VEROTEC

Electronics Packaging

# Thermal Solutions

### CUSTOM THERMAL SOLUTIONS (FAN TRAYS)

TecServ+ is the vehicle by which Verotec delivers its value added services. These fall within 5 main categories and are described below. When it comes to thermal solutions, we've worked with many customers in the past to design, manufacture and help bring to market modified and custom versions of our standard products – a small selection of these are pictured below. If you have any special fan tray requirements, please contact our sales office.

### ENGINEERING SERVICES:

- Complete review of commercial, electro-mechanical, environmental and regulatory product requirements with customer.
- Import of STEP, IGES, DWG & DXF file formats
- Mechanical and electrical design using latest CAD software
- 3D Modelling to allow conceptual testing before production
- Component selection from a vast library of parts

### MANUFACTURING SERVICES:

- Prototype / pre-production samples using small batch shop
- Modification of standard catalogue products (including machining, CNC punching, laser cutting, painting & silk-screening)
- Manufacture of custom / bespoke products (including fabrication, machining, CNC punching, plating, painting & silk-screening)
- Assembly & kitting of components
- Integration & mechanical / electrical testing of complex systems

### COMPLIANCE SERVICES:

- Validation of product design and/or specification
- Advice on environment legislation (RoHS, Reach, Weee etc.)
- In-house pre-compliance testing for CE marking (Safety, EMC)
- Supply of product technical construction file
- Testing & certification of a product at an approved test house (for EMC, shock & vibration, altitude, temperature, humidity etc.)

### LOGISTICAL SERVICES:

- Express manufacturing service for quick turnaround of urgent orders
- Special / bespoke packaging for safe transport of goods
- Scheduled orders (including JIT and KAN BAN systems)
- Stock holding & distribution
- Exporting (including export packaging, land/sea/air transportation, freight forwarding, customs documentation & shipping manifests)

### PROJECT MANAGEMENT SERVICES:

- Initial project consultation
- Capability and feasibility study
- Estimation of project cost and leadtime
- Management of design process (specification to validation)
- Management of manufacturing process (prototype to production)
- Cost reduction programmes throughout product life cycle

***Customised 1U 19" intelligent fan tray with dual redundant AC inputs – nuclear power station application.***

***Custom 3U 19" fan tray with removable drawers and local / remote alarm signalling - telecoms application.***

***Customised 1U 19" intelligent fan tray with integrated temperature sensor – transport signalling application.***





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### *1U, 19" STANDARD FAN TRAYS*

1U x 19" fan trays are designed as a cost effective solution, providing cooling as an integral part of the rack equipment. Designed to operate at fixed speeds, the fans offer good reliability and performance in high density applications, providing an even airflow across the full cabinet width. Available in 3-fan or 6-fan versions, the trays incorporate a computer-optimized vent pattern, providing 70% open-area material above the fan blades. The front panel is available either silver anodised with blue text or black smooth semi-gloss powder coated with white text and includes a power indicator. The fan trays are suitable for use with the air ducting accessories shown on page 10.08 and are supplied with a rack fixing kit containing screws, washers and cage nuts & operating instructions.

### *FEATURES:*

- 1U integral height (to IEC 297-1)
- Designed for high airflow performance
- 70% open-area vent pattern
- Available in 3 or 6 fan sizes
- Available with115V & 230V AC input
- Available with 12, 24 & 48V DC input
- Available with silver (anodised) or black (painted) front panel
- Available without fans (see page 10.05)

### *SPECIFICATIONS:*

- 3 fan trays are 250mm deep, 6 fan tray are 350mm deep
- Material for tray is 1mm thick galvanised steel
- Silver front panel is 3mm thick Aluminium alloy anodized
- Black front panel is 3mm thick steel, black powder coated

| Voltage V | Air Flow (in free air) | | Max static pressure | | Power W | Power Connector | Indicator |
|---|---|---|---|---|---|---|---|
| | cfm | m3/hr | inH2O | Pa | | | |
| 115 AC | 110 | 186 | 0.37 | 92 | 24 | IEC60320 C14 | 115V Neon |
| 230AC | 110 | 186 | 0.37 | 92 | 24 | IEC60320 C14 | 230V Neon |
| 12 DC | 120 | 203 | 0.42 | 104 | 7 | Molex Mini fit Jr | 10mA LED* |
| 24 DC | 120 | 203 | 0.42 | 104 | 7 | Molex Mini fit Jr | 10mA LED* |
| 48 DC | 120 | 203 | 0.42 | 104 | 7 | Molex Mini fit Jr | 10mA LED* |

