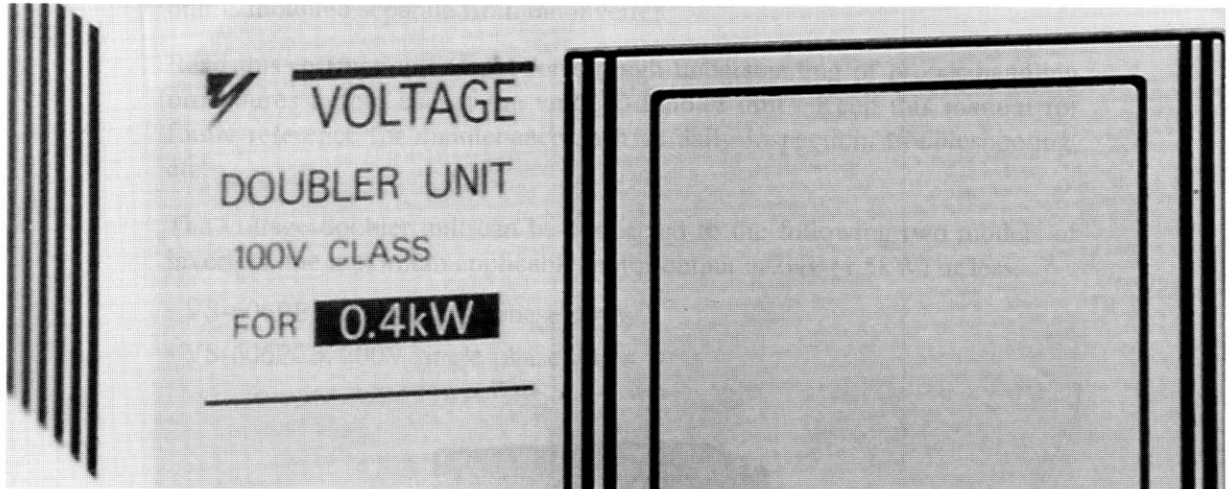


VOLTAGE DOUBLER UNIT

FOR Varispeed-606 SERIES (SINGLE-PHASE, 200V)



Before initial operation, read these instructions thoroughly, and retain for future reference.



YASKAWA

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The voltage doubler unit is provided between the power supply and inverter when an inverter is operated by single-phase 100VAC power supply. The unit is mounted separate from the inverter.

Read this instruction manual for through understanding of proper handling procedures before use of the voltage doubler unit. Keep this manual for future reference for maintenance such as daily inspection, troubleshooting, etc.

The voltage doubler unit can be connected to the following two models of inverters; the maximum applicable motor output is 2HP (1.5kW) or less.

- VS-606PB3, 200V single-phase series
- VS-606PC3, 200V single-phase series



94-C72-011

CAUTIONS

- (1) Do not touch the main circuit section until the CHARGE indicator lamp is extinguished after turning OFF the AC main circuit power supply. (Voltage remains in the capacitor.)
- (2) Do not change the wiring during current conduction.
- (3) Provide grounding (100Ω or less) for the ground terminal (E).
- (4) Do not connect the AC main circuit power supply to output terminal (P) or (N).
- (5) Do not conduct a withstand voltage test of the voltage doubler unit.
- (6) Tighten the screws of the terminals securely.

1. RECEIVING

Upon receipt of the voltage doubler unit, check the following items. If you find anything out of order after checking, immediately contact your YASKAWA representative.

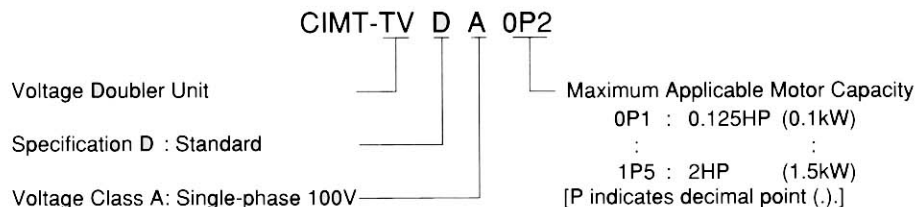
- Its nameplate ratings meet your requirements.
- It has sustained no damage during transportation.

