AEREFY

VAV-E Smart Exhaust Valve

Installation Manual

Models: VAV-E 100 / 125 / 160 mm

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Innoair OÜ | aerefy.com

⚠ Safety Notice
Read this manual in full before installation. Only qualified HVAC installers should install this product. Comply with all applicable local electrical and building regulations. Improper installation may void the warranty and create safety hazards.

1. Introduction

The Aerefy VAV-E series are intelligent demand-controlled exhaust valves designed for hotel rooms, offices, and residential spaces. Each valve contains CO_2, humidity, temperature, pressure, VOC, and optional PIR (motion) sensors that continuously measure indoor air quality and automatically adjust airflow — opening when conditions deteriorate and closing when rooms are empty.

Key benefits at a glance:

- Up to 40 % energy savings compared to constant air volume (CAV) systems
- Up to 3× improvement in indoor air quality
- Self-balancing operation — minimal manual commissioning
- Retrofit-friendly: fits standard 100 mm, 125 mm, and 160 mm round duct connections
- PoE Ethernet (wired) or LoRa wireless (rechargeable battery powered) connectivity with cloud management

How It Works
When the valve detects occupancy or rising CO_2/humidity, it opens — reducing pressure in the exhaust duct. The central ventilation unit senses this pressure drop and increases fan speed to compensate, boosting total fresh air supply. When rooms empty, valves close and energy consumption drops.

1.1 Applicable Standards

This product and its installation must comply with the following standards where applicable:

- EN 16798-1:2019 — Indoor environmental quality and energy performance
- EN 12599 — Test procedures for installed ventilation and air conditioning systems
- EN 16211 — Measurement of airflows on site
- CEN/TR 14788:2006 — Design and dimensioning of residential ventilation systems
- EVS 906:2018 — Ventilation for non-residential buildings (Estonian national annex)
- ISO 5135 / ISO 7235 — Acoustic performance measurement
- Local building codes and regulations must also be followed

2. Product Overview

2.1 Model Range

All VAV-E models share the same physical housing (Ø190 mm, height 107 mm visible 75 mm) and accept fitting rings for 100 mm, 125 mm, or 160 mm duct connections. Models differ in connectivity and sensor complement:

Feature	SB01	BB01	SL01	BL01	COW02-B	COW02-E	DMP01
Display	✓	✗	✓	✗	✗	✗	✓
CO_2 Sensing	✓	✓	✓	✓	✓	✓	✓
LoRa Wireless	✓	✓	✓	✗	✓	✓	✓
THP + VOC	✓	✗	✓	✗	✓	✓	✗
IR Motion Sensor	✓	✗	✓	✗	✓	✓	✗
Bluetooth	✓	✓	✓	✓	✓	✓	✗
Ethernet / PoE	✗	✗	✓	✓	✓	✓	✓
USB-C Chargeable	✓	✓	✗	✗	✓	✓	✗
Battery Life	2 yr	2 yr	—	—	2 yr	—	—

2.2 Mechanical Specifications

Parameter	Value
Duct connection	100 mm / 125 mm / 160 mm
Outer diameter	190 mm
Total height	116 mm
Visible height (installed)	75 mm
Connection type	Male push-fit with EPDM airproof seal
Optional fixing	3× stainless screws
Casing airtightness	Class C
Operating temperature	0 °C to +45 °C
Operating humidity	0–80 % RH (non-condensing)
Warranty	2 years

2.3 Display Functions

Models with a display (SB01, SL01, DMP01) show the following information:

Top row

- Battery charging status icon, serial number

Left section

- Temperature (°C)
- Relative Humidity (%)

- Atmospheric Pressure (mmHg)
- Valve open %

Right large display:

- CO_2 level in ppm

3. Before You Begin

3.1 Tools Required

- Flow hood, vane anemometer, or thermal anemometer (for airflow measurement)
- Differential pressure gauge / manometer
- RJ45 crimp tool and Cat5 U/UTP cable (wired PoE models)
- Sharp knife or Stanley knife (for cable channel preparation)
- Small flathead screwdriver or thin nail / release tool (for cover clips)
- Removable silicone sealant
- Calibrated measurement instruments with valid calibration certificates

3.2 Pre-Installation Checks

1. Verify all system design documents: airflow specifications, duct sizes, valve placement drawings.
2. Confirm duct size at each installation point (100 mm, 125 mm, or 160 mm) matches the fitting ring ordered.
3. For PoE wired models: install and test Ethernet cabling before mounting the valve (see Section 5 for cable routing details).
4. Confirm the central ventilation unit supports constant pressure control with an EC or VFD-controlled fan motor. If not supported, then make sure all valves remain 20% minimum open at all times.
5. Isolate the ventilation section being worked on to prevent unintended airflow interference during installation.

