







# **Motion Control Solutions** for the automation industry



# **Baldor Motion Control At the Heart of Automation**

Baldor motion control products are at the heart of automation, bringing reliability and flexibility to today's machines. Our products operate around the globe in thousands of applications, making sure consumers and businesses alike receive the products they demand in an ever growing global economy. It is Baldor's commitment to quality, service and investment in R&D that makes Baldor a global leader in the motion control industry.

Our comprehensive motion control range includes

- ) Rotary AC and DC servo motors
- ) Linear motors
- Servo drives
- ) Multi-axis motion controllers
- ) Inverter and vector drives



# A Proven Company

In 1920, an electrical engineer and a master machinist began designing and manufacturing some of the highest quality, most energy efficient electric motors in the world. The company's original slogan - "Baldor: A Better Motor" - aptly expressed the company's philosophy.

Nearly a century later, Baldor Electric Company continues this philosophy and commitment to quality.

Today, that same level of unparalleled quality is designed and applied to every product in our extensive line of motion control products - from motors, to drives, to programmable motion controllers.



1952

1920

1983

Baldor expands the BSM servo motor facility in Westville.

Motion control capability expanded with the acquisition of Optimised Control, Bristol.

England

1997

Oklahoma

1997





Baldor's World Headquarters and Drives Center in Fort Smith, Arkansas U.S.A.

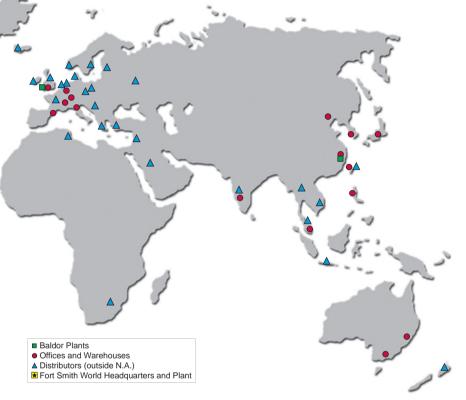


Bristol, England - Design and manufacture of Servo Drives, Motion Controllers and Mint programming software.

# A Global Company with a Local Attitude

Baldor now has more than 8,000 employees in 26 worldwide manufacturing facilities producing an unmatched range of industrial electric motors, drives, generators, motion controls and power transmission products. With 14 motor production plants alone, shipping over 60,000 motors, our facilities are some of the most efficient and productive plants in the world and are constantly being updated with the latest technology and automated production equipment.

Our philosophy is to be a 'local company' in a global market. With a worldwide sales office and distribution network, we sell to more than 160 industries in 70 countries with a comprehensive technical support capability within the countries we serve.



Linear motors and stages introduced with the acquisition of Normag, Santa Clarita, California Baldor introduces a new family of motion controllers and Mint®MT, multitasking software

1999



The products introduced bringing manufacturing facility in Bristol, England is expanded.

Ethernet products introduced bringing more axes of control and system cost reductions

2000 2006



purchases Dodge and Reliance, bringing power transmission products and a wider motor line. Sales double.

2007



# **Specify with Confidence**

## **Solutions**

Baldor's comprehensive range includes multi-axis motion controllers, high performance servo drives, rotary servo motors and linear motors – all designed to seamlessly interface with each other to provide a complete motion solution. This allows you to minimise your design time, save development costs and maximise your time to market.

## Choice

Baldor firmly believes in offering our customers a range of products to fit a variety of market needs. Whether this means delivering a product from stock, designing a product for your specific application, accessing technical data, or how you place your order, we make it easy to do business with us. Our products are designed to handle simple through to demanding applications.

# Quality, Reliability & Design

With ISO9001:2000 accreditation to ensure high quality standards and by using the latest CAD tools and manufacturing techniques, Baldor's engineering teams work side-by-side through design, product development, manufacture and final test to make sure that total quality and reliability is built into and stays with each product throughout its long lifetime.



