



FREQUENCY INVERTER

Series V2500

MANUAL

WATT DRIVE worldwide

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V2500 Kurzanleitung dt/engl.

Watt Drive operates a policy of continuous development. Therefore, we reserve the right to make changes and improvements to any of our products described in this manual without prior notice. Any changes, improvements and typing errors justify no claims for compensation.

PREFACE

Thank you for choosing WATT DRIVE Antriebstechnik GmbH performance V2500 Series. V2500 Series are manufactured by adopting high-quality components, material and incorporating the latest microprocessor technology available.



Getting Started

This manual will be helpful in the installation, parameter setting, troubleshooting, and daily maintenance of the AC motor drives. To guarantee safe operation of the equipment, read the following safety guidelines before connecting power to the AC drives. Keep this operating manual handy and distribute to all users for reference.



DANGER!

This message indicates a situation which may lead to serious injury or even death if the instruction is not observed.



CAUTION!

This message indicates a situation which may lead to minor or moderate injury, or damage of product.



HAZARDOUS HIGH VOLTAGE!

Motor control equipment or electronic controllers are connected to hazardous line voltages.

When servicing drives and electronic controllers there might exist exposed components with cases or protrusions at or above line potential.

Extreme care should be taken to protect against shock.

For these reasons, the following safety guidelines should be observed:

Stand on an insulating pad and make it a habit to use only one hand when checking components. Disconnect power before checking controllers or performing maintenance. Be sure that equipment is grounded properly. Wear safety glasses whenever working on an electronic controller or rotating electrical equipment.



DANGER!

This equipment should be installed, adjusted and serviced only by qualified electrical maintenance personnel familiar with the construction and operation of the equipment and the hazards involved. Failure to observe this precaution could result in bodily injury.



CAUTION!

These instructions should be read and clearly understood before working on V2500 series equipment.



DANGER!

The user is responsible that all driven machinery, drive train mechanism not supplied by WATT Drive Antriebstechnik and process line material are capable of safe operation at an applied frequency of 150% of the maximum selected frequency range to the AC motor. Failure to do so can result in destruction of equipment and injury to personnel should a single point failure occur.



DANGER!

HAZARD OF ELECTRICAL SHOCK. DISCONNECT INCOMING POWER BEFORE WORKING ON THIS CONTROL.

Do not connect or disconnect wires and connectors while power is applied to the circuit. Maintenance must be performed by qualified technicians.

**DANGER!**

A charge may still remain in the DC-link capacitor with hazardous voltages even if the power has been turned off. To avoid personal injury, please ensure that power has turned off before operating AC drive and wait ten minutes for capacitors to discharge to safe voltage levels.

**CAUTION!**

Proper grounds, disconnecting devices (e.g. fuses) and other safety devices and their location are the responsibility of the user and are not provided by WATT DRIVE Antriebstechnik GmbH.

**CAUTION!**

Rotating shafts and electrical potentials above ground level can be hazardous. Therefore it is strongly recommended that all electrical work conform to the national electrical codes and local regulations. Installation, maintenance and alignment should be performed by qualified personnel only.

Factory recommended test procedures included in this instruction manual should be followed. Always disconnect electrical power before working on the unit.

**DANGER!**

- a) Any motor used must be of suitable rating.
- b) Motors may have hazardous moving parts so that suitable protection must be provided in order to avoid injury.

**CAUTION!**

Alarm connections may have hazardous live voltages even when the inverter is disconnected. In case of removing the front cover for maintenance or inspection, confirm that incoming power for alarm connections is surely disconnected.

**CAUTION!**

There are highly sensitive MOS components on the printed circuit boards. These components are especially sensitive to static electricity. To avoid damage to these components, do not touch these components or the circuit boards with metal objects or your bare hands.

**CAUTION!**

Ground the V2500 using the ground terminal. The grounding method must comply with the laws of the country where the AC drive is to be installed. Refer to Basic Wiring Diagram (Chapter 3).

**CAUTION!**

The final enclosures of the AC drive must comply with EN50178. (Live parts shall be arranged in enclosures or located behind barriers that meet at least the requirements of the Protective Type IP20 Main terminals or other hazardous terminals for any interconnection (terminals for connecting the motor, contact breaker, filter etc.) must be inaccessible after installation.. The top surface of the enclosures or barrier that is easily accessible shall meet at least the requirements of the Protective Type IP40). (V2500 series corresponds with this regulation.)

**CAUTION!**

The rated voltage of power system that is installed on AC drive must be equal to or less than 240 Volts (400 / 460V model is 480 Volts) and the current must be equal to or less than 5000A RMS.

**DANGER!**

The AC drive may be destroyed beyond repair if incorrect cables are connected to the input/output terminals. Never connect the AC drive output terminals U/T1, V/T2, and W/T3 directly to the AC main circuit power supply.

**CAUTION!**

Turn power on only when the DC-link capacitors are fully discharged.

**CAUTION!**

Heat sink may heat up over 70°C, during the operation. Do not touch the heat sink.

All of the above instructions, together with any other requirements, recommendations, and safety messages highlighted in this manual must be strictly complied with.

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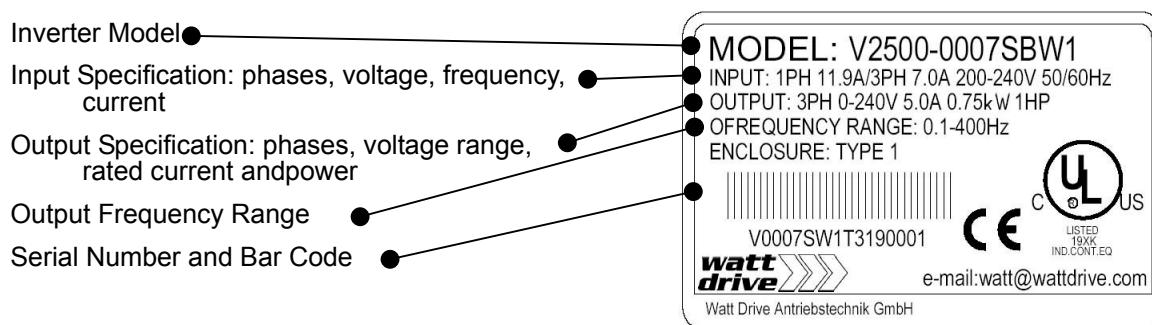
CHAPTER 1 RECEIVING AND INSPECTION

This V2500 AC drive has gone through rigorous quality control tests at the factory before shipment. After receiving the AC drive, please check for the following:

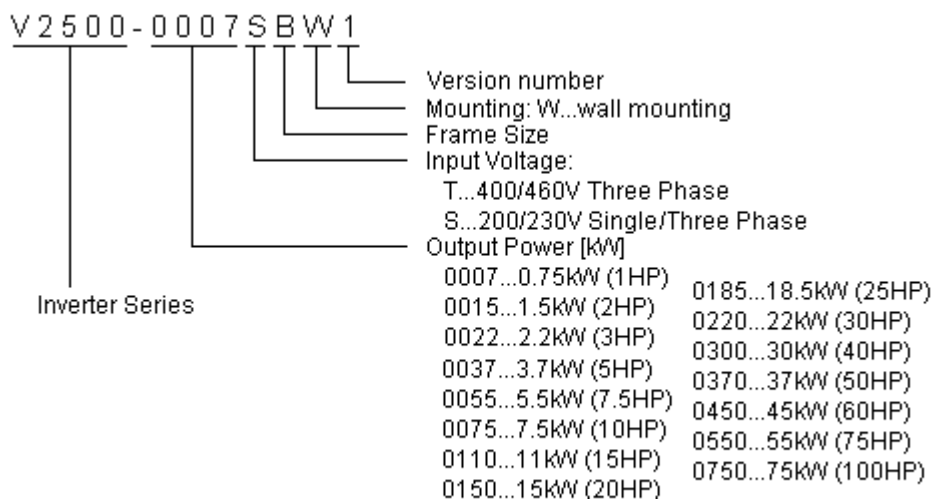
Receiving

- ✓ Check to make sure that the package includes an AC drive, the User Manual, dust covers and rubber bushings.
- ✓ Inspect the unit to insure it was not damaged during shipment.
- ✓ Make sure that the part number indicated on the nameplate corresponds with the part number of your order.

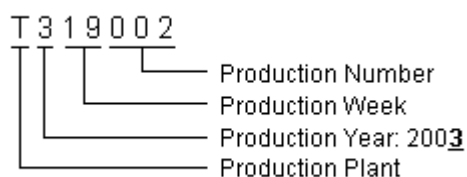
1.1 Nameplate Information: Example for 0.75 kW/1HP 1/3-phase 230V AC drive



1.2 Model Explanation:



1.3 Series Number Explanation:



If there is any nameplate information not corresponding to your purchase order or any problem, please contact your distributor.

2.2 Installation:



CAUTION

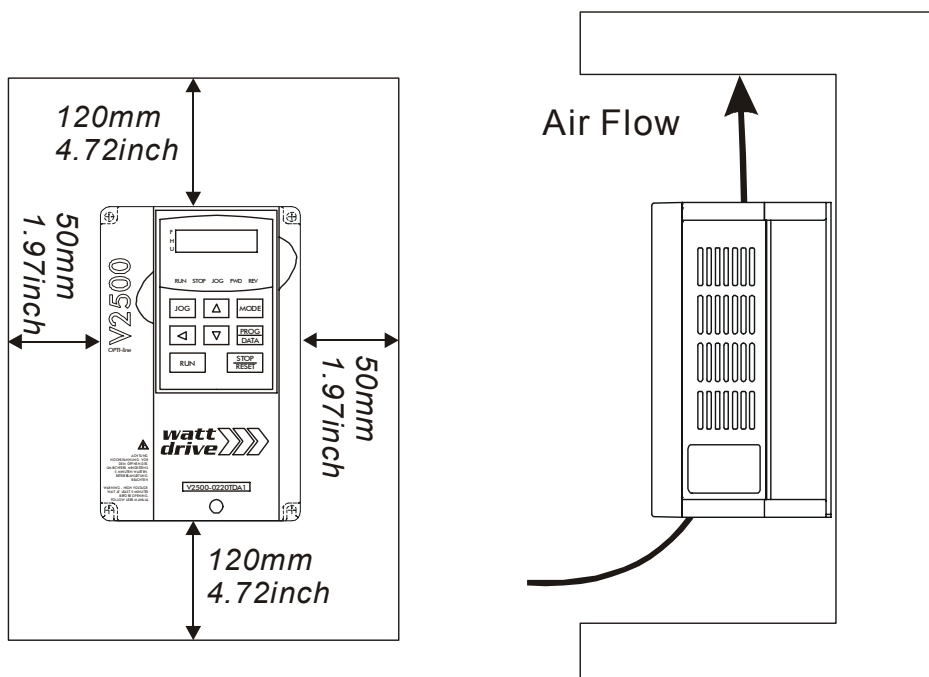
The control, power supply and motor leads must be laid separately. They must not be fed through the same cable conduit / trunking.

High voltage insulation test equipment must not be used on cables connected to the drive.

Improper installation of the AC drive will greatly reduce its life. Be sure to observe the following precautions when selecting a mounting location.

Failure to observe these precautions may void the warranty!

- ◆ Do not mount the AC drive near heat-radiating elements or in direct sunlight.
- ◆ Do not install the AC drive in a place subjected to high temperature, high humidity, excessive vibration, corrosive gases or liquids, or airborne dust or metallic particles.
- ◆ Mount the AC drive vertically and do not restrict the air flow to the heat sink fins.
- ◆ The AC drive generates heat. Allow sufficient space around the unit for heat dissipation.



CHAPTER 3 WIRING



DANGER

Hazardous Voltage

Before accessing the AC drive:

- ♦ Disconnect all power to the AC drive.
- ♦ Wait five minutes for DC bus capacitors discharge.

Any electrical or mechanical modification to this equipment without prior written consent of WATT Drive Antriebstechnik GmbH will void all warranties and may result in a safety hazard in addition to voiding the UL listing or CE conformity.

Short Circuit Withstand:

The rated voltage must be equal to or less than 240V (400/460V model is 480Volts) and the current must be equal to or less than 5000A RMS. (the model of 30 kW or above is 10000A RMS)

General Wiring Information

For installation in compliance with CE standards you must follow the instructions provided in the section "Notes on EMC" in this chapter.

All V2500 AC drives except Underwriters Laboratories, Inc. (UL) and Canadian Underwriters Laboratories (CUL) listed, and therefore comply with the requirements of the National Electrical Code (NEC) and the Canadian Electrical Code (CEC) and CE conformity.

Installation intended to meet the UL and cUL requirements must follow the instructions provided in "Wiring Notes" as a minimum standard. Follow all local codes that exceed UL and cUL requirements. Refer to the technical data label affixed to the AC drive and the motor nameplate for electrical data.

The "Line Fuse Specification" in Appendix B, lists the recommended fuse part number for each V2500 part number. These fuses (or equivalent) must be used on all installations where compliance with U.L. standards is a required.

NOTES ON EMC (ELECTRO MAGNETICAL COMPATIBILITY)

WARNING

This equipment should be installed, adjusted and serviced by qualified personnel familiar with construction and operation of the equipment and the hazards involved. Failure to observe this precaution could result in bodily injury.

When using V2500 series inverters in EU countries, the EMC directive 89/336/EEC must be observed. To satisfy the EMC directive and to comply with the standard, the following provisions should be obeyed:

A) Environmental conditions for the inverter:

- Ambient temperature: -10°C to 40°C.
- Relative Humidity: 20% to 90% (no dew condensation)
- Vibrations: max. 5,9m/s² (0.6 g) at 10–55Hz.
- Location: 1000 meter or less altitude, indoors (no corrosive gas or dust).

B) The power supply to the V2500 inverter must conform to the conditions stated below. If one of the conditions mentioned is not satisfied then an appropriate V2500 AC reactor will have to be installed.

- Voltage fluctuation +/-10% or less
- Voltage unbalance +/-3% or less
- Frequency variation +/-4% or less

C) Wiring

- Shielded wiring (screened cable) is required for motor wiring, and total length has to be kept to less than 50m. When using motor cables longer than 50m, V2500 motor filters should be installed. Directions for installing filters can be found in the V2500 installation manual.
- Separate the mains circuit wiring from the wiring used for signals or process circuit. Please refer to the V2500 installation manual.

D) Installation

- For V2500 series inverters, the filters described hereafter have to be used and the installation notes have to be observed.

If installed according to the following directions, the frequency inverters comply with the following standards:

Emissions: EN 61800-3 (EN 55011 group 1, class B)
Immunity: EN 61800-3, (industrial environments)

For the best possible damping of interference, special line filters have been developed which guarantee you easy assembly and installation along with the necessary electrical reliability. However, effective EMC is only ensured if the suitable filter is selected for the particular drive and installed in accordance with these EMC recommendations.

The amount of line-conducted interference also increases as motor cable length increases. Adherence to the interference limits for line-conducted interference is guaranteed on following way:

- If maximum motor cable length is 35 m (200/240V-inverters) and 15 or 20 m (400/460V inverters) – details see Appendix A: Class „B“
- If maximum motor cable length is between 25 and 80 m (depending on inverter size) – details see Appendix A: Class „A“

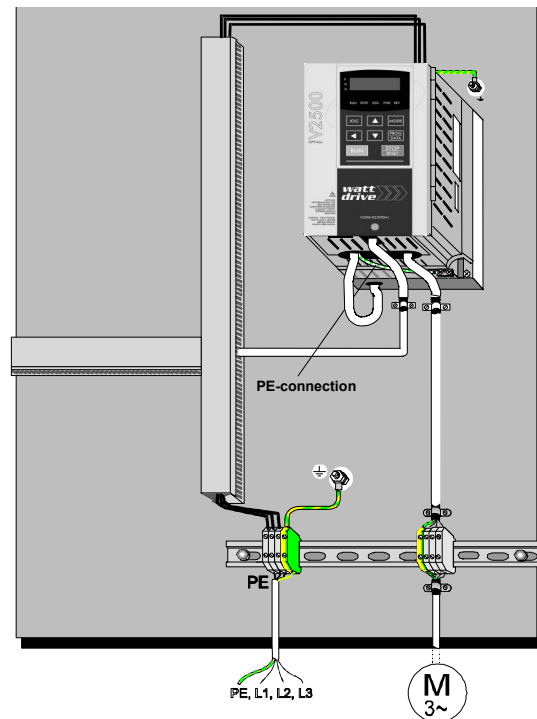
Observe the following provisions for an electromagnetically compatible setup of your drive system:

1. As user you must ensure that the HF impedance between frequency inverter, filter and ground is as small as possible.
 - Take care it that the connections are metallic and have the largest possible areas (zink-plated mounting plates)
2. Conductor loops act like antennas, especially when they encompass large areas. Consequently:
 - Avoid unnecessary conductor loops
 - Avoid parallel arrangement of „clean“ and interference-prone conductors
3. Lay the motor cable and all analog and digital control lines shielded.
 - You should allow the effective shield area of these lines to remain as large as possible; i.e., do not move the shield further away than absolutely necessary.
 - With compact systems, if for example the frequency inverter is communicating with the steering unit, in the same control cabinet connected at the same PE-potential, the screen of control lines should be put on, on both sides with PE. With branch systems, if for example the communicating steering unit is not in the same control cabinet and there is a distance between the systems, we recommend to put on the screen of control lines only on the side of the frequency inverter. If it is possible, direct in the cable entry section of the steering unit. The screen of Motor cables always must be put on, on both sides with PE.
 - The large area contact between shield and PE-potential you can realise with a metal PG screw connection or a metallic mounting clip.
 - Use only copper mesh cable (CY) with 85% coverage
 - The shielding should not be interrupted at any point in the cable. If the use of reactors, contactors, terminals or safety switches in the motor output is necessary, the unshielded section should be kept as small as possible.
 - Some motors have a rubber gasket between terminal box and motor housing. Very often, the terminal boxes, and particularly the threads for the metal PG screw connections, are painted. Make sure there is always a good metallic connection between the shielding of the motor cable, the metal PG screw connection, the terminal box and the motor housing, and carefully remove this paint if necessary.
4. Very frequently, interference is coupled in through installation cables. This influence you can minimize:
 - Lay interfering cables separately, a minimum of 0.25 m from cables susceptible to interference.
 - A particularly critical point is laying cables parallel over larger distances. If two cables intersect, the interference is smallest if they intersect at an angle of 90°. Cables susceptible to interference should therefore only intersect motor cables, intermediate circuit cables, or the wiring of a rheostat at right angles and never be laid parallel to them over larger distances.
5. The distance between an interference source and an interference sink (interference-threatened device) essentially determines the effects of the emitted interference on the interference sink.
 - You should use only interference-free devices and maintain a minimum distance of 0.25 m from the drive.

