



NETPRO-FC SERIES

3 PHASE FREQUENCY CONVERTER USER'S MANUAL

SERVO-MATİK ELEKTRONİK SİSTEMLER

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PREFACE

- This User's Manual covers all the information for installation and operation of NETPRO-FC model frequency converter.
- Follow all the instructions in the correct order.
- Read the warnings in the manual.
- Make sure you read the manual carefully when you want to perform an action on the Frequency Converter. Otherwise the device can be damaged.
- Starting-up the device and all maintenance/service works for the dangerous parts of the system must be done by the authorized personnel who educated for giving technical service.
- Before starting-up the device all safety precautions must be done by authorized personnel.
- If you come across any problem while applying this manual, contact with the service centre via phone number/e-mail on the back cover of this manual.

CAUTION

- Danger of electric shock! Do not open cover of the device. The device has spares that users can not interfere. Contact with the authorized technical service centre in case of fault.
 - Please provide requested medium for installation the device. There should be at least 30 cm free space at both sided and behind of the device as well.
 - All maintenance/service works for the dangerous parts of the system must be done by the authorized personnel who has sufficient technical knowledge.
 - Make sure that all the used parts of the device are electricity less. For safety please control all of circuit breakers by measurement device.
 - During opening the covers and taking some metal objects out of the device please be aware not to hit cables and electronic cards inside of the case.
 - Do not wear metal items like rings, watches during the installation. Use isolated tools.
 - Cables which will be connected to Frequency Converter should be selected in suitable diameter mentioned at user guide.
 - Do not put the device in use without grounding.
 - It could be dangerous for people using a pacemaker to be near the frequency converter.
 - In order to reduce the risk of fire, change the fuses with the same kind and sizes used before if it is necessary.
 - No external objects should be entered the device via ventilation holes and these holes should not be choked up.
 - Please do not use the device in such mediums where explosive and flammable materials exist.
 - Please do not use the device under direct sunshine and near the heater as well.
 - Keep the items like bank card, hard drives precise electronic devices which can be affected by magnetic field, at least 50 cm away from the frequency converter.
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- **Bear in mind that the damages caused by user faults or bad usage will put the device out of warranty.**

USER ERRORS

- 1) Connection of abnormal loads that exceeds device nominal power rate,
- 2) Wrong connection of input, output and battery cables(phase connection to battery etc.),
- 3) Changing phase sequence,
- 4) Changing fuse rates of input, output and battery,
- 5) Changing batteries, reverse connection of batteries and changing number of batteries,
- 6) Working without batteries,
- 7) Changing place of device without information of SERVO-MATİK Electronic Systems
- 8) Being exposed to physical damage to Device or gotten harm
- 9) **Being kept out of normal environmental conditions or worked of device.(Temperature, Humidity, Cleaning, Ventilation, Enviromental conditions, Liquid Contact)**

INTRODUCTION

Nowadays with technology development, electrical, electronical and also electromechanical devices are improving and getting popular. The demand for and also using field of this devices are increasing day by day.

Voltage ripples, harmonic distortions, short and long time electricity interruptions in the main which load connected to could damage it. Frequency converter is used in field of health, data processing, banks, industrial plants which couldn't tolerate to data losses and located between main and load when different frequency usage is needed for pure power. These interruptions could even harm saved datas. Frequency converter also provides customer back up if needed time in the case of voltage interruption(optional).

Frequency converter filters interferences have been formed by main and provides the load with stable main frequency. As the Frequency converter is a controllable device with microprocessor; it could react immediately to voltage ripples and in the case of main interruption the load is supplied via Frequency converter. According to this feature the network irregularity has been avoided. Frequency converter is manufactured according to demand so the features of used materials, efficiency of it and qualifications of the device should be taken under consideration.

GENERAL FEATURES:

- Advanced Microprocessor controller
- Real dual conversion technology
- IGBT rectifier and inverters
- Active input power factor correction (≥ 0.99)
- With low input THDI $< 5\%$ excellent generator compatibility
- With low output THDV $< 5\%$ excellent energy for devices
- Excellent compatibility for loads with different power factors
- Adjustable input and output voltage and frequency
- Extensive input voltage range (221-318V AC)
- Up to 95% high efficiency
- Smart fan control
- EMI/RFI filters
- Short Circuit, high/low voltage and overload protection
- Start up through accumulator (Cold Start-optional)
- Adjustable time for operating through accumulator(optional)
- Accumulator protection against over discharge(optional)
- Temperature controllable accumulator charger, selectable accumulator charge current(optional)
- 240x320 touch graphic LCD display
- Advanced error/fault detection, up to 1000 piece of warning/event memory capacity
- Advanced communication options using RS232/RS485
- Regenerative working feature

PRINCIPLES OF STRUCTURE AND OPERATION

Frequency Converter consisting of the following units:

- Main card
- Sampling Card
- IGBT driver card
- Communication card
- SNMP module
- Soft Start
- Accumulator group(optional)

Frequency Converter as well as supplying sensitive and critical loads, provide the load with appropriate effective value, frequency and wave shapes which sometimes could not be provided by main network. Primarily AC voltage is converted to DC via Rectifier. Rectifier supply inverter as well as charges the accumulators (batteries if included) located at the middle of the circuit.

The function of the inverter is to convert the available DC voltage to required AC voltage with standard effective value and frequency. Output of the rectifier is hold at nominal value while the load is supplied through inverter. In the case of network voltage increase over limit values or interruption of it, rectifier will not operate. Inverter will continue supplying the load at intended value uninterruptedly via DC energy absorbed from accumulators.

In case of absorb high current at overload condition or if there is a fault at the frequency converter then output is turned off .

After overload period if the faults have been solved inverter output is given to load again.

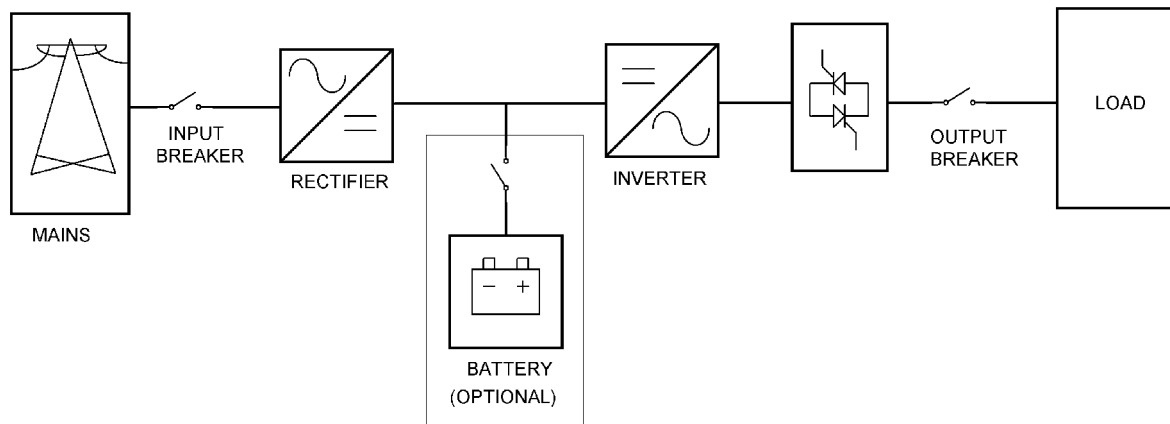


Figure 1: Frequency Converter BLOCK DIAGRAM

PHYSICAL SPECIFICATIONS



Table 1: 1st and 2nd Group Cabin Dimensions

Figure 2: 1st and 2nd Group Cabin Type

SERVO-MATİK company has the right to change the information given above without inform previously.

