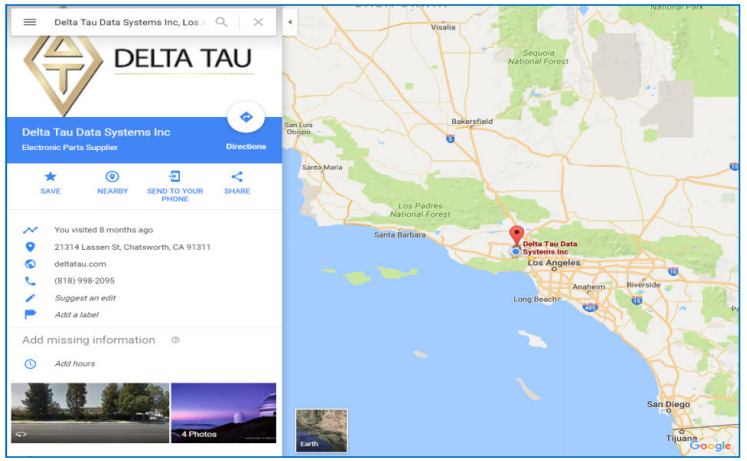
Power PMAC Training
Introduction

Power PMAC Training Introduction

- About Omron Delta Tau (ODT)
- About the Power PMAC
- Core Products
- Core Industries

About Omron Delta Tau (ODT)

- **Located in Chatsworth, Los Angeles, California**
- **Established in 1976**
  - Custom electronics
  - Single motor control
- **Motion control company 1987**
  - Multi-axis solution and trajectory coordination
- **About 150 people (HQ)**
- **Part of Omron Corporation, IAB division September 1st 2015**
  - 39,000 employees, 200+ worldwide locations
- **Design and manufacturing of motion controllers and drives**
- **Specializes in multi-axis coordinated, high performance, high speed, path planning and servo control solutions**
- **Quick prototyping and new solutions/features implementation**
- **It is home of the Power PMAC**



About the Power PMAC

- **PMAC stands for Programmable Multi-Axis Controller**
- **Power designates the 7th generation firmware (Intelligence) – Turbo is previous**
- **Intelligence built on 30+ years of experience in the motion control industry, based on customer feedback and needs**
- **Innovation and solution driven. New functions are always universal, and do not pertain to 1 solution/customer application**
- **Power PMAC comes in various form factors**
- **All form factors possess the same exact firmware.**
  - Once you learn how to program one, you know how to program all

About the Power PMAC

- **The Power PMAC is a general-purpose embedded computer with a hard real-time operating system (Kernel)**
- **General functions**
  - Motor servo control – wide support of encoder/motor types
  - Custom user-written algorithms (e.g. user phase, or servo)
  - Sequenced motion path profiles (e.g. CNC)
  - Synchronous and asynchronous "PLC" logic programs
  - Data acquisition and host communication
- **Machine interface circuitry (Gate3 ASIC)**
  - Analog and digital servo interfaces
  - Analog and digital general-purpose I/Os
  - Industrial network interfaces (e.g. EtherCAT, MACRO)
  - Fieldbus interfaces (e.g. EtherNet IP, Modbus)
- **Programmed using ODT's custom script language as well as standard C**

