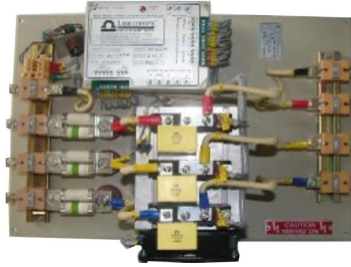


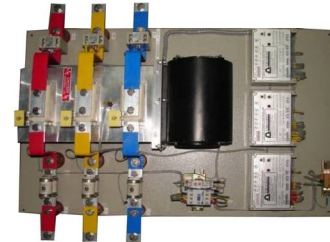
## Thyristor Power Controllers for Resistance Heaters and Transformer loads (Product Code 21s.3)



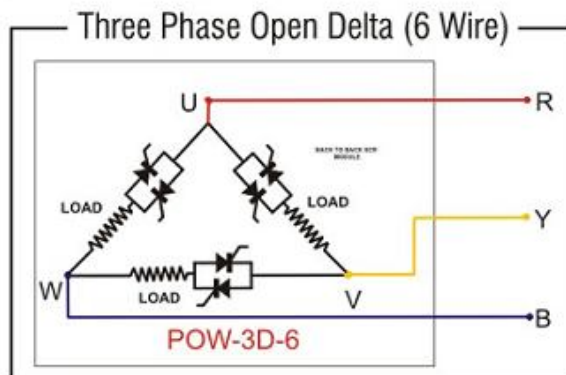
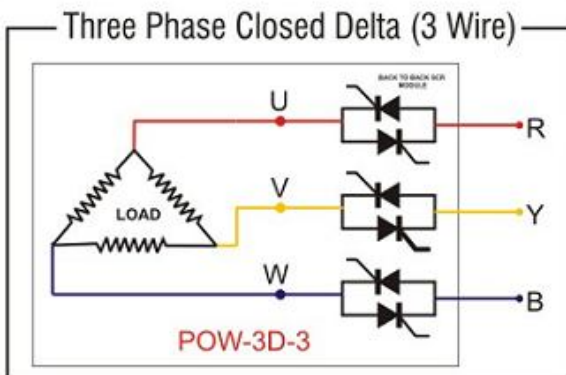
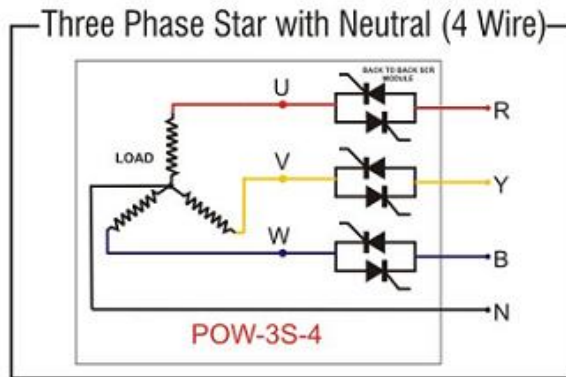
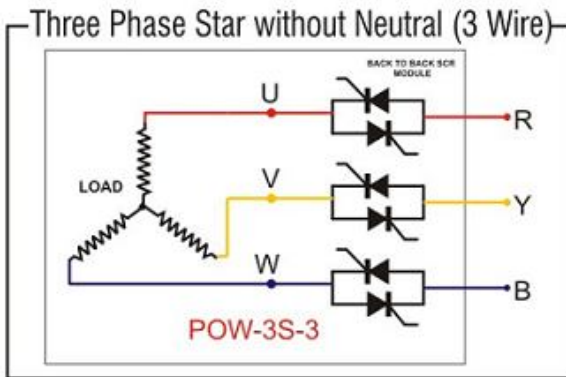
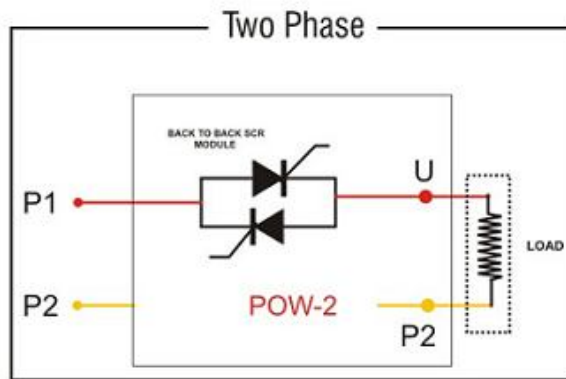
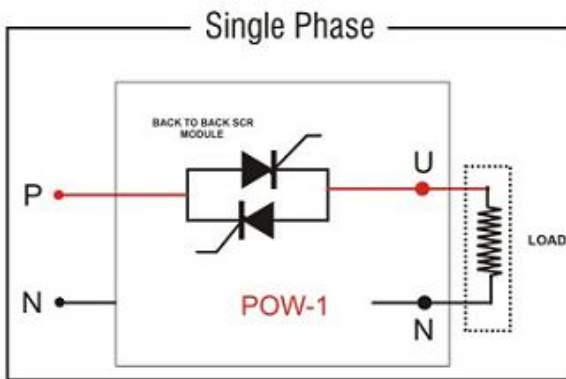
**POW-2-CL**



