

# Drive Set-Up

**IMPORTANT:** You must not exceed the maximum drive and motor ratings. Refer to the Product Code or rating label, and the motor rating plate

The instructions are written in logical order. Complete each stage successfully before progressing to the next.

This simple start-up routine assumes that:

- The Drive is direct from the factory and thus using all factory default settings
- You know how to operate and navigate the Man-Machine Interface (MMI) – keypad + display
- The drive's control terminals are wired as shown in the Installation diagram
- This simple set-up uses ARMATURE VOLTAGE (default setting) as the speed feedback method

## 1: Pre-Operation Checks

Completely disconnect the drive before point-to-point checking with a buzzer, or when checking insulation with a Megger.

Prepare to energise the drive and system as follows:

- **ISOLATE THE DRIVE** using branch circuit protection or circuit breaker (8).
- Disconnect the load from the motor shaft, if possible.
- If there is any doubt about the integrity of a particular installation, insert a high wattage resistor, i.e. fire elements, in series with the motor armature.

Initial checks before applying power:

- Mains power supply voltage is correct for drive.
- Motor vent fan is connected correctly for direction of rotation.
- Motor is of correct armature voltage and current rating.
- Check that cooling fans are intact and free from obstruction (110A – 270A).
- Check for loose ends, clippings, drilling swarf etc., lodged in the Drive and system.
- Auxiliary power supply voltage is correct for drive and integral fans (110A – 270A).
- Check for damage to equipment.
- Check all external wiring circuits - power, control, motor and earth connections.

Ensure the safety of the complete system before the drive is energised:

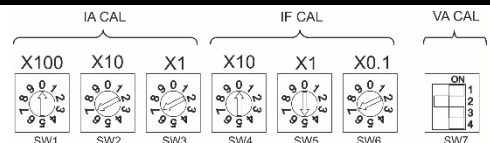
- Ensure that rotation of the motor in either direction will not cause damage
- Ensure that nobody else is working on another part of the system which will be affected by powering up
- Ensure that other equipment will not be adversely affected by powering up

## 2: Calibrating the Control Board

NO POWER IS CONNECTED AT THIS STAGE

- 2.1 Lift the hinged terminal cover to reveal the control board.

Enter the settings for Armature Current, Field Current and Armature Voltage.



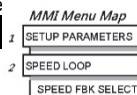
<b>Armature Current (IA CAL)</b>	Note the maximum armature current from the motor rating plate and set this value using SW1, SW2 and SW3. The switches set Amps in hundreds, tens and units. The illustration shows an IA CAL setting of 77A.
<b>Field Current (IF CAL)</b>	Note the nominal field current from the motor rating plate and set this value using SW4, SW5 and SW6. The switches set Amps in tens, units and tenths. The illustration shows an IF CAL setting of 5.7A. The maximum current is 19.9A, setting a higher value than this results in 0A.
<b>Armature Voltage (VA CAL)</b>	Set this using the 4-way switch, SW7. The switch sets voltage according to the table. The illustration shows a VA CAL setting of 200V. (A "1" indicates that the switch is ON).

VA	Armature Volts VA (Volts)															
Switch	150	175	200	225	250	275	300	325	350	375	400	425	450	475	500	525
1	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0
2	1	1	0	0	1	1	0	0	1	1	0	0	1	1	0	0
3	1	1	1	1	0	0	0	0	1	1	1	1	0	0	0	0
4	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0

- 2.2 **CONNECT THE AUXILIARY SUPPLY:** Remove 3-phase fuses (6). Re-instate branch circuit protection or circuit breaker (8). Check that the auxiliary voltage is correct. The MMI will now display the Welcome

AUXILIARY POWER ONLY IS CONNECTED AT THIS STAGE

Use a digital voltmeter to check for +24V rail at terminal C9, +10V rail at terminal B3, -10V rail at terminal B4. The drive will be using the default speed feedback option ARM VOLTS FBK.



## 3: Initial Start-Up Routine

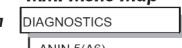
AUXILIARY POWER ONLY IS CONNECTED AT THIS STAGE

Complete steps 3.1 to 3.10

- 3.1 Write down the MAIN CURR. LIMIT parameter's value here: ..... 1

Set to 0.00%

MMI Menu Map



- 3.2 Check that ANIN 5 (A6) is +10V. If not, check the wiring link between terminals A6 and B3.

MMI Menu Map



- 3.3 Save your settings. Press the ↑ (UP) key, as instructed.

