CONTENT

1 RECEIVING

CAUTION
・Do not install or operate any inverter which is damaged or has missing parts. Failure to observe this caution may result in personal injury or equipment damage.

This chapter describes how to verify the inverter after delivery to the user.

1.1 INSPECTIONN CHECKPINTS

(1) Receiving Checkpoints

Checkpoints	Description
Does the inverter model number correspond with the purchase order?	Check the model number on the nameplate on the side of the VFC-1200
Are any parts damaged?	Visually check the exterior and verify that there was no damage during transport.
Is hardware properly seated and securely tightened?	Remove inverter front cover.
Was an instruction manual received?	VFC-1200 instructing manual.

If any of the above checkpoints are not satisfactory, contact your HiTAKE representative.

(2) Checking the Nameplate Data

(a) Nameplate Data

An example for types of 3-phase, A220V、L15HP、11KW 49A）

MODEL ： *VFC-1200-F2011* （AC220V / L15HP）	F2011→ L：220V Level F4011→ H：440V Level
SOURCE ： 3PH AC220V 50/60HZ OUTPUT ： 3PH AC0~230V 11KW 49A SER.NO ：	
www.hitake.com.tw	

2 INSTALLATION

CAUTION
· Lift the cabinet by the base. When moving the unit, never lift by the front cover. Otherwise, the main unit may be dropped causing damage to the unit. · Mount the inverter on nonflammable material (i.e. metal). Failure to observe this caution can result in a fire. · When mounting units in an enclosure, install a fan or other cooling device to keep the intake air temperature below 45℃. Overheating may cause a fire or damage to the unit.

This chapter describes the configuration, location and space when mounting the VFC-1200.

2.1 CHOOSING A LOCATION TO MOUNT THE INVERTER

To ensure proper performance and long operating life, follow the recommendations below when choosing a location for installing the VFC-1200. Make sure the inverter is protected from the following conditions:

1.Extreme cold and heat. Use only within ambient temperature range: -10℃ to +45℃.

2.Rain, moisture. (For enclosed wall-mounted type).

3.Oil sprays, splashes. **4**.Salt spray.

5.Direct sunlight. (Avoid using outdoors.). **6**.Corrosive gases or liquids.

7.Dust or metallic particles in the air. (For enclosed wall-mounted type)

8.Physical shock, vibration.

9.Magnetic noise. (Example: welding machines, power devices, etc.).

10.High humidity.

11.Radioactive materials.

12.Combustibles: thinners, solvents, etc.

2.2 CLEARANCES

Install the VFC-1200 vertically and allow sufficient clearances for effective cooling as shown in

- Front View = 50mm or more*4
- Side view =Air 120mm or more*2

1. The clearances required at top/bottom and both sides are common in open chassis and enclosed wall-mounted.
2. Allowable intake air temperature to the inverter:
   - Open chassis type: -10℃to +45℃
   - Enclosed wall-mounted type: -10℃to +45℃
3. Ensure sufficient space for the sections at the upper and lower parts marked with * in order to permit the flow of intake/exhaust air to/ from the inverter.

3 WIRING

WARNING
· Only commence wiring after verifying that the power supply is turned OFF. Failure to observe this warning can result in an electrical shock or a fire. · Wiring should be performed only by qualified personnel. Failure to observe this warning can result in an electrical shock or a fire. · When wiring the emergency stop circuit, check the wiring thoroughly before operation. Failure to observe this warning can result in personal injury.

CAUTION
· Verify that the inverter rated voltage coincides with the AC power supply voltage. Failure to observe this caution can result in personal injury or a fire. · Do not perform a withstand voltage test of the inverter. It may cause semi-conductor elements to be damaged. · To connect a braking resistor, braking resistor unit or braking unit. Improper connection may cause a fire. · Tighten terminal screws to the specified tightening torque. Failure to observe this caution can result in a fire.

This chapter describes the main circuit wiring and the control circuit wiring of the VFC-1200.

3.1 CONNECTION DIAGRAM

Below is a connection diagram of the main circuit and control circuit. Using the digital operator, the motor can be operated by wiring the main circuit only.

3.2 WIRING THE MAIN CIRCUIT

WARNING
· Make sure to ground the ground terminal. (Ground resistance 220V class: 100 or less, 440V Class: 10 or less) Failure to observe this warning can result in an electrical shock or a fire.

CAUTION
· Never connect the AC main circuit power supply to output terminals U,V and W The inverter will be damaged and invalidate the guarantee.

(1) Wiring Precautions for Main Circuit Input

(a) Installation of Molded-case Circuit Breaker (MCCB)

(b) Installation of Ground Fault Interrupter

When connecting a ground fault interrupter to input terminals (R)L1, (S)L2 and (T)L3, select one that is not affected by high frequency.

(c) Installation of Magnetic Contactor

Inverters can be used without a magnetic contactor(MC) installed at the power supply side. When the main circuit power supply is shut OFF in the sequence, a magnetic contactor(MC)can be used instead of a molded-case circuit breaker (MCCB). However, when a magnetic contactor is switched OFF at the primary side, regenerative braking does not function and the motor coasts to a stop.

- The load can be operated/stopped by opening/closing the magnetic contactor at the primary side. However, frequent switching may cause the inverter to malfunction.
- When using a braking resistor unit, use a sequencer to break power supply side on overload relay trip contact. If the inverter malfunctions, the braking resistor unit may be burned out.

(d) Terminal block Connection Sequence

Input power supply phases can be connected to any terminal regardless of the order of (R)L1, (S)L2 and (T)L3 on the terminal block.

(e) Installation of AC Reactor

When connecting an inverter (220v/440V15kW or less) to a large capacity power supply transformer (600k VA or more), or when switching a phase advancing capacitor, excessive peak current flows in the input power supply circuit, which may damage the converter section. In such cases, install a DC reactor (optional) between inverter 1 and 2 terminals or an AC reactor (optional) on the input side. Installation of a reactor is effective for improvement of power factor on the power supply side.

(f) Installation of Surge Suppressor

For inductive loads (magnetic contactors, magnetic relays, magnetic valves, solenoids, magnetic brakes, etc.) connected near the inverter, use a surge suppressor simultaneously.

(g) Prohibition of Installation of Phase Advancing Capacitor

If a phase advancing capacitor or surge suppressor is connected in order to improve the power factor, it may become overheated and damaged by inverter high harmonic components. Also, the inverter may malfunction because of overcorrect.

(2) Wiring precautions for Main Circuit Output

(a) Connection of Terminal Block and Load

Connect Output terminals U, V and W to motor lead wires U, V and W. Verify that the motor rotates in the forward direction (CCW: counterclockwise when viewed from the motor load side) with the forward run command. If the motor rotation is incorrect, exchange any tow of output terminals U, V and W.

(b) Strict Prohibition of connection of Input Power Supply to Output Terminals

Never touch the output circuit directly or put the output line in contact with the inverter case. Otherwise, it may cause an electrical shock or grounding. In addition, never short circuit the output line.

(c) Strict Prohibition of Short Circuiting or Grounding of Output Circuit

Never touch the output circuit directly or put the output line in contact with the inverter case. Otherwise, it may cause an electrical shock or grounding. In addition, never short circuit the output line.

(d) Prohibition of Connection of Phase Advancing Capacitor or LC/RC Noise Filter

Never connect a phase advancing capacitor or LC/RC noise filter to the output circuit.

(e) Avoidance of installation of magnetic Starter

Do not connect a magnetic starter or magnetic contactor to the output circuit. If the load is connected while the inverter is running, the inverter over current protective circuit operates because of inrush current.

(f) Installation of Thermal Overload Relay

An electronic overload protective function is incorporated into the inverter. However, connect a thermal overload relay when driving several motors with one inverter or when using a multi-pole motor. When using a thermal overload relay, set inverter constant P1-01 to 0. Additionally, for thermal overload relay, at 50Hz set the same rated current value as that described on the motor nameplate, or at 60Hz 1.1 times larger than the rated current value described on the motor nameplate.

(g) Wiring Distance between Inverter and Motor

If the total wiring distance between inverter and motor is excessively long and the inverter carrier frequency (main transistor switching frequency) is high, harmonic leakage current from the cable with adversely to affect the inverter and peripheral devices.

If the wiring distance between inverter and motor is long, reduce the inverter carrier frequency as described below. Carrier frequency can be set by constant 36-01.

Table 2 Wiring Distance between Inverter and Motor

Wiring distance between Inverter and Motor	Up to 50m	Up to 100m	More than 100m
Carrier Frequency (Set value of constant 36-01)	15kHz or less (15.0)	10kHz or less (10.0)	5kHz or less (5.0)

(3) Grounding

- Ground resistance

  220V class: 100Ω or less, 440V class: 10Ω or less.
- Never ground VFC-1200 in common with welding machines, motors, or other large-current electrical equipment. Run all the ground wires in a conduit separate from wires for large-current electrical equipment.

3.3 WIRING THE CONTROL CIRCUIT

The following table outlines the functions of the control circuit terminals.
Wire according to each terminal function.

(1) Functions of Control Circuit Terminals

Classifi-cation	Terminal	Signal Function	Description		Signal Level
Sequence input Signal	FWD	Forward run/stop	Forward run when closed, stop when open		Photo-coupler insulation input : +24VDC 8mA
	REV	Reverse run/stop	Reverse run when closed, stop when open		
	EF	External fault input	Fault when closed, normal state when open	Multi-function contact inputs (T1-01 to T1-06)	
	RST	Fault reset input	Reset when closed		
	MS1	Master/Auxiliary change (Multi-step speed reference 1)	Auxiliary frequency reference when closed		
	MS2	Multi-step speed reference 2	Effective when closed		
	JOG	Jog reference	Jog run when close		
	BX	External baseblock	Inv. Output stop when closed		
	CM	Sequence control input common terminal	-		
Analog Input Signal	+15	+15V power supply output	For analog command +15 V power supply		+15 V (Allowable current 20mA max.)
	-15	-15V Power supply output	For analog command -15 V power supply		-15 V (Allowable current 20mA max.)
	FIV	Master frequency reference	-10 to +10V/100% to +100% 0to +10V/100%		-10 to +10V (20kΩ) 0to +10V (20kΩ)
	FIC		4 to 20mA/100%		4 to 20mA (250Ω)
	MFI	Multi-function analog input	-10 to +10V/-100%to 100% 0 to +10V/100%	Auxiliary analog input (T3-05)	-10 to +10V (20kΩ), 0to +10V/ (20kΩ)
	0V	Common terminal for control circuit	0V		-
	E	Connection to shield sheath of signal lead	--		--
Sequence Output Signal	RA	During running (NO contact)	Closed when running	Multi-function contact output	Dry contact Contact capacity: 250VAC 5A or less 30VDC 5A or less
	RC				
	Y1	Zero speed detection	Makes at min. freq. (51-09) or less		Open collector output 48V 50mA or less
	Y2	Speed agree detection	Makes when the freq reaches to±1Hz fo set freq.		
	YC	Open collector output common			-
	EA	Fault contact output (NO/NC contact)	Fault when closed between terminals 18 and 20 Fault when open between terminals 19 and 20		Dry contact Contact capacity: 250 VAC 5A or less 30 VDC 5A or less
	EB				
	EC				
Analog Output Signal	MV+	Frequency meter output	0 to +10V/100% freq.	Multi-function analog monitor 1 (T4 –01, T4-02)	0 to ± 10V Max. ±5% 2mA or less
	MOC	Common			
	MA+	Current monitor	5V/inverter rated current	Multi-function analog monitor 2 (T4-04, T4-05)	

3.4 WIRING INSPECTION

After completing of installation and wiring, check for the following items. Never use control circuit buzzer check.

