AC SERVO DRIVER

VC-D

Instruction Manual

Ver. 2.2

Nikki Denso Co., Ltd

Manual No. TIE-12860L

Preface

Thank you for adopting our AC servo driver <VC-D series>.

【Check items】

1. Receiving check of our products
   Please check the following points when you receive our products.

   (1) If the products are exactly the ones you ordered. (Type, Rated output, Accessories, etc.)
   (2) If baggage are not damaged during transporting. (Package damage, Abnormal out look)
   (3) If accessories are packed together with the main products.
   ※ If packages as carton boxes are broken, please do not unpack them and inform our sales man. And if above points are unclear or damage, etc. is found, please immediately contact our sales man.

2. Precautions before installations (in handling)

   ※ When transporting a driver and a motor, please handle with care so as not to damage them.

   ※ Cautions
   Be careful not only to pile drivers but also putting anything on the driver cover.
   Be careful not to add shock to a motor shaft which may damage an encoder on the motor shaft.
   Do not move a motor with having a motor cable which may cut the cable.

3. Cautions of storage

   If our products are not used immediately after receiving, store them under the following conditions in order to prevent deterioration of insulation and rust formation. However, unpack the packages, soon after receiving and check any damage and other non-conformances incurred during transportation.

Item		Description
Ambient Condition	Temp.	-20°C～+60°C
	Humidity	85% or less (non-condensing)
	Storage Location	Store in a clean place free from dust and dirt. Do not store in harmful atmosphere such as corrosive gas, grinding powder, metal powder, oil, etc..
Vibration		Store in a place free from vibration.
Others		If storage period is planned for long time, please make rust prevention to screws of terminal blocks and then inspect them periodically. Rust prevention effective period is within 3 months after the shipment from our factory under the above described environmental conditions. If storage period is planned for long time, please make rust prevention to a motor shaft and flange face and then inspect them periodically.

Storage conditions of a controller and a motor

4. Precaution of transportation

If you transport our product after receiving, please satisfy following conditions.

Item		Description
Ambient condition	Temp.	-20°C～+60°C
	Humidity	85%or less (non-condensing)
	Storage Location	Do not transport in a harmful atmosphere such as corrosive gas, grinding powder, metal powder, oil, etc..
Vibration		0.5G or less (Driver, motor)

Transporting conditions of a driver and a motor

⚠ Caution
● Depending on humidity condition, specially, life of the front LCD module and an optional unit SDI device varies, largely. We recommend transportation in the humidity 65%RH or less. If the humidity is supposed more than above value, please consult our sales man.

【Notice of this manual】

This manual explains installation, wiring, operation, maintenance, trouble diagnosis, trouble shooting, etc. of AC servo driver VC-D types and AC servomotors.
In order to use these units properly, please deeply understand the contents of this manual.
At the time of installation, wiring, operation, maintenance, etc, please comply with the conditions and procedures of this manual.
If special version unit is applied, please use both of this manual and materials of the special version specification. If same name description and items exist in both materials, description in the special version materials is prior to it in this manual.

- This manual describes Software version 1.40 or newer of AC servo driver VC-D type.
- In case of using a linear motor, replace the description (torque) with (thrust).
- If your machine can not conduct automatic magnetic pole sensing (motor fluctuating motion) due to work interaction, etc. by the Linear/ Disc motor when power is turned ON, please use a magnetic pole sensor.

【Warranty period】

Warranty period of our products is 1 year after shipment from our factory.
However, please note that any failure or abnormality resulting from the following causes is not covered by the warranty.
① Modification by parties other than NIKKI DENSO.
② None standard operation different from the description in our manuals.
③ Natural disaster or act of gods.
④ Connection with an other maker's unit which is not approved by us.
Regardless to the warranty period, please inform our sales man whenever you find any failure or abnormality.

