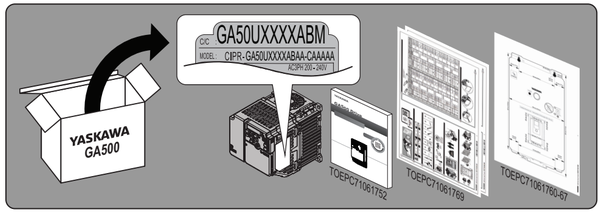
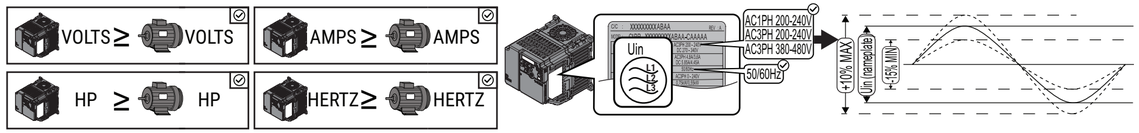
GA500 Quick Setup Procedure for Models GA50UB001 to B018, 2001 to 2082, and 4001 to 4060

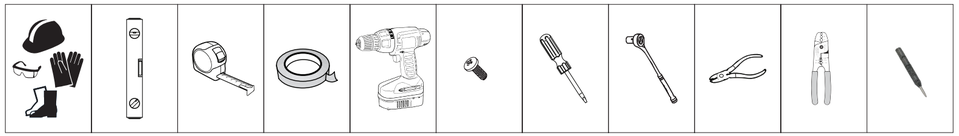


TOEPC7106174B

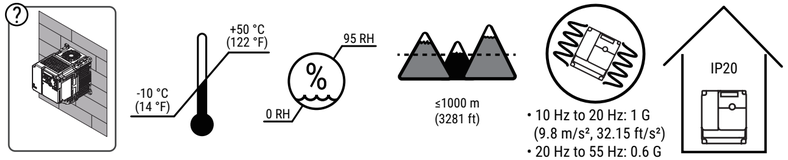
1 Confirm the Drive and Motor Specifications



2 Collect the Required Tools and Equipment



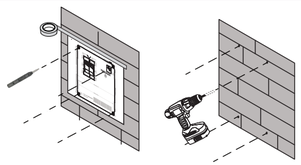
3 Confirm the Correct Drive Installation Environment



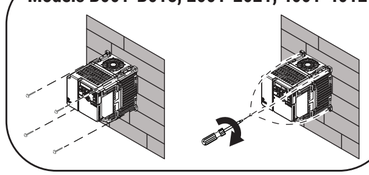
- 10 Hz to 20 Hz: 1 G (9.8 m/s², 32.15 ft/s²)
- 20 Hz to 55 Hz: 0.6 G (5.9 m/s², 19.36 ft/s²)

*Refer to the drive manual for installations exceeding these conditions.

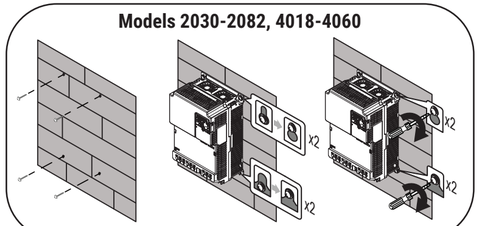
4 Mount the Drive

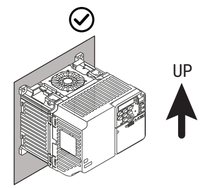


Models B001-B018, 2001-2021, 4001-4012

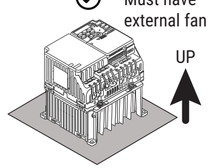


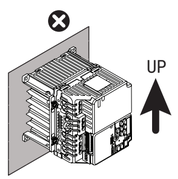
Models 2030-2082, 4018-4060



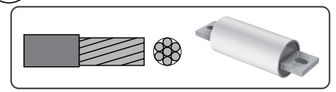


Must have external fan





5 Select the Correct Branch Circuit Protection, Wires, and Wire Strip Length, and Tightening Torque



UL Compliance: Install one of these types of short circuit protection devices to comply with UL 61800-5-1. Semiconductor protective type fuses are recommended, but the table also shows alternative short circuit protection devices. When you use MCCBs, RK1, or RK5 fuses, you must mount the drive in a ventilated enclosure as according to the minimum enclosure volume specified in this document.

