TEXIO
Test and Measurement Solutions

PROGRAMMING MANUAL

WIDE RANGE DC POWER SUPPLY
PFR-100 SERIES

B71-0481-01

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■ About firmware version

This programming manual is required firmware version 1.00 or higher.

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1. Configuration Settings

1-1. Setting Configuration Settings

Background

The normal configuration settings (F-01~F-61, F-71~F-78, 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 Communication Interface chapter. (page 5)
Ensure the load is not connected.
Ensure the output is off.

Note

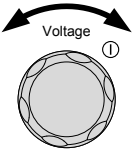
Configuration settings F-90~F-94 cannot be edited in the Normal Function Settings. See the user manual for details.
F-20, F-21, F-25, F-30~F-35, F-78, F-89 settings can only be viewed, not set.

Steps

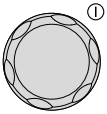
1. Press the Function key. The function key will light up.

2. The display will show F-01 on the top and the configuration setting for F-01 on the bottom.

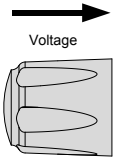
3. Rotate the Voltage knob to change the F setting.
   Range F-00~F-61, F-71~F-78, F-88~F-94



4. Use the Current knob to set the parameter for the chosen F setting.



5. Press the Voltage knob to save the configuration setting.
   ConF will be displayed when successful.



Exit

Press the Function key again to exit the configuration settings.
The Function key light will turn off.

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	0.1V~100.0V/s (PFR-100L50) 0.1V~500.0V/s (PFR-100M250)
Falling voltage slew rate	F-05	0.1V~100.0V/s (PFR-100L50) 0.1V~500.0V/s (PFR-100M250)
Rising current slew rate	F-06	0.01A/s~20.00A/s (PFR-100L50) 0.001A/s~4.000A/s (PFR-100M250)
Falling current slew rate	F-07	0.01A/s~20.00A/s (PFR-100L50) 0.001A/s~4.000A/s (PFR-100M250)
Bleeder circuit control	F-09	0 = OFF, 1 = ON, 2 = AUTO
Buzzer ON/OFF control	F-10	0 = OFF, 1 = ON
Detection Time of OCP	F-12	0.0~2.0 sec
Current Setting Limit (I-Limit)	F-13	0 = OFF (The limit function of current setting is disabled.) 1 = ON (The limit function of current setting is enabled.)
Voltage Setting Limit (V-Limit)	F-14	0 = OFF (The limit function of voltage setting is disabled.) 1 = ON (The limit function of voltage setting is enabled.)
Memory Recall Display	F-15	0 = OFF, 1 = ON
Measurement Average Setting	F-17	0 = Low, 1 = Middle, 2 = High
Lock Mode	F-19	0 = Lock Panel, Allow Output OFF 1 = Lock Panel, Allow Output ON/OFF
USB/GP-IB Settings		
Front panel USB status*	F-20	0 = None, 1 = Mass Storage
Rear panel USB status*	F-21	0 = None, 2 = Linking PC
GP-IB Address	F-23	0~30
Show GPIB available status*	F-25	0 = No GPIB, 1 = GPIB is available
Interface Select	F-29	0 = Disable, 1 = RS232, 2 = R485, 3 = USB-CDC / NO Mass Storage, 4 = GPIB, 5 = LAN SOCKET, 6 = LAN WEB

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
DHCP	F-37	0 = OFF, 1 = ON
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
Web Password Enable/Disable	F-60	0 = Disable, 1 = Enable
Web Enter Password	F-61	0000~9999
UART Settings		
UART Baud Rate	F-71	0 = 1200, 1 = 2400, 2 = 4800, 3 = 9600, 4 = 19200, 5 = 38400, 6 = 57600, 7 = 115200
UART Data Bits	F-72	0 = 7 bits, 1 = 8 bits
UART Parity	F-73	0 = None, 1 = Odd, 2 = Even
UART Stop Bit	F-74	0 = 1 bit, 1 = 2 bits
UART TCP	F-75	0 = SCPI, 1 = Reserve
UART Address	F-76	00~30
UART Multi-Drop control	F-77	0 = Disable, 1 = Master, 2 = Slave, 3 = Display Information
UART Multi-Drop status*	F-78	Displayed parameter: AA-S AA: 0~30 (Address) S: 0 = Off-line, 1 = On-line
System settings		
Factory Default Configuration	F-88	0 = None, 1 = Return to factory default settings

Show Version	F-89	0, 1 = Version 2, 3, 4, 5 = Build date (YYYYMMDD) 6, 7 = Keyboard CPLD Version 8, 9 = Analog-Control CPLD Version A, B = Reserved C, D, E, F = Kernel Build Date (YYYYMMDD)
Power On Configuration Settings**		
CV Control	F-90	0 = Panel control (local) 1 = External Voltage control 2 = External Resistance control-Rising (Ext-R↙ 10kΩ = Vo, max) 3 = External Resistance control-Falling (Ext-R↘10kΩ = 0)
CC Control	F-91	0 = Panel control (local) 1 = External Voltage control 2 = External Resistance control-Rising (Ext-R↙ 10kΩ = Io,max) 3 = External Resistance control-Falling (Ext-R↘10kΩ = 0)
Power ON Output	F-92	0 = Safe Mode (Output OFF at startup) 1 = Force Mode (Output ON at startup) 2 = Auto Mode (Status before last time Power OFF)
External Output Logic Control***	F-94	0 = High ON, 1 = Low ON, 2 = Disable
Special Function setting		
Special Function	F-00	0000~9999

Note

* These settings can only be viewed, not set.

** Normally there are for display only. When setting, hold down the Function key and power on.

*** This function is set by External Output ON / OFF Control

2. Communication Interface

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

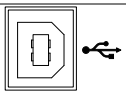
2-1. USB Interface

2-1-1. USB Remote Interface

Note	When using the USB Remote Interface, The USB port on the front panel will become disabled and fail to be used.	
USB Configuration	PC side connector	Type A, host
	PFR-100 side connector	Rear panel Type B, slave
	Speed	1.1 (full speed)
	USB Device Class	USB-CDC
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.	

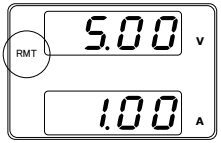
Steps

1. Connect the USB cable to the rear panel USB B port.



2. Press the Function key to enter the Normal configuration settings and select F-29 (Interface port). F-29 = 3 (USB-CDC).

3. Check to see that the USB is detected by PFR-100. The F-21 setting indicates the rear USB port.
   F-21 = 0 Indicates the rear USB port is not detected.
   F-21 = 1 Indicates the rear USB port is available.
4. The RMT indicator will turn on when a remote connection has been established.



5. When the PC correctly recognizes "PFR", the USB driver is installed and registered as a COM port. Open the device manager and check the port.
   If it is not recognized correctly, installation of the USB driver is necessary.
   Since this unit is displayed on "other device", right click on the device and update the driver. Please copy the downloaded USB driver from the attached CD or our HP to the appropriate folder and specify the search destination.

2-1-2. USB-CDC Remote Control Function Check

Please note that the port settings may not be confirmed if the device driver is not used for this unit.

Please prepare the Terminal application (such as PuTTY or RealTerm). Serial communication settings are as follows.

Baud rate	: 9600 bps	Data bits	: 8 bits
Parity bit	: None	Stop bits	: 1 bit
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 name, Serial number, and Firmware version in the following format.

TEXIO,PFR-100L50,TW1234567,01.01.12345678

Manufacturer : TEXIO
Model name : PFR-100L50
Serial number : TW1234567
Firmware version : 01.01.12345678

Termination character of commands and queries use the ^j (LF: Line Feed).

2-2. GPIB Interface

2-2-1. GPIB Remote Interface

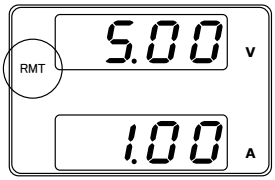
To use GPIB, you must select a model with a GPIB. This is a factory installed option and cannot be installed the end-user. Only one GPIB address can be used at a time.

Configure GPIB

1. Ensure the PFR-100 is off before proceeding.
2. Connect the GPIB cable (part number: GTL-258) from a GPIB controller to the GPIB port on the PFR-100.
3. Turn the PFR-100 on.
4. Press the Function key to enter the Normal configuration settings.

5. Set the following GPIB settings.
   F-29 = 4 Enable the GPIB port
   F-23 = 0~30 Set the GPIB address (0~30/ Default : 8)
6. Check to see the GPIB option is detected by the PFR-100. The F-25 setting indicates the GPIB port status.
   F-25 = 0 Indicates that the GPIB port is not detected.
   F-25 = 1 Indicates that the GPIB port is available.

7. The RMT indicator will turn on when a remote connection has been established.



GPIB 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.

2-2-2. GPIB Function Check

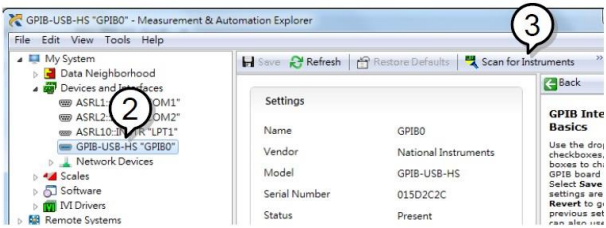
Background — To test the GPIB functionality, National Instruments Measurement and Automation Explorer can be used. This program is available on the NI website, www.ni.com., via a search for the VISA Run-time Engine page, or “downloads” at the following URL, http://www.ni.com/visa/

Requirements — PC Operating System(OS): Windows 7 or later

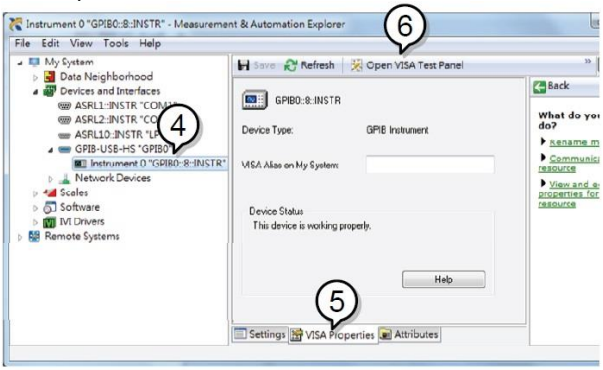
Functionality check

1. Start the NI Measurement and Automation Explorer (NI-MAX) program. Using Windows, press:
   Start ->All Programs ->National Instruments ->Measurement & Automation

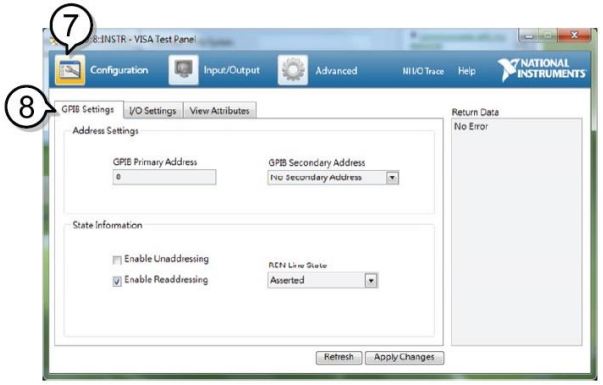
   Display and operated by a version of NI-MAX is different. Please operate in accordance with the version you are using.
2. From the Configuration panel access;
   My system>Devices and Interface>GPIB
3. Press *Scan for Instruments*.



4. Select the device (GPIB address of PFR-100) that now appears in the *System>Devices and Interfaces > GPIB-USB-HS "GPIBX"* node.
5. Click on the *VISA Properties* tab on the bottom.
6. Click *Open Visa Test Panel*.

