



FIXED OUTPUT
STATIC FREQUENCY CONVERTERS / CHANGERS

WITH VOLTAGE CONVERSION OPTION

AC THREE PHASE
6 kVA - 400 kVA

PWM DESIGN
IGBT SOLID STATE



FCL-FX SERIES MODELS

CONVERTING **50 to 60Hz** OR **60 to 50Hz**

+ **400 Hz Output Option** for Aviation & Military Applications

190 to 240V / 380 to 415V / 440 to 480V / 600V

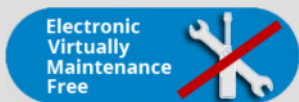
FCL-FX

4 WIRE (with 3 Wire Option)

THREE PHASE



- The **FCL-3P-S10-FX** range of Three Phase Static Frequency Converters / Changers allows the connection of 60 Hz powered equipment to a 50 Hz supply and 50 Hz powered equipment to a 60 Hz supply. Where required, they can convert the supply voltage to a different voltage to match the requirement of the load. Models are also available offering a fixed 400 Hz output - as frequently required in Aviation and Military applications.
- In addition **FCL-3P-S10-FX** Frequency Converters keep the load equipment running through utility voltage fluctuations and frequency variations, delivering a stable and clean voltage and frequency supply to the load equipment.
- Suitable for all load types – Resistive, Inductive & Capacitive (see *Ensuring the Correct Sizing – Page 4*)
- Built upon a dynamic platform, and incorporating the latest Pulse Width Modulated (PWM) inverter and rectifier controls, their solid-state design means that the static converter's only moving parts are the fans used for forced cooling the system.



FEATURES

- Wide Range of Power Ratings
- Uncomplicated and Simple to Use Set-Up and Operation
- Precise Output Voltage Regulation
- Solid State PWM / IGBT Design
- Inbuilt Overload Capability
- Input & Output Circuit Breakers
- Galvanically Isolated with Pure and Stable Sine Wave Output
- Front Display / Control Panel with Parameter Metering - Output Frequency, Voltage, Current and Loading
- Compact Floor Standing Enclosures on Castors
- Option - 3 Wire (No Neutral) Input / 4 Wire (With Neutral) Output
- Compliance with International Standards
- 2 Year / 24 Month Warranty

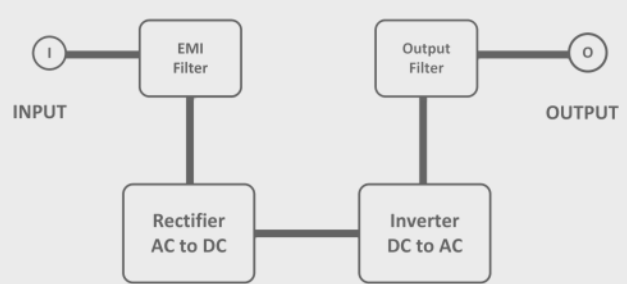


STATIC IGBT PWM DESIGN TOPOLOGY

A **FCL-FX Series** Fixed Output AC Voltage & Frequency Converter takes the electrical input power at one frequency and voltage and provides an another output voltage and frequency.

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.



50Hz INPUT & 60Hz OUTPUT MODELS - VOLTAGE OPTIONS

Also available as Three Phase Input / Single Phase Output Solutions - **FCL-3/IP-S10-FX** Models

FCL-3P-S10 Model	Input Voltage * & Frequency	Output Voltage * & Frequency
HL-FX	380/220V or 400/230V or 415/240V 4 Wire 50Hz	190/100V or 200/110V or 208/120V or 220/127V 3 / 4 Wire 60Hz
HDL-FX	380V or 400V or 415V 3 Wire 50Hz	190/100V or 200/110V or 208/120V or 220/127V 4 Wire 60Hz
H-FX	380/220V or 400/230V or 415/240V 4 Wire 50Hz	380/220V or 400/230V or 415/240V 3 / 4 Wire 60Hz
HD-FX	380V or 400V or 415V 3 Wire 50Hz	380V or 400V or 415V 3 Wire 60Hz
HDY-FX	380V or 400V or 415V 3 Wire 50Hz	380/220V or 400/230V or 415/240V 4 Wire 60Hz
HHX-FX	380/220V or 400/230V or 415/240V 4 Wire 50Hz	440/254V or 460/265V or 480/277V or 600/346V 3 / 4 Wire 60Hz
HDXD-FX	380V or 400V or 415V 3 Wire 50Hz	440V or 460V or 480V or 600V 3 Wire 60Hz
HDHX-FX	380V or 400V or 415V 3 Wire 50Hz	440/254V or 460/265V or 480/277V or 600/346V 4 Wire 60Hz