6. Safety measures

- Ensure that the protective conductor terminal (PE) of the filter is properly connected with the protective conductor terminal of the frequency inverter. An HF ground connection via metal contact between the housings of the filter and the frequency inverter, or solely via cable shield, is not permitted **as** protective conductor connection. The filter must be solidly and permanently connected with the ground potential so as to preclude the danger of electric shock upon touching the filter if a fault occurs. You can achieve this by connecting it with a grounding conductor of at least 10 mm² or connecting a second grounding conductor, connected with a separate grounding terminal, parallel to the protective conductor (the cross section of each single protective conductor terminal must be designed for the required nominal load).

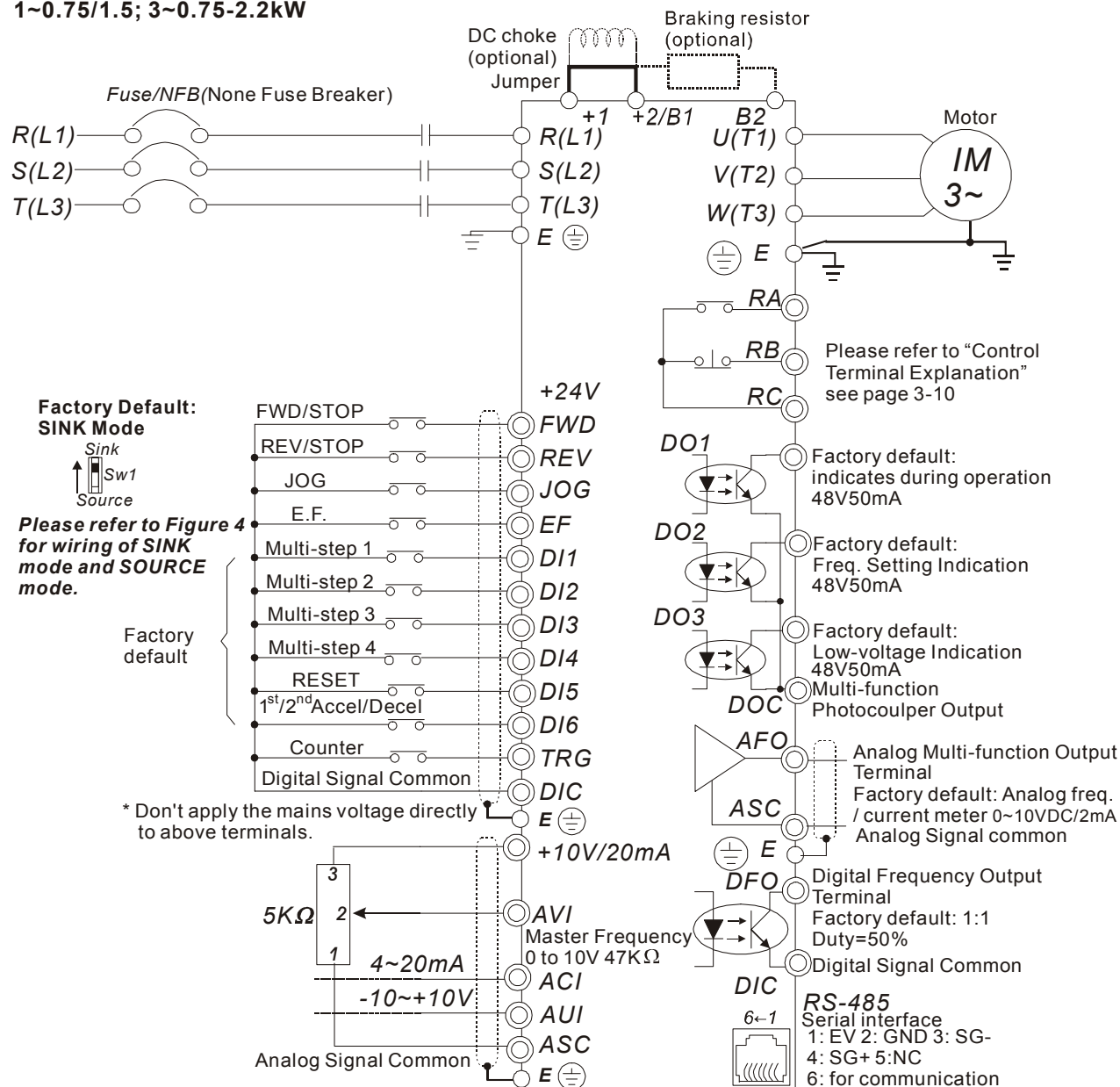
Cabinet installation of V2500 foot print filter:



3.1 Basic Wiring Diagram

Users must connect wires according to the following circuit diagram shown below. Do not plug a Modem or telephone line to the RS-485 communication port, permanent damage may result. Terminals 1 & 2 are the power sources for the optional copy keypad and should not be used while using RS-485 communication.

Figure 1 for models of V2500 Series
1~0.75/1.5; 3~0.75-2.2kW



○ Main circuit (power) terminals

◎ Control circuit terminals

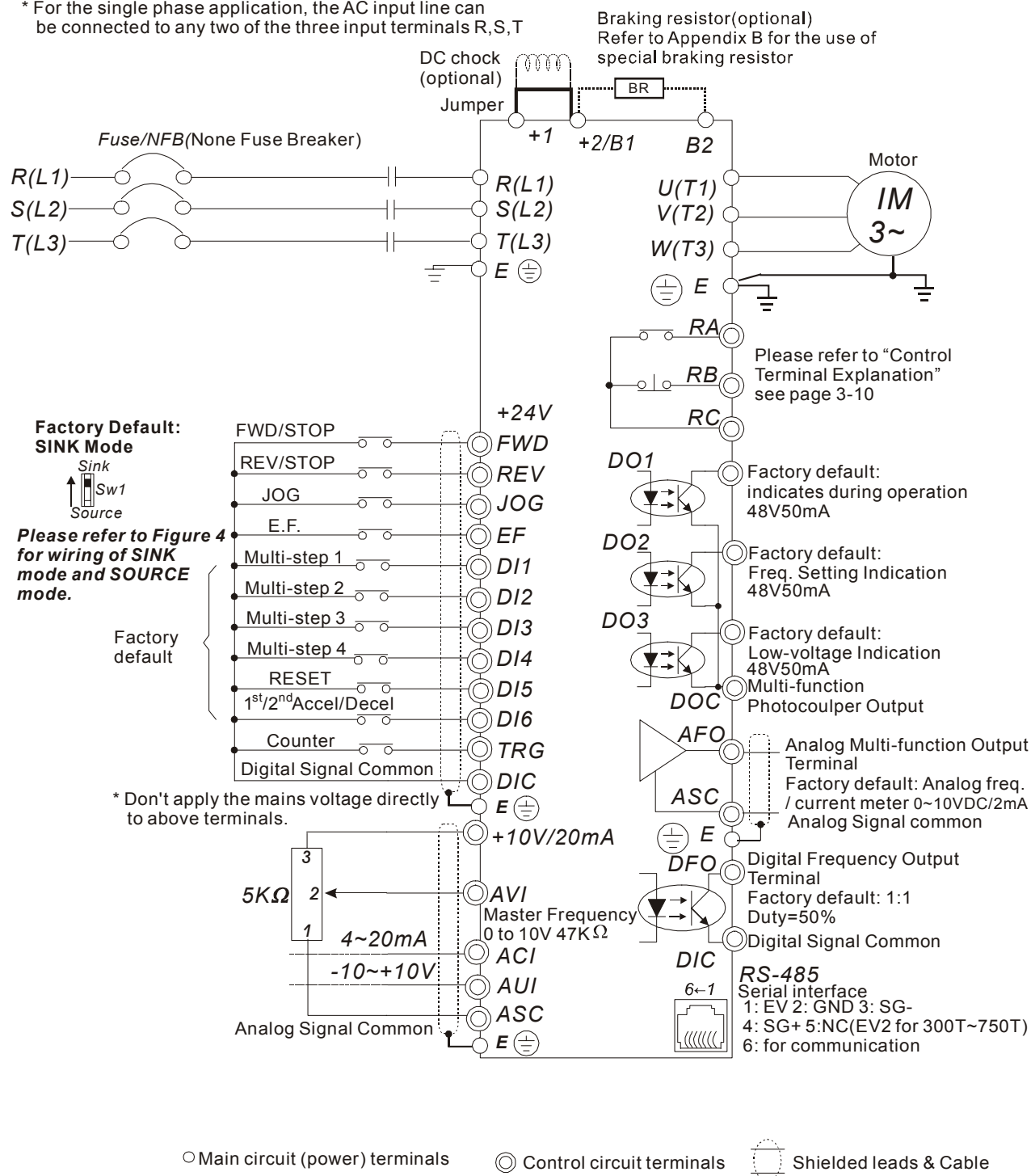


Shielded leads & Cable

**Figure 2 for models of V2500 Series
1~2.2; 3~4.0kW**

* Three phase input power may apply to single phase drives.

* For the single phase application, the AC input line can be connected to any two of the three input terminals R, S, T



**Figure 3 for models of V2500 Series
5.5kW - 75kW**

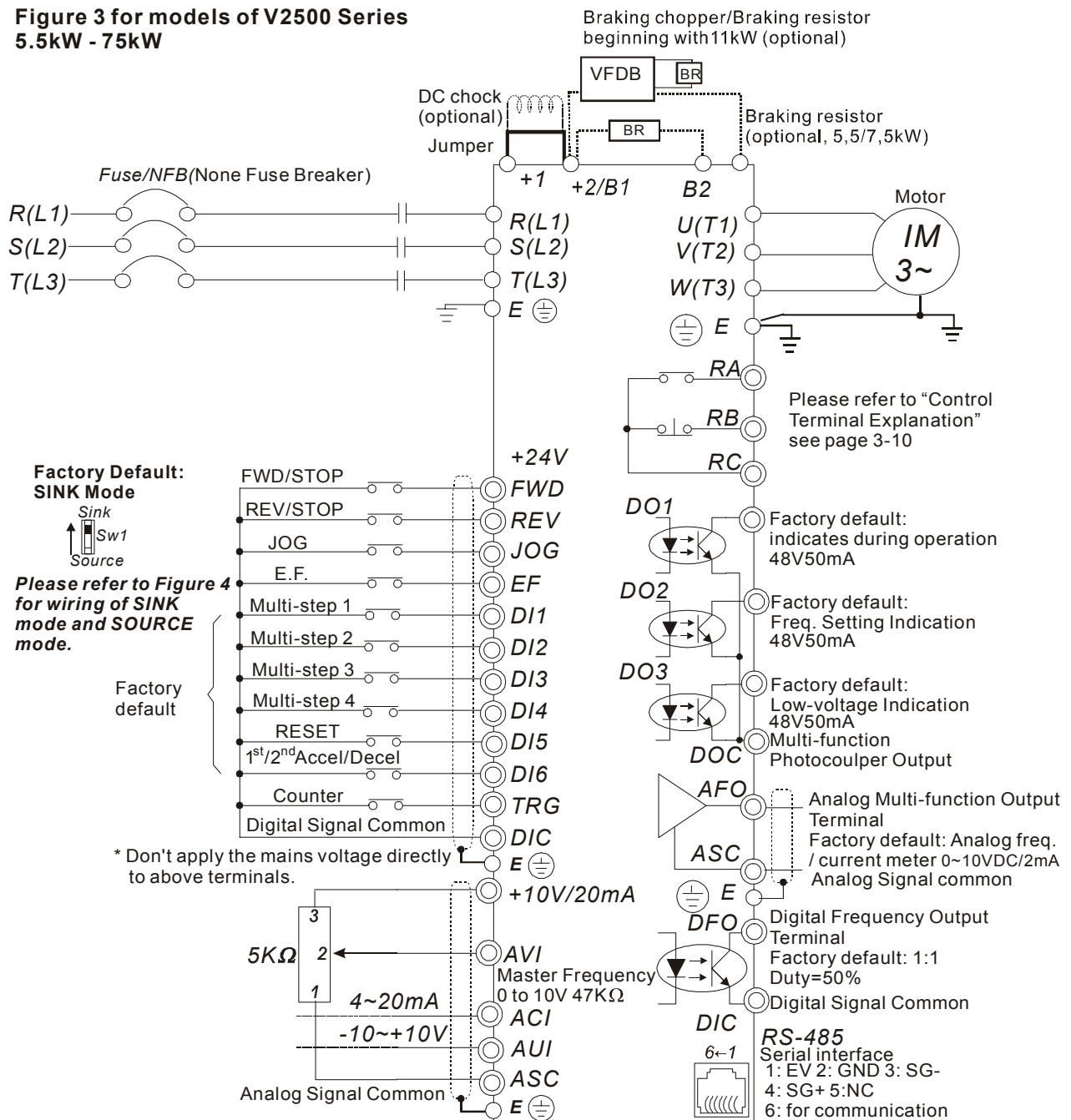
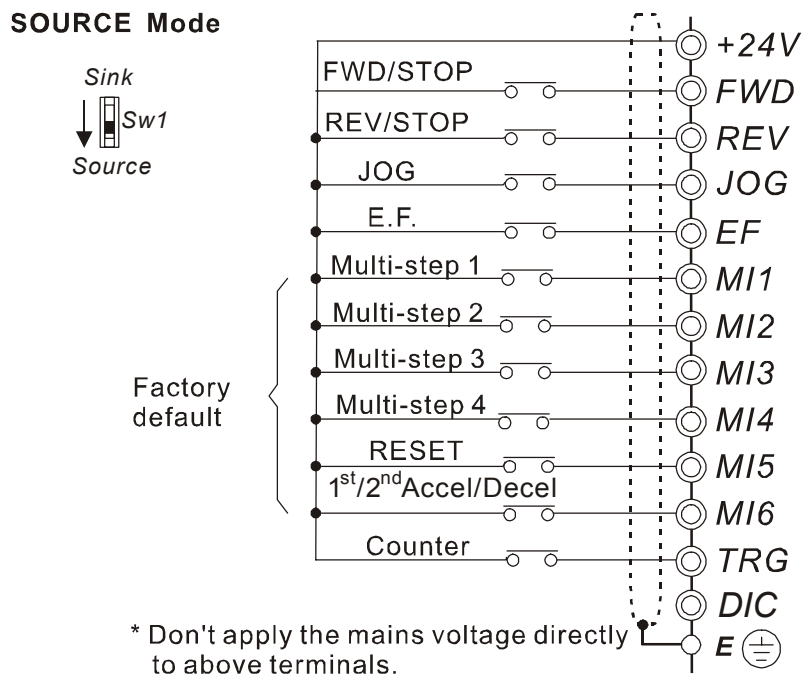
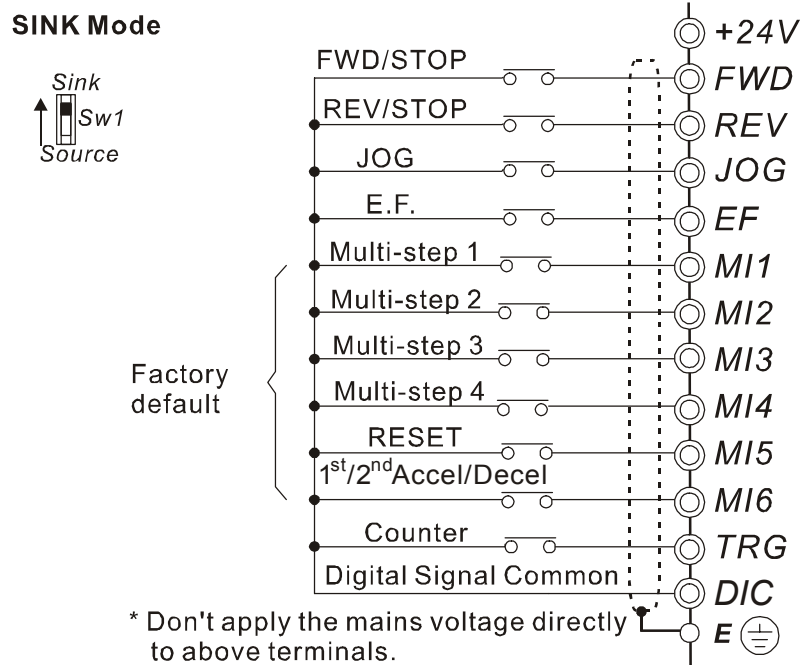



Figure 4 for all models V2500
SINK Mode and SOURCE Mode



3.2 Terminal Explanations

Terminal Symbol	Explanation of Terminal Function
R/L1, S/L2, T/L3	AC line input terminals
U/T1, V/T2, W/T3	AC drive output terminals motor connections
+1,+2	Connections for DC Link Reactor (optional)
+2/B1-B2	Connections for Braking Resistor (optional)
+2 - -(minus sign) +2/B1- -(minus sign)	Connections for External Braking Unit (V2500 series)
	Earth Ground

3.3 Control Terminals Explanations

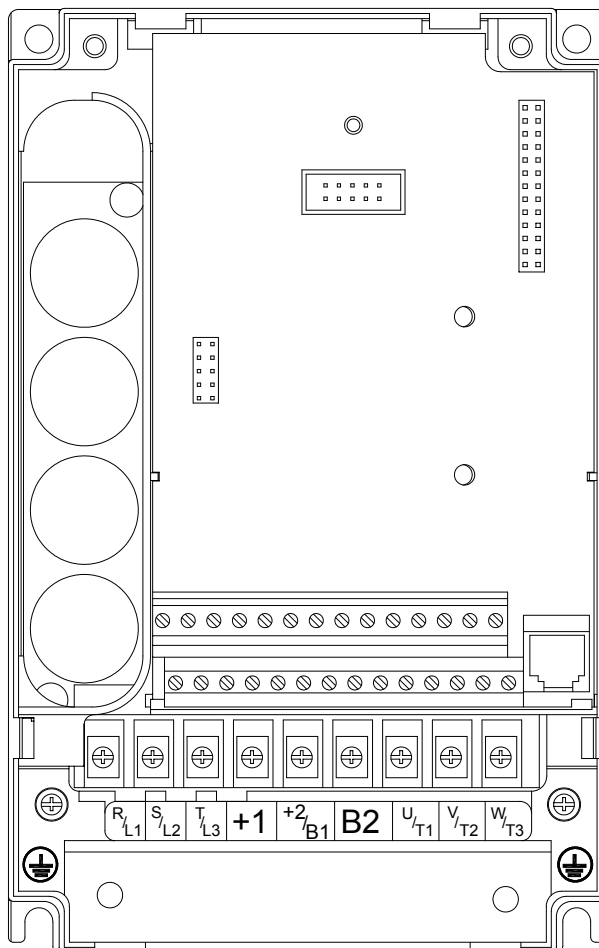
Terminal Symbols	Terminal Functions	Factory Settings
FWD	Forward-Stop command	
REV	Reverse-Stop command	
JOG	Jog command	
EF	External fault	
TRG	External counter input	
DI1	Multi-function Input 1	Refer to Pr.04-04 to Pr.04-09 Multi-function Input Terminals
DI2	Multi-function Input 2	
DI3	Multi-function Input 3	
DI4	Multi-function Input 4	
DI5	Multi-function Input 5	
DI6	Multi-function Input 6	
DFO	Digital Frequency Meter (Open Collector Output)	Factory setting 1:1 (Maximum 48VDC, 50mA)
+24V	DC Voltage Source	(+24V, 20mA), used for source mode.
DIC	Digital Signal Common	Used as common for digital inputs and used for sink mode.

