FINCOR Automatic

2120/2130

SINGLE-PHASE DC SERIES

1/12 through 3 HP Adjustable Speed DC Motor Controllers

- 1/12 - 3 HP
- 115 or 230 V, Single Phase
- Tach Feedback
- Reversing Models
- Current Limit
- Compact “Micro Drives”
- Budget Priced
- Flexible — Modifiable with Standard Options
- NEMA 1 or NEMA 12 Enclosed Models
- Open Chassis Models
- Local and Remote Control Models
- UL Listed or UL Recognized

FIGURE 1.

TABLE 1: MODEL 2120 OPEN CHASSIS UNITS WITHOUT OPERATOR CONTROLS (1)

HORSEPOWER RANGE (5)		MODEL NUMBER	FUNCTION (3)
115V	230V		
1/12-1/2	—	2121	Run-Stop
1/12-1/2 1/12-1 (2)	1/2-1 1/2-2 (2)	2122	Run-Stop
1/12-1	1/2-3	2123	Run-Stop

NOTES:
(1) Model 2120 Units are furnished with a potentiometer rated 5K ohms, 1/2 watt for separate mounting.
(2) Requires either option 1761 for 1 HP on 115 VAC and 2 HP on 230 VAC or option 1760 for 3/4 HP on 115 VAC and 1-1/2 HP on 230 VAC.
(3) Armature contactor Run-Stop-DB, and contactor reversing and dynamic braking are provided by Options 1001E and 1004E.
(4) Panel assembly models do not include an enclosure. They are intended for mounting on a door or other panel surface through an aperture cut into the User’s NEMA 1 or NEMA 12 enclosure.
(5) Units may be easily recalibrated for any standard rating within the range of the product using trimpots.

TABLE 2: ENCLOSED UNITS AND PANEL MOUNT (4)

HORSEPOWER RANGE (5)		MODEL NUMBER	TYPE	FUNCTION
115V	230V			
1/12-1/2	1/2-1	2131P1	NEMA 1 (4) Panel Assembly	Run-Stop
1/12-1/2	1/2-1	2131P1E	NEMA 1 Enclosed	Run-Stop
1/12-1/2	1/2-1	2132P1E	NEMA 12 Enclosed	Run-Stop
1/12-1/2	1/2-1	2131P2	NEMA 1 (4) Panel Assembly	Run-Stop-Reverse
1/12-1/2	1/2-1	2131P2E	NEMA 1 Enclosed	Run-Stop-Reverse
1/12-1/2	1/2-1	2132P2E	NEMA 12 Enclosed	Run-Stop-Reverse

2120/2130

SINGLE-PHASE DC SERIES

DESIGN FEATURES AND FUNCTIONS

1. **Enclosed Models** — These units are furnished in a compact, die cast aluminum, nonventilated enclosure. NEMA 1 and NEMA 12 models are offered. See Figure 3 for NEMA 1 and Figure 4 for NEMA 12 model dimensions. The complete control assembly is mounted on the front panel which can be removed from the enclosure by removing screws. The unenclosed panel assembly can be mounted through a cut-out in the user's enclosure, see Figure 5 for cut-out dimensions.

2. **Chassis Models** — The units are furnished as a very compact open chassis consisting of the regulator/power conversion circuit board mounted to a formed aluminum chassis. Some models may be furnished with supplemental heatsink (Options 1760, 1761) to improve heat dissipation and thereby extend the horsepower range. Chassis units are dimensionally interchangeable with many competitive units. See Figure 1 for dimensions of Models 2121 and 2122. See Figure 2 for dimensions of Model 2123.

3. **Full-Wave Power Conversion** — NEMA Code K converter configuration formed of discrete devices rated 600 PIV. Converter consists of two (2) SCR's, two diodes and a free wheeling diode which provide optimum form factor for best motor performance and long service. Enclosed models use the control enclosure as an integral heatsink with the power control devices electrically isolated from the enclosure.

4. **Voltage Transient Protection** — Metal oxide suppressor across the AC line minimizes the effect of high voltage spikes from the AC power source.

5. **Tachometer Feedback** — All standard units except Model 2121 include a connection to accept a 35, 50 or 100 VDC/1000 RPM feedback signal from a motor mounted DC tachometer generator for improved speed regulation as shown in Table 4 (Unidirectional units only).

