

**THE POWER YOU CAN TRUST**

# **THYRISTOR CONTROLLED CONSTANT VOLTAGE CURRENT LIMITED BATTERY CHARGER / RECTIFIER**

**DESIGNED AND MANUFACTURED TO MEET THE REQUIREMENTS OF  
INDUSTRIAL AND COMMUNICATION APPLICATIONS**



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## TECHNICAL DATA

<b>Supply Voltage</b>	240V +/- 10% 1 phase / 415V +/-10% 3 phase
<b>Frequency</b>	50Hz / 60Hz +/- 5%
<b>Constant Voltage Output</b>	Lead Acid Cell (2.23 to 2.4 V / Cell) / NiCd Cell (1.4 to 1.7 V / Cell)
<b>Output Voltage Stability</b>	+/- 1%
<b>Output Ripple Voltage</b>	Standard Charger :5% RMS or Lower Communication Rectifier : 2mV at 800Hz (psophometrically weighted)
<b>Current Limit</b>	50% to 100% Adjustable
<b>Current Output Stability</b>	+/- 2%
<b>Radio-Interference</b>	In Accordance with VDE0875
<b>Acoustic Noise Level</b>	Lower than 60dB Measured at 1 Meter Height and 1 Meter Away From Cubicle
<b>Transformer Standard</b>	Double Winding Isolated with IEEE Class A Insulation (130 C° Limiting Temperature)
<b>Output Short-Circuit Protection</b>	By Electronically Controlled Current Limiting and Fast Acting Fuse
<b>Reverse Battery Protection</b>	By Fast Acting Fuse and Reverse Protection Diode
<b>Input Protection</b>	By Magnetic Breaker or Fuse
<b>Battery Protection</b>	By Magnetic Breaker or Fast Acting Fuse
<b>Cubicle Protection</b>	IP 23
<b>Operating Temperature</b>	0 to 40 C° Ambient
<b>Humidity</b>	0 to 90% Without Condensation

### THY 1 SERIES 1PHASE MODELS

	12V	24V	30V	48V	110V	220V
	CUBICLE TYPE / WEIGHT (KG)	CUBICLE TYPE / WEIGHT (KG)	CUBICLE TYPE / WEIGHT (KG)	CUBICLE TYPE / WEIGHT (KG)	CUBICLE TYPE / WEIGHT (KG)	CUBICLE TYPE / WEIGHT (KG)
3A	WM1 / 19	WM1 / 21	WM1 / 24	WM1 / 25	WM1 / 35	WM3 / 38
6A	WM1 / 21	WM1 / 23	WM1 / 29	WM1 / 30	WM1 / 40	WM3 / 55
10A	WM1 / 23	WM1 / 28	WM1 / 39	WM1 / 40	WM1 / 55	FS1 / 140
15A	WM1 / 28	WM1 / 38	WM1 / 44	WM1 / 45	WM2 / 90	FS1 / 215
20A	WM2 / 33	WM2 / 43	WM2 / 80	WM3 / 85	WM3 / 100	FS2 / 245
25A	WM2 / 38	WM2 / 50	WM2 / 85	WM3 / 90	WM3 / 125	FS2 / 580
35A	WM3 / 42	WM3 / 55	WM3 / 95	WM3 / 100	WM4 / 220	FS3 / 340
50A	WM3 / 51	WM3 / 103	WM3 125	FS1 / 145	FS2 / 270	FS3 / 400
75A	WM3 / 60	FS1 / 141		FS1 / 210	FS2 / 290	
100A		FS1 / 159		FS2 / 250	FS3 / 340	
125A		FS2 / 181		FS2 / 270	FS3 / 400	
150A		FS2 / 190		FS3 / 330	FS3 / 460	
200A				FS3 / 380	FS3 / 510	
250A				FS3 / 430	FS3 / 550	

### THY 3 SERIES 3 PHASE MODELS

	12V	24V	30V	48V	110V	220V
	CUBICLE TYPE / WEIGHT (KG)	CUBICLE TYPE / WEIGHT (KG)	CUBICLE TYPE / WEIGHT (KG)	CUBICLE TYPE / WEIGHT (KG)	CUBICLE TYPE / WEIGHT (KG)	CUBICLE TYPE / WEIGHT (KG)
10A						FS1 / 150
15A					FS1 / 135	FS1 / 170
25A				FS1 / 135	FS1 / 170	FS1 / 270
35A				FS1 / 140	FS1 / 190	FS2 / 350
50A		FS1 / 130		FS1 / 160	FS2 / 280	FS3 / 400
75A		FS2 / 195		FS1 / 230	FS2 / 300	FS3 / 500
100A		FS2 / 210		FS2 / 255	FS3 / 435	FS3 / 550
125A		FS2 / 225		FS2 / 280	FS3 / 480	FS4 / 670
150A		FS2 / 230		FS3 / 410	FS3 / 510	FS4 / 770
200A		FS2 / 280		FS3 / 440	FS3 / 550	FS4 / 880
250A		FS3 / 340		FS3 / 470	FS4 / 670	FS4 / 1040
300A		FS3 / 400		FS3 / 500	FS4 / 710	FS4 / 1090
350A		FS4 / 500		FS4 / 620	FS4 / 750	FS4 / 1190
400A					FS4 / 790	FS4 / 1260
450A					FS4 / 830	FS4 / 1330
500A						FS4 / 1400
600A						FS4 / 1550

TYPE	H (mm)	W (mm)	D (mm)
WM1	460	400	270
WM2	610	430	330
WM3	790	500	380
FS1	1230	570	490
FS2	1500	570	600
FS3	1900	740	600
FS4	1900	1480	600

## OPTIONAL FUNCTIONS

### Battery Low Disconnection

An inherent setback of lead acid battery is that when it is discharged too deeply for several times, it is difficult to recover its original capacity. To protect the battery, a battery low disconnection device can be incorporated to isolate the battery from the load when its voltage drops to its safe limit.

