

NEW FEATURES FRAME 1 - 5

- New digital input and an analogue output terminals.
- A side entry plug-in communication/clone socket added.



AC10 series

HA502319U100 Issue 5
Product Manual

aerospace
climate control
electromechanical
filtration
fluid & gas handling
hydraulics
pneumatics
process control
sealing & shielding



ENGINEERING **YOUR** SUCCESS.

AC10 Series Variable Speed Drive Safety & Quickstart Booklet

HA 502319U100_05

Contents:

Chapter 1 English	1-1	Chapter 6 Español	6-1
SAFETY INFORMATION	1-1	INFORMACIÓN DE SEGURIDAD	6-1
QUICKSTART	1-3	INICIO RÁPIDO	6-3
COMPLIANCE	1-9	CUMPLIMIENTO	6-8
Chapter 2 Deutsch	2-1	Chapter 7 Svenska	7-1
SICHERHEITS INFORMATIONEN	2-1	SÄKERHETSINFORMATION.....	7-1
SCHNELLSTARTANLEITUNG.....	2-3	SNABBSTART	7-3
KONFORMITÄT	2-7	INSTALLATIONSKRAV	7-8
Chapter 3 Français	3-1	Chapter 8 Türkçe	8-1
Informations de Sécurité.....	3-1	GÜVENLİK BİLGİSİ.....	8-1
DÉMARRAGE RAPIDE.....	3-3	HIZLI BAŞLANGIÇ.....	8-3
CONFORMITÉ	3-7	Ürün Kodu	8-4
Chapter 4 Italiano	4-1	Ürün Çeşitleri	8-5
INFORMAZIONI SULLA SICUREZZA	4-1	UYUMLULUK	8-9
GUIDA RAPIDA	4-3	Chapter 9 中文	9-1
CONFORMITÀ	4-8	安全须知.....	9-1
Chapter 5 Polski	5-1	快速入门.....	9-3
INFORMACJE DOTYCZĄCE BEZPIECZEŃSTWA.....	5-1	变频器认证.....	9-9
INSTRUKCJA SZYBKIEGO URUCHOMIENIA	5-3	Chapter 10 Dimensions for Installations	10-1
KOMPATYBILNOŚĆ.....	5-8	Chapter 11 Applications	11-1

Chapter 1 English

SAFETY INFORMATION

FAILURE OR IMPROPER SELECTION OR IMPROPER USE OF THE PRODUCTS DESCRIBED HEREIN OR RELATED ITEMS CAN CAUSE DEATH, PERSONAL INJURY AND PROPERTY DAMAGE.

This document and other information from Parker-Hannifin Corporation, its subsidiaries and authorized distributors provide product or system options for further investigation by users having technical expertise.

The user, through its own analysis and testing, is solely responsible for making the final selection of the system and components and assuring that all performance, endurance, maintenance, safety and warning requirements of the application are met. The user must analyze all aspects of the application, follow applicable industry standards, and follow the information concerning the product in the current product catalogue and in any other materials provided from Parker or its subsidiaries or authorized distributors.

To the extent that Parker or its subsidiaries or authorized distributors provide component or system options based upon data or specifications provided by the user, the user is responsible for determining that such data and specifications are suitable and sufficient for all applications and reasonably foreseeable uses of the components or systems.

Requirements

IMPORTANT: Please read this information BEFORE installing the equipment.

WARNING – Operation of this equipment requires detailed installation and operation instructions provided in the Installation/Operation manual intended for use with this product. This information is provided on the CD ROM, floppy diskette(s), or other storage device included in the container this device was packaged in. It should be retained with this device at all times. A hard copy of this information may be ordered from the supplier indicated on the product label.

Intended Users

This leaflet is to be made available to all persons who are required to install, configure or service equipment described herein, or any other associated operation.

The information given is intended to highlight safety issues, EMC considerations, and to enable the user to obtain maximum benefit from the equipment.

Application Area

The equipment described is intended for industrial motor speed control utilising, AC induction motors or AC synchronous machines.

Personnel

Installation, operation and maintenance of the equipment should be carried out by competent personnel. A competent person is someone who is technically qualified and familiar with all safety information and established safety practices; with the installation process, operation and maintenance of this equipment; and with all the hazards involved.

