

# MAGNETI MARELLI

ALT DIAG PRO

User's manual

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# **1 General description**

Test bench is designed to verify the proper performance of alternators and starter motors. Testing working parameters helps to diagnose damages that take place in these components.

## **1.1 Usage**

The bench is used to test 12 V to 300 A and 24 V to 150 A alternators and starter motors. Test bench supports alternators with following interfaces: COM (LIN, BSS), C, SIG, RLO, L-RVC and LAMP.

## **1.2 Tested parameters of alternators**

Bench enables detailed diagnosis of alternator's performance basing on following parameters:

- performance curve,
- current ripples chart,
- alternator's leakage current,
- maximum alternator current,
- maximum alternator power,
- charging voltage (voltage set point) ,
- turn-on speed,
- DFM value,
- WINDING value.

## **1.3 Tested parameters of starter motors**

During the starter motor test, the user may examine following parameters:

- maximum current of a starter motor (engine starting current),
- maximum power of a starter motor,
- average current of a starter motor,
- average voltage of a starter motor.

## 2 Device construction

### 2.1 Outer construction and dimensions

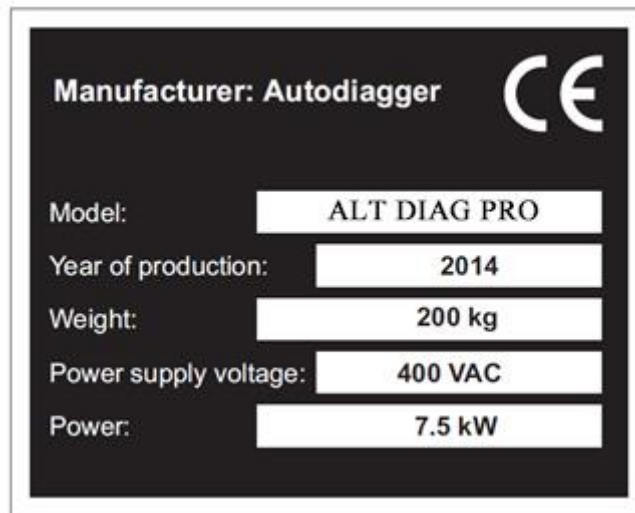
### 2.2 Arrangement of connectors

Connectors in the back of the device should be connected to mains power supply and compressed air supply. On the right side of the bench there are two cables used to provide power to an alternator/starter motor. In the front panel in addition to the touch screen, there is a USB connector (to update software/connect printer), an output for cables to connect the alternator/starter motor, which enables measuring the values properly and controlling the test. Below, there is a projection of the front panel of the device. The panel is composed of the following connectors and buttons:

- L – lamp connector,
- W – winding input,
- +/- additional power output 12 V or 24 V, depending on the type of test,
- COM – output of control signal,
- DFM – DFM signal input,
- IGN – ignition output and leakage measurement input,
- v – lowering engine,
- ^ – raising engine,
- STOP – safety switch used to cut off the tester's power supply,
- USB – connector used to connect the printer or USB flash drive.



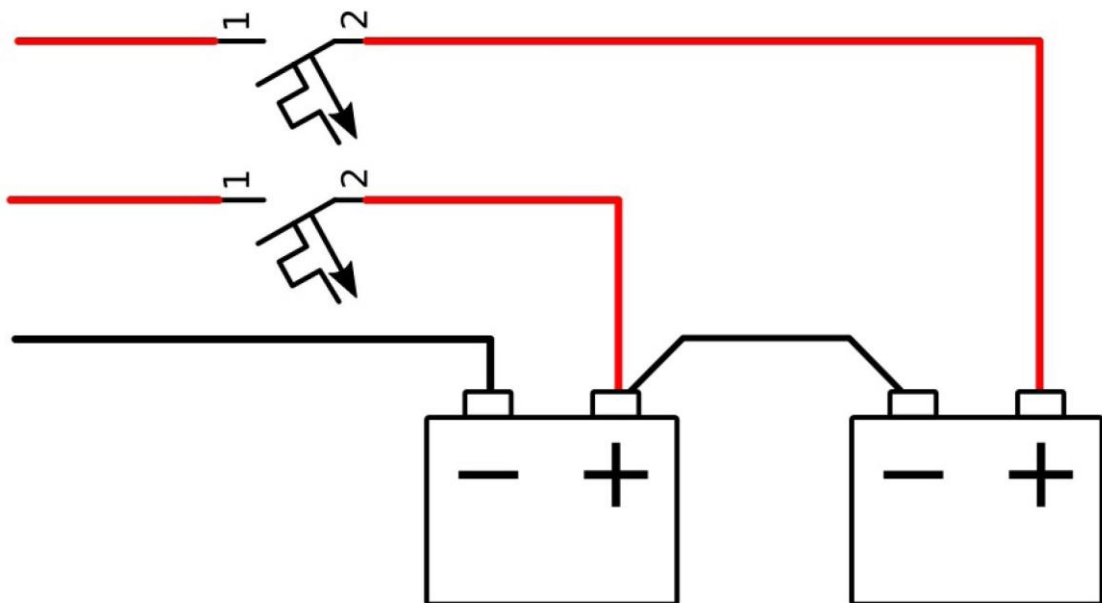
Below, we see a pattern for the identification plate located on the back wall of a tester.



