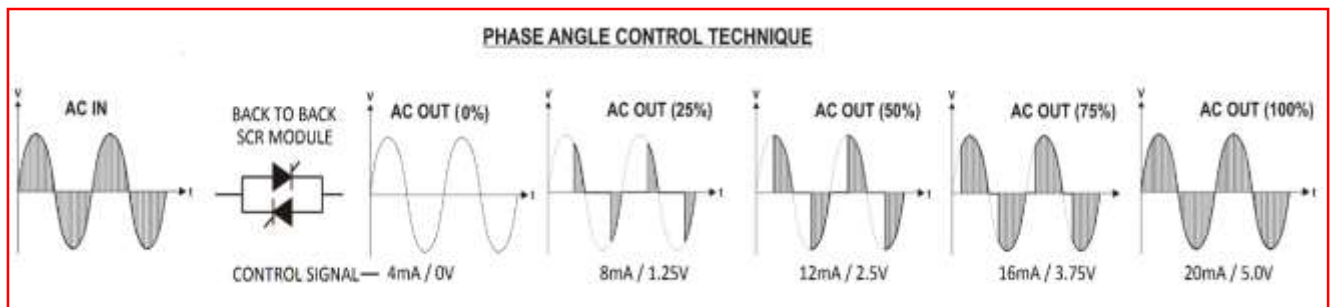


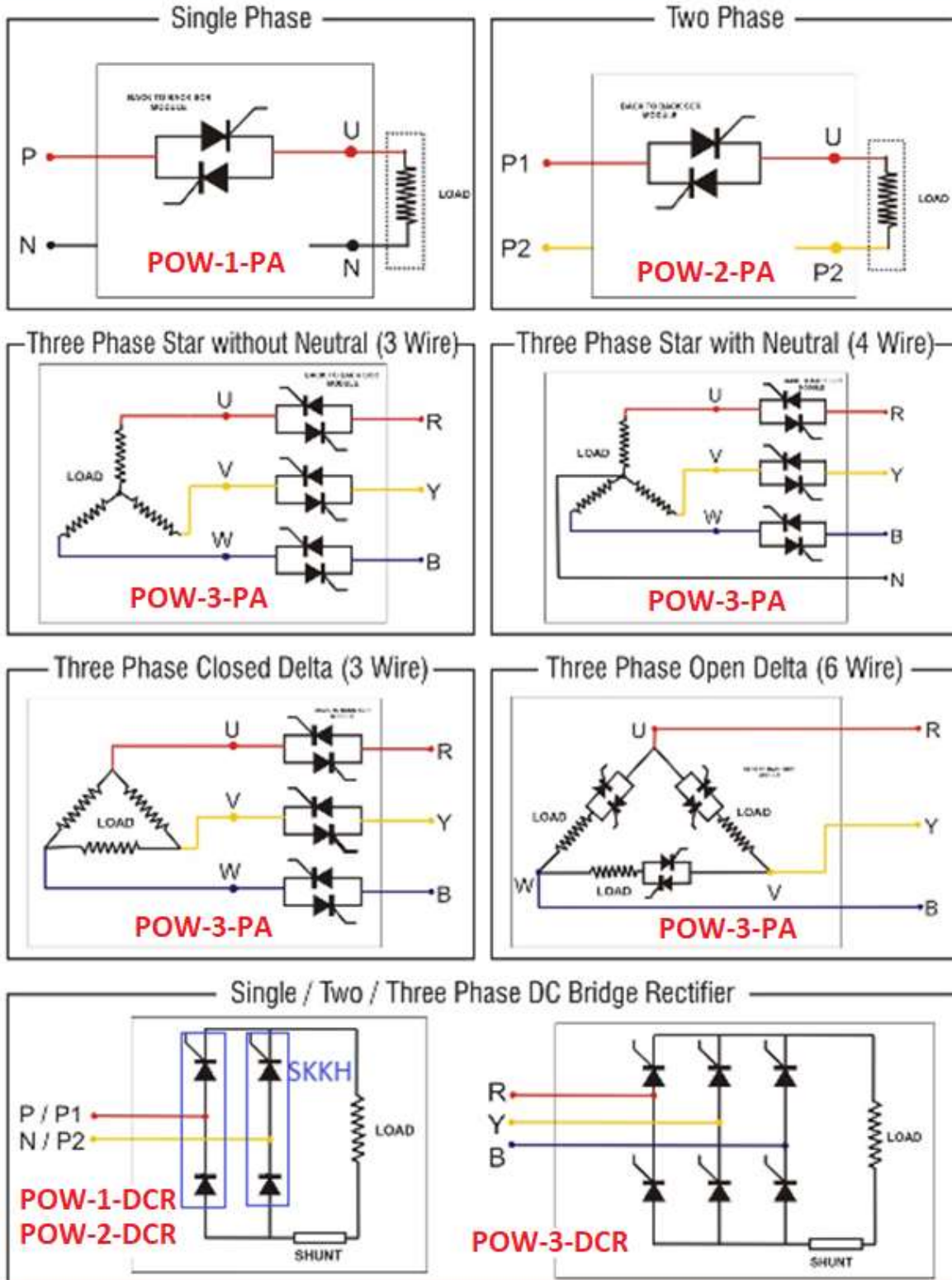
## Thyristor Power Regulators for Resistive and Inductive loads



