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let us reduce your carbon footprint*

natural ventilation range by GDL Air Systems Ltd

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www.grille.co.uk

natural | sustainable | efficient | healthy | eco friendly

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wallunit penthouseturret solarstore solarpipe

The Natural Ventilation Solution

The fundamental difference between more commonly used mechanical ventilation and natural ventilation is the use of encapsulated wind power to fully ventilate the buildings.

Our system works on the basis of natural fresh air entering the building through various wall mounted units with modulating control dampers. The air passes through a series of grilles and dampers allowing for a controlled environment purely using fresh air eliminating the need for a costly mechanical arrangement. The stale air leaves the building via our penthouse roof turrets.

The Advantages of Natural Ventilation

Cost Effective

- Natural Cooling reduces the need for mechanical air conditioning.
- Low energy consumption.
- Low operating costs.
- Low maintenance costs.
- Night purging reduces day time cooling by refreshing the room with cooler night time air.

Sustainable and Eco Friendly

- By harnessing wind power & temperature buoyancy to ventilate the building.
- Increased control significantly reduces energy usage by monitoring CO^2 levels.
- No fossil fuels are necessary significantly contributing to energy conservation and carbon emission reduction.

Health Benefits

- Cool fresh air increases concentration levels due to the fresh supply of oxygen continually replacing any stale air.
- The occupant can fully control the temperature of the room to meet their requirements.
- Eliminates ‘sick building syndrome’.
- Increased security as there are no open windows.

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The Intelivent Range

Utilizing the natural elements to control your building has never been so simple.

The GDL Intelivent Natural Ventilation Range harnesses both wind and solar power to fully ventilate buildings, significantly lowering energy consumption, operating and maintenance costs.

The Intelivent range is particularly suitable for commercial and educational buildings. This unique design eradicates the 'cold drop' effect and allows the 'Wall Unit' to work as a front line heating system. The two modulating dampers give added control to the ventilation rate and the front attenuator baffle gives additional noise reduction to the unit.

The range is ideally controlled by wireless CO^2 and temperature sensors providing user friendly controls. A single control system can control up to five natural ventilation systems. The system can be connected to any existing BMS or internet system.

Intelivent Advantages

- Two section heater battery to give greater control and energy saving.
- Heater battery sited at low level to eliminate cold drop (cold air at low level).
- Split damper which gives greater control to prevent 'over ventilation' and reduces energy consumption.
- The units can be controlled by CO^2 emissions, temperature sensors or manual override.
- Wireless control systems are optional and give significant cost savings over hard wiring.
- A single control system can control up to five natural ventilation units.
- Optional noise attenuation can further reduce noise levels.
- Control systems can be sited remotely, e.g. in the roof space to eliminate misuse.
- Adjustable wall sleeve to cover a wide range of wall thickness.
- Tamper proof fixings and user friendly design to help prevent wilful damage.

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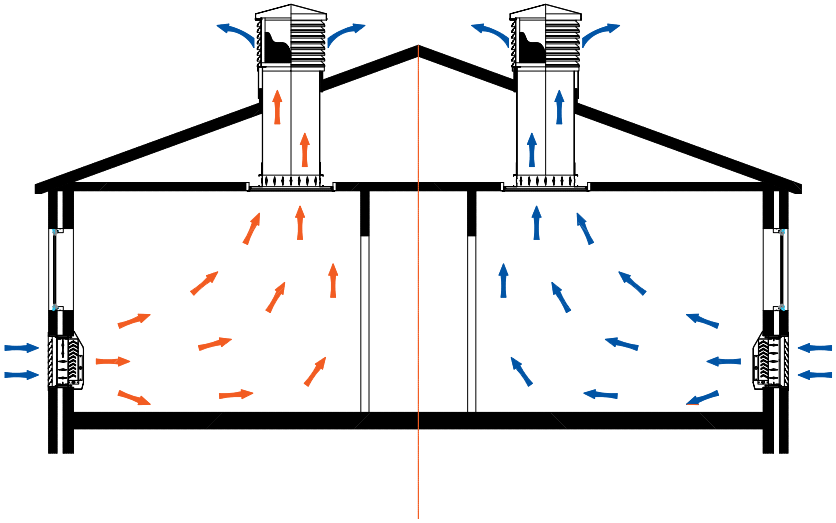
Typical Installation

The natural ventilation solution is achieved by using three primary devices.

