

**DIGITAL**  
power  
**REGULATOR**



**USER MANUAL**

- DPR Series -



## About Products Services

\* Term of guarantee of this product is 1 year from the purchase date.

### Charged Services




–Please read the manual in advance, as a service charge will be imposed for any service request on a product without defects.

<p>When a defect occurs due to mishandling or improper repair.</p>	<ul style="list-style-type: none"> <li>• A defect because a user doesn't follow the instructions in the manual.</li> <li>• A defect caused by not following rating, current capacity, or using abnormal voltage or power.</li> <li>• A defect caused by using components that our company doesn't designate.</li> <li>• A defect caused by repair work of non-specialists.</li> <li>• Alternation of fuse and consumption goods.</li> <li>• A defect caused by natural calamities.</li> </ul>
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### Product installation environments

– Install this product vertically to activate ventilation and do not use it in or around flammable, explosive, corrosive, and humid environments.

### Symbol explanation

Mark	Name	Explanation
	<p>Notice for electric shock</p>	<p>This symbol marks the parts where there is danger of electric shock. Power must be turned off for maintenance or repair of the product.</p>
	<p>Notice Warning Danger</p>	<p>This symbol indicates risk of death or serious injury. When the product is used incorrectly, it could cause property damage.</p>
	<p>Grounding</p>	<p>To prevent malfunction, you must operate grounding To prevent electric shock or noise from the outside.</p>

## NOTICES FOR SAFETY

1. Before installing this machine, install main power circuit breaker (NFB) and Magnetic switch on the outside of the main body for safety.
2. Ground type 1 grounding or special type 3 grounding in the exterior box of the machine to prevent electric shock.
3. Check that voltage of provided power is same as the voltage of the machine and the rated current is not exceeding proper capacity of load current. Then, provide the power.  
(It is recommended that you do not use a machine at over 70% of the rated current condition.)
4. Fuse
  - 1) To prevent fire and to protect the machine, use a fast-acting fuse, which is designated by our company. **(Refer to the product label)**
  - 2) Must turn off the main power to exchange the fuse.
5. Environments
  - 1) Adjust ventilation and temperature so that temperature inside the control panel is not over 45°C.
  - 2) Do not operate the machine where there is a risk of inflammability, explosiveness, corrosion or humidity.
6. Disassembly or remodeling of the machine
  - 1) Never change components voluntarily with the exception of changes of fuse or thyristor.
  - 2) Our company can not guarantee operation of the machine when the volume of the machine or component is altered voluntarily. When a problem occurs, please contact our company's A/S Department.
7. Check and repair
  - 1) Before checking the machine, cut off the power and beware of electric shock.
  - 2) Check fastening condition of bolts and nuts of terminal parts.
  - 3) When bolts of terminal are loose, it could generate heat so wiring can be damaged or fire can occur. Check this condition periodically.
8. This manual could be revised without notification for improvements of functions of the machine.
9. Responsibilities and guarantee
  - 1) Must preserve notices for handling, maintenance, and repair of the machine.
  - 2) Our company is not responsible for damage, which occurs due to not following these instructions..
10. A/S Request

TEL +82-32-326-9120  
FAX +82-32-326-9119  
E-mail : [webmaster@samwontech.com](mailto:webmaster@samwontech.com)



Must preserve notices during handling the machine to ensure safety.

## SERIAL NUMBER LABELS

An **identification** label (specifying the **coding** of the thyristor unit) provide all the information relating to the factory settings of the thyristor unit.

SAMWONTECH , Republic of Korea		+82-32-326-9120
Product	Power Regulator	
Model	TP2-110	
Serial No	3G007	
Power Rating	: 110A @ 220V 60Hz	
Input	: 4~20mA, 0~5V	
Firing Mode	: PHASE ANGLE	Made In Korea
Fuse	: BUSSMAN 170M1368	
Any other fuse invalidates warranty		
H.page : <a href="http://www.samwontech.com">www.samwontech.com</a> , E-mail : <a href="mailto:webmaster@samwontech.com">webmaster@samwontech.com</a>		

Figure 1 Example of identification label for a TP2-110 thyristor unit



SAMWONTECH , Republic of Korea		+82-32-326-9120
Product	Power Regulator	
Model	TZ2-110	
Serial No	3G007	
Power Rating	: 110A @ 220V 60Hz	
Input	: 4~20mA, 0~5V	
Firing Mode	: Zero Crossing	
Fuse	: BUSSMAN 170M1368	Made In Korea
Any other fuse invalidates warranty		
H.page : <a href="http://www.samwontech.com">www.samwontech.com</a> , E-mail : <a href="mailto:webmaster@samwontech.com">webmaster@samwontech.com</a>		

Figure 2 Example of identification label for a TZ2-110 thyristor unit

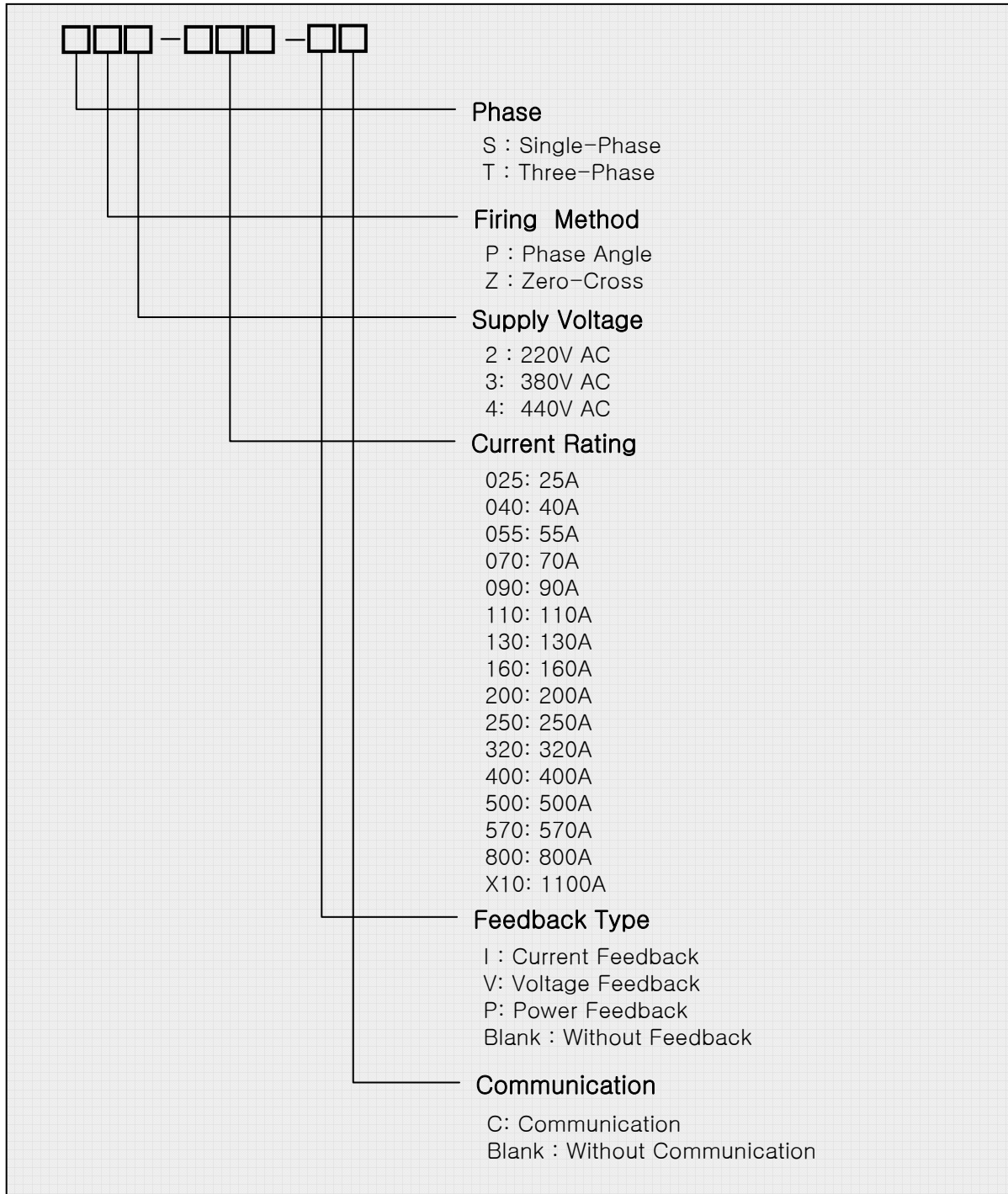


Must preserve notices during handling the machine to ensure safety.

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## 1-1. Coding

**Note**

- The identifying label is located on the right side of the Power Regulator.
- Please make sure that the Power Regulator is the same model as you ordered referring to the identification label and the code above.

## 2-1. Lamp Signal



- Operation related terms I

Message	Explanation
PILOT	Operating status lamp
OC	Over Current
OT	Over Temp.
UL	Unbalanced Load

- a. Normal operation  
: Normal output and Normal status

Message	Lamp
PILOT	Green Lamp Blinking
OC	OFF
OT	OFF
UL	OFF

- b. Warning Operation  
: Normal output but attention is needed.  
Lamps are blinking.

Message	Lamp
PILOT	Yellow Lamp Blinking
OC	Red Lamp Blinking
OT	OFF
UL	Red Lamp Blinking

- c. Alarm Operation  
: Abnormal status and output is off.  
Lamps turn on.

Message	Lamp
PILOT	Red Lamp ON
OC	Red Lamp ON
OT	Red Lamp ON
UL	Red Lamp ON



PLEASE READ CAREFULLY THIS USER'S MANUAL BEFORE OPERATION.  
AND CONSULT AN EXPERT WHEN YOU HAVE ANY QUESTION RELATED TO THIS UNIT.  
WRONG USAGE OR OPERATION CAUSES BAD EFFECT ON THE SYSTEM AND WORKER.

