GA500 Quick Start Guide Rev 3 (16-09-26)

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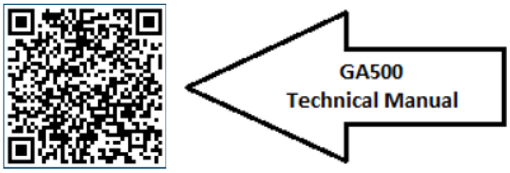
The following quick start guide is a supplement to other documentation available for this equipment and will guide the user in properly wiring the GA500 and motor. It will also show the user how to configure the GA500 for a basic crane application. Please refer to the GA500 technical manual, for full details and detailed operation.

DANGER! Improper wiring can and will cause bodily harm as well as damage to the equipment.

When installing the system, be sure to follow good wiring practices and all applicable codes. Ensure that the mounting of components is secure and that the environment, such as extreme dampness, poor ventilation, etc., will not cause system degradation.

The GA500 manuals are available at the following link, or for direct access to the GA500 Technical Manual, please scan the QR Code.

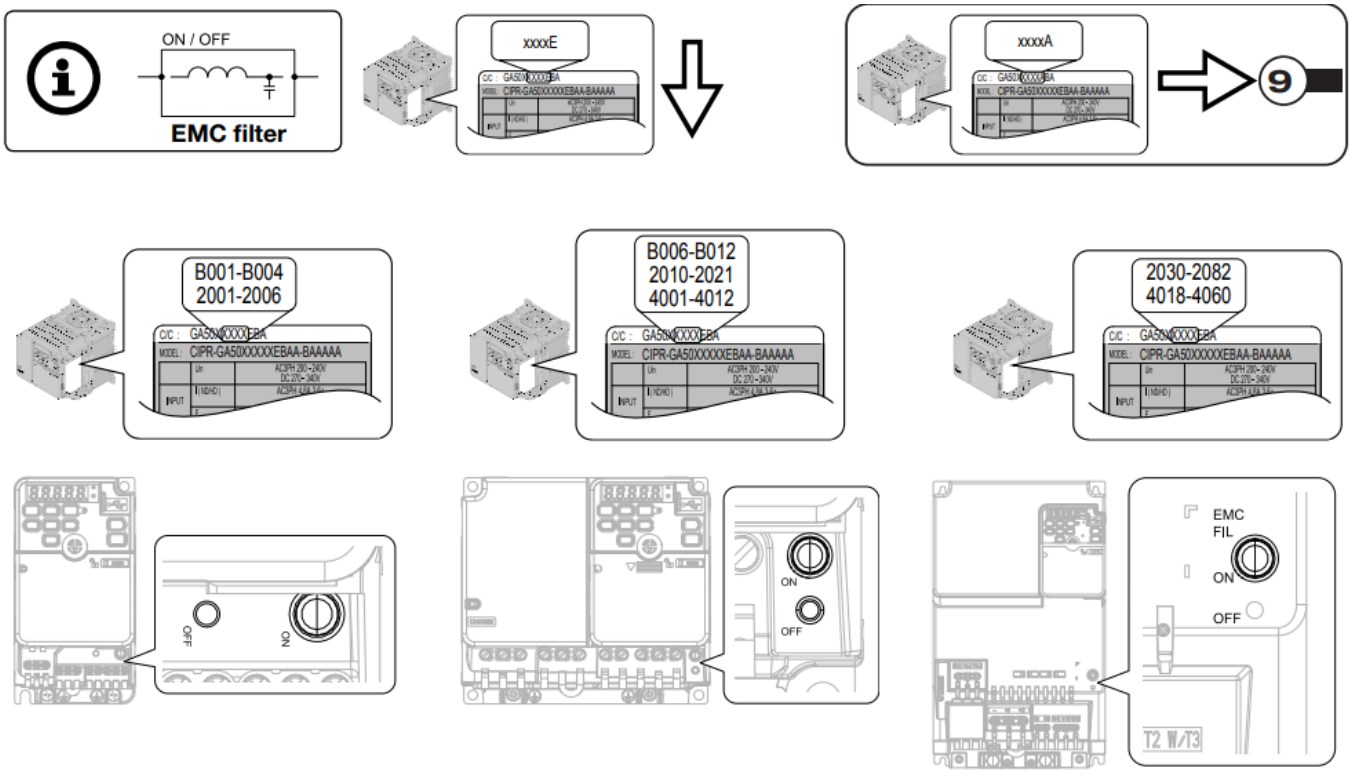
https://www.cpaltd.net/uploads/GA500_Tech_Manual.pdf



Step 1: How to enable the internal EMC Filter.

