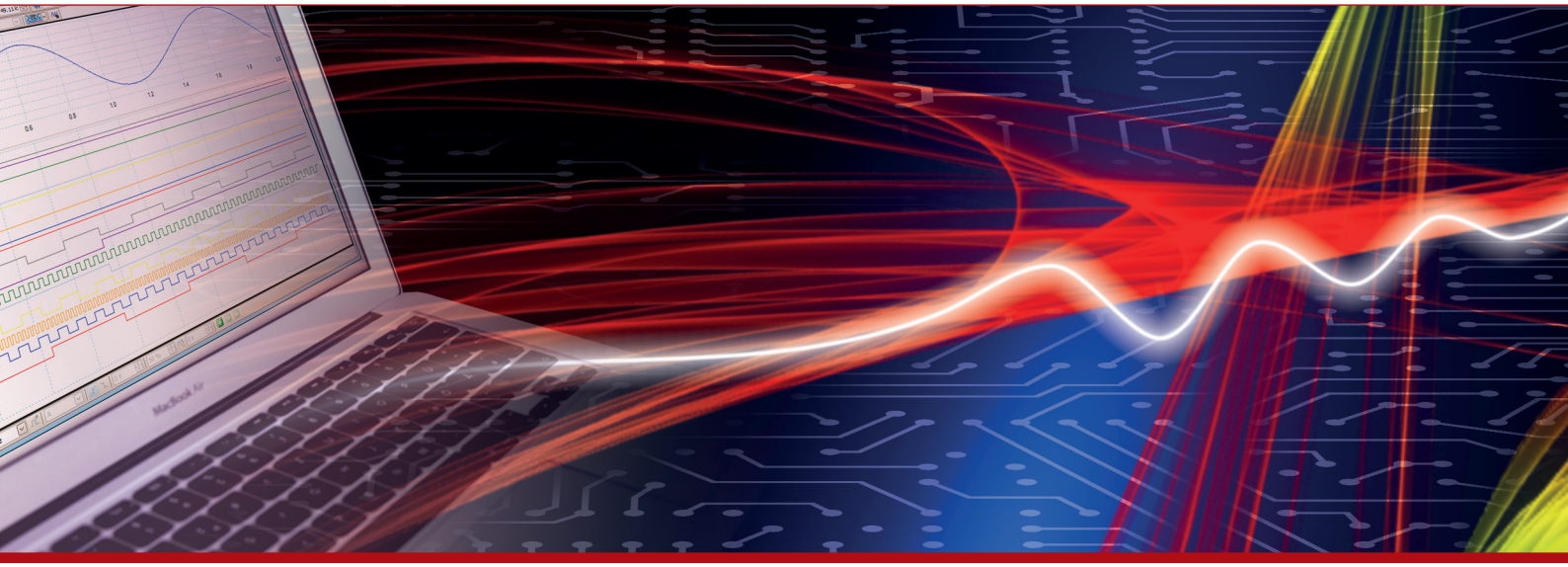
Product Datasheet - Technical Specifications



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PeakTech®

Prüf- und Messtechnik

Spitzentechnologie, die überzeugt

PeakTech® 2275 / 2280

Bedienungsanleitung / Operation manual

Programmierbare elektronische DC-Last /

DC Programmable Electronic Load

1. Safety Precautions

This product complies with the requirements of the following European Community Directives: 2014/30/EU (Electromagnetic Compatibility) and 2014/35/EU (Low Voltage) as amended by 2004/22/EC (CE-Marking).

To ensure safe operation of the equipment and eliminate the danger of serious injury due to short-circuits (arcing), the following safety precautions must be observed.

Damages resulting from failure to observe these safety precautions are exempt from any legal claims whatever.

* Do not use this instrument for high-energy industrial installation measurement.
* Prior to connection of the equipment to the mains, check that the available mains voltage corresponds to the voltage setting of the equipment.
* Connect the mains plug of the equipment only to a mains outlet with earth connection.
* Do not place the equipment on damp or wet surfaces.
* Check test leads and probes for faulty insulation or bare wires before connection to the equipment.
* Replace a defective fuse only with a fuse of the original rating. Never short-circuit fuse or fuse holding.
* Do not cover the ventilation slots of the cabinet to ensure that air is able to circulate freely inside.
* Do not insert metal objects into the equipment by way of the ventilation slots.
* Do not place water-filled containers on the equipment (danger of short-circuit in case of knockover of the container)
* Do not operate the equipment near strong magnetic fields (motors, transformers etc.).
* Do not operate the meter before the cabinet has been closed and screwed safely as terminal can carry voltage.
* Please use only 4mm-safety test leads to ensure immaculate function.
* To avoid electric shock, do not operate this product in wet or damp conditions. Conduct measuring works only in dry clothing and rubber shoes, i.e. on isolating mats.
* Never touch the tips of the test leads or probe.
* Comply with the warning labels and other info on the equipment.
* The measurement instrument is not to be operated unattended.
* Do not subject the equipment to direct sunlight or extreme temperatures, humidity or dampness.
* Do not subject the equipment to shocks or strong vibrations.
* Keep hot soldering irons or guns away from the equipment.
* Allow the equipment to stabilize at room temperature before taking up measurement (important for exact measurements).
* Periodically wipe the cabinet with a damp cloth and mid detergent. Do not use abrasives or solvents.
* The meter is suitable for indoor use only
* Do not store the meter in a place of explosive, inflammable substances.
* Opening the equipment and service – and repair work must only be performed by qualified service personnel
* Do not place the equipment face-down on any table or work bench to prevent damaging the controls at the front.
* Do not modify the equipment in any way
* -**Measuring instruments don't belong to children hands.-**

Cleaning the cabinet
Prior to cleaning the cabinet, withdraw the mains plug from the power outlet. Clean only with a damp, soft cloth and a commercially available mild household cleanser. Ensure that no water gets inside the equipment to prevent possible shorts and damage to the equipment.

2. Introduction

Both the ***PeakTech***® 2275 and 2280 are representing a series of DC Programmable Electronic Loads that are found in many field applications of today`s electronics including the solar and battery systems. These DC Loads are suitable for the industrial use as well as for the development or research. The fundamental features of both units are the input voltage of max. 360 V and the resolutions of 1mV/1mA/1mΩ/1mW in the low ranges that make it possible to use the DC Loads in a variety of applications.

Many dedicated modes, in particular for the short circuit tests, battery tests, user-defined list tests as well as the basic modes CV, CC, CR, CP, make the instruments indispensable in the most industrial fields or educational institutions.