1.1 DESCRIPTION OF NAMEPLATE

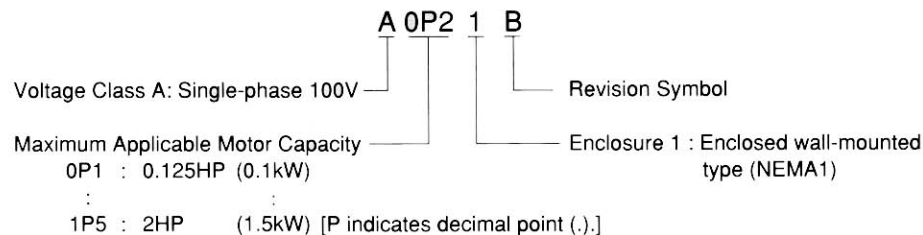
Example : Domestic standard product of 0.25HP (0.2kW) specifications

Model →	MODEL : CIMT-TVDA0P2	SPEC : A0P2	
Input Spec. →	INPUT : AC1PH 100-110V 50Hz/60Hz		
Output Spec. →	OUTPUT : DC 280-310V 2.8A		
Lot No. →	LOT NO :	MASS : 1.0kg	← Mass
Serial No. →	SER NO :		
	YASKAWA ELECTRIC CORPORATION		MADE IN JAPAN

1.2 MODEL DESIGNATION



1.3 DESCRIPTION OF SPEC



2. INSTALLATION

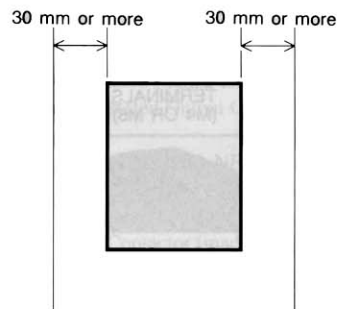
2.1 TRANSPORTATION

- Handle the unit with care so that it will not be damaged during transportation.
- Do not hold the face plate (plastic part) only; carry the unit by holding the die-cast part.
- Never throw or drop the unit.

2.2 MOUNTING SPACE

Mount the voltage doubler unit vertically for better cooling efficiency and secure such space as shown in Fig. 1.

(a) Right and Left Space



(b) Top and Bottom Space

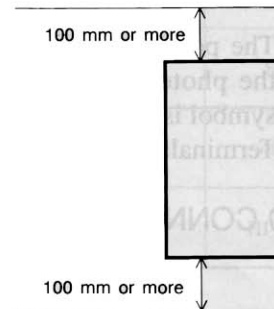


Fig. 1 Mounting Space

2.3 MOUNTING PRECAUTIONS

To mount the voltage doubler unit, lift the main unit section from the unit bottom. Excessive force may cause damage.

Mount the voltage doubler unit in such location as described below :

- Protected from wind, rain, moisture or oil spray
- Protected from direct sunlight
- Protected from corrosive gases or liquids
- Free from dust, iron dust or salt water spray
- Free from vibration
- Ambient temperature from -10 to $+40^{\circ}\text{C}$
- Protected from high humidity
- Free from magnetic noise (for example, away from welders or power devices)
- Free from radioactive substances
- Free from combustibles

To store the unit in a distribution panel, remove the protective cover and terminal cover at the upper/lower parts of the unit and use a cooling fan or the like so that the unit inlet air temperature will not exceed 113°F ($+45^{\circ}\text{C}$).

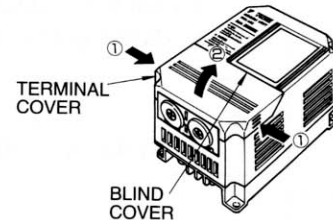
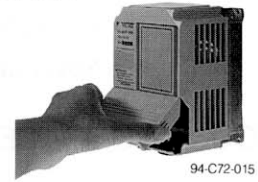
3. WIRING

Observe the following procedures for wiring the voltage doubler unit.

3.1 REMOVAL OF TERMINAL COVER AND POSITION OF TERMINALS

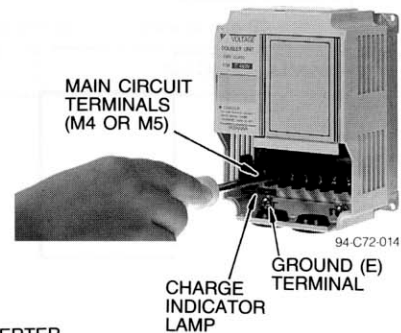
Removal of terminal cover

To remove the terminal cover from the voltage doubler main unit, keep pressing it in direction ① to lift it in direction ②. To mount it, reverse this procedure.

