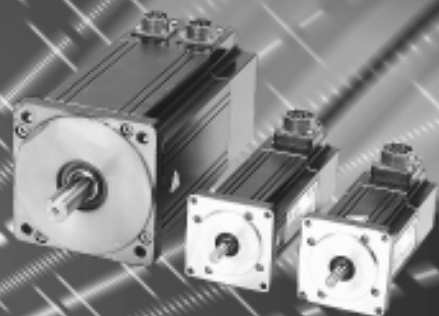


## G Series Digital Drives



**ORMEC**  
**ULTRADRIVE**



# DIGITAL DRIVES:

Digital signal processors (DSPs) bring new level of software sophistication, ease of use and

UltraDrive™ G Series digital drives bring new levels of DSP-based servo performance, ease of use and value to digital servodrives.

Eight drive models range from 290 to 15,000 watts, and offer continuous current output from 2.4 to 60 amps RMS/phase. All G Series drives utilize reliable IGBT-based intelligent power modules and provide a cost effective solution for today's motion control applications. UltraDrive™ G Series drives operate on 115 or 230 VAC input power, and provide both output short circuit and overvoltage protection.



stored in Flash memory. All user configurations are done in software using axis configuration tools in our UltraTools™ software. Motor types are selected from a database of ORMEC standard products or the custom motor editor can be used to add other motor types to the database.

ORMEC AC brushless servomotors can be used with the G series drives to provide continuous stall torques from 3 to 665 lb-in (0.56 to 75 Nm) and speeds up to 7,000 RPM. Or G Series drives can be used with any servomotors incorporating either Hall sensors (trapezoidal commutation) or Hall sensors plus encoders (sinusoidal commutation).



G Series Brushless Servomotors

Consult ORMEC for OEM applications of user-supplied brushless rotary or linear motors -- as well as DC brush-type and voice coil motors.

### DSPs = Digital Servo Performance

Digital signal processors (DSPs) and smart IGBT power blocks implement an all-digital system that provides software to eliminate internal analog circuitry — simplifying drive/motor matching and system tuning. All drive adjustments are in software, eliminating the need to “tweak” potentiometers, jumpers, R/C networks and switches. The result is greater simplicity and consistency in commissioning drives, as well as increased reliability.

### Performance & Flexibility

G Series drives combine all-digital operation with DSP technology to produce fast update rates and current loop bandwidths up to 1200Hz. High bandwidth current loops teamed with high resolution motor feedback combine for quick and accurate torque and velocity control.

UltraDrive™ G Series drives have no pots, jumpers or field component changes whatsoever. Even factory adjustments are digital, automatically calibrated and



#### A Willingness to Customize for OEMs ...

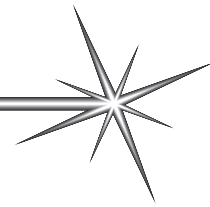
Talk to us about your individual needs for motion applications. The UltraDrive G Series has been designed to conveniently support custom features -- and many enhancements can be easily installed in the final cell of our JIT manufacturing facility.

### UltraDrive G Series Performance Specifications

Drive Power	Units	G03	G05	G10	G17	G20	G25	G35	G60
Continuous Output Current	Amps RMS/phase	2.4	4.1	8.2	14	16	25	35	60
Peak Output Current	Amps RMS/phase	4.2	7.1	14	24	28	50	70	120
Input Voltage	VAC RMS	115/230	115/230	115/230	115/230	115/230	230-3ph	230-3ph	230-3ph
Rated Output Power	Watts	290	490	2,000	3,300	3,900	6,000	8,400	15,000
Output Switching Frequency	kHz	20	20	20	10	10	10	10	10
Input Current at Rated Output	Amps RMS/phase	2.7	4.5	5.2	8.8	10.3	15.8	22.1	37.9
Continuous Regen Power	Watts*	N/A	N/A	600	900	900	5,700	7,000	8,400

\* Requires externally-mounted regen resistor

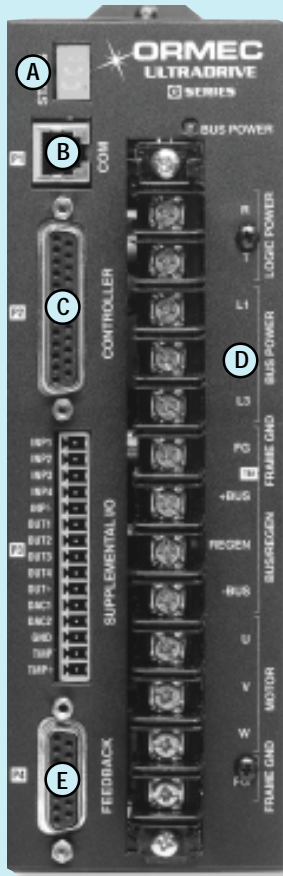
# PERFORMANCE & VALUE!



flexibility to digital servodrives — along with outstanding value.

## G Series Digital Drives --- At a Glance

- ✓ **Continuous output currents** from 2.4 to 60 amps RMS/phase.
- ✓ **Digital design** replaces all manual drive setup including tweaking potentiometers, jumpers and resistor/capacitor networks.
- ✓ **Small footprint** and compact packaging provides high power density and reduces control cabinet space requirements.
- ✓ **Sinusoidal commutation** provides low torque ripple.
- ✓ **Integral shunt regulators** add protection.
- ✓ **UL/CE approvals**



**(A) Seven-segment status LED:** Convenient interface to system status & faults including: (1) RMS current limit; (2) Output short; (3) Bus overvoltage; (4) Motor overtemperature; (5) Heatsink overtemp; (6) Servodrive command saturated; (7) Feedback Fault and; (8) Drive ready indicator.