2.1 Features

- User-friendly operation through the key panel and rotational knob
- High-contrast LCD
- Modes: const. U, I, R or P (CV, CC, CR, CP)
- Short-Circuit-Test, Battery-Test, Dynamic Test, User-Defined Test-List
- Safety protection against overvoltage, overcurrent, overload, overheating, polarity
- Voltage Sense Input for increased accuracy
- Temp. regulated fan
- Key and knob lock
- RS-232 Interface (with USB adapter), PC Software
- Multi-unit support with RS-485

2.2 Accessories

- Operational manual
- Power cord
- USB-to-COM adapter
- CD-ROM

3. Technical Data

3.1 Specifications

Model		2275	2280
Rated Specs	Input Voltage	0 V ~ 360 V	0 V ~ 360 V
	Input Current	1 mA ~ 30 A	1 mA ~ 30 A
	Input Power	150 W	300 W
	Range	Accuracy	Resolution
	0 V … 9.999 V	± (0.1% + 0.03% FS*)	1 mV
	10 V … 99.99 V	± (0.1% + 0.03% FS)	10 mV
	100 V … 360 V	± (0.1% + 0.03% FS)	100 mV
	0 A … 9.999 A	± (0.1% + 0.1% FS)	1 mA
	10 A … 30 A	± (0.2% + 0.15% FS)	10 mA
Const. Voltage Mode	1.5 V … 9.999 V	± (0.1% + 0.03% FS)	1 mV
	10 V … 99.99 V	± (0.1% + 0.03% FS)	10 mV
	100 V … 360 V	± (0.1% + 0.03% FS)	100 mV
Const. Current Mode	0 A … 9.999 A	± (0.1% + 0.1% FS)	1 mA
	10 A … 30 A	± (0.2% + 0.15% FS)	10 mA
Const. Resistance Mode	0.1 Ω … 10 Ω	± (1% +0.3 % FS)	1 mΩ
	10 Ω … 99 Ω	± (1% +0.3 % FS)	10 mΩ
	100 Ω … 999 Ω	± (1% +0.3 % FS)	100 mΩ
	1 kΩ … 4 kΩ	± (1% +0.8 % FS)	1 Ω
Const. Power Mode	0W … 9.999 W	± (1% + 0.1% FS)	1 mW
	10W … 99.99 W	± (1% + 0.1% FS)	10 mW
	100W … 300 W	± (1% + 0.1% FS)	0.1 W
Current Display	0 A … 9.999 A	± (0.1% + 0.1% FS)	1 mA
	10 A … 30 A	± (0.2% + 0.15% FS)	10 mA
Voltage Display	1.5 V … 9.999 V	± (0.1% + 0.03% FS)	1 mV
	10 V … 99.99 V	± (0.1% + 0.03% FS)	10 mV
	100 V … 360 V	± (0.1% + 0.03% FS)	100 mV
Power Display	0W … 9.999 W	± (1% + 0.1% FS)	1 mW
	10W … 99.99 W	± (1% + 0.1% FS)	10 mW
	100W … 300 W	± (1% + 0.1% FS)	0.1 W
Battery Test	Input: 0.8 V … 120 V Max. Measurable Capacity: 999 Ah Resolution: 10 mA Timer Range: 1 ~ 60000 sec		
Dynamic Test	Pulse Width Length: 10 ms ~ 10 s		

*FS: Full Scale

3.2 Work Environment

Temperature: 0°C ~ 40°C
Rel. Humidity: ≤ 90 %RH
Pressure: 86 ~ 104 Pa

3.3 Power Supply
220/110 (1±10%)V AC, 50 Hz/60 Hz (1±5%)
1A fuse for protection.

3.4 Dimensions
310mm × 225mm × 100mm

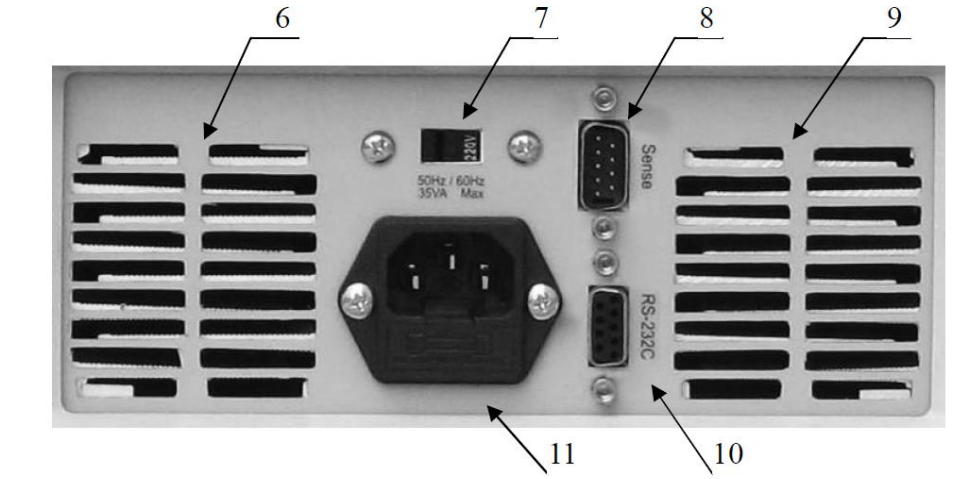
3.5 Weight
Ca. 5.5 kg (P 2275) / 6.0 kg (P 2280)

4. Front and Rear Side

4.1 Front Side

Number	Name	Description
1	LCD	See 4.4
2	Rotating knob	
3	Input terminals: **+ -**	**Reverse polarity may cause high currents!**
4	Key field	See 4.3
5	Power switch	

4.2 Rear Side

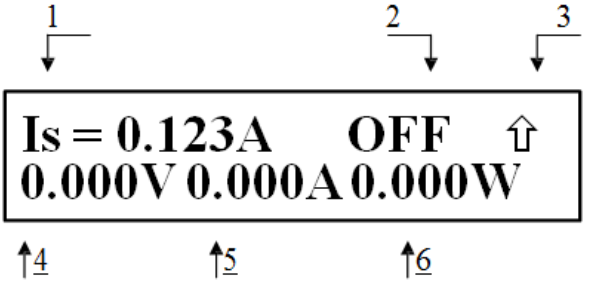


Number	Name	Description
6, 9	Ventilation openings	Do not conceal the openings!
7	110V/220V AC Switch	Please consider the mains voltage of your region
8	Remote Sense and Trigger	See Apendix A for pin-out
10	RS-232 Interface	
11	Mains power socket	1A fuse

4.3 Key Field

Number pad	1, 2, 3, 4, 5, 6, 7, 8, 9, 0, .
Main modes	I-SET, V-SET, P-SET, R-SET
On/Off Key	Activaites the input
Menu keys	ESC, ENT, ▲, ▼
Key functions after pressing the SHIFT key	S-LIST, S-BAT, S-TRAN, SAVE, CALL, SETUP, CONFIG, BAT, SHORT, TRAN, A, B
Derived function keys	MENU, LOCAL, Back Space (B.S.), TRIG

4.4 General Information



Description:

