

Thyristor Power Regulator

TPR-2SL

INSTRUCTION MANUAL

HANYOUNG NUX

HANYOUNGNUX CO.,LTD

28, Gilpa-ro 71beon-gil,
Michuhol-gu, Incheon, Korea
TEL : +82-32-876-4697
http://www.hanyoungnux.com

MB0401KE240227

Thank you for purchasing Hanyoung Nux products. Please read the instruction manual carefully before using this product, and use the product correctly. Also, please keep this manual where you can view it any time.

Safety information

Please read the safety information carefully before the use, and use the product correctly. The alerts declared in the manual are classified into Danger, Warning and Caution according to their importance

DANGER	Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury
WARNING	Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury
CAUTION	Indicates a potentially hazardous situation which, if not avoided, may result in minor injury or property damage

DANGER

To prevent electric shock while it is running, put to earth with the fixed screw of the unit and do not touch the heat sink since it is very hot. Do not touch or contact the input/output terminals because they cause electric shock.

WARNING

- If there is a possibility that a malfunction or abnormality of this product may lead to a serious accident, install an appropriate protection circuit on the outside.
- Any use of the product other than those specified by the manufacturer may result in personal injury or property damage.
- Since this product is not designed as a safety device if it is used with systems, machines and equipment that could lead to a risk of life or property damage, please implement safety devices and protections for both lives and the applications and plan for preventing accidents.
- Please supply the rated power voltage, in order to prevent product breakdowns or malfunctions.
- To prevent electric shocks and malfunctions, do not supply the power until the wiring is completed.
- Never disassemble, modify, process, improve or repair this product, as it may cause abnormal operations, electric shocks or fires.
- Please disassemble the product after turning OFF the power. Failure to do so may result in electric shocks, product abnormal operations or malfunctions.

Suffix code

Model	Code				Content
TPR-2SL	☐	☐	☐	☐	Slim type Single phase power regulator
Rated current	040				40 A
	055				55 A
	070				70 A
	090				90 A
	110				110 A
	130				130 A
	160				160 A
Power supply voltage		L			100 - 240 V a.c. (Low)
		H			380 - 440 V a.c. (High)
			C		RS485
Options				F	Built-in Fuse (Only 40/55/70 A)

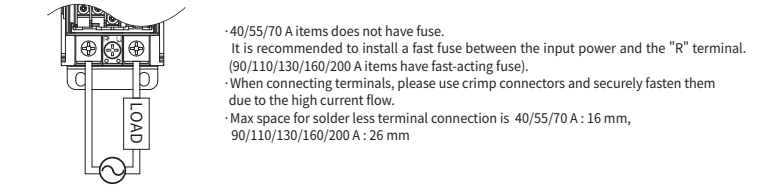
※ Please supply 100 – 240 V a.c. to the control unit of the power controller (Thyristor) separately.

Specification

TPR-									
Model	Low	2SL040L	2SL055L	2SL070L	2SL090L	2SL110L	2SL130L	2SL160L	2SL200L
	High	2SL040H	2SL055H	2SL070H	2SL090H	2SL110H	2SL130H	2SL160H	2SL200H
Power supply voltage	Low	100 - 240 V a.c.							
	High	380 - 440 V a.c.							
Circuit input power	100 - 240 V a.c.								
	6 W			16 W		20 W			
Power frequency	50 Hz / 60 Hz (Dual usage)								
Rated current(40 °C Standard)	40 A	55 A	70 A	90 A	110 A	130 A	160 A	200 A	
Fuse installation	None			Built-in Fuse					
Applying load	Resistive load								
Control Input	Current input	4 ~ 20 mA d.c. (Impedance : 100 Ω)							
	Voltage input	1 - 5 V d.c. (Order specification : 0 - 10 V d.c.)							
	Contact input	ON/OFF							
	External VR	External volume (10 kΩ)							
Control method	Phase control, Fixed Cycle control, Variable Cycle control, ON/OFF control								
Movement type	SOFT START, SOFT UP/DOWN								
Output voltage	More than 98 % of the power supply voltage (In case of maximum current input)								
Cooling method	Natural cooling		Forced cooling		Natural cooling		Forced cooling		
Display method	Display by LED								
Insulation resistance	Min 100 MΩ (Base on 500 VDC mega)								
Output control range	0 ~ 100 %								
Dielectric strength	3,000 V a.c. 50/60 Hz for 1 min								
Line noise	Noise by noise simulator (3,000 V)								
Ambient temperature & humidity	0 ~ 40 °C (Without Condensation), 30 ~ 85 % RH								
Storage temperature	-25 °C ~ 70 °C								
Approval	CE								
Weight(g)	1388		1478		2820				

