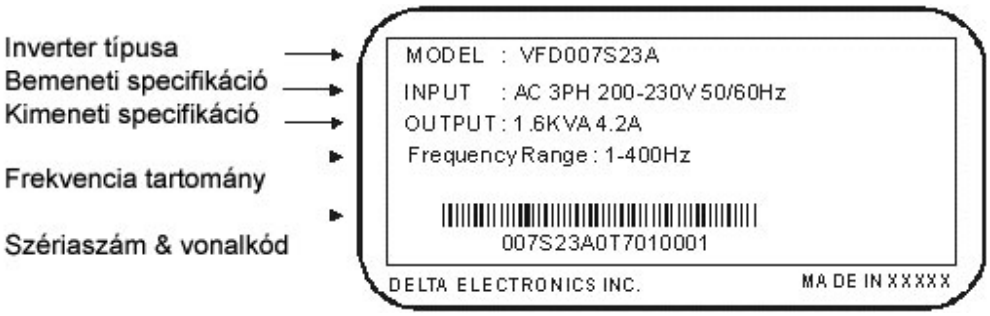
1. FEJEZET – ÁTVÉTEL, VIZSGÁLAT

Ezek a VFD-M típusú frekvenciaváltók kiszállítás előtt szigorú teszteken és különböző ellenőrzéseken mennek keresztül. Kérlek azért te is ellenőrizd le a következő dolgokat:

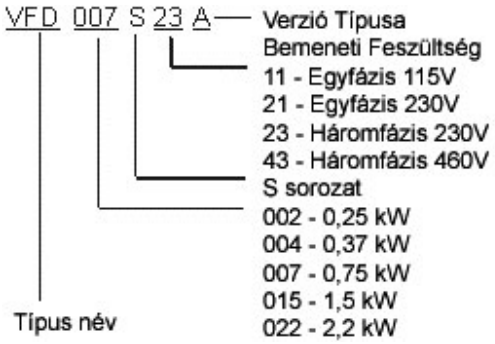
Átvétel

- ✓ Ellenőrizd, hogy a csomag tartalmazza-e a következőket: Inverter, Felhasználói kézikönyv.
- ✓ Ellenőrizd, hogy az áru nem sérült-e meg a szállítás ideje alatt.
- ✓ Ellenőrizd, hogy az adattáblának megfelelő típusú terméket rendeltél.

1.1 Adattábla információ: **Példa:** 1HP 230V inverter



1.2 Típus meghatározás



1.3 Szériaszám magyarázat:

Amennyiben az adattábla információja nem egyezik a te általad választott típusával, akkor azt jelezd azonnal a kereskedőnél.

2. FEJEZET – RAKTÁROZÁS ÉS BEÉPÍTÉS

2.1 Raktározás

Az invertert tartsd a zárt eredeti dobozában a felszerelés idejéig. A teljes idejű garancia megtartása érdekében az alábbi leírásoknak megfelelően tárold, amennyiben hosszabb ideig nem kerül beszerelésre:

Tárold tiszta száraz helyen. Ne tedd ki direkt napsugárzásnak.

-20 °C - +60 °C Közötti hőmérsékleten raktározd.

0% - 90% páratartalmú páralecsapódás-mentes helyen raktározd.

86 kPA - 106kPA közötti nyomású helyen raktározd..

2.2 Környezeti feltételek

Működés	Levegő hőmérséklet: -10°C - +50°C (14°F - 122°F), 5.5 kW: -10°C - +40°C (14°F - 104°F) Relatív páratartalom: 0% - 90%, lecsapódásmentes Környezeti nyomás: 86 - 106 kPa Beépítési magasság: 1000m alatt Megengedett rezgésszint: Max. 9.80 m/s^2 (1G) - 20Hz –nél kevesebb Max. 5.88 m/s^2 (0.6G) / 20Hz - 50Hz
Raktározás	Hőmérséklet: -20°C - +60°C (-4°F - 140°F) Relatív páratartalom: Kevesebb, mint 90%, lecsapódásmentes. Környezeti nyomás: 86 - 106 kPa
Szállítás	Hőmérséklet: -20°C - +60°C (-4°F - 140°F) Relatív páratartalom: Kevesebb, mint 90%, lecsapódásmentes Környezeti nyomás: 86 - 106 kPa Megengedett rezgésszint: Max. 9.80 m/s^2 (1G) kisebb mint 20Hz, Max. 5.88 m/s^2 (0.6G) / 20Hz - 50Hz
Szennyeződési osztály	2: - gyári felhasználásra megfelelő.

2.3 Beépítés:

A nem megfelelő inverter beépítés nagyban csökkentheti az inverter élettartamát. Figyelmesen vedd szemügyre a beépítés helyet, hogy az alábbi követelményeknek 100% -ig megfeleljen.

A rossz helyválasztás akár a garancia megvonását is okozhatja!!

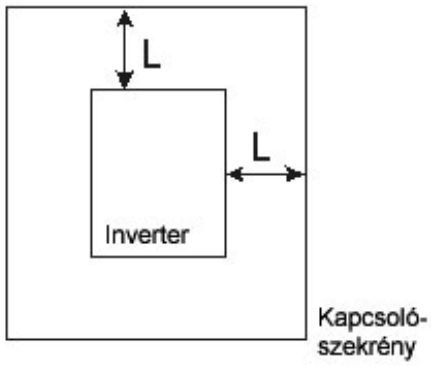
- Ne szereld fel az invertert fűtőberendezés közelébe vagy direkt napsütötte helyre.

- Ne építsd be az invertert, olyan helyre, ahol nagy a külső hőmérséklet, a páratartalom, a rezgés vagy a korrózív gáztartalom.
- Függőleges helyzetben építsd be a frekvenciaváltót. Ne takard el semmivel a hűtőlevegő áramát.
- Az inverter hőt termel. Hagyj elég helyet a frekvenciaváltó körül a hő eltávozásához.

Nem szellőztetett helyre történő beépítés

Ha nem szellőztetett helyre kell beszerelni az invertert, akkor kérjük vegye figyelembe az alábbi táblázatban szereplő távolságokat a szekrények szélétől. A becsül működési hőmérséklet így kevesebb lesz, mint 40° C. (A doboz mélysége min. 200 mm –nek kell lennie)

Inverter S-sorozat	Teljesítmény (HP)	L (in)	Doboz térfogata (cu.ft)
VFD002	0.25	10	3
VFD004	0.5	10	3
VFD007	1	10	3
VFD015	2	10	3
VFD022	3	12	4.7



Az L a szekrény szélétől való távolságot jelöli

3. Fejezet - BEKÖTÉS

VESZÉLY

Nagyfeszültség

Mielőtt kinyitná a frekvenciaváltót:

- Húzza, ki vagy kösse le a hálózati áramforrásról.
- Várjon 5 percet, mielőtt elkezdené a szerelést, hogy a DC Busz kondenzátora kisüljön.

A képviselet előzetes írásos engedélye nélkül bármilyen elektromos vagy mechanikus szerkezeti változtatás a frekvenciaváltón a garancia azonnali megszűnését jelenti.

Rövidzárlati ellenálló képesség:

A bekötéshez olyan kábelt használj, ami képes legalább az 5,000 rms szimmetrikus amper átvitelére. A 460 V –os modelleknél a max. 480 V és a 230 V –os modelleknél max. 240V lehetséges.

🕮 Általános bekötési információ

Alkalmazott kódok

Minden VFD-M inverter megfelel a Underwriters Laboratories, Inc. (UL) és a kanadai Canadian Underwriters Laboratories (cUL) előírásainak, és ebből adódóan szintén megfelel a National Electrical Code (NEC) és a Canadian Electrical Code (CEC) szabványoknak is.

Ahhoz, hogy a bekötés szintén megfeleljen a UL és a cUL követelményeinek, kérlek kövesd az ebben a fejezetben lévő utasításokat. Kérlek a bekötésnél, vedd figyelembe az inverter oldalán lévő specifikus adatoknak megfelelő bekötési értékeket is.

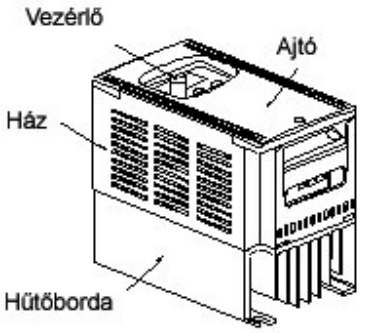
A vonali biztosíték specifikációnál a “B” részben javasolt az előírt biztosíték használat (az U.L. szabvány ezt megköveteli).

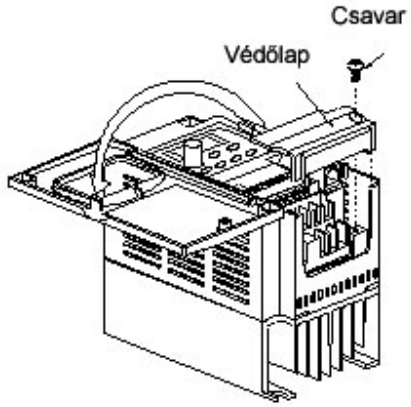
2.5 Környezeti behatások

Beszereléskor

Kerülje a port,
Kerülje a direkt napfényt,
Kerülje a korrózív gázokat,
Kerülje a fémhulladékok bekerülését,
Kerülje a rázkódásokat,
Kerülje a mágnese interferenciát,
Környezeti páratartalom: 90% -os relatív páratartalom alatt,
Környezeti nyomás: 86 kpa ~ 106 kpa.

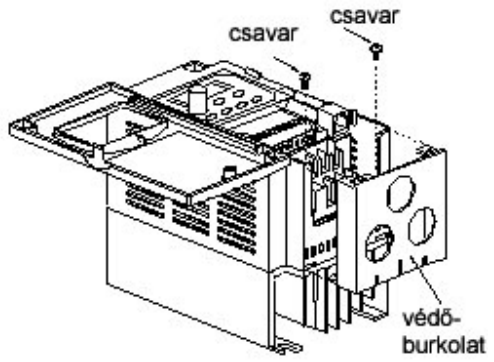
2.6 Beépítési műveletek



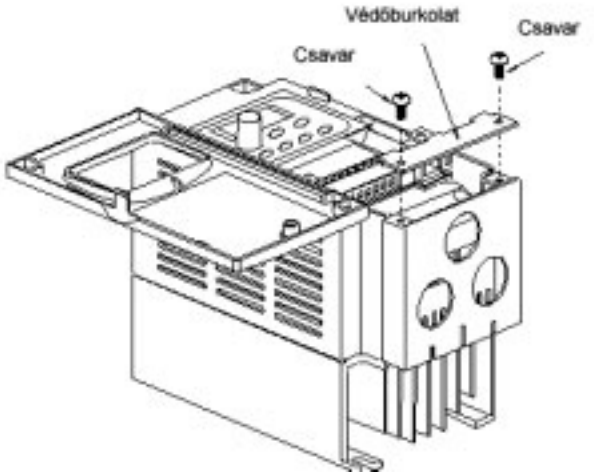


Beépítési lépések

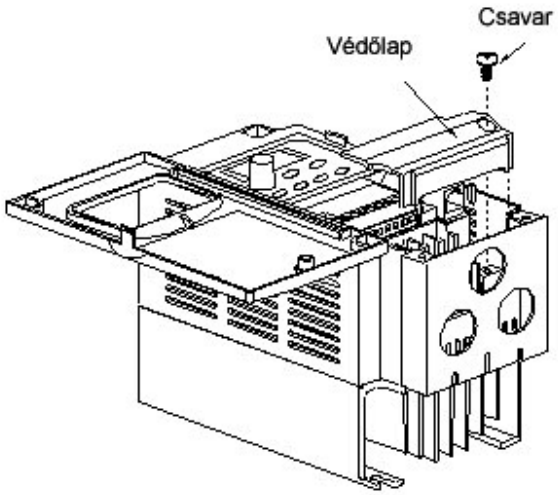
1. Tekerje ki a csavart a fedőlap kinyitásához.
2. Távolítsa el műanyag fedlapot.
3. Kösse be a hálózati és motor kábeleket az inverteren jelölt helyekre. Sose kösse a hálózati kábeleket az inverter U/T1, V/T2, W/T3 motor csatlakozási pontjaira.
4. Rögzítse a műanyag fedlapot vissza a helyére.



Opcionális szerelőlap esetén:
Bizonyosodjon meg róla, hogy a szerelő lap csavarjai jól meg vannak húzva, ahogy az ábra is mutatja földelésvédelmi okokból kifolyólag. Minden kábelt a szerelőlapon keresztül vezessen ki.
Meghúzási nyomaték: 5 - 6 kgf-cm
(4.3 - 5.2 in-lbf)

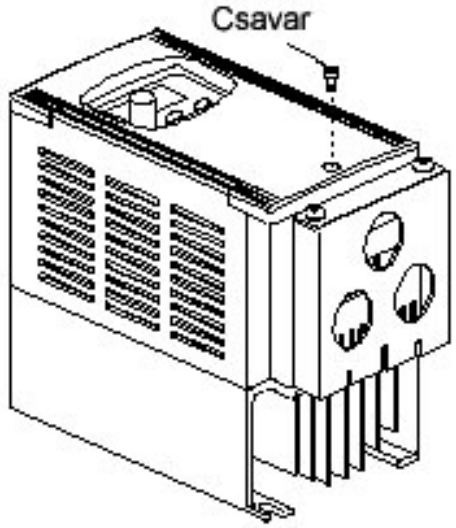


Helyezze fel a szerelő lapot és csavarja be a csavarokat



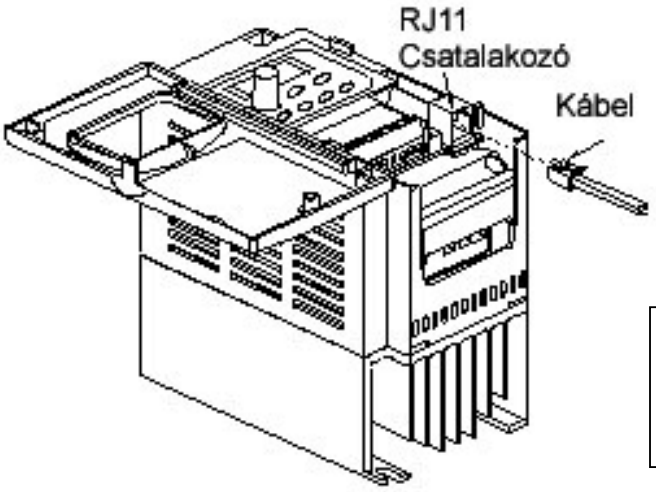
Műanyag borítás visszaszerelése.
Csavar meghúzási nyomatéka: 5 - 6 kgf-cm
(4.3 - 5.2 in-lbf)

UL Szabványos típus



Műanyag borítás visszaszerelése.
Csavar meghúzási nyomatéka:
5 - 6 kgf-cm (4.3 - 5.2 in-lbf)

RS485

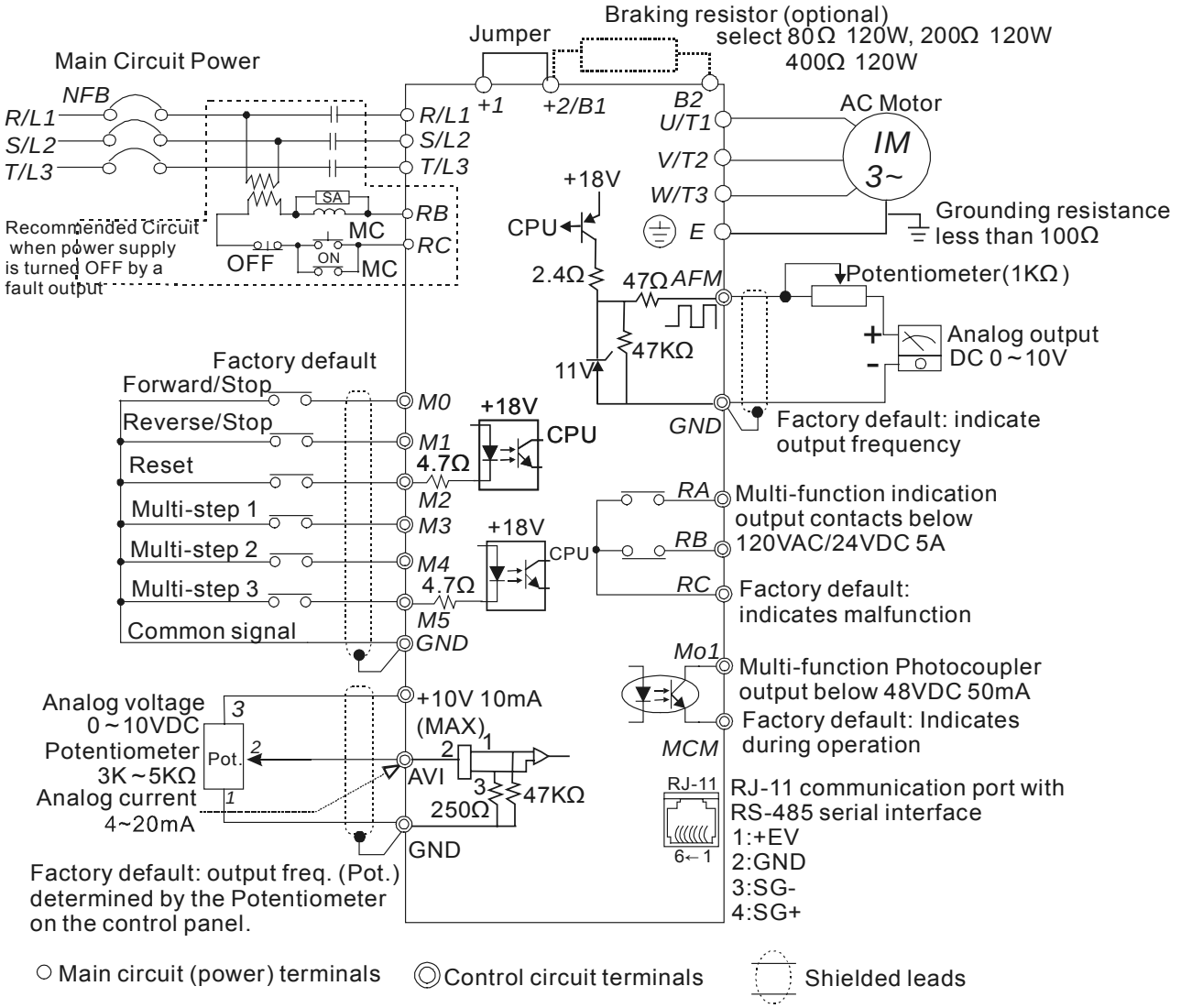


A kommunikáció kialakítása:
Csatlakoztassa az RS 485 kábelt az ábrán jelölt RJ11 csatlakozó aljzatba.

3. FEJEZET - BEKÖTÉS

3.1 Alap bekötési ábra

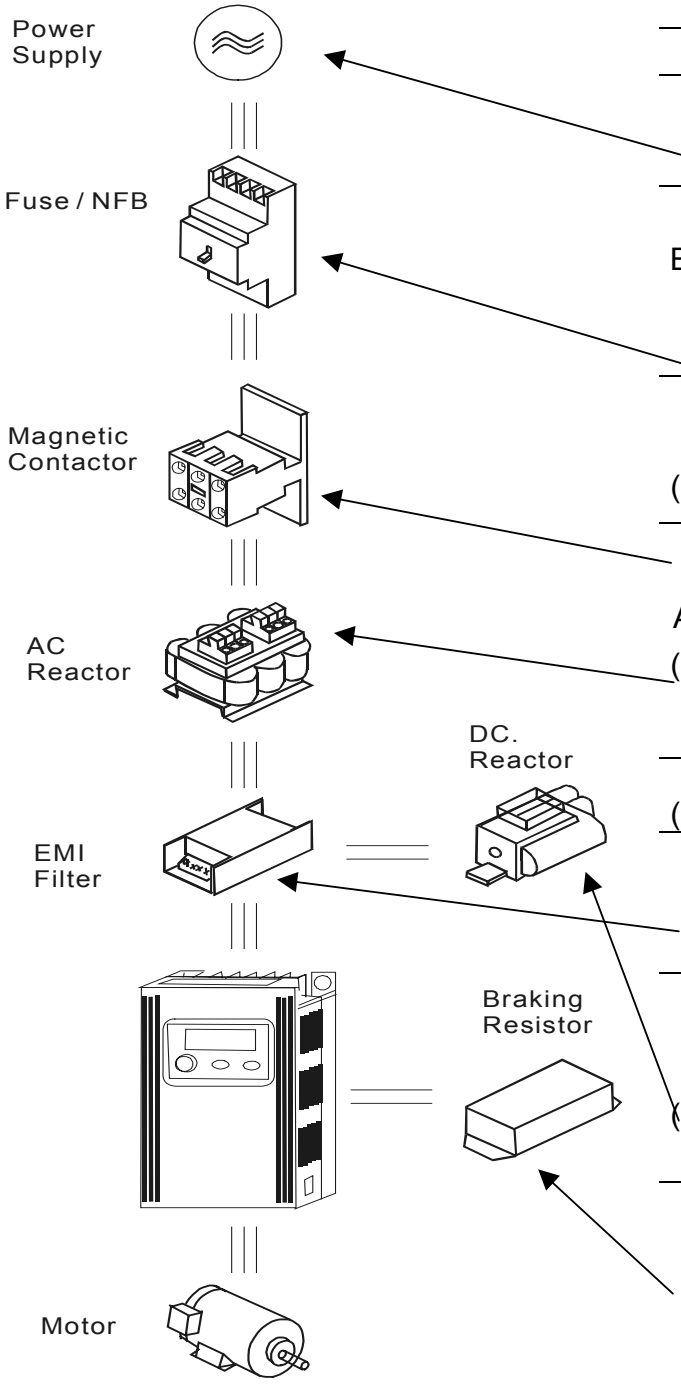
A felhasználóknak az alábbi ábra alapján kell bekötnie az invertert.



NOTE: Do not plug in a Modem or telephone line to the RS-485 communication port, permanent damage may result. Terminal 1 & 2 are the power sources for the optional copy keypad and should not be used while using RS-485 communication.

* If it is single phase model, please select any of the two input power terminals in main circuit power.

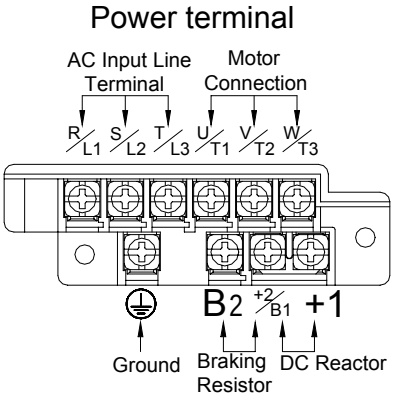
3.2 External Wiring



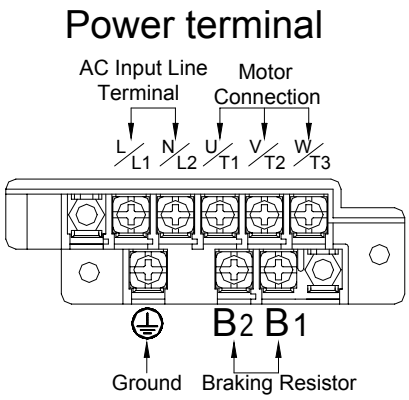
Item	Explanation
Hálózati áram	Kérlek, olvasd el figyelmesen az A – mellékletet a hálózati követelményekkel kapcsolatban.
Biztosíték/NFB	Bekapcsoláskor nagy felfutó áram keletkezhet. Kérlek, olvasd el a B – mellékletet a megfelelő biztosíték kiválasztása érdekében. Az NFB opcionális.
Mágneses kontaktor (Opcionális)	Kérjük ne használjon mágneses kapcsolót mint az inverter ki- be-kapcsolója, ez csökkenti az inverter működési élettartamát.
AC Reactor (Opcionális)	In order to improve the power factor. An AC Reactor may be necessary when capacity is above 1000kVA, and the wiring distance is within 10m.
EMI szűrő (Opcionális)	Az elektromágneses interferencia csökkentéséhez szükséges.
DC Link Reactor (Optional)	Please wire to manufacturer's specification to avoid damage to the AC drive.
Fék ellenállás (Opcionális)	A motor megállási idejének csökkentéséhez használatos. Kérjük lépjen kapcsolatba a területi képviselőjével a megfelelő típus kiválasztása miatt.

3.3 Hálózati terminál bekötése

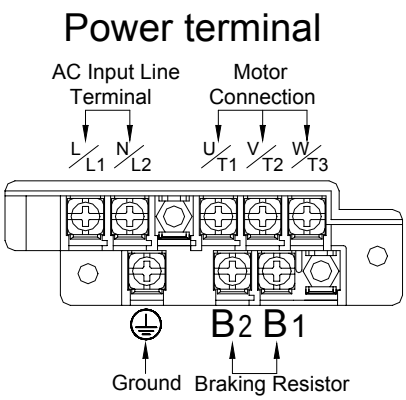
1. Nagyfeszültségű bekötési terminál



230V / 460 V



115V



022S21A/B

0.25-1 HP (1HP: 230V/460V)	1-3 HP (1HP: 115V)
Wire Gauge: 14-20 AWG	Wire Gauge: 10-18 AWG
Wire Type: copper wire only, 75°C	Wire Type: stranded copper wire only, 75°C
Torque: 12 kgf-cm (10 in-lbf)	Torque: 20 kgf-cm (17.4 in-lbf)

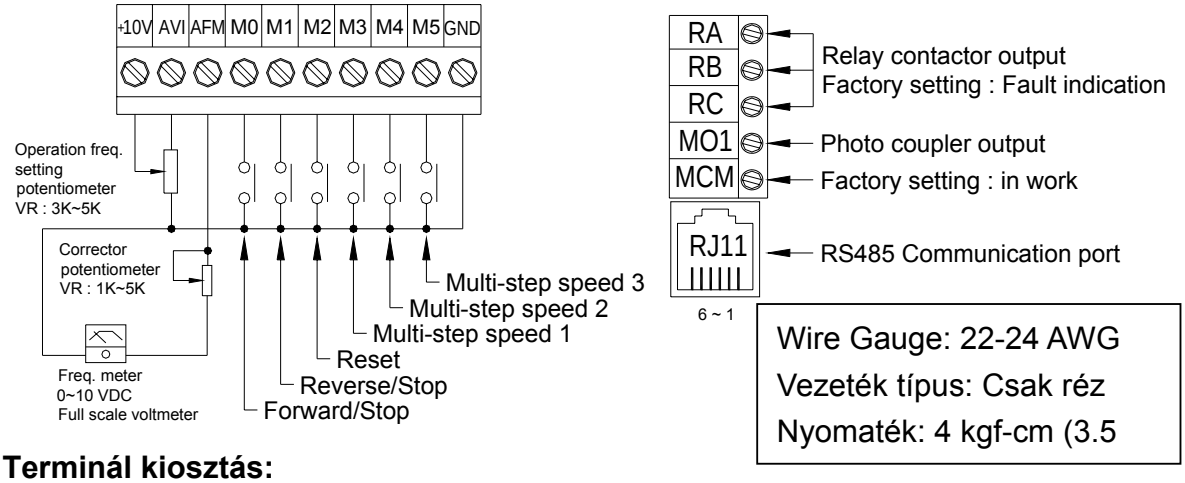
2. Terminál beazonsítása

Terminál kód	Terminál bekötési leírása
R/L1, S/L2, T/L3	Váltóáramú hálózati kábel terminálja (Három fázisú)
L/L1, N/L2	Váltóáramú hálózti kábel terminálja (Egy fázisú)
U/T1, V/T2, W/T3	Motor terminálok
+2/B2 – B1	Fékellenállás bekötési pontjai (opcionális)
+2/+1 – B1	Connections for DC Link Reactor (opcionális)
⏚	Földelési Terminál

3. Terminál méretek

Model VFD-	002S11A/B, 002S21A/B/C, 002S23A/B, 004S11A/B, 004S21A/B/C, 004S23A/B, 004S43A/B, 007S21A/B/C, 007S23A/B, 007S43A/B	007S11A/B, 015S21A/B/C, 015S23A/B, 015S43A/B, 022S21A/B/C, 022S23A/B, 022S43A/B
Terminal Specifikáció (Terminal ϕ)	M3.5	M4

3.4 Vezérlő terminál bekötése (Gyári beállítás)



Wire Gauge: 22-24 AWG
Vezeték típus: Csak réz
Nyomaték: 4 kgf-cm (3.5

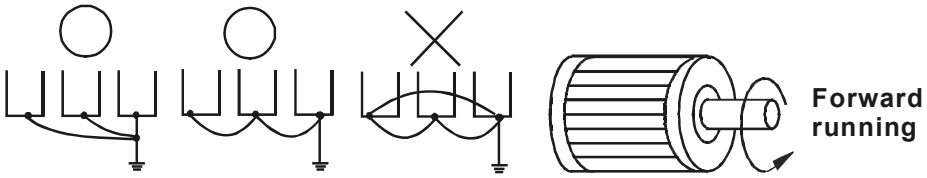
1. Terminál kiosztás:

Terminál kód	Terminál név	Megjegyzés
RA-RC	Multi-Function Indication Output Contact	Lásd Pr.3-06 Relé kimeneti kontaktus RA-RC (Normálisan nyitott kontaktus) RB-RC (Normálisan zárt kontaktus)
RB-RC	Multi-Function Indication Output Contact	
MO1-MCM	Multi-function PHC output	Lásd Pr.3-05
RJ-11	Soros kommunikációs port	RS-485 soros kommunikációs interfész
+10V-GND		Áramforrás (+10 V)
AVI-GND	Analóg feszültség/áramerősség frekvencia vezérlés	0 -tól +10 V (Max. Kimeneti Frekv.) Bemenet vagy 4 - 20mA (Max. Kimeneti Frekv.) Bemenet
AFM-GND	Analóg frekvencia/áram mérő	0 tól +10 V (Max. kimeneti frekv.) kimenet
M0-GND	Multi-function auxiliary input	Lásd Pr.4-04 - Pr.4-08
M1-GND	Multi-funkciós bemenet 1	
M2-GND	Multi-funkciós bemenet 2	
M3-GND	Multi-funkciós bemenet 3	
M4-GND	Multi-funkciós bemenet 4	
M5-GND	Multi-funkciós bemenet 5	

Megjegyzés: Használj árnyékolt csavart érpárú vezetékeket a vezérlő kábeleknek. Fontos, hogy minden kábel jól elkülönüljön egymástól. A földelési kábelt csak a frekvenciaváltóhoz kösd. Ne kösd a földet mindkét a kábel mindkét végéhez.

3.5 Bekötési megjegyzések: Kérlek, olvasd el figyelmesen a bekötés előtt.

1. ⚠ **Veszély:** Ne kössd a hálózati kábelt az inverter U/T1, V/T2, W/T3 kapcsaira, mert ez károsodást okozhat a berendezésben.
2. ⚠ **Figyelem:** Ellenőrizd, hogy minden csavar meg van húzva az előírt nyomatékkal.
3. A bekötés alatt tarts be a helyi szabványnak megfelelő szerelési utasítást a balesetek elkerülése céljából.
4. Ellenőrizd, hogy minden védelmi eszköz (megszakító vagy biztosíték) megfelelően van bekötve az inverter és a hálózati csatlakozás között.
5. Győződjön meg róla, hogy a kábelek jól csatlakoznak, és hogy az inverter megfelelően le van földelve.
6. Használjon a szabványnak megfelelő földelő kábelt a lehető legrövidebb hosszban.
7. Több inverter is berakható egy helyre. Ebben az esetben mindegyiket le kell külön földelni a fő földelő vezetékhez. A földelési kábeleket lehet párhuzamosan is kötni, mint azt az ábra is mutatja. **Ellenőrizd, hogy a földelési kábelekben ne legyen hurokkötés!!**



8. Ha az inverter kimenő kapcsai U/T1, V/T2, és W/T3 a motor csatlakozási pontokra U, V, és W, sorrendbe lettek bekötve, akkor a motor óra járásával ellentétesen fog forogni (a motor tengelyoldaláról nézve), ha az előre forgási parancs van kiadva. Az ellentétes forgási irány beállításához, cseréld meg bármelyik két motorkábel vezetéket.
9. Ellenőrizd, hogy a hálózati áramforrás képes legyen a megfelelő nagyságú feszültség és áramerősség szolgáltatására.
10. Ne köss be, és ne távolíts el vezetéket a frekvenciaváltóból, ha az áram alatt van.
11. Ne vizsgáld az alkatrészeket, ha a belső “CHARGE” lámpa világít, szüntesd meg a hálózati áramot.
12. Ne mérd a jeleket az inverter áramkörén, ha az működik.

13. Az egyfázisú frekvenciaváltók esetén, a hálózati kábelt bemeneti három csatlakozási pont közül bármelyik két pontra kötheted R/L1, S/L2, T/L3.

Megjegyzés: Ez a frekvenciaváltó nem használható 1 fázisú motorok üzemeltetéséhez.

14. Vezesd a vezérlő és hálózati kábeleket külön csatornába. Ne keresztezd őket 90 fokban.

15. Ha EMI zavarszűrő szükséges az esetleges interferenciacsökkentésre, akkor azt kösd be a lehető legközelebb a frekvenciaváltóhoz. Az elektromagnetikus interferencia a vivő frekvencia csökkentésével is lehetséges.

16. Ha az inverter beépítési helyzetéhez közel If the AC drive is installed in the place where a load reactor is needed, install the filter close to U/T1, V/T2, W/T3 side of AC drive. Do not use a Capacitor or L-C Filter (Inductance-Capacitance) or R-C Filter (Resistance-Capacitance), unless approved by Delta.

17. Ha külső földelés megszakadás elleni védelmet használ, akkor az áramerősséget az érzékelőn 200mA állítsd, és a felismerés érzékenysége ne legyen kevesebb, mint 0.1 másodperc a nem valós hibajelzések elkerülése érdekében.

3.6 Motor kiválasztási segédlet

1. Kérjük vegye figyelembe, hogyha hagyományos motort működtet frekvenciaváltóval akkor az energiaveszteség nagyobb lesz mintha inverteres használatra készült motort használna.

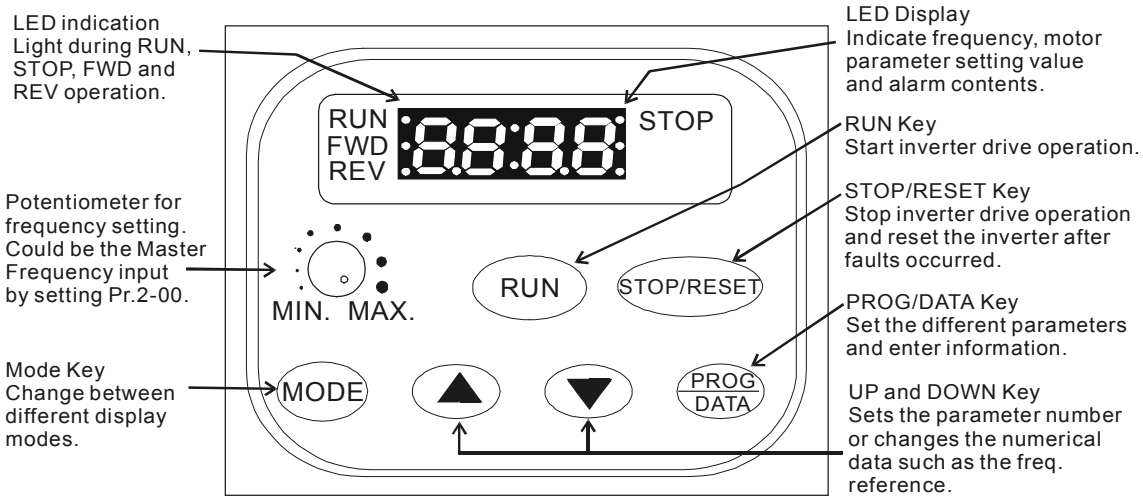
2. Kerülje a meghajtott motoroknál a túl alacsony sebességet. Ebben az esetben a motor tengelyén lévő ventilátor nem tud elégséges levegőt szállítani a hűtéshez és így a berendezés károsodása, léphet fel.

3. A terhelést csökkenteni kell a motoron, ha a motor alacsony sebességen működik.

4. FEJEZET - DIGITÁLIS VEZÉRLŐ MŰKÖDTETÉSÉ

4.1 A digitális vezérlő leírása

A digitális vezérlő két részből áll: Kijelző panel és vezérlő gombok. A kijelző panel a frekvenciaváltó működési és beállítási paraméterek, megjelenítését szolgálja. A vezérlő gombok pedig a paraméterek és kijelzendő adatok változtatását szolgálják.

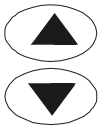


Mode
A “mode” gomb megnyomásával váltani tud a kijelzőn megjelenítendő aktuális értékek típusai között : frekvencia, áramerősség, referencia érték stb.

PROG/ DATA
Az “PROG/DATA” megnyomásával az inverter elmenti a kijelzőn kiírt paraméter értékeket.

Run
Az inverter indítására szolgál. Ennek a gombnak nincs jelentősége ha külső vezérlőről egységről vezérelik a frekvenciaváltót.

Stop / Reset
A frekvenciaváltó programjának megállítására szolgál. Ha az inverter hiba miatt állt le, akkor először keresse meg a hibát, majd ezzel a gombbal tudja a hiba után ismételt alapbeállításba hozni a berendezést.

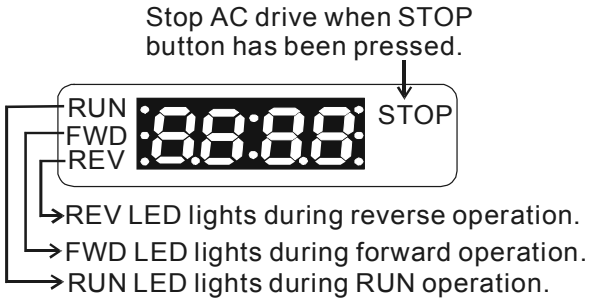


Fel / Le
A fel és le gombok használatával lehet a kijelzett paraméter értékét változtatni. Továbbá használható még a különböző működési értékek vagy paraméterek közötti lépetésre. Megnyomva a fel vagy le gombot növelhetjük vagy csökkenthetjük a megváltoztatni kívánt mértékegységeket. A gyorsabb haladás érdekébe tartsd lenyomva a gombot.