Terminal Symbols	Terminal Functions	Factory Settings
RA	Multi-function Relay output (N.O.) a	Resistor Load 5A(N.O.)/3A(N.C.) 240VAC 5A(N.O.)/3A(N.C.) 24VDC Inductive Load 1.5A(N.O.)/0.5A(N.C.) 240VAC 1.5A(N.O.)/0.5A(N.C.) 24VDC Refer to Pr.03-01 to Pr.03-03
RB	Multi-function Relay output (N.C.) b	
RC	Multi-function Relay common	
DO1	Multi-function output 1 (Photocoupler)	Maximum 48VDC, 50mA Refer to Pr.03-01 to Pr.03-03
DO2	Multi-function output 2 (Photocoupler)	
DO3	Multi-function output 3 (Photocoupler)	
DOC	Multi-function output common	Maximum 48VDC, 50mA
+10V	Potentiometer output power source	+10V 20mA
AVI	Analog voltage Input	0 to +10V
ACI	Analog current Input	4 to 20mA
AUI	Auxiliary analog voltage input	-10 to +10V
AFO	Analog output meter	0 to 10V, 2mA
ASC	Analog control signal (common)	

* Control signal wiring size: 18 AWG (0.75 mm²).

3.4 Main Circuit Wiring

0.75 – 2.2 kW (1 ~ 0.75 – 1.5 kW; 3 ~ 0.75 – 2.2 kW)



Control Terminal

Torque: 0.4 Nm (3 in-lbf)

Wire: 12-24 AWG (0.25 – 4 mm²)

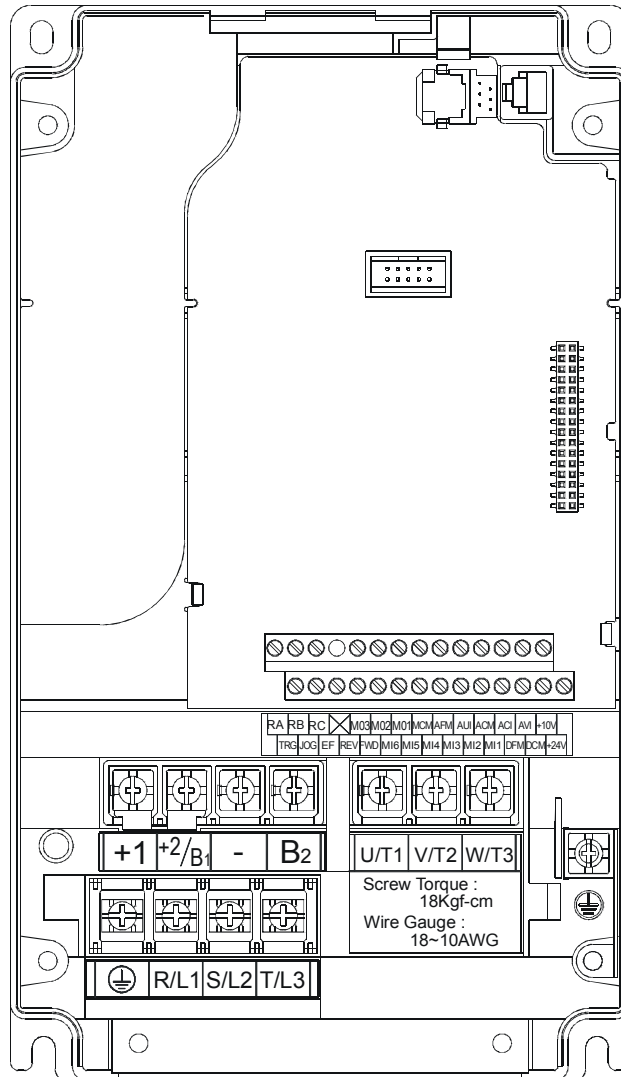
Power Terminal

Torque: 1.8 Nm (15.6 in-lbf)

Wire Gauge: 10-18 AWG (0.75 – 6 mm²), stranded wire, 12-18 AWG solid wire

Wire Type: copper only, 75°C

2.2 – 4.0 kW (1 ~ 2.2 kW; 3 ~ 4 kW)



Control Terminal

Torque: 0.4 Nm (3 in-lbf)

Wire: 12-24 AWG (0.25 – 4 mm²)

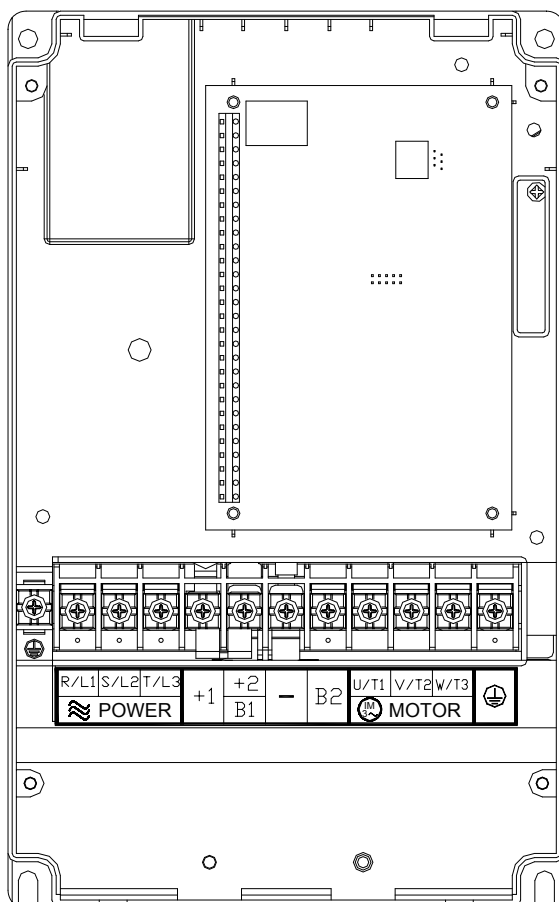
Power Terminal

Torque: 1.8 Nm (15.6 in-lbf)

Wire Gauge: 10-18 AWG (0.75 – 6 mm²)

Wire Type: Stranded copper only, 75°C

5,5 kW – 11 kW



Control Terminal

Torque: 0.4 Nm (3 in-lbf)

Wire: 12-24 AWG (0.25 – 4 mm²)

Power Terminal

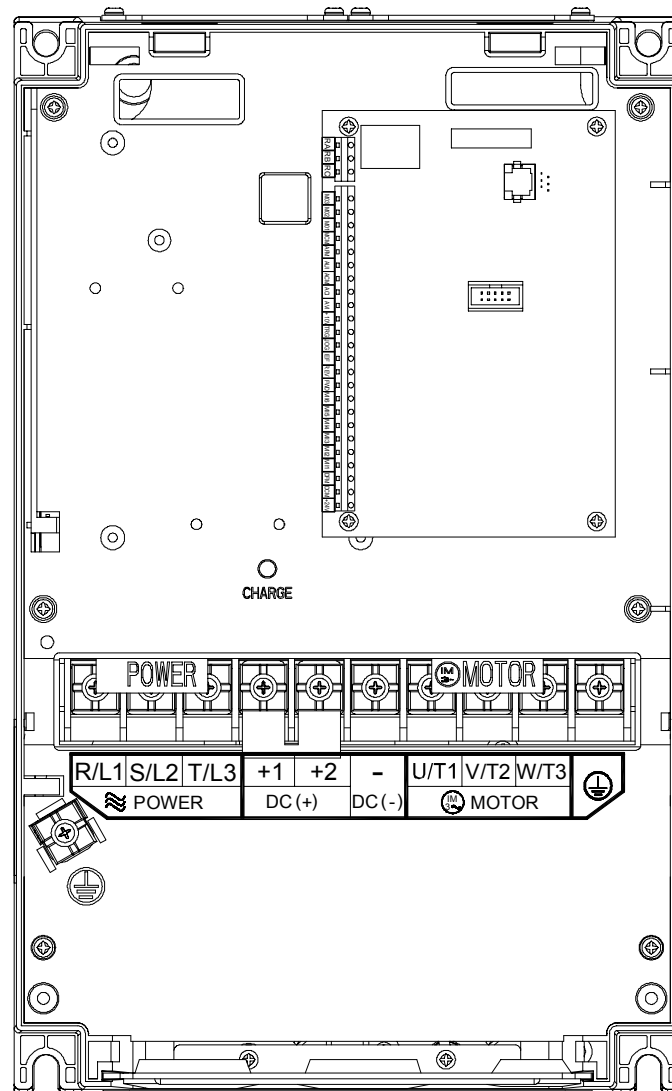
Torque: 3 Nm (26 in-lbf)

Wire: 8-12 AWG (4.0 – 10mm²)

Wire Type: stranded copper only, 75°C

NOTE: If wiring of the terminal utilizes the wire with a 6AWG-diameter (13mm²), it is thus necessary to use the Recognized Ring Terminal to conduct a proper wiring.

15 – 22 kW



Control Terminal

Torque: 0.4 Nm (3 in-lbf)

Wire: 12-24 AWG (0.25 – 4 mm²)

Power Terminal

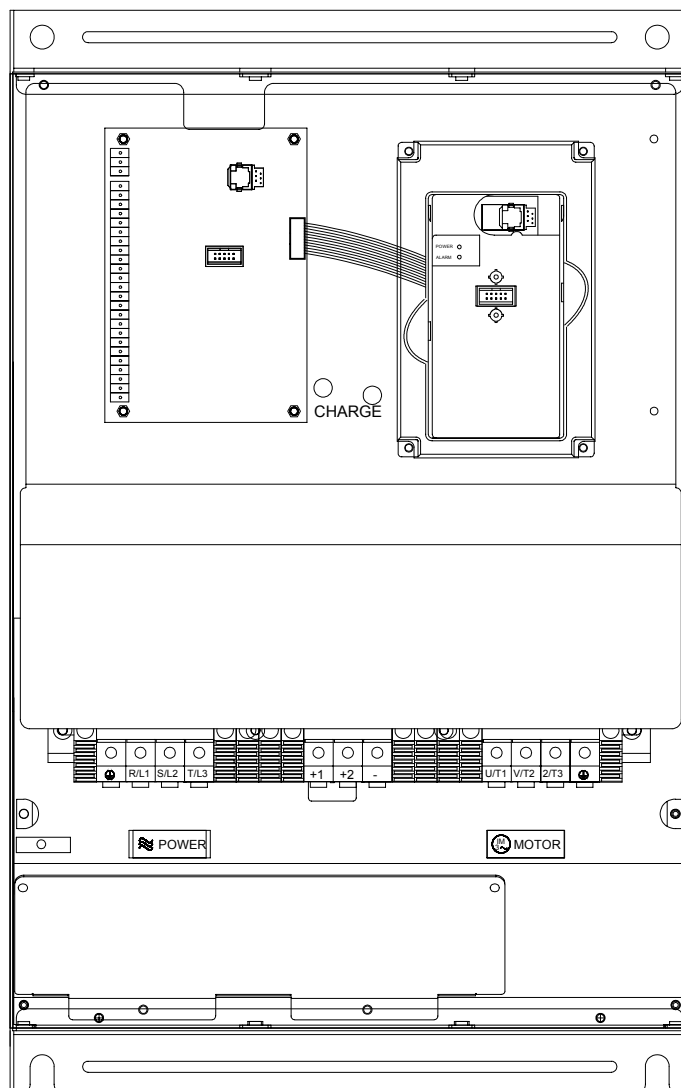
Torque: 3 Nm (26 in-lbf)

Wire: 2-8 AWG (10 – 35mm²)

Wire Type: stranded copper only, 75°C

NOTE: If wiring of the terminal utilizes the wire with a 1AWG-diameter (40mm²), it is thus necessary to use the Recognized Ring Terminal to conduct a proper wiring.

30 – 45 kW



Control Terminal

Torque: 0.4Nm (3 in-lbf)

Wire: 12-24 AWG (0.25 – 4 mm²)

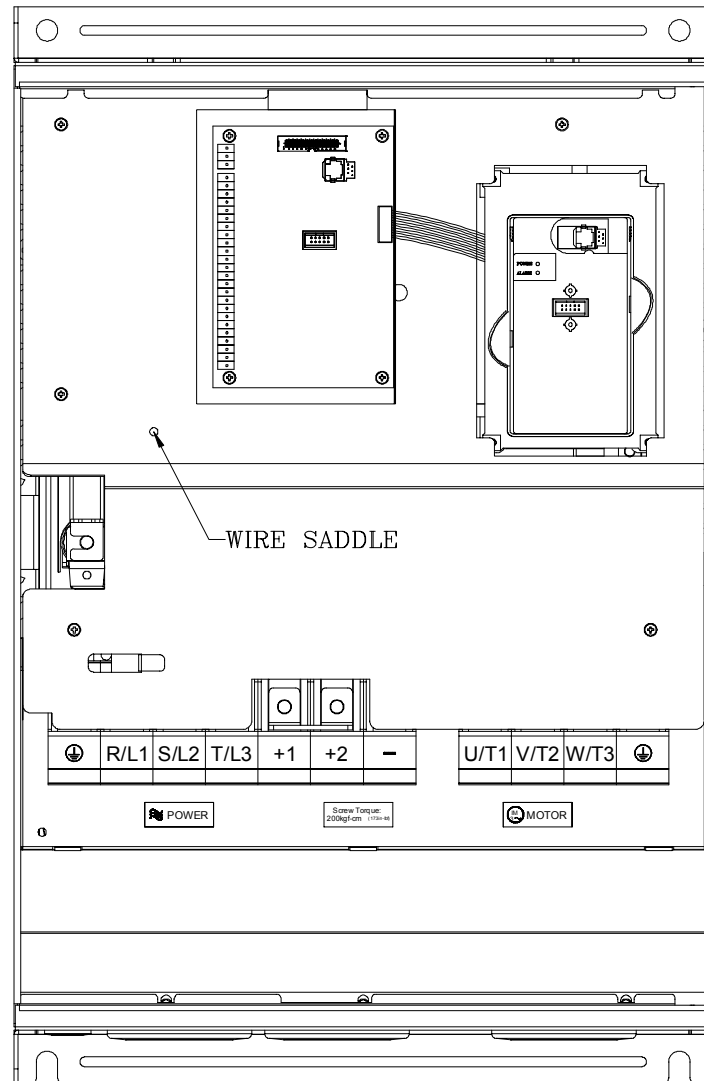
Power Terminal

Torque: 5.8Nm (50.9 in-lbf)

Wire Gauge: 2-4 AWG

Wire Type: Stranded copper only, 75°C

55-75 kW



Control Terminal

Torque: 0,4 Nm (3 in-lbf)

Wire: 12-24 AWG (0.25 – 4 mm²)



Power Terminal

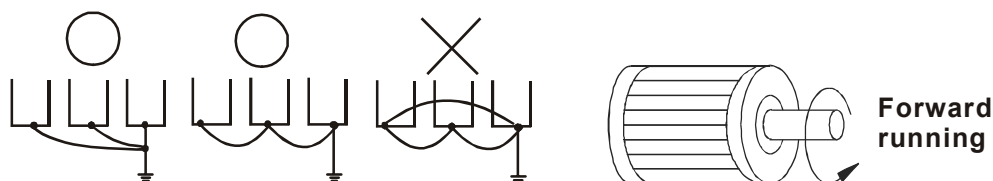
Torque: 20 Nm (173 in-lbf)

Wire Gauge: 2/0-3/0AWG

Wire Type: Stranded copper only, 75°C

3.5 Wiring Notes: PLEASE READ PRIOR TO INSTALLATION.

1.  **CAUTION:** Do not connect the AC power to the U/T1, V/T2, W/T3 terminals, as it will damage the AC drive.
2.  **WARNING:** Ensure all screws are tightened to the proper torque rating.
3. During installation, follow all local electrical, construction, and safety codes for the country the drive is to be installed in.
4. Ensure that the appropriate protective devices (circuit breaker or fuses) are connected between the power supply and AC drive.
5. Make sure that the leads are connected correctly and the AC drive is properly grounded. (Ground resistance should not exceed 0.1 Ω .)
6. Use ground leads that comply with AWG/MCM standards and keep them as short as possible.
7. Multiple V2500 units can be installed in one location. All the units should be grounded directly to a common ground terminal. The V2500 ground terminals may also be connected in parallel, as shown in the figure below. **Ensure there are no ground loops.**



8. When the AC drive output terminals U/T1, V/T2, and W/T3 are connected to the motor terminals U/T1, V/T2, and W/T3, respectively, the motor will rotate counterclockwise (as viewed from the shaft ends of the motor) when a forward operation command is received. To reverse the direction of motor rotation, switch over any of the two motor leads.
9. Make sure that the power source is capable of supplying the correct voltage and required current to the AC drive.
10. Do not attach or remove wiring when power is applied to the AC drive.
11. Do not monitor the signals on the circuit board while the AC drive is in operation.
12. For the single-phase rated AC drives, the AC power can be connected to any two of the three input terminals R/L1, S/L2, T/L3. **Note: This drive is not intended for the use with single-phase motors.**
13. Route the power and control wires separately, or at 90° angle to each other.
14. If a filter is required for reducing EMI (Electro Magnetic Interference), install it as close as possible to AC drive. EMI can also be reduced by lowering the Carrier Frequency.
15. If the AC drive is installed in the place where a load reactor is needed, install the filter close to U/T1, V/T2, W/T3, side of AC drive. Do not use a Capacitor or L-C Filter (Inductance-Capacitance) or R-C Filter (Resistance-Capacitance), unless approved by Watt Drive.
16. When using a GFCI (Ground Fault Circuit Interrupt), select current sensor with sensitivity of 200mA, and not less than 0.1-second detection to avoid nuisance tripping.

