電力調整器

THYRISTOR POWER REGULATOR

F6 SERIES

CE

Product features

- Downward-opened panel designed, Convenient for fuse replacement.
- Top and bottom designation with good looking covers, convenient to open and pug-in for wiring.
- European style terminals is used control wire is connected to the Re-wiring shall not be needed in case of replacement.
- Contains high-speed fuse to prevent damage to major components, external wiring, and reduces installation space when anomaly occurs.

  In cases of SCR overheating or fuse burn-down, the system output is stopped immediately. Once the malfunction is eliminated and power is restored, the system will buffer the output to prevent the fuse burn-down.
- Immediately stops the output after a 0.5Hz power failure, and then buffer the output. (This prevents power surge from causing FUSE to blow abnormally.)

  Activating circuit is independent from the main PCB circuit to prevent the damage occurred in case of main circuit malfunction.

Main power is one spec. Design for 180~480VAC

Automatic self-detecting function enables the availability for 45~65Hz frequency, Manual selecting or switching shall not be needed.

The auxiliary powers (AC1, AC2) are independently controlled for all models.

Multi-LED display panel makes the operating condition clear.

Independent adjustment of Max and BIAS.

Build-in buffering output adjustment (SFS VR), adjusting range 0~25 seconds.
(Only for the phase control product.)

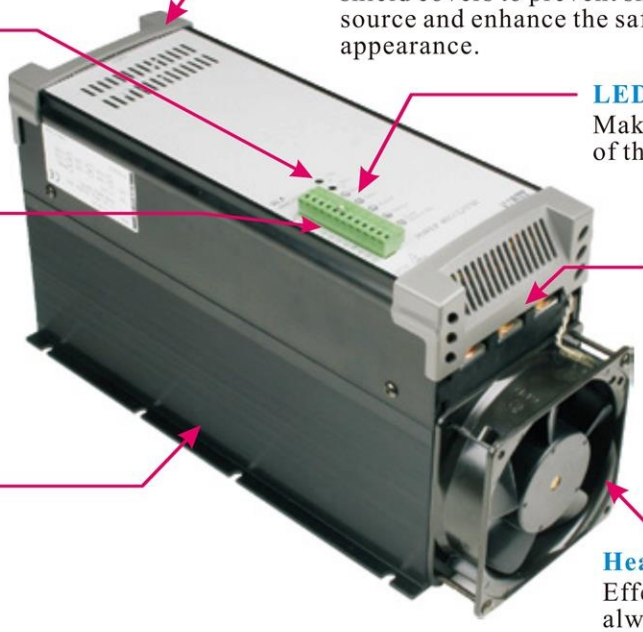
Using Single Chip Control, input resolution 10-Bit, output resolution 0.1%.

4~20mA, 1~5VDC, 2~10VDC, 0~20mA, 0~5 VDC, 0~10VDC, dry contact points…etc., available for any kind of control signal.

Automatic detection and display for power out-of-phase, SCR overheating, and fuse burn-down with one set of alarm dry contact output.

Control modes: Phase proportional control, Zero phase even distribution and Zero phase sampling …etc, can be switch be switched each other.

Outline descriptions



Mains Power Cover
The energized parts of main power are hidden by shield covers to prevent shocking of the power source and enhance the safety and outside appearance.

VR Adjustment
Adjust the maximum voltage output and the voltage rising buffering time.

LED Light Indicators
Make the operating condition of the power regulator clear.

Control Signal Terminal Block
Terminal band of control signals (Temperature controller, control signal, VR...etc.) contains the connectors for output alarm signal.

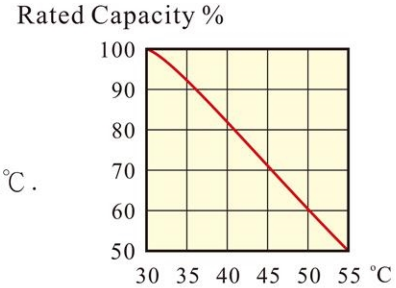
Load Side Protection Cover
The energized parts of load are hidden by shield covers to prevent shocking of the power source and enhance the safety and outside appearance.

Heat Dissipation Fin
Increases heat dissipation area of the SCR Module.

Heat Dissipation Fan
Effective ventilation fans are always running to cool down the facility which assures the Power regulator works in proper condition.

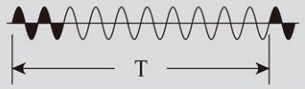
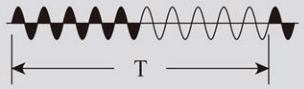
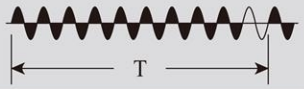
Installation Precautions and Surrounding Conditions

- Power Regulator generates internal heat during operation. Install the unit vertically with sufficient space reserved on both sides, otherwise heat dissipation may be hindered and the internal temperature of the Power Regulator may rise continuously.
- There must be some ventilation holes on the control box. Please follow the principle of hard air rising to install the ventilation holes or extra cooling fans.
- The Control Box shall be provided with vents or a ventilation fan for an air convection base on the principle that hot air rises from bottom to top.
- DO not install the device in a hot position or where the ventilation is poor, otherwise use it at 70% of the rated capacity.
- Avoid installing the regulator in the places with heavy water evaporation, acid, alkaline, or corrosive air.
- Humidity in the surrounding: RH<90% . (Without condensation)
- Temperature in the surrounding: -10℃ ~45℃ .