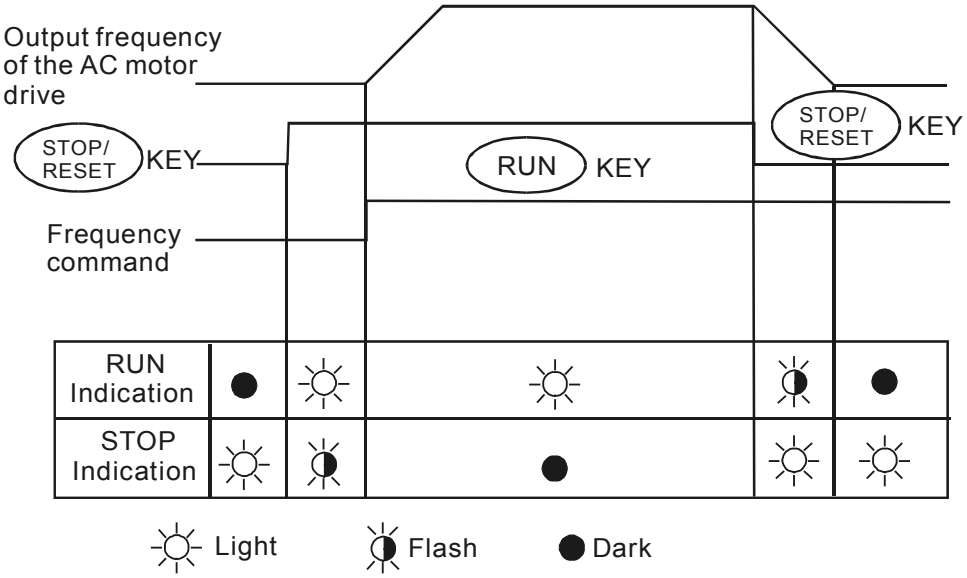
4.3 A kijelzőn megjelenő szövegek magyarázata

Kiírt üzenet	Leírás
	Kimenő frekvencia kijelzése
	Az aktuális jelenlegi frekvencia kijelzése. Ami az U, V, és W kimeneteken megjelenik.
	Az U, V, és W kimeneti pontokon mért áramerősség
	Ügyfél által beírt mértékegység (v), hol v = H x Pr. 0-05.
	Számolási érték (c).
	A belső PLC által végrehajtott aktuális lépés száma
	A DC-BUS feszültsége
	Kimenő feszültség
	A kiválasztott parameter csoport
	A kiválasztott konkrét parameter
	Az aktuálisan tárolt parameter értéke.
	Az inverter forgási irányát mutatja – ELŐRE
	Az inverter forgási irányát mutatja - HÁTRA
	“End” Felirat megjelenése jelzi, hogy az inverter elfogadta a bevitt parmétert. Amikor az új adat bevitelre került a gép automatikusan azt tárolja a memóriájába. A beállítandó érték módosításához kérem használja a ▲ és a ▼ gombokat.
	“Err” a hibás adatbevitelt mutatja

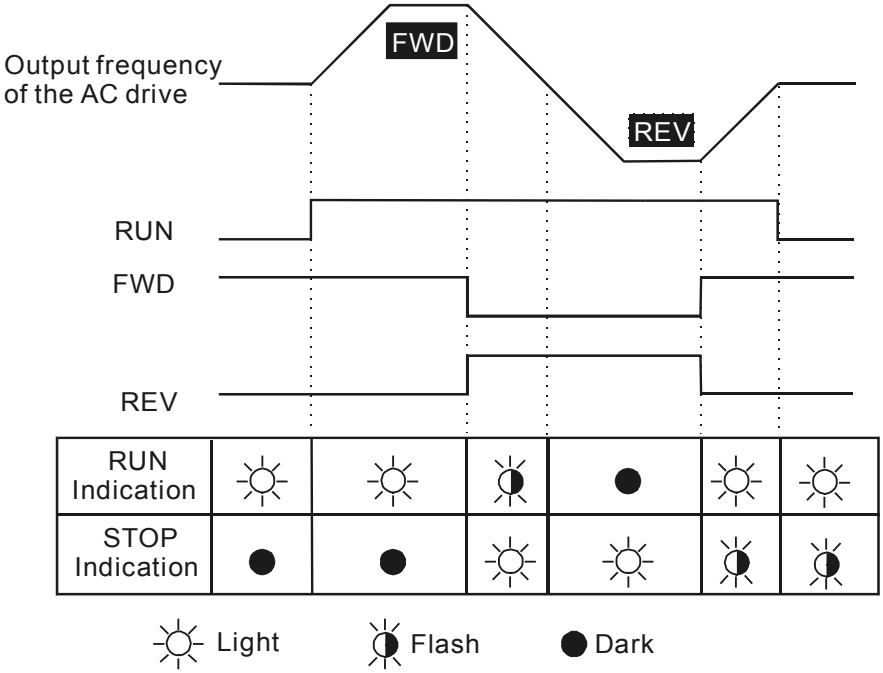
4.3 A LED jelzéseinek magyarázata



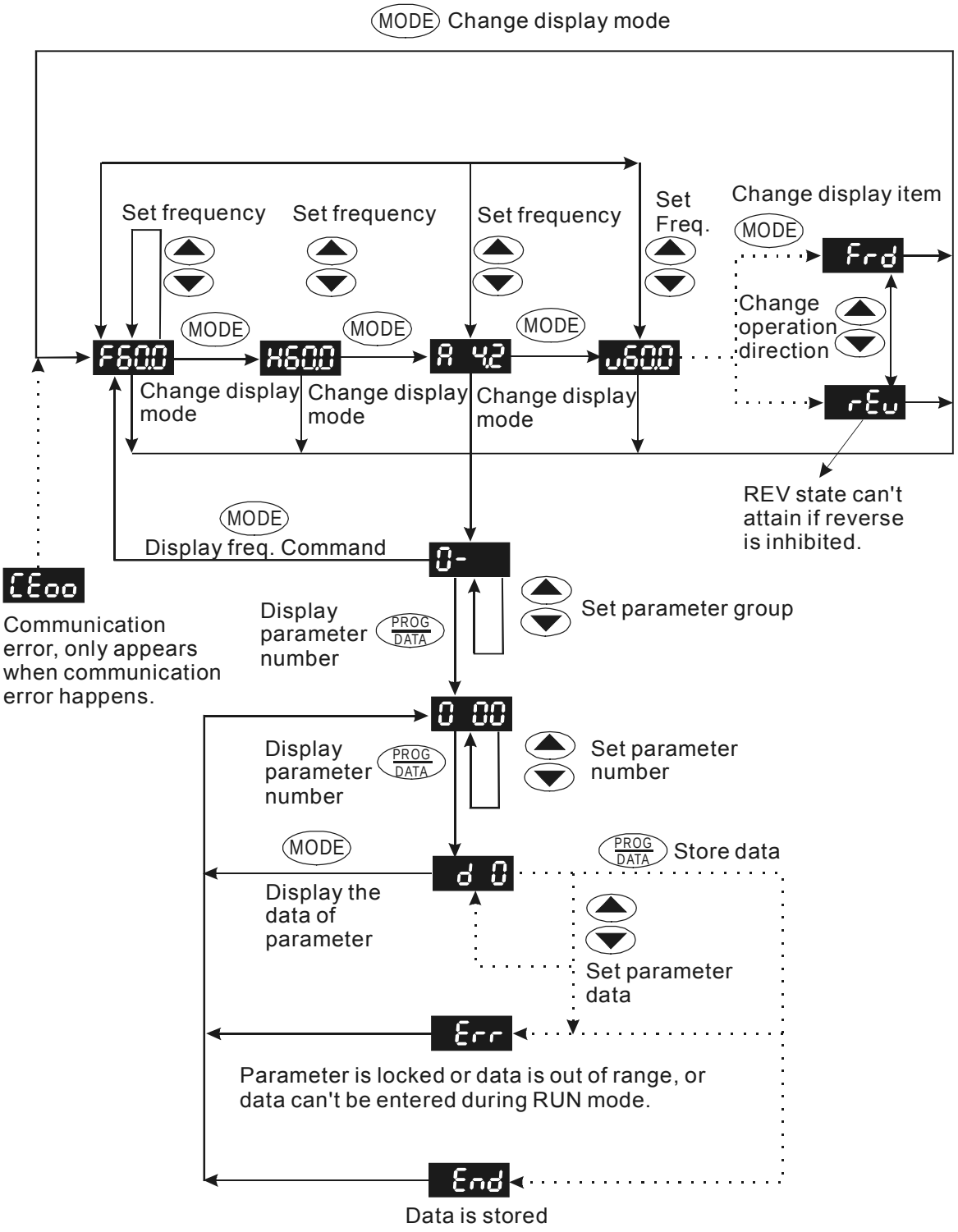
1. A RUN és STOP LED funkciójának leírása



2. Az FWD és REV LED lámpájának magyarázata.



4.4 Digitális vezérlő használata



5. FEJEZET PROGRMAOZÁSI PARAMÉTEREK

5.1 Csoport 0: Felhasználói paraméterek

0 - 00 Frekvenciaváltó azonosító kódja — Alap beállítás: d#

Beállítások Nincs

V \ HP	1/4	1/2	1	2	3
115V/230V	d0	d2	d4	d6	d8
460V	-- -- --	d3	d5	d7	d9

🕮 Ez az adat az inverter teljesítményét mutatja. Kiolvashatja és ellenőrizheti a névleges áram adatait az inverter típusának megfelelően (fenti táblázat) használatával és az áramfelvétel táblázat összeolvasásával. Kérlek ellenőrizd, hogy a néveleges áramfelvétele az inverternek megegyezik az oldalán található adattáblán szereplő adatokkal.

V \ HP	1/4	1/2	1	2	3
115V/230V	1.6A	2.5A	4.2A	7.5A	11.0A
460V	-- -- --	1.5 A	2.5 A	4.2 A	5.5 A

0 - 01 Az inverter névleges áramfelvételének kiírása — Alap beállítás: d ##.#

Beállítások Nincs — lépték: 0.1A

🕮 Ez a paraméter az inverter névleges áramfelvételét írja ki a Pr. 0-00 funkció alapján – csak olvasásra.

0 - 02 Gyári beállítások visszaállítása - Reset — Alap beállítás: d 0

Beállítások d 0 - d 9 Nincs használva

d 10 Minden paraméter a gyári alapbeállításra ugrik vissza.

🕮 Ezzel a funkcióval a gyári alap beállítások használatához térhetünk vissza.

0 - 03	Indítási kijelző állapot	Alap beállítás: d 0

Beállítások d 0 Kijelzi az alap frekvenciát (F)

d 1 Kijelzi az aktuális frekvenciát (H)

d 2 Kijelzi a felhasználó által meghatározott mérőegységet

d 3 Kijelzi a kimenő áramot (A)

Ezt a paramétert menet közben is változtathatod.

0 - 04	A felhasználó által meghatározott mértékegység állítása	Alap beállítás: d 0

Beállítások d 0 Kiírja a felhasználó által beállított mérőegységet (u)

d 1 Kiírja a számláló értéket (C)

d 2 Kiírja a PLC időzítő tartalmát (1 = tt)

d 3 Kiírja a DC BUS feszültségét (U)

d 4 Kiírja a kimenő feszültséget (E)

d 5 Kiírja a PID frekvencia parancsát (P)

d 6 Kiírja a PID funkció visszacsatolását (a megszorzott növelt értéket mutatja) (b)

Ezt a paramétert menet közben is beállíthatja.

Megjegyzés: d 0 paraméternél, a mérőegység = H X **0-05**

0 - 05	A felhasználó által meghatározott állandó K	Alap beállítás: d 1.0

Beállítások d 0.1 - d 160 lépték : 0.1

Ezt a paramétert menet közben is változtathatja.

🕮 A „K” itt egy állandót jelent, amellyel a kijelzett frekvencia megszorozásával más mértékegységek is kijelezhetők a digitális kijelzőn.

A kijelzendő érték a következőképpen számítható ki:

Kiírt érték = (kimenő frekvencia x K)

🕮 A kijelző csak három szám kiírására képes, ha hosszabb számot szeretne megjeleníteni,

akkor a Pr.0-05 funkcióval theti ezt meg. Így a kijelző már öt számot tud megjeleníteni decimális kijelzéssel, melyet az alábbikaban szemléltetünk:

Kijelző	Megjelenített számok
999	The absence of a decimal point indicates a three–digit integer.
99.9	A signal decimal point between the middle and the right-most numbers is a true decimal point; it separates ones and tenths as in “30.5” (thirty and one-half).
999.	A single decimal point after the right-most numbers is not a true decimal point, instead it indicates that a zero follows the right-most number. For example, the number 1230 would be displayed as “123.”
99.9.	Two decimal points (one between the middle and the right-most numbers, and one after the right-most number) are not true decimal points; instead they indicate that two zeros follow the right-most number. For example, the number 34500 would be displayed as “34.5.”.

0 - 06 Software verzió — Alap beállítás: d #.#

Beállítások Nincs

🕮 Ez az értéket csak kiolvasni lehet. Itt tárolódik az inverter software verzió száma.

0 - 07 Jelszavas védelem — Alap beállítás: d 0

Beállítások d 0 - d 999 lépték: 1

🕮 A Pr.0-07 és Pr.0-08 együtt látják el az frekvenicaváltóban tárolt paraméterek védelmét. work together to provide data security for the AC drive. When Pr.0-08 is set to a value other than 0, a password must be entered to alter the values of parameters. The password is the number set in Pr.0-08, which ranges from 1 to 999. Pr.0-07 is where the password is entered to allow parameter values to be altered.

🕮 Kijelző állapotai:
d 0: nincs jelszó / correct password has been input
d 1: programozás lezárva

0 - 08	Jelszó beállítása – megváltoztatása	Alap beállítás: d 0
	Beállítások d 0 - d 999	lépték: 1

📖 For a password to be configured, the non-zero value assigned to Pr.0-08 must be entered **twice.** In other words, set the value of Pr.0-08 to the desired value and press the Prog/Data key. Then, press the Prog/Data key again to display the value of Pr.0-08. Finally, press the Prog/Data key again to store the displayed value, which then becomes the password.

For example, say that Pr.0-08 is set to 111. When the AC drive is powered-up, all the parameters will be locked and their values cannot be changed. To permit the values of parameters to be altered, navigate to Pr.0-07 and change its value to 111 (the password configured in Pr.0-08). Then press the Prog/Data key, and you may alter the parameter values.

📖 Kijelző állapotai:
d 0: nincs jelszó
d 1: jelszó beállítva

5.2 Csoport 1: Alap funkciók

1 - 00	Maximális kimenő frekvencia (Fo. max)	Alap beállítás: d 60.0
	Beállítások d 50.0 - d 400 Hz	lépték: 0.1Hz

🕮 Ez a paraméterrel az inverter maximális frekvenciáját lehet beállítani. Minden inverter analóg bemenete ezen frekvencia tartomány szerint változtatható. (0 to +10V, 4 to 20mA).

1 - 01	Maximum Feszültség Frekvencia	Alap beállítás: d 60.0
	Beállítások d 10.0 - d 400 Hz	lépték: 0.1Hz

🕮 This value should be set according to rated frequency of the motor as indicated on the motor nameplate. Maximum Voltage Frequency determines the volts per hertz ratio. For example, if the drive is rated for 460 VAC output and the Maximum Voltage Frequency is set to 60Hz, the drive will maintain a constant ratio of 7.66 v/Hz. The setting value must be greater than or equal to the middle freq. setting (Pr.1-03).

1 - 02	Max. Kimenő feszültség (Vmax)	Factory Setting: d 230*
	Settings d 2.0 to d 255V*	Unit: 0.1V*
	*Twice value for 460V class	

🕮 This parameter determines the Maximum Output Voltage of the AC drive. The Maximum Output Voltage setting must be smaller than or equal to the rated voltage of the motor as indicated on the motor nameplate. The setting value must be greater than or equal to the Mid-Point Voltage (Pr.1-04).

1 - 03	Középponti frekvencia (Fmid)	Factory Setting: d 1.0
	Settings d 1.0 to d 400Hz	Unit: 0.1Hz

📖 This parameter sets the Mid-Point Frequency of V/F curve. With this setting, the V/F ratio between Minimum Frequency and Mid-Point frequency can be determined. This parameter must be greater than or equal to Minimum Output Frequency (Pr.1-05) and equal to or less than Maximum Voltage Frequency (Pr.1-01).

1 - 04	Középponti feszültség (Vmid)	Factory Setting: d12.0*
	Settings d 2.0 to d 255V*	Unit: 0.1V*
	*Twice value for 460V class	

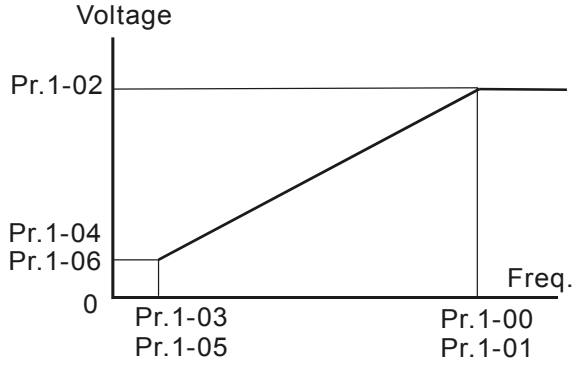
📖 The parameter sets the Mid-Point Voltage of any V/F curve. With this setting, the V/F ratio between Minimum Frequency and Mid-Point Frequency can be determined. This parameter must be equal to or greater than Minimum Output Voltage (Pr.1-06) and equal to or less than Maximum Output Voltage (Pr.1-02).

1 - 05	Minimum kimeneti frekvencia (Fmin)	Factory Setting: d 1.0
	Settings d 1.0 to d 60.0Hz	Unit: 0.1Hz

📖 This parameter sets the Minimum Output Frequency of the AC drive. This parameter must be equal to or less than Mid-Point Frequency (Pr.1-03).

1 - 06	Minimum kimeneti feszültség (Vmin)	Factory Setting: d12.0*
	Settings d 2.0 to d 255V*	Unit: 0.1V*
	*Twice value for 460V class	

📖 This parameter sets Minimum Output Voltage of the AC drive. This parameter must be equal to or less than Mid-Point Voltage (Pr.1-04).



Standard V/F Curve

1 - 07	Upper Bound of Output Frequency	Factory Setting: d 100
	Settings d 1 to d110%	Unit: 1%

📖 This parameter must be equal to or greater than the Lower Bound of Output Frequency (Pr.1-08). The Maximum Output Frequency (Pr.1-00) is regarded as 100%.

1 - 08	Lower Bound of Output Frequency	Factory Setting: d 0
	Settings d 0 to d100%	Unit: 1%

📖 The Upper/Lower Bound is to prevent operation error and machine damage.

📖 If the Upper Bound of Output Frequency is 50Hz and the Maximum Output Frequency is 60Hz, the Maximum Output Frequency will be limited to 50Hz.

📖 If the Lower Bound of Output Frequency is 10Hz, and the Minimum Output Frequency (Pr.1-05) is set at 1.0Hz, then any Command Frequency between 1-10Hz will generate a 10Hz output from the drive.

📖 This parameter must be equal to or less than the Upper Bound of Output Frequency (Pr.1-07).

1 - 09	Gyorsítási idő 1 (Taccel 1)	Factory Setting : d10.0
1 - 10	Lassítási idő 1 (Tdecel 1)	Factory Setting : d10.0
1 - 11	Gyorsítási idő 2 (Taccel 2)	Factory Setting : d10.0
1 - 12	Lassítási idő 2 (Tdecel 2)	Factory Setting : d10.0

Settings d 0.1 to d 600Sec Unit: 0.1sec

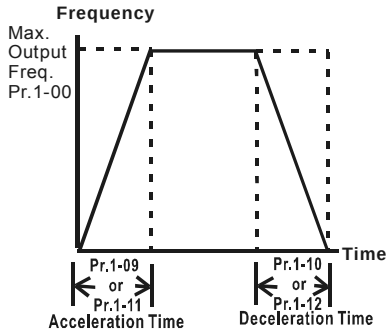
These parameters can be set during operation.

- Pr.1-09. This parameter is used to determine the time required for the AC drive to ramp from 0 Hz to its Maximum Output Frequency (Pr.1-00). The rate is linear unless S-Curve is “Enabled.”

- Pr.1-10. This parameter is used to determine the time required for the AC drive to decelerate from the Maximum Output Frequency (Pr.1-00) down to 0 Hz. The rate is linear unless S-Curve is “Enabled.”

- The acceleration/deceleration time 2 determines the time for the AC drive to acceleration/deceleration from 0Hz to Maximum Output Frequency (Pr.1-00) (acceleration/deceleration time 1 is the default). A Multi-Function Input terminal must be programmed to select acceleration/deceleration time 2 and the terminals must be closed to select acceleration/deceleration time 2. See Pr.4-04 to Pr.4-08.

- In the diagram shown below, the acceleration/deceleration time of the AC drive is the time between 0 Hz to Maximum Output Frequency (Pr.1-00). Suppose the Maximum Output Frequency is 60 Hz, start-up frequency (Pr.1-05) is 1.0 Hz, and acceleration/deceleration time is 10 seconds. The actual time for the AC drive to accelerate from start-up to 60 Hz is 9.83 seconds and the deceleration time is also 9.83 seconds.



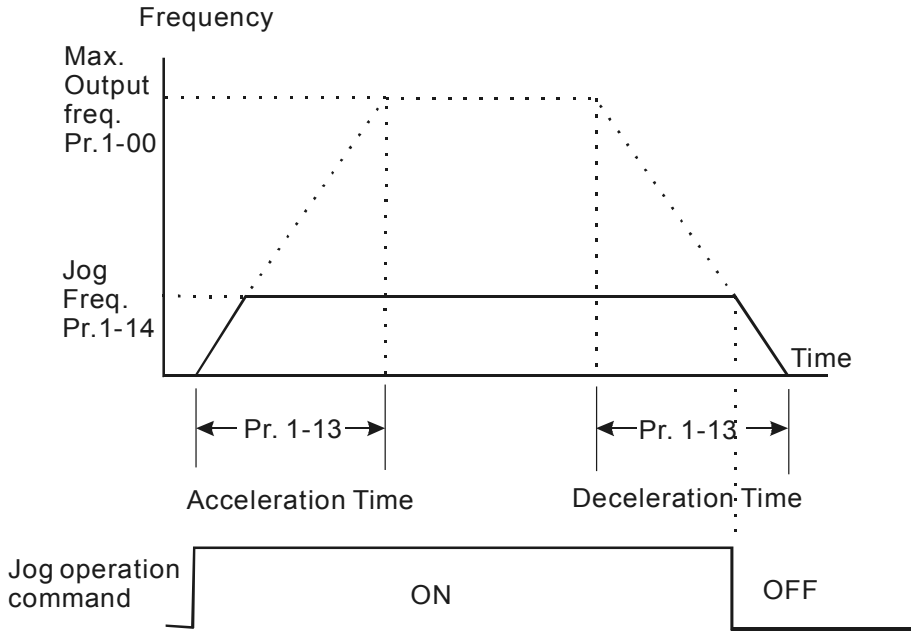
Actual Acceleration/Deceleration Time=

$$\frac{\text{Acceleration/Deceleration Time} \times (\text{Master Freq.} - \text{Min. Output Freq.})}{\text{Max. Output Freq.}}$$

1 - 13	Jog Acceleration/Deceleration Time	Factory Setting: d 10.0
	Settings d 0.1 to d 600Sec	Unit: 0.1Sec
	This parameter can be set during operation.	

1 - 14	Jog Frekvencia	Factory Setting: d 6.0
	Settings d 1.0 to d 400Hz	Unit: 0.1Hz
	This parameter can be set during operation.	

The JOG function can be selected using Multi-function Input terminals (Pr.4-04 to Pr.4-08) if programmed for Jog (d10). When the Jog terminal is “closed”, the AC drive will accelerate from Minimum Output Frequency (Pr.1-05) to Jog Frequency (Pr.1-14). When the Jog terminal “open”, the AC drive will decelerate from Jog Frequency to zero. The acceleration/deceleration time is decided by the Jog acceleration/deceleration time (Pr.1-13). During operation, the AC drive cannot perform Jog command. And during Jog operation, other operation commands cannot be accepted, except command of FORWARD, REVERSE and STOP keys on the digital keypad.



1 - 15	Auto Acceleration / Deceleration	Factory Setting: d 0

Settings
- d 0 Linear acceleration / deceleration.
- d 1 Auto acceleration, linear Deceleration.
- d 2 Linear acceleration, auto Deceleration.
- d 3 Auto acceleration / deceleration
- d 4 Linear acceleration, auto deceleration, and stall prevention during deceleration.
- d 5 Auto acceleration, auto deceleration, and stall prevention during deceleration

🕮 If the auto acceleration/deceleration is selected, the AC drive will acceleration/deceleration in the fastest and smoothest means possible by automatically adjusting the time of acceleration/deceleration.

1 - 16	S-görbe gyorsításkor	Factory Setting: d 0

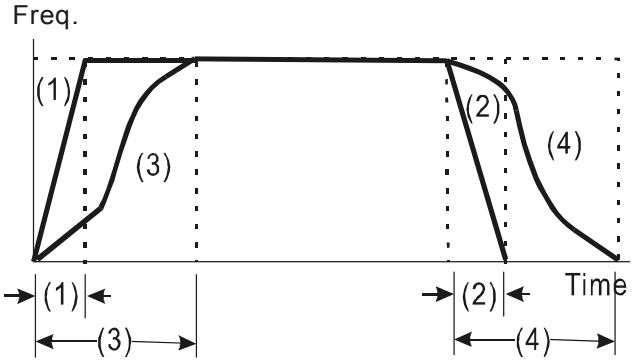
Settings d 0 to d 7

1 - 17	S-görbe lassításkor	Factory Setting: d 0

Settings d 0 to d 7

🕮 These two parameters allow you to configure whether the acceleration and/or deceleration ramps are linear or S-shaped. The S-curve is enabled when set at d1-d7. Setting d1 offers the quickest S-curve and d7 offers the longest and smoothest S-curve. The AC drive will not follow the acceleration/deceleration time in Pr.1-09 to Pr.1-12. To Disable the S-curve, set Pr.1-16 and Pr.1-17 to d0.

🕮 From the diagram shown below, the original setting acceleration/deceleration time will be for reference when the function of the S-curve is enabled. The actual acceleration/deceleration time will be determined based on the S-curve selected (d1 to d7).



Acceleration/Deceleration characteristics
(1), (2) Disabling S curve
(3), (4) Enabling S curve

1 - 18	Jog Lassítási ideje	Factory Setting: d0.0

Settings d0.0 to d600

When Pr.1-18 is set to d0.0 Jog decelerating time determined by the setting of Pr.1-13 0.1 to 600 sec, Jog decelerating time can be set independently, separates from Pr.1-13

📖 When Pr.1-18 is set to 0.0, Pr.1-13 determines both Jog acceleration and deceleration time. When Pr.1-18 is set between 0.1 to 600 seconds, which will determine Jog Decelerating Time and Pr.1-13 will only determine Jog Accelerating Time.

5.3 Group 2: Operation Method Parameters

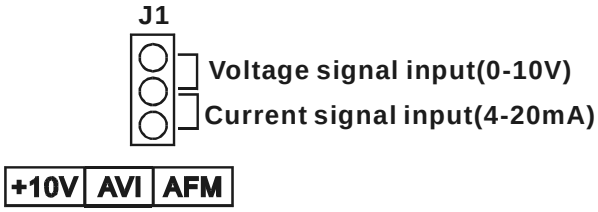
2 – 00	A frekvencia parancs kiadásának forrása	Factory Setting: d 0

Settings

- d 0 Master Frequency input determined by digital keypad. (record the frequency of power loss and it can do analog overlap plus)
- d 1 Master Frequency determined by analog signal DC 0V-10V (external terminal AVI). (won't record the frequency of power loss and it can't do analog overlap plus)
- d 2 Master Frequency determined by analog signal DC 4mA - 20mA (external terminal AVI). (won't record the frequency of power loss and it can't do analog overlap plus)
- d 3 Master Frequency determined by Potentiometer on the digital keypad. (won't record the frequency of power loss and it can do analog overlap plus)
- d 4 Master Frequency operated by RS-485 serial communication interface and record frequency of power loss. (record the frequency of power loss and it can do analog overlap plus)
- d 5 Master Frequency operated by RS-485 serial communication interface and won't record frequency before power loss. (won't record the frequency of power loss and it can do analog overlap plus)

🕮 This parameter sets the Frequency Command Source of the AC drive.
If the Frequency Command Source is external (DC 0 to +10V or 4 to 20mA), please make sure the (AVI) terminal jumper is in the proper position as shown below.

🕮 Position of jumper: Please open the top cover. It is at the lower-left corner of the panel. The jumper J1 determines the type of external analog input, either DC voltage signal or current signal.



📖 When setting analog overlap plus, it needs to set Pr. 2-06 to select AVI or ACI.

2 - 01	Működési parancs kiadásának forrása	Factory Setting: d 0

Settings	d 0	Controlled by the keypad
	d 1	Controlled by the external terminals, keypad STOP enabled.
	d 2	Controlled by the external terminals, keypad STOP disabled.
	d 3	Controlled by the RS-485 communication interface, keypad STOP enabled.
	d 4	Controlled by the RS-485 communication interface, keypad STOP disabled.

5

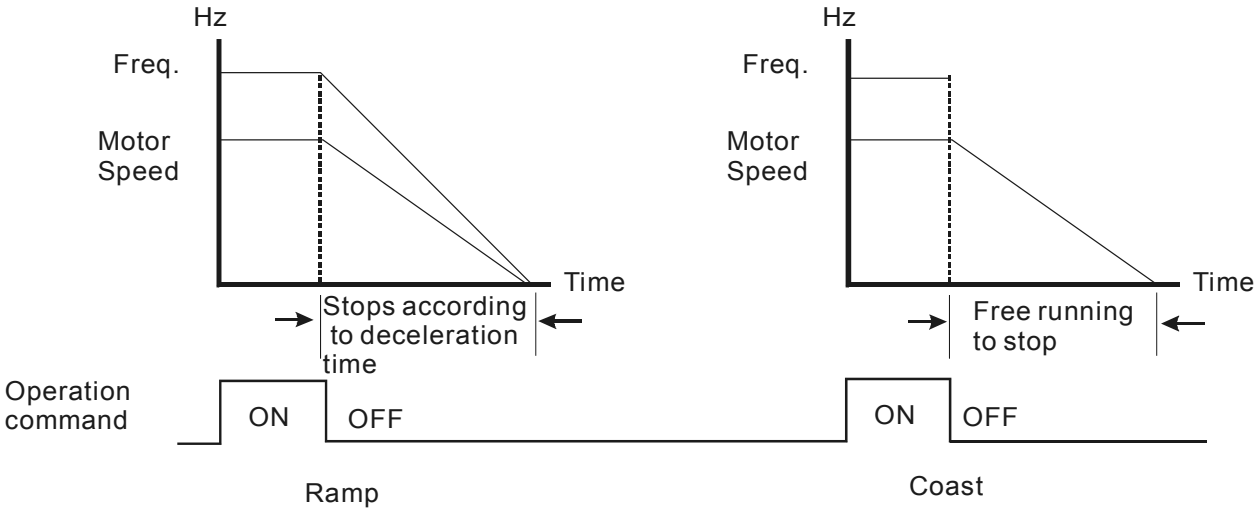
📖 When the AC drive is controlled by an external source, please refer to parameter group 4 for detailed explanations on related parameter settings.

2 - 02	Megállási mód	Factory Setting: d 0

Settings	d 0	Ramp stop
	d 1	Coast stop

📖 The parameter determines how the motor is stopped when the AC drive receives a valid stop command.

1. Ramp: the AC drive decelerates the motor to Minimum Output Frequency (Pr.1-05) and then stops according to the deceleration time set in Pr.1-10 or Pr.1-12.
2. Coast: the AC drive stops output instantly upon command, and the motor free runs until it comes to a complete stop.



Note: The motor stop method is usually determined by the characteristics of the motor load and frequency of stops.

2 - 03	PWM Vivő frekvencia beállítása	Factory Setting: d 10
Settings	d 03 fc= 3KHz d 04 fc= 4KHz d 05 fc= 5KHz to d 10 fc= 10KHz	Unit: 1KHz

This parameter can set the carrier frequency of PWM output.

Carrier Frequency	Acoustic Noise	Electromagnetic Noise, Leakage Current	Heat Dissipation
3KHz	Significant	Minimal	Minimal
↕	↕	↕	↕
10KHz	Minimal	Significant	Significant

📖 From the above table, we see that the carrier frequency of PWM output has a significant influence on the electromagnetic noise, heat dissipation of the AC drive, and the acoustic noise to the motor.

2 - 04	Hátraforgási irány engedélyezése / Tiltása	Factory Setting: d 0

Settings	d 0	Enable REV operation
	d 1	Disable REV operation

📖 The parameter determines whether the AC drive can operate in the reverse direction.

2 - 05	Loss of ACI Signal	Factory Setting: d 0

Settings	d 0	Upon the loss of ACI, the drive will default to an output frequency of 0 Hz.
	d 1	Upon the loss of ACI, the drive will stop and display error message “EF”.
	d 2	Upon the loss of ACI, the drive will continue to run at the last known ACI input.

📖 This parameter is only effective when the Source of Frequency is commanded by a 4 to 20 mA signal. The ACI input is considered lost when the ACI signal falls below 2 mA.

5

2 - 06	Analog Auxiliary Frequency Operation	Factory Setting: d 0

Settings	d 0	Disable
	d 1	Enable + AVI (0~10V)
	d 2	Enable + ACI (4~20mA)

📖 This parameter is used to determinate that the analog signal to overlap is 0~10V (AVI) or 4~20mA (ACI).

📖 To make sure the short PIN of J1 on the panel is correct position before setting this parameter.

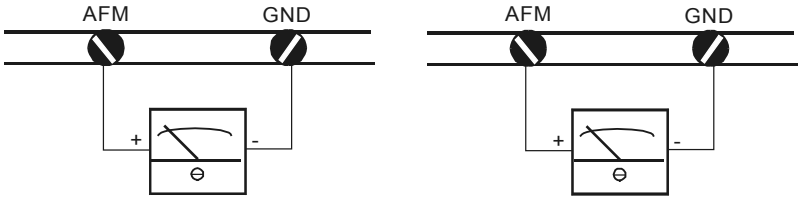
5.4 Group 3: Kimeneti Funkciók Paraméterezése

3 - 00	Analóg kimeneti Jel		Factory Setting: d 0
	Settings	d 0	Analog frequency meter (0 to Maximum Output Frequency).
		d 1	Analog current meter (0 to 250% of the rated AC drive current).

🕮 This parameter selects either Output Frequency or current to be displayed using the 0 to10V AFM output.

3 - 01	Analóg kimenet érték erősítése	Factory Setting: d100
	Settings d 1 to d 200%	Unit: 1%
	The parameter can be set during operation.	

🕮 The parameter sets the voltage range of the analog output signal at terminals AFM, that corresponds with either the output frequency or the output current of the VFD.



Analog Frequency Meter Analog Current Meter

The analog output voltage is directly proportional to the output frequency of the AC drive. With the factory setting of 100%, the Maximum Output Frequency (Pr.1-00) of the AC drive corresponds to +10VDC analog voltage output. (The actual voltage is about +10VDC, and can be adjusted by Pr.3-01).

The analog output voltage is directly proportional to the output current of the AC drive. With the factory setting of 100%, the 2.5 times rated current of the AC drive corresponds to +10VDC analog voltage output. (The actual voltage is about +10VDC, and can be adjusted by Pr. 3-01)

Note: Voltmeter specification: The sourcing capability of the output is limited to 0.21mA. Sourcing voltage: 10V. Output resistance: 47kΩ.

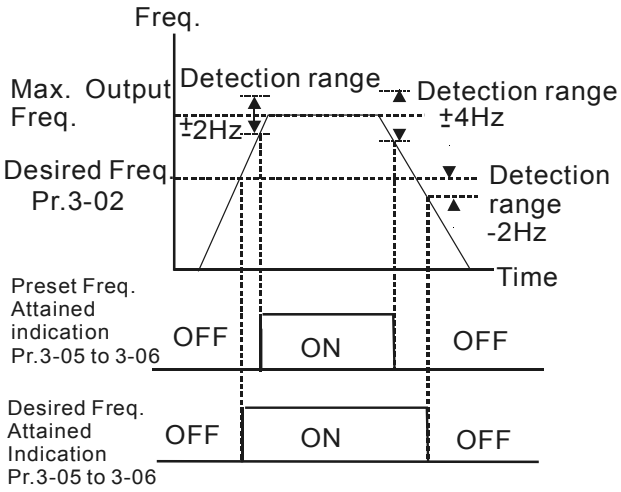
If the meter reads full scale at a voltage less than 10 volts, then Pr.3-01 should be set by the following formula:

Pr.3-01 = ((meter full scale voltage)/10) ×100%

For example: When using the meter with full scale of 5 volts, adjust Pr.3-01 to 50%.

3 - 02	Desired Frequency Attained	Factory Setting: d 1.0
	Settings d 1.0 to d 400 Hz	Unit: 0.1Hz

🕮 If a Multi-function output terminal is set to function as Desired Frequency Attained (Pr.3-05 or 3-06=d9), then the output will be activated when the programmed frequency is attained.



Desired Freq. Attained & Preset Freq. Attained

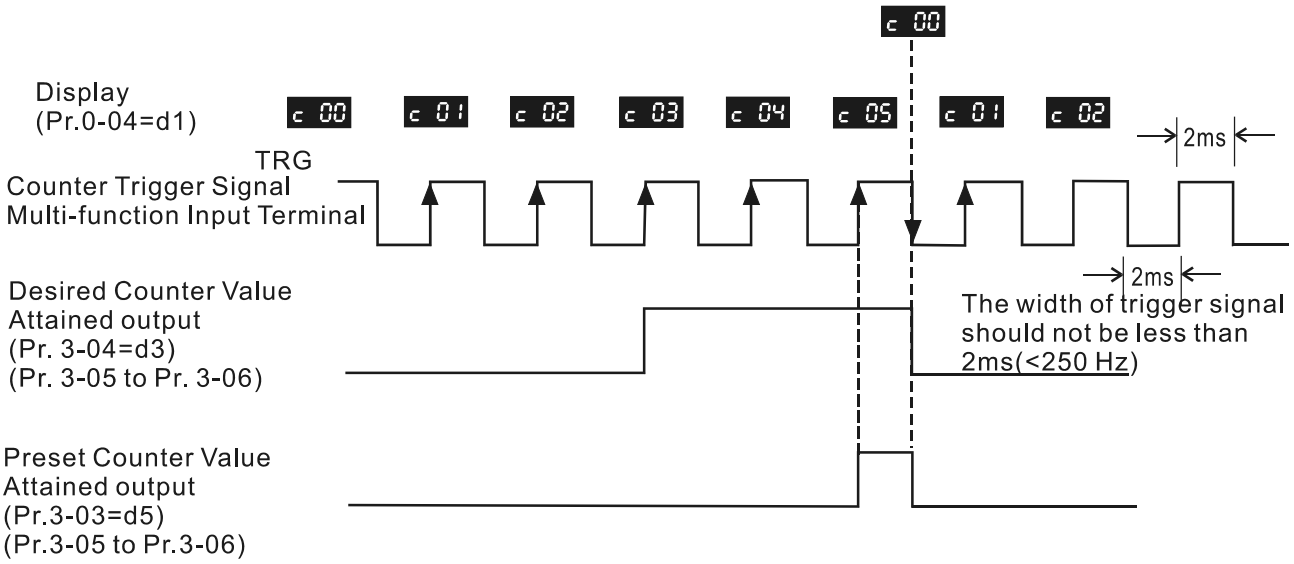
3 - 03	Terminal Count Value	Factory Setting: d 0
	Settings d 0 to d 999	

🕮 The parameter determines the value of the internal counter. The internal counter can be triggered by the external terminal (Pr.4-4 to Pr.4-8, d19). Upon completion of counting, the specified output terminal will be activated. (Pr.3-05, Pr.3-06, d14).

3 - 04	Preliminary Count Value	Factory Setting: d 0
	Settings d 0 to d 999	

🕮 When the counter value is counted up from “1” to the setting value of this parameter, the corresponding multi-function output terminal will be closed, when sets d15 as desired value attained setting. The application can be that closing the multi-function output terminal makes the AC drive operates at low speed until stop before the counting value is going to be attained.

The timing diagram is shown below:



3 - 05	Multi-function Output Terminal 1 (Photocoupler output)	Factory Setting: d 1
3 - 06	Multi-function Output Terminal 2 (relay output)	Factory Setting: d 8

Settings d 0 to d 18

Function Table List:

Setting	Function	Setting	Function
d 0	Not used	d 10	PLC Program Running
d 1	AC Drive Operational	d 11	PLC Program Step Completed
d 2	Maximum Output Frequency Attained	d 12	PLC Program Completed
d 3	Zero speed	d 13	PLC Operation Paused
d 4	Over-Torque detection	d 14	Terminal Count Value Attained
d 5	Base-Block (B.B.) Indication	d 15	Preliminary Counter Value Attained
d 6	Low-Voltage Indication	d 16	Ready State Indicator
d 7	AC Drive Operation Mode	d 17	FWD command indication
d 8	Fault indication	d 18	REV command indication
d 9	Desired Frequency Attained		

Function Explanations:

d 0 Not Used.

d 1 AC drive operational: the output terminal will be activated when the drive is running.

d 2 Maximum Output Frequency Attained: the output will be activated when the AC drive attains Maximum Output Frequency.

d 3 Zero speed: the output will be activated when Command Frequency is lower than the Minimum Output Frequency.

d 4 Over-Torque Detection: the output will be activated as long as the over-torque is detected. Pr.6-04 determines the Over-Torque detection level.

d 5 Base-Block (B.B.) Indication: the output will be activated when the output of the AC drive is shut off by external Baseblock.

d 6 Low Voltage Indication: the output will be activated when low voltage is detected.

d 7 AC Drive Operation Mode: the output will be activated when the operation of the AC drive is controlled by External Control Terminals.

d 8 Fault Indication: the output will be activated when faults occur (oc, ov, oH, oL, oL1, EF, cF3, HPF, ocA, ocd, ocn, GF).

d 9 Desired Frequency Attained: the output will be activated when the desired frequency (Pr.3-02)is attained.

d10 PLC Program Running: the output will be activated when the PLC program is running.

d11 PLC Program Step Completed: the output will be activated for 0.5 sec. when each multi-step speed is attained.

d12 PLC Program completed: the output will be activated for 0.5 sec. when the PLC program cycle has completed.

d13 PLC Program Operation Paused: the output will be activated when PLC operation is paused.

d14 Terminal Count Value Attained: counter reaches Terminal Count Value.

d15 Preliminary Count Value Attained: counter reaches Preliminary Count Value.

d16 Ready State Indicator.

d17 FWD command indication: When AC drive receives the command of forward running, it will output immediately no matter AC drive is in the state of run or stop.

d18 REV command indication: When AC drive receives the command of reverse running, it will output immediately no matter AC drive is in the state of run or stop.

5.5 Group 4: Input Function Parameters

4 - 00	Potentiometer Bias Frequency	Factory Setting: d0.0
Settings	d 0.0 to d 100.0%	Unit: 0.1%

This parameter can be set during the operation.

4 - 01	Potentiometer Bias Polarity	Factory Setting: d 0
Settings	d 0 Positive bias	
	d 1 Negative bias	

This parameter can be set during the operation.

