

# V\*S HIGH PERFORMANCE VARIABLE SPEED AC DRIVES

## CONTROL TO THE HIGHEST POWER

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Recognized for more than 100 years as the standard for quality, reliability and performance, Baldor is proud to introduce the newest innovation in its drive family — the V\*S high-performance variable speed AC drives.

Built on Baldor's H2 technology, no other line of drives offers you the user-friendly approach and consistent performance

that your application demands. With their powerful processor and advanced design features, Baldor V\*S drives assures you high-performance control of your application.

Without a doubt, these new drives are also the simplest to program and the easiest to operate. That's because they share identical operator control, field-installed options, programming style, operating characteristics,

environmental compatibility along with common parameter sets. Plus, their removable keypads provide quick help text information in the language of your choice.

Users can select from two models—VS1SP sensorless vector and V/Hz or VS1GV vector—for performance-matched control.



# VS1SP

## VS1SP AC DRIVE

Our VS1SP model uses a traditional V/Hz control method. Its easy setup, quick startup, and right-out-of-the-box operation make it among the most popular variable speed motor controls. It is ideal for applications where multiple motors are operated simultaneously from one motor control, including most industrial applications.

For single motor operation, the VS1SP drive supports sensorless vector control, which allows better speed and current control for high-performance, open-loop applications.

VS1SP drives are available in horsepower ratings from ¼ to 125 HP and in versions for 115 VAC, 230 VAC, 460 VAC, and 575 VAC. These drives incorporate a variety of features and design innovations that ensure dependable performance.

### FEATURES

- Standard NEMA 1 enclosure
- Output frequency 0 – 500 Hz
- Peak overload capacity of 175%
- Separate accel/decel rates
- Controlled reversing
- Two- and three-input PID process control loop
- Selectable preset speeds
- Jog speed
- Pull-apart I/O connectors

### DESIGN SPECIFICATIONS

- Process follower 0 – 5 VDC, 0 – 10 VDC, and 4-20mA
- Coast or ramp stop
- Dynamic braking
- DC injection braking
- Two analog meter outputs
- Two opto-isolated outputs
- Two relay outputs
- Energy optimization
- Adaptive tuning

### PROTECTIVE FEATURES

- DC bus charge indicator
- Fault indicator
- Adjustable time-based overload
- Cause of last 10 trips retained in memory
- Fault trace function
- Digital display for fault conditions with real-time clock
- Heat sink thermal sensor
- Isolated control circuitry



## VS1GV VECTOR DRIVE

Our VS1GV vector model offers three modes of control: closed-loop vector, sensorless vector, or the traditional V/Hz method. VS1GV drives are available in horsepower ratings from ¼ to 125 HP and in versions for 115 VAC, 230 VAC, 460 VAC, and 575 VAC. These drives incorporate a variety of features and design innovations that ensure dependable performance.

### CLOSED-LOOP VECTOR – FOR THE ULTIMATE CONTROL OF AC INDUCTION MOTORS

The closed-loop vector method provides the ultimate control of AC induction motors. Using a motor-mounted encoder, it precisely controls motor torque and associated operating speed. With its fast microprocessors and current sensors, the VS1GV vector drive can segregate motor current into components that produce torque from the currents that produce motor heating. By minimizing the heating component of current and accurately controlling the torque component of applied current, the motor will behave very much like a DC motor—without the maintenance.

### ADVANTAGES

- Full torque at zero speed
- Direct command of motor torque
- Tight speed regulation
- High-speed motor operation
- Selectable rotational or stationary auto-tuning for easy setup
- Adaptive tuning for adjustments during operation

### SENSORLESS VECTOR CONTROL – FOR TIGHT SPEED AND CURRENT CONTROL IN OPEN-LOOP

For closed-loop performance without the concerns of additional wiring and setup, a sensorless vector control mode is the solution. It is particularly effective in an operation such as mixing or in a process where tight speed control is required.