※The above data are for conditions where the heat dissipation fin is installed to maintain heat convection without corrosion or oil stains on the fin.

Control and applied loading

輸出量 Output / 控制方式 Control mode	輸出波形 Output wave		
	20% Output	50% Output	90% Output
相位控制 Phase angle control			
零位控制(均分控制) Zero crossing control (Cycle sampling)	 1 cycle ON and 4 cycle OFF	 1 cycle ON and 1 cycle OFF	 9 cycle ON and 1 cycle OFF
零位控制(取樣控制) Zero crossing control (Time sampling)			

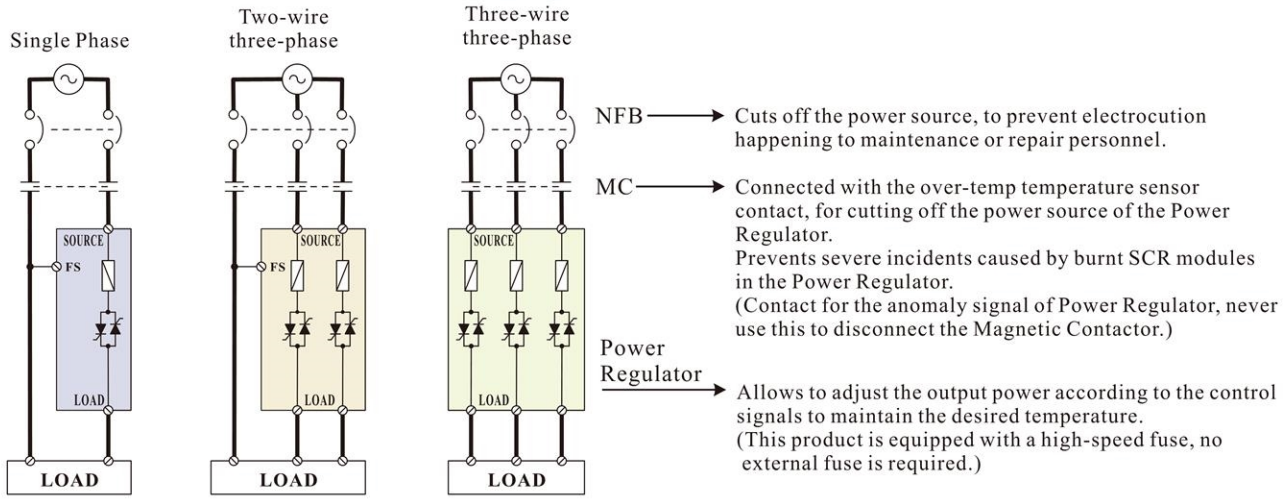
Phase Angle Control: Continuous Phase Angle Control, steady output, no fluctuation in the current meter, but harmonic waves occur.
Applicable Loading: Load with constant impedance, load with variable impedance, reactant load, IR Lamp.

Zero Cycle Sampling: Distributive Zero Control (Variable cycle), minimum resolution 1Hz - number of harmonic waves is lower than Phase Angle Control - current meter fluctuates during output.
Applicable Loading: Load with constant impedance.

Zero Time Sampling: Time Sampling Zero Control, (Constant period) minimum resolution 1Hz - control in low harmonic wave - output is in a full continuous wave.
Applicable Loading: Load with constant impedance.

Remarks: Zero cycle sampling low harmonic control, THID harmonic wave lower than 5%, which meets the US power company IEEE-519 specifications.
(Taiwan Power Company follows the regulations of the American Electric Power Company.)

Wiring and Planning Precautions



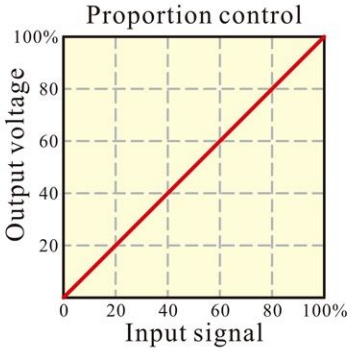
- Planning of the standard mains circuit: Main power → NFB → MC → Power Regulator → Load.
- Make sure all the screws are tightened for the wiring, otherwise poor contact may result in a temperature rise.
- On completion of wiring, make sure all the cover plates are installed before engaging the power source,otherwise electrocution may occur, or a short-circuit may occur due to a conductive object falling in.

