

EPS Stromversorgung GmbH
Alter Postweg 101
86159 Augsburg/Germany
TEL +49 (0) 821 / 570 451 -0
FAX +49 (0) 821 / 570 451 -25
E-Mail: info@eps-germany.de
<http://www.eps-germany.de>



Frequency Converter Manual 45kVA 3x200V 400Hz

Code. 140397

Technical data described in this manual cannot be reproduced without any written license.

WARRANTY

The apparatus is guaranteed from defect of materials and defect in workmanships within bounds of right working.

If within the warranty period, the apparatus was defective, SHT would repair or substitute, free of charge, the damage part, ex our works.

The warranty will be not applied in the following situations:

- Without a proper installation (inadequate air conditioning, high temperatures, dusty and corrosive ambient);
- If a whatever part of the apparatus has repaired or manipulated by not qualified SHT personnel;
- If it turns out that the cause of the fault is due to negligence of not qualified personnel or to bad working of other apparatus (conditioners, fans..);
- If it turns out that the cause of the fault is due to events as: thunderbolts, fires, earthquakes, inundations or other disasters;

REMARK: Ordinary maintenance, if it is not provided in the purchase contract, is charged to customer even during warranty period.

The apparatus has to maintain clean observing the safety instructions described in the chapter "MAINTENANCE".

INTRODUCTION

This technical manual contains all the necessary information for the correct use of the apparatus. If a fault or a bad working happens, our Customer Service will provide authorized electricians or qualified internal personnel to perform the necessary operations. In case of conflict between this manual and drawings or purchase orders, the manual NOT has priority. If errors would be notified upon the content of this manual, these ones had to be communicated to Engineering Department in order to substitute the relative part.

DANGER OF ELECTROCUTION

Inside the apparatus there are some voltage potentials which are dangerous for health bodily.

We exhort to allow the admittance at the apparatus only to expert personnel. Before starting any maintenance operations it is necessary wait for the discharge of electrolytic capacitors and IT IS NECESSARY MEASURE THEIR VOLTAGE BEFORE TOUCH THEM.

TABLE OF CONTENTS

Product introduction
Installation
Start up procedure
Shutdown procedure
Frequency converter maintenance
Troubleshooting
Adjustments
Schematics
Mechanical assembly
Control Logic
CE declaration
Test report

PRODUCT INTRODUCTION

The diodes rectifier converts the input AC voltage into a DC voltage. Therefore the IGBT three phase bridge, reconverts the DC voltage into a AC voltage with PWM technology. The output bridge voltage, is applied to the transformer in order to have a galvanic insulation between input and output and in the meantime to adapt the output voltage from the bridge to the user voltage requested. The filter, placed downstream of transformer, gives the output voltage sinusoidal with a low harmonic content.

The electronic circuits whom provide to the stabilization, with an answer time lower than a semi cycle, and to all protection and control functions, are realized with high immunity components.

INSTALLATION

Upon receiving the frequency converter, carefully examine the packing container for any sign of physical damage.

Place the converter in a room with an enough aeration, and verify that the dissipation power can be evacuated by the foreseen devices in the room.

Not place the apparatus where some dripping of water or of other fluid can be occurred.

Generally:

- If the air change has got with a forced ventilation, calculate the air-flow taking care also of the input latent heat (other apparatus, sun exposure – 1kW/m^2), and avoid zones with heat stagnations. The cooling system have to be redundant in order to avoid critical situation for any fan faults.
- If you use air-conditioners, take care that, even in fault condition, the temperature room doesn't overcome the admitted values.
- If the converter is made for external use, it is important foreseeing a lean-to.

Take care that the air feed opening are always without any obstructions.

Connect the Input/Output Terminal Board. **If not request in explicit form, the output neutral is NOT grounded.**

START UP PROCEDURE

1. Check that input breaker Q1 is in OFF position.
2. Feed the mains to the input converter.
3. Close Q1.
4. Push INPUT green button. Immediately K2 is excited. Green RUNNING lamp and red ALARM lamp are lighted.
After 10 seconds K1 is closed.
After 7 seconds the converter is in function and red ALARM lamp come off: the converter is OK.
5. When converter is OK, it is possible to connect output contactor in agree with the selection performed.

SHUTDOWN PROCEDURE

1. Push OFF button (local or remote) to disconnect output connector.
2. Push INPUT red button to disconnect input contactor.
3. Open input circuit breaker to isolate the converter.