4 - 02	Potentiometer Frequency Gain	Factory Setting: d 100
Settings	d 1 to d 200%	Unit: 1%

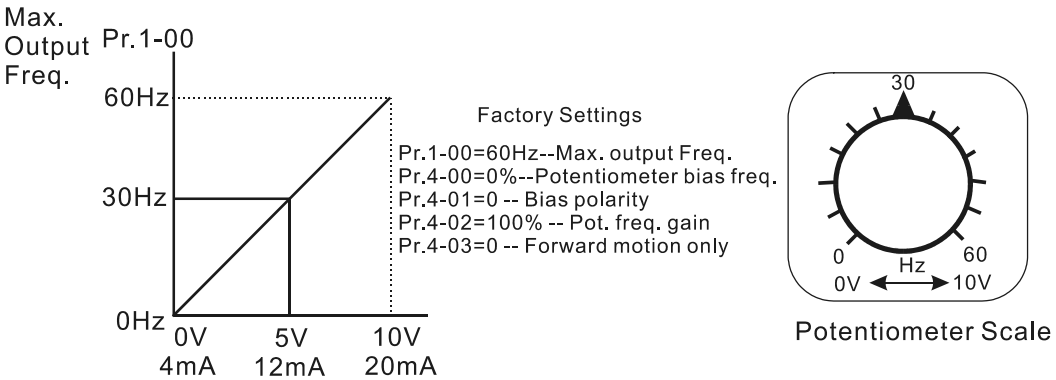
This parameter can be set during the operation.

4 - 03	Potentiometer Reverse Motion Enable	Factory Setting: d 0
Settings	d 0	Forward motion only
	d 1	Reverse motion enable (must be negative bias)

📖 Pr.4-00 to Pr.4-03 are used when the source of frequency command is the analog signal (0 to +10V DC or 4 to 20 mA DC). Refer to the following examples.

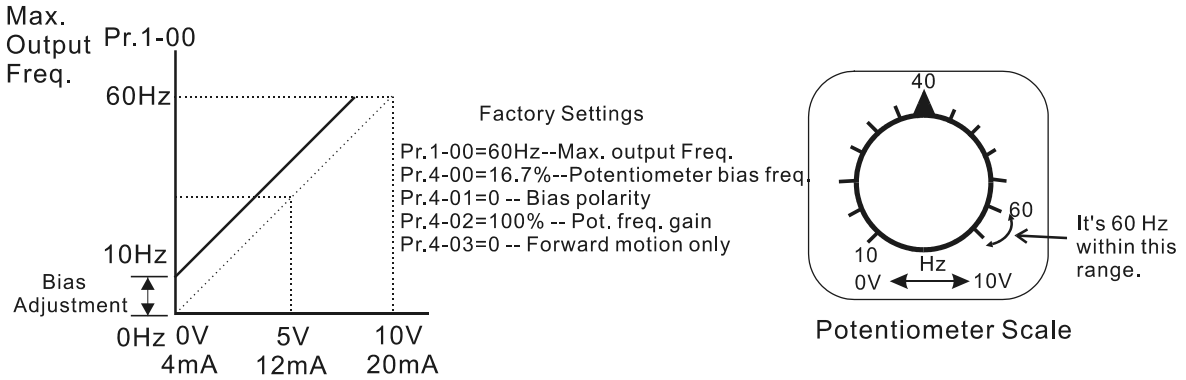
Example 1:

The following is the most common method. Set parameter 2-00 to d1 (0 to +10V signal) or d2 (4 to 20mA current signal).



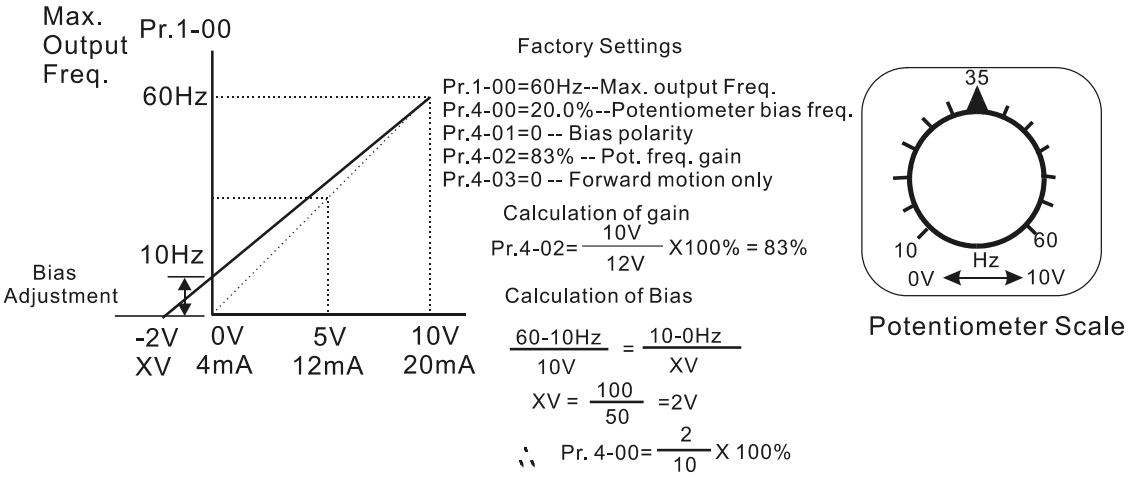
Example 2:

In this example with the potentiometer set to 0V the Output Frequency is 10 Hz. The mid-point of the potentiometer becomes 40 Hz. Once the Maximum Output Frequency is reached any further increase of the potentiometer will not increase output frequency.



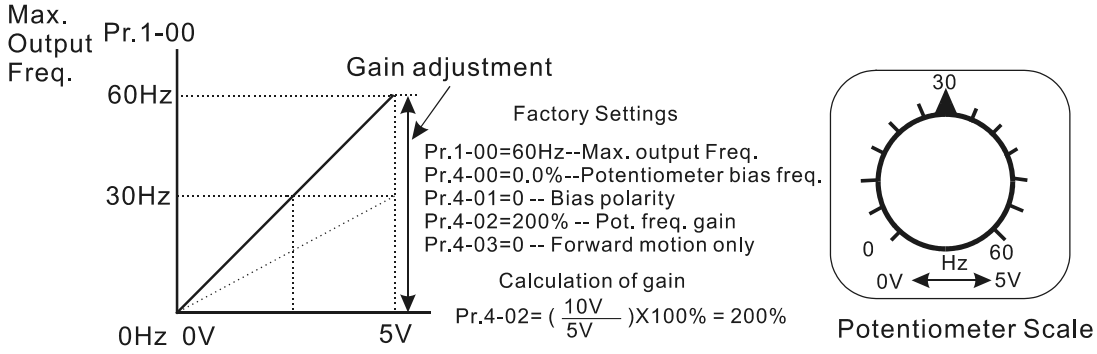
Example 3:

The example also shows the popular method. The whole scale of the potentiometer can be used as desired. In addition to signals of 0 to 10V and 4 to 20mA, the popular voltage signals also include signals of 0 to 5V, 20 to 4mA or that under 10V. Regarding the setting, please refer to the following examples.



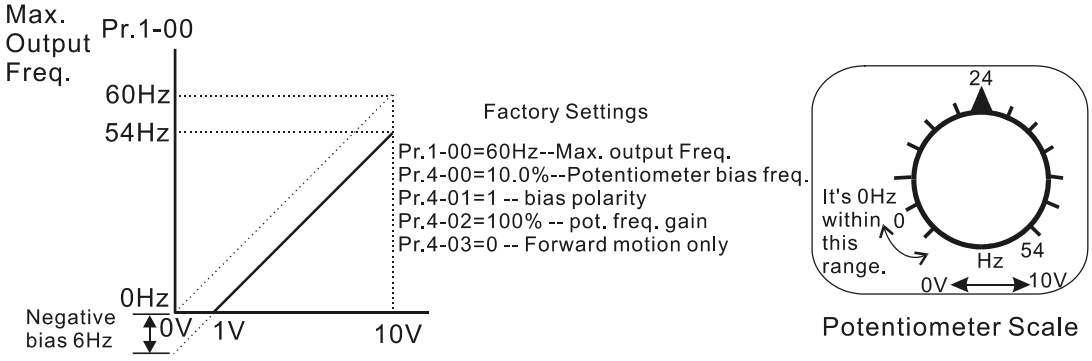
Example 4:

This example shows a potentiometer range of 0 to 5 Volts.



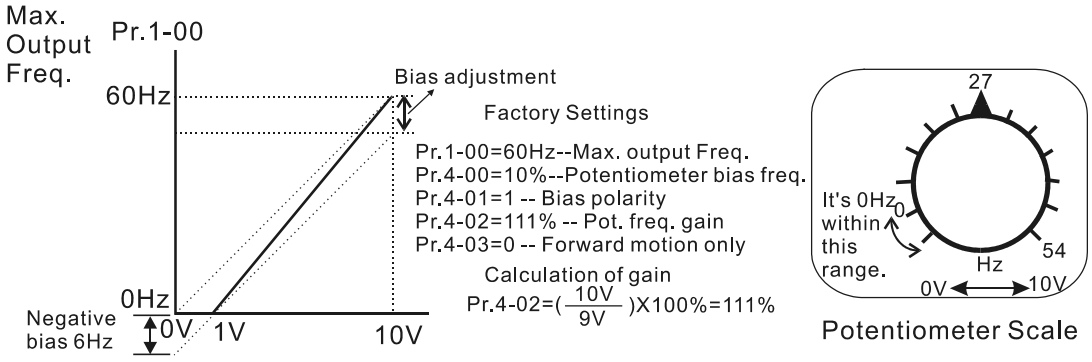
Example 5:

In this example a 1 volt negative bias is used. In a noise environment, it is advantageous to use negative bias to provide a noise margin (1V in this example).



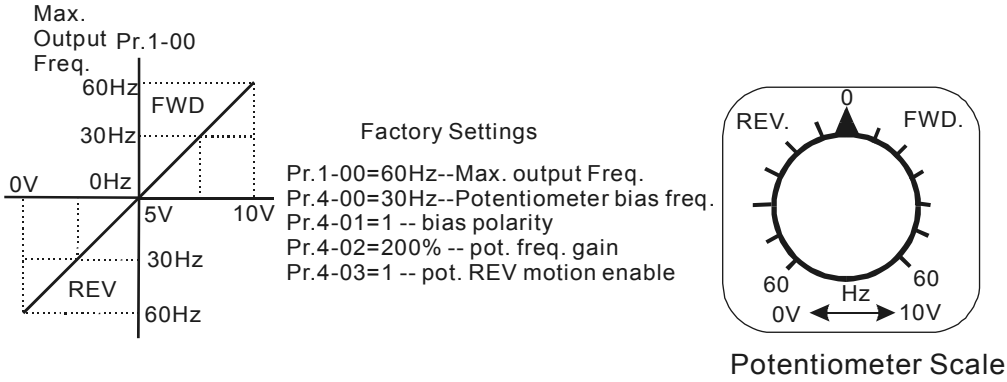
Example 6:

In this example, a negative bias is used to provide a noise margin. Also a potentiometer frequency gain is used to allow the Maximum Output Frequency to be reached.



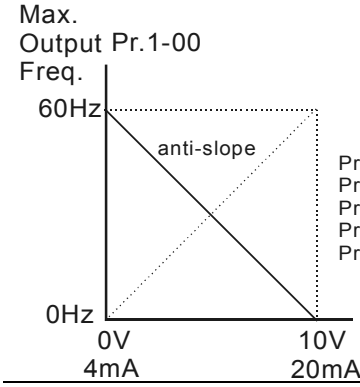
Example 7:

In this example, the potentiometer is programmed to run a motor is both forward and reverse direction. A motor will be idle when the potentiometer position is at mid-point of its scale. Using Pr.4-03 will disable the external FWD and REV controls.

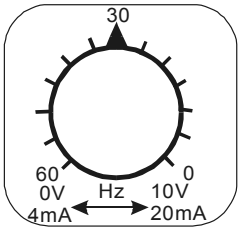


Example 8:

In this example, the option of anti-slope is shown. Anti-slope is used in an application where control of pressure, temperature, or flow is needed. Under a high pressure or flow situation, a sensor will generate a large signal such as 20 mA or 10V. With anti-slope enable, the large signal will slow or stop the AC drive



Factory Settings
Pr.1-00=60Hz--Max. output Freq.
Pr.4-00=60Hz--Potentiometer bias freq.
Pr.4-01=1 -- bias polarity
Pr.4-02=100% -- pot. freq. gain
Pr.4-03=1 -- pot. REV. motion enable



Potentiometer Scale

4 - 04	Multi-function Input Terminal (M0, M1)	Factory Setting: d 1
	Settings d 0 to d 26	
4 – 05	Multi-function Input Terminal (M2)	Factory Setting: d 6
4 – 06	Multi-function Input Terminal (M3)	Factory Setting: d 7
4 – 07	Multi-function Input Terminal (M4)	Factory Setting: d 8
4 – 08	Multi-function Input Terminal (M5)	Factory Setting: d 9
	Settings d 0,d 4 to d 26	

Parameters & Functions table:

Value	Function	Value	Function
d 0	Parameter Disable	d14	External Base Block (N.C.) (Normally Close Contact Input)
d 1	M0: FWD / STOP, M1: REV / STOP		
d 2	M0: RUN / STOP, M1: FWD / REV	d15	Increase Master Frequency
d 3	3-Wire Operation Control mode (M0, M1, M2)	d16	Decrease Master Frequency
d 4	External Fault (Normally Open)	d17	Run PLC Program
d 5	External Fault (Normally Closed)	d18	Pause PLC Program
d 6	External Reset	d19	Counter Trigger Signal
d 7	Multi-Step Speed Command 1	d20	Counter Reset
d 8	Multi-Step Speed Command 2	d21	Select ACI / Deselect AVI (the priority is higher than Pr. 2-00 and d26)
d 9	Multi-Step Speed Command 3	d22	Disable PID function
d10	Jog operation	d23	JOG FWD
d11	Acceleration/Deceleration Speed Inhibit	d24	JOG REV
d12	First or Second Acceleration or Deceleration Time Selection	d25	The source of master frequency is AVI. (The priority is higher than Pr. 2-00 and d26)
d13	External Base Block (N.O.) (Normally Open Contact Input)	d26	The source of master frequency is ACI. (The priority is higher than Pr. 2-00)

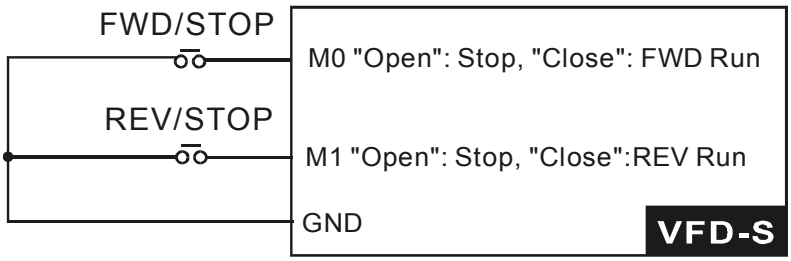
Explanations:

d0 Parameter Disable:

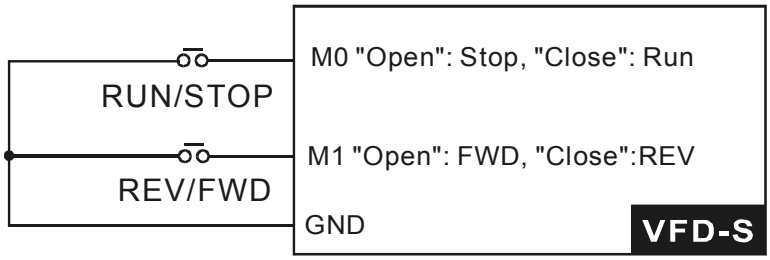
Enter value (d0) to disable any Multi-Function Input Terminal: M1 (Pr.4-04), M2 (Pr.4-05), M3 (Pr.4-06), M4 (Pr.4-07) or M5 (Pr.4-08).

Note: The purpose of this function is to provide isolation for unused Multi-Function Input Terminals. Any unused terminals should be programmed to d0 to insure they have no effect on drive operation.

d1 Two wire operation: Restricted to Pr.4-04 and external terminals M0, M1.

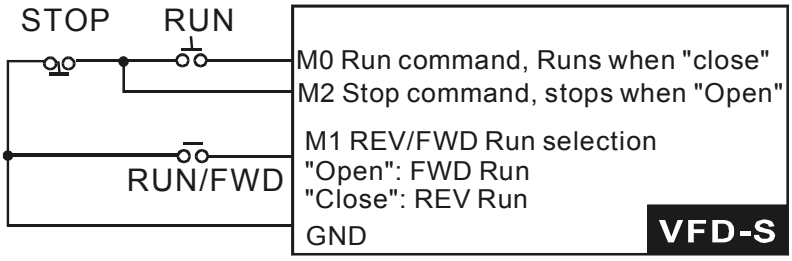


d2 Two wire operation: Restrict to Pr. 4-04 and external terminals M0, M1.



Note: Multi-function Input Terminal M0 does not have its own parameter designation. M0 must be used in conjunction with M1 to operate two and three wire control.

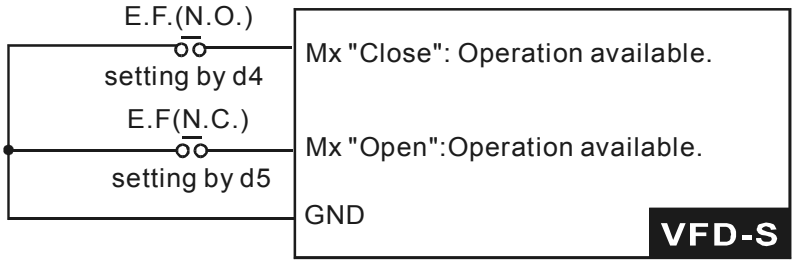
d3 Three Wire Control: Restricted to Pr.4-04 control terminals M0, M1, M2.



Note: When value d3 is selected for Pr. 4-04, this will over ride any value entered in Pr.4-05, since Pr.4-05 must be used for three wire control as shown above.

d4, d5 External Faults:

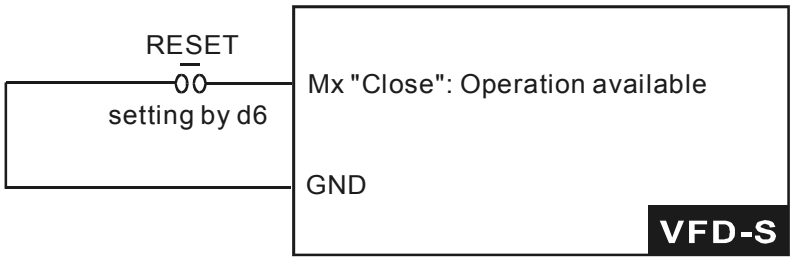
Parameter values d4, d5 programs Multi-Function Input Terminals: M1 (Pr. 4-04), M2 (Pr. 4-05), M3 (Pr. 4-06), M4 (Pr. 4-07) or M5 (Pr. 4-08) to be External Fault (E.F.) inputs.



When an External Fault input signal is received, the AC drive will stop all output and display " E.F." on Digital Keypad, the motor will free run. Normal operation can resume after the External Fault is cleared and the AC drive is reset.

d6 External Reset:

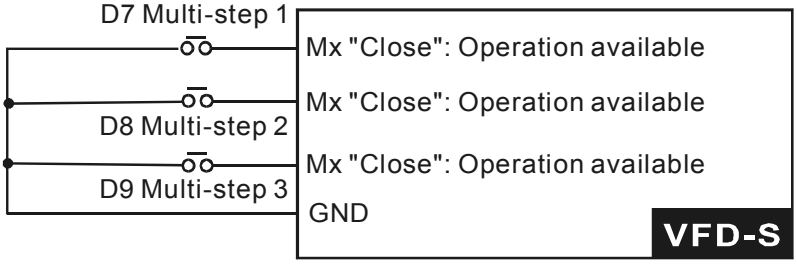
Parameter value d6 programs a Multi-Function Input Terminal: M1 (Pr.4-04), M2 (Pr.4-05), M3 (Pr.4-06), M4 (Pr.4-07) or M5 (Pr.4-08) to be an External Reset.



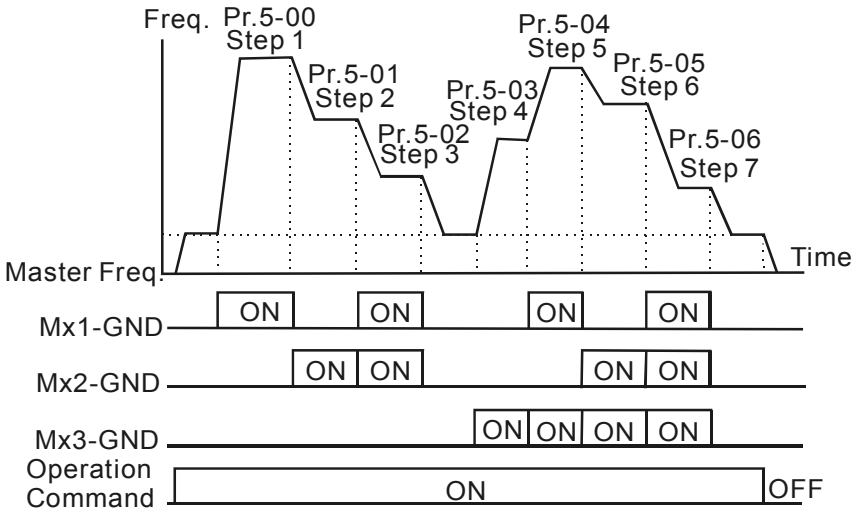
Note: the External Reset has the same function as the Reset key on the Digital keypad. After external fault such as O.H., O.C. and O.V. are clear, this input can be used to reset the drive.

d7, d8, d9 Multi-Step Speed Command:

Parameter values d7, d8, d9 programs any three of the following Multi-Function Input Terminals: M1 (Pr.4-04), M2 (Pr.4-05), M3 (Pr.4-06), M4 (Pr.4-07) or M5 (Pr.4-08) for multi-step speed command function.

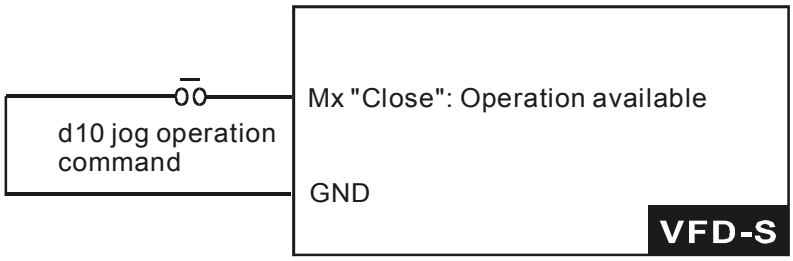


These three inputs select the multi-step speeds defined by Pr.5-00 to Pr.5-06 as shown in the following diagram. Pr.5-07 to Pr.5-16 can also control output speed by programming the AC drive's internal PLC function.



d10 Jog Operation Control:

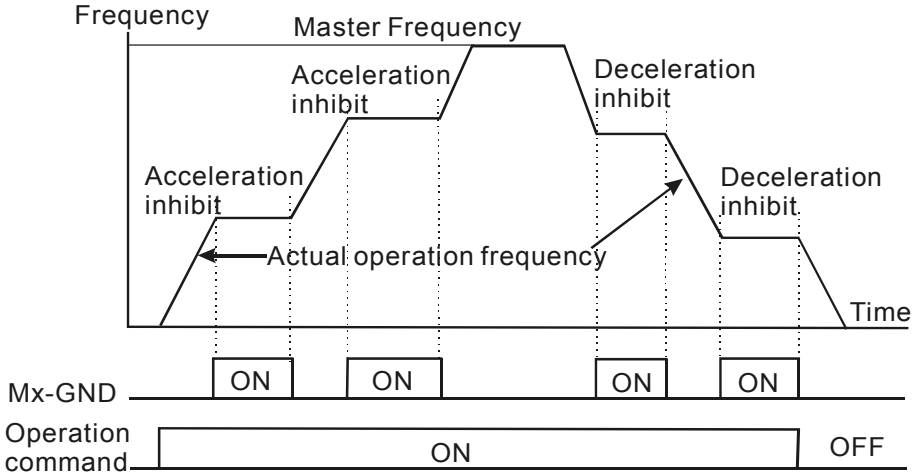
Parameter value d10 programs Multi-Function Input Terminal: M1 (Pr.4-04), M2 (Pr.4-05), M3 (Pr.4-06), M4 (Pr.4-07) or M5 (Pr.4-08) for Jog control.



Note: Jog operation programmed by d10 can only be initiated while the motor is stopped. (Refer to Pr.1-13, Pr.1-14.)

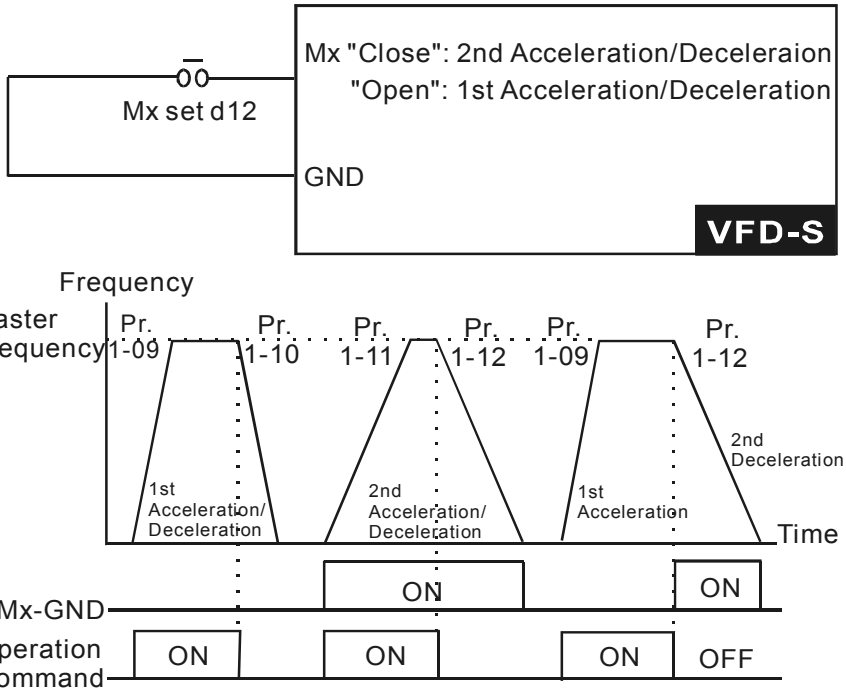
d11 Acceleration/Deceleration Speed Inhibit:

Parameter value d11 programs Multi-Function Input Terminal: M1 (Pr.4-04), M2 (Pr.4-05), M3 (Pr.4-06), M4 (Pr.4-07) or M5 (Pr.4-08) for Acceleration/deceleration Inhibit. When the command is received, acceleration and deceleration is stopped and the AC drive maintains a constant speed.



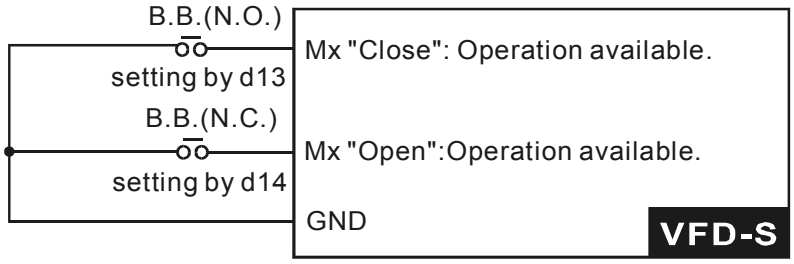
d12 First or Second Acceleration/Deceleration Time Selection:

Parameter value d12 programs a Multi-Function Input Terminal: M1 (Pr.4-04), M2 (Pr.4-05), M3 (Pr.4-06), M4 (Pr.4-07) or M5 (Pr.4-08) to control selection of First or Second Acceleration/deceleration time. (Refer to Pr.1-09 to Pr.1-12.)

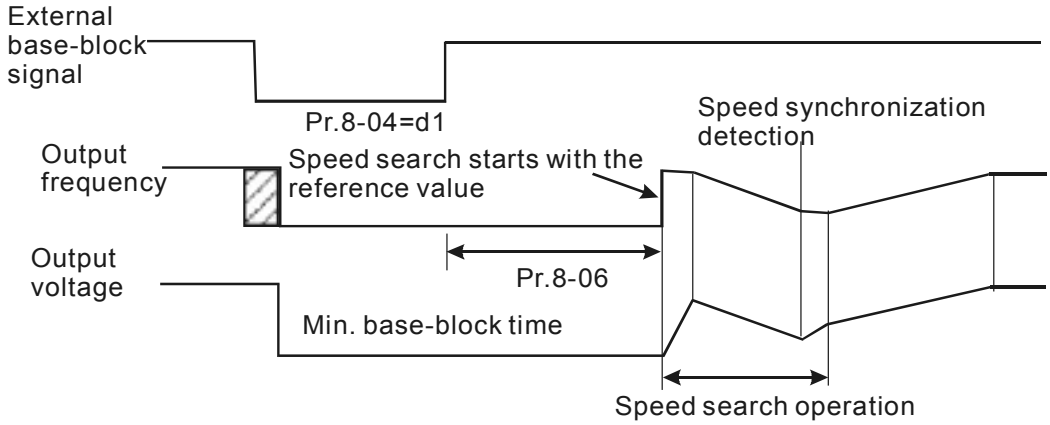


d13, d14 External Base Block:

Parameter values d13, d14 program Multi-Function Input Terminals: M1 (Pr.4-04), M2 (Pr.4-05), M3 (Pr.4-06), M4 (Pr.4-07) or M5 (Pr.4-08) for external Base Block control. Value d13 is for normally open (N.O.) input, and value d14 is for a normally closed (N.C.) input.

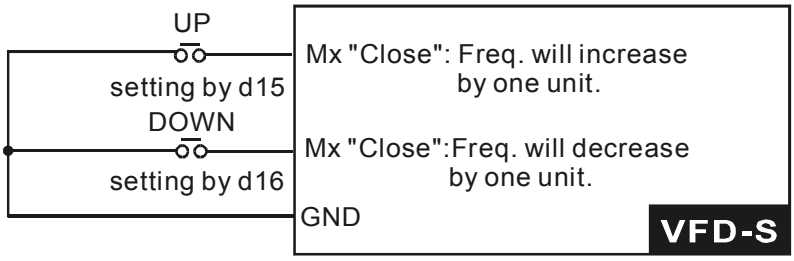


Note: When a Base-Block signal is received, the AC drive will stop all output and the motor will free run. When base block control is deactivated, the AC drive will start its speed search function and synchronize with the motor speed, and then accelerate to Master Frequency.



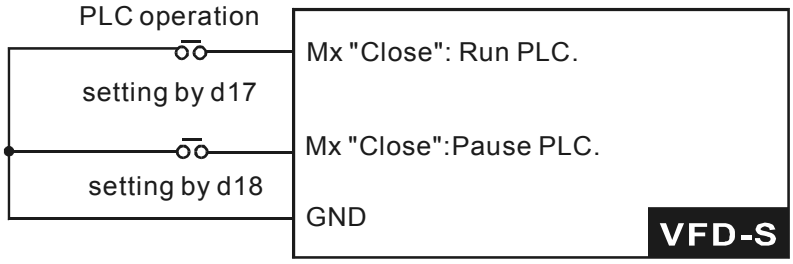
d15, d16 Increase/Decrease Master Frequency:

Parameter values d15, d16 program the Multi-Function Input Terminals: M1 (Pr.4-04), M2 (Pr.4-05), M3 (Pr.4-06), M4 (Pr.4-07) or M5 (Pr.4-08) to incrementally increase/ decrease the Master Frequency each time an input is received.



d17, d18 PLC Function Control:

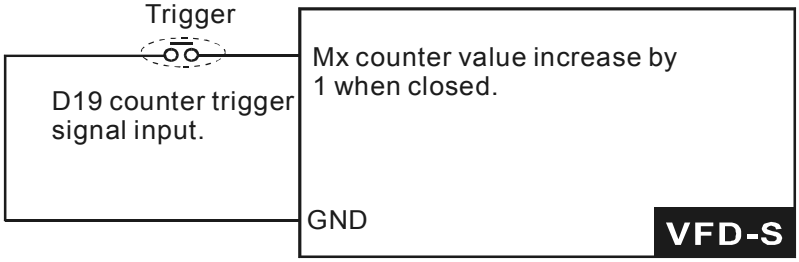
Parameter value d17 programs Multi-Function Input Terminal: M1 (Pr.4-04), M2 (Pr.4-05), M3 (Pr.4-06), M4 (Pr.4-07) or M5 (Pr.4-08) to enable the AC drive internal PLC program. Parameter value d18 programs an input terminal to pause the PLC program.



Note: Pr.5-00 to Pr.5-16 define the PLC program.

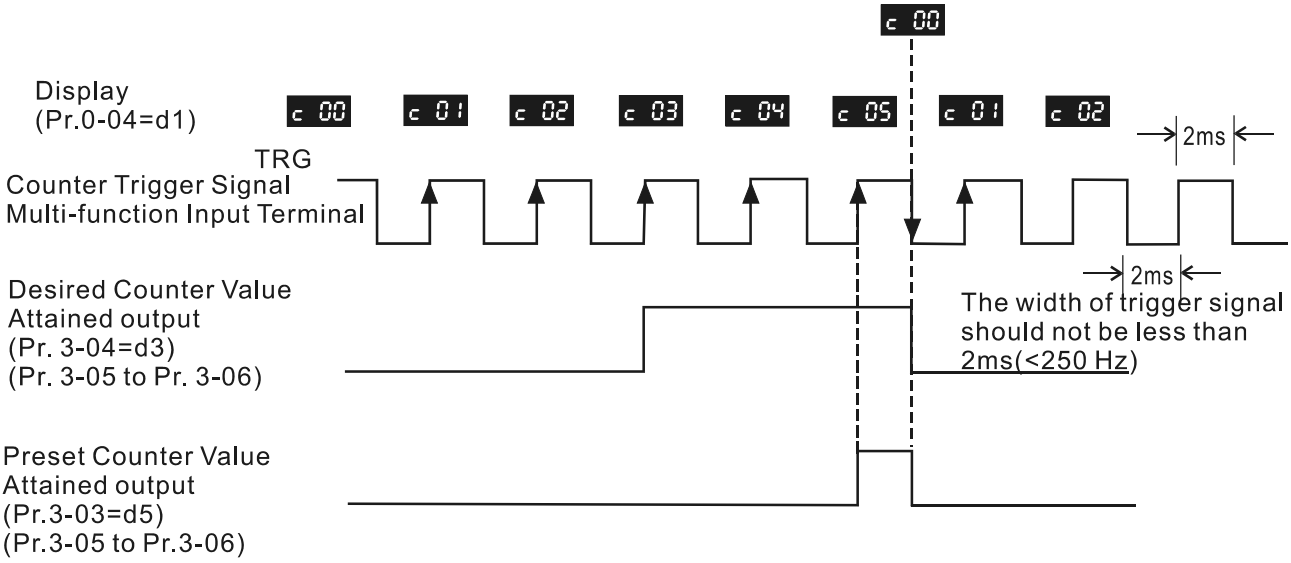
d19 Counter Trigger:

Parameter value d19 programs Multi-Function Input Terminal: M1 (Pr.4-04), M2 (Pr.4-05), M3 (Pr.4-06), M4 (Pr.4-07) or M5 (Pr.4-08) to increase the AC drive's internal counter. When an input is received, the counter is increased by 1.



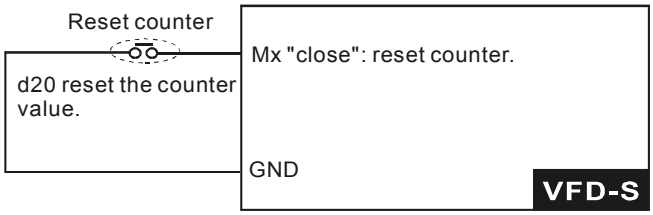
Note:

The Counter Trigger input can be connected to an external Pulse Signal Generator to count a processing step or unit of material. See the diagram below.



d20 Counter Reset:

Parameter value d20 programs Multi-Function Input Terminal: M1 (Pr.4-04), M2 (Pr. 4-05), M3 (Pr.4-06), M4 (Pr.4-07) or M5 (Pr.4-08) to reset the counter.



d21 Select ACI / Deselect AVI:

Parameter value d21 allows the user to select the input type ACI or AVI via an external switch. AVI is selected when the contact is open and ACI is selected when the contact is closed. Please note: the use of this feature will override Pr.2-00 programming and the jumper of the front of the drive must be moved to the correct location either across the AVI or ACI pin head.

4- 09	Line Start Lockout	Factory Setting: d 0

Settings: d0 Disable

d1 Enable

📖 When enabled, the AC drive will not start when powered up with run commands applied. To start in Line Start Lockout mode, the AC drive must see the run command go from stop to run after power up. When Line Start Lockout is disable (also known as Auto-Start), the drive will start when powered-up with run commands applied.

4- 10	Up/down frequency command mode	Factory Setting: d 3

Settings: d0 up/down frequency by acceleration/deceleration time

d1 up frequency according to constant speed, down frequency according to deceleration time

d2 up frequency according to acceleration time, down frequency according to constant speed

d3 up/down frequency by constant speed

4- 11	Acceleration/Deceleration speed of constant up/down frequency	Factory Setting: d 1

Settings: d0 to d1000 Hz/sec Unit: 5 Hz/sec

📖 This parameter is used to set the acceleration/deceleration speed mode when multi-function terminal is set to up/down frequency. (Pr. 4-04 ~ Pr.4-08, function d15, d16)

5.6 Group 5: Multi-step Speed and PLC (Process Logic Control) Parameters

5 - 00	1st Step Speed Frequency	Factory Setting: d 0.0
5 - 01	2nd Step Speed Frequency	Factory Setting: d 0.0
5 - 02	3rd Step Speed Frequency	Factory Setting: d 0.0
5 - 03	4th Step Speed Frequency	Factory Setting: d 0.0
5 - 04	5th Step Speed Frequency	Factory Setting: d 0.0
5 - 05	6th Step Speed Frequency	Factory Setting: d 0.0
5 - 06	7th Step Speed Frequency	Factory Setting: d 0.0

Settings d 0.0 to d 400 Hz Unit: 0.1Hz

This parameter can be set during operation.

📖 The Multi-Function Input Terminals (refer to Pr.4-04 to 4-08) are used to select one of the AC drive Multi-Step speeds. The speeds (frequencies) are determined by Pr.5-00 to 5-06 shown above.

5 – 07	PLC Mode	Factory Setting: d 0

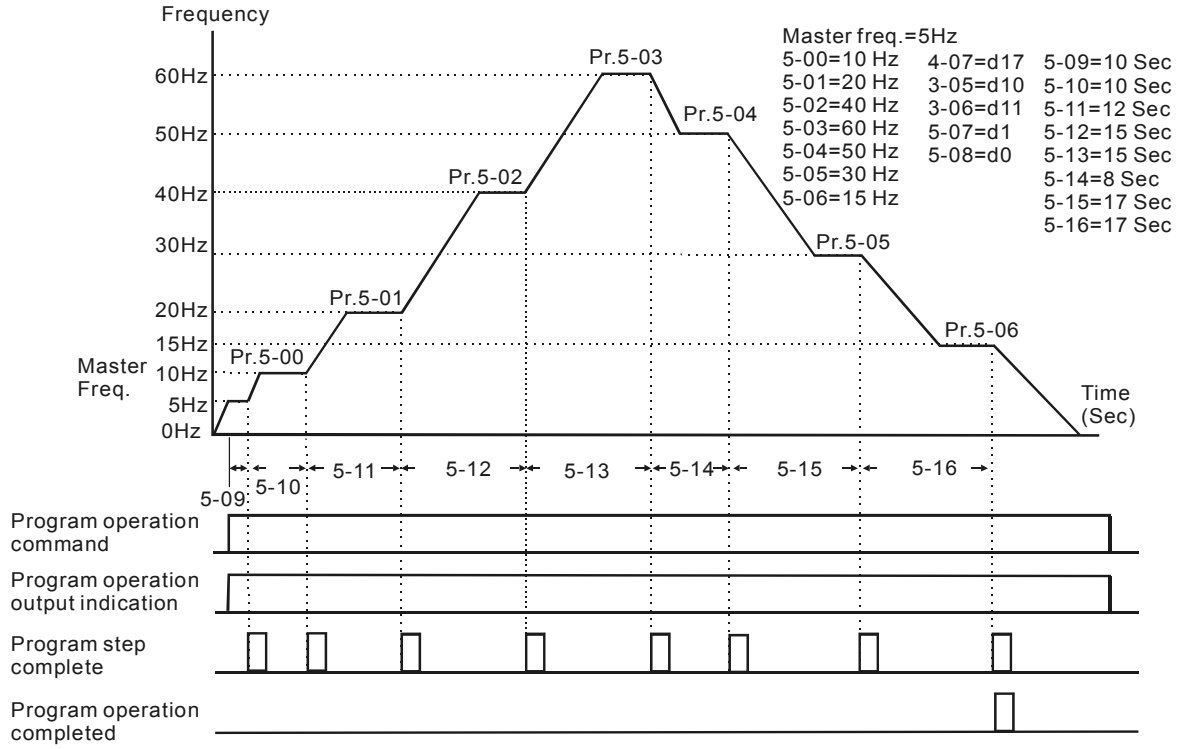
Settings
- d 0 Disable PLC operation
- d 1 Execute one program cycle
- d 2 Continuously execute program cycles
- d 3 Execute one program cycle step by step
- d 4 Continuously execute program cycles step by step
- d 5 Disable PLC operation, but can set direction of 1st speed to 7th speed

📖 This parameter selects the mode of PLC operation for the AC drive. The PLC program can be used in lieu of any External Controls, Relays or Switches. The AC drive will change speeds and directions according to the user's desired programming.

