TEXIO
Test and Measurement Solutions

PROGRAMMING MANUAL

MULTI RANGE DC POWER SUPPLY
PSW SERIES

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■ About firmware version

This programming manual is required firmware version 1.70 or higher.

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1. Configuration Settings
1.1 Setting Configuration Settings

Background		The normal configuration settings (F-01~F-61, F-88, F-89) are used to configure or view system settings. Use the following operation steps when configuring the interface settings used in the Remote Control chapter. Ensure the load is not connected. Ensure the output is off.	
⚠ Note		Configuration settings F-90~F-95 cannot be edited in the Normal Function Settings. See the user manual for details. The F-89 settings can only be viewed, not set.	
Steps.	1.	Press the Function key. The function key will light up.	Function
	2.	The display will show F-01 on the top and the configuration setting for F-01 on the bottom.	F-01 / 0.00
	3.	Rotate the voltage knob to change the F setting. Range F-00~ F-61, F-88, F-89	Voltage
	4.	Use the current knob to set the parameter for the chosen F setting.	Current
	5.	Press the Voltage knob to save the configuration setting. Conf will be displayed when successful.	F-01 / ConF Voltage
Exit		Press the Function key again to exit the configuration settings. The function key light will turn off.	Function
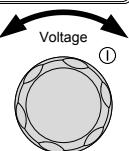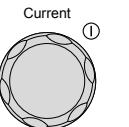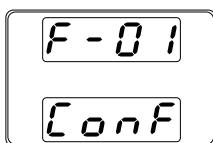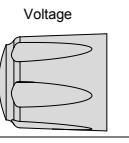
Configuration Table
Please use the configuration settings listed below when applying the configuration settings.

Normal Function Settings	Setting	Setting Range
Output ON delay time	F-01	0.00s~99.99s
Output OFF delay time	F-02	0.00s~99.99s
V-I mode slew rate select	F-03	0 = CV high speed priority 1 = CC high speed priority 2 = CV slew rate priority 3 = CC slew rate priority
Rising voltage slew rate	F-04	0.01V/s~60.00V/s (PSW -XX L30) 0.1V/s~160.0V/s (PSW -XX L80) 0.1V/s~320.0V/s (PSW-XX M160) 0.1V/s~500.0V/s (PSW-XXM250) 1V/s~1600V/s (PSW−XXH800)
Falling voltage slew rate	F-05	0.01V/s~60.00V/s (PSW -XX L30) 0.1V/s~160.0V/s (PSW -XX L80) 0.1V/s~320.0V/s (PSW-XX M160) 0.1V/s~500.0V/s (PSW-XXM250) 1V/s~1600V/s (PSW−XXH800)
Rising current slew rate	F-06	0.01A/s~72.00A/s (PSW-360L30) 0.1A/s~144.0A/s (PSW-720L30) 0.1A/s~216.0A/s (PSW-1080L30) 0.01A/s~27.00A/s (PSW-360L80) 0.01A/s~54.00A/s (PSW-720L80) 0.01A/s~81.00A/s (PSW-1080L80) 0.01A/s~14.40A/s (PSW-360M160) 0.01A/s~28.80A/s (PSW-720M160) 0.01A/s~43.20A/s (PSW-1080M160) 0.001A/s~9.000A/s (PSW-360M250) 0.01A/s~18.00A/s (PSW-720M250) 0.01A/s~27.00A/s (PSW-1080M250) 0.001A/s~2.880A/s (PSW-360H800) 0.001A/s~5.760A/s (PSW-720H800) 0.001A/s~8.640A/s (PSW-1080H800)

Falling current slew rate	F-07	0.01A/s~72.00A/s (PSW-360L30)
		0.1A/s~144.0A/s (PSW-720L30)
		0.1A/s~216.0A/s (PSW-1080L30)
		0.01A/s~27.00A/s (PSW-360L80)
		0.01A/s~54.00A/s (PSW-720L80)
		0.01A/s~81.00A/s (PSW-1080L80)
		0.01A/s~14.40A/s (PSW-360M160)
		0.01A/s~28.80A/s (PSW-720M160)
		0.01A/s~43.20A/s (PSW-1080M160)
		0.001A/s~9.000A/s (PSW-360M250)
		0.01A/s~18.00A/s (PSW-720M250)
		0.01A/s~27.00A/s (PSW-1080M250)
		0.001A/s~2.880A/s (PSW-360H800)
		0.001A/s~5.760A/s (PSW-720H800)
		0.001A/s~8.640A/s (PSW-1080H800)
Internal resistance setting	F-08	0.000Ω~0.833Ω (PSW-360L30)
		0.000Ω~0.417Ω (PSW-720L30)
		0.000Ω~0.278Ω (PSW-1080L30)
		0.000Ω~5.926Ω (PSW-360L80)
		0.000Ω~2.963Ω (PSW-720L80)
		0.000Ω~1.975Ω (PSW-1080L80)
		0.000Ω~22.222Ω (PSW-360M160)
		0.000Ω~11.111Ω (PSW-720M160)
		0.000Ω~7.407Ω (PSW-1080M160)
		0.00Ω ~ 55.55Ω (PSW-360M250)
		0.00Ω ~ 27.77Ω (PSW-720M250)
		0.00Ω ~ 18.51Ω (PSW-1080M250)
		0.0Ω ~ 555.5Ω (PSW-360H800)
		0.0Ω ~ 277.8Ω (PSW-720H800)
		0.0Ω ~ 185.1Ω (PSW-1080H800)
Bleeder circuit control	F-09	0 = OFF, 1 = ON, 2 = AUTO
Buzzer ON/OFF control	F-10	0 = OFF, 1 = ON
Measurement Average Setting	F-17	0 = Low, 1 = Middle, 2 = High
Lock Mode	F-19	0 = Panel lock: allow output off
		1 = Panel lock: allow output on/off
USB/GPIB settings		
Front panel USB State *	F-20	0 = Absent, 1 = Mass Storage
Rear panel USB State *	F-21	0 = Absent, 2 = USB-CDC,
		3 = GPIB-USB adapter
Rear panel USB mode *	F-22	0 = Disable, 1 = GPIB-USB adapter,
		2 = USB CDC,
		3 = USB CDC(Full speed)
GPIB address	F-23	0~30
LAN settings		
MAC Address-1 *	F-30	0x00~0xFF

MAC Address-2 *	F-31	0x00~0xFF
MAC Address-3 *	F-32	0x00~0xFF
MAC Address-4 *	F-33	0x00~0xFF
MAC Address-5 *	F-34	0x00~0xFF
MAC Address-6 *	F-35	0x00~0xFF
LAN	F-36	0 = Disable, 1 = Enable
DHCP	F-37	0 = Disable, 1 = Enable
IP Address-1	F-39	0~255
IP Address-2	F-40	0~255
IP Address-3	F-41	0~255
IP Address-4	F-42	0~255
Subnet Mask-1	F-43	0~255
Subnet Mask-2	F-44	0~255
Subnet Mask-3	F-45	0~255
Subnet Mask-4	F-46	0~255
Gateway-1	F-47	0~255
Gateway-2	F-48	0~255
Gateway-3	F-49	0~255
Gateway-4	F-50	0~255
DNS address -1	F-51	0~255
DNS address -2	F-52	0~255
DNS address -3	F-53	0~255
DNS address -4	F-54	0~255
Sockets active	F-57	0 = Disable, 1 = Enable
Web Server active	F-59	0 = Disable, 1 = Enable
Web password active	F-60	0 = Disable, 1 = Enable
Web setting password	F-61	0000~9999
System Settings		
Factory Set Value	F-88	0 = Disable
		1 = Return to factory settings
Show Version	F-89	0, 1 = PSW version
		2, 3 = PSW build year
		4, 5 = PSW build month/day
		6, 7 = Keyboard CPLD version
		8, 9 = Analog-Control CPLD version
		A, B = Reserved
		C, D = Kernel build year
		E, F = Kernel build month/day
		G, H = Test command version
		I, J = Test command build year
		K, L = Test command build month/day

Power On Configuration Settings*			
CV Control	F-90	0 = Panel control (local)	
		1 = External voltage control	
		2 = External resistance control	
		(Ext-R 10kΩ = Vo, max)	
		3 = External resistance control	
		(Ext-R10kΩ = 0)	
CC Control	F-91	0 = Panel control (local)	
		1 = External voltage control	
		2 = External resistance control	
		(Ext-R 10kΩ = Io,max)	
		3 = External resistance control	
		(Ext-R10kΩ = 0)	
Power-ON Output	F-92	0 = OFF at startup,1 = On at startup	
		t001 ~ t010 = run testscript t001 ~ t010	
Master/Slave	F-93	0 = Master/Local	
		1 = Master/Parallel1	
		2 = Master/Parallel2	
		3 = Slave/Parallel	
		4 = Slave/Series(30V/80V/160V only)	
External Out Logic	F-94	0 = High ON,	
		1 = Low ON	
Power Switch trip	F-95	0 = Enable	
		1 = Disable	

⚠️ *Note   * Items marked with are for display only. They can not be set at normal settings.
The Power On configuration settings can only be changed during power up to prevent the configuration settings being inadvertently changed.

2. REMOTE CONTROL

This chapter describes basic configuration of IEEE488.2 based remote control.

2.1 Interface Configuration
2.1.1 USB Remote Interface

USB configuration	PC side connector	Type A, host
	PSW side connector	Rear panel Type B, slave
	Speed	1.1/2.0 (full speed/high speed)
	USB Class	CDC (communications device class)
⚠ Note	Before using the USB remote control, you will need to install the USB device driver(inf file) that is included on the CD accompanying accessories.	
Panel operation	1. Connect the USB cable to the rear panel USB B port. 2. Press the Function key to enter the Normal configuration settings. Set the following USB settings:	
	F-22 = 2	Set the rear panel USB port to USB-CDC.
	F-22 = 3	Set the rear panel USB port to USB-CDC (Full speed only)
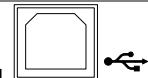
2.1.2 Configure GP-IB Interface

To use GP-IB, the optional GP-IB to USB (GUG-001) adapter must be used. The GP-IB to USB adapter must be connected before the PSW is turned on. Only one GP-IB address can be used at a time.

Configure GP-IB	1. Ensure the PSW is off before proceeding.
	2. Connect the USB cable from the rear panel USB B port on the PSW to the USB A port on the GP-IB to USB adapter.

3. Connect a GP-IB cable from a GP-IB controller to the GP-IB port on the adapter.
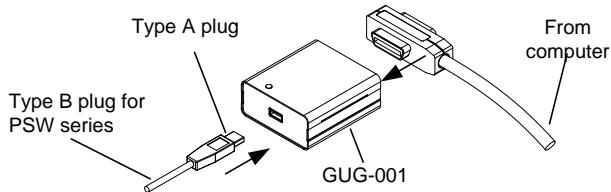
4. Turn the PSW on.
5. Press the Function key to enter the Normal configuration settings.
   Set the following GP-IB settings:

F-22 = 1	Set the rear panel USB port to GPIB-USB (GUG-001)
F-23 = 0~30	Set the GP-IB address (0~30/Default: 8)

GP-IB constraints	Maximum 15 devices altogether, 20m cable length, 2m between each device
	Unique address assigned to each device
	At least 2/3 of the devices turned On
	No loop or parallel connection

2.1.3 Configure Ethernet Connection

The Ethernet interface can be configured for a number of different applications. Ethernet can be configured for basic remote control or monitoring using a web server or it can be configured as a socket server. The PSW series supports both DHCP connections so the instrument can be automatically connected to an existing network or alternatively, network settings can be manually configured.

Ethernet configuration Parameters		
	MAC Address (display only)	LAN
	DHCP	IP Address
	Subnet Mask	Gateway
	DNS Address	Sockets Active
	Web Server Active	Web Password Active
	Web set password	0000～9999(default 0000)
	Port number : 2268(Fixed)	

2.1.4 Web Server Configuration

Configuration   This configuration example will configure the PSW as a web server and use DHCP to automatically assign an IP address to the PSW.

1.Connect an Ethernet cable from the network to the rear panel Ethernet port.

2. Press the Function key to enter the Normal configuration settings.
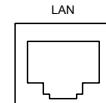
Set the following LAN settings:

F-36 = 1   Enable LAN
F-37 = 1   Turn DHCP to enable
F-59 = 1   Turn the web server on

⚠ Note   It may be necessary to cycle the power or refresh the web browser to connect to a network.

2.1.5 Sockets Server Configuration

Configuration   This configuration example will configure the PSW for web sockets control.

The following configuration settings will manually assign the PSW an IP address and enable web sockets. By default, the socket port number is 2268 and cannot be configured.