MCCB and Non-Semiconductor Fuse Ratings: Maximum MCCB rating is 200% of the Normal-Duty drive full load output amp (FLA) rating. Maximum CC, J, T, RK1, or RK5 fuse rating is 175% of the Normal-Duty drive full load output amp (FLA) rating. You can substitute an alternateUL listed current limiting type MCCB where the peak let-through current and I^2t of the alternate MCCB is not greater than the specified MCCB in this table.

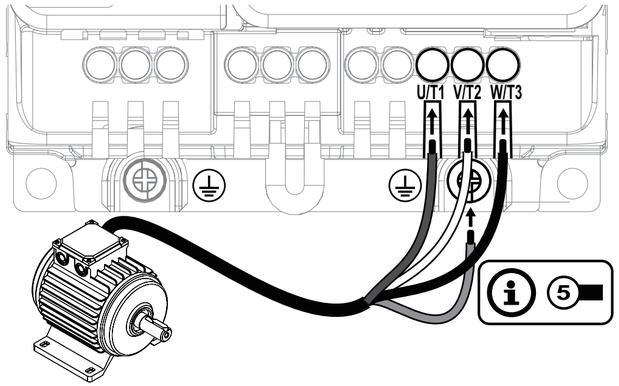
Short Circuit Current Rating (SCCR): The maximum SCCR provided by drive and fuse, or drive and MCCB combinations in this document, is 31,000 RMS symmetrical amps. Use the protection specified in this document to prepare the drive for use on a circuit capable of delivering not more than 31,000 RMS symmetrical amps and not more than 240 Vac (240 V models) and 480 Vac (480 V models) when there is a short circuit in the power supply.

