

Thyristor Power Controller

FPH-3 Type Instruction Manual

[RoHS Compliant]

F P H 3 0 1 - E 1

<Introduction>

Thank you for purchasing the FPH-3 type of Thyristor Power Controller this time.
This book has explained the needed matter before using the FPH-3 type.
Can importantly keep this book, always read when be necessary it, and get it.

=Asking=

Please manage this manual so that it is surely delivered at hand of the person who finally uses this product.



Warning

- * Attention in wiring
 - Please set up an appropriate protection circuit to the outside for the prevention of accidents when the breakdown and abnormality of this equipment might cause a serious accident of the system.
 - Please do the circuit protection with the fuse etc. of appropriate capacity to the I/O line of the power supply line and the high current capacity connected with this equipment for the equipment damage prevention and the equipment breakdown prevention.
- * Power supply
 - Please supply the power supply that exists in the specification for the equipment damage prevention and the equipment breakdown prevention.
 - Please do not turn on the power supply until all wirings ends for the electric shock prevention and the equipment breakdown prevention.
- * Use prohibition in gas
 - Please do not use this equipment in the place with combustion, the explosive gas or steam for a fire and explosion prevention and preventions of the equipment breakdown.
- * Contact prohibition in equipment
 - The people other than our serviceman must not touch in the equipment for the electric shock and the burn preventions.
There is a part of a high voltage or the high temperature in the equipment and it is very dangerous.
- * Remodeling prohibition
 - Please never remodel the equipment originally for the prevention of accidents and the equipment breakdown prevention.
- * Maintenance
 - Please do not do anyone other than our serviceman to the exchange of parts etc. for prevention and the equipment breakdown the electric shock and the burn preventions.
 - Please maintain it regularly to use this equipment continuously and safely.
There are the one that there is longevity in the installing parts of this equipment and the one that changes in year of passing.

Forest Co., Ltd.

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1. Before reading this book

1.1 Reader who targets it

This book targets all the use of the FPH-3 type.

Moreover, the reader is required to have basic knowledge related to electricity and basic knowledge related to the control in this book.

1.2 Attention

- The content of the description of this book is changed without the refusal.
- The all or parts of the content of the description of this book are forbidden to reprint, and to be reproduced without permission.
- And manufactured under strict quality control, and this manual This product has been shipped, but if there is a point of notice and Bugs event, until after the distributor for purchasing our sales representative, the nearest please let me know.
- Please acknowledge that our company cannot assume all the responsibilities even if the user and the third party suffer the following damage.
 - ①Damage because of influence of result of operating this product.
 - ②It is damage in our company due to the defect of this unpredictable product.
 - ③Additionally, all indirect damage.

1.3 To use it safely

1. This machine is required to be used on the following condition.

It is an equipment of the component type, and it sets up in the instrumentation That is, because this equipment is produced partially of end-products, the high voltage part such as the power supply terminals becomes baring. Therefore, when it is installed in end-products, please treat it as the user cannot approach the high voltage part such as the power supply terminals on the end-products side.

2. Please defend the safety notes described in the manual when this equipment is operated, and is maintained, and repaired by you to use this machine correctly and safely.

Our company cannot assume the responsibility and the guarantee about injury and the accident caused by not having followed these attention.

1.4 Attention in mark

In this book, to use this product safely and surely, the following displays are done.

<Signal word>

Warning

: When danger might reach the life and the human body of handlers such as the electric shock, fires, and the burns, notes to avoid the danger have been described.

Attention

: Notes when there is fear of the equipment damage if it doesn't strictly follow the operating procedure etc. are recorded.

Reference

: An exceptional condition and attention are recorded in the operating procedure and the explanation, etc.

<Symbol>



: The electric shock is noted.



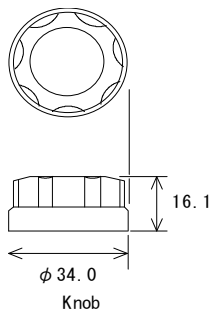
: The high temperature is noted.



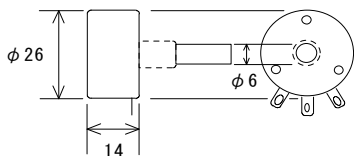
: Especially, this mark is used for would like of me you to note it on safety.



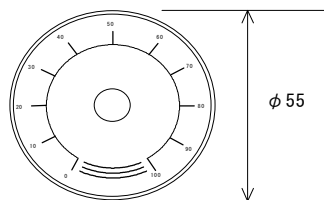
: This mark is used when there are an exceptional condition and attention in the table and figure or is amplification.