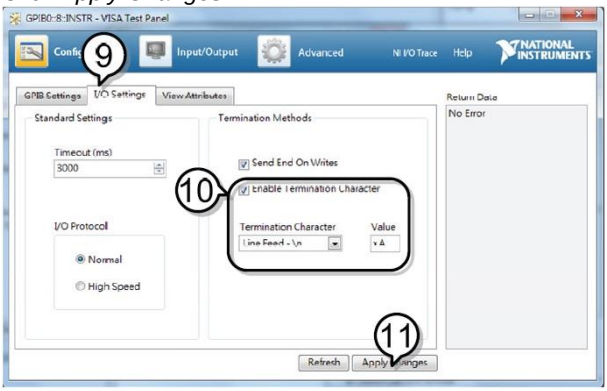


7. Click on *Configuration*.
8. Click on the *GPIB Settings* tab and confirm that the GPIB settings are correct.



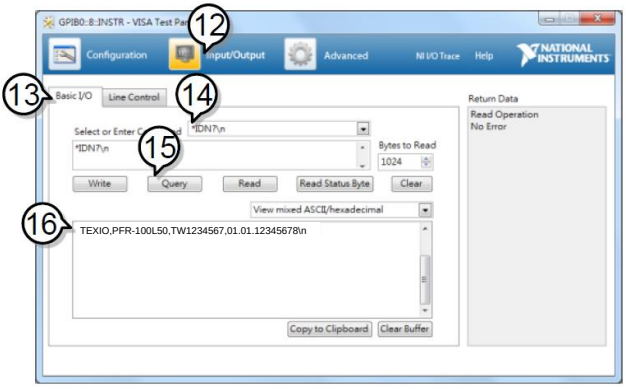
9. Click on the *I/O Settings* tab.
10. Make sure the *Enable Termination Character* check box is checked, and the terminal character is \n (Value: xA).

11. Click *Apply Changes*.



12. Click on *Input/Output*.
13. Click on the *Basic/IO* tab.
14. Enter *IDN? in the *Select or Enter Command* drop down box.
15. Click *Query*.
16. The *IDN? query will return the Manufacturer, model name, serial number and firmware version in the dialog box.

    TEXIO,PFR-100L50,TW1234567,01.01.12345678



2-3. LAN Interface

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 PFR-100 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	For details on how to configure the Ethernet settings	
Parameters	DHCP Enable/Disable	MAC Address (display only)
	Subnet Mask	IP Address
	DNS Address	Gateway
	Web Password Enable/Disable	
	Web Enter Password	0000~9999(Default 0000)
	Socket port:	2268(Fixed)

2-3-1. Web Server Configuration

Configuration

This configuration example will configure the PFR-100 as a web server and use DHCP to automatically assign an IP address to the PFR-100.

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-29 = 6	Interface port select & Turn LAN (Web) on
F-37 = 1	Enable DHCP
F-60 = 0 or 1	Set to 0 to disable web password, set to 1 to enable web password.
F-61 = 0000~9999	Set the web password

3. The LAN indicator will turn on when a network cable is plugged in.

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

2-3-2. Web Server Remote Control Function Check

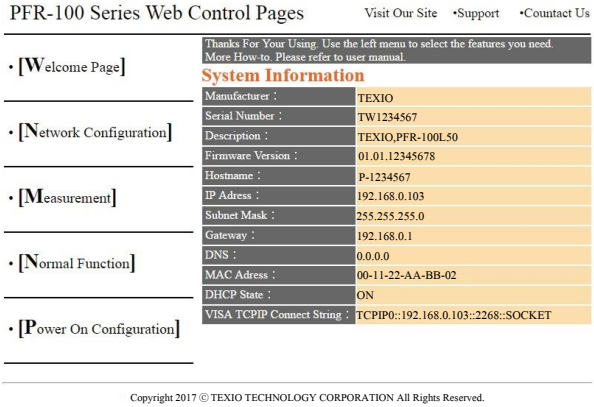
Functionality check

Enter the IP address of the power supply in a web browser after the instrument has been configured as a web server. The web server allows you to monitor the function settings of the PFR-100.
You can check the IP address by checking F-39 to F-42.

F-39 = AAA IP Address part 1 of 4
F-40 = BBB IP Address part 2 of 4
F-41 = CCC IP Address part 3 of 4
F-42 = DDD IP Address part 4 of 4

http://AAA.BBB.CCC.DDD

The web browser interface appears.



The web browser interface allows you to access the following:

- Network configuration settings
- Measurement setting
- Normal Function setting
- Power On Configuration setting

Note

If the network connection can not be confirmed, update the power switch again or update the web browser loading.

2-3-3. Socket Server Configuration

Configuration

This configuration example will configure the PFR-100 socket server.
The following configuration settings will manually assign the PFR-100 an IP address and enable the socket server. The socket server port number is fixed at 2268.

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

5. Press the Function key to enter the Normal configuration settings.

Set the following LAN settings (setting examples from F-39 to F-54):

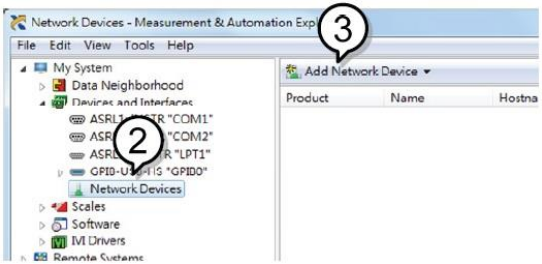
F-29 =	5	Turn LAN (Socket) on
F-37 =	0	Disable DHCP
F-39 =	192	IP Address part 1 of 4
F-40 =	168	IP Address part 2 of 4
F-41 =	5	IP Address part 3 of 4
F-42 =	133	IP Address part 4 of 4
F-43 =	255	Subnet Mask part 1 of 4
F-44 =	255	Subnet Mask part 2 of 4
F-45 =	255	Subnet Mask part 3 of 4
F-46 =	0	Subnet Mask part 4 of 4
F-47 =	192	Gateway part 1 of 4
F-48 =	168	Gateway part 2 of 4
F-49 =	5	Gateway part 3 of 4
F-50 =	101	Gateway part 4 of 4
F-51 =	192	DNS part 1 of 4
F-52 =	168	DNS part 2 of 4
F-53 =	5	DNS part 3 of 4
F-54 =	101	DNS part 4 of 4

2-3-4. Socket Server Function Check

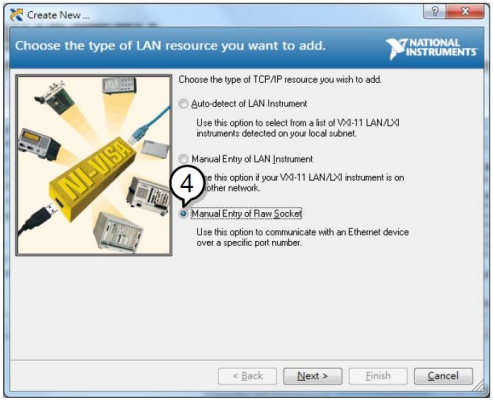
Background	To test the socket server functionality, National Instruments Measurement and Automation Explorer can be used. This program is available on the NI website, www.ni.com., via a search for the VISA Run-time Engine page, or “downloads” at the following URL, http://www.ni.com/visa/
Requirements	PC Operating System(OS): Windows 7 or higher
Functionality check	1. Start the NI Measurement and Automation Explorer (MAX) program. start>All PROGRAM>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...*

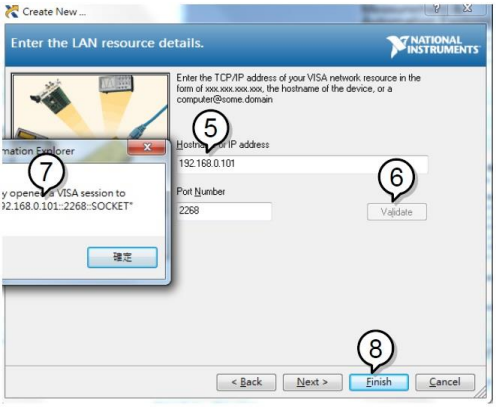


4. Select *Manual Entry of Raw Socket* from the popup window.

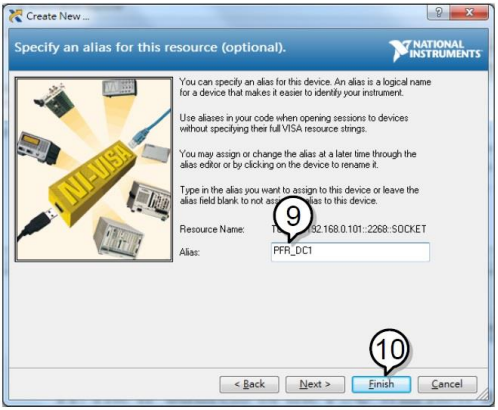


5. Enter the IP address and the port number of the PFR-100. The port number is fixed at 2268.
6. Click the *Validate* button.

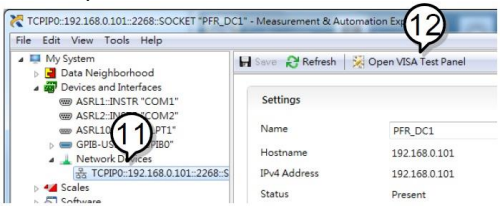
7. A popup will appear if a connection is successfully established.
8. Click *Next*.



9. Next configure the Alias (name) of the PFR-100 connection. Example: PFR-100_DC1
10. Click *finish*.

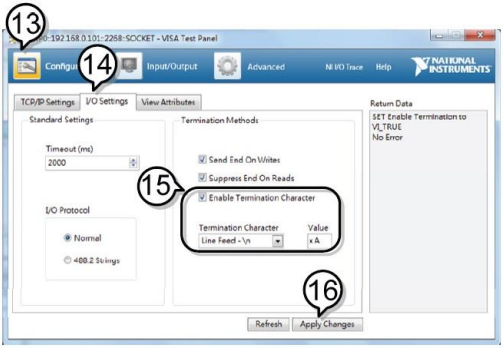


11. The IP address of the PFR-100 will now appear under Network Devices in the configuration panel. Select this icon now.
12. Press *Open VISA Test Panel*.



13. Click the *Configuration* icon.

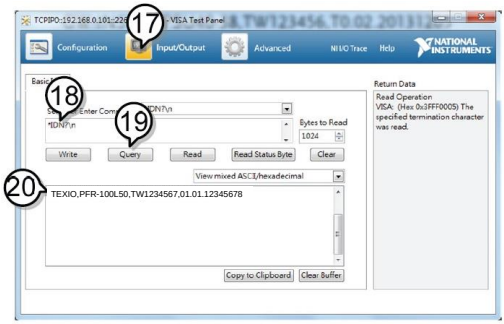
14. Click on *I/O Settings*.
15. Make sure the *Enable Termination Character* check box is checked, and the terminal character is \n (Value: xA).
16. Click *Apply Changes*.



17. Click the *Input/Output* icon.
18. Enter *IDN? in the *Select or Enter Command* dialog box if it is not already.
19. Click the *Query* button.
20. The *IDN? query will return the Manufacturer, model name, serial number and firmware version in the dialog box.

    TEXIO,PFR-100L50,TW1234567,01.01.12345678

    Manufacturer: TEXIO
    Model name : PFR-100L50
    Serial number : TW1234567
    Firmware version : 01.01.12345678



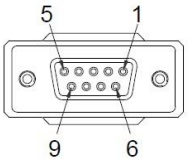
2-4. Serial Interface

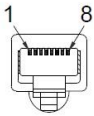
2-4-1. UART Remote Interface

The PFR-100 uses the IN & OUT ports for UART communication coupled with RS232 (Part number: GTL-259) or RS485 adapters (Part number: GTL-260). When using only one unit with RS485, connect the end terminal connector to Remote-OUT. The end terminal connector is not required in RS232.

The pin outs for the adapters are shown below.

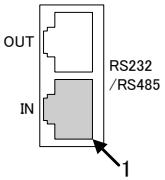
RS232 cable with DB9 & RJ-45 shielded connectors GTL-259	DB-9 Connector		Remote-IN Port		Remarks
	Pin No.	Name	Pin No.	Name	
	Housing	Shield	Housing	Shield	
	2	RX	7	TX	Twisted pair
	3	TX	8	RX	
	5	SG	1	SG	
RS485 cable with DB9 & RJ-45 shielded connectors GTL-260	DB-9 Connector		Remote-IN Port		Remarks
	Pin No.	Name	Pin No.	Pin No.	Name
	Housing	Shield	Housing	Shield	
	9	TXD-	6	RXD-	Twisted pair
	8	TXD+	3	RXD+	
	1	SG	1	SG	
	5	RXD-	5	TXD-	Twisted pair
	4	RXD+	4	TXD+	





Steps

1. Connect the RS232 serial cable (GTL-259) or RS485 serial cable (GTL-260) to the Remote-IN port on the real panel.
   Connect the other end of the cable to the PC.
   When using only one unit with RS485, connect the end terminal connector to Remote-OUT.

