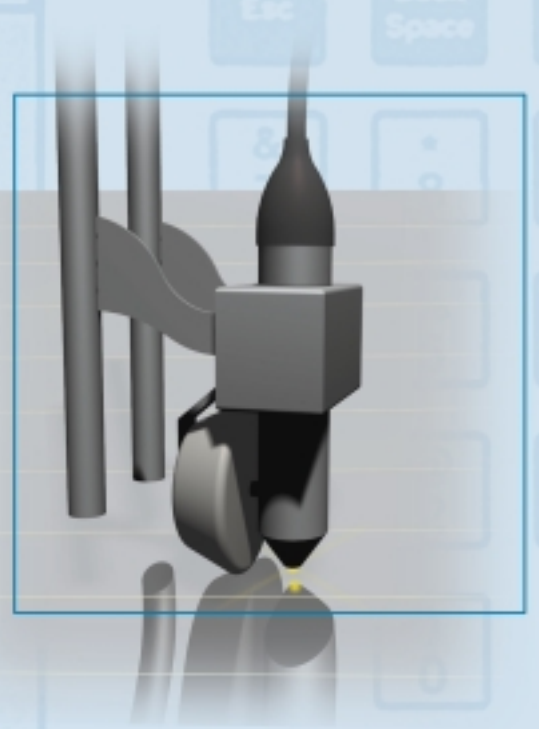


easy  
automation



Electrical  
Check  
Machine  
(ECM)  
of the  
defrosting  
circuit

## 1. General

The ECM can perform the following tests:

- Measuring of the electrical resistance
- Over voltage test
- Detection of wire continuity.

The composition of basic configuration is:

1. Electrical board with an industrial PC
2. A&B PLC to control all the sequences
3. Electrical clamps to be connected to the defrosting bus bars
4. Up to four probes for the detection of the continuity of the wires

## 2. Working sequence

The ECM can be used either in an automatic line or in a manual checking station.

### 2.1. Automatic

The ECM is controlled by an internal PLC and can perform all the necessary tasks. It is integrated in a line with a squaring conveyor and with a support frame for the brush and/or for the electrodes.

### 2.1. Back-Up

The ECM is also ready to interface an existing automatic line with an easy interface to start the required tests. This enables the ECM to be fully flexible, used automatically, manually, or as a back-up machine, with a fast set-up for each mode.

### 2.2. Manual

From the single page of the configuration menu, you can select the operations, the modality to go from one operation to the next, and the parameters of each operation as reported below.