No.		Description	Notes
1	Mode	Is: const. current	
		Vs: const. voltage	
		Ps: const. power	
		Rs: const. resistance	
		Short: short circuit mode	
		Battery: battery test	
		Transient: dynamic test	
2	DC Load State Informations	OFF: load input off	
		RUN: load input on	
		°°°°: State change / Waiting	
		UREG: load is not in const. mode	
		CC: const. current	
		CV: const. voltage	
		CP: const. power	
		CR: const. resistance	
		OC: overcurrent	Automatic load input off and alarm possible
		OV: overvoltage	Automatic load input off and alarm possible
		OP: power to high	Automatic load input off and alarm possible
		HOT: instrument temperature to high	Automatic load input off and alarm
		R.V: reverse voltage	**Reverse polarity may cause high currents**
		ERR: Error	

3	Operation	↑ SHIFT key pressed	
		Key lock	
		Remote control	
4	Input voltage	Voltage on the input terminals or remote sense input	Not available in battery test and dynamic
5	Input current	Input current	
6	Power	Power	
Misc.	Wichtige Alarm-Infos	Reverse Voltage!!!	
		Exceed Voltage!!!: Overvoltage	Automatic load input off
		Over Hot!!!: Temperature to high	Automatic load input off

5. Menu

5.1 Abstract

The menu includes all the modes and settings of the instrument. Press【MENU】to enter the menu. The first submenu is also accessible directly by pressing 【SHIFT】followed by a key with the upper caption of the desired mode or setting. You can always navigate with 【▲】and 【▼】through the menu or use the rotating knob instead. Press 【ENT】 to choose a menu item, with【ESC】you go one level up.

5.2 Menu Description

Main Menu	1. Submenu	2. Submenu
System Config	Power-on Call	OFF
		Nummer 0 ~ 9 for file number
	Key Beep	ON
		OFF
	Key Lock	ON
		OFF
	Knob Lock	ON
		OFF
	Trigger Source	MAN (manual)
		EXT (extern)
		BUS
	Communication Mode	Separator
		Multiple
	Local Address	Number 000~127
	Baud Rate	8 Baud Rates: 4800 9600 11520 12800 14400 19200 28800 38400
	Reset Settings	Reset to Factory settings
	Restore Cal Data	Self-calibration

	Exit	
Load Setup	Remote Sense	ON
		OFF
	Max Current	【Ent】: confirm
	Max Voltage	【Ent】: confirm
	Max Power	【Ent】: confirm
	On Voltage	OFF
		【Ent】: confirm
	Off Voltage	OFF
		【Ent】: confirm
	Auto Off	OFF
		【Ent】: confirm (unit s)
	CR-Mode	InVolt InCurrent OFF
	Exit	
Battery Test Set	Discharge Current	【Ent】: confirm
	Min Voltage	【Ent】: confirm
	Exit	
Tran Test Set	Tran Load	Current
		Voltage
	Level A	【Ent】: confirm (voltage or current)
	Width A	【Ent】: confirm (ms)
	Level B	【Ent】: confirm (voltage or current)
	Width B	【Ent】: confirm (ms)
	Tran Mode	CONT
		PULS
		TRIG
	Exit	

<table>
<tr><td rowspan="13">List Test Set</td><td>Step Number</td><td colspan="2">Number 00~14</td></tr>
<tr><td rowspan="2">Step Mode</td><td colspan="2">AUTO</td></tr>
<tr><td colspan="2">TRIG</td></tr>
<tr><td rowspan="2">Repeat</td><td colspan="2">ON</td></tr>
<tr><td colspan="2">OFF</td></tr>
<tr><td rowspan="11">Step00~14</td><td rowspan="6">List Load</td><td>ConstCurr</td></tr>
<tr><td>ConstVolt</td></tr>
<tr><td>ConstPower</td></tr>
<tr><td>ConstRes</td></tr>
<tr><td>Short (short circuit)</td></tr>
<tr><td>Open (open circuit)</td></tr>
<tr><td>Level</td><td>【Ent】: confirm</td></tr>
<tr><td>Delay</td><td>【Ent】: confirm</td></tr>
<tr><td rowspan="4">Compare</td><td>OFF</td></tr>
<tr><td>InVoit (for voltage comparison)</td></tr>
<tr><td>InCurr (for current comparison)</td></tr>
<tr><td>InPower (for power comparison)</td></tr>
<tr><td>Limit Low</td><td>【Ent】: confirm</td></tr>
<tr><td></td><td></td><td>Limit High</td><td>【Ent】: confirm</td></tr>
</table>

		Copy To Nest	【Esc】: abort
			【Ent】: copy
		Exit	
Save File	Number 0 ~ 9 【Ent】: save current file		
Recall File	Nummer 0 ~ 9 【Ent】: load current file		
Exit	【Ent】: Exit the menu		

5.3 Short Cut Menu

The first submenu is accessible directly by pressing 【SHIFT】followed by a key with the upper caption of the desired mode or setting shown below.

SHIFT + CONFIG	System configuration
SHIFT + SETUP	DC Load settings
SHIFT + CALL	Load settings
SHIFT + SAVE	Save settings
SHIFT + S-BAT	Battery test
SHIFT + S-TRAN	Dynamic test
SHIFT + A	N/A
SHIFT + B	N/A

5.4 Main Menu

The main menu consists of all the mentioned submenues in 5.2.

Note: The symbol indicates that you can use the keys 【▲】and【▼】.

5.4.1 System Config

Here you can change system-related settings of the instrument to meet your requirements.

Power-on Call

When in OFF position, this setting is deactivated. If a number 0-9 was chosen, the instrument loads the configuration file with this number every time the instrument is powered on. If the chosen file couldn't be found, the default configurations will be loaded.

The instrument can store up to 10 configuration files. See „Save File" for further information.

Key Beep

ON/OFF: Activates/deactivates the beep tone when pressing the keys.

Key Lock

ON/OFF: Activates/deactivates the key field of the instrument.

Knob Lock

ON/OFF: Activates/deactivates the rotating knob of the instrument.

Trigger Source

There is often a trigger needed, especially when using the dynamic or list test. You can choose from three trigger modes: MAN, EXT and BUS.

MAN: manual trigger via the 【TRIG】key.
EXT: extern trigger on the rear side of the unit.
BUS: BUS trigger via Software

Note: See Appendix A for Pin-out of the Remote Sense and Trigger
Note: See Appendix B for description of the PC-Software

Communication Mode
The RS232C interface allows a communication with several units. In all cases, the 8-bit transfer mode is used.

Separator: One-unit mode
Multipler: Multi-unit mode

Please notice that addressing a unit with an explicit address is only possible when multi-unit mode was selected.

Notice: See also „P2275-P2280 RS232C Interface.pdf“ on the CD-ROM.

Local Address
In multi-unit mode, every connected unit must have an address (0 - 127). There is no need for an address in one-unit mode, respectively.

