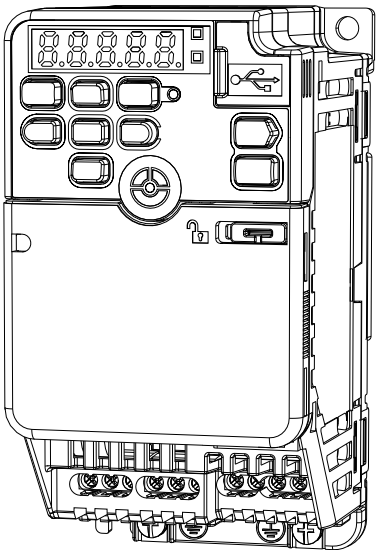
YASKAWA

High Frequency

GA500 AC Microdrive
Custom Software Supplement

Software Number: PRG: 0501x.
Drive Models: GA50Uxxxxxxx

To properly use the product, read this manual thoroughly and retain for easy reference, inspection, and maintenance. Ensure the end user receives this manual.



MANUAL NO. TM.GA500SW.134

1 Preface and Safety

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◆ Supplemental Information - Applicable Documents

The contents of this supplement apply to the product instructions in Table 1.1.

Table 1.1 Affected Documents

Drive Series	Document
GA500	Installation & Primary Operation (TOEPC71061752)
	Technical Reference (SIEPC71061752)
	Quick Setup Procedure (TOEPC71061769)

◆ Supplemental Safety Information

Read and understand this manual and the GA500 Installation & Primary Operation manual before you install, operate, or do maintenance on this drive. Install the drive as specified by the GA500 Installation & Primary Operation manual and local codes. Observe all safety messages in this manual and the standard drive manuals.

Refer to the GA500 Installation & Primary Operation and Technical Reference for safety information and start-up instructions.

This document is a supplement to the standard drive technical manual. It describes the effects on the drive parameters and functions with the software installed.

- Custom software adds functionality to a standard AC drive to enhance or enable use in a specific application.
- The software is loaded to the flash ROM area of the control board, and replaces the standard drive software.

◆ Obtaining Support

You must provide the unique part number shown on the drive nameplate when you want Yaskawa support for a drive with custom software.

The custom software described in this supplement is flashed to the control board memory and the operation of parameters, functions, and monitors are different than the standard drive software.

Refer to Yaskawa office locations listed on the back cover of this supplement for contact information.

2 Product Overview

◆ About this Product

This custom software is designed for high frequency motor applications. The drive's maximum output frequency can be set up to 2000 Hz. Non-applicable drive functions are deleted in order to optimize CPU processing time for this software.

◆ Applicable Models

This custom software is available for the GA500 drive models in Table 2.1.

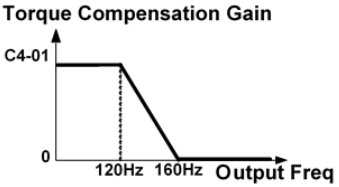
Table 2.1 Applicable Models

Voltage Class	Models
240 V Single-Phase	GA50UBxxxxxx
240 V Three-Phase	GA50U2xxxxxx
480 V Three-Phase	G580U4xxxxxx

3 Software Details

◆ Modifications from Standard Software

Changed item	GA500 High frequency custom software	GA500 Standard software
Maximum output frequency	2000Hz (V/f Control) 1000Hz (PM Open Loop Vector)	590Hz (V/f Control) 590Hz (PM Open Loop Vector)
Setting unit for all parameters related frequency	0.1Hz	0.01Hz
Frequency reference and output frequency display units (o1-03, b5-20)	0: 0.1Hz 1: 0.01%(Maximum frequency 100%) 2: Not Supported 3: User-selected units	0: 0.01Hz 1: 0.01% (Maximum frequency 100%) 2: min^{-1} (Calculated automatically based on the maximum output frequency and number of motor poles) 3: User-selected units
Control method (A1-02)	0: V/f Control 2: Not Supported 5: PM Open Loop Vector Control 6: Not Supported 8: Not Supported	0: V/f Control 2: Open Loop Vector 5: PM Open Loop Vector 6: PM Advanced Open Loop Vector 8: EZ Vector Control
Torque compensation	Enabled only at low speeds (0-160Hz).	Constant throughout the entire frequency range.

