



OPERATION MANUAL

CONSTANT CURRENT LOAD TESTER (CCOLT) 12V420A

Version: 5.0

AUSTRALIA

1300 734 253

sales@valen.com.au
www.valen.com.au

NEW ZEALAND

0800 734 253

sales@valen.co.nz
www.valen.co.nz



The story so far.

Regal Electro was first founded in 1981 in Cape Town, South Africa, supplying mostly security components and batteries to security installers. In 1998, the business was sold and the Managing Director, Philip Daries, immigrated to Australia. The year 1999 saw the opening of the newly renamed Regal Electro, a battery and security component supplier based in Lake Cargelligo, NSW.

Over the next few years, it became apparent that there was a growing need in the industry for a battery supplier who knew not only the characteristics of various technologies, but also understood the technical manufacturing procedures to ensure a quality product.

The growing team at Regal Electro worked to position the company as a premium supplier of fine energy solutions, offering a complete packaged solution to a wide range of clients.

In 2009, Regal Electro opened its very own custom built premises in Hallam, VIC to ensure fast service and delivery to its clients. 2010 saw the establishment of a presence in New Zealand.

To keep up with every-increasing growth, the Lake Cargelligo Head Office moved into a brand new purpose built facility in 2012.

In 2015, Regal Electro successfully completed its first ENLiFEN Energy Storage Optimiser (ESO) prototype which was put proudly on display at the Comms Connect Exhibition in Melbourne.

In 2017, Regal Electro went through another major change with the rebranding and reinvigorating of its core product range, Power Charge. The Power Charge range was renamed Valen, which in Latin means 'Power'. Brisbane operations also began at this time.

A Sydney head office and logistics centre was opened in Lawson in April 2018 with the view to further improve the level of service offered to clients.

In July 2018, Regal Electro made the key strategic decision to go through another rebranding and changed the company name to Valen. This decision was made to strengthen the brand and recognition within the industrial battery market.

As of today, Valen has grown exponentially since its humble beginnings to become a trusted advisor to clients throughout Australia and New Zealand. Valen is an industry leader in energy storage for mission critical applications and continues to innovate and evolve, keeping abreast of new technologies as they emerge.



A company built on its Core Values.



Wow Customers through Service

- Our customers want service and we want our employees to go above and beyond for our customers.
- We expect our employees to deliver a WOW experience with customers.



Move Fast & Remain Focused to Get Results

- We are serious about results and we must never lose focus on our goals and our sense of urgency to achieve.
- Do something once and do it right.
- We believe in working hard and putting in extra effort to get things done.



Upbeat Positive Attitude

- If our employees have a positive attitude and constantly strive to give your best effort, eventually we will overcome our immediate problems and find you are ready for greater challenges.
- Positive and negative are directions that lead to different outcomes. We expect our employees to move in the right direction each day.



Challenge the Status Quo

- We are committed to great results and good is the enemy of great. We want our employees to embrace & drive change



Play as a Team

- Working effectively as a team creates momentum, improves morale.
- The difference between success and failure is a great team and we expect our employees to work together as a team.

THANK YOU FOR INVESTING IN A 12V CCOLT BATTERY TESTER



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INTRODUCTION

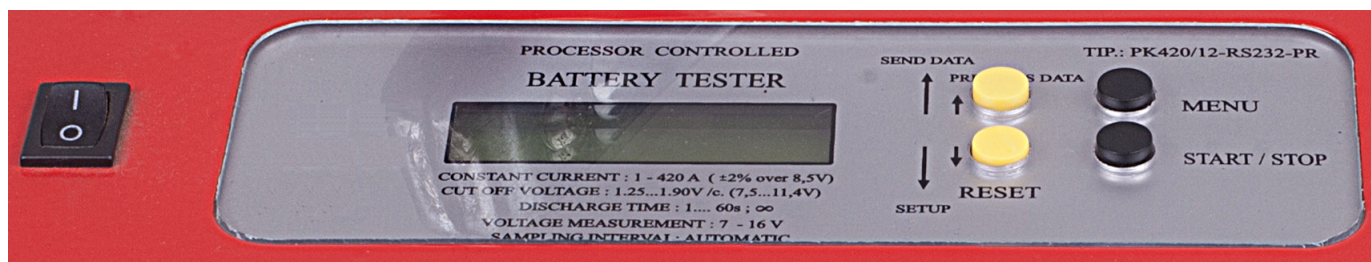
The Valen Constant Current Load Tester (CCOLT) is designed for use on larger batteries battery systems testing their performance by applying a constant current load. Current drain, cut-off voltage and duration can be manually pre-set with the CCOLT monitoring voltage and time elapsed during a test to give an absolute and accurate result of the battery performance.

