

Control Panels

INDEECO can provide a control system for any electric process air heating application. Our experienced engineering staff can design control systems ranging from ON/OFF to full SCR with PID logic. Optional features include ramp/soak, computer interface capability and various control schemes as required.

INDEECO offers two standard control panel designs: Full SCR PID control and ON/OFF contactor control. All components are factory mounted and wired in compliance with the National Electrical Code.

These charts provide a sample of standard control panel designs. Custom control panels, designed specifically for your application, are available.

A Vernier control panel can also be supplied. Vernier control utilizes contactors, one SCR controller, and a microprocessor-based sequencer. The sequencer controls the staging of the contactors and the SCR controller. The SCR controller serves to fill in the gaps between the step-controlled stages. Vernier control is not quite as accurate as full SCR control, but more accurate than contactor (step) control.

Contactor Control Panels

This contactor-based system with ON/OFF process temperature control is recommended for less demanding applications. Systems with two or more heating stages utilize an INDEECO Controls electronic sequencer (step controller), driven by an analog output PID temperature controller to minimize the amount of load cycling while providing good outlet temperature control.

Standard Features:

- INDEECO microprocessor-based sequencer (for panels with two or more heating stages)
- Indicating PID temperature controller (adjustable process temperature with thermocouple input)
- NEMA 12 painted steel enclosure, wall mount unless otherwise noted
- Overtemperature controller (adjustable temperature limit with thermocouple input)
- Door interlock disconnect switch
- Manual reset pushbutton with built-in pilot light (red) for visual "OVERTEMPERATURE" alarm
- Selector switch – ON/OFF with built-in pilot light (green) for "POWER ON" indication
- Control power transformer
- Disconnecting magnetic contactors
- Circuit fusing

| Amps | Number Of Circuits | Amps Per Circuit | Maximum KW | | Approximate Dimensions (Inches) | | | Estimated Weight (Lbs.) |
|------|--------------------|------------------|------------|----------|---------------------------------|-------|-------|-------------------------|
| | | | 240V/3PH | 480V/3PH | Height | Width | Depth | |
| 48 | 1 | 48 | 19 | 39 | 24 | 24 | 8 | 85 |
| 96 | 2 | 48 | 39 | 79 | 30 | 24 | 8 | 105 |
| 144 | 3 | 48 | 59 | 119 | 36 | 30 | 8 | 160 |
| 192 | 4 | 48 | 79 | 159 | 42 | 30 | 8 | 175 |
| 240 | 5 | 48 | 99 | 199 | 48 | 36 | 8 | 260 |
| 288 | 6 | 48 | 119 | 239 | 48 | 36 | 8 | 265 |
| 336 | 7 | 48 | 139 | 279 | 60 | 36 | 8 | 320 |
| 384 | 8 | 48 | 159 | 319 | 60 | 36 | 8 | 330 |
| 432* | 9 | 48 | 179 | 359 | 60 | 48 | 12 | 585 |
| 480* | 10 | 48 | 199 | 399 | 60 | 48 | 12 | 600 |
| 528* | 11 | 48 | 219 | 438 | 60 | 60 | 12 | 680 |
| 576* | 12 | 48 | 239 | 478 | 60 | 60 | 12 | 685 |
| 624* | 13 | 48 | 259 | 518 | 72 | 60 | 12 | 800 |
| 672* | 14 | 48 | 279 | 558 | 72 | 60 | 12 | 805 |
| 720* | 15 | 48 | 299 | 598 | 72 | 60 | 12 | 815 |
| 768* | 16 | 48 | 319 | 638 | 72 | 72 | 12 | 930 |
| 816* | 17 | 48 | 339 | 678 | 72 | 72 | 12 | 945 |
| 864* | 18 | 48 | 359 | 718 | 72 | 72 | 12 | 950 |
| 912* | 19 | 48 | 379 | 758 | 72 | 72 | 12 | 960 |
| 960* | 20 | 48 | 399 | 798 | 72 | 72 | 12 | 965 |

*These panels have double doors and 12" high floor stands.

SCR Control Panels

A full SCR control system with PID temperature control is recommended for industrial heating applications which must accommodate material flow changes and provide the highest degree of accuracy for outlet temperature control.

Standard Features:

- PID self-tuning temperature controller (adjustable process temperature, with thermocouple input)
- INDECO three-phase, zero cross-fired, SCR power controllers
- NEMA 12 painted steel enclosure, wall mount unless otherwise noted
- Overtemperature controller (adjustable temperature limit with thermocouple input)
- Door interlock disconnect switch
- Manual reset pushbutton with built-in pilot light (red) for visual "OVERTEMPERATURE" alarm
- Selector switch – ON/OFF with built-in pilot light (green) for "POWER ON" indication
- Control power transformer
- Safety contactors
- Circuit fusing
- Ventilating fan and filter when required