Note: ratings are per fan * Current limiting resistor is fitted

### *ORDERING INFORMATION:*

| Description | Voltage | Ordercode (Silver front) | Ordercode (Black front) |
|---|---|---|---|
| 3-Fan (250mm) | 115V AC | **28-138204** | **28-4000797** |
| | 230V AC | **28-238120** | **28-4000799** |
| | 12V DC | **28-138201** | **28-4000801** |
| | 24V DC | **28-138202** | **28-4000803** |
| | 48V DC | **28-138203** | **28-4000805** |
| 6-Fan (350mm) | 115V AC | **28-138216** | **28-4000798** |
| | 230V AC | **28-238121** | **28-4000800** |
| | 12V DC | **28-138205** | **28-4000802** |
| | 24V DC | **28-138206** | **28-4000804** |
| | 48V DC | **28-138207** | **28-4000806** |

### *REPLACEMENT FANS AC (119 X 119MM X 38MM)*

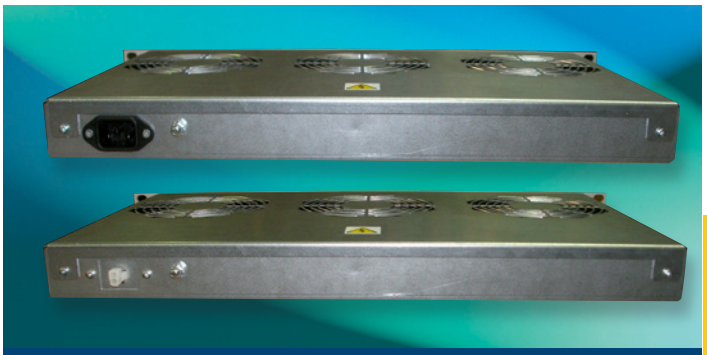
| Voltage V | Air Flow (in free air) | | Max static pressure | | Power W | Used On | Order Code |
|---|---|---|---|---|---|---|---|
| | cfm | m3/hr | inH2O | Pa | | | |
| 115 AC | 110 | 186 | 0.37 | 92 | 24 | 38mm for Standard Fan Trays | **28-4000382** |
| 230AC | 110 | 186 | 0.37 | 92 | 24 | | **28-4000383** |

### *REPLACEMENT FANS DC (119 X 119 X 32MM)*

| Voltage V | Air Flow (in free air) | | Max static pressure | | Power W | Used On | Order Code |
|---|---|---|---|---|---|---|---|
| | cfm | m3/hr | inH2O | Pa | | | |
| 12 DC | 120 | 203 | 0.42 | 104 | 7 | Standard & Filtered | **28-4000386** |
| 24 DC | 120 | 203 | 0.42 | 104 | 7 | | **28-4000387** |
| 48 DC | 120 | 203 | 0.42 | 104 | 7 | | **28-4000388** |

*Standard 19" fan tray*

*Standard 19" fan tray with black front panel*



*Rear view – AC / DC input*

*Replacement fans*

### 1U, 19" FILTERED FAN TRAYS

Of similar size to the standard trays on the previous page, these versions incorporate low profile fans to allow a washable filter to be housed whilst maintaining the 1U rack height. The filter will lessen dust build up in the equipment being cooled and includes an extruded aluminium handle for easy removal. Available in 3-fan or 6-fan versions, the trays incorporate a computer-optimized vent pattern, providing 70% open-area material above the fan blades with an even larger aperture underneath for minimum resistance to air drawn through the filter. The front panel is available either silver anodised with blue text or black smooth semi-gloss powder coated with white text and includes a power indicator. The fan trays are suitable for use with the air ducting accessories shown on page 10.08 and are supplied with a rack fixing kit containing screws, washers and cage nuts & operating instructions.