# **Experience**

Technical knowledge is the key to solving customers' needs. Our extensive experience has been gained over many years through close customer contact from product development to field maintenance, providing invaluable feed-back for our product development process - ensuring Baldor motion control products meet the ease of use, flexibility and performance demanded by the markets we serve.

Application notes reflecting our knowledge and ability are available for download on the web at www.baldormotion.com

### Information

Information must be comprehensive and easily accessed. To make it easier for our customers, we provide a complete range of product literature as well as a website dedicated to motion control products - www.baldormotion.com. This brings together in one location, all the information relevant to motion control products and includes technical information, latest news, application stories, application notes and support.

# Leading the Way

We don't just use the latest technology, we help define it. Baldor is an active member of the Ethernet Powerlink Standardization Group. We helped in defining one of the leading real-time Ethernet technologies on the market today.

Ethernet Powerlink is the latest generation of real-time Ethernet solutions providing a simpler interface between motion controller and drives. Analog and encoder signals are replaced by a simple Ethernet cable. This not only brings about cost savings in wiring, but reduces setup time and provides for a modular control system. Different machine configurations can be dealt with more easily.

POWERLINK real-time technology

# **Setting New Standards in Motion Control**

Baldor's new NextMove e100 multi-axis motion controller and MicroFlex e100 servo drive range set new standards in ease of use, modularity and flexibility. Utilizing the real-time Ethernet network protocol, Powerlink, NextMove e100 can interpolate over 16 axes across the Powerlink network. Over 200 further axes can be coordinated using the standard CAN in Automation (CiA) DS402 device

profile built into the drive.

# **Industries Served include:**

- ) Packaging
- ) Food & Beverage
- Automated Assembly
- Material handling
- Electronic Production& Test
- Semiconductor
  Manufacture & Test

- ) Laser processing
- ) Pharmaceuticals
- Medical Device
- ) CNC
- Stage & theater automation
- Automotive assembly
- ) Robotics

# **Application Competence**

- Labeling
- Wrapping
- Cartoning machines
- ) Web based sheet materials handling paper, plastics and metals
- ) Flow wrapping
- ) Bottling
- ) Form/Fill/Seal
- ) Tube Fillers
- ) Pick and place
- Inspection

- ) Parts handling
- ) Electronic assembly
- ) Textile
- Laser cutting/ Trimming
- Vinyl cutting
- Food processing
- ) Routing
- ) Grinding
- Mixing
- > Pull/cut-to-length
- ) Camera control
- Wrap and Pack
- Motion Simulators
- X-ray Machines
- Material handling
- Stacking
- ) Glue laying

- ) Web feeders
- ) Automotive assembly
- Winding
- ) Gantry robots
- Capping
- Automated barriers
- Flat bed cutters
- Engraving
- Drilling
- Automatic fluid packaging
- ) PC Board trimming
- Automatic pouching
- ) Foil machines
- High speed rotary wrappers
- ) ... and more

# The Value Formula

The Baldor Value Formula is at the core of everything we do, from design to manufacturing to sales and service.

$$V_p = \frac{Q_p \times S_p}{C \times T}$$

(p = perceived)

The Value formula illustrates the equal importance of four factors shaping our customers perception of *Value* (Quality, Service, Cost and Time). We constantly make improvements in the *Quality* of our products. We strive to improve the level of *Service* to our customers, making their jobs easier. By improving *Quality* and *Service*, while reducing the ownership *Cost* of our products, and the *Time* to deliver products to our customers, our *Value* (as perceived by the customer) continues to increase ... year after year.



# **Harmonization for Ease of Use**

Our MotiFlex® e100 is new range of high performance multi-axis drives designed with harmonization and ease of use in mind.

MotiFlex integrates state of the art DSP technology specifically designed for motor control, with a real-time Ethernet Powerlink platform, modular construction and Baldor's Mint® motion control technology. With universal AC operation and current ratings from 1.5 to 33 Amps in two package sizes, MotiFlex has software selectable servo or AC vector modes and suits both rotary and linear motor control.



