



SERIES FAN VAV TERMINAL BOXES

TYPE CVFB & SFTB

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1. INTRODUCTION

Trox Series Fan VAV boxes type CVFB & SFTB are fitted to the supply air ductwork as and where indicated on the Record Drawings.

Fan VAV terminal boxes take primary and secondary air, mix the two thoroughly and provide a constant air supply to the occupied zones of the building.

It is intended that this manual be used to assist a skilled engineer, experienced in the operation and maintenance of plant and systems, to efficiently operate and maintain the systems installed.

Before implementing any maintenance procedures, reference should be made to the as installed drawings to ensure a thorough understanding of the actual installation.

The information, procedures and maintenance instructions contained herein, are those pertinent at the time of preparation of the manual and the date of its issue. Changes of plant and legislation will necessitate revisions to be made to maintain the validity of the manual.

1.1 DESCRIPTION

The fan VAV terminal boxes consist of acoustic and thermal insulated galvanised steel casings, in which are contained a double inlet, double width, forward curved blade, centrifugal fan, direct driven by an electronically commutated type motor, a single blade primary air damper, a primary air pressure differential flow sensor, and optional electric heater elements of varying sizes.

An access door is provided in the casing underside so that the fan/motor unit can be serviced or, if necessary, removed without disturbing the duct connections.

For a more detailed description of the terminal boxes refer to TROX TECHNIK literature enclosed at the back of this manual.

1.2 PACKAGING AND STORAGE

Several units are packed and banded onto each pallet, then covered with plastic sheet. Immediately after taking delivery, check that the consignment is undamaged and complete.

Protect units from the weather, even when packed (e.g. avoid direct sunlight in summer and temperatures above 50°C) and avoid direct contact with water.

1.3 HANDLING

The CVFB & SFTB unit incorporates a double inlet centrifugal fan which has been dynamically balanced. Care must be taken when handling the unit to avoid applying shock loads to the casing, for instance by dropping the unit onto the floor. If for any reason the unit is dropped the fan impeller must be inspected to ensure that it is not rubbing on the fan casing and that it is central in the width of the casing before applying electrical power to the motor. A replacement fan must be fitted if the motor support arms become distorted by shock loads caused by dropping.

TROX[®] ACCEPT NO RESPONSIBILITY FOR DAMAGE TO THE FAN CAUSED BY THE LACK OF CAREFUL HANDLING OF THE UNITS ON SITE AFTER DELIVERY HAS BEEN TAKEN.

1.4 INSTALLATION

Remove all packaging from the inlet and outlet connections. The heating coil is supplied with a cover to protect the finned block. Only remove covers just before connecting the adjacent ductwork.

Before connecting ductwork check for any debris and remove if necessary. The primary air spigot should be carefully inspected for any damage to the volume flow grid.

If the units have been stored for some time all electrical equipment should be checked and insulation checks carried out on the fan motor.

The unit can be installed in the false ceiling or the false floor of the building using the mounting support points on the unit casing. When using other supporting methods please refer to our Technical Department for approval.

Care should be taken when fitting the units before and after bends, dampers or other fittings as catalogue performance may be affected.

Install a minimum of 2 diameters of straight duct of the same size as the inlet spigot.

All duct connections should be well sealed against air leakage.

Adequate access must be provided to the controls enclosure on the side of the box and to the fan access panel. The access provided must allow the fan to be removed from the CVFB & SFTB unit to enable any replacement of the fan assembly to take place.

All electrical connections should be made by appropriately skilled qualified personnel and should be made in accordance with the project specific TROX wiring diagram supplied with the unit and local current wiring regulations (UK – IET wiring regulations BS 7671).

1.5 WIRING

The unit should be wired in accordance with the TROX TECHNIK wiring diagram and in accordance with current IET Wiring Regulations (BS 7671), the Health and Safety at Work Act 1974, the Electricity at Work Regulations 1989 and industry codes of practice.

After working in the control panel it is recommended that all screw terminals are checked by the site electrician.

A function test on the controls can only be carried out when all wiring is complete and there is airflow.

1.6 CONTROLS

The series fan VAV terminal boxes (CVFB & SFTB) are usually supplied fitted with a Belimo actuator to control the primary air volume, with a free issue BMS controller to modulate the actuator to give the required primary minimum and maximum design volumes.

