

# FC300

## FREQUENCY CONVERTERS

### 10-250kVA

50Hz, 60Hz, 400Hz

High Reliability

DSP Control



TOWER



SERVICE /  
TECH. SUPPORT



ECO FRIENDLY



DELTA Frequency Converters are produced to provide the energy for your devices, which are powered by AC voltage and requires different frequency ranges. Our converters, which have many usage areas, mainly in maritime, aviation, industrial equipments and military applications, are designed for continuous operation with PWM and IGBT technology and convert 50 Hz or 60 Hz mains energy to 50 Hz, 60 Hz or 400 Hz energy to supply your critical loads.

Next pages of this catalog, you will find the technical specifications of 400VAC-60Hz converters, 208VAC-60Hz and 400Hz converters with inverter galvanic isolation transformers within 10-250KVA power range and 3/3 phase systems. Please contact with your sales representative for your different requests and questions.

## GENERAL SPECIFICATIONS

- DSP control
- 3-Level technology and fully digital structure (\*)
- Less electronic components and SMD technology
- Low input current harmonic distortion (THDI)
- High input power factor
- High efficiency up to %95
- Advanced control and protection at input
- Current limitation at output, DC leakage, short circuit and overload protection
- Advanced TFT front panel (For 40kVA and above) (\*)
- Advanced diagnostic, easy monitoring and service intervention
- Conforms to CE, TSE and GOST standards
- ISO9001, ISO14001 compliant production
- 512 event logs (46.000 alarm) (\*)
- Clock and calendar (battery supported)
- Advanced communication
- 2 RS232 serial ports and programmable 4 dry contact outputs (12 contacts optional) (\*)
- External REPO input
- Optional SNMP, MODBUS and Remote Monitoring Panel
- Advanced remote control features
- Security with user and centralized service password (OTP)
- Compliant with IEC EN62040 directive
- 2 years warranty

(\*) For detailed product specs, please check the specification tables.



## TECHNICAL SPECIFICATION COMPARISON TABLE

	FC300-60		FCT300-60		FCT300-400	
	60Hz 380-400VAC		60Hz 208VAC		400Hz 208VAC	
	10-30kVA	40-200kVA	10-30kVA	40-200kVA	10-30kVA	40-200kVA
2 Line LCD Display					✓	✓
4 Line LCD Display	✓		✓			
4.3" TFT Display		✓		✓		
Mimic LED Diagram	✓		✓		✓	✓
Alarm Logging (512)	✓	✓	✓	✓		
Alarm Logging (128)					✓	✓
RS232 Serial Port					✓	✓
2xRS232 Serial Port	✓	✓	✓	✓		
3 x Dry Contacts					✓	✓
4 x Dry Contacts	✓	✓	✓	✓		
Galvanic Isolation (Inverter Transformer)			✓	✓	✓	✓
Optional SNMP MODBUS, GSM	✓	✓	✓	✓	✓	✓
Optional + 8 Dry Contacts	✓	✓	✓	✓		
Optional External Input Isolation Transformer	✓	✓	✓	✓	✓	✓
Optional External Output Isolation Transformer	✓	✓				

