FCL-H SERIES - THREE PHASE - 6 to over 400 kVA

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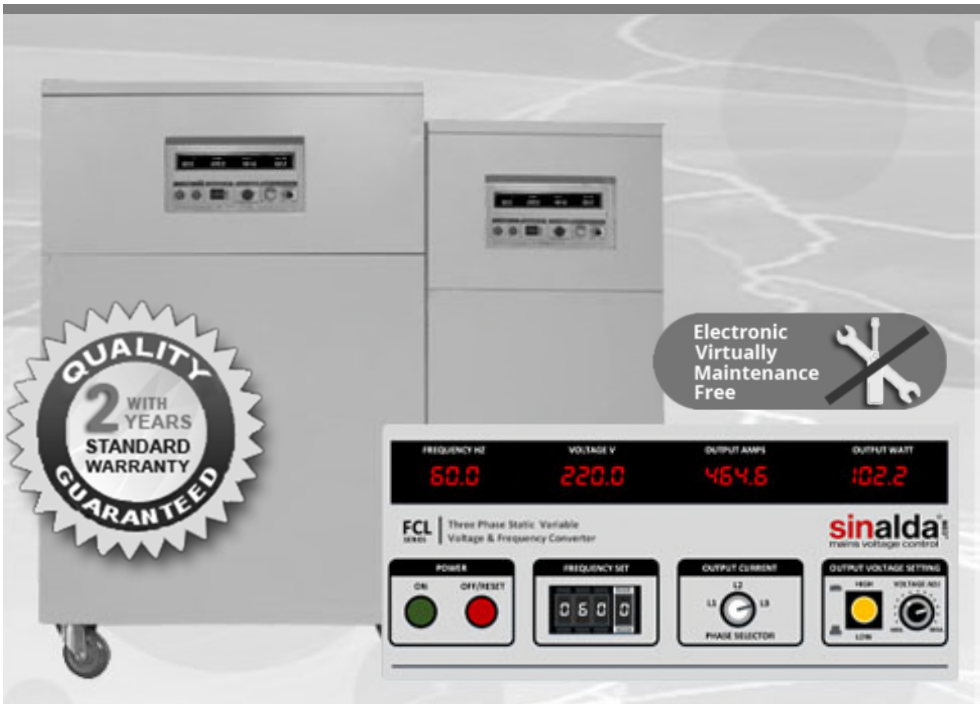

STATIC VARIABLE AC

VOLTAGE & FREQUENCY CONVERTERS

AC THREE PHASE

6 TO 400 kVA

IGBT SOLID STATE PWM DESIGN

H SERIES MODELS

INPUT: 380/220V - 400/230V - 415/240V - 50 or 60Hz

OUTPUT: 0/0V to 520/300V - 40 to 70Hz

HX MODELS: INPUT: 440/256V - 460/265V - 480/277V

OUTPUT: 0/0V - 600/346V (OPTION on H SERIES)

CE UK CA

FCL-3P
H SERIES

4 WIRE - WITH NEUTRAL

THREE PHASE

THE UNIVERSAL AC POWER SOURCE

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

FCL Series Three 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 civil testing centres, research laboratories and for testing on production lines.

Sinalda FCL Series Variable AC Voltage & Frequency Converters offer -

- Ability to replicate all the numerous nominal utility mains three phase voltages (eg 190/100V to 600/346V) 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**

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FCL-H SERIES - THREE PHASE - 6 to over 400 kVA

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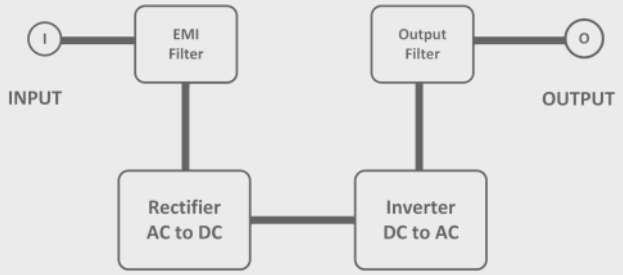
STATIC IGBT PWM DESIGN TOPOLOGY

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 though 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

