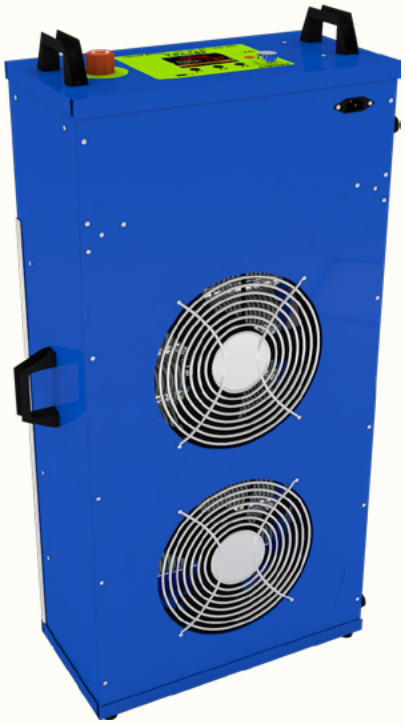

- **TBA 150 (24-80)pwm**
- **TBA 150 (6-24)pwm**
- **TBA 60 (48/110/220)**
- **TBA 300 (24-80)pwm**

TBA accumulator battery tester is designed to examine the quality of lead-acid accumulator battery. Testing can be conducted by using the program of “5-10 or 20-hour current discharge”. Each device also has the “Discharge by Manually Specified Current” program. Parameters of the discharge process are recorded in the tester non-volatile memory which is divided into 16 independent registers called register banks. The register data may be recorded and transferred from the tester by means of a USB flash drive.

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QUICK GUIDE FOR TBA

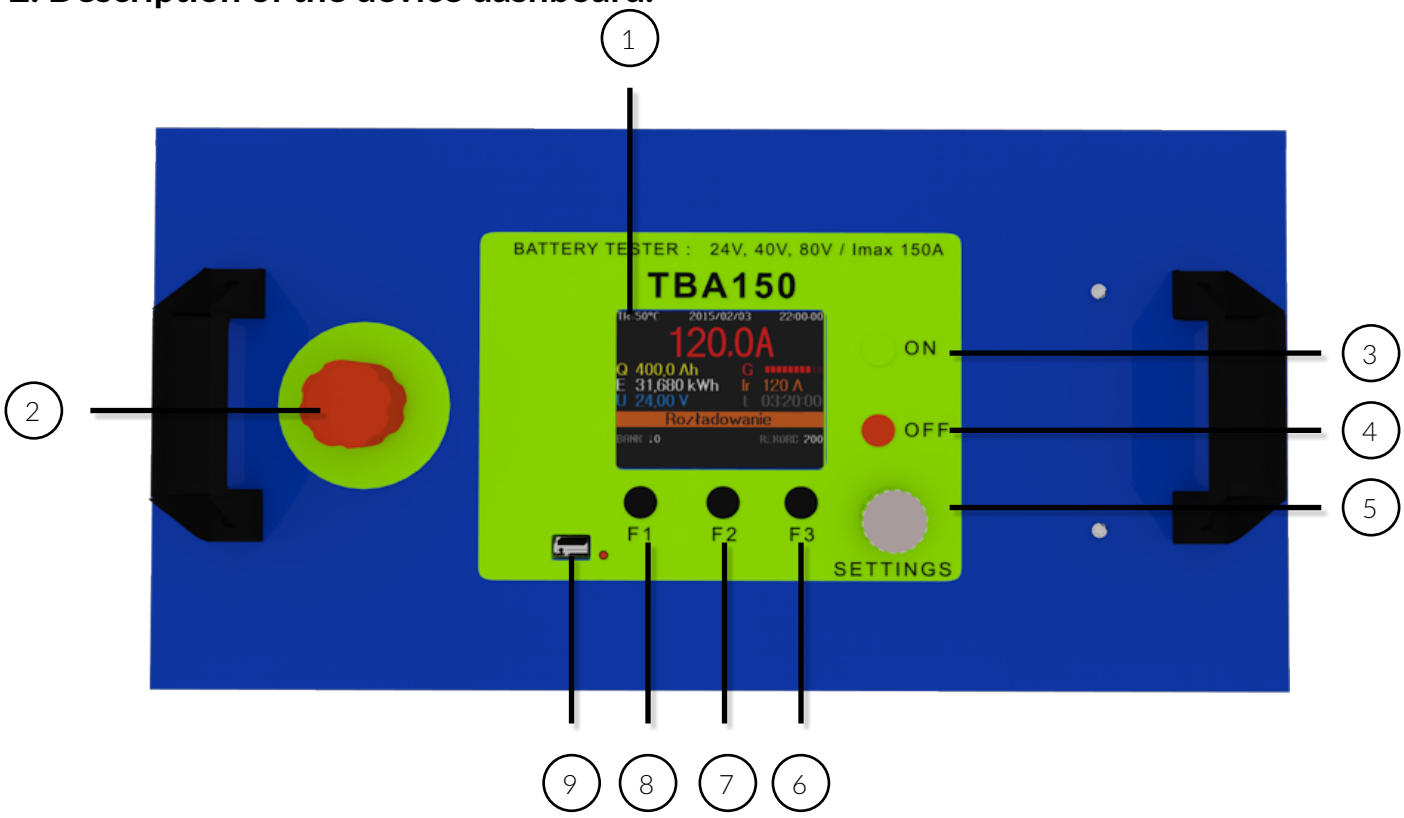
firmware V1.070

1. Quick guide.

This quick guide refers to the following battery testers:
TBA 150 (24-80V)pwm
TBA 150 (6-24V)pwm
TBA 60 (48/110/220V)
TBA 300 (24-80V)pwm

The presented screenshots with the voltage and current values refer to TBA 60 and are the same for the other testers.

2. Description of the device dashboard.



1. **Display**
Presents information on selected settings and the current state of the device.

2. **Safety switch**
Enables immediate (emergency) cessation of the device operation.

3. **ON**
Launches the discharge process.

4. **OFF**
Temporarily halts the discharge process.

5. **Adjuster**
Enables setting the value of a given parameter.

6. **F1, F2, F3 function buttons**
7. Designed to select options on the display.
8.

9. **USB slot**
Enables transfer of data recorded during a test to a data carrier of pendrive type.

