

Drive Set-Up in Local Control

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
- The Keypad is fitted, and you know how to operate and navigate the Keypad
- 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 is of correct armature voltage and current rating
- Check that cooling fans are intact and free from obstruction
- Auxiliary power supply voltage is correct for drive
- 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

2.1 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 Keypad will now display the welcome screen.

AUXILIARY POWER ONLY IS CONNECTED AT THIS STAGE

Press **M**, **M**, **▲** to display the CONFIGURE DRIVE menu. Press **M** again to display the first parameter. Set the following parameters in the menu:

CONFIGURE ENABLE Set to ENABLED. All LEDs on the Keypad will flash.

NOM MOTOR VOLTS Enter Armature Voltage value (VACAL) for Medium Voltage/High Voltage builds **OR** enter DOUBLE the Armature Voltage value for Low Voltage builds.

ARMATURE CURRENT Enter the armature current value (IA CAL) from the motor rating plate.

FIELD CURRENT Enter the nominal field current (IF CAL) from the motor rating plate.

FLD.CTRL MODE Check that the field control mode is set to VOLTAGE CONTROL.

FLD.VOLTS RATIO Enter the calculated ratio into the parameter given by the equation. The default setting of 90% is the maximum value obtainable, i.e. field output = 0.9 x Vac.

CONFIGURE ENABLE Set to DISABLED. The Keypad's LEDs will stop flashing.

PARAMETER SAVE Exit the CONFIGURE DRIVE menu and press the **▲** (UP) key to display the PARAMETER SAVE menu. Press **M**. Press the **▲** (UP) key as instructed to save your settings. Refer to 3.3.

MMI Menu Map

1 CONFIGURE DRIVE

- CONFIGURE ENABLE
- NOM MOTOR VOLTS
- ARMATURE CURRENT
- FIELD CURRENT
- FLD.CTRL MODE
- FLD.VOLTS RATIO
- CUR.LIMIT/SCALER
- AUTOTUNE
- SPEED FBK SELECT
- ENCODER LINES
- ENCODER RPM
- ENCODER SIGN
- SPD.INT.TIME
- SPD.PROP.GAIN

Refer to the Product Code on the drive's Rating Label to confirm the drive's specification.

3: Initial Start-Up Routine

AUXILIARY POWER ONLY IS CONNECTED AT THIS STAGE

Complete steps 3.1 to 3.12

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

MMI Menu Map
1 CONFIGURE DRIVE
MAIN CURR. LIMIT

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

MMI Menu Map
1 DIAGNOSTICS
ANIN 5(A6)

3.3 Save your settings. Press the **▲** (UP) key, as instructed.

MMI Menu Map
1 PARAMETER SAVE
PARAMETER SAVE

3.4 Press the L/R key and select Local mode (the SEQ and/or REF LEDs are lit). The keypad will be used to start, stop and control the speed of the drive.

LOCAL SEQ/REF LEDs
L/R KEY

3.5 With +24V present at terminals B8 and B9 (Program Stop and Coast Stop):

1 Press the Start key on the Keypad.

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

2 Quickly press the Stop key on the Keypad.

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 Stop key. Repeat the test at 3.5 again, but quickly press the Stop key before the alarm has time to initiate.

WARNING

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

3.6 ISOLATE THE DRIVE using branch circuit protection or circuit breaker (8).

Install the 3-phase fuses (6).

Reinstate branch circuit protection or circuit breaker (8).

3.7 Select Local Control on the Keypad. Refer back to 3.4 for how to do this.

FORWARD REF: 0.00 %

This will display the local speed setpoint: 0.00%.

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

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

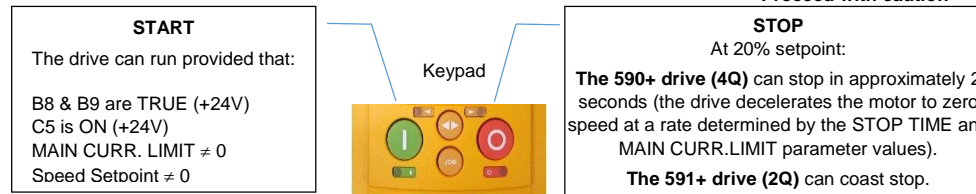
- Press the **1** start key on the keypad
- Ensure that "Enable" (C5) is ON.

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 F+ and F-.

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

This is high voltage DC. Proceed with caution



3.9 Check that the OK (Health) and **1** (Start key) LEDs on the Keypad are now lit, indicating that the motor is capable of rotating.

Also, either the **▶** (forward) or **◀** (reverse) led will be lit, indicating the direction of rotation.

