

### 1/4 through 3 HP Adjustable Frequency AC Motor Controllers

- 1/4-3 HP
- 115/230/460 Volts Single Phase or Three-Phase
- 16 KHz Carrier Frequency
- 50°C (122°F) Ambient
- New Generation IGBT Power Devices
- Enclosure Types:  
(IP20 Protected Chassis)  
(IP65 NEMA 4)
- Output Fault Protected
- Isolated Regulator
- Cool, Quiet Motor Operation
- UL/cUL/ CE Mark
- V/Hz PWM control
- No Derating For Single Phase
- DIN Rail Mounting
- Alarm History
- DC Injection Braking
- 200 Hz Maximum Frequency
- DB Braking on Selected Units



FIGURE 1. SERIES 5740 AC CONTROLLERS

#### GENERAL

Fincor Series 5740 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 preset speed input and direct control by programmable logic controllers and computers.

The Fincor Series 5740 Controllers offers Traditional Volts per Hertz (V/F) control

Fincor Series 5740 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 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 16 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 5740 controllers to numerous industrial applications requiring constant horsepower, constant torque, or variable torque.

#### Electrical Codes:

Fincor 5740 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.

## THREE-PHASE AC SERIES

### TABLE 1 MODEL TYPES

115VAC, 1 phase, 50/60Hz Input, IP20 Open				
HP	AMPS	MODEL NUMBER	DIMENSIONS HxWxD (Inches)	WEIGHT (lbs)
1/4	1.4	5741C00241A	5.20x2.84x8.65	2.3
1/2	2.3	5741C00541A	5.20x2.84x8.65	2.3
1	CF	5741C01041A	5.20x2.84x8.65	2.3

230VAC, 3 phase, 50/60Hz Input, IP20 Open				
HP	AMPS	MODEL NUMBER	DIMENSIONS HxWxD (Inches)	WEIGHT (lbs)
1/4	1.4	5741C0021A	5.20x2.83x4.65	1.7
1/2	2.3	5741C0051A	5.20x2.83x4.65	1.72
1	4.2	5741C0101A	5.20x2.83x4.65	1.81
2	7.5	5741C0201A	5.63x4.64x6.86	4.3
3	10.5	5741C0301A	5.63x4.64x6.86	4.52

460VAC, 3 phase, 50/60Hz Input, IP20 Open				
HP	AMPS	MODEL NUMBER	DIMENSIONS HxWxD (Inches)	WEIGHT (lbs)
1	2.3	5742C0103A	5.63x4.64x6.86	3.53
2	3.8	5742C0203A	5.63x4.64x6.86	3.57
3	5.2	5742C0303A	5.63x4.64x6.86	3.7

115VAC, 1 phase, 50/60Hz Input, NEMA 4 Indoor				
HP	AMPS	MODEL NUMBER	DIMENSIONS HxWxD (Inches)	WEIGHT (lbs)
1/4	1.4	5742S00241A	8.46x5.51x7.19	7.27
1/2	2.3	5742S00541A	8.46x5.51x7.19	7.27
1	4.2	5742S01041A	8.46x5.51x7.19	7.27

230VAC, 1 or 3 phase, 50/60Hz Input, NEMA 4 Indoor				
HP	AMPS	MODEL NUMBER	DIMENSIONS HxWxD (Inches)	WEIGHT (lbs)
1/4	1.4	5741S0021A	8.49x5.51x7.19	7.05
1/2	2.3	5741S0051A	8.49x5.51x7.19	7.05
1	4.2	5741S0101A	8.49x5.51x7.19	7.05
2	7.5	5741S0201F	11.61x9.13x8.32	13.23
3	10.5	5741S0301F	11.61x9.13x8.32	13.45

460VAC, 1 or 3 phase, 50/60Hz Input, NEMA 4 Indoor				
HP	AMPS	MODEL NUMBER	DIMENSIONS HxWxD (Inches)	WEIGHT (lbs)
1	2.3	5741S0103A	11.61x9.13x8.32	12.57
2	3.8	5741S0203F	11.61x9.13x8.32	13.01
3	5.2	5741S0303F	11.61x9.13x8.32	13.23

