

HIB Enclosed Inverter User Guide

(0.75kW~45kW)



V1.4.0

Contents

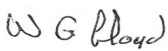
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Declaration of Conformity

Willpower Electrical Limited trading as Motor Control Warehouse hereby states that the Enclosed Inverter range (HIB) 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%)
HIB0075EN200V	0.75kW	230VAC
HIB0150EN200V	1.5kW	230VAC
HIB0220EN200V	2.2kW	230VAC
HIB0400EN200V	4.0kW	230VAC
HIB0075EN400V	0.75kW	400VAC
HIB0150EN400V	1.5kW	400VAC
HIB0220EN400V	2.2kW	400VAC
HIB0400EN400V	4.0kW	400VAC
HIB0550EN400V	5.5kW	400VAC
HIB0750EN400V	7.5kW	400VAC
HIB1100EN400V	11kW	400VAC
HIB1500EN400V	15kW	400VAC
HIB1850EN400V	18.5kW	400VAC
HIB2200EN400V	22kW	400VAC
HIB3000EN400V	30kW	400VAC
HIB3700EN400V	37kW	400VAC
HIB4500EN400V	45kW	400VAC

Signed	
Name	Gareth Lloyd
Position	Technical Director
Date	17.03.2018

Safety Information

This chapter provides very important information so that you can use the **HIB Enclosed Inverter** 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 ID700 Easy Start Guide. Please make this User Guide and the ID700 Easy Start Guide available for the end user.

Please read this safety information in conjunction with the safety information in the Imoticon ID700 Easy Start Guide. Please read the Imoticon ID700 Easy Start 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 HIB Enclosed Inverter should **ONLY** be installed, commissioned and maintained by qualified and competent personnel.
- The HIB must be installed to the latest IEE wiring regulations taking into account local regulations.
- Before power is applied to the HIB, ensure the HIB cubicle door is closed.
- Dangerous voltages are present when the input power supply is connected to the HIB. Before attempting any work on the HIB cubicle or motor, isolate and lock off the input power supply. After disconnecting the supply, wait at least 10 minutes (to let the HIB drives internal capacitors discharge) before opening the cubicle 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 HIB cubicle must be connected to system ground using the cubicles earth terminals. The size of the earth conductor and earth loop impedance must comply with national and local electrical regulations.
- Do not flash test the components within the HIB cubicle.
- If the HIB cubicle is supplied from a pluggable power connector, the HIB interlocked isolator must be turned off before unplugging the connector.
- The HIB is a non-field repairable unit. Contact the supplier of the HIB.
- The HIB cubicle must be protected by the recommended fuses/MCB (See ID700 Easy Start Guide).



Warning

- All machinery, in which this HIB is used, within the European Union, must comply with directive 98/37/EC, Safety of Machinery.
- Do not install the HIB in an explosive environment.
- The motor must be used within the manufacturers guidelines.
- Do not allow conductive material to enter the components within the HIB, e.g. from drilling during installation.
- **The key release disable button on this equipment IS NOT an Emergency Stop button. It is an inverter disable button. This button provides a 'Category zero stop' (coast to stop) by disabling the inverters output. It is a low integrity level, PLa system and has no built in redundancy or safety relay control. This button should not be used as a means of isolation of the motor or equipment for maintenance or any other function. This button must not be used as an Emergency Stop button. Please check this type of system is adequate for your machine/equipment.**

Technical data

Model	kW rating	Input phase	Input voltage (VAC +/-10%)	Max motor current (A)
HIB0075EN200V	0.75	1	230	5
HIB0150EN200V	1.5	1	230	8
HIB0220EN200V	2.2	1	230	11
HIB0400EN200V	4.0	1	230	17.6
HIB0075EN400V	0.75	3	400	2.5
HIB0150EN400V	1.5	3	400	4.2
HIB0220EN400V	2.2	3	400	5.8
HIB0400EN400V	4.0	3	400	9.5
HIB0550EN400V	5.5	3	400	13
HIB0750EN400V	7.5	3	400	17
HIB1100EN400V	11	3	400	24
HIB1500EN400V	15	3	400	32
HIB1850EN400V	18.5	3	400	38
HIB2200EN400V	22	3	400	46
HIB3000EN400V	30	3	400	60
HIB3700EN400V	37	3	400	75
HIB4500EN400V	45	3	400	96