Product Warnings

	DANGER Risk of electric shock		Attention – hot surfaces		Caution Refer to documentation		Earth/Ground Protective Conductor Terminal
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Hazards

DANGER! - Ignoring the following may result in injury

1. This equipment can endanger life by exposure to rotating machinery and high voltages.
2. The equipment must be permanently earthed due to the high earth leakage current, and the drive motor must be connected to an appropriate safety earth.
3. Ensure all incoming supplies are isolated before working on the equipment. Be aware that there may be more than one supply connection to the drive.
4. There may still be dangerous voltages present at power terminals (motor output, supply input phases, DC bus and the brake, where fitted) when the motor is at standstill or is stopped.
5. For measurements use only a meter to IEC 61010 (CAT III or higher). Always begin using the highest range. CAT I and CAT II meters must not be used on this product.
6. Allow at least 5 minutes (20 minutes for above 30kW) for the drive's capacitors to discharge to safe voltage levels (<50V). Use the specified meter capable of measuring up to 1000V dc & ac rms to confirm that less than 50V is present between all power terminals and earth.
7. Unless otherwise stated, this product must NOT be dismantled. In the event of a fault the drive must be returned. Refer to "Routine Maintenance and Repair".
8. **WARNING** – The opening of the branch-circuit protective device may be an indication that a fault current has been interrupted. To reduce the risk of fire or electric shock, current-carrying parts and other components of the controller should be examined and replaced if damaged.

WARNING! - Ignoring the following may result in injury or damage to equipment

SAFETY

Where there is conflict between EMC and Safety requirements, personnel safety shall always take precedence.

- Never perform high voltage resistance checks on the wiring without first disconnecting the drive from the circuit being tested.
- Whilst ensuring ventilation is sufficient, provide guarding and /or additional safety systems to prevent injury or damage to equipment.
- All control and signal terminals are SELV, i.e. protected by double insulation. Ensure all external wiring is rated for the highest system voltage.
- All exposed metalwork in the Inverter is protected by basic insulation and bonded to a safety earth.
- When replacing a drive in an application and before returning to use, it is essential that all user defined parameters for the product's operation are correctly installed.
- Thermal sensors contained within the motor must have at least basic insulation.
- RCDs are not recommended for use with this product but, where their use is mandatory, only Type B RCDs should be used.
- The AC10 series is not a safety component or safety related product.

EMC

- In a domestic environment this product may cause radio interference in which case supplementary mitigation measures may be required.
- This equipment contains electrostatic discharge (ESD) sensitive parts. Observe static control precautions when handling, installing and servicing this product.
- This is a product of the restricted sales distribution class according to IEC 61800-3. It is designated as "professional equipment" as defined in EN61000-3-2. Permission of the supply authority shall be obtained before connection to the low voltage supply.

WARNING! – Control Unit Removal / Fitting

Isolate supply before plugging or unplugging control unit to the power stack.

CAUTION!

APPLICATION RISK

- The specifications, processes and circuitry described herein are for guidance only and may need to be adapted to the user's specific application. We can not guarantee the suitability of the equipment described in this Manual for individual applications.

RISK ASSESSMENT

Under fault conditions, power loss or unintended operating conditions, the drive may not operate as intended.

In particular:

- Stored energy might not discharge to safe levels as quickly as suggested, and can still be present even though the drive appears to be switched off
- The motor's direction of rotation might not be controlled
- The motor speed might not be controlled
- The motor might be energised

A drive is a component within a drive system that may influence its operation or effects under a fault condition. Consideration must be given to:

- Stored energy
- Supply disconnects
- Sequencing logic

QUICKSTART

BEFORE YOU START

This document covers the steps necessary for a basic start up of the AC10 drive. Drive start ups should be performed by competent electrical technicians who are familiar with AC drives and their applications. For detailed installation, safety and applications refer to the Product Manual.

Ensure that all local electric codes are met while installing the drive. Check that all live parts are covered to protect against electric shock and that unexpected rotation of the motor will not result in bodily harm or injury.

This document expects that the drive is already installed in its intended location and that all relevant installation procedures have been followed.

