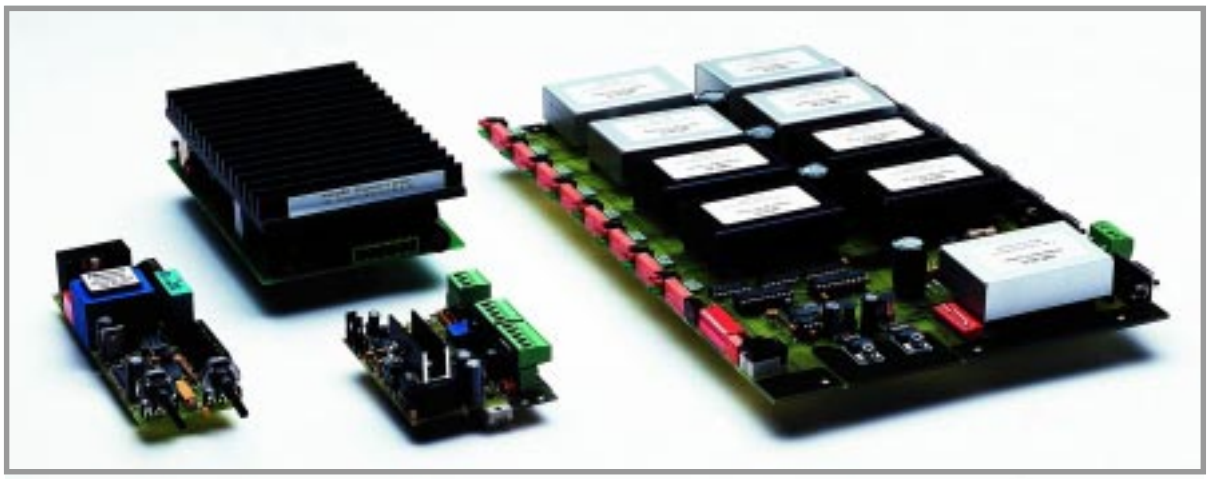
Application Note

JVL ...when motors must be controlled

# Customised Development by JVL

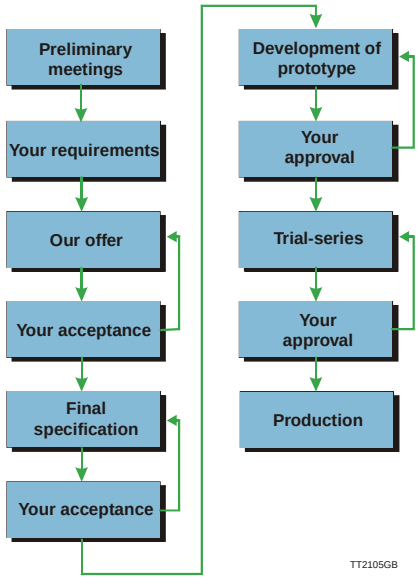
**Utilise our extensive experience in motor control. The best, fastest and most economic way to solve your motion control application.**



JVL Industri Elektronik A/S develops and manufactures a wide range of step and AC/DC servo motor controllers that are used throughout the machine and manufacturing industries, and in research and education. Our expertise in these fields has given us widespread experience in providing optimum motion control solutions. This extensive know-how and experience is available to you for applications in which a standard motor controller cannot be used.
For specialised tasks JVL can offer controllers that are custom designed to your specific applications. In this way you can obtain a solution in which we have combined our experience with tried and tested techniques. This ensures rapid development and high operational reliability.

A typical development project is illustrated in the accompanying diagram.

Once you have specified the task and we have submitted an initial estimate, we prepare a final specification for your approval. Thereafter our co-operation continues, and you approve each stage of the process until your final system is set into production, either by us or by yourself.
In the following pages, we have described several applications where our customers have found that JVL customised developments provided the quickest, best and most economic solution to their needs. Contact us for further information - it will be our pleasure to work with you to solve your motion control application.



# Valve Controllers

**JVL developed step and servo motor controllers for Swedish company**

## Step motor controllers for rotary valves

System Oden is the name of new servo valves for which JVL has developed the step motor controllers. In addition to the step motor controller and step motor, the valves utilise a unique, very compact, play-free gear that has a high ratio and controls the opening of the valve itself. Maximum torques are 50, 220 and 500 Nm.
The step motor controllers are designed as very compact units with a mechanical construction that allows direct mounting above the motor in the valve housing.
4-layer PCBs are used and the driver stage utilises the latest generation of Power MosFet´s. This ensure that heat generation is so small that cooling fins are unnecessary and cooling is achieved via the board. The motor position is controlled by an input signal of 4-20mA. A corresponding output enables the valve position to be read. Set-up of motion velocity, acceleration, torque and hysteresis is accomplished via a compact RS232 interface using Windows software developed by JVL. The drivers provide 3.5 and 6.8A per phase (at nominal 24V). Since the controllers must operate over a wide temperature range from -25 to +60°C, special care has been taken in the selection of components used. The step motor controllers are now in standard production by JVL.

## 3-phase servo controller for controlling linear valves.

JVL and Oden have further developed the concept and constructed a valve control system based on the same functionality as the step motor system but utilising a 3-phase servo motor.
The basis for further development was Oden Control's desire to increase velocity of the motor in situations where a linear valve driven by a spindle could be used. In such cases a step motor was limited with respect to high velocity since a linear valve can typically have a large operating range and require a large number of motor revolutions in a short period.

