



**HAYWARD®**

ISHCPVFD Rev A

# AC Variable Frequency Drive

Hayward Commercial Aquatics

## Owner's Manual



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Certified to NSF/ANSI Standard 50

### 208 - 230 Volt Single-Phase Drives

- HCPVFD2201051P
- HCPVFD2201051P
- HCPVFD3201531P
- HCPVFD4204603P

### 208 - 230 Volt Three-Phase Drive

- HCPVFD2201053P
- HCPVFD2201053P
- HCPVFD3201803P
- HCPVFD3202403P
- HCPVFD4203003P
- HCPVFD4204603P
- HCPVFD4204603P

### 460 Volt Three-Phase Drives

- HCPVFD1400413P
- HCPVFD2400583P
- HCPVFD2400953P
- HCPVFD3401403P
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- HCPVFD3402403P
- HCPVFD4403003P
- HCPVFD4403903P
- HCPVFD4404603P

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## IMPORTANT SAFETY INSTRUCTIONS

When using this electrical equipment, basic safety precautions should always be followed, including the following:

### READ AND FOLLOW ALL INSTRUCTIONS

**WARNING:** Follow all applicable electrical codes.

**WARNING:** Turn off power at main source before making any electrical connections or servicing the unit.

**WARNING:** To reduce the risk of electric shock, injury or death disconnect unit from power supply.

**WARNING:** Follow the instructions or risk of serious injury or death could occur!



**WARNING** - Read and follow all instructions in this owner's manual and on the equipment. Failure to follow instructions can cause severe injury and/or death.



**WARNING – Suction Entrapment Hazard** Suction in suction outlets and/or suction outlet covers which are, damaged, broken, cracked, missing, or unsecured can cause severe injury and/or death due to the following entrapment hazards:



**Hair Entrapment-** Hair can become entangled in suction outlet cover.



**Limb Entrapment-** A limb inserted into an opening of a suction outlet sump or suction outlet cover that is damaged, broken, cracked, missing, or not securely attached can result in a mechanical bind or swelling of the limb.

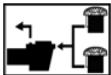


**Body Suction Entrapment-** A negative pressure applied to a large portion of the body or limbs can result in an entrapment.



**Evisceration/ Disembowelment** - A negative pressure applied directly to the intestines through an unprotected suction outlet sump or suction outlet cover which is, damaged, broken, cracked, missing, or unsecured can result in evisceration/ disembowelment.

**Mechanical Entrapment-** There is potential for jewelry, swimsuit, hair decorations, finger, toe or knuckle to be caught in an opening of a suction outlet cover resulting in mechanical entrapment.



**WARNING - To Reduce the risk of Entrapment Hazards:**

- When outlets are small enough to be blocked by a person, a minimum of two functioning suction outlets per pump must be installed. Suction outlets in the same plane (i.e. floor or wall), must be installed a minimum of three feet (3') [1 meter] apart, as measured from near point to near point.
- Dual suction fittings shall be placed in such locations and distances to avoid "dual blockage" by a user.
- Dual suction fittings shall not be located on seating areas or on the backrest for such seating areas.
- Never use Pool or Spa if any suction outlet component is damaged, broken, cracked, missing, or not securely attached.
- Replace damaged, broken, cracked, missing, or not securely attached suction outlet components immediately.
- Two or more suction outlets per pump installed in accordance with latest ASME, APSP Standards and CPSC guidelines, follow all National, State, and Local codes applicable.
- Installation of a vacuum release or vent system, which relieves entrapping suction, is recommended.

**WARNING** – Failure to remove pressure test plugs and/or plugs used in winterization of the pool/spa from the suction outlets can result in an increase potential for suction entrapment as described above.

**WARNING** – Failure to keep suction outlet components clear of debris, such as leaves, dirt, hair, paper and other material can result in an increase potential for suction entrapment as described above.



