

# BK PRECISION®

Model: 1685B, 1687B, 1688B

## Switching DC Power Supplies

PROGRAMMING MANUAL



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# 1 USB Interface Connection

Users can remotely control the power supply via PC over the USB interface. Upon installation of the USB driver, the PC can control the instrument over virtual COM.

## Connecting Instrument to PC

1. Download the USB drivers from [www.bkprecision.com](http://www.bkprecision.com) .
2. Connect the included USB cable to the power supply and the USB port on the PC.
3. When Windows recognizes the USB connection, do not follow the default Windows driver installation wizard. Simply run the setup file from the downloaded USB drivers and follow the prompt to install drivers.
4. The computer will recognize the instrument as a USB (virtual COM) device, meaning it will be detected as a serial COM port. Windows will automatically assign a COM port to the instrument. Please verify which COM port Windows has assigned by going into Device Manager.

## 1.1 USB (Virtual COM) Configuration

The following serial port settings are used by the power supply.

- Baudrate: 9600
- Data bits: 8
- Parity: None
- Stop bits: 1
- Flow Control: None

# 2 PC Software

## 2.1 General Functions and Display

**Note:** The power supply must be in Normal Mode and operated as a standalone equipment (not connected in series or parallel with multiple supplies) for PC interface control.

The remote control PC software will display all output voltage, current, and power readings. Voltage and current values can be set using either the text box or slide bar. The output status is shown on the display panel and can be clicked to set the power supply output ON or OFF.



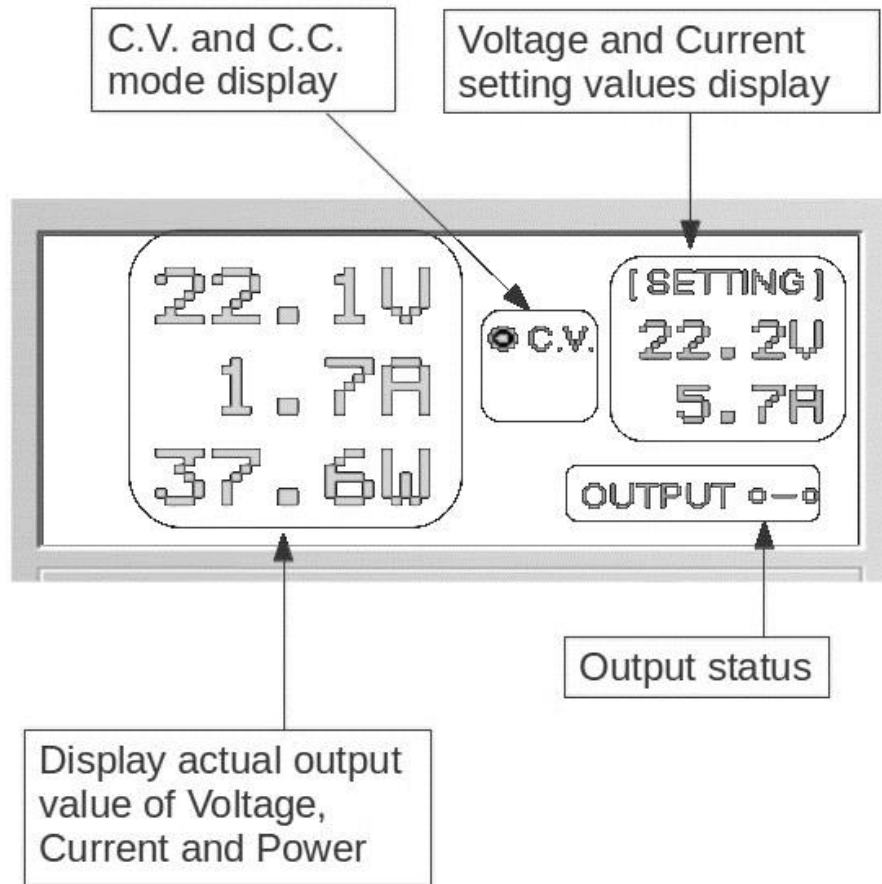


Figure 2.2 - Display Panel



Figure 2.3 - Output Configuration Panel

You can directly type the desired output voltage and output current and then click "Set" button to set the value or use the slide bar to adjust the value.

## 2.2 External Timed Program

External Timed Program is completely controlled by the PC. The PC counts the step time and changes the specified voltage and current levels of the power supply.