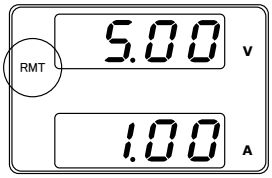


2. Press the Function key to enter the Normal configuration settings.
   Set the following UART settings:

   F-29 = 1 or 2 Interface port:
   1 = RS232 or 2 = RS485
   F-71 = 0~7 Set the baud rate:
   0 = 1200, 1 = 2400, 2 = 4800,
   3 = 9600, 4 = 19200, 5 = 38400,
   6 = 57600, 7 = 115200
   F-72 = 0 or 1 Data bits: 0 = 7 or 1 = 8

F-73 = 0~2	Parity 0 = none, 1 = odd, 2 = even
F-74 = 0 or 1	Stop bits: 0 = 1, 1 = 2
F-75 = 0	TCP: 0 = SCPI
F-76 = 0~30	UART address for multi-unit remote connection.
F-77 = 0~3	Multi-Drop control: 0 = Disable, 1 = Master, 2 = Slave, 3 = Display Information
F-78 = 0~30	Multi-Drop status display Displayed parameter: AA-S AA: 0~30 (Address), S: 0~1 (Off-line/On-line status).

3. The RMT indicator will turn on when a remote connection has been established.



2-4-2. UART Function Check

Functionality check

Invoke a terminal application such as Realterm.
To check the COM port No, see the Device Manager in the PC.
Run this query command via the terminal application after the instrument has been configured for either RS232 or RS485 remote control.

*IDN?

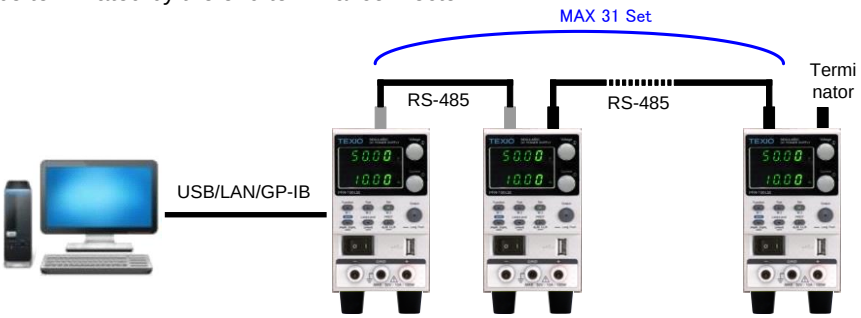
This should return the Manufacturer, Model number, Serial number, and Firmware version in the following format:

TEXIO,PFR-100L50,TW1234567,01.01.12345678
  Manufacturer: TEXIO
  Model name : PFR-100L50
  Serial number : TW1234567
  Firmware version : 01.01.12345678
^j (LF:Line Feed) can be used as the terminal character when entering the queries/commands from a terminal application.

2-5. Multidrop Interface

2-5-1. Multiple Unit Connection

The PFR-100 power supplies can have up to 31 units daisy-chained together using the 8 pin connectors (Remote-IN OUT ports) on the rear panel. The first unit (master) in the chain is remotely connected to a PC using USB, GPIB or LAN (Multi-Drop mode). Each subsequent unit (slave) is daisy-chained to the next using a RS485 local bus. The Remote-OUT port on the last terminal must be terminated by the end terminal connector.

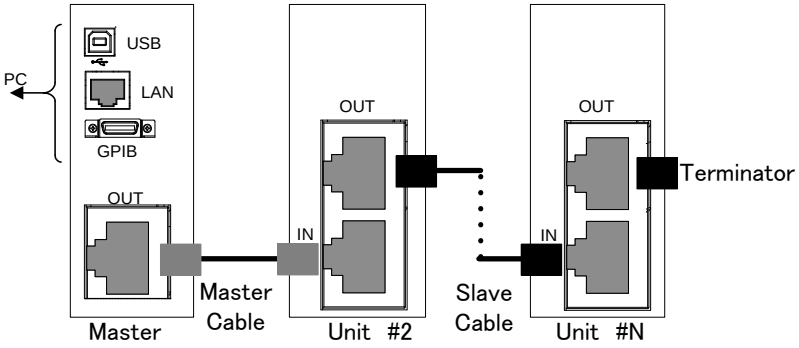


There is a mode for controlling multiple units. This mode allows the user to enter the SCPI commands developed for the instrument (Multi-Drop mode). In this mode, only the Multi-Drop parameters have to be specified. Each unit is assigned a unique address and can then be individually controlled from the host PC.

2-5-1-1. Multi-Drop mode

Operation

1. All units must be powered down before starting the Multi-Drop mode configuration.
2. Connect the first unit's LAN, USB or GPIB port to a PC.
3. Connect the Remote-OUT port on the first unit to the IN port of the second unit using the master serial link cable (gray plug)GTL-261.
4. Connect all the remaining units between the Remote-OUT port and the IN port with the slave serial link cable (black plug) GTL-262 until all the desired units have been daisy-chained together.
5. Terminate the Remote-OUT port of the last unit with the end terminal connector included in the GTL-261.



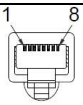
6. Power up all slave units.
7. Set the addresses of all slave units using the F-76 parameter.
   F-76 = 00~30 Set the address of the master unit. It must be a unique address identifier.
8. Set the Multi-Drop setting parameter (F-77) to Slave for all slave units.
   F-77 = 2 Set the Multi-Drop setting to slave.
9. Power up the master unit.
10. Set the addresses of the master units using the F-76 parameter.
    F-76 = 00~30 Set the address of the unit. It must be a unique address identifier.
11. You can check the slaves' addresses by using the F-77 parameter on the master unit.
    F-77 = 3 Display on each slave units the configured address. This can show if identical addresses have been assigned individually to each slave units.
12. Set the Multi-Drop setting parameter (F-77) to Master.
    F-77 = 1 Set the Multi-Drop setting to master.
13. You can display the status of each slave unit by using the F-78 parameter.
    F-78 = 00~30 Displayed parameter: AA-S
    AA: 0~30 (Address),
    S: 0~1 (Off-line/On-line status).
14. Multiple units can now be operated using SCPI commands.

Slave serial link cable with RJ-45 shielded connector (black plug)
GTL-262

RS-485 slave serial link pin assignment			
8 Pin Connector (IN)		8 Pin Connector (OUT)	
Pin No.	Name	Pin No.	Name
Housing	Shield	Housing	Shield
1	SG	1	SG
6	TXD-	6	TXD-
3	TXD+	3	TXD+
5	RXD-	5	RXD-
4	RXD+	4	RXD+

Master serial link cable with RJ-45 shielded connector (gray plug)
GTL-261

RS-485 master serial link pin assignment			
8 Pin Connector (IN)		8 Pin Connector (OUT)	
Pin No.	Name	Pin No.	Name
Housing	Shield	Housing	Shield
1	SG	1	SG
6	TXD-	5	RXD-
3	TXD+	4	RXD+
5	RXD-	6	TXD-
4	RXD+	3	TXD+



2-5-1-2. Multi-Drop mode Function Check

Functionality check

Invoke a terminal application such as Realterm.
To check the COM port No, see the Device Manager in the PC.
When using the Multi-Drop mode, the entire SCPI command list developed for the PFR-100 can be used. Each unit can be individually controlled after a slave unit has been selected. For this function check, we will assume that the master unit is assigned to address 0, while a slave is assigned address 5.
Run this query command via the terminal application after the instruments have been configured for multi-unit control with Multi-Drop mode. See page 18.

```
:INST:SEL 0          ← Press ENTER after typing.
*IDN?                ← Press ENTER after typing.
TEXIO,PFR-100L50,TW1234567,01.01.12345678
```

```
:INST:SEL 5          ← Press ENTER after typing.
*IDN?                ← Press ENTER after typing.
TEXIO,PFR-100L50,TW7654321,01.01.12345678
```

```
:INST:SEL 6          ← Press ENTER after typing.
```

Selects the unit with address 6 (not configured in our example). An error is displayed on the master front panel.

:SYST:ERR? ← Press ENTER after typing.
Settings conflict
Query the system errors. “Settings conflict” is returned.

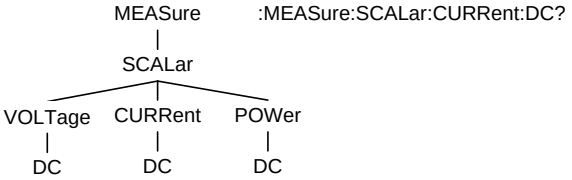
:INST:STAT? ← Press ENTER after typing.
33,0
Returns the active units and master unit in the bus.
33 = 0b100001
The units at address 0 and address 5 are on-line.
0
Master device's address is 0.

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.



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		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. Abort Command

4-1-1. :ABORt

Set →

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

4-2. Apply Commands

4-2-1. :APPLy

Set →
→ Query

Description	This 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> <current> MINimum MAXimum	<NRf>(V) 0% ~ 105% of the rated output voltage. <NRf>(A) 0% ~ 105% of the rated output current. 0 volts/0 amps Maximum value for the present range.
Return parameter 1	<NR2>	Return value of the voltage.
Return parameter 2	<NR2>	Return value of the current.
Example 1	:APPL 5.05,1.1 Sets to 1.1A current, to 5.05V voltage.	
Example 2	: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) .	

4-3. Display Commands

4-3-1. :DISPlay:MENU[:NAME]

Set → / → Query

Description	This 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)	

4-3-2. :DISPlay[:WINDow]:TEXT:CLEar

Set →

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

4-3-3. :DISPlay[:WINDow]:TEXT[:DATA]

Set → / → Query

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.	
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.

Set →
→ Query

4-3-4. :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>	
Example	:DISP:BLIN 1 Turns blink ON.	
Query example	:DISP:BLIN? >0 Return the status of the blink display.	

4-4. Initiate Commands

Set →
→ Query

4-4-1. :INITiate:CONTinuous[:TRANsient]

Description	This command continuously initiates software triggers for the transient or output triggers.	
Syntax	:INITiate:CONTinuous[:TRANsient] { <bool> | OFF | ON }	
Query Syntax	:INITiate:CONTinuous[:TRANsient]?	
Parameter	0 | OFF	OFF
	1 | ON	ON
Return parameter	0	OFF
	1	ON
Example	:INIT:CONT 1 Turns on the continuous trigger.	
Query example	:INIT:CONT? >1 It returns the code of the current state. The trigger is valid.	

4-4-2. :INITiate[:IMMediate]:NAME

Set →

Description	This 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.	

4-4-3. :INITiate[:IMMediate][:TRANsient]

Set →

Description	This command controls the enabling of output triggers. When a trigger is enabled, a trigger causes the specified action to occur. If the trigger system is not enabled, all triggers are ignored.
Syntax	:INITiate[:IMMediate][:TRANsient]
Example	:INIT Generate a trigger.

4-5. Instrument Commands

4-5-1. :INSTrument:SCAN

Set →

Description	Links the units which could be scanned from system when using Multi-Drop mode.
Syntax	:INSTrument:SCAN
Example	:INST:SCAN Scan the linked device.

4-5-2. :INSTrument:SELect

Set → / → Query

Description	Specifies the address of the unit to which communication will be established when using the Multi-Drop mode.	
Syntax	:INSTrument:SELect {<NR1>}	
Query Syntax	:INSTrument:SELect?	
Parameter	<NR1>	The address of the unit to be selected (0~30).
Return parameter	<NR1>	The currently selected address.
Example	:INST:SEL 30 The currently selected address is 30.	
Query example	:INST:SEL? >30 Returns the currently selected address. The address 30 is selected.	

4-5-3. :INSTrument:STATe

→ Query

Description	Displays the status (on-line/off-line) of each slave unit and the address of master unit, when using the Multi-Drop mode.	
Query Syntax	:INSTrument:STATe?	
Return parameter 1	<NR1>	0~2147483647 (2147483647=2^31-1) Each bit of the binary value corresponds to a unit from 0 to 30 (LSB to MSB). The bit will be set to 1 when the corresponding unit is on-line.