1. Connect an Ethernet cable from the network to the rear panel Ethernet port.

2. Press the Function key to enter the Normal configuration settings.
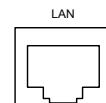
3. Set the following LAN settings:

F-36 =   1   Enable LAN
F-37 =   0   Disable DHCP
F-39 =   172   IP Address part 1 of 4
F-40 =   16   IP Address part 2 of 4
F-41 =   5   IP Address part 3 of 4
F-42 =   133   IP Address part 4 of 4
F-43 =   255   Subnet Mask part 1 of 4
F-44 =   255   Subnet Mask part 2 of 4
F-45 =   128   Subnet Mask part 3 of 4
F-46 =   0   Subnet Mask part 4 of 4
F-43 =   172   Gateway part 1 of 4
F-44 =   16   Gateway part 2 of 4
F-45 =   21   Gateway part 3 of 4

| | F-46 = | 101 | Gateway part 4 of 4 |
| | F-57 = | 1 | Enable Sockets |

| ⚠ Note | The socket function is only available for firmware version V1.12 or above. See the user manual to check your firmware version number. |

2.2 USB Remote Control Function Check

Functionality check	Install a driver(TEXIO_CDC.inf) from Manual CD. The USB device driver of psw is more downloadable than our homepage . When USB connects psw to a computer for the first time, installation of the USB device driver is required. Please perform the installation from the Device Manager if a computer can't recognize psw. Control Panel – All Control Panel Items – Device Manager – Other Device – PSW (Right click) – Update driver Software
	Please prepare the Terminal application(Such as PuTTY or RealTerm). Serial communication settings are as follows. Baud rate : 9600bps Data length : 8bit Parity bit : None Stop bits : 1bit Flow control : None
	Run this query command via the terminal after the instrument has been configured for USB remote control. *idn? This should return the Manufacturer, Model number, Serial number, and Firmware version in the following format. TEXIO,xxxxxxxxxx,TW123456,01.00.20110101 Manufacturer :TEXIO Model number :xxxxxxxxxxx Serial number :TW123456 Firmware version :01.00.20110101 Termination character of commands and queries use the ^j(LF:Line Feed).

2.3 Web Server Remote Control Function Check

Functionality check	Enter the IP address of the power supply in a web browser after the instrument has been configured as a web server
	http:// XXX.XXX.XXX.XXX
	The web browser interface appears.

2.4 Socket Server Function Check

Background	To test the socket server functionality, National Instruments Measurement and Automation Explorer can be used. This program is available on the NI website, www.ni.com.
Requirements	PSW Firmware: V1.12 Operating System: Windows XP, 7, 8
Functionality check	1. Start the NI Measurement and Automation Explorer (NI-MAX) program. Using Windows, press: Start ->All Programs ->National Instruments ->Measurement & Automation

Display and operated by a version of NI-MAX is different.Please operate in accordance with the version you are using.
2. From the Configuration panel access;
My System ->Devices and Interfaces
->Network Devices
3. Press Add New Network Device->Visa TCP/IP Resource....
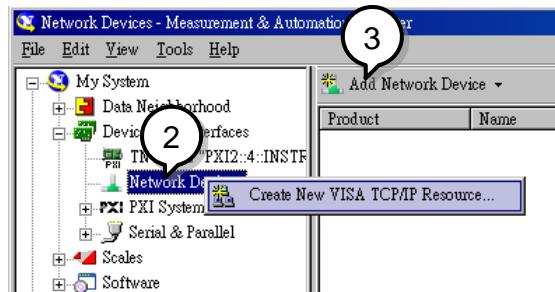
4. Select Manual Entry of Raw Socket from the popup window.
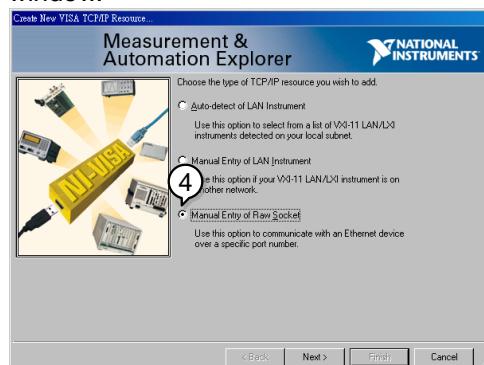
5. Enter the IP address and the port number of the PSW. The port number is fixed at 2268.

6. Double click the Validate button.
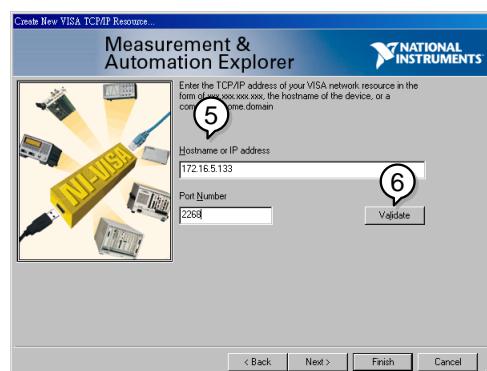
7. Next configure the Alias (name) of the PSW connection. In this example the Alias is:PSW_DC1

8. Click finish.
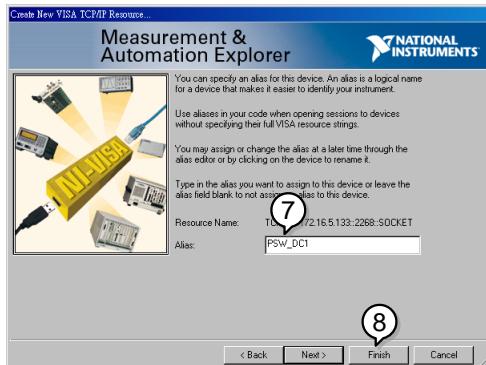
9. The IP address of the PSW will now appear under Network Devices in the configuration panel. Select this icon now.

10. Press Open VISA Test Panel.
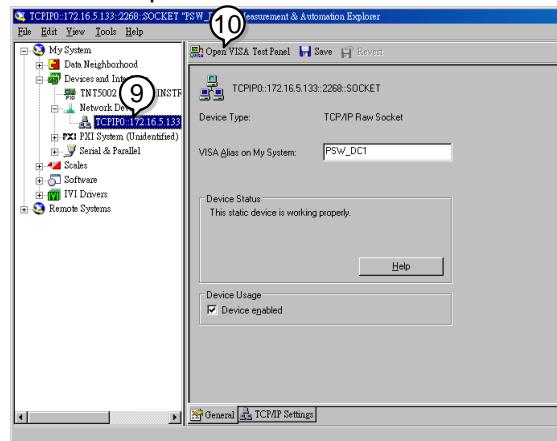
11. Under the Template -> Property Node tabs, set Termination Char Enable from the Attribute Name list to VI_TRUE.
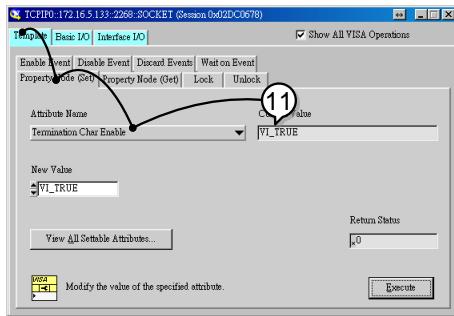
12. Under the Basic I/O ->Write tabs, Enter the *IDN? query into the Buffer, if it is not already there.

13. Click the Execute button.
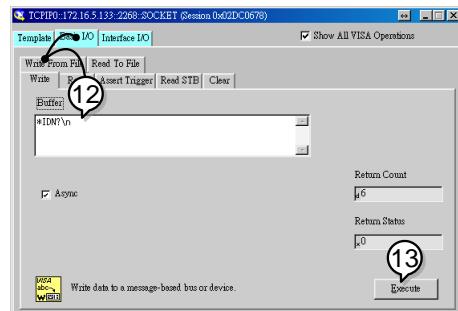
14. In the Basic I/O -> Read tabs, the return parameter for the *IDN? query should be returned to the buffer area:

TEXIO,PSWxxxx,xxxxxxxxxx,,T1.12.20111013
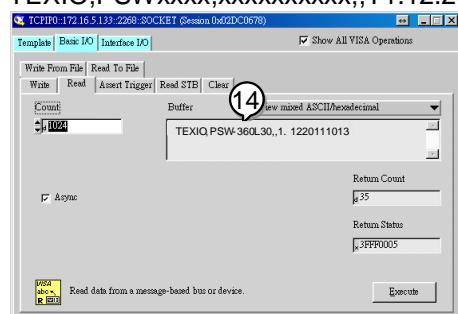
⚠️ Note   For further details, please see the following programming examples.

2.5 Socket Server Examples
2.5.1 Examples of VBA for EXCEL

Background   The following visual basic programming example uses
                  the VISA COM 3.0 Type Library.
                  The example will connect to the PSW using the IP
                  address of 172.15.5.133 over port 2268. The program
                  will send the *IDN? to the PSW, print the return string and
                  then close the connection.
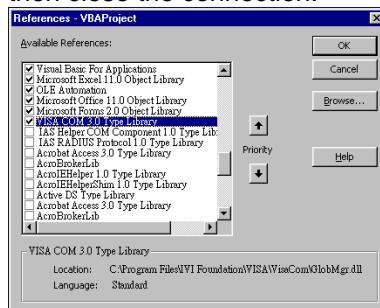

```
'Create VISA ResourceManager object
    Dim rm As New VisaComLib.ResourceManager
    Dim accessMode As VisaComLib.accessMode
    Dim serial As String
    Dim timeOut As Integer
    Dim optionString As String
    Dim psw As VisaComLib.IMessage
    Dim pswcom As VisaComLib.FormattedIO488
    Dim pswsfc As VisaComLib.IAsyncMessage


Private Sub CommandButton1_Click()
    accessMode = VisaComLib.accessMode.NO_LOCK

    timeOut = 0

    optionString = ""

    'Connect to the PSW

    Set psw = rm.Open("TCPIP0::172.16.5.133::2268::SOCKET", _
        accessMode, _
        timeOut, _
        optionString)
    Set pswsfc = psw
    pswsfc.TerminationCharacterEnabled = True

    'Query the System Identify Name
    psw.WriteString ("*IDN?" & vbLf)

    Worksheets("Sheet1").Cells(1, 5) = psw.ReadString(256)

    'Close the communication
    psw.Close

End Sub
```

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2.5.2 C++ Example

Background	The following program creates a connection to the PSW and sets the voltage to 3.3 volts and the current 1.5 amps. The voltage and current reading is then read back and the connection is closed.
⚠ Note	Add visa32.lib to the project library when building the following sample program.

```cpp
#include "stdio.h"
#include "string.h"
#include "visatype.h"
#include "visa.h"
#define IPaddr "172.16.20.181"
int main(int argc, char* argv[])
{
    ViSession defaultRm, instr;
    // Create VISA ResourceManager object
    ViStatus status = viOpenDefaultRM(&defaultRm);
    if (status < VI_SUCCESS)
    {
        // Initialization error
        return -1;
    }
    ViChar rsc[256];
    sprintf(rsc, "TCPIP0::%s::2268::SOCKET", IPaddr);
    ViAccessMode accessMode = VI_NO_LOCK;
    ViUInt32 timeout = 0;
    // Connect the device
    viOpen(defaultRm, rsc, accessMode, timeout, &instr);
    /* Set the timeout for message-based communication        */
    status = viSetAttribute(instr, VI_ATTR_TMO_VALUE, 5000);
    status = viSetAttribute(instr, VI_ATTR_TERMCHAR, 10);
    status = viSetAttribute(instr,  VI_ATTR_TERMCHAR_EN, VI_TRUE);
    ViUInt32 count;
    // Set the Voltage to 3.3, Current to 1.5
    ViBuf buf = (ViBuf)":volt 3.3;:curr 1.5\n";
    viWrite(instr, buf, (ViUInt32)strlen((ViPChar)buf), &count);

    // Query the Voltage, and Current
    buf = (ViBuf)":apply?\n";
    status =viWrite(instr, buf, (ViUInt32)strlen((ViPChar)buf), &count);
    ViChar result[257];
    status =viRead(instr, (ViPBuf)result, 256, &count);
    if (status=VI_SUCCESS_TERM_CHAR)
    {
      result[count] = 0;
      printf("Voltage(V), Current(A)= %s\n", result);
    }else
      printf("Error\n");

    // Close the device
    viClose(instr);
    viClose(defaultRm);

    return 0;
}
```

3. Command Syntax

Compatible Standard	IEEE488.2	Partial compatibility
	SCPI 1999	Partial compatibility

Command Structure	SCPI commands follow a tree-like structure, organized into nodes. Each level of the command tree is a node. Each keyword in a SCPI command represents each node in the command tree. Each keyword (node) of a SCPI command is separated by a colon (:). For example, the diagram below shows an SCPI sub-structure and a command example.

```
            MEASure          MEASure:SCALar:CURRent:DC?
               |
             SCALar
    _____|_____
   |           |           |
VOLTage     CURRent      POWer
   |           |           |
  DC          DC          DC
```

Command types	There are a number of different instrument commands and queries. A command sends instructions or data to the unit and a query receives data or status information from the unit.	
	Command types	
	Simple	A single command with/without a parameter
	Example	*IDN?
	Query	A query is a simple or compound command followed by a question mark (?). A parameter (data) is returned.
	Example	meas:curr:dc?
	Compound	Two or more commands on the same command line. Compound commands are separated with either a semi-colon (;) or a semi-colon and a colon (;:). A semi-colon is used to join two related commands, with the caveat that the last command must begin at the last node of the first command. A semi-colon and colon are used to combine two commands from different nodes.
	Example	meas:volt:dc?;:meas:curr:dc?