A servo motor controller was therefore developed for this purpose. One of the demanding requirements was that the controller must not exceed 62mm in diameter with a height of 25mm!
This was achieved using a multi-layer PCB with components on both sides.
The functions used in the step motor controllers were transferred to the AC servo controller, but feedback from the motor uses the motor's integrated "hall" sensors, giving 24 steps per revolution. A patented eccentric gear (play-free) ensures that the overall resolution is < 0.25 degrees per step on the valve actuator axle, giving an accuracy of better than ±1/100mm.

# Automated Fishing

**JVL supplies equipment to Norwegian firm for controlling fishing robot**

With depths of up to 500 metres and rocky mountain slopes in the Norwegian fiords, it is not possible to fish using traditional trawling methods and specialised fishing equipment must be used. *Mustad*, which is one of the world's largest suppliers of fishing hooks to both hobbyists and professionals, has for several years produced a manual machine that resembles an overgrown fishing reel. Using this machine, it is possible to sink lines to depths of several hundred metres and fish using normal hooks. Mustad wanted to further develop the technique so that professional fishing could be automated and several machines could be installed on a single fishing boat. Via our Norwegian dealer, *Electro Drives*, JVL developed an "automatic fishing rod" in which depth, speed, pauses, etc., can be programmed so that fishing does not require manual operation. A 24VDC/10A DC motor drives the fishing reel and a simple encoder with 4 pulses/revolution determines depth and speed. When the line is reeled in, the fish are also automatically removed from the hooks. The operating panel consists of 4 keys and an LCD display with 2x16 characters. To make it very easy to use, the menus are structured like a mobile phone. The entire construction is housed in a water-tight synthetic unit that can withstand the harsh conditions.
This new product makes it possible to fish very efficiently even in inaccessible areas.

# Peristaltic pumps driven by step motor

**Specially developed step motor driver ensures motion linearity**

For this application JVL developed a mini-step driver that interfaces to a PCB developed by the customer. This generates step-pulse and direction signals. Normally a sine-wave profile is used in mini-step operation, but because the step motor used was non-linear, a special profile was developed so that the motor axle operates following a perfect sine. The driver PCB is 4-layer with SMD power components that conduct heat via the board to the mounting plate. This a new technique developed by JVL and minimises heat generation and reduces cost price, since expensive mechanical components and cooling fins are not necessary. The driver supplies 6 A up to 80VDC and has a fixed mini-step rate of 800 steps/rev. JVL developed and also produces the driver.

# Multi-function step motor driver

**Compact step motor driver can replace Parker Compumotor driver**

For many years, many of our customers throughout Europe have used a driver manufactured by Parker Compumotor, type SD12/13/14/15/15M, and have noted several points that they would like to see improved. Since Parker has not further developed the model, JVL developed a driver that is compatible with the Parker driver, both functionally and in terms of connectors. The JVL Driver PA0076 does however offer improvements in many areas:

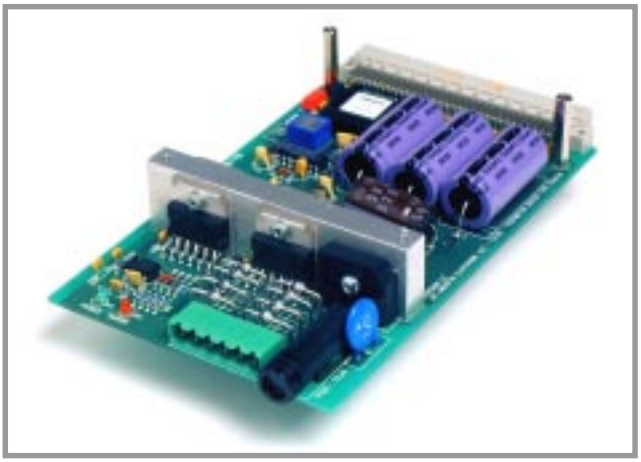
1: High-efficiency MOS FET technology ensures less heat generation.
2: Single power supply of 15-80VAC/DC ensures fewer cables and avoids double power supply
3: Built-in potentiometers so that velocity and acceleration can be adjusted on the PCB. This gives lower cost price in external installations and fewer errors.
4: Increased options for mini-step operation- up to 4000 steps/rev.
5: DIP switch change of modes ensures simpler set-up and fewer errors.
6: LED indicators for power and error condition.
7: Lower price through the use of the latest technology, e.g. without the use of heat sinks and other expensive components.

JVL has used this driver as a replacement for the Parker SD10 series in many projects and in all cases the JVL driver has proven to be a more than satisfactory solution for our customers.

# Controllers in Label Printing Machines

**Print machines supplied with JVL controllers**

When a manufacturer of printing machines for labels had problems with their step motor controllers, they contacted JVL Industri Elektronik. This led to a co-operative venture in which we developed a specialised step motor controller that has now found use in 3 applications. In one application, the controller controls the positioning of the second printing plate so that it is positioned within 8 µ of the first. In the second application, paper is positioned laterally, while in the third the controller is used to pre-set pressure in a flexo machine. Our customer found a very satisfactory and economical solution by commissioning JVL to develop and produce these controllers, which we have now been supplying for a number of years.



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