



Member of Sumitomo Drive Technologies

OPTIPASS

AC variable frequency drive bypass
solution for fan & pump control



NEMA 1



NEMA 12



NEMA 3R



0.75kW – 110kW / 1HP – 175HP
200 – 480V 3 Phase Input





VFD bypass control

0.75 – 110kW / 1 – 175HP
200 – 480V 3 Phase Input



Energy Efficient Fan & Pump Control

Take Control of Your Environment

OptiPass 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. The addition of a traditional bypass circuit introduces the safety and back-up desired by many users.

Invertek Drives' 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.

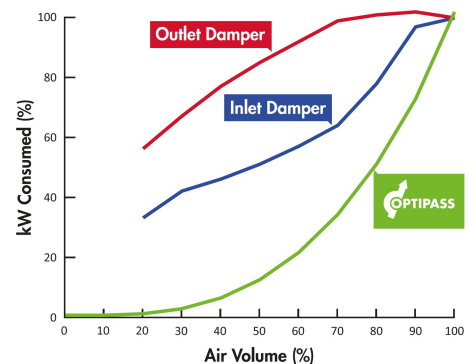
The optional electronic bypass feature assures the user optimal time under VFD control with no need to manually change to bypass.

For simple installation into your buildings management system all OptiPass products are provided with both BACnet MS/TP and Modbus RTU as standard across the product range.



Instant Power Savings

The graph below shows a comparison between the efficiency of various methods which can be used to control the airflow produced by a fan.



From the data, it can be clearly seen that using methods such as dampers to restrict the airflow is much less efficient than controlling the speed of the fan using an OptiPass.



NEMA 1



NEMA 12



NEMA 3R



Energy Savings Calculator

Estimate your potential energy savings, CO₂ emissions and financial savings
www.invertekdrives.com/calculator



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 TFT text display provides intuitive operation

Simple parameter structure with carefully selected default values reduce commissioning time

Electronic bypass eliminates downtime ensuring continuous fan and pump operation.

Key Features



OptiPass Vector Motor Control



Energy Optimised Design



Internal EMC Filter



Low Noise Operation



Improved Fan and Pump Efficiency

Unique OptiPass Vector Sensorless Control

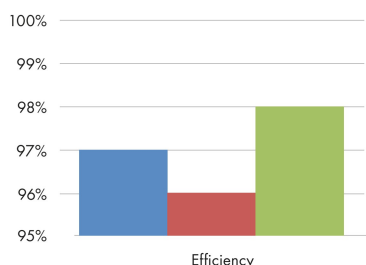
OptiPass uses advanced motor control, designed to provide the most energy efficient motor control possible.

OptiPass 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

OptiPass 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.

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 > 900kWh per year.



Typical efficiency comparison for OptiPass vs other AC variable speed drives

Standard AC Variable Speed Drive
AC Variable Speed Drive + 4% Line Choke
OptiPass

Reliable VFD and DOL Control

Take control of your environment



Building Comfort

Energy Efficient Air
Handling and Pump
Control

Electronic Bypass
Control

Creating comfortable building environments without high energy costs

Where do the energy savings come from?

Air conditioning and pump operation can use a significant 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 flow than you need!

Typically the air conditioning systems in buildings are designed for maximum occupancy, peak outside ambient, or full flow demand. 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.

OptiPass can vary the output of your pump or fan system to meet the varying demands throughout the day.

Airports
Colleges
Hospitals
Kitchens
Laboratories
Hotels
Schools
Conference Centres
Universities
Shopping Centres
Offices



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 OptiPass 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 Optipass and stairwell pressurisation system must increase output so that the required pressure is accurately maintained.

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. OptiPass is easily configured for bi-directional fire mode operation.

Fire Override



Fire override allows the building automation system (BAS) to either switch to DOL control of the motor or remain in VFD control. If VFD control is maintained in fire mode, the VFD ignores signals and alarms keeping the OptiPass operating 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 OptiPass can be easily configured to the signal produced by your fire management system.
- If the VFD controls the motor in fire mode, an independently set speed is selectable as either forward or reverse direction.
- 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.
- If the VFD controls the motor in fire mode, internal clocks and timers monitor operation in fire mode, giving clear information on usage
- Selectable DOL operation or VFD operation is achieved in parameterisation.

Drive Features

A compact and robust range of drives dedicated to HVAC and pumping applications

Internal EMC Filter

Compliant with global EMC Standards

Maintenance interval timer and service indication

Multi Language Text Display

TFT Display

Installed as standard on all models

- Clear multi-line text display
- Operates -10 to 40°C
- Wide viewing angle, effective in dark and light conditions
- Customisable display
- Multi-language selection
- Intuitive trip codes with text description
- Bypass mode indication

DOL Motor Overload LED

If the motor overheats and trips during DOL operation, an LED light indicates the condition.

Belt Break/Dry Pump Detection



OptiPass can provide immediate warning of broken belt or dry pump. 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.

OptiPass 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.

Electronic Bypass Control

In addition to manual bypass operation, activation of Bypass mode can be determined intelligently by the OptiPass 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.



Hand / Auto Keypad

External Programming Port

Bypass overload LED

Bypass on LED

Main Isolation Disconnect (Lockable)

3 Position Switch (3PS)
VFD-Off-Bypass

Hand / Auto

Allows manual VFD 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.