The CCOLT will automatically disconnect the load once the selected cut-off voltage is reached. Tests may be downloaded via software for filing, reporting or analysing the results.

A hard protective carry case with foam insert cut to the shape of the Valen CCOLT is also available. This case is ideal for technicians who need to travel to ensure the CCOLT remains protected and undamaged.

TECHNICAL PARAMETERS

Discharging Currents	1A to 28A with 1A steps, 30A to 420A with 5A steps
Current Stability	Better than: $\pm 2\%$ or $\pm 0.2A$
Average Current Accuracy	$< \pm 1\%$ or $\pm 0.1A$
Cut-off Voltage	9V to 13.8V $\pm 2\%$ current accuracy 7.5V to 9V max. = 380A
Switch Off Voltages	7.5V to 11.4V (in 0.3A steps)
Voltage Measuring	7.5V to 16V
Accuracy	$< 1\%$
Discharging Time	1 sec. to 60 sec., or infinite time. For infinite time, the current can be max. 220A
Sampling Time	Automatic
Discharged Ah Measurement	0.1Ah to 10,000Ah 0.4% accuracy
No. of Possible Measurement	14
Parallel Connection	Max. 4 pieces of testers can be connected; the connection set is an optional element

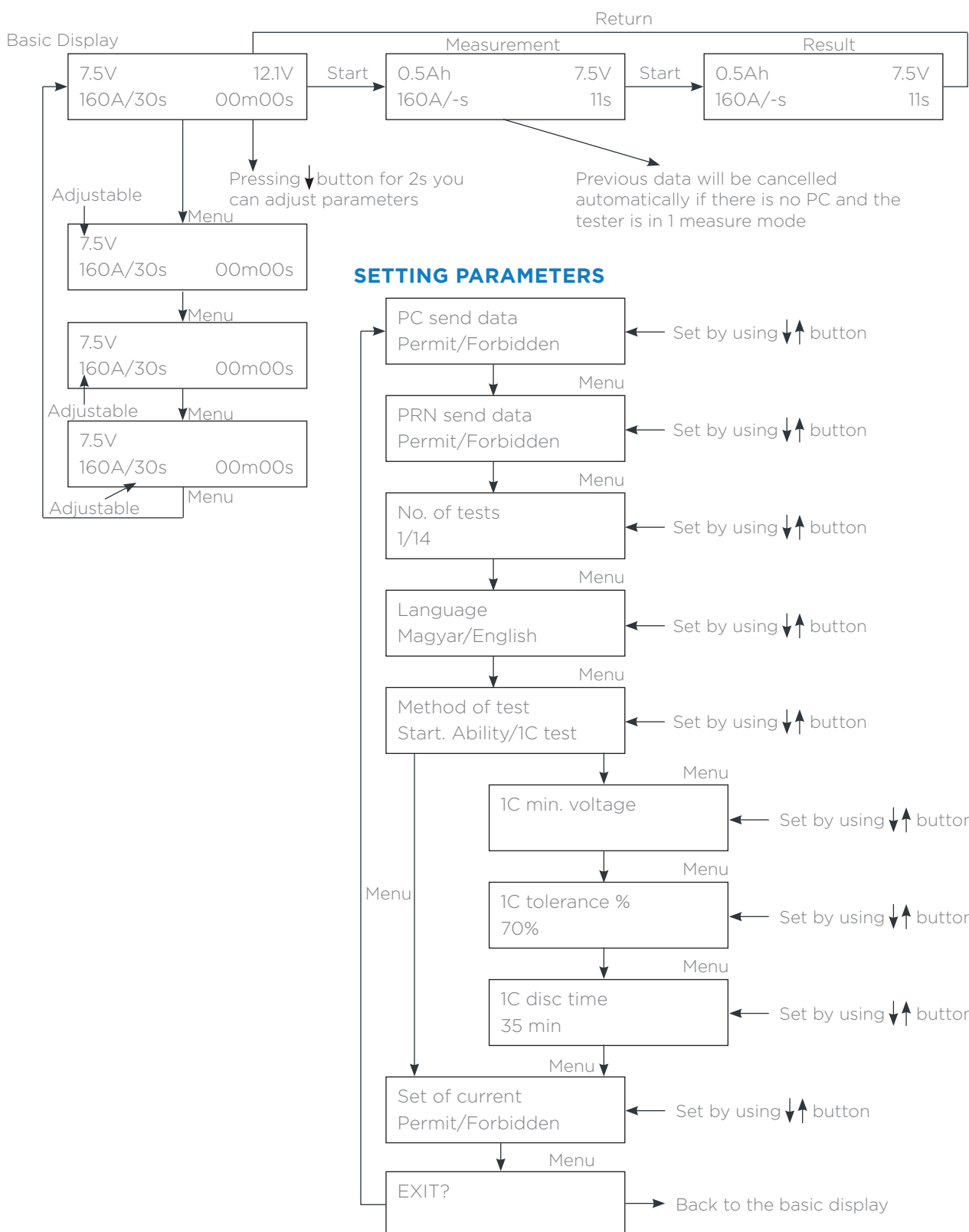


- On/Off: to switch the tester on and off
- Start/Stop: starts or stops measuring
- Reset: clears the measuring result from the display
- Previous Data: shows results of last measurement
