





AC Variable Speed Drive

## PUMP CONTROL

Energy efficient pumping with **OPTIFL W** 





### AC Variable Speed Drive

0.75kW - 250kW / IHP - 350HP **200 - 600V** Single & 3 Phase Input



#### **Energy Efficient Pumping**

When a pump or pump set is selected, it must be suitable for operation during periods of maximum flow demand. In many applications, this maximum flow level may be rarely required, and as such the pump may operate for long periods at less than maximum flow capacity. By varying the speed of the pump to match the actual flow demand, significant energy savings are possible.

Optidrive Eco Pump has been designed to maximise the energy savings potential in pumping applications, whilst also providing significant additional benefits in reduced installation costs, maintenance costs and downtime. Throughout all this, Invertek's "Ease of Use" philosophy ensures that advanced features are simple

to commission, without requiring extensive, in depth knowledge of a huge number of parameters. Optidrive Eco Pump has a simple menu structure, and provides just the right amount of parameters to allow flexibility without over complication.

Overall, this provides the perfect balance of Easy to Install, Easy to operate, Advanced Pump Control.











## Save Energy

**Eco vector operation**, based on Invertek's advanced motor control provides the most energy efficient operation of the pump, continually optimising the output to match the required flow with minimum energy consumption.

**Advanced sleep & wake functions** provide maximum energy savings by switching off the pump when not required

## Save Money

**OPTIFL** "" technology allows simple operation of multiple pump sets without the need for a PLC

**Pump blockage detection and cleaning** dramatically reduces pump maintenance requirements

**Built in PLC function** allows bespoke customised applications to be programmed directly in the drive

## Save Time

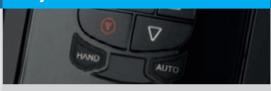
**Simple parameter set** allows fast commissioning of pump control systems

**Pump operating curve detection** automatically detects and monitors normal

automatically detects and monitors normal pump behaviour and is able to react when pumping conditions change

**Customisable OLED display** provides excellent visibility of drive status and operation in all conditions

#### **Key Features**



**ECO Vector Motor Control** 



**Standard Induction Motors** 



**Permanent Magnet AC Motors** 

**Brushless DC Motors** 

**Synchronous Reluctance Motors** 

**Energy Optimised Design** 



**Internal EMC Filter** 



**Low Noise Operation** 



### **Maximum Pumping Efficiency**

#### **Unique Eco Vector Sensorless Control**

Optidrive Eco Pump uses advanced motor control technology, designed to provide the most energy efficient motor control possible. Operation with standard IM Motors, Permanent Magnet or Synchronous Reluctance motors is possible, all without requiring any feedback device or optional modules – simply change parameters to suit the connected motor, autotune and operate!

Eco Vector continuously adjusts in real time to provide the most efficient operating conditions for the load, typically reducing energy consumption by 2 – 3% compared to standard AC drives – providing similar long term costs savings to selecting a higher efficiency motor.

#### **Energy Optimised Design**

Optidrive Eco Pump up to frame size 5 are designed with film capacitors, replacing the traditional electrolytic capacitors used in the DC link. Film capacitors have lower losses, and also remove the need for AC, DC or swinging chokes, improving overall drive efficiency. Efficiency is improved by up to 4% compared to standard AC drives, whilst also reducing supply current total harmonic distortion (iTHD), improving the Real Power Factor and reducing total input current, leading to cost savings on installation through reduced cable and fuse ratings and smaller supply transformer rating.

# **OPTIFL** Multi-pump Control

Embedded control technology for multi-pump systems



#### **Total Control**

A single 'Master' drive acts to control and monitor system operation. Control connections are made to this drive only, saving installation time and reducing costs.

## **Simple Connection**

Additional drives connected on the system require a single RJ45 connection and basic commissioning, leading to time savings and simplified installation.

#### **Flexible Solution**

The system can operate with up to five pumps in any configuration, e.g. Duty / Assist / Standby. Duty pumps are automatically rotated, ensuring maximum service life and system efficiency.

## Energy efficient pumping with **OPTIFL**



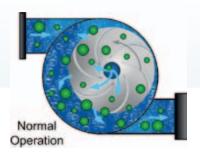
## See OPTIFL OW in action

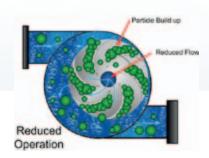
Scan to watch the video or visit http://youtu.be/9QQ89bQYdfs

#### **Avoid Pump Downtime**

#### Blockage Detect/Clear

Optidrive Eco Pump can detect pump blockages and trigger a programmed cleaning cycle to automatically clear them, preventing downtime.





