



# PTLK INVERTER

## **TEKDRIVE TDS-F8**

### **INSTRUCTION MANUAL**

**220V Class 1 $\phi$  0.5 ~ 2HP**

**220V Class 3 $\phi$  0.5 ~ 2HP**

Please hand this manual to the end-users. It will be of great help for their daily operation, maintenance, inspection and troubleshooting.

■ Warning and Caution:



**Danger**

1. Be sure to turn off the main circuit power before any wiring work is to conduct.
2. Do not touch the circuit or replace any component right after turning off the power source, until the discharge time is greater than 1 minute after operator's LED off. Because the high voltage is still in the inverter during discharging.
3. Never connect the output terminals U/T1, V/T2, W/T3 to AC power supply by mistake.
4. Never attempt to modify or alter the inverter.



**Warning**

1. Do not perform voltage withstand tests on the inverter.
2. All the parameters of the inverter have been preset at the factory. Do not change the settings unnecessarily.
3. Install a (or more) cooling fan to keep the temperature below 45°C, when mounting the inverter in enclosure.



**Caution**

1. Read this manual before installation, operation and maintenance, and make sure to be proceeded by authorized personnel.
2. Verify if the model types is same as your expectation.
3. Do not install the inverter with any damaged or missing part.
4. Each inverter shall be attached with QC marking. Do not install the inverter without QC marking.

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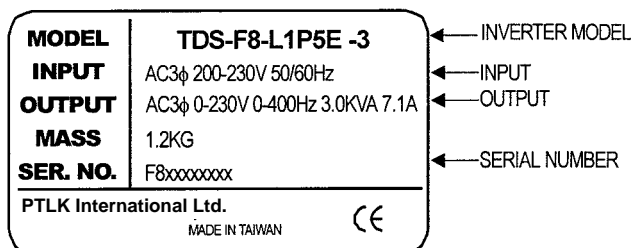
Thank you so much of adopting the TEK-DRIVE multi-function IGBT inverter **TDS-F8**. This manual firstly describes the correct application of handling, wiring, operating, specification, and maintenance/inspection. Then, the manual explains the digital operator performance, parameter setting, operation, troubleshooting, etc. Before using the TDS-F8, a thorough understanding of this manual is recommended for maintenance, troubleshooting and inspection. Please keep this manual in a secure and convenient place for any future reference.

## 1. TDS-F8 Handling Description

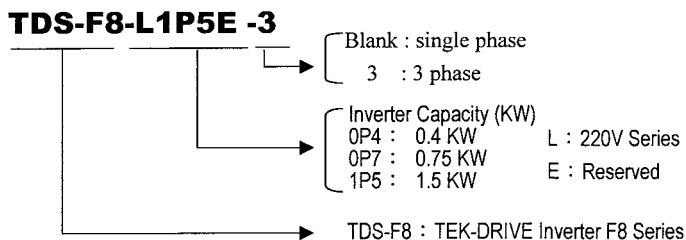
### 1-1 Inspection Procedure on Receiving

Before delivery, every TDS-F8 inverter has been passed the demanding function test. After receiving the inverter, the customer should take it out and follow the below procedure:

- Verify that the model No. of the inverter you've received is the same as the model No. listed on your purchase order. (Please read the nameplate.)
- Observe the condition of the shipping container and report any damage immediately to the commercial carrier that have delivered your inverter.



**Inverter Model Number:**



## 1-2 Installation Orientation and Space

Always provide the following installation space to allow normal heat dissipation.

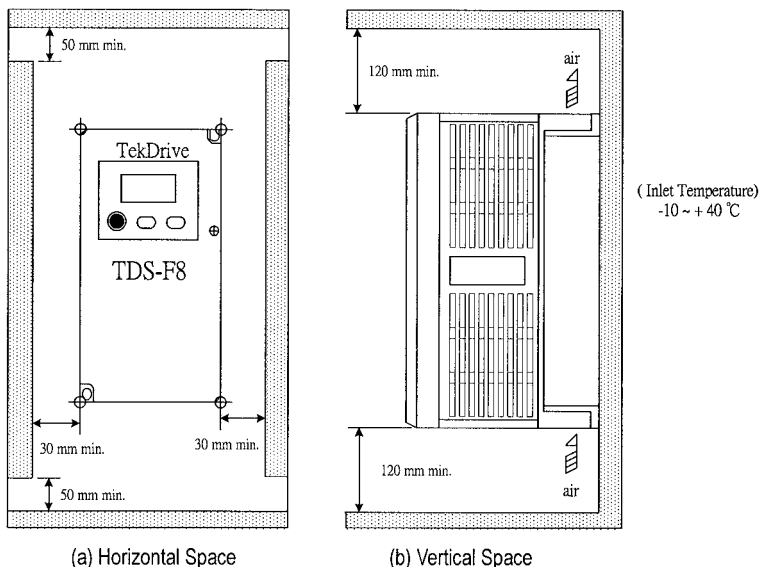


Figure 1-2: TDS-F8 Installation Orientation and Space

## 1-3 Checking and Controlling the Installation Site

It is important for the installation site of inverter to achieve proper performance and normal operating life. Followings are the conditions need to be considered:

- Use only within the ambient temperature range:  $-10^{\circ}\text{C} \sim +40^{\circ}\text{C}$ .
- Install inverter in a location free from rain, moisture and not in direct sunlight.
- Install inverter in a location free from harmful mists, gases, liquids, dusts and metallic powder.
- Install inverter in a location without excessive oscillation and electromagnetic noise.
- When more than 1 inverter are installed in a box, be sure to add a cooling fan or air conditioner to keep the ambient temperature below  $+40^{\circ}\text{C}$ .

## 1-4 Stock Site (or Warehouse) Notice

- Must be put in free dust and dry place.
- Ambient temperature must be within  $-20^{\circ}\text{C}$  to  $+60^{\circ}\text{C}$ .
- Relative humidity (RH) must be less than 90%RH, with no condensation.
- Free from harmful mists, gases, liquids, airborne dusts and metallic particles.
- Properly packaged on the on the case or table above the ground.

## 1-5 Standard Specifications

Item		Specification		
Input Voltage		220V / 1 $\phi$ / 3 $\phi$		
Model Number		TDS-F8-L□□□E-3		
		0P4	0P7	1P5
Max. Applicable Motor Output	HP	0.5	1	2
	KW	0.4	0.75	1.5
Output Power	Rated Output Capacity (kVA)	1.4	2	3
	Rated Output Current (A)	3.2	4.8	7.1
	Maximum Output Voltage (V)	Three-Phase 200~230V		
	Maximum Output Frequency (Hz)	Through Parameter Setting (Maximum 400 Hz)		
Power Source	Rated Voltage, Frequency	1 / 3 $\phi$ 200V~230V, 50/60Hz		
	Allowable Voltage Fluctuation	-15% ~ +10%		
	Allowable Frequency Fluctuation	±5%		
Control Characteristics	Operation Mode	LED Operator		
	Control Mode	Sine Wave PWM		
	Frequency Control Range	0.1Hz~400Hz		
	Frequency Accuracy (Varied with Temperature)	Digital Command : ±0.01% (-10~+40°C), Analog Command : ±0.1% (25°C ±10°C).		
	Frequency Command Resolution	Digital Command: 0.1Hz, Analog Command: 0.06Hz/60Hz.		
	Output Frequency Resolution	0.01Hz		
	Frequency Setting Signal	DC 0~+10V / 4~20mA		
	Acc./Dec. Time	0.0~999.9 second (Independent Acc./Dec. Time Settings)		
	Voltage, Frequency Characteristics	Adaptable V/f Through Parameter Setting		
	Main Control Function	Automatic Torque Boost, Slip Compensation, Restart After Momentary Power Loss, PID Control, Simple PLC Function.		
Protective Functions	Other Functions	Up/Down Operation, 4 Different Sets of Fault Status Record (Including Latest One), Cumulative Power-On & Operation Time Records, RS-485 Communication, Pulse Output Port, 1 Analog Output Port, etc.		
	Stall Prevention	During Acceleration, Deceleration and Constant Speed Operation. (Current Level can be Selected During Acceleration and Constant Speed Operation. During Deceleration, Stall Prevention can be Enabled or Disabled).		
	Instantaneous Over Current (OC)	200% of Inverter Rated Current		
	Inverter Over Load Protection	Motor Coasts to Stop after 1 Minute at 150% Rated Output Current.		
Protective Functions	Motor Over Load Protection	Electronic Overload Protection		

	Over Voltage (OV) Protection	Motor Coasts to Stop if $VDC \geq 410V$ .	
	Under Voltage (UV) Protection	Motor Coasts to Stop if $VDC \leq 190V$ (Can be Determined).	
	Momentary Power Loss Ride-Through time	Momentary Power Loss Lasting $\geq 15ms$	
	Over Heat (OH) Protection	Protection by Thermistor	
Mechanical Construction		Enclosed, Wall-Mounted Type (NEMA-1)	
Cooling Method		Self-Cooling	Forced Air-Cooled
Weight (kg)		1.2	
Environment Conditions	Location	Indoor (Protected from corrosive gas and dust)	
	Ambient Temperature	-10 to +40°C (Non-frozen)	
	Storage Temperature	-20 to +60°C	
	Relative Humidity	Below 90%RH (Non-condensing)	
	Altitude and Vibration	Below 1000 m, less than $5.9m/s^2$ (0.6G). (JISC0911 Standard)	
Communication Function		RS-485 built in (MODBUS Protocol)	
EMI		Meet EN50081-2 (1994) With Specified EMI Filter	
EMC Compatibility		Meet Pr EN50082-2	

## 1-6 Dimensions

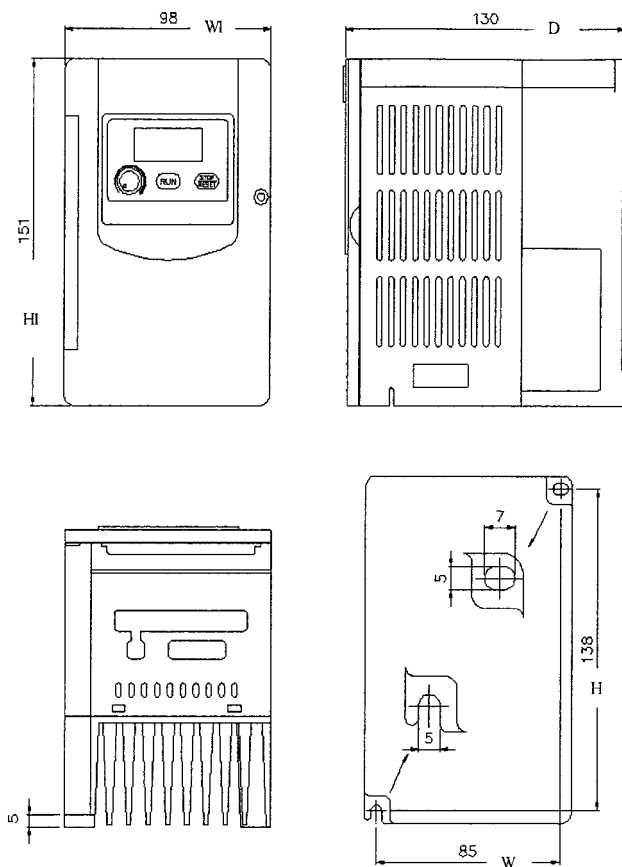


Figure 1-6: Dimensions

Voltage	Max. Applicable Motor Output (HP)/(KW)	Mounting Dimensions (mm)			External Dimensions (mm)			Approx. Mass (kg)
		W	H	D	W1	H1	D	
220V 1/3Ø	0.5HP/0.4KW	85	138	130	98	151	130	1.2
	1HP/0.75KW							
	2HP/1.5KW							



## 1-7 Each Part and Wiring Explanation

### 1-7-1 Each Part Explanation

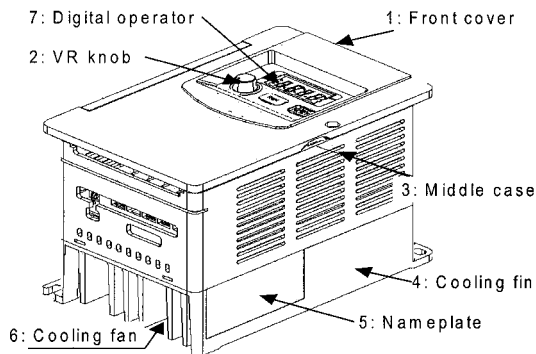
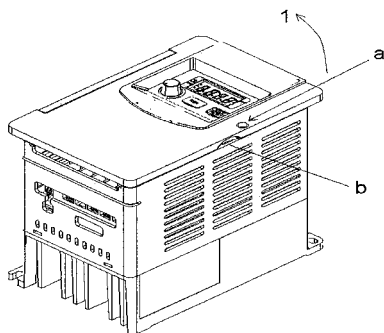


Figure 1-7-1: TDS-F8 Each Part Explanation

### 1-7-2 Wiring Explanation



Wiring explanation:

When we start to conduct TDS-F8 wiring work, firstly loose the screw in (a) place, and then open the front cover from (b) place along the (1) direction. When the front cover is opened as show (2), then we can continue wiring work.

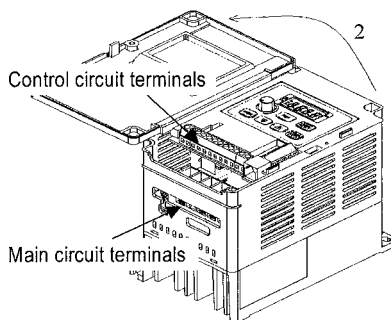
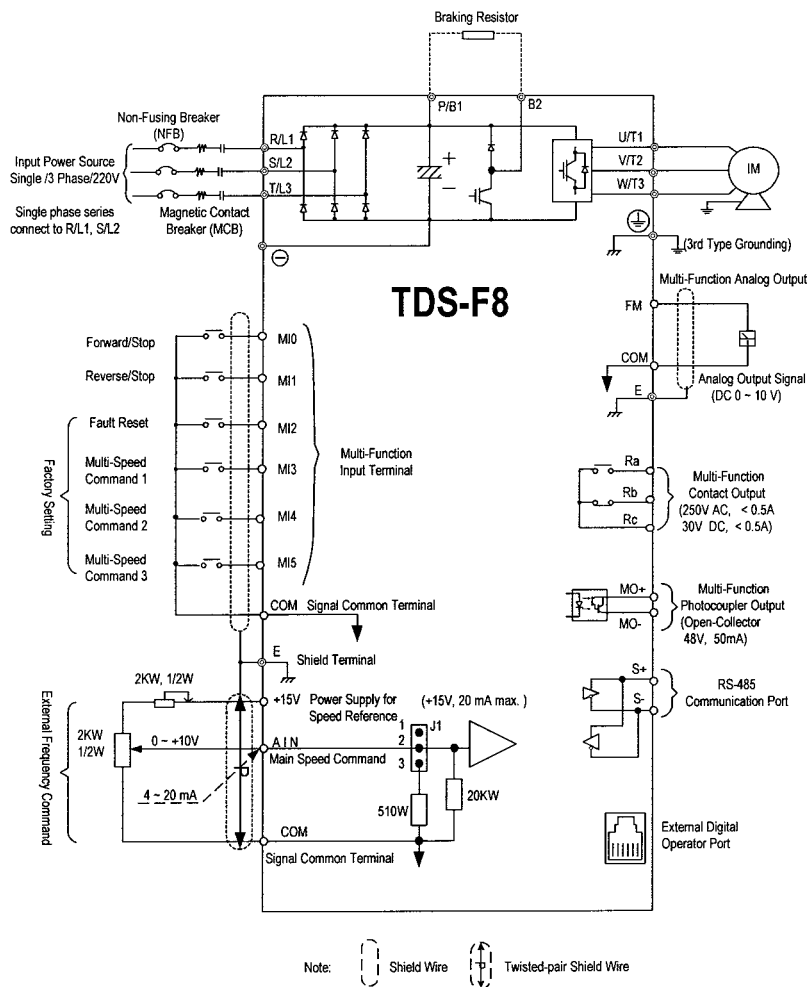


Figure 1-7-2: TDS-F8 Wiring Explanation

## 2. Wiring

### 2-1 Standard Connection Diagram



(◎ : indicates main circuit's terminal, ○ : indicates control circuit's terminal)

Figure 2-1: Standard Connection Diagram

## 2-2 Wiring Main Circuit Terminals and Control Circuit Terminals

### 2-2-1 Main Circuit Terminals

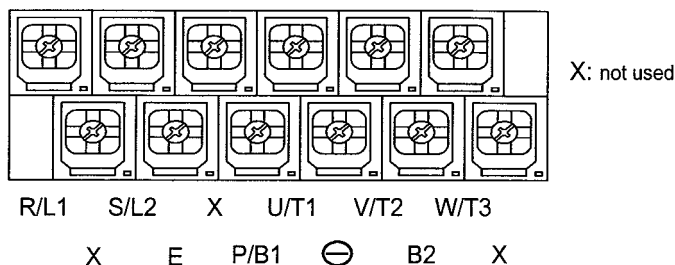


Figure 2-2-1: 1PH Main Circuit Terminals

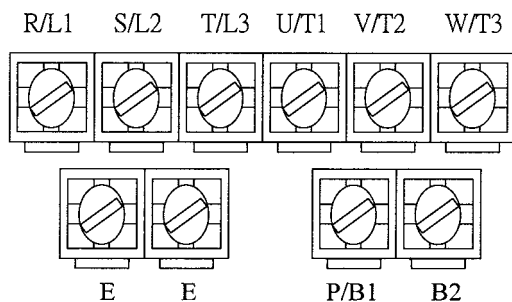


Figure 2-2-1a 3PH Main circuit terminals

#### Main Circuit Terminals Function Description

Terminal	Function
R/L1 S/L2 T/L3	Power Source, Single Phase. Connect to the R/L1,S/L2
$\ominus$ P/B1 B2	P/B1 , B2 : Connect to External Braking Resistor. P/B1 , $\ominus$ : Connect to DC Power Supply Input.(For 1 $\Phi$ series)
U/T1 V/T2 W/T3	Connect to 3 Phase Inductor Motor.
E	Grounding (3rd type grounding, 100 $\Omega$ Below)

## 2-2-2 Control Circuit Terminals

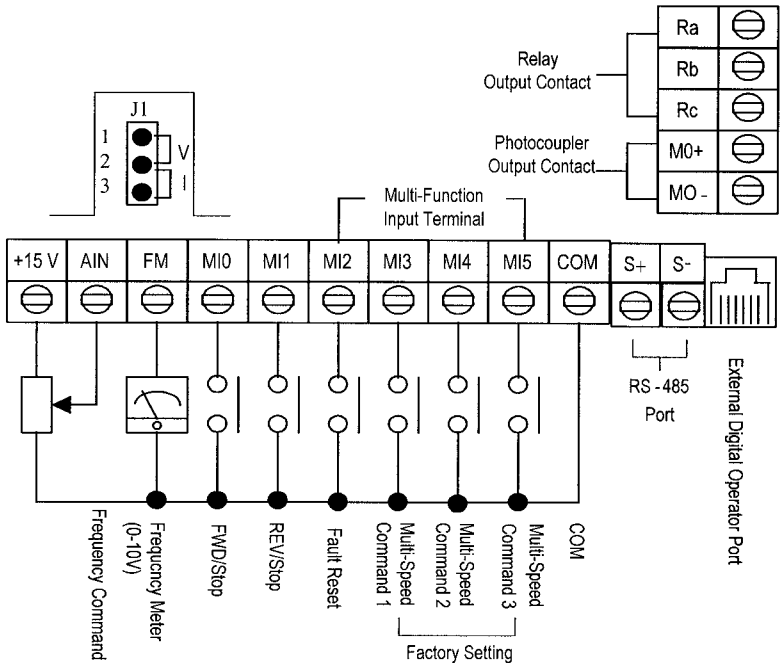


Figure 2-2-2: Control Circuit Terminals

Control Circuit Terminals Function Description

Terminal	Function	Electric Characteristics
MI0	Forward / Stop Operation	Maximum sink current is 6mA for each terminal input.
MI1	Reverse / Stop Operation	
MI2	Multi-Function Digital Input Ports: 3 –Wire Operation, Local/Remote Control, Multi-Speed Select, Accel/Decel time Choice, Accel/Decel Holding, Base-Block, Over Heat Warn, PID Control, Speed Search, Up/Down Function, External Fault, Timer Function.	
MI3		
MI4		
MI5		
COM	Common	
+15V	Power Supply for Setting the Speed	+15V / 20mA max.