Also available as 3 Wire Solutions (No Neutral) - FCL-HD-3P & FCL-LD-3P SERIES

4 WIRE SOLUTIONS

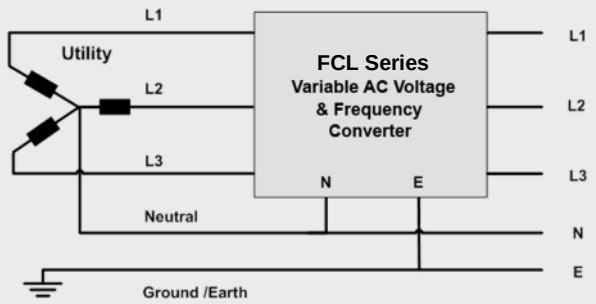
THREE PHASE WITH NEUTRAL (+ GROUND / EARTH)

H SERIES
6 to 400 kVA

High Voltage Models:
380/220V, 400/230V or 415/240V
HX Models - 440/254V, 460/265V or 480/277V
Other voltages available on individual request / quotation.

LY SERIES
6 to 200 kVA

Low Voltage Models:
190/110V, 200/115V, 208/120V or 220/127V
Other voltages available on individual request / quotation.



INPUT & OUTPUT VOLTAGE & FREQUENCY SETTINGS

H SERIES

*= 600/346V available as an option

INPUT			OUTPUT					
Nominal Three Phase Input Voltage & Frequency	Input Voltage Window - S10		Available Output Voltages	Selectable High or Low Current Output Voltage Ranges		Output Voltage Accuracy ± % of Output	Programmable Output Frequency	Output Frequency Accuracy ± % of Output
	L-L	L-N	L-L / L-N		L-N			
380V L-N: 220V 50 or 60Hz	342 to 418V (± 10%)	198 to 242V	0/0V to 520/300V *	High Level	0 to 300V	± 1%	40 to 70 Hz *(40 to 499 Hz Special Option)*	± 0.01%
				Low Level	0 to 150V			
400V L-N: 230V 50 or 60Hz	360 to 440V (± 10%)	207 to 253V	0/0V to 520/300V *	High Level	0 to 300V	± 1%	40 to 70 Hz *(40 to 499 Hz Special Option)*	± 0.01%
				Low Level	0 to 150V			
415V L-N: 240V 50 or 60Hz	374 to 456V (± 10%)	216 to 264V	0V to 520/300V *	High Level	0 to 300V	± 1%	40 to 70 Hz *(40 to 499 Hz Special Option)*	± 0.01%
				Low Level	0 to 150V			

HX SERIES

INPUT			OUTPUT					
Nominal Three Phase Input Voltage & Frequency	Input Voltage Window - S10		Available Output Voltages	Selectable High or Low Current Output Voltage Ranges		Output Voltage Accuracy ± % of Output	Programmable Output Frequency	Output Frequency Accuracy ± % of Output
	L-L	L-N	L-L / L-N		L-N			
440V L-N: 256V 50 or 60Hz	396 to 484V (± 10%)	230 to 281V	0/0V to 600/346V	High Level	0 to 346V	± 1%	40 to 70 Hz *(40 to 499 Hz Special Option)*	± 0.01%
				Low Level	0 to 173V			
460V L-N: 265V 50 or 60Hz	414 to 506V (± 10%)	239 to 291V	0/0V to 600/346V	High Level	0 to 346V	± 1%	40 to 70 Hz *(40 to 499 Hz Special Option)*	± 0.01%
				Low Level	0 to 173V			
480V L-N: 277V 50 or 60Hz	432 to 528V (± 10%)	249 to 304V	0V to 600/346V	High Level	0 to 346V	± 1%	40 to 70 Hz *(40 to 499 Hz Special Option)*	± 0.01%
				Low Level	0 to 173V			

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FCL-H SERIES - THREE PHASE - 6 to over 400 kVA

