



OHIO GEAR™

AC ADJUSTABLE SPEED DRIVES MICRO SERIES INVERTERS



MICRO SERIES INVERTER DRIVES

Full feature, ultra-friendly operation. Programs and reads-out in plain English.

- Intelligent Power Module-IGBT's with a 16 bit Intel microprocessor.
- User choice programming with:
 - ✓ Choice of "Quick Start" factory presets.
 - ✓ Built-In English programmable options via the key touch-pad.
- Output Frequency: 0-120 Hz.
- Overload Current Capacity: 150% for one minute, based on nominal output of the control.
- Speed reference signal. Choice of potentiometer, 0-10VDC or 4-20mA inputs.
- Analog output signal, 0-10VDC, speed or load.
- Two auxiliary contacts: One form C relay and one open collector output.
- Preset speeds: Four.
- 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.
- Underwriters Laboratories Listed.



NEMA 1

Speedmaster® Micro Series compact inverters offer "big drive" features for adapting standard or premium efficiency three phase motors to adjustable speed operation. Utilizing the latest micro-processor and advanced IGBT power conversion devices, these high performance controls program and read-out in plain English, 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 for power in/out and input/output signals speeds installation and reduces installation costs.



WASHGUARD® NEMA 4/12 (IP65) THREE PHASE INPUT/OUTPUT

FOOD-SAFE epoxy finish. No external cooling fan required. Fully gasketed, water and dust-tight enclosure.



WASHGUARD® NEMA 4/12

NEMA 1 (IP31) • THREE PHASE INPUT/OUTPUT

	HP	Output Amps	Input Voltage ⚡	Catalog Number	App. Wgt. (lbs.)	Dimension Key
200-240 Volts	1/2	2.2	200-240	174914	6	B
	1	4.0	200-240	174915	6	C
	1 1/2	5.2	200-240	174916	6	C
	2	6.8	200-240	174917	9	E
	3	9.6	200-240	174918	9	E
	5	15.2	200-240	174919	11	F
	7 1/2	25.0	200-240	174545	13	M
	10	28.0	200-240	174551	15	L
	15	42.0	200-240	174557	19	N
	20	54.0	200-240	174560	21	P
400-480 Volts	1	2.0	400-480	174920	6	B
	2	3.4	400-480	174921	7	D
	3	4.8	400-480	174922	9	E
	5	7.6	400-480	174923	9	E
	7 1/2	11.0	400-480	174924	11	I
	10	14.0	400-480	174552	13	M
	15	21.0	400-480	174558	15	L
	20	27.0	400-480	174561	17	N
	25	34.0	400-480	174563	21	P
	30	40.0	400-480	174565	21	P

⚡ User programmable for 50Hz and other voltage inputs



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™), providing superior protection against voltage spikes induced by variable frequency drives.

WASHGUARD® NEMA 4/12 (IP65) THREE PHASE INPUT/OUTPUT

	HP	Output Amps	Input Voltage ⚡	Catalog Number	App. Wgt. (lbs.)	Dimension Key
200-240 Volts	1/2	2.2	200-240	174935	8	G
	1	4.0	200-240	174936	8	G
	2	6.8	200-240	174937	10	H
	3	9.6	200-240	174938	11	J
	5	15.2	200-240	174730	11	K
	7 1/2	22.0	200-240	174734	27	X
	10	28.0	200-240	174737	32	U
	15	43.0	200-240	174740	40	T
	20	54.0	200-240	174743*	42	T
	400-480 Volts	1	2.0	400-480	174939	8
2		3.4	400-480	174940	10	H
3		4.8	400-480	174941	10	H
5		7.6	400-480	174942	11	J
7 1/2		11.0	400-480	174548	11	K
10		14.0	400-480	174554	11	Q
15		21.0	400-480	174749	32	U
20		27.0	400-480	174752	36	T
25		34.0	400-480	174755*	42	T

⚡ User programmable for 50Hz and other voltage inputs
* Enclosure is NEMA 12 only



AC ADJUSTABLE SPEED DRIVES

MICRO SERIES INVERTERS



OHIO GEAR™

MICRO SERIES INVERTER DRIVES

Single Phase Input with 230V three phase output. NEMA 1 enclosure. These Speedmaster® Micro Series inverters have the same features as units shown on the previous page. All can be programmed in plain English, eliminating the difficulties of using coded symbols.