## FC300-60 TECHNICAL SPECIFICATIONS

MODEL	FC310-50-60	FC315-50-60	FC320-50-60	FC330-50-60	FC340-50-60	FC360-50-60	FC380-50-60
Power (kVA)	10	15	20	30	40	60	80
<b>INPUT</b>							
Voltage (ui/Ui)*	230/400 VAC 3P + N + G $\pm$ 20%						
Frequency**	50Hz $\pm$ 10%						
Power factor (@100% load)	$\geq$ 0,99						
THDI	$\leq$ 3%						
Rectifier soft start time	Minimum 3 sec.						
Protections	Fuses, Voltage and Frequency tolerance, Input power limit, Phase sequency indicator, Input contactor						
<b>OUTPUT</b>							
Power (kW)	9	13,5	18	27	36	54	72
Power factor	0,9 (0,8 and 1,0 Optional)						
Voltage (uo/Uo)*	230/400 VAC 3P + N + G						
Voltage THD	$\leq$ 3% (linear load)						
Frequency**	60Hz $\pm$ 0.25%						
Voltage tolerance	$\pm$ 1% (linear load) $\pm$ 5% (dynamic load)						
Recovery time (Dynamic load)	< 50 ms						
Efficiency (@100% load input voltage tolerance $\pm$ 1,5% transformer excluded)	$\geq$ 93,0%		$\geq$ 93,5%			$\geq$ 94,8%	
Crest factor (@100% load)	3:1						
Overload capacity	5 min. at 125% load, 40ms at 150% load					10 min. at 125% load, 60sec. at 150% load, 40ms at 200% load	
Protections	Advanced short circuit, Voltage tolerance protection, DC balance, Regenerative load, Current limiting protections						
<b>GENERAL</b>							
Standards	EN62040-1, EN62040-2, EN62040-3						
User interface	4 lines LCD panel, Mimic led panel, 5 vector buttons, Buzzer				TFT panel, 5 vector buttons, Buzzer		
Indicators	P-N voltage, P-P voltage, Current, Power, Crest Factor, Frequency, PF, Service time						
Advanced	Self diagnostics, 3 maintenance time indicators, Calibration over RS232, Operating hour meter						
Communication	2xRS232 serial port, 4 standard and 8 optional dry contacts						
Inputs	EPO input, Interactive battery breaker input, Genset input						
Software	Standard T-Mon software (3 clients + 1 server management)						
Alarm logging	Standard: with time & date 512 events						
Other protections	Load protection in case of failure, Power module overheat, Overcurrent, Overheat, Input voltage and frequency, Output voltage and frequency, Phase loss protection, Output DC leakage, Short circuit, DC high, DC low Protections						
Temperature range	0°C +40°C (operation) / -15°C +45°C (storage)						
Protection degree*	IP20						
Relative humidity	20% - 90%						
Altitude	$\leq$ 1000m: 100%; > 1000m: Maximum 0.6% derating per 100m (3000m: 88% rated power with 12% derating)						
Acoustic noise	< 57dBA				< 62dBA		
Net weight (kg)	< 87	< 87	< 91	< 100	< 173	< 197	< 209
Dimensions (mm) HxWxD	1040x400x815				1440x515x855		
<b>OPTIONS</b>							
Different input/output voltage, Uninterruptible operation (battery included), Parallel operation, IP degree	Please ask						
Galvanic isolation transformer at input/output	Optional as external						
Adaptors	SNMP, RS485, Remote monitoring panel, MODBUS (RS485 or TCP/IP), TCP/IP, GSM/GPRS Modem, Comport multiplexer						
(*) Please ask for different options.							
(**) DS300HC-60 series 50Hz input -> 60Hz output converters can also be used as 60Hz input -> 50Hz output by adjusting parameters.							