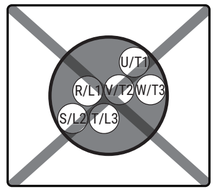
Model	R/L1 or L/L1, S/L2 or N/L2, T/L3		U/T1, V/T2, W/T3		–, +1, +2		B1, B2		⏚		mm (in)	Semiconductor Fuse Manufacturer: Eaton/Bussmann Part Number	Class CC, J, or T Fuse Maximum Amps
	Wire AWG*1	Torque N·m (lbf-in) Screw Size	Wire AWG*1	Torque N·m (lbf-in) Screw Size	Wire AWG*1	Torque N·m (lbf-in) Screw Size	Wire AWG*1	Torque N·m (lbf-in) Screw Size	Wire AWG*1	Torque N·m (lbf-in) Screw Size			
Single-Phase 240 V													
B001	14 (***14***)	0.5 - 0.6 (4.4 - 5.3) ⊖ M3	14 (***14***)	0.5 - 0. 6 (4.4 - 5.3) ⊖ M3	14 (***14***)	0.5 - 0.6 (4.4 - 5.3) ⊖ M3	14 (***14***)	0.5 - 0.6 (4.4 - 5.3) ⊖ M3	14 (***14***)	0.8 - 1.0 (7.1 - 8.9) ⊕ M3.5	6.5 (0.26)	FWH-25A14F	3.5
B002												FWH-25A14F	6
B004												FWH-60B	12
B006	14 - 10 (***12***)		14 - 12 (***14***)		14 - 10 (***12***)		14 - 12 (***14***)		14 - 10 (***10***)	1.2 - 1.5 (10.6 - 13.3) ⊕ M4	8 (0.3)	FWH-80B	20
B010	12 - 10 (***10***)				12 - 10 (***10***)							FWH-100B	35
B012	14 - 8 (***8***)	1.5 - 1.7 (13.5 - 15) ⊖ M4	14 - 10 (***12***)	1.5 - 1.7 (13.5 - 15) ⊖ M4	14 - 8 (***8***)	1.5 - 1.7 (13.5 - 15) ⊖ M4		1.5 - 1.7 (13.5 - 15) ⊖ M4	12 - 8 (***8***)	2.0 - 2.5 (17.7 - 22.1) ⊕ M5	10 (0.4)	FWH-125B	40
B018	12 - 6 (***8***)		14 - 8 (***10***)		12 - 6 (***8***)							FWH-150B	60
Three-Phase 240 V													
2001	14 (***14***)	0.5 - 0.6 (4.4 - 5.3) ⊖ M3	14 (***14***)	0.5 - 0.6 (4.4 - 5.3) ⊖ M3	14 (***14***)	0.5 - 0.6 (4.4 - 5.3) ⊖ M3	14 (***14***)	0.5 - 0.6 (4.4 - 5.3) ⊖ M3	14 (***14***)	0.8 - 1.0 (7.1 - 8.9) ⊕ M3.5	6.5 (0.26)	FWH-25A14F	2
2002												FWH-25A14F	3.2
2004												FWH-25A14F	6
2006												FWH-25A14F	10
2010	14 - 12 (***14***)		14 - 12 (***14***)		14 - 10 (***12***)		14 - 12 (***14***)		14 - 10 (***10***)	1.2 - 1.5 (10.6 - 13.3) ⊕ M4	8 (0.3)	FWH-70B	15
2012	14 - 10 (***12***)		14 - 10 (***12***)		12 - 10 (***10***)							FWH-70B	20
2021	14 - 8 (***8***)	1.5 - 1.7 (13.5 - 15) ⊖ M4	14 - 8 (***10***)	1.5 - 1.7 (13.5 - 15) ⊖ M4	14 - 8 (***8***)	1.5 - 1.7 (13.5 - 15) ⊖ M4	14 - 10 (***14***)	1.5 - 1.7 (13.5 - 15) ⊖ M4	14 - 8 (***8***)	2.0 - 2.5 (17.7 - 22.1) ⊕ M5	10 (0.4)	FWH-90B	35
2030	12 - 6 (***8***)		12 - 6 (***8***)		12 - 6 (***6***)		12 - 8 (***12***)		10 - 6 (***8***)			FWH-100B	50
2042	12 - 6 (***6***)		12 - 6 (***6***)		10 - 2 (***4***)	· ≤ AWG 10 2.3 - 2.5 (19.8 - 22) · AWG 8 ≤ 4.1 - 4.5 (36 - 40) ⊖ M5	14 - 6 (***10***)		10 - 6 (***6***)		10 (0.4)*2	FWH-150B	70
2056	10 - 2 (***4***)	4.1 - 4.5 (36 - 40) ⊖ M5	10 - 2 (***4***)	· ≤ AWG 10 2.3 - 2.5 (19.8 - 22) · AWG 8 ≤ 4.1 - 4.5 (36 - 40) ⊖ M5	8 - 2 (***2***)	4.1 - 4.5 (36 - 40) ⊖ M5	12 - 6 (***8***)		8 - 4 (***6***)	5.4 - 6.0 (47.8 - 53.1) ⊕ M6	18 (0.71)*3	FWH-200B	90
2070	6 - 1 (***2***)	5 - 5.5 (45 - 49) ⓑ M6	8 - 1 (***2***)	5 - 5.5 (45 - 49) ⓑ M6	6 - 1/0 (***1***)	5 - 5.5 (45 - 49) ⓑ M6			6 - 4 (***4***)		20 (0.79)*3	FWH-200B	110
2082	6 - 1/0 (***1***)		6 - 1 (***2***)		2 - 2/0 (***2/0***)		10 - 6 (***6***)					FWH-225B	125
Three-Phase 480 V													
4001	14 - 12 (***14***)	0.5 - 0.6 (4.4 - 5.3) ⊖ M3	14 - 12 (***14***)	0.5 - 0.6 (4.4 - 5.3) ⊖ M3	14 - 12 (***14***)	0.5 - 0.6 (4.4 - 5.3) ⊖ M3	14 - 12 (***14***)	0.5 - 0.6 (4.4 - 5.3) ⊖ M3	14 - 10 (***14***)	1.2 - 1.5 (10.6 - 13.3) ⊕ M4	8 (0.3)	FWH-40B	2
4002												FWH-40B	3.5
4004									14 - 10 (***10***)			FWH-50B	7
4005												FWH-70B	9
4007												FWH-70B	12
4009												FWH-90B	15
4012	14 - 10 (***12***)	1.5 - 1.7 (13.5 - 15) ⊖ M4	12 - 8 (***10***)	1.5 - 1.7 (13.5 - 15) ⊖ M4	12 - 8 (***10***)	1.5 - 1.7 (13.5 - 15) ⊖ M4	14 - 12 (***14***)	1.5 - 1.7 (13.5 - 15) ⊖ M4	14 - 6 (***10***)	2.0 - 2.5 (17.7 - 22.1) ⊕ M5	10 (0.4)	FWH-90B	20
4018	12 - 8 (***10***)		14 - 8 (***10***)		14 - 8 (***10***)				10 - 6 (***10***)			FWH-80B	30
4023	14 - 6 (***8***)		14 - 8 (***10***)		12 - 6 (***8***)		14 - 10 (***12***)		10 - 6 (***8***)			FWH-100B	40
4031	12 - 6 (***8***)		12 - 6 (***8***)		12 - 4 (***6***)	· ≤ AWG 10 2.3 - 2.5 (19.8 - 22) · AWG 8 ≤ 4.1 - 4.5 (36 - 40) ⊖ M5	12 - 8 (***10***)			5.4 - 6.0 (47.8 - 53.1) ⊕ M6	10 (0.4)*2	FWH-125B	50
4038	12 - 6 (***6***)				10 - 2 (***4***)		14 - 6 (***10***)		10 - 6 (***6***)			FWH-175B	60
4044	10 - 2 (***4***)	· ≤ AWG 10 2.3 - 2.5 (19.8 - 22) · AWG 8 ≤ 4.1 - 4.5 (36 - 40) ⊖ M5	12 - 4 (***6***)	· ≤ AWG 10 2.3 - 2.5 (19.8 - 22) · AWG 8 ≤ 4.1 - 4.5 (36 - 40) ⊖ M5	8 - 2 (***2***)	4.1 - 4.5 (36 - 40) ⊖ M5	12 - 6 (***8***)				18 (0.71)*3	FWH-200B	75
4060	8 - 2 (***2***)	4.1 - 4.5 (36 - 40) ⊖ M5	10 - 2 (***4***)		6 - 2 (***2***)							FWH-200B	100