TECHNICAL SPECIFICATIONS

Model	NETPRO FC		
POWER (kVA)	45		
INPUT			
Nominal Voltage/Phase Numbers	208 VAC (3 Phase + Neutral)		
Voltage Range	-20% / +15%		
Frequency	60 Hz		
Frequency Tolerance	±10%		
Input Power Factor	≥99		
Total Harmonic Distortion THDI	< 5%		
OUTPUT			
Nominal Voltage/Phase Numbers	380 VAC (3 Phase + Neutral)		
Voltage Tolerance	±1%		
Frequency	50 Hz		
Frequency Tolerance	50 Hz ±1		
Power Factor	0.8		
Crest Factor	3:1		
Output Voltage Harmonics THDV	<3% (linear load) <5% (non-linear load)		
Output Wave Form	True Sinus		
Over Load	10 min at 125% , 1 min at 150% load		
BATTERY (OPTIONAL)			
Voltage / Number	Variable (Standard 60 pieces-symmetric connected- 12 VDC)		
Type	Dry Cell Battery without maintenance		
Charge Current/ Temperature Adjustable Charge	Selectable / Microprocessor and intelligent sensor controlled		
GENERAL			
Operation Technology	On-Line double conversion		
Control	SPWM controlled IGBT Rectifier and Inverter		
Efficiency	Up to 93%		
Redundant Operation	Optional		
Protection	Overload, Over temperature, Output Short Circuit		
COMMUNICATION			
Indicator	240 x 320 Graphic LCD (Touch Panel)		
Warning/ Event Memory	1000 pieces		
Advanced Communication	RS232, GPRS, Dry Contacts, SNMP (Optional)		
Software	Netpro PC software		
ENVIRONMENTAL SPECIFICATIONS			
Operating temperature / Storage Temperature	0 °C ~ 40 °C / -15 °C ~ +55 °C		
Relative Humidity	%0-%95 relative humidity (noncondensing)		
Height	≤ 2000 m		
Acoustic Noise	< 50 dB	≤ 60 dB	≤ 65 dB
Protection Class	IP20		

Table 2: Frequency Converter Technical Specifications (May change according to models)

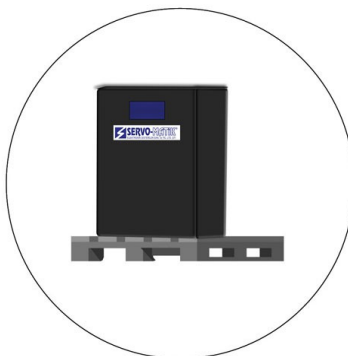
INSTALLATION

SITE SELECTION

- Frequency Converter is generally operating at 0–40°C temperature range. In order to take inside of it cold the environment temperature should be under 25°C.
- Be careful of being at least 50 cm free distance between Frequency Converter and devices around.
- Please be careful about that the device is located should compatible with conditions mentioned at “TECHNICAL SPECIFICATIONS”.
- In order to take temperature between intended ranges enough numbers of ventilation devices should be available at operation site. If necessary for providing air circulation inside the room a fan could be installed or a suitable air filters could be used.
- Be sure that the ventilation holes are open and sufficient air circulation is provided.
- Be sure that the medium has been cleaned up from dust, dirt, oil, etc. and also humidity should be controlled.
- Selected site should not be directly under Sunshine or near to heater.
- The floor that the device will installed on should be flat with enough resistance to carry the weight of the device.
- Some noise is performed during operation related with operate power and cooling fan as well.

TRANSPORTATION

- Carry the device without remove its transportation pallet with a forklift where will it be installed like in Figure 2.
- Package protect the device against problems while transportation since carry the device to its location with its cargo package.
- Pay attention that the device is kept vertical position at all transportation process.
- Device must be carried at least two person.
-



UNPACKING

- Contact with the technical service before using the product and the product with damaged packing material.
- Carefully unpack the device, avoid damaging.
- After unpacking the device, check if the device is damaged during transportation or not. To do this, W-Automat, Pacco Breaker and Compact Breaker on the device are checked and make sure the panel is not damaged.
- Check the device physically to make sure the electrical connections are not broken.
- Do not run the device if any noise comes from inside when it is removed. In this case, please contact with the manufacturer company.
- Before installation, contact with the technical service or installation must be performed by authorized personnel.

ELECTRICAL CONNECTIONS

VISUAL CONTROL OF THE DEVICE

- Check inside of the device if there is dust, dirt, oil or anything else.
- Make sure all connectors and screws are tighten or constant.
- Attention! Followed electrical controls must be done without connection of the input, output, battery and all breakers in “1” or “ON” position. These controls must be done when the device has no electricity!
- Change multimeter’s position to short circuit mode and check the connectivity of the followed points.
- On input terminals, phase between phase for all of them and neutral between ground,
- On output terminals, phase between phase for all of them and neutral between ground,
- Between battery terminals,
- There should be open circuits between any of the two points. These tests are useful to avoid dangerous situations and may not give exact results.
- Turn off all breakers.

MAKING CONNECTIONS



All cable cross-sections, breakers and fuses which will use in the distribution panel must be selected to suitable of the power of the device.



Cable cross sections can be seen from Table 4.