3.3 Central Ventilation Unit Requirements

The Aerefy system requires a central unit capable of constant pressure control:

- Pressure sensor installed inside the unit, on the duct side of the filter
- Electronically commutated (EC) motor or variable frequency drive (VFD) control
- Note: If Aerefy valves control less than ~30 % of total airflow, pressure control may not be required, but energy savings will be limited

4. Mechanical Installation

4.1 Selecting the Correct Fitting Ring

Each VAV-E valve body is supplied with or accepts separate fitting rings for 100 mm, 125 mm, or 160 mm duct connections. Select the ring matching the duct diameter at each installation point. All sensor and electronic features are identical regardless of ring size; only air volumes differ.

4.2 Valve Placement Guidelines

Install exhaust valves as close as possible to the primary source of contamination:

- Bathrooms and wet rooms — always require an Aerefy exhaust valve
- Hotel room living area — place near the bed, as far as possible from the fresh air supply diffuser to avoid short-circuit airflow
- Kitchens, meeting rooms, exercise areas, workspaces, bedrooms

Recommended configurations for hotel rooms:

- Two-valve system (optimal): one in bathroom + one in living area near bed — removes CO_2 and bioeffluents directly from the breathing zone
- Single-valve system: valve in bathroom only — requires effective air transfer from bedroom (door gap or transfer grille above door)

4.3 Mounting the Valve

6. Push the fitting ring into the duct opening until the EPDM seal makes full contact. The ring should sit flush with the ceiling or wall surface.
7. For PoE wired models: route the Cat5 cable through the cable channel in the housing before fitting the valve body (see Section 5).
8. Align the valve body over the fitting ring. The male connection system self-seals with the EPDM gasket — no tools required for standard installations.
9. If additional security is needed (e.g. public areas), fasten with the optional 3× stainless screws using a screwdriver.
10. The valve default position after installation is 20 % open. This provides minimum baseline ventilation.

> ⚠ **Cable Routing Before Mounting**
> For PoE wired models (SL01, BL01, COW02), prepare and route the Ethernet cable BEFORE attaching the valve body to the fitting ring. Once mounted, the cable channel is not accessible from the outside.

4.4 Opening and Removing the Valve Cover

The decorative cover is retained by two spring clips on the inner rim of the valve housing. These clips must be released to access internal components, replace the battery, or connect cables.

To remove the cover:

11. Locate the two clip release points on opposite sides of the cover edge.
12. Insert a thin flathead screwdriver or nail each clip slot and gently pull the clip until you hear a click.

13. The cover will release. Do not use excessive force — the clips are plastic and may break if forced.
14. To refit: align the cover and press firmly and evenly until both clips click into place.

ℹ Clip Location
The two clips are located on the upper side of the cover rim — approximately at the 11 o'clock and 1 o'clock positions when viewed from front. A thin nail or the tip of a flathead screwdriver is the most effective release tool.

5. Wired (PoE Ethernet) Cable Installation

This section applies to PoE wired models: VAV-E SL01, BL01, and COW02-E. Battery-powered models (SB01, BB01, COW02-E) skip this section.

5.1 Cable Specification

Parameter	Requirement
Cable type	Cat5 U/UTP stranded (flexible)
Minimum free cable inside housing	250 mm (leave at least 25 cm of slack)
RJ45 connector	Standard RJ45 — DO NOT USE a plug with a sleeve/boot
Minimum bend radius	25 mm (Cat5 stranded typical minimum)
Cable entry radius from duct centre	85 mm from duct centre axis
Maximum cable length	Standard PoE Ethernet limits (100 m)

⚠ No Plug Sleeve / Boot
Do NOT use an RJ45 plug with a strain-relief sleeve or boot. The cable channel opening is dimensioned for a bare plug only. A sleeved plug will not pass through the channel.

