Power Brick LV Connector Layout and Specifications

**POWER Brick LV**

**BRAINS WITH BRAWN**

All-in-One: Integrated Controller and Low Voltage Amplifiers

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**Connector Layout**

8-Axis Model Shown

<table>
<thead>
<tr>
<th>Motor # 1</th>
<th>Motor # 2</th>
<th>Motor # 3</th>
<th>Motor # 4</th>
<th>Motor # 5</th>
<th>Motor # 6</th>
<th>Motor # 7</th>
<th>Motor # 8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enders # 1 to 4</td>
<td>AMP Status</td>
<td>Encoder # 1</td>
<td>Encoder # 2</td>
<td>Encoder # 3</td>
<td>Encoder # 4</td>
<td>Encoder # 5</td>
<td>Encoder # 6</td>
</tr>
<tr>
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<td>Encoder # 8</td>
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<td>Encoder # 8</td>
</tr>
<tr>
<td>Encoder # 9</td>
<td>Encoder # 10</td>
<td>Motor # 1</td>
<td>Motor # 2</td>
<td>Motor # 3</td>
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**Power Brick LV Specifications & Channel Configurations**

| Output Continuous Current (rms/axis) | 0.25A | 1A | 5A
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Output Peak Current for 1 second (rms/axis)</td>
<td>0.75A</td>
<td>3A</td>
<td>15A</td>
</tr>
<tr>
<td>Max ADC (12 Bit Setting)</td>
<td>1.6925A</td>
<td>6.77A</td>
<td>33.85A</td>
</tr>
<tr>
<td>PWM Frequency Operating Range [kHz]</td>
<td>&lt;100</td>
<td>&lt;30</td>
<td></td>
</tr>
<tr>
<td>PWM Frequency Recommended [kHz]</td>
<td>40</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td>DC Input Line Voltage [VDC]</td>
<td>100 to 60V (50V Max)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Logic Power [VDC, A]</td>
<td>24V, 4A</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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**Worldwide Support**

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You can also find us on...
About the Power Brick LV

The Power Brick LV is an integrated fully scalable Machine and Motion Controller combining the brains of the cutting edge Power PMAC processor, the unsurpassed custom-designed Digital Signal Processor Gate3, and the low voltage brains of the latest high performance MOSFET-based drives technology into one compact 4 or 8-axis servo package drive.

Additional axes are available via MACRO (high speed fiber optic network) and/or EtherCat for a possible total of 104 (8 + 32 MACRO + 64 EtherCat) axes of centralized and coordinated motion control.

Motor Control

The Power Brick LV performs current loop closure, commutation and servo loop closure to drive directly:

- AC/DC Brushless servo (synchronous) linear / rotary motors
- DC Brush and Voicecoil motors
- Low Voltage Stepper motors

Encoder Support

The Power Brick LV can interface with one or a combination of the following types of feedback devices:

- Quadrature
- Sinosoidal x 16K/64K
- Bipolar
- Halls (60°/e120°)
- Kawasaki
- Analog +/- 10VDC

Fieldbus Connectivity

- EtherCAT (Master/Slave)
- Open Modbus (Master/Slave)
- OPC-UA (Slave)
- DeviceNet (Master/Slave)

GP Digital Inputs/Outputs - Relays

The Power Brick LV can be equipped with:

- 8 x general purpose relays
- 32 x digital inputs 12-24VDC
- 16 x digital outputs 12-24VDC 500 mA

All protected and optically isolated. Can be either sinking or sourcing. Thousands of additional digital inputs and outputs can be added via various fieldbus options.

GP Analog Inputs/Outputs - PFM

The Power Brick LV can carry up to:

- 8 x Pulse and Direction / PFM outputs
- 8 x 16-bit analog inputs (+/-10V)
- 8 x 14-bit analog outputs (+/-10V)

Safety & Other Features

- Safe Torque Off (STO) with dynamic braking
- Abort input for safe stops
- Warning/fatal following error limits
- Dedicated brake relays and power input (24V)
- Safety & Other Features
- Safe Torque Off (STO) with dynamic braking
- Abort input for safe stops
- Warning/fatal following error limits
- Dedicated brake relays and power input (24V)
- Short circuit, overcurrent protection
- Hardware / Software thermal I2T protection
- Motor thermal inputs (PTC)
- Encoder count error and encoder loss detection
- Dedicated brake relays and power input (24V)
- Plus/Minus over-travel, home, user inputs
- Software over-travel limits
- Warning/fatal following error limits
- High speed capture outputs
- Internal and external short resistors

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

Compensation Tables

- Position/torque compensation tables in 1D, 2D, or 3D with rollover and mirroring options
- 1st/3rd order interpolation between points every servo cycle
- Up to 256 compensation tables (64K each)
- Support for superimposed compensation table results
- Backlash compensation, fixed or in tables

