



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 two 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.
- Rugged, heavy-gauge steel enclosures with barrier type terminal strips.
- Underwriters Laboratories Listed.
- Dynamic Braking is available as a kit for installation in the field (see page 112), or as a Modification (see page 136).
- Remote keypad is available as a kit for installation in the field (see page 112), or as a Modification (see page 136).

Effective July 1, 2006, the Micro Series inverters have PID software built in making them a closed-loop inverter if needed.

PDF file of Manual available at www.leeson.com



Dimension Table see page 113



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.

NEMA 1 (IP31) • THREE PHASE INPUT/OUTPUT

	HP	Output Amps	Input Voltage ⚡	Catalog Number	List Price	App. Wgt. (lbs.)	Disc. Sym.	Dimension Key
200-240 Volts	1/2	2.2	200-240	174914	\$910	6	A	B
	1	4.0	200-240	174915	957	6	A	C
	1 1/2	5.2	200-240	174916	1002	6	A	C
	2	6.8	200-240	174917	1071	9	A	E
	3	9.6	200-240	174918	1152	9	A	E
	5	15.2	200-240	174919	1361	11	A	F
	7 1/2	25.0	200-240	174545	1966	13	A	M
	10	28.0	200-240	174551	2606	15	A	L
	15	42.0	200-240	174557	3439	19	A	N
	20	54.0	200-240	174560	4666	21	A	P
	25	68.0	200-240	174569	5651	38	A	T
	30	80.0	200-240	174571	6781	44	A	T
400-480 Volts	40	104.0	200-240	174576	10445	130	A	AE
	60	154.0	200-240	174578	14759	185	A	AF
	1	2.0	400-480	174920	1148	6	A	B
	2	3.4	400-480	174921	1259	7	A	D
	3	4.8	400-480	174922	1361	9	A	E
	5	7.6	400-480	174923	1530	9	A	E
	7 1/2	11.0	400-480	174924	2080	11	A	I
	10	14.0	400-480	174552	2825	13	A	M
	15	21.0	400-480	174558	3628	15	A	L
	20	27.0	400-480	174561	4814	17	A	N
	25	34.0	400-480	174563	5675	21	A	P
	30	40.0	400-480	174565	6180	21	A	P
	40	52.0	400-480	174567	7121	35	A	T
	50	65.0	400-480	174593	8681	44	A	W
	60	77.0	400-480	174572	9537	67	A	W
480-590 Volts	75	96.0	400-480	174580	12091	185	A	AG
	100	124.0	400-480	174582	14702	250	A	AH
	125	156.0	400-480	174584	16519	260	A	AH
	150	180.0	400-480	174586	22535	360	A	AL
	1	1.6	480-590	174925	1272	6	A	B
	2	2.7	480-590	174926	1406	7	A	D
	3	3.9	480-590	174927	1554	9	A	E
	5	6.1	480-590	174928	1694	9	A	F
	7 1/2	9.0	480-590	174929	2071	11	A	I
	10	11.0	480-590	174553	3156	13	A	R
	15	17.0	480-590	174559	4166	17	A	N
	20	22.0	480-590	174562	5292	19	A	O
	25	27.0	480-590	174564	6250	21	A	P
	30	32.0	480-590	174598	6836	22	A	S
	40	41.0	480-590	174599	7763	38	A	T
50	52.0	480-590	174594	9417	45	A	W	
60	62.0	480-590	174573	10535	51	A	W	

⚡ User programmable for 50Hz and other voltage inputs

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	List Price	App. Wgt. (lbs.)	Disc. Sym.	Dimension Key
	1/4	1.4	115/230	174930	\$860	5	A	A
	1/2	2.2	115/230	174997	1037	7	A	AC
	1	4.0	115/230	174931	1046	7	A	D
	1 1/2	5.2	115/230	174932	1158	7	A	D
	2	6.8	200-230	174933	1105	9	A	E
	3	9.6	200-230	174934	1217	9	A	E

FOR INFORMATION ON REMOTE KEYPAD OPTION, SEE PAGE 112.



WASHGUARD NEMA 4/12 (IP65/IP54) EPOXY COATED

FOOD-SAFE epoxy finish. No external cooling fan required on NEMA 4 (IP65) drives. NEMA 12 drives have external cooling fan. Fully gasketed, water, oil and dust-tight enclosure. These Speedmaster® Micro Series drives have the same features as units shown on the previous page.



WASHGUARD NEMA 4/12

WASHGUARD NEMA 4X (IP65) STAINLESS STEEL

300-SERIES STAINLESS STEEL NEMA 4X enclosures are fully gasketed to withstand frequent washdown but must be protected from caustic agents. Paint-free stainless steel, no external fans, and anodized aluminum heat sinks provide superior heat transfer and greater structural integrity compared to plastic or fiberglass enclosures. These Speedmaster™ Micro Series drives have the same features as the NEMA 1 drives on the previous page.



WASHGUARD NEMA 4X

WASHGUARD NEMA 4/12 (IP65/IP54) THREE PHASE INPUT/OUTPUT

	HP	Output Amps	Input Voltage ⋆	Catalog Number	List Price	App. Wgt. (lbs.)	Disc. Sym.	Dimension Key
200-240 Volts	1/2	2.2	200-240	174935	\$1290	8	A	G
	1	4	200-240	174936	1401	8	A	G
	1 1/2	5.2	200-240	174482	1420	8	A	Y
	2	6.8	200-240	174937	1500	10	A	H
	3	9.6	200-240	174938	1623	11	A	J
	5	15.2	200-240	174730	2001	11	A	K
	7 1/2	22	200-240	174734	2776	27	A	Q
	10	28	200-240	174737	3503	32	A	U
	15	43	200-240	174740	4223	40	A	V
	20	54	200-240	174743*	5422	42	A	AA
400-480 Volts	25	68	200-240	174595*	7430	53	A	Z
	30	80	200-240	174596*	7873	53	A	Z
	1	2	400-480	174939	1579	8	A	G
	2	3.4	400-480	174940	1742	10	A	H
	3	4.8	400-480	174941	1866	10	A	H
	5	7.6	400-480	174942	2063	11	A	J
	7 1/2	11	400-480	174548	2615	11	A	K
	10	14	400-480	174554	3486	11	A	Q
	15	21	400-480	174749	4344	32	A	U
	20	27	400-480	174752	5570	36	A	V
	25	34	400-480	174755*	6430	42	A	AA
	30	40	400-480	174757*	7028	53	A	AA
	40	52	400-480	174513*	8129	54	A	Z
	50	65	400-480	174511*	9434	75	A	AB
	60	77	400-480	174574*	10622	98	A	AB
480-590 Volts	75	96	400-480	174581*	13112	200	A	AJ
	100	124	400-480	174583*	15837	300	A	AP
	125	156	400-480	174585*	17995	310	A	AO
	1	1.6	480-590	174943	1717	8	A	G
	2	2.7	480-590	174944	1916	10	A	H
	3	3.9	480-590	174945	2088	10	A	H
	5	6.1	480-590	174946	2249	11	A	J
	7 1/2	9	480-590	174549	3091	13	A	K
	10	11	480-590	174556	4054	17	A	Q
	15	17	480-590	174763	4897	38	A	U
20	22	480-590	174766	5962	40	A	V	
25	27	480-590	174769*	7110	42	A	AA	
30	32	480-590	174597*	7803	53	A	AA	
40	41	480-590	174512*	9033	54	A	Z	
50	52	480-590	174510*	10546	75	A	AB	
60	62	480-590	174575*	11797	98	A	AB	

⋆ User programmable for 50Hz and other voltage inputs
* Enclosures are NEMA 12 only – others are NEMA 4/12

