TECO Westinghouse

INVERTER

E510

START-UP AND INSTALLATION MANUAL

230V Class 1/3~

IP20/NEMA 1

0.4 - 2.2 kW / 0.5 - 3 HP

230V Class 3~

IP20/NEMA 1

0.4 - 30 kW / 0.5 - 40 HP

460V Class 3~

IP20/NEMA 1

0.75- 55 kW / 1 - 75 HP

- Read all operating instructions before installing, connecting (wiring), operating, servicing, or inspecting the inverter.
- Ensure that this manual is made available to the end user of the inverter.
- Store this manual in a safe, convenient location.
- The manual is subject to change without prior notice.
- Refer to the E510 Instruction Manual (www.tecowestinghouse.com).

DOCUMENT - TECO-E510N1SI
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****** STATEMENT ******

Si Desea descargar el manual en español diríjase a este Link: www.tecowestinghouse.com

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Preface (English)

The E510 product is an inverter designed to control a three-phase induction motor. Please read this manual carefully to ensure correct operation, safety and to become familiar with the inverter functions.

The E510 inverter is an electrical / electronic product and must be installed and handled by qualified service personnel.

Improper handling may result in incorrect operation, shorter life cycle, or failure of this product as well as the motor.

All E510 documentation is subject to change without notice. Be sure to obtain the latest editions for use or visit our website at www.tecowestinghouse.com

Available Documentation:

1. E510 Start-up and Installation Manual
2. E510 Instruction Manual

Read this Start-up and Installation Manual in conjunction with E510 Instruction Manual thoroughly before proceeding with installation, connections (wiring), operation, or maintenance and inspection. Ensure you have sound knowledge of the device and familiarize yourself with all safety information and precautions before proceeding to operate the inverter. Read E510 Instruction Manual for detailed description on parameters.

IMPORTANT	**For Advanced Installation, Wiring and Programming of the E510 inverter refer to the E510 Instruction Manual.**

Ensure you have sound knowledge of the inverter and familiarize yourself with all safety information and precautions before proceeding to operate the inverter.

Please pay close attention to the safety precautions indicated by the warning  and caution  symbol.

 **Warning**	Failure to ignore the information indicated by the warning symbol may result in death or serious injury.
 **Caution**	Failure to ignore the information indicated by the caution symbol may result in minor or moderate injury and/or substantial property damage.

Préface (Français)

- Le produit est un lecteur conçu pour commander un moteur à induction triphasé. lire attentivement ce manuel pour garantir le bon fonctionnement, la sécurité et pour se familiariser avec les fonctions d'entraînement.
- Le lecteur est un appareil électrique / électronique et doit être installé et géré par un personnel qualifié
- Une mauvaise manipulation peut entraîner un fonctionnement incorrect, cycle de vie plus court, ou l'échec de ce produit ainsi que le moteur.
- Tous les documents sont sujets à changement sans préavis. Soyez sûr d'obtenir les dernières éditions de l'utilisation ou visitez notre site Web
- Lire le manuel d'instructions avant de procéder à l'installation, les connexions (câblage), le fonctionnement ou l'entretien et l'inspection.
- Vérifiez que vous avez une bonne connaissance de l'entraînement et de vous familiariser avec les consignes de sécurité et les précautions avant de procéder à fonctionner le lecteur.
- prêter attention aux consignes de sécurité indiquées par l'avertissement  et symbole Attention  .

Avertissement	ignorer les informations indiquées par le symbole d'avertissement peut entraîner la mort ou des blessures graves.
Attention	ignorer les informations indiquées par le symbole de mise en garde peut entraîner des blessures mineures ou modérées et / ou des dommages matériels importants.

1. Safety Precautions (English)

1.1 Before supplying Power to the Inverter

Warning

The main circuit must be correctly wired. For single phase supply use input terminals (R/L1, T/L3) and for three phase supply use input terminals (L1(L), L2, L3(N)). Terminals T1, T2, T3 must only be used to connect the motor. Connecting the input supply to any of the T1, T2 or T3 terminals will cause damage to the inverter.

Caution

- To avoid the front cover from disengaging or other physical damage, do not carry the inverter by its cover. Support the unit by its heat sink when transporting. Improper handling can damage the inverter or injure personnel, and should be avoided.
- To avoid the risk of fire, do not install the inverter on or near flammable objects. Install on nonflammable objects such as metal surfaces.
- If several inverters are placed inside the same control panel, provide adequate ventilation to maintain the temperature below 40°C/104°F (50°C/122°F without a dust cover) to avoid overheating or fire.
- When removing or installing the digital operator, turn off the power first, and then follow the instructions in this manual to avoid operator error or loss of display caused by faulty connections.

Warning

This product is sold subject to IEC 61800-3. In a domestic environment this product may cause radio interference in which case the user may need to apply corrective measures.

1.2 Wiring

Warning

- Always turn OFF the power supply before attempting inverter installation and wiring of the user terminals.
- Wiring must be performed by a qualified personnel / certified electrician.
- Make sure the inverter is properly grounded. (230V Class: Grounding impedance shall be less than 100Ω. 460V Class: Grounding impedance shall be less than 10Ω.)
- Please check and test emergency stop circuits after wiring. (Installer is responsible for the correct wiring.)
- Never touch any of the input or output power lines directly or allow any input of output power lines to come in contact with the inverter case.
- Do not perform a dielectric voltage withstand test (megger) on the inverter this will result in inverter damage to the semiconductor components.

Caution

- The line voltage applied must comply with the inverter's specified input voltage. (See product nameplate section 2.1)
- Use wire gauge recommendations and torque specifications. (See Wire Gauge and Torque Specification section 3.10)
- Never connect input power to the inverter output terminals T1, T2, T3.
- Do not connect a contactor or switch in series with the inverter and the motor.
- Do not connect a power factor correction capacitor or surge suppressor to the inverter output.
- Ensure the interference generated by the inverter and motor does not affect peripheral devices.

1.3 Before Operation

Warning

- Make sure the inverter capacity matches the parameters 13-00.
- Reduce the carrier frequency (parameter 11-01) If the cable from the inverter to the motor is greater than 80 ft (25m). A high-frequency current can be generated by stray capacitance between the cables and result in an overcurrent trip of the inverter, an increase in leakage current, or an inaccurate current readout.
- Be sure to install all covers before turning on power. Do not remove any of the covers while power to the inverter is on, otherwise electric shock may occur.
- Do not operate switches with wet hands, otherwise electric shock may result.
- Do not touch inverter terminals when energized even if inverter has stopped, otherwise electric shock may result.

1.4 Parameter Setting

Caution

- Do not connect a load to the motor while performing a rotational auto-tune.
- Make sure the motor can freely run and there is sufficient space around the motor when performing a rotational auto-tune.

1.5 Operation

Warning

- Be sure to install all covers before turning on power. Do not remove any of the covers while power to the inverter is on, otherwise electric shock may occur.
- Do not connect or disconnect the motor during operation. This will cause the inverter to trip and may cause damage to the inverter.
- Operations may start suddenly if an alarm or fault is reset with a run command active. Confirm that no run command is active upon resetting the alarm or fault, otherwise accidents may occur.
- Do not operate switches with wet hands, otherwise electric shock may result.
- It provides an independent external hardware emergency switch, which emergently shuts down the inverter output in the case of danger.
- If automatic restart after power recovery (parameter 07-00) is enabled, the inverter will start automatically after power is restored.
- Make sure it is safe to operate the inverter and motor before performing a rotational auto-tune.
- Do not touch inverter terminals when energized even if inverter has stopped, otherwise electric shock may result.
- Do not check signals on circuit boards while the inverter is running.
- After the power is turned off, the cooling fan may continue to run for some time.

Caution

- Do not touch heat-generating components such as heat sinks and braking resistors.
- Carefully check the performance of motor or machine before operating at high speed, otherwise Injury may result.
- Note the parameter settings related to the braking unit when applicable.
- Do not use the inverter braking function for mechanical holding, otherwise injury may result.
- Do not check signals on circuit boards while the inverter is running.

1.6 Maintenance, Inspection and Replacement

Warning

- Wait a minimum of five minutes after power has been turned OFF before starting an inspection. Also confirm that the charge light is OFF and that the DC bus voltage has dropped below 25Vdc.
- Never touch high voltage terminals in the inverter.
- Make sure power to the inverter is disconnected before disassembling the inverter.
- Only authorized personnel should perform maintenance, inspection, and replacement operations. (Take off metal jewelry such as watches and rings and use insulated tools.)

Caution

- The Inverter can be used in an environment with a temperature range from 14 -104°F (-10-40°C) and relative humidity of 95% non-condensing.
- The inverter must be operated in a dust, gas, mist and moisture free environment.

1.7 Disposal of the Inverter

Caution

- Please dispose of this unit with care as an industrial waste and according to your required local regulations.
- The capacitors of inverter main circuit and printed circuit board are considered as hazardous waste and must not be burned.
- The Plastic enclosure and parts of the inverter such as the top cover board will release harmful gases if burned.

1. Consignes de sécurité (Français)

1.1 Avant d'alimenter le disque dur

Avertissement

- Le circuit principal doit être correctement câblée. Pour les terminaux monophasés d'approvisionnement de l'utilisation des intrants (R/L1, T/L3) et de trois bornes d'entrée de l'utilisation de l'offre de phase (R/L1, S/L2, T/L3). U/T1, V/T2, W/T3 ne doivent être utilisés pour connecter le moteur. Raccordement de l'alimentation d'entrée à l'un des U/T1, V/T2 W/T3 ou bornes risque d'endommager le lecteur.

Attention

- Pour éviter que le couvercle ne se désengage ou de tout autre dommage physique, ne portez pas le lecteur par son couverture. Soutenir le groupe par son dissipateur de chaleur lors du transport. Une mauvaise manipulation peut endommager le lecteur ou blesser le personnel, et doit être évitée.
- Pour éviter que les risques d'incendie, ne pas installer le lecteur sur ou à proximité d'objets inflammables. Installer sur des objets ininflammables comme les surfaces métalliques.
- Si plusieurs disques sont placés dans le même panneau de contrôle, fournir une ventilation adéquate pour maintenir la température en dessous de 40 ° C/104 ° F (50 ° C/122 ° F sans housse de protection) pour éviter la surchauffe ou incendie.
- Lors d'un retrait ou d'installation de l'opérateur numérique, éteignez-le d'abord, puis de suivre les instructions de ce manuel pour éviter les erreurs de l'opérateur ou de la perte de l'affichage causé par des connexions défectueuses.

Avertissement

- Lors d'un retrait ou d'installation de l'opérateur numérique, éteignez-le d'abord, puis de suivre les instructions de ce manuel pour éviter les erreurs de l'opérateur ou de la perte de l'affichage causé par des connexions défectueuses....

1.2 Câblage

Avertissement

- Coupez toujours l'alimentation électrique avant de procéder à l'installation d'entraînement et le câblage des terminaux utilisateurs.
- Le câblage doit être effectué par un personnel qualifié / électricien certifié.
- Assurez-vous que le lecteur est correctement mis à la terre. (220V Classe: impédance de mise à la terre doit être inférieure à 100Ω Classe 440V:. Impédance de mise à la terre doit être inférieure à 10Ω.)
- vérifier et tester mes circuits d'arrêt d'urgence après le câblage. (L'Installateur est responsable du câblage.)
- Ne touchez jamais de l'entrée ou de lignes électriques de sortie permettant directement ou toute entrée ou de lignes de puissance de sortie à venir en contact avec le boîtier d'entraînement.
- Ne pas effectuer un test de tenue en tension diélectrique (mégohmmètre) sur le disque dur ou cela va entraîner des dommages de lecture pour les composants semi-conducteurs.

Attention

- La tension d'alimentation appliquée doit se conformer à la tension d'entrée spécifiée par le lecteur. (Voir la section signalétique du produit)
- Raccorder la résistance de freinage et de l'unité de freinage sur les bornes assignées.
- Ne pas brancher une résistance de freinage directement sur les bornes CC P (+) et N (-), sinon risque d'incendie.
- Utilisez des recommandations de la jauge de fil et les spécifications de couple. (Voir Wire Gauge et la section de spécification de couple) ◦
- Ne jamais brancher l'alimentation d'entrée aux bornes onduleur de sortie U/T1, V/T2, W/T3.
- Ne pas brancher un contacteur ou interrupteur en série avec le variateur et le moteur.
- Ne branchez pas un facteur condensateur de correction de puissance ou suppresseur de tension à la sortie du variateur ◦
- S'assurer que l'interférence générée par l'entraînement et le moteur n'a pas d'incidence sur les périphériques.

1.3 Avant l'opération

Avertissement

- Assurez-vous que la capacité du disque correspond aux paramètres de notation avant d'alimenter.
- Réduire le paramètre de la fréquence porteuse si le câble du variateur au moteur est supérieure à 80 pi (25 m). Un courant de haute fréquence peut être générée par la capacité parasite entre les câbles et entraîner un déclenchement de surintensité du variateur, une augmentation du courant ou d'une lecture actuelle inexactes.
- Veillez à installer tous les couvercles avant de l'allumer. Ne retirez pas les capots pendant que l'alimentation du lecteur est allumé, un choc électrique peut se produire autrement.
- Ne pas actionner d'interrupteurs avec les mains mouillées, un choc électrique pourrait survenir autrement.
- Ne touchez pas les bornes d'entraînement lorsqu'il est alimenté, même si le lecteur est arrêté, un choc électrique pourrait survenir autrement.

1.4 Configuration Paramètre

Attention

- Ne branchez pas une charge pour le moteur tout en effectuant un auto-tune.
- Assurez-vous que le moteur peut fonctionner librement et il y a suffisamment d'espace autour du moteur lors de l'exécution d'un auto-tune rotation.

1.5 Opération

Avertissement

- Veillez à installer tous les couvercles avant de l'allumer. Ne retirez pas les capots pendant que l'alimentation du lecteur est allumé, un choc électrique peut se produire autrement.
- Ne pas brancher ou débrancher le moteur pendant le fonctionnement. Le variateur pourrai se déclencher et ainsi endommager le lecteur.
- Les opérations peuvent commencer soudainement si une alarme ou un défaut est réarmé avec un ordre de marche active. Assurez-vous qu'un ordre de marche est actif lors de la réinitialisation de l'alarme ou de défaut, autrement des accidents peuvent se produire.
- Ne pas actionner d'interrupteurs avec les mains mouillées, un choc électrique pourrait survenir.
- Un interrupteur d'urgence externe indépendant est fourni, qui s'arrête en urgence vers le bas la sortie de l'onduleur en cas de danger.
- Si le redémarrage automatique après une récupération d'énergie est activée, le variateur démarrera automatiquement après le rétablissement du courant.
- Assurez-vous qu'il est sûr de faire fonctionner le variateur et le moteur avant d'effectuer un auto-tune rotation.
- Ne touchez pas les bornes d'entraînement lorsqu'il est alimenté même si l'onduleur s'est arrêté, un choc électrique pourrait survenir .
- Ne pas contrôler les signaux sur les circuits pendant que le lecteur est en marche.
- Après la mise hors tension, le ventilateur de refroidissement peut continuer à fonctionner pendant un certain temps.

Attention

- Ne touchez pas les composants générant de la chaleur tels que radiateurs et des résistances de freinage.
- Vérifiez soigneusement la performance du moteur ou de la machine avant d'utiliser à grande vitesse, sous peine de blessure.
- Notez les réglages des paramètres liés à l'unité de freinage lorsque applicable.
- Ne pas utiliser la fonction de freinage d'entraînement pour un maintien mécanique, sous peine de blessure.
- Ne pas contrôler les signaux sur les circuits pendant que le lecteur est en marche.

1.6 Entretien, Inspection et remplacement

Avertissement

- Attendre un minimum de 5 minutes après que l'alimentation a été débranchée avant de commencer une inspection. Vérifiez également que le voyant de charge est éteint et que la tension du bus cc a chuté au-dessous de 25Vdc.
- Ne jamais toucher les bornes à haute tension dans le lecteur.
- Assurez-vous que l'alimentation du lecteur est débranché avant de démonter le lecteur.
- Seul le personnel autorisé peuvent faire l'entretien, l'inspection et les opérations de remplacement. (Enlevez les bijoux en métal tels que les montres et les bagues et utiliser des outils isolés.)

Attention

- Le variateur peut être utilisé dans un environnement avec une gamme de température allant de 14 ° -104 ° F (10-40 ° C) et l'humidité relative de 95% sans condensation.
- Le variateur doit être utilisé dans un environnement sans poussière, gaz, vapeur et humidité.

1.7 Mise au rebut du variateur

Attention

- jeter cet appareil avec soin comme un déchet industriel et selon les réglementations locales nécessaires.
- Les condensateurs du circuit principal d'entraînement et circuits imprimés sont considérés comme des déchets dangereux et ne doivent pas être brûlés.
- The Plastic enclosure and parts of the drive such as the top cover board will release harmful gases if burned.

2. Model Description

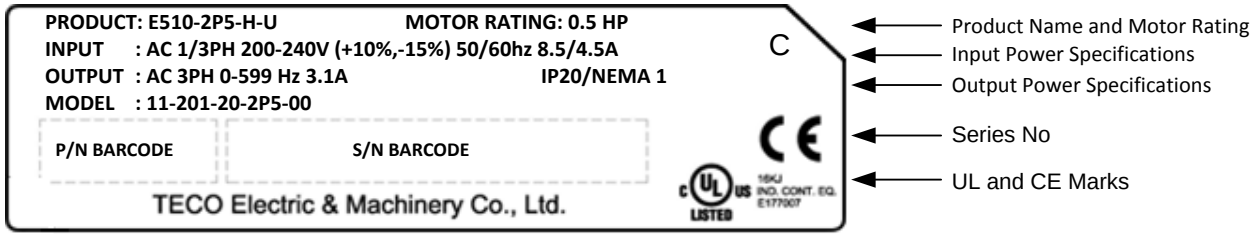
2.1 Nameplate Data

It is essential to verify the E510 inverter nameplate and make sure that the E510 inverter has the correct rating so it can be used in your application with the proper sized AC motor.

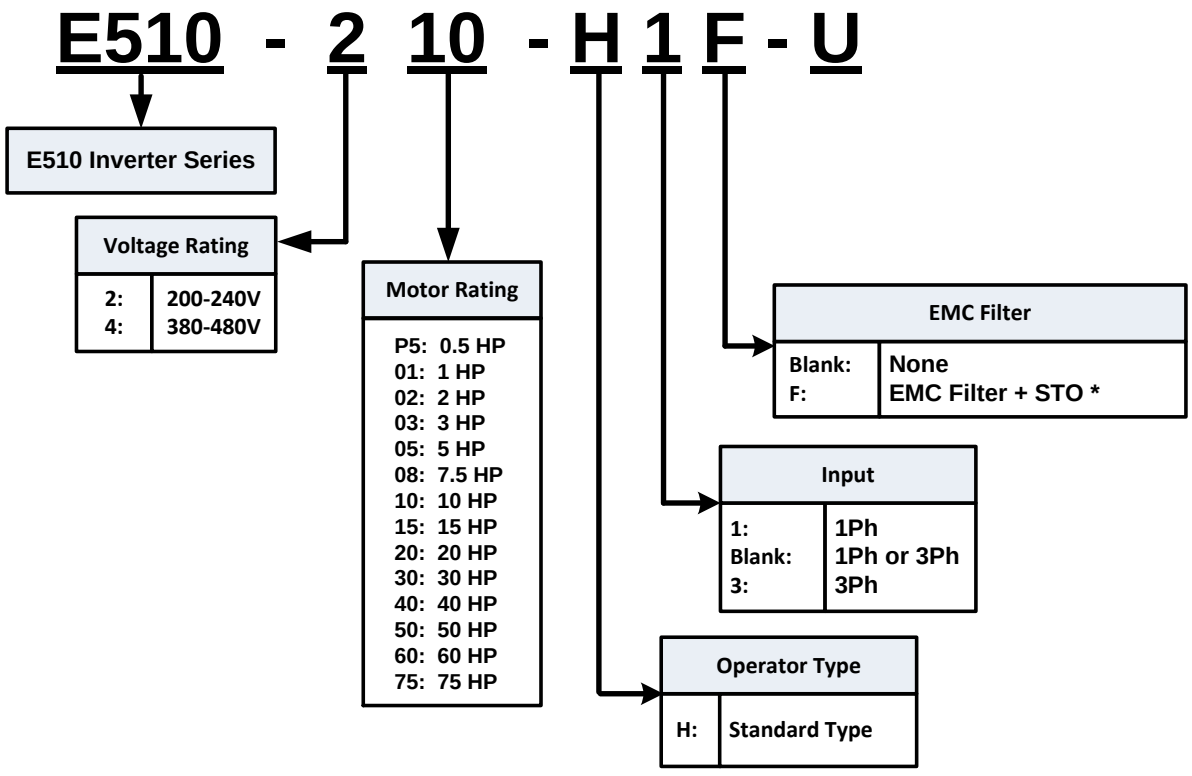
Unpack the E510 inverter and check the following:

(1) The E510 inverter start-up and installation manual (this document) are contained in the package.
(2) The E510 inverter has not been damaged during transportation there should be no dents or parts missing.
(3) The E510 inverter is the type you ordered. You can check the type and specifications on the main nameplate.
(4) Check that the input voltage range meets the input power requirements.
(5) Ensure that the motor HP matches the motor rating of the inverter.

(1HP = 0.746 kW)



Model Identification



*F Version models are not available as standard product in Americas.

2.2 Inverter Models – Motor Power

IP20 / NEMA 1 Type – 200V Class

Model	Supply voltage (Vac)	Horse Power (HP)	Motor (kW)	EMC Filter		STO Function		Frame Size
				V	X	V	X	
E510-2P5-H-U	1 Phase 200~240V +10%-15% 50/60Hz	0.5	0.4		◎		◎	1
E510-201-H-U		1	0.75		◎		◎	1
E510-202-H-U		2	1.5		◎		◎	2
E510-203-H-U		3	2.2		◎		◎	2
E510-2P5-H1F-U*	1 & 3 Phase 200~240V +10%-15% 50/60Hz	0.5	0.4	◎		◎		1
E510-201-H1F-U*		1	0.75	◎		◎		1
E510-202-H1F-U*		2	1.5	◎		◎		2
E510-203-H1F-U*		3	2.2	◎		◎		2
E510-202-H3-U	3 Phase 200~240V +10%-15% 50/60Hz 3 Phase	2	1.5		◎		◎	1
E510-205-H3-U		5	4		◎		◎	2
E510-208-H3-U		7.5	5.5		◎		◎	3
E510-210-H3-U		10	7.5		◎		◎	3
E510-215-H3-U		15	11		◎		◎	4
E510-220-H3-U		20	15		◎		◎	4
E510-225-H3-U		25	18.5 / 22		◎		◎	5
E510-230-H3-U		30	22 / 30		◎		◎	6
E510-240-H3-U		40	30 / 37		◎		◎	6

* F Version models are not available as standard product in Americas.

V: Built-in

X: None

IP20 / NEMA 1 Type – 400V Class

Model	Supply voltage (Vac)	Horse Power (HP)	Motor (kW)	EMC Filter		STO Function		Frame Size
				V	X	V	X	
E510-401-H3-U	3 Phase 380~480V +10%-15% 50/60Hz	1	0.75		◎		◎	1
E510-402-H3-U		2	1.5		◎		◎	1
E510-403-H3-U		3	2.2		◎		◎	2
E510-405-H3-U		5	4		◎		◎	2
E510-408-H3-U		7.5	5.5		◎		◎	3
E510-410-H3-U		10	7.5		◎		◎	3
E510-415-H3-U		15	11		◎		◎	3
E510-420-H3-U		20	15		◎		◎	4
E510-425-H3-U		25	18.5		◎		◎	4
E510-430-H3-U		30	22 / 30		◎		◎	5
E510-440-H3-U		40	30 / 37		◎		◎	6
E510-450-H3-U		50	37 / 45		◎		◎	6
E510-460-H3-U		60	45 / 55		◎		◎	6
E510-475-H3-U		75	55 / 75		◎		◎	6
E510-401-H3F-U*		1	0.75	◎		◎		1
E510-402-H3F-U*		2	1.5	◎		◎		1
E510-403-H3F-U*		3	2.2	◎		◎		2
E510-405-H3F-U*		5	4	◎		◎		2
E510-408-H3F-U*		7.5	5.5	◎		◎		3
E510-410-H3F-U*		10	7.5	◎		◎		3
E510-415-H3F-U*		15	11	◎		◎		3
E510-420-H3F-U*		20	15	◎		◎		4
E510-425-H3F-U*		25	18.5	◎		◎		4
E510-430-H3F-U*		30	22 / 30	◎		◎		5
E510-440-H3F-U*		40	30 / 37	◎		◎		6
E510-450-H3F-U*		50	37 / 45	◎		◎		6
E510-460-H3F-U*		60	45 / 55	◎		◎		6
E510-475-H3F-U*		75	55 / 75	◎		◎		6

* F Version models are not available as standard product in Americas.

V: Built-in

X: None

3. Environment and Installation

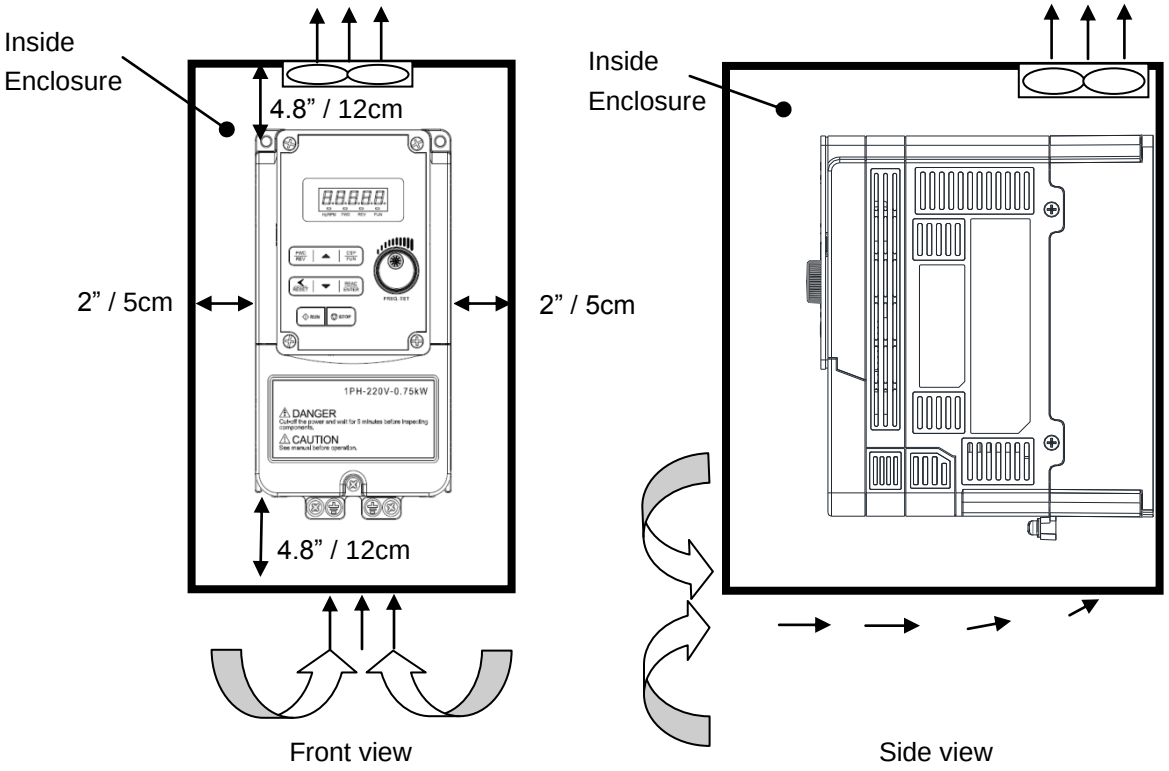
3.1 Environment

The environment will directly affect the proper operation and the life span of the inverter. To ensure that the inverter will give maximum service life, please comply with the following environmental conditions:

Protection	
Protection Class	IP20 / NEMA 1 (Depending on models)
Operating Temperature	IP20 / NEMA 1 type: Inside: -10°C - +50°C (14-122 °F) (without sticker / dust cover) Outside: -10°C - +40°C (14-104 °F) (with sticker / dust cover) If several inverters are placed in the same control panel, provide additional cooling And ventilation to maintain ambient temperatures below 40°C (104 °F)
Storage Temperature	-20°C - +60°C (-4 -140 °F)
Humidity:	95% non-condensing Relative humidity 5% to 95%, free of moisture. (Follow IEC60068-2-78 standard)
Altitude:	< 1000m (3,281 ft.)
Installation Site:	Avoid exposure to rain or moisture.
	Avoid direct sunlight.
	Avoid oil mist and salinity.
	Avoid corrosive liquid and gas.
	Avoid dust, lint fibers, and small metal filings.
	Keep away from radioactive and flammable materials.
	Avoid electromagnetic interference (soldering machines, power machines).
	Avoid vibration (stamping, punching machines etc.). Add a vibration-proof pad if the situation cannot be avoided.
Shock	Maximum acceleration: 1G (9.8m/s²), for <20Hz Maximum acceleration: 0.6G (5.88m/s²), for 20 - 50Hz (IEC60068-2-6 standard)

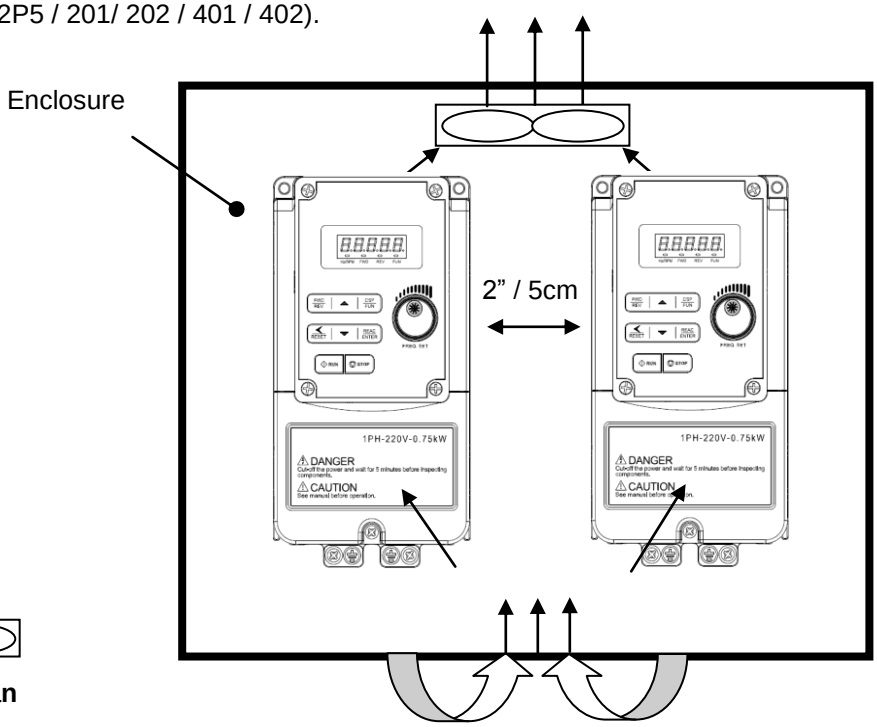
3.2 Installation

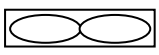
Provide sufficient air circulation space for cooling as shown in examples below. Install the Inverter on surfaces that provide good heat dissipation. Frame1 models：2P5 / 201 / 202 (three phase) / 401 / 402.



Side by side installation

Provide the necessary physical space and cooling based on the ambient temperature and the heat loss in the panel (2P5 / 201/ 202 / 401 / 402).



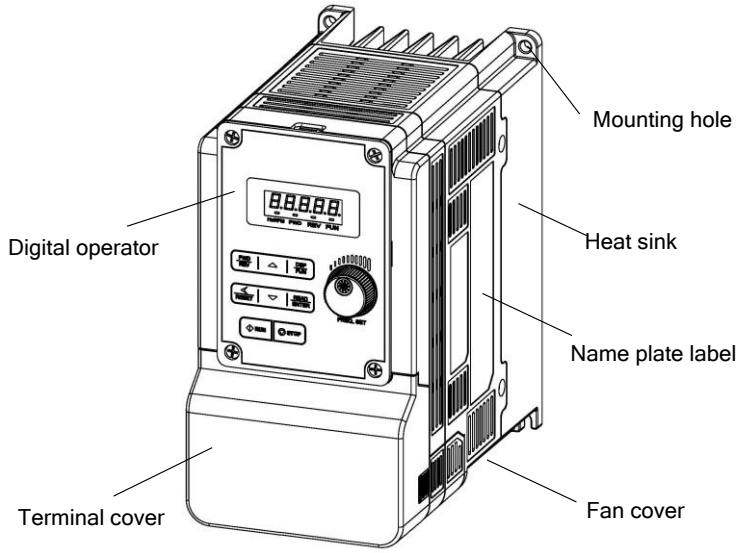


Cooling fan

3.3 External View

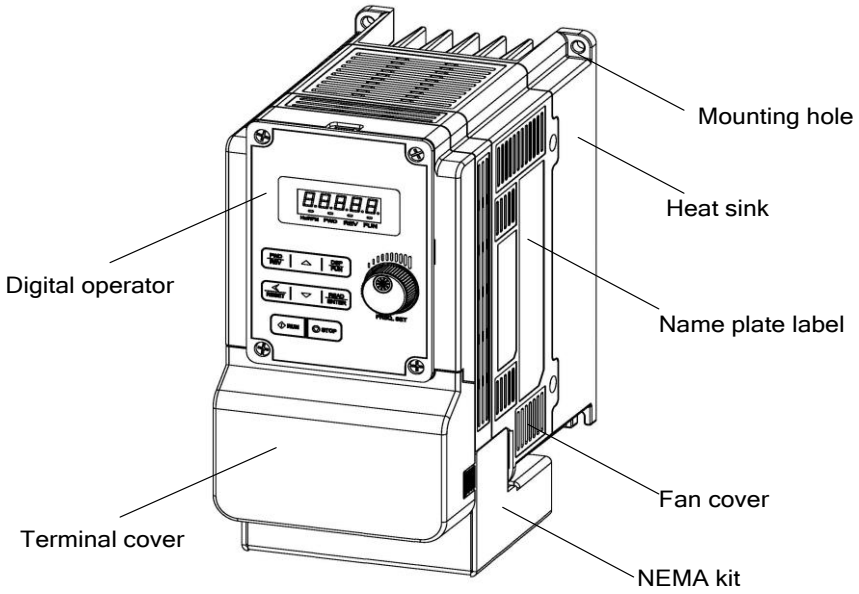
IP20

200V 0.5HP~1HP (Single/Three phase) / 400V 1HP~2HP / 200V 2HP (Three phase)



NEMA1

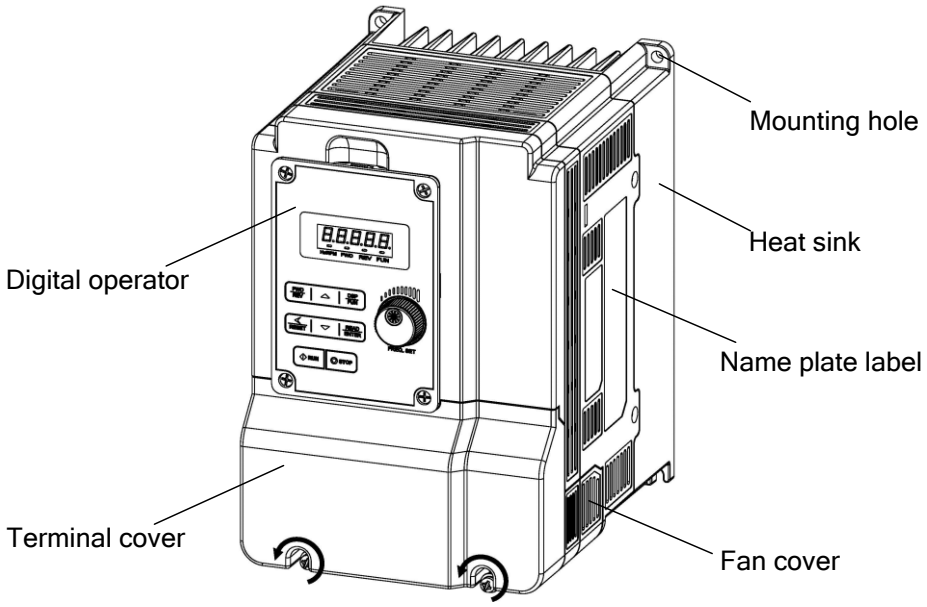
200V 0.5HP~1HP (Single/Three phase) / 400V 1HP~2HP / 200V 2HP (Three phase)



Note: NEMA 1 conduit kit may block access to lower mounting holes and may need to be removed prior to mounting.

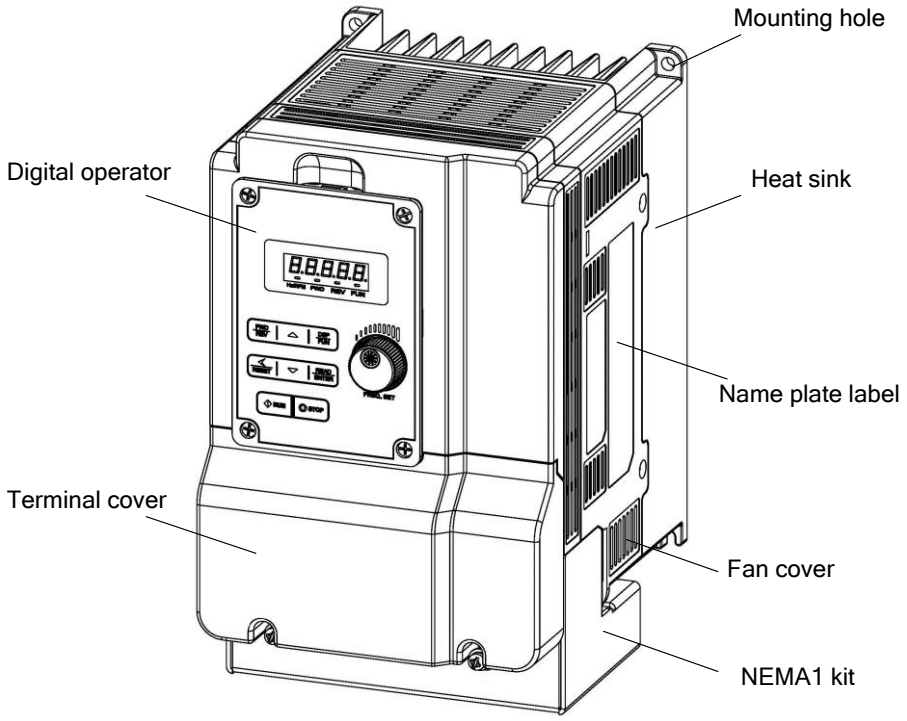
IP20

200V 2-3HP (Single/Three phase) / 200V 3HP~20HP / 400V 3HP~25HP



NEMA1

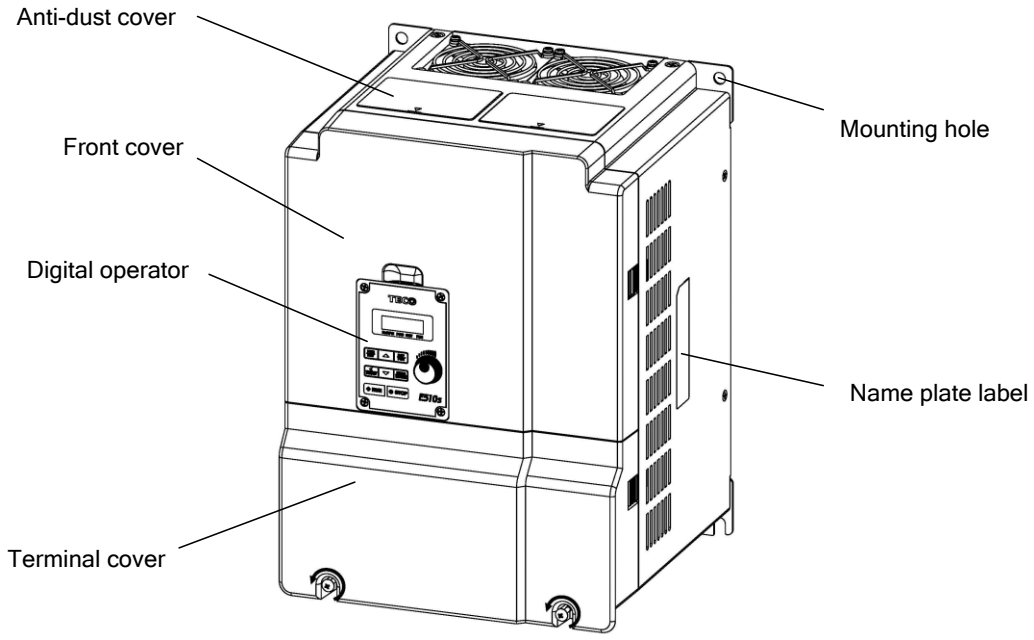
200V 2-3HP (Single/Three phase) / 200V 3HP~20HP / 400V 3HP~25HP



Note: NEMA 1 conduit kit may block access to lower mounting holes and may need to be removed prior to mounting.

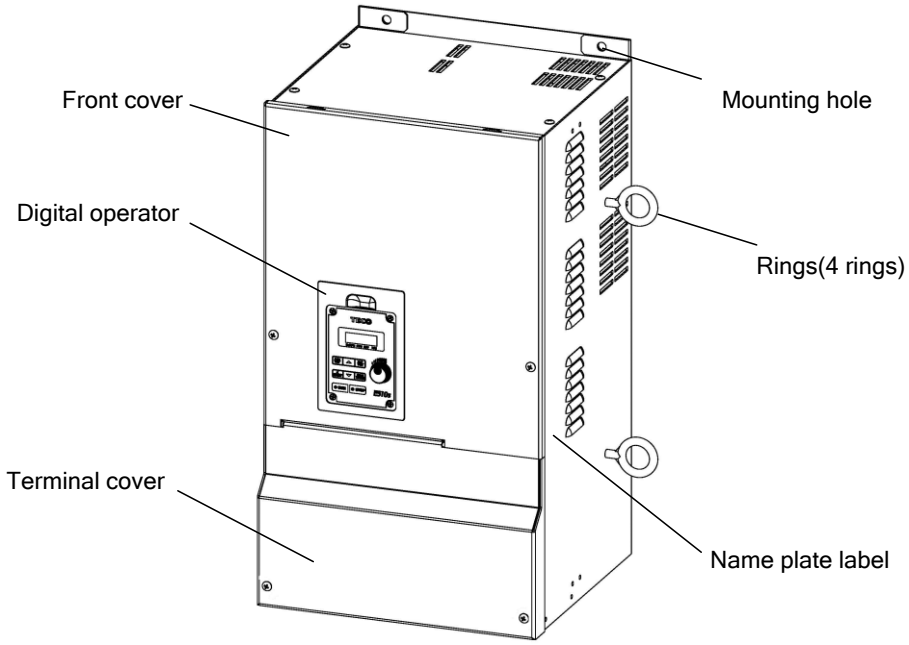
NEMA 1

200V 25HP / 400V 30HP



NEMA 1

200V 30HP~40HP / 400V 40HP~75HP



3.4 Warning Labels

Important: Warning information located on the front cover must be read upon installation of the inverter.

(a) 200V 0.5HP~20HP / 400V 1HP~25HP

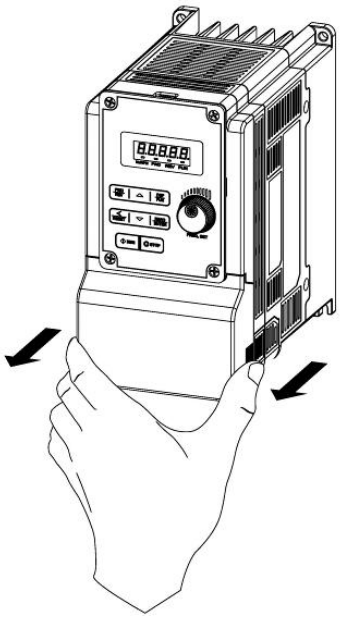
(b) 200V 25HP~40HP / 400V 30HP~75HP

3.5 Removing the Front Cover

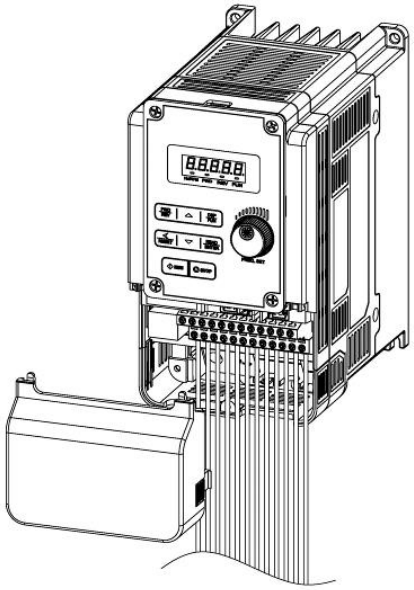
⚠ Caution
• Before making any wiring connections to the inverter the front cover needs to be removed.

IP20

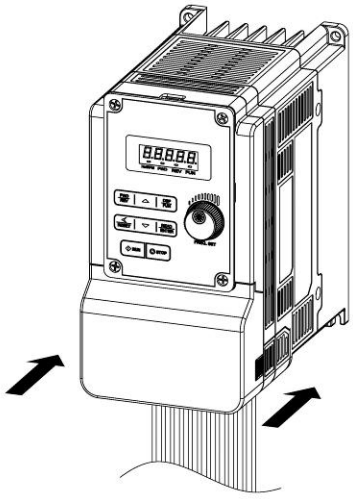
200V 0.5HP~1HP (Single/Three phase)/ 400V 1HP~2HP / 200V 2HP (Three phase)



Step1：Remove terminal cover



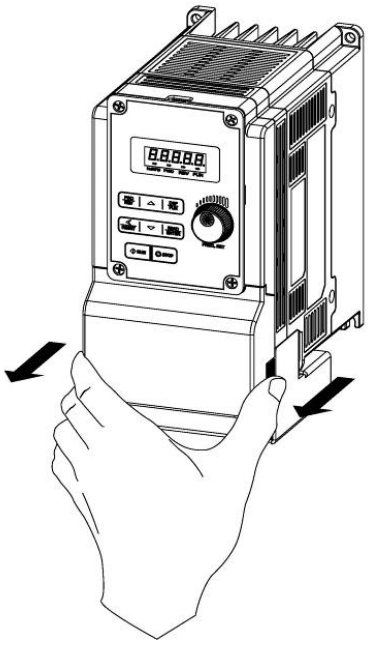
Step2：Wire and reinstall cover



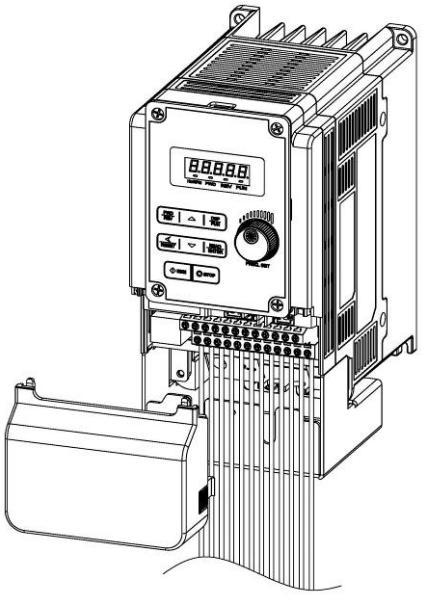
Step3：Put terminal cover back

NEMA 1

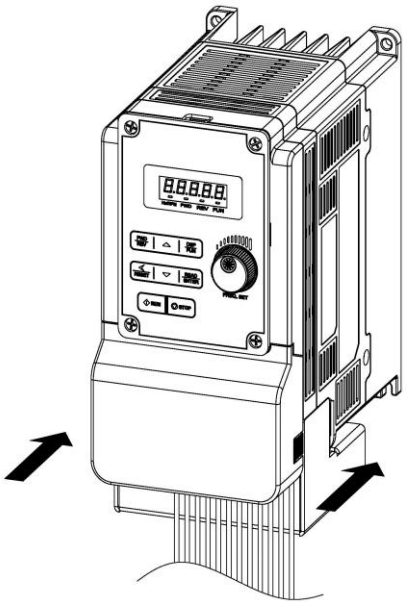
200V 0.5HP~1HP (Single/Three phase)/ 400V 1HP~2HP / 200V 2HP (Three phase)



Step1：Remove terminal cover



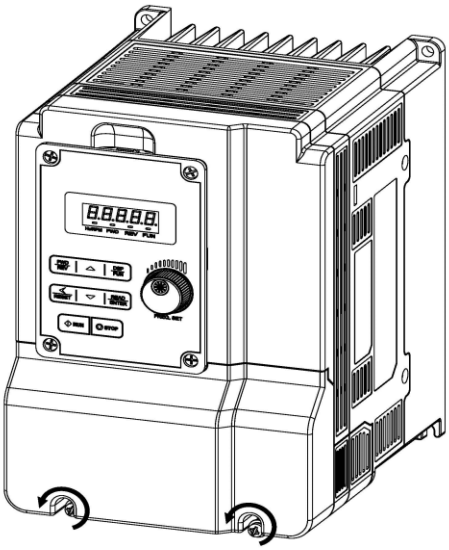
Step2：Wire and reinstall cover



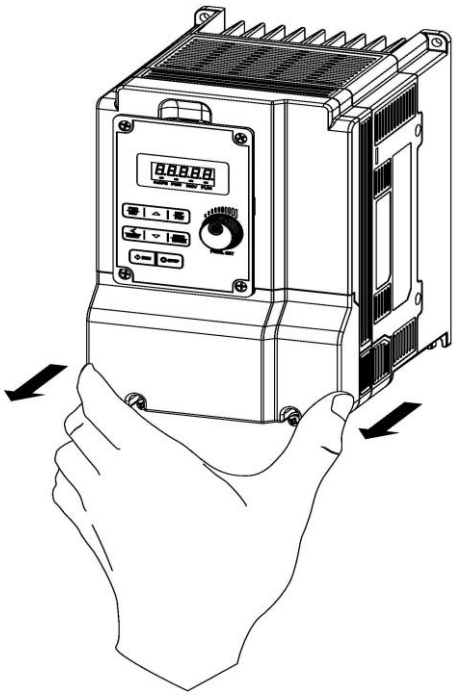
Step3：Put terminal cover back

IP20

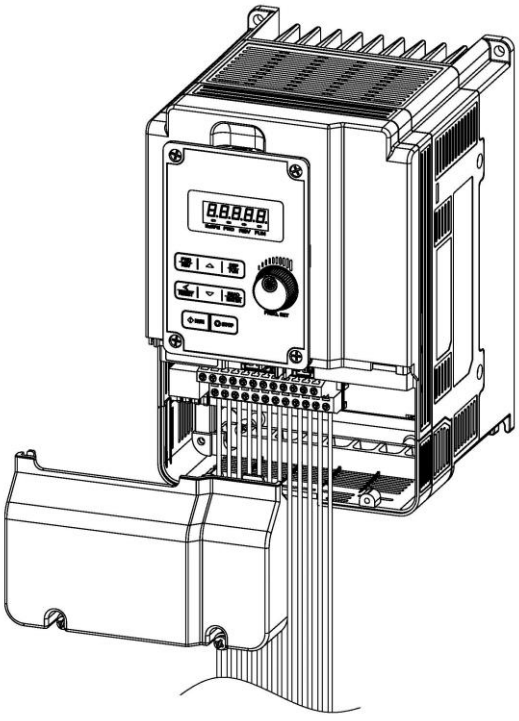
200V 2HP (single/three phase) / 200V 3HP~20HP / 400V 3HP~25HP



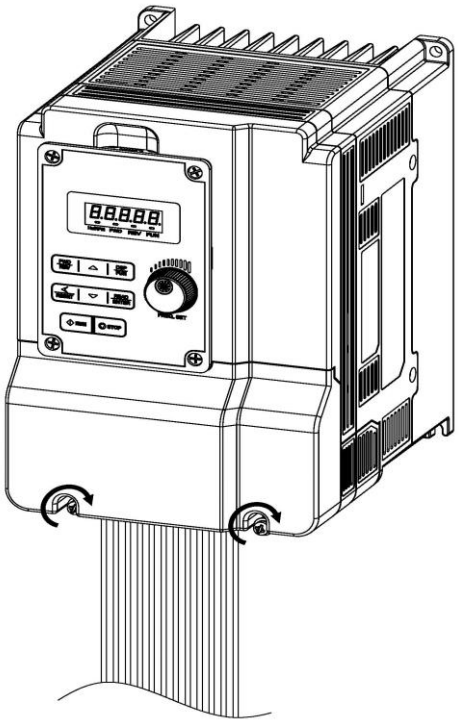
Step1：Unscrew cover



Step2：Remove the terminal cover



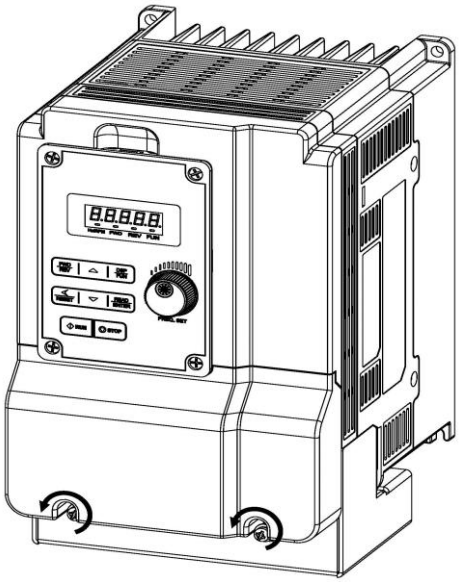
Step3：Wire and reinstall the cover



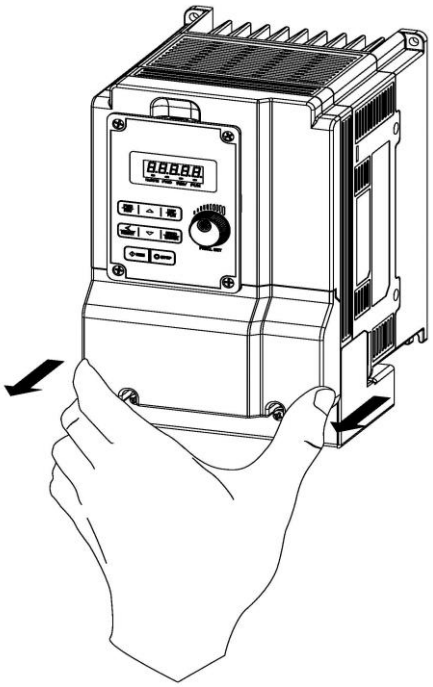
Step4：Tighten the screws

NEMA1

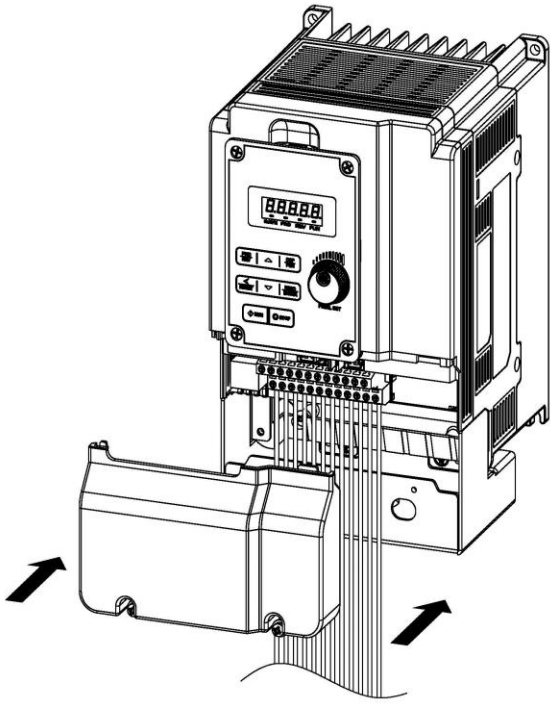
200V 2HP (single/three phase) / 200V 3HP~20HP / 400V 3HP~25HP



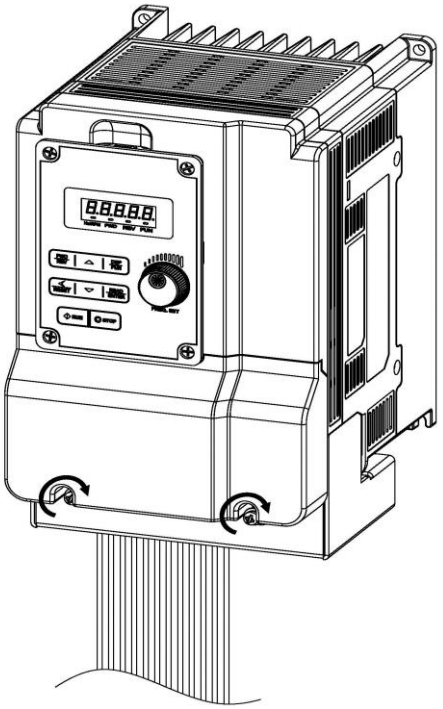
Step1：Unscrew cover



Step2：Remove the terminal cover



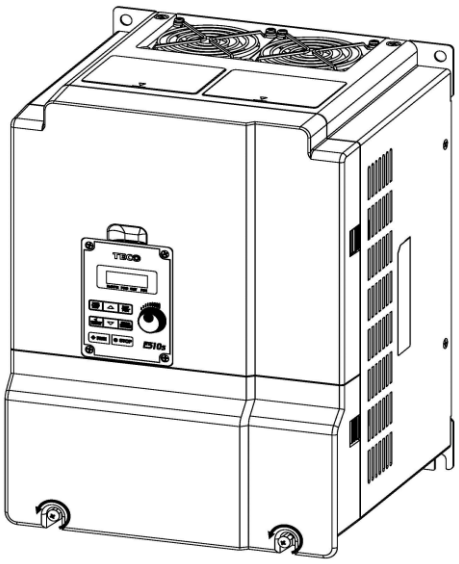
Step3：Wire and reinstall the cover



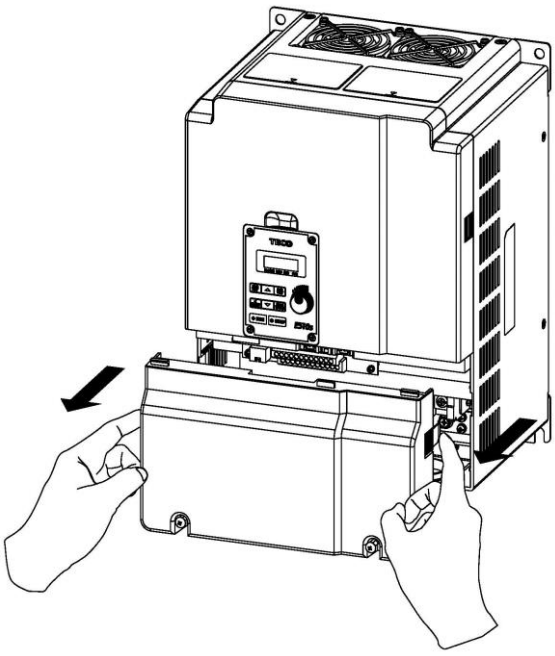
Step4：Tighten the screws

NEMA1

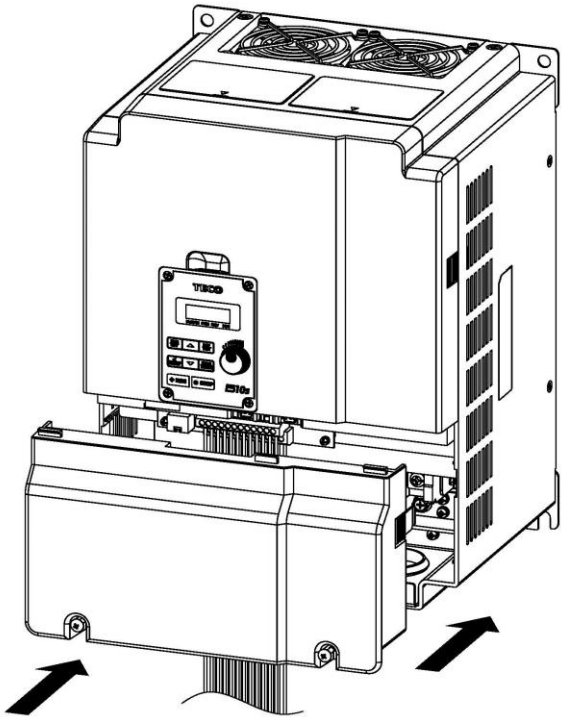
200V 25HP / 400V 30HP



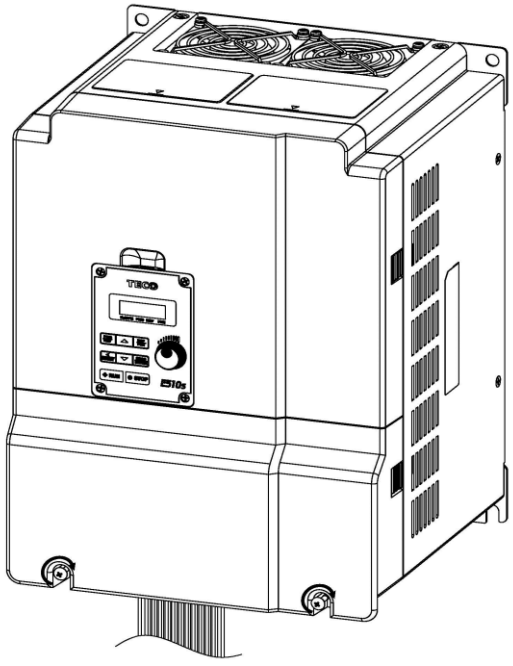
Step1: Unscrew cover



Step2: Remove the terminal cover



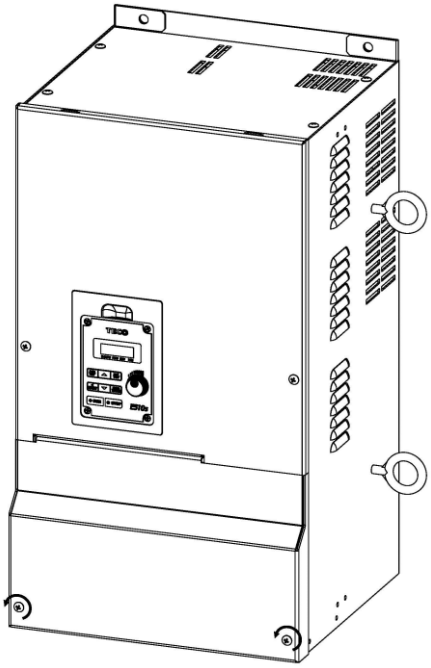
Step3：Wire and reinstall the cover



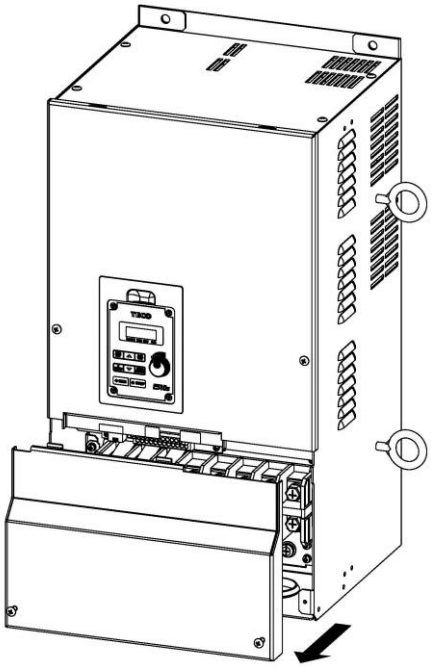
Step4：Tighten the screws

NEMA1

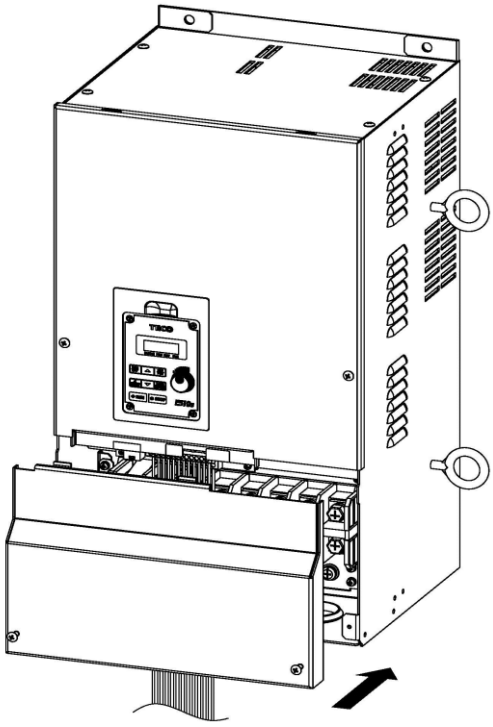
200V 30HP~40HP / 400V 40HP~75HP



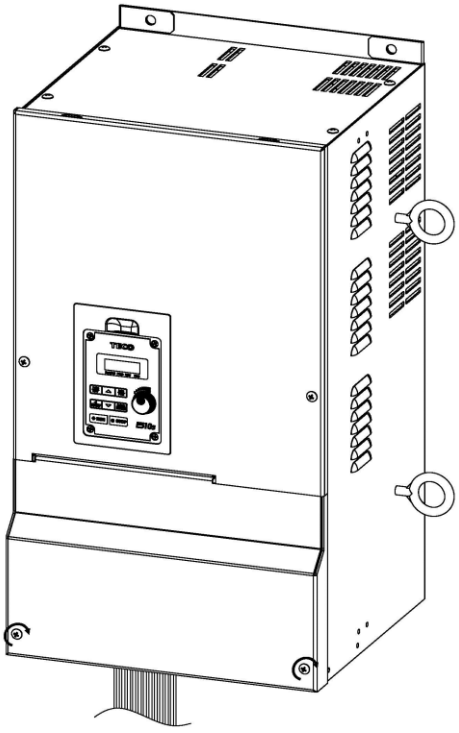
Step1: Unscrew cover



Step2: Remove the terminal cover



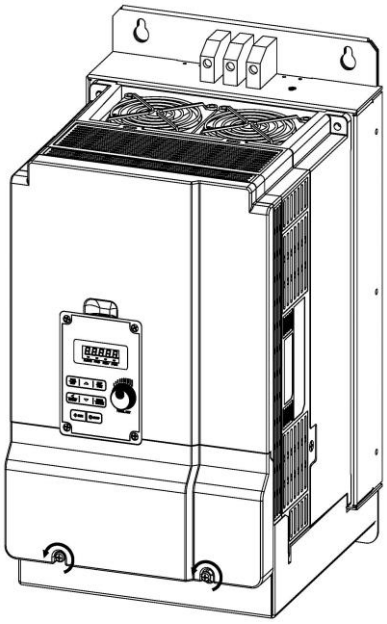
Step3：Wire and Reinstall the cover



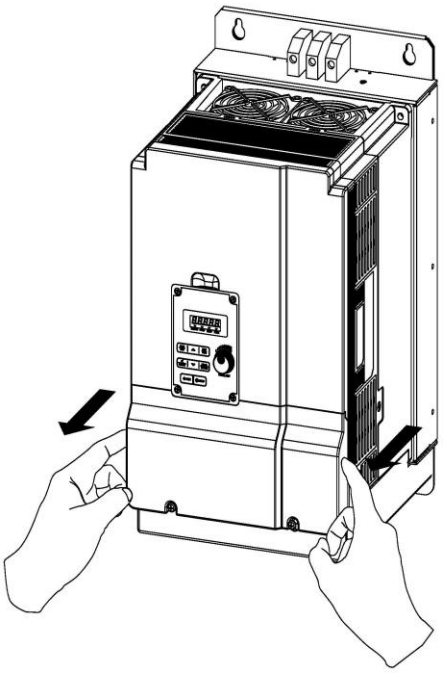
Step4：Tighten the screws

NEMA1

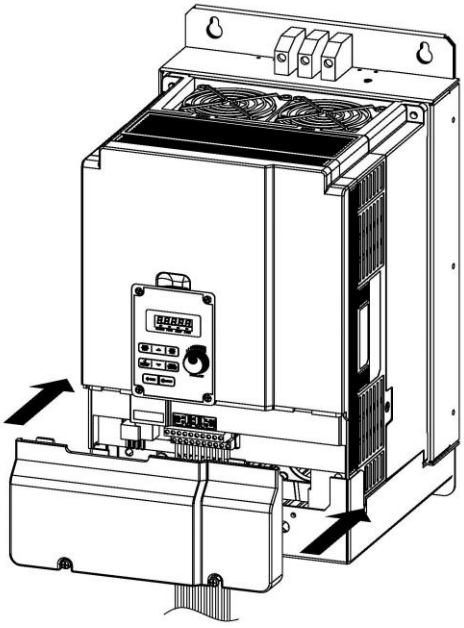
400V 20HP~75HP (with EMC filter)



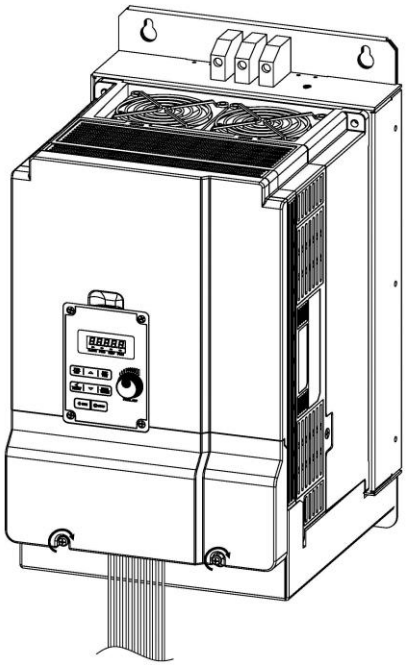
Step1: Unscrew cover



Step2: Remove the terminal cover



Step3：Wire and reinstall the cover



Step4：Tighten the screws

3.6 Wire Gauges, Tightening Torque, Terminal , Short Circuit, Circuit Breaker and Fuse Ratings

Wire Gauges

					TM1				
Frame size	HP	Power specification	Voltage	Amps	Input wiring (TM1)	Output wiring (TM1)	Tightening Torque		
							kgf.cm	lbf.in	Nm
Frame1	0.5/1	200V～240V	600	20	14 AWG (2.5 mm²)	14 AWG (2.5 mm²)	9.8	8.5	0.96
	1/2	380V～480V			14 – 12 AWG (2.5 – 4.0 mm²)	14 – 12 AWG (2.5 – 4.0 mm²)			
Frame2	2(-H)/3/5	200V～240V	600	45	14 – 8 AWG (2.5 – 10 mm²)	14 – 8 AWG (2.5 – 10 mm²)	18.4	15.9	1.8
	3/5	380V～480V			14 – 8 AWG (2.5 – 10 mm²)	14 – 8 AWG (2.5 – 10 mm²)			
Frame 3/4	7.5/10/15/20	200V～240V	600	100	12 – 6 AWG (4.0 – 16 mm²)	12 – 6 AWG (4.0 – 16 mm²)	24.5	21.2	2.4
	7.5/10/15/20 /25	380V～480V	600	65	8 AWG (10 mm²)	8 AWG (10 mm²)			
Frame 5	25	200V～240V	600	100	6 AWG (16 mm²)	6 AWG (16 mm²)	30	26	2.9
	30	380V～480V	600	75	6 AWG (16 mm²)	6 AWG (16 mm²)			
Frame 6	30/40	200V～240V	600	175	0 AWG (50 mm²)	0 AWG (50 mm²)	81.7	70.7	8
	40/50/60/75	380V～480V	600		0 AWG (50 mm²)	0 AWG (50 mm²)			

			TM2			
Frame size	Horsepower	Power specification	Terminal Wiring Size (TM2)	Tightening Torque		
				kgf.cm	lbf.in	Nm
Frame1	0.5/1	200V～240V	26~18 AWG (0.5~1.5 mm²)	5.7	5	0.56
	1/2	380V～480V				
Frame2	2(-H)/3/5	200V～240V				
	3/5	380V～480V				
Frame 3/4	7.5/10/15/20	200V～240V				
	7.5/10/15/20/25	380V～480V				
Frame 5	25	200V～240V	16 AWG (0.5~1.5 mm²)	8	7	0.79
	30	380V～480V				
Frame 6	30/40	200V～240V	14 AWG (0.5~1.5mm²)	8	7	0.79
	40/50/60/75	380V～480V				

NOTES:

* Wire size shown is based on maximum terminal size. Please consult the NEC or local codes for proper size to be used.

