Invertek Drives.com

HVAC Building Services

eco OPTIDRIVE HVAC

AC Variable Speed Drive

HVAC BUILDING SERVICES

Energy efficient fan & pump control with low harmonic distortion

BACnet built-in as standard

Low Harmonics
EN61000-3-12 compliant

5.5kW–45kW / 7.5HP–60HP
380–480V 3 Phase Input

OPTIDRIVE HVAC

AC Variable Speed Drive

5.5kW – 45kW / 7.5HP – 60HP
380 – 480V 3 Phase Input

Energy Efficient
Fan & Pump Control

- Low Input Harmonic Current Distortion, compliant with EN61000-3-12
- > 98% drive efficiency
- Low audible noise motor operation

Energy Savings Calculator

Estimate your potential energy savings, CO_2 emissions and financial savings

www.invertekdrives.com/calculator

Download on the App Store

GET IT ON Google play

Optidrive HVAC Eco provides efficient, reliable and quiet control of motors in Heating, Ventilation and Air Conditioning Applications. Designed to provide maximum operating efficiency whilst minimising environmental impact, Optidrive HVAC Eco offers unrivalled performance and flexibility, whist meeting the key standards and requirements of demanding HVAC applications.

Key to the success of Optidrive HVAC Eco is a design dedicated to reducing the Harmonic Current Distortion associated with electronic equipment, and in particular, traditional variable speed drives. Variable speed drives have been widely used for many years in HVAC applications, thanks to the proven energy saving benefits which help consumers to realise significant savings year upon year. The often hidden penalty of installing variable speed drives however, is the increased level of harmonic current distortion created on the mains power supply. Almost all electronic equipment falls into the category of "Non-Linear" Loads, essentially meaning that the input current flowing into the device, unlike the generated mains power supply, is not sinusoidal. This leads to distortion of the incoming mains supply waveform.

Where the total power consumption of non-linear loads connected to a power supply source represents only a small proportion of the total load, the impact is minimal; however as more and more non-linear loads are connected to a given power supply, the effect becomes cumulative, and power supply quality deteriorates. Reduced power supply quality then leads to unwanted side effects, such as

- Increased Supply Current
- Increased Transformer Heating
- Increased Neutral Current
- Visible Light Flicker

Typical methods to combat these unwanted side effects include adding AC, DC or Swinging chokes, which are designed to add impedance to the power supply, and thereby produce a more sinusoidal input current. Whilst these methods have some positive benefit, the effect of ever increasing supply impedance results in reduced efficiency and increased heat losses, meaning higher overall energy costs. Optidrive HVAC Eco eliminates the need for these chokes, providing maximum efficiency, whilst also reducing the harmonic current distortion to a level equal to or below the maximum possible achievable with simple chokes. In short, the best of both worlds is achieved.

Save Energy, Cut CO_2

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

Key Features

- **Low Harmonic Technology**
  - Reduces Supply Total Harmonic Current Distortion (iTHD)
  - Reduces total Supply Current
  - Reduces cable and busbar rating requirements
  - Reduces fuse sizes
  - Reduces required supply transformer load or rating
- **Built In EMC Filters**
  - Compliance with global EMC Standards
- **Advanced Motor Control**
  - Operation with:
    Standard Induction Motors
    Permanent Magnet AC Motors
    Brushless DC Motors
    Synchronous Reluctance Motors
  - Constant or Variable Torque selectable
  - Maximum motor efficiency
- **Quiet Operation**
  - Temperature controlled cooling fans operate only when required
  - PWM switching technique reduces motor audible noise

Improved Fan Efficiency

Energy Optimisation and Monitoring

The advanced optimisation function intelligently matches energy usage to the driven load to ensure your fan operates at maximum efficiency. The in-built energy consumption meters allow energy consumption to be clearly displayed and savings to be calculated.

Intelligent Standby

To reduce energy used by slow-running fans, Optidrive HVAC Eco has an intelligent standby/sleep function to shut off output from the drive until demand for air flow increases.