WASHGUARD NEMA 4X (IP65) THREE PHASE INPUT/OUTPUT

	HP	Output Amps	Input Voltage ⋆	Catalog Number	List Price	App. Wgt. (lbs.)	Disc. Sym.	Dimension Key
200-240 Volts	1/2	2.2	200-240	174527	\$1515	8	A	G
	1	4	200-240	174528	1625	8	A	G
	1 1/2	5.2	200-240	174529	1701	8	A	Y
	2	6.8	200-240	174530	1804	10	A	H
	3	9.6	200-240	174531	1894	11	A	J
	5	15.2	200-240	174732	2638	11	A	K
	7 1/2	22	200-240	174735	3246	27	A	Q
	10	28	200-240	174738	4049	32	A	U
	15	43	200-240	174741	4948	40	A	V
	400-480 Volts	1	2	400-480	174532	1786	8	A
2		3.4	400-480	174533	2023	10	A	H
3		4.8	400-480	174534	2170	10	A	H
5		7.6	400-480	174535	2478	11	A	J
7 1/2		11	400-480	174745	3360	11	A	K
10		14	400-480	174747	4162	11	A	Q
15		21	400-480	174750	4980	32	A	U
480-590 Volts	20	27	400-480	174753	6147	36	A	V
	1	1.6	480-590	174536	1940	8	A	G
	2	2.7	480-590	174537	2166	10	A	H
	3	3.9	480-590	174538	2343	10	A	H
	5	6.1	480-590	174539	2651	11	A	J
	7 1/2	9	480-590	174759	3584	13	A	K
	10	11	480-590	174761	4600	17	A	Q
15	17	480-590	174764	5525	38	A	U	
20	22	480-590	174767	6680	40	A	V	

⋆ User programmable for 50Hz and other voltage inputs

WASHGUARD NEMA 4X (IP65) STAINLESS STEEL • SINGLE PHASE INPUT • 230V THREE PHASE OUTPUT (Use with three phase 230V motor)

HP	Output Amps	Input Voltage ⋆	Catalog Number	List Price	App. Wgt. (lbs.)	Disc. Sym.	Dimension Key
1/4	1.4	115/230	174519	\$1482	8	A	AD
1/2	2.2	115/230	174520	1647	8	A	X
1	4	115/230	174521	1766	11	A	H
1 1/2	5.2	115/230	174517	2170	11	A	H
2	6.8	208-230	174525	1857	11	A	H
3	9.6	208-230	174526	1947	12	A	J

WASHGUARD NEMA 4 (IP65) EPOXY COATED • SINGLE PHASE INPUT • 230V THREE PHASE OUTPUT (Use with three phase 230V motor)

HP	Output Amps	Input Voltage ⋆	Catalog Number	List Price	App. Wgt. (lbs.)	Disc. Sym.	Dimension Key
1/4	1.4	115/230	174996	\$1199	8	A	AD
1/2	2.2	115/230	174998	1310	8	A	X
1	4	115/230	174999	1433	11	A	H
1 1/2	5.2	115/230	174515	1685	11	A	H
2	6.8	208-230	174475	1526	11	A	H
3	9.6	208-230	174729	1616	12	A	J

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AC ADJUSTABLE SPEED DRIVES

MICRO SERIES INVERTERS

DYNAMIC BRAKING COMPONENTS FOR THE MICRO SERIES DRIVES

Micro Series Drives can be modified to include dynamic braking. The modifications involve replacing board(s) inside of the drive as well as adding a Dynamic Braking Resistor in a separate enclosure. Larger drives require a combination of Dynamic Braking Board and an additional Form C Relay Board. Instructions are included with the boards. Also available as a modification, see Mod Squad section, see page 136.

DYNAMIC BRAKING BOARDS*

Drive HP	Drive Voltage Rating	Catalog Number	List Price	Disc. Sym	App. Wgt.(lbs.)
1/2-3	All	174184	\$357	A	2
5	200-230V	174185	389	A	2
5	460-480V	174185	389	A	2
5	550-575V	174184	357	A	2

* Dynamic braking Resistors are required with the Dynamic Braking Boards.

DYNAMIC BRAKING BOARDS WITH FORM C RELAY BOARD*

Drive HP	Drive Voltage Rating	Catalog Number	List Price	Disc. Sym	App. Wgt.(lbs.)
7 1/2	200-230V	174192	\$344	A	2
7 1/2	460-480V	174193	344	A	2
7 1/2	550-575V	174193	344	A	2
10 - 60	All	174192	344	A	2

* Dynamic braking Resistors are required with the Dynamic Braking Boards.

DYNAMIC BRAKING RESISTORS**

Drive HP	Drive Voltage Rating	Catalog Number	List Price	Disc. Sym	App. Wgt.(lbs.)
1/2	200-230V	174178	\$158	A	1
1	200-230V	174179	158	A	1
	460-480V	174179	158	A	1
	550-575V	174178	158	A	1
1 1/2	200-230V	174179	158	A	1
	200-230V	174180	158	A	1
	460-480V	174180	158	A	1
2	460-480V	174180	158	A	1
	550-575V	174179	158	A	1
	550-575V	174181	158	A	1
3	200-230V	174182	223	A	1
	460-480V	174182	223	A	1
	550-575V	174181	223	A	1
5	200-230V	174183	223	A	1
	460-480V	174183	223	A	1
	550-575V	174182	223	A	1
7 1/2	200-230V	174143	258	A	1
	460-480V	174143	258	A	1
	550-575V	174148	258	A	1
10	200-230V	174143	258	A	1
	460-480V	174143	258	A	1
	550-575V	174148	258	A	1
15-20	200-230V	174144	393	A	1
	460-480V	174144	393	A	1
	550-575V	174149	393	A	1
25-30	200-230V	174145	663	A	1
	460-480V	174145	663	A	1
	550-575V	174140	663	A	1
40	460-480V	174146	864	A	1
	550-575V	174141	864	A	1
	550-575V	174147	1000	A	1
50-60	460-480V	174147	1000	A	1
	550-575V	174142	1000	A	1

** Dynamic braking Resistors are provided with mounting brackets.

REMOTE KEYPADS & CABLES FOR MICRO SERIES DRIVES*

Cable and Keypad are purchased separately. Installing the Remote keypad and Cable involves partially dis-assembling the drive. Instructions are included with the keypad. Also available as a Modification, see Mod Squad section.



Item	Catalog Number	List Price	Disc. Sym	App. Wgt.(lbs.)
Keypad	174177	\$207	A	2
2.5 ft. Cable	174174	61	A	2
5 ft. Cable	174175	87	A	2
10 ft. Cable	174176	141	A	2

* Compatible with any Micro Series drive.

NOTE: Using the remote keypad on a WASHGUARD Duty Inverter is not recommended, for the control will no longer meet NEMA 4/12 sealing requirements.

TECHLINK PROGRAMMING AND MONITORING SOFTWARE

Techlink Software is a powerful Drive Configuration tool that works in a Microsoft Windows environment. TechLink supports the following drives sold by LEESON: Micro Series, SM Plus Series and SM Vector Series.

TechLink allows a drive program to be created off line and to access the drive directly while connected over RS232 or RS485 (depending on the drive). RS485 supports several drives on one drive network but will require an RS232 to RS485 converter for most personal computers.

First time users visit LEESON's website, under "Links and Downloads" to download TechLink Software.

LEESON frequently updates Techlink software and the Models files to keep current with our expanding product offering and upgrades to our existing lines. If you have Techlink software installed on your computer and would like to check to see if you have the most current version of the TechLink program or the Models data, check the versions on the opening TechLink screen to the versions below. You will only need to download the program that has been updated. Each program below is a self extracting zip file; after expanding, run setup.exe to install.

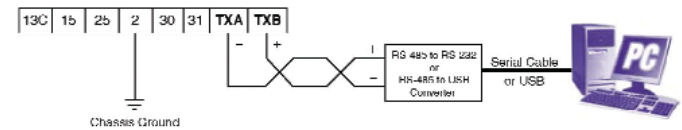
The diagrams below illustrate how to connect the LEESON Micro Series, SM Plus and SM Vector Series drives to a computer in order to use the TechLink software.

