

A newsletter from  
JVL Industri Elektronik A/S

## The flexible MAC motor

### Unique expansion modules for every application

As described in a previous edition of *JVL News*, the MAC motor represents an entirely new concept in "Motion Control". The motor itself includes a complete controller kernel that can either function as supplied, or be adapted to various applications using expansion modules. The "Basic" MAC motor, without any expansion module, offers the following core functionality:

- Electronic gearing
- Velocity control, controlled digitally or via +/-10V input.
- Torque control, controlled digitally or via +/-10V input.
- Positioning via serial interface.
- Electronic gear with offset-function via +/-10V input.

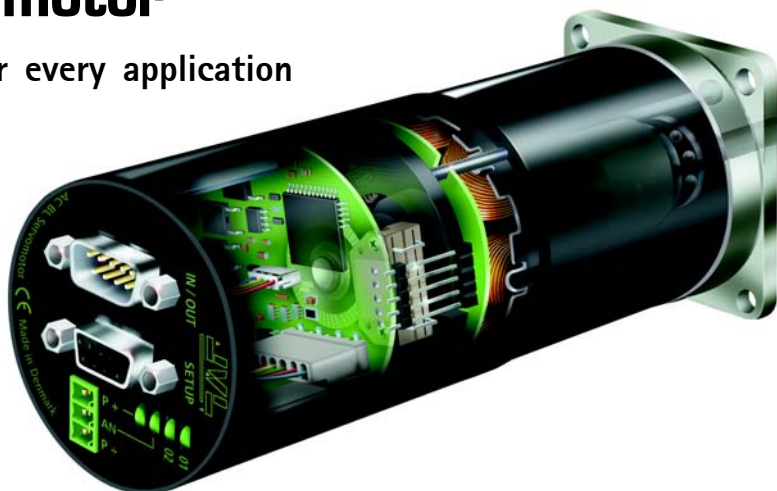
General features of the MAC motor include:

- Software end-of-travel limits
- Selection of acceleration, maximum top velocity, torque, etc.
- 4th-order servo filter
- Sine commutation with 4096 ppr.
- RS232 (w/optional cable) and RS422 communication.
- Alarm and "in position" outputs.
- Internal "power dump"

### Major savings

The MAC motor has been conceptually designed as a very economically competitive and flexible product since the basic motor "only" includes essential features directly related to motor operation. You thus only pay for what you need.

And the fact that the MAC motor additionally offers a single, integrated unit, without the need for additional expensive cabling, makes a MAC-based solution even more attractive.



"Basic" MAC motor with connector module (IP42)



Connector module (IP42)

NanoPLC module (IP67)

Profibus module (IP67)

### Expansion modules.

At present, JVL can offer the following modules for more advanced applications:

*Profibus DP 12 Mbit and CAN-Open module.*

All internal parameters can be controlled via the Profibus or CAN-Open. The module additionally has 6 inputs and 2 outputs so that decentral control of, e.g., start/stop is possible. The module's International Protection rating is IP67\*. *Nano-PLC* Comprises a simple controller kernel that can position on the basis of signals at one of the 8 optically isolated inputs. The PLC module also has 4 outputs, e.g. for indication of errors, etc. This module handles 80% of typical positioning tasks.

The Nano-PLC is available in 2 variants: IP42 or IP67\*.

*Connector modules for IP42 and IP67*

The "basic" MAC motor itself is delivered opened-ended at the rear. For users requiring coverings with either a standard SUB-D connector or watertight connectors, these 2 expansion modules are available.

In addition to functioning as a connector module, the modules also include an RS485 interface and LEDs (IP42 version) for status indication.

### Other modules

JVL is continuing to work on development of other MAC modules such as Indexer, Device Net, Ethernet and wireless modules. Customised modules are also available. Contact us regarding the specific application and together we can discuss features and not least the optimum price for a module.

\* Requires that the "basic" MAC motor is equipped with extended protection (type MACxxx-A3).