**(B) COM Port:** Easy access to RS-232 serial communications (ASCII protocol), drive command & system parameters by motion controllers, PLCs and PCs.

**(C) Motion Controller Interface:** Single connector access to drive controls including analog inputs for torque or velocity control, encoder reference outputs and optically isolated enable and reset.

**(D) Integral power supply:** Universal voltage input (115/230 VAC) without modifying drive improves reliability by decoupling drives in multi-axis applications.

**(E) Interface rotary and linear brushless servomotors:** Motor parameters definable in revolutions or linear length. High encoder input rate allows high speed, accurate positioning.

### Torque Mode Control

The power of DSPs allows the G Series drives to implement elegant control algorithms for high performance, torque mode control.

The current loop is updated every 100 microseconds and, coupled with efficient current loop algorithms, produces current loop performance for demanding applications. Advanced sinusoidal commutation achieves low torque ripple & improves motor efficiency -- lowering motor heat losses and increasing application margin.

The G Series provides current loop control that's beyond simple PI control. Most digital drive current loops accommodate simplistic load models that introduce a single pole. The current loops in the G Series implement P+Lead-Lag compensators to accommodate more complex dynamic load models that may introduce a pole and a zero. The results: greater dynamic bandwidth in the current loop and more robust servo performance.

Tri-state modulation technology cuts switching losses in half compared to traditional modulation techniques, and increases bandwidth near zero crossover, where most drives become non-linear. Our unique approach to PWM (pulse-width modulated) switching enables higher frequency output and allows use of low inductance brushless motors including basket-wound and circuit board motors.

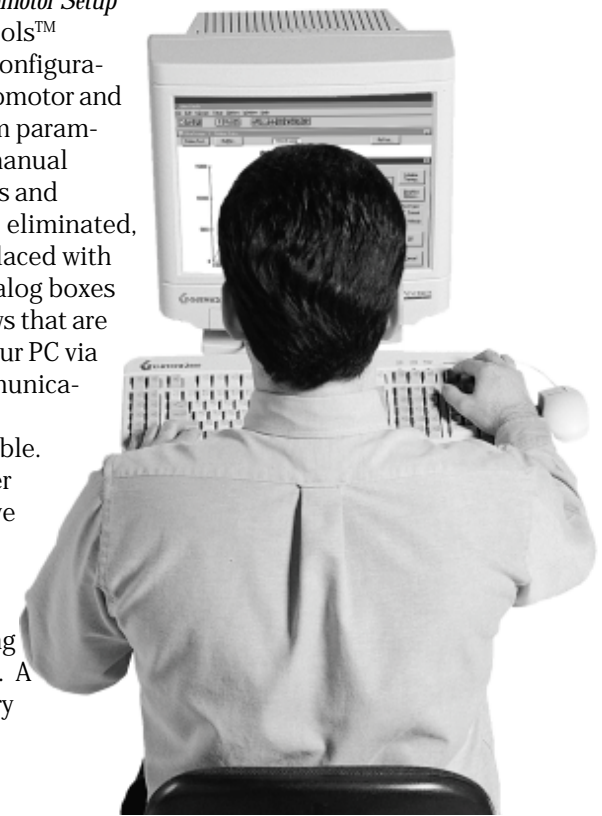
### UltraTools™ Software

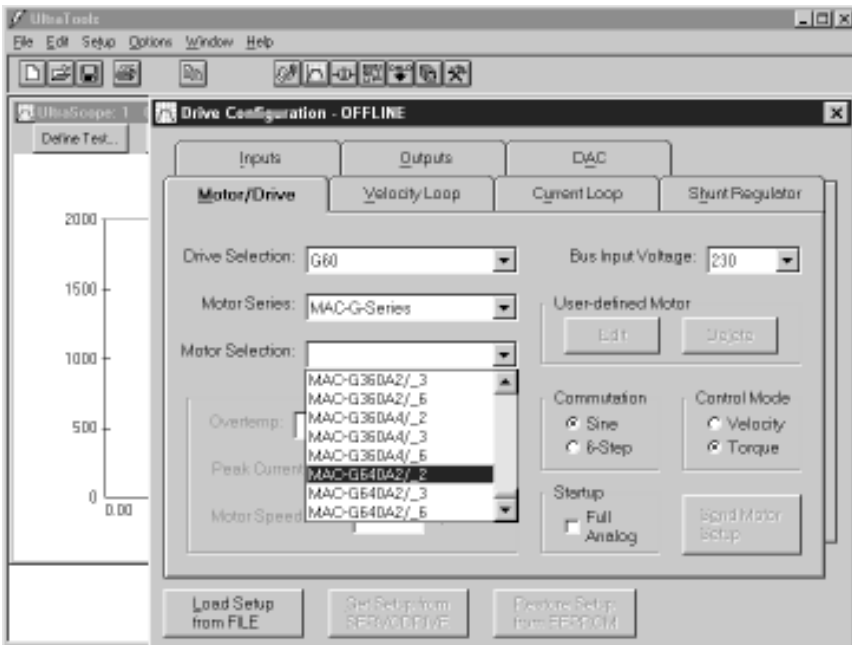
UltraTools™ is an integrated set of Windows 95/NT software development and troubleshooting tools which provide a graphical user interface and simplify G Series drive setup, operation and maintenance.

