

OPTIDRIVE™ HVAC

AC Variable Speed Drive

HVAC BUILDING SERVICES

Energy efficient control for HVAC systems with **BACnet™**



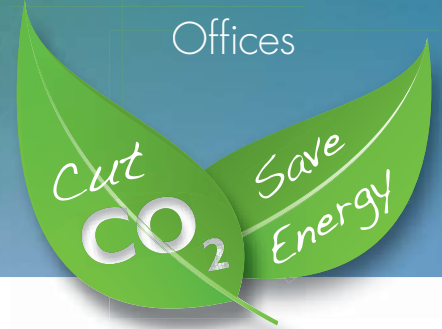
0.75kW – 250kW / 1HP – 350HP
200–480V Single & 3 Phase Input

Energy Efficient HVAC Control

AC variable speed drives designed specifically for HVAC applications

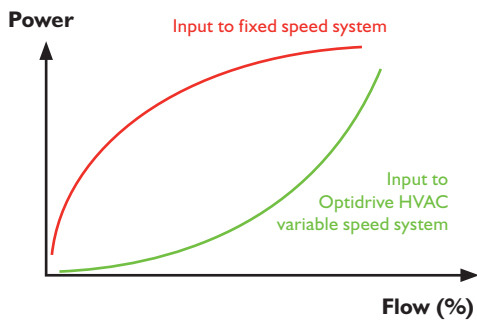


Airports Hospitals Kitchens Laboratories
Hotels Conference Centres Schools Shopping Centres
Apartment Buildings Offices



Instant Power Savings

With variable speed control, Optidrive HVAC immediately reduces power usage compared to fixed speed systems.



Energy Savings Calculator

Estimate your potential energy savings, CO₂ emissions and financial savings using our free software.

www.invertek.co.uk/calculator

Take Control of Your Environment

Modern building ventilation and air conditioning systems are designed to provide optimum climatic conditions for occupants 365 days per year. As such, they must be able to cope with the heat of a mid-summer day equally as well as a frosty winter morning. Building designers must take account of these extremes and select components and systems capable of providing the required comfort levels under all conditions, meaning that during the majority of the time, systems are operating at less than their full designed capacity.

Optidrive HVAC provides a perfect solution to the needs of designers looking to optimise the performance of fans

and pumps used in HVAC applications, allowing them to operate with maximum efficiency under all conditions. Invertek's philosophy to provide innovative products with easy to use, energy efficient features ensures that time, cost and energy savings are maximised at all times, resulting in the shortest possible payback period – the time taken to recover the initial product and installation costs through financial savings achieved through installing Optidrive HVAC drives.

For simple installation into your buildings management system all Optidrive HVAC drives are provided with both BACnet and Modbus RTU as standard across the product range.



Energy efficient control for HVAC systems

Save Energy

Accurate speed control of fans and pumps provides the most energy efficient control method

Energy optimisation function minimises energy usage in real time under partial load conditions

Sleep & wake functions ensure operation only when required

Save Money

Advanced on-board features remove the need for peripheral equipment

Intelligent maintenance interval timing allows programmable maintenance reminders, avoiding costly downtime

Automatic load monitoring provides an early warning of potential faults, such as belt failures or blocked filters

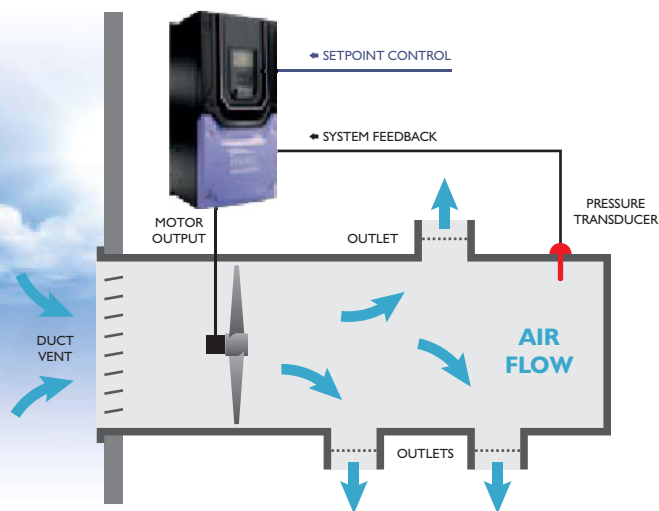
Save Time

Built in keypad and OLED text display provides intuitive operation

Simple parameter structure with carefully selected default values reduce commissioning time

Practical design allows easy access to power and control terminals without specialist tools

Controlling Your HVAC System



Optidrive HVAC has a PID controller built in that is fully integrated with both HVAC and energy efficient features and is packaged in a user friendly way to ensure ease of use and fast commissioning. Now in the majority of applications it has become possible to eliminate the need for external controllers.