Note 1: When using serial communications, terminal 2 on the drive MUST be connected to chassis ground.

SM Plus & SM Vector Series

The SM Plus and SM Vector Series drives are RS-485, so a RS-232 to RS-485 or USB to RS-485 converter is required. The converter connects to the computer using a standard serial connection. A twisted pair connects the converter to the drive.

SM Plus & SM Vector Series Control Strip

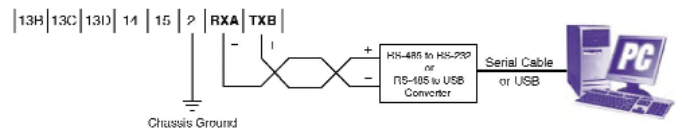


Note 2: Refer to the converter manufacturer's instructions for proper converter configuration. The converter is not supplied by LEESON.

Micro Series

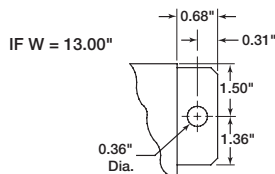
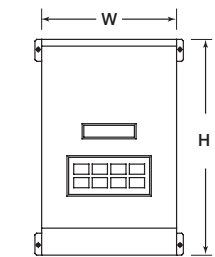
The Micro Series is RS-485, so a RS-232 to RS-485 or USB to RS-485 converter is required. The converter connects to the computer using a standard serial or USB connection. A twisted pair connects the converter to the drive.

Micro Series Control Strip

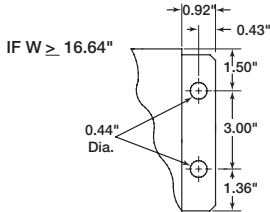
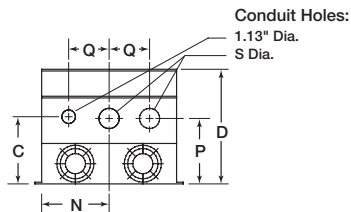


Note: 3 Refer to the converter manufacturer's instructions for proper converter configuration. The converter is not supplied by LEESON.

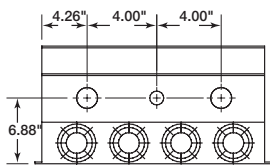
TYPE 1 DIMENSIONS FOR MODELS RATED ABOVE 30 HP AT 240/200 VAC & 60 HP AT 590/480/400 VAC



Mounting Tab Detail

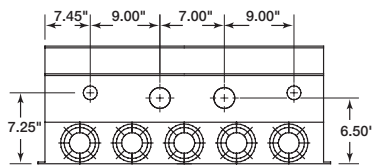


CONDUIT HOLES FOR 174578.00



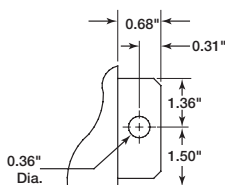
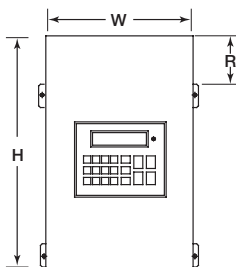
Conduit Holes: Large holes = 1.75\"
Small hole = 1.13\"

CONDUIT HOLES FOR 174586.00

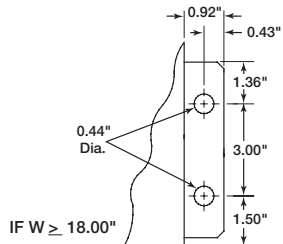
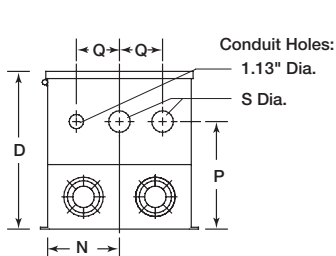


Conduit Holes: Large holes = 3.00\"
Small holes = 1.13\"

TYPE 12 DIMENSIONS FOR MODELS RATED ABOVE 30 HP AT 240/200 VAC AND 60 HP AT 400/480 VAC



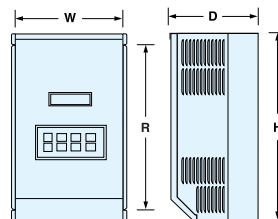
Mounting Tab Detail



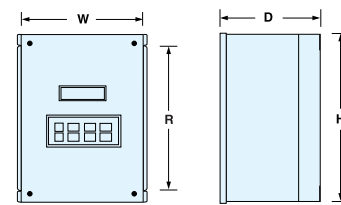
MICRO SERIES INVERTER DIMS. (Inches) • NEMA 1, NEMA 4/12 & NEMA 4X

Dimension Key	H	W	D	N	P	Q	R	S	
A	7.50	4.70	3.33	2.35	1.60	1.37	5.50	0.88	
B	7.50	4.70	3.63	2.35	1.90	1.37	5.50	0.88	
C	7.50	4.70	4.33	2.35	2.60	1.37	5.50	0.88	
D	7.50	6.12	4.22	3.77	2.40	1.37	5.50	0.88	
E	7.50	6.12	5.12	3.77	3.30	1.37	5.50	0.88	
F	7.88	7.86	5.94	5.13	3.95	1.50	5.88	1.13	
G	7.88	6.12	4.35	3.06	2.70	1.37	5.88	0.88	
H	7.88	7.86	4.90	4.80	3.25	1.37	5.88	0.88	
I	9.38	7.86	6.25	5.13	3.95	1.50	7.38	1.13	
J	7.88	7.86	5.90	4.80	4.25	1.37	5.88	0.88	
K	9.75	10.26	7.20	5.13	5.25	2.00	7.75	1.13	
L	11.25	7.86	6.84	3.93	4.19	2.00	7.75	1.38	
M	9.38	7.86	6.84	3.93	4.19	2.00	5.88	1.13	
N	12.75	7.86	6.84	3.93	4.19	2.00	9.25	1.38	
O	12.75	7.86	7.40	3.93	4.19	2.00	9.25	1.38	
P	12.75	10.26	7.74	5.13	5.00	2.50	9.25	1.38	
Q	11.75	10.26	8.35	5.13	5.75	2.00	9.75	1.13	
R	9.38	7.86	7.40	3.93	4.19	2.00	5.88	1.13	
S	12.75	10.26	8.25	5.13	5.00	2.50	9.25	1.38	
T	15.75	10.26	8.35	5.13	5.75	2.50	12.25	1.38	
U	13.75	10.26	8.35	5.13	5.75	2.00	11.75	1.38	
V	15.75	10.26	8.35	5.13	5.75	2.00	13.75	1.38	
W	19.75	10.26	8.55	5.13	5.75	2.50	16.25	1.75	
X	7.88	7.86	3.75	4.80	2.10	1.37	5.88	0.88	
Y	7.88	6.12	5.25	3.06	3.60	1.37	5.88	0.88	
Z	20.25	10.26	8.35	5.13	5.75	2.00	16.25	1.38	
AA	15.75	10.26	8.35	5.13	5.75	2.00	11.75	1.38	
AB	21.00	13.72	8.35	5.13	6.10	2.00	16.25	1.38	
AC	7.50	6.12	3.63	3.77	1.80	1.37	5.50	0.88	
AD	7.88	6.12	3.63	3.06	2.00	1.37	5.88	0.88	
AE	25.00	13.00	10.50	5.56	6.50	2.62	-	1.38	
AF	47.00	16.64	11.85	SEE CHART					
AG	29.00	16.64	11.85	7.14	6.88	3.12	-	1.75	
AH	29.00	24.42	11.85	11.12	6.50	4.50	-	2.50	
AI	29.00	36.66	11.85	11.50	9.00	4.50	-	2.50	
AJ	37.00	18.00	13.30	7.50	8.00	3.13	7.14	1.75	
AK	39.00	26.00	13.30	11.50	9.00	4.50	9.14	2.50	
AL	29.00	36.66	11.85	SEE CHART					
AM	31.00	14.00	11.86	6.00	7.50	2.62	5.64	1.38	
AN	49.00	18.00	13.30	7.50	8.00	3.13	7.14	1.75	
AO	39.00	26.00	13.30	11.50	9.00	4.50	9.14	2.50	