60Hz INPUT & 50Hz OUTPUT MODELS - VOLTAGE OPTIONS

* Customer to specify required Input & Output Voltage at time of ordering

LH-FX	190/100V or 200/110V or 208/120V or 220/127V 4 Wire 60Hz	380/220V or 400/230V or 415/240V 3 / 4 Wire 50Hz
LDY-FX	190V or 200V or 208V or 220V or 230V or 240V 3 Wire 60Hz	380/220V or 400/230V or 415/240V 4 Wire 50Hz
HXY-FX	440/254V or 460/265V or 480/277V or 600/346V 4 Wire 60Hz	380/220V or 400/230V or 415/240V 3 / 4 Wire 50Hz
HXDY-FX	440V or 460V or 480V or 600V 3 Wire 60Hz	380/220V or 400/230V or 415/240V 4 Wire 50Hz

Models are also available offering a **400Hz Output** (or alternative fixed output - 5 to 1000Hz) - please contact our Sales Team for further information.

4 Wire = 3 Phases + Neutral + G/E
3 Wire = 3 Phases + G/E (No Neutral)

ENCLOSURES - IP20 INDOOR & IP54 OUTDOOR

Indoor - IP20 Ingress Protection (Standard)



FCL-3P-S10-FX 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-3P-S10-FX 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.



TECHNICAL SPECIFICATION

*AVAILABLE AS EITHER **4 WIRE** (WITH NEUTRAL)
OR **3 WIRE** (WITHOUT NEUTRAL) MODELS

General:

Phase	HL, H, LH, HXY Models Three Phase, 4 Wire (3P+Neutral+G/E) or HDL, HD, HDY, LDY, HXDY Models - Three Phase, 3 Wire (3P+G/E - No Neutral)
SFC Model Nos.	FCL-6*-3P-S10-FX to FCL-400*-3P-S10-FX
Power Ratings	16 Power Ratings:- 6kVA (4.8kW), 10kVA (8kW), 15kVA (12kW), 20kVA (16W), 30 kVA (24kW), 45 kVA (36kW), 60 kVA (48kW), 75 kVA (60kW), 100kVA (80kW), 120kVA (96kW), 150kVA (120kW), 200kVA (160kW), 240 kVA (192kW), 300 kVA (240kW), 330 kVA (264kW) & 400 kVA (320kW)
Design Topology	Static Solid State - Sine Wave Pulse Width Modulated (SPWM)

Input:

Voltage	HL (4 Wire), HDL (3 Wire), H (4 Wire), HD (3 Wire), HDY (3 Wire) HHX (4 Wire), HDHXD (3 Wire) & HDHX (3 Wire) Models - 380V / 400V / 415V $\pm 10\%$ LH (4 Wire) & LDY (3 Wire) Models - 190V / 200V / 208V / 220V / 230V / 240V $\pm 10\%$ HXY (4 Wire) & HXDY (3 Wire) Models - 440V / 460V / 480V / 600V $\pm 10\%$ (Customer to Specify)
Frequency	47 to 63Hz $\pm 5\%$
Rectifier	6 Pulse
Power Factor	0.8 PF

Output:

Voltage	H (4 Wire), HD (3 Wire), HDY (4 Wire), LH (3/4 Wire), LDY (4 Wire), HXY (3/4 Wire) & HXDY (4 Wire) Models - 380V / 400V / 415V $\pm 1\%$ HL (3/4 Wire), HDL (4 Wire) Models - 190V / 200V / 208V / 220V / 230V / 240V $\pm 1\%$ HHX (3/4 Wire), HDHXD (3 Wire) & HDHX (4 Wire) - Models - 440V / 460V / 480V / 600V $\pm 1\%$ (Customer to Specify)
Frequency	All H Models - 60Hz $\pm 0.05\%$ All L & HX Models - 50Hz $\pm 0.05\%$ 400Hz Output & Other Frequencies (15 to 1000Hz) available to individual quotation / request
Wave Form	Pure Sine Wave
Efficiency	$\geq 85\%$

Metering, Alerts & Communication:

Front Display Panel	Digital Display & Control Panel with Phase Selector Parameter Metering and On / Off Push Buttons
LCD Digital Metering:	Frequency (Hz) Output Frequency - 4 Digit LED Display Voltage (Volts) Output Voltage - 4 Digit LED Display Current (Amps) Load Current - 4 Digit LED Display Load (Watts) Loading Watts - 4 Digit LED Display

Protection Features:

Surge Protection	BS EN 61000-4-5 Level 3
EPO	Front Panel Power Off Button
Overload Protection	3x max current rating for 2 seconds - with Output Cut Off after 2 seconds
Short Circuit Protection	Output Cut Off Immediately (Input & Output Circuit Breaker Protection)