## FC300-60 TECHNICAL SPECIFICATIONS

MODEL	FC3100-50-60	FC3120-50-60	FC3160-50-60	FC3200-50-60
Power (kVA)	100	120	160	200
<b>INPUT</b>				
Voltage (ui/U <sub>i</sub> )*	230/400 VAC 3P + N + G ± 20% (@ 100% load) / - 40% (@ 70% load)			
Frequency**	50Hz ± 10%			
Power factor (@ 100% load)	≥ 0.99			
THDI	≤ 3%			
Rectifier soft start time	Minimum 3 sec.			
Protections	Fuses, Voltage and Frequency tolerance, Input power limit, Phase sequency indicator			
<b>OUTPUT</b>				
Power (kW)	90	108	144	180
Power factor	0,9 (0,8 and 1,0 Optional)			
Output current rated value	131	157	207	261
Voltage (u <sub>o</sub> /U <sub>o</sub> )*	230/400VAC 3P + N + G			
Voltage THD	≤ 2% (linear load)			
Frequency**	60Hz ± 0.1%			
Output voltage tolerance	± 1% (linear load) ± %5 (dynamic load)			
Recovery time (Dynamic load)	< 50 ms			
Efficiency (@100% load input voltage tolerance ± 1,5% transformer excluded)	up to 95.5%		up to 96%	
Crest factor	3:1			
Overload capacity	10 min. @125% load: 1 min. @150% load			
Protections	Advanced short circuit, Voltage tolerance protection, DC balance, Regenerative load, Current limiting protections			
<b>GENERAL</b>				
Standards	EN62040-1, EN62040-2, EN62040-3			
User interface	TFT panel, 5 vector buttons, Buzzer			
Indicators	P-N voltage, P-P voltage, Current, Power, Crest Factor, Frequency, PF, Service time			
Advanced	Self diagnostics, 3 maintenance time indicators, Calibration over RS232, Operating hour meter			
Communication	2xRS232 serial port, 4 standard and 8 optional dry contacts			
Inputs	EPO input, Interactive battery breaker input, Genset input			
Software	Standard T-Mon software (3 clients + 1 server management)			
Alarm logging	Standard: with time & date 512 events			
Other protections	Load protection in case of failure, Power module overheat, Overcurrent, Overheat, Input voltage and frequency, Output voltage and frequency, Phase loss protection, Output DC leakage, Short circuit, DC high, DC low Protections			
Temperature range	0°C +40°C (operation) / -15°C +45°C (storage)			
Protection degree*	IP20			
Relative humidity	90% max. (non-condensing)			
Altitude	≤ 1000m: 100%; > 1000m: Maximum 0.6% derating per 100m (3000m: 88% rated power with 12% derating)			
Acoustic noise	< 62 dBA		< 65 dBA	
Net weight (kg)	210	220	262	270
Dimensions (mm) HxWxD	1440x475x890			
<b>OPTIONS</b>				
Different input/output voltage, Uninterruptible operation (battery included), Parallel operation, IP degree	Please ask			
Galvanic isolation transformer at input/output	Optional as external			
Adaptors	SNMP, RS485, Remote monitoring panel, MODBUS (RS485 or TCP/IP), TCP/IP, GSM/GPRS Modem, Comport multiplexer			
(*) Please ask for different options.				
(**) DS300XC-60 series 50Hz input -> 60Hz output converters can also be used as 60Hz input -> 50Hz output by adjusting parameters.				

## FCT300-60 TECHNICAL SPECIFICATIONS

MODEL	FCT310-50-60	FCT315-50-60	FCT320-50-60	FCT330-50-60	FCT340-50-60	FCT360-50-60	FCT380-50-60
Power (kVA)	10	15	20	30	40	60	80
<b>INPUT</b>							
Voltage (ui/Ui)*	230/400 VAC 3P + N + G $\pm$ 20%						
Frequency**	50Hz $\pm$ 10%						
Power factor (@ 100% load)	$\geq$ 0,99						
THDI	$\leq$ 3%						
Rectifier soft start time	Minimum 3 sec.						
Protections	Fuses, Voltage and Frequency tolerance, Input power limit, Phase sequency indicator, Input contactor						
<b>OUTPUT</b>							
Power (kW)	9	13,5	18	27	36	59	72
Power factor	0,9 (0,8 and 1,0 Optional)						
Voltage (uo/Uo)*	120/208 VAC 3P + N + G						
Voltage THD	$\leq$ 3% (linear load)						
Frequency	60Hz $\pm$ 0.25%						
Voltage tolerance	$\pm$ 1% (linear load) $\pm$ 5% (dynamic load)						
Recovery time (Dynamic load)	< 50 ms						
Output isolation transformer	Galvanic isolation transformer integrated into the internal inverter						
Efficiency (@100% load input voltage tolerance $\pm$ 1,5% transformer included)	$\geq$ 91,1%			$\geq$ 91,6%			$\geq$ 92,6
Crest factor (@ %100 load)	3:1						
Overload capacity	5 min. @125%, 40ms @150% load					10 min. at 125% load, 60sec. at 150% load, 40ms at 200% load	
Protections	Advanced short circuit, Voltage tolerance protection, DC balance, Regenerative load, Current limiting protections						
<b>GENERAL</b>							
Standards	EN62040-1, EN62040-2, EN62040-3						
User interface	4 line LCD panel, Mimic led panel, 5 vector buttons, Buzzer				TFT panel, 5 vector buttons, Buzzer		
Indicators	P-N voltage, P-P voltage, Current, Power, Crest Factor, Frequency, PF, Service time						
Advanced	Self diagnostics, 3 maintenance time indicators, Calibration over RS232, Operating hour meter						
Communication	2xRS232 serial port, 4 standard and 8 optional dry contacts						
Inputs	EPO input, Interactive battery breaker input, Genset input						
Software	Standard T-Mon software (3 clients + 1 server management)						
Alarm logging	Standard: with time & date 512 events						
Other protections	Load protection in case of failure, Power module overheat, Overcurrent, Overheat, Input voltage and frequency, Output voltage and frequency, Phase loss protection, Output DC leakage, Short circuit, DC high, DC low Protections						
Temperature range	0°C +40°C (operation) / -15°C +45°C (storage)						
Protection degree*	IP20						
Relative humidity	20% - 90%						
Altitude	$\leq$ 1000m: 100%; > 1000m: Maximum 0.6% derating per 100m (3000m: 88% rated power with 12% derating)						
Acoustic noise	< 55dBA		< 60dBA			< 62dBA	
Net weight (kg)	187	198,5	244	270	393	457	536
Dimensions (mm) HxWxD	1040x400x815				1440x515x855		
<b>OPTIONS</b>							
Different input/output voltage, Uninterruptible operation (battery included), Parallel operation, IP degree	Please ask						
Transformer	Galvanic isolation transformer at the input (external)						
Adaptors	SNMP, RS485, Remote monitoring panel, MODBUS (RS485 or TCP/IP), TCP/IP, GSM/GPRS Modem, Comport multiplexer						
(*) Please ask for different options.							