FREQUENCY CONVERTER MAINTENANCE

After having started up the apparatus in the right way, it doesn't need any particular care: however it is necessary that the ambient, where the frequency converter is placed, must be airy and without dust. It is important after the first six months to carry out a check of the apparatus to verify its cleanness; if the accumulated dust on radiators is excessive, it is necessary to remove this one with dry low compressed air. For normal environment, it had better clean the apparatus at least yearly.

SCHEDULED OPERATION

- Replacement of the fans after 20.000 working hours;
- Replacement of the electrolytic capacitors after 80.000 working hours;
- Replacement of the filter capacitors after 100.000 working hours;

The above schedules refer to an apparatus that works on average of 25°C. For higher temperatures, consider that for every 10°C more, there is a cutting in a half of above indicated periods.

TROUBLESHOOTING

- Closing Q1 the fans don't start. Check
 - the fuse of auxiliary transformer, 10x38 6A;
 - the circuit breaker of fan: Q1.
 - Closing Q1 the P1 meter doesn't light up. Check the fuse of protection of measure instrument: 10x38 1A.
 - Pressing the INPUT green push button, the K2 contactor is not energized. Check the fuse of protection of input auxiliary circuits: 10x38 4A.
 - Thermostats of each heat sink.
 - Thermostats of each magnetic components (when mounted)
 - Emergency push button must be taken out.
1. In spite of being energized K2, K1 is not energized after 10-12 seconds.
Check:
 - that K3 is energized, and V56 on AICO is lighted. The pilot lamps of START and ALARM on the control panel are lighted.
 - KT timer: is set on 12 seconds. When K3 is energized the green led have to be lighted. When the yellow led lights K1 has to be energized.
If V56 and the pilot lamps doesn't light, switch off the converter, check F7 (10x38 1 A). If it is in fault, change it with an other one. Repeat the forward operation. If the fuse is yet in fault, call the technical service. The fault regards the ALUP (power supply).
 2. K1 is energized, but inverter do not start. When K1 energizes, V57 on AICO has to be lighted.
Check
 - CORE must have yellow LED and 2 green LED lighted. If not control the fuse of ALUP (F4).
 - After 7 seconds that V57 lights on AICO, V96 has to be lighted on CORE (V94 had to be already lighted). After 1-2 seconds V95 has to be lighted.
 - **If is not happened, call the technical service.**
 3. The faults, while the converter is running or starting, are signalled on CORE by LEDs.
 - V95: the led doesn't light. The converter can be in overload.
 - V97. the led lights (yellow) : the converter is in overvoltage and it locks.
 - **V98.** the led lights (red). The right leg of IGBT bridge has a problem: the problem can depend on by an IGBT, by driver board (PGBT) or by section 41-60, (red wire) of CORE flat cable.
 - **V99.** the led lights (red). The central leg of IGBT bridge has a problem: the problem can depend on by an IGBT, by driver board (PGBT) or by section 21-40 of CORE flat cable.
 - **V100.** the led lights (red). The left leg of IGBT bridge has a problem: the problem can depend on by an IGBT, by driver board (PGBT) or by section 01-20 of CORE flat cable.

4. For a fast diagnosis, in order to check the fault causes, after have switched off the converter and after have waited for the discharge of the capacitors, you can do the following test. This test can be done only by technical staff and with the agree of technical ELIT office.

This test consists in changing the wrong leg connector with one of the others two ones:for example, if the led V100 is lighted, it means that the fault is in the section 01-20 of flat cable. If you change this connector with that relative to the part of flat cable 21-40 and remake the starting, it can happen two cases: 1) the led V100 is off, but V99 lights. 2) the led V100 goes on lighting.

In case 1) the fault can regards the IGBTs of the left leg or its driver board. The wrong of a IGBT can be checked by a tester.

In case 2) the fault regards the CORE board.

ADJUSTMENTS

The possible regulations can be done on the CORE board.

- RV1: frequency
- % of drop line compensation.
- RV3: block of the converter for breakdown output voltage
- RV4: alarm for minimum output voltage (the converter doesn't block and, ceased the overload, it restarts to supply the voltage output rating.
- RV5: reserved to technical services.
- RV6: the setting of current limit (to set only with the authorization of technical service)
- RV8: overload signal.
- RV9: reserved to technical assistance
- RV11: setting of voltage output rating.