3. Connecting batteries to the tester.

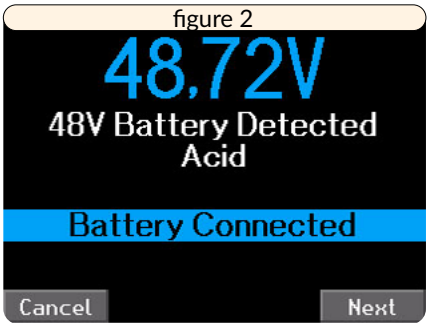
The battery which is to be tested should be attached to the tester connector with appropriate polarity. Reverse polarity will prevent the tester from starting. Safety switch (Emergency Stop) should be set in the ON position – Depressed. After switching the 230V, 50 Hz supply voltage the following home screen is displayed on the tester **(figure 1)**

figure 1

Choose „Next" by pressing the [F3] button to proceed to the next screen.

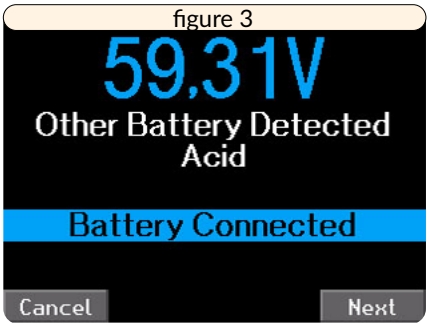
The device tests the voltage of the connected battery. If a battery with a rated voltage is attached to the tester:
for TBA 150 (24-80)pwm - 24V do 80V,
for TBA 150 (6-24)pwm - 6V do 24V,
for TBA 60 (48/110/220) - 48V, 110V lub 220V,
for TBA 300 (24-80)pwm - 24V do 80V,
the type of the battery is determined. **(Figure 2)** presents an exemplary screenshot after attaching a 48V battery.

figure 2



If a battery with another rated voltage is attached to the tester **(figure 3)**, further proceeding should be conducted in accordance with point 6 (Discharge of a battery with the rated voltage other than the basic voltages determined for given types of battery testers. (Other battery).

figure 3

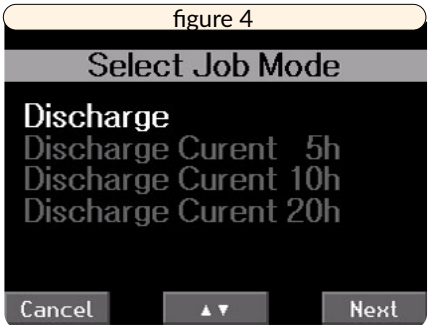


NOTE!
In any case, make sure the displayed voltage value of the connected battery is appropriate.

Choose „Next" by pressing the [F3] button to proceed to the next screen.

On the Select Job Mode screen **(figure 4)** use the [F2] button to choose the „Discharge" mode with manual voltage setting or the 5h, 10h, 20h Discharge Current mode in which the device will choose the discharge current value appropriate for the selected rated capacity of the battery.

figure 4



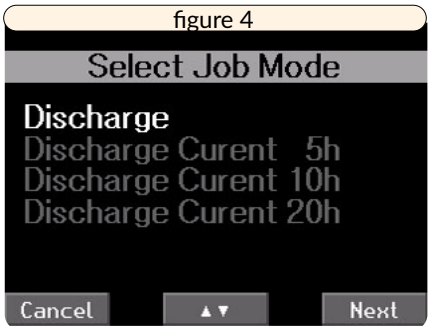
To proceed to the next screen choose „Next" by pressing the button [F3] .

4. Starting the tester in the “Discharge” mode.

On the Select Job Mode screen (figure 4) choose the first „Discharge” mode

To proceed to the next screen choose „Next” by pressing the button [F3] .

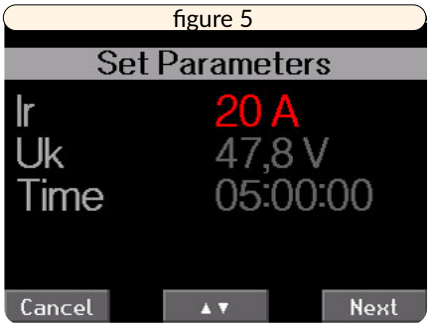
figure 4



Discharge parameters setting. (figure 5)
Set the required discharge current value Ir by means of the adjuster. This value can be corrected in the course of the battery discharge process.
Using the [F2] button place the cursor on „Uk” and set the final voltage value by means of the adjuster.
Using the [F2] button place the cursor on „Time” and set the discharge time by means of the adjuster.

Choose „Next” by pressing the [F3] button to proceed to the next screen .

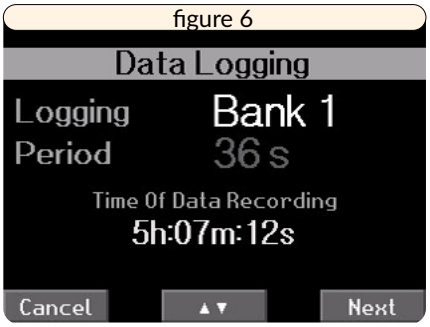
figure 5



Data logging screen. (figure 6)
Using the [F2] button place the cursor on „Data logging” and by means of the adjuster choose the number of memory bank where the data will be recorded during the battery test. You can select only the empty banks which is a protection against erasure of data from previous recordings. In order to avoid recording choose the „No” option.
Using the [F2] button place the cursor on „Period” and set the period of data recording by means of the adjuster.
The change of the data recording period implies the change of the Time of Data Recording whose value is displayed.
Deleting and saving of the banks were described in point 5 of the manual.