Command Forms	Commands and queries have two different forms, long and short. The command syntax is written with the short form of the command in capitals and the remainder (long form) in lower case.
	The commands can be written in capitals or lower-case, just so long as the short or long forms are complete. An incomplete command will not be recognized.
	Below are examples of correctly written commands.
Long form	STATus:OPERation:NTRansition? STATUS:OPERATION:NTRANSITION? status:operation:ntransition?
Short form	STAT:OPER:NTR? stat:oper:ntr?
Square Brackets	Commands that contain square brackets indicate that the contents are optional. The function of the command is the same with or without the square bracketed items, as shown below.
	Both "DISPlay:MENU[:NAME]?" and "DISPlay:MENU?" are both valid forms.
Command Format	APPLY 1.5,5.2 1. Command header

APPLY 1.5,5.2

1 2 3 4 5

1. Command header
2. Space
3. Parameter 1
4. Comma (no space before/after comma)
5. Parameter 2

Parameters	Type	Description	Example
	<Boolean>	Boolean logic	0, 1
	<NR1>	integers	0, 1, 2, 3
	<NR2>	decimal numbers	0.1, 3.14, 8.5
	<NR3>	floating point	4.5e-1, 8.25e+1
	<NRf>	any of NR1, 2, 3	1, 1.5, 4.5e-1
	<string>	Sets the eight characters of 20H ~ 7EH of ASCII characters. Must be enclosed in quotation marks (") string.	
	<block data>	Definitive length arbitrary block data. A single decimal digit followed by data. The decimal digit specifies how many 8-bit data bytes follow.	
Message Terminator	LF	Line feed code	

4. Command List
4.1 Common Commands
4.1.1 *CLS
<div align="right">(Set)→</div>

Description	The *CLS command clears the Standard Event Status, Operation Status and Questionable Status registers. The corresponding Enable registers in each of the above registers are not cleared. If a <NL> newline code immediately precedes a *CLS command, the Error Que and the MAV bit in the Status Byte Register is also cleared.
Syntax	*CLS
Example	*CLS Clear the event status register of Standard register and Operation register and Questionable register.

<div align="right">(Set)→
→(Query)</div>

4.1.2 *ESE

Description	Sets or queries the Standard Event Status Enable register.	
Syntax	*ESE <NR1>	
Query Syntax	*ESE?	
Parameter	<NR1>	0~255
Example	*ESE 255 Sets the Standard Event Status Enable register.	
Query example	*ESE? >255 Return the setting value of the Standard Event Status Enable register.	

4.1.3 *ESR
<div align="right">→(Query)</div>

Description	Queries the Standard Event Status (Event) register. The Event Status register is cleared after it is read.	
Query Syntax	*ESR?	
Return parameter	<NR1>	0~255
Query example	*ESR? >255 Return the value of Standard Event Status register.	

<div align="center">18</div>

4.1.4 *IDN

→ Query

Description	Queries the manufacturer, model name, serial number, and firmware version of the PSW.
Query Syntax	*IDN?
Return parameter	Returns the instrument identification as a string in the following format: <string> Manufacturer:TEXIO <string> Model number : PSWxxxxxxx <string> Serial number :TW123456 <string> Firmware version : 01.00.20110101
Query example	*IDN? > TEXIO,PSWxxxxxxx,TW123456,01.00.20110101 Return the device information.

Set →

4.1.5 *OPC

→ Query

Description	The *OPC command sets the OPC bit (bit0) of the Standard Event Status Register when all current commands have been processed. The *OPC? Query returns 1 when all the outstanding commands have completed.
Syntax	*OPC
Query Syntax	*OPC?
Return parameter	<Boolean> Returns 1 when all the outstanding commands have completed.
Example	OPC Sets the OPC command.
Query example	OPC? >1 Returns 1 when all the outstanding commands have completed.

4.1.6 *RST

Set →

Description	Performs a device reset. Configures the unit to a known configuration (default settings). This known configuration is independent of the usage history.
Syntax	*RST
Example	RST Run a reset of the device.
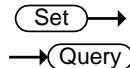
4.1.7 *SRE

Description	Sets or queries the Service Request Enable register. The Service Request Enable register determines which registers of the Status Byte register are able to generate service requests.
Syntax	*SRE <NR1>
Query Syntax	*SRE?
parameter	<NR1> 0~255
Example	SRE 32
	Sets the service request enable register.
Query example	SRE?
	>32
	Return the settings of the service request enable register.

4.1.8 *STB → Query

Description	Queries the bit sum of the Status Byte register with MSS (Master summary Status).
Query Syntax	*STB?
Return parameter	<NR1> 0~255
Query example	SRE?
	>4
	Returns the bit sum of the Status Byte register with the MSS bit (bit 6).

4.1.9 *TRG Set →

Description	The *TRG command is able to generate a "get"(Group Execute Trigger). If the PSW cannot accept a trigger at the time of the command, an error message is generated (-211, "Trigger ignored").
Syntax	*TRG
Example	*TRG
	Sets the trigger.

4.1.10 *TST

→ Query

Description	Executes a self test.	
Query Syntax	*TST?	
Return parameter	<NR1>	Returns the code of self-test. (No error = 0)
Query example	TST? >0 Returns an error code if there is an error.	

4.1.11 *WAI

Set →

Description	Prevents any other commands or queries from being executed until all outstanding commands have completed.
Syntax	*WAI
Example	WAI Run the process the WAI commands.

4.2 Abort Commands
4.2.1 ABORt

Set →

Description	The ABORt command will cancel any triggered actions.
Syntax	ABORt
Example	ABOR Cancel trigger action.

4.3 Apply Commands

4.3.1 APPLy

Set →
→ Query

Description	The APPLy command is used to set both the voltage and current. The voltage and current will be output as soon as the function is executed if the programmed values are within the accepted range. An execution error will occur if the programmed values are not within accepted ranges. The Apply command will set the voltage/current values but these values will not be reflected on the display until the Output is On or if the DISPlay:MENU:NAME 3 (set menu) command is used.	
Syntax	APPLy {<voltage>|MINimum | MAXimum}[,{<current>|MINimum | MAXimum}]	
Query Syntax	APPLy?	
Parameter	<voltage>	<NRf> 0% ~ 105% of the rated output voltage.
	<current>	<NRf> 0% ~ 105% of the rated output current.
	MINimum	0 volts/0 amps
	MAXimum	Maximum value for the present range.
Return parameter	<NR2>	Return value of the voltage.
	<NR2>	Return value of the current.
Example1	APPL 5.05,1.1 Sets to 1.1A current to 5.05V voltage.	
Example2	APPL 3.5 Sets to 3.5V voltage only.	
Query example	APPL? >+5.050, +1.100 Returns a value of setting current (1.1A) and voltage(5.05V) .	

4.4 Display Commands

4.4.1 DISPlay:MENU[:NAME]
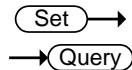
Description	The DISPlay MENU command selects a screen menu or queries the current screen menu.
Syntax	DISPlay:MENU[:NAME] <NR1>
Query Syntax	DISPlay:MENU[:NAME]?
Parameter	0 Measurement-Voltage / Current 1 Measurement-Voltage / Power 2 Measurement-Power / Current 3 Set Menu(Voltage/Current) 4 OVP / OCP Menu 5~99 Not Used. 100~199 F-00~99 Menu.
Example	DISP:MENU 0 Sets the display to the Voltage/Current display screen.
Query example	DISP:MENU? >0 Return the code of the display state. (0= Measurement-Voltage / Current)

4.4.2 DISPlay[:WINDow]:TEXT:CLEar

Description	Clears the text on the main screen.
Syntax	DISPlay[:WINDow]:TEXT:CLEar
Example	DISP:TEXT:CLE Clears the text on the main screen.

4.4.3 DISPlay[:WINDow]:TEXT[:DATA]

Description	Sets or queries the data text that will be written to the display. Writing to the display will overwrite data that is currently on the screen. Overwriting a display area with a shorter string may or may not overwrite the screen. The string must be enclosed in quotes: "STRING". Only ASCII characters 20H to 7EH can be used in the <string>.
Syntax	DISPlay[:WINDow]:TEXT[:DATA] "<string>"
Query Syntax	DISPlay[:WINDow]:TEXT[:DATA]?

Parameter	"<string>"	Sets the eight characters of 20H ~ 7EH of ASCII characters. Must be enclosed in quotation marks (") string.
Return parameter	"<string>"	Return a text string enclosed in quotation marks (").
Example	DISP:TEXT "ABCD"	
	Sets the screen the text data of "ABCD".	
Query example	DISP:TEXT?	
	>"ABCD"	
	Return a string of text data displayed.	

4.4.4 DISPlay:BLINk

Description	Turns blink on or off for the display.	
Syntax	DISPlay:BLINk { <Boolean>	OFF	ON }	
Query Syntax	DISPlay:BLINk?	
Parameter	0 / OFF	Turns blink OFF
	1 / ON	Turns blink ON
Return parameter	<Boolean>	Return the status of the blink display.
Example	DISP:BLIN 1	
	Turns blink ON.	
Query example	DISP:BLIN?	
	>0	
	Return the status of the blink display.	

4.5 Initiate Commands

4.5.1 INITiate[:IMMediate]:NAME

Description	The INITiate command starts the TRANsient or OUTPut trigger.	
Syntax	INITiate[:IMMediate]:NAME {TRANsient|OUTPut}	
Parameter	TRANsient	Starts the TRANsient trigger.
	OUTPut	Starts the OUTPut trigger.
Example	INIT:NAME TRAN	
	Starts the Transient trigger.	

4.6 Measure Commands

4.6.1 MEASure[:SCALar]:CURRent[:DC] → ⬤ Query

Description	Takes a measurement and returns the average output current.	
Query Syntax	MEASure[:SCALar]:CURRent[:DC]?	
Return parameter	\<NR2\>	Returns the current in amps.
Query example	MEAS:CURR? >+1.000 Return the average output current.	

4.6.2 MEASure[:SCALar]:VOLTage[:DC] → ⬤ Query

Description	Takes a measurement and returns the average output voltage.	
Query Syntax	MEASure[:SCALar]:VOLTage[:DC]?	
Return parameter	\<NR2\>	Returns the voltage in volts.
Query example	MEAS:VOLT? >+5.000 Return the average output voltage.	

4.6.3 MEASure[:SCALar]:POWer[:DC] → ⬤ Query

Description	Takes a measurement and returns the average output power.	
Query Syntax	MEASure[:SCALar]:POWer[:DC]?	
Return parameter	\<NR2\>	Returns the power measured in watts.
Query example	MEAS:POW? >+10 Return the average output power.	

4.7 Output Commands

⬤ Set →

4.7.1 OUTPut:DELay:ON → ⬤ Query

Description	Sets the Delay Time in seconds for turning the output on. The delay is set to 0.00 by default.	
Syntax	OUTPut:DELay:ON \<NRf\>	
Query Syntax	OUTPut:DELay:ON?	
Parameter	\<NRf\>	0.00~99.99 seconds, where 0=no delay.

Return parameter	<NR2>	Returns the delay on time in seconds until the output is turned on.
Example	OUTP:DEL:ON 1	
	Sets 1 second to the Delay Time for turning the output on.	
Query example	OUTP:DEL:ON?	
	>+10.000	
	Returns the delay on time in seconds until the output is turned on.	

Set ⟩→

4.7.2 OUTPut:DELay:OFF

→ Query

Description	Sets the Delay Time in seconds for turning the output off. The delay is set to 0.00 by default.	
Syntax	OUTPut:DELay:OFF <NRf>	
Query Syntax	OUTPut:DELay:OFF?	
Parameter	<NRf>	0.00~99.99 seconds, where 0=no delay.
Return parameter	<NR2>	Returns the delay on time in seconds until the output is turned off.
Example	OUTP:DEL:OFF 1	
	Sets 1 second to the Delay Time for turning the output off.	
Query example	OUTP:DEL:OFF?	
	>+10.000	
	Returns the delay on time in seconds until the output is turned off.	

Set ⟩→

4.7.3 OUTPut:MODE

→ Query

Description	Sets the PSW output mode. This is the equivalent to the F-03 (V-I Mode Slew Rate Select) settings.	
Syntax	OUTPut:MODE {<NR1>|CVHS|CCHS|CVLS|CCLS}	
Query Syntax	OUTPut:MODE?	
Parameter	0 / CVHS	CV high speed priority
	1 / CCHS	CC high speed priority
	2 / CVLS	CV slew rate priority
	3 / CCLS	CCV slew rate priority
Return parameter	<NR1>	Returns the output mode.
Example	OUTP:MODE CVHS	
	Sets the output mode.	

Query	OUTP:MODE?
example	>0
	Returns the output mode.