Knob



Volume (Resistance:5kΩ, Change property:B)

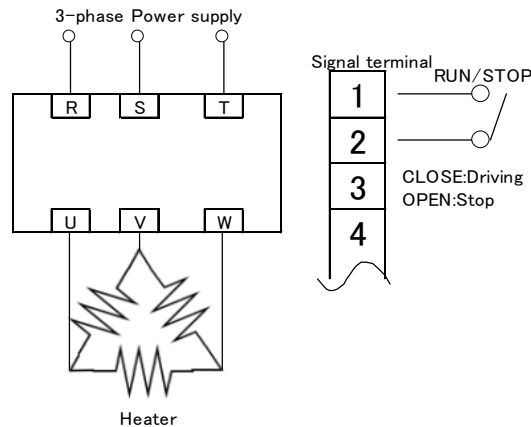


Dial plate

5. External connecting wires and function explanation

5-1. Main circuit wiring and RUN/STOP Function

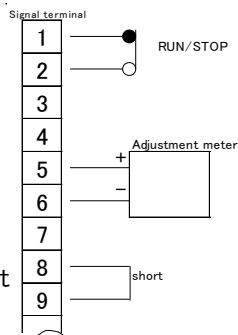
- a) Please supply the 3-phase power supply suitable for the specification value to the R-S-T terminal. Please set up the breaker or the fuse of deciding hastily outside when it is not fuse of deciding hastily addition of optional feature [-F].
- b) Please connect the load such as heaters by the method of [Y] connecting wires or [Delta] connecting wires in U-V-W terminal.
- c) RUN/STOP function is equipped normally with this product.



! Be short-circuited of 1 and 2 of the signal terminals when RUN/STOP function is not used.

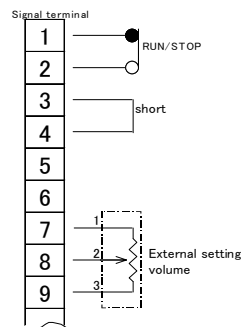
5-2. Automatic

Please connect the signal ([A] type is 4~20mADC, [C] type is 1~5VDC) from the temperature adjustment meter with 5(+) and 6(-) of the terminals. And, be short-circuited of 8 and 9 of the terminals. It becomes an output adjustment by the automatic operation.



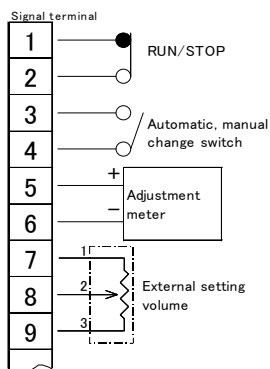
5-3. Manual

Please connect the volume of the attachment with option [-1]. And, be short-circuited of 3 and 4 of the terminals. It becomes an output adjustment by the automatic operation.



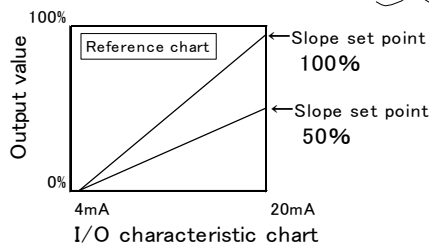
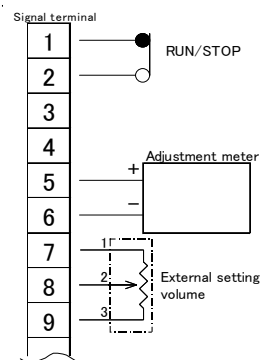
5-4. Automatic / Manual (Slope setting machine)

An automatic, manual change can be done with the option [-1] by using the volume and the changeover switch of the attachment. (The changeover switch is not attached to this product.)



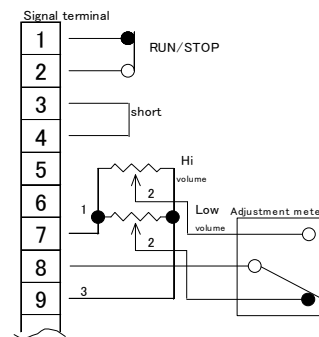
5-5. Slope setup

The output limitation with the slope setting machine can be done with the option [-1] by the combination of the volume and the temperature adjustment meter of the attachment.

