

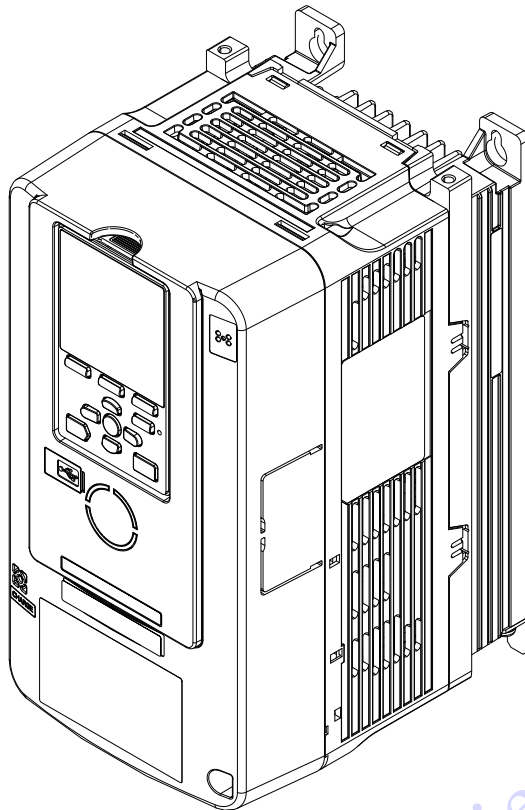
## YASKAWA AC Drive GA700

### High Performance Type

### Initial Steps

Type: CIPR-GA70Cxxxxxxx  
Models: 200 V class: 0.55 to 110 kW  
400 V class: 0.55 to 355 kW

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



Initial Steps

EN

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## 1 General Information

Do not use this manual as a replacement for the Technical Manual. The products and specifications given in this manual and the manual contents can change without notice to make the product and manual better. Be sure to always use the most recent version of this manual. Use the manual for the correct installation, wiring, adjustment, and operation of this product.

This manual is available for download on our documentation website. Refer to the back page of this manual.

## 2 Qualifications for the Intended User

Yaskawa created this manual for electrical specialists and engineers who have experience with AC drive installation, adjustment, repair, inspection, and parts replacement. Persons without technical training, minors, persons with disabilities or mental problems, persons with perception problems, and persons with pacemakers must not use or operate this product.

## 3 Safety

Read the safety guidelines carefully before installing, wiring, or operating this product.

### ◆ Explanation of Signal Words

- ⚠ DANGER** Indicates a hazardous situation, which, if not avoided, will cause death or serious injury.
- ⚠ WARNING** Indicates a hazardous situation, which, if not avoided, could cause death or serious injury.
- ⚠ CAUTION** Indicates a hazardous situation, which, if not avoided, could cause minor or moderate injury.
- NOTICE** Indicates a property damage message.

### ◆ General Safety Instructions

Yaskawa Electric manufactures and supplies electronic components for a variety of industrial applications. The selection and application of Yaskawa products is the responsibility of the designer of the equipment or the customer that assembles the final product. Yaskawa is not responsible for how our products are incorporated into the final system design. In all cases, Yaskawa products should not be incorporated into a product or design as the exclusive or sole safety control function. All control functions are designed to dynamically detect failures and operate safely without exception. All products that are designed to incorporate parts manufactured by Yaskawa must be provided to the end user and include proper warnings and instructions regarding their safe use and operation. All warnings from Yaskawa must be promptly issued to the end user. Yaskawa offers warranties only for the quality of our products, in compliance with standards and specifications that are described in the manual. Yaskawa does not offer other warranties, either explicit or implied. Injuries, property damage, and lost business opportunities caused by improper storage or handling and negligence oversight on the part of your company or your customers will void Yaskawa's warranty for the product.

#### Note:

Failure to obey the safety messages in the manual can cause serious injury or death. Yaskawa is not responsible for injuries or damage to equipment caused by ignoring the safety messages.

- Read this manual carefully when mounting, operating, and repairing AC drives.
- Obey all warnings, cautions, and notices.
- Approved personnel must perform all work.
- Install the drive in an area with these conditions.