Step	Voltage(V)	Current(A)	Time	Output
1	1.0	10.0	0:00:02	<input checked="" type="checkbox"/>
2	5.0	10.0	0:00:01	<input checked="" type="checkbox"/>
3	10.0	5.6	0:00:04	<input checked="" type="checkbox"/>
4	15.0	8.1	0:00:02	<input checked="" type="checkbox"/>
5	14.6	10.0	0:00:03	<input type="checkbox"/>
6	13.0	6.1	0:00:02	<input checked="" type="checkbox"/>
7	7.3	9.5	0:00:03	<input checked="" type="checkbox"/>
8	13.0	8.5	0:00:02	<input type="checkbox"/>
9	10.8	9.9	0:00:03	<input checked="" type="checkbox"/>
10	13.0	9.2	0:00:03	<input checked="" type="checkbox"/>
11	8.9	5.4	0:00:02	<input checked="" type="checkbox"/>
12	16.2	8.0	0:00:02	<input checked="" type="checkbox"/>
13	5.6	9.2	0:00:02	<input checked="" type="checkbox"/>
14	2.0	10.1	0:00:02	<input checked="" type="checkbox"/>
15	16.2	9.4	0:00:04	<input checked="" type="checkbox"/>
16	9.5	7.8	0:00:02	<input checked="" type="checkbox"/>
17	14.6	9.2	0:00:02	<input checked="" type="checkbox"/>
18	6.1	2.2	0:00:03	<input checked="" type="checkbox"/>

Figure 2.4 - External Timed Program

### External Timed Program Procedure

1. Select the External Timed Program tab to switch to the External Timed Program tab.
2. Set voltage, current, and time parameters for number of steps (max 20) needed in timed program. Values can be configured using the slide bar or set incrementally by pressing the left and right arrow keys on your keyboard.
3. Specify desired number of running cycles. Up to 999 running cycles can be entered. Enter 0 for continuous cycle.
4. To run the timed program, click the “Run” button. During running cycles, the “Stop” button can be clicked to stop the program.
5. To save and export the table to a '.csv' file, enter Table Name in text box and click the “Save” icon. The timed program table data can be retrieved or printed by clicking the “Load” and “Print” icons.
6. To delete all data in the table, click the “Clear Table” button.

## 2.3 Internal Preset Memory

The Internal Preset Memory tab allows you to define the power supply's presets remotely.