Return parameter 2	<NR1>	0~30 This value represents the master address.
Query example	:INST:STAT? >+33, 0 33 = 0b100001 The units at address 0 and address 5 are on-line. Master device's address is 0.	

4-5-4. :INSTrument:DISPlay

Set →

Description	Display your own address information (F-76) on all slave units when using the Multi-Drop mode. This command is the same as the “F-77 = 3” of the Master unit.
Syntax	:INSTrument:DISPlay
Example	:INST:DISP Displays the address information on the slave unit.

4-6. Measure Commands

4-6-1. :MEASure[:SCALar]:ALL[:DC]

→ Query

Description	Takes a measurement and returns the average output current and voltage.	
Query Syntax	:MEASure[:SCALar]:ALL[:DC]?	
Return parameter 1	<NR2>	Returns the voltage (V).
Return parameter 2	<NR2>	Returns the current (A)
Query example	:MEAS:ALL? >+1.000, +2.000 Returns the average output voltage (V) and current (A), respectively. The output of 1.000 V/2.000 A.	

4-6-2. :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. The unit is (A).
Query example	:MEAS:CURR? >+1.000 Returns the average output current (A). The output is 1.000 A.	

4-6-3. :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. The unit is (V).
Query example	:MEAS:VOLT? >+5.000 Returns the average output voltage (V). The output is 5.000 V.	

4-6-4. :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 in watts. The unit is (W).
Query example	:MEAS:POW? >+10.000 Returns the average output wattage (W). The output is 10.000 W.	

4-7. Output Commands

4-7-1. :OUTPut:DELay:ON

Set → / → Query

Description	Sets the Delay Time in seconds for turning the output on (F-01). 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.	

4-7-2. :OUTPut:DELay:OFF

Set → / → Query

Description	Sets the Delay Time in seconds for turning the output off (F-02). 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 →
→ Query

4-7-3. :OUTPut:MODE

Description	Sets the PFR-100 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 1 / CCHS 2 / CVLS 3 / CCLS	CV high speed priority CC high speed priority CV slew rate priority CCV slew rate priority
Return parameter	<NR1>	Returns the output mode.
Example	:OUTP:MODE CVHS Sets the output mode.	
Query example	:OUTP:MODE? >0 Returns the output mode.	

Set →
→ Query

4-7-4. :OUTPut[:STATe][:IMMediate]

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

4-7-6. :OUTPut:PROTection:CLEar

Set →

Description	Clears over-voltage, over-current and over-temperature (OVP, OCP, OHP) 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, OHP).	
Query Syntax	:OUTPut:PROTection:TRIPped?	
Return parameter	<Boolean>	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

Set →

4-8-1. :SENSe:AVERage:COUNt

→ Query

Description	Determines the level of smoothing for the average setting. This is the equivalent to the F-17 function setting. (F-17)
Syntax	:SENSe:AVERage:COUNt {<NR1> | LOW | MIDDle | HIGH}

Query Syntax	:SENSe:AVERage:COUNt?	
Parameter	0 / LOW 1 / MIDDle 2 / HIGH	Low level of smoothing. Middle level of smoothing. High level of smoothing.
Return parameter	<NR1>	Returns the level of smoothing.
Example	:SENS:AVER:COUN 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.	

4-9-3. :STATus:OPERation:ENABle Set → / → 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	:STAT:QUES: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:QUEStionable:INSTrument : ISUMmary<n>[:EVENt]

→(Query)

Description	Queries the bit sum of the Questionable Instrument Summary Status Event register. This query will also clear the contents of the register (Multi-Drop mode).	
Query Syntax	:STATus:QUEStionable:INSTrument:ISUMmary<n>[:EVENt]?	
Parameter	<n>	1~3
Return parameter	<NR1>	0~32767
Query example	:STAT:QUES:INST:ISUM1? >1 Queries the bit sum of the Questionable Instrument Summary Status Event register.	

4-9-12. :STATus:QUEStionable:INSTrument :ISUMmary<n>:CONDition

→(Query)

Description	Queries the status (bit sum) of the Questionable Instrument Summary Status Condition register. This query will not clear the register (Multi-Drop mode).	
Query Syntax	:STATus:QUEStionable:INSTrument:ISUMmary<n>:CONDition?	
Parameter	<n>	1~3
Return parameter	<NR1>	0~32767
Query example	:STAT:QUES:INST:ISUM1:COND? >1 Queries the bit sum of the Questionable Instrument Summary Status Condition register.	

4-9-13. :STATus:QUEStionable:INSTrument :ISUMmary<n>:ENABle

(Set)→

→(Query)

Description	Sets or queries the bit sum of the Questionable Instrument Summary Status Enable register. (Multi-Drop mode).
Syntax	:STATus:QUEStionable:INSTrument:ISUMmary<n>:ENABle <NR1>

Query Syntax	:STATus:QUEStionable:INSTrument:ISUMmary<n>:ENABle?	
Parameter	<n>	1~3
	<NR1>	0~32767
Return parameter	<NR1>	0~32767
Example	:STAT:QUES:INST:ISUM1:ENAB 1 Sets the bit0 of the Questionable Instrument Summary Status Enable register.	
Query example	:STAT:QUES:INST:ISUM1:ENAB? >1 Bit0 is set.	

4-9-14. :STATus:PRESet

Set →

Description	This command resets the ENABle register, the PTRansistion filter and NTRansistion 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
	QUEStionable Instrument Summary1 Status Enable	0x7FFF
	QUEStionable Instrument Summary2 Status Enable	0x7FFF
	QUEStionable Instrument Summary3 Status Enable	0x7FFF
	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

4-10-1. [:SOURce]:CURRent[:LEVel][:IMMediate][:AMPLitude]

Set →
→ 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> MINimum MAXimum	0%~105% of the rated current output level. Minimum current level. Maximum current level.
Return parameter	<NR2>	Return the level of the output current.
Example	:CURR 5 Sets the output current level.	
Query example 1	:CURR? >+5.120 Return the setting level of the output current.	
Query example 2	:CURR? MAX >+10.500 Return the maximum setting level of the output current.	

4-10-2. [:SOURce]:CURRent[:LEVel]:TRIGgered [:AMPLitude]

Set → / → 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> MINimum MAXimum	0%~105% of the rated current output in amps. Minimum current level. Maximum current level.
Return parameter	<NR2>	Return the level of the output current of software trigger.
Example	:CURR:TRIG 10 Sets the output current level of software trigger.	
Query example 1	:CURR:TRIG? >+10.000 Return the setting level of the output current of software trigger.	
Query example 2	:CURR:TRIG? MAX >+10.500 Return the maximum setting level of the output current of software trigger.	

4-10-3. [:SOURce]:CURRent:LIMit:AUTO

Set → / → Query

Description	Enables or disables the limit on the current setting (F-13).
Syntax	[:SOURce]:CURRent:LIMit:AUTO {<Boolean> | OFF | ON}
Query Syntax	[:SOURce]:CURRent:LIMit:AUTO?

Parameter	OFF | 0 ON | 1	Disable the setting current limit. Enable the setting current limit.
Return parameter	<Boolean>	Returns the setting in <boolean> format.
Example	:CURR:LIM:AUTO 0 Disables the current limit.	
Query example	:CURR:LIM:AUTO? >0 Returns the limit state. Disables the current limit.	

Set → / → Query

4-10-4. [:SOURce]:CURRent:PROTection:DELay

Description	Sets the Delay Time for OCP in seconds for turning the output off (F-12). The delay is set to 0.0 by default.	
Syntax	[:SOURce]:CURRent:PROTection:DELay {<NR2> | MINimum | MAXimum}	
Query Syntax	[:SOURce]:CURRent:PROTection:DELay?	
Parameter	<NR2> MAXimum MINimum	0.1~2.0 seconds, where 0 = no delay The maximum allowed delay time (2.0). The minimum allowed delay time (0.1).
Return parameter	<NR2>	Returns the delay time in seconds
Example	:CURR:PROT:DEL MAX Sets the OCP delay to the maximum (2.0).	
Query example	:CURR:PROT:DEL? >2.0 Returns the current setting value. Set to 2.0 seconds.	

Set → / → Query

4-10-5. [:SOURce]:CURRent:PROTection[:LEVel]

Description	Sets or queries the OCP level in amps.	
Syntax	[:SOURce]:CURRent:PROTection[:LEVel] {<NRf>|MINimum | MAXimum}	
Query Syntax	[:SOURce]:CURRent:PROTection[:LEVel]? [MINimum | MAXimum]	
Parameter	<NRf> MINimum MAXimum	OCP level. 0%~110% of the rated current output in amps. Minimum OCP level. Maximum OCP level.
Return parameter	<NR2>	Returns the OCP level.
Example	:CURR:PROT 5 Sets the OCP level.	
Query example 1	:CURR:PROT? >+5.000 Returns the OCP level.	

Query example 2	:CURR:PROT? MIN >+0.200 Returns the minimum OCP level.	

4-10-6. [:SOURce]:CURRent:PROTection:TRIPped → Query

Description	Returns the state of the OCP.	
Query Syntax	[:SOURce]:CURRent:PROTection:TRIPped?	
Return parameter	<Boolean>	
	0	The OCP has not been tripped.
	1	The OCP has been tripped.
Query example	:CURR:PROT:TRIP? >0 The OCP has not been tripped.	

Set →

4-10-7. [:SOURce]:CURRent:SLEWrate:RISing → Query

Description	Sets or queries the rising current slew rate. This is only applicable for CC slew rate priority mode.	
Syntax	[:SOURce]:CURRent:SLEWrate:RISing {<NRf>|MINimum | MAXimum}	
Query Syntax	[:SOURce]:CURRent:SLEWrate:RISing? [MINimum | MAXimum]	
Parameter	<NRf>	0.01A/s~20.00A/s (PFR-100L50) 0.001A/s~4.000A/s (PFR-100M250)
	MINimum	Minimum rising current slew rate.
	MAXimum	Maximum rising current slew rate.
Return parameter	<NR2>	Returns the rising current slew rate in amps.
Example	:CURR:SLEW:RIS 20 Sets the rising current slew rate to 20A/ms.	
Query example 1	:CURR:SLEW:RIS? >+5.000 Returns the rising current slew rate.	
Query example 2	:CURR:SLEW:RIS? MAX >+20.000 Returns the maximum rising current slew rate.	

Set →

4-10-8. [:SOURce]:CURRent:SLEWrate:FALLing → Query

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

Parameter	NRf MINimum MAXimum	0.01A/s~20.00A/s (PFR-100L50) 0.001A/s~4.000A/s (PFR-100M250) Minimum falling current slew rate. Maximum falling current slew rate.
Return parameter	<NR2>	Returns the falling current slew rate in amps.
Example	:CURR:SLEW:FALL 1 Sets the rising current slew rate to 1A/ms.	
Query example 1	:CURR:SLEW:FALL? >+5.000 Returns the falling current slew rate.	
Query example 2	:CURR:SLEW:FALL? MAX >+20.000 Returns the maximum falling current slew rate.	

4-10-9. [:SOURce]:MODE? → Query

Description	Returns the status of the output mode (CC, CV, Off) of the power supply. The interface will return “CV’ if the supply is in Constant Voltage Mode, “CC” if the supply is in Constant Current Mode or “OFF” if the supply output is off.	
Query Syntax	[:SOURce]:MODE?	
Return parameter	<string>	Returns the output state as a string, “CC”, “CV”, “OFF”
Query example	:MODE? >CC The power supply is currently in CC mode.	

4-10-10. [:SOURce]:VOLTage[:LEVel][:IMMediate][:AMPLitude]

Set →
→ Query

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> MINimum MAXimum	0~105% of the rated output voltage in volts. Minimum voltage level Maximum voltage level
Return parameter	<NR2>	Returns the voltage level in volts.
Example	:VOLT 10 Sets the voltage level to 10 volts.	
Query example 1	:VOLT? >+10.000 Returns the voltage level.	

Query example 2	:VOLT? MAX >+10.500 Returns the maximum voltage level.