VFD - OFF - Bypass

Simple, reliable 3 position switch allows fast transistor from running the motor DOL or with the VFD.



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

Long Life Dual Ball Bearing Fans provide quiet operation in addition to extended fan life.

Noise Reduction through Speed Control

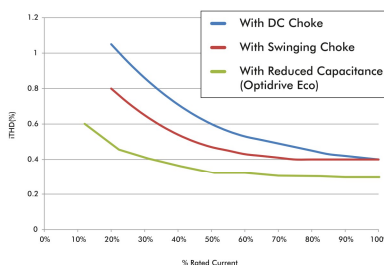
Optimising motor speed gives significant energy savings and reduces motor noise.

Reduced Harmonic Current Distortion

OptiPass uses innovative design to improve overall efficiency whilst minimising the harmonic distortion levels. All drives designed for 3 phase power supply operation¹ 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.

OptiPass product range complies with the requirements of EN61000-3-12.

Typical iTHD values at full and part load

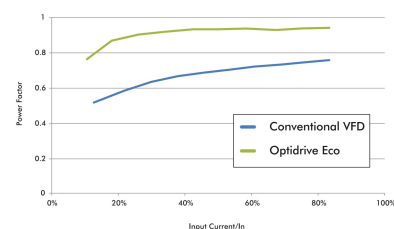


It can be clearly seen that the reduced DC link capacitance significantly reduces the total harmonic distortion at full load, and has a much greater benefit at part load compared to a conventional DC choke or swinging choke. This results in reduced overall input current and reduced transformer heating effect.

OptiPass 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 > 900kWh per year
- Improved True Power Factor – No additional charges etc.
- Lower Mains Supply Current

Power factor comparison



OptiPass offers improved power factor over conventional VFDs under all loads.

Options & Accessories

Peripherals to help integrate Optipass with your HVAC or pump systems



Optistick Smart



Rapid Commissioning Tool

- Allows copying, backup and restore of drive parameters
- Provides Bluetooth interface to a PC running OptiTools Studio or the OptiTools Mobile app on a smartphone

OPT-3-STICK-IN

PC Connection Kit



Direct connection from the PC USB port to the Optipass.

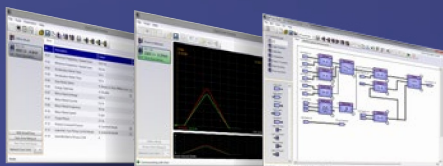
- To provide interface between PC and drive
- For use with OptiTools Studio PC software
- Provides electrical isolation between PC and drive network

OPT-2-USB485-OBUS

ASHRAE **BACnet**
MS/TP
built-in as standard



OptiTools Studio



Powerful PC Software

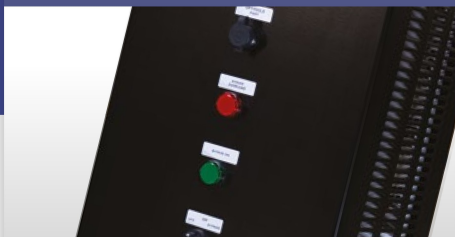
Drive commissioning and parameter backup

- 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 Vista
Windows 7
Windows 8
Windows 8.1
Windows 10

On Board Fieldbus Interfaces



BACnet/MS/TP
On board as standard



Modbus RTU
On board as standard



Optional 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
- Required for damper control

Input Voltage	kW	HP	Amps	Frame Size	Model Code	Cabinet	2 or 3	Input	Motor	Input	Output	Discon	SCCR	VFD P	Motor	Fieldbus	Bypass	Electr	Extern	Lightn	Climate			
200-240V 3Ø	0.75	1	4.3	1	BC	#	2	001	-	0	0	I	#	F	M	-	0	H	E	X	0	-	F	01
	1.5	2	7	1	BC	#	2	002	-	0	0	I	#	F	M	-	0	H	E	X	0	-	F	01
	2.2	3	10.5	1	BC	#	2	003	-	0	0	I	#	F	M	-	0	H	E	X	0	-	F	01
	4.0	5	18	1	BC	#	2	005	-	0	0	I	#	F	M	-	0	H	E	X	0	-	F	01
	5.5	7.5	24	1	BC	#	2	007	-	0	0	I	#	F	M	-	0	H	E	X	0	-	F	01
	7.5	10	30	2	BC	#	2	010	-	0	0	I	#	F	M	-	0	H	E	X	0	-	F	01
	11	15	46	2	BC	#	2	015	-	0	0	I	#	F	M	-	0	H	E	X	0	-	F	01
	15	20	61	2	BC	#	2	020	-	0	0	I	#	F	M	-	0	H	E	X	0	-	F	01
	18.5	25	65	2	BC	#	2	025	-	0	0	I	#	F	M	-	0	H	E	X	0	-	F	01
	22	30	90	3	BC	#	2	030	-	0	0	C	#	F	T	-	0	H	E	X	0	-	F	01
	30	40	110	3	BC	#	2	040	-	0	0	C	#	F	T	-	0	H	E	X	0	-	F	01
	37	50	150	3	BC	#	2	050	-	0	0	C	#	F	T	-	0	H	E	X	0	-	F	01
	45	60	180	4	BC	#	2	060	-	0	0	C	#	F	T	-	0	H	E	X	0	-	F	01
380-480V 3Ø	0.75	1	2.2	1	BC	#	4	001	-	0	0	I	#	F	M	-	0	H	E	X	0	-	F	01
	1.5	2	4.1	1	BC	#	4	002	-	0	0	I	#	F	M	-	0	H	E	X	0	-	F	01
	2.2	3	5.8	1	BC	#	4	003	-	0	0	I	#	F	M	-	0	H	E	X	0	-	F	01
	4.0	5	9.5	1	BC	#	4	005	-	0	0	I	#	F	M	-	0	H	E	X	0	-	F	01
	5.5	7.5	14	1	BC	#	4	007	-	0	0	I	#	F	M	-	0	H	E	X	0	-	F	01
	7.5	10	18	1	BC	#	4	010	-	0	0	I	#	F	M	-	0	H	E	X	0	-	F	01
	11	15	24	1	BC	#	4	015	-	0	0	I	#	F	M	-	0	H	E	X	0	-	F	01
	15	20	30	2	BC	#	4	020	-	0	0	I	#	F	M	-	0	H	E	X	0	-	F	01
	18.5	25	39	2	BC	#	4	025	-	0	0	I	#	F	M	-	0	H	E	X	0	-	F	01
	22	30	46	2	BC	#	4	030	-	0	0	I	#	F	M	-	0	H	E	X	0	-	F	01
	30	40	61	2	BC	#	4	040	-	0	0	I	#	F	M	-	0	H	E	X	0	-	F	01
	37	50	65	2	BC	#	4	050	-	0	0	I	#	F	M	-	0	H	E	X	0	-	F	01
	45	60	90	3	BC	#	4	060	-	0	0	C	#	F	T	-	0	H	E	X	0	-	F	01
	55	75	110	3	BC	#	4	075	-	0	0	C	#	F	T	-	0	H	E	X	0	-	F	01
	75	100	150	3	BC	#	4	100	-	0	0	C	#	F	T	-	0	H	E	X	0	-	F	01
	90	150	180	4	BC	#	4	150	-	0	0	C	#	F	T	-	0	H	E	X	0	-	F	01
	110	175	202	4	BC	#	4	175	-	0	0	C	#	F	T	-	0	H	E	X	0	-	F	01

