

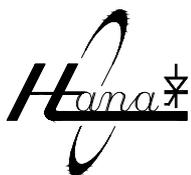
# User's Manual

## ILLUMINATION DRIVES

1 PHASE

type : HN 4200 SERIES

(VER #2.0)



HANA CONTROL ENGINEERING CO.,LTD.  
HANA POWER ELECTRONICS CO.,LTD.

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# 1. General Specification

This illumination drives HN4200 has power input voltage of AC 220[V] and uses frequencies of 50/60[Hz]. This drives is widely used for controlling illumination of lighting load related to various lighting sources within the scope of load capacity 2[kW].

**The characteristics of HN4200 DRIVE UNIT are as follows.**

1) It is a illumination controller of lighting load related to various lighting source, and it composed of fixed voltage control by voltage feedback and fixed illumination control. It is for user to select illumination sensor feedback method by separately option.

2) Stable characteristic is secured by insuring the period of delaying cycle at initial zero-crossing for the stable control during power on.

3) Fixed stable illumination control function is secured to loads by adopting PI feedback of illumination and current loop for the illumination control of light source.

4) Sufficient consideration is given to the detection of abnormality, protection of reactor overheating and overload current on this device and lighting loads.

1. Detection of abnormality of load and drive
2. Detection of overload current
3. Detection of reactor overheating

5) This device has applied manifold input/output terminal that allows compatible configuration with peripheral control unit and the command input used controlling voltage can be diversely selected from 4~20[mA] of current and 0~10[V] of voltage.

6) Power drive platform of this device is a stable structure of high power factor and efficiency and so it can be realize a reduction of energy.

7) This device has reliability because it has high resistance to noise from external power shock. Also the digital signal control input terminals are made of isolation structure to facilitate the configuration of system.

8) The structure of the device is easy for installation, check-out and repair.

## 2. Standard Specification of Device

### 2.1 Standard Specification of Device

[Table 2-1]

Type	Normal Power [kW]	Output Current [A]	Figure of Device [Figure 4-1,2]
	AC 220[V]		
HN4200	2	9.5	SP42S/F

☞ Loads with capacity over these are produced on order

### 2.2 Technical Standard Specification

[Table 2-2]