* Use only copper wires. Proper diameter wire should be based on ratings at 75°C.

* For safety reasons do not use under sized wiring.

Terminals Electrical Rating

Model	Horsepower	Power Specification	Voltage (Volt)	Current(A)
Frame1	0.5/1	200V~240V	600	20
	1/2	380V~480V		
Frame2	2/3/5	200V~240V		45
	3/5	380V~480V		
Frame 3/4	7.5/10/15/20	200V~240V	600	100
	7.5/10/15/20/25	380V~480V	600	65
Frame 5	25	200V~240V	600	100
	30	380V~480V	600	75
Frame 6	30/40	200V~240V	600	175
	40/50/60/75	380V~480V	600	

Short circuit rating

Device Rating		Short circuit Rating (A)	Maximum Voltage (Volt)
voltage	HP		
230V	0.5~40	5,000	240
460V	1~75	5,000	480

Circuit breaker and Fuse Rating

Model：E510-###-###-U	Circuit breaker current rating	Fuse rating
2P5	15A	15A, 300VAC
201/202	20A	30A, 300VAC
203/205	30A	30A, 300VAC
208	50A	60A, 300VAC
210	60A	100A, 300VAC
215/220	100A	200A, 300VAC
225	100A	200A, 300VAC
230	150A	250A, 600VAC
240	175A	300A, 600VAC
401/402/403/405	15A	15A, 600VAC
408	20A	20A, 600VAC
410	30A	40A, 600VAC
415	50A	70A, 600VAC
420	50A	70A, 600VAC
425	75A	100A, 600VAC
430	75A	120A, 600VAC
440	100A	150A, 600VAC
450	100A	200A, 600VAC
460	150A	250A, 600VAC
475	175A	300A, 600VAC

3.7 Wiring Peripheral Power Devices

Caution

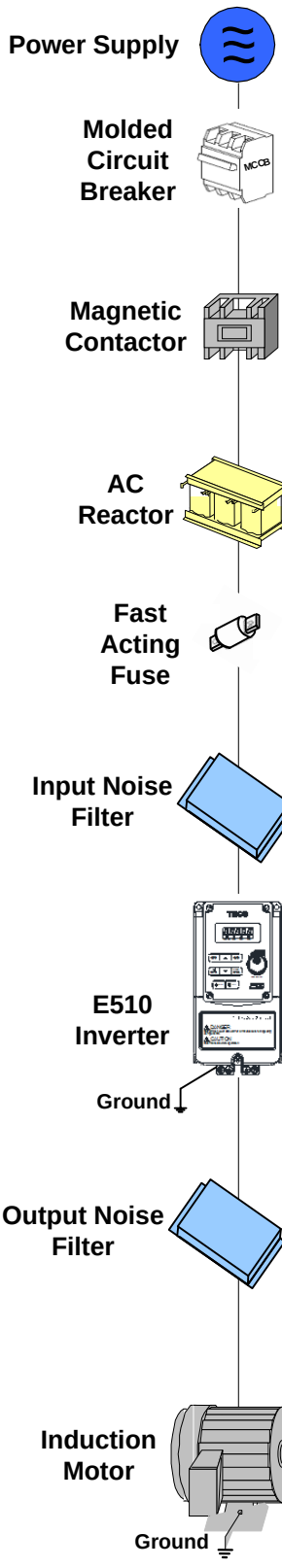
- After power is shut off to the inverter the capacitors will slowly discharge. Do NOT touch and of the inverter circuitry or replace any components until the “CHARGE” indicator is off.
- Do NOT wire or connect/disconnect internal connectors of the inverter when the inverter is powered up or when powered off and the “CHARGE”” indicator is on.
- Do NOT connect inverter output U, V and W to the supply power. This will result in damage to the inverter.
- The inverter must by properly grounded. Use terminal E to connect earth ground and comply with local standards.
- Do NOT perform a dielectric voltage withstand test (Megger) on the inverter this will result in inverter damage to the semiconductor components.
- Do NOT touch any of the components on the inverter control board to prevent damage to the inverter by static electricity.

Caution

- Refer to the recommended wire size table for the appropriate wire to use. The voltage between the power supply and the input of the inverter may not exceed 2%.

  Phase-to-phase voltage drop (V) = $\sqrt{3}$ ×resistance of wire (Ω/km) × length of line m) × current×10^{-3}. (km=3280 x feet) / (m=3.28 x feet)

- Reduce the carrier frequency (parameter 11-01) If the cable from the inverter to the motor is greater than 25m (82ft). A high-frequency current can be generated by stray capacitance between the cables and result in an overcurrent trip of the inverter, an increase in leakage current, or an inaccurate current readout.
- To protect peripheral equipment, install fast acting fuses on the input side of the inverter. Refer to section 11.6 for additional information.



Power supply:

- ⚠ Make sure the correct voltage is applied to avoid damaging the inverter.

Molded-case circuit breaker (MCCB) or fused disconnect:

- A molded-case circuit breaker or fused disconnect must be installed between the AC source and the inverter that conforms to the rated voltage and current of the inverter to control the power and protect the inverter.
- ⚠ Do not use the circuit breaker as the run/stop switch for the inverter.

Ground fault detector / breaker:

- ⚠ Install a ground fault breaker to prevent problems caused by current leakage and to protect personnel. Select current range up to 200mA, and action time up to 0.1 second to prevent high frequency failure.

Magnetic contactor:

- Normal operations do not need a magnetic contactor. When performing functions such as external control and auto restart after power failure, or when using a brake controller, install a magnetic contactor.
- ⚠ Do not use the magnetic contactor as the run/stop switch for the inverter.

AC line reactor for power quality:

- When inverters are supplied by a high capacity power source (> 600KVA), an AC reactor can be connected to improve the power factor.

Install Fast Acting Fuse:

- To protect peripheral equipment, install fast acting fuses in accordance with the specifications in section 11 for peripheral devices.

Input Noise filter:

- A filter must be installed when there are inductive loads affecting the inverter. The inverter meets EN55011 Class A, category C3 when the TECO special filter is used.

Inverter:

- Output terminals T1, T2, and T3 are connected to U, V, and W terminals of the motor. If the motor runs in reverse while the inverter is set to run forward, swap any two terminals connections for T1, T2, and T3.
- ⚠ To avoid damaging the inverter, do not connect the output terminals T1, T2, and T3 to AC input power.
- ⚠ Connect the ground terminal properly. (230V series: Rg <100Ω; 460V series: Rg <10Ω.)

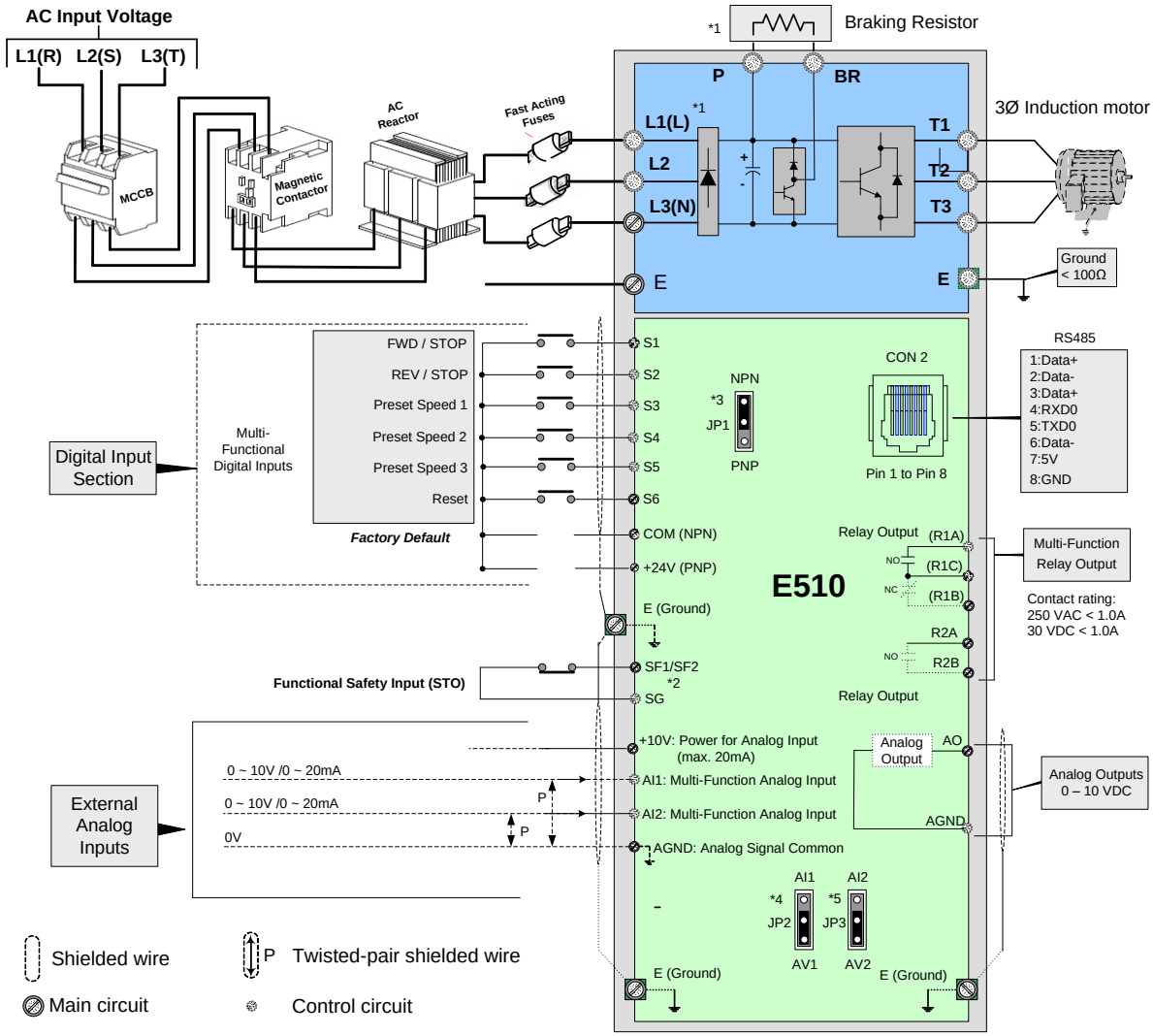
Output Noise filter:

- An output noise filter may reduce system interference and induced noise. See section 11 for peripheral devices.

Motor:

- If the inverter drives multiple motors the output rated current of the inverter must be greater than the total current of all the motors.

3.8 General Wiring Diagram



Notes:

*1: Only 200V 0.5-25HP and 400V 1-40HP have a built-in braking transistor. The braking resistor can be connected directly between P and BR.

*2: Run Permissive input SF and SG is a normally closed input. This input should be closed to enable the inverter output. To activate this input place a jumper wire between SF and SG.

*3: Use jumper JP1 to select between Sink (NPN, with 24VG common) or Source (PNP, with +24V common) for multi-function digital input terminals S1~S6.

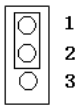
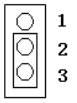
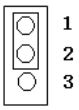
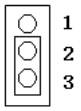
*4: Use jumper JP2 to switch between voltage and current input for Multi-function analog input 1 (AI1).

*5: Use jumper JP3 to switch between voltage and current input for Multi-function analog input 1 (AI2).

3.9 User Terminals (Control Circuit Terminals)

R2A	R2B	R1A	R1B	R1C		S1	S3	S5	24V	AI1	AI2
S(+)	S(-)	SF1	SG		COM	S2	S4	S6	AGND	10V	AO

Jumper function descriptions

Jumper	Symbol	Function	Signal Reference	Note
JP1		NPN/PNP selectable	NPN Input	Factory default setting
			PNP Input	
JP2/JP3		External signal type selection	0~20mA / 4~20mA Analog signal	Set parameters 00-05/00-06 to 2 or 3 (external analog input) to become effective
			0~10VDC / 2~10VDC Analog signal	

Description of User Terminals

Type	Terminal	Terminal function		Signal level
Digital inputs	S1	Refer to parameter group 3 for more information and default settings.		24 VDC, 8 mA, Optical coupling isolation (Max, voltage 30 VDC, Input impedance 3.3kΩ) High Logic: 13V Low Logic: 10V
	S2			
	S3			
	S4			
	S5			
	S6			
Relay outputs	R1A	NO(Normally open)	Multi-function output: Run, Fault, setting Frequency ,Frequency Reached, Auto Restart, Momentary AC Power Loss, Rapid Stop ,Base Block Stop Mode, Motor Overload Protection, Drive Overload Protection, Over-torque Threshold Level、Preset Current level Reached、Preset Brake Frequency Reached, PID Feedback Signal Loss, Final count value reached, Initial count value reached, PLC Status Indicator ,PLC control…	250VAC/1A(30VDC/1A)
	R1B	NC(Normally closed)		
	R1C	COMMON		
	R2A			
	R2B			
24VPower supply	COM	Digital signal common terminal (JP1 Switching NPN position)		±15%,Max output current 60mA
	24V	Digital signal common terminal (JP1 Switching PNP position)		
Analog inputs	10V	Built in Power for an external speed potentiometer		10V(Max current:20mA)
	AI1/AV1	Multifunctional analog input: JP2 selects voltage or current input Voltage: JP2 in AV1 position Current: JP2 in AI1 position		0 ~ 10V,(Max current:20mA) (Input impedance: 153KΩ)
	AI2/AV2	Multifunctional analog input: JP3 selects voltage or current input Voltage: JP3 in AV2 position Current: JP3 in AI2 position		0 ~ 10V,0 ~20mA (Input impedance: 153KΩ)
	AGND	The analog common terminal		----
	⏚	Shielding wire connecting terminal (The earth)		----
Analog output	AO	Multifunctional analog output terminal*3		0 ~10V,(Max current:2mA)
	AGND	The analog common terminal		----
Safety switch	SF1,SF2	Terminal SF is a safety input and can be used to disable drive externally. Note SF2 only available on 'F' version inverters.		
	SG			

Notes:

*1:Multi-function digital input can be referred to in this manual.

- Group 03: External Terminals Digital Input / Output Function Group.

*2:Multi-function analog input can be referred to in this manual.

- Group 04 - External Terminal Analog Signal Input (Output) Function Group.

*3:Multi-function analog output can be referred to in this manual.

- Group 04 - External Terminal Analog Signal Input (Output) Function Group.

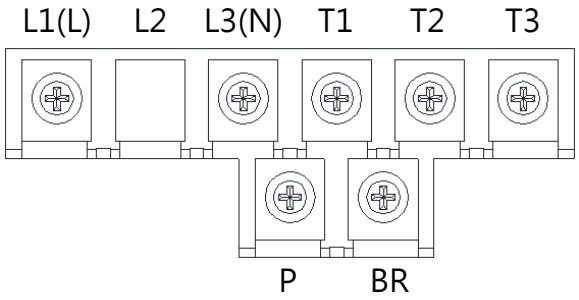
Caution

- Maximum output current capacity for terminal 10V is 20mA.
- Multi-function analog output AO is for use of an analog output meter. Do not use this output for feedback control.
- Control board's is to be used for internal control only, Do not use the internal power-supply to power external devices.

3.10 Power Terminals

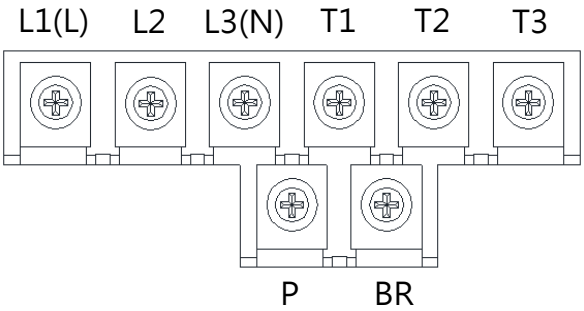
Terminal symbol	TM1 function description		
L1(L)	Main power input,	Single phase：	L1(L)/L3(N)
L2		Single/Three phase：	L1(L)/L2/L3(N)
L3(N)		Three phase：	L1/L2/L3
T1	Inverter output, connect to U/V/W terminals of motor		
T2			
T3			
P	Externally connected braking resistor (Please see the braking resistors reference on section 11.2)		
BR			
⏚	Ground terminal		

Main power terminal of Single phase 200V Class 0.5~1HP

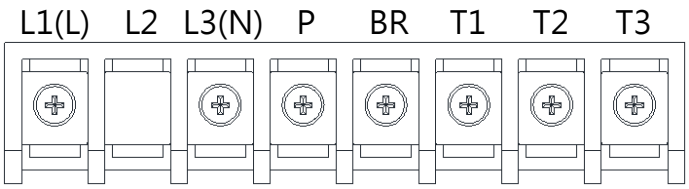


Note： Screw on L2 terminal is removed for single phase input models.

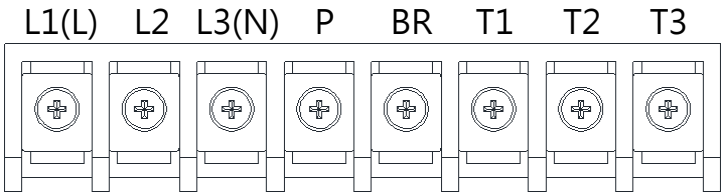
Main power terminal of Single/Three phase 200V Class 0.5~1HP and Three phase 400V Class 1~2HP.



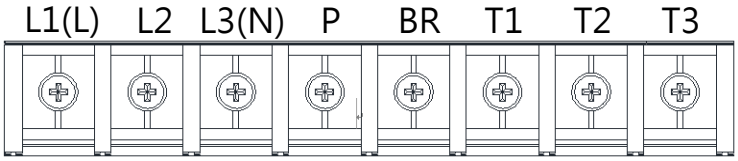
Main power terminal of Single/Three phase 200V Class 2~3HP



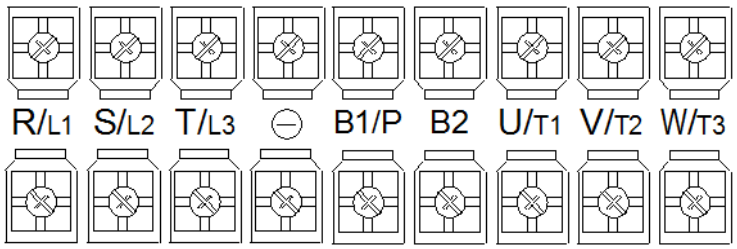
Main power terminal of Single/Three phase 200V Class 2~3HP, Three phase 200V Class 5HP and Three phase 400V Class 3~5HP



Main power terminal of Three phase 200V Class 7.5~20HP and Three phase 400V Class 7.5~20HP

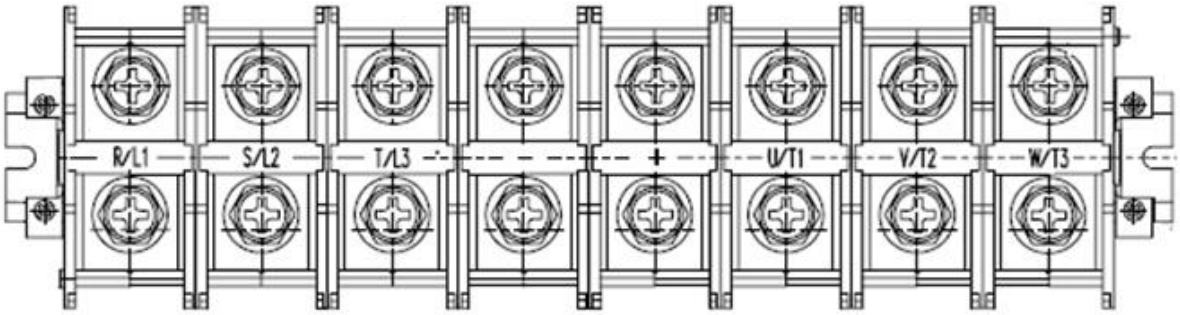


Main power terminal of Three phase 200V Class 25HP and Three phase 400V Class 30HP



Main power terminal of Three phase 200V Class 30~40HP and Three phase 400V Class 40~75HP

R/L1 S/L2 T/L3 - + U/T1 V/T2 W/T3



3.11 Inverter Wiring

Wiring Precautions

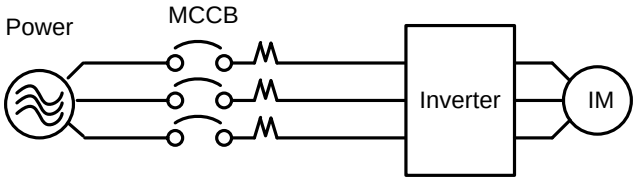
Danger	• Do **NOT** remove any protective covers or attempt any wiring while input power is applied. Connect all wiring before applying input power. When making wiring changes after power up, remove input power and wait a minimum of five minutes after power has been turned off before starting. Also confirm that the charge lamp is off and that DC voltage between terminals B1/P or (+) and (-) does not exceed 25V, otherwise **electric shock may result.** • Only authorized personnel should work on the equipment. (Take off metal jewelry such as watches and rings and use insulated tools.), otherwise **electric shock or injury may result.**

(A) Power input terminals

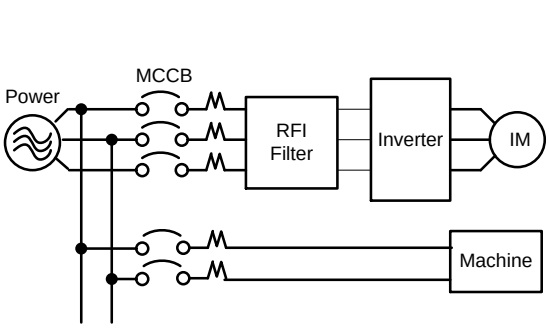
1. The Input power supply voltage can be connected in any phase sequence to power input terminals R/L1, S/L2, or T/L3 on the terminal block.
2. DO NOT connect the AC input power source to the output terminals U/T1, V/T2 and. W/T3.
3. Connect the output terminals U/T1, V/T2, W/T3 to motor lead wires U/T1, V/T2, and W/T3, respectively.
4. Check that the motor rotates forward with the forward run source. If it does not, swap any 2 of the output cables to change motor direction.
5. DO NOT connect phase correcting capacitors or LC/RC noise filter to the output circuit.

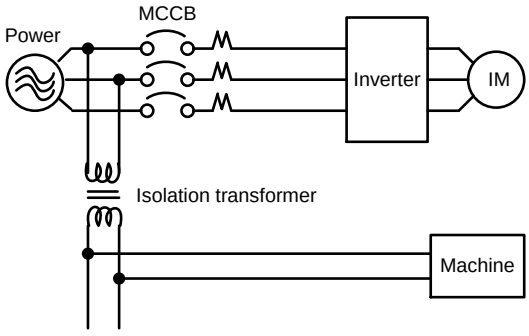
Example power connections:

Inverter with dedicated power line



Install a Supply RFI filter or Isolation transformer when the power source is shared with other high power electrical equipment as shown below.





(B) Grounding

1. Connect the ground terminal (E) to ground having a resistance of less than 100Ω.
2. Do not share the ground wire with other devices, such as welding machines or power tools.
3. Always use a ground wire that complies with the local codes and standards for electrical equipment and minimize the length of ground wire.
4. When using more than one inverter, be careful not to loop the ground wire, as shown below in Fig. 3.11.1.

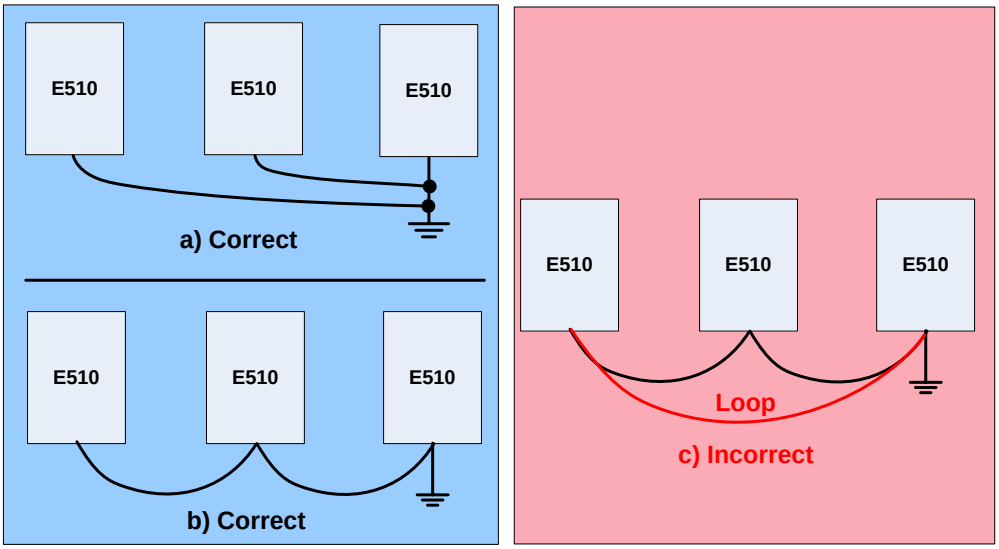


Fig. 3.11.1 Inverter Grounding

3.12 Input Power and Motor Cable Length

The length of the cables between the input power source and /or the motor and inverter can cause a significant phase to phase voltage reduction due to the voltage drop across the cables. The wire size shown in Tables 3.13.1 is based on a maximum voltage drop of 2%. If this value is exceeded, a wire size having larger diameter may be needed. To calculate phase tot phase voltage drop, apply the following formula:

Phase-to-phase voltage drop (V) = $\sqrt{3}$ ×resistance of wire (Ω/km) × length of line m) × current×10^{-3}.

(km=3280 x feet)
(m=3.28 x feet)

3.13 Cable Length vs. Carrier Frequency

The allowable setting of the PWM carrier frequency is also determined by motor cable length and is specified in the following Table 3.13.1.

Table 3.13.1 Cable Length vs. Carrier Frequency

Cable length between the inverter and Motor in m (ft.).	< 30m (100)	30 – 50 (100 – 165)	50 – 100 (166 - 328)	≥ 100 (329)
Recommended carrier frequency allowed Parameter 11-01	16kHz (max)	10 kHz (max)	5 kHz (max)	2 kHz (max)

3.14 Installing an AC Line Reactor

If the inverter is connected to a large-capacity power source (600kVA or more), install an optional AC reactor on the input side of the inverter. This also improves the power factor on the power supply side.

3.15 Power Input Wire Size, and NFB

The following table shows the recommended wire size for each frame of the E510. It depends on the application whether or not to install a circuit breaker. The NFB must be installed between the input power supply and the inverter input (L1 (L), L2, L3 (N)).

Note: When using a ground protection make sure the current setting is above 200mA and trip delay time is 0.1 sec of higher.

Table 3.13.1 Wire size and tightening torque for frame 1 ~ 6

TM1					TM2			
Frame size	Wire Size	Tightening Torque			Wire Size	Tightening Torque		
		kgf.cm	lbf.in	Nm		kgf.cm	lbf.in	Nm
Frame1	14 AWG (2.5 mm²) 14 – 12 AWG (2.5 – 4.0 mm²)	9.8	8.5	0.96	26~18 AWG (0.5~1.5 mm²)	5.7	5	0.56
Frame2	14 – 8 AWG (2.5 – 10 mm²) 14 – 8 AWG (2.5 – 10 mm²)	18.4	15.9	1.8				
Frame 3/4	12 – 6 AWG (4.0 – 16 mm²) 8 AWG (10 mm²)	24.5	21.2	2.4				
Frame 5	6 AWG (16 mm²) 6 AWG (16 mm²)	30	26	2.9	16 AWG (0.5~1.5 mm²)	8	7	0.79
Frame 6	0 AWG (50 mm²) 0 AWG (50 mm²)	81.7	70.7	8	14 AWG (0.5~1.5mm²)	8	7	0.79

3.16 Control Circuit Wiring

(1) Separate the wiring for control circuit terminals from main circuit wiring for terminals (R/L1, S/L2, T/L3, U/T1, V/T2, W/T3).

(2) Separate the wiring for control circuit terminals R1A-R1B-R1C or R2A, R2B (Relay outputs) from wiring for terminals S1 – S6, A0, AGND, +10V, AI1, AI2 and GND wiring.

(3) Use shielded twisted-pair cables (#24 - #14 AWG / 0.5 -2 mm^2) shown in Fig. 3.14.1 for control circuits to minimize noise problems. The maximum wiring distance should not exceed 50m (165 ft).

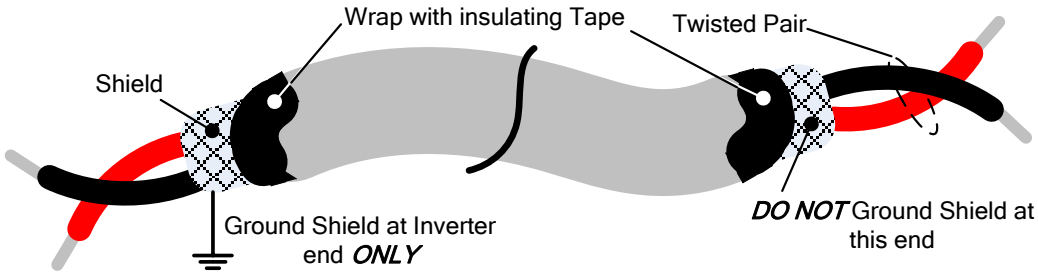


Fig. 3.14.1 Shielded Twisted-Pair

3.17 Inverter Specification

200V Class：Single phase

Model：E510-□□□-H1F-U*	2P5	201	202	203
Horse power (HP)	0.5	1	2	3
Suitable motor capacity (KW)	0.4	0.75	1.5	2.2
Rated output current (A)	3.1	4.5	7.5	10.5
Rated capacity (KVA)	1.2	1.7	2.90	4.00
Input voltage range(V)	Single phase：200~240V, 50/60HZ			
Allowable voltage fluctuation	-15%~+10%			
Output voltage range(V)	Three phase：0~240V			
Input current (A)*	8.5	12	16	23.9
Inverter net weight (KG)	1.65	1.65	2.5	2.5
Allowable momentary power loss time(s)	2.0	2.0	2.0	2.0
Enclosure	IP20/NEMA1			

200V Class：Single/Three phase

Model：E510-□□□-H-U	2P5	201	202	203
Horse power (HP)	0.5	1	2	3
Suitable motor capacity (KW)	0.4	0.75	1.5	2.2
Rated output current (A)	3.1	4.5	7.5	10.5
Rated capacity (KVA)	1.2	1.7	2.90	4.00
Input voltage range(V)	Single/Three：200~240V, 50/60HZ			
Allowable voltage fluctuation	-15%~+10%			
Output voltage range(V)	Three phase：0～240V			
Input current (A)*	8.5/4.5	12/6.5	16/11	23.9/12.5
Inverter net weight (KG)	1.6	1.6	2.5	2.5
Allowable momentary power loss time(s)	2.0	2.0	2.0	2.0
Enclosure	IP20/NEMA1			

* F Version models are not available as standard product in Americas.

200V Class：Three phase

Model：E510-□□□-H3-U	202	205	208	210	215	220
Horse power (HP)	2	5	7.5	10	15	20
Suitable motor capacity (KW)	1.5	4	5.5	7.5	11	15
Rated output current (A)	7.5	17.5	26	35	48	64
Rated capacity (KVA)	2.9	6.7	9.9	13.3	20.6	27.4
Input voltage range(V)	Three phase：200~240V,50/60HZ					
Allowable voltage fluctuation	-15%~+10%					
Output voltage range(V)	Three phase：0~240V					
Input current (A)*	11	20.5	33	42	57	70
Inverter net weight (KG)	1.6	2.5	6.5	6.5	10.1	10.4
Allowable momentary power loss time(s)	2.0	2.0	2.0	2.0	2.0	2.0
Enclosure	IP20/NEMA1					

Model：E510-□□□-H3-U	225	230	240
Horse power (HP)	25	30	40
HD/ND Suitable motor capacity (kW)	18.5/22	22/30	30/37
HD/ND Rated output current (A)	73/80	85/110	115/138
HD/ND Rated capacity (KVA)	27.8/30.1	32.4/41.9	43.8/52.6
Input voltage range(V)	Three phase：200~240V,50/60HZ		
Allowable voltage fluctuation	-15%~+10%		
Output voltage range(V)	Three phase：0~240V		
Input current (A)*	79.4/85.9	92.4/119.6	125/150
Inverter net weight (KG)	10	30	30
Allowable momentary power loss time(s)	2.0	2.0	2.0
Enclosure	IP20/NEMA1		

400V Class：Three phase

Model：E510-□□□-H3(F*)-U	401	402	403	405
Horse power (HP)	1	2	3	5
Suitable motor capacity (KW)	0.75	1.5	2.2	4.0
Rated output current (A)	2.5	3.8	5.3	9.2
Rated capacity (KVA)	1.7	2.9	4.0	6.7
Input voltage range(V)	Three phase：380~480V,50/60HZ			
Allowable voltage fluctuation	-15%~+10%			
Output voltage range(V)	Three phase：0～480V			
Input current (A)*	4.2	5.6	7.3	11.6
Inverter net weight (KG)	1.7	1.7	2.5	2.5
Allowable momentary power loss time(s)	2.0	2.0	2.0	2.0
Enclosure	IP20/NEMA1			

Model：E510-□□□-H3(F*)-U	408	410	415	420	425
Horse power (HP)	7.5	10	15	20	25
Suitable motor capacity (KW)	5.5	7.5	11	15	18.5
Rated output current (A)	13.0	17.5	24	32	40
Rated capacity (KVA)	9.9	13.3	19.1	24	30.5
Input voltage range(V)	Three phase：380~480V,50/60HZ				
Allowable voltage fluctuation	-15%~+10%				
Output voltage range(V)	Three phase：0~480V				
Input current (A)*	17	23	31	38	48
Inverter net weight (KG)	6.7	6.7	6.7	13.7	13.7
Allowable momentary power loss time(s)	2.0	2.0	2.0	2.0	2.0
Enclosure	IP20/NEMA1				

Model：E510-□□□- H3(F*)-U	420	425
Horse power (HP)	20	25
Suitable motor capacity (KW)	15	18.5
Rated output current (A)	32	40
Rated capacity (KVA)	24	30.5
Input voltage range(V)	Three phase：380~480V,50/60HZ	
Allowable voltage fluctuation	-15%~+10%	
Output voltage range(V)	Three phase：0~480V	
Input current (A)*	38	48
Inverter net weight (KG)	10	10
Allowable momentary power loss time(s)	2.0	2.0
Enclosure	IP20/NEMA1	

* F Version models are not available as standard product in Americas.

400V Class：Three phase

Model：E510-□□□- H3(F*)-U	430	440
Horse power (HP)	30	40
HD/ND Suitable motor capacity (kW)	22/30	30/37
HD/ND Rated output current (A)	45/58	60/73
HD/ND Rated capacity (KVA)	34.3/44.2	45.7/55.6
Input voltage range(V)	Three phase : 380~480V,50/60HZ	
Allowable voltage fluctuation	+10%-15%	
Output voltage range(V)	Three phase : 0~480V	
Input current (A)*	48.9/63	65.2/78.3
Inverter net weight (KG)	20	30
Allowable momentary power loss time(s)	2.0	
Enclosure	IP20/NEMA1	

Model：E510-□□□- H3(F*)-U	450	460	475
Horse power (HP)	50	60	75
HD/ND Suitable motor capacity (kW)	37/45	45/55	55/75
HD/ND Rated output current (A)	75/88	91/103	118/145
HD/ND Rated capacity (KVA)	57.2/67.1	69.3/78.5	89.9/111
Input voltage range(V)	Three phase : 380~480V,50/60HZ		
Allowable voltage fluctuation	+10%-15%		
Output voltage range(V)	Three phase : 0~480V		
Input current (A)*	81.5/95.7	98.9/112	130/159
Inverter net weight (KG)	30	30	35
Allowable momentary power loss time(s)	2.0	2.0	2.0
Enclosure	IP20/NEMA1		

* F Version models are not available as standard product in Americas.

3.18 General Specification

Item		E510
Control Mode		V/F, SLV, PMSLV control mode
Frequency	Output Frequency	0.01 ~ 599.00Hz
	Starting Torque	150% / 1Hz (SLV mode)，150% / 3Hz (V/F mode)
	Speed Control Range	1:50
	Setting resolution	Digital input: 0.01Hz Analog input:0.06Hz/60Hz
	Setting	Keypad: Set directly with▲▼ keys or the VR on the keypad External Input Terminals: AI1(0/2~10V), AI2(0/4~20mA)input Multifunction input up/down function(Group3) Setting frequency by communication method.
	Frequency limit	Lower and upper frequency limits, 3 skip frequency settings.
Run	Operation set	Keypad run, stop button External terminals: Multi- operation-mode2 / 3 wire selection Jog operation Run signal by communication method.
Main Control Features	V / F curve setting	15 fixed curves and one customized curve
	Carrier frequency	1~16KHz (factory setting is 5kHz)
	Acceleration and deceleration control	2 Acceleration / deceleration time parameters. 4 off S curve parameters.
	Multifunction input	Refer to description in group 3
	Multifunction output	Refer to description in group 3
	Multifunction analog output	Refer to description in group 4
	Main features	Overload Detection,16 preset speeds, Auto-run, Acc/Dec Switch (2 Stages),Main/Alt run Command select, Main/Alt Frequency Command selection, PID control, torque boost, V/F start Frequency, Fault reset.
Display	LED	Display: parameter / parameter value / frequency / line speed / DC voltage / output voltage / output current / PID feedback / input and output terminal status / Heat sink temperature / Program Version / Fault Log.
	LED Status Indicator	Run / Stop / Forward / Reverse ,and etc.
Protective Functions	Overload Protection (OL1)	Electrical overload protection curve
	Overload Protection (OL2)	H.D mode：150% rated current for 1 minute. N.D mode：120% rated current for 1 minute
	Over voltage	200V Class：DC bus voltage higher than 410Vdc 400V Class：DC bus voltage higher than 820Vdc
	Under Voltage	200V Class：DC bus voltage lower than 190V 400V Class：DC bus voltage lower than 380V
	Momentary Power Loss Restart	Inverter auto-restart after a momentary power loss.
	Stall Prevention	Stall prevention for Acceleration/ Deceleration/ Operation.
	Short-circuit output terminal	Electronic Circuit Protection

	Grounding Fault	Electronic Circuit Protection
	Other protection features	Protection for overheating of heat sink, The carrier frequency decreases based on the temperature, Fault output, Reverse prohibit, Prohibit for direct start after power up and error recovery ,parameter lock up, STO (Safety Torque Off)
	All frames include brake transistor	
Communication control		Built-in RS485 communication multi-drop communication. Built-in BACnet communication for building control. (Ex：Fire protection system, Air conditioning system, Monitoring system and Access control system)
Environment	Operating temperature	IP20/NEMA1 type： -10~50°C(without sticker or upper dust cover) -10~40°C(with sticker or upper dust cover)
	Storage temperature	-20~60°C
	Humidity	95% RH or less (no condensation) (Compliance with IEC 60068 - 2-78)
	Vibration	1G. (9.8m/s²) for < 20Hz. 0.6G (5.88m/s²) 20Hz~50Hz (Follow IEC60068-2-6 standard
	Enclosure	IP20/NEMA1

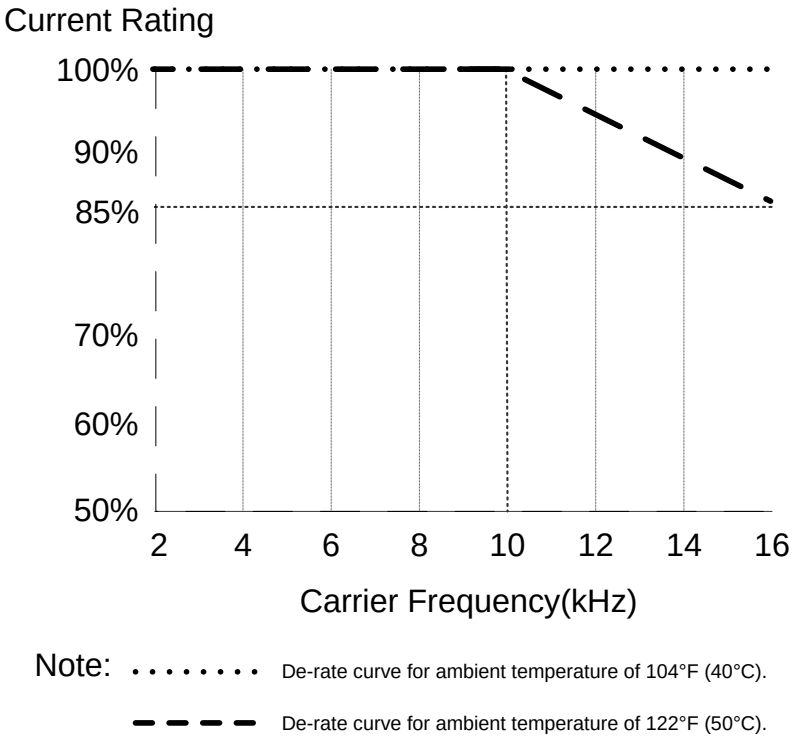
3.19 Inverter derating based on Carrier Frequency

The curves are showing the applicable output current de-rate due to setting of carrier frequency and the ambient operating temperatures of 40 and 50 degrees.

When the carrier frequency is below 10 KHz ambient temperature will not affect rated current.

When the carrier frequency is higher than 10 KHz
If the ambient temperature is below 40°C (104°F), 100% output rated current at 16 KHz.
If the ambient temperature is below 50°C (122°F), 85% output rated current at 16 KHz.

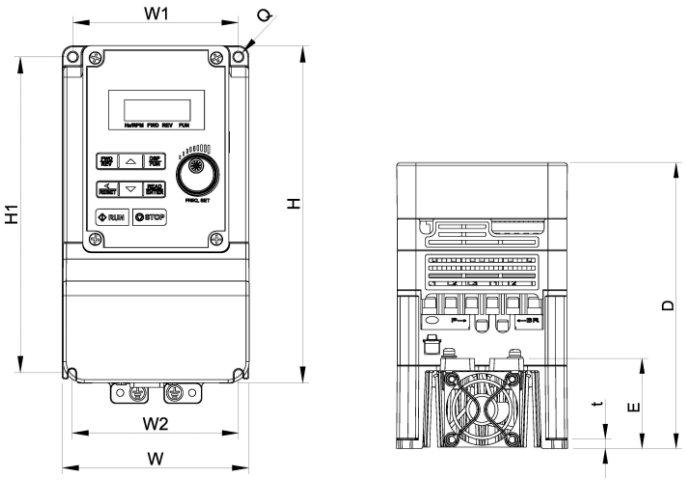
It is required to derate 1.5% of output rated current each additional degree when the ambient temperature rises above 50 degrees °C (122°F)..



3.20 Inverter Dimensions

IP20 Dimensions

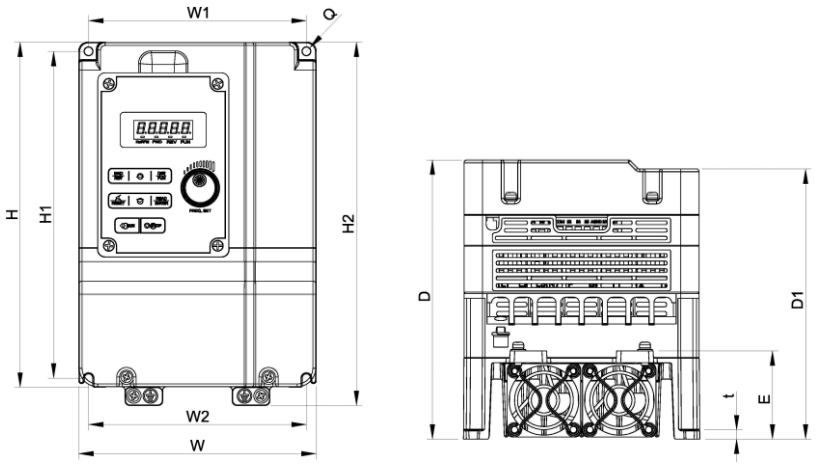
200V Class single phase：0.5HP~1HP
200V Class three phase：2HP
400V Class three phase：1HP~2HP



Inverter Model	Dimensions in mm (inch)									Net Weight in kg/(lbs)
	W	W1	W2	H	H1	D	E	t	Q	
E510-2P5-H-U	90.6 (3.57)	80.5 (3.17)	80.5 (3.17)	164 (6.46)	153 (6.02)	151.4 (5.96)	47 (1.85)	5 (0.19)	M4	1.6/(3.5)
E510-201-H-U	90.6 (3.57)	80.5 (3.17)	80.5 (3.17)	164 (6.46)	153 (6.02)	151.4 (5.96)	47 (1.85)	5 (0.19)	M4	1.6/(3.5)
E510-2P5-H1F-U	90.6 (3.57)	80.5 (3.17)	80.5 (3.17)	164 (6.46)	153 (6.02)	151.4 (5.96)	47 (1.85)	5 (0.19)	M4	1.7/(3.8)
E510-201-H1F-U	90.6 (3.57)	80.5 (3.17)	80.5 (3.17)	164 (6.46)	153 (6.02)	151.4 (5.96)	47 (1.85)	5 (0.19)	M4	1.7/(3.8)
E510-202-H3-U	90.6 (3.57)	80.5 (3.17)	80.5 (3.17)	164 (6.46)	153 (6.02)	151.4 (5.96)	47 (1.85)	5 (0.19)	M4	1.7/(3.8)
E510-401-H3-U	90.6 (3.57)	80.5 (3.17)	80.5 (3.17)	164 (6.46)	153 (6.02)	151.4 (5.96)	47 (1.85)	5 (0.19)	M4	1.7/(3.8)
E510-402-H3-U	90.6 (3.57)	80.5 (3.17)	80.5 (3.17)	164 (6.46)	153 (6.02)	151.4 (5.96)	47 (1.85)	5 (0.19)	M4	1.7/(3.8)
E510-401-H3F-U	90.6 (3.57)	80.5 (3.17)	80.5 (3.17)	164 (6.46)	153 (6.02)	151.4 (5.96)	47 (1.85)	5 (0.19)	M4	1.7/(3.8)
E510-402-H3F-U	90.6 (3.57)	80.5 (3.17)	80.5 (3.17)	164 (6.46)	153 (6.02)	151.4 (5.96)	47 (1.85)	5 (0.19)	M4	1.7/(3.8)

* F Version models are not available as standard product in Americas.

200V Class single/three phase：2HP
400V Class three phase：3~25HP
200V Class three phase：3~20HP



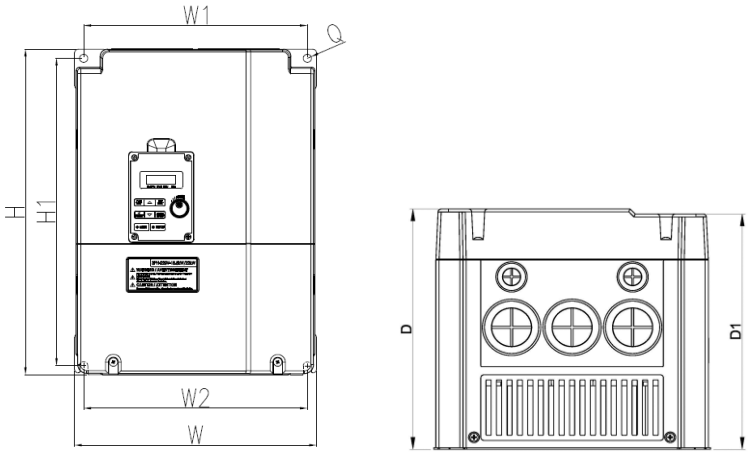
Inverter Model	Dimensions in mm (inch)											Net Weight in Kg/(lbs)
	W	W1	W2	H	H1	H2	D	D1	E	t	Q	
E510-202-H-U	128.7 (5.07)	118 (4.65)	118 (4.65)	187.6 (7.39)	177.6 (6.99)	197.5 (7.78)	152.4 (6)	147.4 (5.8)	48.2 (1.9)	5 (0.19)	M4	2.5/(5.5)
E510-203-H-U	128.7 (5.07)	118 (4.65)	118 (4.65)	187.6 (7.39)	177.6 (6.99)	197.5 (7.78)	152.4 (6)	147.4 (5.8)	48.2 (1.9)	5 (0.19)	M4	2.5/(5.5)
E510-202-H1F-U	128.7 (5.07)	118 (4.65)	118 (4.65)	187.6 (7.39)	177.6 (6.99)	197.5 (7.78)	152.4 (6)	147.4 (5.8)	48.2 (1.9)	5 (0.19)	M4	2.5/(5.5)
E510-203-H1F-U	128.7 (5.07)	118 (4.65)	118 (4.65)	187.6 (7.39)	177.6 (6.99)	197.5 (7.78)	152.4 (6)	147.4 (5.8)	48.2 (1.9)	5 (0.19)	M4	2.5/(5.5)
E510-205-H3-U	128.7 (5.07)	118 (4.65)	118 (4.65)	187.6 (7.39)	177.6 (6.99)	197.5 (7.78)	152.4 (6)	147.4 (5.8)	48.2 (1.9)	5 (0.19)	M4	2.5/(5.5)
E510-403-H3-U	128.7 (5.07)	118 (4.65)	118 (4.65)	187.6 (7.39)	177.6 (6.99)	197.5 (7.78)	152.4 (6)	147.4 (5.8)	48.2 (1.9)	5 (0.19)	M4	2.5/(5.5)
E510-405-H3-U	128.7 (5.07)	118 (4.65)	118 (4.65)	187.6 (7.39)	177.6 (6.99)	197.5 (7.78)	152.4 (6)	147.4 (5.8)	48.2 (1.9)	5 (0.19)	M4	2.5/(5.5)
E510-403-H3F-U	128.7 (5.07)	118 (4.65)	118 (4.65)	187.6 (7.39)	177.6 (6.99)	197.5 (7.78)	152.4 (6)	147.4 (5.8)	48.2 (1.9)	5 (0.19)	M4	2.5/(5.5)
E510-405-H3F-U	128.7 (5.07)	118 (4.65)	118 (4.65)	187.6 (7.39)	177.6 (6.99)	197.5 (7.78)	152.4 (6)	147.4 (5.8)	48.2 (1.9)	5 (0.19)	M4	2.5/(5.5)
E510-208-H3-U	186.9 (7.36)	175 (6.89)	176 (6.93)	260.9 (10.27)	249.8 (9.83)	273 (10.75)	202.6 (7.98)	197.6 (7.78)	76.7 (3.02)	6.5 (0.26)	M4	6.5/(14.3)
E510-210-H3-U	186.9 (7.36)	175 (6.89)	176 (6.93)	260.9 (10.27)	249.8 (9.83)	273 (10.75)	202.6 (7.98)	197.6 (7.78)	76.7 (3.02)	6.5 (0.26)	M4	6.5/(14.3)
E510-408-H3-U	186.9 (7.36)	175 (6.89)	176 (6.93)	260.9 (10.27)	249.8 (9.83)	273 (10.75)	202.6 (7.98)	197.6 (7.78)	76.7 (3.02)	6.5 (0.26)	M4	6.5/(14.3)
E510-410-H3-U	186.9 (7.36)	175 (6.89)	176 (6.93)	260.9 (10.27)	249.8 (9.83)	273 (10.75)	202.6 (7.98)	197.6 (7.78)	76.7 (3.02)	6.5 (0.26)	M4	6.5/(14.3)

* F Version models are not available as standard product in Americas.

Inverter Model	Dimensions in mm (inch)											Net Weight in Kg/(lbs)
	W	W1	W2	H	H1	H2	D	D1	E	t	Q	
E510-415-H3-U	186.9 (7.36)	175 (6.89)	176 (6.93)	260.9 (10.27)	249.8 (9.83)	273 (10.75)	202.6 (7.98)	197.6 (7.78)	76.7 (3.02)	6.5 (0.26)	M4	6.5/(14.3)
E510-408-H3F-U	186.9 (7.36)	175 (6.89)	176 (6.93)	260.9 (10.27)	249.8 (9.83)	273 (10.75)	202.6 (7.98)	197.6 (7.78)	76.7 (3.02)	6.5 (0.26)	M4	6.7/(14.8)
E510-410-H3F-U	186.9 (7.36)	175 (6.89)	176 (6.93)	260.9 (10.27)	249.8 (9.83)	273 (10.75)	202.6 (7.98)	197.6 (7.78)	76.7 (3.02)	6.5 (0.26)	M4	6.7/(14.8)
E510-415-H3F-U	186.9 (7.36)	175 (6.89)	176 (6.93)	260.9 (10.27)	249.8 (9.83)	273 (10.75)	202.6 (7.98)	197.6 (7.78)	76.7 (3.02)	6.5 (0.26)	M4	6.7/(14.8)
E510-215-H3-U	224.6 (8.84)	207 (8.15)	207 (8.15)	321.6 (12.66)	303.5 (11.95)	330.9 (13.03)	206.1 (8.11)	201.1 (7.92)	94 (3.7)	8 (0.31)	M5	10.1/(22.3)
E510-220-H3-U	224.6 (8.84)	207 (8.15)	207 (8.15)	321.6 (12.66)	303.5 (11.95)	330.9 (13.03)	206.1 (8.11)	201.1 (7.92)	94 (3.7)	8 (0.31)	M5	10.4/(22.9)
E510-420-H3-U	224.6 (8.84)	207 (8.15)	207 (8.15)	321.6 (12.66)	303.5 (11.95)	330.9 (13.03)	206.1 (8.11)	201.1 (7.92)	94 (3.7)	8 (0.31)	M5	10.5/(23.2)
E510-425-H3-U	224.6 (8.84)	207 (8.15)	207 (8.15)	321.6 (12.66)	303.5 (11.95)	330.9 (13.03)	206.1 (8.11)	201.1 (7.92)	94 (3.7)	8 (0.31)	M5	10.5/(23.2)

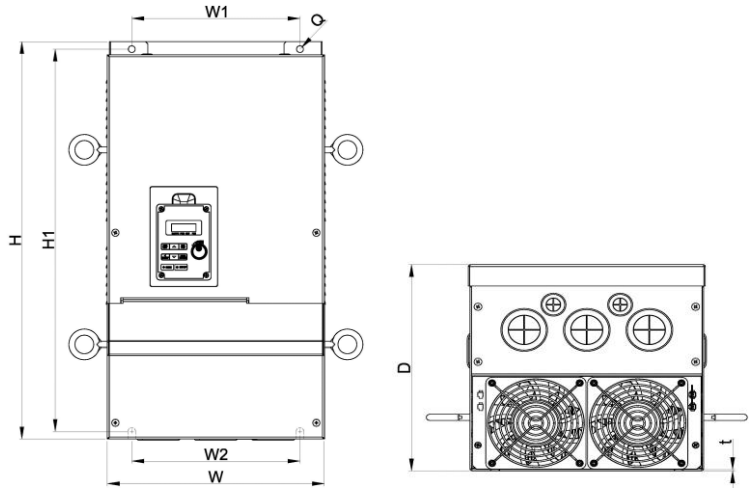
* F Version models are not available as standard product in Americas.