Set → Query

4-10-11. [: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> MINimum MAXimum	0%~105% of the rated voltage output in volts. Minimum voltage level. Maximum voltage level.
Return parameter	<NR2>	Returns the voltage level.
Example	:VOLT:TRIG 10 Sets the voltage level to 10 volts when a software trigger is generated.	
Query example 1	:VOLT:TRIG? >+10.000 Returns the voltage level when a software trigger is generated.	
Query example 2	:VOLT:TRIG? MAX >+52.500 Returns the maximum voltage level.	

Set → Query

4-10-12. [:SOURce]:VOLTage:LIMit:AUTO

Description	Enables or disables the limit on the voltage setting (F-14).	
Syntax	[:SOURce]:VOLTage:LIMit:AUTO {<Boolean> | OFF | ON}	
Query Syntax	[:SOURce]:VOLTage:LIMit:AUTO?	
Parameter	OFF | 0 ON | 1	Disable the setting voltage limit. Enable the setting voltage limit.
Return parameter	<Boolean>	Returns the setting in <boolean> format.
Example	:VOLT:LIM:AUTO 0 Disables the voltage limit.	
Query example	:VOLT:LIM:AUTO? >0 Returns the limit state. Disables the voltage limit.	

Set →

4-10-13. [:SOURce]:VOLTage:LIMit:LOW

→ Query

Description	Sets or queries the UVL point. It can be set only when the limit on the voltage setting is enabled.	
Syntax	[:SOURce]:VOLTage:LIMit:LOW <NRf>(V) | MINimum | MAXimum	
Query Syntax	[:SOURce]:VOLTage:LIMit:LOW?	
Parameter	<NRf>	0~105% of the rated output voltage in volts.
	MINimum	Minimum the UVL level.
	MAXimum	Maximum the UVL level.
Return parameter	<NR2>	Returns the UVL level.
Example	:VOLT:LIM:LOW MAX Sets the UVL level to its maximum.	
Query example	:VOLT:LIM:LOW? >+10.000 Returns the UVL level. It is set to 10 volts.	

Set →

4-10-14. [:SOURce]:VOLTage:PROTection[:LEVel]

→ Query

Description	Sets or queries the OVP level.	
Syntax	[:SOURce]:VOLTage:PROTection[:LEVel] {<NRf> | MINimum | MAXimum}	
Query Syntax	[:SOURce]:VOLTage:PROTection[:LEVel]? [MINimum | MAXimum]	
Parameter	<NRf>	OVP level. 0%~110% of the rated voltage output in volts.
	MINimum	Minimum OVP level.
	MAXimum	Maximum OVP level.
Return parameter	<NR2>	Returns the OVP level.
Example	:VOLT:PROT MAXimum Sets the OVP level to its maximum.	
Query example 1	:VOLT:PROT? >+10.000 Returns the OVP level. It is set to 10 volts.	
Query example 2	:VOLT:PROT? MAX >+55.000 Returns the OVP level to its maximum.	

4-10-15. [:SOURce]:VOLTage:PROTection :TRIPped

→ Query

Description	Returns the state of the OVP.
Query Syntax	[:SOURce]:VOLTage:PROTection:TRIPped?

Return parameter	<Boolean>	
	0	The OVP has not been tripped.
	1	The OVP has been tripped.
Query example	:VOLT:PROT:TRIP? >0 The OVP has not been tripped.	

Set →
Query →

4-10-16. [:SOURce]:VOLTage:SLEWrate:RISing

Description	Sets or queries the rising voltage slew rate. This is only applicable for CV slew rate priority mode.	
Syntax	[:SOURce]:VOLTage:SLEWrate:RISing {<NRf> | MINimum | MAXimum}	
Query Syntax	[:SOURce]:VOLTage:SLEWrate:RISing? [MINimum | MAXimum]	
Parameter	<NRf>	0.1V~100.0V/s (PFR-100L50) 0.1V~500.0V/s (PFR-100M250)
	MINimum	Minimum rising voltage slew rate.
	MAXimum	Maximum rising voltage slew rate.
Return parameter	<NR2>	Returns the rising voltage slew rate in volts.
Example	:VOLT:SLEW:RIS MAX Sets the rising voltgae slew rate to its maximum.	
Query example 1	:VOLT:SLEW:RIS? >+10.000 Returns the rising voltage slew rate.	
Query example 2	:VOLT:SLEW:RIS? MAX >+100.000 Returns the maximum rising voltage slew rate.	

Set →
Query →

4-10-17. [:SOURce]:VOLTage:SLEWrate:FALLing

Description	Sets or queries the falling voltage slew rate. This is only applicable for CV slew rate priority mode.	
Syntax	[:SOURce]:VOLTage:SLEWrate:FALLing {<NRf>|MINimum | MAXimum}	
Query Syntax	[:SOURce]:VOLTage:SLEWrate:FALLing? [MINimum | MAXimum]	
Parameter	<NRf>	0.1V~100.0V/s (PFR-100L50) 0.1V~500.0V/s (PFR-100M250)
	MINimum	Minimum falling voltage slew rate.
	MAXimum	Maximum falling voltage slew rate.
Return parameter	<NR2>	Returns the falling voltage slew rate in volts.
Example	:VOLT:SLEW:FALL MIN Sets the falling voltgae slew rate to its minimum.	

Query example 1	:VOLT:SLEW:FALL? >+10.000 Returns the falling voltage slew rate.
Query example 2	:VOLT:SLEW:FALL? MIN >+0.100 Returns the minimum rising voltage slew rate.

4-11. System Function Command

Set →
→ Query

4-11-1. :SYSTem:BEEPer[:IMMediate]

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> MINimum MAXimum	0 ~ 3600 seconds. Sets the beeper time to the minimum (0 seconds) 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).
Example 1	: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).	
Example 2	:SYST:BEEP? MAX >3600 Returns the maximum settable beeper time in seconds.	

Set →
→ Query

4-11-2. :SYSTem:CONFigure:BEEPer[:STATe]

Description	Sets or queries the buzzer state on/off (F-10).	
Syntax	:SYSTem:CONFigure:BEEPer[:STATe] {<Boolean> | OFF | ON }	
Query Syntax	:SYSTem:CONFigure:BEEPer[:STATe]?	
Parameter	0 / OFF 1 / ON	Turns the buzzer off. 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 example	:SYST:CONF:BEEP? >1 Return the setting of buzzer.

Set →
→ Query

4-11-3. :SYSTem:CONFigure:BLEeder[:STATe]

Description	Sets or queries the status of the bleeder resistor (F-09).	
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	Turn the AUTO mode on.
Return parameter	<NR1>	Returns bleeder resistor status.
Example	:SYST:CONF:BLE ON Turns the bleeder resistor on.	
Query example	:SYST:CONF:BLE? >1 Returns bleeder resistor status.	

Set →
→ Query

4-11-4. :SYSTem:CONFigure:CURRent:CONTrol

Description	Sets or queries the CC control mode (local control (panel), external voltage control, external resistance control). (F-91) This setting is applied only after the unit is reset.	
Syntax	:SYSTem:CONFigure:CURRent:CONTrol {<NR1> | NONE | VOLTage | RRISing | RFALling}	
Query Syntax	:SYSTem:CONFigure:CURRent:CONTrol?	
Parameter	<NR1>	Description
	0 / NONE	Local (Panel) control
	1 / VOLTage	External voltage control
	2 / RRISing	External resistance control; 10kΩ = Io max, 0kΩ = Io min.
	3 / RFALling	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.	

4-11-5. :SYSTem:CONFigure:VOLTage:CONTrol

Set → / → Query

Description	Sets or queries the CV control mode (local control, external voltage control, external resistance control). (F-90) This setting is applied only after the unit is reset.	
Syntax	SYSTem:CONFigure:VOLTage:CONTrol {<NR1> | NONE | VOLTage | RRISing | RFALling}	
Query Syntax	SYSTem:CONFigure:VOLTage:CONTrol?	
Parameter	<NR1>	Description
	0 / NONE	Local (Panel) control
	1 / VOLTage	External voltage control
	2 / RRISing	External resistance control; 10kΩ = Vo max, 0kΩ = Vo min.
	3 / RFALling	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 example	:SYST:CONF:VOLT:CONT? >0 Return the setting state of the CV control mode.	

4-11-6. :SYSTem:CONFigure:OUTPut:PON [:STATe]

Set → / → Query

Description	Sets the output state at power-on. This is the equivalent to the F-92 (Output Status when Power ON) power on configuration settings. These settings only apply after the unit has been reset.	
Syntax	:SYSTem:CONFigure:OUTPut:PON[:STATe] {<NR1> | {SAFE | OFF} | {FORCe | ON} | AUTO}	
Query Syntax	:SYSTem:CONFigure:OUTPut:PON[:STATe]?	
Parameter	0 / SAFE | OFF	The PFR-100 turns on in the same state the unit was in prior to the previous shut down. The output is set to off (default).
	1 / FORCe | ON	The PFR-100 turns on in the same state the unit was in prior to the previous shut down. The output is set to on.
	2 | AUTO	The PFR-100 turns on in the same state the unit was in prior to the previous shut down, but with the same output on/off setting.
Return parameter	0	The power on output setting is “SAFE” or “OFF”.
	1	The power on output setting is “FORCe” or “ON”.
	2	The power on output setting is “AUTO”.
Example	:SYST:CONF:OUTP:PON 1 The power on output setting is on.	

Query example	:SYST:CONF:OUTP:PON? >0 Returns the power on output setting.	

Set →
Query →

4-11-7. :SYSTem:CONFigure:OUTPut:EXTernal:MODE

Description	Sets the logic used to turn the output on or off when using an external contact. This is the equivalent to the F-94 (External Output Logic) power on configuration settings.	
Syntax	:SYSTem:CONFigure:OUTPut:EXTernal:MODE {<NR1> | LOW | HIGH}	
Query Syntax	:SYSTem:CONFigure:OUTPut:EXTernal:MODE?	
Parameter	0 / HIGH 1 / LOW	Active High Active Low
	2	External control is not performed.
Return parameter	<NR1>	Returns the logic setting.
Example	:SYST:CONF:OUTP:EXT:MODE HIGH Sets the external logic mode.	
Query example	:SYST:CONF:OUTP:EXT:MODE? >0 Returns the set value of external logic mode.	

4-12. Communication system configuration Commands

Set →
Query →

4-12-1. :SYSTem:COMMunicate:ENABle

Description	Enables/Disables GPIB, USB or other remote interfaces such as Sockets and the Web Server. (F-29) This setting is only applied after the unit has been reset. Only one interface can be enabled at the same time.	
Syntax	:SYSTem:COMMunicate:ENABle {<Boolean> | OFF | ON, RS232 | RS485 | USBCDC | GPIB | SOCKets | WEB}	
Query Syntax	:SYSTem:COMMunicate:ENABle? {RS232 | RS485 | USBCDC | GPIB | SOCKets | WEB}	
Parameter 1	0 / OFF 1 / ON	Disables the selected interface. Enables the selected interface.
Parameter 2	RS232 RS485 USBCDC GPIB SOCKets WEB	Select the RS232 interface Select the RS485 interface Select the USB-CDC interface Select the GP-IB interface Select the Sockets interface Select the Web Server interface
Return parameter	<Boolean>	Returns the status of the selected mode.

Example	:SYST:COMM:ENAB 1,USBCDC Turns the USB-CDC interface on.
Query example	:SYST:COMM:ENAB? USBCDC >1 Queries the USB-CDC state, returns 1 (USB-CDC is on).

Set →
Query →

4-12-2. :SYSTem:COMMunicate:GPIB[:SELF]:ADDRess

Description	Sets or queries the GPIB address. (F-23) This setting is only applied after the unit has been 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 the GPIB address to 15.	
Query example	:SYST:COMM:GPIB:ADDR? >15 Returns the set value of GP-IB address.	