### 3 Power supply

#### 3.1 Connecting batteries

The device uses two car batteries with a voltage equal to 12 V and a battery capacity of 60 Ah to 80 Ah. The figure below presents a diagram showing the proper battery connection.



### 3.2 Main power supply

Connection with the usage of 400 V, 50 Hz connector for nominal current 16A with the 3P+N+PE evacuation system.

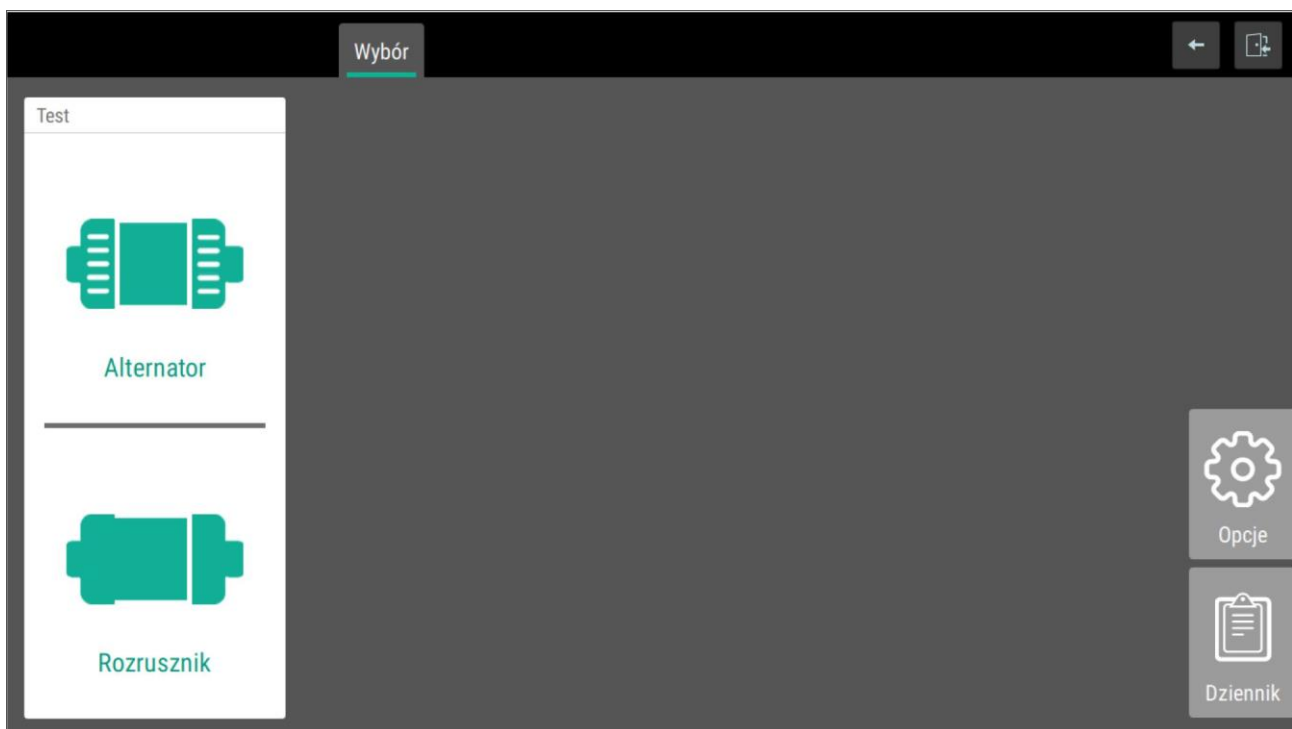
### 3.3 Connecting compressor

It is necessary to connect a compressor with the usage of a 1/2" pneumatic quick-release coupling. The maximum pressure is equal to 10 bar.

## 4 User interface

The device is equipped with a touch screen that is designed to configure and control the test bench.

