

3 PHASE FREQUENCY CONVERTER (INVERTER & RECTIFIER) TEST REPORT

Job Description					
<i>Model</i>	CONV-MAK	<i>Serial No</i>	FC15330044060003	<i>Date</i>	10.09.2015
<i>Project No</i>	15-0051	<i>Stock Code</i>			

Nominal Values			
<i>Power (kVA)</i>	300	<i>DC Bus (V)</i>	450
<i>Input Voltage (V)</i>	380	<i>Input Frequency (Hz)</i>	50
<i>Output Voltage (V)</i>	440	<i>Output Frequency (Hz)</i>	60

Electronic Board Serials			
1001-Inverter DSP Board	AB053-11	IGBT Driver 1	H112-21
1006-Inverter Interface Board	V003-15	IGBT Driver 2	H087-21
1001-Rectifier DSP Board A	AB054-11	IGBT Driver 3	H108-21
1001-Rectifier DSP Board B	AB291-11	IGBT Driver 4	
1006-Rectifier Interface Board	V011-15	IGBT Driver 5	
1001-Monitor DSP Board	AB031-11	IGBT Driver 6	
1004-Alarm & Comm Interface	S182-31	1020-Power Supply Board A	C281-51C
1030-LCD Panel	S216-3	1020-Power Supply Board B	C048-51C
1057-Led Panel Board	D0170-2	1020-Power Supply Board C	
1032-PWM Distribution Board A	E021-21	1008-Thyristor Driver Board A	R237-3
1032-PWM Distribution Board B		1008-Thyristor Driver Board B	R247-3
1056-Conveyor Board	A020-70	1029-Thyristor Snubber Board A	R182-2A
		1029-Thyristor Snubber Board B	R180-2A

Specific Components (Brand and Model)			
IGBT		CM900DUC	
Thyristor		MCC200-16101	
Software Versions			
Inverter DSP	2.00	Inverter uP	2.00
Rectifier DSP	3.09	Rectifier uP	2.00
Monitor DSP	4.00	Monitor uP	2.00

Electronic Measurements					
Power Supply Board A	Input	V	304.1		
	Output	V	+17.90		-18.66
Power Supply Board B	Input	V	304.1		
	Output	V	+17.88		
Power Supply Board C	Input	V			
	Output	V			
Power Supply Board (IGBT Driver)	Output	V	14.99		

Measurements (24% Light Load)					
<i>Input</i>	<i>Voltage</i>	V	220.0	219.0	219.0
	<i>Current</i>	A	89.6	91.3	96.15
	<i>Power</i>	kW	13.93	12.70	15.33
	<i>Power Factor</i>	-	0.7	0.63	0.72
	<i>Current THD</i>	%	18	17	18
<i>DC Bus</i>	<i>Voltage</i>	V	450.4		
	<i>Current</i>	A	86		
<i>Output</i>	<i>Voltage</i>	V	254.4	254.4	254.4
	<i>Voltage THD</i>	%	47.6	47.7	46.4
	<i>Cap. Filter Current</i>	A	77.0	78.0	77.0

Measurements (93.7 %Loaded)					
Input	Voltage	V	215.5	219.4	214.8
	Current	A	414.0	412.0	425.0
	Power	kW	79.4	79.6	80.7
	Power Factor	-	0,87	0,89	0,88
	Current THD	%	8.5	8.9	8,6
	Rectifier 1 Current	A	220		
	Rectifier 2 Current	A	293		
DC Bus	Voltage	V	448.0		
	Current	A	513		
	Ripple	V	0,97		
Output	Voltage (R,S,T)	V	254,1	254,3	254,0
	Current	A	298.0	293.2	296.0
	Power	kW	75.5	74.3	75.3
	Power Factor	-	0,99	0,99	0,99
	Voltage THD	%	1,1	1,3	1,1
	Efficiency	%	93.9		
	Frequency (Variation %)	Hz	59.9 +- 5%		
Temperature Rise Measurement	Ambient Temp.	°C	34		
	Max. Internal Temp.		32		
Humidity		%	60		

Functional Checks	OK	N/A
Input CB Monitoring		X
Output CB Monitoring	X	
Battery CB Monitoring		X
DC Too Low Disconnect	X	
Inverter OverTemperature	X	
Buzzer	X	
LCD Panel Leds	X	
Fan Operation	X	
Alarm Kontakları	X	
Communication	X	
Fan Fuse	X	
LCD Panel Calibrations	X	
Insulation test (500V)	X	
Dielectric Strength test (2500Vac)	X	

Final Control	OK
Earth Continuity Control	X
General view and cleanness (visual Inspection)	X
Warning labels	X
Model & Serial No Labels	X
Protection covers	X

Alarm and warning messages are displayed timely on the LCD display. Audible alarm is also provided at the mean time.

Possible alarm and warning messages are listed below.