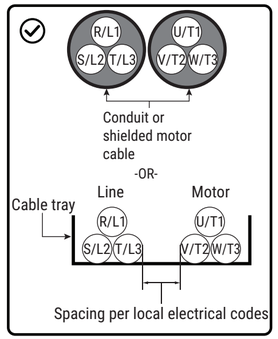
*1 Values in **bold** parentheses are the recommended values.
*2 Strip length for terminals **-, +1, +2** is 18 mm (0.71 in).
*3 Strip length for terminals **B1, B2** is 10 mm (0.4 in).

Flip Over for Steps 6 to 12

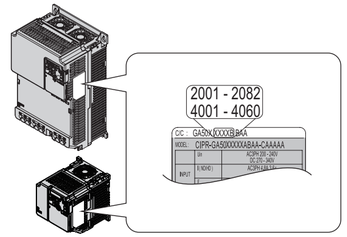
6 Install the Motor Wiring

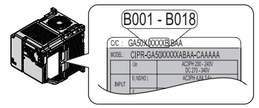


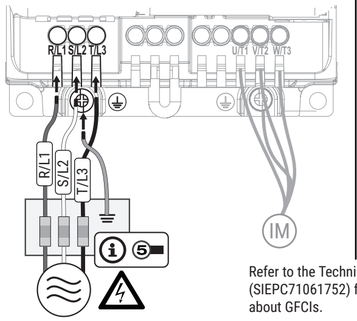


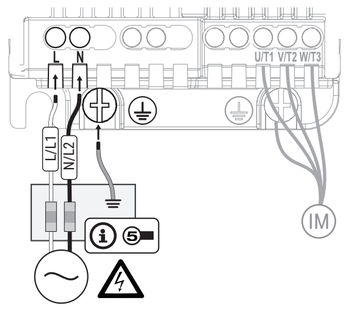


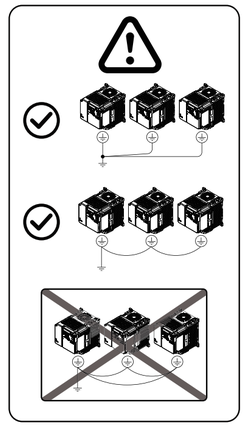
7 Install the Power Wiring





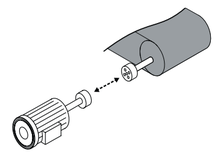
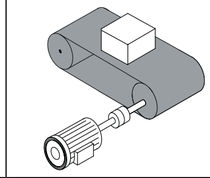




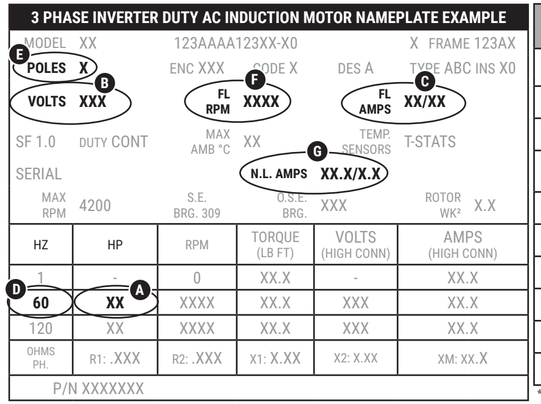


Refer to the Technical Reference (SIEPC71061752) for information about GFCIs.