- 3.4 With the Program Stop and Coast Stop LEDs illuminated:

**IMPORTANT**  
The main contactor should never be operated by any means other than the drive's internal controls, nor should any additional circuitry be placed around the contactor coil circuit.

Apply the "Start/Run" command to C3.

The main 3-phase contactor should close and remain energised.

Quickly press the "Start/Run" command from C3.

The main 3-phase contactor should open and remain de-energised.

Didn't work? Remove the auxiliary power and check start/stop sequencing and contactor wiring.

**3-Phase Alarm?** The drive has tripped because there is no 3-phase supply connected. To clear the alarm press the E key. Repeat the test at 3.4 again, but quickly remove the "Start/Run" command before the alarm has time to initiate.

**WARNING**

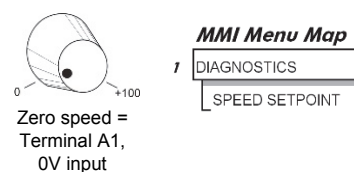
Do not continue until the stop/start circuits and contactor operate correctly.

- 3.5 **ISOLATE THE DRIVE** using branch circuit protection or circuit breaker (8). Install the 3-phase fuses (6). Reinstall branch circuit protection or circuit breaker (8).

**IMPORTANT** Do not change any of the previously made calibration settings once the main contactor is energised.

MAIN & AUXILIARY POWER ARE CONNECTED AT THIS STAGE

- 3.6 Use a Voltmeter that conforms to IEC 61010 (CAT III or higher).



- Set the uni-directional speed potentiometer to zero (check that the value of SPEED SETPOINT parameter = 0 %)

- Apply the "Start/Run" command to C3.

- Ensure that "Enable" (C5) is ON.

- Check that 3-phase mains is applied to the power terminals L1, L2 and L3.

- Check the correct field voltage appears between the field output terminals D3 and D4. **This is high voltage DC. Proceed with caution.**

- If the Field Voltage is incorrect do not continue. Switch off all supplies and check connections.

<p><b>START (C3 = 24V)</b> The drive can run provided that: B8 &amp; B9 are TRUE (+24V) C5 "Enable" is ON (+24V) MAIN CURR. LIMIT ≠ 0 Speed Setpoint ≠ 0</p>	<p><b>STOP (C3 = 0V)</b> At 20% setpoint: <b>The 590+ drive (4Q)</b> can stop in approximately 2 seconds (the drive decelerates the motor to zero speed at a rate determined by the STOP TIME and MAIN CURR.LIMIT parameter values). <b>The 591C drive (2Q)</b> can coast stop.</p>
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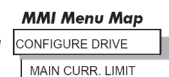
- 3.7 Check that all six MMI LEDs are now lit, indicating that the motor is capable of rotating.

**Caution**

During the following set-up instructions, be ready to STOP the drive should the motor try to overspeed.

- 3.8 Set the speed setpoint to 5% (0.5V at terminal A8).

- 3.9 Refer back to 3.1 to display the CONFIGURE DRIVE menu. Slowly increase the MAIN CURR.LIMIT parameter towards a maximum of 20%. At some point the motor will begin to rotate as the parameter value is increased. The motor speed will settle at 5% of full speed. If the motor is loaded it may require more than 20% current limit to turn the motor.



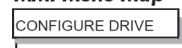
- 3.10 Stop the drive by opening C3. Now Autotune the drive.

## 4: Autotuning

This process tunes the drive to the connected motor. Initial conditions must be:

- Main contactor open, i.e. terminal C3 = 0V.
- Program Stop (terminal B8) and Coast Stop (terminal B9) and Enable (terminal C5) high, i.e. 24V.
- No field voltage: Autotune automatically quenches the (default) internally supplied field.

MMI Menu Map



- 4.1 Set AUTOTUNE to ARMATURE.

- 4.2 Close the main contactor, (apply the "Start/Run" command to C3) to begin the Autotune.

- The keypad displays "Autotuning" during the process. When Autotune is complete (after approximately 10 seconds), the main contactor is opened and the AUTOTUNE parameter is reset to OFF. Ensure that "Enable" (C5) is OFF.

- 4.3 Perform a **PARAMETER SAVE** now. Refer back to 3.3 for how to do this.

The drive is powered-up and operating using Armature Volts Feedback.