- Wiring is proper.
- Wire clippings or screws are not left in the unit.
- Screws are securely tightened.
- Bare wire in the terminal does not contact other terminals.

4 OPERATION

WARNING
❙ Only turn ON the input power supply after replacing the front cover. Do not remove the cover while current is flowing. Failure to observe this warning can result in an electrical shock. ❙ When the retry function (P5-02) is selected, do not approach the inverter or the load, since it may restart suddenly after being stopped. (Construct machine system, so as to assure safety for personnel, even if the inverter should restart.) Failure to observe this warning can result in personal injury. ❙ Since the stop button can be disabled by a function setting, install a separate emergency stop switch. Failure to observe this warning can result in personal injury. ❙ If an alarm is reset with the operation signal ON, the inverter restarts automatically. Only reset the alarm after verifying that the operation signal is OFF. Failure to observe this warning can result in personal injury.

CAUTION
❙ Never touch the heat sink or discharging resistor since the temperature is very high. Failure to observe this caution can result in harmful burns to the body. ❙ Since it is easy to change operation speed from low to high speed, verify the safe working range of the motor and machine before operation. Failure to observe this caution can result in personal injury and machine damage. ❙ Install a holding brake separately if necessary. Failure to observe this caution can result in personal injury. ❙ Do not change signals during operation. The machine or the inverter may be damaged. ❙ All the constants of the inverter have been preset at the factory. Do not change the settings unnecessarily. The inverter may be damaged. For supply voltage, follow Par. 4.3.

This chapter describes the basic operation procedures of the VFC-1200 .

4.1 OPERATION MODE SELECTION

The VFC-1200 has two operation modes, PANEL and REMOTE, as described below. These two modes can be selected by the digital operator “PANEL /REMOTE” key only while the operation is stopped. The selected operation mode can be verified by observing the digital operator SEQ and REF LEDs as shown below. The operation mode is set to REMOTE (run by control circuit terminals FIV and FIC frequency reference and run command from a control circuit terminals FIC and +15 frequency reference and run command from a control circuit terminal) prior to shipment. Multi-function contact inputs from control circuit terminals EF to BX are enabled in both operation modes PANEL / REMOTE.

- PANEL: Both frequency reference and run command are set by the digital operator. SEQ and REF LEDs go OFF.
- REMOTE: Master frequency reference and run command can be selected as described below.

Constant No.	Digital Operator Display	Name	Remarks
21-01	REFERENCE SOURCE	Reference selection	0: Master frequency reference from operator (41-01) (Operator REF LED is OFF. 1: Master frequency reference from control circuit terminals FIV and FIC (operator REF LED is ON) 2: Master frequency reference set by transmission (operator REF LED blinks.) 3: Master frequency reference set by operation (Operator REF LED blinks.)
21-02	RUN SOURCE	Operation method selection	0: master frequency reference from operator (41-01)(operator REF LED is OFF.) 1: Master frequency reference from control circuit terminals FIV and FIC (Operator REF LED is ON.) 2: Master frequency reference set by transmission (Operator REF LED blinks.) 3: Master frequency reference set by option Operator REF LED blinks.)

4.2 TEST RUN CHECKPOINTS

To assure safety, prior to initial operation, disconnect the machine coupling so that the motor is isolated from the machine. If initial operation must be performed while the motor is still coupled to the machine, use great care to avoid potentially hazardous conditions. Check the following items before a test run.

- Wiring and terminal connections are correct.
- No short circuit caused by wire clippings.
- Screw-type terminals are securely tightened.
- Motor is securely mounted.
- All items are correctly earthed (grounded).

4.3 TEST RUN

(1) Digital operator Display at Power-up

When the system is ready for operation, turn ON the power supply. Verify that the inverter power up properly. If any problems are found, turn OFF the power supply immediately. The digital operator display illuminates as shown below when turning the power supply ON.

(2) Operation check Points

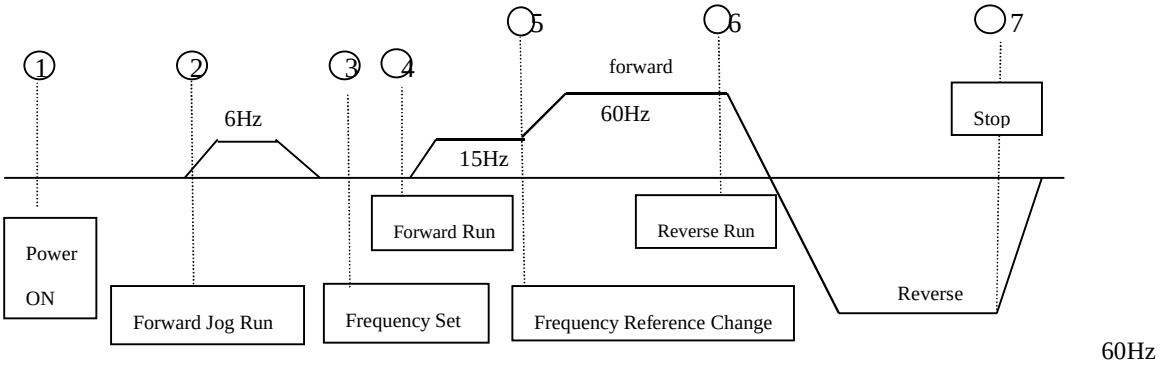
Check the following items during operation.

- Motor rotates smoothly.
- Motor rotates in the correct direction.
- Motor does not have abnormal vibration or noise.
- Acceleration and deceleration are smooth.
- Current matches the load flow.
- Status indicator LEDs and digital operator display are correct.

(3) Example of Basic Operation

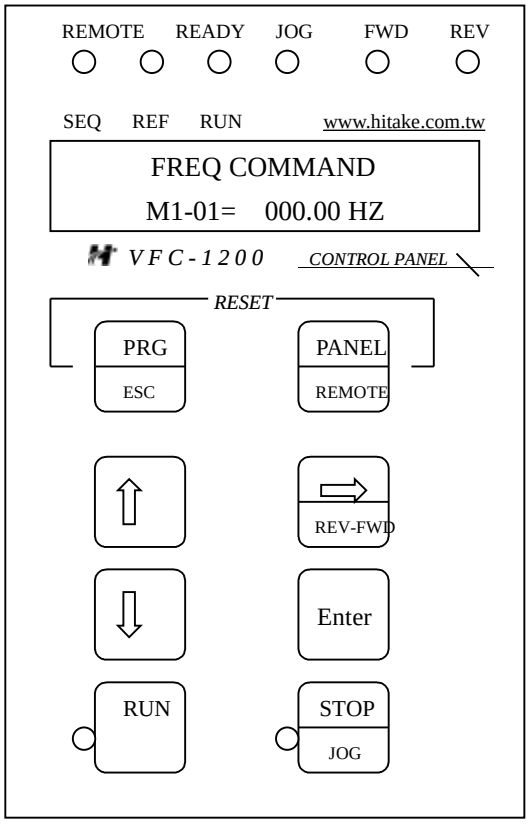
Operation by digital Operator

The diagram below shows a typical operation pattern using the digital operator .



5 SETING OPERATION CONDITIONS

5.1 DIGITAL OPERATOR KEY DESCRIPTION

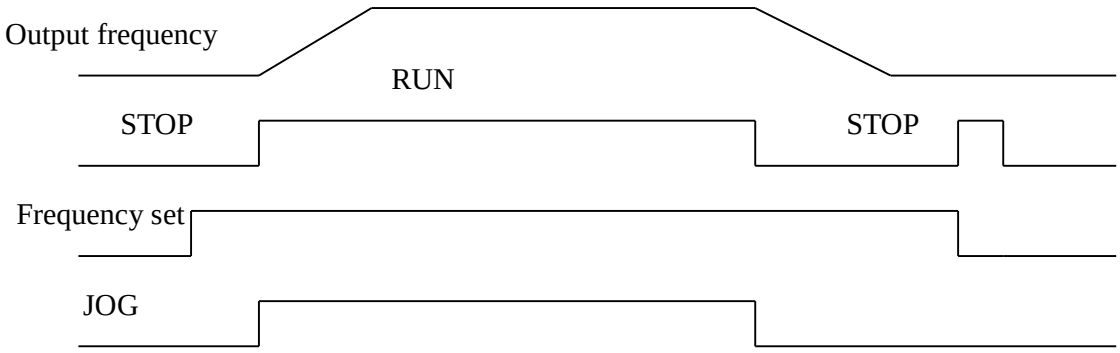


← PANEL， FWD、REV ON。
REMOTE，，SEQ、REF ON。

← Dispiay Section： Frequency reference corresponding to anaiog reference value

← Execute operations such as setting user constants monitoring，jog，autotuning。

Operation lndicator LED：RUN，STOP，JOG。



RUN	*Not Lit*	*Lit*	*Blinking*	*Not Lit*	*Lit*
STOP	*Lit*	*Not Lit*	*Lit*	*Lit*	*Blinking*
JOG	*Not Lit*	*Lit*	*Not Lit*	*Not Lit*	*Not Lit*

5.2 DIGITAL OPERATOR COMPONENT NAMES AND FUNCTIONS

OPERATOR KEY	NAME	FUNCTION
PRG ESC	PRG=Prgram key。 ESC=Escape key。	**PRG：Prgram key** PUSE、PRG，2sec. * HITAKE MENU * displays the menu for mode selection.。 **ESC：Escape key** PUSE Escape, Returns to the status entered before ENTER key was depressed. 。
PANEL REMOTE	PANEL/REMOTE	**Operation Mode Selection key** **PANEL** ：Operator Key，FWD、REV Lit **REMOTE** ：Terminais，SEQ、REF Lit **FUNCTION**：PUSE PANEL<->REMOTE。 The operation mode is alternated between PANEL and REMOTE.
RESET	RESET	「**PRG/ESC**」and「**PANEL/REMOTE**」 Resets operation at faults。
⇧	UP	**Menu/Number Change Keys** selects mode, group, function, constant name or set value. **UP** ：INCREMENT KEY。
⇩	DOWN	**Menu/Number Change Keys** selects mode, group, function, constant name or set value. **DOWN**：DECREMENT KEY。
⇨	MOVES REV/FWD	**MOVES**：the cursor horizontally at data change。 **REV** ：Selects REVERSE Run。 **FWD** ：Selects FORWARD Run。
ENTER	ENTER	**ENTER**：**Write/Read Key** Selects mode, group,function or constant name. Displays each constant set value while displaying a constant name. By depressing this key again, the set value is written in.
RUN	RUN	**RUN** ：Red LED lights by depressing、RUN Lit
STOP JOG	STOP JOG	**STOP**：Red LED lights by depressing、STOP Lit **JOG** ：Jog run is enabled while depressing this key、JOG Lit

5.3 DIGITAL OPERATOR MODE SELECTION

The digital operator of the VFC-1200 has the following four modes.

