IMO

*iDrive*

# EDX

## AC micro-inverters for small 3-phase induction motors

**100V series, 1-ph / 0.2 – 0.75kW (0.25 – 1HP)**
**200V series, 1-ph / 0.2 – 2.2kW (0.25 – 3HP)**
**200V series, 3-ph / 0.2 – 2.2kW (0.25 – 3HP)**
**400V series, 3-ph / 0.75 – 2.2kW (1 – 3HP)**

**Version V5.0807**

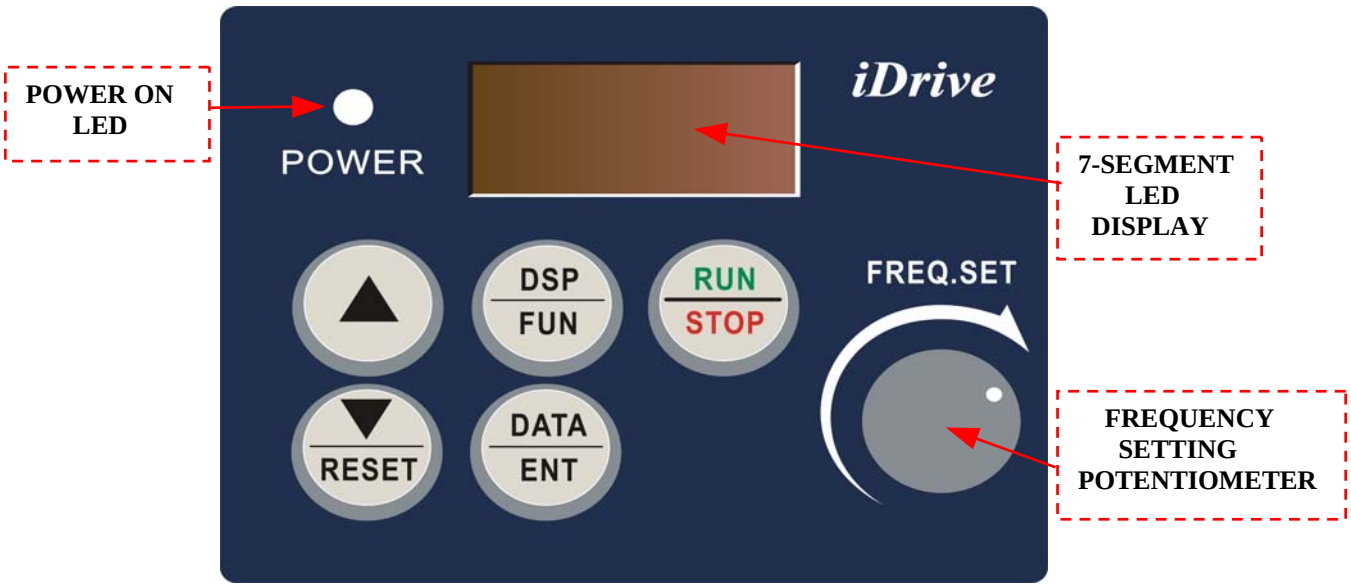
# Quick Start Guide

**Always read the full instruction manual before using *iDrive*.**
**This quick start guide is to assist in installing and running the *iDrive* to verify that the *iDrive* and motor are working properly. Starting, stopping and speed control will be from the keypad. If your application requires external control or special system programming, consult the *iDrive* EDX instruction manual supplied with your inverter.**

## Step 1 - Before applying power to your *iDrive*

**Please refer to Chapter One (Preface) and Chapter Two (Safety Precautions) of the *iDrive* EDX instruction manual. Verify drive is installed in accordance with the procedures as described in Chapter Three (Environment and installation). If something is suspected of being abnormal, do not apply power to the drive until qualified personnel have corrected the situation. (Failure to do so could result in death or serious injury.)**

- **Check inverter and motor nameplates to determine that they have the same power and voltage ratings. Ensure that full load motor current does not exceed that of the inverter.**
- **With power OFF, remove the terminal covers to expose the motor and power terminals.**
  - **a. Verify that AC power is wired to L1(L), L2, and L3(N) .**
  - **b. Verify that motor leads are connected to T1, T2, and T3 .**
  - **c. If a brake module is necessary, please connect terminal voltage of the braking unit to P and N of the inverter. Never connect a resistor directly to *iDrive* terminals P and N.**




***iDrive* EDX keypad**

## Step 2 - Apply power to your *iDrive*

**Apply AC power to the drive and observe the keypad display. The 7-segment LED display should show power voltage (ie 220) for 3~5 seconds and then show the Frequency Command (Hz), factory set at 5.00. (Frequency Command shown on 7-segment display should be flashing, ie inverter output OFF.)**

# Step 3 - Check low speed motor rotation direction without load from keypad.

**(See keypad diagram on previous page)**

- **Press RUN/STOP key. 7-segment display will indicates 00.0 to 05.0. This number is the frequency output value. The display will now become solid (not blinking) because the inverter output is ON.**
- **Check the operating direction of the motor.**
  **IF the direction of the motor is incorrect:**
  **Press RUN/STOP key, turn off the AC power supply. When the power indicator LED is off, change over motor connections T1 and T2 for example.**
  **Apply the power again, and then check the motor direction by pressing RUN/STOP key.**
- **If rotation is correct press RUN/STOP key again.**

# Step 4 - Check full speed at 50Hz / 60Hz

- **Increase the frequency with ⋏,⋎ keys, press DATA/ENT to save this frequency.**
- **Set frequency to 50Hz / 60Hz according to the above.**
- **Press RUN/STOP key; check that the motor accelerates smoothly to full speed.**
- **Press RUN/STOP key; check that the motor decelerates smoothly to zero speed.**

# Step 5 - Other settings

**For other functions, please refer to *iDrive* EDX user manual.**
**Example:**
**Frequency Upper Limit (Hz)…….. P. 4-9**
**Frequency Lower Limit (Hz)…….P. 4-9**
**Acceleration time (s)…..…… P. 4-10**
**Deceleration time (s)…..…… P. 4-10**
**Control mode (Vector, V/F)……..……P. 4-10**
**Motor rated current (A)…..……P. 4-13**

# Step 6 - Vector Mode Settings

**If *iDrive* is required to run in Vector Mode (A06 = 001), the motor parameters need to be set.**
**The required data should found on the motor rating plate. (Motor kW = 0.75 × HP)**
**The parameters to set for vector operation are:**
**Motor Rated Current (Amps) (b09) See page 4-13**
**Motor Rated Voltage (Volts) (b10) See page 4-13**
**Motor Rated Frequency (Hz) (b11) See page 4-13**
**Motor Rated Power (KW) (b12) See page 4-13**
**Motor Rated Speed (RPM) (b13) See page 4-13**
**Additional Vector Mode Settings to adjust for optimum performance are:**
**Torque boost gain (b14) See page 4-13**
**Slip compensation gain (b15) See page 4-14**
**Low Frequency Voltage Compensation (b16) See page 4-14**

# *iDrive* EDX user manual

## Contents


**Quick Start Guide ……..…… i**

**Chapter 0 ~ Preface ……..…** 0-1
- **0.1 Preface ……** 0-1
- **0.2 Product inspection ……...** 0-1

**Chapter 1 ~ Safety precautions……** 1-1
- **1.1 Operating precautions……..** 1-1
  - **1.1.1 Before power up……...** 1-1
  - **1.1.2 During power up……..** 1-2
  - **1.1.3 Before operation ……...** 1-2
  - **1.1.4 Leakage current! …… ……..** 1-2
  - **1.1.5 During operation……** 1-3
  - **1.1.6 Operating environment ……** 1-3

**Chapter 2 ~ Part number description..…….** 2-1

**Chapter 3 ~ Environment description and installation……..…** 3-1
- **3.1 Environment ……** 3-1
- **3.2 Environment precautions……** 3-6
- **3.3 Electrical Installation……..……** 3-7
  - **3.3.1 Notes for wiring…….……** 3-7
  - **3.3.2 MC, MCCB, fuse and cable specifications ……** 3-9
  - **3.3.3 Ancillary power equipment – supply side……** 3-10
  - **3.3.4 Safety and EMC: Good wiring practice ..……...…** 3-11
  - **3.3.5 Long motor cables: effects of volt drop and capacitance…..** 3-13
  - **3.3.6 Input side AC reactor……** 3-13
- **3.4 Specification ……..** 3-14
  - **3.4.1 Product individual specification..……** 3-15
  - **3.4.2 General specifications……** 3-16
- **3.5 Connection diagram……** 3-18
- **3.6 Description of *iDrive* power and control terminals……** 3-19
- **3.7 *iDrive* dimensions …….……..……** 3-22
- **3.8 Multi-*iDrive* installation with regenerative loads…..……..** 3-25

**Chapter 4 ~ Programming instructions & Parameter list**…… 4-1
**4.1 Keypad description**…… 4-1
**4.1.1 Keypad layout**…… 4-1
**4.1.2 Local and Remote operating modes**…… 4-1
**4.1.3 Keypad navigation**…… 4-2
**4.2 Parameter function list**…….. 4-3
**4.3 Parameter function description**……. 4-9

**Chapter 5 ~ Trouble shooting and maintenance**…… 5-1
**5.1 Fault indication and remedy**…….….. 5-1
**5.1.1 Fault/Error display and Diagnostics**…… 5-1
**5.1.2 Set up & Interface Errors** ……..……. 5-4
**5.1.3 Keypad operation error descriptions**…….. 5-5
**5.2 General functional troubleshooting**…….…….... 5-6
**5.3 *iDrive* Troubleshooting flowcharts** ……..…… 5-7
**5.4 Routine and periodic checks**…….……... 5-13
**5.5 Maintenance and inspection**……. 5-14

**Chapter 6 ~ Options**……..……... 6-1
**6.1 Option cards**……..……..… 6-1
**6.1.1 RS-485 option card**……..…… 6-1
**6.1.2 RS-232 option card**……..…… 6-2
**6.1.3 Program copy option card**…….. 6-3
**6.1.4 Remote keypad** …….. 6-4
**6.1.5 2 IN/1OUT expansion card** …… 6-5

**Appendix 1 *iDrive* EDX inverter parameter setting list**……Appendix 1

# Chapter 0 ~ Preface

## 0.1 Preface

To extend the performance of the product and ensure your safety, read this manual thoroughly before using the ***iDrive*.** Should there be any problem in using the product that can not be solved with the information provided in the manual, contact your nearest IMO distributor or the company from who you purchased the product from.

### Precautions

The ***iDrive*** is an electrical / electronic product. For your safety, there are symbols such as "**Danger**" and "**Caution**" in this manual to remind you to pay attention to safety instructions on carrying, installing, operating, and checking the ***iDrive***. Be sure to follow the instructions carefully for safety.

| | |
|---|---|
|  Danger | Indicates a potential hazard that may cause death or serious personal injury to operator or other persons if misused |
|  Caution | Indicates that the ***iDrive*** or a mechanical system might be damaged if misused |

**Danger**

- Do not touch any circuit boards or internal parts until the charge indicator is extinguished after turning the power off.
- Do not connect any wires when the inverter is powered. Do not check parts and signals on circuit boards when the inverter is in operation.
- Do not disassemble the ***iDrive*** and modify internal wires, circuits and parts.
- Connect the PE (protective earth) terminals of the ***iDrive*** correctly. Always follow the advice given in this manual and conform to local / national regulations in force.

**Caution**

- Do not perform a high voltage insulation test on parts inside the inverter. High voltages can easily destroy the ***iDrive***'s semiconductor components.
- Do not connect T1 (U), T2 (V), and T3 (W) terminals of the inverter to AC power source.
- CMOS ICs on the ***iDrive***'s main board are sensitive to static electricity.
  Do not touch the main PC board even when power is off, or damage may occur.

## 0.2 Product Inspection

***iDrive*** EDX inverters have all passed a full function test before delivery. Please check the following when you receive and unpack the inverter:

- The model and capacity of the inverter is the same as those specified on your order.
- Is there any damage caused during transportation? If so, do not apply power.
  Contact IMO distributor or authorised sales representative if any of the above are found to be incorrect..

# Chapter 1 ~ Safety Precautions

## 1.1 Operating Precautions

### 1.1.1 Before Power Up

**⚠ Caution**

The line voltage applied must comply with the ***iDrive's*** specified input voltage.

**Danger**

Make sure the main circuit connections are correct. L1(L), L2, and L3(N) are power-input terminals and must not be confused with T1, T2 and T3. Otherwise, the ***iDrive*** might be damaged.

**⚠ Caution**

- To avoid dropping the ***iDrive*** do not hold by the front cover when carrying. Carry by supporting the main body moulding only as damage could occur if dropped.
- To avoid fire, do not install the ***iDrive*** on a flammable surface or in an enclosure manufactured from combustable material. If possible always install on metal surface.
- If several ***iDrives*** are placed in the same control panel, add extra heat dissipators to keep the temperature below $50^{o}$C to avoid overheating or fire.
- When removing or installing the remote keypad, turn the power off first, and operate the keypad following the instructions in this manual to avoid error.

**NOTE**

When connected as detailed in this manual, this product complies with IEC 61800-3, with built-in EMC filter for Unrestricted Distribution. Conformance should be tested before use in some environments.

### 1.1.2 During Power up

**Danger**

- The ***iDrive*** still has control power if the time of power loss is very short. When the power is re-applied, the inverter operation is controlled by parameter b31.
- The ***iDrive*** operation is controlled by parameters A00, b31, b32 and b33 and the status of any FWD/REV RUN switch. Please be sure to consider the following settings: -

1. When A00=000, the inverter will not auto restart when power is re-applied.
2. When A00=001 and operation switches FWD/REV RUN are OFF, the inverter will not auto restart when power is re-applied.
3. When A00=001 and operation switch ON and b33=000, the inverter will auto restart when power is re-applied. Please turn OFF the run (start) switch to avoid potential damage to machine and injury to operator before the power is re-applied.

- When b33=000 (direct start on power up), please refer to the description of b33 to verify the safety of operator and machine.

### 1.1.3 Before operation

**Caution**

Make sure the model and capacity are the same as that set in parameter b89

### 1.1.4 Earth / ground leakage current

**WARNING**

**Warning! *iDrive* models with built-in EMC filter can give leakage current > 3.5mA.**

**ALWAYS ENSURE INVERTER IS CORRECTLY EARTHED / GROUNDED.**

**Follow instructions given in Section 3 of this manual in ALL installations.**

- **DO NOT** use ***iDrive* EDX** inverters on ungrounded (floating) power supplies.
- ***iDrive* should be used in fixed installations only.**

Operating ***iDrive* EDX** with Residual Current Device (RCD):

1. Leakage current may cause nuisance trip when RCD setting is <200mA
2. Only one inverter should be supplied from each RCD.

### 1.1.5 During operation

**Danger**

Do not connect or disconnect the motor while ***iDrive*** is operating otherwise the inverter and/or the disconnecting device may be damaged by the high level of switch-off current.

**Danger**

- To avoid electric shock, do not remove the front cover when power is on.
  After a power-loss (under-volt) trip occurs, the motor will restart automatically when power is restored if auto-restart function is set. In this case, care must be taken while working with the machine.
- Note: External Emergency stop must mechanically open and un-latch the power supply to the ***iDrive*** without any chance of re-closing until required. It is not permitted to rely upon software control for an emergency stop.

**Caution**

- Do not touch heat-generating components such as heat sink and brake resistor.
- The inverter can operate the motor from low speeds to very high speeds.
  Verify the allowable speed ranges of the motor and the load before operation.
- Note the settings related to the braking unit.
- Do not check signals on circuit PCB while the inverter is running.

**Caution**

Allow a minimum of 5 minutes for ***iDrive*** to discharge after power down before attempting to disassemble or checking the components within the drive.

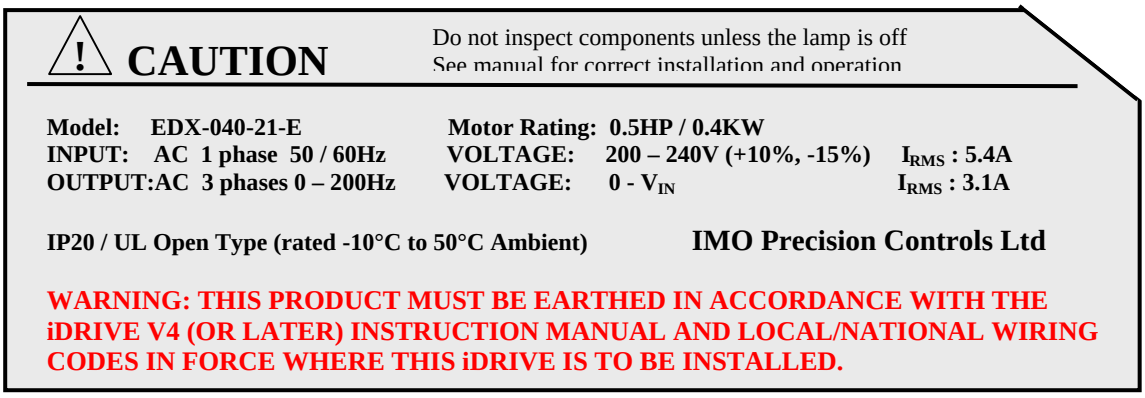
### 1.1.6 Operating environment

**Caution**

***iDrive*** can be used in a non-condensing atmosphere in temperature range from -10$^{o}$C to +50 $^{o}$C and relative humidity of 95%, but the environment should be free from corrosive or explosive gasses, condensation or conductive dust.

# Chapter 2 ~ Part numbering description

## *iDrive* product rating label (example)




## ***iDrive*** part numbers – key to product rating label

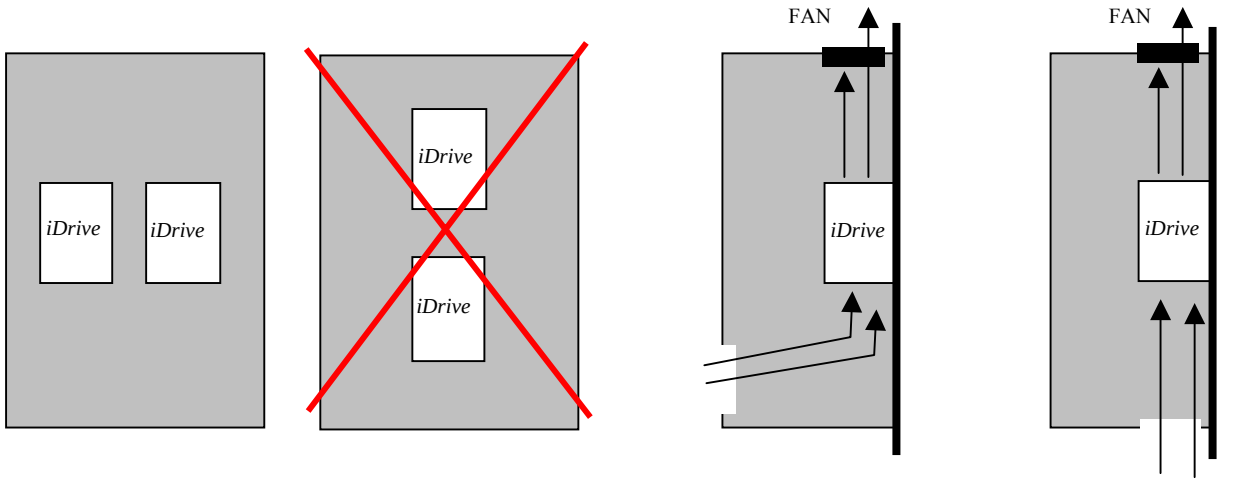
| **EDX** | **-** | **040** | **-** | **2** | **1** | **-** | **E** | **-** |
|---|---|---|---|---|---|---|---|---|
| **Series:** | | **Nominal motor capacity:** | | **Input voltage:** | **Input phases** | | **EMC filter :** | **Enclosure** |
| | | 020: 0.18kW / 0.25 HP | | 1:100V | 1: 1- phase | | E: Integrated Filter | N4S: IP65 /NEMA4 + water and dust-proof isolator / switch / potentiometer |
| | | 040: 0.37kW / 0.5 HP | | 2:230V | 3: 3-phase | | Blank: No Filter | |
| | | 075: 0.75kW / 1.0 HP | | 4: 400V | | | | N4: IP65 No switches etc |
| | | 150: 1.5kW / 2.0 HP | | | | | | |
| | | 220: 2.2kW / 3.0 HP | | | | | | Blank: IP20 |

# Chapter 3 Environment description and installation

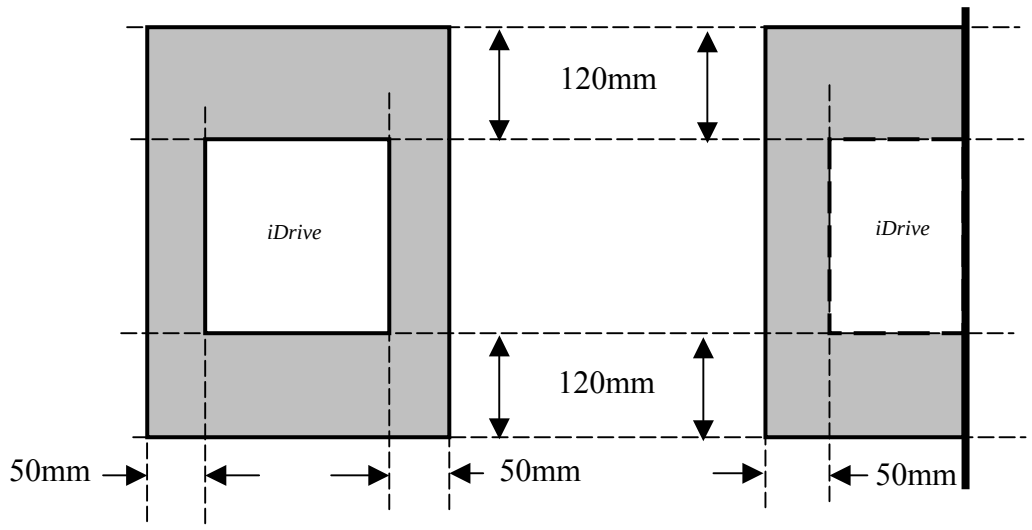
## 3.1 Environment

The environment will directly effect the operation and the life of the *iDrive*.
Always install the *iDrive* in an environment that complies with the following conditions:

- Ambient temperature: -10°C ~ +50°C
- Avoid exposure to rain or moisture.
- Avoid direct sunlight.
- Avoid smoke and salinity.
- Avoid erosive liquid and gas.
- Avoid dust and conductive particles.
- Keep away from radiation and flammable materials.
- Avoid sources of strong electromagnetic interference
- Avoid vibration. Use vibration-proof mounts if the situation can not be avoided.
- If several inverters are placed in the same control panel, additional cooling must be
- used to keep the temperature below 50°C.

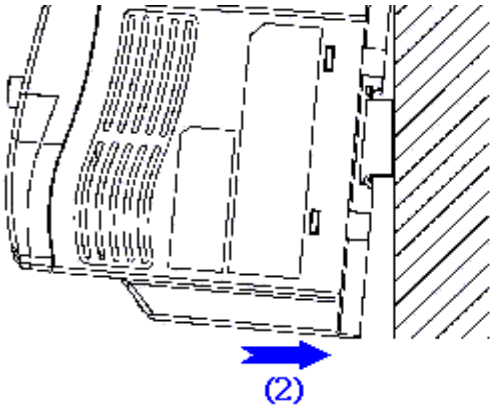



Front view - OK  Front view - X  Side view - OK  Side view - OK

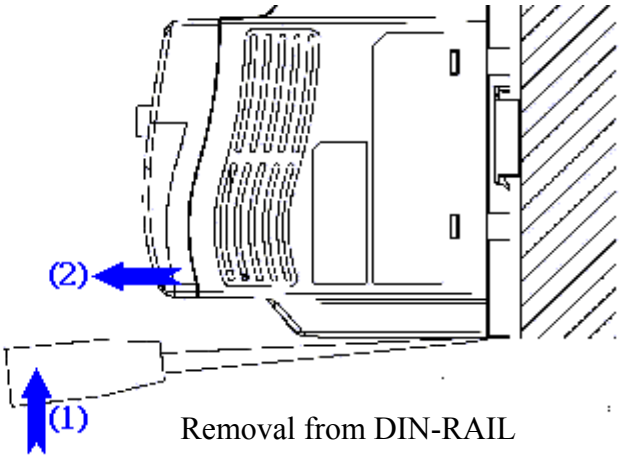



Enclosure front view  Enclosure side view

- The chassis of this model has DIN rail clip device to use when rail mounting.

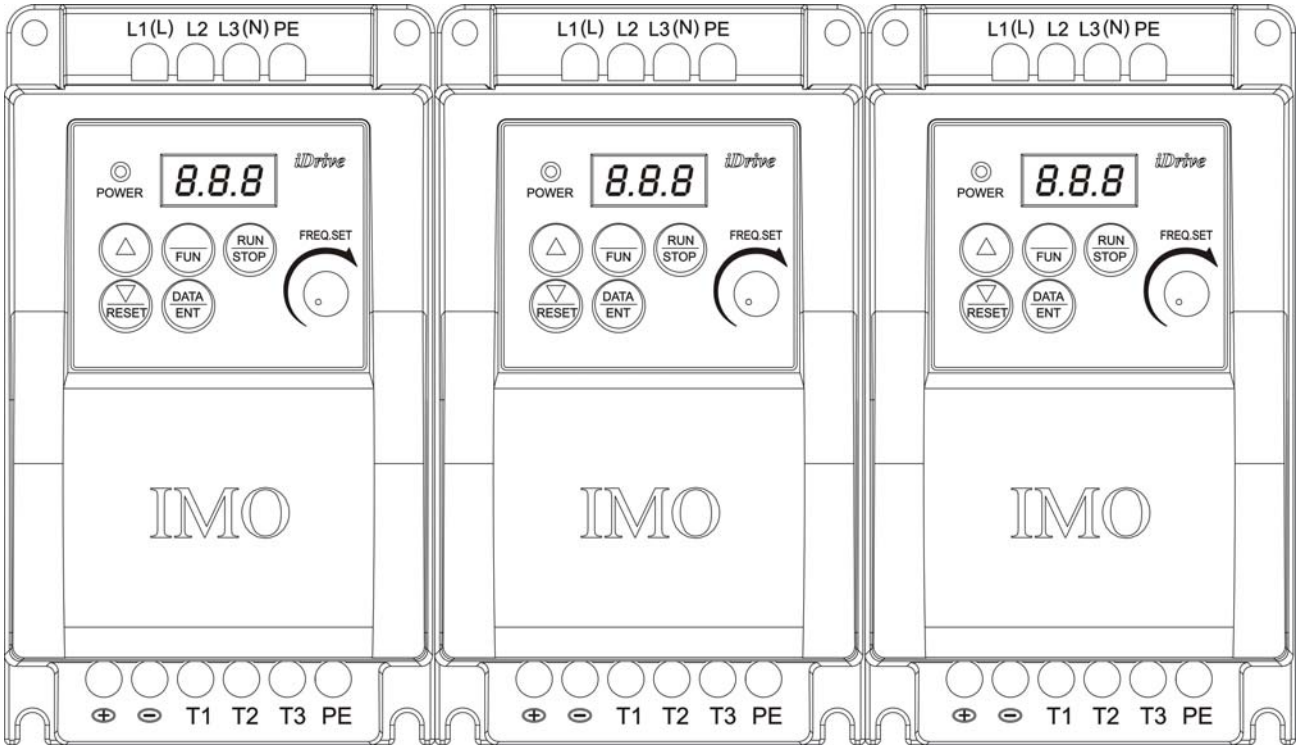



Installing onto DIN-RAIL

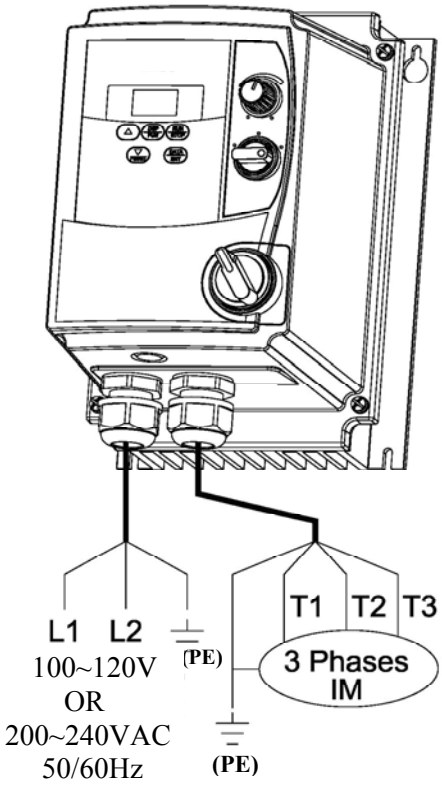


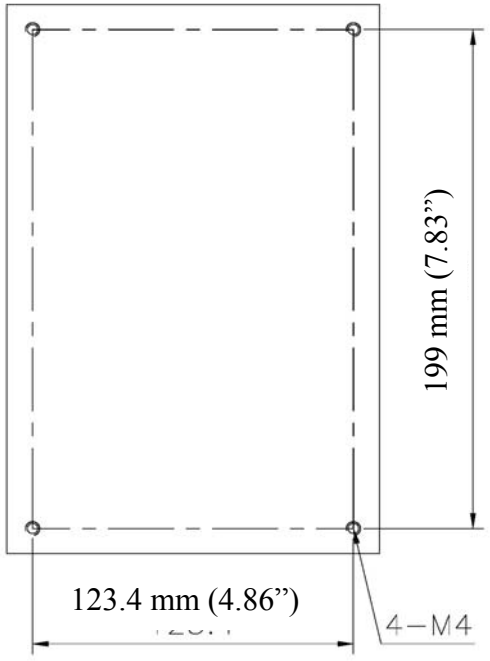

Removal from DIN-RAIL

- All ***iDrive*** IP20 models can be installed side-by-side when temperature is below 50°C.