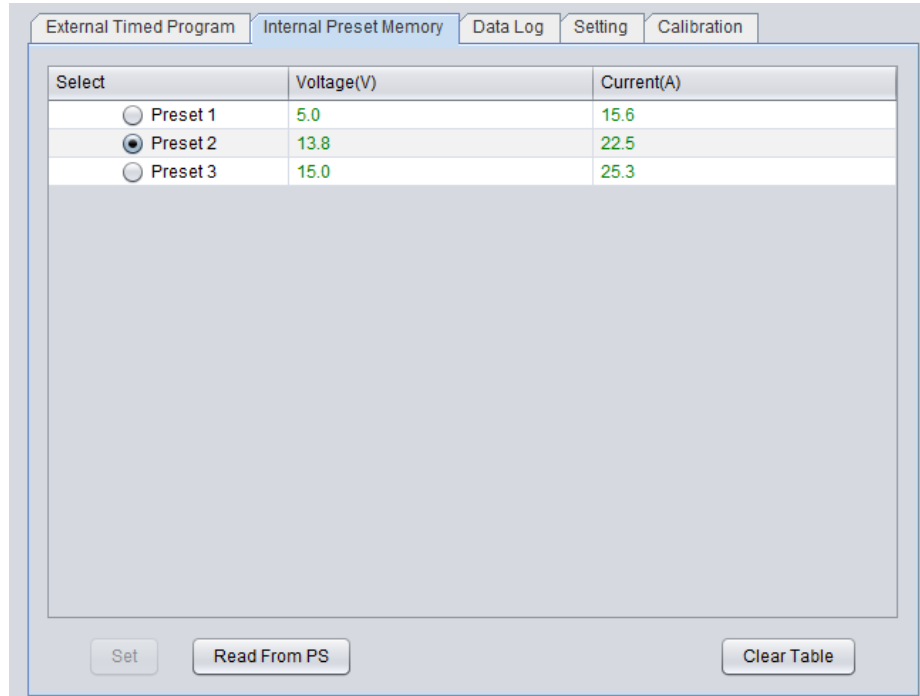


Figure 2.5 - Internal Preset Memory

### Internal Preset Memory Procedure

1. Select Internal Preset Memory tab to switch to the Internal Preset Memory function.
2. Enter in desired Voltage and Current values for Presets 1, 2, and 3.
3. Click "Set" to select and save Presets.
4. To retrieve power supply's stored presets, click the "Read from PS" button.
5. Retrieved data will be shown in red if they exceed the present preset upper voltage and current limit value.
6. To save the table, enter Table Name in text box and click "Save" icon. Data of different groups of presets can be classified, stored, exported to a csv file, printed, or retrieved for use at any time.
7. To delete all data in the table, click the "Clear Table" button.

## 2.4 Data Log

The Data Log window can be used to view real-time or stored output voltage, current, and power data. Move left and right along the graphed data by adjusting the “Move” slide bar. Zoom In/Out of the graph by adjusting the “Zoom” slide bar.

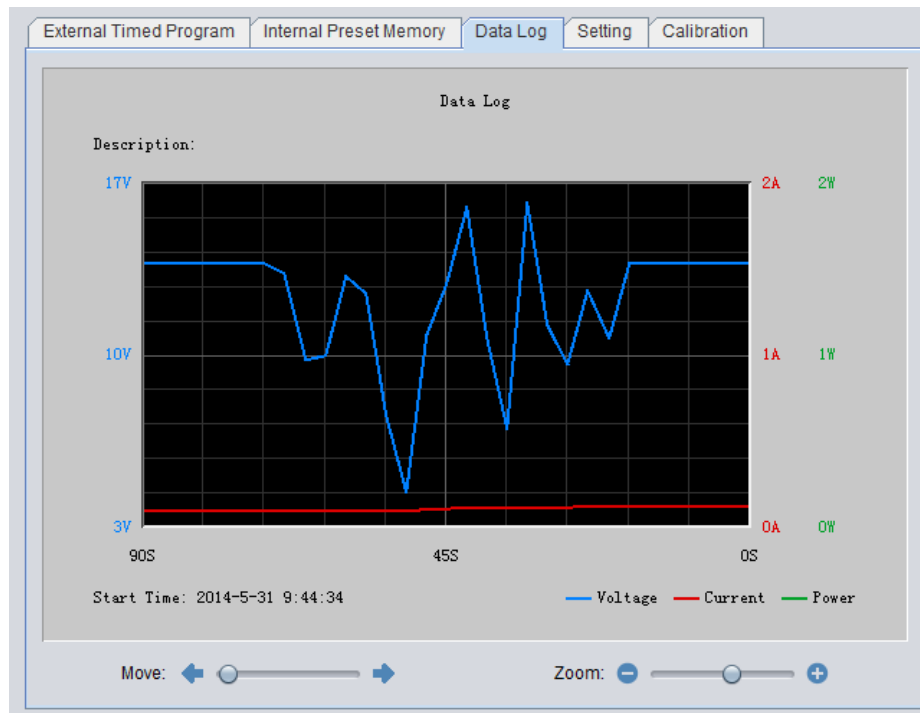


Figure 2.6 - Data Log Window

To save and export a data log to a '.csv' file, enter Log Name in text box and click the “Save” icon.

The log can be retrieved or printed by clicking the “Load” and “Print” icons.

### **Time Frame Concept of Data Log**

The data logging function always starts when the software begins to run.

0 seconds on the right hand side of the X-axis indicates real-time data with the length of time lapsed on the left hand side.

The X-axis is adjustable using the “Move” and “Zoom” slide bars so that any time period of the log can be displayed for analysis.



## 2.5 Settings

Use this tab to configure general settings. The software will automatically detect power supply model and COM port used. If not found, please recheck COM port or USB driver installation as mentioned in “USB Interface Connection” section.