Digital operator Modes

Mode	Description
RUN/STATUS	Inverter operation is enabled. Display monitor value, fault trace or faults that occurred previously.
INIT-SET	Sets and reads language displayed on the digital operator, level to set/ read constants and control method.
PROGRAM-SET	Sets/reads constants.
SET--LIST	Sets/reads constants changed from the values preset at the factory.

Depressing the [MENU] key displays “Operation.” Change the mode display by using [UP] or [DOW] key and select a mode by the [DATA/ENTER] key. The following shows typical operation.

Typical Operation of Mode Selection

【HITAKE MENU】→【RUN/STATUS】→【INIT-SET】→【PROGRAM-SET】

→【EASY-TUNING】→【SET-LIST】→【HITAKE MENU】◦

The mode can be changed even during operation. Even if the mode is changed to the programming mode to set/read constants during operation, the inverter fcontinues operation. The inverter does not operate even if the run command is input, when the programming mode is selected and the inverter is stopped.

5.4 Changing Control Method：

The control method is changed from OPEN LOOP VECTOR to FLUX VECTOR。

Description	Key Sequence	Digital Operator Display
· Display Frequency reference	PRG	FREQ COMMAND M1-01=60.00HZ
· Display Operation	⇩ ⇧	* HITAKE MENU * RUN/STATUS
· Display Initialize	Enter	* HITAKE MENU * INIT-SET
· Select Initialize	⇩ ⇧	FACTORY ID: VFC1275-04-0-J23
· Change the constant name （Display Control Method）	Enter	ACCESS LEVEL ADVANCED LEVEL
· Depressing Enter key ,constant No.and set value are displayed	⇩ ⇧	CONTROL METHOD OPEN LOOP VECTOR
· Change the contril method （Display FLUX VECTOR）	Enter	11-02= 3 FLUX VECTOR
· Select FLUX VECTOR	PRG	ENTRY ACCEQTED
· Return to Operation Puse『PRG』2Sec * HITAKE MENU *	Enter	FREQ COMMAND M1-01=60.00HZ
· Display Frequency reference		

5.5 INITIALIZE MODE

As described below, the language displayed on the digital operator, the access level to set/read constants or control method (V/f control, vector control) can be selected. Make sure to set this mode before use of the VFC-1200. the following table shows the main constants for initialize mode.

Initialize Mode

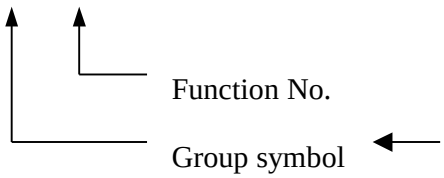
Constant No.	Digital Operator Display	Name	Description
11-00	FACTORY ID:		
11-01	ACCESS LEVEL	Access level (change enable during run)	0: Exclusive for monitoring 1: Constants for user selection (constants to be Set/read can be programmed by operator) 2: QUICK-START (Constants required for test run are set/read.) 3: BASIC (Normally-used constants are set/read.) 4: ADVANCED (All constants are set/read.)
11-02	CONTROL METHOD	Control method selection	0: V/f control 1: V/f control with PG feedback 2: Open loop vector 3: Flux vector
11-03	INIT PARAMETERS	Reset to factory defaults.	0 : No Initialization 1110 : Initialization of user setting 2220 : 2-wire initialization 3330 : 3-wire initialization
11-04	ENTER PASSWORD	Password	Password setting

5.6 PROGRAMMING MODE

The constants of the VFC-1200 are composed of group symbols, function Nos. and serial Nos. for each function item as shown below. Use UP or DOWN key to change the group, function or name display and select one by [ENTER] key. For details of the constants, refer to "**Constants List.**"

Constant NO ·

□ □－06 ← Serial NO. for each function item



2－Application-related constants
3－Accel/decel time setting constants
4－Frequency reference-related constants
5－Motor-related constants
6－Option-related constants
T－Control circuit terminal-related constants
P－Protection-related constants
O－Operator-related constants

According to access level (11-01) setting, there are four ways to set and read constants as described below.

Constant Access Level

Access Level	Description
USER CONSTANT selection	Displays the selected constant from the constant name.
QUICK-START Selection	Displays the constant selected by QUICK-START from the constant name.
BASIC Selection	Displays the constant selected by QUICK-START and BASIC from the function name.
ADVANCED Selection	Displays all constants from the group name.

6 MAINTENANCE AND INSPECTION

WARNING
l Never touch high-voltage terminals in the inverter. Failure to observe this warning can result in an electrical shock. l Replace all protective covers before powering up the inverter. To remove the cover, make sure to shut OFF the molded-case circuit breaker. Failure to observe this warning can result in an electrical shock. l Perform maintenance or inspection only after verifying that the CHARGE LED goes OFF, after the main circuit power supply is turned OFF. The capacitors are still charged and can be dangerous. l Only authorized personnel should be permitted to perform maintenance, inspections or parts replacement. [Remove all metal objects (watches, bracelets, etc.) before operation.] (Use tools which are insulated against electrical shock.) Failure to observe this warning can result in an electrical shock.

CAUTION
l The control PC board employs CMOS ICs. Do not touch the CMOS elements. They are easily damaged by static electricity. l Do not connect or disconnect wires or connectors while power is applied to the circuit. Failure to observe this caution can result in personal injury.

This chapter describes basic maintenance and inspection procedures for the VFC-1200.

6.1 PRIODIC INSPECTION

The VFC-1200 will function longer if it is kept clean, cool and dry, while observing the precautions listed in Par. 2.3. Check for tightness of electrical connections, discoloration or other signs of overheating or aging. Use Table 20 as your inspection guide. Before servicing, turn OFF AC main circuit power and be sure that the CHAARGE LED is OFF.

Periodic Inspection

Component	Check	Corrective Action
External Terminals, Unit Mounting Bolts, Connectors, etc.	Loose screws	Tighten.
	Loose connectors	Tighten.
Heatsink	Build-up of dust and dirt	Blow with dry compressed air of 39.2×10^4 to 58.8×10^4 Pa (4 to 6kg.com^2) pressure.
Printed Circuit Board	Accumulation of conductive dust or oil	Blow with dry compressed air of 39.2×10^4 to 58.8×10^4 Pa (4 to 6kg.com^2) pressure. If dust and oil cannot be removed, replace the board.
Cooling Fan	For abnormal noise and vibration. Whether the cumulative operation time exceeds 20,000 hours or not.	Replace the cooling fan.
Power Elements	Accumulation of dust and dirt	Blow with dry compressed air of 39.2×10^4 to 58.8×10^4 Pa (4 to 6kg.com^2) pressure.
Smoothing capacitor	Discoloration or odor	Replace the capacitor or inverter unit.

6.2 PARTS REPLACEMENT SCHEDULE (GUIDELINES)

Replace the following parts periodically, for a long, safe, trouble free working life of VFC-1200.

Parts Replacement Schedule

Parts	Interval (Approx.)	Remarks
Cooling Fan	2 to 3 years	Replace with new one.
Smoothing Capacitor	5 years	Replace with new one. (Decided after inspection.)
Breakers or Relays	-	Decided after inspection.
Fuse	10 years	Replace with new one.
Aluminum Electrolytic Capacitor on PC Board	5 years	Replace with new one. (decided after inspection.)

Operating conditions are as follows:

Ambient temperature: 30 yearly average

Load factor: 80% or below

Operation rate: 12 hours or below/day

7 TROUBLESHOOTING

This chapter describes the inverter fault display and the fault contents caused by motor/ machine malfunctions and the corrective actions to be taken.

7.1 FAULT DIAGNOSIS AND CORRECTIVE ACTIONS

(1) when the VFC-1200 detects a fault, the fault is displayed on the digital operator and activates the fault contact output and the motor coasts to a stop. Check the cause in the table below and take the corrective actions.

(2) If the inspections or corrective actions described cannot solve the problem, cause in the table below and take the corrective actions.

(3) To restart, turn ON the reset input signal or depress [>] [RESET] key or shut OFF the main circuit power supply once, to reset the stop status.

Fault Diagnosis and Corrective Actions

Fault Display	Description	Details	Corrective Action	Rank* (Standard Value)
U V 1 DC Bus Undervolt	Main circuit undervoltage (PUV)	Undervoltage in the direct current main circuit during running. Detection level 220V class: Approx. 190V or less 440V class: Approx. 380V or less	❙ Check the power supply wiring. ❙ Correct the line voltage .	A
U V 2 DC Bus Undervolt	Control circuit Undervoltage (CUV)	Undervoltage in the control circuit during running.		A
U V 3 DC Bus Undervolt	MC fault	The pre-charge contactor opened during running.		A
U V Under Voltage	Momentary power loss	❙ The main circuit direct current voltage fell below the PUV level. ❙ The control power source fell below the CUV level. ❙ The pre-charge contactor opened.	-	B
O C Overcurrent	Overcurrent (OC)	The inverter output current exceeded the OC level	❙ Check the motor coil resistance. ❙ Extend the accel/decel time. ❙ Check the motor insulation. ❙ Multi-meter check	A
G F Ground Fault	Grounding (GF) (Earth fault)	Inverter output grouding current exceeded 50% of inverter rated current.	❙ Check that motor insulation has not deteriorated. ❙ Check that connection between inverter and motor is not damaged.	A
O V Overvoltage	Overvoltage (OV)	The main circuit direct current voltage exceeded the OV level. Detection level 220V class: Approx. 440V 440V class: Approx. 880V	Extend the deceleration time, add braking circuit.	A
S C Short Circuit	Load short-circuit (SC)	Inverter output (load) is short-circuited.	❙ Check the motor coil resistance. ❙ Check the motor insulation.	A
PUF DC Bus Fuse Open	Fuse blown (FU)	❙ The direct current circuit fuse is blown. ❙ The output transistors were damaged.	Check for damaged transistor, load side short circuit, grounding, etc.	A
O H Heatsink Over tmp	Heatsink overheat (OH1)	The transistor heatsink temperature exceeded the allowable value.	Check the fan an ambient temperature.	A
O L 1 Motor overloaded	Motor overload (OL1)	Inverter output exceeded the motor overload level.	Reduce the load.	A
O L 2 Inv Overloaded	Inverter overload(OL2)	Inverter output exceeded the inverter overload level.	Reduce the load, extend the acceleration time.	A
P F Input Pha Loss	Input open-phase	❙ Inverter input power supply has open-phase. ❙ Large unbalance in input voltage.	❙ Check the line voltage. ❙ Re-tighten the input terminal screws.	A
L F Output Pha Loss	Output open-phase	❙ Inverter output has open-phase.	❙ Check the output wiring. ❙ Check the motor impedance. ❙ Re-tighten the output terminal screws.	A