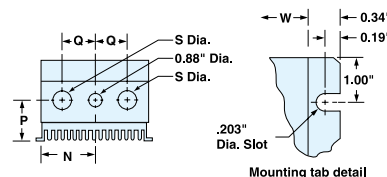
NEMA 1 ONLY



NEMA 4/12 WASHGUARD ONLY



NEMA 1 & NEMA 4/12



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 with finger safe terminals
 - Dynamic braking and remote keypad kits available on pages 118 and 119
- ☆ User programmable for 50Hz and other voltage inputs



SM PLUS

SINGLE PHASE INPUT/THREE PHASE OUTPUT

(Use with three phase 230V motor)

115/230 Volts	HP	Output Amps	Input Voltage ☆	Catalog Number	List Price	App. Wgt.(lbs.)	Disc Sym.	Dimension Key
	1	4.2	115/230	174492	\$805	4	A	B1
	1 1/2	6.0	115/230	174445	908	5	A	B1

SINGLE OR THREE PHASE INPUT/THREE PHASE OUTPUT

(Use with three phase 230V motor)

200-240 Volts	HP	Output Amps	Input Voltage ☆	Catalog Number	List Price	App. Wgt.(lbs.)	Disc Sym.	Dimension Key
	1/4	1.4	200-240	174452	\$576	2	A	A1
	1/2	2.2	200-240	174453	602	2	A	A1
	1	4.2	200-240	174454	647	3	A	A2
	1 1/2	6.0	200-240	174493	770	4	A	B1
	2	6.8	200-240	174494	851	5	A	B2
	3	9.6	200-240	174495	1033	5	A	B2
	5	15.2	200-240	174444	1416	8	A	C1

THREE PHASE INPUT/OUTPUT

200-240 Volts	HP	Output Amps	Input Voltage ☆	Catalog Number	List Price	App. Wgt.(lbs.)	Disc Sym.	Dimension Key
	1	4.2	200-240	174455	\$597	3	A	A2
	1 1/2	6.0	200-240	174456	701	3	A	A3
	2	6.8	200-240	174457	774	4	A	A3
	3	9.6	200-240	174458	922	4	A	A3
	5	15.2	200-240	174446	1187	4	A	B2
	7 1/2	22.0	200-240	174438	1621	8	A	C1
	10	28.0	200-240	174439	1936	8	A	C1
	15	42.0	200-240	174429	2508	13	A	D1
	20	54.0	200-240	174430	3077	14	A	D1
	400-480 Volts	1/2	1.1	400-480	174459	672	2	A
1		2.1	400-480	174460	723	3	A	A2
1 1/2		3.0	400-480	174461	791	3	A	A3
2		3.4	400-480	174462	872	4	A	A3
3		4.8	400-480	174463	974	4	A	A3
5		7.6	400-480	174447	1242	5	A	B2
7 1/2		11.0	400-480	174440	1621	8	A	C1
10		14.0	400-480	174441	1936	8	A	C1
15		21.0	400-480	174431	2459	13	A	D1
20		27.0	400-480	174432	3011	14	A	D1
480-590 Volts	25	34.0	400-480	174433	3584	14	A	D1
	30	40.0	400-480	174500	4165	14	A	D1
	1	1.7	480-590	174464	774	3	A	A2
	2	3.0	480-590	174491	926	4	A	A3
	3	4.2	480-590	174497	1100	5	A	B2
	5	6.6	480-590	174448	1346	5	A	B2
	7 1/2	9.9	480-590	174442	1748	8	A	C1
	10	12.2	480-590	174443	2071	8	A	C1
	15	19.0	480-590	174434	2713	8	A	D1
	20	24.0	480-590	174435	3317	14	A	D1
	25	27.0	480-590	174436	3924	14	A	D1



DIMENSIONS ON PAGE 115

PDF file of Manual available at www.leeson.com

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
Analogue 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

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:

- 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
- I^t 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
- Dynamic braking and remote keypad kits available on pages 118 and 119.

↗ User programmable for 50Hz and other voltage inputs



SM SERIES



SINGLE PHASE INPUT/THREE PHASE OUTPUT

(Use with three phase 230V motor)

	HP	Output Amps 230 VAC	Input Voltage	Catalog Number	List Price	App. Wgt.(lbs.)	Disc. Sym.	Dimension Key
110-120 Volts	1/3	1.7	110-120	174263	\$393	2	A	A5
	1/2	2.4	110-120	174264	426	2	A	A5
	1	4.2	110-120	174265	566	3	A	B5
	1 1/2	6.0	110-120	174266	642	3	A	B5

SINGLE PHASE INPUT/THREE PHASE OUTPUT

(Use with three phase 230V motor)

	HP	Output Amps	Input Voltage	Catalog Number	List Price	App. Wgt.(lbs.)	Disc. Sym.	Dimension Key
200-240 Volts	1/3	1.7	200-240	174267	\$363	2	A	A5
	1/2	2.4	200-240	174268	383	2	A	A5
	1	4.2	200-240	174270	426	3	A	A6
	1 1/2	6.0	200-240	174271	513	4	A	B5
	2	7.0	200-240	174272	603	5	A	B5
	3	9.6	200-240	174273	709	5	A	B6

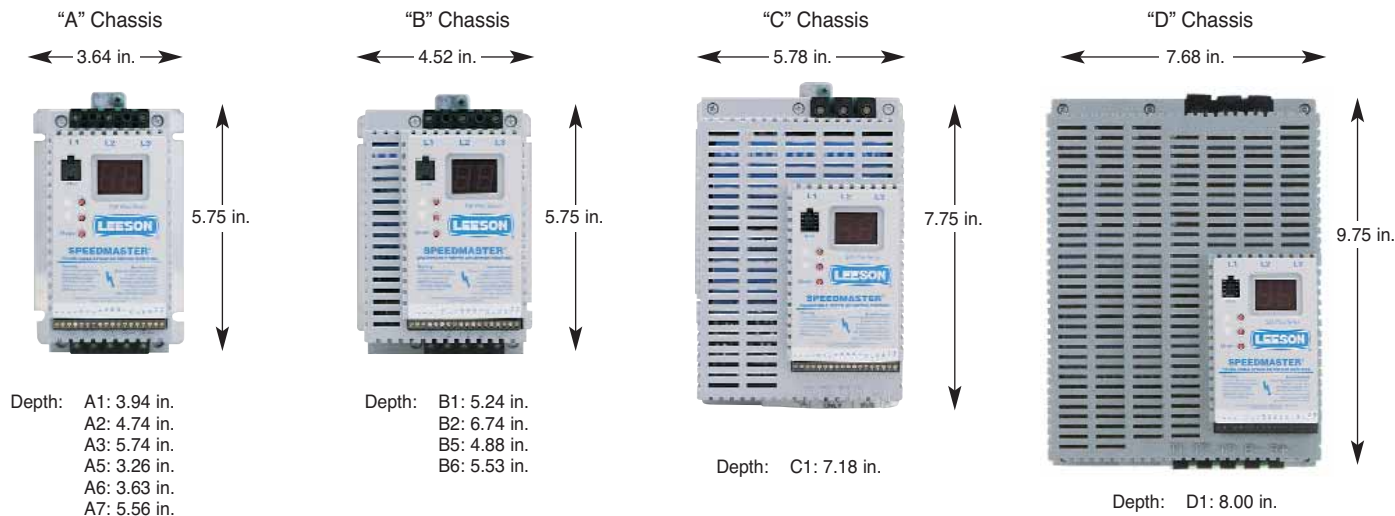
THREE PHASE INPUT/THREE PHASE OUTPUT

	HP	Output Amps	Input Voltage	Catalog Number	List Price	App. Wgt.(lbs.)	Disc. Sym.	Dimension Key
200-240 Volts	1/2	2.4	200-240	174274	\$363	2	A	A5
	1	4.2	200-240	174276	403	2	A	A6
	1 1/2	6.0	200-240	174277	479	3	A	A7
	2	7.0	200-240	174278	547	3	A	A7
	3	9.6	200-240	174279	606	3	A	B6
	5	15.2	200-240	174288	773	5	A	B2
	7 1/2	22	200-240	174280	1067	8	A	C1
	10	28	200-240	174290	1086	8	A	C1
	15	42	200-240	174292	1953	14	A	D1