### FEATURES:

- 1U integral height (to IEC 297-1)
- Removable, washable filter
- 70% open-area vent pattern
- Available in 3 or 6 fan sizes
- Available with115V & 230V AC input
- Available with 12, 24 & 48V DC input
- Available with silver (anodised) or black (painted) front panel
- Available without fans (see page 10.05)

### SPECIFICATION:

- 3 fan trays are 250mm deep, 6 fan tray are 350mm deep
- Material for tray is 1mm thick galvanised steel
- Filter media is 4mm, 30 PPI, UL94, HF1
- Filter frame is mild steel
- Silver front panel is 3mm thick Aluminium alloy anodized
- Black front panel is 3mm thick steel, black powder coated

### ORDERING INFORMATION:

| Description | Voltage | Ordercode (Silver front) | Ordercode (Black front) |
|---|---|---|---|
| 3-Fan (250mm) | 115V AC | **28-138220** | **28-4000807** |
| | 230V AC | **28-238147** | **28-4000809** |
| | 12V DC | **28-138217** | **28-4000811** |
| | 24V DC | **28-138218** | **28-4000813** |
| | 48V DC | **28-138219** | **28-4000815** |
| 6-Fan (350mm) | 115V AC | **28-138211** | **28-4000808** |
| | 230V AC | **28-238148** | **28-4000810** |
| | 12V DC | **28-138208** | **28-4000812** |
| | 24V DC | **28-138209** | **28-4000814** |
| | 48V DC | **28-138210** | **28-4000816** |

### REPLACEMENT FANS AC (119 X 119MM X 32MM)

| Voltage V | Air Flow (in free air) | | Max static pressure | | Power W | Used On | Order Code |
|---|---|---|---|---|---|---|---|
| | cfm | m3/hr | inH2O | Pa | | | |
| 115 AC | 81 | 137 | 0.28 | 69 | 13 | 32mm for Standard Fan Trays | **28-4000384** |
| 230AC | 81 | 137 | 0.28 | 69 | 13 | | **28-4000385** |

### REPLACEMENT FANS DC (119 X 119 X 32MM)

| Voltage V | Air Flow (in free air) | | Max static pressure | | Power W | Used On | Order Code |
|---|---|---|---|---|---|---|---|
| | cfm | m3/hr | inH2O | Pa | | | |
| 12 DC | 120 | 203 | 0.42 | 104 | 7 | Standard & Filtered | **28-4000386** |
| 24 DC | 120 | 203 | 0.42 | 104 | 7 | | **28-4000387** |
| 48 DC | 120 | 203 | 0.42 | 104 | 7 | | **28-4000388** |

### REPLACEMENT FILTERS.

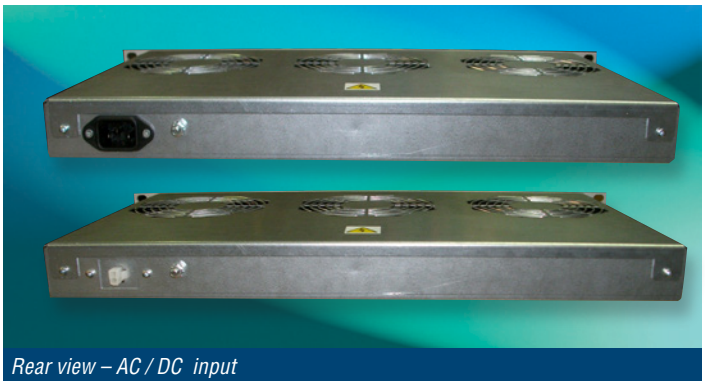
Replacement filter elements for filtered fan trays & fan module (supplied as replacement elements only)

| Description | Order Code |
|---|---|
| Filter element for 250mm deep fan tray | **28-238257** |
| Filter element for 350mm deep fan tray | **28-238258** |