Broken Belt Detection

Optidrive HVAC Eco intelligently monitors current/speed to provide immediate warning of broken belts between motors and ventilation fans.

Resonance Avoidance

Optidrive HVAC Eco can be easily configured to avoid frequencies that cause resonance in ventilation systems, preventing unnecessary noise and mechanical damage to motors and fans.

Internal EMC Filter

Fire Mode

IP55 / NEMA 12

IP66 / NEMA 4X

Dedicated to HVAC Applications

Advanced Motor Control

Optidrive HVAC Eco features unique advanced motor control technology, capable of open loop operation with:

Energy efficient operation with each motor type requires no additional options, only parameter selection of the correct motor type, basic motor parameter data information and an automatic tuning. This allows the latest generation of high efficiency motors to be utilised, providing further energy saving benefits.

- **AC Induction (IM) Motors**
- **AC Permanent Magnet (PM) Motors**
- **Brushless DC (BLDC) Motors**
- **Synchronous Reluctance (SynRel) Motors**

Fire Override Mode

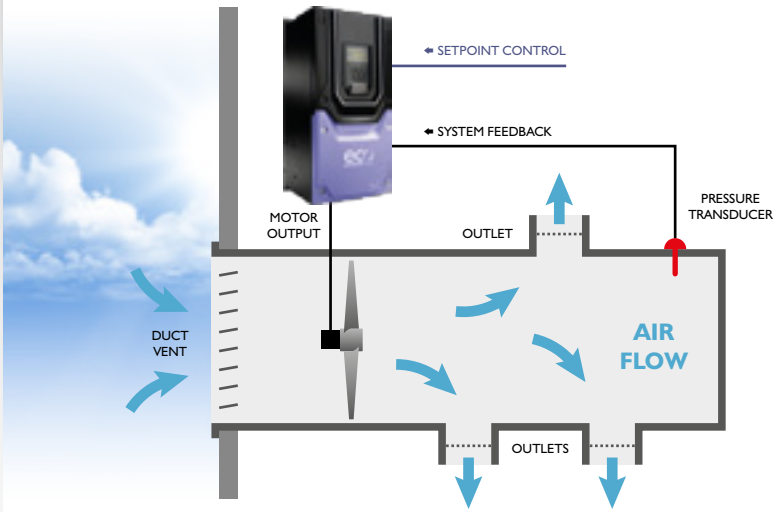
Fire override mode ignores signals and alarms, keeping the drive operating for as long as possible.

This feature is crucial for ensuring smoke extraction from buildings in the event of a fire.

Selectable Normally Open or Normally Closed logic means that the Optidrive HVAC Eco 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 Eco has the flexibility to match the needs of your fire control system.