5.2 Preparing the Cable Channel

The cable channel is a moulded slot in the side of the valve housing that runs from the outer edge to the internal PCB connector. It is sealed at the factory with a thin plastic membrane that must be opened before use.

15. Using a sharp knife (e.g. Stanley knife or box cutter), carefully score along the moulded cut-line on the cable channel cover.
16. Remove all plastic residue from inside the channel — any remaining flash or burr will prevent the RJ45 plug from passing through.
17. Test-fit the bare RJ45 plug through the channel before connecting: it should slide through with light resistance. If it catches, trim any remaining residue.

5.3 Routing the Cable

Figure 1 — Cable channel before opening. Score along the moulded line with a sharp knife.

Figure 2 — Channel after opening, ready for cable insertion.

Figure 3 — RJ45 plug (no sleeve) passing through the channel.

Figure 4 — Cable routed and valve ready for mounting.

18. Run the Cat5 cable from the nearest network point (PoE switch or injector) to the valve location. Leave at least 50 cm of spare cable above the ceiling or in the wall void.
19. At the valve, the cable exits through the ceiling or wall at a point approximately 85 mm from the centre of the duct connection.
20. Pass the bare RJ45-terminated end through the prepared cable channel from outside to inside.
21. Observe the minimum bend radius of 25 mm at all bends near the valve. Sharp bends can cause intermittent connection faults.
22. Connect the RJ45 plug to the PCB socket inside the housing. The socket is located in the centre of the valve body.

23. Ensure at least 25 cm of cable slack remains from the wall to allow for future removal of the valve without disconnecting the cable.

5.4 Sealing the Cable Entry

This step is critical for accurate sensor readings.

Even a small air leak around the cable entry point can introduce unconditioned air from the ceiling void into the sensor chamber. This will cause false CO_2, humidity, or temperature readings and reduce system accuracy.

24. After routing the cable, apply soft removable silicone sealant (“Shake'N'Fill” from AC Cable Solutions or Würth "Sealant, removable") around the cable where it enters the channel.
25. Ensure the sealant fills all gaps between the cable jacket and the channel walls.
26. Alternatively any Standard neutral cure Silicone can be used. Avoid acetoxy-cure silicone (the type that smells strongly of vinegar when applied).
27. Use a removable product (not permanent adhesive) so the valve can be removed for maintenance without damaging the housing.

> ⚠ **Recessed Ceilings — Extra Care Required**
> In installations with recessed ceilings or ceiling voids, even a very small fraction of air infiltrating through the cable duct can significantly affect sensor readings — particularly CO_2 and temperature. Careful sealing is essential in these installations.

6. Airflow & Commissioning

6.1 Default Settings

After installation, all Aerefy valves default to 20 % open position. This provides minimum baseline ventilation. Minimum and maximum airflow positions can be adjusted using the Aerefy App (Bluetooth) or Aerefy Cloud (via network connection).

6.2 K-Values for Airflow Calculation

Airflow is calculated from the measured differential pressure using the formula: $q_v = K \times \sqrt{\Delta p\_m}$ (result in l/s)

Valve / Position	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
VAV-E 100 mm	1.3	1.4	1.8	2.2	2.6	2.9	3.3	3.7	4.0	4.4
VAV-E 125 mm	0.7	1.4	2.0	2.6	3.1	3.7	4.2	4.7	5.1	5.6
VAV-E 160 mm	1.0	1.5	2.3	3.1	3.9	4.6	5.4	5.9	6.7	7.0

6.3 Minimum Airflow at 20 % Open (Design Reference)

Duct pressure (Pa)	100 mm l/s
40 Pa	**8.9**
60 Pa	**10.8**
100 Pa	**14.0**
140 Pa	**16.6**

6.4 Maximum Airflow at 100 % Open

Duct pressure (Pa)	100 mm l/s
40 Pa	**27.8**
60 Pa	**34.1**
100 Pa	**44.0**
140 Pa	**52.1**

ℹ Airflow Range
Dynamic demand-controlled operation typically delivers 3×–5× more air than the minimum setting. This ratio may vary depending on central unit capacity and set pressure differential.

