

5 through 1000 HP Adjustable Speed DC Motor Controllers

- HP Ratings 5-1000
- Voltage Ratings – 230, 380, 460
- NEMA C-Full Converter
- Isolated Regulator
- Overload Protection
- Commonality of Components
- Built-In Test Meter
- Voltage Transient Protection
- Extensive Options
- Field Economy
- Phase Loss Protection
- Phase Insensitive
- NEC & NEMA Compliance
- UL and cUL Listed†

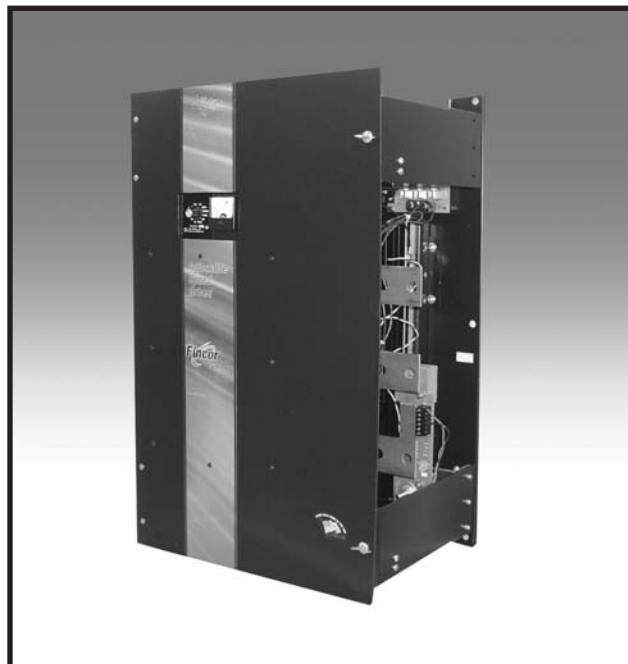


FIGURE 1. Typical Series 3120S Module

TABLE 1. QUICK SELECT††

HP	Voltage	Model Number
5	230	3121S0051A
	380	3121S00522A
	460	3121S0053A
7-1/2	230	3121S0071A
	380	3121S00722A
	460	3121S0073A
10	230	3121S0101A
	380	3121S01022A
	460	3121S0103A
15	230	3122S0151A
	380	3121S01522A
	460	3121S0153A
20	230	3122S0201A
	380	3122S02022A
	460	3121S0203A
25	230	3122S0251A
	380	3122S02522A
	460	3122S0253A
30	230	3122S0301A
	380	3122S03022A
	460	3122S0303A

HP	Voltage	Model Number
40	230	3123S0401A
	380	3122S04022A
	460	3122S0403A
50	230	3123S0501A
	380	3122S05022A
	460	3122S0503A
60	230	3123S0601A
	380	3123S06022A
	460	3122S0603A
75	230	3123S0751A
	380	3123S07522A
	460	3123S0753A
100	230	3124S1001A
	380	3123S10022A
	460	3123S1003A
125	230	3124S1251A
	380	3123S125221
	460	3123S1253A
150	380	3124S15022A
	460	3123S1503A

HP	Voltage	Model Number
200	380	3124S20022A
	460	3124S2003A
250	380	3125S250SSA
	460	3124S2503A
300	380	3125S30022A
	460	3125S3003A
400	380	3126S40022A
	460	3125S4003A
500	380	3126S50022A
	460	3126S5003A
600	380	3126S60022A
	460	3126S6003A
700	380	3127S70022A
	460	3126S7003A
800	380	3127S80022A
	460	3127S8003A
900	380	3127S90022A
	460	3127S9003A
1000	460	3127S10003A

† Models through 125 HP-230V, 200 HP-460V

††See page B45 for current ratings.

DESIGN FEATURES AND FUNCTIONS

Model Type 3120M

1. **Power Conversion** — NEMA Type C full converter, using six silicon controlled rectifiers. Rated 1200 PIV. Power devices may be replaced with conventional tools without removing the 3120M module from the controller.
2. **Voltage Transient Protection** — Metal oxide suppressors across the AC line are combined with RC snubbers across the power bridge to limit potentially damaging high voltage spikes from the AC power source.
3. **Isolated Regulator** — Internal DC circuits are isolated from the AC power source for operator and equipment safety and for simplified application. The control reference input common may be grounded or connected without additional isolation to other drive units or grounded external signal sources. Isolation eliminates line voltage to ground potential being present on the speed control potentiometer.
4. **Feedback Isolation** —
 - (a) Current Feedback — Optical Isolation
 - (b) Voltage Feedback — High impedance circuit (4 megohms).
5. **Start-up Phase Insensitive** — Unit may be started-up with any phase rotation.
6. **Reference Power Supply** — Regulated + 10 VDC
7. **Armature Feedback** — Counter EMF voltage feedback and IR compensation are standard features. IR compensation is adjustable to suit individual motor characteristics.
8. **Phase-Loss Protection** — Interlocked with the controller run/stop logic.
9. **Overload Protection** — A protective circuit continuously monitors motor armature current and shuts down the Regulated Power Conversion Module should the armature current exceeds 120% for 80 seconds.
10. **Undervoltage Protection** — Interlocked to the controller run/stop logic.
11. **Field Supply** — Independent, 3-phase half-wave, DC excitation source, transient and fuse protected.
12. **Field Economy** — Automatically reduces the field voltage to 66% of rated whenever the armature contactor is opened. Reduces power consumption and motor heating during idle periods, extending the life of the motor.
13. **Test Meter** — A meter and multiple position switch monitors essential controller parameters:

a. 3 Phase AC line voltages	f. + 24 VDC Power Supply
b. DC armature load current	g. - 24 VDC Power Supply
c. + 12 VDC Power Supply	h. Field Voltage
d. - 12 VDC Power Supply	i. Reference Voltage
e. Error Voltage	j. Feedback Voltage

Test meter is calibrated 0-150% with color coded scale segments for simplified troubleshooting.
14. **Static Current Limit Adjustment** — Permits simplified field adjustment of the current limit setting. This can be accomplished with the motor contactor open.

15. **Visual Indicators** — Included are individual LED's showing:

a. Current limit operation	c. Phase-Loss
b. Overload Trip	d. Run Enable Command

16. **Reconnectable Operation** — Units through Model 3124 may be programmed by a slide switch on the main control circuit board for either low (190-230V) or high (380-460V) voltage operation. Larger units (Model 3125 and above) are offered for 380-460V operation.
17. **50 Hz Operation** — Selected by a programming module on the main control circuit board.
18. **Auxiliary Interface Connections** — Terminals are provided for connection of the following inputs and outputs to external indicating and control devices to interface the 3120 with external system elements.
 - a. Control overload or phase-loss reset (input)
 - b. Current feedback signal 0 to - 5 VDC (output) equivalent to 0-150% armature current
 - c. + 24 VDC power supply for optional features (output) (1)
 - d. - 12 VDC regulated power supply @ 30 mA for optional features or external use (output) (1)
 - e. + 24 VDC run enable signal (output) (1)

Note: (1) 30 mA combined total for these outputs.
19. **Horsepower Calibration** — A multi-tap armature current shunt is provided for HP calibration.
20. **Modular Construction** — Rugged, lightweight, compact construction with deadback/front access to all components

Model Type 3120S

21. **Circuit Breaker** — A magnetic only, adjustable trip circuit breaker is provided as a means of disconnecting the AC input power to the controller and automatic instantaneous trip protection from a peak load.

This circuit breaker will qualify as a branch circuit protective device only when its interrupting capacity is coordinated with the distribution system (feeder) supplying the drive. Since the control circuit breaker is rated to protect the drive, it may not have sufficient capacity to protect the branch circuit from short circuit current. Optional current limiting fuses (Option 1018) or an additional circuit breaker may be required ahead of the control circuit breaker to protect both the drive and branch circuit. Table 5 shows the circuit breaker interrupting ratings.
22. **Enclosure** — NEMA Type 12 ventilated with hinged, latching door(s). See Table 6 for dimensions.
23. **Control Transformer** — 115 VAC secondary transformer isolates all magnetic control and logic from the AC power source for operator protection.
24. **Safety Features** — Isolated regulator • Low voltage operator control • High interrupting capacity AC circuit breaker • Armature contactor.
25. **Motor Contactor** — Magnetic DC contactor provides a positive disconnection of the motor armature from the controller power source. Action of the contactor is coordinated with the electronic power removal provided by a regulator sequencing circuit to ensure that only no power, "dry-switching" occurs for improved contactor longevity. Run logic interlocks are provided for use with a normally closed motor thermostat. Contactor is two-pole through the 3124 and single-pole above the 3124 with the two-pole optional.