Hardware Position Capture and Compare

- Specialized signal processing encoder counts to digital I/O
- I/O on exact count (without interpolation points) 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 correction

Electronic Gearing and Cams

- Powerful master/slave techniques
- Position following (gearing) requires no program for motion
- External time base (cant) keeps full trajectory flexibility (non-returning, limited reversal, e.g. moving web application)
- Up to 256 cam tables (16K points each)
- - Position/torque profile(s)
- - Returning, forward/reverse travel
- - Extremely precise synchronized outputs
About the Power Brick LV

The Power Brick LV is an integrated fully scalable Machine and Motion Controller combining the brains of the cutting edge Power PMAC processor, the unsurpassed custom-designed Digital Signal Processor Gates3, and the low voltage brawns of the latest high performance MOSFET-based drives technology into one compact 4 or 8-axis servo package drive.

Additional axes are available via MACRO (high speed fiber optic network) and/or EtherCat for a possible total of 104 (8 + 32 MACRO + 64 EtherCat) axes of centralized and coordinated motion control.

Motor Control

The Power Brick LV performs current loop closure, commutation and servo loop closure to drive directly:

- AC/DC Brushless servo  (synchronous) linear / rotary motors
- DC Brush and Voicecoil motors
- Low Voltage Stepper motors

Encoder Support

The Power Brick LV can interface with one or a combination of the following types of feedback devices:

- Quadrature
- Sinusoidal x 16/4096
- Bayonet
- Hall (60° or 120°)
- Kawasaki
- Analog +/- 10VDC
- LVDT / MLDT
- Panasonic
- Yaskawa
- Nikon-O
- BISS-B/C
- EnDat 2.1/2.2
- Mitsubishi
- Tamagawa
- SS
- HiperFace

Fieldbus Connectivity

- CANopen (Master/Slave)
- EtherCAT (Master)

I/O

- EtherCat/IP (Scanners/Adapter)
- EtherCAT (Master/Slave)
- Profibus-DP (Master/Slave)
- DeviceNet (Master/Slave)

GP Digital Inputs/Outputs - Relays

The Power Brick LV can be equipped with:

- 8 x general purpose relays
- 32 x digital inputs 12-24VDC
- 16 x digital outputs 12-24VDC 500 mA

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The Power Brick LV can carry up to:

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- 8 x 16-bit analog inputs (+/-10V)
- 8 x 14-bit analog outputs (+/-10V)

A highly integrated and compact automation controller for low voltage applications.

Safety & Other Features

- Safe Torque Off (STO) with dynamic braking
- Abort Input for safe stop
- Warning/fatal following error limits
- Software over-travel limits

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/reverse kinematics for non-linear mechanisms

Coordinate Systems / Forward and Inverse Kinematics

- Tool radius compensation, 2D or 3D
- Calculations and I/O synchronous to motion
- G-code, M-code, and T-code ready
- Negative feedrate for true motion reversal in lookahead
- Sub-millisecond segmentation time
- Dynamic multi-block lookahead with velocity/acceleration control and jerk limit
- Automatic move until trigger (hardware input)
- Seamless blending between linear, circular and PVT modes (curve fit), Spline move modes

Compensation Tables

- Position/torque compensation tables in 1D, 2D, or 3D
- Linear, circular, rapid, position-velocity-time (PVT), LIN to PVT (curve fit), Spline move modes
- Seamless blending between linear, circular and PVT modes
- Automatic move until trigger (hardware input)
- True S-Curve accel / decel
- All move modes supported with user kinematics
- Dynamic multi-block lookahead with velocity/accleration control and jerk limit
- Sub-millisecond segmentation time
- Move block execution rate up to 10,000 blocks/sec
- G-code, M-code, and T-code ready
- Calculations and I/O synchronous to motion
- Tool radius compensation, 2D or 3D

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
- NUTLAB®/Simulink® Embedded Code® generated code

Hardware Position Capture and Compare

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

Electronic Gearing and Cams

- Powerful master/slave techniques
- Position following (gearring) requires no program for motion
- External time base (cam) keeps full trajectory flexibility (non-returning, limited reversal, e.g. moving web application)
- Up to 256 cam tables (164 points each)
- - Position/torque profile(s)
- - Returning, forward/reverse travel
- - Extremely precise synchronized outputs
Power Brick LV Connector Layout and Specifications

**Top View**
- 24V Logic
- STD
- GP Digital I/O
- Limits & Flags

**Bottom View**
- Analog I/O
- DC Bus Input

**Power Brick LV Specs & Channel Configurations**

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**Connector Layout**
- 8-Axis Model Shown
- Motor # 1 to 8
- Encoder # 1 to 8
- Fieldbus
- Analog I/O
- R232
- USB
- EtherCAT
- EtherCAT Watchdog & Abort
- AMP Status
- MAC Address

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