Fault Diagnosis and Corrective Actions (Cont'd)

Fault Display	Description	Details	Corrective Action	Rank* (Standard Value)
RR Dyn Brk Transistor	Braking transistor failure	The braking transistor has failed	Replace the inverter	A
RH Dyn Brk Resistor	Braking resistor unit overheat	The braking resistor unit temperature has exceeded the allowable value. (Protects only inverter built-in type)	Reduce the regenerative load.	A
OS Overspeed	Overspeed (OS)	The motor speed exceeded the overspeed	_	A
PGO PG Open	PG open circuit (PGO)	The PG line is broken.	❙ Check the PG line. Check the condition of the motor lock or the load.	A
DEV Speed Deviation	Speed deviation (DEV)	The deviation of the speed reference and speed feedback exceeded the regulation level..	Check the load.	B
EF External Fault	Operation reference fault (External)	Both FWD and REV run commands were closed for 500ms or more.	Check sequence circuit.	B
EF3 External Fault 3	External fault at terminal EF	Fault occurred in the external control circuit.	Check the condition of the input terminal . If the LED lights when terminal is not connected, replace the inverter.	A
EF4 External Fault 4	External fault at terminal RST			B
EF5 External Fault 5	External fault at terminal MS1			B
EF6 External Fault 6	External fault at terminal MS2			B
EF7 External Fault 7	External fault at terminal JOG			B
EF8 External Fault 8	External fault at terminal BX			B
OPE01 kVA Selection	kVA selection fault	kVA selection fault	Check and set the constant data.	C
OPE02 Limit	Constant setting range fault (OPE02)	Constant data is out of range.	Check the constant data settings.	C
O P E 03 Terminal	Multi-function contact input selection fault (OPE03)	❙ In T1-01 to T1-06 settings: ❙ The same values are set except for F, FF and 20 to 2F. ❙ Both UP/DOWN and HOLD commands are set. ❙ UP and DOWN commands are not set at the same time. ❙ Two or more HOLD,UP/DOWN, sample/hold commands are set. ❙ Two or more external baseblock and speed search FWD REV EF commands are set. ❙ In 25-01 setting, both PID control and UP/DOWN commands are set. ❙ In T3-09 setting terminal FIV/FIC selection and the value other than "Not used" are set at the same time.	Check the constants.	C

Fault diagnosis and Corrective Actins (Cont'd)

Fault Display	Description	Details	Corrective Action	Rank* (Standard Value)
O P E 0 5 Sequence Select	Option reference Selection fault (OPE05)	❙ In 21-01 setting, C-option is not connected although frequency reference from C-option is selected. ❙ In 21-02 setting, C-option is not connected although run command from C-option is selected.	Check the constants	C
O P E 0 6 PG Opt Missing	Control method selection fault (OPE06)	In 11-02 setting, ❙ Pg is not connected although V/f control with PG feedback is selected. is not connected although flux vector control is selected.	Check the constants.	C
O P E 0 7 Analog Selection	Multi-function analog input selection fault (OPE07)	❙ In T3-05 and T3-09 setting, the same values are set except for 0 and 1F. ❙ While is connected, "0" is set in and option/inverter selection is set in multi-function contact input.	Check the constants.	C
O P E 1 0 V/f	V/f data setting fault (51-04 to 51-10)	When the settings of E1-04 to E1-10 do not satisfy the following conditions: ❙ F Max.≧FA>FB≧F Min. (51-04)(51-07)(51-09)	Check the constants.	C
O P E 11 FC/On-Dly	Constant setting fault	When one of the following setting fault occurs: ❙ Carrier frequency upper limit (36-01)＞5kHz, and Carrier frequency lower limit (36-02)≦5kHz ❙ Carrier frequency proportional gain (36-03)＞6 and (36-01)< (36-02)	Check the constants.	C
E R R EEPROM R/W Err	EEPROM writing fault (ERR)	EEPROM internal data did not match when initializing the constant.	Replace the control card.	B
CALL Serial Com Call	SI-B transmission error	❙ Control data was not received normally when power supply is turned on.	Check transmission devices and transmission signals.	C
C E Memobus Com Err	Transmission error	❙ Control data was not received normally when power supply is turned ON.	Check transmission devices and transmission signals.	A
C P F 0 0 COM-ERR(OP&INV)	Control circuit fault 1 (CPF00) (Digital operator transmission fault)	❙ Transmission between the inverter and digital operator cannot be established 5 seconds after supplying power. ❙ MPU peripheral element check fault (initial)	❙ Insert the digital operator connector again. ❙ Check the control circuit wiring. ❙ Replace the control card.	A
C P F 0 1 COM-ERR(OP&INV)	Control circuit fault 2 (CPF01) (digital operator transmission fault)	❙ Transmission between the inverter and digital operator is established once after supplying power, but later transmission fault continues for more than 2 seconds. ❙ MPU peripheral element check fault (online)	❙ Insert the digital operator connector again. ❙ Check the control circuit wiring. ❙ Replace the control card.	A

Fault diagnosis and corrective actions (Cont'd)

Fault Display	Description	Details	Corrective Action	Rank* (Standard Value)
C P F 0 2 BB Circuit Err	Baseblock circuit fault (CPF02)	Inverter control unit fault.	Replace the control card.	A
C P F 0 3	EEPROM fault (CPF03)			A
C P F 0 4 Internal A/D Err	CPU internal A/D Converter fault (CPF04)			A
C P F 0 5	Option connection fault (CPF05)			A
C P F 0 6	Option connection fault (CPF06)	The option card is not installed correctly.	Install the option card again.	A
C P F 2 0 Option A/D Error	A/D converter fault in analog speed reference card (CPF20)	Option card A/D converter fault	Replace the option card.	A

*The ranks are classified as follows:

Rank A: Major fault (Motor coasts to a stop, operator indication lights, and FAULT contact is output.)

Rank B: Fault [Operation continues, operator indication blinks, no FAULT contact is output, and minor fault contact is output (when multi-function output is selected.)

Rank C: Warning (Operation cannot be performed, operator indication lights, no FAULT contact is output, no minor fault contact is output.)

7.2 MOTOR FAULTS AND CORRECTIVE ACTIONS

(1) If any of the following faults occurs in the motor, check the cause and provide the relevant corrective action.

(2) If these inspections and corrective actions cannot solve the problem, contact your RICH ELECTRIC representative immediately.

Fault	Check Point	Corrective Action
Motor does not rotate.	Power supply voltage applied to power supply terminals L1, L2, L3? CHARGE LED is ON?	❙ Turn ON power supply. ❙ Turn OFF power supply, and then ON again. ❙ Check power supply voltage. ❙ Make sure terminal screws are tight.
	Use rectifier type voltmeter to test. Voltage output to output terminals U, V, W correct?	❙ Turn OFF power supply, then turn ON again.
	Motor locks due to excessive load?	❙ Reduce the load and release the lock.
	Fault displayed in operator display?	❙ Check troubleshooting table.
	FWD or REV run command entered?	❙ Check the wiring.
	Frequency setting voltage entered?	❙ Correct the wiring. ❙ Check frequency setting voltage.
	Operation mode setting correct?	❙ With the operator, check the operation mode selection.
Motor rotation reverses.	Wiring of terminals U, V, W correct?	❙ Match wiring to the phase order of the motor leads U, V, W.
	FWD and REV wiring run signals entered?	❙ Correct the wiring.
Motor rotates, but variable speed not available.	Wiring of frequency setting circuit correct?	❙ Correct the wiring.
	Operation mode setting correct?	❙ With the operator, check the operation mode selection.
Motor rotates, but variable speed not available.	Wiring of frequency setting circuit correct?	❙ Correct the wiring.
	Operation mode setting correct?	❙ With the operator, check the operation mode selection.
	Load excessively large?	❙ Reduce the load.
Motor r/min too high or too low	Accel/decel speed change ratio for gears, etc. correct?	❙ Check speed changer(gears,etc.)
	Maximum frequency set value correct?	❙ Check the maximum frequency set value.
	Use rectifier voltmeter. Voltage between motor terminals not excessively reduced?	❙ Check V/f characteristics values.
Motor r/min not stable during operation.	Load excessively large?	❙ Reduce the load.
	Load variation excessively large?	❙ Reduce the load variation ❙ Increase inverter motor capacity.
	3-phase or single-phase power supply used? For 3-phase power supply, open phase?	❙ For 3-phase power supply, check the wiring if power supply is open phase. ❙ For single-phase power supply, connect AC reactor to the power supply.

8 SPECIFICATIONS

8.1 220V Class Specifications

SERIAL			*VFC-1200*														
Inverter Model		HP	L003	L005	L07.5	L010	L015	L020	L025	L030	L040	L050	L060	L075	L100	L120	L150
Output Characteristic	Max. Applicable Motor output	KW	2.2	3.7	5.5	7.5	11	15	18.5	22	30	37	45	55	75	90	110
	Inverter Capacity	KVA	4.2	6.7	9.5	13	19	24	30	37	50	61	70	85	110	140	160
	Rated output Current	A	11	17.5	25	33	49	64	80	96	130	160	183	224	300	358	415
	Max. Output	V	3-Phase, 200/220/230V/240V(Proportional to input voltage)														
	Rated Output Frequency		Up to 400Hz available by programming														
Power Supply	Rated Input Voltage and Frequency		3-Phase 200～240V、50Hz／60Hz														
	Allowable Voltage Fluctuation		+10～－15%														
	Allowable Frequency Fluctuation		±5%														
Control Characteristics	Control Method		PWM, Electric Current Torque Vector Control，V/F Control，PG etc Control Mode														
	Speed Control Accuracy		±0.2 % ，									【±0.01% =PG】					
	Speed Control Range		1：100 ，									【1：1000 =PG】					
	Speed Response		5Hz，									【30Hz =PG】					
	Starting Torque		150% /0.3HZ－200% /0.5Hz，									【200% /0Hz =PG】					
	Torque Response		20Hz,50ms，									【40Hz,25ms =PG】					
	Torque Limit		control mode set														
	Torque Accuracy		±5%														
	Frequency Control Range		0.01~400Hz														
	Frequency Accuracy		Digital command : ±0.01% (-10℃~+40℃), Analog : ±0.1% (25℃±10℃)														
	Frequency Resolution		Digital command : ±0.01Hz（100Hz 以下）, Analog : ±0.03Hz / 60Hz (12bit)														
	Output Frequency Resolution		0.001Hz														
	Overload Capacity		150% of rated output current for 1 minute 200% /0.5sec														
	Frequency Setting Signal		Analog DC -10~+10V，0~+10V (20kΩ)，4~20mA(250Ω)														
	Accel/Decel Time		0.01~6000.0sec (Accel/decel time setting independently, 4 steps available)														
	Braking Torque		20 (If including braking unit can reach 150%)														
	Serial Port		RS-232C×1，RS-485×1														
	Operation Mode		Operator、RS-232C，RS-485、Terminal														
Protective Functions	Motor Overload Protection		Protected by electronic thermal overload relay														
	Instantaneous Overcurrent		Motor coasts to a stop at Approx. 200% of inverter rated current.														
	Blown Fuse Protection		Motor coasts to a stop by blown-fuse.														
	Overload		Motor coasts to a stop after 1 minute at 150% of rated output current.														
	Overload Voltage		Motor coasts to a stop if converter output voltage exceeds DC 410V														
	Under Voltage		Motor coasts to a stop if converter output voltage drop to DC 190V														
	Heatsink Overheat		Protected by thermistor														
	Momentary Power Loss		Immediately stop by 15ms and above momentary power loss. (Factory setting) Continuous operation during power loss less than 2secis equipped as standard.														
	Stall Prevention		Stall prevention during accel/decel and constant speed operation														
	Ground Fault		Protected by electronic circuit (Overcurrent level)														
	Power Charge Indication		Charge LED stays ON Until bus voltage drops below 50V.														
Environment	Ambient Temperature		-10℃~+50℃														
	Humidity		90% RH or less														
	Vibration		20Hz or less 1G，(20Hz or above 0.2G)														
	Location		Indoor（protected from corrosive gases and dust）														
	Storage Temperature		-20℃~+65℃														
	Elevation		1000m or less														