The fan speed is controlled with a 0 -10V control signal set by a potentiometer (pot) to allow the fan volume to be commissioned to the correct constant volume.

If fitted, electric heaters are also modulated via solid state thyristors controlled by the free issue BMS controller depending on the heating requirement. The heater is protected by safety devices as follows:-

- (a) An auto reset high temperature cut-out (HTCO) set at 40°C.
- (b) A manual reset HTCO fixed at 85°C*.
- (c) A CT switch to monitor fan current draw to ensure the unit is delivering minimum airflow to operate the heater safely.

Any one of these devices can disable the power supply to the electric heater in the event that the minimum airflow conditions are not present.

*Controls may be project specific. Refer to unit wiring diagram for further details.

For details of any free issue components, controller/actuators, temperature sensors not part of TROX supply, please refer to the items manufacturer and/or supplier.

1.7 (OPTIONAL) ELECTRIC HEATER BATTERY

Ensure adjacent duct work has suitable size access panel or similar arrangement for cleaning and maintenance of the heater element and HTCO probe.

Allow minimum of 200mm clearance for the removal of the controls enclosure lid and heater enclosure lid.

! Never switch off the unit whilst the heater battery is running as this will result in excessive ambient temperature inside the heater duct and may trip the high temperature cut outs.

The control strategy for the heater must allow a minimum of 10 minutes run on time to allow the heater element to safely cool at the end of the heating cycle. During this time the Vmin heating cycle volume must be maintained in the duct for at least 10 minutes after the heater control signal is switched off.

During the heating cycle it is recommended that primary air is either shut off or turned down to the absolute minimum in order to reduce the length of the heating cycle (and therefore reduce energy requirements).

2. COMMISSIONING

Switch on the power to the unit and verify that VAV volume controller is on and the fan is also on.

2.1 PRIMARY VAV

Press the adaption button on the BCO compact unit and then allow the unit to carry out an adaption. The unit will travel to its end stops before attempting to control the air volume. The air volume setpoint is control by a 0-10/2-10vdc signal from the building management system or a room temperature controller.

The maximum primary air volume for the fan VAV should be approximately 90% of the commissioned fan volume. Send the correct control voltage to the unit to allow the Vmax primary air volume to be achieved.

Verify the Vmax design air volume is being met by means of an appropriate measuring method. A hand held adjuster tool Belimo ZTH can be used. Alternatively the air volume can be verified by measuring the differential pressure across the flow grid and using the C value to calculate the air volume.

2.2 EC FAN

Commission the fan volume with the primary air at the design max volume. Inside the control panel there is a potentiometer that provides a 0 -10v dc control signal to control the fan. Measure the air volume being delivered by the fan using a balometer hood or other appropriate measurement method. Manually adjust the potentiometer until the required design air volume to the room is achieved.

If other balancing dampers exist downstream of the fan then these will need balancing as part of this process.

Check the induction ports to ensure that they are clear and there is air flow through the ports into the unit.

Reduce the primary air volume to the design Vmin to ensure the unit controls to the Vmin setpoint.

2.3 ELECTRIC HEATER

Once the VAV unit and the fan are commissioned verify the function and control of the electric heater (if fitted).

Provided the airflow through the heater is at least the minimum airflow, send the required control signal(s) to the electric heater to verify the heaters is coming on.

Depending on the type of free issue BMS controller, the control signals may be 0-10Vdc, or 4-20mA, or a heater enable signal may be required. The actual controls

wiring of the unit can be verified from the unit wiring diagram, a copy of which can be found inside the controls enclosure.

The control strategy for the heater must allow a minimum of 10 minutes run on time to allow the heater element to safely cool at the end of the heating cycle. During this time the Vmin heating cycle volume must be maintained in the duct for at least 10 minutes after the heater control signal is switched off.

During the heating cycle it is recommended that primary air is either shut off or turned down to the absolute minimum in order to reduce the length of the heating cycle (and therefore reduce energy requirements). Refer to wiring diagram for Vmin heating volume for safe operation of the heater battery.

If the heater does not heat up then check the following:

Is the fan air volume exceeding the minimum volume for the electric heater?