# Mint® – The Programming Language for Automation

Baldor's Mint Motion Language is a high speed compiled BASIC programming language for motion and machine control that combines multitasking capability for motion, I/O, HMI and communication tasks allowing complex applications to be divided into simpler, more manageable sub-tasks

With twenty years of history and now in its fifth generation, Mint embraces all the modern BASIC programming functionality with powerful features such as multitasking, functions and procedures, data types and local data - making it easy to write and develop modular programs that are easily understood by others, easily maintained and easily re-used across different applications.

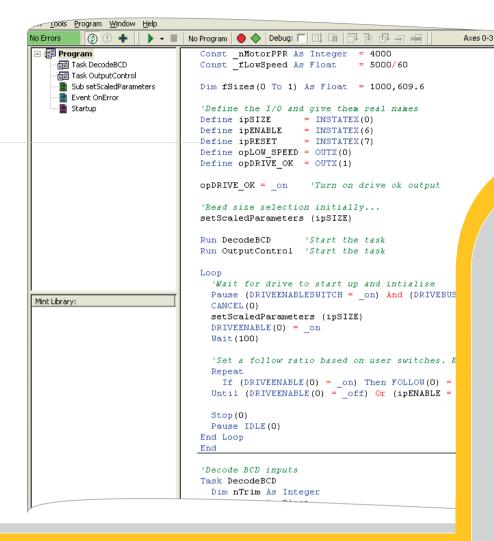
Mint's comprehensive library of motion applications includes interpolated moves, cam profiling, flying shears, electronic gearing and more

A common programming interface for both NextMove and Baldor's intelligent servo and inverter drives further increases productivity and ActiveX<sup>®</sup> components are supplied free of charge to aid in the development of Microsoft Windows<sup>®</sup> front end applications

# **Application Development Tools**

I/O LOGIC





# More than just Motion Control

Direct

**√**≱ 🕕 🚥

Mint excels in motion control applications, but is equally at home in I/O handling, HMI interaction, communications and complex mathematical functions. Some designers choose a standard 'open' PLC language platform that offers a 'standard' set of motion features. However, many industries at the cutting edge of motion control find PLC technology limited in its capabilities for motion control. Those looking for an edge will find it in the advanced motion capabilities of Mint.

Realizing that today's applications are more demanding, more precise, more dynamic and more complex, Mint focuses on providing creative features, advanced motion capabilities and features for the user to innovate in the application solution.

Learn more about Mint in section B of the BR1202 brochure set.

# Mint® WorkBench

Mint WorkBench is a Windows tool which is common across Baldor's range of NextMove motion controllers, servo drives and high performance inverter and vector drives. Mint WorkBench offers an easy to use Windows development front end for Mint programming, with its color highlighting of keywords and context sensitive help. The Program Navigator makes it a breeze to navigate the source code, no matter how complicated.

### Features include:

- Program Navigator for rapid program development
- Mint code library for re-use of commonly used Mint code sections
- ) Spy window to monitor common motion variables and I/O
- ) Software oscilloscope eases tuning and diagnostics
- ) Full debug capabilities including breakpoints and single stepping
- Watch window for variable and task monitoring
- Command line interface to interrogate the controller even when the program is running
- SupportMe function with automatic e-mail generation for rapid technical support
- ) Web updates of firmware within Mint WorkBench
- Easy management of firmware files

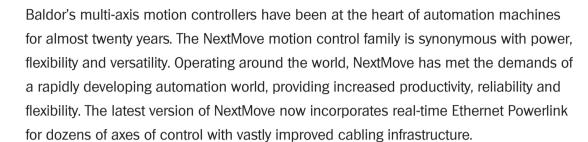


# **Multi-Axis Motion Control Solutions**















# At the Center of Control

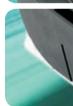
NextMove controllers are available in a range of formats, from panel mount standalone controllers to PC based controllers, providing a flexible architecture for multi-axis machine control. On board digital and analog I/O can perform tasks usually associated with PLC devices and for many applications this allows the PLC to be eliminated. The I/O is easily expanded using the standard CANopen port resident on the NextMove controller. I/O handling, motion and communication are easily intermixed within the same application program using the versatile Mint programming language.