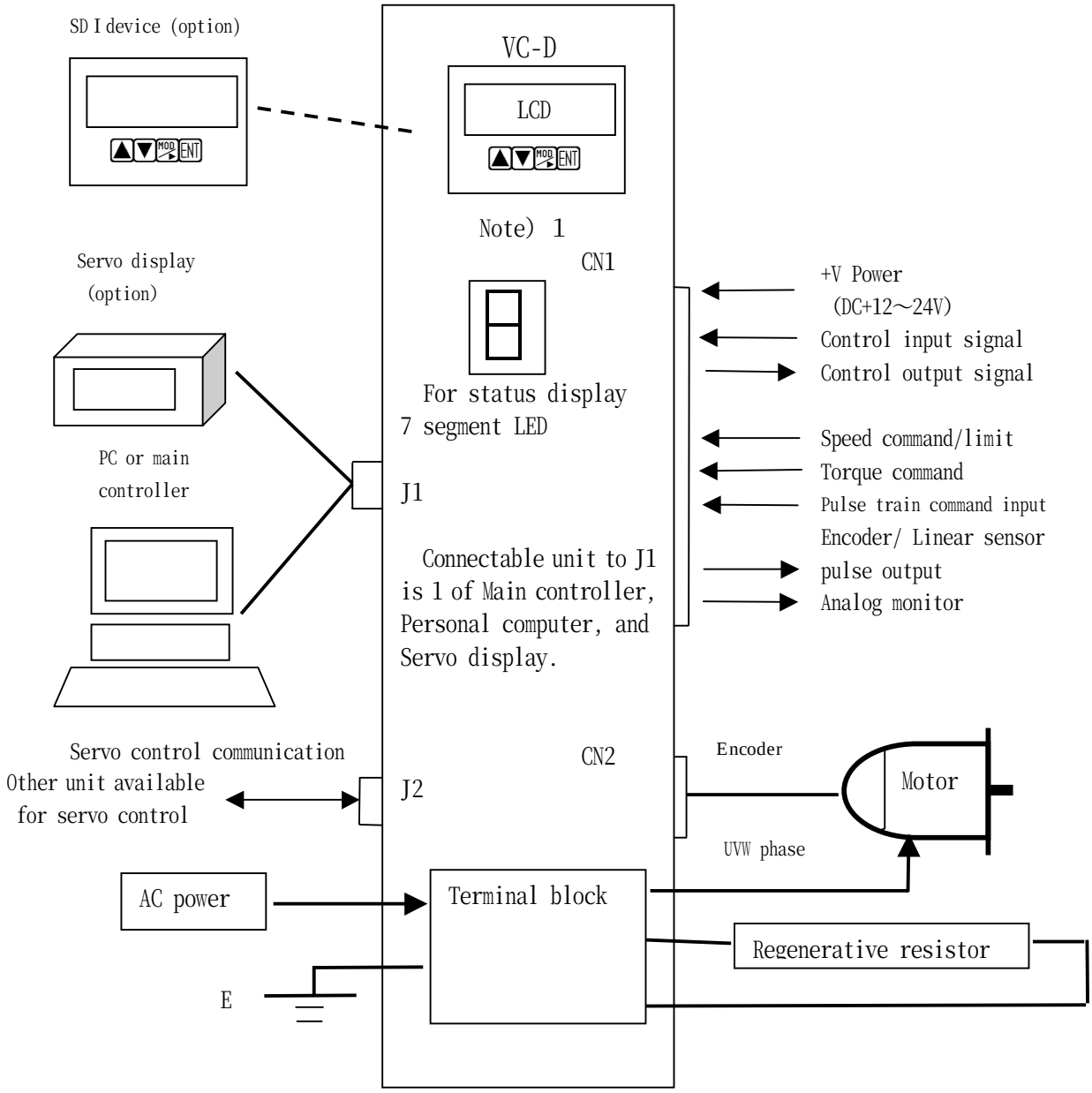
※ NIKKI DENSO retains the right to revise this publication on matter how it is altered. Although the information from NIKKI DENSO is reliable, NIKKI DENSO will not assume responsibility whatever results may arise from the use of this information unless specially guaranteed by NIKKI DENDO.

Chapter 1 Outline

1－1 Basic Configuration

VC-D (Hereafter, this unit or controller is used.) is a unit for Speed control, Torque control and Pulse train control of AC servomotor, Linear motor and Disc motor.

Basic configuration for AC servomotor control by this unit is shown in [Figure 1-1].
VC-D body, a motor, speed/ position detecting encoder/ linear sensors on a motor unloaded shaft, optional encoder/ linear sensor cables, etc. compose a basic system.



[Fig. 1－1] System Basic Configuration

Note1) LCD is a standard device of an unit which capacity is 1.5kW or larger.

