



# Varispeed-656DC5 Slim-type PWM Transistor Converter (VS-656DC5)

Model: CIMR-D5A

400V Class 200~800kW

600V Class 300~1200kW

## **Operator's Manual**

Keep this operator's manual for reference when using this product.

# Table of Contents

<b>Safety Notes</b> .....	<b>1</b>
<b>1. Standard Converter Specifications</b> .....	<b>4</b>
<b>2. Converter Main Circuit Wiring (400V, 600kW example)</b> .....	<b>6</b>
<b>3. Input Wiring</b> .....	<b>7</b>
<b>4. Description of External Terminals</b> .....	<b>8</b>
<b>5. Digital operator (JVOP-132) Description</b> .....	<b>10</b>
5.1 Using the Digital Operator .....	11
5.2 Parameter Setting and Reference (Program Mode) .....	11
<b>6. Notes on PWM Converter Application</b> .....	<b>12</b>
6.1 Total Load .....	12
6.2 Inverter Sequence Wiring .....	12
6.3 Voltage Selection Jumper Settings (Tap Change PCB) .....	12
<b>7. Parameter Lists</b> .....	<b>13</b>
DC5 Parameter List .....	13
Monitor Parameter List (U Parameters) .....	15
Multi-Function I/O Terminal Settings List .....	16
Error Displays and Countermeasures .....	16
OPE Error Details .....	18
CPF Error Details .....	19
Alarm Display Details .....	20

## Safety Notes

### YASKAWA ELECTRIC CORPORATION

#### General Precautions

- Some drawings in this manual are shown with the protective covers and shields removed, in order to illustrate detail with more clarity. Make sure all covers and shields are replaced before operating this product.
- This manual may be modified when necessary to reflect improvements to the product, or changes in specifications. Such modifications are denoted by a revised manual No.
- To order a copy of this manual, contact your YASKAWA representative.
- YASKAWA is not responsible for any modification of the product made by the user. Any modifications will void the warranty.

Be sure prior to installation, running, maintenance, and inspection, to thoroughly read this manual and other affiliated materials, and to use the product properly. Use this product only after familiarizing oneself with all safety information and cautionary items, and having a thorough knowledge of the device.

Safety and cautionary items in this operator's manual are classified by rank as "Warnings" or "Cautions".

#### **WARNING**

Mis-operation may result in a hazardous condition leading to death or serious injury.

#### **CAUTION**

Mis-operation may result in a hazardous condition leading to medium or light injury or physical damage to the device.

In addition, items marked with a "Caution" may lead to serious consequences depending on the situation. Observe both as the content of either one is important.

## Inspection Upon Receipt of this Product

 **CAUTION**

- Do not install or operate a converter which is damaged or has parts missing from it. This may result in injury.

## Installation

 **WARNING**

- Install this unit after verifying that the input power is OFF. Failure to do so may lead to electric shock or fire.
- Wiring should be performed by a skilled electrician. Failure to do so may lead to electric shock or fire.
- Be sure to ground the grounding terminal. Failure to do so may lead to electric shock or fire.

 **CAUTION**

- Check that the rated voltage of the converter matches the AC source voltage. Failure to do so may lead to injury or fire.
- Do not perform a withstand voltage test on the converter. This will lead to damage on the semiconductor elements.
- Connect the input AC reactor, high-frequency filter reactor, and high-frequency filter capacitor exactly as shown in the operator's manual. Failure to do so may lead to fire.
- Check that the total load connected to the converter is within the rated output capacity of the converter. Failure to do so may lead to fire.
- Check that the rated voltage of the converter and the rated voltage of the connected inverter match. Failure to do so may lead to fire.
- Fasten terminal screws securely. Failure to do so may lead to mis-operation, damage to the device, or fire.

## Running

### **WARNING**

- Be sure to turn input power ON only after installing the front cover and terminal cover. Do not remove the cover while power is applied. Removing any cover during operation, or operating device with cover removed, may lead to electric shock.
- Do not operate the digital operator or switches with wet hands. This may lead to electric shock.
- Do not touch the converter terminals while power is being applied to the converter, even while stopped. This may lead to electric shock.

### **CAUTION**

- Do not touch the cooling fin or input AC reactor as they become hot. This may lead to burns.
- Do not perform signal checks during operation. This may damage the unit.
- This converter has been properly set at the factory at time of delivery. Do not carelessly change these settings as it may damage the device.

## Maintenance/Testing

### **WARNING**

- Do not touch the terminals on the converter as they carry a high voltage. This may lead to electric shock.
- Perform maintenance and testing after removing main power and verifying that the CHARGE lamp has gone out. There is danger in that a charge remains in the capacitor. This may lead to electric shock. In any case, use a voltmeter to measure for high voltage prior to performing maintenance.
- Only designated persons should perform maintenance, testing, and parts replacement. When performing maintenance, remove accessories (watches, bracelets, etc.) prior to working. Use insulated tools. Failure to do so may lead to electric shock or injury.
- Do not try to modify the unit. This may lead to electric shock, injury, or damage to the device.