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**WARNING** – Suction outlet components have a finite life, the cover/grate should be inspected frequently and replaced at least every ten years or if found to be damaged, broken, cracked, missing, or not securely attached.

**CAUTION** – Components such as the filtration system, pumps and heater must be positioned so as to prevent their being used as means of access to the pool by young children. To reduce risk of injury, do not permit children to use or climb on this product. Closely supervise children at all times. Components such as the filtration system, pumps, and heaters must be positioned to prevent children from using them as a means of access to the pool.



**WARNING – Hazardous Pressure** Pool and spa water circulation systems operate under hazardous pressure during start up, normal operation, and after pump shut off. Stand clear of circulation system equipment during pump start up. Failure to follow safety and operation instructions could result in violent separation of the pump housing and cover, and/or filter housing and clamp due to pressure in the system, which could cause property damage, severe personal injury, or death. Before servicing pool and spa water circulation system, all system and pump controls must be in off position and filter manual air relief valve must be in open position. Before starting system pump, all system valves must be set in a position to allow system water to return back to the pool. Do not change filter control valve position while system pump is running. Before starting system pump, fully open filter manual air relief valve. Do not close filter manual air relief valve until a steady stream of water (not air or air and water) is discharged.



**WARNING – Separation Hazard** Failure to follow safety and operation instructions could result in violent separation of pump and/or filter components. Strainer cover must be properly secured to pump housing with strainer cover lock ring. Before servicing pool and spa circulation system, filters manual air relief valve must be in open position. Do not operate pool and spa circulation system if a system component is not assembled properly, damaged, or missing. Do not operate pool and spa circulation system unless filter manual air relief valve body is in locked position in filter upper body. Never operate or test the circulation system at more than 50 PSI. Do not purge the system with compressed air. Purging the system with compressed air can cause components to explode, with risk of severe injury or death to anyone nearby. Use only a low pressure (below 5 PSI), high volume blower when air purging the pump, filter, or piping.



**WARNING – Risk of Electric Shock** All electrical wiring MUST be in conformance with applicable local codes, regulations, and the National Electric Code (NEC). Hazardous voltage can shock, burn, and cause death or serious property damage. To reduce the risk of electric shock, do NOT use an extension cord to connect unit to electric supply. Provide a properly located electrical receptacle. Before working on any electrical equipment, turn off power supply to the equipment. To reduce the risk of electric shock replace damaged wiring immediately. Locate conduit to prevent abuse from lawn mowers, hedge trimmers and other equipment. Do NOT ground to a gas supply line.

**WARNING – Risk of Electric Shock** Failure to ground all electrical equipment can cause serious or fatal electrical shock hazard. Electrical ground all electrical equipment before connecting to electrical power supply.

**WARNING – Risk of Electric Shock** Failure to bond all electrical equipment to pool structure will increase risk for electrocution and could result in injury or death. To reduce the risk of electric shock, see installation instructions and consult a professional electrician on how to bond all electrical equipment. Also, contact a licensed electrician for information on local electrical codes for bonding requirements.

**Notes to electrician:** Use a solid copper conductor, size 8 or larger. Run a continuous wire from external bonding lug to reinforcing rod or mesh. Connect a No. 8 AWG (8.4 mm<sup>2</sup>) [No. 6 AWG (13.3 mm<sup>2</sup>) for Canada] solid copper bonding wire to the pressure wire connector provided on the electrical equipment and to all metal parts of swimming pool, spa, or hot tub, and metal piping (except gas piping), and conduit within 5 ft. (1.5 m) of inside walls of swimming pool, spa, or hot tub.

**IMPORTANT** - Reference NEC codes for all wiring standards including, but not limited to, grounding, bonding and other general wiring procedures.