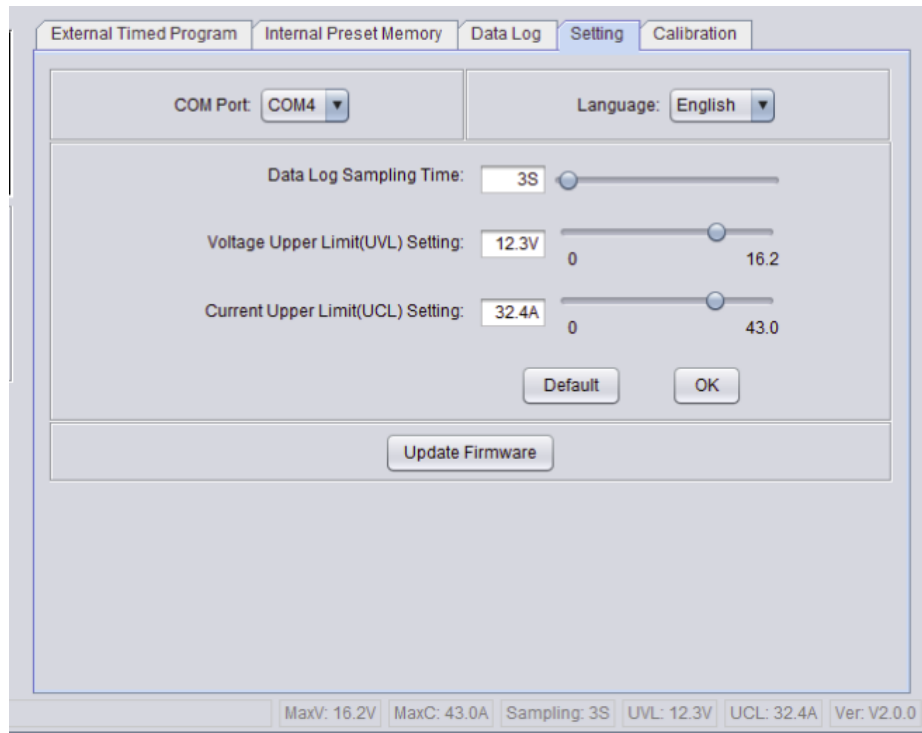


Figure 2.7 - Settings Configuration

Data Log Sampling Time: You can select your desired data log sampling time from 1 second and up.

Voltage Upper Limit (UVL) Setting: You can set your power supply’s upper voltage limit value to safeguard your low voltage applications.

Current Upper Limit (UCL) Setting: You can set your power supply’s upper current limit value to safeguard your low current applications.

**Note: Any changes to the UVL and UCL settings will be saved on the power supply. These values can only be set through remote PC software.**

Update Firmware: The power supply’s firmware could be updated by the user through the software for future versions. This is only available for power supplies with firmware version 3.1 or above.

## 2.6 Power Supply Calibration

**Note: Software calibration only available for firmware 3.1 or above.**

B&K Precision recommends a calibration interval of one year to ensure that the power supply meets specifications. This instrument features closed-case calibration. To perform the calibration, the following equipment is required:

- Digital multimeter
- DC electronic load

### **⚠ WARNING**

The following calibration instructions may be used by authorized technicians or calibration personnel only. If you are not authorized, do not attempt to calibrate the instrument yourself, as it may damage the instrument and void the warranty.

Please refer to the following figure to connect your power supply for Voltage and Current Calibration.

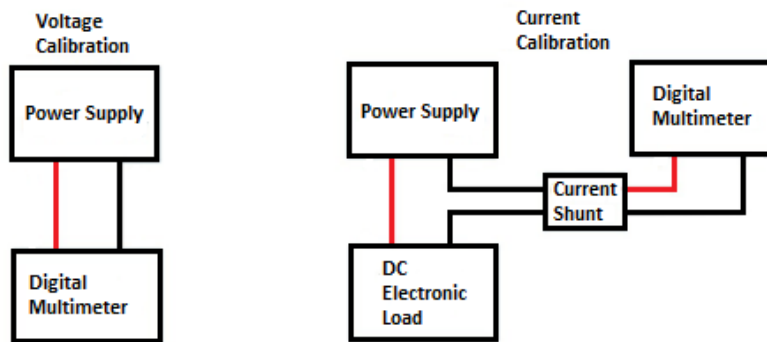


Figure 2.8 - Connection Setup for Calibration

Click on the Calibration tab.