AIN	Main speed command (Voltage or Current signal)		0~10V/4~20mA
FM	Multi-Function Analog Output Port: Frequency Command, Output Frequency, Output Current, Output Voltage, DC Voltage, PID Controlled Value, Analog Command Input of AIN.		0~10V
Ra	Multi-Function	Relay Contact Output A	250VAC, 0.5A Below 30VDC, 0.5A Below
Rb	Relay Output	Relay Contact Output B	
Rc	Terminal	Relay Contact Common	
MO+	Multi-Function Open-Collector Transistor Output	Output Indications: During running, Zero Speed, Frequency Agreed, Frequency Setting Agree, Ready, Under Voltage Detections, Base Block, Operating Mode, Over Torque Detection, Frequency Command missing, Fault, Under Voltage, Over Heat, Motor Over Load, Inverter Over Load, During Retry, Communication Fault, Timer Function Output.	48V/max · 50mA max
MO-	Multi-Function Open-Collector Transistor Common		
S+	RS-485 Communication Port		RS-485 Signal Characteristics
S-			
J1	Input Signal Selection Jumper	Select the type of analog input signal: 1-2 : 0~10V 2-3 : 4~20mA	



## Caution

- Using Control circuit terminal AIN as main speed command, please see J1 Jumper and parameter (4-03) setting usage.
- The maximum output current at terminal (+15V) is 20mA.
- The multi-function analog output terminal FM is a dedicated output for a frequency meter, ammeter, etc. Do not use this analog output for feedback control or for any other control purpose.

## 2-3 Wiring Precautions

### (A) Control circuit wiring:

- (1) Separate the control circuit wiring from main circuit wiring (R/L1, S/L2, U/T1, V/T2, W/T3) and other high-power lines to avoid noise interruption.
- (2) Separate the wiring for control circuit terminals Ra-Rb-Rc (contact output) from wiring for terminals MI0~MI5, FM, COM, MO+, MO-, and +15V, AIN, S+, S-.
- (3) Use the twisted-pair or shielded twisted-pair cables for control circuits to prevent operating faults. Process the cable ends as shown in Figure 2-3-1. The max. Wiring distance should not exceed 50 meter.

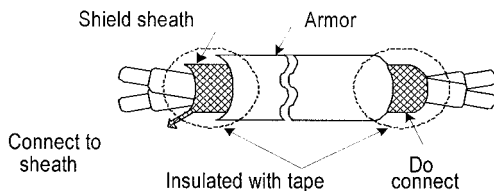


Figure 2-3-1: Processing the ends of twisted-pair cables

- (4) When the digital multi-function output terminals connect serially to an external relay, an anti-parallel freewheeling diode should be applied at both ends of relay, as shown below.

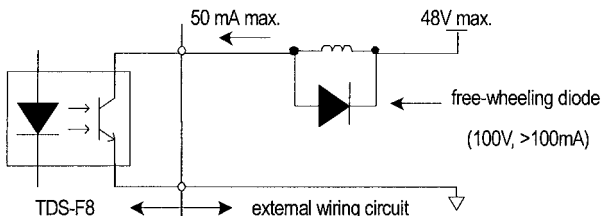


Figure 2-3-2: The Photocoupler output connects to external inductive load

### (B) Wiring the main circuit terminals:

- (1) Input power supply can be connected to any terminal R/L1, S/L2 on the terminal block. The phase sequence of input power supply is irrelevant to the phase sequence.
- (2) Never connect the AC power source to the output terminals U/T1, V/T2 and. W/T3.
- (3) Connect the output terminals U/T1, V/T2, W/T3 to motor lead wires U/T1, V/T2, and W/T3, respectively.
- (4) Check that the motor rotates forward with the forward run source. Switch over any 2 of the output terminals to each other and reconnect if the motor rotates in reverse with the forward run source.
- (5) Never connect a phase advancing capacitor or LC/RC noise filter to an output circuit.

### (C) Grounding:

- (1) Always use the ground terminal (E) with a ground resistance of less than  $100\Omega$ .
- (2) Do not share the ground wire with other devices, such as welding machines or power tools.
- (3) Always use a ground wire that complies with the technical standards on electrical equipment and minimize the length of ground wire.
- (4) When using more than one inverter, be careful not to loop the ground wire, as shown below.

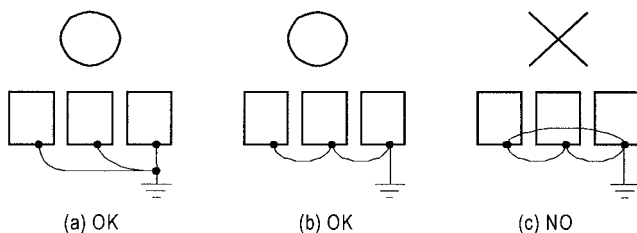


Figure 2-3-3: TDS-F8 Ground Winding

**(d) Others:**

- (1) Determine the wire size for the main circuit so that the line voltage drop is within 2% of the rated voltage. (If there is the possibility of excessive voltage drop, use a larger wire suitable to the required length)
- (2) Installing an AC reactor  
If the inverter is connected to a large-capacity power source (600kVA or more), install an optional AC reactor on the input side of the inverter. This also improves the power factor on the power supply side.
- (3) If the cable between the inverter and the motor is long, the high-frequency leakage current will increase, causing the inverter output current to increase as well. This may affect peripheral devices. To prevent this, adjust the carrier frequency, as shown below:

Cable length	< 30m	30m ~50m	50m ~100m	$\geq 100m$
Carrier frequency (2-06)	15kHz max (2-06=6)	10kHz max (2-06=4)	5kHz max (2-06=2)	2.5kHz (2-06=1)

## 2-4 Wiring Main Circuit and Notice

The Non-Fusing-Breaker (NFB) should be installed between the AC source and the R/L1-S/L2 input terminal of TDS-F8 inverter. The user can make his own decision of installing Magnetic Contact Breaker (MCB) or not. To protect against the false triggering of leakage-current, the user should install a leakage current breaker with amperage sensitivity  $\geq 200\text{mA}$  and operation time  $\geq 0.1\text{ sec}$ .

Table 2-4 : Wiring Peripheral Units Compatible to Main Circuit and Their Precaution Items

Applicable Power Rating HP(KW)	TDS-F8 Rating		Wire Size (mm <sup>2</sup> )			No-Fusing Breaker *3	Magnetic Contactor *3
	KVA	Current (A)	Main Circuit *1	Ground Wire E[G]	Control Wire *2		
0.5(0.4)	1.4	3.2	2~5.5	2~5.5	0.5~2	TO-50E (15A)	C-11L
1(0.75)	2	4.8	2~5.5	2~5.5	0.5~2	TO-50E (15A)	C-11L
2(1.5)	3	7.1	2~5.5	3.5~5.5	0.5~2	TO-50E (20A)	C-11L

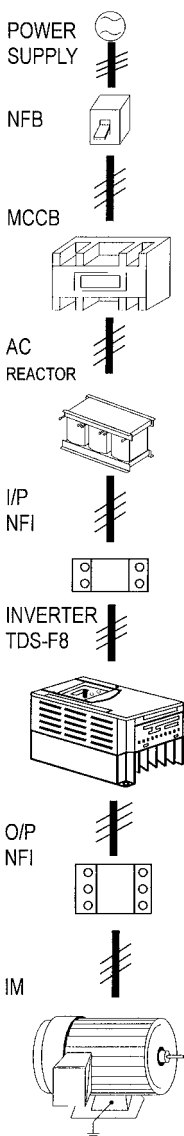
\*1 : Main circuit terminals contains R(L1), S(L2), U(T1), V(T2), W(T3), P/B1,  $\theta$ , B2.

\*2 : The control wire is the wire led to the pin terminals of control board.

\*3 : In the table, the specified Part Number of "No-Fusing Breaker and Magnetic Contactor" are the item No. of Taian products, but the customer can use the same rating of similar products from other sources. To decrease the noise interference, be sure to add R-C surge suppressor (0.1uf/1000VDC, 10 $\Omega$ /5W) at the 2 terminals of coils of electromagnetic contractor.



## 2-5 System Wiring Diagram



- **Power supply switch(NFB) and earth leakage breaker**
  - Choose the power supply switch(NFB) of proper current rating.
  - Do not use the power supply switch(NFB) as the switch that the inverter is used to control the running or stop of motor.
  - When the earth leakage breaker installed to protect the leakage current fault, be sure that the earth leakage breaker has the sensitivity amperage  $\geq 200\text{mA}$  per inverter and operation time  $\geq 0.1$  sec to avoid false-triggering.

- **Electromagnetic contactor**
  - In normal operation, you don't need an electromagnetic contactor. However, you need to install an electro-magnetic contactor while in the case of sequence control through the external device or automatically re-start after power outage.
  - Do not use the electromagnetic contactor as the switch that control the operation of running or stop.

- **AC reactor**
  - The AC-side reactor on the input AC side can improve the power factor and suppress the surge current.

- **Input noise filter**
  - TDS-F8 will comply with the EN55011 class A regulation if an input noise filter (specified by SCHAFFNER) is used.
  - Please refer to the selection Appendix 7.3

- **TDS-F8 inverter**
  - Input power supply can be connected to any terminal R/L1, S/L2, on the terminal block. The phase sequence of input power supply is irrelevant to phase sequence.
  - Please connect the ground terminal E to the site ground securely.

- **Zero phase core**
  - Install the zero phase corer to eliminate noise transmitted between the power line and the inverter.
  - Please refer to the selection Appendix 7.5.

- **Induction motor**
  - If one inverter is to drive more than one motors, the inverter's rated current should be much greater than the sum of total current of motors while in operation.
  - The inverter and the motor should connect to the ground separately.

Figure 2-5: TDS-F8 Inverter System Wiring Diagram

### 3. TDS-F8 Operation Instruction

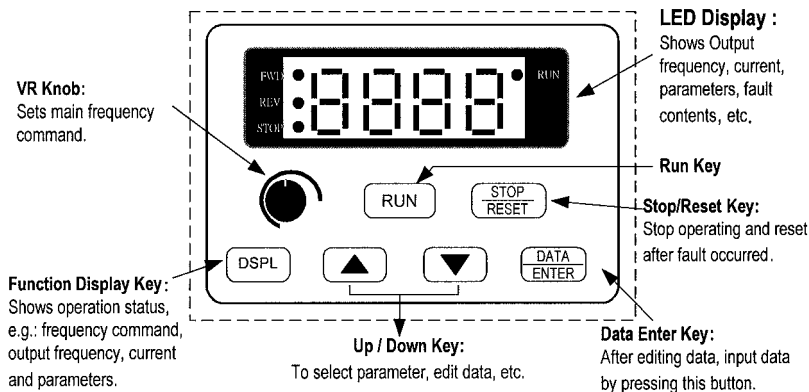
#### 3-1 Keypad

TDS-F8 operation has 2 modes: DRIVE mode and PRGM mode. In DRIVE mode, the running operation like status monitor, FWD run, REV run, stop and jog command can be executed. In PRGM mode, the parameter settings can be operated, but the running operation is disabled. Only the inverter is stopped. DRIVE and PRGM mode can be exchanged.

TDS-F8 digital operator has 2 different types:




- (1). Embedded digital operator: located in the center of inverter. It consists of a VR knob, keypad and LED display. The VR knob can be the main frequency command source by setting parameter (2-02=3); the keypad is an interface for user to input commands or edit data; LED display shows inverter's operation status and parameters information.
- (2). Remote digital operator (TMCA-V8 LED): with extension cable is used for remote control. It is an optional part. When using the remote digital operator, inverter's operation control will automatically be transferred to remote digital operator. In this case, the embedded digital operator can only monitor inverter operation status. The remote digital operator will now take over controlling/commanding inverter and all the setting function of parameters. And, the embedded digital operator cannot set the parameters value and operate/command the inverter.

The outline of embedded digital operator is shown below.



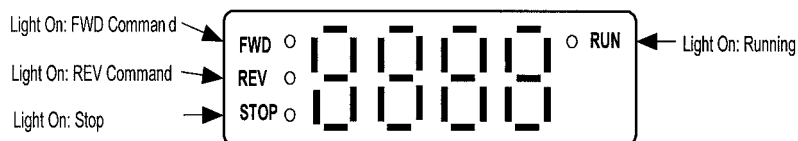
The keypad of embedded digital operator has 6 function keys. They are explained as follows.

Operation Keys	Title	Function Explanation
	Data Enter Key	After editing the parameter, the data will be written/stored by pressing this button.
	Function Display Key	Displays information about inverter operation status, such as: frequency command, output frequency, output current and parameter values.
	Up Key	Selects menu function, parameter groups and monitor items, and increases setting values.

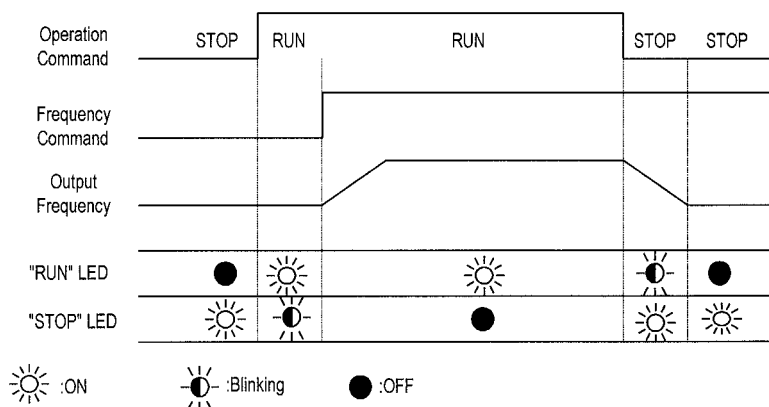
	Down Key	Selects menu function, parameter groups and monitor items, and decreases setting values.
	Run Key	Press this key under DRIVE mode will make the inverter start to run.
	Stop/Reset Key	Stop running. Also, act as the reset key after faults occurred.

### 3-2 LED Display












The LED display consists of four 7-segment LED and four LED indicator lights. The four 7-segment LED shows the frequency command, parameters, status, etc., and the displayed contents are described in next paragraph. Four LED indicator lights have 2 running direction indicators (FWD & REV) and other 2 operation status indicators (RUN & STOP). Under "PRGM" Mode, all 4 LED indicator lights are turned off. Under "DRIVE" Mode, 4 LED indicator lights are described as below.



Based on the operating status, RUN and STOP indicator lights can be divided into three modes: 'On', 'Blinking', 'Off', as described in the below operation.



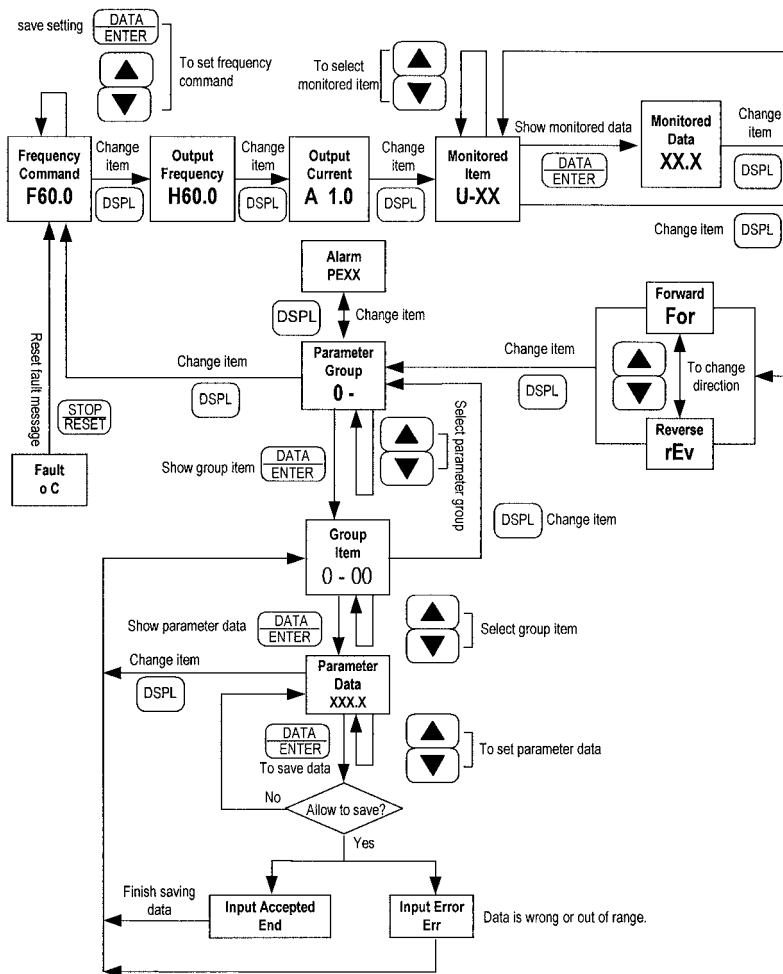
### 3-3 Displayed Contents

Displayed Message	Description
	Show inverter's frequency command setting.
	Show inverter's output frequency.
	Shows inverter's output current at the output sides of U, V, and W.
	Show 10 <sup>th</sup> monitored item.
	Show forward rotation command.
	Show reverse rotation command.
	Shows '0' parameter group title.
	Show the 2 <sup>nd</sup> item of parameter group '0'.
	Show the value contents of parameter command item.
	If "End" message is shown in display area (as shown by the left picture) for about one minute, it means the data has been written/accepted and automatically saved in memory.
	It will appear when the data entered is not accepted or the key-in value has exceeded the specified range.

Other warnings and fault messages, please see Chapter 6 'Fault Display and Troubleshooting' for more details.

### 3-4 Keypad Operations

Every TDS-F8 has the embedded digital operator. For remote operation, the user needs to buy the TMCA-V8LED remote digital operator with its extension cable. Their different operation will be explained as follows.



(A) The Operation/Display Mode of Embedded Digital Operator



## 4. TDS-F8 Parameter Explanation

TDS-F8's parameters are divided into 11 groups. The parameter groups are shown as follows:

- |  |                            |
|--|----------------------------|
| 0: User Parameter                      | 6: Protection Parameter    |
| 1: Basic Parameter                     | 7: Motor Parameter         |
| 2: Operating Method Parameter          | 8: Special Parameter       |
| 3: Output Function Parameter           | 9: Communication Parameter |
| 4: Input Function Parameter            | U: Monitor Parameter       |
| 5: Multi-Speed and Auto-Run Parameters |                            |

### Parameter Explanation

☉ : All having ↗ of parameter can be set while running operation (DRIVE Mode)

#### 0 : User Parameter

0-01 : Unit Displayed by Digital Operator		Factory Setting	0
Setting Value	Contents Displayed by Operator		
0	Displayed Unit: <b>0.1Hz</b>		
1	Displayed Unit: <b>0.1%</b> (base on 1-03 as 100.0% )		
0002~0999	The fourth digit is 0 ⇒ none digit after decimal point Operator displays: <b>XXX</b> For example: 0-01=0500, then displayed 500 at 100% speed.		
1000~1999	The fourth digit is 1 ⇒ one digit after decimal point Operator displays: <b>XX.X</b> For example: 0-01=1300, then displayed 30.0 at 100% speed.		