**⚠ DANGER** *Electrical Shock Hazard. Do not examine, connect, or disconnect wiring on an energized drive. Before servicing, disconnect all power to the equipment and wait for the time specified on the warning label at a minimum. The internal capacitor stays charged after the drive is de-energized. The charge indicator LED extinguishes when the DC bus voltage decreases below 50 Vdc. To prevent electric shock, always wait for at least the amount of time indicated on the warning labels. When all indicators are OFF, remove the covers before measuring for dangerous voltages to make sure that the drive is safe. Failure to obey will cause death or serious injury.*

**⚠ WARNING** *Fire Hazard. Do not connect power supply wiring to drive output terminals U/T1, V/T2, and W/T3. Connect power supply wiring to main circuit input terminals R/L1, S/L2, and T/L3. Failure to obey can cause death or serious injury.*

**⚠ WARNING** *Crush Hazard. Only approved personnel can operate a crane or hoist to move the drive. Failure to obey can cause death or serious injury from falling equipment.*

**⚠ WARNING** *Electrical Shock Hazard. Do not make changes to the drive body or drive circuitry. Failure to obey can cause death or serious injury and will void warranty. Yaskawa is not responsible for changes to the product made by the user.*

**⚠ WARNING** *Electrical Shock Hazard. Only let authorized persons install, wire, maintain, examine, replace parts, and repair the drive. Failure to obey can cause death or serious injury.*

**⚠ WARNING** *Electrical Shock Hazard. Always ground the motor-side grounding terminal. Contacting the motor case can cause death or serious injury from incorrect equipment grounding.*

**⚠ WARNING** *Electrical Shock Hazard. Do not work on the drive or around the drive while wearing loose clothing or jewelry. Tighten loose clothing and remove all metal objects such as watches or rings. Failure to obey can cause death or serious injury.*

**⚠ WARNING** *Electrical Shock Hazard. The leakage current of drive models 4389A to 4675A, 2xxxB/C and 4xxxB/C is more than 3.5 mA. The IEC/EN 61800-5-1: 2007 standard specifies that users must wire the power supply to automatically turn off when the protective ground wire disconnects. Users can also connect a protective ground wire that has a minimum cross-sectional area of 10 mm<sup>2</sup> (copper wire) or 16 mm<sup>2</sup> (aluminum wire). Failure to obey these standards can cause death or serious injury.*

**⚠ WARNING** *Sudden Movement Hazard. Remove all persons and objects from the area around the drive, motor, and load before starting Auto-Tuning. The drive and motor can start suddenly during Auto-Tuning and cause death or serious injury.*

**⚠ WARNING** *Sudden Movement Hazard. Remove all persons and objects from the area around the drive, motor, and machine area and attach covers, couplings, shaft keys, and machine loads before energizing the drive. Failure to obey can cause death or serious injury.*

**⚠ WARNING** *Fire Hazard. Do not use the main circuit power supply (Overcurrent Category III) at incorrect voltages. Make sure that the drive rated voltage aligns with the power supply voltage before energizing the drive. Failure to obey can cause death or serious injury.*

**⚠ WARNING** *Fire Hazard. Do not put flammable or combustible materials on top of the drive and do not install the drive near flammable or combustible materials. Attach the drive to metal or other noncombustible material. Failure to obey can cause death or serious injury.*

**⚠ WARNING** *Fire Hazard. Tighten all terminal screws to the correct tightening torque. Connections that are too loose or too tight can cause incorrect operation and damage to the drive. Incorrect connections can also cause death or serious injury from fire.*

**⚠ WARNING** *Fire Hazard. Tighten screws against the bit at an angle in the specified range described in this manual. Tightening screws at an angle outside of the specified range can cause damage the terminal block or start a fire if the connection is loose.*

**⚠ WARNING** *Crush Hazard. Use a lifting mechanism made to move large drives when necessary. Failure to obey can cause death or serious injury from falling equipment.*

**⚠ WARNING** *Electrical Shock Hazard. Do not cause a short circuit on the drive output circuit. Failure to obey can cause death or serious injury.*

**⚠ WARNING** *Electrical Shock Hazard. Use a type B Residual Current Monitor/Residual Current Device (RCM/RCD) for protection against contact when using a residual current operated protective device or monitoring device as specified by IEC/EN 60755. The drive can cause a residual current with a DC component in the protective earthing conductor. Failure to obey can cause death or serious injury.*

**⚠ WARNING** *Electrical Shock Hazard. Ground the neutral point on the power supply of drive models 2xxxB/C and 4xxxA/B/C to comply with the EMC Directive before turning on the EMC filter or if there is high resistance grounding. Failure to obey can cause death or serious injury.*