Changed item	GA500 High frequency custom software	GA500 Standard software
		
PM motor parameter settings	Number of digits past the decimal point are as follows: E5-05 (PM Motor Resistance (ohms/phase)): 4 digits E5-06 (PM d-axis Inductance (mH/phase)): 3 digits E5-07 (PM q-axis Inductance (mH/phase)): 3 digits E5-09 (PM Back-EMF Vpeak (mV/ (rad/s))): 2 digits E5-24 (PM Back-EMF L-L Vrms (mV/rpm)): 2 digits	Number of digits past the decimal point are as follows: E5-05 (PM Motor Resistance (ohms/phase)): 3 digits E5-06 (PM d-axis Inductance (mH/phase)): 2 digits E5-07 (PM q-axis Inductance (mH/phase)): 2 digits E5-09 (PM Back-EMF Vpeak (mV/ (rad/s))): 1 digit E5-24 (PM Back-EMF L-L Vrms (mV/rpm)): 1 digit
Additional functions	C6-06: PWM Method Selection nA-02: PM Phase Compensation Filter S1-02: Polarity Level Disable S1-04: Adjustment Gain for Current Monitor S1-05: Filter Time Constant for Output Power Monitor	–
Unsupported functions	A1-06: Application Preset b3-xx: Speed Search b8-xx: Energy Saving Control L2-xx: KEB L3-xx: Overvoltage Suppression Current Limit Acceleration Suppression n3-xx: Overexcitation Braking High Slip Braking T1-01 = 0, T2-01 = 4: Rotational Auto-Tuning	–

■ Precautions

- The export of this product will fall under the relevant regulations as stipulated in the Foreign Exchange and Foreign Trade Regulations. Therefore, be sure to follow all procedures and submit all relevant documentation according to any and all rules, regulations and laws that may apply.
- Use only devices designed specifically for operation with a PWM drive.
- When the induction motor requires an output exceeding 1000 Hz, the carrier frequency upper limit (C6-03) should be increased (recommended: 10 times the output frequency or more). Check carrier frequency and rated current derating and select appropriate capacity.

4 Parameter Details

◆ Additional Functions

Register No. (Hex.)	Name	Setting Range	Setting Unit	Default Value
C6-06 (228)	PWM Modulation Method 0: 2/3 Phase Auto-Modulation 2: 3-Phase Modulation	0, 2	–	0
nA-02 (312B)	PM Phase Compensation Filter	0.0 ~ 1000.0	ms	10
S1-02 (681)	Polarity Level Disable 0: Disabled 1: Enabled	0, 1	–	0
S1-04 (683)	Adjustment Gain for Current Monitor	0.00 ~ 2.00	–	1
S1-05 (684)	Filter Time Constant for Output Power Monitor	0.00 ~ 5.00	sec	0

■ PWM Modulation Method (C6-06)

Set PWM Modulation Method (C6-06=2) to 3-Phase Modulation if the amount of heat generated exceeds the tolerable level of the motor designed with 3-phase modulation.

Note that setting to 3-Phase Modulation increases Carrier Frequency Upper Limit (C6-03, C6-04) to 10.0 kHz, and the drive derating differs from 2/3 Phase Auto-Modulation (C6-06=0). Due caution should be observed.

Check the following pages for the differences in drive derating with PWM Modulation Method setting (C6-06).

