



Attestation of Conformity

No.: M15 12P10076 0037

Holder of Certificate: PMI ELEKTRİK VE ELEKTRONİK
SİSTEMLERİ DIŞ TİC LTD ŞTİ

MODERN KERESTECİLER SANAYİ
SİTESİ 1.CADDE, 23.SOKAK, NO:12
SARAY - KAZAN - ANKARA

Product: DC BATTERY CHARGER

Model(s): RDAT 110-100

Parameters: Rated Voltage Input : 380 VAC
Rated Voltage Output : 110 VDC
Rated Frequency : 50 Hz

**Product Tested and Inspected
according to:**

IEC 60146-1-1/1-2: 2009 Semiconductor
Converters
General Requirements and Line
Commutated Converters

This Attestation of Conformity is issued on a voluntary basis according to IEC 60146-1-1: 2009. It conforms that the listed equipment complies with the principal protection requirements of the standard. It refers only to the particular sample and its technical documentation submitted for inspection.

Test Report No.: TGK-LTMP-12-032

First Certificate No: M12 12P10076 0037

Issue Date : 2015-06-18

Expiry Date : 2016-06-18

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K03-E06-S02, Yayın Tarihi: 07.03.2008, Rev: 02 , Rev. Tarihi: 06.03.2008



Türkiye

Attestation of Conformity

No.: M13 12P10076 0027

Holder of Certificate: PMI ELEKTRİK VE ELEKTRONİK
SİSTEMLERİ DIŞ TİC LTD ŞTİ

MODERN KERESTECİLER SANAYİ
SİTESİ 1.CADDE, 23.SOKAK, NO:12
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Issue Date : 2013-05-13

Expiry Date : 2014-05-13

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K03-E06-S02, Yayın Tarihi: 07.03.2008, Rev: 02 , Rev. Tarihi: 06.03.2008



Türkiye

Competence.
Certainty.
Quality.

Technical Report No. TGK-LTMP-12-032

Rev.00

Date: 2012-05-15

Client:	PMI ELEKTRİK VE ELEKTRONİK SİSTEMLERİ DIŞ TİCARET LTD. ŞTİ
Manufacturing place:	MODERN KERESTECİLER SANAYİ SİTESİ, 1.CADDE, 23.SOKAK, NO:12 SARAY - KAZAN - ANKARA
Test object:	DC BATTERY CHARGER Models : RDAT 110-100
Test specifica- tion:	IEC 60146-1-1:2009 - Semiconductor Converters General Requirements and Line Commutated Converters
Purpose of ex- amination:	Test according to the test specifications
Test result:	The presented product were found to be in compliance with the relevant test specifications. The result is positive.

This technical report may only be quoted in full. Any use for advertising purposes must be granted in writing. This report is the result of a single examination of the object in question and is not generally applicable evaluation of the quality of other products in production.



Türkiye

Competence.
Certainty.
Quality.

1 Description of the test subject

1.1 Function

The rectifier is SCR controlled AC/DC rectifier with input isolation transformer and with automatic constant voltage and constant current ability.

1.2 Technical Data

Rated Voltage Input	:380 VAC /23 A
Rated Voltage Output	:110 VDC / 100A
Rated Frequency	:50 Hz

2 Order

The test objects were tested in “**PMI ELEKTRİK VE ELEKTRONİK SİSTEMLERİ**
DIŞ TİCARET LTD. ŞTİ“ on 07.05.2012.

3. Points of non-compliance according to the test specification

None.



Türkiye

Competence.
Certainty.
Quality.

4 Remarks

None

5 Test Results and Summary

The product were tested according to above mentioned specification .
The result is positive.

6 Remarks

The test report of the IEC 60146-1-1:2009 standard and related pictures are given as attachment.