## FCT300-60 TECHNICAL SPECIFICATIONS

MODEL	FCT3100-50-60	FCT3120-50-60	FCT3160-50-60	FCT3200-50-60	FCT3250-50-60
Power (kVA)	100	120	160	200	250
<b>INPUT</b>					
Voltage (ui/U <sub>i</sub> )*	230/400 VAC 3P + N + G ± 20%				
Frequency**	50Hz ± 10%				
Power factor (@ 100% load)	≥ 0,99				
THDI	≤ 3%				
Rectifier soft start time	Minimum 3 sec.				
Protections	Fuses, Voltage and Frequency tolerance, Input power limit, Phase sequency indicator, Input contactor				
<b>OUTPUT</b>					
Power (kW)	90	108	144	180	225
Power factor	0,9 (0,8 and 1,0 Optional)				
Voltage (u <sub>o</sub> /U <sub>o</sub> )*	120/208 VAC 3P + N + G				
Voltage THD	≤ 3% (linear load)				
Frequency	60Hz ± 0,25%				
Voltage tolerance	± 1% (linear load) ± 5% (dynamic load)				
Recovery time (Dynamic load)	< 50 ms				
Output isolation transformer	Galvanic isolation transformer integrated into the internal inverter				
Efficiency (@100% load input voltage tolerance ± 1,5% transformer included)	≥ 92,6%		≥ 93,0%		
Crest factor (@ 100% load)	3:1				
Overload capacity	10 min. @125% load, 60sec. @150% load, 40ms @200% load				
Protections	Advanced short circuit, Voltage tolerance protection, DC balance, Regenerative load, Current limiting protections				
<b>GENERAL</b>					
Standards	EN62040-1, EN62040-2, EN62040-3				
User interface	TFT panel, 5 vector buttons, Buzzer				
Indicators	P-N voltage, P-P voltage, Current, Power, Crest Factor, Frequency, PF, Service time				
Advanced	Self diagnostics, 3 maintenance time indicators, Calibration over RS232, Operating hour meter				
Communication	22xRS232 serial port, 4 standard and 8 optional dry contacts				
Inputs	EPO input, Interactive battery breaker input, Genset input				
Software	Standard T-Mon software (3 clients + 1 server management)				
Alarm logging	Standard: with time & date 512 events				
Other protections	Load protection in case of failure, Power module overheat, Overcurrent, Overheat, Input voltage and frequency, Output voltage and frequency, Phase loss protection, Output DC leakage, Short circuit, DC high, DC low Protections				
Temperature range	0°C +40°C (operation) / -15°C +45°C (storage)				
Protection degree*	IP20				
Relative humidity	20% - 90 %				
Altitude	≤ 1000m: 100%; > 1000m: Maximum 0.6% derating per 100m (3000m: 88% rated power with 12% derating)				
Acoustic noise	< 67 dBA				< 71 dBA
Net weight (kg)	539	595	647	910,5	1150
Dimensions (mm) HxWxD	1770x825x855			1900x1250x1055	
<b>OPTIONS</b>					
Different input/output voltage, Uninterruptible operation (battery included), Parallel operation, IP degree	Please ask				
Transformer	Galvanic isolation transformer at the input (external)				
Adaptors	SNMP, RS485, Remote monitoring panel, MODBUS (RS485 or TCP/IP), TCP/IP, GSM/GPRS Modem, Comport multiplexer				
(*) Please ask for different options.					