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**WARNING – Risk of Electric Shock** The electrical equipment must be connected only to a supply circuit that is protected by a ground-fault circuit-interrupter (GFCI). Such a GFCI should be provided by the installer and should be tested on a routine basis. To test the GFCI, push the test button. The GFCI should interrupt power. Push reset button. Power should be restored. If the GFCI fails to operate in this manner, the GFCI is defective. If the GFCI interrupts power to the electrical equipment without the test button being pushed, a ground current is flowing, indicating the possibility of an electrical shock. Do not use this electrical equipment. Disconnect the electrical equipment and have the problem corrected by a qualified service representative before using.

**CAUTION – HAYWARD® pumps are intended for use with permanently-installed pools and may be used with hot tubs and spas if so marked. Do not use with storable pools. A permanently-installed pool is constructed in or on the ground or in a building such that it cannot be readily disassembled for storage. A storable pool is constructed so that it is capable of being readily disassembled for storage and reassembled to its original integrity.**

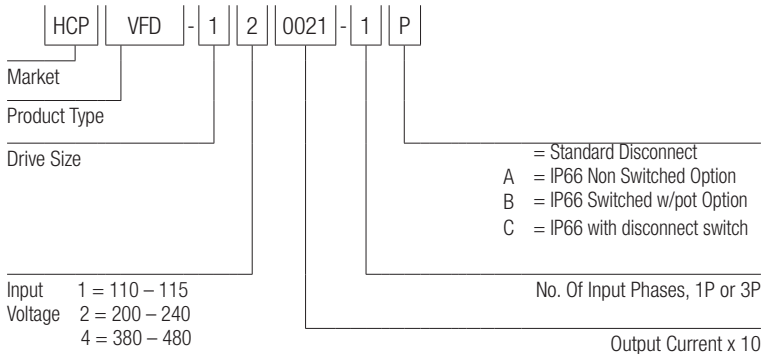
## SAVE THESE INSTRUCTIONS

# Before you Begin

Before installing the new Variable Frequency Drive (VFD), check that you've received the correct drive and that the motor type and specs are suitable for your installation.

## Identifying the Drive by Model Number

Each drive can be identified by its model number, as shown below.





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## Installation

### Mounting Location

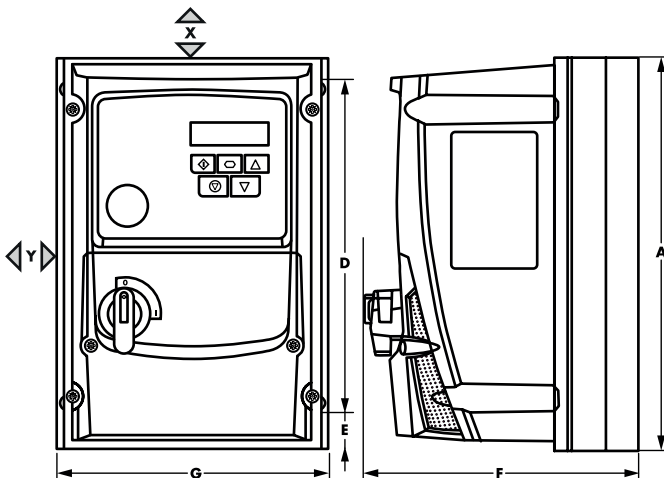
When preparing the mounting location, consider the following:

- The drive must be mounted in a vertical position only.
- Installation should be on a suitable flat, flame resistant surface, away from flammable material.
- Refer to Technical Data and ensure the chosen mounting location is within the drive specification.
- The mounting location should be free from vibration.
- Do not mount the drive in any area with excessive humidity, corrosive airborne chemicals or potentially dangerous dust particles.
- Avoid mounting close to high heat sources.
- The drive must not be mounted in direct sunlight. If necessary, install a suitable shade cover.
- The mounting location must be free from frost.
- Do not restrict the flow of air through the drive heatsink. The drive generates heat which must be naturally allowed to dissipate. Correct air clearance around the drive must be observed.
- If the location is subject to wide ambient temperature and air pressure variation, install a suitable pressure compensation valve in the drive gland plate.