8.2 440V Class Specifications

SERIAL			*VFC-1200*																	
Inverter Model		HP	H3	H5	H7.5	H10	H15	H20	H25	H30	H40	H50	H60	H75	H100	H150	H200	H250	H300	H400
Output Characteristics	Max. Applicable Motor output	KW	2.2	3.7	5.5	7.5	11	15	18.5	22	30	37	45	55	75	110	160	185	220	300
	Inverter Capacity	KVA	4.7	6.1	11	14	21	26	31	37	50	61	73	98	130	170	230	260	340	460
	Rated output Current	A	6.2	8	14	18	27	34	41	48	65	80	96	128	165	224	302	340	450	605
	Max. Output Voltage	V	3-Phase, 380/415/440/460V/480V(Proportional to input voltage)																	
	Rated Output Frequency		Up to 400Hz available by programming																	
Power Supply	Rated Input Voltage and Frequency		3-Phase 380～480V、50Hz／60Hz																	
	Allowable Voltage Fluctuation		+10～－15%																	
	Allowable Frequency Fluctuation		±5%																	
Control Characteristics	Control Method		PWM, Electric Current Torque Vector Control，V/F Control，PG etc Control Mode																	
	Speed Control Accuracy		±0.2 % ，												【±0.01% =PG】					
	Speed Control Range		1：100 ，												【1：1000 =PG】					
	Speed Response		5Hz,0.2s，												【30Hz,33ms =PG】					
	Starting Torque		200% /0.5Hz，												【200% /0Hz =PG】					
	Torque Response		20Hz,50ms，												【40Hz,25ms =PG】					
	Torque Limit		control mode set																	
	Torque Accuracy		±5%																	
	Frequency Control Range		0.01~400Hz																	
	Frequency Accuracy		Digital command : ±0.01% (-10℃~+40℃), Analog : ±0.1% (25℃±10℃)																	
	Frequency Resolution		Digital command : ±0.01Hz（100Hz 以下）, Analog : ±0.03Hz / 60Hz (12bit)																	
	Output Frequency Resolution		0.01Hz																	
	Overload Capacity		150% of rated output current for 1 minute 200% /0.5sec																	
	Frequency Setting Signal		Analog DC -10~+10V，0~+10V (20kΩ)，4~20mA(250Ω)																	
	Accel/Decel Time		0.01~6000.0sec (Accel/decel time setting independently, 4 steps available)																	
	Braking Torque		20 (If including braking unit can reach 150%)																	
	Serial Port		RS-232C×1，RS-485×1																	
	Operation Mode		Operator、RS-232C，RS-485、Terminal																	
Protective Functions	Motor Overload Protection		Protected by electronic thermal overload relay																	
	Instantaneous Overcurrent		Motor coasts to a stop at Approx. 200% of inverter rated current.																	
	Blown Fuse Protection		Motor coasts to a stop by blown-fuse.																	
	Overload		Motor coasts to a stop after 1 minute at 150% of rated output current.																	
	Overload Voltage		Motor coasts to a stop if converter output voltage exceeds DC 820V																	
	Under Voltage		Motor coasts to a stop if converter output voltage drop to DC 380V																	
	Heatsink Overheat		Protected by thermistor																	
	Momentary Power Loss		Immediately stop by 15ms and above momentary power loss. (Factory setting) Continuous operation during power loss less than 2secis equipped as standard.																	
	Stall Prevention		Stall prevention during accel/decel and constant speed operation																	
	Ground Fault		Protected by electronic circuit (Overcurrent level)																	
	Power Charge Indication		Charge LED stays ON Until bus voltage drops below 50V.																	
Environment	Ambient Temperature		-10℃~+50℃																	
	Humidity		90% RH or less																	
	Vibration		20Hz or less 1G，（20Hz or above 0.2G）																	
	Location		Indoor（protected from corrosive gases and dust）																	
	Storage Temperature		-20℃~+65℃																	
	Elevation		1000m or less																	

8.3 DIMENSTIONS(mm)

9. CONSTANTS LIST

Monitor Constants List

Digital Operator Function Display	Constant No.	Digital Operator Display	Constant Name	Unit	Data Selection	Out signal Levels
Monitor	M1-01	FREQ COMMAND	Frequency reference	0.01HZ		10V/ Max frequency
	M1-02	OUTPUT FREQ	Output frequency	0.01HZ		10V/ Max frequency
	M1-03	OUTPUT CURRENT	Output current	0.1A		10V/ Rated current
	M1-04	CONTROL METHOD	Control method	--		--
	M1-05	MOTOR SPEED	Motor speed	0.01HZ		10V/ Max frequency
	M1-06	OUTPUT VOLTAGE	Output voltage	0.1V		10V/200V OR 10V/400V
	M1-07	DC BUS VOLTAGE	DC bus voltage	1V		10V/400V OR 10V/800V
	M1-08	OUTPUT KWATTS	Output power	0.1kw		10V/Max. motor (KW)
	M1-09	TORQUE REFERENCE	Torque reference(internal)	0.1%		10V/Rated torque
	M1-10	INPUT TERM STS	Input terminal status	--	0 0 0 0 0 0 0 0 1：Terminal FWD〝ON〞 1：Terminal REV〝ON〞 1：Terminal EF〝ON〞 1：Terminal RST〝ON〞 1：Terminal MS1〝ON〞 1：Terminal MS2〝ON〞 1：Terminal JOG〝ON〞 1：Terminal BX〝ON〞	--
	M1-11	OUTPUT TERM STS	Output terminal status	--	0 0 0 0 0 0 0 0 1：Terminal RA-RC〝ON〞 1：Terminal Y1〝ON〞 1：Terminal Y2〝ON〞 0：Not used 0：Not used 0：Not used 0：Not used 1：Terminal RC-RB-RA	--
	M1-12	INT CT1 STS 1	Internal control status	--	0 0 0 0 0 0 0 0 1：Running 1：Zero-speed level 1：reverse 1：Reset input ON 1：F./out agree 1：Inverter ready 1：Minor fault detected 1：Major fault detected	--
	M1-13	ELAPSED TIME	Cumulative operation time	1hour		--
	M1-14	SOFT VER：	SOFT VER	--		--

Monitor Constants List

Digital Operator Function Display	Constant No.	Digital Operator Display	Constant Name	Unit	Data Selection	Out signal Levels
		TERM FIV LEVEL	Terminal FIV voltage level	0.1%		10V/100%
	M1-16	TERM FIC LEVEL	Terminal FIC voltage level	0.1%		10V/100%
	M1-17	TERM MFI LEVEL	Terminal MFI voltage level	0.1%		10V/100%
	M1-18	MOT SEC CURRENT	Motor secondary Current	0.1%		10V/ Rated current
	M1-19	MOT EXC CURRENT	Motor exciting current	0.1%		10V/ Rated current
	M1-20	SFS OUTPUT	Output frequency after soft-start	0.01HZ		10V/ Max frequency
	M1-21	ASR INPUT	ASR input	0.01%		10V/ Max frequency
	M1-22	ASR OUTPUT	ASR output	0.01%		10V/ Rated frequency
	M1-23	SPEED DEVIATION	Speed deviation	0.01%		10V/ Max frequency
	M1-24	PID FEEDBACK	PID feedback value	0.01%		--
	M1-25	DI-16 REFERENCE	DI-16H input status	--		--
	M1-26	VOLTAGE REF (VQ)	Output voltage reference (Vq)	0.1V		10V/200V OR 10V/400V
	M1-27	VOLTAGE REF (VD)	Output voltage reference (Vd)	0.1V		10V/200V OR 10V/400V
	M1-28	RISC VER：		--		--
	M1-32	ACR（Q） OUTPUT	ACR output of q axis	--		--
	M1-33	ACR（D） OUTPUT	ACR output of d axis	--		--
	M1-34	OPE DETECTED	OPE fault constant	--		--
Fault Trace	M2-01	CURRENT FAULT	Current fault	--		--
	M2-02	LAST FAULT	Last fault	--		--
	M2-03	FREQUENCY REF	Frequency reference	0.01HZ		--
	M2-04	OUTPUT FREQ	Output frequency at fault	0.01HZ		--
	M2-05	OUTPUT CURRENT	Output current at fault	0.1A		--
	M2-06	MOTOR SPEED	Motor speed at fault	0.01HZ		--
	M2-07	OUTPUT VOLTAGE	Output voltage reference at fault	0.1V		--
	M2-08	DC BUS VOLTAGE	DC bus voltage at fault	1V		--
	M2-09	OUTPUT KWATTS	Output power at fault	0.1KW		--
	M2-10	TORQUE REFERENCE	Torque reference at fault	0.1%		--