DANGER! Ensure the power is off to the drive and that the Charge LED is off before you attempt this step.

On drive models 2xxxE, BxxxE, and 4xxxE, move the screw or screws to turn ON and OFF (enable and disable) the EMC filter. Make sure that the symmetric grounding network is applied and install the screw or screws in the ON position to enable the built-in EMC filter in compliance with the EMC Directive. The EMC filter switch screw or screws are installed in the OFF position by default.



Step 2: Connect Motor and Line Power

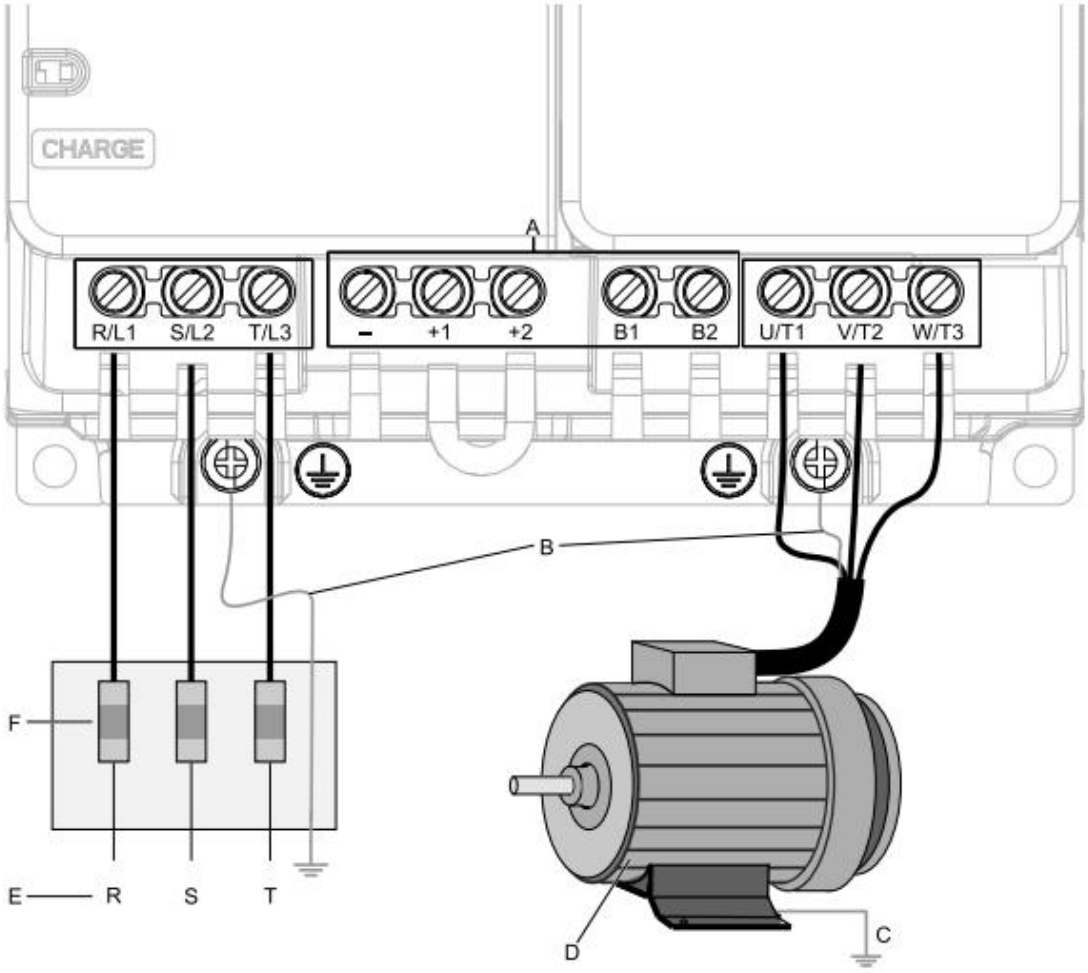
The figure below shows an example of the electrical connections for the input power and motor terminals.

WITH POWER OFF, make the appropriate connections. Make sure to follow good wiring practices and all applicable codes. Ensure that the equipment is grounded properly as shown below.