Description of each section

(1) VC-D body

This unit conducts Speed control, Torque control and Pulse train control of AC servomotor, Linear motor and Disc motor.

Control mode can be changed by a control signal.

And one unit can be selected and applied to several kinds of AC servomotors and encoders by a parameter.

(2) LCD module

This sets display of VC-D body and I/O signal status, and parameters by the cursor key.

This module is installed on a 1.5kW or larger unit as standard.

(3) SDI device (option)

This sets display of VC-D body and I/O signal status, and parameters of a 1.5kW or smaller unit.

(4) Servo display (option) or main controller (personal computer, etc.)

By a software developed by customer side or us,

- Data display of status data (speed, deviation, etc .) can be made.
- Control signal of VC-D body can be controlled.
- Setting and backing up of parameters, etc. can be c onducted.

Since some computers on the market can not be interfaced, please consult us when you plan the adoption.

(5) Motor

As standard use, our AC servomotor will be connected.

(6) Servo control Communication

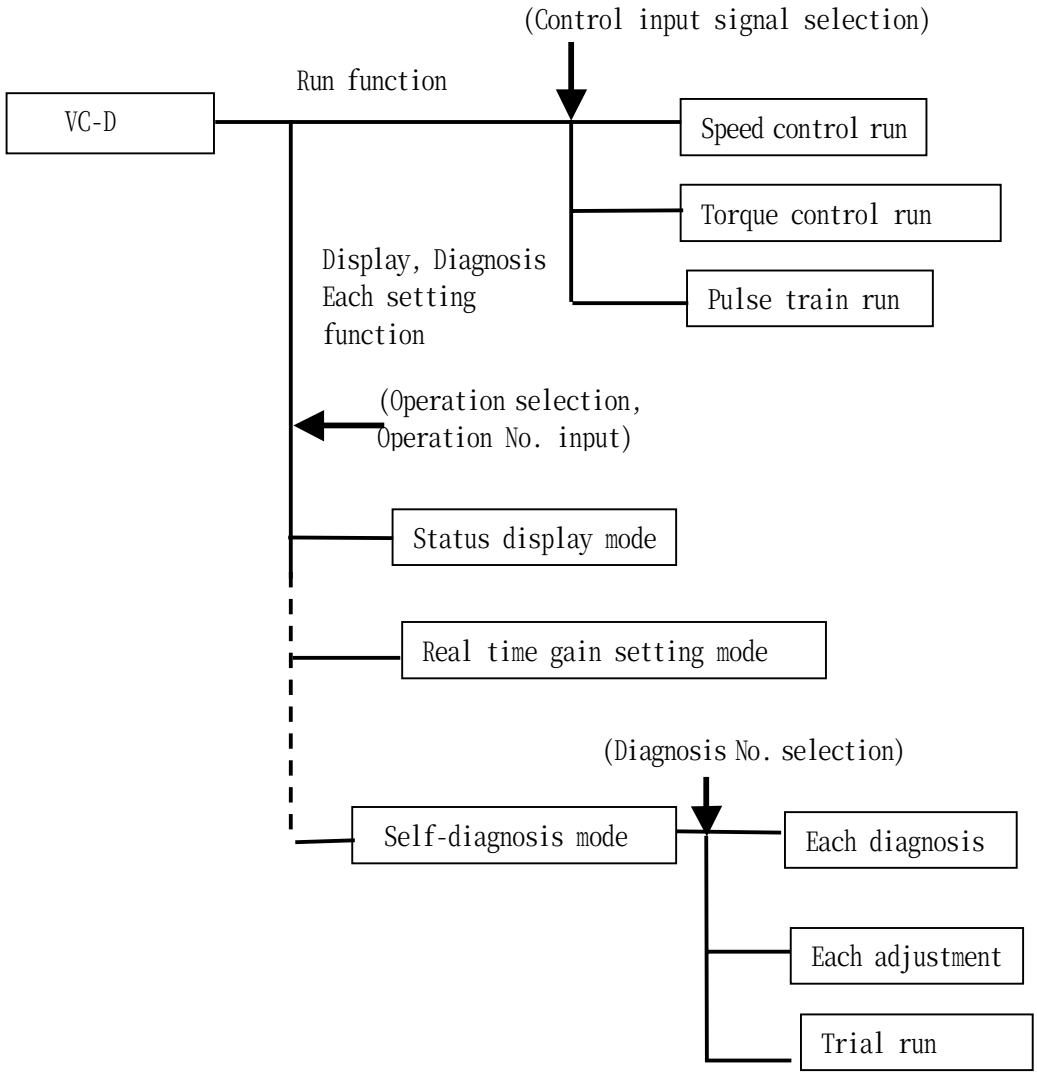
Synchronizing control up to 4 axes can be achieved by one unit which has Servo control communication.