- Menu: starts the menu for setting parameter

BASIC CASE

BASIC CASE

Pressing ↑ button for 2s
you enter sending data




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graph TD
    MainMenu[Main Menu] --> MeasBaudRate[Meas Baud Rate]
    MainMenu --> DeleteMeasData[Delete meas. data]
    MainMenu --> PCHeader[PC header]
    MainMenu --> EXIT[EXIT?]

    MeasBaudRate --> MeasBaudRateSubMenu[Meas Baud Rate 19200]
    MeasBaudRateSubMenu --> MeasBaudRateSubMenu14[14 Meas Baud Rate 19200]
    MeasBaudRateSubMenu --> MeasBaudRateSubMenu13[13 Meas Baud Rate 19200]
    MeasBaudRateSubMenu --> MeasBaudRateSubMenu12[12 Meas Baud Rate 19200]
    MeasBaudRateSubMenu --> MeasBaudRateSubMenu01[01 Meas Baud Rate 19200]

    MeasBaudRateSubMenu14 -- Start --> MeasBaudRateSubMenu14Start[14 Meas Baud Rate 19200]
    MeasBaudRateSubMenu13 -- Start --> MeasBaudRateSubMenu13Start[13 Meas Baud Rate 19200]
    MeasBaudRateSubMenu12 -- Start --> MeasBaudRateSubMenu12Start[12 Meas Baud Rate 19200]
    MeasBaudRateSubMenu01 -- Start --> MeasBaudRateSubMenu01Start[01 Meas Baud Rate 19200]

    MeasBaudRateSubMenu14Start --> MeasBaudRateSubMenu14
    MeasBaudRateSubMenu13Start --> MeasBaudRateSubMenu13
    MeasBaudRateSubMenu12Start --> MeasBaudRateSubMenu12
    MeasBaudRateSubMenu01Start --> MeasBaudRateSubMenu01