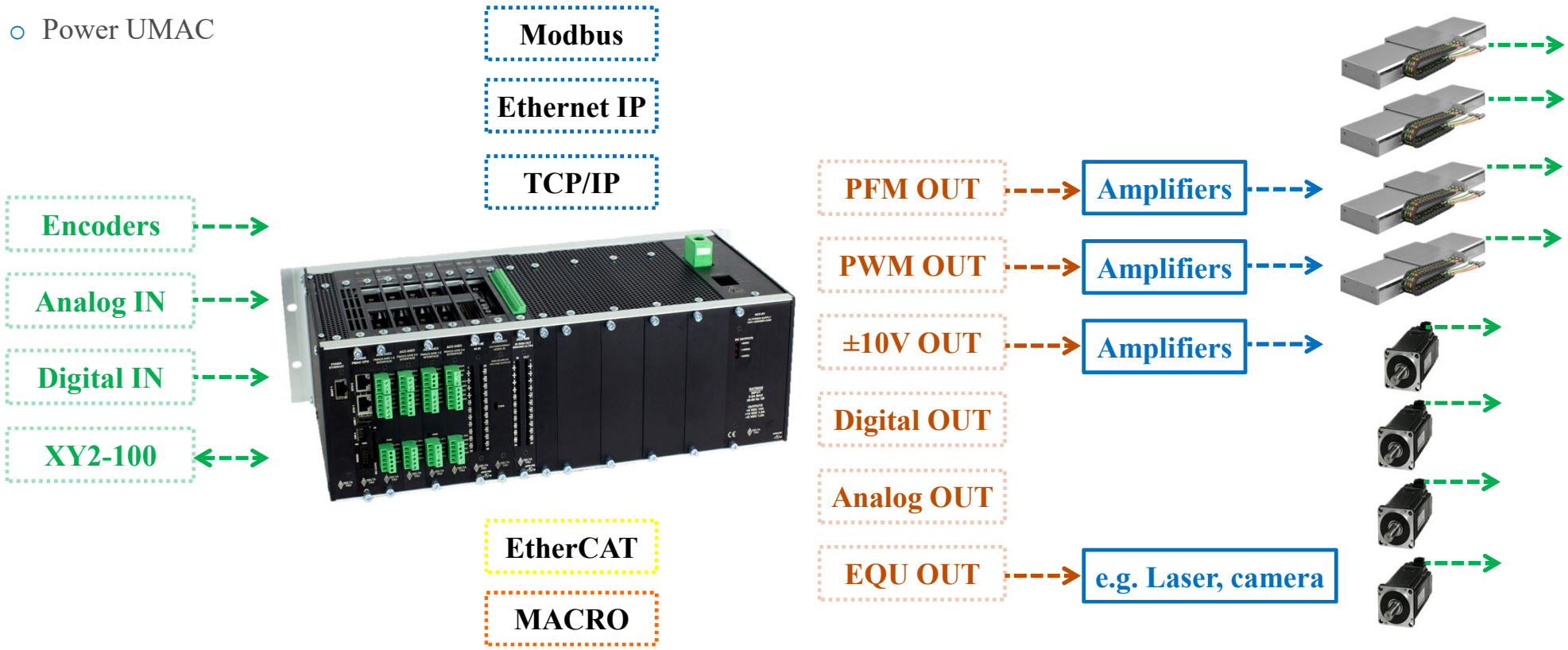
Core Products

- **Power UMAC (Universal Machine & Automation Controller)**
  - Modular, rack based
  - "Any" encoder input
  - Outputs direct PWM, analog (±10V), pulse & direction – to amplifiers
  - Digital & analog I/O accessory cards
  - Galvanometer (XY2-100) interface
  - EtherCAT, MACRO servo & I/O interface
  - EIP, Modbus + other fieldbus I/O interfaces

Core Products

Typical Configuration

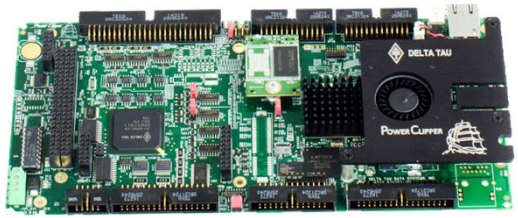
- Power UMAC



Core Products

Power Clipper

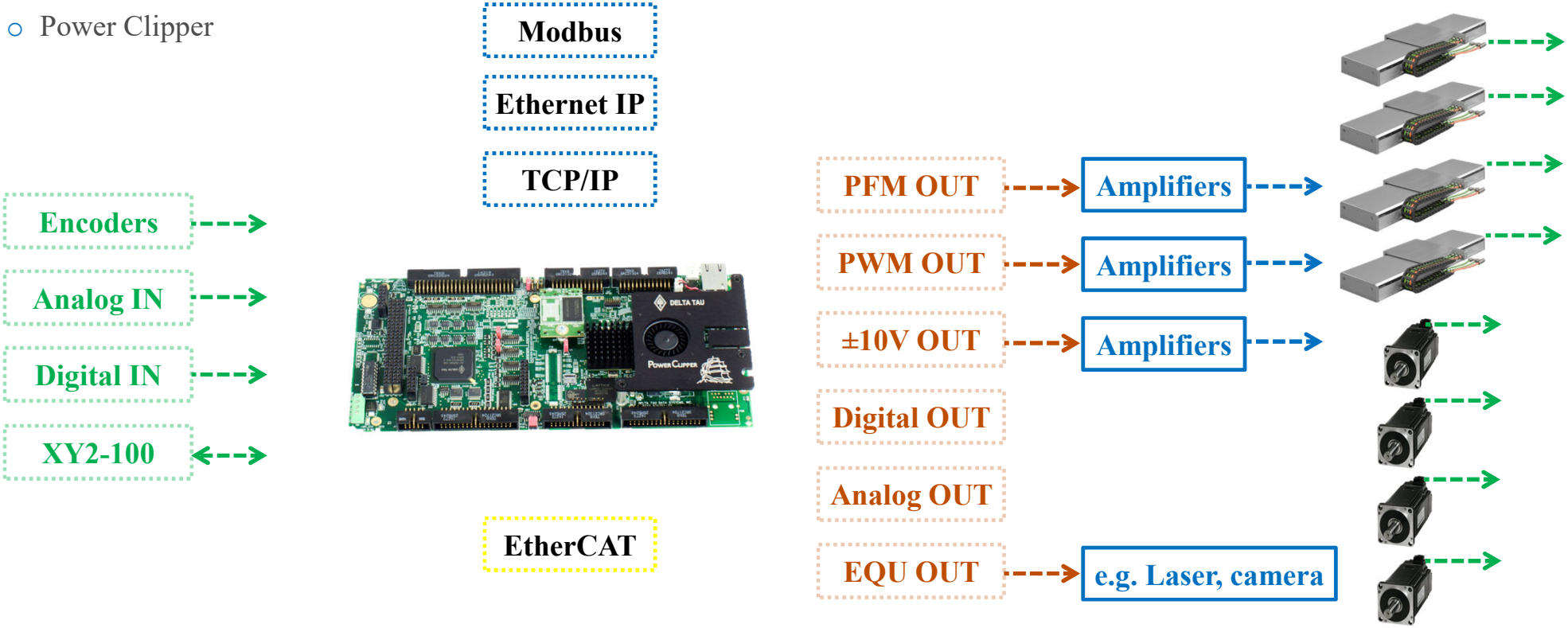
- Single-board low cost 4-axis controller (expandable to 8, piggy back)
  - Long pins for OEM embedded solutions
- "Any encoder" input
- Outputs direct PWM, analog (±10V), pulse & direction – to 3rd party drives
- Galvanometer mirrors interface
- Limited digital & analog I/O on-board
- EtherCAT servo & I/O interface
- EIP, Modbus



