

# AC Motor Drives



## SPINDEL Master Series

- Frequencies to 400 Hz (L), 800 Hz (M) and 3200 Hz (H)
- Currents to 250 A Continuous
- Synchronized PWM control
- Output filter included as standard

# High Frequency/Precision Drives by Design

**SPINDEL Master** is a line of universal high frequency drives, suited for operation of a wide range of 3 phase AC motors, from standard “low speed” motors rated 50 or 60 Hz to high speed motors rated up to 3200 Hz (over 190 000 RPM for 2 pole design).

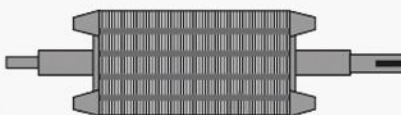
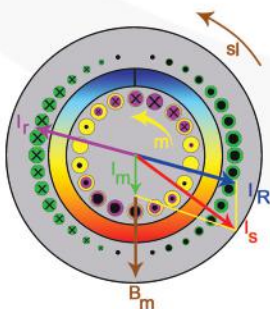
**SPINDEL Master drives are differentiated from “standard” AC drives by the special attention which is given to specific needs of high frequency (low inductance) motors.** The design was optimized around quality of voltage and current waveforms at any speed, low drive induced motor losses and vibration (bearing temperature and life) and control features which high speed motor applications typically require.



## High Quality Output for High Speed Motors

**Synchronized high frequency PWM control method** combined with high PWM carrier frequency significantly reduces motor losses (heat) and vibration, resulting in longer bearing and stator winding life. This approach results in better performance compared to most PWM type high frequency drives. Output filter is included as standard which further improves motor current and voltage waveforms.

**Harmful harmonics** in the motor current are **significantly reduced**, compared to “standard” PWM AC drives, resulting in **lower motor losses** (heat) produced during operation.





# Applications

## **Manufacturing Machinery - High speed electric spindles in:**

Internal cylindrical (ID), universal ID/OD grinding  
Profile and jig grinding  
High speed milling, drilling, routing, engraving  
Semiconductor dicing

Materials: Various metals and alloys, powdered/sintered metal, ceramics, composite materials, stone, marble, granite, glass, wood...

## **Rotational (no-load) testing:**

Testing of high speed machining spindles after repair  
Cycle testing of parts and mechanisms (integrity, life, fatigue)  
Functional spin-testing (aircraft fuel pumps, impellers, seals, etc.)

## **Rotational testing under load:**

Dynamometer testing of high speed motors  
Load testing of turbo-generators

**Turbo-machinery** (turbo-compressors, expanders, blowers)

**Process** (dryers/atomizers, centrifuges, vacuum pumps)

**Instrumentation** (precise high speed spinning)

**Energy storage** (high speed flywheels)

**Other** (conveyers, pumps, blowers)



## Features for ID Grinding

Very fast, repeatable and precise analog load signal is well suited for adaptive grinding. When effectively used by grinder CNC control, it can help to **shorten grinding cycles**. Two programmable level overload thresholds can be used for an **effective crash protection**. In grinding wheel **dressing** applications, this signal can help reduce the removal rate of expensive abrasive material.

Optional fast **Gap Eliminator** function (fast approach - first contact detection) with programmable threshold can improve grinding machine productivity with no additional cost.

The Gap Eliminator function use base load update/sampling for accurate and repeatable sensing. The no load level (load baseline) is sampled either automatically or by user (CNC) controlled input and is stored before each grinding cycle. This **updated load level** is then used as the load baseline for programmable thresholds of the Gap Eliminator function. Accurate and repeatable sensing is maintained even though the no load level varies from motor to motor as well as with bearing condition and temperature.

Reduced spindle vibration leads to better **surface finish** and longer spindle **bearing life**.

Better **part accuracy** due to reduced thermal growth of spindle shaft.

Flexible input/output programming and complete data storage for different configurations of **multiple-spindle** machines (turret-type grinders).

## Replacement for Older High Frequency Spindle Drives on ID Grinding Machines

**SPINDEL Master** drives were designed to be an easy functional replacement for older PWM high-frequency spindle drives on internal cylindrical (ID) grinding machines and for other high rotational speed applications. They can mimic control interface and special features of many older spindle drives, whether they were made in U.S., Europe or Japan.