Approvals	CE approval	CE
Environment	Altitude	1000m rated 1000m ~ 3000m, 1% rated current de-rating per 100m
	Operating Temperature	-10°C ~ +40°C
	Max. Humidity	≤90%RH, non-condensing
	Vibration	≤5.9m/s ² (0.6g)
	Storage Temperature	-40°C ~ +70°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)
HIB Enclosure		IP54
Breaking capacity of protective devices		10kA
Supply frequency		49 to 61Hz
Input supply voltage	200V models	Single phase 200 – 240VAC ±10%
	400V models	3 phase 400VAC ±10%
Output Voltage	200V models	0 to input (230V 3 phase)
	400V models	0 to input (400V 3 phase)

Maximum Motor Cable Lengths

The maximum motor cable lengths for standard SWA (steel wire armoured) or standard SY cable is 100m for all HIB cubicles.

If high capacitance motor cables are used, the maximum motor cable should be halved to 50m.

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

Braking Resistors



WARNING:

If braking resistors are being installed for use with the HIB:

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 Imoticon ID700 Easy Start Guide.

HIB Cubicle Dimensions & Weights

Model	Dimensions (H x W x D)	Weight (kg)
HIB0075EN200V	400 x 300 x 200	20
HIB0150EN200V	400 x 300 x 200	20
HIB0220EN200V	500 x 400 x 250	24
HIB0400EN200V	600 x 400 x 250	28
HIB0075EN400V	400 x 300 x 200	20
HIB0150EN400V	400 x 300 x 200	20
HIB0220EN400V	500 x 400 x 250	24
HIB0400EN400V	500 x 400 x 250	24
HIB0550EN400V	600 x 400 x 250	28
HIB0750EN400V	600 x 400 x 250	28
HIB1100EN400V	800 x 600 x 250	40
HIB1500EN400V	800 x 600 x 300	43
HIB1850EN400V	800 x 600 x 300	43
HIB2200EN400V	800 x 600 x 300	43
HIB3000EN400V	1000 x 800 x 400	70
HIB3700EN400V	1000 x 800 x 400	70
HIB4500EN400V	1000 x 800 x 400	75

Motor cooling

The HIB can be used to reduce the speed of the motor. If the motor is going to be run at low speed for extended periods of time, the cooling air from the motor fan may become ineffective and therefore the motor could overheat. The fitting of a motor force vent cooling fan may be necessary.

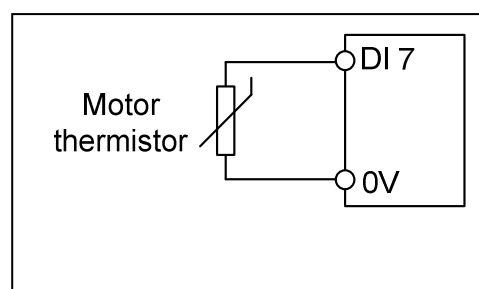
NOTE: The HIB inverter drive can be configured to accept a motor thermistor. The thermistor will cause the drive to trip to prevent the motor overheating.

To implement a motor thermistor, set parameter
P9.24 = 1.

Trip resistance = 3k Ω , reset resistance 1.8k Ω

Drive will trip on F011 to indicate a motor over temperature trip.

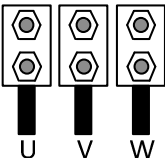
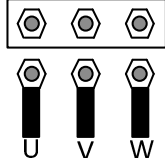
Connection diagram



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 HIB. A phase to earth short circuit at power up may cause drive failure on some models of HIB.