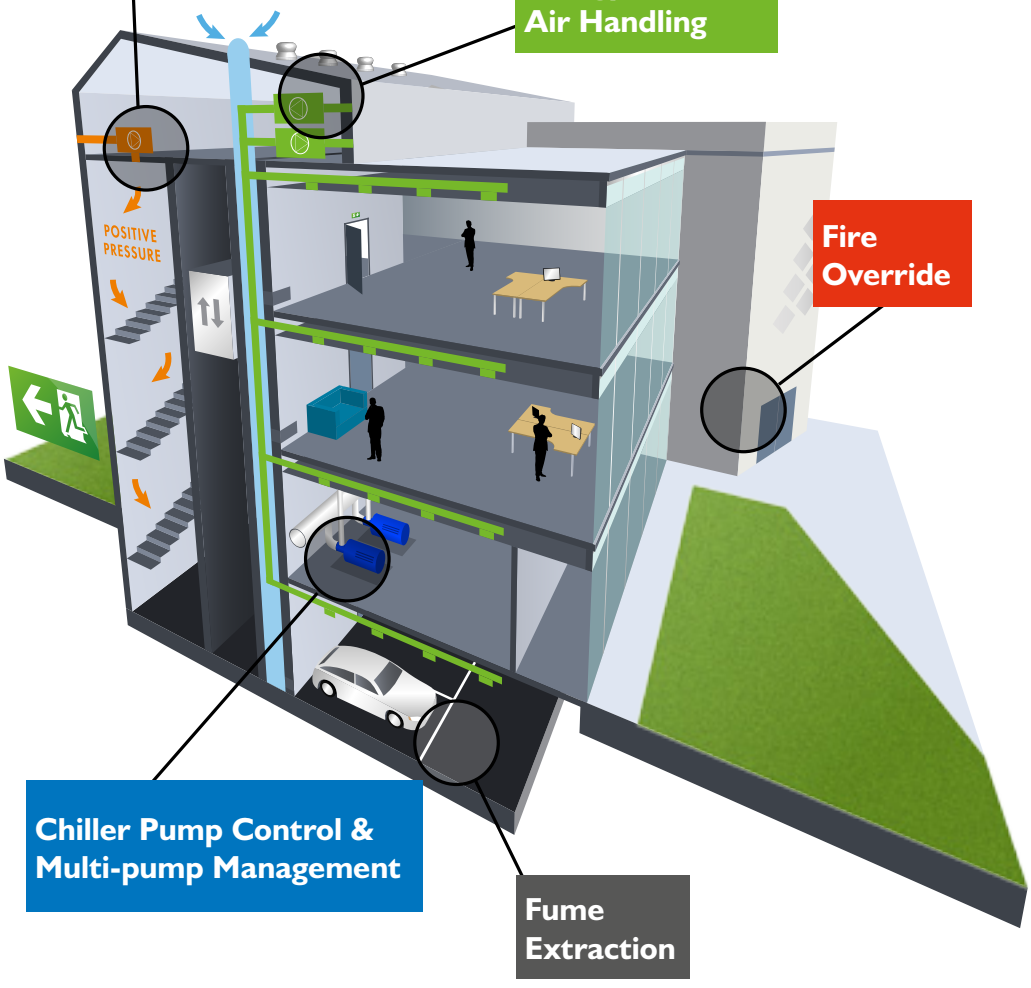
Controlling Your HVAC System



Optidrive HVAC Eco 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.

Energy efficient control for HVAC systems

Comfortable building environments without high energy costs

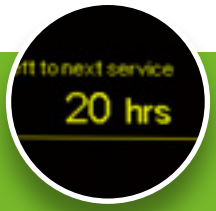


BACnet built-in as standard

Drive Features

A compact and robust range of drives dedicated to HVAC

Internal EMC Filter



Maintenance interval timer and service indication

Multi-language, high visibility OLED display

Simple user interface with HAND / AUTO select

Pluggable control terminals

Integrated cable management

High quality long-life fans

OLED Display

Installed as standard on all IP55 & IP66 models

- Clear multi-line text display
- Operates −10 to 50°C
- Wide viewing angle, effective in dark and light conditions
- Customisable display
- Multi-language selection

Enclosure Options

IP66

IP55

Size 3
Wall or cabinet mount

Sizes 4 & 5
Wall or cabinet mount

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.