### **CAUTION**

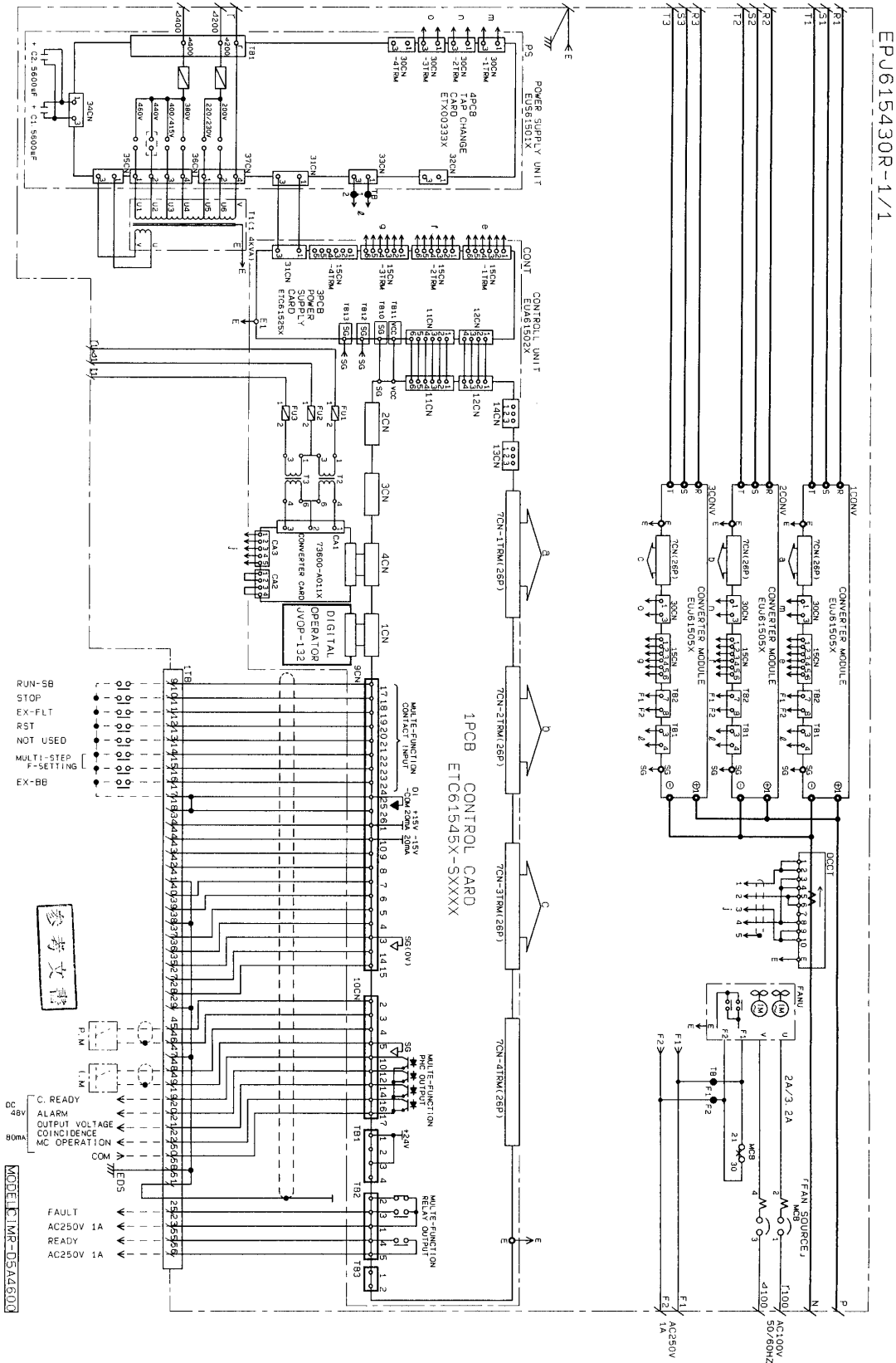
- This converter uses semiconductor elements. Keep this in mind when handling. Damage to the converter may result from static electricity, etc.
- Do not modify the wiring, or install/remove the converter while power is applied. This may result in electric shock, injury, or damage to the device.

## 1. Standard Converter Specifications

Voltage Class		400V Class				600V Class			
Model CIMR-D5A		4200	4400	4600	4800	6300	6600	6900	6000
I/O Ratings	Rated Output kW	250	500	750	1000	330	660	990	1320
	Rated Output Current A	380	760	1140	1520	380	760	1140	1520
	Rated Input Current A	400	800	1200	1600	400	800	1200	1600
	Connected Inverter kVA	300	600	900	1200	400	800	1200	1600
	Rated Output Voltage V	660V DC				860V DC			
Input Power	Voltage/Frequency	AC380~460 50/60Hz				AC500~600 50/60Hz			
	Voltage Tolerance	+10/-15%							
	Frequency Tolerance	±3Hz (phase shift free)							
Control Characteristics	Control Format	Sine-wave PWM type							
	Input Power Factor	0.95 or higher							
	Output Voltage Accuracy	±5%							
	Overload Capacity	1 minute at 150% of rated current							
Run Operation Input		By digital operator or external terminal							
Status Outputs	Fault	1C Contact Output							
	Running	1a Contact Output							
	Alarm, Etc.,	4-point selectable multi-function PHC output							
	Analog Output	1-point selectable input current monitor and multi-function analog output							
Parameter Setting		By digital operator							

