

## 1/4 through 600 HP Adjustable Frequency AC Motor Controllers

- 1/4-600 HP
- 208/230/460 Volts Three-Phase
- Microprocessor Based
- PID Outer Loop Control
- New Generation IGBT Power Devices
- English Word Messages, Faults, Status, and Parameters
- Enclosure Types
  - NEMA 1
  - NEMA 12 Ventilated
  - NEMA 4 & 12
  - Open Chassis
- Output Fault Protected
- Isolated Regulator
- Cool, Quiet Motor Operation
- UL/cUL/ CE Mark
- V/F, Open Loop (Sensorless) Vector, Closed Loop Flux Vector
- Input Protected MOV
- Communications RS-485 Modbus RTU



FIGURE 1. SERIES 6600 AC CONTROLLERS

### GENERAL

Fincor Series 6600 controllers are general purpose, microprocessor based, software-controlled units representing significant advances in AC drive technology. Design features include a comprehensive operator control and programming panel for digital setup, troubleshooting, and self-diagnostics. Additional capabilities include remote interrogation, digital speed input and serial communication for direct control by programmable logic controllers and computers.

The Fincor Series 6600 Controllers offer three methods of motor control:

1. Traditional Space Vector Volts per Hertz (V/F) control
2. Sensorless Torque Control (Encoderless) for improved torque control over the rated speed range.
3. Closed Loop Flux Vector Control (with the addition 1761 Encoder Feedback) for improved speed range (see Table 2).

Fincor Series 6600 controllers provide wide range adjustable speed control of conventional AC induction motors in applications exhibiting a variety of load characteristics.. The unit converts the fixed frequency and voltage of the AC line power source to a sine coded pulse width modulated (PWM) adjustable voltage and frequency output that will control induction motors over a wide speed range.

This is efficiently accomplished by a constant potential link coupled inverter system that maintains a uniformly high displacement power factor throughout the speed range without inducing undesirable voltage notch distortion back to the power source.

The power section uses insulated-gate bipolar transistors (IGBT's) operating at carrier frequencies up to 15 KHz incorporating "soft switching" technology which provides low motor noise, high starting torque, and cool motor operation. The design features of the basic units shown in Figure 1, and available options allow application of the 6600 controllers to numerous industrial applications requiring constant horsepower, constant torque, or variable torque.

#### Electrical Codes:

Fincor 6600 controllers are designed and manufactured to comply with applicable standards established by the National Electric Code, and NEMA for industrial motor and control equipment. They are UL and Canadian UL listed and CE compliant.

# 6600



## THREE-PHASE AC SERIES TABLE 1 MODEL TYPES

230VAC, 3PHASE, 50/60HZ INPUT, ENCLOSED NEMA 1					
HP	KVA RATING	AMPS	MODEL NUMBER	DIMENSIONS	WEIGHT
1/4	0.59	1.5	6611S00021A	10.24x4.33x5.12	4.8
1/2	1.1	3	6611S00051A	10.24x4.33x5.12	4.8
1	1.9	5	6611S00101A	10.24x4.33x5.71	5.5
2	3.1	8	6612S00201A	10.24x5.91x5.71	8.4
3	4.3	11	6612S00301A	10.24x5.91x5.71	8.4
5	6.7	17	6612S00501A	10.24x5.91x5.71	8.4
7.5	9.9	25	6613S00701A	10.24x8.66x7.68	13.4
10	13	33	6613S01001A	10.24x8.66x7.68	13.4
15	18	46	6614S01501A	15.75x9.84x7.68	22
20	23	59	6614S02001A	15.75x9.84x7.68	22
25	29	74	6614S02501A	5.75x9.84x7.68	23.1
30	34	87	6614S03001A	15.75x9.84x7.68	23.1
40	45	115	6615S04001A	29.7x13.5x10	70
50	57	145	6616S05001A	33.1x14.9x10.6	86
60	71	180	6601S06001A	38x14.9x10.6	106
75	85	215	6601S07501A	38x14.9x10.6	110
100	112	283	6602S10001A	41.3x21x11.2	172
125	137	346	6603S12501A	0.4x26.9x14.2	282

460VAC, 3PHASE, 50/60HZ INPUT, ENCLOSED NEMA 1					
HP	KVA RATING	AMPS	MODEL NUMBER	DIMENSIONS	WEIGHT
1/2	1.1	1.5	6611S00053A	10.24x4.33x5.12	4.8
1	1.9	2.5	6611S00103A	10.24x4.33x5.71	5.5
2	2.9	3.7	6612S00203A	10.24x5.91x5.71	8.4
3	4.3	5.5	6612S00303A	10.24x5.91x5.71	8.4
5	7.1	9	6612S00503A	10.24x5.91x5.71	8.4
7.5	10	13	6613S00703A	10.24x8.66x7.68	14.3
10	14	18	6613S01003A	10.24x8.66x7.68	14.3
15	19	24	6614S01503A	15.75x9.84x7.68	22
20	23	30	6614S02003A	15.75x9.84x7.68	22
25	31	39	6614S02503A	15.75x9.84x7.68	23.1
30	35	45	6615S03003A	29.7x13.5x10	23.1
40	47	60	6615S04003A	29.7x13.5x10	70
50	59	75	6616S05003A	33.1x14.9x10.6	82
60	72	91	6616S06003A	33.1x14.9x10.6	95
75	89	112	6601S07503A	38x14.9x10.6	97
100	119	150	6601S10003A	38x14.9x10.6	115
125	140	176	6602S12503A	41.3x21x11.2	174
150	167	210	6603S15003A	50.4x26.9x14.2	245
200	202	253	6604S20003A	53.1x21x14.2	245
250	242	304	6604S25003A	53.1x21x14.2	245
300	300	377	6605S30003A	55.1x26.9x14.2	337
350	330	415	6605S35003A	55.1x26.9x14.2	337
400	414	520	6606S40003A	57.1x26.8x17.7	562
450	466	585	6606S45003A	57.1x26.8x17.7	562
500	518	650	6607S50003A	57.1x34.6x17.7	804
600	590	740	6607S60003A	57.1x34.6x17.7	804