Table of Product ID

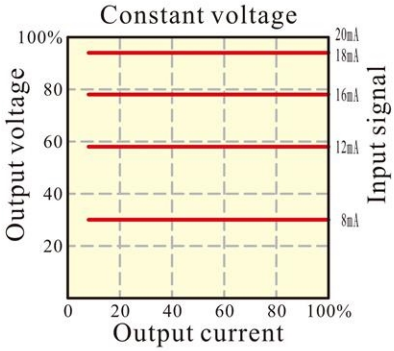
Product Series	F6	F6 Series								
Specification Type	A	Single-phase angle control								
	E	Two-wire three-phase zero crossing control								
	C	Three-wire three-phase angle control								
Mains Voltage	1V	40~120VAC	45~65Hz							
	4V	180~480VAC								
	6V	460~690VAC								
Rated Current	030	30A								
	045	45A								
	060	60A								
	080	80A								
	100	100A								
	125	125A								
	150	150A								
	180	180A								
	230	230A								
	270	270A								
	300	300A								
	380	380A								
	450	450A								
	580	580A								
	750	750A								
Control mode (CT.MD)	P	Phase Control Proportional Output			All the functions can be switched to each other. (Refer to table 1-1)					
	A	Zero Average Distribution (Variable cycle)								
	S	Zero Sampling Control (Sampling time 2 seconds)								
	N	Four-wire three-phase angle control (Load connected to Y, neutral point connected to N-phase) ※Selection of control mode, see table 1-1.								
	V	Phase constant voltage			Control mode can be selected. (Refer to table 1-1)					
	C	Phase constant current								
	L	Phase current limit								
Serial Number	–									
Auxiliary Power	1	1 § 110VAC								
	2	1 § 220VAC								
Input signal code	0	0~5VDC			Input signal can be selected. (Refer to page 5)					
	1	1~5VDC								
	2	2~10VDC								
	3	0~10VDC								
	4	4~20mA								
	5	0~20mA								
	*	SSR dedicated (4~24VDC)								
Buffering time code	J	Adjustable buffering time, 0~25 seconds (The default setting is about 12 seconds)								

Three-wire three-phase angle control T
Two-wire three-phase zero crossing control Z
Single-phase angle control S

Proportion control



Constant voltage



Current limit

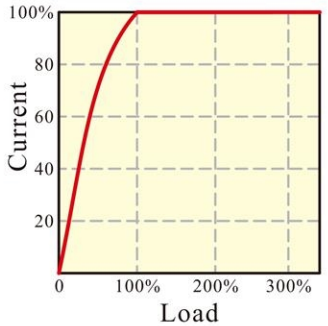


Table 1-1

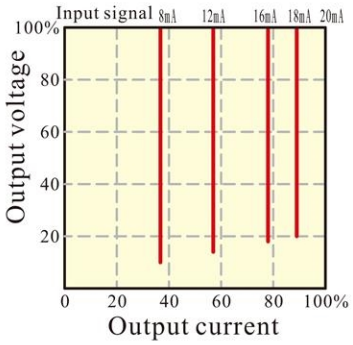
Control mode CT.MD	SW1
P Phase angle control	DP1 DP2 ON 1 2
A Zero cycle sampling	DP1 DP2 ON 1 2
S Zero time sampling	DP1 DP2 ON 1 2

※ Three-phase two-wire products without SW1.

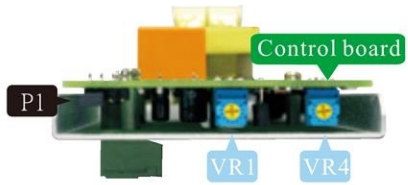
Table 1-2

Control mode CT.MD	SW1
C Constant current	DP1 DP2 ON 1 2
L Current limit	DP1 DP2 ON 1 2

Constant current



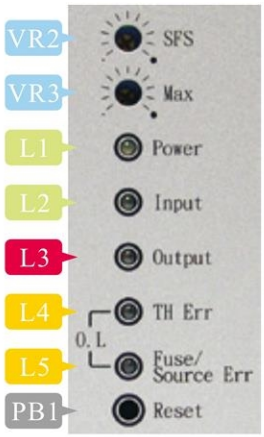
Selection of the input signal



◎ 4~20mA、0~20mA、MANUAL Selection S1 (Input Impedance 249Ω)

◎ 1~5VDC、0~5VDC Selection S2 (Input Impedance 200KΩ)

◎ 2~10VDC、0~10VDC Selection S3 (Input Impedance 18KΩ)



Functional adjustment

VR1 BIAS : Standard output voltage adjustment.
(Counter-clockwise adjust the control signal, lower the input will produce the output.)

VR2 SFS : Buffer rising time adjustment.
(Adjusting range 0~25 seconds, clockwise adjustment will increase the time. No applicable for zero crossing type product.)

VR3 MAX : Maximum output voltage adjustment.
(Adjusting range 10~100%, counter-clockwise adjustment will decrease the output. Set to zero will have no output.)

VR4 OLSET : Adjustment of over current.
(Adjusting range 60~130%, counter-clockwise adjustment will decrease the output.)

PB1 RE SET : Over current RESET.

Descriptions for LED lights and trouble shooting

L1 Power **Power light**	On: Auxiliary power on. Off: 1.Auxiliary power sources have no output → Make sure AC1, AC2 auxiliary power sources have power output. 2.Control board malfunction → Please replace the same spec. control board or send the power regulator for maintenances.
L2 Input **Input light**	On: Control input signal is in. Off: 1.Control signal is not in → Please check the temperature gauge to see if there is input, check the connection and the wiring. 2.Wrong connection on the electrodes of the control board → Check the electrodes of the temperature gauge. 3.Set to zero on the Max VR of the control board or outside VR → Check two VRs to see if any one of them is set to zero. 4.Control board malfunction → Please replace the same-spec. control board or send the power regulator for maintenances.
L3 Output **Output light**	On: Power regulator is in output ┬Phase angle control. (Light and dark based on the output.) └Zero crossing control. (Flash based on the output.) Off: 1.If the abnormal light L5 is on. (Fuse burn down or main power has no output.) → Please refer to ERR (L5). 2.If the temperature light L4 is on. (Power regulator is overheating.) → Please refer to TH (L4). 3.If the input light L2 is off. (No input signal.) → Please refer to IN (L2). 4.If the input light L2 is on. (Control board malfunction.) → Please replace the same spec. control board or send the power regulator for maintenances.
L4 TH Err **Over heating light**	On: 1.Power regulator is over heating → Cooling fan is not operating, check the power, fan damage, or if the fan is stuck by any object and get rid off it if necessary. 2.Bad ventilation or the ambient temperature is too high → Please change the installation place or improve the ventilation. Off: Normal, power regulator is not overheating.
L5 FUSE/ Source Err **Power source abnormal light**	On: 1.Main power source have no output or out-of-phase → Check the power output and all the abnormal conditions. 2.High-speed fuse burn down → Please replace the same spec. fuse and check the shortage and the ground of the loading before restoring the power. Off: Normal
L4&L5 O.L **Over current light**	L4 and L5 On: Power regulator is over current → Please check the shortage and the ground of the loading before press PB1 to reset. (Limited current type/Constant current type of product) Off: Normal