3.6 Motor Operation Precautions

1. When using the AC drive to operate a standard 3-phase induction motor, notice that the energy loss is greater than for an inverter duty motor.
2. Avoid running a standard induction motor at low speed. Under these conditions, the motor temperature may rise above the motor rating due to limited airflow produced by the motor's fan.
3. When the standard motor operates at low speed, the output load must be decreased.
4. If 100% output torque is desired at low speed, it may be necessary to use a special "inverter-duty" rated motor.

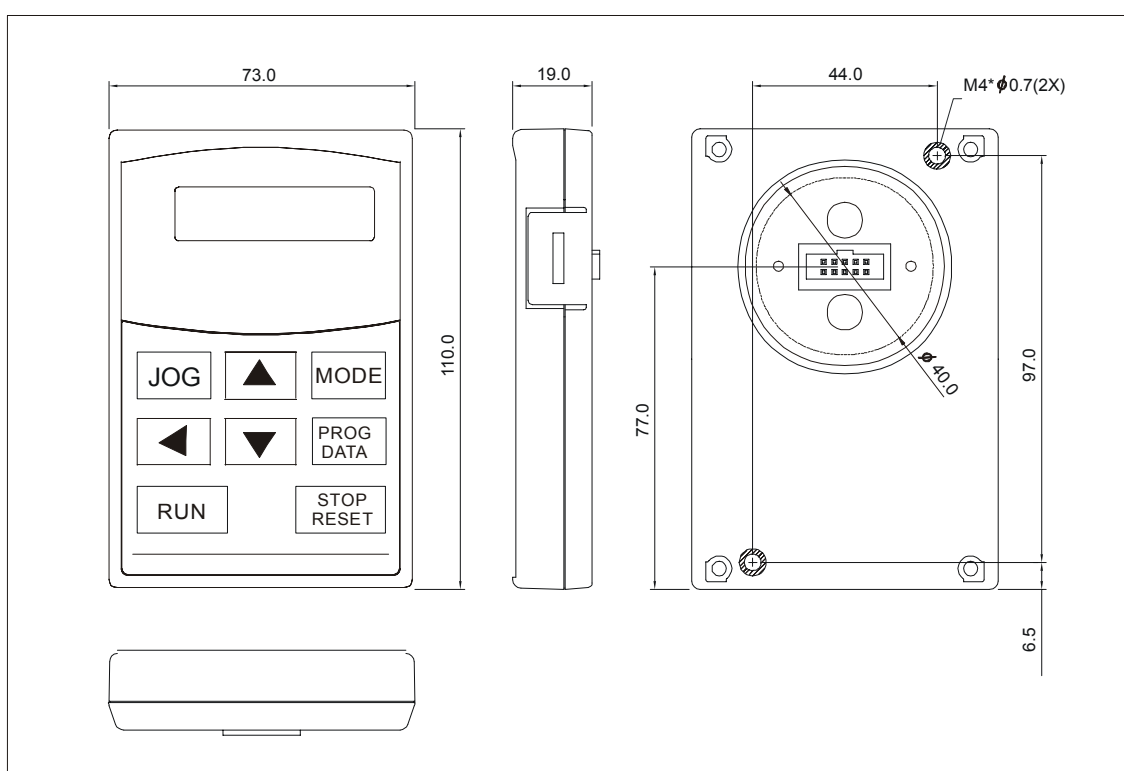
CHAPTER 4 DIGITAL KEYPAD OPERATION

This chapter describes the various controls and indicators found on the digital keypad/display. The information in this chapter should be read and understood before performing the start-up procedures described in the chapter of parameter settings.

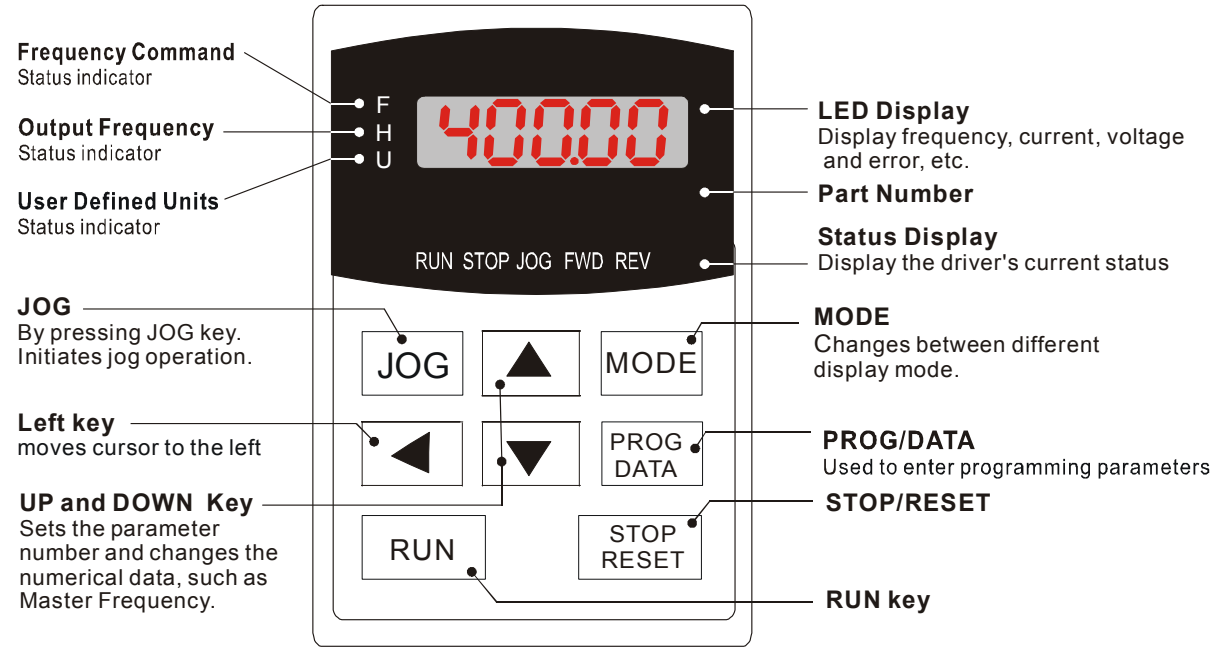
- ↳ Description of the Keypad
- ↳ Description of Display
- ↳ Keypad Operation Modes & Programming Steps

Keypad Dimensions: mm












4



4.1 Description of the Digital Keypad



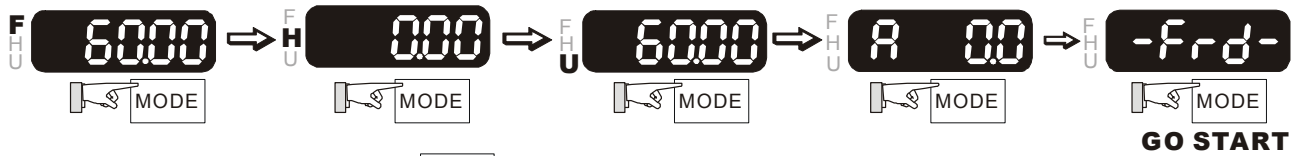
Display Message	Descriptions
	Display the AC drive Master Frequency.
	Display the actual operation frequency present at terminals U/T1, V/T2, and W/T3.
	User defined unit, where (U = F x Pr.00-05)

Display Message	Descriptions
	Display the output current present at terminals U/T1, V/T2, and W/T3.
	Display the AC drive forward run status.
	The AC drive reverse run status.
	The counter value (C).
	Display the specified parameter setting.
	Display the actual value stored within the specified parameter.
	External Fault.
	Display “End” for approximately 1 second if input has been accepted. After a parameter value has been set, the new value is automatically stored in memory. To modify an entry, use the  or  keys.
	Display “Err”, if the input is invalid.

4.2 Operation steps of the Digital Keypad

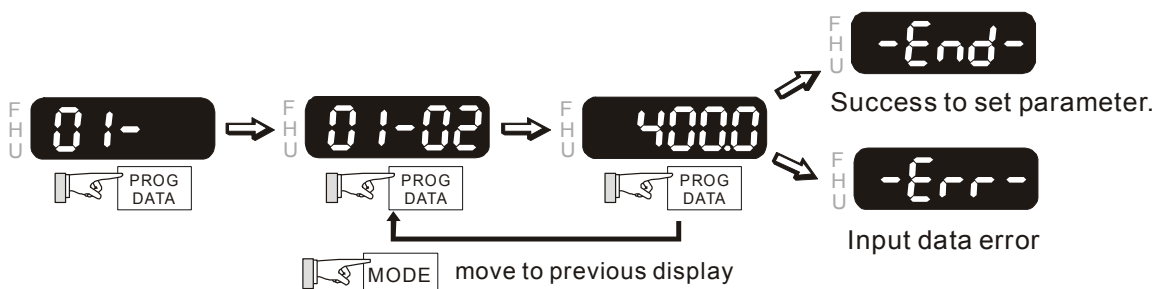
Selecting mode

START



Note: In the selection mode, press **PROG DATA** to set the parameters.

Setting parameters



Note: In the parameter setting mode, you can press **MODE** to return the selecting mode.

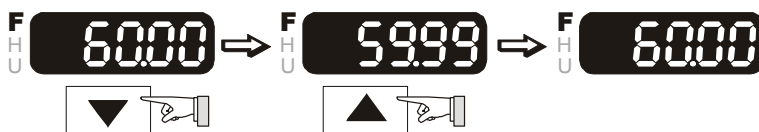
To shift data

START

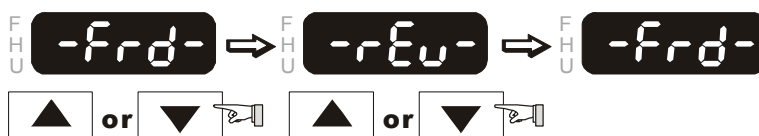


To modify data

START



Setting direction



CHAPTER 5' – QUICK START GUIDE

The parameters of the inverter drives V2500 are pre-set by factory to application based values that usually occur in standard environment.

When following the Warnings in the Introduction of this manual and the storage and installation guidelines in chapter 2 as well as the wiring notes in chapter 3, the start-up will usually be executed in very short time because of the parameters factory settings.

Some parameters that maybe are still necessary to have an eye on are listed right here below. The complete list of parameters for preparing the inverter for your special applications' requirements can be found in chapter 8 of this manual or – as a detailed description - in the long version of the manual, available for download at www.wattdrive.com.

Groupe 0: User Parameters


Para-meter	Explanation	Settings	Factory Setting	Actual Setting
00-09	Control Methods	00: V/F Control 01: V/F + PG Control (also see Pr.10-09 to 10-11) 02: Vector Control 03: Vector + PG Control (also see Pr.10-09 to 10-11)	02	

Groupe 1: Basic Parameters

01-00	Maximum Output Freq. (Fmax)	50.00 to 400.00 Hz	50.00	
01-01	Maximum Voltage Frequency (Base Freq) (Fbase)	0.10 to 400.00 Hz	50.00	
01-02	Maximum Output Voltage (Vmax)	230-V-Series: 0,1 V to 255,0 V	230,0	
		400/460-V-Series: 0,1 V to 510,0 V	400,0	
01-09	Accel Time 1	0.01 to 3600.0 sec	10.0	
01-10	Decel Time 1	0.01 to 3600.0 sec	10.0	

Groupe 2: Operation Method Parameters

02-00	Source of First Frequency Command	00: Digital keypad or Inc./Dec. Frequ. 01: 0 to +10Vdc from AVI 02: 4 to 20mA from ACI 03: -10 to +10Vdc from AUI 04: RS-485 communication interface 05: RS-485 communication interface. It won't memorize the frequency. 06: Combined usage of the master and auxiliary frequency command 02-10, 02-11,02-12	01	
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Parameter	Explanation	Settings	Factory Setting	Actual Setting
02-01	Source of First Operation Command 	00: Determined by digital keypad 01: Master frequency determined by external terminal, keypad STOP enabled. 02: Master Frequency determined by external terminal, keypad STOP disabled. 03: Master Frequency determined by RS-485 communication interface, keypad STOP enabled. 04: Master Frequency determined by RS-485 communication interface, keypad STOP disabled.	01	

Groupe 3: Output Function Parameters

Groupe 4: Input Function Parameters

04-00	AVI Analog Input Bias	0.00 to 100.00 %	0.00	
04-01	AVI Bias Polarity	00: Positive bias 01: Negative bias	00	
04-02	AVI Input Gain	1 to 200 %	100	
04-03	AVI Negative Bias, Reverse Motion Enabled	00: no AVI Negative bias command 01: Negative bias, REV motion enabled 02: Negative bias, REV motion disabled	00	
04-04	Multi-Function Input 1 (DI1)	01: Multi-Step Speed Command 1	01	
04-05	Multi-Function Input 2 (DI2)	02: Multi-Step Speed Command 2 03: Multi-Step Speed Command 3 04: Multi-Step Speed Command 4 05: External Reset 06: Accel/Decel Speed Inhibit 07: First or Second Accel/Decel Time Selection	02	
04-06	Multi-Function Input 3 (DI3)	08: Third or Fourth Accel/Decel Time Selection 09: External Base Block (N.C.) Input 10: External Base Block (N.O.) Input 11: Increase Master Frequency	03	
04-07	Multi-Function Input 4 (DI4)	12: Decrease Master Frequency 13: Counter Reset 14: Run PLC Program 15: Pause PLC Program	04	
04-08	Multi-Function Input 5 (DI5)	16: Auxiliary Motor No.1 Output Failure 17: Auxiliary Motor No.2 Output Failure 18: Auxiliary Motor No.3 Output Failure 19: Emergency Stop (NO)	05	
04-09	Multi-Function Input 6 (DI6)	20: Emergency Stop (NC) 21: Master Frequency Selection AVI/ACI 22: Master Frequency Selection AVI/AUI 23: Operation Command Selection (Keypad/Terminal) 24: Disable Auto Accel/Decel Selection 25: Forced Stop (N.C.)	07	

Parameter	Explanation	Settings	Factory Setting	Actual Setting
		26: Forced Stop (N.O.) 27: Parameter lock enable (N.C.) (Open: Lock, Close: Unlock) 28: PID function disabled 29: Jog Fwd/Jog Rev (it is enabled at external terminal JOG command) 30: Reset (N.C) 31: Source of second frequency command enabled 32: Source of second operation command enabled 33: One shot (PLC) 34: Proximity sensor input for Index function (see Pr. 04-23 to 04-25) 35: Output Shutoff Stop (N.O.) 36: Output Shutoff Stop (N.C) 00: No functions		

Groupe 5: Multi-Step Speed and PLC Parameters

Groupe 6: Protection Parameters

Groupe 7: Motor Parameters

07-00	Motor Rated Current	30 to 120% (of AC drive output current)	100	
07-01	Motor No-Load Current	0 to 90% (of AC drive output current – less than Pr.07-00)	40	
07-04	Number of Motor Poles	2 to 10	4	
07-05	Motor Auto Detection	00: Disable 01: Enable static motor detection (+ press RUN key) 02: Enable dynamic motor detection (+ press RUN key)dynamic WARNING: Motor must run free!!	00	

Groupe 8: Special Parameters

Groupe 9: Communication Parameters

Groupe 10: PID Control Parameters

10-10	PG Pulse Range	01 to 40000	1024	
10-11	PG Input	00: Disable PG 01: Single phase 02: Forward / Counterclockwise rotation 03: Reverse / Clockwise rotation	00	

Groupe 11: Fan & Pump Control Parameters

11-00	V/F Curve Selection	00: V/F Curve determined by Pr.01-00 to Pr.01-06 01: 1.5 Power Curve 02: 1.7 Power Curve 03: Square Curve 04: Cube Curve	00	
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CHAPTER 6 MAINTENANCE AND INSPECTIONS

Modern AC drives are based on solid state electronics technology, preventive maintenance is required to operate this AC drive in its optimal condition, and to ensure a long life. It is recommended to perform a monthly check up of the AC drive by a qualified technician. Before the check up, always turn off the AC Input Power to the unit. **Wait at least 10 minutes after all display lamps have gone out, and then confirm that the capacitors have fully discharged by measuring the voltage between B1 and Ground using a multimeter set to measure DC.**

6.1 Periodic Inspection:

Basic check up items to detect if there were any abnormality during the operation:

1. Whether the motors are operating as expected.
2. Whether the installation environment is abnormal.
3. Whether the cooling system is operating as expected.
4. Whether any irregular vibration or sound occurred during the operation.
5. Whether the motors are overheated during the operation.
6. Always check the input voltage of the AC drive with Voltmeter.