**⚠ WARNING** *Electrical Shock Hazard. Do not immediately energize the drive or operate peripheral devices after the drive blows a fuse or trips an RCM/RCD. Wait for the time specified on the warning label at a minimum and make sure that all indicators are OFF. Then check the wiring and peripheral device ratings to find the cause of the problem. Contact Yaskawa before energizing the drive or peripheral devices if the cause is not known. Failure to obey can cause death or serious injury and damage to the drive.*

**⚠ WARNING** *Fire Hazard. Install sufficient branch circuit short circuit protection as specified by applicable codes and this manual. The drive is suited for circuits that supply not more than 100,000 RMS symmetrical amperes, 240 Vac maximum (200 V Class), 480 Vac maximum (400 V Class). Failure to obey can cause death or serious injury.*

**⚠ CAUTION** *Crush Hazard. Do not hold the drive by the front cover or terminal cover. Tighten the screws correctly before moving the drive. Failure to obey can cause minor to moderate injury.*

**⚠ CAUTION** *Burn Hazard. Do not touch a hot drive heatsink. De-energize the drive, wait 15 minutes minimum, and make sure that the heatsink is cool to replace the cooling fans. Failure to obey can cause minor to moderate injury.*

**NOTICE** *Observe correct electrostatic discharge (ESD) procedures when touching the drive and circuit boards. Failure to obey can cause ESD damage to the drive circuitry.*

**NOTICE** *Do not connect or disconnect the motor from the drive while the drive is supplying voltage. Incorrect equipment sequencing can cause damage to the drive.*

**NOTICE** *Do not do a withstand voltage test or Megger test on the drive. Failure to obey can cause damage to the drive.*

## 4 Moving the Drive

**NOTICE** Do not connect or operate damaged equipment or equipment with missing parts. Failure to obey can cause damage to the drive and connected equipment.

**NOTICE** Install fuses and an RCM/RCD. Failure to obey can cause damage to the drive.

**NOTICE** Do not use unshielded wire for control wiring. Use shielded, twisted-pair wires and ground the shield to the ground terminal of the drive. Failure to obey can cause electrical interference and unsatisfactory system performance.

**NOTICE** Review the Braking Unit and Braking Resistor Unit Installation Manual TOBPC72060001 before connecting a dynamic braking option to the drive. Failure to obey can cause damage to the drive and braking circuit.

**NOTICE** Make sure that all connections are correct after installing the drive and connecting peripheral devices. Failure to obey can cause damage to the drive.

**NOTICE** Do not connect phase-advancing capacitors or LC/RC noise filters to the output circuits. Failure to obey can cause damage to the drive, phase-advancing capacitors, LC/RC noise filters, and leakage breakers (ELCB, GFCI, or RCM/RCD).

### ◆ Intended Use

This AC drive is electrical equipment that controls the speed and rotational direction of a motor in a commercial application. Do not use this product for other functions.

1. Read and understand all safety precautions.
2. Wire and ground the drive as specified by all applicable standards and safety precautions.
3. Tightly attach all parts and protective covers.
4. Always use the product in the correct environmental conditions as specified in this manual.

**⚠ DANGER** Electrical Shock Hazard. Make sure that all electrical connections are correct and install all drive covers before energizing the drive. Use terminals for their intended function only. Incorrect wiring or ground connections, and incorrect repair of protective covers can cause death or serious injury.

**⚠ WARNING** Electrical Shock Hazard. Do not make changes to the drive body or drive circuitry. Failure to obey can cause death or serious injury and will void warranty. Yaskawa is not responsible for changes to the product made by the user.

### ◆ Warranty and Exclusion of Liability

- This product is not designed and manufactured for use in life-support machines or systems.
- Contact a Yaskawa representative or your Yaskawa sales representative if you are considering the application of this product for special purposes, such as machines or systems used for passenger cars, medicine, airplanes and aerospace, nuclear power, electric power, or undersea relaying.

**⚠ WARNING** Injury to Personnel. Yaskawa manufactured this product with strict quality-control guidelines. Install applicable safety devices to minimize the risk of accidents when installing the product where its failure could cause a life-or-death situation, loss of human life, or a serious accident or physical injury.

## 4 Moving the Drive

Obey local laws and regulations when moving and installing this product.

**⚠ CAUTION** Crush Hazard. Do not hold the drive by the front cover or terminal cover. Tighten the screws correctly before moving the drive. Failure to obey can cause minor to moderate injury.

