



## APPLICATION

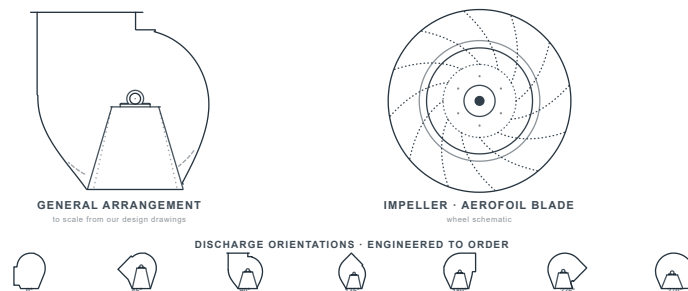
## Data-center cooling air

A data-center cooling fan moves clean, conditioned air through CRAH units, air-handling units and hot/cold-aisle containment — matched to an IT load that never sits still. The duty is clean and low-temperature, so nothing wears; the whole engineering weight falls on three things that decide the PUE and the SLA — part-load efficiency across a swinging load, sound in and around white space, and availability on an N+1 deck that must never drop below the IT heat it carries.

**Capability envelope**

data-center cooling-air service

| PARAMETER         | STANDARD RANGE                           | ON APPLICATION                                                          |
|-------------------|------------------------------------------|-------------------------------------------------------------------------|
| Volume flow       | up to 2,25,000 CMH                       | cooling duty typically 20,000–1,20,000 CMH per unit                     |
| Static pressure   | up to 2,000 mmWC                         | cooling duty typically 150–600 mmWC across coil, filter and containment |
| Air temperature   | ambient conditioned air 15–40 °C         | higher on application for warm-air / free-cooling schemes               |
| Static efficiency | high static efficiency on airfoil builds | held across the 40–100% part-load band                                  |
| Sound level       | <85 dB(A) @ 1 m                          | <75 dB(A) with acoustic enclosure / sound hood                          |
| Control           | VFD default; EC on smaller units         | tracking cold-aisle $\Delta P$ (+5 to +25 Pa)                           |
| Drive power       | up to 425 HP                             | cooling duty typically well below the ceiling                           |
| Balance quality   | ISO 21940 G6.3                           | G2.5 / G1.0 on application                                              |



**FIG. 1** Representative arrangement — a Jitamitra Aerofoil fan, the family most often applied to this duty. The exact family and wheel are engineered to your operating point.

**Construction & materials**

documented on your GA

- **Impeller geometry** — Airfoil-bladed backward-curved for the highest static efficiency on clean cooling air; backward-inclined where the build is smaller and the CAPEX-to-hours case favours it. Wheel sized so the part-load band, not just the peak, sits on the efficiency island.
- **Configuration — plug / plenum** — Direct-driven plug/plenum (unhoused) fan as the default inside CRAH and AHU plenums — no scroll, low installed footprint, even plenum discharge across the coil; housed SWSI where a ducted take-off is required. Fan-array (multiple small plug fans) on application for finer redundancy granularity.
- **Control — VFD / EC as default** — The IT load turns down deeply, so the fan must too. VFD is more efficient than an inlet damper across the range because it avoids the throttling loss at part-load, and is our default; EC-motor direct-drive on the smaller units for tight, quiet speed control and a clean part-load efficiency curve. Both track cold-aisle  $\Delta P$  rather than a fixed setpoint.
- **Materials & reliability** — Mild steel + epoxy coating standard on clean conditioned air; stainless where the inlet air is humid or coastal. Bearings selected for  $L_{10h} \geq 40,000$  h continuous, low residual unbalance to protect the SLA, and vibration-monitoring provision for condition-based maintenance on the redundant deck.

**How a Jitamitra Data-center cooling air fan is specified**

AMCA conventions

| SPECIFICATION FIELD   | OPTIONS                                                                                                                                                                                                             |
|-----------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Arrangement (AMCA 99) | Arr. 4 (direct, motor on base — the plug/plenum default) / Arr. 1 (overhung, fan bearings) / Arr. 8 (overhung on common base) / Arr. 9 (overhung, motor side) — selected by drive, plenum access and unit envelope. |