NOTE If the drive has been in storage for a period longer than 2 years, the DC link capacitors must be reformed. Refer to online documentation for further information.

### Specifications

Refer to the diagram below and the table on page 5 for dimensions of the VFD. Refer to your model number for the Drive Size (page 3).





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## Dimensions

Drive Size	A		D		E		F		G	
	mm	in	mm	in	mm	in	mm	in	mm	in
1	232.0	9.13	189.0	7.44	25.0	0.98	179.0	7.05	161.0	6.34
2	257.0	10.12	200.0	7.87	28.5	1.12	187.0	7.36	188.0	7.40
3	310.0	12.20	251.5	9.90	33.4	1.31	252	9.92	211.0	8.30
4	360	14.2					275	10.8	240	9.5

## Weight

Drive Size	Weight	
	kg	lb
1	3.1	6.8
2	4.1	9.0
3	7.6	16.7
4	10.7	23.5

## Carton

Drive Size	Weight		Size	
	kg	lb	mm/in	
1	4	9	345x205x205mm	13.5x8x8in
2	5.5	12	370x230x216mm	14.5x9x8.5in
3	9.1	20	460x305x270mm	18x12x10.5in
4	12.3	27	560x345x280mm	22x13.5x11in

## Mounting Clearance

Drive Size	X Above & Below		Y Either Side	
	mm	in	mm	in
All	200	7.87	10	0.39

## Mounting Bolts and Tightening Torque

Mounting Bolts		Tightening Torques		
Frame Size		Frame Size	Control Terminals	Power Terminals
1 - 3	4 x M5 (#10)	1 - 3	0.5 Nm (4.5 lb-in)	1 Nm (9 lb-in)
4	4 x M8 (5/16")	4	0.5 Nm (4.5 lb-in)	2 Nm (18 lb-in)

## Wiring

A fixed installation is required according to IEC61800-5-1 with a suitable disconnecting device installed between the drive and the AC Power Source. The disconnecting device must conform to the local safety code / regulations (e.g. within Europe, EN60204-1, Safety of machinery).

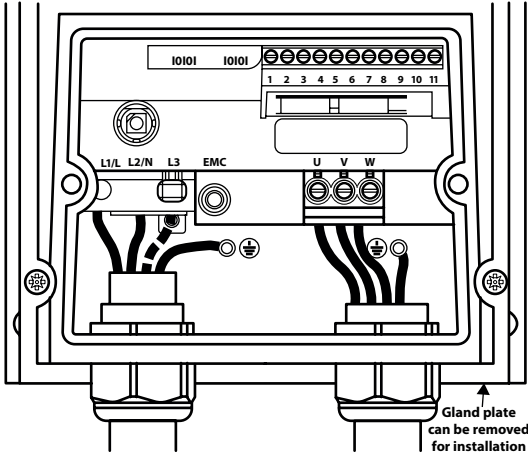
For compliance with CE and C Tick EMC requirements, refer to online documentation.



## Cable Selection

The power input cables should be dimensioned according to any local codes or regulations. Maximum dimensions are given in the Rating Tables section of this manual.

- For 1 phase supply, the mains power cables should be connected to L1/L, L2/N.
- For 3 phase supplies, the mains power cables should be connected to L1, L2, and L3. Phase sequence is not important.



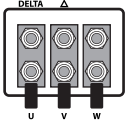
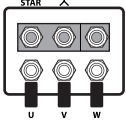
Drive Size	Cable Gland Sizes		
	Power Cable	Motor Cable	Control Cables
1	M20 (PG13.5)	M20 (PG13.5)	M20 (PG13.5)
2	M25 (PG21)	M25 (PG21)	M20 (PG13.5)
3	M25 (PG21)	M25 (PG21)	M20 (PG13.5)
4			
NOTE	Typical drive heat losses are approximately 3% of operating load conditions. Above are guidelines only and the operating ambient temperature of the drive MUST be maintained at all times.		