Set ⟶
4.7.4 OUTPut[:STATe][:IMMediate]
⟶ Query

Description	Turns the output on or off.	
Syntax	OUTPut[:STATe][:IMMediate] { <Boolean>	OFF	ON }	
Query Syntax	OUTPut[:STATe][:IMMediate]?	
Parameter	0 / OFF	Turns the output off.
	1 / ON	Turns the output on.
Return parameter	<NR1>	Returns output status of the instrument.
Example	OUTP ON	
	Sets output status of the instrument.	
Query example	OUTP?	
	>1	
	Returns output status of the instrument.	

Set ⟶
4.7.5 OUTPut[:STATe]:TRIGgered
⟶ Query

Description	Turns the output on or off when a software trigger is generated.	
Syntax	OUTPut[:STATe]:TRIGgered { <Boolean>	OFF	ON }	
Query Syntax	OUTPut[:STATe]:TRIGgered?	
Parameter	0 / OFF	Turns the output off when a software trigger is generated.
	1 / ON	Turns the output on when a software trigger is generated.
Return parameter	<NR1>	Returns output trigger status of the instrument.
Example	OUTP:TRIG ON	
	Sets output trigger status of the instrument.	
Query example	OUTP:TRIG?	
	>1	
	Returns output trigger status of the instrument.	

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4.7.6 OUTPut:PROTection:CLEar ⟨ Set ⟩ ⟶

Description	Clears over-voltage, over-current and over-temperature (OVP, OCP, OTP) protection circuits. It also clears the shutdown protection circuit. The AC failure protection cannot be cleared.
Syntax	OUTPut:PROTection:CLEar
Example	OUTP:PROT:CLE Clears the protection circuit.

4.7.7 OUTPut:PROTection:TRIPped ⟶ ⟨ Query ⟩

Description	Returns the state of the protection circuits (OVP, OCP, OTP).	
Query Syntax	OUTPut:PROTection:TRIPped?	
Return parameter	0	Protection circuits are not tripped.
	1	Protection circuits are tripped.
Query example	OUTP:PROT:TRIP? >0 Return the state of protection circuit.	

4.8 Sense Commands

4.8.1 SENSe:AVERage:COUNt ⟨ Set ⟩ ⟶ / ⟶ ⟨ Query ⟩

Description	Determines the level of smoothing for the average setting. This is the equivalent to the F-17 function setting.	
Syntax	SENSe:AVERage:COUNt {<NR1>| LOW | MIDDle | HIGH}	
Query Syntax	SENSe:AVERage:COUNt?	
Parameter	0 / LOW	Low level of smoothing.
	1 / MIDDle	Middle level of smoothing.
	2 / HIGH	High level of smoothing.
Return parameter	<NR1> 0 1 2	Returns the level of smoothing. Low level of smoothing. Middle level of smoothing. High level of smoothing.
Example	SENSe:AVERage:COUNt 1 Sets the level of smoothing to middle.	
Query example	SENS:AVER:COUN? >0 Return the state of smoothing for the average setting.	

4.9 Status Commands

4.9.1 STATus:OPERation[:EVENt]   → Query

Description	Queries the Operation Status Event register and clears the contents of the register.
Query Syntax	STATus:OPERation[:EVENt]?
Return parameter	<NR1> Returns the bit sum of the Operation Status Event register.
Query example	STAT:OPER? >0 Return the value of the Operation Status Event register.

4.9.2 STATus:OPERation:CONDition   → Query

Description	Queries the Operation Condition register. This query will not clear the register.
Query Syntax	STATus:OPERation:CONDition?
Return parameter	<NR1> Returns the bit sum of the Operation Condition register.
Query example	STAT:OPER:COND? >0 Return the value of the Operation Condition register.

Set →

4.9.3 STATus:OPERation:ENABle   → Query

Description	Sets or queries the bit sum of the Operation Status Enable register.
Syntax	STATus:OPERation:ENABle <NRf>
Query Syntax	STATus:OPERation:ENABle?
Parameter	<NR1> 0~32767
Example	STAT:OPER:ENAB 1 Sets the Operation Status Enable register.
Query example	STAT:OPER:ENAB? >1 Return the value of the Operation Status Enable register.

Set →

4.9.4 STATus:OPERation:PTRansition   → Query

Description	Sets or queries the bit sum of the positive transition filter of the Operation Status register.
Syntax	STATus:OPERation:PTRansition <NRf>

Query Syntax	STATus:OPERation:PTRansition?
Parameter	<NR1>　　　0~32767
Example	STAT:OPER:PTR 1
	Sets the positive transition filter of the Operation Status register.
Query example	STAT:OPER:PTR?
	>1
	Return the value of the positive transition filter of the Operation Status register.

Set ⟶⟶

4.9.5 STATus:OPERation:NTRansition

⟶ Query

Description	Sets or queries the bit sum of the negative transition filter of the Operation Status register.
Syntax	STATus:OPERation:NTRansition <NRf>
Query Syntax	STATus:OPERation:NTRansition?
Parameter	<NR1>　　　0~32767
Example	STAT:OPER:NTR 1
	Sets the negative transition filter of the Operation Status register.
Query example	STAT:OPER:NTR?
	>1
	Return the value of the negative transition filter of the Operation Status register.

4.9.6 STATus:QUEStionable[:EVENt]

⟶ Query

Description	Queries the bit sum of the Questionable Status Event register. This query will also clear the contents of the register.
Query Syntax	STATus:QUEStionable[:EVENt]?
Return parameter	<NR1>　　　Returns the bit sum of the Questionable Status Event register.
Query example	STAT:QUES?
	>0
	Return the value of the Questionable Status Event register.

4.9.7 STATus:QUEStionable:CONDition

⟶ Query

Description	Queries the Questionable Condition register. This query will not clear the register.

Query Syntax	STATus:QUEStionable:CONDition?	
Return parameter	<NR1>	Returns the bit sum of the Questionable Condition register.
Query example	STAT:QUES:COND? >0	
	Return the value of the Questionable Condition register.	

Set ⟶
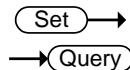
4.9.8 STATus:QUEStionable:ENABle

⟶ Query

Description	Sets or queries the bit sum of the Questionable Status Enable register.
Syntax	STATus:QUEStionable:ENABle <NRf>
Query Syntax	STATus:QUEStionable:ENABle?
Parameter	<NR1> 0~32767
Example	STAT:QUES:ENAB 1
	Sets the Questionable Status Enable register.
Query example	STAT:QUES:ENAB? >1
	Return the value of the Questionable Status Enable register.

Set ⟶

4.9.9 STATus:QUEStionable:PTRansition

⟶ Query

Description	Sets or queries the bit sum of the positive transition filter of the Questionable Status register.
Syntax	STATus:QUEStionable:PTRansition <NRf>
Query Syntax	STATus:QUEStionable:PTRansition?
Parameter	<NR1> 0~32767
Example	STAT:QUES:PTR 1
	Sets the positive transition filter of the Questionable Status register.
Query example	STATQUES:PTR? >1
	Return the value of the positive transition filter of the Questionable Status register.

Set ⟶

4.9.10 STATus:QUEStionable:NTRansition

⟶ Query

Description	Sets or queries the bit sum of the negative transition filter of the Questionable Status register.
Syntax	STATus:QUEStionable:NTRansition <NRf>
Query Syntax	STATus:QUEStionable:NTRansition?

Parameter	<NR1>	0~32767
Example	STAT:QUES:NTR 1	
	Sets the negative transition filter of the Questionable Status register.	
Query example	STAT:QUES:NTR?	
	>1	
	Return the value of the negative transition filter of the Questionable Status register.	

4.9.11 STATus:PRESet   ⟮Set⟯⟶

Description	This command resets the ENABle register, the PTRansistion filter and NTRansition filter on the Operation Status and Questionable Status Registers. The registers/filters will be reset to a default value.	
	Default Register/Filter Values	Setting
	QUEStionable Status Enable	0x0000
	QUEStionable Status Positive Transition	0x7FFF
	QUEStionable Status Negative Transition	0x0000
	Operation Status Enable	0x0000
	Operation Status Positive Transition	0x7FFF
	Operation Status Negative Transition	0x0000
	Summary: The Questionable Status Enable registers and the Operation Status Enable registers are both reset to 0. The Questionable Status and Operation Status Positive Transition filters are all set high (0x7FFF) and the Negative Transition filters are all set low (0x0000). I.e., only positive transitions will be recognized for the Questionable Status and Operation Status registers.	
Syntax	STATus:PRESet	
Example	STAT:PRES	
	Sets the initial value to Questionable status and Operation status.	

4.10 Source Commands

⟮Set⟯⟶

4.10.1 [SOURce:]CURRent[:LEVel][:IMMediate][:AMPLitude]   ⟶⟮Query⟯

Description	Sets or queries the current level in amps. For externally set current levels (from the analog control connector) the set current level is returned.

Syntax	[SOURce:]CURRent[:LEVel][:IMMediate][:AMPLitude] {<NRf>|MINimum | MAXimum}
Query Syntax	[SOURce:]CURRent[:LEVel][:IMMediate][:AMPLitude]? [MINimum | MAXimum]
Parameter	<NRf> 0%~105% of the rated current output level. MINimum Minimum current level. MAXimum Maximum current level.
Return parameter	<NR2> Return the level of the output current.
Example	CURR 5 Sets the output current level.
Query example1	CURR? >+5.120 Return the setting level of the output current.
Query example2	CURR? MAX >+37.800 Return the maximum setting level of the output current.

Set →

4.10.2 [SOURce:]CURRent[:LEVel]:TRIGgered[:AMPLitude]　　→ Query

Description	Sets or queries the current level in amps when a software trigger has been generated.
Syntax	[SOURce:]CURRent[:LEVel]:TRIGgered[:AMPLitude] {<NRf>|MINimum | MAXimum}
Query Syntax	[SOURce:]CURRent[:LEVel]:TRIGgered[:AMPLitude]? [MINimum | MAXimum]
Parameter	<NRf> 0%~105% of the rated current output in amps. MINimum Minimum current level. MAXimum Maximum current level.
Return parameter	<NR2> Return the level of the output current of software trigger.
Example	CURR:TRIG 15 Sets the output current level of software trigger.
Query example1	CURR:TRIG? >+15.000 Return the setting level of the output current of software trigger.
Query example2	CURR:TRIG? MAX >+37.800 Return the maximum setting level of the output current of software trigger.
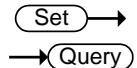
4.10.3 [SOURce:]CURRent:PROTection[:LEVel]

Description	Sets or queries the OCP (over-current protection) level in amps.	
Syntax	[SOURce:]CURRent:PROTection[:LEVel] {<NRf>|MINimum	MAXimum}	
Query Syntax	[SOURce:]CURRent:PROTection[:LEVel]? [MINimum	MAXimum]	
Parameter	<NRf>	10%~110% of the rated current output level.
	MINimum	Minimum OCP level.
	MAXimum	Maximum OCP level.
Return parameter	<NR2>	Returns the OCP level.
Example	CURR:PROT 5 Sets the OCP level.	
Query example1	CURR:PROT? >+5.000 Returns the setting value of the OCP level.	
Query example2	CURR:PROT? MIN >+3.600 Returns the minimum possible OCP level in amps.	
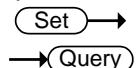
4.10.4 [SOURce:]CURRent:PROTection:STATe

Description	Turns OCP (over-current protection)function to on or off.	
Syntax	[SOURce:]CURRent:PROTection:STATe {0|1|OFF|ON}	
Query Syntax	[SOURce:]CURRent:PROTection:STATe?	
Parameter	0 / OFF	Turns off the OCP function.
	1 / ON	Turns on the OCP function and set OCP value to Maximum.
Return parameter	<Boolean>	Return the state(0 or 1) of the OCP function.
Example	CURR:PROT:STAT ON Sets the OCP function.	
Query example	CURR:PROT:STAT? >1 Return the setting of the OCP function.	
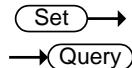
4.10.5 [SOURce:]CURRent:SLEW:RISing

Description	Sets or queries the rising current slew rate. This is only applicable for CC slew rate priority mode.	
Syntax	[SOURce:]CURRent:SLEW:RISing {<NRf>|MINimum	MAXimum}	
Query Syntax	[SOURce:]CURRent:SLEW:RISing? [MINimum	MAXimum]	
Parameter	<NRf>	0.01A/s~72.00A/s (PSW-360L30)
		0.1A/s~144.0A/s (PSW-720L30)
		0.1A/s~216.0A/s (PSW-1080L30)
		0.01A/s~27.00A/s (PSW-360L80)
		0.01A/s~54.00A/s (PSW-720L80)
		0.01A/s~81.00A/s (PSW-1080L80)
		0.01A/s~14.40A/s (PSW-360M160)
		0.01A/s~28.80A/s (PSW-720M160)
		0.01A/s~43.20A/s (PSW-1080M160)
		0.001A/s ~ 9.000A/s (PSW-360M250)
		0.01A/s ~ 18.00A/s (PSW-720M250)
		0.01A/s ~ 27.00A/s (PSW-1080M250)
		0.001A/s ~ 2.880A/s (PSW-360H800)
		0.001A/s ~ 5.760A/s (PSW-720H800)
		0.001A/s ~ 8.640A/s (PSW-1080H800)
	MINimum	Minimum rising current slew rate.
	MAXimum	Maximum rising current slew rate.
Return parameter	<NR2>	Return the value of the rising current slew rate.
Example	CURR:SLEW:RIS 72	
	Sets the rising current slew rate of 72A/s.	
Query example1	CURR:SLEW:RIS?	
	>+5.000	
	Return the setting value of the rising current slew rate.	
Query example2	CURR:SLEW:RIS? MAX	
	>+72.000	
	Return the maximum setting value of the rising current slew rate.	