**POW-3S**



**POW-3D-6-CL**



## Model Wise Descriptions:

Sr. No	Model	Product Description
21.3.1	<b>POW-1</b>	Single Phase SCR Power Controller for single phase heaters
21.3.2	<b>POW-1-CL</b>	Single Phase SCR Power Controller for single phase heaters with current limit and current trip features.
21.3.3	<b>POW-2</b>	Two Phase SCR Power Controller for two phase heaters
21.3.4	<b>POW-2-CL</b>	Two Phase SCR Power Controller for two phase heaters with current limit and current trip features.
21.3.5	<b>POW-3S-4</b>	Three Phase SCR Power Controller – suitable for 3 phase heaters connected in 4 wire <b>Star</b> with neutral configuration.
21.3.6	<b>POW-3S-3</b>	Three Phase SCR Power Controller – suitable for 3 phase heaters connected in 3 wire <b>Star</b> without neutral configuration.
21.3.7	<b>POW-3S-4 - CL</b>	Three Phase SCR Power Controller – suitable for 3 phase heaters connected in 4 wire <b>Star</b> with neutral configuration with current limit and current trip features.
21.3.8	<b>POW-3S-3 -CL</b>	Three Phase SCR Power Controller – suitable for 3 phase heaters connected in 3 wire <b>Star</b> without neutral configuration with current limit and current trip features.
21.3.9	<b>POW-3D-6</b>	Three Phase SCR Power Controller – suitable for 3 phase heaters connected in open <b>Delta</b> 6 wire configuration
21.3.10	<b>POW-3D-6 -CL</b>	Three Phase SCR Power Controller – suitable for 3 phase heaters connected in open <b>Delta</b> 6 wire configuration with current limit and current trip features.
21.3.11	<b>POW-3D-3</b>	Three Phase SCR Power Controller – suitable for 3 phase heaters connected in close <b>Delta</b> 3 wire configuration
21.3.12	<b>POW-3D-3- CL</b>	Three Phase SCR Power Controller – suitable for 3 phase heaters connected in close <b>Delta</b> 3 wire configuration with current limit and current trip features.