6.5 Commissioning Procedure

28. Calculate required opening values for each valve and set the values using the Aerefy App or Cloud.
29. Measure airflow at each valve using a flow hood or anemometer. Record in l/s.
30. After registering the designed airflow at each valve, set them to dynamic setting.

31. Verify the central unit pressure differential matches the design specification (measure ΔPa at the unit, on the duct side of the filter).
32. Adjust minimum open positions per valve if local code requires a higher minimum flow. This can be done in the Aerefy App or Cloud.
33. Set static FRESH AIR supply diffusers to the maximum airflow position — they must be able to supply sufficient fresh air when exhaust valves are fully open.
34. Balance airflow across all sections to ensure equal baseline distribution.
35. Complete and file the commissioning report (see Section 9).

7. Connectivity & Configuration

7.1 Bluetooth Configuration (All Models)

All VAV-E models support Bluetooth configuration via the Aerefy App (iOS and Android). Bluetooth is used for initial setup, local parameter adjustment, and on-site commissioning.

36. Download the Aerefy App from the App Store or Google Play (contact aerefy@aerefy.com for early access).
37. Open the app and select 'Add Device'. Hold your phone within 5 m of the valve.
38. The valve will appear in the Found Valves list. Tap to connect. Known valves are connected automatically. Valves with display show the PIN code on display. Valves w/o display have the serial number and code printed on the printed circuit board as shown on the Figure 5. All valves are accessible over the Bluetooth with an App up to 30 minutes after power supply reset. Bluetooth accessability can be switched permantently on from the App or Cloud.

Figure 5 — Locating Serial no and PIN with the valves w/o display

39. Configure minimum/maximum open positions, sensor thresholds, and operating profiles as required. Expert Installer Settings are accessible by the Installer PIN code that can be obtained from Aerefy or authorised reseller.

