

# Control Panels

INDEECO can provide a control system for any electric process heating application. Our experienced engineering staff can design control systems ranging from ON/OFF logic 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 Electric Code.

These charts are a sample of standard control panel designs. Custom control panels, designed specifically for a customer's application, are available.

A Vernier type control panel can also be supplied. Vernier type 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 type 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 a proportional output 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	No. 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)
- INDEECO 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	No. Of Circuits	Amps Per Circuit	Maximum KW		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 INDEECO 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

controlled by the SCR and process temperature controller 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 this generous heat sink insures against overheating and SCR failure.

# Control Panels

## Cooling Tower Control Panels

INDEECO offers a pre-engineered, UL Listed/CSA Approved package for freeze protecting cooling tower basins.

### The complete package includes:

- Electric Immersion Heater(s)
- Control Panel with Solid-State Printed Circuit Board
- Sensor Probe with Cord
- Wiring Diagram
- Installation and Operating Instructions

### INDEECO offers the following options:

- Disconnect Switch
- Fuses
- Circuit Breaker



### INDEECO Heater Control Panels offer these advantages:

#### Solid-State Control

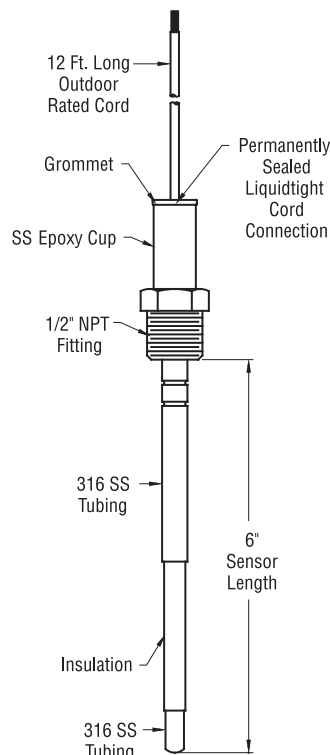
Outmoded bulb and capillary control has been replaced with new patented solid-state technology which combines temperature control with low water level protection in a single solid-state device.

#### NEMA 4X Enclosure

All controls are factory wired inside a rugged NEMA 4X enclosure designed for wet, outdoor use. Pre-engineered designs up to 96 amps are available with stock and built-to-order listings.

#### Lower Cost

Installation time and cost are reduced by replacing individually mounted temperature and liquid level control devices with one pre-engineered and assembled control package that requires only one probe to sense both water temperature and level.



### Sensor Probe Specifications:

- Sensor Probe: INDEECO probe assembly incorporating both temperature and liquid level sensors. Probe is made out of 316 stainless steel to minimize corrosion. Probe can be installed vertically or horizontally.
- Maximum Pressure Rating for Sensor Probe: 15 psi
- Cord: 12-foot outdoor rated cord with PVC hub connector for installation through tower basin wall. Options include different cord lengths or cord suitable for total immersion.

### Cooling Tower Control Panel Specifications:

- Solid-State Control: Pre-set 45° F ON/OFF temperature control with 5° F switching differential and built-in low water cutoff. Circuit board LED's provide visual indication of heater-on and liquid level status.
- Ambient Temperature Range: -40° F to 150° F
- Fail Safe: Output relay is de-energized if the input sensor is either open or short-circuited. This prevents heater burn-out problems.
- NEMA 4X enclosure with pre-mounted electrical hubs for conduit connections.
- Single probe to sense both water temperature and water level. Sensor probe supplied with 12-foot outdoor rated cord pre-connected to control panel. Probe also supplied with PVC hub connector for attachments through cooling tower basin wall.
- Nameplate showing maximum KW and amp ratings at system volts/phase.
- System Wiring Diagram.
- Installation and Operating Instructions.
- Rated for maximum of 40 amps or 50 amps with disconnect switch when specified.
- Suitable for multiple heaters per basin (maximum of 2 on 40 amp panel).
- Disconnect switch with door interlock and operator handle, which can be padlocked in the "OFF" position.
- Dimensions: 8" x 10" x 6" for 40 amp size  
10" x 12" x 7" for 50 amp size  
14" x 16" x 8" for two circuits
- Control panels rated greater than 50 amps are supplied with two circuits and offered either with built-in fusing or a circuit breaker for each circuit.