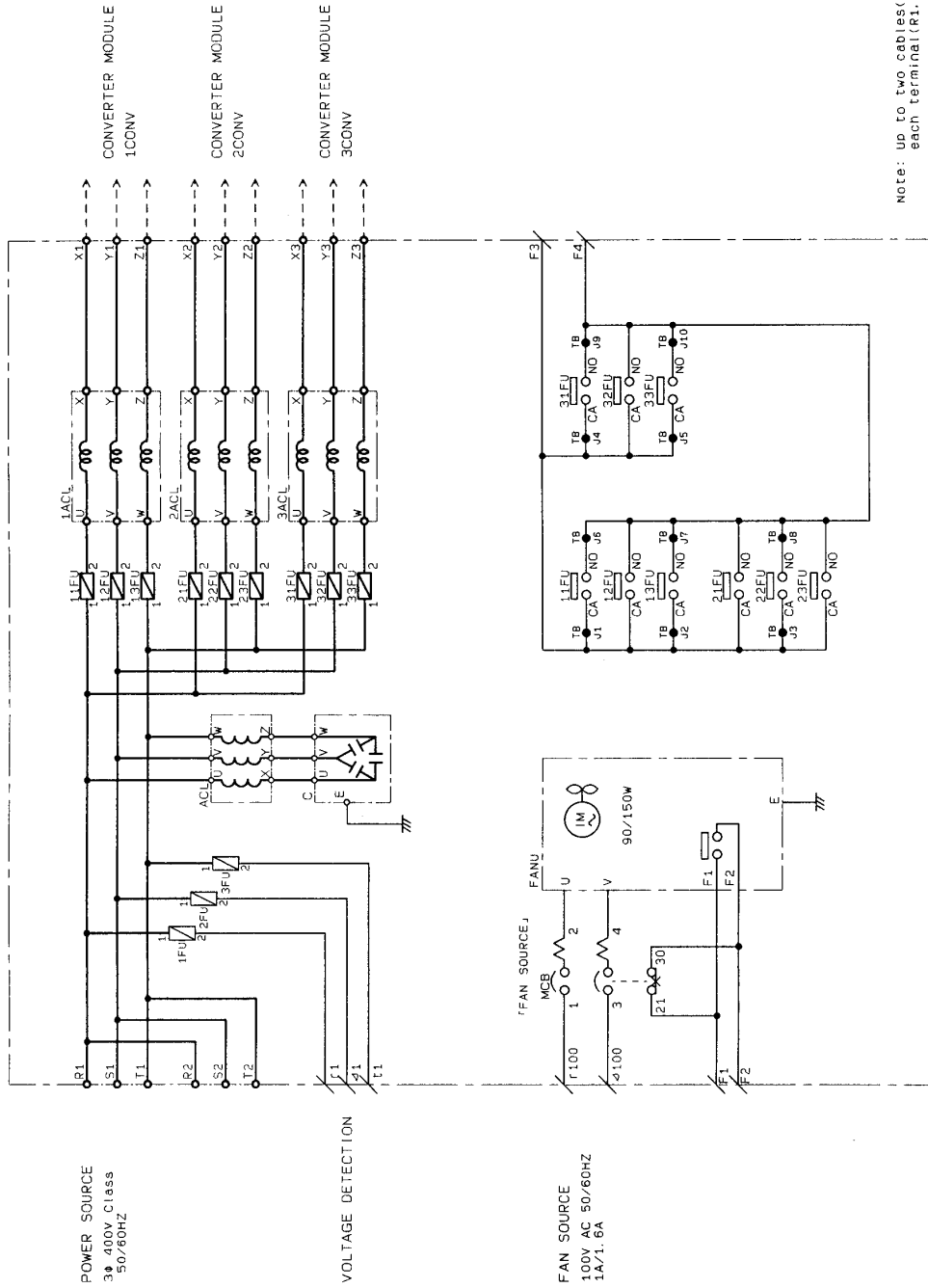
Voltage Class		400V Class				600V Class			
Model CIMR-D5A		4200	4400	4600	4800	6300	6600	6900	6000
Protection Functions	Instantaneous Overcurrent	Stops at approximately 200% converter input current							
	Fusing	Stops upon open fusing							
	Overload	Stops at 1-minute at 150% rated current (power and regenerative)							
	Undervoltage (output)	Stops at approx. DC380V or less				Stops at approx. DC570V or less			
	Undervoltage (input)	Stops at approx. AC300V or less				Stops at approx. AC460V or less			
	Overvoltage	Stops at approx. DC820V or less				Stops at approx. DC1140V or less			
	Cooling fin Overheat	Protected by thermistor							
	Power Phase Loss	Stops at power phase loss detection							
	Ground Fault Detection	Stops at a ground fault current approx. 50% of converter input current							
	Supply Frequency Error	Stops at a fluctuation of $\pm 3$ Hz or more from rated input frequency							
	Charge Display	Displayed until the main output voltage is under approx. 50V							
	Momentary Power Loss	Operation can continue according to the parameter settings for 2sec. or less at momentary power loss							
Environmental Specifications	Usage Location	Indoors (no gas, grime, or dust)							
	Ambient Temperature	-10C~+45C							
	Humidity	90%RH or less (no condensation)							
	Vibration	1G at under 20Hz, up to 0.2G is allowable at 20~50Hz							

## 2. Converter Main Circuit Wiring (400V, 600kW example)





### 3. Input Wiring



Note: Up to two cables(max 325mm/cable) can connect to each terminal(R1, S1, T1, R2, S2, T2).