NOTE: The motor cable length should not exceed 300 feet (100 meters). If longer cable lengths are necessary, please contact Hayward for additional installation requirements.



## Motor Terminal Box Connections

Most general purpose motors are wound for operation on dual voltage supplies. This is indicated on the nameplate of the motor. This operational voltage is normally selected when installing the motor by selecting either STAR or DELTA connection. STAR always gives the higher of the two voltage ratings.

Incoming Supply Voltage	Motor Nameplate Voltages	Connection	
230	230 / 400	Delta	
400	400 / 690		
400	230 / 400	Star	

## Information for UL Compliance

The drive is designed to meet the UL requirements. For an up to date list of UL compliant products, please refer to UL listing NMMS.E226333. Reference numbers are on the drive label. In order to ensure full compliance, the following must be fully observed.

Hayward Part Number	UL Listing	Hayward Part Number	UL Listing
HCPVFD1400413P	E3-140041-301C	HCPVFD2201053P	E3-220105-304C
HCPVFD2400583P	E3-240058-304C	HCPVFD3201803P	E3-320180-304C
HCPVFD2400953P	E3-240095-304C	HCPVFD3202403P	E3-320240-304C
HCPVFD3401403P	E3-340140-304C	HCPVFD4203003P	E3-420300-304C
HCPVFD3401403P	E3-340140-304C	HCPVFD4204603P	E3-420460-304C
HCPVFD3401803P	E3-340180-304C	HCPVFD4204603P	E3-420460-304C
HCPVFD3402403P	E3-340240-304C	HCPVFD2201051P	E3-220105-104C
HCPVFD4403003P	E3-440300-304C	HCPVFD2201051P	E3-220105-104C
HCPVFD4403903P	E3-440390-304C	HCPVFD3201531P	E3-320153-104C
HCPVFD4404603P	E3-440460-304C	HCPVFD4204603P	E3-420460-304C
HCPVFD2201053P	E3-220105-304C		

### Input Power Supply Requirements

Supply Voltage	200 – 240 RMS Volts for 230 Volt rated units, + /- 10% variation allowed. 240 Volt RMS Maximum. 380 – 480 Volts for 400 Volt rated units, + / - 10% variation allowed, Maximum 500 Volts RMS.
Frequency	50 – 60Hz + / - 5% Variation
Short Circuit Capacity	All drives are suitable for use on a circuit capable of delivering not more than 100kA maximum short-circuit Amperes symmetrical with the specified maximum supply voltage when protected by Class J fuses.

### Mechanical Installation Requirements

All drive units are intended for installation within controlled environments which meet the condition limits shown in the Environment section of this manual.





The drive can be operated within an ambient temperature range as stated in the Environment section of this Quick Start Guide.
For IP66 (Nema 4X) units, installation in a pollution degree 2 environment is permissible.
<b>Electrical Installation Requirements</b>
Incoming power supply connection must be according to the Incoming Power Connection section of this Quick Start Guide.
Suitable power and motor cables should be selected according to the data shown in Rating Tables section of this Quick Start Guide and the National Electrical Code or other applicable local codes.
Motor Cable   75°C Copper must be used.
Power cable connections and tightening torques are shown in the Mechanical Dimensions section of this Quick Start Guide.
Integral Solid State short circuit protection does not provide branch circuit protection. Branch circuit protection must be provided in accordance with the national electrical code and any additional local codes. Ratings are shown in the Rating Tables section of this Quick Start Guide.
For Canadian installations transient surge suppression must be installed on the line side of this equipment and shall be rated 480Volt (phase to ground), 480 Volt (phase to phase), suitable for over voltage category iii and shall provide protection for a rated impulse withstand voltage peak of 2.5kV.
UL Listed ring terminals / lugs must be used for all bus bar and grounding connections.