Environmental:

Operating Temp Range	-10% to +45°C
Storage Temp Range	-40 to 50°C
Maximum Altitude	1000 meters (de-rate by 1% per 100 meters up to 2000 meters)
Relative Humidity	0 to 95% (non-condensing)
THD - Harmonic Distortion	<3% for Linear Loads <5% for Non-Linear Loads
Audible Noise	@ 1 meter 50 to 65 dBA (dependent on model rating)

Physical:

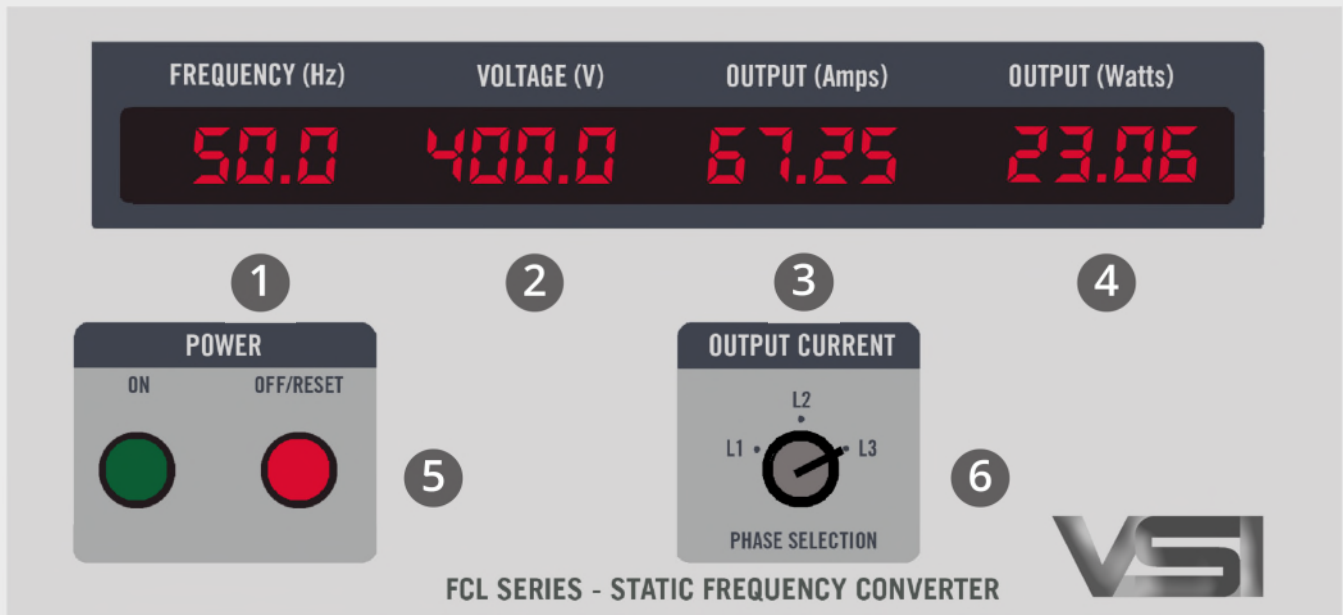
Power Connections	Hardwire - Input & Output
Construction	IP20 / NEMA 1 Style - BS EN 60529 (Option IP54 / NEMA 3 Style)
Dimensions & Weights	Dependent on model rating and configuration Sizes and weights available on individual request

Certification & Conformance:

EMC Conformance	BS EN 55022 and relevant parts of BS EN 61000
CE Certification	2014/30/EU (The EMC Directive) and 2014/35/EU (The Low Voltage Directive)



DIGITAL DISPLAY PANEL



- LCD Digital Metering:
- 1 Output Frequency (Hz)
 - 2 Output Voltage (Volts)
 - 3 Current (Amps)
 - 4 Load (Watts)
 - 5 Power On / Off (Reset) Buttons
 - 6 Current Phase Selector Switch

UNDERSTANDING FCL MODEL NUMBERS

Typical Model No.

FCL-100HXDY-3P-S10-FX600/60-400/50-IP54

1 2 3 4 5 6 7 8 9

- | | | | |
|-----------------------|--|------------------------------|--------------------|
| 1 Ashley-Edison Range | - FCL | 5 Input Voltage Swing | ±10% |
| 2 Power Rating | - 100 kVA (80kW) | 6 Fixed Output | |
| 3 Configuration | - Input 3 Wire / Output 4 Wire - see Voltage Options | 7 Input Voltage / Frequency | - 600 Volts / 60Hz |
| 4 No of Phases | - Three Phase | 8 Output Voltage / Frequency | - 400 Volts / 50Hz |
| | | 9 Option Fitted | - IP54 Enclosure |

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.