6. **Horsepower Selection** — Easily calibrated by built-in trimpots to suit individual motor horsepower ratings without special instruments, or plug-in shunts.

7. **Wiring Terminals** — Enclosed models are provided with barrier terminal strips for all external power and signal wires. Chassis models are provided with male tab wiring connectors. A terminal strip is offered as Options 1730A and 1730B.

8. **AC Line Fuse** — Enclosed models include a fuse holder for an AC line fuse mounted on the circuit board. Chassis units do not include a fuse as standard, but a fuse holder may be provided with Options 1719, 1730A or 1730B.

9. **Operator Controls** — All enclosed models include integral operator controls consisting of a speed setting potentiometer and an ON-OFF AC line power switch. Switch is maintained in ON and OFF positions. Reversing models additionally include a 3-position FORWARD-STOP-REVERSE maintained switch. Switch includes a no pass through center detent which provides anti-plug protection.

   Chassis units are controlled by external, customer furnished switches, pushbuttons, or control logic. Includes an inhibit circuit for automatic operation by switch, relay or PLC.

10. **Line Voltage Selection** — Line voltage selection is automatic without the use of jumpers or switches.

11. **Field Supply** — A full-wave, transient protected motor field supply is provided.

OPERATING CONDITIONS

1. **Line Voltage Variation** ..... ±10% of rated
2. **Line Frequency Variation** ..... ±2 Hz
3. **Ambient Temperature**
   Open Chassis Models ..... 0 to 50°C (32°F to 104°F)
   Enclosed Models ..... 0 to 40°C (32°F to 104°F)
4. **Altitude** (Standard) ..... 3300 feet (1000 meters) maximum

RATINGS

1. **Service Factor** 1.0
2. **Duty** ..... Continuous
3. **Overload Capacity** (armature circuit) (2) ..... 150% for 1 minute
4. **Operating Voltages** ..... See Table 3
5. **Run Speed Potentiometer** ..... 5k ohms, 1/2W
6. **Horsepower Range** ..... See Tables 1, 2
7. **Reference Power Supply** (1) 10VDC
8. **Line Fuse** (2) ..... Provided by others

NOTES:
(1) Units are optionally adaptable for use with 4-20 mA, and 0-10 VDC.
(2) A line fuse holder is provided as standard on 2131 and 2132 Models. Fuse clips are optional on all other models.

TABLE 3. OPERATING VOLTAGES

POWER SOURCE (Single-Phase)	OUTPUT VDC	
	Armature	Field
115V, 50 or 60Hz	0-90	100
230V, 50 or 60 Hz	0-180	200

PERFORMANCE CHARACTERISTICS

1. **Controlled speed range** – Zero to motor base speed. Speed range with respect to the specified regulation is as listed in Table 4. See Catalog Section E for continuous duty application limitations of DC Motors.
2. **Speed Regulation** – (See Table 4) - Regulation percentages listed are of motor base speed under steady-state conditions. Normal operation will result in performance equal to or better than specified.
3. **Efficiency** (Rated Speed/Rated Load)
   (a) Controller SCR regulator 99%
   (b) Complete drive with motor (typical) 85%

TABLE 4. SPEED REGULATION CHARACTERISTICS

REGULATION METHOD	Load Change 95%	Line Voltage ±10%	Field Heating Cold/Normal	Temperature ±10°C	Speed Range
Standard Voltage Feedback with IR Compensation	2%	±1%	5-12%	±2%	30:1
Optional Speed (Tach) Feedback (1)	1%	±1%	0.2%	±2%	100:1

(1) Unidirectional models only.

ADJUSTMENTS

1. **Current Limit** ..... 0-150% full-load torque (typical)
2. **Maximum Speed** ..... 60-100% of motor base speed
3. **Minimum Speed** ..... 0-40% of motor base speed
4. **IR (load) Compensation** ..... 0-100% of rated load
5. **Acceleration/Deceleration (1)** ..... 0-4 seconds

NOTES:
(1) Model 2121 Acceleration/Deceleration is 1.0 seconds fixed rate.