## 4. Description of External Terminals

Explanation of main circuit terminals

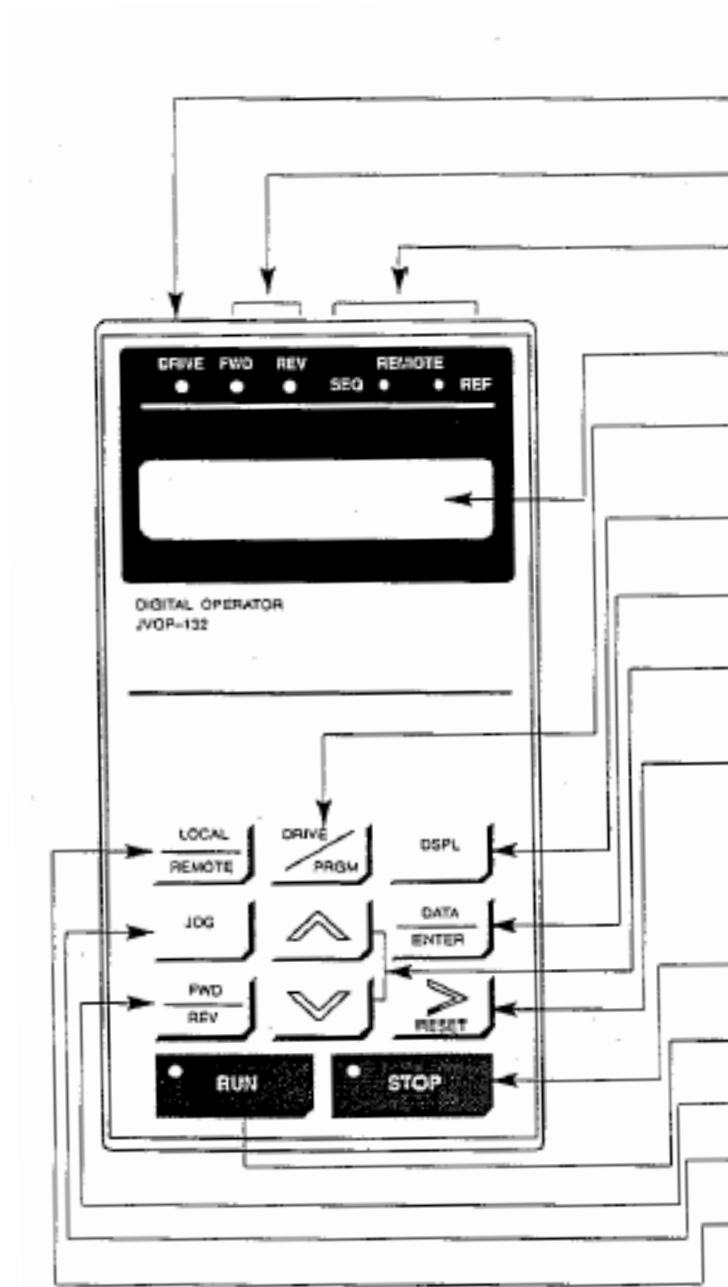
Terminal Sign		Description
Converter Main Circuit Input	(R1, S1, T1) (R2, S2, T2) (R3, S3, T3) (R4, S4, T4)	<ul style="list-style-type: none"> <li>Main AC power input terminals for converter</li> </ul> <p>The number of terminals increases in proportion to the number of parallel converter modules. Each main power terminal (R1, S1, T1) (R2, S2, T2) (R3, S3, T3) must be connected to a dedicated input reactor.</p>
Converter Main Circuit Output	P, N	<ul style="list-style-type: none"> <li>Main DC voltage output terminals for converter</li> </ul> <p>These are the terminals supplying the DC load voltage to the inverter unit.</p>
Supply Voltage Detection	r1, s1, t1	<p>Detects the supply voltage phasing and level.</p> <p>This must be connected to the power source applied to the primary of the input reactors so that the phasing is the same as the power source. (i.e. So that r1 corresponds with R1, s1 corresponds with S1, and t1 corresponds with T1.)</p>
Control Power Input	r, s200, s400	<p>This is the terminal providing power for the converter control power, cooling fan, and soft charge circuit (MC).</p> <p>Connect between r, s200 for 200V-class single-phase power, and between r, s400 for 400V-class single-phase power. It may also be necessary to set the transformer tap of the internal power supply unit on the converter according to the supplied voltage.</p>
Converter Enclosure Cooling Fan Power	r100, s100	<p>These are the input power terminals for the ceiling cooling fan on the converter enclosure. Requires 100VAC. Current capacity differs with the type and number of fans used.</p>
Converter Cooling fin Error Contact Output	F1, F2	<p>This is the error contact output for the ceiling cooling fin on the converter enclosure. Contact capacity is 250V at 1 Amp.</p>

## Description of Control Circuit Terminals

Terminals (Note)			Signal Name	Description of Function	Signal Level
Interface Terminal No.	Name	C Card Pin No.			
	9CN Sequence Input	17	RUN-SB	Converter operation starts when "closed" <ul style="list-style-type: none"> <li>This is a one-shot trigger input. Once input the converter will continue to run even if "open".</li> <li>When starting converter run, terminal number 18 must be "closed".</li> </ul>	24V DC 8mA photocoupler insulation
		18	STOP	STOP command input normally closed to run. Converter stops when "open"	
		19~24	Multi-function Contact Input Terminal	The factory settings are "unused". Functions such as fault reset, external base block, and external faults can be set.	
		25	Sequence Common		
	10CN Photo- coupler Output	10, 12, 14, 16	Multi-Function Open Collector Output	The factory settings are "unused". Functions for "alarm output", etc. can be set.	48V DC 80mA or less
		17	Photocoupler Output Common		
	TB2 Relay Output	2, 3	FAULT Output (Form C Contact)	Output upon error detection. Terminal 2: "Open" at error detection Terminal 3: "Closed" at error detection	250V AC 1A or less 30V DC 1A or less
		1	FAULT Output Common		
		4	Multi-Function Contact Output	The factory settings are "unused". Functions for "alarm output", etc. can be set.	
		5	Multi-Function Contact Output Common		

(Note) The terminal number indicated is the terminal number of the control card. See the elementary diagram for the appropriate terminal on the terminal block ITB for wiring purposes.

## 5. Digital operator (JVOP-132) Description



**Mode Display LEDs**  
(All LEDs will flash when an error occurs in drive mode)

**Drive Mode Display**  
Flashes upon drive mode selection. Off in program mode selection

**Direction Display**  
FWD: Unused  
REV: Unused

**Remote Mode**  
Control by control circuit terminals and option card mode.  
SEQ: Flashes when the run command is by remote mode selection  
REF: Unused

**Display**  
Displays the monitor values for output voltage, output current, etc., as well as settings for the various functions. (5 digit)

**Mode Selection Key**  
Switches between drive mode and program mode (enabled during operation). The drive mode display light will flash while in drive mode.

**Display Selection Key**  
Selects the display type. (procedure is shown on the following page)

**Read/Write Key**  
Displays the setting for each parameter. After setting, write the setting by pressing this key again.

**Number Change Keys**  
These change the numerical values of settings, parameters, etc.  
A: Increment Key  
V: Decrement Key

**Digit Selection Key**  
This selects the digit of a setting value to be changed. The selected digit will flash  
(This becomes the Reset key in an error display)

**Run Command Key**  
Run command key when operating with the digital operator. It is enabled only in the drive mode.

• STOP : Stop Command  
The red lamp on the right will light when STOP is pressed.

• RUN : Run Command  
The red lamp on the left will light when RUN is

FWD/REV: Unused

JOG: Unused

**Run Mode Selection Key**  
This switches the run mode between REMOTE and LOCAL (digital operator).

### 5.1 Using the Digital Operator

(Operation example)

Displaying the output voltage feedback (U1-02) in the output voltage reference display.