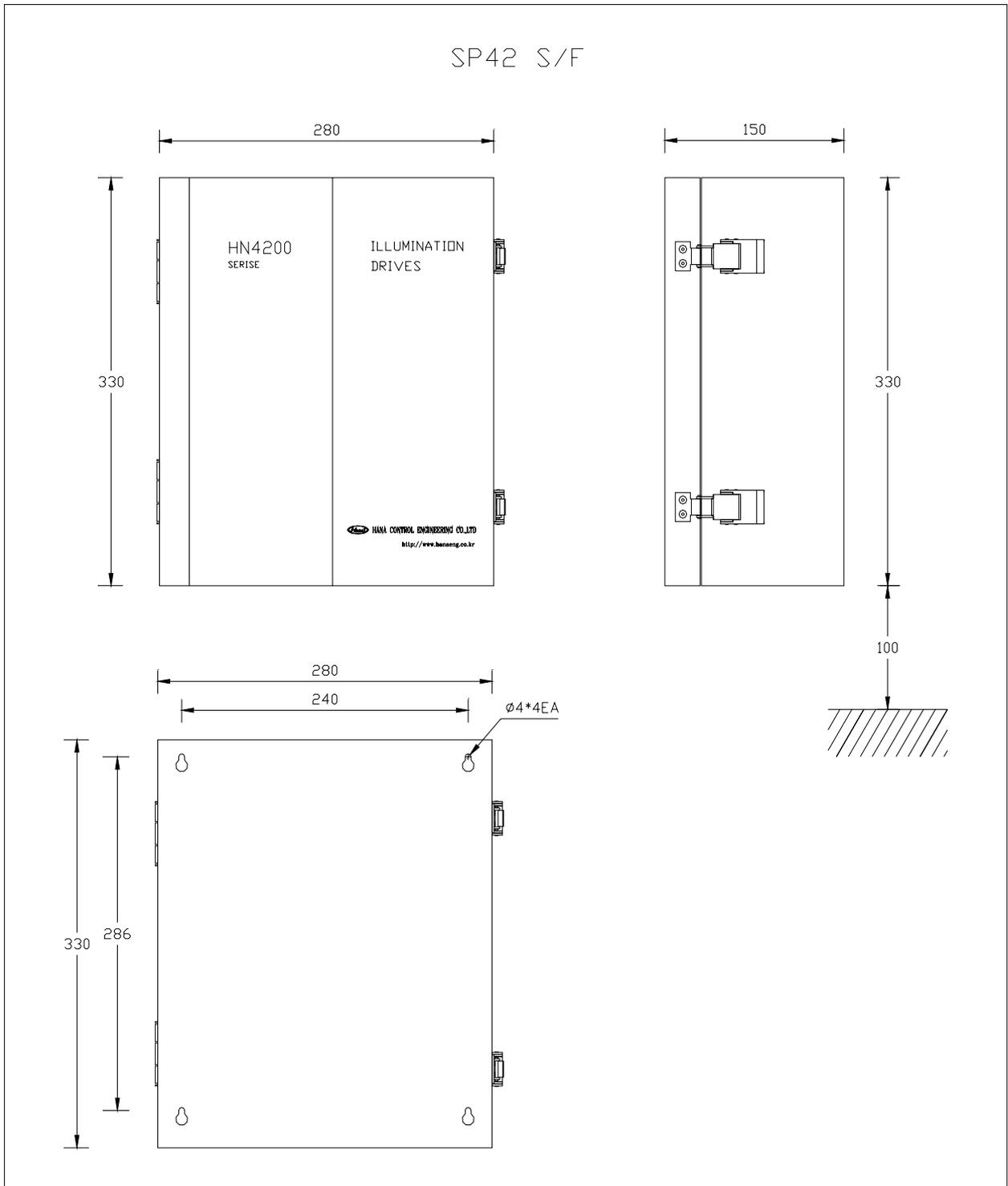
Specific Data	Electrical Specification
Single phase power input and frequency range	AC 220[V]±10%, 50/60[Hz]±2%
External RUN	Input terminal for load control operation signal (DC 24[V])
External illumination setting of voltage and current	Voltage of 0~10[V] and current of 4~20[mA]
Output RELAY	FAULT RELAY (capacity of contact point : AC 220[V], 3[A])
Allowed temperature - Normal temperature  - Preservation temperature	Change of current in response to ambient temperature  0~40[°C] (When it is over 60[°C], allowed temperature decrease by 1.2% in response to 1[°C] increase)  -25 ~ +75[°C]

## 3. Installation

- Install the device vertically so the air can circulate from the lower part to the upper part through heat sink hole.
- Separate the device from heat sources. If the device is installed in a cabinet, the cabinet must be made in a way allowing induction of exterior air and the protection cover must be open on top.
- 10 [cm] or more open space is needed on the top, bottom, right, and left of the drive.

#### 4. Dimension of Device

[Figure 4-1]