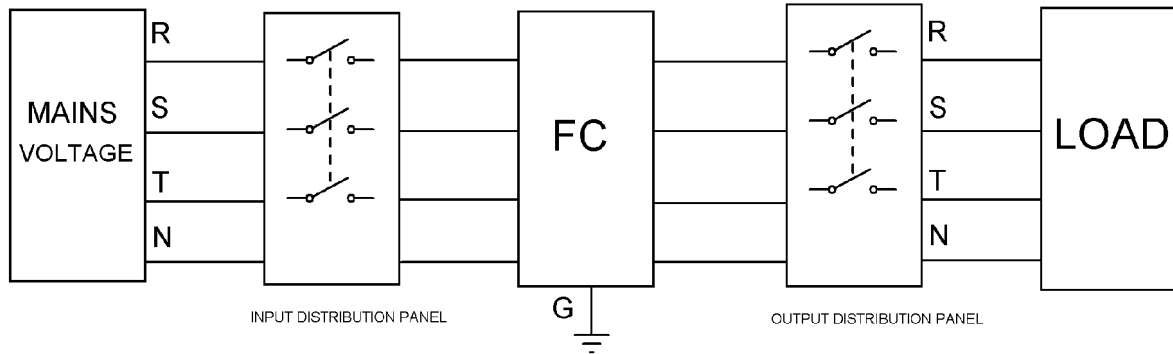


Figure 3: Frequency Converter Electrical Connections

DEVICE POWER (kVA)	INPUT CABLE DIMENSION (mm ²)	OUTPUT CABLE DIMENSION (mm ²)	EARTH CABLE DIMENSION (mm ²)	EXTERNAL BATTERY CABLE DIMENSION (mm ²)
10	4X4	4X4	1X4	3X4
15	4X4	4X4	1X4	3X4
20	4X6	4X6	1X6	3X6
30	4X10	4X10	1X10	3X10
45	4X25	4X25	1X25	3X25
60	4X35	4X35	1X35	3x35
80	4X50	4X50	1X50	3x50
100	4X70	4X70	1X70	3x70
120	4X95	4X95	1X95	3x95
160	2x(4x50)	2x(4x50)	2x50	2x(3x50)
200	2X(4X70)	2X(4X70)	2X70	2X(3X70)
250	2X(4x95)	2X(4x95)	2X95	2X(3x95)
300	2X(4x120)	2X(4x120)	2X120	2X(3x120)
400	3X(4X120)	3X(4X120)	3X120	3X(3X120)

Table 3: NETPRO-FC FREQUENCY CONVERTER CABLE DIAMETERS

*Cable dimensions calculated according to current capacity in the tubes!
External battery cable dimensions are given for the external battery connections!*



Leave the cables taller than normal for considering that in case of moving the device for repair or maintenance situation.



All breakers and switches must be turned off before making electrical connections.

GROUND CONNECTION



Make correct ground connection to provide safely and problemless work of the device. Make ground connection of the device before connecting others.

Connect ground cable that comes from grounding bus to the Ground (G) terminal.

INPUT CONNECTIONS

Connect input cables comes from distribution panel to the input terminal of the device in correct order.



Pay attention to phase sequence when connecting input cables to devices terminal. If phase sequence is wrong, device will not synchronize, and load continue to feed from mains voltage, frequency converter can not pass to normal operation.

Connect input neutral cable to input terminal.

OUTPUT CONNECTIONS

- Connect output cables to the output terminal in correct order.
- Connect output neutral cable.

EXTERNAL BATTERY CONNECTIONS(OPTIONAL)

! There might be dangerous voltage between terminals of the batteries in which devices that have internal batteries. Connect internal batteries' (+), (0), (-) connectors to terminals in appropriate with the polarization.

! When connecting the battery cables to terminals, pay attention to polarizations and battery zero voltage point otherwise device will be damaged.

- 60 pieces battery connects serial, while placing batteries into battery cabinet or device. After that 1st battery's (+) point connects to "BATTERY (+)" terminal, 60th battery's (-) point connects to "BATTERY (-)" terminal and 30th battery's (+) point connects to "0" terminal.
- When using 60 pieces battery and if there is an external battery cabinet for 60 pieces battery, connect (+), 0, (-) points of external battery cabinet with the same name on the input terminals of the device.

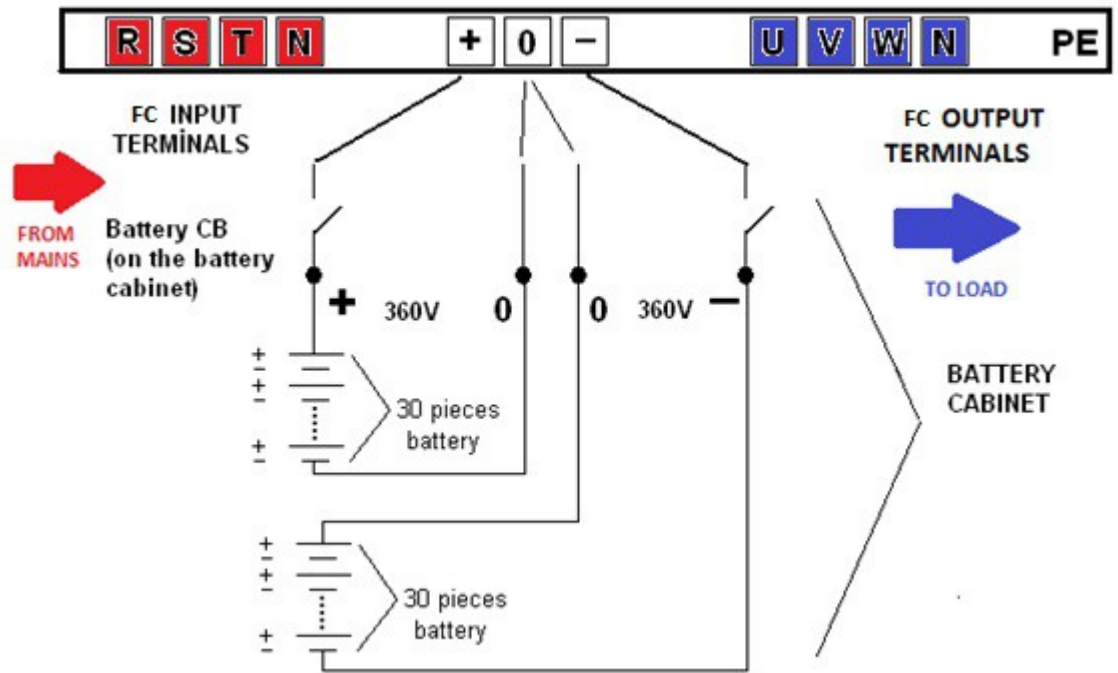


Figure 4: Connection of the Battery Group to the Frequency Converter

STARTUP AND SHUTOFF THE DEVICE

WORKING MODES OF THE DEVICE

NETPRO-FC series s are the device that works in ONLINE mode. Load feeds from inverter voltage while mains voltage exists and specified limits. At that moment batteries are charged. If mains voltage is cut for any reason, inverter feed the load by using energy which is held in batteries.

NORMAL OPERATION – ONLINE MODE (IF MAINS VOLTAGE EXIST)

All switches and breakers are in “ON” position. Inverter feeds the load. In normal operation rectifier provide current to inverter and at the same time charge the batteries.