### MODEL TYPES

Series 6600 controllers are offered in 13 basic power frame configurations comprising 44 models covering the range of 1/4 to 600 HP as shown in TABLE 1.

## RATINGS AND CHARACTERISTICS

### OPERATING CONDITIONS

- Line Voltage Variation .....+10-15% of rated
- Line Frequency Variation.....50 or 60 Hz, ±5%
- Ambient Temperature  
Enclosed Models.....0-40°C (32-104°F)  
Chassis Models.....-10-50°C (14-122°F)
- Altitude (Standard).....3300 Feet (1000 meters) Maximum
- Relative Humidity.....5-95% Noncondensing

### RATINGS

- Horsepower Range .....1/4-600 HP
- Power Source .....208/230/460V, 3-Phase, 50 or 60 Hz
- Output Power (Three-Phase)  
(a) Voltage ..... 0-Rated  
(b) Frequency.....0.5 to 60 Hz Constant Torque  
(Constant V/Hz)  
Selectable Options .....50-400 Hz Constant HP  
(Constant V, Variable Hz)
- Service Factor .....1.0
- Duty .....Industrial, Continuous
- Overload Capacity .....150% for 1 minute  
200% for .5 second
- Linearity (Output to input).....±0.1% Maximum
- Reference Power Supply .....10 VDC
- External Reference Source (1).....0-10 VDC, 4-20ma
- Magnetic (Pushbutton) Control Voltage.....24 VDC
- Storage Temperature.....-25-65°C
- Relative Humidity.....95% Noncondensing  
(1) Isolated reference, external control signal may be grounded or ungrounded.

### ADJUSTMENTS

All adjustments are programmed digitally via the standard, integral operator panel or the standard or optional serial ports. Basic adjustments include:

- Acceleration (Linear) ..... .01-3600 Seconds up to four (4) independent accel rates selectable by digital input.
- Deceleration (Linear) ..... .01-3600 Seconds up to four (4) independent decel rates selectable by digital input.
- Minimum Speed (2).....0-50%
- Maximum Speed (2).....50-100%
- Torque Limit.....20-200% of Rated
- Jog (2).....0-100%
- Voltage Boost .....See Figure 4, Page 5
- Slip Compensation .....0-100%
- Volts/Hz Trim.....±20% of Nominal Setting
- Preset Speeds, 9 Provided (2) .....0-100%

NOTE: (2) % of Maximum Frequency Selected.

### RATINGS AND CHARACTERISTICS (Continued)

#### PERFORMANCE CHARACTERISTICS

**1. Controlled Speed Range** – Zero to motor base speed. This provides constant torque operation with either standard induction motors or synchronous types.

Constant horsepower operation at speeds above motor base speed (with induction motors only) is a standard, selectable capability. See Figure 2. Speed range with respect to the specified speed regulation is as listed in Table 2.

**2. Speed Regulation** (See Table 2) – Regulation percentages listed are of motor rated (base) speed under steady-state operating conditions.

**TABLE 2. SPEED REGULATION CHARACTERISTICS**

Regulation Method	Motor Type		Load Change 95%	Line Voltage +/- 10% (1)	Motor Heating Cold to Normal	Temperature +/-10 C (Controller and Motor)	Speed Range
	Induction	Synchronous					
Normal Volts per Hertz (2)	X	----	3.00%	0.50%	1.00%	0.25%	30:1
	----	X	0.00%	0.00%	0.00%	0.25%	60:1
Slip Comp Volts per Hertz (2)	X	----	1.00%	0.50%	0.50%	0.25%	30:1
	----	X	0.00%	0.00%	0.00%	0.00%	60:1
Normal Sensorless Torque Control (2)	X	----	0.50%	0.50%	0.50%	0.25%	100:1
	----	N/A	----	----	----	----	----
Option 1761 Encoder Feedback (3)	X	----	0.02%	0.02%	0.02%	0.25%	1000:1
	----	N/A	----	----	----	----	----

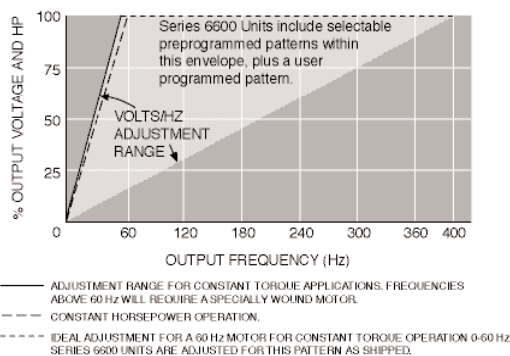
NOTES: (1) Shown at full load, full speed.  
 (2) Listed are average, expected values when using a wide range of standard motors. Results may vary with some makes.  
 (3) 1000 PPR (Min) encoder.