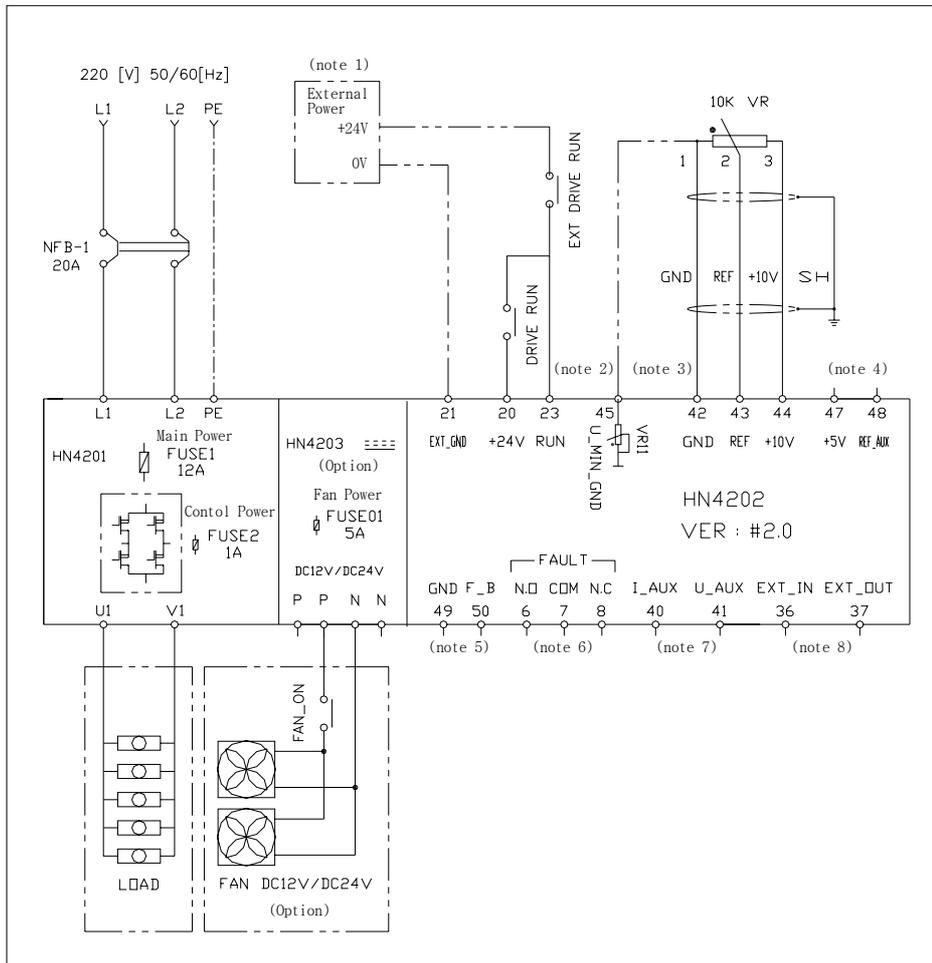


☞ Dimension can be changed to improve the product.

## 5. Wiring Diagram of Device

### 5.1 Standard Wiring Diagram

[Figure 5-1]



[note 1] Verify the switch SS-1 is located at EXT before wire connection in using external power DRIVE RUN.

[note 2] Output voltage can be adjustable from option value(90[V]) set by VR11(U\_MIN) to maximum voltage(210[V]) if No.1 of variable resistor will be connected to No.45 of pin.

[note 3] Output voltage can be adjustable from 0[V] to maximum voltage(210[V]) if No.1 of variable resistor will be connected to No.42 of pin.

[note 4] Auxiliary control terminal.

[note 5] Use it for external feedback.

[note 6] Use it for configuring an external electric circuit. (contact capacity AC 250[V],3[A])

[note 7] Input terminal for analog application. (see Table 5-2)

[note 8] Output terminal for analog application. (see Table 5-2)

[note 9] Power fuse for cooling fan (5[A]).

[note 10] Control fuse use rated 1[A].

[note 11] Main power fuse use rated 12[A].

**[NOTE]** Control signal wire must be shielded wire for covering and only one terminal must be treated with covering shield.

## 5.2 Explanation on the function of Terminal Panel

[Table 5-2]

Terminal Number	Terminal Name	Function and Electric Specification
L1 L2	Single phase main power	AC voltage input terminal for single phase main power supply
U1 V1	Output voltage	voltage output terminal
Power supply Board [ HN4203 ]		
P N	DC 12/24[V]	Power output terminal for cooling fan
Control Board [ HN4202 ]		
6 7 8	FAULT	Abnormality detection relay for load and drive (NO,COM,NC) (capacity of contact point : AC 250[V], 3[A])
20	+24[V]	Control signal terminal for +24[V]
21	EXT_GND	External_ground : 0[V] terminal for isolating from external
23	RUN	Operation signal input terminal
36	EXT_IN	External_in : Analog conversion input terminal (4~20[mA])
37	EXT_OUT	External_out : Analog conversion output terminal (0~10[V])
40	I-AUX	External auxiliary current input terminal (0~±10[V])
41	U-AUX	External auxiliary voltage input terminal (0~±10[V])
42	GND	Ground terminal
43	REF	Voltage command input terminal (0~10[V])
44	+10[V]	+10[V] reference voltage for command
45	U_Min GND	Minimum voltage control terminal
47	+5[V]	+5[V] reference voltage
48	REF_AUX	Auxiliary command input terminal
49	GND	Ground terminal
54	F_B	Feedback input terminal