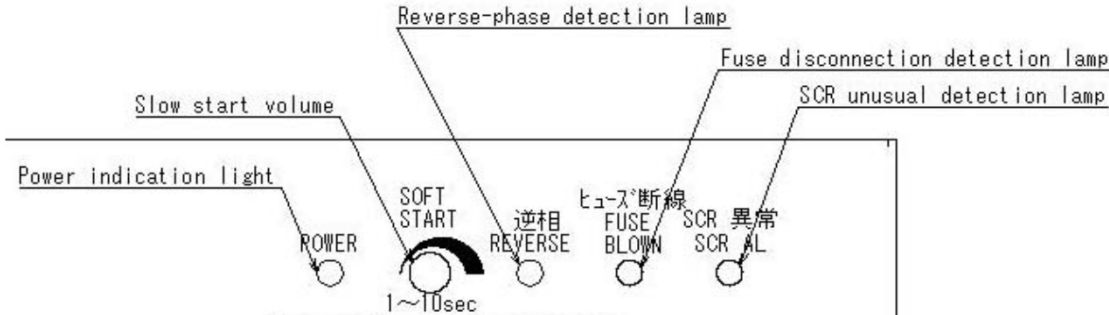


5-6. H-L control

ON/OFF that limits a maximum output and a minimum output by the relay point of contact change can control with option [-5] by making two volumes of the attachment the Hi setting machine and Low setting machine.



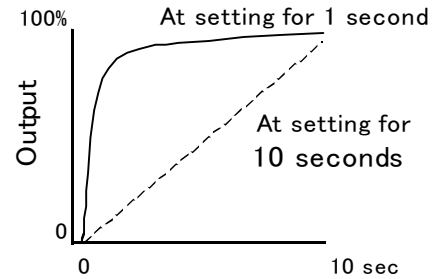
Front panel chart



5-7. Slow start function

It is changeable as for the soft start volume, and the slow start function of about 1-10 seconds works. It is set at about one second of minimum value, and set it to the slow start point suitable for use, please when you ship it.

The displayed time is time to reaching the maximum output.



5-8. Warning function

① SCR unusual detection [-G option]

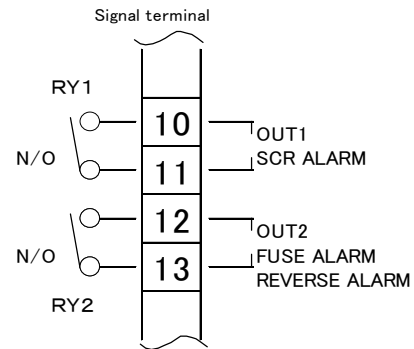
The unusual detection lamp (RED LED) lights when abnormality is detected, and the RY1 relay point of contact closes.

② Reverse phase detection

Reverse phase detection lamp (RED LED) lights when 3-phase power supply R-S-T phase is reversely connected and the RY2 relay point of contact closes.

③ Fuse disconnection detection [-4 option]

With the fuse of deciding hastily of option [-F], Fuse disconnection detection lamp (red LED) lights when the fuse of deciding hastily is disconnected and the RY2 relay point of contact closes.




<RY1 · RY2 Relay point of contact capacity>
AC250V 1A Resistance load/MAX

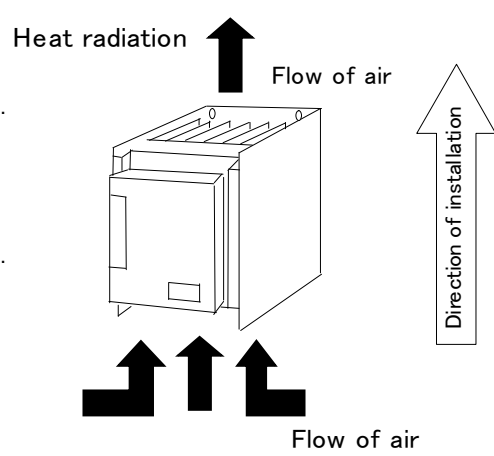
5-9. Power supply frequency distinction function

As for the change of the power supply frequency 50/60Hz, it distinguishes in the unit automatically and the output control is done.