4.10.6 [SOURce:]CURRent:SLEW:FALLing

Description	Sets or queries the falling current slew rate. This is only applicable for CC slew rate priority mode.	
Syntax	[SOURce:]CURRent:SLEW:FALLing {<NRf>|MINimum	MAXimum}	
Query Syntax	[SOURce:]CURRent:SLEW:FALLing? [MINimum	MAXimum]	
Parameter	NRf	0.01A/s~72.00A/s (PSW-360L30)
		0.1A/s~144.0A/s (PSW-720L30)
		0.1A/s~216.0A/s (PSW-1080L30)
		0.01A/s~27.00A/s (PSW-360L80)
		0.01A/s~54.00A/s (PSW-720L80)
		0.01A/s~81.00A/s (PSW-1080L80)
		0.01A/s~14.40A/s (PSW-360M160)
		0.01A/s~28.80A/s (PSW-720M160)
		0.01A/s~43.20A/s (PSW-1080M160)
		0.001A/s ~ 9.000A/s (PSW-360M250)
		0.01A/s ~ 18.00A/s (PSW-720M250)
		0.01A/s ~ 27.00A/s (PSW-1080M250)
		0.001A/s ~ 2.880A/s (PSW-360H800)
		0.001A/s ~ 5.760A/s (PSW-720H800)
		0.001A/s ~ 8.640A/s (PSW-1080H800)
	MINimum	Minimum falling current slew rate.
	MAXimum	Maximum falling current slew rate.
Return parameter	<NR2>	Return the value of the falling current slew rate.
Example	CURR:SLEW:FALL 1	
	Sets the falling current slew rate of 1A/s.	
Query example1	CURR:SLEW:FALL?	
	>+5.000	
	Return the setting value of the falling current slew rate.	
Query example2	CURR:SLEW:FALL? MAX	
	>+72.000	
	Return the maximum setting value of the falling current slew rate.	

4.10.7 [SOURce:]RESistance[:LEVel][:IMMediate][:AMPLitude]

Description	Sets or queries the internal resistance in ohms.
Syntax	[SOURce:]RESistance[:LEVel][:IMMediate][:AMPLitude] {<NRf>|MINimum | MAXimum|?}
Query Syntax	[SOURce:]RESistance[:LEVel][:IMMediate][:AMPLitude]? [MINimum | MAXimum]
Parameter	<NRf> Resistance in ohms: 0.000Ω~0.833Ω (PSW-360L30) 0.000Ω~0.417Ω (PSW-720L30) 0.000Ω~0.278Ω (PSW-1080L30) 0.000Ω~5.926Ω (PSW-360L80) 0.000Ω~2.963Ω (PSW-720L80) 0.000Ω~1.975Ω (PSW-1080L80) 0.000Ω~22.222Ω (PSW-360M160) 0.000Ω~11.111Ω (PSW-720M160) 0.000Ω~7.407Ω (PSW-1080M160) 0.00Ω ~ 55.55Ω (PSW-360M250) 0.00Ω ~ 27.77Ω (PSW-720M250) 0.00Ω ~ 18.51Ω (PSW-1080M250) 0.0Ω ~ 555.5Ω (PSW-360H800) 0.0Ω ~ 277.8Ω (PSW-720H800) 0.0Ω ~ 185.1Ω (PSW-1080H800)
	MINimum Minimum internal resistance in ohms
	MAXimum Maximum internal resistance in ohms
Return parameter	<NR2> Return the setting value of the internal resistance.
Example	RES 0.1 Sets the internal resistance to 100mΩ.
Query example1	RES? >+0.100 Return the setting value of the internal resistance.
Query example2	RES? MAX >+0.278 Return the maximum setting value of the internal resistance.
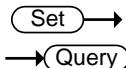
4.10.8 [SOURce:]VOLTage[:LEVel][:IMMediate][:AMPLitude]

Description	Sets or queries the voltage level in volts.
Syntax	[SOURce:]VOLTage[:LEVel][:IMMediate][:AMPLitude] {<NRf>|MINimum | MAXimum}
Query Syntax	[SOURce:]VOLTage[:LEVel][:IMMediate][:AMPLitude]? [MINimum | MAXimum]
Parameter	<NRf> 0%~105% of the rated voltage output level. MINimum Minimum voltage level. MAXimum Maximum voltage level.
Return parameter	<NR2> Return the level of the output voltage.
Example	VOLT 10 Sets the output voltage level.
Query example1	VOLT? >+10.000 Return the setting level of the output voltage.
Query example2	VOLT? MAX >+31.500 Return the maximum setting level of the output voltage.
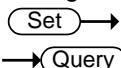
4.10.9 [SOURce:]VOLTage[:LEVel]:TRIGgered[:AMPLitude]

Description	Sets or queries the voltage level in volts when a software trigger has been generated.
Syntax	[SOURce:]VOLTage[:LEVel]:TRIGgered[:AMPLitude] {<NRf>|MINimum | MAXimum}
Query Syntax	[SOURce:]VOLTage[:LEVel]:TRIGgered[:AMPLitude]? [MINimum | MAXimum]
Parameter	<NRf> 0%~105% of the rated voltage output in volts. MINimum Minimum voltage level. MAXimum Maximum voltage level.
Return parameter	<NR2> Return the level of the output voltage of software trigger.
Example	VOLT:TRIG 10 Sets the output voltage level of software trigger.

Query example1	VOLT:TRIG? >+10.000 Return the setting level of the output voltage of software trigger.
Query example2	VOLT:TRIG? MAX >+31.500 Return the maximum setting level of the output voltage of software trigger.

Set →
→ Query
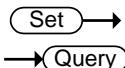
4.10.10 [SOURce:]VOLTage:PROTection[:LEVel]

Description	Sets or queries the OVP (over-voltage protection) level.	
Syntax	[SOURce:]VOLTage:PROTection[:LEVel] {<NRf>|MINimum	MAXimum}	
Query Syntax	[SOURce:]VOLTage:PROTection[:LEVel]? [MINimum | MAXimum]	
Parameter	<NRf>	10%~110% of the rated output voltage in volts.
	MINimum	Minimum OVP level.
	MAXimum	Maximum OVP level.
Return parameter	<NR2>	Returns the OVP level.
Example	VOLT:PROT MAXimum Sets the maximum OVP level.	
Query example1	VOLT:PROT? >+10.000 Returns the setting value of the OVP level.	
Query example2	VOLT:PROT? MAX OVP >+33.000 Returns the maximum possible OVP level in volts.	

Set →
→ Query
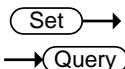
4.10.11 [SOURce:]VOLTage:SLEW:RISing

Description	Sets or queries the rising voltage slew rate. This is only applicable for CV slew rate priority mode.
Syntax	[SOURce:]VOLTage:SLEW:RISing {<NRf>|MINimum | MAXimum}
Query Syntax	[SOURce:]VOLTage:SLEW:RISing? [MINimum | MAXimum]

Parameter	<NRf>	0.01V/s~60.00V/s (PSW-XXL30)
		0.1V/s~160.0V/s (PSW-XXL80)
		0.1V/s~320.0V/s (PSW-XXM160)
		0.1V/s~500.0V/s (PSW-XXM250)
		1V/s ~1600V/s (PSW-XXH800)
	MINimum	Minimum rising voltage slew rate.
	MAXimum	Maximum rising voltage slew rate.
Return parameter	<NR2>	Return the value of rising slew rate of voltage.
Example	VOLT:SLEW:RIS MAX	
	Sets the rising voltage slew rate to its maximum.	
Query example1	VOLT:SLEW:RIS?	
	>+10.000	
	Return the setting value of the rising voltage slew rate.	
Query example2	VOLT:SLEW:RIS? MAX	
	>+33.000	
	Return the rising voltage slew rate to its maximum.	

Set →

4.10.12 [SOURce:]VOLTage:SLEW:FALLing

→ Query

Description	Sets or queries the falling voltage slew rate. This is only applicable for CV slew rate priority mode.
Syntax	[SOURce:]VOLTage:SLEW:FALLing {<NRf>|MINimum	MAXimum}
Query Syntax	[SOURce:]VOLTage:SLEW:FALLing? [MINimum	MAXimum]

Parameter	<NRf>	0.01V/s~60.00V/s (PSW-XXL30)
		0.1V/s~160.0V/s (PSW-XXL80)
		0.1V/s~320.0V/s (PSW-XXM160)
		0.1V/s~500.0V/s (PSW-XXM250)
		1V/s ~1600V/s (PSW-XXH800)
	MINimum	Minimum falling voltage slew rate.
	MAXimum	Maximum falling voltage slew rate.
Return parameter	<NR2>	Return the value of falling slew rate of voltage.
Example	VOLT:SLEW:FALL MIN	
	Sets the falling voltage slew rate to its minimum.	
Query example1	VOLT:SLEW:FALL?	
	>+10.000	
	Return the setting value of the falling voltage slew rate.	

Query example2	VOLT:SLEW:FALL? MIN
	>+0.01
	Return the falling voltage slew rate to its maximum.

4.11 System control setting Commands

Set →

4.11.1 SYSTem:BEEPer[:IMMediate]

→ Query

Description	This command causes an audible tone to be generated by the instrument. The duration time is specified in seconds.	
Syntax	SYSTem:BEEPer[:IMMediate] {<NR1>|MINimum|MAXimum}	
Query Syntax	SYSTem:BEEPer[:IMMediate]? [MINimum|MAXimum]	
Parameter	<NR1>	0 ~ 3600 seconds.
	MINimum	Sets the beeper time to the minimum (0 seconds)
	MAXimum	Sets the beeper time to the maximum (3600 seconds)
Return parameter	<NR1>	Returns the remaining beeper duration time in seconds or returns the maximum or minimum beeper time in seconds (for the [MINimum| MAXimum] query parameters).
Example1	SYST:BEEP 10	
	after a 2 second wait	
	SYST:BEEP?	
	>8	
	The first command turns the beeper on for 10 seconds.	
	After 2 seconds the SYST:BEEP? query returns the remaining beeper time (8 seconds).	
Example2	SYST:BEEP? MAX	
	>3600	
	Returns the maximum settable beeper time in seconds.	

Set →

4.11.2 SYSTem:CONFigure:BEEPer[:STATe]
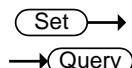
→ Query

Description	Sets or queries the buzzer state on/off.	
Syntax	SYSTem:CONFigure:BEEPer[:STATe] {<Boolean>	OFF	ON }	
Query Syntax	SYSTem:CONFigure:BEEPer[:STATe]?	
Parameter	0 / OFF	Turns the buzzer off.
	1 / ON	Turns the buzzer on.
Return parameter	<Boolean>	Return the setting value of the buzzer by 0 or 1.
Example	SYST:CONF:BEEP ON	
	Sets to turn on the buzzer.	

Query	SYST:CONF:BEEP?
example	>1
	Return the setting of buzzer.

Set →
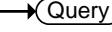
4.11.3 SYSTem:CONFigure:BLEeder[:STATe]

→ Query

Description	Sets or queries the status of the bleeder resistor.
Syntax	SYSTem:CONFigure:BLEeder[:STATe] {<NR1>	OFF	ON	AUTO}
Query Syntax	SYSTem:CONFigure:BLEeder[:STATe]?
Parameter	0 / OFF	Turns the bleeder resistor off.
	1 / ON	Turns the bleeder resistor on.
	2 / AUTO	Turns the AUTO mode on.
Return parameter	<NR1>	Return the setting value of the bleeder resistor.
Example	SYST:CONF:BLE ON
	Sets to turn on the bleeder resistor.
Query example	SYST:CONF:BLE?
	>1
	Return the setting of the bleeder resistor.

4.11.4 SYSTem:CONFigure:BTRip[:IMMediate]

Set →

Description	Trips the power switch trip (circuit breaker) to turn the unit off (shut down the power).
Syntax	SYSTem:CONFigure:BTRip[:IMMediate]
Example	SYST:CONF:BTR
	Turn off the breaker of the power switch.

Set →

4.11.5 SYSTem:CONFigure:BTRip:PROTection

→ Query

Description	Enables/Disables the power switch trip (circuit breaker) when the OVP or OCP protection settings are tripped. This setting only applies after power has been reset.
Syntax	SYSTem:CONFigure:BTRip:PROTection {<Boolean>	OFF	ON }
Query Syntax	SYSTem:CONFigure:BTRip:PROTection?
Parameter	0 / OFF	Sets to disable the power switch circuit breaker of OCP or OVP.
	1 / ON	Sets to enable the power switch circuit breaker of OCP or OVP.