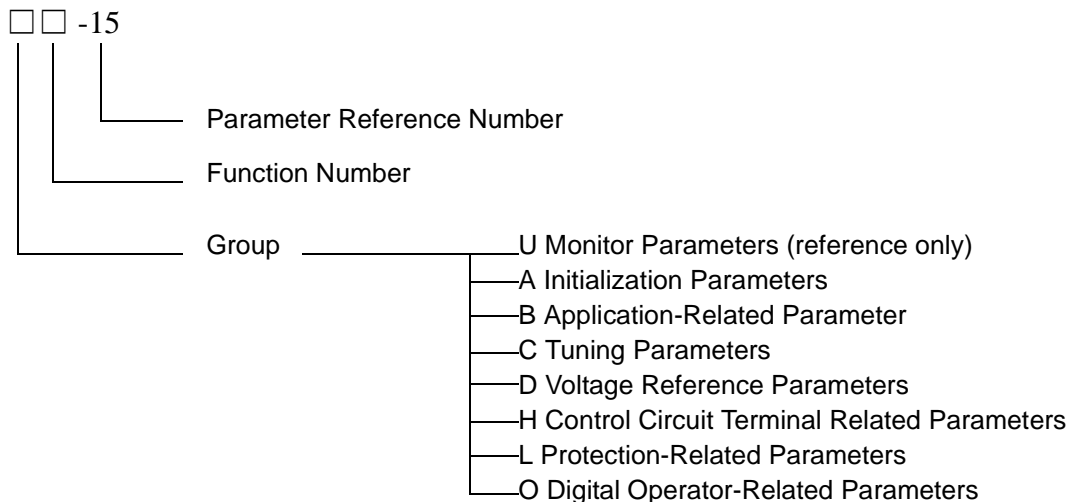
#### Monitor Display Operation Example

Procedure	Key Operation	Digital Operator Display	Notes
Output voltage reference display upon power UP			
Display U parameters			The previously selected U parameter is displayed
Select U1-02			
Perform monitor display			
Return to U1-02 display			
Return to output voltage display			

### 5.2 Parameter Setting and Reference (Program Mode)

A VS656DC5 parameter consists of the group, function, and parameter reference number. Select the group, function, and parameter number with the keys, and select them with the Data/Enter key. See Chapter 7. "Parameter Lists" for details on the parameter.

Parameter No.



## 6. Notes on PWM Converter Application

### 6.1 Total Load

The total load should be within the rated output of the converter.

$$P_{\text{out}} \text{ (kW)} \geq \underbrace{\frac{1}{\eta_{\text{INV}} \times \eta_{\text{M}}}}_{\text{Power}} (P_{\text{MI}} + \dots + P_{\text{MN}}) - \underbrace{\eta_{\text{INV}} \times \eta_{\text{M}}}_{\text{Regen}} (P_{\text{MI}'} + \dots + P_{\text{MN}'})$$

$P_{\text{OUT}}$	: Converter Rated Output (kW)
$P_{\text{MI}} \sim P_{\text{MN}'}$	: Motor Output (kW)
$\eta_{\text{M}}$	: Motor Efficiency 0.9 (Typical)
$\eta_{\text{INV}}$	: Inverter Efficiency 0.95 (Typical)

### 6.2 Inverter Sequence Wiring

An interlock is necessary between the VS-656DC5 and the inverter to stop the inverter using a VS-656DC5 fault signal. It is also necessary to ensure the restart timing when restarting the inverter after a momentary power loss.

Ensure the timing using the “Running” (set value = 00) signal output from the control terminal of the VS-656DC5. When the “Running” signal is “Open”, use the inverter external base block input, etc. as the inverter output termination signal.

#### [Interlock Examples]

#### (1) When not Restarting After Momentary Power Loss (Coast to stop after momentary power loss)

Insert the converter “MC Running” output into the inverter “External Error” input. Assume the inverter “External Error” input to be the b contact input, and select “Accept external errors only while running” to prevent external error operation while power is ON.

#### (2) When Restarting as a System After Momentary Power Loss

Insert the converter “MC Running” output into the inverter “External BB” input. Select “momentary power loss ride through” on the inverter side, and select either free-run lead-in mode or speed search mode. Select the b contact input for the inverter “External BB” input.

### 6.3 Voltage Selection Jumper Settings (Tap Change PCB)

The power voltage selection jumper must be selected according to the main supply voltage level. Insert the connector at the position corresponding to the supply voltage used. The jumper is located on the tap change PCB (ETX00333X).

## 7. Parameter Lists

### DC5 Parameter List

Parameter No.	Name	Initial Value	Setting Range	Change on the Fly?	Access Level	Notes
A1-01	Access Level	2	0~9999	Y	Q	0: Monitor-dedicated 2: Quick-Start (Q) 3: Basic (B) 4: Advanced (A)
A1-02	Initialization	0000	0000~9999	N	Q	2220: Parameter initialization
A1-03	Password 1 (For Input)	0	0000~9999	N	Q	
B1-01	Voltage Reference Selection	0	0	N	Q	0: Digital Operator
B1-02	Run Command Selection	1	0/1	N	Q	0: Digital Operator 1: Control Circuit Terminal
B1-06	Sequence Input Double Read Selection	1	0/1	N	A	0: 1msec double read 1: 5msec double read
C1-01	Accel Time	10.0	0.0~6000.0sec	Y	Q	
C1-02	Decel Time	10.0	0.0~6000.0sec	Y	Q	
C5-01	AVR Proportional (P) Gain	10.00	1.00~300.00	Y	B	
C5-02	AVR Integral (I) Time	0.500	0.000~10.000sec	Y	B	
C5-06	AVR Primary Delay Time	0.000	0.000~0.500sec	N	B	
D1-01	Voltage Reference	See Notes	600V~680V (400V-class) 750V~900V (600V-class)	Y	Q	660 (400V-class) 860 (600V-class)
F1-10	Input Frequency Deviation Detection Level	3.0	0.0~10.0Hz	N	A	
F1-11	Input Frequency Deviation Detection Delay Time	70	0~255msec	N	A	
H1-01	9CN-19 Terminal Selection (Multi-function input)	0F	00~FF	N		0F: Unused
H1-02	9CN-20 Terminal Selection (Multi-function input)	0F	00~FF	N		0F: Unused
H1-03	9CN-21 Terminal Selection (Multi-function input)	0F	00~FF	N		0F: Unused
H1-04	9CN-22 Terminal Selection (Multi-function input)	0F	00~FF	N		0F: Unused
H1-05	9CN-23 Terminal Selection (Multi-function input)	0F	00~FF	N		0F: Unused
H1-06	9CN-24 Terminal Selection (Multi-function input)	0F	00~FF	N		0F: Unused
H2-01	TB2-4, 5 Terminal Selection (Multi-function input)	0F	00~FF	N		0F: Unused
H2-02	10CN-10 Terminal Selection (Multi-function input)	0F	00~FF	N		0F: Unused
H2-03	10CN-12 Terminal Selection (Multi-function input)	0F	00~FF	N		0F: Unused
H2-03	10CN-14 Terminal Selection (Multi-function input)	0F	00~FF	N		0F: Unused
H2-03	10CN-16 Terminal Selection (Multi-function input)	0F	00~FF	N		0F: Unused
H2-03	TB2-1, 2, 3 Terminal Selection (Multi-function input)	0E	00~FF	N		0E: Error
L1-02	Output OL (OL2) Operation Time	60.0	1.0~120.0sec	N	B	