Drive Weight	Persons Necessary to Move the Drive
< 15 kg (33 lbs.)	1
≥ 15 kg (33 lbs.)	2 + using appropriate lifting equipment

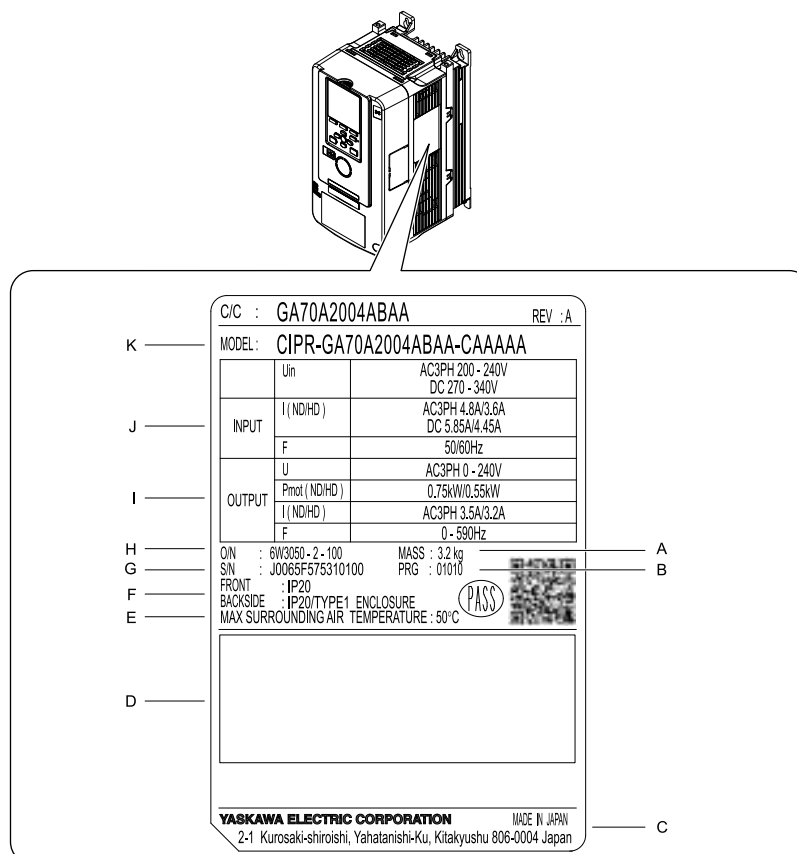
Refer to the Technical Manual for information about moving the drive with suspension systems, wires, or hanging metal brackets.

## 5 Receiving

Please check these items after receiving the drive:

- Examine the drive for damage. Immediately contact the shipping company if the drive is damaged. The Yaskawa warranty does not cover damage from shipping.
- Verify the drive model number in the "MODEL" section of the drive nameplate to make sure that you received the correct model.
- Contact your supplier if you receive the incorrect drive model or if the drive does not operate correctly.

### ◆ Nameplate



- |  |                           |
|--|---------------------------|
| A - Mass   | G - Serial number         |
| B - Drive software version   | H - Lot number            |
| C - The address of the head office of Yaskawa Electric Corporation | I - Output specifications |
| D - Accreditation standards  | J - Input specifications  |
| E - Surrounding air temperature                                    | K - Drive model           |
| F - Protection design  |                           |

