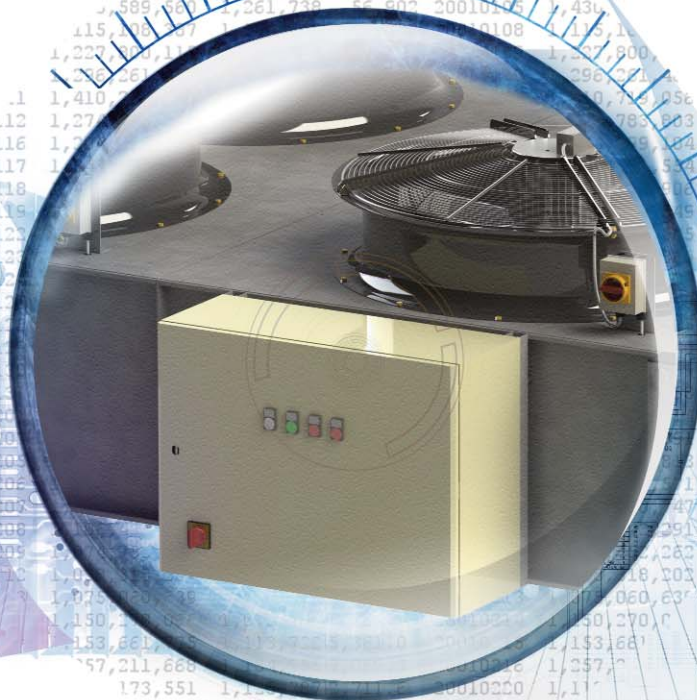


# PIOVAN

Customers. The core of our innovation

## Control Panels



# Control Panels



Typical control panel mounted on cooler

Piovan design and manufacture a range of cooler, condenser and pump set controls to offer customers single point of responsibility when used in conjunction with the array of cooling products available. A variety of standard volt free contacts and optional communication methods also means integration with PLC and BMS systems is as straightforward as possible.

Using only premium switchgear and high specification standardised designs Piovan consider their control panels to be the most reliable and comprehensive on the market. One standout example of this is when Piovan adiabatic controls are applied to Piovan adiabatic coolers the British Health and Safety Executive (HSE) have confirmed that, unlike other systems on the market, the Piovan system is so safe, and presents sufficiently low risk of Legionella bacteria problems, that there is no need to register the equipment with local authorities under the 'Notification of Cooling Towers and Evaporative Condensers Regulations 1992' act.

Due to initiatives Piovan have offered, the interest in energy saving controls is now greater than ever. The majority of panels are supplied complete with energy saving inverter speed control or EC fan control. As well as reducing the CO<sub>2</sub> foot print for Piovan customers, these types of controls are capable of paying back the additional capital expenditure in as little as 2-3 months and can even pay back the entire supply cost of the cooling package in as little as 2-3 years (please see additional inverter control and EC fan literature for further details).

It is Piovan's belief that customers should receive a reliable 'fit and forget' solution to their cooler, condenser and pump set control needs. With this in mind, every Piovan panel supplied is subject to rigorous factory tests and pre-commissioning procedures designed to reduce commissioning time on site.

Furthermore, to ensure control panels meet sound engineering practises and the high level of quality and functionality that customers have come to expect from Piovan, the standard specification for all panels includes:

- IP65 rated control enclosure
- Lockable door inter-locked isolator
- Magnetic and thermal overloads with manual reset per fan/pump/motor etc.
- 24V control circuit
- Remote stop/start link

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Internal View of Special 2 x 14 Fan Inverter Controls with the Addition of Multiple Status Lamp Indication, 2 x 15kW and 2 x 18kW Soft Start Run and Standby Pump Control



Special 2 x 14 Fan Inverter Control Panel with the Addition of Multiple Status Lamp Indication, 2 x 15kW and 2 x 18kW Soft Start Run and Standby Pump Control (1)

- Smart relay control allowing more accurate and far greater functionality together with system integration capability
- Variety of status lamps and volt free terminals for local and remote status monitoring
- Adiabatic cooler control panels benefit from a system test button which initiates the adiabatic sprays for a 20 second burst. This is designed to prove the adiabatic system during commissioning.