(When Pulse train communication is used max. 8 axes can be controlled.)

Though setting of parameters, etc. is normally conducted by the front panel LCD module or an optional SDI device (data creating unit), it can be also conducted by a main controller or a personal computer through Serial communication.

1－2 Run Mode

Each run mode is selected by a parameter and a control input signal as follows.
Each parameter can be set by the front panel LCD, an optional SDI device, or a main controller through Serial communication.



[Figure 1-2] Mode Configuration

Chapter 2 Specification

2－1 Type

Types of VC-D series are described as follows.

NCR － ① ② ③ ④ ⑤ ⑥ － ⑦ ⑧ － ⑨

Sample：NCR － D A B 1 A1 A － 201 A

No.	Item	Display	Contents
		NCR	Nikki AC servo controller series
①	Product type	D	Driver
		C	Controller
②	Type name	A	VC series
③	Version	B	High performance version
		C	Multi-function version
		D	High performance version (with dynamic brake,800W or less)
		E	Multi-function version (with dynamic brake,800W or less)
④	Function	0	Driver
		1	Controller
		3	Flying cut-off control
		6	Free curve control
⑤	Input power specification	A1	AC100V system
		A2	AC200V system
		A3	AC400V system
⑥	Design sequence	A,B,···	Starts from A.
⑦	Output capacity	Sample) 201	20 1 = 20 × 10^1 = 200W | └ n of 10^n └── Effective No.
⑧	Motor kind	None	Multi-function version
		A	Linear coreless/ NA70 motor
		B	Linear core/ Disc motor
		C	Linear coreless NLA-S type motor
		D	Linear coreless NVA type motor
⑨	Special specification	S1	None: Standard type S** : Special type