Test Engineer

Selmin Kutanis

Approved By

Şeyda Uslu



TÜV SÜD
Teknik Güvenlik ve Kalite Denetim
Ticaret Limited Şirketi
Yıldız Posta Caddesi No:17 Kat:5
34394 Esentepe / İSTANBUL
Tel No: +90 (0) 444 6 888
Mecidiyeköy V.D. 882 001 9097

PICTURES OF REPORT



Front View of the Product



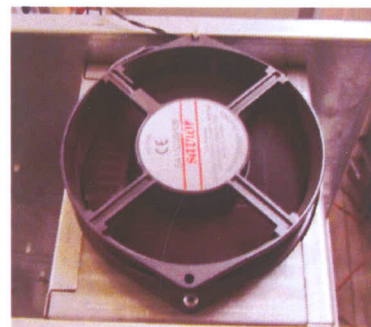
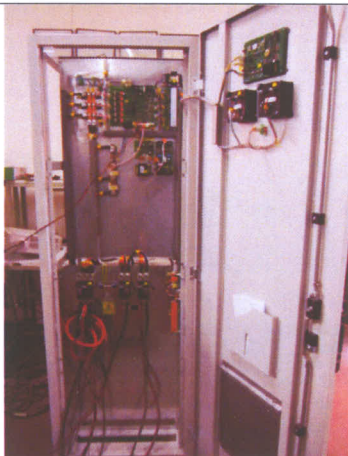
Back View of the Product



Left Side View of the Product



Right Side View of the Product



PICTURES OF REPORT

<p>Inside of the Product</p>	<p>Fan of the Product</p>
	
<p>Place of the Fan of the Product</p>	<p>Led Screen of the Product</p>
	
<p>Back Circuits of the Product</p>	<p>Measurement Equipments 1</p>
	
<p>Measurement Equipments 2</p>	<p>Measurement Equipments 3</p>

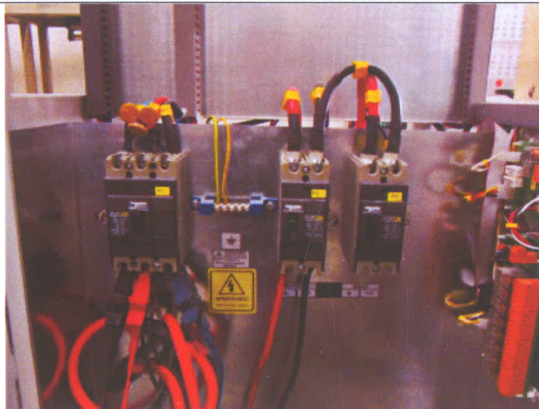
PICTURES OF REPORT



Measurement Equipments 4



Measurement Equipments 5



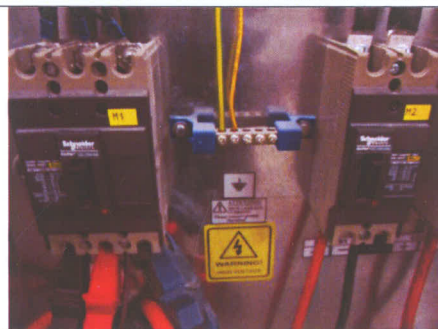
Picture 1: Control Device Function



Picture 2 : D.C Terminals Short Circuited



Picture 3 : Incoming Connected to the AC



Picture 4: Meters and Indicators

PICTURES OF REPORT

<p style="text-align: center;">Supply</p>	
<p style="text-align: center;">Picture 5: Simulation of the Alarms</p>	<p style="text-align: center;">Picture 6: Glass Fuse</p>
<p style="text-align: center;">Picture 7: Manuel Boost</p>	<p style="text-align: center;">Picture 8 : Float Mood</p>
<p style="text-align: center;">Picture 9: Charger Fail</p>	<p style="text-align: center;">Picture 10: Under Voltage</p>

PICTURES OF REPORT

	
<p>Picture 11 : Over Voltage</p>	<p>Picture 12: Earth Fault (+) Leakage</p>
	
<p>Picture 13: Earth Fault (-) Leakage</p>	<p>Picture 14</p>
	
<p>Picture 15</p>	<p>Picture 16</p>
	
<p>Picture 17</p>	<p>Picture 18</p>
	
<p>Picture 19</p>	<p>Picture 20 : Limits of Boost and Float Mood</p>

TEST REPORT

Product : **DC BATTERY CHARGER**

Reference standard: **IEC 60146-1-1 : 2009**

Model/Type:

RDAT 110-100

Rating:

Voltage/current:

INPUT **380 VAC / 23 A**

Voltage/current:

OUTPUT **110 VDC / 100 A**

Serial no:

Date : **07.05.2012**

Clause	Requirement	Remarque	Result
7.2	Insulation tests		
7.2.2	AC voltage test An ac voltage shall be performed on the final assembly.		Completed
	- basic insulation	Basic Insulation Assembly Earthed	Completed
	- supplementary insulation		N / A
	- reinforced insulation		N / A
	Terminals, open contacts on switches and semi conductor valve device shall be bridged in order for continuous circuit for the voltage test. Yes or no.	YES	Completed
	Individual components forming part of the insulation under test shall not be disconnected;	Only Earth Fault Circuit Should Be Disconnected	Completed
	- high frequency capacitors;	N / A	N / A
	Equipment or assembly fully covered by non conductive accessible surface conductive foil shall be wrapped.	Conductive Body	Completed
	Printed circuit board and modules may be disconnected and replaced with dummies during this test.	Circuit Board or Modules Not Disconnected But If Need Can Be Done	Completed
	Switch gear and control gear in main circuits shall be closed.	YES	Completed

Clause	Requirement	Remarque	Result
7.2.2.2	Performing high voltage test The test applied as follows: -		
	- between accessible conductive part and each circuit	Metal Surface Has Been Grounded Between Input and Ground 1000 VAC 50 Hz : 0.9 mA	Completed
	- between accessible non conductive part and each circuit	Between Output and Ground 1000 VAC 50 Hz : 0.7 mA	Completed
	- between each circuit and adjacent circuit with different polarity	Between Input and Output 1000 VAC 50 Hz : 0.7 mA	Completed
	- between each circuit and adjacent circuit with different polarity adjacent circuit	N / A	N / A
7.2.2.3	Duration of the ac voltage test		Completed
	The test voltage shall be applied for one minute	yes	Completed
	The tripping current shall be set to 0.1A	yes	Completed
	The test is considered passed in no electrical breakdown occure during the test	yes	Completed
7.2.2.4	Test voltages		
	Rated insulation voltage (V)	Test voltage (V)	
		Ac (r.m.s.)	DC
	1000 V	>2000 MOhm	
			Completed

Clause	Requirement	Remarque	Result
7.2.3	Insulation resistance		
	One minute after the high voltage test an insulation test with dc 500V test shall be applied as follows:-		
	- between accessible conductive part and each circuit	Between Input and Ground >2000 Mohm	Completed
	- between accessible non conductive part and each circuit	Between Output and Ground >800 Mohm	Completed
	- between each circuit and adjacent circuit with different polarity	Between Input and Output >2000 Mohm	Completed
	- between primary or secondary circuit and adjacent circuit	N / A	N / A
	The measured resistance value shall be not less than 1 M (ohm)		Completed
7.3	Functional test		Completed
	To verify the component and the cooling system function properly;		Completed
7.3.1	Light load test and functional test		Completed
a)	Light load		Completed
	For type test the converter/rectifier is tested at:-		Completed
	- maximum rated voltage ;	440VAC	Completed
	- minimum rated voltage ;	320 VAC	Completed
	If series connected semiconductor devices are used the arms of the converter , the voltage sharing shall be checked;	Blocking Diode	Completed
Clause	Requirement	Remarque	Result
b)	Functional test		Completed
	The test load as declared shall be proven;		
	- control device function ;	See Picture 1 Control Device Function OK	Completed
	- auxiliaries ;	Auxiliaries OK	Completed
	- protection devices ;	Protection Devices Temperature Tests OK	Completed
7.3.2	Rated current test		
	The d.c terminals shall be short circuited directly with a reactor	See Picture 2	Completed
	The incoming connected to the ac supply	382 V	Completed
	The control or auxiliaries to be connected separately with rated voltage if applicable	Common Input	Completed
	The ac supply voltage shall be regulated so as to make the rated current flow continuously in the output circuit.	N / A	N / A
	When it's more convenient the current test may be replaced by a full load test at rated ac voltage.	At 100 Ampere Seen Voltage and Current on the Main Network	Completed
	Rated incoming voltage;	L1-2 : 383 V L2-3: 388 V L1-3: 389 V	Completed
	Rated incoming full load current;	L1-2: 22 A L2-3: 21 A L3-1: 22 A	Completed