*Standard 19" fan tray*

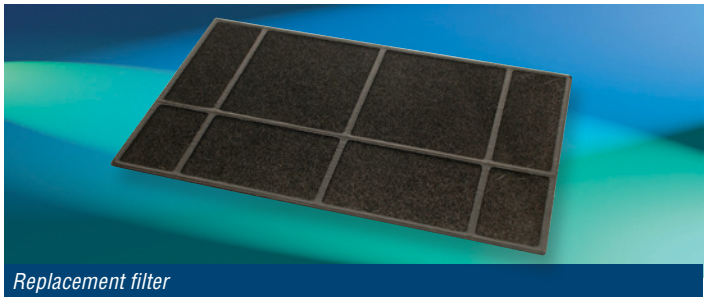
| Voltage V | Air Flow (in free air) | | Max static pressure | | Power W | Power Connector | Indicator |
|---|---|---|---|---|---|---|---|
| | cfm | m3/hr | inH2O | Pa | | | |
| 115 AC | 81 | 137 | 0.28 | 69 | 13 | IEC60320 C14 | 115V Neon |
| 230AC | 81 | 137 | 0.28 | 69 | 13 | IEC60320 C14 | 230V Neon |
| 12 DC | 120 | 203 | 0.42 | 104 | 7 | Molex Mini fit Jr | 10mA LED* |
| 24 DC | 120 | 203 | 0.42 | 104 | 7 | Molex Mini fit Jr | 10mA LED* |
| 48 DC | 120 | 203 | 0.42 | 104 | 7 | Molex Mini fit Jr | 10mA LED* |

*Note: ratings are per fan, * Current limiting resistor is fitted*



*Rear view – AC / DC input*

*Replacement fans*



*Replacement filter*





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### *1U, 19" EMPTY FAN TRAYS*

These fan trays are offered without fans fitted to allow different types / configurations of fans to be fitted. These are offered as AC versions comprising the tray & front panel with IEC inlet & Neon fitted and as DC versions with the Molex Mini fit Jr. and 10mA LED fitted.

The fan trays are supplied with a rack fixing kit containing screws washers and cage nuts & and assembly leaflet.

Standard fan trays are designed to accept 119 x 119mm fans with a maximum height of 38mm whilst filtered fan trays are designed to accept fans of 119 x 119 with a maximum height of 32mm.

### *FEATURES:*

- 1U integral height (to IEC 297-1)
- 70% open-area vent pattern
- Available in 3 or 6 fan sizes
- Available with115V & 230V AC input
- Available with 12, 24 & 48V DC input
- Available with silver (anodised) or black (painted) front panel

### *SPECIFICATIONS:*

- 3 fan trays are 250mm deep, 6 fan tray are 350mm deep
- Material for tray is 1mm thick galvanised steel
- Silver front panel is 3mm thick Aluminium alloy anodized
- Black front panel is 3mm thick steel, black powder coated

Note: Depending on the chosen DC supply, the correct current limiting resistor must be fitted to the LED.

### *ORDERING INFORMATION:*

| Description | Voltage | Ordercode (Silver front) | Ordercode (Black front) |
|---|---|---|---|
| 3-Fan Standard | 115V AC | 28-4000378 | 28-4000817 |
| | 230V AC | 28-239249 | 28-4000819 |
| | DC | 28-138212 | 28-4000825 |
| 6-Fan Standard | 115V AC | 28-4000379 | 28-4000818 |
| | 230V AC | 28-239250 | 28-4000820 |
| | DC | 28-138213 | 28-400826 |
| 3-Fan Filtered | 115V AC | 28-4000380 | 28-4000821 |
| | 230V AC | 28-239251 | 28-4000823 |
| | DC | 28-138214 | 28-400827 |
| 6-Fan Filtered | 115V AC | 28-4000381 | 28-4000822 |
| | 230V AC | 28-239252 | 28-4000824 |
| | DC | 28-138215 | 28-4000828 |

### *FAN INTER-CONNECTING CABLE (DAISY CHAIN) FOR AC FANS ONLY*

| Description | Order Code |
|---|---|
| 3 Fan daisy chain cable | 28-555230 |

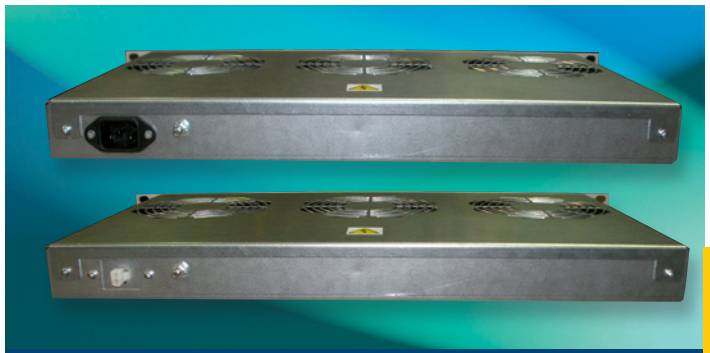
### *REPLACEMENT FILTERS.*

Replacement filter elements for filtered fan trays (supplied as replacement elements only)

| Description | Order Code |
|---|---|
| Filter element for 250mm deep fan tray | 28-238257 |
| Filter element for 350mm deep fan tray | 28-238258 |