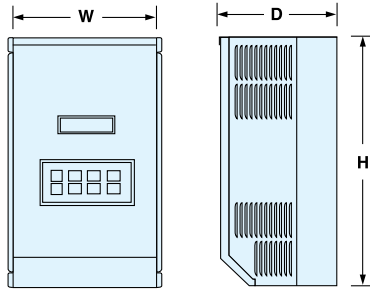
NEMA 1 SINGLE PHASE

NEMA 1 (IP31) • SINGLE PHASE INPUT 230V THREE PHASE OUTPUT (Use with three phase 230V motor)

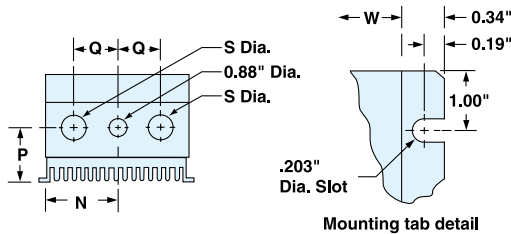
HP	Output Amps 230 VAC	Input Voltage	Catalog Number	App. Wgt. (lbs.)	Dimension Key
1/4	1.4	115/230	174930	5	A
1	4.0	115/230	174931	7	D
1 1/2	5.2	115/230	174932	7	D
2	6.8	200-230	174933	9	E
3	9.6	200-230	174934	9	E

**CONTACT LEESON FOR INFORMATION ON
REMOTE KEYPAD OPTION.**

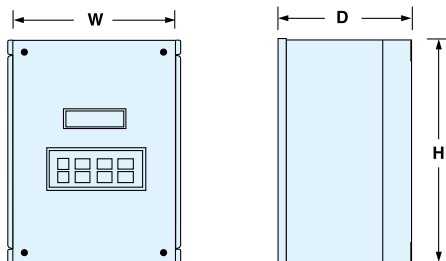
NEMA 1 ONLY



NEMA 1 & NEMA 4/12



NEMA 4/12 WASHGUARD® ONLY



MICRO SERIES INVERTER DIMENSIONS (Inches) • NEMA 1 & NEMA 4/12

Dimension Key	H	W	D	N	P	Q	S
A	7.50	4.70	3.33	2.35	1.60	1.37	.88
B	7.50	4.70	3.63	2.35	1.90	1.37	.88
C	7.50	4.70	4.33	2.35	2.60	1.37	.88
D	7.50	6.12	4.22	3.77	2.40	1.37	.88
E	7.50	6.12	5.12	3.77	3.30	1.37	.88
F	7.88	7.86	5.94	5.13	3.95	1.50	1.13
G	7.88	6.12	4.35	3.06	2.70	1.37	1.38
H	7.88	7.86	4.90	4.80	3.25	1.37	1.38
I	9.38	7.86	6.25	5.13	3.95	1.50	1.13
J	7.88	7.86	5.90	4.80	4.25	1.37	1.38
K	9.75	10.26	7.20	3.93	4.19	2.00	1.38
L	11.25	7.86	6.84	3.93	4.19	2.00	1.38
M	9.38	7.86	6.84	3.93	4.19	2.00	1.13
N	12.75	7.86	6.84	3.93	4.19	2.00	1.38
O	12.75	7.86	7.40	3.93	4.19	2.00	1.38
P	12.75	10.26	7.74	5.13	5.00	2.50	1.38
Q	11.75	10.26	8.35	5.13	5.75	2.00	1.13
R	9.38	7.86	7.40	3.93	4.19	2.00	1.13
S	12.75	10.26	8.25	5.13	5.00	2.50	1.38
T	15.75	10.26	8.35	5.13	5.00	2.50	1.38
U	13.75	10.26	8.35	5.13	5.00	2.50	1.38
V	15.75	10.26	7.74	5.13	5.00	2.50	1.38
W	19.75	10.26	8.55	5.13	5.75	2.50	1.75
X	11.75	10.26	8.35	5.13	5.75	2.00	1.13



