Bulletin - **PRJ002C**

USER'S GUIDE

DIGITAL
CONTROL BOX
MODEL TBM2

Synchronism controllers for Synchronous Motors

Index

Table of Contents

Introdution

To who this manual is destined

This manual is destined to the user that has just acquired your equipment and in this case he is integral part of the supply.

In the last pages of this manual are the warranty conditions and technical support supplied by VARIXX.

These is top in the end the data sheet of the equipment that contain the relative data to the model as well as useful information for the future, date from the delivery and time of warranty.

Important Information to the user

The user should perfectly understand the characteristics, limitations and protections before to specify and to apply any equipment.

Among the most important aspects we emphasized the following ones: ventilation adapted, to respect margins of safety and medium and maximum currents, and cares with electromagnetic noises, that can interfere with the same ones and mainly to perfectly understand the characteristics of operation of the equipment.

The drawings of application of this manual are supplied as example. Because of the many varied involved in the application of the equipments, it falls to the user the correct choice and project outline. VARIXX doesn't take responsibility for any losses or damages, direct or indirect, besides dismissed profits and other consequences. It is prohibited reproduction partly or total of this manual.

The customer, except for agreement existence written in this sense, he is buying only the equipment and no the technology, therefore, is prohibited to publish projects or to reproduce the equipment, without the expressed authorization of VARIXX.

Description

Knowing the Controller of Synchronism

The Toshiba's System is composed of two modules: The keypad (VSC-10) and the controlling board.

The function of the keypad is to send or to collect information of the controlling board, when the motor is stopped.

The controlling board rotates with the rotor of the motor. It controls the exact point of fire of the thiristor of field of the Synchronous Motor.

The communication among the two modules is made through of serial communication cable.

Keypad's Operation

The system has a system menu with 9 items and five navigation keys described to proceed.

The menu items are: Booster, Setpoint, Backlight, Start Time, Resync, Reluctance, Stall Time, Operating Frequency, Events Log.

1) Booster: This Item is to accelerate the motor during the Start. The available options in the menu are Yes or Not. For alteration use the arrows , and ESC and ENTER keys.
When we press the key ENTER the cursor should blink indicating that this in edition mode. Starting from this moment the arrows should be used up and down to modify the options in the display. Chosen the wanted item to press ENTER and the cursor will stop blinking. When pressing ESC the menu it will return to the main menu.

2) Setpoint: it indicates the frequency of performance of fire of the field thiristors. Two setpoints exist: 1 and 2. THE setpoint 1 indicates the point where should begin to happen the booster, in other words, turning on and turning off application of the field voltage. This process continues until the frequency of the field motor approaches of Setpoint 2, where occur definitively the continuous application of the field.
When entering in the setpoint menu, the first setpoint to appear is the setpoint 1. When pressing ENTER the cursor start to blink. Adjust through the arrows, Up and Down, the wanted value of frequency. Press ENTER to freeze value. Automatically the display will change for Setpoint 2. Procedure for adjust of the value is the same as the previous. To finish operation press ESC and return to the main menu.

3) Backlight: It can to light or not the bottom display data. If you select YES in the menu, the bottom of the display will lights up and if you select NO the display should stay extinguished.

4) Start Time: It indicates the maximum time of duration of the Start. If in the finish of the time the motor didn't get to arrive to Setpoint 2, the controller board stays in neutral position, not acting the output field. The Maximum time of Start is 300 seconds and the minimum is zero.

5) Resync: Maximum value of Resync is 3 times. It is the number of times that Control Box resynchronize. This just happened if the field be already applied and case has field loss. In this case Resync will try resynchronize the machine.
Obs: The value of recommended Resync is 3 times.