6. Attention in installation

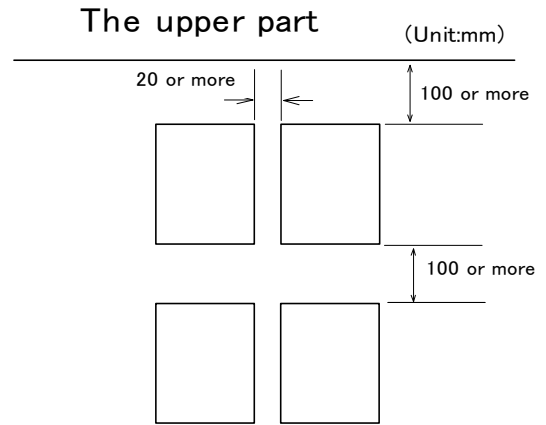
- ① Please confirm the vertical direction of the product, and install it in the decided direction when you install it. Because this product has large generation of heat, it cools by using the heat convection of air. Therefore, when the installations other than upper and lower opposite and install on the floor side being provided are done, it causes the accident and the breakdown. Please note it.

 The opposite direction installation and the installation on the floor side are prohibited.



- ② When you install these several products, please open more than the size in a right picture and install the interval of the adjoined equipment. When the sticking installation is done, it causes the accident and the breakdown because of generation of heat.

 The sticking installation is prohibited.

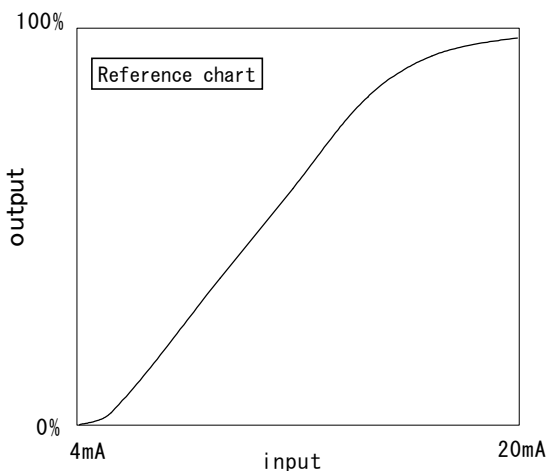


7. Reference

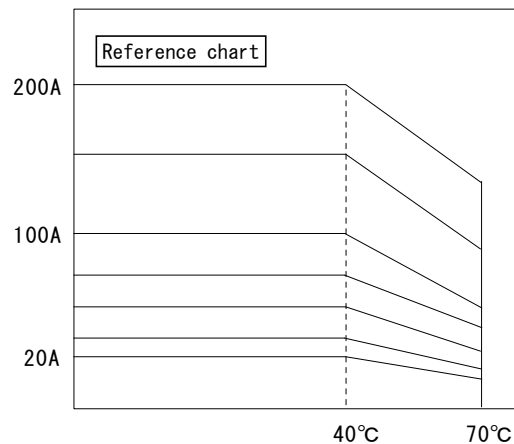
7-1. The main parts

	Fuse of deciding hastily (HINODE ELECTRIC CO., LTD.)	
	200V group	300/400V group
for 20A	250GH-25-F	660GH-25-F
for 30A	250GH-40-F	660GH-40-F
for 50A	250GH-63-F	660GH-80-F
for 70A	250GH-100-F	660GH-100-F
for 100A	250GH-125-F	660GH-125-F
for 150A	250GH-200-F	660GH-200-F
for 200A	250GH-315-F	660GH-315-F

7-2. I/O characteristic



7-3. Load current—Temperature characteristic



8. Check, maintenance, and troubleshooting

Please do the following check and maintenance to drive this product always best.

8-1. Check

- ① Please confirm the wiring for the load again before it energizes after connecting wires ends.
- ② Please confirm reverse phase detection lamp doesn't light.
- ③ Please confirm a regular electric power is adjusted after it energizes.

8-2. Maintenance

- ① Loosening of the screw of the power supply connection terminal causes generation of heat etc. Please confirm there is not loosening of the screw after confirming the thing that the power supply is not impressed.
- ② Parts that there is longevity of the electrolytic capacitor and the cooler fan, etc. in this product are used.
The periodic check will be encouraged every several and we encourage to execute it.

8-3. Troubleshooting

The one that seemed that the most general matter it about the state, the cause investigation, and the measures of meter breakdown was enumerated below.

Please refer maintenance, and the check.

Moreover, please contact the inquiry of this product purchased our sales office or liaison office after confirming the type name and the specification of the product.

① The output doesn't go out.