| Amps | Number Of Circuits | Amps Per Circuit | Maximum KW | | Approximate Dimensions (Inches) | | | Estimated Weight (Lbs.) |
|---|--------------------|------------------|------------|----------|---------------------------------|-------|-------|-------------------------|
| | | | 240V/3PH | 480V/3PH | Height | Width | Depth | |
| SCR panels with externally mounted heat sinks | | | | | | | | |
| 48 | 1 | 48 | 19 | 39 | 24 | 24** | 8 | 95 |
| 70 | 1 | 70 | 29 | 58 | 30 | 24** | 8 | 115 |
| 96 | 2 | 48 | 39 | 79 | 30 | 24** | 8 | 125 |
| 140 | 2 | 70 | 58 | 116 | 42 | 30** | 8 | 205 |
| 144 | 3 | 48 | 59 | 119 | 36 | 30** | 8 | 195 |
| 210 | 3 | 70 | 87 | 174 | 48 | 36** | 8 | 310 |
| 192 | 4 | 48 | 79 | 159 | 42 | 30** | 8 | 225 |
| 280 | 4 | 70 | 116 | 232 | 60 | 36** | 8 | 385 |
| 240 | 5 | 48 | 99 | 199 | 48 | 36** | 8 | 320 |
| 350 | 5 | 70 | 145 | 290 | 60 | 36** | 8 | 415 |
| SCR panels with internally mounted heat sinks, fan and filter | | | | | | | | |
| 295 | 6 | 48 | 119 | 239 | 60 | 36 | 16 | 405 |
| 425* | 9 | 47 | 175 | 351 | 60 | 48 | 16 | 660 |
| 590* | 12 | 48 | 239 | 478 | 60 | 60 | 16 | 750 |
| 850* | 18 | 47 | 351 | 703 | 72 | 72 | 16 | 1090 |

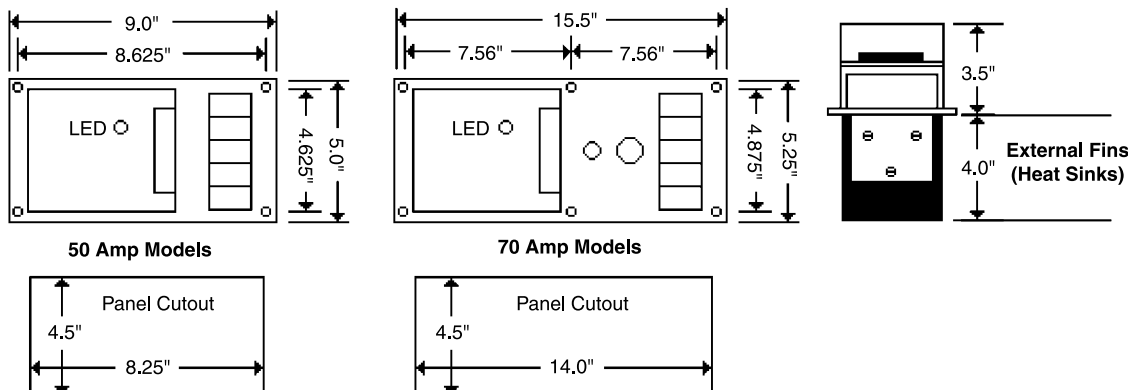
*These panels have double doors and 12" high floor stands.

**Additional 9" clearance required for externally mounted heat sinks which may be mounted on one or both sides of the enclosure for proper convection cooling.

SCR Power Controllers modulate the entire heater load directly, varying the heater output from 0 to 100% of the total heater KW. Working on a four second time base, the heater will be energized only for the number of AC cycles necessary to produce the exact amount of heat required. The resulting precision control and rapid response make the INDECO Controls SCR the choice for many heating applications. For example, multi-stage discharge temperature control of a heater can produce unacceptable temperature swings,

resulting in inefficient energy use. The same heater with SCR control will produce stable, even heat for maximum performance and efficiency.

The SCR's power switching devices are mounted on a large finned heat sink which extends outside the heater terminal box or control panel. The conservative SCR rating and the generous heat sink insure against overheating and SCR failure.



Control Panels

Special Features

Control Relays – These relays are activated by safety devices, such as a flow switch or remote shutoff.

Remote Interlock Terminals – Control circuit terminals are supplied so the heater can be de-energized from remote contacts.

Indicator Lights – Additional indicator lights may be specified for visual indication of system status, such as "LOW TEMPERATURE".

Audible Alarm Package – This package includes a horn, pilot light, latching relay and a push button for silencing the horn.

Low Liquid Cutoff – The relay is mounted and wired with sensing probe shipped loose for field installation.

Special Controllers – The customer may specify the use of special process or overtemperature controllers for a different temperature range, sensor input, control mode, etc.

Panel Heater – A heater and thermostat are provided to prevent condensation and maintain minimum ambient temperature for electrical components.

Wire Markers – Identification markers are attached to both ends of all control and power wires.

Tagging of Internal Parts – Permanent tags are attached to the subpanel near internal parts and marked with component titles as noted on the wiring diagram.

UL Listing – Available on most designs.

Special Coatings – Epoxy or other paints may be specified.

12" High Floor Stand – This construction allows the control panel to be floor mounted.

NEMA 4 Panel Enclosure – Features a gasketed weatherproof construction.

NEMA 4 Instrument Window – This feature allows for access to a control instrument without opening the control panel door.

Stainless Steel Panel Enclosure (NEMA 4X) – This construction provides extra corrosion resistance for harsh environments.