0-02 : Monitor Item after Power On		↗	Factory Setting	00
Setting Value	Displayed Item	Description		
0	Frequency Command	After the power on, inverter is operated in DRIVE Mode, and the displayed item of operator is according to (0-02) setting value.		
1	Output Frequency			
2	Output Current			

## 1 : Basic Parameter

1-01 : Inverter Capacity		Factory Setting	#
Setting Range	Description		
01~03	When the control board of inverter is replaced, we should be according to the inverter's capacity, select the proper value from the table below to reset.		

# Depends on inverter's model

Table 4-1 : Inverter Capacity and Setting Value

(1-01) Setting Value	01	02	03
Inverter Rated Capacity (KVA)	1.4	2	3
Inverter Rated Current (A)	3.2	4.8	7.1
Maximum Applicable Motor Capacity (HP)	0.5	1	2
Motor Rated Current (A)	1.8	3.4	6.1

## 1-02 : Factory Setting Selection

Setting Value	Description
00	Parameter can be set and monitor
01	(0-01), (0-02), (1-02), (1-16) & (5-01)~(5-08) can be set, the others can be monitor only.
02	Reserved
03~08	Reference below table 4-2
09~10	Reserved
11	Clear fault message
12~14	Reserved

Table 4-2 : Constant Initialization by Power Source and External Wiring Operation Method

(1-02) Setting Value	Function		Description
	Terminal function Initialization	V/F #	
03	2-Wire	220V · 60Hz	Except the parameter of 1-01, the parameter groups can be initialized as factory setting according to the different motor's voltage/frequency. At the same time, the terminal MI0~MI2 can be set as 2-wire or 3-wire operation mode under different setting of 1-02. Please see 2/3-wire operation mode (Figure 4-10 and Figure 4-11-1).
04	3-Wire	220V · 60Hz	
05	2-Wire	200V · 60Hz	
06	3-Wire	200V · 60Hz	
07	2-Wire	220V · 50Hz	
08	3-Wire	220V · 50Hz	

# Depends on motor's nameplate



# 1-03~1-09 : V/F Pattern

Parameter		Setting Range	Unit	Factory Setting	Description
1-03	Max. Output Frequency	50.0~400.0Hz	0.1Hz	60.0Hz	<ul style="list-style-type: none"> <li>At low speed operation (&lt;3Hz), a larger torque can be generated by increasing the slope of V/F curve. However, the motor will be hot due to over-excitation. At the same time the inverter will be more inclined to fault. Based on the applied load, properly adjust the V/F curve according to the motor's current.</li> <li>The four frequency and three voltages settings must satisfy the following relationship, otherwise an error message "PE04" will display.  <math>(1-03) \geq (1-05) &gt; (1-06) \geq (1-08)</math>  and  <math>(1-04) \geq (1-07) &gt; (1-09)</math>. </li> <li>If Mid. Output Frequency (1-06) = Min. Output Frequency (1-08), the setting (1-07) will be ineffective.</li> </ul>
1-04	Max. Output Voltage	0.1~255.0V	0.1V	220.0V	
1-05	Max. Voltage Frequency	0.1~400.0Hz	0.1Hz	60.0Hz	
1-06	Middle Output Frequency	0.1~400.0Hz	0.1Hz	15Hz	
1-07	Voltage at Middle Output Frequency	0.1~255.0V	0.1V	7.9V	
1-08	Minimum Output Frequency	0.1~400.0Hz	0.1Hz	15Hz	
1-09	Voltage at Minimum Output Frequency	0.1~255.0V	0.1V	7.9V	

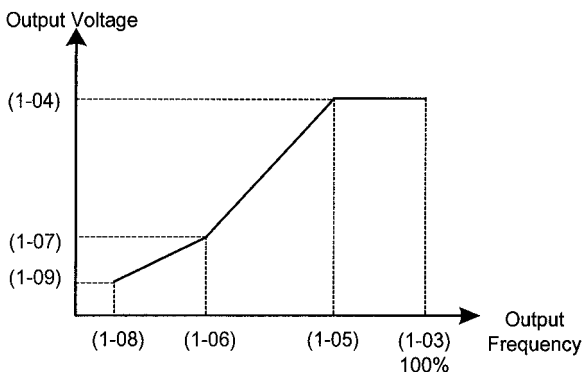


Figure 4-1: The Voltage/Frequency (V/F) Curve

### 1-10~1-11 : Frequency Command Upper and Lower Limits

Parameter		Setting Range	Unit	Factory Setting	Description
1-10	Frequency Command Upper Limit	0~109%	1%	100%	<ul style="list-style-type: none"> <li>The upper and lower limits of the frequency command are used to limit output frequency. If the frequency command is more than the upper limit, the output frequency is limited as the upper limit. If the frequency command is less than the lower limit, the output frequency is limited as the lower limit.</li> <li>The upper and lower limits of the frequency command are set as a percentage of the Max. output frequency (1-03) as 100%.</li> <li>When upper and lower limit values are set as (1-11) &gt; (1-10), the operator will show "PEOS" parameter input error message.</li> </ul>
1-11	Frequency Command Lower Limit	0~109%	1%	0%	

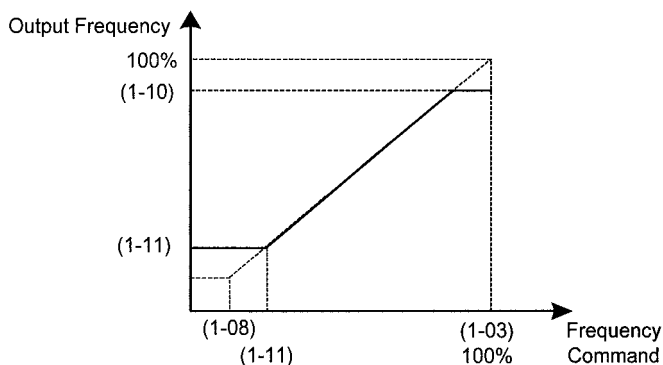


Figure 4-2: Frequency Command Upper and Lower Limits

# 1-12~1-15 : Acceleration – Deceleration Time



Parameter		Setting Range	Unit	Factory Setting	Description
1-12	Acceleration Time 1	0.0~999.9s	0.1s	10.0s	<ol style="list-style-type: none"> <li>1. Acceleration time definition : From 0% →100% maximum output frequency's ascending time. Deceleration time definition : From 100%→0% maximum output frequency's descending time.</li> <li>2. Acceleration-deceleration time is divided into 2 groups, each group's acceleration-deceleration time can be separately set, it can use multi-function contact input terminal to control 2 groups' acceleration-deceleration time switch.</li> <li>3. In some applied occasions, motor will probably be shaken while it is starting or ending acceleration-deceleration process, and we can use S curve time setting to reduce its shake. The S curve time is divided into 4 different settings, and total acceleration/deceleration time will be extended. Please refer to S curve time setting.</li> </ol>
1-13	Deceleration Time 1	0.0~999.9s	0.1s	10.0s	
1-14	Acceleration Time 2	0.0~999.9s	0.1s	10.0s	
1-15	Deceleration Time 2	0.0~999.9s	0.1s	10.0s	

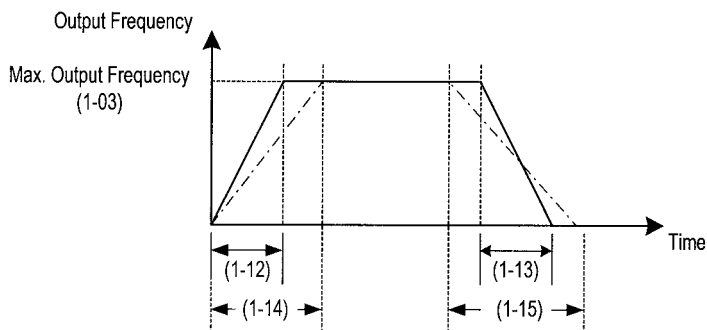


Figure 4-3: Acceleration-Deceleration Time 1 and Acceleration-Deceleration Time 2

## 1-16 : Jog Frequency

Setting Range	Unit	Factory Setting	Description
0.0 ~ 400.0Hz	0.1Hz	6.0 Hz	While using Jog function, inverter will accelerate from the minimum output frequency (1-08) to Jog frequency (1-16), when Jog function is canceled, inverter will decelerate from Jog frequency to stop.

## 1-17~1-20 : S Curve Time

Parameter	Setting Range	Unit	Factory Setting	Description
1-17 S Curve Time in Starting Acceleration	0.0~1.0s	0.1s	0.0s	<ul style="list-style-type: none"> <li>To prevent shock at the machine start/stop, S curve can be performed in acceleration/deceleration.</li> <li>After setting S curve time, the actual acceleration-deceleration time changes into:  <math display="block">\text{Accel. Time} = \text{Accel. time 1 (or 2)} + [(1-17)+(1-18)] / 2,</math> <math display="block">\text{Decel. Time} = \text{Decel. Time 1 (or 2)} + [(1-19)+(1-20)] / 2.</math> </li> <li>Below is the S curve's time sequence graph.</li> </ul>
1-18 S Curve Time in Ending Acceleration	0.0~1.0s	0.1s	0.0s	
1-19 S Curve Time in Starting Deceleration	0.0~1.0s	0.1s	0.0s	
1-20 S Curve Time in Ending Deceleration	0.0~1.0s	0.1s	0.0s	

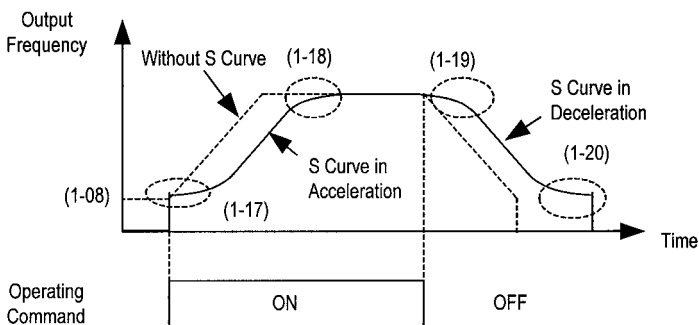


Figure 4-4 : S Curve Time in Acceleration-Deceleration Process

## 2 : Operating Method Parameter

2-01 : Run Command Source Selection		Factory Setting	0
Setting Value	Command Source	Description	
0	Digital Operator	Operating command (Run/Stop, Forward/Reverse) is controlled by digital operator.	
1	Control Circuit Terminal	1. Operation command is controlled by control circuit terminal. 2. When the initial setting of (1-02) is set as 3-wire type, operating instructions are Run, Stop and (Forward / Reverse). 3. If the initial setting is set as 2-wire type, operating command are (Forward / Stop) and (Reverse / Stop). 4. Please refer to 2/3-Wire Type Operation.	
2	RS-485	Operating command (Run / Stop, Forward / Reverse) is controlled by RS-485.	

2-02 : Frequency Command Source Selection		Factory Setting	0
Setting Value	Frequency Command Source	Description	
0	Digital Operator	Main speed frequency is controlled by digital operator.	
1	Terminal AIN	Main speed frequency is controlled by analog input AIN.	
2	RS-485	Main speed frequency is controlled by RS-485.	
3	Panel's VR	Main speed frequency is controlled by Panel's VR.	

2-03 : Stopping Method Selection		Factory Setting	0
Setting Value	Stop Method	Description	
0	Ramp to Stop	When stop command exists, motor will decelerate to stop according to the deceleration time.	
1	Coast to Stop	When stop command exists, inverter will immediately stop to output, and motor will coast to stop.	

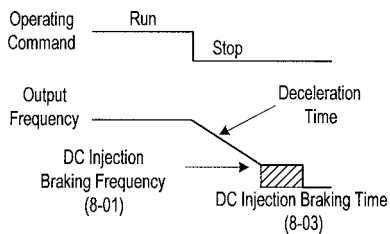


Figure 4-5-1: Ramp to Stop (2-03=0)

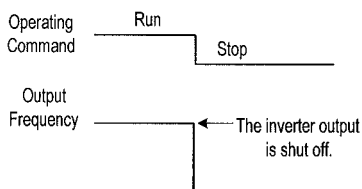


Figure 4-5-2: Coast to Stop (2-03=1)

2-04 : Operator's STOP Key Function			Factory Setting	0
Setting Value	Function	Description		
0	Effective	When operating command is controlled by the terminals or RS-485 communication port, we can set whether digital operator's STOP key is effective or not to stop inverter.		
1	Ineffective			

2-05 : Reverse Prohibition Setting			Factory Setting	0
Setting Value	Function	Description		
0	Reversible	Setting whether the motor's operation method is reversible or not.		
1	Irreversible			

2-06 : Carrier Frequency Setting			Factory Setting	4
Setting Value	Unit	Description		
1~6	—	<ul style="list-style-type: none"> <li>Setting value's range is 1~6, relative carrier frequency is 2.5kHz~15kHz, by using carrier frequency 2.5kHz as a standard, each section increases by 2.5kHz, the maximum carrier frequency is 15kHz.</li> <li>To lower the carrier frequency, we can reduce heat dissipation, RFI noise and current leakage, but audible noise will relatively become loud. To higher carrier frequency, the smaller audible noise will occur. Please refer to Table 4-4.</li> <li>Carrier frequency generally does not have to be adjusted, but when the wiring distance between inverter and motor is very far, please to adjust the carrier frequency in an appropriate value following by Table 4-3.</li> </ul>		

Table 4-3 : Wiring Distance and Carrier Frequency Setting

Wiring Distance	Under 30m	30m - 50m	50m - 100m	Above 100m
Carrier Frequency (2-06)	Under 15kHz	Under 10kHz	Under 5KHz	2.5KHz

Table 4-4 : Carrier Frequency V.S. Audible Noise, Electromagnetic Noise, Current Leakage and Heat Dissipation

Carrier Frequency	Audible Noise	RFI Noise and Current Leakage	Heat Dissipation
2.5kHz	Larger	Smaller	Smaller
15kHz	Smaller	Larger	Larger



**2-07 : External UP/DOWN Memory Function**

Factory Setting	1
-----------------	---

Setting Value	Memory Function	Description
0	Disable	When we are using external terminal to do UP/DOWN operation, the inverter accepts STOP command, it cannot memorize frequency command at that time. Next time when it accepts RUN command again, its frequency command will be start from minimum frequency (1-09).
1	Enable	When we are using external terminal to do UP/DOWN operation, the inverter accepts STOP command, it can memorize frequency command at that time. Next time when it accepts RUN command again, it will start from memorized frequency command.


**2-08 : Remote Operator's UP/DOWN Function**

Factory Setting	0
-----------------	---

Setting Value	UP/DOWN Function	Description
0	Disable	If we operate remote digital operator to modify frequency command using UP/DOWN keys (  /  ), we need to press EDIT/ENTER key to change the output frequency.
1	Enable	When we operate remote digital operator to modify frequency command using UP/DOWN keys, the output frequency is changed directly without EDIT/ENTER key pressed. But the setting frequency command will be not stored into memory unless the EDIT/ENTER key is pressed.

### 3: Output Function Parameter

3-01 : Analog Output FM Function Selection			Factory Setting	0
Setting Value	Output Function	Specification		
00	Frequency Command	10V/Maximum frequency		
01	Output frequency	10V/Maximum frequency		
02	Output Current	10V/Inverter Rated Current		
03	Output Voltage	10V/AC 220V		
04	DC Bus Voltage	10V/DC 400V		
05	Output Power	10V/Rated Output Power		
06	Analog Input AIN	10V/Maximum frequency		
07	Reserved			
08	Panel's VR	10V/100%		
09	PID Input	10V/Maximum frequency		
10	PID Output 1	10V/Maximum frequency		
11	PID Output 2	10V/Maximum frequency		

3-02 : Analog Output Gain				
Setting Value	Unit	Factory Setting	Description	
1~255	1%	100%	<ol style="list-style-type: none"> <li>The analog output port can connect to frequency meter, voltage meter, etc. The output function is according to (3-01) setting, which signal output range is 0~10V, and has 10V/256 output resolution. The output specification of FM at (3-02)=100%, please refer to the Analog Output FM Function Selection.</li> <li>This function is used to adjust output signal voltage of analog output terminal FM. If the meter used is not 10V as full-scale, you need to adjust the analog output gain (3-02) to fit it. For example, using 5V full-scale of frequency meter at this time the parameter (3-02) need to be adjusted into 50%.</li> </ol>	



### 3-03~3-05 : Frequency Agreed Detection

	Parameter	Setting Value	Unit	Factory Setting	Description
3-03	Frequency Agreed Detection Level During Acceleration	0.0~400.0Hz	0.1Hz	0.0Hz	1. Digital Multifunction output Terminals (Ra-Rb-Rc) & (MO+MO-) can be set as: Frequency Agree, setting Frequency Agree and output frequency detection. 2. The table 4-5 below shows frequency detection action.
3-04	Frequency Agreed Detection Level During Deceleration	0.0~400.0Hz	0.1Hz	0.0Hz	
3-05	Frequency Agree Width	0.1~25.5Hz	0.1Hz	2.0Hz	

Table 4-5: Frequency Detection Action

Function	Frequency Detection Action	Explanation
Frequency Agree		1. ON : Output frequency = Freq. command $\pm$ (3-05), Freq. agree width: (3-05) 2. Output signal function of (3-06)~(3-07) can be set as 02.
Setting Frequency Agree		1. ON : Output frequency = (3-03) $\pm$ (3-05) Freq. agree width:(3-05) 2. Output signal function of (3-06)~(3-07) can be set as 03.