Core Products

Typical Configuration

- Power Clipper



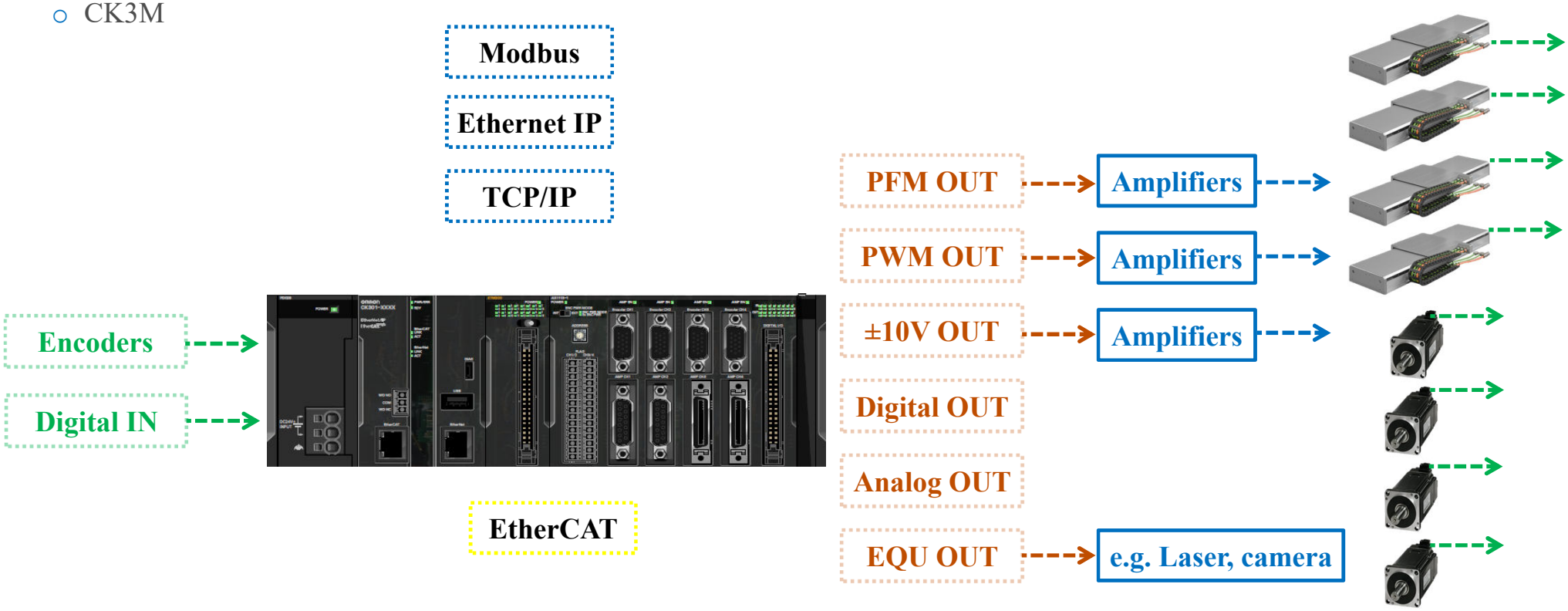
Core Products

CK3M

- Omron branded , rack mount PMAC
- Extendible up to 16-axis
- Quadrature
  - Panasonic (G5), Yaskawa (up to Sigma VII), SSI, EnDat, Tamagawa, Mitutoyo, Kawasaki)
- Digital Direct PWM
- Outputs analog (±10V), pulse & direction – to 3rd party drives
- On-board digital I/O
- EtherCAT servo & I/O interface
- EIP, Modbus