1. The Wall Mounted units.
2. The Penthouse Turret.
3. The solar powered Solarstore option.

The devices work in harmony with each other, each being controlled by CO^2 and temperature sensors. This creates a 'stack effect' which draws the air through the building giving;

- Free cooling, night purge.
- Natural ventilation.
- Control of temperature and CO^2 levels.



Winter Scenario
Lower damper section fully open to allow fresh air to pass over heater coil into room.

Summer Scenario
Upper and lower damper sections fully open to allow fresh air to pass into room.

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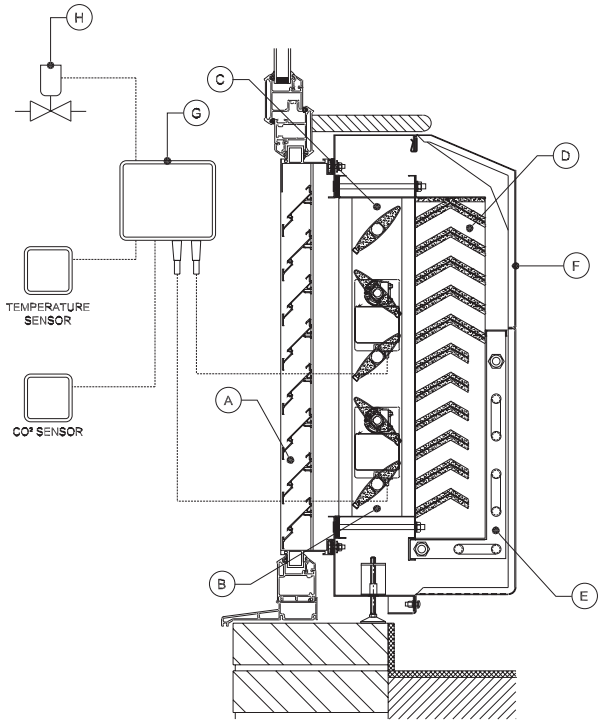
Key Features



A. Weather Louvre

B. Tight Shut-off Insulated Damper (vent)

C. Tight Shut-off Insulated Damper (cooling)

D. Acoustic Baffle

E. Low Pressure Hot Water Heating Coil

F. Fascia Grille

G. Control Panel

H. Low Pressure Hot Water Control Valve

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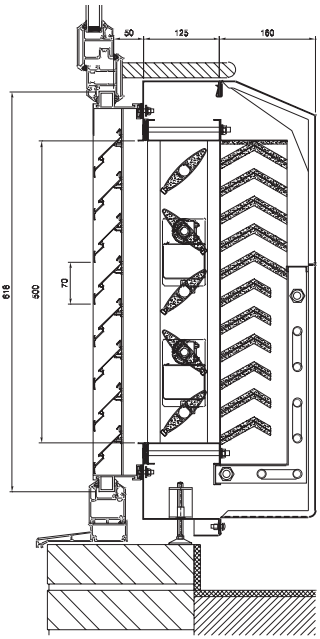
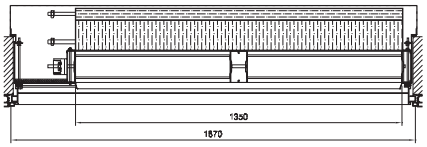
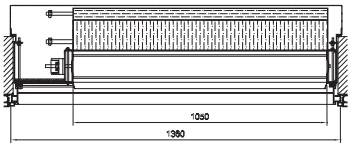
Unit Sizes

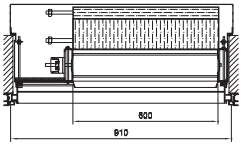
The data provided below is related to the three unit sizes.

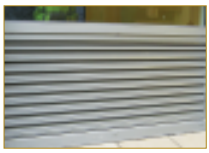
The wall mounted units can be manufactured to fit any bespoke size.