Output Frequency detection 1	<p>Output Frequency</p> <p>Output Frequency Detection 1 Signal Output</p> <p>ON OFF ON OFF ON</p> <p>Forward Reverse</p> <p>(3-03) (3-04) (3-05)</p>	<p>1. ON : While ACC,  <math>-(3-03) \geq \text{Output freq.} \geq (3-03)</math>  While DEC,  <math>-(3-04) \geq \text{Output freq.} \geq (3-04)</math>  Freq. agree width: (3-05)</p> <p>2. Output signal function of (3-06)~(3-07) can be set as 04.</p>
Output Frequency detection 2	<p>Output Frequency</p> <p>Output Frequency Detection 2 Signal Output</p> <p>OFF ON OFF ON OFF</p> <p>Forward Reverse</p> <p>(3-03) (3-04) (3-05)</p>	<p>1. ON : While ACC,  Output freq <math>\geq (3-03)</math>  While DEC,  Output freq <math>\geq (3-04)</math>  Freq. agree width: (3-05)</p> <p>2. Output signal function of (3-06)~(3-07) can be set as 05.</p>

3-06 : Digital Output Terminal Ra-Rb-Rc Function		Factory Setting	10
3-07 : Digital Output Terminal MO+·MO- Function			0
Setting Value	Function	Description	
00	During running	ON : Running	
01	Zero speed	ON : Zero Speed	
02	Frequency agree	ON : Frequency Command – (3-05) ≤ Output Frequency ≤ Frequency Command + (3-05)	
03	Setting frequency agree	ON : (3-03)–(3-05) ≤ Output Frequency ≤ (3-03) + (3-05)	
04	Output frequency detection 1	ON : Accelerating →   Output Frequency   ≤ (3-03) Decelerating →   Output Frequency   ≤ (3-04) Frequency check margin=(3-05)	
05	Output frequency detection 2	ON : Accelerating →   Output Frequency   ≥ (3-03) Decelerating →   Output Frequency   ≥ (3-04) Frequency check margin=(3-05)	
06	Inverter ready	ON : Ready	
07	Undervoltage detected	ON : Undervoltage detected	

08	Output baseblocked (A-contact)	ON : Output baseblocked
09	Output baseblocked (B_contact)	OFF : Output baseblocked
10	Fault	ON : Fault
11	Over torque detected (A-contact)	ON : Over torque detected
12	Operating mode	ON : Operating instruction is controlled by digital operator. (Local mode)
13	Main frequency Command mode	ON : Frequency command is controlled by digital operator. (Local mode)
14	Reverse running	ON : Reverse
15	Frequency command missing	ON : Frequency command loss
16	Over torque detected (B-contact)	OFF : Over torque detected
17	Pulse signal output	When terminal MO <sup>+</sup> -MO <sup>-</sup> is set as pulse signal output function, and the frequency of output pulse is proportional to output frequency.
18	Timer function output	As Timer function output terminal
19	Undervoltage alarm	ON : During undervoltage precaution
20	During retry	ON : During retry mode
21	Motor overload OL1	ON : During OL1
22	Inverter overheat OH	ON : During OH
23	Inverter overload OL2	ON : During OL2
24	RS-485 communication fault	ON : RS-485 transmission error occurs.
25	RS-485 communication application	Expanding RS-485 output contact
26	Auto-Run period 1	ON : Auto-Run operation in the 1 <sup>st</sup> time period
27	Auto-Run period 2	ON : Auto-Run operation in the 2 <sup>nd</sup> time period
28	Auto-Run period 3	ON : Auto-Run operation in the 3 <sup>rd</sup> ime period
29	Auto-Run period 4	ON : Auto-Run operation in the 4 <sup>th</sup> time period
30	Auto-Run period 5	ON : Auto-Run operation in the 5 <sup>th</sup> time period
31	Auto-Run period 6	ON : Auto-Run operation in the 6 <sup>th</sup> time period

32	Auto-Run period 7	ON : Auto-Run operation in the 7 <sup>th</sup> time period
33	Auto-Run period 8	ON : Auto-Run operation in the 8 <sup>th</sup> time period
34	Counter exceeds setting value (A-contact)	ON : Counter exceeds setting value (4-11)
35	Counter exceeds setting value (B-contact)	OFF : Counter exceeds setting value (4-11)
36~38	Reserved	

#### Digital Output Terminal Function Explanation:

- During Running (Setting value: 00)

Output	Explanation
OFF	When ' RUN' command is OFF, inverter has no voltage output.
ON	When ' RUN' command is ON, or 'RUN' command is OFF, it still has voltage output.

- Zero Speed (Setting value : 01)

Output	Explanation
OFF	Output Frequency $\geq$ Minimum Output Frequency (1-08)
ON	Output Frequency < Minimum Output Frequency (1-08)

- Frequency Agree (Setting Value : 02)
- Setting Frequency Agree (Setting Value : 03)
- Output Frequency Detection 1 (Setting Value : 04)
- Output Frequency Detection 2 (Setting Value : 05)

Please see Table 4-5: Frequency Agree Detection.

- Inverter Ready (Setting Value : 06)
- Undervoltage Detected (Setting Value : 07)
- Output Baseblocked (A-contact) (Setting Value : 08)
- Output Baseblocked (B-contact) (Setting Value : 09)
- Fault (Setting Value : 10)

When inverter detects any fault, the fault output contact is ON. But if inverter message transmission is warning, the fault output contact does not act.

- Over Torque Detection (A-contact) (Setting Value : 11)
- Over Torque Detection (B-contact) (Setting Value : 16)

Please see Over Torque Detection Function (Parameter 6-06 ~ 6-08).

• Operating Mode (Setting Value : 12)

Output	Explanation
OFF	<b>Remote Mode</b> ( 2-01= 1 or 2, or when multifunction input terminal MI2~MI5 act as Local/ Remote control and terminal is OFF ), at this time operating command is set externally, and Remote Digital Operator's ' <b>SEQ</b> ' light is on.
ON	<b>Local Mode</b> ( 2-01= 0 or when multifunction input terminal MI2~MI5 act as Local/ Remote control and terminal is ON), at this time operating command is set by Digital Operator, and Remote Digital Operator's ' <b>SEQ</b> ' light is off.

• Main Frequency Command Mode (Setting Value : 13)

Output	Explanation
OFF	<b>Remote Mode</b> ( 2-02=1 or 2, or when multifunction input terminal MI2~MI5 act as Local/ Remote control and terminal is OFF), at this time frequency command is set externally, and Remote Digital Operator's ' <b>REF</b> ' light is on.
ON	<b>Local Mode</b> (2-02= 0 or when multifunction input terminal MI2~MI5 act as Local/ Remote control and terminal is ON), at this time frequency command is set by Digital Operator, and Remote Digital Operator's ' <b>REF</b> ' light is off.

• Reverse Running (Setting Value : 14)

When motor is conducting reverse operation, output contact is ON.

• Frequency Command Missing (Setting Value : 15)

Run source is ON and frequency command is 0, the output at the multi-function output terminal is ON.

• Pulse Signal Output (Setting Value : 17)

- Only multi-function output terminal MO+ - MO- (3-07=17) can be set as the pulse signal output. The pulse output frequency is set by parameter (3-08).
- Terminal MO+ - MO- is a photo-coupler/open-collector output. The wiring is like the diagram below.

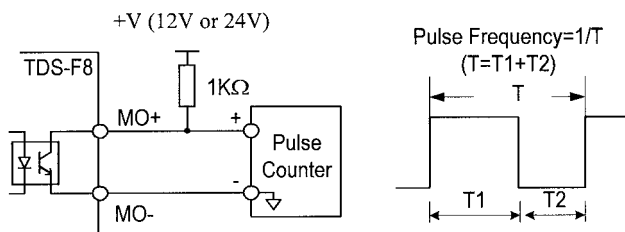


Figure 4-6 : Pulse Signal Output

• Timer Function Output (Setting Value : 18)

When multi-function input terminal MI2~MI5 is set as Timer Input Function (4-05 ~ 4-08=23), the signal will be output through the corresponding multi-function output

terminals with the specified ON-delay and OFF-delay time (8-14 & 8-15) as shown below.

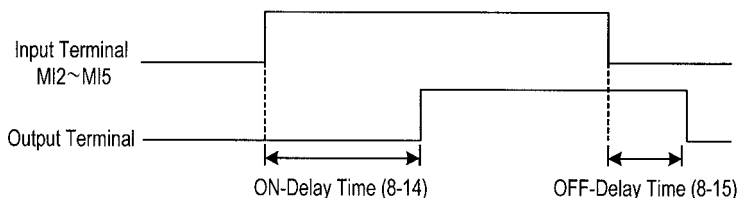


Figure 4-7 : Timer Output Function

- Undervoltage Precaution (Setting Value : 19)  
If the main circuit DC bus voltage is below the undervoltage alarm detected level, the multi-function output terminal is ON.  
\*Undervoltage alarm detected level: 220V Class is 190VDC.
- During retry (Setting Value : 20)  
When retry function begins, output contact is ON. Please see Retry Function (8-13).
- Motor Over Load (Setting Value : 21)  
When motor over load is detected (OL1), output contact is ON. Please see Motor Over Load Protection Selections (6-09) .
- Inverter Over Heat (Setting Value : 22)  
When inverter over heat is detected (OH), output contact is ON.
- Inverter Over Load (Setting Value : 23)  
When inverter over load is detected (OL2), output contact is ON.
- RS-485 Communication Fault (Setting Value : 24)  
When inverter RS-485 message transmission is error, output contact is ON.
- RS-485 Communication Application (Setting Value : 25)  
When RS-485 is communicating, Master can use inverter output terminal to expand the output contact. Please see RS-485 Communication Manual.
- Auto-Run Period 1~8 (Setting Value : 26~33)  
In Auto-Run mode, when the specified stage/period is excuted, its corresponding output contact is ON.
- Counter Exceeds Setting Value (A-contact) (Setting Value : 34)  
When input pulse exceeds setting value, output contact is ON.
- Counter Exceeds Setting Value (B-contact) (Setting Value : 35)  
When input pulse exceeds setting value, output contact is OFF.

3-08 : Pulse Output Multiple Selection		Factory Setting	01
Setting Value	Description		
01~16	When multifunction output terminal MO*~MO· is set as Pulse Output Function (3-07=17), we can adjust output pulse frequency by using (3-08) setting value. Output pulse frequency = (Inverter output frequency) * (3-08 setting value).		

## 4: Input Function Parameter

4-01 ~ 4-02 : Analog Input Frequency Command					
Parameter	Setting Range	Unit	Factory Setting	Description	
4-01 Analog Frequency Command AIN Gain	0 ~ 1000.0 %	0.1%	100.0%	The frequency command provided when analog input signal is 10V (20mA) can be set in unit of 0.1%.	
4-02 Analog Frequency Command AIN Bias	-99.9 ~ 100.0%	0.1%	0.0%	The frequency command provided when analog input signal is 0V (4mA) can be set in unit of 0.1%.	

Analog input signal (0 ~ 10V or 4 ~ 20mA) from AIN terminal provides main frequency command, the relationship between analog input and frequency command is described in the following Figure 4-8:

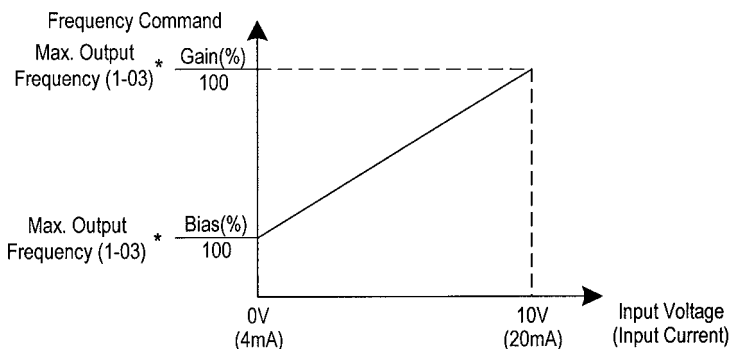


Figure 4-8 : Analog Frequency Command Bias and Gain

4-03 : Analog Input Signal Source Selection			Factory Setting	0
Setting Value	Description			
0	Select 0 ~ 10V input signal as frequency command.			
1	Select 4 ~ 20mA input signal as frequency command.			

Note : When the parameter (2-02) is set 1, the inverter's frequency command is come from analog input terminal AIN, applicable parameter (4-03) is to select analog input signal which is (0 ~ 10 V) or (4 ~ 20mA). At the same time must match-up with

control board's jumper J1 that determines voltage or current signal input.

Jumper J1 Location: Please open the inverter's front cover; it is located in bottom right side of control board.

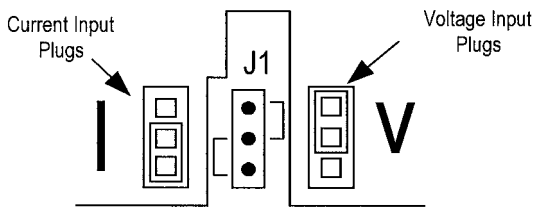


Figure 4-9-1 : Analog Input Signal's Jumper J1 Selection

4-04 : Analog Frequency Command Input Characteristics			Factory Setting	0
Setting Value	Function	Description		
0	Normal	Analog input and frequency command has characteristics as: (0~10V or 4~20mA) $\leftrightarrow$ 0~100% Max. Frequency.		
1	Reverse	Analog input and frequency command has characteristics as: (10~0V or 20~4mA) $\leftrightarrow$ 0~100% Max. Frequency.		
2	Fwd_Rev	Analog input and frequency command has characteristics as: (10~0V or 20~4mA) $\leftrightarrow$ -100~100% Max. Frequency.		

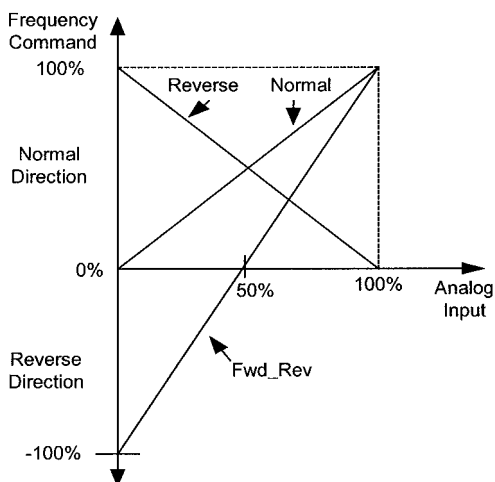


Figure 4-9-2: Analog Input and Frequency Command Characteristics



4-05 : Multi-function Input Terminal MI2 Selection		Factory Setting	3
4-06 : Multi-function Input Terminal MI3 Selection			4
4-07 : Multi-function Input Terminal MI4 Selection			5
4-08 : Multi-function Input Terminal MI5 Selection			6
Setting Value	Function	Description	
00	3-Wire Type FWD/REV Command	3-wire type operating mode	
01	Local/Remote Control 1	ON : Local mode control (through digital operator) OFF : Run source and frequency command is determined according to (2-01& 2-02) setting.	
02	Local/Remote Control 2	ON : Local mode control (through terminal) OFF : Run source and frequency command is determined according to (2-01& 2-02) setting.	
03	Fault Reset	ON : Reset after fault occurred	
04	Multi-Speed Command 1	Multi-speed frequency command selection	
05	Multi-Speed Command 2		
06	Multi-Speed Command 3		
07	Jog Command	ON : Select Jog frequency	
08	Acc/Dec Time Switch	OFF : The Acc/Dec time 1: (1-12) / ( 1-13) ON : The Acc/Dec time 2: (1-14) / (1-15)	
09	Inhibit Acc/Dec	ON : Inhibit Acc/Dec action (hold frequency).	
10	External Baseblock (A-Contact)	ON : Stop inverter output	
11	External Baseblock (B-Contact)	OFF : Stop inverter output	
12	FJOG Command	ON : Forward Jog operation	
13	RJOG Command	ON : Reverse Jog operation	
14	PID Control Invalid	ON : Disable PID function	
15	PID Integral Value Reset	ON : Reset PID control's integral value.	
16	Inverter Overheat Warning	ON : Blink show OverHeat (inverter can proceed running)	
17	External Fault Input (A-contact)	ON : External fault input	
18	External Fault Input (B-contact)	OFF : External fault input	
19~20	Reserved		
21	Speed Search from Maximum Frequency	ON : Begin to search motor's rotation speed from maximum frequency.	
22	Speed Search from Setting Frequency	ON : Begin to search motor's rotation speed from setting frequency.	

23	Timer Function Input	ON-Delay / OFF-Delay timer input port
24	External UP/DOWN Function	Only (4-08) can be set, and then terminal MI4 acts as 'UP' command, terminal MI5 acts as 'DOWN' command.
25	Counter Reset	Clear the counter's cumulative value to be 0.
26	Counter Input	The input terminal of counter's pulse
27~30	Reserved	

Note : An error message of "PE□□" will be displayed if:

- Setting value of (4-05~4-08) is not organized in monotonically increasing order.
- Values 21 or 22 (both for speed search command) are set at the same time.

#### Multi-function Input Terminal Function :

- 3-Wire Type FWD/REV Switch (Setting Value : 00)

Under 2-wire initialization mode (1-02= 3, 5 or 7), terminal MI0 acts as 'Forward/Stop' command and terminal MI1 acts as 'Reverse/Stop' command. The 2-wire mode connection is shown as in Figure 4-10.

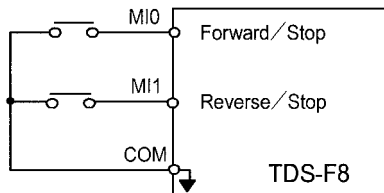


Figure4-10 : 2-Wire mode connection diagram

Under 3-wire initialization mode (1-02= 4 or 6 or 8), the function of terminal MI2 (4-05) is set as '00', and the connection is shown as in Figure 4-11-1. The Run and Stop command is controlled by MI0 & MI1 terminals, and the Forward/Reverse command is determined by terminal MI2.

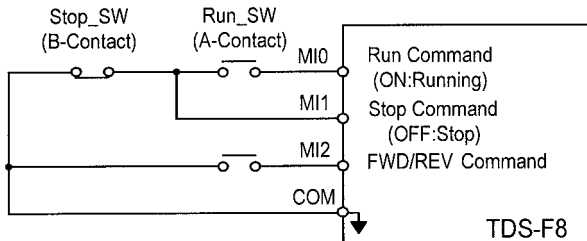


Figure 4-11-1 : 3-Wire mode connection diagram

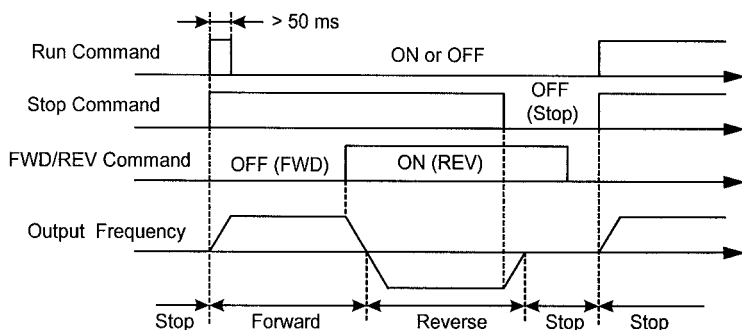


Figure 4-11-2 : The control sequence of 3-wire mode connection

• **Local/Remote Control 1** (Setting Value : 01)

Input	Explanation
OFF	<b>Remote Control</b> Run command and frequency command is performed through operator, control circuit terminal or RS-485 communication port. (It will be set by the combination of settings of 2-01 and 2-02.)
ON	<b>Local Control</b> Run command and frequency command is performed through <b>digital operator</b> . The remote digital operator's REMOTE-REF& SEQ LED light is OFF.

• **Local/Remote Control 2** (Setting Value : 02)

Input	Explanation
OFF	<b>Remote Control</b> Run command and frequency command is performed through operator, control circuit terminal or RS-485 communication port. (It will be set by the combination of settings of 2-01 and 2-02.)
ON	<b>Local Control</b> Run command and frequency command is performed through <b>control circuit terminal</b> . The remote digital operator's REMOTE-REF& SEQ LED light is ON.

Note : Local/Remote switch is available only when inverter is under STOP status.

- **Fault Reset** (Setting Value : 03)
- **Multi-Speed Command 1** (Setting Value : 04)
- **Multi-Speed Command 2** (Setting Value : 05)
- **Multi-Speed Command 3** (Setting Value : 06)
- **Jog Command** (Setting Value : 07)

Jog frequency command has higher priority than the other multi-speed command. We can establish multi-speed command 1~3 by using MI2~MI5 terminals, the maximum achievable speed control is 8 stages.