Core Products

- **Typical Configuration**
  - CK3M



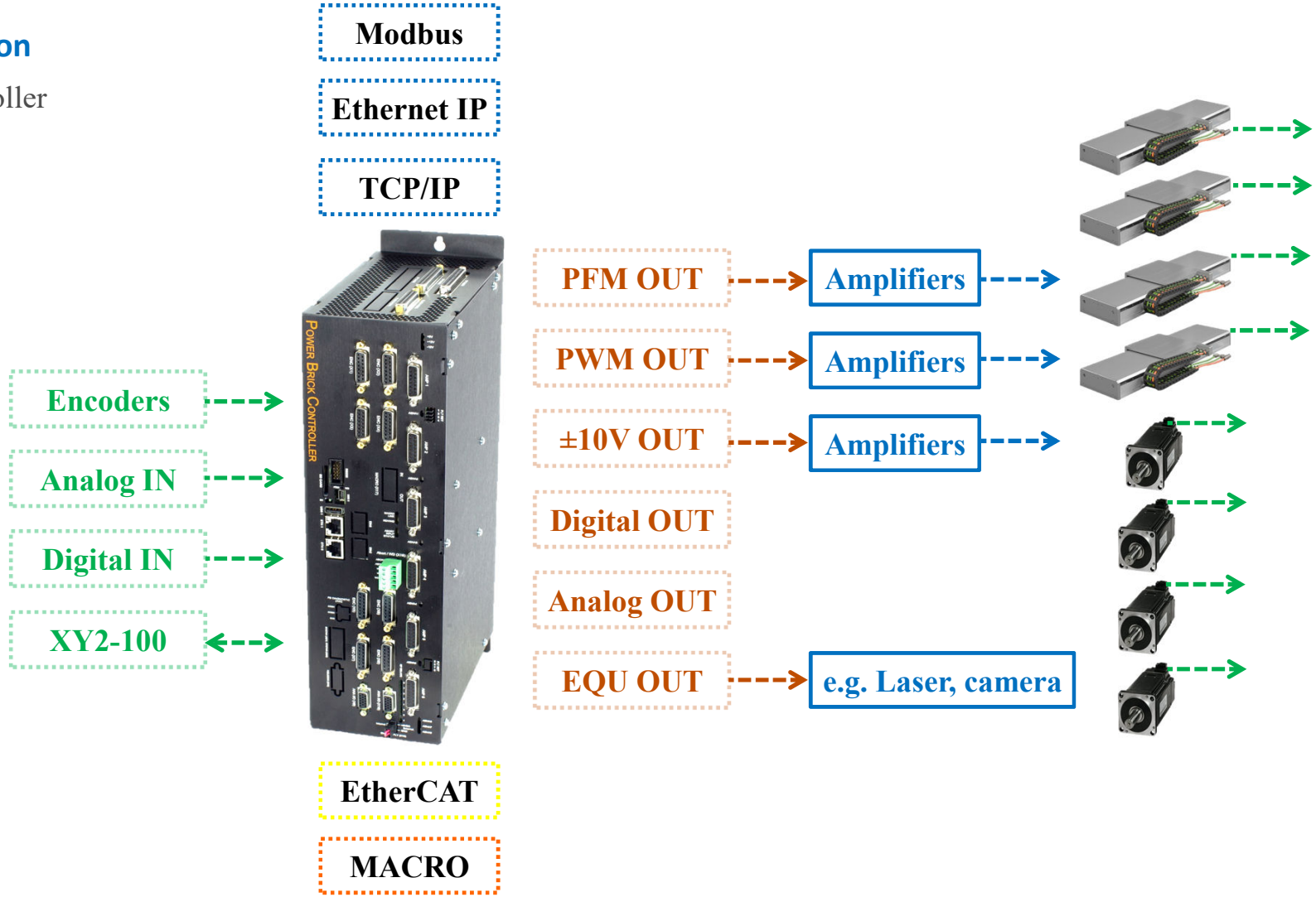
Core Products

Power Brick Controller

- Boxed 4 / 8-axis controller
- "Any encoder" input
- Outputs direct PWM, analog (±10V), pulse & direction – to 3rd party drives
- Galvanometer mirrors interface
- Limited digital & analog I/O on-board
- EtherCAT, MACRO servo & I/O interface
- EIP, Modbus + other Fieldbus I/O interfaces
- Can daisy-chain over MACRO for coordinated motion of up to 40 axes

Core Products

- **Typical Configuration**
  - Power Brick Controller



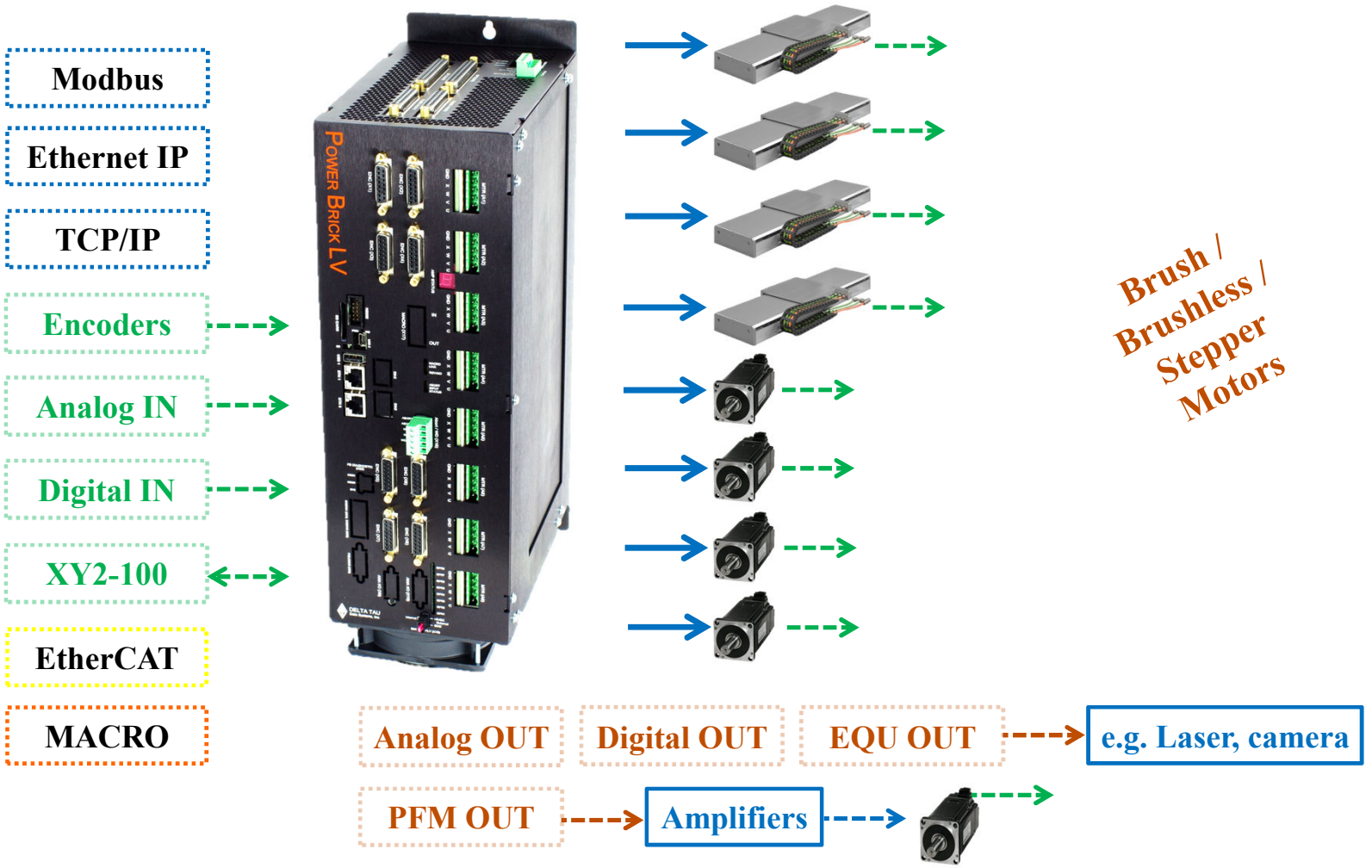
Core Products

Power Brick LV (< 60 VDC)