IP66 Inbuilt isolator option available

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

Internal EMC Filter

Compliant with global EMC Standards

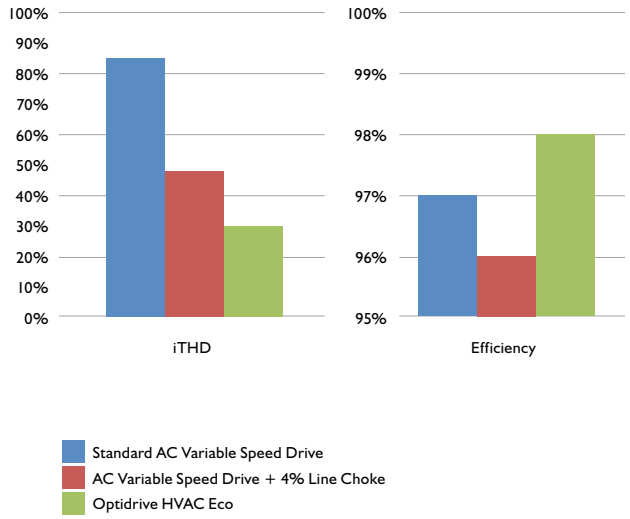
Reduced Harmonic Current Distortion

Optidrive HVAC Eco is a dedicated 'low harmonics' drive that uses the latest technology to minimise disruption (harmonics) of the incoming mains power supply which can be created by non-linear loads, such as AC drives. The third generation HVAC drive can reduce harmonic current distortion to below 30% iTHD (Total Harmonic Distortion), whilst also increasing efficiency by reducing the input current levels – leading to reduced life time costs.

Optidrive HVAC Eco delivers…

- Lower mains supply current - reduced cable size, reduced fuse size, reduced transformer size
- Improved power factor - no additional charges from the electricity supply company due to low power factor
- Improved efficiency - Reduced Life Time Costs. E.g. 37kW, operating 10 hours per day, 5 days per week, 50 weeks per years - Power Consumption is 92500kWh - 1.1% reduction is > 100kWh saving

Typical Total Harmonic Current Distortion (iTHD) and efficiency comparison for Optidrive HVAC Eco vs other AC variable speed drives



EN61000-3-12 compliant

Options & Accessories

Peripherals to help integrate Optidrive HVAC Eco with your HVAC systems

BACnet
built-in as standard

Optistick

Bluetooth®

Rapid Commissioning Tool

Plug-in or wirelessly copy parameter sets between drives.

OPT-2-STICK-IN

Optipad

Remote Keypad & OLED Display

IP55 panel mount operator interface.

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

OPT-2-OPPAD-IN

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
- Real-time scope function and data logging
- Real-time data monitoring

Compatible with Windows XP, Windows Vista & Windows 7

Fieldbus Interfaces

BacNet IP
OPT-2-BNTIP-IN

Profibus DP
OPT-2-PROFB-IN

DeviceNet
OPT-2-DEVNT-IN

Ethernet IP
OPT-2-ETHNT-IN

Modbus TCP
OPT-2-MODIP-IN

Profinet
OPT-2-PFNET-IN

EtherCat
OPT-2-ETCAT-IN

Plug-in Options

Extended I/O **OPT-2-EXTIO-IN**

- Additional 3 Digital Inputs
- Additional Relay Output

Cascade Control **OPT-2-CASCD-IN**

Additional 3 Relay Outputs

BACnet & Modbus RTU on board as standard

Mains Isolator

Mains Isolator Option

Frame Size 3 can be factory ordered with a built in lockable isolator. An optional bolt on isolator is available for Frame Sizes 4 & 5

Product Codes:
Frame Size 4 = OPT-2-ISOL4-IN
Frame Size 5 = OPT-2-ISOL5-IN

kW	HP	Amps	Size	Model Code	Product Range	Generation	Frame Size	Supply Voltage	Capacity	Input Phases	Factory Build Options
380–480V ± 10% 3 Phase Input	5.5	7.5	14	3	ODV-3-3 4 0140-3	F	I	#	-	#	#
	7.5	10	18	3	ODV-3-3 4 0180-3	F	I	#	-	#	#
	11	15	24	3	ODV-3-3 4 0240-3	F	I	2	-	S	#
	11	15	24	4	ODV-3-4 4 0240-3	F	I	N	-	T	#
	15	20	30	4	ODV-3-4 4 0300-3	F	I	N	-	T	#
	18.5	25	39	4	ODV-3-4 4 0390-3	F	I	N	-	T	#
	22	30	46	4	ODV-3-4 4 0460-3	F	I	N	-	T	#
	30	40	61	5	ODV-3-5 4 0610-3	F	I	N	-	T	#
	37	50	72	5	ODV-3-5 4 0720-3	F	I	N	-	T	#
	45	60	90	5	ODV-3-5 4 0900-3	F	I	N	-	T	#

