



OPTIDRIVE™ CP²

AC Variable Speed Drive

Powerful Performance

Advanced motor control



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

At a Glance...

High performance, excellent usability and flexible to meet the needs of your application

**Keyhole
Mounts for fast
installation**

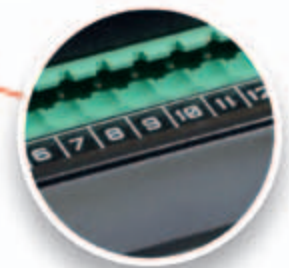


IP55 / NEMA 12



**Integrated
Keypad & Display**
(LED or Multi-language OLED
Display)

**Integrated
EMC Filter**



**Pluggable Control
Terminals**



**Integrated Cable
Management**



**High Quality
Long-life Fans**

**Integral
Brake
Transistor**

Contactor-style Power Wiring Arrangement



Keyhole Mounts for fast installation



Convenient Reference Card

DIN Rail Mount

Modbus RTU and CANopen on board as standard



Modbus
CANopen



Safe Torque Off (provided as standard)

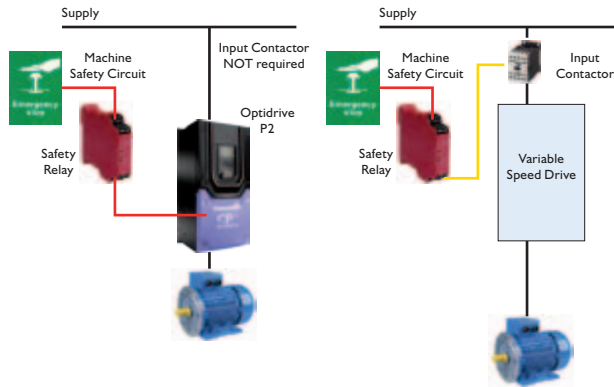
Optidrive P2 features a safe torque off function to allow simple integration into machine critical safety circuits.

- Simple machine design reduces component costs, saves panel space and minimises installation time
- Faster shut down and reset procedures reduce system maintenance time
- Better safety standard compared to mechanical solution
- Better motor connection. Single cable with no interruption.



With

Without



Powerful Performance

World leading control for the latest generation of permanent magnet and standard induction motors

Manufacturing Pumping Conveyer Systems Machine Tools Processing Plants Chemical Rubber Elevators Cranes



World Leading Motor Control

The all new Optidrive P2 offers the perfect combination of high performance together with ease of use to allow even the most demanding applications to be tackled easily.

Designed for fast installation and commissioning, Optidrive P2 provides the most cost effective solution for industry.

All Optidrive P2 units provide 150% overload for 60 seconds as standard, ensuring each drive is suitable for Heavy Duty applications, whilst the IP55 enclosed versions ensure the drive is tough enough to survive in industrial environments.

Extensive I/O and communications interface capabilities ensure the drive can be integrated quickly and efficiently into a wide variety of control systems with the minimum commissioning time, ensuring rapid start up. Invertek's simple parameter structure, and carefully selected factory parameter settings ensure that commissioning time is kept to a minimum.



Compliant with international standards.
Manufactured in the UK.

150% overload for 60 seconds



IP20

Panel mount units available up to 11kW



IP55

Wall mount units available up to 200kW



IP66

Wall mount units available up to 7.5kW

Advanced Motor Control

Optidrive P2 has been uniquely developed to allow a wide range of different motor types to be used, with only parameter changes being required. This technology allows the same drive to be used in a wide range of applications, allowing OEM's and end user alike to take advantage of the energy saving provided by using the latest motor technologies.

AC Induction Motors

The majority of AC motors in use today around the world are standard induction motors. These motors are relatively low cost, readily available and provide good performance with long service life. With the ever increasing focus on energy efficiency, motor manufacturers have refined and improved their designs in recent years.

Optidrive P2 has been developed to provide optimum control and maximum efficiency when operating with older motors designs, or newer high efficiency designs.

Operation can be in simple V/F control mode or in High Performance Third Generation Vector Mode, which provides up to 200% torque from zero speed without requiring an encoder.