Note: Press 【ENT】 to make an entry with the number keys.

Baud Rate
The baud rate of the RS232C Interface has to be the same as in the PC settings. You can choose one of the following baud rates: 4800 9600 11520 12800 14400 19200 28800 38400.

Reset Settings
Sets the settings of the instrument to default factory settings. You will be asked to repower the DC Load afterwards.

Restore Cal Data
Self-calibration. You will be asked to repower the DC Load afterwards.

Exit
Press 【ENT】 or 【ESC】to leave the menu.

5.4.2 Load Setup
This submenu includes parameters of the DC Load that make it more flexible in use. That could especially be advantageous when using the instrument in an automated environment.

Remote Sense
Since the sampling of the voltage is also affecting other calculations, you may want to measure it as close as possible to the voltage source itself. This will especially be noticeable if big currents flow and a bigger portion of the voltage drops across the leads to the load. To solve the problem, you can use the high-impedance Remote Sense input to measure the voltage directly on the desired spot in your circuit.

The Remote Sense input is found on the rear side of the instrument. See Appendix A for further information.

ON: Remote Sense activated.
OFF: Remote Sense deactivated.

Use the keys【▲】and【▼】or the rotating knob to change the setting.

Max Current
The setting „Max Current“ lets you set the current of the load to a value smaller than the predetermined maximum current of 30A . You should always make this setting before the operation. The set value will have the following implications:

a) Limiting current.
b) In the modes CV, CP, CR and Short Circuit Test, you will hear a beep tone and see the warning „OC“ on the LCD. If the current hasn't been decreased over a longer period of time, the instrument will automatically deactivate the input.
c) If the set max. current is less than 3A, the low current range will be used. For values above 3A, the upper current range is used, accordingly.

Max. Voltage
Similar to "Max Current", you can also set a max. voltage level. The set value will have the following implications:

a) Limiting voltage.
b) If the actual voltage exceeds the set max. voltage, the LCD shows "Exceed Voltage!!!" and the instrument will deactivate the input automatically.

Max. Power
When the drawn power exceeds the set value, you will hear a beep tone and see the warning „OC“ on the LCD. In critical cases, the instrument will automatically deactivate the input.

Note: The settings „Max. Current“, „Max. Voltage“ and „Max. Power“ are similar to each other.

On Voltage
The menu item "On Voltage" sets a minimal threshold voltage for the DC Load to be activated. If the actual voltage is below the set value, the input will be off and you'll see "。。。。" on the LCD, meaning that the unit is in waiting mode. Is the actual voltage above the threshold, the input will be activated automatically. This setting is available in the modes CV, CC, CP and CR.

Example: Consider, the DC Load should be activated above 1.25 V. Choose the menu item "On Voltage" by pressing 【ENT】. You will see either the value set before or OFF. Press once again 【ENT】 and then 【1】【.】【2】【5】. Press 【ENT】 to confirm.

Note: If the entered value is close to 0 V, the "On Voltage" setting will be set to OFF.

Off Voltage
"Off Voltage" is similar to "On Voltage" except for the fact that the load will turn off the input if the voltage falls below the set value. This setting is available in the modes CV, CC, CP and CR.

Note: If the entered value is close to 0 V, the setting switches to OFF.

Auto Off
This setting turns the load input off after a specified time in the range of 0-60000 s. The timer is activated after turning the input on.

Note: The value „0“ deactivates this function.

Exit
Press 【ENT】 or 【ESC】to exit.

5.4.3Battery Test Set

Discharge Current
Battery discharging is done in CC mode, the menu item „Discharge Current“ sets the value for the current. Press 【ENT】after selecting the menu item and enter the desired value. Press 【ENT】 once again, your set value is now shown together with the unit A.

Min Voltage
„Min Voltage“ sets the end voltage value of the battery where the test should be stopped. You will see then the discharge time and the capacity in Ah.

Choose the item „Min Voltage “, press 【ENT】and enter the desired value. Press 【ENT】 once again, your set value is now shown together with the unit V.

Note: You cannot set „Min Voltage“ to OFF. If the set value is close to 0 V, the battery test may not be able to stop. The highest value is 36 V.

Exit
Press 【ENT】 or 【ESC】to exit.

5.4.4 Tran Test Set (Dynamic Test)

Tran Load
Choose here if the dynamic test should be done in CC or CV mode. Use the keys 【▲】 and 【▼】.

Level A
This setting changes the value of Level A. The current value is shown by selecting the menu item. Press 【ENT】to enter a new value. The unit depends on the chosen mode (see „Tran Load “).

Width A
Here, you can change the width of Level A. The current value is shown by selecting the menu item. Press 【ENT】to enter a new value in ms.

Level B
This setting changes the value of B Level. The current value is shown by selecting the menu item. Press 【ENT】to enter a new value. The unit depends on the chosen mode (see „Tran Load “).

Width B
Here, you can change the width of Level B. The current value is shown by selecting the menu item. Press 【ENT】to enter a new value in ms.

Tran Mode
The DC Load has three controlling modes the dynamic test can work in.

CONT: Continuous Mode. After the test has been started, the Load switches between Level A and B with the corresponding values of Width A and B.

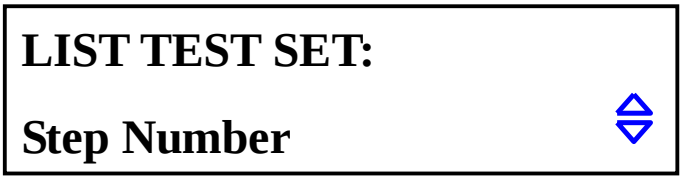
PULS: Pulse Mode. After the test has been started, the Load will work in Level A. If a trigger event occurs, the Load switches to Level B and stays there for a time period set in Width B. Afterwards, Level A will be active again. Width A will not be used in this mode.

TRIG: Trigger Mode. Width A and B aren't used. The Load works in one of the two levels and switches between them every time a trigger event occurs.

Note: See 6.7 for further information of dynamic test mode.

Exit
Press 【ENT】 or 【ESC】to exit.

5.4.5 List Test Set



Step Number
Quantity of instructions. There can be up to 15 instructions, from 00 to 14. Use 【▲】 and 【▼】to set up a number.

Step Mode
Step Mode decides how the instructions are switched between (the change from instruction N to N+1).

AUTO: Automatic switching considering the delay time.

TRIG: Wait for the trigger to switch after the set delay time.
Note: See 5.4.1 for trigger settings.

Repeat
Automatically repeat. Choose ON if you want to repeat the instructions, or OFF to run the test just once.

Step XX
XX stays for a number of the instruction (00 - 14) - Press 【ENT】 to open this submenu:

List Load
Sets a mode (CC, CV, CP, CR, Short, Open) for the instruction XX.