Monitor constants List

Digital Operator Display	Constant No.	Digital Operator Display	Constant Name	Unit	Data Selection	Out signal Levels
Fault History	M2-11	INPUT TERM STS	Input terminal status	--	M1-10	--
	M2-12	OUTPUT TERM STS	Output terminal status at fault	--	M1-11	--
	M2-13	INVERTER STATUS	Operation status at fault	--	M1-12	--
	M2-14	ELAPSED TIME	Cumulative operation time at fault	1hour		--
	M3-01	LAST FAULT	Last fault	--		--
	M3-02	FAULT MESSAGE 2	Second most recent fault	--		--
	M3-03	FAULT MESSAGE 3	Third most recent fault	--		--
	M3-04	FAULT MESSAGE 4	Fourth/Oldest fault	--		--
	M3-05	ELAPSED TIME 1	Cumulative operation time at fault	1hour		--
	M3-06	ELAPSED TIME 2	Accumulated time of second fault	1hour		--
	M3-07	ELAPSED TIME 3	Accumulated time of third fault	1hour		--
	M3-08	ELAPSED TIME 4	Accumulated time of fourth/oldest fault	1hour		--

9.1 Constants List

Digital		Constant No.	Digital Operator	Constant Name	Setting Range	Min	Factory Setting	Data Selection	RUN
	Initialize Mode Constants	11-00	FACTORY ID:	VFC-1604-08-000	--	--	--	FACTORY ID	
		11-01	ACCESS LEVEL	Constant access level (Set/Read)	0~4	1	4	0：MONIORING ONLY 1：USED TO SELECT 2：QUICK START 3：BASIC LEVEL 4：ADVANCED LEVEL	Can
		11-02	CONTROL METHOD	Setting constant	0~3	1	2	0：V/F CONTROL 1：V/F WITH PG 2：OPEN LOOP VECTOR 3：FLUX VECTOR PG	Cannot
		11-03	DATA INITIAL	Initialize	0000~9999	1	0000	1110：Init user constants 2220：Init two-wire 3333：Init three-wire	Cannot
		11-04	USER PASSWORD	Password	0000~9999	1	0000	Password input	Cannot
		11-05	PROTELT PASSWORD	Password	0000~9999	1	0000	Password Set When the11-04 displayed（ ＞key + PRG key）the Password will be displayed.	Cannot
		12-01~12-32	USER PARAM 1 TO 32	User setting	--	--	--	User setting constant	Cannot
Application Constants	Operation Mode Selections	21-01	REFERENCE SOURCE	Reference Selection	0~3	1	1	0：DIGITAL OPERATOR 1：CONTROL TERMINALS 2：MEMOBUS 3：OPTION PCB	Cannot
		21-02	RUN SOURCE	Operation Method Selection	0~3	1	1	0：DIGITAL OPERATOR 1：CONTROL TERMINALS 2：MEMOBUS 3：OPTION PCB	Cannot
		21-03	STOPPING METHOD	Stopping Method Selection	0~3	1	1	0：Ramp to stop 1：Coast to stop 2：DC Braking stop 3：Coast to stop with timer	Cannot
		21-04	REVERSE OPER	Prohibition of reverse Selection	0,1	1	0	0：Reverse enabled 1：Reverse disabled	Cannot
		21-05	ZERO-SPEED OPER	Operation Selection For setting (51-09)	0~3	1	0	0：Run reference 1：Stop Coast (B.B) 2：Run at min frequency 3：Runat zero speed	Cannot
		21-06	PANEL/REMUTE	Read sequence input twice	0,1	1	1	0：2msec 1：5msec	Cannot
		21-07	RUN CYCLE EXTRN RUN	Operation selection After sw. remote	0,1	1	0		Cannot
	DC injection	22-01	DCLNJ START FREQ	DCinj Zero speed	0.0~10.0	0.1HZ	0.5	Dcinj Zero speed level	Cannot
		22-02	DCLNJ CURRENT	DCinj current	0~100	1%	50	DCinj braking current	Cannot
		22-03	DCLNJ TIME @START	DCinj time Start	0.00~10.0	0.01sec	0.00	DCinj braking T-Start	Cannot
		22-04	DCLNJ TIME @STOP	DCinj time Stop	0.00~10.0	0.01sec	0.50	DCinj braking T-Stop	Cannot

Digital		Constant No.	Digital Operator	Constant Name	Setting Range	Min	Factory Setting	Data Selection	RUN
Application Constants	Speed search	23-01	SPDSRCH AT START	Speed search selection at start	0,1	1	0	0：Start speed Disabled 1：Start speed Enabled	Cannot
		23-02	SPDSRCH CURRENT	search Current	0~200	1%	150	Speed search Current	Cannot
		23-03	SPDSRCH DEC TIME	Deceleration timer	0.1~10.0	0.1sec	2.0	Speed Search deceleration time	Cannot
	Timer	24-01	DELAY-ON TIMER	ON DELAY timer	0.0~300.0	0.1sec	0.0	Timer Function On delay	Cannot
		24-02	DELAY-OFF TIMER	OFF DELAY timer	0.0~300.0	0.1sec	0.0	Timer Function OFF delay	Cannot
	PID Control	25-01	PID MODE	PID control mode selection	0,1,2	1	0	0：PID Disabled 1：PID Enabled 2：PID Enabled	Cannot
		25-02	PID GAIN	Proportional gain (P)	0.00~10.00	0.01	1.00	Proportional gain (P)	Can
		25-03	PID I TIME	Integral (I) time	0.0~360.0	0.1sec	1.0		Can
		25-04	PID I LIMIT	Integral (I) limit	0.0~100.0	0.1%	100.0		Can
		25-05	PID D TIME	Differential (D)	0.00~10.0	0.01sec	0.00	Differential (D) time	Can
		25-06	PID LIMIT	PID Limit	0.0~100.0	0.1%	100.0		Can
		25-07	PID OFFSET	PID Offset adjustment	-100.0~ 100.0	0.1%	0.0		Can
		25-08	PID DELAY TIME	PID primary delay time constant	0.00~-100.0	0.01sec	0.00		Can
	Dwell Functions	26-01	DWELL REF @ START	Dwell frequency at start	0.0~400.0	0.1HZ	0.0		Cannot
		26-02	DWELL TIME @ STOP	Dwell time at start	0.0~10.0	0.1sec	0.0		Cannot
		26-03	DWELL REF @ STOP	Dwell frequency at stop	0.0~400.0	0.1HZ	0.0		Cannot
		26-04	DWELL TIME @ STOP	Dwell time at stop	0.0~400.0	0.1sec	0.0		Cannot
	Droop Control	27-01	DROOP QUANTITY	Droop control gain	0.00~100.0	0.01	0.0		Can
		27-02	DROOP DELAY TIME	Droop control Delay time	0.03~2.00	0.03sec	0.05		Can
	Energy saving	28-01	ENERGY SAVE GAIN	Energy saveing gain	0~100	1%	80		Cannot
		28-02	ENERGY SAVE FREQ	Energy saving frequency	0.0~400.0	0.1HZ	0.0		Cannot

Digital		Constant No.	Digital Operator	Constant Name	Setting Range	Min	Factory Setting	Data Selection	RUN
	Zero Servo	29-01	ZERO SERVO GAIN	zero servo gain	0~100	1	5		Cannot
		29-02	ZERO SERVO COUNT	zero servo completion width	0~16383	1	10		Cannot
Autotuning	Acceleration/Deceleration	31-01	ACCEL TIME 1	Acceleration time1	0.0~6000.0	0.1sec	10.0		Can
		31-02	DECEL TIME 1	Deceleration time1	0.0~6000.0	0.1sec	10.0		Can
		31-03	ACCEL TIME 2	Acceleration time2	0.0~6000.0	0.1sec	10.0		Can
		31-04	DECEL TIME 2	Deceleration time2	0.0~6000.0	0.1sec	10.0		Can
		31-05	ACCEL TIME 3	Acceleration time3	0.0~6000.0	0.1sec	10.0		Cannot
		31-06	DECEL TIME 3	Deceleration time3	0.0~6000.0	0.1sec	10.0		Cannot
		31-07	ACCEL TIME 4	Acceleration time4	0.0~6000.0	0.1sec	10.0		Cannot
		31-08	DECEL TIME 4	Deceleration time4	0.0~6000.0	0.1sec	10.0		Cannot
		31-09	FAST STOP TIME	Emergency stop	0.0~6000.0	0.1sec	10.0	Emergency stop time	Cannot
		31-10	ACC/DEC UNIST	Accel/Decel time setting unit	0,1	1	1	0：0.01-second units 1：0.1- second units	Cannot
		31-11	ACC/DEC SW FREQ	Accel/Decel time Switching freq	0.0~400.0	0.1HZ	0.0	Accel/Decel time Switching frequency	Cannot
	S-curve ACC/DEC	32-01	SCRV ACC @ START	S-curve charac Teristic time start	0.00~2.50	0.01sec	0.20		Cannot
		32-02	SCRV ACC @ END	S-curve charac Teristic time end	0.00~2.50	0.01sec	0.20		Cannot
		32-03	SCRV EDC @ START	S-curve charac Teristic time start	0.00~2.50	0.01sec	0.20		Cannot
		32-04	SCRV EDC @ END	S-curve charac Teristic time end	0.00~2.50	0.01sec	0.20		Cannot
	Motor Slip Compensation	33-01	SLIP COMP GAIN	Slip comp gain	0.00~2.50	0.01	1.0	Slip compensation gain	Can
		33-02	SLIP COMP TIME	Slip compensation Primary delay time	0~1000	1ms	200		Cannot
		33-03	SLIP COMP LIMIT	Slip comp limit	0~250	1%	200	Slip compensation limit	Cannot
		33-04	SLIP COMP REGEN	Slip compensation Selection during regeneration	0,1	1	0	0：Disabled 1：Enabled	Cannot
	Torque	34-01	TORQ COMP GAIN	Torque gain	0.00~2.5	0.01	1.00		Can
		34-02	TORQ COMP TIME	Torque time	0~1000	0msec	20		Cannot