Figure 5.1 Nameplate Information Example

## 6 Keypad

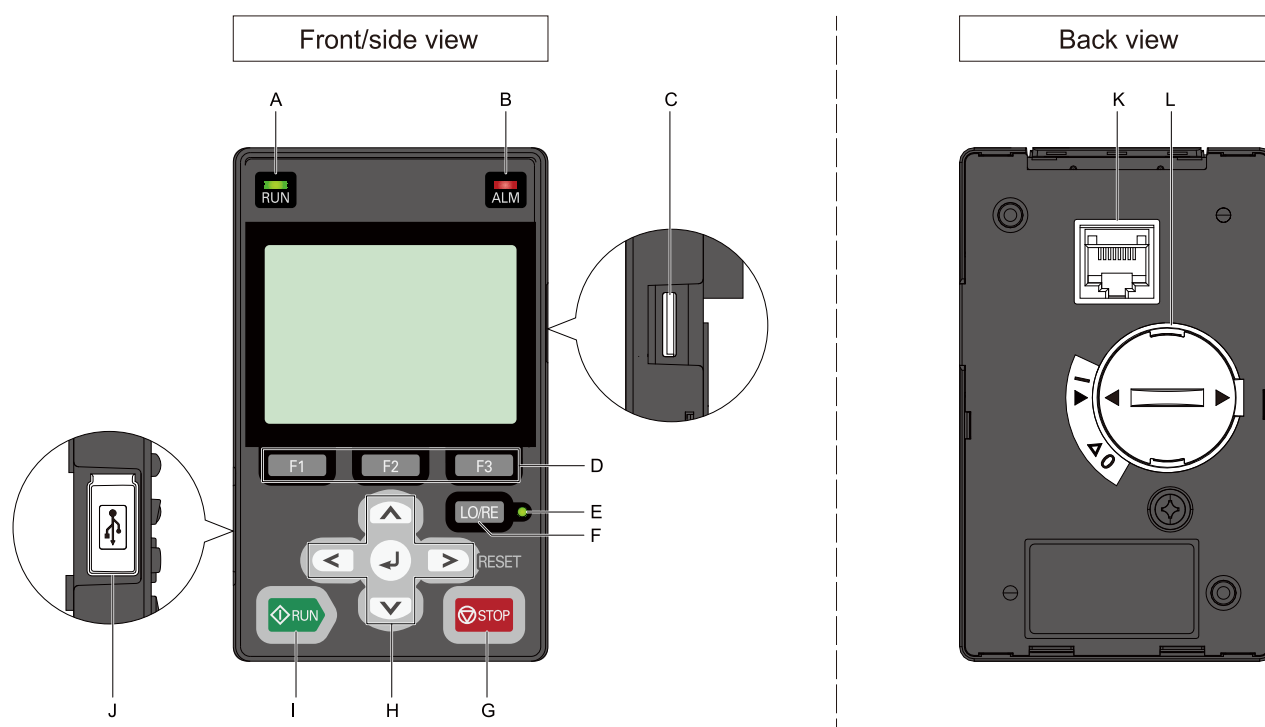


















Figure 6.1 Keypad

Table 6.1 Keypad: Names and Functions

No.	Name	Functions
A	RUN LED 	<p>Illuminates to show that the drive is operating the motor. The LED turns OFF when the drive stops. Flashes to show that:</p> <ul style="list-style-type: none"> <li>The drive is decelerating to stop.</li> <li>The drive received a Run command with a frequency reference of 0 Hz, but the drive is not set for zero speed control.</li> </ul> <p>Flashes quickly to show that:</p> <ul style="list-style-type: none"> <li>The drive received a Run command from the MFDI terminals and is switching to REMOTE Mode while the drive is in LOCAL Mode.</li> <li>The drive received a Run command from the MFDI terminals when the drive is not in Drive Mode.</li> <li>The drive received a Fast Stop command.</li> <li>The safety function shuts off the drive output.</li> <li>The user pushed  on the keypad while the drive is operating in REMOTE Mode.</li> <li>The drive is energized with an active Run command and <math>b1-17 = 0</math> [Run Command at Power Up = Disregard Existing RUN Command].</li> </ul>
B	ALM LED 	<p>Illuminates when the drive detects a fault. Flashes when the drive detects:</p> <ul style="list-style-type: none"> <li>An Alarm</li> <li>An oPE parameter setting error</li> <li>A fault or alarm during Auto-Tuning</li> </ul> <p>The LED turns OFF when no fault or alarm occurs on the drive.</p>
C	microSD Card Insertion Slot	The insertion point for a microSD card.
D	Function Keys F1, F2, F3 	<p>The menu shown on the keypad sets the functions for function keys. The name of each function is in the lower half of the display window.</p>