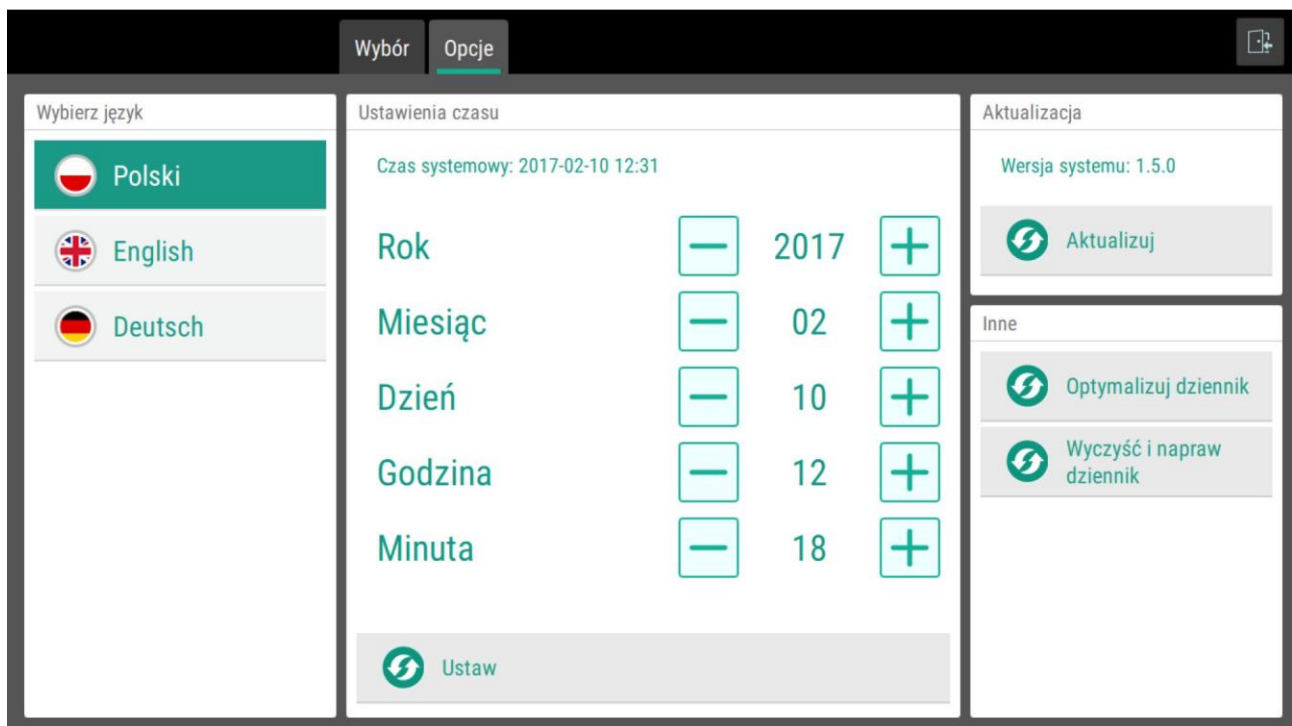
### 4.1 General description



The interface is composed of two modules. The first is the configuration of the device and a Logbook of the previous tests. The second module enables testing of alternators and starter motors.

## 4.2 Configuration

Configuration may be carried out by accessing the options tab.



### 4.2.1 Change of date

In order to change the date, the user has to modify the value by the usage of the '+', '-' keys and confirming the value by pressing 'set'.

### 4.2.2 Change of language

List of available languages:

- Polish,
- English,
- German,

In order to change the language, the user needs to press the key with the name of the language in the options window.

## 4.3 Printing

ALT DIAG PRO enables printing data:

- screen of manual test at any moment of the test,
- results of automatic test of an alternator,
- results of a test of a starter motor.