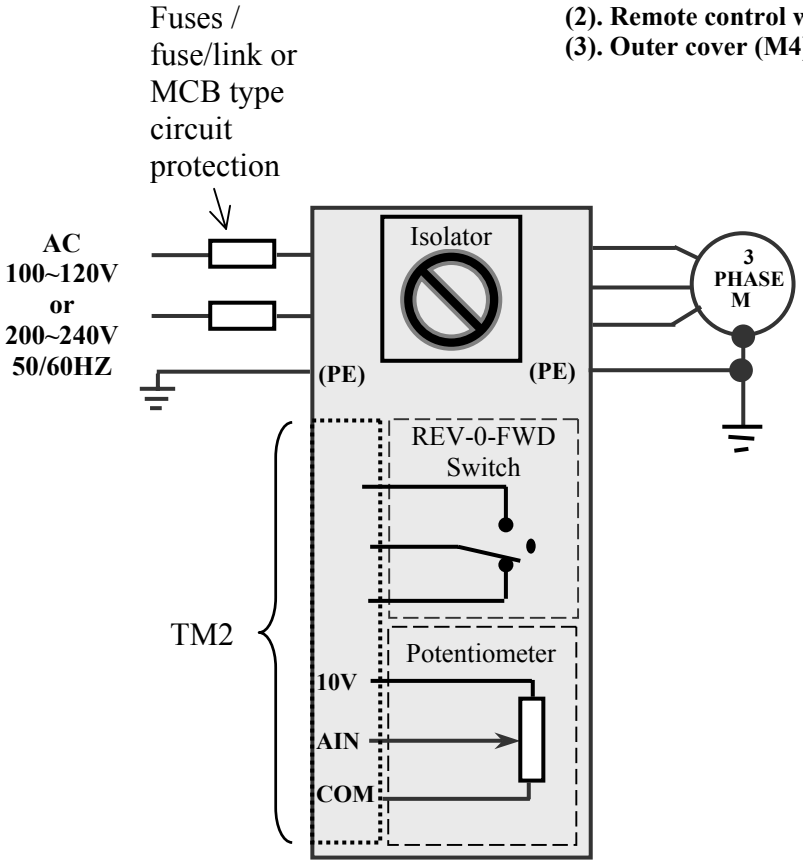


- ***iDrive* EDX- 040-21 / 075-21; 040-11 / 075-11-N4S (IP65) type installation:**



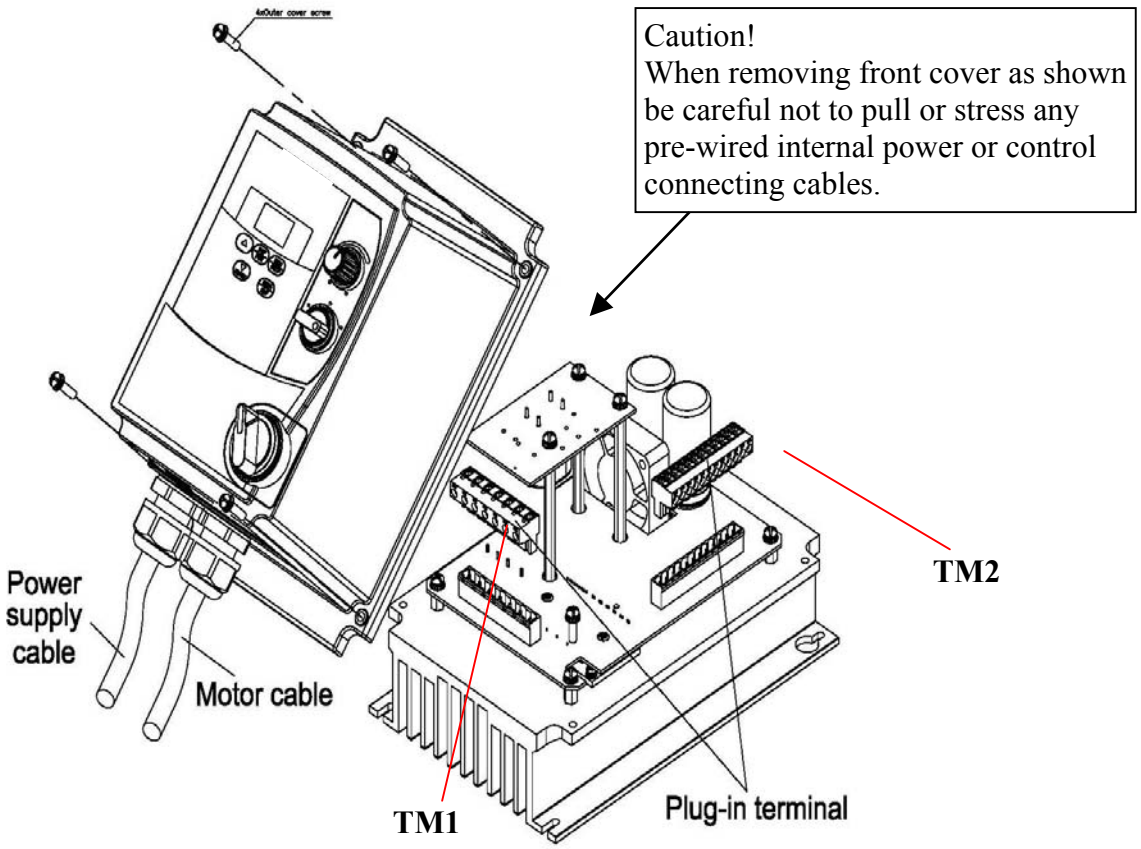



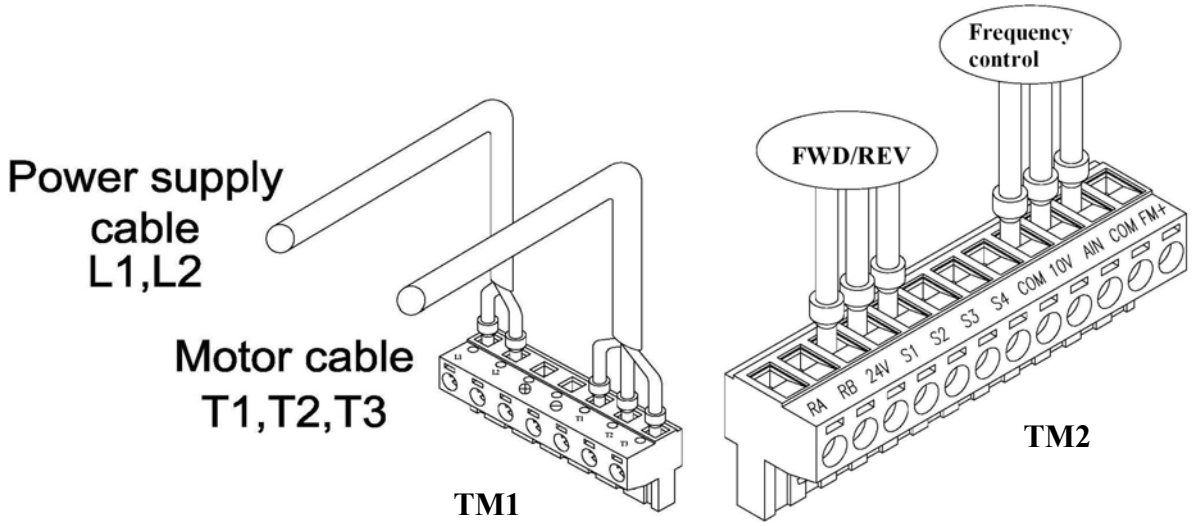

**NOTES A :**
**1. Isolating switch, REV-0-FWD switch and potentiometer are only for EDX-######- N4S models**
**2. Power supply cable : 600V AC rated PVC**
**3. Motor cable : 600V AC rated PVC / (screened or armoured)/PVC**
**4. Maximum torque on terminal screws :**
**(1). Power/motor cable (plug in) terminal : 5kg-cm(4.34 in-lb)**
**(2). Remote control wire : 4kg-cm (3.47 in-lb)**
**(3). Outer cover (M4) : 6kg-cm (5.20 in-lb)**



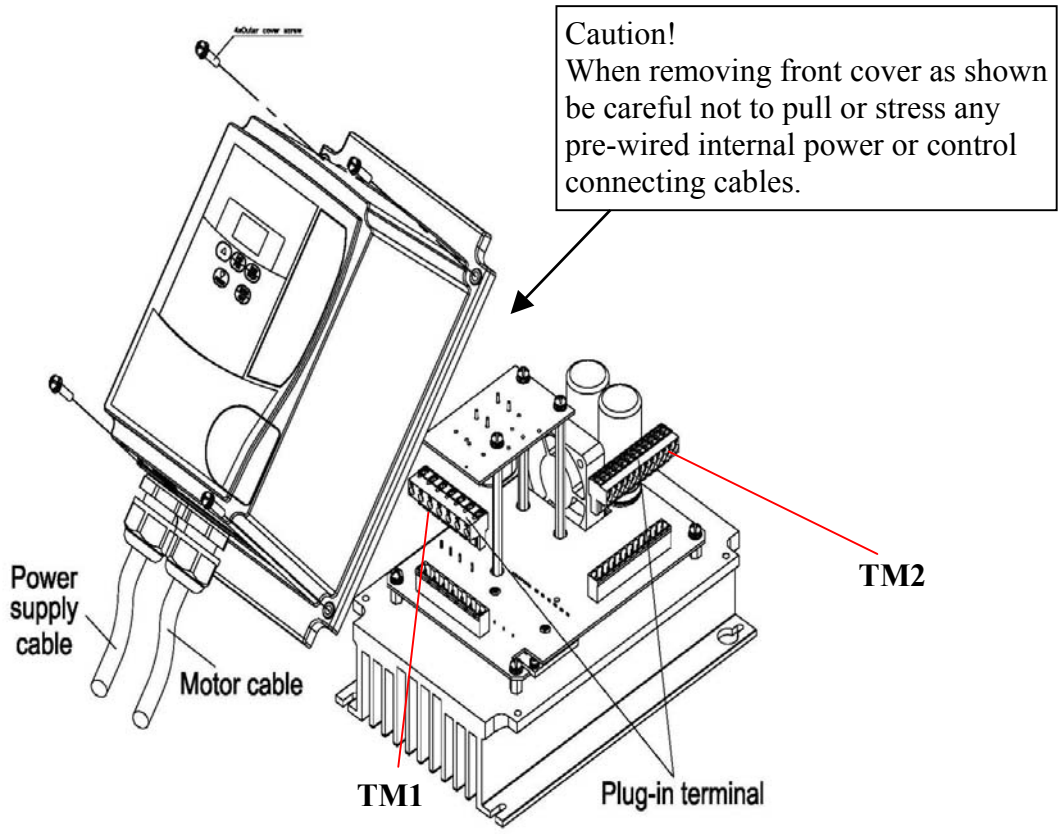

**NOTES B:**
**(1). Input power : single-phase (L1,L2, ⏚(PE)) ensuring supply is 100~120 or 200~240VAC according to model type.**
**(2). Motor output: three-phase (T1,T2,T3,⏚(PE) ). Caution: Do not start or stop the motor by switching input power**
**・For EV-######-N4S type :**
**Ensure that the REV-0-FWD switch is set at '0' position so that the *iDrive* has no run signal at power-on otherwise injury may result.**

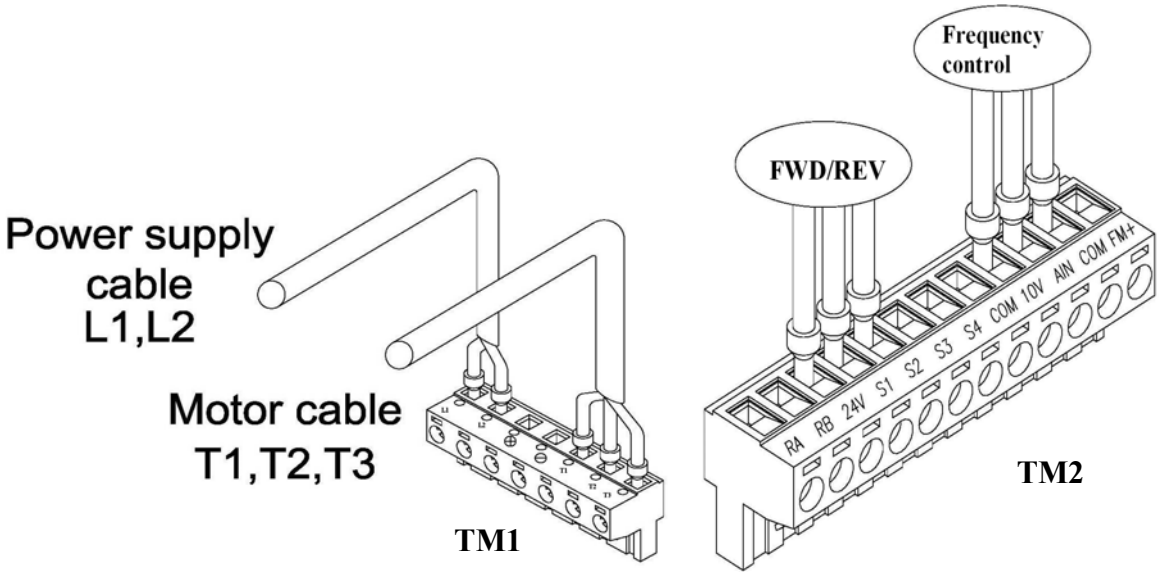
- **EDX-###-##-N4S installation :**



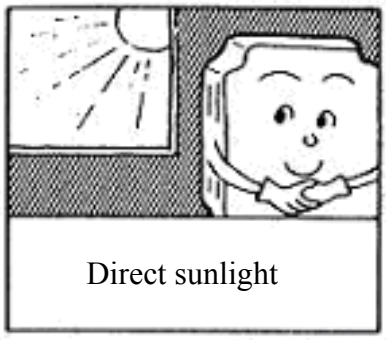
- **EDX-###-##-N4 installation :**

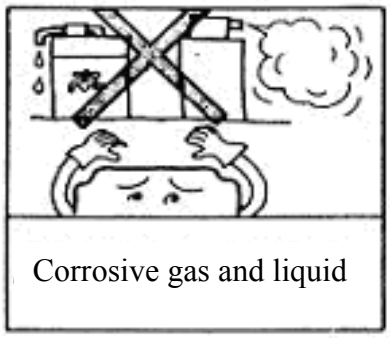


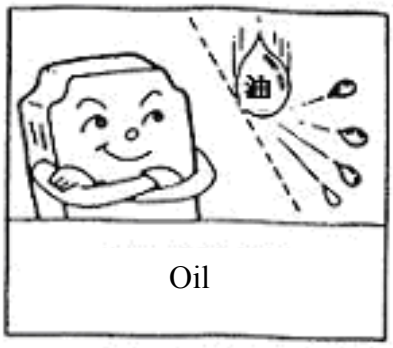



## 3.2 Environmental precautions

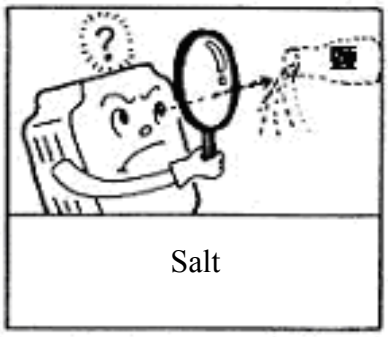
Do not use the inverter in an environment with the following conditions:

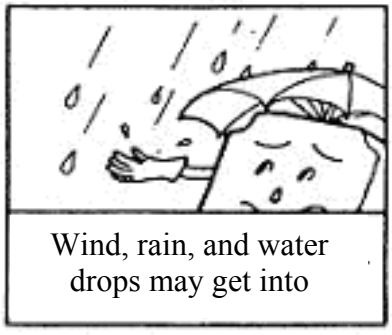

Direct sunlight

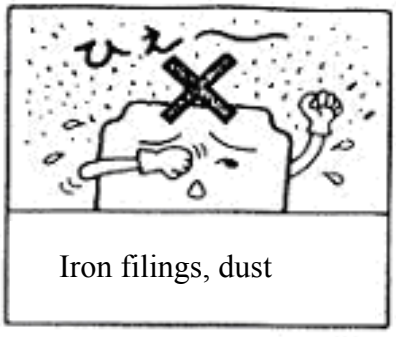

Corrosive gas and liquid



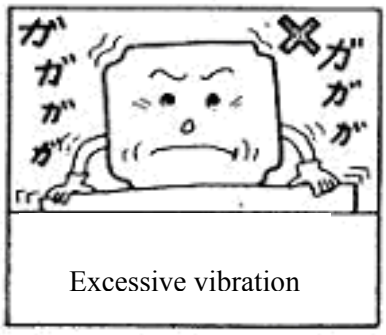
Oil


Salt

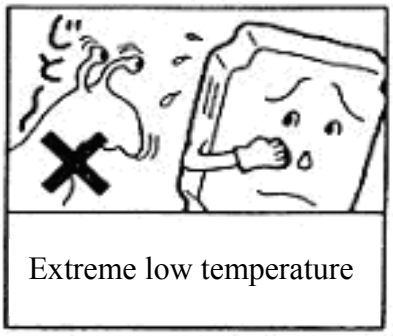

Wind, rain, and water drops may get into



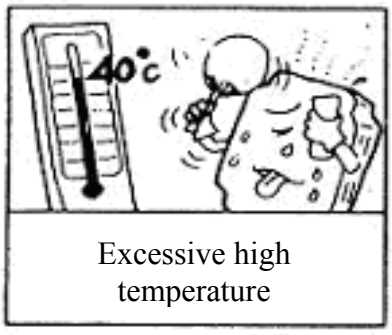
Iron filings, dust



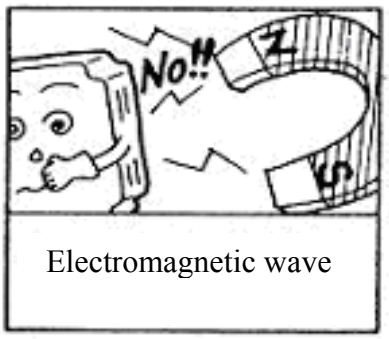
Excessive vibration



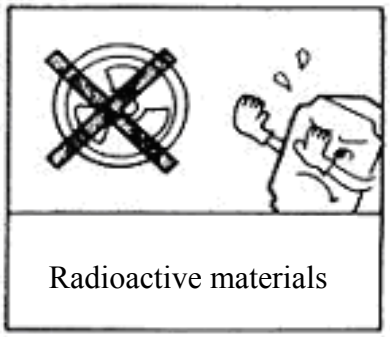
Extreme low temperature

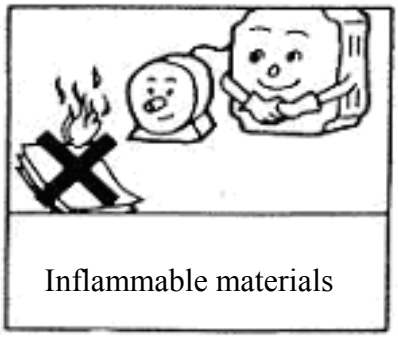


Excessive high temperature



Electromagnetic wave


Radioactive materials


Inflammable materials

## 3.3 Electrical Installation

### 3.3.1 Notes for wiring

**A. Screwdriver torque:**

Connect cables and tighten to the torques listed below.

| Tightening torque | | | | |
|---|---|---|---|---|
| Horsepower | KW | Power source | Nominal tightening torque for TM1 terminals | |
| 0.25/0.5/1 | 0.2/0.4/0.75 | 100-120V | 0.74/0.1 (lbs-ft / Kg-m) | 8.66/10 (lbs-in / Kg-cm) |
| 0.25/0.5/1 | 0.2/0.4/0.75 | 200-240V | | |
| 2/3 | 1.5/2.2 | 200-240V | 1.286/0.18 (lbs-f t / Kg-m) | 15.97/18 (lbs-in / Kg-cm) |
| 1/2/3 | 0.75/1.5/2.2 | 380-480V | | |

**B. Power cables (connected to TM1):**

Power cables are connected to L1(L), L2, L3 (N), T1, T2, T3, P and N. Choose cable in accordance with the following criteria:

(1) Use cable with copper cores only. Select cable with insulation diameter based on working conditions at 221°F / 105°C.

(2) For nominal voltage ratings, use cable rated at minimum 300V for 240Vac ***iDrive*** and 600V rated cable for 480Vac ***iDrive***.

**C. Control cables (connected to TM2):**

Control cables are connected to TM2 control terminals. Choose cable in accordance with the following criteria:

(1) Use cable with copper cores only. Select cable with insulation diameter based on working conditions at 221°F / 105°C.

(2) For nominal voltage ratings, use cable rated at minimum 300V for 240Vac ***iDrive*** and 600V rated cable for 480Vac ***iDrive***.

(3) To avoid noise interference, do not run control cables in the same conduit or trunking as power cables. Where possible use screened / shielded control cables to minimise electromagnetic interference. To avoid ground loops always earth the shield at one end only.

**D. Nominal electrical specifications of terminal block TM1:**

| KW | HP | Power source | Volts | Amps |
|---|---|---|---|---|
| 0.2 / 0.4 / 0.75 | 0.25 / 0.5 / 1 | 100-120V | 600 | 15 |
| 0.2 / 0.4 / 0.75 | 0.25 / 0.5 / 1 | 200-240V | | |
| 1.5 / 2.2 | 2 / 3 | 200-240V | 600 | 40 |
| 0.75 / 1.5 / 2.2 | 1 / 2 / 3 | 380-480V | | |

## E. Fuse types

Drive input fuses are necessary to disconnect the drive from the power supply in the event of component failure in the drive's power input circuit. The ***iDrive***'s electronic protection circuitry is designed to clear output short circuits and ground faults without blowing the input fuses. The table below shows the ***iDrive*** EDX input fuse ratings.
To protect the ***iDrive*** most effectively, use fuses with quick-blow characteristics (semi-conductor fuses).
**It is the responsibility of the user/installer to ensure that the correct fuse protection (or other) is applied.**

**RK5, CC/T type fuses for *iDrive* EDX**

**110V input models (1-phase)**

| EDX- | HP | KW | KVA | 100% CONT Output AMPS (A) | Max.RK5 FUSE Rating(A) | Max.CC or T FUSE Rating(A) |
|---|---|---|---|---|---|---|
| 020-11 | 0.25 | 0.2 | 0.53 | 1.7 | 10 | 20 |
| 040-11 | 0.5 | 0.4 | 0.88 | 3.1 | 15 | 30 |
| 075-11 | 1 | 0.75 | 1.6 | 4.2 | 20 | 40 |

**220V input models (1-phase)**

| EDX- | HP | KW | KVA | 100% CONT Output AMPS (A) | Max.RK5 FUSE Rating(A) | Max.CC or T FUSE Rating(A) |
|---|---|---|---|---|---|---|
| 020-21 | 0.25 | 0.2 | 0.53 | 1.7 | 8 | 15 |
| 040-21 | 0.5 | 0.4 | 0.88 | 3.1 | 10 | 20 |
| 075-21 | 1 | 0.75 | 1.6 | 4.2 | 15 | 30 |
| 150-21 | 2 | 1.5 | 2.9 | 7.5 | 20 | 40 |
| 220-21 | 3 | 2.2 | 4.0 | 10.5 | 25 | 50 |

**220V input models (3-phase)**

| EDX- | HP | KW | KVA | 100% CONT Output AMPS (A) | Max.RK5 FUSE Rating(A) | Max.CC or T FUSE Rating(A) |
|---|---|---|---|---|---|---|
| 020-23 | 0.25 | 0.2 | 0.53 | 1.7 | 5 | 8 |
| 040-23 | 0.5 | 0.4 | 0.88 | 3.1 | 8 | 10 |
| 075-23 | 1 | 0.75 | 1.6 | 4.2 | 12 | 15 |
| 150-23 | 2 | 1.5 | 2.9 | 7.5 | 15 | 20 |
| 220-23 | 3 | 2.2 | 4.0 | 10.5 | 20 | 30 |

**440V input models (3-phase)**

| EDX-- | HP | KW | KVA | 100% CONT Output AMPS (A) | Max.RK5 FUSE Rating(A) | Max.CC or T FUSE Rating(A) |
|---|---|---|---|---|---|---|
| 075-43 | 1 | 0.75 | 1.7 | 2.3 | 6 | 10 |
| 150-43 | 2 | 1.5 | 2.9 | 3.8 | 10 | 15 |
| 220-43 | 3 | 2.2 | 4.0 | 5.2 | 10 | 20 |

**UL class fuses overload characteristics.**
RK5 - type has a time delay characteristic
T-type is quick-blow
CC – type have both types of characteristic

*Fuse ratings are based upon 250V fuses for 120V inverters, and 300V fuses for 240V inverters, and 600V for 480V inverters.

### 3.3.2 MC, MCCB, Fuse and cable specifications.

**MCCB/ MC/ Fuse**

- IMO warranty will not apply under the following condition.

(1) MCCB or fuse is not installed or incorrectly installed or installed with over capacity, which has resulted in ***iDrive*** failure.

(2) MC or capacitor or surge absorber is connected in series between inverter and motor.

| ***iDrive*** EDX model | ###-11/21/43 | | | | ###-43(-E) |
|---|---|---|---|---|---|
| | 020-11/040-11<br>040-11<br>040-21-E | 075-21-E<br>075-23 | 150-21-E<br>220-21-E | 150-23<br>220-23 | 075/150/220 |
| Fuse | 10A<br>300Vac | 16A<br>300Vac | | 20A<br>300Vac | 16A/600Vac |
| MCCB | 10A | 20A | 32A | | 16A |
| MC<br>(from IMO) | MC14-S | MC18-S | MC32-S | | MC18-S |
| Power Input/Output cables (c.s.a.) | 2.5mm$^2$ / (13 AWG)<br>Terminal screw M4 | | 4 mm$^2$ / (11AWG)<br>Terminal screw M4 | | 2.5mm$^2$ / (13 AWG)<br>Terminal screw M4 |
| Earth/ground cables PE terminal (c.s.a.) | 4 mm$^2$ / (11AWG)<br>Terminal screw M4 | | See Note 1 Below | 4 mm$^2$ (14AWG)<br>Terminal screw M4 | |
| Control terminals (TM2) | Cable dimension 0.75mm$^2$(18AWG) Terminal screw M3 | | | | |

Notes

1. To comply with BS7671 requirements the ***iDrive*** must be earthed by a conductor(s) of minimum 4 mm$^2$ c.s.a. with additional mechanical protection. Therefore the ***iDrive*** must be installed in a steel enclosure and wired according to the diagram on page 3-11.

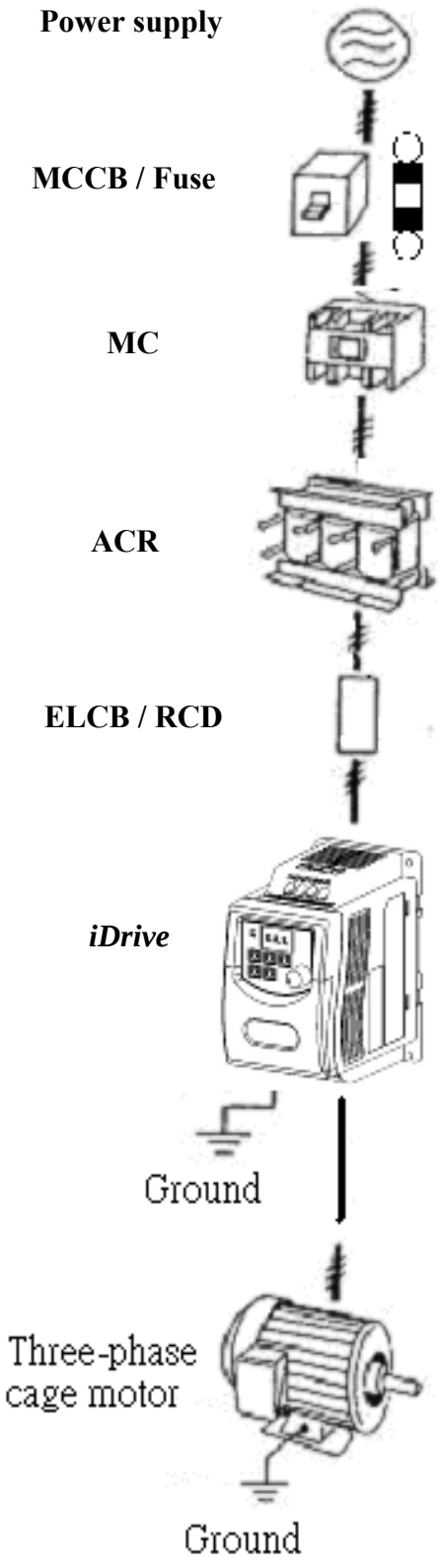
2. Use a single fuse in the live line for 1-phase input ***iDrive*** models where supply is L+N. Where L+L supply is to be used, each line must be fused.
   For 3-phase input models, each L1(L)/L2/L3(N) phase must be fused or protected by MCCB.

3. A suitable three-phase 'squirrel cage' induction motor must be used with ***iDrive***.

4. If an ***iDrive*** is to operate more than one motor in parallel, the total operating current should be less than or equal to the ***iDrive's*** rated output current.
   A suitable thermistor should be installed in each motor to protect from winding over-heat.

5. Do not install a capacitor, LC, or RC network between the ***iDrive*** and the motor.

### 3.3.3 Ancillary power equipment – supply side:




**Power supply:**

- Make sure the voltage applied is correct to avoid damaging the ***iDrive***.

**Moulded-case circuit breaker MCCB:**

- Use a MCCB that matches the rated voltage and current of the ***iDrive*** to control the power ON/OFF and protect the input wiring.
- Do not use the MCCB as the switch for running and stopping the motor.

**Fuse:**

- A suitable rated fuse(s) should be installed between the ***iDrive*** and the AC power source to protect the wiring if a MCCB has not been used.

**Earth Leakage circuit breaker ELCB / RCD:**

- To prevent error operation caused by filter leakage current install a RCD with a trip current range of 30mA or greater, and action time <0.04 seconds. In case of models EDX-150-21-E and EDX-220-21-E a RCD with trip current range >200mA should be used.

**Magnetic contactor MC:**

- If required use a suitably rated magnetic contactor between the power supply and the ***iDrive*** input terminals.
- Do not use the magnetic contactor as the run/stop switch for the ***iDrive.***

**AC Reactor for power improvement ACR:**

- When ***iDrives*** are supplied with high capacity (above 600KVA) power source, an AC reactor can be installed between the ***iDrive*** and the AC power souce to improve Power Factor, reduce harmonic currents and increase short-circuit protection – see page 3-12. An ACR can also be used on the motor side when cable is very long.

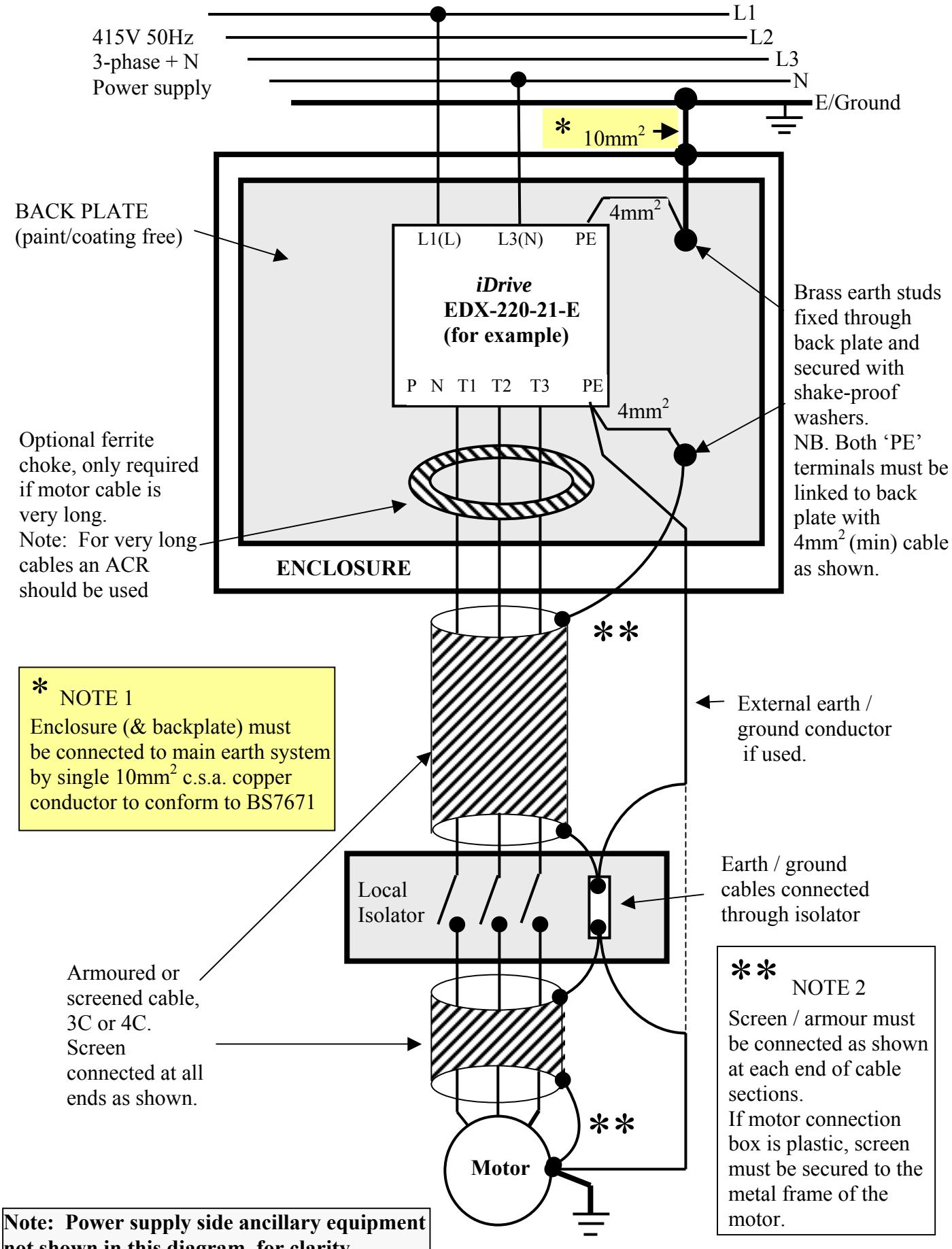
**EMC filter:**

- Standard ***iDrive's*** have an integrated EMC filter to reduce electromagnetic interference to other equipment connected to the same AC power supply.

***iDrive*:**

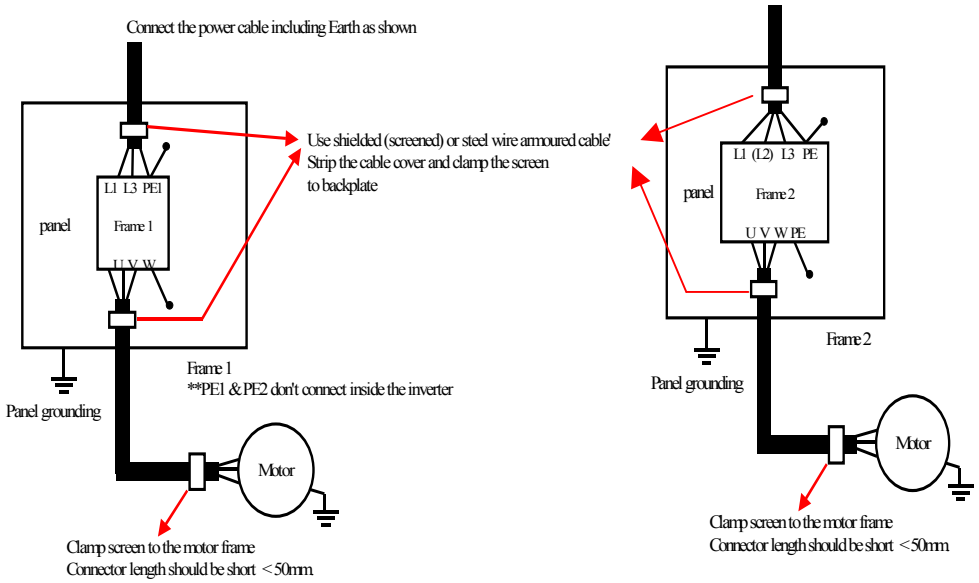
- Output terminals T1, T2, and T3 are connected to U, V, and W terminals of the motor.
- To avoid damaging the ***iDrive***, do not connect the motor terminals T1, T2, and T3 to AC power.