Optimising Efficiency

Energy Optimisation

The advanced optimisation function intelligently matches energy usage to the fan or pump load to ensure your system operates at maximum efficiency.

Energy Monitoring

The inbuilt energy consumption meters allow energy consumption to be clearly displayed and savings to be calculated.

Resonance Avoidance

Optidrive HVAC can be easily configured to avoid frequencies that cause resonance in air handling and pumping systems, preventing unnecessary noise and mechanical damage to motors, ductwork, pipework etc.

In-built Sleep Mode with Auto-boost

Sleep mode saves energy by detecting when the system is running inefficiently and producing little useful work. Optidrive HVAC can be programmed to enter into a sleep/disabled mode until the demand increases. To help prevent sleep mode oscillation, Optidrive HVAC can automatically initiate a boost cycle to increase pressure on starting or stopping.

Dedicated to HVAC Applications

Take control of your environment

Co-ordinated fan station control

built-in to each Optidrive HVAC as standard allows independent control in multiple fan or fan bank applications

Setpoint Control



Drive communications

Multiple Fan Operation

- All drives operate as variable speed for maximum energy saving.
- Equal run time sharing across each fan / fan bank.
- Automatic system reconfiguration in the event of a fan fault.
- Continued system operation when drives are individually powered off.
- Communication and +24V control voltage shared between drives via a standard RJ45 patch lead.
- Independent maintenance indicators for each fan bank.
- Any fan bank can be switched to Hand operation at the touch of a button and will automatically rejoin the network when switched back to Auto.
- For belt driven fan applications each fan can be set for belt break detection.
- Optional mains isolator with lockoff for safe system maintenance.
- Drives configured through simple parameter set-up and intelligent drive self configuration.

Also ideal for multi-stage / booster set pumping operations.

Energy efficient control for HVAC systems

Resonance Avoidance

Resonance frequencies in motors and mechanical components can rapidly cause damage and increased maintenance costs. By programming Optidrive HVAC to avoid these frequencies damage can be prevented and maintenance costs reduced.

When programmed to skip through a resonance frequency the Optidrive HVAC run at the resonant frequency only momentarily (whilst accelerating or decelerating to a safe operating speed), rather than allowing continuously operation at the problematic frequency.

Hand / Auto



Allows manual control to easily be selected in the event of an automatic control system failure or for simplified commissioning/system checks, or when a fast temporary override of the control system is required. Built-in 'Auto Control Selection' allows return to automatic system control just as easily.

Drive Controlled Bypass

Optidrive HVAC can operate as a bypass controller when installed as part of a bypass circuit. Activation of Bypass mode can be determined intelligently by the Optidrive HVAC drive based on a command from the building management system. Additionally the drive can be set to automatically select bypass mode when entering into a trip condition ensuring minimal disruption to service.

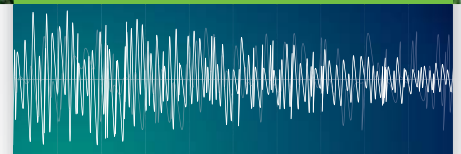
Belt Break Detection



Optidrive HVAC can provide immediate warning of broken belt between motor and fan. Due to its simple and flexible configuration the feature can also be used for any loss of load condition, such as broken coupling or other mechanical failure.

Optidrive HVAC monitors the load output profile throughout the speed range and compares it to normal operating conditions (established during commissioning). Sensitivity adjustment means that it is possible to detect the indications of a belt failure (such as belt slipping) prior to complete failure of the belt.

Noise Reduction



Quiet Motor Operation

High switching frequency selection (up to 32kHz) ensures motor noise is minimised.

Quiet System Mechanics

Simple skip frequency selection avoids stresses and noise caused by mechanical resonance in ducting or pipework.