| SPECIFICATION FIELD                     | OPTIONS                                                                                                                                                                                                                                                                                                        |
|-----------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Configuration                           | Plug / plenum (unhoused, direct-driven) default inside CRAH and AHU plenums; housed SWSI (single width, single inlet) where a ducted take-off is required; fan-array of multiple plug fans on application for finer N+1 granularity.                                                                           |
| Wheel type                              | Airfoil-bladed backward-curved (default, highest efficiency on clean cooling air) / backward-inclined (smaller builds) — low tip speed selected for a tone-free acoustic signature.                                                                                                                            |
| Class (by pressure / outlet velocity)   | Class I / II selected from the duty point on the pressure-vs-outlet-velocity limits; cooling-air duty is typically Class I / II, well below the pressure ceiling.                                                                                                                                              |
| Materials of construction               | Mild steel + epoxy coating (standard, clean conditioned air) / stainless steel for humid or coastal inlet air / <b>special coating</b> on application; no wear plates or high-temperature metallurgy required on this duty.                                                                                    |
| Drive & control                         | Direct-coupled with VFD (default) / EC-motor direct-drive on smaller units, tracking cold-aisle $\Delta P$ . Drive to <b>425 HP</b> across the envelope; cooling duty typically well below it; speed set to the duty and the sound limit.                                                                      |
| Redundancy scheme                       | Sized to the N+1 or 2N deck so the remaining units carry the full IT heat on a fan-out; vibration-monitoring provision and <b>L10h <math>\geq</math> 40,000 h</b> bearings for uptime between planned outages.                                                                                                 |
| Discharge & rotation (AMCA orientation) | Even plenum discharge for the plug/plenum default; for housed builds, rotation CW or CCW (viewed from drive side) with discharge angle per AMCA — e.g. TH/BH/UB/DB — set to match your unit take-off and installed footprint.                                                                                  |
| Accessories & acoustic scope            | VFD or EC control package; inlet and outlet silencers for low-frequency content; casing-wall acoustic lagging and acoustic enclosure / sound hood for <b>&lt;75 dB(A)</b> ; flexible connections / expansion joints at the unit interface; inlet guide vanes (IGV) on application; inspection doors and drain. |

## Where the Data-center cooling air runs

|                                                                                                                                                                |                                                                                                                                                                                                                   |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>DATA CENTERS</b><br>CRAH-unit supply, AHU supply/return, hot/cold-aisle containment plenum fans on N+1 decks.                                               | <b>HVAC &amp; COMMERCIAL BUILDINGS</b><br>Built-up and packaged AHU supply/return where 24×7 run-hours make efficiency the lead spec.                                                                             |
| <b>SEMICONDUCTOR &amp; ELECTRONICS</b><br>Process-cooling and clean-air handling for fabs and electronics assembly with tight acoustic and reliability limits. | <b>TELECOM &amp; EDGE</b><br>Cooling-air fans for switch rooms, edge sites and containerised deployments where footprint and quiet running matter.                                                                |
| <b>AIRPORTS &amp; LARGE INFRASTRUCTURE</b><br>Large AHU supply/return where continuous duty and acoustic performance carry the specification.                  | <b>PHARMACEUTICALS</b><br>AHU supply/return on utility-grade HVAC adjacent to controlled areas, efficiency and low noise led.                                                                                     |
| <b>COLOCATION &amp; HYPERSCALE OEMS</b><br>Cooling fans supplied as a sub-package to CRAH, AHU and containment builders — interface documented up front.       | <b>YOUR DUTY POINT</b><br>Send us flow, static pressure and the air / gas condition — we size the wheel to it and quote in <b>3 to 5 working days</b> — <b>5 to 7 working days</b> for ATEX and special projects. |

## Standards & conformity

|                                                                                                                                                                    |                                                                                                                                                   |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>PERFORMANCE</b><br>Tested to the <b>IS 4894 / ISO 5801 / AMCA 210</b> method, in-house on our <b>200 HP</b> VFD rig. Tested-to-method — not AMCA-certified.     | <b>QUALITY SYSTEM</b><br><b>ISO 9001:2015</b> — third-party certified (our only third-party certification).                                       |
| <b>CE CONFORMITY</b><br>Self-declared per <b>2006/42/EC + 2014/35/EU</b> . Not a notified-body certificate.                                                        | <b>ATEX CONFORMITY</b><br>Self-declared, spark-resistant (SR), <b>Zone 2/22 Cat 3</b> per <b>2014/34/EU</b> , where area classification requires. |
| <b>BALANCE &amp; VIBRATION</b><br>Balance <b>ISO 21940</b> (G6.3 std, G2.5 on request); fan vibration acceptance <b>ISO 14694</b> , measurement <b>ISO 14695</b> . | <b>WELDING &amp; HEAVY DUTY</b><br><b>ASME Sec IX</b> welders + WPS; <b>API 673</b> available as project-specific scope for oil & gas.            |

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*Figures indicate family capability; every fan is engineered to the customer's duty point and confirmed on the approved GA drawing.*