Replace # in model code with colour-coded option:

Number of Contactors

- 2** 2 Contactor Type
- 3** 3 Contactor Type

Disconnect Type

- I** = Isolation Disconnect
- C** = Circuit Breaker Disconnect

SCCR Rating

- S** 200-240V 3Ø = 50 KAIC
380-480V 3Ø = 14KAIC
- 1** 100 KAIC

Motor Protection

- M** = Magnetic Motor Starter
- T** = Thermal Overload

Options*

Bypass up to 400 Hp/480V
Bypass up to 100 Hp/240V
*Consult your Invertek Dealer.

NOT TO SCALE

	Size	1	2	3	4
in	Height	46.3	70.7	60.6	72.0
in	Width	13.2	19.4	36.0	36.0
in	Depth	10.1	11.8	16.8	16.8
lb	Weight	118	272	446	606



Drive Specification

Input Ratings	Supply Voltage	200 – 240V ± 10% 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
	KAIC Ratings	200-240V 3Ø 50 KAIC 380-480V 3Ø 14 KAIC Optional 100 KAIC
	VFD Protection	Fuses
	Motor Protection	380-480V 1~50Hp Magnetic Motor Starter 60~175Hp Thermal Overload 200-240V 1~25Hp Magnetic Motor Starter 30~60Hp Thermal Overload


Output Ratings	Output Power	200-240V 3Ph Input 1-60Hp 380-480V 3Ph Input 1-175Hp Optional 200-240V up to 100Hp 380-480V up to 400Hp
	Overload Capacity	110% for 60 seconds 150% for 15 seconds
	Output Frequency	0 – 250Hz, 0.1Hz resolution
	Typical Efficiency	> 98%

Ambient Conditions	Temperature	Storage: -40 to 60°C (-40 to 140°F) Operating: -10 to 40°C (14 to 104°F)
	Altitude	Up to 1000m ASL without derating Up to 2000m maximum UL approved Up to 4000m maximum (non UL)
	Humidity	95% Max, non condensing
	Vibration	Conforms to EN61800-5-1 2007, IEC 60068-2-6

Enclosure	Ingress Protection	NEMA 1
	Ventilation	Fan w/ Thermostat

Programming	Keypad	Built-in keypad as standard
	Display	Built-in multi language TFT
	PC	OptiTools Studio (Requires optional OPT-2-USB485-OBUS PC Cable)
	Smart Phone	OptiTools Studio Mobile App (Requires optional OPT-3-STICK-IN)

Control Specification	Control Method	OptiPass Sensorless Vector
	PWM Frequency	4 – 32kHz Effective
	Stopping Mode	Ramp to stop: User Adjustable 0.1 – 600 secs Coast to stop
	Braking	AC Flux Braking
	Skip Frequency	Single point, user adjustable (up to 4 upon request)
	Setpoint Control	Analog Signal 0 to 10 Volts / 10 to 0 Volts -10 Volts to +10 Volts 0 to 20mA / 20 to 0mA 4 to 20mA / 20 to 4mA
		Digital Motorised Potentiometer (Keypad) Modbus RTU BACnet MS/TP


Fieldbus Connectivity	Built-in	BACnet MS/TP BTL Compliant 	BACnet Application Specific Controller 9.6 - 76.8 kbps selectable Data Format: 8N1, 8N2, 8O1, 8E1
		Modbus RTU	9.6 - 115.2 kbps selectable Data Format: 8N1, 8N2, 8O1, 8E1
		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