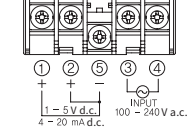
Connection diagram

Connection diagram of load terminal



Connection diagram of input signal and power terminal

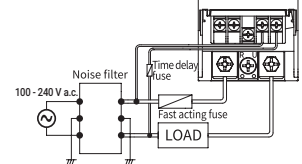
General type



- Current input : 4 - 20 mA d.c.(connect no. 1 and 5)
- Voltage input : 1 - 5 V d.c.(connect no.2 and 5)
- Input power voltage(for control unit) : 100 - 240 V a.c.(no. 3 and 4)

Recommended connection diagram

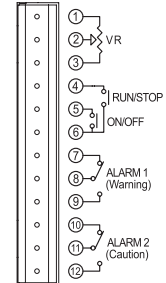
Low



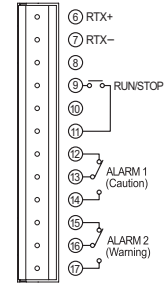
- In case of low voltage model, we suggest connect it as following picture. (90/110/130/160/200 A have fuse).
- If the product is used in a place where there is an excessive amount of noise from power then make sure to use a noise filter satisfied its specification as shown in the picture below. If not, it can be a cause of malfunction.
- When the voltage is used higher than 380 V a.c., please make sure that the input power for the control unit is separately connected to 240 V a.c.
- Protection fuse 0.5A or an equivalent device should be connected in the terminal of power input on circuit.
- Please select a fuse that satisfied with operating current/voltage for the fast acting fuse.
(example) actual operating current 40A : BUSSMANN FWH-40 (please use 40 A r.m.s min)

Connection diagram of signal and alarm terminal

General type



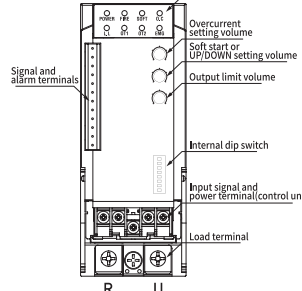
Communication type



※ When there is an alarm condition, the alarm is on after 3 seconds. If alarm condition is cleared within 3 seconds, the alarm is off.

