



TESTTRANSFO2 User's Guide

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MADE - V 1.14



MADE

S.A. au capital de 270 130 €
167, Impasse de la garrigue
F 83210 LA FARLEDE

Tél: + 33 (0) 494 083 198 – FAX : + 33 (0) 494 082 879
-mail: contact@made-sa.com - Web : www.made-sa.com



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1 DOCUMENT OBJECTIVE

This document presents the **TESTTRANSFO2** instrument, describing its use and also the PC software which enables storage and printing of the results obtained.

2 TERMINOLOGY

TESTTRANSFO2 is a product of the MADE-S.A. company. It enables checking the function of disconnected distribution transformers in place or in the storage yard.

3 OVERVIEW

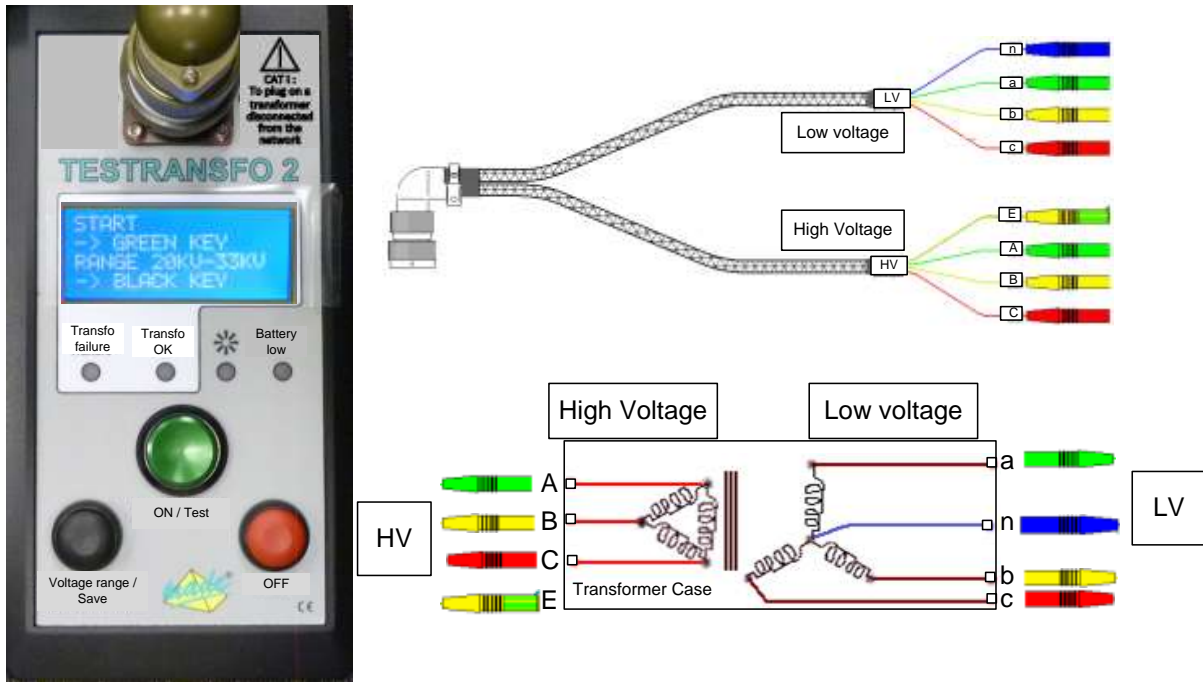
3.1 Use

The **TESTTRANSFO2** is a portable instrument which is used for verifying the integrity of an MV/LV distribution transformer . It is particularly useful :

- Before installation, to verify the integrity of any internal protections after transporting the transformer
- After a failure, as an on-site diagnostic aid.
- On reception of transformers on arrival from the manufacturer (to avoid disputes).



3.2 Connection Scheme



TESTTRANSFO2 tests the states of any internal protections

TESTTRANSFO2 tests the most common causes of failures by a series of 19 measurements.

Use the 8 crocodile clamps to connect to the transformer connections.

On the low voltage side:

- Phase a: Green
- Phase b: Yellow
- Phase c: Red
- Neutral: Blue

On the high voltage side:

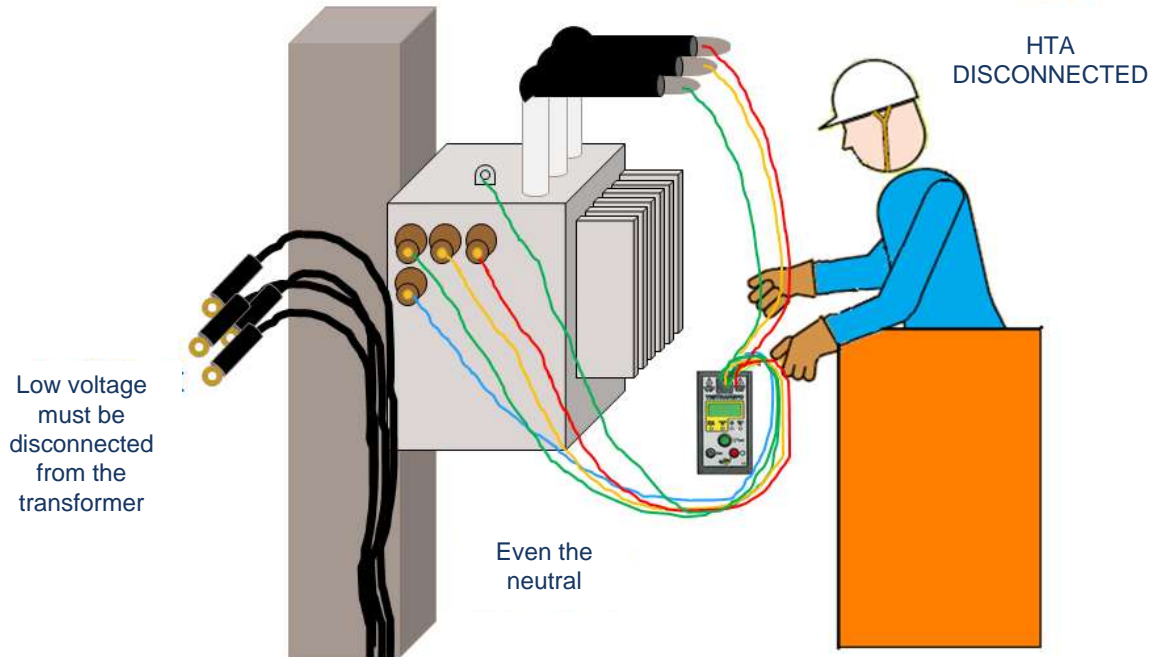
- Phase A: Green
- Phase B: Yellow
- Phase C: Red
- Ground: Yellow/Green



4 OPERATION

4.1 Method of Operation

4.1.1 Connection



Disconnect all HV and LV connections from the transformer, including the earth (it is not sufficient to only disconnect the LV).