- 3. Frequency Resolution** (at 60 Hz)
  - (a) Analog Input.....0.02 Hz
  - (b) Digital Input.....0.01 Hz
- 4. Frequency Stability** .....0.01%
- 5. Modulation Frequency** (Selectable)..... .75-10 KHz
- 6. Efficiency** (at rated speed, rated load @ the specified carrier frequency)

Nominal Efficiency	2KHz	15KHz
Controller	97.8%	96.4%

**7. Displacement Power Factor** .....95%

**FIGURE 2. Volts/Hertz Adjustment Range**



### DESIGN FEATURES AND FUNCTIONS

- 1. Construction** – Compact, high density, dead back configuration featuring circuitry on swing-out panels, providing superior access for troubleshooting or replacement. Standard Series 6600 units are furnished in a NEMA 1 enclosure with door. All units include fans to force cooling air over shrouded fins to aid dissipation of internal heat. NEMA 1 units are intended for application indoors in nonhazardous areas.
- 2. Microprocessor Design** – Series 6600 units use a powerful 16-bit microprocessor for logic, communications, and regulator functions, while a companion custom I.C. provides the realtime control necessary for waveform generation.
- 3. Power Devices** – Series 6600 controllers use state-of-the-art new generation insulated gate bi-polar transistor (IGBT) output power switches. IGBT's require less gate drive power which reduces internal controller temperatures. Their extremely high speed switching capability produces a superior Sinusoidal PWM waveform for greater starting torque, cooler and virtually inaudible motor operation.
- 4. PWM Modulation Technique** – Series 6600 controllers use Sinusoidal PWM Control modulation for smooth, quiet motor operation. Dynamic Torque Vector Control and Flux Vector Control (with optional encoder) are available.
- 5. Operator Panel** – Series 6600 units include a versatile, digital control panel mounted in the front cover of the unit. The panel includes a membrane keypad, and a LCD display that enables its use for set-up monitoring of all controller functions and operating parameters, self diagnostic purposes, and also as a local operator control station. The operator panel is a smooth, unbroken surface which is easy to keep clean and is sealed to prevent the penetration of liquids or dust.

- A. Display – LCD display provides operating and function setup. Display is back lighted, enabling viewing in extremes of lighting conditions including total darkness. Displays motor speed, motor load and power, and indicates all programmable functions and faults in English language word messages.
- B. Visual Indicators – LED's are provided to indicate power on, direction, run/jog, stop and operating mode.
- C. Keypad Memory: Nonvolatile Keypad can be used to download parameters into other drives
- D. Keypad – 9 buttons are provided for local operator control and programming. The buttons include a raised perimeter which defines the operating area and tactile feedback provides confidence that the command has been entered. The keypad is logically designed with two operating areas, one for local operator control, and the other for programming:

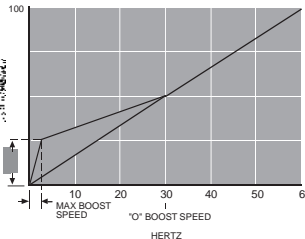


**FIGURE 3. Operator Panel**

## DESIGN FEATURES AND FUNCTIONS (Continued)

1. Local Operator Control – Buttons and their functions:
  - a. Stop (Controlled) - Local Stop
  - b. Forward – Provides forward function. Includes an LED indicator
  - c. Reverse – Provides reverse function. Includes an LED indicator.
  - d. Stop & ^ – Alternate presses activate and deactivate the Jog mode. An LED indicator is illuminated when Jog mode is selected. Jog mode makes the operation of the Forward and Reverse buttons momentary.
  - e. Stop & reset – Alternate presses activate and deactivate the auto mode. An LED indicates Remote mode has been selected. Auto mode allows speed and/or torque control commands to be accepted from alternate or external sources.
  - f. ^ – Pressing the up arrow key will increase the local run speed command, or parameter value.
  - g. v – Pressing the down arrow key will decrease the local run speed command, or parameter value.
2. FUNC/DATA – Buttons and their functions:
  - a. Prg – Selects adjustable drive parameters which can then be set with the arrow buttons.
  - b. Func/Data – Used to switch the LED monitor or to determine the entered frequency function code, or data.
6. **Operating Modes** – Series 6600 controllers provide two basic operating modes selectable by the operator panel:
  - A. Operation Mode – Permits Run-Stop-Jog-Reverse, Local Remote functions and speed control from the integral operator panel, a remote control station, or an external signal source such as a process controller.
  - B. Program Mode – Allows monitoring and adjustment of all Series 6600 parameters. Parameters are grouped logically into menus. Parameters are grouped in descending order from those most general to those more specific for operational simplicity and quick selection.
7. **Fuse Protection** – DC bus fuse, 40 hp, 460 volt and above, provides protection from internal short circuits. An external AC line fused disconnect or circuit breaker must be provided by the user in accord with national or local electrical codes.
8. **Control Power Supply** – A 24 VDC @100 mA power supply isolates all magnetic control for pushbuttons and external Run-Stop logic from the AC power source for operator protection and equipment reliability.
9. **Overvoltage and Undervoltage Protection** – Electronic shutdown when line voltage exceeds approximately +10% of maximum or –30% of minimum specified voltage.
10. **Power Loss Ride-Through** – The controller has sufficient energy storage to maintain control of the motor for at least 2 seconds whenever the AC power source is interrupted. Upon reapplication of AC line power, within 15 milliseconds, the motor will resume its set speed with a minimum of disturbance. The amount of speed droop during the power outage will be determined by the actual motor loading and other mechanical time constants.
11. **Power Loss Shut-Down** – During power interruption, if control power is lost prior to DC bus power a power loss fault is registered. If bus power is lost prior to control power, this is interpreted as a normal power down, and no fault is generated. If a phase is absent that does not create the preceding conditions, a phase-loss fault will be issued if the drive is running.
12. **Automatic Restart** – Series 6600 units may be programmed for 10 automatic restart after any or all of the faults.  
This flexible feature allows the user to program the number of tries as well as the retry time. The retry number will be indicated on the programming panel display.
13. **Start Into Rotating Motor** – The unit can be programmed to restart into a spinning motor. When programmed for this mode of operation, the 6600 can start while the motor is still spinning. The drive will not trip and the motor will not necessarily be brought to zero speed.
14. **Line Starting Capability** – The unit can be programmed to start when the main AC power is applied to its input terminals.
15. **Visual Indicators** – LED indicators are provided to monitor circuit operation and aid in troubleshooting. Included are individual LED's showing:
  - a. Red on control circuit board shows DC Bus Charged
  - b. Bar on operator panel shows FWD, REV, JOG, STOP, REM (Remote), LOC (Local), COMM.
16. **Multiple PWM Carrier Frequencies** – The user may program carrier frequencies of .75 - 15 KHz. The most efficient operation is produced at the lower carrier frequencies.
17. **AC Line Voltage Compensation** – Holds output voltage constant with rated line voltage variations when output voltage is less than line voltage (10% line voltage variation causes 1% output voltage variation).
18. **Volts/Hertz Adjustment** – Volts/Hertz may be trimmed  $\pm 20\%$  of nominal (Voltage Adjustment)
19. **Run/Stop Control** – Series 6600 controllers can be remotely started and stopped by:
  - a. 2 wire control (maintained dry contacts)
  - b. 3 wire control (momentary)
  - c. Application of AC line power
20. **Jog Control** – The 6600 features a separate jog function with unique, directional speed commands and accel/decel rates. This feature allows hard or ramp acceleration on jog without affecting run operation.
21. **Isolated Regulator** – Internal logic and control circuits are isolated from the AC power source and internal DC power circuitry for operator and equipment safety and for simplified application. Isolation eliminates the common condition of line voltage to ground potentials being present on the speed control potentiometer.
22. **P.I.D. Control** – A built in Proportional Integral Derivative control is standard in the 6600. Provides outer loop control of speed, flow, pressure, fluid level or other process variables. The PID loop may be programmed to accept setpoint/feedback input or error input. A flexible configuration scheme allows PID inputs to be either analog or digital with PID gains being separately adjustable.
23. **Dwell Feature** – Provides adjustable dwell time and dwell speed. This feature is commonly used in pumping applications. Dwell halts acceleration for a programmed period of time at a programmed frequency.
24. **Resonant Frequency Avoidance** – A frequency jump control is provided to eliminate undesirable speed related resonance in the driven machine or process. Over a range of 0-100% speed, up to three regions of programmable width of 0-30 Hz of maximum each can be selected to prevent motor operation in those regions.
25. **Multiple Motor Operation** – All motors will track the common output frequency of the Series 6600 controller. Synchronous motors are ideal for this purpose since they will provide identical motor to motor shaft speeds.

**26. Voltage Boost** – Provides improved torque capacity at lower speeds to produce 150% or greater starting torque with most standard motors. 6600 voltage boost provides a programmable voltage boost level with two frequency break points for optimum starting performances. See Figure 4.



**FIGURE 4. Voltage Boost**

**27. DC Injection Braking** – Provides effective low speed braking by injecting DC current into two motor windings. The brake time period is programmable to 30 seconds and is engaged under programmable control at stop, start, or both.

**28.** The unit is shipped programmed for 60 Hz. Patterns which permit operation above 60 Hz may require a special high speed motor.

**29. Output Protection** – Ground Fault, Line to Ground, Line to Line.

**30. Phase-Loss Protection** – The controller detects phase-loss and inhibits normal operation as necessary to prevent drive malfunction. If the phase-loss is of short duration (less than 15 milliseconds), the drive will resume normal operation with re-application of the lost phase. If the phase is lost for a longer time period, the controller interprets this as a phase loss and will shut down the drive.

**31. Over Temperature Protected** – Thermalguard in the power section will shut down the controller in the event of cooling fan failure or other causes for overheating.

**32. Analog Output** – One analog output rated 0-10 VDC at 2 mA is provided and may be programmed to follow any one of the following parameters:

- |                      |                     |
|----------------------|---------------------|
| a. Load Factor       | f. PG Feedback Volt |
| b. Motor Voltage     | g. Output Torque    |
| c. Motor Current     | h. PID Feedback     |
| d. Frequency         | i. DCLink Voltage   |
| e. Power Consumption |                     |

The output could be used with external meters or as a speed reference for other drive units in a system.