6.2 Periodic Maintenance



WARNING! Disconnecting AC power before processing!

1. Tighten and reinforce the screws of the AC drive if necessary, cause it may loose due to the vibration or changing of temperatures.
2. Whether the conductors or insulators were corroded and damaged.
3. If use of the AC drive is discontinued for a long period of time, turn the power on at least once every two years and confirm that it still functions properly. To confirm functionality, disconnect the motor and energize the AC drive for 5 hours or more before attempting to run a motor with it.
4. Clean off any dust and dirt with a vacuum cleaner. Place special emphasis on cleaning the ventilation ports and PCBs. Always keep these areas clean, as accumulation of dust and dirt can cause unforeseen failures.

CHAPTER 7 Troubleshooting and Fault Information

The AC drive has a comprehensive fault diagnostic system that includes several different alarms and fault messages. Once a fault is detected, the corresponding protective functions will be activated. The following faults are displayed as shown on the AC drive digital keypad display. The four most recent faults can be read on the digital keypad display.

NOTE: Faults can be cleared by a reset from the keypad or Input Terminal.

Common Problems and Solutions:

Fault Name	Fault Descriptions	Corrective Actions
OC	The AC drive detects an abnormal increase in current.	<ol style="list-style-type: none"> 1. Check whether the motors horsepower corresponds to the AC drive output power. 2. Check the wiring connections between the AC drive and motor for possible short circuits. 3. Increase the Acceleration time. 4. Check for possible excessive loading conditions at the motor. 5. If there are any abnormal conditions when operating the AC drive after short-circuit being removed, it should be sent back to manufacturer.
OCC	IGBT protection	
OU	The AC drive detects that the DC bus voltage has exceeded its maximum allowable value.	<ol style="list-style-type: none"> 1. Check whether the input voltage falls within the rated AC drive input voltage. 2. Check for possible voltage transients. 3. Bus over-voltage may also be caused by motor regeneration. Either increase the decel time or add an optional braking resistor. 4. Check whether the required braking power is within the specified limits.
OH	The AC drive temperature sensor detects excessive heat.	<ol style="list-style-type: none"> 1. Ensure that the ambient temperature falls within the specified temperature range. 2. Make sure that the ventilation holes are not obstructed. 3. Remove any foreign objects on the heatsinks and check for possible dirty heat sink fins. 4. Provide enough spacing for adequate ventilation.

Fault Name	Fault Descriptions	Corrective Actions
Lu	The AC drive detects that the DC bus voltage has fallen below its minimum value.	Check whether the input voltage falls within the rated AC drive's input voltage.
ol	The AC drive detects excessive drive output current. Note: The AC drive can withstand up to 150% of the rated current for a maximum of 60 seconds.	<ol style="list-style-type: none"> 1. Check whether the motor is overloaded. 2. Reduce torque compensation setting as set in Pr.7-02. 3. Increase the AC drive's output capacity.
ol1	Internal electronic overload trip	<ol style="list-style-type: none"> 1. Check for possible motor overload. 2. Check electronic thermal overload setting. 3. Increase motor capacity. 4. Reduce the current level so that the drive output current does not exceed the value set by the Motor Rated Current Pr.7-00.
ol2	Motor overload. Check the parameter settings (Pr.6-03 to Pr.6-05)	<ol style="list-style-type: none"> 1. Reduce the motor load. 2. Adjust the over-torque detection setting to an appropriate setting (Pr.06-03 to Pr.06-05).
ce-	Communication Error	<ol style="list-style-type: none"> 1. Check the connection between the AC drive and computer for loose wires. 2. Check if the communication protocol is properly set.
ocA	Over-current during acceleration: <ol style="list-style-type: none"> 1. Short-circuit at motor output. 2. Torque boost too high. 3. Acceleration time too short. 4. AC drive output capacity is too small. 	<ol style="list-style-type: none"> 1. Check for possible poor insulation at the output line. 2. Decrease the torque boost setting in Pr.7-02. 3. Increase the acceleration time. 4. Replace the AC drive with one that has a higher output capacity (next HP size).
ocd	Over-current during deceleration: <ol style="list-style-type: none"> 1. Short-circuit at motor output. 2. Deceleration time too short. 3. AC drive output capacity is too small. 	<ol style="list-style-type: none"> 1. Check for possible poor insulation at the output line. 2. Increase the deceleration time. 3. Replace with the AC drive with one that has a higher output capacity (next HP size).

Fault Name	Fault Descriptions	Corrective Actions
OCn	Over-current during steady state operation: 1. Short-circuit at motor output. 2. Sudden increase in motor loading. 3. AC drive output capacity is too small.	1. Check for possible poor insulation at the output line. 2. Check for possible motor stall. 3. Replace the AC drive with one that has a higher output capacity (next HP size).
EF	The external terminal EF-GND goes from OFF to ON.	1. When external terminal EF-GND is closed, the output will be turned off. (Under N.O. E.F.) 2. Press RESET after fault has been cleared.
EF 1	Emergency stop. When the multi-function input terminals (DI1 to DI6) are set to emergency stop, AC drive stops any output.	Press RESET after fault has been cleared.
cF 1	Internal memory IC can not be programmed.	1. Return to the factory. 2. Check the EEPROM on the control board.
cF2	Internal memory IC can not be read.	1. Return to the factory. 2. Reset drive to factory defaults.
cF3	Drive's internal circuitry abnormal.	Return to the factory.
HPF	Hardware protection failure	Return to the factory.
codE	Software protection failure	Return to the factory.
cFA	Auto accel/decel failure	Don't use the function of auto acceleration /deceleration.

Fault Name	Fault Descriptions	Corrective Actions
OFF	Ground fault : The AC drive output is abnormal. When the output terminal is grounded (short circuit current is 50% more than the AC drive rated current), the AC drive power module may be damaged. The short circuit protection is provided for AC drive protection, not user protection.	Ground fault : 1. Check whether the IGBT power module is damaged. 2. Check for possible poor insulation at the output line.
bb	External Base Block. AC drive output is turned off.	1. When the external input terminal (B.B) is active, the AC drive output will be turned off. 2. Disable this connection and the AC drive will begin to work again.
AnLEr PGErr	AnLEr: analog feedback error PGErr: PG feedback signal error	1. Check both parameter settings and wiring of Analog/PC (Pr.10-00). 2. Check for possible fault between system reaction time and the feedback signal detection time (Pr.10-08).
Lc	The AC drive detects that the load current is lower than the 06-12 setting value.	Please check the setting of parameter 06-12 to 06-14 or the load condition.
cEF	Counter cause external Fault	Please check the setting of parameter 03-11 or the trigger signal of the counter.
PHL	Power input phase loss or unbalance	◆ Check whether the power voltage is normal ◆ Check whether the screw at the input power terminal is tightened

CHAPTER 8 SUMMARY OF PARAMETER SETTINGS













◆: The parameter can be set during operation.

*: Twice the value or higher value for 400/460V class





Group 0: User Parameters

Parameter	Explanation	Settings	Factory Setting	Actual Setting
00-00	Identity Code of AC Drive	Read-only	##	
00-01	Rated Current Display	Read-only	##.#	
00-02	Parameter Reset	08: Keypad lock 09: Reset parameter to factory setting (50Hz, 230/400Vac) 10: Reset parameter to factory setting (60Hz, 230/460Vac)	0	
00-03	Start-up Display Page Selection ◆	00: F (setting frequency) 01: H (actual frequency) 02: U (user-defined unit) 03: Multi Function Display 04: FWD/REV command	01	
00-04	Content of Multi Function Display	00: Display output current (A) 01: Display counter value (C) 02: Display process operation (PLC time) (1. tt) 03: Display DC-BUS voltage (U) 04: Display output voltage (E) 05: Output power factor angle (n.) 06: Display output power (kW) 07: Display actual motor speed (HU) 08: Display the estimative value of the ration of torque (t) 09: Display PG numbers/10ms (G) 10: Display analog feedback signal value (b) 11: Display AVI (U1.) (%) 12: Display ACI (U2.) (%) 13: Display AUI (U3.) (%)	00	
00-05	User-Defined Coefficient K ◆	0.01 to 160.00	1.00	
00-06	Software Version	Read-only	#.##	
00-07	Password Decode	1 to 65535	00	
00-08	Password Setting	0 to 65535	00	
00-09	Control Methods	00: V/F Control 01: V/F + PG Control (also see Pr.10-09 to 10-11) 02: Vector Control 03: Vector + PG Control (also see Pr.10-09 to 10-11)	02	
00-10	Reserved – Do Not Change!			

Group 1: Basic Parameters



Parameters	Explanation	Settings	Factory Setting	Actual Setting
01-00	Maximum Output Freq. (Fmax)	50.00 to 400.00 Hz	50.00	
01-01	Maximum Voltage Frequency (Base Freq) (Fbase)	0.10 to 400.00 Hz	50.00	
01-02	Maximum Output Voltage (Vmax)	230V series: 0.1V to 255.0V 400/460V series: 0.1V to 510.0V	230.0 400.0	
01-03	Mid-Point Frequency (Fmid)	0.10 to 400.00 Hz	0.50	
01-04	Mid-Point Voltage (Vmid)	230V: 0.1V to 255V 460V: 0.1V to 510V	1.7 3.4	
01-05	Minimum Output Frequency (Fmin)	0.10 to 400.00 Hz	0.50	
01-06	Minimum Output Voltage (Vmin)	230V series: 0.1V to 255.0V 460V series: 0.1V to 510.0V	1.7 3.4	
01-07	Upper bound of Output freq.	1 to 120% (of Fmax)	110	
01-08	Lower bound of Output freq.	00 to 100% (of Fmax)	00	
01-09	Accel Time 1 	0.01 to 3600.0 sec	10.0	
01-10	Decel Time 1 	0.01 to 3600.0 sec	10.0	
01-11	Accel Time 2 	0.01 to 3600.0 sec	10.0	
01-12	Decel Time 2 	0.01 to 3600.0 sec	10.0	
01-13	Jog Accel Time 	0.01 to 3600.0 sec	1.0	
01-14	Jog Frequency 	0.10 Hz to 400.00 Hz	6.00	
01-15	Auto Accel/Decel (fastest possible Accel/Decel) 	00: Linear Accel/Decel 01: Auto Accel, Linear Decel 02: Linear Accel, Auto Decel 03: Auto Accel/Decel 04: Auto Accel/Decel (using Pr.01-09~12 and/or Pr.01-18~21 as minimum)	00	
01-16	S-Curve in Accel	00 to 07	00	
01-17	S-Curve in Decel	00 to 07	00	
01-18	Accel Time 3 	0.01 to 3600.0 sec	10.0	
01-19	Decel Time 3 	0.01 to 3600.0 sec	10.0	
01-20	Accel Time 4 	0.01 to 3600.0 sec	10.0	
01-21	Decel Time 4 	0.01 to 3600.0 sec	10.0	
01-22	Jog Decel Time 	0.01 to 3600.0 sec	1.0	
01-23	Unit for Accel/Decel Time	00: Unit: 1 sec 01: Unit: 0.1 sec 02: Unit: 0.01 sec	01	

Group 2: Operation Method Parameters

Parameters	Explanation	Settings	Factory Setting	Actual Setting
02-00	Source of First Frequency Command 	00: Digital keypad or Inc./Dec. Frequ. 01: 0 to +10Vdc from AVI 02: 4 to 20mA from ACI 03: -10 to +10Vdc from AUI 04: RS-485 communication interface 05: RS-485 communication interface. It won't memorize the frequency. 06: Combined usage of the master and auxiliary frequency command 02-10, 02-11, 02-12	01	
02-01	Source of First Operation Command 	00: Determined by digital keypad 01: Master frequency determined by external terminal, keypad STOP enabled. 02: Master Frequency determined by external terminal, keypad STOP disabled. 03: Master Frequency determined by RS-485 communication interface, keypad STOP enabled. 04: Master Frequency determined by RS-485 communication interface, keypad STOP disabled.	01	
02-02	Stop Method	00: Ramp Stop; E.F. coast stop 01: Coast Stop; E.F. coast stop 02: Ramp Stop; E.F. ramp stop 03: Coast Stop; E.F. ramp stop	00	
02-03	PWM Carrier Frequency	1 – 5 HP: 01-15kHz	05	
		7.5 – 22 HP: 01-15kHz	05	
		30 – 60 HP: 01-09kHz	04	
		75 – 100 HP: 01-09kHz	04	
02-04	Motor Direction Control	00: Enable REV operation 01: Disable REV operation 02: Disabled FWD operation	00	
02-05	2-wire/3-wire Operation Control Modes	00: FWD/STOP, REV/STOP 01: FWD/REV, RUN/STOP 02: 3-wire Operation	00	
02-06	Line Start Lockout	00: Disable 01: Enable	01	
02-07	Loss of ACI Signal	00: Decelerate to 0 Hz 01: Stop immediately and display "EF" 02: Continue operation by last frequency command	01	
02-08	Up/Down Key Mode / Jog mode 	00: Based on accel/decel time 01: Constant speed/msec (02-09)	00	
02-09	The Accel/Decel Speed of the UP/DOWN Key with Constant Speed 	0.01~1.00 Hz/msec	0.01	

Parameters	Explanation	Settings	Factory Setting	Actual Setting
02-10	Source of the Master Frequency Command (FCHA) ◆	00: Digital keypad 01: 0 to +10V from AVI 02: 4 to 20mA from ACI 03: -10 to +10Vdc from AUI 04: RS-485 communication interface	01	
02-11	Source of the Auxiliary Frequency Command (FCHB) ◆	00: Digital keypad or Inc./Dec. Frequ. 01: 0 to +10V from AVI 02: 4 to 20mA from ACI 03: -10 to +10Vdc from AUI 04: RS-485 communication interface	02	
02-12	Combination of the Master and Auxiliary Frequency Command ◆	00: Master frequency + auxiliary frequency 01: Master frequency - auxiliary frequency	00	
02-13	Source of Second Frequency Command ◆	00: Digital keypad or Inc./Dec. Frequ. 01: 0 to +10V from AVI 02: 4 to 20mA from ACI 03: -10 to +10Vdc from AUI 04: RS-485 communication interface 05: RS-485 communication interface. It won't memorize the frequency. 06: Combined usage of the master and auxiliary frequency command 02-10, 02-11, 02-12	02	
02-14	Source of Second Operation Command ◆	00: Determined by digital keypad 01: Master frequency determined by external terminal, keypad STOP enabled. 02: Master Frequency determined by external terminal, keypad STOP disabled. 03: Master Frequency determined by RS-485 communication interface, keypad STOP enabled. 04: Master Frequency determined by RS-485 communication interface, keypad STOP disabled.	01	
02-15	Keyboard Frequency Command ◆	0.00 ~ 400.00Hz	50.00	

Group 3: Output Function Parameters

Parameters	Explanation	Settings	Factory Setting	Actual Setting
03-00	Multi-Function Output (Relay Output)	01: AC Drive Operational 02: Master Freq. Attained 03: Zero Speed	08	
03-01	Multi-Function Output DO1	04: Over Torque Detection 05: Base-Block (B.B.) Indication 06: Low-Voltage Indication 07: AC Drive Operation Mode (1 = drive operation by terminals)	01	
03-02	Multi-Function Output DO2	08: Fault Indication 09: Desired Freq. Attained 1 10: PLC Program Running 11: PLC Program Step Completed	02	
03-03	Multi-Function Output DO3	12: PLC Program Completed 13: PLC Program Operation Paused 14: Terminal Count Value Attained 15: Preliminary Count Value Attained 16: Auxiliary Motor No.1 17: Auxiliary Motor No.2 18: Auxiliary Motor No.3 19: Heat Sink Overheat Warning 20: AC Drive Ready 21: Emergency Stop Indication 22: Desired Frequency Attained 2 23: Software Braking Chopper Signal 24: Zero Speed Output Signal 25: Low-current Detection 26: Operation indication ($H \geq F_{min}$) 27: Feedback signal error 28: User-defined low-voltage Detection 00: No functions	20	
03-04	Desired Freq. Attained 1	0.00 to 400.00 Hz	0.00	
03-05	Analog Output Signal	00: Output frequency (0 – Fmax) 01: Output current (0 – 250%) 02: Output voltage (0 – Vmax) 03: Output frequency command (0–Fmax) 04: Output motor speed (0 – Fmax) 05: Load power factor	00	
03-06	Analog Output Gain 	01 to 200%	100	
03-07	Digital Frequency Output Multiplying Factor 	01 to 20	01	
03-08	Terminal Count Value	00 to 65500	00	
03-09	Preliminary Count Value	00 to 65500	00	
03-10	Desired Freq. attained 2	0.00 to 400.00 Hz	0.00	
03-11	EF Display (when Preliminary Count Value Attained)	00: Preliminary count value attained, no EF display. 01: Preliminary count value attained, EF display.	00	
03-12	Fan Control	00: Always fan on 01: Power off 1 minute later, fan off 02: Run and fan on, stop and fan off 03: Preliminary temperature attained, Fan start to run	01	