# Lanterns measured using JVL controllers

## Goniometer controlled using step motors and controllers from JVL

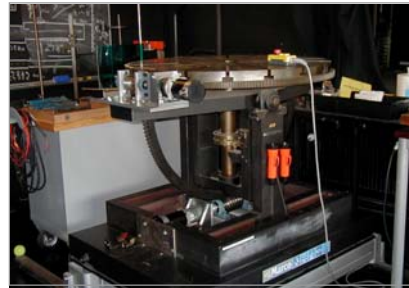
One of the tasks of The Royal Danish Administration of Navigation and Hydrography (RDANH) is to measure the output of lenses and lanterns of navigation beacons and buoys. It is essential that these data are of the highest quality since they are employed in navigational safety for mariners. The information is published for example on sea charts.

The beacon lanterns are mounted on a Goniometer table, which can be rotated both horizontally and vertically. Light emission is measured using a lux meter at a distance of up to 57 metres in a long measurement corridor, and is measured as a function of the lantern's rotational angle in both planes. Until now these measurements were taken manually, but the RDANH wanted to automate the measurements to perform them faster and with greater accuracy.

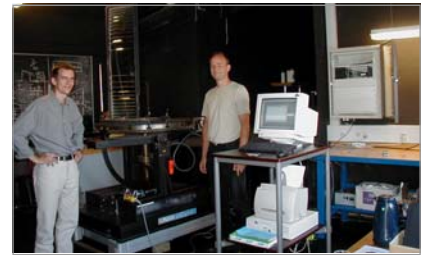
In cooperation with JVL, the RDANH developed a solution based on a step motor control system supplied by JVL. The Goniometer's movements are carried out by 2 Zebotronics step motors equipped with TR planetary gears that are controlled by a 1 1/2-axis controller. This consists of a JVL SMC35B Step Motor Controller and a

JVL Ministep Driver SMD41C3. The controller is controlled from a PC for which JVL has supplied software that facilitates easy entry of required movements in both planes. An autostep-function enables the table to be moved in steps a required number of degrees, e.g. from 0 to 90 degrees, with a suitable step interval for reading the lux meter.

The RDANH is continuing development of the system so that light and positioning measurements can be automatically plotted.



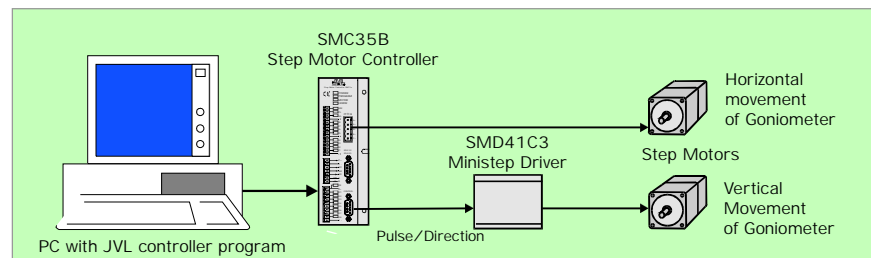
The goniometer with step motors



Goniometer setup



Cabinet with controllers and lux meter



The complete measurement setup

# Servo Controller that's worth a closer look

## Redesigned model of AMC20 launched

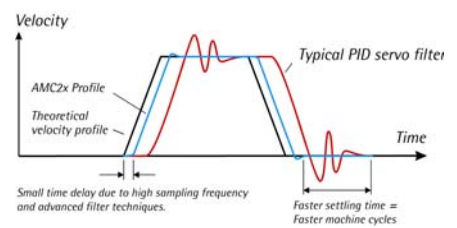
JVL's AMC20 Controller has now been launched in a new and improved model. Both hardware and software have been redesigned to provide solutions to even more applications. For example, the current filter has been significantly enhanced so that screw- and torque-related applications can be performed with great accuracy at high speed. Novo Nordisk for example has utilised this feature to great effect in one of their production machines. It is now also possible to connect additional motor types, such as the Yaskawa/Omron motors with serial 2-core encoder. New commands have been added so that external brakes can



be controlled very precisely and the motor will not move if current is lost. In addition, there are numerous new commands and functions for PLC programming, allowing more rapid definition of

control sequences.