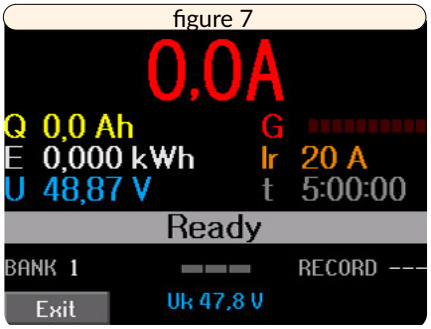
To proceed to the next screen choose „Next” by pressing the button [F3].

figure 6



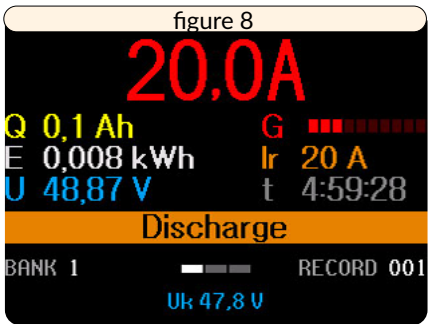
Discharge home screen. (figure 7)
Press the (green) [ON] button – The discharge will begin, fans cooling resistors will start working, too.

figure 7



Description of the displayed parameters (figure 8):
„Q" - charge collected from the discharging battery
„E" - energy collected from the discharging battery
„U" - present voltage of the discharging battery
„Ir" - set discharge current
(correction by means of the adjuster is possible)
„t" - discharge time which increases or decreases depending on the "Counter Settings"
„G" - the number of enabled resistors enforcing the discharge current

figure 8



The end of the discharge process occurs when the battery achieves the final voltage declared in the settings (figure 9) or when the set discharge time is over (figure 10).

Fans work for three minutes after the end of the discharge. Blowing process enables faster cooling of the resistors.

figure 9

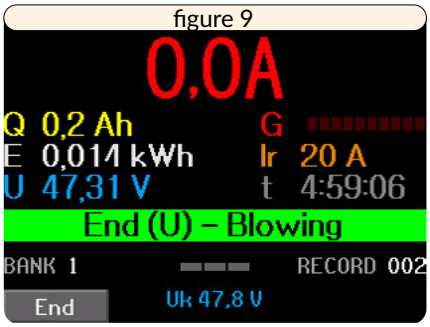
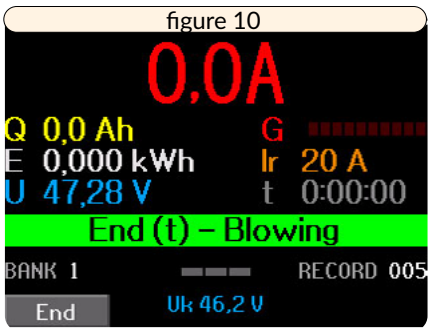


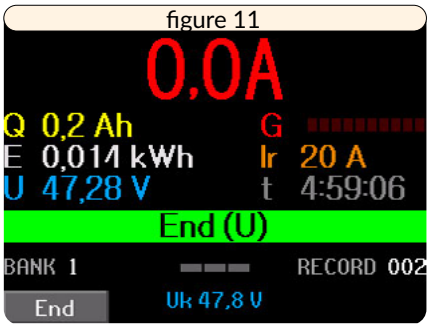
figure 10



When the blowing time is over, information about reason for the end of the discharge will remain on the display: „U" if the battery voltage at the „Uk" link achieved the set value (figure 11) or „t" if the set discharge time was over (figure 12).

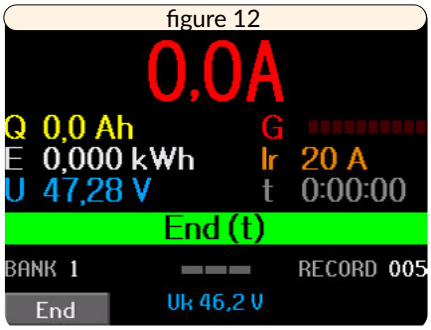
Press the F1 [End] button to return to the main menu of the tester.

figure 11



At any moment of the discharge process you may turn off the discharge current by pressing the [OFF] (red) button.
This possibility should be treated as a temporary halt to the discharge process.
Press the [ON] (green) button to reactivate the discharge process.
To permanently finish the discharge process, press the F1 „End" button.

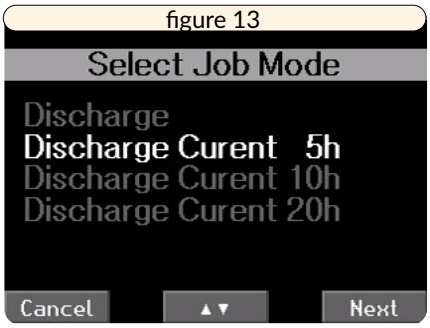
figure 12



5. Starting the tester in the “5h, 10h, 20h Discharge” mode.

If a battery with a rated voltage is attached to the tester:
for TBA 60 (48/110/220) – 48V, 110 V or 220V,
for TBA 150 (24-80)pwm - 24V to 80V,
for TBA 150 (6-24)pwm – 6V to 24V,
for TBA 300 (24-80)pwm - 24V to 80V,
the following modes can be selected by means of the [F2] button (figure 13):

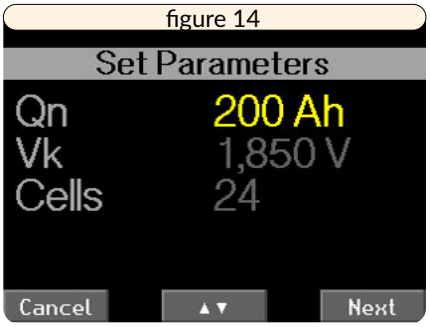
figure 13



- 5h Discharge Current – determining battery efficiency according to Q5
- 10h Discharge Current – determining battery efficiency according to Q10
- 20h Discharge Current – determining battery efficiency according to Q20

To proceed to the next screen choose „Next” by pressing the button [F3].

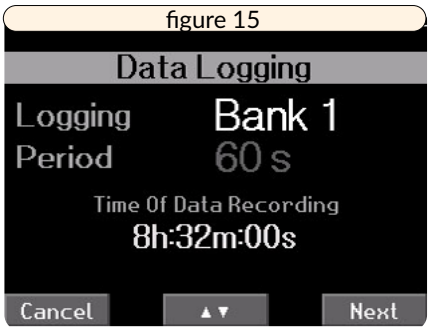
figure 14



Discharge parameters setting (figure 14):
Using the [F2] button and the adjuster set:
- value of rated capacity of the tested battery „Qn”,
- the final voltage of the discharged cell „Vk”,
- in the case of the TBA 60 tester set the correct number of tested cells (this parameter is unavailable in the TBA 150 testers).