Group 4: Input Function Parameters

Parameters	Explanation	Settings	Factory Setting	Actual Setting
04-00	AVI Analog Input Bias	0.00 to 100.00 %	0.00	
04-01	AVI Bias Polarity	00: Positive bias 01: Negative bias	00	
04-02	AVI Input Gain	1 to 200 %	100	
04-03	AVI Negative Bias, Reverse Motion Enabled	00: no AVI Negative bias command 01: Negative bias, REV motion enabled 02: Negative bias, REV motion disabled	00	
04-04	Multi-Function Input 1 (DI1)	01: Multi-Step Speed Command 1 02: Multi-Step Speed Command 2 03: Multi-Step Speed Command 3 04: Multi-Step Speed Command 4	01	
04-05	Multi-Function Input 2 (DI2)	05: External Reset 06: Accel/Decel Speed Inhibit 07: First or Second Accel/Decel Time Selection	02	
04-06	Multi-Function Input 3 (DI3)	08: Third or Fourth Accel/Decel Time Selection 09: External Base Block (N.C.) Input 10: External Base Block (N.O.) Input 11: Increase Master Frequency 12: Decrease Master Frequency	03	
04-07	Multi-Function Input 4 (DI4)	13: Counter Reset 14: Run PLC Program 15: Pause PLC Program	04	
04-08	Multi-Function Input 5 (DI5)	16: Auxiliary Motor No.1 Output Failure 17: Auxiliary Motor No.2 Output Failure 18: Auxiliary Motor No.3 Output Failure 19: Emergency Stop (NO) 20: Emergency Stop (NC)	05	
04-09	Multi-Function Input 6 (DI6)	21: Master Frequency Selection AVI/ACI 22: Master Frequency Selection AVI/AUI 23: Operation Command Selection (Keypad/Terminal) 24: Disable Auto Accel/Decel Selection 25: Forced Stop (N.C.) 26: Forced Stop (N.O.) 27: Parameter lock enable (N.C.) (Open: Lock, Close: Unlock) 28: PID function disabled 29: Jog Fwd/Jog Rev (it is enabled at external terminal JOG command) 30: Reset (N.C.) 31: Source of second frequency command enabled 32: Source of second operation command enabled 33: One shot (PLC) 34: Proximity sensor input for Index function (see Pr. 04-23 to 04-25) 35: Output Shutoff Stop (N.O.)	07	

Para- meters	Explanation	Settings	Factory Setting	Actual Setting
		36: Output Shutoff Stop (N.C) 00: No functions		
04-10	Digital Input Delay Time	1 to 20 (*2ms)	05	
04-11	ACI Analog Input Bias	0.00 to 100.00 %	0.00	
04-12	ACI Bias Polarity	00: Positive bias 01: Negative bias	00	
04-13	ACI Input Gain	1 to 200 %	100	
04-14	ACI Negative Bias Reverse Motion Enable	00: no ACI Negative bias command 01: Negative bias, REV motion enabled 02: Negative bias, REV motion disabled	00	
04-15	AUI Analog Input Bias	0.00 to 100.00 %	0.00	
04-16	AUI Bias Polarity	00: Positive bias 01: Negative bias	00	
04-17	AUI Input Gain	1 to 200 %	100	
04-18	AUI Negative Bias Reverse Motion Enabled	00: No AUI Negative bias command 01: Negative bias, REV motion enabled 02: Negative bias, REV motion disabled	00	
04-19	AVI Analog Input Delay	0.00 to 10.00 Sec	0.10	
04-20	ACI Analog Input Delay	0.00 to 10.00 Sec	0.10	
04-21	AUI Analog Input Delay	0.00 to 10.00 Sec	0.10	
04-22	Analog Input Frequency Resolution	00: 0.01Hz 01: 0.1Hz	01	
04-23	Gear Ratio for Simple Index Function	4 ~ 1000 (Pr. 04-04 to 04-09 set to 34)	200	
04-24	Index Angle for Simple Index Function	0.0 ~360.0 (Pr. 04-04 to 04-09 set to 34)	180.0	
04-25	Deceleration Time for Simple Index Function ◆	0.00 ~100.00 (Pr. 04-04 to 04-09 set to 34)	0.0	

Group 5: Multi-Step Speed and PLC Parameters

Parameters	Explanation	Settings	Factory Setting	Actual Setting
05-00	1 st Step Speed Freq. ◇	0.00 to 400.00 Hz	0.00	
05-01	2 nd Step Speed Freq. ◇	0.00 to 400.00 Hz	0.00	
05-02	3 rd Step Speed Freq. ◇	0.00 to 400.00 Hz	0.00	
05-03	4 th Step Speed Freq. ◇	0.00 to 400.00 Hz	0.00	
05-04	5 th Step Speed Freq. ◇	0.00 to 400.00 Hz	0.00	
05-05	6 th Step Speed Freq. ◇	0.00 to 400.00 Hz	0.00	
05-06	7 th Step Speed Freq. ◇	0.00 to 400.00 Hz	0.00	
05-07	8 th Step Speed Freq. ◇	0.00 to 400.00 Hz	0.00	
05-08	9 th Step Speed Freq. ◇	0.00 to 400.00 Hz	0.00	
05-09	10 th Step Speed Freq. ◇	0.00 to 400.00 Hz	0.00	
05-10	11 th Step Speed Freq. ◇	0.00 to 400.00 Hz	0.00	
05-11	12 th Step Speed Freq. ◇	0.00 to 400.00 Hz	0.00	
05-12	13 th Step Speed Freq. ◇	0.00 to 400.00 Hz	0.00	
05-13	14 th Step Speed Freq. ◇	0.00 to 400.00 Hz	0.00	
05-14	15 th Step Speed Freq. ◇	0.00 to 400.00 Hz	0.00	
05-15	PLC Mode	00: Disable PLC Operation 01: Execute one program cycle 02: Continuously execute program cycles 03: Execute one program cycle step by step 04: Continuously execute program cycles step by step	00	
05-16	PLC Forward/ Reverse Motion	0 to 32767 sec (0: FWD 1: REV)	0	
05-17	Time Duration Step 1	0.0 to 65500 sec	0.0	
05-18	Time Duration Step 2	0.0 to 65500 sec	0.0	
05-19	Time Duration Step 3	0.0 to 65500 sec	0.0	
05-20	Time Duration Step 4	0.0 to 65500 sec	0.0	
05-21	Time Duration Step 5	0.0 to 65500 sec	0.0	
05-22	Time Duration Step 6	0.0 to 65500 sec	0.0	
05-23	Time Duration Step 7	0.0 to 65500 sec	0.0	
05-24	Time Duration Step 8	0.0 to 65500 Sec	0.0	
05-25	Time Duration Step 9	0.0 to 65500 Sec	0.0	
05-26	Time Duration Step 10	0.0 to 65500 Sec	0.0	
05-27	Time Duration Step 11	0.0 to 65500 Sec	0.0	
05-28	Time Duration Step 12	0.0 to 65500 Sec	0.0	
05-29	Time Duration Step 13	0.0 to 65500 Sec	0.0	
05-30	Time Duration Step 14	0.0 to 65500 Sec	0.0	
05-31	Time Duration Step 15	0.0 to 65500 Sec	0.0	
05-32	Time Unit Settings	00: 1 Sec 01: 0.1 Sec	00	
05-33	Skip Frequency Width	0.00 to 400.00 Hz	0.00	
05-34	Bias Frequency Width	0.00 to 400.00 Hz	0.00	

Group 6: Protection Parameters

Parameters	Explanation	Settings	Factory Setting	Actual Setting
06-00	Over-Voltage Stall Prevention Level	230V-series: 330V ~ 410V 400/460V-series: 660V ~ 820V 0: Disable	390*	
06-01	Over-Current Stall Prevention during Accel	20 to 250% CAUTION: High current will reduce the inverters lifetime and/or may cause immediate damage.	170	
06-02	Over-Current Stall Prevention during Operation	20 to 250% CAUTION: High current will reduce the inverters lifetime and/or may cause immediate damage.	170	
06-03	Over-Torque Detection Mode (OL2)	00: Disabled 01: Enabled during constant speed operation and operation continues after over-torque detection. 02: Enabled during Constant Speed Operation and operation halted after over-torque detection 03: Enabled during Accel and continues operation after over-torque detection 04: Enabled during Accel and halted after over-torque detection	00	
06-04	Over-Torque Detection Level	10 to 200% NOTE: High current will reduce the inverters lifetime and/or may cause immediate damage.	150	
06-05	Over-Torque Detection Time	0.1 to 60.0 Sec	0.1	
06-06	Electronic Thermal Overload Relay Selection	00: Standard Motor (self ventilated) 01: Special Motor (force cooled) 02: Disabled	00	
06-07	Electronic Thermal Characteristics	30 to 600 Sec	60	
06-08	Present Fault Record	00: No Fault occurred 01: Over Current (oc) 02: Over Voltage (ov) 03: Over Heat (oH) 04: Over Load (oL)	00	
06-09	Second Most Recent Fault Record	05: Over Load (oL1) 06: External Fault (EF) 07: IGBT Protection (occ) 08: CPU failure (cF3) 09: Hardware Protection Failure (HPF)		
06-10	Third Most Recent Fault Record	10: Current exceed during Acceleration (ocA) 11: Current exceed during Deceleration (ocd) 12: Current exceed during Steady State (ocn) 13: Ground Fault (GFF) 14: Low Voltage (Lv) 15: CPU READ failure CF1		

Parameters	Explanation	Settings	Factory Setting	Actual Setting
06-11	Fourth Most Recent Fault Record	16: CPU WRITE failure CF2 17: external Base Block stop (b.b) 18: Motor over load (oL2) 19: Auto Accel/Decel Failure (CFA) 20: Software/Password Protection (code) 21: EF1 (External Emergency Stop) 22: PHL (Phase-Loss) 23: cEF (Preliminary count value attained, EF active) 24:Lc (Low-current) 25:AnLEr (Analog feedback signal error) 26:PGErr (PG feedback signal error)		
06-12	Low-Current Detection Level	00 to 100% (00: Disabled)	00	
06-13	Low-Current Detection Time	0.1~ 3600.0 Sec	10.0	
06-14	Low-Current Detection Treatment	00: Warn and keep operating 01: Warn and ramp to stop 02: Warn and coast to stop 03: Warn, after coast to stop, restart (delay 06-15 setting time)	0	
06-15	Low-Current Detection Restart Delay Time	1~600 Min.	10	
06-16	User-Defined Low-Voltage Detection Level	220VDC to 300VDC* 0: Disabled	00	
06-17	User-Defined Low-Voltage Detection Time	0.1~ 3600.0 Sec	0.5	
06-18	Reserved – Do Not Change!			

Group 7: Motor Parameters

Parameters	Explanation	Settings	Factory Setting	Actual Setting
07-00	Motor Rated Current	30 to 120% (of AC drive output current)	100	
07-01	Motor No-Load Current	0 to 90% (of AC drive output current – less than Pr.07-00)	40	
07-02	Torque Compensation	0.0 to 10.0	0.0	
07-03	Slip Compensation	0.0 to 3.0	1.0	
07-04	Number of Motor Poles	2 to 10	4	
07-05	Motor Auto Detection	00: Disable 01: Enable static motor detection (+ press RUN key) 02: Enable dynamic motor detection (+ press RUN key)dynamic WARNING: Motor must run free!!	00	
07-06	Motor Line-to-line Resistance R1	0 to 65535 mΩ	00	
07-07	Reserved – Do Not Change!			
07-08	Motor Rated Slip	0.00 to 20.00 Hz	3.00	
07-09	Slip Compensation Limit	0 to 250% (% of Pr. 07-08)	200	
07-10	Reserved – Do Not Change!			
07-11	Reserved – Do Not Change!			
07-12	Torque Compensation Time Constant	0.01 ~10.00 Sec	0.05	
07-13	Slip Compensation Time Constant	0.05 ~10.00 Sec	0.10	
07-14	Accumulative Motor Operation Time (Min.)	00 to 1439 Min.	00	
07-15	Accumulative Motor Operation Day	00 to 65535 Day	00	

Group 8: Special Parameters

Parameters	Explanation	Settings	Factory Setting	Actual Setting
08-00	DC Braking Current Level	00 to 100%	00	
08-01	DC Braking Time during Start-Up	0.0 to 60.0 Sec	0.0	
08-02	DC Braking Time during Stopping	0.0 to 60.0 Sec	0.0	
08-03	Start-Point for DC Braking	0.00 to 400.00 Hz	0.00	
08-04	Momentary Power Loss Operation Selection	00: Operation stops after Momentary Power Loss 01: Operation continues after Momentary Power Loss, speed search starts with Master Frequency 02: Operation continues after Momentary Power Loss, speed search starts with Minimum Output Frequency	00	
08-05	Maximum Allowable Power Loss Time	0.1 to 5.0 sec	2.0	
08-06	B.B. Time for Speed Search	0.1 to 5.0 sec	0.5	
08-07	Current Limit for Speed Search	30 to 200%	150	
08-08	Skip Frequency 1 Upper Bound	0.00 to 400.00 Hz	0.00	
08-09	Skip Frequency 1 Lower Bound	0.00 to 400.00 Hz	0.00	
08-10	Skip Frequency 2 Upper Bound	0.00 to 400.00 Hz	0.00	
08-11	Skip Frequency 2 Lower bound	0.00 to 400.00 Hz	0.00	
08-12	Skip Frequency 3 Upper bound	0.00 to 400.00 Hz	0.00	
08-13	Skip Frequency 3 Lower Bound	0.00 to 400.00 Hz	0.00	
08-14	Auto Restart After Fault	00 to 10	00	
08-15	Auto Energy Saving	00: Disable 01: Enable	00	
08-16	AVR Function	00: AVR Function Enable 01: AVR Function Disable 02: AVR Function Disable for Decel	00	
08-17	Software Setting of the Braking Level	230V: 370 to 430V	380	
		460V: 740 to 860V	760	
08-18	Base-block Speed Search	00: Speed Search Starts with Last Frequency Command 01: Starts with Minimum Output Frequency (Pr. 01-05)	00	
08-19	Speed Search	00: Speed Search Disable 01: Speed Search Enable	00	
08-20	Speed Search Frequency during Start-up ◇	00: Setting Frequency 01: Maximum Operation Frequency (01-00)	00	
08-21	Auto Reset Time at Restart after Fault	00 to 60000 sec	600	
08-22	Compensation Coefficient for Motor Instability ◇	0~1000	0	

Group 9: Communication Parameters

Parameters	Explanation	Settings	Factory Setting	Actual Setting
09-00	Communication Address ◆	1 to 254	1	
09-01	Transmission Speed ◆	00: Baud Rate 4800bps 01: Baud Rate 9600bps 02: Baud Rate 19200bps 03: Baud Rate 38400bps	01	
09-02	Transmission Fault Treatment ◆	00: Warn and keep Operating 01: Warn and Ramp to Stop 02: Warn and Coast to Stop 03: No warning and keep Operating	03	
09-03	Timeout Detection ◆	0.0 ~ 60.0 second 0.0: Disable	0.0	
09-04	Communication Protocol ◆	00: 7,N,2 (Modbus, ASCII) 01: 7,E,1 (Modbus, ASCII) 02: 7,O,1 (Modbus, ASCII) 03: 8,N,2 (Modbus, RTU) 04: 8,E,1 (Modbus, RTU) 05: 8,O,1 (Modbus, RTU)	00	
09-05	HMI Register 1 ◆	00 to 65535	00	
09-06	HMI Register 2 ◆	00 to 65535	00	
09-07	Response Delay Time after AC-drives receives communication command	00 ~ 200ms	00	

Group 10: PID Control Parameters

Parameters	Explanation	Settings	Factory Setting	Actual Setting
10-00	Input for PID Feedback	00: Inhibit PID operation 01: Input negative PID feedback from external terminal (AVI) 0 to +10V 02: Input negative PID feedback from external terminal (ACI) 4 to 20mA 03: Input positive PID feedback from external terminal (AVI) 0 to +10V 04: Input positive PID feedback from external terminal (ACI) 4 to 20mA	00	
10-01	Gain over PID Detection value	0.00 to 10.00	1.00	
10-02	PID-Proportional Gain (P)	0.0 to 10.0	1.0	
10-03	PID-Integral Gain (I)	0.00 to 100.00 sec (0.00 disable)	1.00	
10-04	PID-Derivative Control (D)	0.00 to 1.00 sec	0.00	
10-05	Upper Bound for PID-Integral Control	00 to 100%	100	
10-06	Primary Delay Filter time	0.0 to 2.5 sec	0.0	
10-07	PID Output Freq Limit	0 to 110%	100	
10-08	PID-Feedback Signal Detection time	0.0 to 3600.0 sec	60.0	
10-09	Treatment of the Erroneous Feedback Signals	00: Warn and keep operation 01: Warn and RAMP to stop 02: Warn and COAST to stop	00	
10-10	PG Pulse Range	01 to 40000	1024	
10-11	PG Input	00: Disable PG 01: Single phase 02: Forward / Counterclockwise rotation 03: Reverse / Clockwise rotation	00	
10-12	Proportional Speed control (P)	0.0 to 10.0	1.0	
10-13	Integral Speed Control (I)	0.00 to 100.00 (0.00 disable)	1.00	
10-14	Speed Control Output Frequency Limit	0.0 to 10.0 Hz	10.0	
10-15	Refreshing Time for PG pulse counter	0.01~1.00 sec	0.10	
10-16	Deviation Range of PID Feedback Signal Error	0.00~100.00%	100.00	

Group 11: Fan & Pump Control Parameters

Parameters	Explanation	Settings	Factory Setting	Actual Setting
11-00	V/F Curve Selection	00: V/F Curve determined by Pr.01-00 to Pr.01-06 01: 1.5 Power Curve 02: 1.7 Power Curve 03: Square Curve 04: Cube Curve	00	
11-01	Start-Up Frequency of the Auxiliary Motor	0.00 to 120.00 Hz	0.00	
11-02	Stop Frequency of Auxiliary Motor	0.00 to 120.00 Hz	0.00	
11-03	Time Delay before Starting the Auxiliary Motor	0.0 to 3600.0 sec	0.0	
11-04	Time Delay before Stopping the Auxiliary Motor	0.0 to 3600.0 sec	0.0	
11-05	Sleep/Wake Up Detection Time	0.0 ~6550.0 sec	0.0	
11-06	Sleep Frequency	0.00~Fmax	0.00	
11-07	Wakeup Frequency	0.00~Fmax	0.00	