EMC Filter
F – Internal EMC Filter

Brake Transistor
I – No Brake Transistor

Enclosure
2 – IP20
X – IP55
D – IP66 Non-switched, IP66 with Isolator

Display
S – 7 Segment LED Display
T – OLED Display

PCB Coating
N – Standard Coating
C – Full Conformal Coating

Factory Build Options

Replace # in model code with colour-coded option
IP20 units are available with 7 Segment LED Display only
All other models are available with OLED Text Display only

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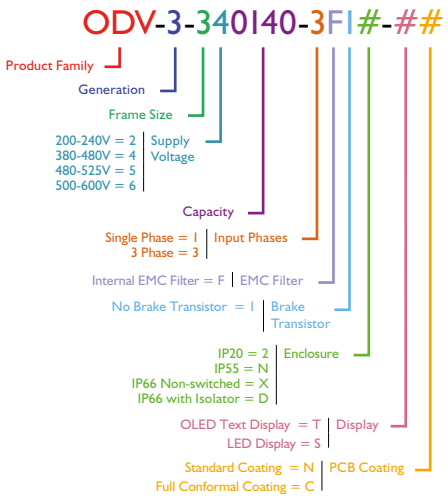
Drive Specification

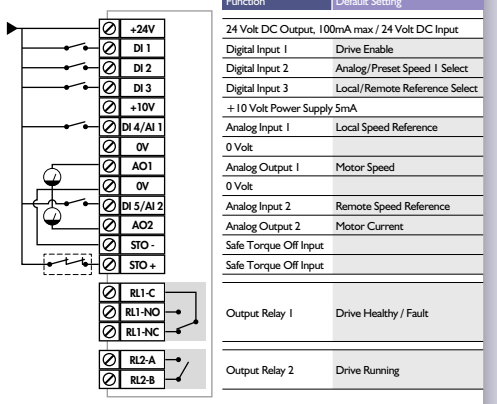
Input Ratings	Supply Voltage	380 – 480V ± 10%
	Supply Frequency	48 – 62Hz
	Displacement Power Factor	> 0.98
	Phase Imbalance	3% Maximum allowed
	Inrush Current	< rated current
	Power Cycles	120 per hour maximum, evenly spaced
	Total Harmonic Current Distortion	< 30% iTHD
Output Ratings	Output Power	5.5kW – 45kW
	Overload Capacity	110% for 60 seconds
	Output Frequency	0 – 120Hz, 0.1Hz resolution
	Typical Efficiency	98%
Ambient Conditions	Temperature	Storage : –40 to 60°C Operating : –10 to 50°C
	Altitude	Up to 1000m ASL without derating Up to 2000m maximum UL approved Up to 4000m maximum (non UL) Derate 1% per 100m above 1000m
	Humidity	95% without condensing, dripping water or ice forming, according to IEC 60068-2-78
	Vibration	Conforms to IEC 60068-2-6 Sinusoidal Vibration Frequency Range : 10 – 150Hz 10 – 57Hz @ 0.075mm Pk 57 – 150Hz @ 1g Pk
Programming	Keypad	Built-in keypad as standard Optional remote keypad
	Display	Multi language OLED display
	PC	OptiTools Studio
Control Specification	Control Method	IM Motors PM Motors BLDC Motors SynRel Motors Sensorless Vector CT / VT Operation
	PWM Frequency	10 – 32kHz Effective
	Stopping Mode	Ramp to Stop : User Adjustable 1 – 600 seconds Coast to Stop
	Braking	Motor Flux Braking
	Resonance Avoidance	Skip frequency
I/O Specification	Setpoint Control	Analog Signal: 0 to 10 Volts, 10 to 0 Volts, 0 to 20mA, 4 to 20mA, 20 to 4mA, 20 to 0mA Digital: Motorised Potentiometer, Modbus RTU, BACnet MS/TP Optional: BACnet IP, Profibus DP, DeviceNet, EtherNet IP, EtherCat, Modbus TCP, Profinet IO
	Power Supply	24 Volt DC, 100mA, Over Current Protected 10 Volt DC, 5mA
	Programmable Inputs	5 Onboard (Optional Additional 3) 2 Analog / Digital 3 Digital
	Digital Inputs	10 – 30 Volt DC, Internal or External Supply PNP Response time : < 4ms
	Analog Inputs	Resolution : 12 bits Response time : < 4ms Accuracy : Better than 1% Full Scale Parameter adjustable scaling and offset
	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 : 6A AC, 5A DC
	Analog Outputs	0 – 10 Volts 0 – 20mA 4 – 20mA