## 6. Explanation of Drive Configuration

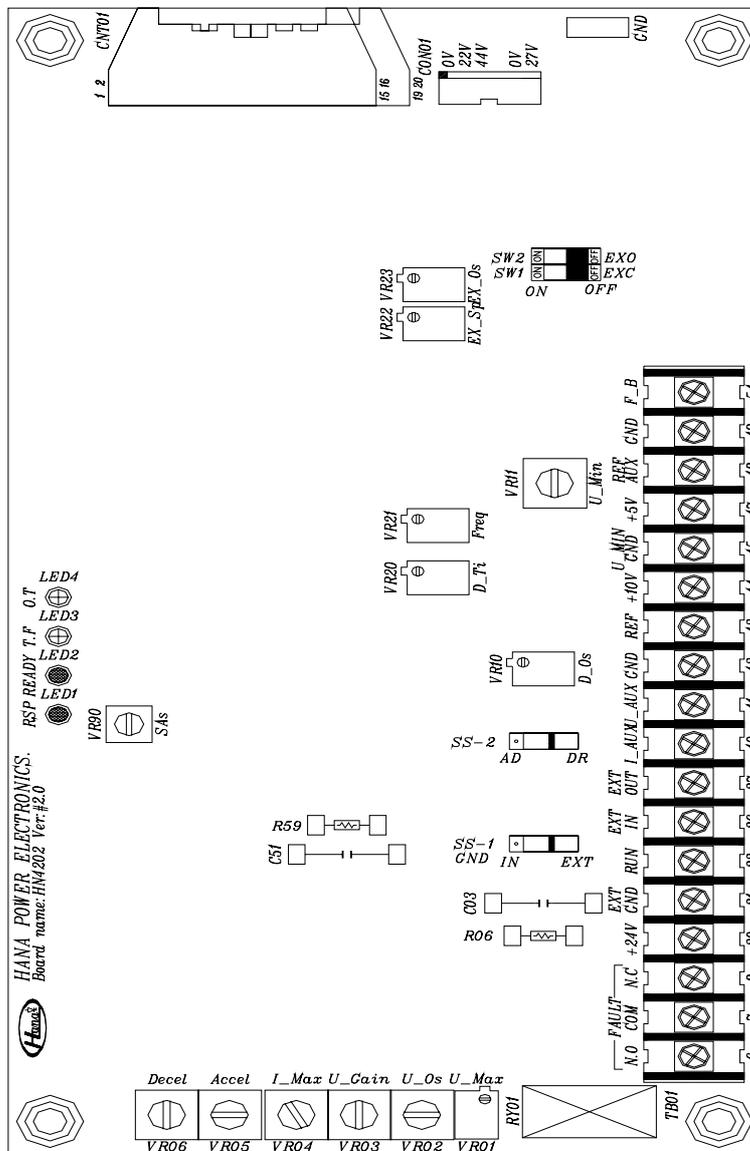
### 6.1 Preliminary Inspection

1) This drive is a product that satisfies most general operation conditions. Verify the compatibility among supplied power, drive and load by inspecting the specifications on the panel of device.

2) Confirm whether wiring is done as shown in the wiring diagram. Also, verify that the conditions of terminal connection and the linkage of connecting parts are good.

### 6.2 Reference Location Map of Selection Switch and Trimmer

[Figure 6-2]



## 6.3 Functions of Selection Switch

**[Caution]** Select a selection switch when the main power and the control power are not on.

[Table 6-3]

Switch	Switch Function	Explanation on Functions of Selector Switch	
Power Supply Board [ HN4203 ]			
SVS1	Output voltage select switch	Select DC 12[V] or DC 24[V]	
Control Board [ HN4202 ]			
SS-1	Internal/external ground select switch (Digital input GND)	IN	EXT
		Select internal ground	Select external ground
SS-2	Select ACCEL/DECEL use	AD	DR
		ACCEL TIME (0~30[sec]) DECEL TIME (0~30[sec])	No use
SW1 (EXC)	Select analog conversion input (EX_IN/TB1 No.36)	ON	OFF
		4~20[mA]	0~10[V]
SW2 (EXO)	Conversion input OFFSET switch (EX_IN/TB1 No.36)	ON	OFF
		4~20[mA]	0~10[V]