Message	Meaning of the message	Result
OUTPUT FAIL (OVER VOLTAGE)	Indicates that the output voltage is out of the tolerances (over voltage under voltage etc.). Normal, that this message is displayed during stop mode.	OK
LINE FAILURE	Indicates that the rectifier AC input voltage is low or failed.	OK
12 PULSE FAILURE	Indicated that the 12 pulse controller has detected an error. In this case, the rectifier will limit its current to the half of the nominal to not to overload the 6 pulse bridge. (Option)	OK
DC LOW	Indicates that the frequency converter DC Bus voltage is lower than the adjustable DC LOW value. System continues to operate.	OK
DC HIGH	Indicates that the frequency converter DC Bus voltage is higher than the adjustable DC HIGH value. System continues to operate. In this case, the equipment will stop generating DC to prevent any damage to batteries or load.	OK
DC TOO LOW	Indicates that the frequency converter DC Bus voltage is lower than the adjustable DC TOO LOW value. In this case, the equipment will stop generating AC to prevent any damage to the input source, possibly batteries. (battery deep discharge cutoff)	OK
OVER TEMPERATURE	Indicates that the inverter and / or rectifier bridge temperature has exceeded limits. The equipment will stop generating AC.	OK
IGBT / IPM FAULT (SHORT CIRCUIT)	Indicates that the current of IGBT or IPM transistor of 3 phase inverter bridge, has exceeded the limits.or inicates power supply failure.To protect the IGBT / IPM, the equipment will stop generating AC.	OK
OVER CURRENT	Indicates that the output current exceeded nominal capacity.	OK
OVERLOAD BLOCK	Indicates that the output of the system is blocked because of the over current.	OK
BREAKER OPEN	Indicates that one of the input or output circuit breakers are open. (Option depending on user requirement)	OK
EARTH FAULT	Indicates there is a leakage current from any of the AC outputs to ground.	OK
NO RESPONSE (NO CONNECTION)	Indicates that comminication error occured between the DSP boards	OK

Note: Product elements are protected againts short circuit over current, over voltage and output distortion.

Tested by	Approved by
Ufuk Sici	GURCAN YILMAZ SUKUTUN Bureau Veritas Istanbul



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Model	CONV-MAK	Serial No	FC15360044060004	Date	10.09.2015
Project No	15-0051	Stock Code			

Nominal Values			
Power (kVA)	600	DC Bus (V)	450
Input Voltage (V)	380	Input Frequency (Hz)	50
Output Voltage (V)	440	Output Frequency (Hz)	60

Electronic Board Serials			
1001-Inverter DSP Board	AB192-11	IGBT Driver 1	H114-21
1006-Inverter Interface Board	V002-15	IGBT Driver 2	H081-21
1001-Rectifier DSP Board A	AB357-11	IGBT Driver 3	H109-21
1001-Rectifier DSP Board B	AB444-11	IGBT Driver 4	H105-21
1006-Rectifier Interface Board	V192-15	IGBT Driver 5	H082-21
1001-Monitor DSP Board	AB454-11	IGBT Driver 6	H106-21
1004-Alarm & Comm Interface	T089-31	1020-Power Supply Board A	E007-52C
1030-LCD Panel	S248-3	1020-Power Supply Board B	E036-52C
1057-Led Panel Board	D156-2	1020-Power Supply Board C	E013-52C
1032-PWM Distribution Board A	E041-1	1008-Thyristor Driver Board A	R252-3
1032-PWM Distribution Board B	D045-1	1008-Thyristor Driver Board B	R2251-3
1056-Conveyor Board	A021-70	1029-Thyristor Snubber Board A	R122-2A
		1029-Thyristor Snubber Board B	R222-2A

Specific Components (Brand and Model)			
IGBT		CM900DUC	
Thyristor		MCC310-16101	
Software Versions			
Inverter DSP	2.00	Inverter uP	2.00
Rectifier DSP	3.09	Rectifier uP	2.00
Monitor DSP	4.00	Monitor uP	2.00

Electronic Measurements					
Power Supply Board A	Input	V	304.7		
	Output	V	+17.44		-18.66
Power Supply Board B	Input	V	304.7		
	Output	V	+17.91		
Power Supply Board C	Input	V	304.7		
	Output	V	+17.89		
Power Supply Board (IGBT Driver)	Output	V	14.99		

Measurements (24% Light Load)					
Input	Voltage	V	221.2	223.0	221.9
	Current	A	156	130	156.2
	Power	kW	24.26	22.46	22.79
	Power Factor	-	0.70	0.72	0.66
	Current THD	%	16.6	16.5	17
DC Bus	Voltage	V	449.2		
	Current	A	144.0		
Output	Voltage	V	253.5	253.7	253.7
	Voltage THD	%	1.7	1.5	1.5
	Cap. Filter Current	A	154.0	154.0	153.0

Measurements (41 %Loaded)					
Input	Voltage	V	219.0	219.6	218.9
	Current	A	418.0	392	402
	Power	kW	74.81	71.9	72.4
	Power Factor	-	0,81	0,84	0,82
	Current THD	%	8.6	9.5	89.3
	Rectifier 1 Current	A	212		
	Rectifier 2 Current	A	228		
DC Bus	Voltage	V	450		
	Current	A	438		
	Ripple	V	0,62		
Output	Voltage (R,S,T)	V	253.3	253.5	253.61
	Current	A	257.0	259.0	263.0
	Power	kW	64.9	65.6	66.50
	Power Factor	-	0,99	0,99	0,99
	Voltage THD	%	1.6	1.9	1.4
	Efficiency	%	89.9		
	Frequency (Variation %)	Hz	60.01 +- %5		
Temperature Rise Measurement	Ambient Temp.	°C	34		
	Max. Internal Temp.		33		
Humidity		%	60		

Functional Checks	OK	N/A
Input CB Monitoring		X
Output CB Monitoring	X	
Battery CB Monitoring		X
DC Too Low Disconnect	X	
Inverter OverTemperature	X	
Buzzer	X	
LCD Panel Leds	X	
Fan Operation	X	
Alarm Kontakları	X	
Communication	X	
Fan Fuse	X	
LCD Panel Calibrations	X	
Insulation test (500V)	X	
Dielectric Strength test (2500Vac)	X	

Final Control	OK
Earth Continuity Control	X
General view and clearence (visual Inspection)	X
Warning labels	X
Model & Serial No Labels	X
Protection covers	X

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