THREE PHASE INPUT/THREE PHASE OUTPUT

	HP	Output Amps	Input Voltage	Catalog Number	List Price	App. Wgt.(lbs.)	Disc. Sym.	Dimension Key
400-480 Volts	1/2	1.1	400-480	174281	\$486	2	A	A1
	1	2.1	400-480	174282	519	3	A	A2
	1 1/2	3.0	400-480	174283	564	3	A	A3
	2	3.4	400-480	174284	602	4	A	A3
	3	4.8	400-480	174286	660	4	A	B1
	5	7.8	400-480	174287	790	5	A	B2
	7 1/2	11	400-480	174285	1026	5	A	B2
	10	14	400-480	174291	1222	8	A	C1
	15	21	400-480	174293	1444	8	A	C1

DIMENSIONS: SM, SM PLUS AND SM VECTOR INVERTERS



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

LEESON AC ADJUSTABLE SPEED DRIVES

SM VECTOR SUB-MICRO INVERTERS

SM VECTOR SUB-MICRO INVERTER DRIVES

Sensorless Vector AC Drive delivers up to 200% starting torque and can control a vector duty motor down to 1Hz at full output torque!

- The SM-Vector drive is designed for operation with vector duty rated induction motors rated for 200, 230, 400, 460, or 590VAC from 0 to 240Hz.
- IP20 enclosure with finger safe terminals
- Easy setup and operation – Program the SM-Vector drive one of four different ways:
 - From the front of the drive
 - The optional remote keypad
 - A PC using the TechLink Software
 - The EPM Programmer
- Modes of operation:
 - Constant Torque V/Hz
 - Variable Torque V/Hz
 - Sensorless Vector – speed mode
 - Sensorless Vector – torque mode
- Auto Tuning determines key performance values based on the motor and installation variables. Required for operation in vector modes, but can be used to enhance performance in V/Hz mode.
- The SM-Vector drive is an approved thermal overload protection device for single motor applications.
- 18 isolated terminals provide 5 logic inputs and 2 logic outputs.
- Two reference inputs allow for 4-20mA and either 0-10V or bipolar -10 to +10V
- Two analog outputs indicate speed and load.
- Two wire RS485 serial communication.
- Dynamic braking and remote keypad kits available on pages 118 and 119.



SM VECTOR

SINGLE OR THREE PHASE INPUT/THREE PHASE OUTPUT (Use with three phase 230V motor)

	HP	Output Amps 230VAC	Input Voltage ✕	Catalog Number	List Price	Wgt. (lbs.)	Disc Sym.	Dimension Key
200-240 Volts	1/2	2.2	200-240	174000	\$605	2	A	A1
	1	4.2	200-240	174001	680	3	A	A2
	1 1/2	6.0	200-240	174002	807	4	A	B1
	2	6.8	200-240	174003	894	5	A	B2
	3	9.6	200-240	174004	1086	5	A	B2

THREE PHASE INPUT/THREE PHASE OUTPUT

	HP	Output Amps 230VAC	Input Voltage ✕	Catalog Number	List Price	Wgt. (lbs.)	Disc Sym.	Dimension Key
200-240 Volts	1	4.2	200-240	174006	\$626	3	A	A2
	1 1/2	6.0	200-240	174007	737	3	A	A3
	2	6.8	200-240	174008	812	4	A	B2
	3	9.6	200-240	174009	969	4	A	B2
	5	15.2	200-240	174010	1246	4	A	B2
	7 1/2	22	200-240	174011	1701	8	A	C1
	10	28	200-240	174012	2033	8	A	C1

THREE PHASE INPUT/THREE PHASE OUTPUT

	HP	Output Amps	Input Voltage ✕	Catalog Number	List Price	Wgt. (lbs.)	Disc Sym.	Dimension Key
400-480 Volts	1/2	1.1	400-480	174015	\$705	2	A	B1
	1	2.1	400-480	174016	759	3	A	B1
	1 1/2	3.0	400-480	174017	831	3	A	B1
	2	3.4	400-480	174018	916	4	A	B2
	3	4.8	400-480	174019	1024	4	A	B2
	5	7.8	400-480	174020	1305	5	A	B2
	7 1/2	11	400-480	174021	1701	8	A	C1
	10	14	400-480	174022	2033	8	A	C1

THREE PHASE INPUT/THREE PHASE OUTPUT

	HP	Output Amps	Input Voltage ✕	Catalog Number	List Price	Wgt. (lbs.)	Disc Sym.	Dimension Key
480-590 Volts	1	1.7	480-590	174027	\$812	3	A	B1
	2	3.0	480-590	174028	973	4	A	B2
	3	4.2	480-590	174029	1155	5	A	B2
	5	6.6	480-590	174030	1413	5	A	B2
	7 1/2	9.9	480-590	174031	1834	8	A	C1
	10	12.2	480-590	174032	2175	8	A	C1

✕ User programmable for 50Hz and other voltage inputs



DIMENSIONS ON PAGE 115

PDF file of Manual available at www.leeson.com

SPECIFICATIONS:		Enclosure	IP20
Storage Temperature	-20° to 70° C	Service Factor	1.0
Ambient Operating Temperature	0° to 50° C	Efficiency	up to 98%
Ambient Humidity	<95% (non-condensing)	Power Factor (displacement)	0.96 or better
Maximum Altitude	3300 ft (1000m) above sea level	Overload Current Capacity	150% for 60 seconds 200% for 25 seconds
Input Line Voltages	208-240 VAC, 400-480 VAC, 480-590 VAC	Speed Reference Follower	0-10 VDC, 4-20 mA
Input Voltage Tolerance	+10%, -15%	Control Voltage	15 VDC
Input Frequency Tolerance	48 to 62 Hz	Analog Outputs	0-10 VDC or 2-10 VDC: Proportional to speed, load, or torque
Output Wave Form	Sine Coded PWM	Digital Outputs	Open-collector: 50 mA at 30 VDC
Output Frequency	0-240 Hz	Power Supply for Aux. Relays	50 mA at 12 VDC
Carrier Frequency	2 kHz, 4 kHz, 8 kHz		

AC ADJUSTABLE SPEED DRIVES

SM2 SERIES SUB-MICRO INVERTERS



SM2 SERIES FLUX VECTOR DRIVE

With its price, its flexibility and a power range of up to 25 Hp, the SM2 SERIES FLUX VECTOR drive excels in environments where inverter technology was once considered too costly, including packaging machinery, food processing machinery, material handling/conveying systems and HVAC systems.

The SM2 SERIES FLUX VECTOR carries all the features required by demanding applications including four modes of operation (V/Hz, Enhanced V/Hz, Vector Speed, and Torque), high starting torque, auto-tuning, advanced low-speed control, and dynamic speed regulation.