Descriptions of the connectors

Single phase, Two-wire three-phase (W6S、W6Z)

Connector pin	Connector No.	Description	Remarks
TB-01	FS	Detection of the fuse burn down	The connection from power to loading must be connected back to the FS side.
TB-02	M	+5VDC	Only for this control board, not for other use positive control signal input.
TB-03	+	Positive control signal input	The default setting is 4~20mA when the sticker is not marked.
TB-04	−	Standard analog signal voltage	
TB-05	E3	Connected to the VR 3rd pin of the outside potentiometer	Adjustable output 0~100%, Please eliminate the shorted copper wire between E3 and E2 when using the outside potentiometer with VR. (2~10KΩ)
TB-06	E2	Connected to the VR 2nd pin of the outside potentiometer	
TB-07	E1	Connected to the VR 1st pin of the outside potentiometer	
TB-08	NC	Alarm connector output (Normal close)	Connector capacity 250VAC 2A 24VDC 2A
TB-09	COM	Alarm connector output (Common point)	
TB-10	NO	Alarm connector output (Normal open)	
TB-11	AC1	Auxiliary power source	Please refer to the stick for the auxiliary power and voltage.
TB-12	AC2		

Three-wire three-phase (W6T)

Connector pin	Connector No.	Description	Remarks
TB-01	•	Empty pin	Do not connect.
TB-02	M	+5VDC	Only for this control board, not for other use positive control signal input.
TB-03	+	Positive control signal input	The default setting is 4~20mA when the sticker is not marked.
TB-04	−	Standard analog signal voltage	
TB-05	E3	Connected to the VR 3rd pin of the outside potentiometer	Adjustable output 0~100%, Please eliminate the shorted copper wire between E3 and E2 when using the outside potentiometer with VR. (2~10KΩ)
TB-06	E2	Connected to the VR 2nd pin of the outside potentiometer	
TB-07	E1	Connected to the VR 1st pin of the outside potentiometer	
TB-08	NC	Alarm connector output (Normal close)	Connector capacity 250VAC 2A 24VDC 2A
TB-09	COM	Alarm connector output (Common point)	
TB-10	NO	Alarm connector output (Normal open)	
TB-11	AC1	Auxiliary power source	Please refer to the stick for the auxiliary power and voltage.
TB-12	AC2		

Applicable high-speed fuse for the power regulator

Rated current	30A	45A	60A	80A	100A
Fuse	40ET	63ET	80ET 660GH-80	660GH-100	660GHX125
Brand	EATON(Bussmann)	EATON(Bussmann)	EATON(Bussmann) HINODE	HINODE	HINODE

Rated current	125A	150A	180A	230A	270A
Fuse	80ET＊2 660GH-80＊2	660GH-100＊2	660GHX125＊2	250FM	315FM
Brand	EATON(Bussmann) HINODE	HINODE	HINODE	EATON(Bussmann)	EATON(Bussmann)

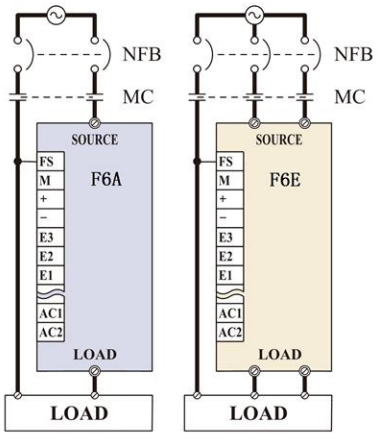
Rated current	300A	380A	450A	580A	750A
Fuse	315FM	660GH-400	250FM＊2	315FM＊2	660GH-400＊2
Brand	EATON(Bussmann)	HINODE	EATON(Bussmann)	EATON(Bussmann)	HINODE

Wiring setup examples for single-phase and Two-wire three-phase zero crossing

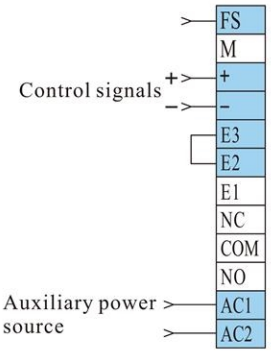
■ Main circuit wiring diagram

※ When electromagnetic switch is used, please install it on the power source side.