No.	Name	Functions
E	LO/RE LED 	<p>Illuminates to identify when the drive is operating in LOCAL Mode. The LED turns OFF when the drive is operating in REMOTE Mode.</p> <p><b>Note:</b></p> <ul style="list-style-type: none"> <li>• LOCAL Mode: The keypad controls the Run command and frequency reference. Use the keypad to enter Run/Stop commands and the frequency reference command.</li> <li>• REMOTE Mode: The control circuit terminal or serial transmission device controls the Run command and frequency reference. Use the frequency reference source entered in <i>b1-01</i> [Frequency Reference Selection 1] and the Run command source selected in <i>b1-02</i> [Run Command Selection 1].</li> </ul>
F	LO/RE Selection Key 	<p>Switches drive control for the Run command and frequency reference between the keypad (LOCAL) and an external source (REMOTE).</p> <p><b>Note:</b></p> <ul style="list-style-type: none"> <li>• Stop operation in Drive Mode to enable the LO/RE Selection Key. Set <i>o2-01</i> = 0 [LO/RE Key Function Selection = Disabled] to disable  when switching from REMOTE to LOCAL will have a negative effect on system performance.</li> <li>• The drive will not switch between LOCAL and REMOTE when it is receiving a Run command from an external source.</li> </ul>
G	STOP Key 	<p>Stops drive operation.</p> <p><b>Note:</b></p> <p>Uses a stop-priority circuit. Push  to stop the motor even when a Run command is active at MFDI terminals. Set <i>o2-02</i> = 0 [STOP Key Function Selection = Disabled] to disable the priority in .</p>
H	Left Arrow Key 	Moves the cursor to the left.
	Up Arrow Key/Down Arrow Key 	<ul style="list-style-type: none"> <li>• Scrolls up or down to display the next item or the previous item.</li> <li>• Selects parameter numbers, and increments or decrements setting values.</li> </ul>
	Right Arrow Key (RESET) 	<ul style="list-style-type: none"> <li>• Moves the cursor to the right.</li> <li>• Continues to the next screen.</li> <li>• Restarts the drive to clear a fault.</li> </ul>
	ENTER Key 	<ul style="list-style-type: none"> <li>• Enters parameter values and settings.</li> <li>• Selects menu items to move the user between keypad displays.</li> <li>• Selects each mode, parameter, and set value.</li> </ul>
I	RUN Key 	<p>Starts the drive in LOCAL mode. Starts the operation in Auto-Tuning Mode.</p> <p><b>Note:</b></p> <p>Push  on the keypad to set the drive to LOCAL Mode before using the keypad to operate the motor.</p>
J	USB Terminal	Insertion point for a mini USB cable. Use the mini USB cable to connect the drive to a PC.
K	RJ-45 Connector	Connects the keypad directly to the drive.
L	Clock Battery Cover	Cover for the customer-supplied clock battery.

**⚠ WARNING** Sudden Movement Hazard. Remove all persons and objects from the area around the drive, motor, and machine area before switching control sources when *b1-07* = 1 [LOCAL/REMOTE Run Selection = Accept Existing RUN Command]. Failure to obey can cause death or serious injury.