### Drive & Servomotor Setup

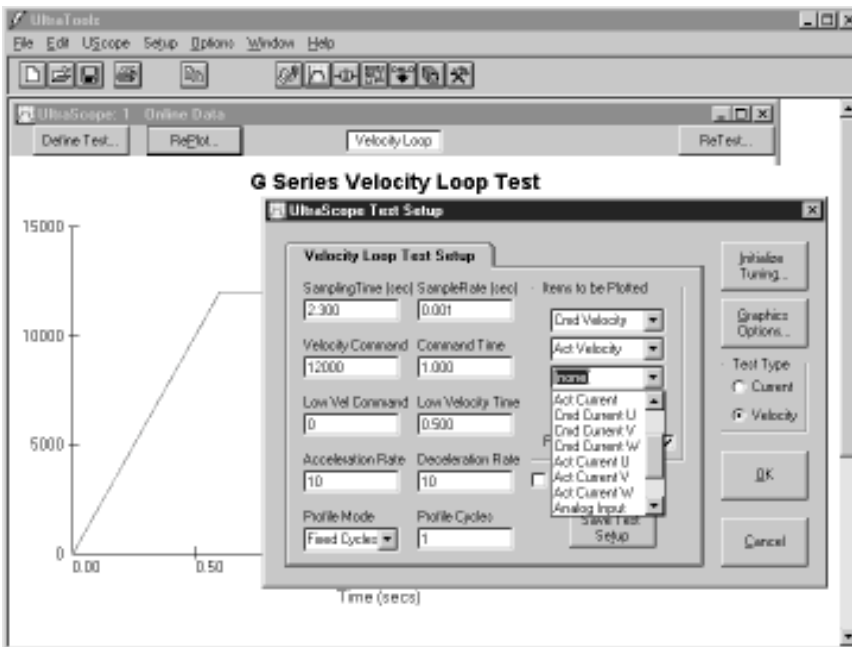
UltraTools™ simplifies configuration of servomotor and drive system parameters. All manual adjustments and settings are eliminated, and are replaced with software dialog boxes and windows that are linked to your PC via serial communications and a standard cable.

The user defines drive & motor setup, and selects initial tuning parameters. A motor library





UltraTools provides a powerful graphical user interface to simplify setup, operation and maintenance of G Series drives. The development software provides an easy to use, consistent interface and all drive setup parameters are in software -- conveniently eliminating manual adjustments.



UltraScope provides a convenient digital scope for viewing, monitoring and adjusting motion performance. Tuning parameters can be easily adjusted, and system performance evaluated interactively for optimal system performance.

defines standard configurations for all standard ORMEC servomotors, and can be expanded for user-defined motors.

### UltraScope

UltraScope is a digital scope that uses the data sampling capabilities of the G Series drive to provide a visual picture of motion performance. A user can easily define a test motion profile, and adjust tuning for optimal performance. UltraScope allows the user to view (plot) all the standard motion parameters -- including current and velocity loop commands plus actual output -- that may be of interest in setting up the drive system. Defining the motion

profile, the items to be plotted, the color of the plotted lines, the thickness and type of plotted lines, are all easily accomplished with UltraScope. Each plot can also be saved as a bitmap, easily printed for future reference, or sampled data can be saved to disk for analysis.

### UltraLink

UltraLink is a communications utility that allows the user to talk directly to the G Series servodrive through its RS-232 serial port. Any of the G Series servodrive commands -- including software for adjusting drive setup and tuning parameters, velocity profiling and data collection -- can be entered using the UltraLink "console" window. UltraLink can be used to view all non-volatile software parameters and/or other setup parameter sets prepared for entry into the drive.

### UltraEditor

The UltraEditor can be used to edit text files used with the G Series. The editor provides basic editing tools to modify text --- as well as simple formatting tools.

### FlexROM™ Technology

A key to implementing a fully digital drive system is software access to system parameters. FlexROM™ technology in G Series drives utilizes Flash memory to create a software interface that can be accessed by our UltraTools™ setup software and/or your application program.

Non-volatile user parameters including setup system variables, application tuning values, configuration of motor characteristics and I/O are all stored using FlexROM™ technology. Since all drive set-up parameters are in software, drive commissioning is quick and repeatable. New systems are up and running faster, and field maintenance is simplified.

FlexROM™ technology also includes the ability to electronically update the drive's firmware through a serial connection -- rather than replacing EPROMs or other components to update firmware. This allows us to cost-effectively

provide customized

features for specific volume applications. Users can also load factory upgrades and manage software versions in the field using a simple software utility.

### Data Capture & Analysis

The G Series drives offer software commands and memory to simplify

#### NON-VOLATILE PARAMETER STORAGE

vKi	Velocity Loop Integral Gain
vKp	Velocity Loop Proportional Gain
vKd	Velocity Loop Derivative Gain
Torque	Torque Mode
Velocity	Velocity Mode
EncoderLines	Encoder Lines Per Revolution
MotorPoles	Motor Pole Pairs Per Rev.
PhaseAdv	Phase Advance Coefficient
cKp	Current Loop A Proportional Gain
cKi	Current Loop A Integral Gain
Ilimit	Peak Current Limit
Irms	RMS Current Limit
HPLimit	Horsepower Limit
OutFN	Assign Output to Function
Input#	Assign Input to Function/Macro
ANALOG	Analog Command Mode
SERIAL	Serial Command Mode