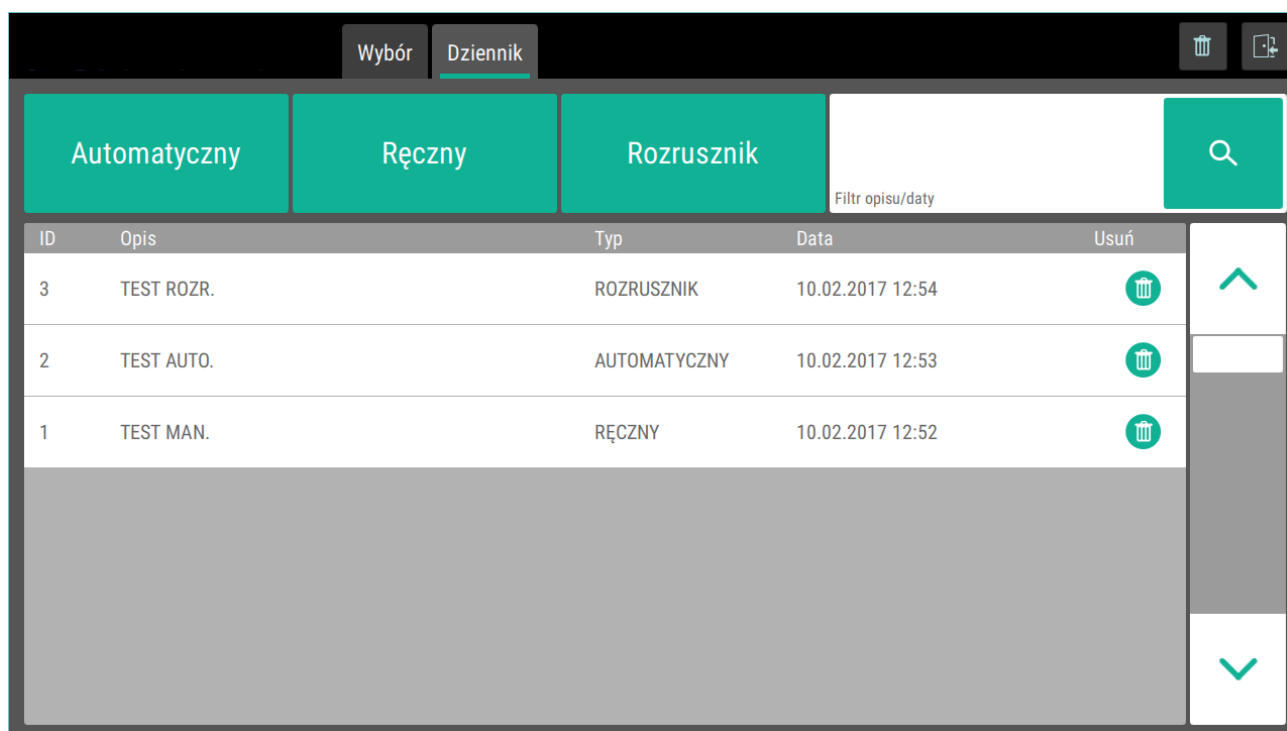
In order to print data, the user needs to connect the printer to the USB connector and press the 'print' button. The printing may be carried out during the test or by using data recorded in the log.




### 4.3.1 Supported printer

Test bench supports following printers, connected through USB cable:

- Samsung-M2070,
- HP Deskjet\_1010,
- HP Deskjet\_3540,
- HP Deskjet\_2135.

## 4.4 Logbook



ID	Opis	Typ	Data	Usun
3	TEST ROZR.	ROZRUSZNIK	10.02.2017 12:54	
2	TEST AUTO.	AUTOMATYCZNY	10.02.2017 12:53	
1	TEST MAN.	RĘCZNY	10.02.2017 12:52	

Logbook enables to view previously done tests. Logbook stores results from last 1000 tests. If the number of performed tests on the device will exceed 1000, and the results will not be erased by the user, tester removes from the memory the oldest records, so the number of recorded results will be equal to 1000.

#### **4.4.1 Browsing the logbook**

In order to facilitate searching for a specific test, the tests are separated into three groups:

- automatic test (alternator),
- manual test (alternator),
- starter motor test.

The user has an option to search among all of the three groups, two groups or within one chosen group. There is also a possibility to search for the test by specifying the description (if such description was previously added), the description should be entered into appropriate field at moment of starting the test. It is also possible to search for a test using its date.

#### **4.4.2 Logbook optimization**

Logbook optimization arranges the results in a database within the memory. It is necessary to run optimization when the efficiency of logbook performance lowers.

#### **4.4.3 Clearing and fixing the logbook**

Fixing the logbook erases the entire database and creates it anew. It is necessary to run it when the logbook stops adding records (e.g. due to installation of the wrong system update).

### **5 Mounting and connecting an alternator**

#### **5.1 Mounting an alternator**

Alternator should be mounted on a metal handle. Then, it is necessary to put on the alternator belt and tense it by usage of button controlling the tension. Before beginning the test it is necessary to check:

- if the belt was tensed strongly enough,
- if the alternator is mounted steadily,
- if the cover was lowered and is protected from opening during the test.

#### **5.2 Connecting an alternator**

In order to run the test, it is necessary to connect the alternator to the power supply, varying on the type of alternator and interface it uses, the following clamps:

- COM,
- Lamp,
- Ignition,
- Winding,
- + (additional),

- DFM.

Sound signal means that there is an error in connection – there is a short circuit. In case of digital interfaces (COM – LIN, BSS) the connection of controlling line is verified, and in case of connection error, the device will display message after entering the test screen.