About this QuickStart

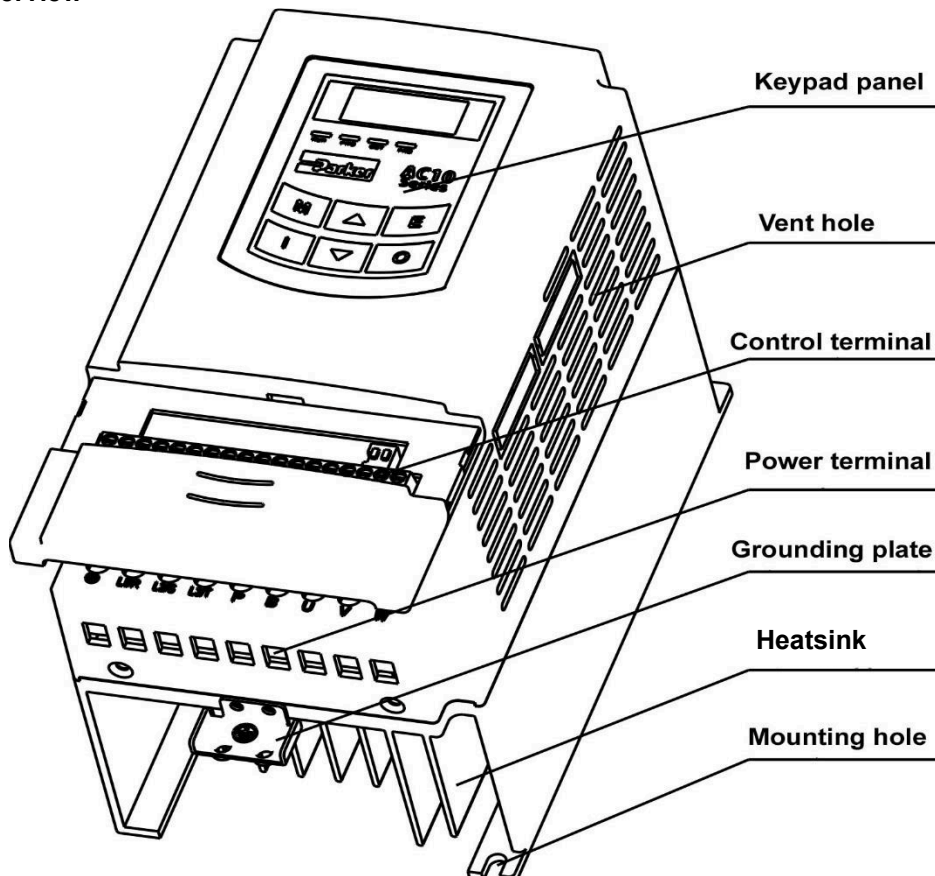
This QuickStart will:

- Familiarise you with the terminals and operation of the unit.
- Provide basic installation details and a quick set-up procedure.
- Show you how to Autotune the drive and start the motor.

This QuickStart assumes that:

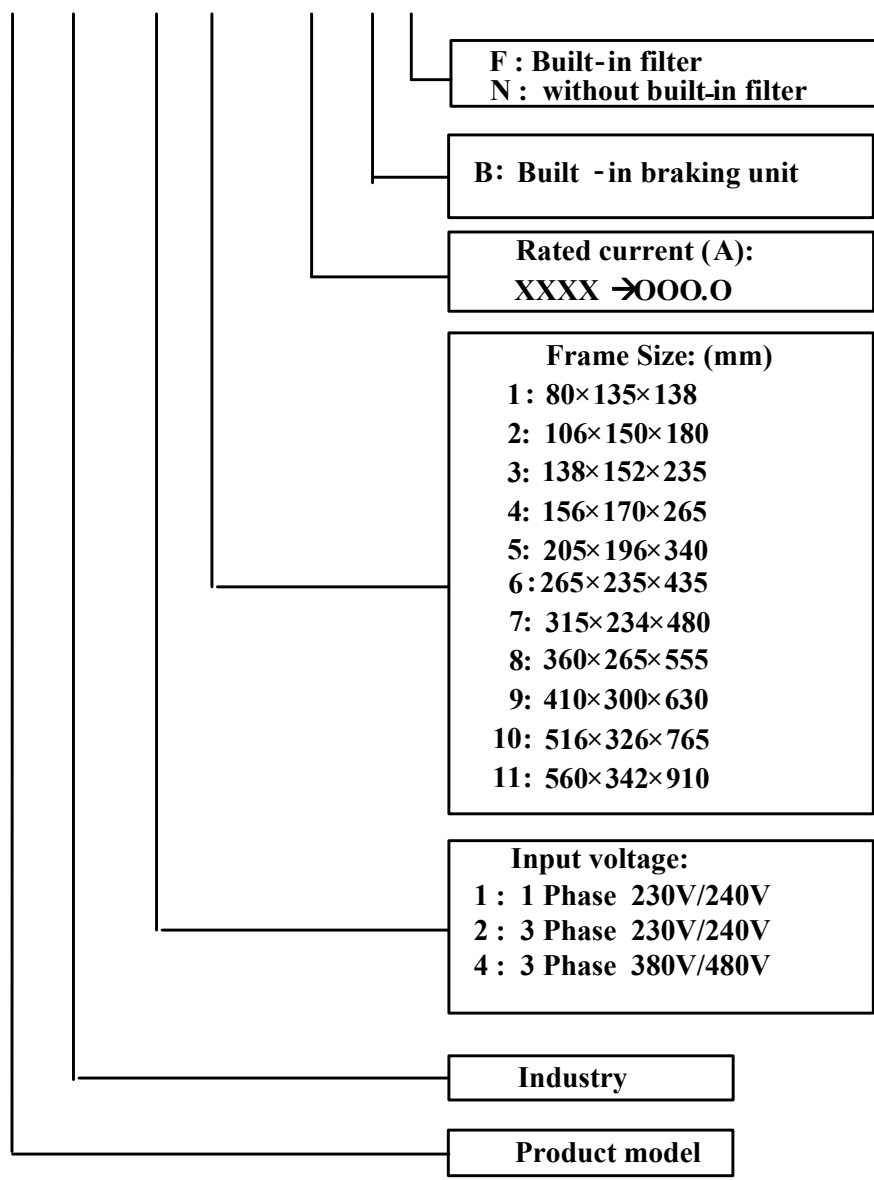
- You are a competent technician with experience of installing this type of equipment.
- You are familiar with the relevant standards and Local Electric Codes (which take precedence).
- You have read and understood the Safety Information provided at the front of this QuickStart.
- You realise that this guide contains only basic information and that you may need to refer to the AC10 Product Manual to complete your installation.

Product Overview



Product Code

10 G - 1 1 - 0015- B F



Product Range

Supply	Part number	Frame Size	kW	Input current (A)			Output Current (A)	Input protection current
				230V	380V/400V	460V/480V		
1Ph 230V	10G-11-0015-XX	1	0.2	4			1.5	6.0
	10G-11-0025-XX	1	0.37	5.8			2.5	10.0
	10G-11-0035-XX	1	0.55	7.6			3.5	14.0
	10G-11-0045-XX	1	0.75	10			4.5	18.1
	10G-12-0050-XX	2	1.1	10.8			5	24.5
	10G-12-0070-XX	2	1.5	14			7	25.2
	10G-12-0100-XX	2	2.2	20			10	32.0
3Ph 230V	10G-31-0015-XX	1	0.2	2.5			1.5	5.0
	10G-31-0025-XX	1	0.37	3.5			2.5	8.2
	10G-31-0035-XX	1	0.55	4.5			3.5	10.0
	10G-31-0045-XX	1	0.75	5.4			4.5	11.5
	10G-32-0050-XX	2	1.1	5.8			5	18.0
	10G-32-0070-XX	2	1.5	7.8			7	18.2
	10G-32-0100-XX	2	2.2	11			10	21.5
	10G-33-0170-XX	3	4	18.5			17	28
	10G-34-0210-XX	4	5.5	22			21	33
	10G-35-0300-XX	5	7.5	31			30	47
	10G-35-0400-XX	5	11	41			40	62
	10G-36-0550-XX	6	15	57			55	86
	3Ph 400V	10G-41-0006-XX	1	0.2		1.1	0.8	0.6
10G-41-0010-XX		1	0.37		1.5	1.2	1	5.0
10G-41-0015-XX		1	0.55		2.1	1.8	1.5	5.5
10G-42-0020-XX		2	0.75		3	2.1	2	6.5
10G-42-0030-XX		2	1.1		4	3.2	3	10.2
10G-42-0040-XX		2	1.5		5	4.2	4	11.0
10G-42-0065-XX		2	2.2		7.5	7.0	6.5	15.0
10G-43-0080-XX		3	3.7		10.5	8.3	8	18.0
10G-43-0090-XX		3	4		11	9.2	9	21.0
10G-43-0120-XX		3	5.5		14	11.5	12	29.0
10G-44-0170-XX		4	7.5		18.5	16	17	34.0
10G-44-0230-XX		4	11		24	21	23	46.5
10G-45-0320-XX		5	15		36.5	27	32	80.0
10G-45-0380-XX		5	18.5		44	31	38	90
10G-45-0440-XX		5	22		51	35	44	100
10G-46-0600-XX		6	30		70	53	60	110
10G-47-0750-XX		7	37		80	64	75	120
10G-47-0900-XX		7	45		94	75	90	150
10G-48-1100-XX		8	55		120	85	110	180
10G-48-1500-XX		8	75		160	115	150	240
10G-49-1800-XX		9	90		190	130	180	285
10G-49-2200-XX	9	110		225	170	220	340	
10G-410-2650-XX	10	132		275	210	265	400	
10G-411-3200-XX	11	160		330	250	320	500	
10G-411-3600-XX	11	180		370	280	360	550	