### 3.3.4 Safety and EMC: Good wiring practice IP20 models

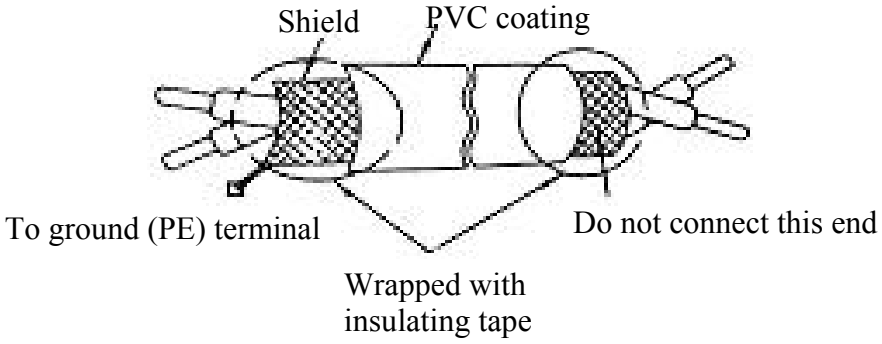



**Note: Power supply side ancillary equipment not shown in this diagram, for clarity.**

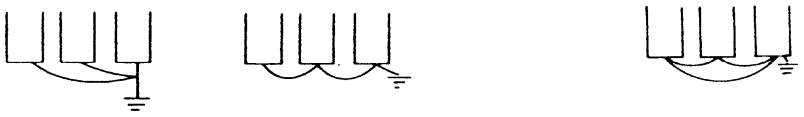
- Further good EMC practice IP20 models




- A ferrite choke in the output of the main circuit can suppress conducted emissions. To limit the effects of radiated emissions unscreened motor cables should be put in an earthed metal conduit. Do not run control cables inside conduit or within 30 cm of the motor cables.
- If control/signal cables must cross over motor cables, ensure that they do so at right angles (90°).
- The supply and output (PE) terminals should to be connected to ground to increase noise immunity of the integrated EMC filter.
- To prevent RF interference resulting in ***iDrive*** operation error, control circuit wiring should be shielded and twisted. Please refer to following diagram, connect shielded wire to ground terminal at one end only. The wiring distance should be less than 50m.




- Earth / ground wiring should be made as short and thick as possible. Copper braided tape is better than cable for this application, but not always practical.
- Do not 'daisy-chain' the earth / ground of the inverter to other equipment. Connect the (PE) terminal to a centralized main earth / ground point and 'star' connect all other equipment ground wires to this point.
- Do not make a loop when several inverters share a common ground point.



(a) Correct (b) Incorrect (c) Incorrect

To ensure maximum safety, use correct wire size for the main power circuit and control circuit according to the required wiring regulations.

On completion, check that the wiring is correct and terminal screws are secured.

### 3.3.5 Long motor cables: effects of volt drop and capacitance

When the cable between the ***iDrive*** and the motor is too long, the effect of volt drop along the cable and cable capacitance must be considered. For very long cables it is sometimes necessary to use ***iDrive*** one frame size higher than motor power rating.

Phase-to-phase voltage drop ($V_d$)

$$\mathbf{V_d = \sqrt{3} \times resistance\ of\ wire\ (\Omega/km) \times length\ of\ line\ (mts) \times current \times 10^{-3}}$$

To prevent RF problems and excessive high frequency ground leakage currents the ***iDrive*** carrier frequency (function **b86**) should be adjusted based on the length of the motor cable, for example:

| Motor cable length | < 25m | < 50m | < 100m | > 100m |
|---|---|---|---|---|
| Carrier frequency (b86) | < 16kHz | < 12kHz | < 8kHz | < 5kHz |

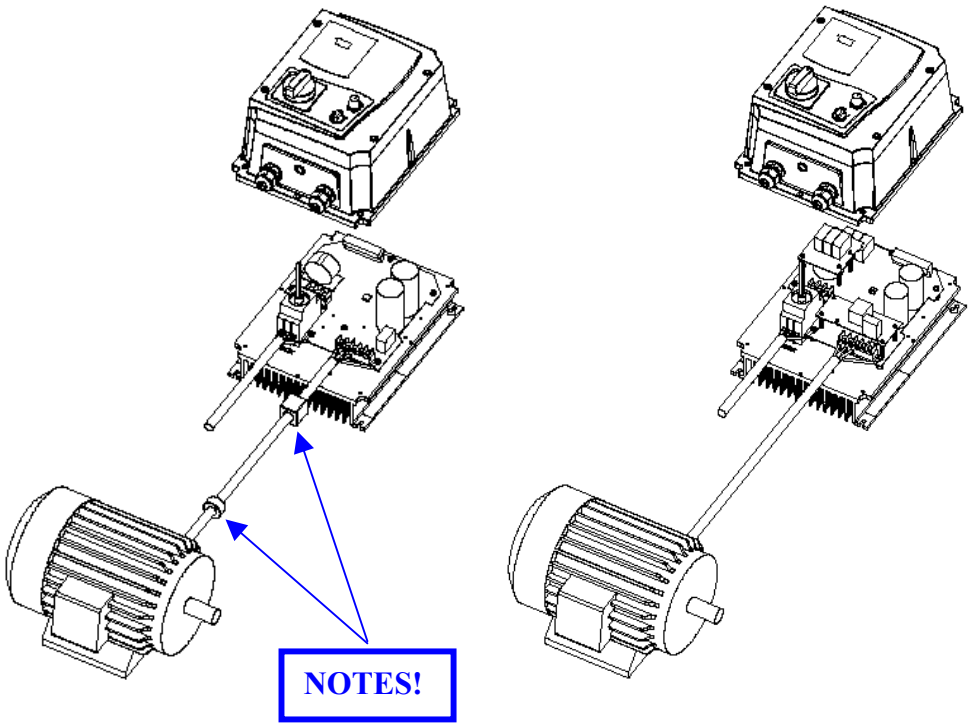
### 3.3.6 Input side AC reactor

An AC input reactor can be installed to reduce the harmonic content of the ***iDrive*** input current. If the harmonic distortion is reduced, the RMS input current is also reduced.
An AC reactor can also be installed on the output side of ***iDrive*** when the motor cable is excessively long and can counter the effect of cable capacitance and nuisance tripping. Contact IMO for details.

**Input reactor specifications**

| ***iDrive*** model | | Line input side AC inductance (typical) | |
|---|---|---|---|
| | | Current (A) | Inductance (mH) |
| EDX - | 040-21-# | 5.0 | 2.1 |
| | 075-21-# | 5.0 | 2.1 |
| | 150-21-# | 19.0 | 1.1 |
| | 220-21-# | 25.0 | 0.71 |
| | 075-43-# | 2.5 | 8.4 |
| | 150-43-# | 5.0 | 4.2 |
| | 220-43-# | 7.5 | 3.6 |

**IP65 / NEMA4 - EMC good practice guide EDX-150-21, 220-21, 075-43, 150-43, 220-43**




**NOTES:**

1) For **EDX-150-21-E – N4S** and **EDX-220-21-E-N4S** models, additional items will be found inside the outer packaging including 2pc of EMC conformed waterproof (IP65) ferrite core.

2) If application requires meeting published EMC performance class, you must fit the ferrite cores onto the motor cable outside the plastic sheath as shown in the above diagram. The quadrilateral type ferrite core should be fitted as close as possible to inverter output terminals T1, T2, T3, and the circular type ferrite core should be fitted close to the motor.
Please also note that the length of the motor cable CANNOT exceed 5 metres if the declared EMC performance is to be met.

## 3.4 Specification

### 3.4.1 Product individual specification

| *iDrive* | 100V model | | | 200V model | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | EDX-□□□-11 | | | EDX-□□□-21 (-E) | | | | | EDX-□□□-23 | | | | |
| | 020 | 040 | 075 | 020 | 040 | 075 | 150 | 220 | 020 | 040 | 075 | 150 | 220 |
| Horsepower (HP) | 0.25 | 0.5 | 1 | 0.25 | 0.5 | 1 | 2 | 3 | 0.25 | 0.5 | 1 | 2 | 3 |
| Suitable motor capacity (kW) | 0.2 | 0.4 | 0.75 | 0.2 | 0.4 | 0.75 | 1.5 | 2.2 | 0.2 | 0.4 | 0.75 | 1.50 | 2.2 |
| Rated output current ($A_{RMS}$) | 1.7 | 3.1 | 4.2 | 1.7 | 3.1 | 4.2 | 7.5 | 10.5 | 1.7 | 3.1 | 4.2 | 7.5 | 10.5 |
| Rated capacity (kVA) | 0.53 | 0.88 | 1.60 | 0.53 | 0.88 | 1.60 | 2.90 | 4.00 | 0.53 | 0.88 | 1.60 | 2.90 | 4.00 |
| Input voltage range （V） | 1-phase 100~120V+10%, -15% (50/60Hz) | | | 1-phase 200~240V+10%, -15% (50/60Hz) | | | | | 3-phase 200~240V+10%, -15% (50/60Hz) | | | | |
| Output voltage range （V） | 3-phase 0~240V | | | | | | | | | | | | |
| Input current ($A_{RMS}$) | 7.1 | 12.2 | 17.9 | 4.3 | 5.4 | 10.4 | 15.5 | 21 | 3.0 | 4.0 | 6.4 | 9.4 | 12.2 |
| Net weight (Kg) | 0.62 | 0.68 | 0.72 | 0.71 | 0.73 | 0.73 | 1.25 | 1.3 | 0.61 | 0.61 | 0.66 | 0.95 | 1 |
| Allowable momentary power loss time (S) | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 2.0 | 2.0 | 1.0 | 1.0 | 1.0 | 2.0 | 2.0 |
| Enclosure | IP20 | | | | | | | | | | | | |

| *iDrive* | 400V model | | |
|---|---|---|---|
| | EDX-□□□-43 (-E) | | |
| | 075 | 150 | 220 |
| Horsepower (HP) | 1 | 2 | 3 |
| Suitable motor capacity (kW) | 0.75 | 1.50 | 2.2 |
| Rated output current ($A_{RMS}$) | 2.3 | 3.8 | 5.2 |
| Rated capacity (kVA) | 1.7 | 2.9 | 4.0 |
| Input voltage range （V） | 3-phase 380~480V+10%, -15% (50/60Hz) | | |
| Output voltage range （V） | 3-phase 0~480V | | |
| Input current ($A_{RMS}$) | 3.0 | 4.8 | 6.6 |
| Net weight (Kg) | 1.68 | 1.70 | 1.73 |
| Allowable momentary power loss time (S) | 1.0 | 2.0 | 2.0 |
| Enclosure | IP20 | | |

Standard Models　　Non-Standard Models

### 3.4.2 General Specifications

| | | |
|---|---|---|
| Frequency control | Output Frequency range | 0~200Hz |
| | Starting torque | 100% / 3Hz (Vector mode) |
| | Speed Control Range | 20:1 (Vector mode) |
| | Speed Control accuracy | ±0.5% (Vector mode) |
| | Setting resolution ※1 | Digital: 0.1Hz(0~99.9Hz)/1Hz(100~200Hz); analog: 0.06Hz/ 60Hz |
| | Keypad setting | Set directly with▲▼ keys or the potentiometer VR on the keypad |
| | Display / Indication | 7 segment*3. Displays frequency / DC voltage / output voltage / output current / inverter parameters / alarm log /software version / PID feedback control |
| | External signal setting | •External variable resistor / 0-10V/ 4-20mA<br>•Performs up/down control (Motorized Pot.) with multi-function programmable inputs on the terminal base. |
| | Frequency limit functions | Possible to set Upper and Lower frequency limits, and two-stage skip-frequencies. |
| General control | Carrier frequency | 4~16KHz (default 10KHz, above 10KHz with de-rating) |
| | V/F pattern | Select 6 fixed patterns 50Hz/60Hz or 1 user programmable pattern |
| | Acc/dec control | Two independent sets of accel / decel ramps (0.1~999s) |
| | Multi-func. analog O/P | 6 functions (refer to b53 description) |
| | Multi-func. digital I/P's | 19 functions (refer to b35~b38 description) |
| | Multi-funct. relay O/P | 16 functions (refer to b55 description) |
| | DO (relay output) | 1* Relay output as standard SPST.---- selectable as multi-function output. 1* optional external multi-function output (open-collector transistor 24V, 600mA) |
| | DI (digital inputs) | Selectable NPN/PNP: 4 inputs (S1~S4) as standard； 2 extra inputs (S5~S6) available on option card. |
| | AI (analog input) | Set speed command and PID feedback signal (speed, PID, 4~20mA / 0~10V) |
| | Other functions | Instantaneous power loss restart, Speed search, auto-restart, DC brake, torque boost, 2 / 3wire control and PID control. |
| | Communication control | •RS485 Option card： Modbus RTU/ASCII modes, 4800~38400 bps, max. 254 stations<br>•PC/PDA software |
| | Operation temperature | -10~50°C (inside enclosure) IP20 ; -10~40□ IP65 |
| | Storage temperature | -20~60°C |
| | Humidity | 0 – 95% RH (non condensing) |
| | Vibration immunity | 1G (9.8m/s$^2$) |
| | EMC ※2 | Internal EMC filter: First Environment, Restricted Distribution.<br>External EMC filter: First Environment, Unrestricted Distribution.<br>In accordance with EN61800-3 |
| | LVD | Conforming to EN50178 |
| | Enclosure | IP20 |
| | Safety Class | UL508C |

| | | |
|---|---|---|
| Protective Functions | Over load protection | Inverter rated current 150%/1min |
| | International conformity | UL/cUL/CE |
| | Over-voltage trip | 200V Class: DC voltage >400V. 400V Class: DC voltage >800V |
| | Under-voltage trip | 200V Class: DC voltage <190V. 400 Class: DC voltage <380V |
| | Instantaneous power-loss restart | Set to enable or disable |
| | Stall prevention | ACC/DEC/ Operation stall prevention and stall prevention level. |
| | Output terminal short circuit | Electronic circuit protection |
| | Other faults | Electronic circuit protection |
| | Other function | Over-current, over-voltage, under-voltage, overload, instantaneous power-loss restart, ACC/DEC / RUN stall prevention, output terminal short circuit, grounding error, reverse block, direct start at power on and fault reset limit. |

※1: The setting resolution above 100Hz is 1Hz when set by keypad, and 0.01Hz when set using serial communication from computer (PC) or programmable controller (PLC).

※2: Non-standard, un-filtered ***iDrive*** model numbers **EDX-020-21** to **EDX-075-21**, and **EDX-075-43** to **EDX-220-43** fitted with optional external filter are in accordance with EN61800-3 First Environment; Unrestricted Distribution when carrier frequency is set at 10KHz or less.

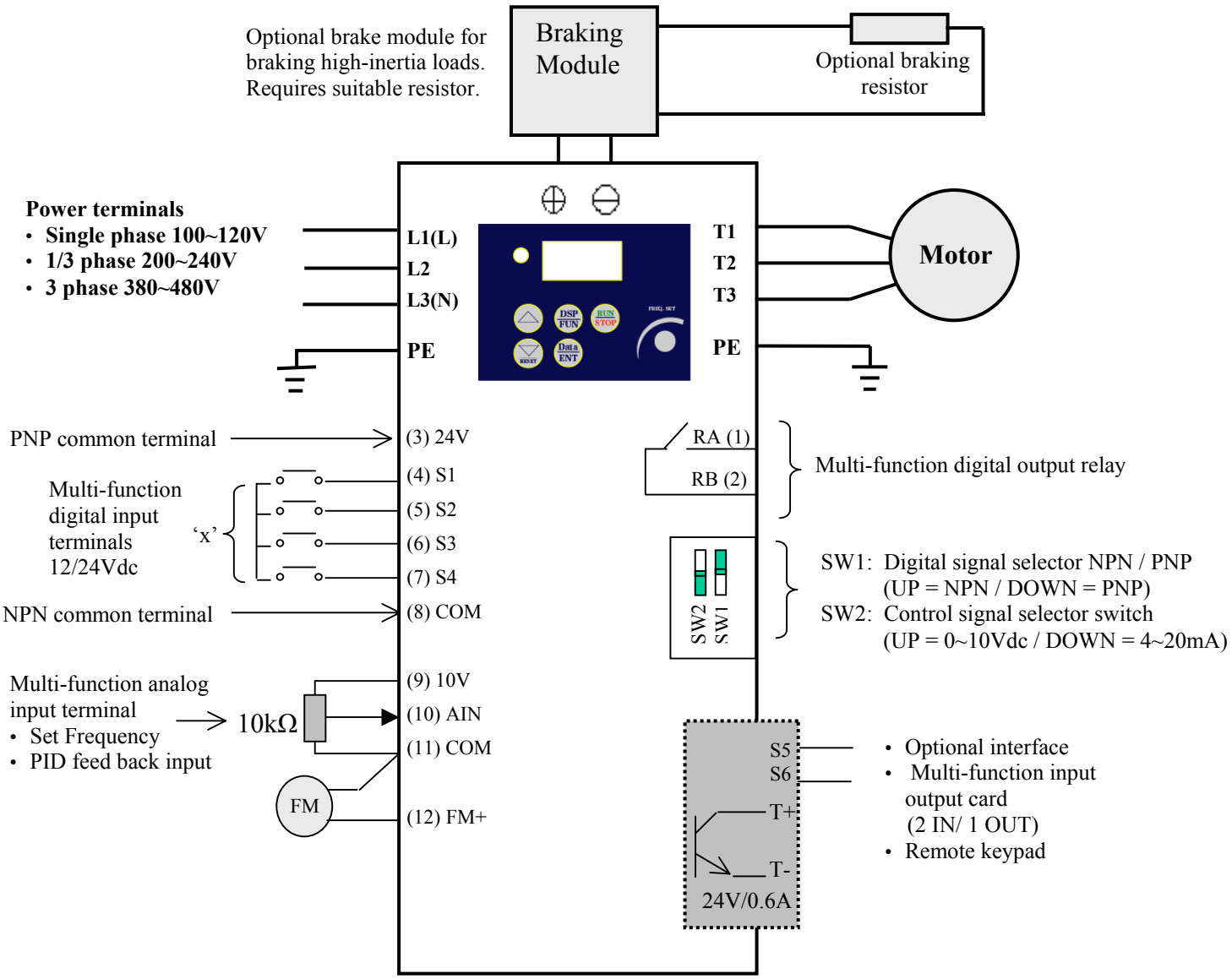
Non-standard, un-filtered ***iDrive*** model numbers **EDX-150-21** and **EDX-220-21**, fitted with optional external filter are in accordance with EN61800-3 First Environment; Unrestricted Distribution when carrier frequency is set at 10KHz or less.

Standard, filtered ***iDrive*** model numbers **EDX-020-21-E** to **EDX-075-21-E**, are in accordance with EN61800-3 First Environment; Restricted Distribution when carrier frequency is set at 10KHz or less.

Model numbers **EDX-150-21-E** and **EDX-220-21-E** are in accordance with EN61800-3 First Environment; Restricted Distribution when carrier frequency is set at 6KHz or less.

IP65 / NEMA4 ***iDrive*** models **EDX-020-21-E-N4(S)** to **EDX-220-21-E-N4(S)** and **EDX-075-43-E-N4(S)** to **EDX-220-43-E-N4(S)** are in accordance with EN61800-3 First Environment; Restricted Distribution when carrier frequency is set at 10KHz or less.

## 3.5 *iDrive* EDX connection diagram




Note 1:- Connect point 'x' to either: -
Terminal (3) (internal +24Vdc) for PNP mode (positive switching)

(3) 24V ——/——▶ (4)S1, (5)S2, (6)S3, (7)S4

OR…

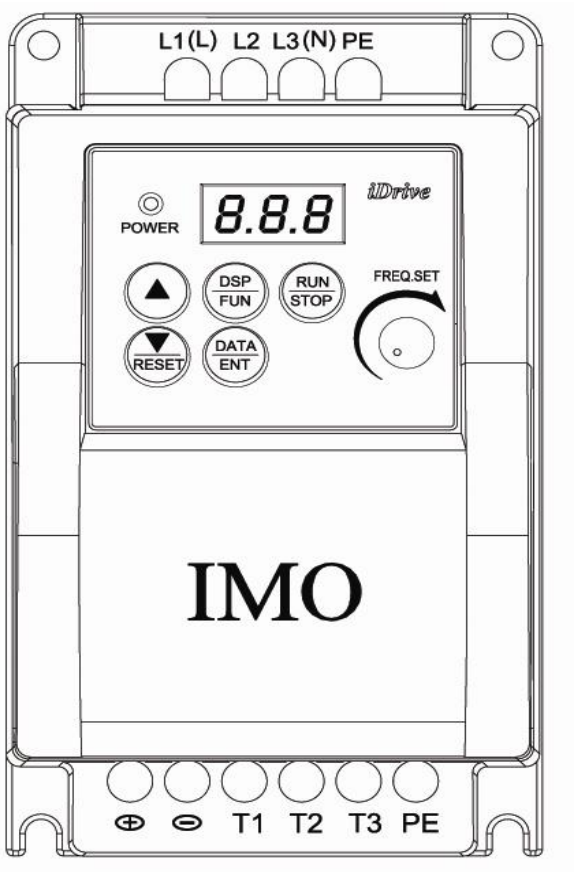
Terminal (8) (Common 0V) for NPN mode (negative switching).

(4)S1, (5)S2, (6)S3, (7)S4 ——/——▶ (8)COM

Note2:- External 24Vdc may be used to supply the external contacts at point 'x'.
If so then connect the 0V of the external supply to Common (terminal 8).

## 3.6 Descriptions of *iDrive* Power and Control terminals

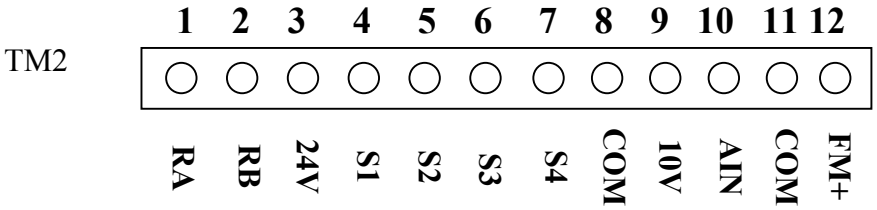
### Power input, power output, and earth/ground terminal block descriptions




| Terminal | Description |
|---|---|
| L1(L) | Main power input Single-phase: L1/L3(N)<br>Three-phase: L1/L2/L3 |
| L2 | |
| L3(N) | |
| ⊕ | DC link and braking module* connection terminals.<br>Never connect resistors directly to these terminals or damage will occur! |
| ⊖ | |
| T1 | Inverter output.<br>Connect appropriate 3-phase AC induction motor to these terminals. |
| T2 | |
| T3 | |
| PE | Earth / Ground terminals (2 points) |

*A brake module is required for applications where a load with high inertia needs to be stopped rapidly.
Use a correctly rated braking module and resistor(s) to dissipate the energy generated by the load during stopping or rapid speed change for example otherwise ***iDrive*** may trip on over-voltage '**OV**'.

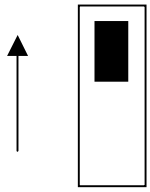
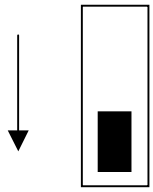
## Control signal terminal block description

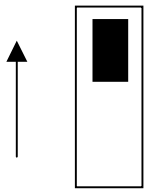
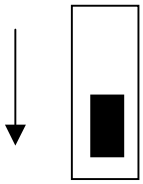



| Terminal | Description | |
|---|---|---|
| RA | Multi-functional output terminals.<br>Normally open relay contacts SPST | Rated contact capacity:<br>(250VAC/10A resistive)<br>(Refer to parameter b55 for functions) |
| RB | | |
| 10V | +10Vdc terminal. Supply for external potentiometer for speed reference. | |
| AIN | Analog frequency command input or PID feedback signal terminal.<br>(Refer to parameter b41) | |
| 24V | 24Vdc common terminal; Frame size 1 maximum current = 100mA<br>Frame size 2 maximum current = 150mA<br>PNP (SOURCE) for inputs S1~S4 (and option card inputs S5 and S6).<br>Set SW1 to 'PNP' position. Connect option card power supply if required. | |
| COM | 0Vdc common terminal.<br>NPN (SINK) for input, S1~S4 (and option card inputs S5 and S6).<br>Set SW1 to 'NPN' position. Connect option card power if required.<br>Also use this terminal for analogue input and analogue output signals - common. | |
| FM+ | Multi-function analog output terminal, (refer to parameter b53 for functions)<br>Output signal: 0-10Vdc proportional to b53 setting.<br>Maximum output current = 25mA | |

| Terminal | Description |
|---|---|
| S1 | Multi-function input terminals (refer to parameters b35~b38 descriptions)<br>Maximum input current per terminal: Frame size 1 = 20mA.<br>Frame size 2 = 25mA |
| S2 | |
| S3 | |
| S4 | |

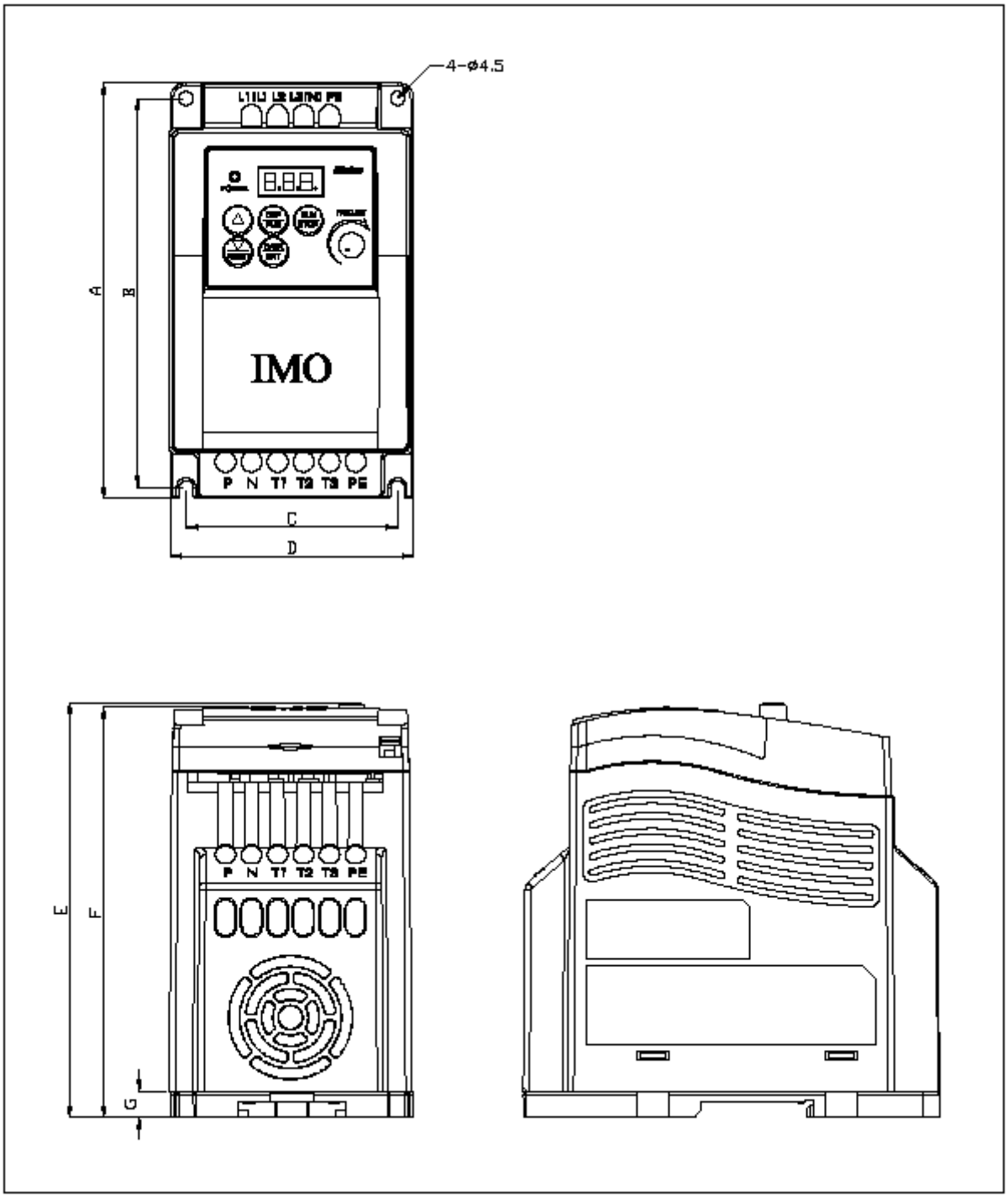
**SW1 and SW2 function description**

| SW1 | External signal logic | Remarks |
|---|---|---|
|  | NPN input (SINK) | **Factory setting = PNP** |
|  | PNP input (SOURCE) | |

| SW2 | External input (for speed/frequency reference) | Remarks |
|---|---|---|
|  | 0~10Vdc analogue signal | Effective when Function A01= 002 (external analogue input to terminal AIN)<br><br>**Factory setting = V** |
|  | 4~20mA analogue signal | |

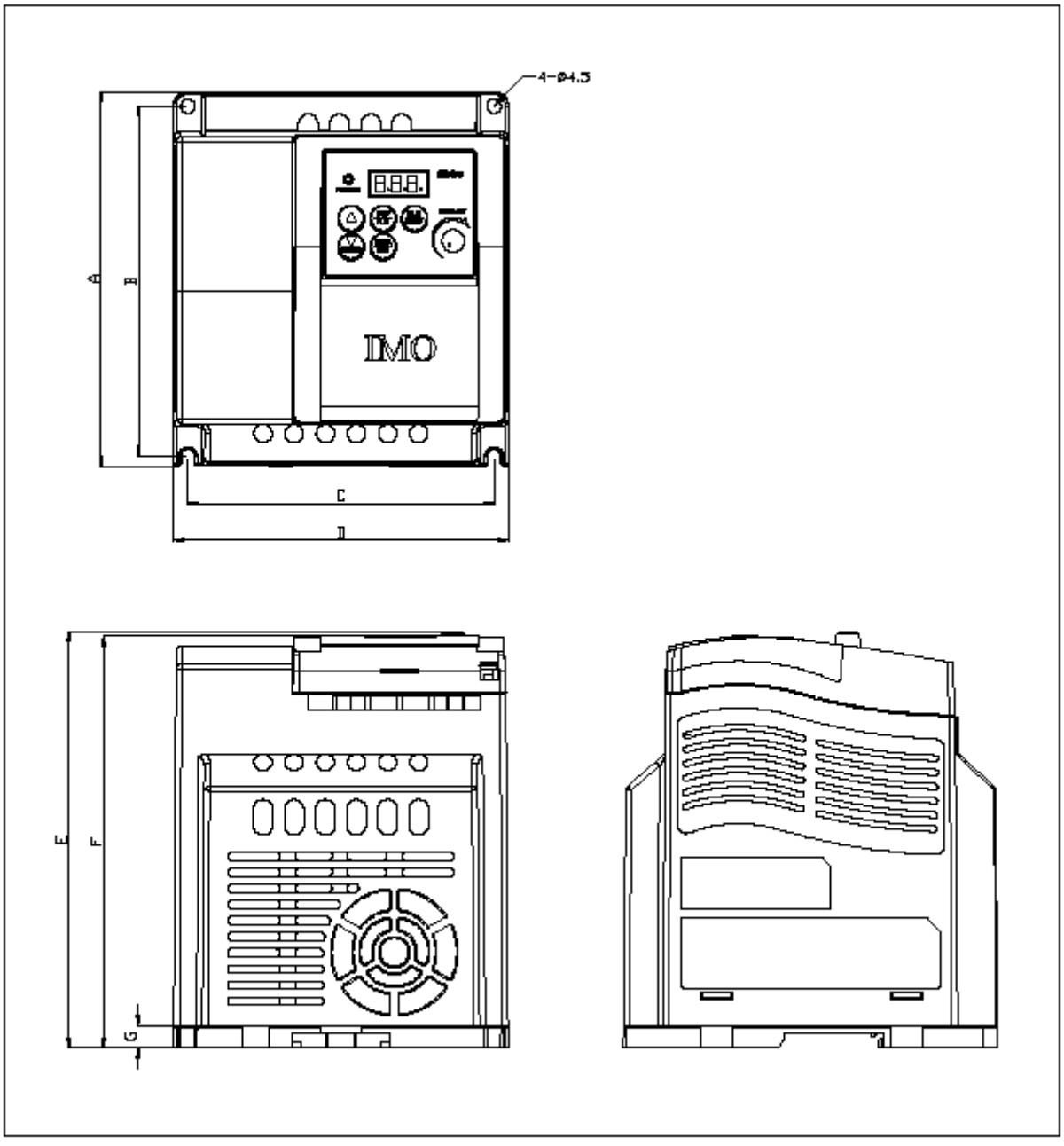
## 3.7 *iDrive* Dimensions

**IP20 Frame 1**: 1-phase 100V: **EDX-020-11 ~ EDX-075-11**
1-phase 200V: **EDX-020-21 ~ EDX-075-21, EDX-020-21-E ~ EDX-075-21-E**
3-phase 200V: **EDX-020-23 ~ EDX-075-23**



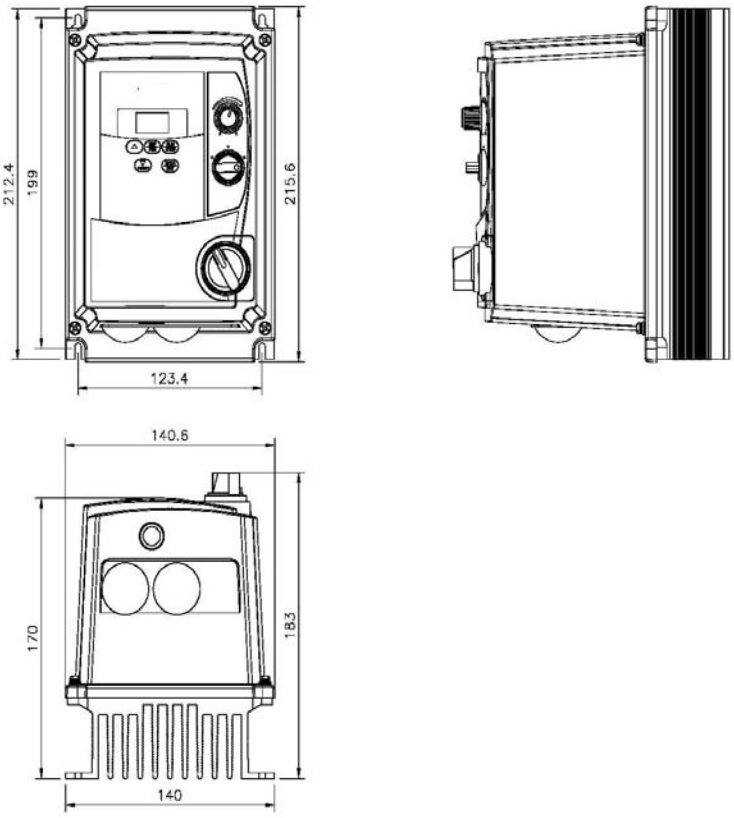

| | A | B | C | D | E | F | G |
|---|---|---|---|---|---|---|---|
| Frame 1 | 132 / 5.2 | 123.5 / 4.86 | 67 / 2.64 | 77 / 3.03 | 130.5 / 5.13 | 128.45 / 5.06 | 8 / 0.315 |