Return parameter	<Boolean>	Return the setting value of the power switch circuit breaker by 0 or 1.
Example	SYST:CONF:BTR:PROT ON	
	Sets to enable the protection function of the power switch circuit breaker.	
Query example	SYST:CONF:BTR:PROT?	
	>1	
	Return the value of the protection function of circuit breaker of the power switch.	

Set $\longrightarrow$

4.11.6 SYSTem:CONFigure:CURRent:CONTrol

$\longrightarrow$ Query

Description	Sets or queries the CC control mode (local control (panel), external voltage control, external resistance control). This setting is applied only after the unit is reset.	
Syntax	SYSTem:CONFigure:CURRent:CONTrol {0 | 1 | 2 | 3}	
Query Syntax	SYSTem:CONFigure:CURRent:CONTrol?	
Parameter	0	Local (Panel) control
	1	External voltage control
	2	External resistance control; 10kΩ = Io max, 0kΩ = Io min.
	3	External resistance control; 10kΩ = Io min, 0kΩ = Io max.
Example	SYST:CONF:CURR:CONT 0	
	Sets the setting state of the CC control mode.	
Query example	SYST:CONF:CURR:CONT?	
	>0	
	Return the setting state of the CC control mode.	

Set $\longrightarrow$

4.11.7 SYSTem:CONFigure:VOLTage:CONTrol

$\longrightarrow$ Query

Description	Sets or queries the CV control mode (local control, external voltage control, external resistance control). This setting is applied only after the unit is reset.	
Syntax	SYSTem:CONFigure:VOLTage:CONTrol {0 | 1 | 2 | 3}	
Query Syntax	SYSTem:CONFigure:VOLTage:CONTrol?	
Parameter	0	Local (Panel) control
	1	External voltage control
	2	External resistance control; 10kΩ = Vo max, 0kΩ = Vo min.
	3	External resistance control; 10kΩ = Vo min, 0kΩ = Vo max.

Example	SYST:CONF:VOLT:CONT 0
	Sets the setting state of the CV control mode.
Query	SYST:CONF:VOLT:CONT?
example	>0
	Return the setting state of the CV control mode.

Set ⟶
⟶ Query

4.11.8 SYSTem:CONFigure:MSLave

Description	Sets or queries the unit operation mode. This setting is only applied after the unit has been reset.
Syntax	SYSTem:CONFigure:MSLave {0 | 1 | 2 | 3 | 4}
Query Syntax	SYSTem:CONFigure:MSLave?
Note	Series mode is only supported for 30V/80V/160V models.
Parameter	0	Master / Local
	1	Master / Parallel 1 (2 units)
	2	Master / Parallel 2 (3 units)
	3	Slave / Parallel
	4	Slave / Series
Example	SYST:CONF:MSL 0
	Sets the operation mode.
Query example	SYST:CONF:MSL?
	>0
	Return the operation mode.

Set ⟶
⟶ Query
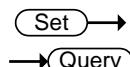
4.11.9 SYSTem:CONFigure:OUTPut:EXTernal[:MODE]

Description	Sets the external logic as active high or active low. This setting is only applied after the unit has been reset.
Syntax	SYSTem:CONFigure:OUTPut:EXTernal[:MODE]
Query Syntax	SYSTem:CONFigure:OUTPut:EXTernal[:MODE]?
Parameter	0 / HIGH	Active high
	1 / LOW	Active low
Return parameter	<Boolean>	Return the setting value of the the mode of the external logic by 0 or 1.
Example	SYST:CONF:OUTP:EXT HIGH
	Sets the external logic mode.
Query	SYST:CONF:OUTP:EXT?
example	>0
	Return the external logic mode.

4.11.10 SYSTem:CONFigure:OUTPut:PON[:STATe]

Description	Sets the unit to turn the output ON/OFF at power-up. This setting is only applied after the unit has been reset.
Syntax	SYSTem:CONFigure:OUTPut:PON[:STATe] {<Boolean> | OFF | ON }
Query Syntax	SYSTem:CONFigure:OUTPut:PON[:STATe]?
Parameter	0 / OFF　　Output off at power up 1 / ON　　Output on at power up
Return parameter	<Boolean>　Return the setting value of the power up by 0 or 1.
Example	SYST:CONF:OUTP:PON ON Sets the output state of the power up.
Query example	SYST:CONF:OUTP:PON? >0 Return the output state setting of the power up.

4.12 Communication system configuration Commands

4.12.1 SYSTem:COMMunicate:ENABle

Description	Enables/Disables LAN, GPIB or USB remote interfaces as well as remote services　(Sockets, Web Server). This setting is applied only　after the unit is reset.
Syntax	SYSTem:COMMunicate:ENABle <mode>,<interface>
Query Syntax	SYSTem:COMMunicate:ENABle? <interface>
Parameter	<mode> 0 / OFF　　Turns the selected mode off. 1 / ON　　Turns the selected mode on. <interface> GPIB　　Select GPIB USB　　Select USB LAN　　Select LAN SOCKets　Select Sockets WEB　　Select the web server
Return parameter	<Boolean>　Return the setting value of selected the remote interfaces by 0 or 1.
Example	SYST:COMM:ENAB 1,USB Sets of the operation of the USB.

Query example	SYST:COMM:ENAB? USB
	>1
	Return the setting of the operation of USB.

Set →

4.12.2 SYSTem:COMMunicate:GPIB[:SELF]:ADDRess → Query

Description	Sets or queries the GPIB address. This setting is applied only after the unit is reset.
Syntax	SYSTem:COMMunicate:GPIB[:SELF]:ADDRess <NR1>
Query Syntax	SYSTem:COMMunicate:GPIB[:SELF]:ADDRess?
Parameter	<NR1> 0~30
Example	SYST:COMM:GPIB:ADDR 15
	Sets 15 as the GP-IB address.
Query example	SYST:COMM:GPIB:ADDR?
	>15
	Return the setting value of the GP-IB address.

Set →

4.12.3 SYSTem:COMMunicate:LAN:IPADdress → Query

Description	Sets or queries LAN IP address.
	This setting is applied only after the unit is reset.
Syntax	SYSTem:COMMunicate:LAN:IPADdress <string>
Query Syntax	SYSTem:COMMunicate:LAN:IPADdress?
Parameter	<string> LAN IP address in string format ("address")
	Applicable ASCII characters: 20H to 7EH.
Return parameter	<string> Return the set value of the IP address of the LAN.
Example	SYST:COMM:LAN:IPAD "172.16.5.111"
	Sets the IP address of the LAN.
Query example	SYST:COMM:LAN:IPAD?
	>172.16.5.111
	Return the setting value of the IP address of the LAN.

Set →

4.12.4 SYSTem:COMMunicate:LAN:GATEway → Query

Description	Sets or queries the Gateway address. This setting is applied only after the unit is reset.
Syntax	SYSTem:COMMunicate:LAN:GATEway <string>
Query Syntax	SYSTem:COMMunicate:LAN:GATEway?
Parameter	<string> LAN Gateway address in string format ("address") Applicable ASCII characters: 20H to 7EH.

Return parameter	<string>	Return the set value of the Gateway address of the LAN.
Example	SYST:COMM:LAN:GATE "172.16.0.254" Sets the Gateway address of the LAN.	
Query example	SYST:COMM:LAN:GATE? >172.16.0.254 Return the setting value of the Gateway address of the LAN.	

Set →

4.12.5 SYSTem:COMMunicate:LAN:SMASk
→ Query
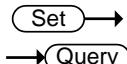
Description	Sets or queries the LAN subnet mask. This setting is applied only after the unit is reset.	
Syntax	SYSTem:COMMunicate:LAN:SMASk <string>	
Query Syntax	SYSTem:COMMunicate:LAN:SMASk?	
Parameter	<string>	Subnet mask in string format ("mask") Applicable ASCII characters: 20H to 7EH.
Return parameter	<string>	Return the set value of the subnet mask of the LAN.
Example	SYST:COMM:LAN:SMAS "255.255.0.0" Sets the subnet mask of the LAN.	
Query example	SYST:COMM:LAN:SMAS? >255.255.0.0 Return the setting value of the subnet mask of the LAN.	

4.12.6 SYSTem:COMMunicate:LAN:MAC
→ Query

Description	Returns the unit MAC address as a string. The MAC address cannot be changed.	
Query Syntax	SYSTem:COMMunicate:LAN:MAC?	
Return parameter	<string>	Returns the MAC address in the following format "FF-FF-FF-FF-FF-FF".
Query example	SYST:COMM:LAN:MAC? 02-80-AD-20-31-B1 Returns the MAC address.	

Set →

4.12.7 SYSTem:COMMunicate:LAN:DHCP
→ Query
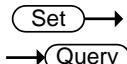
Description	Turns DHCP on/off. Queries the DHCP status. This setting is applied only after the unit is reset.	
Syntax	SYSTem:COMMunicate:LAN:DHCP {<Boolean>	OFF | ON }	
Query Syntax	SYSTem:COMMunicate:LAN:DHCP?	

Parameter	0 / OFF	DHCP off
	1 / ON	DHCP on
Return parameter	<Boolean>	Return the setting of the DHCP by 0 or 1.
Example	SYST:COMM:LAN:DHCP ON	
	DHCP on	
Query example	SYST:COMM:LAN:DHCP?	
	>1	
	Return the setting of the DHCP.	

Set →
4.12.8 SYSTem:COMMunicate:LAN:DNS
→ Query

Description	Sets or queries the DNS address. This setting is applied only after the unit is reset.
Syntax	SYSTem:COMMunicate:LAN:DNS <string>
Query Syntax	SYSTem:COMMunicate:LAN:DNS?
Parameter	<string>	DNS in string format ("mask") Applicable ASCII characters: 20H to 7EH.
Return parameter	<string>	Return the set value of the DNS address of the LAN.
Example	SYST:COMM:LAN:DNS "172.16.1.252"	
	Sets the DNS address of the LAN.	
Query example	SYST:COMM:LAN:DNS?	
	>172.16.1.252	
	Return the setting value of the DNS address of the LAN.	

4.12.9 SYSTem:COMMunicate:LAN:HOSTname
→ Query

Description	Queries the host name.
Query Syntax	SYSTem:COMMunicate:LAN:HOSTname?
Return parameter	<string>	Host name in string format.
Query example	SYST:COMM:LAN:HOST?	
	>P-160054	
	Returns the host name.	

4.12.10 SYSTem:COMMunicate:LAN:WEB:PACTive → Query

Description	Sets or queries whether the web password is on or off. This setting is applied only after the unit is reset.
Syntax	SYSTem:COMMunicate:LAN:WEB:PACTive {<Boolean> | OFF | ON }
Query Syntax	SYSTem:COMMunicate:LAN:WEB:PACTive?
Parameter	0 / OFF Web password off 1 / ON Web password on
Return parameter	<Boolean> Return the setting state of the Web password by 0 or 1.
Example	SYST:COMM:LAN:WEB:PACT ON Sets the Web password.
Query example	SYST:COMM:LAN:WEB:PACT? >1 Return the setting state of the Web password.

Set →

4.12.11 SYSTem:COMMunicate:LAN:WEB:PASSword → Query

Description	Sets or queries the web password. This setting is applied only after the unit is reset.
Syntax	SYSTem:COMMunicate:LAN:WEB:PASSword <NR1>
Query Syntax	SYSTem:COMMunicate:LAN:WEB:PASSword?
Parameter	<NR1> 0 ~ 9999
Example	SYST:COMM:LAN:WEB:PASS 1234 Sets the Web password of 1234.
Query example	SYST:COMM:LAN:WEB:PASS? >1234 Return the setting value of the Web password.

Set →

4.12.12 SYSTem:COMMunicate:RLSTate → Query

Description	Sets or queries the control state of the instrument.
Syntax	SYSTem:COMMunicate:RLSTate {LOCal | REMote | RWLock}
Query Syntax	SYSTem:COMMunicate:RLSTate ?

Parameter	LOCal	Sets the instrument to front panel control.
	REMote	Sets the instrument to remote interface control.
	RWLock	Disables the front panel keys and only allows the instrument to be controlled via the remote interface.
Return parameter	LOC	The instrument is set to front panel control.
	REM	The instrument is set to remote interface control.
	RWL	The front panel keys are disabled. The instrument can only be controlled via the remote interface.
Example	SYST:COMM:RLST: LOC	
	Sets the instrument to front panel control.	

4.12.13 SYSTem:COMMunicate:USB:FRONt:STATe $\rightarrow$ (Query)

Description	Queries the front panel USB-A port state.
Query Syntax	SYSTem:COMMunicate:USB:FRONt:STATe?

Return parameter	0	Absent
	1	Mass Storage

Query example	SYST:COMM:USB:FRON:STAT?
	>1
	Return the status of the USB connection on the front panel.

4.12.14 SYSTem:COMMunicate:USB:REAR:STATe $\rightarrow$ (Query)

Description	Queries the rear panel USB-B port state.
Query Syntax	SYSTem:COMMunicate:USB:REAR:STATe?

Return parameter	0	Absent
	2	USB-CDC
	3	GPIB-USB (GUG-001)

Query example	SYST:COMM:USB:REAR:STAT?
	>2
	Return the status of the USB connection on the rear panel.