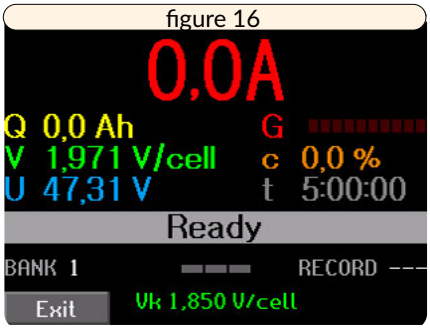
To proceed to the next screen choose „Next” by pressing the button [F3].

figure 15



Data logging screen. (figure 15)
Using the [F2] button place the cursor on Data logging and by means of the adjuster choose the number of memory bank where the data will be recorded during the battery test. You can select only empty banks which protects against erasure of data from previous recordings. In order to avoid recording set No.
Using the [F2] button place the cursor on Period and set the period of data recording by means of the adjuster.
The change of the data recording period implies the change of the Time of Data Recording whose value is displayed.
Deleting and saving of the banks is described in point 5 of the manual.

figure 16

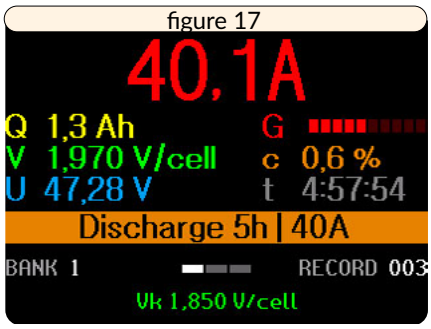


To proceed to the next screen choose „Next” by pressing the button [F3].

Discharge home screen. (figure 16)
After pressing the (green) [ON] button the discharge current will flow, and the fans which cool the tester heaters will start working.

Description of the displayed parameters (figure 17):
„Q" - charge collected from the discharging battery
„V" - average voltage value per cell
„U" - present voltage of the discharging battery
„c" - battery efficiency coefficient (%) [(Q/Q5) x 100%]
„t" - discharge time which increases or decreases depending on the "Counter Settings"
„G" - the number of enabled resistors enforcing the discharge current
„T"k - resistance chamber temperature

figure 17



The discharge is over when either the battery voltage achieved the set value „Vk" (figure 18) or the set discharge time was over „t" (figure 19).

Blowing is on for 3 minutes after the end of the discharge. The blowing process allows for faster cooling of resistors.

figure 18

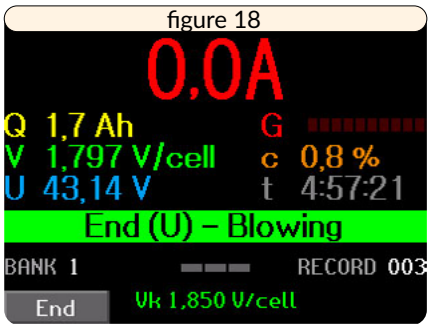
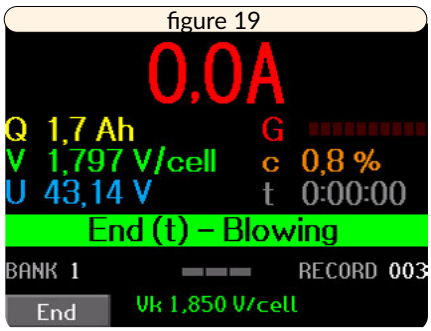


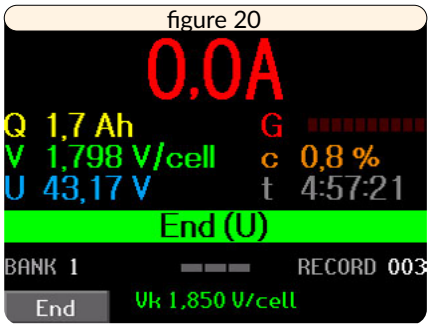
figure 19



When the blowing time is over, the display will show the information on the discharge end reason: „U" - when the set final voltage of the „Vk" cell achieved the set value (figure 20) or „t" - when the set discharge time was over (figure 21).

Press the [F1] „End" button to return to the main menu of the tester.

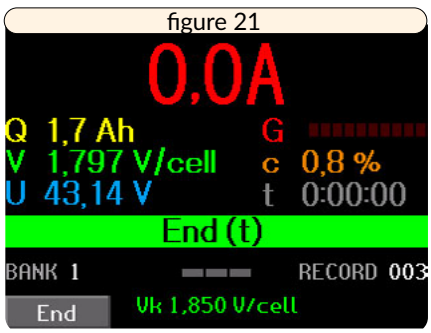
figure 20



At any moment of the discharge process you may turn off the discharge current by pressing the [OFF] (red) button.
This possibility should be treated as a temporary halt to the discharge process.

Press the [ON] (green) button to reactivate the discharge process.
To permanently finish the discharge process, press the F1 [End] button.

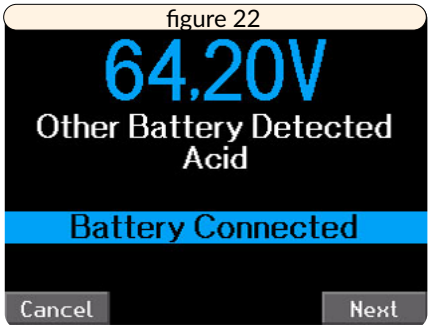
figure 21



6. Discharge of a battery with the rated voltage other than the basic voltages determined for given types of battery testers. (Other battery).

The device recognises „Other Battery" (figure 22) if the detected voltage is not identified with one of the basic voltages for a given tester type:
for TBA 60 (48/110/220) – 48V, 110 V or 220V,
for TBA 150 (24-80)pwm – 24V, 48V or 80V,
for TBA 150 (6-24)pwm – 6V, 12V or 24V,
for TBA 300 (24-80)pwm – 24V, 48V or 80V,
however, it is within the range of voltages operated by a given tester type:
for TBA 60 (48/110/220) – from 20V to 248V,
for TBA 150 (24-80)pwm – from 5V to 92V,
for TBA 150 (6-24)pwm – from 4V to 32V,
for TBA 300 (24-80)pwm – from 5V to 92V.

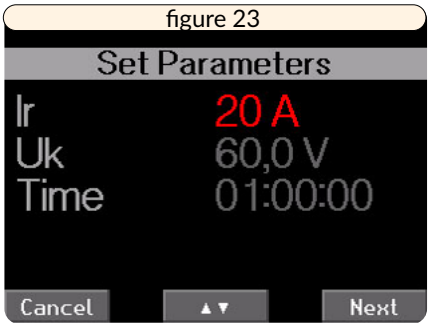
figure 22



To proceed to the next screen choose „Next" by pressing the button [F3].

