, files, etc.)
- Dedicated controller runs in the RT Linux environment
- Full 32/64-bit architecture
- Hardware 64-bit double precision floating point math
- Support for large memory - Up to 16 GB Flash - Up to 4GB DDR memory with error correction - 8MB NVR flash for Kernel and Bootloader - Interface for SD Card - Interface for USB 2.0 Devices (Hard drive, USB Stick, Keyboard, Mouse, etc.)
- 2 ethernet 1Gbps ports
- Built-in USB 2.0 Interface
- Optional 4-CPCI Express (PCIe) port
- Optional Direct Video Interface (DVI Output)
- DM output, 2 extra USB ports

**Programming Tools**

- MATLAB®/Simulink® Embedded Code® generated code
- Epochs

**Fieldbus Connectivity**

- MACRO (Master/Slave)
- EtherCAT (Master)
- DeviceNet (Master/Slave)
- CANopen (Master/Slave)
- Open Modbus (Master/Slave)
- CC-Link (Slave)
- PROFINET IO RT (Cyclic/Local/Device)

**Control Through Industrial Network/Fieldbus Connectivity**

**PROGRAMMING LANGUAGES**

- **PMAC Script**
- **ANSI C**
- **G-Code**
- **Epics**

**Programming Tools**

- MATLAB®/Simulink® Embedded Code® generated code
- Epochs

**Fieldbus Connectivity**

- **Serve**
  - MACRO (Master/Slave)
  - EtherCAT (Master)
- **I/O**
  - EtherNet/IP (Scanner/Adapter)
  - EtherCAT (Master/Slave)
  - DeviceNet (Master/Slave)
  - CANopen (Master/Slave)
  - Open Modbus (Master/Slave)
- **I/O - Interface for USB 2.0 Devices** (Hard drive, USB Stick, Keyboard, Mouse, etc.)
- 2 ethernet 1Gbps ports
- Built-in USB 2.0 Interface
- Optional 4-CPCI Express (PCIe) port
- Optional Direct Video Interface (DVI Output)
- DM output, 2 extra USB ports

**Motor Servo Control**

- Extremely fast update rates (Phase and Servo)
- Standard PID with full feedback model
- Powerful automatic tuning and analyzer tools
- Analog, Pulse Width Modulated (PWM), Pulse Frequency Modulated (PFM), MACRO or EtherCAT Outputs
- Vibration suppression filters
- Multiple 7th order notch and low pass filters
- Adaptive control for varying loads
- Cascaded loops (force, height, camera auto-focus control)
- Support for custom-written commutation routines
- Support for custom-written servo routines
- Custom routines directly in C or from MATLAB®/Simulink®

**Coordinate Systems / Forward and Inverse Kinematics**

- Up to 256 axes of coordinated or independent motion
- Up to 128 independent coordinate systems
- Up to 32 independent axes per coordinate system
- Dynamic axes transformations (e.g. offsets, rotations, mirroring)
- Forward/Inverse kinematics for nonlinear mechanisms
- User defined chained axes convert from tool coordinate to actuator positions
- Arc-min direct specification of tool tip path

**Electronic Gearing and Cams**

- Support for superimposed compensation table results
- Backlash compensation, fixed or in tables

**Compensation Tables**

- Position/torque compensation tables in 1D, 2D, or 3D
- with backlash and mirroring options
- 1st/3rd order interpolation between points over entire cycle
- Up to 1066 compensation tables (64K each)
- Support for superimposed compensation table results

**Gantry Control**

- Follower motor() executes leader’s trajectory
- Automatic skew removal on homing
- Automatic gantry cross-coupling servo control

**About the Power PMAC**

The power and flexibility of the Power PMAC allows the integration of the Power PMAC EtherLite in virtually any kind of industrial motion control application.

**Programmable Logic Control (PLCs)**

- Access to all registers
- Trigonometric, transcendental, vector and matrix functions
- 64-bit floating-point architecture-optimized math
- Executive functions for standalone operation
- Data gathering of up to 128 hardware/software registers per servo cycle
- Program in PMAC Script
- Program in ANSI C
  - Real-time with preemptive kernel routines
  - General purpose routines
  - MATLAB®/Simulink® Embedded Code® generated code

**Hardware Position Capture and Compare**

- Specialized circuitry tying encoder counts to digital I/O
- I/O on exact count (sub-sub-count interpolation) at any speed (within 10 nanoseconds)
- For probing, registration, measurement trigger, laser firing

**Gantry Control**

- Follower motor(s) executes leader’s trajectory
- Automatic skew removal on homing
- Automatic gantry cross-coupling servo control

**Electronic Gearing and Cams**

- Powerful master/slave techniques
- Position following (gearing) requires no program for motion
- External time base (can keep full trajectory flexibility [non-retaining, limited reversal, e.g. moving web application])
- Up to 256 cam tables (16K points each)
  - Position/orient/profiling
  - Returning, forward/reverse travel
  - Extremely precise synchronized outputs
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Capable of controlling up to 128 axes and thousands of I/O points, the Power PMAC EtherLite empowers the motion and software features of the Power PMAC Family in systems with highly distributed network hardware from vendors of your choosing, resulting in a “Motion Solution” with unparalleled performance capabilities.

