

Commander C300 Enclosed Inverter User Guide

(0.75kW~45kW)



V1.0.0

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Declaration of Conformity

Willpower Electrical Limited trading as Motor Control Warehouse hereby states that the Enclosed Inverter range (CIB) conforms to the relevant safety provisions of the **Low Voltage Directive 2006/95/EC** and the **EMC Directive 2004/108/EC** and have been designed and manufactured in accordance with the following harmonised European standards:

EN61000-6-2	EMC immunity in industrial environment
EN61000-6-4	EMC emission in industrial environment
EN61010-1	Safety
EN60529: 1992	Specifications for the degrees of protection provided by enclosures

Model	kW Rating	Input Voltage (+/-10%)
CIB0075EN200V	0.75kW	230VAC
CIB0150EN200V	1.5kW	230VAC
CIB0220EN200V	2.2kW	230VAC
CIB0300EN200V	3.0kW	230VAC
CIB0075EN400V	0.75kW	400VAC
CIB0150EN400V	1.5kW	400VAC
CIB0220EN400V	2.2kW	400VAC
CIB0400EN400V	4.0kW	400VAC
CIB0550EN400V	5.5kW	400VAC
CIB0750EN400V	7.5kW	400VAC
CIB1100EN400V	11kW	400VAC
CIB1500EN400V	15kW	400VAC
CIB1850EN400V	18.5kW	400VAC
CIB2200EN400V	22kW	400VAC
CIB3000EN400V	30kW	400VAC
CIB3700EN400V	37kW	400VAC
CIB4500EN400V	45kW	400VAC

Signed	
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Position	Technical Director
Date	13.10.2020

Safety Information

This chapter provides very important information so that you can use the **Commander C300 Enclosed Inverter (CIB)** safely, prevent injury or death, or damage to equipment. Please read this information thoroughly and make sure you observe all the safety information shown below and elsewhere in this manual and in the Commander C300 Safety Booklet. Please make this User Guide and the Commander C300 Safety Booklet available for the end user.

Please read this safety information in conjunction with the safety information in the Commander C300 Safety Booklet. Please read the Commander C300 Quick Start Guide and Commander C300 Installation Guide for details such as Fuse/MCB and cable sizes etc.

Safety symbols



Danger: Danger of electrical shock which can cause injury or death, or damage to equipment



Warning: Potential hazard, other than electrical, that can cause physical injury or damage to equipment



Danger

- The CIB should **ONLY** be installed, commissioned and maintained by qualified and competent personnel.
- The CIB must be installed to the latest IEE wiring regulations taking into account local regulations.
- Before power is applied to the CIB, ensure the enclosure door is closed.
- Dangerous voltages are present when the input power supply is connected to the CIB. Before attempting any work on the CIB or motor, isolate and lock off the input power supply. After disconnecting the supply, wait at least 10 minutes (to let the Commander C inverters internal capacitors discharge) before opening the enclosure door. Prove dead using a voltage tester. The voltage tester itself should be proved immediately before and after testing using a proving unit with a low power output.
- The CIB enclosure must be connected to system ground using the cubicles earth terminals. The size of the earth conductor and earth loop impedance must comply with local and national electrical regulations.
- Do not flash test the components within the CIB enclosure.
- If the CIB is supplied from a pluggable power connector, the enclosures interlocked isolator must be turned off before unplugging the connector.
- The CIB is a non-field repairable unit. Contact the supplier of the CIB.
- The CIB cubicle must be protected by the recommended fuses/MCB (See the Commander C Enclosed Inverter User Guide).



Warning

- All machinery, in which this CIB is used, within the European Union, must comply with directive 98/37/EC, Safety of Machinery.
- Do not install the CIB in an explosive environment.
- The motor must be used within the manufacturers guidelines.
- Do not allow conductive material to enter the components within the CIB, e.g. from drilling during installation.
- The red mushroom button on this equipment is an Emergency Stop button. This button provides a 'Category 0' stop by disabling the inverters output via its safe torque off input, the motor will coast to a stop when the button is pressed. This button should not be used as a means of isolation of the motor or equipment for maintenance or any other function.