## 6.4 Explanation on the Function of Trimmer

- VR01 : U\_Max - Setting for maximum load voltage due to feedback
- VR02 : U\_Os - Setting for minimum load voltage due to feedback
- VR03 : U\_Gain - Setting for the gain of amplification ratio of voltage regulator
- VR04 : I\_Max - Setting for maximum operation current of device
- VR05 : Accel - Adjusting acceleration gradient (0~30[sec])
- VR06 : Decel - Adjusting deceleration gradient (0~30[sec])
- VR10 : D\_Os - Setting dead time offset
- VR11 : U\_Min - Setting for minimum output voltage
- VR30 : D\_Ti - Setting dead time
- VR31 : Freq - Setting frequency
- VR32 : EX\_Sp - Setting analog conversion output value
- VR33 : EX\_Os - Setting analog conversion input offset
- VR90 : SAs - Setting for timing of zero-crossing

## 6.5 Explanation on the Adjustment of External Analog Conversion Input

– When 0~10[V] input will be applied to analog conversion input terminal TB36, select SW1[EXC], SW2[EXO] to all OFF and adjust VR32[EX\_Sp] to make input value from the maximum to become DC +10[V] in output terminal TB37.

– When 4~20[mA] input will be applied to analog conversion input terminal TB36, select SW1[EXC], SW2[EXO] to all ON and adjust VR33[EX\_Os] to make input value from 4[mA] to become DC 0[V] at output terminal TB37 and also adjust VR32[EX\_Sp] to make input value from 20[mA] to become DC +10[V] in output terminal TB37.

## 6.6 Explanation on the Adjustment of Device

– Though this device is set to default at shipping, it can be readjusted according to the following when there is a need for readjustment on the site.

### 6.6.1 Setting Maximum Voltage (U\_Max) by Voltage Feedback

– Verify that the location of switch SS-1 should have been becoming "IN" when internal feedback is selected.

– Verify that the location of switch SS-1 should have been becoming "EXT" when external feedback is selected and then verify that the polarity of voltage(F.B) is correctly wired according to the wiring diagram. (No.49 of terminal board TB1 is plus, and No.54 is minus)

– Set the external voltage command to the minimum value (0[V]).

– Turn on the load operation signal RUN terminal (TB1 No.23).

– Set the external voltage command to the minimum value (0[V]) and adjust trimmer U\_Os(VR02) to set to the minimum voltage value of load. (clockwise : increase voltage, counterclockwise : decrease voltage)

– Slowly raise the external voltage command to reach to the maximum value (+10[V]) and adjust trimmer U\_Max(VR01) to set to the maximum voltage value of load. (clockwise : increase voltage, counterclockwise : decrease voltage)

※ When the voltage of the load is unstable during the setting of the maximum voltage, adjust U\_Gain(VR03) to stabilize the voltage and then readjust U\_Max (VR01).

**[caution]** In setting the maximum voltage, the drive output voltage (U1,V1) must not exceed the rated voltage of load.

### 6.6.2 Setting Voltage Loop Gain (U\_Gain)

In case that the feedback voltage of load is unstable, adjust as following.

– Set the external voltage command to 5[V] in operating device and then observe feedback voltage of No.54 of TB01 by oscilloscope in repeating ON/OFF of command.

– Adjust trimmer U\_Gain(VR03) to reach the setting voltage as soon as possible without excessive delay.

※ The value of condenser C03 (reference value : 1.0[μF]) must be changed in case the adjusting is not well done because the adjusting range of time constant of U\_Gain is different according to the type of the load and the reactance value.

### 6.6.3 Setting the Maximum Operational Current Value (I\_Max)

– The setting for the maximum operational current of drive is determined by the actual load current, and is set by trimmer I\_Max(VR04). (clockwise : increase the set current, counterclockwise : decrease the set current)

※ I\_Max (VR04) is set to the rated current of device at production.

## 7. Trouble Inspection and Remedial Measures

**[Caution]** When inspecting or carrying out remedial measures in the device, turn off the power.

### 7.1 Explanation on LED DISPLAY Function ( HN4202 )

[Table 7-1]

LED Number	Name	Explanation on Function	Inspection and Remedial Measures
LD1	RSP	Drive stop and hold	Light off when drive operates
LD2	READY	Normal status of load and drive and preparation for operation	Light on when normal
LD3	T.F	IGBT total fault	Check main fuse and IGBT
LD4	O.T	Overheat of output reactor	Check load and output reactor

☞ When conducting inspection or remedial measure, refer to a person in charge of drive at Hana Control Engineering.

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