### MODEL TYPES

Series 5740 controllers are offered in 2 basic power frame configurations comprising 22 models covering the range of 1/4 to 3 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 .....-10-50°C (14-104°F)
  - Chassis Models .....-10-50°C (14-104°F)
- Altitude (Standard) .....3300 Feet (1000 meters) Maximum
- Relative Humidity .....5-95% Noncondensing

### RATINGS

- Horsepower Range .....1/4-3 HP
- Power Source .....115/230/460V, 1/3-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 .....60-200 Hz Constant HP  
(Constant V, Variable Hz)
- Service Factor .....1.0
- Duty .....Industrial, Continuous
- Overload Capacity .....150% for 1 minute
- Linearity (Output to input) .....±0.1% Maximum
- Reference Power Supply .....10 VDC
- External Reference Source (1) .....0-10 VDC, 4-20ma, 0-20ma

## RATINGS AND CHARACTERISTICS (CONTINUED)

- Magnetic (Pushbutton) Control Voltage .....12 VDC

### ADJUSTMENTS

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

- Acceleration (Linear) .....1-999 Seconds up to four (4) independent accel rates selectable by digital input.
- Deceleration (Linear) .....1-999 Seconds up to four (4) independent decel rates selectable by digital input.
- Minimum Speed .....0-200Hz
- Maximum Speed .....0-200Hz
- Current Limit .....50-100% of Rated
- Voltage Boost .....See Figure 4 (0-10%)
- Preset Speeds, Provided .....0-100%

## PERFORMANCE CHARACTERISTICS

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

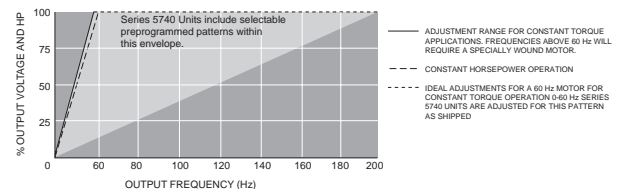
- NOTES: (1) Shown at full load, full speed.  
(2) Listed are average, expected values when using a wide range of standard motors. Results may vary with some makes.

- Frequency Resolution (at 60 Hz)
  - (a) Analog Input .....0.06%
  - (b) Digital Input .....0.01%
- Frequency Stability .....0.01%
- Modulation Frequency (Selectable) .....4-16 KHz
- Efficiency (at rated speed, rated load @ the specified carrier frequency)

Nominal Efficiency	4KHz	8KHz
Controller	95.7%	94.1%

- Displacement Power Factor 95%

### FIGURE 2. Volts/Hertz Adjustment Range



### DESIGN FEATURES AND FUNCTIONS

1. **Construction** – Compact, high density, dead back configuration, providing superior access for troubleshooting or replacement. Standard Series 5740 units are furnished in a IP65 NEMA 4 enclosure and 1P20 (chassis). Units above 1HP include fans to force cooling air over shrouded fins to aid dissipation of internal heat. NEMA 4 units are intended for application indoors in nonhazardous areas.
2. **Microprocessor Design** – Series 5740 units use a powerful 16-bit microprocessor for logic, and regulator functions.
3. **Power Devices** – Series 5740 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 5740 controllers use Sinusoidal PWM Control modulation for smooth, quiet motor operation.
5. **Operator Panel** – Series 5740 units include a versatile, digital control panel mounted in the front cover of the unit. The panel includes a membrane keypad, and a LED 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** – LED display provides operating and function setup. Displays motor speed, motor load and power, and indicates all programmable functions and faults.
  - B. **Visual Indicators** – LED's are provided to indicate Run, Panel Control and Operating Mode.
  - C. **Keypad** – 5 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:
    1. **Local Operator Control** – Buttons and their functions:
      - a. **RUN/STOP** — Press to start operation, Press again to stop
      - b. **^** – Pressing the up arrow key will increase the local run speed command, or parameter value.
      - c. **v** – Pressing the down arrow key will decrease the local run speed command, or parameter value.
    2. **DSP/FUN** – Buttons and their functions:
      - a. Selects adjustable drive parameters which can then be set with the arrow buttons.
    3. **DATA/ENT** – Used to switch the LED monitor to enter frequency function code, or data.
6. **Operating Modes** – Series 5740 controllers provide two basic operating modes selectable by the operator panel:
  - A. **Operation Mode** – Permits Run-Stop 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 5740 parameters. Parameters are grouped in descending order from those most general to those more specific for operational simplicity and quick selection.
7. **Fuse Protection** – 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 12 VDC @ 50 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.
12. **Automatic Restart** – Series 5740 units may be programmed for automatic restart after any or all of the faults.
 