8 Determine the Correct Auto-Tuning Method

Motor Connection and Load Condition	
	
Use Rotational Auto-Tuning T1-01 = 0	Use Stationary Auto-Tuning T1-01 = 1

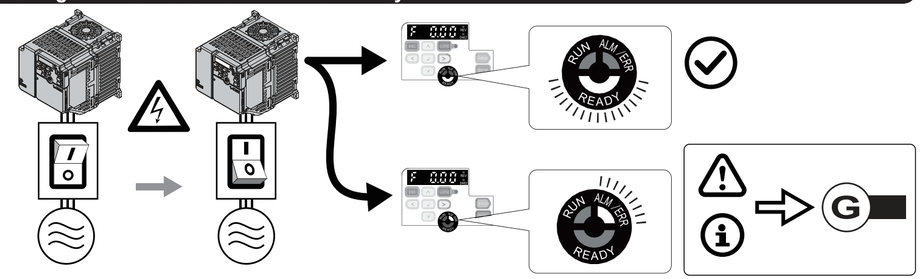
9 Collect and Record Auto-Tuning Data from Motor Nameplate



Reference	T1-xx Parameter (Ex-xx Parameter*1)	Motor Nameplate Data	Motor Nameplate Value	
A	T1-02 (E2-11)	Motor Rated Power	(HP x 0.746)	kW
B	T1-03 (E1-05)	Motor Rated Voltage		V
C	T1-04 (E2-01)	Motor Rated Current (FLA)		A
D	T1-05 (E1-04/E1-06)	Motor Rated Frequency (Base Frequency)		Hz
E	T1-06 (E2-04)	Motor Pole Count		-
F	T1-07	Motor Rated RPM		RPM
G	T1-09 (E2-03)	Motor No-Load Current*2		A
-	T1-10 (E2-02)	Motor Rated Slip*2*3	0.000	Hz
-	T1-12	Test Mode Selection*2		-
-	T1-13	Motor No-Load Voltage		V

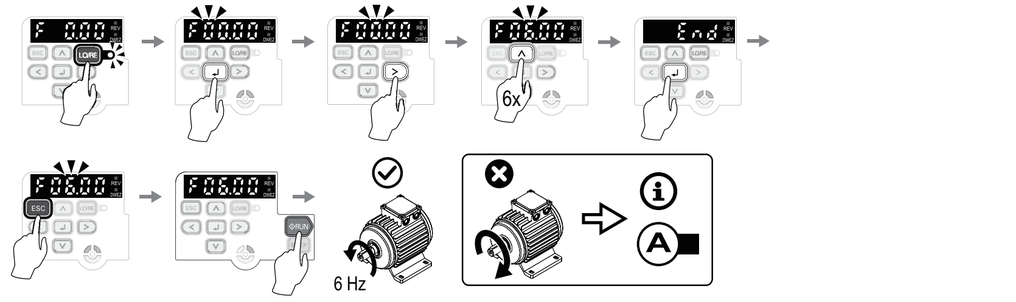
*1 Auto-Tuning will automatically set the E1-xx and E2-xx parameters. You can manually adjust Ex-xx parameters after Auto-Tuning.
*2 These values are only necessary for Stationary Auto-Tuning (T1-01 = 1).
*3 If you do not know this value, leave at the default value of 0.000.