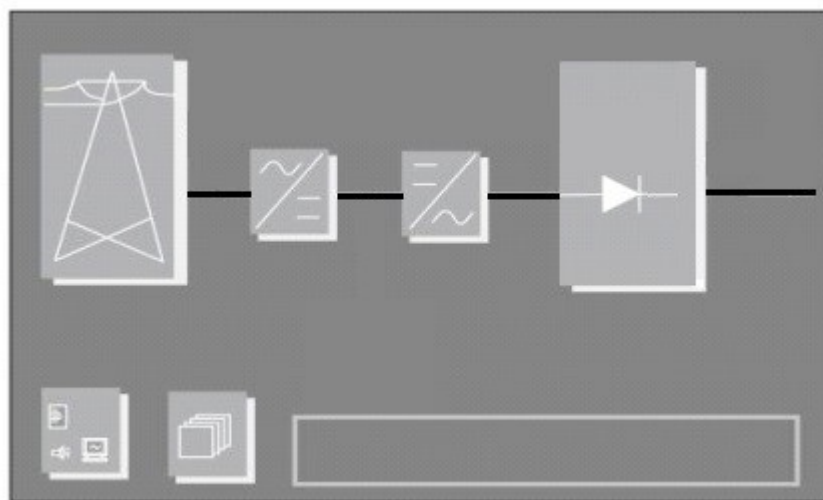


Figure 5: Working from mains voltage in on-line mode

BATTERY OPERATION(OPTIONAL)

Batteries are connected to the output of the rectifier and this section is called DC BUS. If there is a problem on the mains voltage (when mains voltage is cut or input AC current not in the specified tolerances) rectifier stops and the voltage that is essential for the inverter is provided from batteries. Thus voltage that feeds the load is provided uninterruptedly until batteries are fully discharged. At the end of the discharge time inverter closed automatically and when mains voltage comes back inverter and rectifier continue their normal operation. Rectifier closes in automatic and manual battery tests and inverter feeds from battery.

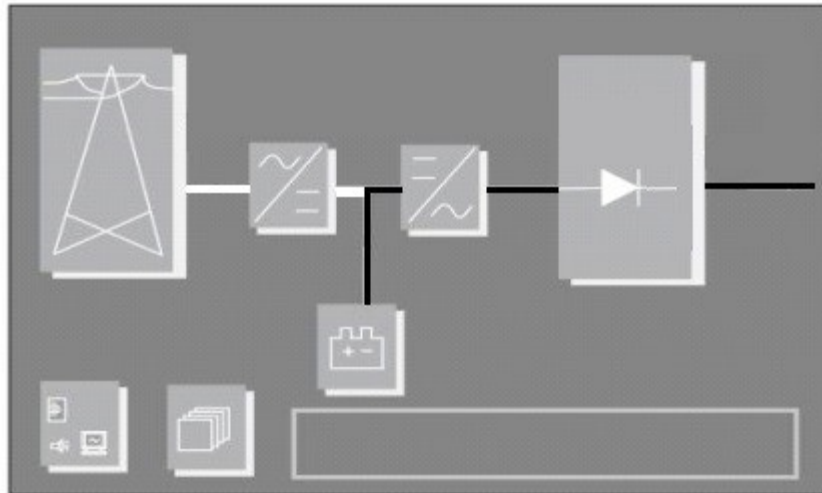


Figure 6: Working from batteries

SAFETY PRECAUTIONS

- Battery Breaker must be “ON” only when rectifier output voltage close to the battery voltage. For this reason, battery breaker must be “ON” when device pass to normal mode.
- When the device is working in normal operation do not turn off “Power ON” switch. Power ON switch should be used to energize electronic boards. When the Power ON switch turned on, all electronic cards and LCD Panel will energize in a few seconds. Starting up or shutting down the frequency converter is done by buttons in LCD Panel.
- After device is closed, there could be dangerous voltage in it. If intervention for service to device is necessary wait at least 5 minutes for discharge of the capacitors and DC BUS voltage.

ENERGIZING THE DEVICE



All breakers must be in “OFF” or “0” position before starting up the device.

- Check the accuracy of the electrical connections.
- Make sure battery cables are connected to the battery terminal in suitable polarization!(if exist)
- Provide voltage to the input terminal of the Frequency Converters (Turn on circuit breaker form distribution panel)
- Measure these voltages with a multimeter: Phase-phase, phase-neutral voltages and frequency. Mains voltage should be in specified limits.
- Voltage difference between neutral and ground should not be over 2V. Otherwise that shows grounding are not made truly. Responsible people and customer should be informed and necessary operations must be done.

START UP THE DEVICE

If there is a “COLD START” switch in your device follow the steps as shown in “STARTUP FROM BATTERY (COLD START)”!

Follow the below instructions otherwise device could be harm!

- Turn on “Power ON” or “ON/OFF” switch. If there is a charge/softstart switch turn it on and wait for 30 seconds.
- Turn on “INPUT BREAKER” If the device give “phase sequence error” turn off “Power ON” switch and all other breakers. Cut the input power, coming from main distribution panel. Change whichever two input phase cable out of three cables and tighten the connections. Start the steps from “STARTING UP THE DEVICE” again.
- Press “ON/OFF” button on the LCD Panel for 3 seconds. Device will start automatically.
- Rectifier and inverter start to work respectively and then device pass to online mode. That can be seen from LCD Panel.
- After rectifier and inverter work battery percentage on the LCD Panel will rise to 100%.
- Turn on “OUTPUT BREAKER”.

STOP THE DEVICE

- Press “ON/OFF” button from front panel for 3 seconds.
- Rectifier and inverter will stop. If “ON/OFF” button pressed again device will start automatically.

SHUTOFF THE DEVICE

- Stop the device by pressing ON/OFF button for 3 seconds on the LCD panel. Frequency Converter will stop and output will turned off.
- Close all the loads which connected to the Frequency Converter.
- Turn off “OUTPUT”, “BATTERY(if exist)” and “INPUT” breakers respectively.
- Turn off “Power ON” and “SOFT START” switch. Attention, do not turn off Power On switch and all other breakers when rectifier or inverter is working!

STARTUP FROM BATTERY (COLD START-OPTIONAL)

If there is a “COLD START” switch on your device follow below instructions to start up the device. Otherwise frequency converter will get harm!

MAKE SURE THAT ALL BREAKERS AND SWITCHES IN “OFF” or “0” POSITION FOLLOW THE BELOW STEPS RESPECTIVELY!

1. Turn on “Power ON” or “ON/OFF” switch.
2. Turn on “COLD START” switch.
3. LCD Panel will energize. Press battery icon on the LCD Panel. See the rise of the battery voltages. About $\pm 300V$ (totally 600V) or above voltage should be seen.
4. When battery voltage rise to $\pm 300V$ (totally 600V) turn on “BATTERY” breaker.
5. Turn off “COLD START” switch.
6. Press “ON/OFF” button on the LCD Panel for 3 seconds. Frequency converter will pass to Online Mode.
7. Turn on “INPUT” breaker.
8. Turn on “OUTPUT” breaker. (Make sure that load is ready to connect the device, if there is a short circuit on the load it will harm the device.)

LCD TOUCH PANEL

SPECIFICATIONS OF LCD TOUCH PANEL

Main menu screen as shown in below. In order to navigate on the menu press slightly icons or blocks.