APPENDIX A: TECHNICAL SPECIFICATIONS

Voltage Class			230V Class			400/460V class			
OPTI-line V2500-0...yW1			007S	015S	022S	007T	015T	022T	037T
Max. Applicable Motor Output (kW)			0.75	1.5	2.2	0.75	1.5	2.2	3.7
Max. Applicable Motor Output (HP)			1	2	3	1	2	3	5
Output Rating	Rated Output Capacity (kVA)		1.9	2.5	4.2	2.3	3.2	4.2	6.5
	Rated Output Current (A)		5.0	7.0	11.0	2.7	4.2	5.5	8.5
	Recommended	50 Hz	81N4/91S4	91L4	101L4	81N4/91S4	91L4	101L4	114M4
	WATT motor *)	87/100Hz				81K4	81N4	91S4	101L4
Maximum Output Voltage (V)			Proportional to Input Voltage						
Input Rating	Rated Input Current (A)		11.9/ 7.0	15.3/ 7.6	22/15.5	3.2	4.3	5.9	11.2
	Rated Voltage		1/3-phase 180...264 Vac			3-phase 342...528 Vac			
	Frequency Tolerance		47 – 63 Hz						
Control Characteristics	Control System		SPWM (Sinusoidal Pulse Width Modulation, carrier frequency 1-15kHz)						
	Output Frequency Resolution		0.01Hz						
	Torque Characteristics		Including auto-torque boost & auto-slip compensation; starting torque up to 150% at 1.0Hz						
	Overload Endurance		150% of rated current for 1 minute						
	Accel/Decel Time		0.1 to 3600 seconds (4 Independent settings for Accel/Decel Time)						
	V/F Pattern		Adjustable V/F pattern (for different types load)						
	Stall Prevention Level		20 to 250%, Setting of Rated Current						
Operating Characteristics	Frequency Setting	Keypad	Setting by ▲ ▼						
		External Signal	Potentiometer-5K Ω /0.5W, DC 0 to +10V or -10 to +10V (Input impedance 47K Ω), RS-485 interface, 4 to 20mA (Input impedance 250 Ω), Multi-Function Inputs 1 to 6 (16 steps, Jog, up/down)						
	Operation Setting Signal	Keypad	Set by RUN, STOP and JOG						
		External Signal	Digital Inputs DI1 to DI6 can be combined to offer various modes of operation, RS-485 serial interface (MODBUS).						
	Multi-Function Input Signal		Multi-step selection 0 to 15, Jog, accel/decel inhibit, first to forth accel/decel switches, counter, PLC operation, external Base Block (NC, NO), etc.						
	Multi-Function Output Indication		AC Drive Operating, Frequency Attained, Non-zero, Base Block, Fault Indication, Local/Remote indication, PLC Operation indication and Auxiliary Motor Output						
	Analog Output Signal		Analog frequency/current signal output.						
Other Functions			AVR, S-Curve, Over-Voltage, Over-Current Stall Prevention, Fault Records, Adjustable Carrier Frequency, DC Braking, Braking Chopper, Momentary Power Loss restart, Auto Tuning, Frequency Limits, Parameter Lock/Reset, new Sensorless Vector Control, Counter, PID Control, Fan & Pump Control, PLC, MODBUS Communication, Reverse Inhibition						
Options			Filter, Braking Resistor, internal PG-Feedback for closed loop Vector Control, Communication Modules for DeviceNet and Profibus DP (coming soon).						
Protection			Self-testing, Over Voltage, Over Current, Under Voltage, Overload, Overheating, External Fault, Electronic thermal, Ground Fault.						
Cooling Methods			Convection cooled	Fan-cooled	Convection cooled	Fan-cooled			
Environmental Conditions	Installation Location		Altitude 1,000 m or lower, keep from corrosive gasses, liquid and dust						
	Pollution Degree		2						
	Ambient Temperature		-10°C to 40°C (-10°C to 50°C without blind plate) Non-Condensing and not frozen						
	Storage/ Transportation Temp.		-20°C to 60°C						
	Ambient Humidity		Below 90% RH (non-condensing)						
	Vibration		9.80665m/s ² (1G) less than 20Hz, 5.88m/s ² (0.6G) at 20 to 50Hz						
Dimensions (mm)		W	118	118	150	118	118	118	150
		H	185	185	260	185	185	185	260
		D	160	160	160	145	160	145	160
V2500-0wxyz_W1 size		B	B	D	A	B	C	D	
Weight		kg	2.7	3.2	4.5	2.7	3.2	3.2	3
EMC	EMC-conformity		optional external EMC-filter according to EN61800-3 amendment A11						
	cable len.(2nd env.)	m	65	65	65	60	60	60	60
	cable len.(1st env.)	m	35	35	35	15	15	15	15

*) 4-pole motor - for details on motor type and data please refer to the current motor catalogue EUSAS03

APPENDIX A: TECHNICAL SPECIFICATIONS

Voltage Class			400/460V class (ff)										
OPTI-line V2500-0____yW1			055T	075T	110T	150T	185T	220T	300T	370T	450T	550T	750T
Max. Applicable Motor Output (kW)			5.5	7.5	11	15	18.5	22	30	37	45	55	75
Max. Applicable Motor Output (HP)			7.5	10	15	20	25	30	40	50	60	75	100
Output Rating	Rated Output Capacity (kVA)		9.9	13.7	18.3	24.4	28.9	34.3	45.7	55.6	69.3	84	114
	Rated Output Current (A)		13	18	24	32	38	45	60	73	91	110	150
	Recommended WATT motor *)	50 Hz	134S4	134M4	161M4	161L4	180M4	180L4	200L4	226S4	226M4	251M4	281S4
		87/100Hz	101LA4	114M4	134S4	134M4	134ML4	161M4	161L4	180M4	180L4	200L4	226S4
Maximum Output Voltage (V)			Proportional to Input Voltage										
Input Rating	Rated Input Current (A)		14	19	25	32	39	49	60	63	90	130	160
	Rated Voltage		3-phase 342...528 Vac										
	Frequency Tolerance		47 – 63 Hz										
Control Characteristics	Control System		SPWM (Sinusoidal Pulse Width Modulation, carrier frequency 1-15kHz)										
	Output Frequency Resolution		0.01Hz										
	Torque Characteristics		Including auto-torque boost & auto-slip compensation; starting torque up to 150% at 1.0Hz										
	Overload Endurance		150% of rated current for 1 minute										
	Accel/Decel Time		0.1 to 3600 seconds (4 Independent settings for Accel/Decel Time)										
	V/F Pattern		Adjustable V/F pattern (for different types load)										
	Stall Prevention Level		20 to 250%, Setting of Rated Current										
Operating Characteristics	Frequency Setting	Keypad	Setting by ▲ ▼										
		External Signal	Potentiometer-5KΩ/0.5W, DC 0 to +10V or -10 to +10V (Input impedance 47KΩ), RS-485 interface, 4 to 20mA (Input impedance 250Ω), Multi-Function Inputs 1 to 6 (16 steps, Jog, up/down)										
	Operation Setting Signal	Keypad	Set by RUN, STOP and JOG										
		External Signal	Digital Inputs DI1 to DI6 can be combined to offer various modes of operation, RS-485 serial interface (MODBUS).										
	Multi-Function Input Signal		Multi-step selection 0 to 15, Jog, accel/decel inhibit, first to forth accel/decel switches, counter, PLC operation, external Base Block (NC, NO), etc.										
	Multi-Function Output Indication		AC Drive Operating, Frequency Attained, Non-zero, Base Block, Fault Indication, Local/Remote indication, PLC Operation indication and Auxiliary Motor Output										
Analog Output Signal			Analog frequency/current signal output.										
Other Functions			AVR, S-Curve, Over-Voltage, Over-Current Stall Prevention, Fault Records, Adjustable Carrier Frequency, DC Braking, Braking Chopper (up to 11kW), Momentary Power Loss restart, Auto Tuning, Frequency Limits, Parameter Lock/Reset, new Sensorless Vector Control, Counter, PID Control, Fan & Pump Control, PLC, MODBUS Communication, Reverse Inhibition										
Options			Filter, Braking Resistor/Chopper, internal PG-Feedback for closed loop Vector Control, Communication Modules for DeviceNet and ProfiBus DP (coming soon).										
Protection			Self-testing, Over Voltage, Over Current, Under Voltage, Overload, Overheating, External Fault, Electronic thermal, Ground Fault.										
Cooling Methods			Fan-cooled										
Environmental Conditions	Installation Location		Altitude 1,000 m or lower, keep from corrosive gasses, liquid and dust										
	Pollution Degree		2										
	Ambient Temperature**)		-10°C to 40°C (-10°C to 50°C without blind plate) Non-Condensing and not frozen										
	Storage/ Transportation Temp.		-20°C to 60°C										
	Ambient Humidity		Below 90% RH (non-condensing)										
Vibration			9.80665m/s ² (1G) less than 20Hz, 5.88m/s ² (0.6G) at 20 to 50Hz										
Dimensions (mm)		W	200	200	200	250	250	250	370	370	370	425	425
		H	323	323	323	403.8	403.8	403.8	589	589	589	660	660
		D	183.2	183.2	183.2	205.4	205.4	205.4	260	260	260	264	264
V2500-0wxyz_W1 size		E	E	E	F	F	F	G	G	G	H	H	
Weight		kg	8	10	13	13	13	13	36	36	36	50	50
EMC	EMC-conformity		optional external EMC-filter according to EN61800-3 amendment A11										
	cable len.(2nd env.)	m	60	80	80	75	50	45	50	50	25	25	25
	cable len.(1st env.)	m	15	15	15	20	15	15	20	20	15	15	15

*) 4-pole motor - for details on motor type and data please refer to the current motor catalogue EUSAS'03

**) Max. Ambient Temp. is 50°C for size E (5.5kW to 11kW) and G (30kW to 45kW) inverters

APPENDIX B: ACCESSORIES

B.1 Non-fuse Circuit Breaker Chart

Recommended by WATT DRIVE (UL 508C, paragraph 45.8.4, part a)

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

(Note: For our experience, we suggest to use less than 1.5-2 times of input/output current rating.)

1-phase		3-phase	
Model	Input Current (A)	Model	Output Current (A)
V2500-0007SBW1	11.9	V2500-0007TAW1	2.7
V2500-0015SBW1	15.3	V2500-0015TBW1	4.2
V2500-0022SDW1	22.0	V2500-0022TCW1	5.5
		V2500-0037TDW1	8.5
		V2500-0055TEW1	13
		V2500-0075TEW1	18
		V2500-0110TEW1	24
		V2500-0150TFW1	32
		V2500-0185TFW1	38
		V2500-0220TFW1	45
		V2500-0300TGW1	60
		V2500-0370TGW1	73
		V2500-0450TGW1	90
		V2500-0550THW1	110
		V2500-0750THW1	150

Fuse Specification Chart

Smaller fuses than those shown in the table are permitted.

Model	I (A) (Input)	I (A) (Output)	Line Fuse	
			I (A)*1	I (A)*2
V2500-0007SBW1	11.9	5.0	30	16
V2500-0015SBW1	15.3	7.0	40	20
V2500-0022SDW1	22.0	11	60	25
V2500-0007TAW1	3.2	2.7	10	6
V2500-0015TBW1	4.3	4.2	15	10
V2500-0022TCW1	5.9	5.5	20	10
V2500-0037TDW1	11.2	8.5	30	16
V2500-0055TEW1	14	13	50	16
V2500-0075TEW1	19	18	70	20
V2500-0110TEW1	25	24	90	25
V2500-0150TFW1	32	32	125	35
V2500-0185TFW1	39	38	150	50

Model	I (A) (Input)	I (A) (Output)	Line Fuse	
			I (A)*1	I (A)*2
V2500-0220TFW1	49	45	175	50
V2500-0300TGW1	60	60	225	63
V2500-0370TGW1	63	73	250	80
V2500-0450TGW1	90	91	350	100
V2500-0550THW1	130	110	400	125
V2500-0750THW1	160	150	600	150

Note:

***1) Use “ultra rapid fuses” when working according to uL and CuL standards
(e.g. Bussmann Type JJN/JJS)**

***2) Fuse characteristics - “gL” for European standard environment**

B.2 All Braking Resistors & Braking Units Use in AC Drives

Note: Please use resistors recommended by WATT DRIVE Antriebstechnik GmbH. Other resistors and values will void WATT DRIVE Antriebstechnik GmbH warranty. Please contact your nearest WATT DRIVE Antriebstechnik GmbH representative for use of special resistors..

Inverter	Specification Resistor	Brakechopper	Dimensions W/H/D	Braking Torque 10% ED
V2500-0007SBW1	UDZBW-200/00080		140/20/60	125
V2500-0015SBW1	UDZBW-100/00300		155/36/28	125
V2500-0022SDW1	UDZBW-070/00300		155/36/28	125
V2500-0007TAW1	UDZBW-750/00080		140/20/60	125
V2500-0015TBW1	UDZBW-400/00300		155/36/28	125
V2500-0022TCW1	UDZBW-250/00300		155/36/28	125
V2500-0037TDW1	UDZBW-150/00400		200/36/28	125
V2500-0055TEW1	UDZBW-100/00500		335/30/60	125
V2500-0075TEW1	UDZBW-075/01000		400/50/100	125
V2500-0110TEW1	UDZBW-050/01000	UDZBC-30	600/92/120	125
V2500-0150TFW1	UDZBW-040/01500	UDZBC-30	500/150/120	125
V2500-0185TFW1	UDZBW-032/04800	UDZBC-30	490/430/260	125
V2500-0220TFW1	UDZBW-027/04800	UDZBC-30	490/430/260	125
V2500-0300TGW1	UDZBW-020/06000	UDZBC-30	490/430/260	125
V2500-0370TGW1	UDZBW-016/09600	UDZBC-45	490/630/270	125
V2500-0450TGW1	UDZBW-013/09600	UDZBC-45	490/630/270	125
V2500-0550THW1	UDZBW-010/12000	UDZBC-52	490/630/270	125
V2500-0750THW1	UDZBW-006/19200	UDZBC-52	490/1030/270	125

Note:

1. Please select the factory default resistance value (Watt) and the frequency value (ED%)
2. If damage resulted in the drive or other equipments due to the fact that the braking resistors and the braking modules in use are not provided by Watt, the warranty will be void.
3. Take into consideration the safety of the environment when installing the braking resistors.
4. If the minimum resistance value is to be utilized, consult local dealers for the calculation of the Watt figures.
5. Please select thermal relay trip contact to prevent resistor over load.

B.3 AMD - EMI FILTER CROSS REFERENCE

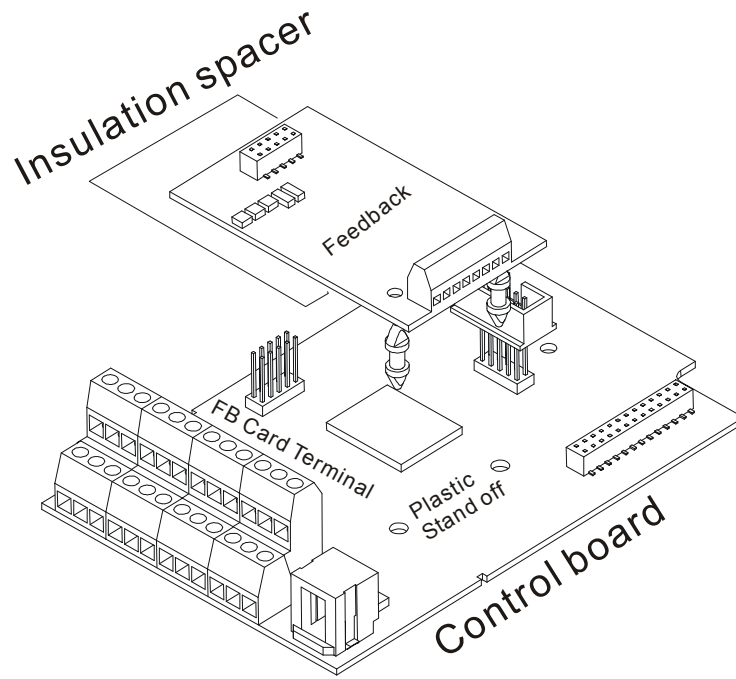
Inverter	Foot Print	Dimensions	EMI Filter without Choke
V2500-0007SBW1 V2500-0015SBW1	Y	239/120/50	UDZNFV-015S
V2500-0022SDW1	Y	315/150/60	UDZNFV-022S
V2500-0007TAW1 V2500-0015TBW1 V2500-0022TCW1	Y	239/120/50	UDZNFV-022T
V2500-0037TDW1	Y	315/150/60	UDZNFV-037T
V2500-0055TEW1 V2500-0075TEW1 V2500-0110TEW1	Y	398/200/60	UDZNFV-110T
V2500-0150TFW1 V2500-0185TFW1	N	363/150/90	UDZNFV-185T
V2500-0220TFW1 V2500-0300TGW1 V2500-0370TGW1	N	430/202/122	UDZNFV-370T
V2500-0450TGW1	N	480/202/122	UDZNFV-450T
V2500-0550THW1 V2500-0750THW1	N	1080/242/142	UDZNFV-750T