This flexible feature allows the user to program the number of tries.
13. **Start Into Rotating Motor** – The unit can be programmed to restart into a spinning motor. When programmed for this mode of operation, the 5740 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 is a Power ON LED.
16. **Multiple PWM Carrier Frequencies** – The user may program carrier frequencies of 4 - 16 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** – Fixed up to 60Hz adjustable to 200 Hz
19. **Run/Stop Control** – Series 5740 controllers can be remotely started and stopped by:
  - a. 2 wire control (maintained dry contacts)
  - b. 3 wire control (momentary contacts)
  - c. Application of AC line power
20. **Fault History** – Control stores 3 most recent faults to aid troubleshooting.
21. **Isolated Regulator** – Internal logic and control circuits are isolated



FIGURE 3. Operator Panel

## THREE-PHASE AC SERIES

### DESIGN FEATURES AND FUNCTIONS (Continued)

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. Multiple Motor Operation** – All motors will track the common output frequency of the Series 5740 controller. Synchronous motors are ideal for this purpose since they will provide identical motor to motor shaft speeds.

**23. Voltage Boost** – Provides improved torque capacity at lower speeds with most standard motors. 5740 voltage boost provides automatic programmable voltage boost by selecting V/F pattern points for optimum starting performances. See Figure 4.

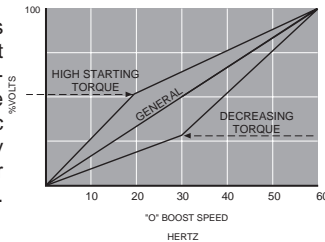


FIGURE 4. Voltage Boost

**24. DC Injection Braking** – Provides effective low speed braking by injecting DC current into two motor windings. The brake time period is programmable to 25 seconds and is engaged under programmable control at stop, start, or both.

**25. Electronic Braking** – The 5740 is equipped with the circuitry for 20% braking. Additional Braking torque is available. see opt. 1045C.

**26. Output Protection** – Ground Fault, Output, Short Circuit.

**27. 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.

**28. Analog Output** – One analog output rated 0-10 VDC at 2 mA is provided to provide frequency.

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

**29. Output Contacts** – One set of NO output contacts, rated 250 VAC, 30 VDC @1 mA , for fault annunciation, run mode signal, or at frequency speed.

**30. 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.

**31. 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.

**32. Analog Input** - 0-10 Volt, 20-4 or 4-20 ma can be programmed for reference.

**33. Digital Control Inputs** – A total of 2 programmable digital inputs are provided, these provide the following basic functions.

- A. Jog
- B. Preset Speed (up to 3)
- C. External Emergency Stop Signal
- D. Immediate Shut Down (Enable)
- E. Reset

All inputs are designed for use with the 12V control voltage supplied by the 5740 controller or an external power source.

### OPTION DESCRIPTIONS

OPTION NUMBER	DESCRIPTION
1149A	<b>DIN Rail Mounting Kit</b> This option enables the control to be mounted on a standard 35mm DIN rail, simplifying installation and maximizing available real estate
1074C	<b>EMI Filter</b> Class B Filter (FCC class A, Class B, and VDE 0871 Class A)
F	<b>RFI Filter Required For CE Applications</b> Must be ordered with drive. Not available as a separate option.
C	<b>Option Includes power ON/OFF switch, RUN/STOP switch, and Speed Pot</b>
1045C	<b>Braking Resistor</b> This option is designed 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 Defined typical load is defined as" <ol style="list-style-type: none"> <li>1. Not exceeding rated-load torque.</li> <li>2. External load inertia (beyond the motor shaft) not exceeding that of the motor rotor</li> </ol> <p><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>