Connect the tester correctly to all the terminals of the transformer with the 8 cables according to the colour code.



Always check the good quality of the contacts between the crocodile clamps and the transformer connectors.

Remove the dirt or the paint if necessary to make sure the connection is good.

On the high voltage side, you can also use the small adapters supplied with TesTransfo. See the illustration on the right.



4.1.2 Start-Up

Press the green button, and the **TESTTRANSFO2** will initialise:

Press the green button again, and the system starts automatically.

After the audible signal, **press the green button again** to launch the series of tests.

TesTransfo automatically tests the 18 different internal connections.



4.1.3 Choice of the transformer input range

TESTTRANSFO2 adapts to the transformer input voltage rating in order to obtain the best results possible for the transformers under test. The three ranges of input voltages are : 5-9KV / 10-19KvV / 20-33KV

The range must be chosen using the black button before starting the test :



The correct choice of range before initiating the measurements is imperative for the best final result. The default range is 20/33 KV.

Between each change of range, there is a pause while the instrument re-calibrates itself appropriately :



The 3 ranges are :

Range 20KV – 33KV



Range 10KV –193KV



Range 05KV –09KV



Select the range according to the transformer under test.

4.1.4 Test

Press the green button once again to start the 19 automatic measurements :

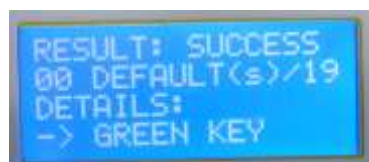


4.1.5 Interpretation of the results

The result is shown directly on the display

TESTTRANSFO2 displays : « **RESULT : CORRECT** » or « **RESULT : FAULT.** »

It is essential that the **19 tests** are seen as **correct** for the transformer to be considered functional.



Transfo correct



Transfo faulty

4.2 Test Sequence

Important reminder: all connections to the transformer, MV and LV, must be disconnected during the test.

TESTTRANSFO2 automatically runs a sequence of direct current tests for each of the 13 bipolar combinations formed, while checking conformity with the expected result for each case : Open Circuit, Short Circuit, impedance.

The type of fault found is shown at the end of the test by scrolling all the combinations using the green button, and is summarised according to 3 criteria :

- Short-circuit (SC),
- Open Circuit (OC),
- Out of Norm (impedance fault, incoherent response curve, ..)

6 complementary alternating current measurements are used to check the transformation ratios on the three phases: **TESTTRANSFO2** compares the values between each phase from the HV side and the LV side as well as the coherence of the ratio HV/LV of each phase .

The measurement precision is 5 % : 2% of the measurement + 3% due to the tolerance inherent to the transformer

Note :

TESTTRANSFO2 does not check the insulation.

- Always ensure good contact by the croc clips : Scrape off paint or dirt if necessary. Use the adapters if necessary for the HV connections.

4.3 Recording the Results of a Measurement Program

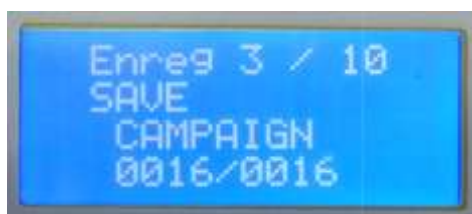
To record a set of results, scroll through the result details (cf § 4.2). The following screen is displayed :



Record the results by pressing the black button :



The recorded results can be transferred later to a PC with the software package supplied (cf §5). The instrument can store ten sets of results on a FIFO basis. After the 10th recording, the first is overwritten and so on.



4.4 Turning Off

The red button is used to turn off the instrument.

After 5 minutes of inactivity, the instrument turns off automatically

4.5 Changing the batteries

TESTTRANSFO2 is powered by 2 x 9V Type LR61 batteries


Inserting the batteries in the back of the instrument :



5 TESTTRANSFO2 SOFTWARE

TTRANSFO2 - P:/TESTTRANSFO2/FAB/Clef_usb/TESTTRANSFO2/Data/aaa_essai_test(1).tt2
↔ □ ×