Permanent Magnet AC Motors

Permanent magnet AC motors provide improved efficiency compared to standard induction motors. Using permanent magnets in the motor construction eliminates the need for any magnetising current, reducing electrical losses. PM motors have been used for many years in high performance applications, however this has always required the use of a feedback device, such as a resolver or encoder. Optidrive P2 has been designed to operate with AC PM motors without requiring any feedback device, allowing them to be used for their energy efficiency benefits without incurring extra cost and complexity in applications which do not require position feedback.

Brushless DC Motors

BLDC motors are similar to AC PM motors, however the design requires a slightly different control method to optimise the performance. Optidrive P2 has the flexibility to control this type of motor, requiring only simple parameter changes. This provides much greater flexibility for OEM's, allowing Optidrive P2 to be used in a variety of applications, with various motor types.

Synchronous Reluctance Motors

Synchronous Reluctance Motors (SynRM), not to be confused with Switched Reluctance Motors, share a similar stator construction to standard induction motors, however the rotor is substantially different, in order to improve the overall efficiency of the motor. SynRM motors are ideally suited to variable torque applications.

Optidrive P2 can control synchronous reluctance motors, allowing the energy saving benefits to be realised.

Applications

High performance, accurate motor control for even the most demanding of applications



Mining & Quarrying

- Feed conveyers
- Crushers
- Cranes

Metals & Processing

- Grinding
- Cutting
- Polishing
- Drilling
- Rolling

Rubber & Plastics

- Extruders
- Moulding
- Mixers
- Winding

Food & Beverage

- Conveyers
- Pumps
- Mixers
- Palletisers

Powerful, versatile and easy to use

Cranes



Requirements:

- High starting torque
- Smooth motor operation throughout starting and stopping phases
- Motor holding brake control
- Avoidance of load droop and sag
- Regeneration and braking capability during load lowering

Optidrive P2 provides:

- Dedicated Hoist Mode Operation with motor holding brake control algorithm
- Up to 200% torque from zero speed in vector operation without encoder feedback
- Multiple Preset Speed or variable speed operation
- Built in dynamic braking transistor, requires only an external resistor

Compressors



Requirements:

- Precise regulation of speed to ensure a consistent end product
- High starting torque demand in many applications
- Maximum efficiency under all conditions
- Safe operation to prevent accidents and injuries

Optidrive P2 Provides:

- PM Motor control mode to allow open loop operation with Permanent Magnet motors for maximum efficiency
- Maximum starting torque with standard AC motors
- Better than 0.5% speed holding accuracy in Open Loop Vector Operation
- Dedicated Safe Torque Off input complies with EN62061 SIL Level 2 for safe operation

Winding



Requirements:

- Precise control of motor torque over a broad speed range
- Accurate control of material tension under all conditions
- Open or closed loop control capability, based on tension feedback or winding diameter
- Web break protection in case of material breakage

Optidrive P2 Provides:

- PID Closed Loop Tension Control with feedback from a load cell or dancer arm
- Open Loop Vector control provides optimum control of the output torque level
- Encoder feedback option allows for a very wide speed range, even down to zero speed
- Safe Torque Off input immediately disables the drive in Emergency conditions

Options & Accessories

Installation options, plug-in modules and commissioning tools



Fieldbus Interfaces

Plug-in Options

Modbus RTU and CANopen on board as standard

For additional communication interfaces or functionality a range of plug-in modules is available:



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



Encoder Feedback OPT-2-EXTIO-IN

Closed loop encoder feedback, compatible with a wide range of incremental encoders

Extended I/O OPT-2-EXTIO-IN

- Additional 3 Digital Inputs
- Additional Relay Output

Extended Relay OPT-2-CASCD-IN

Additional 3 Relay Outputs:

- Relay 3** – Drive Healthy Indication
- Relay 4** – Drive Fault Indication
- Relay 5** – Drive Running Indication

Functions are programmable / adjustable

Installation & Peripheral Options

A range of external EMC Filters, Brake Resistors, Input Chokes and Output Filters are available, to suit all installation requirements

Optistick



Rapid Commissioning

- Allows rapid copying of parameters between multiple drives
- Provides Bluetooth wireless interface to a PC running OptiTools Studio
- Backup and restore of drive parameters