📖 When this parameter is set to d5 and it is running by external multi-speed, the high priority of the operation direction is Pr. 5-08.

Example 1 (Pr.5-07 = d1): Execute one cycle of the PLC program. Its relative parameter settings are:

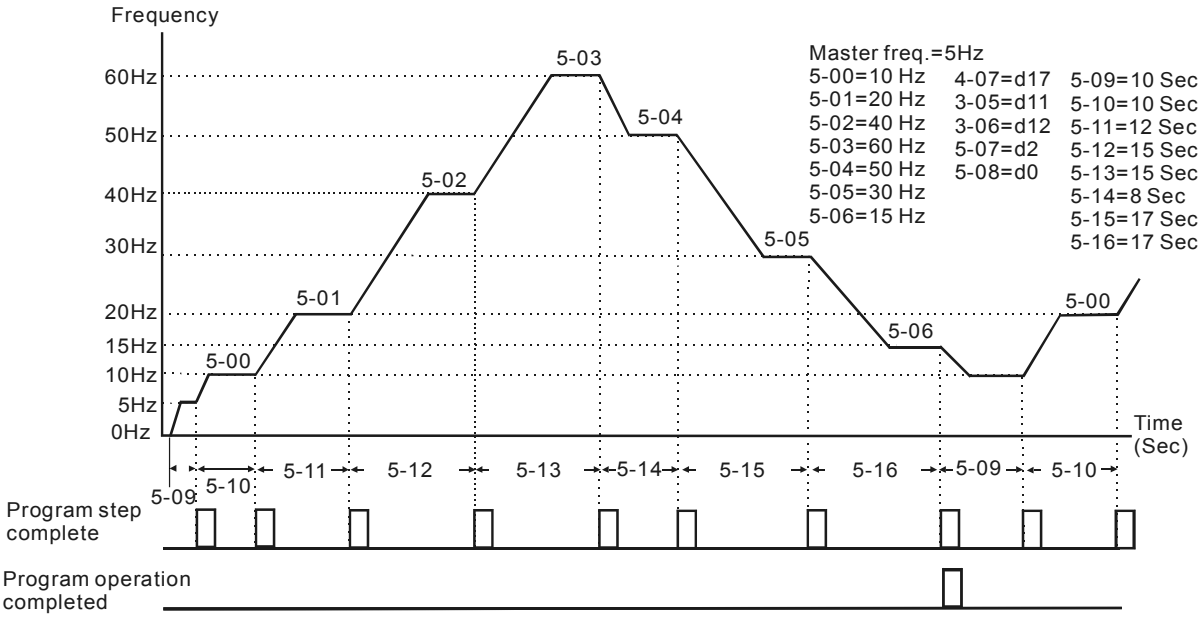
1. Pr.5-00 to 5-06: 1st to 7th step speed (sets the frequency of each step speed).
2. Pr.4-04 to 4-08: Multi-Function Input Terminals (set one multi-function terminal as d17-PLC auto-operation).
3. Pr.3-05 to 3-06: Multi-Function Output Terminals (set a Multi-Function Terminal as d10-PLC operation indication, d11-one cycle in PLC auto mode or d12-PLC operation fulfillment attainment).
4. Pr.5-07: PLC mode.
5. Pr.5-08: Direction of operation for Master Frequency and 1st to 7th step speed.
6. Pr.5-09 to 5-16: operation time setting of Master Frequency and 1st to 7th step speed.



Note: The above diagram shows one complete PLC cycle. To restart the cycle, turn the PLC program off and then back on.

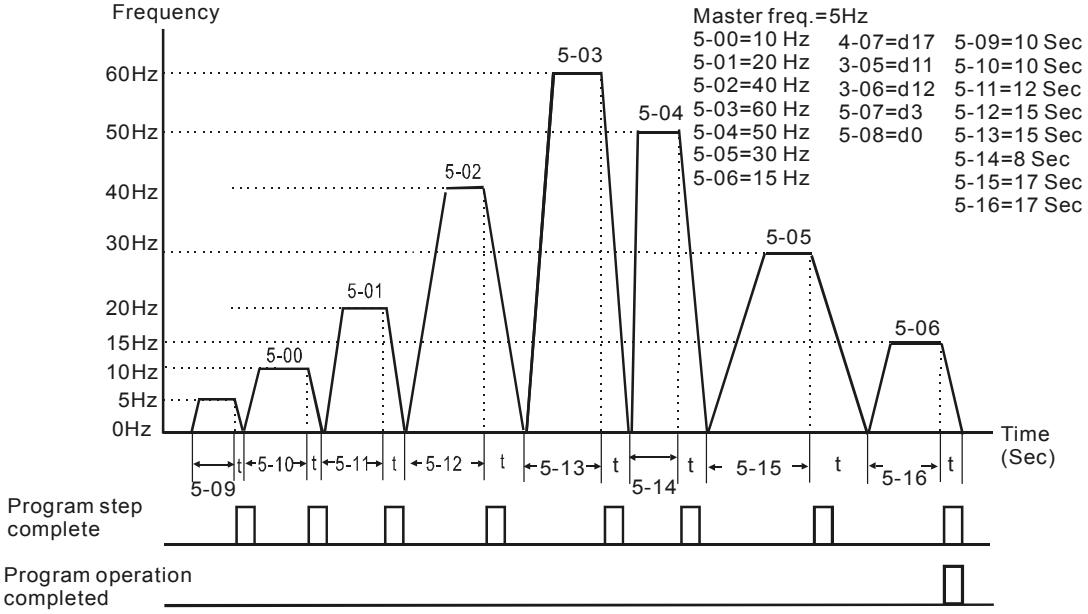
Example 2 (Pr.5-07 = d2): Continuously executes program cycles

The diagram below shows the PLC program stepping through each speed and the automatically starting again. To stop the PLC program, one must either pause the program or turn it off (Refer to Pr.4-05 to 4-08 value d17 and d18).



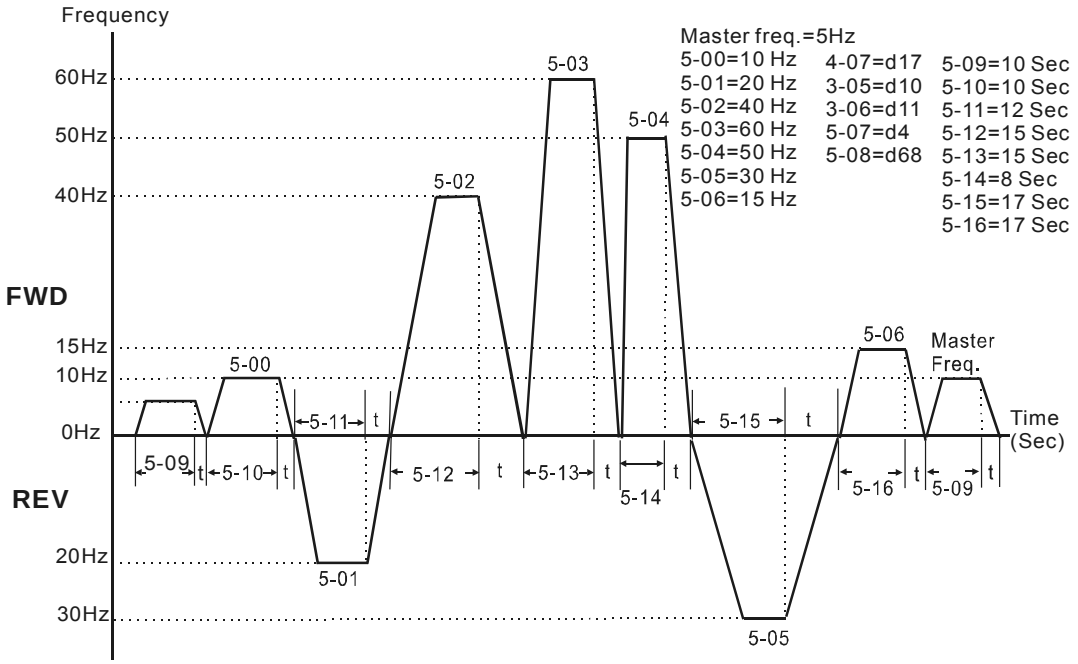
Example 3 (Pr. 5-07 = d3) Execute one cycle step by step:

The example shows how the PLC can perform one cycle at a time, within a complete cycle. Each step will use the acceleration/deceleration times in Pr.1-09 to Pr.1-12. It should be noticed that the time each step spends at its intended frequency is diminished, due to the time spent during acceleration/deceleration.



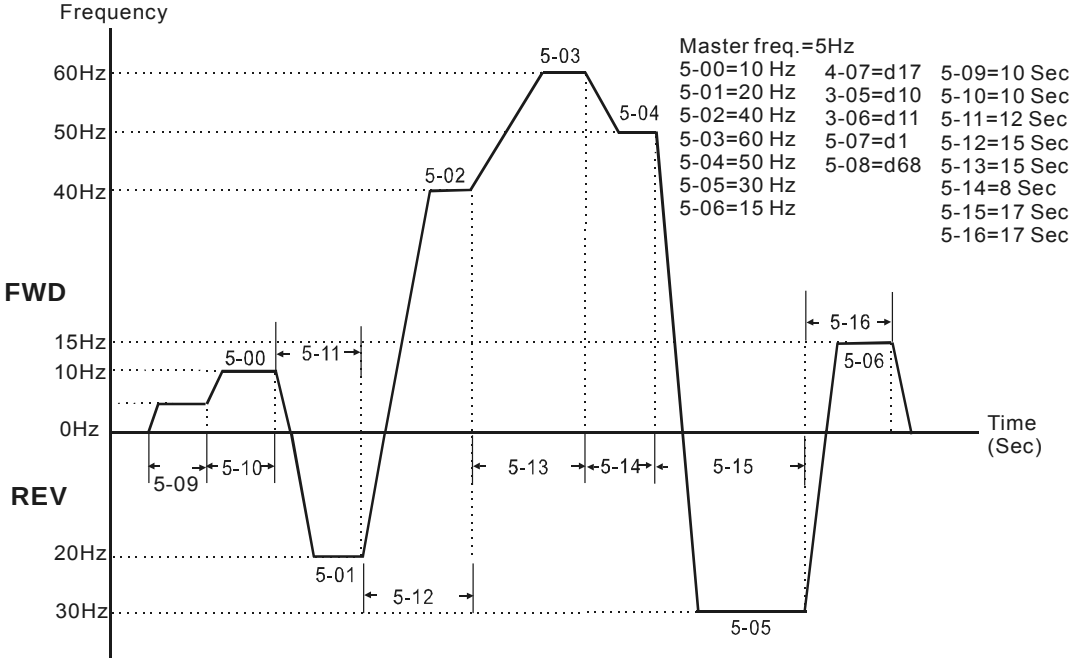
Example 4 (Pr. 5-07 =d 4) Continuously execute PLC cycles step by step:

In this explanation, the PLC program runs continuously step by step. Also shown are examples of steps in the Reverse direction.



Example 5 (Pr. 5-07 = d1 Execute one cycle of the PLC program):

In this example, the PLC program runs continuously. It should be noted that the times of reserve motion may be shorter than expected, due to the acceleration/deceleration times.



* The calculation of time for Pr.5-11, Pr.5-12, Pr.5-15 and Pr.5-16 should be carefully planned.

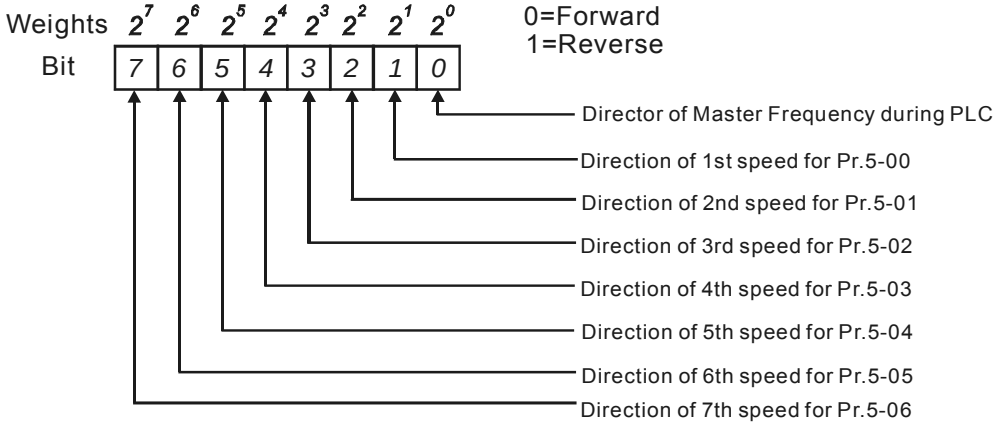
5 - 08	PLC Forward/Reverse Motion	Factory Setting: d 0

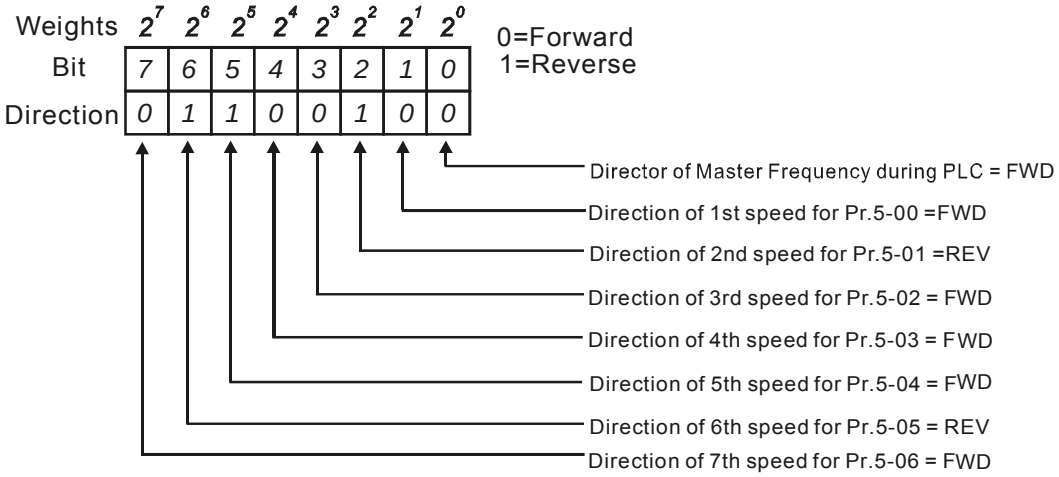
Settings d 0 to d 255

📖 This parameter controls the direction of motion for the Multi-Step Speed Pr.5-00 to Pr.5-06 and the Master Frequency. The original direction of Master Frequency will become invalid.

Note:

The equivalent 8-bit number is used to program the forward/reverse motion for each of the 8 speed steps (including Master Frequency). The binary notation for the 8-bit number must be translated into decimal notation and then be entered.





The setting value = bit7 x 2^7+bit6 x 2^6+bit5 x 2^5+bit4 x 2^4+bit3 x 2^3+bit2 x 2^2+bit1 x 2^1+bit0 x 2^0

= 0 x 2^7+1 x 2^6+0 x 2^5+0 x 2^4+0 x 2^3+1 x 2^2+0 x 2^1+0 x 2^0

= 0+64+0+0+0+4+0+0

= 68

Setting Pr.5-08 as d68.

5 - 09	Time Duration of Master Frequency	Factory Setting: d 0
5 - 10	Time Duration of 1st Step Speed	Factory Setting: d 0
5 - 11	Time Duration of 2nd Step Speed	Factory Setting: d 0
5 - 12	Time Duration of 3rd Step Speed	Factory Setting: d 0
5 - 13	Time Duration of 4th Step Speed	Factory Setting: d 0
5 - 14	Time Duration of 5th Step Speed	Factory Setting: d 0
5 - 15	Time Duration of 6th Step Speed	Factory Setting: d 0
5 - 16	Time Duration of 7th Step Speed	Factory Setting: d 0
	Settings d 0 to d 65500	Unit: 1 sec

📖 Pr.5-10 to Pr.5-16 correspond to operation time of each multi-step speed defined by parameters 5-00 to 5-06. The maximum value of these parameters is 65500 sec., and it's displayed as d 65.5.

Note: If a parameter is set to "d0" (0 Sec), the corresponding step will be skipped. This is commonly used to reduce number of program steps

5.7 Group 6: Védelmi paraméterk

6 - 00	Over-Voltage Stall Prevention		Factory Setting: d 1
Settings	d 0	Disable Over-Voltage Stall Prevention	
	d 1	Enable Over-Voltage Stall Prevention	

🕮 During deceleration, the motor DC bus voltage may exceed its Maximum Allowable Value due to motor regeneration. When this function is enabled, the AC drive will stop decelerating. Maintaining a constant output frequency when it happens. The AC drive will only resume deceleration when the voltage drops below preset value.

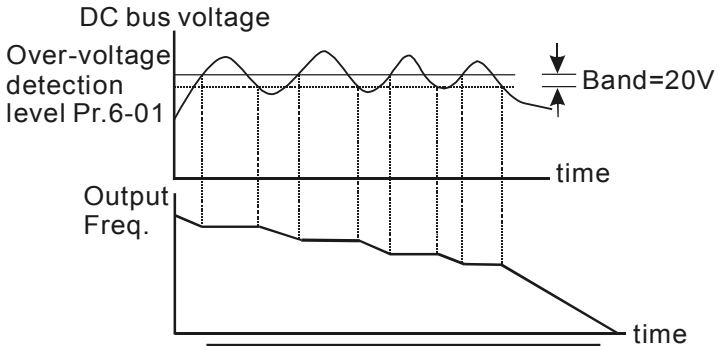
Note:

With a moderate inertial load, the over-voltage during deceleration won't happen, and the drive will stop in programmed time. The AC drive will automatically extend the deceleration time with high inertial loads. If deceleration time is critical for the application, then dynamic braking resistors should be used.

6-01	**Over-Voltage Stall Prevention Level**	Unit: 1V
Settings	230V series d350 to d410V	Factory Setting: d390
	460V series d700 to d820V	Factory Setting: d780

🕮 During deceleration, the DC bus voltage may exceed its maximum allowable value due to motor regeneration. When this function is enabled, the AC drive will stop decelerating. Maintaining a constant output frequency when it happens. The AC drive will resume deceleration when the voltage drops below preset value.

🕮 With a moderate inertial load, the over-voltage during deceleration won't happen, and the drive will stop in programmed time. The AC drive will automatically extend the deceleration time with high inertial loads. If deceleration time is critical for the application, then dynamic braking resistors should be used.

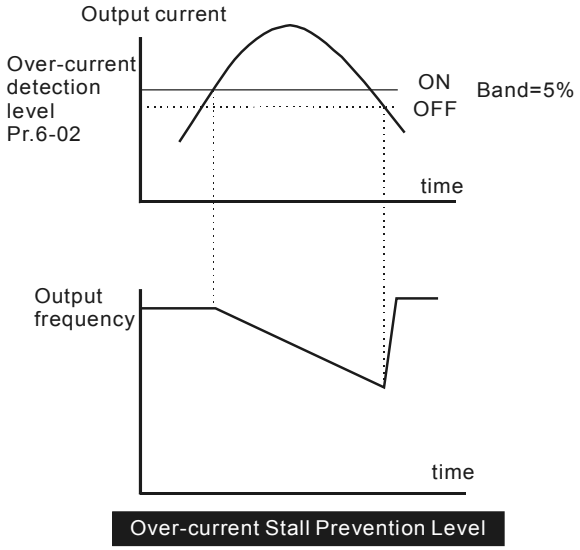


Over-voltage Stall Prevention

6-02	Over-Current Stall Prevention Level	Factory Setting: d130
	Settings d20 to d150%	Unit: 1%

📖 A setting of 100% is equal to the Rated Output Current of the drive.

📖 During acceleration and steady-state operation, the AC drive output current may increase abruptly to exceed the value specified by Pr.6-02 due to rapid acceleration or excessive load on the motor. When this function is enabled, the AC drive will decrease. The AC drive will only resume acceleration when the current drops below the level specified by Pr. 6-02.



Over-current Stall Prevention Level

6 - 03	Túlnyomaték felismerési módja (OL2)	Factory Setting: d 0

Settings	d 0	Over-Torque detection disabled.
	d 1	Over-Torque detection enabled during constant speed operation, and continue to run till OL1 or OL.
	d 2	Over-Torque detection enabled during constant speed operation, and operation halted after over-torque detection.
	d 3	Over-Torque detection enabled during running, and continues to run till OL1 or OL.
	d 4	Over-Torque detection enabled during running, and operation halted after over-torque detection

6 - 04	Túlnyomaték felismerési szintje	Factory Setting: d 150
	Settings d 30 to d 200%	Unit: 1%

🕮 A setting of proportional to the Rated Output Current of the drive.

6 - 05	Time setting for Over-torque Detection	Factory Setting: d 0.1
	Settings d 0.1 to d 10.0 sec	Unit: 0.1sec

🕮 If a Multi-Function Output Terminal is set as Over-Torque Detection Indication and the output current exceeds the Over-Torque Detection Level (Pr.6-04, Factory Setting: 150%), the Over-Torque Detection Time (Pr.6-05, Factory setting: 0.1) and the setting of multi-function terminal is Over-Torque Detection Indication, the contact will be “close”.

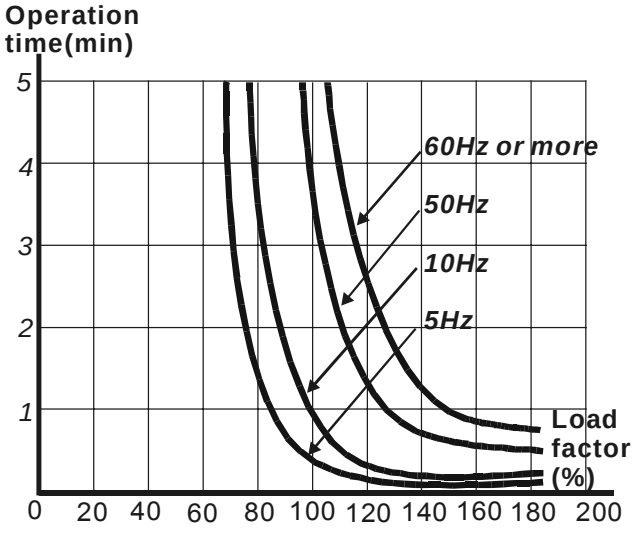
6 - 06	Electronic Thermal Overload Relay Selection	Factory Setting: d 2
	Settings d 0	Reduce Torque Motor
	d 1	Constant Torque Motor
	d 2	Inactive

🕮 This function is used to limit the output power of the AC drive when powering a “self-cooled motor” at low speed.

6 - 07	Electronic Thermal Characteristic	Factory Setting: d 60
	Settings d 30 to d 600Sec	Unit: 1 Sec

This parameter can be set during operation.

🕮 The parameter determines the time required activating the I^2t electronic thermal protection function. The graph below shows I^2t curves for 150% output power for 1 minute.



6 - 08	Present Fault Record	Factory Setting: d 0
6 - 09	Second Most Recent Fault Record	Factory Setting: d 0
6 - 10	Third Most Recent Fault Record	Factory Setting: d 0

Settings
- d 0 No fault occurred
- d 1 Over-current (oc)
- d 2 Over-voltage (ov)
- d 3 Overheat (oH)
- d 4 Overload (oL)
- d 5 Overload1 (oL1)
- d 6 External fault (EF)
- d 7 Not used
- d 8 Not used
- d 9 Current exceeds 2 times rated current during acce. (ocA)
- d 10 Current exceeds 2 times rated current during dece. (ocd)
- d 11 Current exceeds 2 times rated current during steady state operation (ocn)
- d 12 Ground fault (GF)

📖 Pr.6-08 to 6-10 store records of the three most recent faults that had occurred. Use the reset key to reset the drive when the fault no longer exits.

5.8 Group 7: Motor Paraméterek

7 - 00	Motor néveleges áramfelvétele	Factory Setting: d 85
	Settings d 30 to d 120%	Unit: 1%
	This parameter can be set during operation.	

📖 This parameter will limit the AC drive output current in order to prevent the motor from overheating.

7 - 01	Motor terhelés nélküli áramfelvétele	Factory Setting: d 50
	Settings d 0 to d 90%	Unit: 1%
	This parameter can be set during operation.	

📖 The rated current of the AC drive is regarded as 100%. Motor setting of no-load current will effect the slip compensation. The setting value must be less than motor rated current setting Pr.7-00

7 - 02	Nyomaték kompenzáció	Factory Setting: d 1
	Settings d 0 to d 10	Unit: 1
	This parameter can be set during operation.	

📖 This parameter may be set so that the AC drive will increase its voltage output during start-up to obtain a higher initial starting torque.

7 - 03	Slip Kompenzásció	Factory Setting: d 0.0
	Settings d 0.0 to d 10.0	Unit: 0.1
	This parameter can be set during operation.	

📖 While driving an asynchronous motor, load on the AC drive will increase, causing an increase in slip. This parameter may be used to compensate the nominal slip within a range of 0 to 10. When the output current of the AC drive is greater than the motor no-load current (Pr.7-01), the AC drive will adjust its output frequency according to this parameter.

5.9 Group 8: Special Parameters

8 - 00	DC Fékezési feszültségi szint	Factory Setting: d 0
	Settings d 0 to d30%	Unit: 1%

📖 This parameter determines the level of DC Braking Voltage Level output to the motor during start-up and stopping. When setting DC Braking Voltage, the Maximum Output Voltage (Pr.1-02) is regarded as 100%. It is recommended to start with a low DC Braking Voltage Level and then increase until proper holding torque has been attained.

8 - 01	DC Fékezési ideje indításnál	Factory Setting: d 0.0
	Settings d 0.0 to d 60.0 sec	Unit: 0.1sec

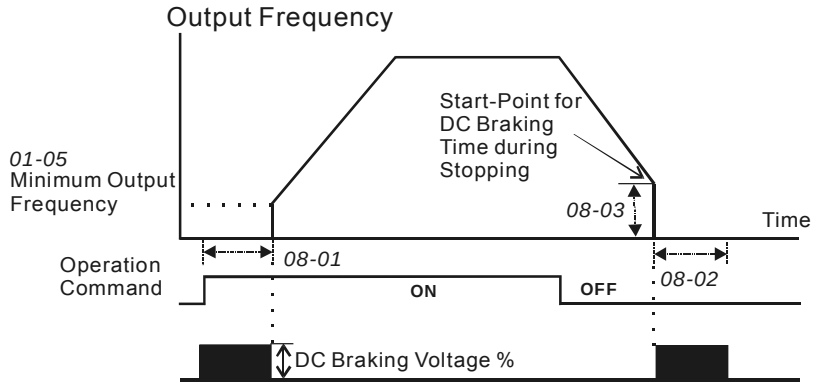
📖 This parameter determines the duration of time that the DC Braking Current will be applied to the motor during the AC drive start-up.

8 - 02	DC Fékezési idő a megállás során	Factory Setting: d 0.0
	Settings d 0.0 to d 60.0 sec	Unit: 0.1 sec

📖 This parameter determines the duration of time that the DC braking voltage will be applied to the motor during stopping. If stopping with DC Braking is desired, then Pr.2-02 must be set to RAMP stop (d 0).

8 - 03	DC fékezés indítási pontja	Factory Setting: d 0.0
	Settings d 0.0 to d 400Hz	Unit: 0.1Hz

📖 This parameter determines the frequency when DC Braking will begin during deceleration.



NOTE: 1. DC Braking during Start-up is used for loads that may move before AC drive starts, such as fans and pumps. These loads may also be moving in the wrong direction. Under such circumstances, DC Braking can be executed to hold the load in position before applying a forward motion.

2. DC Braking during stopping is used to decrease stopping time and also to hold a stopped load in position. For high inertial loads, a dynamic braking resistor may be needed for quick decelerations.

8 - 04	Momentary Power Loss Operation Selection		Factory Setting: d 0
Settings	d 0	Operation stop after momentary power loss	
	d 1	Operation continue after momentary power loss Speed search start with the Master Frequency reference value	
	d 2	Operation continue after momentary power loss Speed search start with the min frequency	

8 - 05	Maximálisan megengedhető áramkimaradási idő	Factory Setting: d 2.0
Settings	d 0.3 to d 5.0Sec	Unit: 0.1sec

5

📖 During a power loss, if the power loss time is less than the time defined by this parameter, the AC drive will resume operation. If the Maximum Allowable Power Loss Time is exceeded, the AC drive output is then turned off.

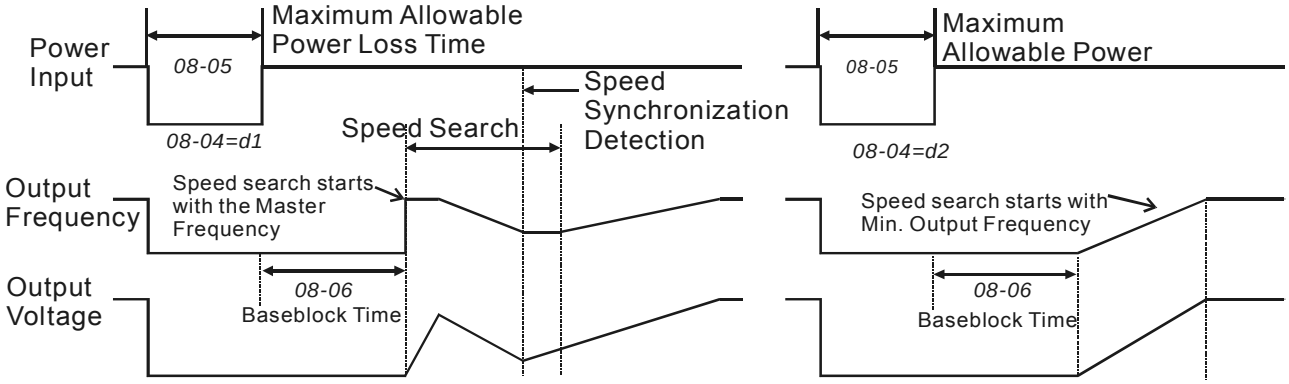
8 - 06	Base-Block Time for Speed Search	Factory Setting: d 0.5
Settings	d 0.3 to d 5.0Sec	Unit: 0.1Sec

📖 When a momentary power loss is detected, the AC drive turns off for a specified time interval determined by Pr.8-06 before resuming operation. This time interval is called Base-Block. This parameter should be set to a value where the residual output voltage is nearly zero, before the drive resumes operation.

📖 This parameter also determines the searching time when performing external Base-Block and fault reset.

8 - 07	Maximum Speed Search Current Level	Factory Setting: d 150
Settings	d 30 to d 200%	Unit: 1%

Following a power failure, the AC drive will start its speed search operation, only if the output current is greater than the value determined by Pr.8-07. When the output current is less than that of Pr.8-07, the AC drive output frequency is at a “speed synchronization point”. The drive will start to accelerate or decelerate back to the operating frequency at which it was running prior to the power failure.



8 - 08	Skip Frequency 1 Upper Bound	Factory Setting: d 0.0
8 - 09	Skip Frequency 1 Lower Bound	Factory Setting: d 0.0
8 - 10	Skip Frequency 2 Upper Bound	Factory Setting: d 0.0
8 - 11	Skip Frequency 2 Lower Bound	Factory Setting: d 0.0
8 - 12	Skip Frequency 3 Upper Bound	Factory Setting: d 0.0
8 - 13	Skip Frequency 3 Lower Bound	Factory Setting: d 0.0

Settings d 0.0 to d 400Hz Unit: 0.1Hz

These parameters determine Skip frequency. It will cause the AC drive to skip operation at these frequency ranges with continuous frequency output.

Pr.8-9, Pr.8-11,Pr.8-13 are for Lower Bound setting, and the settings should follow as Pr.8-9□Pr.8-11□Pr.8-13.

8 - 14	Hiba utáni autómatikus újraindítás	Factory Setting: d 0

Settings d 0 to d 10

After fault occurs (allowable faults: over-current OC, over-voltage OV), the AC drive can be reset/restarted automatically up to 10 times. Setting this parameter to 0 will disable the reset/restart operation after any fault has occurred. When enabled, the AC drive will restart with speed search, which starts at the Master Frequency.

8 - 15	Autómatikus feszültségszabályozás (AVR)	Factory Setting: d 2

Settings d 0 AVR function enabled

d 1 AVR function disabled

d 2 AVR function disabled when deceleration

📖 AVR function automatically regulates the AC drive output voltage to the Maximum Output Voltage (Pr.1-02). For instance, if Pr.1-02 is set at 200 VAC and the input voltage is at 200V to 264VAC, then the Maximum Output Voltage will automatically be reduced to a maximum of 200 VAC.

📖 Without AVR function, the Maximum Output Voltage may vary between 180V to 264VAC, due to the input voltage varying between 180V to 264 VAC.

📖 Selecting program value d2 enables the AVR function and also disables the AVR function during deceleration. This offers a quicker deceleration.

8 - 16	Dynamic Braking Voltage	Factory Setting: d 380*

Settings d 350 to d 450V* Unit: 1Volt*

*Twice value for 460V class

📖 During deceleration, the DC-bus voltage will increase due to motor regeneration. When DC bus voltage level exceeds the Dynamic Braking Voltage, the DC brake output pins (B1, B2) will be activated.

8 - 17	Lower Bound of DC Braking Start-up Frequency	Factory Setting: d 0.0

Settings d0.0 to d400 Hz Unit: 0.1Hz

📖 The setting frequency is lower than Pr.8-17, the DC Braking will not be activated when stops.

5.10 Group 9: Communication Parameters

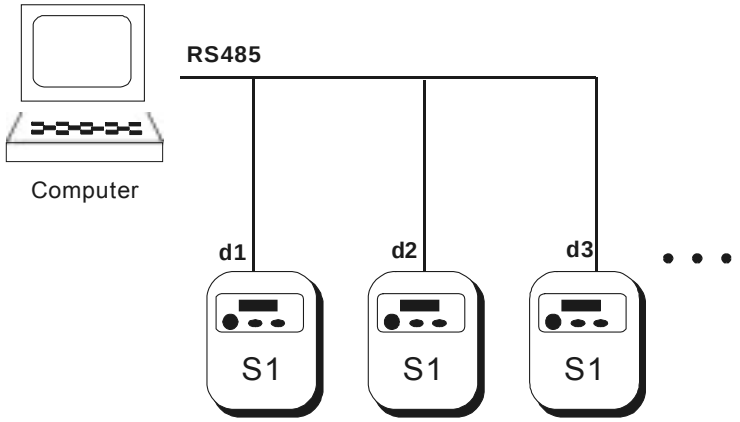
9 - 00	Kommunikációs cím	Factory Setting: d 1

Settings d 1 to d254

This parameter can be set during operation.

`

🕮 If the AC drive is controlled by RS-485 serial communication, the communication address must be set via this parameter.



9 - 01	Átviteli sebesség	Factory Setting: d 1

Settings d 0 Baud rate 4800 (data transmission speed: bits / second)

d 1 Baud rate 9600 (data transmission speed: bits / second)

d 2 Baud rate 19200 (data transmission speed: bits / second)

d 3 Baud rate 38400 (data transmission speed: bits / second)

This parameter can be set during operation.

🕮 Users can set parameters and control the operation of the AC drive via the RS-485 serial interface of a personal computer. This parameter is used to set the transmission speed between the computer and AC drive.

9 - 02	Transmission Fault Treatment	Factory Setting: d 0

Settings d 0 Warn and keep operating

d 1 Warn and RAMP to stop

d 2 Warn and COAST to stop

d 3 Keep operation without warning

9 - 03	Modbus Communication Watchdog Timer	Factory Setting: d 0

Settings d0 Disable Unit: 1 sec

d1 1 sec to d20 20 sec

This parameter can be set during operation.

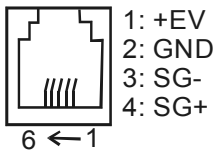
📖 If the Watchdog timer function is enabled, the timer will start counting once the first valid Modbus communication signal is received after power-up or reset. The timer will reset to 0 after each valid Modbus communication message is received. If the watchdog timer reaches the value set in Pr. 9-03, the drive will stop its output and display the message "CE10" on the digital keypad. This fault can reset by an external terminal, keypad or a Modbus communication reset command.

9 – 04	Kommunikációs protokol	Factory Setting: d 0

Settings	d 0	Modbus ASCII mode, protocol <7,N,2>
	d 1	Modbus ASCII mode, protocol <7,E,1>
	d 2	Modbus ASCII mode, protocol <7,O,1>
	d 3	Modbus ASCII mode, protocol <8,N,2>
	d 4	Modbus ASCII mode, protocol <8,E,1>
	d 5	Modbus ASCII mode, protocol <8,O,1>
	d 6	Modbus RTU mode, protocol <8,N,2>
	d 7	Modbus RTU mode, protocol <8,E,1>
	d 8	Modbus RTU mode, protocol <8,O,1>

This parameter can be set during operation.

📖 1.Computer Control



★ There is a built-in RS-485 serial interface, marked (RJ-11 Jack) on the control terminal block, for VFD-S Series. The pins are defined above.
Each VFD-S AC drive has a pre-assigned communication address specified by Pr. (9-00). The computer then controls each AC drive according to its communication address.

★ VFD-S can be setup to communicate on Modbus networks using one of the following modes: ASCII (American Standard Code for Information Interchange) or RTU (Remote Terminal Unit). Users can select the desired mode along with the serial port communication protocol in Pr. 9-04.

★ Code Meaning:

ASCII mód:

Each 8-bit data is the combination of two ASCII characters. For example, a 1-byte data: 64 Hex, shown as ‘64’ in ASCII, consists of ‘6’ (36Hex) and ‘4’ (34Hex).

Character	‘0’	‘1’	‘2’	‘3’	‘4’	‘5’	‘6’	‘7’
ASCII code	30H	31H	32H	33H	34H	35H	36H	37H

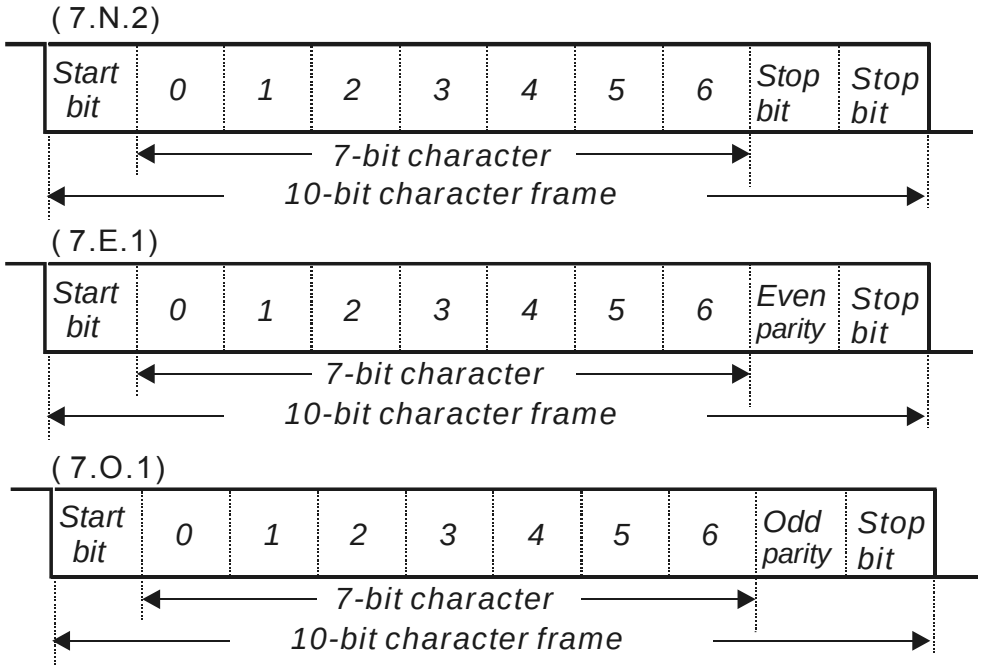
Character	‘8’	‘9’	‘A’	‘B’	‘C’	‘D’	‘E’	‘F’
ASCII code	38H	39H	41H	42H	43H	44H	45H	46H

RTU mód:

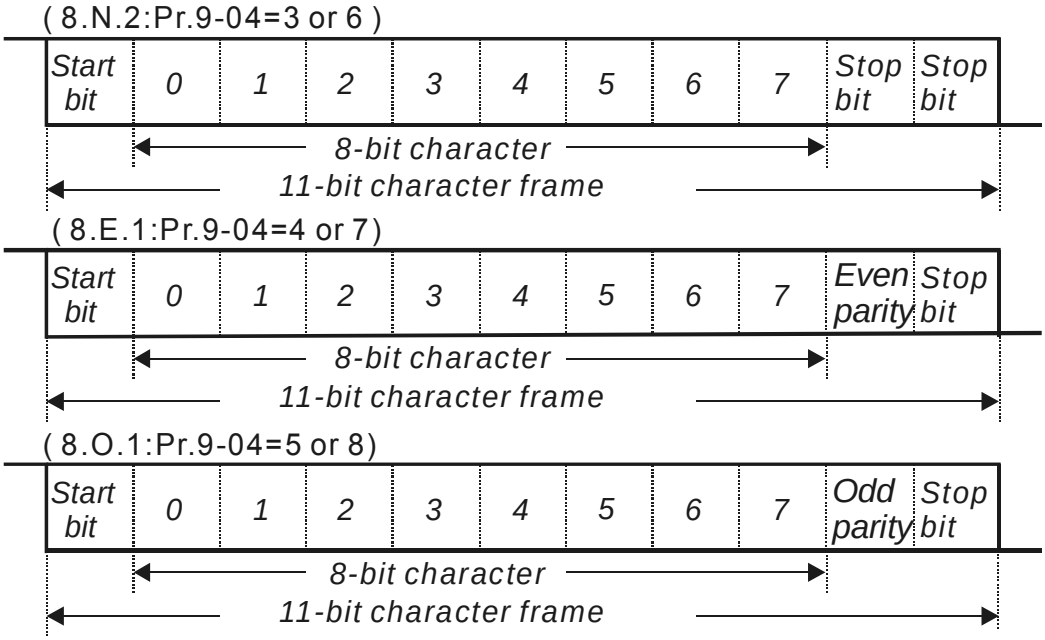
Each 8-bit data is the combination of two 4-bit hexadecimal characters. For example, 64 Hex.