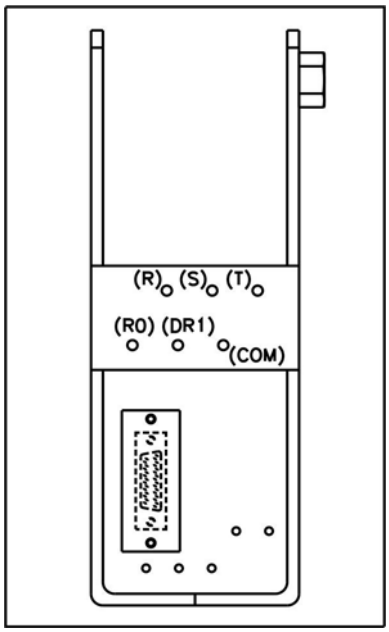
6) Reluctance: If the field frequency falls to zero quickly after the Start it happens the reluctance. The reluctance value acted in the menu indicates a value of time after the reluctance occurrence, in other words, the system detected reluctance. After the programmed time of reluctance the board controller fires the thiristors. It's maximum value is 300 seconds and his minimum value is zero.
Obs: The value more indicated is second.

7) Stall Time: Indication of locked rotor. If the load in the axis is very high or the rotor be locked, he will appear a fixed frequency of 60 Hertz in the field motor. The value of maximum time is 300 seconds and the minimum is zero. After this value of time, the controller board stays inhibited until turning off of the motor.

8) Operation Frequency: It indicates the Operating Frequency of the motor. It can be of two values: 50 or 60 Hertz.

Identification of the front terminals TBM2A/B models

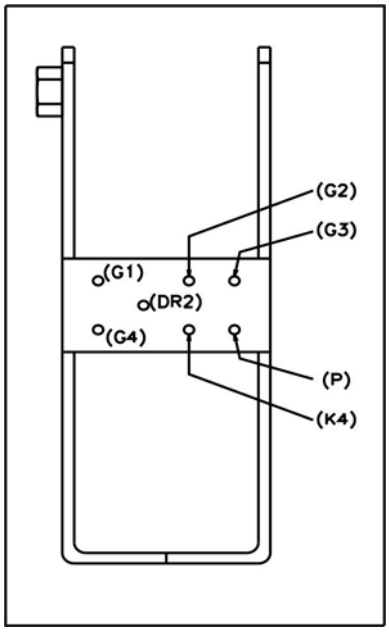
Identification of the front terminals



R – Phase R: Alternate Voltage Vac.
S – Phase S: Alternate Voltage Vac.
T – Phase T: Alternate Voltage Vac.

R0: To connect (There is no internal connection).
DR1: Frequency Input (Frequency Sensor).
COM: Common and Field “-”.

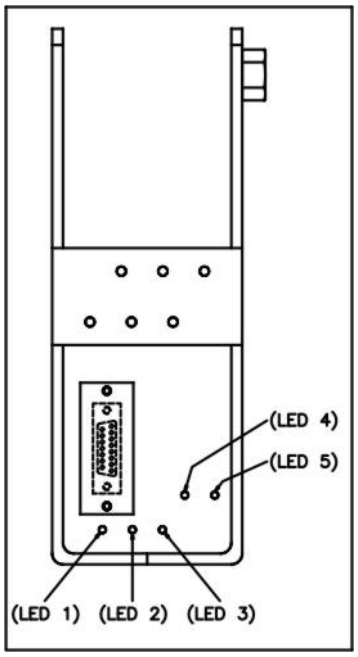
Identification of the back terminals TBM2A/B models



G1 – Gate 1: SCR'S of the bridge rectifier.
G2 – Gate 2: SCR'S of the bridge rectifier.
G3 – Gate 3: SCR'S of the bridge rectifier.

G4: Gate SCR Crowbar.
K4: Katode SCR Crowbar and Discharge Resistor.
P: Anode SCR Crowbar and Field "+".
DR2: to connect (There is no internal connection).