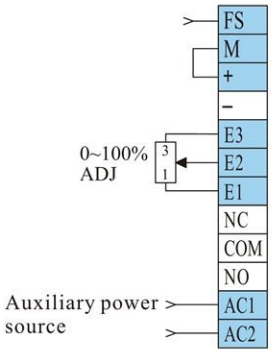
※ For FS connector wiring, please refer to the right diagram.



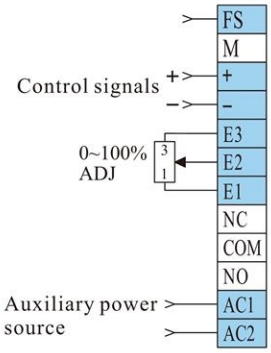
1. Control signal input



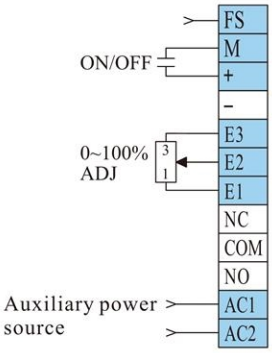
2. Manual control



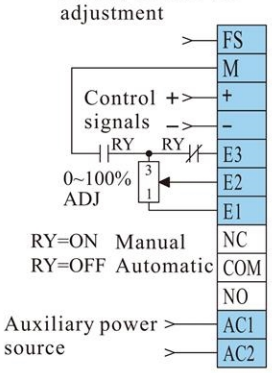
3. Control signal input, limited adjustment for output



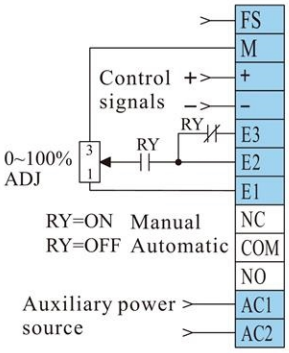
4. Dry contact signal input, outside VR adjustment



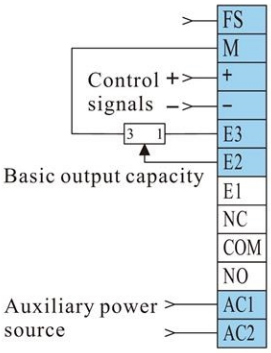
5. Manual-automatic relay switch, outside VR adjustment



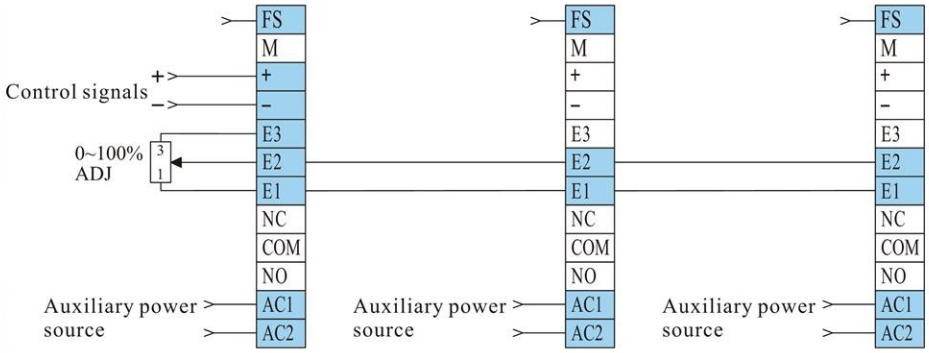
6. Manual-automatic relay switch



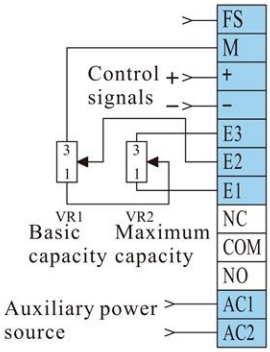
7. Control signal input, basic output setting



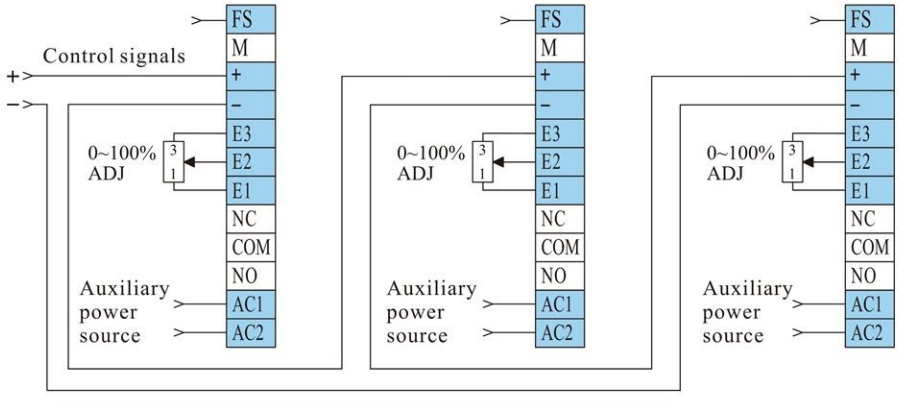
8. Multiple connection, only one for outside VR setting



9. Basic and maximum output setting



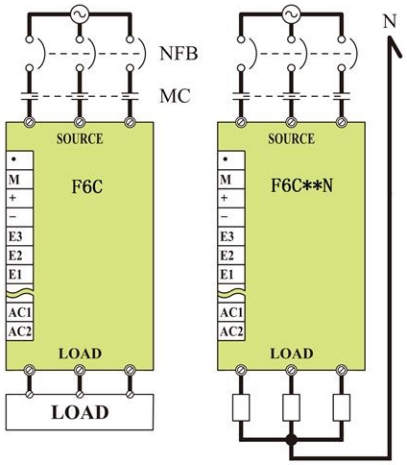
10. Three set connection, independent outside VR setting (Limited for 3 sets cascades only)