Digital		Constant No.	Digital Operator	Constant Name	Setting Range	Min	Factory Setting	Data Selection	RUN
Autotuning	Speed Control ASR	35-01	ASR P GAIN 1	ASR gain 1	0.00~300.0	0.01	20.00	ASR proportional gain	Can
		35-02	ASR I TIME 1	ASR integral time 1	0.000~ 10.000	0.001 sec	0.500		Can
		35-03	ASR P GAIN 2	ASR gain 2	0.00~300.0	0.01	20.00	ASR proportional gain	Can
		35-04	ASR I TIME 2	ASR integral time 2	0.000~ 10.000	0.001 sec	0.500		Can
		35-05	ASR LIMIT	ASR limit	0.0~20.0	0.1%	5.0		Cannot
		35-06	ASR DELAY TIME	ASR primary dealy time	0.000~0.500	0.001 sec	0.004		Cannot
		35-07	ASR GAIN SW FREQ	ASR switching	0.0~400.0	0.01HZ	0.0	ASR switching freq	Cannot
	Carrier Freq	36-01	CARRIER FREQ MAX	Carrier up limit	0.4~15.0	0.1KHZ	15.0	FIXED 36-01~02 setting 2.0~15.0	Cannot
		36-02	CARRIER FREQ MIN	Carrier lower limit	0.4~15.0	0.1KHZ	15.0		Cannot
		36-03	CARRIER FREQ GAIN	Carrier Frequency gain	00~99	1	00		Cannot
	Hunting	37-01	HNUT PREV SELECT	Hunting prevention selection	0.1~1	1	1	0：Disabled 1：Enabled	Cannot
		37-02	HNUT PREV GAIN	Hunting gain	0.00~2.50	0.01	1.00		Cannot
	Factory tuning	38-08	AFR GAIN	AFR gain	0.00~10.00	0.01	1.00		Cannot
		38-09	AFR TIME	AFR Detection limit	0~2000	1msec	50		Can
		38-30	CURRIER IN TUNE	Carrier freq selection during autotuing	0,1,2	0	2	0：Carrier set 2.0kHZ 1：Carrier 36-01 setting 2：Carrier set 5.0kHZ	Can
Reference Constants	Preset Reference	41-01	REFERENCE 1	Freq reference 1	0.0~400.00	0.1HZ	0.00	Frequency reference 1	Can
		41-02	REFERENCE 2	Freq reference 2	0.0~400.00	0.1HZ	0.00	Frequency reference 2	Can
		41-03	REFERENCE 3	Freq reference 3	0.0~400.00	0.1HZ	0.00	Frequency reference 3	Can
		41-04	REFERENCE 4	Freq reference 4	0.0~400.00	0.1HZ	0.00	Frequency reference 4	Can
		41-05	REFERENCE 5	Freq reference 5	0.0~400.00	0.1HZ	0.00	Frequency reference 5	Can
		41-06	REFERENCE 6	Freq reference 6	0.0~400.00	0.1HZ	0.00	Frequency reference 6	Can
		41-07	REFERENCE 7	Freq reference 7	0.0~400.00	0.1HZ	0.00	Frequency reference 7	Can
		41-08	REFERENCE 8	Freq reference 8	0.0~400.00	0.1HZ	0.00	Frequency reference 8	Can
		41-09	JOG REFERENCE	Jog reference	0.0~400.00	0.1HZ	6.00	Jog Frequency reference	Can
	Reference Limits	42-01	REF UPPER LIMIT	Reference upper limit	0.0~110.0	0.1%	100%		Cannot
		42-02	REF LOWER LIMIT	Reference lower limit	0.0~110.0	0.1%	0.0%		Cannot
	Jump	43-01	JUMP FREQ 1	Jump frequency 1	0.0~400.0	0.1HZ	0.0		Cannot
		43-02	JUMP FREQ 2	Jump frequency 2	0.0~400.0	0.1HZ	0.0		Cannot
		43-03	JUMP FREQ 3	Jump frequency 3	0.0~400.0	0.1HZ	0.0		Cannot
		43-04	JUMP BANDWIDTH	Jump freq width	0.0~20.0	0.1HZ	1.0		Cannot
	Hold	44-01	MOP REF MEMORY	Frequency reference hoid function	0,1	1	0	0：Disabled 1：Enabled	Cannot
		44-02	TRIM CONTROL LVL	+/－Speed limits	0~100	1%	25		Cannot

Digital		Constant No.	Digital Operator	Constant Name	Setting Range	Min	Factory Setting	Data Selection	RUN
Motor Constant Constants	Torque Control	45-01	TORQ CONTROL SEL	Torque selection	0,.1	1	0	0：Speed control 35-01~07 1：Torque control	Cannot
		45-02	TORQUE REF FILTER	Torque reference delay time	0~1000	1msec	0		Cannot
		45-03	SPEED LIMIT SEL	Speed limit selection	1,.2	1	1	1：Anaiog input 2：Limited 45-04 constant	Cannot
		45-04	SPEED LMT VALUE	Speed limit	-120~+120	0%	0		Cannot
		45-05	SPEED LMT BIAS	Speed limit bias	0~120	1%	10		Cannot
		45-06	REF HOLD TIME	Speed／torque Switching timer	0~1000	1msec	0		Cannot
	V/F Pattern	51-01	INPUT VOLTAGE	Input voltage set	155~255	1V	200		Cannot
		51-02	MOTOR SELECTION	Motor selection	0,1,2	1	0	0：fan-cooled motor 1：blower-cooled motor 2：Special motor	Cannot
		51-03	V/F SELECTION	V/F pattern	00~OF	1	OF	00~OE：15preset patterns OF：Custom user-set	Cannot
		51-04	MAX FREQUENCY	Max. output freq	40.0~400.0	0.1HZ	60.0		Cannot
		51-05	MAX VOLTAGE	Max. voltage	0.0~255.0	0.1V	200.0		Cannot
		51-06	BASE FREQUENCY	Base frequency	0.0~400.0	0.1HZ	60.0		Cannot
		51-07	MID FREQUENCY A	Mid output freq A	0.0~400.0	0.1HZ	3.0		Cannot
		51-08	MID VOLTAGE A	Mid output freq voltage A	0.0~255.0	0.1V	11.0		Cnanot
		51-09	MIN FREQUENCY	Min. output freq	0.0~400.0	0.1HZ	0.5		Cannot
		51-10	MIN VOLTAGE	Min. output freq voltage	0.0~255.0	0.1V	2.0		Cannit
		51-11	MIN FREQUENCY B	Mid output freq B	0.0~400.0	0.1HE	0.0		Cannot
		51-12	MID VOLTAGE B	Mid output freq voltage B	0.0~255.0	0.1V	0.0		Cannot
		51-13	BASE VOLTAGE	Base voltage	0.01~255.0	0.1V	0.0		Cannot
	Motor Setup	52-01	MOTOR RATED FLA	Motor rated current	0.01~1500.0	0.1A	1.90		Cannot
		52-02	MOTOR RATED SLIP	Motor rated slip	0.00~20.00	0.01HZ	2.9		Cannot
		52-03	NO-LOAD CURRENT	Motor no-load current	0.00~ 1500.00	0.01A	1.20		Cannot
		52-04	NUMBER OF POLES	Numder motor poles	2~48	2pole	4		Cannot
		52-05	TERM RESISTANCE	Line resistance	0.00~65.000	0.001Ω	9.842	Motor line-to line resistance	Cannot
		52-06	LEAK INDUCTANCE	Leak inductance	0.0~40.0	0.1%	18.2		Cannot
		52-07	SATURATION COMP 1	Iron-core saturation coefficient 1	0.00~0.50	0.01	0.5		Cannot
		52-08	SATURATION COMP 2	Iron-core saturation coefficient 2	0.00~0.75	0.01	0.75		Cannot
		52-09	MECHANICAL LOSS	Mechanical loss	0.0~10.0	0.1%	0.0		Cannot
	Motor 2Method	53-01	CONTROL METHOD	Motor 2 control method selection	0~3	1	2	0：V/F CONTROL 1：V/F WITH PG 2：OPEN LOOP VECTOR 3：FLUX VECTOR PG	Cannot

Digital		Constant No.	Digital Operator	Constant Name	Setting Range	Min	Factory Setting	Data Selection	RUN
Motor Constant Constants	V/F Pattern 2	54-01	V/F2 MAX FREQ	Max. output frequency 2	50.0~ 400.0	0.1HZ	60.0		Cannot
		54-02	V/F2 MAX VOLTAGE	Max. voltage 2	0.0~255.0	0.1V	200.0		Cannot
		54-03	V/F2 BASE FREQ	Max. viltage frequency 2	0.0~400.0	0.1HZ	60.0		Cannot
		5404	V/F2 MID FREQ	Max. mid frequency 2	0.0~400.0	0.1HZ	3.0	11-03	Cannot
		5405	V/F2 MIN VOLTAGE	Max. mid frequency voltage2	0.0~255.0	0.1V	10.0	11-03	Cannot
		5406	V/F2 MID FREQ	Max. min frequency 2	0.0~400.0	0.1HZ	0.5	11-03	Cannot
		54-07	V/F2 MIN VOLTAGE	Max. min frequency voltage2	0.0~255.0	0.1V	1.7	11-03	Cannot
	Motor 2 Setup	55-01	MOTOR 2 RATED FLA	2 rated current	0.00~ 1500.0	0.1A	1.90		Cannot
		55-02	MOTOR 2 SLIP FREQ	2 rated slip	0.00~ 20.00	0.01HZ	2.90		Cannot
		55-03	MOTOR 2 NO-LOAD 1	2 no-load current	0.00~ 1500.0	0.01A	1.20		Cannot
		55-04	MOTOR 2 # POLES	2 number of poles	2~48	1pole	4		Cannot
		55-05	MOTOR 2 TERM OHMS	2 line-to-line resistance	0.000~ 65.000	0.001Ω	9.842		Cannot
		55-06	MOTOR 2 LEAK	2 leak inductance	0.0~30.0	0.1%	18.2		Cannot
Options Constants	PG Option Setup	61-01	PG PULSES/REV	PGconstant	0~60000	1	600		Cannot
		61-02	PG FDBK LOSS SEL	Operation selection PG open circuit	0~3	1	1	0：Ramp stop3：continue 1：Coast stop 2：Fast stop	Cannot
		61-03	PG OVERSPEED SEL	Operation selection overspeed	0~3	1	1	0：Ramp stop3：continue 1：Coast stop 2：Fast stop	Cannot
		61-04	PG DEVIATION SEL	Operation selection deviation	0~3	1	1	0：Ramp stop3：continue 1：Coast stop 2：Fast stop	Cannot
		61-05	PG ROTATION SEL	PGrotation	0,1	1	0	0：Phase A leads forward 1：Phase B leads forward	Cannot
		61-06	PG OUTPUT RATIO	PGRotation sel	1~132	1	1	PGB-K2 (1+n/m), n=0,1m=1~32	Cannot
		61-07	PG RAMP PL/1 SEL	Integeal value during accel/decel	0,1	1	0	0：Disabled 1：Enabled	Cannot
		61-08	PG OVERSPD LEVEL	Overspeed detection	1~120	1%	115		Cannot
		61-09	PG OVERSPD TIME	Overspeed delay	0.0~2.0	0.1sec	0.0		Cannot
		61-10	PG DEVIATE LEVEL	Excessive speed deviation detection	0~50	1%	10		Cannot
		61-11	PG DEVIATE TIME	Excessive speed delay time	0.0~10.0	0.1sec	0.5		Cannot
		61-12	PG# GEAR TEETH 1	PG gear teeth 1	0~1000	1	0	Number of PG	Cannot
		61-13	PG# GEAR TEETH 2	PG gear teeth 2	0~1000	1	0	Number of PG	Cannot
		61-14	PGO DETECTION	PGO oper circuit Detection time	0.0~10.0	0.1	2.0		Cannot