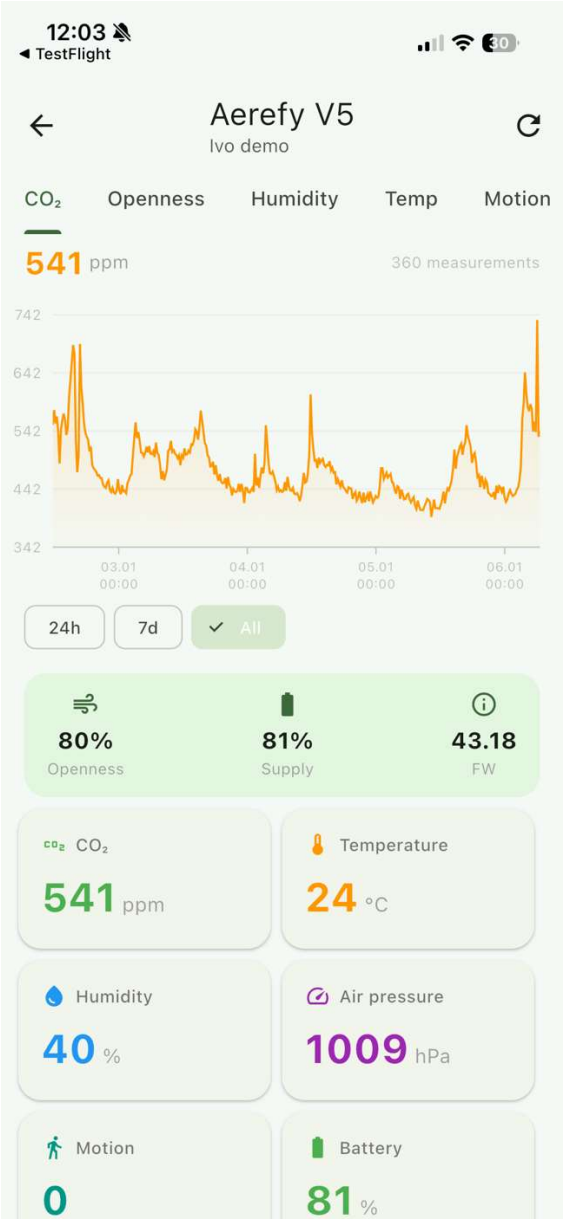

Figure 6 — Valve configuration over Bluetooth with App

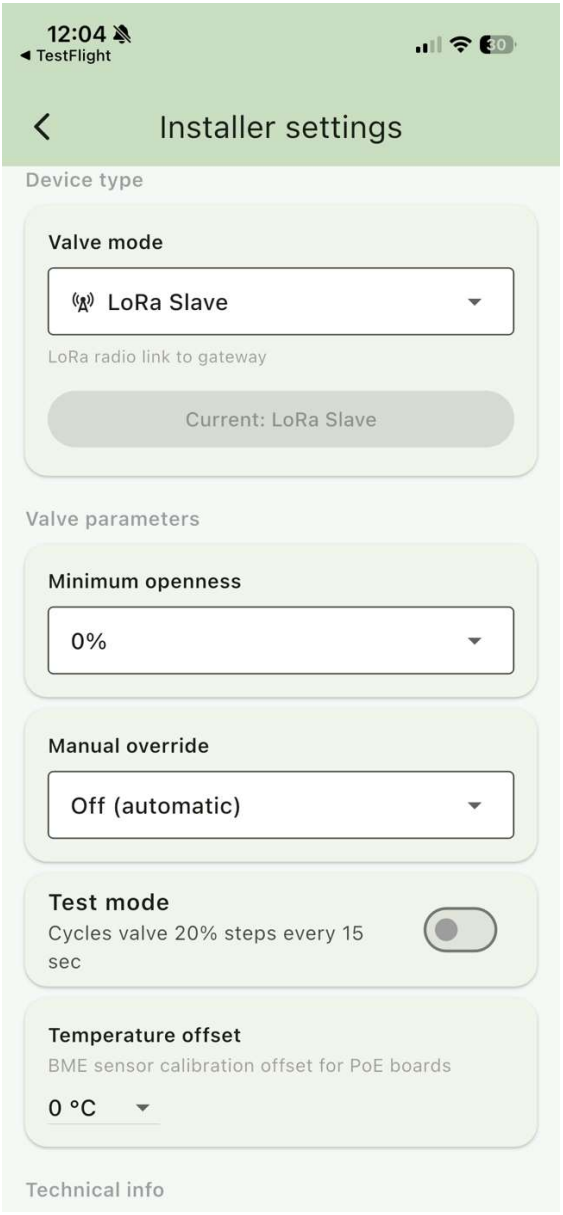

Figure 7 — Installer settings in App

7.2 PoE Ethernet (Wired Models — SL01, BL01, COW02)

Wired models receive power and data over a single Cat5 Ethernet cable connected to a PoE switch or injector. No separate power supply is required.

- Connect the RJ45 plug to a PoE-capable network port (IEEE 802.3af or 802.3at)
- The valve will automatically obtain an IP address via DHCP, or can be assigned a static IP
- Once networked, the valve appears in the Aerefy Cloud dashboard
- Ensure the cable is fully tested before valve installation (see Section 5)

7.3 LoRa Wireless (Battery Models — SB01, BB01, SL01, COW02-B, DMP01)

Battery or USB-C powered models communicate via LoRaWAN — a long-range, low-power wireless protocol. Any Aerefy valve can operate as LoRa gateway. Valves that are configured as LoRa gateway shall be connected with wired PoE and internet.

- Typical gateway coverage: 100–300 m in buildings (one gateway per floor is recommended)
- Battery life: approximately 2 years per charge under normal DCV operation

- Batteries with integrated USB-C charging port allow semi-powered solution for hard to access locations where electricity is available, but PoE not. Alternatively, PoE power injector can be also used for powering the battery powered versions using LoRa
- The gateway connects to the Aerefy Cloud and relays all valve data

7.4 Aerefy Cloud

All connected valves are managed through the Aerefy Cloud dashboard at dashboard.aerefy.com:

- Real-time sensor readings: CO_2, temperature, humidity, pressure, valve position
- Historical data and trend graphs (7 days, 3 days, 24 hours, free date range)
- Device configuration and operating profiles
- Firmware updates (OTA)
- Alerts and notifications
- BMS (Building Management System) integration