Set →
Query →

4-12-3. :SYSTem:COMMunicate:LAN:IPADdress

Description	Sets or queries LAN IP address. (F-39~42) It can be set when DHCP setting is off. This setting is only applied after the unit has been reset.	
Syntax	:SYSTem:COMMunicate:LAN:IPADdress “<string>”	
Query Syntax	:SYSTem:COMMunicate:LAN:IPADdress?	
Parameter	<string>	LAN IP address in string format (“*.*.*.*”)
Return parameter	<string>	Returns the IP address.
Example	:SYST:COMM:LAN:IPAD “172.16.5.111” Sets the IP address to “172.16.5.111”.	
Query example	:SYST:COMM:LAN:IPAD? >172.16.5.111 Returns the IP address.	

Set →
Query →

4-12-4. :SYSTem:COMMunicate:LAN:GATEway

Description	Sets or queries the Gateway address.（F-47~50） This setting is only applied after the unit has been reset.	
Syntax	:SYSTem:COMMunicate:LAN:GATEway “<string>”	
Query Syntax	:SYSTem:COMMunicate:LAN:GATEway?	
Parameter	<string>	Gateway address in string format (“*.*.*.*”)
Return parameter	<string>	Returns the Gateway address.

Example	:SYST:COMM:LAN:GATE “172.16.0.254” Sets the Gateway address to “172.16.0.254”.
Query example	:SYST:COMM:LAN:GATE? >172.16.0.254 Returns the Gateway address.

Set → / → Query

4-12-5. :SYSTem:COMMunicate:LAN:SMASk

Description	Sets or queries the LAN subnet mask. This setting is only applied after the unit has been reset.	
Syntax	:SYSTem:COMMunicate:LAN:SMASk “<string>”	
Query Syntax	:SYSTem:COMMunicate:LAN:SMASk?	
Parameter	<string>	Gateway address in string format (“*.*.*.*”)
Return parameter	<string>	Returns the subnet mask address.
Example	:SYST:COMM:LAN:SMAS “255.255.0.0” Sets the subnet mask address to “255.255.0.0”.	
Query example	:SYST:COMM:LAN:SMAS? >255.255.0.0 Returns the subnet mask address.	

4-12-6. :SYSTem:COMMunicate:LAN:MAC

→ Query

Description	Returns the unit MAC address as a string.（F-30~35） 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 → / → Query

4-12-7. :SYSTem:COMMunicate:LAN:DHCP

Description	Turns DHCP on/off. Queries the DHCP status. (F-37) This setting is only applied after the unit has been reset.	
Syntax	:SYSTem:COMMunicate:LAN:DHCP {<Boolean> | OFF | ON }	
Query Syntax	:SYSTem:COMMunicate:LAN:DHCP?	
Parameter	0 / OFF 1 / ON	DHCP off 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 →
→ Query

4-12-8. :SYSTem:COMMunicate:LAN:DNS

Description	Sets or queries the DNS address. (F-51~54) This setting is only applied after the unit has been reset.	
Syntax	:SYSTem:COMMunicate:LAN:DNS “<string>”	
Query Syntax	:SYSTem:COMMunicate:LAN:DNS?	
Parameter	<string>	DNS address in string format (“*.*.*.*”)
Return parameter	<string>	Returns the DNS address
Example	:SYST:COMM:LAN:DNS “172.16.1.252” Sets the DNS to “172.16.1.252”.	
Query example	:SYST:COMM:LAN:DNS? >172.16.1.252 Returns the DNS address.	

Set →
→ Query

4-12-9. :SYSTem:COMMunicate:RLSTate

Description	Enables or disables local/remote state of the instrument.	
Syntax	:SYSTem:COMMunicate:RLSTate {LOCal | REMote | RWLock}	
Query Syntax	:SYSTem:COMMunicate:RLSTate?	
Parameter	LOCal	All keys are valid. This instrument is controlled by the front panel controls.
	REMote	All keys are invalid, except for the [local] key and the ability to turn the output off.
	RWLock	All keys are invalid. The instrument can only be controlled remotely.
Example	:SYST:COMM:RLST LOC Sets the operating mode to local.	
Query example	:SYST:COMM:RLST? >LOC It is in the local state.	

4-12-10. :SYSTem:COMMunicate:TCPip:CONTrol → Query

Description	Queries the socket port number.	
Query Syntax	:SYSTem:COMMunicate:TCPip:CONTrol?	
Return parameter	<NR1>	2268 (fixed)
Query example	:SYST:COMM:TCP:CONT? >2268 Returns the socket port number.	

4-12-11. :SYSTem:COMMunicate:SERial [:RECeive]:TRANsmit:BAUD

Set → / → Query

Description	Sets or queries the UART baud rate. (F-71) This setting is only applied after the unit has been reset.	
Syntax	:SYSTem:COMMunicate:SERial[:RECeive]:TRANsmit:BAUD <NR1>	
Query Syntax	:SYSTem:COMMunicate:SERial[:RECeive]:TRANsmit:BAUD?	
Parameter	<NR1>	1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200
Example	:SYST:COMM:SER:TRAN:BAUD 2400 Sets the baud rate to 2400.	
Query example	:SYST:COMM:SER:TRAN:BAUD? >2400 Returns the baud rate settings.	

4-12-12. :SYSTem:COMMunicate:SERial [:RECeive]:TRANsmit:BITS

Set → / → Query

Description	Sets or queries the UART number of data bits. (F-72) This setting is only applied after the unit has been reset.	
Syntax	:SYSTem:COMMunicate:SERial[:RECeive]:TRANsmit:BITS <NR1>	
Query Syntax	:SYSTem:COMMunicate:SERial[:RECeive]:TRANsmit:BITS?	
Parameter	0	7 bits
	1	8 bits
Example	:SYST:COMM:SER:TRAN:BITS 1 Sets the UART number of data bits to 8 bits.	
Query example	:SYST:COMM:SER:TRAN:BITS? >1 Indicates that 8 data bits are used for the UART connection.	

4-12-13. :SYSTem:COMMunicate:SERial [:RECeive]:TRANsmit:PARity

Set → / → Query

Description	Sets or queries the parity of the UART connection. (F-73) This setting is only applied after the unit has been reset.	
Syntax	:SYSTem:COMMunicate:SERial[:RECeive]:TRANsmit:PARity <NR1>	
Query Syntax	:SYSTem:COMMunicate:SERial[:RECeive]:TRANsmit:PARity?	
Parameter	0	None
	1	Odd
	2	Even
Example	:SYST:COMM:SER:TRAN:PAR 1 Sets the parity of the UART connection to odd.	

Query example	:SYST:COMM:SER:TRAN:PAR? >1 Indicates that odd parity is used for the UART connection.

4-12-14. :SYSTem:COMMunicate:SERial [:RECeive]:TRANsmit:SBITs

Set → → Query

Description	Sets or queries the number of stop bits used for the UART connection. (F-74) This setting is only applied after the unit has been reset.	
Syntax	:SYSTem:COMMunicate:SERial[:RECeive]:TRANsmit:SBITs <NR1>	
Query Syntax	:SYSTem:COMMunicate:SERial[:RECeive]:TRANsmit:SBITs?	
Parameter	0	1 stop bit
	1	2 stop bits
Example	:SYST:COMM:SER:TRAN:SBIT 1 Sets the number of stop bits used for the UART connection to two stop bits.	
Query example	:SYST:COMM:SER:TRAN:SBIT? >1 Indicates that two stop bits is used for the UART connection.	

4-12-15. :SYSTem:COMMunicate:MULTidrop :CONTrol

→ Query

Description	Queries the Multi-Drop Control state.	
Query Syntax	:SYSTem:COMMunicate:MULTidrop:CONTrol?	
Return parameter	0	Disable
	1	Master
	2	Slave
Query example	:SYST:COMM:MULT:CONT? >1 Respond to the situation. It is a master unit.	

4-12-16. :SYSTem:COMMunicate:USB:FRONt :STATe

→ Query

Description	Queries the front panel USB-A port state. (F-20)	
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.	

4-12-17. :SYSTem:COMMunicate:USB:REAR :STATe

→ Query

Description	Queries the rear panel USB-B port state. (F-21)
Query Syntax	:SYSTem:COMMunicate:USB:REAR:STATe?

Return parameter	0 1	Absent Connected to the PC
Query example	:SYST:COMM:USB:REAR:STAT? >1 Return the status of the USB connection on the rear panel	

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. Request until the error is zero.	
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:KLOCk

→(Query)

Description	Enables or disables the front panel key lock.	
Syntax	:SYSTem:KLOCk {<Boolean> | OFF | ON}	
Query Syntax	:SYSTem:KLOCk?	
Parameter	0 / OFF 1 / ON	Panel keys unlocked. 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.	

(Set)→

4-13-3. :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.

4-13-4. :SYSTem:ERRor:ENABle

Set →

Description	Clears the Error Queue and enables all error messages to be placed in the System Error Queue.
Syntax	:SYSTem:ERRor:ENABle
Example	:SYST:ERR:ENAB Clears the Error Queue.

4-13-5. :SYSTem:PRESet

Set →

Description	Resets all the settings to the factory default settings. The preset memory and the test function memory are not cleared.
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 PFR-100 SCPI version.
Query Syntax	:SYSTem:VERSion?
Return parameter	<string> Always returns 1999.0 as the SCPI version.
Query example	:SYST:VERS? >1999.0 Returns 1999.0 as the SCPI version.

4-13-7. :SYSTem:REBoot

Set →

Description	Reboots the PFR-100 system.
Syntax	:SYSTem:REBoot
Example	:SYST:REB Reboots the PFR-100 system.

4-14. Trigger Commands

4-14-1. :TRIGger:OUTPut:SOURce

Set →

→ Query

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.	

4-14-2. :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.

4-14-3. :TRIGger[:TRANsient]:SOURce

Set → / → 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.	

4-14-4. :TRIGger[:TRANsient][:IMMediate]

Set →

Description	Generates a software trigger for the transient trigger system. The transient trigger system performs a pair of voltage settings and current settings for the trigger.
Syntax	:TRIGger:TRANsient[:IMMediate]
Example	:TRIG:TRAN Generates a software trigger for the transient trigger 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.

4-15. IEEE 488.2 Common Commands

4-15-1. *CLS

Set ⟶

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.

Set →

4-15-2. *ESE

→ Query

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.	

4-15-3. *ESR

→ Query

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

4-15-4. *IDN

→ Query

Description	Queries the manufacturer, model name, serial number, and firmware version of the PFR-100.	
Query Syntax	*IDN?	
Return parameter		Returns the instrument identification as a string in the following format:
	<string>	Manufacturer: TEXIO
	<string>	Model name: PFR-100L50
	<string>	Serial number: TW123456
	<string>	Firmware version: 01.00.20110101
Query example	*IDN? > TEXIO,PFR-100L50,TW123456,01.00.20110101 Returns device information.	

Set →

4-15-5. *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 Set the OPC command.	
Query example	*OPC? >1 Returns 1 when all the outstanding commands have completed.	

4-15-6. *RCL

Set →

Description	Recalls the contents stored in memory slot M1, M2 or M3.	
Syntax	*RCL {<NR1> | MINimum | MAXimum}	
Parameter	<NR1>	0, 1, 2 (as memory M1 , M2, M3)
	MINimum	Recalls the M1 memory contents.
	MAXimum	Recalls the M3 memory contents.
Example	*RCL 0 Recall the M1 memory.	

4-15-7. *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 Performs a device reset.

4-15-8. *SAV

Set →

Description	Saves the settings into memory slot M1, M2 or M3.	
Syntax	*SAV {<NR1> | MINimum | MAXimum}	
Parameter	<NR1>	0, 1, 2 (as memory M1 , M2, M3)
	MINimum	Saves the M1 memory contents.
	MAXimum	Saves the M3 memory contents.

Example	*SAV 0 Save the M1 memory.

Set →

4-15-9. *SRE

→ Query

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>	Returns the Service Request Enable register as a value between 0 and 255.
Return parameter	<NR1>	Returns the bit sum of the Service Request Enable register.
Example	*SRE 32 Sets the Service Request Enable register.	
Query example	*SRE? >32 Returns the bit sum of the Service Request Enable register.	

4-15-10. *STB

→ Query

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

4-15-11. *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.

4-15-12. *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.	

4-15-13. *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.

5. Status Register Overview

To program the PFR-100 power supply effectively, the Status registers need to be understood. This chapter explains in detail how the Status registers are used how to configure them.