Terminal MI4 (4-07)=06	Terminal MI3 (4-06)=05	Terminal MI2 (4-05)=04	Multi-Speed Frequency Command
Multi-Speed Command 3	Multi-Speed Command 2	Multi-Speed Command 1	
0	0	0	Frequency Command 1 (5-01) *1
0	0	1	Frequency Command 2 (5-02)
0	1	0	Frequency Command 3 (5-03)
0	1	1	Frequency Command 4 (5-04)
1	0	0	Frequency Command 5 (5-05)
1	0	1	Frequency Command 6 (5-06)
1	1	0	Frequency Command 7 (5-07)
1	1	1	Frequency Command 8 (5-08)

0: Terminal is OFF

1: Terminal is ON

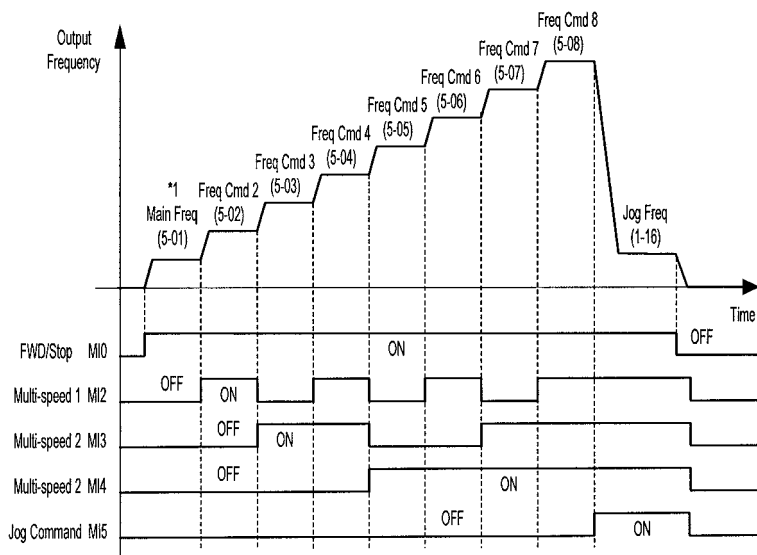


Figure 4-12 : Time Chart for 8-Stage Speed and Jog Frequency Command

- \*1 Main speed frequency command source is determined by parameter (2-02), when parameter (2-02)=0, main speed frequency command is determined by parameter (5-01), and when parameter (2-02)=1, main speed frequency command is determined by Analog Command Input.

• **Acc/Dec Time Switch**

(Setting Value : 08)

Input	Acceleration - Deceleration Time	Explanation
OFF	Acceleration Time 1/ Deceleration Time 1	The acceleration and deceleration time can be changed through the ON/FF switch of digital input terminal.
ON	Acceleration Time 2/ Deceleration Time 2	

• **Inhibit Acc./Dec. Action**

(Setting Value : 09)

Input	Acceleration- Deceleration	Explanation
OFF	Allowable	<ol style="list-style-type: none"> <li>With this setting, the signal of Acceleration/deceleration holding (input from the multi-function input terminals) will pause the acceleration/deceleration action of motor, and maintain the output frequency.</li> <li>The motor will coast to stop if STOP command is input while the acceleration / deceleration is holding, then the output frequency will be memorized and the Acceleration/deceleration holding command will be released.</li> </ol>
ON	Forbidden	

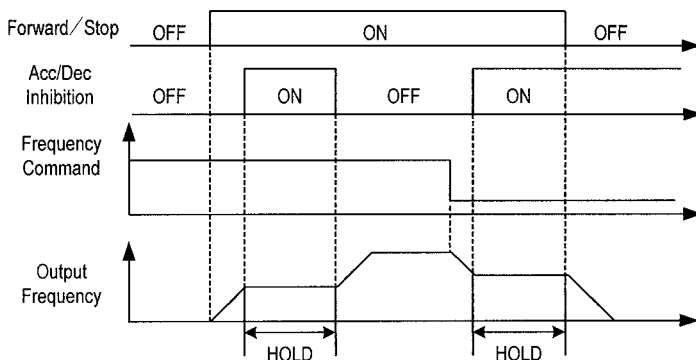


Figure 4-13 : Acceleration-Deceleration Inhibition

• **External Base-block (A-Contact)**

(Setting Value : 10)

• **External Base-block (B-Contact)**

(Setting Value : 11)

External base-block	Input		Explanation
	OFF	ON	
A-contact	No Base-block	Base-block	<ul style="list-style-type: none"> <li>• With either of these settings, the multi-function input terminal controls its inverter base-block operation.</li> <li>• During running : As an external base-block signal is detected, the digital operator will display a "B.B." alarm. Then, the inverter output is blocked. After the base-block signal is cleared, the motor will resume running according to its then frequency command.</li> <li>• During deceleration : An external base-block signal is input, the digital operator will display "B.B." alarm, the inverter is blocked from output and the output frequency will drop to zero. The motor will then coast to stop freely. After this external base-block signal is cleared, the inverter will stay in stop mode.</li> </ul>
B-contact	Base-block	No Base-block	

• **FJOG Command**

(Setting Value : 12)

• **RJOG Command**

(Setting Value : 13)

JOG Command	Input		Explanation
	OFF	ON	
FJOG	Stop	Forward JOG	<p>FJOG command "ON": Forward running at Jog frequency            RJOG command "ON": Reverse running at Jog frequency</p> <ul style="list-style-type: none"> <li>• The forward jog and reverse jog commands have priority over other frequency command commands.</li> <li>• The inverter will stop running with the stopping method set by the setting of (2-03) if the forward jog and reverse jog commands are both ON for more than 500 ms.</li> </ul>
RJOG	Stop	Reverse JOG	

• **PID Control Invalid**

(Setting Value : 14)

Input	PID Control	Explanation
OFF	Valid	<p>The setting of (8-16) can be used to enable or disable the PID function. After the PID function is performed, the inverter is used in a closed-loop system. For some reason, the system will be changed into an open-loop operation, and the PID function must be canceled. Through this setting, the PID function can easily be enabled/disabled by input terminal.</p>
ON	Invalid	

• **PID Integral Value Reset**

(Setting Value : 15)

Input	RESET Function	Explanation
OFF	Invalid	In the application of PID control, the integral value of PID can be reset to zero through the multi-function input terminal MI2~5 (4-05~08= 15).
ON	Valid	

• **Inverter Overheat Warning**

(Setting Value : 16)

Input	Function	Explanation
OFF	Normal	When the inverter detects a overheat signal "ON", the digital operator will change its display as "Overheat Alarm". And the inverter still maintains its operation. When the overheat signal is "OFF", the digital operator will restore its previous display automatically. No RESET-key pressing is required
ON	Over Heat Alarm	

• **External Fault Input (A-contact)**

(Setting Value : 17)

• **External Fault Input (B-contact)**

(Setting Value : 18)

External Fault	Input		Explanation
	OFF	ON	
A-contact	Normal	External Fault	<ul style="list-style-type: none"> <li>The external fault input terminal is set to "ON", then an external fault will occur. If the terminal MI2 is set as external fault input terminal, then external fault message " E F 2 " will be displayed during external fault.</li> <li>There are 4 terminal to be assigned as external fault inputs, they are terminal MI2~MI5.</li> <li>When an external fault occurs, the output of inverter will be blocked, and the motor will coast to stop.</li> </ul>
B-contact	External Fault	Normal	

• **Speed Search from Maximum Frequency**

(Setting Value : 21)

• **Speed Search from Setting Frequency**

(Setting Value : 22)

Speed Search	Input		Function
	OFF	ON	
From Maximum Frequency	Disable	Enable	When the speed search function is active by external input terminal, the inverter will search the motor speed from Max. frequency or Setting frequency. Please see Speed Search Function (Parameter 8-06 ~8-08).
From Setting Frequency	Disable	Enable	

• **Timer Function Input**

(Setting Value : 23)

Refer to the setting of timer function on parameter (8-14 and 8-15).

• **External UP/DOWN Function**

(Setting Value : 24)

- The inverter can use either the digital operator or external multi-function input terminals (terminal MI4 or MI5) to change the output frequency upward or downward.
- Firstly, the run and frequency command are controlled through the control circuit terminals by setting the parameters (2-01= 1, 2-02= 1). Secondly, set the parameter 4-08 = 24 (terminal MI4 will now have the function "UP", its original function is disabled). Then, terminal MI4 and MI5 can be used for "UP" and "DOWN" function to control the output frequency directly.
- Operation sequence as below:

Terminal MI4 = UP	ON	OFF	OFF	ON
Terminal MI5 = DOWN	OFF	ON	OFF	ON
Operating Status	Acceleration (UP)	Deceleration (DOWN)	Setting Speed (HOLD)	Setting Speed (HOLD)

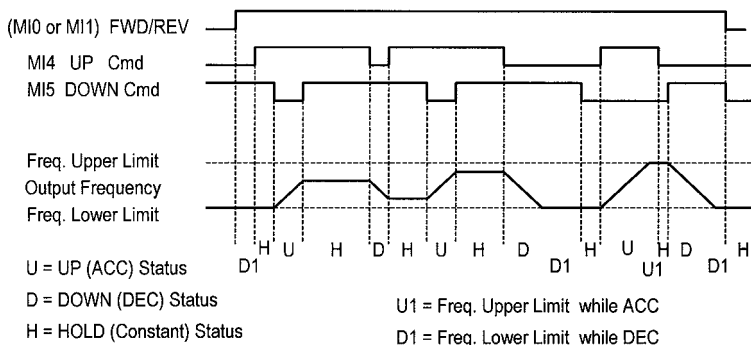


Figure 4-14: Time chart of output frequency with the UP/DOWN function

• **Counter Reset**

(Setting Value : 25)

During Counter Function, this terminal is used to set cumulative value of counter as 0. Please see Figure 4-15 : Counter Function Procedure.

• **Counter Input**

(Setting Value : 26)

During Counter Function, this terminal is act as pulse input port. Please see Figure 4-15 : Counter Function Procedure.

4-09 : Scan Times of Input Terminal			Factory Setting	1
Setting Value	Scanning no.	Description		
0	1 Time	Select scan times of input terminal: 0: 1 Time / 5ms. 1: 2 Times/ 10ms.		
1	2 Times			



4-10 : Analog Input Filter		Factory Setting	10
Setting Range	Description		
01 ~ 80	This setting is to adjust the response time of the analog input signal (AIN). The smaller value has the faster response time.		

4-11 : Counter Setting Value		Factory Setting	0
Setting Range	Description		
00 ~ 9999	<ol style="list-style-type: none"> <li>When the pulse inputs from terminal (4-05~4-08=26), the counter will increase progressively in proper order. When the counter is more than its setting value (4-11), the inverter sends out the message through output terminal (3-06 or 3-07=34 or 35).</li> <li>When the input terminal (4-05~4-08=25) has "counter reset" signal, the counter value will reset into 0.</li> <li>Input pulse duty must be greater than 5 ms.</li> </ol>		

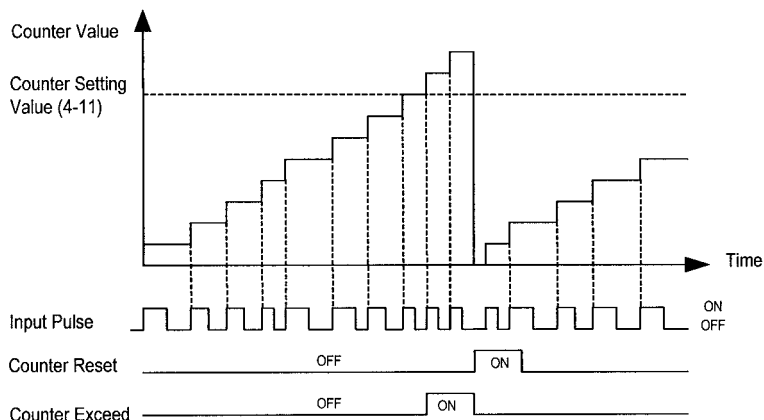


Figure 4-15 : Counter Function Procedure

## 5 : Multi-Speed and Auto-Run Parameters

5-01 : Frequency Command 1	✓	Factory Setting	0.0
5-02 : Frequency Command 2	✓	Factory Setting	0.0
5-03 : Frequency Command 3	✓	Factory Setting	0.0
5-04 : Frequency Command 4	✓	Factory Setting	0.0
5-05 : Frequency Command 5	✓	Factory Setting	0.0

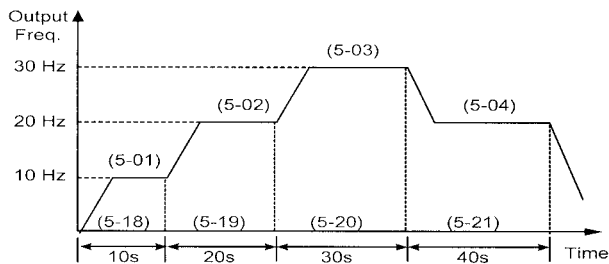
5-06 : Frequency Command 6		↗	Factory Setting	0.0
5-07 : Frequency Command 7		↗	Factory Setting	0.0
5-08 : Frequency Command 8		↗	Factory Setting	0.0
Setting Range	Unit	Description		
0.0 ~ 400.0Hz	0.1Hz	<ol style="list-style-type: none"> <li>By using multifunction input terminal (parameter 4-05 ~ 4-08), we can perform multi-speed control (maximum 8 stages). The different frequency command at different step is specified through the setting (5-01) ~ (5-08).</li> <li>The setting (5-01) ~ (5-28) can provide the different frequency at different periods during Auto-Run operation.</li> </ol>		

5-09 ~ 5-25 : Auto-Run Setting Parameters				
No.	Function		Factory Setting	Description
5-09	<b>Auto-Run Mode Selection:</b> 0: Auto-Run mode is disabled. 1: One single cycle Auto-Run mode is performed. (continuing running from the unfinished step if restarting) 2: Periodical cycle Auto-Run mode is performed. (continuing running from the unfinished step if restarting) 3: Perform one single cycle Auto-Run, then hold the speed of final step to run. (continuing running from the unfinished step if restarting) 4: One single cycle Auto-Run mode is performed. (starting a new cycle if restarting) 5: Auto-Run mode is performed periodically. (starting a new cycle if restarting) 6: Perform one single cycle Auto-Run, then hold the speed of final step to run. (starting a new cycle if restarting)		0	<ul style="list-style-type: none"> <li>The Auto-Run mode is the simple PLC operation, which has the 8 programmable control stages.</li> <li>In each stage of the Auto-Run mode, the frequency command can be set through (5-01 ~ 5-08), the run direction can be set through (5-10 ~ 5-17), and the running period time can be set with the setting value of (5-18 ~ 5-25).</li> <li>In the Auto-Run mode, the multi-speed control through the MI2~MI5 terminals is disabled.</li> <li>In Auto-Run Mode, the ACC/DEC time of each stage follow the setting of (1-12) and (1-13).</li> <li>If the setting values of (5-18 ~ 5-25) are all zero, the Auto-Run mode is disabled.</li> <li>(5-09) = 1~3: If the inverter stops and then re-starts again, it will continue running from the unfinished step according to the setting of (5-09).</li> <li>(5-09) = 4~6: If the inverter stops and re-starts again, it will begin a new cycle and continue running according to the setting of (5-09).</li> </ul>
5-10 ~ 5-17	Auto-Run Mode Direction 1 ~ 8	0: Stop 1: Forward Run 2: Reverse Run	0	Run command of each stage in Auto-Run mode.
5-18 ~ 5-25	Auto-Run Mode Run Time 1 ~ 8	0.0 ~ 6000.0 sec	0	Run time of each stage in Auto-Run mode.

● Auto-Run mode's example operation

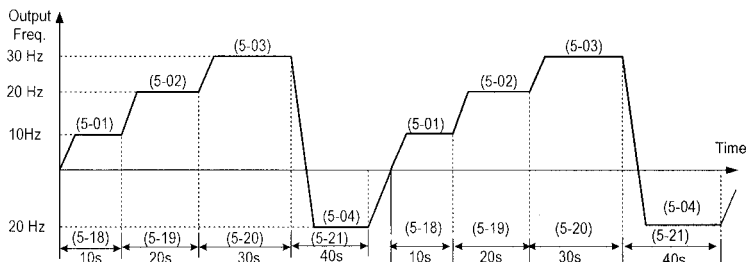
- (a) In the operation within a single period, after completing a period, it will stop operating.  
(5-09=1,4)

E.g.: (5-01)=10Hz, (5-02)=20Hz, (5-03)=30Hz, (5-04)=20Hz, (5-05)~(5-08)=0,  
(5-18)=10.0s, (5-19)=20.0s, (5-20)=30.0s, (5-21)=40.0s, (5-22)~(5-25)=0 s,  
(5-10)~(5-17)=1, (5-09)=1.



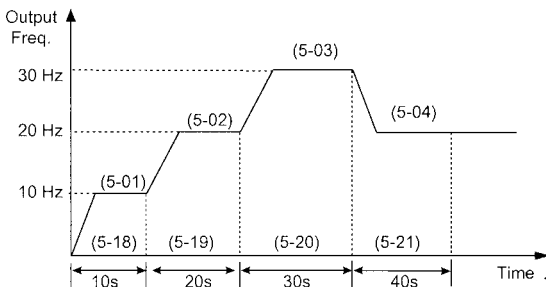
- (b) In operation within successive circle period, after completing a period, it will repeat into the same period. (5-09=2,5)

E.g.: (5-01)~(5-08): setting value and (a) are equal, (5-18)~(5-25): setting value and (a) are equal, (5-10)~(5-12)=1, (5-13)=2, (5-09)= 2.



- (c) In operation within a single period, after completing a period, it will continue operating under the last stage's speed. (5-09=3,6)

E.g.: (5-01)~(5-08): setting value and (a) are similar, (5-10)~(5-17)=1, (5-18)~(5-25): setting value and (a) are similar, (5-09)=3.