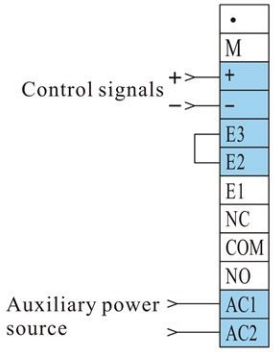
Wiring setup examples for and Three-wire three-phase angle and Four-wire three-phase angle

■ Main circuit wiring diagram

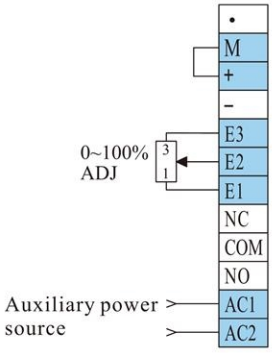
※ When electromagnetic switch is used, please install it on the power source side.



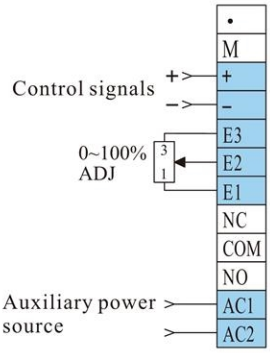
1. Control signal input



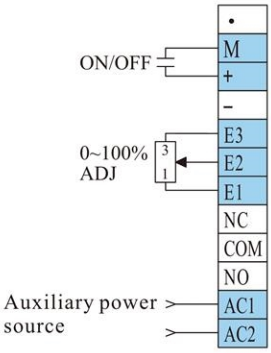
2. Manual control



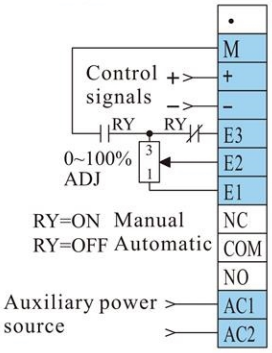
3. Control signal input, limited adjustment for output



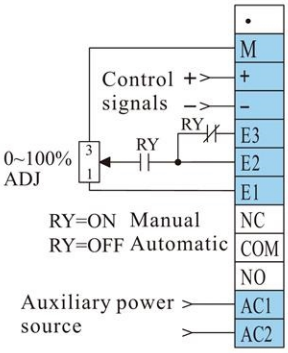
4. Dry contact signal input, outside VR adjustmen



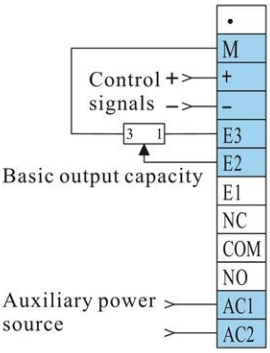
5. Manual-automatic relay switch, outside VR adjustment



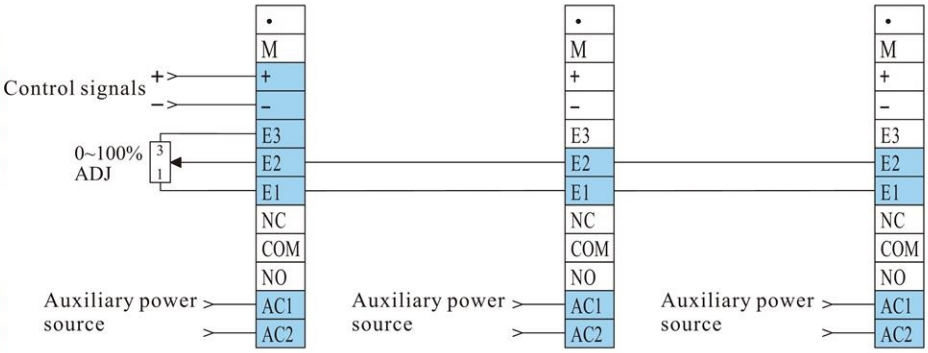
6. Manual-automatic relay switch



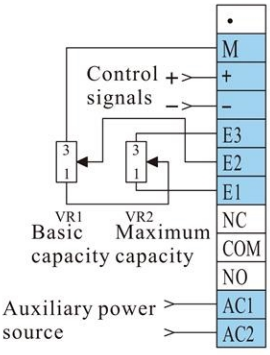
7. Control signal input, basic output setting



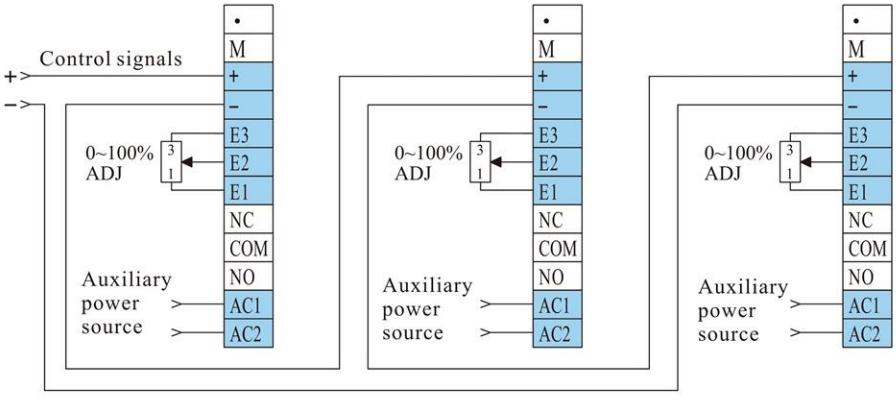
8. Multiple connection, only one for outside VR setting