General Specifications:

- **Horsepower:** 1 to 25HP (0.75 to 18.5kW)
- **Supply Power:**
 - Single Phase: 120, 208, 220 or 240VAC
 - Three Phase: 208, 240, 400, 480 or 600VAC
 - 50 / 60 Hz

Motors: Designed for operation with vector duty rated induction motors rated for 120, 200, 230, 400, 460 or 575VAC from 0 to 240Hz.

Enclosure: NEMA1, IP21, -10 to 55°C, 2.5% derate per °C above 40°C

Standard Features: Easy Set-up and Operation: Program the Vector control in one of four convenient ways:

- From the front of the drive
- The optional remote keypad
- A PC Using TechLink Software (Available free from www.leeson.com)
- The innovative EPM Programmer.

Modes of operation:

- Open Loop Flux Vector (Speed or Torque)
- V/Hz (constant or variable)
- Enhanced V/Hz with Auto-tuning

Easy to Use Keypad & Display 6-Button Interface:

- Start
- Stop
- Forward/Reverse
- Scroll Up
- Scroll Down
- Enter/Mode

Vivid Illumination:

- 4 digit LED display
- Easy to read from a distance
- Movable Decimal Point

Acceleration/Deceleration Profiles:

- Two Independent Accel Ramps
- Two Independent Decel Ramps
- Linear or S-Type
- Auxiliary Ramp-to-Stop

Output Frequency:

- 500 Hz Std., 1000 Hz Optional

Selectable Logic Assertion:

- Positive Logic Input (PNP current sourcing)
- Negative Logic Input (NPN current sinking)

Multiple Braking Functions

Loss of Follower Management

Speed Commands: Keypad, Jog, Floating Point Control

Voltage: Scalable 0-10 VDC,

Current: Scalable 4-20 mA, Potentiometer, 8 Preset Speeds

Process Control: PID Modes: Direct or Reverse Acting, PID Sleep Mode

PDF file of Manual available at www.leeson.com

SINGLE PHASE INPUT/THREE PHASE OUTPUT

115-230 Volts	HP	Output Amps 230 VAC	Input Voltage	Catalog Number	List Price	App. Wgt.(lbs.)	Disc. Sym.	Dimension H x W x D (in.)
	1/3	1.7	115/230	174603	\$450	2.9	A	7.5 x 3.9 x 4.35
1/2	2.4	115/230	174604	462	3.0	A	7.5 x 3.9 x 4.35	
1	4.2	115/230	174605	515	3.2	A	7.5 x 3.9 x 4.35	

SINGLE OR THREE PHASE INPUT/THREE PHASE OUTPUT

208-240 Volts	HP	Output Amps 230 VAC	Input Voltage	Catalog Number	List Price	App. Wgt.(lbs.)	Disc. Sym.	Dimension H x W x D (in.)
	1/3	1.7	208/240	174606 Ⓢ	\$410	2.5	A	7.5 x 3.9 x 4.35
1/2	2.4	208/240	174607	431	2.9	A	7.5 x 3.9 x 4.35	
1	4.2	208/240	174608	456	3.2	A	7.5 x 3.9 x 4.35	
1 1/2	6.0	208/240	174609	508	3.7	A	7.5 x 3.9 x 5.45	
2	7.0	208/240	174610	551	3.7	A	7.5 x 3.9 x 5.45	
3	9.6	208/240	174611	698	3.9	A	7.5 x 3.9 x 5.45	

Ⓢ LEESON model 174606 is single-phase input only

THREE PHASE INPUT/OUTPUT

200-240 Volts	HP	Output Amps 230 VAC	Input Voltage	Catalog Number	List Price	App. Wgt.(lbs.)	Disc. Sym.	Dimension H x W x D (in.)
	1 1/2	6.0	200/240	174612	\$485	3.7	A	7.5 x 3.9 x 5.45
2	7.0	200/240	174613	521	3.7	A	7.5 x 3.9 x 5.45	
3	9.6	200/240	174614	655	3.8	A	7.5 x 3.9 x 5.45	
5	16.5	200/240	174615	781	4.2	A	7.5 x 3.9 x 5.8	
7 1/2	23.0	200/240	174616	1043	7.3	A	9.83 x 5.12 x 6.3	
10	29.0	200/240	174617	1288	7.3	A	9.83 x 5.12 x 6.3	
15	42.0	200/240	174618 Ⓢ	TBA	20	A	12.33 x 6.88 x 8.08	
20	54.0	200/240	174619 Ⓢ	TBA	20	A	12.33 x 6.88 x 8.08	
400-480 Volts	1/2	1.1	400/480	174620	497	3.0	A	7.5 x 3.9 x 4.35
	1	2.1	400/480	174621	534	3.2	A	7.5 x 3.9 x 4.35
	1 1/2	3.0	400/480	174622	578	3.6	A	7.5 x 3.9 x 5.45
	2	3.5	400/480	174623	617	3.7	A	7.5 x 3.9 x 5.45
	3	4.8	400/480	174624	727	3.7	A	7.5 x 3.9 x 5.45
	5	8.2	400/480	174625	822	4.3	A	7.5 x 3.9 x 5.8
	7 1/2	11.0	400/480	174626	1041	7.3	A	9.83 x 5.12 x 6.3
	10	14.0	400/480	174627	1286	7.3	A	9.83 x 5.12 x 6.3
	15	21.0	400/480	174628 Ⓢ	TBA	20	A	12.33 x 6.88 x 8.08
	20	27.0	400/480	174629 Ⓢ	TBA	20	A	12.33 x 6.88 x 8.08
480-590 Volts	25	35.0	400/480	174630 Ⓢ	TBA	20	A	12.33 x 6.88 x 8.08
	1	1.7	480/590	174631	615	3.2	A	7.5 x 3.9 x 4.35
	2	2.7	480/590	174632	793	3.7	A	7.5 x 3.9 x 5.45
	3	3.9	480/590	174633	793	3.8	A	7.5 x 3.9 x 5.45
	5	6.1	480/590	174634	896	4.2	A	7.5 x 3.9 x 5.8
	7 1/2	9.0	480/590	174635	1118	7.3	A	9.83 x 5.12 x 6.3
	10	11.0	480/590	174636	1379	7.3	A	9.83 x 5.12 x 6.3
	15	17.0	480/590	174637 Ⓢ	TBA	20	A	12.33 x 6.88 x 8.08
20	22.0	480/590	174638 Ⓢ	TBA	20	A	12.33 x 6.88 x 8.08	
25	27.0	480/590	174639 Ⓢ	TBA	20	A	12.33 x 6.88 x 8.08	

Ⓢ Coming in 4th quarter 2008

Voltage Monitoring

Current Monitoring

Real Time Monitoring: 8 register fault history, Software Version Drive Network ID, DC Bus Voltage (V), Motor Voltage (V), Output Current (%) Motor Current (A), Motor Torque (%), Power (kW) Energy Consumption (kWh), Heatsink Temperature (°C), 0-10 VDC Input (User Defined), 4-20 mA Input (User Defined) PID

Feedback (User Defined), Analog Output (% Load, % Torque, kW), Network Speed (baud rate), Terminal Continuity, Keypad Status,

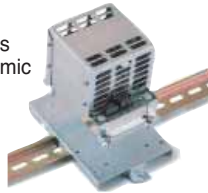
Elapsed Run Time (hours), Elapsed Power on Time (hours)

Standards: UL (USA), cUL (Canada), CE (Europe), GOST (Russia/Ukraine) C-Tick (Australia/New Zealand)

ACCESSORIES FOR THE SM, SM-PLUS & SM VECTOR SERIES DRIVES

Dynamic Braking Components for the SM, SM-Plus & SM Vector Series Drives

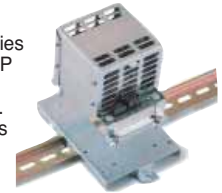
Dynamic braking is available for the SM, SM-Plus and SM Vector series drives as a separate Dynamic Braking Module. Lower HP modules have the control electronics and the dynamic braking resistor in one convenient package. Larger units require a separate resistor. The modules can be panel or DIN rail mounted.