Clause	Requirement	Remarque	Result
7.4.1	Losses, temperature and power factor		
	Power loss may be determined by:-		
	- Calculating based on measurement	Between Phase - Notr 14,5KW	Completed
	- direct measurement;	11,7 KW	Completed
	Indirectly cooled converters		
	1.Power loss indirectly cooled converters by using calorimetric method	There is Cooler and Fan on the System See Photo: Fan of the Product	Completed
	When loss measurement cannot be performed under actual service conditions (rated load)		
		N / A	N / A
	The following method can be applied;	N / A	N / A
	a) the losses semiconductor valve are negligible.	N / A	N / A
	b) the forward voltage drop in the semiconductor valve can be represented.	N / A	N / A
	c) the losses due to forward current the same as in service.	N / A	N / A
	d) saturable and non-saturable reactors built into the assembly	N / A	N / A
	e) for load condition for which the efficiency is specified. The efficiency may be determined by measuring input and output power.	N / A	N / A
	f) for those load conditions for which a conversion factor is specified may be determined by measuring the ac power and dc output.	N / A	N / A
	g) increase of power losses due to existing line distortion or due to load increase is not considered.	N / A	N / A
	h) main power loss at full load	input:11.8 KW output: 10.9 KW Power Loss: 900 W / %8 see table 1	Completed

Clause	Requirement	Remarque	Result
7.4.1.2	Methods of measurement		
	- Test at normal ambient temperature ;	25-27 ° C	
	- forward loss measured when all parts of the converter have reached stable temperature at full load current.	The Cause of the Power Loss is Temperature Loss of the System (Transformer has biggest Loss) See Clause "h"	N / A
	- when the converter transformer is included the power loss measurement , the load losses shall be corrected to a reference temperature .		N / A
7.4.1.3	Test circuit		
	In all cases the losses that will occur in service in voltage dividing resistors, damping circuits and surge arrestors if any are to be calculated and added.		Completed
7.4.2	Temperature rise test		
	The temperature rise of the converter shall be determined also during the current test.		Completed
	Test carried out at rated load conditions.	See Table 2	Completed
	In other cases when carrying out clause 7.3.2		Completed
	The temperature rise measure at specified point;		Completed

Clause	Requirement	Remarque	Result
7.4.3	Power factor measurement		
	For converters supplying mainly battery chargers or capacitive loads, the total power factor should be considered.	0,83	Completed
	Power factor;		
	When the actual direct current and output direct voltages of a line commutated converter is known the following formulae can be used;	Actual Output Valves Are Measured	Completed
	Active power $P=U \times I$ (direct voltage x direct current)	See Table 1	Completed
	Apparent power ; $S= U \times I$ (ideal no load direct voltage x direct current)	See Table 1	
	Displacement factor ; $\cos \phi = P/S$	See Table 1	
	Reactive power ; $Q = \sqrt{S^2 - P^2}$	See Table 1	
7.5	Auxiliaries and control		
7.5.1	Checking auxiliary devices		
	These devices shall be during clause light load test ;		Completed
	Contractors;	N / A	N / A
	Meters and indicators	See Picture 4	Completed
	Sequencing equipment;	N / A	N / A
	Fans; (heat sinks)		Completed
	Others; (as detailed manufacture's check list)		
7.5.2	Checking the properties of the control equipment;		
	Trigger equipment checked at rated full load conditions;	See Led Screen	Completed
	Control equipment may be checked during test of 7.3.1 and 7.3.2		Completed
	Dynamic and static properties shall be checked for all values of rated voltages;	Tested at 248 V and 240 V OK	Completed