RATINGS & CHARACTERISTICS

TABLE 5. TYPICAL APPLICATION DATA

COMPONENT			RATINGS									
RATED HORSEPOWER (HP)			1/12	1/6	1/4	1/3	1/2	3/4	1	1-1/2	2	3
RATED KILOWATTS (kW)			0.062	0.124	0.187	0.249	0.373	0.560	0.746	1.129	1.492	2.238
1-PHASE AC INPUT (FULL-LOAD)	Line Amps	115V Unit	2.0	3.9	5.0	6.0	8.7	12.4	15.0	–	–	–
		230V Unit	–	–	–	–	4.8	5.9	8.8	12.6	15.8	24.0
	KVA		.30	.48	.58	.71	1.0	1.4	2.0	3.0	4.0	6.0
DC OUTPUT (FULL-LOAD)	Motor Armature Amps	90V	.9	2.0	2.8	3.5	5.4	8.1	10.5	–	–	–
		180V	–	–	–	–	2.7	3.8	5.5	8.2	11.6	16.0
	Motor Field Amps	100V	1.0	1.0	1.0	1.0	1.0	1.0	1.0	–	–	–
		200V	–	–	–	–	1.0	1.0	1.0	1.0	1.0	1.0
	Full-Load Torque (Lb-ft) with 1750 RPM Base Speed Motors		.25	0.5	0.75	1.0	1.5	2.2	3.0	4.5	6.0	9.0

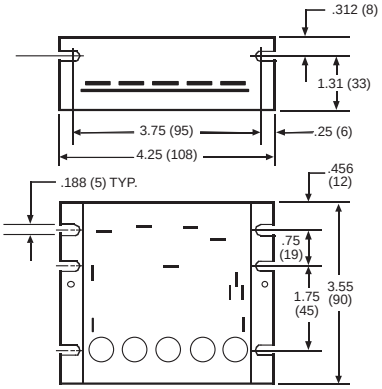

FIGURE 1. Models 2121 and 2122 Dimensions

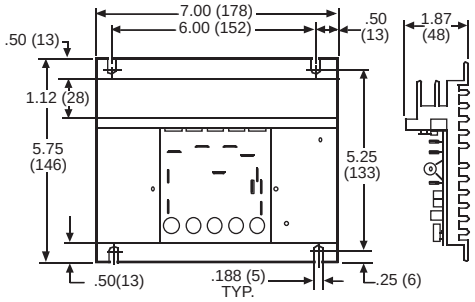

FIGURE 2. Model 2123 Dimensions

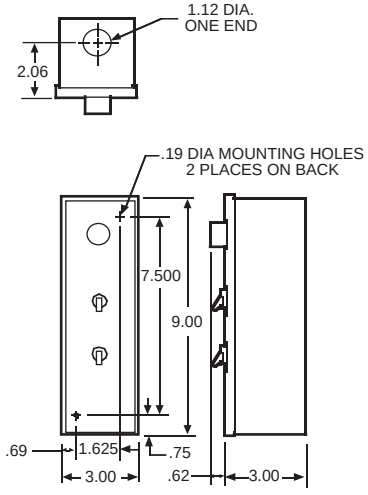

FIGURE 3. Model 2130 NEMA 1 Dimensions

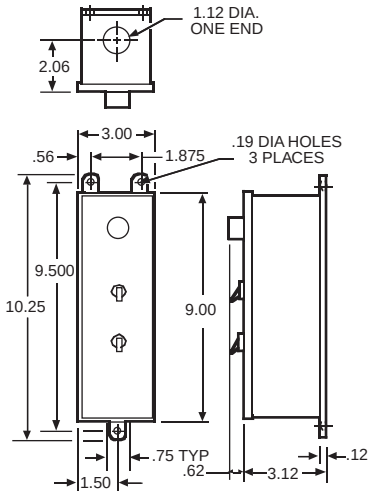

FIGURE 4. Model 2130 NEMA 12 Dimensions

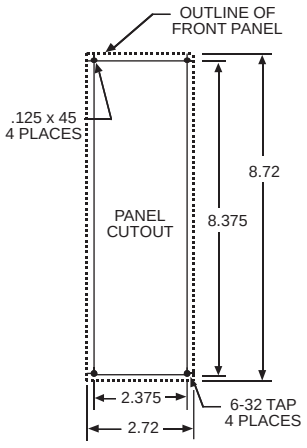

FIGURE 5. Model 2130 Panel Mounting Cut-Out Dimensions

OPTION DESCRIPTIONS

OPTIONS (KITS FOR USE WITH MODELS 2121, 2122, 2123 ONLY)