At the heart of NextMove's success and flexibility is Baldor's highly acclaimed motion programming language, Mint. Mint provides a high level, easy-to- use programming language that incorporates the needs of multi-axis motion, HMI communications, I/O machine control and more. Mint allows the NextMove motion controllers to operate in a standalone capacity without the need for a PC or PLC. The supplied ActiveX control allow complete freedom to program motion, I/O sequencing and monitoring from any Windows application. The application can be run in parallel to the embedded Mint application for increased flexibility.

Learn more about the NextMove product range in section C of the BR1202 brochure set.

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# **NextMove Motion Controllers**



### NextMove e100

Stand-alone Ethernet based motion controller for up to 16 axes coordinated motion and many more axes of non-interpolated motion.

20 digital in; 12 digital out; 4 analog in



### NextMove ESB-2

Up to 8 axes stand-alone servo and stepper motion controller.

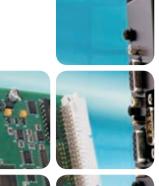
20 digital in; 12 digital out; 4 analog in



### NextMove PCI-2

Up to 12 axes PCI-bus servo and stepper motion controller.

20 digital in; 12 digital out; 4 analog in





X6 ENC





































- 1 thru 16 axes of fully coordinated motion control
- Choice of multi-axis PC board, panel mount or distributed intelligent controls
- Move types: linear, circular, helical interpolation; software cams; flying shears; electronic gearing; splines; synchronization with positional offsets and virtual axes
- Flexible processor architecture to tackle the most demanding applications
- Choice of open or closed loop motion control
- Flexible onboard machine control I/O: digital and analog
- High speed registration inputs
- Choice of communication interfaces
- Peer-to-peer communications
- **Ethernet Powerlink communications** available







### NextMove ES

6-axis Euro card stepper and servo

20 digital in; 12 digital out; 2 analog in



## Mint Option Board

Mint capability for MotiFlex drives, from

4 digital in; 4 digital out; 2 analog in



# **Servo Drives for Today's Equipment**







Whether your needs call for control of speed or torque, preset point-to-point moves, or a fully Mint<sup>®</sup> programmable single axis positioner/drive, Baldor has the answer with our wide range of servo drives.





# **Getting Started Quickly**

Baldor's drives are designed for ease of use the moment you take them out of the box. Start the accompanying Windows based Mint WorkBench and the wizard will take you through all of the commissioning steps. Simply select your rotary or linear catalog model number from the database and answer some simple application questions. Full auto-tune of current, velocity and position loops will get you up and running quickly, deliver optimum performance, and test that the motor cables have been correctly wired and the feedback is in the correct orientation.



The MicroFlex and MotiFlex families incorporates sophisticated low pass and notch filters to handle the most dynamic of applications, by helping to eliminate resonance within the machine. These are configured within the easy-to-use Mint WorkBench.

## **Real-Time Ethernet Drives**

MicroFlex e100 and MotiFlex e100 lead the way in utilizing the real-time Ethernet protocol, Ethernet Powerlink, where traditional wiring is replaced by a single Ethernet cable. This simplifies wirings, reduces costs and improves setup time and diagnostics.

# Flexibility and Versatility

Baldor's servo drives offer the best in flexibility and versatility. If your needs call for point-to-point moves then the Flex+Drive-II will handle this. Preset position or speeds can be programmed from an easy-to-use table configuration tool. Flex+Drive-II is also programmable in Baldor's programming language Mint. With a large complement of onboard I/O Flex+Drive-II can deal with more complex applications without having to rely on external logic such as a PLC. Our award winning MintDrive-II can handle more sophisticated application such as cams, or flying shears, in addition to multi-tasking Mint capability.

Learn more about Baldor's servo drive product range in section D of the BR1202 brochure set.