    MeasBaudRateSubMenu14 -- Menu --> MeasBaudRateSubMenu
    MeasBaudRateSubMenu13 -- Menu --> MeasBaudRateSubMenu
    MeasBaudRateSubMenu12 -- Menu --> MeasBaudRateSubMenu
    MeasBaudRateSubMenu01 -- Menu --> MeasBaudRateSubMenu

    DeleteMeasData --> DeleteMeasDataStart[Starts to START and deletes all tests]
    DeleteMeasDataStart --> MeasBaudRateSubMenu14Start

    PCHeader --> PCHeaderSubMenu[PC header]
    PCHeaderSubMenu --> PCHeaderSubMenu14[14 Meas Baud Rate 9600]
    PCHeaderSubMenu --> PCHeaderSubMenu13[13 Meas Baud Rate 9600]
    PCHeaderSubMenu --> PCHeaderSubMenu12[12 Meas Baud Rate 9600]
    PCHeaderSubMenu --> PCHeaderSubMenu01[01 Meas Baud Rate 9600]

    PCHeaderSubMenu14 -- Start --> PCHeaderSubMenu14Start[14 Meas Baud Rate 9600]
    PCHeaderSubMenu13 -- Start --> PCHeaderSubMenu13Start[13 Meas Baud Rate 9600]
    PCHeaderSubMenu12 -- Start --> PCHeaderSubMenu12Start[12 Meas Baud Rate 9600]
    PCHeaderSubMenu01 -- Start --> PCHeaderSubMenu01Start[01 Meas Baud Rate 9600]

    PCHeaderSubMenu14Start --> PCHeaderSubMenu14
    PCHeaderSubMenu13Start --> PCHeaderSubMenu13
    PCHeaderSubMenu12Start --> PCHeaderSubMenu12
    PCHeaderSubMenu01Start --> PCHeaderSubMenu01

    PCHeaderSubMenu14 -- Menu --> PCHeaderSubMenu
    PCHeaderSubMenu13 -- Menu --> PCHeaderSubMenu
    PCHeaderSubMenu12 -- Menu --> PCHeaderSubMenu
    PCHeaderSubMenu01 -- Menu --> PCHeaderSubMenu