- 4 / 8-axis integrated controller-drives 0.25/0.75A, 1/3A, or 5/15A
- "Any encoder" input
- Drives directly brush, brushless, and stepper motors
- Also, can output pulse & direction - to 3rd party drives
- Galvanometer mirrors interface
- Limited digital & analog I/O on-board
- EtherCAT, MACRO servo & I/O interface
- EIP, Modbus + other Fieldbus I/O interfaces
- Can daisy-chain over MACRO for coordinated motion of up to 40 axes

Core Products

- **Typical Configuration**
  - Power Brick LV

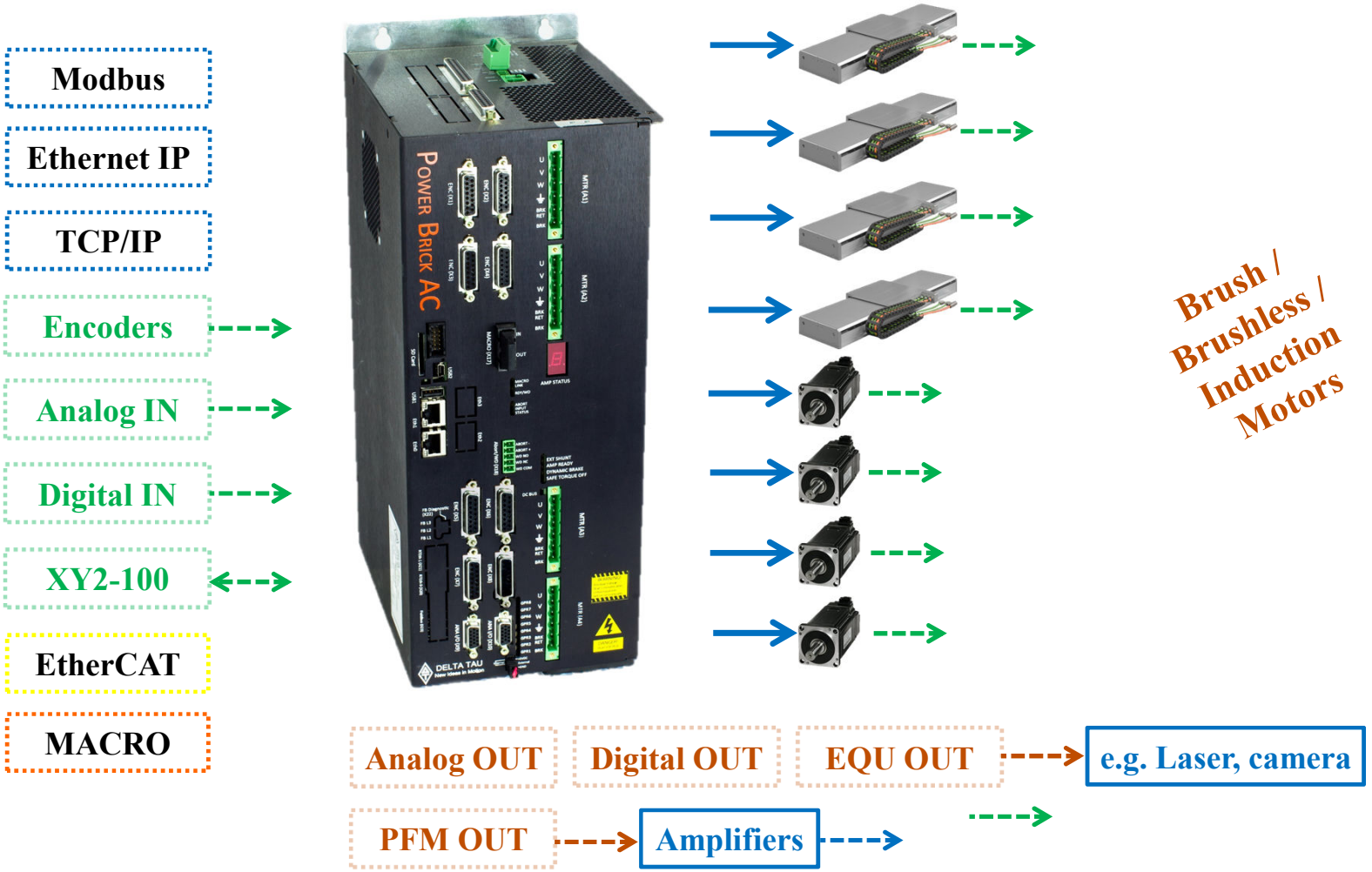


Core Products

- **Power Brick AC (< 240 VAC)**
  - 4 / 8-axis integrated controller-drives 5/10A or 8/16A
  - "Any encoder" input
  - Drives directly brush, brushless, and induction motors
  - Also, can output pulse & direction - to 3rd party drives
  - Galvanometer mirrors interface
  - Limited digital & analog I/O on-board
  - EtherCAT, MACRO servo & I/O interface
  - EIP, Modbus + other Fieldbus I/O interfaces
  - Can daisy-chain over MACRO for coordinated motion of up to 40 axes