Technical data

Model	kW rating	Input phase	Input voltage (VAC)	Max motor current (A)	Approx. weight (kg)
CIB0075EN200V	0.75	1	230	4.2	20
CIB0150EN200V	1.5	1	230	7.5	20
CIB0220EN200V	2.2	1	230	10	24
CIB0300EN200V	3.0	1	230	13.3	28
CIB0075EN400V	0.75	3	400	2.3	20
CIB0150EN400V	1.5	3	400	4.1	20
CIB0220EN400V	2.2	3	400	5.6	24
CIB0300EN400V	3.0	3	400	7.3	24
CIB0400EN400V	4.0	3	400	9.4	24
CIB0550EN400V	5.5	3	400	13.5	28
CIB0750EN400V	7.5	3	400	17	28
CIB1100EN400V	11	3	400	27	40
CIB1500EN400V	15	3	400	30	43
CIB1850EN400V	18.5	3	400	42	43
CIB2200EN400V	22	3	400	47	43
CIB3000EN400V	30	3	400	66	70
CIB3700EN400V	37	3	400	77	70
CIB4500EN400V	45	3	400	100	75

Approvals	CE approval	CE
Environment	Altitude	1000m rated 1000m~3000m, 1% rated current de-rating per 100m
	Operating Temperature	-20°C~+60°C (>40°C requires current de-rating)
	Max. Humidity	≤95%RH, non-condensing at 40°C
	Vibration	See Commander C Installation guide
	Storage Temperature	-40°C~+60°C
	Running Environment	Non-flammable, No corrosive gasses, no contamination with electrically conductive material, avoid dust which may restrict the fan
Supported Power Supply Systems		TT TN IT (removal of drives internal EMC filter and MOV required)
Commander C Enclosure		IP54
Breaking capacity of protective devices		10kA
Supply frequency		45 to 66Hz
Supply voltage		Single phase 200 – 240VAC ±10% 3 phase 400VAC ±10%

Maximum Motor Cable Lengths

For the maximum motor cable lengths, refer to the Commander C Installation Guide.

If the maximum motor cable length is to be exceeded, an output reactor (choke) or sine filter must be used.

Braking Resistors



WARNING:

If braking resistors are being installed for use with the Commander C Enclosed Inverter:

Braking resistors can reach high temperatures and therefore must be located as not to cause damage. They must be connected using cables suitable for these high temperatures.

It is essential that the braking resistor is protected against overload. A thermal device that disconnects the AC supply to the drive must be fitted.

NOTE: Please observe the minimum braking resistor value in the tables in the Commander C Quick Start Guide.

CIB Cubicle Dimensions

Model	Dimensions (H x W x D)
CIB0075EN200V	400 x 300 x 200
CIB0150EN200V	400 x 300 x 200
CIB0220EN200V	500 x 400 x 250
CIB0075EN400V	400 x 300 x 200
CIB0150EN400V	400 x 300 x 200
CIB0220EN400V	500 x 400 x 250
CIB0400EN400V	500 x 400 x 250
CIB0550EN400V	600 x 400 x 250
CIB0750EN400V	600 x 400 x 250
CIB1100EN400V	800 x 600 x 250
CIB1500EN400V	800 x 600 x 300
CIB1850EN400V	800 x 600 x 300
CIB2200EN400V	800 x 600 x 300
CIB3000EN400V	1000 x 800 x 400
CIB3700EN400V	1000 x 800 x 400
CIB4500EN400V	1000 x 800 x 400

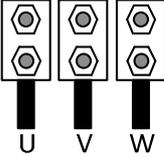
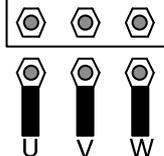
CIB Features

Interlocked mains isolator
 10kA MCBs
 Tri-rated cable
 IP65 rated speed potentiometer
 Motor connections on DIN rail terminals
 Thermostat controlled cooling fan
 Safety Relay: SIL 3 Category 0 E-Stop with manual reset

Motor connection

When connecting a 3 phase motor to an AC inverter drive, it is important that the motor terminal box connections are correct for the supply voltage being used. Generally up to 3kW, the motor is wound for 230V delta, 400V star. Generally above 3kW, the motor is wound for 400V delta, 690V star.

Please check the motor nameplate for the correct connection.

Inverter Supply Voltage	Motor Nameplate Voltages	Connections	
230V	230V / 400V	Delta △	
400V	400V / 690V		
400V	230V / 400V	Star ∧	

The usual issues when the wrong connections are made:

230V AC drive connected to a 400V star connected motor or 400V AC drive connected to a 690V star connected motor:

The motor will probably run if starting a lightly loaded motor. If the motor tries to start a heavy load or if a heavy load is applied to the motor while running, the motor will stall due to a lack of torque and the drive will trip on an over current or I x t trip.

