

New Integrated AC Servo Motor

A Danish company, JVL Industri Elektronik A/S, has developed a completely new concept in motor control: the “**MAC Motor**”.

The MAC motor is an AC servo motor and controller combined in a single unit, offering previously unseen low pricing for the OEM market. Integrating electronics in a motor has been achieved previously, but never in such a compact unit with *true AC servo performance*. In the MAC motor, the servo motor, hall sensors, encoder and control circuitry have been especially designed by JVL to provide a self-contained, integrated unit in which the driver and controller are mounted behind the motor in a sealed housing.

System intelligence is thereby decentralized by off-loading control functions to the device level. This makes the MAC motor well suited for distributed control architectures which are prevalent in factory automation processes today.

The MAC motor is available in 3 models: 50, 95 or 140W. NEMA23 flange is standard so the MAC can directly replace a step motor without mechanical modification. Motor parameters are set-up via an RS232 port using Windows software MacTalk.

Numerous Advantages

There are many benefits achieved from having the intelligence at the device level.

- **Reduced material costs**
Because the drive and controller are in the motor *most cabling to a control panel is eliminated*
- **Reduced labor costs**
With cabling eliminated, assembly time is greatly reduced
- **Better quality & reliability**
Fewer connections, less wiring
- **Ease of serviceability**
Because all electronics are self contained you simply change out the motor
- **Better noise immunity, less noise transmission**
I/O is integral eliminating noise induced from external wiring issues
Switching noise from the drive due to commutation is contained in the motor
- **Reduced setup time**
4th order digital filter requires only one tuning parameter for load or reflected inertia
- **OEM cost savings**
Modular approach means you only pay for the functionality required

Modular Approach

JVL has adopted a modular approach to system functionality. The MAC line starts with a base model that includes the hall-effects, encoder, drive and controller with basic motion profiling.

Application specific requirements for I/O, connectors, network and PC/PLC options are handled through the use of add on modules which piggy back the main board within the motor. In this manner the customer only pays for the functionality necessary for the specific application.

Base model

- Analog $\pm 10V$ input for velocity or torque control
- Pulse/direction inputs
- Serial command interface using RS-232/422
- Encoder In & Out with gear following

Option Modules

- RS-232/485 with D-sub connectors and status LED's
- PLC interface for positioning via I/O
- μ PLC with 8 inputs & 4 outputs at 300ma each
- Profibus interface
- CAN/DeviceNet interface
- Bluetooth wireless interface
- Multiple connector and cable options

Simplified Tuning - Adjust 1 Parameter Only

JVL has developed a revolutionary approach to tuning the MAC motor.

A typical servo system uses a PID algorithm which is a 1st or 2nd order filter. The MAC motor incorporates a 4th order digital filter which requires only a single adjustment based on reflected inertia of the load.

This high order filter eliminates the "art" of tuning and gives the following benefits:

- Shorter installation and commissioning times
- A stiffer system with shorter positioning times.
- Inexperienced users can readily set-up the servo system.
- Oscillations due to non-linear mechanical systems are avoided.
- Minimum positioning error during operation and halt.

Other Features and Options

- Torque mode homing
- SW position limits
- IP67 for full wash down option
- Planetary gear heads with ratios of 3, 5, 10, 20 or 100:1.

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