Caution

During the following set-up instructions, be ready to STOP **2** the drive should the motor try to overspeed.

3.10 Set the speed setpoint to 5%. Press the PROG key to display (toggle) the main menu system.

FORWARD REF: 5.00 %

3.11 Refer back to 2.1 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.

MMI Menu Map
1 CONFIGURE DRIVE
MAIN CURR. LIMIT

3.12 Stop the drive **2**. Now Autotune the drive.

4: Autotuning

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

- Main contactor open, i.e. Stop key **2** pressed.
- Program Stop (terminal B8) and Coast Stop (terminal B9) high, i.e. 24V.
- No field voltage: Autotune automatically quenches the (default) internally supplied field.

4.1 Set AUTOTUNE to ON.

MMI Menu Map
1 CONFIGURE DRIVE
AUTOTUNE

4.2 Close the main contactor, i.e., press the start key **1** to begin the Autotune.

- 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 under Local Control using Armature Volts Feedback. Opposite are details for converting to a very simple form of Remote Control.

For the full product manual please visit Parker web site 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)

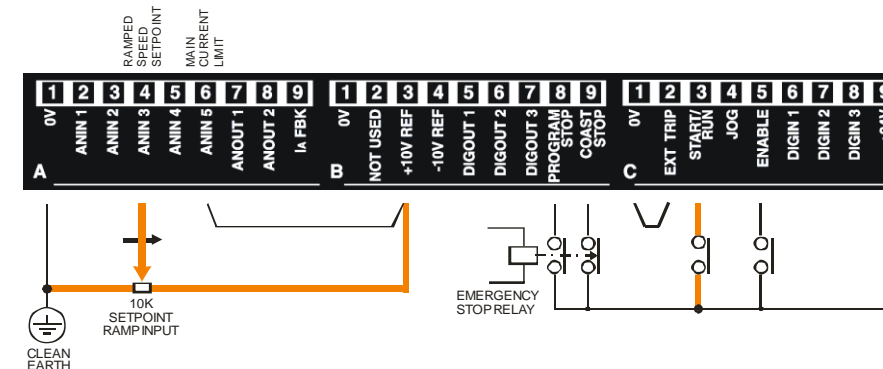


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Converting to Remote Control

ISOLATE THE DRIVE using branch circuit protection or circuit breaker (8).

This description assumes you have completed the "Drive Set-Up in Local Control".



Speed Demand (Uni-directional)	A1 A4 B3	The 10K potentiometer adjust the speed setpoint: Zero speed = Terminal A1, 0V input Maximum forward speed (+100% = Terminal B3, 10V input)	
Start/Run	C3 C9	When C3 (START/RUN) is connected to C9 the drive can run provided that: B8 and B9 are TRUE (+24V) MAIN CURR. LIMIT ≠ 0 C5 "Enable" is ON (+24V) Speed Setpoint ≠ 0	

- Reinstate branch circuit protection or circuit breaker (8).
- By default, Remote Control is already selected on the Keypad (the SEQ and REF LEDs are not lit). Your control connections will be used to start, stop, and control the speed of the drive. Refer back to 2.1 to display the CONFIGURE DRIVE menu.
- Set the MAIN CURR. LIMIT parameter to 0.00%.
- Ensure that "Enable" (C5) is ON.
Set the potentiometer to 5%. To check this, 0.5V (the Total Speed Setpoint) can be measured at terminal A8, Analog Output 2.
Start the drive by closing the "Start/Run" contact (C3).
- 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 unloaded. If the motor is loaded it may require more than 20% current limit to turn the motor. Now stop the drive by opening the "Start/Run" contact (C3). Ensure that "Enable" (C5) is OFF.

The drive is powered-up and operating safely under Remote Control using Armature Volts Feedback.

590+
series
FRAME 1, 2 & 3

HA500650U000 Issue 3

DC590+ series DC Digital Drive

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.

Your 590+ will arrive with English set as default

To change the language press the E key until the LANGUAGE parameter is displayed, approximately 2s, scroll to your selection and press the E key again to finish.



ENGINEERING YOUR SUCCESS.

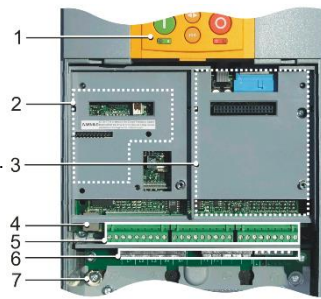
Mechanical Installation

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.

NOTE: 161mm clearance is required above Frame 2 drive to open the cover.