TECHNICAL SPECIFICATION FREQUENCY CONVERTER

45kVA – 400Hz

1. INPUT DATA

- Rated voltage:	: 3 x 400V +-15%
- Frequency:	: 50/60Hz +-5%
- Input current at full load	: 67.5 A
- Power factor	: 0.94
- Total Current Harmonic Distortion	: 25%
- Inrush current	: absent

2. OUTPUT DATA

- Rated power (cos phi=0,8)	: 45kVA
- Rated voltage	: 200/115V 4w
- Frequency	: 400Hz ±0,5%
- Power factor	: ind./cap.
- Waveform	: sinusoidal
- Total Harmonic Distortion (linear load)	: 3%
- Voltage regulation	: ± 1%
- Voltage transient (for load step 0-100% and back):	: ± 8%
- Recovery time	: 2 msec.
- Overload 10 minutes	: 1.25 of full load
- Overload 1 minute	: 1.5 of full load
- Voltage symmetry with balanced load	: ± 1%
- Voltage symmetry with 30% unbalanced load	: ± 2%

3. SYSTEM PARAMETERS

- Dimensions (Width x Depth x Height mm)	: 600x900x1200
- Weight (kgs)	: 450
- Efficiency	: >90%
- Audible noise	: 65dBA
- Operating temperature	: -25°C to +50°C
- Relative humidity (non-condensing)	: 0 to 95%
- Altitude without derating	: 1000m msl
- Enclosure:	: IP 20
- Cooling:	: forced air

4. STANDARDS

CE compliant.

ISO 6858: Ground support electrical supplies

EN 2282: Characteristics of aircraft electrical supplies – General requirements

MIL-STD-704E

EN50091-1

EN 61000-6-2: Electromagnetic compatibility. Emission

EN 61000-6-4: Electromagnetic compatibility. Immunity.

5. BREAKERS, OPERATOR CONTROLS, MEASURES, INDICATORS

- Input circuit breaker (door interlocked)

- Output switch

- ON/OFF switch operator

- Measures:

: output voltage

: output current

: output frequency

-Indicators:

: frequency converter running

: frequency converter alarm

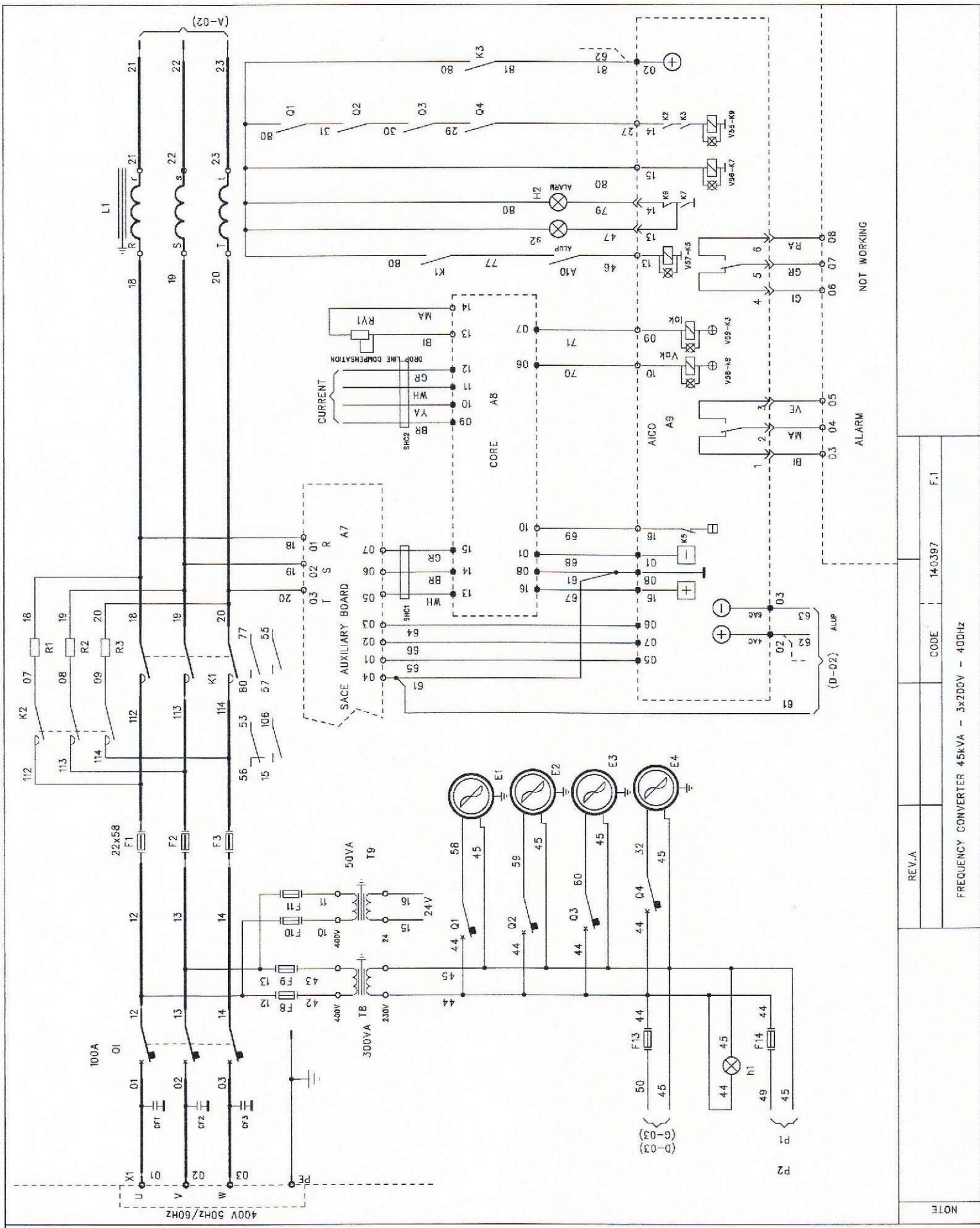
- Remote control