10 Energize the Drive and Confirm It Is Ready

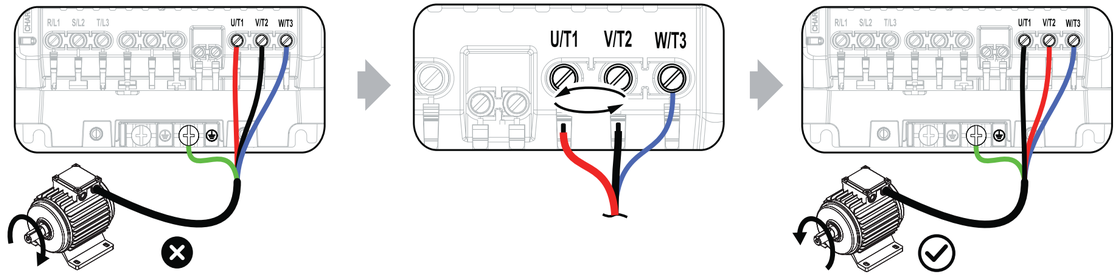


11 Use Auto-Tuning Data from Motor Nameplate to Set Parameters and Auto-Tune the Drive

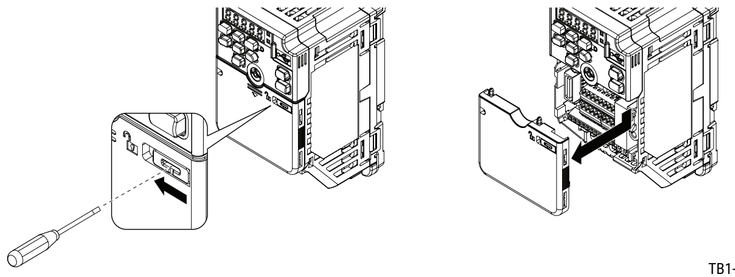
12 Set a Frequency Reference and Check the Motor Rotation Direction

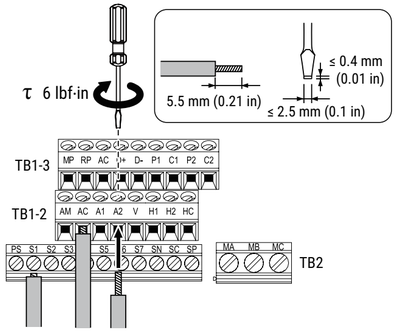


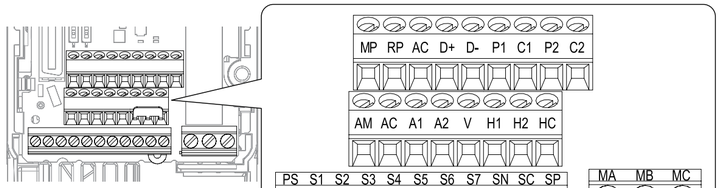
A If the Motor Does Not Rotate in the Correct Direction



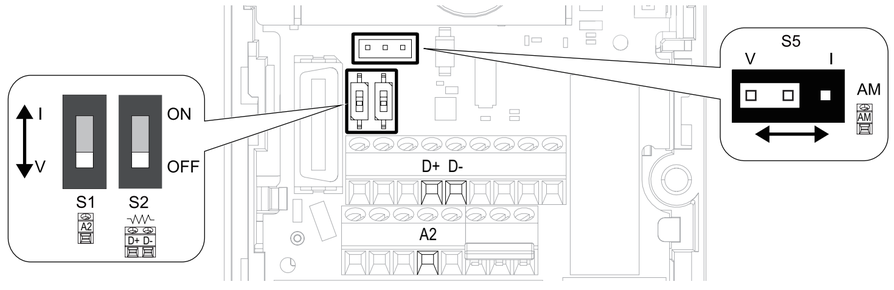
B Control Circuit Configuration and Accessibility