📖 2.Data Format:

2.1 10-bit character frame (For 7-bit character):



2.2 11-bit character frame (For 8-bit character):



📖 3.Communication Protocol

3.1 Communication Data Frame:

ASCII mód:

STX	Start character ':' (3AH)
ADR 1	Communication address: 8-bit address consists of 2 ASCII codes
ADR 0	
CMD 1	Command code: 8-bit command consists of 2 ASCII codes
CMD 0	
DATA (n-1)	Contents of data: n x 8-bit data consist of 2n ASCII codes. n <= 25，maximum of 50 ASCII codes
…….	
DATA 0	
LRC CHK 1	LRC check sum: 8-bit check sum consists of 2 ASCII codes
LRC CHK 0	
END 1	End characters: END1= CR (0DH), END0= LF (0AH)
END 0	

RTU mód:

START	A silent interval of more than 10 ms
ADR	Communication address: 8-bit address
CMD	Command code: 8-bit command
DATA (n-1)	Contents of data: n x 8-bit data, n<= 25
…….	
DATA 0	
CRC CHK Low	CRC check sum: 16-bit check sum consists of 2 8-bit characters
CRC CHK High	
END	A silent interval of more than 10 ms

3.2 ADR (Communication Address)

Valid communication addresses are in the range of 0 to 254. Communication address equals to 0 means broadcast to all AC drives (AMD), in this case, the AMD will not reply any message to the master device.

For example, communication to AMD with address 16 decimal:
ASCII mode: (ADR 1, ADR 0) ='1','0' ≥ '1'=31H, '0'=30H
RTU mode: (ADR) = 10H

3.3 CMD (Command code) and DATA (data characters)

The format of data characters depends on the command code. The available command codes are described as followed: Command code: 03H, read N words. The maximum value of N is 12. For example, reading continuous 2 words from starting address 2102H of AMD with address 01H.

ASCII mód:

Command message:

STX	':'
ADR 1	'0'
ADR 0	'1'
CMD 1	'0'
CMD 0	'3'
Starting data address	'2'
	'1'
	'0'
	'2'
Number of data (count by word)	'0'
	'0'
	'0'
	'2'
LRC CHK 1	'D'
LRC CHK 0	'7'
END 1	CR
END 0	LF

Response message:

STX	':'
ADR 1	'0'
ADR 0	'1'
CMD 1	'0'
CMD 0	'3'
Number of data (count by byte)	'0'
	'4'
Content of starting data address 2102H	'1'
	'7'
	'7'
	'0'
Content of data address 2103H	'0'
	'0'
	'0'
	'0'
LRC CHK 1	'7'
LRC CHK 0	'1'
END 1	CR
END 0	LF

RTU mód:

Command message:

ADR	01H
CMD	03H
Starting data address	21H
	02H
Number of data (count by word)	00H
	02H
CRC CHK Low	6FH
CRC CHK High	F7H

Response message:

ADR	01H
CMD	03H
Number of data (count by byte)	04H
Content of data address 2102H	17H
	70H
Content of data address 2103H	00H
	00H
CRC CHK Low	FEH
CRC CHK High	5CH

Command code: 06H, write 1 word

For example, writing 6000(1770H) to address 0100H of AMD with address 01H.

ASCII mód:

Command message:

STX	':'
ADR 1	'0'
ADR 0	'1'
CMD 1	'0'
CMD 0	'6'
Data address	'0'
	'1'
	'0'
	'0'
Data content	'1'
	'7'
	'7'
	'0'
LRC CHK 1	'7'
LRC CHK 0	'1'
END 1	CR
END 0	LF

Response message:

STX	':'
ADR 1	'0'
ADR 0	'1'
CMD 1	'0'
CMD 0	'6'
Data address	'0'
	'1'
	'0'
	'0'
Data content	'1'
	'7'
	'7'
	'0'
LRC CHK 1	'7'
LRC CHK 0	'1'
END 1	CR
END 0	LF

RTU mód:

Command message:

ADR	01H
CMD	06H
Data address	01H
	00H
Data content	17H
	70H
CRC CHK Low	86H
CRC CHK High	22H

Response message:

ADR	01H
CMD	06H
Data address	01H
	00H
Data content	17H
	70H
CRC CHK Low	86H
CRC CHK High	22H

Command code: 10H, write n word, n<=12

For example, writing 6000(1770H) to Pr 5-00 (address 0500H) and 1000(03E8H) to Pr 5-01 (address 0501H) with slave address 01H.

ASCII mód:

Command message:

STX	':'
ADR 1	'0'
ADR 0	'1'
CMD 1	'1'
CMD 0	'0'
Starting Data address	'0'
	'5'
	'0'
	'0'
Number of data (count by word)	'0'
	'0'
	'0'
	'2'
Number of data (count by byte)	'0'
	'4'
Data content of address 0500H	'1'
	'7'
	'7'
	'0'
Data content of address 0501H	'0'
	'3'
	'E'
	'8'
LRC CHK 1	'7
LRC CHK 0	'2
END 1	CR
END 0	LF

Response message:

STX	':'
ADR 1	'0'
ADR 0	'1'
CMD 1	'1'
CMD 0	'0'
Starting Data address	'0'
	'5'
	'0'
	'0'
Number of data (count by word)	'0'
	'0'
	'0'
	'2'
LRC CHK 1	'E'
LRC CHK 0	'8'
END 1	CR
END 0	LF

RTU mód:

Command message:

ADR	01H
CMD	10H
Starting Data address	05H
	00H
Number of data (count by word)	00H
	02H
Number of data (count by Byte)	04H
Data content of address 0500H	17H
	70H
Data content of address 0501H	03H
	E8H
CRC CHK Low	C8H
CRC CHK High	2EH

Response message:

ADR	01H
CMD	10H
Starting Data address	05H
	00H
Number of data (count by word)	00H
	02H
CRC CHK Low	41H
CRC CHK High	04H

5

3.4 CHK (check sum)

ASCII mód:

LRC (Longitudinal Redundancy Check) is calculated by summing up, module 256, the values of the bytes from ADR1 to last data character then calculating the hexadecimal representation of the 2's-complement negation of the sum.

For example, reading 1 word from address 0401H of the AC drive with address 01H

STX	':'
ADR 1	'0'
ADR 0	'1'
CMD 1	'0'
CMD 0	'3'
Starting data address	'0'
	'4'
	'0'
	'1'
Number of data	'0'
	'0'
	'0'
	'1'
LRC CHK 1	'F'
LRC CHK 0	'6'
END 1	CR
END 0	LF

01H+03H+04H+01H+00H+01H=0AH, the 2's-complement negation of 0AH is **F6**H.

RTU mód:

ADR	01H
CMD	03H
Starting address	21H
	02H
Number of data	00H
(count by word)	02H
CRC CHK Low	6FH
CRC CHK High	F7H

CRC (Cyclical Redundancy Check) is calculated by the following steps:

Step 1 : Load a 16-bit register (called CRC register) with FFFFH.

Step 2: Exclusive OR the first 8-bit byte of the command message with the low order byte of the 16-bit CRC register, putting the result in the CRC register.

Step 3: Examine the LSB of CRC register.

Step 4: If the LSB of CRC register is 0, shift the CRC register one bit to the right with MSB zero filling, then repeat step 3. If the LSB of CRC register is 1, shift the CRC register one bit to the right with MSB zero filling, Exclusive OR the CRC register with the polynomial value A001H, then repeat step 3.

Step 5: Repeat step 3 and 4 until eight shifts have been performed. When this is done, a complete 8-bit byte will have been processed.

Step 6: Repeat step 2 to 5 for the next 8-bit byte of the command message. Continue doing this until all bytes have been processed. The final contents of the CRC register are the CRC value. **When transmitting the CRC value in the message, the upper and lower bytes of the CRC value must be swapped, i.e. the lower order byte will be transmitted first.**

The following is an example of CRC generation using C language. The function takes two arguments:

Unsigned char* data ← a pointer to the message buffer

Unsigned char length ← the quantity of bytes in the message buffer

The function returns the CRC value as a type of unsigned integer.


```
Unsigned int crc_chk(unsigned char* data, unsigned char length){
   int j;
   unsigned int reg_crc=0xFFFF;
   while(length--){
      reg_crc ^= *data++;
      for(j=0;j<8;j++){
         if(reg_crc & 0x01){    /* LSB(b0)=1 */
            reg_crc=(reg_crc>>1) ^ 0xA001;
         }else{
            reg_crc=reg_crc >>1;
         }
      }
   }
  return reg_crc;
}
```

3.5 Address list:

The contents of available addresses are shown as below:

Tartalom	Tár cím	Funkciók	
AC drive Parameters	ggnnH	gg means parameter group, nn means parameter number, for example, the address of Pr 4-01 is 0401H. Referencing to chapter 5 for the function of each parameter. When reading parameter by command code 03H, only one parameter can be read at one time.	
Command	2000H	Bit 0-1	00: No function 01: Stop 10: Run 11: Jog + Run
		Bit 2-3	Not used
		Bit 4-5	00: No function 01: FWD 10: REV 11: Change direction
		Bit 6-15	Not used
	2001H	Freq. command	
	2002H	Bit 0	1: EF (external fault) on
		Bit 1	1: Reset
		Bit 2-15	Not used
Status monitor Read only	2100H	Error code: 0: No errors occurred 1: Over-current (oc) 2: Over-voltage (ov) 3: Overheat (oH) 5: Overload1 (oL1) 6: External fault (EF) 7: Not used 8: Not used 9: Current exceeds 2 times rated current during acceleration (ocA) 10: Current exceeds 2 times rated current during deceleration (ocd) 11: Current exceeds 2 times rated current during steady state operation (ocn) 12: Ground Fault (GF) 13: Reserved 14: Low voltage (Lv) 15: CPU failure 1 (cF1) 16: CPU failure 2 (cF2) 17: Base block 18: Overload (oL2) 19: Auto acceleration/deceleration failure (cFA) 20: Software protection enable (codE)	

Tartalom	Tár cím	Funkciók	
Status monitor Read only	2100H	21: Reserved 22: CPU failure (cF3.1) 23: CPU failure (cF3.2) 24: CPU failure (cF3.3) 25: CPU failure (cF3.4) 26: CPU failure (cF3.5) 27: CPU failure (cF3.6) 28: CPU failure (cF3.7) 29: Hardware protection failure (HPF.1) 30: Hardware protection failure (HPF.2) 31: Hardware protection failure (HPF.3) 32: CE 10 33: doG 34: SErr 35: ErEd 36: PID error	
	2101H	Status of AC Drive	
		Bit 0-1	00: RUN LED light off, STOP LED light up
			01: RUN LED blink, STOP LED light up
			10: RUN LED light up, STOP LED blink
			11: RUN LED light up, STOP LED light off
		Bit 2	01: Jog active
		Bit 3-4	00: REV LED light off, FWD LED light up
			01: REV LED blink, FWD LED light up
			10: REV LED light up, FWD LED blink
			11: REV LED light up, FRD LED light off
		Bit 5-7	Not used
		Bit 8	1: Main freq. Controlled by communication
		Bit 9	1: Main freq. Controlled by external terminal
		Bit 10	1: Operation command controlled by communication
		Bit 11	1: Parameters have been locked
		Bit 12-15	Not Used
	2102H	Frequency command F (XXX.XX)	
	2103H	Output Frequency H (XXX.XX)	
	2104H	Output Current A (XXX.XX)	
	2105H	DC-BUS Voltage U (XXX.XX)	
	2106H	Output Voltage E (XXX.XX)	
	2107H	Step number of Multi-Step Speed Operation	
	2108H	Step number of PLC operation	
	2109H	Time of PLC Operation	
	210AH	Counter Value	

3.6 Exception response:

Except for broadcast messages, the AC drive is been expected to return a normal response after receiving command messages from the master device. The following depicts the conditions that no normal response is replied to the master device.

The AC drive does not receive the messages due to a communication error; thus, the AC drive has no response. The master device will eventually process a timeout condition.

The AC drive receives the messages without a communication error, but cannot handle it, an exception response will return to the master device and an error message “CExx” will display on the keypad of AC drive. The xx of “CExx” is a decimal code equal to the exception code that will describe below.

In the exception response, the most significant bit of the original command code is set to 1, and an exception code explains the condition that caused the exception is returned. An example of exception response of command code 06H and exception code 02H:

ASCII mód:

STX	‘:’
ADR 1	‘0’
ADR 0	‘1’
CMD 1	‘8’
CMD 0	‘6’
Exception code	‘0’
	‘2’
LRC CHK 1	‘7’
LRC CHK 0	‘7’
END 1	CR
END 0	LF

RTU mód:

ADR	01H
CMD	86H
Exception code	02H
CRC CHK Low	C3H
CRC CHK High	A1H

The meaning of exception code:

Exception code	Jelentése
1	**Illegal command code:** The command code received in the command message is not available for the AC drive.
2	**Illegal data address:** The data address received in the command message is not available for the AC drive.
3	**Illegal data value:** The data value received in the command message is not available for the AC drive.
4	**Slave device failure:** The AC drive is unable to perform the requested action.

The AC drive receives the messages, but detects a communication error, thus, no response is returned, but there will be error message “CExx” displayed on the keypad of AC drive. The master device will eventually process a timeout condition. The xx of “CExx” is a decimal code, the meaning of the error message is below:

Error message	Jelentése
5	Reserved
6	AC drive busy: The time interval between commands is too short. Please keep an interval of 10ms at least after the return of a command. If no command returned, please keep a 10ms interval at least for the same reason.
7	Reserved
8	Reserved
9	Check Sum Error: Check if the Check Sum is correct.
10	Watchdog Timer: The timer will reset to 0 after each valid Modbus communication message is received.
11	Frame Error: Check if the Baud rate complies with the data format.
12	The command message is too short.
13	Command message length is out of range.
14	The command messages include the data that does not belong to ‘0’ to ‘9’, ‘A’ to ‘F except starting and end character (only for Modbus ASCII mode).

3.7 Communication program of PC:

The following is a simple example of how to write a communication program for Modbus ASCII mode on a PC by C language.

```
#include<stdio.h>
#include<dos.h>
#include<conio.h>
#include<process.h>

#define PORT 0x03F8    /* the address of COM1 */

/* the address offset value relative to COM1 */
#define THR    0x0000
#define RDR    0x0000
#define BRDL 0x0000
#define IER    0x0001
#define BRDH 0x0001
#define LCR    0x0003
```



```
#define MCR    0x0004
#define LSR    0x0005
#define MSR    0x0006


unsigned char rdat[60];
/* read 2 data from address 2102H of AC drive with address 1 */
 unsigned char tdat[60]={':','0','1','0','3','2','1','0','2',
                                '0','0','0','2','D','7','\r','\n'};

void main(){
   int i;
   outportb(PORT+MCR,0x08);                  /* interrupt enable */
   outportb(PORT+IER,0x01);                 /* interrupt as data in */
   outportb(PORT+LCR,(inportb(PORT+LCR) | 0x80));
      /* the BRDL/BRDH can be access as LCR.b7==1 */
   outportb(PORT+BRDL,12);                   /* set baudrate=9600,
12=115200/9600*/
   outportb(PORT+BRDH,0x00);
   outportb(PORT+LCR,0x06);                  /* set protocol, <7,N,2>=06H
<7,E,1>=1AH,    <7,O,1>=0AH
 <8,N,2>=07H,    <8,E,1>=1BH
 <8,O,1>=0BH */
   for(i=0;i<=16;i++){
      while(!(inportb(PORT+LSR) & 0x20)); /* wait until THR empty */
      outportb(PORT+THR,tdat[i]);          /* send data to THR */
   }

   i=0;
   while(!kbhit()){
      if(inportb(PORT+LSR) & 0x01){ /* b0==1, read data ready */
         rdat[i++]=inportb(PORT+RDR); /* read data form RDR */
      }
   }
}
```

5.11 Group A: PID Parameters

A - 00	PID Visszacsatolási terminál kiválasztása	Factory Setting: d 0

Settings
- d 0 Disable PID function
- d 1 Negative feedback 0~10V AVI
- d 2 Negative feedback 4~20mA ACI
- d 3 Positive feedback 0~10V AVI
- d 4 Positive feedback 4~20mA ACI

📖 Select an input terminal to serve as the PID feedback location. Please verify the feedback location is different from the Frequency Set Point location and J1 for selecting ACI or AVI must be in the correct position. (Refer to Pr. 2-00 for detail)

📖 Negative feedback = Positive target value – detection value.
Positive feedback = Negative target value + detection value.

A - 01	Visszacsatolási érték erősítése	Factory Setting: d100

Settings d0 to d999% (d100 means gain value is 1) Unit: 1%

📖 To Adjust feedback detective gain value. It is used to adjust target value error.

A - 02	Arányosítási növekmény beállítása (P)	Factory Setting: d100

Settings d0 to d999% (d0: disable) (d100 means gain value is 1)

📖 This parameter is used to determinate error gain. If I = 0 and D = 0, doing proportional gain operation.

A - 03	Integrális idő (I)	Factory Setting: d100

Settings d0 to d999 (d0: disable) Unit: 0.01 second

📖 When this parameter is defined to gain is 1 and error value is fixed, integral value is equal to error value as the setting of integral time is attained.

A - 04	Differenciális idő (D)	Factory Setting: d0

Settings d0 to d100 (d0: disable) Unit: 0.01 second

📖 When this parameter is set to gain =1, PID output is differential time. At this time, error value –error value of the preceding item= additional respond speed and it is easy to have over compensation situation.

A - 05	Integration's Upper Bound Frequency	Factory Setting: d100

Settings d0 to d100%

📖 This parameter determines the integration's upper frequency limit while operating in the PID feedback loop. (Limit = 1-00×A-05 %). During a fast Integration response, it is possible for the frequency to spike beyond a reasonable point. This parameter will limit this frequency spike.

A - 06	Egyszeri várakozás	Factory Setting: d0

Settings d0 to d999 Unit: 2 msec

📖 One-time delay of PID will slow down oscillation of the system.

📖 A setting of d0 disables this function.

A - 07	PID Frekvencia kimeneti korlátozása	Factory Setting: d100

Settings d0 to d110%

📖 This parameter determines the limit of the PID Command frequency. If this parameter is set to 110%, then the maximum output frequency while in the PID operation will be (110% x Pr.01-00) 66Hz.

A - 08	Detection Time of the Feedback Error	Factory Setting: d0.0

Settings d0.0 to d650 seconds

📖 This parameter defines the detection time for the loss of a feedback analog signal. The drive will follow the operating procedure programmed in Pr.A-09 if the feedback signal is lost for more than the time set in Pr. A-08.

📖 A setting of 0.0 disables this function.

A - 09	Feedback Signal Fault Treatment	Factory Setting: d0

Settings d 0 warn and RAMP to stop

d 1 warn and COAST to stop

📖 This parameter selects the operation of the drive upon a loss of PID feedback signal.

A - 10	Dwell (sleep) Frequency	Factory Setting: d0.0

Settings d0.0 to d400Hz

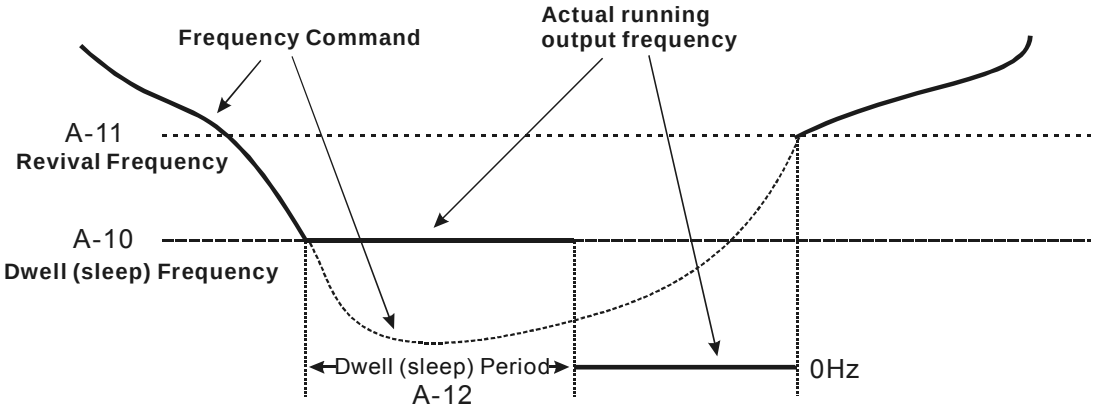
A - 11	Revival Frequency	Factory Setting: d0.0

Settings d0.0 to d400Hz

A - 12	Dwell (sleep) Period	Factory Setting: d0.0

Settings d0.0 to d650 seconds

📖 These parameters determine Dwell (sleep) functions of the AC drive. If the command frequency falls below the Dwell frequency, for the specified time in Pr. A-12, then the drive will shut off the output and wait until the command frequency rises above Pr. A-11. Please see the below diagram.

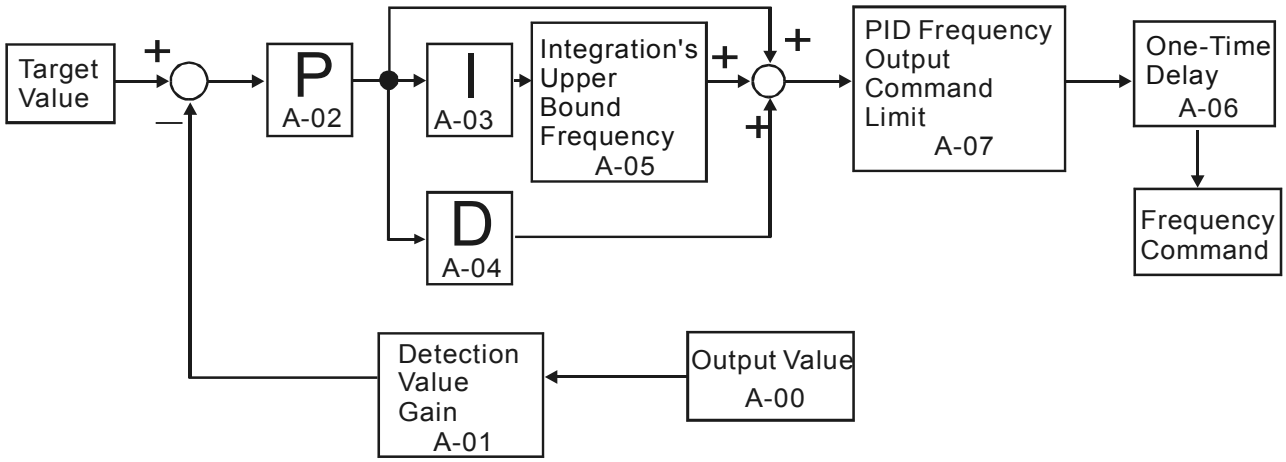


Dwell (sleep) Function

A - 13	PID – Felhasználó által beállított	Factory Setting: d0.0

Settings d0.0 to d400

📖 When parameter A-13 is set to 0, what F and H display is the actual value of setting frequency and output frequency. When this parameter is not set to 0, the display value of F and H = actual value ×A-13/1-00. To set frequency with panel, communication, VR, AVI or ACI need to set according to the display value. For example, when 1-00=60.0Hz, if A-13 is set to 30.0 Hz, it means when the actual value of frequency is 30.00 Hz, the display value will be 15.0 Hz . If you want to let drive run at 10.0Hz, the frequency command must be 5.0 Hz. But the setting frequency of parameters, such as Max. operation frequency, 1st speed and etc., they are still needed to set with actual value.



If the input range of sensor is 0~SI_max, output range is SO_min~SO_max and then $\frac{\text{Input}}{\text{Per output}}$ is $\frac{\text{SI\_max}}{\text{SO\_max-SO\_min}}$, set drive input to sensor output

Set input range of drive is D_range= 10V(0~10V) or 16mA (4~20mA) that correspond to 0~1-00Hz and then $\frac{\text{Output}}{\text{Per input}}$ will be $\frac{\text{1-00}}{\text{D\_range}}$

According to the display value of F and H = actual value ×A-13/1-00, and then $\frac{\text{Display value of F, H}}{\text{Actual value}}$ =A-13/1-00. If you want the result to be display value = sensor output and actual value = drive output, and then

$$\frac{\text{A-13}}{\text{1-00}} = \frac{\frac{\text{SI\_max}}{\text{SO\_max-SO\_min}} \text{X} \frac{\text{A-01}}{100}}{\frac{\text{1-00}}{\text{D\_range}}} \Rightarrow \text{A-13} = \frac{\text{SI\_max}}{\text{SO\_max-SO\_min}} \text{X} \frac{\text{A-01}}{100} \text{X D\_range}$$

Példa:

Sensor: 0~6 psi input corresponds to 0~5V output

drive AVI: 0~10V input corresponds to 0~60Hz, A-01=100

$$\text{A-13} = \frac{6}{5\text{-}0} \text{X} \frac{100}{100} \text{X} 10 = 12$$

7. FEJEZET HIBAKERESÉS ÉS HIBAÜZENETEK

Az inverterben egy beépített intelligens hibakereső rendszere van, mely több fajta különböző típusú hibát képes észlelni és jelezni a felhasználó felé. Amennyiben hiba jelentkezik az inverter működése során az észlelésre kerül, és az annak megfelelő védelmi funkció automatikusan működésbe lép. Ilyen esetben, az alábbi táblázatban található hibaüzenetek egyike jelenik meg. Pr.6-08 – Pr.6-10.

Megjegyzés: A hiba nyugtázása és törlése a digitális vezérlőn és a bemeneti terminálon egyaránt lehetséges.

Általános problémák és megoldások:

Hiba kiírás	Hiba típusának leírása	Javasolt elhárítási módszer
oc	Az inverter nem normális áramerősség növekedést észlelet.	1. Check whether the motors horsepower corresponds to the AC drive output power. 2. Check the wiring connections between the AC drive and motor for possible short circuits. 3. Increase the Acceleration time (Pr.1-09, Pr.1-11). 4. Check for possible excessive loading conditions at the motor. 5. If there are any abnormal conditions when operating the AC drive after short-circuit being removed, it should be sent back to manufacturer.
ou	A DC Busz feszültsége elérte a maximálisan megengedhető értéket.	1. Check whether the input voltage falls within the rated AC drive input voltage. 2. Check for possible voltage transients. 3. Bus over-voltage may also be caused by motor regeneration. Either increase the decel time or add an optional braking resistor. 4. Check whether the required braking power is within the specified limits.
oH	Az inverter hőmérséklet érzékelője túlmelegedést észlelt.	1. Ensure that the ambient temperature falls within the specified temperature range. 2. Make sure that the ventilation holes are not obstructed. 3. Remove any foreign objects on the heatsinks and check for possible dirty heat-sink fins. 4. Provide enough spacing for adequate ventilation.
Lu	A DC Busz feszültsége a minimum érték alá csökkent.	Check whether the input voltage falls within the rated AC drive's input voltage.

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Hiba kiírás	Hiba típusának leírása	Javasolt elhárítási módszer
oL	Az inverter egy nagyobb kimenő áramot észlelt. Megjegyzés: Az invert képes kibírni a névleges áramfelvételének 150%-át 60 s ideig.	1. Check whether the motor is overloaded. 2. Reduce torque compensation setting as set in Pr.7-02. 3. Increase the AC drive's output capacity.
oL 1	Belső elektronikus túlterhelési hiba.	1. Check for possible motor overload. 2. Check electronic thermal overload setting. 3. Increase motor capacity. 4. Reduce the current level so that the drive output current does not exceed the value set by the Motor Rated Current Pr.7-00.
oL2	Motor túlterhelés. Ellenőrizze a paraméterbeállításokat. (Pr.6-03 - Pr.6-05)	1. Reduce the motor load. 2. Adjust the over-torque detection setting to an appropriate setting.
ocA	Túláram gyorsítás alatt: 1. Rövidzárlat a motor kimenetén. 2. Nyomaték boost túl magas. 3. Gyorsítási idő túl rövid. 4. Az inverter kimeneti kapacitása túl kicsi.	1. Check for possible poor insulation at the output line. 2. Decrease the torque boost setting in Pr.7-02. 3. Increase the acceleration time. 4. Replace with the AC drive with one that has a higher output capacity (next HP size).
ocd	Túláram lassításkor: 1. Rövidzárlat a motor kimenetén. 2. Lassítási idő túl rövid. 3. Az inverter kimeneti kapcitása túl kicsi.	1. Check for possible poor insulation at the output line. 2. Increase the deceleration time. 3. Replace with the AC drive with one that has a higher output capacity (next HP size).
ocn	Túláram normális működés közben. Over-current during steady state operation: 1. Rövidzárlat a motor kimenetén. 2. Hirtelen megnövekedett motorterhelés. 3. Az inverter kimeneti kapacitása túl kicsi.	1. Check for possible poor insulation at the output line. 2. Check for possible motor stall. 3. Replace with the AC drive with one that has a higher output capacity (next HP size).
EF	A külső terminál EF-GND OFF –ról ON –ra váltott.	When external terminal EF-GND is closed, the output will be turned off. (under N.O. E.F.)

Hiba kiírás	Hiba típusának leírása	Javasolt elhárítási módszer
cF1	A belső memória IC .t nem lehet programozni.	1. Switch off power supply. 2. Check whether the input voltage falls within the rated AC drive input voltage. 3. Switch the AC drive back on.
cF2	A belső memória IC –t nem lehet olvasni.	1. Check the connections between the main control board and the power board. 2. Reset drive to factory defaults.
cF3	Az inverter belső áramköre hibát jelez.	1. Switch off power supply. 2. Check whether the input voltage falls within the rated AC drive input voltage. Switch on the AC drive.
HPF	Hardware védelmi hiba	Return to the factory.
codE	Software védelmi hiba.	Return to the factory.
cFA	Auto Gyorsítási/Lassítási hiba.	Don't use the function of auto acceleration / deceleration.
GF	Földelési hiba: Az inverter kimenete nem jól működik. Ha a kimeneti terminál földelve van (Rövidzárlati áram több mint 50% az inverter néveleges áramának) az inverter hálózati panleja meghibásodhatott. A rövidzárlati védelem csak az inverter felé használható és nem felhasználói védelem.	Ground fault : 1. Check whether the IGBT power module is damaged. 2. Check for possible poor insulation at the output line.
cE1	Communikációs hiba	1. Check the connection between the AC drive and computer for loose wires. 2. Check if the communication protocol is properly set.
bb	Külső hiba. Az inverter kimenete kikapcsolt.	1. When the external input terminal (B.B) is active, the AC drive output will be turned off. 2. Disable this connection and the AC drive will begin to work again.

8. FEJEZET - PARAMÉTERÖSSZEGZÉS

◈: Ezek a parméterek menetközben is beállíthatók, *: 460V –os inverternél duplázza meg az értéket.

0 Csoport: Felhasználói Paraméterek

Parametéter	Explanation	Beállítás	Alap beállítás
0-00	Inverter azonosítási kódja	Csak olvasásra	d #
0-01	Rated Current Display	Csak olvasásra	d##.#
0-02	Paraméter Reset	d10: Minden paraméter a gyári értékre áll	d0
0-03	Bekapcsolási alap kijelző állapota ◈	d0: F (Frekvencia állítás) d1: H (Aktuális frekvencia kijelzése) d2: (Ügyfél specifikus mértékegység) d3: A (kimeneti áramerősség kijelzése)	d0
0-04	User-Specifikus egység ◈	d0: Display User-Defined Unit (u) d1: Display Counter Value (C) d2: Display Process Operation (1= tt) d3: Display DC-BUS Voltage (U) d4: Display output voltage (E) d5: Display frequency commands of PID (P) d6: Display PID feedback (after multiplying by Gain) (b)	d0
0-05	Ügyfél specifikus állandó K ◈	d0.1 - d160	d1.0
0-06	Software verzió	Csak olvasásra	d#.#
0-07	Jelszó bekódolása	d0 - d999	d0
0-08	Jelszó kikódolása	d0 - d999	d0

1 Csoport – ALAP PARAMÉTREK

Paraméter	Explanation	Beállítás	Alap beállítás
1-00	Maximális kimeneti frekv.	d50.0 - d400 Hz	d60.0
1-01	Maximális feszültség frekvencia (Alap frekv.)	d10.0 - d400 Hz	d60.0
1-02	Maximális kimeneti feszültség	d2.0V - d255V*	d230*
1-03	Középponti ferkvencia	d1.0 - d400 Hz	d1.0
1-04	Középponti feszültség	d2.0V - d255V*	d12*
1-05	Minimum kimeneti frekvencia	d1.0 - d60.0 Hz	d1.0
1-06	Minimum kimeneti feszültség	d2.0V - d255V*	d12*
1-07	Upper Bound of freq.	d1 - d110%	d100
1-08	Lower Bound of freq.	d0 - d100%	d0
1-09	Gyorsítási idő 1 (Tacc1) ◈	d0.1 - d600 Sec	d10.0
1-10	Lassítási idő 1 (Tdec1) ◈	d0.1 - d600 Sec	d10.0
1-11	Gyorsítási idő 2 ◈	d0.1 - d600 Sec	d10.0
1-12	Lassítási idő 2 ◈	d0.1 - d600 Sec	d10.0
1-13	Jog Gyorsítási / Lassítási idő ◈	d0.1 - d600 Sec	d10.0
1-14	Jog Frekvencia ◈	d1.0 Hz - d400 Hz	d6.0
1-15	Auto gyorsítás / Lassítás	d0: Linear Acceleration/Deceleration d1: Auto Acceleration, Linear Deceleration d2: Linear Acceleration, Auto Deceleration d3: Auto Acceleration/Deceleration d4: Linear Acceleration; Auto Deceleration, Stall Prevention during Deceleration d5: Auto Deceleration; Auto Acceleration, Stall Prevention during Deceleration	d0
1-16	S-görbe gyorsításkor	d0 - d7	d0
1-17	S-görbe lassításkor	d0 - d7	d0
1-18	Jog lassítási idő	d 0.0 A Jog Lassítási idejét a Pr. 1- 13 funkció határozza meg d 0.1 - d600	d0.0

2 Csoport – MŰKÖDÉSI MÓD PARAMÉTEREI

Paraméter	Explanation	Beállítás	Gyári beállítás
2-00	Frekvencia parancs kiadásának helye	d0: Master Frequency input determined by digital keypad. (record the frequency of power loss and it can do analog overlap plus) d1: Master Frequency determined by analog signal DC 0V-10V (external terminal AVI). (won't record the frequency of power loss and it can't do analog overlap plus) d2: Master Frequency determined by analog signal DC 4mA - 20mA (external terminal AVI). (won't record the frequency of power loss and it can't do analog overlap plus) d3: Master Frequency determined by Potentiometer on the digital keypad. (won't record the frequency of power loss and it can do analog overlap plus) d4: Master Frequency operated by RS-485 serial communication interface and record frequency of power loss. (record the frequency of power loss and it can do analog overlap plus) d5: Master Frequency operated by RS-485 serial communication interface and won't record frequency before power loss. (won't record the frequency of power loss and it can do analog overlap plus)	d0

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Paraméter	Explanation	Beállítás	Gyári beállítás
2-01	Működési parancs kiadásának forrása	d0: Digitális vezérlő d1: by external terminals, keypad STOP enabled d2: by external terminals, keypad STOP disabled d3: by RS-485 communication interface, keypad STOP enabled d4: by RS-485 communication interface, keypad STOP disabled	d0
2-02	Megállási mód	d0: Ramp Stop d1: Coast Stop	d0
2-03	PWM Vivőfrekvencia	d3: 3KHz d4: 4KHz d5: 5KHz d6: 6KHz d7: 7KHz d8: 8KHz d9: 9KHz d10: 10KHz	d10
2-04	Reverse Operation	d0: Enable REV d1: Disable REV	d0
2-05	ACI Jel vesztése esetén	d0: 0 Hz, forgás folytatása d1: A frekvencia kimenet leállítása d2: Utolsó ACI bemeneti parancs	d0
2-06	Analog Auxiliary Frequency Operation	d0: Tíltva d1: Engedélyezve + AVI d2: Engedélyezve + ACI	d0

3 Csoport – KIMENETI FUNKCIÓK PARAMÉTEREI

Paraméter	Explanation	Beállítás	Gyári beállítás
3-00	Analog kimeneti jel	d0: analog frekvencia d1: analog áram	d0
3-01	Analog kimenet erősítés◈	d1 - d200%	d100
3-02	Desired Freq. Attained	d1.0 - d400 Hz	d1.0
3-03	Terminal Count Value	d0 - d999	d0
3-04	Preliminary Count Value	d0 - d999	d0
3-05	Multi-Function Output1 (Photocoupler Output)	d0: Not Used	d1
3-06	Multi-Funkciós kimenet2 (Relé kimenet)	d1: AC Inverter működik d2: Max. kimeneti frekvencia elérve d3: Zero sebesség d4: Túlnyomaték d5: Base-Block (B.B.) d6: Alacsony feszültség felismerés d7: AC Inverter működési mód d8: Hibajelzés d9: Beállított frekvencia elérve d10: PLC Program futása d11: PLC Program 1 lépése kész d12: PLC Program befejeződött d13: PLC Program futása megszakítva d14: Terminál számlálási értéke elérve d15: Preliminary Count Value Attained d16: Készenléti helyzetjelzés d17: ELŐRE parancs jelzése d18: HÁTRA parancs jelzése	d8

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4 Csoport – BEMENETI FUNKCIÓK PARAMÉTEREZÉS

Parameters	Explanation	Settings	Factory Setting
4-00	Potentiometer Bias Frequency ◈	d 0.0 - d 100.0%	d0.0
4-01	Potentiometer Bias Polarity ◈	d0: Positive Bias d1: Negative Bias	d0
4-02	Potentiometer Frequency Gain ◈	d1 - d200 %	d100
4-03	Potenciométeres hátra forgás negedélyezve	d0: Csak az előreforgás engedélyezve d1: Reverse Motion enabled	d0
4-04	Multi-Funkciós bemeneti Terminál 1 (M0, M1)	d0: Paraméter tiktása d1: FWD/STOP, REV/STOP d2: FWD/REV, RUN/STOP d3: 3-wire Operation Control Mode d4: E.F. External Fault Input (N.O.) d5: E.F. External Fault Input (N.C.) d6: Reset d7: Multi-Step Speed Command 1 d8: Multi-Step Speed Command 2 d9: Multi-Step Speed Command 3 d10: Jog Operation d11: Acceleration/deceleration Speed Inhibit d12: First or Second Acceleration/deceleration Time Selection d13: Base-Block (B.B.) (N.O.) d14: Base-Block (B.B.) (N.C.) d15: Increase Master Frequency d16: Decrease Master Frequency d17: Run PLC Program d18: Pause PLC d19: Counter Trigger Signal d20: Counter Reset d21: Select ACI / Deselect AVI d22: Disable PID function d23: JOG FWD d24: JOG REV d25: The source of master frequency is AVI. d26: The source of master frequency is ACI.	d1
4-05	Multi-Funkciós bemeneti Terminál 2 (M2)		d6
4-06	Multi-Funkciós bemeneti Terminal 3 (M3)		d7
4-07	Multi-Funkciós bemeneti Terminál 4 (M4)		d8
4-08	Multi-Funkciós bemeneti Terminál 5(M5)		d9

Parameters	Explanation	Settings	Factory Setting
4-09	Line Start Lockout	d0: Tiltva d1: Engedélyezve	d0
4-10	Fel/Le frekvencia parancs mód	d0: Up/down frequency by acceleration/deceleration time d1: Up frequency according to constant speed, down frequency according to deceleration time d2: Up frequency according to acceleration time, down frequenc according to constant speed d3: Up/down frequency by constant speed	d3
4-11	Acceleration /Deceleration speed of constant up/down frequency	d0 - d1000 Hz/sec	d1