8. Troubleshooting

Symptom	Likely Cause
Valve not responding to App	Bluetooth timeout, bluetooth out of range or valve not powered — check battery level or PoE connection, restart power
CO_2 reading appears too low	Air infiltration through cable entry — check sealant around cable channel (Section 5.4)
Temperature reading lower or higher than room temperature	Ceiling void air leaking through cable channel — seal as described in Section 5.4. In case of other heat sources next to the valve, temperature offset can be adjusted in Valve Installer settings.
Valve stays closed / low airflow	Minimum position set too low, or central unit pressure too low — check settings in App or Cloud
Valve stuck at one position	Battery empty or motor management fault — Recharge battery. Restart the valve from the App or Cloud.
RJ45 plug will not fit through channel	Plug has a sleeve/boot fitted — remove the sleeve; or cable channel not fully cleared of plastic residue
Network not detecting valve	PoE switch not 802.3af/at compatible, or cable fault — test cable continuity
Battery draining faster than expected	Valve activating very frequently — check CO_2/humidity thresholds and settings; high-occupancy spaces may require wired model
Noisy airflow / whistling	Valve operating at high pressure differential — check that system pressure is within design range and if the valve minimum open is set >10%

9. Commissioning Report Template

Complete and retain this report after commissioning. A signed copy must be provided to the building owner or facility manager.

9.1 Project Information

Field	Value
Project name	
Location / address	
Date of commissioning	
Prepared by (name & title)	
Contact information	
Central ventilation unit model	
Design ventilation category (IEQ1–IEQ4)	
Design pressure differential (ΔPa)	
Nominal airflow of central unit (l/s)	
Maximum airflow of central unit (l/s)	

9.2 Measured Results per Section

Complete one row per valve:

Section	Valve ID	Baseline Measured l/s	Baseline Target l/s	Max Measured l/s	Max Target l/s	Pass / Fail

9.3 Compliance Declaration

Check	Result
Airflow compliance (EN 12599)	☐ Yes ☐ No
Pressure compliance	☐ Yes ☐ No
Leakage compliance	☐ Yes ☐ No
Cable sealing completed (wired models)	☐ Yes ☐ N/A
All sensors responding correctly	☐ Yes ☐ No
Cloud/App connectivity confirmed	☐ Yes ☐ No

Prepared by: _____ Date: _____

Approved by: _____ Date: _____

10. Maintenance

10.1 Routine Maintenance Schedule

Interval	Task
Monthly	Check Aerefy Cloud for alerts, sensor anomalies, or offline devices
Quarterly	Visually inspect valves for dust accumulation on the grille; clean with a dry cloth if necessary
Annually	Verify commissioning airflow values against current readings; adjust if occupancy patterns have changed
Every 2 years (battery models)	Replace or recharge battery via USB-C port
After renovations	Re-commission affected sections and update commissioning report

10.2 Cleaning

The valve grille can be wiped with a dry or lightly damp cloth. Do not use solvents or abrasive cleaners. The internal components are protected by the housing and do not require periodic cleaning under normal conditions.

10.3 Firmware Updates

Firmware updates are delivered over-the-air (OTA) via Aerefy Cloud. Updates can be scheduled to run during off-hours to avoid disruption. For wired models, updates occur automatically when connected. For LoRa models, updates are delivered via the LoRa gateway.

10.4 Warranty & Support

All Aerefy VAV-E valves carry a 2-year warranty covering manufacturing defects under normal use and installation conditions. The warranty is void if the product has been modified, incorrectly installed, or operated outside specified conditions.

For support: support@aerefy.com | +372 515 9410 | aerefy.com/get-support

11. Certifications & Compliance

- CE marked — complies with applicable EU directives for safety and EMC
- ISO 9001 certified manufacturing
- Acoustic performance tested per ISO 5135:2020 (sound power) and ISO 7235:2009 (transmission loss)
- Aerodynamic performance tested per EN 12238:2001
- Patent pending — Innoair OÜ, Aerefy.com

Measurement reports (ETS NORD AS, Tallinn, 2026) are available for download at aerefy.com/download:

- Report RH26002-1: VAV-E 100 extract valve
- Report RH26002-2: VAV-E 125 extract valve
- Report RH26002-3: VAV-E 160 extract valve