### ADVANTAGES

- Low-speed operation near zero speed
- Good motor current control

### FEATURES

- Standard NEMA 1 enclosure
- Output frequency 0 – 500 Hz
- Peak overload capacity of 175%
- Automatic tuning to motor
- Full rated torque down to zero speed

- Digital speed or torque control
- Two- and three-input PID process control loop
- Linear or S-curve deceleration
- 15 preset speeds
- Pull-apart I/O connectors

### DESIGN SPECIFICATIONS

- Motor shaft orient to marker
- Process follower  $\pm 5$  VDC, 0 – 5 VDC;  $\pm 10$  VDC, 0 – 10 VDC; and 4-20mA, digital via keypad or serial
- Two assignable analog outputs
- Two assignable opto outputs

- Two assignable relay outputs
- Two assignable analog inputs
- Nine digital inputs (sink/source)
- Adaptive tuning to load
- USB 2.0 full-speed port
- ModBus RTU port (RS485)

### PROTECTIVE FEATURES

- Adjustable current limit
- Isolated control circuitry
- Digital display for fault conditions with real-time clock
- Fault trace function
- Selectable automatic restart at momentary power loss

- DC bus charge indicator
- Cause of last 10 trips retained in memory
- 24 VDC isolated user supply
- Adjustable time-based overload (NEC 2005 Compliant)
- Isolated encoder power supply



# ENGINEERED FOR SUPERIOR RELIABILITY

## REMOVEABLE, INTERCHANGEABLE KEYPAD EASY TO PROGRAM. SIMPLE TO OPERATE.

The keypad on your V\*S Performance drive is not only removable—it is interchangeable and capable of interfacing with all power bases, control boards, and expansion boards

Easy to program, simple to operate, and convenient to monitor, it has 14 keys and stores up to four sets of parameters for easy drive set-

up duplication or "cloning." It features a five-line, 128 x 64 graphical display with simple, easy-to-use navigation keys.

Plus, its Block Programming feature lets you adjust controls quickly and easily—without having to scroll through endless parameters. With block programming, adjustments are grouped in blocks of like adjustments for your convenience.

### KEYPAD ENCLOSURE

Rated NEMA 4X when mounted on a NEMA 4X panel, the keypad's enclosure is designed for remote mounting up to 200 feet away.

### EASY-TO-READ DISPLAY

The display on our V\*S performance drives is easy to read and easy to follow. All operating conditions, programming steps, and help text is printed in English, and there are no difficult codes to understand. It can also be programmed to display the information in larger type for individuals who are sight impaired.

### LED'S ON ACTION KEYS

Four keys on the keypad feature a light-emitting diode (LED): REV, JOG, FWD, and STOP. Whenever a command is active, the LED is on. This signifies that your command has been received and is accepted.

### NAVIGATION KEYS

The keypad's navigation keys allow complete, full-function navigation. Easy to use, its familiar up and down keys, along with left and right arrows, let you navigate effortlessly through the display and programming functions.



## CONTROL FOR EVERY APPLICATION

The V\*S high-performance family of AC drives can operate three-phase induction motors in several control modes as either an open- or closed-loop control.

Open-loop speed control is available as inverter Volts per Hertz (V/Hz) and sensorless vector control. Closed-loop vector control is accomplished using a sophisticated space vector control algorithm and motor feedback.