Quiet Drive Operation

Temperature-controlled cooling fans ensure quiet operation in periods of reduced load.

Noise Reduction through Speed Control

Optimising motor speed gives significant energy savings and reduces motor noise.

Dedicated to HVAC Applications

Take control of your environment



Building Comfort

Ventilation Systems

Creating comfortable building environments without high energy costs

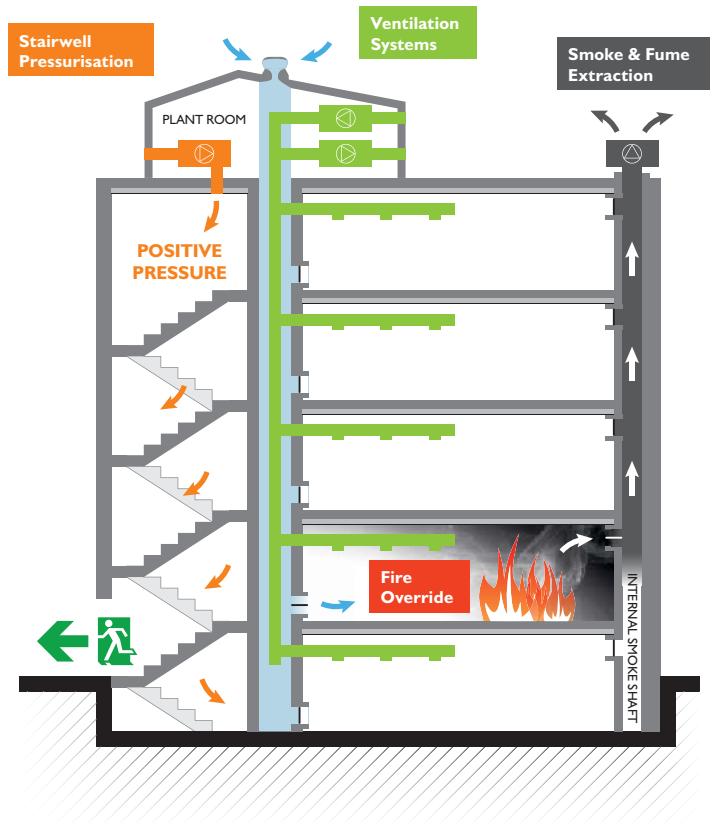
Where do the energy savings come from?

Air conditioning can use a huge amount of energy. In some cases it could even double energy consumption, not to mention the resultant increase in a company's carbon footprint.

Don't produce more airflow than you need!

Typically the air conditioning systems in buildings are designed for maximum occupancy and peak outside ambient. This means that for the majority of time there is large scope for running the systems at reduced speed and significant money to be saved with variable speed drives.

Optidrive HVAC can vary the output of your air conditioning system to meet the varying demands throughout the day.



Energy efficient control for HVAC systems

Chiller Water Pumps

Variable Speed Control for Pumps

Optidrive HVAC provides the ideal pump control solution for chiller, circulation and cooling pumps.

Dual Setpoint Control maximises energy savings by allowing pumps to be switched back to lower setpoints during quieter, low demand periods whilst maintaining full operation when required.

Advanced OPTIFLOW™ Multi-pump Management allows pumps which operate in typical configurations such as Duty / Standby or Duty / Assist / Standby to be simply connected together using RJ45 patch cables and commissioned as a single pump set, saving installation and commissioning time and providing fully automatic duty changeover operation.



Building Safety Systems

Stairwell Pressurisation

Stairwell (escape route) pressurisation systems are being extensively employed in large buildings and complexes to help ensure the safe evacuation of occupants during a fire. Variable speed drives are playing an increasing role in maintaining pressures (of approximately 50 Pa) within these critical areas. Here Optidrive HVAC is used to provide a smoke free escape by accurately maintaining the air pressure along that route.

Pressures must be maintained at a high enough level that a door opened between the fire floor and the escape route does not result in smoke entering the escape route. Equally, as doors and vents are opened along the escape route allowing air to escape the Optidrive and stairwell pressurisation system must increase output so that the required pressure is accurately maintained.