Level
The value related to the set load mode. Not significant if the mode is Short or Open, otherwise with a unit A (CC mode), V (CV mode) etc.

Delay
Delay time during the instruction XX is active. The unit is s.

Compare
Sets a value for comparison.

OFF: No comparison
InVolt: Compares voltages
InCurr: Compares currents
InPower: Compares power

LimitLow
Lower limit of the value to compare with. The unit is the corresponding unit of "Compare" setting and will not be shown on the LCD.

LimitHigh
Upper limit of the value to compare with. The unit is the corresponding unit of "Compare" setting and will not be shown on the LCD.

Copy To Next
Copy to next instruction.

Exit
Press 【ENT】 or 【ESC】 to exit this submenu.

5.4.6 Save File
Here you can save your currenty made settings of the instrument. The settings are saved as a file. You can save up to 10 files (0 - 9). You can then either load the file manually or automatically (see Power On Call).

By choosing this submenu, you will see "0" as the number of the file and the status Y or N meaning whether the file has been saved under the given file number. Press 【ENT】 to save your settings. You will see „Saving ...“ on the LCD and the status changes to Y.

5.4.7 Recall File

You can load the saved file by pressing 【ENT】. A status N means that no file has been saved under this number.

5.4.8 Exit

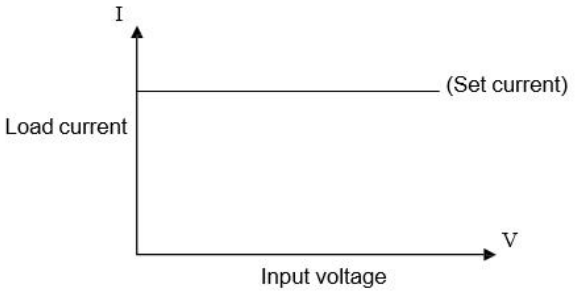
Press 【ENT】 or 【ESC】to exit the menu.

6. Operation

This chapter covers the operation of the DC Loads P 2275 and P 2280 together with their working modes.

6.1 Const. Current Mode (CC Mode)

In the CC mode, the load tries to hold the set current, even if the voltage on the terminals (or on the Remote Sense input) is not stable or changes.

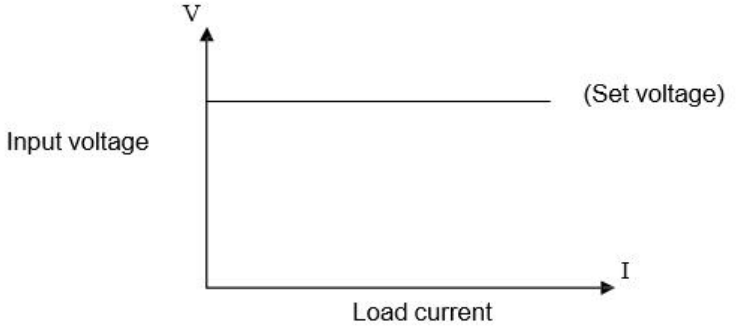


Being in any other mode, press 【I-SET】 to enter the CC Mode. Press then 【ON/OFF】 to activate the Load.

If the Load is deactivated, you can change the desired current with the rotating knob. Press 【I-SET】 once again to enter the value per key field.

6.2 Const. Voltage Mode (CV Mode)

In this mode, the load tries to adjust the own resistance so that the voltage on the terminals (or on the Remote Sense input) is equal to the set value.



Being in any other mode, press 【V-SET】 to enter the CV Mode. Press then 【ON/OFF】 to activate the Load.

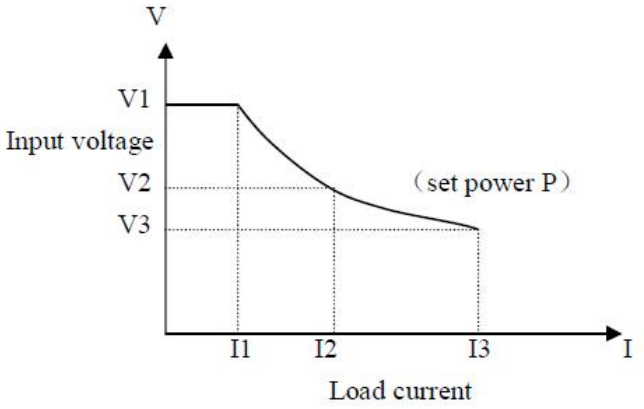
If the Load is deactivated, you can change the desired current with the rotating knob. Press 【V-SET】 once again to enter the value per key field.

Note: If the voltage on the terminals or Remote Sense is less than the set value, the CV mode doesn't have an effect.

Note: The difference between the source voltage and the set voltage will fall onto the internal source resistance and lead's resistance. If the difference is too high and the internal source resistance low, high current will also flow through the Load.

6.3 Const. Power Mode (CP Mode)

In this mode, the Load will try to hold the set power value. If the voltage changes, more or less current will be drawn.

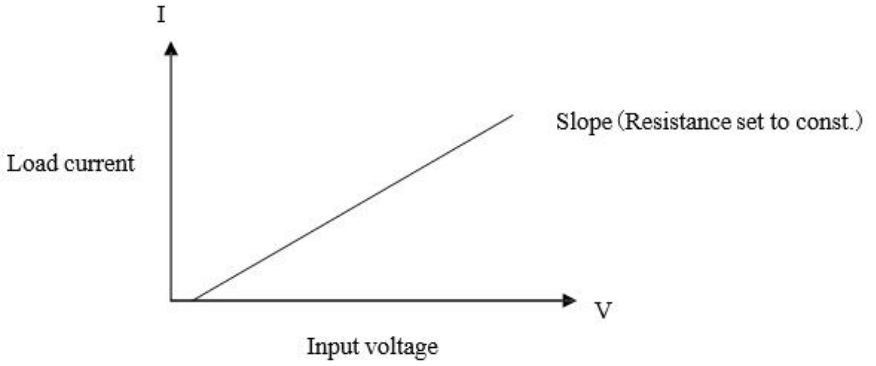


Being in any other mode, press 【P-SET】 to enter the CP Mode. Press then 【ON/OFF】 to activate the Load.

If the Load is deactivated, you can change the desired current with the rotating knob. Press 【P-SET】 once again to enter the value per key field.

6.4 Const. Resistance Mode (CR Mode)

In CR Mode, the Load will set the resistance to a desired value. The current will therefore go up or down together with the applied voltage.



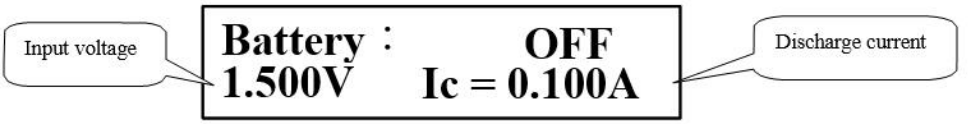
Being in any other mode, press 【R-SET】 to enter the CR Mode. Press then 【ON/OFF】 to activate the Load.

