

Electronic
Virtually
Maintenance
Free**STATIC VARIABLE AC
VOLTAGE &
FREQUENCY
CONVERTERS****AC SINGLE PHASE
2 TO 150 kVA****IGBT SOLID STATE
PWM DESIGN**

CE

**H SERIES MODELS****INPUT: 220V - 230V - 240V - 50 or 60Hz****OUTPUT: 0V to 300V - 40 to 70Hz****FCL****220V / 230V / 240V - 2 WIRE
SINGLE PHASE****THE UNIVERSAL AC POWER SOURCE**

IDEAL FOR USE IN TESTING CENTRES, RESEARCH LABS AND TESTING ON PRODUCTION LINES

FCL Series Single Phase Static Variable Voltage and Frequency Converters utilise the latest in solid state Pulse Width Modulated (PWM) Inverter and Rectifier technology, combined with Galvanic Isolation, to deliver a clean and regulated variable AC power supply - ideal for use in testing centres, research laboratories and for testing on production lines.

FCL Series Variable AC Voltage & Frequency Converters offer -

- Ability to replicate all the numerous nominal utility mains single phase voltages (eg 100V to 277V) and civil Frequencies 40 to 70 Hz (40 to 499 Hz Special Build Option for Military, Avionic and Marine applications) deployed throughout the world
- Suitable for use with Resistive, Capacitive, Inductive and Non-Linear Loads
- Galvanically Isolated with Pure & Stable Sine Wave Output delivering minimal harmonic distortion (EMI/EMC)
- Selectable High or Low Current Output Voltage Ranges
- High Overload Capability
- PWM / IGBT design ensures High Efficiency and Low Noise whilst delivering Maximum Reliability
- Uncomplicated and simple to use set-up and operation
- Easy to read LED Digital Metering displaying Output Frequency, Voltage, Current and Loading - eliminating the need for external monitoring

**TYPICAL APPLICATIONS**

- Test Laboratory & Research Centre
- Electrical & Electronic Equipment Testing
- Production & Process Control Systems
- Airport Grounding Equipment
- Military Diagnostic Systems
- Communication, Avionics & Marine Equipment



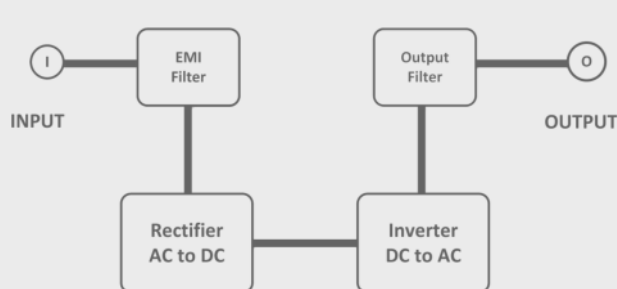
FCL SERIES - SINGLE PHASE - 2 to 150 kVA

STATIC IGBT PWM DESIGN TOPOLOGY

A FCL Series Variable AC Voltage & Frequency Converter takes the electrical input power at one frequency and voltage and provides an adjustable output voltage and frequency - ideal for testing loads over their full voltage and frequency range.

By design the incoming AC Mains Utility supply is converted by a rectifier into DC. The DC is then feed into an Inverter which produces the required AC output power. The resulting stable and pure sinewave is then passed through a low distortion linear amplifier to achieve the required high power output rating. By utilising crystal oscillation the availability of enhanced frequency stability is ensured.

Solid State in basic design, the only moving parts are the fans used to force cool the system.



INPUT VOLTAGE CHOICES AVAILABLE

2 WIRE SOLUTIONS

SINGLE PHASE WITH NEUTRAL (+ GROUND / EARTH)

H SERIES

2 to 150 kVA

High Voltage Models:

220V, 230V or 240V

Other voltages available on individual request / quotation.

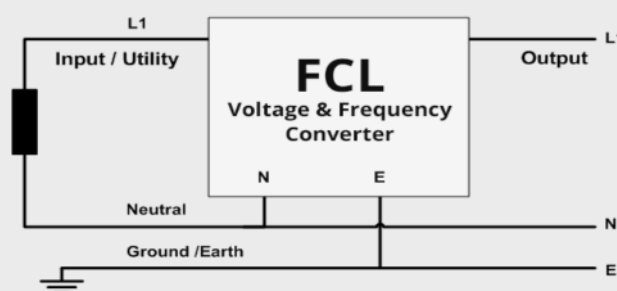
L SERIES

2 to 30 kVA

Low Voltage Models:

110V, 115V, 120V or 127V

Other voltages available on individual request / quotation.