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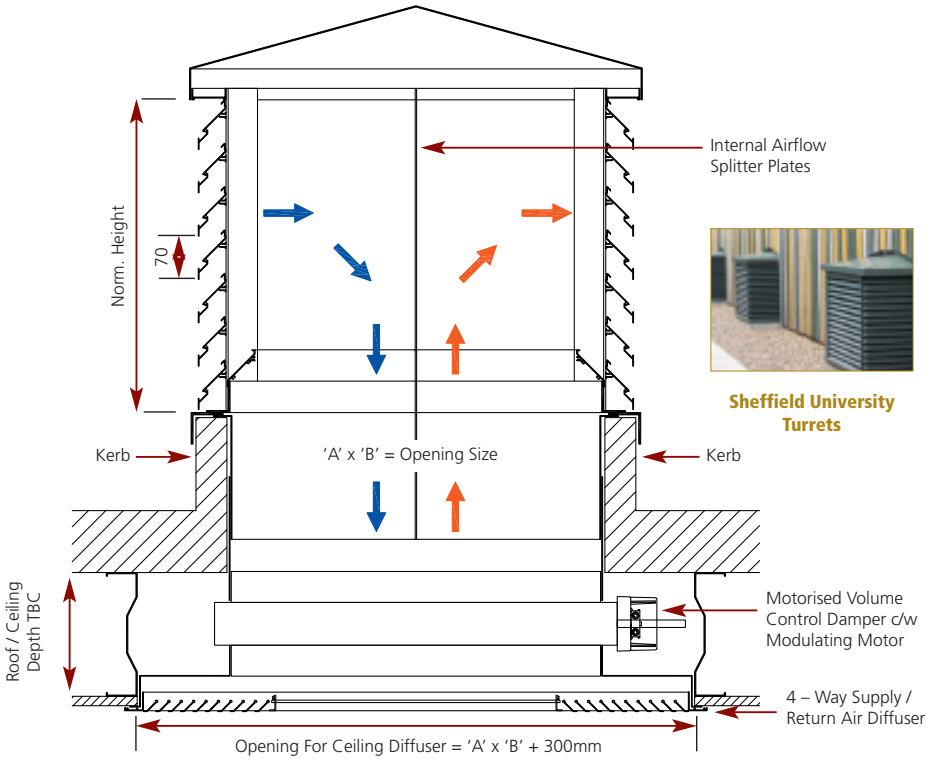
Penthouse Turret

Our natural ventilation split turret units are designed to offer a balanced supply of fresh air whilst also having the ability to remove warm, stale air. Due to the effective internal split design within the turret unit and duct extension sleeve, the supply and extract air are kept separate, avoiding cross contamination.

The air is balanced through our motorised volume control damper which would be linked to our controls package. The air is both distributed and extracted through a common adjustable blade, 4-way pattern diffuser. These units are ideally suited for sports halls, gymnasiums and assembly areas.



Sheffield University Turrets

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Penthouse Turret Technical Details

Construction	From extruded aluminium sections, frame 3.0mm - 5.0mm thick, with 1.6mm thick blades. Aluminium roof 1.5mm thick fully welded construction.
Size & Weight	There are virtually no size restrictions on the units as manufacture of these can be undertaken in sections, to facilitate both size requirements and location / lifting requirements. Average Weight 60.0kg/m^3 Average Free Area 40%
Rain Defence	Our high performance louvre blades will achieve Class B (0.95 - 0.989% Effectiveness) in accordance with European Standard. EN13030 : 2002
Airflow Performance	The air flow volume provided through the turret unit is dependant on the external wind speed but typically offer the following performance.
External Wind Speed M/S **2.0** **4.0**	Max Air Volume m^3/sec/m^2 of louvre. 0.2 0.6
Determination of Air Volume	This is determined by both the internal air temperature and CO^2 Levels. The intelligent controls & sensing devices determine the modulation and control of the dampers for the requirement of the given space area.
Options	Thermally lined internal splitter plates. Guards (insect screen) removable. Controls package (see separate data sheet). Wireless battery-less peripheral devices. User interfaces (separate data sheet).

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Intelivent Technical Data

The data provided below is related to three unit sizes. The wall mounted units can be manufactured to fit any bespoke size.