**DC5 Parameter List (Continued)**

Parameter No.	Name	Initial Value	Setting Range	Change on the Fly?	Access Level	Notes
L1-03	Output OL (OL2) Detection Start Current	110	50~200%	N	B	
L1-04	Operation Selection At Output OL (OL2) Operation	1	0/1	N	B	0: Continue Running 1: BB Stop
L2-01	Operation Selection At Momentary Power Loss	0	0/1	N	B	0: None 1: Momentary Power Loss Ride Through
L2-02	Momentary Power Loss Ride Through Time	1.0	0.0~2.0sec	N	B	
L2-05	Undervoltage Detection Level	380	300~420V	Y	A	Setting 1.5x at 600V
L3-02	Input OL (OL1) Operation Time	60.0	1.0~120.0s	N	-	
L3-03	Input OL (OL1) Detection Starting Current	110	50~200%	N	-	
L3-04	Input OL (OL1) Operation Selection	1	0/1	N	B	0: Continue Running 1: BB Stop
L5-01	No. Of Fault Retries	0	0~10	N	B	
L5-02	Contact Operation Selection During Fault Retry	0	0/1	N	B	0: Error output contact not operating during retry 1: Error output contact operating during retry
L7-01	Drive Side Torque Limit	150	0~300%	N	B	
L7-02	Regenerative Side Torque Limit	150	0~300%	N	B	
L8-02	Converter OH Pre-alarm Level	95	50~110deg	N	A	
L8-03	Operation Selection After Converter OH Pre-alarm	3	1, 3	N	A	0: Continue Running 1: BB Stop
O1-01	Monitor Mode Display Item Selection	8	4~50	Y	B	
O1-02	Monitor Item Selection at Power ON	1	1~4	Y	B	1: Output Voltage Reference (U1-01) 2: Output Voltage Feedback (U1-02) 3: Output Current (U1-03) 4: Monitor selected in O1-01
O2-01	LOCAL/REMOTE Key Selection	1	0/1	N	B	0: Disable REMOTE/LOCAL key 1: Enable REMOTE/LOCAL key
O2-02	Stop Key Enable Selection During REMOTE Operation	0	0/1	N	B	0: Enabled when there is a RUN command from the digital operator 1: Always enabled
O2-04	kVA Selection	*	00~FF	N	B	81: 400V 200kW 91: 600V 300kW 82: 400V 400kW 92: 600V 600kW 83: 400V 600kW 93: 600V 900kW 84: 400V 800kW 94: 600V 1200kW
O2-06	Digital Operator Disconnection Detection Disabled/Enabled Selection	0	0/1	N	A	0: Continue running even when digital operator is disconnected 1: Inverter error when digital operator is disconnected
O2-07	Elapsed Time Set	-	0~65535H	N	A	
O2-08	Elapsed Time Selection	0	0/1	N	A	0: Power feed time is cumulative running time 1: Running time is cumulative running time

(Note) These parameters normally need not be changed.



**Monitor Parameter List (U Parameters)**

Parameter No.	Name	Unit	Access Level	Notes
U1-01	Output Voltage Reference (pre-SFS)	1V	Q	
U1-02	Output Voltage Feedback	1V	Q	
U1-03	Output Current	1A	Q	
U1-04	Input Voltage	1V	Q	
U1-05	Input Current	1A	Q	
U1-06	Output Power	1kW	Q	
U1-07	Input Power	1kW	Q	
U1-08	Input Frequency	0.01Hz	Q	
U1-10	Input Terminal Status	-	Q	
U1-11	Output Terminal Status	-	Q	
U1-12	Run Status	-	Q	
U1-13	Elapsed Time	1H	Q	
U1-14	Prom Signal (FLASH Side)	-	Q	
U1-18	Active current reference (Iq)	0.1%	B	
U1-19	Reactive current reference (Id)	0.1%	B	
U1-20	Output Voltage Reference (post-SFS)	1V	A	
U1-21	AVR Input (Voltage Deviation)	1V	A	
U1-22	AVR Output	0.01%	A	
U1-26	Output Voltage Reference (Vq)	1V	A	
U1-27	Output Voltage Reference (Vd)	1V	A	
U1-28	CPURUM ID (CPU ROM side)	-	A	
U1-29	Led Check (diagnostic)	-	A	
U1-48	ACRq Output	0.1%	A	
U1-49	ACRd Output	0.1%	A	
U2-01	Current Fault	-	Q	
U2-02	Past Faults	-	Q	
U2-03	Fault At U1-01	1V	Q	
U2-04	Fault At U1-02	1V	Q	
U2-05	Fault At U1-03	1A	Q	
U2-06	Fault At U1-04	-	Q	
U2-07	Fault At U1-05	1A	Q	
U2-08	Fault At U1-06	1kW	Q	
U2-09	Fault At U1-07	1kW	Q	
U2-10	Fault At U1-08	0.01Hz	Q	
U2-12	Fault At U1-10	-	Q	
U2-13	Fault At U1-11	-	Q	
U2-14	Fault At U1-12	-	Q	
U2-15	Fault At U1-13	1H	A	
U2-17	Fault At U1-18	0.1%	Q	
U2-18	Fault At U1-19	0.1%	Q	
U2-19	Fault At U1-20	1V	Q	
U2-20	Fault At U1-21	1V	A	
U2-21	Fault At U1-26	1V	A	
U2-22	Fault At U1-27	1V	A	
U3-01	Last Fault	-	Q	