INPUT & OUTPUT VOLTAGE & FREQUENCY SETTINGS

H SERIES

INPUT	
Nominal Single Phase Input Voltage & Frequency	Input Voltage Window - S10
220V 50 or 60Hz	198 to 242V (± 10%)
230V 50 or 60Hz	207 to 253V (± 10%)
240V 50 or 60Hz	216 to 264V (± 10%)

OUTPUT					
Available Output Voltages	Selectable High or Low Current Output Voltage Ranges		Output Voltage Accuracy ± % of Output	Programmable Output Frequency	Output Frequency Accuracy ± % of Output
0V to 300V	High Level	0 to 300V	± 1%	40 to 70Hz (40 to 499 Hz Special Option)	± 0.01%
	Low Level	0 to 150V			
0V to 300V	High Level	0 to 300V	± 1%	40 to 70Hz (40 to 499 Hz Special Option) Hz	± 0.01%
	Low Level	0 to 150V			
0V to 300V	High Level	0 to 300V	± 1%	40 to 70Hz (40 to 499 Hz Special Option)	± 0.01%
	Low Level	0 to 150V			

ENSURING THE CORRECT SIZING

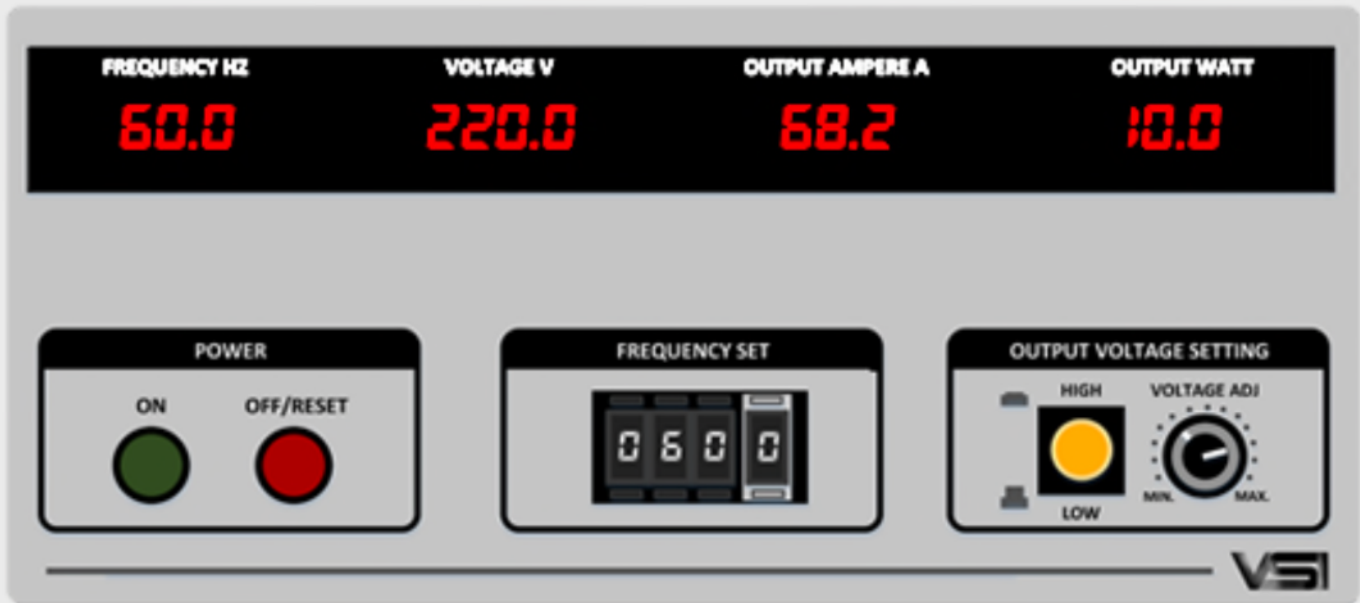
FCL Frequency Converters have both maximum kVA (Apparent Power) ratings and kW (Real Power) ratings – difference between the two being commonly referred to as the Power Factor.

In general, when sizing the Frequency Converter neither the kW nor kVA rating of a Frequency Converter should be exceeded.