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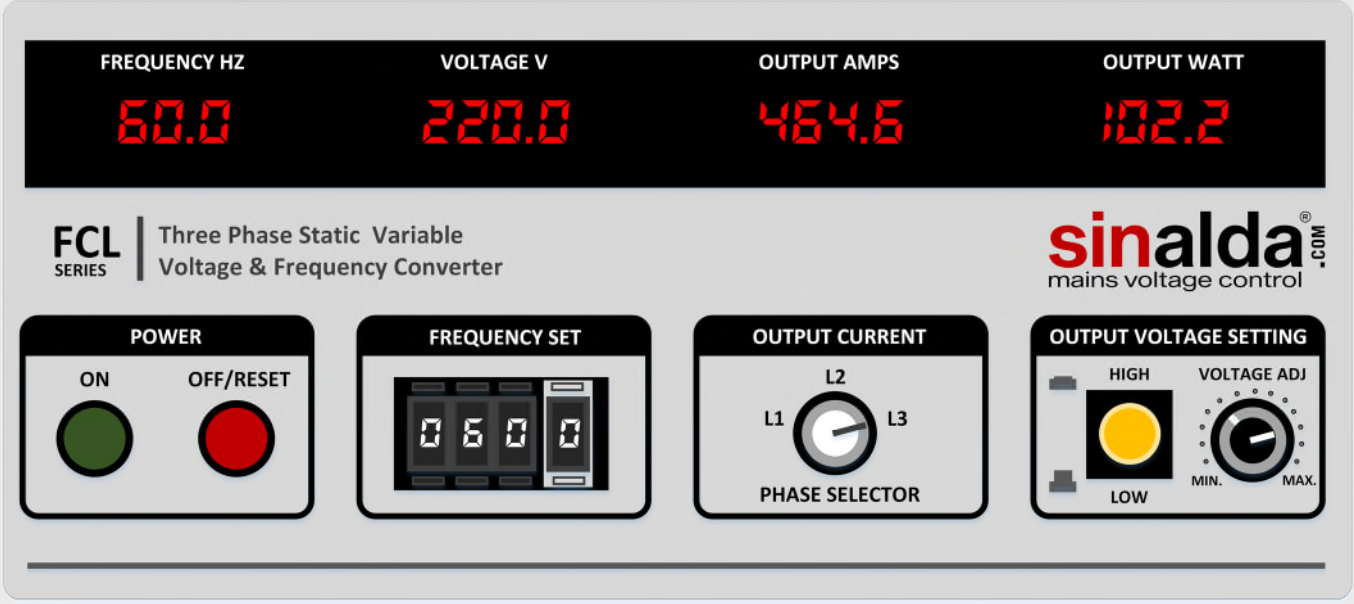
DIGITAL DISPLAY PANEL



PRODUCT SELECTION TABLE

H SERIES & HX SERIES

Sinalda Model No.	Power Rating	Maximum Output Current Rating @40~70Hz for Selectable High or Low Current Output Voltage Ranges				Physical Size & Weights	
		H Series (Input 380-415V)		HX Series (Input 440-480V)			
		High Level Setting 150 to 300V	Low Level Setting 0 to 149V	High Level Setting 174 to 346V	Low Level Setting 0 to 173V		
	kVA (kW)	Amps per Phase		Amps per Phase		W x H x D mm	Kg
FCL-6H-3P-S10	6 kVA (4.8 kW)	6.7	13.4	5.8	11.6	500 x 850 x 650	160
FCL-10H-3P-S10	10 kVA (8 kW)	11.1	22.2	9.6	19.2	500 x 850 x 650	200
FCL-15H-3P-S10	15 kVA (12 kW)	16.7	33.4	14.4	28.8	500 x 850 x 650	260
FCL-20H-3P-S10	20 kVA (16 kW)	22	44	19	38	550 x 1100 x 750	320
FCL-30H-3P-S10	30 kVA (24 kW)	33	66	28	56	550 x 1100 x 750	450
FCL-45H-3P-S10	45 kVA (36 kW)	50	100	43	86	600 x 1300 x 800	560
FCL-60H-3P-S10	60 kVA (48 kW)	66	132	57	114	600 x 1300 x 800	660
FCL-75H-3P-S10	75 kVA (60 kW)	83	166	72	144	860 x 1300 x 800	750
FCL-100H-3P-S10	100 kVA (80 kW)	111	222	96	192	860 x 1300 x 800	900
FCL-120H-3P-S10	120 kVA (96 kW)	133	266	115	230	860 x 1435 x 1500	1040
FCL-150H-3P-S10	150 kVA (120 kW)	166	332	144	288	860 x 1435 x 1500	1180
FCL-200H-3P-S10	200 kVA (160 kW)	222	444	192	384	860 x 1435 x 1500	1320
FCL-240H-3P-S10	240 kVA (192 kW)	266	532	230	460	960 x 1600 x 1700	1470
FCL-300H-3P-S10	300 kVA (240 kW)	333	666	288	576	960 x 1600 x 1700	1580
FCL-330H-3P-S10	330 kVA (264 kW)	366	732	317	634	960 x 1600 x 1700	1840
FCL-400H-3P-S10	400 kVA (320 kW)	444	888	384	768	1060 x 1750 x 1900	2100