## 2-2. CONTROL Volume

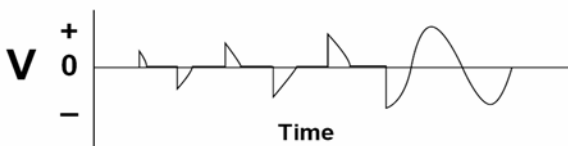


Current Value

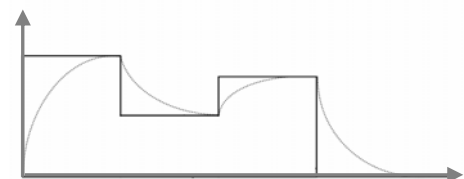
▪ Operation related terms II

Volume	Explanation
RESET	RESTART : On Alarming status
OUT PUT	Select maximum output
SOFT	Time for Soft Start & Soft UP/DOWN
OC	Over Current prevention function

- ① Use RESET Button when you re-start the unit on the status of warning operation or alarm operation.
- ② OUTPUT Volume is used when selecting maximum output. FND shows figures 0~100(%), set up the figure you require by turning volume left and right. After setting up the figure you want, just push RESET BUTTON to complete selection.
- ③ Use SOFT Volume to adjust soft Start time(0~30sec). This setting time applies to soft up/down also. On the adjusting soft volume, display FND shows you 0~30 sec. Then you can select required time by turning volume switch left and right. After setting up the figure you want, just push RESET BUTTON to complete selection.
- ④ On selecting OC (Over Current) Volume, FND shows 0~max (maximum amperage will be shown), For example, OC volume is selected as 40 amp over current more than 52 amp(40amp X 1.3 normally 1.3 times of maximum amp. is the limit over current) flows, the unit notify the abnormal status and does not allow the output. (OC lamp : Red lamp on)



Soft Start



Soft UP/DOWN



PLEASE READ CAREFULLY THIS USER'S MANUAL BEFORE OPERATION.  
AND CONSULT AN EXPERT WHEN YOU HAVE ANY QUESTION RELATED TO THIS UNIT.  
WRONG USAGE OR OPERATION CAUSES BAD EFFECT ON THE SYSTEM AND WORKER.



<b>3</b>	<b>Control Mode Selection</b>
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3-1. Dip Switch Selection

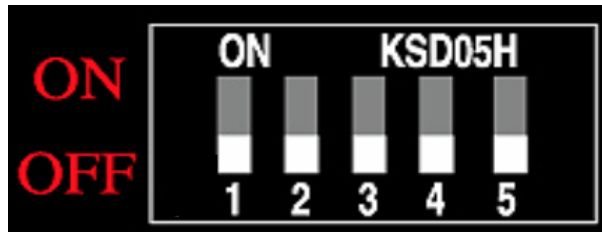


Figure 3.1 Dip Switch

1) DIP Switch selection in phase-angle mode

	Function	
	ON	OFF
SW1	TRANSFORMER Load	Resistive Load
SW2	Soft up/down operating	No operating Soft up/down
SW3	Outer power volume operating	No operating outer power volume
SW4	F/B gain setting	
SW5	F/B gain setting	

\* FEED BACK Selection (Only for the unit with Feed back function )

① Verify SW4, SW5 are OFF.

② Set the required volume by operating output volume

2) DIP Switch selection in zero-crossing mode

SW1	SW2	SW3	Function
OFF	OFF	OFF	4 Cycle Burst Firing
OFF	<b>ON</b>	OFF	8 Cycle Burst Firing ( <b>Default mode</b> )
OFF	OFF	<b>ON</b>	16 Cycle Burst Firing
OFF	<b>ON</b>	<b>ON</b>	128 Cycle Burst Firing



PLEASE MAKE SURE DIP SWITCH SELECTION WHEN TRANSFORMER LOAD IS USED. IF YOU DO NOT SELECT CONTROL MODE, THE FUSE IN THE UNIT CAN BE DAMAGED.

## 4-1. Technical Data

## a. General Specifications

**Voltage Rating :**

200/220/240VAC, or 380/400/440VAC

**Frequency :** 50/60Hz(Auto-selectable)**Current Rating :**

25A,40A,55A,70A,90A,110A,130A,160A,200A  
 250A,320A,400A,500A,570A,800A,1100A  
 (all based on an ambient temperature of 50°C)

**Input Signal :**

4 to 20mADC, 1 to 5V, 0 to 5V

**Output Range :**

- Phase Angle Control
- Current feedback
  - 0 to 100% of current rating
- Voltage feedback
  - 0 to 98%(95%) of the voltage rating
- Power feedback
  - [0 to 98%(95%) of the voltage rating] X [0 to 100% of current rating]
- Non Feedback
  - 0 to 98% of the voltage rating

- Zero Crossing Control
- 0 to 100% of voltage rating
- (): In case of Three-Phase

**Applicable Load :**

- Resistive load or inductive load  
(transformer primary side control)

**For Zero Crossing Control, only resistive load can be used.**

**Allowable Ambient Temperature :**

- Performance guarantee range :  
0 to +50°C
- Operating guarantee range :  
-15°C to +55°C

**Cooling Method :**

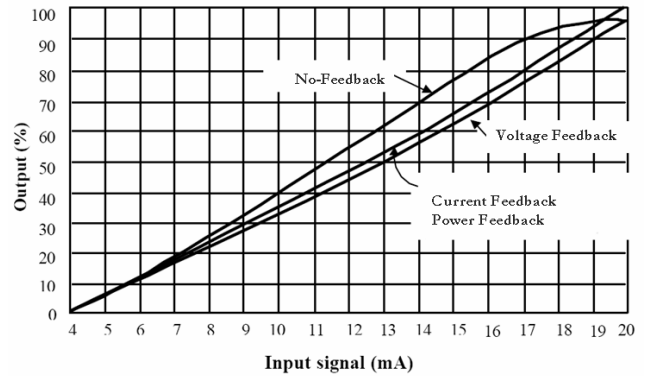
- Current rating of 70A or less :  
Natural convection
- Current rating of 90A(25A) or more :  
Fan Cooling as standard