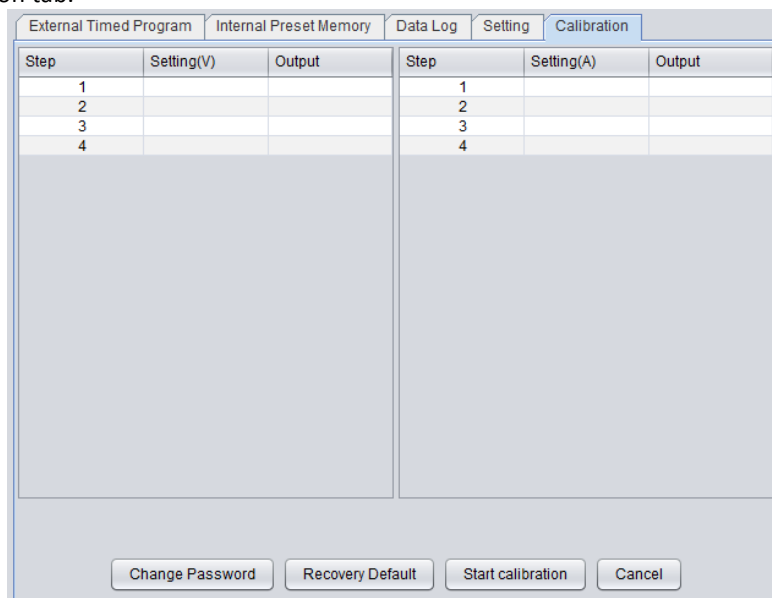


Figure 2.9 - Calibration Screen

To enter the Calibration function, input the password (default is “password”). After log-in, click the “Change Password” button to enter a new password.

To recover to default factory shipped calibration, click on the “Recovery Default” button.

Click the “Start calibration” button to run the calibration process.

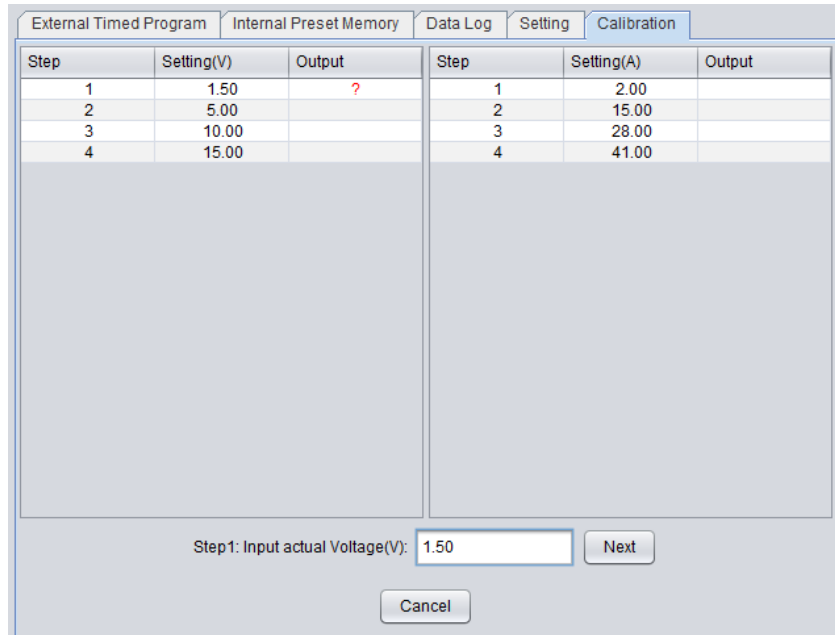


Figure 2.10 – Calibration Steps

In total, there are 8 steps for calibration (4 steps for voltage and 4 steps for current). Voltage calibration starts first. Follow each step to finish calibration.

Do not connect power supply to electronic load for voltage calibration. As shown in Figure 2.10, the software will automatically set the output voltage for each step. Measure the actual output of the power supply by using a digital multimeter and input the actual voltage. Then click the “Next” button to continue to the next step and repeat voltage measurements.

After voltage calibration, the software will switch to current calibration. Connect power supply to electronic load for current calibration as shown in Figure 2.8 - Connection Setup for Calibration. Measure the actual output of the power supply by using a digital multimeter and input the actual current. Then click the “Next” button to continue to the next step and repeat current measurements. You can click the “Cancel” button to cancel calibration at any time.

### 3 Command Set

**Note:** In order to use remote commands, please make sure to use the following communication settings - Baud rate: 9600, Data bits: 8, Parity: none, Stop bits: 1. If you are using HyperTerminal, make sure to check your ASCII setup to not append line feeds.

Command line format: **COMMAND<parameter1><parameter2>...[CR]**

Current value will have one decimal place for models 1687B and 1688B, and two decimal places for Model 1685B.