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

2. HX Model Sizing & Weights may vary- subject to confirmation at time of ordering

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FCL-H SERIES - THREE PHASE - 6 to over 400 kVA

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TECHNICAL SPECIFICATION

General:

Phase	Three Phase, 4 Wire (3P+Neutral+G/E)
Ashley-Edison Models	FCL-6H-3P-S10 to FCL-400H-3P-S10
Power Ratings	16 Model Ratings- **6kVA** (4.kW), **10kVA** (8kW), **15kVA** (12kW), **20kVA** (16kW), **30kVA** (24kW) , **45kVA** (36kW), **60kVA** (48kW), **75kVA** (60kW), **100kVA** (80kW), **120kVA** (96kW), **150kVA** (120kW), **200kVA** (160kW), **240kVA** (192kW), **300kVA** (240kW), **330kVA** (264kW) and **400kVA** (320kW) *- Larger ratings to special order*
Design Topology	Static—IGBT/ Pulse Width Modulated (PWM)

Input:

Voltage	H Series	380/220V - 400/230V - 415/240V ±10%
	HX Series	440/256V - 460/265V - 480/277V ±10%
Frequency		47 to 63Hz ±5% (400Hz Option)

Output:

Selectable High or Low Current Output Voltage Ranges Line to Neutral Voltages	H Series	High Voltage - 0 to 300V (Option 0 to 346V*) Low Voltage - 0 to 150V (Option 0 to 173V*)
* = *to specific order*	HX Series	High Voltage - 0 to 346V Low Voltage - 0 to 173V
Voltage Regulation		±1%
Frequency		40 to 70 Hz (Programmable Key Lock Setting) *(Extendable to 499 Hz as a special build option)*
Frequency Stability		±0.01%
Power Factor		0.8 Power Factor
Digital Metering:	Frequency (Hz)	4 Digit LED Digital Display - Resolution 0.1Hz/Step
	Voltage (Volts)	4 Digit LED Digital Display - Resolution 0.1 Volt
	Current (Amps)	4 Digit LED Digital Display - Resolution 0.1 Amp
	Loading (Watts)	4 Digit LED Digital Display - Resolution 0.1 Watt

Protection Features:

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

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 1000m. Derate by 2.5% for each additional 500m.
Relative Humidity	Suitable for indoor tropical use 90% RH *(non-condensing)*
Efficiency	≥94%
THD - Harmonic Distortion	Pure Sinewave ≤2%
Audible Noise	60~120 dB at 1 meter *(dependent on rating)*

Physical:

Construction:	Enclosures to IP20 (NEMA 1 Style) - BS EN 60529 (IP54 Option)
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 & UKCA Certification	CE / UKCA Marked - being fully compliant with European Union Directives 2014/30/EU (The EMC Directive) and 2014/35/EU (The Low Voltage Directive) and corresponding UK regulations

Warranty:

Standard Warranty	2 Years / 24 Months from date of supply
Extended Warranty	Option - Extendable Warranty up to 60 Months / 5 Years

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FCL-H SERIES - THREE PHASE - 6 to over 400 kVA

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TYPICAL APPLICATIONS

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

- Research & Design	• 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, Sinalda UK can work with you to define your AC power solution.
- Manufacturing Testing	• 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. • Sinalda 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.
- Military	• From field use, to shipboard applications, to laboratory environments, Sinalda'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.
- Avionics	• As aircraft electronics continue to evolve, so do their power requirements. • At Sinalda UK 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.

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 and that the inrush current does not exceed the listed "**Maximum Output Current Rating**" of the converter.

CUSTOM BUILT SOLUTIONS

Sinalda UK, 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.

FCL & FCL / FX SERIES

FCL SERIES

Static Variable and Fixed Output Voltage and Frequency converters are available from -

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