ACCESSORIES FOR THE SM2 FLUX VECTOR SERIES DRIVES

Dynamic Braking Components for the SM2 Vector Series Drives

Dynamic braking is available for the SM2 Vector Series drives as a separate Dynamic Braking Module. 10 HP and lower modules have control electronics and the dynamic braking resistor in one convenient package. Larger units require a separate resistor. The modules can be panel or DIN rail mounted.



DYNAMIC BRAKING MODULES WITH BUILT-IN DYNAMIC BRAKING RESISTORS*

Drive HP	Motor Voltage Rating	Catalog Number	List Price	Disc. Sym.	App. Wgt. (lbs.)
1/4-1/2	208-230V	174400	\$266	A	2
1/4-1/2	400-480V	174406	266	A	2
1 - 1 1/2	208-230V	174401	309	A	3
1 - 1 1/2	400-480V	174407	309	A	3
1 - 1 1/2	480-590V	174412	309	A	3
2 - 3	208-230V	174402	420	A	4
2 - 3	400-480V	174408	420	A	4
2 - 3	480-590V	174413	420	A	4
5	208-230V	174403	548	A	5
5	400-480V	174409	548	A	5
5	480-590V	174414	548	A	5
7 1/2	208-230V	174404	692	A	6
7 1/2	400-480V	174410	692	A	6
7 1/2	480-590V	174415	692	A	6
10	208-230V	174405	835	A	8
10	400-480V	174411	835	A	8
10	480-590V	174416	835	A	8

* Braking Resistors are included with the module and not purchased separately.

DYNAMIC BRAKING MODULES WITH BUILT-IN DYNAMIC BRAKING RESISTORS*

Drive HP	Motor Voltage Rating	Catalog Number	List Price	Disc. Sym.	App. Wgt. (lbs.)
1/3-1/2	208 - 230V	174157	\$259	A	2
1/3-1/2	400 - 480V	174158	259	A	2
1 - 1 1/2	208 - 230V	174151	303	A	3
1 - 1 1/2	400 - 480V	174152	303	A	3
1 - 1 1/2	480 - 590V	174153	303	A	3
2 - 3	208 - 230V	174154	413	A	4
2 - 3	400 - 480V	174155	413	A	4
2 - 3	480 - 590V	174156	413	A	4
5	208 - 230v	174159	537	A	5
5	400 - 480V	174160	537	A	5
5	480 - 590V	174161	537	A	5
7 1/2	208 - 230V	174162	678	A	6
7 1/2	400 - 480V	174163	678	A	6
7 1/2	480 - 590V	174164	678	A	6
10	208 - 230V	174165	819	A	8
10	400 - 480V	174166	819	A	8
10	480 - 590V	174167	819	A	8

* Braking Resistors are included with the module and not purchased separately.

ELECTRONIC PROGRAMMING UNIT

Electronic Programming Unit allows off-line set-up and replication of the drive's plug-in electronic programming module (shown at right). Excellent for multi-drive applications. Keypad input and alphanumeric display simplify programming. RS-232 serial port allows downloading of configuration files from personal computer.



Catalog Number	List Price	Disc. Sym.	App. Wgt. (lbs.)
174189	\$736	A	2

DIN RAIL MOUNTING KITS

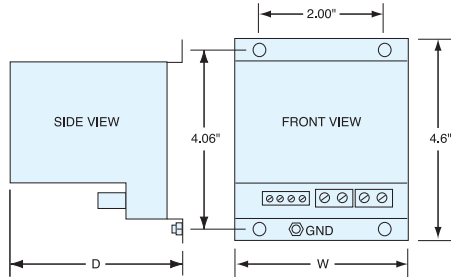
Steel plates and fasteners for mounting drives on standard 35mm DIN rails for panel building. **Set of six.**



- 174186 for "A" chassis drives.
- 174187 for "B" chassis drives.
- 174188 for "C" chassis drives.

Catalog Number	List Price (6 pcs.)	Disc. Sym.	App. Wgt. (lbs.)
174186	\$151	A	3
174187	169	A	3
174188	201	A	3

Dimensions (inches)		
HP	W	D
0.25-1.5	3.1	3.1
2-3	3.1	4.3
5	3.1	5.6
7.5-10	4.2	6.7



DYNAMIC BRAKING MODULES WITHOUT RESISTORS

Drive HP	Motor Voltage Rating	Catalog Number	List Price	Disc. Sym.	App. Wgt. (lbs.)
15-20	208-230V	174417	\$357	A	10
15-30	400-480V	174418	357	A	10
15-25	480-590V	174419	357	A	10

* Dynamic Braking Resistors are purchased and mounted separately.

DYNAMIC BRAKING RESISTORS

Drive HP	Motor Voltage Rating	Catalog Number	List Price	Disc. Sym.	App. Wgt. (lbs.)
15-20	208-230V	174144	\$393	A	1
15-20	400-480V	174144	393	A	1
15-20	480-590V	174149	393	A	1
15-30	400-480V	174145	663	A	1
25	480-590V	174140	663	A	1

** Dynamic Braking Resistors are provided with mounting brackets.

EPM BULK PACK

Plug-in electronic programming modules (EPM). Allow off-line set-up and replication of program using Electronic Programming Unit (at left). **Set of 10.**



Catalog Number	List Price (10 pcs.)	Disc. Sym.	App. Wgt. (lbs.)
174190	\$162	A	1

REMOTE KEYPAD

Remote keypad kit for includes eight-foot connecting cable and gasket. Mounted in proper enclosure, the keypad kit will provide up to NEMA 4 protection. **These keypads can only be used with Sub-Micro drives manufactured May, 1999 or later (date code of 9922 or higher).**



Drive Type	Catalog Number	List Price	App. Disc. Sym.	Wgt. (lbs.)
SM Plus	174191	\$213	A	2
SM	174194	173	A	2
SM Vector	174306	213	A	2
SM2 Vector	174150	209	A	2

AC Drives



AC ADJUSTABLE SPEED DRIVES

SUB-MICRO INVERTER ACCESSORIES

FHP SERIES AC DRIVES

General Specifications:

The FHP Series volts/hertz-type AC drives are as simple to set-up and calibrate as an SCR-type DC drive. Rated from 1/4 to 1HP with 115V, 230V, or 115/230V "doubler" input power ratings.

The cost-conscious and compact chassis design of the FHP Series maintains the industry standard for mounting hole location.

The NEMA 4X enclosed drive has additional features in a compact package size.

With its compact size, standard features and application flexibility, the FHP Series is an excellent choice for most 1 hp and under AC applications.

Common features for chassis and enclosed units:

- Compact size – (4.30" x 3.70")
- Industry standard mounting
- Output voltage on dual voltage models is jumper selectable and can double the output voltage – allowing the use of a 230V motor when only 115V power is available.
- Quickly and easily change trimmer pot ranges for 1/15 to 1 hp motors.
- Easy calibration and setup with on board trim pot adjustments for boost, max speed, acceleration, deceleration, to overcome intermittent peak loads, then reduces the torque and torque limit.
- Torque 'foldback' feature – Allows up to 200% torque for short periods (output current) to a safe level that is set with the TQ LIMIT trim pot.
- 16kHz switching frequency, with option to change between 4 and 16kHz in the field.
- Adjustable torque boost for startup – Up to 200% additional torque for loads with high inertia or friction.
- Color-coded on-board LEDs for Power, Fault and Torque Limit enable easy visual determination of drive status.
- Easy start/stop and direction control with enable and Direction terminal connections.
- Accepts speed reference from 0-5VDC isolated signal or wired in speed potentiometer.
- Plug-in Process Control Module (PCM) kit available to accept 0-5VDC, 0-10VDC or 4-20mA input.
- UL listed