Options available on request include:

- Stainless Steel enclosure for aggressive environments
- Panel heaters for low ambient design conditions
- HMI (Human Machine Interface) screens for live status display, further digital integration with various Building Management System languages and reduction of cabling for remote status monitoring
- Pump controls – for additional information please see Piovani's pump set literature.

Additional features for different products are shown on the following pages.

## Dry Air Operation

### Stage Control – Single Bank

|                    |  |
|--------------------|--|
| Method of control: | Controller feeding smart relay(s). Full stage rotation                               |
| Lamps:             | Panel live, fan(s) running, fan fault  |
| Volt free:         | Fan(s) running, fan fault, general fault terminals if general fault only is required |
| Stage:             | No more than 2 fans per stage – Maximum 11 stages                                    |

### Stage Control – Double Bank

|                    |  |
|--------------------|--|
| Method of control: | 2 off Controllers feeding smart relay(s) controlling on water circuit furthest from set point. Full stage rotation |
| Lamps:             | Panel live, fan(s) running, fan fault  |
| Volt free:         | Fan(s) running, fan fault, general fault terminals if general fault only is required                               |
| Stage:             | No more than 2 fans per stage – Maximum 11 stages  |

### Stage Control – Free Cooling

|                    |   |
|--------------------|---|
| Method of control: | Controller feeding smart relay(s), single stage stat monitoring air temperature. Full stage rotation      |
| Lamps:             | Panel live, fan(s) running, fan fault, free cooling active  |
| Volt free:         | Fan(s) running, fan fault, free cooling active, general fault terminals if general fault only is required |
| Stage:             | No more than 2 fans per stage – Maximum 11 stages   |
| Interlocks:        | On air stat failure, system will revert to free cooling mode  |



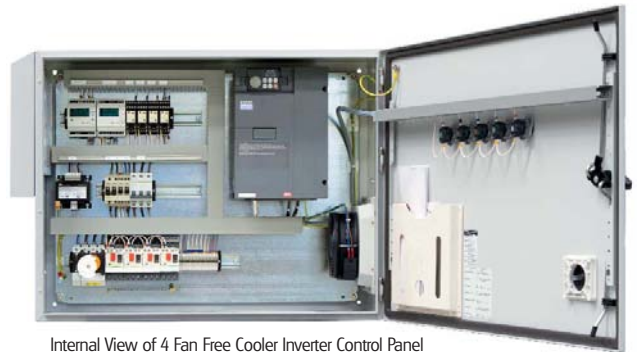
1 Fan Dry Cooler Stage Control Panel



Internal View of 1 Fan Dry Cooler Stage Control Panel



4 Fan Free Cooler Inverter Control Panel.



Internal View of 4 Fan Free Cooler Inverter Control Panel

### Inverter – Single Bank

Method of control: Controller feeding inverter.  
Lamps: Panel live, fan(s) running, fan fault, inverter fault  
Volt free: Fan(s) running, fan fault, inverter fault, general fault terminals if general fault only is required

### Inverter – Double Bank

Method of control: 2 off controllers feeding inverter controlling on water circuit furthest from set point  
Lamps: Panel live, fan(s) running, fan fault, inverter fault  
Volt free: Fan(s) running, fan fault, inverter fault, general fault terminals if general fault only is required

### Inverter – Free Cooling

Method of control: Controller feeding inverter  
Lamps: Panel live, fan(s) running, fan fault, inverter fault, free cooling active  
Volt free: Fan(s) running, fan fault, inverter fault, free cooling active, general fault terminals if general fault only is required  
Interlocks: On air stat failure, system will revert to free cooling mode