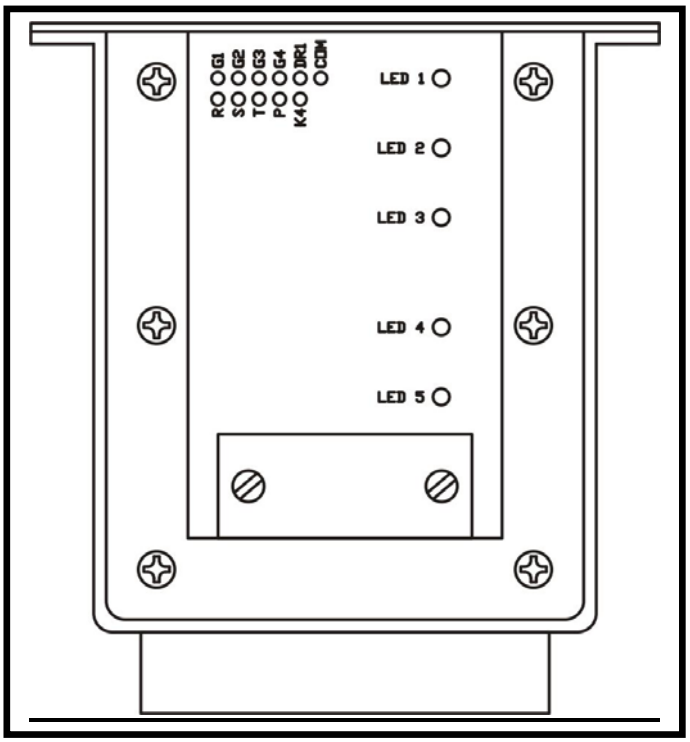
Identification of Led’s TBM2A/B models



<u>LED 1</u>: Red. It only acts when Crowbar is turned on.
<u>LED 2</u>: Green. Field Frequency. It blinks in the negative frequency.
<u>LED 3</u>: Yellow. Field Applies. It blinks in the value of frequency set in SP1. When the field is applied LED stays lit.
<u>LED 4</u>: Red. Field Applies. It blinks in the value of frequency set in SP1. When the field is applied, LED stays lit. Another function of this LED is the fault indication, it happens when crosses the programmed time, start time, Stall time and also when crosses the number of times of Resync.
<u>LED 5</u>: Red. It only works when the field is applied (SP2) and it stays lit. Another function of this LED is the fault indication, it happens when crosses the programmed time of the Start time, Stall time and when crosses the programmed number of times of Resync.

Obs: In case of fault, LED'S 4 and 5 blink quickly at the same time.

Identification of the terminals and Leds TBM2D models



CONNECTIONS (CABLES)

R – Phase R: Alternate Voltage Vac.
S – Phase S: Alternate Voltage Vac.
T – Phase T: Alternate Voltage Vac.
DR1: Frequency Input (Frequency Sensor).
COM: Common and Field "-"