**IP20 Frame 2**: 1-phase 200V: **EDX-150-21 ~ EDX-220-21; EDX-020-21-E ~ EDX-075-21-E**
3-phase 200V: **EDX-150-23 ~ EDX-220-23**
3-phase 400V: **EDX-075-43 ~ EDX-220-43; EDX-075-43-E ~ EDX-220-43-E**

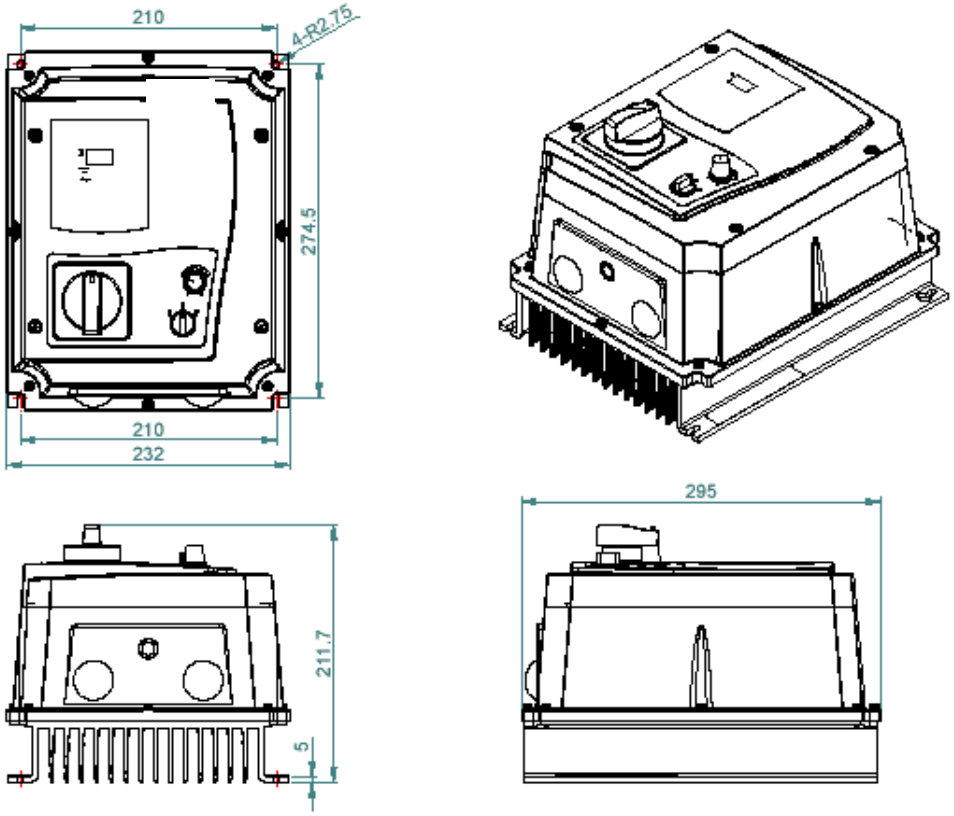



| | A | B | C | D | E | F | G |
|---|---|---|---|---|---|---|---|
| Frame 2 | 132 / 5.2 | 123.5 / 4.86 | 108 / 4.25 | 118 / 4.65 | 148 / 5.83 | 144 / 5.67 | 8 / 0.315 |

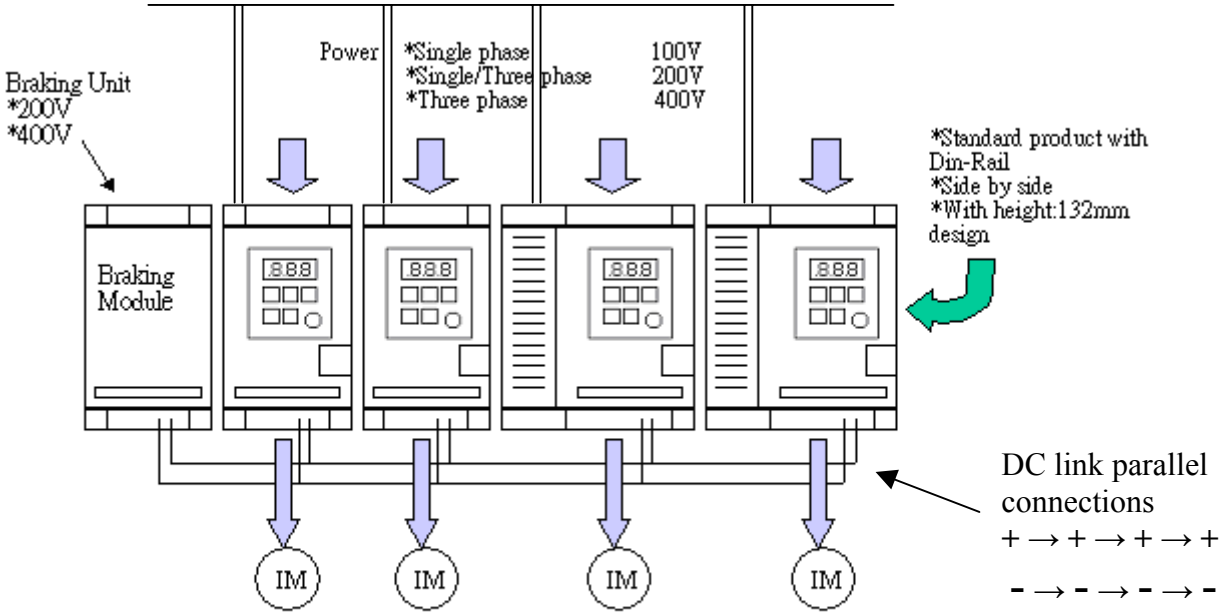
**IP65 Frame 1**: 1-phase 100V models: **EDX-020-11-N4S ~ EDX-075-11-N4S**
1-phase 200V models: **EDX-020-21-E-N4S ~ EDX-075-21-E-N4S**




**IP65 Frame 2**: 1-phase 200V models: **EDX-150-21-E-N4S & EDX-220-21-N4S**
3-phase 400V models: **EDX-075-43-E-NS4 ~ EDX-220-43-E-N4S**



## 3.8 Multi-*iDrive* installation with regenerative loads




If all ***iDrives*** are of the same voltage rating, the DC bus connections of each can be connected together in parallel. Regenerated braking power from stopping of high inertia loads can then be dissipated or partly dissipated between all of the paralleled ***iDrives.***
If more energy requires dissipating, a braking module and resistors can be connected as shown above.
Note: All drives must power on at the same time*.

Notes:

- *If parallel connecting the DC busses of different capacity inverters;
  Must power up in sequence: Largest capacity first → smallest capacity last.
- DC fuses and/or other precautions may be necessary.
- Never connect '+' terminals to '–' terminals or damage will occur.

If in doubt consult your local ***iDrive*** distributor or dealer.

# Chapter 4 Programming instructions & Parameter list

## 4.1 Keypad

### 4.1.1 Keypad layout




### 4.1.2 Local and Remote operating modes

**Local mode**

Run Command
Set **(A00 = 000):** Run command only from **RUN / STOP** keys on the keypad.

Frequency command
Set **(A01 = 000):** UP/DOWN keys on keypad control the motor frequency (speed).
Set **(A01 = 001):** only the 'Freq.Set' potentiometer (VR) on the keypad can control the motor speed.

**Remote mode**

Run Command
Set **(A00 = 001):** Run command only by digital input to TM2 terminal S1 to S4.
Terminals S1 to S4 can be configured for 'RUN' input by setting functions (**b34 to b38 = 000 / 001)**

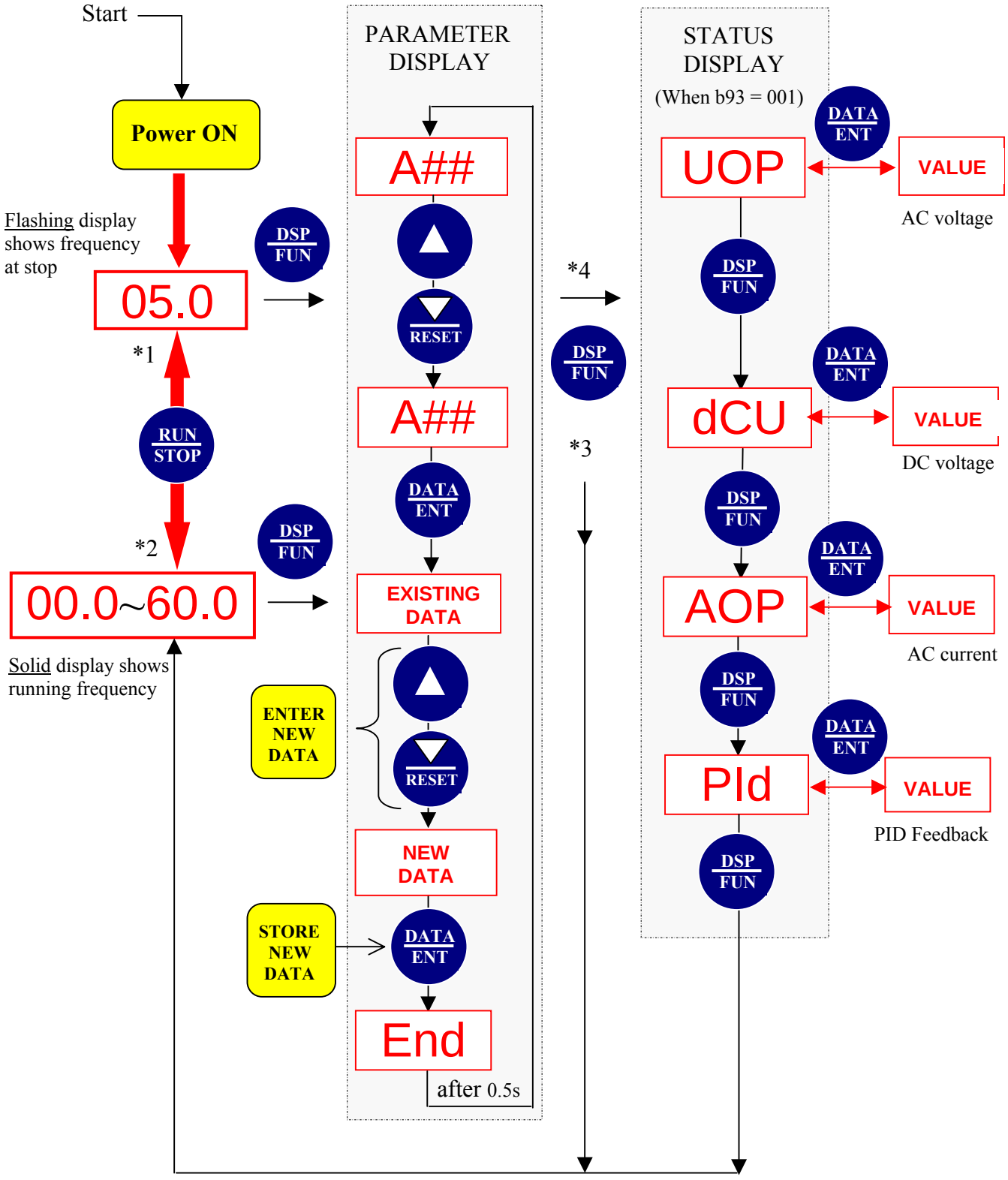
Frequency command
Set **(A01 = 002):** only external speed reference to TM2 terminal 10 (AIN) can control the motor speed.
Note: Switch SW2 and **(b61 = 000 / 001)** must be set for either 0-10V or 4-20mA input.

**Tip!**

Quick changeover between **LOCAL** and **REMOTE** control modes can be made by simultaneously pressing the RESET and the DATA ENT keys on the keypad.

Modes can be 'toggled' by this method when commissioning for example.
Note that the motor must be stopped before changeover is allowed.

### 4.1.3 Keypad navigation




*1: Display flashes with set frequency in STOP mode.
*2: Display is steady (not flashing) with set frequency in RUN mode.
(Required output frequency can be set during both STOP and RUN modes.)
*3: If parameter A12 = 000 (factory setting) then display returns to RUN/STOP frequency.
If parameter A12 = 001, b parameters will now be visible.
*4: If parameter b93 = 001, STATUS DISPLAYS will now be opened.

## 4.2 Parameter functions
## Quick-Start 'A' parameter function list

| Parameter Number | Function | Range / (Units) | Factory Setting | Notes |
|---|---|---|---|---|
| A00 | Operation control | 000: Keypad RUN/STOP keys<br>001: Terminals<br>002: RS232/485 Comms | 000 | |
| A01 | Frequency control | 000: Keypad UP/DOWN keys<br>001: Potentiometer on Keypad<br>002: AIN signal (TM2)<br>003: MFIT : Mot. Pot. function<br>004: RS232/485 Comms | 000 | |
| A02 | Frequency high limit | 01.0 ~ 200 (Hz) | 50.0/60.0 | *2 |
| A03 | Frequency low limit | 00.0 ~ 200 (Hz) | 00.0 | *2 |
| A04 | Acceleration time 1 | 00.1 ~ 999 (s) | 05.0 | *1, *2 |
| A05 | Deceleration time 1 | 00.1 ~ 999 (s) | 05.0 | *1, *2 |
| A06 | Control mode select | 000: Vector control<br>001: V/F control | 001 | *4 |
| A07 | V/F Pattern set | 001 ~ 007 | 001 | |
| A08 | Output voltage at base frequency | 198 ~ 264, 380 ~ 528 (V) | 220 / 440 | |
| A09 | Base frequency | 00.2 ~ 200 (Hz) | 50.0/60.0 | |
| A10 | Torque Boost Gain [V/F] | 00.0 ~ 30.0 (%) | 00.0 | *1 |
| A11 | Electronic thermal overload relay protection for motor (OL1) | 000: Enable motor protection<br>001: Disable motor protection | 000 | |
| A12 | Access to 'b##' parameters | 000: b-parameters CLOSED<br>001: b-parameters OPEN | 000 | |

## Advanced 'b' parameter function list (Access to these parameters by setting A12 = 001)

| Parameter Number | Function | Range / (Units) | Factory Setting | Notes |
|---|---|---|---|---|
| b00 | Acceleration time 2 | 00.1 ~ 999 (s) | 05.0 | *1, *2 |
| b01 | Deceleration time 2 | 00.1 ~ 999 (s) | 05.0 | *1, *2 |
| b02 | Slip Compensation Gain [V/F] | 00.0 ~ 100 (%) | 00.0 | *1 |
| b03 | Motor No-Load Current [V/F] | --- (A) | --- | *4 |
| b04 | Output Voltage at Max Frequency [V/F] | 00.0 ~ 100 (%) | 100 | |
| b05 | Mid Output Frequency [V/F] | 00.1 ~ 200 (Hz) | 25.0 | |
| b06 | Output Voltage at Mid Frequency [V/F] | 00.0 ~ 100 (%) | 50.0 | |
| b07 | Min Output Frequency [V/F] | 00.1 ~ 200 (Hz) | 00.5 | |
| b08 | Output Voltage at Min Frequency [V/F] | 00.0 ~ 100 (%) | 01.0 | |
| b09 | Motor Rated Current | --- (A) | --- | *4 |
| b10 | Motor Rated Voltage | --- (V) | --- | *4 |
| b11 | Motor Rated (Base) Frequency | --- (Hz) | --- | *4 |
| b12 | Motor Rated Power | --- (KW) | --- | *4 |
| b13 | Motor Rated Speed | --- (RPM/10) | --- | *4 |

| | | | | |
|---|---|---|---|---|
| b14 | Torque Boost Gain | 001 ~ 450 (%) | | |
| b15 | Slip Compensation Gain | 001 ~ 450 (%) | | |
| b16 | Low Frequency Dead-Band Voltage Compensation | 000 ~ 040 | | |
| b17 | DC Injection Braking Time | 00.0 ~ 25.5 (s) | 00.5 | |
| b18 | DC Injection Braking Start Frequency | 01.0 ~ 10.0 (Hz) | 01.5 | |
| b19 | DC Injection Braking Level | 000 ~ 020 (%) | 005 | |
| b20 | Skip Frequency 1 | 00.0 ~ 200 (Hz) | 00.0 | *1 |
| b21 | Skip Frequency 2 | 00.0 ~ 200 (Hz) | 00.0 | *1 |
| b22 | Skip Frequency Bandwidth | 00.0 ~ 30.0 (+/-Hz) | 00.0 | *1 |
| b23 | Acceleration Stall Prevention Level | 050 ~ 200 (%) | 200 | |
| b24 | Deceleration Stall Prevention Level | 050 ~ 200 (%) | 200 | |
| b25 | Running Stall Prevention Level | 050 ~ 200 (%) | 200 | |
| b26 | Stall Prevention Deceleration Time | 00.1 ~ 999 (s) | 03.0 | |
| b27 | Acceleration Stall Prevention | 000: Enabled<br>001: Disabled | 000 | |
| b28 | Deceleration Stall Prevention | 000: Enabled<br>001: Disabled | 000 | |
| b29 | Running Stall Prevention | 000: Enabled<br>001: Disabled | 000 | |
| b30 | Stall Prevention Time During Running | 000: According to (A05)<br>001: According to (b26) | 000 | |
| b31 | Power Loss Auto Re-start | 000: Enabled<br>001: Disabled | 001 | |
| b32 | Auto Re-start Attempts | 000 ~ 005 | 000 | |
| b33 | Auto-Start at Power ON | 000: Auto-Start Enabled<br>001: Auto-Start Disabled | 001 | |
| b34 | Reset Mode | 000: Reset command available if RUN command is OFF<br>001: Reset command available if RUN is ON or OFF | 000 | |
| b35 | Terminal S1 Function | 000: RUN Forward<br>001: RUN Reverse<br>002: Preset Speed Command 1<br>003: Preset Speed Command 2<br>004: Preset Speed Command 3<br>005: JOG Frequency Command<br>006: Emergency STOP (E.S.)<br>007: Base Block (b.b.)<br>008: Select Accel 2 / Decel 2<br>009: Reset<br>010: UP Command<br>011: DOWN Command<br>012: Control Signal Switch<br>013: Communications Mode<br>014: Accel. / Decel. Prohibit<br>015: Master / Auxiliary Speed Signal | 000 | |
| b36 | Terminal S2 Function | | 001 | |
| b37 | Terminal S3 Function | | 005 | |
| b38 | Terminal S4 Function | | 006 | |
| b39 | Terminal S5 Function | | 007 | |

| | | | | |
|---|---|---|---|---|
| b40 | Terminal S6 Function | 016: PID Disabled<br>017: Analog Frequency Signal Input Terminal AIN<br>018: PID feedback signal (AIN)<br>019: DC Brake (ON command) | 009 | |
| b41 | Terminal AIN Function | | 017 | |
| b42 | Frequency UP/DOWN Control (MFIT) | 000: UP/DOWN Control ON (Freq. Held at Power OFF)<br>001: UP/DOWN Control ON (Freq. Reset to 0Hz at OFF)<br>002: UP/DOWN Control ON (As 000 – UP/DOWN is Available when Output OFF) | 000 | |
| b43 | S1 ~ S6 Digital Input Scan Time | 001 ~ 100 (mS x 8) | 010 | |
| b44 | Jog Frequency | 00.0 ~ 200 (Hz) | 05.0 | *1 |
| b45 | Preset Frequency 1 | 00.0 ~ 200 (Hz) | 05.0 | *1 |
| b46 | Preset Frequency 2 | 00.0 ~ 200 (Hz) | 05.0 | *1 |
| b47 | Preset Frequency 3 | 00.0 ~ 200 (Hz) | 10.0 | *1 |
| b48 | Preset Frequency 4 | 00.0 ~ 200 (Hz) | 20.0 | *1 |
| b49 | Preset Frequency 5 | 00.0 ~ 200 (Hz) | 30.0 | *1 |
| b50 | Preset Frequency 6 | 00.0 ~ 200 (Hz) | 40.0 | *1 |
| b51 | Preset Frequency 7 | 00.0 ~ 200 (Hz) | 50.0 | *1 |
| b52 | Preset Frequency 8 | 00.0 ~ 200 (Hz) | 60.0 | *1 |
| b53 | 0-10V Analogue Output Select | 000: Output Frequency<br>001: Set Frequency<br>002: Output Voltage<br>003: DC Voltage<br>004: Output Current<br>005: PID feedback Signal | 000 | *1 |
| b54 | Analogue Output Gain | 00.0 ~ 200 (%) | 100 | *1 |
| b55 | Multi-Function Output Relay RY1 | 000: RUN<br>001: Frequency Reached (± b57)<br>002: Frequency in Range (b56 ± b57)<br>003: Frequency Detected (>b56)<br>004: Frequency Detected (<b56)<br>005: Fault<br>006: Auto Reset / Restart<br>007: Momentary Power Loss<br>008: Emergency Stop (E.S.)<br>009: Base Block (b.b.)<br>010: Motor Overload<br>011: Inverter Overload<br>012: xxx Not Used xxx<br>013: Power ON<br>014: Communication Error<br>015: Output Current (>b58) | 000 | |
| b56 | Output Frequency Reached Set Value | 00.0 ~ 200 (Hz) | 00.0 | *1 |
| b57 | Frequency Detection Range | 00.0 ~ 30.0 (±Hz) | 00.0 | *1 |

| | | | | |
|---|---|---|---|---|
| b58 | Output Current Reached Set Value | 000 ~ 100 (%) | 000 | |
| b59 | Output Current Detection Time | 00.0 ~ 25.5 (S) | 00.0 | |
| b60 | Multi-Function Output Transistor (T+ / T- Option Card) | 000: RUN<br>001: Frequency Reached (± b57)<br>002: Frequency in Range (b56 ± b57)<br>003: Frequency Detected (>b56)<br>004: Frequency Detected (<b56)<br>005: Fault<br>006: Auto Reset / Restart<br>007: Momentary Power Loss<br>008: Emergency Stop (E.S.)<br>009: Base Block (b.b.)<br>010: Motor Overload<br>011: Inverter Overload<br>012: xxx Not Used xxx<br>013: Power ON<br>014: Communication Error<br>015: Output Current (>b58) | 005 | |
| b61 | AIN Signal Select | 000: 0-10V<br>001: 4-20mA | 000 | |
| b62 | AIN Gain | 000 ~ 200 (%) | 100 | *1 |
| b63 | AIN Bias | 000 ~ 100 (%) | 000 | *1 |
| b64 | AIN Bias | 000: Positive<br>001: Negative | 000 | *1 |
| b65 | AIN Slope Direction | 000: Positive<br>001: Negative | 000 | *1 |
| b66 | AIN Analogue Input Scan Time | 000 ~ 100 (mS x 4) | 050 | |
| b67 | PID Operation Mode | 000: PID Control Disabled<br>001: PID Bias D Control<br>002: PID Feedback D Control<br>003: PID Bias D Reverse Control<br>004: PID Feedback D Reverse Control | 000 | |
| b68 | Feedback Gain | 0.00 ~ 10 (%) | 1.00 | *1 |
| b69 | P: Proportional Gain | 0.00 ~ 10 (%) | 01.0 | *1 |
| b70 | I: Integral Time | 00.0 ~ 10 (s) | 10.0 | *1 |
| b71 | D: Differential Time | 0.00 ~ 10 (s) | 0.00 | *1 |
| b72 | PID Bias/Offset | 000: Positive Direction<br>001: Negative Direction | 000 | *1 |
| b73 | PID Bias Adjust | 000 ~ 109 (%) | 000 | *1 |
| b74 | PID Filter Time | 00.0 ~ 02.5 (s) | 00.0 | *1 |
| b75 | PID Sleep Level | 00.0 ~ 200 (Hz) | 00.0 | |
| b76 | PID Sleep On-Delay Time | 00.0 ~ 25.5 (s) | 00.0 | |
| b77 | Serial Communications Address | 001 ~ 254 | 001 | *3 *4 |

| | | | | |
|---|---|---|---|---|
| b78 | Serial Communications Baud Rate | 000: 4800 (bps)<br>001: 9600<br>002: 19200<br>003: 38400 | 003 | *3 *4 |
| b79 | Stop Bits | 000: 1 Bit<br>001: 2 Bits | 000 | *3 *4 |
| b80 | Parity Bit | 000: No Parity<br>001: Even Parity<br>002: Odd Parity | 000 | *3 *4 |
| b81 | Data Bits | 000: 8 Bits<br>001: 7 Bits | 000 | *3 *4 |
| b82 | Communication Error Detection Time | 00.0 ~ 25.5 (s) | 00.0 | *3 |
| b83 | Communication Error Response | 000: Decelerate to Stop (A05)<br>001: Coast to Stop<br>002: Decelerate to Stop (b01)<br>003: Continue to Run | 000 | *3 |
| b84 | Remote Keypad Frequency Control (by) | 000: UP/DOWN Keys<br>001: Potentiometer (VR) | 000 | |
| b85 | Remote Keypad – Enable / Disable (and action if keypad cable fault) | 000: Remote keypad disabled<br>001: Remote keypad enabled (Motor stopped as set by b92)<br>002: Remote keypad enabled (No stop, runs at Set Freq) | 000 | |
| b86 | Carrier Frequency | 004 ~ 016 (kHz) | 010 | |
| b87 | Inverter Cooling Fan | 000: Auto Run by Inverter °C<br>001: Run When Output On<br>002: Always Run<br>003: Always Stop | 001 | IP20 Only. |
| b88 | Motor Rotation Direction | 000: Forward<br>001: Reverse | 000 | *1 |
| b89 | Inverter Power Code (Read Only) | See following description | | |
| b90 | RUN / STOP / Direction Switching | 000: FWD/STOP-REV/STOP<br>001: RUN/STOP-FWD/REV<br>002: 3-Wire – RUN/STOP | 000 | |
| b91 | Reverse RUN Instruction | 000: Reverse Enabled<br>001: Reverse Disabled | 000 | |
| b92 | STOP Method | 000: Decelerate to STOP<br>001: Coast to STOP | 000 | |
| b93 | Operation Monitor | 000: Display Hz Only<br>001: Display Hz, A, V, PID, etc | 000 | |
| b94 | Copy Module | 000: Module Disabled<br>001: Copy ***iDrive*** to Module<br>002: Copy Module to ***iDrive***<br>003: Read / Write Check | 000 | *3 |
| b95 | All Data Reset to Factory Settings | 010: Reset to Default (50Hz)<br>020: Reset to Default (60Hz) | 000 | |
| b96 | Software Version (Read Only) | CPU Version | | *3 *4 |
| b97 | Alarm Log | Last 3 fault records | | *3 *4 |

**Note: *1: Parameter value can be modified when *iDrive* output is on (motor running).**

***2: Frequency resolution is 1Hz for settings above 100 Hz.**

***3: Cannot be modified during communication.**

***4: Do not change while making factory setting.**

**b95 factory setting is 010 (50Hz) and motor parameter value is 140.**

**b95 factory setting is 020 (60Hz) and motor parameter value is 170.**

## 4.3 Parameter Function Description

### Basic 'A' parameter functions

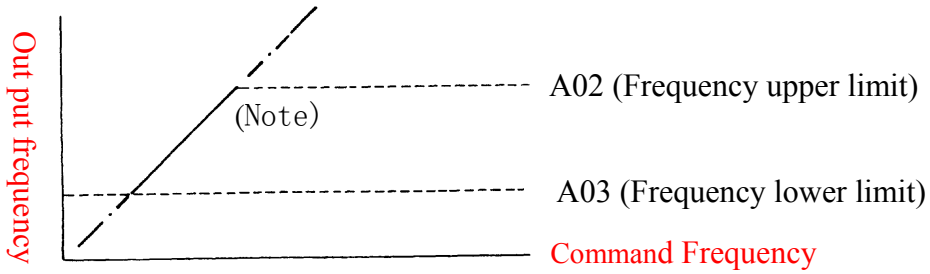
| | |
|---|---|
| **A00 Operation Control (Run / Stop Command)** | **000: Keypad**<br>**001: External Terminal**<br>**002: Communication Control** |

1.) A00 = 000, ***iDrive*** RUN/STOP command is from keypad.
2.) A00 = 001, ***iDrive*** RUN/STOP command is from external terminals.
3.) A00 = 002, ***iDrive*** RUN/STOP command by serial communication.

| | |
|---|---|
| **A01 Frequency Control (Speed Reference Source)** | **000: UP/Down keys on keypad**<br>**001: VR on keypad (Potentiometer)**<br>**002: Control terminal 10 input signal (TM2)**<br>**003: Multi-function input terminal UP/DOWN function**<br>**004: Frequency set by serial communication**<br>**(When b85 = 1: Remote keypad has priority)** |

1.) A01 = 001, when one of parameter group b35 ~ b38, or b41 is set to 015 and multi-function input terminal is OFF, the frequency is set by VR on keypad. If the multi-function input terminal is ON, the frequency is set by analog signal (auxiliary speed) from TM2.
2.) A01 = 002,when one of parameter group b35 ~ b38, or b41 is set to 015 and multi-function input terminal is OFF, the frequency is set by analog signal (auxiliary speed) from TM2. If the multi-function input terminal ON, the frequency is set by VR on keypad.
3.) Up/Down terminal: Refer to description of parameter group b35~ b38 (multi-function input Terminal)
4.) Priority of reading frequency command: Jog > preset frequency > (Keypad▲▼ or TM2 UP/ Down or communication)

| |
|---|
| **A02 Frequency upper limit (Hz) : 01.0 - 200** |
| **A03 Frequency lower limit (Hz): 00.0 - 200** |




**Note: If A02 = 0 Hz and frequency command = 0Hz, the *iDrive* will zero-speed stop.**
**If A03 > 0 Hz and frequency command = 0 Hz *iDrive* output will be at A03 set value.**

**A04 Acceleration time 1 (s): 00.1 – 999**
**A05 Deceleration time 1 (s): 00.1 – 999**

Formula for acceleration/deceleration time:
Denominator is based on factory setting in Sensorless Vector control
a) Motor rated frequency (Sensorless Vector control).
b) Max output frequency (V/F control).

a)

$$\text{Acceleration time} = A04 \times \frac{\text{Set frequency}}{\text{b11 (rated frequency)}} \qquad \text{Deceleration time} = A05 \times \frac{\text{Set frequency}}{\text{b11 (rated frequency)}} \rightarrow \text{vector}$$

b)

$$\text{Acceleration time} = A04 \times \frac{\text{Set frequency}}{\text{A09 (Max output frequency)}} \qquad \text{Deceleration time} = A05 \times \frac{\text{Set frequency}}{\text{A09 (Max output frequency)}} \rightarrow \text{V/F}$$

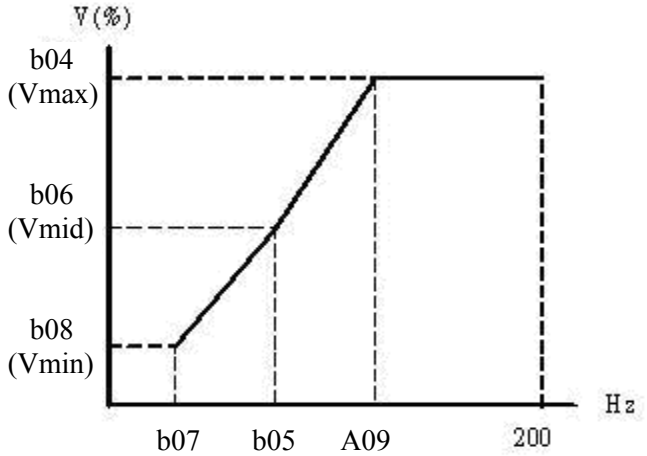
| **A06: Control mode** | **Vector control or V/F control** |
|---|---|

A06 = 000: ***iDrive*** operates in Sensorless Vector mode. Dynamic response to changing load is improved, motor starting torque increased and low-speed operation is more stable. For better S/V control it is also necessary to input correct values into parameters A08, A09, b09 – b16.