### EC Control – Single Bank

Method of control: Controller feeding EC fans  
Lamp: Panel live, fan(s) running, fan fault  
Volt free: Fan(s) running, fan fault, general fault terminals if general fault only is required

### EC Control – Double Bank

Method of control: 2 off controllers feeding EC fans controlling on water circuit furthest from set point  
Lamps: Panel live, fan(s) running, fan fault  
Volt free: Fan(s) running, fan fault, general fault terminals if general fault only is required

### EC Control – Free Cooling

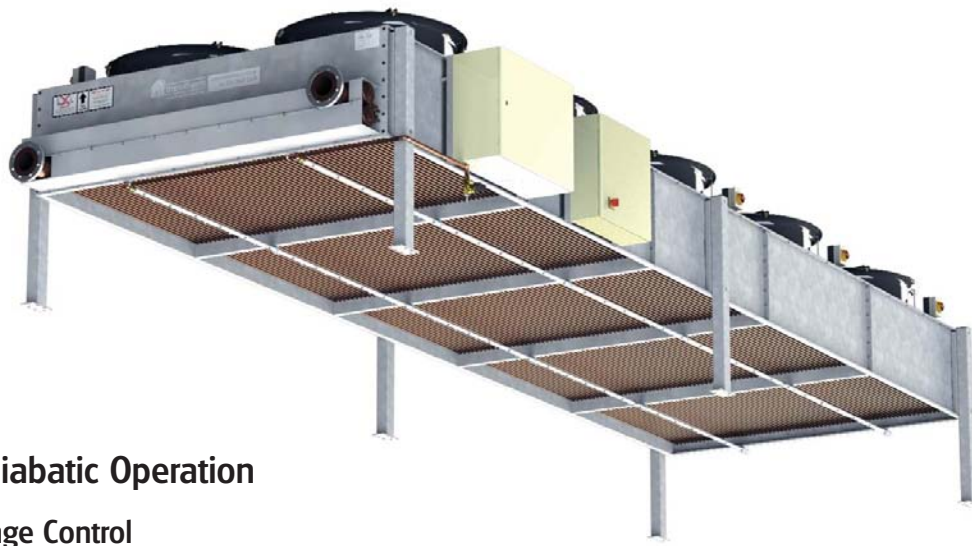
Method of control: Controller feeding EC fans  
Lamps: Panel live, fan(s) running, fan fault, free cooling active  
Volt free: Fan(s) running, fan fault, free cooling active, general fault terminals if general fault only is required  
Interlocks: On air stat failure, system will revert to free cooling mode



6 Fan Double Bank Dry Cooler Inverter Control Panel



Internal View of 6 Fan Double Bank Dry Cooler Inverter Control Panel



## Adiabatic Operation

### Stage Control

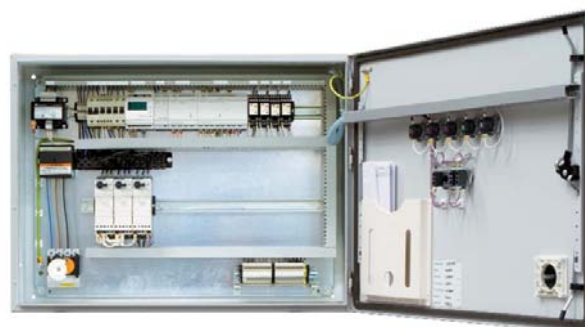
|                    |   |
|--------------------|---|
| Method of control: | Fans – controller feeding smart relay(s)<br>Adiabatic – controller feeding smart relay<br>Full stage rotation   |
| Lamps:             | Panel live, fan(s) running, fan fault, UV fault, adiabatic feed low pressure fault  |
| Volt free:         | Fan(s) running, fan fault, UV fault, adiabatic feed low pressure fault, general fault terminals if general fault only is required   |
| Stage:             | No more than 2 fans per stage – Maximum 11 stages   |
| Interlocks:        | Adiabatic system will not spray under the following conditions: <ul style="list-style-type: none"> <li>- Door switch set to 'Dry' or 'Off'</li> <li>- Ambient dry bulb below design</li> <li>- Fan controller fault</li> <li>- Adiabatic pump fault</li> <li>- UV fault</li> <li>- Adiabatic feed low pressure fault</li> </ul> |