DANGER! Improper wiring can and will cause bodily harm as well as damage to the equipment.

DANGER! LETHAL VOLTAGES ARE PRESENT. Before applying power to the GA500, ensure that the terminal cover is fastened, and all wiring connections are secure. After the power has been turned off, wait at least five minutes until the charge indicator extinguishes completely before touching any wiring, circuit boards or components.

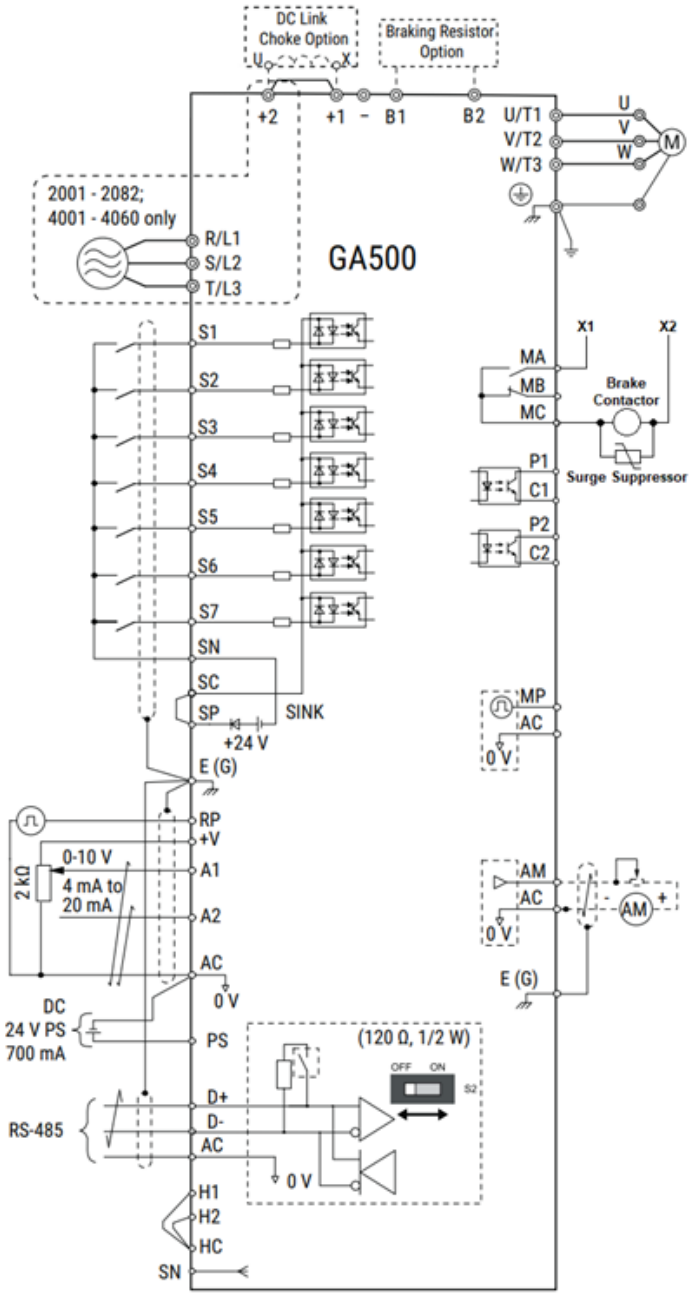
Electrical Shock Hazard. Do not connect terminals R/L1, S/L2, T/L3, U/T1, V/T2, W/T3, -, +1, +2, +3, B1, or B2 to the ground terminal. If you connect these terminals to earth ground, it can cause damage to the drive or serious injury or death.



A - DC bus terminal
B - Connect to the drive ground terminal.
C - Ground the motor case.
D - Three-Phase Motor
E - Use terminals R/L1, S/L2, and T/L3 for three-phase power supply input. Use terminals L/L1 and N/L2 for single-phase power supply input.
F - Input Protection (Fuses or Circuit Breakers)

Step 3: Typical connection diagram.

This step shows a typical wiring diagram and connection points for the GA500. Wiring connections should only be made by trained and authorized personnel when power to the drive is turned off.