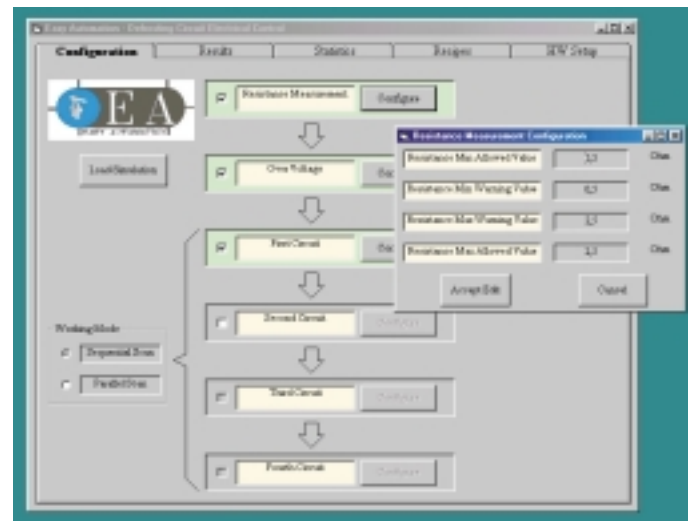
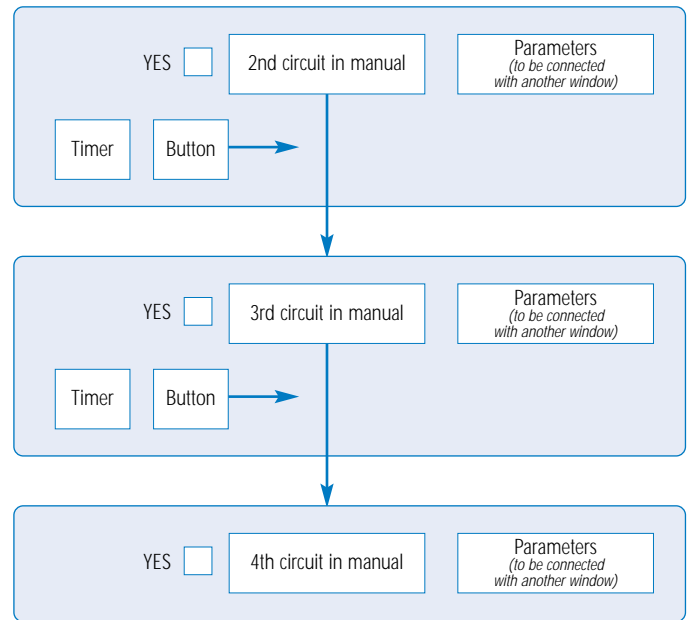
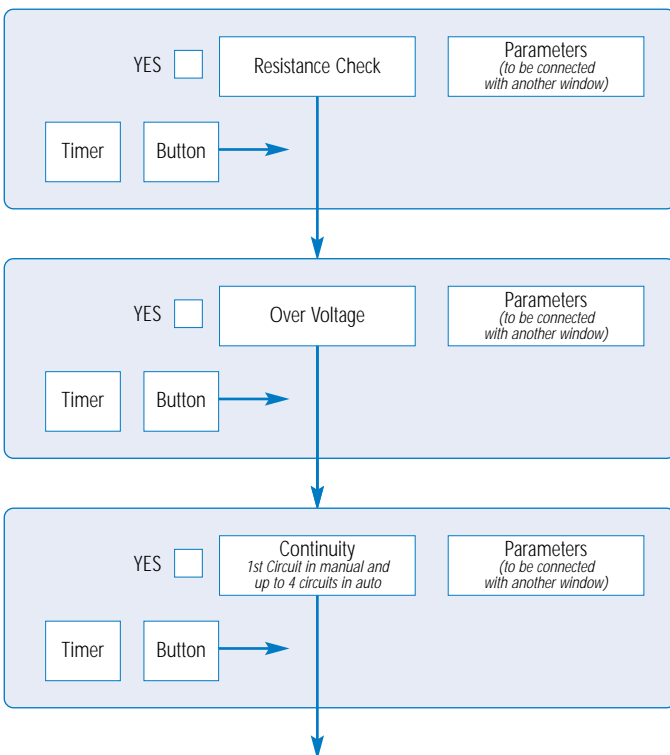


Fig. 1 - Configuration Page

## 3. Electrical resistance

The machine measures the resistance through a volt-ammeter method, supplied with a **calibration** certificate with the following specifications:

Specifications	Minimum	Maximum
Range of measurement	0.5 $\Omega$	2.5 $\Omega$
Accuracy	0.02 $\Omega$	-
Balance for the thermal derive	By a pyrometer	-
Measuring time	-	0.2 sec.

The historical values of the resistance are graphically represented on the results screen of the industrial PC .

## 4. OverVoltage

After the measuring of the resistance it is possible to over-load the

electric circuit in order to break wires that have local defects. It is possible to regulate the Voltage up to 36\* Volts. The value of the voltage is defined in the configuration windows, and it can be saved for each specific model. No manual operation is necessary to regulate the voltage. In the same way the application time can be regulated from 0 to 10 sec.

## 5. Wire continuity

After the over voltage is performed, the continuity of up to four wire circuits can be measured. A high sensitivity no contact magnetic probe is used to perform the test while the circuit is powered. The system is able to perform the test from 1 to 4 different equipotential circuits. In the line solution the test can be performed simultaneously, using several probes. While in a typical manual operation it can be done sequentially with one single probe. The stability of the system also permits one to compare the electrical resistance of each single wire as a percentage of the total one. It is very useful to have an indication of the reduced section of each single wire. A threshold can be settled referring to a defined glass, in order to have a warning when the resistance of the wire is higher than the one expected.