**Insulation Resistance :** Over DC 500V 200MΩ  
between power terminal and case

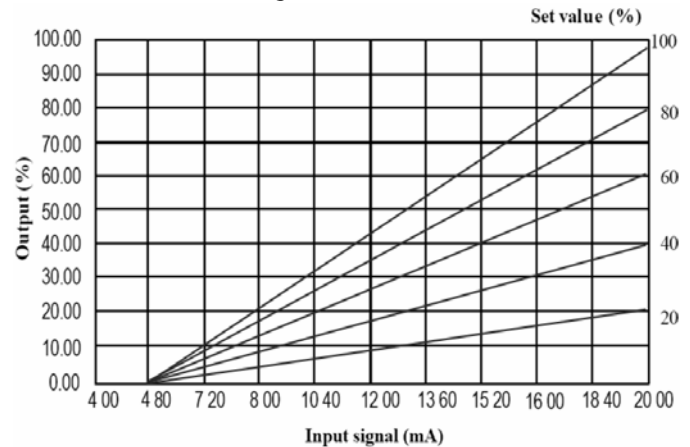
**Mounting Method :** Vertical Method

## b. Characteristics

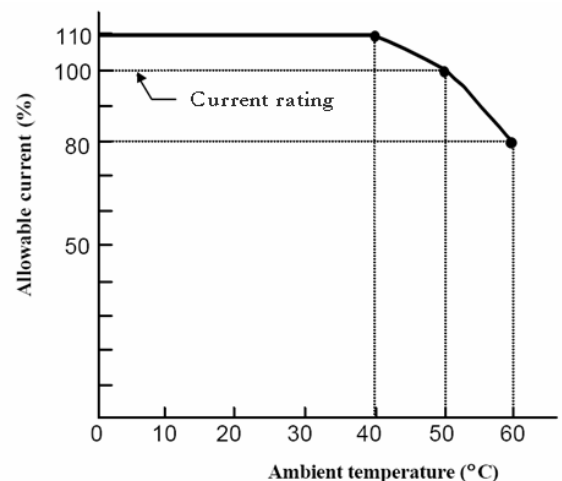
## ■ Input/output characteristics



## ■ Gradient setting characteristics

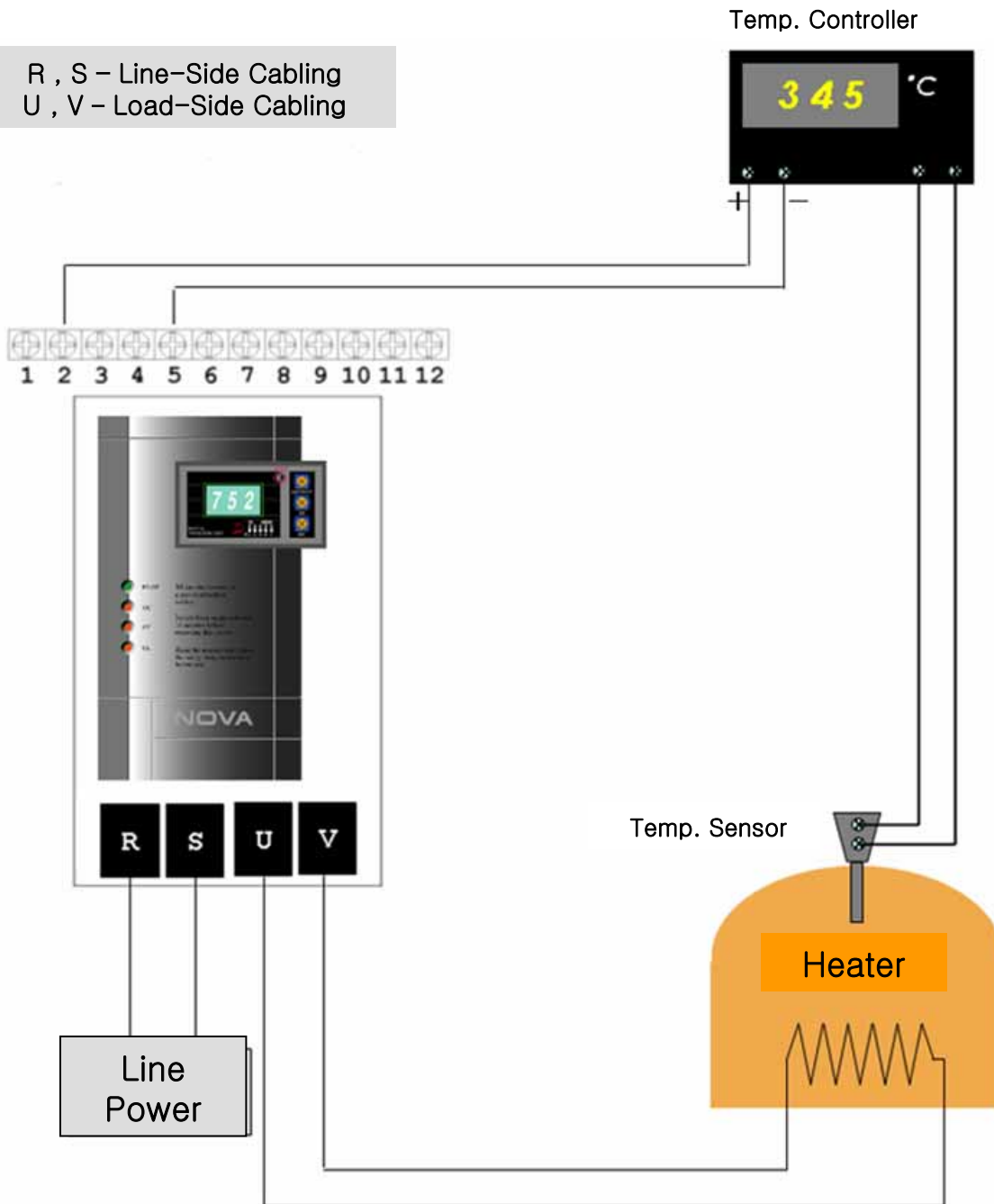


## ■ Ambient temperature and allowable current



## 4-2 . Wiring

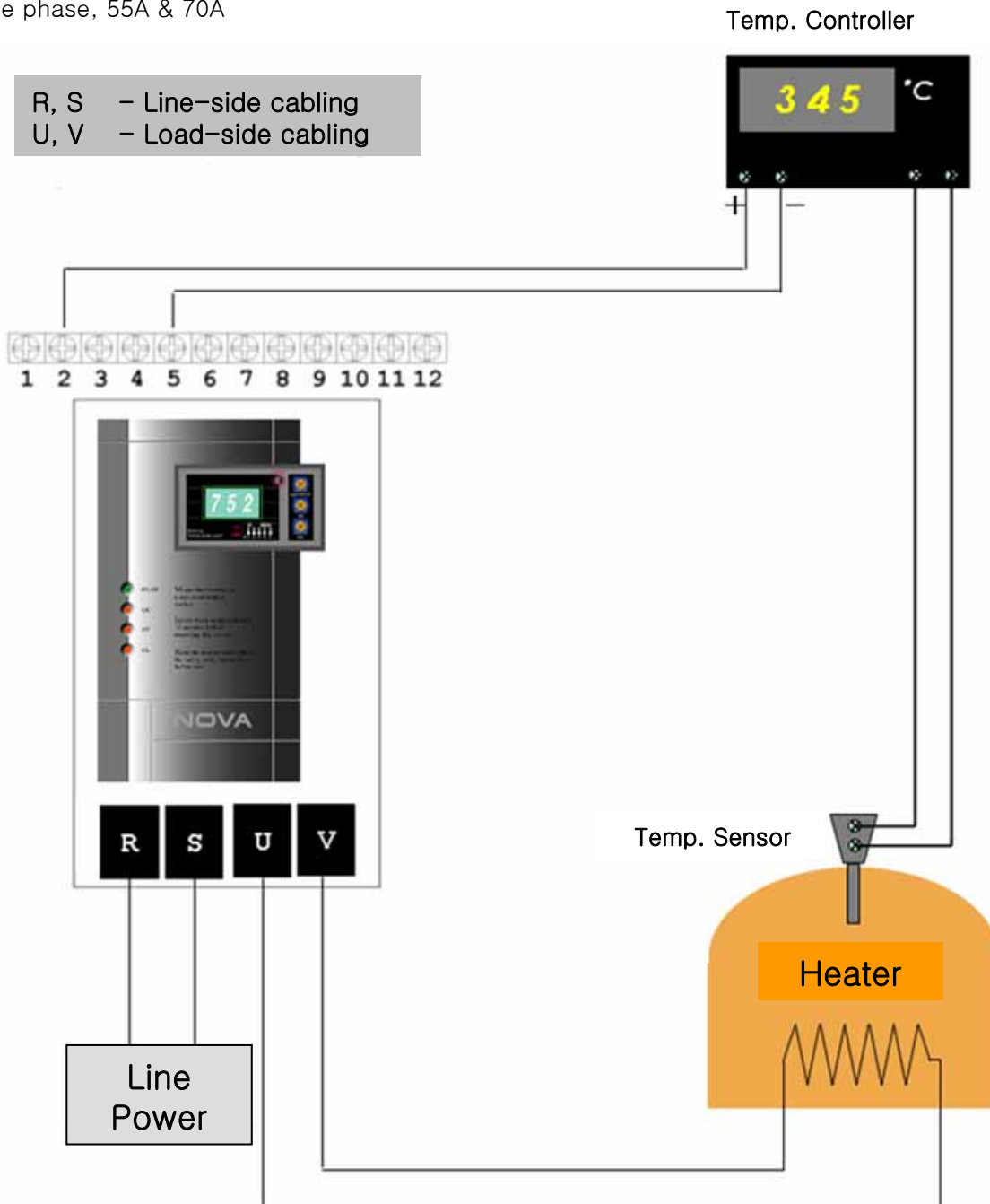
a) Single phase, below 40A



Check the voltage of provided power is same as the voltage of the machine and the rated current is not exceeding proper capacity of load current. Then, provide the power. (It is recommended that you do not use a machine at over 70% of the rated current condition.)

## 4-2 . Wiring

b) Single phase, 55A &amp; 70A



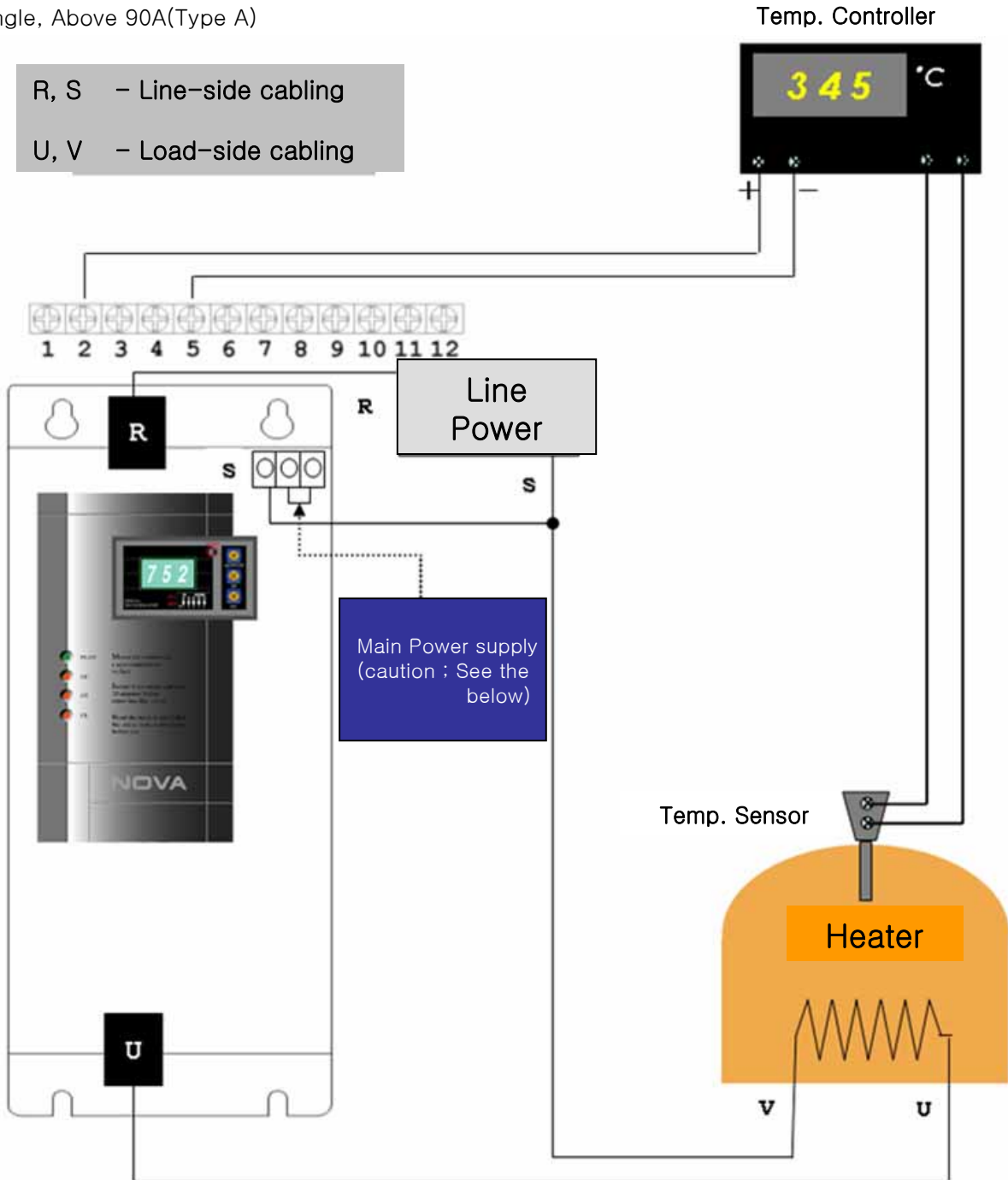
Check the voltage of provided power is same as the voltage of the machine and the rated current is not exceeding proper capacity of load current. Then, provide the power. (It is recommended that you do not use a machine at over 70% of the rated current condition.)