Terminal	Type	Signal Level	Default
S1	Multi-functional Digital Input 1 to 7	Photocoupler 24V, 6,mA	Forward run/Stop
S2			Reverse run/Stop
S3			External fault
S4			Fault reset
S5			Multi-step speed 1
S6			Multi-step speed 2
S7			Jog reference
SN	MFDI power 0 V	24 V, 150 mA maximum (for external fuse)	-
SC	MFDI common		-
SP	MFDI power +24 VDC		-
H1	Safe disable input 1	24 V, 6 mA	-
H2	Safe disable input 2	Internal impedance: 4.7 kΩ	-
HC	Safe disable common	Minimum OFF time: 3 ms	-
RP	Master frequency reference pulse train input	Response frequency: 0 ~ 32 kHz H level duty: 30 ~ 70% H level voltage: 3.5 ~ 13.2 V L level voltage: 0.0 ~ 0.8 V Input impedance: 3 kΩ	-
+V	Frequency setting power supply	10.5 V (20 mA maximum)	-
A1	Multi-functional Analog Input 1	0V ~ +10 V/100% (input impedance: 20 kΩ)	Master frequency reference
A2	Multi-functional Analog Input 2	0 V ~ +10 V/100% (input impedance: 20 kΩ) 4 mA ~ 20 mA/100%, 0 mA ~ 20 mA/100% (input impedance: 250 Ω)	Combined w/ A1
AC	Common	0V	-
E(G)	Connect shielded cable	-	-
MA	Multi-Functional Digital Output	30 VDC, 10 mA ~ 1 A 250 VAC, 10 mA ~ 1 A Minimum load: 5 V, 10 mA	Fault
MB			Fault
MC	Common		-
P1	Multi-Functional Photocoupler	48 VDC, 2 mA ~ 50 mA	During run
C1			
P2	Multi-Functional Photocoupler		Speed agree 1
C2			
MP	Pulse train out	32 kHz maximum	Output frequency
AM	Analogue Monitor Output	V ~ +10 V/0% ~ 100% 4 mA ~ 20 mA	Output frequency
AC	Common	0V	-
PS	External 24 V PS input	21.6 VDC ~ 26.4 VDC, 700 mA	-
AC	External 24 V PS ground	0V	-
D+	Communication +, MEMOBUS/Modbus, RS-485	115.2 kbps maximum	-
D-	Communication -		-
AC	Common	0V	-

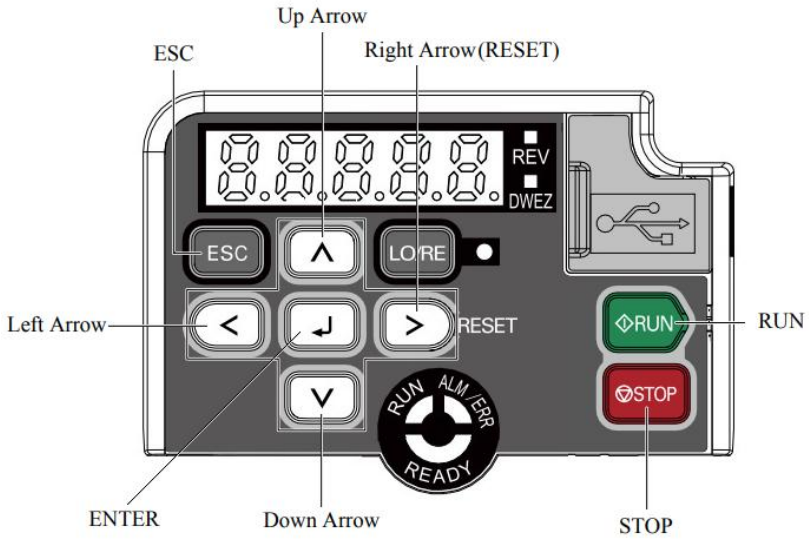
Step 4: Changing Parameters and Monitoring the GA500.

This step shows how to access and modify a GA500 parameter, as well as how to monitor the GA500 signals such as output frequency and motor current.

NOTE – Make sure all of the protective covers have been re-attached before power is turned on.

DO NOT RUN THE MOTOR

GA500 Keypad



Accessing Parameter Menu & Changing Parameters

- Press ∨ two times until the digital operator shows the parameter menu (PAr), then press ↵.
- Press > to select the digit you would like to change. Next use ∧ and ∨ to select the parameter group, sub-group, or number, then press ↵ to view the parameter value.
- Modify the parameter using ∧ and ∨. Press ↵ to save the new value.
- Press ESC several times to return to the main display.

Monitor Motor Frequency and Motor Current

- From the main Display, press ∧ until you see 0.00. The drive now shows the actual drive output frequency into Hz.
- Pressing ∧ again will show the motor output current in Amps.