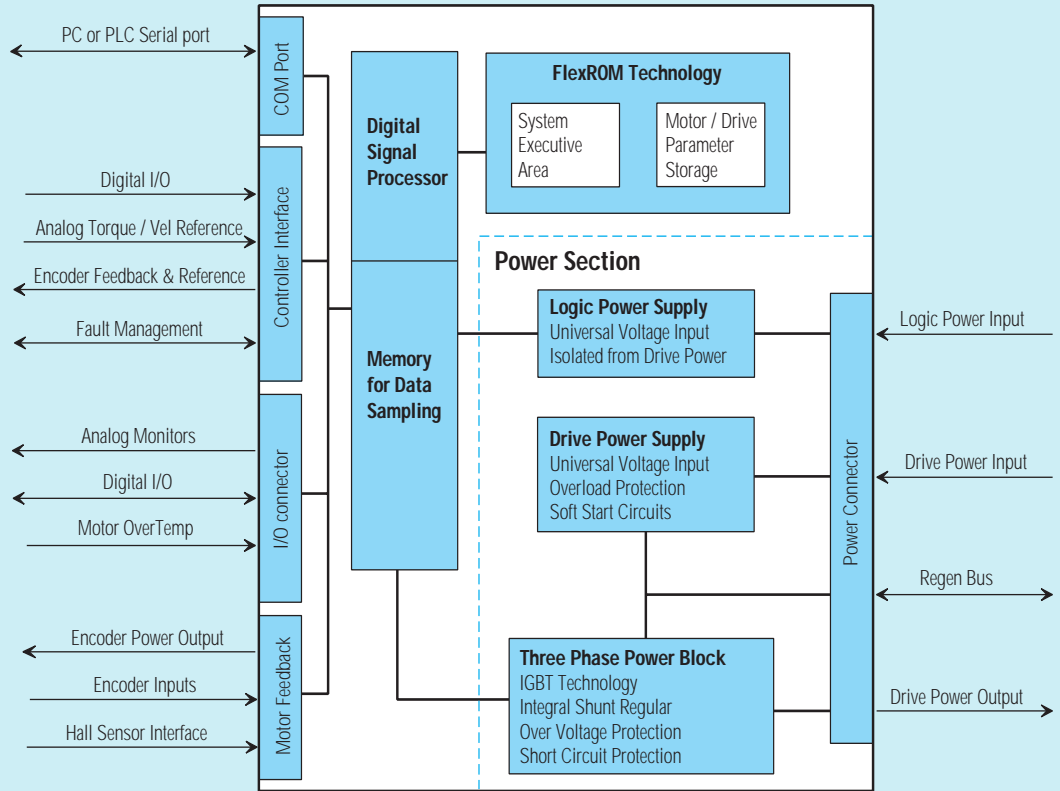
# Anatomy of the G Series Servodrive

COM port provides support for G Series serial commands by PC or PLC

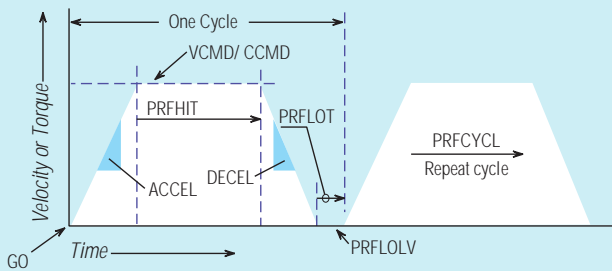
25-pin D-sub connector provides encoder feedback signals for motion controller, analog input to drive and interface signals for fault reset and drive enable.

Discrete I/O communications can be flexibly mapped to PLC or PC --- providing method to access internal drive functions and communicate drive faults.

15-pin D-sub connector provides interface to servomotor for positioning and commutation feedback.



## Creating Simple Velocity Profiles



### SERIAL COMMAND LISTING

PRFENA 1	Enable G Series Profiling
PRFMODE 3	Turn on "repeat cycle" mode for specific number of cycles
ACCEL 15	Set acceleration ramp value to 15 (counts/sec <sup>2</sup> )
DECEL 15	Set deceleration ramp value to 15 (counts/sec <sup>2</sup> )
VCMD 1000	Set target velocity to 1000 (counts/sec)
PRFHIT 10000	Set time at top velocity
PRFLOLV 0	Set low velocity value to zero
PRFLOT 4000	Set time at low velocity
PRFCYCLE 50	Repeat Profile 50 times
GO	Start Profile

## Flexible Velocity Profiling

The G Series also provides a set of serial commands which can be used to configure velocity profiles. The user can create simple velocity profiles by issuing a series of serial commands which define acceleration, deceleration and target velocity. The velocity profile is controlled with the GO and STOP commands.

This technique can be used to create velocity profiles that can be changed on-the-fly by specifying new accel, decel or velocity values.

By specifying time at commanded velocity, the user can create simple motion profiles, and the velocity profile can be repeated a specified number of cycles. See "Creating Simple Velocity Profiles" (at left) for more details.

data gathering and analysis. This information can be helpful in evaluating system performance and/or collecting data for statistical process control (SPC) applications.

One use of this capability is to upload a defined, time-sampled set of commanded and/or actual values from the DSP to the PC. Up to 8,000 data points can be captured and stored in DSP RAM, and can include commanded or actual velocity, commanded or actual current, analog input values, position information and values for digital I/O states.

## G-Series Compatibility Chart

ORMEC's all-digital drive technology provides the ability to control a variety of servomotors with a single servodrive. The chart (at right) provides an overview of ServoWire drive compatibility with ORMEC's G-Series servomotors.

The recommended servodrive (⊕) provides sufficient power to provide the continuous torques specified for the corresponding servomotor.

Compatible servodrives (✓) may be used instead of the recommended servodrive to increase the amount or duration of peak torque, and also allow each servodrive model to support a wider range of motors, simplifying the stocking of spare parts.