If the Load is deactivated, you can change the desired current with the rotating knob. Press 【R-SET】 once again to enter the value per key field.

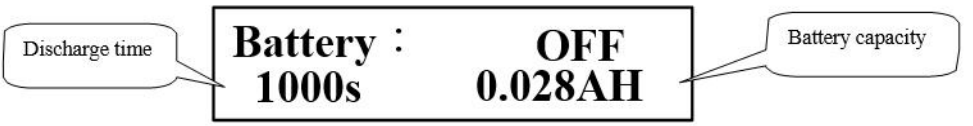
The range of both DC Loads is 0.1 Ω to 4 kΩ.

6.5 Battery Test Mode

The battery test mode works as follows: Constant current will be drawn from the battery. That eventually will cause the voltage to drop to a pre-set cut-off value. The time needed for the voltage to drop to that value and the drawn current allow the calculation of battery capacity.



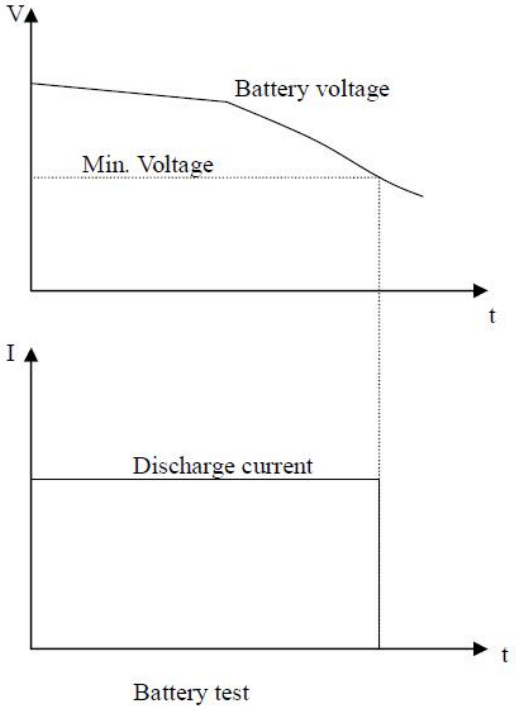
Immediately after the battery test was completed, discharge time and battery capacity in Ah will be displayed. If not, press 【ENT】.



Note: You can also check the values of discharge time and capacity by pressing 【ENT】 during the test.

Being in any other mode, press 【SHIFT】,【BAT】to enter the Battery Mode. Press then 【ON/OFF】 to start or to end the test. By restarting the test, the discharge time will be set to 0 again.

You should always set the parameters of the battery test first. Press 【SHIFT】,【BAT】 and 【ENT】 to set the parameters for discharge current and the cut-off voltage of the battery. See also 5.4.3.



Battery test

6.6 Short-Circuit Test Mode

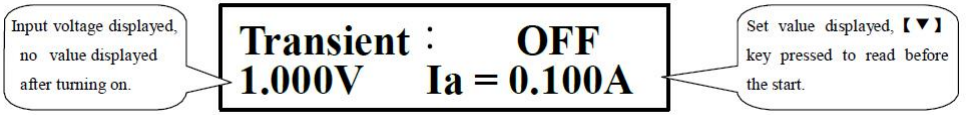
In Short-Circuit Mode, the Load tries to simulate a short-circuit between the terminals.

Being in any other mode, press 【SHIFT】,【SHORT】to enter the Short-Circuit Mode. Press then 【ON/OFF】 to activate or to deactivate the Load.

There are no settings to be made in this mode.

6.7 Dynamic Test Mode

The Dynamic Test Mode can assist you when analysing the dynamic and transient behaviour of a voltage or current source.



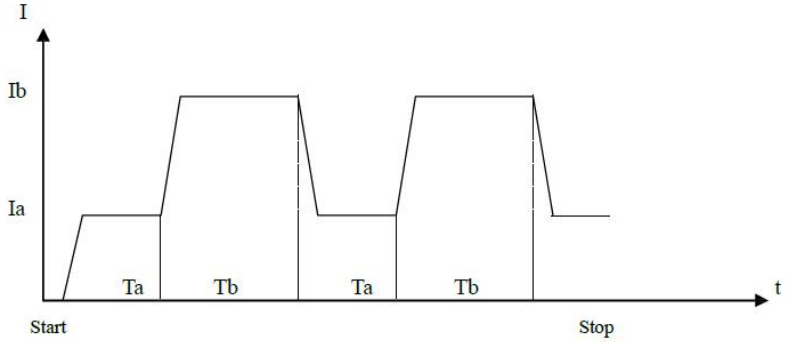
Being in any other mode, press 【SHIFT】,【TRAN】to enter the Dynamic Test Mode. Press then 【ON/OFF】 to activate or to deactivate the Load.

See 5.4.4 for setting the parameters of Dynamic Test before activating the Load.

This mode has three operation modes: CONT, PULS, TRIG.

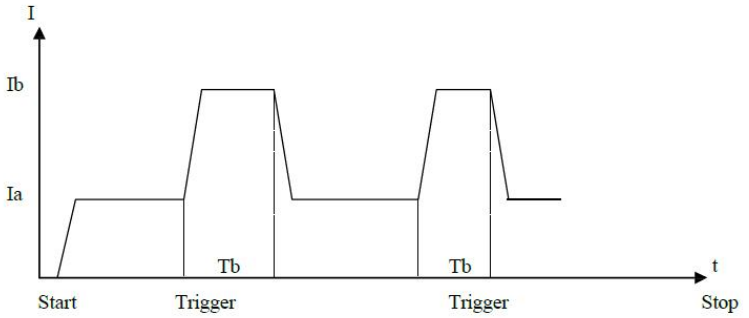
6.7.1 Continuous Mode (CONT)

Switches continuously between Level A and Level B with the corresponding values of Width A, Width B.



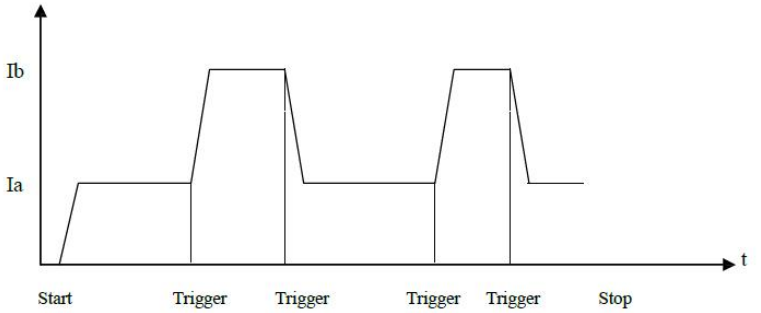
6.7.2 Pulse Mode (PULS)

After the test has been started, the Load works in Level A. Once a trigger signal was received, the Load switches in Level B and stays there for a time period set in Width B. Afterwards, Level A will be selected again. Width A is not used in this operation mode.