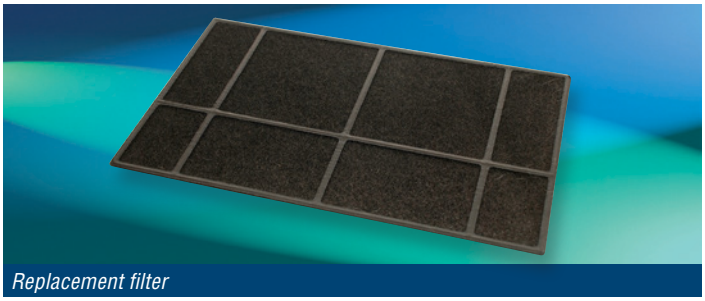
*Empty 19" fan tray*

*Empty 19" fan tray with black front panel*



*Rear view – AC / DC input*

*AC fan daisy chain cable*



*Replacement filter*

# Intelligent Fan Trays

The fan trays are designed to form part of a rack management system which will provide cooling in response to the thermal requirement of the rack whilst monitoring its component parts and providing a response to failure of either a fan or thermal sensor and providing a local and remote alarm. Designed as a 1U high (IEC 297-1) component for insertion adjacent to the equipment requiring cooling, positioning is normally below the item(s) to be cooled

**Features:**

- 1U integral height (to IEC 297-1).
- Forms part of a complete rack management system.
- Fan speed responsive to temperature.
- Monitoring of fans, thermal control, & power supply
- Status indication locally by LED and audible alarm
- Remote alarm indication by volt free changeover contact
- Available in 3 fan & 6 fan versions
- Available in auto ranging AC input
- Available in -48v DC input versions (to ETS 300 132-2)

The Intelligent Fan Tray features a design which uses proven control solution for each group of 3 fans within a tray. On 6 fan versions this allows for separate monitoring for each group for both control and alarm functions allowing for redundancy if required with a further option of Dual Power Input on some styles.

Function of each group of 3 fans is regulated by programmed controller that operates the fans at half speed up to 35°C and increases the speed linearly to full speed at 55°C.

Thermal control is via a pluggable thermistor sensor for each group of 3 fans. These are available in various lengths to suit its positioning within the rack, or integrated onto a bracket that fits directly to the rear of the fan tray. These must be ordered separately.

**Monitoring of the various functions of each group of 3 fans is also carried out by the programmed controller as follows:**

- In the event of a fan failure the speed of the remaining fans in the group increases to full speed and an alarm condition is created.
- In the event of a failure of the thermistor sensor, either short circuit or open circuit, the speed of the fans in the group will increase to full speed and an alarm condition is created.
- When the themistor sensor for the group reaches a temperature of 71°C an alarm condition is created, this will reset at 62°C.

**The fan tray presents the following:**

- A Power On LED illuminated yellow when power is being supplied to the fan controller. On dual input units two Power On LEDs are present)
- And for each group of 3 fans:
- A Status LED illuminated green under normal operating conditions and red under alarm conditions.
- An Audible alarm will sound under alarm conditions until the fault is cleared.
- A Remote alarm via a set of volt free changeover contacts which will change over under any of the above alarm conditions. This remote alarm is designed to “fail safe” and is energised under normal conditions and will therefore also assume an alarm status on power failure.

**Fan Tray Specification:**

- Input voltage (AC) 100-240V +/- 10% 47-63Hz
- Input Voltage (DC) -48V Nom (-40.5 to -57.0V to ETS 300 132-2)
- Airflow is 170m3/h (100cfm) each fan (in free air)
- Operating temperature – fan tray 70°C maximum
- AC input units - Input connector(s) IEC 60320 C14
- DC input units - Input connector(s) Molex Min Fit Jr 4 way (mating part supplied)
- On 3 fan units -Alarm connector Molex Min Fit Jr 3 way (mating part supplied)
- On 6 fan units- Alarm connectors 2 off Molex mini fit Jr 3 way (mating parts supplied) to allow various combinations of alarm interconnection to be achievied.