Clause	Requirement	Remarque	Result
7.5.3	Checking the protective devices;		Completed
	Ability to protect the converters from over current.		Completed
	The protective devices shall be checked for its marking on rating and test report;		Completed
	Fuses ;	N / A	N / A
	Glass Fuses;	See Picture 6	Completed
	MCB;	N / A	N / A
	Relays;		Completed
	CT;		Completed
	MCCB;		Completed
	varistor (500 V)		Completed

System input and power factor

No.	particulars		System power consumption						
			KVA	KVAR	KW	PF	V	A	Hz
	Terminal	Input	14.9 kVA	4,8	11,8	0,85	205	22	50 Hz
		output			10,9		122 VDC	90	
		No de load output					122 VDC		
		Efficiency %				92%			

Table.2 Temperature rise of critical components
 Room ambient = (30-35) C

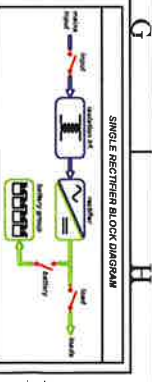
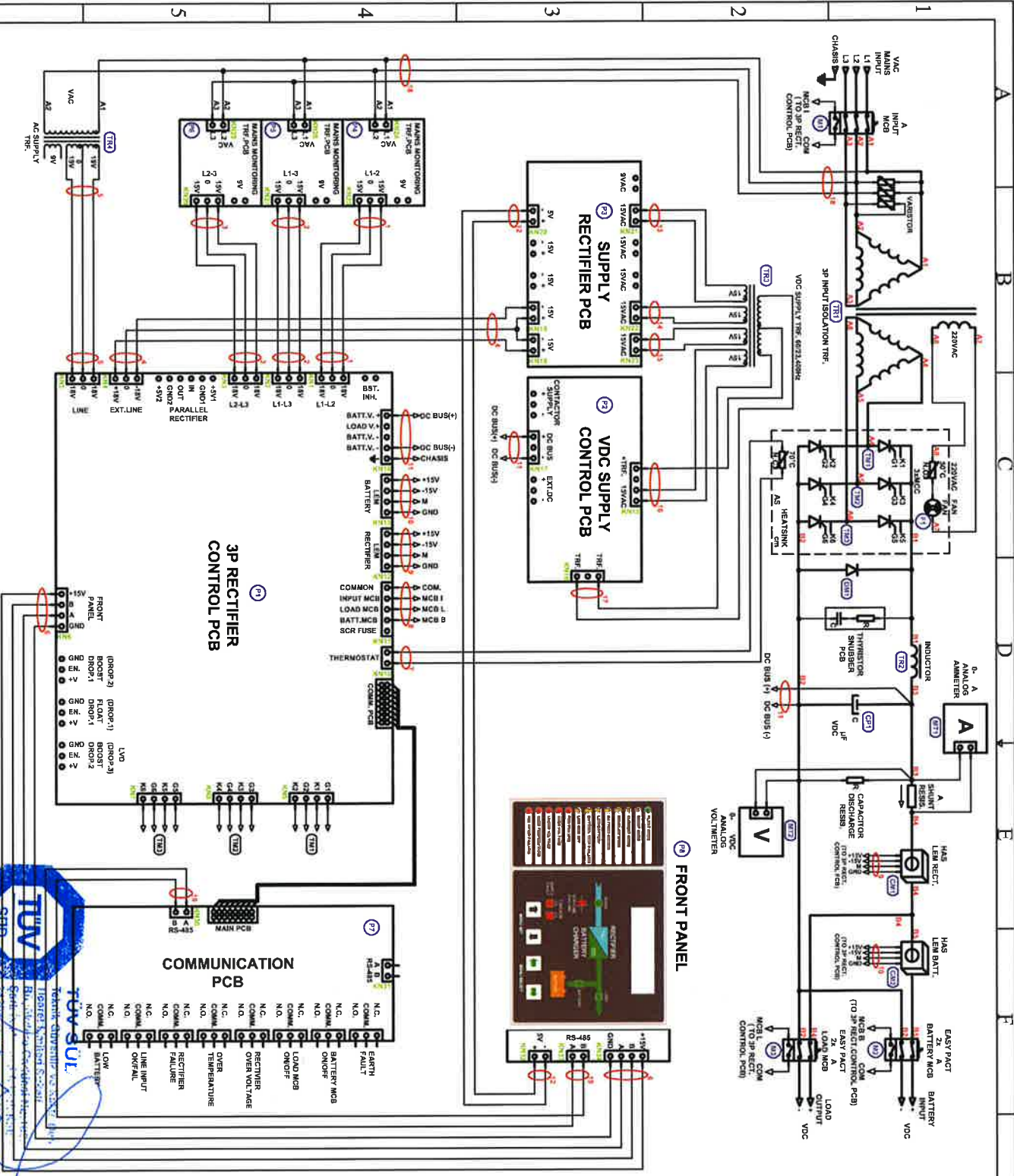
No.	particulars	Placing of Thermocouple for temperature measurement	Voltage drop measured across	Power loss (vd x I)	Temperature measured (C)	Results or limits
1.	Main transformer			See Table 1	Winding 68 ° C	Complied
					Iron Core 56 ° C	Complied
2	Capacitor (C)	Body Surface		See Table 1	35 ° C	Complied
3	Reactors (L)			See Table 1	Iron Core 46 ° C	Complied
4	Reactors (L)			See Table 1	Winding 56 ° C	Complied
5	Rectifier			See Table 1	34 ° C	Complied
7	Blocking diode			See Table 1	N/A	N/A
8	Heat sinks	Surface of Heat Sink		See Table 1	30 ° C	Complied
9	Internal ambient	Top-Mid Section		See Table 1	26 ° C	Complied
10	Enclosure assembly	Front Near Handle		See Table 1	33 ° C	Complied