5 Csoport – TÖBB LÉPCSŐS SEBESSÉG és PLC PARAMÉTEREK

Parameters	Explanation	Settings	Factory Setting
5-00	1. Léptetési frekvencia	d0.0 - d400 Hz	d0.0
5-01	2. Léptetési frekvencia	d0.0 - d400 Hz	d0.0
5-02	3. Léptetési frekvencia	d0.0 - d400 Hz	d0.0
5-03	4. léptetési frekvencia	d0.0 - d400 Hz	d0.0
5-04	5. léptetési frekvencia	d0.0 - d400 Hz	d0.0
5-05	6. léptetési frekvencia	d0.0 - d400 Hz	d0.0
5-06	7. léptetési frekvencia	d0.0 - d400 Hz	d0.0
5-07	PLC Mód	d0: PLC mód letiltása d1: Egy programciklus végrehajtása d2:Programciklus folyamatos végrehajtása d3: Egy programciklus lépésről-lépésre való végrehajtása d4: Programciklus folyamatos lépésről-lépésre történő végrehalytása d5: PLC működés tiltása, de a 1. – 7. seesség irányának beállítása lehetséges	d0
5-08	PLC ELŐRE/ HÁTRA Forgás beállítása	d0 - d255 (0: ELŐRE 1: HÁTRA)	d0
5-09	Time Duration Step 0	d0 - d65500 Sec	d0
5-10	Time Duration Step 1	d0 - d65500 Sec	d0
5-11	Time Duration Step 2	d0 - d65500 Sec	d0
5-12	Time Duration Step 3	d0 - d65500 Sec	d0
5-13	Time Duration Step 4	d0 - d65500 Sec	d0
5-14	Time Duration Step 5	d0 - d65500 Sec	d0
5-15	Time Duration Step 6	d0 - d65500 Sec	d0
5-16	Time Duration Step 7	d0 - d65500 Sec	d0

6. Csoport – VÉDELMI PARAMÉTEREK

Parameters	Explanation	Settings	Factory Setting
6-00	Over-Voltage Stall Prevention	d0: Tíltva d1: Engedélyezve	d1
6-01	Over-Voltage Prevention Level	230V sorozat: d350 - d410V	d390
		460V sorozat: d700 - d820V	d780
6-02	Over-Current Stall Prevention Level	d20 - d150%	d130
6-03	Túlnyomaték felismerés módja	d0: Disabled d1: Enabled during constant speed operation and continue to run to OL1 or OL. d2: Enabled during Constant Speed Operation and halted after detection d3: Enabled during running and continues before Continuous Output Time Limit (Pr.6-05) is reached d4: Enabled during running and halted after Over-Torque detection	d0
6-04	Túlnyomaték felismerés szintje	d30 - d200%	d150
6-05	Túlnyomaték felismerés idejének beállítása	d0.1 - d10.0 Sec	d0.1
6-06	Electronic Thermal Overload Relay Selection	d0 - d2	d2
6-07	Electronikus hővédelem karakteriszitikája ◈	d30 - d600 Sec	d60
6-08	Jelenlegi hibakód	d0: Nincs hiba d1: Túláram (oc) d2: Túlfeszültség (ov) d3: Túlmelegedés (oH) d4: Túlterhelés (oL) d5: Túlterhelés (oL1) d6: Külső hiba (EF) d7: Nincs használatban d8: Nincs használatban d9: Túláram goyrsításkor (ocA) d10:Túláram lassításkor (ocd) d11:Túláram készenléti állapotban (ocn) d12: Földhiba (GF)	d0
6-09	Második legjellemzőbb hiba előhívása		
6-10	Harmadik legjellemzőbb hiba előhívása		

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7. Csoport – MOTOR PARAMÉTEREK

Parameters	Explanation	Settings	Factory Setting
7-00	Motor névleges áramfelvétele ◈	D30 - d120%	d85
7-01	Motor terheletlen áramfelvétele ◈	D0 - d90%	d50
7-02	Nyomaték kompenzáció ◈	D0 - d10	d01
7-03	Slip Kompenzáció ◈	D0.0 - d10.0	d0.0

8. Csoport – SPECIÁLIS PARAMÉTREK

Parameters	Explanation	Settings	Factory Setting
8-00	DC Fékezés feszültségszintje	d0 - d30%	d0
8-01	DC Fékezési idő indításkor	d0.0 - d60.0 Sec	d0.0
8-02	DC Fékezési idő megálláskor	d0.0 - d60.0 Sec	d0.0
8-03	DC Fékezési pont beállítása	d0.0 - d400 Hz	d0.0
8-04	Működési mód kiválasztása pillanatnyi áramkimaradás estére	d0: Működés megszakítása pill. Áramkimaradás esetén d1: Pill. Áramkimaradás után működés folytatása – az eredetileg beállított frekvencián d2: Pill. Áramkimaradáa után működés folytatása a minimum frekvencián	d0
8-05	Maximálisan megengedett hálózati áramkimaradás ideje	d0.3 - d5.0 Sec	d2.0
8-06	B.B. Time for Speed Search	d0.3 - d5.0 Sec	d0.5
8-07	Maximum Speed Search Current Level	d30 - d200%	d150
8-08	Skip Frequency 1 Upper Bound	d0.0 - d400 Hz	d0.0
8-09	Skip Frequency 1 Lower Bound	d0.0 - d400 Hz	d0.0
8-10	Skip Frequency 2 Upper Bound	d0.0 - d400 Hz	d0.0
8-11	Skip Frequency 2 Lower bound	d0.0 - d400 Hz	d0.0
8-12	Skip Frequency 3 Upper bound	d0.0 - d400 Hz	d0.0
8-13	Skip Frequency 3 Lower Bound	d0.0 - d400 Hz	d0.0
8-14	Hiba utáni autómatikus újraindítás	d0 - d10	d0
8-15	AVR Funkció – Autómatikus feszültség szabályozás	d0: AVR Funkció engedélyezve d1: AVR Funkció tiltva d2: AVR Funkció lassításkor tíltva	d2
8-16	Dynamic Braking Voltage	d350 - d450V*	d380*
8-17	DC Braking Lower Bound Limit	d0.0 - d400 Hz	d0.0

9 Csoport – KOMMUNIKÁCIÓS PARAMÉTEREK

Paraméter	Explanation	Beállítás	Alap beállítás
9-00	Kommunikációs Cím ◈	d1 - d254	d1
9-01	Átviteli sebesség ◈	d0: Átvitel 4800 bps d1: Átvitel 9600 bps d2: Átvitel 19200 bps d3: Átvitel 38400 bps	d1
9-02	Transmission Fault Treatment ◈	d0: Warn and Keep Operating d1: Warn and Ramp to Stop d2: Warn and Coast to Stop d3: Keep Operating without Warning	d0
9-03	Modbus Communication Watchdog Timer ◈	d0: Tiltva d1 - d20: time setting (1 sec increment)	d0
9-04	Kommunikációs Protokol ◈	d0: 7,N,2 (Modbus, ASCII) d1: 7,E,1 (Modbus, ASCII) d2: 7,O,1 (Modbus, ASCII) d3: 8,N,2 (Modbus, ASCII) d4: 8,E,1 (Modbus, ASCII) d5: 8,O,1 (Modbus, ASCII) d6: 8,N,2 (Modbus, RTU) d7: 8,E,1 (Modbus, RTU) d8: 8,O,1 (Modbus, RTU)	d0

A Csoport – KOMMUNIKÁCIÓS PARAMÉTEREK

Parameters	Explanation	Settings	Factory Setting
A-00	PID Visszacsatolási terminál kiválasztása	d0: PID Letiltása d1: Negatív visszacsatolás 0~10V AVI d2: Negatív visszacsatolás 4~20mA ACI d3: Pozitív visszacsatolás 0~10V AVI d4: Pozitív visszacsatolás 4~20mA ACI	d0
A-01	Feedback Signal Gain	d0 - d999	d100
A-02	Proportional Gain (P)	d0 - d999	d100
A-03	Integrál idő (I)	d0 - d999	d100
A-04	Differenciál idő (D)	d0 - d100	d0
A-05	Integration's Upper Bound Frequency	d0 - d100%	d100
A-06	Egyszeri késleltetés	d0 - d999	d0
A-07	PID Frequency Output Command Limit	d0 - d110%	d100
A-08	Detection Time of the Feedback Error	d0.0 - d650 másodperc	d0.0
A-09	Feedback Signal Fault Treatment	d0: Figyelmeztet éswarn and RAMP to stop d1: warn and COAST to stop	d0
A-10	Dwell (sleep) Frequency	d0.0 - d400Hz	d0.0
A-11	Revival Frequency	d0.0 - d400Hz	d0.0
A-12	Dwell (sleep) Period	d0.0 - d650 másodperc	d0.0
A-13	PID User Defined	d0.0 - d400	d0.0

STANDARD SPECIFICATIONS

Voltage Class		115V Class			230V Class					460V Class			
Model Number VFD-□ □ □ S		002	004	007	002	004	007	015	022	004	007	015	022
Max. Applicable Motor Output (kW)		0.2	0.4	0.75	0.2	0.4	0.75	1.5	2.2	0.4	0.75	1.5	2.2
Output Rating	Rated Output Capacity (KVA)	0.6	1.0	1.6	0.6	1.0	1.6	2.9	4.2	1.2	2.0	3.3	4.4
	Rated Output Current (A)	1.6	2.5	4.2	1.6	2.5	4.2	7.5	11.0	1.5	2.5	4.2	5.5
	Maximum Output Voltage (V)	Proportional to Input Voltage											
	Rated Frequency (Hz)	1.0 to 400 Hz											
Input Rating	Rated Input Current (A)	Single phase			Single/3-phase					3-phase			
		6	9	18	4.9/2.4	6.5/3.0	9.7/5.1	15.7/8.4	24/--	1.7	2.9	5.1	6.9
	Single (3-phase Input Current)	-- --			1.9	2.7	5.1	9.0	15	-- --			
	Rated Voltage/Frequency	100/110/120 VAC 50/60 Hz			200/208/220/240 VAC 50/60Hz					380/400/415/480 VAC 50/60Hz			
	Voltage/Freq. Tolerance	Voltage: ±10%, Frequency: ±5%											
Control Characteristics	Control System	SPWM (Sinusoidal Pulse Width Modulation, carrier frequency 3k-10kHz)											
	Output Frequency Resolution	0.1Hz											
	Torque Characteristics	Including the auto-torque, auto-slip compensation; starting torque can be 150% at 5Hz											
	Overload Endurance	150% of rated current for 1 minute											
	Accel/Decel Time	0.1to 600 second (2 Independent settings for Accel/Decel Time)											
	V/F Pattern	V/F pattern adjustable											
	Stall Prevention Level	20 to 200%, Setting of Rated Current											
Operating Characteristics	Frequency Setting	Keypad	Setting by ▲ ▼ or Potentiometer										
		External Signal	Potentiometer-5KΩ/0.5W, DC 0 to +10V or 0 to +5V (Input impedance 47KΩ), RS-485 interface, 4 to 20mA (Input impedance 250Ω); Multi-Function Inputs 1 to 5 (7 steps, Jog, up/down)										
	Operation Setting Signal	Keypad	Setting by RUN, STOP										
		External Signal	M0 to M5 can be combined to offer various modes of operation, RS-485 serial interface (MODBUS).										
	Multi-Function Input Signal	Multi-step selection 0 to7, Jog, accel/decel inhibit, first/second accel/decel switch, counter, PLC operation, external Base Block (NC, NO)											
	Multi-Function Output Indication	AC Drive Operating, Frequency Attained, Non-zero, Base Block, Fault Indication, Local/Remote indication, PLC Operation indication.											
	Analog Output Signal	Analog frequency/current signal output.											
Other Function		AVR, S-Curve, Over-Voltage, Over-Current Stall Prevention, Fault Records, Adjustable Carrier Frequency, DC Braking, Momentary Power Loss restart, Frequency Limits, Parameter Lock/Reset, Reverse Inhibition, etc.											
Protection		Self-testing, Over Voltage, Over Current, Under Voltage, Overload, Overheating, External Fault, Electronic thermal, Ground Fault.											
Cooling		Natural air-cooling								Forced air-cooling (3Hp)			
Enviroment	Installation Location	Altitude 1,000 m or below, keep from corrosive gasses, liquid and dust											
	Pollution Degree	2											
	Ambient Temperature	-10°C to 40°C (Non-Condensing and not frozen)											
	Storage Temperature	-20°C to 60°C											
	Ambient Humidity	Below 90% RH (non-condensing)											
	Vibration	9.80665m/s^2 (1G) less than 20Hz, 5.88m/s^2 (0.6G) at 20 to 50Hz											

A

ACCESSORIES

B.1 Non-fuse Circuit Breaker Chart

Per UL 508C, paragraph 44.8.6, part a,

1. For 1-phase drives, the current rating of the breaker shall be four times maximum of input current rating.
2. For 3-phase drives, the current rating of the breaker shall be four times maximum of output current rating.

(Note: Please select enough current capacity of NFB.)

1-phase		3-phase	
Model	Input Current (A)	Model	Output Current (A)
VFD002S11A/B	6.0	VFD002S23A/B	1.6
VFD002S21A/B/C	4.9	VFD004S23A/B	2.5
VFD004S11A/B	9.0	VFD004S43A/B	1.5
VFD004S21A/B/C	6.5	VFD007S23A/B	4.2
VFD007S11A/B	18.0	VFD007S43A/B	2.5
VFD007S21A/B/C	9.7	VFD015S23A/B	7.5
VFD015S21A/B/C	15.7	VFD015S43A/B	4.2
VFD022S21A/B/C	24	VFD022S23A/B	11.0
		VFD022S43A/B	5.5

Biztosíték beépítési diagramm

A táblázatban szereplő biztosítékoknál kisebb beépítési tilos.

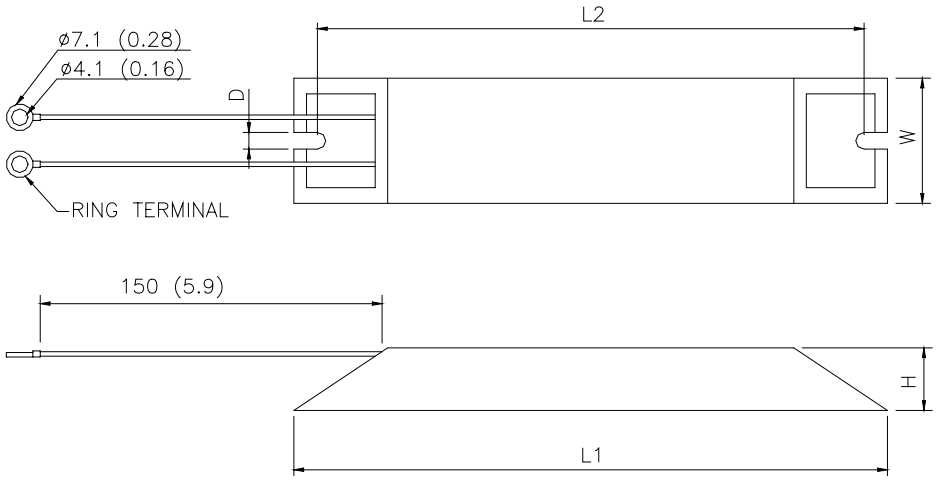
Modell	Bemeneti áram (A)	Kimenő áram (A)	Hálózati biztosíték	
			I (A)	Bussmann P/N
VFD002S11A/B	6.0	1.6	15	JJN-15
VFD002S21A/B/C	4.9	1.6	15	JJN-15
VFD002S23A/B	1.9	1.6	6	JJN-6
VFD004S11A/B	9.0	2.5	30	JJN-30
VFD004S21A/B/C	6.5	2.5	20	JJN-20
VFD004S23A/B	2.7	2.5	10	JJN-10
VFD004S43A/B	1.7	1.5	6	JJS-6
VFD007S11A/B	18.0	4.2	50	JJN-50
VFD007S21A/B/C	9.7	4.2	30	JJN-30
VFD007S23A/B	5.1	4.2	15	JJN-15
VFD007S43A/B	2.9	2.5	10	JJS-10
VFD015S21A/B/C	15.7	7.5	50	JJN-50
VFD015S23A/B	9.0	7.5	30	JJN-30
VFD015S43A/B	5.1	4.2	15	JJS-15
VFD022S21A/B/C	24	11	50	JJN-50
VFD022S23A/B	15.0	11.0	40	JJN-40
VFD022S43A/B	6.9	5.5	20	JJS-20

B.2 Az inverterhez használható összes fékrezisztor & Fékezőegység

Feszültség	Alkalmazott motor		Max. terhelési nyomaték kgf-m	Ellenállás Specifikáció	Fék ellenállási modell típusa és felhasznált darab mennyiség		Fékezési nyomaték 10%ED%	Minimum ellenállási érték
	HP	kW						
115 / 230 V Sorozat	1/4	0.2	0.110	80W 200Ω	BR080W200	1	400	---
	1/2	0.4	0.216	80W 200Ω	BR080W200	1	220	---
	1	0.75	0.427	80W 200Ω	BR080W200	1	125	80Ω
	2	1.5	0.849	300W 100Ω	BR300W100	1	125	55Ω
	3	2.2	1.262	300W 70Ω	BR300W070	1	125	35Ω
460 V Sorozat	1/2	0.4	0.216	80W 750Ω	BR080W750	1	230	---
	1	0.75	0.427	80W 750Ω	BR080W750	1	125	260Ω
	2	1.5	0.849	300W 400Ω	BR300W400	1	125	190Ω
	3	2.2	1.262	300W 250Ω	BR300W250	1	125	145Ω

Fékellenállás méretei

Mértékegység: mm (inch)



TÍPUS	L1	L2	H	D	W	MAX. SÚLY (g)
MVR200W120	165	150	20	5.3	40	240
MVR400W120	165	150	20	5.3	40	240
BR080W200	140	125	20	5.3	60	160
BR080W750	140	125	20	5.3	60	160
BR300W070	215	200	30	5.3	60	750
BR300W100	215	200	30	5.3	60	750
BR300W250	215	200	30	5.3	60	750
BR300W400	215	200	30	5.3	60	750

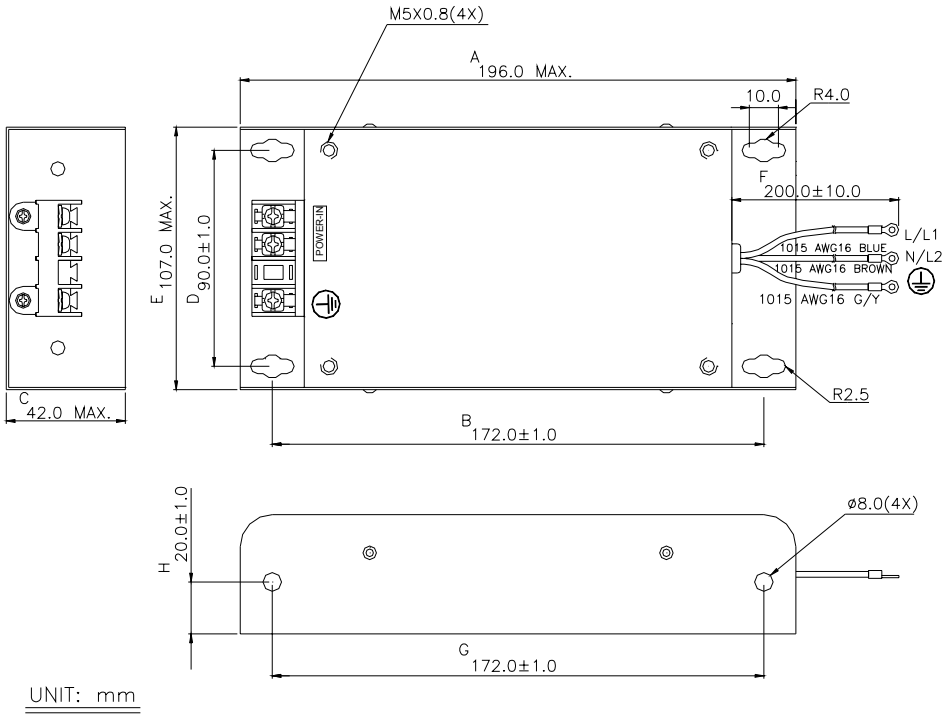
B

B.3 EMI Filters

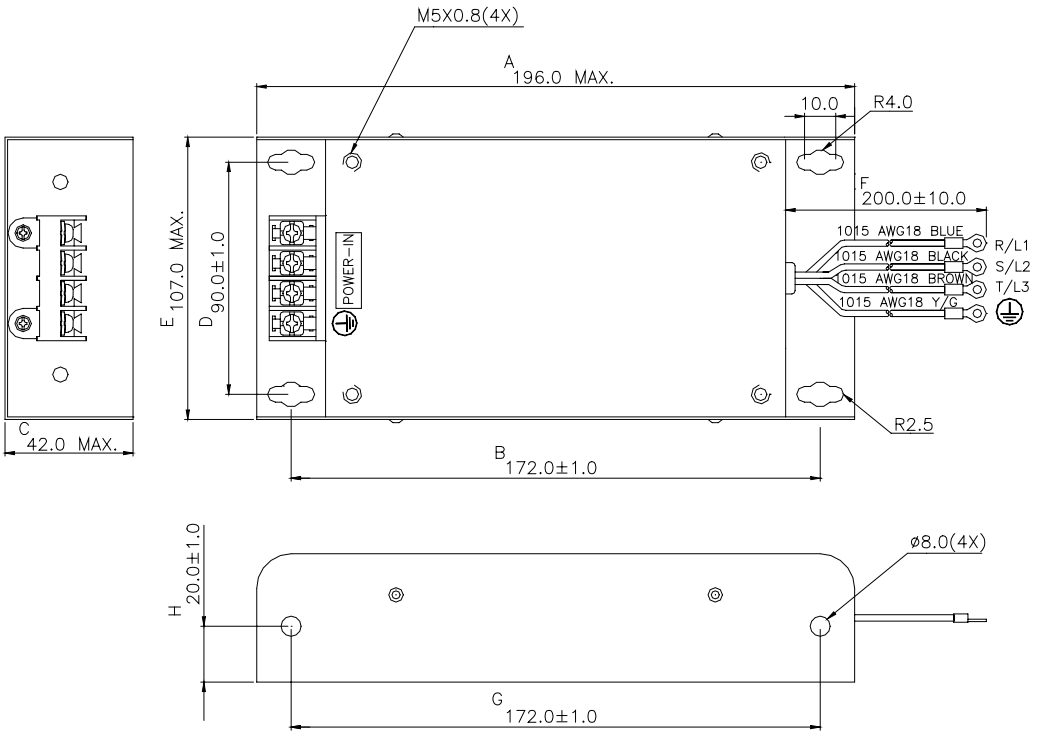
The DELTA VFD-S Series 0.25-3HP, 115V, 230V, 460V AC drive uses DELTA EMI Filter. Use the table below to find the appropriate filter for your DELTA VFD-S drive.

Model of AC Motor Drive	EMI Filter
VFD002S21A, VFD004S21A, VFD007S21A VFD002S11A, VFD004S11A	12DKT1W3S
VFD002S23A, VFD004S23A, VFD007S23A	08TDT1W4S
VFD007S11A, VFD015S21A	22DRT1W3S
VFD015S23A, VFD022S23A	20TDT1W4S
VFD004S43A, VFD007S43A	05TDT1W4S4
VFD015S43A, VFD022S43A	10TDT1W4S4
VFD022S21A	35DRT1W3C

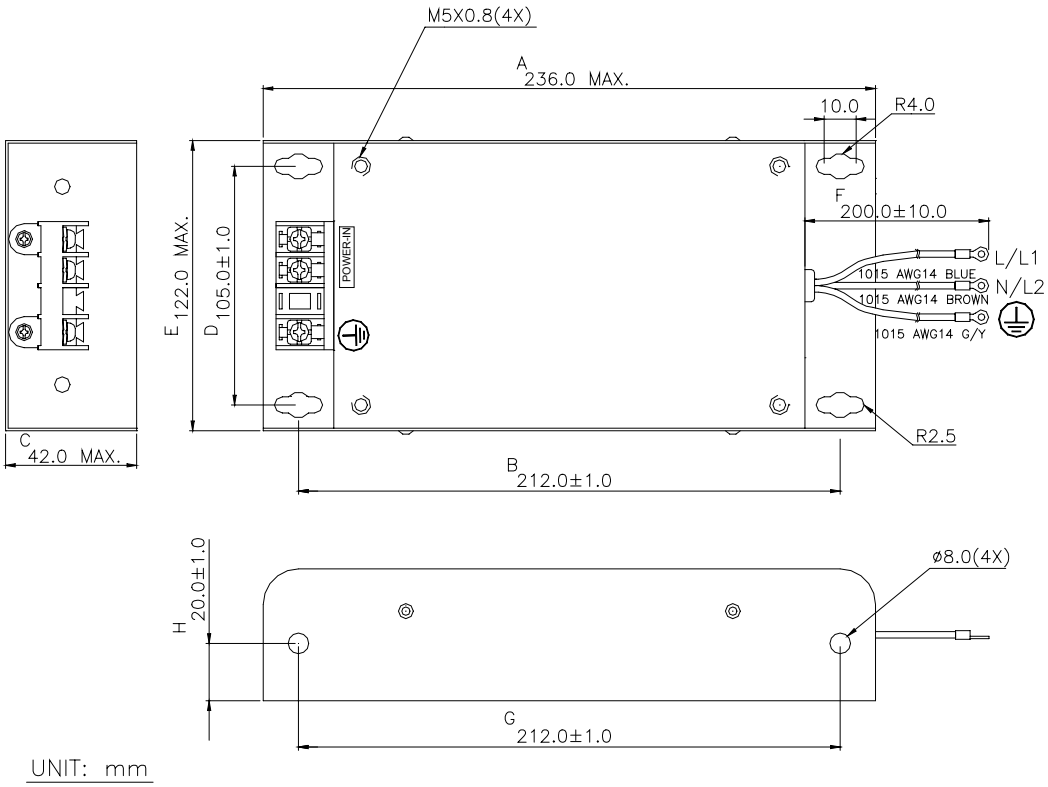
1. EMI Filter (12DKT1W3S) Use on 0.25-0.5 HP / 115V, 0.25-1 HP / 230V, Single Phase Models



2. EMI Filter (08TDT1W4S) Use on 0.25-1 HP/ 230V, Three Phase Models



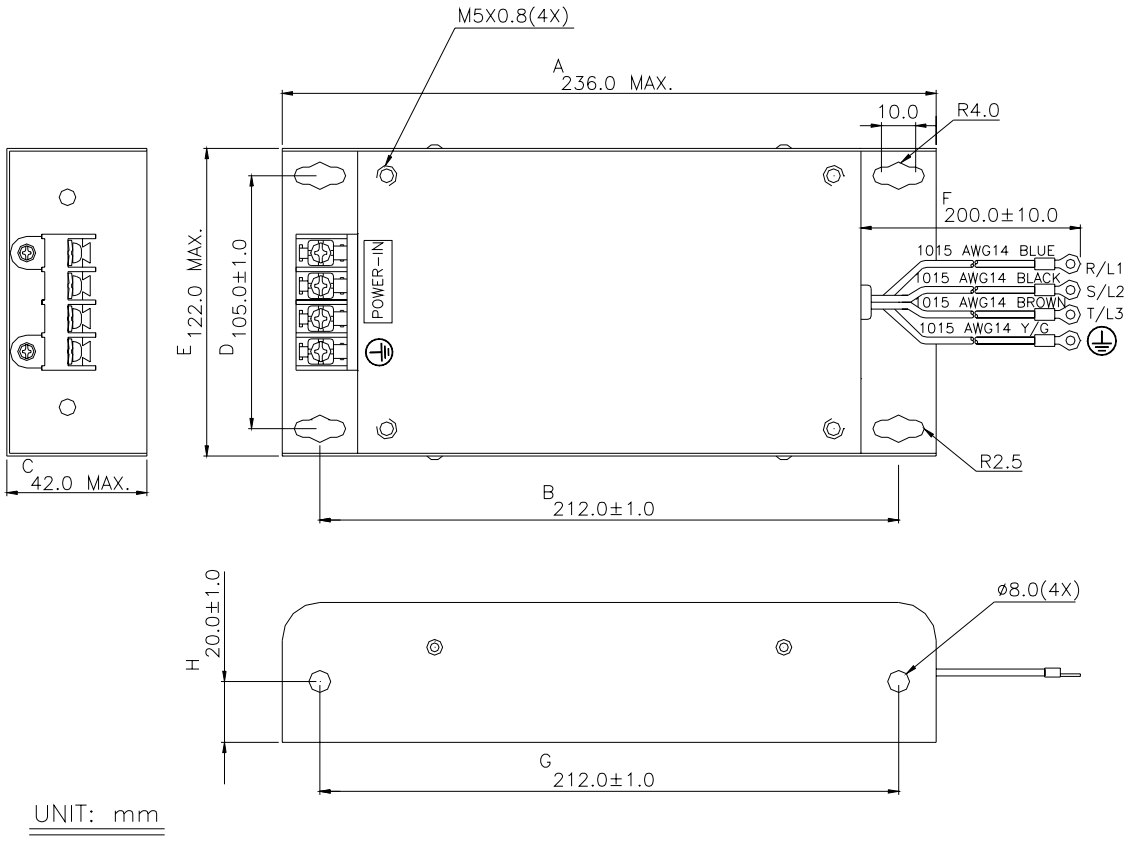
3. EMI Filter (22DRT1W3S) Use on 1 HP / 115V, 2HP / 230V, Single Phase Models



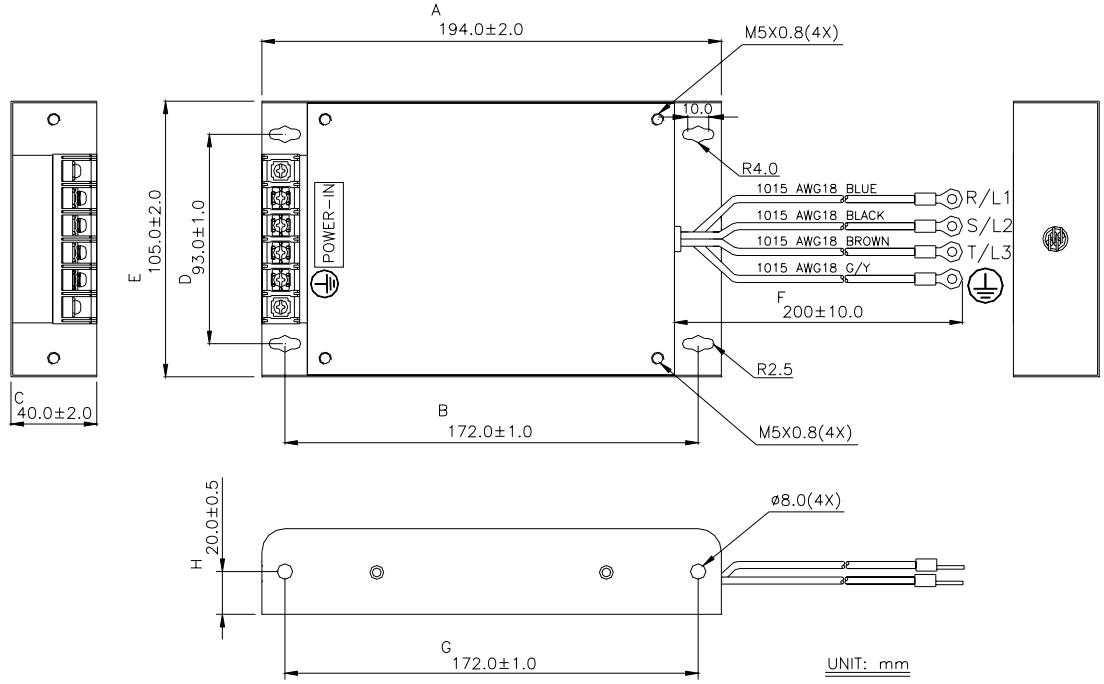
UNIT: mm

B

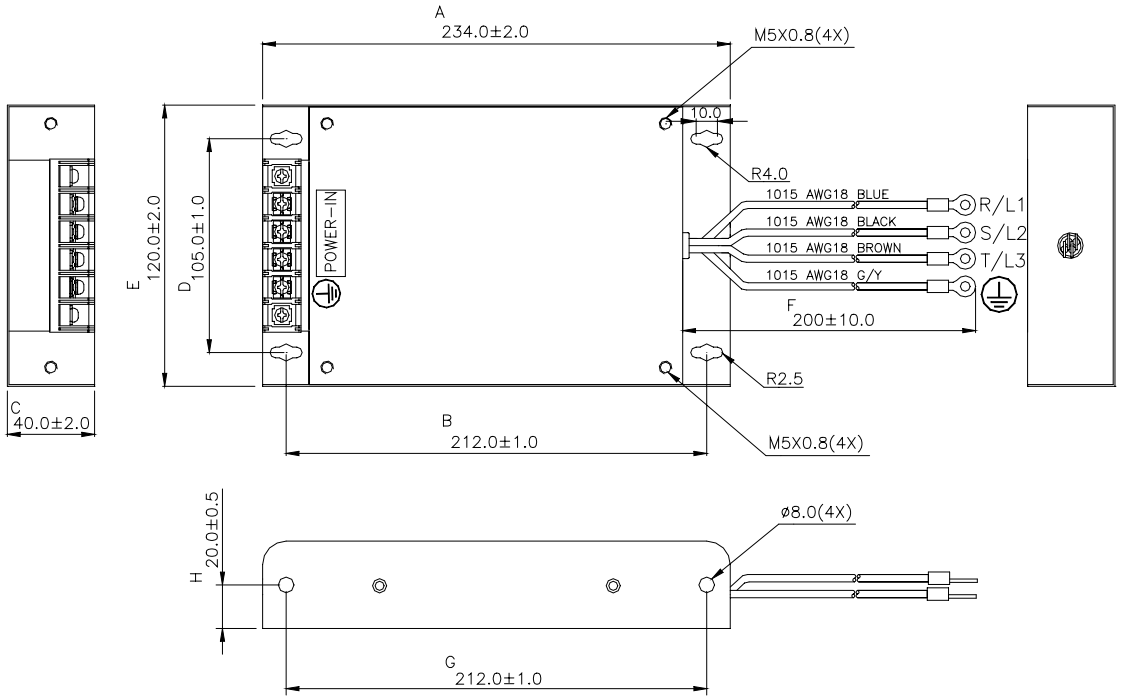
4. EMI Zavarszűrő (20TDT1W4S) - 2-3 HP / 230V, Háromfázisú modelleknél



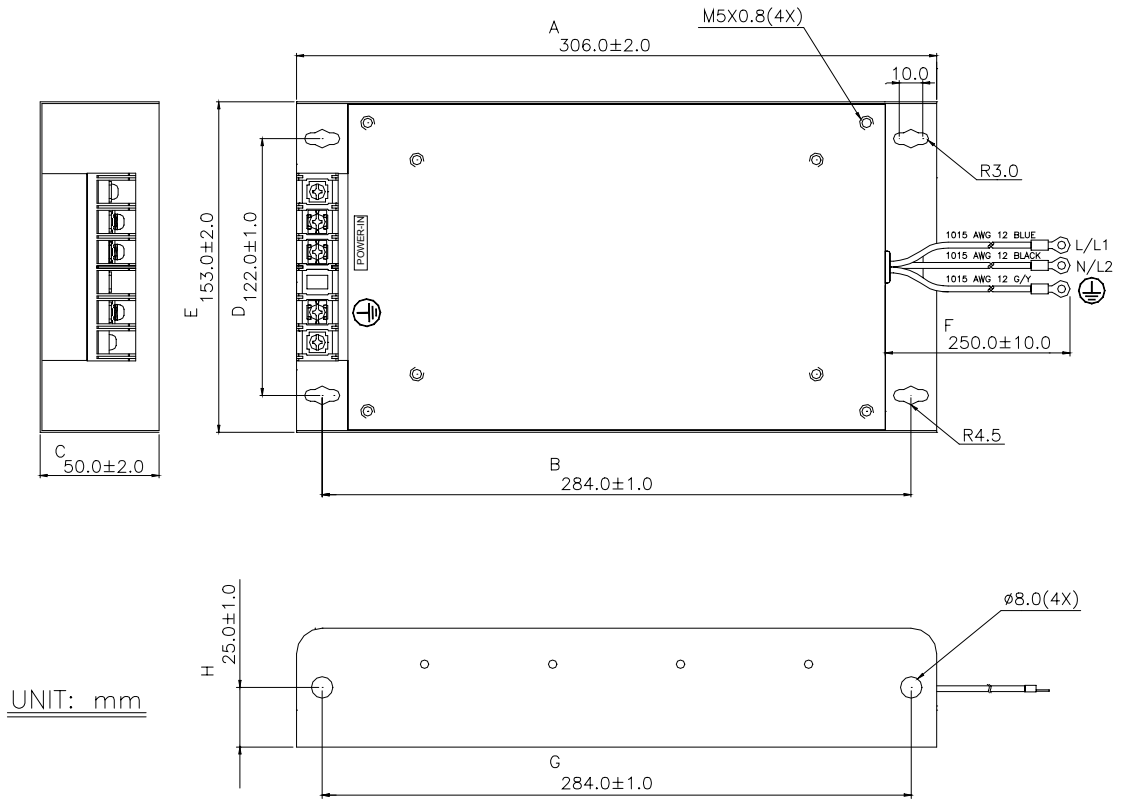
5. EMI Filter (05TDT1W4S4) Use on 0.5-1 HP / 460V, Three Phase Models



6. EMI Filter (10TDT1W4S4) Use on 2-3 HP / 460V, Three Phase Models



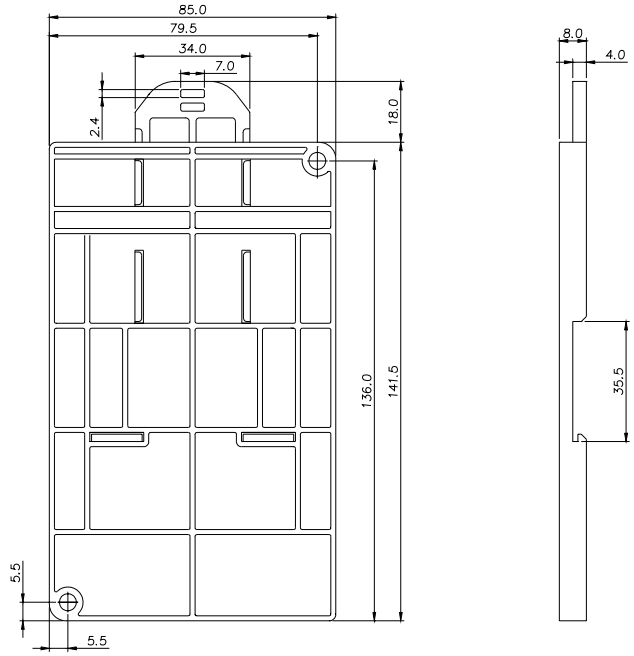
7. EMI Filter (35DRT1W3C) Use on 2 HP / 230V, Single Phase Models

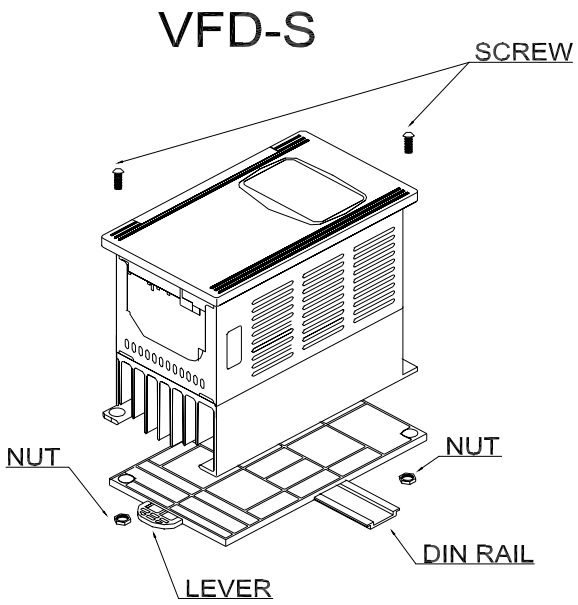


B

B.4 Din szabványú illesztősin -DR01

Mértékegység: mm



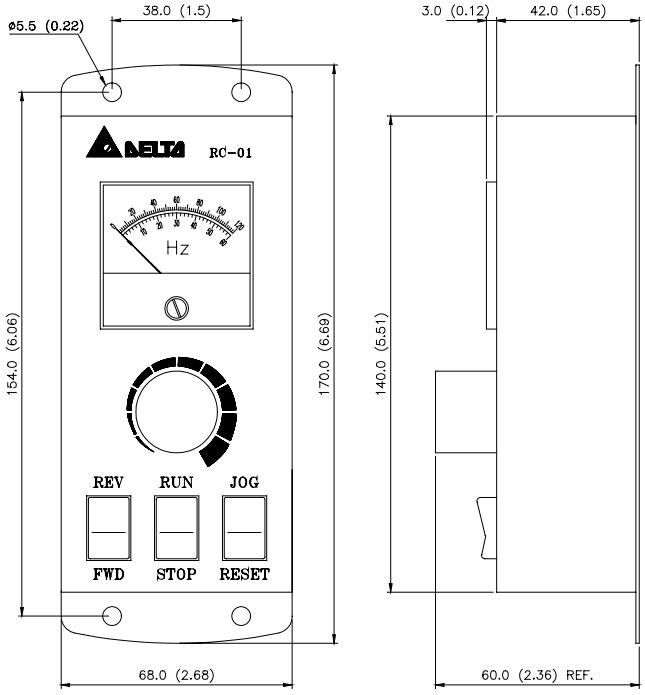


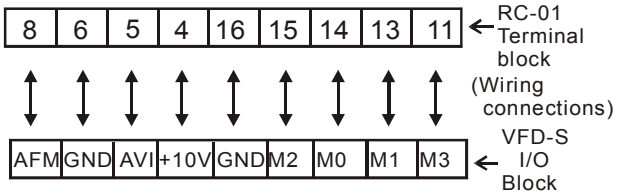
Típusok	Csavarméret
VFD002S11A/B	M4*22
VFD002S21A/B/C	M4*22
VFD002S23A/B	M4*22
VFD004S11A/B	M4*12
VFD004S21A/B/C	M4*12
VFD004S23A/B	M4*12
VFD004S43A/B	M4*12
VFD007S21A/B/C	M4*12
VFD007S23A/B	M4*12
VFD007S43A/B	M4*12

- To install the Din Rail Adapter use the specified screws for different models. Refer to the above chart.
- To mount the drive on a Din Rail, place the drive on the rail and push the lever toward the rail.