- 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 – M5: 2.7Nm(2ft.lbf.) : 4.5Nm(3.3ft.lbf)



- 1 Keypad
 - 2 Speed Feedback Option
 - 3 Communications Option
 - 4 P3 Port
 - 5 Control Terminals
 - 6 Power Terminals
 - 7 Drive Earth/Ground
- (Frame 1 illustrated)

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)

Frame	Current Rating (A)	Weight Kg (lbs)	Overall Dimensions			Fixing Centres		Fixing	Air Clearance (above/below)
			Width	Height	Depth	Width	Height		
1	15 - 35	6.4 (14)	200 (7.9)	375 (14.8)	220 (8.7)	140 (5.5)	360 (14.2)	M5	100/100mm
2	40 - 165	10.5 (23)	200 (7.9)	434 (17.1)	292 (11.5)	140 (5.5)	418 (16.5)	M6	161/100mm
3	180	20 (44)	250 (9.8)	485 (19.1)	234 (9.2)	200 (7.9)	400 (15.7)	M6	150/100mm
3	270	20 (44)	300 (11.8)	485 (19.1)	234 (9.2)	200 (7.9)	400 (15.7)	M6	100/100mm

Dimensions are in millimetres (inches)

Electrical Ratings - Power Circuit

Motor HP ratings as NEC Table 430-147: "Full Load Current in Amperes, DC Motors"

Output Current @ 150% and 200%*(A)	Output Current @ 100% Continuous*(A)	Power @ 500V dc (kW)	Motor HP @ 500V dc (HP)	Field Current (A)	Total Losses @ Full Load (W)	Symmetrical Fault Current rms (kA)
15	15	7	7.5	4	57	5
35	35	15	20	4	117	5
40	40	18	25	10	132	10
70	70	30	40	10	234	10
110	110	50	60	10	354	10
165	165	75	100	10	519	10
180	180	80	50 ♦	10	570	10
270	270	120	150	10	840	10

* The output current figures are given at 100% Continuous (no overload), and with overloads of 150% for 30 seconds or 200% for 10 seconds
♦ Rated armature voltage : 240V dc

Power Supply Details

3-Phase Supply	LV Build	110-220V ac ±10%, 50/60Hz ±5%, line-to-line, ground referenced (TN) and non-ground referenced (IT)
	MV Build (standard)	220-500V ac ±10%, 50/60Hz ±5%, line-to-line, ground referenced (TN) and non-ground referenced (IT)
Supply Current	(0.9 x Idc) Amps ac rms	
Field Supply Current	(1 x Idc) Amps ac rms (build-related)	
Field Supply Voltage	Build-related	
3 Phase Input	3-phase rotation insensitive, no adjustment necessary for frequency change	

Auxiliary Power Supply Details

Auxiliary Supply	110-230V ±10%, 50-60Hz ±10%, single phase, Overvoltage Category II 3A ac rms maximum. Nominal current used for power supplies: 0.5A at 115V ac, 0.25A at 230V ac
Contactors Output	3A maximum at the auxiliary voltage

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.

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.

Frame 1 (15, 35A units)	12 AWG, 2.0Nm (17 in.lbf)
Frame 2 (40A, 70A, 110A units)	6 AWG, 5.6Nm (50 in.lbf)
Frame 2 (165A units)	3 AWG, 5.6Nm (50 in.lbf)
Frame 3 (180, 270A units)	2/0 AWG, 6.8Nm (60 in.lbf)

Environmental Conditions

Operating ambient temperature	Frames 1 & 2: 0°C to 45°C (32°F to 113°F), Frame 3: 0°C to 35°C (32°F to 95°F)
Enclosure rating	Frame 1: IP20 - UL(cUL) Open Type, Frames 2 & 3: IP00 - UL(cUL) Open Type
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 L2 L3	Connect via branch protection fuses, filter (optional), 3Ø semi-conductor fuses, contactor, capacitor box (optional), and AC Line Choke/Reactor. AC Current = 0.83 x DC Armature Current.
Motor Armature	A+ A-	Connect shield between motor and earth rail.
Field Output	F+ F-	Frame 3: Terminals F- & F+ = D3 & D4 Connect shield between motor and earth rail. These terminals provide an internal motor field supply fused by 10A fuses.
Auxiliary Supply	L N	Frame 3: Terminals L & N = D8 & D7 Single phase, 110/240V ac, 50/60Hz. Match auxiliary supply to the contactor coil voltage. 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 SSD Drives
External Contactor	3 (L) 4 (N)	Frame 3: Terminals 3 & 4 = D5 & D6. Connect the contactor coil to terminals 3 (L) & 4 (N) (Live & Neutral).
Motor Thermistor	TH1 TH2	Connect motor thermal switch or thermistor to TH1, TH2. 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. Thermistor inputs must be connected for the drive to run.