#### **Dry Run Protection**

Optidrive Eco Pump can evaluate a pump's speed/power and shut it off or warn when the pump starts to run dry, protecting it from heat/friction damage.

#### **Motor Preheat Function**

Optidrive Eco Pump features a motor preheat function to help ensure moisture is not permitted to collect on the motor in periods of inactivity and prior to motor start up. In addition, the motor preheat function can be used to keep condensation from developing on the motor as the motor cools down immediately following a stop. The feature is fully configurable, meaning the pump can be always available the instant it is required.

#### **Pump Stir Cycle**

Triggered by a settable period of inactivity, a configurable cleaning cycle can be run to clear sediment, ensuring the pump is ready to run when needed.

#### Summary

- All drives operate at variable speed for maximum energy efficiency.
- Operating time (Hours Run) is automatically balanced and duty pumps rotated
- Automatic system reconfiguration in the event of a pump fault (including the master pump).
- Continued system operation when drives are individually powered off (including the master drive).
- Communication and +24V control voltage shared between drives via a standard RJ45 patch lead.
- Independent maintenance indicators for each pump.
- Any pump can be switched to Hand operation a the touch of a button, and will automatically rejoin the network when switched back to Auto.
- For waste water applications each pump can be set for blockage/ragging detection and activate an automatic de-ragging/pump cleaning cycle.
- Optional mains isolator with lock-off for safe pump maintenance.
- Optiflow function configured through simple parameter set-up and intelligent drive self configuration.

#### **Consistent Flow**

The required pressure and flow levels are maintained regardless of how many pumps are required. When demand increases, additional pumps are automatically brought on stream to assist and are switched off again when not required.

#### **Reduced Downtime**

In the event of a fault, or if a pump needs to be isolated for maintenance, the system will automatically continue to operate with the remaining available pumps. The mains power can even be completely isolated from the Master drive without affecting operation of the Slave drives.

## **Drive Features**

A compact and robust range of drives dedicated to pump control





Maintenance interval timer and service indication



Multi Language OLED Display



Hand / Auto Keypad

## Enclosure Options





Pluggable terminals

## **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



Long Life, Dual Ball Bearing Fans



Integrated cable management





### Energy efficient pumping with **OPTIFL** W



### **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 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.

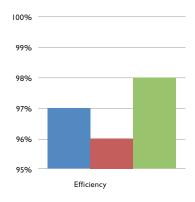
Optidrive Eco Pump uses innovative design to improve overall efficiency whilst minimising the harmonic distortion levels. All drives designed for 3 phase power supply operation up to frame size 5 utilise film capacitor in the DC link, providing exceptionally low harmonic current distortion without compromising efficiency. Frame size 6 and above include DC chokes and traditional electrolytic capacitors.

Optidrive Eco Pump product range complies with the requirements of EN61000-3-12.

#### **Optidrive Eco Pump delivers**

- Improved Efficiency, Reduced Lifetime Costs: e.g. for a 37kW load, operating 10 hours per day, 5 days per week, 50 weeks per year, improving the efficiency by just 1% will provide an energy saving > 100kWh per year
- Improved True Power Factor No additional charges etc.
- Lower Mains Supply Current