200V Class three phase：25HP
400V Class three phase：30HP



Inverter Model	Dimensions in mm (inch)									Net Weight in Kg/(lbs)
	W	**W1**	**W2**	**H**	**H1**	**D**	**D1**	**t**	**Q**	
E510-225-H3-U	265 (10.43)	245 (9.65)	245 (9.65)	360 (14.17)	340 (13.39)	238.2 (9.38)	233.2 (9.18)	1.6 (0.06)	M8	10/(22.1)
E510-430-H3-U	265 (10.43)	245 (9.65)	245 (9.65)	360 (14.17)	340 (13.39)	238.2 (9.38)	233.2 (9.18)	1.6 (0.06)	M8	10/(22.1)

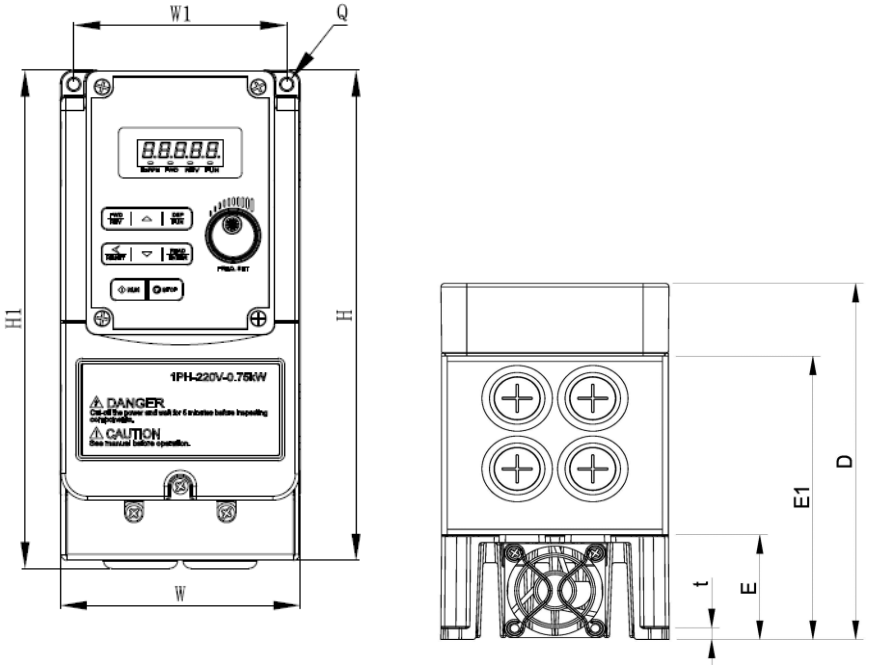
200V Class three phase：30~40HP
400V Class three phase：40~75HP



Inverter Model	Dimensions in mm (inch)								Net Weight in Kg/(lbs)
	W	W1	W2	H	H1	D	t	Q	
E510-230-H3-U	286.5 (11.28)	220 (8.66)	220 (8.66)	525 (20.67)	505 (19.88)	269.8 (10.62)	3.3 (0.13)	M8	30/(66.1)
E510-240-H3-U	286.5 (11.28)	220 (8.66)	220 (8.66)	525 (20.67)	505 (19.88)	269.8 (10.62)	3.3 (0.13)	M8	30/(66.1)
E510-440-H3-U	286.5 (11.28)	220 (8.66)	220 (8.66)	525 (20.67)	505 (19.88)	269.8 (10.62)	3.3 (0.13)	M8	30/(66.1)
E510-450-H3-U	286.5 (11.28)	220 (8.66)	220 (8.66)	525 (20.67)	505 (19.88)	269.8 (10.62)	3.3 (0.13)	M8	30/(66.1)
E510-460-H3-U	286.5 (11.28)	220 (8.66)	220 (8.66)	525 (20.67)	505 (19.88)	269.8 (10.62)	3.3 (0.13)	M8	30/(66.1)
E510-475-H3-U	286.5 (11.28)	220 (8.66)	220 (8.66)	525 (20.67)	505 (19.88)	269.8 (10.62)	3.3 (0.13)	M8	35/(77.2)

NEMA 1 Dimensions

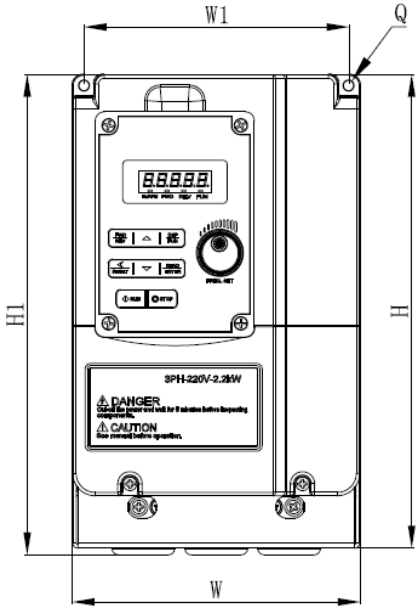
200V Class single phase：0.5~1HP
400V Class three phase：1~2HP
200V Class three phase：2HP

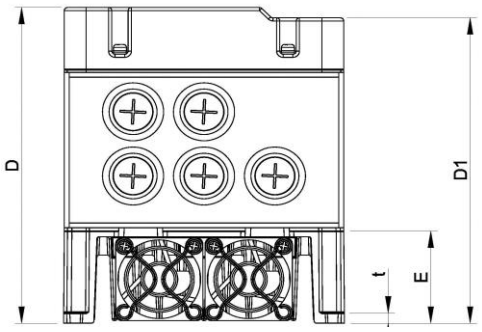


Inverter Model	Dimensions in mm (inch)									Net Weight in Kg/(lbs)
	W	W1	H	H1	D	E	E1	t	Q	
E510-2P5-H-U	90.6 (3.57)	80.5 (3.17)	186.2 (7.33)	189.2 (7.45)	151.4 (5.96)	47 (1.85)	120.5 (4.74)	5 (0.19)	M4	1.8/(3.9)
E510-201-H-U	90.6 (3.57)	80.5 (3.17)	186.2 (7.33)	189.2 (7.45)	151.4 (5.96)	47 (1.85)	120.5 (4.74)	5 (0.19)	M4	1.8/(3.9)
E510-2P5-H1F-U	90.6 (3.57)	80.5 (3.17)	186.2 (7.33)	189.2 (7.45)	151.4 (5.96)	47 (1.85)	120.5 (4.74)	5 (0.19)	M4	1.9/(4.2)
E510-201-H1F-U	90.6 (3.57)	80.5 (3.17)	186.2 (7.33)	189.2 (7.45)	151.4 (5.96)	47 (1.85)	120.5 (4.74)	5 (0.19)	M4	1.9/(4.2)
E510-202-H3-U	90.6 (3.57)	80.5 (3.17)	186.2 (7.33)	189.2 (7.45)	151.4 (5.96)	47 (1.85)	120.5 (4.74)	5 (0.19)	M4	1.9/(4.2)
E510-401-H3-U	90.6 (3.57)	80.5 (3.17)	186.2 (7.33)	189.2 (7.45)	151.4 (5.96)	47 (1.85)	120.5 (4.74)	5 (0.19)	M4	1.9/(4.2)
E510-402-H3-U	90.6 (3.57)	80.5 (3.17)	186.2 (7.33)	189.2 (7.45)	151.4 (5.96)	47 (1.85)	120.5 (4.74)	5 (0.19)	M4	1.9/(4.2)
E510-401-H3F-U	90.6 (3.57)	80.5 (3.17)	186.2 (7.33)	189.2 (7.45)	151.4 (5.96)	47 (1.85)	120.5 (4.74)	5 (0.19)	M4	1.9/(4.2)
E510-402-H3F-U	90.6 (3.57)	80.5 (3.17)	186.2 (7.33)	189.2 (7.45)	151.4 (5.96)	47 (1.85)	120.5 (4.74)	5 (0.19)	M4	1.9/(4.2)

* F Version models are not available as standard product in Americas.

200V Class single phase/three phase：2HP
400V Class three phase：3~25HP
200V Class three phase：3~20HP



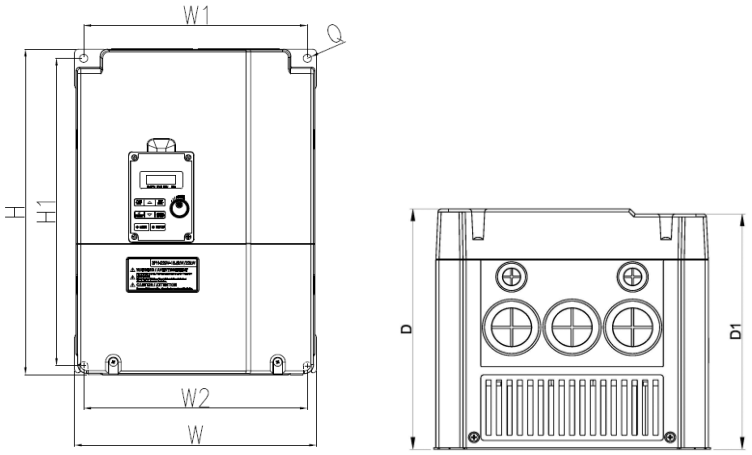


Inverter Model	Dimensions in mm (inch)										Net Weight in kg/(lbs)
	W	W1	H	H1	D	D1	E	E1	t	Q	
E510-202-H-U	128.7 (5.06)	118 (4.65)	210.6 (8.29)	213.6 (8.41)	152.4 (6)	147.4 (5.8)	48.2 (1.9)	121.1 (4.77)	5 (0.19)	M4	2.7/(5.9)
E510-203-H-U	128.7 (5.06)	118 (4.65)	210.6 (8.29)	213.6 (8.41)	152.4 (6)	147.4 (5.8)	48.2 (1.9)	121.1 (4.77)	5 (0.19)	M4	2.7/(5.9)
E510-202-H1F-U	128.7 (5.06)	118 (4.65)	210.6 (8.29)	213.6 (8.41)	152.4 (6)	147.4 (5.8)	48.2 (1.9)	121.1 (4.77)	5 (0.19)	M4	2.8/(6.2)
E510-203-H1F-U	128.7 (5.06)	118 (4.65)	210.6 (8.29)	213.6 (8.41)	152.4 (6)	147.4 (5.8)	48.2 (1.9)	121.1 (4.77)	5 (0.19)	M4	2.8/(6.2)
E510-205-H3-U	128.7 (5.06)	118 (4.65)	210.6 (8.29)	213.6 (8.41)	152.4 (6)	147.4 (5.8)	48.2 (1.9)	121.1 (4.77)	5 (0.19)	M4	2.8/(6.2)
E510-403-H3-U	128.7 (5.06)	118 (4.65)	210.6 (8.29)	213.6 (8.41)	152.4 (6)	147.4 (5.8)	48.2 (1.9)	121.1 (4.77)	5 (0.19)	M4	2.8/(6.2)
E510-405-H3-U	128.7 (5.06)	118 (4.65)	210.6 (8.29)	213.6 (8.41)	152.4 (6)	147.4 (5.8)	48.2 (1.9)	121.1 (4.77)	5 (0.19)	M4	2.8/(6.2)
E510-403-H3F-U	128.7 (5.06)	118 (4.65)	210.6 (8.29)	213.6 (8.41)	152.4 (6)	147.4 (5.8)	48.2 (1.9)	121.1 (4.77)	5 (0.19)	M4	2.8/(6.2)
E510-405-H3F-U	128.7 (5.06)	118 (4.65)	210.6 (8.29)	213.6 (8.41)	152.4 (6)	147.4 (5.8)	48.2 (1.9)	121.1 (4.77)	5 (0.19)	M4	2.8/(6.2)
E510-208-H3-U	186.9 (7.36)	175 (6.89)	291 (11.47)	293.5 (11.56)	202.6 (7.98)	197.6 (7.78)	76.7 (3.02)	170.6 (6.72)	6.5 (0.26)	M4	6.9/(15.2)
E510-210-H3-U	186.9 (7.36)	175 (6.89)	291 (11.47)	293.5 (11.56)	202.6 (7.98)	197.6 (7.78)	76.7 (3.02)	170.6 (6.72)	6.5 (0.26)	M4	6.9/(15.2)

E510-408-H3-U	186.9 (7.36)	175 (6.89)	291 (11.47)	293.5 (11.56)	202.6 (7.98)	197.6 (7.78)	76.7 (3.02)	170.6 (6.72)	6.5 (0.26)	M4	6.9/(15.2)
E510-410-H3-U	186.9 (7.36)	175 (6.89)	291 (11.47)	293.5 (11.56)	202.6 (7.98)	197.6 (7.78)	76.7 (3.02)	170.6 (6.72)	6.5 (0.26)	M4	6.9/(15.2)
E510-415-H3-U	186.9 (7.36)	175 (6.89)	291 (11.47)	293.5 (11.56)	202.6 (7.98)	197.6 (7.78)	76.7 (3.02)	170.6 (6.72)	6.5 (0.26)	M4	6.9/(15.2)
E510-408-H3F-U	186.9 (7.36)	175 (6.89)	291 (11.47)	293.5 (11.56)	202.6 (7.98)	197.6 (7.78)	76.7 (3.02)	170.6 (6.72)	6.5 (0.26)	M4	7.1/(15.7)
E510-410-H3F-U	186.9 (7.36)	175 (6.89)	291 (11.47)	293.5 (11.56)	202.6 (7.98)	197.6 (7.78)	76.7 (3.02)	170.6 (6.72)	6.5 (0.26)	M4	7.1/(15.7)
E510-415-H3F-U	186.9 (7.36)	175 (6.89)	291 (11.47)	293.5 (11.56)	202.6 (7.98)	197.6 (7.78)	76.7 (3.02)	170.6 (6.72)	6.5 (0.26)	M4	7.1/(15.7)
E510-215-H3-U	224.6 (8.84)	207 (8.15)	358.3 (14.1)	363.3 (14.3)	206.1 (8.11)	201.1 (7.92)	94 (3.7)	174 (6.85)	8 (0.31)	M4	10.5/(23.2)
E510-220-H3-U	224.6 (8.84)	207 (8.15)	358.3 (14.1)	363.3 (14.3)	206.1 (8.11)	201.1 (7.92)	94 (3.7)	174 (6.85)	8 (0.31)	M4	10.5/(23.2)
E510-420-H3-U	224.6 (8.84)	207 (8.15)	358.3 (14.1)	363.3 (14.3)	206.1 (8.11)	201.1 (7.92)	94 (3.7)	174 (6.85)	8 (0.31)	M4	10.9/(24)
E510-425-H3-U	224.6 (8.84)	207 (8.15)	358.3 (14.1)	363.3 (14.3)	206.1 (8.11)	201.1 (7.92)	94 (3.7)	174 (6.85)	8 (0.31)	M4	11/(24.3)

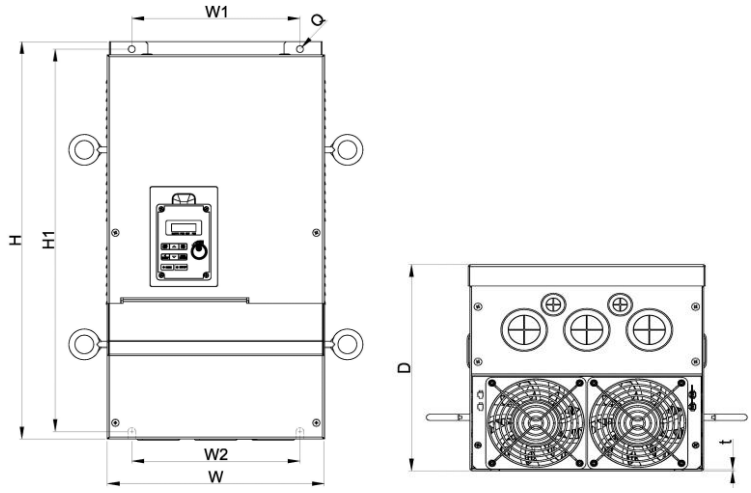
* F Version models are not available as standard product in Americas.

200V Class three phase：25HP
400V Class three phase：30HP



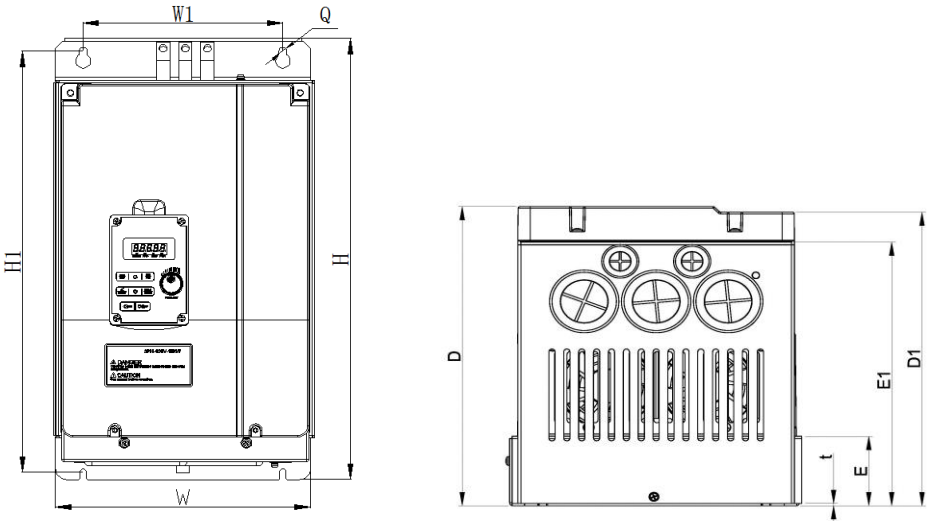
Inverter Model	Dimensions in mm (inch)									Net Weight in Kg/(lbs)
	W	**W1**	**W2**	**H**	**H1**	**D**	**D1**	**t**	**Q**	
E510-225-H3-U	265 (10.43)	245 (9.65)	245 (9.65)	360 (14.17)	340 (13.39)	238.2 (9.38)	233.2 (9.18)	1.6 (0.06)	M8	10/(22.1)
E510-430-H3-U	265 (10.43)	245 (9.65)	245 (9.65)	360 (14.17)	340 (13.39)	238.2 (9.38)	233.2 (9.18)	1.6 (0.06)	M8	10/(22.1)

200V Class three phase：30~40HP
400V Class three phase：40~75HP



Inverter Model	Dimensions in mm (inch)								Net Weight in Kg/(lbs)
	W	W1	W2	H	H1	D	t	Q	
E510-230-H3-U	286.5 (11.28)	220 (8.66)	220 (8.66)	525 (20.67)	505 (19.88)	269.8 (10.62)	3.3 (0.13)	M8	30/(66.1)
E510-240-H3-U	286.5 (11.28)	220 (8.66)	220 (8.66)	525 (20.67)	505 (19.88)	269.8 (10.62)	3.3 (0.13)	M8	30/(66.1)
E510-440-H3-U	286.5 (11.28)	220 (8.66)	220 (8.66)	525 (20.67)	505 (19.88)	269.8 (10.62)	3.3 (0.13)	M8	30/(66.1)
E510-450-H3-U	286.5 (11.28)	220 (8.66)	220 (8.66)	525 (20.67)	505 (19.88)	269.8 (10.62)	3.3 (0.13)	M8	30/(66.1)
E510-460-H3-U	286.5 (11.28)	220 (8.66)	220 (8.66)	525 (20.67)	505 (19.88)	269.8 (10.62)	3.3 (0.13)	M8	30/(66.1)
E510-475-H3-U	286.5 (11.28)	220 (8.66)	220 (8.66)	525 (20.67)	505 (19.88)	269.8 (10.62)	3.3 (0.13)	M8	35/(77.2)

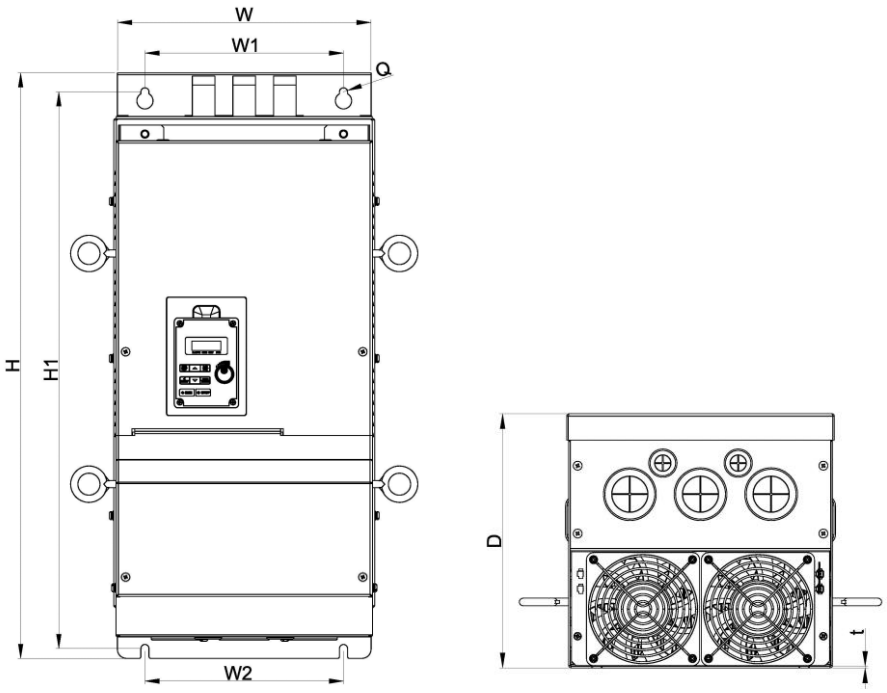
400V Class three phase：20~30HP (built-in EMC filter)



Inverter Model	Dimensions in mm (inch)										Net Weight in Kg/(lbs)
	W	W1	H	H1	D	D1	E	E1	t	Q	
E510-420-H3F-U	235.6 (9.28)	180 (7.09)	400 (15.75)	381.5 (15.02)	267.1 (10.52)	262.1 (10.32)	62 (2.44)	237 (9.33)	4 (0.16)	M6	13.8/(30.4)
E510-425-H3F-U	235.6 (9.28)	180 (7.09)	400 (15.75)	381.5 (15.02)	267.1 (10.52)	262.1 (10.32)	62 (2.44)	237 (9.33)	4 (0.16)	M6	13.8/(30.4)
E510-430-H3F-U	269 (10.59)	230 (9.05)	462 (18.19)	440 (17.32)	318.2 (12.53)	313.2 (12.33)	80 (3.15)	267.6 (10.54)	4 (0.16)	M8	13.8/(30.4)

* F Version models are not available as standard product in Americas.

400V Class three phase：40~75HP (built-in EMC filter)



Inverter Model	Dimensions in mm (inch)										Net Weight in kg (lbs)
	W	W1	W2	H	H1	D	E	E1	t	Q	
E510-440-H3F-U	288.9 (11.37)	220 (8.66)	220 (8.66)	652 (25.67)	620 (24.41)	369.8 (14.56)	90 (3.54)	331.1 (13.04)	4 (0.16)	M8	35.9 (80)
E510-450-H3F-U	288.9 (11.37)	220 (8.66)	220 (8.66)	652 (25.67)	620 (24.41)	369.8 (14.56)	90 (3.54)	331.1 (13.04)	4 (0.16)	M8	35.9 (80)
E510-460-H3F-U	288.9 (11.37)	220 (8.66)	220 (8.66)	652 (25.67)	620 (24.41)	369.8 (14.56)	90 (3.54)	331.1 (13.04)	4 (0.16)	M8	35.9 (80)
E510-475-H3F-U	288.9 (11.37)	220 (8.66)	220 (8.66)	652 (25.67)	620 (24.41)	369.8 (14.56)	90 (3.54)	331.1 (13.04)	4 (0.16)	M8	40.9 (90)

* F Version models are not available as standard product in Americas.

4. Keypad and Programming Functions

4.1 LED / LCD Keypad

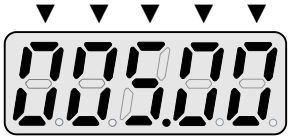
4.1.1 LED Keypad Display and Keys

DISPLAY	Description
5 Digit LED Display	Monitor inverter signals, view / edit parameters, fault / alarm display.
LED INDICATORS	
Hz/RPM	LED **ON** when frequency or line speed is displayed.
FWD	LED **ON** when inverter is running in forward direction, flashing when stopping.
REV	On when inverter is running in reverse direction, flashing when stopping.
FUN	LED **ON** when parameters are displayed.

KEYS (8)	Description
RUN	RUN Inverter in Local Mode
STOP	STOP Inverter
▲	Parameter navigation Up, Increase parameter or reference value
▼	Parameter navigation down, decrease parameter or reference value
FWD/REV	FWD: Forward Run / REV: Reverse Run
DSP/FUN	DSP: Switch between available display modes FUN: View/Edit parameter value
READ/ENTER	Used to display parameter settings and save parameter changed settings
< / RESET	Use to reset alarms or resettable faults

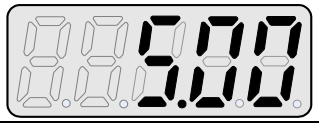
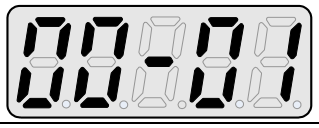
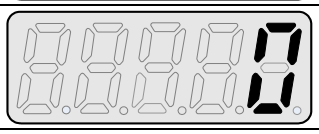
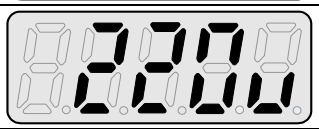
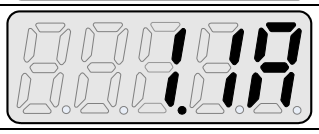
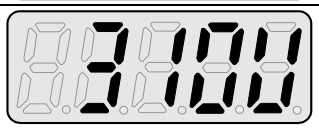
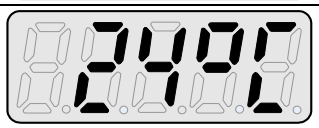
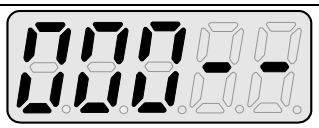
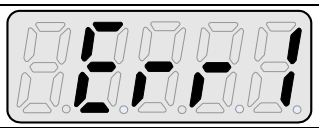
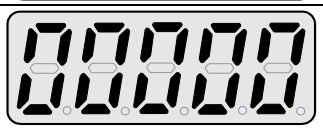
4.1.2 Display Description

Actual	LED Display	Actual	LED Display	Actual	LED Display	Actual	LED Display
0	0	**A**	A	**L**	L	**Y**	y
1	1	**B**	b	**n**	n	**-**	-
2	2	**C**	C	**o**	o	**°**	o
3	3	**D**	d	**P**	P	**_**	-
4	4	**E**	E	**q**	q	**.**	
5	5	**F**	F	**r**	r		
6	6	**G**	G	**S**	5		
7	7	**H**	H	**t**	t		
8	8	**I**	I	**u**	u		
9	9	**J**	J	**V**	U		

Display output frequency	**Frequency Reference**	**Set Frequency Reference**
LED lights on	LED flashes	Flashing digit
		

At power-up the display will show the frequency reference setting, all LEDs are flashing. Press the ▲UP or ▼DOWN key to enter the frequency reference edit mode, use the **◄/ENT** key to select which digit to edit (flashing). Use the ▲UP or ▼DOWN key to modify the value. During run operation the display will show the output frequency.

LED display examples

Seven Segment display	Description
	1. Displays the frequency reference at power-up 2. Display the actual output frequency in operation status.
	Display parameter code
	Display the setting value of parameter
	Display input voltage
	Display inverter current.
	Display DC Bus Voltage
	Display temperature
	Display PID feedback value. The displayed digit is set by 12-01.
	Error display, refer to Chapter 5 Troubleshooting and maintenance
	Analog Current / Voltage AI1 / AI2. Range **(0~1000)**

4.1.3 LED Status description

Hz/ RPM LED

State	Description	Hz/RPM LED
Off	Display doesn't show frequency or line speed	
Illuminated	Display shows frequency or line speed	

Forward LED

State	Description	FWD LED
Off	Inverter in reverse direction	
Illuminated	Inverter is running in forward direction	
Flashing	Forward direction active, no run command	

Reverse LED

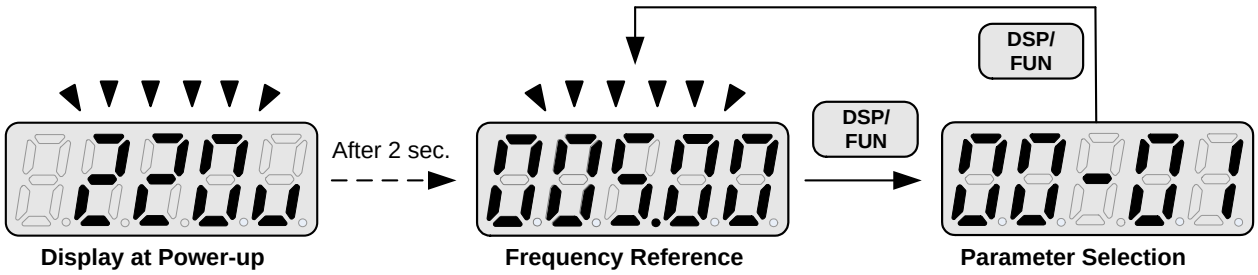
State	Description	REV LED
Off	Inverter in forward direction	
Illuminated	Inverter is running in reverse direction	
Flashing	Reverse direction active, no run command	

FUN LED

State	Description	FUN LED
Off	Display doesn't show parameter	
Illuminated	Display shows parameter	
Flashing	Firemode Enabled	

4.1.4 Power-Up Monitor

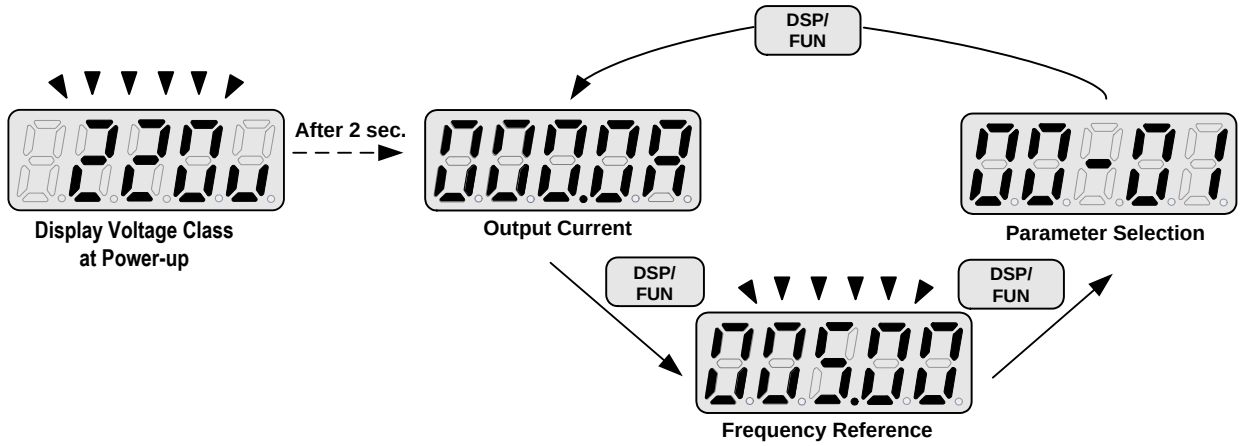
Power Up:



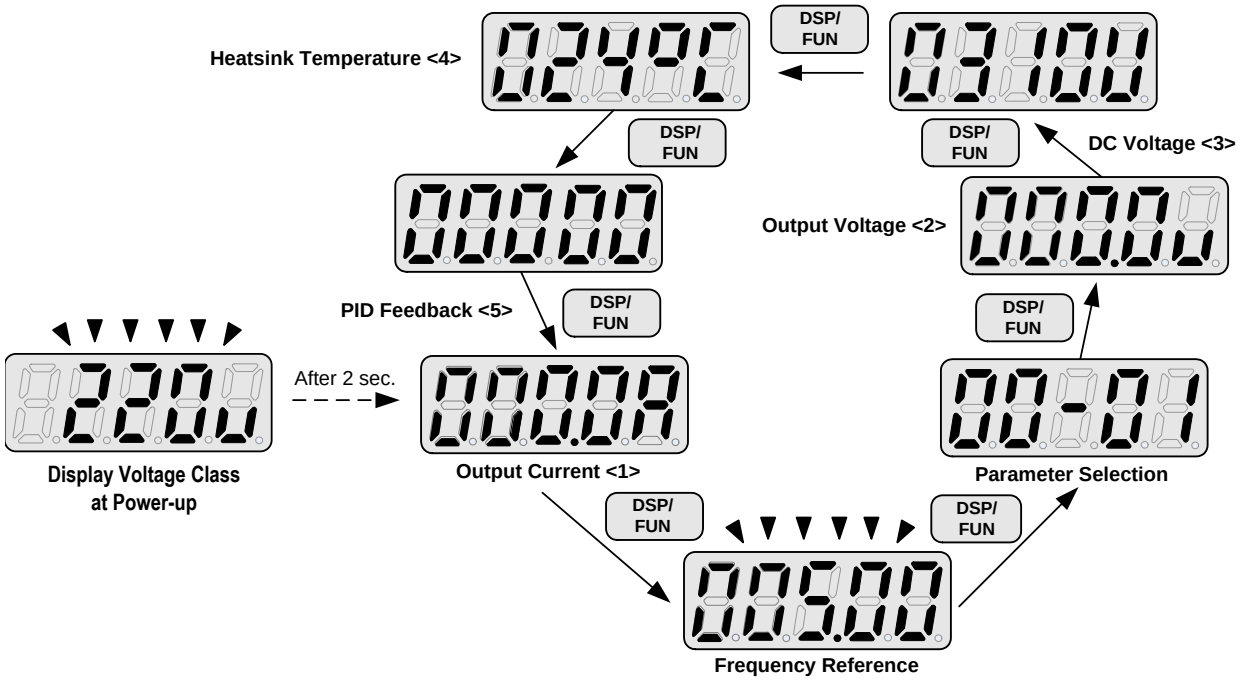
Change Monitor at Power-Up

12-00	Display selection
Range	**Highest bit -> 0 0 0 0 0 <- Lowest bit** The setting range for each bit is **0 ~ 8** from the highest bit to the lowest bit**.** **0:** No display **4:** Temperature **8:** Count value **1:** Output current **5:** PID feedback **2:** Output voltage **6:** AI1 value **3:** DC voltage **7:** AI2 value

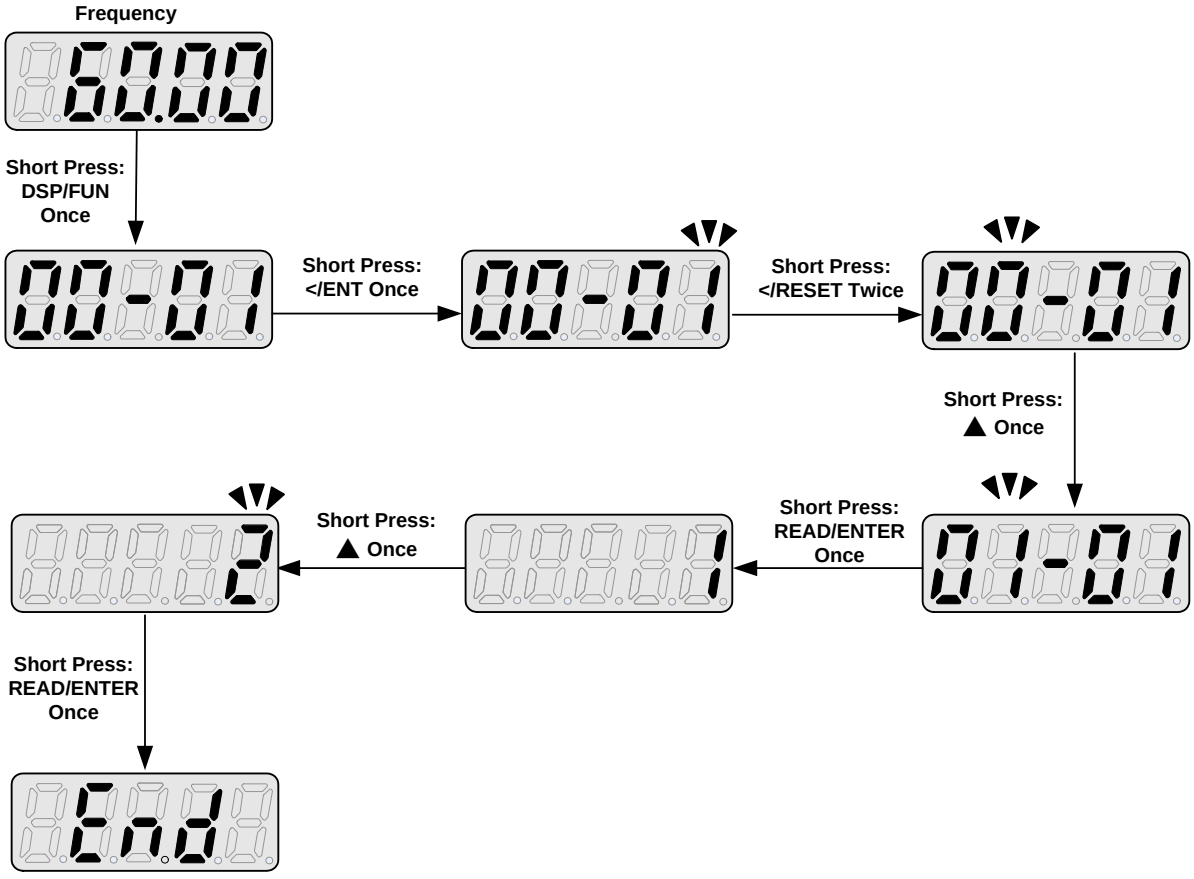
Example: 12-00 = 10000



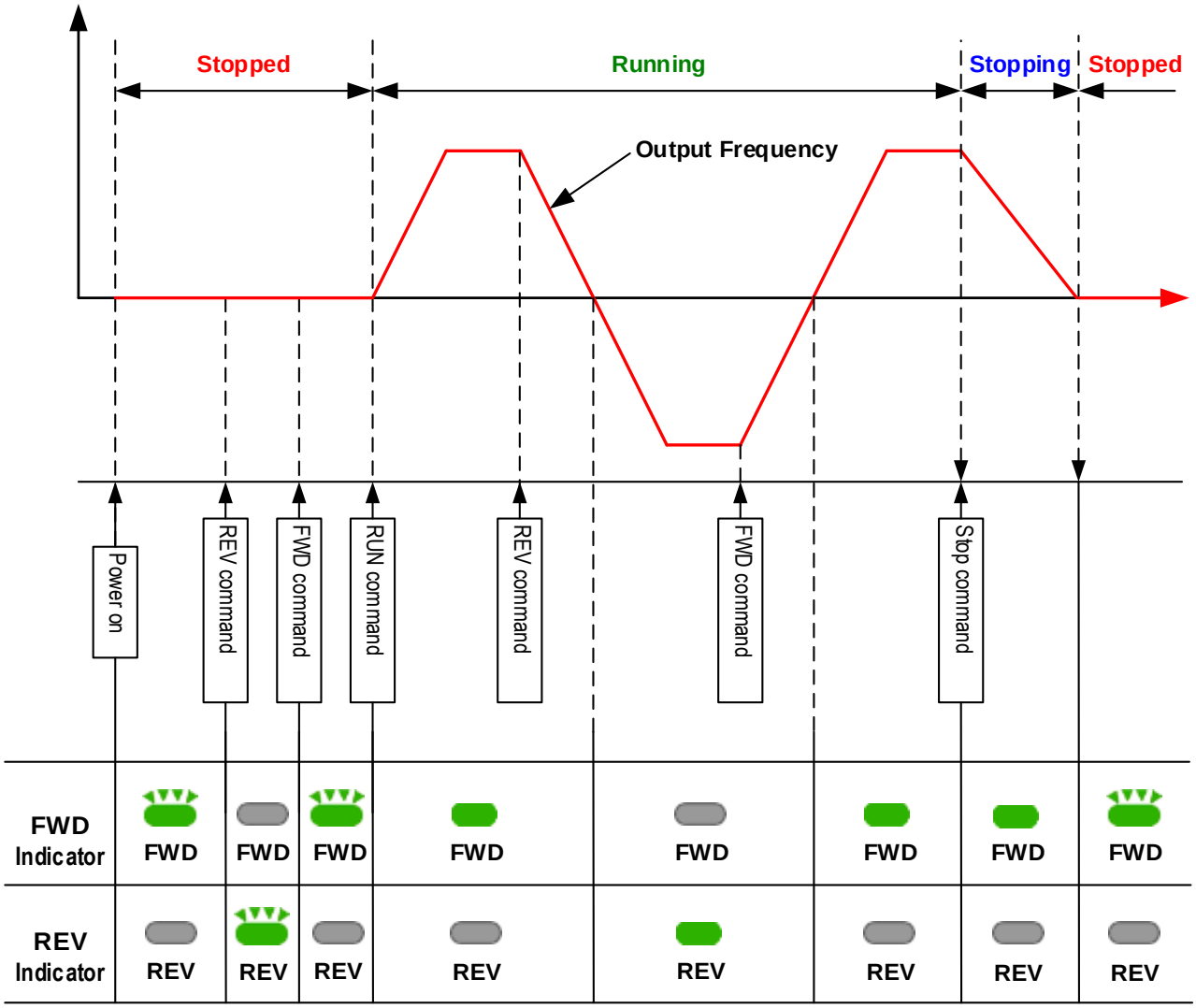
Example: 12-00 = 12345



4.1.5 Modifying Parameters / Set Frequency Reference



4.1.6 Operation Control



4.1.6 LCD Keypad Display and Keys

Note: LCD Copy Keypad is an optional keypad for remote mounting only.

The LCD keypad (PN: JN5-OP-A02) has a built-in parameter copy function (non-volatile memory) to copy parameters from one inverter to another one.

DISPLAY	Description
LCD Display	Monitor inverter signals, view / edit parameters, fault / alarm display.
LED INDICATORS	
FAULT	LED ON when a fault or alarm is active.
FWD	LED ON when inverter is running in forward direction, flashing when stopping.
REV	On when inverter is running in reverse direction, flashing when stopping.
SEQ	LED ON when RUN command is from the external control terminals or from serial communication
REF	LED ON when Frequency Reference command is from the external control terminals or from serial communication

KEYS (8)	Description
RUN	RUN Inverter in Local Mode
STOP	STOP Inverter
▲	Parameter navigation Up, Increase parameter or reference value
▼	Parameter navigation down, decrease parameter or reference value
FWD/REV	Used to switch between Forward and Reverse direction
DSP/FUN	Used to scroll to next screen Frequency screen →Function selection→Monitor parameter
◄ / RESET	Selects active seven segment digit for editing with the ▲▼ keys Used to reset fault condition.
READ / ENTER	Used to read and save the value of the active parameter

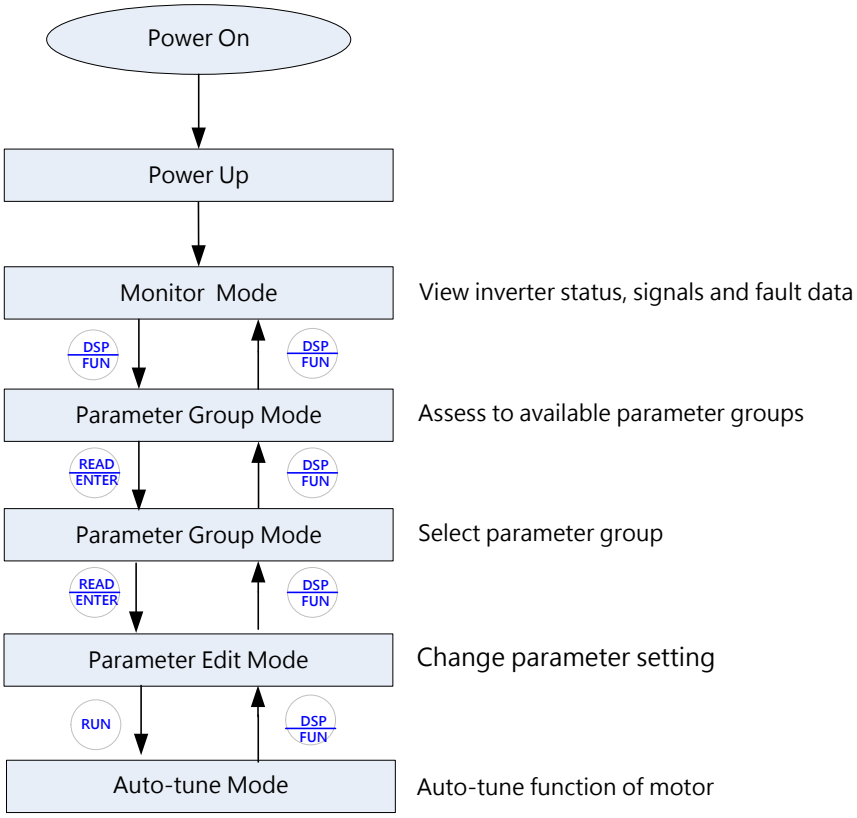
Auto-Repeat Keys

Holding the ▲UP or ▼DOWN key for a longer period of time will initiate the auto-repeat function resulting in the value of the selected digit to automatically increase or decrease.

4.1.8 Keypad Menu Structure

Main Menu

The E510 inverter main menu consists of four main groups (modes). The DSP/FUN key is used to switch between the modes.



Mode	Description
Monitor Mode	View inverter status, signals and fault data.
Parameter Group Mode	Access to available parameter groups.
Auto-tune Mode	Auto-tuning of the Motor

All the available parameter groups are listed in the Parameter Group Mode use the up and down keys to select a group and press Read/Enter key to access its parameters.

Notes:

- Always perform an auto-tune on the motor before operating the inverter in vector control (sensorless vector or flux vector). Auto-tuning mode will not be displayed when the inverter is running or when a fault is active.
- To scroll through the available modes, parameter groups or parameter list press and hold the up or down key.

Monitor Mode

In monitor mode inverter signals can be monitored such as output frequency, output current and output voltage, etc…) as well as fault information and fault trace. See Fig 4.1.8.1 for keypad navigation.

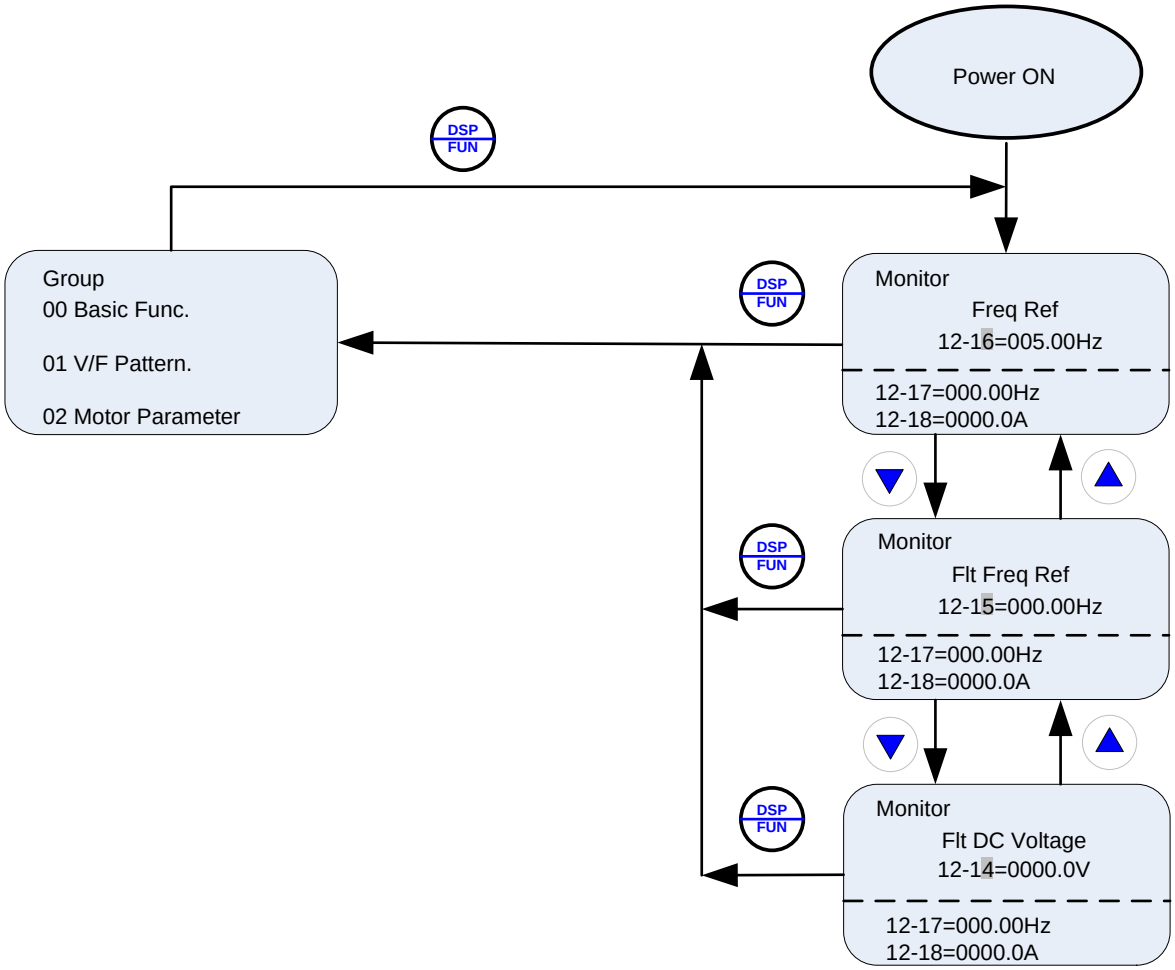


Fig 4.1.8.1 Monitor Mode

Notes:

- To scroll through the available monitor parameter list, press and hold the ▲ (up) or ▼ (down) key.

Programming Mode

In programming mode inverter parameters can be read or changed. See Fig 4.1.8.2 for keypad navigation.

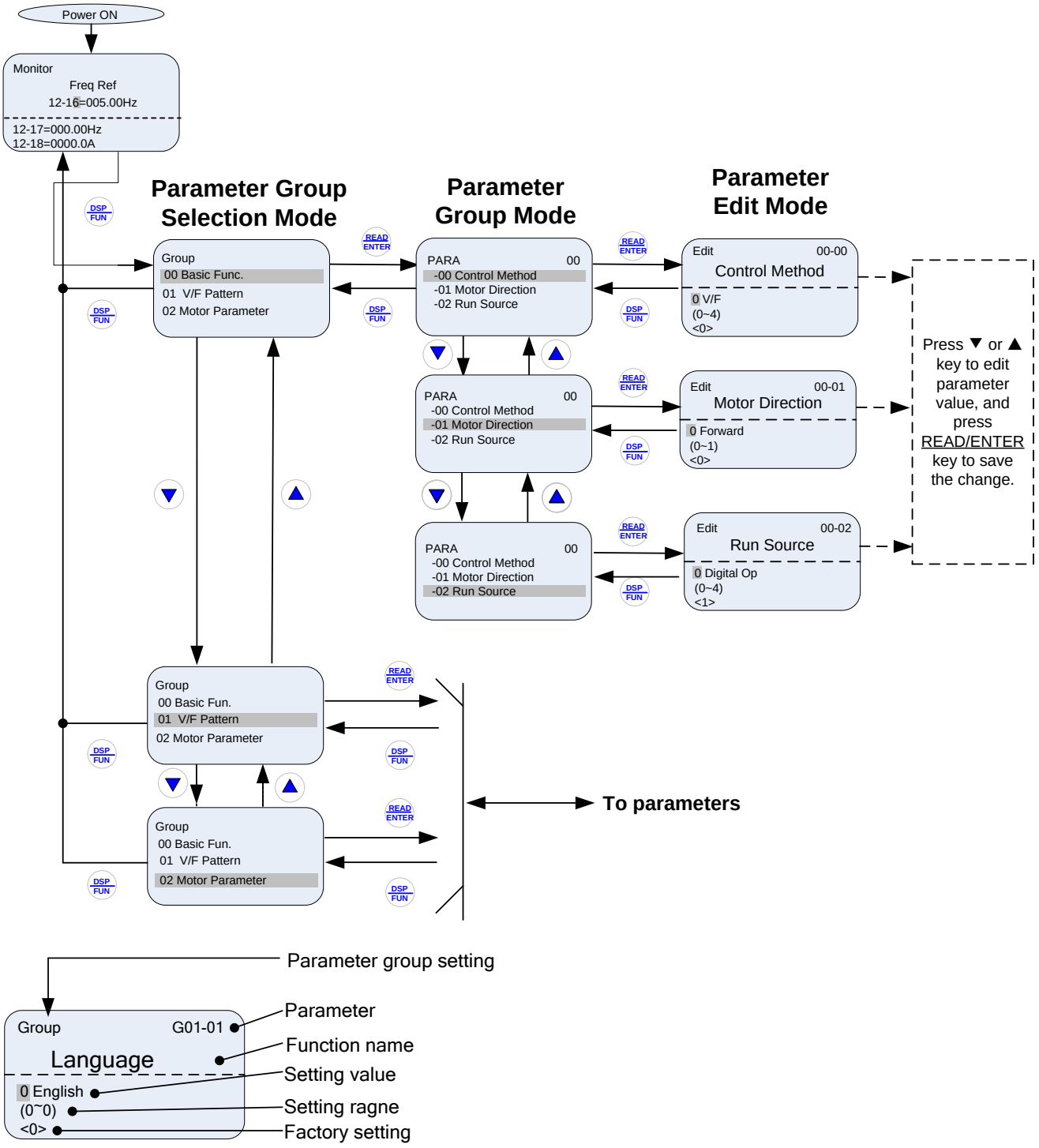


Fig 4.1.8.2 Programming Mode

Notes:

- The parameters values can be changed from the Edit screen with the up, down and < / RESET shift key.
- To save a parameter press the READ/ENTER key.
- Refer to section 4.3 for parameter details.
- Press the ▲ (up) or ▼ (down) key to scroll parameter groups or parameter list.

Auto-tuning Mode

In the auto-tuning mode motor parameters can be calculated and set automatically based on the selected control mode. See Fig 4.1.8.3 for keypad navigation.

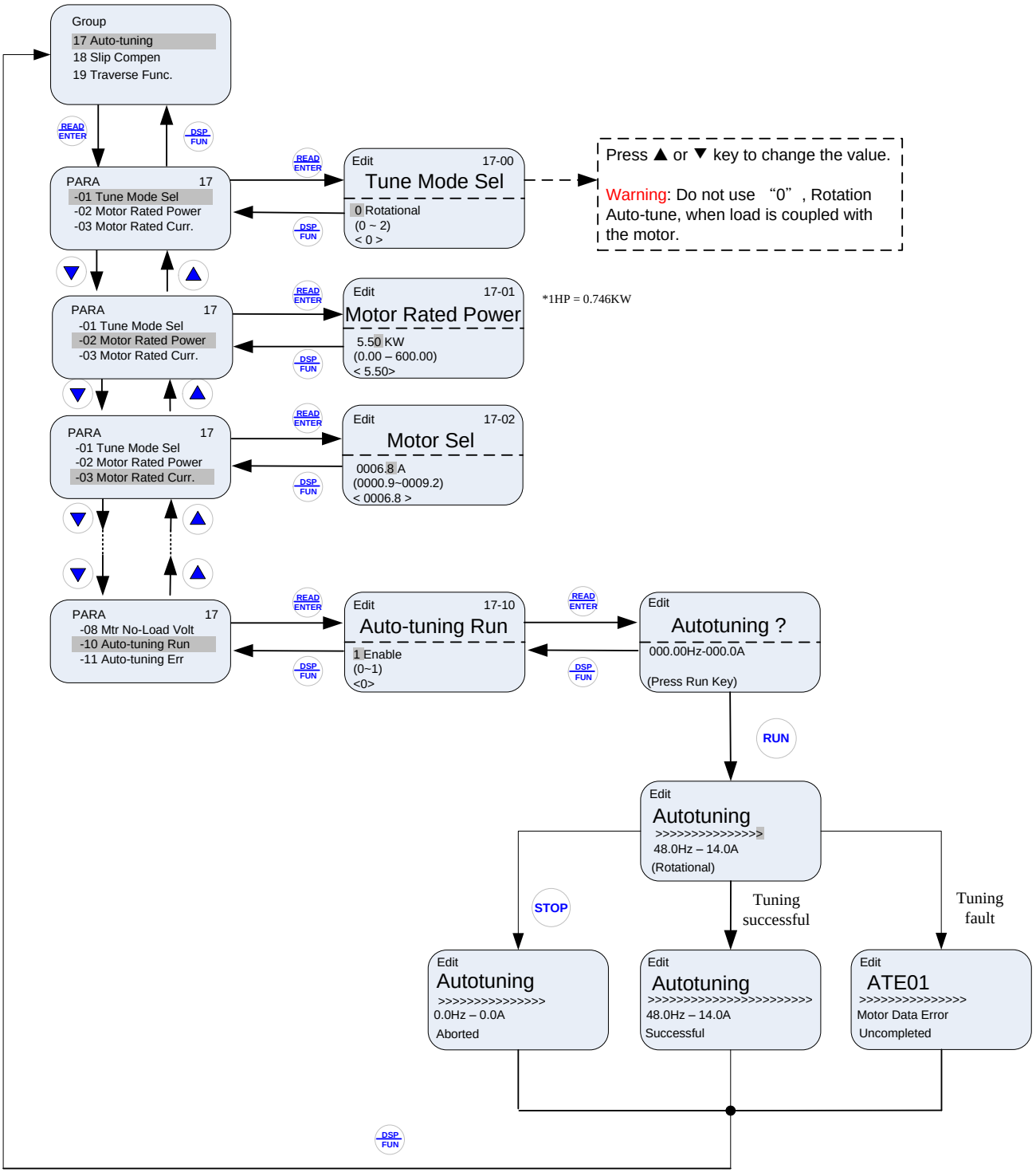


Fig 4.1.8.3 Auto-tuning Mode

Notes:

- Set correct motor parameters based on the information on the motor nameplate.
- Refer to section 4.3 for parameter details.

Notes:

1. Use the up and down keys to scroll though the auto-tuning parameter list. Depending on the selected control mode in parameter 00-00, some of the auto-tuning parameters will not be accessible. (Refer to the Auto-tuning Group 17 parameters).

2. After entering the motor nameplate rated output power (17-01), rated current (17-02), rated voltage (17-03), rated frequency (17-04), rated speed (17-05) and number of motor poles (17-06), select the automatic tuning mode and press the RUN key to perform the auto-tuning operation. When auto-tuning is successful the calculated motor parameters will be saved into parameter group 02 (motor parameters).

3. (a) “Atune “(LED) / “Rotational” will be displayed during rotational auto-tuning (17-00=0) and the motor will rotate during auto-tuning. Ensure that it is safe to operate the motor before pressing the RUN key.
   (b) “Stationary” will be displayed during stationary auto-tuning (17-00=1), the motor shaft does not rotate.
   (c) The RUN LED (in the upper left corner of the RUN key) will be lit during auto-tuning.
   (d) The LCD display shows “>>>” or "Atund" during the auto-tuning process.

4. Press the STOP key on the keypad to abort the auto-tuning operation.

5. In case of an auto-tuning fault, a fault message and the uncompleted message are displayed on the keypad. The RUN LED will be flashing and the motor will coast to stop. (Refer to section 10.4 for the Auto-tuning Faults.) The auto-tuning fault can be cleared by pressing the RESET key after which the keypad displays the auto-tuning mode again.

   All motor parameters (group 02 and group 17 parameters) will revert back to their factory settings if a fault occurs. The motor data must be entered again before re-starting auto-tuning. The keypad shows “>>>” during an auto-tuning fault.

6. Upon successful completion of an auto-tune, the RUN LED will turn off. Press the DSP/FUN key to return to the main menu to select the next operation. The auto-tuning procedure takes approximately 50 seconds.

4.2 Parameters

For complete parameter function descriptions please refer to the Instruction Manual online at www.tecowestinghouse.com

Parameter group	Name
Group 00	Basic Parameters
Group 01	V/F Control Parameters
Group 02	Motor Parameters
Group 03	External Digital Input and Output Parameters
Group 04	External Analog Input and Output Parameters
Group 05	Preset-Speed Parameters
Group 06	Automatic Program Operation Parameters
Group 07	Start /Stop Parameters
Group 08	Protection Parameters
Group 09	Communication Parameters
Group 10	PID Parameters
Group 11	Performance Control Parameters
Group 12	Monitoring Parameters
Group 13	Maintenance Parameters
Group 14	PLC Parameters
Group 15	PLC Monitoring Parameters
Group 16	LCD Parameters
Group 17	Automatic Tuning Parameters
Group 18	Slip Compensation Parameters
Group 20	Speed Control Parameters
Group 21	PM Motor Parameters

Parameter Notes	
***1**	Parameter can be changed during running.
***2**	Reserved
***3**	Parameter will not reset to default during a factory reset (initialization).
***4**	Read-only parameter
***5**	Parameter will be displayed in being coupled with the option card.
***6**	Parameter will be displayed only when using the LED keypad.
***7**	Parameter will be displayed only when using the LCD keypad.
***8**	Parameter value / default setting is dependent on drive size/model

Group 00 Basic Parameters								
Code	Parameter Name	Setting Range	Default	Unit	Control mode			Attribute
					V/F	SLV	PM SLV	
00-00	Control Mode Selection	0：V/F 2：SLV 5：PMSLV	0	-	O	O	O	*3
00-01	Motor's Rotation Direction	0：Forward 1：Reverse	0	-	O	O	O	*1
00-02	Main Run Command Source Selection	0：Keypad 1：External Terminal (Control Circuit) 2：Communication Control (RS-485) 3：PLC	0	-	O	O	O	
00-03	Alternative Run Command Selection	0：Keypad 1：External Terminal (Control Circuit) 2：Communication Control (RS-485) 3：PLC	2	-	O	O	O	
00-04	Operation Modes for External Terminals	0：Forward/Stop-Reverse/Stop 1：Run/Stop- Reverse/Forward 2：3 Wire Control Mode Run/Stop	0	-	O	O	O	*7
00-05	Main Frequency Command Source Selection	0：UP/DOWN from Keypad 1：Potentiometer on Keypad 2：External AI1 Analog Signal Input 3：External AI2 Analog Signal Input 4：External Up/Down Frequency 5：Communication Setting Frequency 6：Reserved 7：Pulse Input(*6)	0	-	O	O	O	
00-06	Alternative Frequency Command Source Selection	0：UP/DOWN on Keypad 1：Potentiometer on Keypad 2：External AI1 Analog Signal Input 3：External AI2 Analog Signal Input 4：External Up/Down Frequency 5：Communication Setting Frequency 6：Reserved 7：Pulse Input(*6)	4	-	O	O	O	
00-07	Main and Alternative Frequency Command Modes	0：Main or Alternative Frequency 1：Main Frequency+ Alternative Frequency	0	-	O	O	O	
00-08	Communication Frequency Command	0.00~599.00	0.00	Hz	O	O	O	*4
00-09	Frequency Command Save on Power Down	0：Disabled 1：Enabled	0	-	O	O	-	
00-10	Initial Frequency Selection (keypad mode)	0：by Current Frequency Command 1：by 0 Frequency Command 2：by 00-11	0	-	O	O	O	
00-11	Initial Frequency Setpoint	0.00-599.00	50/60	Hz	O	O	O	

Group 00 Basic Parameters								
Code	Parameter Name	Setting Range	Default	Unit	Control mode			Attribute
					V/F	SLV	PM SLV	
00-12	Frequency Upper Limit	0.01-599.00	0.0	Hz	O	O	O	
00-13	Frequency Lower Limit	0.00-598.99	0.0	Hz	O	O	O	
00-14	Acceleration Time 1	0.1~6000.0	*	s	O	O	O	*1
00-15	Deceleration Time 1	0.1~6000.0	*	s	O	O	O	*1
00-16	Acceleration Time 2	0.1~6000.0	*	s	O	O	O	*1
00-17	Deceleration Time 2	0.1~6000.0	*	s	O	O	O	*1
00-18	Jog Frequency	0.00~599.00	2.00	Hz	O	O	O	*1*7
00-19	Jog Acceleration Time	0.1~0600.0	*	s	O	O	O	*1*7
00-20	Jog Deceleration Time	0.1~0600.0	*	s	O	O	O	*1*7
00-26	Emergency Stop Time	0.1~6000.0	5.0	s	O	O	O	
00-27	HD/ND Mode (F5/F6 Only)(***)	0：HD (Heavy Duty Mode) 1：ND (Normal Duty Mode)	0	-	O	X	X	
00-34	Language	0：English 1：Simplified Chinese 2：Traditional Chinese 3：Turkish	0	-	O	O	O	
00-35	Minimum Frequency Detection	0：Alarm 1：Keep Running At Lower Frequency	0	-	O	O	O	
00-36	PID Lower Frequency Selection	0：Lower Frequency of PID Sleep Mode 1：0Hz of PID Sleep Mode	0	-	O	O	O	

*** : If parameter 00-27 is set to ND mode, group 02 motor 1 parameter will automatically be adjusted.
If parameter 00-27 is set to HD mode, group 02 motor 1 parameter will automatically be adjusted.
It is recommended that parameter 00-27 be set first before performing an auto-tune because motor parameters will be updated automatically.