## ◆ Keypad Mode and Menu Displays

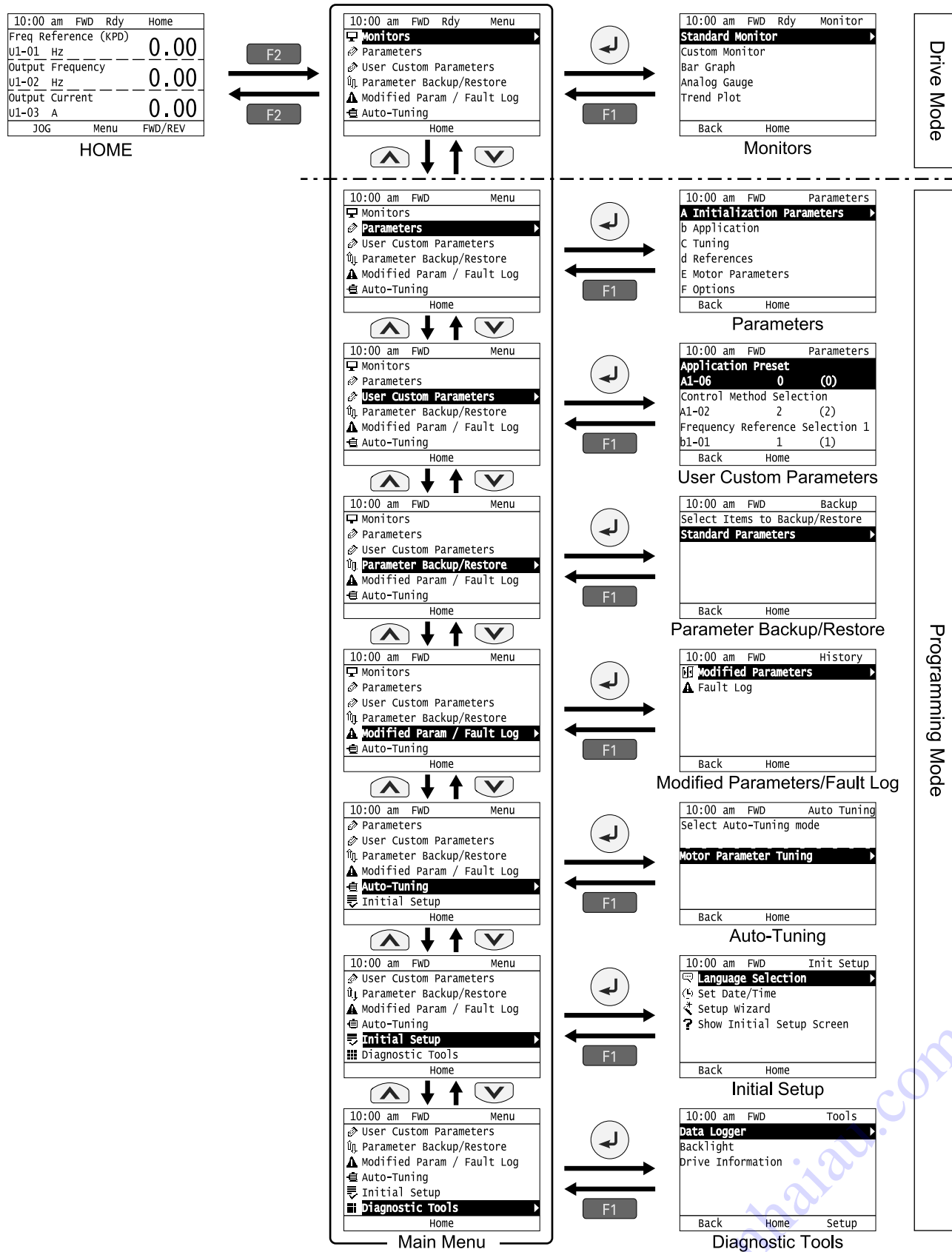




Figure 6.2 Keypad Functions and Display Levels

**Note:**

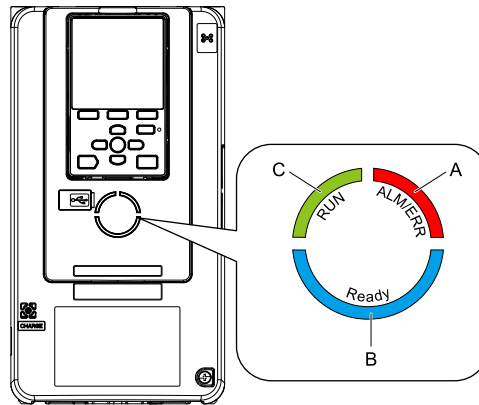
- Energize the drive with factory defaults to show the Initial Setup screen. Push **F2** (Home) to show the HOME screen.  
–Select [No] from the [Show Initial Setup Screen] setting to not display the Initial Setup screen.
- Push  from the Home screen to show drive monitors.
- Push  to set *d1-01 [Reference 1]* when the Home screen shows *U1-01 [Frequency Reference]* in LOCAL Mode.
- The keypad will show [Rdy] when the drive is in Drive Mode. The drive is prepared to accept a Run command.
- The drive will not accept a Run command in Programming Mode in the default setting. Set *b1-08 [Run Command Select in PRG Mode]* to accept or reject a Run command from an external source while in Programming Mode.  
–Set *b1-08 = 0 [Disregard RUN while Programming]* to reject the Run command from an external source while in Programming Mode (default).  
–Set *b1-08 = 1 [Accept RUN while Programming]* to accept the Run command from an external source while in Programming Mode.  
–Set *b1-08 = 2 [Allow Programming Only at Stop]* to prevent changes from Drive Mode to Programming Mode while the drive is operating.

**Table 6.2 Drive Mode Screens and Functions**

Mode	Keypad Screen	Function
Drive Mode	Monitors	Sets monitor items to display.
Programming Mode	Parameters	Changes parameter settings.
	User Custom Parameters	Shows the User Parameters.
	Parameter Backup/Restore	Saves parameters to the keypad as backup.
	Modified Parameters/Fault Log	Shows modified parameters and fault history.
	Auto-Tuning	Auto-Tunes the drive.
	Initial Setup	Changes initial settings.
	Diagnostic Tools	Sets data logs and backlight.



## 7 LED Status Ring

The LED Status Ring on the drive cover shows the drive operating status.