9. Basic and maximum output setting



10. Three set connection, independent outside VR setting (Limited for 3 sets cascades only)



The weights and related dimensions of the power regulators

Single-phase(F6A)

Normal rated current	Figure	Outline dimensions (mm)			Net weights (Kg)	Packed dimensions (mm)			Packed weights (Kg)	Fixed-hole dimensions (mm)				Mainpower source screw	Torque (kgf.cm)	Way of cooling
		Length	Width	Height		Length	Width	Height		L1	L2	L3	W			
30A	A	162	98	133	1.2	225	127	166	1.5	122	O	O	90	M6	50~60	Air-cooling
45A	A	200	98	133	1.4	262	127	166	1.7	122	O	O	90	M6	60~70	Air-cooling
60,80A	B	162	112	183	1.6	225	140	220	2.0	122	O	O	104	M6	70~90	Air-cooling
100A	C	189	112	183	1.9	250	140	220	2.3	122	O	O	104	M6	70~90	Fan-cooling
125,150,180A	C	275	112	183	2.9	336	140	220	3.3	122	86	O	104	M8	160~200	Fan-cooling
230,270A	C	287	112	188	3.3	345	140	220	3.7	122	86	O	104	M10	250~280	Fan-cooling
300,380A	I	390	140	248	6.2	450	168	277	6.8	122	86	94	132	M10	280~320	Fan-cooling
450A	I	390	140	248	7.0	450	168	277	7.6	122	86	94	132	M10*2	320~360	Fan-cooling
580A	I	460	140	248	8.6	590	260	390	10.4	122	86	94	132	M10*2	320~360	Fan-cooling
750A	I	560	140	248	10.4	690	260	390	12.6	122	86	239	132	M10*2	320~360	Fan-cooling

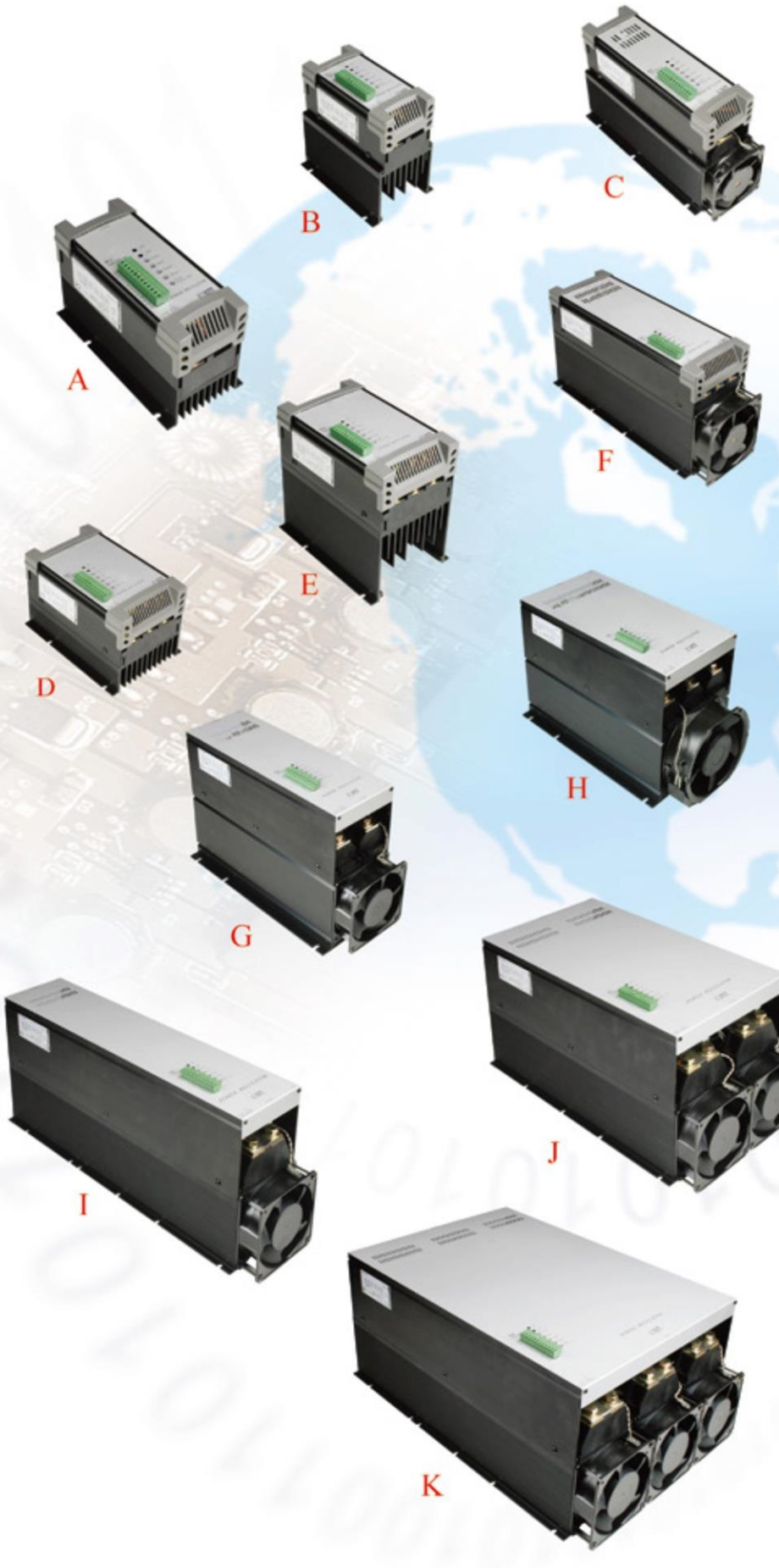
Two-wire three-phase(F6E)