**Note: For single phase heaters within 8 KW – our low cost model LTC-16 given in 21.2 can be considered.**

## Features:

- ❖ 15 Amps to 350 Amps capacity (1KW to 180KW).
- ❖ Single phase / 2 phase / 3 phase versions.
- ❖ Suitable for 3 or 4 wire star configuration / 3 or 6 wire delta configuration.
- ❖ Auto / Manual operation.
- ❖ Accepts (4-20)mA / (0-5)VDC / (0-10)VDC control input.
- ❖ Soft start for smooth control.
- ❖ Adjustable power and current limit.
- ❖ Isolated heat sink for safety.
- ❖ Simple and Modular design for easy servicing of cards and thyristors.
- ❖ Ideally suitable for resistive, transformer, inductive or heating loads like Silicone Carbide and Molybdenum which exhibits significant changes of resistance with increase in temperature.
- ❖ Other features like partial load failure detection can also be optionally provided

## Application:

Thyristor Power Pack has a varied application and can be used with heating elements like Kanthal, Super Kanthal, Silicon Carbide, Molybdenum, Infra Red, etc. where precise and accurate power control is required. There is significant power savings with respect to conventional contactor type temperature control system, which also depends on various other factors.

## Description of Thyristor Power Controller:

Libratherm offers ready to use SCR power controller for electrical heating loads ranging from 3 KW/Single phase to 300KW/3-phase. This power pack module comprises of suitable triggering card model LTC-12 or LTC-13 or LTC-15, suitably rated back to back connected SCR module (with electrically isolated base)- mounted on the appropriately rated heat sink (natural air or forced air cool), input and output clip-on type heavy duty connectors or copper bus bars, semiconductor fuses and thermal cutouts. The entire assembly is mounted on MS powder coated plate, which in turn can be easily mounted inside the closed control panel as desired. Complete ready to use control panel with suitable PID / Program temperature controller can also be supplied as per the user's specifications and requirement.

## Technical Specifications:

<b>Available Ratings</b>	3KW Single phase to 600KW Three phase
<b>Available Configuration</b>	Single phase, Two phase, Three phase (3 or 4 wire star and 3 or 6 wire delta)
<b>Control Action</b>	Phase angle control (self synchronized)
<b>Control Signal</b>	(4-20)mA / (0-5)VDC / (0-10)VDC / Potentiometer
<b>Output</b>	0 to 230VAC or 0 to 415VAC variable voltage proportional to the control signal.
<b>Smooth Control</b>	Adjustable Ramp Up and Ramp Down Time for soft increase and decrease of output voltage. (Settable in the range of 2 to 20 seconds)
<b>Current Control</b>	Using on card Current Limit and Trip settings. (LTC-13 and CLM-15)
<b>Settings</b>	For adjusting voltage and current per phase using on card presets
<b>Load Type</b>	Suitable for both resistive and inductive / transformer load (15A to 500A @ 110/230/415 VAC)
<b>Supply Voltage</b>	120/240/380/415 VAC, 50/60 Hz. (User should specify)
<b>Available Models</b>	As given in the above table (Under Model wise description)
<b>Other accessories provided with each power pack</b>	a) Semiconductor fuse per phase – to protect thyristors against short circuit condition. RC snubber / MOV across the SCRs to protect against transients. b) Thermal cut out switch on the heat sink – to protect thyristors against over heating c) Cooling fan on heat sinks for thyristors above 50Ampere d) Heavy duty input/output terminals or Copper Bus bars for supply and heater Connections.
<b>Size (Power Pack)</b>	As per Std. (Sizes can be given on request – based on the model)
<b>Mounting</b>	Power pack can be mounted on the base plate of the control panel