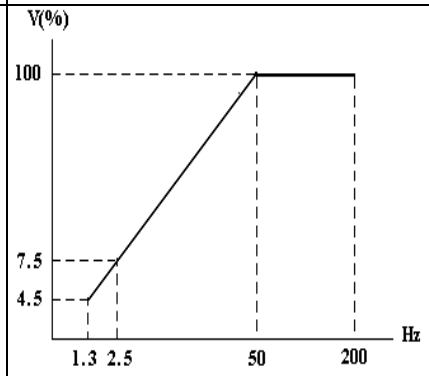
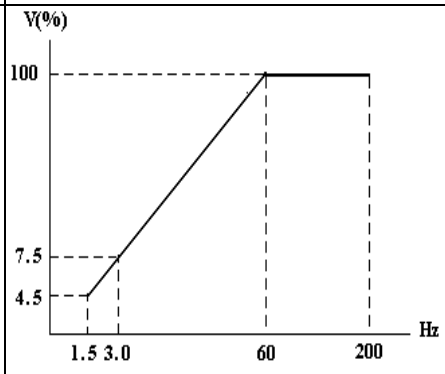
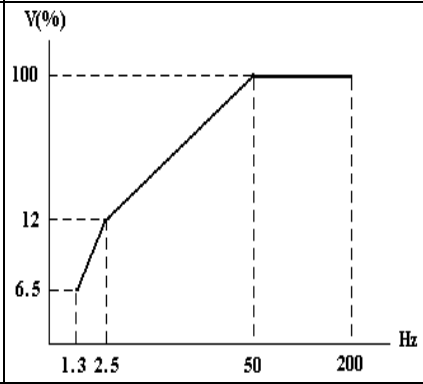
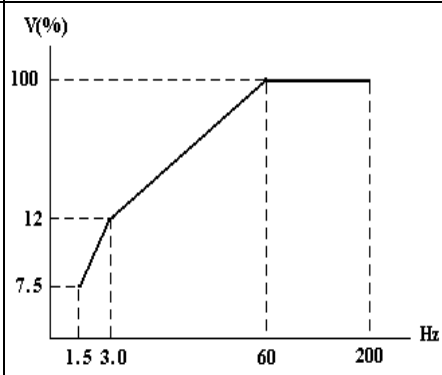
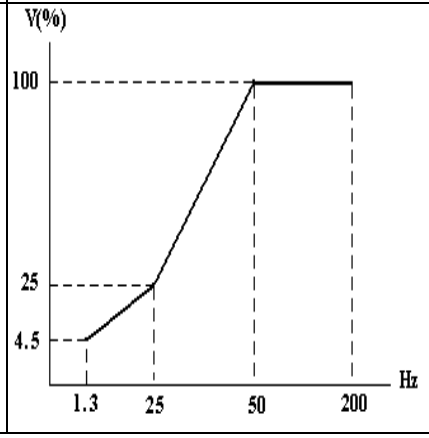
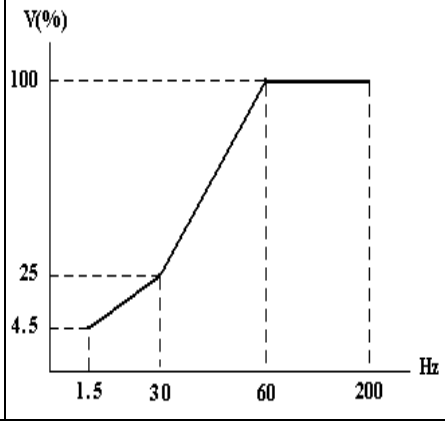
A06 = 001: ***iDrive*** operates in V/F mode. Standard performance for fans, pumps, and other non-demanding (non-dynamic) loads.

**A07: V/F Preset patterns 1 – 7**

A07 = 007.
Selects user configurable V/F pattern by setting parameters A09, b04 – b08.
Care should be taken when using this feature as incorrect setting of these parameters may cause motor over-heating or incorrect operation.

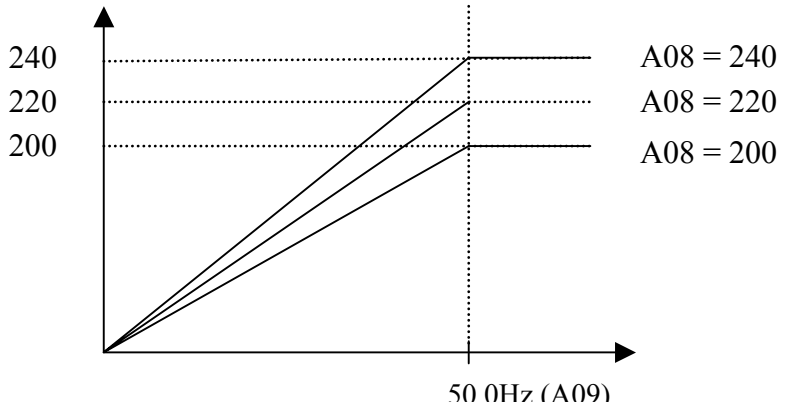


A07 = 001 ~ 006 User selectable fixed V/F patterns (refer to following table).

| E.U. | Spec. | A07 | V/F Pattern | U.S. CAN | Spec. | A07 | V/F Pattern |
|---|---|---|---|---|---|---|---|
| 50 Hz Motors | General | 001 |  | 60 Hz Motors | General | 004 |  |
| | High start torque | 002 |  | | High start torque | 005 |  |
| | Variable torque | 003 |  | | Variable torque | 006 |  |

| **A08 V/F Base Voltage** |
|---|
| **A09 V/F Base Frequency** |

In example below: A09 = 50Hz, b04 =100%
If A08 setting is 200~240V, then output voltage for the pattern:




The ***iDrive*** output voltage cannot exceed its input voltage.

| **A10 V/F Torque Boost Gain 00.0 – 30.0%** |
|---|

| **A11 Electronic thermal overload protection for motor (OL1) :** | **000: Protection Enabled**<br>**001: Protection Disabled** |
|---|---|

Set A11 = 000 and **b09** to rated motor current (Amps) to give correct thermal overload protection.

| **A12 Advanced parameter functions display** | **000: Disable access to advanced parameters (b parameters)**<br>**001: Enable access to advanced parameters (b parameters)** |
|---|---|

A12 = 000. Parameter group **'b'** cannot be displayed or accessed.
A12 = 001. Enable display and access parameter group **'b'**.

## Advanced 'b' parameters functions

**b00 Acceleration time 2 (s): 00.1 – 999**
**b01 Deceleration time 2 (s): 00.1 – 999**

**b02 V/F Slip Compensation Gain 00.0 – 100%**

**b03 Motor no-load current (A)**

Motor no-load current differs with ***iDrive*** capacity b89. Adjust according to motor information.

| | |
|---|---|
| **b04: Output voltage ratio at max. frequency (%)** | **00.0 – 100%** |
| **b05: Mid frequency (Hz)** | **00.1 – 200Hz** |
| **b06: Output voltage ratio at mid. frequency (%)** | **00.0 – 100%** |
| **b07: Min. output frequency (Hz)** | **00.1 – 200Hz** |
| **b08: Output voltage ratio at min. frequency (%)** | **00.0 – 100%** |

b04~b08 please refer to A07 description

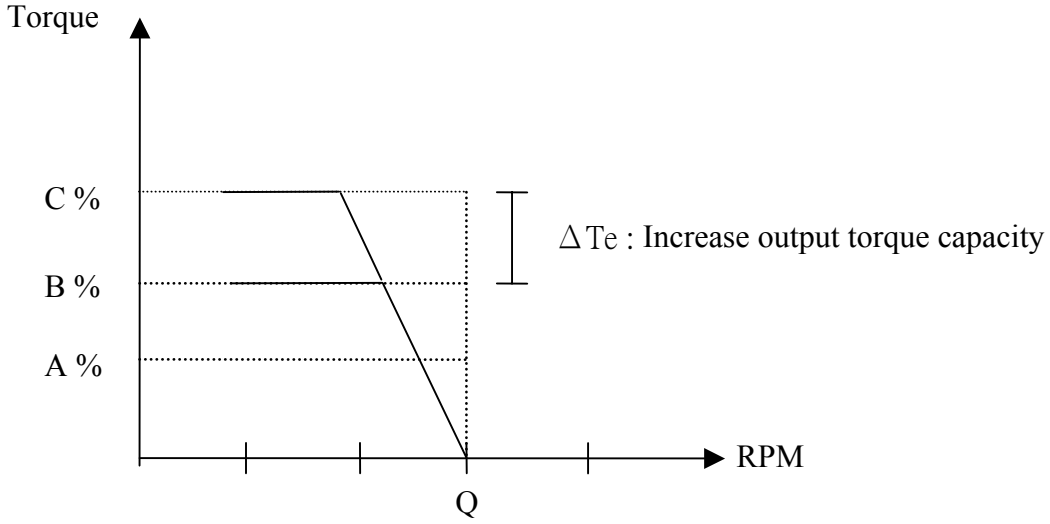
**b09 Motor rated current (A)**
**b10 Motor rated voltage (V)**
**b11 Motor rated base frequency (Hz)**
**b12 Motor rated power (kW)**
**b13 Motor rated speed (RPM)**

**b14 Torque Boost Gain (Only for vector control, A06 = 001)**

If motor load torque increases, this function increases the available output torque to match the load.

$$\Delta Te = \underset{\text{(load current)}}{I} \times \underset{\text{(torque boost)}}{Gain}$$

• Torque/Speed curve pattern:




• Operating frequency range: 0 ~ Motor rated frequency

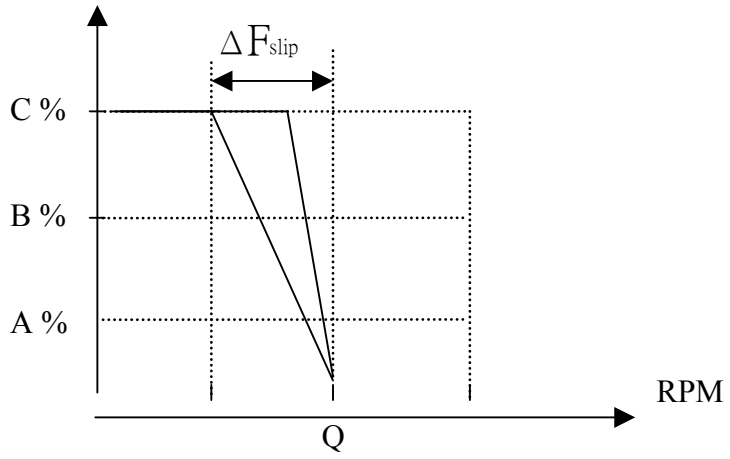
• When the motor output torque is not enough, increase b14 set value.
• If the motor vibrates or becomes very hot decrease b14 set value.
• If running at low speeds for long periods, high b14 set value can cause the motor to overheat
• The maximum output torque limit is proportional to the ***iDrive*** rated current.
• If increasing b14 set value causes the output current to be too large, increase b03 set value.

## b15 Slip Compensation Gain (Only for vector control, A06 = 001)

If the detected motor load is too large, speed will drop. Increase gain b15 to compensate.

$$\Delta F_{slip} = \underset{\text{(load current)}}{I} \times \underset{\text{(slip compensation )}}{Gain}$$

• Torque/Speed curve pattern:

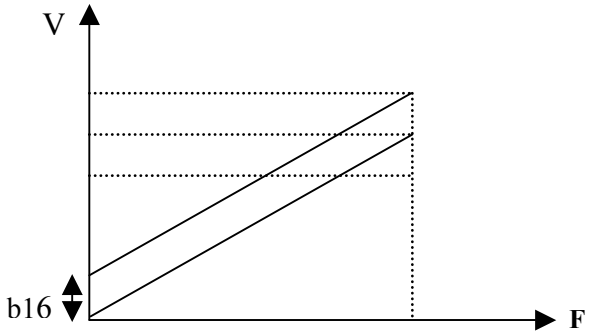



• Operating frequency range: 0 ~motor rated frequency.
• When the motor load is high, speed will decrease (slip). Increase b15 set value to compensate.
• If the motor vibrates or becomes very hot decrease b14 set value.
• The maximum rotational output speed limit is fixed by the motor maximum set frequency.

## b16 Low Frequency DB Voltage Compensation (Only for Vector control, A06 = 001)

Increasing b16 set value will increase output voltage and low frequency torque.

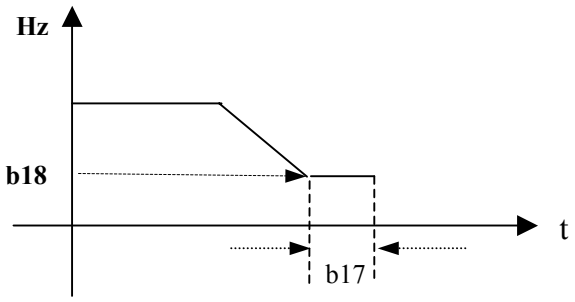
• Output voltage/frequency pattern:




• Operating frequency range: 0~10HZ / 50HZ
0~12HZ / 60HZ
• At low operating frequency: -
When the motor output torque is not enough increase b16 set value.

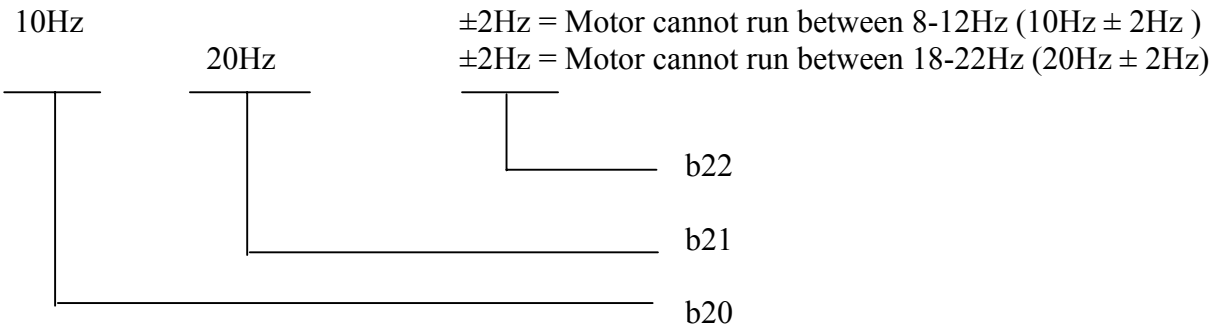
**b17 DC braking time (s) 00.0~25.5**
**b18 DC braking start frequency (Hz) 01.0~10.0**
**b19 DC braking level 00.0~20.0%**

b17 / b18: DC braking time and start frequency, as following figure:




**b20 Skip Frequency 1 (Hz) : 00.0 – 200**
**b21 Skip Frequency 2 (Hz) : 00.0 – 200**
**b22 Skip Frequency Hysterisis (± Hz) : 00.0 – 30.0**

Example: When b20 = 10.0Hz
b21 =20.0Hz
b22 = 02.0Hz




**b23 Acceleration stall-prevention level: 050% ~ 200%**
**b24 Deceleration stall-prevention level: 050% ~ 200%**
**b25 Run stall-prevention level: 050% ~ 200%**
**b26 Stall prevention deceleration time: 00.1 ~ 999s**
**b27 Acceleration stall-prevention:**
**= 000: Enable Stall prevention during acceleration.**
**= 001: Disable Stall prevention during acceleration.**
**b28 Deceleration stall-prevention:**
**= 000: Enable Stall prevention during deceleration.**
**= 001: Disable Stall prevention during deceleration.**
**b29 Run stall-prevention:**
**= 000: Enable Stall prevention in Run mode.**
**= 001: Disable Stall prevention in Run mode.**
**b30 Stall prevention time during run mode.**
**= 000: according to A05 (Deceleration Time 1).**
**= 001: according to b26.**

1.) When the acceleration time is set too short the ***iDrive*** may trip on Over-Current (OC).
If the time accelerating time cannot be increased use stall-prevention. A stall-prevention level needs to be programmed and when the inverter detects this level it freezes the acceleration ramp until the current falls below the set level, then continues accelerating.

2.) When the Deceleration time is set too short the ***iDrive*** may trip on Over-Voltage (OU).
If the time deceleration time cannot be increased then stall-prevention can be used. A stall-prevention level has to be programmed and when the inverter detects this level it holds the deceleration ramp until the DC link voltage falls below the factory set level, then continues decelerating.

3.) The ***iDrive*** could stall during run mode due to an impact load or sudden changes of the load. Stall prevention in run mode will detect a programmed stall level (b25) for a period of time (b30) , if the level exceeds b25 , then the ***iDrive*** reduces its output frequency (speed) to provide the required additional torque to overcome the stall condition. Once this level is below the programmed stall level then it ramps up to its normal running speed.

| **b31 Auto restart on momentary power loss.** | **000:** Enabled<br>**001:** Disabled |
|---|---|

b31 = 000: Auto restart after a momentary power loss is enabled on resumption of power and application of run signal, according to setting of parameter A00.
The ***iDrive*** will carry out an auto speed search, once the motor speed and direction are found then it will accelerate to the running speed prior to the power loss.
b31 = 001: Auto restart disabled.

| **b32 Auto restart times: 000 ~ 005** |
|---|

1.) b32 = 000: The ***iDrive*** will not auto-restart on fault trip.
2.) b32 > 000
The ***iDrive*** will carry out an auto-speed search 0.5 sec after the fault trip, while the output is switched off and the motor is coasting to stop.
Once the rotating speed is determined the ***iDrive*** will accelerate or decelerate from this speed to the running speed before the fault.
3.) Auto restart will not occur following OL1, OL2, OH, or BB alarms.
Note:- Auto restart will not function while DC injection braking or decelerating to stop.

| **b33 Auto-start on power up** | **000: Enable direct start on power up.**<br>**001: Disable direct start on power up.** |
|---|---|

**Danger:**
1.) When b33 = 000 and external run mode (A00 = 001) are selected and a RUN command is present, the ***iDrive*** will auto-start the motor when power is applied.

***This feature should only be considered when all safety implications of its use have been investigate, risk assessment for maintenance, use of warning labels etc.***

2.) When b33 = 001 and external run mode (A00 = 001) are selected, and a RUN command is present, the motor will not auto-start when power is applied to the ***iDrive***.
The ***iDrive*** display will flash and SP1' error message. It can only restart after the RUN command has been removed then reapplied.

| | |
|---|---|
| **b34 Reset mode** | **000: Reset is enabled only when a RUN command is OFF.**<br>**001: Reset is enabled when a RUN command is OFF or ON.** |

b34 = 000. Fault cannot be reset therefore ***iDrive*** cannot start if a RUN command is ON (A00=001)

| | |
|---|---|
| **b35 ~ b38, b41** | **Selectable Functions for input terminals (S1 - S4 & AIN )**<br>**000: Run Forward**<br>**001: Run Reverse**<br>**002: Preset Speed Command 1**<br>**003: Preset Speed Command 2**<br>**004: Preset Speed Command 3**<br>**005: Jog frequency Command**<br>**006: Emergency stop (E.S.)**<br>**007: Base Block (b.b.)**<br>**008: Switching to 2nd acceleration / deceleration time**<br>**009: Reset**<br>**010: Up command**<br>**011: Down command**<br>**012: Control signal switch**<br>**013: Communication mode. Disable – Enable.**<br>**014: Acceleration / deceleration prohibit**<br>**015: Master / Auxiliary speed switch**<br>**016: PID function prohibit**<br>**017: Analog frequency signal input (terminal AIN)**<br>**018: PID feedback signal (terminal AIN)**<br>**019: DC Brake (ON command)** |

1.) S1~S4 & AIN on TM2 are multi-function input terminals (MFIT); configure as shown above.

2.) Parameters b35~b38, and b41 control the function of each terminal as shown below:
b35 controls terminal S1, b36 controls terminal S2, b37 controls terminal S3, etc

**b35 ~ b38 (or b41) = 000/001 (Forward/ Reverse)**

Forward command ON means motor will run forward, when OFF, the motor stops. b35 factory default is forward command.
Reverse command ON means motor will run in reverse, when OFF, the motor stops. b36 factory default is reverse command.
If forward and reverse commands are ON simultaneously the motor will stop.

**b35 ~ b38 (or b41) = 002~004 (Preset Speed Command 1~3)**

When a run signal is applied and the selected external multi-function input terminal is on, the ***iDrive*** will run at one of 8 preset speeds, which are controlled by the status of the terminals. The corresponding speeds are as that programmed in parameters b44 to b52 as shown in the table below.

**b35 ~ b38 (or b41) = 005 (Jog Frequency Command)**

When run signal is applied and the selected external multi-function input terminal is on and set to Jog speed, the ***iDrive*** will run according to b44.

**Priority: Jog > Preset Speed**

| Preset Speed Command 3<br>Set value = 004 | Preset Speed Command 2<br>Set value = 003 | Preset Speed Command 1<br>Set value = 002 | Jog Frequency Command<br>Set value = 005 | Output frequency set value |
|---|---|---|---|---|
| X | X | X | 1 | b44 |
| 0 | 0 | 0 | 0 | b45 |
| 0 | 0 | 1 | 0 | b46 |
| 0 | 1 | 0 | 0 | b47 |
| 0 | 1 | 1 | 0 | b48 |
| 1 | 0 | 0 | 0 | b49 |
| 1 | 0 | 1 | 0 | b50 |
| 1 | 1 | 0 | 0 | b51 |
| 1 | 1 | 1 | 0 | b52 |

**b35 ~ b38 (or b41) = 006: Emergency Stop (E.S)**
The ***iDrive*** will decelerate the motor to stop on receiving the external emergency stop signal.
The display will be flashing 'E.S.'
The ***iDrive*** will only start the motor again when the Emergency Stop signal is removed and the start signal is turned off and then on again (remote start mode) or the Run key is pressed in (keypad mode).
Removing the Emergency Stop signal before the ***iDrive*** has fully stopped the motor will not inhibit the Emergency Stop operation.
Output relay can be set to Emergency Stop fault by setting b55 = 008

**b35 ~ b38 (or b41) = 007: Base Block (b.b.)**
The ***iDrive*** will stop the motor immediately on receiving a Base Block signal regardless of setting of b92 and display flashes '**b.b.**' The ***iDrive*** auto restarts in speed search when b.b. is signal removed.

**b35 ~ b38 (or b41) = 008: Switching to Acceleration time 2 / Deceleration time 2**
When terminal is ON the 2nd acceleration / deceleration ramps are selected.

**b35 ~ b38 (or b41) = 009: Reset command**

Reset command ON. The ***iDrive*** output will be disabled. Resettable faults will be cleared.

**b35 ~ b38 (or b41) = 010 / 011: UP / DOWN function:** (According to acceleration/deceleration time)

**Set A01 = 003,** to enable UP/DOWN function. The UP/DOWN key on Keypad is unavailable for changing frequency directly in this mode.

**Set b42 = 000,** When an UP/DOWN signal is ON, the ***iDrive*** accelerates / decelerates the motor to a frequency and stops accelerating / decelerating when the UP/ DOWN signal is removed. The motor will continue at this speed until another command is given.

The ***iDrive*** will decelerate the motor to stop or free run to stop when the run command is OFF according to b92. The frequency at which the ***iDrive*** stops the motor will be stored in b45.

In this mode the UP/DOWN key is unavailable for modifying frequency. Use b45 to modify.

**Set b42 = 001,** The ***iDrive*** will run from 0Hz on receiving a run command.

UP/DOWN action is similar to above description. When the run command is removed, the motor will decelerate to stop or free run to stop (0 Hz) according to setting of b92.

The ***iDrive*** will output from 0Hz in next operation.

**Note: UP/ DOWN commands are disabled if both terminals are ON at the same time.**

**b35 ~ b38 (or b41) = 012: Control Signal Switch**
Terminal OFF: Operation signal / frequency reference signal is controlled by A00/A01.
Terminal ON: Operation signal / frequency signal is controlled by keypad (not controlled by A00/A01).

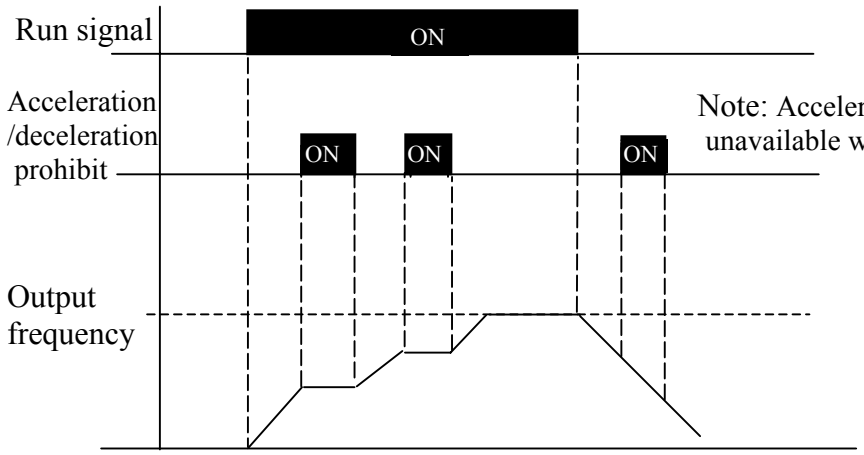
**b35 ~ b38 (or b41) = 013: Communication Mode Select.**

**Terminal OFF**: In communication mode, the ***iDrive*** is controlled by master (PC or PLC) run and frequency signals and also allowed to modify parameters. The Keypad and TM2 run/frequency signal is not available at this time. The Keypad is only available for displaying voltage / current / frequency and parameters can be read but not modified. **Emergency stop is operational.**

**Terminal ON**: PC/PLC can read and modify parameters. Note that ALL operating controls are from keypad. (Not effected by setting of A00 & A01).

**b35 ~ b38 (or b41) = 014: Acceleration/deceleration disable.**

When external control terminal ON, the ***iDrive*** will stop accelerating/ decelerating until the signal is released. The motion is as follows:




**b35 ~ b38 (or b41) = 015 Master/Auxiliary speed switch**

1) A01 = 001: When one of the parameters b35 ~ b38 (or b41) is set to 015, and terminal is OFF, the frequency is set by the VR on the Keypad (Master speed).

When multi-function input terminal is ON, the frequency is set by the analog signal on TM2 (Auxiliary speed AIN).

2.) A01 = 002: When one of the parameters b35 ~ b38 (or b41) is set to 015, and terminal is OFF, the frequency is set by the analog signal on TM2, (Master Auxiliary speed AIN).

When terminal is ON, the frequency is set by the VR on the Keypad (Auxiliary speed).

**b35 ~ b38 (or b41) = 016 (PID function disable)**

When input terminal is ON, PID functions set by b67 are disabled.
When input terminal is OFF, PID functions are enabled.

**b41 = 017 Analog frequency signal input (Terminal AIN)**

Frequency reference is set by 0-10Vdc or 4-20mA on terminal AIN, set by b61 and SW2.

**b41 = 018 PID Feedback signal input (Terminal AIN)**

PID feedback can be connected to AIN terminal 0-10Vdc/0~20mA or 2~10V/4-20mA as set by b61 and SW2.

**b35 ~ b38 = 019 DC Brake signal**

When DC injection is selected (b17~b19) and TM2 DC Brake signal is OFF brake time is set by value of b17; When TM2 DC Brake signal is ON, DC brake signal is held ON until either the RUN signal is removed or the DC brake signal is removed (OFF).

| | |
|---|---|
| **b39 / b40 (option card)** | **S5 / S6 terminal MFIT Setting**<br>**000: Run Forward**<br>**001: Run Reverse**<br>**002: Preset Speed Command 1**<br>**003: Preset Speed Command 2**<br>**004: Preset Speed Command 3**<br>**005: Jog Frequency Command**<br>**006: Emergency Stop (E.S.)**<br>**007: Base Block (b.b.)**<br>**008: Switching to 2nd acceleration/ deceleration time.**<br>**009: Reset**<br>**010: Up Command**<br>**011: Down Command**<br>**012: Control signal switch**<br>**013: Communication control signal switch**<br>**014: Acceleration/ deceleration disable**<br>**015: Master/ auxiliary speed switch**<br>**016: PID function disable** |

Refer to b35 ~ b38

**b42 Frequency UP / DOWN control (Motorized pot):**
**000 : Set frequency by this function will be stored when the inverter stops.**
**UP/DOWN function is not available in stop mode.**
**001 : Set frequency will be reset to 0Hz when the inverter stops.**
**002 : Set frequency will be stored when the inverter stops.**
**UP/DOWN function is available in stop mode.**

1) **b42 = 000**, when a RUN command is ON, the ***iDrive*** will accelerate the motor to the frequency set in b45 then maintain running at this speed. When UP/DOWN terminal is ON, the ***iDrive*** begins to accelerate/decelerate the motor until the signal goes OFF then it runs at this new speed etc.

   When the RUN goes OFF, the ***iDrive*** decelerates or coasts the motor to stop according to the setting of b92. The frequency at which the RUN signal is OFF will be stored in b45.

   The UP/DOWN Key is not available at stop. The stored frequency cannot be changed by UP/DOWN terminal, but can by changing the value of b45.

2) **b42 = 001**, the ***iDrive*** will run from 0 Hz when run signal is applied.
   UP/DOWN operation method is same as b45 = 000, but when next RUN signal is ON, ***iDrive*** will start from 0Hz.

3) **b42 = 002**. Same as when b45 = 001 but UP/DOWN is available while in stop mode.

**b43: Multi-function input terminal S1~S6 signal scan time (N. mS × 8), N = (1~100 times).**
**b66: AIN signal scan time (N. mS × 8), N = (1~100 times).**

1.) If b43 scan time is set to say 80mS (i.e N = 10) then digital input signals on for less then 80mS will be ignored.
2.) If the CPU scans the same input signal for N times (scan times), it is accepted as normal. If it is less than N times, it will be taken as noise. One scan time: 8ms.
3.) User can increase the CPU scan time to counteract electromagnetic noise in the operating environment. Increasing b43/b66 will reduce the inverter response time.

**b44 – b52 Keypad, Jog and Preset Frequency setting**

Note 1: - Frequency selection will be made according to status of terminals S1-S4 & AIN and setting of parameters b35-b38 and b41 as required.
Note2:- Selected preset frequency values should be programmed into parameters b44 – b52 as required.

1) **b35 ~ b38, and b41 = 002 - 004 (Preset Frequency Command 1~3)**

When a run command is applied and any of the selected multi-function input terminals are ON, the motor will run at the preset frequency according to the table below.

2) **b35 ~ b38, and b41 = 005 (Jog Frequency Command)**

External input terminal is set to Jog operation. When terminal is ON, the motor will run at the Jog frequency according to the table below.

| Parameter | Description | Frequency range | Factory default |
|---|---|---|---|
| b45 | Preset frequency 1 (Hz) | 00.0 - 200 | 05.0 |
| b46 | Preset frequency 2 (Hz) | 00.0 - 200 | 05.0 |
| b47 | Preset frequency 3 (Hz) | 00.0 - 200 | 10.0 |
| b48 | Preset frequency 4 (Hz) | 00.0 - 200 | 20.0 |
| b49 | Preset frequency 5 (Hz) | 00.0 - 200 | 30.0 |
| b50 | Preset frequency 6 (Hz) | 00.0 - 200 | 40.0 |
| b51 | Preset frequency 7 (Hz) | 00.0 - 200 | 50.0 |
| b52 | Preset frequency 8 (Hz) | 00.0 - 200 | 60.0 |
| b44 | Jog frequency (Hz) | 00.0 - 200 | 05.0 |

**b53 Multi-function analog output:**
**Multi-function analog output signal select:-**
**001: Set / command frequency**
**002: Output frequency**
**003: DC link voltage**
**004: Output current**
**005: PID feedback signal**
**b54 Multi-function analog output gain = 000 ~ 200%**

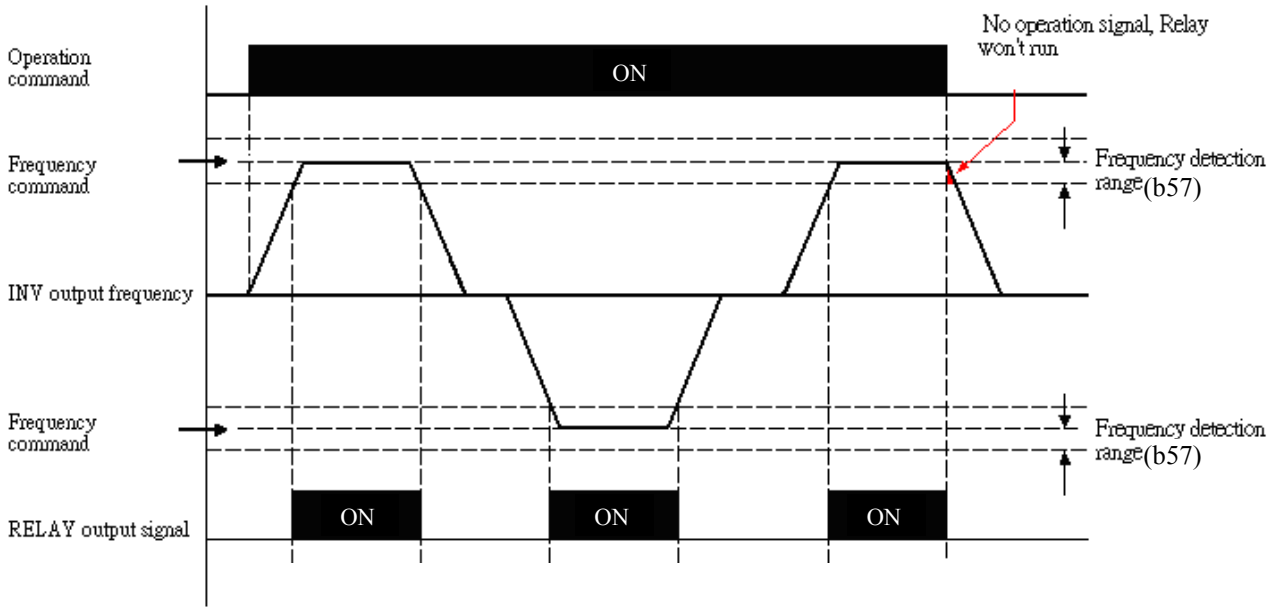
0-10 Vdc is output from multi-function analog output terminal FM+.
Output can be set to correspond to any of the above values.

b54 is used to scale the output signal supplied to an externally connected analog device.