Core Products

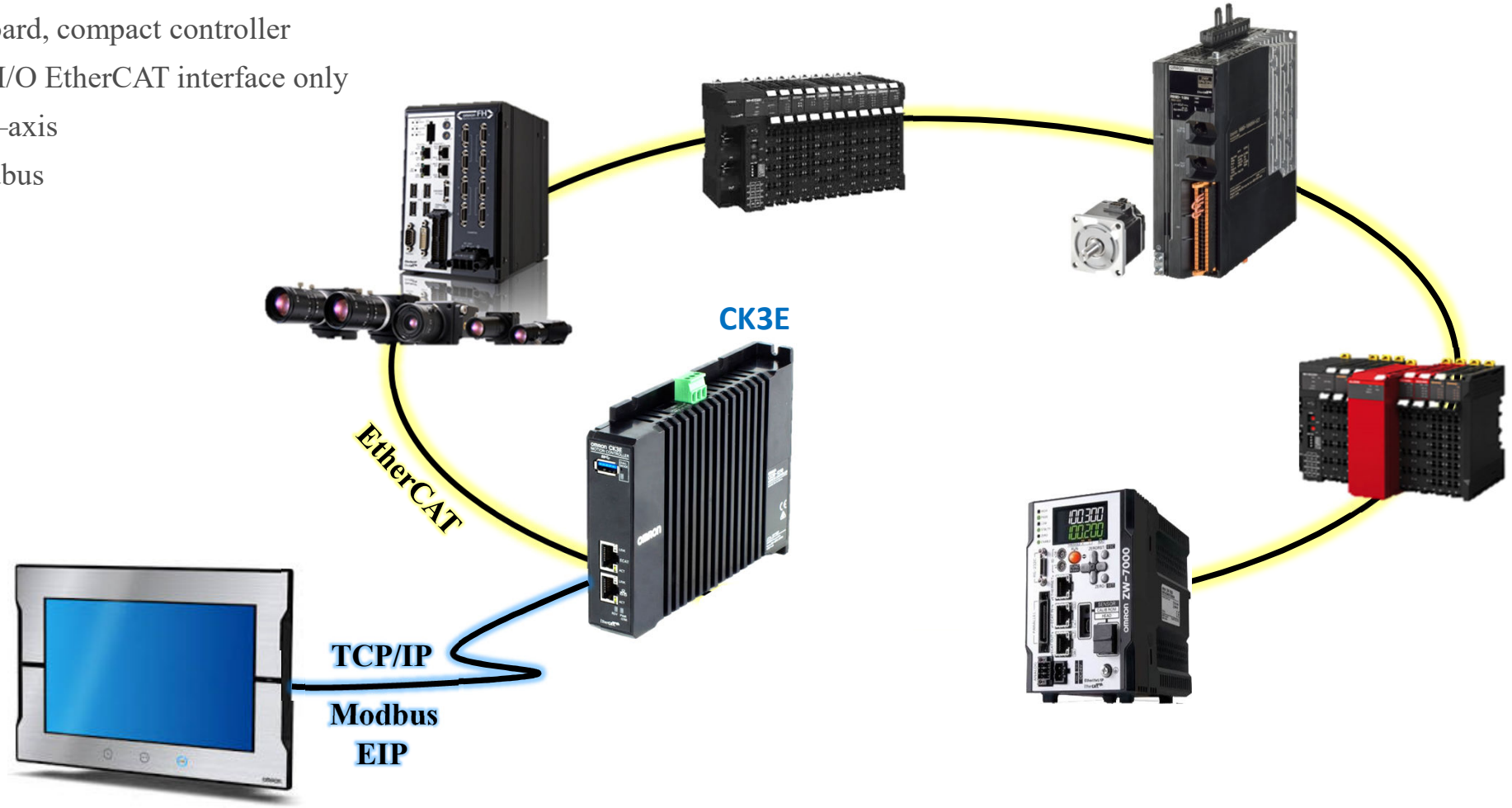
- **Typical Configuration**
  - Power Brick AC



Core Products

- **CK3E (µPowerPMAC)**
  - Single board, compact controller
  - Servo & I/O EtherCAT interface only
  - Up to 32–axis
  - EIP, Modbus