1670 X 618	**Entry Velocity of 0.45m/sec**	
Air Flow Ventilation Rate	0.15m³/sec	2.2 pa Δp
Air Flow Cooling Rate	0.30m³/sec	4.2 pa Δp
LPHW Heating Coil	4.5 KW	
82°c - 72°c Water Flow	0.11 l/sec	10.3k pa Δp
1360 X 618	**Entry Velocity 0.45m/sec**	
Air Flow Ventilation Rate	0.1m³/sec	2.2 pa Δp
Air Flow Cooling Rate	0.19m³/sec	4.2 pa Δp
LPHW Heating Coil	3.0kw	
82°c - 72°c Water Flow	0.07 l/sec	6.5k pa Δp
910 X 618	**Entry Velocity 0.45m/sec**	
Air Flow Ventilation Rate	0.07m³/sec	2.2 pa Δp
Air Flow Cooling Rate	0.132m³/sec	4.2 pa Δp
LPHW Heating Coil	2.5 KW	
82°c - 72°c Water Flow	0.06 l/sec	4.1k pa Δp

All heating coils are sized to raise the ventilation rate by x 23C I.e –4°c to + 19°c.

Noise Resilience

The chart below shows the noise reduction performance with 1 and 2 units installed in a facade wall of 15m wide x 3m high.

Damper Position	**Number of Units Within Facade** **1 Unit**	**2 Units**
Fully Open	24	21
Half Open	25	22
Fully Closed	34	31

These tests have been carried out on the A 1650 X 600 unit by the AIRO labs in Hertfordshire.

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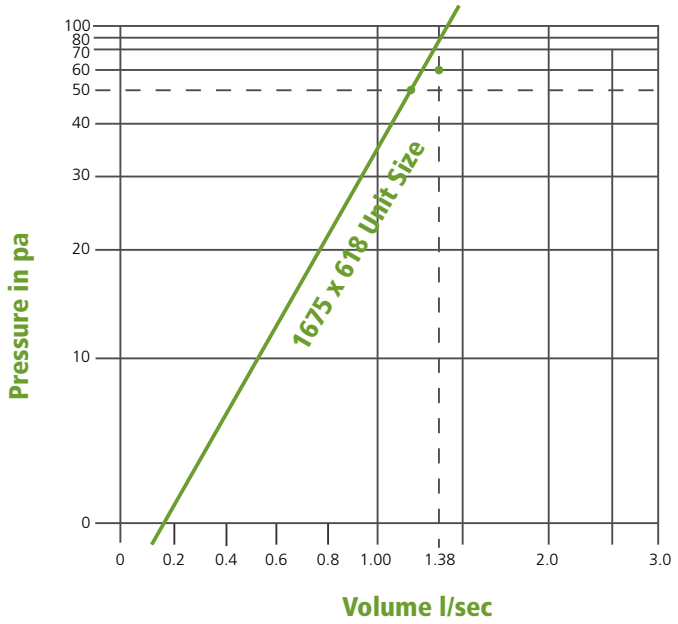
Insulated Damper Leakage Rate Chart

AT 10m³ per hour / m², or 2.78 l/sec m².

Unit Size	Area	Allowable Leakage	Actual Leakage
(Opening)	(m²)	(@ 50pa Pressure)	(@ 50pa Pressure)
1675 x 618	1.03	1.42 l/sec	1.27 l/sec
1360 x 618	0.84	1.16 l/sec	1.07 l/sec
910 x 618	0.56	0.77 l/sec	0.72 l/sec

The graph below shows the unit passed 1.27 l/sec @ 50 pa and held below 1.38 l/sec with the pressure of 60 pa.



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Smart Control Applications

The intelivent controls (EcoSystem) comprises of the following options:

Intelicontrol
Is a multi-protocol wired and wireless control solution, this provides the ability to deploy fully integrated solutions directly from the Intelivent smart control platform. The system can quickly and efficiently link multiple devices based on the multiple protocols embedded within the controller.

Embedded Wireless Protocols
- EnOcean
- Zigbee

Embedded Wireless Protocols
- BACnet
- Canbus
- Ethernet

The controller can be mounted locally on the damper shaft or remotely within a purpose built control panel. Where the controller is mounted locally the device has the capacity to control through both the wired I/O and also the wireless stream. In both applications the hardware can operate in both read and write applications, over both the wired and wireless network.

Application Solutions
The system can be operated independently under the Intelivent controls package or integrated into any open platform or enterprise solution. It is fully Bems compatible (In fact more advanced than most) and or can be utilised as the building Bems Solution, providing guaranteed capital and on-going energy and cost savings.