Additional Test :

Clause	Description	Condition	Criteria	LED Reset	Remote Signal Ind/Com	Result
6	Simulation of Indication					Completed
6.1	MAINS ON	Input MCCB ON	MAINS ON and Float Leds are ON	Auto		Completed
6.2	Float charge	See Picture 8	Float Led is ON	Auto		Completed
6.3	Manual boost	See Picture 7	Boost Led is ON	Auto		Completed
7	Simulation of alarms	See Picture 5		Auto		Completed
7.1	Led test	ON / OFF Menu Press on Button	All Alarm LEDs are ON	Auto		Completed
7.2	Charger fail	Common Alarm	Charger Fail Led is ON See Picture 9	Auto		Completed
7.3	Charger Under Voltage	Feedback Information Has Been Cut	LED Under Voltage See Picture 10			Completed

Clause	Description	Condition	Criteria	LED	Remote	Result
7.4	Charger Over Voltage	11 Batteries Connected to System	Led Over Voltage See Picture 11	LED is ON		Completed
7.5	Earth fault	Earth Fault + and - LEDs ON 150 mA >	Earth Fault Circuit Short Circuit Between Body Surface and Positive Terminal See Picture 12	LED in ON		Completed
7.6	Earth Fault	Earth Fault + and - LEDs ON 150 mA >	Short Circuit Between Body Surface and Positive Terminal See Picture 13	LED in ON		Completed
7.7	Low Electrolyte level	N / A	N / A	N / A		N / A
8	Breaker isolation test	Switch of Circuit Breaker	No AC Voltage Supply to Charger	N / A		N / A