1001E

Contactor, Two-Pole with Dynamic Braking

The basic Series 2120 chassis controller is designed for Run-Stop unidirectional operation without an armature contactor. This option provides a two-pole armature contactor which is necessary whenever the application requires a positive disconnection of the rectified armature power source from the motor on a stop command. Action of the contactor is sequenced with the SCR regulator to ensure that the DC power circuit is "phased-off" before the contactor is opened. This results in "Dry switching" for improved contactor longevity. This option also includes dynamic braking which provides exponential rate braking of the DC motor armature. Included is a DB resistor with an anti-plug circuit to prevent restarting the controller until the braking cycle is complete, thereby preventing a potentially damaging electrical surge and mechanical stress.

COMPONENT	UNIT	RATED HORSEPOWER									
		1/12	1/6	1/4	1/3	1/2	3/4	1	1-1/2	2	3
Braking Torque %	115V	250	180	129	103	66	44	34	–	–	–
	230V	–	–	–	–	278	190	130	88	62	44
Stops Per Minute	115V	18	15	12	11	8	6	2	–	–	–
	230V	–	–	–	–	8	6	1	1	1	1

This option permits motor Start/Stop operation by pushbuttons or external logic in 115 or 230 VAC applications.

The DB resistor is rated for stopping a typical load, when the external machine inertia does not exceed that of the motor armature, as shown in the table.

1004E

Reversing, Armature with Dynamic Braking

This option is the same as Option 1001E except two double pole contactors are provided for reversing the DC motor armature rated 1 HP at 90 VDC armature or 3 HP at 180 VDC maximum. Anti-plug protection is provided to prevent armature reversal until a safe minimum speed is attained. The direction of motor rotation is controlled by external RUN/FORWARD-REVERSE pushbuttons, swtiches or logic. Braking times are same as option 1001E above.

1719

Fuse Block Kit

Kit includes a fuse block, lead wire with spade connectors, and mounting screw. The option provides external line fuse protection for Series 2120 chassis controllers (*fuse not included).*

1721

Knob and Dial Plate Kit

This option provides a knob and a dial face graduated 0-100% for use with the potentiometer provided with Series 2120 units.

1730 A/B

Barrier Terminal Board

Kit includes screw terminals for all external wiring, one line fuse holder, and an LED power on indicator in an assembly that plugs piggy-back onto chassis model units. *(fuse not included).*

OPTION	INPUT VOLTAGE	HORSEPOWER RATING
1730A	115 VAC	1
1730B	230 VAC	3

1731

Dual Connector Terminal Adapter

This option provides a two (male) into one (female) push-on terminal to facilitate connection of Series 2120 units for tachometer feedback and/or inhibit.

1749A

Follower, External signal

This option is intended as a low cost alternative which offers greater accuracy and flexibility. Option 1749A is capable of operating from the following isolated or nonisolated signals: 4-20 DC ma, 0-10 VDC. *This option includes a scaling potentiometer for offset adjustment.*

Dimensions 1.5" (38) X 3.38" (86) X .75" (19)

1760

Heatsink Kit (Flat)

This option consists of an extruded aluminum heatsink and hardware to mount a Model 2122 controller. This heatsink is intended for use only with Model 2122 where its greater heat dissipation permits increasing the units original rated horsepower. *Option includes special white silicone grease compound to improve heat transfer.*

INPUT VOLTAGE	HORSEPOWER RATING
115 VAC	3/4
230 VAC	1-1/2

Dimensions: 4.4375" (113) X 6.75" (171) X .875" (22)

1761

Heatsink Kit (Radial)

This option consists of a unique space saving radial design heatsink and hardware to mount to a Model 2122 controller. This heatsink is intended for use only with Model 2122 where it's greater heat dissipation permits a greater horsepower rating than when using the 1760 Flat Heatsink Kit. *Option includes special white silicon grease compound to improve heat transfer.*

INPUT VOLTAGE	HORSEPOWER RATING
115 VAC	1
230 VAC	2

Dimensions: 2" (51) X 1.375" (35) X 4.25" (108)