OPT-2-STICK-IN

OptiTools Studio

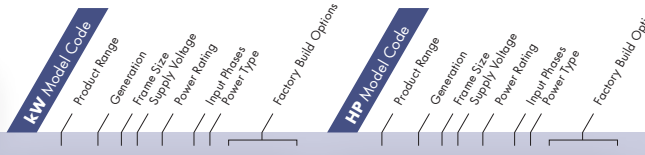


Powerful PC Software

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



Input Voltage	kW	HP	Amps	Size	kW Model Code	HP Model Code	Factory Build Options
200–240V ± 10% 1 Phase Input	0.75	1	4.3	2	ODP - 2 - 2 2 075 - 1 K	ODP - 2 - 2 2 010 - 1 H	F 4 # # #
	1.5	2	7	2	ODP - 2 - 2 2 150 - 1 K	ODP - 2 - 2 2 020 - 1 H	F 4 # # #
	2.2	3	10.5	2	ODP - 2 - 2 2 220 - 1 K	ODP - 2 - 2 2 030 - 1 H	F 4 # # #
200–240V ± 10% 3 Phase Input	0.75	1	4.3	2	ODP - 2 - 2 2 075 - 3 K	ODP - 2 - 2 2 010 - 3 H	F 4 # # #
	1.5	2	7	2	ODP - 2 - 2 2 150 - 3 K	ODP - 2 - 2 2 020 - 3 H	F 4 # # #
	2.2	3	10.5	2	ODP - 2 - 2 2 220 - 3 K	ODP - 2 - 2 2 030 - 3 H	F 4 # # #
	4	5	15	3	ODP - 2 - 3 2 040 - 3 K	ODP - 2 - 3 2 050 - 3 H	F 4 # # #
	5.5	7.5	24	3	ODP - 2 - 3 2 055 - 3 K	ODP - 2 - 3 2 075 - 3 H	F 4 2 - S #
	5.5	7.5	24	4	ODP - 2 - 4 2 055 - 3 K	ODP - 2 - 4 2 075 - 3 H	F 4 N - # # #
	7.5	10	30	4	ODP - 2 - 4 2 075 - 3 K	ODP - 2 - 4 2 100 - 3 H	F 4 N - # # #
	11	15	46	4	ODP - 2 - 4 2 110 - 3 K	ODP - 2 - 4 2 150 - 3 H	F 4 N - # # #
	15	20	60	5	ODP - 2 - 5 2 150 - 3 K	ODP - 2 - 5 2 020 - 3 H	F 4 N - # # #
	18.5	25	72	5	ODP - 2 - 5 2 185 - 3 K	ODP - 2 - 5 2 025 - 3 H	F 4 N - # # #
	22	30	90	6	ODP - 2 - 6 2 022 - 3 K	ODP - 2 - 6 2 030 - 3 H	F # N - # # #
	30	40	110	6	ODP - 2 - 6 2 030 - 3 K	ODP - 2 - 6 2 040 - 3 H	F # N - # # #
	37	50	150	6	ODP - 2 - 6 2 037 - 3 K	ODP - 2 - 6 2 050 - 3 H	F # N - # # #
	45	60	180	6	ODP - 2 - 6 2 045 - 3 K	ODP - 2 - 6 2 060 - 3 H	F # N - # # #
	55	75	202	7	ODP - 2 - 7 2 055 - 3 K	ODP - 2 - 7 2 075 - 3 H	F # N - # # #
75	100	248	7	ODP - 2 - 7 2 075 - 3 K	ODP - 2 - 7 2 100 - 3 H	F # N - # # #	
380–480V ± 10% 3 Phase Input	0.75	1	2.2	2	ODP - 2 - 2 4 075 - 3 K	ODP - 2 - 2 4 010 - 3 H	F 4 # # #
	1.5	2	4.1	2	ODP - 2 - 2 4 150 - 3 K	ODP - 2 - 2 4 020 - 3 H	F 4 # # #
	2.2	3	5.8	2	ODP - 2 - 2 4 220 - 3 K	ODP - 2 - 2 4 030 - 3 H	F 4 # # #
	4	5	9.5	2	ODP - 2 - 2 4 400 - 3 K	ODP - 2 - 2 4 050 - 3 H	F 4 # # #
	5.5	7.5	14	3	ODP - 2 - 3 4 055 - 3 K	ODP - 2 - 3 4 075 - 3 H	F 4 # # #
	7.5	10	18	3	ODP - 2 - 3 4 075 - 3 K	ODP - 2 - 3 4 100 - 3 H	F 4 # # #
	11	15	24	3	ODP - 2 - 3 4 110 - 3 K	ODP - 2 - 3 4 150 - 3 H	F 4 2 - S #
	11	15	24	4	ODP - 2 - 4 4 110 - 3 K	ODP - 2 - 4 4 150 - 3 H	F 4 N - # # #
	15	20	30	4	ODP - 2 - 4 4 150 - 3 K	ODP - 2 - 4 4 200 - 3 H	F 4 N - # # #
	18.5	25	39	4	ODP - 2 - 4 4 185 - 3 K	ODP - 2 - 4 4 250 - 3 H	F 4 N - # # #