The system has the ability under the Solarstore to operate without any power or wired requirement, utilising the solar cell to generate the power, the system can operate all the devices and communicate over the Zigbee mesh network to push the information between the controllers – providing at any point the ability to integrate over any of the above protocols. The self-powered peripheral devices transmit the environment requirements back to the control network.

Wireless Battery less Peripheral options

• CO2 – Temperature - Humidity Sensor
With a wide variety of options the sensor can be supplied as either a combined unit or as any one individual or combination of the elements. The device also has soft configurable buttons/adjusters to provide bespoke functionality to your application.
- Setpoint Adjustment.
- Fan Speed.
- Service Performance.
- Override Functionality.
- Boost Facility.

• Wireless Switch
The wireless batteryless switch generates energy from motion – pushing the switch provides enough energy to broadcast the EnOcean wireless packet to the receiving station. The Switch sends out 2 packets of information per depress/release so the switch can be configured multifunctional for both digital switching and variable process.

• Thermal Sensor
The thermal sensor works on temperature differential and can generate energy whenever a temperature differential is realised between the sensing element and the surrounding environment the sensor can work in both positive and negative differential.

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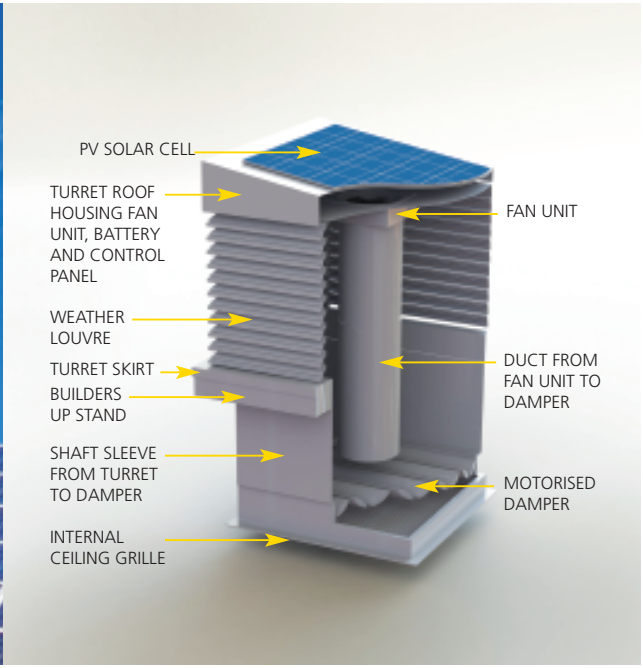
Why Choose Solar Power?

Solar power is the most eco/environmentally friendly energy provider. Solar panels harness the power of the sun's rays and covert this into energy, in this instance photovoltaic cells are used to convert that energy into electricity to drive the supply and extract fans.

Where Is This Application Suitable?

Our full Intelivent range is ideally suited for both commercial and educational buildings. The Solarstore is particularly suitable for all small intermittent power applications when energy requirements peak in the summer.



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The Solarstore Solution

The Solarstore solution is the latest addition to our Intelivent Natural Ventilation and Renewable Energy Range, breaking new ground in the solar energy free ventilation market. The system works on the same principle as our existing Intelivent Wall Unit and Penthouse Turret solutions.

There are various options available, both utilise the energy provided from the solar photovoltaic cell.
Please refer to Diagrams A and B on the following pages.

The first, Diagram A, being a standard unit inclusive of a solarstore option.

The second, Diagram B, provides a unique combination of free ventilation coupled with solar powered supply & extract fans running through a plate heat exchanger.

The Advantages

- The Solarstore can increase the ventilation rate by over 75%.
- The innovative design permits the DC battery to run the dual fan system allowing 24 hour supply and extract ventilation.
- The unit is controlled by CO^2 and temperature sensors or manual override.
- To introduce $1m^3$/sec during winter, the air temperature needs to be raised from 0^0C to 20^0C. This takes over 20kw, with the Solarstore this requirement is reduced to 7kw.
- The DC battery enables night purge allowing '24 hour' ventilation.
- The carbon fibre battery ensures maximum vent even on overcast days.
- The speed controller gives variable air volume.