## 4-2 . Wiring

c) Single, Above 90A(Type A)

R, S - Line-side cabling

U, V - Load-side cabling

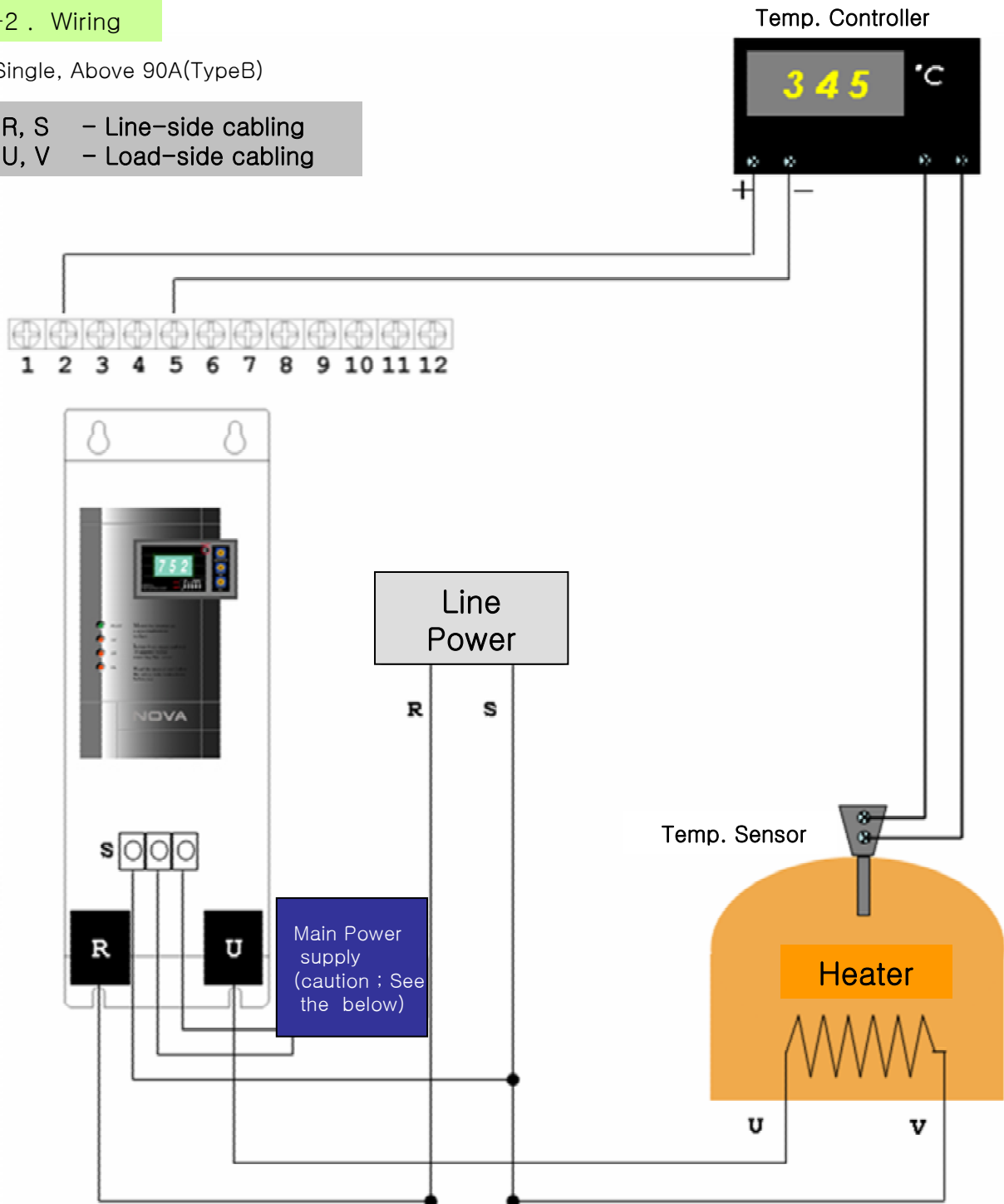


Check the voltage of provided power is same as the voltage of the machine and the rated current is not exceeding proper capacity of load current. Then, provide the power. (It is recommended that you do not use a machine at over 70% of the rated current condition.)

## 4-2 . Wiring

d) Single, Above 90A(TypeB)

R, S – Line-side cabling  
 U, V – Load-side cabling



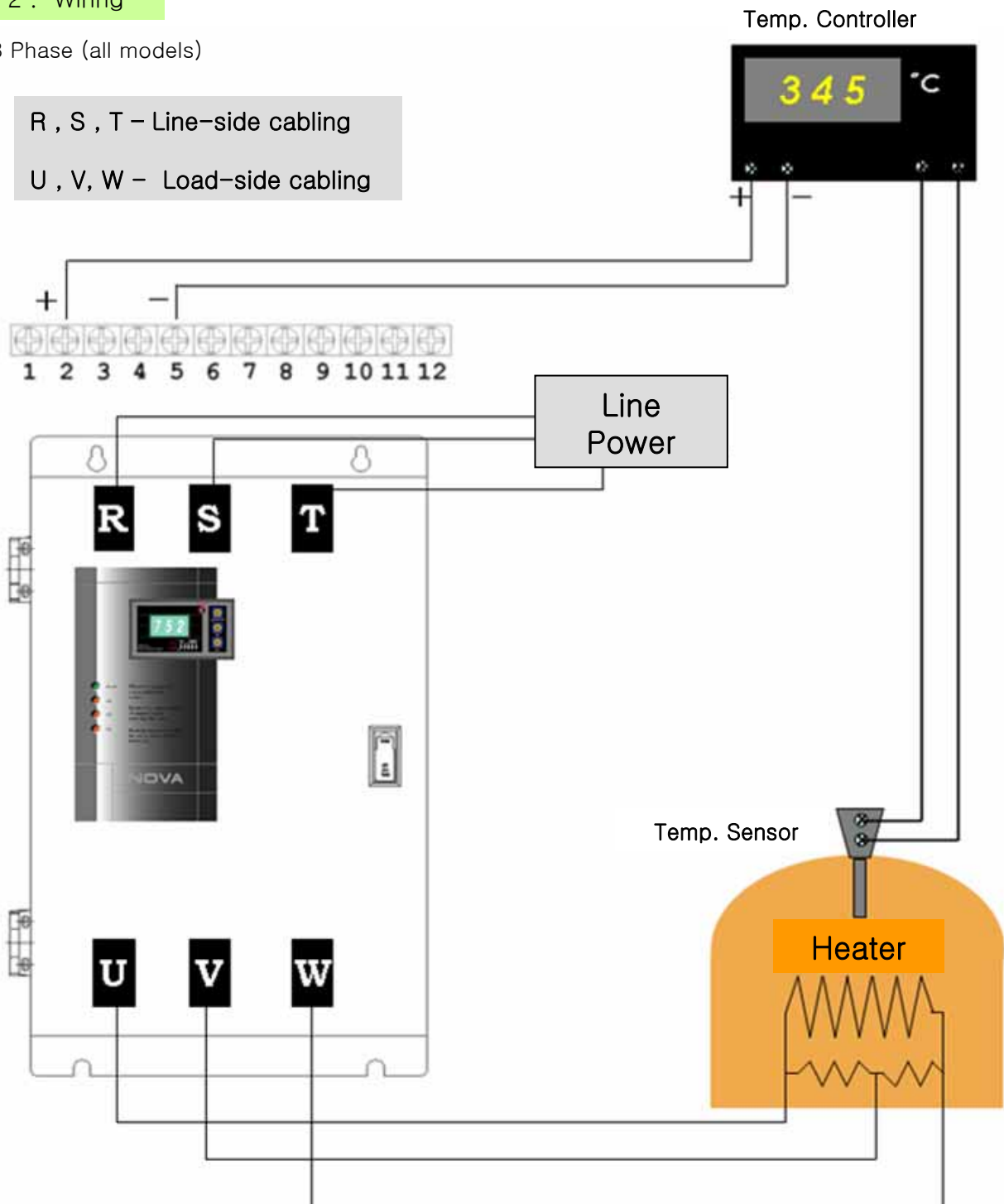
Check the voltage of provided power is same as the voltage of the machine and the rated current is not exceeding proper capacity of load current. Then, provide the power. (It is recommended that you do not use a machine at over 70% of the rated current condition.)

## 4-2 . Wiring

e) 3 Phase (all models)

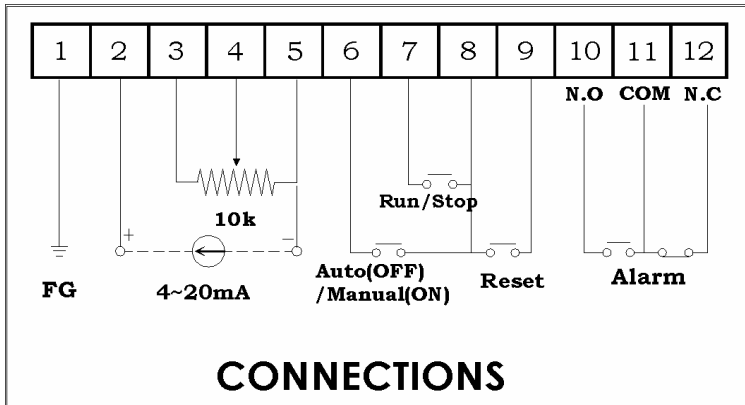
R , S , T – Line-side cabling

U , V , W – Load-side cabling



Check the voltage of provided power is same as the voltage of the machine and the rated current is not exceeding proper capacity of load current. Then, provide the power. (It is recommended that you do not use a machine at over 70% of the rated current condition.)