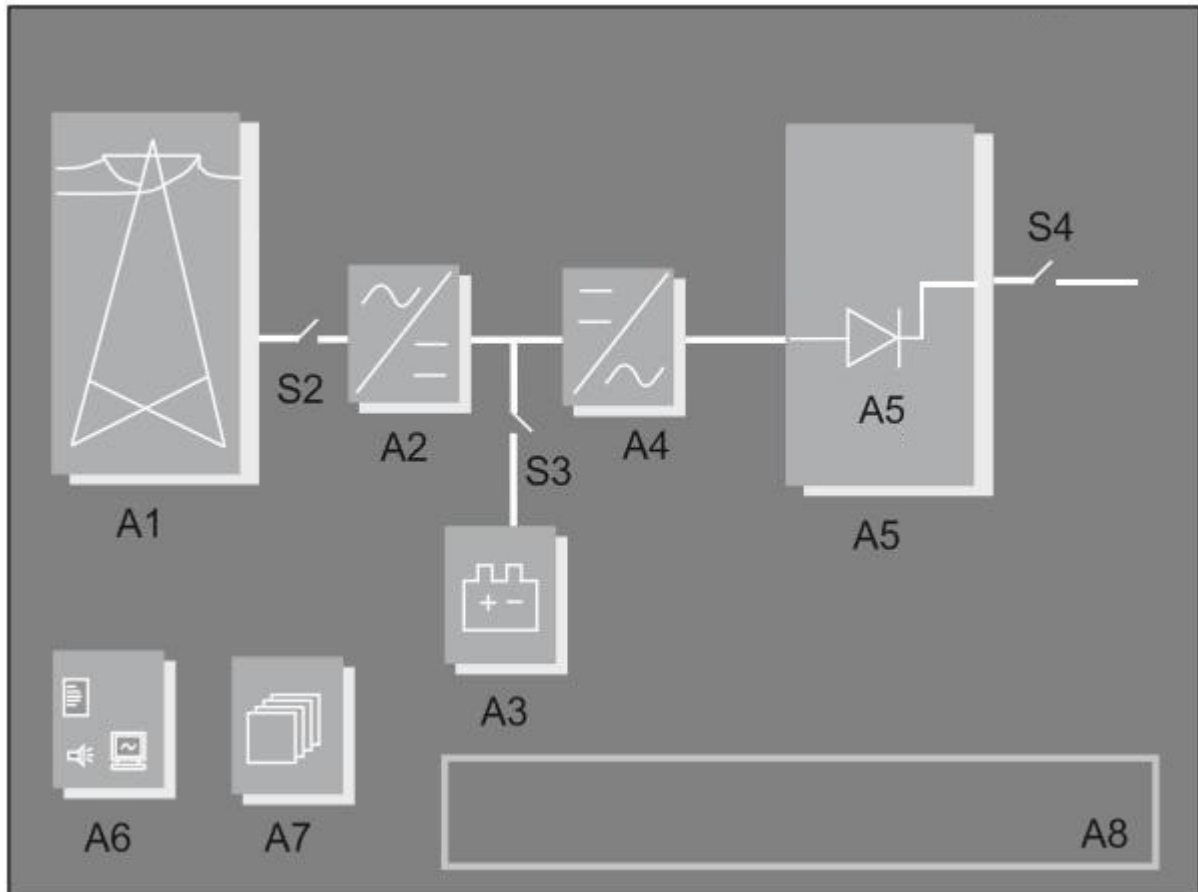


Figure 7: Frequency Converter Main Menu

SWITCH DEFINITIONS

- S2: Input Breaker
- S3: Battery Breaker(optional)
- S4: Output Breaker

BUTTONS AND FREQUENCY CONVERTER BLOCKS

- A1: Mains voltage diagram and menu button
- A2: Rectifier Block and Indicator/Rectifier Menu Button
- A3: Battery Block and Indicator/Battery Menu Button(Optional)
- A4: Inverter Block and Indicator/Inverter Menu Button
- A5: Inverter Output SCR Indicator

- A6: System Menu Button
- A7: Menu Button
- A8: Warnings/Events Menu Button

RECTIFIER: PWM controlled IGBT's are used in NETPRO-FC series. Thus input power factor correction (PFC) increase and input current harmonic distortions (THDI) decrease.

There are 3 phase inputs of the IGBT Rectifier and this produce DC voltage. Therefore inverter feeds from that DC voltage and batteries are charged.

BATTERIES: Batteries are used with intent to backup power when lack of mains voltage or blackout etc. They provide bipolar voltage (+, 0,-) in NETPRO-33 series.

Inverter feeds from battery in the absence of mains voltage. When mains voltage comes back, the batteries are charged by IGBT Rectifier.

INVERTER: It produced by using latest IGBT technology and PWM technique. Inverter uses DC BUS voltage which is provided by IGBT Rectifier or battery voltage (batteries and rectifier output is the same point). The DC Bus Voltage which is produced by IGBT Rectifier is inverted to 3 phase constant and regulated AC voltage by inverter block.

The critical loads that are connected to the output of the Frequency converter feeds from inverter output.

BATTERY BREAKER: It is connected to the battery inputs of the Frequency converter. This breaker controls the battery block and it connects after battery fuses.