## 6 : Protection Parameter

### 6-01~6-05 : Protection Characteristic Selection

Parameter		Setting Value	Factory Setting	Description
6-01	Stall Prevention Selection During Acceleration	0: Disable 1: Enable	1	Stall Prevention During Acceleration: Stop acceleration if output current exceeds the (6-04) setting value. Accelerate again when the current recovers.
6-02	Stall Prevention Selection During Deceleration	0: Disable 1: Enable	1	<ul style="list-style-type: none"> <li>If external braking resistor unit is installed, the (6-02) setting must be disabled (= 0).</li> <li>If the load inertia is so large that it exceeds the regenerative braking torque. When setting (6-02= 1, enabled) is selected, the deceleration time (1-13or 1-15) is extended so that a main circuit over voltage does not occur.</li> </ul>
6-03	Stall Prevention Selection During Running	0: Disable 1: Enable	1	Deceleration is started if output current exceeds the run stall prevention level (6-05), especially when an impact load is applied suddenly. Accelerate again when the current level is lower than (6-05).
6-04	Stall Prevention level During Acceleration	30~150%	140%	Base on the rated current of inverter (100%).
6-05	Stall Prevention level During Running	30~150%	130%	

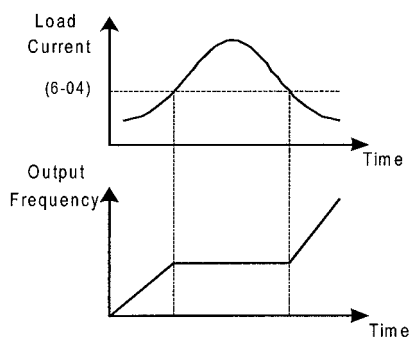


Figure 4-16-1: Stall Prevention during Acceleration

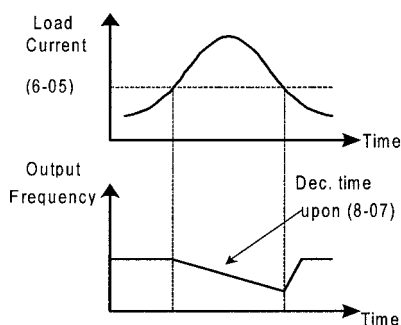


Figure 4-16-2: Stall Prevention during Running

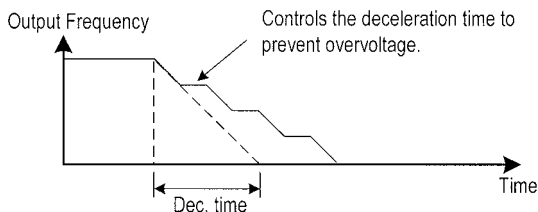


Figure 4-16-3 : Stall Prevention during Deceleration (6-02=1)

#### 6-06~6-08 : Over Torque Detection

Parameter		Setting Range	Unit	Factory Setting	Description
6- 06	Over Torque Detected Level	30~150%	1%	130%	<ul style="list-style-type: none"> <li>When over torque detection is enabled (6-08=1~4), an over torque condition is detected when the current exceeds the over torque detected level (6-06) for longer than the over torque detection time (6-07). Then the multifunction digital output terminal will output the over torque signal.</li> <li>The setting value of over torque detected level (6-06) base on the inverter rated current (100%).</li> <li>The parameter (6-08) is used to decide the action after over torque detection: frequencies agree or over torque detected in operation, continuous operation after over torque detected or stop output.</li> </ul>
6- 07	Over Torque Detection Time	0.0~25.5s	0.1s	0.1s	
6- 08	<b>Over Torque Detection Selections:</b> 0: Over torque detection function is disabled. 1: Over torque is detected only at frequency agree; the motor will continue running after the over torque has been detected. 2: Over torque is detected only at frequency agree; the motor will stop after the over torque has been detected. 3: Over torque is detected during running (ACC, DEC included); the motor will continue running after the over torque has been detected. 4: Over torque is detected during running (ACC, DEC included); the motor will stop after the over torque has been detected.			0	

# 6-09 : Motor Electronic Over Load Protection Selections

Factory  
Setting

1

Setting Value	Function	Description
0	Electronic overload protection is disabled.	<ul style="list-style-type: none"> <li>• (6-09)=1~4: Electronic overload protection is enabled. The electronic thermal overload is detected according to the characteristic curves of protection operating time. vs. motor rated current setting (7-01).</li> </ul>
1	The overload is detected according to the standard motor cold start curve.	<ul style="list-style-type: none"> <li>• Disable the motor protection function (setting 0) when 2 or more motors are connected to a single inverter. Use another method to provide overload protection separately to each motor, such as connecting a thermal overload relay to the power line of each motor.</li> </ul>
2	The overload is detected according to the standard motor hot start curve.	<ul style="list-style-type: none"> <li>• The motor overload protection function should be set as (6-09) = 2 or 4 (hot start protection characteristic curve) when the power supply is turned on or off frequently, because the thermal values is reset each time when the power is turned off.</li> </ul>
3	The overload is detected according to the specific motor cold start curve.	<ul style="list-style-type: none"> <li>• For the motor without forced cooling fan, the heat dissipation capability is lower when in the low speed operation. The setting (6-09) can be either '1' or '2'.</li> <li>• For the motor with forced cooling fan, the heat dissipation capability is not dependent upon the rotating speed. The setting (6-09) can be either '3' or '4'.</li> </ul>
4	The overload is detected according to the specific motor hot start curve.	<ul style="list-style-type: none"> <li>• To protect the motor from overload by use of electronic overload protection, be sure to set the parameter (7-01) according to the rated current value shown on the motor nameplate.</li> </ul>

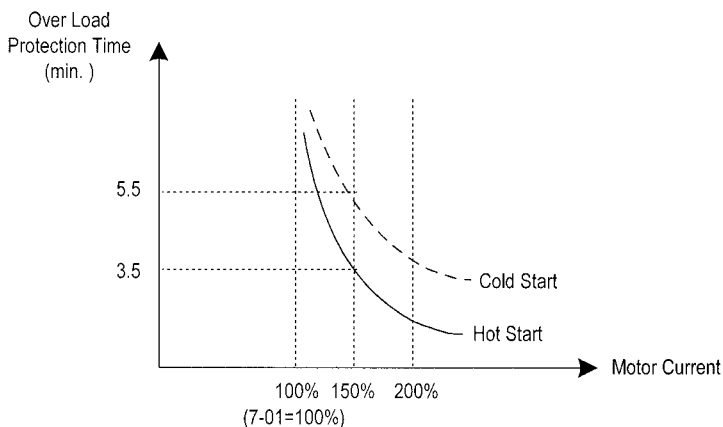


Figure 4-17 : Motor Over Load Protection Curve (while 7-01=100%)

6-10 : Under Voltage Detection Level			Factory Setting	190
Setting Range	Unit	Description		
150 ~ 210V	1V	To set a main circuit DC voltage level that under-voltage is detected. In most cases, the default setting (6-10) need not be changed. If an external AC reactor is used, decrease the under voltage detection level by adjusting (6-10) setting smaller.		

## 7 : Motor Parameter

7-01 : Motor Rated Current			Factory Setting	*2
Setting Range	Unit	Description		
*1	0.1A	This setting is used as the reference current of electronic overload thermal or slip compensation. Set it by motor's nameplate.		

\*1 : The setting range is 10%~200% of the inverter rated current.

\*2 : The factory setting depends on the capacity of inverter (1-01).

7-02 : Motor No-Load Current			Factory Setting	30
Setting Range	Unit	Description		
0~99%	1%	This setting is used as a reference value of slip compensation. The setting range is 0~99% of the motor rated current (7-01).		

7-03 : Motor Rated Slip			Factory Setting	0.0
Setting Range	Unit	Description		
0~9.9%	0.1%	<ul style="list-style-type: none"> <li>This setting is used as a reference value for slip compensation function. See "Motor Rated Slip Calculating Formula".</li> <li>The rated slip is modified in different output frequency, shown in Fig.4-18-1.</li> <li>This setting is as a percentage of max. voltage frequency (1-05) as 100%.</li> <li>If setting (7-03) is zero, no slip compensation is used.</li> <li>There is no slip compensation when the frequency command is less than the min. output frequency or during regeneration.</li> </ul>		

### Motor Rated Slip Calculating Formula:

$$\text{Motor Rated Slip (\%)} = \frac{\text{Maximum Voltage Freq. (Hz)} - \frac{[\text{Rated Speed (rpm)} \times \text{Motor's Poles (p)}] / 120}{\text{Maximum Voltage Frequency (Hz)}} \times 100$$

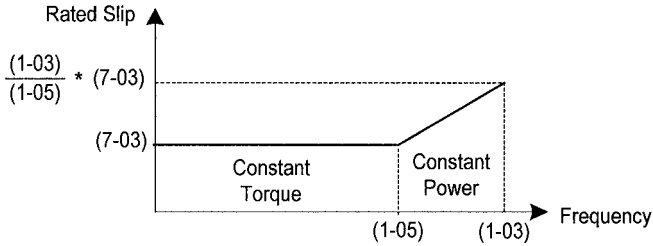


Figure 4-18-1 : Rated Slip modification in different frequency

### Slip Compensation Control:

The slip compensation is enabled when the output current is greater than motor no-load current (7-02). The output frequency will shift from f1 to f2 for the positive change of load torque. Please see Figure 4-18-2.

$$\text{Slip Freq. (Hz)} = \frac{\text{Rated Slip} \times (\text{Output Current} - (\text{No-Load Current})) \times \text{Max. Voltage Frequency}}{100 \times (\text{Motor Rated Current} - (\text{No-Load Current}))}$$

(7-03)
(7-02)
(1-05)

(7-01)
(7-02)

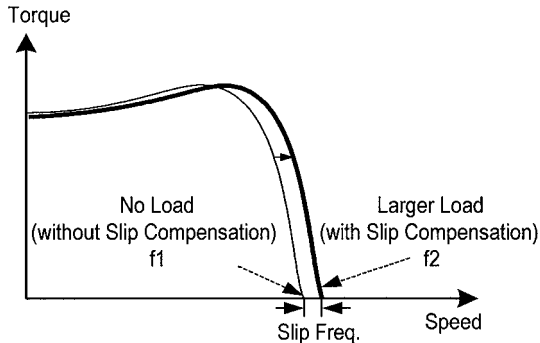


Figure 4-18-2: Slip Compensation Control



7-04 : Automatic Torque Boost Gain				Factory Setting	0.0
Setting Range	Unit	Description			
0.0~2.0	0.1	<ul style="list-style-type: none"> <li>Through the automatic torque boost function, the inverter can adjust automatically output voltage to compensate the change of load. As a result, the energy efficiency is also improved. Normally, no adjustment is required.</li> <li>In the case that the wiring distance between the inverter and the motor is too long (e.g. more than 100m), the motor torque is a little short because of voltage drop. Increase the value of (7-04) gradually and make sure the current will not increase too much.</li> </ul>			

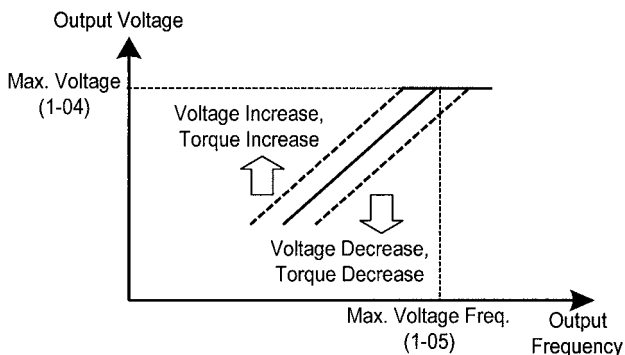


Figure 4-19: Automatic Torque Boost Function

## 8 : Special Parameter

8-01~8-04 : DC Injection Braking Function					
Parameter		Setting Range	Unit	Factory Setting	Description
8-01	DC Injection Braking Freq.	0.1~10.0 Hz	0.1Hz	1.5Hz	The DC injection braking frequency (8-01) is to set the frequency for beginning DC injection braking for deceleration. If the braking frequency is less than the Min. output frequency (1-08), the DC injection will begin from Min. output frequency.
8-02	DC Injection Braking Current	0~80%	1%	40%	Base on the inverter rated current as 100%.

8-03	DC Injection Braking Time at Stop	0.0 ~ 25.5 s	0.1 s	0.5 s	If the DC injection braking time at stop (8-03) is 0.0, the DC injection braking is disabled at stopping. In this case, the inverter output will be blocked off when the output frequency is less than the DC injection braking frequency (8-01).
8-04	DC Injection Braking Time at Start	0.0 ~ 25.5 s	0.1 s	0.0 s	If the DC injection braking time at start (8-04) is 0.0, the motor starts from the Min. output frequency and the DC injection braking is disabled at starting.

### DC Injection Braking Function:

- The DC injection braking function is to apply a DC current to the motor for generating the braking torque. This happens in the 2 cases:
  - DC injection at start: It is effective for temporarily halting the motor before running.
  - DC injection at stop: It is used to prevent the motor with a large load to keep running after stopping.
- Lengthening the DC injection braking time at stop (8-03) or increasing the DC injection braking current (8-02) can shorten the motor stopping time.
- For the DC injection braking current (8-02), set the output current at the time of DC injection. DC injection braking current is set as a percentage of inverter rated output current, with the inverter rated output current taken as 100%.

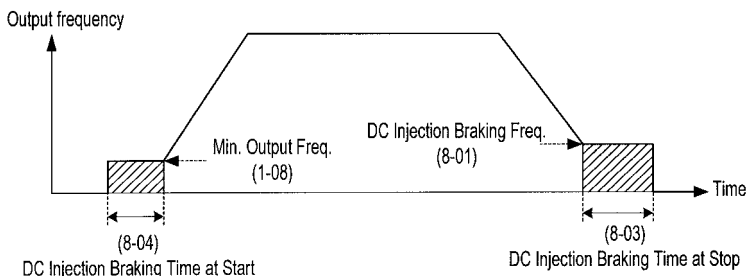


Figure 4-20 : Time Chart of DC Injection Braking

8-05 : Operating Selection at Power Loss			Factory Setting	0
Setting Value	Operating	Description		
0	Stop	The power loss message is accepted during inverter is running, and then inverter will coast to stop. After power is recovered, inverter will keep to stopping.		
1	Continue	The power loss message is accepted during inverter is running, and then inverter will coast to stop. After power is recovered, inverter will keep to running through speed search operation.		

# 8-06~8-08 : Speed Search Setting

	Parameter	Setting Range	Unit	Factory Setting	Description
8-06	Speed Search Current Level	0~150%	1%	100%	See Figure 4-21 : The Time Chart of Speed Search.
8-07	Speed Search Deceleration Time	0.1~25.5s	0.1s	5.0s	
8-08	Min. Base-block Time	0.5~5.0s	0.1s	0.5s	

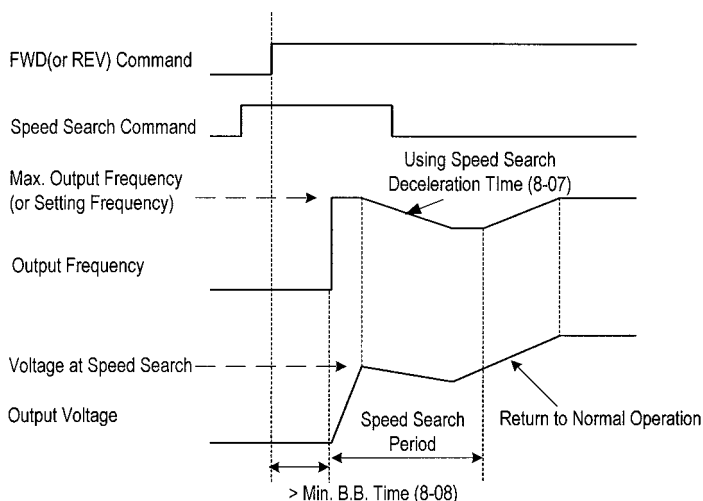


Figure 4-21 : Time Chart of Speed Search

- The speed search command can be set through the multi-function digital input terminals MI2~MI5 (by setting the parameters 4-05~4-08).
- If (4-05)~(4-08)= 21: Speed search frequency is performed from Max. output frequency when speed search command is enabled.
- If (4-05)~(4-08)= 22: Speed search frequency starts from the setting frequency when speed search command is enabled.
- Firstly, the speed search command is enabled after the inverter output is blocked. Then the inverter will begin to search the motor speed after the output block time is greater than the min. base-block time (8-08).
- At speed search operation, if the inverter output current is less than (8-06), the inverter will take the output frequency as motor speed at that time. From that output frequency, the inverter will accelerate or decelerate to the setting frequency according to the acceleration or deceleration time.

Note:

1. The speed search operation will be disabled if the speed search command is acted from the max. frequency and the setting frequency. (i.e., (4-07)=21, (4-08)=22 and multi-function input terminals M14 & M15 is used at the same time).
2. Make sure that the FWD/REV command must be performed before or at the same time with the speed search command.
3. For the Min. base block time, set the time long enough to allow the motor's residual voltage to dissipate while inverter output voltage is blocked. If an over current is detected at starting of the speed search, then raise the setting (8-08) to prevent a fault. As a result, the (8-08) setting cannot be set too small.

#### 8-09~8-12 : Jump Frequency

Parameter	Setting Range	Unit	Factory Setting	Description
8-09 Jump Frequency 1	0.0~400.0Hz	0.1Hz	0.0Hz	<ul style="list-style-type: none"> <li>• These settings allow the "jumping" of certain frequencies within the inverter's frequency command so that the motor can avoid to be operated in resonant oscillation frequencies caused by some machine systems.</li> <li>• Frequency command is prohibited within the jump frequency range, but output frequency is not jumped during acceleration and deceleration.</li> <li>• To disable this function, set the jump frequency 1~3 (8-09~8-11) to 0.0Hz.</li> <li>• For the jump frequency 1~3 (8-09~8-11), set the center frequency to be jumped.</li> <li>• Be sure to set the jump frequency so that <math>(8-09) \geq (8-10) \geq (8-11)</math>. If not, an error message "PECE" is displayed.</li> <li>• For (8-12), set the jump frequency bandwidth. If (8-12) is set as 0.0Hz, the jump frequency function is disabled.</li> </ul>
8-10 Jump Frequency 2	0.0~400.0Hz	0.1Hz	0.0Hz	
8-11 Jump Frequency 3	0.0~400.0Hz	0.1Hz	0.0Hz	
8-12 Jump Frequency Width	0.0~25.5Hz	0.1Hz	1.0Hz	

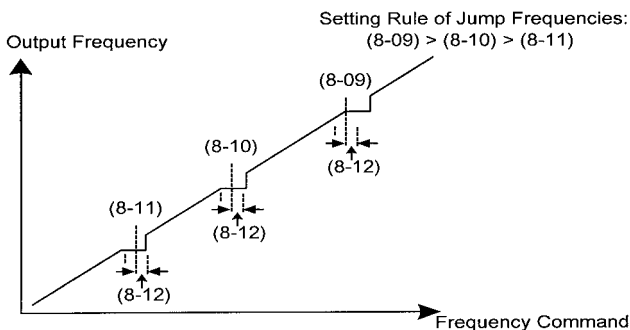




Figure 4-22 : The Setting of Jump Frequency

8-13 : Fault RetryTimes			Factory Setting	0
Setting Range	Unit	Description		
0~10	—	<ul style="list-style-type: none"> <li>The fault retry function will automatically restart the inverter when an internal fault occurs during inverter operation, and reset fault signal not need.</li> <li>The fault retry function is effective with the following faults: OC • UV1 • OL1 • GF • OV • OL2.</li> <li>The fault retry count will automatically increase upon the restart activated and will be cleared in the following cases: <ul style="list-style-type: none"> <li>a. When the operation is normal for 10 minutes after a fault retry is performed.</li> <li>b. By pressing  key or fault reset terminal.</li> <li>c. When the power is turned off and on again.</li> </ul> </li> <li>When one of the multi-function output terminals (Ra-Rb-Rc or MO<sup>+</sup>-MO<sup>-</sup>) is set to 'during retry' function, the output will be ON while the fault retry function is in progress.</li> </ul>		

8-14~8-15 : Timer Function					
Parameter	Setting Range	Unit	Factory Setting	Description	
8-14	ON-Delay Time of Timer Function	0.0~999.9	0.1s	0.0s	<ol style="list-style-type: none"> <li>Multi-function input terminal MI2~MI5 (parameter setting 4-05~4-08=23) and multi-function output terminal (parameter setting 3-06~3-07=18) are determined as time delay setting in timer function. The appropriate setting ON/OFF delay time (8-14 &amp; 8-15) can remove switch's bounce noise.</li> <li>When timer function input terminal ON time is greater than (8-14) setting value, timer function output terminal is ON. When timer function input terminal OFF time is greater than (8-15) setting value, timer function output terminal is OFF.</li> </ol>
8-15	OFF-Delay Time of Timer Function	0.0~999.9s	0.1s	0.0s	

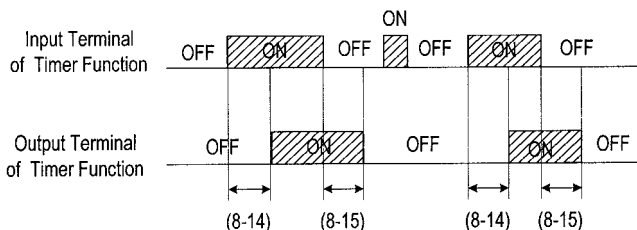


Figure 4-23 : An Operation Example of Timer Function

8-16 : PID Function Selection			Factory Setting	0
Setting Value	PID Function	Description		
0	Disable	1. Select PID Control Function. 2. PID Control, please see PID Control Scheme and Parameter Adjustment Method (parameter 8-17~8-23).		
1	Enable			

8-17~8-23 : PID Control					
Parameter	Setting Range	Unit	Factory Setting	Description	
8-17	PID Detection Gain	1~1000	1%	100%	<ul style="list-style-type: none"> <li>The PID controller is composing of the proportional (P), integral (I) and derivative (D) control item, and is used to control the feedback value of system match up with the target value of system. Please see Figure 4-24: Block Diagram of the PID control.</li> <li>The tuning procedures of proportional gain (P), integral time (I) and derivative time (D) to achieve required response is described in below. Please see "Adjusting PID controller".</li> <li>The parameter (8-21) is used to let the inverter output frequency to zero, if both the target value and feedback value are set to 0.</li> <li>The parameter (8-22) prevents the calculated value of the integral control of PID from exceeding the fixed amount. The integral value is limited within 0-109% of Max. output frequency (100%). If the setting of (8-22) is too small, the feedback value may not match the target setting.</li> <li>The parameter (8-23) is the low pass filter setting for PID control output. Increase the setting (8-23) can stabilize the system during oscillation occurs, but It will decrease the responsiveness of system.</li> </ul>
8-18	PID Proportional Gain (P)	1~1000	1%	100%	
8-19	PID Integral Time (I)	0.0~100.0s	0.1s	1.0s	
8-20	PID Differential Time (D)	0~1000ms	1ms	0ms	
8-21	PID Output Bias	0~109%	1%	0%	
8-22	PID Integral Upper Limit	0~109%	1%	100%	
8-23	PID Output Delay Time	0.0~2.5s	0.1s	0.0s	

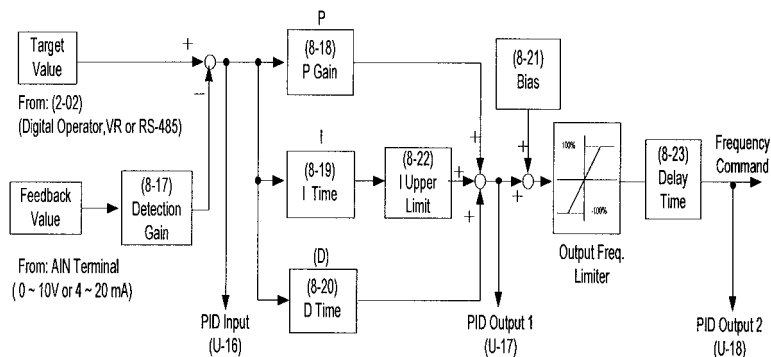


Figure 4-24 : Block Diagram of the PID control (When (8-16)=1, PID control is enabled.)