**33. Output Contacts** – One set of Form C output contacts, rated 30 VDC @ 2 mA or 250 VAC @ 300 mA, for fault annunciation. One N.O. contact programmable up to 34 status functions.

**34. Digital Control Outputs** – Four buffered open collector outputs, rated 24 VDC @ 50 mA, are available for external alarms or monitoring of up to 34 status functions.

**35. Slip Compensation** – Programmable slip compensation is provided to correct for induction motor speed droop or slip and thereby improve speed regulation up to 15.00 Hz.

**36. Electronic Inverse Time Motor Overload Protection** – Inverse time motor overload protection provides a programmable threshold and time to trip to reduce the potential of costly motor damage. NOTE: To insure motor protection, a motor thermal switch is suggested.

**37. Static Reversing Control** – Contactorless reversing is a standard capability. Requires only the selection of an operator station with reversing controls, or direction may be selected by external control contacts or the standard 6600 operation station.

**38. Protective Features** –

- A. Inverter Trip – Due to overvoltage, overcurrent, undervoltage, controller overtemperature, ground fault, motor overtemperature, overload, and CPU error. The unit will annunciate the fault.
- B. Fault History – Control stores 4 most recent faults to aid trouble shooting.

**39. Analog Signal Inputs** - Three analog signal inputs are provided. The Analog to Digital conversion resolution is 12 bit plus sign. The associated external signals may be grounded or ungrounded. All three analog inputs share the same common connection. These inputs are programmable for the following functions:

- |                       |                   |
|-----------------------|-------------------|
| a) Run Speed Command  | g) PID Error      |
| b) Jog Speed Command  | h) PID Feedback   |
| c) Torque Reference   | i) Speed Ratio    |
| d) Auto Speed Command | j) Speed Trim     |
| e) Auto Torque Limit  | k) Speed Feedback |
| f) PID Reference      |                   |

The Analog Input may be programmed for Scaling, Offset, Inversion. Signal Filtering are available for all Analog Inputs.

**40. Digital Control Inputs** – A total of 2 predefined and 9 programmable digital inputs are provided, these provide the following basic functions (sinking or sourcing).

Predefined Digital Inputs:

- a) Forward
- b) Reverse

Programmable Digital Inputs:

- a) Multi-step frequency selection
- b) Accel / Decel time select
- c) Self-hold selection
- d) Coast-to-stop command
- e) Alarm reset
- f) External Alarm
- g) Jogging
- h) Freq. setting 1 / Freq. setting 2
- i) DC inject brake command
- j) Torque Limit 1 / Torque Limit 2
- k) UP command
- l) DOWN command
- m) PID control cancellation
- n) Normal / Inverse switching
- o) Link Operation

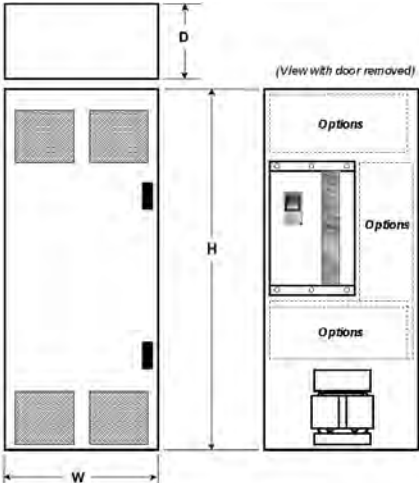
All inputs are designed for use with the 24V control voltage supplied by the 6600 controller or an external power source. The predefined Digital Inputs can be disabled if desired.

**41. Serial Communications** - An RS-485 compatible serial port is standard on the 5750. Modbus RTU is provided as the standard Communication Protocol. See PG 6600-8 for additional communication options.