Another innovative new feature is the option for decreasing the switching frequency to avoid energy loss in very long cables - up to 100m.



Most of the new functions can be applied to earlier AMC20 models by downloading new firmware. Contact JVL for firmware to be sent directly.

This servo controller's regulation, which is based on a 7th-order filter, should also be mentioned. It provides less overshoot, unprecedented stiffness in elastic systems, and shorter machine-cycle times. See above illustration.

# MacTalk, advanced software at your fingertips

*MacTalk* setup and diagnostic software for JVL's MAC motors is state-of-the-art

JVL's new software *MacTalk*, for use with the MAC series of integrated servo motors, more than merits its own highlight in this issue of JVL News.

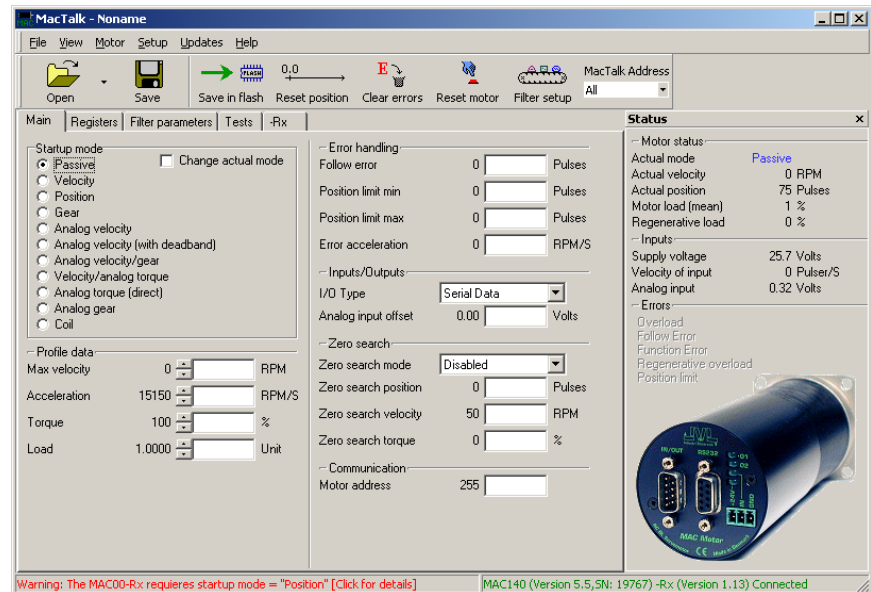
*MacTalk* really makes it easy to setup and diagnose MAC motors.

All vital parameters and save/load parameters from disk can easily be adjusted. In addition, motor status and motor parameters can be monitored in real-time.

*MacTalk* also enables on-line communication with the motor, with the ability to change all parameters on-line.

A firmware update function enables the firmware in motors and expansion modules to be updated. If an internet connection is available, the software will automatically search for new firmware versions and download these to the computer.

*MacTalk* itself can also be automatically updated via the internet. Indications of the changes



available and comparisons with the currently installed version are given.

*MacTalk* makes it easy to test and adjust a motor control system. A test sequence is simply set up and parameters such as velocity, acceleration and torque can be

adjusted. Positions and any delays can also be tuned.

*MacTalk* automatically detects which modules are installed in the motor and displays the correct setup screen and menus for the relevant motor configuration.

## JVL Controllers for demanding applications

Poul Johansen Maskiner A/S is now also using JVL's integrated AC servo motors

Danish company *Poul Johansen Maskiner A/S* has long used a wide range of JVL's step motor controllers and drivers for a variety of solutions. Recently the company also adopted the new integrated AC-servo motors from JVL - the MAC motors.

A total of 4 MAC motors in all are being used for a range of different purposes in one of the company's assembly machines.

Electrical manager, Niels Sørensen took part in selecting the MAC motors, which were chosen on the basis of their compact construction and simple cabling, as well as the many control

facilities provided using the associated *MacTalk* software. In particular, Niels Sørensen emphasises the facility for fieldbus modules - especially Profibus DP - for use with the compact motors. Price-performance ratio was also an important factor in selection.