## PERFORMANCE PROVEN

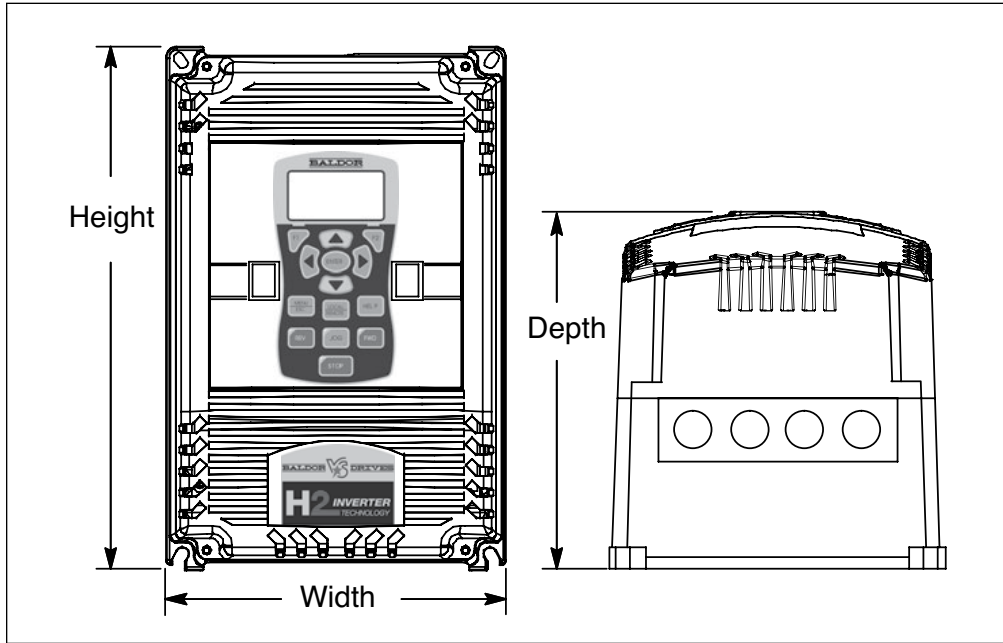
Our exclusive Matched Performance™ testing produces more than "typical" performance curves—it provides actual laboratory dynamometer-tested results. That lets you match the right motor with the right control, so you get the precise drive you need.

Plus, the motor and control methods incorporated into our V\*S drives have been expertly fine-tuned. Our design strategies reduce motor stresses while increasing performance—especially when our V\*S AC drives are matched with Baldor/Reliance® motors.

## STANDARD V\*S FEATURES THAT DRIVE PERFORMANCE

- Fast, powerful processor
- Flash memory (allows firmware update from any PC with a USB port)
- Real-time clock
- Current limit
- DC fans (no derate for 50 Hz)
- On-board 24 VDC power supply
- Common bus setup with one parameter change
- Profile run mode
- Preset position mode
- Pulse follower mode
- Micro PLC
- 115V logic expansion board
- Ethernet connectivity (web server)
- Hi-res analog I/O (16-bit resolution/two additional I/O)
- Fieldbus communications

## DIMENSIONS



### EXTENSIVELY TESTED

At Baldor, we commit our efforts to developing and manufacturing the most reliable industrial drives you can buy. To that end, every drive we manufacture undergoes extensive testing to ensure its performance. No where is this commitment more evident than in our new line of V\*S high-performance AC drives.

#### STRESS TESTED

Every V\*S drive is stress tested under rapid temperature excursions to verify the integrity of all components and connections.

#### IN-CIRCUIT TESTED

Circuit boards are in-circuit tested at the point of manufacture for 96.3% of all components and 100% of all circuit functions.

#### FUNCTIONAL TESTING

Functional testing of all input and output circuits on all circuit boards is performed at the point of manufacture to verify the integrity and accuracy of all available combinations.

#### OPERATING SOFTWARE TESTED

Each design has its operating software tested for all combinations of parameter values, terminal inputs and outputs, and keystrokes to verify the code structure and operating efficiency.

#### DYNO TESTED

All V\*S drives are dyno tested at the point of final assembly to certify output power under various load conditions. This final test determines the correct calibration of current and voltage sensing circuitry.

#### ENVIRONMENTAL PERFORMANCE TEST

The environmental compatibility of every Baldor V\*S AC drive is verified with extensive testing throughout the manufacturing process. Tested to extreme operating conditions, these drives surpass all industrial requirements for electromagnetic susceptibility, radiated noise, and conducted emissions. Plus V\*S drives are built with lead-free components and soldering techniques, and they meet regulations for post-use disposal.