I/O Specification	Power Supply	24 Volt DC, 100mA, Short Circuit Protected 10 Volt DC, 10mA for Potentiometer
	Programmable Inputs	5 Total as standard (optional additional 3) 3 Digital (optional additional 3) 2 Analog / Digital selectable
	Digital Inputs	Opto - Isolated 8 – 30 Volt DC, internal or external supply Response time < 4ms
	Analog Inputs	Resolution: 12 bits Response time: < 4ms Accuracy: < 1% full scale Parameter adjustable scaling and offset
	PTC Input	Motor PTC / Thermistor Input Trip Level : 3kΩ
	Programmable Outputs	2 Total 1 Analog / Digital 1 Relay
	Relay Outputs	Maximum Voltage: 250 VAC, 30 VDC Switching Current Capacity: 5A
	Analog Outputs	0 to 10 Volts / 10 to 0 Volts 0 to 20mA / 20 to 0mA 4 to 20mA / 20 to 4mA

Application Features	Manual VFD/Bypass Switch	VFD-Off-Bypass Selector Switch
	Mains Disconnect	380-480V 1~50Hp Isolation Disconnect 60~175Hp Circuit Breaker Disconnect 200-240V1~25Hp Isolation Disconnect 30~60Hp Circuit Breaker Disconnect
	External Optitools Port	Externally accessible RJ45 allows programming and diagnosis using PC or Smartphone (Requires optional OPT-2-USB485-OBUS PC Cable or OPT-3-STICK-IN Bluetooth Stick)
	Keypad w/ Hand/Auto selection	Hand mode allows control for set-up using the keypad Auto mode allows operation via digital/analog inputs or fieldbus
	Bypass Overload LED	Red LED "on" when the MMS or Thermal overload have tripped while operating the motor DOL
	Bypass On LED	Green LED "on" when operating in bypass (Motor DOL)
	PID Control	Internal PID Controller Multi-setpoint Select Standby / Sleep Mode Boost Function
	Fire Mode	Bidirectional Selectable Speed Setpoint (Fixed / PID / Analog / Fieldbus)
	Load Monitoring	Over Torque Protection (Fan / Pump Blocked) Under Torque Protection (Broken Belt / Shaft) Pump Blockage Detection with Cleaning
	Damper Control (Optional)	Discharge air, Discharge+outside air Option requires Cascade Module+FB Program Consult factory for details
	Remote Bypass	Trigger bypass operation by digital input or fieldbus
	Electronic Bypass	Switch to DOL automatically upon VFD fault. Enable this function in VFD Parameters

Pump Control Features	Pump Blockage Detection	Pump load monitoring with autotune function, user configurable
	Pump Cleaning	Adjustable Bidirectional Pump Cleaning Cycle operation
	Pump Stir	Automatic pump stir to prevent sediment build-up
	Pump Prime	Pump priming with burst pipe detection
	Motor Preheat	Preheat the motor to prevent moisture and condensation build-up

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 Cooling Fan Run Time

Standards Compliance	Low Voltage Directive	2014/35/EU
	EMC Directive	2014/30/EU
	Additional Conformance	UL, cUL, EAC, RCM
	Harmonic Currents	IEC61000-3-12
	Environmental Conditions	Designed to meet IEC 60721-3-3, in operation: IP20 Drives: 3S2/3C2 IP55 & 66 Drives: 3S3/3C3
	Panel Assembly	Panels Marked cTULus. UL: 508A Issued: 2013/12/20 Ed: 2 Rev: 2014/01/13 Industrial Control Panels.
		 Intertek