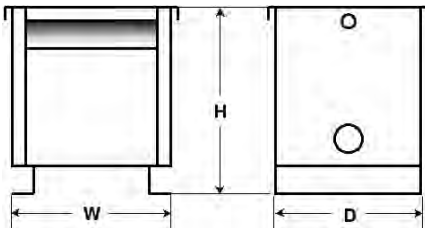
## OPTION DESCRIPTIONS

OPTION NUMBER	DESCRIPTION
1002	<p><b>Motor Contactor</b> Provides an AC output contactor that is coordinated with the drive electronics to ensure a safe, reliable shut-down and a positive disconnection of the motor from the drive. This option also ensures that upon a Run command the contactor is energized before the drive is permitted to run. This option includes a fused 115V excitation source.</p>
1010A	<p><b>AC Line Circuit Breaker</b> Provides a 3-pole, magnetic only, fast trip circuit breaker as a means of manually disconnecting the Series 6600 controller from the AC line.</p>
1011	<p><b>Circuit Breaker, Handle and Enclosure Modification</b> Provides a door mounted handle to operate the circuit breaker which is interlocked to prohibit opening the enclosure door when the circuit breaker is in the "ON" position. May be bypassed for servicing the equipment with the door open. Option 1011 is a desirable safety feature for operating personnel, and is a mandatory requirement for California Electrical Code.</p>
1045A	<p><b>Braking, Electronic</b> The braking capability of the standard Series 6600 controllers is approximately 15-20% of rated load torque. This is the limit of a typical drive to dissipate the energy regenerated from the motor and connected machine load while braking. This option includes supplemental circuitry which increases the braking capability to 100% of rated torque at motor base speed. This provides faster deceleration and improved control for overhauling loads. The braking rate is established by the standard deceleration control effective under the conditions listed: a. On a pushbutton stop command or a stop command from external control logic. b. Whenever the speed reference is reset to command a reduction in speed. c. With an overhauling load. <i>See Option 1045C for standard braking resistor packages furnished in a NEMA 1 ventilated enclosure, or you may provide your own assemblies in accord with the listed specifications.</i></p>
1045C	<p><b>Braking, Resistor Assembly</b> Option 1045A braking modules can either be used in conjunction with a Fincor Option 1045C Braking Resistor package or with user supplied resistors. This option includes a ventilated metal enclosure designed for mounting on top of standard Series 6600 enclosure or for separate mounting. The braking circuit is rated for stopping a typical load a maximum number of two stops per minute from motor base speed. A typical load is defined as: 1. Not exceeding rated-load torque. 2. External load inertia (beyond the motor shaft) not exceeding that of the motor rotor. <i>High inertia loads may extend braking times beyond the wattage rating of the power dissipation resistor. The braking circuit is not rated for continuous regeneration and should be used only where intermittent control of overhauling loads is required. The braking circuit is not a holding brake; it will not prevent a motor at rest from rotating.</i></p>
1056	<p><b>Follower, Pneumatic Control Signal</b> This option converts a 3-15 PSI pneumatic process air signal into an electrical signal which the drive can follow. Other pressure ranges are available upon special order.</p>
1058B	<p><b>Hand-Off-Auto Mode Select (Toggle Switch)</b> Factory installed to function with the keypad fast/slow control in "HAND" mode. In "AUTO" mode an external reference is required. (ex: 4-20 MADC or 0-10 VDC)</p>
1058C	<p><b>Hand-Off-Auto Mode Select (Toggle Switch) with Speed Potentiometer</b> Factory installed to function with the speed potentiometer in "HAND" mode. In "AUTO" mode an external reference is required. (ex: 4-20 MADC or 0-10 VDC)</p>
1071	<p><b>Blower Motor Control</b> Includes a 3-pole AC motor starter with 3-leg overload protection and integral circuit breaker to control and protect an AC force-ventilation blower mounted on the main drive motor. The blower is energized whenever power is applied to the controller and the optional AC line switch or circuit breaker is closed. <i>Motor blower is not included with this option.</i></p>
1074/1074A	<p><b>Line Reactors</b> Includes an assembly with three AC line reactors (chokes rated 3% impedance) connected in series with the AC supply lines. The assembly is offered in either an enclosed configuration (1074) for separate mounting or an open configuration (1074A) for mounting in an existing enclosure. These reactors oppose rapid line current changes and surges and help protect the unit from transients. Option 1074 is not normally needed when a controller is connected to the AC supply through an isolation transformer. However, Option 1074 is suggested whenever: 1. The KVA of the AC power supply is greater than three times the horsepower rating of the controller. 2. Additional transient voltage surge protection is desirable. 3. It is desirable to isolate inverter ripple currents from the AC line 4. Harmonic distortion must be reduced.</p>
1074B	<p><b>Harmonic input filter (12%THID) This is a separately mounted filter to meet IEEE-519 and is UL recognized (UL-508C).</b> Fincor Matrix Harmonic Filters provide broad band reduction of harmonics and can increase true power factor. Not only do they improve upon former broad band filtering and 12-pulse harmonic reduction techniques, but they are also suitable for a wider range of applications. Matrix Harmonic Filters offer the best value for harmonic filtering and comply with both the current and voltage distortion limits of IEEE-519.</p>
1085	<p><b>Controller Less Enclosure</b> Provides an unenclosed, panel-mount version of the controller. Caution must be used in the selection of an enclosure with adequate provisions for proper ventilation and operating environment. Temperature within the enclosure should not exceed 50°C.</p>
1120K	<p><b>Potentiometer (Motor Speed)</b> Included is a single turn, 5K ohm, 2W potentiometer and dial for mounting in a remote operator panel. The potentiometer is used instead of the Faster-Slower buttons to set the desired motor speed.</p>