TABLE 2. DESIGN SELECTION CHART

HP	Input Voltage	Model Number	Line Amps	KVA	Motor Arm. Volts	Motor Arm. Amps	Max. Field Volts	Max. Field Amps	Rated Kilowatts (KW)	Std. Encl. & Approx. Wt. (lbs)†
5	230	3121S0051A	18	8	240V	18	150V	5	3.7	W8, 160
	380	3121S00522A	11	8	440V	10	240V			
	460	3121S0053A	10	8	500V	9	300V			
7-1/2	230	3121S0071A	26	11	240V	28	150V	5	5.6	W8, 160
	380	3121S00722A	16	11	440V	16	240V			
	460	3121S0073A	14	11	500V	14	300V			
10	230	3122S0101A	32	14	240V	36	150V	5	7.5	W8, 160
	380	3121S01022A	20	14	440V	21	240V			
	460	3121S0103A	17	14	500V	18	300V			
15	230	3122S0151A	48	19	240V	55	150V	5	11.2	W8, 160
	380	3121S01522A	27	19	440V	29	240V			
	460	3121S0153A	23	19	500V	25	300V			
20	230	3122S0201A	60	25	240V	70	150V	5	14.9	W8, 160
	380	3122S02022A	35	25	440V	40	240V			
	460	3121S0203A	31	25	500V	35	300V			
25	230	3122S0251A	78	31	240V	90	150V	5	18.7	W8, 160
	380	3122S02522A	43	31	440V	49	240V			
	460	3122S0253A	38	31	500V	43	300V			
30	230	3122S0301A	90	36	240V	105	150V	5	22.4	W8, 160
	380	3122S03022A	51	36	440V	58	240V			
	460	3122S0303A	44	36	500V	51	300V			
40	230	3123S0401A	119	47	240V	140	150V	5	29.8	U200, 370 W8, 160 W8, 160
	380	3122S04022A	65	47	440V	75	240V			
	460	3122S0403A	57	47	500V	66	300V			
50	230	3123S0501A	148	59	240V	175	150V	5	37.3	U200, 370 W8, 160 W8, 160
	380	3122S05022A	80	59	440V	94	240V			
	460	3122S0503A	71	59	500V	83	300V			
60	230	3123S0601A	177	70	240V	210	150V	5	44.8	U200, 370 U200, 370 W8, 160
	380	3123S06022A	95	70	440V	112	240V			
	460	3122S0603A	83	70	500V	98	300V			
75	230	3123S0751A	216	86	240V	258	150V	5	56.0	U200, 370
	380	3123S07522A	118	86	440V	140	240V			
	460	3123S0753A	103	86	500V	123	300V			
100	230	3124S1001A	285	114	240V	342	150V	10 5 5	74.6	U200, 420 U200, 370 U200, 370
	380	3123S10022A	155	114	440V	185	240V			
	460	3123S1003A	136	114	500V	163	300V			
125	230	3124S1251A	336	137	240V	426	150V	10 5 5	93.3	U200, 420 U200, 370 U200, 370
	380	3123S125221	194	137	440V	233	240V			
	460	3123S1253A	173	137	500V	205	300V			
150	380	3124S15022A	231	163	440V	278	240V	10 5	111.9	U200, 420 U200, 370
	460	3123S1503A	205	163	500V	245	300V			
200	380	3124S20022A	306	219	440V	370	240V	10	149.2	U200, 420
	460	3124S2003A	275	219	500V	325	300V			
250	380	3125S250SSA	376	267	440V	455	240V	10	186.5	F3, 1500 U200, 420
	460	3124S2503A	336	267	500V	400	300V			
300	380	3125S30022A	451	314	440V	546	240V	10	223.8	F3, 1500
	460	3125S3003A	402	314	500V	480	300V			
400	380	3126S40022A	595	421	440V	722	240V	10	298.4	F3, 1793 F3, 1500
	460	3125S4003A	529	421	500V	635	300V			
500	380	3126S50022A	739	522	440V	898	240V	10	373	F3, 1793
	460	3126S5003A	656	522	500V	790	300V			
600	380	3126S60022A	889	633	440V	1091	240V	10	447.6	F3, 1793
	460	3126S6003A	795	633	500V	960	300V			
700	380	3127S70022A	1047	738	440V	1120	240V	10	522.2	F3, 1893 F3, 1793
	460	3126S7003A	927	738	500V	1120	300V			
800	380	3127S80022A	1196	842	440V	1280	240V	10	596.8	F3, 1893
	460	3127S8003A	1058	842	500V	1280	300V			
900	380	3127S90022A	1345	947	440V	1637	240V	10	671.4	F3, 1893
	460	3127S9003A	1190	947	500V	1440	300V			
1000	460	3127S10003A	1320	1050	500V	1600	300V	10	746	F3, 1893

†Refer to Table 6 for dimensions.

3120



THREE-PHASE DC SERIES

RATINGS AND CHARACTERISTICS

OPERATING CONDITIONS

1. **Line Voltage Variation** ±10% of rated
2. **Line Frequency Variation** ±2 Hz
3. **Ambient Temperature (1)** 0 to 40°C (32° to 104°F)
4. **Altitude (Standard)**..... 3300 feet (1000m) maximum

NOTE: (1) Series 3120 modules are designed for panel mounting where the internal temperature of the enclosure does not exceed 55°C (131°F).

PERFORMANCE CHARACTERISTICS

1. **Controlled speed range** – Zero to motor base speed. Speed range with respect to the specified regulation is as shown in Table 4. See Catalog Section E for constant torque continuous duty application limitations of DC motors.
2. **Speed Regulation** – Regulation percentages shown in Table 4 are of motor base speed under steady-state conditions.
3. **Efficiency** (maximum speed and rated load)
 - (a) Controller SCR regulator 99%
 - (b) Complete drive with motor (typical) 87%
4. **Displacement Power Factor** (maximum speed and rated load) 88%

ADJUSTMENTS

1. **Acceleration/Deceleration** 1-30 seconds
Linear, independently adjustable
2. **Current Limit** 50-150% full-load torque
3. **Maximum Current** 150% full-load torque (factory set)
4. **Minimum Speed** 0-25% of motor base speed
5. **Maximum Speed** 70-100% of motor base speed
6. **IR (load) Compensation** 0-100% of rated load

RATINGS

1. **Horsepower Range**5-1000 HP
2. **Power Source**.....See Table 3.
3. **Output Voltages**See Table 3.
4. **Reference Voltage**.....See Table 3.
5. **Service Factor**.....1.0
6. **Duty**Continuous
7. **Overload Capacity**
(armature circuit current)150% for 1 minute
8. **AC Line Circuit Breaker, Interrupting Ratings**See Table 5.
9. **Run-Speed Potentiometer**5K, 1/2 W

TABLE 3. SERIES 3120 OPERATING VOLTAGES

Power Source (3-Phase)		Output VDC		Magnetic Control Voltage	Control Reference Voltage
Volts	Hz.	Armature	Field(1)		
230	50 or 60	0-240	150	115 VAC	10 VDC
460	50 or 60	0-500	300		
220	50	0-260	150		
380	50	0-440	250		
415	50	0-460	270		

Note (1) For field voltages other than those shown, see Option Number 1079, Constant Current Field Power Supply.

TABLE 4. SPEED REGULATION CHARACTERISTICS

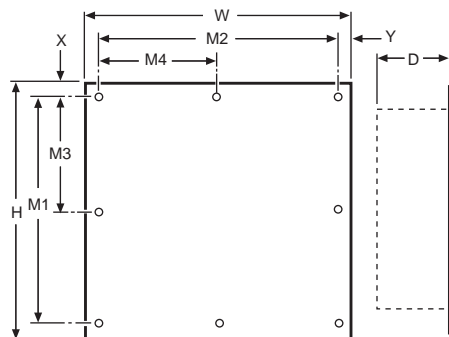
Regulation Method	Variable				
	Load Change 95%	Field Line Voltage +10%	Heating Cold-Normal	Temperature +10°C	Speed Range
Standard Voltage Feedback with IR Compensation	2%	±1%	5-12%	+2%	50:1
Optional Speed Feedback 1061C w/5PY DC Tach	0.5%	±1%	0.2%	±2%	200:1
Optional Speed Feedback 1061C w/BC42 DC Tach and Precision Reference Option 1059	0.2%	±0.1%	0.2%	±0.1% (1)	500:1

NOTE: (1) With BC 46 Tach ±0.05%, all other data the same as BC-42.