	22	30	46	4	ODP - 2 - 4 4 220 - 3 K	ODP - 2 - 4 4 300 - 3 H	F 4 N - # # #
	30	40	61	5	ODP - 2 - 5 4 300 - 3 K	ODP - 2 - 5 4 040 - 3 H	F 4 N - # # #
	37	50	72	5	ODP - 2 - 5 4 370 - 3 K	ODP - 2 - 5 4 050 - 3 H	F 4 N - # # #
	45	60	90	6	ODP - 2 - 6 4 045 - 3 K	ODP - 2 - 6 4 060 - 3 H	F # N - # # #
	55	75	110	6	ODP - 2 - 6 4 055 - 3 K	ODP - 2 - 6 4 075 - 3 H	F # N - # # #
	75	100	150	6	ODP - 2 - 6 4 075 - 3 K	ODP - 2 - 6 4 100 - 3 H	F # N - # # #
	90	150	180	6	ODP - 2 - 6 4 090 - 3 K	ODP - 2 - 6 4 150 - 3 H	F # N - # # #
	110	175	202	7	ODP - 2 - 7 4 110 - 3 K	ODP - 2 - 7 4 175 - 3 H	F # N - # # #
	132	200	240	7	ODP - 2 - 7 4 132 - 3 K	ODP - 2 - 7 4 200 - 3 H	F # N - # # #
	160	250	302	7	ODP - 2 - 7 4 160 - 3 K	ODP - 2 - 7 4 250 - 3 H	F # N - # # #
200	300	370	8	ODP - 2 - 8 4 200 - 3 K	ODP - 2 - 8 4 300 - 3 H	# # 2 - # # #	
250	350	480	8	ODP - 2 - 8 4 250 - 3 K	ODP - 2 - 8 4 400 - 3 H	# # 2 - # # #	
480–525V ± 10% 3 Phase Input	132	-	185	7	ODP - 2 - 7 5 132 - 3 K	N/A	O # N - # # #
	150	-	205	7	ODP - 2 - 7 5 150 - 3 K	N/A	O # N - # # #
	185	-	255	7	ODP - 2 - 7 5 185 - 3 K	N/A	O # N - # # #
	200	-	275	7	ODP - 2 - 7 5 200 - 3 K	N/A	O # N - # # #
500–600V ± 10% 3 Phase Input	0.75	1	2.1	2	ODP - 2 - 2 6 075 - 3 K	ODP - 2 - 2 6 010 - 3 H	O 4 # # #
	1.5	2	3.1	2	ODP - 2 - 2 6 150 - 3 K	ODP - 2 - 2 6 020 - 3 H	O 4 # # #
	2.2	3	4.1	2	ODP - 2 - 2 6 220 - 3 K	ODP - 2 - 2 6 030 - 3 H	O 4 # # #
	4	5	6.5	2	ODP - 2 - 2 6 400 - 3 K	ODP - 2 - 2 6 050 - 3 H	O 4 # # #
	5.5	7.5	9	2	ODP - 2 - 2 6 055 - 3 K	ODP - 2 - 2 6 075 - 3 H	O 4 # # #
	7.5	10	12	3	ODP - 2 - 3 6 075 - 3 K	ODP - 2 - 3 6 100 - 3 H	O 4 # # #
	11	15	17	3	ODP - 2 - 3 6 110 - 3 K	ODP - 2 - 3 6 150 - 3 H	O 4 # # #
	15	20	22	3	ODP - 2 - 3 6 150 - 3 K	ODP - 2 - 3 6 200 - 3 H	O 4 2 - S #
	15	20	22	4	ODP - 2 - 4 6 150 - 3 K	ODP - 2 - 4 6 200 - 3 H	O 4 N - # # #
	18.5	25	28	4	ODP - 2 - 4 6 185 - 3 K	ODP - 2 - 4 6 250 - 3 H	O 4 N - # # #
	22	30	34	4	ODP - 2 - 4 6 220 - 3 K	ODP - 2 - 4 6 300 - 3 H	O 4 N - # # #
	30	40	43	4	ODP - 2 - 4 6 300 - 3 K	ODP - 2 - 4 6 400 - 3 H	O 4 N - # # #
	37	50	54	5	ODP - 2 - 5 6 370 - 3 K	ODP - 2 - 5 6 050 - 3 H	O 4 N - # # #
	45	60	65	5	ODP - 2 - 5 6 045 - 3 K	ODP - 2 - 5 6 060 - 3 H	O # N - # # #
	55	75	78	6	ODP - 2 - 6 6 055 - 3 K	ODP - 2 - 6 6 075 - 3 H	O # N - # # #
	75	100	105	6	ODP - 2 - 6 6 075 - 3 K	ODP - 2 - 6 6 100 - 3 H	O # N - # # #
	90	125	130	6	ODP - 2 - 6 6 090 - 3 K	ODP - 2 - 6 6 125 - 3 H	O # N - # # #
	110	150	150	6	ODP - 2 - 6 6 110 - 3 K	ODP - 2 - 6 6 150 - 3 H	O # N - # # #