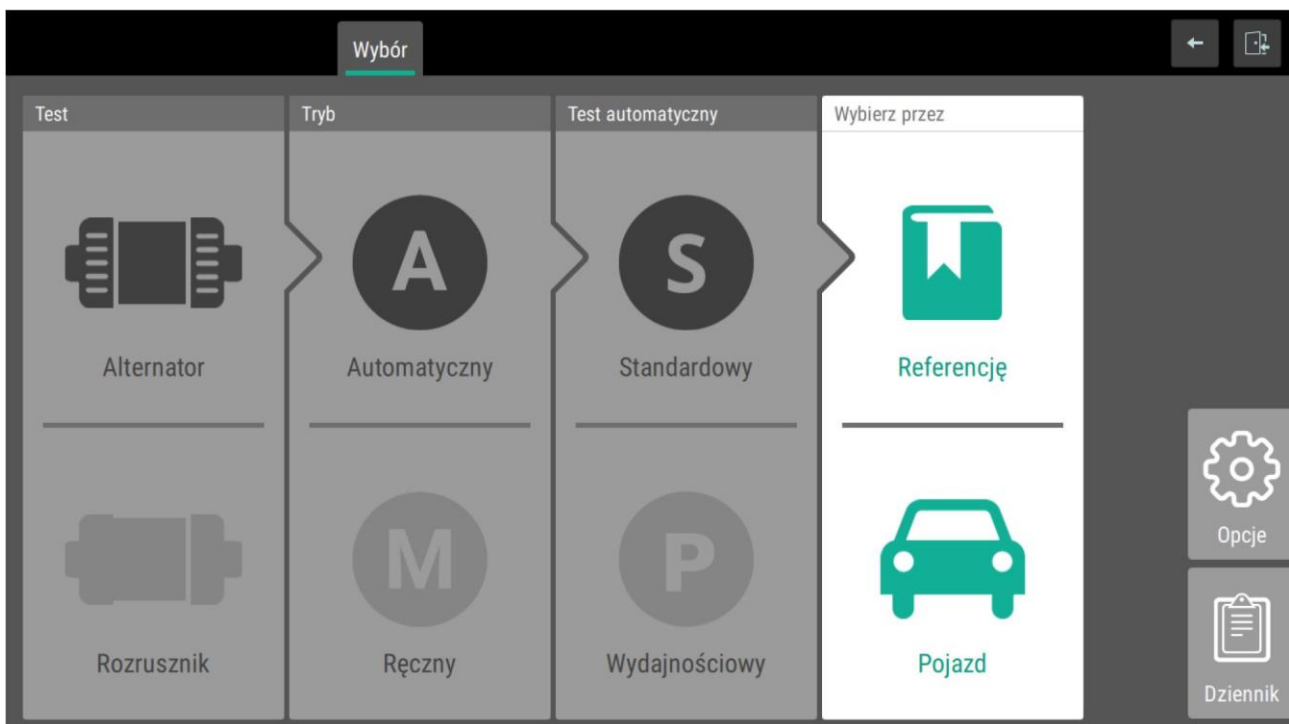
## 6 Connecting a starter motor

In order to perform the test of a starter motor properly, it is necessary to connect the power supply and ignition clamp. Continuous sound signal activated after connecting the starter motor means that there is a short circuit of the power supply.

## 7 Automatic test of an alternator

The test bench allows the user to perform two types of automatic tests of an alternator:

- standard test – draws from the base of alternators the maximum value of load current which shall not be exceeded during the test,
- performance test – does not use nominal limit of the current during the test, the load of alternator is maximal.








## 7.1 Starting a test

Each test begins with choosing its parameters:

- test → of an alternator,
- mode → automatic,
- type of automatic test → standard test / performance test
- data selection from the base through - > reference / vehicle

In order to download the data related to specific alternator from the database it is necessary to choose an alternator. Choosing alternator is done through usage of alternator's reference number or through choosing vehicle in which the alternator is used.

Wybór			Referencja			Parametry			 	
Typ instalacji			Interfejs							
12V 24V			LAMP							
Ograniczenie prądu [A]			Kierunek rotacji							
34			 							
Średnica koła pasowego [mm]			Max prędkość alternatora [RPM]							
< wprowadź >			6000							
Alternator			Opis			Proces				
LRA00100			< wprowadź >			URUCHOM				

The next stage is selecting detailed parameters of the test. In most events the parameters are downloaded from the database, however in case some information is unavailable in the database or user considers it as an invalid it is possible to change such parameters as:

- interface → LAMP/ COM/ C/ L-RVC/ RLO/ SIG,
- rotation direction → left / right,
- pulley diameter [mm] → 1-200,
- max speed of the alternator [RPM] → 1000-6000,

- description – own name with length up to 32 characters.