TABLE 5. CIRCUIT BREAKER FAULT INTERRUPTING CAPACITY

Maximum HP			Circuit Breaker Data				
			Type	Trip Range Amps	Cont. Rating Amps	Interrupting Rating-Symmetrical Amperes	
230V	380V	460V				230V	460V
10	15	20	HMCP	115-170	70	100,000	65,000
30	50	60	HMCP	210-560	100	100,000	65,000
75	125	150	HMCP	350-700	250	100,000	65,000
125	200	250	HMCP	350-700	400	100,000	65,000
—	250	300	MAL	2500-5000	500	30,000	30,000
—	310	400	MAL	2500-5000	600	30,000	30,000
—	400	500	MAL	5000-10000	800	30,000	30,000
—	500	600	MAL	5000-10000	1000	30,000	30,000
—	600	700	NAL	5000-10000	1200	50,000	50,000
—	700	800	NAL	5000-10000	1200	50,000	50,000
—	800	900	PB	2500-7000	1400	200,000	200,000
—	900	1000	PB	3000-8000	1600	200,000	200,000

DIMENSIONS



Model Number	Maximum Horsepower			Dimensions, Inches (mm)								
	230V	380V	460V	Panel			Mounting					
	H	W	D	M1	M2	M3	M4	X	Y			
3121S	10	15	20	27.0 (686)	29.0 (737)	8.6 (218)	26.0 (660)	28.0 (711)	—	—	0.5 (13)	0.5 (13)
3122S	30	50	60	45.0 (1143)	35.0 (889)	10.4 (264)	44.0 (1118)	34.0 (864)	22.0 (559)	—	0.5 (13)	0.5 (13)
3123S	75	125	150	45.0 (1143)	35.0 (889)	11.6 (295)	44.0 (1118)	34.0 (864)	22.0 (559)	—	0.5 (13)	0.5 (13)
3124S	125	200	250	45.0 (1143)	35.0 (889)	11.6 (295)	44.0 (1118)	34.0 (864)	22.0 (559)	—	0.5 (13)	0.5 (13)
3125S	—	300	400	86.0 (2184)	70.0 (1778)	18.0 (457)	84.25 (2140)	68.25 (1734)	42.13 (1070)	34.13 (867)	0.9 (23)	0.9 (23)
3126S	—	600	700									
3127S	—	900	1000									

FIGURE 2. 3120S Unenclosed (Panel Mounted) Configuration

TABLE 6. ENCLOSURE DIMENSIONS

Enclosure Model	Dimensions, Inches (mm) (1)							
	Enclosure				Mounting			
	H	H2 (2)	W	D	M1	M2	M3	M4
W8 (Figure 3)	30.3 (770)	—	30.3 (770)	12.0 (305)	28.5 (724)	25.0 (635)	—	—
U200 (Figure 4)	55.0 (1397)	62 (1575)	36.5 (927)	15.3 (389)	51.0 (1295)	32.0 (813)	33.5 (851)	11.0 (279)
F3 (Figure 5)	90.0 (2286)	—	72.0 (1824)	25.5 (648)	—	—	—	—

Notes: (1) Dimensions are for reference only.
(2) With Option 1039 (Penthouse).

OPERATOR CONTROLS

Table 7 lists companion operator control stations for use with Series 3120 controllers. All operator stations listed are NEMA 1, nonventilated; essential dimensions are shown in Figure 6. All control stations are suitable for use when Dynamic Braking, Option 1039, is combined with the listed options.

TABLE 7. OPERATOR CONTROL STATIONS

Catalog Number	Use With Controller Options	Control Elements		
		Pushbuttons	Toggle Switch	Potentiometer
SCS 161	Basic	Run, Stop	—	1-Turn Run
SCS 163	1022	Run, Stop	Run-Jog	1-Turn Run 1-Turn Jog
SCS 165	1019 or 1023 or 1024	Run, Stop, Jog	—	1-Turn Run
SCS 166	1004	Fwd, Rev, Stop	—	1-Turn Run

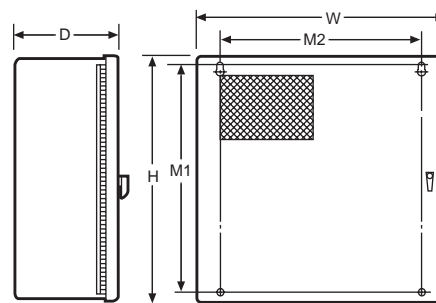
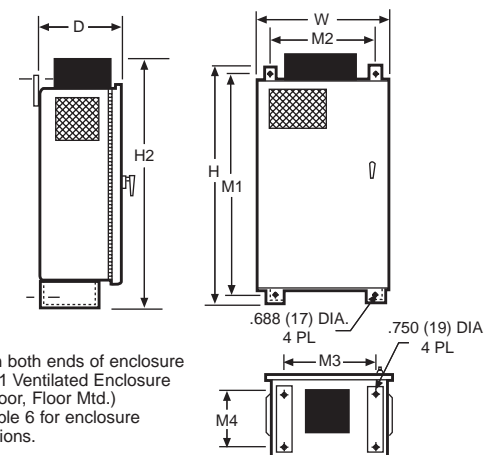


FIGURE 3. NEMA 1 Ventilated Enclosure, W8



NOTES:
(1) Vent on both ends of enclosure
(2) NEMA 1 Ventilated Enclosure (Two Door, Floor Mtd.)
(3) See Table 6 for enclosure dimensions.

FIGURE 4. NEMA 1 Ventilated Enclosure, U200

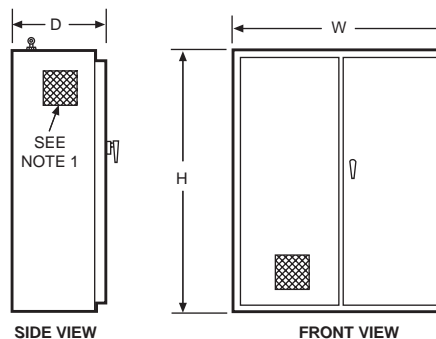


FIGURE 5. NEMA 1 Ventilated Enclosure, F3

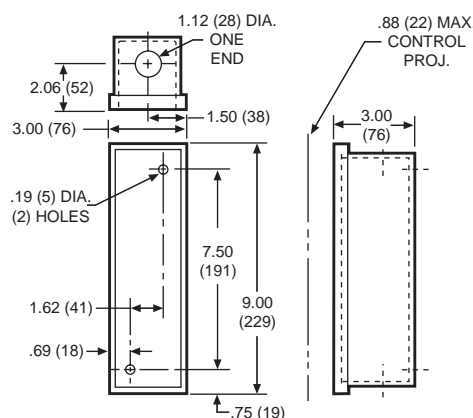


FIGURE 6. Operator Control Stations

3120



THREE-PHASE DC SERIES

POWER CONVERSION MODULES

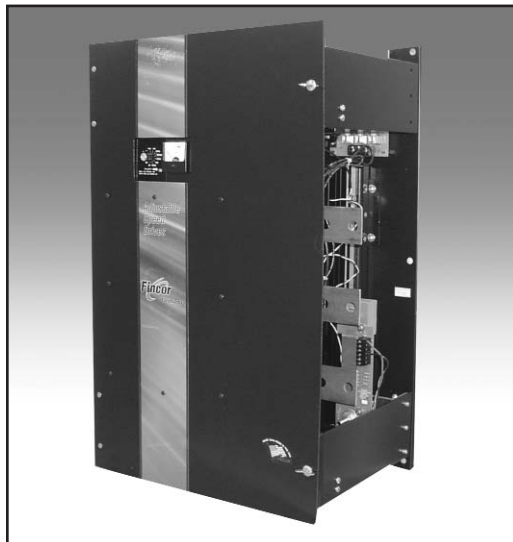


FIGURE 7. Typical 3120M Regulator Power Conversion Module

3120M – Basic six-pulse power conversion and regulator module. Offered as a chassis-mount unit for the OEM or panel builder who may want to build his own custom system by adding protective devices, armature contactor and magnetic control logic. The 3120M, shown in Figure 7, forms the nucleus of all other 3120 models. See Figure 8 for 3120M dimensions. Seven modules cover the design range of 5-100 HP and uses design features and functions 1 through 23 only.

TABLE 8. HORSEPOWER RANGE

Model Number	Rated Armature Amps. (1)	Max. Horsepower (2)		
		230V	380V	460V
3121 M	36	15	15	20
3122 M	105	30	50	60
3123 M	258	75	125	150
3124 M	426	125	200	250
3125 M	635	NA	300	400
3126 M	1120	NA	600	700
3127 M	1600	NA	900	1000

NOTES:

- (1) Armature current ratings listed are the maximum continuous rating at 100% rated load. A 150% overload capacity permits current limit operation up to one minute.
- (2) Horsepower ratings are typical. If motor data plate armature amps exceed those listed a higher rated 3120 must be selected.