Step 5: Initial Setup

Note: Before you set A1-06 [Application Preset], make sure that you set A1-03 = 2220 [Initialize Parameters = 2-Wire Initialization] to initialize parameters. It is not possible to change the A1-06 value. To set an application preset, set A1-03 = 2220 to initialize parameters, then set this parameter. If initializing all parameters will cause a problem, do not change the settings.

- **Use A1-06 [Application Preset].** The drive software contains the application presets shown below. Set A1-06 [Application Selection] to align with the application to let the drive automatically set the best parameter settings for the selected application.

Application	A1-06	Description
Crane (Hoist)	6	The drive automatically sets the parameters for a hoist application. **Note:** Make sure that you do Auto-Tuning after you set A1-06 for Hoist application
Crane (Travelling)	7	The drive automatically sets the parameters for a Travelling application.

Application Preset – Crane (Hoist)

The drive automatically sets the parameters in table below for a hoist application.

No.	Name	Optimal Value
A1-02	Control Method Selection	2: Open Loop Vector
B1-01	Frequency Reference Selection 1	0: Keypad
B6-01	Dwell Reference at Start	3.0 Hz
b6-02	Dwell Time at Start	0.3s
C1-01	Acceleration Time 1	3.0s
C1-02	Deceleration Time 1	3.0s
C6-01	Normal / Heavy Duty Selection	0: Heavy Duty Rating
C6-02	Carrier Frequency Selection	2: 5.0 kHz (4.0 kHz for AOLV/PM)
D1-01	Reference 1	6.00 Hz
D1-02	Reference 2	30.00 Hz
D1-03	Reference 3	50.00 Hz
E1-03	V/f Pattern Selection	F: Custom
H2-01	Term MA/MB-MC Function Selection	5: Frequency Detection
H2-02	Term P1 Function Selection	37: During Frequency Output
L2-03	Minimum Baseblock Time	0.3 s
L3-04	Stall Prevention during Decel	0: Disabled
L4-01	Speed Agree Detection Level	2.0 Hz
L4-02	Speed Agree Detection Width	0.0 Hz
L6-01	Torque Detection Selection 1	8: UL @ RUN - Fault
L6-02	Torque Detection Level 1	2%
L6-03	Torque Detection Level 1	0.5s
L8-05	Input Phase Loss Protection Sel	1: Enabled
L8-07	Output Phase Loss Protection Sel	1: Fault when One Phase is Lost
L8-41	High Current Alarm Selection	1: Enabled

Application Preset – Crane (Travelling)

The drive automatically sets the parameters in table below for a traveling application.

No.	Name	Optimal Value
A1-02	Control Method Selection	0: V/f Control
B1-01	Frequency Reference Selection 1	0: Keypad
C1-01	Acceleration Time 1	3.0s
C1-02	Deceleration Time 1	3.0s
C6-01	Normal / Heavy Duty Selection	0: Heavy Duty Rating
C6-02	Carrier Frequency Selection	2: 5.0 kHz (4.0 kHz for AOLV/PM)
D1-01	Reference 1	6.00 Hz
D1-02	Reference 2	30.00 Hz
D1-03	Reference 3	50.00 Hz
H1-05	Terminal S5 Function Selection	3: Multi-Step Speed Reference 1
H1-06	Terminal S6 Function Selection	4: Multi-Step Speed Reference 2
H2-01	Term MA/MB-MC Function Selection	37: During Frequency Output
H2-02	Term P1 Function Selection	37: During Frequency Output
L3-04	Stall Prevention during Decel	0: Disabled
L8-05	Input Phase Loss Protection Sel	1: Enabled
L8-07	Output Phase Loss Protection Sel	1: Fault when One Phase is Lost
L8-41	High Current Alarm Selection	1: Enabled

- **A1-02 [Control Method Selection]**. If required, select the applicable control method for the application different to the default set via the Application Preset (A1-06).

No. (Hex.)	Name	Description
A1-02 (0102)	Control Method Selection	V/f OLV Sets the Control Method for the drive application and the motor. 0: V/f Control 2: Open Loop Vector

Step 6: Auto-Tuning

In this step the GA500 is set up for use with the motor.

NOTE – Make sure all of the protective covers have been re-attached before power is turned on.