File Configuration Curve Help Language



TESTTRANSFO 2

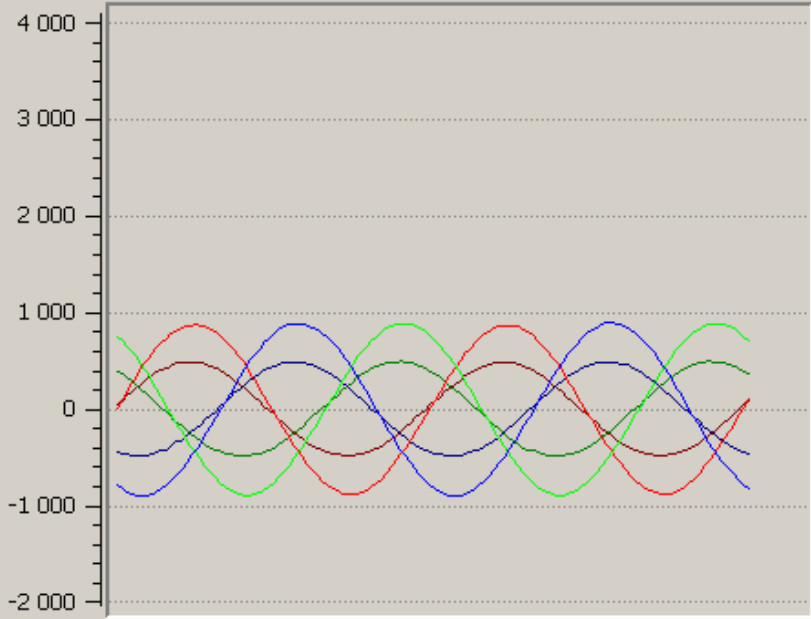
Information statement

Operator name:	<input type="text" value="polqe"/>	Date:	<input type="text" value="23/05/2013"/>
Site location:	<input type="text" value="aaa_essai"/>	Code:	<input type="text" value="test"/>
Transformer number:	<input type="text"/>	Manufacturer:	<input type="text" value="Transfix(TFX)"/>
Power:	<input type="text" value="160 kVA"/>	HV Voltage:	<input type="text" value="20 kV"/>
Fused:	<input type="text"/>		

Tests Results

1	<input checked="" type="checkbox"/>	Test_Ne-HV.A Succes OPEN CIRCUIT	10	<input checked="" type="checkbox"/>	Test_Ea-LV.A Succes OPEN CIRCUIT
2	<input checked="" type="checkbox"/>	Test_Ne-HV.B Succes OPEN CIRCUIT	11	<input checked="" type="checkbox"/>	Test_Ea-LV.B Succes OPEN CIRCUIT
3	<input checked="" type="checkbox"/>	Test_Ne-HV.C Succes OPEN CIRCUIT	12	<input checked="" type="checkbox"/>	Test_Ea-LV.C Succes OPEN CIRCUIT
4	<input checked="" type="checkbox"/>	Test_Ea-HV.A Succes OPEN CIRCUIT	13	<input checked="" type="checkbox"/>	Test_Ea-Ne- Succes OPEN CIRCUIT
5	<input checked="" type="checkbox"/>	Test_Ea-HV.B Succes OPEN CIRCUIT	14	<input checked="" type="checkbox"/>	Test_HV.A Succes RANGE OK
6	<input checked="" type="checkbox"/>	Test_Ea-HV.C Succes OPEN CIRCUIT	15	<input checked="" type="checkbox"/>	Test_HV.B Succes RANGE OK
7	<input checked="" type="checkbox"/>	Test_Ne-LV.A Succes CIRCUIT OK	16	<input checked="" type="checkbox"/>	Test_HV.C Succes RANGE OK
8	<input checked="" type="checkbox"/>	Test_Ne-LV.B Succes CIRCUIT OK	17	<input checked="" type="checkbox"/>	Test_LV.A Succes RANGE OK
9	<input checked="" type="checkbox"/>	Test_Ne-LV.C Succes CIRCUIT OK	18	<input checked="" type="checkbox"/>	Test_LV.B Succes RANGE OK
			19	<input checked="" type="checkbox"/>	Test_LV.C Succes RANGE OK

HV Curves



— HT.-A-B
— HT.-A-C
— HT.-B-C
— BT.-A-B
— BT.-A-C
— BT.-B-C

Comments

Download

Print

Save

Info.

Exit

Port COM36 is open at 115200 bauds.

5.1 Loading the Software

TESTTRANSFO2 is delivered with a USB memory stick holding the PC software package.

TESTTRANSFO2 is connected to a PC via a USB cable.

If the drivers are not recognised, the certificates are located in :

- « USBkey »:\TESTTRANSFO2\driver usb\USB FTDI.

It is possible to install the software on a PC by copying the directory « USBkey »:\TESTTRANSFO2 onto the hard disk.

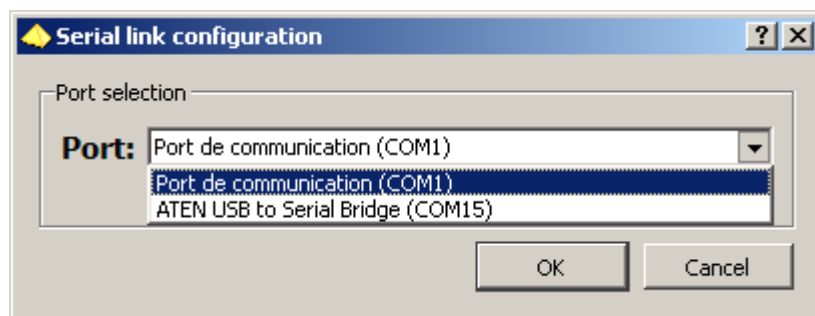
5.2 Opening the Software

Connect the **TESTTRANSFO 2** to the PC with the USB cable, and turn it on with the green button.

The software is opened by selecting : « TESTTRANSFO2\TTRANSFO2.exe »

5.3 Selection of the COM port

In the menu « Series Configuration »



Select the appropriate COM port in the list shown

5.4 Filling in the worksheet

Before carrying out the data transfer, fill in the fields below :

Information statement			
Operator name:	<input type="text" value="polqe"/>	Date:	<input type="text" value="23/05/2013"/>
Site location:	<input type="text" value="aaa essai"/>	Code:	<input type="text" value="test"/>
Transformer number:	<input type="text"/>	Manufacturer:	<input type="text" value="Transfix(TFX)"/>
Power:	<input type="text" value="160 kVA"/>	HV Voltage:	<input type="text" value="20 kV"/>
Fused:	<input type="text"/>		

Enter the name of the operator or the company :

Operator name:	<input type="text" value="polqe"/>
-----------------------	------------------------------------

Enter the date on which the measurement is taken :

Date: 23/05/2013

Code: mai, 2013

Manufacturer: dim. lun. mar. mer. jeu. ven. sam.