Drive Start-up

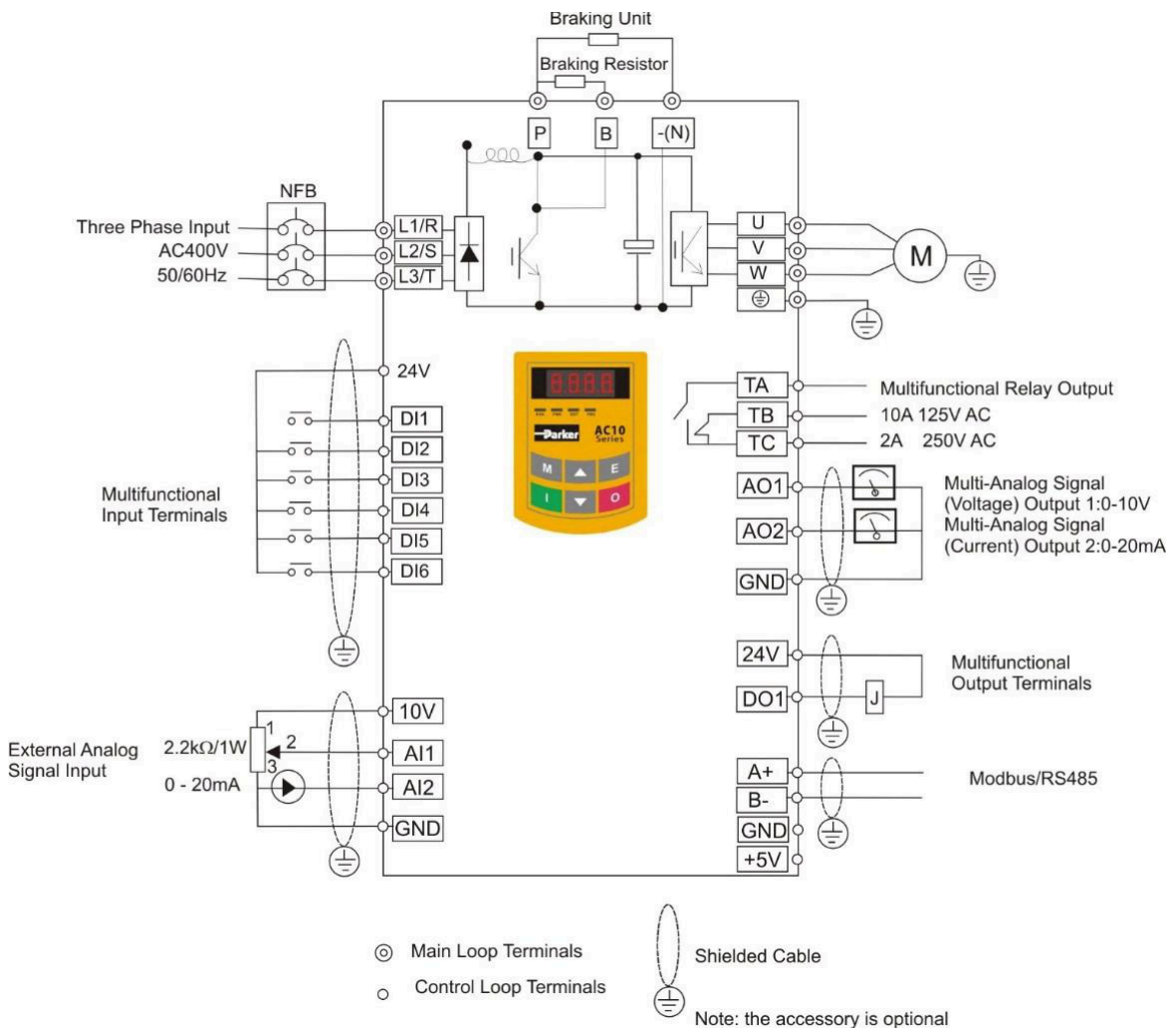
- Read the Safety section at the front of the QuickStart.
- Ensure that all local electric codes are met.
- Check for damage to equipment.
- Check for loose ends, clippings, filings, drilling swarf etc. lodged in the drive and system.
- Check all external wiring circuits of the system - power, control, motor and earth connections.
- Ensure that unexpected rotation of the motor in either direction will not result in damage, bodily harm or injury. Disconnect the load from the motor shaft, if possible.
- Check external run contacts are open. Check external speed setpoints are all at zero.
- Ensure that nobody is working on another part of the system which will be affected by powering up.
- Ensure that other equipment will not be adversely affected by powering up.
- Check motor stator connections are correctly wired for Star or Delta as necessary for drive output voltage.