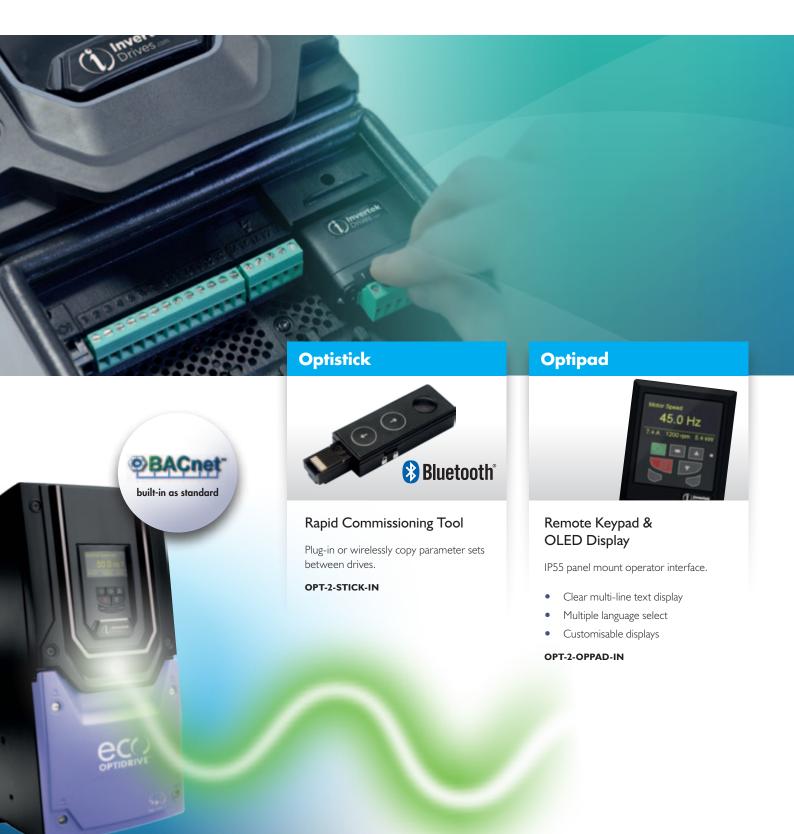
Typical efficiency comparison for Optidrive Eco Pump vs other AC variable speed drives