**SM PLUS
SUB-MICRO
INVERTER DRIVES**

BIG performance from an ultra-compact design. Provides 18 isolated I/O terminals plus RS485 Modbus® serial communication. Other features include:

- Removable electronic programming module allows off-line set-up and program replication.
- Input line voltage calibration—optimizes over and under voltage trip levels
- Current limit to 180% with frequency foldback
- Adjustable carrier frequency (4 to 10 kHz)
- Adjustable V/Hz
- Output frequency to 240 Hz
- Seven preset speeds
- Automatic restart after fault
- Control via drive face, 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
- I²t motor thermal overload protection; meets UL requirements for motor protection in single motor applications
- Fixed boost for high starting torque
- Accel boost for high torque accelerating at any speed
- Slip compensation
- Three-digit LED display
- Password protection
- Fault history: Stores eight previous trips
- Terminal status indication
- Default parameter reset
- IP20 enclosure



SM PLUS

SINGLE PHASE INPUT/THREE PHASE OUTPUT

	HP	Output Amps 230 VAC	Input Voltage ↕	Catalog Number	App. Wgt.(lbs.)	Dimension Key
115/230 Volts	1/4	1.4	115/230	174450 ^d	2	A1
	1/2	2.2	115/230	174451 ^d	3	A1
	1	2.0	115/230	174492 ^d	4	B1
	1 1/2	6.0	115/230	174445 ^d	5	B1

^d To be discontinued when present stock is depleted. See S-M series drives for similar ratings.

SINGLE OR THREE PHASE INPUT/THREE PHASE OUTPUT

	HP	Output Amps	Input Voltage ↕	Catalog Number	App. Wgt.(lbs.)	Dimension Key
200-230 Volts	1/4	1.4	200-230	174452	2	A1
	1/2	2.2	200-230	174453	2	A1
	1	4.2	200-230	174454	3	A2
	1 1/2	6.0	200-230	174493	4	B1
	2	6.8	200-230	174494	5	B2
	3	9.6	200-230	174495	5	B2
	5	15.2	200-230	174444	8	C1

THREE PHASE INPUT/OUTPUT

	HP	Output Amps	Input Voltage ↕	Catalog Number	App. Wgt.(lbs.)	Dimension Key
200-230 Volts	1	4.2	200-230	174455	3	A2
	1 1/2	6.0	200-230	174456	3	A3
	2	6.8	200-230	174457	4	A3
	3	9.6	200-230	174458	4	A3
	5	15.2	200-230	174446	4	B2
	7 1/2	22.0	200-230	174438	8	C1
	10	28.0	200-230	174439	8	C1
	15	42.0	200-230	174429	13	D1
	20	54.0	200-230	174430	14	D1
	460-480 Volts	1/2	1.1	460-480	174459	2
1		2.1	460-480	174460	3	A2
1 1/2		3.0	460-480	174461	3	A3
2		3.4	460-480	174462	4	A3
3		4.8	460-480	174463	4	A3
5		7.6	460-480	174447	5	B2
7 1/2		11.0	460-480	174440	8	C1
10		14.0	460-480	174441	8	C1
15		21.0	460-480	174431	13	D1
20		27.0	460-480	174432	14	D1
	25	34.0	460-480	174433	14	D1

↕ User programmable for 50Hz and other voltage inputs



DIMENSIONS ON PAGE 164

SPECIFICATIONS:

Storage Temperature	-20° to 70° C
Ambient Operating Temperature	0° to 50° C
Ambient Humidity	<95% (non-condensing)
Maximum Altitude	3300 ft (1000m) above sea level
Input Line Voltages	115/230 VAC, 200-230 VAC, 460-480 VAC, and 550-575 VAC
Input Voltage Tolerance	+10%, -15%
Input Frequency Tolerance	48 to 62 Hz
Output Wave Form	Sine Coded PWM
Output Frequency	0-240 Hz
Carrier Frequency	4 kHz to 10 kHz