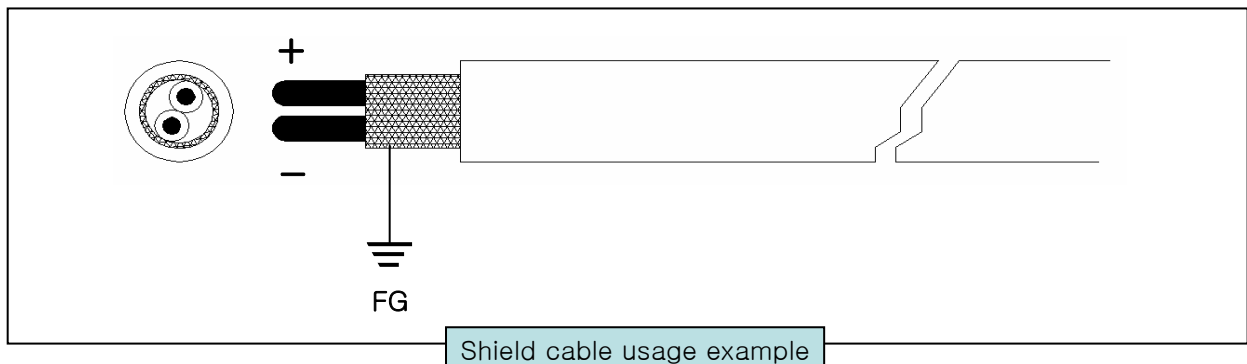
## 4-3 . Control Terminal Arrangement

Note

Please refer to the control input wiring diagram, which is attached to the inside of the front panel, to connect the wires.



1. The main power must be cut off to connect wires.
2. To prevent malfunctions by noise, use the twist shield cable for control input wiring. FIELD GROUND and SIGNAL GROUND must be operated.
3. Install wiring of the control input part far from the other power lines.

**Danger, Warning/Notice**

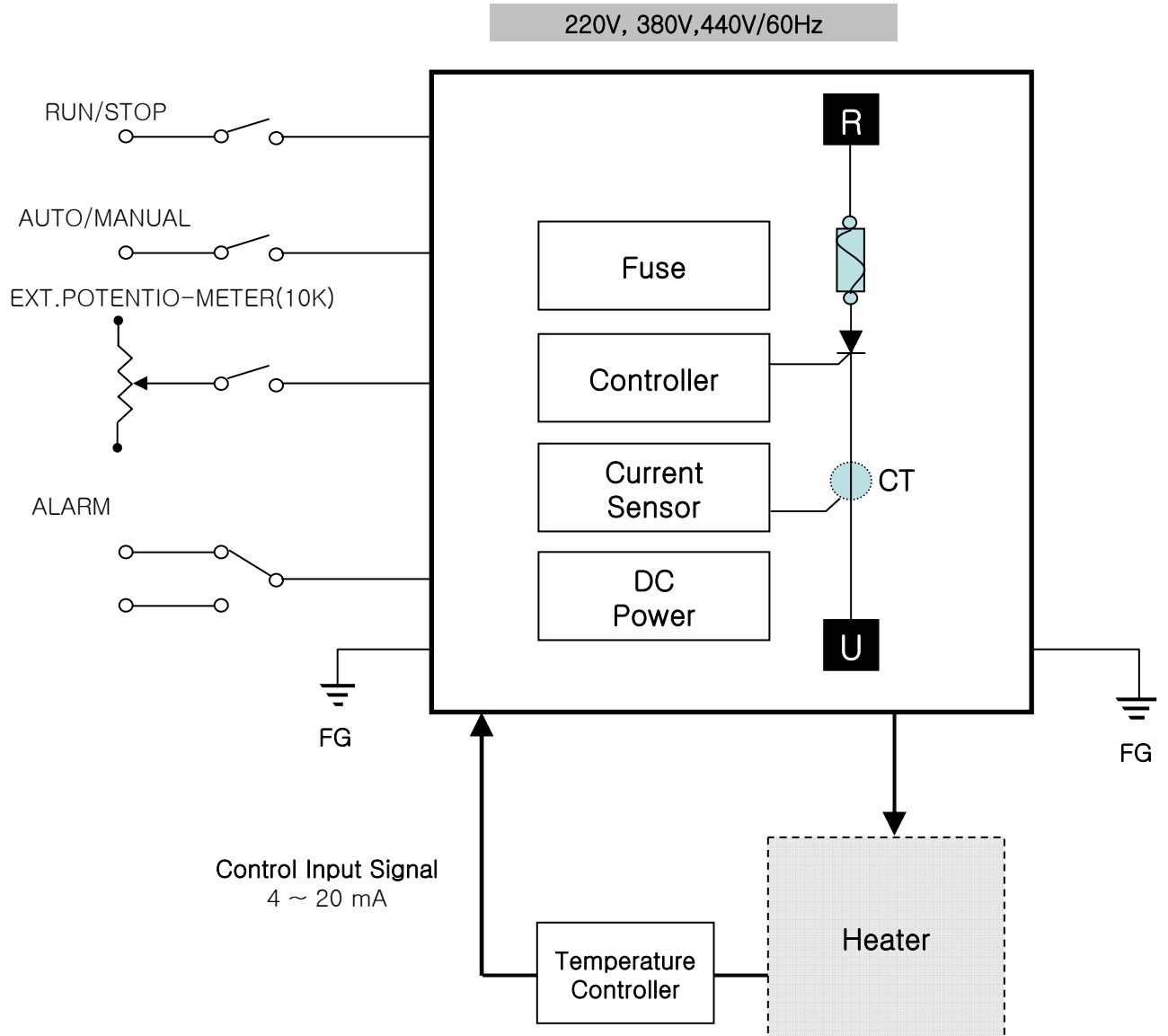
**Danger, Warning** : This symbol is displayed when there is risk of death or severe injuries.