Input Voltage	kW	HP	Amps	Frame Size	Model Code	Cabinet Bypass	2 or 3 Contactor	Input Voltage	Motor Horsepower	Input Reactor	Output Reactor	Disconnect Type	SCCR Rating	VFD Protection	Motor Protection	Fieldbus	Bypass Operators	Electronic Bypass	External Keypad	Lightning Arrestor	Climate Control	Enclosure Rating
200-240V 3Ø	0.75	1	4.3	1	BC	#	2	001	- 0 0	I	#	F	M	- 0	H	E	X	0	- V	12		
	1.5	2	7	1	BC	#	2	002	- 0 0	I	#	F	M	- 0	H	E	X	0	- V	12		
	2.2	3	10.5	1	BC	#	2	003	- 0 0	I	#	F	M	- 0	H	E	X	0	- V	12		
	4.0	5	18	1	BC	#	2	005	- 0 0	I	#	F	M	- 0	H	E	X	0	- V	12		
	5.5	7.5	24	1	BC	#	2	007	- 0 0	I	#	F	M	- 0	H	E	X	0	- V	12		
	7.5	10	30	2	BC	#	2	010	- 0 0	I	#	F	M	- 0	H	E	X	0	- V	12		
	11	15	46	2	BC	#	2	015	- 0 0	I	#	F	M	- 0	H	E	X	0	- V	12		
	15	20	61	2	BC	#	2	020	- 0 0	I	#	F	M	- 0	H	E	X	0	- V	12		
	18.5	25	65	2	BC	#	2	025	- 0 0	I	#	F	M	- 0	H	E	X	0	- V	12		
	22	30	90	3	BC	#	2	030	- 0 0	C	#	F	T	- 0	H	E	X	0	- V	12		
	30	40	110	3	BC	#	2	040	- 0 0	C	#	F	T	- 0	H	E	X	0	- V	12		
	37	50	150	3	BC	#	2	050	- 0 0	C	#	F	T	- 0	H	E	X	0	- V	12		
	45	60	180	4	BC	#	2	060	- 0 0	C	#	F	T	- 0	H	E	X	0	- V	12		
380-480V 3Ø	0.75	1	2.2	1	BC	#	4	001	- 0 0	I	#	F	M	- 0	H	E	X	0	- V	12		
	1.5	2	4.1	1	BC	#	4	002	- 0 0	I	#	F	M	- 0	H	E	X	0	- V	12		
	2.2	3	5.8	1	BC	#	4	003	- 0 0	I	#	F	M	- 0	H	E	X	0	- V	12		
	4.0	5	9.5	1	BC	#	4	005	- 0 0	I	#	F	M	- 0	H	E	X	0	- V	12		
	5.5	7.5	14	1	BC	#	4	007	- 0 0	I	#	F	M	- 0	H	E	X	0	- V	12		
	7.5	10	18	1	BC	#	4	010	- 0 0	I	#	F	M	- 0	H	E	X	0	- V	12		
	11	15	24	1	BC	#	4	015	- 0 0	I	#	F	M	- 0	H	E	X	0	- V	12		
	15	20	30	2	BC	#	4	020	- 0 0	I	#	F	M	- 0	H	E	X	0	- V	12		
	18.5	25	39	2	BC	#	4	025	- 0 0	I	#	F	M	- 0	H	E	X	0	- V	12		
	22	30	46	2	BC	#	4	030	- 0 0	I	#	F	M	- 0	H	E	X	0	- V	12		
	30	40	61	2	BC	#	4	040	- 0 0	I	#	F	M	- 0	H	E	X	0	- V	12		
	37	50	65	2	BC	#	4	050	- 0 0	I	#	F	M	- 0	H	E	X	0	- V	12		
	45	60	90	3	BC	#	4	060	- 0 0	C	#	F	T	- 0	H	E	X	0	- V	12		
	55	75	110	3	BC	#	4	075	- 0 0	C	#	F	T	- 0	H	E	X	0	- V	12		
	75	100	150	3	BC	#	4	100	- 0 0	C	#	F	T	- 0	H	E	X	0	- V	12		
	90	150	180	4	BC	#	4	150	- 0 0	C	#	F	T	- 0	H	E	X	0	- V	12		
	110	175	202	4	BC	#	4	175	- 0 0	C	#	F	T	- 0	H	E	X	0	- V	12		

Replace # in model code with colour-coded option:

Number of Contactors

- 2** 2 Contactor Type
- 3** 3 Contactor Type

Disconnect Type

- I** = Isolation Disconnect
- C** = Circuit Breaker Disconnect

SCCR Rating

- S** 200-240V 3Ø = 50 KAIC
380-480V 3Ø = 14KAIC
- 1** 100 KAIC

Motor Protection

- M** = Magnetic Motor Starter
- T** = Thermal Overload

Options*

Bypass up to 400 Hp/480V
Bypass up to 100 Hp/240V
*Consult your Invertek Dealer.

NOT TO SCALE

	Size	1	2	3	4
in	Height	43.9	68.2	60.0	72.0
in	Width	13.2	19.4	36.0	36.0
in	Depth	13.8	16.8	16.8	16.8
lb	Weight	151	304	446	606



Drive Specification

Input Ratings	Supply Voltage	200 – 240V ± 10% 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
	KAIC Ratings	200-240V 3Ø 50 KAIC 380-480V 3Ø 14 KAIC Optional 100 KAIC
	VFD Protection	Fuses
	Motor Protection	380-480V 1~50Hp Magnetic Motor Starter 60~175Hp Thermal Overload 200-240V 1~25Hp Magnetic Motor Starter 30~60Hp Thermal Overload


Output Ratings	Output Power	200-240V 3Ph Input 1-60Hp 380-480V 3Ph Input 1-175Hp Optional 200-240V up to 100Hp 380-480V up to 400Hp
	Overload Capacity	110% for 60 seconds 150% for 15 seconds
	Output Frequency	0 – 250Hz, 0.1Hz resolution
	Typical Efficiency	> 98%

Ambient Conditions	Temperature	Storage: -40 to 60°C (-40 to 140°F) Operating: -10 to 40°C (14 to 104°F)
	Altitude	Up to 1000m ASL without derating Up to 2000m maximum UL approved Up to 4000m maximum (non UL)
	Humidity	95% Max, non condensing
	Vibration	Conforms to EN61800-5-1 2007, IEC 60068-2-6

Enclosure	Ingress Protection	NEMA 12
	Ventilation	Fan w/ Thermostat

Programming	Keypad	Built-in keypad as standard
	Display	Built-in multi language TFT
	PC	OptiTools Studio (Requires optional OPT-2-USB485-OBUS PC Cable)
	Smart Phone	OptiTools Studio Mobile App (Requires optional OPT-3-STICK-IN)