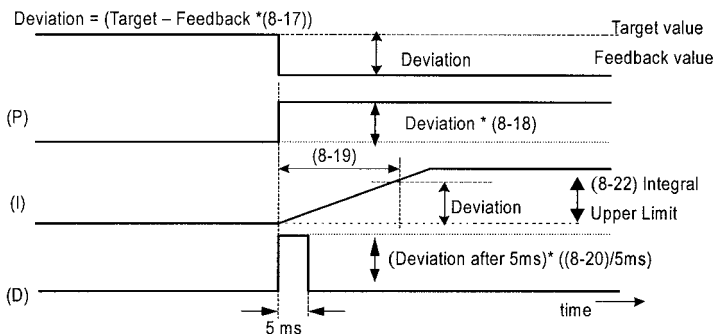


Figure 4-25 : Response of PID control with STEP input

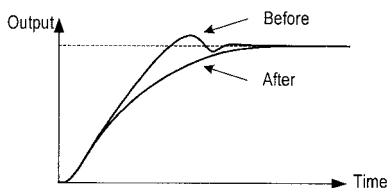
- The value of Deviation = Target Value – (Feedback Value × (8-17))
- The value of proportional item (P) = Deviation × (8-18)
- The value of integral item (I) increases with time and will be equal to the deviation value after time specified by parameter (8-19).
- The parameter (8-22) will prevent the calculated value of the Integral item (with the integral time (8-19)) in the PID control from exceeding the fixed amount.
- The value of derivative item (D) is described in below:

$$\text{The value of D item} = \left[ \frac{(8-20)}{5 \text{ msec}} \right] \times (5 \text{ msec Difference})$$

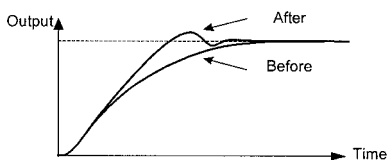
### Adjusting PID controller :

Use the following procedure to activate PID control, and then adjust it while monitoring the response.

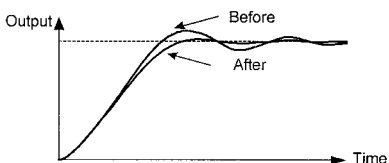
1. Enable PID control (8-16=1).
2. Increase the proportional gain (8-18) as far as possible without creating oscillation.
3. Decrease the integral time (8-19) as far as possible without creating oscillation.
4. Increase the derivative time (8-20) as far as possible without creating oscillation.



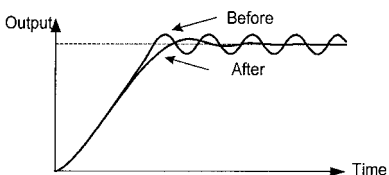
If overshoot occurs, shorten the derivative time (D) and lengthen the integral time (I).



To rapidly stabilize the control conditions even when overshooting occurs, shorten the integral time (I) and lengthen the derivative time (D).



If oscillation occurs with a longer cycle than the integral time (I) setting, it means that the integral operation is strong. The oscillation will be reduced as the integral time (I) is lengthened.



If oscillation cycle is short and approx. the same as the derivative time (D) setting, it means that the derivative operation is strong. The oscillation will be reduced as the derivative time (D) is shortened. If even setting the derivative time (D) to 0.00 cannot reduce oscillation, then either decrease the proportional gain (P) or raise the PID primary delay time constant.



## 9 : Communication Parameter

Parameter		Setting Range	Factory Setting	Description
9-01	RS-485 Slave Address	01 ~ 255	01	The inverter's station address in RS-485 communication
9-02	RS-485 Baud Rate	0	3	1200 bps (bps: bit / sec)
		1		2400 bps (bps: bit / sec)
		2		4800 bps (bps: bit / sec)
		3		9600 bps (bps: bit / sec)
9-03	RS-485 Parity	0	0	No parity
		1		Even parity
		2		Odd parity
9-04	Stop Method during RS-485 Comm. Error	0	0	Deceleration to stop with (1-13) deceleration time, when RS-485 has communication error.
		1		Coast to stop.
		2		Deceleration to stop with (1-15) deceleration time, when RS-485 has communication error.
		3		Continue operating (or press STOP button to stop).
9-05	Detection Time of Comm. Error	0.0 ~ 25.5s	1.0s	For RS-485 communication error allowed time, it can issue communication error warning, when transmission error time exceeds setting value (9-05), digital operator will displays "Err" message. When it is set as (9-05) = 00.0, it means there is no communication error detected.

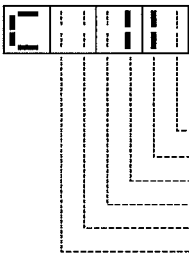
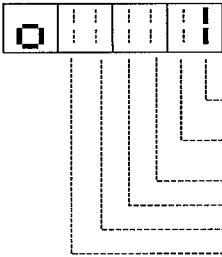
- The TDS-F8 inverter has a built-in RS-485 port for the communication with a single master (PLC). The maximum 31 slave units (TDS-F8) can be connected in RS-485 system, and the slave address of all units must be different.
- The RTU mode of MODBUS protocol is used in the RS-485 communication. The master sends a signal to one slave at a time. Each slave has a pre-registered address No., and the master specifies the number and conducts signal communication. The slave receives the communications to carry out designated functions and reply to the master.
- Each data in MODBUS format has a fixed data length of 11 bits: 1 start bit, 8 data bits, 1 parity bit and 1 stop bit. If no parity (9-03=0) be set, the parity bit should be "1".

1	2	3	4	5	6	7	8	9	10	11
Start Bit	Data Bit 0	Data Bit 1	Data Bit 2	Data Bit 3	Data Bit 4	Data Bit 5	Data Bit 6	Data Bit 7	Parity Bit	Stop Bit


- 3 different commands are used for communication between the inverter and master:
  - ① Read command: to read the register data of inverter.
  - ② Write command: to write data into the register of inverter.
  - ③ Loop test command: to test the communication between the inverter and master.
- The change of setting (9-01), (9-02) and (9-03) will be effective in the next start time after turning off the inverter.
- Do not make the DRIVE/PRGM changeover while writing the date into the inverter through RS-485 port.

- For more details of RS-485 communication, refer to "TDS-F8's MODBUS Communication Operating Manual".

## U : Monitor Parameter

Parameter		Unit	Description
U-01	Frequency Command	0.1Hz	Display frequency command. The displayed unit is determined by (0-01).
U-02	Output Frequency	0.1Hz	Display output frequency. The displayed unit is determined by (0-01).
U-03	Output Current	0.1A	Display inverter's output current.
U-04	Output Voltage	1V	Display output voltage command of inverter.
U-05	DC Bus Voltage	1V	Display DC voltage of inverter main circuit.
U-06	Output Power	1W	Display output power of inverter.
U-07	Input Terminal Status	-	 <p>LED OFF : Open LED ON : Close</p> <p>LED OFF: MI0 Open LED ON: MI1 Close LED ON: MI2 Close LED OFF: MI3 Open LED OFF: MI4 Open LED OFF: MI5 Open</p> <p>Monitor the input terminals MI0 ~MI5 status: ON/OFF.</p>
U-08	Output Terminal Status	-	 <p>LED OFF : Open LED ON : Close</p> <p>Relay Contact Ra-Rc (Close) Photocouper MO+ - MO- (Open) not used not used not used not used</p> <p>Monitor the output terminal Ra-Rc and MO+~MO- status: ON/OFF.</p>
U-09	Cumulative Operation Time	1Hr	The parameter will record the cumulative operation time when inverter is running. Its value is 0~65535 Hr. If the value exceeds 65536, it will restart from 0 again.

Parameter		Unit	Description
U-10	Cumulative Power-On Time	1Hr	The parameter will record the cumulative time after inverter's power is on. Its value is 0~65535 Hr. If the value exceeds 65536, it will restart from 0 again.
U-11	AIN Command (0~10V or 4~20mA)	0.1%	The parameter can monitor the signal of external analog terminal AIN (0~10V / 4~20mA). When the PID control is enabled, the analog command is the feedback of PID. Refer to the "Block Diagram of the PID Control". 100% = Maximum output frequency
U-12	Panel's VR	0.1%	Monitor the analog command from panel's VR. 100% = Maximum output frequency
U-13	Multifunction Analog Output	0.1%	Monitor the voltage 10V/100% of multifunction analog output terminal FM.
U-14	Counter Cumulative Value	-	Monitor counter cumulative Value.
U-15	Auto-Run step	-	Monitor the step now during auto run mode
U-16	PID Control Input	0.1%	Refer to "Block Diagram of the PID Control". U-16, 17 and 18 can be used to monitor. 100% = Maximum output frequency
U-17	PID Control Output	0.1%	
U-18	PID Control Output	0.1%	
U-19	Frequency Command when Fault Occurred	0.1Hz	The parameters will display the inverter status when the fault occurred lately so as the status.
U-20	Output Frequency when Fault Occurred	0.1Hz	
U-21	Output Current when Fault Occurred	0.1A	
U-22	Output Current when Fault Occurred	1V	
U-23	DC Voltage when Fault Occurred	1V	
U-24	Cumulative Operation Time when Fault Occurred	1Hr	
U-25	Input Terminal Status when Fault Occurred	-	
U-26	Output Terminal Status when Fault Occurs	-	
U-27	Fault Message 1 (Fault now)	-	Fault message occurred now.
U-28	Fault Message 2 (Last time fault)	-	Fault message occurred last time:
U-29	Fault Message 3 (Last two times fault)	-	Fault message occurred last two times.

Parameter No.		Unit	Description
U-30	Fault Message 4 (Last three times fault)	-	Fault message occurred last three times.
U-31	EPROM Software Version	-	Software Serial No. For manufacturing use.
U-32	TEK DRIVE Inverter Model Number	-	Display “  ”, represent the inverter model number of TEK DRIVE .
U-33	Reserved		

## 5. TDS-F8 Parameter Table

### 0 : User Parameter

No.	Function	Setting Range	Factory Setting	User Setting	Ref. Page	Note
0-01	Unit Displayed by Digital Operator	0 ~ 1999	0		21	
0-02	Monitor Item after Power On	0 ~ 2	0		21	↗
0-03	Reserved					

### 1 : Basic Parameter

No.	Function	Setting Range	Factory Setting	User Setting	Ref. Page	Note
1-01	Inverter Capacity	Capacity Selection : 1 ~ 3 220V / 0.5、1 and 2 HP	*1		22	
1-02	Factory Setting Selection	Operation status and initial setting : 00 ~ 14 00 : Parameter can be set and monitored. 01 : Some certain parameter can be set and monitored, the others can only be monitored. 02 : Reserved 03 : 2-Wire, 220V/60Hz 04 : 3-Wire, 220V/60Hz 05 : 2-Wire, 200V/60Hz 06 : 3-Wire, 200V/60Hz 07 : 2-Wire, 220V/50Hz 08 : 3-Wire, 220V/50Hz 09 ~ 10 : Reserved 11 : Clear fault message 12 ~ 14 : Reserved	0		23	
1-03	Maximum Output Frequency	50.0 ~ 400.0Hz	60.0Hz		24	
1-04	Maximum Output Voltage	0.1 ~ 255.0V	220.0V			
1-05	Max. Voltage Frequency	0.1 ~ 400.0Hz	60.0Hz			
1-06	Middle Output Frequency	0.1 ~ 400.0Hz	1.5Hz		24	
1-07	Voltage at Middle Output Frequency	0.1 ~ 255.0V	7.9V			
1-08	Minimum Output Frequency	0.1 ~ 400.0Hz	1.5Hz			
1-09	Voltage at Minimum Output Frequency	0.1 ~ 255.0V	7.9V		25	
1-10	Frequency Command Upper Limit	0 ~ 109%	100%			

1-11	Frequency Command Lower Limit	0~109%	0%			
1-12	Acceleration Time 1	0.0~999.9s	10.0s		26	↗
1-13	Deceleration Time 1	0.0~999.9s	10.0s			↗
1-14	Acceleration Time 2	0.0~999.9s	10.0s			↗
1-15	Deceleration Time 2	0.0~999.9s	10.0s			↗
1-16	Jog Frequency	0.0~400.0Hz	6.0Hz		27	↗
1-17	S Curve Time in Starting Acceleration	0.0~1.0s	0.0s		27	
1-18	S Curve Time in Ending Acceleration	0.0~1.0s	0.0s			
1-19	S Curve Time in Starting Deceleration	0.0~1.0s	0.0s			
1-20	S Curve Time in Ending Deceleration	0.0~1.0s	0.0s			

\*1 : Inverter Model Determination

## 2 : Operating Method Parameter

No.	Function	Setting Range	Factory Setting	User Setting	Ref. Page	Note
2-01	Run Command Source Selection	0 : Digital Operator	0		28	
		1 : Control Circuit Terminal				
		2 : RS-485 Communicator				
2-02	Frequency Command Source Selection	0 : Digital Operator	0		28	
		1 : Terminal AIN				
		2 : RS-485 Communicator				
		3 : Panel's VR				
2-03	Stop Method Selection	0 : Ramp to Stop 1 : Coast to Stop	0		28	
2-04	Operator's STOP Key Function	0 : STOP Key is valid. 1 : STOP Key is invalid.	0		29	
2-05	Reverse Prohibition Setting	0 : Allow 1 : Prohibit	0		29	
2-06	Carrier Frequency Setting	1~6	4		29	
2-07	External UP/DOWN Memory Function	0 : Disable 1 : Enable	1		30	
2-08	Operator's UP/DOWN Function	0 : Disable 1 : Enable	0		30	

### 3 : Output Function Parameter

No.	Function	Setting Range	Factory Setting	User Setting	Ref. Page	Note
3-01	Analog Output FM Function Selection	00~11	0		31	
3-02	Analog Output Gain	1~255%	100%		31	↗
3-03	Frequency Agreed Detection Level During Acceleration	0.0~400.0Hz	0.0Hz		32 & 33	
3-04	Frequency Agreed Detection Level During Deceleration	0.0~400.0Hz	0.0Hz			
3-05	Frequency Agree Width	0.1~25.5Hz	2.0Hz			
3-06	Digital Output Terminal (Ra-Rb-Rc) Function	0~38	10		33	
3-07	Digital Output Terminal MO Function		0		37	
3-08	Pulse Output Multiple Selection	01~16	1		38	

### 4 : Input Function Parameter

No.	Function	Setting Range	Factory Setting	User Setting	Ref. Page	Note
4-01	Analog Frequency Command AIN Gain	0.0~1000.0%	100.0%		38	↗
4-02	Analog Frequency Command AIN Bias	-99.9~100.0%	0.0%			↗
4-03	Analog Input Signal Source Selection	0 : 0~10V 1 : 4~20mA	0		39	
4-04	Analog Frequency Command Input Characteristic	0 : Freq. Command is 0~100% (Normal) 1 : Freq. Command is 100~0% (Reverse) 2 : Freq. Command is -100~100%(Fwd_Rev)	0		39	
4-05	Multi-Function MI2 Selection	00~27	3		40 ~ 47	
4-06	Multi-Function MI3 Selection	01~28	4			
4-07	Multi-Function MI4 Selection	02~29	5			
4-08	Multi-Function MI5 Selection	03~30	6			
4-09	Scan Times of Input Terminal	0 : Scan 1 times 1 : Scan 2 times	1		48	
4-10	Analog Input Filter	1~80	10		48	
4-11	Counter Setting Value	0~9999	0		48	

## 5 : Multi-Speed and Auto-Run Parameter

No.	Function	Setting Range	Factory Setting	User Setting	Ref. Page	Note
5-01	Frequency Command 1	0.0~400.0Hz	0.0Hz		48	↗
5-02	Frequency Command 2	0.0~400.0Hz	0.0Hz			↗
5-03	Frequency Command 3	0.0~400.0Hz	0.0Hz			↗
5-04	Frequency Command 4	0.0~400.0Hz	0.0Hz			↗
5-05	Frequency Command 5	0.0~400.0Hz	0.0Hz			↗
5-06	Frequency Command 6	0.0~400.0Hz	0.0Hz			↗
5-07	Frequency Command 7	0.0~400.0Hz	0.0Hz			↗
5-08	Frequency Command 8	0.0~400.0Hz	0.0Hz			↗
5-09	Auto-Run Mode Selections: 0: Auto-Run mode is disabled. 1: One single cycle Auto-Run mode is performed. (continuing running from the unfinished step if restarting) 2: Periodical cycle Auto-Run mode is performed. (continuing running from the unfinished step if restarting) 3: Perform one single cycle Auto-Run, then hold the speed of final step to run. (continuing running from the unfinished step if restarting) 4: One single cycle Auto-Run mode is performed. (starting a new cycle if restarting) 5: Auto-Run mode is performed periodically. (starting a new cycle if restarting) 6: Perform one single cycle Auto-Run, then hold the speed of final step to run. (starting a new cycle if restarting)		0		49 ~ 50	
5-10	Auto-Run Direction 1	0 : Stop 1 : Forward 2 : Reverse	0			
5-11	Auto-Run Direction 2		0			
5-12	Auto-Run Direction 3		0			
5-13	Auto-Run Direction 4		0			
5-14	Auto-Run Direction 5		0			
5-15	Auto-Run Direction 6		0			
5-16	Auto-Run Direction 7		0			
5-17	Auto-Run Direction 8		0			
5-18	Auto-Run 1 <sup>st</sup> Step Time	0.0~6000.0s	0.0s			↗
5-19	Auto-Run 2 <sup>nd</sup> Step Time	0.0~6000.0s	0.0s			↗
5-20	Auto-Run 3 <sup>rd</sup> Step Time	0.0~6000.0s	0.0s			↗
5-21	Auto-Run 4 <sup>th</sup> Step Time	0.0~6000.0s	0.0s			↗
5-22	Auto-Run 5 <sup>th</sup> Step Time	0.0~6000.0s	0.0s			↗
5-23	Auto-Run 6 <sup>th</sup> Step Time	0.0~6000.0s	0.0s			↗
5-24	Auto-Run 7 <sup>th</sup> Step Time	0.0~6000.0s	0.0s			↗
5-25	Auto-Run 8 <sup>th</sup> Step Time	0.0~6000.0s	0.0s			↗