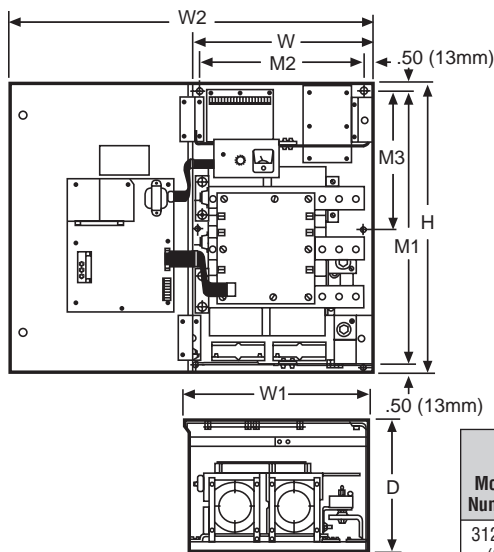


FIGURE A

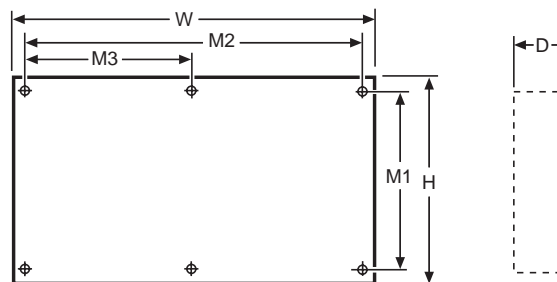


FIGURE B

Model Number	Maximum Horsepower			Weight lbs. (kgs)	Dimensions, Inches (mm) (3)									Fig.
	230V	380V	460V		Regulated Power Conversion Module				Mounting					
					H	W	D	W1	W2	M1	M2	M3	Holes	
3121M (1)	15	15	20	24 (10.8)	19.0 (483)	12.0 (305)	8.5 (216)	12.3 (312)	24.5 (622)	18.0 (457)	11.0 (279)	—	4x .281 (7) Dia.	A
3122M (1)	30	50	60	26 (11.7)	19.5 (495)	14.5 (368)	10.3 (262)	14.8 (376)	29.6 (752)	18.5 (470)	13.5 (343)	—	4x .375 (10) Dia.	A
3123M (1)	75	125	150	49 (22.1)	26.0 (660)	16.0 (406)	11.5 (292)	16.3 (414)	32.6 (828)	25.0 (635)	15.0 (381)	12.5 (318)	6x .375 (10) Dia.	A
3125M (2)	—	300	400	225 (102.3)	30.0 (762)	48.0 (1219)	11.2 (285)	—	—	28.25 (718)	46.25 (1175)	23.13 (588)	6x .41 (10.4) Dia.	B
3126M (2)	—	600	700											
3127M (2)	—	900	1000											

NOTE: (3) Dimensions are for reference only.

FIGURE 8. 3120M Regulator Power Conversion Module Dimensions

OPTIONS

The versatility of the Series 3120 controllers is further extended by selecting one or more of the following options. Table 9 lists the allowable combinations of options by Groups, Option Number and Type as well as the Section reference for a detailed description of the option.

Where functional, physical or environmental requirements demand special configurations not possible with the standard options listed. Fincor offers Custom Engineered Controllers and Systems. Custom Engineered Controllers are subject to individual quotation and are manufactured to order. Consult factory for lead time and pricing.

TABLE 9. ALLOWABLE OPTION COMBINATIONS

Remarks	Option Group	Option Number	Option	Type (4)	Mounted in Module (4)
Feedback Options: Choice of one within this group unless Option 1037 is selected. Can be combined with Option selected from all groups except Group C.	A(1)	1037	Input and Feedback Interface Board	SP	Y(6)
		1061C	Feedback, Tachometer, AC or DC	SP	Y
		1062A	Feedback, Digital Pulse Generator	SP	Y
		1064	Torque (Current) Limit Control	SP	Y
		1190	Torque Taper	SP	Y
Input Options: Choice of one within this group unless Option 1037 is selected. Can be combined with Options selected from all groups except Group C. Note: (a) Specify AC Load Current - Current transformer must be separately mounted.	B(1)	1034(Std)	Acceleration/Deceleration Linear	STD	Y
		1037	Input and Feedback Interface Board	SP	Y(6)
		1049	Follower, External DC Signal	SP	Y
		1050	Follower, External AC Signal	SP	Y
		1050A(a)	Follower, AC Current Transducer	SP/SE	Y
		1051	Follower, Master Isolated Reference Controller	SP	Y
		1055	Follower, AC or DC Tachometer Generator	SP	Y
		1057A	Follower, Digital Pulse Generator	SP	Y
		1059	Reference, Precision	SP	Y
1065	Isolator, Speed Potentiometer	SP	Y		
Input and Feedback Options: Choice of one within this group. Can be combined with Options selected from all groups except Group A and B.	C(1)	1064A	Follower, Current Regulator	SP	Y
		1191	Centerwind Torque Taper	SP	Y
		1220	Constant Velocity Winder	SP	Y
Miscellaneous Options: Choice of any or all within this group. Can be combined with options selected from any and all groups. Notes: (a) Requires Option 1076, Antiplug Protection (b) Line Reactor on Model 3121 and 3122 is mounted within the power module (c) Requires Option 1061C, Tachometer Feedback (d) Can only select 1029 or 1079, not both (e) Cannot be used with Options from Group B. (f) Does not include provisions for switching (g) Requires Option 1004 or 1004C (h) Can only select 1058 or 1058A, not both.	D(2)	1011	Circuit Breaker Handle and Enclosure Modification	s	n
		1018	Fuses, Current Limiting	S	N(6)
		1019B(g)	Job, Reverse	S	N
		1024	Preset Speed, (Independent, Adjustable)	S	N(6)
		1027(std)	Field Economy	STD	Y
		1029(c)	Field Regulator	S	N(6)
		1032	Potentiometer, Motor Operated	S	N(6)
		1037A(g)	Input and Feedback Adapter, 1-Position	S	N(6)
		1037B(f)	Input and Feedback Adapter, 2-Position	S	N(6)
		1039(a)	Dynamic Braking	S	N
		1047(e)	Controlled (Ramp) Stop	S	N(6)
		1058(h)	Follower/Manual Mode Select (Relays)	S	N(6)
		1058A(h)	Follower/Manual Mode Select (Toggle-Switch)	SE	N
		1066	Light, "Power On"	S	N(6)
		1067	Light, "Motor On"	S	N(6)
		1070	Meter, Load, Door Mounted	S	N(6)
		1070A	Meter, Speed Indicator (Analog), Door Mounted	S	N(6)
		1070B	Meter, Speed Indicator (Digital), Door Mounted	S	N(6)
		1072A	Auxiliary Contacts	S	N
		1073	Test Meter	STD	Y
1074(b)	Reactors, AC Line Inductors	S	Y(5)		
1076	Antiplug Protection (APR)	SP	Y		
1077	Field Loss Protection	S	N		
1079(d)	Field Power Supply, Constant Current	S	Y(6)		

(continued on next page)

TABLE 9. ALLOWABLE OPTION COMBINATIONS (Continued)

Remarks	Option Group	Option Number	Option	Type (4)	Mounted in Module (4)
(i) Can only select 1081B or 1081C, not both. (j) Can only select 1081B or 1081C, not both.	D(2)	1081B(i)	Torque (Current) Monitor	S	N(6)
		1081C(i)	Torque (Current) Monitor, Inverse	S	N(6)
		1085	Controller Less Enclosure	S	N
		1135	Thermal Overload, Power Bridge	S	Y
		1139	Enclosure, Larger NEMA 1	S	N(6)
		1147	Enclosure, Modification NEMA Type 12, Ventilated	S	N(6)
		1165	Paint Finish, Special	S	N
		1166	Manual, Instruction	—	N
		1170	Fans, Power Bridge	S	Y
Reversing Options: Choice of one within this group. Can be combined with options selected from any and all groups. Note: (a) Requires Options 1076, Antiplug Protection	E(2)	1004(a)	Reversing, Armature (Magnetic Control)	S	N
		1004C(a)	Reversing, Field	S	N(6)
Jog Forward Options: Choice of one within this group. Can be combined with options selected from any and all groups.	F(2)	1019	Jog, Forward (Push-Button Selection)	S	N
		1019A	Jog, Hard (Push-Button Selection)	S	N(6)
		1022	Jog, Toggle-Switch Selection	SE	N
Thread and Crawl Options: Choice of one within this group. Can be combined with options selected from any and all groups. Note: (a) Requires Option 1061C. Tach Feedback.	G(2)	1023	Thread, (Preset, Independent, Adjustable)	S	N
		1023(a)	Crawl, (Preset, Independent, Adjustable)	S	N
Blower Motor Control Options: Choice of one within this group. Can be combined with options selected from any and all groups. Note: (a) Unit-cooled motors require two blower circuits.	H(2)	1071(a)	Blower Motor Control	S	N(6)
		1071A(a)	Blower Motor Fuses	S	N(6)
Operator Control Options: Choice of any or all within this group. Can be combined with options selected from any or all groups.	K(3)	1120	Control Station	SE	N
		1120A	Potentiometer, Ten-Turn Motor Speed	SE	N
		1120B	Potentiometer, Single-Turn Motor Speed Assembly	SE	N
		1120C	Potentiometer, Ten-Turn Motor Speed Digital Counter	SE	N

NOTES: (1) Options in Groups A, B and C can be furnished as factory installed or as field kits. Group A, B and C options are simple plug-in additions.