### SPECIFICATIONS

#### Main Circuit Power

- 115 or 230 VAC +15%, -20%, 50/60 Hz, single phase (G03 and G05) or three phase (G10, G17, G20, G25, G35 and G60)
- 290 to 15,000 watts of incoming service power (see Servomotor Selection Charts for power requirements on matching drives)

#### Control Circuit Power

- 115 or 230 VAC, +15%, -20%, 50/60 Hz, 56 watts RMS, single phase

#### Torque / Velocity Command

- 14 bit analog input
- Current loop bandwidth up to 1.2 kHz

#### G Series Drive Output

- IGBT pulse width-modulated with sinusoidal or trapezoidal commutation
- Large heat sinks with temperature monitor (fan cooled on SAC-G20 through G60)
- Internal shunt regulator for regenerative load dissipation on all except G03 & G05
- Peak currents up to 200% of RMS continuous capability

Servomotor Model Number	Single Phase Drives (No Regen)			Three Phase Drives (External Regen)				
	G03	G05	G10	G17	G20	G25	G35	G60
MAC-G005A1	⊕	✓	✓					
MAC-G006A1		⊕	✓					
MAC-G006A2	⊕	✓	✓					
MAC-G010A1		⊕	✓	✓				
MAC-G010B1	⊕	✓	✓					
MAC-G011A1			⊕	✓	✓			
MAC-G011A2		⊕	✓					
MAC-G011B2	⊕	✓	✓					
MAC-G015A1			⊕	✓	✓			
MAC-G015A2		⊕	✓	✓				
MAC-G015B2	⊕	✓	✓					
MAC-G016A2		⊕	✓					
MAC-G016B2	⊕	✓	✓					
MAC-G019A1				⊕	✓			
MAC-G019A2			⊕	✓	✓			
MAC-G019B2	⊕	✓	✓					
MAC-G030A2			⊕	✓	✓			
MAC-G030B2		⊕	✓					
MAC-G040A2			⊕	✓	✓			
MAC-G040B2	⊕	✓	✓					
MAC-G055A2			⊕	✓	✓			
MAC-G055A4		⊕	✓					
MAC-G080A2				⊕	✓	✓		
MAC-G080A4			⊕	✓	✓			
MAC-G115A2					⊕	✓	✓	
MAC-G115A4			⊕	✓	✓			
MAC-G130A2				⊕	✓	✓		
MAC-G130A4			⊕	✓	✓			
MAC-G210A2					⊕	✓	✓	
MAC-G210A4				⊕	✓	✓		
MAC-G280A2							⊕	✓
MAC-G280A4						⊕	✓	
MAC-G360A2							⊕	✓
MAC-G360A4						⊕	✓	
MAC-G640A2								⊕

⊕ Recommended drive model    ✓ Compatible drive model

### ORDERING INFORMATION

*G Series Drives: Single Phase, 115 or 230 VAC Input*

G03-AEB-00 Servodrive, 3 amps continuous, 6 amps peak  
 G05-AEB-00 Servodrive, 5 amps continuous, 10 amps peak

*G Series Drives: Three Phase, 230 VAC Input*

G10-AEB-00 Servodrive, 8.2/14 amps RMS/phase, encoder feedback  
 G17-AEB-00 Servodrive, 14/24 amps RMS/phase, encoder feedback  
 G20-AEB-00 Servodrive, 16/28 amps RMS/phase, encoder feedback  
 G25-AEB-00 Servodrive, 25/50 amps RMS/phase, encoder feedback  
 G35-AEB-00 Servodrive, 35/70 amps RMS/phase, encoder feedback  
 G60-AEB-00 Servodrive, 60/120 amps RMS/phase, encoder feedback

CBL-SER-AT Serial Coil Cord, RS-232, 9-pin, 3/12 ft.  
 CBL-SER-PC Serial Coil Cord, RS-232, 25-pin, 3/12 ft.

#### Panel Mount Regen Resistors

SAC-SWRR/0055 Regen Resistor, 55 watts, 50 ohms, for G10  
 SAC-SWRR/0095 Regen Resistor, 95 watts, 40 ohms, for G17 & G20  
 SAC-SWRR/0700 Regen Resistor, 700 watts, 54 ohms, for G10  
 SAC-SWRR/0845 Regen Resistor, 845 watts, 40 ohms, for G17 & G20  
 SAC-SWRR/0846 Regen Resistor, 846 watts, 10 ohms, for G25 & G35  
 SAC-SWRR/1700 Regen Resistor, 1,700 watts, 6.5 ohms, for G60

#### UL Listed Line Filters

SAC-LF215U Line Filter, 115/230 VAC, 1-phase, 15 amps, 4.2"l, 2.9"w, 2.0"d  
 SAC-LF230U Line Filter, 115/230 VAC, 1-phase, 30 amps, 5.5"l, 3.0"w, 2.8"d  
 SAC-LF30C Line Filter, 230 VAC, 3-phase, 30 amps, 13.9"l, 2.4"w, 5.9"d  
 SAC-LF55C Line Filter, 230 VAC, 3-phase, 55 amps, 14.8"l, 3.1"w, 7.3"d  
 SAC-LF100C Line Filter, 230 VAC, 3-phase, 100 amps, 17.2"l, 3.5"w, 8.7"d

- ❑ DC Bus voltage of 325 VDC at nominal input of 230 VAC and 163 VDC at 115 VAC

### External Analog Monitors

- ❑ Torque Monitor output  $\pm 3.0V$  @ 100% rated torque, 10 bit resolution
- ❑ Speed Monitor output  $\pm 10.0V$  @ 1.0V / 1000 RPM, 2.0V/1000 RPM, or 5.0V/1000 RPM; scale depends on motor's max speed.