## Options & Accessories

Peripherals to help integrate Optidrive Eco Pump with your pumping systems





## Energy efficient pumping with **OPTIFL** W







## 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



**Modbus TCP** OPT-2-MODIP-IN

**Modbus** TCP

**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

#### **Mains Isolator**



#### Mains Isolator Option

Frame Sizes 2 & 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

**BACnet & Modbus RTU** on board as standard



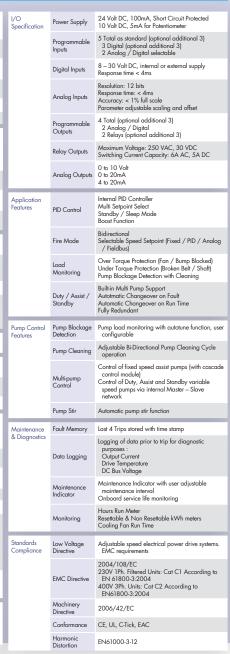
OPTIDRI	VE"	1			
	kW	HP	Amps	Size	
200-240V±10%	0.75	1	4.3 7	2	ODV - 3 - 2 2 0043 - 1 F 1 # - # N ODV - 3 - 2 2 0070 - 1 F 1 # - # N
1 Phase Input	2.2	3	10.5	2	ODV - 3 - 2 2 0105 - 1 F 1 # - # N
	0.75	ļ	4.0	0	ODV - 3 - 2 2 0043 - 3 F 1 # - # N
	0.75	1	4.3 7	2	ODV - 3 - 2 2 0043 - 3 F 1 # - # N
	2.2	3	10.5	2	ODV - 3 - 2 2 0105 - 3 F 1 # - # N
	4	5	15	3	ODV - 3 - 3 2 0150 - 3 F 1 # - # N
	5.5 7.5	7.5 10	24 30	3	ODV - 3 - 3 2 0240 - 3 F 1 # - # N ODV - 3 - 4 2 0300 - 3 F 1 N - T N
	11	15	46	4	ODV - 3 - 4 2 0300 - 3 F 1 N - T N
200-240V±10%	15	20	60	5	ODV - 3 - 5 2 0600 - 3 F 1 N - T N
3 Phase Input	18.5	25	72	5	ODV - 3 - 5 2 0720 - 3 F 1 N - T N
	22	30	90	5	ODV - 3 - 5 2 0900 - 3 F 1 N - T N
	30 37	40 50	110	6	ODV - 3 - 6 2 1100 - 3 F 1 N - T N ODV - 3 - 6 2 1500 - 3 F 1 N - T N
	45	60	180	6	ODV - 3 - 6 2 1800 - 3 F 1 N - T N
	55	75	202	7	ODV - 3 - 7 2 2020 - 3 F 1 N - T N
	75	100	248	7	ODV - 3 - 7 2 2480 - 3 F 1 N - T N
	0.75	1	2.2	2	ODV - 3 - 2 4 0022 - 3 F 1 # - # N
	1.5	2	4.1	2	ODV - 3 - 2 4 0041 - 3 F 1 # - # N
	2.2	3	5.8	2	ODV - 3 - 2 4 0058 - 3 F 1 # - # N
	4	5	9.5	2	ODV - 3 - 2 4 0095 - 3 F 1 # - # N
	5.5 7.5	7.5 10	14 18	3	ODV - 3 - 3 4 0140 - 3 F 1 # - # N ODV - 3 - 3 4 0180 - 3 F 1 # - # N
	11	15	24	3	ODV - 3 - 3 4 0240 - 3 F 1 # - # N
	15	20	30	4	ODV - 3 - 4 4 0300 - 3 F 1 N - T N
	18.5	25	39	4	ODV - 3 - 4 4 0390 - 3 F 1 N - T N
380-480V±10%	22 30	30 40	46 61	5	ODV - 3 - 4 4 0460 - 3 F 1 N - T N ODV - 3 - 5 4 0610 - 3 F 1 N - T N
3 Phase Input	37	50	72	5	ODV - 3 - 5 4 0610 - 3 F 1 N - T N
	45	60	90	5	ODV - 3 - 5 4 0900 - 3 F 1 N - T N
	55	75	110	6	ODV - 3 - 6 4 1100 - 3 F 1 N - T N
	75	100	150	6	ODV - 3 - 6 4 1500 - 3 F 1 N - T N
	90	150 175	180	6 7	ODV - 3 - 6 4 1800 - 3 F 1 N - T N ODV - 3 - 7 4 2020 - 3 F 1 N - T N
	132	200	240	7	ODV - 3 - 7 4 2400 - 3 F 1 N - T N
	160	250	302	7	ODV - 3 - 7 4 3020 - 3 F 1 N - T N
	200	300	370	8	ODV - 3 - 8 4 3700 - 3 F 1 2 - T N
	250	350	450	8	ODV - 3 - 8 4 4500 - 3 F 1 2 - T N
	132	175	185	7	ODV - 3 - 7 5 1850 - 3 0 1 N - T N
480-525V±10%	150	200	205	7	ODV - 3 - 7 5 2050 - 3 0 1 N - T N
3 Phase Input	185	250 270	255 275	7 7	ODV - 3 - 7 5 2550 - 3 0 1 N - T N ODV - 3 - 7 5 2750 - 3 0 1 N - T N
	200	270	27 3	,	ODT 0 7 3 27 30 0 0 1 N 1 N
	0.75	1	2.1	2	ODV - 3 - 2 6 0021 - 3 0 1 # - # N
	1.5	2	3.1	2	ODV - 3 - 2 6 0031 - 3 0 1 # - # N ODV - 3 - 2 6 0041 - 3 0 1 # - # N
	2.2	3 5	4.1 6.5	2	ODV - 3 - 2 6 0041 - 3 0 1 # - # N
	5.5	7.5	9	2	ODV - 3 - 2 6 0090 - 3 0 1 # - # N
	7.5	10	12	3	ODV - 3 - 3 6 0120 - 3 0 1 # - # N
	11	15	17	3	ODV - 3 - 3 6 0170 - 3 0 1 # - # N
500-600V±10%	15 18.5	20 25	22	4	ODV - 3 - 4 6 0220 - 3 0 1 N - T N ODV - 3 - 4 6 0280 - 3 0 1 N - T N
3 Phase Input	22	30	34	4	ODV - 3 - 4 6 0280 - 3 0 1 N - 1 N
	30	40	43	4	ODV - 3 - 4 6 0430 - 3 0 1 N-T N
	37	50	54	5	ODV - 3 - 5 6 0540 - 3 0 1 N - T N
	45	60	65	5	ODV - 3 - 5 6 0650 - 3 0 1 N - T N
	55 75	75 100	78 105	5	ODV - 3 - 5 6 0780 - 3 0 1 N - T N ODV - 3 - 6 6 1050 - 3 0 1 N - T N
	90	125	130	6	ODV - 3 - 6 6 1300 - 3 0 1 N - T N
	110	150	150	6	ODV - 3 - 6 6 1500 - 3 0 1 N - T N