Group 01 V/F Control Parameters								
Code	Parameter Name	Setting Range	Default	Unit	Control mode			Attribute
					V/F	SLV	PM SLV	
01-00	Volts/Hz Pattern of Motor 1	0~FF	F	-	O	X	X	*3
01-02	Maximum Frequency of Motor 1	4.8~599.0	50.0/60.0	Hz	O	O	O	*8
01-03	Maximum Output Voltage of Motor 1	200V：0.1~255.0	230.0	V	O	X	X	*8
		400V：0.2~510.0	400.0					
01-04	Middle Output Frequency 2 of Motor 1	0.0~599.0	0.0	Hz	O	X	X	
01-05	Middle Output Voltage 2 of Motor 1	200V：0.0~255.0	0.0	V	O	X	X	*8
		400V：0.0~510.0						
01-06	Middle Output Frequency 1 of Motor 1	0.0~599.0	3.0	Hz	O	X	X	
01-07	Middle Output Voltage 1 of Motor 1	200V：0.0~255.0	*	V	O	X	X	*8
		400V：0.0~510.0						
01-08	Minimum Output Frequency of Motor 1	0.0~599.0 V/F:	1.5	Hz	O	O	O	
		0.0~599.0 SLV:	0.6					
		0.0~599.0 PMSLV:	10.0					
01-09	Minimum Output Voltage of Motor 1	200V：0.0~255.0	*	V	O	X	X	*8
		400V：0.0~510.0						
01-10	Torque Compensation Gain	0.0~2.0	0.5	-	O	X	X	*1
01-11	Selection of Torque Compensation Mode	0：Mode 0 (Normal) 1：Mode 1 (High Speed)	0	-	O	X	X	
01-12	Base Frequency of Motor 1	4.8~599.0	50.0/60.0	Hz	O	O	O	*8
01-13	Base Output Voltage of Motor 1	200V：0.0~255.0	230.0	V	O	X	X	*8
		400V：0.0~510.0	400.0					
01-14	Input Voltage Setting	200V：55.0~255.0	230.0	V	O	O	O	*8
		400V：10.0~510.0	400.0					
01-15	Torque Compensation Time	0~10000	200	ms	O	X	X	
01-16	Maximum Output Frequency of Motor 2	4.8~599.0	50.0/60.0	Hz	O	X	X	*8
01-17	Maximum Output Voltage of Motor 2	200V：0.1~255.0	230.0	V	O	X	X	*8
		400V：0.2~510.0	400.0					
01-18	Middle Output Frequency 2 of Motor 2	0.0~599.0	0.0	Hz	O	X	X	
01-19	Middle Output Voltage 2 of Motor 2	200V：0.0~255.0	0.0	V	O	X	X	
		400V：0.0~510.0						
01-20	Middle Output Frequency 1 of Motor 2	0.0~599.0	3.0	Hz	O	X	X	
01-21	Middle Output Voltage 1 of Motor 2	200V：0.0~255.0	KVA	V	O	X	X	
		400V：0.0~510.0						
01-22	Minimum Output Frequency of Motor 2	0.0~599.0	1.5	Hz	O	X	X	
01-23	Minimum Output Voltage of Motor 2	200V: 0.0~255.0	KVA	V	O	X	X	
		400V: 0.0~510.0						
01-24	Base Frequency of Motor 2	4.8~599.0	50.0/60.0	Hz	O	X	X	*8
01-25	Base Output Voltage of Motor 2	200V: 0.0~255.0	230.0	V	O	X	X	*8
		400V: 0.0~510.0	400.0					
01-26	V/F Curve Selection of Motor 2	0~FF	F	-	O	X	X	*3

Group 02 IM Motor Parameters								
Code	Parameter Name	Setting Range	Default	Unit	Control mode			Attribute
					V/F	SLV	PM SLV	
02-00	No-Load Current of Motor1	0.01~600.00	-	A	O	X	X	
02-01	Rated Current of Motor1	V/F mode: 10%~200% of inverter rated current. SLV mode: 25%~200% of inverter rated current.	-	A	O	O	X	
02-03	Rated Rotation Speed of Motor1	0~60000	-	rpm	O	O	X	
02-04	Rated Voltage of Motor1	200V: 50.0~240.0	230.0	V	O	O	X	*8
		400V: 100.0~480.0	400.0					
02-05	Rated Power of Motor1	0.01~600.00	-	kW	O	O	X	
02-06	Rated Frequency of Motor1	4.8~599.0	50.0/60.0	Hz	O	O	X	*8
02-07	Number of Motor Poles of Motor 1	2~16(Even)	4	-	O	O	X	
02-09	Excitation Current of Motor 1	15%~70% of motor rated current	-	%	X	O	X	
02-10	Core Saturation Coefficient 1	1~100	-	%	X	O	X	
02-11	Core Saturation Coefficient 2 of Motor 1	1~100	-	%	X	O	X	
02-12	Core Saturation Coefficient 3 of Motor 1	80~300	-	%	X	O	X	
02-13	Core loss of Motor 1	0.0~15.0	-	%	O	X	X	
02-15	Line-to-line Resistance Motor 1	1~60.000		Ω	O	O	X	
02-16	Rotor Resistance of Motor 1	1~60.000		Ω	O	O	X	
02-17	Leakage Inductance of Motor 1	0.01~200.00	-	mH	O	O	X	
02-19	No-Load Voltage of Motor 1	200V：50~240	-	V	X	O	X	
		400V：100~480	-					
02-20	No-Load Current of Motor 2	0.01~600.00	-	A	O	X	X	
02-21	Rated Current of Motor 2	10%~200% of inverter rated current	-	A	O	X	X	
02-22	Rated Rotation Speed of Motor 2	0~60000	-	Rpm	O	X	X	*8
02-23	Rated Voltage of Motor 2	200V：50.0~240.0	230.0	V	O	X	X	
		400V：100.0~480.0	400.0					
02-24	Rated Power of Motor 2	0.01~600.00	-	kW	O	X	X	
02-25	Rated Frequency of Motor 2	4.8~599.0	50.0/60.0	Hz	O	X	X	*8
02-26	Number of Motor Poles of Motor 2	2~16 (Even)	4	-	O	X	X	
02-32	Line-to-line Resistance Motor 2	0.001~60.000	-	Ω	O	X	X	
02-33	Proportion of Motor Leakage Inductance	0.1~15.0	3.4	%	X	O	X	
02-34	Slip Frequency of Motor	0.10~20.00	1.00	Hz	X	O	X	

Group 03 External Digital Input and Output Parameters								
Code	Parameter Name	Setting Range	Default	Unit	Control mode			Attribute
					V/F	SLV	PM SLV	
03-00	Multifunction Input Terminal S1	0：Forward/Stop Command	0	-	O	O	O	
		1：Reverse/Stop Command			O	O	O	
		2：Multi-Speed/Position Setting Command 0			O	O	O	
		3：Multi-Speed/Position Setting Command 1			O	O	O	
		4：Multi-Speed/Position Setting Command 2			O	O	O	
		5：Multi-Speed/Position Setting Command 3			O	O	O	
		6：Forward Jog Run Command			O	O	O	
03-01	Multifunction Input Terminal S2	7：Reverse Jog Run Command	1	-	O	O	O	
		8：UP Frequency Increasing Command			O	O	O	
		9：DOWN Frequency Decreasing Command			O	O	O	
		10：Acceleration/ Deceleration Time Selection 2			O	O	O	
		11：Inhibit Acceleration/ Deceleration Command			O	O	O	
		12：Main/ Alternative Run Switch Function			O	O	O	
		13：Main/ Alternative Frequency Switch Function			O	O	O	
03-02	Multifunction Input Terminal S3	14：Emergency Stop (decelerate to zero and stop)	2	-	O	O	O	
		15：External Baseblock Command (coast to stop)			O	O	O	
		16：PID Control Disabled			O	O	O	
		17：Fault Reset			O	O	O	
		18：Auto Run Mode Enable			-	-	-	
		19：Speed Search			O	O	X	
		20：Energy Saving (V/F only)			O	X	X	
03-03	Multifunction Input Terminal S5	21：Reset PID integral value to Zero	3	-	O	O	O	
		22：Counter Input			-	-	-	
		23：Counter reset			-	-	-	
		24：PLC Input			O	O	O	
		25：Pulse width modulation measurement (S3)			O	O	O	
		26：Pulse frequency measure (S3)			O	O	O	
03-04	Multifunction Input Terminal S5	27：Local/Remote selection	4	-	O	O	O	
		28：Remote mode selection		-	O	O	O	
		29：Jog Frequency Selection						
		33：DC Braking		-	O	O	O	
03-05	Multifunction Input Terminal S6	34：Speed Search 2	17	-	O	O	X	
		40：Motor 1/Motor 2 selection		-	O	O	X	
		47：Fire mode			O	O	O	
		48：KEB Acceleration			O	X	X	
		65：Short-circuit braking		-	X	X	O	
03-06	Up/Down frequency step	0.00~5.00			O	O	O	

Group 03 External Digital Input and Output Parameters								
Code	Parameter Name	Setting Range	Default	Unit	Control mode			Attribute
					V/F	SLV	PM SLV	
03-07	Up/Down Keep Frequency Status after Stop Command	0：When Up/Down is used, the preset frequency is held as the inverter stops, and the UP/Down function is disabled 1：When Up/Down is used, the preset frequency is reset to 0 Hz as the inverter stops. 2：When Up/Down is used, the preset frequency is held as the inverter stops, and the UP/Down is available. 3：When acceleration is used, the output frequency will be updated.	0	-	O	O	O	
03-08	S1 ~ S6 scan confirmation	1~200	1	-	O	O	O	
03-09	S1~ S4 switch type select	xxx0b：S1 A Contact xxx1b：S1 B Contact xx0xb：S2 A Contact xx1xb：S2 B Contact x0xxb：S3 A Contact x1xxb：S3 B Contact 0xxxb：S4 A Contact 1xxxb：S4 B Contact	0000b	-	O	O	O	
03-10	S5~ S6 switch type select	xxx0b：S5A Contact xxx1b：S5 B Contact xx0xb：S6 A Contact xx1xb：S6 B Contact	0000b	-	O	O	O	
03-11	Relay (R1A-R1C) Output	0：During Running	0	- -	O	O	O	
		1：Fault Contact Output			O	O	O	
		2：Frequency Agree			O	O	O	
		3：Setting Frequency Agree (03-13±03-14)			O	O	O	
		4：Frequency Detection 1 (≧03-13+03-14)			O	O	O	
		5：Frequency Detection 2 (≦ 03-13+03-14)			O	O	O	
		6：Automatic Restart			O	O	O	
		7：Momentary AC Power Loss			-	-	-	
		8：Rapid Stop			-	-	-	
		9：Base Block			O	O	O	
		10：Motor Overload Protection (OL1)			-	-	-	
		11：Drive Overload Protection (OL2)			-	-	-	
		12：Over-torque Threshold Level (OL3)			O	O	O	
		13：Preset Output Current Reached			O	O	O	

Group 03 External Digital Input and Output Parameters								
Code	Parameter Name	Setting Range	Default	Unit	Control mode			Attribute
					V/F	SLV	PM SLV	
		14：Brake Control			O	O	O	
		15：PID Feedback Signal Loss			-	-	-	
		16：Single pre-set count (3-22~23)			-	-	-	
		17：Dual pre-set count (3-22~23)			-	-	-	
		18：PLC Status Indicator (00-02)			O	O	O	
		19：PLC control *			O	O	O	
		20：Zero Speed			O	O	O	
03-12	Relay (R2A-R2C) Output	54：Turn on short-circuit braking	1	-	X	X	O	
		55：Low Current Detection			O	O	O	
03-13	Frequency Detection Level	0.0~599.0	0.0	Hz	O	O	O	
03-14	Frequency Detection Width	0.1~25.5	2.0	Hz	O	O	O	
03-15	Current Agree Level	0.1~999.9	0.1	A	O	O	O	
03-16	Delay Time of Current Agree Detection	0.1~10.0	0.1	s	O	O	O	
03-17	* Mechanical Braking Release Level	0.00~599.00	0.00	Hz	O	O	O	
03-18	* Mechanical Braking Level Set	0.00~599.00	0.00	Hz	O	O	O	
03-19	Relay (R1A-R2A) Type	xxx0b：R1 A Contact xxx1b：R1 B Contact xx0xb：R2 A Contact xx1xb：R2 B Contact	0000b	-	O	O	O	
03-20	Internal / External Multi-Function Input Terminal Selection	0~63	0		O	O	O	
03-21	Action To Set The Internal Multi-Function Input Terminals	0~65	0		O	O	O	
03-22	Pre-Set Count 1	0~9999	0		O	O	O	
03-23	Pre-Set Count 2	0~9999	0		O	O	O	
03-24	Output Under Current Detection	0：Invalid 1：Valid			O	O	O	
03-25	Output Under Current Detection Level	0~999.9A			O	O	O	
03-26	Output Under Current Detection Delay Time	0.0~655.35s			O	O	O	
03-27	Pulse Frequency	50~25000		Hz	O	O	O	
03-28	Pulse Input Gain	0.0~1000.0		%	O	O	O	
03-29	Photo-coupler Output Selection	xxx0b：Photo-coupler A Contact xxx1b：Photo-coupler B Contact	0000b		O	O	O	

Group 03 External Digital Input and Output Parameters								
Code	Parameter Name	Setting Range	Default	Unit	Control mode			Attribute
					V/F	SLV	PM SLV	
03-30	Selection of Pulse Input	0：General Pulse Input 1：PWM	0	-	O	O	O	
03-33	Pulse Input Bias	-100.0~100.0	0.0	%	O	O	O	
03-34	Filter Time of Pulse Input	0.00~2.00	0.1	Sec	O	O	O	

* ：If the maximum output frequency of motor is over 300HZ, the frequency resolution is changed to 0.1Hz

Group 04 Analog signal inputs / Analog output								
Code	Parameter Name	Setting Range	Default	Unit	Control mode			Attribute
					V/F	SLV	PM SLV	
04-00	Analog Input Signal Type	0：AI1 0~10V AI2 0~10V / 0~20mA 1：AI1 0~10V AI2 4~20mA / 2~10V 2：AI1 2~10V AI2 0~10V / 0~20mA 3：AI1 2~10V AI2 4~20mA / 2~10V	1	-	O	O	O	
04-01	AI1 Signal Scanning and Filtering Time	0.00~2.00	0.03	s	O	O	O	
04-02	AI1 Gain	0.0~1000.0	100.0	%	O	O	O	*1
04-03	AI1 Bias	-100.0~100.0	0	%	O	O	O	*1
04-05	AI1 Slope	0：Positive 1：Negative	0	-	O	O	O	
04-06	AI2 Signal Scanning and Filtering Time	0.00~2.00	0.03	s	O	O	O	
04-07	AI2 Gain	0.0~1000.0	100.0	%	O	O	O	
04-08	AI2 Bias	-100.0~100.0	0	%	O	O	O	
04-10	AI2 Slope	0：Positive 1：Negative	0	-	O	O	O	
04-11	Analog Output (AO) Mode	0：Output Frequency	0	-	O	O	O	
		1：Frequency Command			O	O	O	
		2：Output Voltage			O	O	O	
		3：DC Bus Voltage			O	O	O	
		4：Output Current			O	O	O	
04-12	AO Gain	0.0~1000.0	100.0	%	O	O	O	
04-13	AO Bias	-100.0~100.0	0	%	O	O	O	
04-15	AO Slope	0：Positive 1：Negative	0	-	O	O	O	
04-16	F-Gain	0：Disable 1：Enable	0	-	O	O	O	
04-20	AO Signal Scanning and Filtering Time	0.00~0.50	0.00	s	O	O	O	

Group 05 Preset Frequency Selection								
Code	Parameter Name	Setting Range	Default	Unit	Control mode			Attribute
					V/F	SLV	PM SLV	
05-00	Preset Speed Control Mode Selection	0：Accel/Decel 1~4 apply to all speeds 1：Individual Accel/Decel for each preset speed	0	-	O	O	O	
05-01	* Preset Speed 0	0.00~599.00	5.00	Hz	O	O	O	*1
05-02	* Preset Speed 1	0.00~599.00	5.00	Hz	O	O	O	*1
05-03	* Preset Speed 2	0.00~599.00	10.00	Hz	O	O	O	*1
05-04	* Preset Speed 3	0.00~599.00	20.00	Hz	O	O	O	*1
05-05	* Preset Speed 4	0.00~599.00	30.00	Hz	O	O	O	*1
05-06	* Preset Speed 5	0.00~599.00	40.00	Hz	O	O	O	*1
05-07	* Preset Speed 6	0.00~599.00	50.00	Hz	O	O	O	*1
05-08	* Preset Speed 7	0.00~599.00	50.00	Hz	O	O	O	*1
05-09	* Preset Speed 8	0.00~599.00	5.00	Hz	O	O	O	*1
05-10	* Preset Speed 9	0.00~599.00	5.00	Hz	O	O	O	*1
05-11	* Preset Speed 10	0.00~599.00	5.00	Hz	O	O	O	*1
05-12	* Preset Speed 11	0.00~599.00	5.00	Hz	O	O	O	*1
05-13	* Preset Speed 12	0.00~599.00	5.00	Hz	O	O	O	*1
05-14	* Preset Speed 13	0.00~599.00	5.00	Hz	O	O	O	*1
05-15	* Preset Speed 14	0.00~599.00	5.00	Hz	O	O	O	*1
05-16	* Preset Speed 15	0.00~599.00	5.00	Hz	O	O	O	*1
05-17	Preset Speed 0-Acc time	0.1~6000.0	10.0	s	O	O	O	
05-18	Preset Speed 0-Dec time	0.1~6000.0	10.0	s	O	O	O	
05-19	Preset Speed 1-Acc time	0.1~6000.0	10.0	s	O	O	O	
05-20	Preset Speed 1-Dec time	0.1~6000.0	10.0	s	O	O	O	
05-21	Preset Speed 2-Acc time	0.1~6000.0	10.0	s	O	O	O	
05-22	Preset Speed 2-Dec time	0.1~6000.0	10.0	s	O	O	O	
05-23	Preset Speed 3-Acc time	0.1~6000.0	10.0	s	O	O	O	
05-24	Preset Speed 3-Dec time	0.1~6000.0	10.0	s	O	O	O	
05-25	Preset Speed 4-Acc time	0.1~6000.0	10.0	s	O	O	O	
05-26	Preset Speed 4-Dec time	0.1~6000.0	10.0	s	O	O	O	
05-27	Preset Speed 5-Acc time	0.1~6000.0	10.0	s	O	O	O	
05-28	Preset Speed 5-Dec time	0.1~6000.0	10.0	s	O	O	O	
05-29	Preset Speed 6-Acc time	0.1~6000.0	10.0	s	O	O	O	
05-30	Preset Speed 6-Dec time	0.1~6000.0	10.0	s	O	O	O	
05-31	Preset Speed 7-Acc time	0.1~6000.0	10.0	s	O	O	O	

Group 05 Preset Frequency Selection								
Code	Parameter Name	Setting Range	Default	Unit	Control mode			Attribute
					V/F	SLV	PM SLV	
05-32	Preset Speed 7-Dec time	0.1~6000.0	10.0	s	O	O	O	
05-33	Preset Speed 8-Acc time	0.1~6000.0	10.0	s	O	O	O	
05-34	Preset Speed 8-Dec time	0.1~6000.0	10.0	s	O	O	O	
05-35	Preset Speed 9-Acc time	0.1~6000.0	10.0	s	O	O	O	
05-36	Preset Speed 9-Dec time	0.1~6000.0	10.0	s	O	O	O	
05-37	Preset Speed 10-Acc time	0.1~6000.0	10.0	s	O	O	O	
05-38	Preset Speed 10-Dec time	0.1~6000.0	10.0	s	O	O	O	
05-39	Preset Speed 11-Acc time	0.1~6000.0	10.0	s	O	O	O	
05-40	Preset Speed 11-Dec time	0.1~6000.0	10.0	s	O	O	O	
05-41	Preset Speed 12-Acc time	0.1~6000.0	10.0	s	O	O	O	
05-42	Preset Speed 12-Dec time	0.1~6000.0	10.0	s	O	O	O	
05-43	Preset Speed 13-Acc time	0.1~6000.0	10.0	s	O	O	O	
05-44	Preset Speed 13-Dec time	0.1~6000.0	10.0	s	O	O	O	
05-45	Preset Speed 14-Acc time	0.1~6000.0	10.0	s	O	O	O	
05-46	Preset Speed 14-Dec time	0.1~6000.0	10.0	s	O	O	O	
05-47	Preset Speed 15-Acc time	0.1~6000.0	10.0	s	O	O	O	
05-48	Preset Speed 15-Dec time	0.1~6000.0	10.0	s	O	O	O	

* ：If the maximum output frequency of motor is over 300Hz, the frequency resolution is changed to 0.1Hz

Group 06 Automatic Program Operation								
Code	Parameter Name	Setting Range	Default	Unit	Control mode			Attribute
					V/F	SLV	PM SLV	
06-00	Auto Run Mode Selection	0：Disabled 1：Execute a single cycle operation mode. Restart speed is based on the previous stopped speed. 2：Execute continuous cycle operation mode. Restart speed is based on the previous stopped speed. 3：After the completion of a single cycle, the on-going operation speed is based on the speed of the last stage. Restart speed is based on the previous stopped speed. 4：Execute a single cycle operation mode. Restart speed will be based on the speed of stage 0. 5：Execute continuous cycle operation mode. Restart speed will be based on the speed of stage 0. 6：After the completion of a single cycle, the on-going operation speed is based on the speed of the last stage. Restart speed is based on the speed of stage 0.	0	-	O	O	X	
06-01	* Frequency Setting of Operation-Stage 1	0.00~599.00	5.00	Hz	O	O	X	*1
06-02	* Frequency Setting of Operation-Stage 2	0.00~599.00	10.00	Hz	O	O	X	*1
06-03	* Frequency Setting of Operation-Stage 3	0.00~599.00	20.00	Hz	O	O	X	*1
06-04	* Frequency Setting of Operation-Stage 4	0.00~599.00	30.00	Hz	O	O	X	*1
06-05	* Frequency Setting of Operation-Stage 5	0.00~599.00	40.00	Hz	O	O	X	*1
06-06	* Frequency Setting of Operation-Stage 6	0.00~599.00	50.00	Hz	O	O	X	*1
06-07	* Frequency Setting of Operation-Stage 7	0.00~599.00	50.00	Hz	O	O	X	*1
06-08	* Frequency Setting of Operation-Stage 8	0.00~599.00	5.00	Hz	O	O	X	*1
06-09	* Frequency Setting of Operation-Stage 9	0.00~599.00	5.00	Hz	O	O	X	*1

Group 06 Automatic Program Operation								
Code	Parameter Name	Setting Range	Default	Unit	Control mode			Attribute
					V/F	SLV	PM SLV	
06-10	* Frequency Setting of Operation-Stage 10	0.00~599.00	5.00	Hz	O	O	X	*1
06-11	* Frequency Setting of Operation-Stage 11	0.00~599.00	5.00	Hz	O	O	X	*1
06-12	* Frequency Setting of Operation-Stage 12	0.00~599.00	5.00	Hz	O	O	X	*1
06-13	* Frequency Setting of Operation-Stage 13	0.00~599.00	5.00	Hz	O	O	X	*1
06-14	* Frequency Setting of Operation-Stage 14	0.00~599.00	5.00	Hz	O	O	X	*1
06-15	* Frequency Setting of Operation-Stage 15	0.00~599.00	5.00	Hz	O	O	X	*1
06-16	Operation Time Setting of Speed-Stage 0	0.0~6000.0	0.0	s	O	O	X	*1
06-17	Operation Time Setting of Speed-Stage 1	0.0~6000.0	0.0	s	O	O	X	*1
06-18	Operation Time Setting of Speed-Stage 2	0.0~6000.0	0.0	s	O	O	X	*1
06-19	Operation Time Setting of Speed-Stage 3	0.0~6000.0	0.0	s	O	O	X	*1
06-20	Operation Time Setting of Speed-Stage 4	0.0~6000.0	0.0	s	O	O	X	*1
06-21	Operation Time Setting of Speed-Stage 5	0.0~6000.0	0.0	s	O	O	X	*1
06-22	Operation Time Setting of Speed-Stage 6	0.0~6000.0	0.0	s	O	O	X	*1
06-23	Operation Time Setting of Speed-Stage 7	0.0~6000.0	0.0	s	O	O	X	*1
06-24	Operation Time Setting of Speed-Stage 8	0.0~6000.0	0.0	s	O	O	X	*1
06-25	Operation Time Setting of Speed-Stage 9	0.0~6000.0	0.0	s	O	O	X	*1
06-26	Operation Time Setting of Speed-Stage 10	0.0~6000.0	0.0	s	O	O	X	*1
06-27	Operation Time Setting of Speed-Stage 11	0.0~6000.0	0.0	s	O	O	X	*1
06-28	Operation Time Setting of Speed-Stage 12	0.0~6000.0	0.0	s	O	O	X	*1
06-29	Operation Time Setting of Speed-Stage 13	0.0~6000.0	0.0	s	O	O	X	*1
06-30	Operation Time Setting of Speed-Stage 14	0.0~6000.0	0.0	s	O	O	X	*1
06-31	Operation Time Setting of Speed-Stage 15	0.0~6000.0	0.0	s	O	O	X	*1

Group 06 Automatic Program Operation								
Code	Parameter Name	Setting Range	Default	Unit	Control mode			Attribute
					V/F	SLV	PM SLV	
06-32	Operation Direction Selection of Speed Stage 0	0 : Stop 1 : Forward 2 : Reverse	0	-	O	O	X	
06-33	Operation Direction Selection of Speed Stage 1	0 : Stop 1 : Forward 2 : Reverse	0	-	O	O	X	
06-34	Operation Direction Selection of Speed Stage 2	0 : Stop 1 : Forward 2 : Reverse	0	-	O	O	X	
06-35	Operation Direction Selection of Speed Stage 3	0 : Stop 1 : Forward 2 : Reverse	0	-	O	O	X	
06-36	Operation Direction Selection of Speed Stage 4	0 : Stop 1 : Forward 2 : Reverse	0	-	O	O	X	
06-37	Operation Direction Selection of Speed Stage 5	0 : Stop 1 : Forward 2 : Reverse	0	-	O	O	X	
06-38	Operation Direction Selection of Speed Stage 6	0 : Stop 1 : Forward 2 : Reverse	0	-	O	O	X	
06-39	Operation Direction Selection of Speed Stage 7	0 : Stop 1 : Forward 2 : Reverse	0	-	O	O	X	
06-40	Operation Direction Selection of Speed Stage 8	0 : Stop 1 : Forward 2 : Reverse	0	-	O	O	X	
06-41	Operation Direction Selection of Speed Stage 9	0 : Stop 1 : Forward 2 : Reverse	0	-	O	O	X	
06-42	Operation Direction Selection of Speed Stage 10	0 : Stop 1 : Forward 2 : Reverse	0	-	O	O	X	
06-43	Operation Direction Selection of Speed Stage 11	0 : Stop 1 : Forward 2 : Reverse	0	-	O	O	X	
06-44	Operation Direction Selection of Speed Stage 12	0 : Stop 1 : Forward 2 : Reverse	0	-	O	O	X	
06-45	Operation Direction Selection of Speed Stage 13	0 : Stop 1 : Forward 2 : Reverse	0	-	O	O	X	
06-46	Operation Direction Selection of Speed Stage 14	0 : Stop 1 : Forward 2 : Reverse	0	-	O	O	X	

Group 06 Automatic Program Operation								
Code	Parameter Name	Setting Range	Default	Unit	Control mode			Attribute
					V/F	SLV	PM SLV	
06-47	Operation Direction Selection of Speed Stage 15	0：Stop 1：Forward 2：Reverse	0	-	O	O	X	

* : **If the maximum output frequency of motor is over 300Hz, the frequency resolution is changed to 0.1Hz**

Group 07 Start/Stop Parameters								
Code	Parameter Name	Setting Range	Default	Unit	Control mode			Attribute
					V/F	SLV	PM SLV	
07-00	Momentary Power Loss and Restart	0：Disable 1：Enable	0	-	O	O	X	
07-01	Fault Reset Time	0~7200	0	s	O	O	O	
07-02	Number of Auto Restart Attempts	0~10	0	-	O	O	O	
07-03	Reset Mode Setting	0：Enable Reset Only when Run Command is Off 1：Enable Reset when Run Command is On or Off						
07-04	Momentary Power Loss and Restart	0：Enable Direct run on power up 1：Disable Direct run on power up	1	-	O	O	O	
07-05	Delay-ON Timer	1.0~300.0	1.0	s	O	O	O	
07-06	DC Injection Braking Start Frequency	0.0~10.0	1.5	Hz	O	O	O	
07-07	DC Injection Braking Level (Current Mode)	0~100	50	%	O	O	O	
07-08	DC Injection Braking Time	0.00~100.00	0.50	s	O	O	O	
07-09	Stop Mode Selection	0：Deceleration to Stop 1：Coast to Stop 2：DC Braking Stop in All Fields 3：Coast to Stop with Timer	0	-	O	O	O	
07-10	Speed Search Mode Selection	0：Normal Start 1：Execute Speed Search Once 2：Speed Search Start			O	O	O	
07-13	Low Voltage Detection Level	200V：150~300 400V：250~600	190 380	V	O	O	O	
07-15	DC Injection Brake Mode	0：Voltage Mode 1：Current Mode	1		O	O	X	
07-16	DC Injection Braking Time at Start	0.00~100.00	0.00	s	O	O	O	
07-18	Minimum Base block Time	0.1~5.0	-	Sec	O	O	O	
07-19	Speed Direction Search Operation Current	0~100	50	%	O	O	X	
07-20	Speed Search Operating Current	0~100	20	%	O	O	X	
07-21	Integral Time of Speed Searching	0.1~10.0	2.0	Sec	O	O	X	
07-22	Delay Time of Speed Searching	0.0~20.0	0.2	Sec	O	O	X	
07-23	Voltage Recovery Time	0.1~5.0	2.0	Sec	O	O	X	
07-24	Direction-Detection Speed Search Selection	0：Invalid 1：Valid	1	-	O	O	X	

Group 07 Start/Stop Parameters								
Code	Parameter Name	Setting Range	Default	Unit	Control mode			Attribute
					V/F	V/F	V/F	
07-25	Low Voltage Detection Time	0.00~1.00	0.02	Sec	O	O	O	
07-33	Start Frequency of Speed Search Selection	0：Maximum Output Frequency 1：Frequency Command	0	-	O	O	X	
07-34	Start Short-Circuit Braking Time	0.00~100.00	0.00	Sec	X	X	O	
07-35	Stop Short-Circuit Braking Time	0.00~100.00	0.50	Sec	X	X	O	
07-36	Short-Circuit Braking Current Limited	0.0~200.0	100.0	%	X	X	O	
07-37	Pre-Excitation Time	0.00~10.00	2.00	Sec	X	O	X	
07-38	Pre-Excitation Level	50~200	100	%	X	O	X	
07-39	Short-Circuit Braking Time of PM Motor Speed Search Function	0.00~100.00	0.00	Sec	X	X	O	
07-40	DC Injection Braking Time of PM Motor Speed Search Function	0.00~100.00	0.00	Sec	X	X	O	

* ：**If the maximum output frequency of motor is over 300Hz, the frequency resolution is changed to 0.1Hz**

Group 08 Protection Parameters								
Code	Parameter Name	Setting Range	Default	Unit	Control mode			Attribute
					V/F	SLV	PM SLV	
08-00	Stall Prevention Function	xxx0b：Stall prevention is enabled in acceleration. xxx1b：Stall prevention is disabled in acceleration. xx0xb：Stall prevention is enabled in deceleration. xx1xb：Stall prevention is disabled in deceleration. x0xxb：Stall prevention is enabled in operation x1xxb：Stall prevention is disabled in operation 0xxxb：Stall prevention in operation is based on deceleration time of speed-stage 1. 1xxxb：Stall prevention in operation is based on deceleration time of speed-stage 2.	0000b	-	O	O	O	
08-01	Stall Prevention Level During Acceleration	20~200	HD：150 ND：120	%	O	O	O	
08-02	Stall Prevention Level During Deceleration	200V：330V~410V 400V：660V~820V	385V 770V	V	O	O	O	
08-03	Stall Prevention Level During Run	30~200	HD：160 ND：120	%	O	O	O	
08-05	Selection for Motor Overload Protection (OL1)	xxx0b：Overload Protection is disabled. xxx1b：Overload Protection is enabled. xx0xb：Cold Start of Motor Overload xx1xb：Hot Start of Motor Overload x0xxb：Standard Motor x1xxb：Inverter Duty Motor 0xxxb：Reserved 1xxxb：Reserved	0001b	-	O	O	O	
08-06	Start-up Mode of Overload Protection Operation (OL1)	0：Stop Output after Overload Protection 1：Continuous Operation after Overload Protection.	0	-	O	O	O	
08-07	Over Heat Protection (Cooling Fan Control)	0：Auto (Depends on temp.) 1：Operate while in RUN Mode 2：Always Run 3：Stop Operation	1	-	O	O	O	
08-08	Auto Voltage Regulation (AVR)	0：Enable 1：Disable	0	-	O	O	O	
08-09	Selection of Input Phase Loss Protection	0：Disable 1：Enable	0	-	O	O	O	
08-10	Selection of Output	0：Disable	0	-	O	O	O	

Group 08 Protection Parameters								
Code	Parameter Name	Setting Range	Default	Unit	Control mode			Attribute
					V/F	SLV	PM SLV	
	Phase Loss Protection	1：Enable						
08-13	Selection of Over-Torque Detection	0：Over-Torque Detection is Disabled. 1：Start detection when reaching the set frequency. 2：Start detection during running	0	-	O	O	O	
08-14	Selection of Over-Torque Action	0：Decelerate to Stop when Over Torque is Detected. 1：Display Warning when Over Torque is Detected. Continue operation. 2：Coast to Stop when Over Torque is Detected	0	-	O	O	O	
08-15	Level of Over-Torque Detection	0~300	160	%	O	O	O	
08-16	Time of Over-Torque Detection	0.0~10.0	0.1	Sec	O	O	O	
08-17	Fire Mode	0：Disabled 1：Enabled	0	-	O	O	O	
08-21	Limit of Stall Prevention During Acceleration	1~100	50	%	O	O	O	
08-22	Stall Prevention Detection Time During Run	2~100	100	ms	O	O	O	
08-23	Ground Fault (GF) Selection	0：Disable 1：Enable	0	-	O	O	O	
08-30	STO function selection (***)	0：Deceleration to Stop 1：Coast to Stop	0	-	O	O	O	
08-35	Motor Overheating Fault Selection	0：Disable 1：Deceleration to Stop 2：Coast to Stop 3：Continue Running	0	-	O	O	O	
08-36	PTC Input Filter Time Constant	0.00 ~ 5.00	2.00	Sec	O	O	O	
08-38	Delay Time of Fan Off	0~600	60	Sec	O	O	O	
08-39	Delay Time of Motor Overheat Protection	1~300	60	Sec	O	O	O	
08-40	Motor2 Acceleration Stall Prevention Level	20~200	HD: 150 ND: 120	%	O	O	X	
08-41	Motor2 Acceleration Stall Prevention Limit	1~100	50	%	O	O	X	
08-42	PTC Protection Level	0.1~10.0V	0.7	V	O	O	O	
08-43	PTC Restart Level	0.1~10.0V	0.3	V	O	O	O	

Group 08 Protection Parameters								
Code	Parameter Name	Setting Range	Default	Unit	Control mode			Attribute
					V/F	SLV	PM SLV	
08-44	PTC Warning Level	0.1~10.0V	0.5	V	O	O	O	

*****STO function only available in inverters with built-in EMC filter.**

Group 09 Communication Parameters								
Code	Parameter Name	Setting Range	Default	Unit	Control mode			Attribute
					V/F	SLV	PM SLV	
09-00	INV Communication Station Address	1~32	1	-	O	O	O	*3
09-01	Communication Mode Selection	0：MODBUS 1：BACnet 2：Reserved 3：Reserved 4：Reserved	0		O	O	O	*3 *5
09-02	Baud Rate Setting (bps)	2：4800 3：9600 4：19200 5：38400	4	-	O	O	O	*3
09-03	Stop Bit Selection	0：1 Stop Bit 1：2 Stop Bit	0	-	O	O	O	*3
09-04	Parity Selection	0：No Parity 1：Even Bit 2：Odd Bit	0	-	O	O	O	*3
09-05	Communication Data Bit Selection	0：8 Bit Data 1：7 Bit Data	0	-	O	O	O	*3
09-06	Communication Error Detection Time	0.0~25.5	0.0	S	O	O	O	*3
09-07	Fault Stop Selection	: Deceleration to Stop By Deceleration Time 1 1: Coast to Stop 2: Deceleration to Stop By Deceleration Time 2 3: Continue	3	-	O	O	O	*3
09-08	Comm. Fault Tolerance Count	1~20	1	-	O	O	O	*3
09-09	Waiting Time	5~65	5	ms	O	O	O	*3
09-10	BACNET Device Instance Number	1~254	1		O	O	O	

*3：Parameter group 09 settings are NOT set to factory default when inverter is initialized (13-08).

Note: Changes to group 09 require the power to be cycled to take effect.

Group 10 PID Parameters								
Code	Parameters	Setting Range	Default	Unit	Control Mode			Attribute
					V/F	SLV	PM SLV	
10-00	PID Target Value Source Setting	0：Keypad 1：AI1 Input 2：AI2 Input 3：Communication 4：10-02 given	1	-	O	O	O	
10-01	PID Feedback Value Source Setting	0：Keypad 1：AI1 Input 2：AI2 Input 3：Communication	2	-	O	O	O	
10-02	PID Target Value	0.00~100.00	0.00	%	O	O	O	*1
10-03	PID Control Mode	xxx0b：PID Disable xxx1b：PID Enable xx0xb：PID Positive Characteristic xx1xb：PID Negative Characteristic x0xxb：PID Error Value of D Control x1xxb：PID Feedback Value of D Control 0xxxb：PID Output 1xxxb：PID Output+Frequency Command	0000b	-	O	O	O	
10-04	Feedback Gain	0.01~10.00	1.00	-	O	O	O	*1
10-05	Proportional Gain (P)	0.00~10.00	1.00	-	O	O	O	*1
10-06	Integral Time (I)	0.00~100.00	1.00	s	O	O	O	*1
10-07	Differential Time (D)	0.00~10.00	0.00	s	O	O	O	*1
10-09	PID Bias	-100.0~100.0	0	%	O	O	O	*1
10-11	PID Feedback Loss Detection Selection	0：Disable 1：Warning 2：Fault	0	-	O	O	O	*1
10-12	PID Feedback Loss Det. Lev.	0~100	0	%	O	O	O	
10-13	PID Feedback Loss Det. Time	0.0~10.0	1.0	s	O	O	O	
10-14	PID Integral Limit	0.0~100.0	100.0	%	O	O	O	*1
10-15	PID Trim Mode	0 ~ 30	0		O	O	O	
10-16	PID Trim Scale	0 ~ 100	0		O	O	O	
10-17	* Start Frequency of PID Sleep	0.00~599.00	0.00	Hz	O	O	O	
10-18	Delay Time of PID Sleep	0.0~255.5	0.0	s	O	O	O	
10-19	* Frequency of PID Waking up	0.00~599.00	0.00	Hz	O	O	O	
10-20	Delay Time of PID Waking up	0.0~255.5	0.0	s	O	O	O	
10-21	Reserved							
10-22	Reserved							
10-23	PID Output Limit	0.00~100.0	100.0	%	O	O	O	*1
10-24	PID Output Gain	0.0~25.0	1.0	-	O	O	O	
10-25	PID Reversal Output Selection	0：No Allowing Reversal Output 1：Allow Reversal Output	0	-	O	O	O	

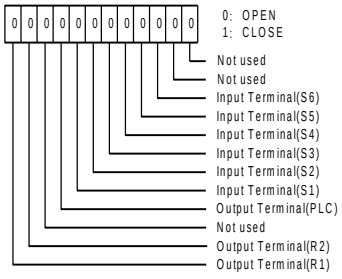
Group 10 PID Parameters								
Code	Parameters	Setting Range	Default	Unit	Control Mode			Attribute
					V/F	SLV	PM SLV	
10-26	PID Target Acceleration/ Deceleration Time	0.0~25.5	0.0	s	O	O	O	
10-27	PID Feedback Display Bias	0 ~ 9999	0	-	O	O	O	
10-28	PID Feedback Display Gain	0.00~100.00	100.00		O	O	O	
10-29	PID Sleep Selection	0：Disable 1：Enable 2：Set By DI	1	-	O	O	O	
10-30	Upper Limit of PID Target	0.0 ~ 100.0	100.0	%	O	O	O	
10-31	Lower Limit of PID Target	0.0 ~ 100.0	0.0	%	O	O	O	
10-33	Maximum Value of PID Feedback	1 ~ 10000	999	-	O	O	O	
10-34	PID Decimal Width	0 ~ 4	1		O	O	O	
10-35	PID Unit	0：% 1：FPM 2：CFM 3：SPI 4：GPH 5：GPM 6：IN 7：FT 8：/s 9：/m 10：/h 11：°F 12：inW 13：HP 14：m/s 15：MPM 16：CMM 17：W 18：KW 19：m 20：°C 21：RPM 22：Bar 23：Pa	0		O	O	O	*7
10-39	* Output Frequency Setting of PID Disconnection	00.00~599.00	30.00	Hz	O	O	O	
10-40	Selection of PID Sleep Compensation Frequency	0：Disable 1：Enable	0	-	O	O	O	

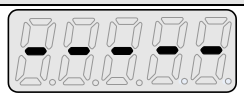
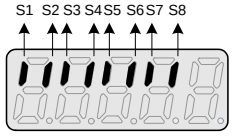
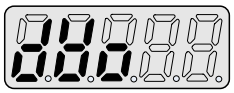
Group 11 Auxiliary Parameters								
Code	Parameters	Setting Range	Default	Unit	Control Mode			Attribute
					V/F	SLV	PM SLV	
11-00	Direction Lock Selection	0：Allow Forward and Reverse Rotation 1：Only Allow Forward Rotation 2：Only Allow Reverse Rotation	0	-	O	O	O	
11-01	Carrier frequency	0：Carrier Output Frequency Tuning 1~16：1~16KHz	*	-	O	O	O	*1
11-02	Soft PWM Function Selection	0：Disable 1：Soft PWM 2：Random PWM	0	-	O	O	O	
11-03	Automatic carrier lowering selection	0：Disable 1：Enable	0	-	O	X	X	
11-04	S-curve Time Setting at the Start of Acceleration	0.00~2.50	0.20	s	O	O	O	
11-05	S-curve Time Setting at the Stop of Acceleration	0.00~2.50	0.20	s	O	O	O	
11-06	S-curve Time Setting at the Start of Deceleration	0.00~2.50	0.20	s	O	O	O	
11-07	S-curve Time Setting at the Stop of Deceleration	0.00~2.50	0.20	s	O	O	O	
11-08	Jump Frequency 1	0.0~599.0	0.0	Hz	O	O	O	
11-09	Jump Frequency 2	0.0~599.0	0.0	Hz	O	O	O	
11-10	Jump Frequency 3	0.0~599.0	0.0	Hz	O	O	O	
11-11	Jump Frequency Width	0.00 ~ 30.0	1.0	Hz	O	O	O	
11-12	Manual Energy Saving Gain (V/F)	0~100	80	%	O	X	X	
11-14	OV Prevention Selection	230V：200V~400V 400V：400V~800V	370 740		O	X	X	
11-17	Acceleration/Deceleration Gain	0.1~10.0	1		O	X	X	
11-18	Manual Energy Savings Frequency	0.0~599.0	0.0	Hz	O	O	O	
11-28	Frequency Gain of Over Voltage Prevention 2	1 ~ 200		%	O	O	X	
11-33	DC Voltage Filter Rise Amount	0.1 ~ 10.0		V	O	O	X	
11-34	DC Voltage Filter Fall Amount	0.1 ~ 10.0		V	O	O	X	
11-35	DC Voltage Filter Dead-band Level	0.0 ~ 99.0		V	O	O	X	
11-36	Frequency gain of OV Prevention	0.000 ~ 1.000			O	O	X	

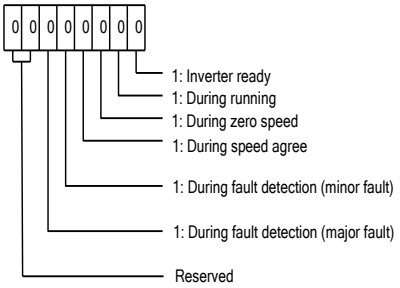
Group 11 Auxiliary Parameters								
Code	Parameters	Setting Range	Default	Unit	Control Mode			Attribute
					V/F	SLV	PM SLV	
11-37	Frequency limit of OV Prevention	0.00 ~ 599.00		Hz	O	O	X	
11-38	Deceleration start voltage of OV prevention	230V：200V~400V	300	V	O	O	X	
		400V：400V~800V	600					
11-39	Deceleration end voltage of OV Prevention	230V：300V~400V	350	V	O	O	X	
		400V：600V~800V	700					
11-40	OV Prevention Selection	0~3	0		O	X	X	
11-47	KEB Deceleration Time	0.0~25.5	0.0	s	O	X	X	
11-48	KEB Detection Level	230V：190~210	200V	V	O	X	X	
		400V：380~420	400V					
11-55	STOP Key Selection	0：Stop Key is Disabled when the Operation Command is not Provided by Operator.	1	-	O	O	O	
		1：Stop Key is Enabled when the Operation Command is not Provided by Operator.						
11-59	Gain of Preventing Oscillation	0.00~2.50	*		O	X	X	
11-60	Upper Limit of Preventing Oscillation	0~100	*	%	O	X	X	
11-61	Time Parameter of Preventing Oscillation	0~100	0		O	X	X	
11-62	Selection of Preventing Oscillation	0：Mode 1	1	-	O	X	X	
		1：Mode 2						
		2：Mode 3						
11-63	Strong Magnetic Selection	0：Disable	1	-	X	O	X	
		1：Enable						
11-66	2/3 Phase PWM Switch Frequency	6.00~60.00	20	-	X	O	X	
11-67	RPWM Frequency Bias	0~12000	0	-	X	O	X	
11-68	RPWM Switch Frequency	6.00~60.00	20.00	Hz	X	O	X	
11-69	Gain of Preventing Oscillation 2	0.00~200.00	5.00	%	O	X	X	
11-70	Upper Limit of Preventing Oscillation 2	0.01~100.00	5.00	%	O	X	X	
11-71	Time of Preventing Oscillation 2	0~30000	100	ms	O	X	X	
11-72	Switch Frequency 1 of Preventing Oscillation 2	0.01~300.00	30.00	Hz	O	X	X	
11-73	Switch Frequency 2 of Preventing Oscillation 2	0.01~300.00	50.00	Hz	O	X	X	

*** If the maximum output frequency of motor is over 300Hz, the frequency resolution is changed to 0.1Hz**

Note：The parameter of 11-01 can be changed during run operation, the range is 1~16KHz.

Group 12 Monitoring Parameters								
Code	Parameters	Setting Range	Default	Unit	Control Mode			Attribute
					V/F	SLV	PM SLV	
12-00	Display Screen Selection (LED)	00000~88888 From the leftmost bit, it displays the screen when press DSP key in order. 0：no display 1：Output Current 2：Output Voltage 3：DC Bus Voltage 4：Heatsink Temperature* 5：PID Feedback 6：AI1 Value 7：AI2 Value 8：Counter Value	00000	-	O	O	O	*1 *6
12-01	PID Feedback Display Mode (LED)	0：Display the Feedback Value by Integer (xxx) 1：Display the Feedback Value by the Value with One Decimal Place (xx.x) 2：Display the Feedback Value by the Value with Two Decimal Places (x.xx)	0		O	O	O	*6
12-02	PID Feedback Display Unit Setting (LED)	0：xxxxx (no unit) 1：xxxPb (pressure) 2：xxxFL (flow)	0		O	O	O	*6
12-03	Line Speed Display (LED)	0~60000	1500/ 1800	RPM	O	O	O	*1 *6
12-04	Modes of Line Speed Display (LED)	0：Display Inverter Output Frequency 1：Display Line Speed with integer (xxxxx) 2：Display Line Speed with the First Decimal Place (xxxx.x) 3：Display Line Speed with the Second Decimal Place (xxx.xx) 4：Display Line Speed with the Third Decimal Place (xx.xxx)	0	-	O	O	O	*1 *6
12-05	Status Display of Digital Input & Output Terminal (LED/LCD)	LCD display is shown as below  LED display is shown as on the next page.	-		O	O	O	

Group 12 Monitoring Parameters								
Code	Parameters	Setting Range	Default	Unit	Control Mode			Attribute
					V/F	SLV	PM SLV	
		 Correspondences to input and output  						
12-11	Output Current of Current Fault	Display the output current of current fault	-	A	O	O	O	
12-12	Output Voltage of Current Fault	Display the output voltage of current fault	-	V	O	O	O	
12-13	Output Frequency of Current Fault	Display the output frequency of current fault	-	Hz	O	O	O	
12-14	DC Voltage of Current Fault	Display the DC voltage of current fault	-	V	O	O	O	
12-15	Frequency Command of Current Fault	Display the frequency command of current fault	-	Hz	O	O	O	
12-16	Frequency Command	If LED enters this parameter, it only allows monitoring frequency command.	-	Hz	O	O	O	
12-17	Output Frequency	Display the current output frequency	-	Hz	O	O	O	
12-18	Output Current	Display the current output current	-	A	O	O	O	
12-19	Output Voltage	Display the current output voltage	-	V	O	O	O	
12-20	DC Voltage (Vdc)	Display the current DC voltage	-	V	O	O	O	
12-28	Motor Torque Current (Iq)	Display the current q-axis current		%	X	O	O	
12-29	Motor Excitation Current (Id)	Display the current d-axis current		%	X	O	O	
12-36	PID Input	Display input error of the PID controller (PID target value - PID feedback) (100% corresponds to the maximum frequency set by 01-02 or 01-16)		%	O	O	O	
12-37	PID Output	Display output of the PID controller (100% corresponds to the maximum frequency set by 01-02 or 01-16)		%	O	O	O	
12-38	PID Setting	Display the target value of the PID controller (100% corresponds to the maximum frequency set by 01-02 or 01-16)		%	O	O	O	
12-39	PID Feedback	Display the feedback value of the PID controller (100% corresponds to the maximum frequency set by 01-02 or 01-16)		%	O	O	O	
12-41	Heatsink Temperature*	Display the heatsink temperature / IGBT temperature**		℃	O	O	O	

Group 12 Monitoring Parameters								
Code	Parameters	Setting Range	Default	Unit	Control Mode			Attribute
					V/F	SLV	PM SLV	
12-43	Inverter Status				O	O	O	

Group 13 Maintance Parameters								
Code	Parameters	Setting Range	Default	Unit	Control Mode			Attribute
					V/F	SLV	PM SLV	
13-00	Inverter Capacity Selection	----	-	-	O	O	O	*4
13-01	Software Version	0.00-9.99	-	-	O	O	O	*4
13-02	Fault Record		0	-	O	O	O	*1
13-03	Cumulative Operation Hours 1	0~23	-	hr	O	O	O	*4
13-04	Cumulative Operation Hours 2	0~65535	-	day	O	O	O	*4
13-05	Selection of Cumulative Operation Time	0: Cumulative time in power on 1: Cumulative time in operation	0	-	O	O	O	*1
13-06	Parameters Locked	0: Parameters are read-only except 13-06 and main frequency 1 : Reserved 2: Advanced Level, all parameters are accesible	2	-	O	O	O	*1
13-07	Parameter Password Function	00000~65534	00000	-	O	O	O	*1
13-08	Restore Factory Setting	1：2 wire initialization (50Hz) (220V/380V) 2：2 wire initialization (60Hz) (220V/380V) 3：2 wire initialization (50Hz) (230V/400V) 4：2 wire initialization (60Hz) (230V/460V) 5：2 wire initialization (50Hz) (220V/415V) 6：2 wire initialization (60Hz) (230V/400V) 7：2 wire initialization (50Hz) (220V/440V) 8：2 wire initialization (60Hz) (220V/440V) 1112：PLC initialization (RESET)	-	-	O	O	O	
13-10	Parameter Password Function 2	0~9999	0		O	O	O	
13-51	Operation Time Clearance Function	0: Do not clear operation time 1: Clear operation time	0		O	O	O	

Group 14 PLC Setting Parameters								
Code	Parameters	Setting Range	Default	Unit	Control Mode			Attribute
					V/F	SLV	PM SLV	
14-00	T1 Set Value 1	0~9999	0	-	O	O	O	
14-01	T1 Set Value 2 (Mode 7)	0~9999	0	-	O	O	O	
14-02	T2 Set Value 1	0~9999	0	-	O	O	O	
14-03	T2 Set Value 2 (Mode 7)	0~9999	0	-	O	O	O	
14-04	T3 Set Value 1	0~9999	0	-	O	O	O	
14-05	T3 Set Value 2 (Mode 7)	0~9999	0	-	O	O	O	
14-06	T4 Set Value 1	0~9999	0	-	O	O	O	
14-07	T4 Set Value 2 (Mode 7)	0~9999	0	-	O	O	O	
14-08	T5 Set Value 1	0~9999	0	-	O	O	O	
14-09	T5 Set Value 2 (Mode 7)	0~9999	0	-	O	O	O	
14-10	T6 Set Value 1	0~9999	0	-	O	O	O	
14-11	T6 Set Value 2 (Mode 7)	0~9999	0	-	O	O	O	
14-12	T7 Set Value 1	0~9999	0	-	O	O	O	
14-13	T7 Set Value 2 (Mode 7)	0~9999	0	-	O	O	O	
14-14	T8 Set Value 1	0~9999	0	-	O	O	O	
14-15	T8 Set Value 2 (Mode 7)	0~9999	0	-	O	O	O	
14-16	C1 Set Value	0~65535	0	-	O	O	O	
14-17	C2 Set Value	0~65535	0	-	O	O	O	
14-18	C3 Set Value	0~65535	0	-	O	O	O	
14-19	C4 Set Value	0~65535	0	-	O	O	O	
14-20	C5 Set Value	0~65535	0	-	O	O	O	
14-21	C6 Set Value	0~65535	0	-	O	O	O	
14-22	C7 Set Value	0~65535	0	-	O	O	O	
14-23	C8 Set Value	0~65535	0	-	O	O	O	
14-24	AS1 Set Value 1	0~65535	0	-	O	O	O	
14-25	AS1 Set Value 2	0~65535	0	-	O	O	O	
14-26	AS1 Set Value 3	0~65535	0	-	O	O	O	
14-27	AS2 Set Value 1	0~65535	0	-	O	O	O	
14-28	AS2 Set Value 2	0~65535	0	-	O	O	O	
14-29	AS2 Set Value 3	0~65535	0	-	O	O	O	
14-30	AS3 Set Value 1	0~65535	0	-	O	O	O	
14-31	AS3 Set Value 2	0~65535	0	-	O	O	O	
14-32	AS3 Set Value 3	0~65535	0	-	O	O	O	
14-33	AS4 Set Value 1	0~65535	0	-	O	O	O	
14-34	AS4 Set Value 2	0~65535	0	-	O	O	O	
14-35	AS4 Set Value 3	0~65535	0	-	O	O	O	
14-36	MD1 Set Value 1	0~65535	1	-	O	O	O	
14-37	MD1 Set Value 2	0~65535	1	-	O	O	O	
14-38	MD1 Set Value 3	0~65535	1	-	O	O	O	
14-39	MD2 Set Value 1	0~65535	1	-	O	O	O	
14-40	MD2 Set Value 2	0~65535	1	-	O	O	O	
14-41	MD2 Set Value 3	0~65535	1	-	O	O	O	
14-42	MD3 Set Value 1	0~65535	1	-	O	O	O	

Group 14 PLC Setting Parameters								
Code	Parameters	Setting Range	Default	Unit	Control Mode			Attribute
					V/F	SLV	PM SLV	
14-43	MD3 Set Value 2	0~65535	1	-	O	O	O	
14-44	MD3 Set Value 3	0~65535	1	-	O	O	O	
14-45	MD4 Set Value 1	0~65535	1	-	O	O	O	
14-46	MD4 Set Value 2	0~65535	1	-	O	O	O	
14-47	MD4 Set Value 3	0~65535	1	-	O	O	O	

Group 15 PLC Monitoring Parameters								
Code	Parameters	Setting Range	Default	Unit	Control Mode			Attribute
					V/F	SLV	PM SLV	
15-00	T1 Current Value1	0~9999	0	-	O	O	O	
15-01	T1 Current Value 2 (Mode7)	0~9999	0	-	O	O	O	
15-02	T2 Current Value 1	0~9999	0	-	O	O	O	
15-03	T2 Current Value 2 (Mode7)	0~9999	0	-	O	O	O	
15-04	T3 Current Value 1	0~9999	0	-	O	O	O	
15-05	T3 Current Value 2 (Mode7)	0~9999	0	-	O	O	O	
15-06	T4 Current Value 1	0~9999	0	-	O	O	O	
15-07	T4 Current Value 2 (Mode7)	0~9999	0	-	O	O	O	
15-08	T5 Current Value 1	0~9999	0	-	O	O	O	
15-09	T5 Current Value 2 (Mode7)	0~9999	0	-	O	O	O	
15-10	T6 Current Value 1	0~9999	0	-	O	O	O	
15-11	T6 Current Value 2 (Mode7)	0~9999	0	-	O	O	O	
15-12	T7 Current Value 1	0~9999	0	-	O	O	O	
15-13	T7 Current Value 2 (Mode7)	0~9999	0	-	O	O	O	
15-14	T8 Current Value 1	0~9999	0	-	O	O	O	
15-15	T8 Current Value 2 (Mode7)	0~9999	0	-	O	O	O	
15-16	C1 Current Value	0~65535	0	-	O	O	O	
15-17	C2 Current Value	0~65535	0	-	O	O	O	
15-18	C3 Current Value	0~65535	0	-	O	O	O	
15-19	C4 Current Value	0~65535	0	-	O	O	O	
15-20	C5 Current Value	0~65535	0	-	O	O	O	
15-21	C6 Current Value	0~65535	0	-	O	O	O	
15-22	C7 Current Value	0~65535	0	-	O	O	O	
15-23	C8 Current Value	0~65535	0	-	O	O	O	
15-24	AS1 Current Value	0~65535	0	-	O	O	O	
15-25	AS2 Current Value	0~65535	0	-	O	O	O	
15-26	AS3 Current Value	0~65535	0	-	O	O	O	
15-27	AS4 Current Value	0~65535	0	-	O	O	O	
15-28	MD1 Current Value	0~65535	0	-	O	O	O	
15-29	MD2 Current Value	0~65535	0	-	O	O	O	
15-30	MD3 Current Value	0~65535	0	-	O	O	O	
15-31	MD4 Current Value	0~65535	0	-	O	O	O	
15-32	TD Current Value	0~65535	0	-	O	O	O	

Group 16 LCD Function Parameters								
Code	Parameters	Setting Range	Default	Unit	Control Mode			Attribute
					V/F	SLV	PM SLV	
16-00	Main Screen Monitoring	5~39 when using LCD to operate, the monitored item displays in the first line. (default is frequency command)	16	-	O	O	O	*1
16-01	Sub-Screen Monitoring 1	5~39 when using LCD to operate, the monitored item displays in the second line. (default is output frequency)	17	-	O	O	O	*1
16-02	Sub-Screen Monitoring 2	5~39 when using LCD to operate, the monitored item displays in the third line. (default is output current))	18	-	O	O	O	*1
16-03	Display Unit	0~39999 Determine the display way and unit of frequency command	0	-	O	O	O	
		0：Frequency display unit is 0.01Hz						
		1：Frequency display unit is 0.01%						
		2：Frequency display unit is rpm.						
		3~39：Reserved						
		40~9999： Users specify the format, Input 0XXXX represents the display of XXXX at 100%.						
		10001~19999： Users specify the format; Input 1XXXX represents the display of XXX.X at 100%.						
		20001~29999： Users specify the format, Input 2XXXX represents the display of XX.XX at 100%.						
		30001~39999： Users specify the format, Input 3XXXX represents the display of X.XXX at 100%.						
16-04	Engineering Unit	0：Without using engineering units	0	-	O	O	O	
		1：FPM						
		2：CFM						
		3：PSI						
		4：GPH						
		5：GPM						
		6：IN						
		7：FT						
		8：/s						
		9：/m						
		10：/h						
		11：°F						

Group 16 LCD Function Parameters								
Code	Parameters	Setting Range	Default	Unit	Control Mode			Attribute
					V/F	SLV	PM SLV	
		12：inW						
		13：HP						
		14：m/s						
		15：MPM						
		16：CMM						
		17：W						
		18：KW						
		19：m						
		20：°C						
		21：RPM						
		22：Bar						
		23：Pa						
16-05	LCD Backlight	0~7	5	-	O	O	O	
16-07	Copy Function Selection	0：Do not copy parameters	0	-	O	O	O	
		1：Read inverter parameters and store parameters settings in the operator.						
		2：Write the operator parameters to the inverter.						
		3：Compare operator parameters against inverter.						
16-08	Selection of Allowing Reading	0：Do not allow to read inverter parameters or save them to the operator.	0	-	O	O	O	
		1：Allow to read inverter parameters and save to the operator.						
16-09	Selection of Operator Removed (LCD)	0：Continue operation when LCD operator is removed.	0	-	O	O	O	
		1：Display fault when LCD operator is removed						

Group 17 Automatic Tuning Parameters								
Code	Parameter Name	Setting Range	Default	Unit	Control Mode			Attribute
					V/F	SLV	PM SLV	
17-00	Mode Selection of Automatic Tuning*	0：Rotation Auto-tuning 1：Static Auto-tuning 2：Stator Resistance Measurement 3：Reserved 4：Loop Tuning 5：Rotation Auto-tuning Combination (item: 4+2+0) 6：Static Auto-tuning Combination (item: 4+2+1)	V/F: 2 SLV: 6	-	O	O	X	
17-01	Motor Rated Output Power	0.00~600.00	KVA	KW	O	O	X	
17-02	Motor Rated Current	0.1~1200.0	KVA	A	O	O	X	
17-03	Motor Rated Voltage	200V：50.0~240.0 400V：100.0~480.0	220 440	V	O	O	X	
17-04	Motor Rated Frequency	4.8~599.0	60.0	Hz	O	O	X	
17-05	Motor Rated Speed	0~24000	KVA	rpm	O	O	X	
17-06	Pole Number of Motor	2~16(Even)	4	Pole	O	O	X	
17-08	Motor no-load Voltage	200V：50~240 400V：100~480	-	V	O	O	X	
17-09	Motor Excitation Current	0.01~600.00	-	A	X	O	X	
17-10	Automatic Tuning Start	0：Disable 1：Enable	0	-	O	O	X	
17-11	Error History of Automatic Tuning	0：No error 1：Motor data error 2：Stator resistance tuning error 3：Leakage induction tuning error 4：Rotor resistance tuning error 5：Mutual induction tuning error 6：DT Error 7：Encoder error 8：Motor's acceleration error 9：Warning	0	-	O	O	X	
17-12	Proportion of Motor Leakage Inductance	0.1~15.0	3.4	%	X	O	X	
17-13	Motor Slip Frequency	0.10~20.00	1.00	Hz	X	O	X	
17-14	Selection of Rotation Auto-tuning	0: V/f Rotation Auto-tuning 1: Vector Rotation Auto-tuning	0	-	O	O	X	

KVA：The default value of this parameter will be changed by different capacities of inverter

It is suggested that HD/ ND mode (00-27) be selected first before motor performs auto-tuning.