Part name and function

General type



LED indicator and explanation

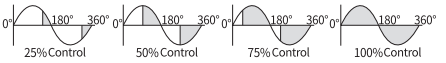
LED indicator name	Description
POWER	POWER indicator turns ON when the power is being supplied separately.
FIRE	FIRE indicator turns ON proportionally to the control output according to the control input. It lights longer if the output amount is large and it is continuously ON if it outputs 100 % continuously.
SOFT	To use Soft start, Soft up/down function, turn Soft VR clockwise and SOFT indicator will turn ON.
O.C	- After overcurrent occurs, lights up when current exceeding O.C VR set value for protection of product and load. - FAN break : The indicator flashes when the fan is broken.(Special order spec) - Over load: When SCR is shorted, the power is turned on and 100% output is exited irrespective of the control input state. If current is over 5A in each control period, it flashes.
L.L	- If the DIP switch 2 is turned OFF after the power is turned on, the heater value will be detected after confirming the capacity of the heater while automatically outputting 0 ~ 100%. When the heater value detection is completed, the LL LED remains on. When the DIP switch 2 is turned ON again, the LED goes off and the partial heater break. The detection function starts. If the heater value is less than 30% of the heater value detected at the initial setting for 6 seconds, "Caution" alarm output and LL LED lights up. - If you want to use the partial heater disconnection detection function automatically, set the DIP switch to the ON state to automatically detect the heater value and start the detection function (but not detect if the heater is already disconnected) Does not. - It will not operate when the output is below 20%.
0.T1	Lights up when the temperature of the heat sink rises above 60 °C during control, when the operation is normal and the alarm is cleared when the temperature of the heat sink falls below about 50 °C
0.T2	On / off when the heat sink temperature rises above 80 °C during control
EMG	The EMG LED indicator is ON in the following situations: - Abnormal status with power: when circuit power (24 V d.c.) is being supplied, EMG LED is ON if the load power is not being supplied or the heater is disconnected. - SCR short: If the SCR is shorted, the power supply will continue to be conductive even when there are no control input and TPR output, and the heater will continue overheating. Therefore, if the current continues to flow without the control input, the EMG LED will flash (detectable when the load current is 10A or more)

Internal dip switch operation

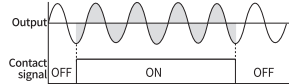
Number	OFF	ON	Initial setting mode	
No. 1	RESET CLEAR RESET	RESET	OFF	ON
No. 2	Use function of manual partial load break	Use function of auto partial load break	1	☐
No. 3	Partial load disconnection	-	2	☐
No. 4		Fixed cycle control	3	☐
No. 5		Variable cycle control	4	☐
No. 4, 5		Phase control	5	☐
No. 6		Limit mode (Not using internal VR)	6	☐
No. 7		1 - 5 V d.c.	7	☐
No. 8		External VR	8	☐
No. 7, 8	Use external and internal V.R simultaneously	4 - 20 mA d.c.	1. input mode : 4 - 20 mA d.c. 2. control mode : phase control	

Function descriptions

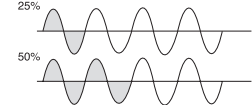
Phase control



ON/OFF control

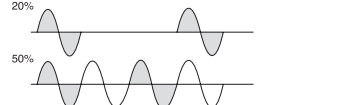


Fixed cycle control



As setting the constant cycle of the output, (1 sec), fixed cycle control is to control the AC power supply repeatedly with a constant rate of ON/OFF according to the control input.

Variable cycle control



Restart function

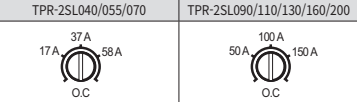
When a warning or caution alarm occurs, TPR gives alarm 1 or 2 or stop the output. This function is used to return to normal operation when factors caused errors are eliminated. This function is able to set up when Fuse/Power Supply is in disorder, Heat sink over heat, SCR Short is occurred. (When Overcurrent is occurred, this function is not working)

VR Explanation

O.C (overcurrent setting function)

When overcurrent occurs, protection function for TPR and load (Only for phase control)

• VR gradation for overcurrent setting position.



- The overcurrent setting can be different depending on the types of load or VR tolerance. In order to set an accurate position of the overcurrent setting, adjust the control signal that TPR can have the current that needs to be alarmed. Turn the O.C VR until the O.C indicator is ON. The position of the O.C VR is the overcurrent setting value.
- If OC VR turning to the right of the maximum, overcurrent function does not work.