### Motor Feedback Interface

- ❑ Three differential input channels for encoder position feedback with 5.3 volt encoder power supplied
- ❑ Quadrature feedback 4x decoding with input data rates to 4 Mbps (after decoding)
- ❑ Three differential input channels for motor commutation feedback
- ❑ Open-wire detection on all differential encoder connections

### Operating Modes

Analog Velocity Input & Analog Torque Input  $\pm 10$  VDC = max speed/torque

Serial Velocity

Serial commands for desired velocity

Serial Torque

Serial commands for desired torque

Serial Velocity Profile

Serial commands define velocity profiles

### Environmental Specifications

Operating Temperature

0 - 50 degrees C

Relative Humidity

5% to 95% non condensing

### Physical

Weight (lbs/kg)

G03, G05 & G10 -- 4 lbs / 1.8 kg

G17 -- 6 lbs / 2.7 kg

G20 -- 7 lbs / 3.2 kg

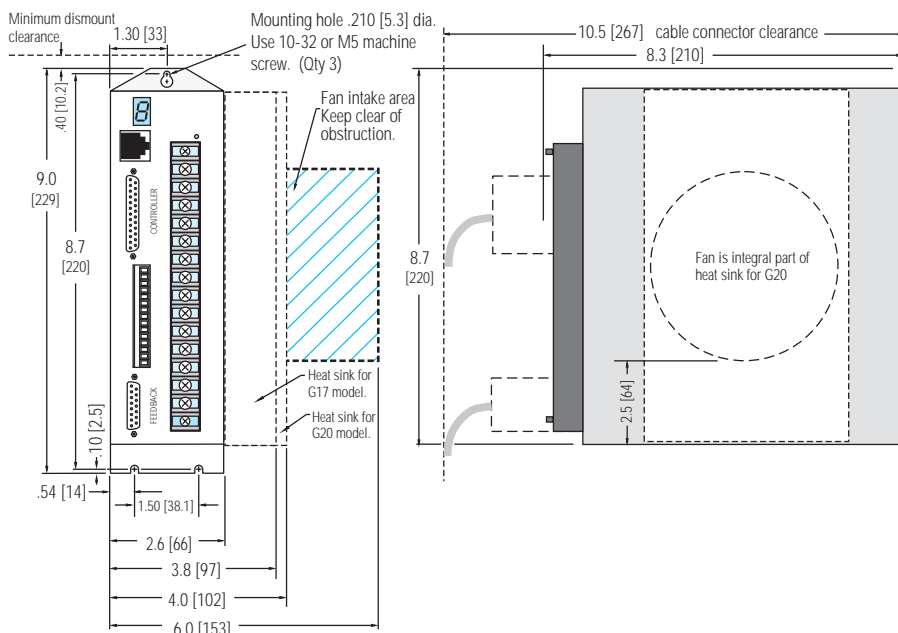
G25, G35 & G60 -- 17.8 lbs / 8.1 kg

### Serial I/O

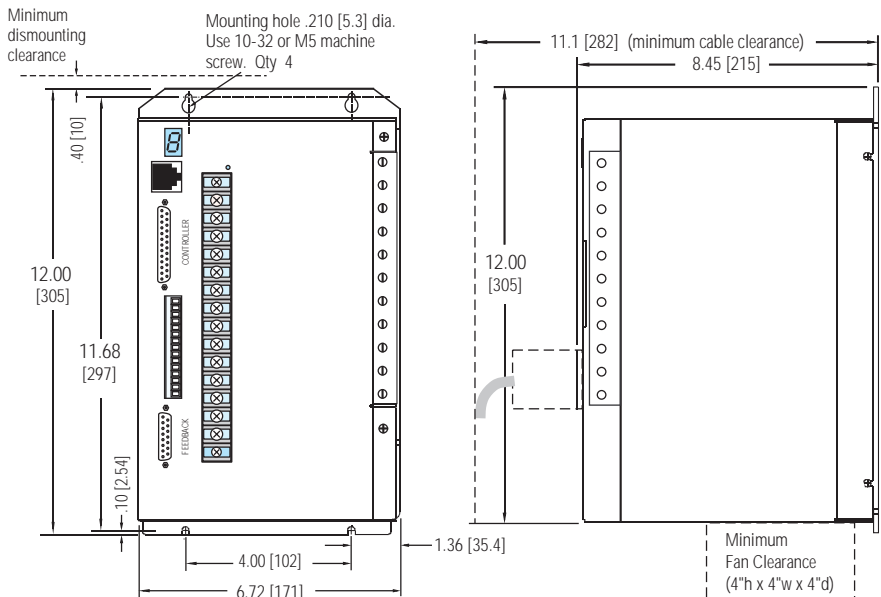
Type RS-232

Baud Rate Up to 38.4K

### Mounting Information for SAC-G03, G05, G10, G17 & G20



### Mounting Information for SAC-G25, G35 & G60



NOTE: Dimensions in inches [millimeters]