# Servo Drives



MicroFlex®

Economical drive solution 105-230 VAC 1ph to 9A 230 VAC 3ph



FlexDrive-II

Fully featured servo drive 115 or 230 VAC 1ph to 7.5A 230-460VAC 3ph to 27.5A



Flex+Drive®II

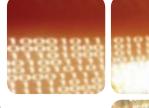
Point-to-point moves or Mint programmable

115 or 230 VAC 1ph to 7.5A 230-460VAC 3ph to 27.5A



MintDrive®II

Multitasking Mint programmable 115 or 230 VAC 1ph to 7.5A 230-460VAC 3ph to 27A



















































# **Servo Drive Features**

- Operates rotary and linear brushless servo motors, and AC Induction Motors
- AC and DC drives available
- Windows software setup easy to setup, adjust and tune
- Full auto-tuning current, velocity and position
- Sophisticated control features (low pass & notch filters) for dynamic applications
- Single phase drives to 9A Three phase drives to 54A
- Choice of Encoder, Resolver, EnDat, Hiperface, SSI, BiSS feedback §
- Fieldbus options: DeviceNet, Profibus-DP, CANopen, Ethernet/IP, ProfiNet-RT §
- Ethernet Powerlink based drives simplifies wiring, reduces set-up time and improves diagnostics
- § Product dependent











### MicroFlex® e100

Ethernet Powerlink® enabled

105-230 VAC 1ph to 9A 230 VAC 3ph



### MotiFlex® e100

High performance multi-axis Ethernet Powerlink drives 230-460VAC 3ph to 33A



# **High Performance Servo Motors**

Baldor is a major worldwide provider of servo motors for automation solutions. Our servo motors are designed to a high specification for high performance. They operate

quickly and precisely in order to maximize your machine operating time.













# More Uptime - Less Maintenance

Baldor's servo motors represent the toughest, most durable and reliable product from the industry's servo motor leader, providing the best long term investment. Many models are available from stock and custom motors are available on short lead time, the shortest in the industry.

# AC Servo

Baldor's AC servo motors are available in two families, the BSM C-Series, a cost effective higher inertia motor, and the BSM N-Series offering the ultimate in servo performance. BSM N-Series is ideally suited to demanding applications which require a high product throughput. Both product families use Neodymium Iron Boron magnets for maximum torque, durability and reliability. Both families are available in all stainless steel washdown for pharmaceutical and food processing applications.

### DC Servo

Baldor offers a range of DC servo motors designed to exacting standards for continuous high duty operation. Standard mountings are designed for worldwide acceptance.

### Servo Gearheads

Baldor's new range of servo gearheads provide precision and long, trouble free operation. Their high efficiency design maximizes power transmission capability. These gearhead mount directly to the BSM servo motor family to provide torque multiplication, speed reduction and inertia matching.

Learn more about the Baldor servo motor line in sections E and F of the BR1202 brochure set.

# **Servo Motors**



BSM N-Series AC Servo High performance servo motor 0.4 to 40Nm (3.9 to 354 In-in)



BSM C-Series AC Servo Higher inertia servo motor 1.2 to 120Nm (10 to 1062lb-in)



**BSM Stainless Steel Servo** Pharmaceutical; food duty; 0.45 to 32Nm (3.9 to 283lb-in)



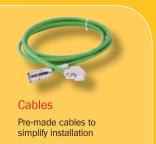
MT Series DC Servo Motors 0.2 to 6.3Nm (1.8 to 56lb-in)



# **Servo Motor Features**

- Torque range from 0.3Nm (2.8lb-in) to 120 Nm (1062 lb-in)
- Very high acceleration torques over 360 Nm (3190 lb-in)
- Available in high and low inertia models
- Wide speed ratings to 8,000 RPM
- Stock and custom designs
- Variety of feedback options resolver, incremental and absolute encoder, synchronous serial interface (SSI), BiSS
- Optional integral holding brakes, cooling fans to extend torque capability and servo gearheads
- ) IEC and NEMA frame sizes available
- ) Optional stainless steel models available



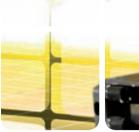




# **Precision Linear Products**



Baldor is a leading designer and manufacturer of linear motors. We provide advanced innovations for linear solutions. When your application calls for extreme acceleration and speeds with position, repeatability and accuracy in microns, the best choice is a Baldor linear product - for long-term trouble-free operation.