Smoke & Fume Extraction

Many buildings now incorporate dedicated smoke management and extraction systems designed to safely extract smoke in the event of a fire, these systems are designed to localise and extract smoke such that the rest of the building remains smoke free and can be evacuated safely. Here the Optidrive's Fire Mode function is critical in maintaining continued operation of the smoke extraction system for the longest permissible period.

For applications such as underground car parks the fans providing fresh air intake are often reversed in the event of a fire to provide smoke extraction. Optidrive HVAC is easily configured for bi-directional fire mode operation.

Fire Override

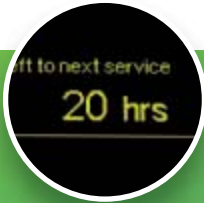


Fire override mode ignores signals and alarms, keeping the Optidrive HVAC operating for as long as possible.

- This feature is crucial for ensuring smoke extraction from buildings in the event of a fire.
- Selectable logic means that the Optidrive HVAC can be easily configured to the signal produced by your fire management system.
- With an independently set speed for fire mode operation, selectable as either forward or reverse direction, the Optidrive HVAC has the flexibility to match the needs of your fire control system.
- Fire mode operation is indicated clearly on the drive display during periods of fire mode operation.
- Drive output logic can easily be configurable for indicating to external drives that fire mode is active.
- Internal clocks and timers monitoring operation in fire mode, giving clear information on usage.

Features & Options

Peripherals and factory build options to help integrate Optidrive HVAC with your HVAC systems



Maintenance interval timer and service indication



Multi-language, high visibility OLED display



Simple user interface with HAND / AUTO select



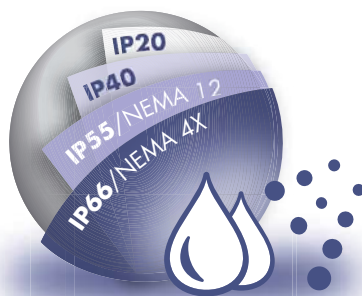
Pluggable control terminals



High quality long-life fans



Integrated cable management



OLED Display

Installed as standard on all IP55 & IP66 models

- Clear multi-line text display
- Operates to -10°C
- Wide viewing angle, effective in dark and light conditions
- Customisable display
- Multi-language selection

Enclosure Options

			
IP20	IP66	IP55	IP40
Sizes 2 & 3 Cabinet mount	Sizes 2 & 3 Wall or cabinet mount	Sizes 4-7 Wall or cabinet mount	Size 8 Free-standing

Optional kit is available for through-hole mounting

IP66: Protection in Harsh Environments

Dust-tight

Install in-situ and be sure of protection from dust and contaminants.

Washdown Ready

With a sealed ABS enclosure and corrosion resistant heatsink, IP66 rated drives are ideal for high pressure washdown applications.

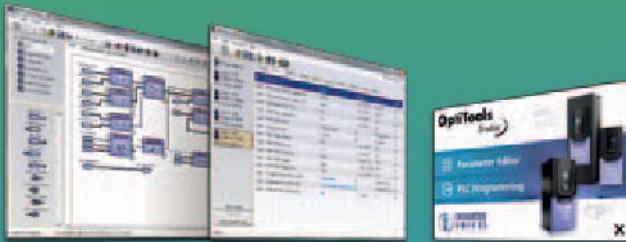
Corrosion Protection

The heat-sink of the IP66 drive is specially coated to protect against attack / corrosion by harsh environments and chemicals. For additional protection in water and waste water applications all HVAC drives can be ordered with full conformal coating of the internal drive electronics. The conformal coating option provides protection to level 3C2 according to IEC60721-3-3. Localised conformal coating of critical components is provided as standard.



Energy efficient control for HVAC systems

OptiTools Studio



Powerful PC Software

Drive commissioning and parameter backup

- Real-time parameter editing
- Drive network communication
- Parameter upload, download and storage
- Simple PLC function programming

Compatible with Windows XP, Windows Vista & Windows 7

Plug-in Modules



Extend functionality and communication options

Expansion Modules

- Extended I/O (3 x Digital In, 1 x Relay Out)
- Cascade Control (extended Relay) (3 x Relay Outputs)

Fieldbus Interfaces

- BACnet/IP
- EtherNet/IP
- DeviceNet
- Profibus



Optipad



Remote Keypad & OLED Display

IP55 panel mount operator interface.