    EXIT --> EXITStart[Back to the basic display]
    EXITStart --> MainMenu
  
```


SETTING UP FOR MEASUREMENT

1. Basic case (see menu system)

Parameters set:

- 1 or 14 measurements
- Starting capacity measurement

By switching the device ON you'll see the following image:

Switch-off Voltage	Measured Voltage
9.6V	12.8V
420A/10s	0h0m0s
Set Current	Set disc time Time Passed

For a measurement with completely the same parameters as the previous one, press the START button. By pressing the START button, the measurement will start. At the end of the measurement you will see the discharged Ah and the time of the test on the display.

For a measurement with new parameters, set the data by the following method:

- At the starting screen, press the MENU button. The cursor will blink at the switch-off voltage. With the $\downarrow\uparrow$ buttons on the display, you can set the proper final voltage. For the measurement of a general starting ability the switch-off voltage is 9.6V.
- By pressing the MENU button again, the cursor jumps to the discharge current. Now you can set the constant flowing current using the $\downarrow\uparrow$ button. Generally, for measuring the starting ability, set the half of the starting current value EN/2 given according to the EN standard.
- By pressing the MENU button again, you can set the time of discharging. The range can be set from 1-60 seconds or in case of measuring capacity, to infinite time. For measuring the starting ability set 15 seconds in general. By pressing the MENU button again, you'll get back to the basic screen, where by pressing the START button you can start the test.

⚠ WARNING!

In one measure mode, if the PC data sending is turned off, the starting of the new measurement will cancel the results of the previous measurement automatically.

In 14 measurements mode, the settings are the same as the one measurement mode settings. However, the next measurement will not cancel the previous one. Plus, by pressing the MENU button again at the basic screen, you will see the number of the next measurement. By pressing the MENU button right again the next measurement will start. This will happen until the 14 measurements are finished.

After the 14 measurements, the device will offer the possibility of sending data to the PC (if there is one) or delete the results. After 14 measurements you can start a new one only after cleaning the memory.

2. IC Measurement (see menu system)

Parameters set:

- 1 or 14 measurements
- 1C discharging

1C measurement means a discharge with the adequate constant current for the 20 hours Ah capacity's value of the battery. This means a fast, but still accurate capacity measurement.

After a 1C measurement, the previously charged and healthy battery will still remain able to start. At the basic screen of the 1C by pressing the MENU button, you only set the battery's Ah capacity, with the $\downarrow\uparrow$ buttons.

The discharge final voltage, the discharge time for the 100% 'status' and the qualification limit value can be set at the PARAMETERS. The current will be set automatically for the capacity, by the tester. By pressing the MENU button again, you'll get back to the basic screen and by pressing the START button you can start the next measurement.

The result of the 1C measurement is a time, and a % value and a qualification made by these: good battery - bad battery.

Typical 1C measurement setting: set between the parameters a 9.6V limit; for example, at liquid type starting batteries 35 minutes for the 100% battery and give for example 60% for the good or bad qualification's limit value.

You can interrupt the measurements anytime by pressing the STOP button. But starting again will be a new measurement.

For restarting, the Ah display should be erased by pressing the RESET button. After this, we can start the tester from the basic case. By pressing the RESET button again, we can read the voltage at that current time. Suggested measuring for starting ability load the battery with half of the starting current suggested in EN for 15 seconds. During this time, the voltage of the battery able to start cannot drop under 9.6V, not even after 2-3 following discharges.

STANDARD STARTING ABILITY MEASUREMENT

Load the battery which is cooled down to -18°C with the starting current suggested in EN for 10 seconds. During this time, the battery cannot drop under 7.5V. With one tester max. 380A, with four 1520A discharging current can be reached until 7.5V.

Measuring Capacity: (reserve capacity)

Reserve Capacity: set the voltage limit to 10.5V, 25A load current, infinite time, then start the measurement according to the above. At the end of the measurement, we can read the measured reserve capacity (RC) of the battery in minutes.

Measuring by 1xC-: set 9.6V bottom voltage, 1xC (A) discharge current, infinite time, and then start measuring. by the T/min. shown at the end of measuring the 20 hour capacity can be easily calculated with a simple antecedent. At the 100% wet batteries can provide 1xC for 35 minutes.

Generator Testing (optional): connect the tester to the battery installed in the car. Set the voltage limit to 10.5V, current to 1A, time to infinite /-/. Start the tester. The current can be set under loading, by this defining the load capacity of the generator (up to 13.6V).

Analysing the Results: at the end of the measurement we can read the voltage and time values, we can see which reached, passed the values set. We can read the amount of charge which we took out. But, these are not in the memory, by pressing the RESET or START buttons, this data will be forgotten by the device.

Parameter Setting Menu: you can get to the parameter adjusting menu by pressing the button for 2 seconds at the basic screen. Here you can set the parameters which are in connection with the operation of the device and the measurement.

These are the following:

- PC Data Sending: set the option of sending the data to a PC
- PRN Data Sending: permit/forbid functions you can allow printer
- No. of Tests: set the number of the measurements, 1 to 14