## FCT300-400 TECHNICAL SPECIFICATIONS

MODEL	FCT310-50-400	FCT315-50-400	FCT320-50-400	FCT330-50-400	FCT340-50-400	FCT350-50-400
Güç (kVA)	10	15	20	30	40	50
<b>INPUT</b>						
Voltage (ui/Ui)*	230/400 VAC 3P + N + G $\pm$ 20%					
Frequency**	50Hz $\pm$ 10%					
Power factor (@ 100% load)	$\geq$ 0,99					
THDI	$\leq$ 5% (depends on input voltage conditions)					
Protections	Fuses, Voltage and Frequency tolerance, Input power limit, Phase sequency indicator, Input contactor					
<b>OUTPUT</b>						
Power (kW)	8	12	16	24	32	40
Power factor	0,8 (0,9 and 1,0 Optional)					
Voltage (uo/Uo)*	120/208 VAC 3P + N + G					
Voltage THD	$\leq$ 3% (linear load)					
Frequency	400Hz $\pm$ 0.2%					
Output voltage tolerance	$\pm$ 1% (linear load), $\pm$ 5% (dynamic load)					
Recovery time (Dynamic load)	< 20 ms					
Output isolation transformer	Internal, inverter integrated galvanic isolation transformer					
Efficiency (@100% load input voltage tolerance $\pm$ 1,5% transformer included)	$\geq$ 88,0%	$\geq$ 88,5%	$\geq$ 88,8%	$\geq$ 89,0%	$\geq$ 89,5%	
Crest factor (@ 100% load)	3:1					
Overload capacity	5 min. @125% load, 40ms @150% load					10 min. @125% load, 60 sec. @150% load, 40 ms @200% load
Protections	Short circuit protection, Phase and voltage tolerance protection, DC balance, Current limiting protections					
<b>GENERAL</b>						
Standards	EN62040-1, EN62040-2, EN62040-3					
User interface	2 line LCD panel, LED Mimic diagram, control buttons, buzzer					
Indicators	Input/output P-N voltage, P-P voltage, Frequency, Load percentage, DC voltage, Input current					
Diagnostic	Error and status recording system with 128 memory with real-time clock and calendar					
Communication	RS232 serial port (standard), Remote monitoring panel, SNMP, Modbus, RS485, Modem connections (optional)					
Alarm relay contacts	3 dry contacts (Mains fault, Common alarm, Overtemperature)					
EPO input	Standard					
Other protections	Load protection in case of failure, Power module overheat, Overcurrent, Overheat, Input voltage and frequency, Output voltage and frequency, Phase loss protection, Output DC leakage, Short circuit, DC high, DC low Protections					
Temperature range	0°C +40°C (operation) / -15°C +45°C (storage)					
Protection degree*	IP20					
Relative humidity	20% - 90%					
Altitude	$\leq$ 1000m: 100%; > 1000m: Maximum 0.6% derating per 100m (3000m: 88% rated power with 12% derating)					
Acoustic noise (1 $\pm$ 5% m distance at 100% load)	< 60dBA		< 61 dBA		< 63 dBA	
Net weight (kg)	190	200	220	230	250	280
Dimensions (mm) HxWxD	1040x425x805			1190x515x830		
<b>OPTIONS</b>						
Different input/output voltage, Uninterruptible operation (battery included), Parallel operation, IP degree	Please ask					
Transformer	Optional as external					
Adaptors	SNMP, RS485, Remote monitoring panel, MODBUS (RS485 or TCP/IP), TCP/IP, GSM/GPRS Modem, Comport multiplexer					
(*) Please ask for different options.						