**Notice** : This symbol is displayed when there is a risk of property damage.



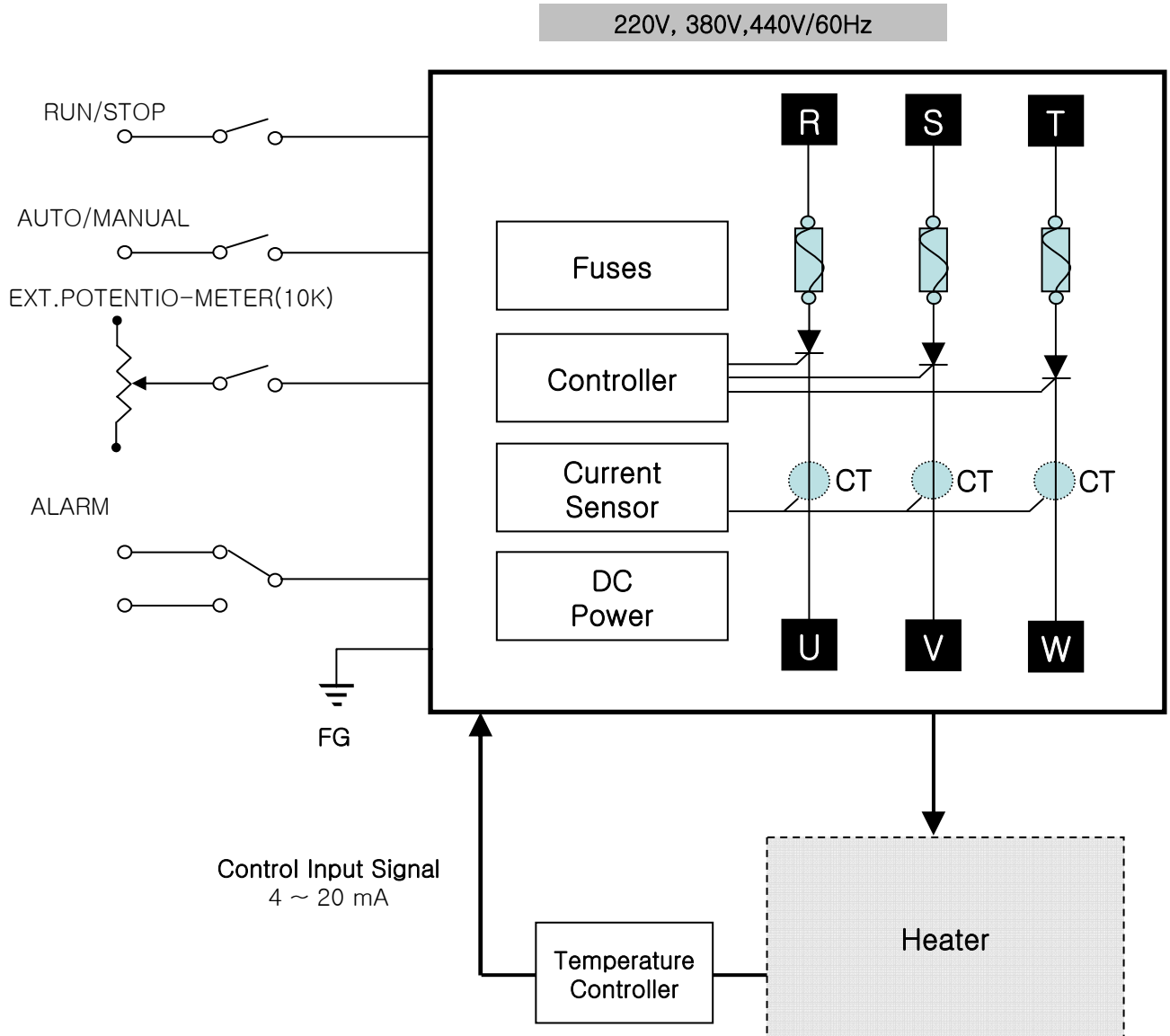
## 4-4 . System Block Diagram

a) Single Phase



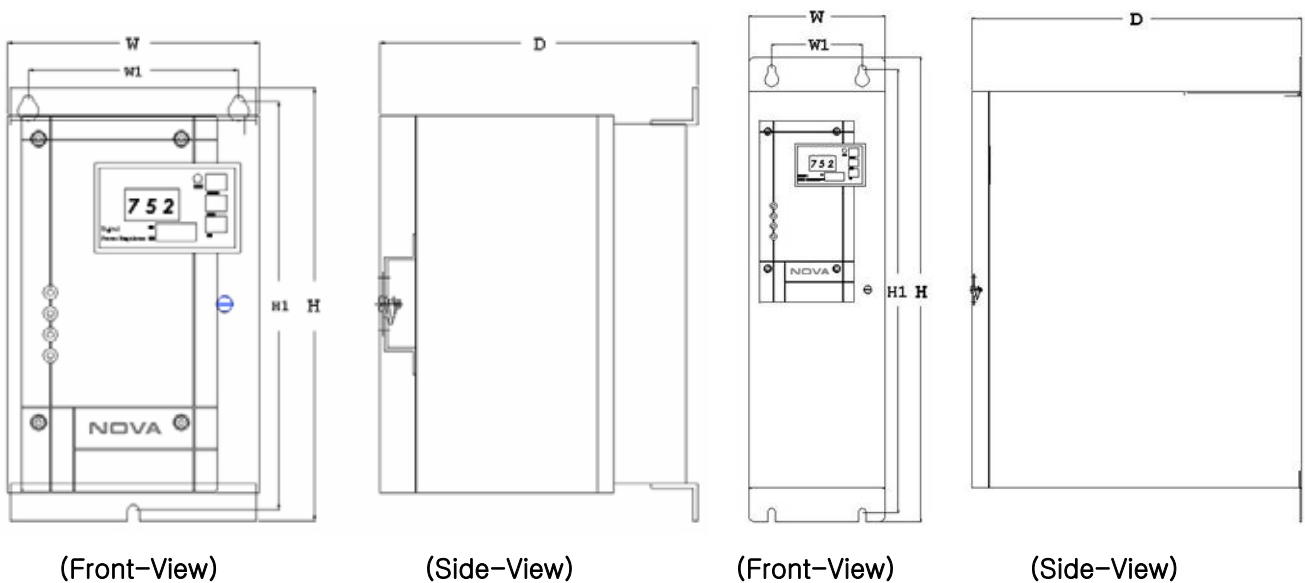
4-4 . System Block Diagram

b) Three Phase



## 4-5 . Dimension

## a) Single Phase



- Models for less than 70 A -

- Models for more than 90 A -

Model Type [A]	W	H	D	W1	H1	Mounting Bolt	Note
25, 40, 55, 70	108	195	140	90	184	5 mm	Terminal Block
			(170)				
90, 110, 130	A	123	340	220	98	5 mm	BUS-BAR
	B	123	315	190	98		
160, 200, 250, 320	A	123	405	250	88	6 mm	BUS-BAR
	B	130	325	255	88		
400, 500	A	123	510	290	88	6 mm	BUS-BAR
	B	130	495	260	88		

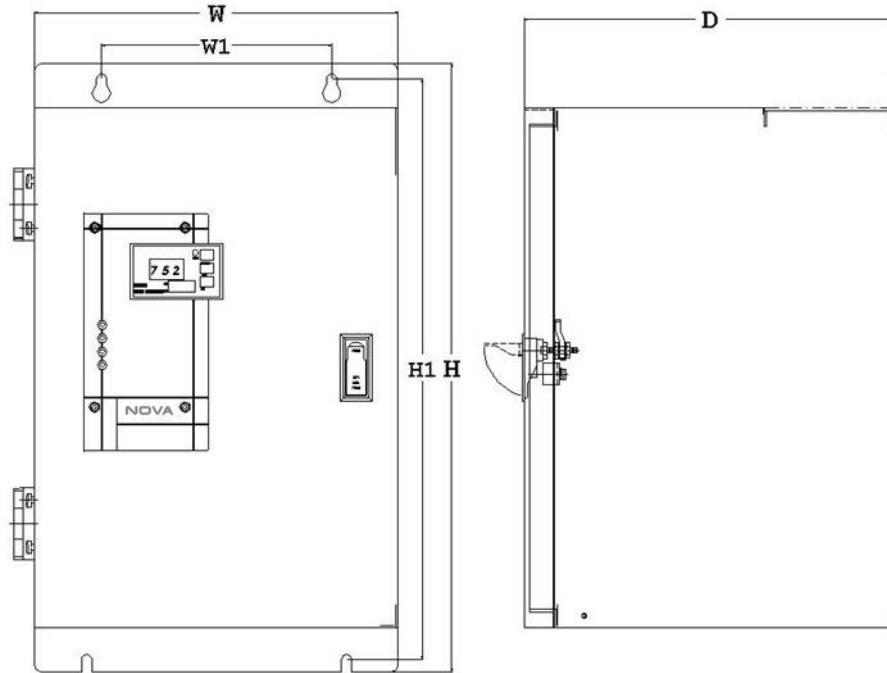
\*Dimensions of the upper product could be changed without pre-notification for improving functions.

\*The sizes in ( ) are for the product with feed back function.

\*The sizes for A and B, please refer to page 12 and 13.

## 4-5 . Dimension

## b) Three Phase










Model Type [A]	W	H	D	W1	H1	Mounting Bolt	Note
25, 40, 55, 70,	153	240	200	140	200	5 mm	Terminal Block
90, 110, 130, 160	196	340	235	170	324	6 mm	BUS - BAR
200, 250, 320	250	415	270	200	395	6 mm	BUS - BAR
400, 500	330	530	290	220	510	6 mm	BUS - BAR

\* Dimensions of the upper product could be changed without notification for improving functions.

## 4-6 . Display Message

## a) Main Message

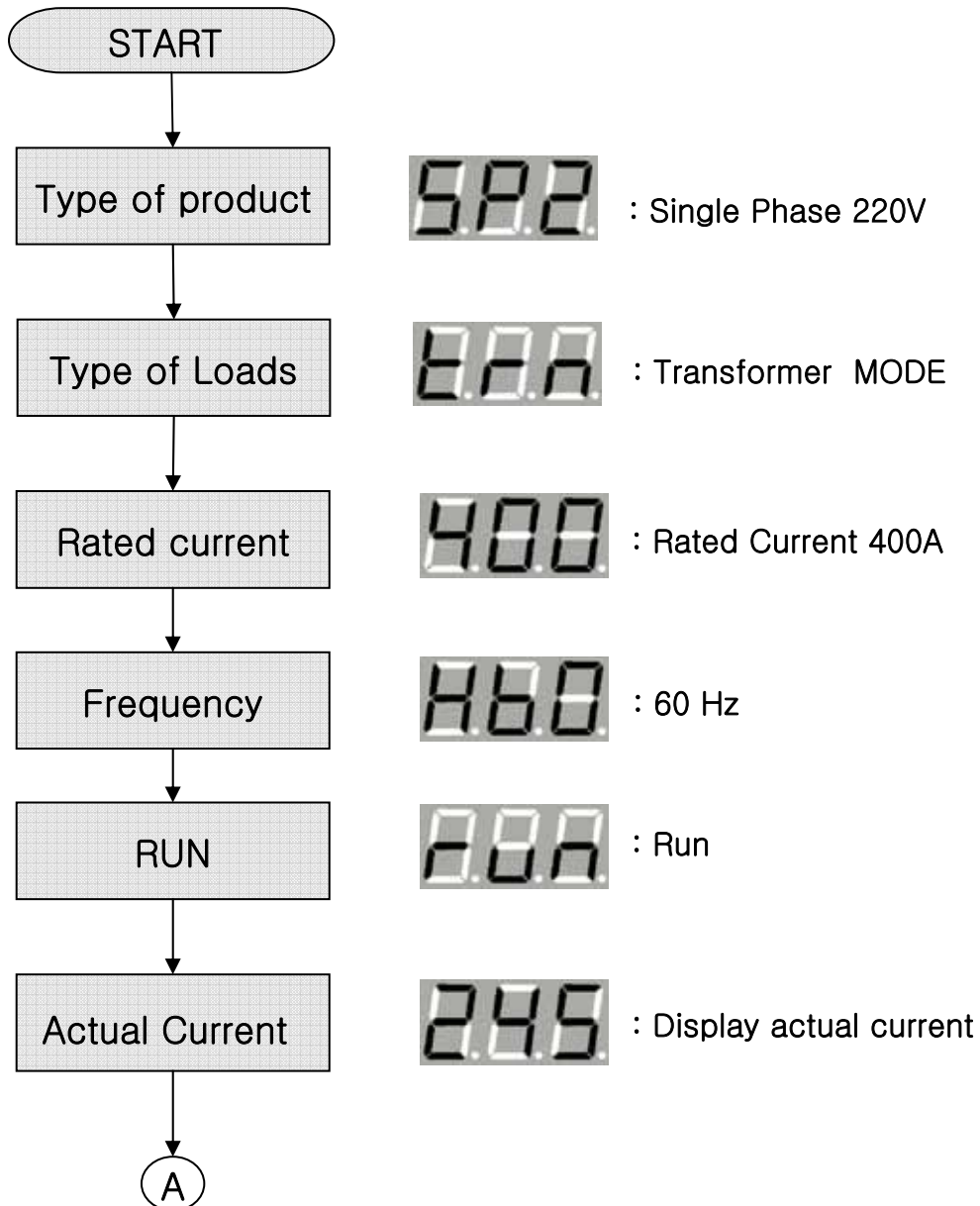
Display Message	Description
	Transformer Coupled Load
	Resistive Load
	Over Current
	Over Temperature
	Fuse Cut Off
	Load failure or system main power failure
	Operation