### Model Wise Descriptions:

Sr. No	Model	Product Description
1	<b>POW-1-PA-CL</b>	Single Phase SCR Power Regulator for single phase heater with current control and overload protection.
2	<b>POW-1-DCR-CL</b>	Single Phase SCR based Full Wave half control DC Rectifier with Shunt feedback
3	<b>POW-2-PA-CL</b>	Two Phase SCR Power Regulator for two phase heater with current control and overload protection.
4	<b>POW-2-DCR-CL</b>	Two Phase SCR based Full Wave half control DC Rectifier with Shunt feedback
5	<b>POW-3-PA-CL</b>	Three Phase SCR Power Regulator – suitable for 3 phase heaters connected in 3 or 4 wire <b>Star</b> or 3 wire close or open <b>delta</b> configurations with current control and overload protection.
6	<b>POW-3-DCR-CL</b>	Three Phase SCR based Full Wave full control DC Rectifier with Shunt feedback

# VARIOUS LOAD CONFIGURATIONS



## Key Features :

- Digital Firing Cards for single phase/two-phase/three-phase are Field-proven for 25+ years.
- Semikron brand SCR Modules - SKKT Series are used for AC to AC control and SKKT / SKKH Series are used for AC to DC control.
- Auto-detection of phase sequence and auto-synchronization.
- Heatsinks are mounted with thermistors to protect against overheating and auto cut-off in case of over-temperature.
- Built-in Current Limit and Overcurrent Trip facility to limit the desired current through heaters. This feature saves on the cost of using external safety fuses.
- Soft start and Soft stop voltage across the load.
- Separate auxiliary supply of 230 VAC with built-in RFI/EMI filter – Thereby electronics is safe against line voltage fluctuations and RFI/EMI electrical noise.
- SCR Modules are protected by suitable RC snubber and surge suppressors.
- High-speed ball bearing type cooling fan – To keep Thyristor cool.
- Built-in safety fuses for the cooling fan and Auxiliary supply.
- Current control feature avoids the need for external Fuse in series with the load.
- Rugged metal enclosure & modular design - easy to install & easy to maintain.
- Libratherm Thyristors are time-tested and field-proven in all major industries for 25+ years.
- More than 2000 installations have taken place across India & abroad and the number is growing rapidly.
- Usage of best-in-quality components, since we understand that downtime and service cost is more expensive than the cost of the product.

## **Applications:**

Thyristor Power Regulators have varied applications and can be used with heating elements like Nichrome, Kanthal, Super Kanthal, Silicon Carbide, Molybdenum Disilicide, Infra-Red or heating through Step Up or Step Down transformer etc. where precise and accurate power and temperature control is required. There is a significant electrical power saving with respect to the conventional contactor type temperature control systems. Thyristors have many direct and indirect advantages compared to electro - mechanical contactor. These Regulators can also be used for AC to DC or as a Rectifier to convert AC voltage to the DC voltage required by many applications like Electroplating, Effluent Treatment Plants, Battery Chargers etc..

## **Description/Construction of A Thyristor Power Regulators and DC Rectifiers:**

Libratherm offers ready to use SCR power Controller/Regulator for electrical heating loads ranging from 5 KW/Single phase to 360KW/3-phase. This power regulator modules are built using suitable triggering cards model LTC-13 or LTC-18 plus suitably rated back to back connected SCR modules (with electrically isolated base, mounted on the heat sink, input and output clip-on type heavy duty connectors or Aluminum/Copper bus bars, semiconductor fuses and thermal cutouts. The entire assembly is mounted on MS powder coated enclosure, 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. For DC rectified output the assembly remains the same, except the SCRs are connected in bridge configurations as shown above in the diagram.