## 6: Protection Parameter

No.	Function	Setting Range	Factory Setting	User Setting	Ref. Page	Note
6-01	Stall Prevention Function Selection During Acceleration	0 : Disable, 1 : Enable	1		51	
6-02	Stall Prevention Function Selection During Deceleration	0 : Disable, 1 : Enable	1			
6-03	Stall Prevention Function Selection During Running	0 : Disable, 1 : Enable	1			
6-04	Stall Prevention Level During Acceleration	30~150%	140%			
6-05	Stall Prevention Level During Running	30~150%	130%			
6-06	Over Torque Detected Level	30~150%	130%		52	
6-07	Over Torque Detection Time	0.0~25.5s	0.1s			
6-08	Over Torque Detection Selections: 0: Over torque detection function is disabled. 1: Over torque has been detected only at frequency agree; the motor will continue operation. 2: Over torque has been detected only at frequency agree; the motor will stop. 3: Over torque has been detected during running (ACC, DEC included). The motor will continue operation. 4: Over torque has been detected during running (ACC, DEC included). The motor will stop.		0			
6-09	Motor Over Load Protection Selections: 1: Motor overload protection is disabled. 2: The overload is detected according to the standard motor cold start curve. 3: The overload is detected according to the standard motor hot start curve. 4: The overload is detected according to the specific motor cold start curve. 5: The overload is detected according to the specific motor hot start curve.		1		53	
6-10	Under Voltage Detection Level	150~210V	190V		54	

## 7 : Motor Parameter

No.	Function	Setting Range	Factory Setting	User Setting	Ref. Page	Note
7-01	Motor Rated Current	*.A	*1		54	
7-02	Motor No-Load Current	0~99%	30%		54	
7-03	Motor Rated Slip	0~9.9%	0.0%		54	
7-04	Automatic Torque Boost Gain	0.0~2.0	0.0		56	


\*1 : Inverter Model Determination

## 8 : Special Parameter

No.	Function	Setting Range	Factory Setting	User Setting	Ref. Page	Note
8-01	DC Injection Braking Frequency	0.1~10.0Hz	1.5Hz		56~	
8-02	DC Injection Braking Current	0~80%	40%			
8-03	DC Injection Braking Time at Stop	0.0~25.5s	0.5s		57	
8-04	DC Injection Braking Time at Start	0.0~25.5s	0.0s			
8-05	Operating Selection at Power Loss	0 : Stop 1 : Continue	0		57 & 58	
8-06	Speed Search Current Level	0~150%	100%			
8-07	Speed Search Deceleration Time	0.1~25.5s	5.0s		59	
8-08	Minimum Base-block Time	0.5~5.0s	0.5s			
8-09	Jump Frequency 1	0.0~400.0Hz	0.0Hz			
8-10	Jump Frequency 2	0.0~400.0Hz	0.0Hz			
8-11	Jump Frequency 3	0.0~400.0Hz	0.0Hz		60	
8-12	Jump Frequency Width	0.0~25.5Hz	1.0Hz			
8-13	Fault Retry times	0~10	0		61	
8-14	ON-Delay Time of Timer Function	0.0~999.9s	0.0s			⚡
8-15	OFF-Delay Time of Timer Function	0.0~999.9s	0.0s		61 ~ 64	⚡
8-16	PID Function Selection	0: Disable 1: Enable	0			
8-17	PID Detection Gain	1~1000%	100%			⚡
8-18	PID Proportional Gain (P)	1~1000%	100%			⚡
8-19	PID Integral Time (I)	0.0~100.0s	1.0s			⚡
8-20	PID Differential Time (D)	0~1000ms	0ms			⚡
8-21	PID Output Bias	0~109%	0%			⚡
8-22	PID Integral Upper Limit	0~109%	100%			
8-23	PID Output Delay Time	0.0~2.5s	0.0s			

## 9 : Communication Parameter

No.	Function	Setting Range	Factory Setting	User Setting	Ref. Page	Note
9-01	RS-485 Address	01 ~ 255	1		64 & 65	
9-02	RS-485 Baud Rate	0 : 1200 bps (byte/s) 1 : 2400 bps 2 : 4800 bps 3 : 9600 bps	3			
9-03	RS-485 Parity	0 : No Parity 1 : Even Parity 2 : Odd Parity	0			
9-04	Stop Method during RS-485 Comm. Error	1 : Ramp to Stop (1-13) 2 : Coast to Stop 3 : Ramp Stop (1-15) 4 : Continue Running	0			
9-05	Detection Time of Communication Error	0.0 ~ 25.5s	1.0s			










Note : All parameters having  sign, can be set while running (DRIVE Mode)

Display	Alarm Description	Causes	Corrective Actions
Alarm Operator Communication Fault	within 5 sec after power-on. After communication is established, there is the transmission error with digital operator for more than 2 sec.	<ul style="list-style-type: none"> <li>The control board is failure.</li> </ul>	<ul style="list-style-type: none"> <li>Replace the control board.</li> </ul>
<b>bb</b> (Blinking) Base block	When the base-block signal occurred at the input terminal, the inverter will coast to stop. When the base-block input signal is gone, the inverter will execute the speed search and run again.	External base-block signal occurred at the input of multi-function terminal, the inverter stop output frequency command.	Clear the external base-block signal, the 'bb' warning will disappear.
<b>EF 1</b> (Blinking) Input Command Error	FWD and REV commands input simultaneously for more than 500ms.	Improper operation procedure.	<ul style="list-style-type: none"> <li>Check the wiring of control board.</li> <li>Check the operation Procedure.</li> </ul>
<b>PE01</b> Parameter Error 1	Parameter setting is not correct.	<ul style="list-style-type: none"> <li>Improper setting of inverter capacity (1-01).</li> <li>Setting value exceeds its range.</li> </ul>	<ul style="list-style-type: none"> <li>Set proper KVA value. Be aware of the difference of 220V and 440 V.</li> <li>Re-initiate the parameter setting (1-02).</li> </ul>
<b>PE02</b> Parameter Error 2	The setting of input terminals (4-05)~(4-08) is not correct.	<ul style="list-style-type: none"> <li>The setting of (4-05)~(4-08) does not comply with the rule of (4-05) &lt; (4-06) &lt; (4-07) &lt; (4-08).</li> <li>There are 2 multi-function input terminals that are assigned as speed search command.</li> </ul>	<ul style="list-style-type: none"> <li>Change the settings of (4-05)~(4-08) to fit the rule.</li> <li>Only 1 input terminal is assigned to speed search.</li> </ul>
<b>PE03</b> Parameter Error 3	The setting of Auto-run operation is not correct.	Auto-run operation is enabled ( 5-09 > 0), but the setting of (5-10)~(5-17) is stop mode (= 0).	Enter the correct settings of (5-09) or (5-10)~(5-17).
<b>PE04</b> Parameter Error 4	The V/F curve parameters (1-03)~(1-09) are not correct.	The setting of (1-03)~(1-09) does not satisfy the conditions of (1-03) ≥ (1-05) > (1-06) ≥ (1-08) and (1-04) ≥ (1-07) > (1-09).	Adjust the setting of the parameters (1-03)~(1-09) to fit the rules.
<b>PE05</b> Parameter Error 5	The setting of upper and lower limit frequency is Improper.	The setting of upper and lower limit frequency does not satisfy the condition of (1-11) < (1-10).	Adjust the setting of the parameters (1-10) and (1-11) to fit the rule.
<b>PE06</b> Parameter Error 6	The setting of jump frequency is Improper.	The setting of jump frequency (8-09)~(8-11) does not satisfy the condition of (8-09) ≥ (8-10) ≥ (8-11).	Adjust the setting of the parameters (8-09)~(8-11) to fit the rule.
<b>P I D E</b> (Blinking) PID Error	PID Error is detected, and in this case inverter is set as continuous running mode.	<ul style="list-style-type: none"> <li>Improper PID command</li> <li>Improper feedback signal</li> <li>Improper detection setting</li> </ul>	<ul style="list-style-type: none"> <li>Set proper PID command.</li> <li>Check feedback signal level.</li> <li>Set proper PID detection value.</li> </ul>

Display	Fault Description	Causes	Corrective Actions
<b>PF03</b> EEPROM Fault	EEPROM Fault	EEPROM of control board is failure.	Use parameter (1-02) to initialize the inverter. If the error still exists, replace the control board.
<b>PF05</b> A/D Fault	A/D converter (inside the CPU) fault	Control board is damaged.	Replace the control board
<b>GF</b> Ground Fault	A ground fault occurs at the inverter output side and the ground-fault current exceeds approx. 50% of the inverter rated current.	<ul style="list-style-type: none"> <li>Motor dielectric strength is insufficient.</li> <li>Load wiring is not proper.</li> </ul>	<ul style="list-style-type: none"> <li>Check the motor wiring impedance.</li> <li>Check the output wiring.</li> </ul>
<b>CErr</b> RS-485 Comm. Fault	RS-485 communication fault occurs. In this case the inverter is to stop according to (9-04).	<ul style="list-style-type: none"> <li>Improper RS-485 comm. setting</li> <li>Improper RS-485 wiring.</li> <li>Incorrect RS-485 comm. format.</li> <li>Noise corruption.</li> </ul>	<ul style="list-style-type: none"> <li>Check RS-485 com. setting.</li> <li>Check RS-485 wiring.</li> <li>Check RS-485 comm. format.</li> <li>Use noise-resistive parts.</li> </ul>
<b>PIDE</b> PID Fault	During PID control is enabled, PID error value is greater than detection level and continues the detection time. In this case, the inverter is set to stop.	<ul style="list-style-type: none"> <li>Improper PID command</li> <li>Improper feedback signal</li> <li>Improper detection setting</li> </ul>	<ul style="list-style-type: none"> <li>Set proper PID command.</li> <li>Check feedback signal level.</li> <li>Set proper detection value.</li> </ul>

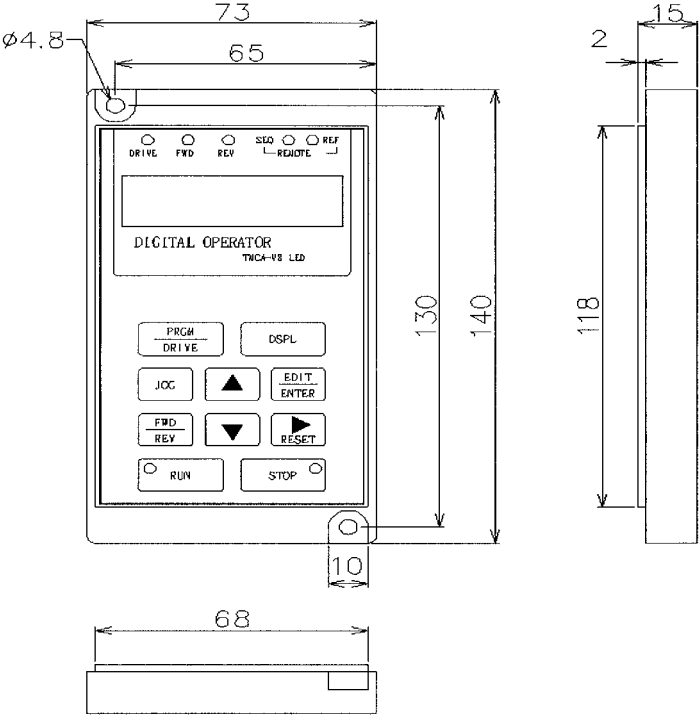
## 6-2 Alarm Display, Causes and Troubleshooting

Display	Alarm Description	Causes	Corrective Actions
<b>UV</b> (Blinking) Alarm Under Voltage	The main circuit DC voltage becomes lower than the under-voltage level while inverter stopping.	<ul style="list-style-type: none"> <li>Input voltage is too low.</li> <li>Improper Input power wiring</li> </ul>	<ul style="list-style-type: none"> <li>Check power source voltage.</li> <li>Check input power wiring</li> </ul>
<b>OV</b> (Blinking) Alarm Over Voltage	The main circuit DC voltage exceeds the over voltage level during inverter stop.	<ul style="list-style-type: none"> <li>Input voltage is too high.</li> <li>Improper Input power wiring</li> </ul>	<ul style="list-style-type: none"> <li>Check power source voltage.</li> <li>Check input power wiring</li> </ul>
<b>OH</b> (Blinking) Alarm Over Heat	The thermal protection contact is input to the external terminal.	Inverter overheat alarm signal is input from a multi-function input and this multi-function input terminal is set	Check the multi-function input overheat alarm terminal
<b>OL3</b> (Blinking) Alarm Over Torque	Over Torque is detected when the output current over (6-06). In this case, the inverter is set to continue to run.	<ul style="list-style-type: none"> <li>Mechanical system errors or overload</li> <li>Improper overload detection level setting</li> </ul>	<ul style="list-style-type: none"> <li>Check the mechanical system.</li> <li>Set proper overload detection level (6-06).</li> </ul>
<b>CErr</b> (Blinking) Alarm RS-485 Interrupt	RS-485 Communication fault occurs. In this case, the inverter is set to continue to run	<ul style="list-style-type: none"> <li>Improper RS-485 comm. setting</li> <li>Improper RS-485 wiring.</li> <li>Incorrect RS-485 comm. format.</li> <li>Noise corruption.</li> </ul>	<ul style="list-style-type: none"> <li>Check RS-485 com. setting.</li> <li>Check RS-485 wiring.</li> <li>Check RS-485 comm. format.</li> <li>Use noise-resistive parts.</li> </ul>
<b>CPFD1</b>	Communication with digital operator is not established	<ul style="list-style-type: none"> <li>Improper connection between digital operator and inverter.</li> </ul>	<ul style="list-style-type: none"> <li>Disconnect operator and then connect it again.</li> </ul>

Display	Alarm Description	Causes	Corrective Actions
Alarm Operator Communication Fault	within 5 sec after power-on. After communication is established, there is the transmission error with digital operator for more than 2 sec.	<ul style="list-style-type: none"> <li>The control board is failure.</li> </ul>	<ul style="list-style-type: none"> <li>Replace the control board.</li> </ul>
 (Blinking) Base block	When the base-block signal occurred at the input terminal, the inverter will coast to stop. When the base-block input signal is gone, the inverter will execute the speed search and run again.	External base-block signal occurred at the input of multi-function terminal, the inverter stop output frequency command.	Clear the external base-block signal, the 'b' warning will disappear.
 (Blinking) Input Command Error	FWD and REV commands input simultaneously for more than 500ms.	Improper operation procedure.	<ul style="list-style-type: none"> <li>Check the wiring of control board.</li> <li>Check the operation Procedure.</li> </ul>
 Parameter Error 1	Parameter setting is not correct.	<ul style="list-style-type: none"> <li>Improper setting of inverter capacity (1-01).</li> <li>Setting value exceeds its range.</li> </ul>	<ul style="list-style-type: none"> <li>Set proper KVA value. Be aware of the difference of 220V and 440 V.</li> <li>Re-initiate the parameter setting (1-02).</li> </ul>
 Parameter Error 2	The setting of input terminals (4-05)~(4-08) is not correct.	<ul style="list-style-type: none"> <li>The setting of (4-05)~(4-08) does not comply with the rule of (4-05) &lt; (4-06) &lt; (4-07) &lt; (4-08).</li> <li>There are 2 multi-function input terminals that are assigned as speed search command.</li> </ul>	<ul style="list-style-type: none"> <li>Change the settings of (4-05)~(4-08) to fit the rule.</li> <li>Only 1 input terminal is assigned to speed search.</li> </ul>
 Parameter Error 3	The setting of Auto-run operation is not correct.	Auto-run operation is enabled (5-09 > 0), but the setting of (5-10)~(5-17) is stop mode (= 0).	Enter the correct settings of (5-09) or (5-10)~(5-17).
 Parameter Error 4	The V/F curve parameters (1-03)~(1-09) are not correct.	The setting of (1-03)~(1-09) does not satisfy the conditions of (1-03) ≥ (1-05) > (1-06) ≥ (1-08) and (1-04) ≥ (1-07) > (1-09).	Adjust the setting of the parameters (1-03)~(1-09) to fit the rules..
 Parameter Error 5	The setting of upper and lower limit frequency is Improper.	The setting of upper and lower limit frequency does not satisfy the condition of (1-11) < (1-10).	Adjust the setting of the parameters (1-10) and (1-11) to fit the rule.
 Parameter Error 6	The setting of jump frequency is Improper.	The setting of jump frequency (8-09)~(8-11) does not satisfy the condition of (8-09) ≥ (8-10) ≥ (8-11).	Adjust the setting of the parameters (8-09)~(8-11) to fit the rule.
 (Blinking) PID Error	PID Error is detected, and in this case inverter is set as continuous running mode.	<ul style="list-style-type: none"> <li>Improper PID command</li> <li>Improper feedback signal</li> <li>Improper detection setting</li> </ul>	<ul style="list-style-type: none"> <li>Set proper PID command.</li> <li>Check feedback signal level.</li> <li>Set proper PID detection value.</li> </ul>

7. Appendix

7-1 External Mode Digital Operator Exterior and Dimensions



7-2 Braking Resistor Table

Inverter		External Braking Resistor		Approximate Braking Torque (10%ED) %
Voltage Class	Maximum Applicable Motor Capacity HP (KW)	Resistance Value (1 Set)		
220V	0.5 (0.4)	260W	200Ω	125
	1 (0.75)	260W	200Ω	125
	2 (1.5)	260W	70Ω	125

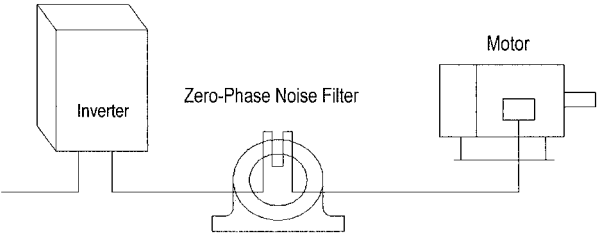
7-3 Noise Filter Table

Voltage Class	Maximum Applicable Motor Capacity HP (KW)	Standard Filter (by SCHAFFNER)		
		Serial Number	Number	Rated Current (A)
220V	0.5 (0.4)	FS7400-13-06	1	13
	1 (0.75)	FS7400-13-06	1	13
	2 (1.5)	FS7400-13-06	1	13

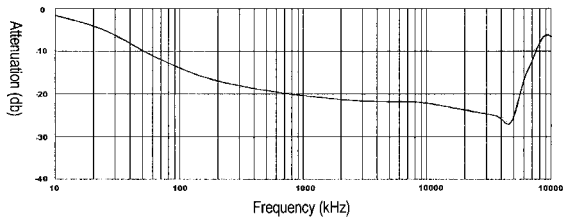
7-4 AC Reactor Table

Voltage Class	Maximum Applicable Motor Capacity HP (KW)	Specifications	
		Current (A)	Inductance (mH)
1φ 220V 50/60HZ	0.5 (0.4)	2.5	4.2
	1 (0.75)	5	2.1
	2 (1.5)	10	1.1

7-5 Zero Phase Noise Filter



(10 turns)



TDSZF-100 —Zero Phase Noise Filter at Output Side



TDS-F8

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