FOR CHILLED-WATER PLANTS AND THE CHILLERS IN THEM

Chiller optimization, in stages. Setpoints first; inside the machine with the OEM.

Start with the setpoints your building system already writes: no change to the chiller and no manufacturer needed. Go inside the machine, to compressor and valve, only with the OEM.

- **U.S. Patent 12,768,557** granted Oct. 20, 2026
- **Physics model** of your plant and chiller
- **Your plant controls stay** staging, towers, targets
- **Protections unchanged** OEM interlocks act regardless

Four stages, each ending in a decision

STAGE 1

Read-only assessment

- Your trend data, a model of the plant, its decisions against your history.
- No command sent.

✓ NO OEM NEEDED

STAGE 2

Setpoint optimization

- Condenser-water and chilled-water setpoints, tower fans and plant pumps, written by your BAS.
- Inside the maker's published limits. Chiller internals unchanged.

✓ NO OEM NEEDED

STAGE 3

Inside the chiller

- Compressor speed, expansion valve, the machine's own pumps and fans: one decision.
- Through an approved interface; warranty and commissioning agreed.

WITH THE OEM OR ITS INTEGRATOR

STAGE 4

Built in at the factory

- The optimizer ships inside new chillers, commissioned from a model of the machine.
- Licensed per unit.

THE OEM'S PRODUCT

Where each stage acts

Plant level · yours	Staging, shared towers and pumps, campus targets. Stage 2 suggests its setpoints; your BAS applies them.
Machine level · AReCoS	Stage 3: compressor, refrigerant flow, the chiller's dedicated pumps and fans, inside OEM limits.
Protections · unchanged	OEM interlocks, pressure limits and shutdowns act whatever the controller does.

One chiller, three conventional controls. Find the one you run.

The same chiller, plant and 44 °F supply each time; only the control changes. AReCoS sets compressor, both pumps and all seven fans as one decision: 0.66 kW/ton against all three.[1]

LEGACY A

Staged compressors?

Two scrolls switched on and off, fixed pumps.

33%

less energy per ton-hour

- **125 → 1** starts on the design day; 19.7 → 0 an hour at ¼ load
- 6% and 18% less on two office days
- About $1,366 a year[2]

LEGACY B

Variable-speed compressor?

Compressor and pump on PI loops, fixed-speed fans switched whole.

35%

less energy per ton-hour

- **5.7 → 1.7 kW** mean fan power, fans slowed with the compressor
- 7% and 19% less on two office days
- About $1,675 a year[2]

LEGACY C

Variable speed everywhere?