6.7.3 Trigger-Mode (TRIG)

Width A, B will not be used here. The Load works in Level A or B. By receiving a trigger signal, the Level switches over.



6.8 Protection of the Instrument

Please note that your instrument can only work correctly if both the environmental and technical specifications were met. The max. values for current, voltage and power vary depending on the model. You can find the specifications for your unit in chapter 3 of this document.

The operator can also set his own max. values for voltage, current and power. These values cannot be set higher than those set by the manufacturer, though (see 5.4.2). Further, the Loads feature a thermal and false-polarity protection.

Note: Dynamic Test Mode doesn't allow any user-defined limits mentioned above to be made.

6.8.1 Over-voltage Protection

If the set voltage limit was exceeded, the Load deactivates the input with a warning tone. Following will be shown on the LCD:

6.8.2 Over-current Protection

If the set current limit was exceeded, "OC" will be shown on the LCD and a warning tone will be heard. If the current will not be decreased soon and reaches 110 % of the set max. value, the Load input will be deactivated automatically.

6.8.3 Overload Protection

If the set power limit was exceeded, "OP" will be shown on the LCD and a warning tone will be heard. If the power will not be decreased soon and reaches 110 % of the set max. value, the Load input will be deactivated automatically.

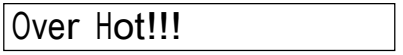
6.8.4 Reverse Polarity Protection

Warning: During the reverse-polarity condition, current limiting functionality of the Load is not active!

The Load deactivates the input as soon as a reverse-polarity condition was detected. Following message will be seen on the LCD:

6.8.5 Thermal Protection

Should the temperature inside the instrument exceed 80 °C, a warning tone will be heard and the input of the Load will be turned off. Following message will be seen on the LCD:



Appendix A - Remote Sense and External Trigger

The DB-9 male connector on the rear side of the instrument consists of both the Sense input and Trigger input. An extra cable for this purpose is not part of the accessories.

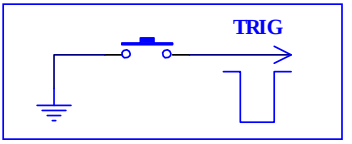
A1 Remote Sense

To achieve a compensation of the cable losses that leads to more precise voltage measuremens, the voltage can be measured directly on the voltage source leads. This technique is also known as the "4-Wire-Sensing". Before using the Sense input, you have to activate it in the menu first (see 5.4.2).

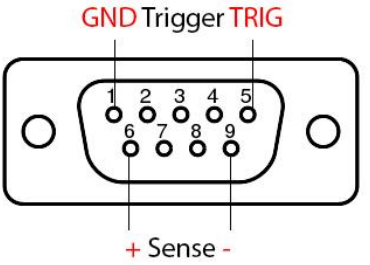
A2 External Trigger

By using the dynamic test or the list test that both facilitate an external trigger option, you will need to use the Sense connector on the rear side of the unit, too.

A trigger signal of not less than 100 µs pulse width is seen as reliable. However, take into account a possible jitter that could unwillingly activate the trigger.



A3 Pinout



Trigger: Pin 1: Ground (GND), Pin 5: Trigger. To activate the trigger, connect Pin 5 to GND. **Never apply external voltage to these pins!**

***Voltage Sense*:** Pin 6: positive input, Pin 9: negative input. Pay attention to the right polarity!

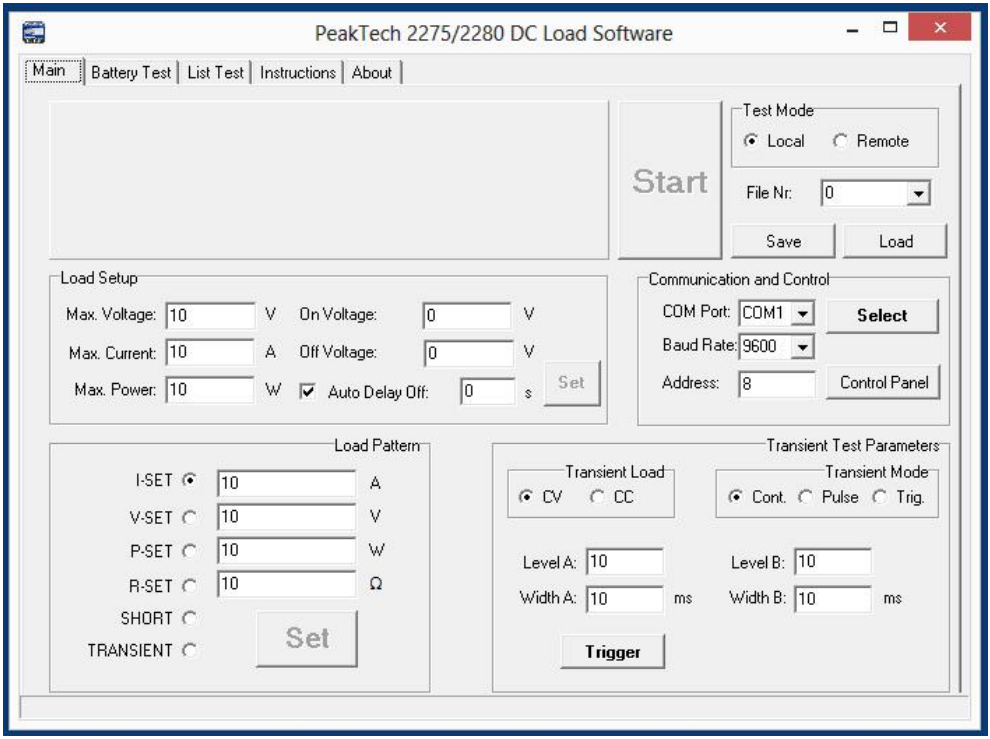
Appendix B – PC Software

The appended Windows Software allows you to remotely control your DC Load and offers additional visual facilities and tools for further processing of the collected data.

Please copy all the files of the directory "Software" from the CD to a writable hard disk, as the software will rewrite the file named „md.mdb“ in the same directory.

There are no additional drivers needed for connecting your PC with the DC Load over RS-232 interface. However, if you wish to use a USB port instead, you will have to install the driver "PL2303" before using the USB-to-Com-Adapter. You can find the driver on the CD, too.

Once you've managed to connect the instrument to your PC, the software can be executed by opening "PeakTech DC Load.exe".