400V AC drive connected to a 230V delta connected motor:

On enable, the drive will either trip on an over current trip or the drive will go into current limit and trip on an "I x t trip".

NOTE: Please make sure there are no phase to earth short circuits on the motor/motor cable before powering up the Commander C Enclosed Inverter. A phase to earth short circuit at power up may cause drive failure on some models of Commander C Enclosed Inverter.

Operation

The Commander C range of enclosed motor inverters is designed to be as close to a plug and play product as possible. They require a suitable 3 phase and earth or single phase and earth power supply and a three wire and earth motor cable. Please note it is best practice to use a screened/shielded motor cable.

The Commander C Enclosed Inverter is equipped with:

- Green start button
- Red stop button
- Blue reset button
- Red keyed latching Emergency Stop button
- Drive healthy lamp
- Drive running lamp
- E-Stop active lamp
- Reverse/Forward switch
- A single turn speed potentiometer
- An interlocked mains isolator is also provided; the enclosure door cannot be opened unless the isolator is in the off position.

The Commander C Enclosed Inverter will provide a soft start and a soft stop along with motor thermal protection.

The red mushroom button on this equipment is an Emergency Stop button. This button provides a 'Category 0' stop by disabling the inverters output via its Safe Torque Off input, the motor will coast to a stop when the E-Stop button is pressed. This button should not be used as a means of isolation of the motor or equipment for maintenance or any other function.

Start Button - When pressed (providing the inverter disable button is not pressed) the inverter will start and ramp up to the speed set by the speed potentiometer.

Stop Button - When pressed the inverter will ramp to a stop.

E-stop Button - When pressed the inverter will disable its outputs immediately and the connected motor will 'coast to a stop'. This is a twist release button and can be locked in the "in" position. **This button and should not be used for safety isolation.**

Speed Potentiometer - When turned in the anti clockwise direction this will reduce inverter output speed. When turned in the clockwise direction this will increase inverter output speed.

Forward/Reverse Switch - When set in the forward position the inverter will turn a motor in the clockwise direction of rotation when looking at the motor shaft from in front of the motor (providing U,V,W on the inverter are connected to U1, V1, W1 on the motor).

When set in the reverse position the inverter will turn a motor in the anti-clockwise direction of rotation when looking at the motor shaft from in front of the motor (providing U,V,W on the inverter are connected to U1, V1, W1 on the motor).

Healthy Lamp - This lamp will be illuminated when the Commander C inverter is in the healthy state (not tripped).

Running Lamp - This lamp will be illuminated when the Commander C inverter is running (inverter output enabled).

E-Stop active lamp - This lamp will be illuminated when the safety relay is in a tripped state.

Reset Button – When safety relay has tripped, this button will reset the safety relay providing all E-Stop buttons have been released

Mains Isolator - With the mains isolator in the off position mains power will be removed from the control box. Mains power will still be present at the input connections to the isolator only.

Commander C Enclosed Inverter Parameter Settings

The following parameters have been pre-programmed in to the Commander C Inverter drive:

Parameter	Setting	Description
P06.040	On	Latching mode
P06.041	6	Terminals to user Settable
P08.014	1	Digital input 4 invert
P08.022	6.039	Digital input 2 as STOP input
P08.023	6.034	Digital input 3 as RUN input
P08.024	6.033	Digital Input 4 as FORWARD/REVERSE input
P08.025	6.038	Digital input 5 as ENABLE input
P08.091	1	Digital output 1 as DRIVE RUNNING output

NOTE: Please make sure that the following parameters are set according to the motor nameplate:

P00.06 – Motor rated current

P00.08 – Motor rated voltage

P00.39 – Motor rated frequency

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Commander C300 Enclosed Inverter Menu 0 Useful Parameters

Parameter	Parameter name	CIB Setting	Parameter	Parameter name	CIB Setting
00.001	Minimum ref clamp		00.037	Switching frequency	
00.002	Max ref clamp		00.038	Autotune	
00.003	Acceleration rate		00.039	Motor rated frequency	
00.004	Deceleration rate		00.041	Control mode	
00.006	Motor rated current		00.042	Voltage boost	
00.008	Motor rated voltage				
00.009	Motor power factor				
00.010	User security status				
00.031	Stop mode				
00.033	Catch a spinning motor				