Note：The value of mode selection of automatic tuning is 6 (Static Auto-tuning Combination). When do auto-tuning with no-load motor, it is suggested to select 17-00=5 (Rotation Auto-tuning Combination)

Group 18 Slip Compensation Parameters								
Code	Parameters	Setting Range	Default	Unit	Control mode			Attribute
					V/F	SLV	PM SLV	
18-00	Slip Compensation Gain at Low Speed.	0.00~2.50	VF：0.00 SLV：*	-	O	O	X	*1
18-01	Slip Compensation Gain at High Speed.	-1.00~1.00	0.0	-	O	O	X	*1
18-02	Slip Compensation Limit	0~250	200	%	O	X	X	
18-03	Slip Compensation Filter Time	0.0~10.0	1.0	Sec	O	X	X	
18-04	Regenerative Slip Compensation Selection	0：Disable 1：Enable	0	-	O	X	X	
18-05	FOC Delay Time	1~1000	100	ms	X	O	X	
18-06	FOC Gain	0.00~2.00	0.1	-	X	O	X	

***** : Refer to attachment 1 of the instruction manual online.

Group 20 Speed Control Parameters								
Code	Parameters	Setting Range	Default	Unit	Control Mode			Attribute
					V/F	SLV	PM SLV	
20-00	ASR Gain 1	0.00~250.00	-	-	X	O	O	*1
20-01	ASR Integral Time 1	0.001~10.000	-	Sec	X	O	O	*1
20-02	ASR Gain 2	0.00~250.00	-	-	X	O	O	*1
20-03	ASR Integral Time 2	0.001~10.000	-	Sec	X	O	O	*1
20-04	ASR Integral Time Limit	0~300	200	%	X	O	O	
20-07	Selection of Acceleration and Deceleration of P/PI	0：PI speed control will be enabled only in constant speed. For speed acceleration and deceleration, only use P control. 1：Speed control is enabled either during acceleration or deceleration.	0	-	X	O	X	
20-08	ASR Delay Time	0.000~0.500	0.004	Sec	X	O	O	
20-09	Speed Observer Proportional (P) Gain1	0.00~2.55	0.61	-	X	O	X	*1
20-10	Speed Observer Integral(I) Time 1	0.01~10.00	0.05	Sec	X	O	X	*1
20-11	Speed Observer Proportional (P) Gain2	0.00~2.55	0.61	-	X	O	X	*1
20-12	Speed Observer Integral(I) Time 2	0.01~10.00	0.06	Sec	X	O	X	*1
20-13	Low-pass Filter Time Constant of Speed Feedback 1	1~1000	4	ms	X	O	X	
20-14	Low-pass Filter Time Constant of Speed Feedback 2	1~1000	30	ms	X	O	X	
20-15	ASR Gain Change Frequency 1	0.0~599.0	4.0	Hz	X	O	O	
20-16	ASR Gain Change Frequency 2	0.0~599.0	8.0	Hz	X	O	O	
20-17	Torque Compensation Gain at Low Speed	0.00~2.50	1.00	-	X	O	X	*1
20-18	Torque Compensation Gain at High Speed	-10~10	0	%	X	O	X	*1
20-33	Detection Level at Constant Speed	0.1~5.0	1.0		X	O	O	*1
20-34	Compensation Gain of Derating	0~25600	0		X	O	O	*1
20-35	Compensation Time of Derating	0~30000	100	ms	X	O	O	*1

Group 21 Torque And Position Control Parameters								
Code	Parameters	Setting Range	Default	Unit	Control mode			Attribute
					V/F	SLV	PM SLV	
21-05	Positive Torque Limit	0~300	*	%	X	O	O	*
21-06	Negative Torque Limit	0~300	*	%	X	O	O	*
21-07	Forward Regenerative Torque Limit	0~300	*	%	X	O	O	*
21-08	Reversal Regenerative Torque Limit	0~300	*	%	X	O	O	*

***** : Refer to attachment 1 of the instruction manual online.

Group 22 PM Motor Parameters								
Code	Parameters	Setting Range	Default	Unit	Control Mode			Attribute
					V/F	SLV	PM SLV	
22-00	PM Motor Rated Power	0.00~600.00	KVA	kW	X	X	O	
22-02	PM Motor Rated Current	25%~200% inverter rated current	KVA	A	X	X	O	
22-03	PM Motor‘s Pole Number	2~96	8	poles	X	X	O	
22-04	PM Motor’s Rotation Speed	6~65535	1500	rpm	X	X	O	
22-05	PM Motor’s Maximum Rotation Speed	6~65535	1500	rpm	X	X	O	
22-06	PM Motor Rated Frequency	4.8~599.0	75.0	Hz	X	X	O	
22-10	PM SLV Start Current	20% ~ 120% Motor Rated Current	50	%	X	X	O	
22-11	I/F Mode Start Frequency Switching Point	1.0 ~ 20.0	10.0	%	X	X	O	
22-14	Armature Resistance of PM Motor	0.001 ~ 30.000	1.000	Ω	X	X	O	
22-15	D-axis Inductance of PM Motor	0.01 ~300.00	10.00	mH	X	X	O	
22-16	Q-axis Inductance of PM Motor	0.01 ~ 300.00	10.00	mH	X	X	O	
22-18	Flux-Weakening Limit	0~100	0	%	X	X	O	
22-21	PM Motor Tuning	0：PM Motor Tuning is not Active. 1：Parameter Auto-tune	0	-	X	X	O	
22-23	PMSLV acceleration time	0.1~10.0	1.0	Sec	X	X	O	
22-25	Initial Position Detection of PM Motor	0：Disable 1：Detected when inverter is running	1	-	X	X	O	

4.3 Commonly used parameters

For complete parameter function descriptions please refer to the Instruction Manual online at www.tecowestinghouse.com

00-02	Main Run Command Source Selection
00-03	Alternative Run Command Source Selection
Range	【0】:Keypad control 【1】:External terminal control 【2】:Communication control 【3】:PLC

Note: To switch the command source between the setting of main (00-02) and alternative (00-03) assign one of the DI (S1 to S6) to be the “Run Command Switch Over” (03-00~03-05=12).

00-02=0: Keypad Control
Use the keypad to start and stop the inverter and set direction with the forward / reverse key. Refer to section 4-1 for details on the keypad.

00-02=1: External Terminal Control
External terminals are used to start and stop the inverter and select motor direction. There are three different types: 2-wire and 3-wire operation and 2-wire self-holding (latching) mode.

■ 2-wire operation

For 2-wire operation, set 03-00 (S1 terminal selection) to 0 and 03-01 (S2 terminal selection) to 1

Terminal S1	Terminal S2	Operation
Open	Open	Stop Inverter
Closed	Open	Run Forward
Open	Closed	Run Reverse
Closed	Closed	Stop Inverter, Display EF9 Alarm after 500ms

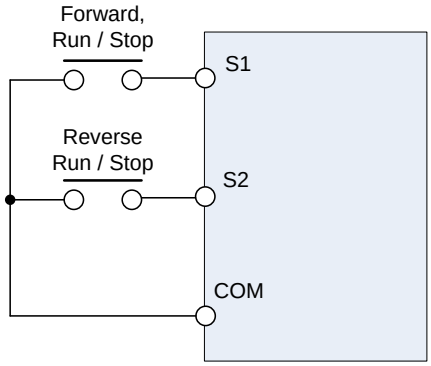


Figure 4.3.1 Wiring example of 2-wire

■ 3-wire operation

Set parameter 00-04 to 2 for 3-wire program initialization, multi-function input terminal S1 is set to run operation, S2 for stop operation and S3 for forward/reverse command.

Note: Terminal S1 must be closed for a minimum of 50ms to activate operation.

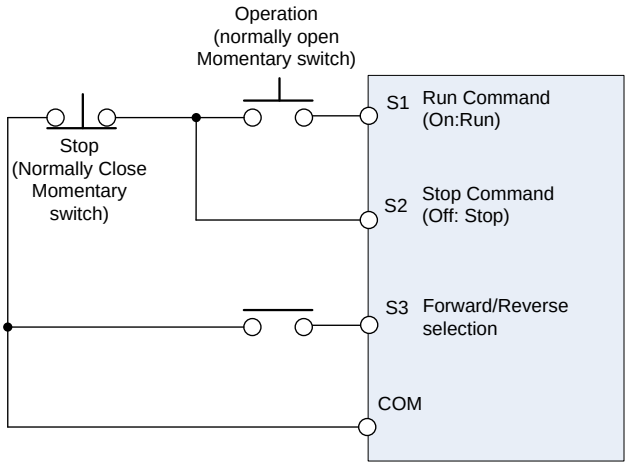


Figure 4.3.2 Wiring example of 3-wire

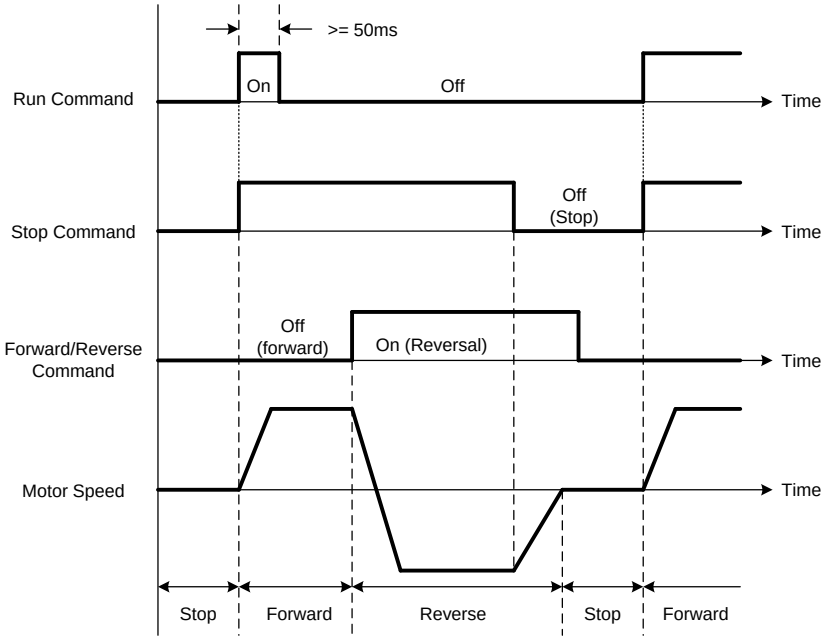


Figure 4.3.3 3-wire operation

00-03=2: Communication control

The inverter is controlled by the RS-485 port. Refer to parameter group 9 for communication setup.

00-03=3: PLC control

The inverter is controlled by the inverter built-in PLC logic. Refer to section 4.4.

00-04	Operation Modes for External Terminals
Range	【0】:Forward/Stop-Reverse/Stop 【1】:Run/Stop- Reverse/ Forward 【2】:3 Wire Control Mode - Run/Stop

■ 00-04 is valid when run command is set to external mode by 00-02/00-03 =1.

2 Wire Operation Mode,

Set 00-04=【0/1】first, before setting (03-00, 03-04) to【0】or【1】

00-04=【0】, Set external terminals (03-00 to 03-05) function to 0 for FWD/Stop or Set to 1 for REV/Stop..

00-04=【1】, Set external terminals (03-00 to 03-05) function to 0 for Run/Stop or Set to 1 for FWD/REV

3 Wire Operation Mode,

00-04 =【2】Terminals S1, S2, S3 are used in a combination to enable 3 wire run/stop mode.

Settings for 03-00, 03-01, and 03–02 will not be effective... (Refer to group 03)

00-05	Main Frequency Command Source Selection
00-06	Alternative Frequency Source Selection
Range	【0】:Up/Down on Keypad 【1】:Potentiometer on Keypad 【2】:External AI1 Analog Signal Input 【3】:External AI2 Analog Signal Input 【4】:External Up/Down Frequency Control 【5】:Communication Setting Frequency 【6】:Reserved 【7】:Pulse Input

00-05/00-06= 0: Keypad

Use the keypad to enter the frequency reference or by setting parameter 05-01 (frequency reference 1). Note that once the frequency command is switched to alternative frequency reference and 00-06 is set to 0, the frequency can be adjusted using parameter 05-01.

00-05/00-06= 1: Potentiometer on Keypad

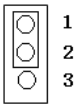
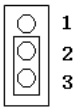
Use the keypad potentiometer to set frequency reference

00-05/00-06= 2, 3: External Analog Input AI1 / External Analog Input AI2

Set any of the multi-function terminals (03-00~03-05) to 13, to switch between main and alternate frequency.

Use analog reference from analog input AI1 or AI2 to set the frequency reference (as shown in Figure 4.3.4). Refer to parameter 04-00 to select the signal type.

		AI1	AI2	
04-00	Analog Input Signal Type Select (AI1/AI2)	(0): 0~10V (0~20mA)	0~10V (0~20mA)	
		(1): 0~10V (0~20mA)	2~10V (4~20mA)	**Factory Default**
		(2): 2~10V (4~20mA)	0~10V (0~20mA)	
		(3): 2~10V (4~20mA)	2~10V (4~20mA)	

JP2/JP3		External signal type selection	0~20mA / 4~20mA Analog signal
			0~10VDC / 2~10VDC Analog signal

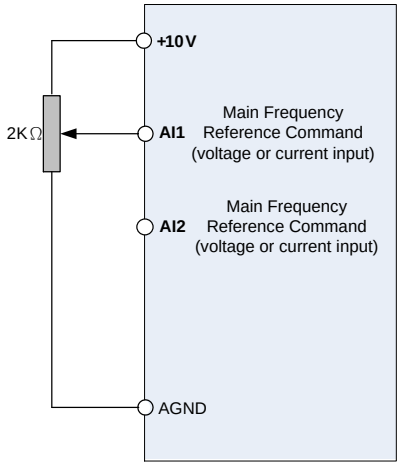


Figure 4.3.4 Analog input as main frequency reference command

00-05/00-06= 4: Terminal UP / DOWN

The inverter accelerates with the UP command closed and decelerates with the DOWN command closed. Please refer to parameter 03-00 ~ 03-05 for additional information.

Note: To use this function both the UP and DOWN command have to be set to any of the input terminals.

00-05/00-06= 5: Communication Control

The frequency reference command is set via the RS-485 communication port.

Refer to parameter group 9 for additional information.

00-05/00-06= 6: Reserved

00-05/00-06= 7: Pulse Input

Frequency reference from an external pulse input. Can be used only with multi-function input terminal S3 (03-02 = 25 or 26). See parameter group 3 multi-function input selections 25 and 26.

00-14	Acceleration Time 1
Range	【0.1~6000.0】Sec
00-15	Deceleration Time 1
Range	【0.1~6000.0】Sec

Notes:

- Acceleration time is the time required to accelerate from 0 to 100% of maximum output frequency.
- Deceleration time is the time required to decelerate from 100 to 0% of maximum output frequency.
- Maximum frequency is set by parameter 01-02.
- If parameter 01-00=18, Maximum output frequency is set by parameter 01-02.
- If parameter 01-00≠18, Maximum output frequency = 50.00 or 60.00 depending on initialization mode.

Actual acceleration and deceleration time is calculated as follows:

$$\text{Actual acceleration time} = \frac{\text{(00-14)x(set frequency - the minimum starting frequency)}}{\text{Maximum output frequency}}$$

$$\text{Actual deceleration time} = \frac{\text{(00-15)x(set frequency - the minimum starting frequency)}}{\text{Maximum output frequency}}$$

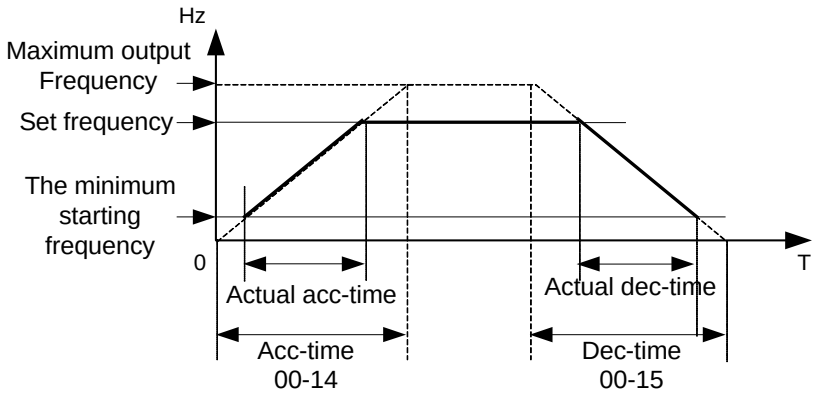


Figure 4.3.5 Acceleration / Deceleration Ramp

01-00	Volts/Hz Patterns
Range	【0~FF】

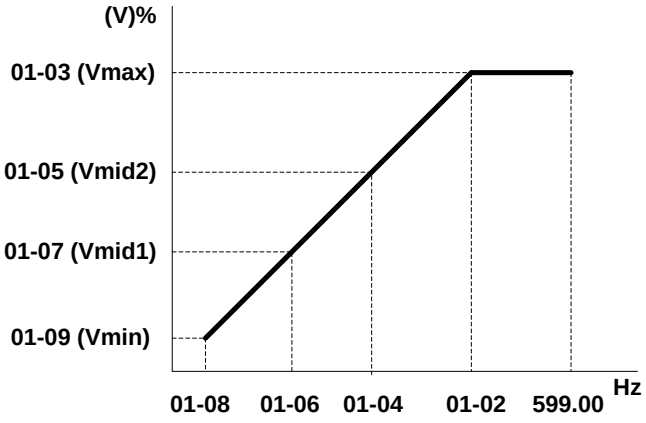
The V/F curve selection is enabled for V/F mode. Make sure to set the inverter input voltage parameter 01-14.

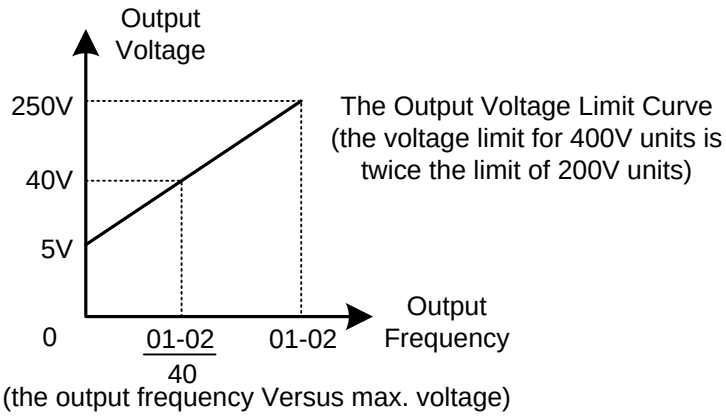
There are three ways to set V/F curve:
(1) 01-00 = 0 to 0E: choose any of the 15 predefined curves (0 to 17).
(2) 01-00 = 0F, use 01-02~01-09 and 01-12 ~ 01-13, with voltage limit
(2) 01-00 = FF, use 01-02~01-09 and 01-12 ~ 01-13, without voltage limit

The default parameters (01-02 ~ 01-09 and 01-12 ~ 01-13) are the same when 01-00 is set to 0F and 01-00 is set to 1 depending on the initialization mode.

Parameters 01-02 ~ 01-13 are automatically set when any of the predefined V/F curves are selected.

Consider the following items as the conditions for selecting a V/F pattern.
(1) The voltage and frequency characteristic of motor.
(2) The maximum speed of motor.





(the output frequency Versus max. voltage)

Note: Parameter 01-00 V/f Pattern setting is not affected by drive initializing (see parameter 13-08).

Table 4.3.1 2P5 - 2HP V/F curve selection (230V)

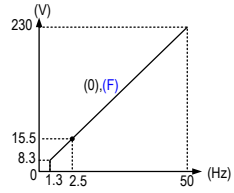
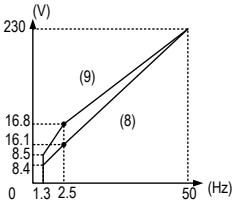
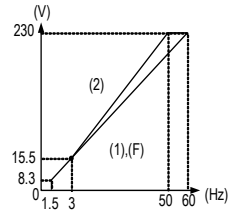
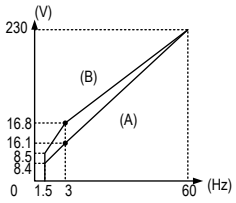
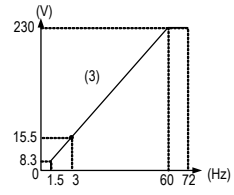
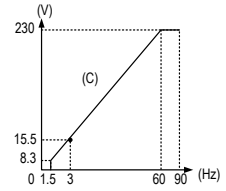
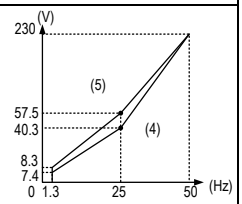
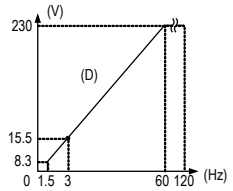
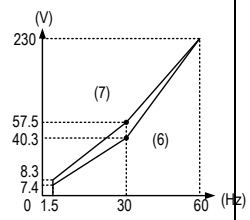
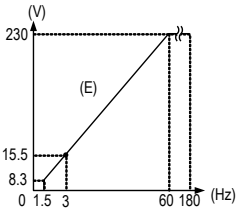
Type	Specification		01-00	V/F curve	Type	Specification		01-00	V/F curve
General application	50Hz		0		High Staring Torque‡	50Hz	Low Starting Torque	8	
			F (50Hz Default setting)				High Starting Torque	9	
	60Hz	60Hz Saturation	1			60Hz	Low Starting Torque	A	
			F (60Hz Default setting)						
		50Hz Saturation	2				Low Starting Torque	B	
Variable Torque Characteristic	72Hz		3		Constant-power torque (Reducer)	90Hz		C	
	50Hz	Variable Torque 1	4			120Hz		D	
		Variable Torque 2	5						
	60Hz	Variable Torque 3	6			180Hz		E	
		Variable Torque 4	7						

Table 4.3.2 3 - 30HP V/F curve selection (230V)

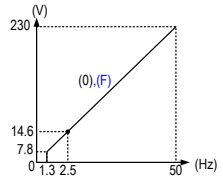
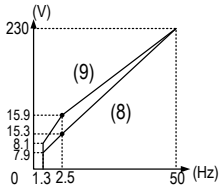
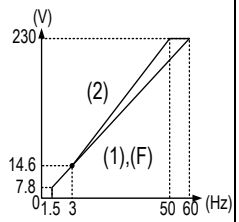
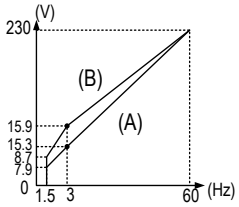
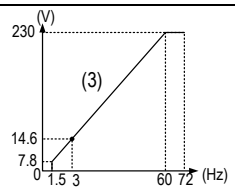
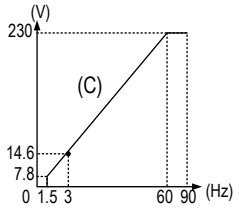
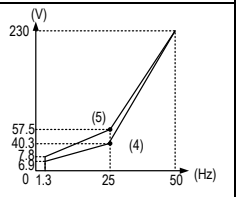
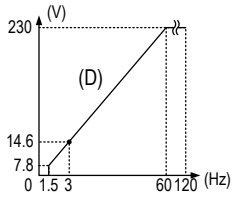
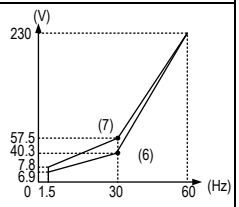
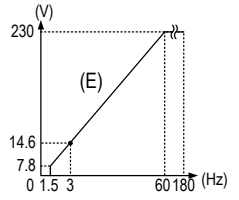
Type	Specification		01-00	V/F curve	Type	Specification		01-00	V/F curve
General application	50Hz		0		High Staring Torque‡	50Hz	Low Starting Torque	8	
			F (50Hz Default setting)				High Starting Torque	9	
	60Hz	60Hz Saturation	1			60Hz	Low Starting Torque	A	
			F (60Hz Default setting)						
		50Hz Saturation	2				Low Starting Torque	B	
Variable Torque Characteristic	72Hz		3		Constant-power torque (Reducer)	90Hz		C	
	50Hz	Variable Torque 1	4			120Hz		D	
		Variable Torque 2	5						
	60Hz	Variable Torque 3	6			180Hz		E	
		Variable Torque 4	7						

Table 4.3.3 40HP and above V/F curve selection (230V)

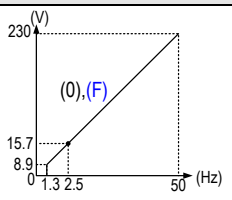
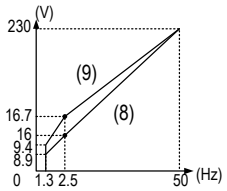
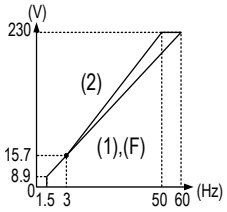
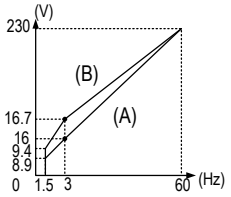
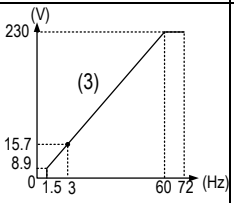
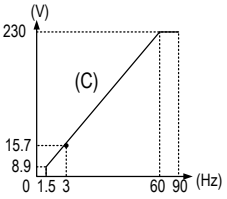
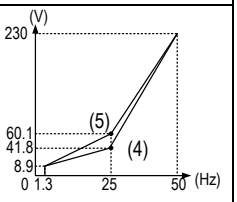
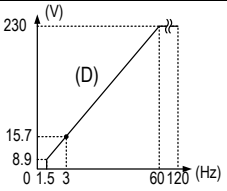
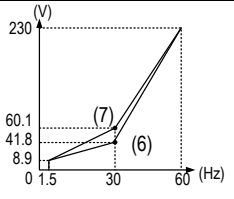
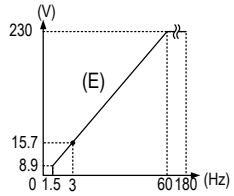
<table>
<tr><th>Type</th><th colspan="2">Specification</th><th>01-00</th><th>V/F curve</th><th>Type</th><th colspan="2">Specification</th><th>01-00</th><th>V/F curve</th></tr>
<tr><td rowspan="4">General application</td><td colspan="2" rowspan="2">50Hz</td><td>0</td><td rowspan="2"> 
</td><td rowspan="4">High Staring Torque‡</td><td rowspan="2">50Hz</td><td>Low Starting Torque</td><td>8</td><td rowspan="2"> 
</td></tr>
<tr><td>F (50Hz Default setting)</td><td>High Starting Torque</td><td>9</td></tr>
<tr><td rowspan="2">60Hz</td><td>60Hz Saturation</td><td>1
F (60Hz Default setting)</td><td rowspan="2"> 
</td><td rowspan="2">60Hz</td><td>Low Starting Torque</td><td>A</td><td rowspan="2"> 
</td></tr>
<tr><td>50Hz Saturation</td><td>2</td><td>Low Starting Torque</td><td>B</td></tr>
<tr><td rowspan="5">Variable Torque Characteristic</td><td colspan="2">72Hz</td><td>3</td><td> 
</td><td rowspan="5">Constant-power torque (Reducer)</td><td colspan="2">90Hz</td><td>C</td><td> 
</td></tr>
<tr><td rowspan="2">50Hz</td><td>Variable Torque 1</td><td>4</td><td rowspan="2"> 
</td><td colspan="2">120Hz</td><td>D</td><td> 
</td></tr>
<tr><td>Variable Torque 2</td><td>5</td><td colspan="2">180Hz</td><td>E</td></tr>
<tr><td rowspan="2">60Hz</td><td>Variable Torque 3</td><td>6</td><td rowspan="2"> 
</td><td rowspan="2"> 
</td></tr>
<tr><td>Variable Torque 4</td><td>7</td></tr>
</table>

Table 4.3.4 2P5 - 2HP V/F curve selection (460V)

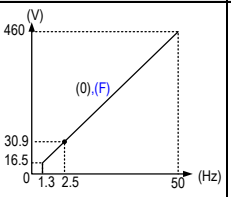
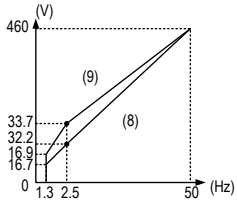
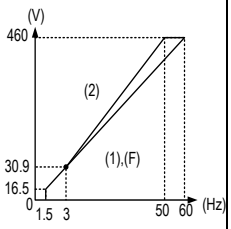
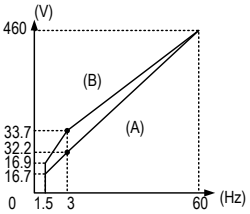
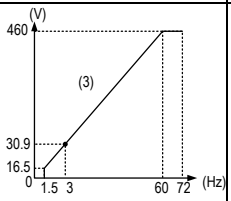
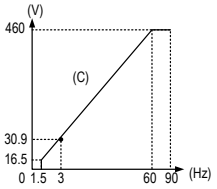
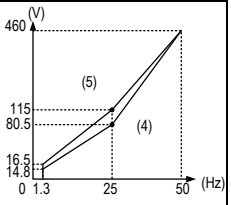
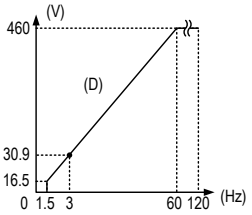
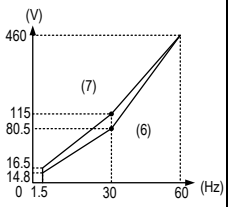
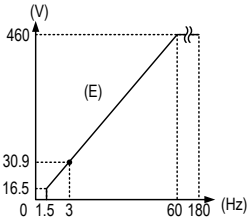
Type	Specification		01-00	V/F curve	Type	Specification		01-00	V/F curve
General application	50Hz		0		High Staring Torque+	50Hz	Low Starting Torque	8	
			F (50Hz Default setting)				High Starting Torque	9	
	60Hz	60Hz Saturation	1			60Hz	Low Starting Torque	A	
			F (60Hz Default setting)						
		50Hz Saturation	2				Low Starting Torque	B	
Variable Torque Characteristic	72Hz		3		Constant-power torque (Reducer)	90Hz		C	
	50Hz	Variable Torque 1	4			120Hz		D	
		Variable Torque 2	5						
	60Hz	Variable Torque 3	6			180Hz		E	
		Variable Torque 4	7						

Table 4.3.5 3 - 30HP V/F curve selection (460V)

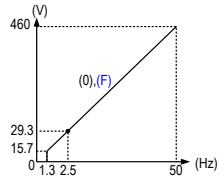
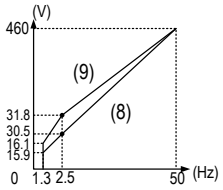
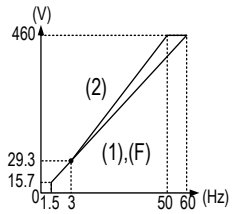
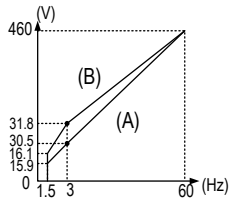
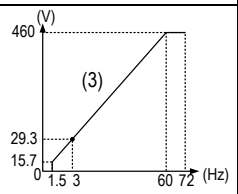
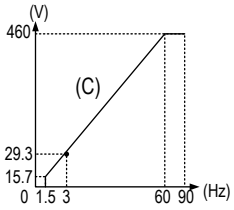
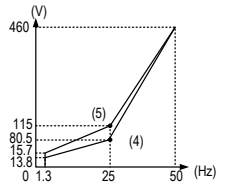
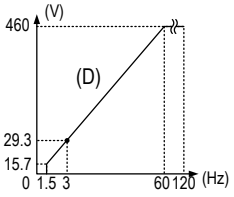
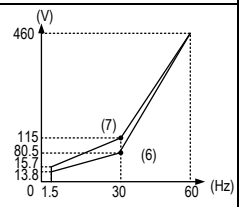
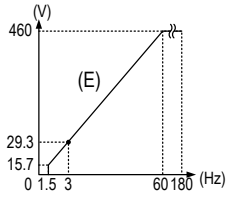
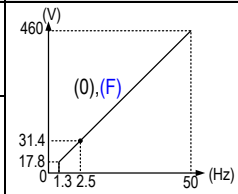
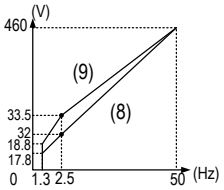
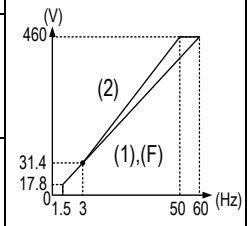
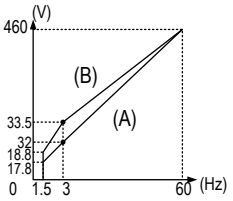
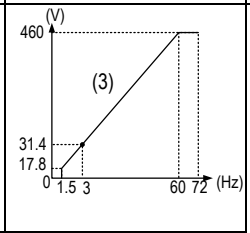
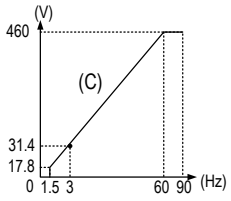
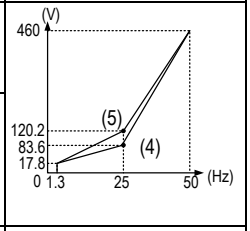
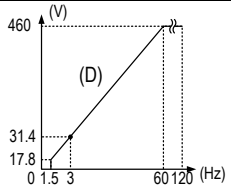
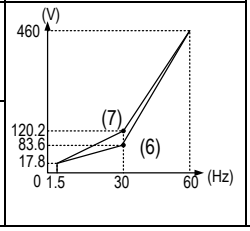
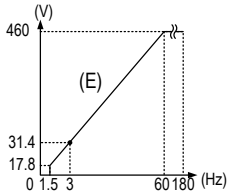
Type	Specification		01-00	V/F curve	Type	Specification		01-00	V/F curve
General application	50Hz		0		High Staring Torque++	50Hz	Low Starting Torque	8	
			F (50Hz Default setting)				High Starting Torque	9	
	60Hz	60Hz Saturation	1			60Hz	Low Starting Torque	A	
			F (60Hz Default setting)						
		50Hz Saturation	2				Low Starting Torque	B	
Variable Torque Characteristic	72Hz		3		Constant-power torque (Reducer)	90Hz		C	
	50Hz	Variable Torque 1	4			120Hz		D	
		Variable Torque 2	5						
	60Hz	Variable Torque 3	6			180Hz		E	
		Variable Torque 4	7						

Table 4.3.6 40HP and above V/F curve selection (460V)

Type	Specification		01-00	V/F curve	Type	Specification		01-00	V/F curve
General application	50Hz		0		High Staring Torque‡	50Hz	Low Starting Torque	8	
			F (50Hz Default setting)				High Starting Torque	9	
	60Hz	60Hz Saturation	1			60Hz	Low Starting Torque	A	
			F (60Hz Default setting)						
		50Hz Saturation	2				Low Starting Torque	B	
Variable Torque Characteristic	72Hz		3		Constant-power torque (Reducer)	90Hz		C	
	50Hz	Variable Torque 1	4			120Hz		D	
		Variable Torque 2	5						
	60Hz	Variable Torque 3	6			180Hz		E	
		Variable Torque 4	7						

01-02	Base frequency of motor 1
Range	【4.8~599.0】Hz
01-03	**Maximum output voltage of motor 1**
Range	200V:【0.1~255.0】V 400V:【0.2~510.0】V
01-04	**Middle output frequency 2 of motor 1**
Range	【0.0~599.0】Hz
01-05	**Middle output voltage 2 of motor 1**
Range	200V:【0.0~255.0】V 400V:【0.0~510.0】V
01-06	**Middle output frequency 1 of motor 1**
Range	【0.0~599.0】Hz
01-07	**Middle output voltage 1 of motor 1**
Range	200V:【0.0~255.0】V 400V:【0.0~510.0】V
01-08	**Minimum output frequency of motor 1**
Range	【0.0~599.0】Hz
01-09	**Minimum output voltage of the motor 1**
Range	200V:【0.0~255.0】V 400V:【0.0~510.0】V
01-12	**Base frequency of motor 1**
Range	【4.8~599.0】Hz
01-13	**Base output voltage of motor 1**
Range	200V:【0.0~255.0】V 400V:【0.0~510.0】V

V/F curve setting (01-02~01-09 and 01-12~01-13)

Select any of the predefined V/F curves setting ‘0’ to ‘E’ that best matches your application and the load characteristic of your motor, choose a custom curve setting ‘F’ or ‘FF’ to set a custom curve.

Important:

Improper V/F curve selection can result in low motor torque or increased current due to excitation.

For low torque or high speed applications, the motor may overheat. Make sure to provide adequate cooling when operating the motor under these conditions for a longer period of time.

If the automatic torque boost function is enabled (parameter 01-10), the applied motor voltage will automatically change to provide adequate motor torque during start or operating at low frequency.

03-00	**Multi-function input terminal S1**
03-01	**Multi-function input terminal S2**
03-02	**Multi-function input terminal S3**
03-03	**Multi-function input terminal S4**
03-04	**Multi-function input terminal S5**
03-05	**Multi-function input terminal S6**
Range	【0】: Forward/Stop command 【1】: Reverse/Stop command 【2】: Multi-speed/position setting command 0 【3】: Multi-speed/position setting command 1 【4】: Multi-speed/position setting command 2 【5】: Multi-speed/position setting command 3 【6】: Forward jog run command 【7】: Reverse jog run command 【8】: UP frequency increasing command 【9】: DOWN frequency decreasing command 【10】: Acceleration/deceleration time selection 2 【11】: Inhibit Acceleration/deceleration command 【12】: Main/ Alternative Run Switch Function 【13】: Main/ Alternative Frequency Switch Function 【14】: Emergency Stop (decelerate to zero and stop) 【15】: External Baseblock Command(rotation freely to stop) 【16】: PID control disable 【17】: Fault reset (Reset) 【18】: Auto Run Mode Enable 【19】: Speed Search (from the maximum frequency) 【20】: Energy Saving (V/F mode only) 【21】: Reset PID Integral Value to Zero 【22】: Counter Input 【23】: Counter Reset 【24】: PLC Input 【25】: Pulse-In Width Measure(S3) 【26】: Pulse-In Frequency Measure (S3) 【27】: Local/Remote Selection 【28】: Remote Mode Selection 【29】: Jog Frequency Selection 【33】: DC Braking 【34】: Speed Search 2 (From The Frequency Command) 【40】: Switching Between Motor 1/Motor 2 【47】: Fire Mode (Forced Operation Mode) 【48】: KEB Acceleration 【65】: Short-Circuit Breaking

Refer to the multi-function digital input and parameters in the following Figure 4.3.6

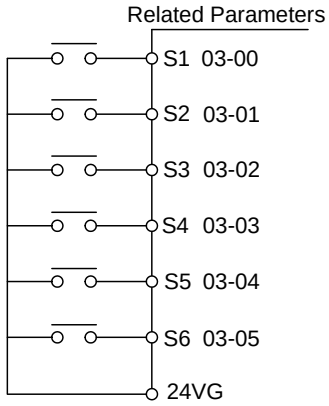


Figure 4.3.6 Multi-function digital input and related parameters

Table 4.3.27 Multi-function digital input setting (03-00 to 03-05) ("O":Enable, "X":Disable)

Value	Function		Description	Control Mode		
	Name	LCD Display		V/F	SLV	PM SLV
0	Forward/Stop command	2-Wire (FWD-RUN)	2- wire Forward/Stop command (ON: Forward operation command).	O	O	O
1	Reverse/Stop command	2-Wire (REV-RUN)	2- wire Reverse/Stop command (ON: Reverse operation command).	O	O	O
2	Multi-speed/position setting command 0	Muti-Spd/Pos Ref 0	Multi-Speed Reference / Position Reference 0	O	O	O
3	Multi-speed/position setting command 1	Muti-Spd/Pos Ref 1	Multi-Speed Reference / Position Reference 1	O	O	O
4	Multi-speed/position setting command 2	Muti-Spd/Pos Ref 2	Multi-Speed Reference / Position Reference 2	O	O	O
5	Multi-speed/position setting command 3	Muti-Spd/Pos Ref 3	Multi-Speed Reference / Position Reference 3	O	O	O
6	Forward jog run command	FJOG	ON: Forward operation in jog mode (00-18).	O	O	O
7	Reverse jog run command	RJOG	ON: Reverse operation in jog mode (00-18).	O	O	O
8	UP frequency increasing command	UP command	ON: Increase output frequency (Up/Down Function, only active when DOWN command is programmed).	O	O	O
9	DOWN frequency decreasing command	DOWN command	ON: Decrease output frequency (Up/Down Function, only active when ON command is programmed).	O	O	O
10	Acceleration/deceleration time selection 2	Acc/Decel Time Selection 1	Acceleration/deceleration time selection command 1	O	O	O
11	Inhibit Acceleration /deceleration command	ACC/DEC Inhibit	ON: Acceleration/ deceleration prohibition	O	O	O
12	Main/ Alternative Run Switch Function	Run Change Sel	Run Command Source is set in parameter of alternative frequency command (00-03)	O	O	O
13	Main/ Alternative Frequency Switch Function	Freq Change Sel	Frequency Command Source is set in parameter of alternative frequency command (00-06)	O	O	O

Value	Function		Description	Control Mode		
	Name	LCD Display		V/F	SLV	PM SLV
14	Emergency Stop (decelerate to zero and stop)	E-Stop	ON: Emergency stop active	O	O	O
15	External Baseblock Command (rotation freely to stop)	Ext. BB	ON: Base block active	O	O	O
16	PID control disable	PID Disable	ON: PID control disabled	O	O	O
17	Fault reset (Reset)	Fault Reset	ON: Fault reset	O	O	O
18	Auto Run Mode Enable		ON: Auto run mode enabled (06-00)	-	-	-
19	Speed Search (from the maximum frequency)	Speed Search 1	ON: Speed search from the maximum output frequency	O	O	X
20	Energy Saving	Energy saving	ON: Manual energy saving control is based on the settings of 11-12 and 11-18.	O	X	X
21	Reset PID Integral Value to Zero	PID I-Reset	ON:PID integral reset	O	O	O
22	Counter Input	Cnt Input	ON: Counter input by digital input	O	O	O
23	Counter Reset	Cnt Reset	ON: Counter input by digital input	O	O	O
24	PLC Input	PLC Input	ON:PLC input	O	O	O
25	Pulse-In Width Measure (S3)	Pulse Input-Width Measure	ON: Switch to pulse width measurement	O	O	O
26	Pulse-In Frequency Measure (S3)	Pulse Input-Frequency Measure	ON: Switch to pulse frequency measurement	O	O	O
27	Local/Remote Selection	Local/Remote	ON: Local mode (via the digital operator) OFF: Frequency command and operation command will be determined according to the setting of parameter (00-02 and 00-05).	O	O	O
28	Remote Mode Selection	Remote Mode Sel	ON: RS-485 communication control active OFF: Control circuit terminal active	O	O	O
29	Jog Frequency Selection	JOG Freq sel	ON: Jog Frequency Active	O	O	O
30	Reserved	Reserved	Reserved	-	-	-
31	Reserved	Reserved	Reserved	-	-	-
32	Reserved	Reserved	Reserved	-	-	-
33	DC Braking	DC Brake Command	ON: DC braking active	O	O	O
34	Speed Search 2 (From The Frequency Command)	Speed Search 2	ON: Speed search from set frequency	O	O	X
35	Reserved	Reserved	Reserved	-	-	-
36	Reserved	Reserved	Reserved	-	-	-
37	Reserved	Reserved	Reserved	-	-	-
38	Reserved	Reserved	Reserved	-	-	-
39	Reserved	Reserved	Reserved	-	-	-
40	Switching Between Motor 1/Motor 2	Motor 2 Switch	ON: Start motor 2	O	O	X
41	Reserved	Reserved	Reserved	-	-	-
42	Reserved	Reserved	Reserved	-	-	-

Value	Function		Description	Control Mode		
	Name	LCD Display		V/F	SLV	PM SLV
43	Reserved	Reserved	Reserved	-	-	-
44	Reserved	Reserved	Reserved	-	-	-
45	Reserved	Reserved	Reserved	-	-	-
46	Reserved	Reserved	Reserved	-	-	-
47	Fire Mode (Forced Operation Mode)	Fire Mode	ON: Fire Mode Active (disables hardware and software fault /alarm protection and runs inverter at 08-17 frequency).	O	O	O
48	KEB Acceleration	KEB Accel.	ON:KEB acceleration start	O	O	O
49	Reserved	Reserved	Reserved	-	-	-
50	Reserved	Reserved	Reserved	-	-	-
51	Reserved	Reserved	Reserved	-	-	-
52	Reserved	Reserved	Reserved	-	-	-
53	Reserved	Reserved	Reserved	-	-	-
54	Reserved	Reserved	Reserved	-	-	-
55	Reserved	Reserved	Reserved	-	-	-
56	Reserved	Reserved	Reserved	-	-	-
57	Reserved	Reserved	Reserved	-	-	-
58	Reserved	Reserved	Reserved	-	-	-
59	Reserved	Reserved	Reserved	-	-	-
60	Reserved	Reserved	Reserved	-	-	-
61	Reserved	Reserved	Reserved	-	-	-
62	Reserved	Reserved	Reserved	-	-	-
63	Reserved	Reserved	Reserved	-	-	-
64	Reserved	Reserved	Reserved	-	-	-
65	Short-Circuit Breaking	SC Brk	ON: Short-Circuit Breaking turn on	X	X	O

(1) 2-wire control forward operation (03-0X=00)
(2) 2-wire control: reverse operation (03-0X=01)
(3) Multi-speed/position setting command 1 (03-0X=02)
(4) Multi-speed/position setting command 2 (03-0X=03)
(5) Multi-speed/position setting command 3 (03-0X=04)
(6) Multi-speed/position setting command 4 (03-0X=05)
(7) Jog frequency selection, select frequency reference using the multi-function digital input. (03-0X=29)

Table 4.3.7 Multi-speed operation selection

Speed	Multi-function digital input (S1 to S6)*1					Frequency selection
	Jog frequency reference	Multi-speed frequency 3	Multi-speed frequency 2	Multi-speed frequency 1	Multi-speed frequency 0	
1	0	0	0	0	0	Frequency command 0(05-01) or main speed frequency *2
2	0	0	0	0	1	Frequency command 1 (05-02) *3
3	0	0	0	1	0	Frequency command 2 (05-03)
4	0	0	0	1	1	Frequency command 3 (05-04)
5	0	0	1	0	0	Frequency command 4 (05-05)
6	0	0	1	0	1	Frequency command 5 (05-06)
7	0	0	1	1	0	Frequency command 6 (05-07)
8	0	0	1	1	1	Frequency command 7 (05-08)
9	0	1	0	0	0	Frequency command 8 (05-09)
10	0	1	0	0	1	Frequency command 9 (05-10)
11	0	1	0	1	0	Frequency command 10(05-11)
12	0	1	0	1	1	Frequency command 11 (05-12)
13	0	1	1	0	0	Frequency command 12 (05-13)
14	0	1	1	0	1	Frequency command 13(05-14)
15	0	1	1	1	0	Frequency command 14 (05-15)
16	0	1	1	1	1	Frequency command 15 (05-16)
17	1*1	—	—	—	—	Jog frequency command (00-18)

“0”:OFF, “1”:ON, “-“:Ignore

*1: Jog frequency terminal has a higher priority than multi-speed reference 1 to 4.

*2: When parameter 00-05=0 (frequency reference input = digital operator), multi-speed frequency 1 will be set by 05-01 frequency reference setting1). When parameter 00-05=1 (frequency reference input=control circuit terminal), multi-speed frequency command 1 is input through analog command terminal AI1 or AI2).

*3: Multi-speed operation is disabled when PID is enabled.

Wiring Example:
Figure 4.3.7 and 4.3.8 is the example of a 9 speed operation selection

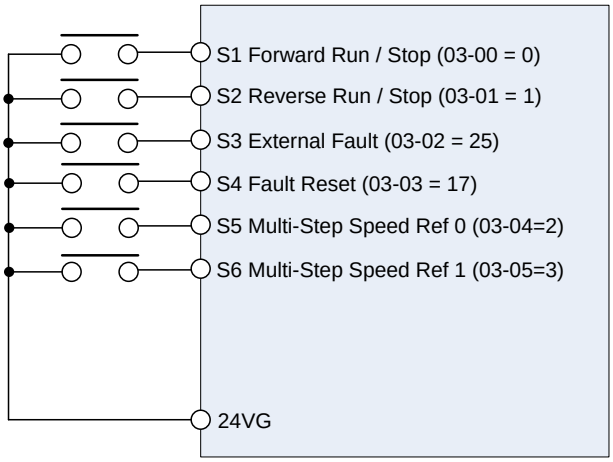


Figure 4.3.7 Control Terminal Wiring Example

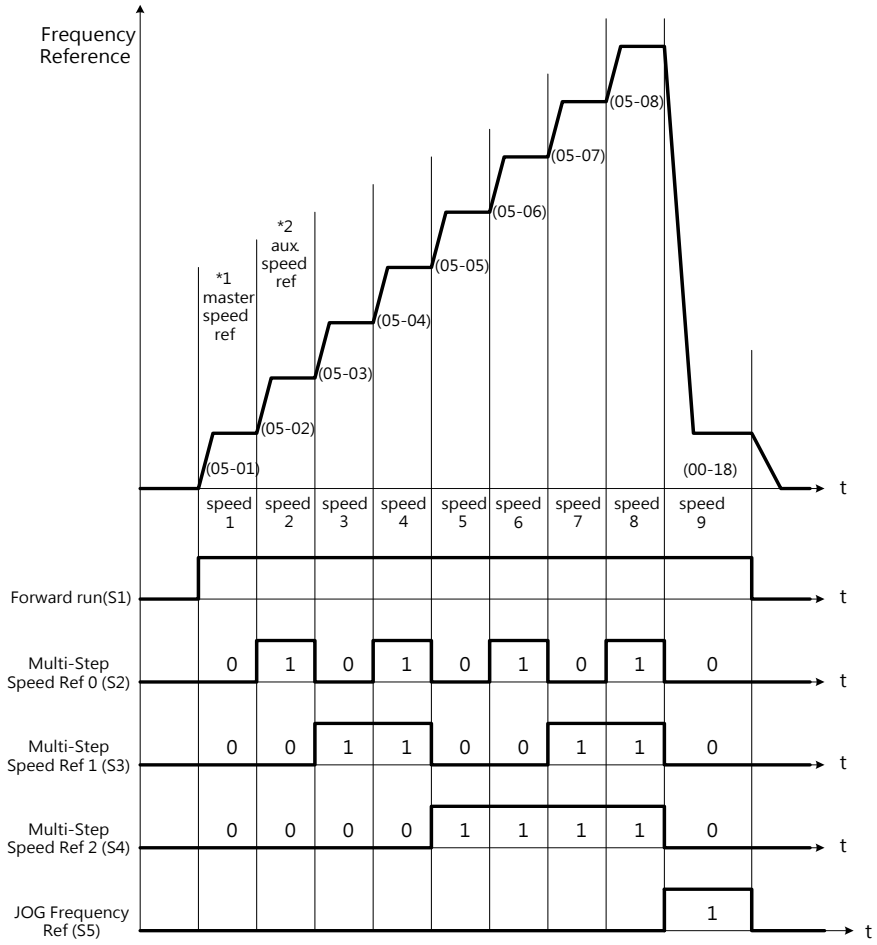


Figure 4.3.8 9-speed timing diagram

*1: **00-05=1**, multi-speed frequency reference is set by analog input AI1 or AI2.
00-05=0, multi-speed frequency reference is set by 05-01.

03-0X =06: Forward jog run command, uses jog frequency parameter 00-18.

Note:

- Jog command has a higher priority than other frequency reference commands.
- Jog command uses stop mode set in parameter 07-09 when Jog command is active > 500ms.

03-0X =07: Reverse jog run command, uses jog frequency parameter 00-18.

03-0X =08: UP frequency command

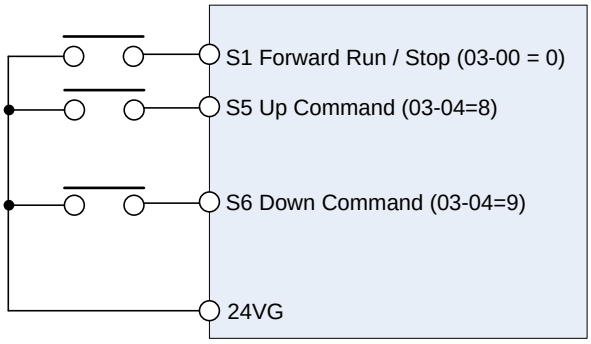
03-0X =09: Down frequency command

Inverter can use the digital operator and external digital input (S1~S6) to increase or decrease output frequency while motor is running. To use the external digital inputs are used to perform UP/DOWN, set 00-02=1, 00-05=4 and 03-0X=8 and 9, this function requires both UP and DOWN functions 08 and 09 to be programmed to two of the digital input terminals.

UP/DOWN frequency command follows the standard acceleration and deceleration times
SE02 DI terminal error will be displayed when:

- When only one UP or DOWN command is programmed for the digital inputs.
- When DOWN command and Inhibit Acceleration/deceleration commands are activate simultaneously.
- When UP command and Inhibit Acceleration/deceleration commands are active simultaneously.

For an example of UP/DOWN control wiring and operation, please refer to Figure 4.3.9 and Figure 4.3.10.



UP Command (Terminal S5)	1	0	0	1
Down Command (Terminal S6)	0	1	0	1
Operation	Accel (UP)	Decel (DWN)	Hold	Hold

Figure 4.3.9 UP/DOWN wiring and operation example

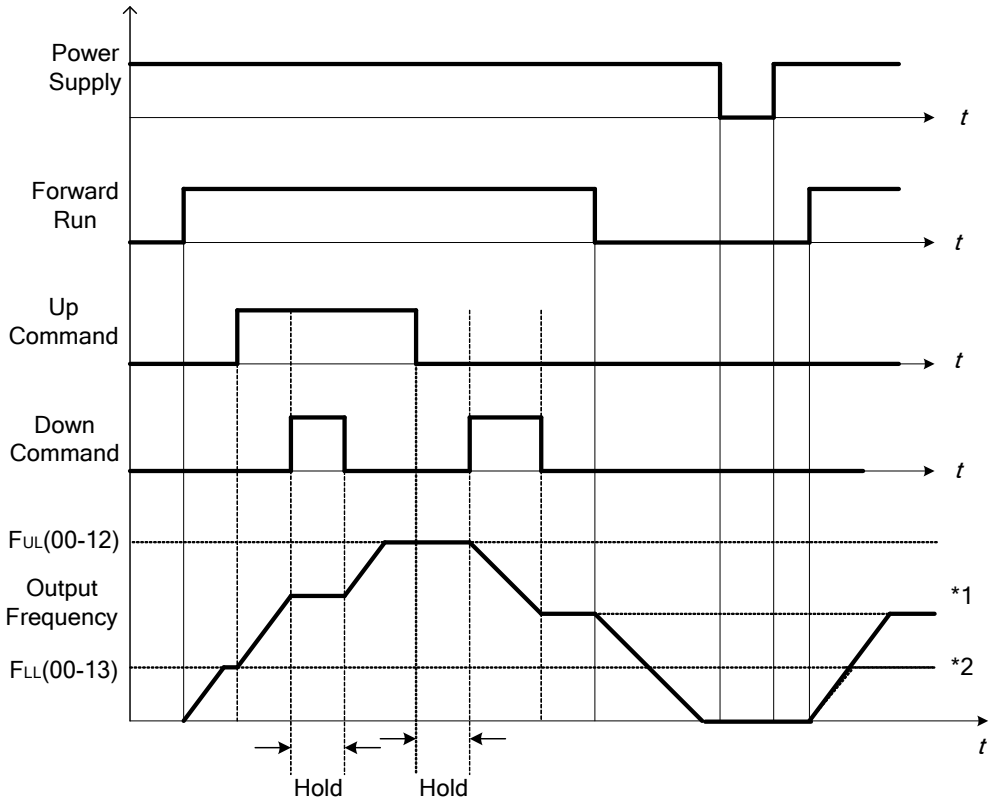


Figure 4.3.10 UP / DOWN command timing diagram

UP / DOWN Command Operation

When the Forward Run command is active and the UP or Down command is momentarily activated the inverter will accelerate the motor up to the lower limit of the frequency reference (00-13).

When using the UP / Down command, the output frequency is limited to the upper limit of frequency reference (00-12) and the lower limit of frequency reference (00-13).

The UP / DOWN command uses acceleration 1 or 2 / deceleration time 1 or 2 for normal operation Tacc1 / Tdec1 (00-14, 00-15) or Tacc2 / Tdec 2 (00-16, 00-17).

03-0X =10: Acceleration/deceleration 1 selection

03-0X =30: Acceleration/deceleration 2 selection
Refer to the "multi-function digital input terminals select acceleration / deceleration time"

03-0X =11: Inhibit Acceleration/deceleration command (hold command)

When activated suspends the acceleration / deceleration operation and maintains the output frequency at current level.
Operation of inhibit Acceleration/deceleration function, please refer Figure 4.3.11.

The frequency reference value is saved when the acceleration/deceleration inhibit command is active and the frequency reference value is saved even when powering down the inverter.

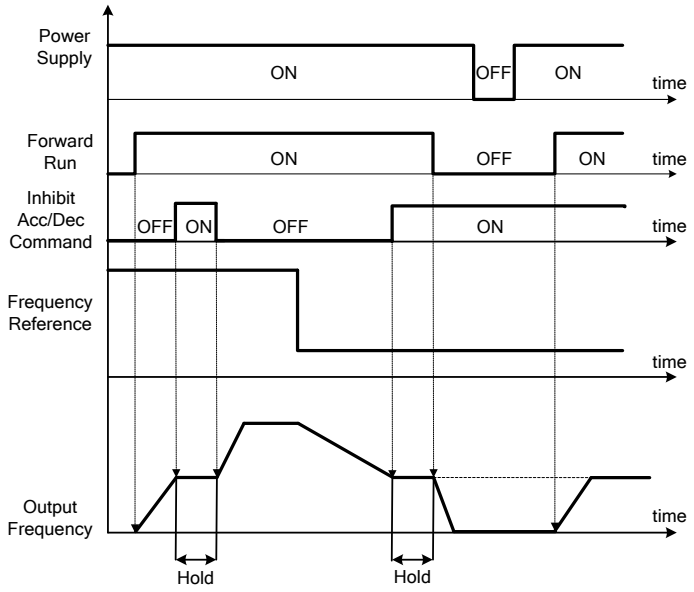


Figure 4.3.11 Inhibit acceleration / deceleration command operation

03-0X =12: Main / Alternative Run Switch Function

When active, run command source is set to the alternative run command (00-03).
Note: Digital input function 27 (Local/ Remote control selection) has a higher priority than the main/alternative run switch.

03-0X =13: Main/ Alternative Frequency Switch Function

When active, frequency command source is set to the alternative frequency command (00-06). When PID function is active (10-03=XXX1B), this function is disabled and the frequency reference is set by the PID function.
Note: Digital input function 27 (Local/ Remote control selection) has a higher priority than the main/alternative run switch.

03-0X =14: Emergency stop (decelerate to zero and stop)
Refer to the "deceleration time of emergency stop" of parameter 00-26

03-0X =15: External Baseblock Command (coast to stop)
When active the inverter output is turned off.

During run: When an external base block command is activated, the keypad displays "BBn BaseBlock (Sn)", indicating the inverter output is turned off (n indicates the digital input number 1 – 6). Upon removing the base block signal, the motor will run at the frequency reference. If speed search from frequency reference is active the inverter output frequency starts from the frequency reference and searches for the coasting motor speed and continue to operate. If speed search is not active the output frequency starts at 0Hz.

During deceleration: When an external base block command is activated, the keypad displays "BBn BaseBlock (Sn)", indicating the inverter output is turned off (n indicates the digital input number 1 – 6). Upon removing the base block signal, the motor is stopped or will coast to a stop and the inverter remains in the stop condition.

During acceleration: When an external base block command is activated, the keypad displays "BBn BaseBlock (Sn)", indicating the inverter output is turned off (n indicates the digital input number 1 – 6). Upon removing the base block signal, the motor will run at the frequency reference. If speed search from frequency reference is active the inverter output frequency starts from the frequency reference and searches for the coasting motor speed and continue to operate. If speed search is not active the output frequency starts at 0Hz.

Please refer Figure 4.3.12 for external base block operation。

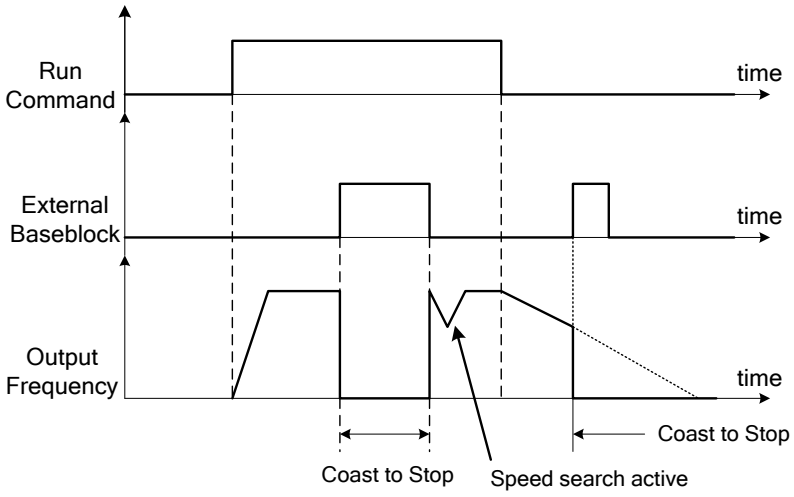


Figure 4.3.12 External base block operation

03-0X =16: PID control disabled.

03-0X =17: Fault reset

When the inverter trips on a fault the fault output contact is activated, the inverter output is turned off (base block) and the keypad displays a dedicated fault message.

The following options are available to reset a fault:

1. Program one of the multi-function digital inputs (03-00 to 03-05) to 17 (reset fault) and activate input.*****
2. Press the reset key of the digital operator (RESET).*****
3. Cycle power to the inverter. ***Important Note:*** If a run command is active during power-up, the inverter will start running automatically.

***** To reset an active fault the run command has to be removed.

03-0X =18: Auto run mode enable

When active auto run mode function is enabled, please refer to group 06 for more information.

03-0X =19: Speed Search 1 (from the maximum frequency).

03-0X =34: Speed Search 2 (from the frequency command).

Refer to the "speed search" function.

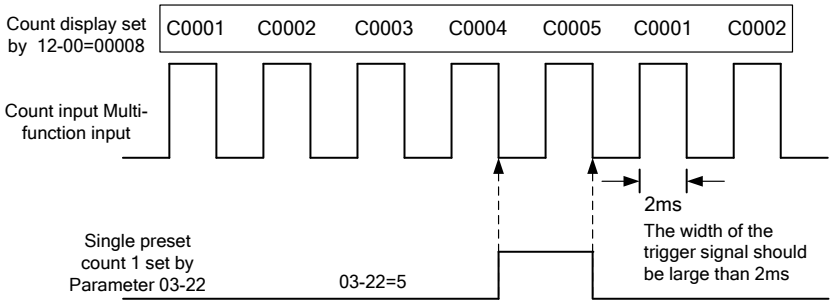
03-0X =20: Energy saving enabled

Manual energy savings function is set with parameters 11-12 and 11-18.

03-0X =21: PID integral reset

03-0X =22: Counter Input 1

When input goes from OFF to ON the counter value increased by '1',



03-0X =23: Counter Reset

When active counter is reset to 0 and the inverter display shows "C0000". Deactivate the counter reset input to enable counter.

03-0X =24: PLC Input

It is required to be with the software of Drive Link. PLC software program conducts the ladder diagram editing. When the signal output conducts, it will be transmitted to the inverter to be active.

03-0X =25: Pulse Width Measurement

Can only be used for terminal S3 (03-02=25) for pulse width measurement functions.

To following parameters have to be set to use the pulse width function.
00-05=7: Pulse with speed control
03-02=25: Pulse input width measure
03-27=0.05 ~ 25 kHz: pulse input frequency
03-28=100.0 ~ 1000.0%: pulse input gain setting
Inverter reference frequency= Duty cycle x (00-12) x (03-28) Hz, and below the frequency upper limit

Note: In this mode, the frequency range of pulse input is 0.01 ~ 0.20 kHz.

Example:
To use the pulse input as a speed reference set the following parameters:
00=05=7, 03-0X=26 · X=0~6 (except select 2), 03-27=pulse input frequency
03-28=100.0 (adjust as required)

Pulse input frequency is 200Hz, set 03-27=0.20kHz.

Example 1:
Pulse input frequency is 200Hz (03-27=0.20), duty cycle is 50%, frequency upper limit is 50Hz (00-12=50.00), and 03-28=100.0. Inverter reference frequency is 50% x 50.00=25.00Hz

Example 2:
Pulse input frequency is 200Hz (03-27=0.20), duty cycle is 30%, frequency upper limit is 50Hz (00-12=50.00), and 03-28=200.0. Inverter reference frequency is 30% x 50.00 x 2=30.00Hz

Example 3:
Pulse input frequency is 200Hz (03-27=0.20), duty cycle is 15%, frequency upper limit is 599Hz (00-12=599.00), and 03-28=500.0. Inverter reference frequency is 15% x 599.00 x 5.00=499.25Hz

Note:
The examples are based on the digital inputs set for NPN input configuration. To use PNP, the relationship between duty cycle and inverter reference frequency is inverted, so 20% duty cycle translates to 80% inverter reference frequency.