## FCT300-400 TECHNICAL SPECIFICATIONS

MODEL	FCT375-50-400	FCT3100-50-400	FCT3125-50-400	FCT3150-50-400	FCT3200-50-400
Power (kVA)	75	100	125	150	200
<b>INPUT</b>					
Voltage (ui/Ui)*	230/400 VAC 3P + N + G $\pm$ 20%				
Frequency	50Hz $\pm$ 10%				
Power factor (@100% load)	$\geq$ 0,99				
THDI	$\leq$ 5% (depends on input voltage conditions)				
Protections	Fuses, Voltage and Frequency tolerance, Input power limit, Phase sequency indicator, Input contactor				
<b>OUTPUT</b>					
Power (kW)	60	80	100	120	160
Power factor	0,8 (0,9 and 1,0 Optional)				
Voltage (uo/Uo)*	120/208 VAC 3P + N + G				
Voltage THD	$\leq$ 3% (linear load)				
Frequency	400Hz $\pm$ 0.2%				
Output voltage tolerance	$\pm$ 1% (linear load), $\pm$ 5% (dynamic load)				
Recovery time (Dynamic load)	< 20 ms				
Output isolation transformer	Internal, inverter integrated galvanic isolation transformer				
Efficiency (@100% load input voltage tolerance $\pm$ 1,5% transformer included)	$\geq$ %91,0		$\geq$ %92,0	$\geq$ %92,8	$\geq$ %93,5
Crest factor (@100% load)	3:1				
Overload capacity	10 min. @125% load, 60sec. @ %150 load, 40ms @ 200% load				
Protections	Advanced short circuit, Voltage tolerance protection, DC balance, Regenerative load, Current limiting protections				
<b>GENERAL</b>					
Standards	EN62040-1, EN62040-2, EN62040-3				
User interface	2 line LCD panel, LED Mimic diagram, control buttons, buzzer				
Indicators	Input/output P-N voltage, P-P voltage, Frequency, Load percentage, DC voltage, Input current				
Diagnostic	Error and status recording system with 128 memory with real-time clock and calendar				
Communication	RS232 serial port (standard), Remote monitoring panel, SNMP, Modbus, RS485, Modem connections (optional)				
Alarm relay contacts	3 dry contacts (Mains fault, Common alarm, Overtemperature)				
EPO input	Standard				
Other protections	Load protection in case of failure, Power module overheat, Overcurrent, Overheat, Input voltage and frequency, Output voltage and frequency, Phase loss protection, Output DC leakage, Short circuit, DC high, DC low Protections				
Temperature range	0°C +40°C (operation) / -15°C +45°C (storage)				
Protection degree*	IP20				
Relative humidity	20% - 90%				
Altitude	$\leq$ 1000m: 100%; > 1000m: Maximum 0.6% derating per 100m (3000m: 88% rated power with 12% derating)				
Acoustic noise (at 100% load at 1 $\pm$ 5% m distance)	< 68 dBA	< 71 dBA		< 73 dBA	
Net weight (kg)	510	600	650	1050	1200
Dimensons (mm) HxWxD	1880x860x880			1900x1250x1055	
<b>OPTIONS</b>					
Different input/output voltage, Uninterruptible operation (battery included), Parallel operation, IP degree	Please ask				
Galvanic isolation transformer at the input	Optional as external				
Adaptors	SNMP, RS485, Remote monitoring panel, MODBUS (RS485 or TCP/IP), TCP/IP, GSM/GPRS Modem, Comport multiplexer				
(*) Please ask for different options.					