- * A regular load voltage is not impressed. (Example: The product of 400V fraction is used by 200V.)
- * The plus(+) and the minus(-) of the current input signal are opposite.
- * The fuse disconnection warning lamp lights. = The fuse has been disconnected.
- * (At the manual setting) Neither M turn terminal nor terminal A are short-circuited.
- * (At the slope setting control) The volume of the slope setting machine of 0 remains.
- * (At the H-L control) The HIGH side volume of 0 remains.
- * SCR warning turning on the lamp. (Damage of thyristor element by load short etc. Or, when you open between phases of the load) → Repair necessary

② The output remains going out.

- * The load is not connected with this product, and it is connected directly with the power supply. (Mistake of wiring)
- * It remains about the manual setting. (At 100% in the volume of the manual setting)
- * (At the H-L control) It remains about 100% in the LOW side volume.
- * The input signal from the adjustment meter is the maximum value. → Trouble of adjustment meter
- * SCR warning turning on the lamp (Damage of thyristor element by load short etc.) →

Repair necessary

③ A regular output doesn't go out.

- * A regular load voltage is not impressed. (The rated voltage is not impressed.)
- * The input of this product is not suitable for the output of the adjustment meter. (Example: 1~5V ties to 4~20mA.)
- * Wiring is reverse phase. (reverse phase detection lamp lights.)
- * (At the slope setting control) The volume of the slope setting machine of 0 remains.
- * (At the H-L control) The volume setting value of the HIGH side and the LOW side is not correct.
- * The selection of the resistance load (R load) and the inductive load (L load) is wrong.
- * This breakdown in product due to part deterioration etc. → Repair necessary

9. Product specification

Maximum load current	: AC:20A, AC:30A, AC:50A, AC:70A, AC:100A, AC:150A, AC:200A
Control method	: Phase control method (at 40°C)
Applicable load	: Linear (R:resistance) load or the inductivity(L) load. (Specification necessary)
Load make-break device	: Thyristor module
Minimum load current	: 0.3A or less
Range of output control	: 0~98% of the first side power-supply voltage
Start method	: Slow start standard equipment : about 1 sec~10 sec (Time until outputting 98%)
Input	: Sign「A」 : 4~20mA DC (Input impedance about 150Ω) Sign「C」 : 1~5V DC (Input impedance about 25KΩ)
Output protection	: None (Fuse of deciding hastily, It is possible to correspond by the option.)
Power-supply voltage	: AC: 200V, 220V, 380V, 400V, 440V
Reverse phase detection	: LED display
Power supply frequency	: 50Hz ±1Hz · 60Hz ±1Hz (It is a main body and judgment Auto Select.)
Permissible voltage change	: Within ±10% of ratings value
Cooling system	: Self-cooled (20A, 30A, 50A, 70A) · Compulsive-cooled using a fan (100A, 150A, 200A)
Permissible ambient temperature	: 0~40°C (Within the range of 40~70°C, the maximum load current decreases. Page 6 Refer to Figure 7-3.)
Allowance and relativity humidities	: 90%RH or less (without bedewing)
Environmental conditions	: No exposure to corrosive/inflammable gases, dust or vibration
Insulation withstand voltage	: Between the power supply and the frame :1500 VAC for one minute
Insulation resistance	: Between the power supply and the frame : Over 50 MΩ (in 500 VDC megger)
Power consumption	: 20A: 2.4VA, 30A: 2.4VA, 50A: 2.4VA, 70A: 2.4VA, 100A:20.4VA, 150A:20.4VA, 200A:20.4VA
Attachment	: Perpendicular attachment
Externals size	: Refer to externals dimensional drawing on page 3.
Weight	: 20A:about3.0Kg, 30A:about3.5Kg, 50A:about6Kg, 70A:about10Kg, 100A:about11Kg, 150A:about11Kg, 200A:about11Kg
Option	: - 1 ; auto/manual selection/gradient setting - 4 ; alarm of fuse blown (only for type with fuse) - 5 ; High-Low control - F ; with quick-blow fuse - G ; SCR alarm output with - T ; non-standard supply voltage (Specification necessary: To maximum 440VAC)
Attention	: ① The I/O characteristic is a straight line curve. ② The sticking installation cannot be done. ③ It is not possible to use it for a capacitive load such as capacitors.

The contents are subject to change without notice for improvement. Please note.

Attention concerning use

- This product is not the one produced aiming at the usage provided by Export Trade Control Ordinance. Therefore, it is not possible to use it aiming at Weapons of mass destruction etc.
- Please use it after investigating externals never used by Weapons of mass destruction (military usage and military equipment, etc.) etc. and the final usage and the final customer.
Please note it enough externals not exported as the re-sales are illegal.



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