### Stage Control – Adiabatic with Free Cooling Function

|                    |   |
|--------------------|---|
| Method of control: | Fans – controller feeding smart relay(s). Lead control stage rotation<br>Adiabatic – controller feeding smart relay<br>Free Cooling – Auto change-over from adiabatic condenser water cooling to dry free cooling for suitable free cooling ambient temperatures<br>Full stage rotation   |
| Lamps:             | Panel live, fan(s) running, fan fault, UV fault, adiabatic feed low pressure fault, free cooling active   |
| Volt free:         | Fan(s) running, fan fault, UV fault, adiabatic feed low pressure fault, free cooling active, general fault terminals if general fault only is required  |
| Stage:             | No more than 2 fans per stage – Maximum 11 stages   |
| Interlocks:        | Adiabatic system will not spray under the following conditions: <ul style="list-style-type: none"> <li>- Door switch set to 'Dry' or 'Off'</li> <li>- Ambient dry bulb below design</li> <li>- Fan controller fault</li> <li>- Adiabatic pump fault</li> <li>- UV fault</li> <li>- Adiabatic feed low pressure fault</li> <li>- On air stat failure, system will revert to free cooling mode</li> </ul> |



2 Fan Adiabatic Cooler Stage Control Panel

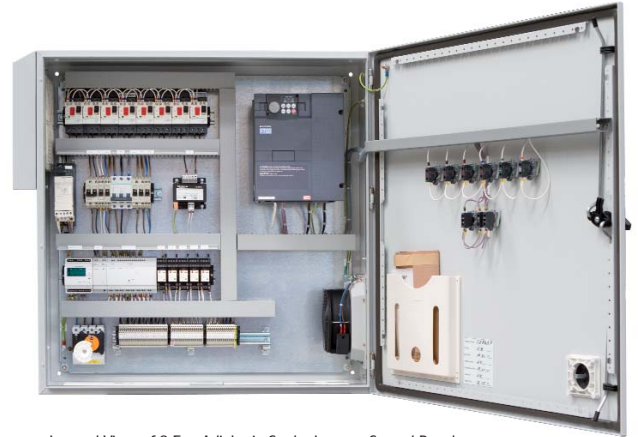


Internal View of 2 Fan Adiabatic Cooler Stage Control Panel





8 Fan Adiabatic Cooler Inverter Control Panel



Internal View of 8 Fan Adiabatic Cooler Inverter Control Panel

## Inverter

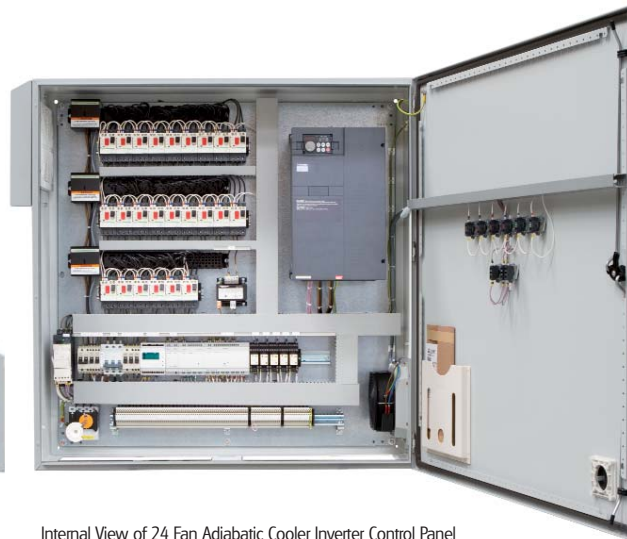
|                          |   |
|--------------------------|---|
| Method of control:       | Fans – controller feeding inverter<br>Adiabatic – controller feeding smart relay  |
| Lamps:<br>inverter fault | Panel live, fan(s) running, fan fault, UV fault, adiabatic feed low pressure fault,   |
| Volt free:               | Fan(s) running, fan fault, UV fault, adiabatic feed low pressure, inverter fault,<br>general fault terminals if general fault only is required  |
| Interlocks:              | Adiabatic system will not spray under the following conditions: <ul style="list-style-type: none"><li>- Door switch set to 'Dry' or 'Off'</li><li>- Ambient dry bulb below design</li><li>- Fan controller fault</li><li>- Inverter not up to, or above design speed</li><li>- Inverter fault</li><li>- Adiabatic pump fault</li><li>- UV fault</li><li>- Adiabatic feed low pressure fault</li></ul> |