B.5 Távvezérlő egység RC-01

Mértékegység: mm (inch)





VFD-S Programming

Pr. 2-00 and Pr. 2-01 set to d01

Pr. 4-04 set to d02 (M0, M1 set at RUN/STOP and FWD/REV)

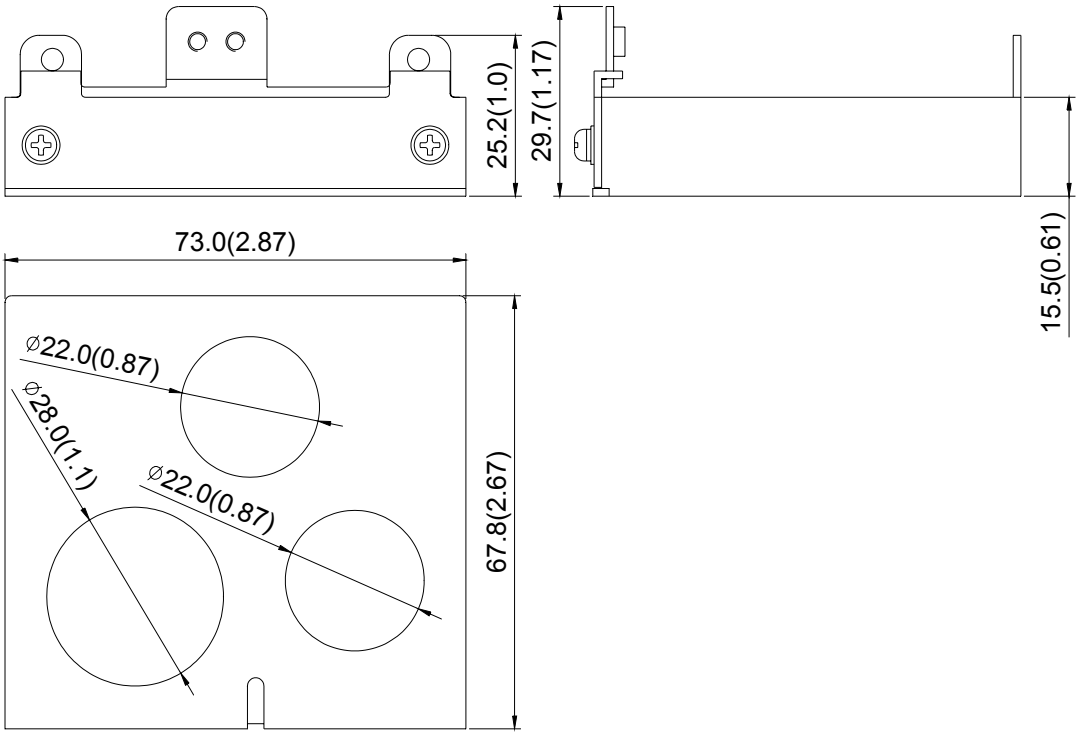
Pr. 4-05 set to d06 (M2 set for reset)

Pr. 4-06 set to d10 (M3 set for jog operation)

B

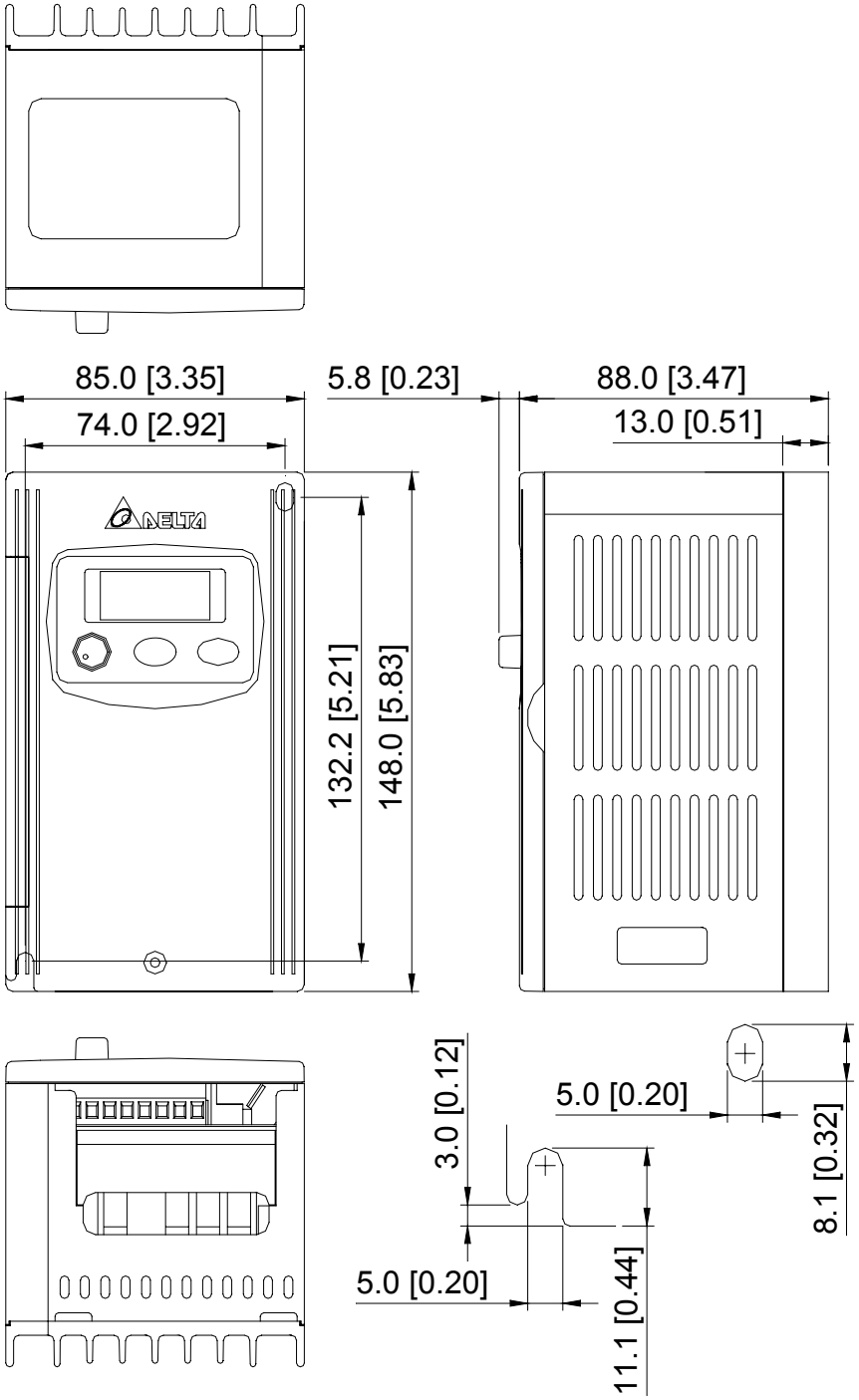
B.6 Szerelő lap (BK-S)

Mértékegység: mm (inch)



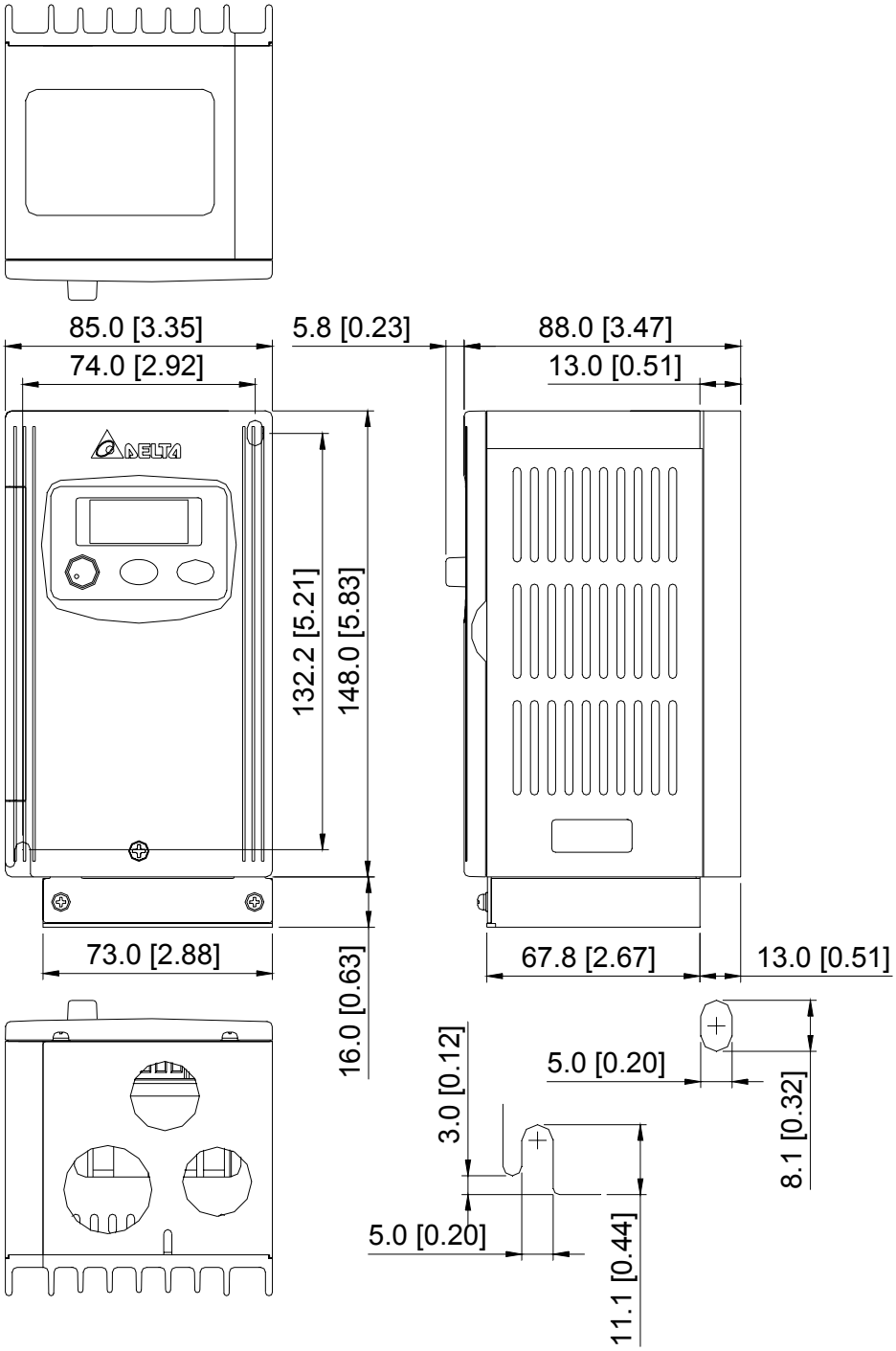
Dimensions

VFD002S11A 0.25HP 115V / 1 Phase
VFD002S21A 0.25HP 230V / 1 Phase
VFD002S23A 0.25HP 230V / 3 Phase
Unit: mm [inches]

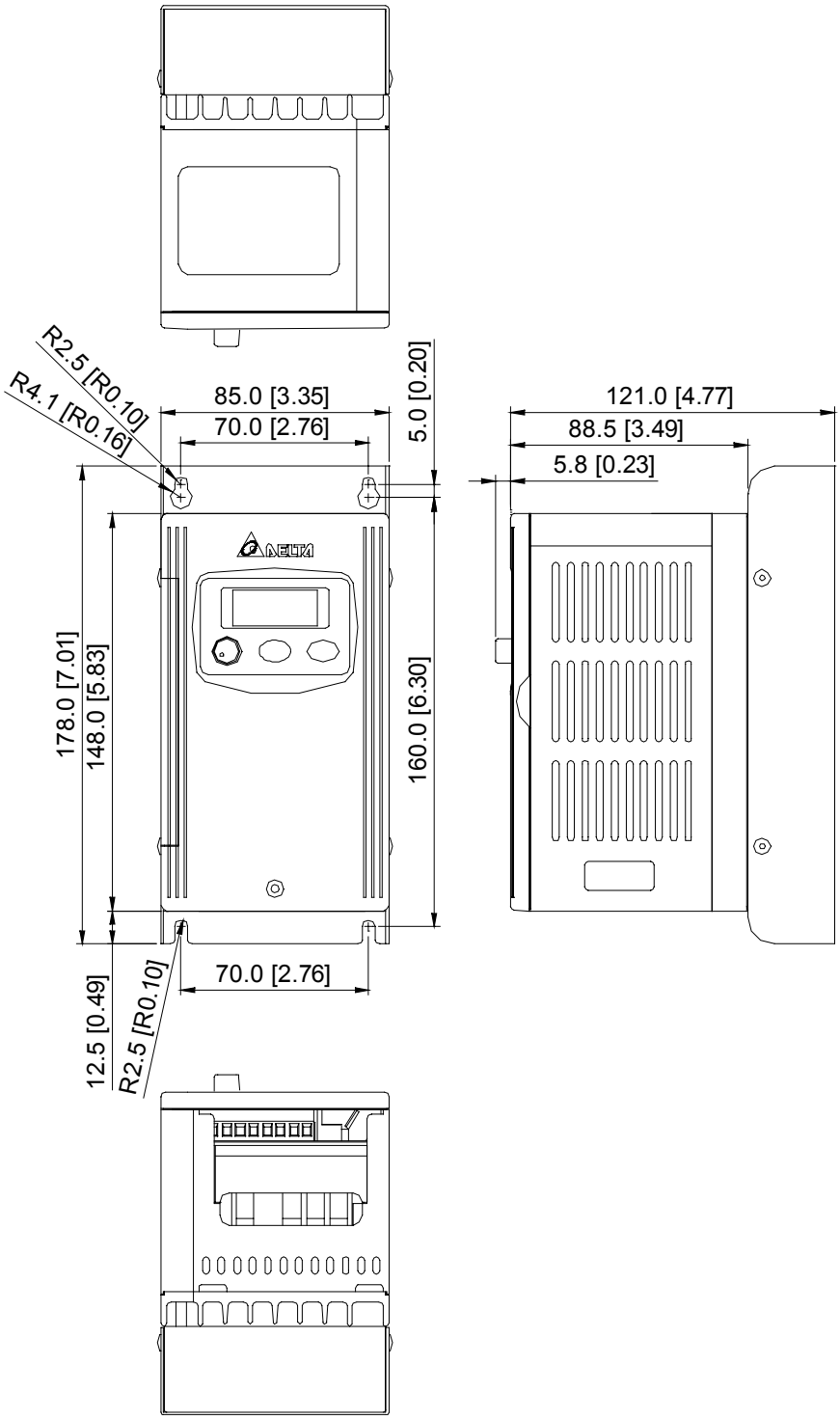


C

VFD002S11B 0.25HP 115V / 1 Phase
VFD002S21B 0.25HP 230V / 1 Phase
VFD002S23B 0.25HP 230V / 3 Phase
Unit: mm [inches]

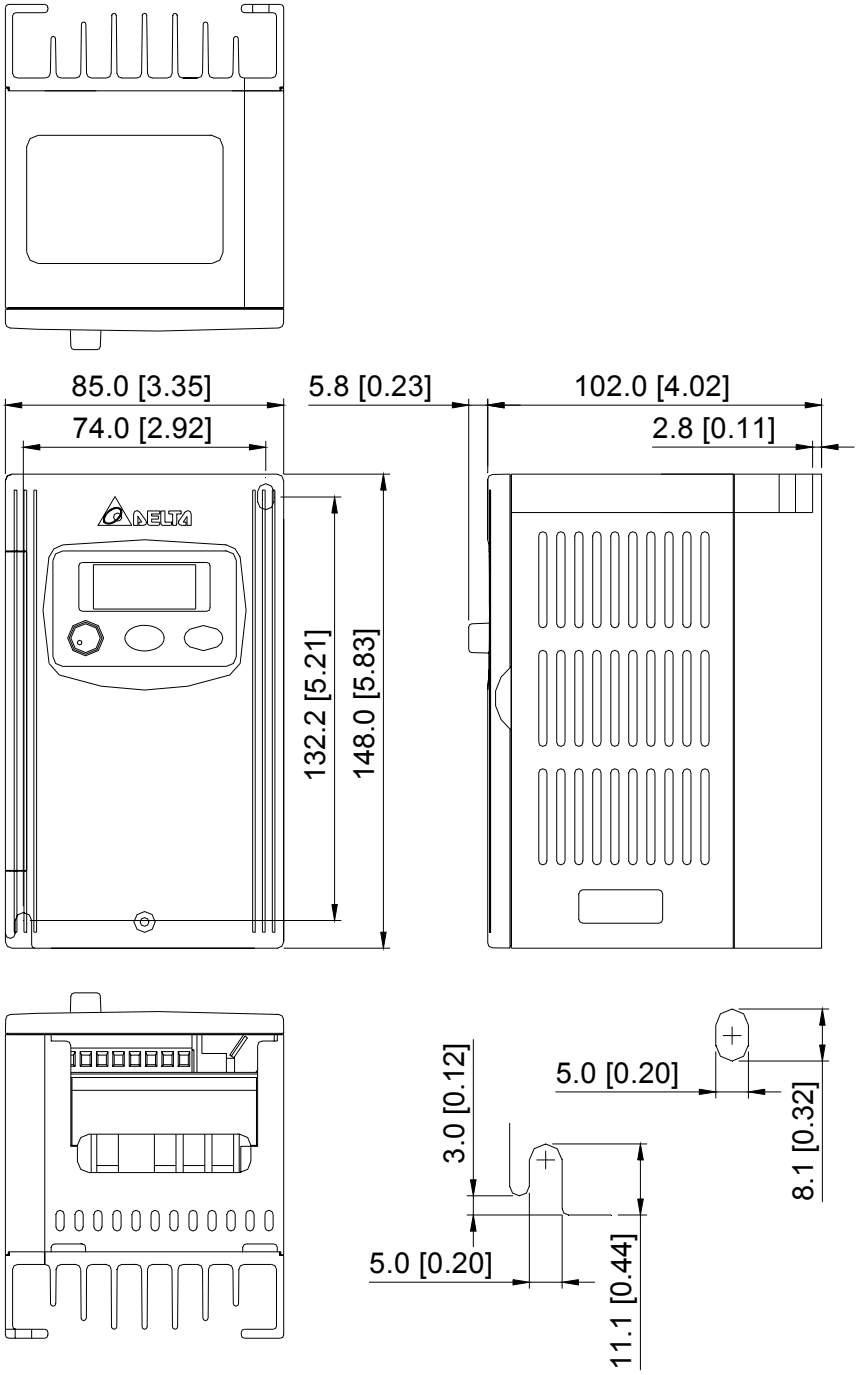


VFD002S21C 0.25HP 230V / 1 Phase



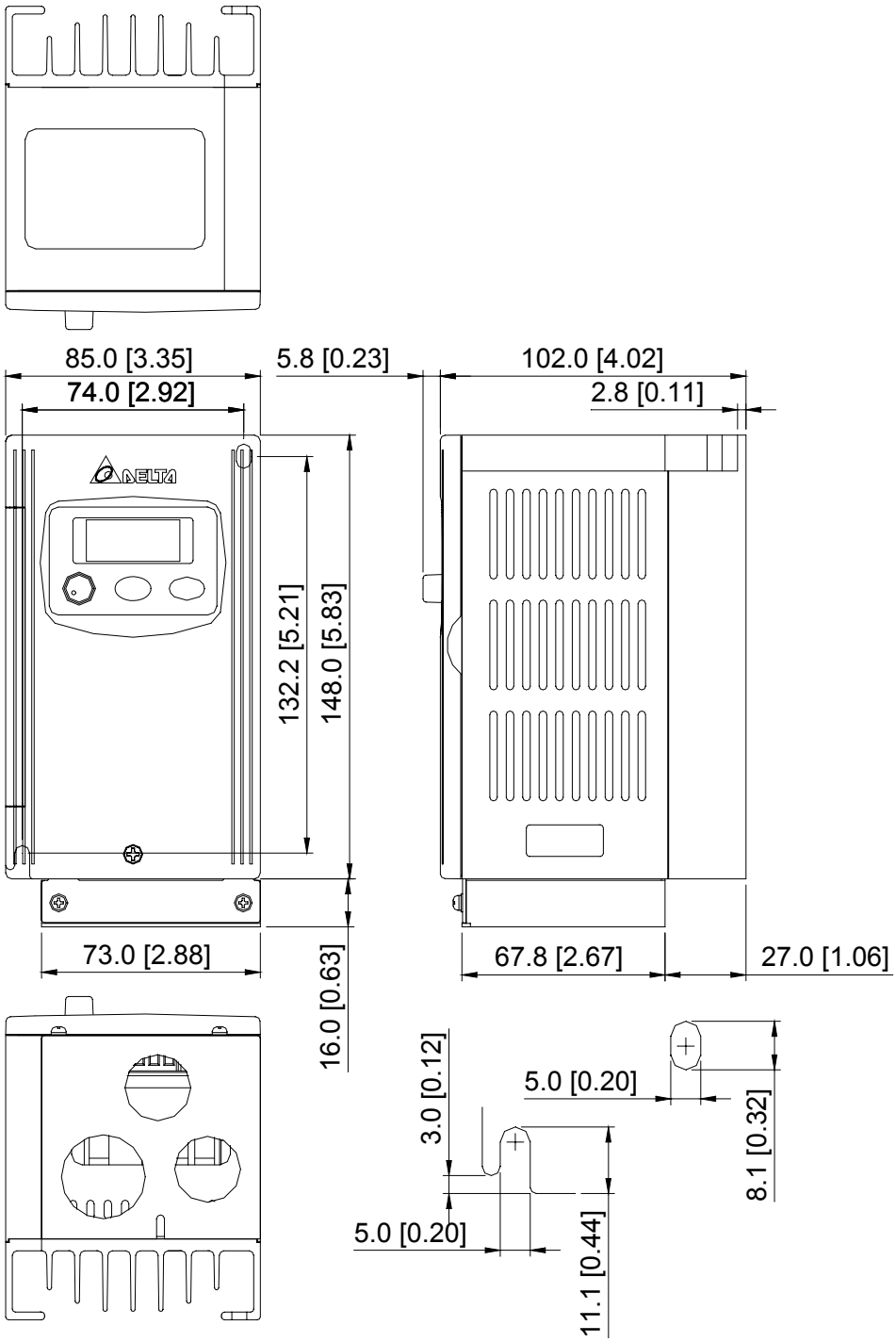
C

VFD004S11A 0.5HP 115V / 1 Phase
VFD004S21A 0.5HP 230V / 1 Phase
VFD004S23A 0.5HP 230V / 3 Phase
VFD004S11A-2 0.5HP 115V / 1 Phase
VFD004S21A-2 0.5HP 230V / 1 Phase
Unit: mm [inches]



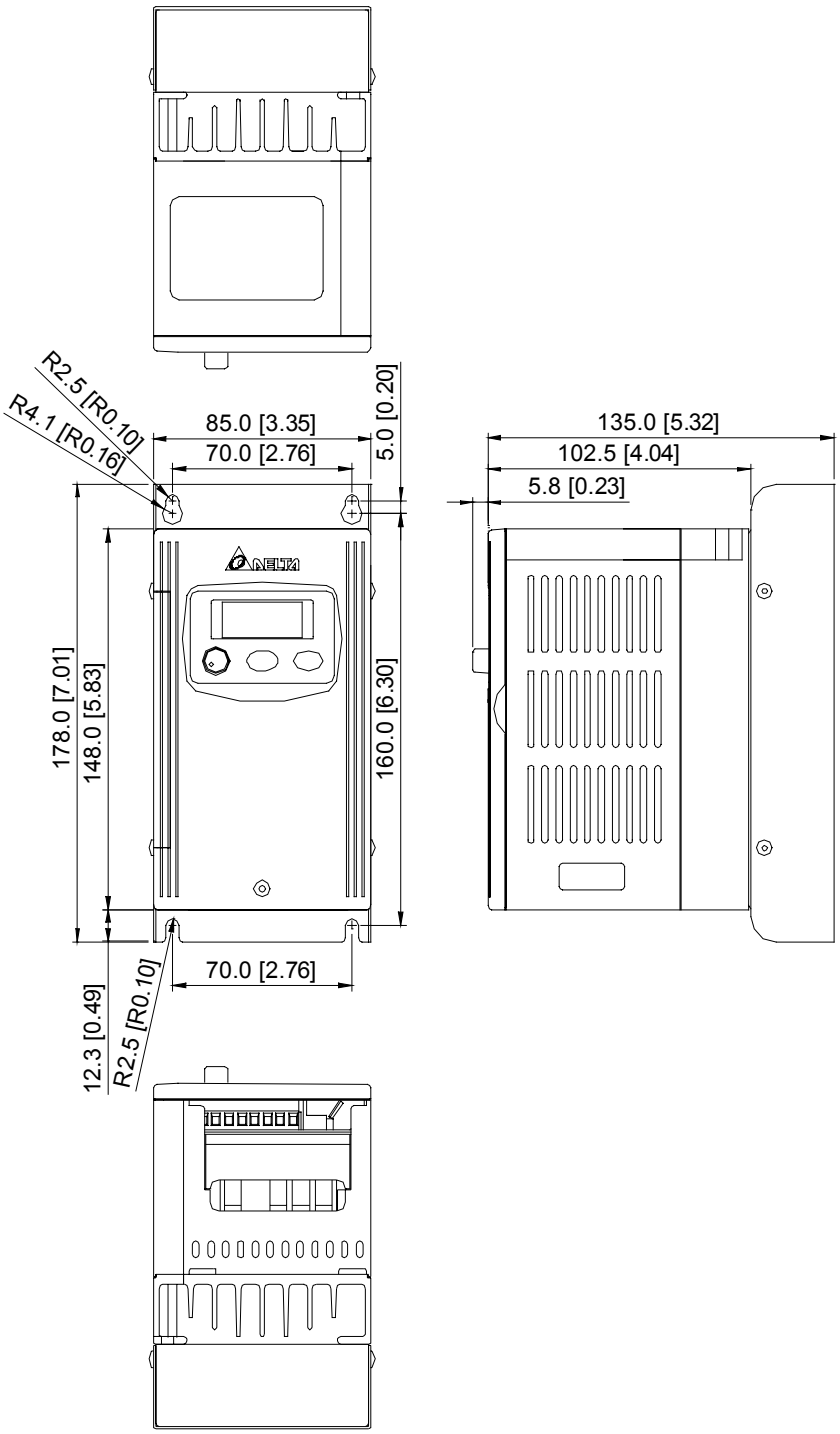
VFD004S11B 0.5HP 115V / 1 Phase
VFD004S21B 0.5HP 230V / 1 Phase
VFD004S23B 0.5HP 230V / 3 Phase

Unit: mm [inches]

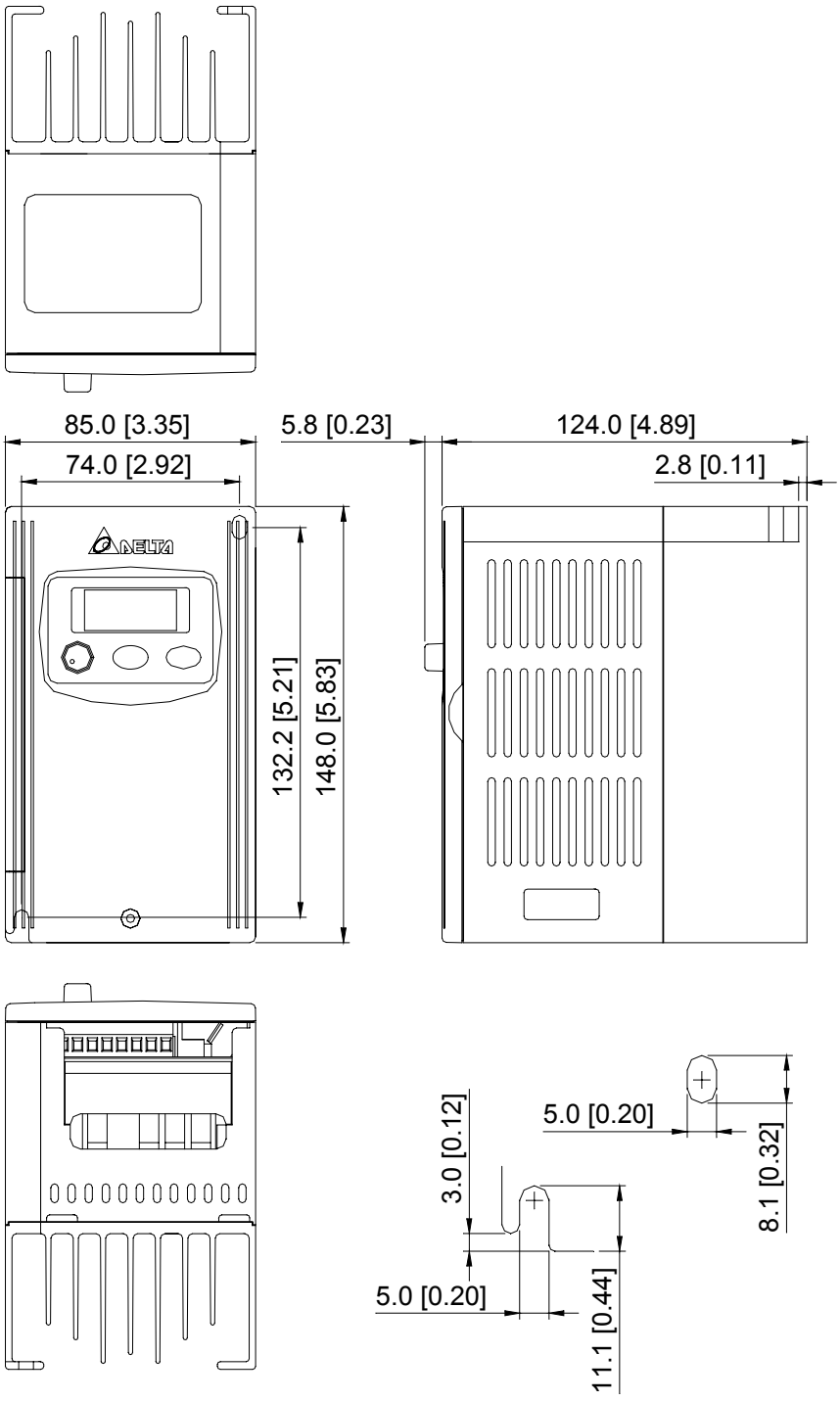


C

VFD004S21C 0.5HP 230V / 1 Phase

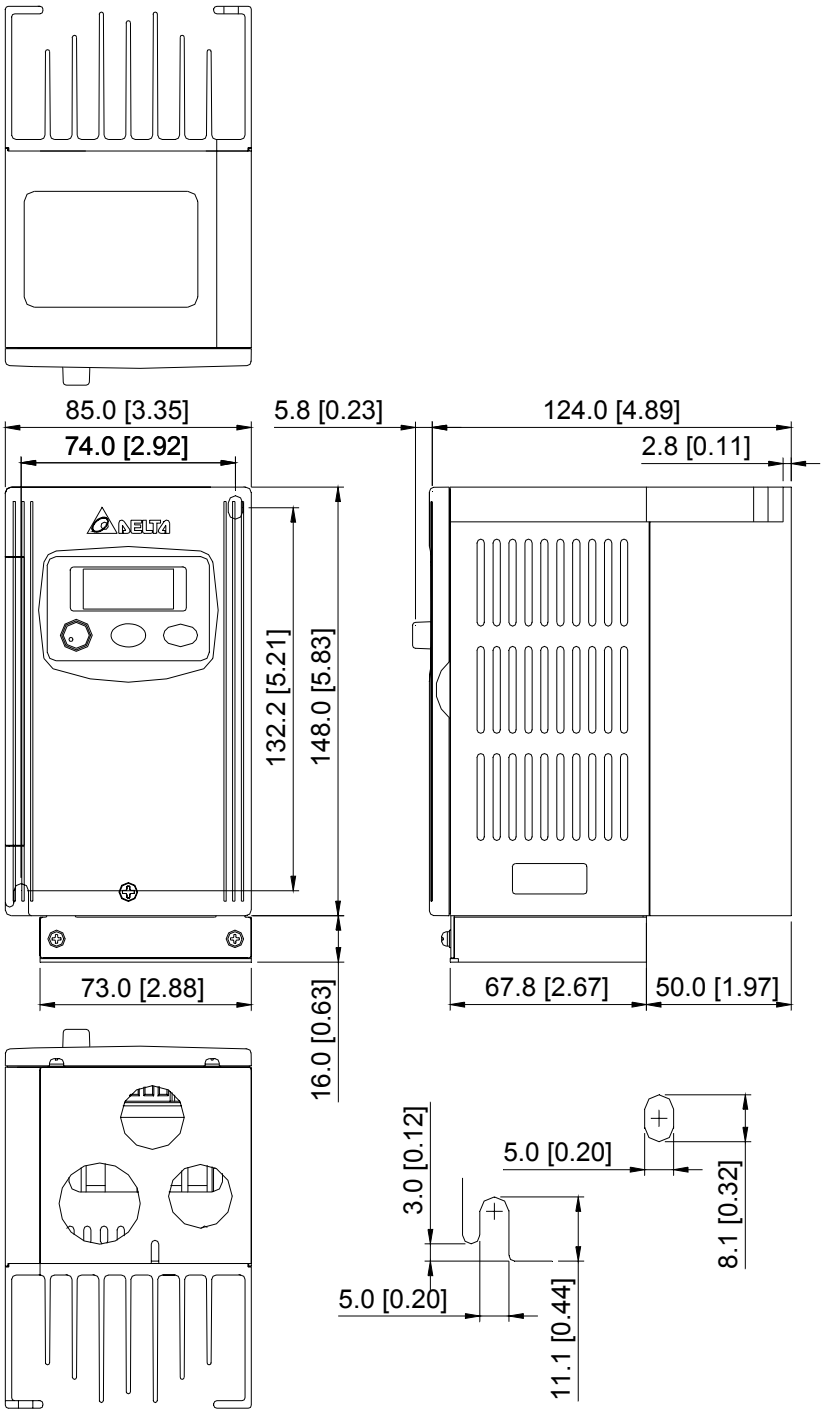


VFD004S43A 0.5HP 460V / 3 Phase
VFD007S21A 1 HP 230V / 1 Phase
VFD007S23A 1 HP 230V / 3 Phase
VFD007S21A-2 1 HP 230V / 1 Phase
VFD007S21A-G 1 HP 230V / 1 Phase
Unit: mm [inches]

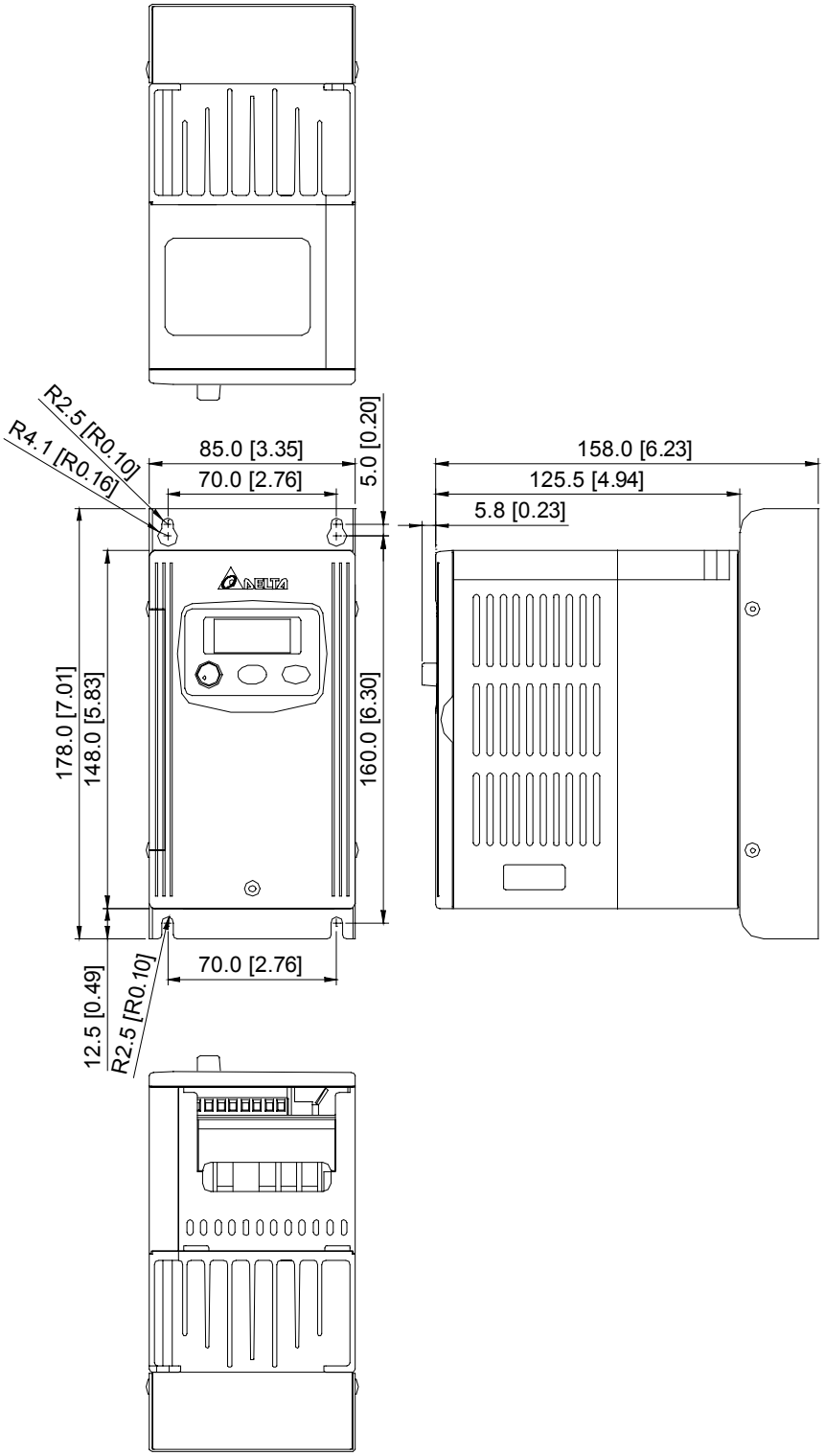


C

VFD004S43B 0.5HP 460V / 3 Phase
VFD007S21B 1 HP 230V / 1 Phase
VFD007S23B 1 HP 230V / 3 Phase
Unit: mm [inches]