### General Requirements

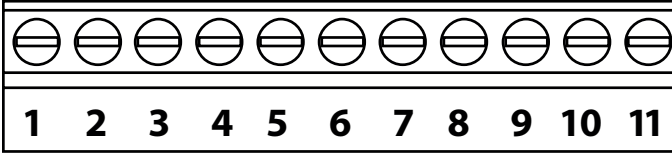
The drive provides motor overload protection, set at 150% of full load, in accordance with the National Electrical Code (US).
Where a motor thermistor is fitted and connected to the drive, connection must be carried out according to the information shown in the Motor Thermistor Connection section of the Quick Start Guide.
UL rated ingress protection ("Type") is only met when cables are installed using a UL recognized bushing or fitting for a flexible conduit system which meets the required level of protection ("Type").
For conduit installations the conduit entry holes require standard opening to the required sizes specified per the NEC.
Not intended for installation using rigid conduit system.
<b>WARNING:</b> The opening of the branch-circuit protective device may be an indication that a fault has been interrupted. To reduce the risk of fire or electric shock, current-carrying parts and other components of the controller should be examined and replaced if damaged. If burnout of the current element of an overload relay occurs, the complete overload relay must be replaced.

## Control Terminal Wiring

- All analog signal cables should be suitably shielded. Twisted pair cables are recommended.
- Power and Control Signal cables should be routed separately where possible, and must not be routed parallel to each other.
- Signal levels of different voltages e.g. 24 Volt DC and 110 Volt AC, should not be routed in the same cable.
- Maximum control terminal tightening torque is 0.5Nm.
- Control Cable entry conductor size: 0.05 – 2.5mm<sup>2</sup> / 30 – 12 AWG.

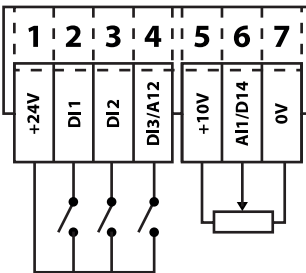
## Control Terminal Connections

Non-Switched Units: Require external control signals to be connected to the control terminals.



+24 VDC	DI1	DI2	DI3 AI2	+10 VDC	DI4 AI1	0V	A0	0V	RL1	RL2
No.	Purpose				Function					
1	+24VDC 100mA Output				24 VDC Output					
2	DI1 Digital Input 1				Close to terminal 1 to run					
3	DI2 Digital Input 2				Not Used					
4	DI3 Digital Input 3/ AI2 Analog Input 2				Not Used					
5	+10VDC 5mA Output				10 VDC Output for external potentiometer					
6	DI4 Digital Input 4/ AI1 Analog Input 1				Open for Minimum Speed Close to Terminal 5 for Maximum Speed					
7	0VDC Common									
8	A0 Analog Output				Not Used					
9	0VDC Common									
10	RL1 Output Relay				Not Used					
11	RL2 Output Relay				Not Used					

## Connection Example





## Factory Default Functions

No.	Description	
DI1	0/1	Open : Stop Closed : Run
AI1	Speed Reference Input	Sets the Speed Reference Open for Minimum Speed

## Operation

Before starting the VFD, ensure that all connections have been made properly and are secure.

### Keypad and Display

The drive is configured and its operation monitored via the keypad and display. Refer to the table below for basic operation.



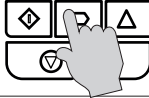
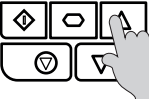
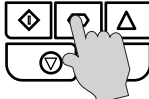
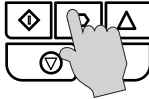
	<b>START</b>	When in keypad mode, used to start a stopped drive or to reverse the direction of rotation if bi-directional keypad mode is enabled.
	<b>UP</b>	Used to increase speed in real-time mode or to increase parameter values in parameter edit mode.
	<b>DOWN</b>	Used to decrease speed in real-time mode or to decrease parameter values in parameter edit mode.
	<b>NAVIGATE</b>	Used to display real-time information, to access and exit parameter edit mode and to store parameter changes.
	<b>RESET /STOP</b>	Used to reset a tripped drive.