kW Models: Factory Settings
 Motor Rated Frequency: 50Hz
 Motor Rated Voltage: 400V

HP Models: Factory Settings
 Motor Rated Frequency: 60Hz
 Motor Rated Voltage: 460V

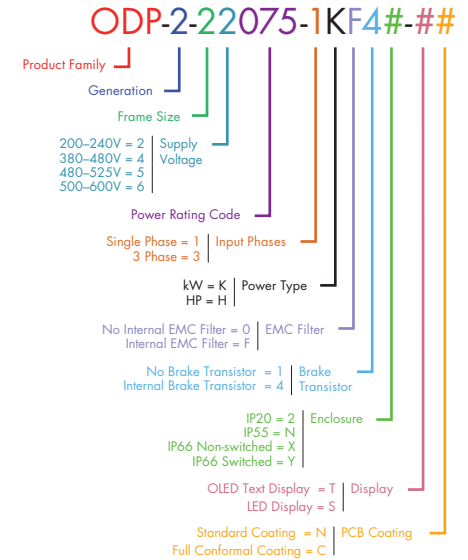
Replace # in model code with colour-coded option
Size 2 & 3 IP20 units are available with 7 Segment LED Display only

Drive Specification

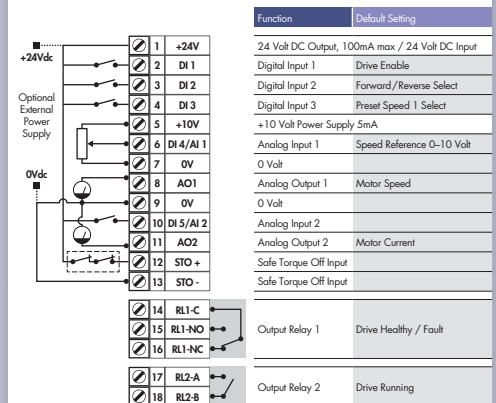
Input Ratings	Supply Voltage	200 – 240V ± 10% 380 – 480V ± 10% 480 – 525V ± 10% 500 – 600V ± 10%	
	Supply Frequency	48 – 62Hz	
	Displacement Power Factor	> 0.98	
	Phase Imbalance	3% Maximum allowed	
	Inrush Current	< rated current	
	Power Cycles	120 per hour maximum, evenly spaced	
	Output Ratings	Output Power	230V 1 Phase: 0.75–2.2kW / 1–3HP 230V 3 Phase: 0.75–7.5kW / 1–100HP 400V 3 Phase: 1.75–250kW 460V 3 Phase: 1–350HP 525V 3 Phase: 0.75–200kW 575V 3 Phase: 0.75–110kW / 1–150HP
Overload Capacity		150% for 60 seconds	
Output Frequency		0 – 500Hz, 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) Above 1000m: Derate by 1% per 100m Humidity: 95% Max, non-condensing	
Programming	Keypad	Built-in keypad as standard Optional remote mountable keypad	
	Display	Optional OLED or LED display (OLED Display Multi Language)	
	PC	OptiTools Studio	
Control Specification	Control Method	V/F Voltage Vector Energy Optimised V/F Sensorless Vector Speed Control Sensorless Vector Torque Control Synchronous Reluctance Motor Control Brushless DC Motor Control Closed Loop [Encoder] Speed Control Closed Loop [Encoder] Torque Control Open Loop PM Vector Control	
	PWM Frequency	4–32kHz Effective	
	Stopping Mode	Ramp to Stop: User Adjustable 0.1–600 secs Coast to Stop	
	Braking	Motor Flux Braking Built-in Braking Transistor (Optional for frame sizes 6, 7 & 8)	
	Skip Frequency	Single point, 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 4mA
		Digital	Motorised Potentiometer (Keypad) Modbus RTU CANopen
		Optional	PROFIBUS DP, DeviceNet, EtherNet/IP, Modbus TCP, EtherCAT, PROFINET