VFD007S21C 1 HP 230V / 1 Phase

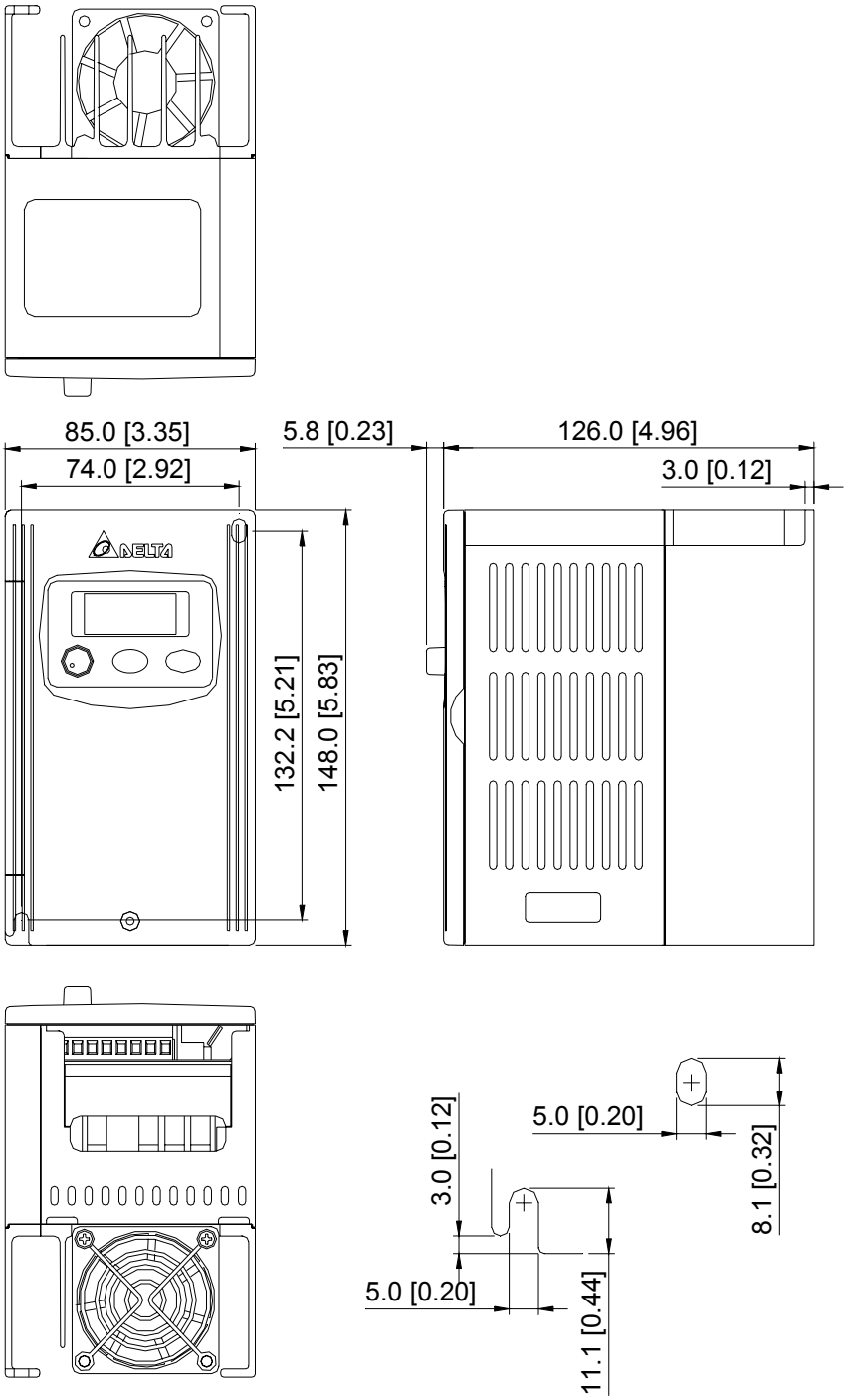


C

VFD007S43A 1 HP 460V / 3 Phase

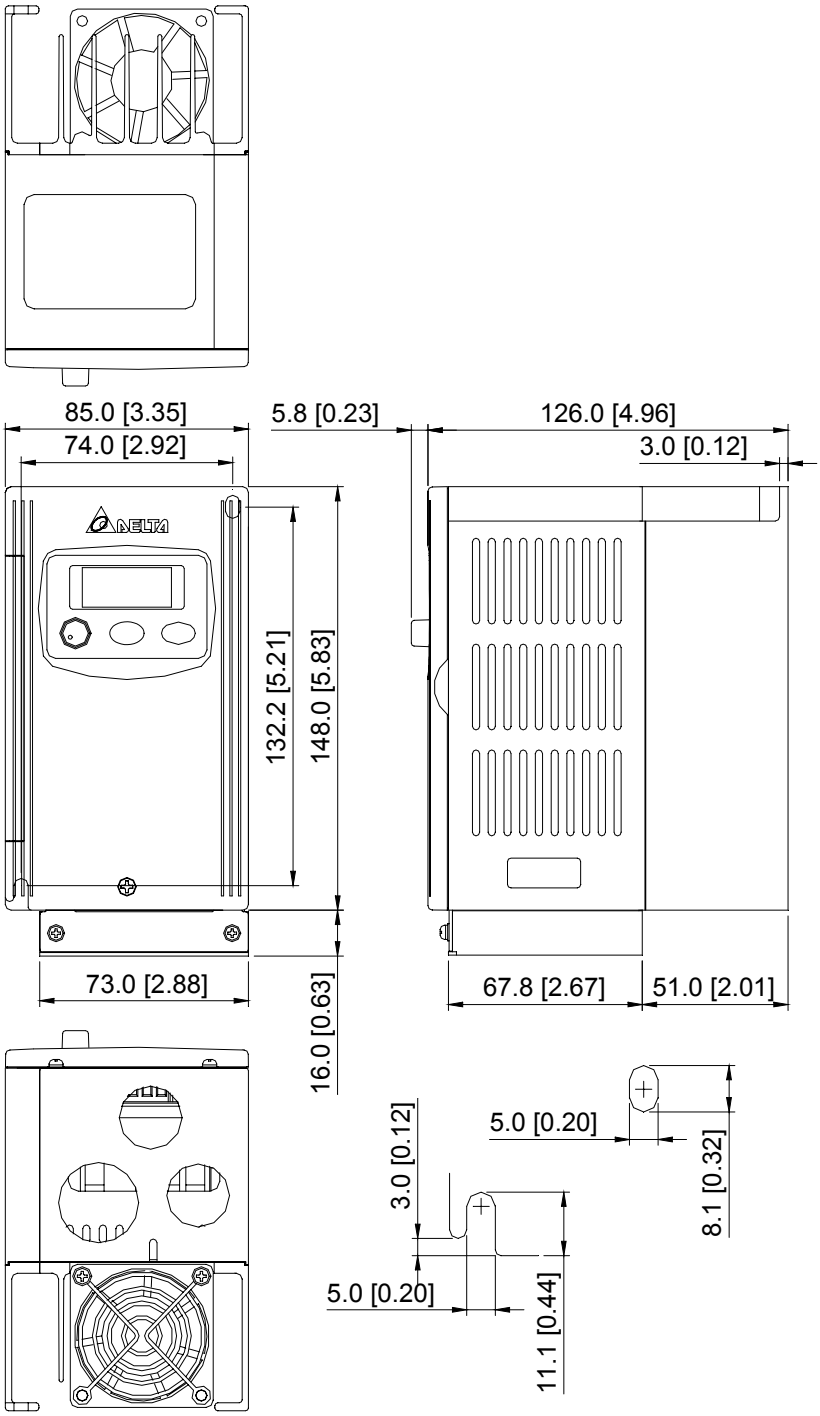
VFD007S43A-G 1 HP 460V / 3 Phase

Unit: mm [inches]



VFD007S43B 1 HP 460V / 3 Phase

Unit: mm [inches]

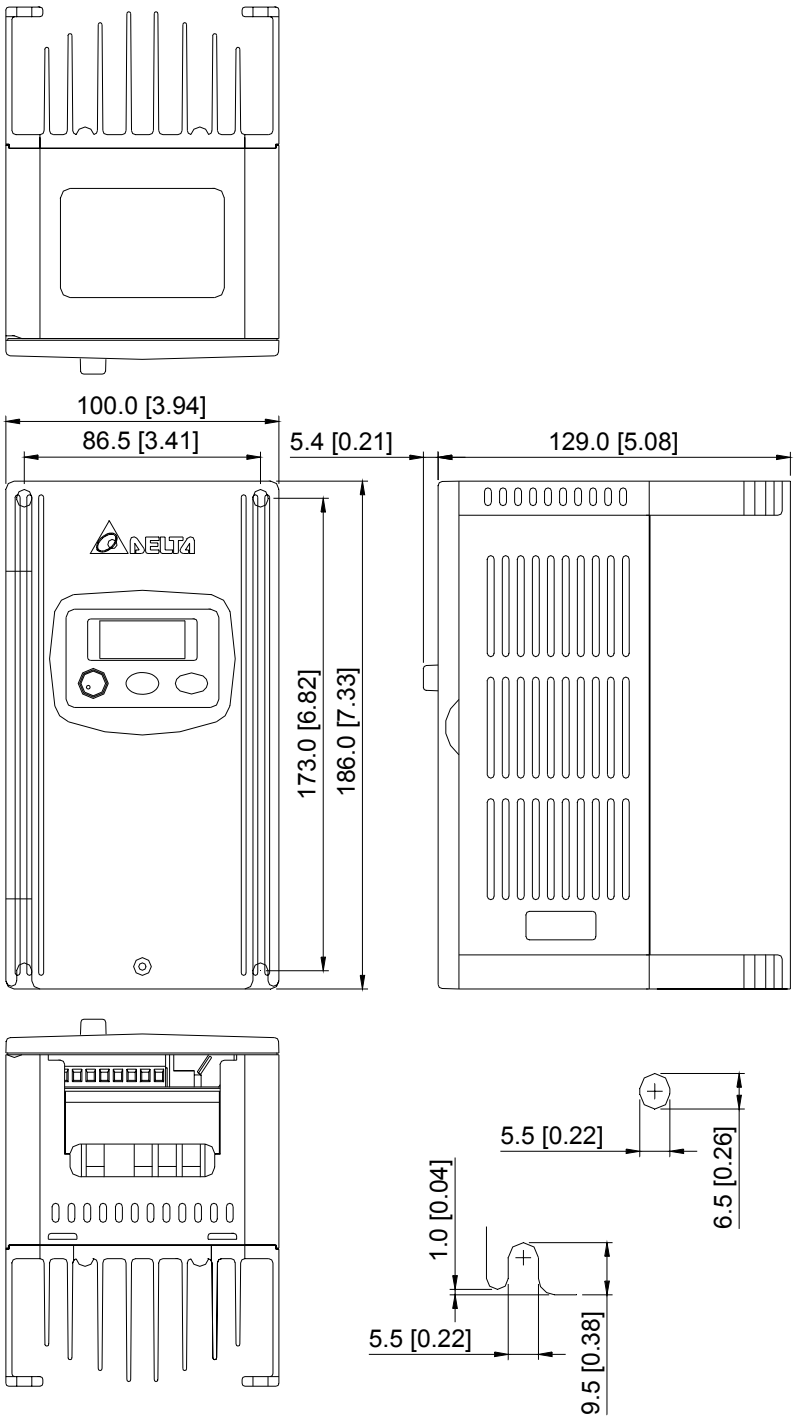


C

VFD007S11A 1 HP 115V / 1 Phase

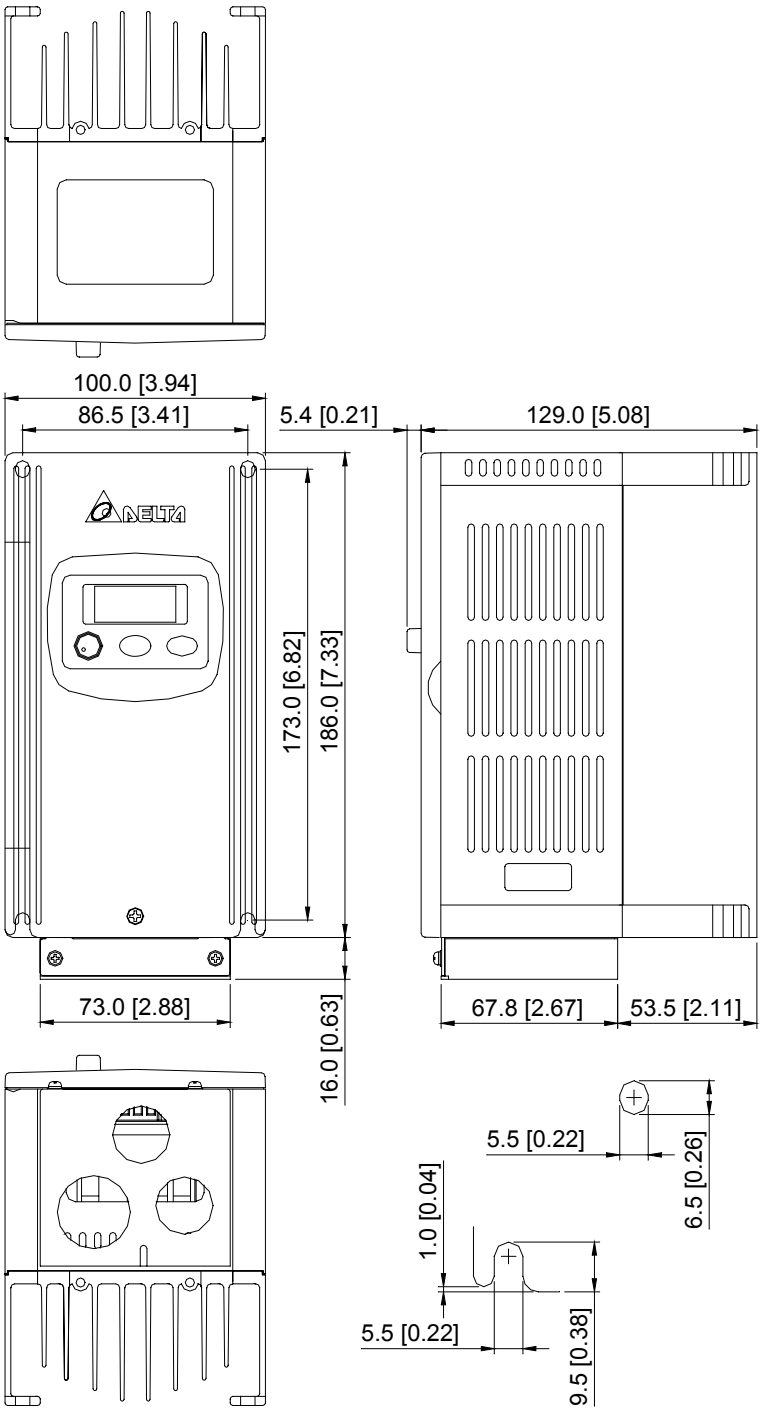
VFD007S11A-2 1 HP 115V / 1 Phase

Unit: mm [inches]



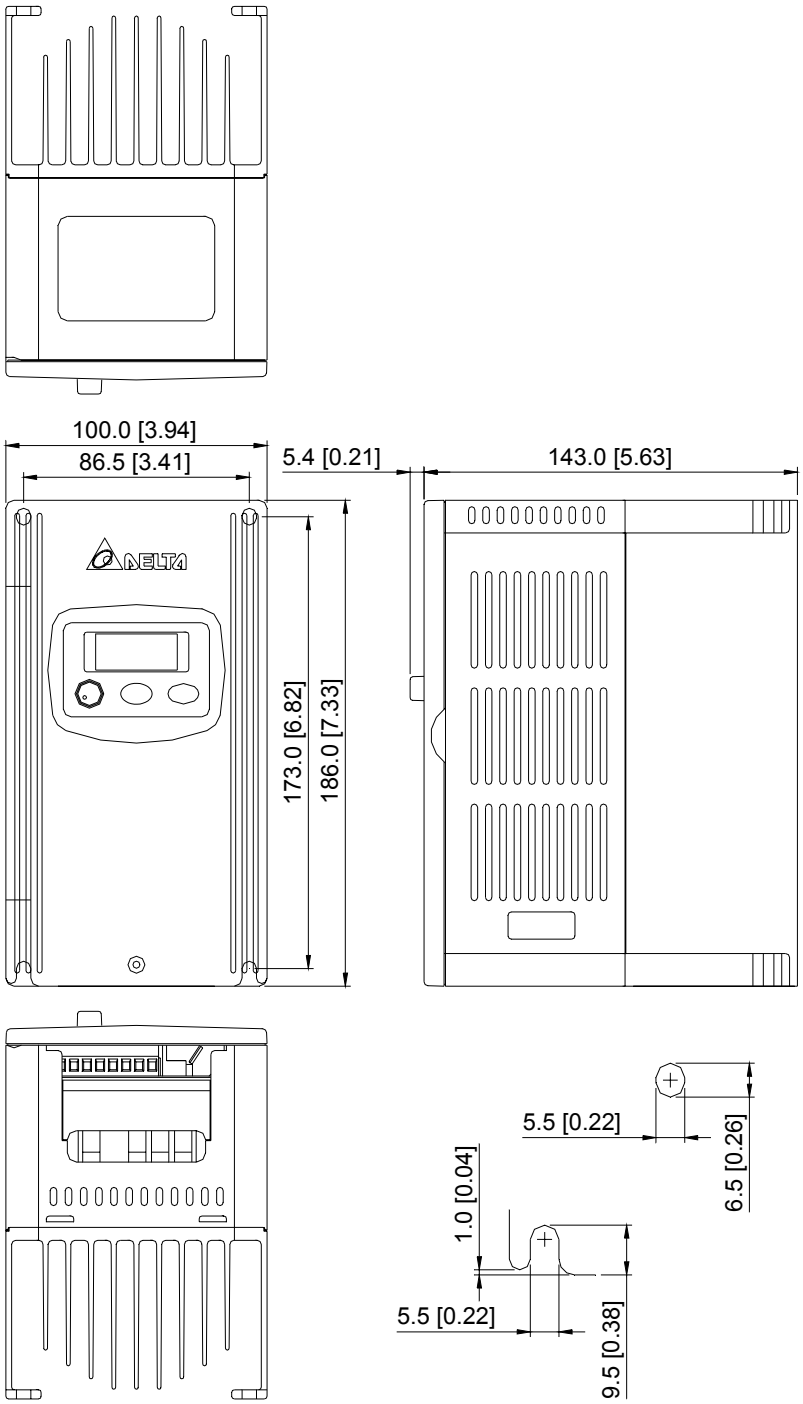
VFD007S11B 1 HP 115V / 1 Phase

Unit: mm [inches]



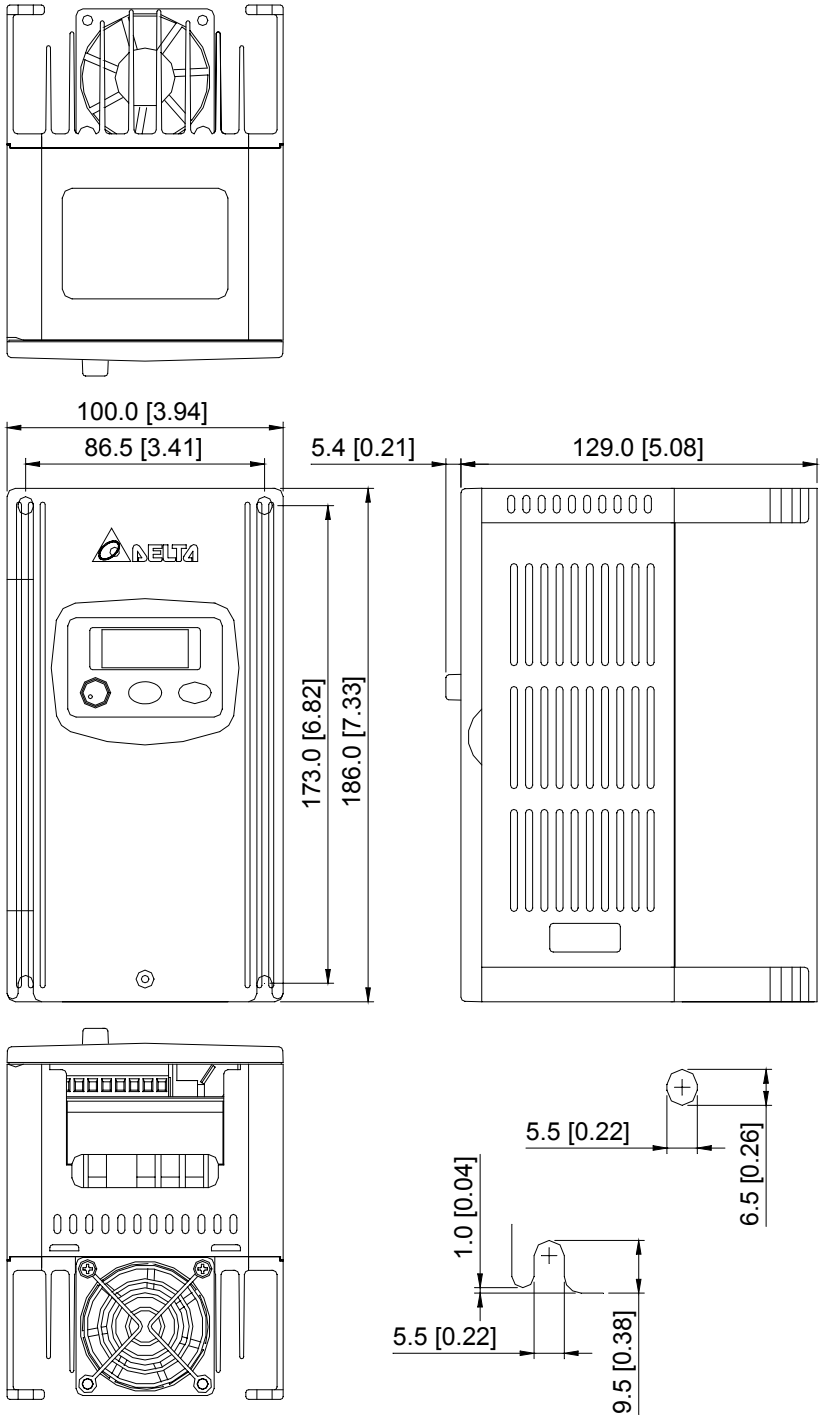
C

VFD015S21A 2 HP 230V / 1 Phase
VFD015S23A 2 HP 230V / 3 Phase
VFD015S21A-2 2 HP 230V / 1 Phase
Unit: mm [inches]



VFD015S43A 2 HP 460V / 3 Phase
VFD022S23A 3 HP 230V / 3 Phase
VFD022S43A 3 HP 460V / 3 Phase

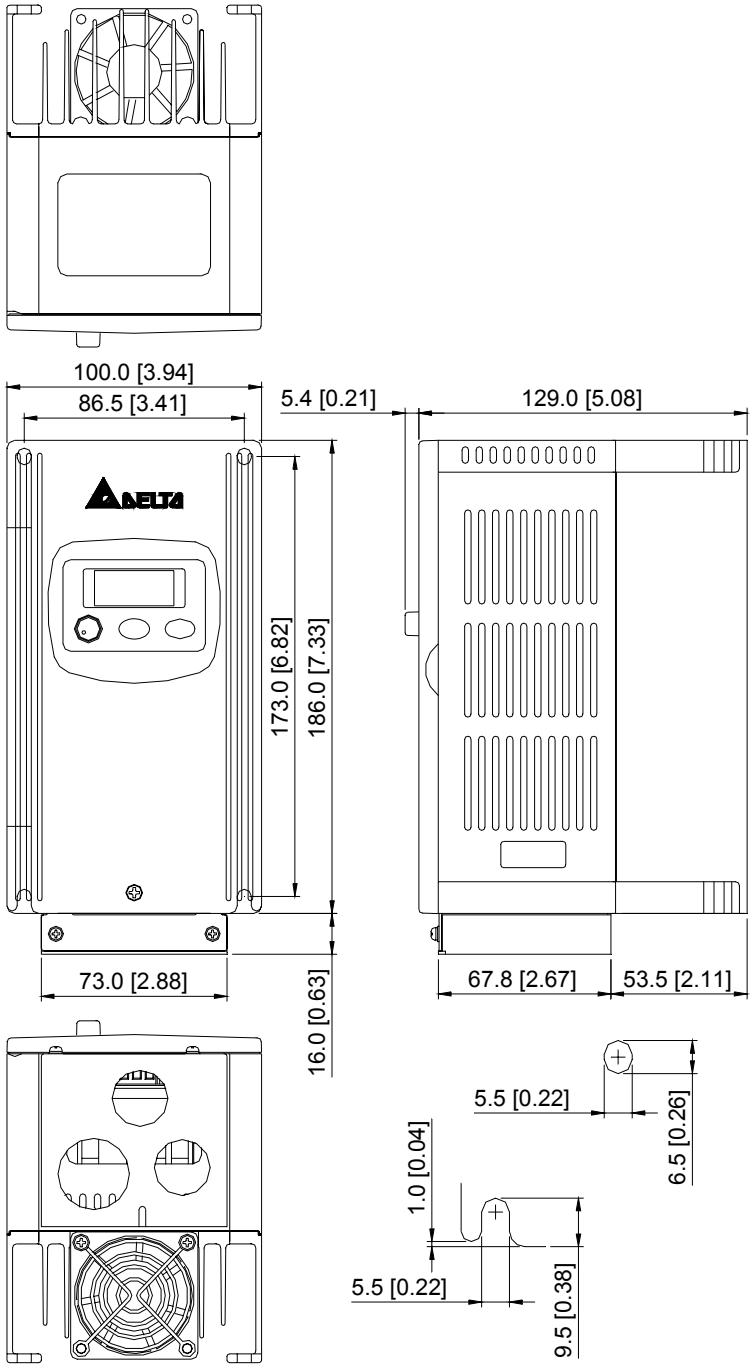
Unit: mm [inches]



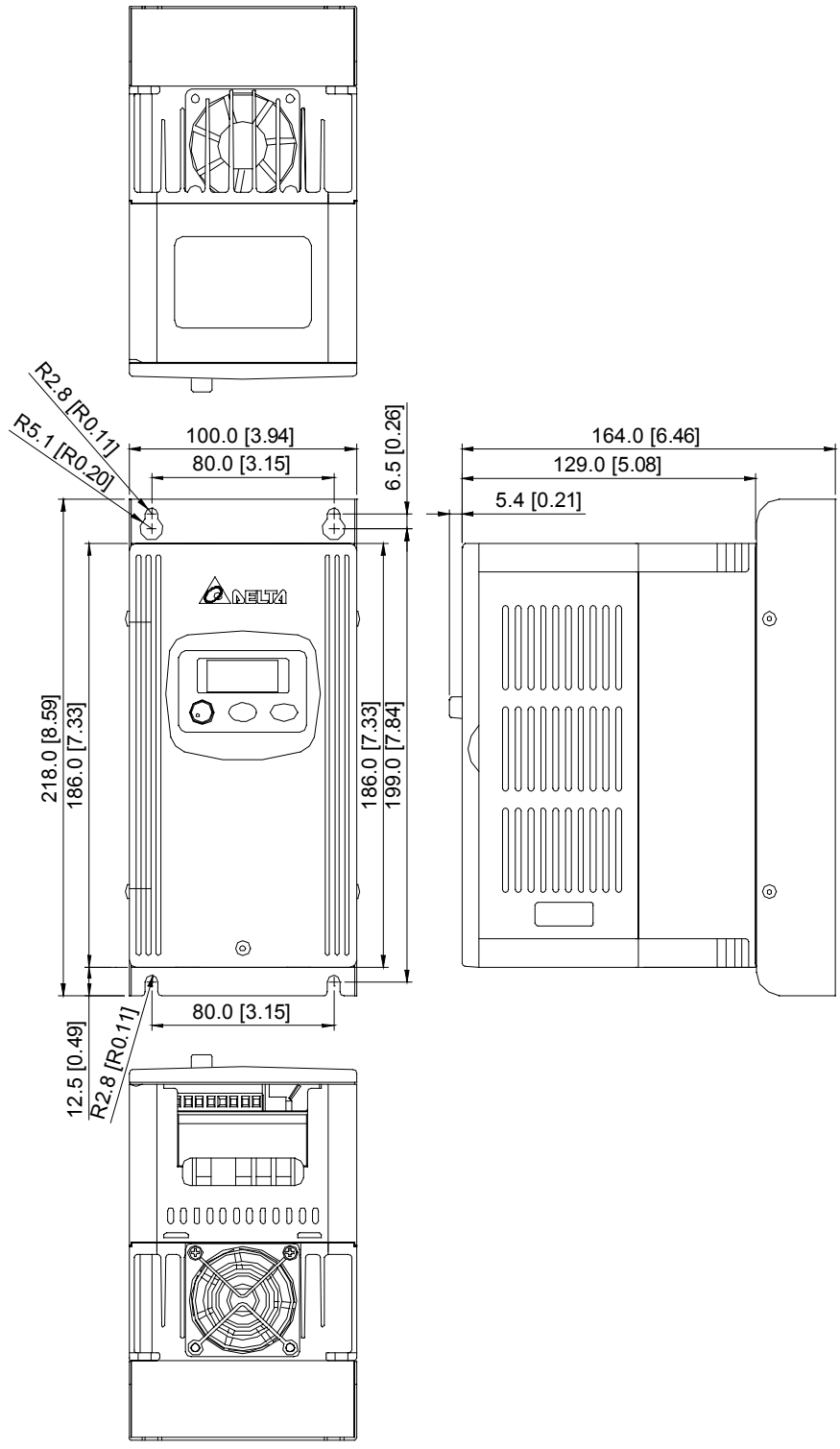
C

VFD015S21B 2 HP 230V / 1 Phase
VFD015S23B 2 HP 230V / 3 Phase
VFD015S43B 2 HP 460V / 3 Phase
VFD022S23B 3 HP 230V / 3 Phase
VFD022S43B 3 HP 460V / 3 Phase

Unit: mm [inches]



VFD015S21C 2 HP 230V / 1 Phase

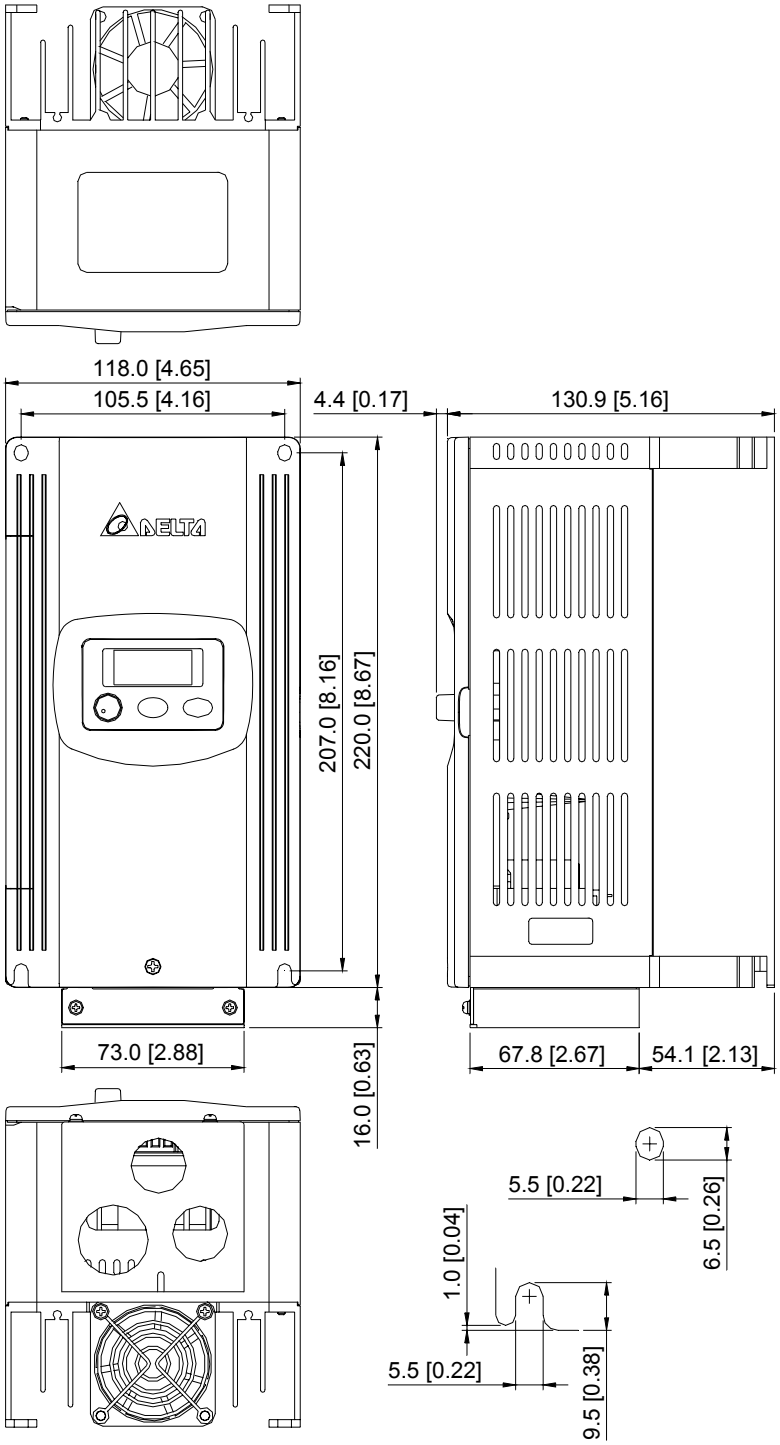


C

VFD022S21A 3 HP 230V / 1 Phase

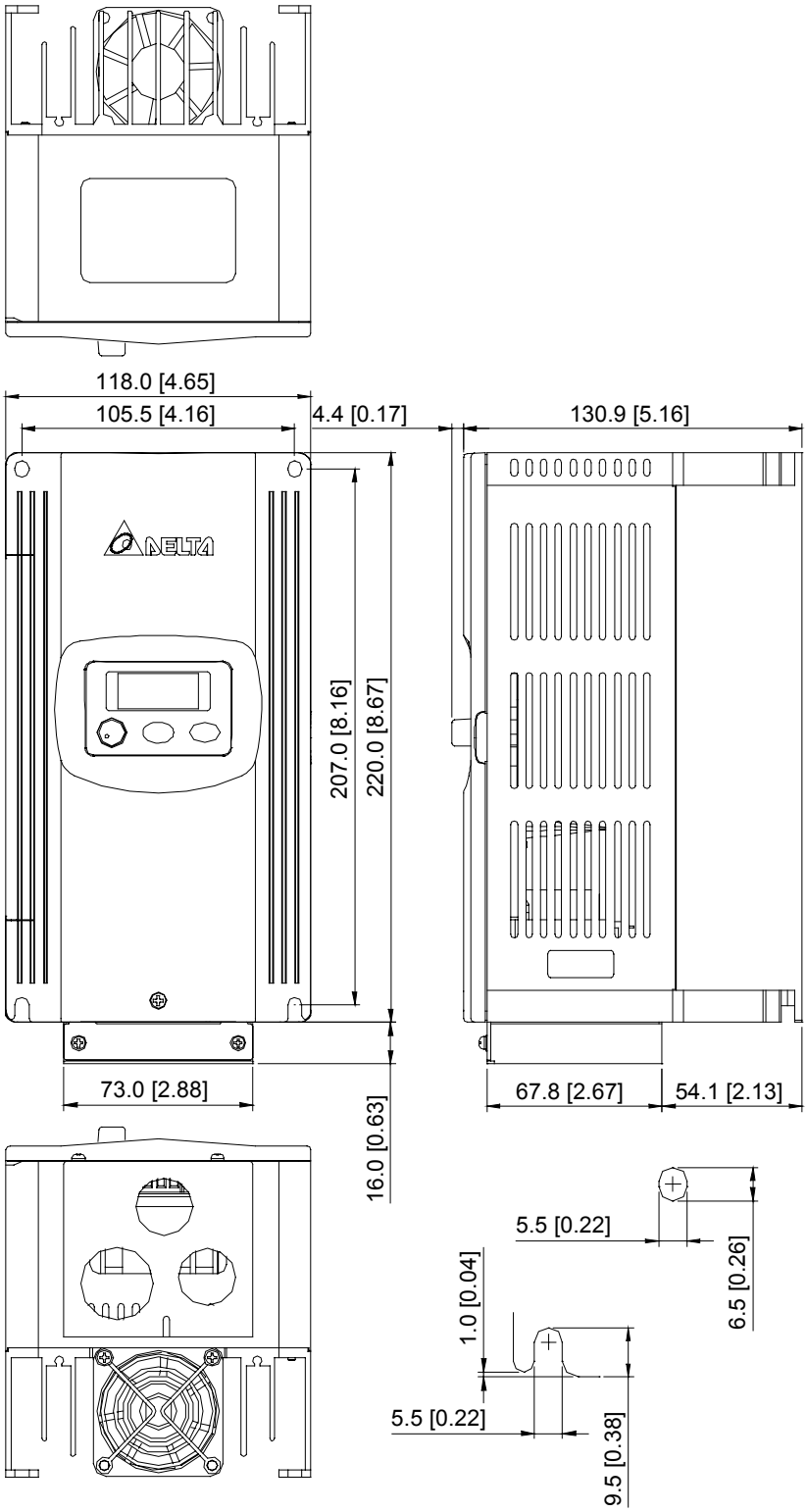
VFD022S21A-2 3 HP 230V / 1 Phase

Unit: mm [inches]



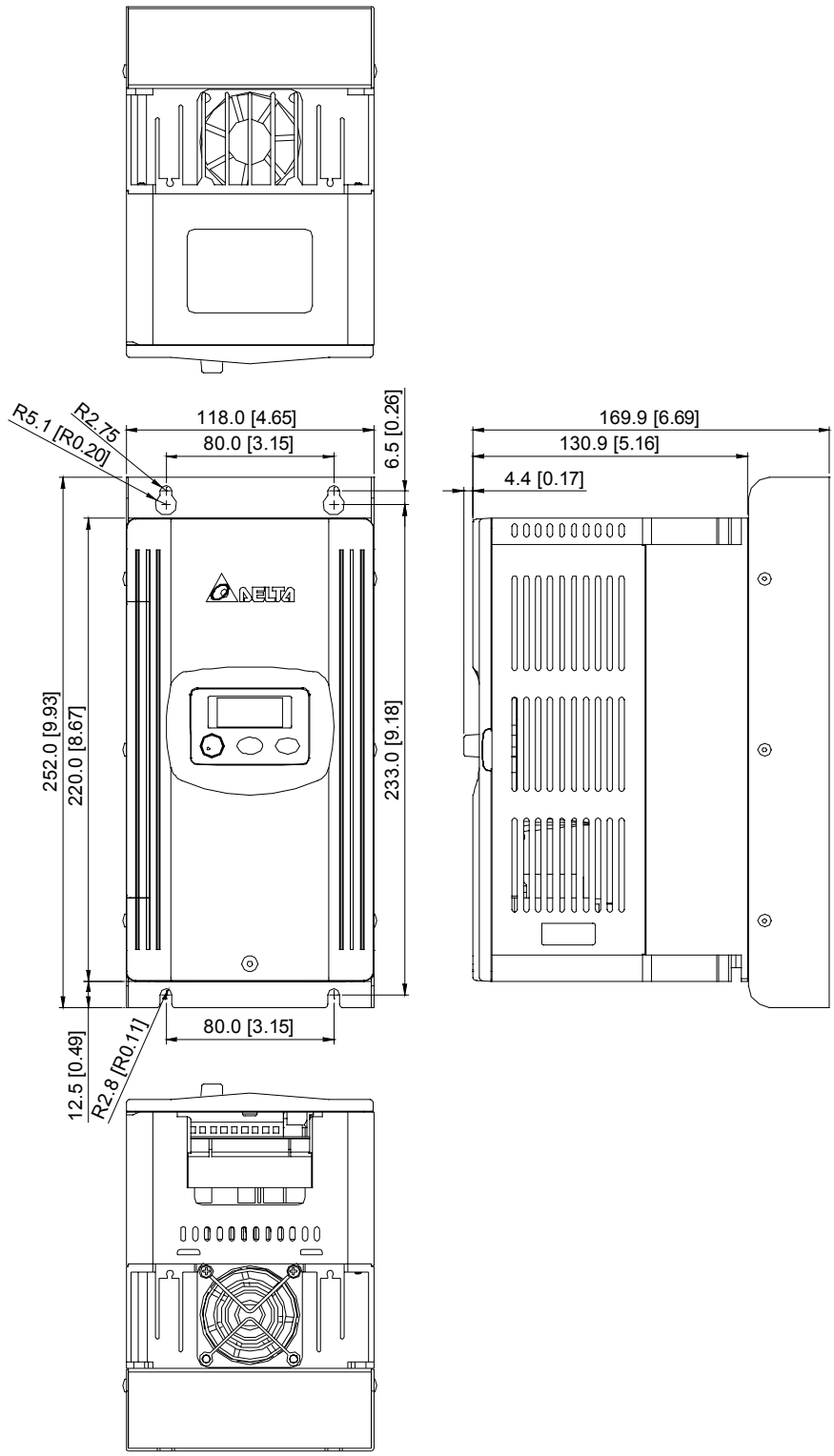
VFD022S21B 3 HP 230V / 1 Phase

Unit: mm [inches]



C

VFD022S21C 2 HP 230V / 1 Phase



DELTA ELECTRONICS, INC.

EC Declaration of Conformity
According to the Low Voltage Directive 73/23/EEC and the Amendment Directive 93/68/EEC

For the following equipment:

AC Motor Drive

(Product Name)

VFD002S11A/B, VFD002S21A/B/C, VFD002S23A/B, VFD004S11A/B, VFD004S21A/B/C, VFD004S23A/B, VFD004S43A/B, VFD007S11A/B, VFD007S21A/B/C, VFD007S23A/B, VFD007S43A/B, VFD015S21A/B/C, VFD015S23A/B, VFD015S43A/B, VFD022S21A/B/C, VFD022S23A/B, VFD022S43A/B

(Model Name)

is herewith confirmed to comply with the requirements set out in the Council Directive 73/23/EEC for electrical equipment used within certain voltage limits and the Amendment Directive 93/68/EEC. For the evaluation of the compliance with this Directive, the following standard was applied:

EN 50178

The following manufacturer/importer is responsible for this declaration:

Delta Electronics, Inc.

(Company Name)

D

DELTA ELECTRONICS, INC.

EC Declaration of Conformity According to the Electromagnetic Compatibility 89/336/EEC and the Amendment Directive 93/68/EEC

For the following equipment:

AC Motor Drive
(Product Name)

VFD002S11A/B, VFD002S21A/B/C, VFD002S23A/B, VFD004S11A/B, VFD004S21A/B/C, VFD004S23A/B, VFD004S43A/B, VFD007S11A/B, VFD007S21A/B/C, VFD007S23A/B, VFD007S43A/B, VFD015S21A/B/C, VFD015S23A/B, VFD015S43A/B, VFD022S21A/B/C, VFD022S23A/B, VFD022S43A/B
(Model Designation)

is herewith confirmed to comply with the requirements set out in the Council Directive 89/336/EEC for electromagnetic compatibility and the Amendment Directive 93/68/EEC. For the evaluation of the compliance with this Directive, the following standard was applied:

EN 61800-3, EN 55011, EN 61000-4-2, EN 61000-4-3, EN 1000-4-4, EN 61000-4-5, EN 61000-4-6, EN 61000-4-8

The following manufacturer/importer is responsible for this declaration:

Delta Electronics, Inc.
(Company Name)