Enclosure	IP20
Service Factor	1.0
Efficiency	up to 98%
Power Factor (displacement)	>0.96
Overload Current Capacity	150% for 60 seconds 180% for 20 seconds
Speed Reference Follower	0-10 VDC, 4-20 mA
Control Voltage	15 VDC
Analog Outputs	0-10 VDC or 2-10 VDC: Proportional to frequency or load
Digital Outputs	Open-collector: 40 mA at 30 VDC
Power Supply for Aux. Relays	40 mA at 12 VDC



AC ADJUSTABLE SPEED DRIVES SM SERIES SUB-MICRO INVERTERS



OHIO GEAR™

SM SERIES SUB-MICRO INVERTER DRIVES

For applications requiring a simpler drive without the advanced features of the SM-Plus drive. Provides 11 isolated I/O terminals with one Form A relay output. Other features include:



SM SERIES

- Removable electronic programming module allows off-line set-up and program replication.
- Input line voltage calibration—optimizes over and under voltage trip levels
- Current limit to 180% with frequency foldback
- Adjustable carrier frequency (4 to 10 kHz)
- Adjustable V/Hz
- Output frequency to 240 Hz
- Seven preset speeds
- Automatic restart after fault
- Control via drive face, 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
- I²t motor thermal overload protection; meets UL requirements for motor protection in single motor applications
- Fixed boost for high starting torque
- Accel boost for high torque accelerating at any speed
- Slip compensation
- Three-digit LED display
- Password protection
- Fault history: Stores eight previous trips
- Terminal status indication
- Default parameter reset
- IP20 enclosure with finger safe terminals

SINGLE PHASE INPUT/THREE PHASE OUTPUT

	HP	Output Amps 230 VAC	Input Voltage	Catalog Number	App. Wgt.(lbs.)	Dimension Key
110-120 Volts	1/3	1.7	110-120	174263	2	A5
	1/2	2.4	110-120	174264	2	A5
	1	4.2	110-120	174265	3	B5
	1 1/2	6.0	110-120	174266	3	B5

SINGLE PHASE INPUT/THREE PHASE OUTPUT

	HP	Output Amps	Input Voltage	Catalog Number	App. Wgt.(lbs.)	Dimension Key
208-240 Volts	1/3	1.7	208-240	174267	2	A5
	1/2	2.4	208-240	174268	2	A5
	1	4.2	208-240	174270	3	A6
	1 1/2	6.0	208-240	174271	4	B5
	2	7.0	208-240	174272	5	B5
	3	9.6	208-240	174273	5	B6

THREE PHASE INPUT/THREE PHASE OUTPUT

	HP	Output Amps	Input Voltage	Catalog Number	App. Wgt.(lbs.)	Dimension Key
208-240 Volts	1/2	2.4	208-240	174274	2	A5
	1	4.2	208-240	174276	2	A6
	1 1/2	6.0	208-240	174277	3	A7
	2	7.0	208-240	174278	3	A7
	3	9.6	208-240	174279	3	B6
	5	15.2	208-240	174288	5	B6

THREE PHASE INPUT/THREE PHASE OUTPUT

	HP	Output Amps	Input Voltage	Catalog Number	App. Wgt.(lbs.)	Dimension Key
400-480 Volts	1/2	1.1	400-480	174281	2	A1
	1	2.1	400-480	174282	3	A2
	1 1/2	3.0	400-480	174283	3	A3
	2	3.4	400-480	174284	4	A3
	3	4.8	400-480	174286	4	B2
	5	7.8	400-480	174287	5	B2



DIMENSIONS: SM AND SM PLUS INVERTERS

“A” Chassis
← 3.64 in. →



Depth: A1: 3.94 in.
A2: 4.74 in.
A3: 5.74 in.
A5: 3.26 in.
A6: 3.63 in.
A7: 5.56 in.

“B” Chassis
← 4.52 in. →



Depth: B1: 5.24 in.
B2: 6.74 in.
B5: 4.88 in.
B6: 5.53 in.

“C” Chassis
← 5.78 in. →



Depth: C1: 7.18 in.

“D” Chassis
← 7.68 in. →



Depth: D1: 8.00 in.

Dimensions shown for reference only. Contact LEESON for detailed drawing.