Control Specification	Control Method	OptiPass Sensorless Vector
	PWM Frequency	4 – 32kHz Effective
	Stopping Mode	Ramp to stop: User Adjustable 0.1 – 600 secs Coast to stop
	Braking	AC Flux Braking
	Skip Frequency	Single point, user adjustable (up to 4 upon request)
	Setpoint Control	Analog Signal 0 to 10 Volts / 10 to 0 Volts -10 Volts to +10 Volts 0 to 20mA / 20 to 0mA 4 to 20mA / 20 to 4mA
		Digital Motorised Potentiometer (Keypad) Modbus RTU BACnet MS/TP


Fieldbus Connectivity	Built-in	BACnet MS/TP BTL Compliant 	BACnet Application Specific Controller 9.6 - 76.8 kbps selectable Data Format: 8N1, 8N2, 8O1, 8E1
		Modbus RTU	9.6 - 115.2 kbps selectable Data Format: 8N1, 8N2, 8O1, 8E1
		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

I/O Specification	Power Supply	24 Volt DC, 100mA, Short Circuit Protected 10 Volt DC, 10mA for Potentiometer
	Programmable Inputs	5 Total as standard (optional additional 3) 3 Digital (optional additional 3) 2 Analog / Digital selectable
	Digital Inputs	Opto - Isolated 8 – 30 Volt DC, internal or external supply Response time < 4ms
	Analog Inputs	Resolution: 12 bits Response time: < 4ms Accuracy: < 1% full scale Parameter adjustable scaling and offset
	PTC Input	Motor PTC / Thermistor Input Trip Level : 3kΩ
	Programmable Outputs	2 Total 1 Analog / Digital 1 Relay
	Relay Outputs	Maximum Voltage: 250 VAC, 30 VDC Switching Current Capacity: 5A
	Analog Outputs	0 to 10 Volts / 10 to 0 Volts 0 to 20mA / 20 to 0mA 4 to 20mA / 20 to 4mA

Application Features	Manual VFD/Bypass Switch	VFD-Off-Bypass Selector Switch
	Mains Disconnect	380-480V 1~50Hp Isolation Disconnect 60~175Hp Circuit Breaker Disconnect 200-240V1~25Hp Isolation Disconnect 30~60Hp Circuit Breaker Disconnect
	External Optitools Port	Externally accessible RJ45 allows programming and diagnosis using PC or Smartphone (Requires optional OPT-2-USB485-OBUS PC Cable or OPT-3-STICK-IN Bluetooth Stick)
	Keypad w/ Hand/Auto selection	Hand mode allows control for set-up using the keypad Auto mode allows operation via digital/analog inputs or fieldbus
	Bypass Overload LED	Red LED "on" when the MMS or Thermal overload have tripped while operating the motor DOL
	Bypass On LED	Green LED "on" when operating in bypass (Motor DOL)
	PID Control	Internal PID Controller Multi-setpoint Select Standby / Sleep Mode Boost Function
	Fire Mode	Bidirectional Selectable Speed Setpoint (Fixed / PID / Analog / Fieldbus)
	Load Monitoring	Over Torque Protection (Fan / Pump Blocked) Under Torque Protection (Broken Belt / Shaft) Pump Blockage Detection with Cleaning
	Damper Control (Optional)	Discharge air, Discharge+outside air Option requires Cascade Module+FB Program Consult factory for details
	Remote Bypass	Trigger bypass operation by digital input or fieldbus
	Electronic Bypass	Switch to DOL automatically upon VFD fault. Enable this function in VFD Parameters

Pump Control Features	Pump Blockage Detection	Pump load monitoring with autotune function, user configurable
	Pump Cleaning	Adjustable Bidirectional Pump Cleaning Cycle operation
	Pump Stir	Automatic pump stir to prevent sediment build-up
	Pump Prime	Pump priming with burst pipe detection
	Motor Preheat	Preheat the motor to prevent moisture and condensation build-up

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 Cooling Fan Run Time

Standards Compliance	Low Voltage Directive	2014/35/EU
	EMC Directive	2014/30/EU
	Additional Conformance	UL, cUL, EAC, RCM
	Harmonic Currents	IEC61000-3-12
	Environmental Conditions	Designed to meet IEC 60721-3-3, in operation: IP20 Drives: 3S2/3C2 IP55 & 66 Drives: 3S3/3C3
	Panel Assembly	Panels Marked cTULus. UL: 508A Issued: 2013/12/20 Ed: 2 Rev: 2014/01/13 Industrial Control Panels.
		 Intertek