The volumetric flow required varies depending on the box size and can be found by referring to the wiring diagram.

NOTE: Do not attempt operate the electric heater below the published minimum air volume.

Has the high temperature cut-out (HTCO) next to the duct heating element tripped?

If so this will prevent the heater from operating. This could be caused if the heater is operated below the minimum airflow, or if the airflow is switched off before the end of the run-on time needed at the end of the heating cycle.

NOTE: The BMS control strategy for the heater must allow a minimum of 10 minutes run-on time to allow the heater element to safely cool at the end of the heating cycle. During this time, the vmin heating cycle air volume must be maintained in the heater duct for at least 10 minutes after the heater control signal is switched off.

NOTE: For safety reasons, if the unit has a manual reset HTCO that has operated due to temperature over limit, it is recommended that both manual & auto reset HTCOs be replaced before making heater battery operational again.

Has the BMS reduced the primary air to Vmin during the heating cycle?

It is expected that the primary air will be shut off, or at the very least turned down to Vmin during the heating cycle in order to reduce energy usage.

The unit has a CT switch in order to verify that the fan is running before the electric heater can be enabled.

The CT switch has been factory calibrated to operate when the fan is running at Vmax volume with 30Pa external static pressure with no primary air.

If this is not the case when the unit has been installed and commissioned on site, or if the primary air is not being turned down during heating, then it may be necessary to site adjust the CT switch to operate at a lower set point.

It is necessary during commissioning to prove the electric heater once the fan volume has been commissioned and the primary air is running at Vmax design and then prove the heater again with the primary air in the design Vmin state or with the primary air shut off if the unit is to be used in this condition.

2.4 CT SWITCH ADJUSTMENT

When the CT switch is operating over the setpoint, the contacts will be closed and a red LED will light on top of the CT switch. If the red LED is off then the CT switch contacts are open and the heater will not be enabled.

Before any adjustment can be made to the CT switch, wait 30 seconds for the fan speed to settle after making any adjustment to the fan speed or primary air volume, and use a miniature flat screwdriver to adjust the small screw on top of the CT switch as follows:

Turn clockwise until the red LED just comes on,
Or turn counter clockwise until the red LED just goes off.

The CT switch should only be adjusted when the required minimum airflow has been verified by the commissioning engineer.

NOTE: If the unit has an electric heater, ensure that the published minimum airflow for safe operation of the electric heater is achieved before making any adjustment to the CT switch setpoint. Do not adjust the CT switch set-point any lower than is required to get the electric heater to operate safely.

To adjust the CT switch, first close the primary air VAV damper by depressing the clutch. Then adjust the CT switch by turning the screw clockwise. As soon as the red LED comes on turn the screw a further two turns clockwise.

Test the operation by switching the fan off and on again to make sure the red LED illuminates once the fan is running at its design air volume.

Once the CT switch is set release the clutch on the primary air VAV controller.

3. MAINTENANCE

The fan VAV terminal boxes are virtually maintenance free with respect to all moving parts and no lubrication is required.

Any throw away air filters mounted on the induction ports must be examined periodically and, if necessary, the filters discarded and replaced.

During initial operation of the system it is recommended that a 3 month inspection period is used increasing to a six/twelve months after eighteen months use.

The fan impeller should be inspected for build-up of dust on the blades and cleaned as necessary.

Fan motors are “lubricated for life”.

Note: the units must be switched off, and inlet ports covered whilst any adjacent drilling or cutting work is being undertaken in the vicinity to protect internal components.

3.1 SAFETY

As with other types of moving machinery, fans can be dangerous. It is **essential** that before any fan is in any way examined it must first be completely isolated from the mains supply using the lockable isolator provided.

THE FAN IS FITTED WITH AN AUTOMATIC RESETTING THERMAL OVERLOAD CUT-OUT. THESE OPERATE IF THE MOTOR OVERHEATS FOR ANY CAUSE. NATURALLY ONCE THE MOTOR HAS COOLED DOWN THEY WILL AUTOMATICALLY RESTART. THEREFORE THIS RE-EMPHASISES THE REQUIREMENT TO ISOLATE THE FAN EVEN IF IT HAS STOPPED OPERATING.

3.2 CONTACTS

For further information on the working, servicing and spares on the VAV/CV products please contact Trox

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