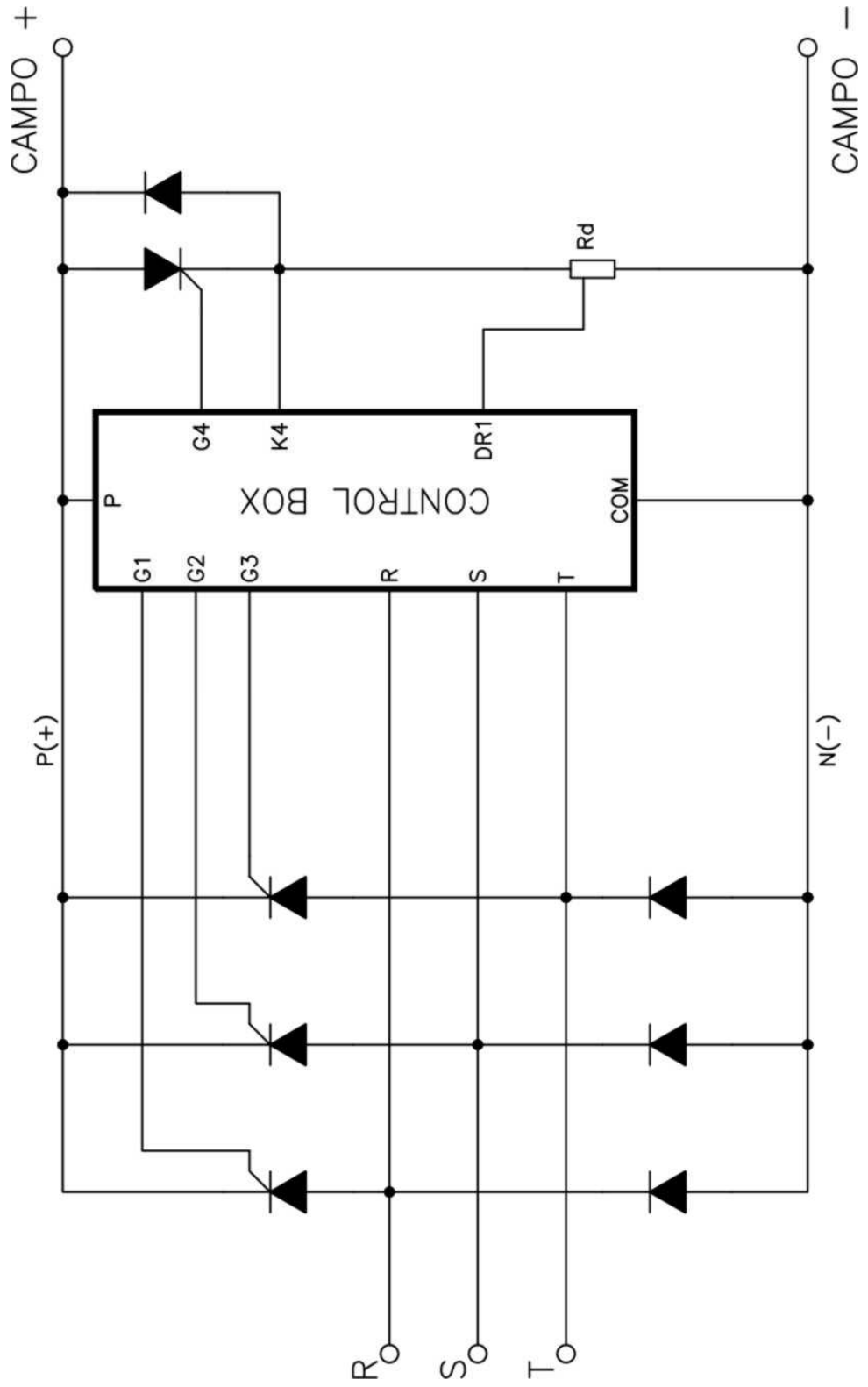
G1 – Gate 1: SCR'S of the bridge rectifier.
G2 – Gate 2: SCR'S of the bridge rectifier.
G3 – Gate 3: SCR'S of the bridge rectifier.

G4: Gate SCR Crowbar.
K4: Katode SCR Crowbar and Discharge Resistor.
P: Anode SCR Crowbar and Field "+".