Key Features

The Solarstore control arrangement is made up from;

- Photovoltaic solar cell.
- Power management module.
- DC carbon fibre battery.
- Dual DC reversible fans.
- Smart Distech wireless controller.
- Wireless battery-less (Distech Enocean enabled) peripheral devices.

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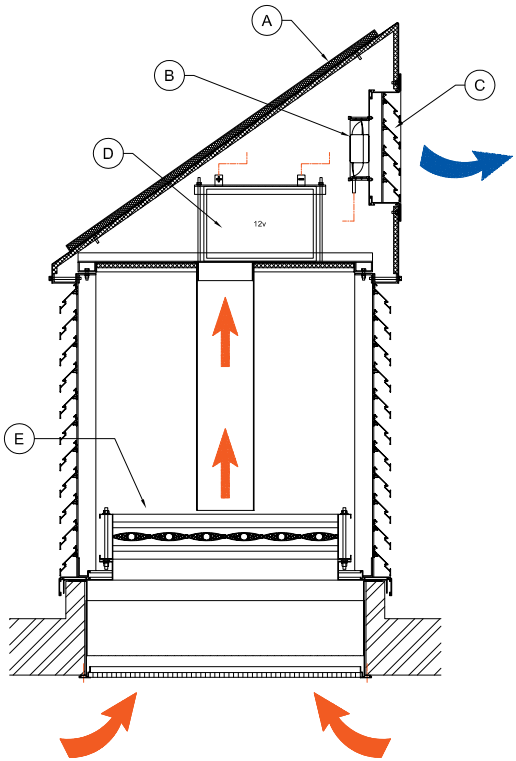
Standard Unit Complete with Solarstore Option

Diagram A



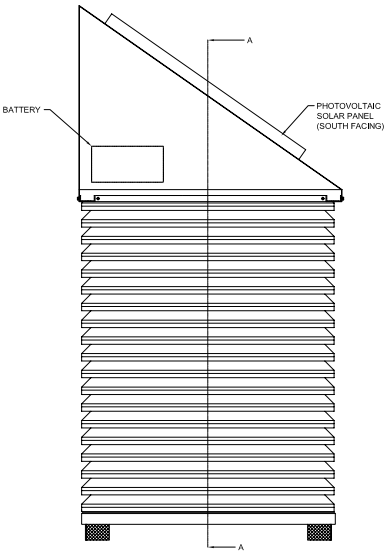
A. Photovoltaic Solar Panel (South Facing)

B. 12v DC Extract Fan Unit Handling 0.2m/Sec. Fitted to Rear of Extract Louvre

C. High Performance Extract Louvre Mounted in Roof

D. 12v Rechargeable Battery

E. Motorised Fully Sealed Insulated Low Leakage Damper



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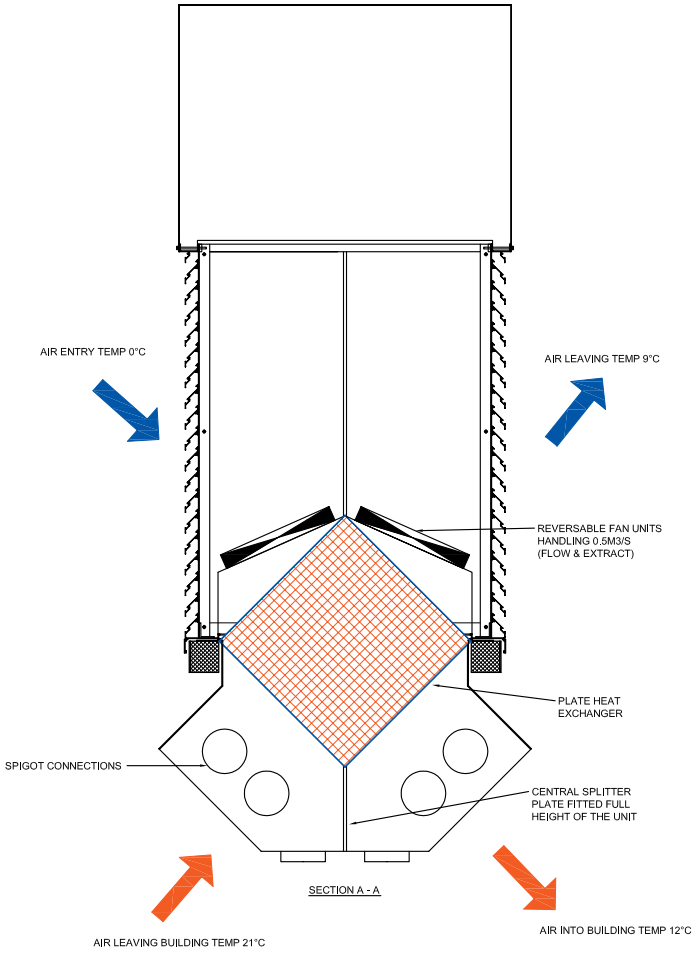
Free Ventilation Coupled with Solar Powered Supply & Extract Fans

