



# SPEEDMASTER®

## AC ADJUSTABLE SPEED DRIVES

- Micro Series Through 60 HP
- SM Plus Series Through 10 HP
- Match With LEESON Motors for Complete Drive Package



ELECTRIC MOTORS  
GEARMOTORS AND DRIVES



**Micro Series**  
1/2 - 60 HP



**SM Plus**  
1/4 - 10 HP

For complete ordering information, please refer to LEESON Stock Catalog 1050.

# SPEEDMASTER® Inverter Drives

As the demand for tighter process control and greater operating efficiency grows, customers increasingly look to LEESON for easy-to-use, cost-effective inverters and complete motor and drives systems. Our two distinct families of inverters offer specific benefits in many adjustable speed applications.

## Micro Series: 1/2 through 60 HP

Full metal NEMA 1 or NEMA 4/12 enclosures. Intuitive alphanumeric display for programming and set-up. Built-in thermal overload protection and heavy-duty wiring terminals. With these industrial-duty features, and many others, SPEEDMASTER® Micro Series inverters set the standard for out-of-the-box functionality. Plus, their modular design reduces manufacturing cost and enhances reliability, making our Micros among the most cost-effective full-featured drives. Best of all, LEESON's customer-friendly inventory approach allows the flexibility to purchase quantities large or small to meet immediate needs.

## SM Plus Series: 1/4 through 10 HP

Ideal for OEM or multi-drive applications, the ultra-compact SM Plus inverter offers a removable Electronic Programming Module for off-line set-up and program replication. Over 50 programmable functions, 18 isolated I/O terminals and other software-intensive features mean unlimited versatility. No other Sub-Micro class drive offers a greater range of performance enhancements. Its advanced design makes the SM Plus cost-competitive with DC drives, two-speed motors, adjustable pulleys, soft starters—even, in many cases, with fixed speed AC systems.

## NEMA 4/12 Micro Series WASHGUARD® Inverters



**NEMA 4/12, IP65 Enclosure**

- 1/2 - 20 HP
- Food-safe epoxy finish
- All steel construction provides complete protection, fully gasketed, water and dust-tight enclosure
- Fully enclosed with no cooling fans
- Ideal for use with LEESON's IRIS™ protected WASHGUARD® washdown-duty motors

# Micro Series: Full Features, Ultra-Friendly Set-Up And Operation



NEMA 1, IP31 Enclosures

Micro Series compact inverters offer “big drive” features for adapting standard or premium efficiency three-phase motors to adjustable speed operation. Utilizing the latest microprocessor and advanced IGBT power conversion devices, these high performance controls program and read-out in plain English terms, eliminating the frustration and time involved in looking up confusing coded symbols. Complete, rugged steel enclosures for NEMA 1 (IP31) or NEMA 4/12 (IP65) service do not require additional enclosure protection as with many plastic-housed compact drives. Built-in thermal overload protection reduces additional costs. Heavy-duty wiring terminals, accessible via three conduit openings on the bottom of the housing, speed installation and cut costs. Available in single-phase and three-phase input models.

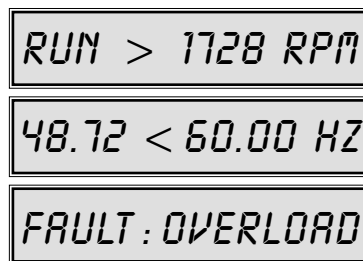
## Standard Micro Series Features

- Intelligent Power Module—IGBT's with a 16-bit Intel® motor control microprocessor
- Back-lit 16 character plain-English display
- User choice programming with “speed dial”:
- ✓ Choice of “Quick Start” factory presets
- ✓ Built-in English programmable options, 52 parameters, accessible via build-in touch-pad
- ✓ Serial communication port for RS485 interface with MODBUS® protocol
- Speed reference signal. Choice of potentiometer, 0-10VDC or 4-20mA inputs
- Analog output signal 0-10VDC, speed or load
- Three preset speeds
- Two auxiliary contacts: One from C relay and one open collector output
- Slip compensation
- Adjustable carrier frequency
- Adjustable acceleration and deceleration times
- Forward/reverse
- DC braking – time and voltage adjustable
- Password protected
- Constant torque – with adjustable current limit
- 150% overload capacity for one minute based on nominal output rating of the control
- Rugged, heavy-gauge steel enclosures with barrier type terminal strips
- UL listed