Equipment nameplate ratings are often stated in kVA, which makes it difficult to know the kilo-watt ratings. If using equipment nameplate ratings for sizing, a user might configure a system, which appears to be correctly sized based on kVA ratings, but actually exceeds the Frequency Converters kW rating. By sizing the kVA rating of a load to be no greater than 60% of the kVA rating of the Converter, it minimises the risk of exceeding the watt rating of the Converter. Therefore, unless you have high certainty of the watt ratings of the loads, the safest approach, and widely considered to be the 'best practice', is to keep the sum of the load nameplate ratings below 60% of the converters kVA rating.

Where the load type is **inductive** in nature such as motors (fans, pumps, etc), solenoids, and relays it is essential that high inrush current and short-time overload factors are fully considered. With motors (*without a soft start facility*) typically drawing on start-up current 5 to 7 times the stated rating of the motor it is recommended that a Frequency Converter is selected that is 3 times the stated rated capacity of the load.

DIGITAL DISPLAY PANEL



PRODUCT SELECTION TABLE

H SERIES

VSi Model No.	Power Rating kVA (kW)	Max. Current for Selectable High or Low Current Output Voltage Ranges		Physical Size & Weights	
		High	Low	W x H x D mm	Kg
FCL-2H-S10	2 kVA (1.6 kW)	8.3	16.6	350 x 535 x 700	40
FCL-3H-S10	3 kVA (2.4 kW)	12.5	25.0	350 x 535 x 700	50
FCL-5H-S10	5 kVA (4 kW)	20.8	41.6	350 x 535 x 700	60
FCL-10H-S10	10 kVA (8 kW)	41.7	83.4	420 x 640 x 920	90
FCL-15H-S10	15 kVA (12 kW)	62.5	125.0	420 x 640 x 920	110
FCL-20H-S10	20 kVA (18 kW)	83.3	166.6	420 x 640 x 920	140
FCL-30H-S10	30 kVA (24 kW)	125.0	250.0	550 x 770 x 1110	180
FCL-45H-S10	45 kVA (36 kW)	187.5	375.0	750 x 1200 x 850	220
FCL-50H-S10	50 kVA (40 kW)	208.3	416.6	750 x 1200 x 850	330
FCL-60H-S10	60 kVA (48 kW)	250.0	500.0	750 x 1200 x 850	360
FCL-75H-S10	75 kVA (60 kW)	312.5	625.0	860 x 1300 x 1050	430
FCL-80H-S10	80 kVA (64 kW)	333.3	666.6	860 x 1300 x 1050	450
FCL-90H-S10	90 kVA (72 kW)	375.0	750.0	860 x 1300 x 1050	490
FCL-100H-S10	100 kVA (80kW)	416.6	833.2	860 x 1300 x 1050	530
FCL-120H-S10	120 kVA (100 kW)	500.0	1000.0	860 x 1435 x 1500	660
FCL-150H-S10	150 kVA (120 kW)	622.5	1245.0	860 x 1435 x 1500	730

Note: 1. Larger kVA and alternative voltage options available to order / individual request.



TECHNICAL SPECIFICATION

General:

Phase	Single Phase, 2 Wire (1P+Neutral+G/E)
Ashley-Edison Models	FCL-2H-S10 to FCL-150H-S10
Power Ratings	<p>16 Model Ratings-</p> <p>2kVA (1.6kW), 3kVA (2.4kW), 5kVA (4kW), 10kVA (8kW), 15kVA (12kW), 20kVA (16kW), 30kVA (24kW), 45kVA (36kW), 50kVA (40kW), 60kVA (48kW), 75kVA (60kW), 80kVA (64kW), 90kVA (72kW), 100kVA (80kW), 120kVA (100kW) & 150kVA (120kW)</p> <p>- Larger ratings to special order</p>
Design Topology	Static - IGBT/ Pulse Width Modulated (PWM)

Input:

Voltage	220V - 230V - 240V $\pm 10\%$
Frequency	47 to 63Hz $\pm 5\%$

Output:

Selectable High or Low Current Output Voltage Ranges	<p>High Voltage - 0 to 300V</p> <p>Low Voltage - 0 to 150V</p>
Voltage Regulation	$\pm 1\%$
Frequency	40 to 70Hz (Programmable Key Lock Setting) <i>(Extendable to 499 Hz as special build option)</i>
Frequency Stability	$\pm 0.01\%$
Power Factor	0.8 Power Factor
Digital Metering:	<p>Frequency (Hz) 4 Digit LED Digital Display - Resolution 0.1Hz/Step</p> <p>Voltage (Volts) 4 Digit LED Digital Display - Resolution 0.1 Volt</p> <p>Current (Amps) 4 Digit LED Digital Display - Resolution 0.1 Amp</p> <p>Loading (Watts) 4 Digit LED Digital Display - Resolution 0.1 Watt</p>