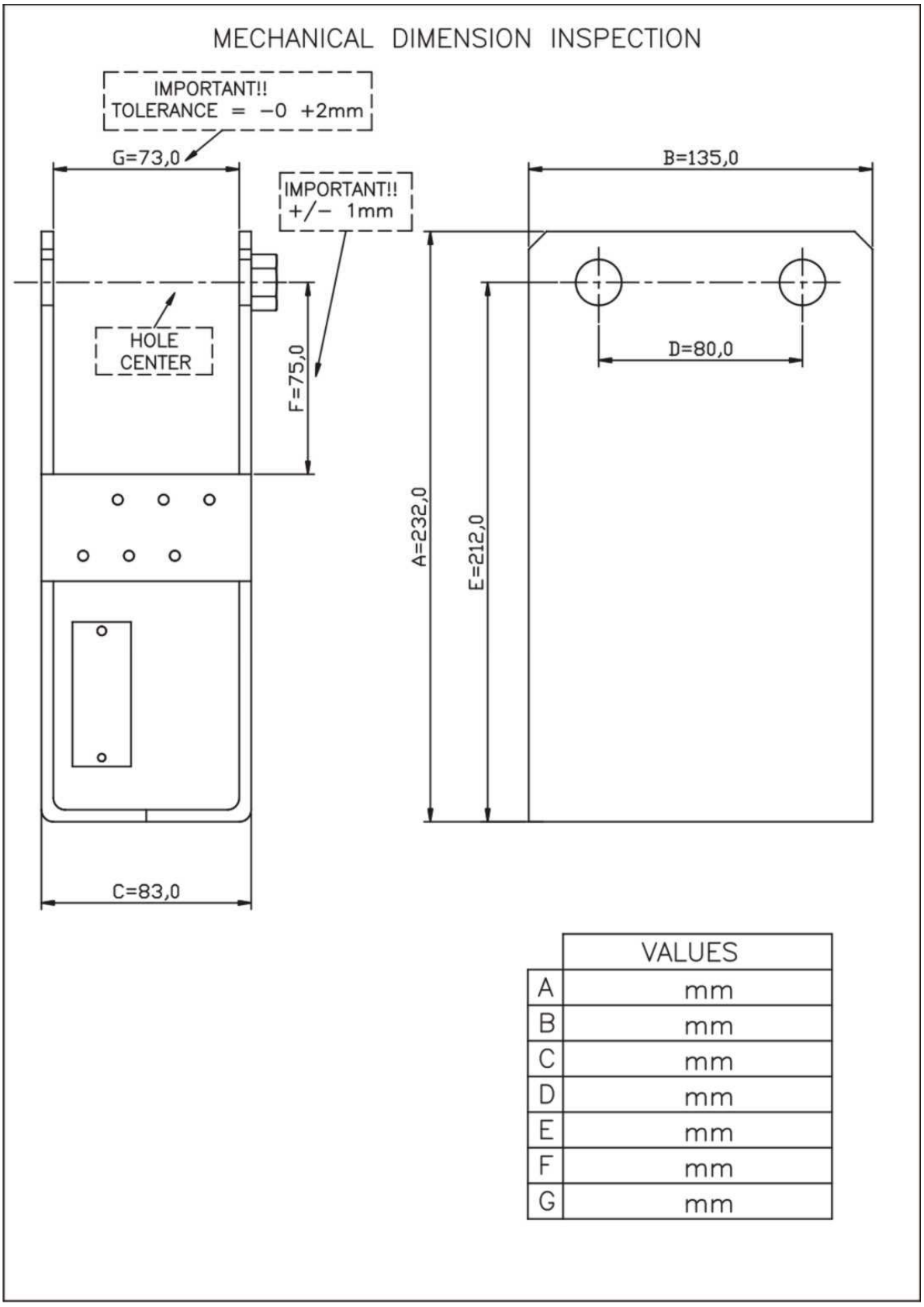
LED 1: Red. It only acts when Crowbar is turned on.
LED 2: Green. Field Frequency. It blinks in the negative frequency.
LED 3: Yellow. Field Applies. It blinks in the value of frequency set in SP1. When the field is applied LED stays lit.
LED 4: Red. Field Applies. It blinks in the value of frequency set in SP1. When the field is applied, LED stays lit. Another function of this LED is the fault indication, it happens when crosses the programmed time, start time, Stall time and also when crosses the number of times of Resync.
LED 5: Red. It only works when the field is applied (SP2) and it stays lit. Another function of this LED is the fault indication, it happens when crosses the programmed time of the Start time, Stall time and when crosses the programmed number of times of Resync.

Obs: In case of fault, LED'S 4 and 5 blink quickly at the same time.