Input Voltage	kW	HP	Amps	Frame Size	Model Code	Cabinet	2 or 3	Input Voltage	Motor	Input Reactor	Output Reactor	Disconnect	SCCR	VFD Protection	Motor	Fieldbus	Bypass	Electronic	External	Lightning	Climate
200-240V 3Ø	0.75	1	4.3	1	BC	#	2	001	- 0 0	I	#	F	M	- 0 H	E	X	#	- B	3R		
	1.5	2	7	1		#	2	002	- 0 0	I	#	F	M	- 0 H	E	X	#	- B	3R		
	2.2	3	10.5	1		#	2	003	- 0 0	I	#	F	M	- 0 H	E	X	#	- B	3R		
	4.0	5	18	1		#	2	005	- 0 0	I	#	F	M	- 0 H	E	X	#	- B	3R		
	5.5	7.5	24	1		#	2	007	- 0 0	I	#	F	M	- 0 H	E	X	#	- B	3R		
	7.5	10	30	2		#	2	010	- 0 0	I	#	F	M	- 0 H	E	X	#	- B	3R		
	11	15	46	2		#	2	015	- 0 0	I	#	F	M	- 0 H	E	X	#	- B	3R		
	15	20	61	2		#	2	020	- 0 0	I	#	F	M	- 0 H	E	X	#	- B	3R		
	18.5	25	65	2		#	2	025	- 0 0	I	#	F	M	- 0 H	E	X	#	- B	3R		
	22	30	90	3		#	2	030	- 0 0	C	#	F	T	- 0 H	E	X	#	- B	3R		
	30	40	110	3		#	2	040	- 0 0	C	#	F	T	- 0 H	E	X	#	- B	3R		
	37	50	150	3		#	2	050	- 0 0	C	#	F	T	- 0 H	E	X	#	- B	3R		
	45	60	180	4		#	2	060	- 0 0	C	#	F	T	- 0 H	E	X	#	- B	3R		
	380-480V 3Ø	0.75	1	2.2		1	BC	#	4	001	- 0 0	I	#	F	M	- 0 H	E	X	#	- B	3R
1.5		2	4.1	1	#	4		002	- 0 0	I	#	F	M	- 0 H	E	X	#	- B	3R		
2.2		3	5.8	1	#	4		003	- 0 0	I	#	F	M	- 0 H	E	X	#	- B	3R		
4.0		5	9.5	1	#	4		005	- 0 0	I	#	F	M	- 0 H	E	X	#	- B	3R		
5.5		7.5	14	1	#	4		007	- 0 0	I	#	F	M	- 0 H	E	X	#	- B	3R		
7.5		10	18	1	#	4		010	- 0 0	I	#	F	M	- 0 H	E	X	#	- B	3R		
11		15	24	1	#	4		015	- 0 0	I	#	F	M	- 0 H	E	X	#	- B	3R		
15		20	30	2	#	4		020	- 0 0	I	#	F	M	- 0 H	E	X	#	- B	3R		
18.5		25	39	2	#	4		025	- 0 0	I	#	F	M	- 0 H	E	X	#	- B	3R		
22		30	46	2	#	4		030	- 0 0	I	#	F	M	- 0 H	E	X	#	- B	3R		
30		40	61	2	#	4		040	- 0 0	I	#	F	M	- 0 H	E	X	#	- B	3R		
37		50	65	2	#	4		050	- 0 0	I	#	F	M	- 0 H	E	X	#	- B	3R		
45		60	90	3	#	4		060	- 0 0	C	#	F	T	- 0 H	E	X	#	- B	3R		
55		75	110	3	#	4		075	- 0 0	C	#	F	T	- 0 H	E	X	#	- B	3R		
75		100	150	3	#	4		100	- 0 0	C	#	F	T	- 0 H	E	X	#	- B	3R		
90		150	180	4	#	4		150	- 0 0	C	#	F	T	- 0 H	E	X	#	- B	3R		
110		175	202	4	#	4		175	- 0 0	C	#	F	T	- 0 H	E	X	#	- B	3R		

Replace # in model code with colour-coded option:

Number of Contactors

- 2** 2 Contactor Type
3 3 Contactor Type

Disconnect Type

- I** = Isolation Disconnect
C = Circuit Breaker Disconnect

SCCR Rating

- S** 200-240V 3Ø = 50 KAIC
 380-480V 3Ø = 14KAIC
1 100 KAIC

Motor Protection

- M** = Magnetic Motor Starter
T = Thermal Overload

Lightning Arrestor

- 0** No Lightning Arrestor
L With Lightning Arrestor

Options*

NEMA4X Designs

Bypass up to 400 Hp/480V

Bypass up to 100 Hp/240V

*Consult your Invertek Dealer.

NOT TO SCALE



Size	1	2	3	4	5	6
in Height	30	30	36.0	42	72.0	84.1
in Width	20	24	30.0	30	36.0	60.0
in Depth	10.8	12.8	12.8	16.8	16.8	19.9
lb Weight	101	151	214	279	554	1024