: ON/OFF Converter

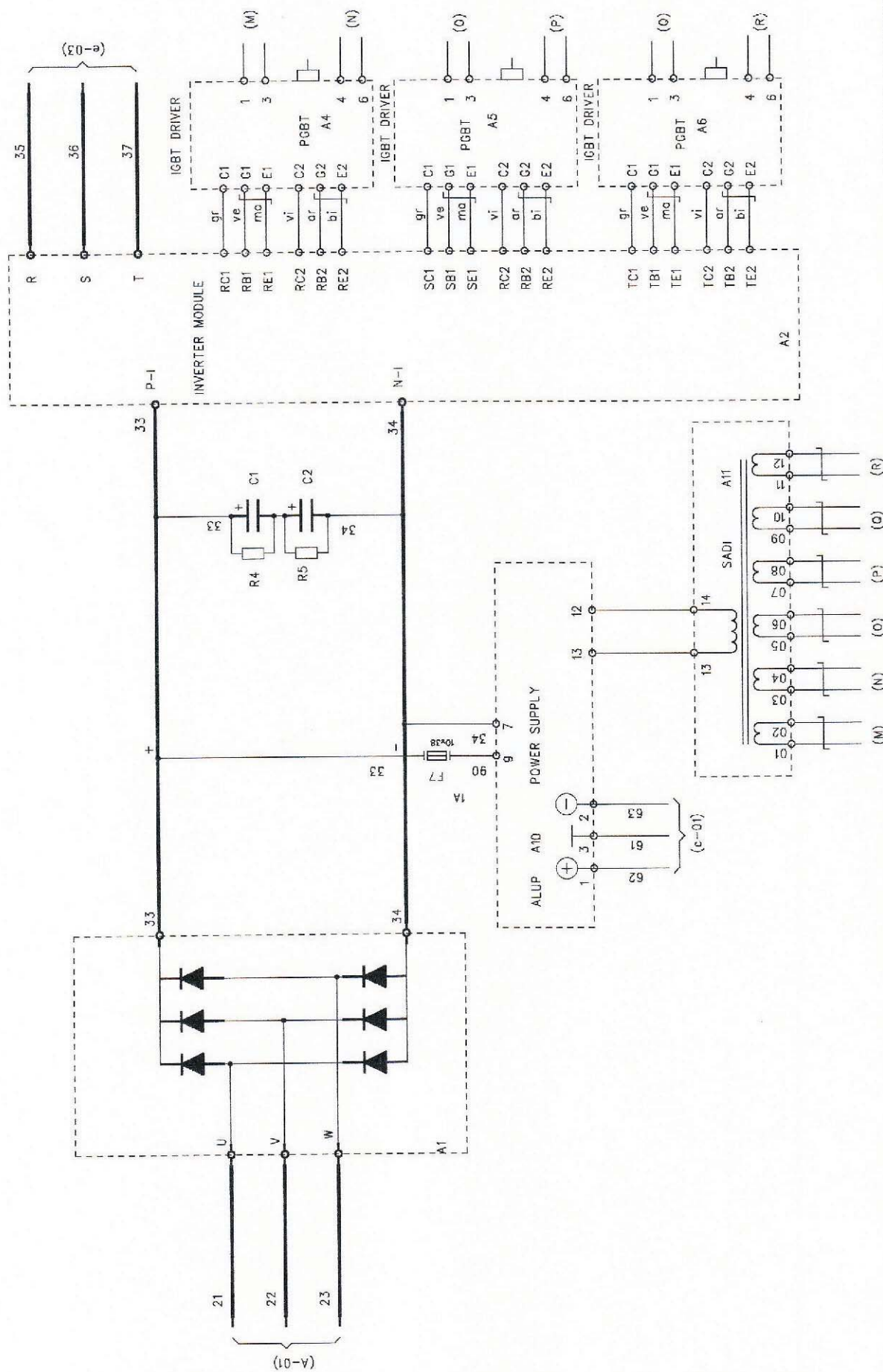
- On door voltage calibration (optional)