Application Example



Mechanical Dimension Inspection



	VALUES
A	mm
B	mm
C	mm
D	mm
E	mm
F	mm
G	mm

TESTS

Report of Test

Model:

OP:

Date:

Customer:

Serial Number VARIXX:

Serial Number TBRTECH:

1 – **Crowbar performance voltage:**

Operation: 450V

Measured real value:

2 – **Performance for timer after to slip with 0 Hertz**

Input Voltage (V)	Performance Time (Seg.)	Conclusion
20		
25		
30		
35		
40		
50		
100		
150		

2.1 – **Minimum Voltage Operation:** V

2.2 – **Sensing Voltage and fire error:** V

2.3 – **To measure with the wheel rotating:**

Input Voltage (V)	G1	G2	G3
V	V	V	V

3 – **Performance for Frequency (Programmed)**

Set	Performance (SP1)	Field Apply (SP2)	Field Apply with booster
/	Hz	Hz	Hz

4 – **Start Time (Programmed):** Seg.

5 – **Resync Programmed for:** x (vezes).

6 - **Reluctance programmed for:** Seg.

7 - **Stall time programmed for:** Seg.

Warranty and Custom Details

Conditions of Warranty

In the following pages will be found a Sheet with the warranty terms and conditions of technical attendance, besides the Data Sheet that specifies the characteristics of the equipment, including the purchase date, order number and serial numbers, which should be specified in the eventual request of technical attendance outside or inside of the warranty period.

The foreseen warranty, in the specified conditions, is already included in the supply of the product and the buyer when acquiring the same agrees expressly with the terms. Additional warranties as more time or others addtional coverings can be negotiated in writing, by means of additional payments specifical in contract.

WARRANTY

1- The VARIXX equipments are guaranteed against production defects and materials, for 2 years starting from the date of delivery of the same ones, constant of the Data Sheet, that is integral part of this manual, being excepted the coming defects by the occurrence of the following: Operation out of the characteristics of the same ones. Wrong Operation, inclusive in what refers to the ventilation of the panel and environment temperature recommended. Connection of voltage out of the specified in manual and Data Sheet. Handles wrong, beaten and damages caused during the transport. Other causes that not directly those caused by material defect or production, besides catastrophes, vibration excess in the installation place, exposition to weather, exposition to too dirty or polluted aggressive environment. To make modification or alteration in the equipment, without the expressed authorization in writing of VARIXX. To make repairs not through people authorized expressly by VARIXX.

2 - The supplied warranty is expressly for equipment placed in our factory, being the expenses of round trip transport due to the customer. The inherent risks to the round trip transport for repairs are due to the customer and should be supplied by the insurance of the carrier chosen by the customer.

3 - VARIXX commits to execute the repair in the briefest possible time, even so cannot commit to have all the components during the whole time in stock, due to big variety of types, what eventually can cart delays.

4 - The work hand and materials won't be charged in case the equipment is in the warranty and in conformity with the item 1. In case the user requests at any time, maintenance “ON SITE”, and exclusively by criterion and readiness of VARIXX, the same can be made, by means of previous budget and agreement in writing of the user.

5 - VARIXX doesn't take any responsibility, for any type of losses, damages, accidents, or profit cessation, due to flaw or defect in the equipment, so only if committing to repair or to restore the defective components in the VARIXX product, of the equipment that is inside of the conditions of the item 1.

6 - The Data Sheet in the end of this manual is integral part of this warranty because it specifies the operation conditions, date of purchase, and serial number.

7 - Each purchase of equipment will be accompanied of a manual by equipment type, with the respective Data Sheet, which can refer to more than

one equipment, always of the same type. VARIXX for its time keeps a copy of the Data Sheet, for future reference and supply of the warranty and components.

8 - The user should keep the Data Sheet in safe place, since the sequential numeration of the same will owe mentioned for the supply of the warranty.

9 - The acquisition of this equipment, doesn't include the technology and project of the same, that it is of property of VARIXX, and the customer agrees expressly with this clause, being therefore illegal the reproduction of this equipment and the disclose of its project.