NEMA 4/12 CHASSIS NEMA 1

NEMA 4/12 TOTALLY ENCLOSED



174102 Non-Reversing 174107 Reversing

LEESON Speedmaster® DC controls are general purpose drives designed for use with permanent magnet type direct current motors. NEMA 1 enclosed drives are suitable for most industrial applications, with the NEMA 4X enclosures best suited for washdown or outdoor installations or for extremely dusty applications. Chassis only units are available for building into equipment, machinery or existing enclosures. Most controls have a dual voltage switch allowing the control to be used on 115 or 230 volt, single phase, 50/60 Hertz service. However, the proper voltage motor should be selected for use with the power supply input, i.e., 90 volt DC motors for 115 volt input or 180 volt motors for 230 volt input service. Installation and adjustment instructions are included.

SCR/Thyristor drives are available in unidirectional and electro-mechanical type reversing styles for NEMA frame ratings and sub-fractional HP sizes.

Regenerative, four quadrant controls in NEMA 4X or chassis style available for applications requiring more precise motion control. These controls will produce both motoring and braking torque regulation for NEMA frame 1/4 HP through 2 HP motors.

Pulse Width Modulated (PWM) controls are available in NEMA 1 and chassis style units for subfractional HP frame motors from 1/40 through 1/4 HP. Due to their improved form factor, these PWM controls will result in quieter operation, lower operating temperatures, longer brush life, and greater motor overload capacity than for the same motor on an SCR type control.

FOR NEMA FRAME MOTORS & GEARMOTORS
SCR CONTROLS • ENCLOSED • SINGLE PHASE 50/60 HZ

Description	Catalog Number	Output Current Amps	HP Range		App. Wgt. (lbs.)
			115V	230V	
NEMA 1 General Purpose					
– Non-Reversing	174307	10	1/8 to 1 [Ⓜ]	1/4 to 2 [Ⓜ]	5
– Reversing with dynamic braking	174308	10	1/8 to 1 [Ⓜ]	1/4 to 2 [Ⓜ]	5
– Heat Sink	174316	—	—	—	1
NEMA 4X Washdown—Dust-Tight					
– Non-Reversing, Steel Enclosure	174100 ^d	10	1/4 to 1	1/4 to 2	7
– Non-Reversing, Plastic Enclosure	174102	10	1/4 to 1	1/4 to 2	6
	174902 ^d	10	1/4 to 1	1/4 to 2	2
– Reversing, Steel with dyn. braking	174105 ^d	10	1/4 to 1	1/4 to 2	8
– Reversing, Plastic Enclosure *	174107	10	1/4 to 1	1/4 to 2	7
	174903 ^d	10	1/4 to 1	1/4 to 2	2
NEMA 4					
– Non-Reversing 3HP	174709	15	—	3	8

SCR CONTROLS • OPEN CHASSIS

Description	Catalog Number	Output Current Amps	HP Range		App. Wgt. (lbs.)
			115V	230V	
Chassis with Speed Pot-Non Reversing	174311	10	1/8 to 1 [Ⓜ]	1/4 to 2 [Ⓜ]	1
Chassis Heat Sink [Ⓜ]	174314	—	—	—	1

REGENERATIVE SCR DRIVES • FOUR QUADRANT • FULL WAVE

Description	Catalog Number	Output Current Amps	HP Range		App. Wgt. (lbs.)
			115V	230V	
NEMA 4X Washdown ✓	175720	10	1/4 to 1	1/2 to 2	8
Open Chassis with Speed Pot ✓	175721	10	1/4 to 1 [Ⓜ]	1/2 to 2 [Ⓜ]	2
Chassis Heat Sink [Ⓜ]	175722	—	—	—	2

✓ Regenerative drives are reversible and have regenerative braking.

* Drive does not have dynamic braking. Motor shaft must be at zero speed before reversing.
[Ⓜ] Heat sink #174316 is required for NEMA 1 type 3/4 and 1HP 115V and 1 1/2 and 2HP 230V
[Ⓜ] Chassis Heat Sink #174314 required for 3/4 and 1HP 115V and 1 1/2 and 2HP 230V
[Ⓜ] Chassis Heat sink #175722 required for 1HP and above.
^d To be discontinued when present stock is depleted.