DO NOT RUN THE MOTOR

Refer to the Technical Manual for more detailed information about Auto-Tuning

!WARNING Injury to Personnel. Rotational Auto-Tuning rotates the motor at 50% or more of the motor rated frequency. Make sure that there are no issues related to safety in the area around the drive and motor. Increased motor frequency can cause serious injury or death.

!WARNING Sudden Movement Hazard. Before you do Rotational Auto-Tuning, disconnect the load from the motor. The load can move suddenly and cause serious injury or death.

Auto-Tuning automatically sets parameters on the drive connected to the motor. You must input some parameters individually during Auto-Tuning.

- To access the Auto-Tuning menu, press  once from the main screen until the digital operator shows  (Auto-Tune), then press .
- The Digital Operator with the show  (T0-00). Press  once for  (T1-01), then press . Using  and  select the Auto-Tuning Mode from the table below and press .

PLEASE TAKE NOTE OF THE APPLICABLE CONTOL METHODS AVAILABLE FOR WHEN SELECTING THE TYPE OF AUTO-TUNING REQUIRED. FOR STATIONARY AUTO-TUNING, THE DRIVE MUST BE IN OLV (A1-02 = 2).

Method	Parameter Setting	Application Conditions and Benefits	Applicable Control Method (A1-02)	
			V/f (0)	OLV (2)
Rotational Auto-Tuning	T1-01 = 0	• When you can decouple the motor and load the motor can rotate freely while Auto-Tuning. • When operating motors that have fixed output characteristics. • When it is necessary to use motors that have high-precision control. • When you cannot decouple the motor and load, but the motor load is less than 30%.	YES	YES
Stationary Auto-Tuning	T1-01 = 1	• When you cannot decouple the motor and load. • When the motor load is more than 30%. • When the information from the motor test report or motor nameplate is not available. With Stationary Auto-Tuning, the energized drive stays stopped for approximately 1 minute. During this time, the drive automatically measures the necessary motor parameters. • When you operate the motor with less than 30% load after Auto-Tuning. Set T1-12 = 1 [Test Mode Selection = Yes] to do a test run after Auto-Tuning.	NO	YES
Stationary Line-Line Resistance	T1-01 = 2	• After Auto-Tuning, the wiring distance between the drive and motor changed by 50 m or more. • When the wiring distance is 50 m or more in the V/f Control mode. • When the motor output and drive capacity are different.	YES	YES

- Press  to select the next parameter and follow the same process as described above to enter the values from the table below.
- At  (** = Tune method value) press  to begin the Auto-Tune.
- The display will show  (* = Tune method value) when the Auto-Tuning procedure has been successfully completed. **NOTE:** If you get an **END 1-9** message following the Auto-Tune, then please refer to the technical manual.
- Press  several times to return to the main display.

  Please refer to the GA500 technical manual or repeat the Auto-Tuning procedure again if the display shows an error message.

Input Data	Parameter	Unit	Auto-Tuning Mode (T1-01 Setting)		
			Rotational Auto-Tuning (0)	Stationary Auto-Tuning (1)	Stationary Line-Line Resistance (2)
Motor Rated Power	T1-02	kW	y	x	x
Motor Rated Voltage	T1-03	V	x	x	-
Motor Rated Current	T1-04	A	x	x	x
Motor Base Frequency	T1-05	Hz	x	x	-
Number of Motor Poles	T1-06	-	x	x	-
Motor Base Speed	T1-07	min -1	x	x	-
Motor No-Load Current	T1-09	A	-	x	-
Motor Rated Slip Frequency	T1-10	Hz	-	x *1	-
Motor Iron Loss	T1-11	W	x *2	-	-
Test Mode Selection *3	T1-12	-	-	x *4	-
No-Load Voltage	T1-13	V	x *5	x *5	-

*1 Shows 0 Hz as the default value. If you do not know the Motor Rated Slip Frequency, keep the setting at 0 Hz.

*2 Input this value when A1-02 = 0 [Control Method Selection = V/f].

*3 If T1-12 = 1 [Test Mode Selection = Yes], when you run the motor in Drive Mode for the first time after Auto-Tuning, the drive will automatically set E2-02 [Motor Rated Slip] and E2-03 [Motor No-Load Current].

*4 Input this value when T1-10 [Motor Rated Slip Frequency] = 0 Hz.

*5 Set the same value to No-Load Voltage as T1-03 [Motor Rated Voltage] to get the same characteristics using Yaskawa 1000-Series drives or other legacy models.