### KW (Kilowatt) wise selection table for resistance heaters or transformer loads:

Load Current per phase to Neutral or Phase1 to Phase 2 AMPS	<b>POW-1</b> @230VAC (V X I) KW	<b>POW-2</b> @ 415VAC (V X I) KW	<b>POW-3S</b> <b>POW-3S-3</b> @415VAC (V X I X 3) KW	<b>POW-3D-6</b> <b>POW-3D-3</b> @415VAC (V X I X 3) KW (V X I X 1.732)KW
<b>25A</b> (27A SCR module)	1 - 5 KW	2 - 10 KW	3 - 15 KW	6 - 30 KW 3 - 17 KW
<b>50A</b> (57A SCR module)	6 - 10 KW	11 - 20 KW	16 - 30 KW	31 - 60 KW 18 - 33 KW
<b>90A</b> (91A SCR module)	11 - 18 KW	21 - 36 KW	31 - 54 KW	61 - 108 KW 34 - 62 KW
<b>100A</b> (106A SCR module)	19 - 20 KW	37 - 40KW	55 - 60 KW	109 - 120 KW 63 - 69 KW
<b>150A</b> (162A SCR module)	21 - 30 KW	41 - 60 KW	61 - 90KW	121 - 180KW 70 - 104 KW
<b>200A</b> (250A SCR module)	31 - 40 KW	61 - 80 KW	91 - 120 KW	181 - 240 KW 105 - 138 KW
<b>250A</b> (250A SCR module)	41 - 50 KW	81 - 100 KW	121 - 150 KW	241 - 300 KW 139 - 172 KW
<b>300A</b> (330A SCR module)	51 - 60 KW	101 - 120 KW	151 - 180 KW	301 - 360 KW 173 - 207 KW
<b>400A</b> (500A SCR module)	61 - 80 KW	121 - 160 KW	181 - 240 KW	361 - 480 KW 208 - 277 KW
<b>500A</b> (500A SCR module)	81 - 100 KW	161 - 200 KW	241 - 300 KW	481 - 600 KW 278 - 346 KW

- User can select the required power pack – either by actual current through the heaters or by KW of the heaters.
- Single phase, two phase or three phase selection can be done by selecting appropriate model based on the desired configuration, from the table given above.
- If the heaters are designed at different voltage other than 230VAC or 415VAC, still the selection can be made, based on the actual current flowing through the heaters at the desired voltage level.
- For inductive / transformer load, the desired KW can be selected as per the requirement.
- For 3 wire closed delta configuration, the line current should be taken into consideration and not the load current. Power pack should be chosen with Line current of 1.73 x load current. For example : If load current is 50A then line current will be 86.5A, so thyristor must be chosen of 90A.

### Ordering Information:

MODEL	A- INPUT CONTROL SIGNAL	B- CURRENT (Phase to Neutral) or (Phase1 to Phase2)
POW-1 POW-1-CL POW-2 POW-2-CL POW-3S-4 POW-3S-3 POW-3S-4-CL POW-3S-3-CL POW-3D-6 POW-3D-3 POW-3D-6-CL POW-3D-3-CL	A1- ( 0-5 VDC ) A2- (0-10 VDC) A3- (4-20 mA ) A4- All above but user selectable using DIP switch selection  Variable signal through external potentiometer is available in all models.	B1-25A B2-50A B3-90A B4-100A B5-150A B6-200A B7-250A B8-300A B9-400A B10-500A

### Examples:

MODEL	A- INPUT CONTROL SIGNAL	B- CURRENT (Phase to Neutral) or (Phase1 to Phase2)
POW-1	A1	B2
POW-2-CL	A3	B5
POW-3S	A3	B4
POW-3D-3 -CL	A2	B7

Example	Ordering Code	Description
1	POW-1-A1-B2	This is single phase AC power pack with 0-5VDC control Signal suitable for maximum 10KW @ 230VAC, or max. 50A @ 230VAC, single phase heater load.
2	POW-2-CL-A3-B5	This is two phase AC power pack with 4-20mA control signal suitable for maximum 60KW @ 415VAC, or 150A @ 415VAC two phase heater load.
3	POW-3S-4-A3-B4	This is three phase AC power pack with 4-20mA control signal suitable for maximum 60KW @ 415VAC, three phase heater load connected in 4 wire star with neutral configuration. Maximum 20KW or 100A current per phase to neutral.
4	POW-3D-3-CL-A2-B7	This is three phase AC power pack with 0-10VDC control signal suitable for maximum 172KW @ 415VAC, three phase heater load connected in 3 wire close delta configuration. Maximum 57KW between two phase or 140A current per phase to phase (or line current of $140 \times 1.732 = 242$ Amps)

REMARK :