5-1. Introduction to the Status Registers

Overview

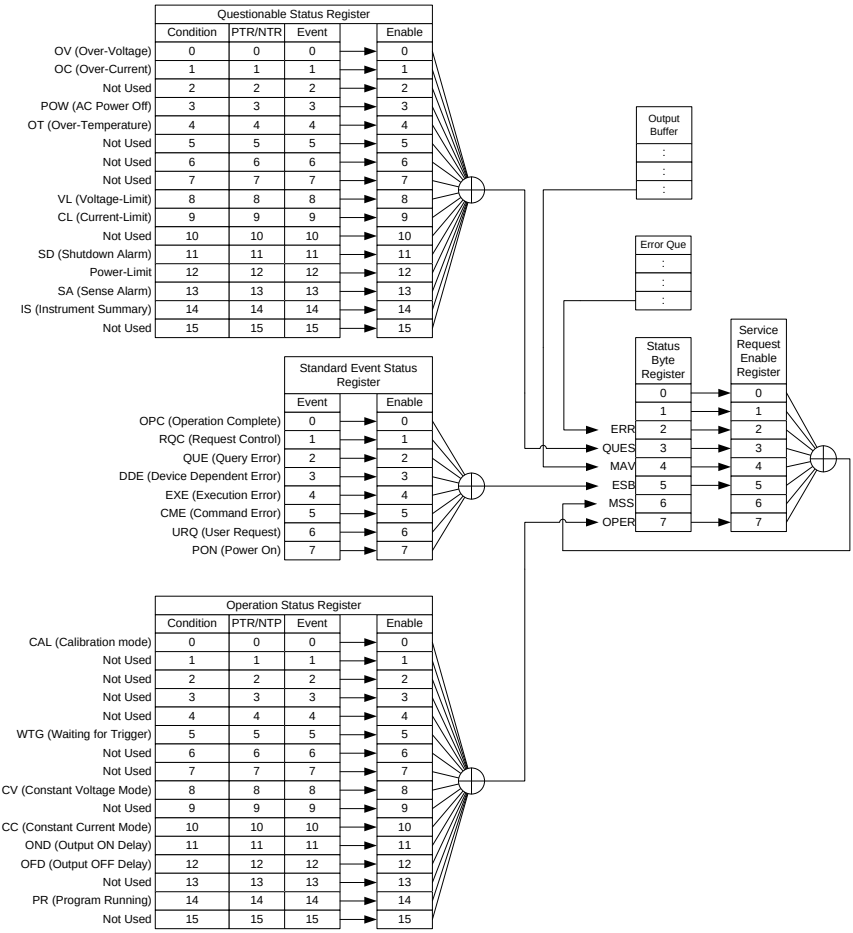
The status registers are used to determine the status of the power supply. The status registers maintain the status of the protection conditions, operation conditions and instrument errors.

The PFR-100 Series have a number of register groups:

- Questionable Status Register Group
- Standard Event Status Register Group
- Operation Status Register Group
- Status Byte Register Group
- Service Request Enable Register Group
- Service Request Generation
- Error Query
- Output Buffer

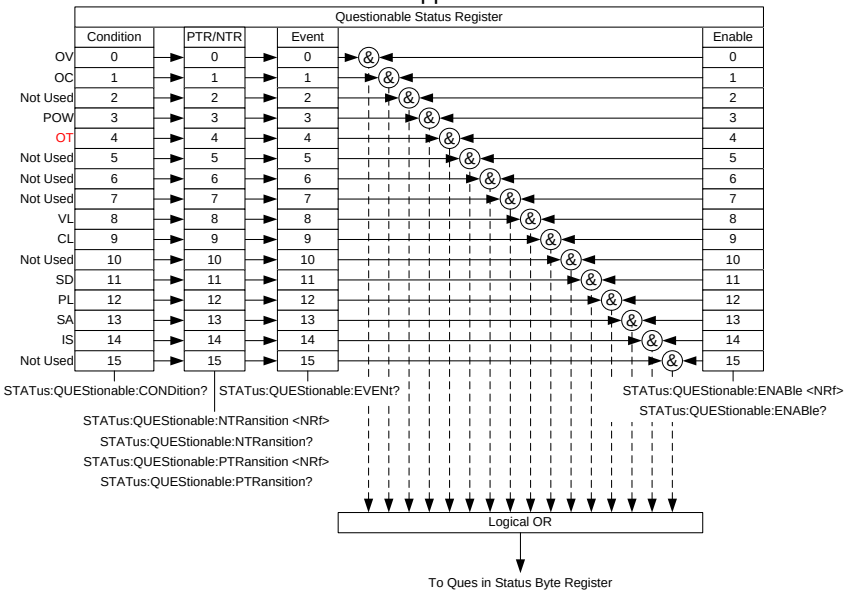
The following page shows the configuration of the Status Register.

5-2. Configuration status register



5-3. Questionable Status Register Group

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

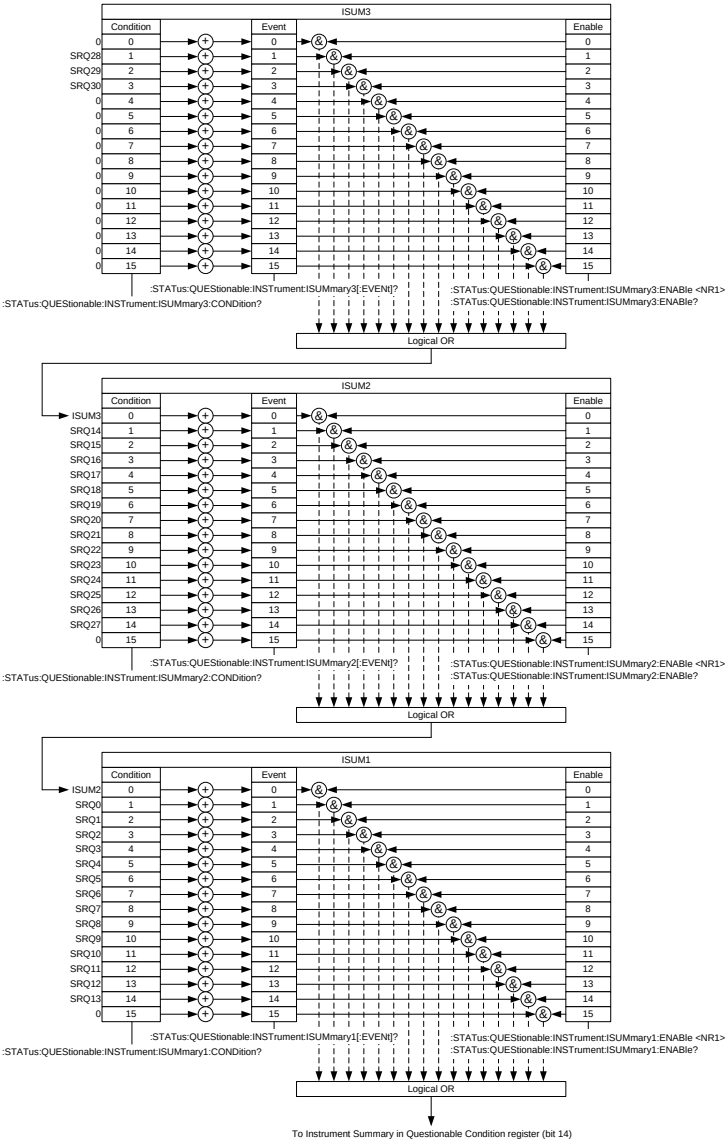


Bit Summary

Bit name	Event	Bit #	Bit Weight
OV	Over-Voltage Over voltage protection has been tripped	0	1
OC	Over-Current Over current protection has been tripped	1	2
POW	AC Power Off AC power switch is off	3	8
OT	Over Temperature Over temperature protection has been tripped	4	16
VL	Voltage Limit Voltage limit has been reached	8	256
CL	Current Limit Current limit has been reached	9	512
SD	Shutdown Alarm	11	2048
PL	Power-Limit	12	4096
SA	Sense Alarm	13	8192
IS	Insturument Summary	14	16384

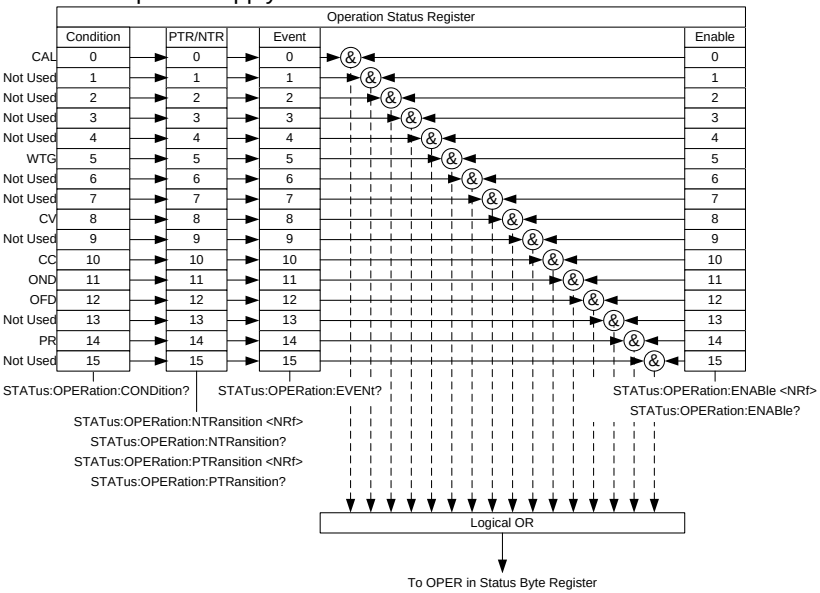
Condition Register	The Questionable Status Condition Register indicates the status of the power supply. If a bit is set in the Condition register, it indicates that the event is true. Reading the condition register does not change the state of the condition register.	
PTR/NTR Filters	The PTR/NTR (Positive/Negative 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.	

Instrument Summary Registers	The Instrument Summary Registers indicate if the protection mode or limit of any of the instruments connected in Multi-Drop mode has been tripped.



5-4. Operation Status Register Group

Overview The Operation Status Register Group indicates the operating status of the power supply.



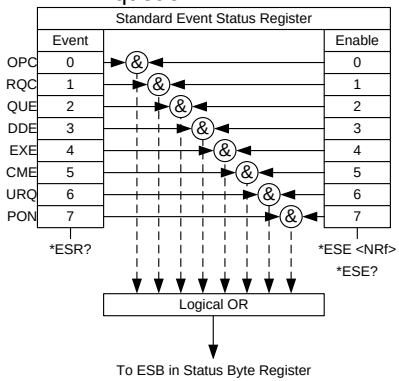
Bit Summary	Bit name	Event	Bit #	Bit Waight
	CAL	Calibration mode Indicates if the PFR-100 is in calibration mode.	0	1
	WTG	Waiting for trigger Indicates if the PFR-100 is waiting for a trigger.	5	32
	CV	Constant voltage mode Indicates if the PFR-100 is in CV mode.	8	256
	CC	Constant current mode Indicates if the PFR-100 is in CC mode.	10	1024
	OND	Output ON Delay Indicates if Output ON delay time is active	11	2048
	OFD	Output OFF Delay Indicates if Output OFF delay time is active	12	4096
	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 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 registered Events in the Event Register will be used to set the OPER bit in the Status Byte Register. When the Enable register is 0, the OPER bit is not set.

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.