Shortly after the software has been executed, you will see the open Main tab. On the right side, within the group box „Communication and Control“, you'll see the settings needed to connect the software to the desired port. Enter here your values and click „Select“ and then „Connect“. You will notice the status

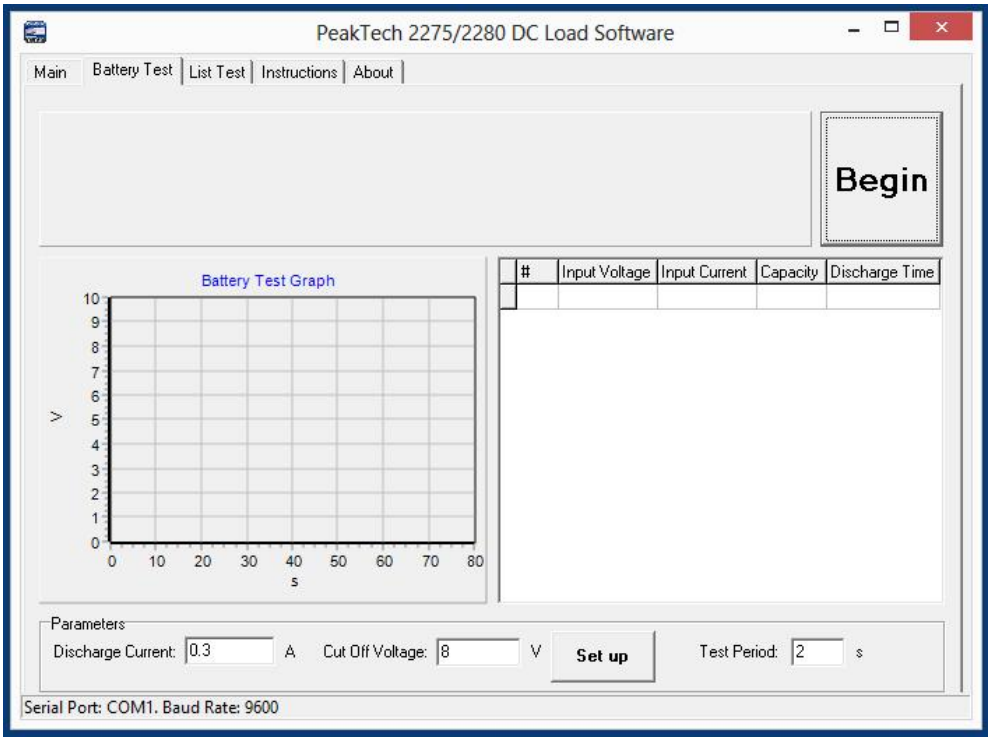
of the connection in the status bar at the bottom. If a problem with the connection occurs, you'll get an additional message.

The field "Address" together with the button "Control Panel" is for multi-unit mode purposes. You can use several units with unique addresses connected to a RS-485 bus (see 5.4.1).

If the connection was successful, the settings will be transferred from the instrument to the software. These settings can be modified and saved by software with the button "Set".

On the top right side you can activate the Remote Sense or leave it on "Local". Below at "File Nr.", it's possible to save the settings as a file on the Load and load one of the previously saved files.

"Load Pattern" covers the main modes of the Load. Choose one of them and click "Set". Click now "Begin" on top to activate the Load input. Now, the shown values on the LCD will also be shown in software. Click on "Stop" to deactivate the input.



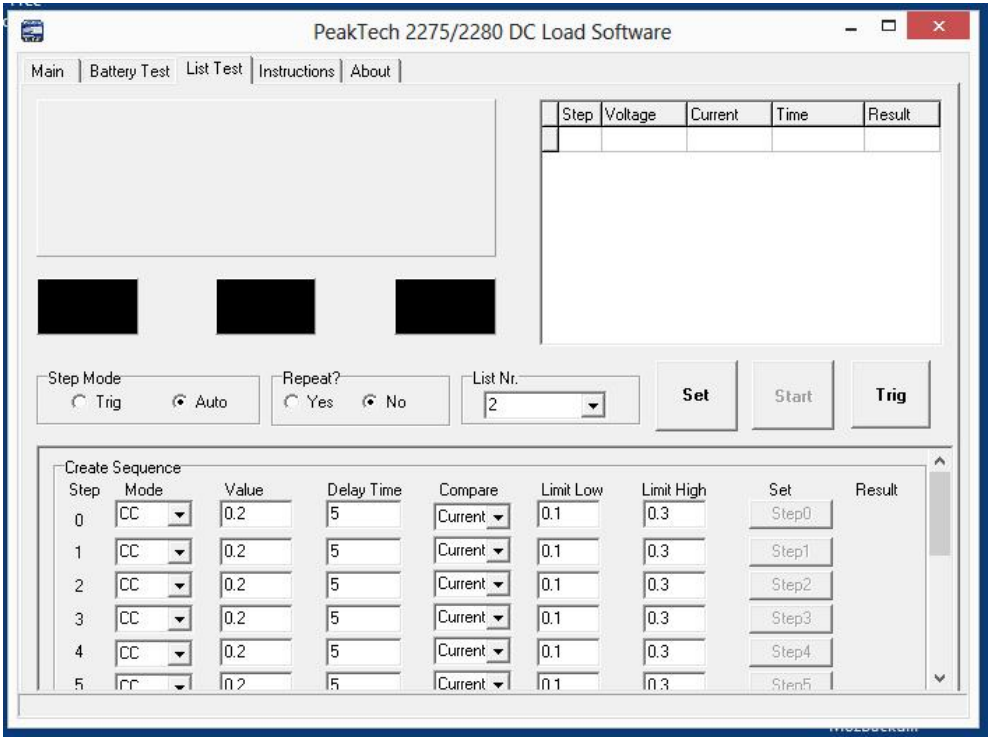
Click on the "Battery Test" tab for a battery test. The field "Parameters" includes the necessary settings of the test. Click "Set up" to apply the parameters. The button "Start/Begin" will activate the load and start the test, click "Stop" to pause it. You will see the sampled data filling the table and the graph during

the test. In addition, the data will be written into the file „db.mdb“. You can open the file for further processing by MS Access or Excel.

WARNING: The file db.mdb will be overwritten every time the software was executed!

Lastly, you will find the user interface for doing a user-defined list test by clicking on the „List Test“ tab. Set the number of commands first and click "Set". You can define every single command individually (called steps here), click on "StepXX" to transfer the values of command XX to the Load. Should you have chosen the option „Trig“ on „Step Mode“, the button „Trig“ will be used to activate the trigger. The button "Start/Begin" will activate the load and start the test, click "Stop" to abort it. The test results will fill the table and be shown on the top left side. In addition, the data will be written into the file „db.mdb“.

WARNING: The file db.mdb will be overwritten every time the software was executed!
Note: See 5.4.5 for detailed description of the List Mode.



This manual is according the latest technical knowing. Technical alterations reserved.

We herewith confirm that the units are calibrated by the factory according to the specifications as per the technical specifications.

We recommend to calibrate the unit again, after 1 year.