Drive Setup

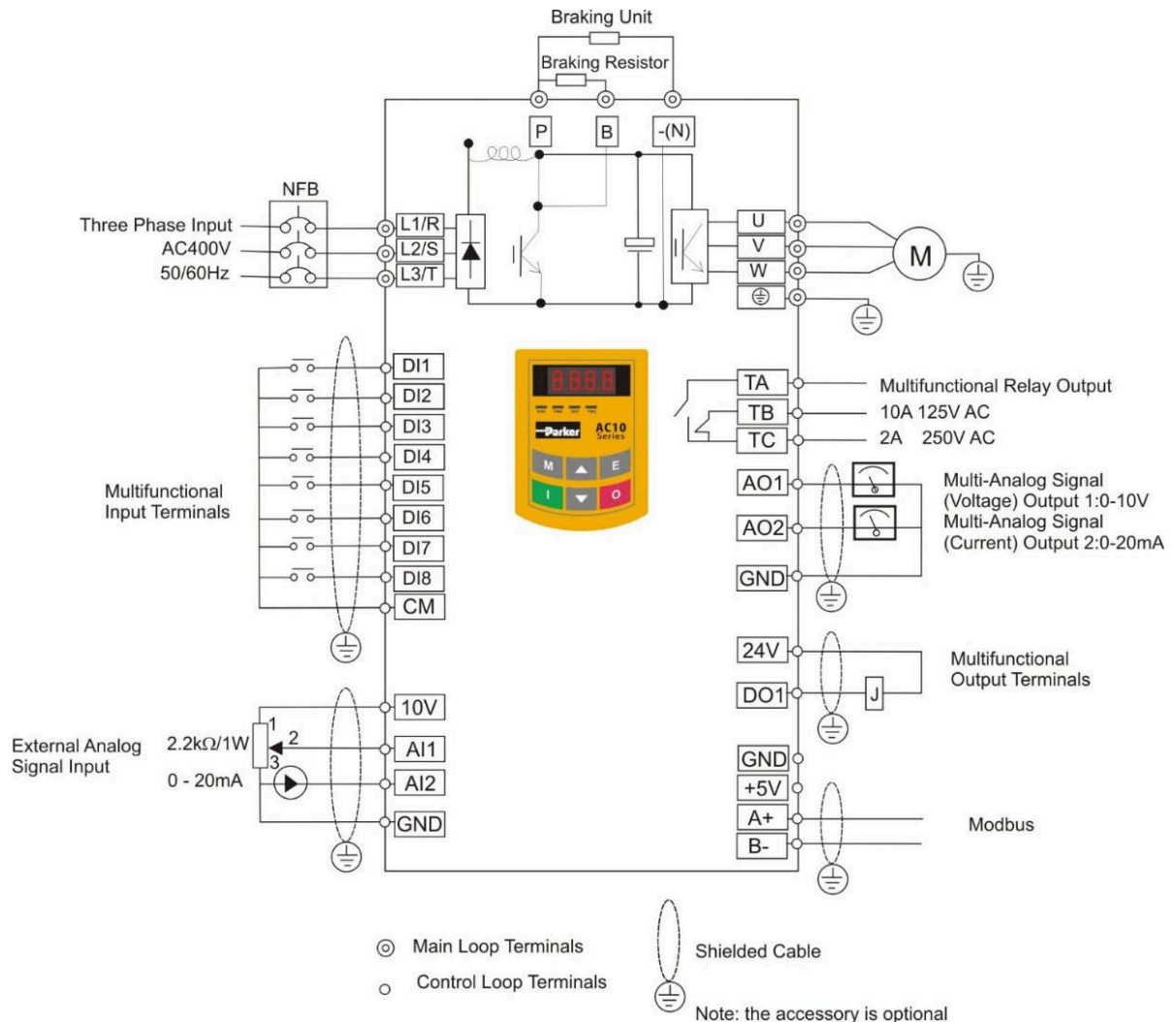
Before attempting to set up the drive, you will need some motor information. This is found on the motor nameplate. The information you will need is listed below:

Base Volts, Base frequency
 Base RPM
 Full load amps
 No load amps (mag current)
 Connection (star or delta)

Basic Connections

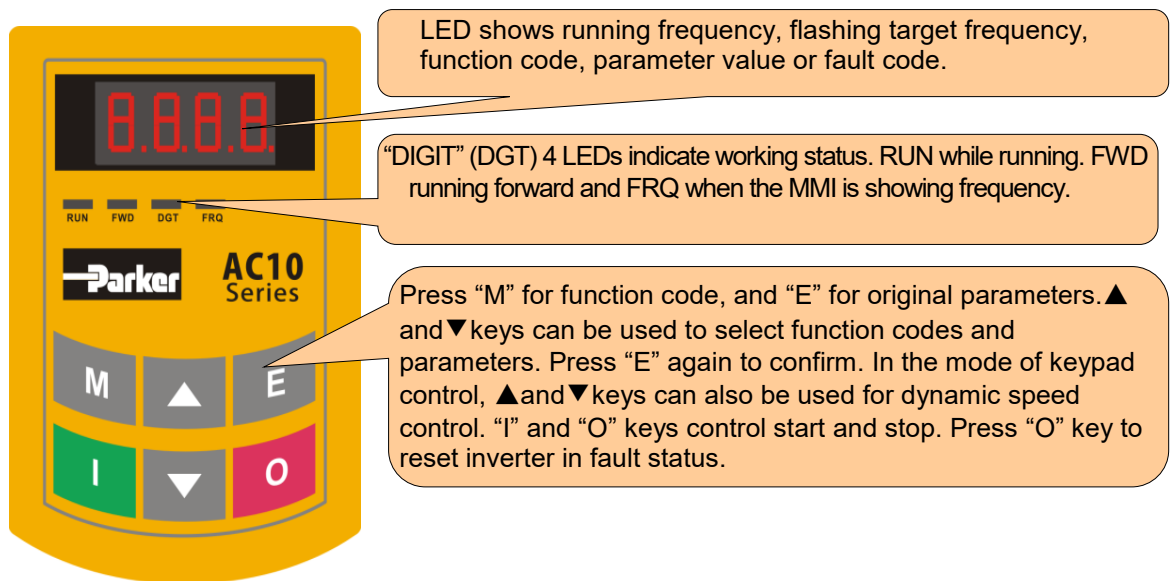


0.2kW – 22kW Basic Wiring Diagram for Multi-stage speed control macro (PNP type)



30kW – 180kW Basic Wiring Diagram for Three-phase AC drives (NPN type)

Keypad



Press “M” key to display function code
 Press “Up” or “Down” to select required function code
 Press E to read data set in the function code
 Press “Up” or “Down” to modify data
 Press M to show corresponding target frequency by flashing after saving the set data
 Press E to display the current function code

Set-Up Instructions

- Select the application mode. See Chapter 9 for the application description.
 - Press (M) until F100 is shown on the display
 - Press (O) until only the FWD LED is illuminated (X O X X)
 - Press (UP) to access parameter block F2xx
 - Press (O) until both the FWD and DGT LEDs are illuminated (X O O X)
 - Press (UP) until display shows F228
 - Press (E) to edit the application number
 - Use the (UP) and (DOWN) keys to select the application
 - Press (E) to confirm your selection

F228	Application selection	0: Invalid 1: Basic speed control 2: Auto/manual control 3: Stage speed control 4: Terminal control; 5: PID control;
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Application is set as default, this allows access to all parameters please see the full manual for description on all operations.