## No Drive Is Easier To Use

- “No language barrier,” plain-English programming and operational read-outs
- Back-lit LCD displays for easy readability. 1 line x 16 characters
- Eight-button keypad with choice of scrolling or “speed dial” access to programming, monitoring or operational functions
- “Quick Start” factory presets

## Plain-English Display Examples



## Condensed Inverter Specifications

**Input Line Voltages:**  
**Micro Series:** 120/240, 200-240 400-480, 480-590 VAC, +10%, -15%  
**SM Plus:** 115/230, 200-230, 460-480, 550-575 VAC, +10%, -15%

**Input Frequency:** 50/60 Hz, tolerance of 48 to 62 Hz  
**Output Wave Form:** Sine coded, pulse width modulated  
**Output Frequency:** 0-120 Hz  
**Carrier Frequency:**  
**Micro Series:** 2.5 kHz to 14 kHz  
**SM Plus:** 4 kHz to 10 kHz  
**Service Factor:** 1.0

# SM Plus Series: Big Performance In A Sub-Micro Package



IP20 Enclosures

## Key SM Plus Features

- Input line voltage calibration—optimizes over and under voltage trip levels
- Current limit to 180% with frequency foldback
- Adjustable carrier frequency
- Adjustable V/Hz
- Output frequency to 120 Hz
- Seven preset speeds
- Three programmable terminals for speed reference and control activation
- Two open collector auxiliary outputs
- Automatic restart after fault
- Control via terminal strip or optional remote keypad
- Coast or ramp to stop
- Independent accel and decel adjustment
- Forward only or forward and reverse direction
- Adjustable DC injection braking
- Speed reference: Keypad, 0-10 VDC, or 4-20 mA
- Speed reference calibration
- Speed and load indicating output signal selection: 0-10 VDC or 4-20mA
- Output signal calibration
- I<sup>2</sup>t motor thermal overload protection
- Torque and accel boost
- Slip compensation
- Activation or disabling of serial communications
- Assignment of serial addresses
- Modbus® Serial Communication Protocol
- Password protection
- Fault history: Stores eight previous trips
- Terminal status indication
- Default parameter reset

## Popular SM Plus Accessories Electronic Programming Unit

Optional SM Plus Electronic Programming Unit allows off-line set-up and replication of the drive's plug-in electronic programming module. Excellent for multi-drive applications. RS-232 serial port allows downloading of configuration files from personal computer.



## Programming Modules

Plug-in electronic programming modules (EPM) for SM Plus drives. Allow off-line set-up and replication of program using Electronic Programming Unit.



## Remote Keypad

Optional remote keypad kit for SM Plus drive includes eight-foot connecting cable and gasket. Mounted in proper enclosure, the keypad kit will provide up to NEMA 4 protection.



ELECTRIC MOTORS  
GEARMOTORS AND DRIVES

# LEESON Inverter-Capable Motors... Available From Stock

With LEESON, you don't have to wonder whether your motor is suitable for inverter duty. That's because all LEESON stock three-phase motors 1 HP and larger, as well as all WASHGUARD® motors, include our exclusive IRIS™ Inverter-Rated Insulation System at no extra cost.

IRIS™ is a multi-level system that results in a motor truly hardened for inverter service. Careful placement of wire within the stator, well thought-out winding and lamination design, and precise insulation practices (including phase insulation, sleeving, connection insulation and varnish) all play critical roles. Second-generation spike-resistant magnet wire, specially coated to resist corona inception, completes the system—offering service life well beyond conventional double, triple or even quad-build wire in inverter-fed applications.

For the highest inverter-duty performance, coupled with above-EPACT premium efficiencies, LEESON offers the inverter-duty WATTS AVER® line. How tough are these motors? They carry a three-year warranty... even in inverter service! Constant-speed blower kits extend WATTS AVER's capabilities to full torque at zero speed, making these motors ideal for use with vector drives. And slim-line encoders are available for closed-loop control.



See back page for chart of inverter motor capabilities.

## **WATTS AVER** Inverter-Duty Premium Efficiency Motor

Premium efficiency WATTS AVER® motors are built with greater copper and steel mass, which results in additional tolerance to heat rise in inverter-fed applications. As with all LEESON motors, WATTS AVER® efficiencies are verified to IEEE 112B test standards.



Standard at no extra cost on all LEESON stock NEMA three-phase motors, 1 HP and larger, is the exclusive Inverter Rated Insulation System (IRIS™). This provides superior protection against voltage spikes induced by variable frequency drives.



Encoder kits are available for LEESON cast iron TEFC motors from NEMA 182-4T through 284-6T frame size. The encoder slips over the motor's fan-end shaft to provide speed-reference signals for closed-loop control systems. Industrial-duty encoders are isolated from shaft currents, and electrical noise immunity exceeds international standards.