(Set) →

4.12.15 SYSTem:COMMunicate:USB:REAR:MODE $\rightarrow$ (Query)

Description	Sets or queries the rear panel USB-B port mode. This command is the equivalent to the F-22 configuration setting.
Syntax	SYSTem:COMMunicate:USB:REAR:MODE {0|1|2|3}

Query Syntax	SYSTem:COMMunicate:USB:REAR:MODE?	
Parameter	0 1 2 3	Disable GPIB-USB adapter Auto detect speed Full speed only
Example	SYST:COMM:USB:REAR:MODE 1 Sets the rear panel USB-B port mode to GPIB-USB adapter.	

4.13 System Settings Commands

4.13.1 SYSTem:ERRor ➜ Query

Description	Queries the error queue. The last error message is returned. A maximum of 32 errors are stored in the error queue.	
Query Syntax	SYSTem:ERRor?	
Return parameter	<NR1> <string>	Returns an error code followed by an error message as a string. The string is returned as "string".
Query example	SYST:ERR? >-100, "Command error" Returns the contents of the error message and error code.	

Set ➜

4.13.2 SYSTem:KEYLock:MODE ➜ Query

Description	Sets or queries the key lock mode. This setting is the equivalent of the F-19 function setting.	
Syntax	SYSTem:KEYLock:MODE {0|1}	
Query Syntax	SYSTem:KEYLock:MODE?	
Parameter	0 1	Panel lock: allow output off. Panel lock: allow output on/off.
Example	SYST:KEYL:MODE 0 Sets the key lock mode of allow output off	
Query example	SYST:KEYL:MODE? >0 Return the setting state of the key lock mode by 0 or 1.	

Set ➜

4.13.3 SYSTem:KLOCk ➜ Query

Description	Enables or disables the front panel key lock.
Syntax	SYSTem:KLOCk { Boolean>	OFF	ON}

Query Syntax	SYSTem:KLOCk?	
Parameter	0 / OFF	Panel keys unlocked
	1 / ON	Panel keys locked
Return parameter	<Boolean>	Return the setting state of the key lock of the front panel by 0 or 1.
Example	SYST:KLOC ON	
	Sets the key lock of the front panel.	
Query example	SYST:KLOC?	
	>1	
	Return the setting state of the key lock of the front panel by 0 or 1.	

4.13.4 SYSTem:INFormation   → Query

Description	Queries the system information. Returns the machine version, build date, keyboard CPLD version and analog CPLD version.	
Query Syntax	SYSTem:INFormation?	
Return parameter	<block data>	Definite length arbitrary block response data.
Query example	SYST:INF?	
	#3238MFRS TEXIO,Model PSW,SN	
	EL160054,Firmware-Version	
	T1.11.20110922,Keyboard-CPLD	
	0x030C,AnalogControl-CPLD 0x0421,Kernel-Buildon	
	May 22 2011,OSRelease 2.6.28.10,Test-Version 01.00	
	Aug 1 2011,MAC 02-80-ad-20-31-b1	
	Returns the system information as a block data.	

4.13.5 SYSTem:PRESet   Set →

Description	Resets all the settings to the factory default settings. See page 67for details.	
Syntax	SYSTem:PRESet	
Example	SYST:PRES	
	Sets to the factory setting default settings of all.	

4.13.6 SYSTem:VERSion   → Query

Description	Returns the version of the SCPI specifications that the unit complies with.	
Query Syntax	SYSTem:VERSion?	
Return parameter	1999.0	Always return the SCPI version of "1999.0".

Query	SYST: VERS
example	>1999.0
	Rturn the SCPI version.

4.14 Trigger Commands

4.14.1 TRIGger:TRANsient[:IMMediate]　　　　　(Set)⟶

Description	Generates a software trigger for the transient trigger system.
Syntax	TRIGger:TRANsient[:IMMediate]
Example	TRIG:TRAN
	Generates a software trigger for the transient trigger system.

(Set)⟶

4.14.2 TRIGger:TRANsient:SOURce　　　　　⟶(Query)

Description	Sets or queries the trigger source for the transient system.	
Syntax	TRIGger:TRANsient:SOURce {BUS | IMMediate}	
Query Syntax	TRIGger:TRANsient:SOURce?	
Parameter	BUS	Internal software trigger. Waits for the *TRG (or IEEE 488.1 "get" group execute trigger) command to start the trigger.
	IMMediate	Starts the trigger immediately. (default)
Return parameter	<string>	Return in value of the {BUS| IMM} the setting the trigger source for the transient system.
Example	TRIG:TRAN:SOUR IMM	
	Sets the trigger source of the transient system.	
Query example	TRIG:TRAN:SOUR?	
	>IMM	
	Return the trigger source of the transient system.	

4.14.3 TRIGger:OUTPut[:IMMediate]　　　　　(Set)⟶

Description	Generates a software trigger for the output trigger system.
Syntax	TRIGger:OUTPut[:IMMediate]
Example	TRIG:OUTP
	Generates a software trigger for the output trigger system.
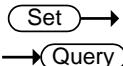
4.14.4 TRIGger:OUTPut:SOURce

Description	Sets or queries the trigger source for the output system.
Syntax	TRIGger:OUTPut:SOURce [BUS | IMMediate]
Query Syntax	TRIGger:OUTPut:SOURce?
Parameter	BUS	Internal software trigger. Waits for the *TRG (or IEEE 488.1 "get" group execute trigger) command to start the trigger.
	IMMediate	Starts the trigger immediately. (default)
Return parameter	<string>	Return in value of the {BUS| IMM} the setting the trigger source for the output system.
Example	TRIG:OUTP:SOUR IMM
	Sets the trigger source of the output system.
Query example	TRIG:OUTP:SOUR?
	>IMM
	Return the trigger source of the output system.

4.14.5 Trigger Commands Examples

Example 1	The transient system for the trigger in immediate mode.
	TRIG:TRAN:SOUR IMM
	CURR:TRIG MAX
	VOLT:TRIG 5
	INIT:NAME TRAN -> The current changes to the maximum, and the voltage changes to 5V.
Example 2	The transient system for the trigger in BUS mode.
	TRIG:TRAN:SOUR BUS
	CURR:TRIG MAX
	VOLT:TRIG 5
	INIT:NAME TRAN
	TRIG:TRAN (or *TRG) -> The current changes to the maximum, and the voltage changes to 5V.
Example 3	The output system for the trigger in immediate mode.
	TRIG:OUTP:SOUR IMM
	OUTP:TRIG 1
	INIT:NAME OUTP -> The output changes to ON.
Example 4	The output system for the trigger in BUS mode.

```
TRIG:OUTP:SOUR BUS
OUTP:TRIG 1
INIT:NAME OUTP
TRIG:OUTP (or *TRG) ->    The output changes to
                          ON.
```

5. Status Register Overview

To program the PSW power supply effectively, the Status registers need to be understood. This chapter explains in detail how the Status registers are used and how to configure them.

5.1 Introduction to the status register

Overview   The status registers are used to determine the status of the power supply. The status registers maintain the status of the protection conditions, operation conditions and instrument errors.

The PSW Series have a number of register groups:
・Questionable Status Register Group
・Operation Status Register Group
・Standard Event Status Register Group
・Status register group

5.2 Configuration status register

Questionable Status Register

Signal	Condition	PTR/NTP	Event	Enable
OV (Over-Voltage)	0	0	0	0
OC (Over-Current)	1	1	1	1
Not Used	2	2	2	2
POW (AC Power Off)	3	3	3	3
OT (Over-Temperature)	4	4	4	4
Not Used	5	5	5	5
Not Used	6	6	6	6
Not Used	7	7	7	7
VL (Voltage-Limit)	8	8	8	8
CL (Current-Limit)	9	9	9	9
Not Used	10	10	10	10
SD (Shutdown Alarm)	11	11	11	11
Power-Limit	12	12	12	12
Not Used	13	13	13	13
Not Used	14	14	14	14
Not Used	15	15	15	15

Standard Event Status Register

Signal	Event	Enable
OPC (Operation Complete)	0	0
RQC (Request Control)	1	1
QUE (Query Error)	2	2
DDE (Device Dependent Error)	3	3
EXE (Execution Error)	4	4
CME (Command Error)	5	5
URQ (User Request)	6	6
PON (Power On)	7	7

Operation Status Register

Signal	Condition	PTR/NTP	Event	Enable
CAL (Calibration mode)	0	0	0	0
Not Used	1	1	1	1
Not Used	2	2	2	2
Not Used	3	3	3	3
Not Used	4	4	4	4
WTG (Waiting for Trigger)	5	5	5	5
Not Used	6	6	6	6
Not Used	7	7	7	7
CV (Constant Voltage Mode)	8	8	8	8
Not Used	9	9	9	9
CC (Constant Current Mode)	10	10	10	10
OND (Output ON Delay)	11	11	11	11
OFD (Output OFF Delay)	12	12	12	12
Not Used	13	13	13	13
PR (Program Running)	14	14	14	14
Not Used	15	15	15	15

Output Buffer

Error Que

Status Byte Register / Service Request Enable Register

Signal	Status Byte Register	Service Request Enable Register
	0	0
	1	1
ERR	2	2
QUES	3	3
MAV	4	4
ESB	5	5
MSS	6	6
OPER	7	7

5.3 Questionable Status Register Group

Overview   The Questionable Status Register Group indicates if any protection modes or limits have been tripped.

Questionable Status Register

	Condition	PTR/NTP	Event		Enable
OV	0	0	0	&	0
OC	1	1	1	&	1
Not Used	2	2	2	&	2
POW	3	3	3	&	3
OT	4	4	4	&	4
Not Used	5	5	5	&	5
Not Used	6	6	6	&	6
Not Used	7	7	7	&	7
VL	8	8	8	&	8
CL	9	9	9	&	9
Not Used	10	10	10	&	10
SD	11	11	11	&	11
PL	12	12	12	&	12
Not Used	13	13	13	&	13
Not Used	14	14	14	&	14
Not Used	15	15	15	&	15

STATus:QUEStionable:CONDition?   STATus:QUEStionable:EVENt?

STATus:QUEStionable:NTRansition <NRf>
STATus:QUEStionable:NTRansition?
STATus:QUEStionable:PTRansition <NRf>
STATus:QUEStionable:PTRansition?

STATus:QUEStionable:ENABle <NRf>
STATus:QUEStionable:ENABle?

Logical OR

To Status Byte Register

Bit Summary	Bit name	Event	Bit #	Bit Weight
	OV	OV (Over-Voltage) Over voltage protection has been tripped	0	1
	OC	OC (Over-Current) Over current protection has been tripped	1	2
	POW	POW (AC Power Off) AC power switch is off	3	8
	OT	OT (Over Temperature) Over temperature protection has been tripped	4	16
	VL	VL (Voltage Limit) Voltage limit has been reached	8	256
	CL	CL (Current Limit) Current limit has been reached	9	512
	SD	Shutdown Alarm	11	2048
	PL	Power-Limit	12	4096

Condition Register	The Questionable Status Condition Register indicates the status of the power supply. If a bit is set in the Condition register, it indicates that the event is true. Reading the condition register does not change the state of the condition register.
PTR/NTR Filters	The PTR/NTR (Positive/Negative transition) register determines the type of transition conditions that will set the corresponding bit in the Event Registers. Use the Positive transition filter to view events that change from false to positive, and use the negative transition filter to view events that change from positive to negative.
	Positive Transition 0→1 Negative Transition 1→0
Event Register	The PTR/NTR Register will dictate the type of transition conditions will set the corresponding bits in the Event Register. If the Event Register is read, it will be cleared to 0.
Enable Register	The Enable register determines which Events in the Event Register will be used to set the QUES bit in the Status Byte Register.