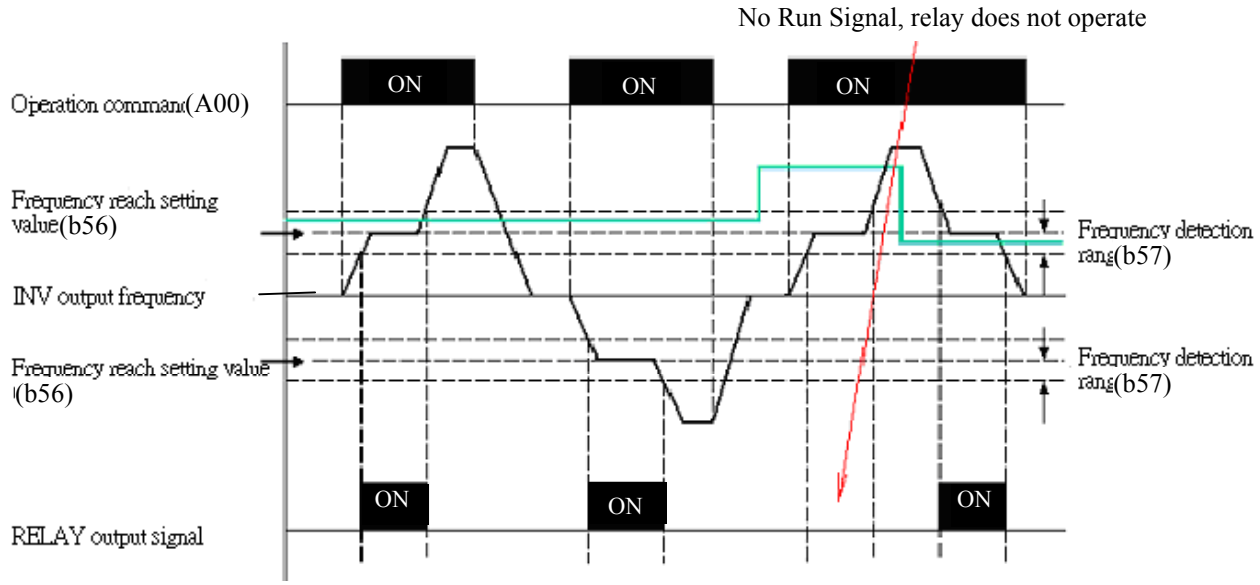
b53 = 005, PID Feedback. The analog input to terminal AIN (0-10Vdc or 4-20mA) will be output from terminal FM+ as 0-10Vdc.
Note: Due to hardware limits, the max output voltage from FM+ terminal is limited to 10V.

**b55 Multi-function output RY1**
**000: Inverter output on - RUN**
**001: Frequency reached (Preset target frequency ± b57)**
**002: Frequency reached (Preset output frequency level (b56) ±b57)**
**003: Frequency Detection (>b56)**
**004: Frequency Detection (<b57)**
**005: Fault output**
**006: Auto restart**
**007: Momentary power loss**
**008: Emergency Stop (E.S.)**
**009: Base Block (b.b.)**
**010: Motor overload protection**
**011: Inverter overload protection**
**012: xxx Not used xxx**
**013: Power On**
**014: Communication error**
**015: Output current detection**
**b56 Preset Output frequency reached = 00.0 ~ 200Hz**
**b57 Frequency detection range = 00.0 ~ 30Hz**

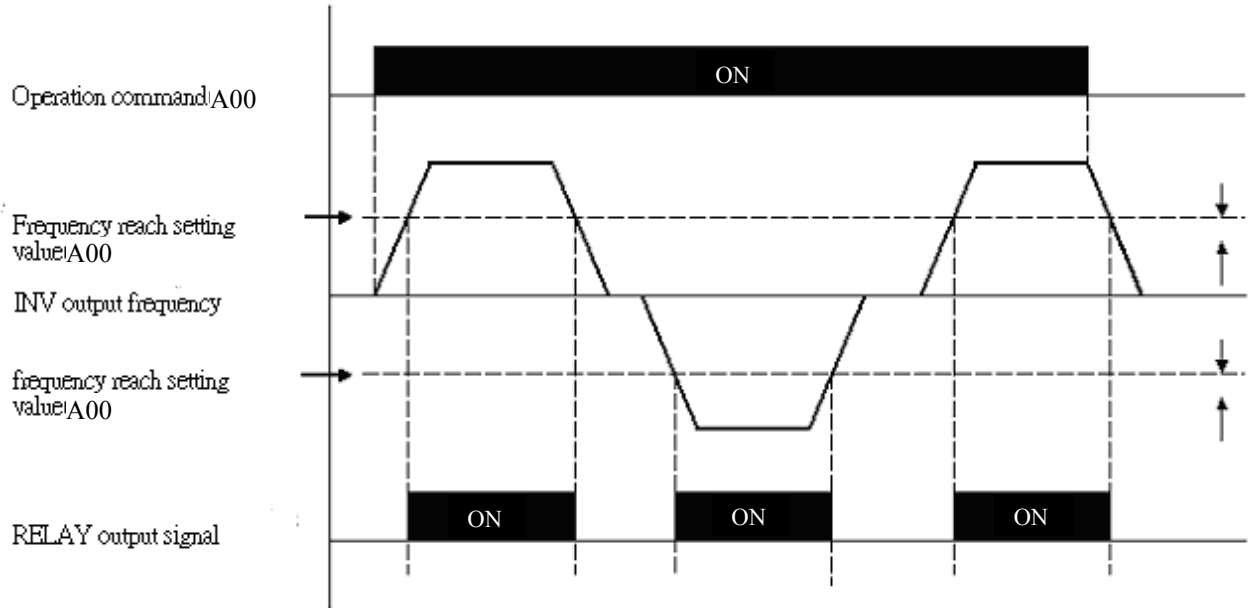
## b55 (b60) = 001: Frequency Reached: Target frequency ± b57



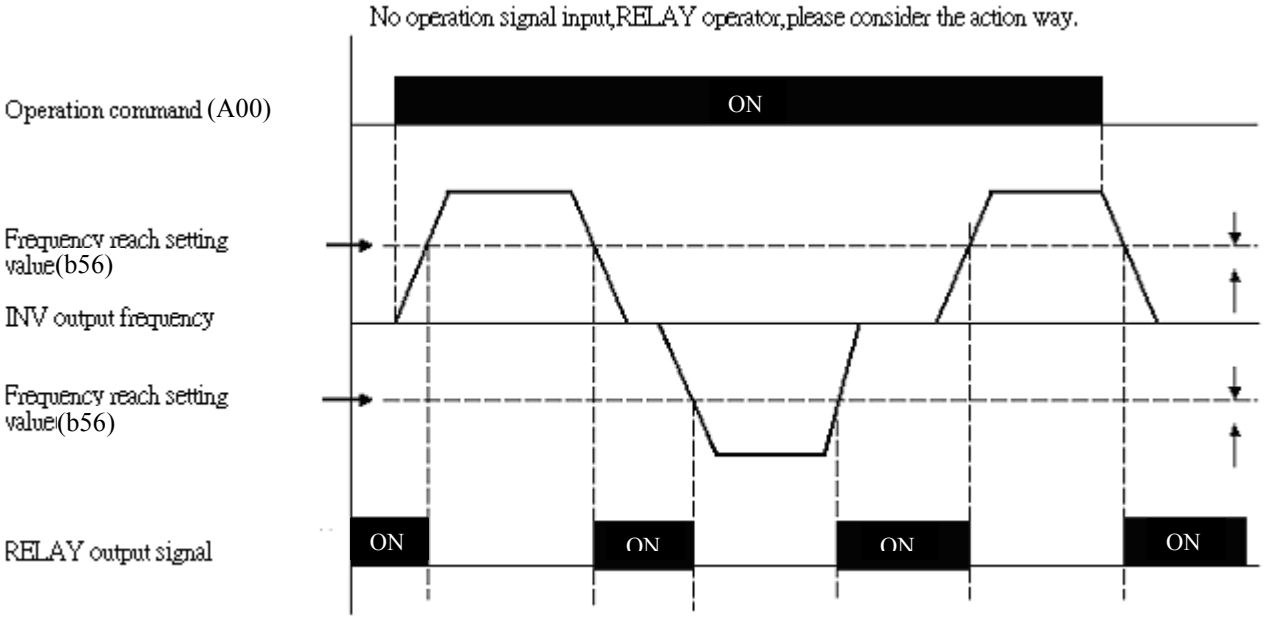
### b55 / b60 = 002 Preset Output Frequency b56 ± b57 Reached.




### b55 / b60 = 003: Frequency Detection $F_{out}$ >b56



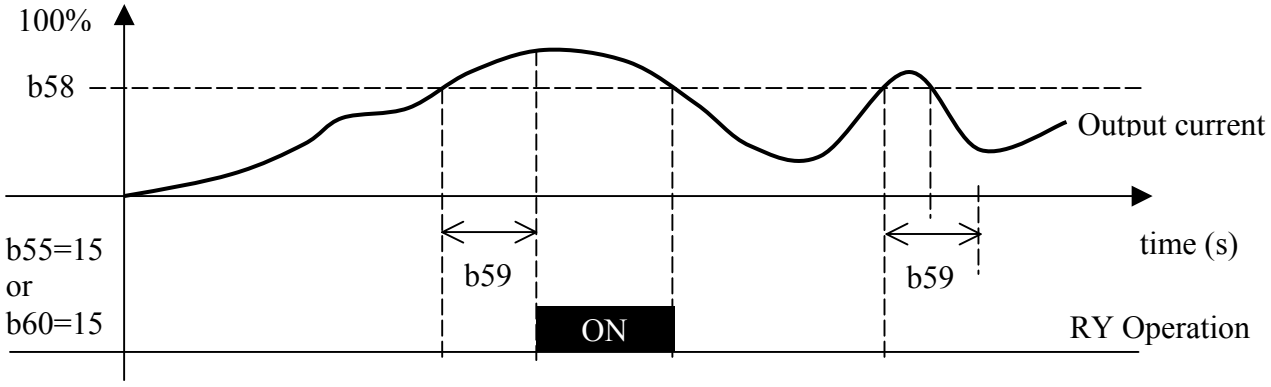
**b55 / b56 = 004: Frequency Detection $F_{out}$ <b56**




**b58 Output Current reached set value**

**b59 Output Current detection time**

b55: Output current detection value > b58
b60: Output current detection value > b58
} When set value is 015
b58: Set value (000-100%) of motor rated current b09
b59: Set value (00.0-25.5s)



**b60 Multi-function output transistor ~ (terminals T+, T- Option card)**
**000: Inverter output on - RUN**
**001: Frequency reached (Preset target frequency ± b57)**
**002: Frequency reached (Preset output frequency level (b56) ±b57)**
**003: Frequency Detection (>b56)**
**004: Frequency Detection (<b57)**
**005: Fault output**
**006: Auto restart**
**007: Momentary power loss**
**008: Emergency Stop (E.S.)**
**009: Base Block (b.b.)**
**010: Motor overload protection**
**011: Inverter overload protection**
**012: xxx Not used xxx**
**013: Power On**
**014: Communication error**
**015: Output current detection**

**Note: Frequency priority: Jog→ Preset frequency →External analog frequency signal**

Refer to parameter b55 description for more details.

**b61 AIN signal select**
**000: 0~10V/0~20mA**
**001: 2~10V/4~20mA**

Note: Switch SW2 (V/I signal select) on ***iDrive*** control board must be set to required position
b61 = 000: 0~10V/0~20mA
b61 = 001: 2~10V/4~20mA

**b62 AIN Gain (%) 000 - 200**
**b63 AIN Bias (%) 000 - 100**

1) b64 = 000: 0V (4mA) corresponds to lower frequency limit, 10V (20mA) corresponds to upper frequency limit.

2) b64 = 001: 10V (20mA) corresponds to lower frequency limit, 0V (4mA) corresponding to upper frequency limit.

Fig (1) example settings below:

| | b62 | b63 | b64 | b65 |
|---|---|---|---|---|
| A | 100% | 050% | 000 | 000 |
| B | 100% | 000% | 000 | 000 |

Fig (2) example settings below:

| | b62 | b63 | b64 | b65 |
|---|---|---|---|---|
| C | 100% | 050% | 000 | 001 |
| D | 100% | 000% | 000 | 001 |

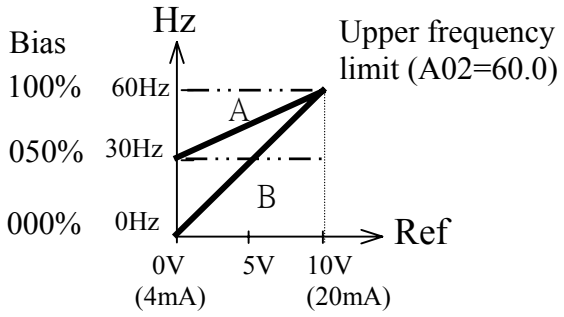



**Fig (1)**

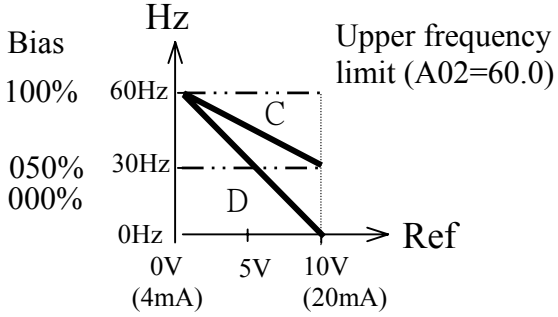



**Fig (2)**

Fig (3) example settings below:

| | b62 | b63 | b64 | b65 |
|---|---|---|---|---|
| E | 100% | 020% | 001 | 000 |

Fig (4) example settings below:

| | b62 | b63 | b64 | b65 |
|---|---|---|---|---|
| F | 100% | 100% | 001 | 001 |

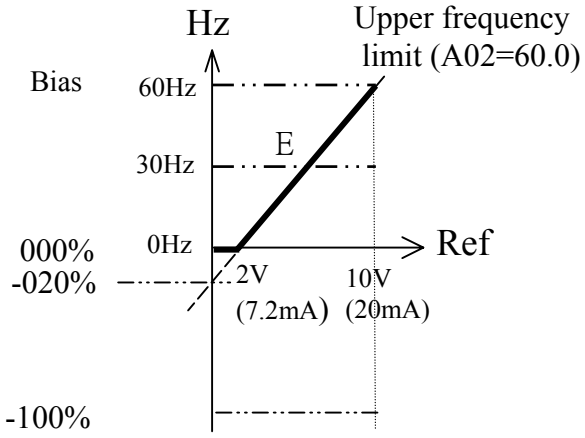



**Fig (3)**

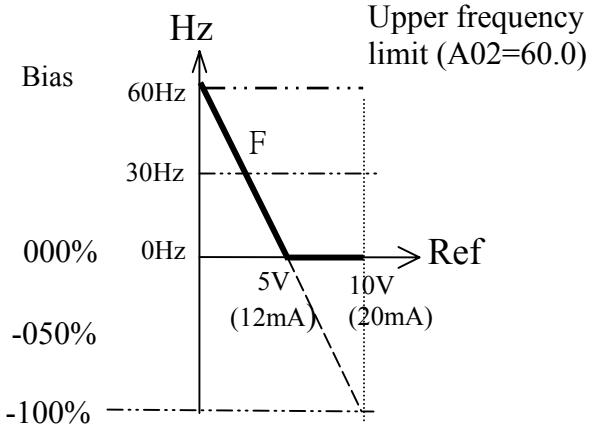



**Fig (4)**

Note: 'Ref' = Analogue frequency reference signal V or I

| |
|---|
| **b64 AIN Bias: 000: Positive 001: Negative** |
| **b65 AIN Signal Slope direction. 000: Positive 001: Negative** |
| **b66 AIN signal scan time confirmation. (mSec × 8): 001 – 100** |

Refer to b62/b63 description

The ***iDrive*** reads A/D average value every b66 x 8mS. The user can set scan interval time according to noise in the operation environment. Increase value of b66 if electromagnetic noise is a problem but note that the inverter response time will be slower.

**b67 PID operation mode**
**000: PID Function disabled.**
**001: PID Control, deviation is derivative controlled**
**002: PID Control, feedback is derivative controlled.**
**003: Same as 001 but (reverse characteristics control).**
**004: Same as 002 but (reverse characteristics control).**

b67 = 001, D is the deviation from (target value – feedback value) in the unit time (b71).
= 002, D is the deviation of feedback value in the unit time (b71).
= 003, D is the deviation of (target value – feedback value) in the unit time (b71).
If the deviation is positive, the output frequency decreases, vice versa.

= 004, D is the deviation of feedback value in unit time (b71).
When the deviation is positive, the output frequency decreases, vice versa.

**b68 Feedback gain : 0.00 - 10.0**

b68 is feedback gain, ie feedback value = detected value × b68.

**b69 P: Proportional gain : 0.00 - 10.0**

b69: Proportional gain for P control.

**b70 I: Integral time (s) : 00.0 - 100**

b70: Integral time for I control

**b71 D: Differential time (s) : 0.00 - 10.0**

b71: Differential time for D control.

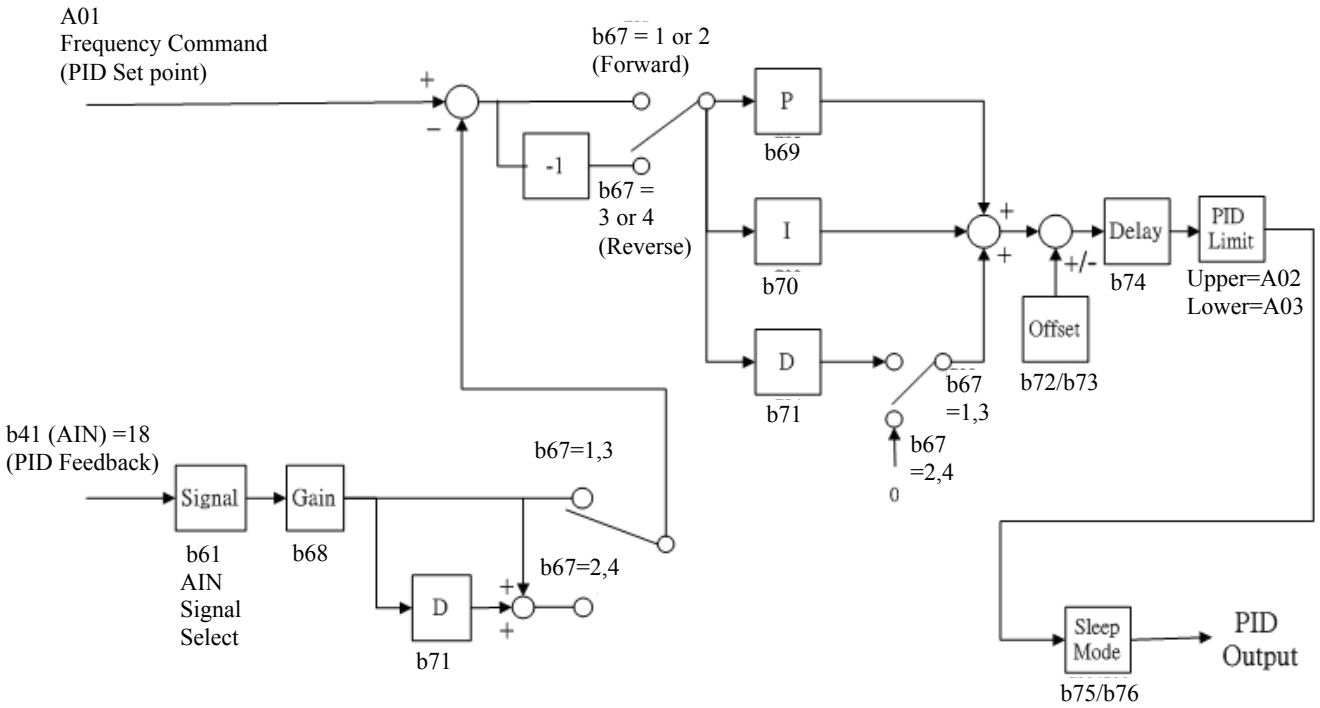
**b72 PID offset** **000: Positive direction**
**001: Negative direction**
**b73 PID offset adjust (%) : 000 ~ 109%**

PID operation result can be adjusted by b73 (b72 effects the polarity of b73).

**b74 PID update time (s) : 00.0 - 02.5**

b74: the refresh time of PID output command.

**Note: PID function is used in flow control, fan air volume control and temperature control. Control flow diagram below:**



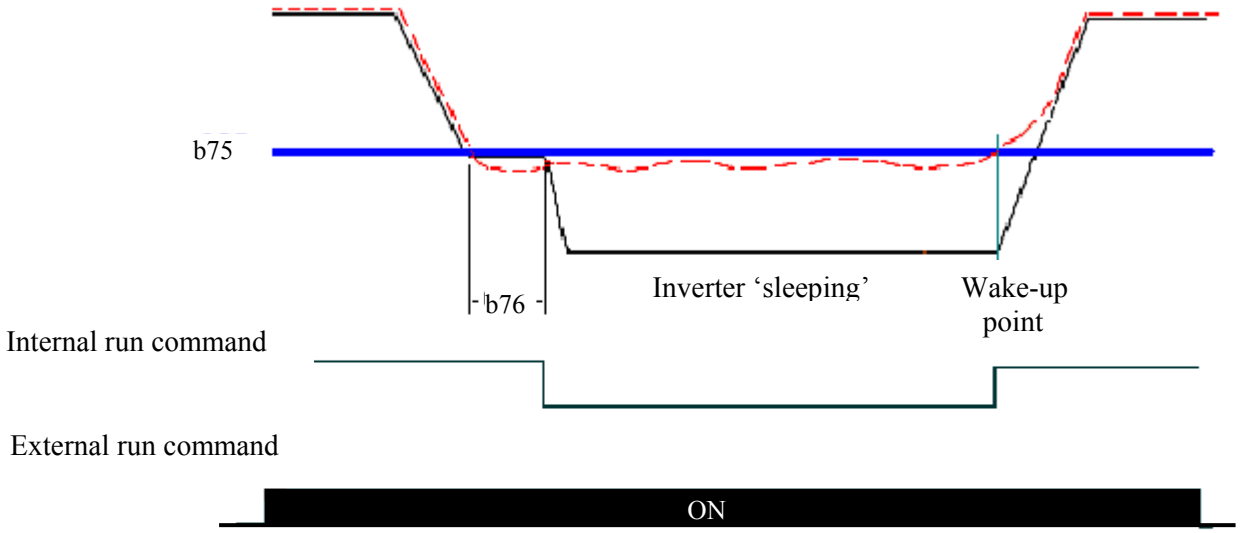

1. In PID mode, select AIN on TM2 as PID feedback signal, Set b41 = 018.
2. The PID set-point control input is set by parameter A01 (selections 000 & 001). This value is stored in b45.

**b75 PID Sleep frequency (Hz) 00.0~200Hz**
**b76 PID Sleep delay time (sec) 00.0~25.5sec**

PID sleep mode can be set by using function codes below: -
b67 = 001~004 (PID Enable)
b41 = 018 (AIN is PID feedback signal)
b45 = PID preset frequency
b75 = sleep start frequency, (Hz)
b76 = PID sleep delay time, (s)

When PID output frequency becomes lower than PID sleep start frequency (b75) for a period of time (b76), the ***iDrive*** output will decelerate to zero speed (Sleep mode). When the PID output frequency becomes higher than the sleep start frequency (b75), the ***iDrive*** output accelerates to PID output frequency (Wake-up mode).

Sleep-mode; Typical example:




***iDrive*** output frequency
PID output
Sleep frequency (b75)

b75: Sleep level
b76: Sleep delay

| | |
|---|---|
| **b77 Inverter Communication Address:** | **001~ 254** |

b77 sets the communication address for a specific inverter when multi-inverters are controlled by serial communication method.

| | |
|---|---|
| **b78 Baud Rate (bps)** | **000: 4800**<br>**001: 9600**<br>**002: 19200**<br>**003: 38400** |

| | |
|---|---|
| **b79 Stop bit** | **000: 1 Stop bit**<br>**001: 2 Stop bit** |

| | |
|---|---|
| **b80 Parity bit** | **000: No parity**<br>**001: Even parity**<br>**002: Odd parity** |

| | |
|---|---|
| **b81 Data bits** | **000: 8 bits data**<br>**001: 7 bits data** |

**1. RS-485 communication:** (requires RS485 option card)(Option)

**1 to 1 control**: PC, PLC or other device can control one ***iDrive*** on the communication link at any given time. Each ***iDrive*** requires that b77 is set between 001~254. Only the ***iDrive*** with the correct address will reply to the master with an Acknowledge/Not Acknowledge message.

**1 to many control:** PC, PLC or other device can send a 'broadcast' message to all ***iDrive's*** on the communication link by sending to address 000. In this transmission mode all of the connected ***iDrive's*** each receive the same command (regardless of setting b77 on each ***iDrive***) but do not reply to the master.

**2. RS-232 communication:** (requires RS232 port device)(Option)
1 to 1 control: PC or PLC or controller controls one inverter (b77 is set to 001~254).

※**Note: a**. The baud rate (b78) and communication format (b79/b80/b81) of PC (or PLC or other controller) and ***iDrive*** should be the same.

**b**. The ***iDrive*** will validate any modified parameters after the parameters are modified by PLC or PC etc.

**c**. Communication protocol: refer to EDX communication protocol description.

**d**. Parameters b77~b81 cannot be changed in communication mode.

**b82 Communication error detection time (s)**
**b83 Communication error – inverter response**

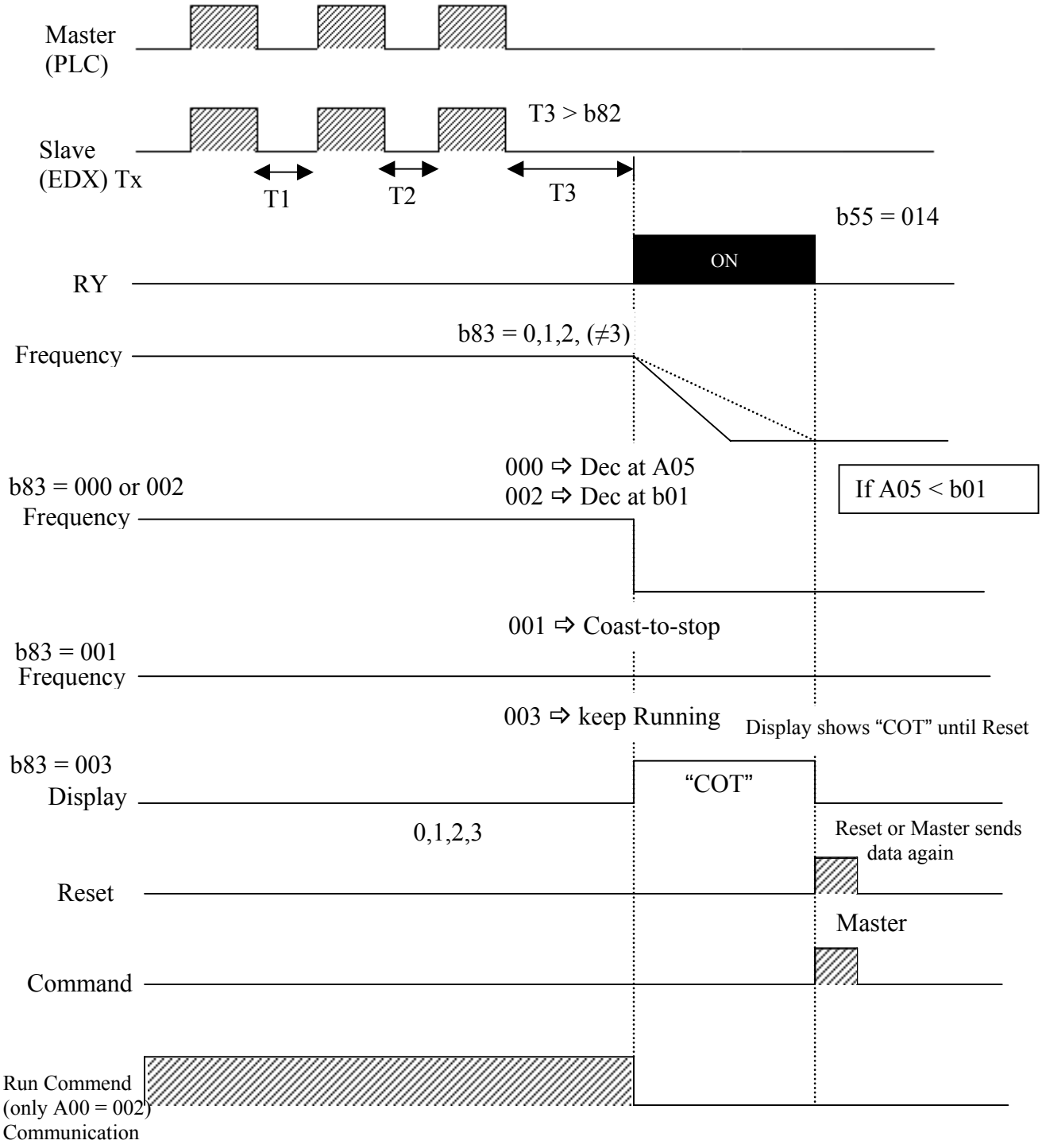
(1) Time-out detection time: 00.0~25.5sec; setting 00.0 sec: disable time-out function.
Default = 00.0sec
*Cannot be changed in communication mode.

(2) Time-out operation selection:
000 : Deceleration to stop (A05 : Deceleration time 1).
001 : Coast-to-stop.
002 : Deceleration to stop (b01 : Deceleration time 2).
003 : Continue operating (Ignore error).
Default = 000

*Cannot be changed in communication mode.

See Communication error timing diagram following.

b82/b83 Communication error timing diagram




## b84 Local / Remote control select

- **Local mode**

  Run command

  Only Run/Stop on the keypad can control ON / OFF and the setting of A00 has no relationship.

Frequency command

When b84 = 000: only UP/DOWN on the keypad can control and the setting of A01 has no No relationship.

When b84 = 001: only VR on the keypad can control and the setting of A01 has no relationship.

• **Remote mode**

Run command from the run parameter A00

Frequency command from the frequency parameter A01

**Tip!**
Quick changeover between **LOCAL** and **REMOTE** control modes can be made by simultaneously pressing the **▼/RESET** and the **DATA/ENT** keys on keypad. Modes can be 'toggled' by this method. Note that the motor must be stopped before changeover is allowed.

| | |
|---|---|
| **b85 Remote keypad control** | **000: Disabled**<br>**001: Enabled: Operation according to b92 if cable fault**<br>**002: Enabled: Operation at the last set frequency if cable fault**<br>(Stop mode by ***iDrive*** Keypad or parameter A00 as appropriate). |

When b85 = 001, the following parameters will be auto set:

***iDrive*** serial communication address: = 1 Data bits: 8 bit
Baud rated (bps): 38400 Parity: no parity
Stop bits: 1 bit

**Note: 1. Connect remote keypad in stop mode; control priority is with remote keypad**
**2. If the remote keypad is connected in run mode, it will not be effective until the inverter is in stop mode.**

**b86 Carrier frequency (kHz) : 004-016**
**Set this parameter from 4-16kHz as required. (Default = 10 kHz).**

**Note: In situations where there is excessive audible noise from the motor or it is required to reduce electrical interference (RFI) from the inverter caused by use of long cable then the carrier frequency can be adjusted.**

- To reduce electromagnetic interference due to long cable etc, decrease carrier frequency.
- To reduce motor audible noise, increase carrier frequency.

| b86 | Carrier frequency | b86 | Carrier frequency | b86 | Carrier frequency | b86 | Carrier frequency |
|---|---|---|---|---|---|---|---|
| 004 | 4kHz | 008 | 8kHz | 012 | 12kHz | 016 | 16kHz |
| 005 | 5kHz | 009 | 9kHz | 013 | 13kHz | | |
| 006 | 6kHz | 010 | 10kHz | 014 | 14kHz | | |
| 007 | 7kHz | 011 | 11kHz | 015 | 15kHz | | |

**Note: If the carrier frequency is increased the output current from the inverter must be de-rated according to the following table.**

**Output current (A) derating with increasing carrier frequency**

| EDX- / Carrier frequency | 020-11, 020-21, 020-23 | 040-11, 040-21, 040-23 | 075-11, 075-21, 075-23 | 150-21, 150-23 | 220-21, 220-23 | 075-43 | 150-43 | 220-43 |
|---|---|---|---|---|---|---|---|---|
| 4~10kHz | 1.7 | 3.1 | 4.2 | 7.5 | 10.5 | 2.3 | 3.8 | 5.2 |
| 12kHz | 1.7 | 3.1 | 4.2 | 7.5 | 10.5 | | | |
| 14kHz | 1.6 | 3.0 | 4.0 | 7.0 | 10 | | | |
| 16kHz | 1.5 | 2.8 | 3.8 | 6.8 | 9.8 | | | |

| | |
|---|---|
| **b87 Cooling fan control** | **000: Auto-run by inverter temperature**<br>**001: Run when inverter output is ON**<br>**002: Always running.**<br>**003: Always stopped.** |

1.) b87 = 000: The fan is thermostatically controlled in order to extend the life of the fan.
2.) b87 = 001: The fan runs when the ***iDrive*** output is ON.
3.) b87 = 002: The fan runs when power supply is ON (***iDrive*** output OFF or ON).
**3.)** b87 = 003: The fan does not run at any time **(care needed as damage to *iDrive* could occur!)**

| | |
|---|---|
| **b88 Motor rotating direction** | **000: Forward**<br>**001: Reverse** |

Only when A00 = 000 (***iDrive*** operation is controlled by Keypad).