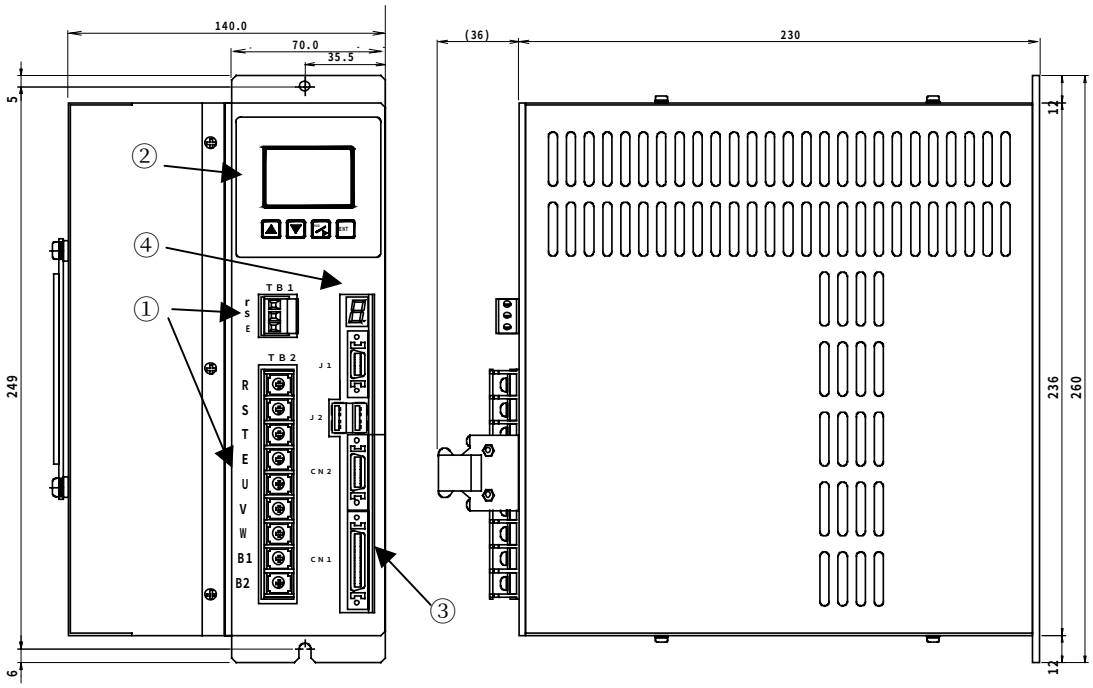
[Tab.2-1] Type description

2－2 General Specification

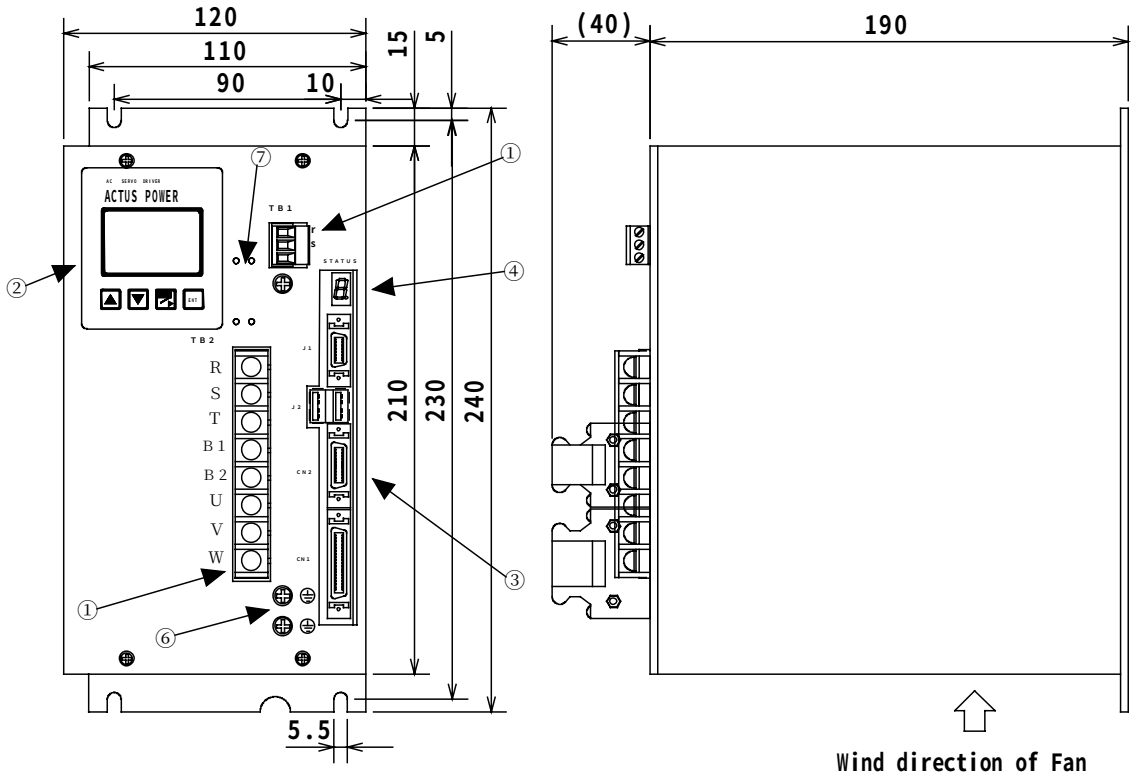
Item		Contents
Outline		Refer to Chapter 3 (Outline).
Ambient condition	Temperature	In control 0 ～ 55°C(unit circumference)/ in storage -20～60°C
	Humidity	85% or less, non-condensing
	Altitude	1000m or lower
	Location	Do not install it in harmful atmosphere such as corrosive gas, grinding oil, metal powder, oil, etc..
Cooling method		Natural air cooling
Mounting method		Panel mounting type
Vibration resistance		0.5G (10～50Hz)
Shock resistance		5G
Noise resistance		Line noise：2000V (50ns、1μs) , 1 minute Radiation noise：1000V (50ns、10cm) , 1 minute Electro-static noise：10kV (between earth and case)