Control Connections for Local Control

Refer to the Installation Diagram

- Control wiring must have a minimum cross-section area of 0.75mm² (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 B9 C9	Removing B8 from C9 (24V) causes a Program Stop (regenerative drive only) Removing B9 from C9 (24V) causes a Coast Stop 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.
External Trip	C1 C2	Terminals C1 and C2 must be linked for the drive to run (External Trip interlock not required in this simple set-up).
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.

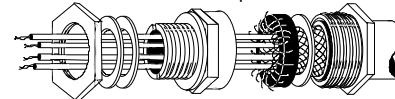
Immunity complies with the requirement of EN61800-3, for equipment intended for use in the second environment.

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.

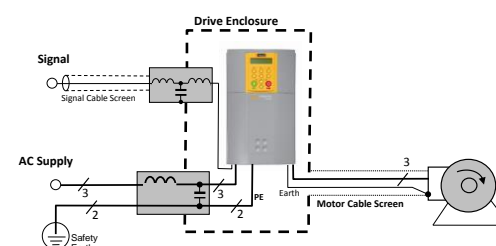
Note: Connect the control and signal screens (at the VSD end) to the VSD protective earth point, and not to the control board terminals.

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

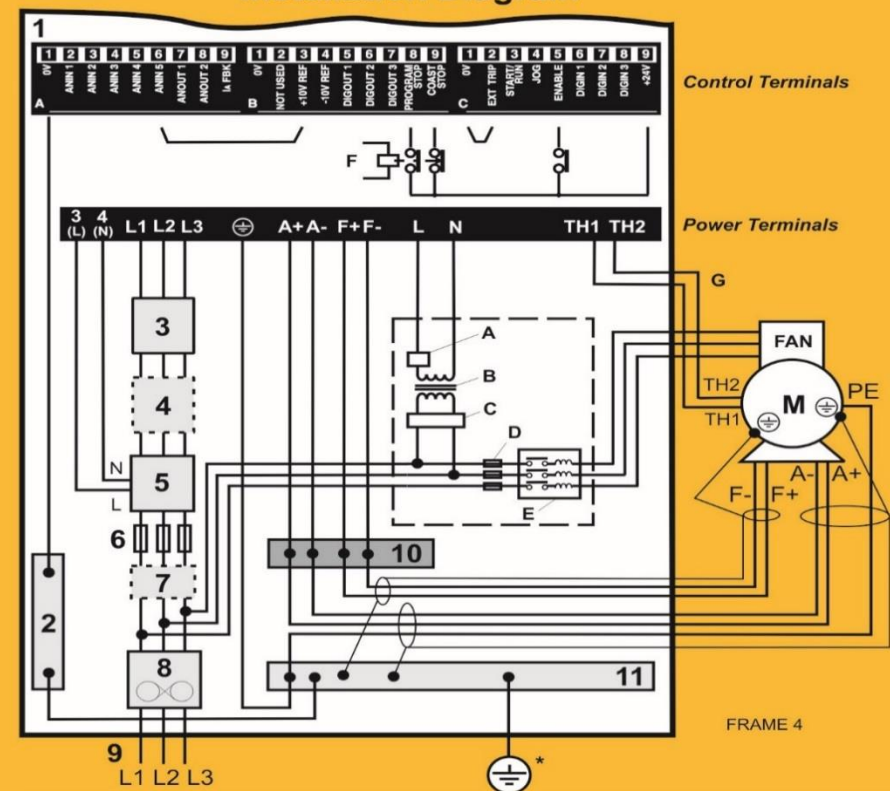


Planning Cable Runs

- ♦ 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.



Installation Diagram



* Permanent Earthing

The unit must be permanently earthed according to EN50178:

A cross-section conductor of at least 10²mm is required.

This can be achieved by using a single conductor (PE) or by laying a second conductor through separate terminals (PE2 where provided) and electrically in parallel.

- | | |
|--|-----------------------------|
| 1 Cubicle | 9 3Ø Power Supply Cable |
| 2 Clean Earth/Ground Rail | 10 Terminal Rail |
| 3 AC Line Choke | 11 Dirty Earth/Ground Rail |
| 4 Capacitor Box - CO468398 (optional) | A 1 Pole MCB |
| 5 AC Contactor | B Control Transformer |
| 6 3Ø Semi-Conductor Fuses | C 2 Pole MCB |
| 7 External AC Supply EMC filter (optional) | D Fan Fuses |
| 8 Branch Protection Fuses or Circuit Breaker | E Motor Overload Protection |
| | F Emergency Stop Relay |
| | G Isolated Motor Thermistor |
| | M Motor |