HV Voltage:

28	29	30	1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	1
2	3	4	5	6	7	8

10 T

11 T

12 T

Test Ea-LV.C Succes OPEN CIRCUIT

Enter the name of the sub-station :

Site location: aaa essai

Enter the identifying code:

Code: test

Select the manufacturer :

Manufacturer: Transfix(TFX)

HV Voltage: ABB(ABB)

Alsthom(ALS)

Areva(ARE)

France Transfo(FTR)

Matelec(MAT)

Merlin Gerin(MGE)

Ormazabal(ORM)

Pauwels(PWS)

Schneider(SCH)

Siemens(SIE)

10 T

11 T

12 T

13 T

14 T

15 T

Test Ea-LV.C Succes OPEN CIRCUIT

Select the transformer power :

Power: 160 kVA

Fused: 50 kVA

100 kVA

160 kVA

250 kVA

400 kVA

630 kVA

800 kVA

1000 kVA

Autre

Tests Results

1 Test Ne-t

2 Test Ne-t

3 Test Ne-t

4 Test_Ea-H

5 Test Ea-t

6 Test Ea-LV.C Succes OPEN CIRCUIT

Select the transformer operating voltage :

HV Voltage: 20 kV

10 kV

15 kV

20 kV

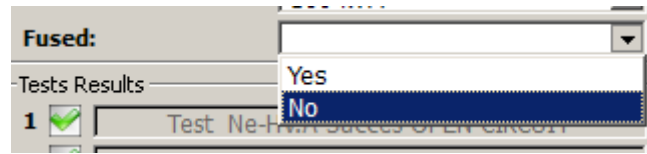
Autre

10 T

11 T

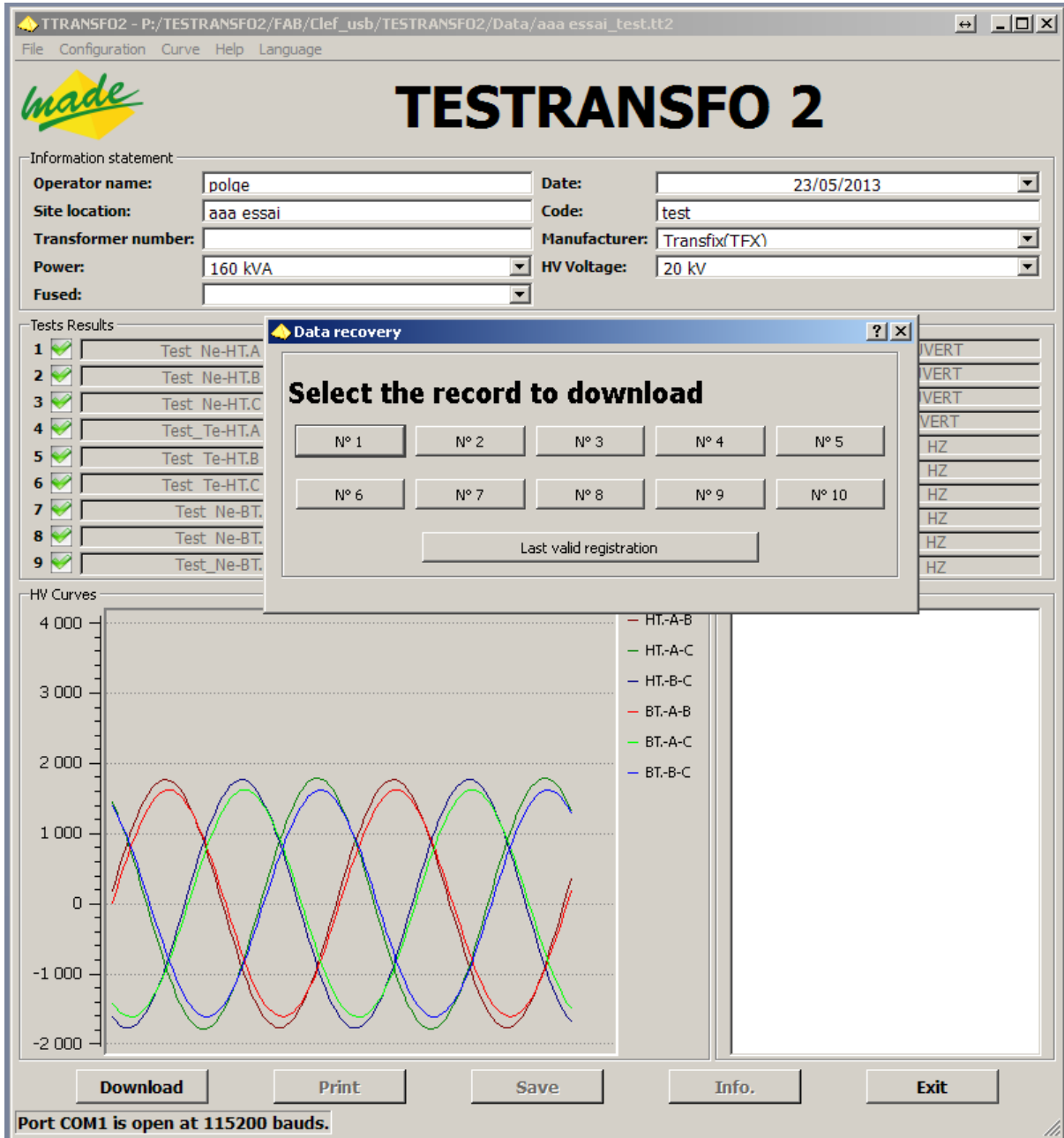
Test Ea-LV.B Succes OPEN CIRCUIT

Declare the presence or not of the HV fuses (TPC transformer) :



5.5 Data Transfer

Once these fields are completed, click on the « d » button:

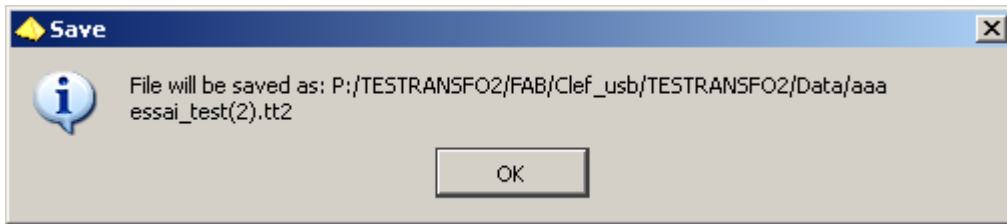


The screenshot shows the TESTTRANSFO 2 software interface. At the top, there's a menu bar with 'File', 'Configuration', 'Curve', 'Help', and 'Language'. Below the menu is the 'made' logo and the title 'TESTTRANSFO 2'. The main area is divided into several sections:

- Information statement:** A form with fields for 'Operator name' (polqe), 'Date' (23/05/2013), 'Site location' (aaa essai), 'Code' (test), 'Transformer number', 'Manufacturer' (Transfix(TFX)), 'Power' (160 kVA), and 'HV Voltage' (20 kV). There is also a 'Fused' dropdown menu.
- Tests Results:** A table with 9 rows, each with a checkbox and a test name (e.g., 'Test_Ne-HT.A').
- HV Curves:** A graph showing three sets of sine waves (HT-A-B, HT-A-C, HT-B-C) with a legend on the right. The y-axis ranges from -2000 to 4000.
- Data recovery dialog:** A modal window titled 'Data recovery' with the text 'Select the record to download'. It contains buttons for 'N° 1' through 'N° 10' and a 'Last valid registration' button.
- Bottom bar:** Contains buttons for 'Download', 'Print', 'Save', 'Info.', and 'Exit'. A status bar at the bottom left says 'Port COM1 is open at 115200 bauds.'

Choose the recording required, or simply the last recording in the instrument

The name of the file is made up from the fields « sub-stations name » and «identifying Code », separated by the character « _ ».



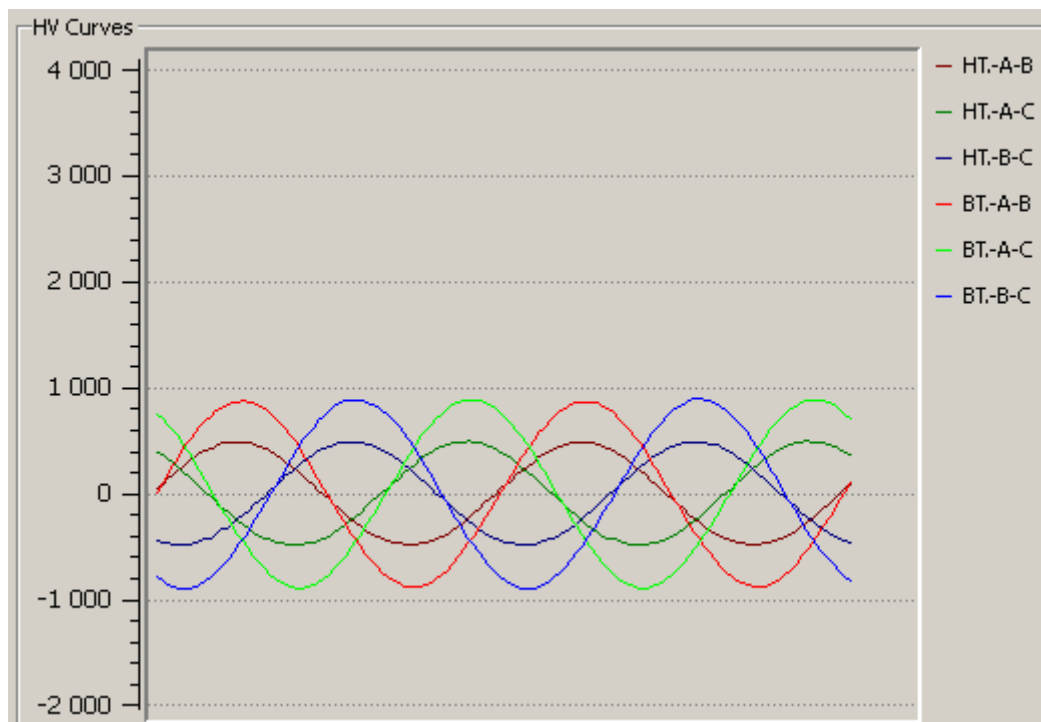
Results of the 19 tests : continuity and transformer ratio

Tests Results	
1 <input checked="" type="checkbox"/>	Test Ne-HV.A Succes OPEN CIRCUIT
2 <input checked="" type="checkbox"/>	Test Ne-HV.B Succes OPEN CIRCUIT
3 <input checked="" type="checkbox"/>	Test Ne-HV.C Succes OPEN CIRCUIT
4 <input checked="" type="checkbox"/>	Test Ea-HV.A Succes OPEN CIRCUIT
5 <input checked="" type="checkbox"/>	Test Ea-HV.B Succes OPEN CIRCUIT
6 <input checked="" type="checkbox"/>	Test Ea-HV.C Succes OPEN CIRCUIT
7 <input checked="" type="checkbox"/>	Test Ne-LV.A Succes CIRCUIT OK
8 <input checked="" type="checkbox"/>	Test Ne-LV.B Succes CIRCUIT OK
9 <input checked="" type="checkbox"/>	Test Ne-LV.C Succes CIRCUIT OK
10 <input checked="" type="checkbox"/>	Test Ea-LV.A Succes OPEN CIRCUIT
11 <input checked="" type="checkbox"/>	Test Ea-LV.B Succes OPEN CIRCUIT
12 <input checked="" type="checkbox"/>	Test Ea-LV.C Succes OPEN CIRCUIT
13 <input checked="" type="checkbox"/>	Test Ea-Ne- Succes OPEN CIRCUIT
14 <input checked="" type="checkbox"/>	Test HV.A Succes RANGE OK
15 <input checked="" type="checkbox"/>	Test HV.B Succes RANGE OK
16 <input checked="" type="checkbox"/>	Test HV.C Succes RANGE OK
17 <input checked="" type="checkbox"/>	Test LV.A Succes RANGE OK
18 <input checked="" type="checkbox"/>	Test LV.B Succes RANGE OK
19 <input checked="" type="checkbox"/>	Test LV.C Succes RANGE OK

For confirmation of the function of the transformer by the instrument, all these tests must be correct.