**Monitor Parameter List (U Parameters) (Continued)**

Parameter No.	Name	Unit	Access Level	Notes
U3-02	Fault Message 2	-	Q	
U3-03	Fault Message 3	-	Q	
U3-04	Fault Message 4	-	Q	
U3-05	Last Elapsed Time	1H	Q	
U3-06	Elapsed Time 2	1H	Q	
U3-07	Elapsed Time 3	1H	Q	
U3-08	Elapsed Time 4	1H	Q	

**Multi-Function I/O Terminal Settings List**

Setting	Multi-Function Input Terminal Function (H1-01, 02, 03, 04, 05, 06)	Notes
08	External base block (N.C)	
09	External base block (N.O)	
0F	Not used	
14	Fault reset	
15	Emergency stop	
20	External fault	
21-2F		

Setting	Multi-Function Output Terminal Function (H1-01, 02, 03, 04, 05, 06)	Notes
00	During run	
01	Inverter ready	
06	Converter ready	
07	Undervoltage detected	
08	Base block	
0E	Fault	
0F	Not used	
11	Fault reset	
0A	MC ON	
1D	Drive/Regen	
1F	OL1 pre-alarm	

**Error Displays and Countermeasures**

Error Display	Error Display Content	Description	Countermeasures
PUF	Blown Fuse	Main transistor is damaged. AC, DC circuit fuse is broken	Check for a damaged transistor, short on the input or output side, ground fault, etc.

**Error Displays and Countermeasures (Continued)**

Error Display	Error Display Content	Description	Countermeasures
UV1	Main Circuit Undervoltage	While running, the main circuit voltage fell beneath the PUV detection level and exceeded the momentary power loss ride-through time. Detection level 400V Class: Approx. 380V DC or less 600V Class: Approx. 570V DC or less	<ul style="list-style-type: none"> <li>• Check the wiring on power side devices</li> <li>• Fix the source voltage</li> </ul>
UV2	Control Circuit Undervoltage	An undervoltage has occurred in the control circuit	
UV3	MC Answer Fault	The in rush current suppressing contactor opened during operation.	
AUv	Supply Under-voltage	While running, an undervoltage occurred on the power supply side. Detection level 400V Class: Approx 300V AC or less 600V: Approx. 400V AC or less	
FdEv	Power Frequency Error	The power frequency has exceeded the tolerance (F1-10)	
SrC	Input Phasing Error	The phase cycle direction on the input side changed after control power input.	
OC	Overcurrent	The Converter input current exceeded the OC level.	<ul style="list-style-type: none"> <li>• Output short</li> <li>• Decrease power</li> </ul>
OV	Overvoltage	The main circuit DC voltage exceeded the OV level Detection level 400V Class: Approx 800V DC or higher 600V: Approx 1040V DC or higher	Excessive regen load
OH	Cooling Fin Overheat	The cooling fin temperature has exceeded the value in L8-02.	<ul style="list-style-type: none"> <li>• Check fin, ambient temperature</li> <li>• Check the filter, fin</li> </ul>
OH1	Cooling Fin Overheat	The cooling fin temperature has exceeded the tolerance.	
OL	Converter Input Overload	The input overload level has been exceeded.	Decrease load

**Error Displays and Countermeasures (Continued)**

Error Display	Error Display Content	Description	Countermeasures	
EF3	Control Circuit Terminal 3 External Fault	External error input from control circuit terminal 3.	Check input terminal	
EF4	Control Circuit Terminal 4 External Fault	External error input from control circuit terminal 4.		
EF5	Control Circuit Terminal 5 External Fault	External error input from control circuit terminal 5.		
EF6	Control Circuit Terminal 6 External Fault	External error input from control circuit terminal 6.		
EF7	Control Circuit Terminal 7 External Fault	External error input from control circuit terminal 7.		
EF8	Control Circuit Terminal 8 External Fault	External error input from control circuit terminal 8.		
OPR	Operator Connection Fault	The run command comes from the operator, but the operator is not connected.		Check the cable and connectors
ERR	EEPROM Write Error	Cannot write to EEPROM		Replace control card.
UNBC	Current Imbalance	An unbalanced current has flowed between the modules	<ul style="list-style-type: none"> <li>Check the wiring on the power source device.</li> </ul>	

**OPE Error Details**

OPE Number	Display Content	Description	Countermeasures
OPE01	kVA Selection Error	Improper/Unused capacity selected Detection level 600V class selected for 400V class 400V class selected for 600V class	Check parameters
OPE02	Upper/Lower Limit Error	Parameter setting outside of allowable range. Setting exceeds upper limit or is below lower limit.	
OPE03	Multi-function Contact Input Selection Error	Duplicate settings for parameters H1-01~H1-06. Same setting outside of 0F, FF, 20~2F.	

## CPF Error Details

Error Display	Error Display Content	Description	Countermeasures
CPF00	Control Circuit Error 1 (Operator Transmission Error)	<ul style="list-style-type: none"> <li>Communication between the controller and operator not established even though 5 sec. have passed since power ON.</li> <li>MPU peripheral element check error</li> </ul>	<ul style="list-style-type: none"> <li>Re-connect operator and connector</li> <li>Check wiring on control circuit power source</li> <li>Replace controller card</li> </ul>
CPF01	Control Circuit Error 2 (Operator Transmission Error)	<ul style="list-style-type: none"> <li>After communication has been established between the controller and the operator after power ON, a 2 sec. + transmission error occurred.</li> <li>MPU peripheral element check error</li> </ul>	<ul style="list-style-type: none"> <li>Re-connect operator and connector</li> <li>Check wiring on control circuit power source</li> <li>Replace controller card</li> </ul>
CPF02	Base Block Circuit Fault	Converter Controller Fault	Replace control card
CPF03	EEPROM Fault		
CPF04	CPU-Internal A/D Converter Fault		
CPF05	CPU-External A/D Converter Fault		
CPF06	Option Connection Error	Option card improperly connected.	Re-insert option card.
CPF07	PWM Timer Error	Converter Controller Fault	Replace control card
CPF08	DPRAM BCC Check Error		
CPF09	DPRAM Interconnection Diagnostic Error		
CPF10	DPRAM Write Error		
CPF22	Option Device Code Error	Incompatible option is connected.	Check the connected options.
CPF24	Converter Card Error	Converter card A/D conversion error.	Replace converter card.