03-0X =26: Pulse Input Frequency

To following parameters have to be set to use the Pulse Input Frequency function.
00-05=7: Pulse with speed control
03-02=26: Pulse input frequency
03-28=100.0 ~ 1000.0%: pulse input gain setting
Inverter reference frequency= (Pulse input frequency) x (03-28) Hz, reference frequency limit is the inverter frequency upper limit

Example 1:
Pulse input frequency is 20Hz, frequency upper limit is 50Hz (00-12=50.00), and 03-28=100.0, Inverter reference frequency is 20.00Hz.

Example 2:
Pulse input frequency is 50Hz, frequency upper limit is 50Hz (00-12=50.00), and 03-28=100.0, Inverter reference frequency is 50.00Hz.

Example 3:
Pulse input frequency is 55Hz, frequency upper limit is 50Hz (00-12=50.00), and 03-28=100.0, Inverter reference frequency is 50.00Hz.

Example 4:
Pulse input frequency is 599Hz, frequency upper limit is 599Hz (00-12=599.00), and 03-28=20.0, Inverter reference frequency is 599 x 0.2 = 119.9Hz

Notes:

- Pulse Input frequency range is 0.05~25.00 kHz.
- Only terminal S3 can be used for pulse input.

Digital Inputs configured for PNP: (set switch JP1 to PNP)
The pulse output terminal (Y0) of PLC needs to connect to S3 terminal of inverter.
The common terminal of the pulse generator (e.g. PLC) output needs to be connected to the +24V terminal of the inverter.

Digital Inputs configured for NPN: (set switch JP1 to NPN)
The pulse output terminal (Y0) of PLC needs to connect to S3 terminal of inverter.
The common terminal of the pulse generator (e.g. PLC) output needs to be connected to the COM terminal of the inverter.

03-0X =27: Local / Remote selection.

Switch the inverter frequency reference source between Local (keypad) or Remote (control circuit terminals or RS485). Use parameter 00-05 (Main frequency command source selection) and 00-02 (Run command selection) to select the remote source.

Note: In 3-wire operation terminal S1 and S2 are reserved for run/stop operation and the Local / Remote function can only be set to digital input terminals S3 to S6 (03-02 to 03-05).

Note: To switch between local and remote the inverter has to be stopped.

Input	Mode	Frequency Reference / Run/Stop Command Source
ON	Local	- Frequency reference and Run-Stop from keypad. - LEDs SEQ and REF are off.
OFF	Remote	- Frequency reference source selected by parameter 00-05 and Run-Stop source selected by parameter 00-02. - LEDs SEQ and REF are on.

03-0X =28: Local/Remote selection

Switch between terminal source and communication (RS-422/RS-485) source for frequency reference and operation command.

In Remote mode, indicators of SEQ and REF are on; you can use terminals AI1 and AI2 to control the frequency command, and use terminals S1, S2 or communication terminal RS-485 to control the operation command.

Input	Mode	Frequency Reference / Run/Stop Command Source
ON	Communication	- Frequency reference and run/stop command control via communication (RS-422/RS-485).
OFF	Terminal	- Frequency reference source from AI1 / AI2 input (00-05=1) and Run-Stop command from terminals S1 / S2 (00-02=1).

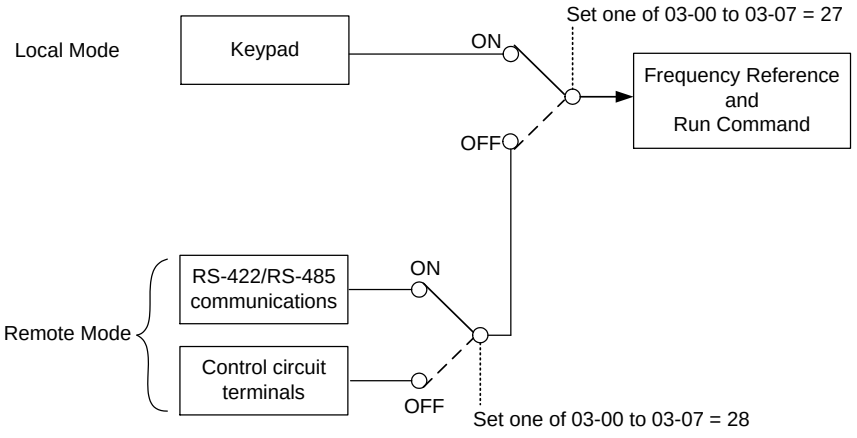


Figure 4.3.13 Remote mode operation selection

03-0X =29: Jog Frequency Selection

When jog frequency selection is on, the inverter will depend on the parameter 00-18 (jog frequency) as the command.

03-0X =33: DC braking

When input is active DC-Injection braking is enabled during start and stopping of the inverter.
DC Injection braking is disabled when a run or jog command is active. Refer to the DC braking time diagram in Figure 4.3.14.

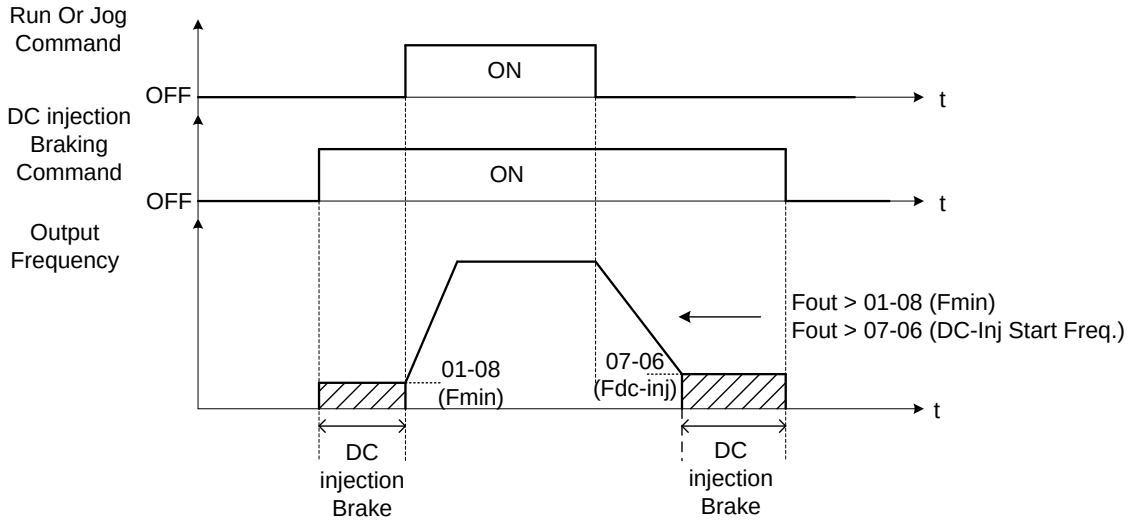


Figure 4.3.14 DC braking timing diagram

03-0X =34: Speed Search
Activate speed search function

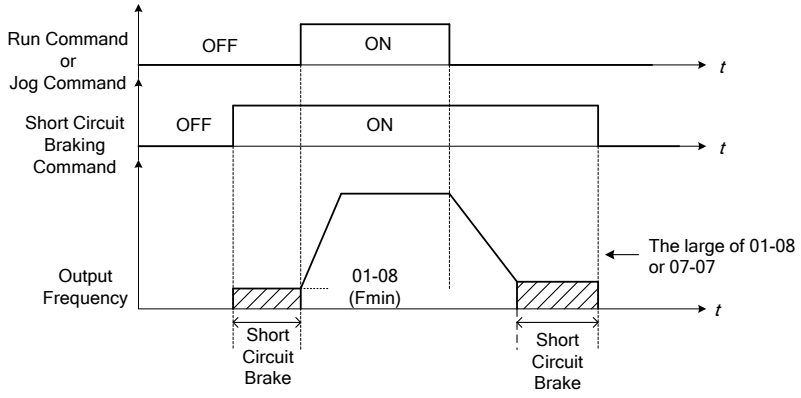
03-0X =40: Motor 2 Selection
Activate speed search function

03-0X =47: Fire mode
When input is active disables all inverter warning and hardware protections. This function is commonly used in commercial applications where the inverter controls an exhaust fan and needs run to destruction in case of a fire.

03-0X =48: KEB acceleration
When input is active enables KEB (Kinetic Energy Braking) during acceleration. Refer to the parameter description of 11-47 and 11-48. Note: To enable set parameter 11-47 to a value greater than 0.

03-0X =65: Short Circuit braking

When active stops inverter by turning on Short-circuit braking. Short-circuit braking is disabled when a run or jog command is active.



03-11	**Relay (R1A-R1C) output**
03-12	**Relay (R2A-R2C) output**
Range	【0】: During Running 【1】: Fault Contact Output 【2】: Frequency Agree 【3】: Setting Frequency Agree (03-13 ± 03-14) 【4】: Frequency Detection 1 (≧ 03-13, hysteresis range is the setting value of 03-14) 【5】: Frequency Detection 2 (≦03-13, hysteresis range is the setting value of 03-14) 【6】: Automatic Restart 【7】: Momentary AC Power Loss 【8】: Rapid Stop 【9】: Base Block 【10】: Motor Overload Protection (OL1) 【11】: Drive Overload Protection (OL2) 【12】: Over Torque Threshold Level (OL3) 【13】: Preset Output Current Reached 【14】: Brake Control 【15】: PID Feedback Signal Loss 【16】: Single Pre-set Count (03-22~03-23) 【17】: Dual Pre-set Count (03-22~03-23) 【18】: PLC Status Indicator (00-02) 【19】: PLC Control 【20】: Zero Speed 【30】: Motor 2 Selection 【54】: Turn On Short-Circuit Braking 【55】: Low Current Detection

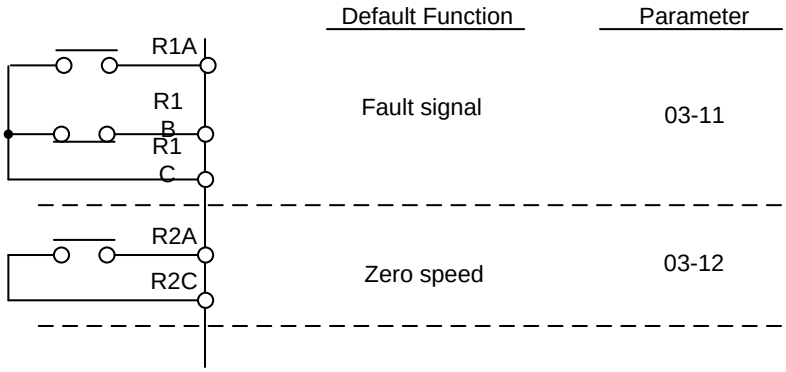


Figure 4.3.15 Multi-function digital output and related parameters

Table 4.3.8 Function table of multi-function digital output

Value	Function		Contents	Control mode		
	Name	LCD display		V/F	SLV	PM SLV
0	During Running	Running	ON:Dring running (Run command is ON)	O	O	O
1	Fault Contact Output	Fault	ON:Fault contact output (except CF00 and CF01)	O	O	O
2	Frequency Agree	Freq. Agree	ON:Frequency agree (frequency agree width detection is set by 03-14)	O	O	O
3	Setting Frequency Agree (03-13 ± 03-14)	Setting Freq Agree	ON:Output frequency = allowed frequency detection level (03-13) ± frequency bandwidth (03-14)	O	O	O
4	Frequency Detection 1 (≧ 03-13, hysteresis range is the setting value of 03-14)	Freq. Detect 1	ON:Output frequency > 03-13, Hysteresis range is 03-14	O	O	O
5	Frequency Detection 2 (≦03-13, hysteresis range is the setting value of 03-14)	Freq. Detect 2	OFF:Output frequency > 03-13, Hysteresis range is 03-14	O	O	O
6	Automatic Restart	Auto Restart	ON:the period of automatic restart	O	O	O
7	Momentary AC Power Loss	Invalid Do Func.	Reserved	O	O	O
8	Rapid Stop	Invalid Do Func.	Reserved	O	O	O
9	Base Block	Baseblock	ON:During Baseblock	O	O	O
10	Motor Overload Protection (OL1)	Invalid Do Func.	Reserved	O	O	O
11	Drive Overload Protection (OL2)	Invalid Do Func.	Reserved	O	O	O
12	Over Torque Threshold Level (OL3)	Over Torque	ON:Over torque detection is ON	O	O	O
13	Preset Output Current Reached	Currebt Agree	ON:When output current > 03-15 is ON	O	O	O
14	Brake Control	Invalid Do Func.	ON:Mechanical braking release frequency OFF:Mechanical braking run frequency	O	O	O
15	PID Feedback Signal Loss	Invalid Do Func.	Reserved	O	O	O
16	Single Pre-set Count (03-22~03-23)	Invalid Do Func.	Reserved	O	O	O
17	Dual Pre-set Count (03-22~03-23)	Invalid Do Func.	Reserved	O	O	O
18	PLC Status Indicator (00-02)	PLC statement	ON:When 00-02 is set to 3 (PLC operation command source)	O	O	O
19	PLC Control	Control From PLC	ON:Control from PLC	O	O	O

20	Zero Speed	Zero Speed	ON:Output frequency < Minimum output frequency (Fmin)	O	O	O
21	Reserved	Reserved	Reserved	-	-	-
22	Reserved	Reserved	Reserved	-	-	-
23	Reserved	Reserved	Reserved	-	-	-
24	Reserved	Reserved	Reserved	-	-	-
25	Reserved	Reserved	Reserved	-	-	-
26	Reserved	Reserved	Reserved	-	-	-
27	Reserved	Reserved	Reserved	-	-	-
28	Reserved	Reserved	Reserved	-	-	-
29	Reserved	Reserved	Reserved	-	-	-
30	Motor 2 Selection	Motor 2 Selection	ON:Switch to Motor 2	O	O	X
31	Reserved	Reserved	Reserved	-	-	-
32	Reserved	Reserved	Reserved	-	-	-
33	Reserved	Reserved	Reserved	-	-	-
34	Reserved	Reserved	Reserved	-	-	-
35	Reserved	Reserved	Reserved	-	-	-
36	Reserved	Reserved	Reserved	-	-	-
37	Reserved	Reserved	Reserved	-	-	-
38	Reserved	Reserved	Reserved	-	-	-
39	Reserved	Reserved	Reserved	-	-	-
40	Reserved	Reserved	Reserved	-	-	-
41	Reserved	Reserved	Reserved	-	-	-
42	Reserved	Reserved	Reserved	-	-	-
43	Reserved	Reserved	Reserved	-	-	-
44	Reserved	Reserved	Reserved	-	-	-
45	Reserved	Reserved	Reserved	-	-	-
46	Reserved	Reserved	Reserved			
47	Reserved	Reserved	Reserved	-	-	-
48	Reserved	Reserved	Reserved	-	-	-
49	Reserved	Reserved	Reserved	-	-	-
50	Reserved	Reserved	Reserved	-	-	-
51	Reserved	Reserved	Reserved	-	-	-
52	Reserved	Reserved	Reserved	-	-	-
53	Reserved	Reserved	Reserved	-	-	-
54	Turn On Short-Circuit Braking	SC Brk	ON:Turn on short-circuit braking	X	X	O
55	Low Current Detection	Low Current Detect	ON:Output Current ≦ 03-48 Low Current detection level	-	-	-

03-1X=0: During Running

ON: Run command is ON or output frequency is greater than 0

OFF: Run command is OFF and the inverter is stopped.

03-1X=1: Fault contact output
Output is active during fault condition.
Note: Communication error (CF00, CF01) do not activate the fault contact.

03-1X=2: Frequency Agree
Output is active when the output frequency falls within the frequency reference minus the frequency detection width (o3-14).

03-1X=3: Setting Frequency Agree
Output is active when the output frequency falls within the frequency detection width (03-14) of the set frequency detection level (o3-13).

03-1X=4: Frequency detection 1
Output is active when the output frequency rises above the frequency detection level (03-13) + frequency detection width (o3-14) and deactivates when the output frequency falls below frequency detection level (o3-13).

03-1X=5: Frequency detection 2
Output is active when the output frequency is below the frequency detection level (03-13) + frequency detection width (03-14) and turns off when the output frequency falls below frequency detection level.

Refer to table 4.3.9 for the operation of frequency detection.

03-1X=6: Automatic restart.
Output is active during an auto-restart operation.

03-1X=7: Baseblock (B.B.)
Output is active during a momentary AC power loss

03-1X=8: Rapid Stop
Output is active during a rapid stop

03-1X=9: Baseblock (B.B.)
Output is active when the inverter output is turned off during a Baseblock command.

03-1X=10: Motor Overload Protection (OL1)
Output is active during motor overload detection (OL1)

03-1X=11: Drive Overload Protection (OL2)
Output is active during inverter overload detection (OL2)

03-1X=12: Over torque detected (Normally Open)
Output is active during an over torque detection see parameters 08-13 ~ 08-16.

03-1X=13: Preset Output Current Reached
When output current > 03-15 and output current > 03-15 duration >03-16, it is ON.

03-1X=14: Motor Overload Protection (OL1)
Output is active when brake control is active

03-1X=15: Motor Overload Protection (OL1)
Output is active when PID feedback signal is lost (e.g. wire break)

03-1X=18: PLC status (setting =18)
Output is active when operation command parameter (00-02) is set to 3: PLC Control.

03-1X=19: PLC control contact
Output is controlled by the PLC logic

03-1X=20: Zero-speed
Output is active during zero-speed when output frequency ≦ minimum output frequency (01-08).

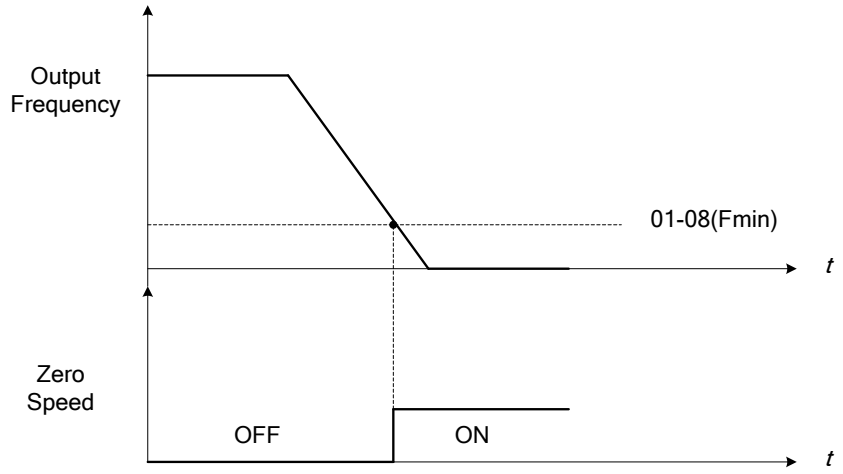


Figure 4.3.16 Zero speed operation

03-1X=30: Motor 2 Selection
Output is active when motor 2 is selected

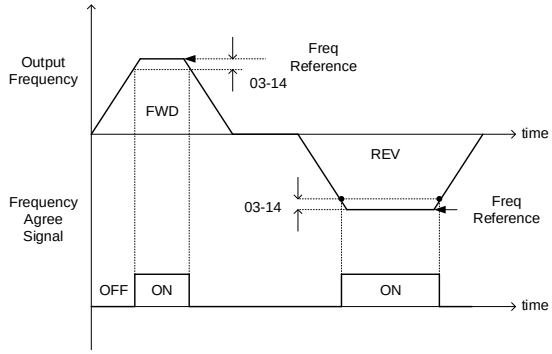
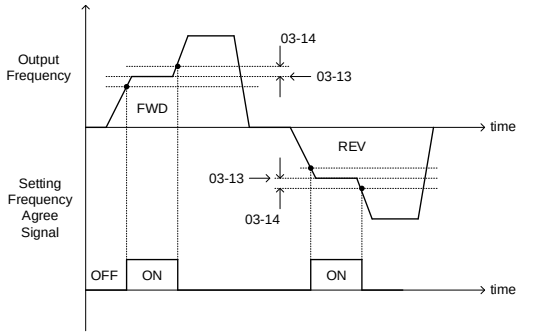
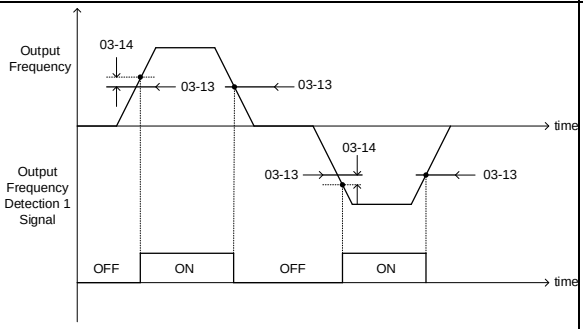
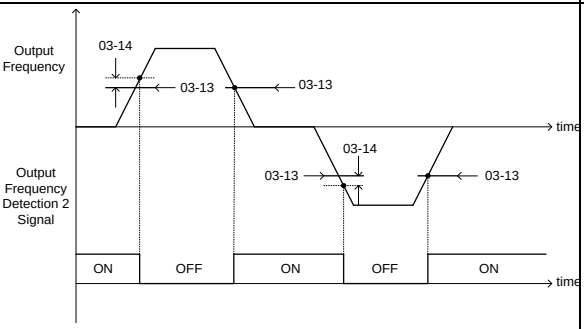
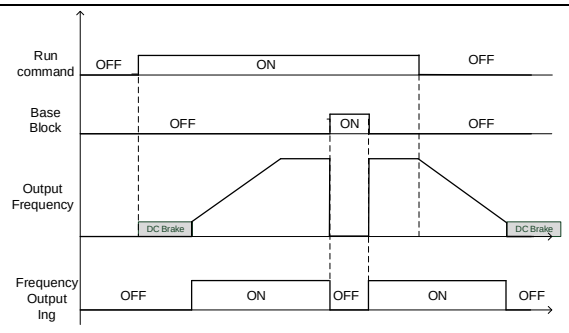
03-1X=54: Short Circuit Braking
Output is active during short circuit braking

03-1X=55: Low Current Detection
Output is active when low current detection is active, output current <= 03-48.

03-13	Frequency detection Level
Range	【0.0~599.0】 Hz
03-14	Frequency detection width
Range	【0.1~25.5】 Hz

Frequency detection Level: set the multi-function output terminals R1A-R1C, R2A-R2C or PH1 (03-11, 03-12) to the desired detection level and bandwidth for use with multi-function output functions 1 to 6.

The time charts for the Frequency Agree Detection operation are shown in the following table 4.3.30.

Function	Frequency Detection Function	Description
Frequency agree		Output is active when the output frequency falls within the frequency reference minus the frequency detection width (03-14). Any of the digital outputs function (03-11, 03-12 or 03-28) can be set to 2 (Frequency agree).
Set frequency agree		Output is active the output frequency falls within the frequency detection width (03-14) of the set frequency detection level (03-13). Any of the digital outputs function (03-11, 03-12 or 03-28) can be set to 3 (Set frequency agree).
Output frequency detection 1		Output is active when the output frequency rises above the frequency detection level (03-13) + frequency detection width (o3-14) and deactivates when the output frequency falls below frequency detection level (03-13). Any of the digital outputs function (03-11, 03-12 or 03-28) can be set to 4 (Output frequency detection 1).
Output frequency detection 2		Output is active when the output frequency is below the frequency detection level (03-13) + frequency detection width (03-14) and turns off when the output frequency falls below frequency detection level. Any of the digital outputs function (03-11, 03-12 or 03-28) can be set to 5 (Output frequency detection 2).
Frequency Output		Output is active when the inverter output frequency is greater than 0.

04-00	Analog Input Signal Type	
Range	【0】: AI1 0~10V / 0~20mA	AI2 0~10V / 0~20mA
	【1】: AI1 0~10V / 0~20mA	AI2 2~10V / 4~20mA
	【2】: AI1 2~10V / 4~20mA	AI2 0~10V / 0~20mA
	【3】: AI1 2~10V / 4~20mA	AI2 2~10V / 4~20mA
04-01	AI1 Signal Scaling and Filter Time	
Range	【0.00~2.00】Sec	
04-02	AI1 Gain	
Range	【0.0~1000.0】%	
04-03	AI1 Bias	
Range	【-100~100.0】%	
04-05	AI1 Slope	
Range	【0】:Positive 【1】:Negative	
04-06	AI2 Signal Scaling and Filter Time	
Range	【0】:Positive 【1】:Negative	
04-07	AI2 Gain	
Range	【0.0~1000.0】%	
04-08	AI2 Bias	
Range	【-100.0~100.0】%	
04-10	AI2 Gain	
Range	【0】:Positive 【1】:Negative	

Analog input signal type selection (04-00):

- AI1 is 0~10V, switch JP2 of control board to V, set parameter 04-00 to 0 or 1.
- AI1 is 2~10V, switch JP2 of control board to V, set parameter 04-00 to 2 or 3.
- AI1 is 0~20mA, switch JP2 of control board to I, set parameter 04-00 to 0 or 1.
- AI1 is 4~20mA, switch JP2 of control board to I, set parameter 04-00 to 2 or 3.

- AI2 is 0~10V, switch JP3 of control board to V, set parameter 04-00 to 1 or 3.
- AI2 is 2~10V, switch JP3 of control board to V, set parameter 04-00 to 2 or 4.
- AI2 is 0~20mA, switch JP3 of control board to I, set parameter 04-00 to 1 or 3.
- AI2 is 4~20mA, switch JP3 of control board to I, set parameter 04-00 to 2 or 4.

(1) Analog Input Level Adjustment AI1, AI2 (04-02, 04-03, 04-07, 04-08)

Each analog input AI1and AI2 has a separate gain and bias parameter associated with it.

Analog input signal AI1 can be adjusted with parameter 04-02 and 04-03; Analog input signal AI2 can be adjusted with parameter 04-07 and 04-08. Refer to Figure 4.3.17.

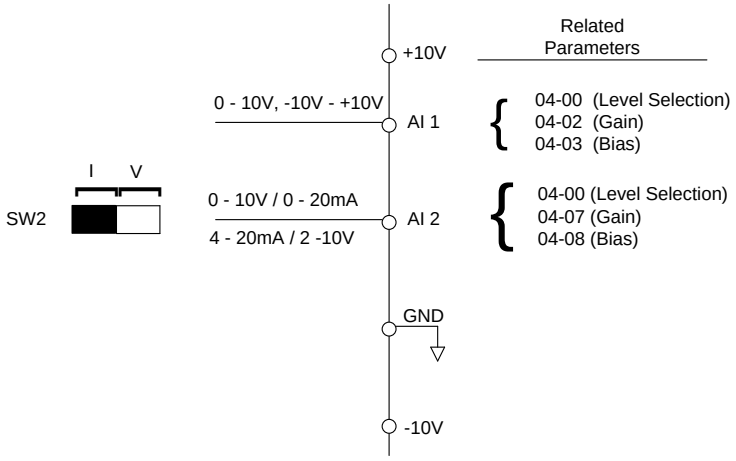


Figure 4.3.17 Analog inputs and related parameters

Gain setting: Sets the level in % that corresponds to a 10V, -10V or 20mA signal at the analog input. (Set the maximum output frequency 01-02 to 100 %)

Bias setting: Sets the level in % that corresponds to a 0V or 4mA signal at the analog input. (Set the maximum output frequency 01-02 to 100%)

Use both gain and bias setting to scale the input signal.

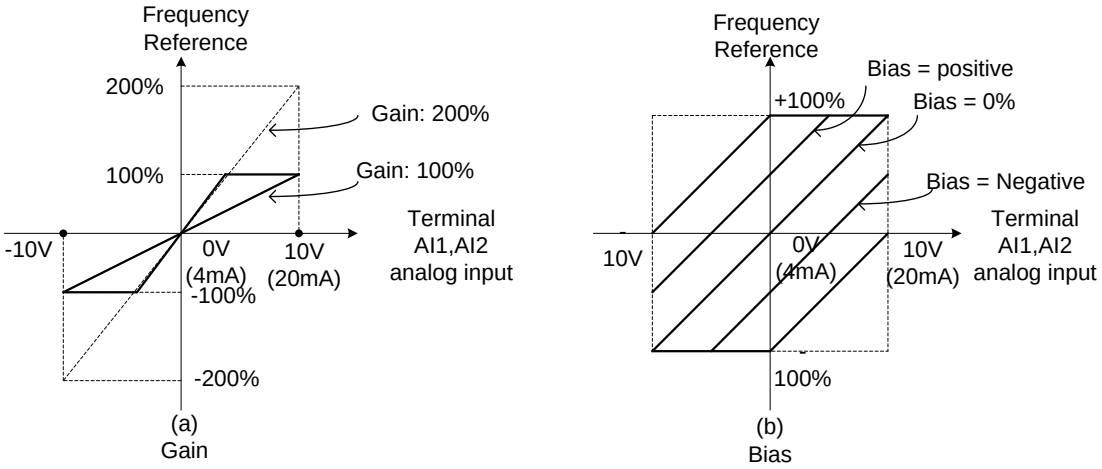


Figure 4.3.18 Gain and bias operations (for frequency reference signal)

(2) AI1 signal filtering time **(04-01)**

(3) AI2 signal filtering time **(04-06)**

All analog inputs (AI1, AI2) have a 1st order programmable input filter that can be adjusted when noise is present on each of the incoming analog signal to prevent erratic drive control.

The filter time constant (range: 0.00 to 2.00 seconds) is defined as the time that the input step signal reaches 63% of its final value.

Note: Increasing the filter time causes the drive operation to become more stable but less responsive to change to the analog input.

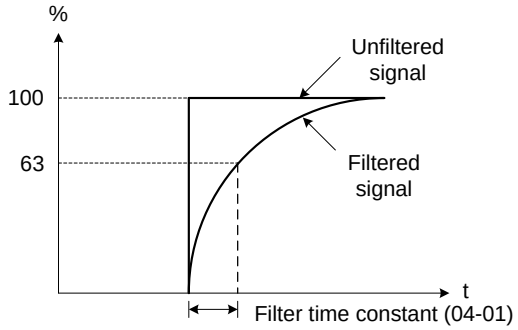


Figure 4.3.19 Filter time constant

04-11	AO function setting
Range	【0】:Output frequency 【1】:Frequency command 【2】:Output voltage 【3】:DC voltage 【4】:Output current
04-12	AO gain
Range	【0.0~1000.0】%
04-13	AO bias
Range	【-100.0~100.0】%
04-15	AO Slope
Range	【0】:Positive 【1】:Negative
04-16	F-Gain / Proportional Gearing function
Range	【0】:Disable 【1】:Enable

For the analog output and related parameters, please refer to Figure 4.3.20a.

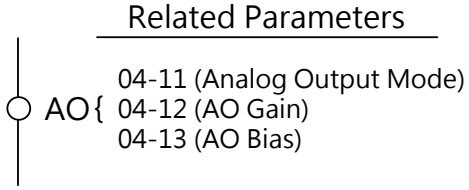


Figure 4.3.20a Analog outputs and related parameters

Analog output AO adjustment (04-12, 04-13 and 04-15)

Signal: Use parameter 04-11 to select the analog output signal for AO.

Gain: Use parameter 04-12 to adjust the gain for AO. Adjust the gain so that the analog output (10V) matches 100% of the selected analog output signal (04-11 for AO).

Bias: Use parameter 04-13 to adjust the bias for AO. Adjust the bias so that the analog output (0V) matches 0% of the selected analog output signal (04-11 for AO).

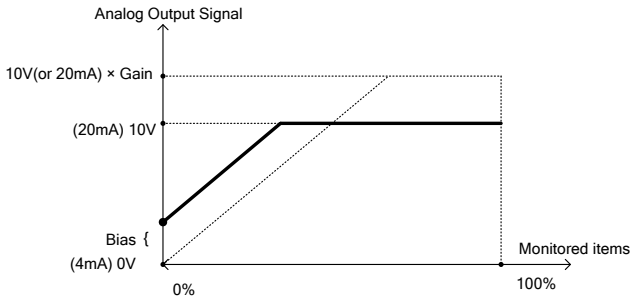


Figure 4.3.20b Analog output level adjustment

Analog output terminal function selection (04-11)

Please refer to the following table 4.3.9.

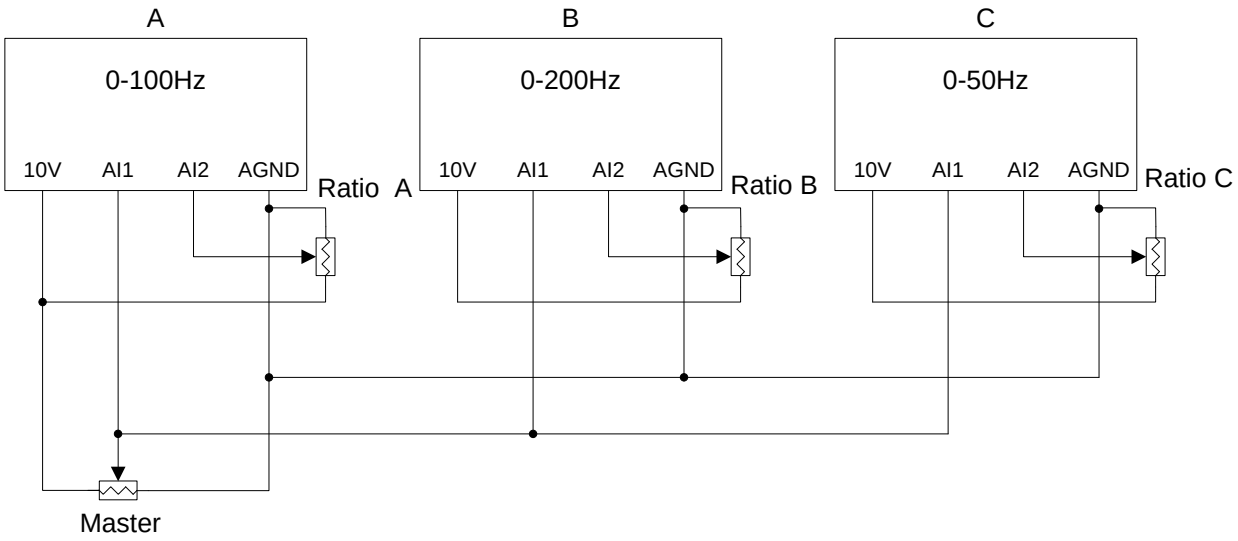
04-11 parameter setting	**Function (Keypad display)**	**Monitoring Parameters 12 Group**	**Control Mode**		
			VF	**SLV**	**PMSLV**
0	Output Freq	12-17	O	O	O
1	Freq Ref	12-16	O	O	O
2	Output Voltage	12-19	O	O	O
3	DC Voltage	12-20	O	O	O
4	Output Current	12-18	O	O	O

Table 4.3.9 Selection of analog output terminals function (04-11)

F-Gain Function:

The F- Gain function offers the ability to use a single frequency reference set by a master potentiometer to more than one inverter. The master frequency can be scaled by three individual potentiometers for each inverter as show in the diagram below.

To enable set parameter 04-16=1 and set parameter 00-05 =2 (external Analog input AI1). Analog input 2 (AI2) can now be used for external scaling (potentiometer).



Parameter Preset:

A	B	C
00-05=2	00-05=2	00-05=2
00-12=100	00-12=200	00-12=50
04-16=1	04-16=1	04-16=1

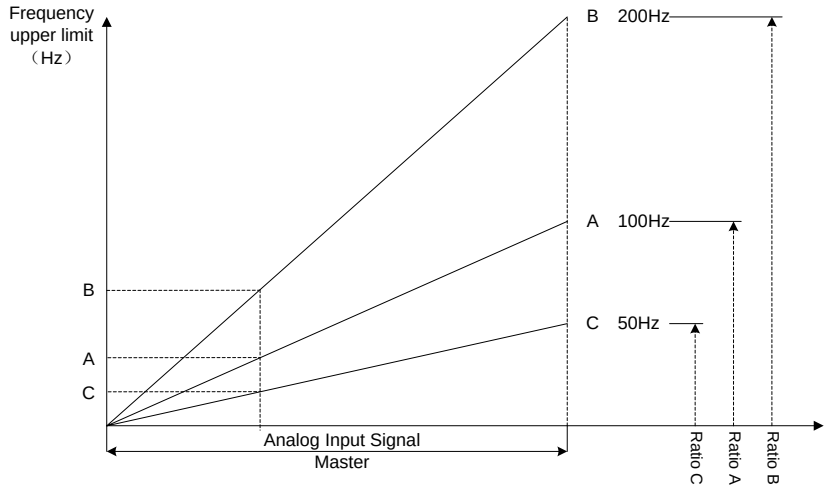


Figure 4.3.21 Diagram of F-Gain function

04-20	AO signal scanning and filtering time
Range	【0.00~0.50】**Sec**

Parameter 04-20 can be used to filter momentary changes in the analog output signal.

Note: Increasing the filter time results in a slower system response, decreasing the filter time may cause instability of the analog output signal.

07-00	Momentary power loss and restart
Range	【0】:Disabled 【1】:Enabled
07-01	Fault reset time
Range	【0~7200】 Sec
07-02	Number of restart attempts
Range	【0~10】
07-03	Reset Mode Setting
Range	【0】:Enable Reset Only when Run Command is Off 【1】:Enable Reset when Run Command is On or Off

Inverter output will be turned off during a sudden drop in input voltage below the under voltage level.
07-00=0: Inverter trips on “UV” fault on power loss and will not restart.
07-00=1: Inverter resumes operation at half of the output frequency before power-loss after power has been restored. There is no limitation on the number of restarts.

The momentary power loss function is enabled as long as the inverter CPU still has power and the inverter will restart when power is restored based on the setting of parameters 00-02, 07-04 and status of External run command.

Caution: After a power loss and Run mode is set to External Run (00-02=1) and Direct start on power up is enabled (07-04=0) the inverter will automatically start when power is restored.

To ensure safety of operators and to avoid any damages to the machinery, all necessary safety measure must be taken and an inverter input disconnect switch must be used.

The automatic restart function can be used for the following faults. Please note that when the fault is not listed in the table the inverter will not attempt an automatic restart.

Fault Code	Description	Number of Restarts
UV:	Under voltage	Unlimited
OC:	Over current	(07-02)
OCA:	Over current during acceleration	(07-02)
OCC:	Over current during constant speed	(07-02)
OCd:	Over current during deceleration	(07-02)
OL1:	Motor overload	(07-02)
UT:	Under torque detection	(07-02)
IPL:	Input phase loss	(07-02)
GF:	Ground fault	(07-02)
OV:	Overvoltage	(07-02)
OL2:	Inverter overload	(07-02)
OT:	Over-torque detection	(07-02)

Note: Auto restart after a fault will not function during DC injection braking or decelerating to stop.

08-00	Stall prevention function
Range	【xxx0b】:Stall prevention function is enabled during acceleration. 【xxx1b】:Stall prevention function is disabled during acceleration. 【xx0xb】:Stall prevention function is enabled during deceleration. 【xx1xb】:Stall prevention function is disabled during deceleration. 【x0xxb】:Stall prevention function is enabled during operation. 【x1xxb】:Stall prevention function is disabled during run. 【0xxxb】:Stall prevention function during run is based on the first acceleration time. 【1xxxb】:Stall prevention function during run is based on the second acceleration time.
08-01	Stall prevention level during acceleration
Range	【20~200】%
08-02	Stall prevention level during deceleration
Range	200V :【330V~410V】 400V :【660V~820V】
08-03	Stall prevention level during run
Range	【30~200】%
08-21	Limit of stall prevention during acceleration
Range	【1~100】%
08-22	Stall prevention detection time during run
Range	【2~100】ms
08- 40	Motor 2 Acceleration Stall Prevention Level
Range	【20~200】%
08-41	Motor 2 Acceleration Stall Prevention Limit
Range	【1~100】%

Stall prevention during acceleration (08-00=xxx0b)

Prevents the inverter from faulting (Overcurrent, Motor overload, Inverter overload) when accelerating with heavy loads.

When the inverter output current reaches the level set in parameter 08-01 minus 15% the acceleration rate starts to decrease. When the inverter output current reaches the level set in parameter 08-01 the motor stops accelerating. Refer to Figure 4.3.22 for more information.

Notes:
- Reduce stall prevention level during acceleration (08-01) in case the motor stalls (when the motor power is smaller than the inverter rating.
- The inverter rated output current should be set to 100%.

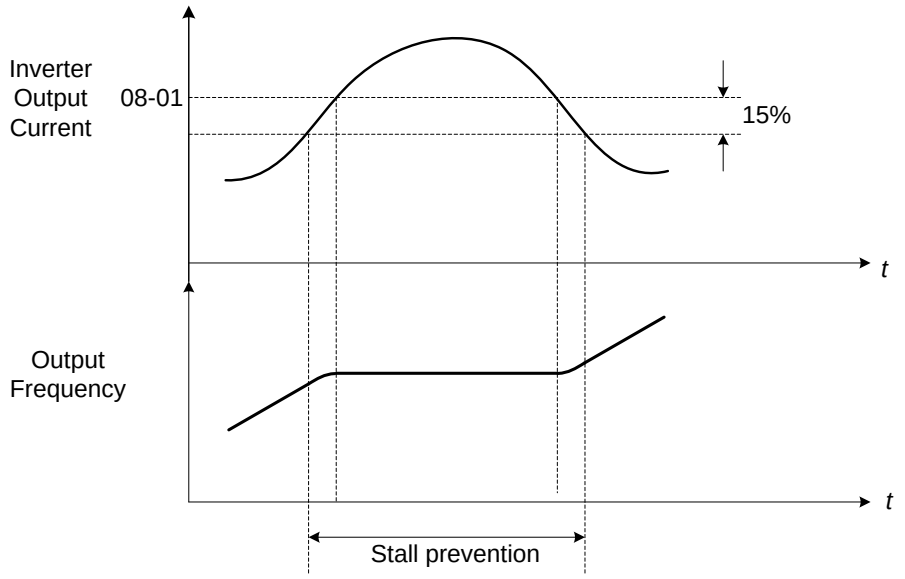


Figure 4.3.22 Stall prevention during acceleration

If the motor is used in the constant power (CH) region, the stall prevention level (08-01) is automatically reduced to prevent the stall.

Stall prevention level during acceleration (Constant horsepower)

$$\text{Stall Prev. Lev. Acceleration (CH)} = \frac{\text{Stall prevention level in acceleration (08-01)} \times \text{Fbase (01-12)}}{\text{Output frequency}}$$

Parameter 08-21 is the stall prevention limit value in Constant Horsepower region. Refer to Figure 4.3.23.

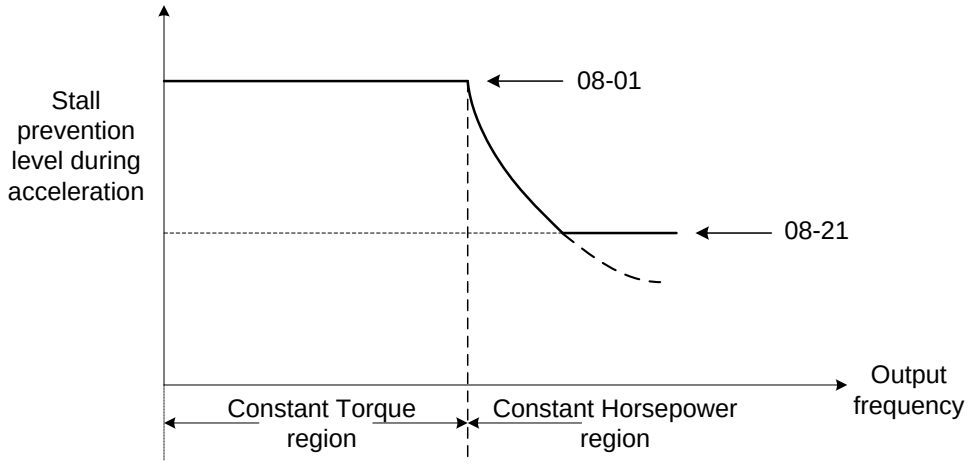


Figure 4.3.23 Stall prevention level and limit in acceleration

Motor2 Acceleration Stall Prevention Level (08-40) and Motor2 Acceleration Stall Prevention Limit (08-41) are

Used when 03-00~03-07=40 (Switching between Motor 1/Motor 2)

Stall prevention selection during deceleration (08-00=xx0xb)

Stall prevention during deceleration automatically increases the deceleration time based on the DC-bus voltage to prevent over-voltage during deceleration. Refer to Figure 4.3.69 for stall prevention during deceleration

When the DC-bus voltage exceeds the stall prevention level, deceleration will stop and the inverter will wait for the DC-bus voltage to fall below the stall prevention level before continuing deceleration. Stall prevention level can be set by 08-02, see section 4.3, table 4.4.13.

Stall prevention level can be set by 08-02, see section 4.3, table 4.3.34

Table 4.3.34 Stall prevention level

Inverter model	08-02 default value
200V class	385VDC
400V class	770VDC

Stall prevention during deceleration function (08-00 to xx1xb) has to be set to disabled when using a braking resistor or braking module.

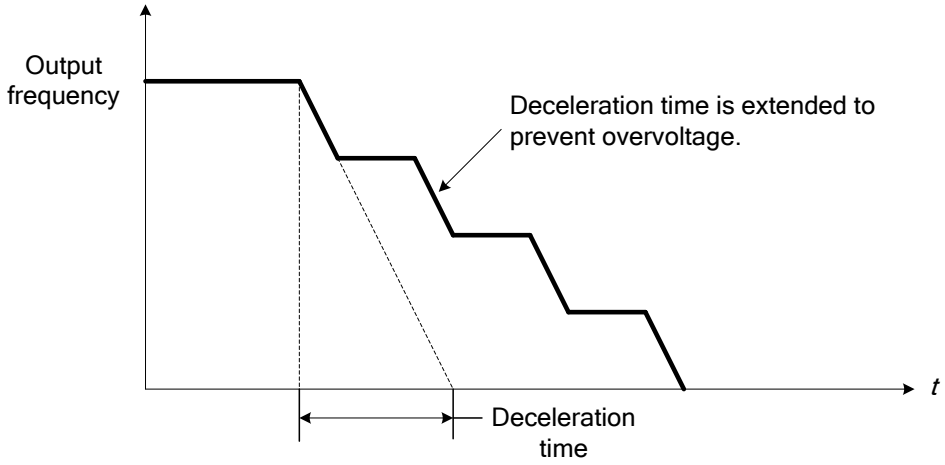


Figure 4.3.23 Stall prevention selection in deceleration

Stall prevention selection during run (08-00=x0xxb)

Stall prevention during run can only be used in V/F and SLV control mode.

This function prevents the motor from stalling by automatically reducing the output frequency during run.

If the inverter output current rises above the level set in parameter 08-03 for the time specified in parameter 08-22, the inverter output frequency is automatically decreased following deceleration time 1 (00-15) or deceleration time 2 (00-17).

When the inverter output current falls below the level set in parameter (08-03) minus 2%, normal operation continues and the output frequency increases to the frequency reference using the acceleration time 1 or acceleration time 2. Refer to the following Figure 4.3.24.

Note: The stall prevention level during run can be set by using multi-function analog input AI2 (04-05=7).

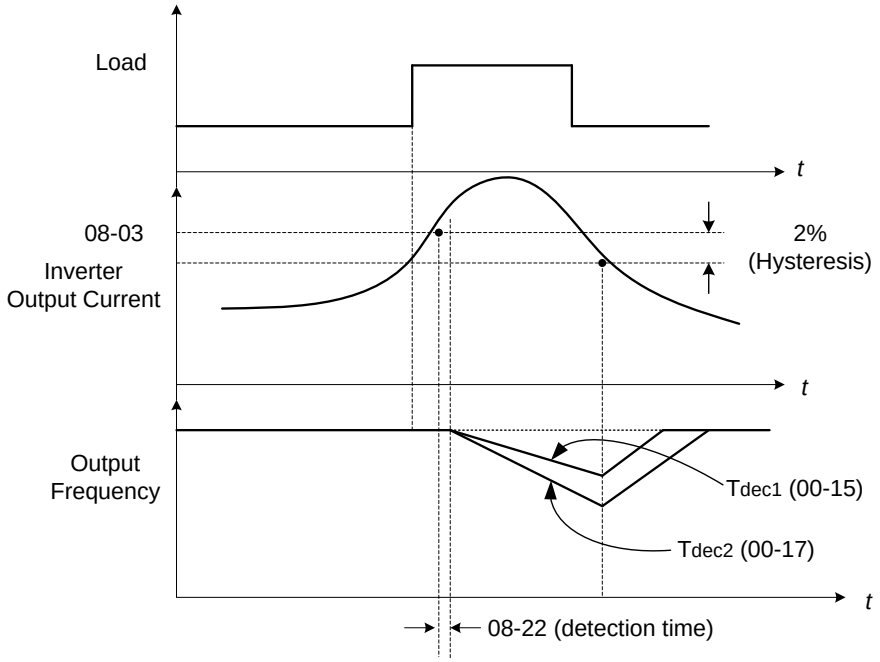


Figure 4.3.24 Stall prevention selection in operation

08-05	Selection for motor overload protection (OL1)
Range	【**xxx0b**】**:**Motor overload is disabled 【**xxx1b**】**:**Motor overload is enabled 【**xx0xb**】**:**Cold start of motor overload 【**xx1xb**】**:**Hot start of motor overload 【**x0xxb**】**:**Standard motor 【**x1xxb**】**:**Special motor 【**0xxxb**】**:**Reserved 【**1xxxb**】**:**Reserved

The motor overload protection function estimates the motor overload level based on the output current, output frequency, motor characteristics and time. The motor overload trip time depends on the motor rated current when the output frequency is greater than 60Hz.

On inverter power-up the motor overload protection internal thermal accumulation register is automatically reset.

To use the built-in motor overload protection function parameter 02-01 (motor rated current) has to match the motor rated current on the motor nameplate.

Turn off the motor overload protection when using two or more motors connected to the inverter (set 08-05 = xxx0b), and provide external overload protection for each motor (e.g. thermal overload switch).

With cold start enabled (08-05 = xx0xb), motor overload protection occurs in 5 and a half minutes when operating the motor at 150% of the motor rated current at an output frequency greater than 60Hz.

With hot start enabled (08-05 = xx1xb), motor overload protection occurs in 3 and a half minutes when operating

the motor at 150% of the motor rated current at an output frequency greater than 60Hz.

Refer to the following Figure 4.3.25 for an example of motor overload protection curve.

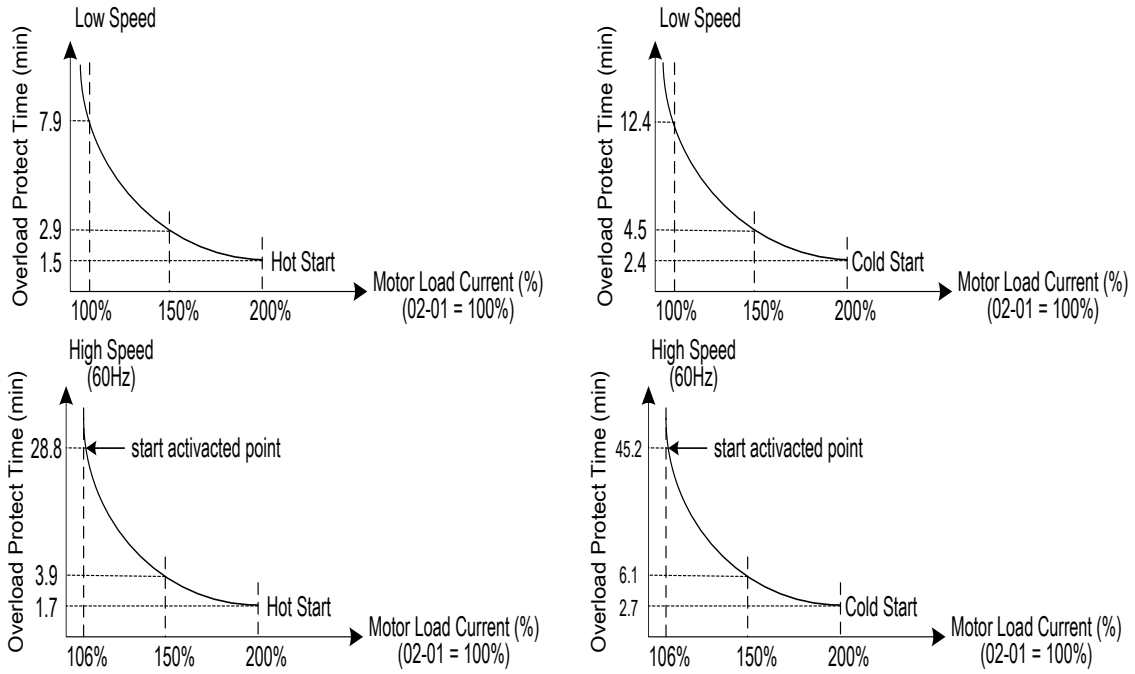


Figure 4.3.25 Motor overload protection curve (example: standard motor)

When using force cooled motors (Special inverter motor), thermal characteristics are independent of the motor speed, set 08-05 = x1xxb.

When 08-05 = x1xxb, overload protection function is based on motor rated current for output frequencies between 6 and 60Hz. If the output frequency is less than 1Hz, the overload protection function uses 83% of the motor rated current to determine an overload condition.

When 08-05 = x0xxb, overload protection function is based on 70% of the motor rated current for an output frequency of 20Hz. If the output frequency is lower than 1Hz, the overload protection function uses 40% of the motor rated current to determine an overload condition.

Motor overload rating at different output frequencies is shown at Figure 4.3.26.

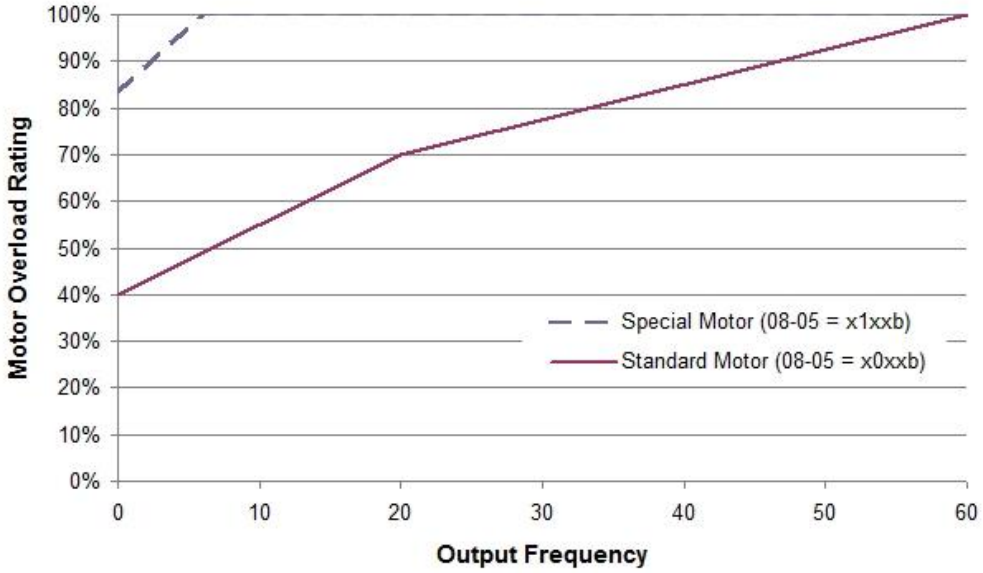


Figure 4.3.26 Motor overload rating at different output frequencies

12-00	Display Screen Selection (LED)
Range	**0 0 0 0 0** **MSD LSD** **00000~88888 Each digit can be set from 0 to 8 as listed below.** 【0】: No display 【1】: Output current 【2】: No display 【3】: DC bus voltage 【4】: heatsink temperature 【5】: PID feedback 【6】: AI1 value 【7】: AI2 value 【8】: Counter

Note: The highest bit is used for power-up monitor. The 4 least significant bits can be used to customize the display sequence see chapter 4.1.4.

12-01	PID Feedback Display Mode (LED)
Range	**【0】:** Display the feedback value as integer (xxx) **【1】:** Display the feedback value with one decimal (xx.x) **【2】:** Display the feedback value (x.xx) with two decimals
12-02	**PID Feedback Display Unit Setting (LED)**
Range	**【0】:** xxxxx (no unit) **【1】:** xxxPb (pressure) **【2】:** xxxFL (flow)
12-03	**Line Speed Display (LED)**
Range	【0~60000】RPM

Set motor rated RPM for the inverter to display the actual motor speed based on the output frequency.
Motor synchronous speed = 120 x Rated frequency ÷ Number of poles.

12- 04	Line Speed Display Mode (LED)
Range	【0】: Display Inverter Output Frequency 【1】: Line Speed Display at Integer. (xxxxx) 【2】: Line Speed Display at One Decimal Place. (xxxx.x) 【3】: Line Speed Display at Two Decimal Places. (xxx.xx) 【4】: Line Speed Display at Three Decimal Places. (xx.xxx)

12-04≠0, line speed is always displayed in run or stop mode. Set 12-03 to the maximum line speed that corresponds to the maximum output frequency.

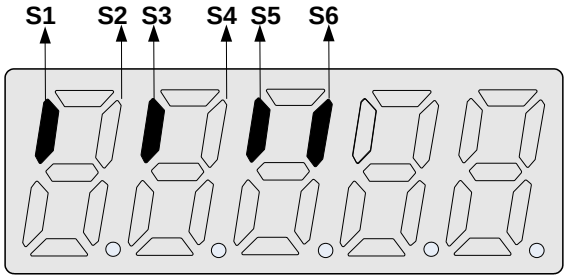
Example: Line speed display 12-03 is 1800, the keypad display will show 900 when the output frequency is 30Hz.

12-05	Status display of digital input terminal (LED / LCD)
Range	Read-only

Terminals S1-S6 are represented using two segments of each digit. Segment turns on when input is active. The bottom segments of each of the first three digits are used to represent the digital outputs (R1, R2). Segments turn on when output is active.

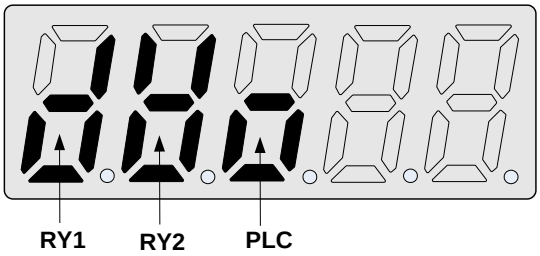
Example 1:

S1/S3/S5/S6 are ON, S2/S4 are OFF, 12-05 will turn on when RY1 without output. (LED)



Example 2:

S2/S3/S4 are ON, S1/S5/S6 are OFF, RY1/RY2 outputs are turned on.



13-02	Fault Log Display（Last 3 faults）
Range	----

Last three faults are stored using FIFO mechanism, whenever a new fault occurs the previous faults are pushed down. Example: Fault stored in 2.xxx is moved to 3.xxx and 1.xxx is moved to 2.xxx. The most recent fault will be stored on position 1.xxx.

Notes:

- Use Up▲and Down▼ keys to scroll between the fault registers.
- Pressing the reset key when parameter 13-02 is displayed will clear all three fault registers and the display for each register will change to 1. ---, 2. ---, 3. ---.
- Fault log content 1.OC-C'; means that most recent fault is OC-C, etc...

13-08	Restore factory setting / Initialize
Range	【1】:2 wires initialization (50Hz) (220V/380V) 【2】:2 wires initialization (60Hz) (220V/380V) 【3】:2 wires initialization (50Hz) (230V/400V) 【4】:2 wires initialization (60Hz) (220V/460V) 【5】:2 wires initialization (50Hz) (220V/415V) 【6】:2 wires initialization (60Hz) (230V/400V) 【7】:2 wires initialization (50Hz) (220V/440V) 【8】:2 wires initialization (60Hz) (220V/440V) 【1112】:PLC initialization (RESET)

Use parameter 13-08 to initialize the inverter to factory default. It is recommended to write down the modified parameters before initializing the inverter. After initialization, the value of 13-08 will return to zero automatically

5. Check motor rotation and direction

This test is to be performed solely from the inverter keypad. Apply power to the inverter after all the electrical connections have been made and protective covers have been re-attached. At this point, **DO NOT RUN THE MOTOR**, the keypad should display as shown below in Fig. 5.1 and the speed reference **5.00Hz** should be blinking at the parameter code “05-01”.

Important: Motor rotation and direction only applies to standard AC motors with a base frequency of 60Hz. For 50Hz or other frequency AC motors please set V/F pattern in group 01 before running the motor.

LED Operator

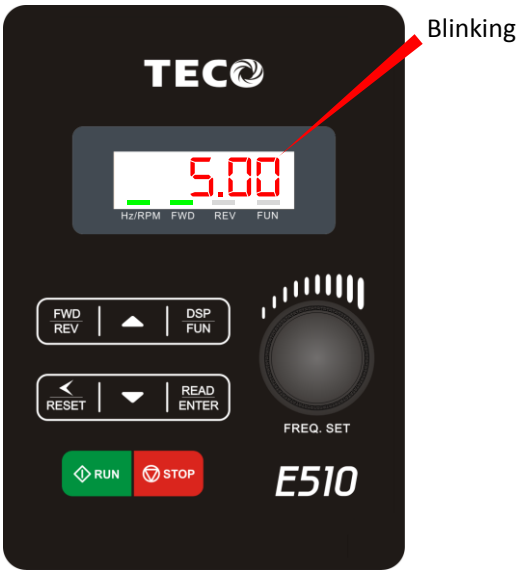


Fig 5.1: Keypad (Stopped)

Fig 5.2: Keypad (Running)

Next press the **RUN** key, see Fig 5.2. The motor should now be operating at low speed running in forward (clockwise) direction. Next press **STOP** key to stop the motor.

If the motor rotation is incorrect, power down the inverter.

After the power has been turned OFF, wait at least ten minutes until the charge indicator extinguishes completely before touching any wiring, circuit boards or components.

Using Safety precaution, and referring to section 3.9 exchange any two of the three output leads to the motor (U/T1, V/T2 and W/T3). After the wiring change, repeat this step and recheck motor direction.

LCD Operator (Optional Keypad)

Fig 5.1: Keypad (Stopped)

Fig 5.2: Keypad (Running)

Next press the **RUN** key, see Fig 5.2. The motor should now be operating at low speed running in forward (clockwise) direction. The parameter code 12-17 shown at the bottom left corner of the screen will change from 12-17=000.00Hz to 12-17=005.00Hz. Next press **STOP** key to stop the motor.

If the motor rotation is incorrect, power down the inverter.

After the power has been turned OFF, wait at least ten minutes until the charge indicator extinguishes completely before touching any wiring, circuit boards or components.

Using Safety precaution, and referring to section 3.8 exchange any two of the three output leads to the motor (U/T1, V/T2 and W/T3). After the wiring change, repeat this step and recheck motor direction.

6. Speed Reference Command Configuration

The inverter offers users several choices to set the speed reference source. The most commonly used methods are described in the next sections.

Frequency reference command is selected with parameter 00-05.

00-05: Main Frequency Command (Frequency Source)

This function sets the frequency command source.

Setting Range: 0 to 7

To set parameter 00-05:
- After power-up press the **DSP/FUN** key
- Select **00 Basic Fun**
- Press **READ/ ENTER** key
- Select parameter -05 with the **UP/DOWN** ▲ and ▼ keys and press the **READ/ ENTER** key.

In the parameter list move cursor to 00-05 with the **UP/DOWN** keys and press **READ/ ENTER** key to select.