### Separate Output for Load

In application where the load requires a narrow voltage tolerance, a separate regulated output can be provided which is kept constant irrespective of battery voltage fluctuation.

### Upgradable Output Current

Two or more rectifiers can be connected in parallel to increase output current. For system upgrading, new rectifiers of any ratings can be added onto existing rectifier to increase output current needed by the upgraded load.

## STANDARD FEATURES

### Control

On / Off Switch / Breaker for AC Input  
High Rate / Float Charge Selector Switch

### Indicator

High Rate LED  
Float LED  
Rectifier On LED

### Cubicle Construction

Wall mounting or Floor  
Standing Sheet Steel Enclosure with Front Opening Door and Coated with Oven Baked Epoxy Finishing



## OPTIONAL FEATURES

### DC Low Volt Alarm

Provide LED indication of low DC voltage with adjusting range of -20% of float voltage.

### DC High Volt Alarm

Provide LED indication of high DC voltage with adjusting range of +20% of float voltage.

### Battery Earth Fault Alarm

Provide LED indication on positive or negative to earth fault failure.

### Mains Failure Alarm

Provide LED indication when mains voltage is abnormal or when there is a loss of any phase in a three phase supply.

### Charger Failure Alarm

Provide LED indication when charger output voltage drops abnormally.

### Load Open Alarm

Provide LED indication when load current is below 5% of output rating.

### Low Electrolyte Alarm

Provide LED indication when electrolyte needs topping up.

### Summary Remote Alarm Contact Output

A common relay activated by any of the alarm condition provides a pair of volt-free change-over contact rated at AC 240V 3A.

### Individual Remote Alarm Contact Output

Provide individual change-over volt-free contact rated at AC 240V 3A for each and every alarm condition.

### DC Low Volt Alarm

Provide LED indication of low DC voltage with adjusting range of -20% of float voltage.

### Manual Boost Charger Timer

When manually activated to high-rate charge, a timer automatically revert to float charge when preset time is up.

### Automatically Boost Charger with Timer Control

Automatically switch charger to high rate charge when battery low condition is detected. A timer is built in to revert to float charge when preset time is up.

### Battery Current Limit

Where allowable battery charging current is low compared to the load current, charging current into the battery can be limited to the required value.

## INTRODUCTION

The THY SERIES charger / rectifier utilizes thyristors as the power controlling element. What makes a thyristor controlled rectifier unique is its high efficiency and overload capability. High efficiency of operation enables the rectifier to deliver higher output current with a lower power loss. The equipment can operate at a cooler temperature.

High overload capability means the equipment is less susceptible to damage caused by output overload or short-circuit.

The THY SERIES charger / rectifier combines these inherent advantages to provide its users products with high reliability and durability. Expectations for longer service life-spans can be achieved.

Rectifier output current is limited by electronics control and is able to maintain its rated output current even in the event of continuous output short-circuit. No fold-back current is necessary to reduce power dissipation. This feature is advantageous when it is charging up a fully discharged "flattened" battery which almost resembles an output short-circuit.

## OUTSTANDING FEATURES

- DC 12 Volts to DC 220 Volts Models
- 3 to 600 Amperes Output
- High Efficiency
- High Reliability - Thyristor Controlled Rectifying Operating
- Low Output Noise Level
- Constant Voltage Output - Excellent Regulation
- Two Selectable Charging Rates - Standby Charge or Fast Charge
- Current Limiting
- Reverse Battery Operation
- Slow Start Operation - Minimizing Start-up Inrush Current
- Operate With or Without Battery - As Float Charge System or Battery Eliminator
- Easily maintained - Modular, Easily Replaceable and Front Accessible Components Reduce System Downtime In Repair
- Battery Over-Discharge Protection
- Input and Output Surge Suppressions
- Parallel Connection of More Than Two Rectifiers for Higher Output Current
- Suitable for Charging Lead Acid or Nickel Cadmium Battery

## OPERATING PRINCIPLE

An isolating transformer is used to isolate the mains supply from the DC circuit. It also changes the mains voltage to a suitable level which is then rectified by the SCR bridge to obtain the DC output. Conducting duration of each half period of the AC waveform through the SCRs determines the DC output level. A filtering network consisting of inductors and capacitors are used to smooth out the DC output to obtain low output ripple voltage.

Control circuit monitors the output voltage, varies the conducting duration of the SCRs to keep the output voltage constant irrespective of mains supply voltage fluctuation and load current variation.

When the load current exceeds the preset limit, a current limiting circuit reduces the conducting duration of the SCRs to reduce output voltage hence the load current.

Slow-start circuit raises the output voltage gradually from zero to its preset level at start-up. This minimizes the inrush current surge exerting on the mains supply, and it also protects the rectifier from excessive current surge if the output is short-circuited during start-up. Surge suppressors are incorporated to protect the rectifier against transient mains voltage. Any transient across the output is also suppressed.