- On door frequency calibration (optional)

Power reserves his right to do modifications to his products without notice.



REV.A	CODE	140.397	F.1
FREQUENCY CONVERTER 45kVA - 3x200V - 400Hz			



NOTE

CODE 140397 F.2

FREQUENCY CONVERTER 45kVA - 3x200V - 400Hz

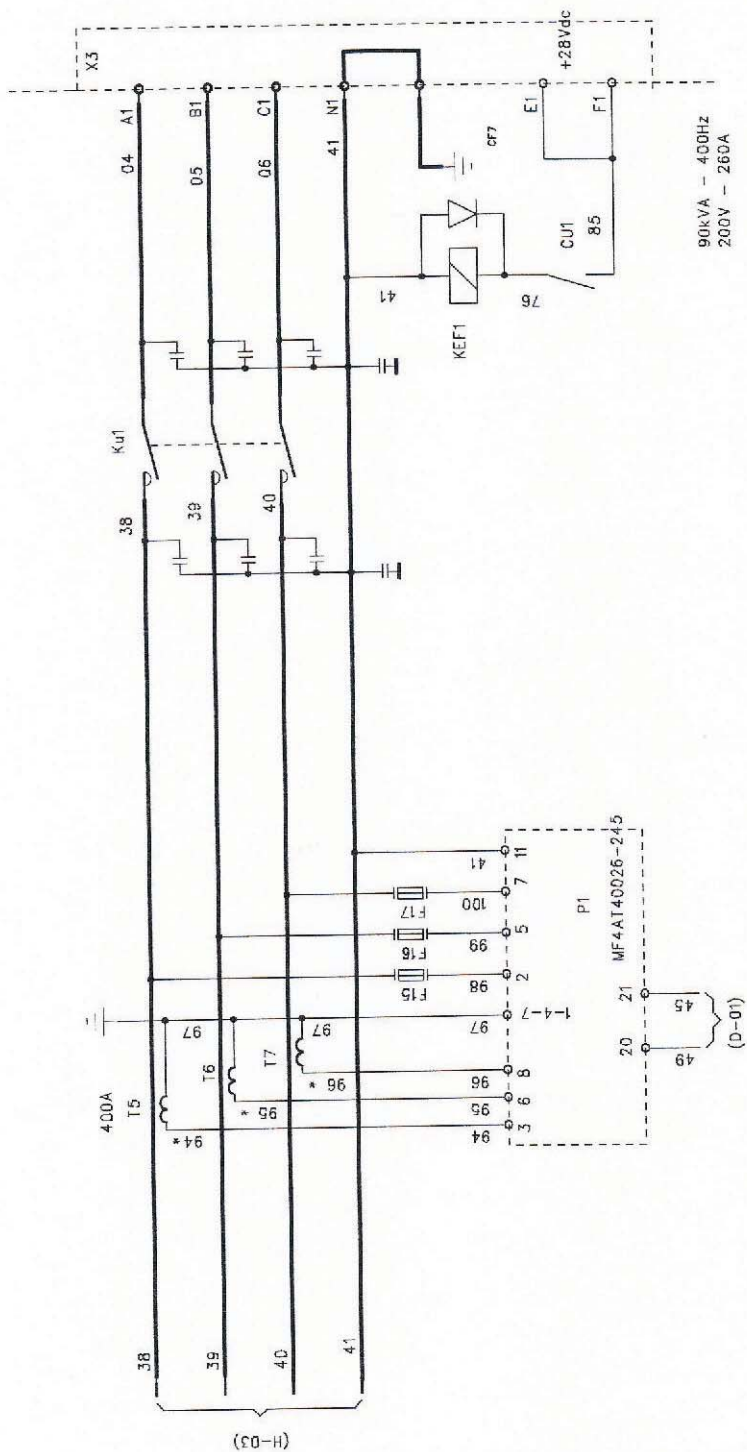


FREQUENCY CONVERTER 45kVA - 3x200V - 400Hz

CODE	140397
------	--------

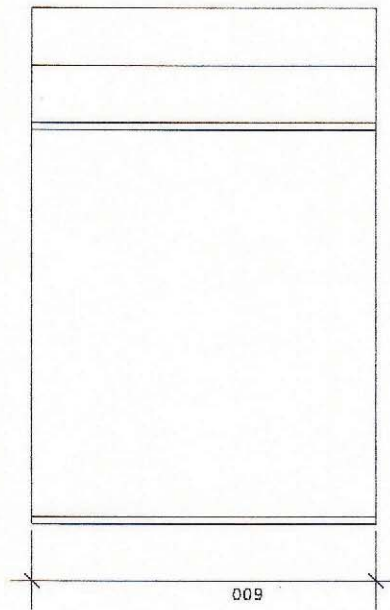
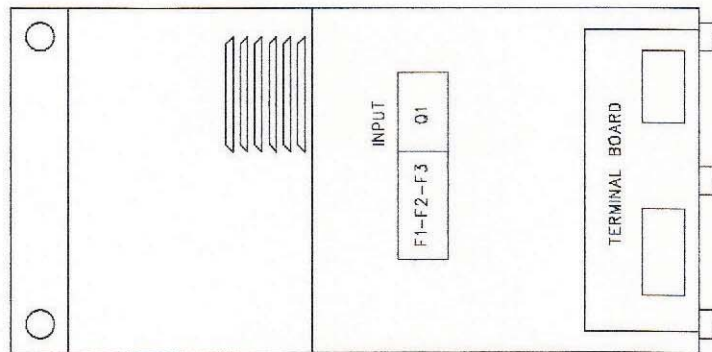
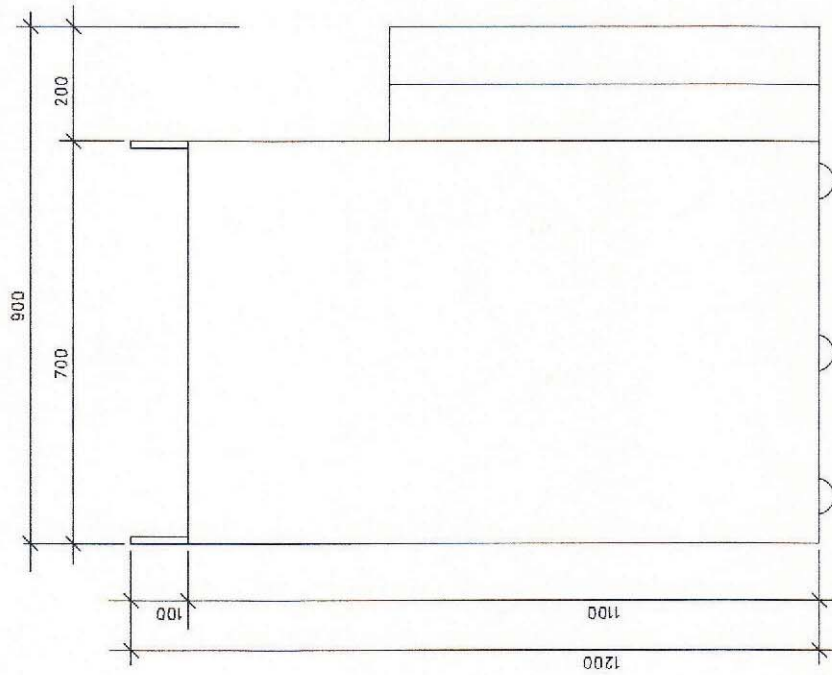
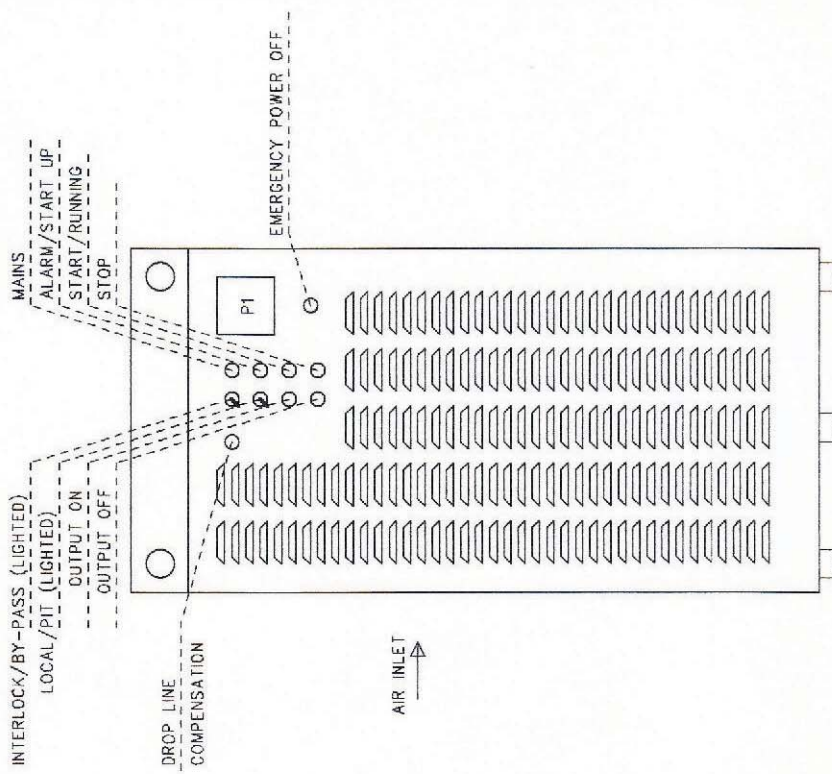
F.3