Diagram B



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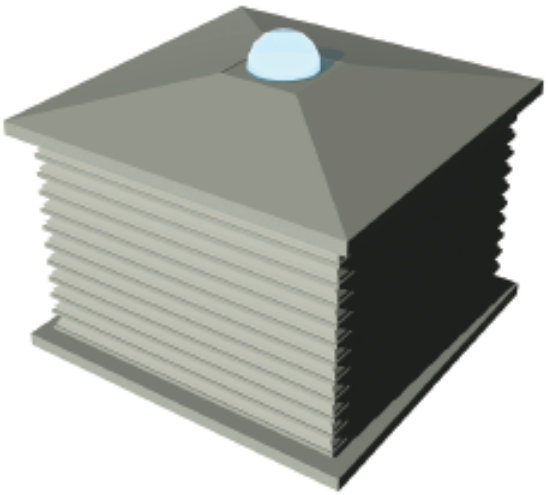
The Solarpipe Turret

The roof mounted Solarpipe turret is designed to deliver natural daylight throughout buildings in areas such as corridors, stairwells, offices and class rooms. This system is often specified within educational, healthcare and commercial buildings.

The purpose of this system is to diffuse natural light into the building eliminating the need for artificial lighting providing a sustainable an energy efficient alternative. Natural light enters the turret at roof level and is directed into the building via reflective tubing where the light is dispersed into the required areas.

The tube material is 99.7% reflective allowing maximum light transfer into the building. The Solarpipe is available in 250mm diameter to light upto 13sqm, 350mm diameter to light upto 22sqm and 530mm diameter to light upto 33sqm. Transition boxes are available to convert between sizes for drywalls and suspended ceilings.



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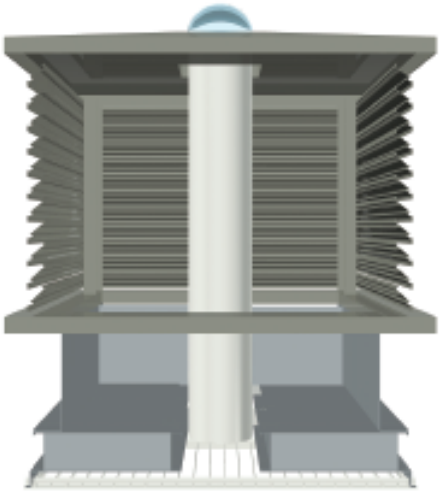
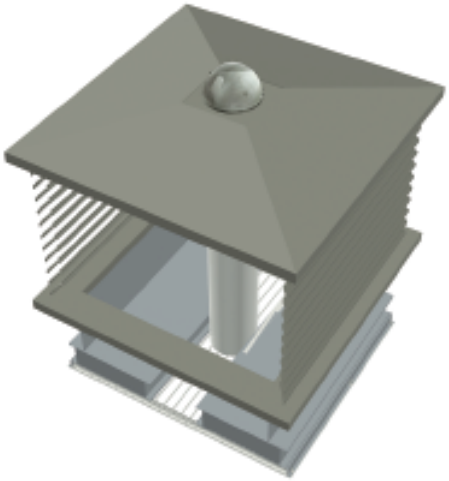
Natural Ventilation and Lighting Combined

The Solarpipe can be used in conjunction with the penthouse turret to provide both lighting and ventilation requirements within the buildings. Our design team can size the turrets accordingly to meet the required light and ventilation needs for each specific space.