- Clear multi-line text display
- Multiple language select
- Customisable displays

Mains Isolator



Mains Isolator Option

Lockable mains isolator option. Can be used with sizes 4-8.

Optistick



Rapid Commissioning Tool

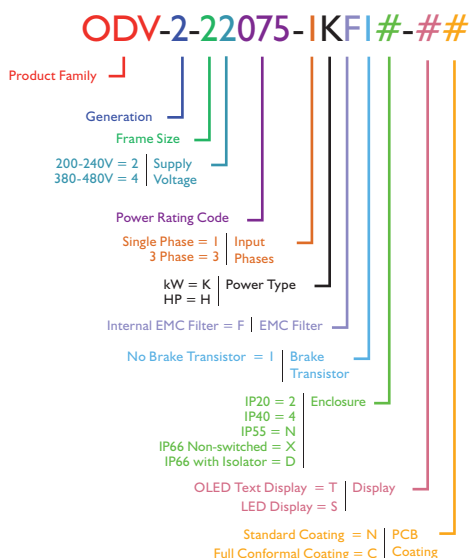
Plug-in or wirelessly copy parameter sets between drives.



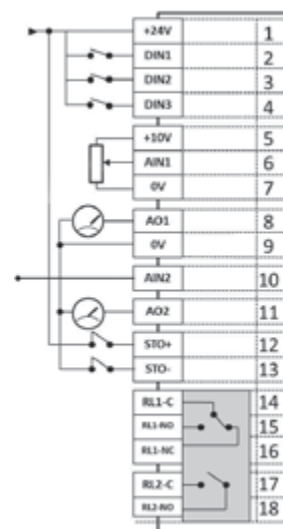
Drive Specification

Input Ratings	Supply Voltage	200 – 240V ± 10% 380 – 480V ± 10%	Control Specification	Control Method	Variable Torque V/F Variable Torque Energy Optimised V/F	Control Features	Fire Mode	Selectable direction Selectable speed reference
	Supply Frequency	48 – 62Hz		PWM Frequency	4 – 32kHz Effective		Broken Belt Detection	Under load monitoring with autotune configuration
	Displacement Power Factor	> 0.98		Stopping Mode	Ramp to Stop: User Adjustable 1 – 600 seconds Coast to Stop		PID Control	Internal PID control with feedback display
	Phase Imbalance	3% Maximum allowed		Braking	Motor Flux Braking	Pump Control Features	Pump Blockage Detection	Pump load monitoring with autotune function, user configurable
	Inrush Current	< rated current		Skip Frequency	Single point, user adjustable		Pump Cleaning	Adjustable Pump Cleaning Cycle operation
	Power Cycles	120 per hour maximum, evenly spaced		Setpoint Control	Analog Signal	0 to 10 Volts 10 to 0 Volts – 10 to + 10 Volts	Multi-pump Control	Control of fixed speed assist pumps via optional cascade control module Control of Duty, Assist and Standby variable speed pumps via internal Master – Slave network
	Output Ratings	Output Power				230V 1 Phase Input: 0.75–2.2kW (1–3HP) 230V 3 Phase Input: 0.75–75kW (1–100HP) 400V 3 Phase Input: 0.75–250kW 460V 3 Phase Input: 1–350HP		Digital
Overload Capacity		110% for 60 seconds	Optional			BACnet/IP, Profibus DP, DeviceNet, EtherNet/IP	Maintenance & Diagnostics	Fault Memory
Output Frequency		0 – 120Hz, 0.1Hz resolution	I/O Specification	Power Supply	24 Volt DC, 100mA, Short Circuit Protected 10 Volt DC, 5mA for Potentiometer	Data Logging		Logging of data prior to trip for diagnostic purposes: Output Current, Drive Temperature, DC Bus Voltage
Typical Efficiency		98%			Programmable Inputs	5 Total as standard (Optional additional 3)		Maintenance Indicator
Ambient Conditions	Temperature	IP20: 50°C IP40: 40°C IP55: 40°C IP66: 40°C			Digital Inputs	10 – 30 Volt DC, internal or external supply, NPN Response time : < 4ms	Monitoring	Hours Run Meter Resettable & Non Resettable kWh meters
	Altitude	Up to 1000m ASL without derating Up to 2000m maximum UL approved Up to 4000m maximum (non UL) Above 1000m : Derate by 1% per 100m			Analog Inputs	Resolution : 12 bits Response time : < 4ms Accuracy : < 1% full scale Parameter adjustable scaling and offset	Standards Compliance	EN 61800-3:2004
Humidity	95% Max, non-condensing	Programmable Outputs	4 Total (Optional additional 3) 2 Analog / Digital 2 Relays (Optional additional 3)	Relay Outputs	Maximum Voltage : 250 VAC, 30 VDC Switching Current Capacity : 6A AC, 5A DC	Analog Outputs		0 to 10 Volt 0 to 20mA 4 to 20mA
Enclosure	Ingress Protection	IP20 (Frame sizes 2 & 3) IP66 (Frame sizes 2 & 3; up to 7.5kW) IP55 (Frame sizes 4 – 7) IP40 (Frame size 8)	Relay Outputs		0 to 10 Volt 0 to 20mA 4 to 20mA			
	Programming	Keypad	Built-in keypad as standard Optional remote mountable keypad					
Display		Built-in multi language OLED display (except IP20) LED display (IP20 only)						
PC		OptiTools Studio						