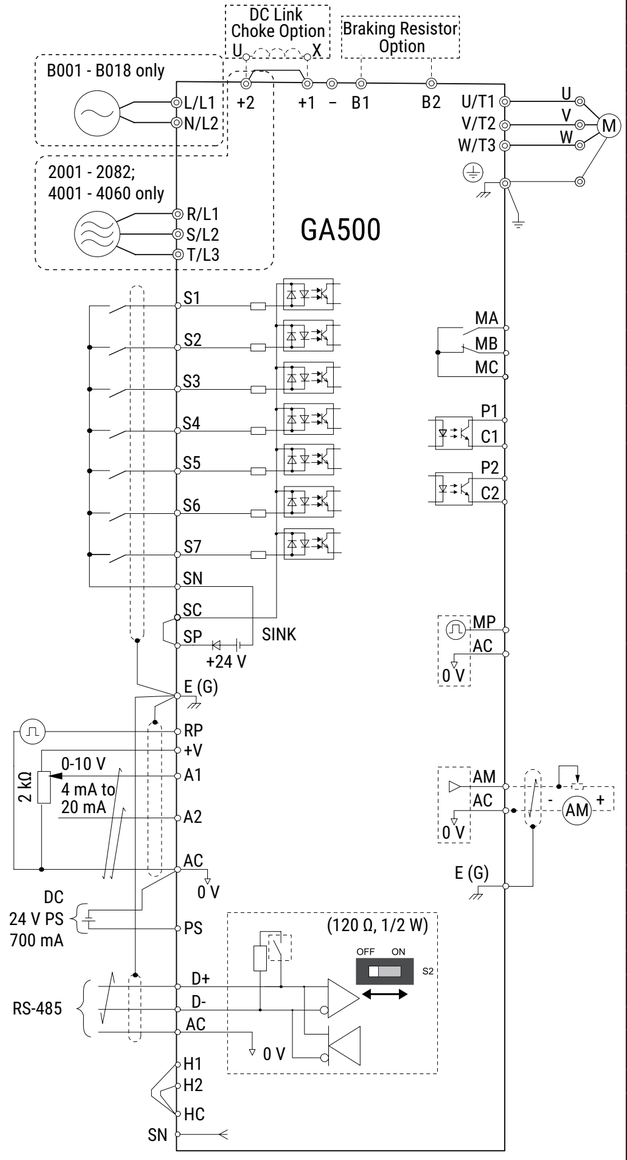




C Switches and Jumpers on the Control Board



D Connection Diagram and Terminal Functions



Terminal	Type	Signal Level	Default
S1	MFDI selection 1	Photocoupler 24 V, 6 mA	Forward run/Stop
S2	MFDI selection 2		Reverse run/Stop
S3	MFDI selection 3		External fault (N.O.)
S4	MFDI selection 4		Fault reset
S5	MFDI selection 5		Multi-step speed reference 1
S6	MFDI selection 6		Multi-step speed reference 2
S7	MFDI selection 7		Jog command
SN	MFDI power supply 0 V	24 V, 150 mA maximum	-
SC	MFDI selection common		-
SP	MFDI power supply +24 Vdc		-
H1	Safe Disable input 1	24 V, 6 mA Internal impedance: 4.7 kΩ Minimum OFF time: 3 ms	-
H2	Safe Disable input 2		-
HC	Safe Disable function common	Safe Disable function common	-
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 V ~ 0.8 V Input impedance: 3 kΩ	-
+V	Power supply for frequency setting	10.5 V (20 mA maximum)	-
A1	MFAI 1	0 V ~ 10 V/100% (input impedance: minimum 15 kΩ) -10 V ~ +10 V/-100% ~ +100% (input impedance: minimum 15 kΩ)	Master frequency reference
A2	MFAI 2	0 V ~ 10 V/100% (input impedance: minimum 15 kΩ) -10 V ~ +10 V/-100% ~ +100% (input impedance: minimum 15 kΩ) 4 mA ~ 20 mA/100%, 0 mA ~ 20 mA/100% (input impedance: 250 Ω)	Combined to terminal A1
AC	Frequency reference common	0 V	-
E(G)	Connect shielded cable	-	-
MA	N.O. output	30 Vdc, 10 mA ~ 1 A 250 Vac, 10 mA ~ 1 A Minimum load: 5 V, 10 mA	Fault
MB	N.C. output		Fault
MC	Digital output common		-
P1	Multi-function photocoupler output 1	Photocoupler output 48 V, 2 mA ~ 50 mA	During RUN
C1			
P2	Multi-function photocoupler output 2		Speed agree 1
C2			
MP	Pulse train output	32 kHz maximum	Output frequency
AM	Analog monitor output	0 V ~ +10 V/0% ~ 100% 4 mA ~ 20 mA (receiver recommended impedance: 250 Ω)	Output frequency
AC	Monitor common	0 V	-
PS	External 24 V power supply input	21.6 Vdc ~ 26.4 Vdc, 700 mA	-
AC	External 24 V power supply ground	0 V	-
D+	Communication input/output (+)	MEMOBUS/Modbus, RS-485 115.2 kbps maximum	-
D-	Communication output (-)		-
AC	Shield ground	0 V	-

MFDI: Multi-Function Digital Input
MFAI: Muti-Function Analog Input

E Parameter Groups

A: Initialization Parameters	
A1	Initialization
A2	User Parameters
b: Application	
b1	Operation Mode Selection
b2	DC Injection Braking and Short Circuit Braking
b3	Speed Search
b4	Timer Function
b5	PID Control
b6	Dwell Function
b8	Energy Saving
C: Tuning	
C1	Accel & Decel Time
C2	S-Curve Characteristics
C3	Slip Compensation
C4	Torque Compensation
C5	Automatic Speed Regulator (ASR)
C6	Duty & Carrier Frequency