# CONFIGURE DRIVE Menu

CONFIGURE DRIVE (MMI view)

Parameter	Tag	Range	SETUP PARAMETERS Function Blocks
<b>FLD. CTRL MODE</b>	209	See below	
Selects between open-loop VOLTAGE CONTROL or closed-loop CURRENT CONTROL. Refer to <b>FIELD CONTROL</b>			
<b>FLD. VOLTS RATIO</b>	210	0.0 to 100.0 % (h)	
Sets the output dc field voltage as a ratio of the RMS FIELD supply voltage when FLD CTRL MODE is set to VOLTAGE CONTROL. Refer to <b>FIELD CONTROL</b>			
<b>MAIN CURR. LIMIT</b>	421	0.00 to 200.00 %	
Independent symmetric current clamp. Sets symmetric clamps outside scaling from the CUR. LIMIT/SCALER parameter. Refer to <b>CURRENT LOOP</b>			
<b>AUTOTUNE</b>	18	OFF/ARMATURE	
Turns the AUTOTUNE procedure on. Refer to Chapter 4: "Operating the Drive"- Performance Adjustment. Refer to <b>AUTOTUNE</b>			
<b>SPEED FBK SELECT</b>	47	See below	
Determines the source of the speed feedback signal. The default, ARM VOLTS FBK, uses internal circuitry to derive the speed feedback. The other selections require the appropriate external device to provide the feedback signal. 0 : ARM VOLTS FBK 1 : ANALOG TACH 2 : ENCODER 3 : ENCODER/ANALOG – for Parker use Refer to <b>SPEED LOOP</b>			
<b>ENCODER LINES</b>	24	10 to 5000	
The number of lines must be set to match the type of encoder being used. Incorrect setting of this parameter will result in an erroneous speed measurement. The 5901 microtach has 1000 lines per revolution as standard. Proprietary encoders of other specifications can be normalised by setting this parameter as appropriate. Refer to <b>ENCODER</b>			
<b>ENCODER RPM</b>	22	0 to 6000	
Motor top speed setting (100%) when using encoder feedback. Refer to <b>ENCODER</b>			
<b>ENCODER SIGN</b>	49	NEGATIVE / POSITIVE	
Since the encoder feedback cannot be reversed electrically, the signal polarity can be reversed by the control software. It is necessary to set up this parameter when in encoder feedback closed-loop speed control mode, as the encoder direction must be correct for this mode to operate. Refer to <b>ENCODER</b>			
<b>SPD.INT.TIME</b>	13	0.001 to 30.000 s	
Speed loop PI integral gain adjustment. Refer to <b>SPEED LOOP</b>			
<b>SPD.PROP.GAIN</b>	14	0.00 to 200.00	
Speed loop PI proportional gain adjustment. Refer to <b>SPEED LOOP</b>			

For more information refer to the above function blocks in the Product Manual

For the full product manual please visit Parker web site [www.parker.com/ssd](http://www.parker.com/ssd)

In the Product Manual refer to the sections below to make the installation application specific:

CHAPTER 3	Connection Diagrams
	Control Connections
	Optional Equipment
CHAPTER 4	Selecting Speed Feedback
	Initial Start-up Routine (the full routine will help with any additions you make)
	Performance Adjustment (any parameter changes will require another Autotune)



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590C series FRAME 1, 2 & 3

## DC590C series DC Digital Drive

HA500741U000 Issue 3

This Quickstart will:

- Provide \*basic installation details
  - Start the motor and perform an Autotune
- \*We detail the quickest way to power up the drive using minimal control wiring.

This Quickstart assumes that:

- You have read and understood the Safety Information provided separately.



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## Mechanical Installation

**NOTE:** Refer to the Safety and EMC sheets provided with the drive.

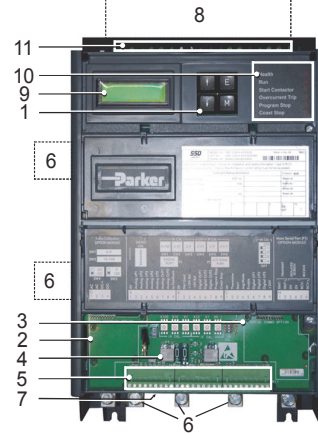
Mount the unit vertically inside a suitable cubicle. Drill mounting holes accurately. Check for material that could damage/restrict operation.

- Fit 4 x inserts into the back panel.
- Fit bolts/washers loosely into lower inserts.
- Engage the drive's lower mounting slots onto the bolts.
- Fit the top bolts and tighten – M6 : 4.5Nm (3.3 lbf.ft).