Discharge parameters setting. (figure 23)
Set the required discharge current value Ir by means of the adjuster. The value can be corrected during the battery discharge process.
Using the [F2] button place the cursor on „Uk" and set the final voltage value of the battery by means of the adjuster.
Using the [F2] button place the cursor on „Time" and set the discharge time by means of the adjuster.

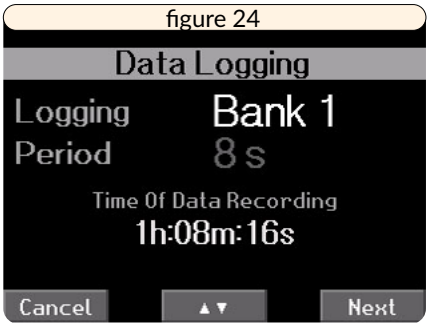
figure 23



To proceed to the next screen choose „Next" by pressing the button [F3].

Data logging screen. (figure 24)
Using the [F2] button place the cursor on Data logging and by means of the adjuster choose the number of memory bank where the data will be recorded during the battery test. You can select only empty banks which protects against erasure of data from previous recordings. In order to avoid recording set No.
Using the [F2] button place the cursor on Period and set the period of data recording by means of the adjuster.
The change of the data recording period implies the change of the Time of Data Recording whose value is displayed.
Deleting and saving of the banks is described in point 5 of the manual.

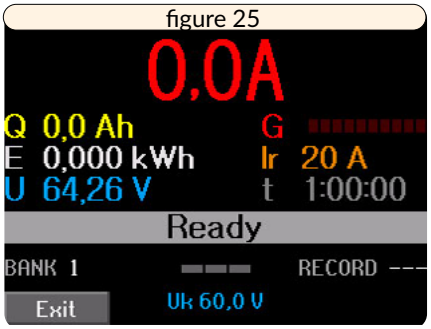
figure 24



To proceed to the next screen choose „Next" by pressing the button [F3].

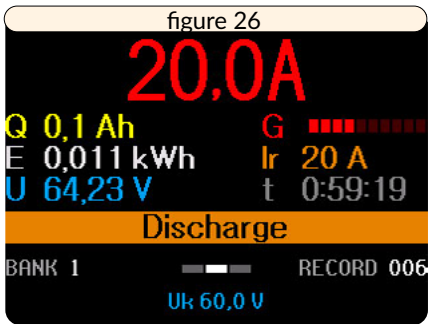
Discharge home screen. (figure 7)
Press the (green) ON button and the discharge will begin, fans cooling resistors will start working, too.

figure 25



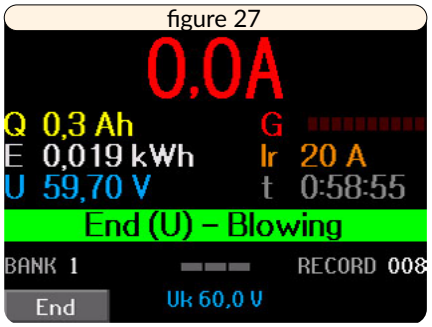
Description of the displayed parameters (figure 26):
„Q" - charge collected from the discharging battery
„E" - energy collected from the discharging battery
„U" - present voltage of the discharging battery
„Ir" - set discharge current
(correction by means of the adjuster is possible)
„t" - discharge time which increases or decreases depending on the "Counter Settings"
„G" - the number of enabled resistors enforcing the discharge current

figure 26



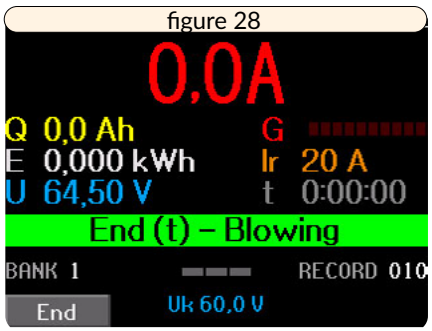
The discharge process is over when the battery reached the final voltage set in the „Uk" settings (figure 27) or when the set time was over (figure 28).

figure 27



Blowing is on for 3 minutes after the end of the discharge. The blowing process allows for faster cooling of resistors.

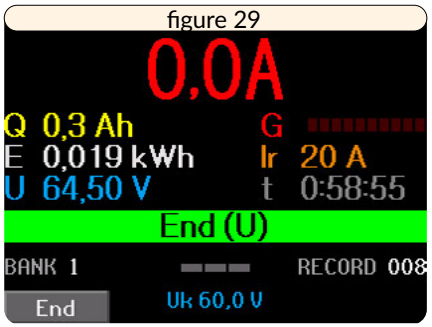
figure 28



When the blowing time is over, the display will show the information on the discharge end reason: „U" - when the „Uk" battery voltage achieved the set value (figure 29) or „t" - when the set discharge time was over (figure 30).

Press the F1 [End] button to return to the main menu of the tester.

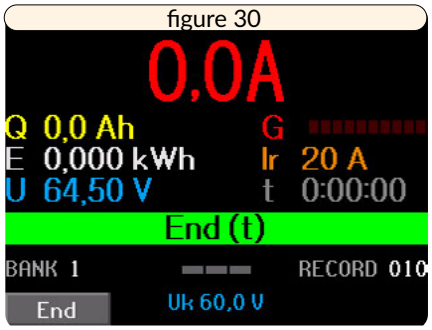
figure 29



At any moment of the discharge process you may turn off the discharge current by pressing the [OFF] (red) button.
This possibility should be treated as a temporary halt to the discharge process.
Press the [ON] (green) button to reactivate the discharge process.

To permanently finish the discharge process, press the F1 [End] button.

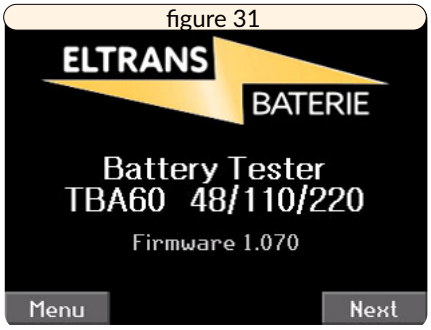
figure 30



7. Saving the recorded data to a USB memory stick.

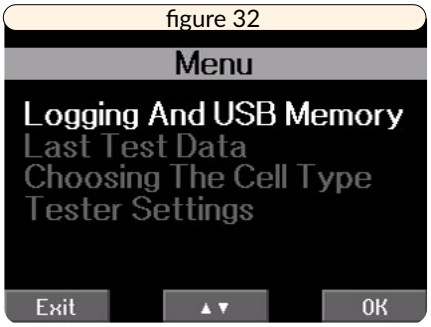
Managing the recorded data is possible in the Logging and USB Memory menu.
To select the Logging and USB Memory menu, press the [F1] – „Menu" button on the home screen (figure 31).

figure 31



Settings and additional options menu. (figure 32)
Using the [F2] button select the Logging and USB Memory menu and then press the [F3] – „OK" button.