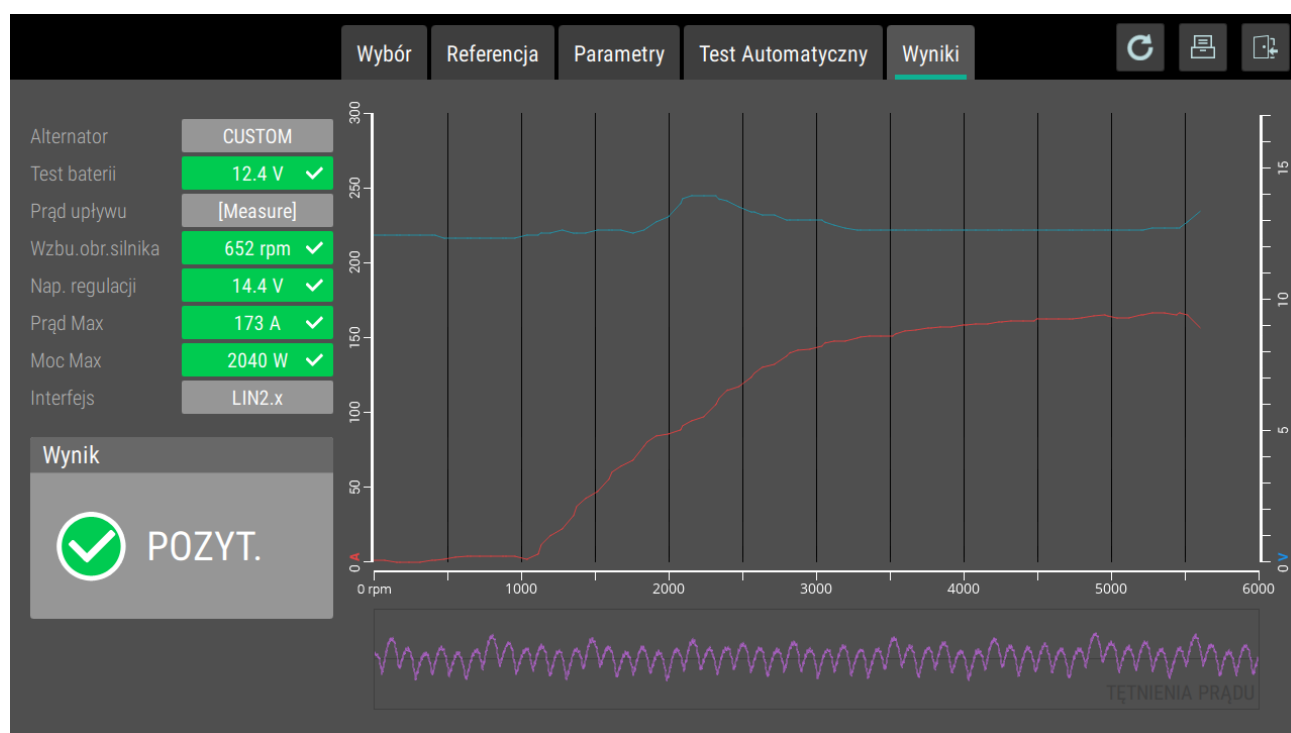
After complete configuration of the test it should be started by pressing run key. The test begins with initialization procedure – which is verifying the functional condition of the device.

## 7.2 Test progress

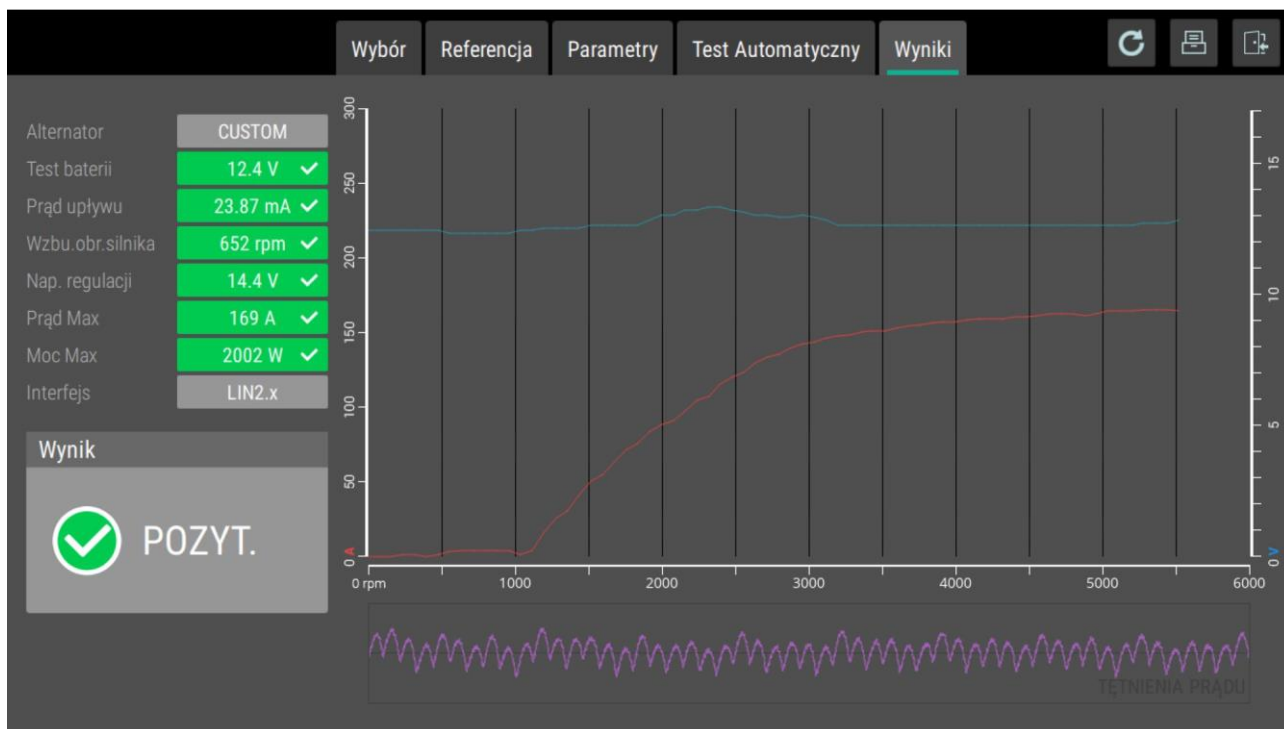
Automatic test begins with testing engine's rpm, which will enable the alternator to turn on. Consequently, the engine is stopped and started again to reach maximum rpm, defined in moment of starting the test. After reaching maximum rpm, the engine gradually slows down, this process enables to gather information for alternator's performance curve and to perform remaining measurements required to determine the condition of an alternator.