5.6 Transformer Ratio

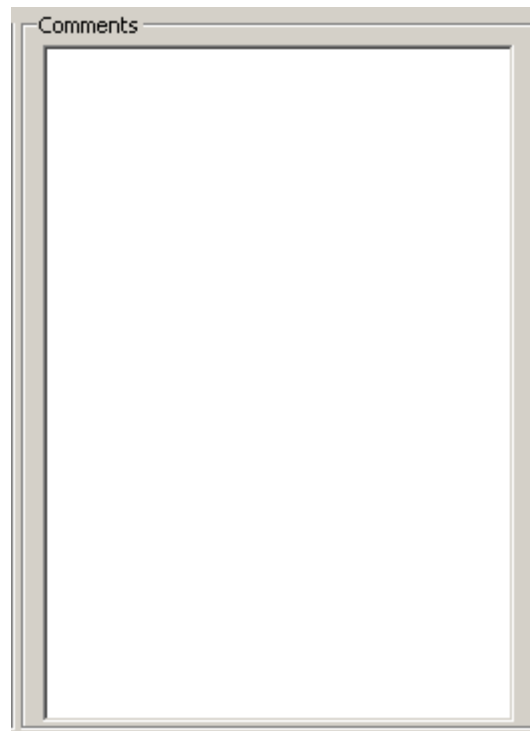
The transformer ratios, as well as the form of the phases are shown graphically :



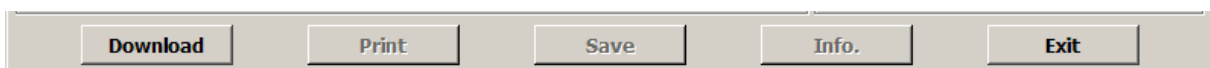
5.7 The comments field

This field recapitulates the **TESTTRANSFO2** data and contains some comments :

It is a text field left to the discretion of the user.



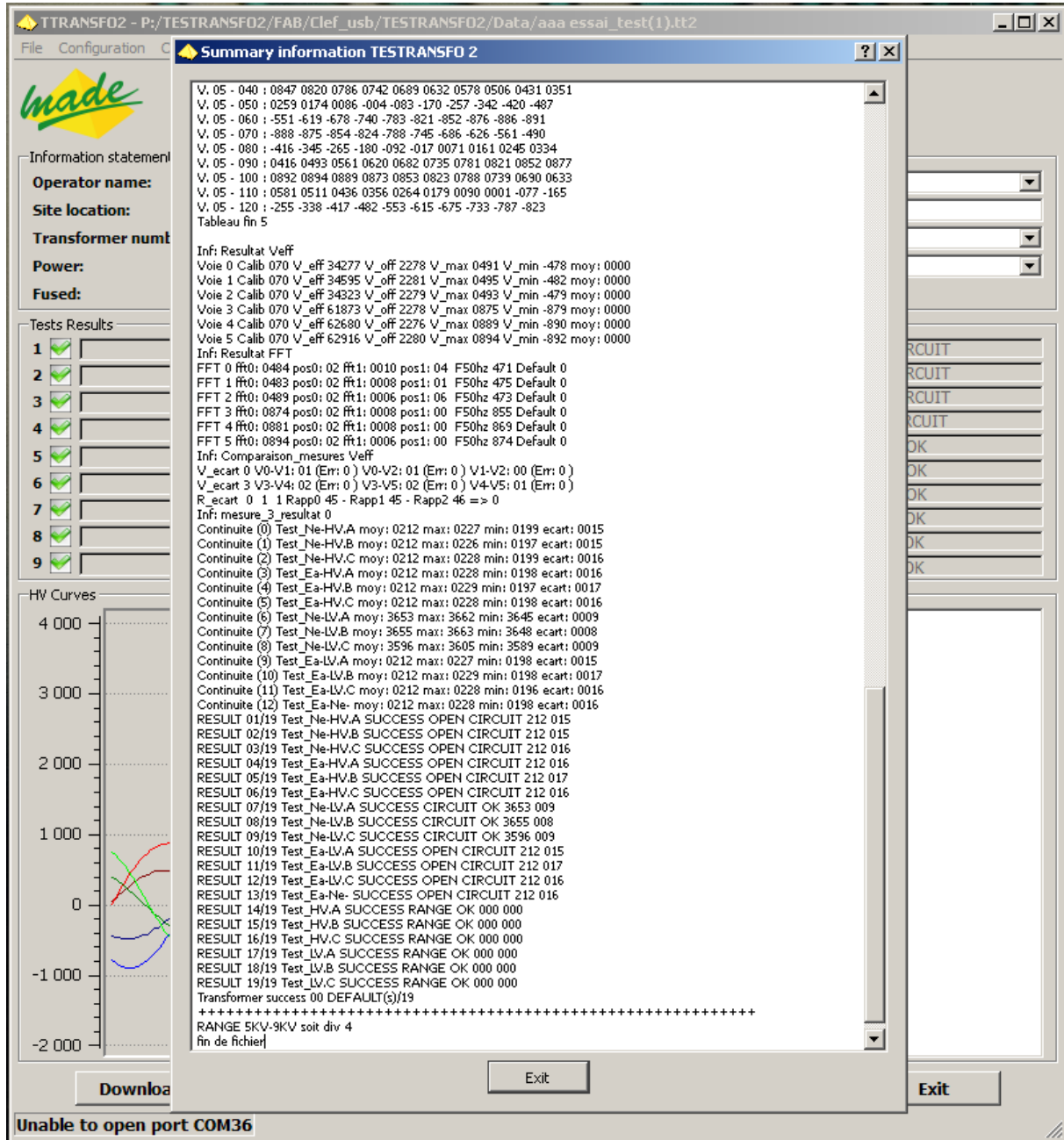
5.8 The « Save » Button



The « Download » button enables saving all of the file in a directory, this can be useful when it is required to add further comments.