## Technical Specifications:

<b>Available Ratings</b>	6KW Single phase to 720KW Three phase
<b>Available Configuration</b>	Single phase, Two phase, Three phase (3 or 4 wire star and 3 or 6 wire delta) or DC rectifier configuration.
<b>Control Action</b>	Phase angle control (self-synchronized)
<b>Control Signal</b>	(4-20)mA / (0-5)VDC / (0-10)VDC / Potentiometer – user selectable
<b>AC and DC Output</b>	0 to 240VAC or 0 to 415V/440AC variable voltage proportional to the control signal. 0 to 200VDC, 0 to 400VDC, 0 to 560VDC rectified output proportional to the control signal.
<b>DI DO control</b>	a) Potential free contact input (DI) to remotely start/stop the Thyristor b) Potential free contact output (DO1) to indicate the status of the Thyristor ON or OFF. c) Potential free contact output (DO2) to indicate Overload condition (Trip Contact).
<b>AO (Optional)</b>	Single and Isolated 4-20mA proportional to the single-arm load current
<b>Smooth Control</b>	Adjustable Ramp Up and Ramp Down Time for the 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 Overload Trip settings.
<b>Load Type</b>	Suitable for both resistive and inductive / transformer load
<b>Aux. Supply Voltage</b>	240VAC +/- 10%, 50/60 Hz, 415/440VAC for 2 phase models
<b>Available Models</b>	As given in the above table (Under Model wise description)
<b>Other accessories provided with each Thyristor power regulator/rectifier</b>	a) RC snubber / MOV across the SCRs to protect against voltage transients dv/dt b) Thermal cut out switch on the heat sink – to protect thyristors against overheating. c) Cooling fan on heat sinks. Heavy-duty input/output Copper or Aluminum Bus bars for supply and heater/load Connections.
<b>Size</b>	As per the Thyristor Ordering Information table given below.
<b>Mounting</b>	Thyristor power regulators can be mounted on the base plate of the control panel using 4 screws/bolts.

**Ordering Information:**
**For Single Phase /Two Phase/Three Phase AC to AC Thyristor power regulators.**
**To order specify part no.**

<b>1</b>	<b>POW-1-PA</b>	<b>MEDIUM AND HIGH RATINGS SINGLE PHASE AC to AC CONTROL THYRISTORS (6KW TO 120KW)</b>	<b>Size (h x w x d)mm</b>	<b>PART NO.</b>
1.1	<b>POW-1-PA-CL-25 (6KW)</b>	Single phase thyristor power regulator - suitable for max. 6KW/25A @ 240VAC with current control and overload protection	220 x 140 x 205	2601-1`
1.2	<b>POW-1-PA-CL-50 (12KW)</b>	Single phase thyristor power regulator - suitable for max. 12KW/50A @ 240VAC with current control and overload protection	220 x 140 x 205	2601-2
1.3	<b>POW-1-PA-CL-100 (24KW)</b>	Single phase thyristor power regulator - suitable for max. 24KW/ 100A @ 240VAC with current control and overload protection	220 x 140 x 205	2601-3
1.4	<b>POW-1-PA-CL-150 (36KW)</b>	Single phase thyristor power regulator - suitable for max. 36KW/150A @ 240VAC with current control and overload protection	325 x 185 x 245	2601-4
1.5	<b>POW-1-PA-CL-200 (48KW)</b>	Single phase thyristor power regulator - suitable for max. 48KW/200A @ 240VAC with current control and overload protection	325 x 185 x 245	2601-5
1.6	<b>POW-1-PA-CL-250 (60KW)</b>	Single phase thyristor power regulator - suitable for max. 60KW/250A @ 240VAC with current control and overload protection	325 x 185 x 245	2601-6
1.7	<b>POW-1-PA-CL-300 (72KW)</b>	Single phase thyristor power regulator - suitable for max. 72KW/300A @ 240VAC with current control and overload protection	325 x 185 x 245	2601-7
1.8	<b>POW-1-PA-CL-400 (96KW)</b>	Single phase thyristor power regulator - suitable for max. 96KW/400A @ 240VAC with current control and overload protection	385 x 200 x 245	2601-8
1.9	<b>POW-1-PA-CL-500 (120KW)</b>	Single phase thyristor power regulator - suitable for max. 120KW/500A @ 240VAC with current control and overload protection	385 x 200 x 245	2601-9