MENUS

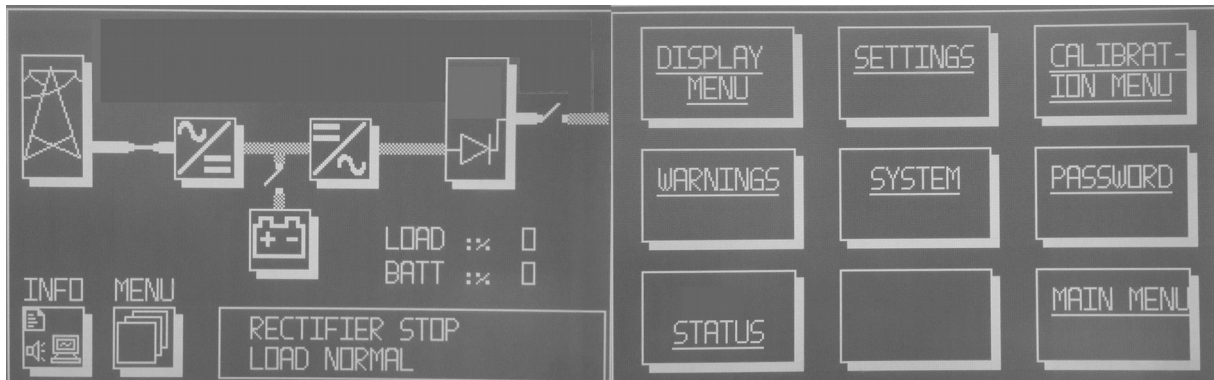


Figure 8: System Mimic Diagram and Main Menu

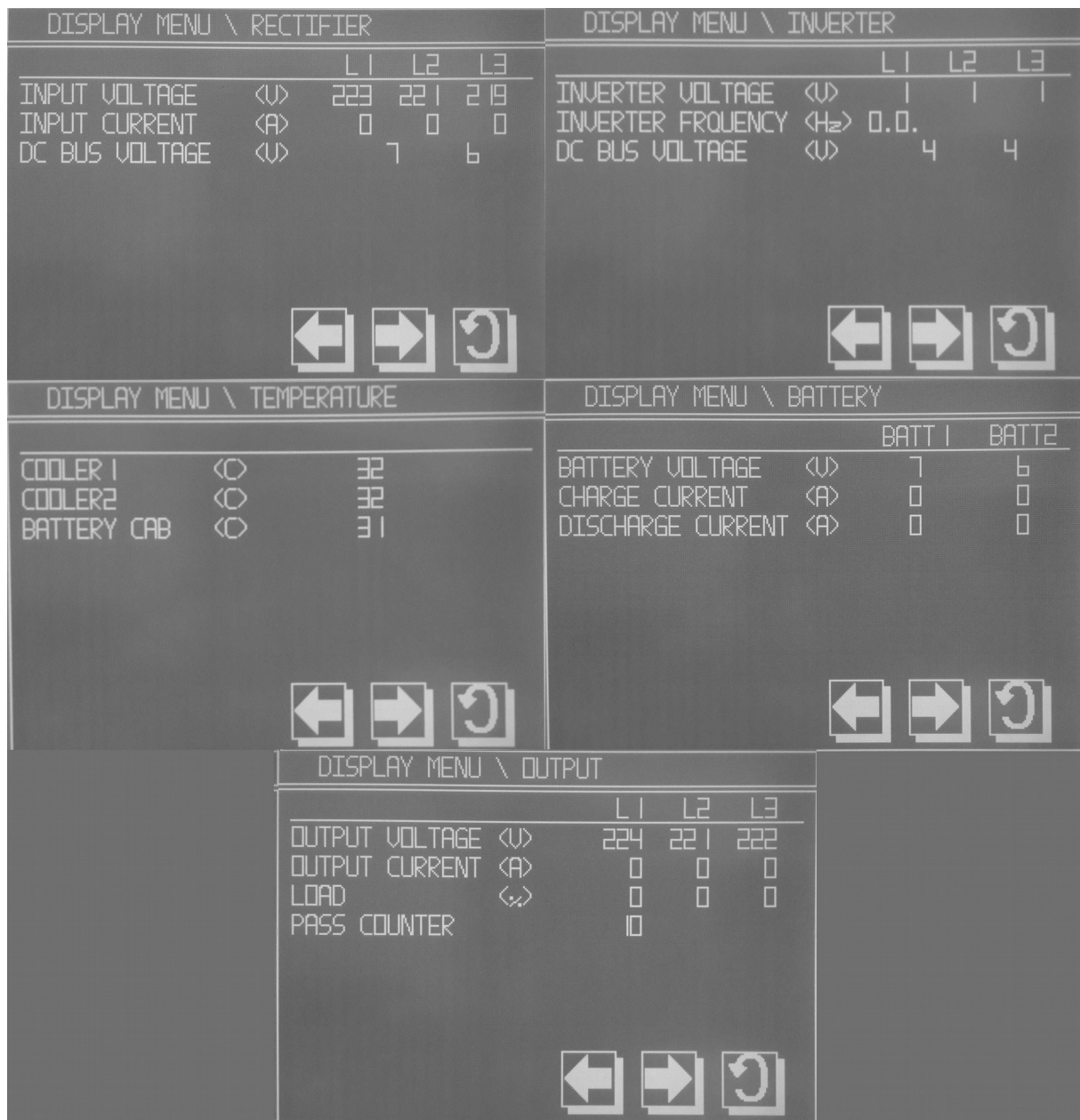


Figure 9: Indicators Submenu

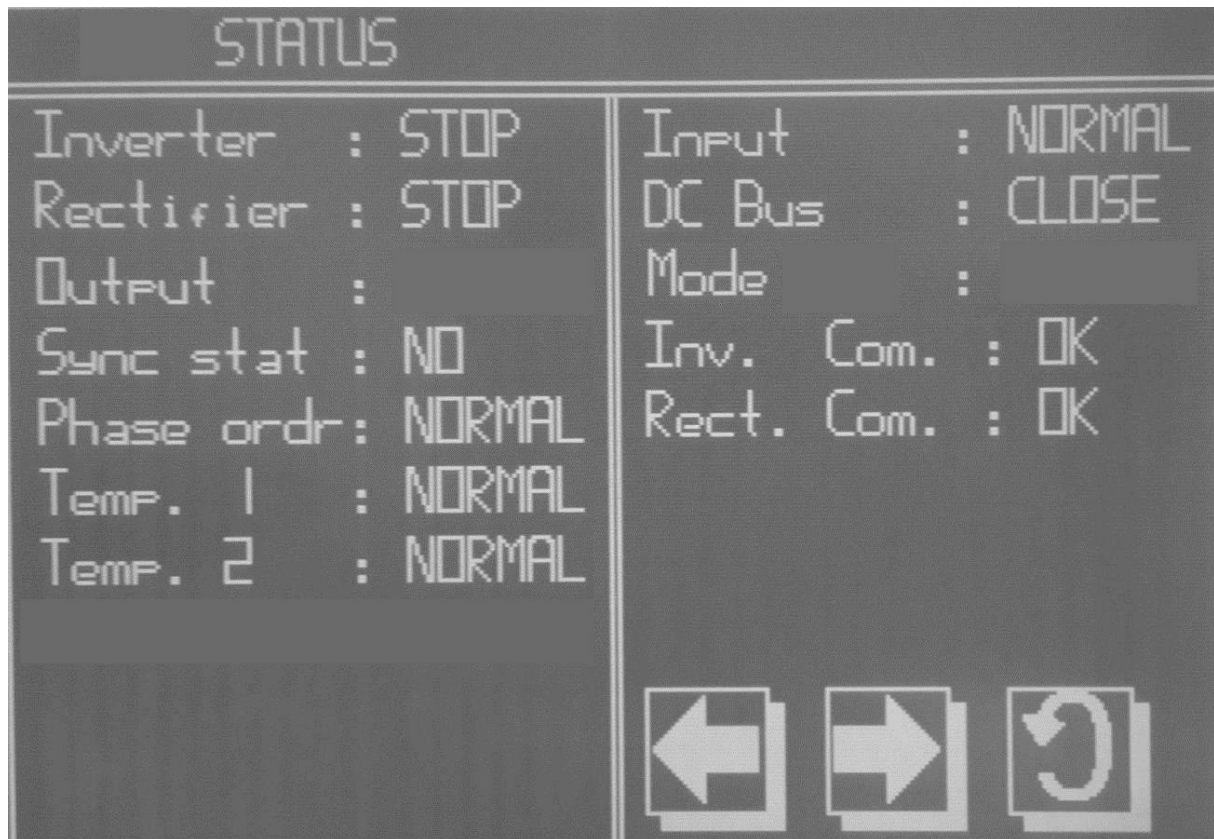


Figure 10: Frequency Converter Status Submenu



Figure 11: Frequency Converter Warnings Submenu

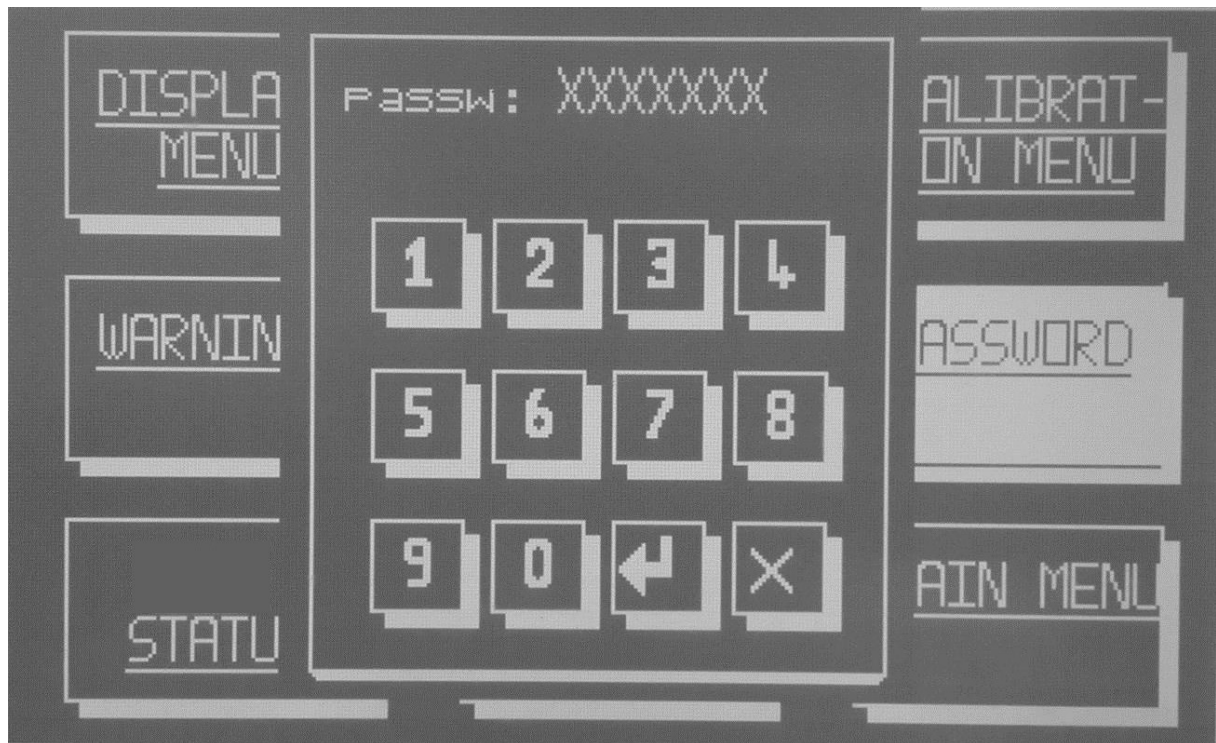


Figure 12: Password Menu

*After this password is entered submenus that is necessary for the service is opened!

SERVICE AND MAINTENANCE

Manufacturer of the device supposes that users guarantee to have technical knowledge, have the goods, gets training about device and not to do behaviors which are life-critical. All operations about life-critical part of the device should be done by the people who have technical knowledge about device.

Manufacturer refuses responsibility for damage because of user error or miss-use.

The user guide was prepared for the people who get all kind of the technical trainings without turning on and off the device.

All kind of response and operation should be done by only competent people or the people who have the goods about the device.

The device covers should be opened only for maintenance, repairing and special purpose entity.

Fault diagnosis and response to the failure should be done by the competent people. Problem analysis is not to be considered necessary for the competent people. The predicted rules and warnings are only to save the user against to potential dangers.

The system was designed to work safety if system safety and rules are considered and maintenance of the device is carried out by the competent people. All kind of precautions were taken for the life-critical parts of the device. The device will work for a long time if the technical rules are followed and all conditions are suitable.

When the device covers are open, it is possible to touch to the dangers parts of the device although all precautions taken. Thereby, users should be knowledgeable about the device and not touch dangers parts. Therefore, when the device works, all device covers should be close.

Device lifetime is identified and announced on 13/6/2014 dated and 29029 numbered Official Gazzete After Sales Services Regulation Appendix is 5 years.