■ Carrier Frequency and Rated Current Deratings (C6-06=0)

Model * "x" varies depending on region	Rated Current (A)					
	2.0kHz	5.0kHz	8.0kHz	10.0kHz	12.5kHz	15.0kHz
GA50xB001Axx	0.8	0.8	0.8	0.8	0.7	0.6
GA50xB002Axx	1.6	1.6	1.6	1.6	1.4	1.3
GA50xB004Axx	3	3	3	3	2.7	2.4
GA50xB006Axx	5	5	5	5	4.5	4
GA50xB010Axx	8	8	8	7.5	7	6.4
GA50xB012Axx	11	11	11	10.4	9.6	8.8
GA50xB018Axx	17.6	17.6	17.6	16.6	15.3	14.1
GA50x2001Axx	0.8	0.8	0.8	0.8	0.7	0.6

GA50x2002Axx	1.6	1.6	1.6	1.6	1.4	1.3
GA50x2004Axx	3	3	3	3	2.7	2.4
GA50x2006Axx	5	5	5	5	4.5	4
GA50x2008Axx	6.9	6.9	6.9	6.5	6	5.5
GA50x2010Axx	8	8	8	7.5	7	6.4
GA50x2012Axx	11	11	11	10.4	9.6	8.8
GA50x2018Axx	14	14	14	13.2	12.2	11.2
GA50x2021Axx	17.6	17.6	17.6	16.6	15.3	14.1
GA50x2030Axx	25	25	25	23.6	21.8	20
GA50x2042Axx	33	33	33	31.1	28.8	26.4
GA50x2056Axx	47	47	47	44.3	41	37.6
GA50x2070Axx	60	60	60	56.6	52.3	48
GA50x2082Axx	75	75	75	70.7	65.4	60
GA50x4001Axx	1.2	1.2	1.2	1.1	0.9	0.7
GA50x4002Axx	1.8	1.8	1.8	1.6	1.3	1.1
GA50x4004Axx	3.4	3.4	3.4	3	2.5	2
GA50x4005Axx	4.8	4.8	4.8	4.3	3.6	2.9
GA50x4007Axx	5.5	5.5	5.5	4.9	4.1	3.3
GA50x4009Axx	7.3	7.3	7.3	6.5	5.4	4.4
GA50x4012Axx	9.2	9.2	9.2	8.1	6.8	5.5
GA50x4018Axx	14.8	14.8	14.8	13.1	11	8.9
GA50x4023Axx	18	18	18	15.9	13.4	10.8
GA50x4031Axx	24	24	24	21.3	17.8	14.4
GA50x4038Axx	31	31	31	27.5	23	18.6
GA50x4044Axx	39	39	39	34.5	29	23.4
GA50x4060Axx	45	45	45	39.9	33.4	27

■ Carrier Frequency and Rated Current Detaings (C6-06=2)

Model	Rated Current (A)			
* "x" varies depending on region	2.0kHz	5.0kHz	8.0kHz	10.0kHz
GA50xB001Axx	0.8	0.8	0.7	0.6
GA50xB002Axx	1.6	1.6	1.5	1.3
GA50xB004Axx	3	3	2.8	2.4

GA50xB006Axx	5	5	4.6	4
GA50xB010Axx	8	8	7.1	6.4
GA50xB012Axx	11	11	9.7	8.8
GA50xB018Axx	17.6	17.6	15.6	14.1
GA50x2001Axx	0.8	0.8	0.7	0.6
GA50x2002Axx	1.6	1.6	1.5	1.3
GA50x2004Axx	3	3	2.8	2.4
GA50x2006Axx	5	5	4.6	4
GA50x2008Axx	6.9	6.9	6.1	5.5
GA50x2010Axx	8	8	7.1	6.4
GA50x2012Axx	11	11	9.7	8.8
GA50x2018Axx	14	14	12.4	11.2
GA50x2021Axx	17.6	17.6	15.6	14.1
GA50x2030Axx	25	25	22.1	20
GA50x2042Axx	33	33	29.2	26.4
GA50x2056Axx	47	47	41.6	37.6
GA50x2070Axx	60	60	53.1	48
GA50x2082Axx	75	75	66.4	60
GA50x4001Axx	1.2	1.2	0.9	0.7
GA50x4002Axx	1.8	1.8	1.4	1.1
GA50x4004Axx	3.4	3.4	2.6	2
GA50x4005Axx	4.8	4.8	3.7	2.9
GA50x4007Axx	5.5	5.5	4.2	3.3
GA50x4009Axx	7.3	7.3	5.6	4.4
GA50x4012Axx	9.2	9.2	7.1	5.5
GA50x4018Axx	14.8	14.8	11.4	8.9
GA50x4023Axx	18	18	13.9	10.8
GA50x4031Axx	24	24	18.5	14.4
GA50x4038Axx	31	31	23.9	18.6
GA50x4044Axx	39	39	30.1	23.4
GA50x4060Axx	45	45	34.7	27