Bit Summary

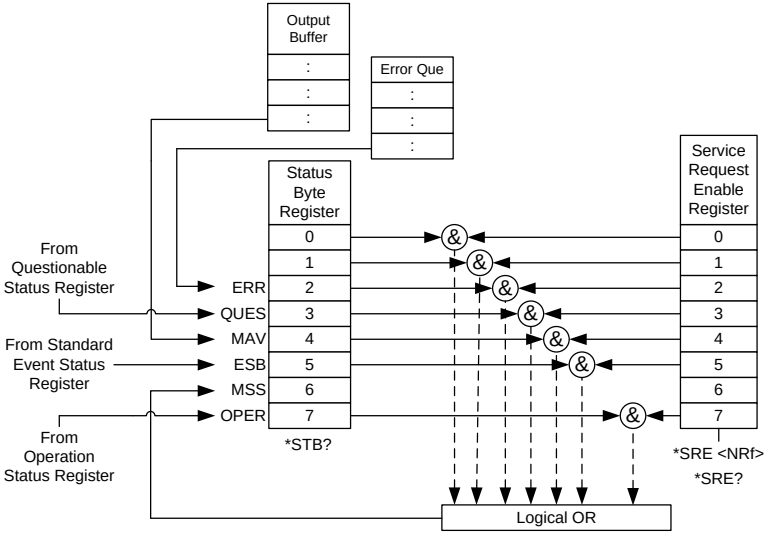
Bit name	Event	Bit #	Bit Weight
OPC	Operation complete The OCP bit is set when all selected pending operations are complete. This bit is set in response to the *OPC command.	0	1
RQC	Request control	1	2
QUE	Query Error The Query Error bit is set in response to an error reading the Output Queue. This can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

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	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	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 Byte Register & Service Request Enable Register

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	Error Event/Quere If data is present in the Error queue, the ERR bit will be set.	2	4
	QUES	Questionable Status Register The summary bit for the Questionable Status Register group.	3	8
	MAV	Message Available This is set when there is data in the Output Queue waiting to be read.	4	16
	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	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 list

5-7-1. Command Errors

Overview	An <error / event number> in the range [-199, -100] indicates that an IEEE 488.2 syntax error has been detected by the instrument's parser. The occurrence of any error in this class shall cause the command error bit (bit 5) in the event status register (IEEE 488.2, section 11.5.1) to be set. One of the following events has occurred: An IEEE 488.2 syntax error has been detected by the parser. That is, a controller-to-device message was received which is in violation of the IEEE 488.2 standard. Possible violations include a data element which violates the device listening formats or whose type is unacceptable to the device. An unrecognized header was received. Unrecognized headers include incorrect device-specific headers and incorrect or unimplemented IEEE 488.2 common commands. Events that generate command errors shall not generate execution errors, device-specific errors, or query errors; see the other error definitions in this chapter.

Error code		Description
-100	Command error	This is the generic syntax error for devices that cannot detect more specific errors. This code indicates only that a Command Error as defined in IEEE 488.2, 11.5.1.1.4 has occurred.
-102	Syntax error	An unrecognized command or data type was encountered; for example, a string was received when the device does not accept strings.
-103	Invalid separator	The parser was expecting a separator and encountered an illegal character; for example, the semicolon was omitted after a program message unit, MEAS:VOLT:DC?:MEAS:CURR:DC?
-104	Data type error	The parser recognized a data element different than one allowed; for example, numeric or string data was expected but block data was encountered.
-108	Parameter not allowed	More parameters were received than expected for the header; for example, the KLOCk command only accepts one parameter, so receiving ":SYSTem:KLOCk 1,0" is not allowed.
-109	Missing parameter	Fewer parameters were received than required for the header; for example, the KLOCk command requires one parameter, so receiving "KLOCk" is not allowed.
-111	Header separator error	A character which is not a legal header separator was encountered while parsing the header; for example, no white space followed the header, thus *SRE2 is an error.
-112	Program mnemonic too long	The header contains more that twelve characters (see IEEE 488.2, 7.6.1.4.1).
-113	Undefined header	The header is syntactically correct, but it is undefined for this specific device; for example, *XYZ is not defined for any device.
-114	Header suffix out of range	The value of a numeric suffix attached to a program mnemonic, see Syntax and Style section 6.2.5.2, makes the header invalid.
-115	Unexpected number of parameters	The number of parameters received does not correspond to the number of parameters expected. This is typically due an inconsistency with the number of instruments in the selected group.
-120	Numeric data error	This error, as well as errors -121 through -129, are generated when parsing a data element which appears to be numeric, including the nondecimal numeric types. This particular error message should be used if the device cannot detect a more specific error.

-121	Invalid character in number	An invalid character for the data type being parsed was encountered; for example, an alpha in a decimal numeric or a “9" in octal data.
-128	Numeric data not allowed	A legal numeric data element was received, but the device does not accept one in this position for the header.
-131	Invalid suffix	The suffix does not follow the syntax described in IEEE 488.2, 7.7.3.2, or the suffix is inappropriate for this device.
-141	Invalid character data	Either the character data element contains an invalid character or the particular element received is not valid for the header.
-148	Character data not allowed	A legal character data element was encountered where prohibited by the device.
-151	Invalid string data	A string data element was expected, but was invalid for some reason (see IEEE 488.2, 7.7.5.2); for example, an END message was received before the terminal quote character.
-158	String data not allowed	A string data element was encountered but was not allowed by the device at this point in parsing.
-160	Block data error	This error, as well as errors -161 through -169, are generated when parsing a block data element. This particular error message should be used if the device cannot detect a more specific error.
-161	Invalid block data	A block data element was expected, but was invalid for some reason (see IEEE 488.2, 7.7.6.2); for example, an END message was received before the length was satisfied.
-168	Block data not allowed	A legal block data element was encountered but was not allowed by the device at this point in parsing.
-178	Expression data not allowed	A legal expression data was encountered but was not allowed by the device at this point in parsing.

5-7-2. Execution Errors

Overview

An <error/event number> in the range [-299 , -200] indicates that an error has been detected by the instrument’s execution control block. The occurrence of any error in this class shall cause the execution error bit (bit 4) in the event status register (IEEE 488.2, section 11.5.1) to be set. One of the following events has occurred:

A <PROGRAM DATA> element following a header was evaluated by the device as outside of its legal input range or is otherwise inconsistent with the device’s capabilities.

A valid program message could not be properly executed due to some device condition.

Execution errors shall be reported by the device after rounding and expression evaluation operations have taken place. Rounding a numeric data element, for example, shall not be reported as an execution error. Events that generate execution errors shall not generate Command Errors, device-specific errors, or Query Errors; see the other error definitions in this section.

Error code		Description
-200	Execution error	This is the generic syntax error for devices that cannot detect more specific errors. This code indicates only that an Execution Error as defined in IEEE 488.2, 11.5.1.1.5 has occurred.
-201	Invalid while in local	Indicates that a command is not executable while the device is in local due to a hard local control (see IEEE 488.2, 5.6.1.5); for example, a device with a rotary switch receives a message which would change the switches state, but the device is in local so the message cannot be executed.
-203	Command protected	Indicates that a legal password-protected program command or query could not be executed because the command was disabled.
-211	Trigger ignored	Indicates that a GET, *TRG, or triggering signal was received and recognized by the device but was ignored because of device timing considerations; for example, the device was not ready to respond. Note: a DT0 device always ignores GET and treats *TRG as a Command Error.
-213	Init ignored	Indicates that a request for a measurement initiation was ignored as another measurement was already in progress.
-220	Parameter error	Indicates that a program data element related error occurred. This error message should be used when the device cannot detect the more specific errors described for errors -221 through -229.
-221	settings conflict	Indicates that a legal program data element was parsed but could not be executed due to the current device state (see IEEE 488.2, 6.4.5.3 and 11.5.1.1.5.).
-222	Data out of range	Indicates that a legal program data element was parsed but could not be executed because the interpreted value was outside the legal range as defined by the device (see IEEE 488.2, 11.5.1.1.5.).
-224	Illegal parameter value	This parameter can not be specified.

5-7-3. Device Specific Errors

Overview

An <error/event number> in the range [-399 , -300] or [1 , 32767] indicates that the instrument has detected an error which is not a command error, a query error, or an execution error; some device operations did not properly complete, possibly due to an abnormal hardware or firmware condition. These codes are also used for self-test response errors. The occurrence of any error in this class should cause the device-specific error bit (bit 3) in the event status register (IEEE 488.2, section 11.5.1) to be set. The meaning of positive error codes is device-dependent and may be enumerated or bit mapped; the <error message>string for positive error codes is not defined by SCPI and available to the device designer.
Note that the string is not optional; if the designer does not wish to implement a string for a particular error, the null string should be sent (for example, 42,""). The occurrence of any error in this class should cause the device-specific error bit (bit 3) in the event status register (IEEE 488.2, section 11.5.1) to be set. Events that generate device-specific errors shall not generate command errors, execution errors, or query errors; see the other error definitions in this section.

Error code		Description
-310	System error	Indicates that some error, termed “system error” by the device, has occurred. This code is device-dependent.
-320	Storage fault	Indicates that the firmware detected a fault when using data storage. This error is not an indication of physical damage or failure of any mass storage element.

5-7-4. Query Errors

Overview

An <error/event number> in the range [-499 , -400] indicates that the output queue control of the instrument has detected a problem with the message exchange protocol described in IEEE 488.2, chapter 6. The occurrence of any error in this class shall cause the query error bit (bit 2) in the event status register (IEEE 488.2, section 11.5.1) to be set. These errors correspond to message exchange protocol errors described in IEEE 488.2, section 6.5. One of the following is true:

An attempt is being made to read data from the output queue when no output is either present or pending;

Events that generate query errors shall not generate command errors, execution errors, or device-specific errors; see the other error

definitions in this section.

Error code	Description
-400 Query error	This is the generic query error for devices that cannot detect more specific errors. This code indicates only that a Query Error as defined in IEEE 488.2, 11.5.1.1.7 and 6.3 has occurred.

6. Appendix

6-1. Default Settings

The following default settings are the factory configuration settings for the power supply.

Initial Settings		Default Setting
Output		OFF
Key lock		0 (Disabled)
Voltage setting		0 V
Current setting		0 A
OVP		Maximum
OCP		Maximum
UVL		0V
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	100.0V/s (PFR-100L50) 500.0V/s (PFR-100M250)
Falling voltage slew rate	F-05	100.0V/s (PFR-100L50) 500.0V/s (PFR-100M250)
Rising current slew rate	F-06	20.00A/s (PFR-100L50) 4.000A/s (PFR-100M250)
Falling current slew rate	F-07	20.00A/s (PFR-100L50) 4.000A/s (PFR-100M250)
Bleeder circuit control	F-09	1 = ON
Buzzer ON/OFF control	F-10	1 = ON
Detection Time of OCP	F-12	0.0 sec
Current Setting limit	F-13	0 = OFF (The limit function of current setting is disabled.)
Voltage Setting limit	F-14	0 = OFF (The limit function of voltage setting is disabled.)
Memory Recall display	F-15	0 = OFF
Measurement average setting	F-17	0 = Low
Lock Mode	F-19	0 =0: Lock Panel, Allow Output OFF
USB / GP-IB setting	**Setting**	**Default Setting**
GP-IB address	F-23	8
LAN setting	**Setting**	**Default Setting**
DHCP	F-37	1 = ON
Web password enable / disable	F-60	1 = Enable
Web password	F-61	0000
UART setting	**Setting**	**Default Setting**
UART Baudrate	F-71	7 = 115200
UART Data Bits	F-72	1 = 8bits

UART Parity	F-73	0 = None
UART Stop Bit	F-74	0 = 1bit
UART TCP	F-75	0 = SCPI
Power On Configuration setting	Setting	Default Setting
CV Control	F-90	0 = Panel control (local)
CC Control	F-91	0 = Panel control (local)
Power ON Output	F-92	0 = Safe Mode (Output Off at startup)
External Output Logic Control	F-94	0 = High ON

The contents of the Test Mode are not cleared at initialization of F-88.
Clear the Delete Test Data.
The contents of the memory data (M1, M2, M3) are not cleared for F-88 initialization.
The Interface Select (F-29) setting is not initialized in F-88.
The UART address (F-76) and the Multi-drop control (F-77) settings are not initialized in F-88.

6-2. Error Messages and other Messages

The following error messages or other messages may appear on the PFR-100 screen during operation.

Error Message	Description
OHP	Over temperature protection
SENSE ALARM1	Sense Alarm1
SENSE ALARM2	Sense Alarm2
AC	AC fail
OVP	Over voltage protection
OCP	Over current protection
SHUTDOWN	Force shutdown
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 005	File size error
Err 007	Slave occurs Off-line (Multi-Drop mode)
Normal 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)
Communication Interface Messages	Description
MS ON	Mass storage plugged into front USB port
MS OFF	Mass storage removed from front USB port

6-3. LED ASCII Table Character Set

Use the following table to read the LED 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	(	)	+	-	,	
													

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