For large systems where networked connections are important to simplify wiring:

Power PMAC EtherLite

CONTROL EVERYTHING

Delta Tau’s Open Architecture Platform provides complete flexibility to choose multiple types of fieldbuses, enabling you to create a system perfect for your application.

Fieldbus Connectivity

Serve
- MACRO (Master/Slave)
- EtherCAT (Master)

I/O
- EtherNet/IP (Scanner/Adapter)
- EtherCAT (Master/Slave)
- Profinet-CP (Master/Slave)
- DeviceNet (Master/Slave)
- CANopen (Master/Slave)
- Open Modbus (Master/Slave)
- CC-Link (Slave)
- PROPNET IQ RT (Cy/Other/Device)

Programming Languages
- PMAC Script
- ANSI C
- G-Code

Programming Tools
- MATLAB®/Simulink® Embedded Code® generated code
- Epic

Program in PMAC Script
- Data gathering of up to 128 hardware/software registers per servo cycle
- Executive functions for standalone operation
- Access to all registers
- Tool radius compensation, 2D or 3D
- G-code, M-code, and T-code ready
- Move block execution rate up to 10,000 blocks/sec
- Negative feedrate for true motion reversal in lookahead
- Sub-millisecond segmentation time
- Dynamic multi-block lookahead with velocity/acceleration control and jerk limit
- All move modes supported with user kinematics
- Dynamic multi-block lookahead with velocity/acceleration control and jerk limit
- Allocation of up to 32 independent axes per coordinate system
- Coordinate Systems / Forward and Inverse Kinematics
- Up to 256 axes of coordinated or independent motion
- Up to 128 independent coordinate systems
- Up to 32 independent axes per coordinate system
- Dynamic axes transformations (e.g. offsets, rotations, mirroring)
- Forward/Inverse kinematics for non-linear mechanisms
- User defined matrices convert between tool tip coordinates and actuator positions
- Permits direct specification of tool tip path
- Auto-coordination of multiple sets of axes
- Linear, circular, rapid, position-velocity-time (PVT), LIN to PVT (curve fit), Spline move modes
- Automatic skew removal on homing
- Follower motor(s) executes leader’s trajectory
- Automatic skew removal on homing
- Automatic gantry cross-coupling servo correction
- Trajectory Generation - Motion Programs
- Auto-coordination of multiple sets of axes
- Linear, circular, rapid, position-velocity-time (PVT), LIN to PVT (curve fit), Spline move modes
- Dynamic multi-block lookahead with velocity/acceleration control and jerk limit
- Up to 256 cam tables (16k points each)
- External time base (cam) keeps full trajectory flexibility (non-returning, limited reversal, e.g. moving web application)
- Up to 256 cam tables (16k points each)
- Position/orientation
- Return to return/reverse travel
- Extremely precise synchronized outputs
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- Position/orientation
- Return to return/reverse travel
- Extremely precise synchronized outputs

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- Analog, Pulse Width Modulated (PWM), Pulse Frequency Modulated (PFM), MACRO or EtherCAT Outputs
- Vibration suppression filters
- Multiple 7th order notch and low pass filters
- Adaptive control for varying loads
- Cascaded loop (force, height, camera auto-focus control)
- Support for custom-written commutation routines
- Support for custom-written servo routines
- Custom routines directly in C or from MATLAB®/Simulink®
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Power PMAC EtherLite Connector Layout

CONNECTOR LAYOUT
Fiber Optic MACRO Version

Top View
- +24VDC Logic
- Power Connector
- 7.44” (190.00 mm)

Bottom View
- Watchdog Terminal
- 3.90” (99.06 mm)

6.05” (153.67 mm)
- Ethernet 0
- DVI
- Ethernet 1 or EtherCAT 0
- Keyboard
- USB 2
- SD Card & Mouse
- Fiber Optic OUT
- Fiber Optic IN
- USB 1
- Ethernet 2 or EtherCAT 1
- Ethernet 3 or EtherCAT 2
- RS232

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