Note: The rated current value changes linearly in accordance with carrier frequency changes. The rated current value at frequencies not listed in the above table can also be obtained by performing calculations with the values listed in the table.

■ PM Phase Compensation Filter (nA-02)

If oscillation or hunting occurs with Control Method set to PM Open Loop Vector (A1-02=5), or STPo (Pull-Out Detection) occurs, increase/decrease the setting value of PM Phase Compensation Filter (nA-02) in steps of 5ms.

■ Polarity Level Disable (S1-02)

The approximate motor constant can be identified using Auto-Tuning function if the motor nameplate value is unknown.

The motor may rotate slightly at the start of Auto-Tuning. Setting Polarity Level Disable (S1-02=1) to Enable allows to start Auto-Tuning without rotating the motor.

■ Adjustment Gain for Current Monitor (S1-04)

The monitor value of U1-03 (Output Current) may differ from the measured value of the clamp meter due to high-frequency noise.

Use Adjustment Gain for Current Monitor (S1-04) to adjust the monitor value so that it approaches the actual measurement value.

■ Filter Time Constant for Output Monitor (S1-05)

This parameter applies primary delay filters to Output Power monitor (U1-08). Set this parameter if U1-08 fluctuates during high frequency operation.

◆ Differences from Standard Software

Expanded setting ranges of frequency related parameters.

- (Differences are shown in **bold and shaded**)

Register No. (Hex.)	Name	Range	Setting Unit
b5-15 (01B3)	PID Sleep Function Start Level	0.0 ~ **2000.0** *1	Hz
b6-01 (01B6)	Dwell Reference at Start	0.0 ~ **2000.0** *1	Hz
b6-03 (01B8)	Dwell Reference at Stop	0.0 ~ **2000.0** *1	Hz
C1-11 (020A)	Accel/Decel Time Switchover Freq	0.0 ~ **2000.0** *1	Hz
d1-01 (280)	Reference 1	0.0 ~ **2000.0** *1	Hz
d1-02 (281)	Reference 2	0.0 ~ **2000.0** *1	Hz
d1-03 (282)	Reference 3	0.0 ~ **2000.0** *1	Hz
d1-04 (283)	Reference 4	0.0 ~ **2000.0** *1	Hz

d1-05 (284)	Reference 5	0.0 ~ **2000.0** *1	Hz
d1-06 (285)	Reference 6	0.0 ~ **2000.0** *1	Hz
d1-07 (286)	Reference 7	0.0 ~ **2000.0** *1	Hz
d1-08 (287)	Reference 8	0.0 ~ **2000.0** *1	Hz
d1-09 (288)	Reference 9	0.0 ~ **2000.0** *1	Hz
d1-10 (028B)	Reference 10	0.0 ~ **2000.0** *1	Hz
d1-11 (028C)	Reference 11	0.0 ~ **2000.0** *1	Hz
d1-12 (028D)	Reference 12	0.0 ~ **2000.0** *1	Hz
d1-13 (028E)	Reference 13	0.0 ~ **2000.0** *1	Hz
d1-14 (028F)	Reference 14	0.0 ~ **2000.0** *1	Hz
d1-15 (290)	Reference 15	0.0 ~ **2000.0** *1	Hz
d1-16 (291)	Reference 16	0.0 ~ **2000.0** *1	Hz
d1-17 (292)	Jog Reference	0.0 ~ **2000.0** *1	Hz
d3-01 ~ d3-03 (0294 ~ 0296)	Jump Frequency 1 ~ 3	0.0 ~ **2000.0** *1	Hz
d3-04 (297)	Jump Frequency Width	0.0 ~ **2000.0** *1	Hz
d6-02 (02A1)	Field Weakening Frequency Limit	0.0 ~ **2000.0** *1	Hz
E1-04 (303)	Maximum Output Frequency	40.0 ~ **2000.0** *1	Hz
E1-06 (305)	Base Frequency	0.0 ~ **2000.0** *1	Hz
E1-07 (306)	Mid Point A Frequency	0.0 ~ **2000.0**	Hz
E1-09 (308)	Minimum Output Frequency	0.0 ~ **2000.0** *1	Hz
E1-11 (030A)	Mid Point B Frequency 2	0.0 ~ **2000.0**	Hz