5.9 The « INFO » button

The « INFO » button displays a page which summarises the TESTTRANSFO2 data:



Summary information TESTTRANSFO 2

V. 05 - 040 : 0847 0820 0786 0742 0689 0632 0578 0506 0431 0351
 V. 05 - 050 : 0259 0174 0086 -004 -083 -170 -257 -342 -420 -487
 V. 05 - 060 : -551 -619 -678 -740 -783 -821 -852 -876 -886 -891
 V. 05 - 070 : -888 -875 -854 -824 -788 -745 -686 -626 -561 -490
 V. 05 - 080 : -416 -345 -265 -180 -092 -017 0071 0161 0245 0334
 V. 05 - 090 : 0416 0493 0561 0620 0682 0735 0781 0821 0852 0877
 V. 05 - 100 : 0892 0894 0889 0873 0853 0823 0788 0739 0690 0633
 V. 05 - 110 : 0581 0511 0436 0356 0264 0179 0090 0001 -077 -165
 V. 05 - 120 : -255 -338 -417 -482 -553 -615 -675 -733 -787 -823
 Tableau fin 5

Inf: Resultat Veff
 Voie 0 Calib 070 V_eff 34277 V_off 2278 V_max 0491 V_min -478 moy: 0000
 Voie 1 Calib 070 V_eff 34595 V_off 2281 V_max 0495 V_min -482 moy: 0000
 Voie 2 Calib 070 V_eff 34323 V_off 2279 V_max 0493 V_min -479 moy: 0000
 Voie 3 Calib 070 V_eff 61873 V_off 2278 V_max 0875 V_min -879 moy: 0000
 Voie 4 Calib 070 V_eff 62680 V_off 2276 V_max 0889 V_min -890 moy: 0000
 Voie 5 Calib 070 V_eff 62916 V_off 2280 V_max 0894 V_min -892 moy: 0000

Inf: Resultat FFT
 FFT 0 fr0: 0484 pos0: 02 fr1: 0010 pos1: 04 F50hz 471 Default 0
 FFT 1 fr0: 0483 pos0: 02 fr1: 0008 pos1: 01 F50hz 475 Default 0
 FFT 2 fr0: 0489 pos0: 02 fr1: 0006 pos1: 06 F50hz 473 Default 0
 FFT 3 fr0: 0874 pos0: 02 fr1: 0008 pos1: 00 F50hz 855 Default 0
 FFT 4 fr0: 0881 pos0: 02 fr1: 0008 pos1: 00 F50hz 869 Default 0
 FFT 5 fr0: 0894 pos0: 02 fr1: 0006 pos1: 00 F50hz 874 Default 0

Inf: Comparaison_mesures Veff
 V_ecart 0 V0-V1: 01 (Err: 0) V0-V2: 01 (Err: 0) V1-V2: 00 (Err: 0)
 V_ecart 3 V3-V4: 02 (Err: 0) V3-V5: 02 (Err: 0) V4-V5: 01 (Err: 0)
 R_ecart 0 1 1 Rapp0 45 - Rapp1 45 - Rapp2 46 => 0
 Inf: mesure_3_resultat 0

Continuite (0) Test_Ne-HV.A moy: 0212 max: 0227 min: 0199 ecart: 0015
 Continuite (1) Test_Ne-HV.B moy: 0212 max: 0226 min: 0197 ecart: 0015
 Continuite (2) Test_Ne-HV.C moy: 0212 max: 0228 min: 0199 ecart: 0016
 Continuite (3) Test_Ea-HV.A moy: 0212 max: 0228 min: 0198 ecart: 0016
 Continuite (4) Test_Ea-HV.B moy: 0212 max: 0229 min: 0197 ecart: 0017
 Continuite (5) Test_Ea-HV.C moy: 0212 max: 0228 min: 0198 ecart: 0016
 Continuite (6) Test_Ne-LV.A moy: 3653 max: 3662 min: 3645 ecart: 0009
 Continuite (7) Test_Ne-LV.B moy: 3655 max: 3663 min: 3648 ecart: 0008
 Continuite (8) Test_Ne-LV.C moy: 3596 max: 3605 min: 3589 ecart: 0009
 Continuite (9) Test_Ea-LV.A moy: 0212 max: 0227 min: 0198 ecart: 0015
 Continuite (10) Test_Ea-LV.B moy: 0212 max: 0229 min: 0198 ecart: 0017
 Continuite (11) Test_Ea-LV.C moy: 0212 max: 0228 min: 0196 ecart: 0016
 Continuite (12) Test_Ea-Ne- moy: 0212 max: 0228 min: 0198 ecart: 0016

RESULT 01/19 Test_Ne-HV.A SUCCESS OPEN CIRCUIT 212 015
 RESULT 02/19 Test_Ne-HV.B SUCCESS OPEN CIRCUIT 212 015
 RESULT 03/19 Test_Ne-HV.C SUCCESS OPEN CIRCUIT 212 016
 RESULT 04/19 Test_Ea-HV.A SUCCESS OPEN CIRCUIT 212 016
 RESULT 05/19 Test_Ea-HV.B SUCCESS OPEN CIRCUIT 212 017
 RESULT 06/19 Test_Ea-HV.C SUCCESS OPEN CIRCUIT 212 016
 RESULT 07/19 Test_Ne-LV.A SUCCESS CIRCUIT OK 3653 009
 RESULT 08/19 Test_Ne-LV.B SUCCESS CIRCUIT OK 3655 008
 RESULT 09/19 Test_Ne-LV.C SUCCESS CIRCUIT OK 3596 009
 RESULT 10/19 Test_Ea-LV.A SUCCESS OPEN CIRCUIT 212 015
 RESULT 11/19 Test_Ea-LV.B SUCCESS OPEN CIRCUIT 212 017
 RESULT 12/19 Test_Ea-LV.C SUCCESS OPEN CIRCUIT 212 016
 RESULT 13/19 Test_Ea-Ne- SUCCESS OPEN CIRCUIT 212 016
 RESULT 14/19 Test_HV.A SUCCESS RANGE OK 000 000
 RESULT 15/19 Test_HV.B SUCCESS RANGE OK 000 000
 RESULT 16/19 Test_HV.C SUCCESS RANGE OK 000 000
 RESULT 17/19 Test_LV.A SUCCESS RANGE OK 000 000
 RESULT 18/19 Test_LV.B SUCCESS RANGE OK 000 000
 RESULT 19/19 Test_LV.C SUCCESS RANGE OK 000 000