SOFT

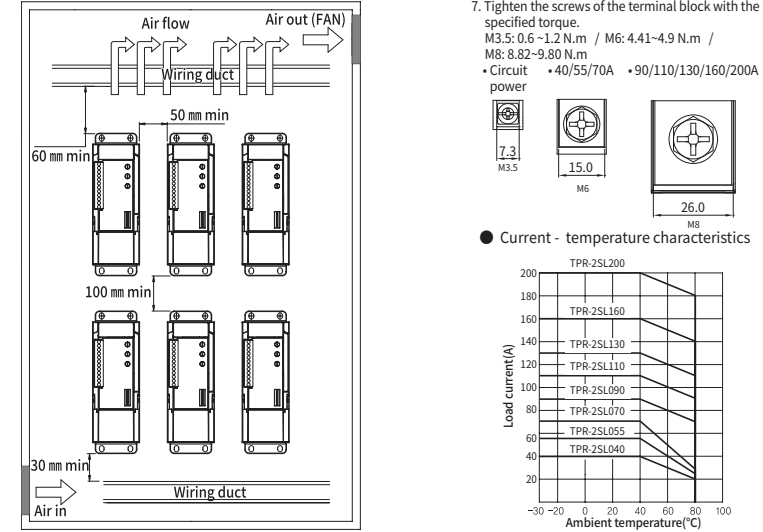
This volume is to set time for Soft start or Soft up/down. (Only phase control, ON/OFF control)
-Soft start : Protection functions against big load of start current (inrush current). It increases output softly. When control input is applied and power is on, Soft start operates when rung signal is applied. In case of maximum VR, it set 60 second.
(Example : 20 mA : 60 sec, 12 mA : 30 sec)
-Soft up / down : When rung signal and power are applied and if control input is applied, it will operate. It case of maximum VR, it set 15 second.
- If VR turn to the right, the function does not work. And if VR turn right, time will be reduced.

POWER (output limit function)

This function is to limit the output regardless of the control input amount. Even though the control input is 100 %, the output will decrease as turning POWER volume counterclockwise.

Installation

- Please install it perpendicularly. If the product is installed vertically in unavoidable circumstances, please use 50% of rated current.
- When multiple products are closely installed, please install them with keeping a distance of more than a width of 5cm and a length of 10cm as shown in the picture.
- In order to not block the air flow, please install the wiring duct less than the half of the heat sink height.
- Please consider whether the air flow is good enough when installing the product. If the ambient temperature is as low as possible in the inside then the life span of the product is increasing as the durability and reliability of the product are improving. The operating ambient temperature is 0 ~ 40 °C. Please refer to the following graph. However, if the ambient temperature is higher than 40 °C, the maximum load current is decreasing like the below.
- When connecting R and U, please securely fasten them with using crimp connectors since high current flows into these terminals. If the contact surface of the connectors and terminals are poor, it may lead to a fire since the wires and terminal gets overheated.
- Before applying power, this model need more than the third class grounding to prevent electric shock. This model does not have separate grounding terminal so we suggest using grounding terminal and bracket together when install this model to a panel.

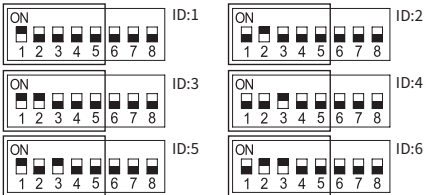


Communication

- Communication method: RS485 2-wire half-duplex
- Communication speed: 2400, 4800, 9600, 19200 bps
- Maximum number of connections: 31
- Protocol: ModBus RTU, ModBus ASCII

Address (ID) setting

- Set the ID with DIP S/W no.1-5
- Set 1 ~ 31 (except 0).
- When communication setting is changed, the change is applied after reset.



Communication setting (ModBus RTU/ASC II)

Communication settings				Structure (RTU)			
Communication speed	2400, 4800, 9600, 19200	bps		Division	Address(ID)	Function	Start Address
Protocol	ModBus RTU	ModBus ASC II		Request	1	1	2
Parity bit	Even	None	bit				
Data bit	8	7	bit				
Stop bit	1		bit				
ID	1 ~ 31						

Example (RTU)						Structure (ASC II)		
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