Protection Features:

As Standard	Electronic Circuit/Circuit Breaker, Overload Warning, Over Temperature, Short Circuit and Auto-Power Off
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Environmental:

Operating Temperature Range	Temperature range -15 to 45 °C. Derate by 2% for each additional °C Up to max 60 °C .
Maximum Altitude	Maximum altitude 4000m. Derate by 2.5% for each additional 500m.
Relative Humidity	Suitable for indoor tropical use 90% RH (non-condensing).
Efficiency	$\geq 94\%$
THD - Harmonic Distortion	Pure Sinewave $\leq 2\%$
Audible Noise	<60 dB (at 1 metre)

Physical:

Construction:	Enclosures to IP20 (NEMA 1 Style) - BS EN 60529
Colour:	RAL 7032 (Pebble Grey - Epoxy Powder Coating)
Dimensions & Weights	See Product Selection Table

Certification & Conformance:

EMC Conformance	Complies with BS EN 55022 and the relevant parts of the BS EN 61000 series of standards
CE Certification	CE Marked - being fully compliant with European Union Directives 2014/30/EU (The EMC Directive) and 2014/35/EU (The Low Voltage Directive).

Warranty:

Standard Warranty	1 Year / 12 Months from date of supply
Extended Warranty	Option - Extendable Warranty up to 60 Months / 5 Years



TYPICAL APPLICATIONS

Our **FCL Series** Variable Voltage and Frequency Converters are typically utilised in -

<p>- Research & Design</p>	<ul style="list-style-type: none"> ● New product design brings certain challenges for manufacturers today as the world marketplace presents a wide variety of AC power forms. In addition to the many variations of power, the stability of that power may not always be consistent from one locality to another. ● Whether you want consistent precision power from day to day or need to simulate a wide variety of power line disturbances, VSi can work with you to define your AC power solution.
<p>- Manufacturing Testing</p>	<ul style="list-style-type: none"> ● Often products are used at a different voltage and frequency from the country in which they are produced. This creates a need to convert both voltage and frequency on a production line. ● VSi products are used worldwide to supply the voltage and frequency needed by any given product requiring AC Power. Stable voltage and frequency are also required to minimize the rejection of a product due to poor power conditions in a factory. Our products provide a stable output while the input voltage or frequency may vary. This provides the assurance that a product did not fail due to a low-voltage line in your facility.
<p>- Military</p>	<ul style="list-style-type: none"> ● From field use, to shipboard applications, to laboratory environments, VSi's military customers benefit from the high quality, rugged designs of its standard Variable AC Voltage and Frequency Converters. ● Our products can be found powering sensitive electronic equipment in a wide variety of military applications and environments.
<p>- Avionics</p>	<ul style="list-style-type: none"> ● As aircraft electronics continue to evolve, so do their power requirements. ● At VSi we are able to replicate the environments required to test for compliance with aerospace test requirements. Varying frequency and voltage, we can provide a great amount of control and simulation of the AC power on an aircraft.

ENCLOSURES - IP20 INDOOR & IP54 OUTDOOR

Indoor - IP20 Ingress Protection (*Standard*)



FCL-S10 Frequency Converters presented in durable in robust air-cooled IP20 (BS/EN 60529) / NEMA 1 floor standing steel cubicles, primarily intended for indoor use.

These enclosures offer removeable panels for ease of installation and servicing and, in addition, lockable front door access is provided.

Outdoor - IP54 Ingress Protection (*-IP54 Option*)



FCL-S10 Frequency Converters presented in durable IP54 (BS/EN 60529) / NEMA 3 free standing steel cubicles suitable for external use, or more challenging internal environments.

IP 54 = Dust Protected. Limited ingress of dust permitted, but will not interfere with operation of the equipment. Protection against water splashing from all directions. Limited ingress permitted.

CUSTOM BUILT SOLUTIONS

VSi, with a strong and wide manufacturing base, is able to meet the requirements of customers from our own in-house professional resources.

Where bespoke / custom built solutions are required we are able to call upon our extensive portfolio of proven standard designs and tailor offerings to accommodate, without breaking the bank, most individual specific requirements.