B.4 Feedback Card

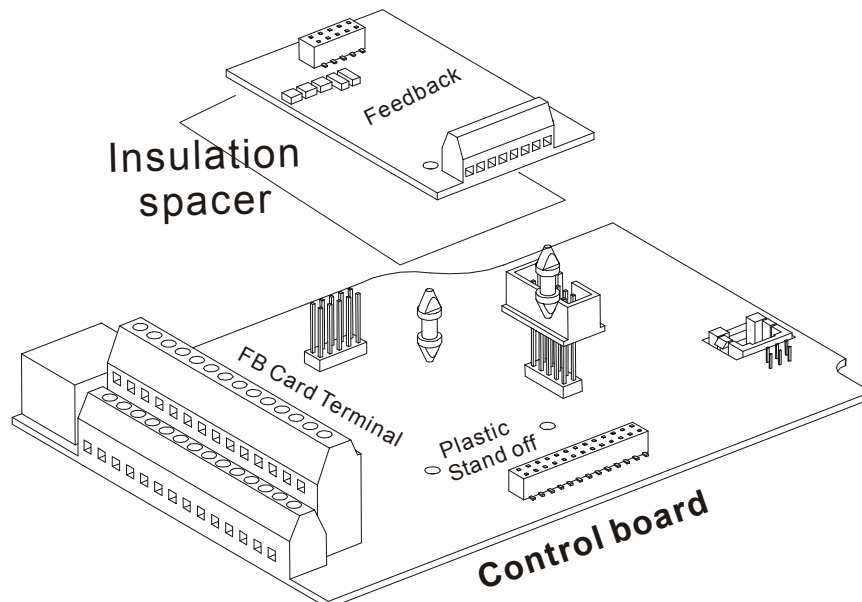
(Refer to Pr.10-10 to 10-15 of related parameter settings)

Section 1 Installation

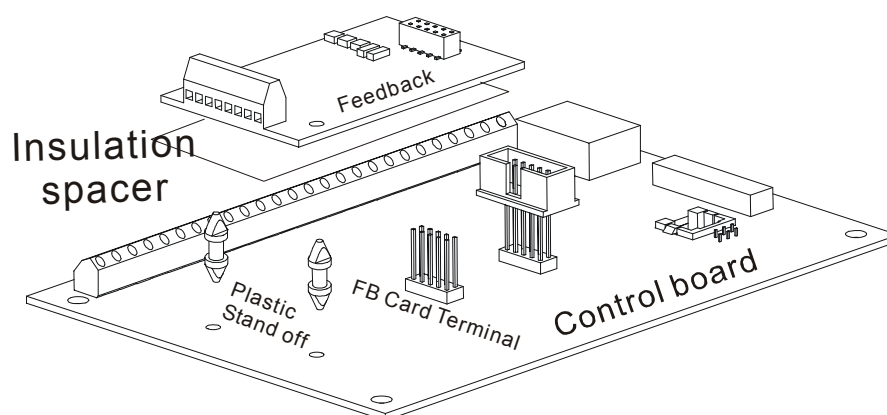
1.1) 0.75kW to 1.5kW



1.2) 2.2kW to 3.7kW

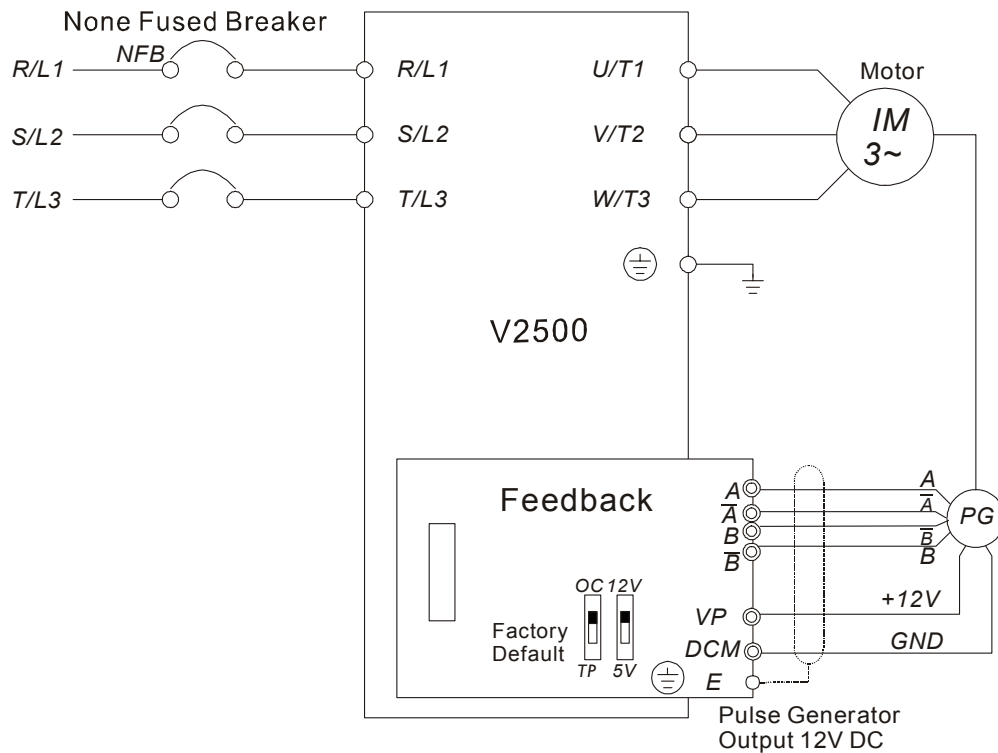


1.3) 5.5kW and above



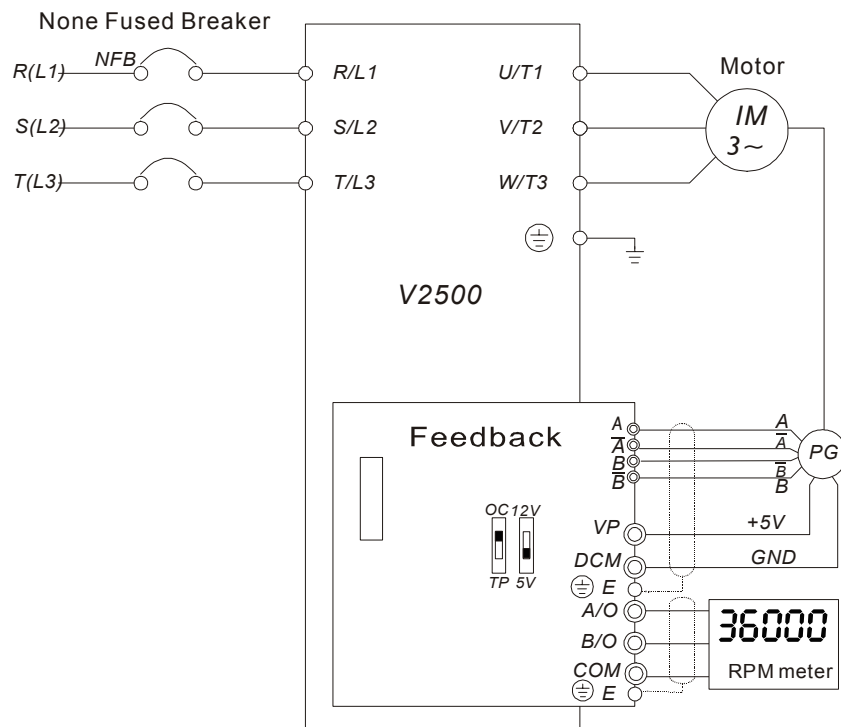
Section 2 FEEDBACK Card (UDZ-FEEDBACK)

2.1) Basic Wiring Diagram



FB-02 and Pulse Generator Connections

2.2) Basic Wiring Diagram with RPM Meter Attached.



FB-02 and Pulse Generator Connections

Section 3 FB Terminal Descriptions

3.1) Terminals

Terminal Symbols	Descriptions
VP	Power source of FB (FSW1 can be switched to 12V or 5V) Output Voltage: (+12VDC $\pm 5\%$ 200mA) or (+5VDC $\pm 2\%$ 400mA)
DCM	Power source (VP) and input signal (A, B) common
A, \bar{A} , B, \bar{B}	Input signal from Pulse Generator. Input type is selected by TSW2. Please See section 3.4. Maximum 500KP/Sec
A/O, B/O	FB output signal for use with RPM Meter. (Open Collector) Maximum DC24V 100mA
COM	FB output signal (A/O, B/O) common.

3.2) Wiring Notes

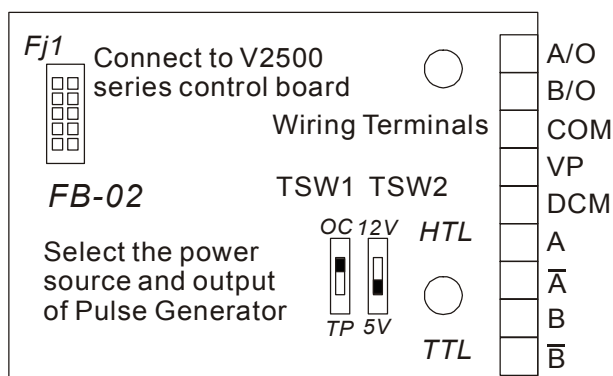
The control, power supply and motor leads must be laid separately. They must not be fed through the same cable conduit / trunking.

1. Please use a shield cable to prevent interference. Do not run control wire parallel to any high voltage AC power line (220 V and up).
2. Connect shielded wire to DCM only.
3. Recommended wire size 0.21 to 0.81mm² (AWG24 to AWG18).
4. Wire length:

Types of Pulse Generators	Maximum Wire Length	Wire Gauge
Output Voltage	50m	1.25mm ² (AWG16) or above
Open Collector	50m	
Line Driver	300m	
Complementary	70m	

B

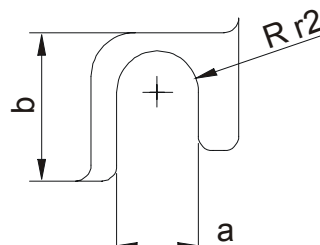
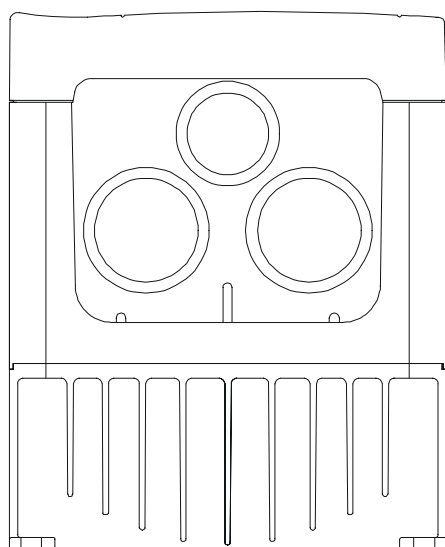
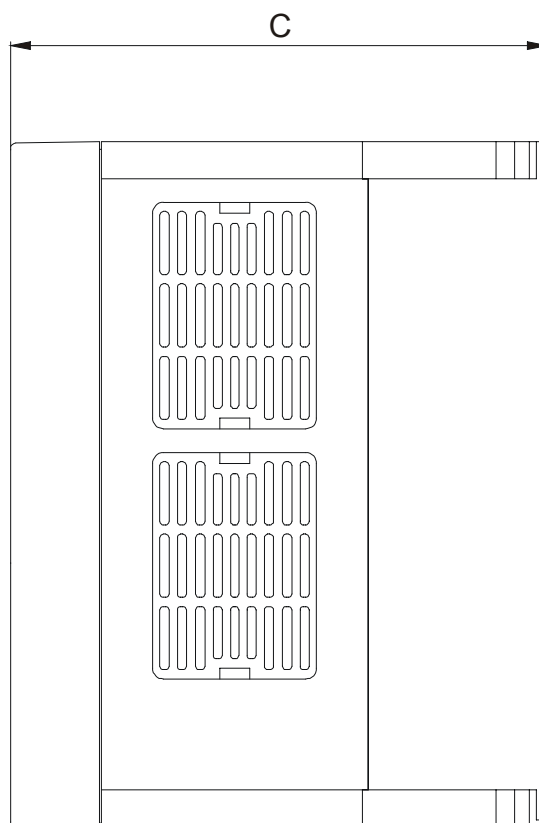
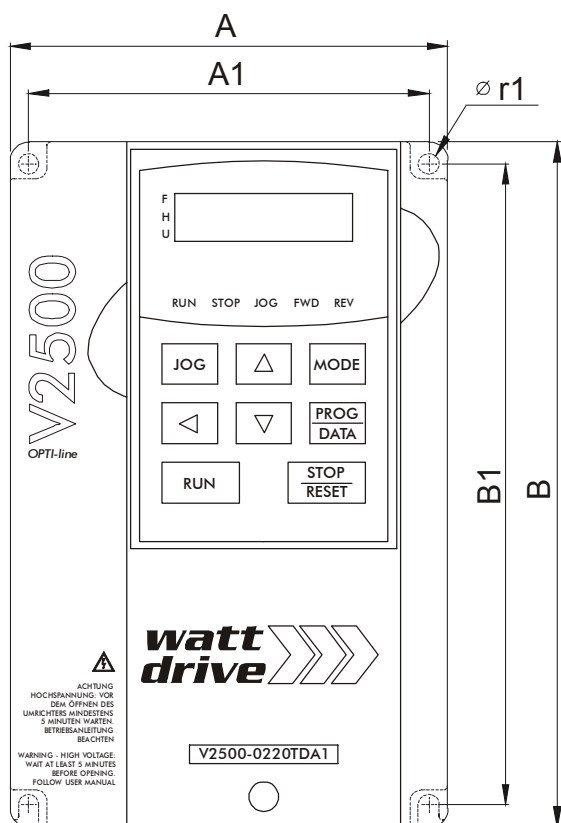
3.3) Control Terminals Block Designations.



3.4) Types of Pulse Generators

Types of Pulse Generators		TSW1 and TSW2 switches	
		5V	12V
Output Voltage			
Open collector			
Line driver			
Complimentary			

APPENDIX C: DIMENSIONS



C

APPENDIX C: DIMENSIONS

Model	A [mm] (inch)	A1 [mm] (inch)	B [mm] (inch)	B1 [mm] (inch)	C [mm] (inch)	r1 [mm] (inch)	a [mm] (inch)	b [mm] (inch)	r2 [mm] (inch)
V2500-0007SBW1	118 (4.65)	108 (4.25)	185 (7.28)	173 (6.81)	160 (6.3)	5.5 (0.22)	5.5 (0.22)	- -	2.75 (0.11)
V2500-0015SBW1	118 (4.65)	108 (4.25)	185 (7.28)	173 (6.81)	160 (6.3)	5.5 (0.22)	5.5 (0.22)	- -	2.75 (0.11)
V2500-0022SDW1	150 (5.91)	135 (5.31)	260 (10.24)	244.3 (9.62)	160.2 (6.31)	6.5 (0.26)	6.5 (0.26)	11.3 (0.44)	3.25 (0.13)
V2500-0007TAW1	118 (4.65)	108 (4.25)	185 (7.28)	173 (6.81)	145 (5.71)	5.5 (0.22)	5.5 (0.22)	- -	2.75 (0.11)
V2500-0015TBW1	118 (4.65)	108 (4.25)	185 (7.28)	173 (6.81)	160 (6.3)	5.5 (0.22)	5.5 (0.22)	- -	2.75 (0.11)
V2500-0022TCW1	118 (4.65)	108 (4.25)	185 (7.28)	173 (6.81)	145 (5.71)	5.5 (0.22)	5.5 (0.22)	- -	2.75 (0.11)
V2500-0037TDW1	150 (5.91)	135 (5.31)	260 (10.24)	244.3 (9.62)	160.2 (6.31)	6.5 (0.26)	6.5 (0.26)	11.3 (0.44)	3.25 (0.13)
V2500-0055TEW1	200 (7.87)	185.6 (7.31)	323 (12.72)	303 (11.93)	183.2 (7.21)	7 (0.28)	7 (0.28)	13.5 (0.53)	3.5 (0.14)
V2500-0075TEW1	200 (7.87)	185.6 (7.31)	323 (12.72)	303 (11.93)	183.2 (7.21)	7 (0.28)	7 (0.28)	13.5 (0.53)	3.5 (0.14)
V2500-0110TEW1	200 (7.87)	185.6 (7.31)	323 (12.72)	303 (11.93)	183.2 (7.21)	7 (0.28)	7 (0.28)	13.5 (0.53)	3.5 (0.14)
V2500-0150TFW1	250 (9.84)	226 (8.9)	403.8 (15.9)	384 (15.12)	205.4 (8.09)	10 (0.39)	10 (0.39)	13 (0.51)	5 (0.2)
V2500-0185TFW1	250 (9.84)	226 (8.9)	403.8 (15.9)	384 (15.12)	205.4 (8.09)	10 (0.39)	10 (0.39)	13 (0.51)	5 (0.2)
V2500-0220TFW1	250 (9.84)	226 (8.9)	403.8 (15.9)	384 (15.12)	205.4 (8.09)	10 (0.39)	10 (0.39)	13 (0.51)	5 (0.2)
V2500-0300TGW1	370 (14.57)	335 (13.19)	589 (23.19)	560 (22.05)	260 (10.24)	13 (0.51)	13 (0.51)	21 (0.83)	6.5 (0.26)
V2500-0370TGW1	370 (14.57)	335 (13.19)	589 (23.19)	560 (22.05)	260 (10.24)	13 (0.51)	13 (0.51)	21 (0.83)	6.5 (0.26)
V2500-0450TGW1	370 (14.57)	335 (13.19)	589 (23.19)	560 (22.05)	260 (10.24)	13 (0.51)	13 (0.51)	21 (0.83)	6.5 (0.26)
V2500-0550THW1	425 (16.73)	385 (15.16)	660 (25.98)	631 (24.84)	264 (10.39)	13 (0.51)	13 (0.51)	21 (0.83)	6.5 (0.26)
V2500-0750THW1	425 (16.73)	385 (15.16)	660 (25.98)	631 (24.84)	264 (10.39)	13 (0.51)	13 (0.51)	21 (0.83)	6.5 (0.26)