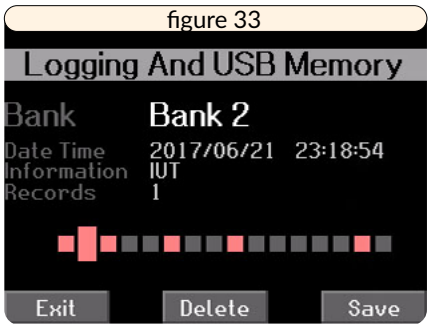
figure 32



Logging and USB Memory screen (figure 33) allows you to manage recorder banks. Select a bank by means of the adjuster.

Pink colour means that the Bank is full – there are recorded logging data.
Green colour means that the data from the Bank have just been saved to a USB memory stick.
Grey colour means that the Bank is empty.

figure 33



There are 16 banks in total, each bank can contain 512 records.
Records are saved in the following time interval (the period of record saving):
The frequency of record saving is set before the discharge process.

Transfer of data from the tester memory to a PC should be performed by using a USB memory stick.

For USB memory sticks with the capacity up to 2 GB select the FAT16 file system while formatting them.
For USB memory sticks with the capacity over 2 GB select the FAT32 file system while formatting them.

The device does not support media formatted in the NTFS file system.

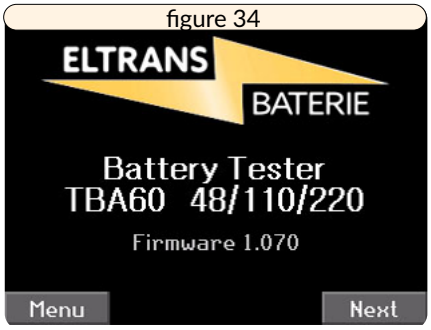
After placing the USB memory stick in the USB slot and locating the cursor by means of the adjuster on a selected Bank, press the [F3] – „Save" button. The data will be saved in a moment and the cursor will change its colour to green.

Logging data files are saved in the CSV format – this format is supported by popular spreadsheets.
As CSV is a text file in which the data are separated by a ‚;' sign, you can view its contents by using a text editor.

8. Deleting recorded data.

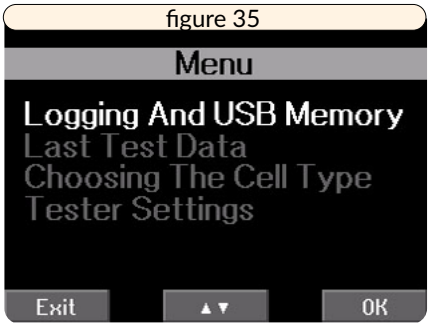
Deleting recorded data is possible in the Logging and USB Memory menu.
To select the Logging and USB Memory menu, press the [F1] – „Menu" button on the home screen. (figure 34)

figure 34



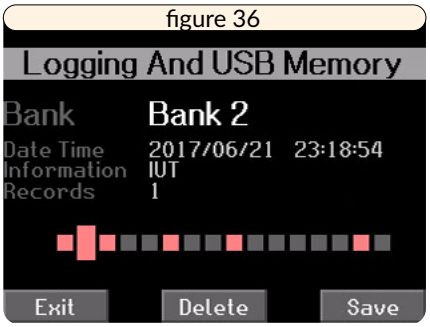
Settings and additional options menu. (figure 35)
Select the „Logging and USB Memory" menu by pressing the [F2] button and then press the [F3] - „OK" button

figure 35



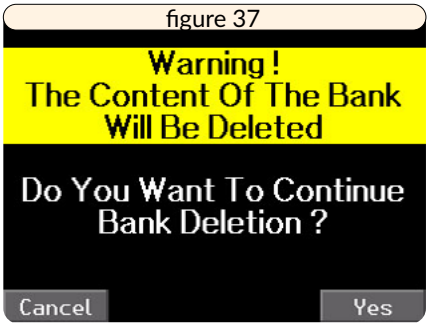
The „Logging and USB Memory" screen (figure 36) allows for managing the recorder banks. Select a bank by means of the adjuster. The record of the selected bank is deleted by means of the [F2] - „Delete" button

figure 36



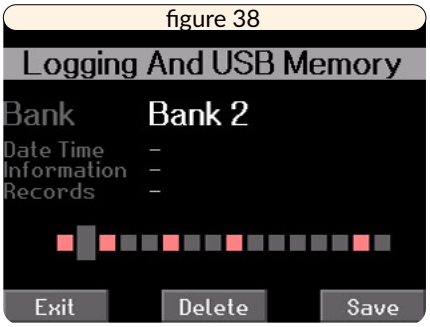
The tester is equipped with functions warning against a wrong decision (figure 37).
To permanently delete the content of the data Bank, press the [F1] - „Yes" button

figure 37



When the Bank data deletion is over, the cursor will change its colour to grey (figure 38).
During one operation it is possible to delete data from only one selected bank.

figure 38

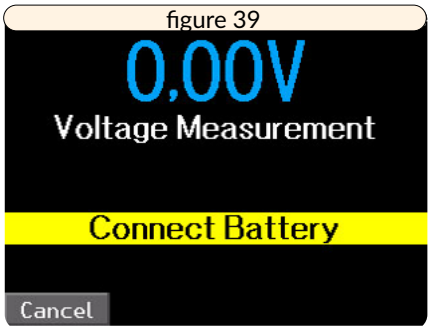


9. Device security and alarms.

The battery tester has security measures whose work is signalized by alarms on the display.
Security measures and alarms warn the User against incorrect handling and protect the device from damage.
Every time the alarm is displayed, the discharge current is prevented from flowing through the tester.