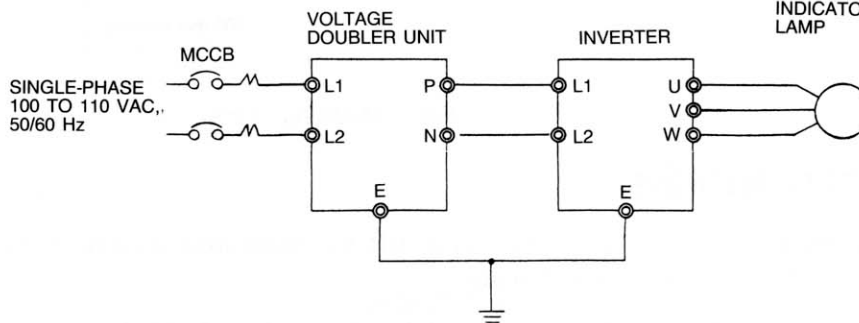


Position of terminals

The position of the terminals are as shown in the photograph on the right. Each terminal symbol is described in Par. 3.3, "Description of Terminals".



3.2 STANDARD CONNECTION DIAGRAM



Note : Since connection to the inverter control circuit terminals is not described, refer to the instruction manual of the inverter to be used.

3.3 DESCRIPTION OF TERMINALS

Terminal Symbol	Description
L1	For AC main circuit power supply input
L2	
P	For DC power supply output
N	
E*	For grounding (100Ω or less)

Note : Use unit enclosure grounding screws.

• Main circuit terminal Arrangement

0.125 - 0.5HP (0.1-0.4kW)			L1	L2	N	P			(Do not use blanks.)
1/2HP (0.75, 1.5kW)	L1	L2	N	P					

3.4 MOLDED-CASE CIRCUIT BREAKER (MCCB) AND MAGNETIC CONTACTOR

For wiring protection, be sure to connect MCCBs between AC main circuit power supply and the voltage doubler unit input terminals (L1) and (L2). Additionally, connect a magnetic contactor when necessary. Table 1 describes the recommended MCCBs and magnetic contactors.

When a ground fault interrupter is used, select one not influenced by high frequency, and setting current should be 200mA or over and operating time, 0.1sec or over to prevent malfunction.

Example : NV series by MITSUBISHI ELECTRIC CO., LTD. (manufactured in and after 1988)
EGSG series by FUJI ELECTRIC CO., LTD. (manufactured in and after 1984)

Table 1 Molded-case Circuit Breakers and Magnetic Contactors

Voltage Doubler Unit Model CIMT-	TVDA0P1	TVDA0P2	TVDA0P4	TVDA0P7	TVDA1P5
Capacity (kVA)	0.3	0.6	1.2	2.0	2.5
Recommended MCCB and Magnetic Contactor Rated Output Current (A _{oc})	1.5	2.8	5.6	8.4	11.0
MCCB models NF30, NF50 (made by MITSUBISHI ELECTRIC CO., LTD.)	10A	15A	30A	40A	50A
Magnetic Contactor (made by YASKAWA CONTROLS CO., LTD)	HI-7E	HI-10E	HI-25E	HI-30E	HI-30E

3.5 WIRE AND TERMINAL SCREW SIZES

Table 2 shows the wire sizes to be used for wiring.

Table 2 Wire Sizes

Model CIMT-	I/O Section	Terminal Symbol	Wire Size mm ² *	Wire Type
TVDA0P1	Input	(L1) (L2)	2 to 5.5	Power cable : 600V vinyl- sheathed lead or equivalent
	Output	(P) (N)	2 to 5.5	
	Grounding	(E)	2 to 5.5	
TVDA0P2	Input	(L1) (L2)	2 to 5.5	
	Output	(P) (N)	2 to 5.5	
	Grounding	(E)	2 to 5.5	
TVDA0P4	Input	(L1) (L2)	3.5 to 5.5	
	Output	(P) (N)	2 to 5.5	
	Grounding	(E)	2 to 5.5	
TVDA0P7	Input	(L1) (L2)	3.5 to 8	
	Output	(P) (N)	3.5 to 8	
	Grounding	(E)	2 to 5.5	
TVDA1P5	Input	(L1) (L2)	3.5 to 8	
	Output	(P) (N)	3.5 to 8	
	Grounding	(E)	2 to 5.5	

*: Determination of cable size

Lead size should be determined considering voltage drop of leads.