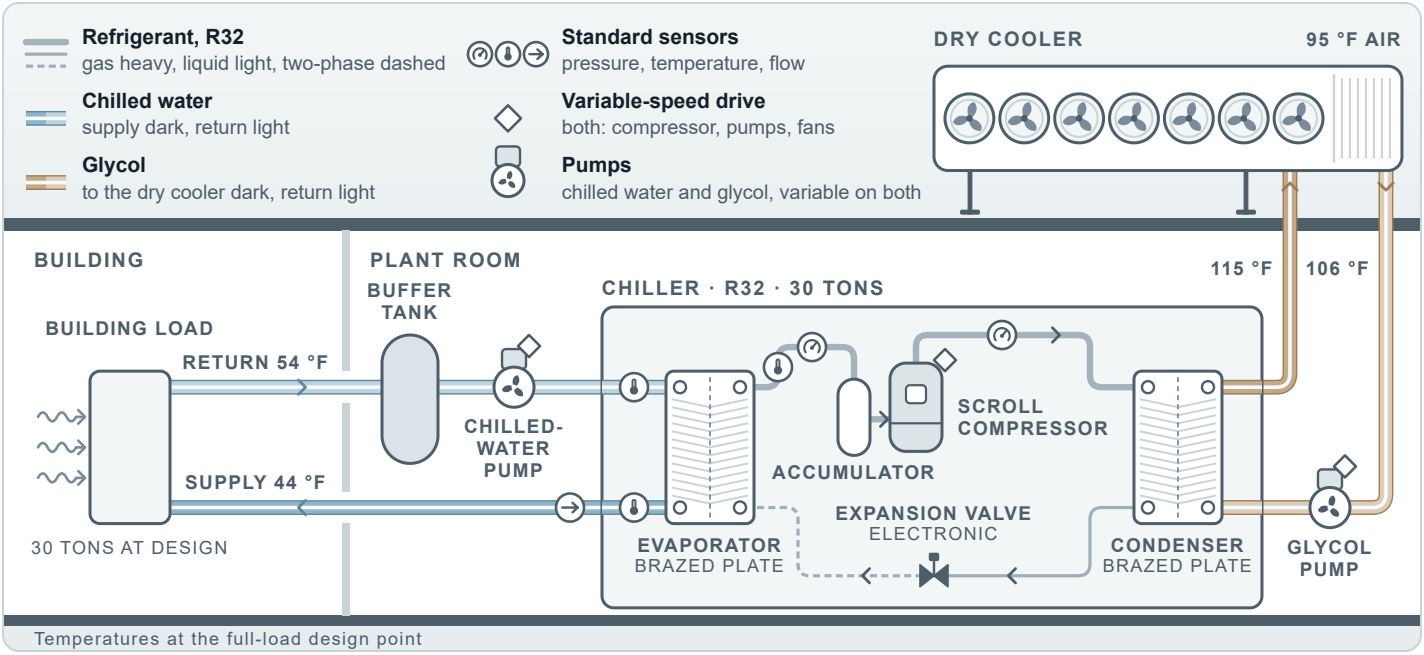
Compressor, pumps and fans on PI loops, fans at the maker's fixed 104 °F setpoint.

31%

less energy per ton-hour

- **Same drives:** the gain is the decision alone, with no loop tuning
- 5% and 12% less on two office days
- About $1,354 a year[2]

Point	Outdoor	Legacy A	Legacy B	Legacy C	AReCoS
100 %	95 °F	1.36	1.36	1.36	**1.35**
75 %	80 °F	1.05	1.07	0.95	**0.92**
50 %	65 °F	0.95	0.93	0.94	**0.60**
25 %	55 °F	0.94	1.21	1.05	**0.40**
AHRI-weighted, kW/ton		**0.99**	**1.02**	**0.96**	**0.66**



Temperatures at the full-load design point

[1] Physics-based model results on a 30-ton R32 reference chiller built from public data, every control from the same start; AHRI 550/590 weights, not a certified IPLV. Office loads: DOE ASHRAE 90.1-2019 Medium Office, Atlanta. [2] Estimate, one chiller, Atlanta office year at 11.53 ¢/kWh. · Rev 3

Start with data and setpoints. Nothing in the chiller changes.

Stage 2 weighs colder condenser water, which saves compressor power, against the tower-fan and pump power it takes to make it, and does the same for the chilled-water supply.

Condenser water

The entering setpoint, from load, wet-bulb, chiller performance and tower and pump power. Often set by hand in winter.

Chilled-water supply

Raised when the load allows it, held where the coils need it.

Towers and plant pumps

Fan speed or staging, and pump speed, set with the chillers, not apart from them.

Stage 1: what we ask for, and what the report compares

We ask for

- Trends every 1 to 5 minutes: chiller power and load, water temperatures and flows, tower and pump power, wet-bulb.
- Maker, model, compressor and drive, the existing controller.
- Approved setpoint limits, freeze protection, alarms. No source code or network passwords.

The report compares

- Energy per ton-hour, chillers, towers and pumps together.
- Leaving chilled-water temperature and compressor cycling.
- The benefit beyond the optimization you already run.

Who does what

AReCoS

The model, the optimization, the analysis and the report.

The plant owner

The data, a facilities contact, and approval at every stage.

The OEM or integrator

From stage 3 only: the interface, safety, warranty and commissioning.

The first step: one plant, read-only. Pick one or two chillers with the clearest problem and the best data; a short sample is enough to begin. Each stage goes ahead only with your approval.
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