Specifications	Minimum	Maximum
Time for measuring of one single circuit	Depending on the probe speed <1 sec	No limits
Time for measuring of two single circuit at the same time	Depending on the probe speed <1 sec	No limits
Time for measuring of three single circuit at the same time	Depending on the probe speed <1 sec	No limits
Time for measuring of four single circuit at the same time	Depending on the probe speed <1 sec	No limits
Distance between close wires	<15** mm	-
Probe characteristics	High sensitivity	-
Distance of the probe from the glass	0.5 mm	5 mm
Possibility to detect the wires from the opposite surface		Yes
Possibility to display the current of each single wire		Yes
Possibility to have a variable threshold for each model		Yes
Possibility to detect the position of the broken wires		Yes

## 6. Results

The results are displayed on two devices:

- Control PC
- Lamp alarm

In the Control PC result windows, strips with green, orange or red color are activated immediately after each test, in order to have a direct view of the single testing step. Inside these strips the referring and the measured data are reported. In the result windows select graphics are present:

- Resistance trends
- Multi-circuit wire measurement

At the touch of a button you can connect to the statistics windows with trends of the resistances and production report. All the reports are printable.



Fig. 2 - Statistical Report

## 7. Options

For the stand alone configuration:

- Electrical brushing heads with bus bar electrical contact
- Glass stops for the manual squaring of the glass
- Glass supports
- Probe movement system

For the line configuration:

- Squaring conveyor
- Bridge-shaped frame
- Electrical brushing heads with bus bar electrical contact
- Probe movement system

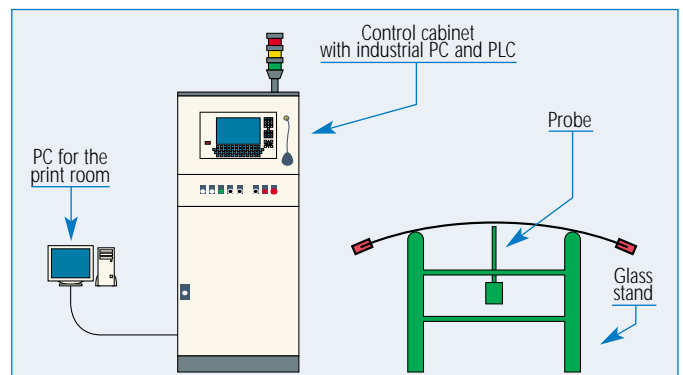


Fig. 3 - Stand alone station in the standard configuration

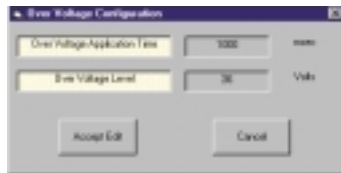
\* 36 Volt @ R=1 Ω, 24 Volt @ R=0,5 Ω

\*\* Depending on the circuit

## Key Points

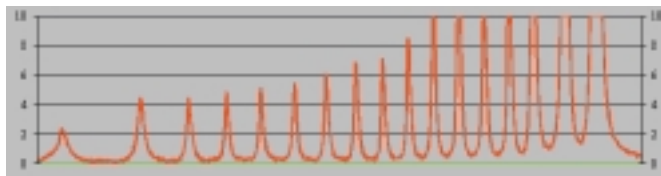
### 1) Easy interface and storable recipes

All the parameters are easy written into the configuration Windows and stored in the PC hard disk. A direct link with the result windows compare the reference value with the measured ones and high light the correspondig strip with green, grey, or red dependig on the result.



### 2) Current flow information of each wire

The linear magnetic probe, developed for this application, allow to measure the current intensity of each single wire.



### 3) Printable statistical reports

### 4) Up to 4 circuits checked

### 5) Continuity acquisition in less than 1 second for 4 circuits

### 6) Wires continuity detection from the print opposite face

### 7) Close wire detection

### 8) Ethernet connection with the print room PC

### 9) Position detection of the broken wires