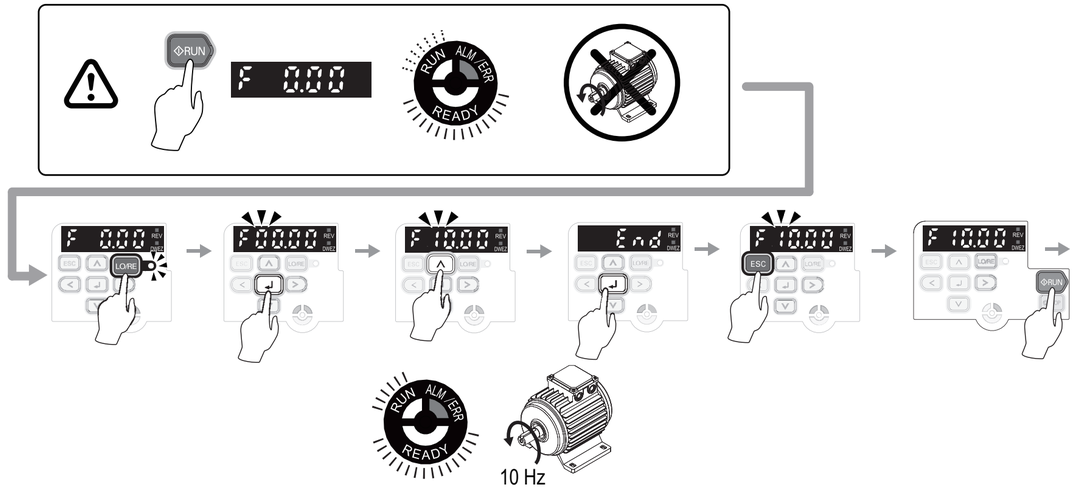
d: Reference Settings	
d1	Frequency Reference
d2	Reference Limits
d3	Jump Frequency
d4	Frequency Ref Up/Down & Hold
d6	Field Weakening/Forcing
d7	Offset Frequency
E: Motor Parameters	
E1	V/f Pattern for Motor 1
E2	Motor Parameters
E3	V/f Pattern for Motor 2
E4	Motor 2 Parameters
E5	PM Motor Settings
E9	Motor Setting
F: Options	
F1	Fault Detection in PG Speed Control
F6	Communication Options
F7	Communication Options

H: Terminal Functions	
H1	Digital Inputs
H2	Digital Outputs
H3	Analog Inputs
H4	Analog Outputs
H5	Modbus Communication
H6	Pulse Train Input/Output
H7	Virtual MFIO Selection
L: Protection Functions	
L1	Motor Protection
L2	Power Loss Ride Through
L3	Stall Prevention
L4	Speed Detection
L5	Fault Restart
L6	Torque Detection
L7	Torque Limit
L8	Drive Protection

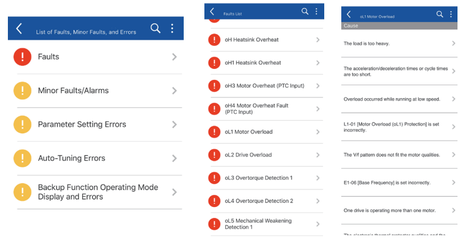
n: Special Adjustment	
n1	Hunting Prevention
n2	Auto Freq Regulator (AFR)
n3	High Slip/Overexcite Braking
n5	Feed Forward Control
n6	Online Tuning
n7	EZ Drive
n8	PM Motor Control Tuning
nA	PM Motor Control Tuning
o: Keypad-Related Settings	
o1	Keypad Display
o2	Keypad Operation
o3	Copy Keypad Function
o4	Maintenance Monitors
o5	Log Function

q: DriveWorksEZ Parameters	
r: DWEZ Connection 1-20	
T: Motor Tuning	
T0	Tuning Mode Selection
T1	Induction Motor Auto-Tuning
T2	PM Motor Auto-Tuning
T3	ASR and Inertia Tuning
T4	EZ Tuning
U: Monitors	
U1	Operation Status Monitors
U2	Fault Trace
U3	Fault History
U4	Maintenance Monitors
U5	PID Monitors
U6	Operation Status Monitors
U8	DriveWorksEZ Monitors

F If You Push the Run Button but the Motor Does Not Spin



G Troubleshooting Resources for Drive Faults and Alarms

Resource	Choose This When:	URL	QR Code
Installation & Primary Operation	You have access to the paper copy of the manual that was packaged with the drive. This manual lists all drive faults and alarms, and offers a selection of causes and solutions. 	https://www.yaskawa.com/toepc71061752	PDF download
Mobile App	You want to use your smartphone or tablet and use the embedded help to look up the full complement of causes and solutions to all drive faults and alarms. 	https://www.yaskawa.com/dwm	Download on the App Store GET IT ON Google Play App download
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