Operation

The HIB 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 motor cable.

The HIB is equipped with:

- Green start button
- Red stop button
- Red keyed latching **Inverter Disable** button (**Not Emergency Stop button**)
- Drive healthy lamp
- Drive running lamp
- Forward/Reverse 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 HIB will provide a soft start and a soft stop along with motor thermal protection.

The key release disable button on this equipment IS NOT an Emergency Stop button. It is an inverter disable button. This button provides a 'Category zero stop' (coast to stop) by disabling the inverters output. It is a low integrity level, PLa system and has no built in redundancy or safety relay control. This button should not be used as a means of isolation of the motor or equipment for maintenance or any other function. This button must not be used as an Emergency Stop button. Please check this type of system is adequate for your machine/equipment.

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.

Inverter Disable 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 is not an Emergency Stop 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 HIB inverter is in the healthy state (not tripped).

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

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.

HIB Parameter Settings

The following parameters have been pre-programmed in to the HIB ID700 Inverter drive:

Single Phase Input

Parameter	Setting	Description
P00.04	1	Terminal control mode
P00.05	3	Analogue input 1 reference
P00.14	2	Digital input selector
P00.17	0	Auto-Start after power off to disabled
P00.23	1	Extended parameter access
P09.14	1	Digital input 3 invert
P12.09	0	Input phase loss trip disabled

Three Phase Input

Parameter	Setting	Description
P00.04	1	Terminal control mode
P00.05	3	Analogue input 1 reference
P00.14	2	Digital input selector
P00.17	0	Auto-Start after power off to disabled
P00.23	1	Extended parameter access
P09.14	1	Digital input 3 invert