# 380 - 460 V<sub>AC</sub>

**Nominal AC Line Voltage: 380, 415, 460 V<sub>AC</sub>, 50/60 Hz**

Rating No.	Continuous Output Current	150% Output Current	KW[HP] at 460V	Input Phases	Dimensions H x W x D mm [inches]
4V003A-*	3.3	5.0	2 [1.5]	3	381 x 237 x 249 [15.0 x 9.3 x 9.8]
4V005A-*	5.1	7.6	4 [3]	3	
4V008A-*	8.5	13	6.5 [5]	3	
4V013A-*-B1	13	19	10 [7.5]	3	495 x 267 x 277 [19.5 x 10.5 x 10.9]
4V018A-*-B1	18	27	14 [10]	3	
4V026A-*-B1	26	39	20 [15]	3	
4V034A-*	34	51	27 [20]	3	743 x 389 x 302 [29.3 x 15.3 x 11.9]
4V052A-*	52	78	40 [30]	3	
4V067A-*	67	100	55 [40]	3	
4V077A-*	77	115	60 [45]	3	
4V096A-*	96	144	75 [55]	3	Size Depends on Output Frequency, Cousult factory
4V125A-*	125	187	100 [75]	3	
4V190A-*	190	190	150 [110]	3	
4V250A-*	250	250	200 [150]	3	

**\* Replace with**

**L for maximum frequency of 400 Hz  
M for maximum frequency of 800 Hz  
H for maximum frequency of 3200 Hz**





Nominal AC Line Voltage: 208 and 230 V<sub>AC</sub>, 50/60 Hz

Rating No.	Continuous Output Current	150% Output Current	KW[HP] at 460V	Input Phases	Dimensions H x W x D mm [inches]
2V005A-*	5.5	8.2	2 [1.5]	1 or 3	381 x 237 x 249 [15.0 x 9.3 x 9.8]
2V007A-*	7.3	11	2.7 [2]	1 or 3	
2V011A-*	11	16	4 [3]	1 or 3	
2V015A-*-B1	15	22	5.5 [4]	3	495 x 267 x 277 [19.5 x 10.5 x 10.9]
2V019A-*-B1	19	28	7 [5]	3	
2V028A-*-B1	28	42	10 [7.5]	3	
2V038A-*	38	57	15 [11]	3	489 x 287 x 302 [19.3 x 11.3 x 11.9]
2V080A-*	80	120	30 [22]	3	743 x 389 x 302 [29.3 x 15.3 x 11.9]

\* Replace with

L for maximum frequency of 400 Hz

M for maximum frequency of 800 Hz

H for maximum frequency of 3200 Hz



# SPINDEL Master Series AC Motor Drives

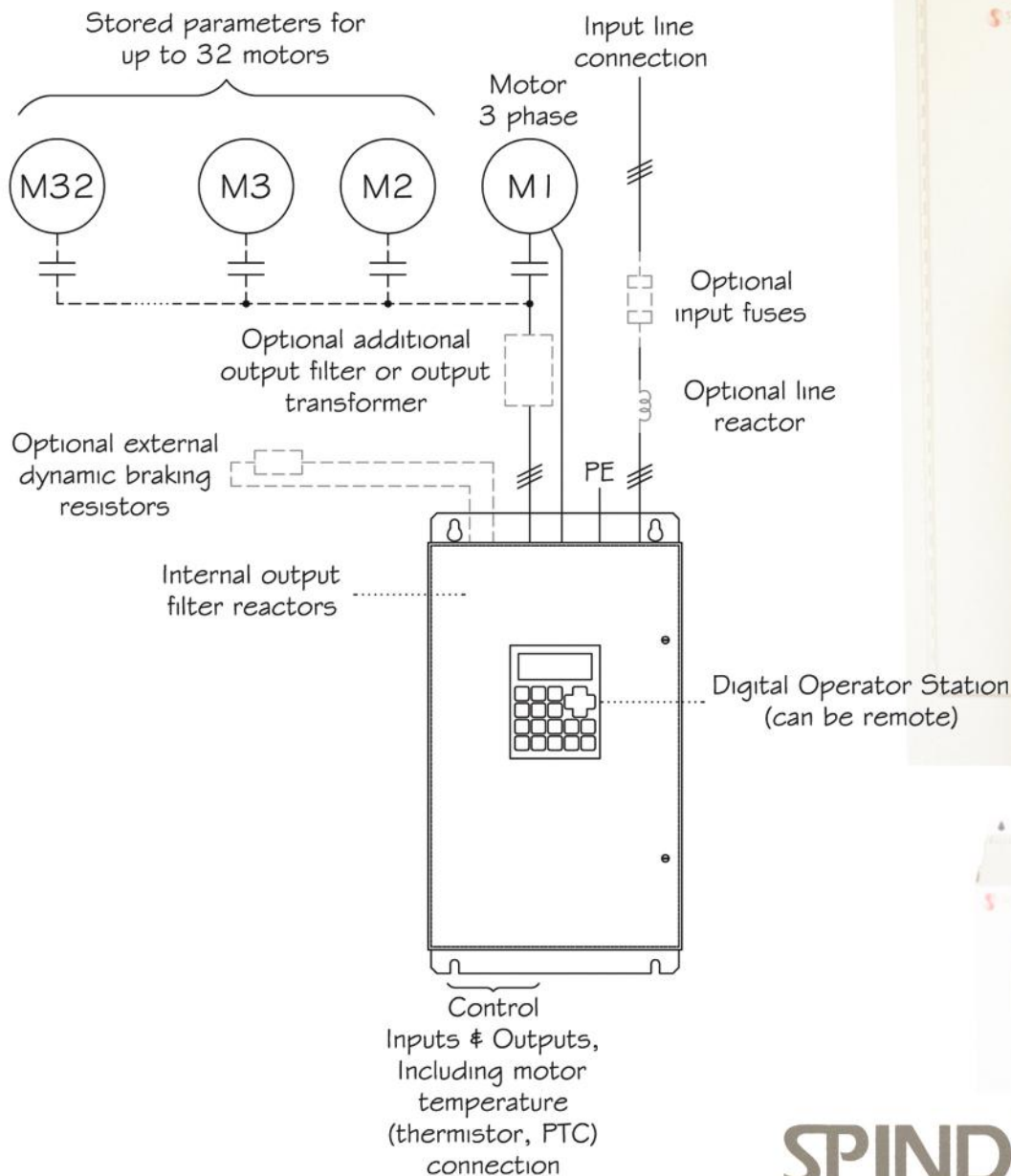
## Standard Features:

- Motor (output) frequencies to 400 Hz (L), 800 Hz (M) and 3200 Hz (H)
- Synchronized high frequency PWM control (20/40 kHz for most applications)
- Simplicity of V/Hz (U/f) programming
- Digital Operator Station (keypad with display) on front door
- High system efficiency (low drive and spindle motor losses)
- Output filter included
- No need for motor inductors for most applications
- Output fully short circuit protected
- Monitoring of all three phase currents
- Thermistor (PTC) sensing circuit for monitoring of motor temperature
- Fast, accurate and repeatable analog load signal (torque)
- Fast touch sensing (Gap Eliminator) signal
- High resolution analog speed reference input
- Two analog inputs, one analog output
- Seven programmable digital inputs
- Five programmable output relays
- Programmable pulse output for connection of a digital speed indicator
- Simple operation of multiple motors connected in parallel
- Easy integration with LabView™ test environment
- Dynamic braking with internal resistors
- Fully protected IP21 (NEMA 1) steel enclosure

## Partial List of Options:

- Additional dynamic braking resistors (up to 100% capacity)
- Remote mounting of Digital Operator Station (keypad with display)
- Multiple Motor Option for programming up to 32 different motors
- Option board with fast analog outputs
- Protective enclosures with IP54 (NEMA 12), floor or wall mounting
- Custom enclosures
- Safety door disconnect switch, flange mounted or through door
- Input fuses, input (line) reactors, power on/off contactors
- Liquid cooling, through the wall mounting in sealed enclosures
- 400 Hz AC and DC input power
- Input and output transformers
- Additional output filters
- Output contactors, overloads, connectors, terminals
- Additional control inputs and outputs
- Custom controls, meters, selector switches, legend plates etc.
- Orientation using proximity sensors
- Closed loop speed regulation, better than 0.01%





**SPINDEL Master™**  
AC Motor Drive

## Advanced Motor Protection

All three phase **motor currents** are continuously monitored by dedicated fast circuits for safe and expected values, for phase current differences (phase imbalance), for open connection in one phase and for short circuits.

If the insulation in a motor phase fails, SPINDEL Master drives will indicate which phase has a problem, which greatly facilitates troubleshooting.

**Load sensing** measures real motor load and is fast and precise. Programmable timed-overload function permits transient overloads while thermally protecting the motor.

A circuit is included for **monitoring of stator winding temperature** via PTC thermistor style sensor.





SPINDEL Electronics specializes in the design and manufacture of high frequency drives for high speed electric motors. In addition, we repair all major brands of high frequency drives and offer drop-in replacements and engineered retrofit solutions.

With our 30+ years experience in the field of high frequency drives, SPINDEL Electronics is dedicated to helping our customers with quality products and knowledgeable support for all of their high frequency drive needs.

SPINDEL Electronics  
4517 Broadmoor Avenue, SE  
Grand Rapids, MI 49512  
U.S.A.

[www.spindel.com](http://www.spindel.com)

TEL: +1 616 554 2200  
FAX: +1 616 554 2033

[sales@spindel.com](mailto:sales@spindel.com)  
[service@spindel.com](mailto:service@spindel.com)  
[info@spindel.com](mailto:info@spindel.com)

SPINDEL Master drives are made in the U.S.A.  
All information is subject to change without notice.