# **Complete Application Solutions**

Baldor can provide a complete application solution to meet your needs. Linear products can be provided as a standalone motor assembly (consisting of magnet and moving forcer) or as a complete stage - built with an extruded aluminum housing with linear bearings, limit switches, cable track, protective bellows and encoder in a wide variety of lengths.

# **Unique Performance**

Linear motors provide unique speed and positioning performance advantages such as direct-coupled backlash-free motion, zero friction for maximum life and the elimination of mechanical transmission devices.

They offer substantial improvements over applications using ball screws, timing belts, etc. The rugged mechanical design provides accurate motion and precision positioning for hundreds of millions of cycles. Baldor linear motors and stages are used in thousands of successful applications worldwide.

Baldor's servo drives provide control of the linear servo motors as standard. Coupled with our NextMove multi-axis motion controllers and BSM rotary servo motors, this will provide you the best automation solution in the market place today.

Learn more about the Baldor's linear motor line in section G of the BR1202 brochure set.

# **Linear Motors**





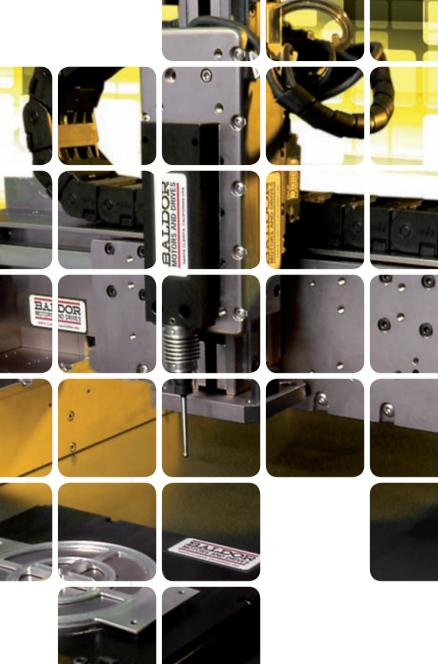
Brushless Iron Core
High performance motor
80 to 5179N (18 to 1164 Lbs)



Stepper Motor
Cost effective linear solution
10 to 200N (2.2 to 45Lbs)



Stepper Motor
Dual axis stepper
15 to 134N (3.3 to 30Lbs)



# **Linear Motor Features**

- High repeatability resolution to less than 50 nanometers (0.000002 inches)
- Extremely high accuracies to 50 nanometers (0.000002 inches)
- No backlash improving positional accuracy
- > Fast acceleration to 10 g's (98 m/s<sup>2</sup>)
- Higher speeds to 8 m/s (300 inches/sec)
- ) Long term reliability non contact design
- No wear or maintenance friction free
- Brushed and Brushless linear servo designs plus linear stepper and AC linear induction designs for maximum application choice
- ) Cog-free designs for smoother performance
- Available as components or built-in to single or multi-axis positioning tables - gantry styles available



Linear Induction
High forces and long travel
62 to 2224N (14 to 500 Lbs)





# **Baldor V\*S Drives**<br/>Industrial Series

programming and the capability to meet any application need.

















As well as designing and manufacturing some of the most exciting motion control products available on the market today, Baldor is also leading the field in industrial motor and drive technologies. The Baldor V\*S Drive range has been designed to define quality, reliability and performance by utilising easy-to-use interfaces, intuitive

# Strength and Depth

Baldor V\*S Drives are grouped into 3 categories to provide the functionality and performance across the widest range of applications:

- ) High Performance Drives
- ) Pump and Fan Drives
- Microdrives

# **High Performance**

No other drives on the market can offer you the user-friendly approach or consistent performance of the Baldor V\*S Drives high performance AC drives-no matter what voltage, power rating, or performance level your application demands. With their powerful processor and advanced design features, these drives assure you control to the highest power.