### G-Series Encoder and Motor Cables

Standard	IP-67 Sealing	Brake Option	Brake w/IP-67 Sealing	
CBL-GBRFC/X	CBL-GBRFCV/X	(p/o motor cable)	(p/o motor cable)	Encoder cables for MAC-G016 & G030 - G115 motors, 1-150 ft
CBL-GBRFB/X	CBL-GBRFBV/X	CBL-GBRFB/X	CBL-GBRFBV/X	Encoder cables for MAC-G130 - G640 motors, 1-150 ft
CBL-GBRFP/X	CBL-GBRFPV/X	CBL-GBRFP/X	CBL-GBRFPV/X	Motor/Encoder cables for MAC-G005 - G015, & G019 motors with G Series drives (G03, G05, G10, G17 & G20), 1-150 ft
CBL-GMSW2/X	CBL-GMSW2/X	CBL-GMSWB2/X	CBL-GMSWB2/X	Motor cables for MAC-G016 & G030-G115 with G Series drives (G03, G05, G10, G17 & G20), 1-150 ft
CBL-GMSWT2/X	CBL-GMSWVT2/X	CBL-GMSWBT2/X	CBL-GMSWBT2/X	Motor cables for MAC-G080A2 & G115A2 with G25 & G35, 1-150 ft
CBL-GMSW3/X	CBL-GMSWV3/X	(p/o encoder cable)	(p/o encoder cable)	Motor cables for MAC-G130 - G210 with G10, G17 & G20, 1-150 ft
CBL-GMSWT3/X	CBL-GMSWVT3/X	(p/o encoder cable)	(p/o encoder cable)	Motor cables for MAC-G130A2 with G Series drive (G25) 1-150 ft
CBL-GMSWT5/X	CBL-GMSWVT5/X	(p/o encoder cable)	(p/o encoder cable)	Motor cables for MAC-G210, MAC-G280A4 & G360A4 with G Series drives (G25 & G35), 1-150 ft
CBL-GMSWT6/X	CBL-GMSWVT6/X	(p/o encoder cable)	(p/o encoder cable)	Motor cables for MAC-G280A2 & G360A2 with G35 & G60, 1-150 ft
CBL-GMSWT9/X	CBL-GMSWVT9/X	(p/o encoder cable)	(p/o encoder cable)	Motor cables for MAC-G640A2 with G Series drive (G60), 1-150 ft

Note: For all cables above, specify length of the cable by adding the numerical length in the "X" placeholder in the Model Number.