The Intelligent fan tray will not operate without the Thermal Sensor(s) which are available in different lengths to suit the required position(s) within the rack.

*INTELLIGENT 19” FANTRAY*

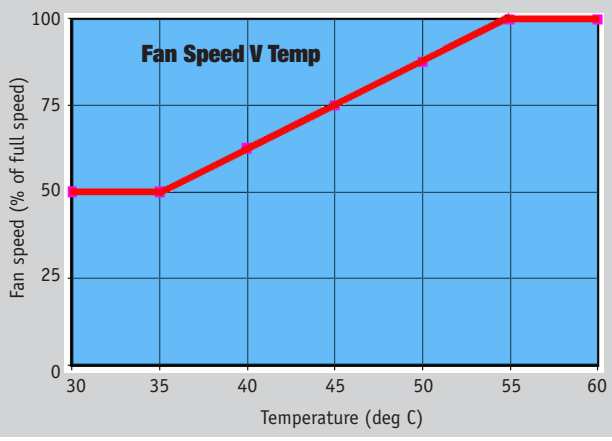
| Description | Power Input | Order Code Sliver | Order Code Black | Thermal Sensors Required |
|---|---|---|---|---|
| 3 Fan Intelligent Fan Tray | Single Auto-ranging AC | **28-4000193** | **28-4000610** | 1 |
| 3 Fan Intelligent Fan Tray | Single -48V DC | **28-4000390** | **28-4000611** | 1 |
| 3 Fan Intelligent Fan Tray | Dual -48V DC | **28-4000391** | **28-4000612** | 1 |
| 6 Fan Intelligent Fan Tray | Single Auto-ranging AC | **28-4000392** | **28-4000613** | 2 |
| 6 Fan Intelligent Fan Tray | Dual Auto-ranging AC | **28-4000393** | **28-4000614** | 2 |
| 6 Fan Intelligent Fan Tray | Single -48V DC | **28-4000394** | **28-4000615** | 2 |
| 6 Fan Intelligent Fan Tray | Dual -48V DC | **28-4000395** | **28-4000616** | **2** |

### *THERMAL SENSORS FOR INTELLIGENT FAN TRAYS*

| Description & Length | Order Code |
|---|---|
| Thermistor Assembly -0.5Metre | **919-4000232** |
| Thermistor Assembly -1.0Metre | **919-4000233** |
| Thermistor Assembly -1.5Metre | **919-4000234** |
| Thermistor Assembly -2.0Metre | **919-4000235** |
| Thermistor Assembly -2.5Metre | **919-4000236** |
| Thermistor Assembly -3.0Metre | **919-4000237** |
| Thermistor Bracket Assembly (3-Fan) | **28-4002877** |
| Thermistor Bracket Assembly (6-Fan) | **28-4002878** |

*Thermistor bracket assembly*

### *THERMAL PROFILE OF STANDARD INTELLIGENT FAN TRAY*

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MONITORED FAN TRAY


PLUG-IN MODULES

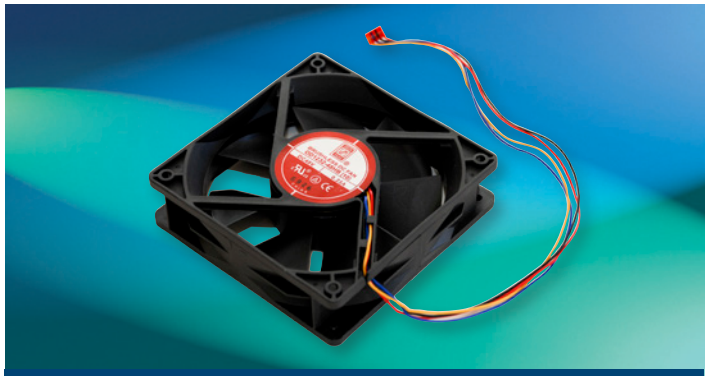
### MONITORED FAN TRAYS

Some applications may only require the fans to run at full speed but have the facility to present an alarm on fan failure or power failure. This may be achieved by the use of an Intelligent Fan Tray fitted with a Dummy sensor for each group of 3 fans in place of the Thermal sensor. The Intelligent Fan Tray will not operate correctly without the required sensor(s) fitted.