## Ventilation

The Drive gives off heat during normal operation and requires:

- Adequate cooling air to enter and exit the cubicle.
- Free flowing air through the drive's ventilation slots and heatsink.
- A normally cool mounting surface.
- Minimum air clearances to be maintained above and below drives and other equipment (additive when two units are mounted together).



1 Keypad	4 P3 Port	7 Drive Earth/Ground	10 Status LEDs
2 Speed Feedback Option	5 Control Terminals	8 Exhaust (110A-270A)	11 Field Terminals & Auxiliary Power
3 Communications Option	6 Power Terminals	9 Display	

Frame	Current Rating (A)	Weight Kg (lbs)	Overall Dimensions			Fixing Centres		Fixing	Air Clearance (above/below)
			Width	Height	Depth	Width	Height		
1	35 - 70	10-14 (22-30)	250 (9.8)	415 (16.3)	171 (6.7)	200 (7.9)	400 (15.7)	M6	100/100mm
2	110 - 150	15 (33.2)	250 (9.8)	451 (17.8)	171 (6.7)	200 (7.9)	400 (15.7)	M6	100/100mm
3	180	17 (37.5)	250 (9.8)	485 (19.1)	213 (8.4)	200 (7.9)	400 (15.7)	M6	150/100mm
3	270	20 (44)	250 (9.8)*	485 (19.1)	213 (8.4)	200 (7.9)	400 (15.7)	M6	150/100mm

\* Add 50 (1.9) for Power Terminals (6)

Dimensions are in millimetres (inches)

## Electrical Ratings - Power Circuit

Output Current @ 100% Continuous*(A)	Power @ 460V dc(kW)	Field Current (A)	Approximate Total Losses @ Full Load (W)	Max Supply Fault Current rms symmetrical (kA)
35	15	10	105	5
70	30	10	210	5
110	45	10	330	10
150	60	10	450	10
180	75	10	540	10
270	110	10	710	10

\* The standard overload capacity available is 200% for 10 seconds, 150% for 30 seconds.

## Power Supply Details

3-Phase Supply	3-phase, 50/60Hz, earth referenced (TN) and non-earth referenced (IT)	
Operating Supply Tolerance	±10%	
Voltage Ranges	220 to 500V AC – Standard Product	
Supply Current	(0.9 x Idc) Amps AC rms	
Field Supply Voltage	500V maximum	
3 Phase Input	3-phase rotation insensitive, no adjustment necessary for frequency change	

## Auxiliary Power Supply Details

Control and Fan *	Single phase, 50-60Hz ±10%	*110A to 270A
Supply Voltage	110-120V ±10%	220-240V ±10%

## Electrical Installation

**NOTE:** Refer to the Safety and EMC sheets provided with the drive. An EMC compliant installation is shown.

### Earth/Ground Connections

**IMPORTANT** Refer to "Permanent Earthing" on the Installation Diagram.

#### Earth/Ground Rails

Provide a (dirty) earth/ground rail (11) inside the cubicle. Connect it to an external earth/ground, PE.

Provide a (clean) earth/ground rail (2) inside the cubicle, connected directly to the (dirty) earth/ground rail and insulated from the mounting panel. This is used for all signal and control cabling.

Note: In a system of more than one drive connect all (clean) earth rails together and only connect to the (dirty) earth rail (2) at one point.

#### Motor Earth/Ground

Connect an earth/ground wire to the motor from the (dirty) earth/ground rail. Connect shield between the motor and (dirty) earth/ground rail.

#### Drive Earth/Ground

Connect an earth/ground wire from the (dirty) earth/ground rail to the drive's power terminal(s) marked PE.

35 - 270A units M6, 6.8Nm (5.0lbf.ft)

### Environmental Conditions

Operating ambient temperature Frame 1 (35A to 70A) 0°C to 45°C (32°F to 113°F)  
Frame 2 & 3 (110A to 270A) 0°C to 35°C (32°F to 95°F)

Enclosure rating IP00 (Europe), UL(cUL) Open Type (North America/Canada)

Atmosphere Dust free, non flammable, non corrosive, <85% humidity, Pollution Degree 2, non-condensing

## Power Connections

Refer to the Installation Diagram

- Minimum rating of 1.1 x full load current (Europe)
- Minimum rating of 1.25 x full load current (UL)