## 7.3 Leakage measurement

Leakage measurement may be performed in the summary screen of automatic test. In order for the measurement to be correct it is necessary to disconnect all cables except '-' from the alternator. Then, user should connect ignition cable in place where '+' (main) cable was connected. After changing the connection user should press button [Measure], which is located in leakage current field.



## 7.4 Test summary



Test results are displayed directly after the test finishes. Green color marks the fields, where values are proper for a specific alternator, red color fields indicate wrong values. General test result is located in field Result. Tested alternator is considered as functional when all measured parameters are within their range. Detailed results include following parameters.

- battery voltage,
- leakage current,
- engine speed which turns on alternator,
- regulation voltage,
- maximum current,
- maximum power.

Besides values listed above, user may familiarize himself with chart presenting alternator's performance curve, which shows change of voltage for the alternator and its load current within a function of engine's rpm. Another chart, presented in results, includes behavior of current ripples.

## 8 Manual test of an alternator

A manual test, in contrast to the automatic test, allows the user to freely control the performance of an alternator. The user may freely control:

- engine speed,
- alternator's voltage,
- alternator's load.

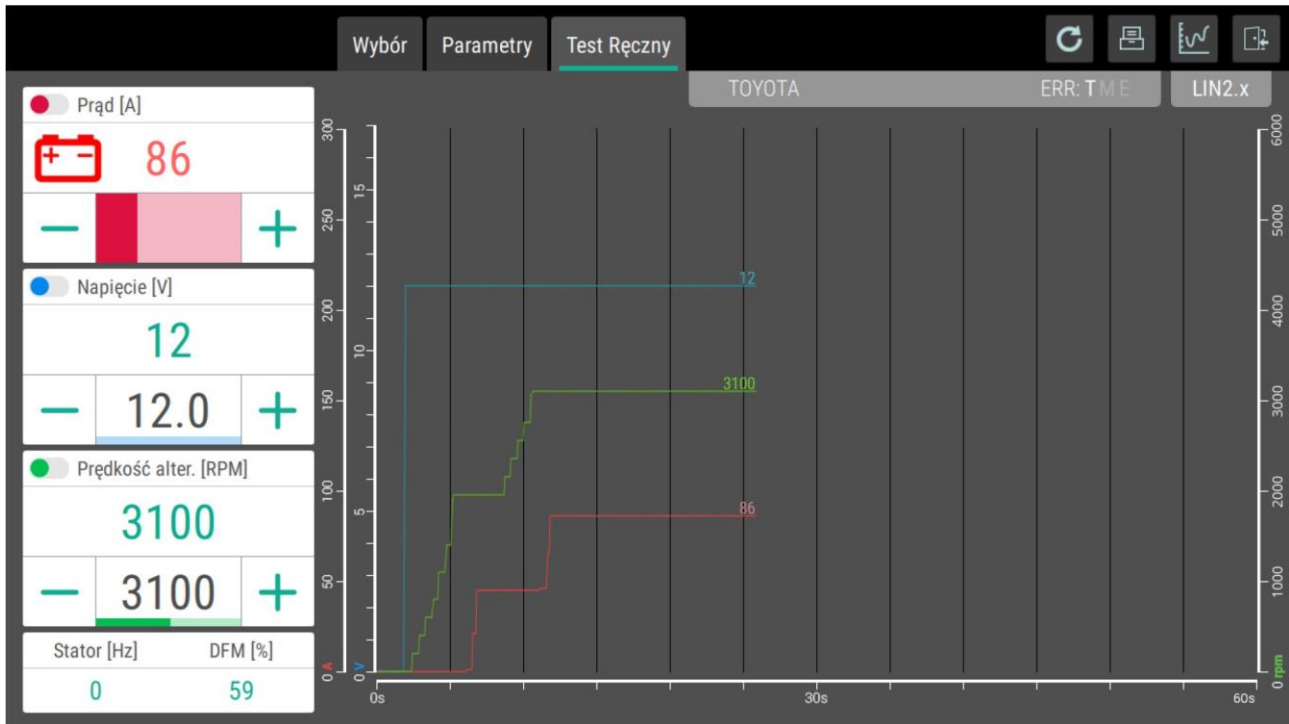
### 8.1 Starting a test

While starting a manual test, the user sets the parameters, such as:

- interface → LAMP/ COM/ C/ L-RVC/ RLO/ SIG,
- rotation direction → left/right
- pulley diameter [mm] → 1-200,
- maximum alternator's speed [RPM] → 1000-6000,
- description – own name with length up to 32 characters

After the test configuration is done, the user should start it by pressing the 'run' button. Test begins with the initialization procedure – which verifies the condition of the device.

## 8.2 Test progress



The manual test begins with the initial values. The set-point value of the voltage is equal to 12 V – the alternator is not charging: the value measured presents the actual voltage on batteries. The alternator's speed is set to '0' – the engine is stopped. The controlled load current is equal to zero. The user, at any given moment, may use buttons '+' and '-' to change the selected values:

- set-point voltage,
- alternator's speed,
- load current.