*Poul Johansen* manufactures precision machinery such as assembly machines for a wide range of well-known companies in Denmark and abroad, including Danfoss and Novo.

At JVL we are proud to contribute to the development of modern automation systems and regard the use of MAC motors at *Poul Johansen Maskiner A/S*



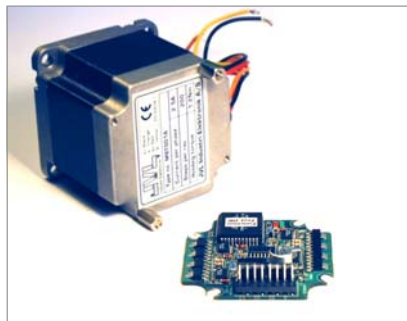
as further evidence of the increasing application of these unique integrated servo motors.

# Mini-driver now with built-in step generator

## Many new opportunities afforded by this small, compact driver

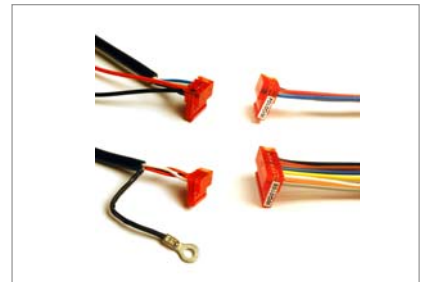
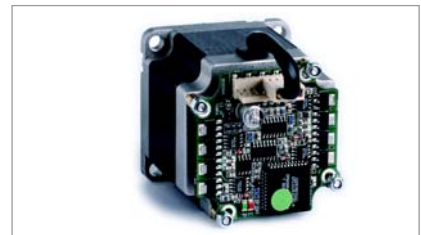
The incredibly compact driver SMD73 has been further developed and is now available in several new versions. In addition to the 1/2 step model introduced in 2001, JVL can now supply models with the following step resolutions: 1/1, 1/2, 1/4, 1/5, 1/8. Operating and standby currents were originally fixed at 2.6A and 0.8A respectively. Many customers had however asked for greater flexibility. It is now possible to select 11 different current settings independently of one another, e.g. 3.0 A operating current and 0.25A stand-by current.

The pulse/direction inputs now also cater for 24V PNP/NPN connection and 5V inputs, e.g. for the SMD73 to receive signals from a PC or custom developed PC-board. The power supply is unchanged at 15 to 28VDC. JVL can now also supply various cables to simplify the interface to PLCs or in-house circuitry. 4 screened or un-screened cable types are available.



Furthermore, Mini-step Driver SMD73 can now be supplied with a built-in step generator, allowing the motor to be operated simply by activating input 1. The direction of rotation can be changed via input 2. 24V PNP/NPN and 5V inputs can be used, and various current settings selected. Step-resolution is a fixed 800 step/rev. The velocity (generator frequency) can be modified by changing the value of a single resistor.

No acceleration- or deceleration profile is used, which means that the motor



immediately runs at the selected velocity. If too high a velocity is selected, the motor will simply not start.

These enhancements to the mini-step driver's many features provide opportunities for a large number of additional applications.

## Power supplies

### Wide range available, also for MAC motors



PSU48-240

PSUKIT40,80,150

PSU00-PD1

We have recently launched 3 different power supplies to meet the needs for simple powering, in particular of the new MAC motors. 3 different types are available:

PSU48-240 is a particularly compact, complete switch-mode power supply for DIN rail mounting. It supplies 48VDC/5A and is well-suited for supplying several MAC motors.

The PSUKIT comprises transformers,

capacitors and rectifiers for constructing customised power supplies in a control cabinet. The set is delivered with 40, 80 and 150VDC output, and power ratings of from 100 to 1000W (4kW peak).

The PSU00-PD1 is a large capacitor with mounted power supply. The capacitance absorbs regenerative energy during motor deceleration so that the energy can be re-used. If the voltage

exceeds approximately 50V DC, the energy is dissipated in a power-dump resistor. An external transformer must be used.



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