3-Phase Supply	L1	Connect via branch protection fuses, filter (optional), 3Ø semi-conductor fuses,
	L2	3-phase external contactor, capacitor box (optional), and AC Line Choke/Reactor.
	L3	AC Current = 0.83 x DC Armature Current.
Motor Armature	A+	Connect shield between motor and earth rail: ⊕
	A-	
External AC Field Supply	D1	Do not connect to these terminals if using an internal field supply.
	D2	If an external field supply is required by the drive for application reasons, refer to the Product Manual: "Installing the Drive".
Motor Field	D3 (F-)	Connect shield between motor and earth rail ⊕. These terminals provide an internal motor field supply fused by 10A fuses. If the motor has no field connections, is a permanent magnet motor, or if the field is derived externally, you must inhibit the FIELD ENABLE parameter.
	D4 (F+)	
3-Phase Contactor	D5 (L)	Connect the contactor coil to terminals D5 & D6 (Live & Neutral).
	D6 (N)	
Auxiliary Supply	D7 (N)	Single phase, 110/240V ac, 50/60Hz. Match auxiliary supply to the contactor coil voltage and to the integral fan voltage (110A-270A). Protect with external fuses determined by the contactor holding VA, or MCB. Connect auxiliary supply terminals directly to the incoming supply. No series sequencing switches or contacts are permitted without consultation from Parker.
	D8 (L)	

## Control Connections

Refer to the Installation Diagram

- Control wiring must have a minimum cross-section area of 0.75mm<sup>2</sup> (18AWG)
- Use screened control cables to comply with EMC requirements

Current Limit (fixed)	A6 B3	Connection to allow the MAIN CURR. LIMIT parameter to adjust the current limit.
Program Stop/Coast Stop	B8	Removing B8 from C9 (24V) causes a Program Stop (regenerative drive only)
	B9	Removing B9 from C9 (24V) causes a Coast Stop
	C9	The Emergency Stop relay (normally-open, delay on de-energisation) is not sequenced via the drive. It is a separate control feature.
Enable	C5 C9	The contact between terminals C5 (ENABLE) and C9 must be closed for the drive to run.
Speed Demand (Uni-directional)	A1	The 10K potentiometer adjusts the speed setpoint: Zero speed = Terminal A1, 0V input Maximum forward speed (+100%) = Terminal B3, 10V input
	A4	
	B3	
Start/Run	C3 C9	When C3 (START/RUN) is connected to C9 the drive can run provided that: B8 & B9 are TRUE (+24V) C5 "Enable" is ON (+24V) MAIN CURR. LIMIT ≠ 0 Speed Setpoint ≠ 0
Thermistor	C1 C2	Connect double insulated motor thermal switch or thermistor to C1, C2. The drive will trip when the thermal switch opens, or when the thermistor resistance exceeds 4kΩ maximum (PTC Type A : IEC 34-11 Part 2). If the motor does not have a protective device (thermistor), link these terminals. The thermistor input C2 must be connected for the drive to run.
Clean Earth	A1	Via the clean earth rail which originates directly from the main incoming earth rail.

## Compliance

A comprehensive guide to product compliance is available in the full 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 installation/operation manual intended for use on this product. This information is provided on the CD ROM included in the container this device was packaged in. It should be retained with this device 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**  
Conducted Emissions comply with EN61800-3 category C3 when installed in accordance with instructions in Chapter 3 refer to "Mounting Drives".  
Radiated Emissions comply with EN61800-3 category C3 and category C2 when fitted with specified external filter.

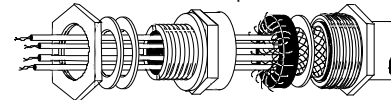
Immunity complies with the requirement of EN61800-3, for equipment intended for use in the second environment.

**EMC Connections**  
For compliance with the EMC requirements, the "0V/signal ground" is to be separately earthed. When a number of units are used in a system, these terminals should be connected together at a single, local earthing point.

Control and signal connections should be made with screened cables, with the screen connected only at the VSD end. However, if high frequency noise is still a problem, earth screen at the non VSD end via a 0.1µF capacitor.

**Note:** Connect the control and signal screens (at the VSD end) to the VSD protective earth point, and not to the control board terminals.

Motor cables should have a 360° bond to ensure a low impedance connection, as per the figure below;



### 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 0.25 meters, for runs longer than 10 meters, separation should be increased proportionally.
- Sensitive cables should cross noisy cables at 90°.
- 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.