(2) Options in Groups D, E, F, G and H are offered as factory installed only unless they are listed in the 2910 Option Description Section in which case they can be furnished as factory installed or as field kits.

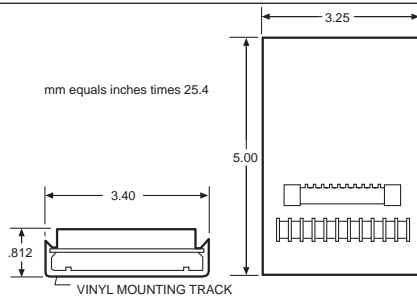
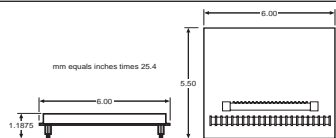
(3) Options in Group K are offered as field kits only for separate mounting.

(4) Codes: S – Standard Internal Mounted Option
SE – Standard External Mounted Option
SP – Standard Plug-In Internal Mounted Option
STD – Standard Feature
Y – Yes
N – No

(5) External to module in Models 3123 through 3127.

(6) Requires application engineering.

(7) See Option for a complete description of all options. The Option Description Section Number indicates the Section where the description is located.

Option Number	Description																													
1022	<p>Jog, Toggle Switch Selection Option includes a RUN-JOG selector switch and a JOG SPEED potentiometer for installation in the operator control panel. The RUN-JOG toggle switch (maintained) contacts in the operator station open the contactor seal-in circuit. Controller then jogs when the RUN pushbutton is pressed and held at the JOG SPEED potentiometer setting.</p> <p>Jog action is momentary, causing motor rotation only when the RUN pushbutton is depressed. This option is also suitable for reversing units where identical forward and reverse jog speeds are acceptable.</p>																													
1034	<p>Acceleration/Deceleration, Linear Permits simple potentiometer adjustments of solid-state timing circuits to establish a desired time span to attain a preset speed. The speed change is linear with respect to time, and is effective any time the speed control potentiometer is changed, not just from start-up. Acceleration and deceleration rates are independently adjustable from 1 to 30 seconds. This option is a suggested method of accelerating high inertia loads, for controlling the slowdown of high friction loads, matching the acceleration and deceleration rates of multiple drives, and other applications where acceleration and deceleration are critical.</p> <p>Where high inertia loads are encountered, the deceleration control may be limited, as the coast time may exceed the programmed deceleration time.</p> <p><i>Option 1034 consists of a small plug-in circuit board which inserts into the INPUT connector of the control circuit board.</i></p>																													
1037	<p>Feedback/Input Adapter, Interface Board Signal input or feedback circuit boards plug directly into the control board of the controller. Some applications require multiple operating modes with the ability to selectively track two or more external reference signals, i.e., a tachometer signal or an external DC signal. This option provides an extender circuit board with a terminal strip which replaces the standard input or feedback board. This brings the internal regulator circuits of the control board to screw terminal connection points. The input or feedback boards are mounted externally from the controller and wired through selection logic to the external input or feedback interface terminal board.</p>																													
1037A	<p>Feedback/Input Adapter, 1-Position Provides an assembly capable of accepting either a standard input option board or a feedback option board.</p> <p><i>Option 1037A consists of a vinyl mounting track with P.C. socket and terminal board.</i></p> 																													
1037B	<p>Feedback/Input Adapter, 2-Position Provides an assembly capable of accepting feedback and input boards or a double width board containing both the feedback and input function (i.e., Option 1191).</p> <p><i>Option 1037B consists of a base with P.C. socket and terminal board.</i></p> 																													
1049	<p>Follower, External DC Signal Provides necessary impedance matching circuitry to interface a customer supplied DC signal source with the drive controller reference input. Typical applications are those where motor speed must be controlled as a function of a process variable such as temperature, weight, flow, pressure, etc.</p> <p>In many applications, the reference signal is obtained from a process instrument controller or other commercially available transducer with a DC milliampere output. Devices of this type normally provide signal levels compatible with requirements listed in the table:</p> <p>Included are suitable adjustments for linear transfer of instrument output current to motor speed. The adjustments will normally be set so minimum transducer signal results in minimum or zero motor speed. Also provided is an adjustment to extend or compress the transducer signal output so a 5:1 transducer output signal range, for example, could provide a 10:1 or 20:1 drive speed range. Included are individual potentiometer adjustments for:</p> <table border="1" data-bbox="857 1528 1398 1871"> <thead> <tr> <th rowspan="2">DC Input Signal Range (mA)</th> <th colspan="2">Option Input Impedance (Ohms)</th> </tr> <tr> <th>Option 1049</th> <th>Option 1052</th> </tr> </thead> <tbody> <tr> <td>0-5</td> <td>80</td> <td>1000</td> </tr> <tr> <td>0-10</td> <td>40</td> <td>500</td> </tr> <tr> <td>0-25</td> <td>16</td> <td>200</td> </tr> <tr> <td>0-50</td> <td>8</td> <td>200</td> </tr> <tr> <td>1-5</td> <td>80</td> <td>1000</td> </tr> <tr> <td>2-10</td> <td>40</td> <td>500</td> </tr> <tr> <td>4-20</td> <td>16</td> <td>250</td> </tr> <tr> <td>10-50</td> <td>8</td> <td>250</td> </tr> </tbody> </table>	DC Input Signal Range (mA)	Option Input Impedance (Ohms)		Option 1049	Option 1052	0-5	80	1000	0-10	40	500	0-25	16	200	0-50	8	200	1-5	80	1000	2-10	40	500	4-20	16	250	10-50	8	250
DC Input Signal Range (mA)	Option Input Impedance (Ohms)																													
	Option 1049	Option 1052																												
0-5	80	1000																												
0-10	40	500																												
0-25	16	200																												
0-50	8	200																												
1-5	80	1000																												
2-10	40	500																												
4-20	16	250																												
10-50	8	250																												