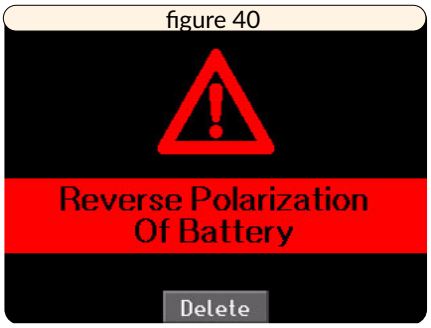
I. Starting the tester without the battery connected. (figure 39)
Solution to the problem: the battery should be connected.

figure 39



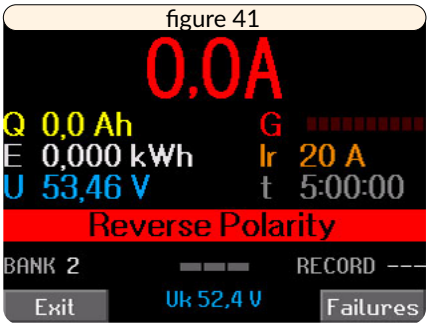
II. Reverse connection of the battery. (figure 40)
The warning is displayed if a battery is connected contrary to the (+/-) signs.
At the same time the sound signalization will inform about reverse polarization.
The system will prevent further work until the battery is appropriately connected.
Solution to the problem: the battery should be connected in accordance with the (+/-) signs.

figure 40



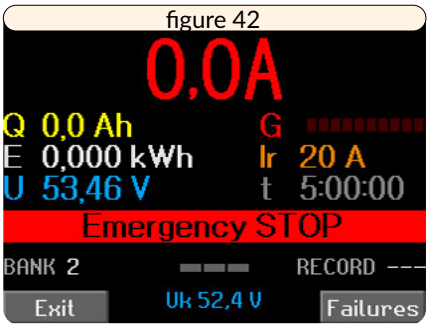
III. Reverse connection of the battery after pause and restart of the discharge process. (figure 41)
If the pause of the process occurs (by the [OFF] button being pressed), information about the end of the discharge process is displayed.
The battery can now be disconnected and connected again, however, its reverse connection will prevent the tester from further work.
Solution to the problem: the battery should be connected in accordance with the (+/-) signs.

figure 41



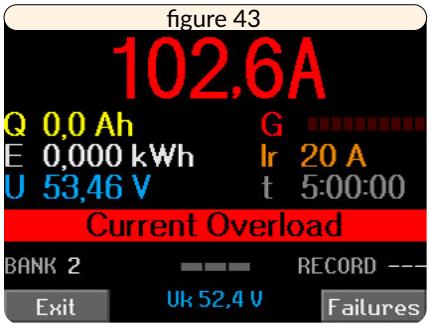
IV. Switching on the tester with the [safety switch] off. (figure 42)
Solution to the problem: the [safety switch] should be turned on.

figure 42



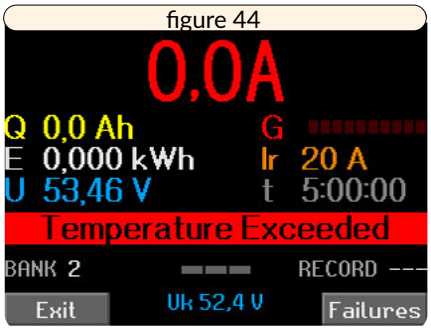
V. Overcurrent protection (figure 43) – the discharge current value exceeds the maximum value.
The display will show the “Current Overload” information when the battery current exceeds
102.5A – for TBA 60
152.5A – for TBA 150
Solution to the problem: Cancel the emergency message following instructions in point 10. If the alarm occurs again, contact the support service.

figure 43



VI. Thermal protection. (figure 44) The "Temperature Exceeded" information will appear when the temperature of the chamber exceeds 100°C or thermal security measures of the heater are activated.
Solution to the problem: Check if the device has proper ventilation. Cancel the emergency message following instructions in point 10. If the alarm occurs again, contact the support service.

figure 44

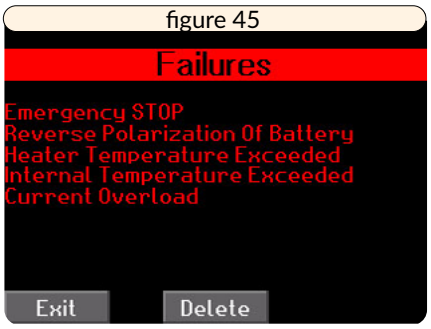


10. Responding to alerts.

In order to enable further work, the reason for the alert should be eliminated, e.g. the Emergency STOP safety switch should be turned on, the [F3] - [Failures] button should be pressed.

The display will show information about emergencies, e.g. "Emergency STOP". (figure 45)

figure 45

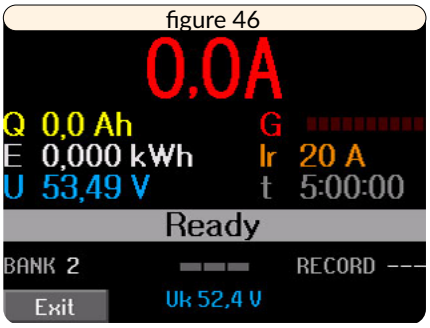


In case of any of the emergencies, after their cancellation or termination, press the [F3] - „Failures" button to open the list of failures and cancel the alert by means of the [F2] - „Cancel" button.
Failures can not be deleted if the emergency is not resolved, e.g. the emergency switch is on.

Press the [F2] - „Cancel" button to delete the emergency and then press the [F1] - „Exit" button.

The basic screen can be seen on the display (figure 46).
Press the [F1] - „Exit" button to leave the basic screen and allow for the further work of the device.

figure 46

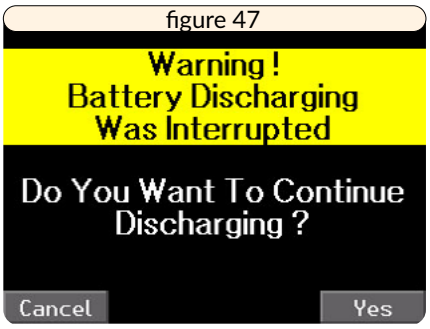


11. Protection from power outage .

The battery tester is protected from power failure. During the discharge process current data are saved in a non-volatile memory every 5 minutes. If power failure and power return occurred during the test, the display will show the message in (figure 47).