### Operating Displays

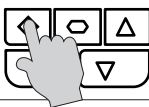
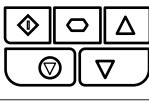
<p>STOP</p>	<p>H 50 0</p>	<p>R 2.3</p>
Drive Stopped / Disabled	Start. Drive is enabled / running, display shows the output frequency (Hz)	Press the Navigate key for < 1 second. The display will show the motor current (Amps)
<p>P 1.50</p>	<p>1500</p>	
Press the Navigate key for < 1 second. The display will show the motor power (kW)	If P-10 > 0, pressing the Navigate key for < 1 second will display the motor speed (RPM)	



## Changing Parameters

<p>STOP</p> 	<p>P-01</p> 	<p>P-08</p> 
<p>Press and hold the Navigate key &gt; 2 seconds</p>	<p>Use the up and down keys to select the required parameter</p>	<p>Press the Navigate key for &lt; 1 second</p>
<p>00</p> 	<p>P-08</p> 	<p>P-08</p> 
<p>Adjust the value using the Up and Down keys</p>	<p>Press for &lt; 1 second to return to the parameter menu</p>	<p>Press for &gt; 2 seconds to return to the operating display</p>

## Resetting a Fault

<p>0-1</p> 	<p>STOP</p> 
<p>Press the Stop key. The display will show "STOP"</p>	

## Available Parameters

The parameters available are shown in the table below.

Par.	Description	Min	Max	Default	Units
P-01	Maximum Frequency/Speed Limit	P-02	500.0	50.0 (60.0)	Hz/RPM
P-02	Minimum Frequency/Speed Limit	0.0	P-01	20.0	Hz/RPM
P-03	Acceleration Ramp Time	0.00	600.0	5.0	s
P-04	Deceleration Ramp Time	0.00	600.0	5.0	s
P-06	Energy Optimiser	0	1	0	-
	<b>Setting</b>	<b>Motor Energy Optimisation</b>		<b>Optidrive Energy Optimisation</b>	
	0	Disabled		Disabled	
	1	Enabled		Disabled	
	2	Disabled		Enabled	
	3	Enabled		Enabled	
P-07	Motor Rated Voltage/Back EMF at rated speed (PM/BLDC)	0	250/ 500	230/400	V
P-08	Motor Rated Current	Drive Rating Dependent			A



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Par.	Description	Min	Max	Default	Units
P-09	Motor Rated Frequency	10	500	50 (60)	Hz
P-10	Motor Rated Speed	0	30000	0	RPM
P-11	Low Frequency Torque Boost	0.0	Drive Dependent		%

## Technical Data

### Operational ambient temperature range

Enclosed Drives: -20 ... 40°C (frost and condensation free)  
 Storage ambient temperature range: -40 ... 60°C  
 Maximum altitude: 2000m. Derate above 1000m: 1% / 100m  
 Maximum humidity: 95%, non-condensing

## Ratings Table

Frame Size	kW	HP	Input Current	Fuse/MCB (Type B)		Maximum Cable Size		Output Current	Recommended Brake Resistance
				Non UL	UL	mm	AWG		
<b>110 - 115 (+ / - 10%) V 1 Phase Input, 230V 3 Phase Output (Voltage Doubler)</b>									
1	0.37	0.5	7.8	10	10	8	8	2.3	-
1	0.75	1	15.8	25	20	8	8	4.3	-
2	1.1	1.5	21.9	32	30	8	8	5.8	100
<b>200 - 240 (+ / - 10%) V 1 Phase Input, 3 Phase Output</b>									
1	0.37	0.5	3.7	10	6	8	8	2.3	-
1	0.75	1	7.5	10	10	8	8	4.3	-
1	1.5	2	12.9	16	17.5	8	8	7	-
2	1.5	2	12.9	16	17.5	8	8	7	100
2	2.2	3	19.2	25	25	8	8	10.5	50
3	4	5	29.2	40	40	8	8	15.3	25
<b>200 - 240 (+ / - 10%) V 3 Phase Input, 3 Phase Output</b>									
1	0.37	0.5	3.4	6	6	8	8	2.3	-
1	0.75	1	5.6	10	10	8	8	4.3	-
1	1.5	2	8.9	16	15	8	8	7	-
2	1.5	2	8.9	16	15	8	8	7	100
2	2.2	3	12.1	16	17.5	8	8	10.5	50
3	4	5	20.9	32	30	8	8	18	25
3	5.5	7.5	26.4	40	35	8	8	24	20
4	7.5	10	33.3	40	45	16	5	30	15
4	11	15	50.1	63	70	16	5	46	10