Authorized service stations and spare part shops address', phone numbers and other informations can be get from +90 533 663 33 04 numbered customer support line.

PERIODIC MAINTENANCE

The device will not need to periodic maintenance if it is worked in suitable environment and condition. However, it is recommended to carry out maintenance every other year.

FAULT

Nobody can carry out maintenance the device without technical service personal. In such case, the information about the fault must give to manufacturer technical service.

BEFORE CALL THE SERVICE

- Read user guide carefully.
- Check the input and output connections whether it is done correct.
- If there is any fault, restart the device by using On/Off button on the LCD panel.
- Explain the problem by giving all detail.

FAULT DIAGNOSIS

When Frequency Converter work if there is a problem or there is an unusual situation, follow the below steps before the call service.

- Are ground connections of input and output and battery connections of Frequency Converter correct?
- Check whether the fuses are damaged in the Frequency Converter or on wall box.
- Check the power switch that is behind of the Frequency Converter.
- Whether there is any writhing on the panel.
- If Frequency Converter gave any warning, check what the content of the warning.
- Check serial number of the Frequency Converter and Power of the Frequency Converter.

After control which is mentioned above, explain the problem clearly technical service. Do not allow to response to device without technical service personal. The problem can be solved by only the people who got training about the device. Any technician cannot response the device.

POSSIBLE FAULTS, REASONS AND SOLUTION OFFERS

Possible problems that can be occurred in Frequency Converter and practical information about the cause of the problems are mentioned below;

(1) BATTERY WORKING TIME IS LESS THAN INDICTED TIME	
Possible Reasons	Solution Offers
Batteries were not charged completely.	Batteries must be charged at least 10 hours and check.
Battery life finished.	Call the technical service.
There can be a problem on the battery charger.	Call the technical service
Some batteries could damage.	Call the technical service
Battery fuses could blow.	Check the battery fuses.