Constant-speed blower kits convert LEESON cast iron TEFC motors to NEMA MG1.6 (IC46) standard for inverter and vector drive applications where continuous cooling is required. Installation requires no shaft modification. Available for NEMA frame sizes 182-4T through 324-6T.

# Inverter Capabilities of IRIS™ Protected LEESON Motors

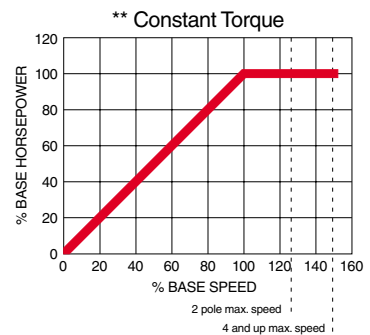
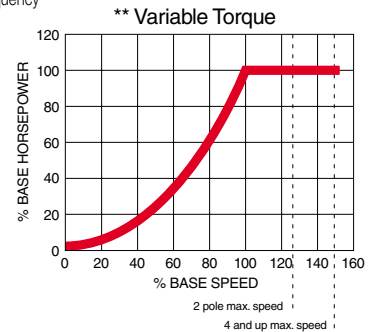
STEEL FRAME MOTORS	NEMA Frame	Variable Torque**	Constant Torque**	Notes
Standard General Purpose				
TEFC	56-210 frame	10-90* Hz	20-90* Hz	
ODP	56-210 frame	10-90* Hz	20-90* Hz	
WATTS AVER® Premium Efficiency				
TEFC	56-210 frame	6-90* Hz	20-90* Hz	CT: 10-90 Hz on some ratings
ODP	56-210 frame	6-90* Hz	20-90* Hz	CT: 10-90 Hz on some ratings
Special Purpose Motors				
WASHGUARD® MOTORS				
TENV	56-140 frame	10-90* Hz	10-90* Hz	
TEFC	56-210 frame	10-90* Hz	20-90* Hz	
CAST IRON MOTORS	NEMA Frame	Variable Torque**	Constant Torque**	Notes
Standard General Purpose				
TEFC	180-440 frame	10-90* Hz	20-90* Hz	CT: 15-90 Hz on some ratings
ODP	180-440 frame	10-90* Hz	20-90* Hz	CT: 15-90 Hz on some ratings
TEFC with blower kit	180-320 frame	5-90* Hz	5-90* Hz	full torque at low speed with vector drive
WATTS AVER® Inverter Duty, Premium Efficiency				
TEFC	180-280 frame	6-90* Hz	6-90* Hz	
	320-440 frame	10-90* Hz	15-90* Hz	CT: 6-90 Hz on some ratings
ODP	180-280 frame	6-90* Hz	6-90* Hz	
	320-440 frame	10-90* Hz	15-90* Hz	CT: 6-90 Hz on some ratings
TEFC with blower kit	180-320 frame	0-90* Hz	0-90* Hz	full torque at zero speed with vector drive

\* The maximum recommended frequency (speed) for 2 pole (3600 rpm) motors, without application analysis, is Hz=75, rather than 90 Hz. Contact factory for details.

\*\* Operation for variable or constant torque is up to a base frequency of 60 Hz only. Operation above 60 Hz to the maximum frequency listed is constant horsepower (horsepower equal to motor rated horsepower).

## NOTES:

- All motors are class F insulated, 40°C ambient, 3300 ft. and 1.0 service factor when used with an inverter.
- Optimized voltage boost is required for continuous operation throughout the frequency range specified. (See operating curves.)
- Motors with blower kits have continuous cooling and are capable of full rated torque at 0 speed with properly tuned vector drive.
- Maximum recommended cable length for IGBT inverters is 250 ft. (longer cable lengths may require noise or voltage suppression).
- All motors have LEESON's IRIS™ insulation system, which is designed to meet the NEMA requirements for peak voltages up to 1600 volts, and pulse rise time greater than or equal to 0.1 microseconds.
- Operating curves are available for WATTS AVER® motors. Refer to curves for more details about frequency ranges.



## DC Adjustable Speed Drives

SPEEDMASTER® DC drives range from sub-fractional-horsepower through 3 HP. SCR and PWM versions are offered, in reversing or non-reversing options. Four-quadrant regenerative drives are also available. NEMA 1, NEMA 4X or open chassis styles. For more information, request Catalog 1050.

## LEESON ELECTRIC CORPORATION

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