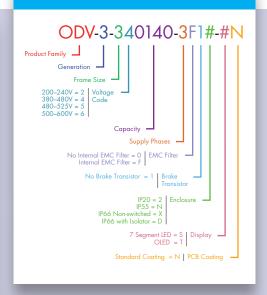


## **Drive Specification**

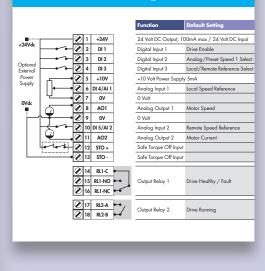
Input Ratings	Supply Voltage	200 – 240V 380 – 480V 500 – 600V	± 10%		
	Supply Frequency	48 – 62Hz			
	Displacement Power Factor	> 0.98			
	Phase Imbalance	3% Maximum	n allowed		
	Inrush Current	< rated currer	nt		
	Power Cycles		maximum, evenly spaced		
Output Ratings	Output Power	230V 1Ph. Input: 0.75–2.2kW (1–3HP) 230V 3Ph. Input: 0.75–75kW (1–100HP) 400V 3Ph. Input: 0.75–250kW 460V 3Ph. Input: 1–350HP 575V 3Ph. Input: 0.75–110kW (1–120HP)			
	Overload Capacity	110% for 60 seconds			
	Output Frequency	0 – 120Hz, 0	).1Hz resolution		
	Typical Efficiency	> 98%			
Ambient Conditions	Temperature	Storage: -40 Operating: -			
	Altitude	Up to 2000m	ASL without derating maximum UL approved maximum (non UL)		
	Humidity	95% Max, no	on condensing		
	Vibration	Sinusoidal Vik	EC 60068-2-6 oration I 0.075mm Pk @ 1g Pk		
Enclosure	Ingress Protection	IP20, IP55, IP	66		
Programming	Keypad		Built-in keypad as standard Optional remote mountable keypad		
	Display	Built-in multi lo 7 Segment LE	anguage OLED (IP55 & IP66) D (IP20)		
	PC	OptiTools Stu	dio		
Control Specification	Control Method	Open Loop P Open Loop B	ss Vector Control ermanent Magnet Vector IDC Vector ynchronous Reluctance Vector		
	PWM Frequency	4 – 32kHz Effective			
	Stopping Mode	Ramp to stop: Coast to stop	mp to stop: User Adjustable 1-600 secs past to stop		
	Braking	Motor Flux Br	aking		
	Skip Frequency	Single point, a	user adjustable		
	Setpoint Control	Analog Signal	0 to 10 Volts 10 to 0 Volts -10 to +10 Volts 0 to 20mA 20 to 0mA 4 to 20mA 20 to 4 mA		
		Digital	Motorised Potentiometer (Keypad) Modbus RTU BACnet MS/TP		
Fieldbus Connectivity	Built-in	BACnet MS/TP	BACnet Application Specific Controller 9.6 - 76.8 kbps selectable Date Format: 8N1, 8N2, 8E1, 8O1		
		Modbus RTU	9.6 - 115.2 kbps selectable 8N1, 8N2, 8E1, 8O1		
		BACnet/IP	Plug-in BACnet/IP interface Dual LAN ports Device Level Ring		
	Optional	Other	PROFIBUS DP (DPV1) PROFINET IO DeviceNet EtherNet/IP EtherCAT Modbus TCP		



#### **Model Code Guide**



#### **Connection Diagram**











**3** 

211

266

7.7

IP66









Size	
Height	mm
Width	mm
Depth	mm
Weight	kg

		00
2	3	2
221	261	257
110	131	188
185	205	239
1.8	3.5	4.8

4	5
450	540
171	235
252	270
11.5	23

IP55

865 330 330 55	6	
330	865	
	330	
55	330	
	55	

7
1280
330
360
89





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### **Optidrive Eco Pump**

#### ✓ Saving Energy / Reducing CO,

With large scale increases in global energy costs and the introduction of taxes and legislation relating to the industrial production of CO<sub>2</sub> gases the need to reduce energy consumption and save money has never been greater. Optidrive Eco Pump can be used with environmental sensors to reduce pump speed in 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 Eco Pump drive with small dimensions and innovative mounting and cabling features.

#### ✓ Simple Set-up & Rapid Commissioning

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

#### ✓ Imaginative Enclosure Design

With a selection of IP55 and IP66 enclosures, Optidrive Eco Pump is well suited to harsh environments, or where cabinet and cabling costs need to be reduced.

#### ✓ Advanced Pump Control Functions

The key pump control functionality required for your application is inbuilt into Optidrive Eco Pump 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 Eco Pump 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.



#### www.invertekdrives.com/pump-control

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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

All company operations are accredited to the exacting customer focused globally in over 80 different countries. Invertek Drives' unique and innovative drives are designed for ease of use and meet with recognised

## Global Pump Solutions

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



**IRELAND** Maintaining pressure at pumping stations



HOLLAND Hot water pumping



Cooling loop flow &



AUSTRALIA Improve reliability & running costs