## 4-6 . Display Message

## b) Display Example

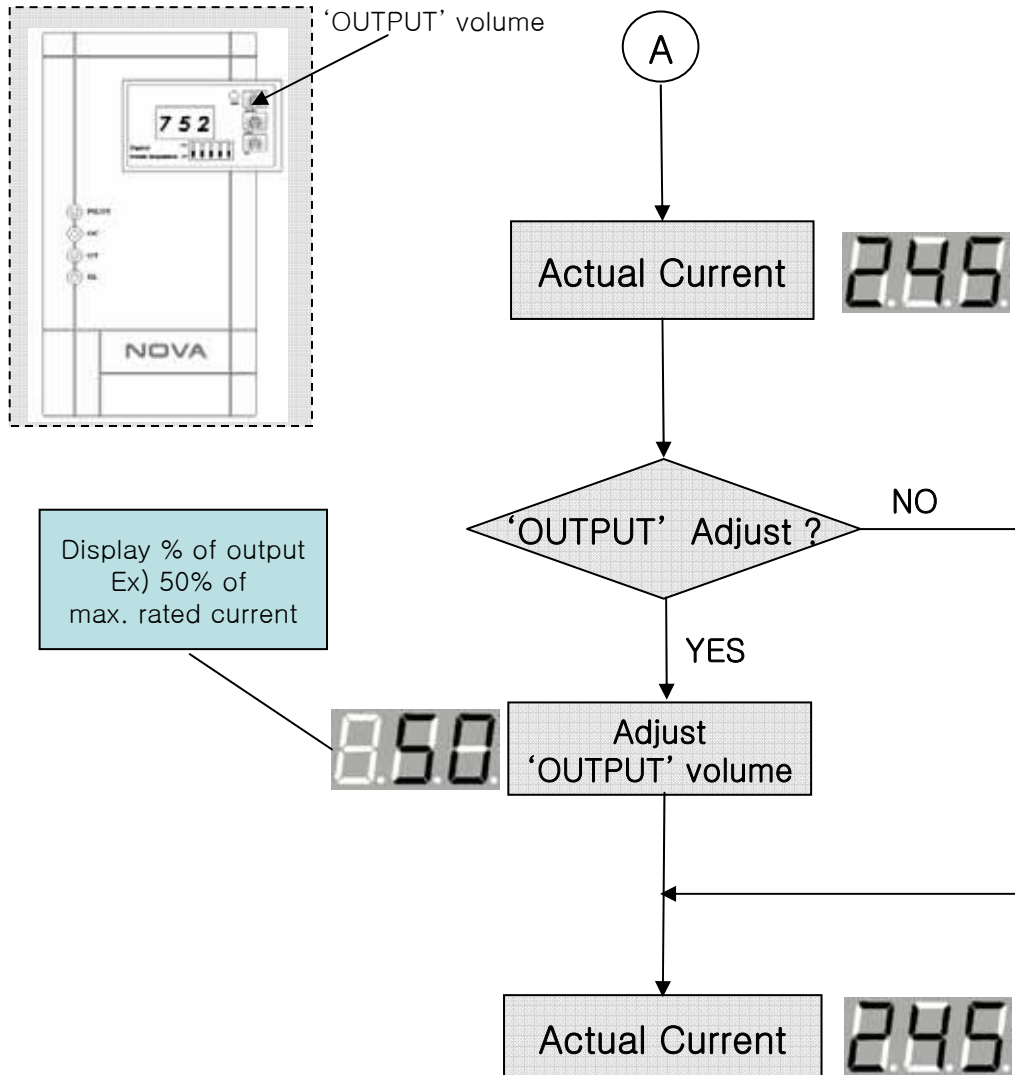
## ① While initial starting

Example) Single Phase 220V 400A  
display Message.



## 4-6 . Display Message

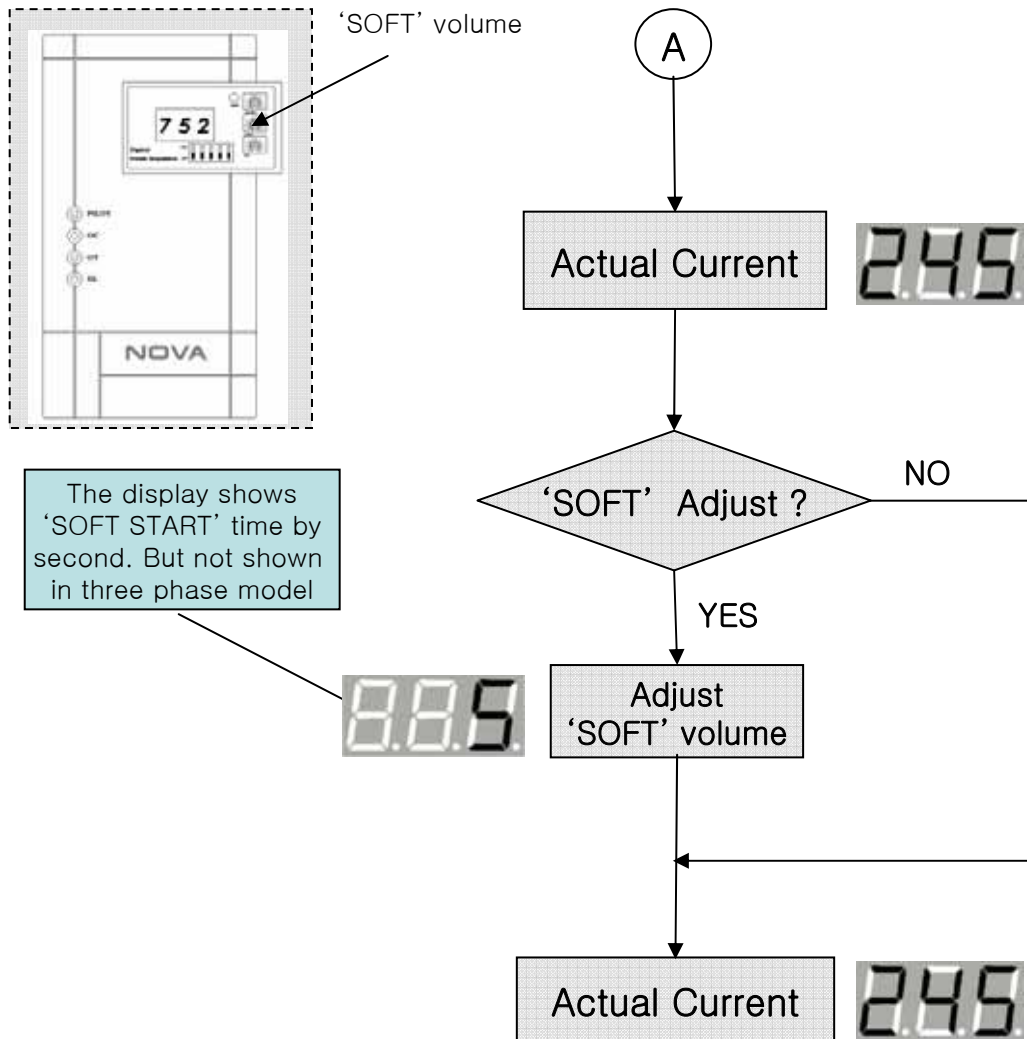
② On adjusting 'OUTPUT' power volume



OUTPUT Volume is used when selecting maximum output. FND shows figures 0~100(%), set up the figure you require by turning volume left and right. After setting up the figure you want, just push RESET BUTTON to complete selection.

## 4-6 . Display Message

③ On adjusting 'SOFT' volume



Use SOFT Volume to adjust soft Start time(0~30sec). This setting time applies to soft up/down also. On the adjusting soft volume, display FND shows you 0~30 sec. Then you can select required time by turning volume switch left and right. After setting up the figure you want, just push RESET BUTTON to complete selection.

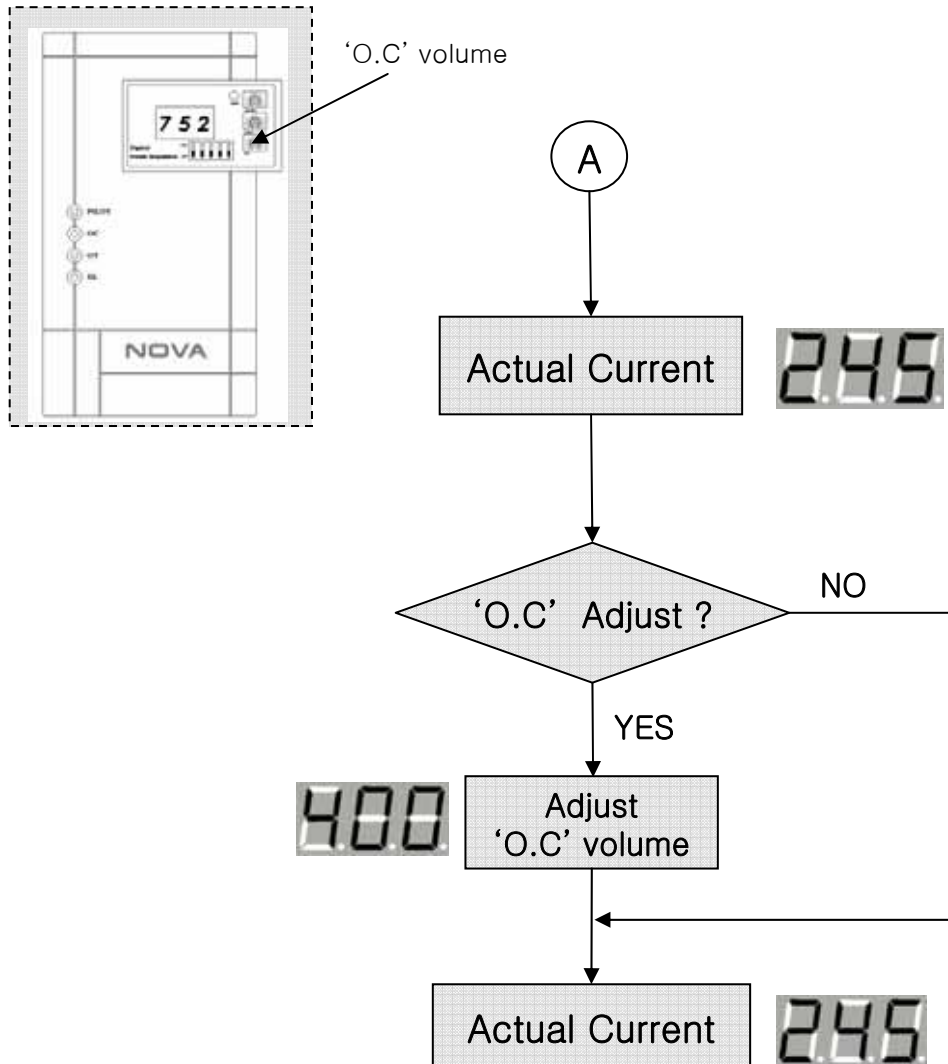
**Note**

- 'SOFT' volume adjusting is only possible while the 2<sup>nd</sup> switch of DIP switch (see page 7) is ON.