- Language: change to english or hungarian
- Method of Measurement: change between starting ability measurement/1C measure functions.

WARNING!

This function erases the memory without warning when changing.

At the Starting Ability mode, you can set the discharging voltage, discharge loading power and the time of discharging.

In 1C mode, you can only have to set the battery's 20 hours Ah capacity, because the tester sets the other parameters automatically.


1C Minimum Voltage	Base value: 9.6V
Discharging Power	Similar constant to the Ah capacity's value, the current (A) is set by the tester
1C Allowance, Tolerance Level	Base value: 70%
1C Discharging Time	Base time for 100% = 35 minutes / suggested values IF the producer of the battery hasn't provided other values
Wet Type Battery	35 minutes
AGM Battery	40 minutes
Spiral Celled Battery	45 minutes

At the current setting permit/forbid function, you can set the option of changing the loading current during the starting ability measurement (for example, at a generator test it is necessary to increase the current).

The parameters basic settings:



1. PC: there is no PC
2. No. of measurements: 14
3. PRN: no printer
4. Language: English
5. Measure Mode: starting ability test
6. Current Setting: current setting adjustable


DATA SENDING MENU




From the basic screen by pressing the  button for two seconds, you can get to the 'sending data' menu. In this menu, you can send the results to the PC, printer or display and you can upload the tester's data which appears in printing (for example, data of the company, etc.). In this menu, you could erase the measured values.

Downloading to PC

During the test, the tester stores the measured data in its own memory. The stored data can be loaded to the PC by RS232 serial port for further analysis, printing or storing.

For this, go into the Data Sending menu by pressing the  button for 2 seconds, and then choose the measurement to PC function by pressing the START button. After this, by pressing the  button, you can transfer each measurement starting from measurement 1.

You can reach the last measurement by pressing the  button. You can start the sending of the chosen results by pressing the START button.

Press FILE-Read measure menu or Read measure icon, then set the transfer speed 19200 baud. Pressing the MENU -  - START - START buttons on the tester, steps into 'Test > PC' menu point, and then if you have made several tests, select the required test by using the   buttons. Then press the START button. Test results are then downloaded to the PC and can be analysed in the program.


Data on the Display

At the data sending menu step to the Measurement LCD, choose the adequate measurement and press start to have it shown on the screen.

Data Sending to the Serial Port Printer

(the serial port printer is optional, it can be ordered separately). At the data sending menu, step up the Measurement PRN, choose the adequate measurement and press start to send to the printer.

Deleting Data from the Memory

The tester can hold max. 14 measurements in its own memory. If you want to do further measurements you must erase the memory. To perform this task, go to the data sending menu by pressing the  button for two seconds, here choose the DELETE function by the START button. By pressing the START button again, all of the measurements will be deleted from the memory.



WARNING!

If you change between the 1 and 14 measurements or between starting ability measurement and 1C measurement in the parameter setting menu, the memory will be deleted immediately without warning!

Header, Title Data Transferring from PC to the Tester for Serial Port printers:

You can send the data which appears when printing from the PC program to the connected tester, for serial port printers - the following way.

- Header transferring from PC to the tester for serial port printers: connect the tester to the PC. You can find the menu for this task at FILE-HEADER. You can change the header which appears on the printing in this menu. At the data sending menu, go to the header function and then press the START button.
- Data loading: the PC program (AKKU.EXE) does not need installation; it is enough if you save it to a HDD. Connect the tester through an RS232 serial port. Start the AKKU.EXE program on the PC. Set the serial port in the software. Press FILE-Read measure menu or read measure icon, then set the the transfer speed to 19200 baud. For transferring, go into the Data sending menu by pressing the \uparrow button for 2 seconds. By pressing the MENU - \downarrow - START - START buttons on the tester you enter into 'Test > PC' menu point, and then if you have made several tests, select the required test by the \downarrow \uparrow buttons. Then press the START button. Test results are then downloaded to the PC and then can be analysed in the program.

Self-checking Function

At the end of the test the tester switches on the relays used during the test one by one, to check if they operated correctly, if the test was longer than 3 seconds. If there is a wrong connection or relay, it displays an error message. This is possible to clear with the RESET button and the test results can be seen, but it is possible that the discharge current was less than what was selected because of a relay fault. Repeat the test and have the tester repaired.

Systems of Testers

The elements of the system are 12V420A testers that can function one by one as separate testers, it is possible to connect a max. of 4 testers at a time to the paralleling device by the help of an RS232 cable. One of the 4 testers is of an advanced function tester, a so-called Master, while the other three are of equal positioned Slaves.

A Master always has to have a tester connected to it. the number of Slaves can be 1, 2, and 3 depending on the necessary discharge current. The below table shows the possible discharge currents:

Slave	Max. Current	Min. Current	Max. Current by Infinite Time
1	840A	200A	320A
2	1260A	300A	480A
3	1680A	400A	640A