5.4 Operation Status Register Group

Overview   The Operation Status Register Group indicates the operating status of the power supply.
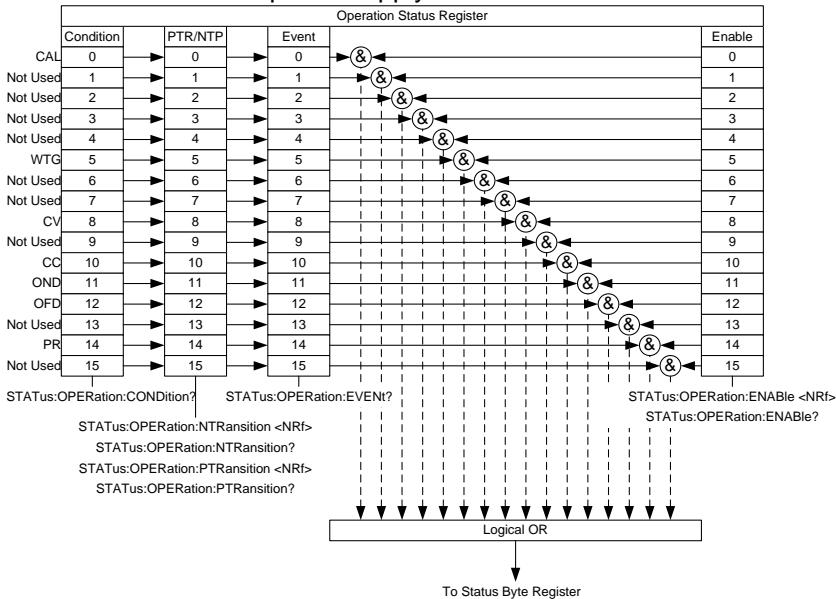
Bit Summary	Bit name	Event	Bit #	Bit Weight
	CAL	CAL (Calibration mode) Indicates if the PSW is in calibration mode.	0	1
	WTG	WTG (Waiting for trigger) Indicates if the PSW is waiting for a trigger.	5	32
	CV	CV (Constant voltage mode) Indicates if the PSW is in CV mode.	8	256
	CC	CC (Constant current mode) Indicates if the PSW is in CC mode.	10	1024
	OND	OND (Output ON Delay) Indicates if Output ON delay time is active	11	2048
	OFD	OFD (Output OFF Delay) Indicates if Output OFF delay time is active	12	4096

	PR	PR (Program Running) Indicates if a Test is running	13	8192
Condition Register	The Operation Status Condition Register indicates the operating status of the power supply. If a bit is set in the Condition register, it indicates that the event is true. Reading the condition register does not change the state of the condition register.			
PTR/NTR Filters	The PTR/NTR (Positive/Negative transition) register determines the type of transition conditions that will set the corresponding bit in the Event Registers. Use the Positive transition filter to view events that change from false to positive, and use the negative transition filter to view events that change from positive to negative.			
	Positive Transition $\quad$ 0→1 Negative Transition $\quad$ 1→0			
Event Register	The PTR/NTR Register will dictate the type of transition conditions will set the corresponding bits in the Event Register. If the Event Register is read, it will be cleared to 0.			
Enable Register	The Enable register determines which registered Events in the Event Register will be used to set the OPER bit in the Status Byte Register.			

5.5 Standard Event Status Register Group

Overview   The Standard Event Status Register Group indicates if any errors have occurred. The bits of the Event register are set by the error event queue.

Standard Event Status Register

	Event		Enable
OPC	0	&	0
RQC	1	&	1
QUE	2	&	2
DDE	3	&	3
EXE	4	&	4
CME	5	&	5
URQ	6	&	6
PON	7	&	7

*ESR?   *ESE <NRf>
                                       *ESE?

Logical OR

To Status Byte Register
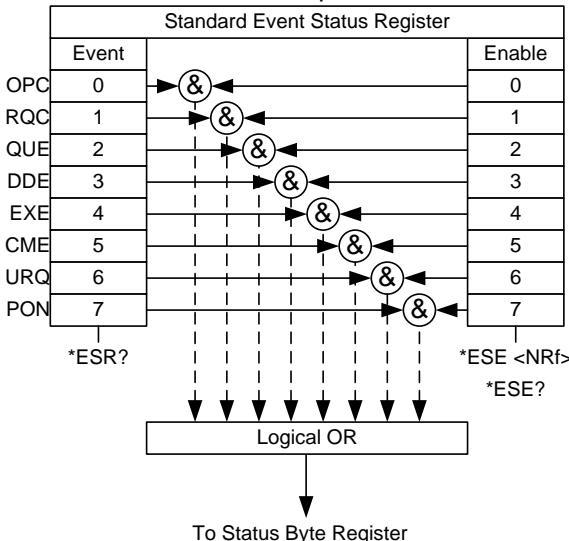
Bit Summary	Bit name	Event	Bit #	Bit Weight
	OPC	OPC (Operation complete) The OCP bit is set when all selected pending operations are complete. This bit is set in response to the *OPC command.	0	1
	RQC	Request control	1	2
	QUE	QUE (Query Error) The Query Error bit is set in response to an error reading the Output Queue. This can be caused by trying to read the Output Queue when there is no data present.	2	4
	DDE	DDE (Device Dependent Error) Device specific error.	3	8

	EXE	EXE (Execution Error) The EXE bit indicates an execution error due to one of the following: illegal command parameter, parameter out of range, invalid parameter, the command didn't execute due to an overriding operation condition.	4	16
	CME	CME (Command Error) The CME bit is set when a syntax error has occurred. The CME bit can also be set when a <GET> command is received within a program message.	5	32
	URQ	(User Request	6	64
	PON	PON (Power On) Indicates the power is turned on.	7	128

Event Register	Any bits set in the event register indicate that an error has occurred. Reading the Event register will reset the register to 0.
Enable Register	The Enable register determines which Events in the Event Register will be used to set the ESB bit in the Status Byte Register.

5.6 Status register group

Overview The Status Byte register consolidates the status events of all the status registers. The Status Byte register can be read with the *STB? query and can be cleared with the *CLS command.
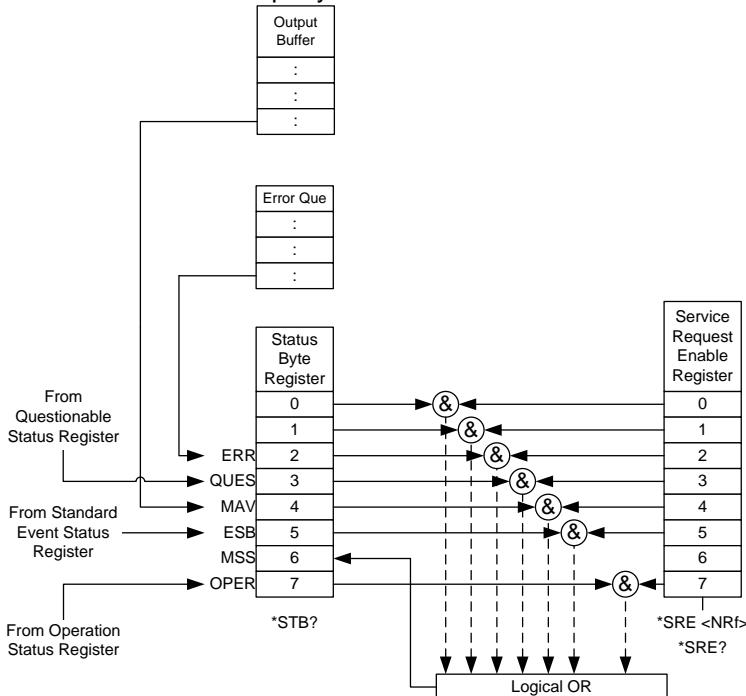
Bit Summary	Bit name	Event	Bit #	Bit Weight
	ERR	ERR (Error Event/Queue) If data is present in the Error queue, the ERR bit will be set.	2	4
	QUES	QUES (Questionable Status Register) The summary bit for the Questionable Status Register group.	3	8
	MAV	MAV (Message Available) This is set when there is data in the Output Queue waiting to be read.	4	16

	ESB	ESB (Event Summary Bit) The ESB is the summary bit for the Standard Event Status Register group.	5	32
	MSS	The MSS Bit is the summary of the Status Byte Register and Service Request register (bits 1-5, 7). This will be set to 1.	6	64
	OPER	OPER (Operation Status Register) OPER bit is the summary bit for the Operation Status Register Group.	7	128

Status Byte Register	Any bits set in the Status byte register acts as a summary register for all the three other status registers and indicates if there is a service request, an error in the Error Queue or data in the Output Queue. Reading the Status Byte register will reset the register to 0.
Service Request Enable Register	The Service Request Enable Register controls which bits in the Status Byte Register are able to generate service requests.

5.7 Error code

No.	Description
-100	Command
-102	Syntax error
-103	Invalid separator
-104	Data type
-108	Parameter not allowed
-109	Missing parameter
-111	Header separator error
-112	Program mnemonic too long
-113	Undefined header
-114	Header suffix out of range
-115	Unexpected number of parameters
-120	Numeric data error
-121	Invalid character in number
-128	Numeric data not allowed
-131	Invalid suffix
-141	Invalid character data
-148	Character data not allowed
-151	Invalid string data
-158	String data not allowed
-160	Block data error
-161	Invalid block data
-168	Block data not allowed
-178	Expression data not allowed
-180	Macro error
-200	Execution error
-201	Invalid while in local
-203	Command protected
-211	Trigger ignored
-213	Init ignored
-220	Parameter error
-221	Settings conflict
-222	Data out of range
-224	Illegal parameter value
-310	System error
-320	Storage fault
-400	Query error

6. Appendix
6.1 PSW Default Settings

The following default settings are the factory configuration settings for the power supply(Function settings/Test settings).

Initial Settings		Default Setting
Output		OFF
Key lock		0 (Disabled)
Voltage setting		0 V
Current setting		0 A
OVP		Maximum
OCP		Maximum
Normal Function Settings	Setting	Default Setting
Output ON delay time	F-01	0.00s
Output OFF delay time	F-02	0.00s
V-I mode slew rate select	F-03	0 = CV high speed priority
Rising voltage slew rate	F-04	0.01V/s~60.00V/s (PSW-XXL30)
		0.1V/s~160.0V/s (PSW-XXL80)
		0.1V/s~320.0V/s (PSW-XXM160)
		0.1V/s~500.0V/s (PSW-XXM250)
		1V/s ~1600V/s (PSW-XXH800)
Falling voltage slew rate	F-05	0.01V/s~60.00V/s (PSW-XXL30)
		0.1V/s~160.0V/s (PSW-XXL80)
		0.1V/s~320.0V/s (PSW-XXM160)
		0.1V/s~500.0V/s (PSW-XXM250)
		1V/s ~1600V/s (PSW-XXH800)
Rising current slew rate	F-06	0.01A/s~72.00A/s (PSW-360L30)
		0.1A/s~144.0A/s (PSW-720L30)
		0.1A/s~216.0A/s (PSW-1080L30)
		0.01A/s~27.00A/s (PSW-360L80)
		0.01A/s~54.00A/s (PSW-720L80)
		0.01A/s~81.00A/s (PSW-1080L80)
		0.01A/s~14.40A/s (PSW-360M160)
		0.01A/s~28.80A/s (PSW-720M160)
		0.01A/s~43.20A/s (PSW-1080M160)
		0.001A/s ~ 9.000A/s (PSW-360M250)
		0.01A/s ~ 18.00A/s (PSW-720M250)
		0.01A/s ~ 27.00A/s (PSW-1080M250)
		0.001A/s ~ 2.880A/s (PSW-360H800)
		0.001A/s ~ 5.760A/s (PSW-720H800)
		0.001A/s ~ 8.640A/s (PSW-1080H800)

Falling current slew rate	F-07	0.01A/s~72.00A/s (PSW-360L30) 0.1A/s~144.0A/s (PSW-720L30) 0.1A/s~216.0A/s (PSW-1080L30) 0.01A/s~27.00A/s (PSW-360L80) 0.01A/s~54.00A/s (PSW-720L80) 0.01A/s~81.00A/s (PSW-1080L80) 0.01A/s~14.40A/s (PSW-360M160) 0.01A/s~28.80A/s (PSW-720M160) 0.01A/s~43.20A/s (PSW-1080M160) 0.001A/s ~ 9.000A/s (PSW-360M250) 0.01A/s ~ 18.00A/s (PSW-720M250) 0.01A/s ~ 27.00A/s (PSW-1080M250) 0.001A/s ~ 2.880A/s (PSW-360H800) 0.001A/s ~ 5.760A/s (PSW-720H800) 0.001A/s ~ 8.640A/s (PSW-1080H800)
Internal resistance setting	F-08	0.000Ω
Bleeder circuit control	F-09	1 = ON
Buzzer ON/OFF control	F-10	1 = ON
Measurement Average Setting	F-17	0 = Low
Lock Mode	F-19	0 = Panel lock: allow output off
USB/GPIB setting		
Rear Panel USB Mode	F-22	2 = USB CDC
GPIB address	F-23	8
LAN setting		
LAN	F-36	1 = Enable
DHCP	F-37	1 = Enable
Sockets active	F-57	1 = Enable
Web Server active	F-59	1 = Enable
Web password active	F-60	1 = Enable
Web setting password	F-61	0000
Power On Configuration		
CV Control	F-90	0 = Panel control (local)
CC Control	F-91	0 = Panel control (local)
Power-ON Output	F-92	0 = OFF at startup
Master/Slave	F-93	0 = Master/Local
External Out Logic	F-94	0 = High ON
Power Switch trip	F-95	0 = Enable

6.2 Error Messages & Messages

The following error messages or messages may appear on the PSW screen during operation.

Error Messages	Description
Err 001	USB Mass Storage is not present
Err 002	No (such)file in USB mass storage
Err 003	Empty memory location
Err 004	File access error
Err 901	Keyboard CPLD error
Err 902	External control input and output error CPLD
Err 920	Over-range of the ADC calibration
Err 921	Over-range of the DAC calibration
Err 922	Calibration point invalid
Messages	Description
MSG 001	External control of output. Output off (F-94=0, High=on)
MSG 002	External control of output. Output off (F-94=1, Low=on)
MSG 003	Not connected. (F-93=1 or F-93=2)

LCD Display Format
Use the following table to read the LCD display messages.

0	1	2	3	4	5	6	7	8	9	A	B	C	D

E	F	G	H	I	J	K	L	M	N	O	P	Q	R

S	T	U	V	W	X	Y	Z	(	)	+	-	,	

TEXIO

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