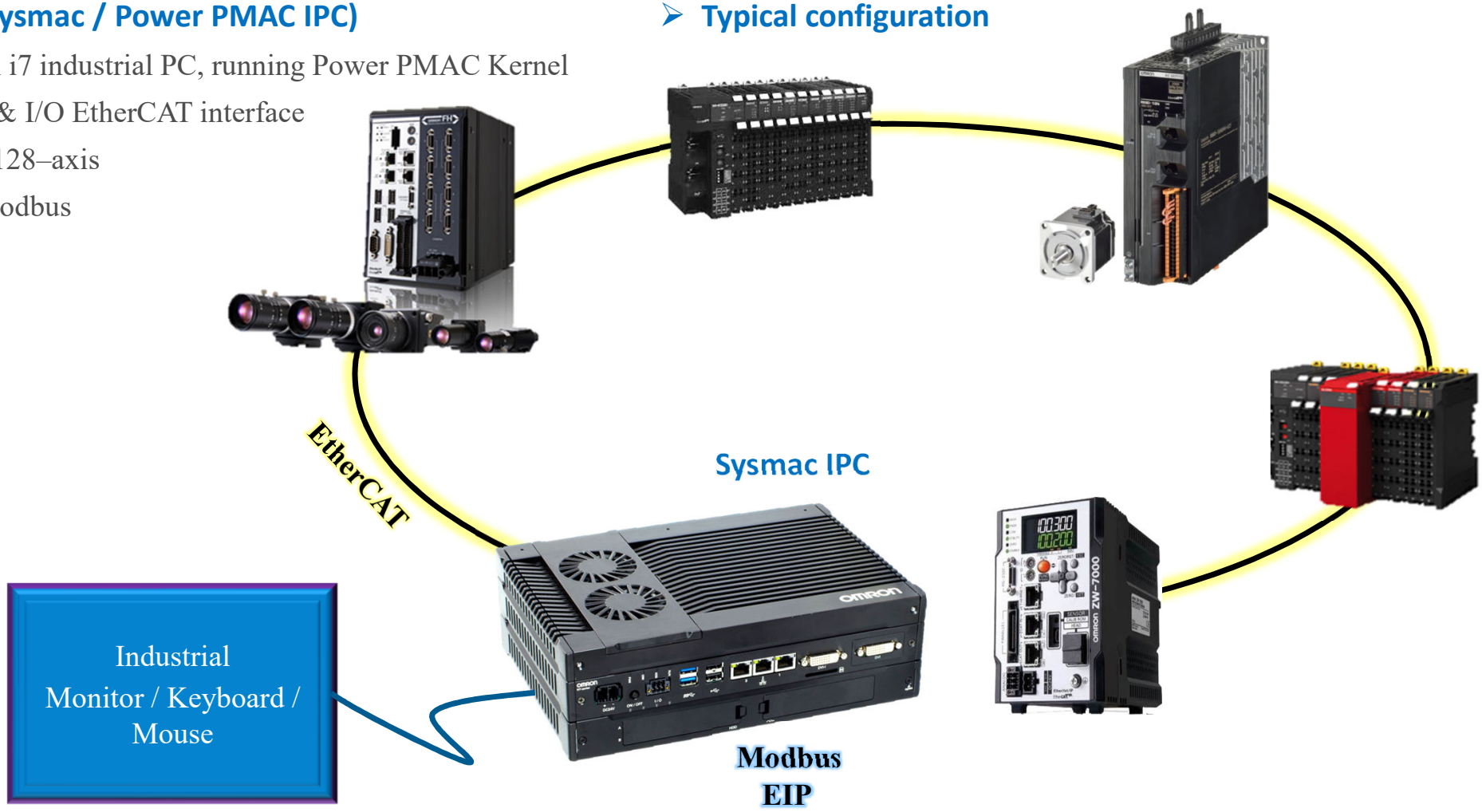
- **Typical configuration**



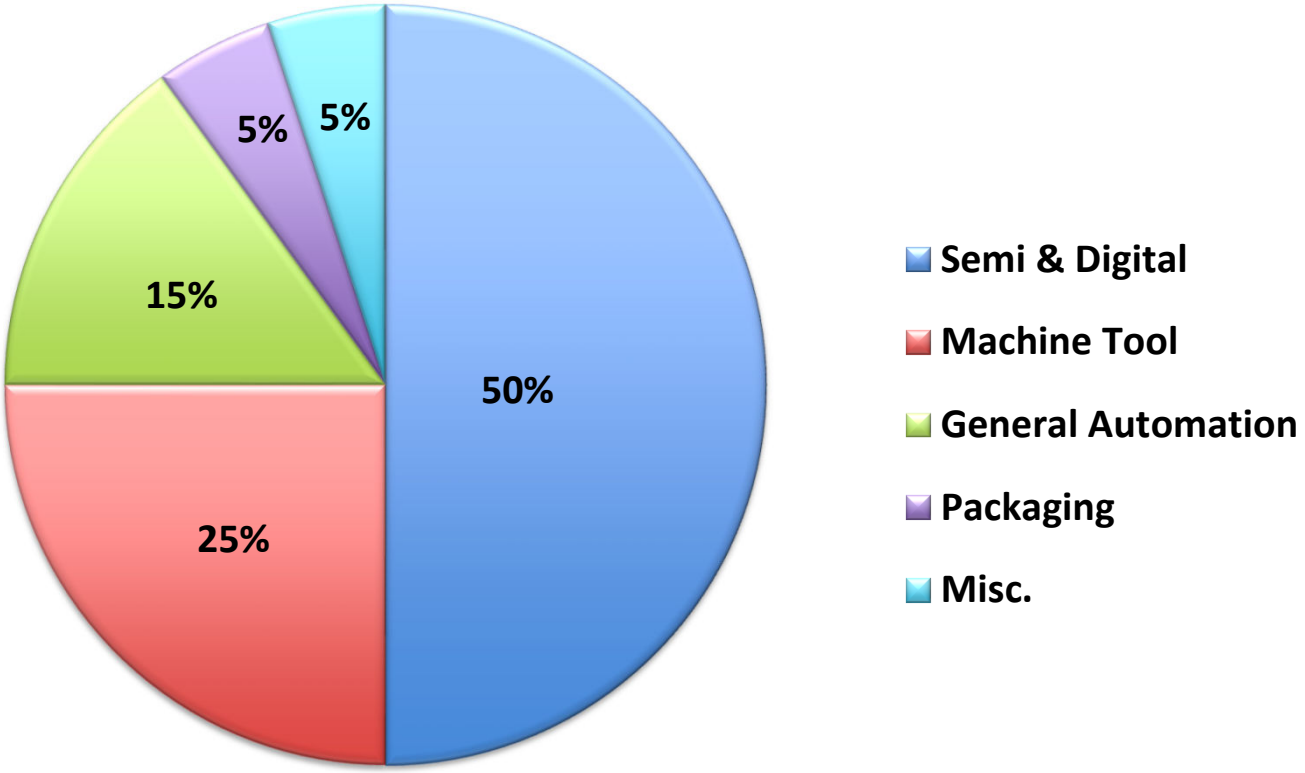
Core Products

- **NY51 (Sysmac / Power PMAC IPC)**
  - Omron i7 industrial PC, running Power PMAC Kernel
  - Servo & I/O EtherCAT interface
  - Up to 128–axis
  - EIP, Modbus