Control Features	Fire Mode	Selectable Speed Setpoint (Fixed / PID / Analog / Fieldbus) Selectable Direction
	PID Controller	Internal PID Controller Multi Setpoint Select Standby / Sleep Mode
	Load Monitoring	Over Torque Protection (Fan / Pump Blocked) Under Torque Protection (Broken Belt / Shaft / Impellor)
	Maintenance Indicator	User programmable Maintenance Warning Timer
	Duty / Assist / Standby	Automated Changeover for Duty / Standby Automatic Assist Control
Fieldbus	BACnet MS/TP	Built in BACnet MS / TP interface (BacNet Application Specific Controller) 9.6 – 76.8 kbps selectable Date Format : 8N1, 8N2, 8E1, 8O1
	Modbus RTU	Built In Modbus RTU 9.6 – 115.2 kbps selectable User Selectable Format
	BACnet IP	Optional Plug In BACnet IP Interface (BacNet Application Specific Controller) Dual LAN ports with switch support Device Level Ring
	Modbus TCP	Optional Plug In Modbus TCP Interface Dual LAN ports with switch support Device Level Ring Read / Write Parameter access
	Other	Optional Fieldbus Interfaces for Profinet IO Profibus DP (DPV1) DeviceNet Ethernet IP EtherCat
Maintenance & Diagnostics	Cooling	Long life dual ball bearing fans Fan operation time monitoring
	Fault Memory	Last 4 Trips
	Critical Fault Counters	Over Current Over Voltage Over Temperature Mains Loss Communications Loss
	Data Logging	Logging of critical data for diagnostic prior to last trip : Output Current DC Link Voltage Heatsink Temperature
	High Speed Scope Data Logger	1mS Sample time Download & Trace via Optitools Studio PC Software
	Real Time Usage	Run Time Counter Energy Consumption Meter External Real Time Data Logging via RS485 or Bluetooth to Optitools Studio PC software
Design Standards	Low Voltage Directive	2006 / 95 / EC
	EMC Directive	2004 / 108 / EC Category C1 / C2 according to EN61800-3 : 2004 EN61000-3-12
	Machinery Directive	98 / 37 / EC
	Conformance	UL, cUL, CTick
	Ingress Protection	IP20, IP55, IP66

Model Code Guide



Connection Diagram



Function	Default Setting
24 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

NOT TO SCALE

	Size	IP20	IP66	IP55	
		3	3	4	5
mm	Height	261	310	440	540
mm	Width	131	211	171	235
mm	Depth	205	266	252	270
kg	Weight	3.5	7.3	11.5	22.5

eco OPTIDRIVE HVAC

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Optidrive HVAC Eco

✓ Saving Energy / Reducing CO_2

With large scale increases in global energy costs and the introduction of taxes and legislation relating to the industrial production of CO_2 gases the need to reduce energy consumption and save money has never been greater. The Optidrive HVAC Eco 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 has accumulated in a robust HVAC drive with small dimensions and innovative mounting and cabling features.

✓ Simple Set-up & Rapid Commissioning

Optidrive HVAC Eco was developed from concept for ease 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 Eco 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 Eco and packaged to be both quick and simple to activate. Added to this is the drive's own PLC programming flexibility that makes drive functionality virtually limitless.

✓ Options for Flexibility

Optidrive HVAC Eco 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 Headquarters, 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. The company pledges to implement and operate the ISO 14001 Environmental Management System to enhance environmental performance.

All company operations are accredited to the exacting customer focused ISO 9001:2008 quality standard. The company's products are sold globally in over 80 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

www.invertekdrives.com/hvac-building-services

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