### OPTION DESCRIPTIONS (Continued)

OPTION NUMBER	DESCRIPTION																											
1143A	<p><b>NEMA 12 Nonventilated Enclosure</b>            Intended for indoor use to protect the enclosed equipment against fibers, flyings, lint, dust, dirt, light splashing, seepage, dripping and external condensation of noncorrosive liquids. There shall be no openings except that oiltight mechanisms may be mounted through holes in the enclosure when provided with oil resistant gaskets. Also the doors shall be provided with oil resistant gaskets and shall require a tool to open and provisions for locking. Please Note: 1143A are available in limited HP ratings.</p>																											
1144A	<p><b>NEMA 4 Enclosures</b>            Intended for indoor use. Protects the enclosed equipment against splashing water, hose directed water, dust, lint and fibers. The NEMA 4 enclosure is totally enclosed. Please Note: 1144A are available in limited HP ratings.</p>																											
1147	<p><b>Common Nema 12 Vent Enclosure to House the drive and options.</b>  <b>This option consists of a separate NEMA 12 ventilated enclosure with ample space to mount various options.</b>  <b>Please note: Option mounting area will vary depending on options selected and HP rating.</b></p> <div style="display: flex; align-items: center;">  <div style="margin-left: 20px;"> <p style="border: 1px solid black; padding: 2px; display: inline-block;">Enclosure size will vary depending on options selected and HP rating.</p> </div> </div> <table border="1" style="margin-left: 20px; border-collapse: collapse; text-align: center;"> <thead> <tr> <th colspan="4" style="background-color: #f2f2f2;">ENCLOSURE DIMENSION CHART</th> </tr> <tr> <th rowspan="2" style="text-align: left;">Enclosure type</th> <th colspan="3">DIMENSIONS (Inch.)</th> </tr> <tr> <th>Width</th> <th>Height</th> <th>Depth</th> </tr> </thead> <tbody> <tr> <td>F12-6</td> <td>30.00</td> <td>76.13</td> <td>16.51</td> </tr> <tr> <td>F12-7</td> <td>36.00</td> <td>84.00</td> <td>29.39</td> </tr> <tr> <td>F-2</td> <td>72.00</td> <td>72.00</td> <td>25.50</td> </tr> <tr> <td>F-3</td> <td>90.00</td> <td>72.00</td> <td>25.50</td> </tr> </tbody> </table>	ENCLOSURE DIMENSION CHART				Enclosure type	DIMENSIONS (Inch.)			Width	Height	Depth	F12-6	30.00	76.13	16.51	F12-7	36.00	84.00	29.39	F-2	72.00	72.00	25.50	F-3	90.00	72.00	25.50
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1257A	<p><b>Relay output card</b>            This option provides four (4) relays with isolated form "C" contacts rated 250VAC, .3amps for customer use to annunciate the digital control outputs provided by terminals Y1 to Y4 on the 6600 drive. The power source for the relay card is supplied from the drive.</p>																											
1261E3	<p><b>Complete Magnetic Bypass</b>            With this option, the 6600 is bypassed and the motor is directly connected to the AC line. Three contactors, motor overload and circuit breaker or AC line disconnect with fuses are included in a NEMA 1 enclosure. The drive is isolated in the bypass mode.</p>																											
1265	<p><b>Multi-Drive sequencing</b>            This option provides the necessary logic to coordinate the operation of multiple Adjustable Speed A.C. Drives in a sequentially additive manner for the control of a common system parameter such as temperature, pressure, flow, liquid level, etc. A typical system would utilize a number of drive units, each sized to handle a percentage of the total system load. The benefits of this method include:</p> <ol style="list-style-type: none"> <li>1. Improve efficiency and reduced power consumption, since only the units necessary to satisfy the system demand will be energized at any give time.</li> <li>2. Reduced and/or equalized wear of the individual drive units, fans or pumps.</li> <li>3. Enhanced system reliability since the total system demand is distribute demand multiple units. Inherent back-up is provided by remaining units if any units malfunction.</li> </ol>																											
1266	<p><b>Auto Bypass</b>            Provides an automatic transfer of the motor across the line should the 6600 controller become disabled or shut down for maintenance. This option is added to option 1261E3 when required.</p>																											
1655	<p><b>Diagnostics &amp; Setup:</b></p> <p><b>B</b> Provides a cable and FINbusII-AC 6600 communications software for the setup and maintenance of the 6600. This option is a ideal tool for the monitoring and logging of parameter setup data, data logging, realtime chart recording, monitoring parameters through a windows based software.</p> <p><b>C</b> Provides the FINbusII-AC 6600 communications software for the system PC for set up and monitoring through the serial communications terminals provided as standard on the 6600.</p>																											
1701A	<p><b>Analog I/O Interface Card</b>            Provide 3 Analog Inputs (2 Volt &amp; 1 Current), and 2 Analog Outputs (1 Voltage and 1 Current). Option 1701 provides the capability to follow two additional parameters of those listed. This option may be useful for external analog monitoring devices or as a speed or torque reference for other drives in a system.</p>																											