2	<b>POW-2-PA</b>	<b>MEDIUM AND HIGH RATINGS TWO PHASE AC to AC CONTROL THYRISTORS (10KW TO 207KW)</b>	<b>Size (h x w x d)mm</b>	<b>Part No.</b>
2.1	<b>POW-2-PA-CL-25 (10KW)</b>	Two phase thyristor power regulator - suitable for max. 10KW/25A @ 415VAC with current control and overload protection	220 x 140 x 205	2602-1
2.2	<b>POW-2-PA-CL-50 (20KW)</b>	Two phase thyristor power regulator - suitable for max. 20KW/50A @ 415VAC with current control and overload protection	220 x 140 x 205	2602-2
2.3	<b>POW-2-PA-CL-100 (40KW)</b>	Two phase thyristor power regulator - suitable for max. 40KW/100A @ 415VAC with current control and overload protection	220 x 140 x 205	2602-3
2.4	<b>POW-2-PA-CL-150 (62KW)</b>	Two phase thyristor power regulator – suitable for max. 62KW/150A @ 415VAC with current control and overload protection	325 x 185 x 245	2602-4
2.5	<b>POW-2-PA-CL-200 (83KW)</b>	Two phase thyristor power regulator – suitable for max. 83KW/200A @ 415VAC with current control and overload protection	325 x 185 x 245	2602-5
2.6	<b>POW-2-PA-CL-250 (103KW)</b>	Two phase thyristor power regulator - suitable for max. 103KW/250A @ 415VAC with current control and overload protection	325 x 185 x 245	2602-6
2.7	<b>POW-2-PA-CL-300 (124KW)</b>	Two phase thyristor power regulator - suitable for max. 124KW/300A @ 415VAC with current control and overload protection	325 x 185 x 245	2602-7
2.8	<b>POW-2-PA-CL-400 (166KW)</b>	Two phase thyristor power regulator - suitable for max. 166KW/400A @ 415VAC with current control and overload protection	385 x 200 x 245	2602-8
2.9	<b>POW-2-PA-CL-500 (207KW)</b>	Two phase thyristor power regulator - suitable for max. 207KW/500A @ 415VAC with current control and overload protection	385 x 200 x 245	2602-9

3	<b>POW-3-PA</b>	<b>MEDIUM AND HIGH RATINGS THREE PHASE AC to AC CONTROL THYRISTORS (3 OR 4 WIRE STAR / 3 WIRE CLOSE DELTA 6 WIRE OPEN DELTA CONFIGURATION) (36KW TO 720KW)</b>	<b>Size (h x w x d)mm</b>	<b>PART NO.</b>
3.1	<b>POW-3-PA-CL-50 (36KW)</b>	Three phase thyristor power regulator - suitable for max. 36KW/50A @ 415/440VAC with current control and overload protection	305 x 185 x 220	2603-1
3.2	<b>POW-3-PA-CL-100 (68KW)</b>	Three phase thyristor power regulator - suitable for max. 68KW/95A @ 415/440VAC with current control and overload protection	325 x 185 x 245	2603-2
3.3	<b>POW-3-PA-CL-150 (104KW)</b>	Three phase thyristor power regulator - suitable for max. 104KW/145A @ 415/440VAC with current control and overload protection	345 x 185 x 285	2603-3
3.4	<b>POW-3-PA-CL-200 (144KW)</b>	Three phase thyristor power regulator - suitable for max. 144KW/200A @ 415/440VAC with current control and overload protection	425 x 285 x 300	2603-4
3.5	<b>POW-3-PA-CL-250 (178KW)</b>	Three phase thyristor power regulator - suitable for max. 177KW/250A @ 415/440VAC with current control and overload protection	425 x 285 x 300	2603-5
3.6	<b>POW-3-PA-CL-300 (215KW)</b>	Three phase thyristor power regulator - suitable for max. 215KW/300A @ 415/440VAC with current control and overload protection	450 x 350 x 350	2603-6
3.7	<b>POW-3-PA-CL-400 (287KW)</b>	Three phase thyristor power regulator - suitable for max. 287KW/400A @ 415/440VAC with current control and overload protection	450 x 350 x 350	2603-7
3.8	<b>POW-3-PA-CL-500 (360KW)</b>	Three phase thyristor power regulator - suitable for max. 360KW/500A @ 415/440VAC with current control and overload protection	625 x 350 x 350	2603-8
3.9	<b>POW-3-PA-CL-600 (430KW)</b>	Three phase thyristor power regulator - suitable for max. 425KW/500A @ 415/440VAC with current control and overload protection	625 x 350 x 350	2603-9
3.10	<b>POW-3-PA-CL-800 (570KW)</b>	Three phase thyristor power regulator - suitable for max. 570KW/800A @ 415/440VAC with current control and overload protection	625 x 700 x 350	2603-10
3.11	<b>POW-3-PA-CL-1000 (720KW)</b>	Three phase thyristor power regulator - suitable for max. 720KW/1000A @ 415/440VAC with current control and overload protection	625 x 700 x 350	2603-11