Special features of the NEMA 4X drive:

- NEMA 4X enclosure
- Jumper selectable DC injection braking or coast to stop
- Brake time and current are adjustable
- Built-in isolation card to accept a speed reference signal
- Min speed adjustment
- Auto or manual restart after power loss

PARAMETER	SPECIFICATIONS FOR ALL FHP MODELS
Max load	150% for 5 minutes
Output frequency	0-120Hz
Output type	6 step PWM
Switching frequency	4-16kHz range* with 16kHz as factory default
Speed regulation and range	±3% of base speed; up to 50:1
On-board adjustable trim pots	Max speed, accel, decel, boost & torque limit
Adjustable maximum frequency range	32-120Hz
Adjustable accel and decel time range	1-12 seconds
Torque boost range	0-200%
LED indicators	Power (green), Fault‡ (red), Torque Limit (yellow)
Instantaneous over-current trip time	3 µsec
Analog reference input and impedance	0-5VDC isolated, ~100Kohm
Plug-in PCM isolator card input	0-5 VDC, 0-10VDC, 4-20mA
Ambient temperature range	0-40°C
Weight (Chassis Models)	1.2 lbs.
Vibration	0.5G max (20-50Hz); 0.1G max (>50Hz)
Approvals	UL, cUL

* Plug-in capacitor kit (175325) for field adjustments to less than 16khz; ‡ Faults are Over-voltage, Under-voltage and Instantaneous Over Current trip.



FHP SERIES AC DRIVES • CHASSIS MOUNT SINGLE PHASE INPUT/SINGLE OR THREE PHASE OUTPUT

HP	Input Voltage	Output Amps	Output Voltage	Catalog Number	List Price	Disc. Sym.	App. Wgt. (lbs.)
1/4	230	1.2	230	175318	\$309	A	2
	115/230	1.2	230	175319	368	A	2
	115	2.4	115	175320	319	A	3
1/2	230	2.4	230	175321	319	A	3
	115/230	2.4	230	175310	405	A	3
	115	4.0	115	175322	396	A	4
1	230	4.0	230	175323	392	A	4
	115/230	4.0	230	175311	513	A	4

FHP SERIES AC DRIVES • ACCESSORIES

Item Description	Catalog Number	List Price	Disc. Sym.	App. Wgt. (lbs.)
Process Control Module (PCM) Kit*	175324	\$101	A	2
Carrier Frequency Capacitor Kit	175325	24	A	1

* PCM Kit is for use with chassis drives only.

FHP SERIES AC DRIVES • NEMA 4X (IP65) SINGLE PHASE INPUT/THREE PHASE OUTPUT

- NEMA 4X enclosure
- Min speed adjustment
- Jumper selectable features:
 - DC injection braking or coast to stop
 - Brake time and current are adjustable
 - Auto or manual restart after power loss
- Built-in isolation card to accept a speed reference signal



HP	Input Voltage	Output Amps	Output Voltage	Catalog Number	List Price	Disc. Sym.	App. Wgt. (lbs.)
1/6-1	115/230	4.0	230	175326	\$720	A	7

DUAL MODE • DUAL SPEED CONTROL

- Dual Motor, Dual Voltage Control
- SCR Control designed to run two DC motors at the same time in either Independent mode or Slave/Master mode
- Open Chassis Design
- Dual voltage, 115-230 VAC input with jumper selectable 90/180 VDC output
- Jumper selectable speed and torque mode
- Two trim pots each for the minimum speed, maximum speed, IR compensation, current limit and acceleration/deceleration
- Comes standard with two potentiometers



HP	Input Voltage	Output Amps	Output Voltage	Catalog Number	List Price	Disc. Sym.	App. Wgt. (lbs.)
1 HP @ 90 VDC 2 HP @ 180 VDC	115/230	10*‡	0-90/0-180	174422	\$312	A	3

* Heat sink 174314 is required if one side provides more than 5A or the output of both sides is more than 6.5A.



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.

All SCR/Thyristor drives have Shunt Field Supply Terminals and can be used with Shunt Wound DC Motors.

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	List Price	Output Current Amps	HP Range		App. Wgt. (lbs.)	Disc. Sym.
				115V	230V		
NEMA 1 General Purpose							
– Non-Reversing	174307	\$363	10	1/8 to 1 ^(H)	1/4 to 2 ^(H)	5	A
– Reversing with dynamic braking	174308	496	10	1/8 to 1 ^(H)	1/4 to 2 ^(H)	5	A
– Heat Sink	174316	81	—	—	—	1	A
NEMA 4X Washdown—Dust-Tight							
– Non-Reversing, Plastic Enclosure	174102	494	10	1/4 to 1	1/4 to 2	6	A
– Non-Reversing, Plastic Enclosure with Signal Follower	174103	718	10	1/4 to 1	1/4 to 2	7	A
– Reversing, Plastic Enclosure*	174107	670	10	1/4 to 1	1/4 to 2	7	A
NEMA 4							
– Non-Reversing 3HP	174709	949	15	—	3	8	A

SCR CONTROLS • OPEN CHASSIS

Description	Catalog Number	List Price	Output Current Amps	HP Range		App. Wgt. (lbs.)	Disc. Sym.
				115V	230V		
Chassis with Speed Pot-Non Reversing	174311	\$200	10	1/8 to 1 ^(J)	1/4 to 2 ^(J)	1	A
Chassis Heat Sink ^(K)	174314	60	—	—	—	1	A

REGENERATIVE SCR DRIVES • FOUR QUADRANT • FULL WAVE

Description	Catalog Number	List Price	Output Current Amps	HP Range		App. Wgt. (lbs.)	Disc. Sym.
				115V	230V		
NEMA 4X Washdown ✓	175720	\$1036	10	1/4 to 1 ^(K)	1/2 to 2 ^(K)	8	A
Open Chassis with Speed Pot ✓	175721	667	10	1/4 to 1 ^(K)	1/2 to 2 ^(K)	2	A
Chassis Heat Sink ^(K)	175722	116	—	—	—	2	A

FOR SUBFRACTIONAL HP MOTORS & GEARMOTORS PWM & SCR CONTROLS • ENCLOSED • SINGLE PHASE 50/60 HZ

Description	Catalog Number	List Price	Output Current Amps	HP Range		App. Wgt. (lbs.)	Disc. Sym.
				115V	230V		
NEMA 1 General Purpose							
– SCR Non-Reversing	M1740005	\$348	3	1/40 to 1/8	1/40 to 1/4	5	A
– SCR Reversing With Dynamic Braking	M1740006	471	3	1/40 to 1/8	1/40 to 1/4	5	A
– PWM Non-Reversing	M1740008	302	3	1/40 to 1/8	1/40 to 1/4	2	A

PWM & SCR CONTROLS • OPEN CHASSIS

Description	Catalog Number	List Price	Output Current Amps	HP Range		App. Wgt. (lbs.)	Disc. Sym.
				115V	230V		
Open Chassis SCR Type							
– Chassis with Speed Pot-Non Reversing	M1740007	\$194	1.5	1/40 to 1/8	1/40 to 1/4	1	A
Open Chassis PWM Type							
– Chassis with Speed Pot-Non Reversing	M1740009	225	2.0	1/40 to 1/8	—	1	A

* Drive does not have dynamic braking. Motor shaft must be at zero speed before reversing.
^(H) Heat sink #174316 is required for NEMA 1 type 3/4 and 1HP 115V and 1 1/2 and 2HP 230V when the amp draw of the motor exceeds 5 amps.
^(J) Chassis Heat Sink #174314 required for 3/4 and 1HP 115V and 1 1/2 and 2HP 230V when the amp draw of the motor exceeds 5 amps.
^(K) Chassis Heat sink #175722 required for 1HP and above when the amp draw of the motor exceeds 5 amps.
 ✓ Regenerative drives are reversible and have regenerative braking.