### OPTION DESCRIPTIONS (Continued)

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1703A	<b>Digital I/O Card</b> This option Provides up to 4 digital Inputs and 3 Digital Outputs.																																																																								
1713	<b>A-C digital operator panel (Cable)</b> This option provides a: a) 2 meters, b) 5 meters, c) 10 meters, cable and connector for plug-in connection to the Series 6600 controller. The operator panel would normally be mounted in the door of a larger enclosure within which the Series 6600 enclosure is mounted.																																																																								
1714	<b>Operator panel mounting kits (external from drive)</b> <ul style="list-style-type: none"> <li>A. Provides a Keypad cable and NEMA 1 bezel kit for mounting the keypad external from the drive.</li> <li>B. Provides a Keypad cable and NEMA 4/3R bezel kit for mounting the keypad external from the drive.</li> <li>C. Provides a Keypad cable and NEMA 12 bezel kit for mounting the keypad external from the drive.</li> <li>X. Provides a Keypad cable extension per additional foot for mounting the keypad external from the drive. The standard cable is three (3) feet The maximum allowable cable length is 10 feet.</li> </ul>																																																																								
1727A	<b>LonWorks Network Interface</b>																																																																								
1727C	<b>Johnson Meta Sys N2</b>																																																																								
1727F	<b>Profibus -DP- Serial Communication Card.</b>																																																																								
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1727J	<b>Modbus Plus-Serial Communication Card.</b>																																																																								
1761	<b>Close Loop Flux Vector (Encoder Feedback)</b> Provides terminals and circuitry for accepting a digital feedback signal from a photo-optic encoder mechanically coupled to the drive motor rotor. The feedback signal replaces the slip compensation circuitry in the Series 6600 controller, making the unit directly sensitive to the motor speed. This option results in improved speed regulation with load changes and reduced sensitivity to operating conditions such as line voltage variations, ambient temperature changes, motor heating, and other variables as shown in Table 2. <b>Encoder Specifications</b> <ol style="list-style-type: none"> <li>1. Electrical: LED/Optical type</li> <li>2. Supply Voltage: +5 VDC power supply is provided in the Series 6600 controller,</li> <li>3. Channel Arrangement: Quadrature, Differential, Bi-directional</li> <li>4. Differential line drivers (TTL) are required for applications where greater than 50 feet of wiring distance separate the motor and controller.</li> <li>5. Marker Pulse: Not required.</li> <li>6. Number of Lines, Pulses Per Revolution (PPR): 1000 or 1024 PPR is standard. A performance reduction will result when lower frequency encoders are applied.</li> </ol> <p><i>This option does not include the encoder which may be selected from catalog Section 7400.</i></p>																																																																								
1761A	<b>Encoder Follower/Feedback</b> Option 1761A is identical to 1761 description except it offers the ability to accept a digital follower signal and the high performance digital follower give these products the capability to perform many tasks requiring steady state position synchronization such as following a lead encoder driven by a master drive. Typical are applications where under steady state conditions the angular displacement of two or more motor shafts must be maintained at an adjustable ratio with respect to the master drive motor.																																																																								
1778/1778A	<div style="display: flex; align-items: flex-start;"> <div style="flex: 1;"> <p><b>DC Link Reactor</b></p> <p>This option improves input power factor by reducing the RMS current required by the drive. The option also provides the additional benefit of reducing bus capacitor ripple current, yielding reduced heating and longer service life. This option is standard on Model 6602 through 6608.</p> </div> <div style="flex: 1; text-align: center;">  </div> <div style="flex: 1;"> <table border="1"> <thead> <tr> <th rowspan="2">Frame No.</th> <th colspan="3">DIMENSIONS (Inch.)</th> <th rowspan="2">Weight (lb)</th> <th rowspan="2">Loss (W)</th> </tr> <tr> <th>Width</th> <th>Height</th> <th>Depth</th> </tr> </thead> <tbody> <tr><td>6611</td><td rowspan="3">8.00</td><td rowspan="3">8.00</td><td rowspan="3">6.00</td><td>8</td><td>5</td></tr> <tr><td>6612</td><td>12</td><td>21</td></tr> <tr><td>6613</td><td>18</td><td>29</td></tr> <tr><td>6614</td><td rowspan="3">13.00</td><td rowspan="3">13.00</td><td rowspan="3">13.00</td><td>24</td><td>39</td></tr> <tr><td>6615</td><td>39</td><td>49</td></tr> <tr><td>6616</td><td>45</td><td>58</td></tr> <tr><td>6601</td><td rowspan="6">22.00</td><td rowspan="6">16.50</td><td rowspan="6">11.50</td><td>54</td><td>64</td></tr> <tr><td>6602</td><td>56</td><td>73</td></tr> <tr><td>6603</td><td>65</td><td>84</td></tr> <tr><td>6604</td><td>78</td><td>90</td></tr> <tr><td>6605</td><td>90</td><td>126</td></tr> <tr><td>6606</td><td>96</td><td>131</td></tr> <tr><td>6607</td><td rowspan="3">20.00</td><td rowspan="3">14.80</td><td rowspan="3">14.80</td><td>105</td><td>133</td></tr> <tr><td>6608</td><td>105</td><td>150</td></tr> <tr><td>6609</td><td>110</td><td>205</td></tr> <tr><td>6610</td><td></td><td></td><td></td><td>116</td><td>215</td></tr> </tbody> </table> </div> </div>	Frame No.	DIMENSIONS (Inch.)			Weight (lb)	Loss (W)	Width	Height	Depth	6611	8.00	8.00	6.00	8	5	6612	12	21	6613	18	29	6614	13.00	13.00	13.00	24	39	6615	39	49	6616	45	58	6601	22.00	16.50	11.50	54	64	6602	56	73	6603	65	84	6604	78	90	6605	90	126	6606	96	131	6607	20.00	14.80	14.80	105	133	6608	105	150	6609	110	205	6610				116	215
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1779/1779A	<b>Output Reactor</b> This option filters the AC output to provide the following benefits: <ol style="list-style-type: none"> <li>a. Quiet motor operation at low carrier frequencies.</li> <li>b. Elimination of ground fault due to DV/DT.</li> <li>c. Reduced DV/DT stress on motor windings at higher carrier frequencies.</li> </ol>																																																																								
1788/1788A	<b>Motor Protection Filter</b> This LC filter provides a higher level of filtering of the AC output than Option 1779. Benefits include: <ol style="list-style-type: none"> <li>a. Reduced DV/DT stress on motor windings.</li> <li>b. Reduced peak voltage on the motor.</li> <li>c. Reduced high frequency energy in motor lead</li> <li>d. Extend Motor Life</li> <li>e. Reduce Motor Temperature</li> </ol> <p><i>This option is useful with 460V motors under 3 HP which may be sensitive to peak voltage and DV/DT.</i></p>																																																																								