Voltage drop can be obtained by the following equation: Select lead size so that voltage drop will be within 2% of normal rated voltage.

$$\text{Phase-to-phase voltage drop (V)} = \sqrt{3} \times \text{lead resistance } (\Omega/\text{km}) \times \text{wiring distance (m)} \times \text{current (A)} \times 10^{-3}$$

Precautions

- Insertion of power supply coordination AC reactor

When power supply capacity exceeds 600kVA, connect an AC reactor to the voltage doubler unit input side for power supply coordination. This reactor is effective for power factor improvement of the power supply.

Additionally, inserting an AC reactor is effective to use the voltage doubler unit by connecting it to household power supply or to reduce power supply influence on other electric products.

- The inverter may not output the maximum value under the following conditions.
 - ① AC main circuit power supply voltage is low.
 - ② Power supply impedance is high.
 - ③ Wiring between voltage doubler unit and inverter is excessively long or thin.

3.6 WIRING PRECAUTIONS

- The phase of input terminal (L1) or (L2) can be in either direction.
- Do not connect the AC main circuit power supply to output terminals (P) or (N). Otherwise, the voltage doubler unit may be damaged.
- Wiring between the voltage doubler unit and the inverter must be as short as possible in order to prevent affects from voltage drop.
- Make sure that the I/O wiring will not contact the case, etc. (This may cause grounding or shortcircuiting.)
- Make sure to tighten the terminal screws.
- Separate main circuit wiring from control lines of the inverter and peripheral devices to prevent the devices from malfunctioning.
- Ground the casing of the voltage doubler unit using ground terminal (E). Ground resistance should be 100 Ω or less.
- Never ground the voltage doubler unit in common with welding machines, motors, or other large-current electrical equipment.
- Use the ground leads which comply with AWG standards and make the length as short as possible.
- Where several voltage doubler units are used side by side, all the units should be grounded as shown in (a) or (b) of Fig. 2. Do not form a loop with the ground leads.

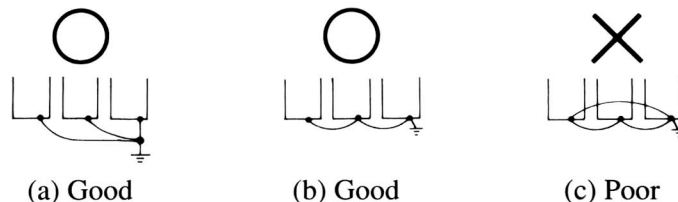


Fig. 2 Grounding of Three Units

4. TEST RUN

Check the following items after completion of installation and wiring.

- Wiring is correct. Especially, the power supply is not connected to output terminals (P) or (N).
- No shortcircuit because of wiring contamination (dust, oil, etc.)
- Screw terminals are tightened securely. Wiring is processed properly.
- Wiring is not accidentally grounded.
- Wiring to the inverter main circuit or control circuit is proper.
- Load status is good.
- Disconnect the coupling or belt connecting the motor with the machine before test run for safe operation so that motor is rotated without load.

To operate the motor directly connected to the machine, correct procedures must be followed.

- Turn ON the power supply after verifying that the forward/reverse run commands are not input to the inverter.
- Read the inverter instruction manual before turning ON the power supply.

5. STANDARD SPECIFICATIONS

Type CIMT –		TVDA0P1	TVDA0P2	TVDA0P4	TVDA0P7	TVDA1P5
Maximum Applicable Motor HP (kW)*1		0.125 (0.1)	0.25 (0.2)	0.5 (0.4)	1 (0.75)	2 (1.5)
Output Characteristics	Rated Output Capacity (kVA)	0.3	0.6	1.2	2.0	2.5
	Rated Output Current (A _{bc})*2	1.5	2.8	2.8	8.4	11.0
	Maximum Output Voltage (V _{DC})	280 to 310VAC (for input voltage)				
Power Supply	Rated Voltage/Rated Frequency	Single-phase 100 to 110V 50/60Hz				
	Allowable Voltage Variation	±10%				
	Allowable Frequency Variation	±5%				
Overload Resistance		Motor coasts to a stop in 1 minute at 150% of rated output current.				
Power Charge Indication		Charge lamp stays ON until main circuit DC voltage drops below 50V.				
Enclosure		Enclosed wall-mounted type NEMA1 (In-panel mounted type also available)				
Cooling Method		Self-cooling				
Mass lb (kg)		2.0 (0.9)	2.2(1.0)	2.2(1.0)	4.9 (2.2)	4.9 (2.2)
Environmental Conditions	Location	Indoor (no corrosive gases or dust)				
	Ambient Temperature	-10 to + 40°C (prevent freezing)				
	Storage Temperature*3	-20 to +60°C				
	Humidity	90% RH or less (non-condensing)				
	Vibration	9.8m/s ² (1G) at 20Hz or less 2m/s ² (0.2G) at 20 to 50Hz				

*1 : Our standard 4-pole motor is used to determine applicable motor output.