A - ALM/ERR  
B - Ready

C - RUN

LED	Status	Description
A	ALM/ERR	Illuminated
		The drive detects a fault.
		Flashing <sup>*1</sup>
B	Ready	The drive detects:
		<ul style="list-style-type: none"> <li>An Alarm</li> <li>An oPE parameter setting error</li> <li>A fault or error during Auto-Tuning.</li> </ul>
		<b>Note:</b> The LED will illuminate to identify a fault if the drive detects a fault and an alarm at the same time.
		OFF
C	RUN	No fault or alarm occurs on the drive.
		Illuminated
		The drive is operating or is prepared for operation.
		Flashing <sup>*1</sup>
		The drive is in <i>STo</i> [Safe Torque OFF] Mode.
	Ready	Flashing Quickly <sup>*1</sup>
		The voltage of the main circuit power supply dropped, and only the external 24 V power supply provides the power to the drive.
		OFF
		<ul style="list-style-type: none"> <li>The drive detects a fault.</li> <li>There is no fault and the drive received a Run command, but the drive cannot operate (such as when in Programming Mode, or when  is flashing).</li> </ul>
	RUN	Illuminated
		The drive is in regular operation.
		Flashing <sup>*1</sup>
		<ul style="list-style-type: none"> <li>The drive is decelerating to stop.</li> <li>The drive received a Run command with a frequency reference of 0 Hz, but the drive is not set for zero speed control.</li> <li>The drive received a DC Injection Braking command.</li> </ul>
		Flashing Quickly <sup>*1</sup>
	RUN	<ul style="list-style-type: none"> <li>The drive received a Run command from the MFDI terminals and is switching to REMOTE Mode while the drive is in LOCAL Mode.</li> <li>The drive received a Run command from the MFDI terminals when the drive is <b>not</b> in Drive Mode.</li> <li>The drive received a Fast Stop command.</li> <li>The safety function shuts off the drive output.</li> <li>The user pushed  on the keypad while the drive is operating in REMOTE Mode.</li> <li>The drive is energized with an active Run command and <math>b1-17 = 0</math> [Run Command at Power Up = Disregard Existing RUN Command].</li> <li>The drive is set to coast-to-stop with timer (<math>b1-03 = 3</math> [Stopping Method Selection = Coast to Stop with Timer]), and the Run command is disabled then enabled during the Run wait time.</li> </ul>
		OFF
		The motor is stopped.

\*1 Refer to Figure 7.1 for the difference between flashing and flashing quickly.

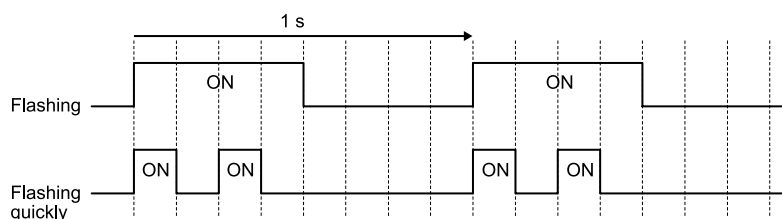


Figure 7.1 LED Flashing Statuses

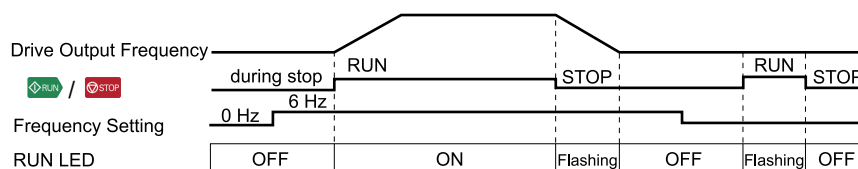


Figure 7.2 Relation between RUN LED and Drive Operation

## 8 Start-Up Procedure

1. Install and wire the drive.
2. Energize the drive.
3. Use *A1-06 [Application Preset]* to initialize the drive for a special application if necessary.
4. Run the Setup Wizard to automatically set these functions:
  - Control method selection
  - Duty rating selection
  - Monitor parameters
  - Speed reference source
  - Run command source
  - Acceleration and deceleration times
5. Run the motor without a load.
6. Make sure that the drive is operating correctly and make sure that the host controller is sending commands to the drive.
7. Connect the load.
8. Run the motor.
9. Make sure that the drive is operating correctly.
10. Fine-tune and set application parameters, such as PID.
11. Check final operation and make sure that parameter settings are correct.

The drive is prepared to run the operation.