E3-04 (031A)	Motor 2 Maximum Output Frequency	40.0 ~ **2000.0**	Hz
E3-06 (031C)	Motor 2 Base Frequency	0.0 ~ **2000.0**	Hz
E3-07 (031D)	Motor 2 Mid Point A Frequency	0.0 ~ **2000.0**	Hz
E3-09 (031F)	Motor 2 Minimum Output Frequency	0.0 ~ **2000.0**	Hz
E3-11 (345)	Motor 2 Mid Point B Frequency	0.0 ~ **2000.0**	Hz
L4-03 (049B)	Speed Agree Detection Level (+/-)	-2000 ~ **2000** *2	Hz
T2-07 (753)	PM Motor Base Frequency	0.0 ~ **1000.0**	Hz

1. The maximum value for PM Open Loop Vector is 1000.0Hz.
2. Setting range for PM Open Loop Vector is -1000Hz - 1000Hz.

■ Additional Parameter Differences

(Differences are shown in **bold and shaded**)

Register No. (Hex.)	Name	Setting Range	Setting Unit	Default Value
A1-02 (102)	Control Method Selection	0, 5	–	0
b2-04 (018C)	DC Inject Braking Time at Stop	0.00 ~ 10.00	%	0
b5-20 (01E2)	PID Unit Selection	0, 1, 3	–	1
C6-02 (0224)	Carrier Frequency Selection	F	–	F
C6-03 (0225)	Carrier Frequency Upper Limit	1.0 ~ 15.0	kHz	10
C6-04 (0226)	Carrier Frequency Lower Limit	1.0 ~ 15.0	kHz	1
C6-05 (0227)	Carrier Freq Proportional Gain	0 ~ 99	–	12
E3-01 (0319)	Motor 2 Control Mode Selection	0	–	0
E5-05 (032D)	PM Motor Resistance (ohms/phase)	0.0000 ~ **6.5000**	Ω	0.1
E5-06 (032E)	PM d-axis Inductance (mH/phase)	**0.000** ~ 65.000	mH	1

E5-07 (032F)	PM q-axis Inductance (mH/phase)	**0.000** ~ 65.000	mH	1
E5-09 (0331)	PM Back-EMF Vpeak (mV/ (rad/s))	**0.00** ~ 650.00	mV/(rad/s)	0
E5-24 (0353)	PM Back-EMF L-L Vrms (mV/rpm)	**0.00** ~ 650.00	**0.00** ~ 650.00	100 (200V class) 200 (400V class)
H6-01 (042C)	PulseTrain InTerm RP Func Select	0, 1, 2	–	0
L2-01 (0485)	Momentary Power Loss Ope Select	0, 1, 2	–	0
L3-01 (048F)	Stall Prevent Select during Accel	0, 1	–	1
L3-02 (0490)	Stall Prevent Level during Accel	**0** ~ 170	%	150
L3-04 (0492)	Stall Prevention during Decel	0, 1, 3	–	1
o1-03 (0502)	Frequency Display Unit Selection	0, 1, 3	–	0
T1-01 (0701)	Auto-Tuning Mode Selection	1, 2	–	2
T2-01 (0750)	PM Auto-Tuning Selection	0, 1, 2	–	0
T2-07 (0753)	PM Motor Base Frequency	**0.0** ~ 1000.0	Hz	87.5
T2-10 (0754)	PM Motor Stator Resistance	0.0000 ~ **6.5000**	Ω	0.1
T2-11 (0735)	PM Motor d-Axis Inductance	**0.000** ~ 65.000	mH	1
T2-12 (0736)	PM Motor q-Axis Inductance	**0.000** ~ 65.000	mH	1
T2-14 (0737)	Back-EMF Voltage Constant (Ke)	**0.00** ~ 650.00	Determined by T2-13	Determined by T2-13