Model Code Guide



Connection Diagram



Function	Default Setting
12 Volt DC Output, 100mA max / 24 Volt DC Input	
Digital Input 1	Drive Enable
Digital Input 2	Analog / Preset Speed 1 Select
Digital Input 3	Local / Remote Reference Select
+10 Volt Power Supply 5mA	
Analog Input 1	Local Speed Reference
0 Volt	
Analog Output 1	Motor Speed
0 Volt	
Analog Input 2	Remote Speed Reference
Analog Output 2	Motor Current
Safe Torque Off Input	
Safe Torque Off Input	
Output Relay 1	Drive Healthy / Fault
Output Relay 2	Drive Running

Optidrive HVAC

✓ Saving Energy / Reducing CO₂

With large scale increases in global energy costs and the introduction of taxes and legislation relating to the Industrial production of CO₂ gases the needed to reduce energy consumption and save money has never been greater. The Optidrive HVAC can be used with environmental sensors to reduce speed in air handling and pumping applications without compromising the required output of the system.

✓ Easy Installation

Compact and modern design utilising the latest available technology have accumulated in a robust HVAC drive with small dimensions and innovative mounting and cabling features

✓ Simple Set-up & Rapid Commissioning

Optidrive HVAC was developed from concept for easy of use. A handful of parameters configure the drive for basic HVAC applications. A short, concise product data means the drive is running in seconds. Advanced powerful functionality is equally easily accessible.

✓ Imaginative Enclosure Design

With Enclosure design from IP20 all the way up to IP66 the Optidrive HVAC is well suited to harsh environments, or where cabinet and cabling costs need to be reduced.

✓ Advanced Fan Control Functions

The key HVAC control functionality required for your application is inbuilt into the Optidrive HVAC and packaged to be both quick and simple to activate. Added to this is the drives own PLC programming flexibility that makes drive functionality virtually limitless.

✓ Options for Flexibility

Optidrive HVAC combines both peripheral and factory built options to ensure you get the right drive, scaled to suit your application. With inbuilt BACnet and Modbus, and a host of communication options the Optidrive can integrate easily into your Industrial network of choice.

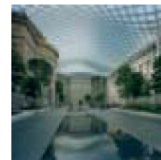


UK Head Office, Welshpool

Invertek Drives Ltd is dedicated to the design, manufacture and marketing of electronic variable speed drives. The state of the art UK headquarters houses specialist facilities for research & development, manufacturing and global marketing. All company operations are accredited to the exacting customer focused ISO 9001:2008 quality standard. The company's products are sold globally in over 65 different countries. Invertek Drives' unique and innovative drives are designed for ease of use and meet with recognised international design standards.

Global HVAC Solutions

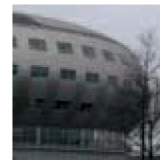
Invertek Drives operate at the heart of HVAC systems around the world



USA
National Portrait
Gallery climate control



UK
Safety critical
ventilation in car parks



HOLLAND
Hot water pumping
across district network



SINGAPORE
Building automation at
Maybank Tower



Optidrive HVAC User Guide



Scan to download or visit the
Invertek Drives website

www.invertek.co.uk/optidrive-hvac



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