## 4-6 . Display Message

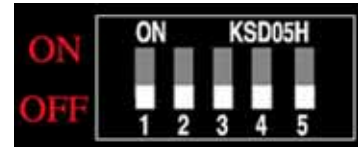
④ On adjusting O.C. (over current) volume



On selecting OC (Over Current) Volume, FND shows 0~max (maximum amperage will be shown), For example, OC volume is selected as 40 amp over current more than 52 amp (40amp X 1.3 normally 1.3 times of maximum amp. Is the limit over current) flows, the unit notify the abnormal status and does not allow the output. (OC lamp : Red lamp on)

## 4-6 . Display Message

## ⑤ PID SELECTION (FEED BACK TYPE)



Volume	Function	Explanation
OUTPUT	P	Proportional Control
SOFT	I	Integral Control
OC	D	Derivative Control

◆ Please follow below instructions to set up PID gain value.

- ① Turn the 4<sup>th</sup> and 5<sup>th</sup> DIP switches on.
- ② Set the required “P” value gain by turning OUTPUT volume right and left. When your required “P” value shows, then fix the OUTPUT volume and wait till the display shows “0”. When it shows “0”, the setting is completed.
- ③ Set the required “I” value gain by turning SOFT volume right and left. When your required “I” value shows, then fix the SOFT volume and wait till the display shows “0”. When it shows “0”, the setting is completed.
- ④ Set the required “D” value gain by turning OC (Over Current) volume right and left. When your required “D” value shows, then fix the OC volume and wait till the display shows “0”. When it shows “0”, the setting is completed.
- ⑤ After completing PID setting, turn the 4<sup>th</sup> and 5<sup>th</sup> DIP switches off. And re-set the OUTPUT, SOFT and OC values. Then, push the re-set button to complete all the settings.

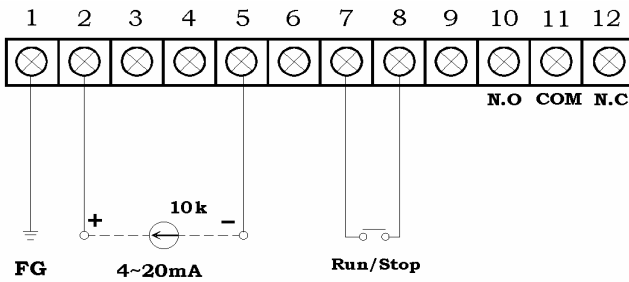
- Please consult expert in our company when you set up PID gain values. Wrong usage or operation causes bad effect on the system and worker.

## 5-1 . Notices During Operation

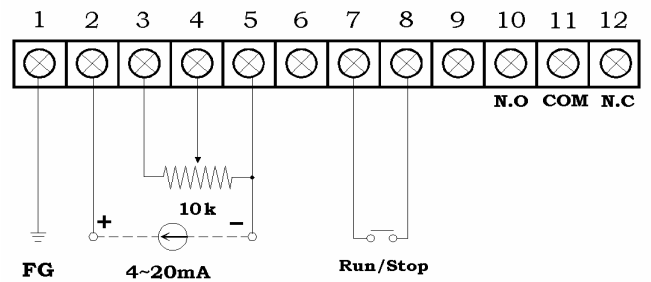
- 1) Please watch out power supply terminals otherwise electric shock will cause.
- 2) Do not touch any of components in the unit because of high temperature. Especially watch out not to put your finger or any stick in the cooling fan which turns too fast and cause you any harm.
- 3) Do not operate or turn on the unit without load which results in over voltage and damages transformer in unit.
- 4) Use only shield cable when wiring control terminal block.
- 5) Must not allow more than DC 5V or DC 20mA as input signal.
- 6) Installation Circumstances
  - ① Mount this unit in the place where it ventilates well.
  - ② Do not operate the machine where there is a risk of inflammability, explosiveness, corrosion or humidity.
- 7) Ground type 1 grounding or special type 3 grounding in the exterior box of the machine to prevent electric shock.
- 8) Check that voltage of provided power is same as the voltage of the machine and the rated current is not exceeding proper capacity of load current. Then, provide the power. (It is recommended that you do not use a machine at over 70% of the rated current condition.)
- 9) FUSE
  - ① To prevent fire and to protect the machine, use a fast-acting fuse which is designated by our company. **(Refer to the product label)**
  - ② Must turn off the main power to exchange the fuse.
- 10) Disassembly or remodeling of the machine
  - ① Never change components voluntarily with the exception of changes of fuse or thyristor.
  - ② Our company can not guarantee operation of the machine when the volume of the machine or component is altered voluntarily. When a problem occurs, please contact our company's A/S Department.
- 11) Check and repair
  - ① Before checking the machine, cut off the power and beware of electric shock.
  - ② Check fastening condition of bolts and nuts of terminal parts.
  - ③ When bolts of terminal are loose, it could generate heat so wiring can be damaged or fire can occur. Check this condition periodically.

## 5-2 . Wiring Control Terminal Block

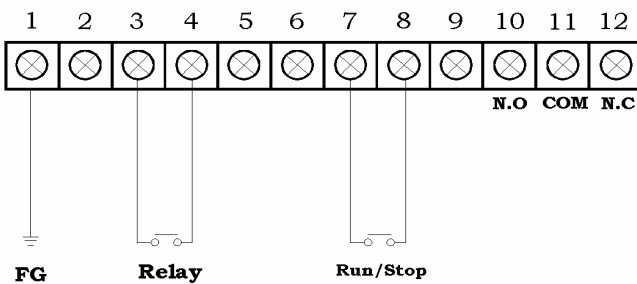
## 1. 4~20mA (Auto Mode)



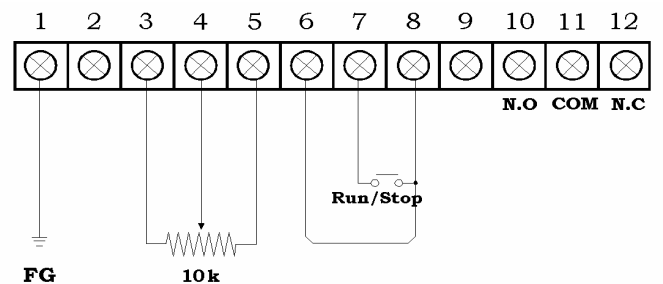
## 2. 4~20mA, Outer Power Volume

\* 3<sup>rd</sup> DIP switch on In Phase angle control

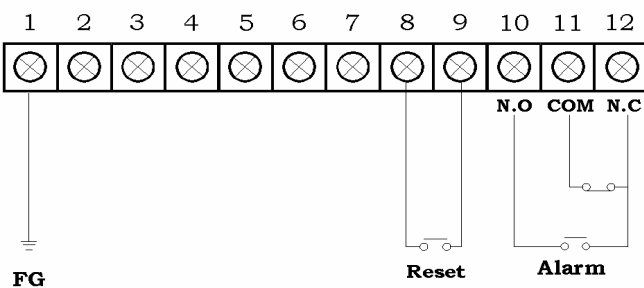
## 3. Relay Switch ON/OFF control



## 4. Manual Only



## 5. Reset, Alarm wiring



PLEASE KEEP IN MIND THAT YOU MUST NOT ALLOW MORE THAN DC 5V OR DC 20mA AS INPUT SIGNAL

### FUSE Exchange



- . The main power must be turned off to change the fuse.
- . A fuse designated by our company must be used.
- . Check that the fuse is fastened correctly after it is changed.

### SCR Exchange



- . The main power must be turned off to change the SCR element.
- . An SRC designated by our company must be used.
- . Check that the SCR is fastened correctly after changing it.

### PCB UNIT



- . The main power must be turned off to check PCB UNIT.
- . PCB UNIT is manufactured through our company's precise inspections. When a problem occurs in the PCB UNIT, please contact our company's A/S Department.

Danger, Warning/ Notice



**Danger, Warning:** This symbol is displayed when there is risk of death or serious injury.

**Notice:** When the product is used incorrectly, it could cause property damage.



- . The main power must be turned off to operate periodic inspection. There is a risk of defect, electric shock, or fire.

### Periodic Inspection

Please operate the periodic inspection, the following items, once every 6 months to maintain the best condition and functions of the machine.

#### 1. Cleaning



Dust may come from the outside. When there is dust, such as iron powder, insulation is worse and causes inferiority of operation. So please clean the attached materials. Remove the dust, on the components, using a soft brush or air.

#### 2. Components fastening condition



Check the screw fastening condition of each connection part. The screw could be loosened with time. Fastened screw could cause damage by heat so it could cause control instability or defects. So periodic inspection is necessary to keep the normal condition.

#### 3. Wiring condition check



Must check abnormality or modification of insulating covering of input and output wires of the machine. When there is abnormality, please change the part.

#### 4. Other check items



Must check the fastening and connection condition of connector and terminals in the machine.

Danger, Warning/ Notice



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