If the lamp's clamp is connected, the user may observe the indicator located in the top right corner. After connecting the 'W' clamps, the user will receive its current value in the bottom left corner. The same goes for connecting the 'DFM' clamp. In COM interfaces, it is not necessary to connect this clamp; the parameter value is read from the regulator. The progress of the test is reflected by the chart.

### 8.3 Current ripple measurement

This measurement is performed with the usage of a button presenting a chart, which is located in the top right corner. The user should remember that in order for the measurement to be correct, the alternator should be fully charged; its DFM should reach the maximum value.

## 9 Starter motor test

The starter motor test is designed to verify its basic performance parameters.

Wybór

Test Rozrusznika

Opis

TEST ROZR.

Odczyt napięcia [V]

10.0

Typ rozrusznika

12V 24V

Odczyt prądu [A]

76

Napięcie Init

12.5 V

Napięcie Avg

12.0 V

Prąd Max

650 A

Prąd wyzna.

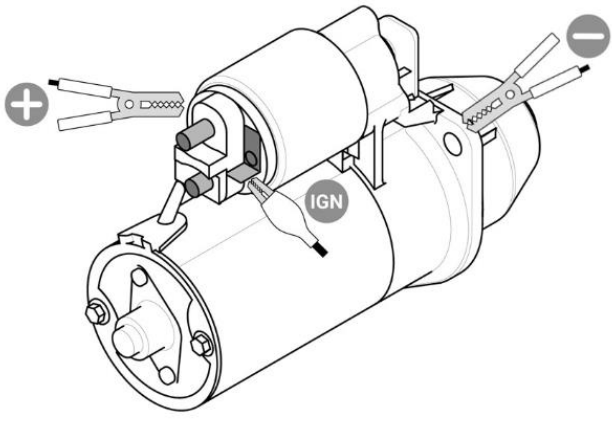
540 A

Moc Max

3500 W

Proces

URUCHOM



### 9.1 Starting a test

Before starting a test, it is necessary to connect the starter motor correctly by connecting the power supply and ignition clamp. The user should choose the appropriate voltage for the tested starter motor (12 or 24 V). Then, while steadily and safely holding the starter motor, the user should push the RUN button. After verifying that everything is in order, the test will commence.

### 9.2 Test progress

A test of a starter motor lasts for 3 seconds. During the work of the starter motor, the test bench gathers the values describing the basic parameters of its performance.

### 9.3 Test results

After finishing the test, in the same window, the results are displayed; they include parameters such as:

- initial voltage,
- average voltage,
- maximum current – engine starting current,
- designated current,
- maximum power.

After the test ends, the user may print its results.

## **10 Software update**

The device has a function to update the software. In order to do that, the user should appropriately prepare the software saved on a USB flash drive.

### **10.1 Enabling update**

In order to update the software, the user should connect the USB flash drive into the USB socket and press the 'Update' button. While the update is running, the user should follow the instructions on the screen and turn off the tester and turn it on again after 60 seconds.

### **10.2 Update progress**

The software update is performed without the interference of the user. After the update is finished, the screen will display information about the successful update.

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