◆ Unsupported Functions

■ Unsupported Parameters

Register No. (Hex.)	Name	Notes
A1-06 (0127)	Application Preset	0 (General-purpose) fixed
b3-06	Speed Estimation Current Level 1	

(0196)		
b3-07 (0197)	Speed Estimation Current Level 2	
b3-08 (0198)	Speed Estimation ACR P Gain	
b3-09 (0199)	Speed Estimation ACR I Time	
b3-10 (019A)	Speed Estimation Detection Gain	
b3-24 (01C0)	Speed Search Method Selection	2 (Speed Estimation) fixed
b3-26 (01C7)	Direction Determination Level	
b8-01 (01CC)	Energy Saving Control Selection	0 (Disabled) fixed
b8-04 (01CF)	Energy Saving Coefficient Value	
b8-05 (01D0)	Power Detection Filter Time	
b8-06 (01D1)	Search Operation Voltage Limit	
C6-01 (0223)	Normal / Heavy Duty Selection	0 (HD) fixed *ND not supported
E5-01 (0329)	PM Motor Code Selection	FFFF fixed
L2-06 (048A)	Kinetic Energy Backup Decel Time	
L2-07 (048B)	Kinetic Energy Backup Accel Time	
L2-08 (048C)	Frequency Gain at KEB Start	
L2-09 (048D)	KEB Minimum Frequency Level	
L2-10 (048E)	Minimum KEB Time	
L2-11 (0461)	KEB DC Bus Voltage Setpoint	
L2-29 (0475)	Kinetic Energy Backup Method	
L2-30 (045E)	KEB Zero Speed Operation	

L2-31 (045D)	KEB Start Voltage Offset Level	
L3-11 (04C7)	Overvoltage Suppression Select	0 (Disabled) fixed
L3-17 (0462)	DC Bus Reg Level	
L3-20 (0465)	DC Bus Voltage Adjustment Gain	
L3-21 (0466)	OV Suppression Accel/Decel P Gain	
L3-24 (046E)	Motor Accel Time@ Rated Torque	
L3-25 (046F)	Load Inertia Ratio	
L3-35 (0747)	Speed Agree Width for Auto Decel	
L3-36 (11D0)	VibraSuppression Gain during Accel	
L3-37 (11D1)	Current Limit P Gain @ Accel	
L3-38 (11D2)	Current Limit I Time @ Accel	
L3-39 (11D3)	CurlimIntegTime Con during Acc/Dec	
L3-40 (11D4)	CurlimMaxScurve Sel during Acc/Dec	
n3-01 (0588)	HSB Deceleration Frequency Width	
n3-02 (0589)	HSB Current Limit Level	
n3-03 (058A)	HSB Dwell Time at Stop	
n3-04 (058B)	HSB Overload Time	
n3-13 (0531)	Overexcitation Deceleration Gain	
n3-14 (0532)	OEB High Frequency Injection	0 (Disabled) fixed
n3-21 (0579)	High-Slip Suppression Current Lvl	

n3-23 (057B)	Overexcitation Operation Select	0 (Enabled in both directions) fixed
T2-02 (0571)	PM Motor Code Selection	FFFF fixed

■ Unsupported Functions (Multi-Function Digital Input/Output Setting values)

Setting Values		Name
Digital Inputs (H1-01 ~ H1-07)	65	KEB Ride-Thru 1 (N.C.)
	66	KEB Ride-Thru 1 (N.O.)
	68, 168	High Slip Braking (HSB)
	7A	KEB Ride-Thru 2 (N.C.)
	7B	KEB Ride-Thru 2 (N.O.)
Digital Outputs (H2-01~H2-03)	4A	During KEB Ride-Thru
	14A	During KEB Ride-Thru (N.C.)