(2) 'OVER HEAT TURN OFF' WARNING ON THE PANEL	
Possible Reasons	Solution Offers
The vent holes could congest.	Check the all vent holes. If necessary, clean the dust in the vent holes.
Ambient temperature is not suitable.	Ambient temperature is not suitable with respect to values on the ambient temperatures features part. Choose more suitable place or a ventilation system should bound ambient temperature in proper range.
There could be a problem on the cooler fuses.	Check the fuses.
Thermostat could damage and not transmit voltage to coolers.	Call the technical service.
The cooler could damage.	Check the coolers. Call the technical service.

(3)BY THE TIME DEVICE STARTS, IT GIVES ‘SYNC STAT: NO’ WARNING	
Possible Reasons	Solution Offers
Frequencies and voltages could be read wrong by main board	Call the technical service.
Main board could damage.	Call the technical service.
Phase order could be reverse.	Change order of the two input phases. Make sure the correctness of the phase order.

(4)IF DEVICE GIVES ‘DC HIGH’ WARNING	
Possible Reasons	Solution Offers
There could be DC bus calibration problem.	Call the technical service.
The setting of the DC bus could change from ‘Settings’ menu	Call the technical service.
Battery charge could be over the limit (810 V) because of long time charging.	Chang OFF the battery breaker. Measure the battery voltage from terminal.

(5)IF LINE VOLTAGE COULD NOT BE READ ON THE PANEL	
Possible Reasons	Solution Offers
Input breaker could be OFF.	Check the input breaker.
AC voltage divider card (NT33HVSAMP) could be damage.	Call the technical service.
Mainboard NTMB33 could damage and not read the voltages.	Call the technical service.
There could not be data transfer between mainboard (NTMB33) and monitor (NT33MON02) cards	Call the technical service.

(6)DEVICE GIVES ‘INPUT CURRENT LIMIT’ WARNING	
Possible Reasons	Solution Offers
There could be input current calibration problem.	Call the technical service.
Input current settings could damage.	Call the technical service.
Current could not be transmitted from rectifier current sampling card (NTCSMP33) to mainboard (NTMB33) because of any damage or connection problem.	Call the technical service.
Thyristor driver could damage and, not send signal to thyristors.	Call the technical service.
Mainboard could damage and not send trigger signal tor thyristor driver card.	Call the technical service.
Inverter AC capacitors could damage or there could be a connection problem.	Call the technical service.
Inverter fuses could damage.	Check the inverter fuses.

(7)DEVICE GIVES 'INVERTER ERROR' WARNING	
Possible Reasons	Solution Offers
Any IGBT of inverter could damage	Call the technical service.
PWM signals could not be transmitted to Inverter IGBT driver card, there could be a damage on the flat cable or connection problem.	Call the technical service.
Supply voltage could not be transmitted to Inverter IGBT driver card.	Call the technical service.
AC voltage divider card (NT33HVSAMP) could damage.	Call the technical service.
There could be an inverter calibration problem.	Call the technical service.
Invertor thyristors could damage.	Call the technical service.

(8) PANEL DOES NOT WORK	
Possible Reasons	Solution Offers
There is no line voltage.	Line connections should be checked by an electrician.
On/Off switch could be off or damage.	Check the switch.
LCD could damage.	On/Off switch should be changed OFF then, changed ON. If the problem goes on, call the technical service.
Supply card could be damaged; supply voltage could not be produced for panel card.	Call the technical service.
Panel card could damage.	Call the technical service.

(9)COMMUNICATION PROBLEM BETWEEN COMPUTER AND FREQUENCY CONVERTER	
Possible Reasons	Solution Offers
Distance between computer and Frequency Converter is too much (for RS232 communication maximum 30m).	Use shorter cable or different communication protocol.
Communication card (NT33COMM) could damage.	Call the technical service.
Data could not be transmitted from LCD panel to monitor card (NT33MON02) because of monitor card damage.	Call the technical service.

(10)BY THE TIME DEVICE STARTS, DC BUS VOLTAGE DOES NOT RISE	
Possible Reasons	Solution Offers
Input fuse could blown.	Check the input fuses. Check the inputs via monitors.
Soft Start Thyristors could be damage.	Call the technical service.
Input smoothing coil damage.	Call the technical service.
Short circuit occurred because of DC bus capacitance damage etc.	Call the technical service.

(11)DEVICE GIVES ‘DC LOW’ WARNING	
Possible Reasons	Solution Offers
There could be DC bus calibration problem.	Call the technical service.
Settings about DC bus could change in device setting menu.	Call the technical service.
Battery voltage could fall down under limit (600 V) because of discharging.	Chang battery breaker position OFF. Measure battery voltage from terminals.
There could be error on sampling of DC voltage or reading by microprocessor.	Call the technical service.

(12)DEVICE GIVES ‘RECTIFIER ERROR’ WARNINGS	
Possible Reasons	Solution Offers
Mainboard could send wrong PWM signal to rectifier driver card.	Call the technical service.
There could be damage on the rectifier IGBT driver card.	Call the technical service.
One of the rectifiers IGBT could damage.	Call the technical service.
DC bus voltage could not be transmitted to mainboard or microprocessor could read wrong.	Call the technical service.
Positive and negative DC bus voltage equality could be corrupted.	Call the technical service.
Device settings could change on the Settings menu.	Call the technical service.

WARRANTY CONDITIONS

Warranty conditions are declared on the proforma invoice of the product. Warranty period begins at the date of invoice and valid for year for international markets. Extended warranties are based on contracts between the manufacturer and buyer.

Failures caused by: misuse, neglect, accident, modification, operation outside the Specified Operating Environment (including, but not limited to, lack of a good electrical ground) improper maintenance by the Customer, failure caused by service of the machine by non-authorized servicers, damage caused by the use of the SERVOMATIK product for purposes other than those for which it was designed, or failure caused by a product, which SERVOMATIK doesn't recommend and supply ARE NOT COVERED.

Warranty is not a guarantee of uninterrupted or error-free functioning of a machine.

Restoration of lost data and reinstallation of software are not covered. This policy does not cover damage from a cause other than AC power line transients, except for damage due to telephone line, network or CATV transients, which is covered only if the SERVOMATIK product offers such protection.

SERVOMATIK reserves the right to replace relevant part with the same or equivalent part, rather than repair it. Where a replacement is provided the part replaced becomes the property of SERVOMATIK. SERVOMATIK may replace parts with refurbished parts. Replacement of the part does not extend or restart the warranty period.

SERVOMATIK On Site Warranty Service is provided in predefined and agreed terms at the site location during the contracted Principal Period of Maintenance (PPM) if any SERVOMATIK Authorized Distributor Exists in the location.. If an Authorized Service Technician is needed immediately in the countries which SASC (SERVOMATIK Authorized Service Center) is not available, the customer has to pay the travel and accommodation costs for the technician from SERVOMATIK TURKEY.

SERVOMATIK on Site Warranty Service is not available for all machines or machines that have been defaced, altered, or damaged beyond repair at any locations. Please contact SERVOMATIK to determine if this option is available for your location and machine model.