

CRAC vs CRAH & Cooling Sizing

Two machines, one job — and the kW-to-BTU/hr-to-tons math

Two machines, one job

CRAC — Computer Room Air Conditioner

- Self-contained refrigeration (DX compressor) in each unit
- Simple and independent — each unit is its own cooling plant
- Ideal for smaller rooms and edge sites
- Specified by sensible cooling capacity, runs 24/7

CRAH — Computer Room Air Handler

- No compressor — coils carry chilled water from a central plant
- Fans move the air
- More efficient at scale
- Large facilities standardize on CRAH + chillers

1 kW

of IT load $\approx$ 3,412 BTU/hr of heat

1 ton

of cooling = 12,000 BTU/hr $\approx$ 3.517 kW

N+1

rooms are designed with one spare unit's worth of cooling — a silent CRAC failure spends your margin

Cooling load: kW to BTU/hr and tons

IT load	Heat output	Cooling required
3 kW	10,236 BTU/hr	0.85 tons
5 kW	17,061 BTU/hr	1.42 tons
8 kW	27,297 BTU/hr	2.27 tons
10 kW	34,121 BTU/hr	2.84 tons
15 kW	51,182 BTU/hr	4.27 tons
20 kW	68,243 BTU/hr	5.69 tons
30 kW	102,364 BTU/hr	8.53 tons
50 kW	170,607 BTU/hr	14.22 tons

Raw IT heat loads. Real CRAC selection adds building gains, lighting, people, and an N+1 margin — and works from a unit's sensible capacity, because data center loads are almost entirely sensible heat.

A failing CRAC is a countdown timer

- Supply/return temperature and humidity monitored live
- Compressor and fan health tracked
- N+1 margin visible, not assumed
- Cooling faults mapped to the racks at risk
- Thermal trends surfaced before hard alarms