For application connection drawings please see the end of this quick start guide.

- Set the Motor Parameters

F801	Rated power (kW)	Setting range: 0.75~1000	
F802	Rated voltage (V)	Setting range: 1~440	
F803	Rated current (A)	Setting range: 0.1~6500	
F804	Number of motor poles	Setting range: 2~100	4
F805	Rated rotary speed	Setting range: 1~30000	
F810	Motor rated frequency	Setting range: 1.0~590.0	50.00

- Select control mode

The AC10 inverter has three control modes: sensorless vector control (F106=0), VVVF control (F106=2) and vector control 1 (F106=3). Under VVVF control mode, the AC10 inverter has four kinds of torque compensation modes: Linear compensation (F137=0); Square compensation (F137=1); User-defined multipoint compensation (F137=2); Auto torque compensation (F137=3)

- Set the limits

F111	Max Frequency (Hz)	Setting range: F113~590.0	Mfr's value: 50.00
F112	Min Frequency (Hz)	Setting range: 0.00~F113	Mfr's value: 0.50

- Set the ramp rates

F114	First Acceleration Time (S)	Setting range: 0.1~3000	Mfr's value: subject to inverter model
F115	First Deceleration Time (S)		
F116	Second Acceleration Time (S)		
F117	Second Deceleration Time (S)		

- Set the I/O control mode

The channel for inverter to receive control commands (including start, stop and jogging, etc) contains 5 modes: 0. Keypad control; 1. Terminal control; 2. Keypad + terminal control 3. Modbus control; 4. Keypad + terminal + Modbus. The modes of control command can be selected through the function codes F200 and F201.

F200	Source of start command	0: Keypad command; 1: Terminal command; 2: Keypad + Terminal; 3: MODBUS; 4: Keypad + Terminal + MODBUS
F201	Source of stop command	0: Keypad command; 1: Terminal command; 2: Keypad + Terminal; 3: MODBUS; 4: Keypad + Terminal + MODBUS

For terminal control please check the selector switched for the analogue inputs.

F203=2, channel AI2 is selected			F203=1, channel AI1 is selected	
SW1 coding switch			S1 toggle switch	
Coding Switch 1	Coding Switch 2	Analog Input AI2 signal	+	-
OFF	OFF	0~5V voltage	0~10V voltage	-10~+10V voltage
OFF	ON	0~10V voltage		
ON	ON	0~20mA current		

Also check the NPN, PNP selector switches for the digital inputs.

- Test run the inverter
Test run the inverter from the keypad or the terminal control, checking all conditions are safe.
- For advanced functions see the product manual.
- To reset all parameters to default values set F160 to = 1.

COMPLIANCE

A comprehensive guide to product compliance is available in the AC10 Product Manual.

Warning – Where there is a conflict between EMC and safety requirements personnel safety shall always take precedence.

Operation of this equipment requires detailed installation and operation instructions provided in the product manual intended for use on this product. This information is provided on the cd rom included in the container this product was packaged in. It should be retained with the product at all times.

Caution: This is a product of the restricted sales distribution class according to IEC 61800-3. It is designated as “professional equipment” as defined in EN61000-3. Permission of the supply authority shall be obtained before connection to the low voltage supply.

In a domestic environment this product may cause radio interference in which case supplementary mitigation measures may be required.

This equipment contains electrostatic discharge (ESD) sensitive parts. Observe static control precautions when handling, installing and servicing this product.

EMC Emissions

Radiated Emissions comply with EN61800-3 category C1, C2 and C3 when installed in accordance with instructions.

Conducted Emissions comply with EN61800-3 category C3 external filter.

Immunity complies with the requirement of EN61800-3, for equipment intended for use in the second environment.

Planning Cable Runs

Use the shortest possible motor cable lengths.

Use a single length of cable to a star junction point to feed multiple motors.

Keep electrically noisy and sensitive cables apart. If this is not possible parallel cable runs should be separated by at least 0.25metres, for runs longer than 10 meters, separation should be increased proportionally.

Sensitive cables should cross noisy cables at 90° angle.

Never run sensitive cables close or parallel to the motor, dc link and braking chopper circuit for any distance.

Never run supply, dc link or motor cables in the same bundle as the signal/control and feedback cables, even if they are screened.

Ensure EMC filter input and output cables are separately routed and do not couple across the filter.