Clause	Description	Condition	Criteria	LED	Remote	Result
9	Line Stability Test with 10 % (light) load. Measure dc voltage at battery terminal at nominal, minimum and maximum input voltages.	Input Supply Voltage	Battery Terminal at Float Condition	Battery Connection Led	Screen	
		Min: 320 V AC Nom: 380 VAC Max: 440 VAC			Screen	122 VDC with + or - < % 1 123 VDC with + or - < % 1 123.1 VDC with + or - < % 1
10	Load output regulation at 10%, 50% and 100%. Measure the DC across the load terminal at float and boost condition.	Load Output Regulation	Float Condition		Screen	121.8 VDC with + or - < % 1 122.5 VDC with + or - < % 1 122.4 VDC with + or - < % 1
		% 15 - 15 ADC % 55 - 55 ADC % 93 - 93 ADC	122.4 VDC			
		% 19.2 - 19.2 A % 53.4 - 53.4 A % 98 - 98 A	127.8 VDC	See Picture 14 See Picture 15 See Picture 16 See Picture 17 See Picture 18 See Picture 19		
11	Ripple voltage (rms voltage)	Measured RMS Voltage Without Battery at Full Load Full Load 90 A	< % 1		Screen	1.2 VAC RMS Ripple % 0,98
12	Current limit and Automatic boost Test	Increase DC Load %110 Measure Current Limit Voltage	100.5 ADC	LED Alarm	Screen	Passed Rectifier Current Mode 100 ADC With + or - % 1
	Automatic Boost Test	If Charge Current is Above 6 ADC the System Passes to Boost Mode If it is below 3ADC the system passes to Float Mode.	10.6 ADC	LED Alarm See Picture 20	Screen	Passed Rectifier Boost Mode



- ### FRONT PANEL LED INDICATIONS
1. FLOAT MODE (GREEN)
 2. BOOST MODE (AMBER)
 3. CURRENT MODE (AMBER)
 4. EQUALIZE MODE (AMBER)
 5. BATTERY ENDING (AMBER)
 6. LOW BATTERY (AMBER)
 7. BATTERY TEST FAILURE (AMBER)
 8. LINE MCB OFF (AMBER)
 9. FAN FAILURE (RED)
 10. OVER VOLTAGE (RED)
 11. UNDER VOLTAGE (RED)
 12. OVER TEMPERATURE (RED)
 13. RECTIFIER FAILURE (RED)
 14. MAINS MCB (GREEN)
 15. BATTERY MCB (GREEN)
 16. LOAD MCB (GREEN)
 17. (+) LEAKAGE (RED)
 18. (-) LEAKAGE (RED)
 19. SCR FUSE FAILURE (RED)
- ### FREE ALARM CONTACTS
1. LOW BATTERY
 2. LINE INPUT OK/FAIL
 3. RECTIFIER FAILURE
 4. OVER TEMPERATURE
 5. RECTIFIER OVER VOLTAGE
 6. LOAD MCB ON/OFF
 7. BATTERY MCB ON/OFF
 8. EARTH FAULT
- ### COMPONENT CODE LIST
- | COMPONENT | CODE |
|--------------------------|-------------|
| INPUT MCB | M1 |
| BATTERY MCB | M2 |
| LOAD MCB | M3 |
| 3P INPUT ISOLATION TRF. | TR1 |
| INDUCTOR | TR2 |
| DC SUPPLY TRF. | TR3 |
| AC SUPPLY TRF. | TR4 |
| DC BUS CAPACITOR | CP1 |
| LEM MODULE (RECT.) | CM1 |
| LEM MODULE (BATT.) | CM2 |
| RECTIFIER THYRISTORS | TM1-TM2-TM3 |
| DIODE MODULE | DM1 |
| 3P RECTIFIER CONTROL PCB | PC1 |
| SUPPLY CONTROL PCB | PC2 |
| SUPPLY RECTIFIER PCB | PC3 |
| MAINS MONITORING TRF.PCB | PA-P5-P6 |
| COMMUNICATION PCB | PC7 |
| FRONT PANEL | PC8 |
| HEATSINK FAN | MT1 |
| ANALOG AMMETER | MT2 |
| ANALOG VOLTMETER | MT3 |
| CONNECTOR CODE | KN1-KN34 |
| CABLE CODE | A1-B5/1-19 |

REV	DATE	NAME	DESCRIPTION

DESIGN BY	APPR BY	CHECKED BY	DRAWN BY

PROJECT NO.	SHEET

DATE	



RDAT 110-00 Subject to TUV Certification
 Test Report No.: 79K-LTMF-12-032
 First Certificate No.: 79K-LTMF-12-032

3P AUTOMATION TYPE RECTIFIER POWER & CONTROL WIRING DIAGRAM
 (380VAC / 110VDC - 100A)



3P AUTOMATION TYPE RECTIFIER POWER & CONTROL WIRING DIAGRAM
 (380VAC / 110VDC - 100A)