# Fan and Pump

The VS1PF Pump and Fan drive is a feature rich AC drive targeted at the pump and fan market but with functionality that rivals more sophisticated general purpose products. The VS1PF provides ability to gain traditional energy savings achieved by controlling centrifugal loads with a variable frequency drive while implementing unique algorithms that further reduce energy consumed by your application.

# **Microdrives**

Competitive in price, and compact, the Baldor microdrives features user-friendly interfaces and design elements that assure consistent motor control throughout a wide range of voltages, horsepower's, and enclosure types. Ranging from .37 to 10kW (1/2 to 15 Hp) stock ratings, these performance-proven microdrives are well suited for a wide range of applications.

# V\*S Industrial Drives



VS1ST

Starter-style Microdrive: IP20



VS1MX

Microdrive; NEMA 4X (IP66) and NEMA 12 (IP55) enclosures



VS1MD

Microdrive: IP20, NEMA 1



VS1PF

Pump and Fan Drive: NEMA 1 to 11kw (15Hp), NEMA 1 kit to 93kW (125Hp), IP00 above



































Enhanced Sensorless Vector or V/Hz Control; NEMA 1 enclosure. NEMA 4X available















- High Performance, Pump and Fan, and Microdrives ranges for best application match
- Inverter and Vector with closed-loop, encoderless or V/Hz
- Standard and Washdown enclosures NEMA-1 or NEMA 4X (IP66)
- Choice of keypad or Mint WorkBench set-up §
- Some models offer optional Mint Motion Card for positioning. Active-X and ModBus libraries included
- Voltage range from 115-660 volts single and 3-phase
- Power ratings to 700Hp (520 kW)
- § Product dependent





## VS1GV

Performance Vector, Sensorless Vector or V/Hz Control; NEMA 1 Enclosure



Performance Servo Control; NEMA 1 and NEMA 4X **Enclosures** 



# **A Complete Motion Control Solution**

The driving force in today's equipment/machines resides within motion control.

# Product Range Overview

Software

Mint Workbench
Application
development suite

**MintNC** 

CAD to Motion

Plotter language

Tools

motion contro

drives







# **Unrivalled Expertise**

Linear

Motors

Cog Free Brushless

Iron Core Brushless

Linear Stepper

**Dual Axis Stepper** 

**AC Induction** 

Baldor provides unmatched advanced expertise for equipment and machines worldwide. We also provide solutions and products that are proven to provide more up time, while enhancing your equipment with productivity, flexibility and rapid machine cycle times and increasing manufacturing throughput.

Our products - from motors to drives to motion controllers - provide today's machines with stateof-the-art solutions and technology. Our products are very easily and quickly installed, adjusted, integrated and maintained.

Linear

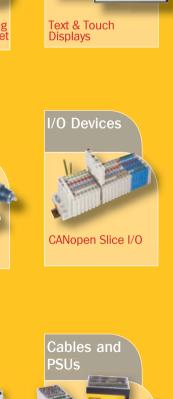
Actuators



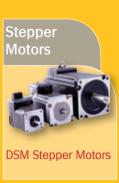
DC Servo







**HMI Panels** 





# **Baldor's Motion Solutions Catalogs**

**BR1202-A** Motion Control Solutions

**BR1202-B** Mint<sup>®</sup> Software and Applications

**BR1202-C** NextMove Multi-Axis Motion Controllers

**BR1202-D** AC Servo Drives

**BR1202-E** AC Servo Motors

**BR1202-F** DC Servo Motors and Drives **BR1202-G** Linear Motors and Stages

**BR1202-H** Motion Product Accessories

**BR1202-I** Real-Time Ethernet Motion Solutions

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