45kVA - 400Hz
200V - 130A



CODE		140397	SH.5
FREQUENCY CONVERTER 45kVA - 3x200V - 400Hz			

NOTE



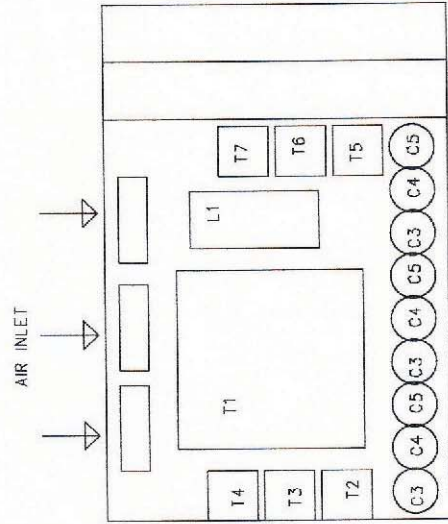
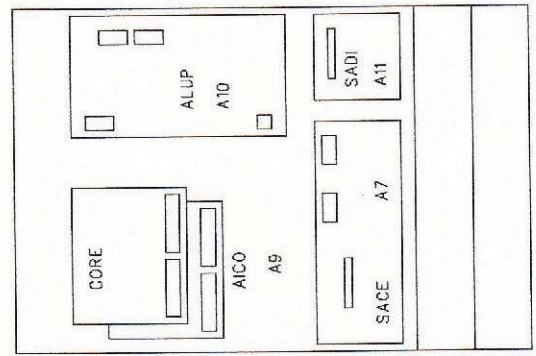
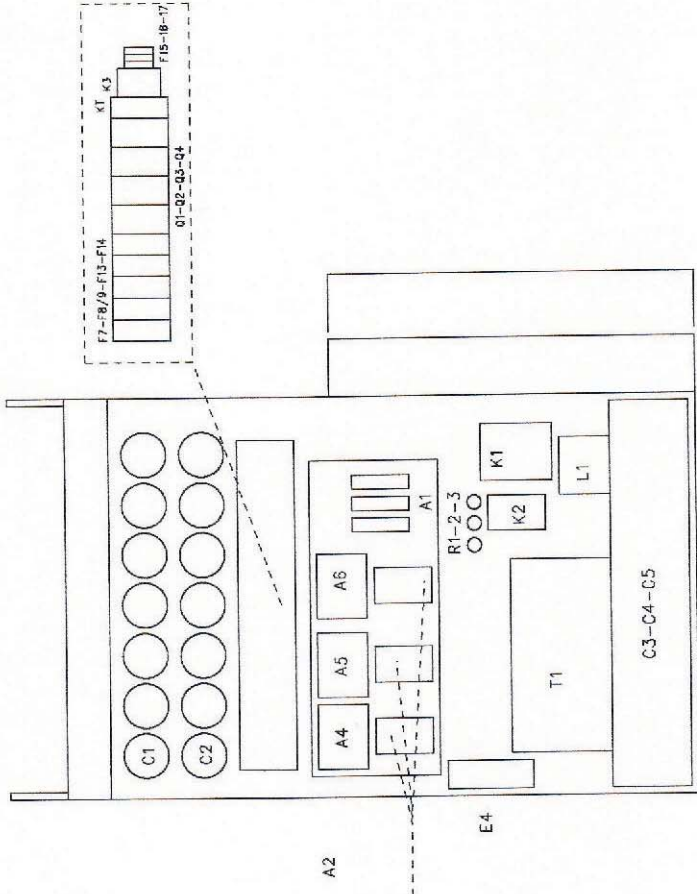
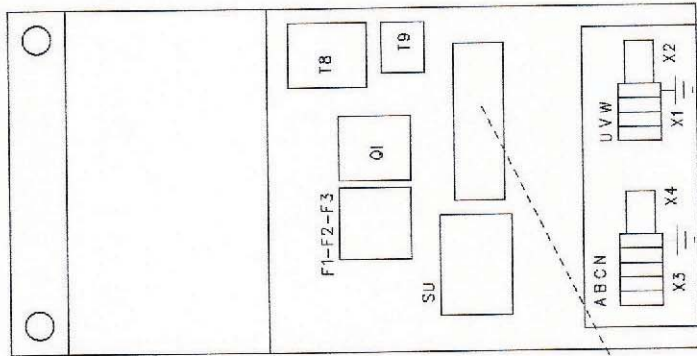
NOTE

CABINET

CODE

140397

SH.6



NOTE

CABINET: INTERNAL VIEW

CODE 140397 SH.7

59

01

01

16

RV1

0

FREQUENCY

RV2

CW

x

-V

RV3

CW

x

NC

RV4

CW

x

OK

RV5

CW

x

+G

RV6

CW

x

LIMIT

RV8

CW

x

LOW

RV9

CW

x

+V

RV11

CW

x

+V

IM

C

A

0

0

0

V94

0

V95

0

V96

0

V97

0

V98

0

V99

0

V100

0

DROP LINE COMPENSATION

MAX INV. VOLTAGE

MIN INV. VOLTAGE

CURRENT GAIN

CURRENT LIMIT

OVERLOAD SIGNALLING

MANUAL VOLTAGE REGULATION

OUTPUT VOLTAGE SETTING

INVERTER CURRENT OK

INVERTER VOLTAGE OK

START INVERTER

MAX. VOLTAGE

FAULT FLAT 41-60

FAULT FLAT 21-40

FAULT FLAT 01-20

NOTE	REV.A		CODE	SH.B
CORE				

POSITIVE POWER SUPPLY OK

NEGATIVE POWER SUPPLY OK

☐ V51
☐ V52

01 16

INVERTER REGULARLY RUNNING

SWITCH OPERATOR IN START POSITION

K1 AND SECURITY CHAIN, OK INVERTER START UP

INVERTER VOLTAGE OK

CURRENT INVERTER OK

☐ V55
☐ V56
☐ V57
☐ V58
☐ V59

01

01 16

REV.A

CODE

140397

SH.9

AICO

NOTE

NEGATIVE POWER SUPPLY OK

POSITIVE POWER SUPPLY OK

V45

V46



20 15 14 09

110129

V48



AUXILIARY VOLTAGE OK

01

06

07 08

NOTE

CODE 140397

SH.10

ALUP/C