[Tab. 2-2] General Specification

3－1－4　NCR－＊A＊－１５２／２２２

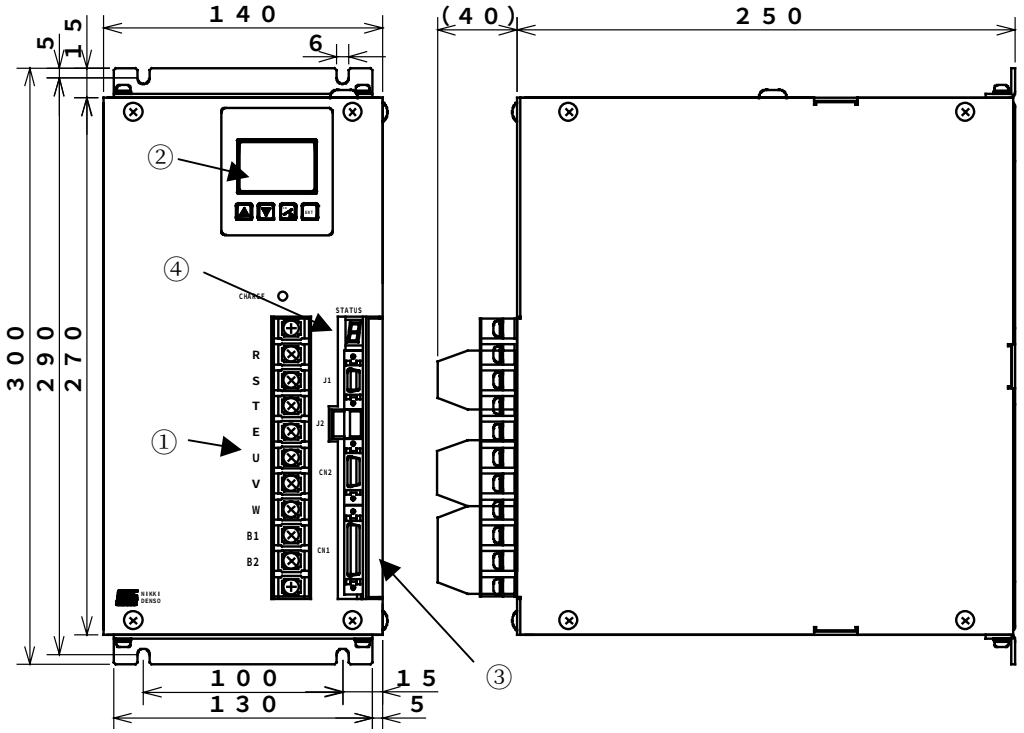


[Design sequence B／C (NCR-DA*0*B-XXX／NCR-DA*0*C-XXX) or before]

