

# Refrigeration Controls in Practice — Eliwell Controllers and Penn Mechanical Controls Side by Side

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Where an electronic controller (Eliwell IDNext/ICPlus/SmartCella) replaces mechanical controls, where Penn A19 thermostats and P77 pressure switches remain the right answer, service-thermostat stop-gaps, and how the two worlds combine on a sound cold-room panel.

## Electronic where logic lives, mechanical where physics suffices

A cold room needs temperature control, defrost scheduling and termination, fan management, alarms — that is controller work: the stocked Eliwell line covers it from panel-mount (IDNext 902, ICPlus 11I, 12 V) to the wall-mounted IP65 SmartCella (1 × 16 A relay, 2 NTC probes, 230 V) that runs a small room without a panel at all. Pure limit functions — high-pressure cut-out, fan cycling by head pressure, a simple space thermostat — stay mechanical with Penn: A19ABC " 35...+40 °C and the A19 family, P77 switches (HP 3–30 bar, LP " 0.5...7 bar). Mechanical devices need no supply, fail predictably and satisfy the "independent protection" principle: the electronic controller controls, the mechanical switch protects.

## A sound minimal cold-room scheme

Controller (SmartCella class): room probe B1, evaporator/defrost probe B2 on the coil, compressor relay via contactor; defrost on schedule, terminated on B2 temperature with a safety time.

HP cut-out (manual reset) wired to break the contactor coil independent of the controller; LP switch for pump-down or loss-of-charge protection.

Door and light per room practice; alarms from the controller's buzzer/relay.

Set differentials deliberately: room  $\pm 2$  K typical; LP cut-in above vacuum; HP per refrigerant and plant design — and record every setpoint on the panel door. Probe placement decides performance: B1 in return air, never in the supply stream or against a wall; B2 between fins where ice lasts longest, or defrost ends too early every time.

## Service thermostats

For cabinets whose original controls die, the Danfoss 077B service-thermostat series is the field standard stop-gap, numbered by application: No. 4 (adsorption cabinets), No. 5 (ice-cream, no signal), No. 6 (chest freezer, signal), No. 7 (upright freezer, signal). Match the number to the cabinet type, route the capillary uninked to the original clamp point, and the cabinet runs to spec without electronics.

## Controllers for bigger plants

Above single rooms, the stocked ladder continues: Danfoss ERC cabinet controllers (ERC 211, ERC 213, ERC 214), Carel ir33 universal stages (ir33 wide, 2 relays), EVD Evolution drivers for electronic valves (single, twin) and pCO-class programmable controllers with their terminal sets (pCO5+ connector kits). Temperature sensing standardises on NTC/PTC probes — PTC Ø6×40, 1.5 m silicone / 3 m — matched to the controller input type; a PTC on an NTC input reads garbage, so check before wiring, not after.

## Commissioning checklist

Probe types vs controller inputs verified; probes physically where the manual says.

Compressor via contactor (controller relays switch coils, not compressors — see the TeSys pairing guide).

Defrost: schedule, termination temperature, drip time, fan delay — then watch one full cycle.

Trip-test the mechanical HP/LP by driving pressure, not by trusting the dial.

Alarm routing proven (buzzer, relay, BMS) and setpoints documented on the door card.

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