Drive Specification

Input Ratings	Supply Voltage	200 – 240V ± 10% 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
	KAIC Ratings	200-240V 3Ø 50 KAIC 380-480V 3Ø 14 KAIC Optional 100 KAIC
	VFD Protection	Fuses
	Motor Protection	380-480V 1-50Hp Magnetic Motor Starter 60-175Hp Thermal Overload 200-240V 1-25Hp Magnetic Motor Starter 30-60Hp Thermal Overload
Output Ratings	Output Power	200-240V 3Ph Input 1-60Hp 380-480V 3Ph Input 1-175Hp Optional 200-240V up to 100Hp 380-480V up to 400Hp
	Overload Capacity	110% for 60 seconds 150% for 15 seconds
	Output Frequency	0 – 250Hz, 0.1Hz resolution
	Typical Efficiency	> 98%
Ambient Conditions	Temperature	Storage: -40 to 60°C (-40 to 140°F) Interior Panel: -10 to 50°C (14 to 122°F)* Exterior Panel: -40 to 40°C (-40 to 104°F)
	Low Ambient Operation	*If starting a panel at a temperature below -10°C (14°F) please allow time for the panel heater to raise the interior panel temp above -10°C (14°F) before enabling the VFD.
	Altitude	Up to 1000m ASL without derating Up to 2000m maximum UL approved Up to 4000m maximum (non UL)
	Humidity	95% Max, non condensing
	Vibration	Conforms to EN61800-5-1 2007, IEC 60068-2-6
Enclosure	Ingress Protection	NEMA 3R
	Ventilation/Heat	Filter Fan w/ Thermostat and Heater w/ Thermostat
	Optional	Lightning Arrestor/Surge Suppressor NEMA4 or NEMA4X
Programming	Keypad	Built-in keypad as standard
	Display	Built-in multi language TFT
	PC	OptiTools Studio (Requires optional OPT-2-USB485-OBUS PC Cable)
	Smart Phone	OptiTools Studio Mobile App (Requires optional OPT-3-STICK-IN)
Control Specification	Control Method	OptiPass Sensorless Vector
	PWM Frequency	4 – 32kHz Effective
	Stopping Mode	Ramp to stop: User Adjustable 0.1 – 600 secs Coast to stop
	Braking	AC Flux Braking
Fieldbus Connectivity	Skip Frequency	Single point, user adjustable (up to 4 upon request)
	Setpoint Control	Analog Signal 0 to 10 Volts / 10 to 0 Volts -10 Volts to +10 Volts 0 to 20mA / 20 to 0mA 4 to 20mA / 20 to 4mA Digital Motorised Potentiometer (Keypad) Modbus RTU BACnet MS/TP
	Built-in	BACnet MS/TP BACnet Application Specific Controller BTL Compliant 9.6 - 76.8 kbps selectable Data Format: 8N1, 8N2, 8O1, 8E1 Modbus RTU 9.6 - 115.2 kbps selectable Data Format: 8N1, 8N2, 8O1, 8E1
	Optional	Plug-in BACnet/IP interface Dual LAN ports Device Level Ring PROFIBUS DP (DPV1) PROFINET IO DeviceNet EtherNet/IP EtherCAT Modbus TCP
I/O Specification	Power Supply	24 Volt DC, 100mA, Short Circuit Protected 10 Volt DC, 10mA for Potentiometer
	Programmable Inputs	5 Total as standard (optional additional 3) 3 Digital (optional additional 3) 2 Analog / Digital selectable
	Digital Inputs	Opto - Isolated 8 – 30 Volt DC, internal or external supply Response time < 4ms
	Analog Inputs	Resolution: 12 bits Response time: < 4ms Accuracy: < 1% full scale Parameter adjustable scaling and offset
	PTC Input	Motor PTC / Thermistor Input Trip Level: 3kΩ
	Programmable Outputs	2 Total 1 Analog / Digital 1 Relay
	Relay Outputs	Maximum Voltage: 250 VAC, 30 VDC Switching Current Capacity: 5A
	Analog Outputs	0 to 10 Volts / 10 to 0 Volts 0 to 20mA / 20 to 0mA 4 to 20mA / 20 to 4mA
Application Features	Manual VFD/Bypass Switch	VFD-Off-Bypass Selector Switch
	Mains Disconnect	380-480V 1-50Hp Isolation Disconnect 60-175Hp Circuit Breaker Disconnect 200-240V 1-25Hp Isolation Disconnect 30-60Hp Circuit Breaker Disconnect
	External Optitools Port	Externally accessible RJ45 allows programming and diagnosis using PC or Smartphone (Requires optional OPT-2-USB485-OBUS PC Cable or OPT-3-STICK-IN Bluetooth Stick)
	Keypad w/ Hand/Auto selection	Hand mode allows control for setup using the keypad Auto mode allows operation via digital/analog inputs or fieldbus
	Bypass Overload LED	Red LED "on" when the MMS or Thermal overload have tripped while operating the motor DOL
	Bypass On LED	Green LED "on" when operating in bypass (Motor DOL)
	PID Control	Internal PID Controller Multi-setpoint Select Standby / Sleep Mode Boost Function
	Fire Mode	Bidirectional Selectable Speed Setpoint (Fixed / PID / Analog / Fieldbus)
	Load Monitoring	Over Torque Protection (Fan / Pump Blocked) Under Torque Protection (Broken Belt / Shaft) Pump Blockage Detection with Cleaning
	Damper Control (Optional)	Discharge air, Discharge+outside air Option requires Cascade Module+FB Program Consult factory for details
Pump Control Features	Remote Bypass	Trigger bypass operation by digital input or fieldbus
	Electronic Bypass	Switch to DOL automatically upon VFD fault. Enable this function in VFD Parameters
	Pump Blockage Detection	Pump load monitoring with autotune function, user configurable
	Pump Cleaning	Adjustable Bi-directional Pump Cleaning Cycle operation
	Pump Stir	Automatic pump stir to prevent sediment build-up
	Pump Prime	Pump priming with burst pipe detection
Maintenance & Diagnostics	Motor Preheat	Preheat the motor to prevent moisture and condensation build-up
	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
Standards Compliance	Monitoring	Hours Run Meter Resettable & Non-Resettable kWh meters Cooling Fan Run Time
	Low Voltage Directive	2014/35/EU
	EMC Directive	2014/30/EU
	Additional Conformance	UL, cUL, EAC, RCM
	Harmonic Currents	IEC61000-3-12
	Environmental Conditions	Designed to meet IEC 60721-3-3, in operation: IP20 Drives: 3S2/3C2 IP55 & 66 Drives: 3S3/3C3
	Panel Assembly	Panels Marked cETLus. UL: 508A Issued: 2013/12/20 Ed: 2 Rev: 2014/01/13 Industrial Control Panels.
		