## Ratings Table (continued)

Frame Size	kW	HP	Input Current	Fuse/MCB (Type B)		Maximum Cable Size		Output Current	Recommended Brake Resistance
				Non UL	UL	mm	AWG	A	Ω
380 - 480 (+ / - 10%)V 3 Phase Input, 3 Phase Output									
1	0.75	1	3.5	6	6	8	8	2.2	-
1	1.5	2	5.6	10	10	8	8	4.1	-
2	1.5	2	5.6	10	10	8	8	4.1	250
2	2.2	3	7.5	16	10	8	8	5.8	200
2	4	5	11.5	16	15	8	8	9.5	120
3	5.5	7.5	17.2	25	25	8	8	14	100
3	7.5	10	21.2	32	30	8	8	18	80
3	11	15	27.5	40	35	8	8	24	50
4	15	20	34.2	40	45	16	5	30	30
4	18.5	25	44.1	50	60	16	5	39	22
4	22	30	51.9	63	70	16	5	46	22

NOTE Cable sizes shown are the maximum possible that may be connected to the drive. Cables should be selected according to local wiring codes or regulations at the point of installation.



## Troubleshooting

### Fault Code Messages

Fault Code	No.	Description
01-b	01	Brake channel over current
OL-br	02	Brake resistor overload
0-1	03	Output Over Current
1_t-trP	04	Motor Thermal Overload (I2t)
0-volt	06	Over voltage on DC bus
U-volt	07	Under voltage on DC bus
0-t	08	Heatsink over temperature
U-t	09	Under temperature
E-trip	11	External trip
FLT-dc	13	DC bus ripple too high
P-LOSS	14	Input phase loss trip
h0-1	15	Output Over Current
th-Flt	16	Faulty thermistor on heatsink
data-F	17	Internal memory fault (IO)
4-20 F	18	4-20mA Signal Lost
data-E	19	Internal memory fault (DSP)
F-Ptc	21	Motor PTC thermistor trip
FAn-F	22	Cooling Fan Fault (IP66 only)
0-heat	23	Drive internal temperature too high
OUt-F	26	Output Fault

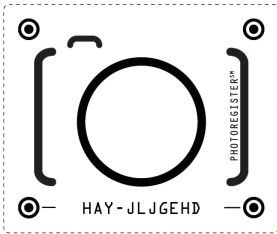
NOTE: Following an over current or overload trip (3, 4, 5, 15), the drive may not be reset until the reset time delay has elapsed to prevent damage to the drive.

# 90 DAY EXTENDED WARRANTY\* REGISTER WITH YOUR SMARTPHONE

— PROTECT YOUR INVESTMENT IN 2 EASY STEPS —

## 1. TAKE A PHOTO

Take a photo of the camera icon



## 2. SEND IT IN

Send it in using one of the methods below



### SMARTPHONE

Text a photo of the camera icon to **71403**

OR



### ONLINE

Visit [Hayward.com/Warranty](http://Hayward.com/Warranty)

OR



### MESSENGER

Send photo to **photoregister**

\*Extended warranty is in addition to applicable product warranty and is for parts only, labor not included.

Need help? Visit [photoregister.com/help](http://photoregister.com/help) or text HELP to 71403.

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