## Alarm Display Details

Alarms do not operate the error contact outputs, and will automatically return to the original run state when their cause has been removed. Alarms flash when displayed.

Alarm Display	Alarm Display Content	Description	Countermeasures
UV	Undervoltage Detected	The main DC voltage was less than L2-05 (undervoltage detection level) while stopped or during momentary power loss.	–
OV	OV While Stopped	The main circuit DC voltage has exceeded the OV level.	Excessive regen load
OL	Converter Input Overload	Input load capacity level has been exceeded.	Reduce load
OH	Cooling Fin Overheat	Cooling fin temperature has exceeded L8-02	<ul style="list-style-type: none"> <li>• Check fin, ambient temperature</li> <li>• Check filter, fin</li> </ul>
EF3	Control Circuit Terminal 3 External Error	An external error (minor fault selection) was input from control circuit terminal 3.	Check input terminal.
EF4	Control Circuit Terminal 4 External Error	An external error (minor fault selection) was input from control circuit terminal 4.	
EF5	Control Circuit Terminal 5 External Error	An external error (minor fault selection) was input from control circuit terminal 5.	
EF6	Control Circuit Terminal 6 External Error	An external error (minor fault selection) was input from control circuit terminal 6.	
EF7	Control Circuit Terminal 7 External Error	An external error (minor fault selection) was input from control circuit terminal 7.	
EF8	Control Circuit Terminal 8 External Error	An external error (minor fault selection) was input from control circuit terminal 8.	



**YASKAWA ELECTRIC AMERICA, INC.**

**Chicago-Corporate Headquarters** 2121 Norman Drive South, Waukegan, IL 60085, U.S.A.  
Phone: (847) 887-7000 Fax: (847) 887-7310 Internet: <http://www.yaskawa.com>

**MOTOMAN INC.**

805 Liberty Lane, West Carrollton, OH 45449, U.S.A.  
Phone: (937) 847-6200 Fax: (937) 847-6277

**YASKAWA ELECTRIC CORPORATION**

New Pier Takeshiba South Tower, 1-16-1, Kaigan, Minatoku, Tokyo, 105-0022, Japan  
Phone: 81-3-5402-4511 Fax: 81-3-5402-4580 Internet: <http://www.yaskawa.co.jp>

**YASKAWA ELETRICO DO BRASIL COMERCIO LTDA.**

Avenida Fagundes Filho, 620 Bairro Saude Sao Paulo-SP, Brasil CEP: 04304-000  
Phone: 55-11-5071-2552 Fax: 55-11-5581-8795 E-mail: [yaskawabrasil@originet.com.br](mailto:yaskawabrasil@originet.com.br)

**YASKAWA ELECTRIC EUROPE GmbH**

Am Kronberger Hang 2, 65824 Schwalbach, Germany  
Phone: 49-6196-569-300 Fax: 49-6196-888-301

**MOTOMAN ROBOTICS AB**

Box 504 S38525, Torsas, Sweden  
Phone: 46-486-48800 Fax: 46-486-41410

**MOTOMAN ROBOTEC GmbH**

Kammerfeldstraße 1, 85391 Allershausen, Germany  
Phone: 49-8166-900 Fax: 49-8166-9039

**YASKAWA ELECTRIC UK LTD.**

1 Hunt Hill Orchardton Woods Cumbernauld, G68 9LF, Scotland, United Kingdom  
Phone: 44-12-3673-5000 Fax: 44-12-3645-8182

**YASKAWA ELECTRIC KOREA CORPORATION**

Paik Nam Bldg. 901 188-3, 1-Ga Euljiro, Joong-Gu, Seoul, Korea  
Phone: 82-2-776-7844 Fax: 82-2-753-2639

**YASKAWA ELECTRIC (SINGAPORE) PTE. LTD.**

**Head Office:** 151 Lorong Chuan, #04-01, New Tech Park Singapore 556741, SINGAPORE  
Phone: 65-282-3003 Fax: 65-289-3003

**TAIPEI OFFICE (AND YATEC ENGINEERING CORPORATION)**

10F 146 Sung Chiang Road, Taipei, Taiwan  
Phone: 886-2-2563-0010 Fax: 886-2-2567-4677

**YASKAWA JASON (HK) COMPANY LIMITED**

Rm. 2909-10, Hong Kong Plaza, 186-191 Connaught Road West, Hong Kong  
Phone: 852-2803-2385 Fax: 852-2547-5773

**BEIJING OFFICE**

Room No. 301 Office Building of Beijing International Club,  
21 Jianguomanwai Avenue, Beijing 100020, China  
Phone: 86-10-6532-1850 Fax: 86-10-6532-1851

**SHANGHAI OFFICE**

27 Hui He Road Shanghai 200437 China  
Phone: 86-21-6553-6600 Fax: 86-21-6531-4242

**SHANGHAI YASKAWA-TONJIM & E CO., LTD.**

27 Hui He Road Shanghai 200437 China  
Phone: 86-21-6533-2828 Fax: 86-21-6553-6677

**BEIJING YASKAWA BEIKE AUTOMATION ENGINEERING CO., LTD.**

30 Xue Yuan Road, Haidian, Beijing 100083 China  
Phone: 86-10-6232-9943 Fax: 86-10-6234-5002

**SHOUGANG MOTOMAN ROBOT CO., LTD.**

7, Yongchang-North Street, Beijing Economic & Technological Development Area,  
Beijing 100076 China

Phone: 86-10-6788-0551 Fax: 86-10-6788-2878