3120



THREE-PHASE DC SERIES

<p>1049 (Cont.)</p>	<p>MINIMUM SPEED (Override) — Adjustable by the MOTOR SPEED potentiometer to establish a minimum drive speed independent of the external reference signal. The MOTOR SPEED potentiometer is also used as a manual speed setting control when no external reference signal is present. See Figure A. A MANUAL/FOLLOWER selector switch is therefore unnecessary for most applications and is not included with this option. See Option 1058A when a switch is required. The MOTOR SPEED potentiometer is mounted in the operator control station.</p> <p>IMPEDANCE MATCH — Provides a means of matching the impedance of the signal source. Also functions as a GAIN adjustment as shown by Figure B.</p> <p>OFFSET — See Figure B for adjustment range.</p> <p>IMPEDANCE MATCH and OFFSET potentiometers are mounted on the Option Circuit Board.</p> <p>This option does not provide signal isolation. It is therefore not recommended for use with units which have non-isolated regulators such as Series 3135 drive controllers unless:</p> <p>(a) The signal source is ungrounded and isolated. (b) The drive controller is isolated from the AC line with an isolation transformer when the control signal is grounded. (c) The drive controller is isolated from the AC line with an isolation transformer whenever the control signal is also connected to the control input terminals of any other drive controller(s) with non-isolated regulator(s).</p> <p><i>Whenever these conditions are not practical, Option 1052 is suggested for single drive applications, and Option 1051 with the MIRC master controller is suggested for multiple drive systems.</i></p> <p><i>Option 1049 consists of a small plug-in circuit board which inserts into the INPUT connector of the control circuit board.</i></p> <p><i>Option 1049 does not include the external signal source, Motor Speed potentiometer or optional Manual Follower selector switch.</i></p>
<p>1050</p>	<p>Follower, External AC Signal</p> <p>Provides necessary impedance matching, isolation, signal conversion and filtering as required to adjust the speed of the drive (or drives) from an external AC signal source. Option 1050 permits full range speed control from an external 0 to 115 VAC adjustable signal source manually controlled by a potentiometer, variable autotransformer or some other suitable means.</p> <p>This option is required for each controller which is to be controlled by the external AC signal.</p> <p>Included in this option are minimum and maximum speed adjustments, with the normal drive run speed potentiometer functioning as a ratio setting when following the external AC signal. This option is useful for multiple section machines where a definite speed relationship must be maintained between sections, while the entire machine is varied over a specified speed range by a common manual speed control device.</p> <p>This option consists of a small plug-in circuit board which inserts into the input connector of the control board.</p> <p><i>The option does not include the external AC signal source.</i></p>
<p>1050A</p>	<p>Follower, AC Current Transducer</p> <p>Intended for automatic control systems where it is necessary for the drive to follow an AC signal proportional to the load current of an AC constant speed, induction motor. Typical examples are conveying systems where the material feed rate has a direct influence over the loading of the AC motor, i.e: the carriage or conveyor feeding logs to a saw powered by an AC motor. Since the thickness and density of the wood is not uniform this option permits automatic adjustment of conveyor speed to the highest feed rate which will not overload the saw motor.</p> <p>In order that a proper current transformer may be supplied it is necessary that nameplate data such as horsepower, voltage, load current, etc. be provided from the AC motor.</p> <p>This illustration shows an application which requires an inverse relationship between AC motor load current and the follower drive motor speed. This option may also be programmed for a direct relationship where the follower drive would increase in speed with increasing AC motor load current. Included are independent controls and adjustments for:</p> <p>AUTO/MANUAL SELECTOR SWITCH (1) — Selects the operation function. When the switch is in AUTO position, the drive functions as an AC current follower unit. When the switch is in MANUAL position the drive functions as an adjustable speed unit. When the AUTO function is selected, the separately furnished Motor Speed potentiometer provides speed adjustment of the DC motor at a ratio from 0 to 100% of the AC input signal. When the MANUAL function is selected, the Motor Speed potentiometer provides normal manual speed adjustment of the DC motor.</p> <p>DIRECT/INVERT SLIDE SWITCH (2) — Selects the operation mode. When the switch is in DIR position, the speed of the DC drive motor varies directly proportional to the load current drawn by the AC motor. When the switch is in INVT position the speed of the DC drive motor varies inversely proportional to the AC motor load current, i.e., when the load of the AC motor increases causing it to draw more current, the DC motor speed decreases.</p> <p>BIAS (2) — Set the maximum DC motor speed for the INVERT mode of operation.</p> <p>CURRENT SCALING (2) — Matches the range of the AC input signal to the input signal range requirements of the controller.</p> <p>INTEGRATION RATE (2) — Sets the response rate of the system when the AUTO function is selected.</p> <p>MINIMUM SPEED (2) — Sets minimum speed independently of the input control signal.</p> <p>PROPORTIONAL GAIN (2) — Sets the gain of Circuit Board when the AUTO function is selected.</p> <p><i>This option consists of:</i></p> <p><i>a. Toroidal current transformer for separated mounting by the user for sensing AC motor load current</i> <i>b. A small plug-in circuit board which inserts into the input connector of the control circuit board.</i> <i>c. AUTO/MANUAL selector switch for mounting remotely.</i></p> <p>Notes: (1) Mounted in operator control station. (2) Located on circuit board</p>

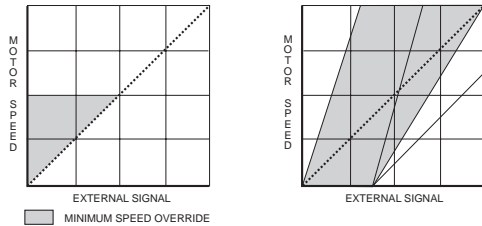
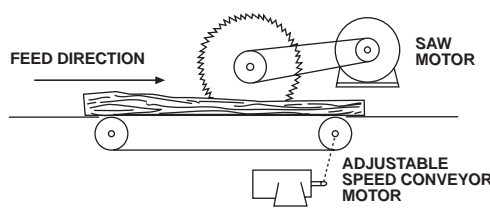
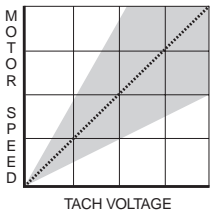
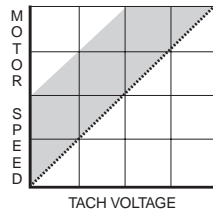
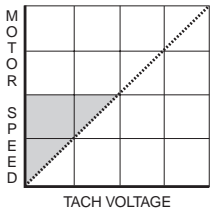


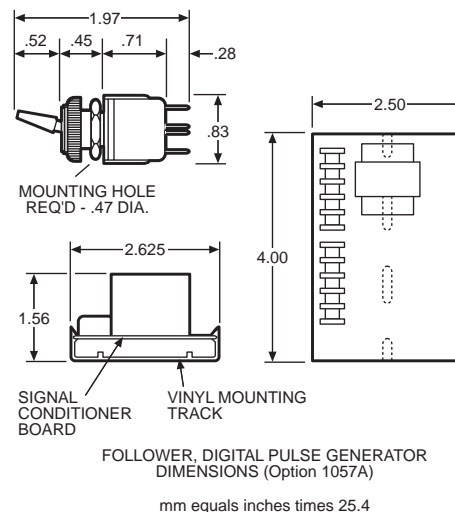
FIGURE A

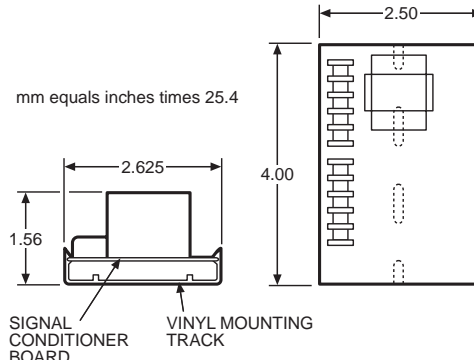
FIGURE B



Option Number	Description
<p>1051</p>	<p>Follower, Master Isolated Reference Controller (MIRC) Provides an input circuit board to interface a controller with speed reference signals transmitted by the Model MIRC101 master controller. The receiver circuit board includes necessary isolation impedance matching and frequency to analog conversion.</p> <p>This option is required for each controller whenever one or more is to be controlled by the MIRC101. Option 1051 includes adjustments for maximum ratio, minimum speed and offset as well as the separately furnished MOTOR SPEED potentiometer. The MIRC101 is a versatile master controller suggested for use whenever isolation is required between a controller and a grounded external signal source and/or signal isolation is required between multiple controllers which must track a common speed reference signal.</p> <p>All adjustments excepting the MOTOR SPEED potentiometer are mounted on the option circuit board. The MOTOR SPEED potentiometer functions as a manual speed setting device with the MASTER/LOCAL selector switch in the LOCAL position. In the MASTER position this potentiometer provides a ratio or draw adjustment.</p> <p>See Standard Specification 7140 for additional information on the MIRC101 Master Controller.</p> <p><i>Option 1051 consists of a small plug-in circuit board which inserts into a prewired connector provided for this purpose and a MASTER/LOCAL selector switch.</i></p> <p><i>This option does not include the MIRC101 Master Controller or the MOTOR SPEED potentiometer.</i></p>
<p>1055</p>	<p>Follower, AC or DC Tachometer Generator Intended for automatic control systems where it is necessary for the drive to follow the speed of a preceding drive unit or rotating machine coupled to an AC or DC tachometer generator. The tachometer voltage signal provides the speed reference for the "follower" drive.</p> <p>Option 1055 is not recommended for use where multiple drive controllers are required to operate from a common signal source, unless the controllers are isolated. A more economical approach if the controllers are not isolated would be the use of the MIRC101 master isolated reference controller which is intended for use with multiple drive controllers. See Option 1051.</p> <p>Adjustments are provided to adapt the unit to a wide range of system requirements. Included are independent adjustments for:</p> <p>TACH SCALING — Adjustable to interface the tachometer generated voltage with the required controller reference voltage when the FOLLOWER RATIO potentiometer is set on maximum. If a plus ratio is required (i.e.: the follower drive is at full speed when the master drive is at half speed) set the FOLLOWER RATIO potentiometer at its midpoint and adjust TACH SCALING for the required controller reference voltage and then adjust the FOLLOWER RATIO potentiometer toward 100.</p> <p>FOLLOWER RATIO — Adjustable to permit tracking the tachometer signal voltage at a plus or minus ratio. See Figure 1. The FOLLOWER RATIO potentiometer is mounted in the operator control panel.</p> <p>MINIMUM SPEED (additive) — Adjustable to permit tracking the tachometer signal at a fixed offset voltage. See Figure 2. MINIMUM SPEED ADDITIVE potentiometer is mounted on the Option 1055 circuit board.</p> <p>MINIMUM SPEED (Override) — Adjustable by the MOTOR SPEED potentiometer to establish a minimum drive speed independent of tachometer signal voltage. The MOTOR SPEED potentiometer is also used as a manual speed setting control when no tachometer signal is present. See Figure 3. The MOTOR SPEED potentiometer is mounted in the operator control station.</p> <p>A MANUAL/FOLLOWER selector switch is therefore unnecessary for most applications and is not included with this option. See Option 1058A when a switch is required. The MOTOR SPEED potentiometer is mounted in the operator control station.</p> <p><i>Option 1055 consists of a small plug-in circuit board which inserts into the INPUT connector of the Control Circuit Board and a FOLLOWER RATIO potentiometer for separate mounting.</i></p> <p><i>This option does not include the tachometer generator which must provide 30 volts at base speed and not to exceed 180 volts at maximum speed.</i></p> <div style="display: flex; justify-content: space-around; align-items: flex-end;"> <div style="text-align: center;">  <p>FIGURE 1. Tach Scaling and Follower Ratio</p> </div> <div style="text-align: center;">  <p>FIGURE 2. Minimum Speed Additive</p> </div> <div style="text-align: center;">  <p>FIGURE 3. Minimum Speed Override</p> </div> </div>