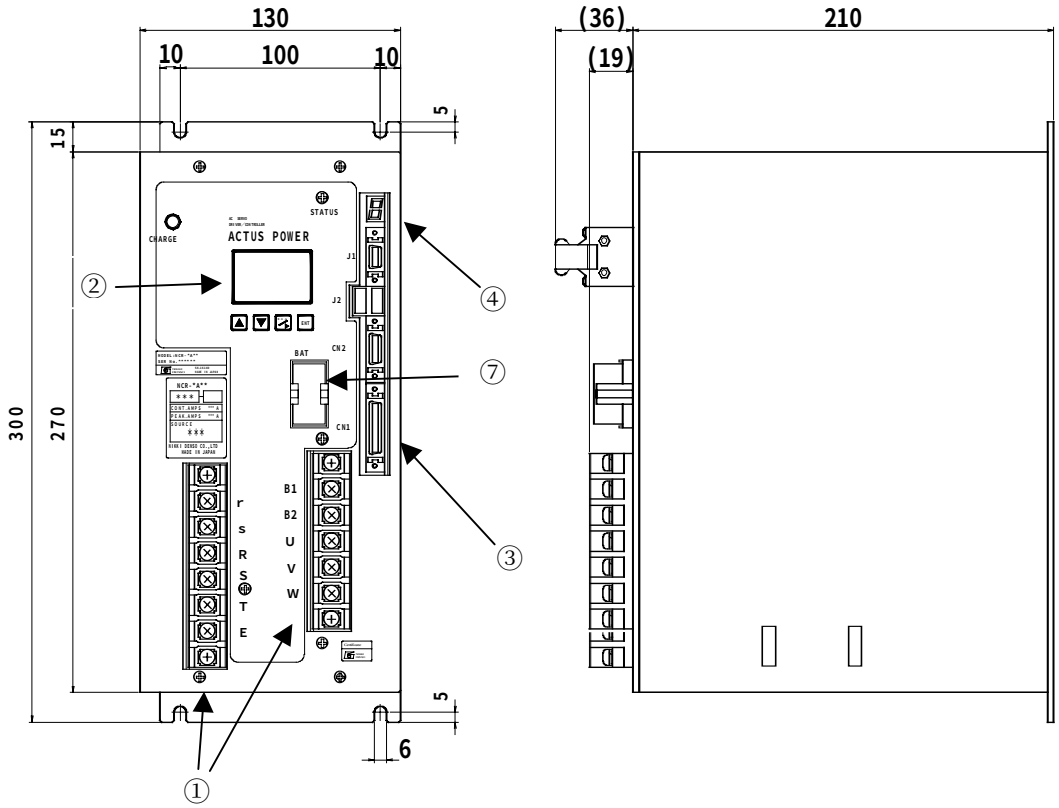


[Design sequence**D**(NCR-DA*0*D-XXX) or higher]

3－1－5　NCR－＊A＊－３０２／４０２



[Design sequence**A**／**B**(NCR-DA*0*A-XXX／NCR-DA*0*B-XXX)]



[Design sequence**C**(NCR-DA*0*C-XXX) or higher]

200V type controller

Item	Contents							
Series name (Type)	NCR-*A*A2*							
	-101	-201	-401	-801	-152	-222	-302	-402
Input power source	AC180～242V、50／60Hz 3 phase							
Output capacity [W]	100	200	400	800	1.5K	2.2K	3.0K	4.0K
Drive method	3 phase sine wave PWM							
Power capacity (at rated output) [kVA] *2	0.3	0.6	1.1	1.8	3.0	4.7	4.8	6.4 7.8
Continuous output current [Arms] *6	1.1	2.0	3.4	6.8	8.0	10.2	14.0 16.0	21.0 26.0
Momentary output current [Arms] *7	3.3	6.0	9.9	17.0	24.0	30.6	42.0 48.0	63.0 78.0
Control method	Semi-closed loop by encoder (Linear sensor) feedback							
Brake method	Regenerative brake：External Regenerative resistor							
Carrier frequency	High performance version：25kHz/10kHz (output capacity 3.0KW or larger) Plural function version：Parameter selection (10K/16K/20K/24K) * 5							
Speed control range	１：５０００ *1							
Maximum speed frequency	１６Ｍｐｐｓ							
No fuse breaker (rated current) [A] *3	5	5	5	10	15	20	20	30
Weight [kg] *4	1.0	1.0	1.4	2.4	5.8	5.8	7.7 6.0	7.7 6.0
Shape	Refer to Chapter 3 Outline.							
Accessory	Regenerative resistor (400W or smaller, option) Refer to 12-2 [Outline of Regenerative resistor, combination].							
Applicable motor	Refer to 12-4 [Applicable motor list].							

* 1: A motor may not run smoothly at 1/5000 of rated speed.
Speed control range is defined that a motor will not stop with 100% load in the range.
* 2: It changes according to power source impedance.
* 3: Please be sure to select sufficient shut down capacity type of a no fuse breaker to conduct protective coordinate with power source capacity.
* 4: Weight does not include weight of options.
* 5: Please set 「10kHz」 to a unit which output capacity is larger than 3.0 kW.
*6. For 3.0KW and 4.0KW, the upper column shows the Continuous output current for the design sequence A/B (NCR-DA*0*A-XXX/NCR-DA*0*B). The lower column shows the Continuous output current for the design sequence C to up (NCR-DA*0*C-XXX/NCR-DA*0*B).
*7. For 3.0KW and 4.0KW, the upper column shows the Momentary output current for the design sequence A/B (NCR-DA*0*A-XXX/NCR-DA*0*B). The lower column shows the Momentary output current for the design sequence C to up (NCR-DA*0*C-XXX/NCR-DA*0*B).

[Tab. １２－１(b)] Electric Specification 2/2