## G-Series Servomotors & Matching Servodrives

Servomotor Model Number	Max. Speed <sup>(1)</sup> (RPM)	Peak / Stall Torque lb-in (N-m)	Motor Inertia lb-in-sec <sup>2</sup> (kg-m <sup>2</sup> )	Rated Voltage volts AC	Matched Servodrive Model #	Rated Output Power watts hp		Input Power <sup>(2) (3)</sup> watts/amps
MAC-G005A1	5,000	10/5.0 (1.1/0.56)	0.074 x 10 <sup>-3</sup> (0.084 x 10 <sup>-4</sup> )	115	SAC-G03-AEB	150	0.20	170 / 1.5
MAC-G006A1	6,800	12/5.8 (1.4/0.66)	0.127 x 10 <sup>-3</sup> (0.14 x 10 <sup>-4</sup> )	115	SAC-G05-AEB	270	0.36	300 / 2.7
MAC-G006A2	4,600	14/5.8 (1.6/0.66)	0.127 x 10 <sup>-3</sup> (0.14 x 10 <sup>-4</sup> )	230	SAC-G03-AEB	230	0.31	250 / 1.1
MAC-G010A1	5,500	17/10 (1.9/1.1)	0.137 x 10 <sup>-3</sup> (0.15 x 10 <sup>-4</sup> )	115	SAC-G05-AEB	310	0.42	340 / 3.1
MAC-G010B1	3,500	16/9.4 (1.8/1.1)	0.137 x 10 <sup>-3</sup> (0.15 x 10 <sup>-4</sup> )	115	SAC-G03-AEB	200	0.27	220 / 2.0
MAC-G011A1	7,000	26/11 (3.0/1.3)	0.247 x 10 <sup>-3</sup> (0.28 x 10 <sup>-4</sup> )	115	SAC-G10-AEB	540	0.72	600 / 5.4
MAC-G011A2	5,600	24/11 (2.7/1.3)	0.247 x 10 <sup>-3</sup> (0.28 x 10 <sup>-4</sup> )	230	SAC-G05-AEB	460	0.62	500 / 2.2
MAC-G011B2	3,800	28/11 (3.2/1.3)	0.247 x 10 <sup>-3</sup> (0.28 x 10 <sup>-4</sup> )	230	SAC-G03-AEB	290	0.39	320 / 1.4
MAC-G015A1	6,300	25/15 (2.9/1.7)	0.357 x 10 <sup>-3</sup> (0.40 x 10 <sup>-4</sup> )	115	SAC-G10-AEB	680	0.91	750 / 6.8
MAC-G015A2	5,600	24/15 (2.7/1.7)	0.357 x 10 <sup>-3</sup> (0.40 x 10 <sup>-4</sup> )	230	SAC-G05-AEB	610	0.82	670 / 2.9
MAC-G015B2	3,700	29/15 (3.2/1.7)	0.357 x 10 <sup>-3</sup> (0.40 x 10 <sup>-4</sup> )	230	SAC-G03-AEB	390	0.52	430 / 1.9
MAC-G016A2	5,000	35/16 (4.0/1.8)	0.328 x 10 <sup>-3</sup> (0.37 x 10 <sup>-4</sup> )	230	SAC-G05-AEB	560	0.75	615 / 2.7
MAC-G016B2	2,500	42/16 (4.7/1.8)	0.328 x 10 <sup>-3</sup> (0.37 x 10 <sup>-4</sup> )	230	SAC-G03-AEB	280	0.38	300 / 1.3
MAC-G019A1	5,625	41/19 (4.7/2.1)	0.467 x 10 <sup>-3</sup> (0.53 x 10 <sup>-4</sup> )	115	SAC-G17-AEB	850	1.1	935 / 8.5
MAC-G019A2	5,000	50/19 (5.6/2.1)	0.467 x 10 <sup>-3</sup> (0.53 x 10 <sup>-4</sup> )	230	SAC-G10-AEB	770	1.0	850 / 3.7
MAC-G019B2	3,700	29/17 (3.2/2.0)	0.467 x 10 <sup>-3</sup> (0.53 x 10 <sup>-4</sup> )	230	SAC-G03-AEB	500	0.67	550 / 2.4
MAC-G030A2	5,000	68/30 (7.7/3.4)	0.828 x 10 <sup>-3</sup> (0.94 x 10 <sup>-4</sup> )	230	SAC-G10-AEB	1,100	1.5	1,250 / 5.3
MAC-G030B2	2,600	67/30 (7.6/3.4)	0.828 x 10 <sup>-3</sup> (0.94 x 10 <sup>-4</sup> )	230	SAC-G05-AEB	560	0.75	620 / 2.7
MAC-G040A2	3,500	102/39 (11/4.4)	1.23 x 10 <sup>-3</sup> (1.39 x 10 <sup>-4</sup> )	230	SAC-G10-AEB	1,000	1.3	1,100 / 4.8
MAC-G040B2	1,700	61/39 (6.9/4.4)	1.23 x 10 <sup>-3</sup> (1.39 x 10 <sup>-4</sup> )	230	SAC-G03-AEB	430	0.58	480 / 2.1
MAC-G055A2	3,500	102/54 (11/6.1)	2.43 x 10 <sup>-3</sup> (2.74 x 10 <sup>-4</sup> )	230	SAC-G10-AEB	1,300	1.7	1,430 / 6.2
MAC-G055A4	1,850	102/54 (11/6.1)	2.43 x 10 <sup>-3</sup> (2.74 x 10 <sup>-4</sup> )	230	SAC-G05-AEB	770	1.0	850 / 3.7
MAC-G080A2	3,500	173/83 (20/9.4)	4.93 x 10 <sup>-3</sup> (5.57 x 10 <sup>-4</sup> )	230	SAC-G17-AEB	2,100	2.8	2,310 / 10
MAC-G080A4	1,850	203/83 (23/9.4)	4.93 x 10 <sup>-3</sup> (5.57 x 10 <sup>-4</sup> )	230	SAC-G10-AEB	1,200	1.6	1,320 / 5.7
MAC-G115A2	3,500	203/116 (23/13)	7.23 x 10 <sup>-3</sup> (8.17 x 10 <sup>-4</sup> )	230	SAC-G20-AEB	3,000	4.0	3,300 / 14
MAC-G115A4	1,850	203/116 (23/13)	7.23 x 10 <sup>-3</sup> (8.17 x 10 <sup>-4</sup> )	230	SAC-G10-AEB	1,700	2.3	1,870 / 8.1
MAC-G130A2	2,700	220/130 (25/15)	9.43 x 10 <sup>-3</sup> (10.7 x 10 <sup>-4</sup> )	230	SAC-G17-AEB	2,500	3.4	2,750 / 12
MAC-G130A4	1,750	213/130 (24/15)	9.43 x 10 <sup>-3</sup> (10.7 x 10 <sup>-4</sup> )	230	SAC-G10-AEB	1,700	2.3	1,870 / 8.1
MAC-G210A2	2,700	458/210 (52/24)	19.0 x 10 <sup>-3</sup> (21.5 x 10 <sup>-4</sup> )	230	SAC-G25-AEB	4,300	5.8	4,730 / 21
MAC-G210A4	1,750	361/210 (41/24)	19.0 x 10 <sup>-3</sup> (21.5 x 10 <sup>-4</sup> )	230	SAC-G17-AEB	2,900	3.9	3,190 / 14
MAC-G280A2	2,700	641/280 (72/32)	28.6 x 10 <sup>-3</sup> (32.3 x 10 <sup>-4</sup> )	230	SAC-G35-AEB	5,700	7.6	6,270 / 27
MAC-G280A4	1,750	752/280 (85/32)	28.6 x 10 <sup>-3</sup> (32.3 x 10 <sup>-4</sup> )	230	SAC-G25-AEB	3,800	5.1	4,180 / 18
MAC-G360A2	2,000	851/360 (96/41)	38.2 x 10 <sup>-3</sup> (43.2 x 10 <sup>-4</sup> )	230	SAC-G35-AEB	5,700	7.6	6,270 / 27
MAC-G360A4	1,750	752/360 (85/41)	38.2 x 10 <sup>-3</sup> (43.2 x 10 <sup>-4</sup> )	230	SAC-G25-AEB	4,900	6.6	5,390 / 23
MAC-G640A2	2,400	1,239/640 (140/72)	71.8 x 10 <sup>-3</sup> (81.2 x 10 <sup>-4</sup> )	230	SAC-G60-AEB	10,000	13	11,000 / 48

<sup>1</sup>Actual maximum speed is dependent on motor encoder resolution. Refer to "Understanding the G-Series Servomotor Model Numbers" on page 1 for further information.

<sup>2</sup>Power listed is the required incoming line power in watts when the motor is operating at rated output. To determine total incoming power requirements, add up the listed values for each servomotor/drive combination in the system.

<sup>3</sup>Current listed in amps is the recommended slow-blow fuse capacity for each leg of the three phase power. To select fuses for the system, add the recommended fuse capacities for each servomotor/drive combination in the system.



19 Linden Park, Rochester, NY 14625