Option Number	Description
<p>1057A</p>	<p>Follower, Digital Pulse Generator</p> <p>This option provides signal conditioning and isolation for accepting a signal from a magnetic pulse pick-up mechanically coupled to a preceding drive motor, rotating machinery or various static pulse generators permitting the drive to follow at an adjustable ratio.</p> <p><i>This option consists of:</i></p> <ol style="list-style-type: none"> Digital to analog conversion circuit board which inserts into the INPUT connector of the control circuit board. A signal conditioning circuit board which is mounted in the base of the controller or remotely mounted. MANUAL/FOLLOWER selector switch for separate mounting. Interconnection wire harness. <p>Two modes of operation are provided: Manual and Follower, as selected by the MANUAL/FOLLOWER switch. In the Manual mode, the MOTOR SPEED potentiometer controls motor speed. In the Follower mode, the motor follows the digital pulse signal, and the MOTOR SPEED potentiometer functions as the follower ratio adjust potentiometer.</p> <p>The signal conditioner circuit board accepts the output of any one of the following devices:</p> <ol style="list-style-type: none"> Magnetic pulse pick-up capable of providing 450 pulses/second at motor base speed and not exceeding a maximum of 2500 pulses/second at motor base speed. Recommended input: 100 tooth gear on a 1150 RPM motor. 60 tooth gear on a 1750 RPM motor. 30 tooth gear on a 2400 RPM motor. Pulse generator (TTL) with a 0 to +5V output, capable of providing a minimum of 450 pulses/second at motor base speed and not exceeding a maximum of 2500 pulses/second at motor base speed. Pulse generator with an open collector output, capable of conducting 2 milliamperes at 24VDC. <p><i>This option does not include the magnetic pick-up assembly, pulse gear or other signal source, or the MOTOR SPEED potentiometer.</i></p>
<p>1058A</p>	<p>Manual/Follower Mode Select (Toggle Switch)</p> <p>This option is intended as a companion to Option 1055, Option 1049 and Option 1052.</p> <p>Options 1055, 1049 and 1052 do not include a selector switch and rely upon a zero speed setting of the MOTOR SPEED potentiometer to transfer to full automatic control by the external signal. Option 1058A, when used with these options, allows manual switch selection of either the MOTOR SPEED potentiometer or automatic control by the external signal.</p> <p><i>Option 1058A includes a switch with a MANUAL/FOLLOWER legend plate for installation in the operator control panel.</i></p>
<p>1059</p>	<p>Reference, Precision</p> <p>This option provides a high stability, precision reference circuit that replaces the function of the standard internal reference circuit in the drive controller. This circuit offers important benefits for critical applications where sensitivity to operating variables such as load changes, temperature, line voltage variations, etc. must be held to an absolute minimum. This option may be used in combination with Option 1061C, Feedback, Tachometer AC or DC.</p> <p><i>This option consists of a small plug-in circuit board which replaces the standard input board.</i></p>
<p>1061C</p>	<p>Feedback, Tachometer AC or DC</p> <p>Provides impedance matching and terminals for accepting a signal from a 2 phase AC or DC tachometer generator, mechanically coupled to the drive motor armature. The tachometer signal defeats the IR compensation circuitry in the drive controller making the unit directly sensitive to motor speed. This results in expanded speed range, improved speed regulation with load changes, and reduced sensitivity to operating conditions such as line voltage variations, ambient temperature changes, motor field heating and other operating variables. The controller will automatically switch to armature feedback if the tachometer signal is lost.</p> <p>Tachometer generator must provide 30 to 180 volts at maximum motor speed. A MAXIMUM SPEED TACHOMETER potentiometer is provided to scale the tachometer signal.</p> <p><i>Option 1061C consists of a small plug-in circuit board which inserts into the FEEDBACK connector on the control circuit board, replacing the armature feedback circuit board. Option 1061C does not include the tachometer generator.</i></p>



Option Number	Description
<p>1062A</p>	<p>Feedback, Digital Pulse Generator Provides signal conditioning and isolation for accepting a signal from a magnetic pulse pick-up mechanically coupled to the drive motor armature. The magnetic pulse pick-up must provide a minimum of 450 pulses per second at motor speed (60 tooth gear on a 1750 RPM motor). The pulse pick-up signal defeats the IR compensation circuitry in the drive controller, making the unit directly sensitive to motor speed. Speed range is limited to 35:1.</p> <p>The option results in improved speed regulation with load changes (equal to DC tachometer feedback) and reduced sensitivity to operating conditions such as line voltage variations, ambient temperature changes, motor field heating and other variables.</p> <p><i>Option 1062A consists of:</i></p> <ol style="list-style-type: none"> Digital to analog conversion circuit board which inserts into the FEEDBACK connector of the control circuit board. A signal conditioner circuit board which is mounted on the base of the controller or remotely mounted. This option does not include the pulse pick-up assembly. 
<p>1064</p>	<p>Torque (Current) Limit Control Provides the ability to adjust the drive current limit setting and thus the motor torque over a range of 50-150% by a remote mounted TORQUE ADJUST potentiometer. (See Option 1190).</p>
<p>1064A</p>	<p>Follower, Current Regulator Provides a means of controlling motor armature current and torque by a manually adjusted potentiometer or an external DC voltage reference signal. The circuit includes internal isolation permitting direct connection to a grounded signal source or the armature circuit shunt of another DC drive controller. Since torque is directly controlled independent of motor speed, provision is included for limiting maximum motor speed.</p> <p>Multiple motor applications typically involve a master speed regulated drive which establishes the speed of the system and one or more current regulated follower drive units. The follower units obtain their current reference signal from the master controller. Typical applications include:</p> <ol style="list-style-type: none"> Load sharing between two or more drive units with their motors mechanically coupled. Load sharing between two or more drive units coupled by the process material itself such as steel bar stock being pulled by multiple drive units through separately powered sections of a machine. Tension control of a web of process material being transferred between sections of a multiple section machine. <p>APPLICATION INFORMATION</p> <ol style="list-style-type: none"> Current Response time Zero to full-load current 150 Milliseconds Output Current Control Range 10:1 Signal input required for maximum current output Range 1 3.35 to 36.5 VDC Range 2 0.34 to 3.7 VDC Range 3 0.04 to 0.44 VDC Transfer linearity Input signal to output current 1% <p><i>This option consists of a plug-in circuit board which inserts into both input and feedback connectors of the control board. Included are separate adjustments for:</i></p> <p>Maximum Speed 0-Motor Base Speed Maximum Current 0-150% of rated (1) Input Scaling Adjustable to match the input signal (0.04 to 36.5 VDC) for maximum current output Current offset Adjustable for zero current output with minimum signal output. (1) 0-75% of rated achieved by adjustment of the unit current limit.</p>
<p>1065</p>	<p>Isolator, Speed Potentiometer Provides isolation between the MOTOR SPEED potentiometer and the controller. Suggested for applications where the potentiometer must be isolated from the controller or mounted more than 100 ft. (30m) from the controller. This option consists of a circuit board which plugs into the INPUT connector of the control circuit board.</p>
<p>1081B</p>	<p>Torque (Current) Monitor Provides an adjustable, static circuit that monitors motor armature current and provides a programmed shutdown of the drive under sustained overload conditions to prevent motor damage. The circuit provides greater versatility than the standard, non-adjustable overload circuit calibrated to trip whenever armature current exceeds 120% for 80 seconds.</p> <p>The static overload circuit supplements the protective benefits of the controller current limit and motor thermostat. It is especially effective in preventing motor damage when:</p> <ol style="list-style-type: none"> The motor is subjected to high torque loads at low speeds.