**b89 Inverter capacity code** (Input voltage – Output HP/kW)

| b89 code | ***iDrive*** rated V & HP / kW |
|---|---|
| 1P2 | 110V - 0.25 / 0.18 |
| 1P5 | 110V - 0.5 / 0.37 |
| 101 | 110V - 1 / 0.75 |
| 2P2 | 220V – 0.25 / 0.18 |
| 2P5 | 220V - 0.5 / 0.37 |
| 201 | 220V - 1 / 0.75 |
| 202 | 220V – 2 / 1.5 |
| 203 | 220V – 3 / 2.2 |
| 401 | 400V – 1 / 0.75 |
| 402 | 400V – 2 / 1.5 |
| 403 | 400V – 3 / 2.2 |

Examples:

2P5 =
***iDrive*** 220V input / 0.5HP (0.37kW) rated output power

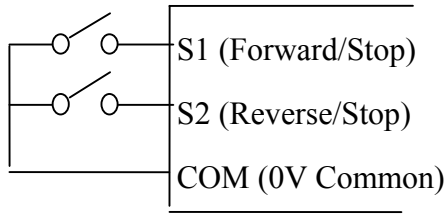
402 =
***iDrive*** 400V input / 2.0HP (1.5kW) rated output power

| **b90 : External control operation mode** | **000: Forward/ Stop-Reverse/Stop**<br>**001: Run/ Stop-Forward/Reverse**<br>**002: 3-wire—Run/ Stop** |
|---|---|

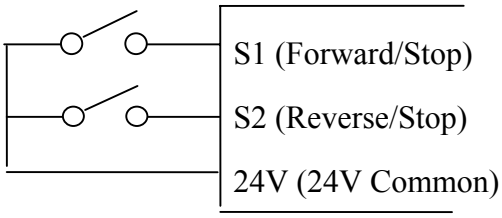
1.) b90 is only available when A00 = 001 (control from terminals TM2).
2.) When both forward and reverse commands are ON, output is stopped.

Parameter b90 = 000

(1). NPN input signal:

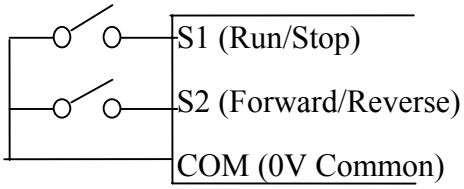



(2). PNP input signal:

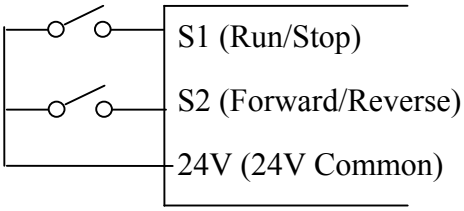



Parameter b90 = 001

(1). NPN input signal:

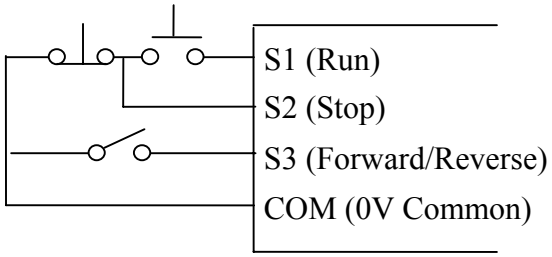



(2). PNP input signal:

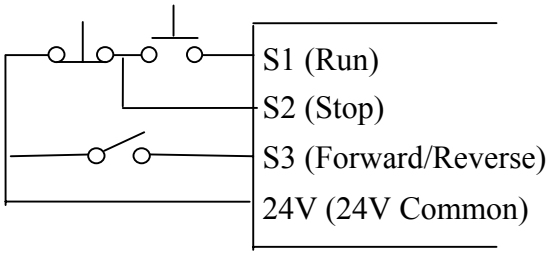



Parameter b90 = 002

(1). NPN input signal:

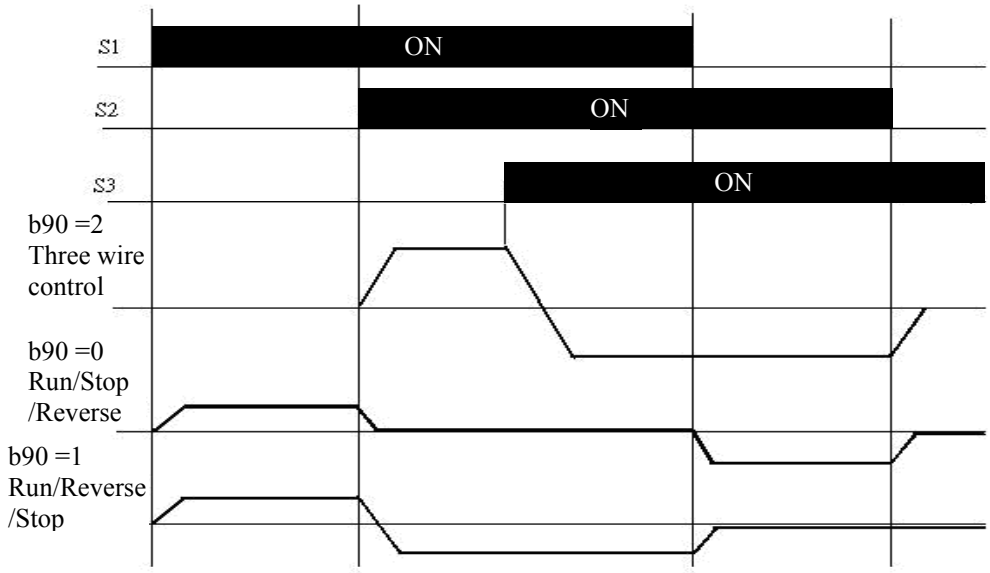



(2). PNP input signal:




**Note:- In 3 wire control mode terminals S1-S3 are used , therefore parameters b35 ~ b37 are ineffective.**

Parameter b90 timing and operation diagram




**Note: If b91 = 001, reverse command is disabled.**

| | |
|---|---|
| **b91 Reverse run** | **000: Reverse enable**<br>**001: Reverse disable** |

A00 = 000 and b91 = 001, b88 (motor direction) disabled, the ***iDrive*** is set to forward operation.
A00 = 001 or 002, and b91 = 001, reverse command is disable.

| | |
|---|---|
| **b92 Stopping method** | **000: Decelerate to stop**<br>**001: Free run (Coast) to stop** |

1.) b92 = 000: after receiving stop command, the motor will decelerate (ramp) to stop according to setting of A05.
2.) b92 = 001: after receiving stop command, the motor will free-run (coast) to stop.

| | |
|---|---|
| **b93 Status monitoring display** | **000: Disable**<br>**001: Enable.** |

b93 = 001 display shows Output Frequency, Motor Current, Output Voltage, DC Link Voltage, or PID feedback.

| | |
|---|---|
| **b94 Copy module** | **000: Copy module Disabled**<br>**001: Copy to module from *iDrive* (Read)**<br>**002: Copy to *iDrive* from module (Write)**<br>**003: Read / write check (Compare parameters).** |

Note: Parameter copy facility is applicable only to ***iDrives*** with the same voltage and kW capacity.

| | |
|---|---|
| **b95 Factory default** | **010: Reset all parameters to factory default (50Hz)**<br>**020: Reset all parameters to factory default (60Hz)** |

| | |
|---|---|
| **b96 Software version** | **Displays inverter software version (Read only)** |

| |
|---|
| **b97 Fault / Alarm log (last 3 alarms) – (read only)** |

# Chapter 5 Troubleshooting and Maintenance

## 5.1 Fault indication and remedy

### 5.1.1 Fault / Error display and Diagnostics

1. Non-resetable errors

| | Display | Error | Cause | Remedy |
|---|---|---|---|---|
| | EPR | Memory problem | EEPROM fault | Contact your supplier |
| @ | OU | Over voltage during stopping | Detection circuit malfunction | Contact your supplier |
| @ | LU | Under voltage | 1. Power voltage too low<br>2. Supply fuse blown.<br>3. Detection circuit malfunction | 1. Check if the power voltage is correct<br>2. Replace the fuse<br>3. Contact your supplier |
| @ | OH | The inverter has overheated | 1. Detection circuit malfunction<br>2. Ambient temperature too high or poor ventilation | 1. Improve ventilation conditions<br>2. Contact your supplier |
| | CTR | Current transducer detection error | Current transducer or circuit error. | Contact your supplier |

Note： 〝@〞 Alarm relay contacts do not operate.

## 1. Errors which can be reset manually and automatically

| Display | Error | Cause | Remedy |
|---|---|---|---|
| OCS | Over-current at start-up | 1. The motor winding and frame short circuit<br>2. Motor cable ground fault<br>3. Power module is damaged | 1. Check the motor<br>2. Check the motor wiring<br>3. Contact your supplier |
| OCD | Over-current at deceleration | Deceleration time is too short | Set a longer deceleration time |
| OCA | Over-current at acceleration | 1. Acceleration time is too short<br>2. The capacity of the motor higher than the capacity of the inverter<br>3. Short circuit between the motor winding and frame.<br>4.Short circuit between motor wiring and earth<br>5. IGBT module is damaged | 1. Set a longer acceleration time<br>2. Replace inverter with the same capacity as that of the motor<br>3. Check the motor windings<br>4. Check the motor wiring<br>5. Contact your supplier |
| OCC | Over-current during running | 1. Transient load change<br>2. Transient power change<br>3. Motor or wiring fault | 1/2. Increase *iDrive* capacity<br>3. Check the motor & wiring |
| OUC | Over voltage during operation/ deceleration | 1. Deceleration time setting is too short or large load inertia<br>2. Power voltage varies widely | 1. Set a longer deceleration time<br>2. Connect a brake module & suitable braking resistor<br>3. Use an ACR reactor on the power input side<br>4. Increase *iDrive* capacity |
| OHC | High heat sink temperature during operation | 1. Heavy load<br>2. Ambient temperature too high or poor ventilation | 1. Check if there are any problems with the load<br>2. Increase *iDrive* capacity<br>3. Improve ventilation conditions<br>4. Check *iDrive* cooling fan is operating (if fitted)<br>5. Check the setting value of parameter b87 |

**3. Errors which can only be recovered manually but cannot be auto-recovered**

| Display | Error | Cause | Remedy |
|---|---|---|---|
| OC | Over-current during stopping | 1. Detection circuit malfunction<br>2. Poor connection on CT signal cable | Contact your supplier |
| OL1 | Motor overload | 1. Heavy load<br>2. Incorrect setting of b09 | 1. Increase motor and *iDrive* capacity<br>2. Set b09 correctly according to motor nameplate. |
| OL2 | Inverter overload | Load too big on *iDrive* | Increase *iDrive* capacity or reduce load |
| OCL | Over-current limit | 1. Heavy Load<br>2. Continuous over load<br>3. Shock Load<br>4. Instantaneous over-current due to motor or wiring fault | 1. Increase motor capacity<br>2. Increase ACC/ DEC time A04 ~ A05, etc<br>3. Set stall prevention function b23 ~ b29<br>4. Check motor & wiring |
| LUC | Under voltage during operation | 1. Power voltage too low<br>2. Power voltage momentary dip | 1. Check input voltage<br>2. Use an ACR on the power input side & record input voltage over time period<br>3. Increase *iDrive* capacity |

### 5.1.2 Set up & Interface Errors.

| Display | Error | Description |
|---|---|---|
| SP0 | Zero speed stop | Displayed when set frequency <0.1Hz<br>Increase frequency reference signal. |
| SP1 | Fail to start directly | 1. If the *iDrive* is set to external control mode (A00 = 001), and direct start is disabled (b33=001), the *iDrive* cannot be started and will flash STP1 when Run command in ON when power is applied (see descriptions of b33).<br>2. Direct start is possible when b33 = 000. |
| SP2 | Keypad emergency stop | 1. If the *iDrive* is set to external control mode (A00=001) the *iDrive* will stop according to the setting of b92 when stop key is pressed. STP2 flashes after stop. Turn the Run switch to OFF and then ON again to restart the *iDrive*.<br>2.If the *iDrive* is in communication mode and Stop key is enabled, the *iDrive* will stop as set by b92 when Stop key is pressed during operation and then flashes STP2.<br>The PLC must send a Stop command followed by a Run command to the *iDrive* for it to be restarted. |
| E.S. | External emergency stop | The *iDrive* will decelerate to stop and then flashes E.S. when there is an external emergency stop signal via the multi-function input terminals (see descriptions of b35 ~ b38). |
| b.b. | External base block | The *iDrive* stops immediately and then flashes b.b. when external base block is input through the multi-functional input terminal (see descriptions of b35 ~ b38). |
| PID | PID feedback signal fault | PID feedback signal circuit error detection |
| - - - | REMOTE KEYPAD cable broken | 1. REMOTE KEYPAD is not connected with inverter, such a display will occur.<br>2. REMOTE KEYPAD and main KEYPAD both display such signal means a communication error.<br>Note: It is normal for the main *iDrive* keypad to display this code when the REMOTE KEYPAD is connected and functioning normally |

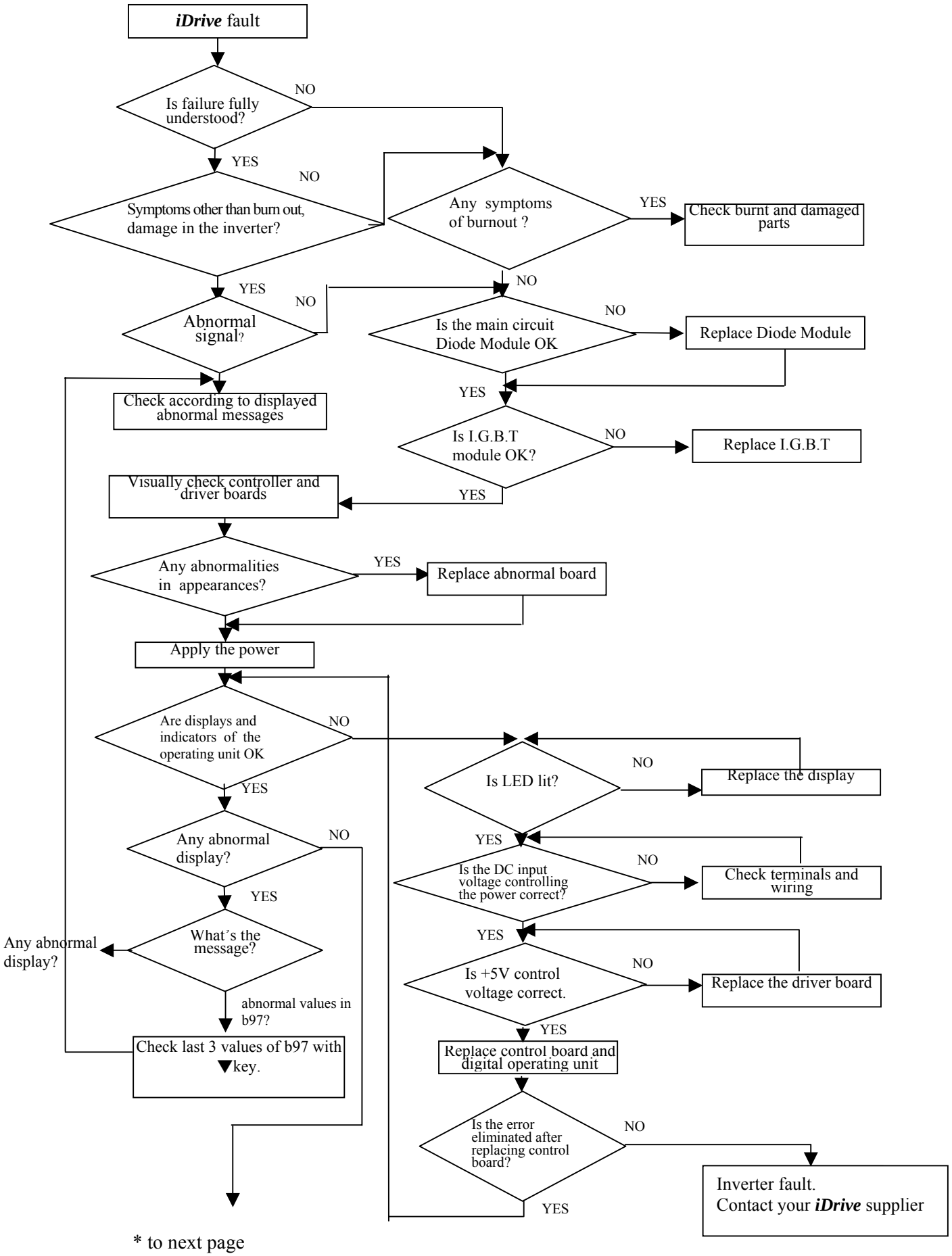
### 5.1.3 Keypad operation error description

| Display | Error | Cause | Remedy |
|---|---|---|---|
| Er1 | Key operation error | 1. Press▲ or ▼ keys when A01 > 0 or in speed operation.<br>2. Attempt to modify parameters, which cannot be modified during Run (see parameter list). | 1. ▲ or ▼ keys can be used to modify frequencies only when A01 = 0.<br>2. Modify them after Stop. |
| Er2 | Parameter setting error | 1. A02 is in ranges of b20±b22 or b21±b22<br>2. A02 < A03 | 1. Change A02 value<br>2. Make A02 > A03 |
| Er5 | Modification of parameter is not allowed during communication | 1. Control command given when communications are disabled<br>2. Attempt to modify b77 ~ b81 during communication. | Set up parameters before communication begins. |
| Er6 | Communication failure | 1. Incorrect cabling.<br>2. Incorrect settings of communication parameters.<br>3. Check sum error.<br>4. Incorrect communication program. | 1. Check connections.<br>2. Check b77 ~ b81 |
| Er7 | Incorrect parameter settings | 1. Attempt to modify b89<br>2. Voltage and current detection circuits work abnormally. | 1. Reset *iDrive.*<br>2. If not possible contact your supplier |
| EP1 | Parameter set error, Copy Unit failure | 1. If b94 = 1 or 2, and cannot connect with Copy Unit.<br>2. Copy Unit failure.<br>3.The voltage and capacity parameter of Copy Unit & the *iDrive* are different. | 1. Modify b94<br>2. Change Copy Unit<br>3. Copy the same *iDrive* parameter for voltage and capacity, then WRITE. |
| EP2 | Parameters do not match | When copying parameters to *iDrive* – verification code that parameters do not match. | 1. Change Copy Unit<br>2. The voltage and capacity parameter in Copy Unit are different to *iDrive* |

## 5.2 General functional troubleshooting

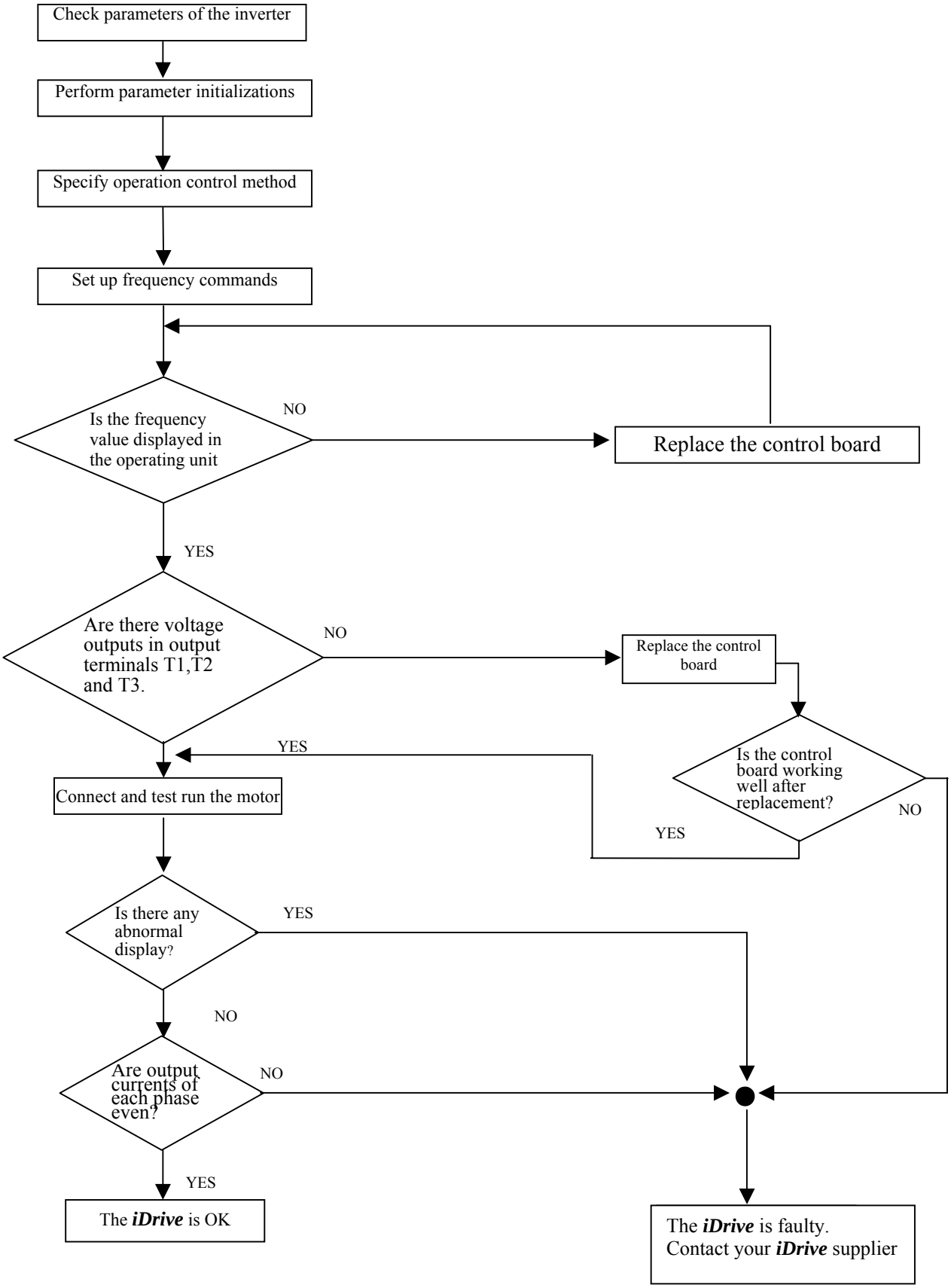
| Status | Checking point | Remedy |
|---|---|---|
| Motor can not run | Is power applied to L1, L2, and L3(N) terminals (is the charging indicator lit)? | □Is the power applied?<br>□Turn the power OFF and then ON again.<br>□Make sure the power voltage is correct.<br>□Make sure terminals are fully tightened. |
| | Is there voltage output at T1, T2, and T3 terminals? | □Turn the power OFF and then ON again. |
| | Is the motor mechanically overloaded? | □Reduce the load to allow the motor to rotate. |
| | Are there any abnormalities in the inverter? | See error descriptions to check wiring and correct if necessary. |
| | Is forward or reverse run command issued? | |
| | Is there an analog input signal? | • Is analog frequency input signal wiring correct?<br>□Is voltage of frequency input correct? |
| | Is operation mode setting correct? | • Check parameter setting |
| Motor runs in wrong direction | Is output wiring on terminals T1, T2, and T3 correct? | □Wiring must match U, V, and W terminals of the motor. |
| | Is wiring for forward and reverse signals correct? | □Check wiring is correct if necessary. |
| The motor speed can not vary | Are wiring for output terminals T1, T2, and T3 correct? | □Check wiring is correct if necessary. |
| | Is the setting of frequency command source correct? | □Check the operation mode setting at the keypad. |
| | Is the mechanical load too heavy? | □Reduce load. |
| Motor running speed too high or too low | Is the setting of operation mode correct? | □Confirm the motor's specifications. |
| | Is the load too heavy? | □Confirm the gear ratio. |
| | Are specifications of the motor (poles, voltage…) correct? | □Confirm the highest output frequency. |
| Motor speed varies unusually | Is the gear ratio correct? | □Reduce the load. |
| | Is the setting of the highest output frequency correct? | □Minimize the variation of the load.<br>□Increase capacities of the inverter and the motor. |
| | Is the load too heavy? | □Add an AC reactor at the power input side if using single-phase power.<br>□Check wiring if using three-phase power. |

## 5.3 *iDrive* Troubleshooting Flowcharts

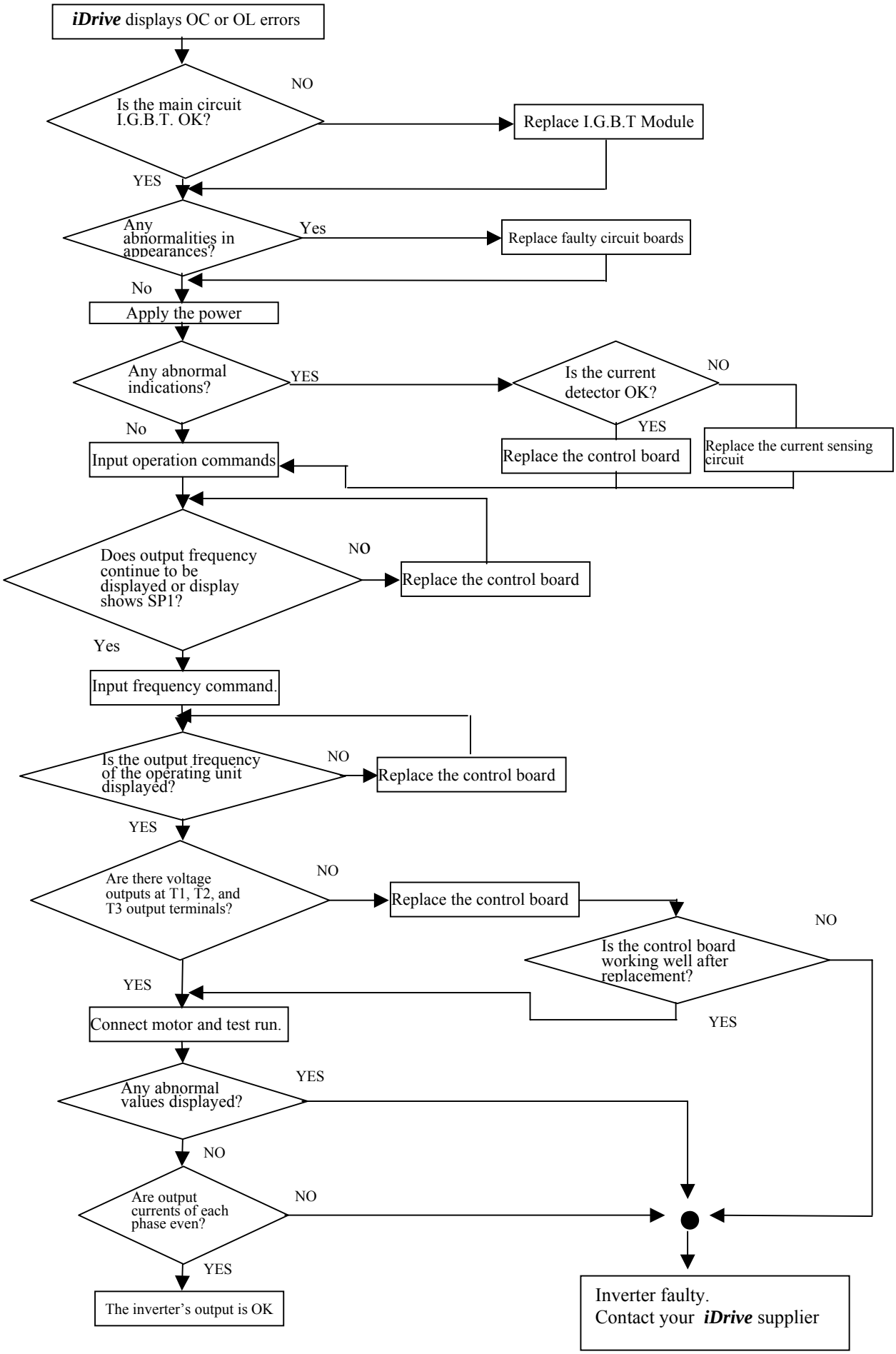



* to next page

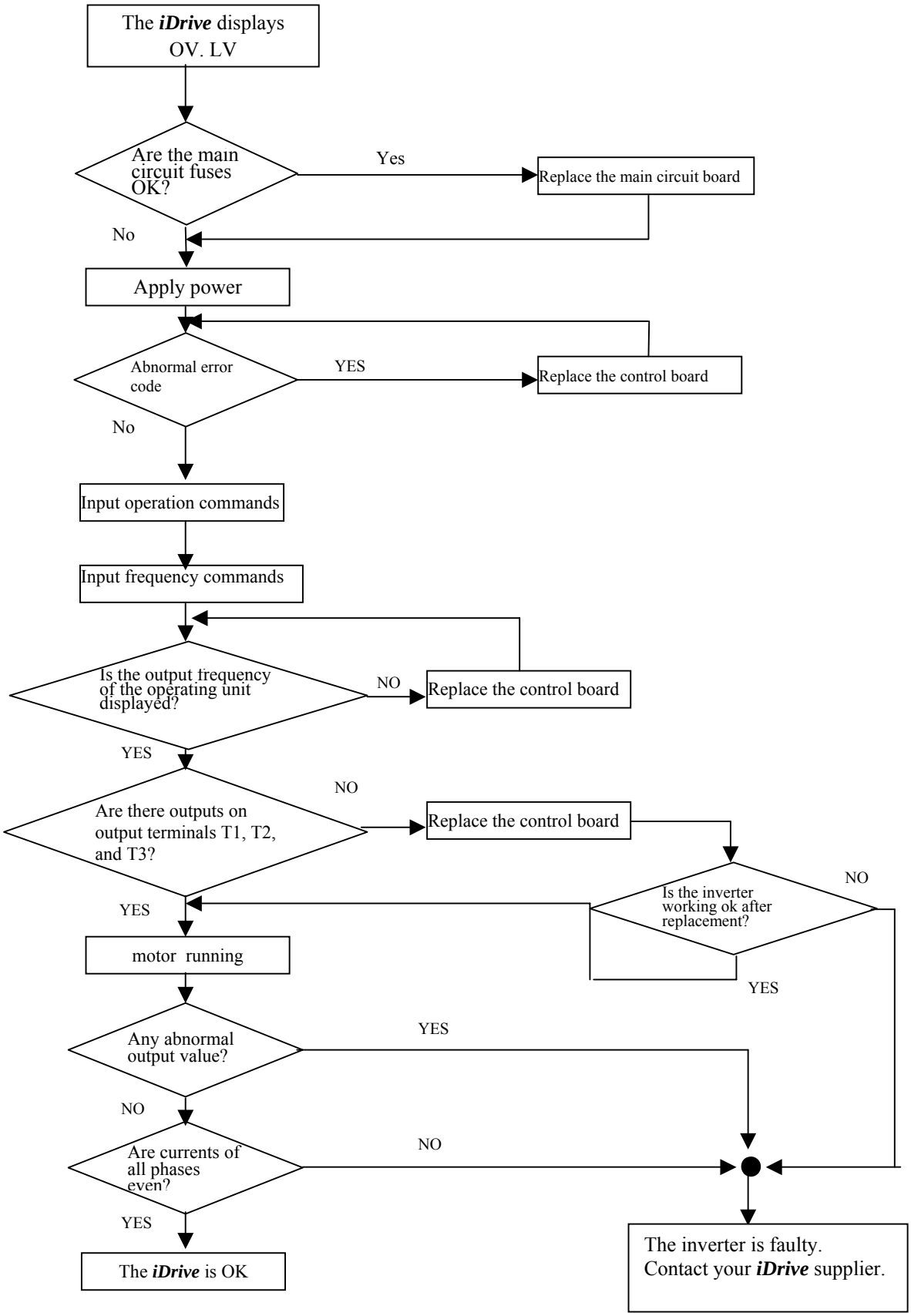
* to previous page



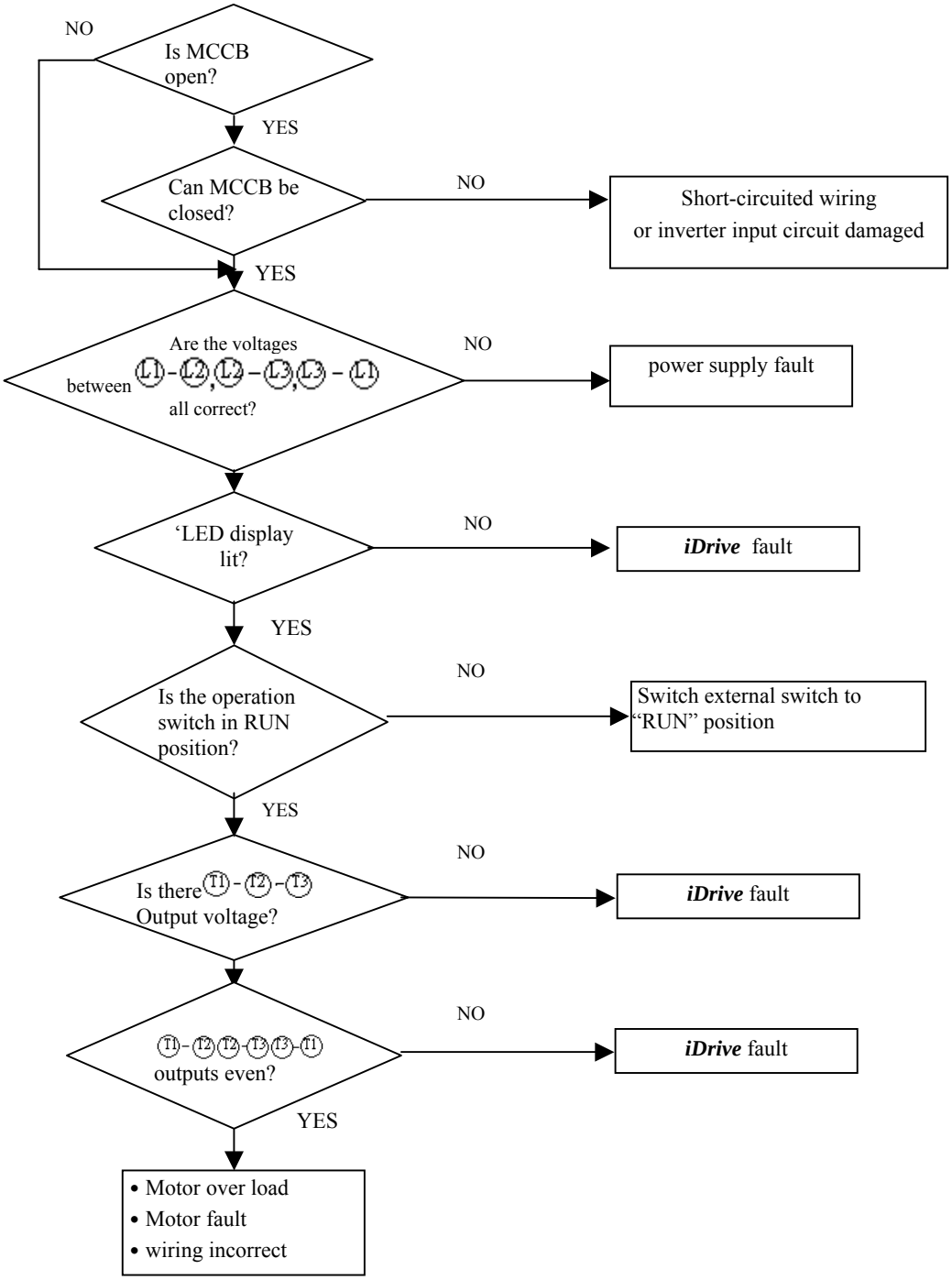
## Troubleshooting for OC, OL error displays