I/O Specification	Power Supply	24 Volt DC, 100mA, Short Circuit Protected 10 Volt DC, 5mA for Potentiometer
	Programmable Inputs	5 Total as standard (Optional additional 3) 3 Digital (Optional additional 3) 2 Analog / Digital Selectable
	Digital Inputs	10 – 30 Volt DC, internal or external supply, PNP Response time: < 4ms
	Analog Inputs	Resolution: 12 bits Response time: < 4ms Accuracy: < ± 2% of Full Scale Parameter adjustable scaling and offset
	Programmable Outputs	4 Total (Optional additional 3) 2 Analog / Digital 2 Relays (Optional additional 3)
Relay Outputs	Relay Outputs	Maximum Voltage: 250 VAC, 30 VDC Switching Current Capacity: 6A AC
	Analog Outputs	0 to 10 Volt 0 to 20mA 4 to 20mA
	Control Features	Hoist Operation: Dedicated Hoist Operation Mode PID Control: Internal PID control with feedback display
Maintenance & Diagnostics	Fault Memory	Last 4 Trips stored with time stamp
	Data Logging	Logging of data prior to trip for diagnostic purposes: Output Current, Drive Temperature, DC Bus Voltage
	Maintenance Indicator	Maintenance Indicator with user adjustable maintenance interval Onboard service life monitoring
	Monitoring	Hours Run Meter Resettable & Non Resettable kWh meters
Design Standards	EN 61800-3:2004	Adjustable speed electrical power drive systems. EMC requirements.
	2004/108/EC	
	Low Voltage Directive	230V 1 Phase Models Category C1 according to EN61800-3:2004
	Machinery Directive	400V 3 Phase Models Category C2 according to EN61800-3:2004
	Safe Torque Off Function	SIL CL2 According to EN61800-5-2 / EN62061 / IEC61508
	Ingress Protection	CE, UL, cUL, C-Tick, RoHS, GOST R IP20 (Size 2, 3, 8) IP55 (Size 4, 5, 6, 7) IP66 (Size 2, 3, up to 7.5kW)

Model Code Guide



Connection Diagram



NOT TO SCALE



Size	IP20		IP66		IP55			IP20
	2	3	2	3	4	5	6	8
mm Height	221	261	257	310	450	540	865	1005
mm Width	110	131	188	211	171	235	330	480
mm Depth	185	205	239	266	252	270	330	480
kg Weight	1.8	3.5	4.8	7.3	11.5	22.5	50	200

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.



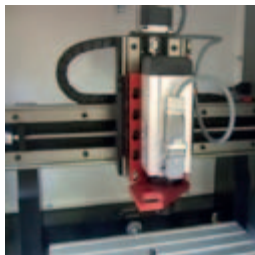
UK Headquarters, Welshpool

Global Drive Solutions

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



Crane Control
Demanding application at South African mine



Machine Tool OEM
UK machine tool supplier specifies Optidrive



Film Manufacturing
Optimum tension control in Australia



Food Processing
Precision conveyor control in Spain



Amusement Parks
Reliable control of difficult loads in Spain



Optidrive P2 User Guide

Scan to download or visit the Invertek Drives website

www.invertekdrives.com/optidrive-p2

INVERTEK DRIVES LIMITED UK Headquarters

Offa's Dyke Business Park, Welshpool, Powys. UK SY21 8JF

Tel: +44 (0)1938 556868 Fax: +44 (0)1938 556869 Email: sales@invertekdrives.com



©2014 Invertek Drives Ltd. All rights reserved.

85-ODP2B-IN V3.02