Option Number	Description
1081B (cont'd)	<p>Torque (Current) Monitor</p> <p>b. The current limit allows adjustments to 150% of rated armature current. Standard 1.0 service factor motors are rated for 1 minute of operation at this load. Damage or reduced motor life may result if sustained for longer periods since the current limit functions independent of time.</p> <p>c. The motor is forced cooled and must run at speeds below 50% base speed for any sustained period of time.</p> <p>Circuit includes one set of Form C, 2 amp, 120 VAC or 28 VDC rated relay contacts that may be used to signal audible or visual alarms or auxiliary control devices such as lubrication pumps, fans or valves.</p> <p>Circuit includes two adjustments:</p> <p>1. "THRESHOLD" (trip current level) 10-180% Rated Armature Amps 2. "DELAY" (time at trip current level) 1-90 seconds</p> <p>The threshold adjustment establishes the amount of armature current necessary to initiate the timing period set by the delay circuit. When the current remains above the threshold level for a period equal to the delay time setting, the relay energizes.</p> <p>The accuracy of the current monitor is not affected by ambient temperature changes within the design operating limits of the drive controller.</p>
1120	<p>Control Station</p> <p>Provides a standard model numbered remote control station for separate mounting by the user. Control elements are provided mounted within the station and wired to a terminal board.</p>
1120A	<p>Potentiometer, Ten-Turn Motor Speed (Analog Dial)</p> <p>Provides a ten-turn, 2W potentiometer, knob and analog counting dial for separate mounting by user. See Specification 7100; Table 2 for selection by product series, Figure 2 for dimensions.</p>
1120B	<p>Potentiometer, Single-Turn Motor Speed Assembly</p> <p>Provides a single-turn, 2W potentiometer, knob and dial wired to a terminal board for separate mounting by user. See Specification 7100; Table 5 for selection by product series, Figure 4 for dimensions.</p>
1120C	<p>Potentiometer, Ten-Turn Motor Speed (Digital Dial)</p> <p>Provides a ten-turn, 2W potentiometer, knob and digital counting indicator dial assembly for separate mounting by user. See Specification 7100; Table 5 for selection by product series, Figure 6 for dimensions.</p>
1190	<p>Torque Taper</p> <p>Center driven winders ideally require a reciprocal speed torque relationship (constant horsepower) to maintain constant tension throughout the range of material buildup as illustrated by Figure 1. Acceptable performance can be economically achieved for many applications with an inverse-linear speed-torque relationship provided by this option. Tension control accuracy of approximately 20% can normally be maintained from empty to full roll at a given production machine speed.</p> <p><i>This option consists of a plug-in circuit board which inserts into the FEEDBACK connector of the control circuit board, and a TORQUE ADJUST potentiometer prewired for installation in the operator control panel. Independent potentiometers are provided for:</i></p> <p>TORQUE ADJUST — Establishes maximum low speed torque as illustrated by Figure 2. The TORQUE ADJUST in combination with the SLOPE ADJUST establishes the torque available at any point throughout the operating speed range. The TORQUE ADJUST potentiometer is mounted in the operator control panel.</p> <p>SLOPE ADJUST — Establishes the slope or rate of linear torque increase with decreasing speed, throughout the operating range. Adjustable from 0 to 100% torque at maximum motor speed with minimum effect on low speed torque. See Figure 3. The SLOPE ADJUST potentiometer is mounted within the controller on the option circuit board.</p> <p>Use caution in the selection of motors for center driven windup applications where torque loads increase in inverse proportions to motor speed. Web break or other process material detectors are recommended to prevent a dangerous over-speed should the process material break.</p> <p><i>Option 1190 normally provides acceptable performance in applications where the material being wound travels a constant speed during winder roll buildup. If the process is such that the speed of the material being wound varies during winder roll buildup or if more accurate tension control is desired, see Option 1191.</i></p> <p><i>Option 1190 can also be used for constant torque applications where conventional operation of the current limit is required and remote mounting of the torque (current) potentiometer is desired. When used in this manner, the Slope adjustment is set for a vertical cut-off of motor (maximum setting) torque (current).</i></p> <div style="display: flex; justify-content: space-around;"> <div data-bbox="722 1560 911 1759"> <p style="text-align: center;">MOTOR TORQUE</p> </div> <div data-bbox="959 1560 1164 1772"> <p style="text-align: center;">50% MOTOR TORQUE 150%</p> </div> <div data-bbox="1190 1560 1395 1772"> <p style="text-align: center;">50% MOTOR TORQUE 100%</p> </div> </div> <div style="display: flex; justify-content: space-around; margin-top: 10px;"> <div data-bbox="706 1782 938 1856"> <p>FIGURE 1. "Ideal" Constant HP Curve for a Winder Application.</p> </div> <div data-bbox="959 1782 1164 1856"> <p>FIGURE 2. Torque Adjust with Taper Adjust at Maximum.</p> </div> <div data-bbox="1190 1782 1403 1879"> <p>FIGURE 3. Taper Adjust with Torque Adjust at 100% Torque Setting.</p> </div> </div>

Option Number	Description						
1191	<p>Centerwind Torque Control</p> <p>This option offers a more sophisticated solution to controlling the tension of center driven winders than Torque Taper Option 1190. Tension control is more accurate since this option produces a reciprocal speed-torque relationship which closely matches the ideal constant horsepower curve required to maintain constant tension.</p> <p>Option 1191 has provisions to accept a signal proportional to web speed from either a tachometer generator driven from the production machine feeding the winder or a potentiometer ganged to the production machine speed control. Tension control accuracy of better than 20% can normally be maintained from empty to full roll; and the control automatically compensates for changes in production machine speed.</p> <p><i>This option consists of a plug-in circuit board which inserts into both the INPUT and the FEEDBACK connectors of the control board, and a TORQUE ADJUST potentiometer pre-wired for installation in the operator control panel. Included are independent potentiometer adjustments for:</i></p> <p>TORQUE ADJUST — Sets the desired tension in the material being wound. This potentiometer is mounted in the operator control panel.</p> <p>TACH SCALING (1) — Scales the production machine tachometer signal voltage to the control requirements.</p> <p>MAX TORQUE EMPTY ROLL (1) — Establishes the torque required to maintain proper tension at high winder speed.</p> <p>MAX TORQUE FULL ROLL (1) — Establishes the torque required to maintain proper tension at low winder speed.</p> <p>TORQUE BOOST TIME (1) — Establishes the time that additional torque is supplied to accelerate the winder when the production machine speed is increased.</p> <p>Use caution in the selection of motors for center driven windup applications where torque loads increase in inverse proportion to motor speed. Also, web break or other process material detectors are recommended to prevent a dangerous overspeed should the process material break.</p> <p>An AC or DC tachometer generator with a minimum output of 30 volts at base speed and not exceeding 180 volts at maximum production machine speed or a 5K ohm potentiometer ganged to the production machine speed control is required, but not furnished as part of this option.</p> <p>(1) These potentiometers are mounted on the option circuit board.</p>						
1220	<p>Constant Velocity Winder</p> <p>This option provides an economical but accurate method of automatically controlling the tension of process material in strip, web, wire or cable form as wound by a center driven winder.</p> <p>As shown by the figure below, the option requires the use of a DC tachometer generator coupled to the process material by nip rolls, a pressure roller or capstan in a manner that will provide a continuous feedback of the velocity of the process material.</p> <p>A manually set MOTOR SPEED potentiometer establishes the desired line speed of the process material. As material builds up on the winder core, the diameter increases which would tend to increase the line speed of the material. This will produce a higher voltage output from the tachometer generator which will cause the drive motor and winder to slow down to maintain a constant velocity and uniform winder tension.</p> <p>Should a break occur in the process material, this option will automatically transfer to an adjustable minimum take up speed to minimize damage to the product and winder machinery.</p> <p>RATINGS</p> <table border="0"> <tr> <td>1. Regulation Accuracy</td> <td>2% of motor base speed</td> </tr> <tr> <td>2. Maximum Line Speed Range</td> <td>30</td> </tr> <tr> <td></td> <td style="text-align: right;">Build Ratio</td> </tr> </table> <p>Example: a 3:1 build ratio (3 ft. dia. full roll, 1 ft. dia. empty roll) = 10:1 line speed range.</p> <p>3. MOTOR SPEED potentiometer 5,000 ohms</p> <p><i>The option consists of a plug-in circuit board which inserts into both the INPUT and the FEEDBACK connectors of the control board. Included are independent potentiometer adjustments for :</i></p> <p>ADJUSTMENTS</p> <ol style="list-style-type: none"> 1. Take-Up Speed 0 to 50% of maximum speed 2. Maximum Speed Set maximum range of MOTOR SPEED potentiometer 3. Acceleration (Response Time) 1-60 sec. <p>Use caution in the selection of motors for center driven windup applications where torque loads increase in inverse proportion to motor speed.</p> <p>A DC Tachometer Generator with a minimum output of 1.0 volt at base speed and not to exceed 120 volts at maximum production machine speed and a 5K MOTOR SPEED potentiometer are required but not furnished as part of this option.</p> <div data-bbox="860 1512 1396 1764" style="text-align: center;"> </div>	1. Regulation Accuracy	2% of motor base speed	2. Maximum Line Speed Range	30		Build Ratio
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