■ Unsupported Register (MEMOBUS Communications Data)

Register No. (Hex.)	Description	
003E	Output Frequency	Units: min^{-1} or r/min
00AC	U1-05 [Motor Speed]	Units: min^{-1} or r/min
00B5	U1-16 [SFS Output Frequency]	Units: min^{-1} or r/min
00B7	Frequency Reference Monitor	Units: min^{-1} or r/min

Note: : min^{-1} related registers cannot be used for communication option cards either.

5 Application Notes

◆ Using an Output Reactor

If drive oL2 faults occur and a typical drive overload is not suspected, an output reactor or a larger drive may be required to eliminate oL2 faults. High-speed motors typically have very low impedance, which may result in excessive peak motor current, increased motor temperature, low speed cogging, or increased torque ripple.

It may be necessary to use an output reactor to add impedance to the system and reduce the peak ripple current and eliminate nuisance oL2 faults. To confirm that excessive peak current caused by low motor impedance is causing the oL2 fault, measure the output current using an oscilloscope or chart recorder with a clamp-on amp meter.

Generally, the peak of the motor current waveform should not exceed 100% continuous **drive HD nameplate x 2.5**. This value may vary slightly by drive model. Refer to Figure 4 for an example of peak current measurement.

When using a reactor to reduce peak current, consult with the reactor manufacturer to select a reactor that will smooth out the current waveform and also prevent a large voltage drop. Proper reactor selection is critical in high speed applications because the reactor impedance is directly

proportional to the output frequency, which is usually given at 60 Hz. Example; a reactor operating at 600 Hz will have 10 times the impedance and result in 10 times the voltage drop when compared to the same reactor operating at 60 Hz.

Using a larger capacity drive to allow for the additional peak current may also solve the oL2 overload trip problem. The decision to employ an output reactor or increase drive capacity is made on a case-by-case basis.

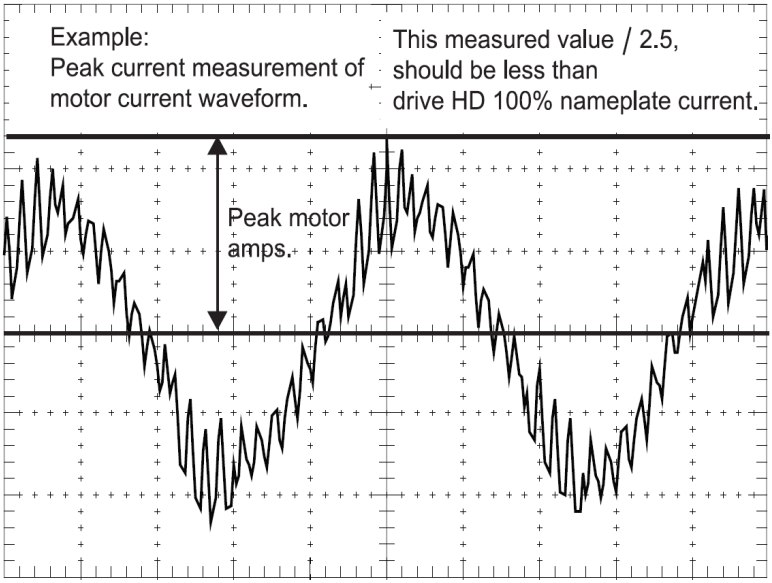


Figure 5.1 Measuring Peak Current

◆ Fine Tuning the Carrier Frequency

It is important to optimize the carrier frequency to improve the motor current waveform. This will improve motor speed stability and torque performance and also limit hunting and oscillation at higher speeds.