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Penthouse Turret Components

Listed below are the components that comprise our Intelivent Penthouse Turrets inclusive of the Solarpipe system:

High Performance Natural Ventilation Turret
Extruded aluminium 70mm high performance external weather louvre with extended turned down base angle and central apex roof.

Natural Ventilation Dampers
1.2mm aluminium blades with galvanised mild steel casing. The depth of the damper is 120mm with 35mm flanges. The damper includes a Belimo SM24-ASR fully modulating actuator with a maximum unit size of 1450mm x 1400mm.

Damper Connection Sleeve
Constructed from 1.2mm galvanised mild steel with fully welded and dressed joints. The casing is fully lined with 12mm Pyrosorb foam.

Internal Ceiling Grille
Our wide range of ceiling grilles and diffusers are available depending on the application, in most cases an eggcrate grille is used to diffuse the air and daylight.

The Solarpipe
The Solarpipe dome is located on the roof of the penthouse turret. The lens system in the dome captures as much natural daylight as possible this is then reflected down the tubing. The Solarpipe system is available in 250mm diameter, 350mm diameter and 530mm diameter.

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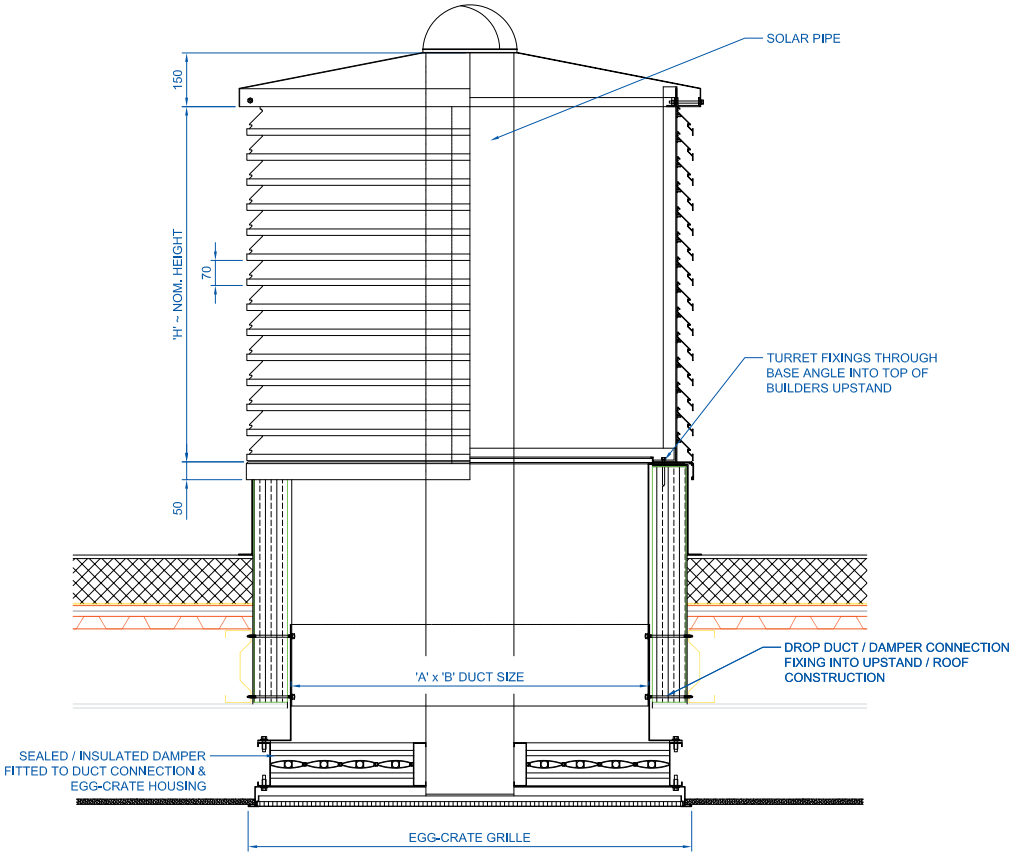
solarpipe



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*Part of a controlled natural ventilation unit. GDL is a manufacturer of air distribution systems. Intelivent and Intelishade only refers to the control packages available on our natural ventilation and Solar Shading systems within our renewable energy range. The systems can be purchased from us with or without the controls package.