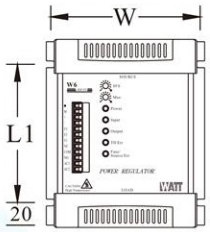
Normal rated current	Figure	Outline dimensions (mm)			Net weights (Kg)	Packed dimensions (mm)			Packed weights (Kg)	Fixed-hole dimensions (mm)				Mainpower source screw	Torque (kgf.cm)	Way of cooling
		Length	Width	Height		Length	Width	Height		L1	L2	L3	W			
30A	A	162	98	133	1.5	225	127	166	1.7	122	O	O	90	M6	50~60	Air-cooling
45A	B	162	112	183	1.9	225	140	220	2.2	122	O	O	104	M6	60~70	Air-cooling
60,80,100A	C	189	112	183	2.2	250	140	220	2.5	122	O	O	104	M6	70~90	Fan-cooling
125A	C	275	112	183	3.1	336	140	220	3.5	122	86	O	104	M8	180~200	Fan-cooling
150A	F	326	140	205	4.5	388	168	245	5.0	122	86	O	132	M8	180~200	Fan-cooling
180A	F	382	140	205	5.4	443	168	245	5.9	122	86	94	132	M8	200~220	Fan-cooling
230,270A	G	310	155	265	10.3	445	260	410	11.8	230	O	O	143	M10	250~280	Fan-cooling
300,380A	G	390	155	265	13.6	525	260	410	15.5	230	80	O	143	M10	280~320	Fan-cooling
450A	J	390	260	248	13.0	530	380	390	15.3	122	86	94	252	M10*2	320~360	Fan-cooling
580A	J	460	260	248	16.1	590	380	390	18.7	122	86	94	252	M10*2	320~360	Fan-cooling
750A	J	560	260	248	20.0	690	380	390	23.0	122	86	239	252	M10*2	320~360	Fan-cooling

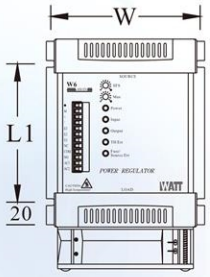
Three-wire three-phase(F6C)

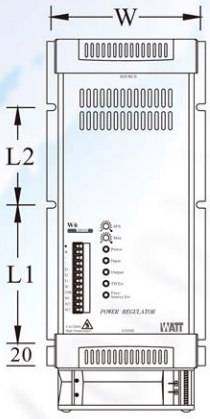
Normal rated current	Figure	Outline dimensions (mm)			Net weights (Kg)	Packed dimensions (mm)			Packed weights (Kg)	Fixed-hole dimensions (mm)				Mainpower source screw	Torque (kgf.cm)	Way of cooling
		Length	Width	Height		Length	Width	Height		L1	L2	L3	W			
30A	D	200	140	145	2.5	262	168	182	2.8	122	O	O	132	M6	50~60	Air-cooling
45A	E	200	140	205	3.0	262	168	245	3.4	122	O	O	132	M6	60~70	Air-cooling
60,80,100A	F	202	140	205	3.1	262	168	245	3.5	122	O	O	132	M6	70~90	Fan-cooling
125A	F	288	140	205	4.5	350	168	245	5.0	122	86	O	132	M8	180~200	Fan-cooling
150A	F	326	140	205	4.9	388	168	245	5.4	122	86	O	132	M8	180~200	Fan-cooling
180A	F	382	140	205	5.8	443	168	245	6.3	122	86	94	132	M8	200~220	Fan-cooling
230,270A	H	322	215	265	15.3	445	320	400	17.2	230	O	O	203	M10	250~280	Fan-cooling
300,380A	H	402	215	265	20.1	530	320	400	22.3	230	80	O	203	M10	280~320	Fan-cooling
450A	K	390	380	248	19.2	515	500	390	22.0	122	86	94	372	M10*2	320~360	Fan-cooling
580A	K	460	380	248	24.4	590	500	390	27.4	122	86	94	372	M10*2	320~360	Fan-cooling
750A	K	560	380	248	29.5	690	500	390	33.2	122	86	239	372	M10*2	320~360	Fan-cooling

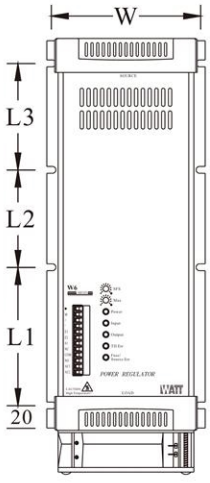
Outline appearance and fixed dimensions











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