### DUMMY SENSOR FOR MONITORED FAN TRAY

| Description | Order Code |
|---|---|
| Dummy Sensor | 919-4000396 |

Qty 1 required for a 3 fan tray & qty 2 for 6 fan trays


REPLACEMENT FAN

### REPLACEMENT FAN DC FOR INTELLIGENT/MONITORED FAN TRAY

| Voltage V | Freq. Hz | Air Flow in free air m3/hr | Power W | USED ON | Order Code |
|---|---|---|---|---|---|
| 48VDC | - | 170 | 4 | Intelligent Fan Trays | 28-4000389 |

### PLUG-IN FAN MODULE

The plug in Fan module is designed to provide cooling as an integral part of an IEC 297-3 sub-rack system. The unit occupies a 3U 10HP space at 160mm or 220mm card depth.

The Fan module draws air through the front panel and blows to the left for cooling horizontally mounted PCBs or “hot units such as power supplies.

The module is fitted with a removable, washable filter behind the front panel and can be operated with or without the filter in place.

Unit is supplied as a 230V 50Hz unit. Connections are via a male DIN41612 H15 connector with the connections (on AC input units assembled with fans) L to Z24, N to Z28 and Earth to Z32.

### PLUG-IN FAN MODULE

**Features:**

- Forms integral part of 3U IEC 297-3 Sub-rack system
- Only occupies 10HP space.
- Available in 160 & 220 card depths.
- Supplied as 230V 50Hz unit.
- Input power 13 watts
- Supplied as filtered unit.
- Air output, with filter, 10.1cfm 4.11m3/hr.
- Air output, without filter 14.4 cfm 5.87 m3/hr.
- Connection via industry standard connector.
- Also available without fans for configuration to other voltages and fan types.
- Mating connector kit available.

Module is 1.5 & 1mm thick galvanised steel
Front panel is 2.5mm thick Aluminium alloy anodised
Filter is a 30pore polyurethane foam filter element (rated UL94-HF1) fitted in a galvanised steel frame:

### FAN MODULE

| Description | Order code |
|---|---|
| 3U x 10HP x 160 Fan Module 230V AC | 173-202514 |
| 3U x 10HP x 220 Fan Module 230V AC | 173-202515 |
| 3U x 10HP x 160 Fan Module (NO FAN) | 173-202956 |
| 3U x 10HP x 220 Fan Module (NO FAN) | 173-202957 |

### FAN MODULE CONNECTION KIT

Comprising mating connector (H15 Female with 6.3 Faston terminals), 6HP DIN 41612 adaptors and all fixings

| Description | Order code |
|---|---|
| Fan Module Connection Kit | 173-4000397 |

### REPLACEMENT FAN FOR FAN MODULES (92 X 92 X 25MM)

| Voltage V | Freq. Hz | Air Flow in free air m3/hr | Power W | USED ON | Order Code |
|---|---|---|---|---|---|
| 230VAC | 50 | 59 | 13 | Fan module | 28-4000398 |

### REPLACEMENT FILTERS.

Replacement filter elements for filtered fan trays & fan module (supplied as replacement elements only)

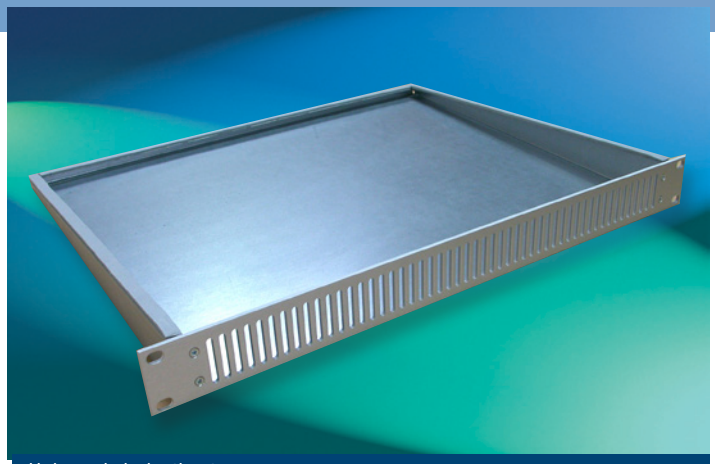
| Description | Order Code |
|---|---|
| Filter element for 3U 10HP fan Module | 173-202508 |

### UNIVERSAL AIR DUCTING TRAYS

Universal air ducting trays are compatible with standard, filtered, monitored and intelligent fantrays and indeed any industry standard 19" rack mounting fan tray. Occupying 1U of rack height, they can be used to isolate a hot spot within an equipment rack, ducting cool air into the rack and/or hot air from the rack without affecting the other mounted equipment. An airtight seal is assured between ducting tray and adjacent equipment / fan tray by a foam gasket around the tray edge. Supplied with 19" mounting hardware.