Transformer success 00 DEFAULT(s)/19

 RANGE 5KV-9KV soit div 4
 fin de fichier

Tests Results

1
 2
 3
 4
 5
 6
 7
 8
 9

HV Curves

4 000
 3 000
 2 000
 1 000
 0
 -1 000
 -2 000

Download Exit Exit

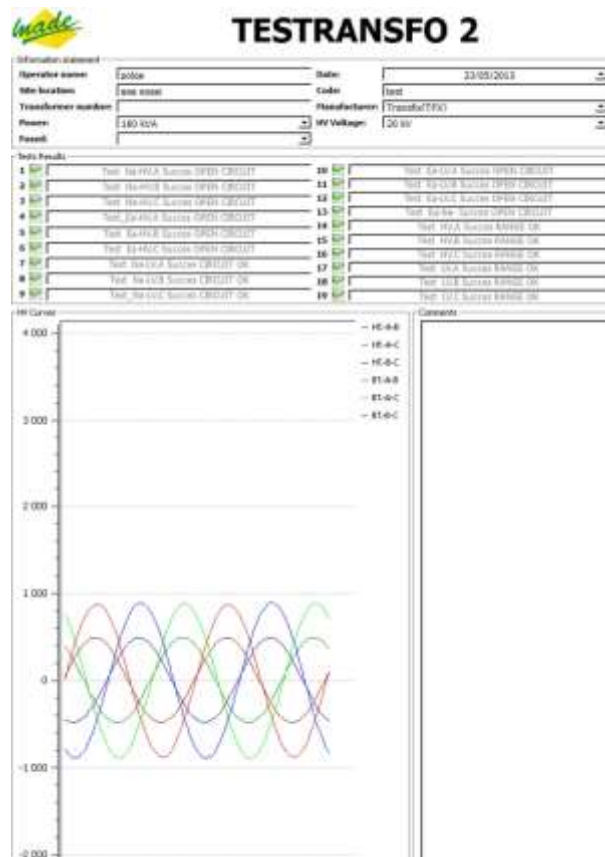
Unable to open port COM36

5.10 Printing

The « Print » button gives access to system printers to print the page :




Print example



6 TESTTRANSFO2 TECHNICAL CHARACTERISTICS

Power supply	9 volts battery , type LR61
Dimensions	440 x 280 x 320 mm
Composition	Plastic case
Weight	0.3 Kg
Display :	LCD screen 4 lines + led

Standard : 
NF EN 50082-1 : CEM
NF EN 61010-1 : Electric safety.
Protection class : IP 32 – IK 07



CAUTION : Utilization of TESTTRANSFO is forbidden with a live transformer.
Disconnect the transformer with all safety procedures required.

7 MAINTENANCE

Opening the TESTRANSFO is not allowed, except by personnel qualified and agreed by MADE.

An annual inspection can be carried out in our workshops

The instrument should only be cleaned with a soft dry cloth.

Never use solvent or a solvent based product , on the instrument or its accessories.

8 RECYCLAGE

In accordance with the decree n° 2005-829 of July 20, 2005 relating to the waste disposal of electrical equipment and electronic (WEEE), the user ensures and takes responsibility for the collection and the elimination of the WEEE under the conditions of the articles 21 and 22 of this decree.



9 GUARANTEE

MADE guarantees this product, to the initial purchaser, against any material or operational fault for one year from the date of delivery, unless otherwise indicated in the product manual. If such a fault is discovered during the guarantee period, MADE can decide to repair or replace the faulty product, excluding transport and handling costs. Any product repaired or replaced in the terms of this agreement will only be guaranteed for the remainder of the initial guarantee period of the instrument.

9.1 Limitations

This guarantee does not cover:

- Damage caused by a "cause beyond control", natural disasters, strikes, wars (declared or not), terrorism, social conflicts or any acts under governmental jurisdiction
- Damage due to misuse, to carelessness, to any accident or an unsuitable application or installation
- Damage caused by a repair or an attempted repair not authorized by MADE
- Any product that is not used in accordance with the instructions provided by MADE
- Cost of transport back to MADE
- Cost of transport by express delivery of parts or products under guarantee
- Cost travel for a repair on site under guarantee

This guarantee constitutes the unique explicit guarantee established by MADE for its products. All implied guarantees, including, but not limited to, guarantees on the commercial value of the product and its suitability for a particular use are positively rejected.

The present guarantee confers certain rights : the legislation of the country or jurisdiction can grant others. This guarantee constitutes the final declaration, complete and exclusive, of the terms of the guarantee and no body is allowed to give other guarantees or promises on MADE's account.

9.2 Claims Limitations

Claims having for object repair or replacement are the only allowable claims in case of the breaking of this guarantee. The MADE Company cannot be held responsible, whether on the basis of strict responsibility or any other legal basis, of any incidental or consecutive damage resulting from a violation of the guarantee or from carelessness.



10 COPYRIGHT

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MADE declines all responsibility for mistakes or inaccuracies that the present document may contain.

11 ANNEXE

11.1 déclaration of conformity CE

déclaration of conformity **CE**

Déclaration : CE_TesTransfo2 / 09 / 2013

The manufacturer:

MADE SA

167, Impasse de la Garrigue
F 83210 LA FARLEDE



Declares the product:

TesTransfo2

Has been designed and manufactured to conform to :

The EU directives and specifications listed

- CEM 2004/108/CE relative au « Marquage CE»
- 2006/95/CE relative à la sécurité des matériels électriques destinés à être employés dans certaines limites de tension.

Standards and / or technical specifications referenced in this manual have been applied and the device referenced above is in conformity with the Directive 2004/104/EC.

In addition, the product described above has been designed, manufactured and tested as part of a Quality Assurance System certified according to EN ISO 9001/2008, by the French Association for Quality Assurance - AFAQ certificate: QUAL / 2005 / the 24473B: 05/05/2011.

Signed at La Farlède, the 3rd September, 2013

Directeur Général	Directeur Technique	Responsable Qualité
Marc Rivasseau 	Laurent Zomerg 	Jean Yves Creste 