Press the [F3] - [Yes] button to continue the process.

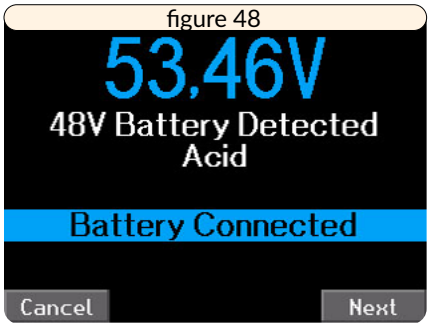
figure 47



Checking the voltage of the connected battery. (figure 48)
If the value of the displayed voltage is consistent with the voltage of the tested battery, press the [F3] - „Next" button.
Then the tester will display the parameters of the battery before the power outage and will be prepared to continue the test.

To cancel the further discharge process, press the [F1] - „Cancel" button.

figure 48



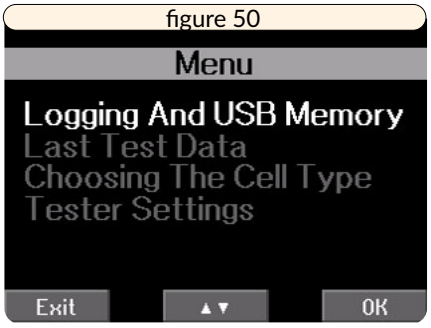
12. Tester menu and settings .

Additional information and tester settings are available in the „menu". To access „Menu", press the [F1] - „Menu" button on the home screen (figure 49).

figure 49

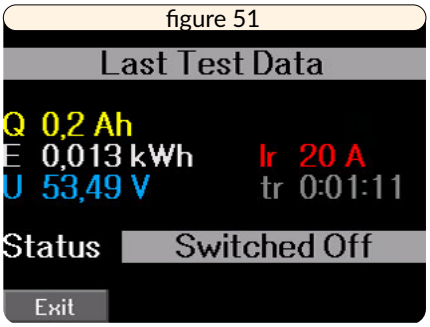
Setting and additional options menu. (figure 50)
Using the cursor [F2] select a menu command and confirm by means of the [F3] - „OK" button.
„Logging and USB Memory" are described in point 6 and 7 of this quick guide.

figure 50



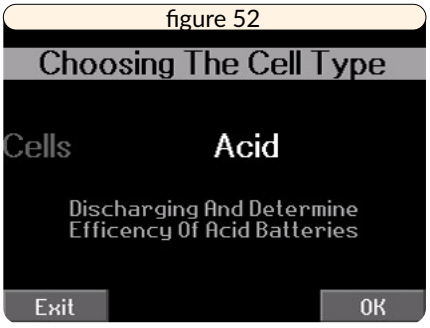
I. Last test data. (figure 51)
This function allows you to review data from the last discharge test performed.
The data are stored in the device memory until the power is switched off.

figure 51



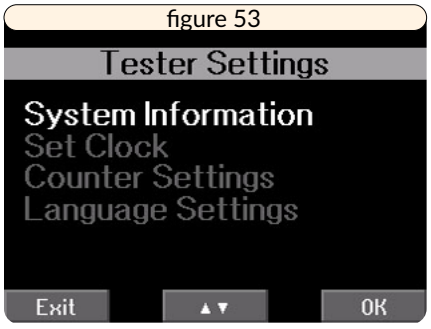
II. Choosing the cell type. (figure 52)
By means of the adjuster you can change the cell type: Acid / Alkaline.
If you choose Acid cells, the device will assign voltage parameters of the tested cells in accordance with acid cells during the 5h/10h/20h Discharge.
If you choose Alkaline cells, only one available "Discharge" mode will be available with the maximum current of:
40A for TBA 60
100A for TBA 150

figure 52



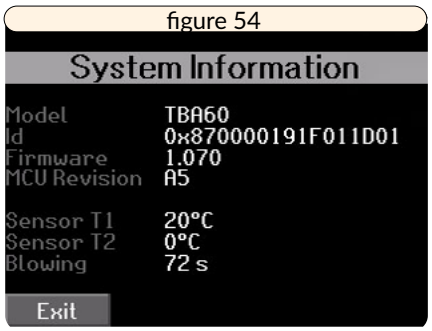
III. Tester Settings . (figure 53)
Using the [F2] cursor select the menu command and confirm by means of the [F3] - „OK" button.

figure 53



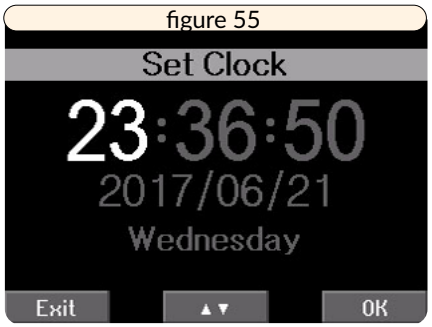
a) System information. (figure 54)
This screen presents information connected with the model of the tester, the unique identification number of the device, firmware version, temperature of the chamber and the remaining time of blowing.

figure 54



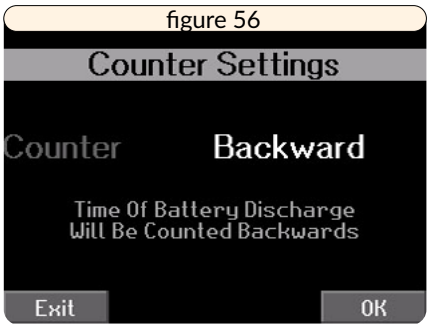
b) Clock settings. (figure 55)
This function allows you to set the current date and time. The device keeps date and time correctly without mains power supply for about 90 days. After this period the date and time should be set again. To set the date and time, use the [F2] button and the adjuster, and confirm the setting by pressing the [F3] - „OK" button.

figure 55



c) Counter settings. (figure 56)
This function allows you to set the mode of counting time during a battery test.
If the parameter is set to: Backwards - the battery test time counts down to „0".
If the parameter is set to: Forwards - the battery test time counts to a set value.
To change parameters, use the adjuster and the [F3] - „OK" button.

figure 56



d) Language settings . (figure 57)
This feature allows you to change the language in which information is presented on the display.
To change parameters, use the adjuster and the [F3] - „OK" button.
TBA tester with firmware V1.070 is designed for three languages: Polish, English and Romanian.

figure 57