Use one of the following setting recommendations to fine tune the carrier frequency for optimum motor performance:

1. **For a flat 15.0 kHz across the speed range:** Set C6-03 = “15.0”, C6-04 = “15.0”, and C6-05 = “0”. The 15.0 kHz across the output frequency range keeps the carrier frequency as high as possible.
2. To create a ramped carrier frequency pattern to keep the output frequency and **carrier frequency at a constant ratio:**
   - Set C6-03 = “15.0 kHz” so the motor will run at 15.0 kHz at top speed.
   - Set C6-04 = “1.0 kHz” so the carrier frequency will be ramped for the greatest output frequency range.
   - Solve the following formula for C6-05:

     C6-05 = [15000 Hz / (2 x E1-04)]

The C6-05 setting range is 7 ~ 99, however a setting lower than 7 disables the ramp function and C6-03 is used across the output frequency range. For motors with output frequencies greater than 500 Hz, use C6-05 = 7.

- Solve for corner output frequencies A and B:

A Hz = [1000 Hz / (2 x C6-05)]
B Hz = [15000 Hz / (2 x C6-05)]

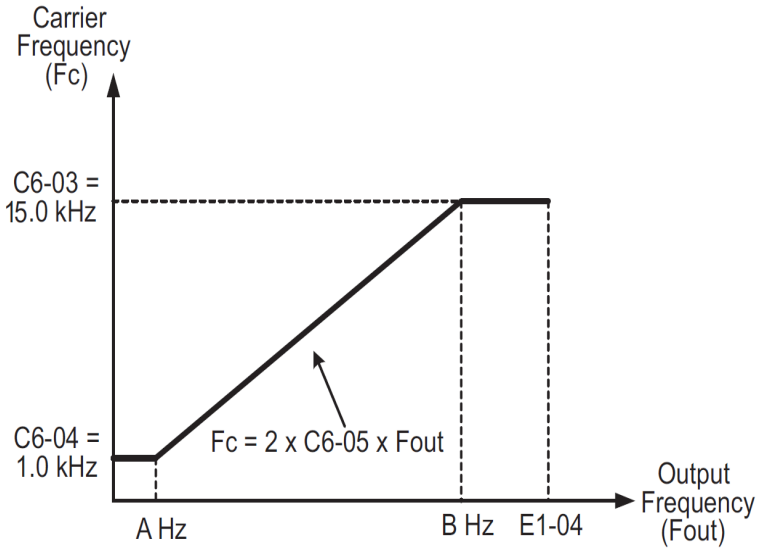


Figure 5.2 Carrier Frequency

◆ Precautions for High Frequency/Low Impedance Motors

High frequency motors exhibit different characteristics than standard 60/120 Hz maximum frequency motors. The low impedance associated with these high frequency motors often requires manually programming a custom V/f pattern into the E1 parameter group to obtain proper performance and rated power from the drive-motor combination.

The low impedance may also cause excessive motor current. In addition to considering the use of an output reactor, it may be advantageous to oversize the drive to accommodate the high peak current that may result from the low impedance motor. Using a drive that is at least one or two models larger than the motor FLA may also help eliminate the oL2 faults.

Compatibility between the drive, motor, and the reactor is best accomplished via testing and observation of the motor current waveform with an oscilloscope. Refer to *Using an Output Reactor on page 14*.

Revision History

Date of Publication	Revision Number	Section	Revised Content
August 2021	1-1	Applicable Models	Revision: Corrected Model Number
May 2021	1	Application Notes	Revision: High frequency software calculations and graphic.
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High Frequency

GA500 AC Microdrive
Custom Software Supplement

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In the event that the end user of this product is to be the military and said product is to be employed in any weapons systems or the manufacture thereof, the export will fall under the relevant regulations as stipulated in the Foreign Exchange and Foreign Trade Regulations. Therefore, be sure to follow all procedures and submit all relevant documentation according to any and all rules, regulations and laws that may apply.

Specifications are subject to change without notice for ongoing product modifications and improvements.

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