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

P00.01 – Motor rated voltage

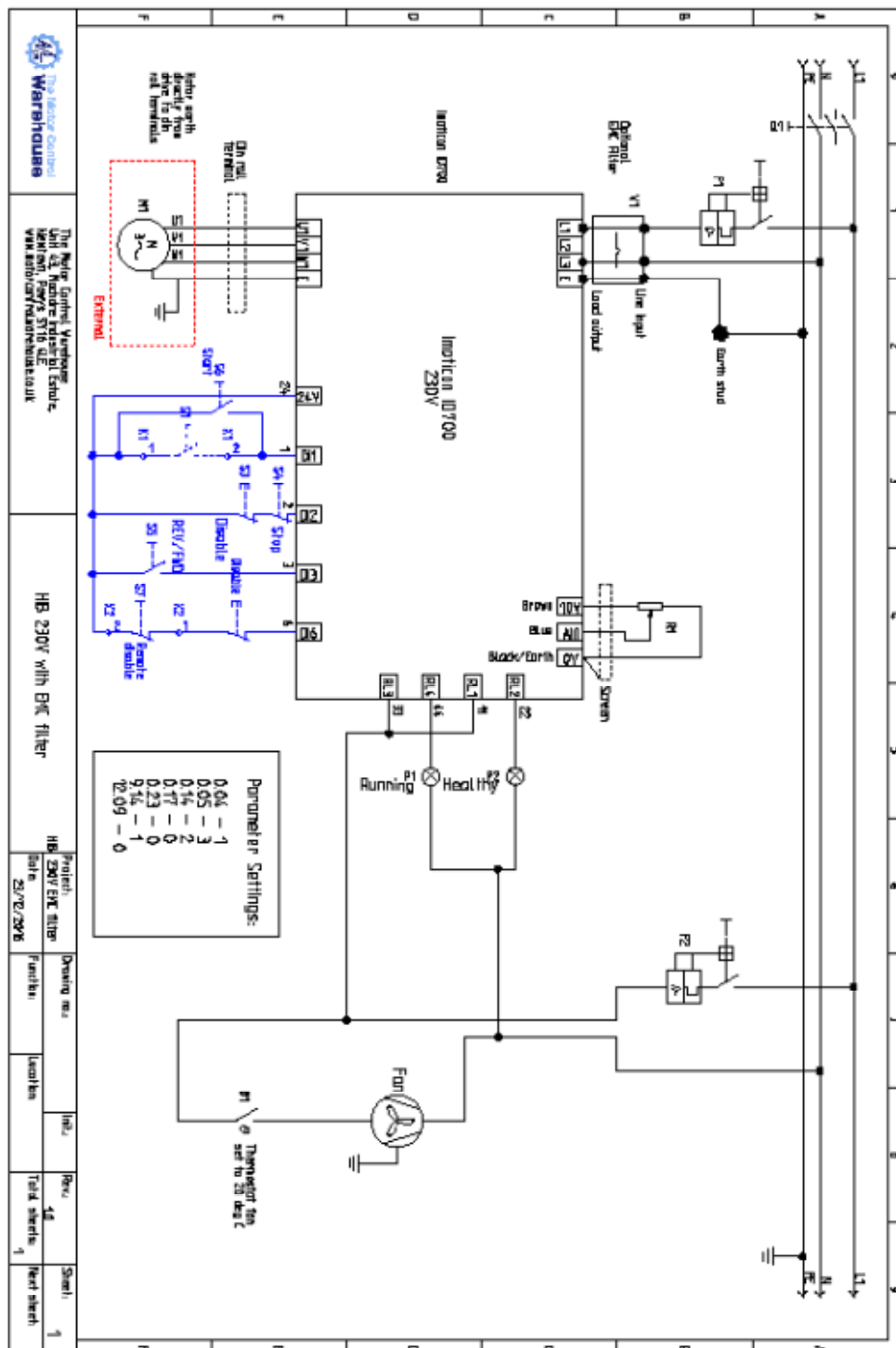
P00.02 – Motor rated current

P00.03 – Motor rated frequency

Circuit Diagrams

230V Single phase input

With Optional EMC filter diagram shown



Other Enclosed Products from Motor Control Warehouse

- **Enclosed Star Delta Starters**, three phase input from 7.5kW to 90kW. Trip Class 10 and Trip Class 20 ratings available.



Features

IP65 Powder coated steel enclosure
Interlocked mains isolator
10kA MCBs – power and control
Tri-rated cable
Start/Stop pushbuttons
Motor outputs to terminals
Terminals for external start/stop
Key release E-Stop button
Adjustable changeover timer
110VAC/230VAC/400VAC Control voltage options

- **Enclosed Soft Starters**, from 7.5kW to 55kW, three phase input. All these products are rated at trip class 10 (medium industrial loads).



Features

IP65 Powder coated steel enclosure
10kA MCBs – power and control
Interlocked mains isolator
Motor thermal overload relay
Internal bypass contactor
Stop/start pushbuttons
Keyed soft stop button
Running and healthy lamps
Customer terminals
24Vdc power supply
Tri-rated cable
Fairford Electronics DFE Soft Start

HIB IMOTICON ID700 Easy Menu Parameters

Parameter	Parameter name	HIB Setting	Parameter	Parameter name	HIB Setting
P00.01	Motor rated voltage	230V or 400V	P00.13	V/f control mode	0
P00.02	Motor rated current	By model	P00.14	Digital input selector	2
P00.03	Motor rated frequency	50.00Hz	P00.15	Relay 1 selector	0
P00.04	Control mode	1	P00.16	Preset speed 1	5.00Hz
P00.05	Reference source selector	3	P00.17	Auto-Start After Power Off	0
P00.06	Minimum reference (speed)	0.00Hz	P00.22	Password	0
P00.07	Maximum reference (speed)	50.00Hz	P00.23	Extended group access	0
P00.08	Acceleration time	10.00s	P00.24	Load defaults	0
P00.09	Deceleration time	20.00s	P09.14	DI 3 input invert	1
P00.10	Stop mode selector	0			
P00.11	AI 1 mode selector	6			
P00.12	Low speed voltage boost level	By model			

HIB IMOTICON ID700 Control Terminal Connections