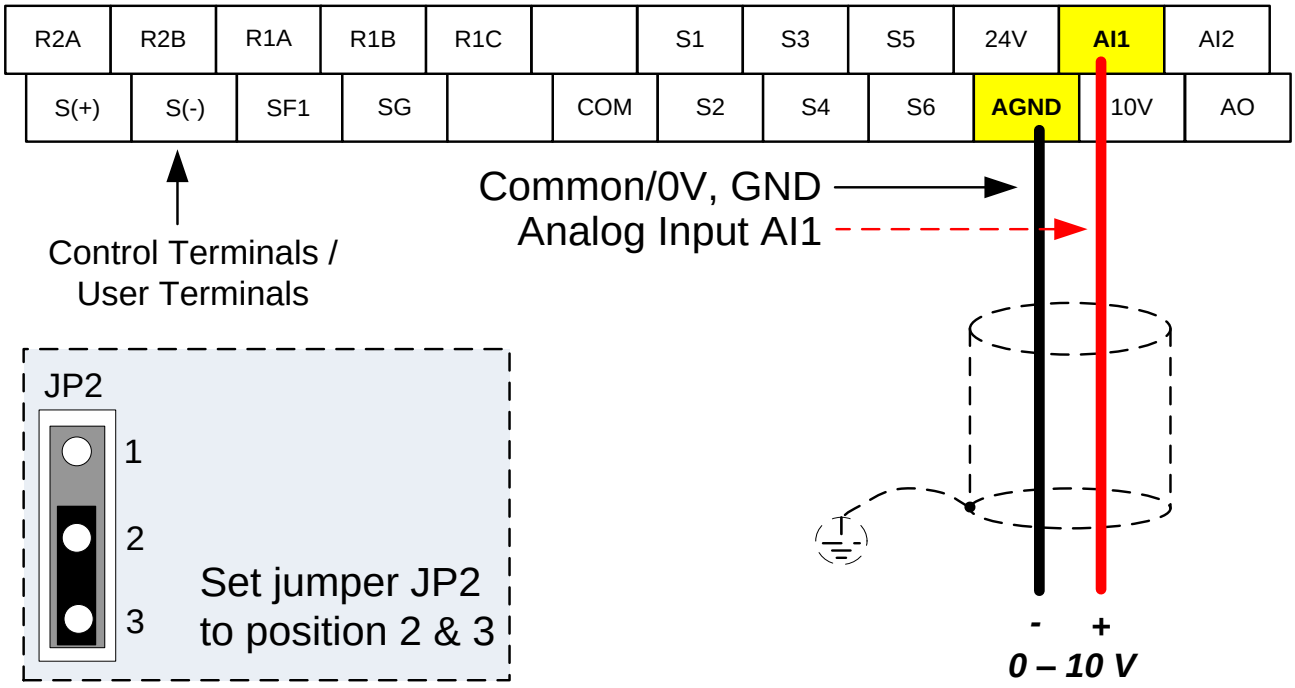
00-05	Main Frequency Command Source Selection
Range	**【0】:Up/Down of Keypad** **【1】:Potentiometer on Keypad** **【2】:External AI1 Analog Signal Input** **【3】:External AI2 Analog Signal Input** **【4】:External Up/Down Frequency Control** **【5】:Communication Setting Frequency** **【6】:Reserved** **【7】:Pulse Input**

6.1 Reference from Keypad

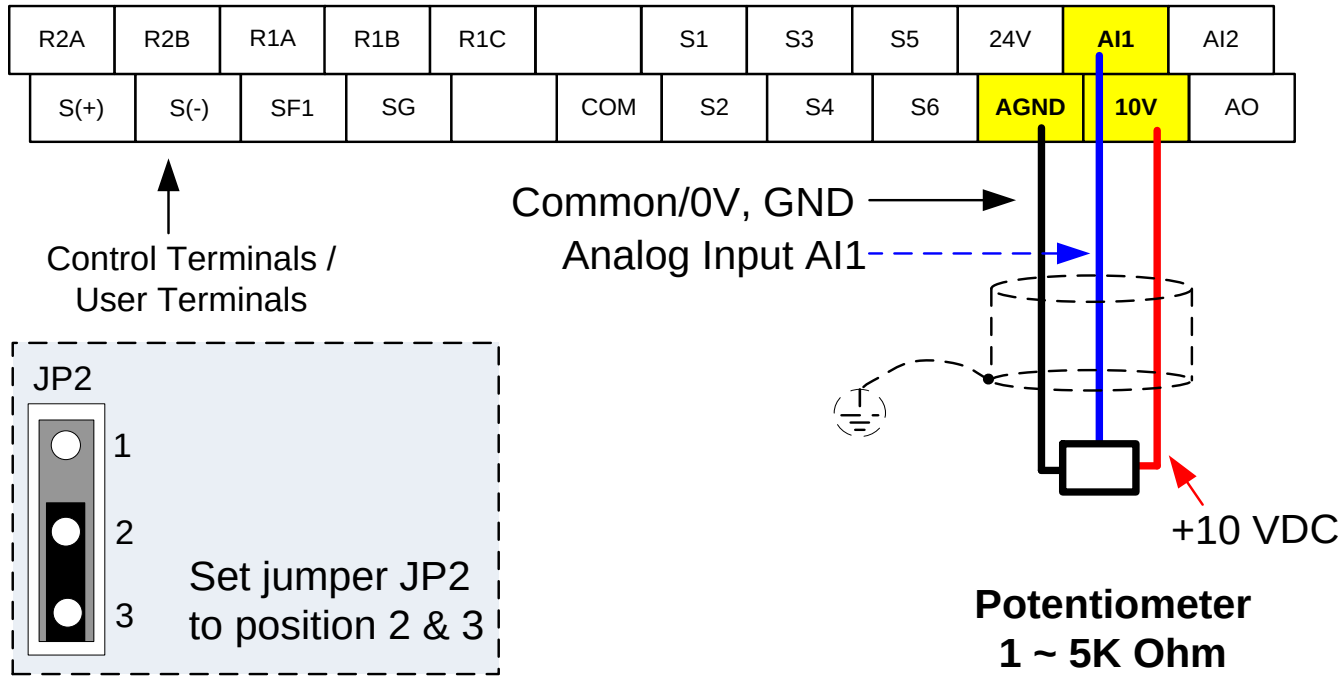
Speed reference from the keypad is the default setting. Press the **READ/ ENTER** key first and use the </RESET, ▲ and ▼ keys to change the speed reference.

6.2 Reference from External Analog Signal (0-10V / 4-20mA)

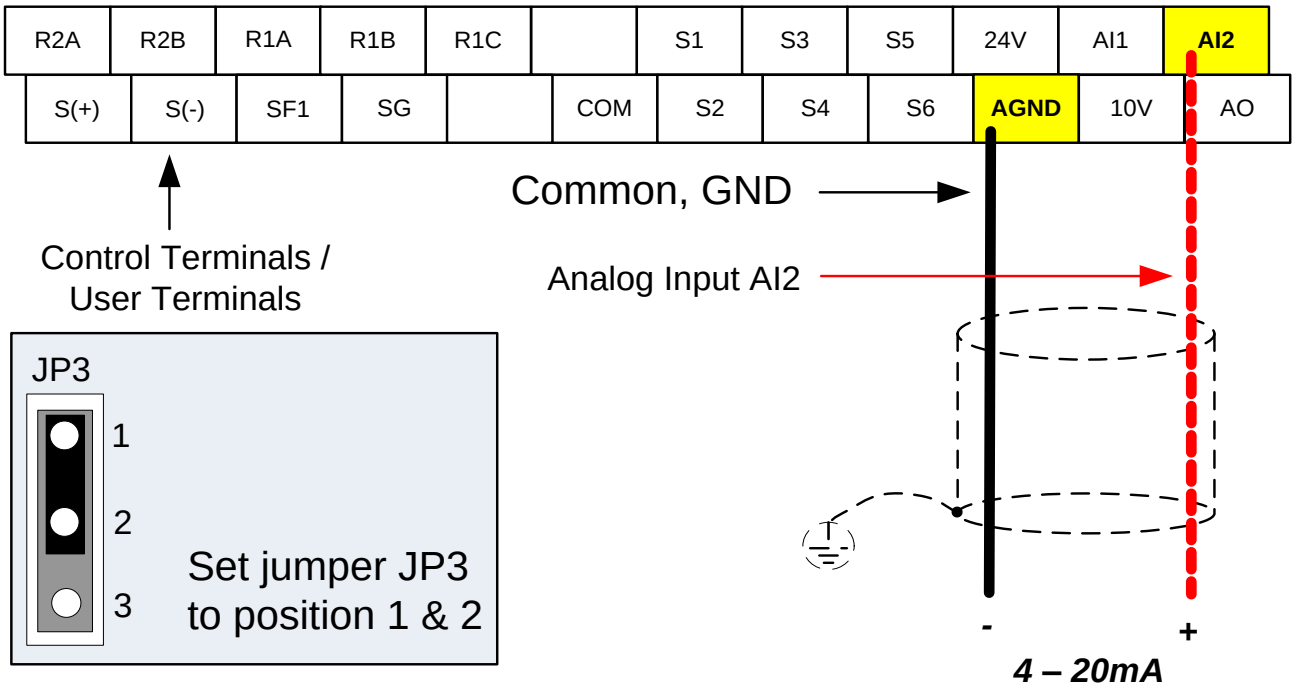
Analog Reference: 0 – 10 V (Setting 00-05 = 2)



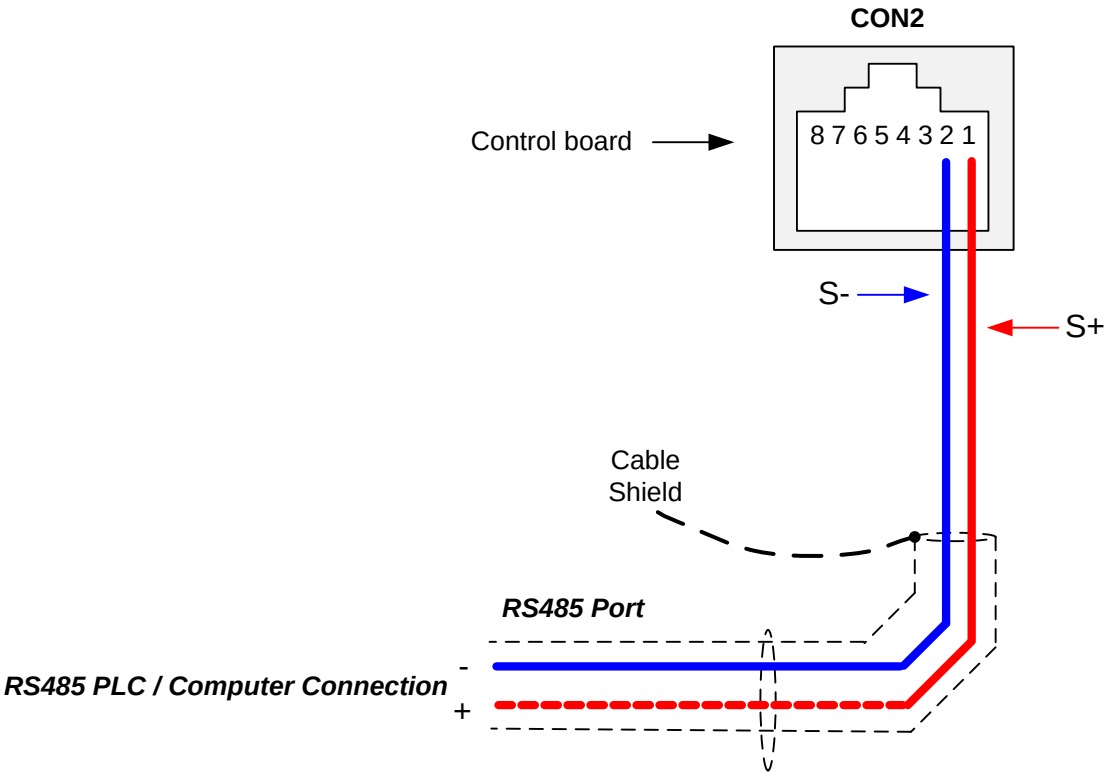
Analog Reference: Potentiometer / Speed Pot (Setting 00-05 = 2)



Analog Reference: 4 – 20mA (Setting 00-05 = 2)



6.3 Reference from Serial Communication RS485 (00-05=5)



To set the speed reference for the inverter via serial communication parameter 00-05 has be set to “5” for frequency command via serial communication.

Default Communication Setting is: Address “1”, 9600 Bits/sec, 1 Start Bit, 1 Stop Bit, and No Parity

The serial communication link function uses RS485 Modbus RTU protocol and allows for:

1) Monitoring (data monitoring, function data check).
2) Frequency setting.
3) Operation command (FWD, REV, and other commands for digital input).
4) Write function data.

Frequency Reference Command Register

Inverter Frequency Reference Register: 2502 (Hexadecimal) - Bit 0 – Bit 15: 0.00 ~ 599.00 Hz

Examples:

Frequency Reference Command: 10.00 Hz (Inverter Node Address: 01)

Command String (hexadecimal): 01 06 25 02 03 E8 23 B8

To set the frequency reference to 10.00, a value of ‘1000’ (03E8h) has to be send to the inverter.

Frequency Reference Command: 30.00 Hz (Inverter Node Address: 01)

Command String (hexadecimal): 01 06 25 02 0B B8 24 44

To set the frequency reference to 30.00, a value of ‘3000’ (0BB8h) has to be send to the inverter.

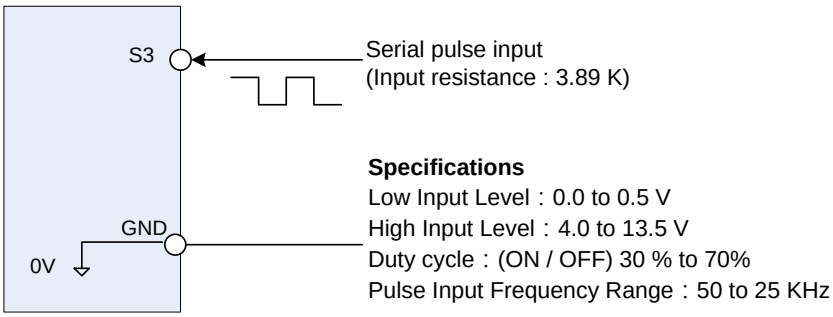
Frequency Reference Command: 60.00 Hz (Inverter Node Address: 01)

Command String (hexadecimal): 01 06 25 02 17 70 2D 12

To set the frequency reference to 60.00, a value of ‘6000’ (1770h) has to be send to the inverter

Note: The last 2 bytes of the command strings consist of a CRC16 checksum, please refer to section 4.5 of the instruction manual for additional information.

6.4 Reference from Pulse Input (00-05=7)



Set Pulse Input Setup as Frequency Reference

Set parameter 00-05 to 7 and 03-02 to 26 to use the pulse input terminal S3 as the frequency reference source. Next set the pulse frequency (03-27).

When 03-02=26, S3 is used for frequency measurement.

Set the following parameters to use pulse input for speed command:

00-05=7

03-02=26

03-28=1 (adjust if needed)

Example 1:
Pulse input frequency is 20Hz, frequency upper limit is 50Hz (00-12=50.00), and 03-28=1.
Inverter frequency is 20.00Hz

Example 2:
Pulse input frequency is 45Hz, frequency upper limit is 50Hz (00-12=50.00), and 03-28=1.
Inverter frequency is 45.00Hz

Example 3:
Pulse input frequency is 55Hz, frequency upper limit is 50Hz (00-12=50.00), and 03-28=1.
Inverter frequency is 50.00Hz

Example 4:
Pulse input frequency is 2000Hz, frequency upper limit is 599 Hz (00-12=599.00), and 03-28=0.2.
Inverter frequency is 2000 x 0.2 = 400.00Hz

6.5 Change Frequency Unit from Hz to rpm

12-03	Custom Units (Line Speed) Display Mode
Range	【0~65535】Rpm

Set motor rated RPM for the inverter to display the actual motor speed based on the output frequency.
Motor synchronous speed = 120 x Rated frequency ÷ Number of poles.

12- 04	Custom Units (Line Speed) Display Mode
Range	【0】:Drive Output Frequency is Displayed 【1】:Line Speed is Displayed in Integer (xxxxx) 【2】:Line Speed is Displayed with One Decimal Place (xxxx.x) 【3】:Line Speed is Displayed with Two Decimal Places (xxx.xx) 【4】:Line Speed is Displayed with Three Decimal Places (xx.xxx)

Set parameter 12-04 to a value greater than 0 to display motor speed.

7. Operation Method Configuration (Run / Stop)

The inverter offers users several choices to run and stop from different sources. The most commonly used methods are described in the next sections.

Operation command is selected with parameter 00-02.

00-02: Run Command Selection

This function sets the frequency command source.

Setting Range: 0 to 3

To set parameter 00-01:
- After power-up press the **DSP/FUN** key
- Select **00 Basic Fun**
- Press **DATA/ENTER** key
- Select parameter -01 with the **UP/DOWN ▲** and **▼** keys and press the **DATA/ENTER** key.

In the parameter list move cursor to 00-01 with the **UP/DOWN** keys and press **DATA/ENTER** key to select.

00-02	Run Command Selection
Range	**0:** Keypad control **1:** External terminal control **2:** Communication control **3:** PLC

7.1 Run/Stop from the Keypad (00-02=0) – Default Setting

Use the **RUN** key to run the drive in forward direction and the **FWD/REV** key to change the motor direction. (Note: to disable reverse direction set parameter 11-00 to 1)

Press **STOP** key to stop the inverter. (Note: Stop method can be set with parameter 07-09, default is **deceleration to stop)**.

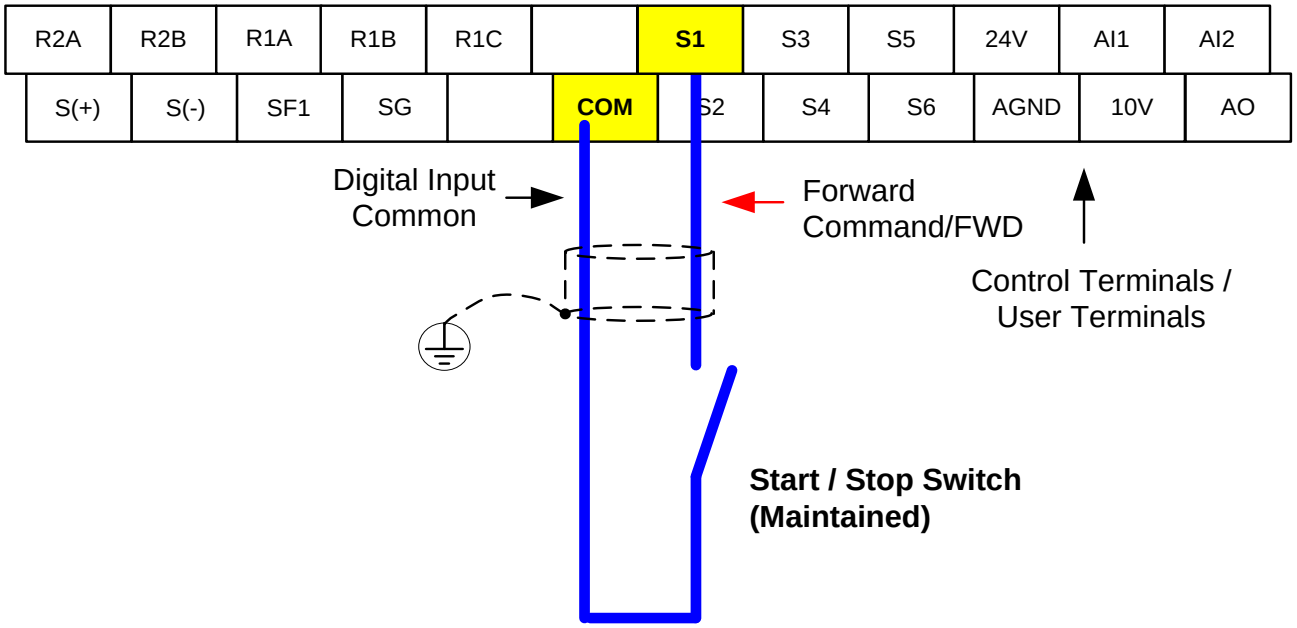
7.2 Run/Stop from External Switch / Contact or Pushbutton (00-02=1)

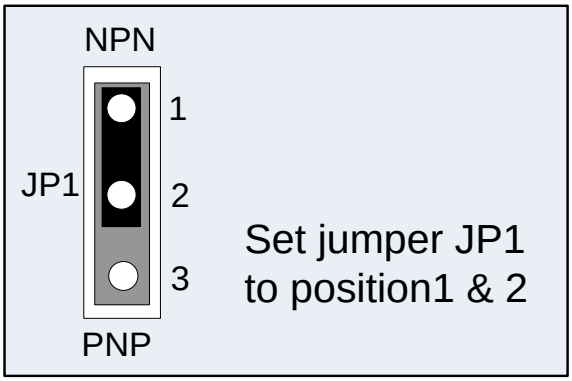
Use an external contact or switch to Run and Stop the inverter.

Set parameter 00-04 to 0 for 2-wire operation, multi-function input terminal S1 is set to run operation forward command.

00-02 Run Command Selection = 1

Permanent Switch / Contact



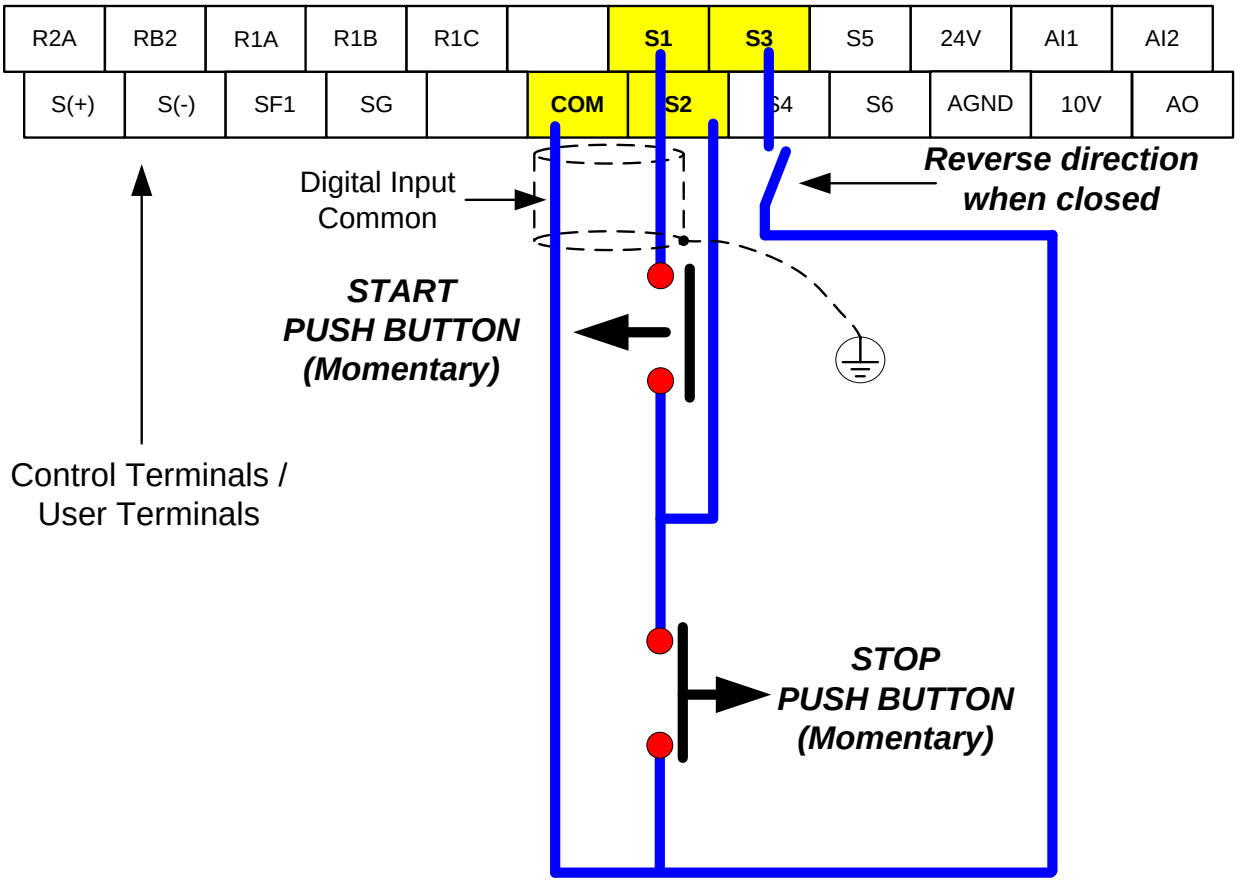


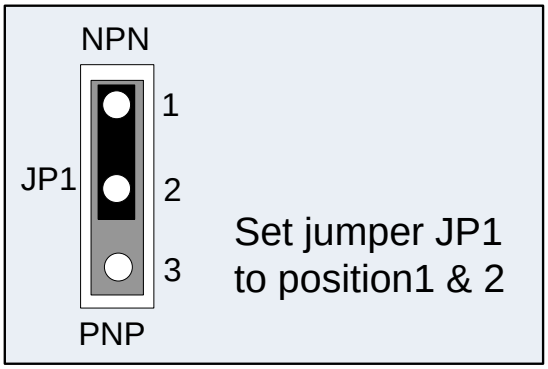
Momentary Contacts (Push Buttons)

Use push button / momentary switch to Run and Stop the inverter.

Set parameter 00-04 to 2 for 3-wire operation, multi-function input terminal S1 is set to run operation, S2 for stop operation and S3 for forward/reverse command.

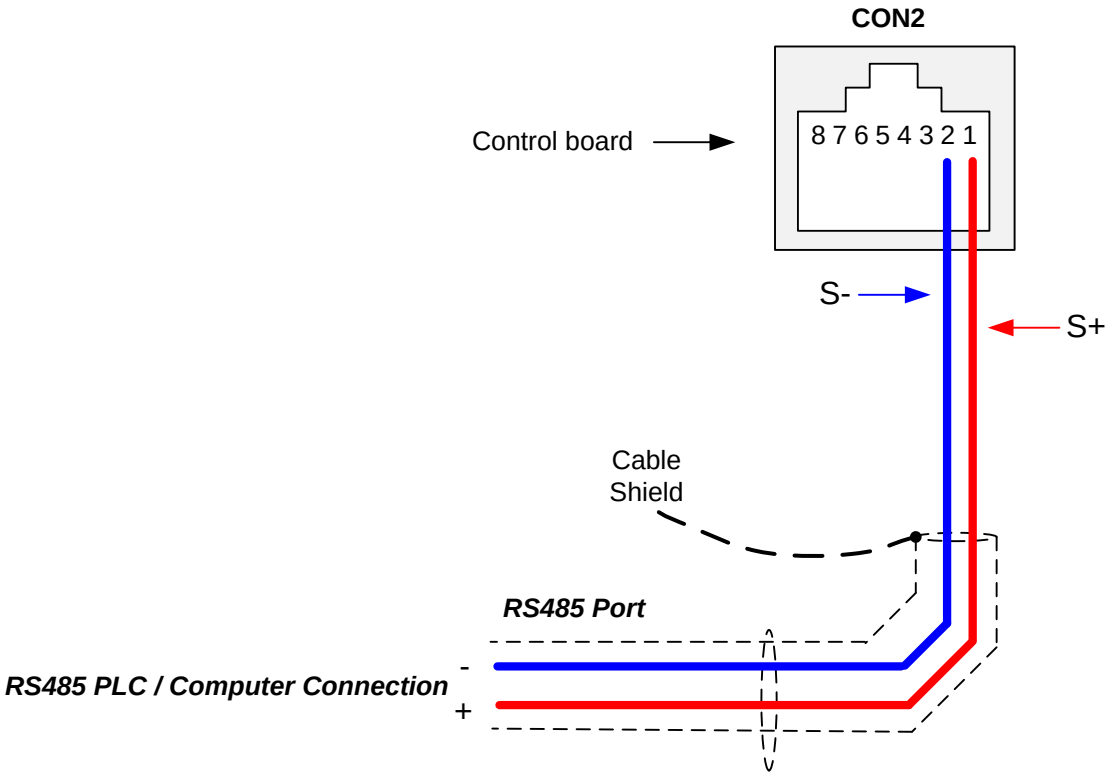
00-02 Run Command Selection = 1





Note: Stop mode selection can be set with parameter 07-09, default is **deceleration to stop**.

7.3 Run/Stop from Serial Communication RS485 (00-02=2)



To control (Run/Stop) the inverter via serial communication parameter 00-02 has be set to a “2” for communication control.

Default Communication Setting is: Address “1”, 9600 Bits/sec, 1 Start Bit, 1 Stop Bit, and No Parity

The serial communication link function uses RS485 Modbus RTU protocol and allows for:
1) Monitoring (data monitoring, function data check).
2) Frequency setting.
3) Operation command (FWD, REV, and other commands for digital input).
4) Write function data.

Command Register

Inverter Command Register: 2501 (Hexadecimal)

Bit 0: Run Forward
Bit 1: Run Reverse
Bit 2 ~ Bit 15: Refer to the chapter XX of this manual

Examples:

Run Forward Command (Inverter Address: 01)

Command String (hexadecimal): 01 06 25 01 00 01 12 C6

Run Reverse Command (Inverter Address: 01)

Command String (hexadecimal): 01 06 25 01 00 03 93 07

Stop Command (Inverter Address: 01)

Command String (hexadecimal): 01 06 25 01 00 00 D3 06

Note: The last 2 bytes of the command strings consist of a CRC16 checksum, please refer to section 4.5 of the instruction manual for additional information.

8. Motor and Application Specific Settings

It is essential that before running the motor, the motor nameplate data matches the motor data in the inverter.

8.1 Set Motor Nameplate Data (02-01, 02-05)

02-05 Motor Rated Power

The nominal motor rated capacity is set at the factory. Please verify that the motor name plate data matches the motor rated capacity shown in parameter 02-05. The setting should only be changed when driving a motor with a different capacity.

Range: 0.1 to 600.0 kW (1HP = 0.746 kW)

To set parameter 02-05:

- After power-up press the **DSP/FUN** key
- Select **02 Motor Parameter**
- Press **READ/ ENTER** key
- Select parameter -01 with the **UP/DOWN** ▲ and ▼ keys and press the **READ/ ENTER** key.

Default values vary based on the inverter model.

02-01 Motor Rated Current

The motor rated current is set at the factory based on the inverter model. Enter the motor rated current from the motor nameplate if it does not match the value shown in parameter 02-01.

Setting range: V/F mode: 10%~200% of inverter rated current. SLV mode: 25%~200% of inverter rated current.

To set parameter 02-01:

- After power-up press the **DSP/FUN** key
- Select **02 Motor Parameter**
- Press **READ/ ENTER** key
- Select parameter -01 with the **UP/DOWN** ▲ and ▼ keys and press the **READ/ ENTER** key.

8.2 Acceleration and Deceleration Time (00-14, 00-15)

Acceleration and Deceleration times directly control the system dynamic response. In general, the longer the acceleration and deceleration time, the slower the system response, and the shorter time, the faster the response. An excessive amount of time can result in sluggish system performance while too short of a time may result in system instability.

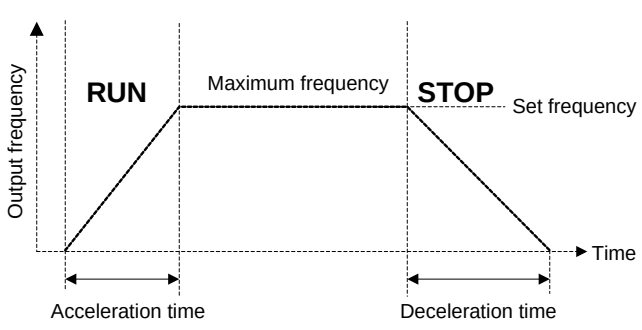
The default values suggested normally result in good system performance for the majority of general purpose applications. If the values need to be adjusted, caution should be exercised, and the changes should be in small increments to avoid system instability.

00-14 Acceleration time 1
00-15 Deceleration time 1

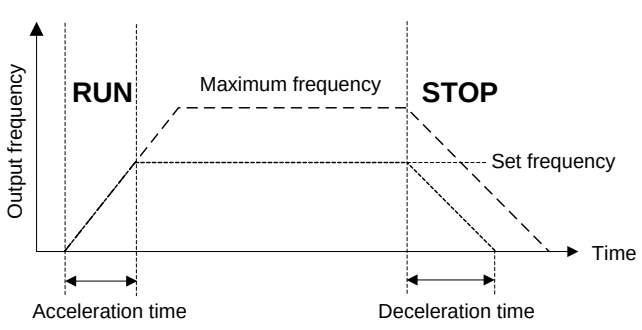
These parameters set the acceleration and deceleration times of the output frequency from 0 to maximum frequency and from maximum frequency to 0.

To set parameter 00-14 or 00-15:
- After power-up press the **DSP/FUN** key
- Select **00 Basic Fun**
- Press **READ/ ENTER** key
- Select parameter -14 or -15 with the **UP/DOWN ▲** and **▼** keys and press the **READ/ ENTER** key.

Acceleration and deceleration times are represented by the three most significant (high order) digits. Set acceleration and deceleration times with respect to maximum frequency. The relationship between the set frequency value and acceleration/deceleration times is as follows:



Set Frequency = Maximum Frequency



Set Frequency < Maximum Frequency

Note: If the set acceleration and deceleration times are set too low, the torque limiting function or stall prevention function can become activated if the load torque and or inertia are relatively high. This will prolong the acceleration and or deceleration times and not allow the set times to be followed. In this case the acceleration and or the deceleration times should be adjusted.

8.3 Torque Boost (V/f Curve Modification) (01-10)

This parameter sets the relationship between output frequency and output voltage. Constant torque applications have the same torque requirements at low speed as well as at high speed.

Initial Setup

For Variable Torque / Normal Duty applications set parameter 01-10 to an initial value of 0.5.

For Constant Torque / Heavy Duty applications set parameter 01-10 to an initial value of 1.0.

01-10 Torque compensation gain

This parameter sets the torque boost for motor 1.

Setting range: 0.0 to 2.0

To set parameter 01-10:
- After power-up press the **DSP/FUN** key
- Select **01 V/F Pattern**
- Press **READ/ ENTER** key
- Select parameter -10 with the **UP/DOWN ▲** and **▼** keys and press the **READ/ ENTER** key.

Increase value when:
- The wiring between the inverter and the motor very too long
- The motor size is smaller than the inverter size

Note: Gradually increase the torque compensation value and make sure the output current does not exceed inverter rated current.

Reduce value when:
- Experiencing motor vibration
- Over Current Fault
- Overload Fault

Important: Confirm that the output current at low speed does not exceed the rated output current of the inverter.

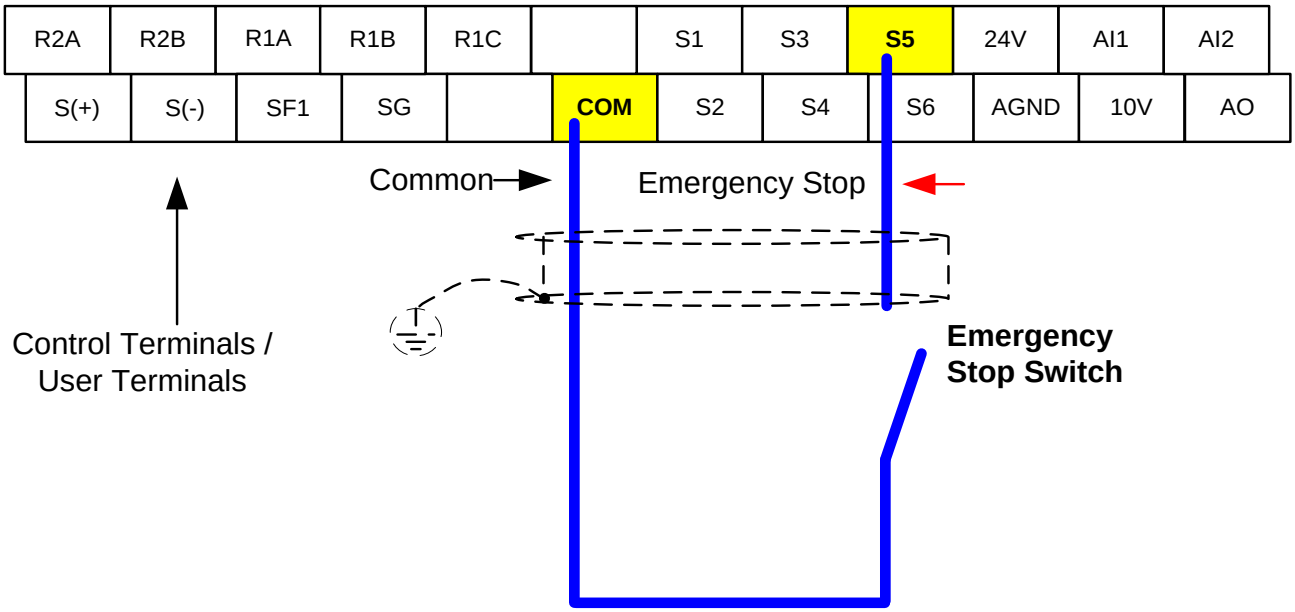
Warning: A larger than required torque compensation gain value creates over-excitation at low speeds, continued operation may cause the motor to overheat. Check the characteristics of the motor for additional information.

8.4 Emergency Stop

Deceleration time 2 is used in combination with multi-function digital input function #14 (Emergency stop). When rapid stop input is activated the inverter will decelerate to a stop using the Deceleration time 2 (00-17) and display the [E.S.] condition on the keypad.

Note: To cancel the emergency stop condition the run command has to be removed and emergency stop input deactivated.

Example: Emergency Stop Switch set for input terminal S5 (03-04 = 14).

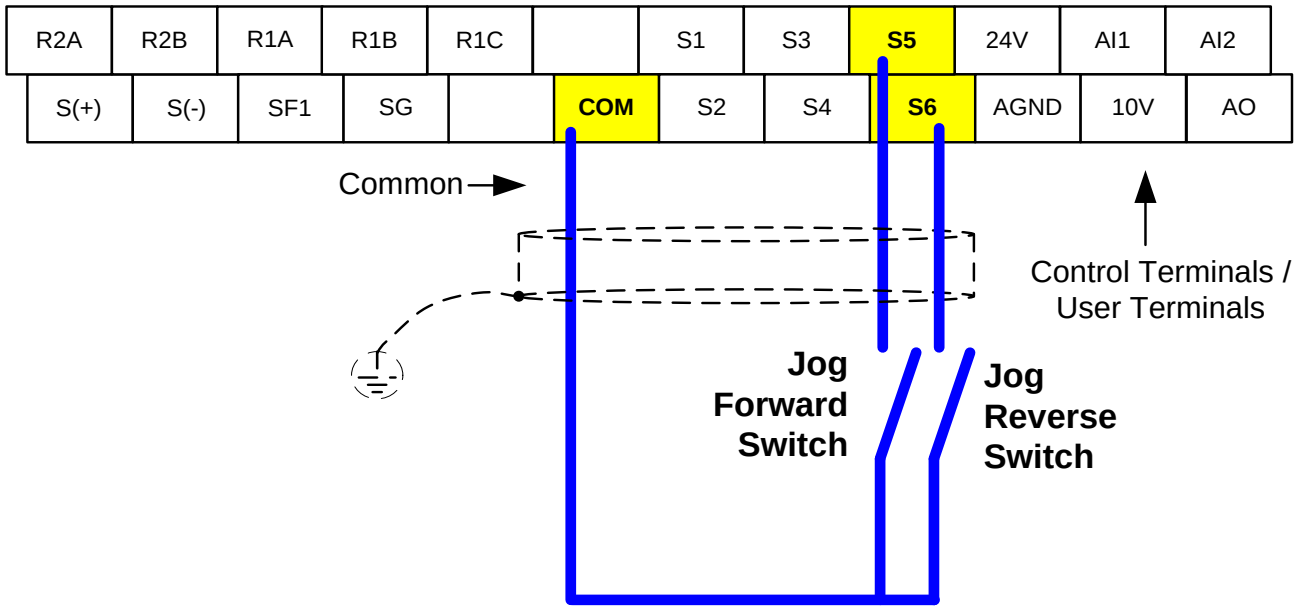


00-17	Deceleration Time 2
Range	0.1~6000.0 Sec

8.5 Forward and Reverse Jog

The jog forward command is used in combination with multi-function digital input function #6 (Jog Forward) and the jog reverse command is used in combination with multi-function digital input function #7 (Jog Reverse).

Example: Jog Forward input terminal S5 (03-04 = 06) and Jog Reverse input terminal S6 (03-05=7)



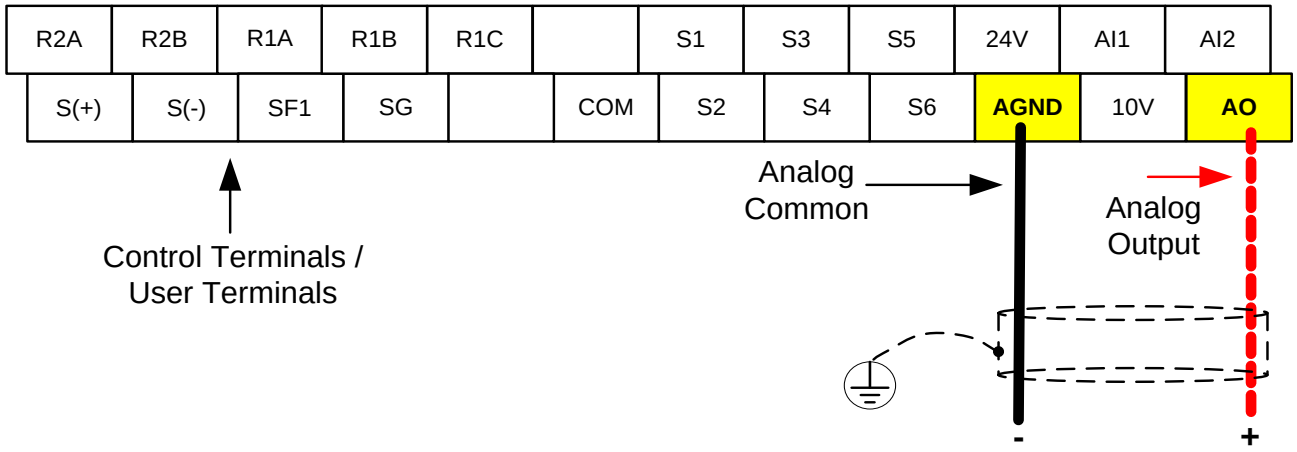
8.6 Analog Output Setup

Signal: Use parameter 04-11 to select the analog output signal for AO.

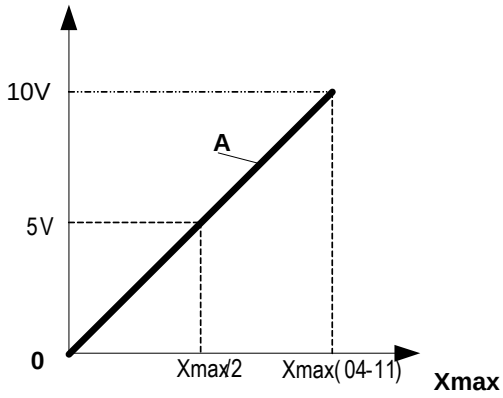
Gain: Use parameter 04-12 to adjust the gain for AO. Adjust the gain so that the analog output (10V) matches 100% of the selected analog output signal (04-11). Use parameter 04-15 to set slope direction.

Bias: Use parameter 04-13 to adjust the bias for AO. Adjust the bias so that the analog output (0V) matches 0% of the selected analog output signal (04-11).

Example: Analog Output Wiring



Example: Set 04-11 as required according to the table below.



04-11	A	Xmax
【0】	Output frequency	upper frequency limit
【1】	Frequency Setting	upper frequency limit
【2】	Output voltage	Motor Rated Voltage
【3】	DC Bus Voltage	220V: 0~400V 440V: 0~800V
【4】	Output current	rated current of inverter

04-12	**AO Gain**
Range	**【0 ~ 1000.0】%**
04-13	**AO Bias**
Range	**【-100.0 ~ 100.0】%**
04-15	**AO Slope**
Range	**【0】: Positive 【1】: Negative**

Note: The max output voltage is 10Vdc limited by the inverter hardware. Use external devices that require a maximum of 10Vdc signal.

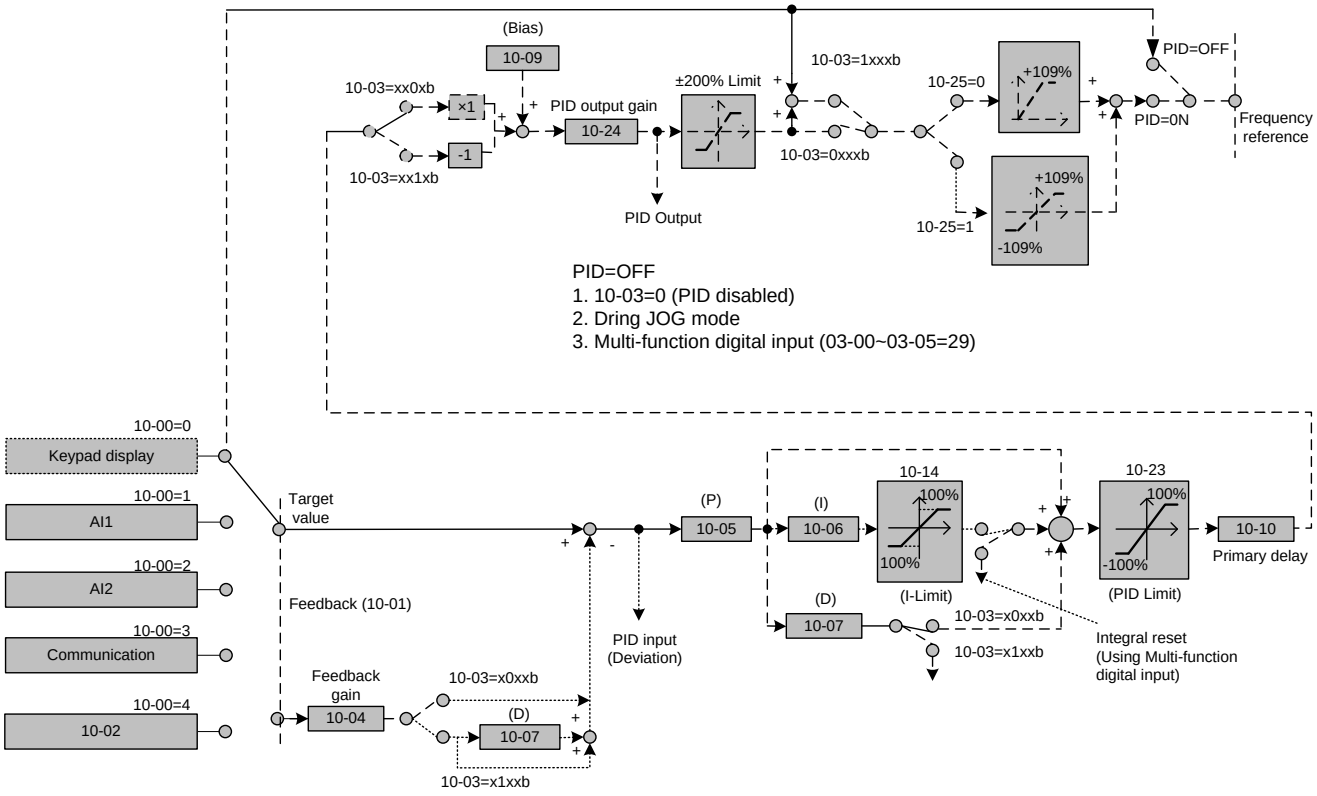
9. Using PID Control for Constant Flow / Pressure Applications

9.1 What is PID Control?

The PID function in the inverter can be used to maintain a constant process variable such as pressure, flow, temperature by regulating the output frequency (motor speed). A feedback device (transducer) signal is used to compare the actual process variable to a specified setpoint.

The difference between the set-point and feedback signal is called the error signal.

The PID control tries to minimize this error to maintain a constant process variable by regulating the output frequency (motor speed).



The amplitude of the error can be adjusted with the Proportional Gain parameter 10-05 and is directly related to the output of the PID controller, so the larger gain the larger the output correction.

Example 1:	**Example 2:**
Gain = 1.0	Gain = 2.0
Set-Point = 80%	Set-Point = 80%
Feedback = 78%	Feedback = 78%
Error = Set-point - Feedback = 2%	Error = Set-point - Feedback = 2%
Control Error = Gain x Error = 2%	Control Error = Gain x Error = 4%

Please note that an excessive gain can make the system unstable and oscillation may occur.

The response time of the system can be adjusted with the Integral Gain set by parameter 10-06. Increasing the Integral Time will make the system less responsive and decreasing the Integral Gain Time will increase response but may result in instability of the total system.

Slowing the system down too much may be unsatisfactory for the process. The end result is that these two parameters in conjunction with the acceleration (00-14) and deceleration (00-15) times are adjusted to achieve optimum performance for a particular application.

For typical fan and pump applications a Proportional Gain (10-05) of 2.0 and an Integral Time (10-06) of 5.0 sec. is recommended.

10-03 PID control mode

PID control can be enabled by setting parameter 10-03 to a value greater than 0.

10-03	**PID Mode Selection**
Range	xxx0b：PID Disable
	xxx1b：PID Enable
	xx0xb：PID Positive Characteristic
	xx1xb：PID Negative Characteristic
	x0xxb：PID Error Value of D Control
	x1xxb：PID Feedback Value of D Control
	0xxxb：PID Output
	1xxxb：PID Output + Frequency Command

Commonly used PID control modes

1: Forward operation: PID operation enabled, motor speeds increases when feedback signal is smaller than set-point (most fan and pump applications)

3: Reverse operation: PID operation enabled, motor slows down when feedback signal is smaller than set-point (e.g. level control applications)

To set parameter 10-03:

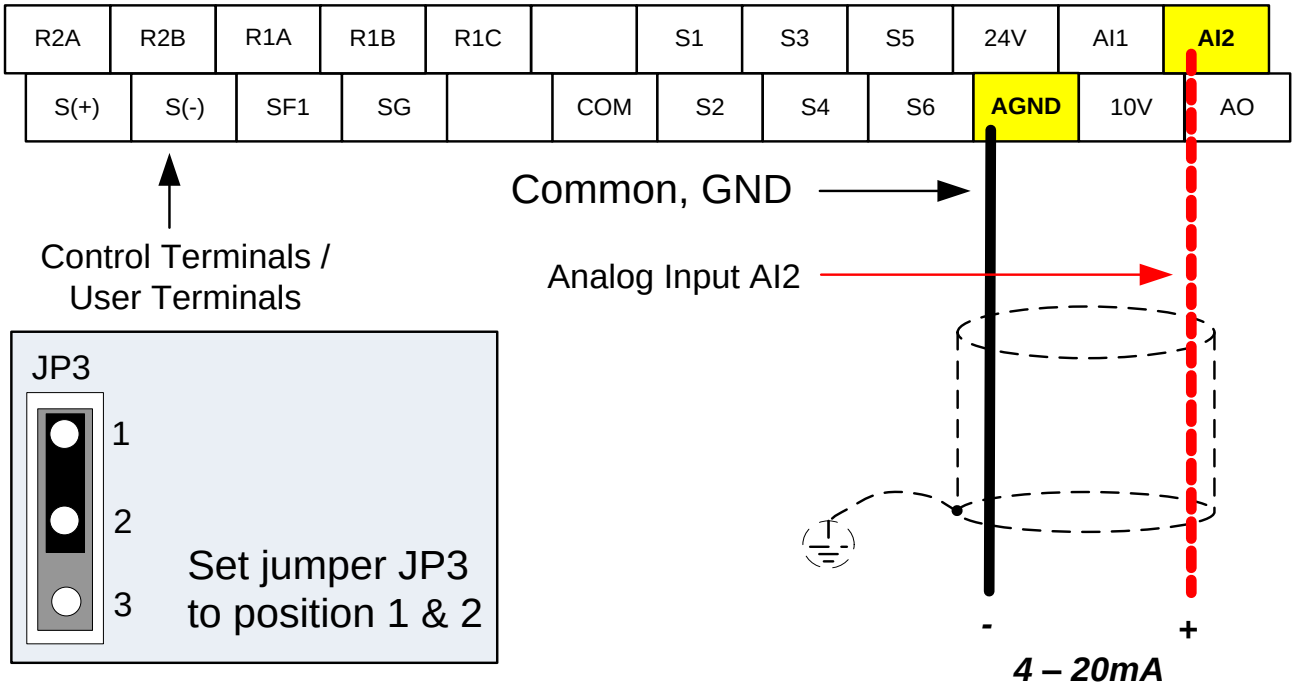
- After power-up press the **MODE** key
- Select 10-03 using the arrow keys and up/down keys
- Press **</ENTER** key
- Set parameter 10-03 using the arrow keys and **</ENTER** key to save setting.

9.2 Connect Transducer Feedback Signal (10-01)

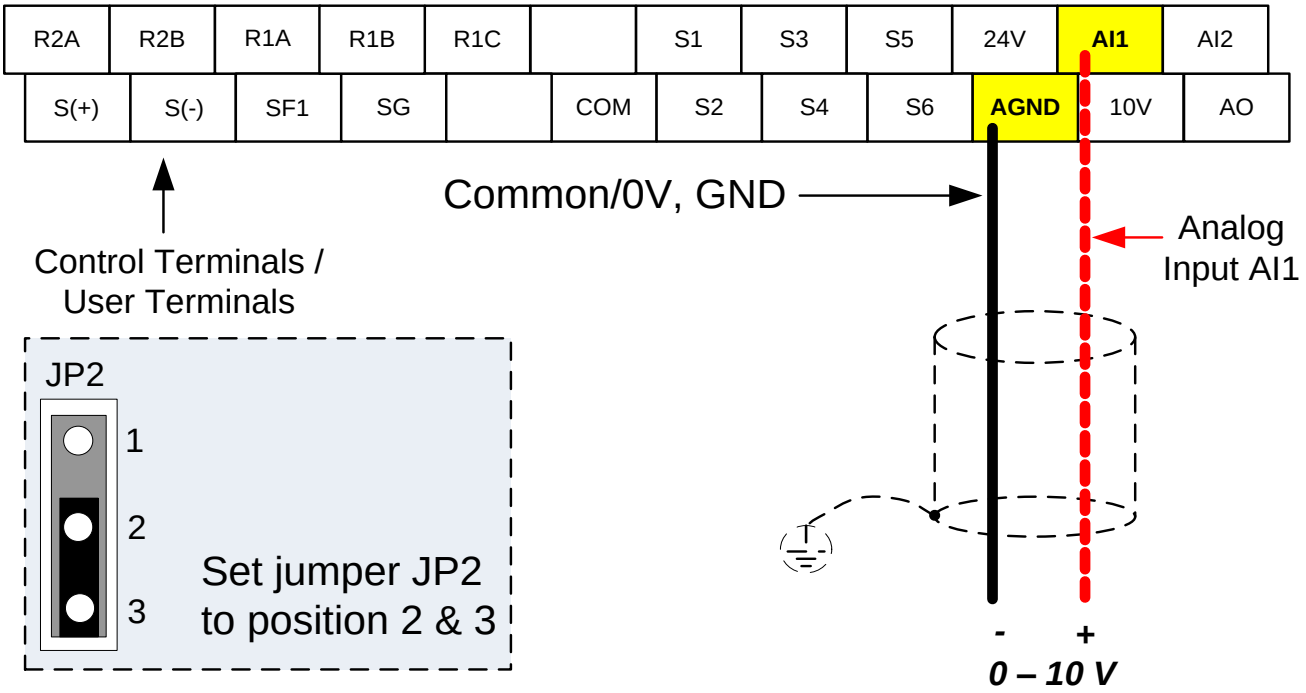
The PID function in the inverter

Depending on the type of feedback transducer used, the inverter can be setup for either 0-10V or a 4-20mA feedback transducer.

Feedback Signal 4 – 20mA (10-01 = 2)



Feedback Signal 0 – 10V (10-01 = 1)



9.3 Engineering Units

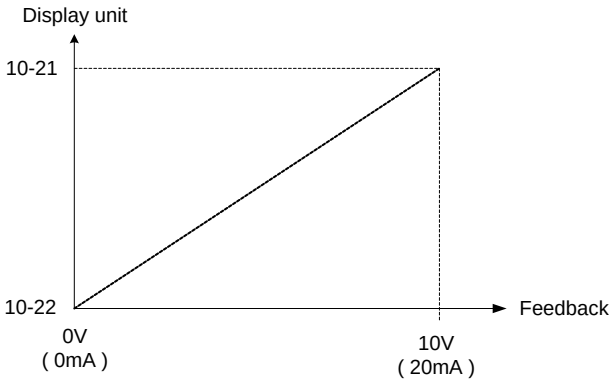
PID Feedback Display Scaling

The PID feedback signal can be scaled to represent actual engineering units. Use parameter 10-33 to set the feedback signal maximum scaling.

Example:

Feedback signal is a pressure transducer (0-10V/0-20mA) with a range of 0 – 200 PSI
0V/0mA = 0 PSI, 10V/20mA = 200 PSI.

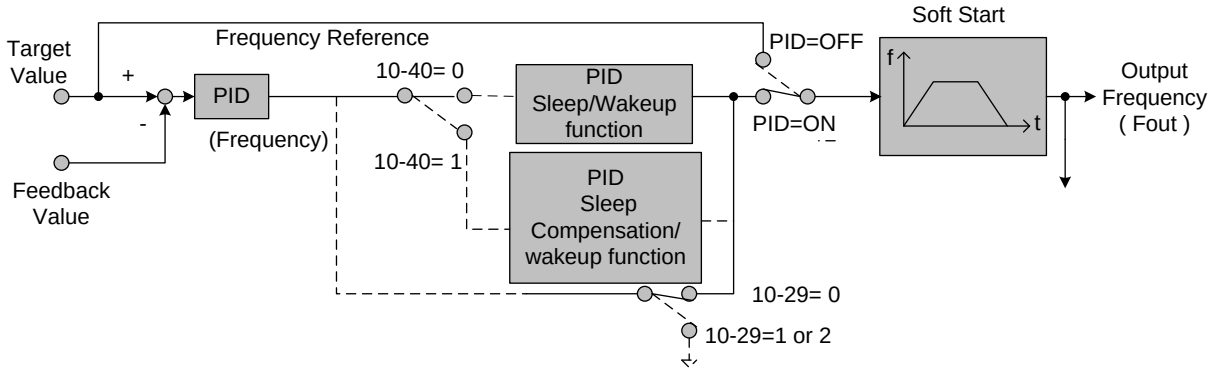
Set parameter 10-33 to 200 maximum of transducer range (100%).

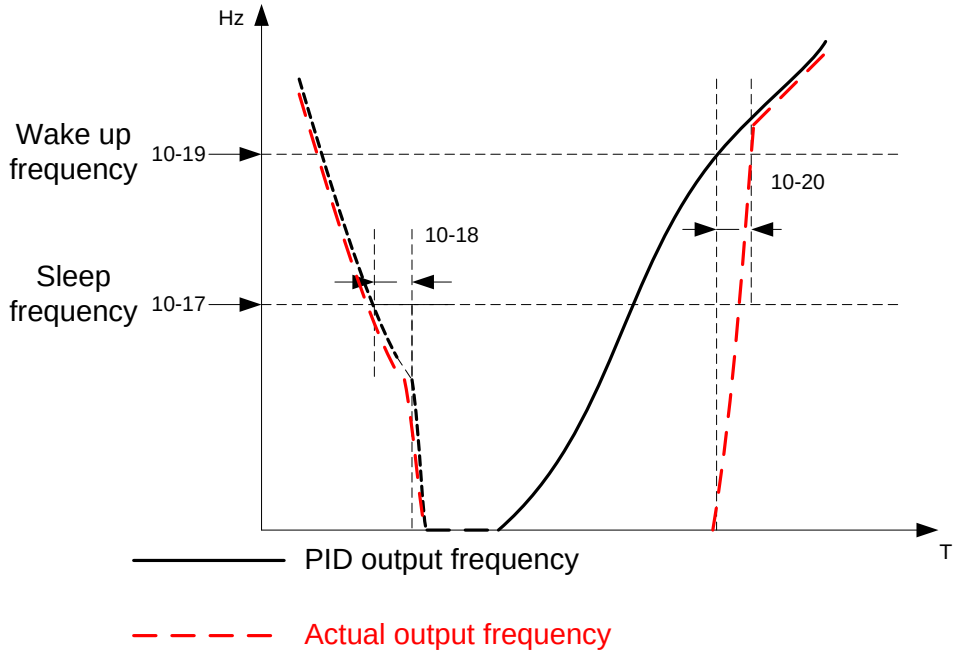


9.4 Sleep / Wakeup Function

The PID Sleep function can be used to prevent a system from running at low speeds and is frequently used in pumping application. The PID Sleep function is turned on setting parameter 10-29 to a value greater than 0. The inverter output turns off when the PID output falls below the PID sleep level (10-17) for the time specified in the PID sleep delay time parameter (10-18).

The inverter wakes up from a sleep condition when the PID output (Reference frequency) rises above the PID wake-up frequency (10-19) for the time specified in the PID wake-up delay time (10-20).





PID Sleep Function

10. Troubleshooting, Fault Diagnostics and Maintenance

10.1 General

Inverter fault detection and early warning / self-diagnosis function. When the inverter detects a fault, a fault message is displayed on the keypad.

When the inverter detects a warning / self-diagnostics error, the digital operator will display a warning or self-diagnostic code, the fault output does not energize in this case. Once the warning is removed, the system will automatically return to its original state.

10.2 Fault Detection Function

When a fault occurs, refer to Table 10.2.1 for possible causes and appropriate measures.

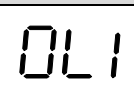
Use one of the following methods to restart:
1. Set one of multi-function digital input terminals (03-00 ~ 03-05) to 17 (Fault reset); activate input
2. Press the reset button on the keypad.
3. Power down inverter wait until keypad goes blank and power-up the inverter again.

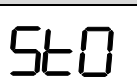
When a fault occurs, the fault message is stored in the fault history (see group 12 parameters).

Table 10.2.1 Fault information and possible solutions

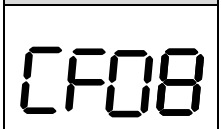
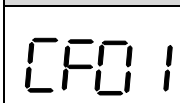
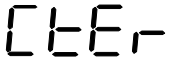
LED display	Description	Cause	Possible solutions
Over Current OC	The inverter output current exceeds the overcurrent level (200% of the inverter rated current).	• Acceleration / Deceleration time is set too short. • Contactor installed at the inverter output side. • Motor rating exceeds inverter rating. • Short circuit or ground fault.	• Extend acceleration / deceleration time. • Check the motor wiring. • Disconnect motor and try running inverter.
Over Current OCA	The inverter output current exceeds the overcurrent level in acceleration time	• Acceleration time set too short • Motor rating is exceeds inverter rating. • Short circuit between winding and shell of motor • Short circuit between wire and ground of motor • IGBT failure	• Set the longer acceleration time • Change to bigger capacity of inverter • Examine motor • Check the wire • Replace IGBT module
Over Current OCC	The inverter output current exceeds the overcurrent level in acceleration time	• Acceleration time set too short • Motor rating is exceeds inverter rating • Short circuit between motor winding and motor casing • Short circuit between wire and ground of motor • IGBT failure	• Set the longer acceleration time • Change to bigger capacity of inverter • Check motor • Check wiring • Replace IGBT module

LED display	Description	Cause	Possible solutions
Over Current 	The inverter output current exceeds the overcurrent level during deceleration	• Deceleration time is set too short	• Set longer acceleration time
Ground Fault 	The ground fault exceeds 50% of the inverter rated output current (08-23 = 1, GF function is enabled).	• Motor damaged (insulation). • Wire damage or deterioration. • Inverter DCCT sensors defect.	• Replace motor. • Check motor wiring. • Disconnect motor and try running inverter. • Check resistance between cables and ground. • Reduce carrier frequency.
Over voltage 	DC bus voltage exceeds the OV detection level: 200V class: 410Vdc 400V class: 820Vdc	• Deceleration time set too short, resulting in regenerative energy flowing back from motor to the inverter. • The inverter input voltage is too high. • Use of power factor correction capacitors. • Excessive braking load. • Braking transistor or resistor defective. • Speed search parameters set incorrectly.	• Increase deceleration time • Reduce input voltage to comply with the input voltage requirements or install an AC line reactor to lower the input voltage. • Remove the power factor correction capacitor. • Use dynamic braking unit. • Replace braking transistor or resistor. • Adjust speed search parameters.
Under Voltage 	DC bus voltage is lower than the UV detection level or the pre-charge contactor is not active while the inverter is running. 200V class: 190Vdc 400V class: 380Vdc The detection value can be adjusted by 07-13).	• The input voltage is too low. • Input phase loss. • Acceleration time set too short. • Input voltage fluctuation. • Pre-charge contactor damaged. • DC bus voltage feedback signal value not incorrect.	• Check the input voltage. • Check input wiring. • Increase acceleration time. • Check power source • Replace pre-charge contactor • Replace control board or complete inverter.