Digital		Constant No.	Digital Operator	Constant Name	Setting Range	Min	Factory Setting	Data Selection	RUN
	Multi-function input	T1-01	TERMINAL EF SEL	Multi-function in EF	00~FF	1	24		Cannot
		T1-02	TERMINAL RST SEL	Multi-function in RST	00~FF	1	14		Cannot
		T1-03	TERMINAL MS1 SEL	Multi-function in MS1	00~FF	1	3		Cannot
		T1-04	TERMINAL MS2 SEL	Multi-function in MS2	00~FF	1	4		Cannot
		T1-05	TERMINAL JOG SEL	Multi-function in JOG	00~FF	1	6		Cannot
		T1-06	TERMINAL BX SEL	Multi-function in BX	00~FF	1	8		Cannot
		T2-01	TERMINAL RA SEL	Multi-function in RA-RC	00~FF	1	0		Cannot
		T2-02	TERMINAL Y1 SEL	Multi-function in Y1	00~FF	1	1		Cannot
		T2-03	TERMINAL Y2 SEL	Multi-function in Y2	00~FF	1	2		Cannot
		T3-01	TERM FIV SIGNAL	Signal level FIV	0,1	0	0	0：0~+10V Input 1：-10V~+10V Input	Cannot
		T3-02	TERMINAL FIV GAIN	Gain FIV	0.0~ 1000.0	0.1%	100.0		Can
		T3-03	TERMINAL FIV BIAS	Bias FIV	-100.0~ +100.0	0.1%	0.0		Can
		T3-04	TERM MFI SEL	Signal level MFI	0,1	1	0	0：0~+10V Input 1：-10V~+10V Input	Cannot
		T3-05	TERMINAL MFI SEL	Mulit-function analog input MFI	0~1F	1	0		Cannot
		T3-06	TERMINAL MFI GAIN	Gain MFI	0.0~ 1000.0	0.1%	100.0		Can
		T3-07	TERMINAL MFI BIAS	Bias MFI	-100.0~ +100.0	0.1%	0.0		Can
		T3-08	TERM FIC SIGNAL	Signal level FIC	0,1,2	1	2	0：0~+10V 1：-10V~+10V 2：4~20mA	Cannot
		T3-09	TERMINAL FIC SEL	Mulit-function analog input FIC	0~1F	1	1F		Cannot
		T3-10	TERMINAL FIC GAIN	Gain FIC	0.0~1000.0	0.1%	100.0		Can
		T3-11	TERMINAL FIC BIAS	Bias FIC	-100.0~ +100.0	0.1%	0.0		Can
		T3-12	FILTER AVG TIME	Analog input filter time constant	0.00~2.00	0.01sec	0.00		Cannot

Digital		Constant No.	Digital Operator	Constant Name	Setting Range	Min	Factory Setting	Data Selection	RUN
Terminal Constants	Anaiog input	T4-01	TERMINAL MV+ SEL	Monitor MV+ selection	1~31	1	2		Cannot
		T4-02	TERMINAL MV+ GAIN	Gain MV+ opuput	0.0~2.50	0.01	1.00		Can
		T4-03	TERMINAL MV+ BIAS	Bias MV+ opuput	-10.0~+10.0	0.0%	0.0		Can
		T4-04	TERMINAL MA+ SEL	Monito MA+ selection	1~31	1	3		Cannot
		T4-05	TERMINAL MA+ GAIN	Gain MA+ opuput	0.0~2.50	0.01	0.50		Can
		T4-06	TERMINAL MA+ BIAS	Bias MA+ opuput	-10.0~+10.0	0.1%	0.0		Can
		T4-07	AO LEVEL SELECT	Analog output signal level selection	0,1	1	0	0：0~+10V 1：-10V~+10V	Cannot
	MODBUS	T5-01	SERIAL COMM. ADR	MODBUS Station address	0~1F	1	1F		Cannot
		T5-02	SERIAL BAUD RATE	MODBUS speed	0~4	1	3	0：1200BPS ◦ 1：2400BPS 2：4800BPS ◦ 3：9600BPS 4：19200BPS	Cannot
		T5-03	SERIAL COM SEL	Parity selection	0,1,2	1	0	0：No parity 1：Even parity 2：Odd parity	Cannot
		T5-04	SERIAL FAULT SEL	Stopping method after com error	0~3	1	3	0：Deceleration stop 1：Coast to stop 2：Emergency stop 3：continue operation	Cannot
	overload	P1-01	MOL FAULT SELECT	Protection selection	0,1	1	1	0：Disabled 1：Enabled	Cannot
		P1-02	MOL TIME CONST	Protection time	0.1~5.0	0.1	1.0		Cannot
		P2-01	PWRL SELESCTION	Momentary power loss detection	0,1,2	1	0	0：Disabled 1：Enabled 2：Enabled operating	Cannot
	Power Loss	P2-02	PWRL RIDETHRU T	Ridethru time	0.0~2.0	0.1sec	0.7*2	*2	Cannot
		P2-03	PWRL BASEBLOCK T	Min.baseblock time	0.0~5.0	0.1sec	0.5*2	*2	Cannot
		P2-04	PWRL V/F RAMP T	Voltage recovery time	0.0~2.0	0.1sec	0.3*2	*2	Cannot
		P2-05	PUV DET LEVEL	Undervoltage	150~210	1V	190*3	*3：440V setup 220 *2	Cannot
		P2-06	KEB FREQUENCY	Deceleration rate	0.0~100.0	0.1	0.0		Cannot

Digital		Constant No.	Digital Operator	Constant Name	Setting Range	Min	Factory Setting	Data Selection	RUN
Protection Constants	Stall Prevention	P3-01	STALLP ACCEL SEL	Stall prevention During accel	0,1,2	1	1	0：Disabled 1：Enabled	Cannot
		P3-02	STALLP ACCEL LVL	Stall prevention level During accel	0~200	1%	150		Cannot
		P3-03	STALLP CHP LVL	Stall prevention limit During accel	0~100	1%	100*4	*4：11-02	Cannot
		P3-04	STALLP DECEL SEL	Stall prevention During decel	0,1,2,3	1	1	0：Disabled 1：Enabled	Cannot
		P3-05	STALLP RUN SEL	Stall prevention Selection During running	0,1,2	1	1	0：Disabled 1：Enabled (31-02) 2：Enabled (31-04)	Cannot
		P3-06	STALLP RUN LEVEL	Stall prevention Level during run	30~200	1%	160		Cannot
	Reference Detection	P4-01	SPD AGREE LEVEL	Detection levrl	0.0~400.0	0.1HZ	0.0		Cannot
		P4-02	SPD AGREE WIDTH	Detection width	0.0~20.0	0.1HZ	2.0		Cannot
		P4-03	SPD AGREE LVL + -	Detection levrl (+/-)	0.0~±400.0	0.1HZ	0.0		Cannot
		P4-04	SPD AGREE WDTH +-	Detection width (+/-)	0.0~20.0	0.1HZ	2.0		Cannot
		P4-05	REF LOSS SEL	Operstion frequency reference is missing	0,1	1	0	0：Stop 1：operation 80% continues	Cannot
	Torque Detection	P5-01	NUM OF RESTARTS	Number at auto restart attempts	0~10	1	0		Cannot
		P5-02	RESTART SEL	Auto restart operation selection	0,1	1	0	0：Not output 1：output	Cannot
		P6-01	TORQ DET 1 SEL	Torque detection selection 1	0~4	1	0	0：over Det Disabled 1：Det during speed agree only/ operation continues after Det 2：Det during run operation continues after Det 3：Speed Inv output is off 4：Run Inv output is off	Cannot
		P6-02	TORQ DET 1 LVL	Torq detection levrl1	0~300	1%	150		Cannot
		P6-03	TORQ DET 1 TIME	Torq detection time1	0.0~10.0	0.1sec	0.1		Cannot
		P6-04	TORQ DET 2 SEL	Torq detection selection 2	0~4	1	0	0：over Det Disabled 1：Det during speed agree only/ operation continues after Det 2：Det during run operation continues after Det 3：Speed Inv output is off 4：Run Inv output is off	Cannot
		P6-05	TORQ DET 2 LVL	Torq detection levrl2	0~300	1%	150		Cannot
		P6-06	TORQ DET 2 TIME	Torq detection time2	0.0~10.0	0.1sec	0.		Cannot

Digital		Constant No.	Digital Operator	Constant Name	Setting Range	Min	Factory Setting	Data Selection	RUN
Protection Constants	Torque Limit	P7-01	TORQ LIMIT FWD	Forward torque limit	0~300	1%	200		Cannot
		P7-02	TORQ LIMIT REV	Reverse torque limit	0~300	1%	200		Cannot
		P7-03	TORQ LMT FWD RGN	Forward regeneration torque limit	0~300	1%	200		Cannot
		P7-04	TORQ LMT REV RGN	Reverse regeneration torque limit	0~300	1%	200		Cannot
	Hardware Protection	P8-01	DB RESISTOR PROT	Protect selection INT DB resistor	0,1	1	0	0 ：Disabled 1 ：Enabled	Cannot
		P8-02	OH PRE-ALARM LVL	OH pre-alarm level	50~110	1deg	95		Cannot
		P8-03	OH PRE-ALARM SEL	OH selection pre-alarm	0~3	1	3	0：Decelerate to stop time 1：Coast to stop 2：Fast stop time 3：Contioue operation	Cannot
		P8-05	PH LOSS IN SEL	Input oper-phase protection selection	0,1	1	0	0：Disabled 1：Enabled	Cannot
		P8-07	PH LOSS OUT SEL	output oper-phase protection selection	0,1	1	0	0：Disabled 1：Enabled	Cannot
		P8-10	GROUND FAULT SEL	Ground protection selection	0,1	1	1	0：Disabled 1：Enabled	Cannot
Operator constants	Monitor Select	O1-01	USER MONITOR SELECT SEL	Montitor selection	4~29	1	6		Can
		O1-02	POWER-ON MONITOR	Montitor selection tion after opwer up	1~4	1	1	1：Frequency reference 2：output Frequency 3：Output current 4：monitor item set	Can
		O1-03	DISPLAY SCALING	Freq units setting	0~39999	1	0	Freq units reference setting monitor	Cannot
		O1-04	DISPLAY UNITS	Freq units setting	0,1	1	0	0：HZ 1：r/min	Cannot
		O2-01	PANEL/REMOTE KEY	PANEL／LOCAL key	0,1	1	1	0：Disabled 1：Enabled	Cannot
	Multi-function	O2-02	OPERS STOP KEY	STOP key during control circuit operation	0,1	1	1	0：Disabled 1：Enabled	Cannot
		O2-03	USER DEFAULTS	User constant initial value	0,1,2	0	0	0：stores not set 1：begins storing 2：all clear	Cannot
		O2-05	OPERATOR M.O.P.	Freq reference Set method	0,1	1	0	0：ENTER key needed 1：ENTER key not needed	Cannot
		O2-06	OPER DETECTION	Operation selection when digital operator disconnected	0,1	1	0	0：Disabled 1：Enabled	Cannot
		O2-07	ELAPSED TIME SEL	Cumulative operation time set	0~65535	1hour	_		Cannot
		O2-08	ELAPSED TIME RUN	Cumulative operation time selection	0,1	1	0	0：Cumulative power on 1：Cumulative inverter run time	Cannot