*2 : Rated output current indicates a value at inverter rated output.

*3 : Storage temperature is short-term temperature during transportation.

6. MAINTENANCE

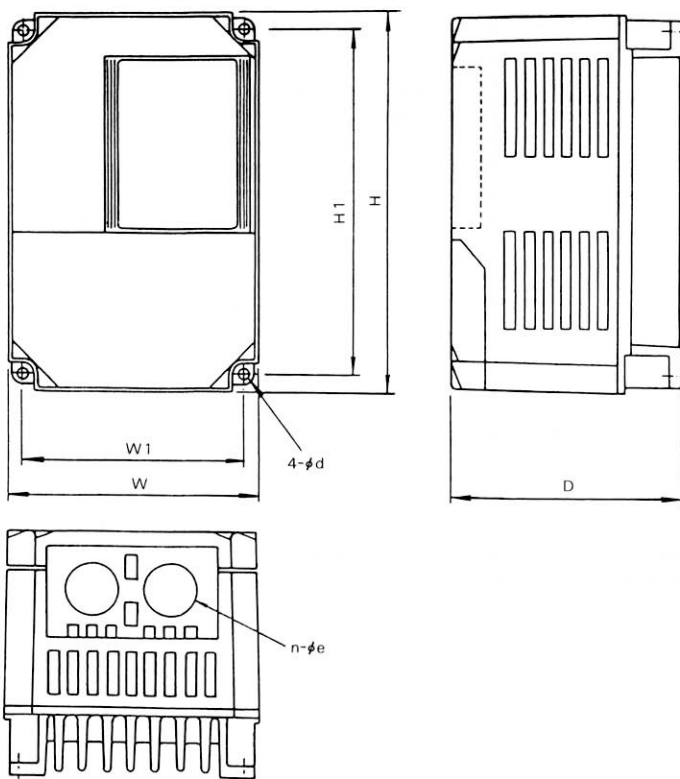
The voltage doubler unit does not require any special maintenance. However, to prevent any accidents from occurring and secure operation with high reliability for a long period, the inspections shown in Table 3 must be executed periodically. These inspections are not to be executed unless the main circuit power supply is turned OFF and the CHARGE indicator lamp is extinguished.

Table 3

Inspection Item	Check	Corrective Actions
External Terminals, Unit Mounting Bolts		Retighten the screws.
Cooling Fins	Tightening of screws Accumulation of dust or dirt	Clean with dry, compressed air of 39.2×10^4 Pa [57 to 85 psi (4 to 6kg/cm ²)] pressure.
Printed Circuit Board	Adhesion of conductive dust or oil mist	Clean with dry, compressed air of 39.2×10^4 Pa [57 to 85 psi (4 to 6kg/cm ²)] pressure. If not possible, replace the voltage doubler unit.
Power Element	Adhesion of dust and dirt	Clean with dry, compressed air of 39.2×10^4 Pa [57 to 85 psi (4 to 6kg/cm ²)] pressure.
Smoothing Capacitor	Discoloration or odor.	Replace the voltage doubler unit.

7. OUTSIDE DIMENSIONS in mm (inches)

Capacity	W	W1	H	H1	D	d	n-øe
0.125 to 0.5HP (0.1 to 0.4kW)	105 (4.13)	93 (3.66)	150 (5.91)	138 (5.43)	100 (3.94)	5 (0.20)	2-ø22 (2-ø0.87)
1/2HP (0.75/1.5kW)	140 (5.51)	128 (5.04)	150 (5.91)	138 (5.43)	138.5 (5.45)	5 (0.20)	3-ø22 (3-ø0.87)



For further information on the voltage doubler unit :

Use the voltage doubler unit according to this instruction manual so that it will contribute to production at all times.

If you find anything unclear or any fault without knowing the cause, check the following points in advance and contact your YASKAWA representative whose address and telephone number is printed on the back cover.

Well-experienced YASKAWA engineers are available for consultation at any time.

Provide the following information to the YASKAWA representative :

- Product name, application
- Model, SPEC, lot No. or serial No., rated output
- Trouble occurrence, status, inspection results
- Your address, person in charge, means of transportation for YASKAWA representative to your location

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