Command code & Return value	Function	Example
Input command: VOLT{<voltage>}[CR]  Return value: OK[CR]	Set voltage level <voltage> = 000-XXX	Input command: VOLT010[CR]  Return value: OK[CR]  Sets voltage level to 1.0 V
Input command: CURR{<current>}[CR]  Return value: OK[CR]	Set current level <current> = 000-XXX	Input command: CURR025[CR]  Return value: OK[CR]  Sets current level to 2.5 A
Input command: PROM{<preset 1 voltage>}{<preset 1 current>}{<preset 2 voltage>}{<preset 2 current>}{<preset 3 voltage>}{<preset 3 current>}[CR]  Return value: OK[CR]	Set power supply preset memory values  <preset X voltage> = 000-XXX <preset X current> = 000-XXX	Input command: PROM011022033044055066  Return value: OK[CR]  Sets preset 1 voltage and current to 1.1 V and 2.2 A, preset 2 voltage and current to 3.3 V and 4.4 A, and preset 3 voltage and current to 5.5 V and 6.6 A
Input command: GETS[CR]  Return value: [voltage][current][CR] OK[CR]	Get voltage and current setting values from power supply  [voltage] = 000-XXX [current] = 000-XXX	Input command: GETS[CR]  Return value: 025051 OK  Indicates voltage setting is 2.5 V and current setting is 5.1 A

Command code & Return value	Function	Example
Input command: GETD[CR]  Return value: [voltage][current][status][CR] OK[CR]	Get display voltage, current, and status reading from power supply  [voltage] = 0000-XXXX [current] = 0000-XXXX [status] = 0 1 (0=CV, 1=CC)	Input command: GETD[CR]  Return value: 030201450 OK  Indicates voltage reading is 3.02 V and current reading is 1.45 A. Power supply is in CV mode
Input command: GETM[CR]  Return value: [preset 1 voltage][preset 1 current][CR] [preset 2 voltage][preset 2 current][CR] [preset 3 voltage][preset 3 current][CR] OK[CR]	Get preset memory values  <preset 1 2 3 voltage> = 000-XXX <preset 1 2 3 current> = 000-XXX	Input command: GETM[CR]  Return value: 015015 025025 035035 OK  Indicates preset 1 voltage and current is 1.5 V and 1.5 A, preset 2 voltage and current is 2.5 V and 2.5 A, preset 3 voltage and current is 3.5 V and 3.5 A
Input command: RUNM{<memory>}[CR] ]  Return value: OK[CR]	Set voltage and current using values saved in preset memory locations  <memory>=0 1 2 0 = preset 1 values 1 = preset 2 values 2 = preset 3 values	Input command: RUNM0[CR]  Return value: OK[CR]  Sets voltage and current using values from memory location 1
Input command: SOUT{<output>}[CR]  Return value: OK[CR]	Output On/Off control  <output> = 0 1 0=ON 1=OFF	Input command: SOUT1[CR]  Return value: OK[CR]  Switches output OFF
Input command: SOVP{<voltage>}[CR]  Return value: OK[CR]	Set upper voltage limit of power supply  <voltage> = 000-XXX	Input command: SOVP151[CR]  Return value: OK[CR]  Sets upper voltage limit to 15.1 V

Command code & Return value	Function	Example
Input command: SOCP{<current>}[CR]  Return value: OK[CR]	Set upper current limit of power supply  <current> = 000-XXX	Input command: SOCP108[CR]  Return value: OK[CR]  Sets upper current limit to 10.8 A
Input command: GOVP[CR]  Return value: [voltage][CR] OK[CR]	Get upper voltage limit of power supply  [voltage] = 000-XXX	Input command: GOVP[CR]  Return value: 152 OK  Indicates upper voltage limit is set to 15.2 V
Input command: GOCP[CR]  Return value: [current][CR] OK[CR]	Get upper current limit of power supply  [current] = 000-XXX	Input command: GOCP[CR]  Return value: 052 OK  Indicates maximum current limit is set to 5.2 A
Input command: GMAX[CR]  Return value: [voltage][current][CR] OK[CR]	Get power supply maximum voltage and current values  <voltage> = 000-XXX <current> = 000-XXX	Input command: GMAX[CR]  Return value: 180200[CR] OK[CR]  Indicates maximum voltage is 18.0 V and maximum current is 20.0 A

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