LED display	Description	Cause	Possible solutions
Input phase loss 	Phase loss at the input side of the inverter or input voltage imbalance, active when 08-09 = 1 (enabled).	• Loose wire at inverter input terminal. • Momentary power loss. • Input voltage imbalance.	• Check input wiring. • Fasten wire terminal screws. • Check power supply.
Output phase loss 	Phase loss at the output side of the inverter, active when 08-10 = 1 (enabled).	• Wiring loose at inverter output terminal. • Motor rated current is less than 10% of the inverter rated current.	• Check output wiring / fasten screws. • Check motor & inverter rating.
OH1 Heatsink overheat 	The temperature of the heat sink is too high. Note: when OH1 fault occurs three times within five minutes, requires to wait 10 minutes before the inverter can be reset.	• Ambient temperature too high. • Cooling fan failed. • Carrier frequency set too high. • Load too heavy.	• Install fan or AC to cool surroundings. • Replace cooling fan. • Reduce carrier frequency. • Reduce load / Measure output current
OH4 Motor overheating 	Motor overheating, PTC (Positive Temperature Coefficient) exceeds the overheat protection level.	• The surrounding temperature of the motor is too high. • The PTC input (Positive Temperature Coefficient) exceeds the overheat protection level.	• Check the surrounding Temperature of the motor. • Check the MT and GND terminal wiring.
OL1 Motor overload 	Internal motor overload protection tripped, active when protection curve 08-05 = xxx1.	• Voltage setting in V/F mode set too high, resulting in over-excitation of the motor. • Motor rated current (02-01) set incorrectly. • Load too heavy.	• Check V/f curve. • Check motor rated current • Check and reduce motor load, check application operation duty cycle.
OL2 Inverter overload 	Inverter thermal overload protection tripped. If an inverter overload occurs 4 times in five minutes, requires to wait 4 minutes before the inverter can be reset.	• Voltage setting in V/F mode set too high, resulting in over-excitation of the motor. • Inverter rating to small. • Load too heavy.	• Check V/f curve. • Replace inverter with larger size inverter. • Check and reduce motor load, check application operation duty cycle.

LED display	Description	Cause	Possible solutions
OT **Over torque detection** 	Inverter output torque is higher than 08-15 (over torque detection level) for the time specified in 08-16. Parameter 08-14 = 0 to activate.	• Load too heavy.	• Check over torque detection parameters (08-15 / 08-16). • Check and reduce motor load, check and operation duty cycle.
Comm. Error 	No Modbus communication received for the time specified in 09-06 (communication error detection time). Active when 09-07(= 0 to 2).	• Connection lost or wire broken. • Host stopped communicating.	• Check connection. • Check host computer / software.
PID feedback loss 	PID feedback signal falls below level specified in 10-12 (PID feedback loss detection level) for the time specified in 10-13 (Feedback loss detection time). Active when parameter (10-11 = 2).	• Feedback signal wire broken • Feedback sensor broken.	• Check feedback wiring. • Replace feedback sensor.
Safety 1 Error 	STO terminal 1 error	• Terminal board Input SF1 and SG are not connected	• Check SF1 and SG Connection.
Safety 2 Error 	STO terminal 2 error	• Terminal board Input SF2 and SG are not connected	• Check SF2 and SG Connection.
Safety 3 Error 	STO terminal 3 error	• Transformer voltage output of inverter is not stable.	• Replace the power board • Contact with TECO

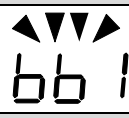
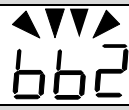
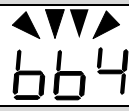
LED display	Description	Cause	Possible solutions
External fault 0 EF0	External fault (Modbus)	• Modbus communication 0x2501 bit 2= "1"	Reset Modbus communication 0x2501 bit 2= "1"
External fault (S1) EF1	External fault (Terminal S1) Active when 03-00= 25, and Inverter external fault selection 08-24=0 or 1.	• Multifunction digital input external fault active.	Multi-function input function set incorrectly. Check wiring
External fault (S2) EF2	External fault (Terminal S2) Active when 03-01= 25, and Inverter external fault selection 08-24=0 or 1.		
External fault (S3) EF3	External fault (Terminal S3) Active when 03-02= 25, and Inverter external fault selection 08-24=0 or 1.		
External fault (S4) EF4	External fault (Terminal S4) Active when 03-03= 25, and Inverter external fault selection 08-24=0 or 1.		
External fault (S5) EF5	External fault (Terminal S5) Active when 03-04= 25, and Inverter external fault selection 08-24=0 or 1.		
External fault (S6) EF6	External fault (Terminal S6) Active when 03-05= 25, and Inverter external fault selection 08-24=0 or 1.		
Motor Control Fault CF07	Motor control fault	• SLV mode is unable to run motor.	Perform rotational or stationary auto-tune Increase minimum output frequency (01-08)

LED display	Description	Cause	Possible solutions
Motor control fault 	Motor control fault	• Start or Run fault in PMSLV mode.	• Increase the value of 22-10 and 22-23. • Perform auto-tune (22-21) • Check if the load is too heavy to raise torque output limit.
Operator Communication Error 	Communication error between inverter and LCD keypad.	• LCD keypad and inverter cannot transmit data after power on 5 seconds.	• Disconnect the operator and then reconnect. • Replace control board.
Operator Communication Error 2 	Communication error between inverter and LCD keypad.	• LCD keypad and inverter can transmit data but transmission error occurs for more than 2 seconds	• Disconnect the operator and then reconnect. • Replace control board.
Current Transducer Error 	Three phase input voltage detection level error	• Input voltage abnormal • Input voltage noise is too high • Control board malfunction	• Check input voltage and the voltage signal of control board
PTC Error 	PTC wires disconnected	• PTC wires disconnected for more than 10 seconds.	• Check the MT and GND connection
Operator Disconnection 	When 00-02=0 and operator is disconnected while inverter is running. Fault action selection set by parameter 16-09.	• When 00-02=0, warning is displayed when operator is disconnected.	• Check the keypad operator connection.

LED display	Description	Cause	Possible solutions
Short Circuit 	Inverter output short circuit or ground fault.	• Short circuit or ground fault (08-23 = 1). • Motor damaged (insulation). • Wire damage or deterioration.	Check motor wiring. Disconnect motor and try running the inverter.

Table 2 Warning/Self-diagnosis and Corrective actions

LED display	Description	Cause	Possible solutions
OV (flash) Over voltage 	DC bus voltage exceeds the OV detection level： 200V class：410Vdc 400V class：820Vdc (for 400V class, if input voltage 01-14 is set lower than 400V, the OV detection value will is decreased to 700Vdc)	• Deceleration time set too short, resulting in regenerative energy flowing back from motor to the inverter. • The inverter input voltage is too high. • Use of power factor correction capacitors. • Excessive braking load. • Braking transistor or resistor defective. • Speed search parameters set incorrectly.	• Increase deceleration time • Reduce input voltage to comply with the input voltage requirements or install an AC line reactor to lower the input voltage. • Remove the power factor correction capacitor. • Use dynamic braking unit. • Replace braking transistor or resistor. • Adjust speed search parameters.
UV (flash) under voltage 	DC bus voltage is lower than the UV detection level or the pre-charge contactor is not active while the inverter is running. 190Vdc：200V class; 380Vdc：400V class (the detection value can be adjusted with parameter 07-13)	• The input voltage is too low. • Input phase loss. • Acceleration time set too short. • Input voltage fluctuation. • Pre-charge contactor damaged. • DC bus voltage feedback signal value incorrect.	• Check the input voltage. • Check input wiring. • Increase acceleration time. • Check power source • Replace pre-charge contactor • Replace control board or complete inverter.
OH1 (flash) Heatsink overheat 	The temperature of the heat sink is too high. Note: when OH1 fault occurs three times within five minutes, it is required to wait 10 minutes before the inverter can be reset.	• Ambient temperature too high. • Cooling fan failed • Carrier frequency set too high. • Load too heavy.	• Install fan or AC to cool surroundings. • Replace cooling fan. • Reduce carrier frequency. • Reduce load / Measure output current
OH2 (flash) Inverter over Heating warning 	Inverters overheat warning. Multi-function digital input set to 31. (03-00~03-05=31)	• Multifunction digital input overheat warning active	• Multi-function input function set incorrectly. • Check wiring

LED display	Description	Cause	Possible solutions
OT (flash) Over torque detection 	Inverter output torque is higher than 08-15 (over torque detection level) for the time specified in 08-16. Parameter 08-14 = 0 to activate.	Load too heavy.	Check over torque detection parameters (08-15 / 08-16). Check and reduce motor load, check and operation duty cycle.
bb1 (flash) External baseblock 	External base block (Terminal S1)	Multifunction digital input external baseblock active.	Multi-function input function set incorrectly. Check wiring
bb2 (flash) External baseblock 	External base block (Terminal S2)		
bb3 (flash) External baseblock 	External base block (Terminal S3)		
bb4 (flash) External baseblock 	External base block (Terminal S4)		
bb5 (flash) External baseblock 	External base block (Terminal S5)		
bb6 (flash) External baseblock 	External base block (Terminal S6)		

LED display	Description	Cause	Possible solutions
OL1 Motor overload 	Internal motor overload protection tripped, active when protection curve 08-05 = xxx1.	• Voltage setting V/F mode too high, resulting in over-excitation of the motor. • Motor rated current (02-01) set incorrectly. • Load too heavy.	Check V/f curve. Check motor rated current Check and reduce motor load, check application duty cycle.
OL2 Inverter overload 	Inverter thermal overload protection tripped. If an inverter overload occurs 4 times in five minutes, it is required to wait 4 minutes before resetting the fault.	• Voltage setting V/F mode too high, resulting in over-excitation of the motor. • Motor rated current (02-01) set incorrectly. • Load too heavy.	Check V/f curve. Check motor rated current Check and reduce motor load, check application duty cycle
CE (flash) communication error 	No Modbus communication received for 2 sec. Active when 09-07=3.	• Connection lost or wire break. • Host stopped communicating.	Check connection Check host computer / software.
Over current protection level B 	Inverter current reaches the current protection level B.	• Inverter current too high. • Load too heavy.	Check load and application duty cycle.
Retry (flash) retry 	Automatic reset activated, warning is displayed until restart delay time set (07-01) expires.	• Parameter 07-01 set to a value greater than 0. • Parameter 07-02 set to a value greater than 0.	Warning disappears after automatic reset.

LED display	Description	Cause	Possible solutions
EF1 (flash) External fault (S1) 	External fault (Terminal S1) Active when 03-00= 25, and Inverter external fault selection 08-24=2.	Multifunction digital input external fault active and parameter 08-24 set to 2 for operation to continue.	Multi-function input function set incorrectly. Check wiring.
EF2 (flash) External fault (S2) 	External fault (Terminal S2) Active when 03-01= 25, and Inverter external fault selection 08-24=2.		
EF3 (flash) External fault (S3) 	External fault (Terminal S3) Active when 03-02= 25, and Inverter external fault selection 08-24=2.		
EF4 (flash) External fault (S4) 	External fault (Terminal S4) Active when 03-03= 25, and Inverter external fault selection 08-24=2.		
EF5 (flash) External fault (S5) 	External fault (Terminal S5) Active when 03-04= 25, and Inverter external fault selection 08-24=2.		
EF6 (flash) External fault (S6) 	External fault (Terminal S6) Active when 03-05= 25, and Inverter external fault selection 08-24=2.		

LED display	Description	Cause	Possible solutions
EF9 (flash) error of forward/ reverse rotation 	Forward run and reverse run are active within 0.5 sec of each other. Stop method set by parameter 07-09.	Forward run and reverse run active (see 2-wire control).	Check run command wiring
Rang setting error 	Parameter setting falls outside the allowed range.	Some parameter ranges are determined by other inverter parameters which could cause an out of range warning when the dependency parameter is adjusted. Example: 02-00>02-01,or 20>02-21 2.00-12>00-13, 00-07 =1, 00-05=00-06 02-03>02-06 or 02-22>02-25 20-16<20-15	Check parameter setting.
Digital input terminal error 	Multi-function input setting error.	Multi-function digital input terminals (03-00 to 03-05) are set to the same function (not including ext. fault and not used.) or: UP/DOWN commands are not set at the same time (they must be used together). UP/DOWN commands (08 and 09) and ACC/DEC commands (11) are set at the same time. Speed search 1 (19: maximum frequency) and Speed search 2 (34:from the set frequency) are set at the same time. 03-00~03-05 set two-wire and three-wire in the same time.	Check multi-function input setting.
V/f curve error 	V/f curve setting error.	V/F curve setting error. 01-02(Fmax)>01-12 (Fbase)>01-06 (Fmid1)>01-08(Fmin) 01-16(Fmax2)> 01-24(Fbase2)> 01-20(Fmid1)> 01-22(Fmin2)	Check V/F parameters

LED display	Description	Cause	Possible solutions
PID selection error 	PID selection error.	• 10-00 and10-01 set to 1(AI1) or set to 2(AI2). • When 23-05=0 and 10-33 >= 1000 or 10-34≠1.	• Check 10-00 and 10-01 • Check 10-33,10-34, 23-05.
Model selection error 	Inverter capacity setting error: Inverter capacity setting 13-00 does not match the rated voltage.	• Inverter capacity setting does not match voltage class (13-00).	• Check inverter capacity setting 13-00.
PI setting error 	Inverter PI setting error	• Inverter pulse input selection (03-30) selection conflicts with PID source (10-00 and 10-01).	• Check pulse input selection (03-30) and PID source (10-00 and 10-01).
FB (flash) PID feedback breaking 	PID feedback signal falls below level specified in 10-12 (PID feedback loss detection level) for the time specified in 10-13 (Feedback loss detection time). Active when parameter (10-11 = 1).	• Feedback signal wire break • Feedback sensor broken.	• Check feedback wiring • Replace feedback sensor.
USP (flash) Unattended Start Protection 	Unattended Start Protection (USP) is enabled (enabled at power-up.)	• USP at power-up (activated by multi-function digital input) is enabled. The inverter will not accept a run command. • While the warning is active the inverter does not accept a run command. (See parameter 03-00 - 03-08 = 50).	• Remove run command or reset inverter via multi-function digital input (03-00 to 03-07 = 17) or use the RESET key on the keypad to reset inverter. • Activate USP input and re-apply the power.
Fire mode enabled 	Fire mode enabled	• Fire mode enabled.	• Check for fire. If case of no fire, turn off the power and power on again.
Parameter setting Error 	Parameter setting error	• The parameter setting is incorrect.	• Please refer to the manual for correct setting

LED display	Description	Cause	Possible solutions
Direct start warning 	The inverter can't start directly, due to 07-04=1	• Run command from the terminal is enabled and 07-04=1	Remove the run command from the terminal first, and enabled later.
External Terminal Stop Error 	External Terminal is main run command source selection (00-02=1) and run command executes but executes stop command from keypad.	• Run command executes from external terminal but executes stop command from keypad.	Remove the run command from external terminal
Voltage on C/B Error 	The voltage on the control board error	• Errors of detecting voltages • Noises too much • Control board failure	Check the voltage on the control board.
EEPROM Save Error 	The data save in EEPROM is wrong.	• EEPROM circuit failure. Parameter check error after power on.	Restore factory setting, then cut off the power and power on again. If warning again, replace control board.
Control Board Error 	Firmware can't meet Control board.	• Firmware not compatible with Control board.	Replace the control board.
Wrong Running Direction Error 	Running direction is different from 11-00	• Direction control selection 11-00 set incorrectly, jog and DI control wired incorrectly.	Revise direction selection 11-00, verify jog and DI control.
PTC Error 	PTC wires disconnected	• PTC wires disconnected for more than 10 seconds.	Check the MT and GND connection

LED display	Description	Cause	Possible solutions
Parameter Lock 	Inverter parameters locked.	Parameter lock key code is already active (13-07)	Remove parameter lock, by entering the correct code in parameter for 13-07
Set password failed 	Parameter key code entered is incorrect.	To enable the parameter lock the Key code has to be correct,	Enter the correct code for 13-07 to enable the parameter lock.
Run Command Error 	Single direction operation only, inverter cannot receive a reverse operation command at the same time a forward command is active.	Check terminal for reverse operation command.	Disconnect reverse operation command from external terminal.
ES (flash) External Emergency Stop 	External emergency stop Enabled.	03-00~03-05 set to 14 and digital input is active.	Turn off run command, and remove external emergency stop command.
Zero Speed Stop Error 	Frequency command below 01-08 without using the DC brake function.	Frequency command set below minimum output frequency.	Adjust frequency command.

Warning Message (LCD display only)

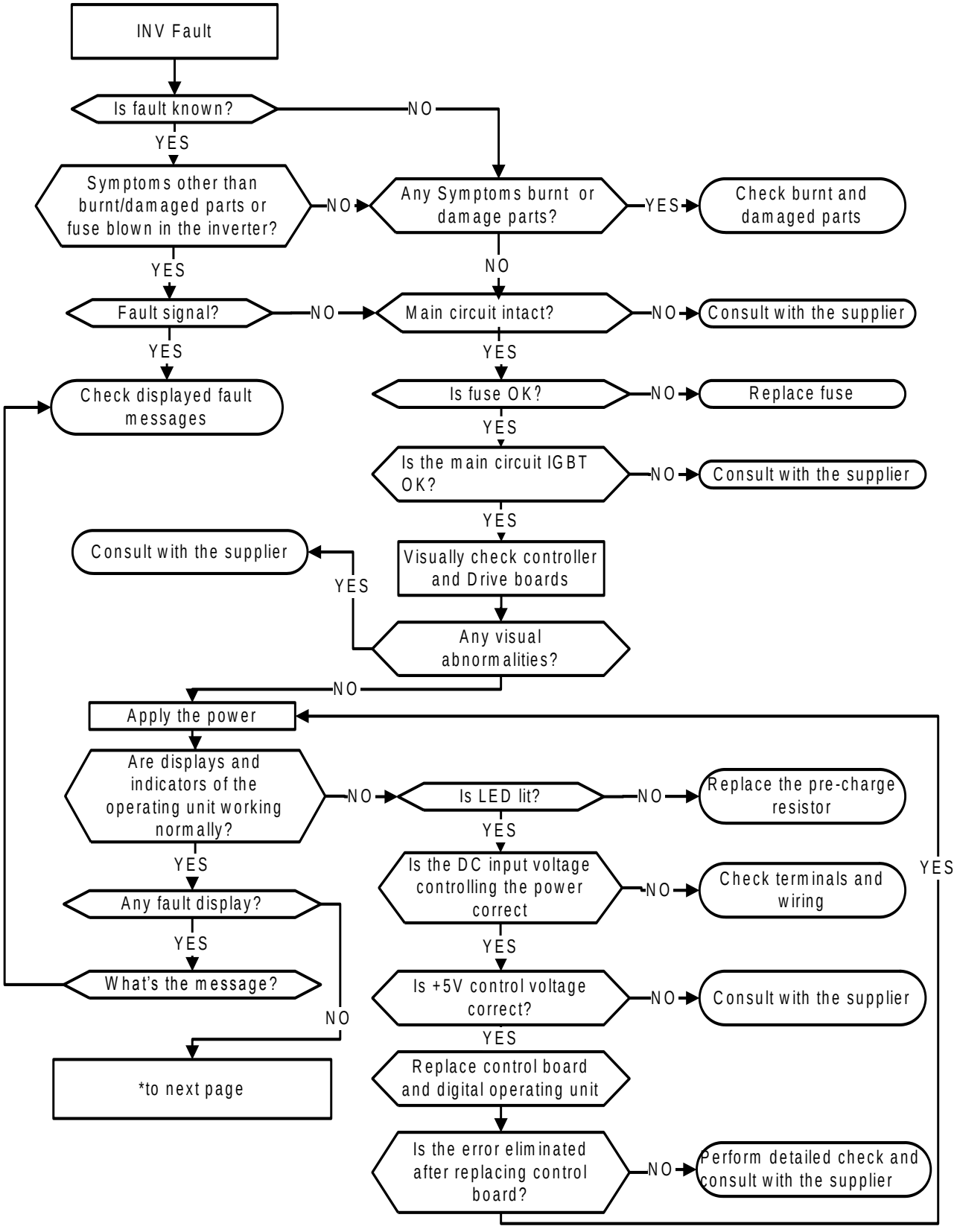
LCD display	Description	Cause	Possible solutions
Operator Copy Error RDE	Parameters cannot be uploaded to the operator	Inverter data transmission error, cannot upload the data to operator	Check operator and control connection
Operator Write Error WRE	Operator cannot write data to the inverter	The control mode in the operator does not match the inverter. The model name in the operator does not match the inverter. The firmware version in the operator does not match the inverter.	Check the control mode, model name and firmware version of the inverter.
Operator Compare Error VRYE	Data compare failed between operator and inverter.	Data in the inverter does not match data saved in the operator.	Check parameters.
Does Not Allow to Read and Save Data RDP	Operator cannot read or save inverter parameters	When 16-08=0, operator read/save function disabled.	Check parameter 16-08 setting.

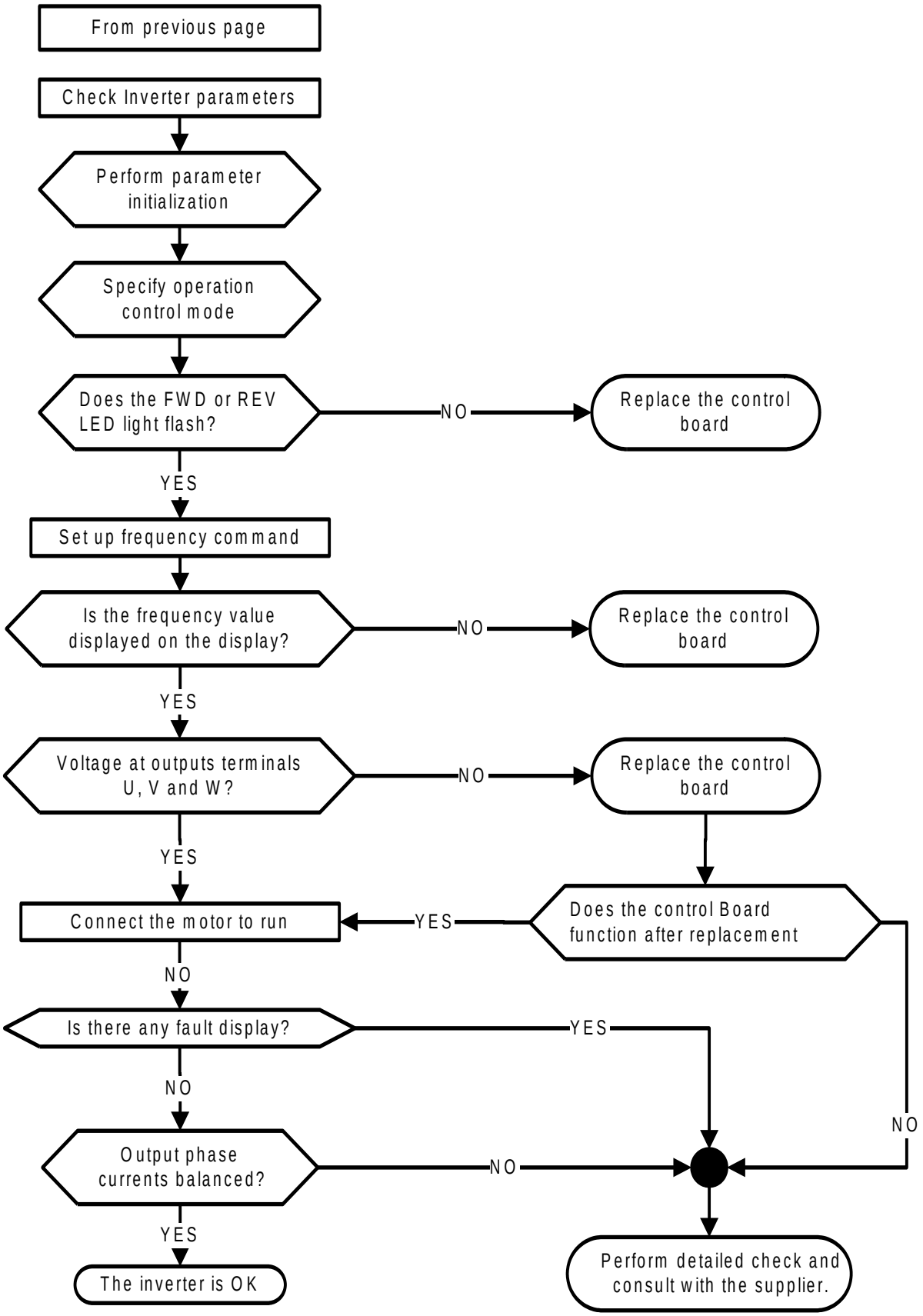
10.3 General Troubleshooting

Status	Checking point	Remedy
Motor runs in wrong direction	Motor wiring correct to inverter output terminals?	Inverter must be connected to U, V, and W terminal of the motor.
	Control wiring correct for forward and reverse commands?	Check wiring.
The motor speed cannot be regulated.	Wiring for the analog frequency reference inputs correct?	Check wiring.
	Operation mode correct?	Check the Frequency source parameters 00-05/00-06.
	Is the load too excessive?	Reduce the load.
Motor speed too high or too low	Check the motor specifications (FLA, voltage, max speed…) correct?	Check motor nameplate.
	Is the gear ratio correct?	Confirm the gear ratio.
	Is the maximum frequency setting correct?	Check maximum frequency settings.
Motor speed unstable	Is the motor load too high?	Reduce motor load.
	Motor load unstable?	(1) Stabilize motor load. (2) Consider increasing inverter and motor size.
	Is the input power unstable or is there a phase loss condition?	(1) Consider adding an AC reactor at the power input side. (2) Check wiring when using three-phase power.
Motor does not run	Input power connected to the correct L1(L), L2, and L3(N) terminals? Charging indicator lit?	(1) Power turned ON? (2) Cycle power to the inverter. (3) Make sure the input voltage is correct. (4) Make sure input terminal screws are fastened.
	Is there voltage across the output terminals T1, T2, and T3?	Cycle power to the inverter.
	Is motor load causing the motor to stall?	Reduce the motor load.
	Are there any errors shown on the inverter keypad?	See error descriptions and check wiring, correct if necessary.
	Forward or reverse run command active?	
	Check analog frequency reference signal?	(1) Analog frequency input signal wired correctly? (2) Check analog input voltage of frequency input.
	Operation mode setting correct?	Check if inverter operation mode 00-02/00-03.

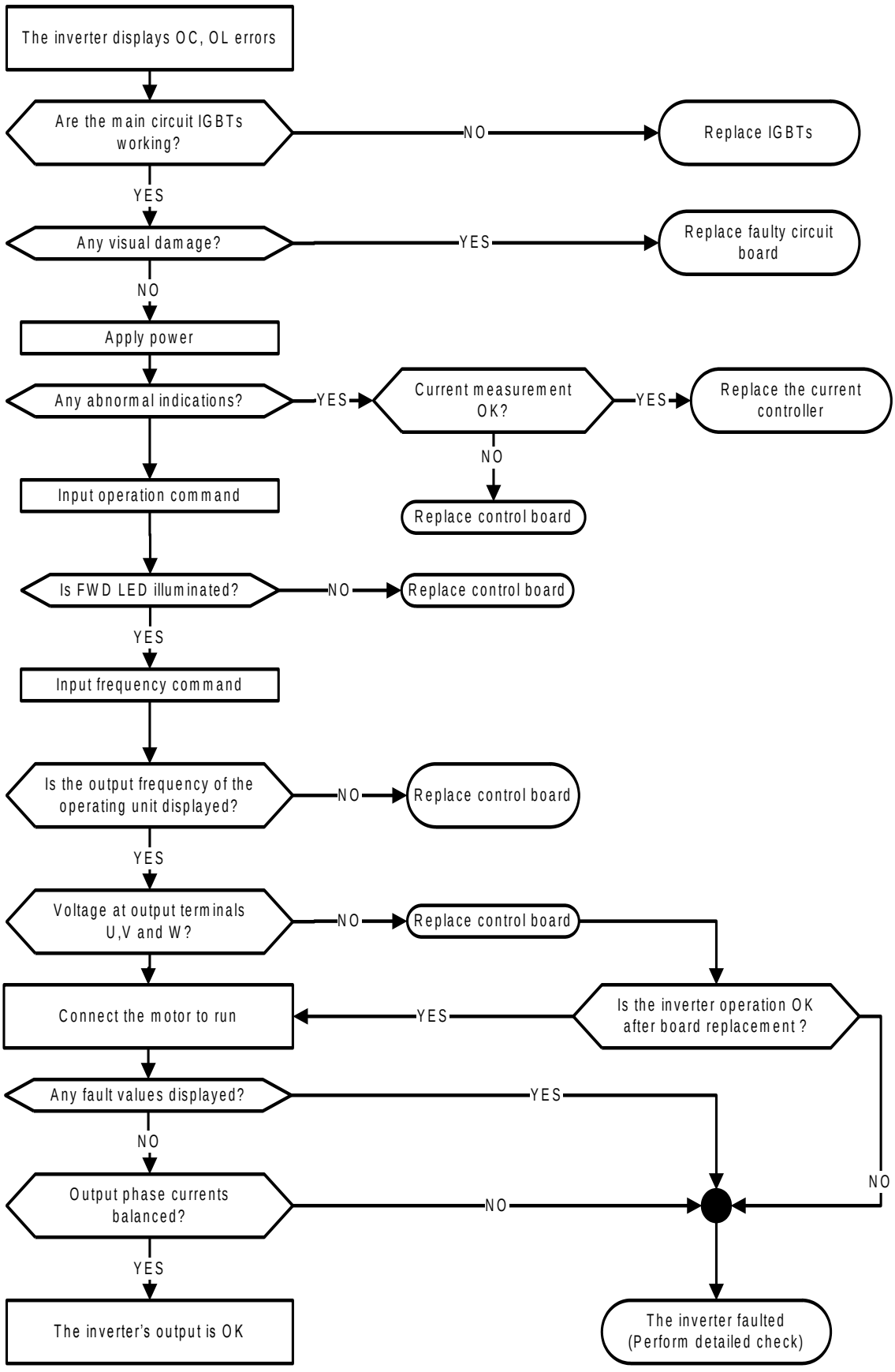
10.4 Inverter Troubleshooting

10.4.1 Quick troubleshooting of inverter

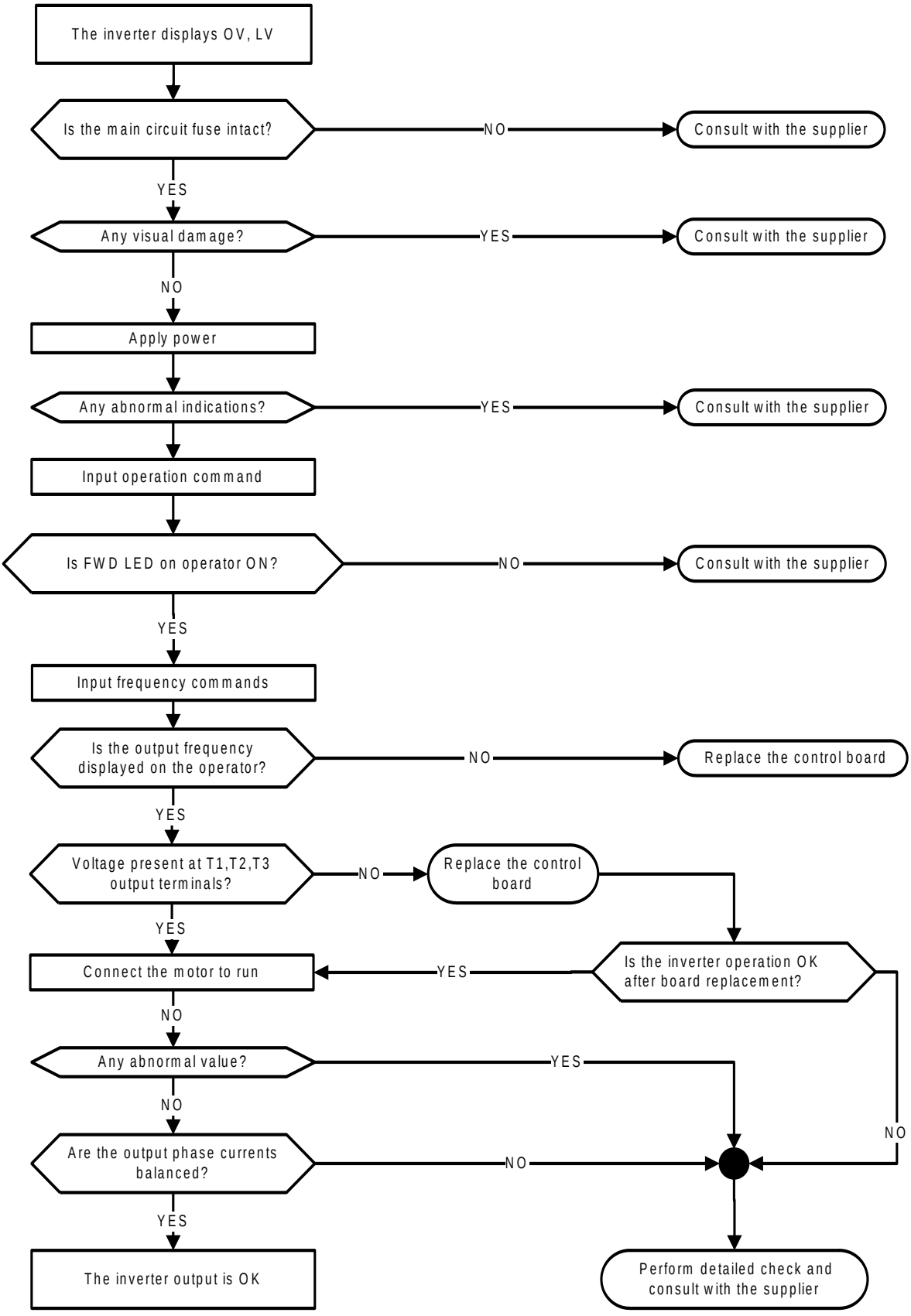



From previous page
Check Inverter parameters
Perform parameter initialization
Specify operation control mode
Does the FWD or REV LED light flash?
NO
Replace the control board
YES
Set up frequency command
Is the frequency value displayed on the display?
NO
Replace the control board
YES
Voltage at outputs terminals U, V and W?
NO
Replace the control board
YES
Connect the motor to run
YES
Does the control Board function after replacement
NO
Is there any fault display?
YES
NO
Output phase currents balanced?
NO
YES
The inverter is OK
Perform detailed check and consult with the supplier.

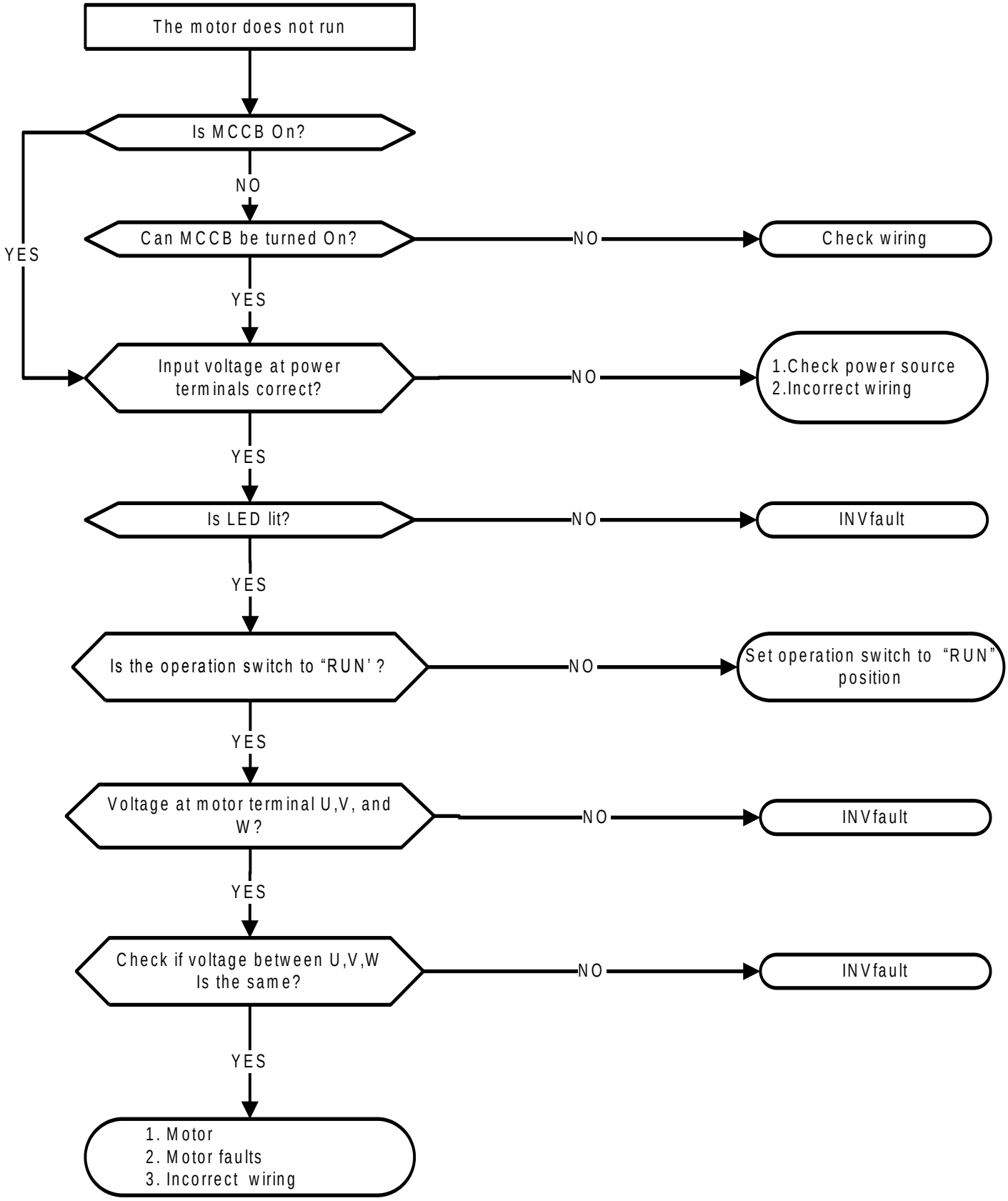
10.4.2 Overcurrent and Overload Troubleshooting



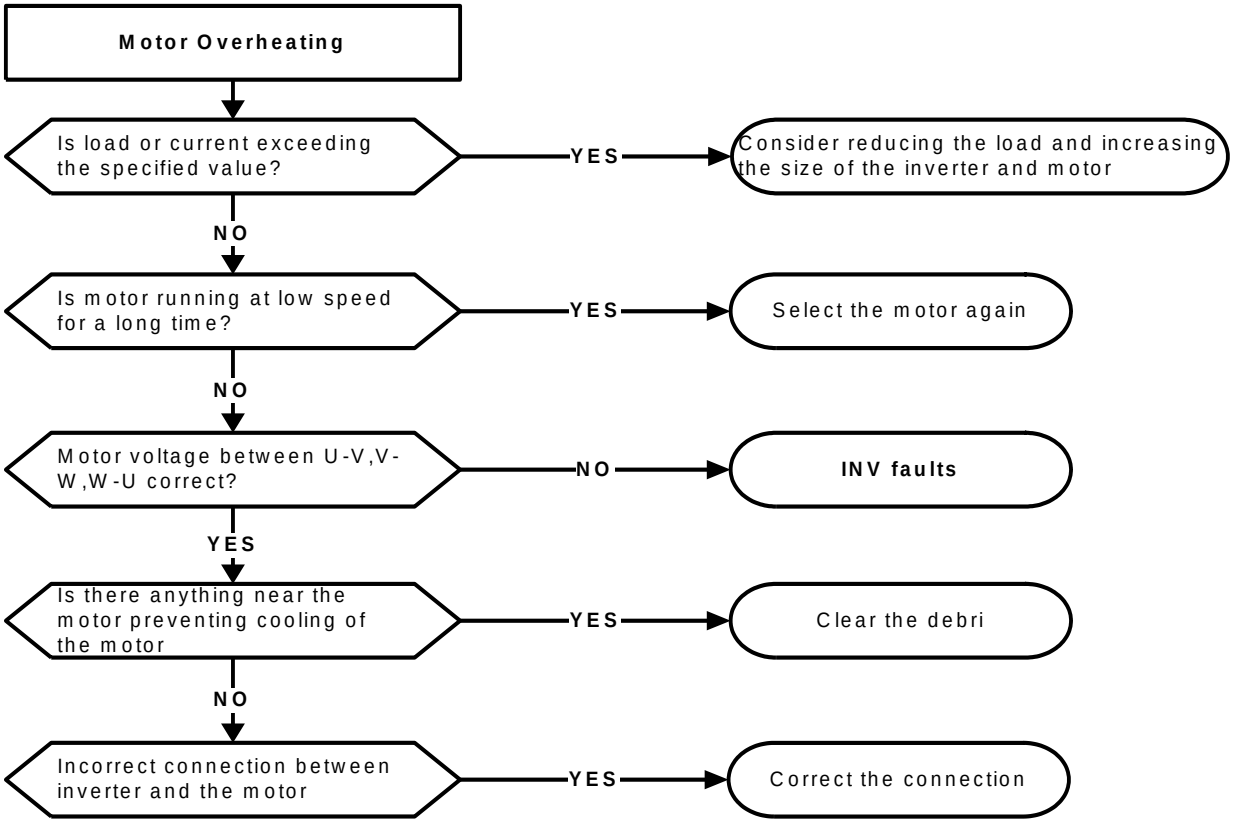
10.4.3 Overvoltage and Undervoltage Troubleshooting



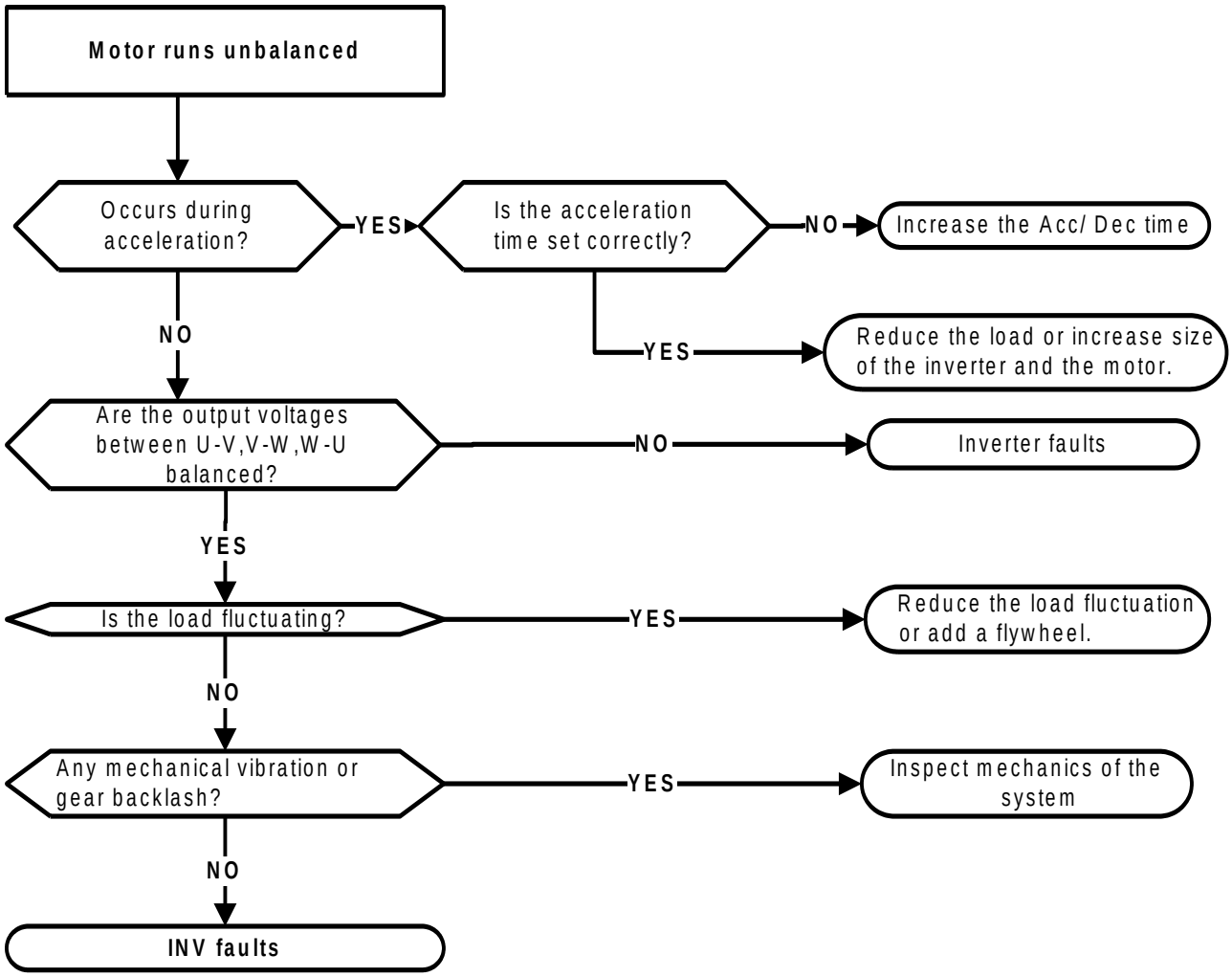
10.4.4 Motor not running



10.4.5 Motor overheating



10.4.6 Motor runs unbalanced



10.5 Routine and periodic inspection

To ensure safe and problem free operation, check and maintain the inverter at regular intervals.
Use the checklist below as a maintenance guideline.
Disconnect power and wait approximately 10 minutes unit charge led is no longer lit to make sure no voltages are present on the output terminals before performing inspection or maintenance.

Items	Details	Checking period		Methods	Criteria	Remedies
		Daily	1Year			
Environment & Ground connection						
Ambient conditions on site	Confirm ambient temperature and relative humidity on site	◎		Measure with thermometer and hygrometer	Temperature: -10 – 40°C (14-120°F) Humidity: Below 95%RH	Improve the ambient or relocate the drive to a better area.
	Are there flammable materials close to the inverter?	◎		Visual check	Keep area clear	
Installation Grounding	Any unusual vibration from surrounding machine	◎		Visual and noise check	Keep area clear	Secure screws
	Is the grounding resistance correct?		◎	Measure the resistance with a multi-meter	200Vclass: below 100Ω	Improve the grounding if needed.
Terminals & Wiring						
Connection terminals	Check for loose terminals		◎	Visual check Check with a screwdriver	Correct installation requirement	Secure terminals and remove rust
	Check for damage to the base of the inverter		◎			
	Check for corroded Terminals		◎			
Wiring	Check for broken wires		◎	Visual check	Correct wiring requirement	Rectify as necessary
	Check wire insulation		◎			
Input Voltage						
Input power voltage	Check input voltage	◎		Measure the voltage with a multi-meter	Voltage must conform with the spec.	Improve input voltage if necessary.

Items	Details	Checking period		Methods	Criteria	Remedies
		Daily	1Year			
Circuit boards and components						
Printed circuit board	Check for damage to PCBs		◎	Visual check	Correct component condition	Clean or replace the circuit board
	Check for discolored, overheated, or burned parts		◎			
Capacitor	Check for unusual odor or leakage	◎				Replace capacitor or inverter
	Check for any physical damage or protrusion		◎			
Power component	Check for any dust or debris		◎			Clean components
	Check resistance between each terminals		◎	Measure with a multi-meter	No short circuit or faulty three-phase output	Consult factory
Peripheral device						
Rheostat	Whether rheostat wiring or connector are damaged		◎	Visual check	No abnormalities	Replacement rheostat
Electromagnetic Contactor	Check contacts and connections for any abnormality	◎				Replacement Contactor
	Unusual vibration and noise	◎		Noise check		
Reactor	Is there any abnormalities	◎		Visual check		Replacement Reactor
Cooling System						
Cooling fan	Unusual vibration and noise		◎	Visual or hearing check	Correct cooling	Consult with the supplier
	Excessive dust or debris	◎		Visual check		Clean the fan
Heat sink	Excessive dust or debris	◎				Clean up debris or dust
Ventilation Path	Is the ventilation path blocked	◎				Clear the path

10.6 Maintenance

To ensure long-term reliability, follow the instructions below to perform regular inspection. Turn the power off and wait for a minimum of 5 minutes before inspection to avoid potential shock hazard from the charge stored in high-capacity capacitors.

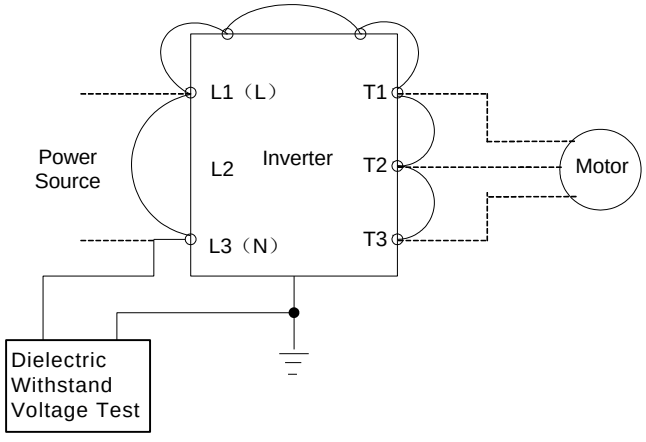
To ensure stable and safe inverter operation it is recommended to perform routine inverter maintenance at regular intervals. Use the checklist below as a guideline for inspection. Make sure to turn power off and wait for a minimum of 5 minutes or until the charge indicator extinguishes before inspecting the inverter to avoid electric shock hazard from the charged capacitors.

1. Maintenance Check List

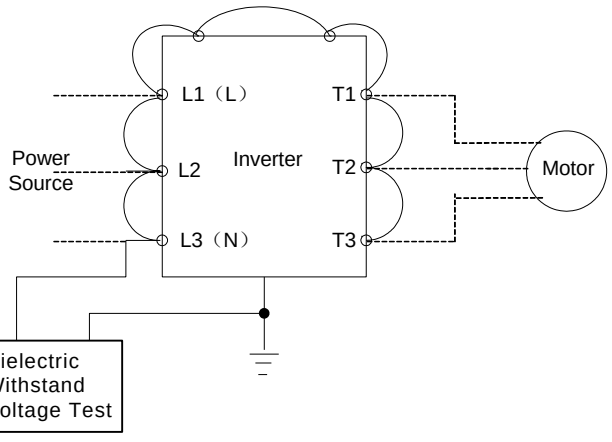
• Ensure that temperature and humidity where the inverter is installed falls within the specification make sure correct ventilation is provided.
• For replacement of a failed or damaged inverter consult factory.
• Ensure that the installation area is free from dust and any other debris.
• Check and ensure that the ground connections are secure and correct.
• Terminal screws cannot be loose, tighten terminal for power input and output of the inverter with power turned off.
• Do not perform any insulation test on the control circuit.

2. Insulation test (megger test)

Single Phase



Three Phase



11. Accessories

11.1 Options

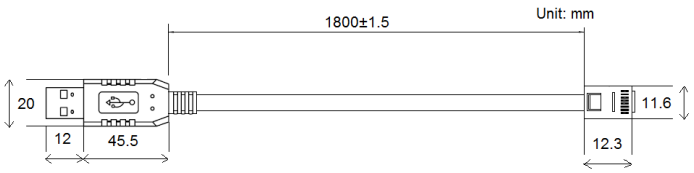
Accessories	Model	Function	Notes
IP20/NEMA1 Digital Operator Extension cable	JN5-CB-01M	Used for remote control purposes with the remote keypad operator (JN5-CU).	3.14ft (1m)
	JN5-CB-02M		6.28ft (2m)
	JN5-CB-03M		9.84ft (3m)
	JN5-CB-05M		16.4ft (5m)
NEMA 1 Kits	JN5-NK-E01	Includes dust cover for top of inverter and conduit box for bottom of the meet NEMA1. (Frame 5/6 have been designed to meet NEMA1 protection level, not kit required)	Frame 1
	JN5-NK-E02		Frame 2
	JN5-NK-E03		Frame 3
	JN5-NK-E04		Frame 4
JN5-CM-USB	RJ45 to USB connecting cable	The communication cable is used to communicate with the TECO Link software directly to the inverter using the PC USB port. Length 1.8 meters / 6ft.	JN5-CM-USB
LCD Digital Operator	JN5-OP-A02	IP20 LCD Operator panel mount.	
Keypad Display Holder	JN5-KEYBOX	Keypad display panel mount.	
Copy module	JN5-CU	Used to copy parameter settings from one inverter to another inverter. Use the RJ45 port to connect to the inverter when a remote keypad is used. Use extension cable JN5-CM-0XM when using the copy module operator as a remote keypad.	

RJ45 to USB Communication Cable (6ft / 1.8m) (JN5-CM-USB) / (JN5-CM-USB for 10ft / 3m cable)

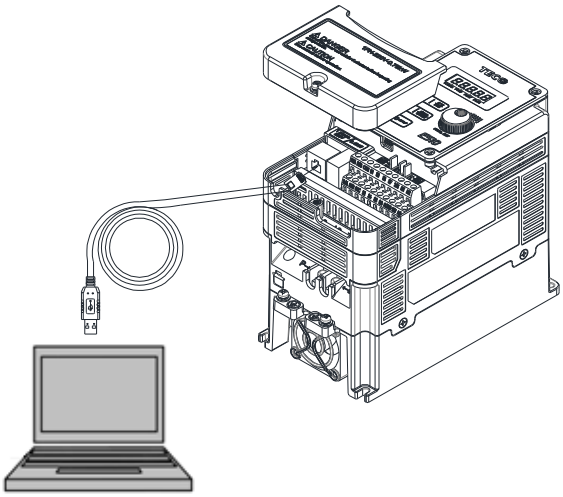
The communication cable is used to communicate with the TECO Link software directly to the inverter using the PC USB port.

Note: Contact factory for software download link.

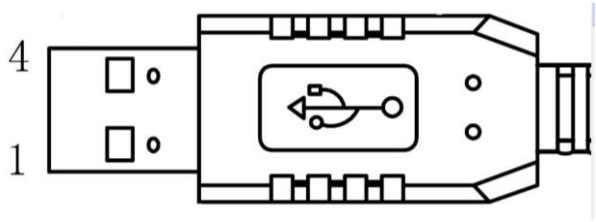
- Cable:



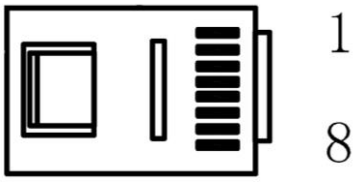
- Connect to the RS45 port:



RS232/USB PC side



RS485/RJ45 connector inverter side



RS485/RJ45 pin definition

Pin No.,	1	2	3	4	5	6	7	8
Define	A	B	NC	NC	NC	NC	VCC	GND

Note:
A/B phase signal (pin1&pin2) are the RS485 differential mode data signals.
VCC & GND are the +5VDC and common of the inverter's internal power source.

Important Note:

1. Please turn off the power before you connect the cable.
2. PC software will show "communication error" when the inverter is powered down during communication.
3. If there is any error during communication, please check the wiring connection and restart the pc software.

11.2 Braking resistors

Inverter			Braking Unit		Resistor Unit		Braking resistor Specification		Duty Cycle	Braking torque	Minimum Resistance	
V	HP	KW	Model	Qty Req.	Model	Qty Req.	(Ω)	(W)	(%)	(%)	(Ω)	(W)
220V 1Ph/3Ph	0.5	0.4	-	-	JNBR-150W200	1	200	150	10	214	70	210
	1	0.75	-	-	JNBR-150W200	1	200	150	10	117	70	210
	2	1.5	-	-	JNBR-150W100	1	100	150	10	117	70	210
	3	2.2	-	-	JNBR-260W70	1	70	260	10	112	70	210
220V 3Ph	5	4	-	-	JNBR-390W40	1	40	390	10	117	30	500
	7.5	5.5	-	-	JNBR-520W30	1	30	520	10	123	25	600
	10	7.5	-	-	JNBR-780W20	1	20	780	10	117	15	1000
	15	11	-	-	JNBR-2R4KW13R6	1	13.6	2400	10	100	10	1500
	20	15	-	-	JNBR-2R4KW13R6	1	13.6	2400	10	100	10	1500
	25	18.5	-	-	JNBR-4R8KW8	1	8	4800	10	119	7	2400
	30	22	-	-	JNBR-4R8KW6R8	1	6.8	4800	10	117	5.5	3000
	40	30	JNTBU-230	2	JNBR-3KW10	2	10	3000	10	119	5.5	3000
400V 3Ph	1	0.75	-	-	JNBR-150W750	1	750	150	10	123	120	500
	2	1.5	-	-	JNBR-150W400	1	400	150	10	117	120	500
	3	2.2	-	-	JNBR-260W250	1	250	260	10	123	100	600
	5	4	-	-	JNBR-400W150	1	150	400	10	123	60	1000
	7.5	5.5	-	-	JNBR-600W130	1	130	600	10	123	50	1200
	10	7.5	-	-	JNBR-800W100	1	100	800	10	117	50	1200
	15	11	-	-	JNBR-1R6KW50	1	50	1600	10	149	50	1200
	20	15	-	-	JNBR-1R5KW40	1	40	1500	10	100	25	2400
	25	18.5	-	-	JNBR-4R8KW32	1	32	4800	10	120	15	4000
	30	22	-	-	JNBR-4R8KW27R2	1	27.2	4800	10	117	14	4800
	40	30	-	-	JNBR-6KW20	1	20	6000	10	117	19.2	3600
	50	37	JNTBU-430	2	JNBR-4R8KW32	2	32	4800	10	117	19.2	3600
	60	45	JNTBU-430	2	JNBR-4R8KW27R2	2	27.2	4800	10	117	19.2	3600
	75	55	JNTBU-430	2	JNBR-6KW20	2	20	6000	10	117	19.2	3600

Note：

Formula to calculate braking resistor wattage：**W= (Vpnb * Vpnb) * ED% / Rmin**

(1) **W**：braking resistor power (Watts)

(2) **Vpnb**：braking voltage (220V=380VDC, 440V=760VDC)

(3) **ED%**：braking duty cycle

(4) **R**min：braking resistor minimum value (ohms)

Appendix: UL Instructions

Danger

Electric Shock Hazard

Do not connect or disconnect wiring while the power is on.
Failure to comply will result in death or serious injury.

Warning

Electric Shock Hazard

Do not operate equipment with covers removed.
Failure to comply could result in death or serious injury.
The diagrams in this section may show inverters without covers or safety shields to show details. Be sure to reinstall covers or shields before operating the inverters and run the inverters according to the instructions described in this manual.

Always ground the motor-side grounding terminal.
Improper equipment grounding could result in death or serious injury by contacting the motor case.

Do not touch any terminals before the capacitors have fully discharged.
Failure to comply could result in death or serious injury.
Before wiring terminals, disconnect all power to the equipment. The internal capacitor remains charged even after the power supply is turned off. After shutting off the power, wait for at least the amount of time specified on the inverter before touching any components.

Do not allow unqualified personnel to perform work on the inverter.
Failure to comply could result in death or serious injury.
Installation, maintenance, inspection, and servicing must be performed only by authorized personnel familiar with installation, adjustment, and maintenance of inverters.

Do not perform work on the inverter while wearing loose clothing, jewelry, or lack of eye protection.
Failure to comply could result in death or serious injury.
Remove all metal objects such as watches and rings, secure loose clothing, and wear eye protection before beginning work on the inverter.

Do not remove covers or touch circuit boards while the power is on.
Failure to comply could result in death or serious injury.

Warning

Fire Hazard

Tighten all terminal screws to the specified tightening torque.
Loose electrical connections could result in death or serious injury by fire due to overheating of electrical connections.

Do not use an improper voltage source.
Failure to comply could result in death or serious injury by fire.
Verify that the rated voltage of the inverter matches the voltage of the incoming power supply before applying power.

Do not use improper combustible materials.
Failure to comply could result in death or serious injury by fire. Attach the inverter to metal or other noncombustible material.

NOTICE

Observe proper electrostatic discharge procedures (ESD) when handling the inverter and circuit boards.
Failure to comply may result in ESD damage to the inverter circuitry.

Never connect or disconnect the motor from the inverter while the inverter is outputting voltage.
Improper equipment sequencing could result in damage to the inverter.

Do not use unshielded cable for control wiring.
Failure to comply may cause electrical interference resulting in poor system performance. Use shielded twisted-pair wires and ground the shield to the ground terminal of the inverter.

Do not modify the inverter circuitry.
Failure to comply could result in damage to the inverter and will void warranty. TECO is not responsible for any modification of the product made by the user. This product must not be modified.

Check all the wiring to ensure that all connections are correct after installing the inverter and connecting any other devices.
Failure to comply could result in damage to the inverter.

❖ UL Standards

The UL/cUL mark applies to products in the United States and Canada and it means that UL has performed product testing and evaluation and determined that their stringent standards for product safety have been met. For a product to receive UL certification, all components inside that product must also receive UL certification.

UL/cUL Mark

❖ UL Standards Compliance

This inverter is tested in accordance with UL standard UL508C and complies with UL requirements. To ensure continued compliance when using this inverter in combination with other equipment, meet the following conditions:

■ Installation Area

Do not install the inverter to an area greater than pollution severity 2 (UL standard).

■ Motor Over Temperature Protection

Motor over temperature protection shall be provided in the end use application.

■ Field Wiring Terminals

All input and output field wiring terminals not located within the motor circuit shall be marked to indicate the proper connections that are to be made to each terminal and indicate that copper conductors, rated 75°C are to be used.

■ Inverter Short-Circuit Rating

This inverter has undergone the UL short-circuit test, which certifies that during a short circuit in the power supply the current flow will not rise above value. Please see electrical ratings for maximum voltage and table below for current.

• The MCCB and breaker protection and fuse ratings (refer to the preceding table) shall be equal to or greater than the short-circuit tolerance of the power supply being used.
• Suitable for use on a circuit capable of delivering not more than (A) RMS symmetrical amperes for (HP) HP in 240 / 480 V class drives motor overload protection.

Horse Power (HP)	Current (A)	Voltage (V)
1 - 50	5,000	240 / 480
51 - 200	10,000	240 / 480

❖ Inverter Motor Overload Protection

Set parameter 02-01 (motor rated current) to the appropriate value to enable motor overload protection. The internal motor overload protection is UL listed and in accordance with the NEC and CEC.

■ 02-01 Motor Rated Current

Setting Range Model Dependent
Factory Default: Model Dependent

The motor rated current parameter (02-01) protects the motor. The motor protection parameter 08-05 is set as factory default. Set 02-01 to the full load amps (FLA) as shown on the nameplate of the motor.

■ 08-05 Motor Overload Protection Selection

The inverter has an electronic overload protection function (OL1) based on time, output current, and output frequency, which protects the motor from overheating. The electronic thermal overload function is UL-recognized, so it does not require an external thermal overload relay for single motor operation.
This parameter selects the motor overload curve used according to the type of motor applied.

08-05	Selection for motor overload protection (OL1)
Range	**【xxx0b】**：Motor overload is disabled **【xxx1b】**：Motor overload is enabled **【xx0xb】**：Cold start of motor overload **【xx1xb】**：Hot start of motor overload **【x0xxb】**：Standard motor **【x1xxb】**：Special motor **【0xxxb】**：Reserved **【1xxxb】**：Reserved

Sets motor overload protection function in parameter 08-05 according to the applicable motor.

08-05 = 0: Disables the motor overload protection function when two or more motors are connected to a single inverter. Use an alternative method to provide separate overload protection for each motor such as connecting a thermal overload relay to 1he power line of each motor.

08-05 = 1: The motor overload protection function should be set to hot start protection characteristic curve when the power supply is turned on and off frequently, because the thermal values are reset each time when the power is turned off.

■ **08-06 Motor Overload Operation Selection**

08-06	Start-up mode of overload protection operation (OL1)
Range	**0:** Coast-to-Stop After Overload Protection is Activated **1:** Drive Will Not Trip when Overload Protection is Activated (OL1)

08-06=0: When the inverter detects a motor overload the inverter output is turned off and the OL1 fault message will flash on the keypad. Press RESET button on the keypad or activate the reset function through the multi-function inputs to reset the OL1 fault.

08-06=1: When the inverter detects a motor overload the inverter will continue running and the OL1 alarm message will flash on the keypad until the motor current falls within the normal operating range.

■ **00-27 HD/ND Mode**

00-27	HD/ND Mode
Range	【0】: HD (Heavy Duty / Constant Torque) – 150% for 1 Min 【1】: ND (Normal Duty / Variable Torque) – 120% for 1 Min

00-27=0: For constant torque applications with a load less than 150% of the motor rated current. If the load is greater than 150% of the motor rated current, the motor will run for 1 minute before faulting on motor overload.

00-27=1: For variable torque applications (Fan, Pumps…) with a load less than 120% of the motor rated current. If the load is greater than 120% of the motor rated current, the motor will run for 1 minute before faulting on motor overload.

TECO Westinghouse

INVERTER

E510

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