### ORDERING INFORMATION:

| Description | Order Code |
|---|---|
| Ducting tray for 250mm deep fan tray | 28-4004501 |
| Ducting tray for 350mm deep fan tray | 28-4004502 |



*Universal air ducting tray*

### MAINS LEAD

A 10A rated mains lead comprising 2 metres of cable with a moulded IEC 60320 C13 appliance connector at one end and a moulded BS1363A plug, with a10A fuse fitted, at the other end.

For use with the fans trays shown here we recommend that the fuse be changed to a 3A fuse (BS1362 type) to ensure continued protection of the fan tray wiring & components.

### ORDERING INFORMATION:

| Description | Order Code |
|---|---|
| 2.0m 10A mains lead with UK plug | 28-261791 |

*THERMOSTAT*

### THERMOSTAT

The noise from continuously running fans can be obtrusive and annoying, particularly where equipment is installed in an office environment, as well as consuming power that may not be required.

Using a rack mounted thermostat to switch on the fans when a predetermined temperature is reached will reduce this to the occasions when the worst case requirements are being met.

The thermostat is suitable for installation as part rack wiring and will operate, via the changeover contacts both heaters and cooling fans.

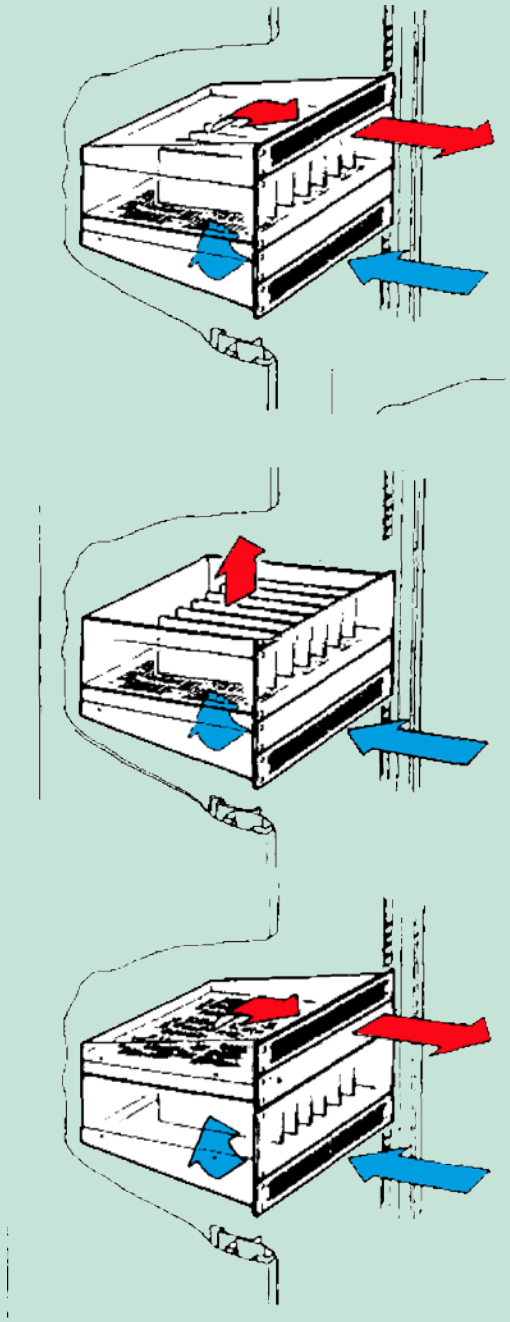
**Specification:**

- 0-60°C operating range
- Rated 250VAC
- Contacts rated : 5A (2) contact closes as temperature rises
  10A (4) contact opens as temperature rises

### ORDERING INFORMATION:

| Description | Order Code |
|---|---|
| Thermostat FZK 01170.0-00 | 608-555725 |

### TYPICAL APPLICATIONS OF AIR DUCTING TRAY







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