## Inverter – Adiabatic with Free Cooling Function

|                    |  |
|--------------------|--|
| Method of control: | Fans – controller feeding inverter<br>Adiabatic – controller feeding smart relay<br>Free Cooling – Auto change-over from adiabatic condenser water cooling to dry<br>free cooling for suitable free cooling ambient temperatures   |
| Lamps:             | Panel live, fan(s) running, fan fault, UV fault, adiabatic feed low pressure fault,<br>inverter fault, free cooling active   |
| Volt free:         | Fan(s) running, fan fault, UV fault, adiabatic feed low pressure fault, inverter fault,<br>free cooling active, general fault terminals if general fault only is required  |
| Interlocks:        | Adiabatic system will not spray under the following conditions: <ul style="list-style-type: none"><li>- Door switch set to 'Dry' or 'Off'</li><li>- Ambient dry bulb below design</li><li>- Fan controller fault</li><li>- Inverter not up to, or above design speed</li><li>- Inverter fault</li><li>- Adiabatic pump fault</li><li>- UV fault</li><li>- Adiabatic feed low pressure fault</li><li>- On air stat failure, system will revert to free cooling mode</li></ul> |



24 Fan Adiabatic Cooler Inverter Control Panel.



Internal View of 24 Fan Adiabatic Cooler Inverter Control Panel

## EC Control

- Method of control: Fans – controller feeding EC fans  
 Adiabatic – controller feeding smart relay
- Lamps: Panel live, fan(s) running, fan fault, UV fault, adiabatic feed low pressure fault
- Volt free: Fan(s) running, fan fault, UV fault, adiabatic feed low pressure fault, general fault terminals if general fault only is required
- Interlocks: Adiabatic system will not spray under the following conditions:
- Door switch set to 'Dry' or 'Off'
  - Ambient dry bulb below design
  - Fan controller fault
  - Fans not up to, or above design speed
  - Adiabatic pump fault
  - UV fault
  - Adiabatic feed low pressure fault

## EC Control – Adiabatic with Free Cooling Function

- Method of control: Fans – controller feeding EC fans  
 Adiabatic – controller feeding smart relay  
 Free Cooling – Auto change-over from adiabatic condenser water cooling to dry free cooling during suitable free cooling ambient temperatures
- Lamps: Panel live, fan(s) running, fan fault, UV fault, adiabatic feed low pressure fault, free cooling active
- Volt free: Fan(s) running, fan fault, UV fault, adiabatic feed low pressure fault, free cooling active, general fault terminals if general fault only is required
- Interlocks: Adiabatic system will not spray under the following conditions:
- Door switch set to 'Dry' or 'Off'
  - Ambient dry bulb below design
  - Fan controller fault
  - Fans not up to, or above 48Hz
  - Adiabatic pump fault
  - UV fault
  - Adiabatic feed low pressure fault
  - On air stat failure, system will revert to free cooling mode



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