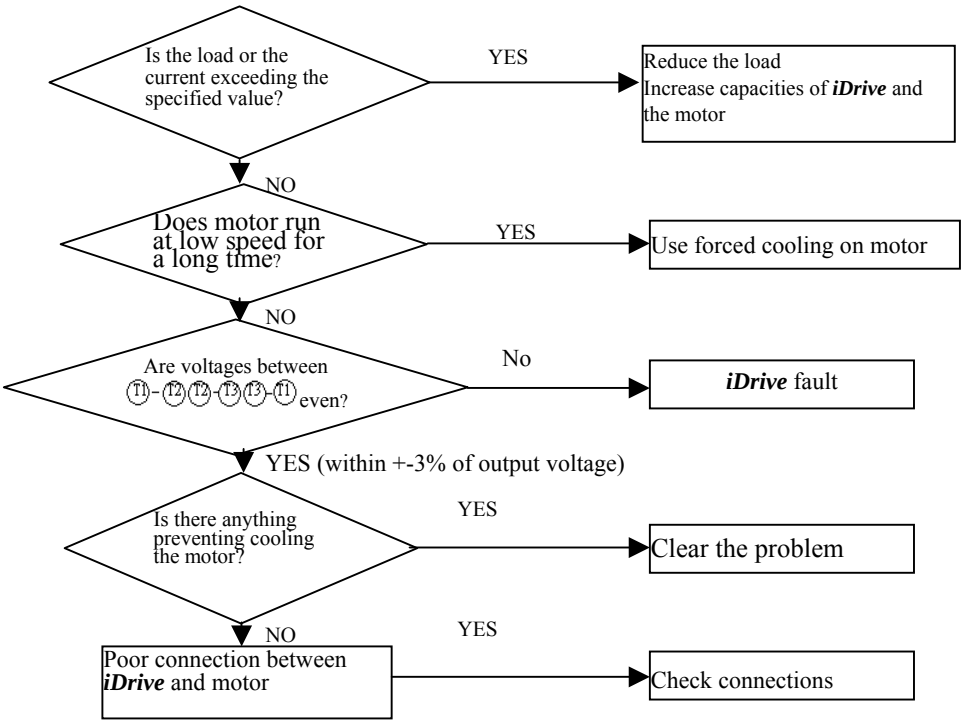
**Troubleshooting for OV, LV error display**



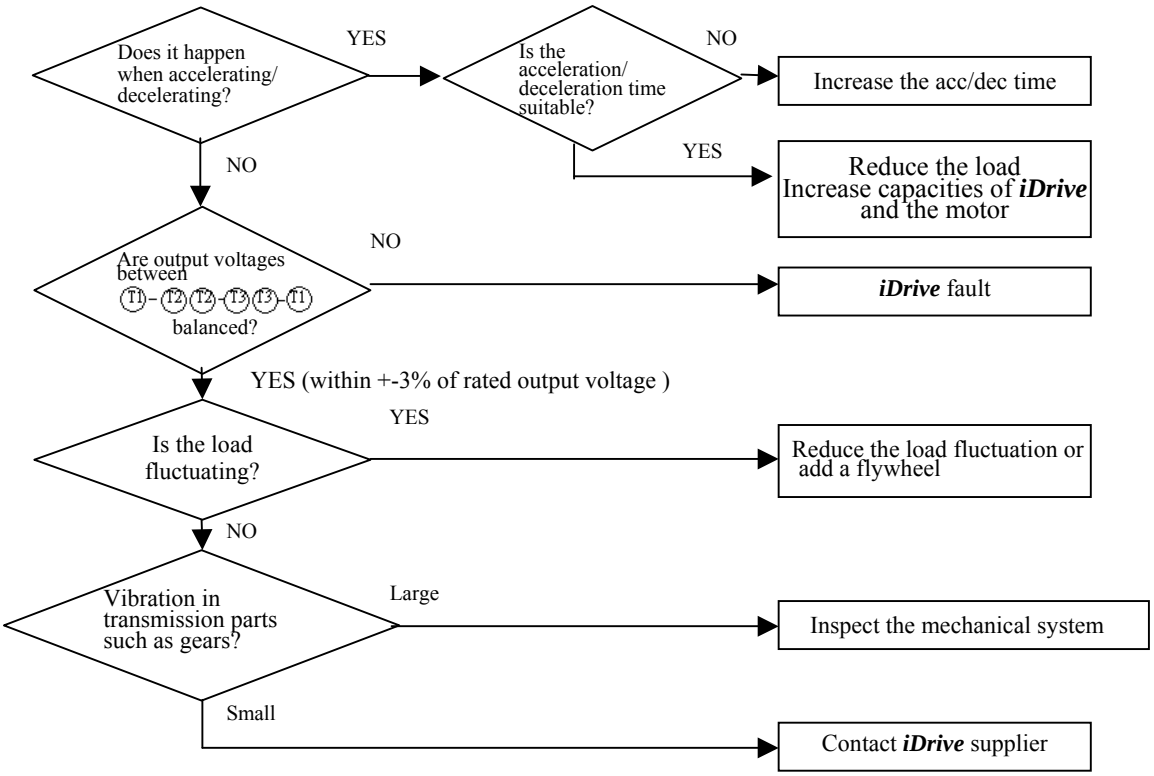
**The *iDrive* will not power-up / Motor will not run**



### Motor overheating




## Motor runs unevenly



## 5.4 Routine periodic checks

To ensure stable and safe operation, check and maintain the inverter regularly.
The table below lists the items requiring checking to ensure safe operation.
Check these items 5 minutes after the "Charge" indicator goes out to prevent service persons from being hurt by residual electric power.

| Items | Details | Checking period | | Methods | Criteria | Remedies |
|---|---|---|---|---|---|---|
| | | Week | Year | | | |
| Circumstances around the machine | Confirm the temperature and humidity around the machine | ○ | | Measure with thermometer and hygrometer according to installation notices. | Temperature: -10 – 50°C<br>Humidity: Below 95% RH | |
| | Are there inflammable materials in proximity? | ○ | | Visual check | No foreign matters | |
| Installation and grounding of the inverter | Any unusual vibration from the machine | ○ | | Visual, hearing | No foreign matters | Secure screws |
| | Is the grounding resistance / earth-loop impedance correct? | | ○ | Measure the resistance | According to national regulations | Improve the grounding path |
| Input power voltage | Is the voltage of the main circuit correct? | | ○ | Measure the voltage with a multi-meter | Voltage must conform with the specifications | Improve power supply |
| External terminals and internal mounting screws of the inverter | Are secure parts loose? | | ○ | Visual check<br>Check with a screwdriver<br>(Make sure power is OFF first) | No abnormalities or cross-threading | Secure or send back for repair |
| | Is the terminal base damaged? | | ○ | | | |
| | Obvious corrosion? | | ○ | | | |
| Internal wiring of the inverter | Trapped or over-heated? | | ○ | Visual check | No abnormalities | Inform your supplier |
| | Any damage of to the insulation? | | ○ | | | |
| Heat sink | Build-up of dust deposits | ○ | | Visual check | No abnormalities | Clean away dust |
| Printed circuit board | Build-up of conductive metal or oil sludge | | ○ | Visual check | No abnormalities | Clean up or replace the circuit board |
| | Discolored, overheated, or burned parts | | ○ | | | |
| Cooling fan | Check if operating ok or unusual vibration and noise | ○ | | Visual or hearing check | Clean, quiet, operating OK | Replace the cooling fan |
| | Build-up of dust deposits | ○ | | Visual check | | Clean |
| Power component | Build-up of dust deposits | | ○ | Visual check | No abnormalities | Clean up |
| | Check circuit between terminals | | ○ | Measure with a multi-tester (diode checker) | No short circuit or damage to input /output circuits | Replace power component or inverter |
| DC Link Capacitor(s) | Any unusual odor or leakage of electrolyte | | ○ | Visual check | No abnormalities | Replace capacitor or inverter |
| | Any splits / swelling to case or end caps? | | ○ | | | |
| | High temperatures? | | ○ | | | |

## 5.5 Maintenance and inspection

The ***iDrive*** doesn't need daily inspection and maintenance.
To ensure long-term reliability, follow the instructions below when performing regular inspection.

ALWAYS turn the power off and wait for the keypad LED display to extinguish before inspection or maintenance begins to avoid potential shock hazard caused by high residual charge in the DC link capacitors.
If in doubt wait 10 minutes after switching off power supply, then test across terminals + and – with a multi-meter for the presence of DC voltage.

(1) Clean up any accumulation of dust or foreign matter inside the inverter.

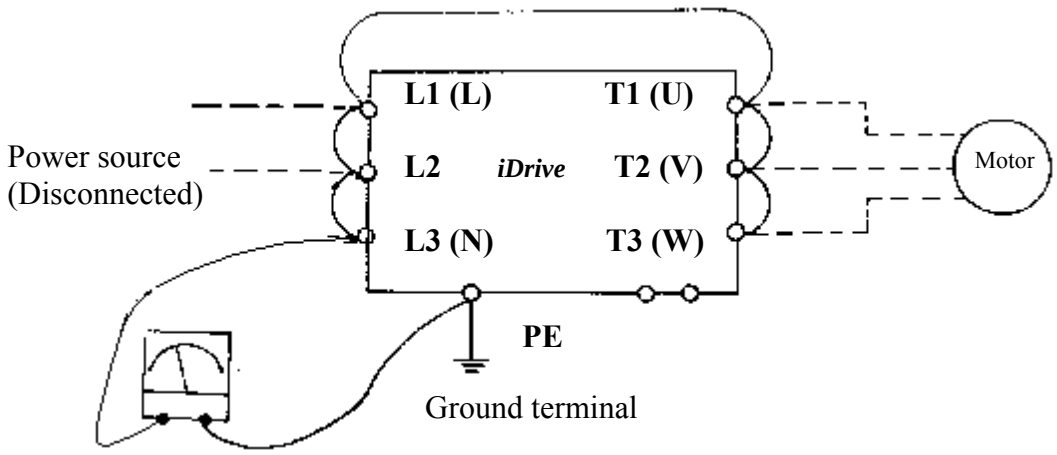
(2) Check if there are any loose terminal screws and securing screws. Tighten all loose screws.

(3) Insulation tests

(a) Disconnect all leads connecting ***iDrive*** with external circuits when performing insulation tests.

(b) Internal insulation test should be performed on the main circuit of the ***iDrive*** only. Use a high resistance 500VDC meter with insulating resistance higher than 5MΩ.

See diagram below: -



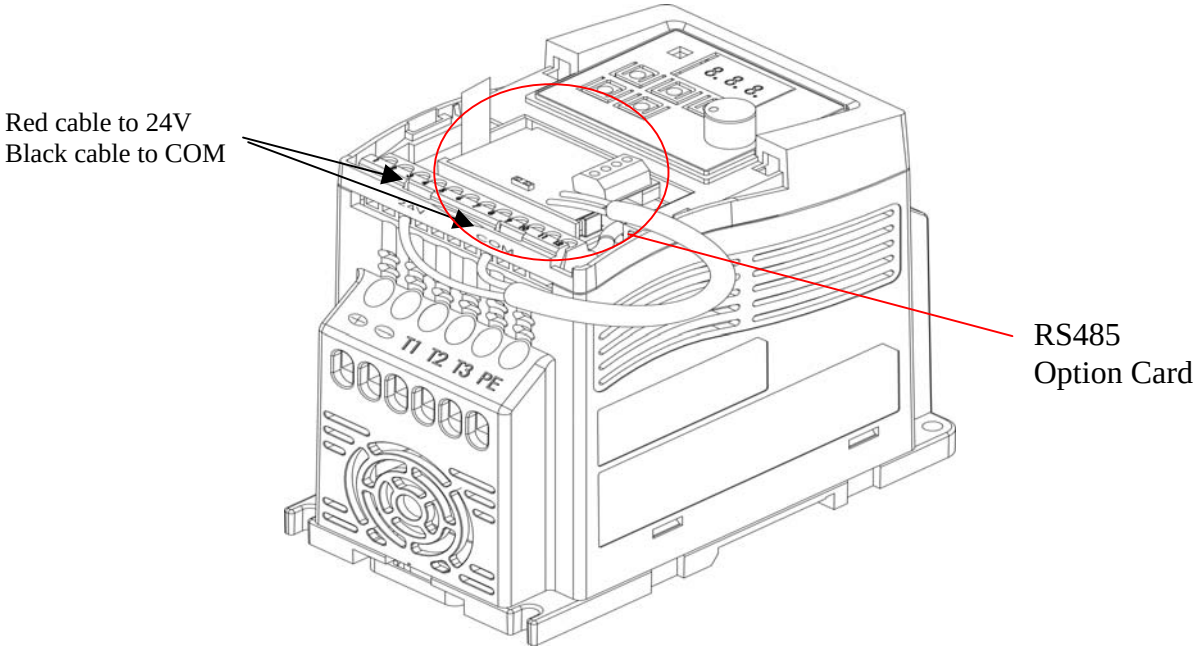

DC-500V high resistance meter

**Caution! Do not perform this test on the control circuit or damage will occur.**

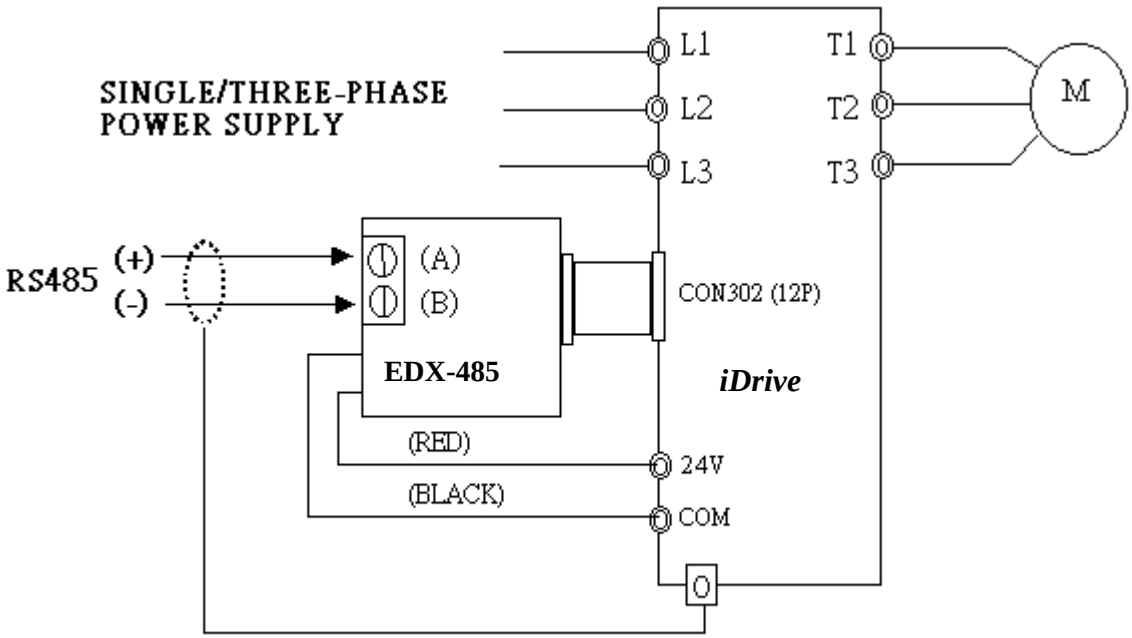
# Chapter 6 Options

## 6.1 Option cards

### 6.1.1 RS-485 option card (EDX-485)

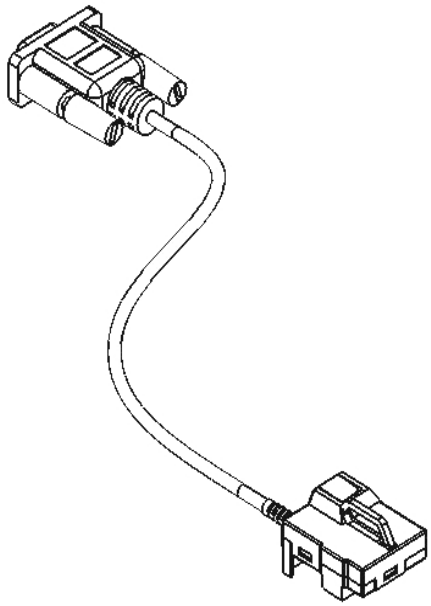



EDX-485 connection diagram:

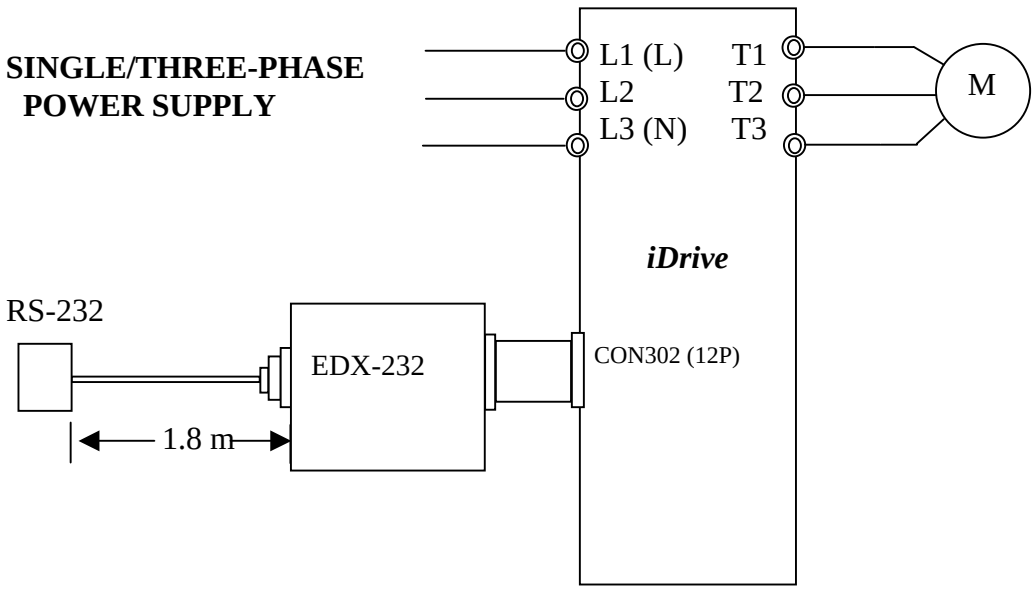



Note :
In order to avoid external interfere with option card, fit top cover to the main unit.
Use isolated RS232 / RS485 converter connecting with PC and option card to avoid damaging configuration.

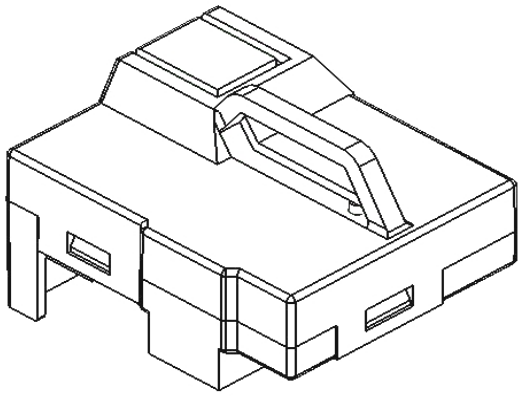
### 6.1.2 RS-232 option card and cable (EDX-232)



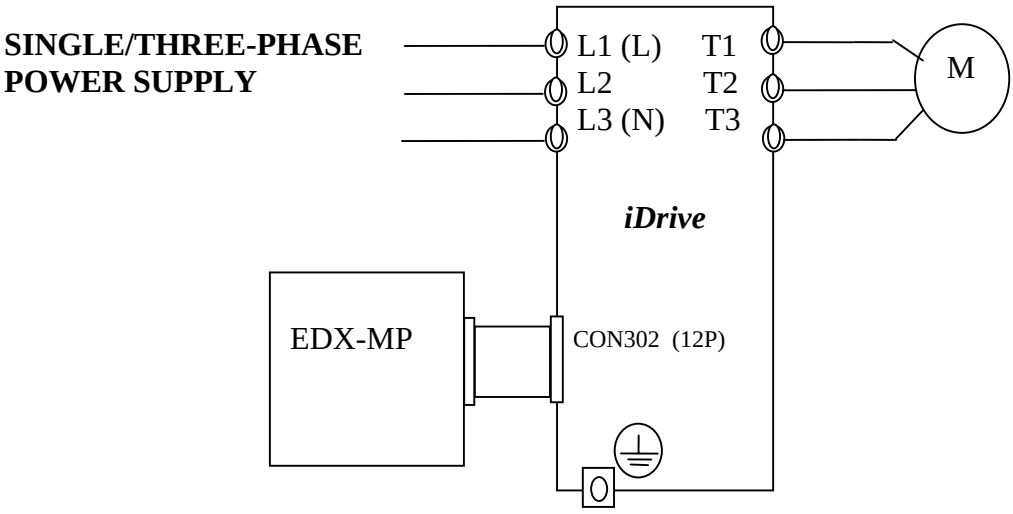
EDX-232 connection diagram



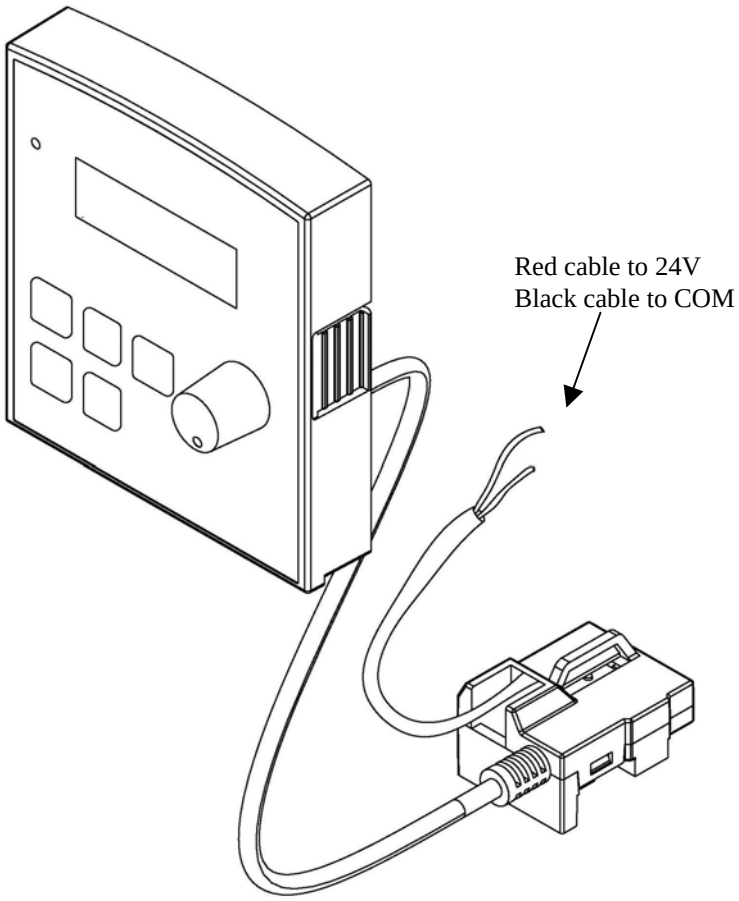
### 6.1.3 Program Copy option card (EDX-MP)



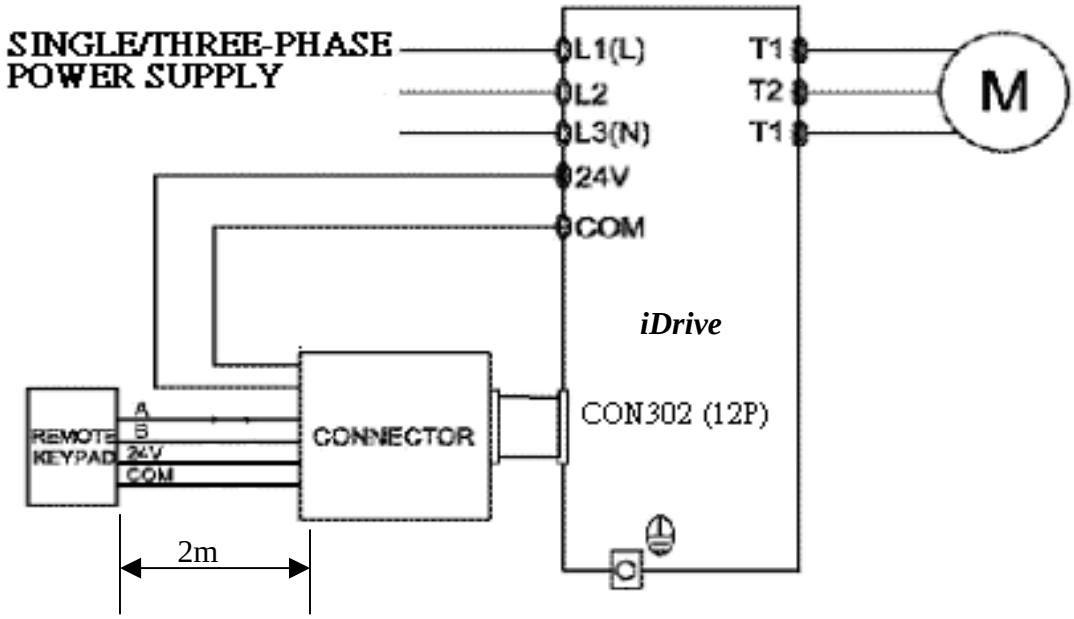
EDX-MP connection diagram



### 6.1.4 Remote keypad (EDX-LED)

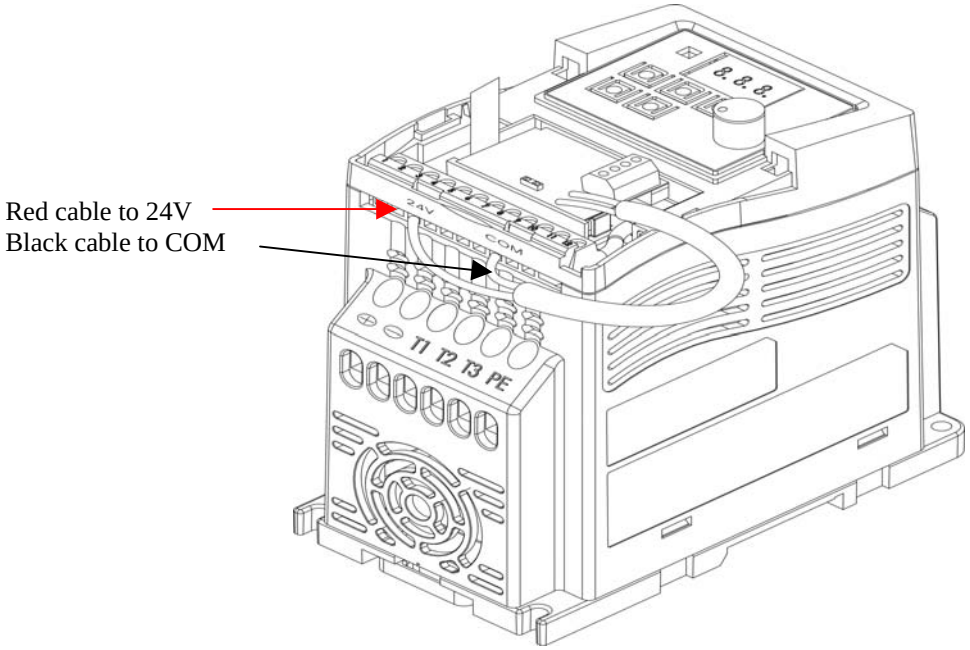



EDX-LED connection diagram

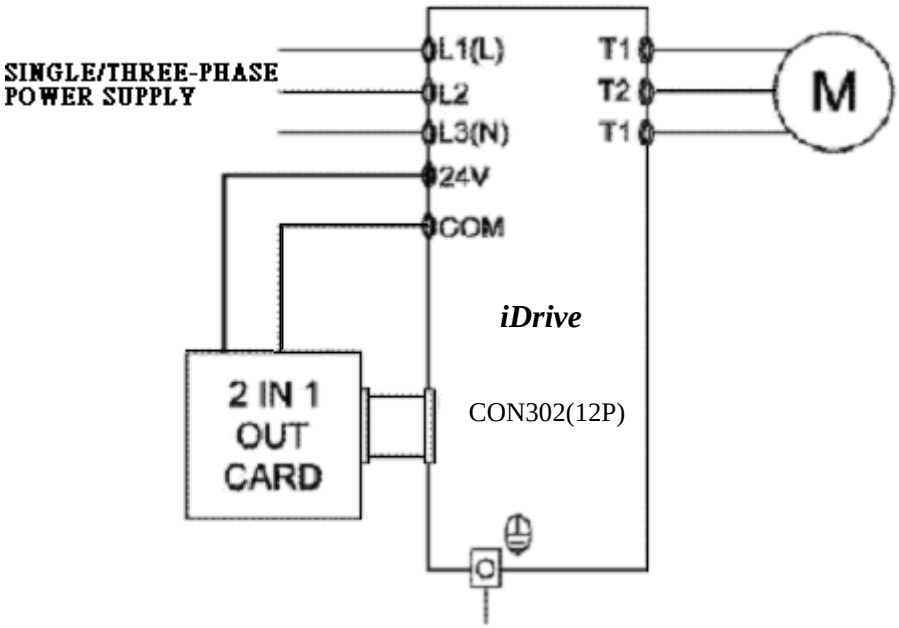



- When the inverter is powered on or off it is possible to set up or remove the remote keypad, but must be connected to TM2 24V DC power in normal use.
- For remote keypad operation set parameter b85 according to required action.

### 6.1.5 2 IN/1OUT expansion card (EDX-IO)




2 In/1 Out card wiring diagram



# Appendix: ***iDrive*** -EDX inverter parameter setting list

| Inverter model: EDX- | | | Company: | | |
|---|---|---|---|---|---|
| Date: | Application: | | | | |
| Engineer: | Note: | | | | |
| Parameter Number | Setting | Parameter Number | Setting | Parameter Number | Setting |
| A00 | | b24 | | b62 | |
| A01 | | b25 | | b63 | |
| A02 | | b26 | | b64 | |
| A03 | | b27 | | b65 | |
| A04 | | b28 | | b66 | |
| A05 | | b29 | | b67 | |
| A06 | | b30 | | b68 | |
| A07 | | b31 | | b69 | |
| A08 | | b32 | | b70 | |
| A09 | | b33 | | b71 | |
| A10 | | b34 | | b72 | |
| A11 | | b35 | | b73 | |
| A12 | | b36 | | b74 | |
| | | b37 | | b75 | |
| b00 | | b38 | | b76 | |
| b01 | | b39 | | b77 | |
| b02 | | b40 | | b78 | |
| b03 | | b41 | | b79 | |
| b04 | | b42 | | b80 | |
| b05 | | b43 | | b81 | |
| b06 | | b44 | | b82 | |
| b07 | | b45 | | b83 | |
| b08 | | b46 | | b84 | |
| b09 | | b47 | | b85 | |
| b10 | | b48 | | b86 | |
| b11 | | b49 | | b87 | |
| b12 | | b50 | | b88 | |
| b13 | | b51 | | b89 | |
| b14 | | b52 | | b90 | |
| b15 | | b53 | | b91 | |
| b16 | | b54 | | b92 | |
| b17 | | b55 | | b93 | |
| b18 | | b56 | | b94 | |
| b19 | | b57 | | b95 | |
| b20 | | b58 | | b96 | |
| b21 | | b59 | | b97 | |
| b22 | | b60 | | | |
| b23 | | b61 | | | |

**Documentation**

Every effort has been made by IMO Precision Controls Ltd to ensure that this document accurately represents the ***iDrive*** **EDX** range of micro inverters at the time of going to press. Information with respect to installation is necessarily generalised, and IMO accept no liability for contingencies over which we have no control in respect to the selection, installation and/or operation of equipment.

**Copyright**

All rights reserved. No part of this publication may be produced or transmitted in any form or by any means, electronic or mechanical including photocopying, recording, or by any information storage or retrieval system without the written permission of IMO Precision Controls Ltd.

©IMO Precision Controls Ltd; 2007

**IMO Precision Controls Ltd**
1000 North Circular Road
Staples Corner
London NW2 7JP
United Kingdom

Telephone: +44(0)208 452 6444
Fax: +44(0)208 452 3512

Web: www.imopc.com
Email: imo@imopc.com