- **Typical configuration**

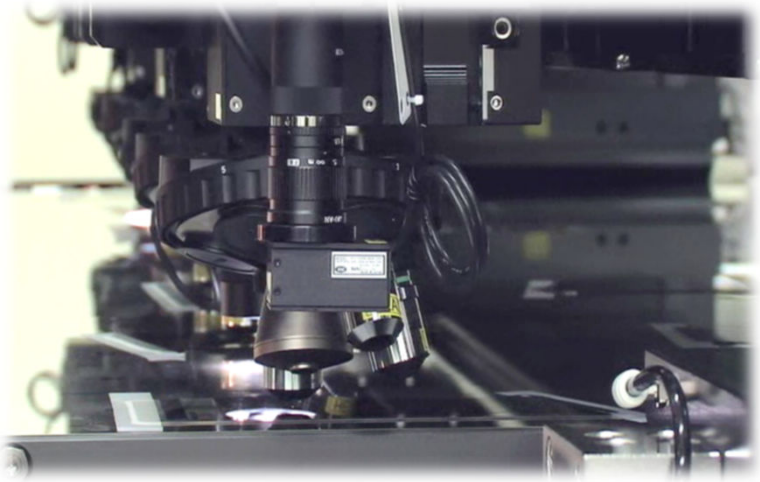


Core Industries

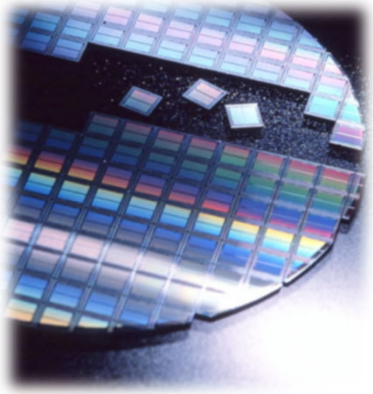


Core Industries

Semi & Digital



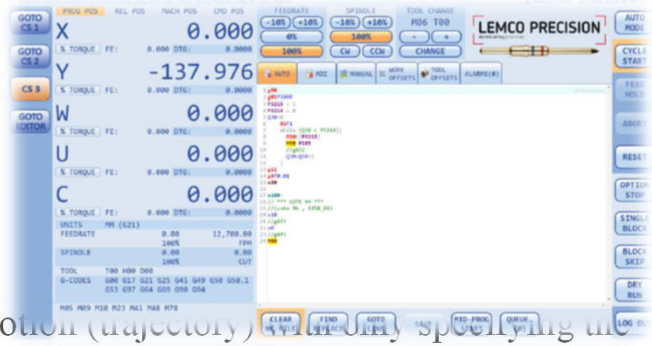
- Ability to interface with a wide range of encoder feedback devices
- Ability to drive virtually any type of motor
- Fast servo update rate (even with high number of axes)
- Extensive servo control tools, and advanced gantry control functions
- High precision servo positioning (sub-nanometer)
- Openness, and flexibility; custom user algorithms
- High speed position capture and compare, synchronization with motion
- Camera auto-focus, height, and force control
- Smooth modern path motion profiles execution (spline, PVT, low velocity jitter)
- High accuracy, and capacity compensation tables (position, and torque)
- High speed communication and data acquisition
- Standard C programming
- EtherCAT interface
- Software Tuning Tools
- Cost and form factor

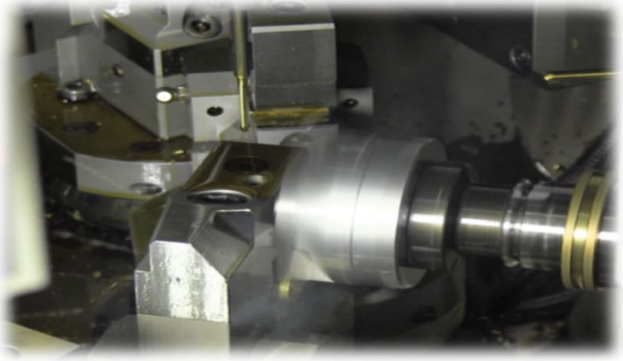


Core Industries

Machine Tool

- Ability to execute machine tool code (e.g. G, M, T code) natively
- Ability to add and or customize machine tool codes
- Advanced segmented multi-block lookahead for superior 3D contouring
- Permits, automatically, the fastest and smoothest execution of thousands of blocks of motion (trajectory) with only specifying the maximum jerk, acceleration, and speed limits of the machine
- Block retrace buffer allowing motion reversal through segmented "history"
- Leadscrew, backlash, and Cutter compensation (e.g. tooltip geometry, offsets)
- Multiple coordinate system support (128)
- Large part program file (100's of MB) and rotary buffer support
- Built-in coordinate system manipulation (e.g. rotation, translation, mirroring)
- High block rate processing (e.g. 10,000 blocks per second)
- Laser control and synchronization with motion (e.g. Power modulation)
- Galvo mirrors control & synchronization with XY– Hot market!
- NC16 software interface features





Core Industries

General Automation

- Coordination of up to 256-axis
- Electronic gearing
- Powerful CAM tables, with 3rd order interpolation, and I/O synchronization
- Time base control for web handling
- Advanced math/trig. Functions – built-in
- Open architecture, kinematic buffers
  - Allows controlling, in tooltip coordinate, any robot or mechanical linkage