Programming Manual

BT SERIES

*AC-DC high voltage, low power,
bench-top power supply*

Rev. A 5/2011

**This manual is specifically intended for specialists trained in the use of high voltage
equipment and aware of the dangers inherent in its use.**

S.C.P.I. Compliant. This device fully complies with S.C.P.I. version 1999.0.

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1. Overview

This product is a compact high voltage AC-DC bench-top power supply with adjustable output voltage and fixed current limiting.

The device allows both local and remote operations.

For stand-alone operation, the power supply is fitted with integrated push buttons for local manual programming.

For remote operation, it is fitted either with an analog control port (by default) or with a serial interface supporting a RS232 port (optional). For the optional RS232 version, the ordering code of the device must include the suffix "-RS".

The BT features:

- *a large 128x64 graphical LCD backlighted display*
- *voltage control functions*
- *one SHV or BNC high voltage coaxial connector*
- *an analog remote control port (by default)*
- *or an optional SCPI compliant RS-232 communication port (replaces the analog port)*

All instrument features are available via the communication ports.

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2. Safety Information

This power supply is specifically intended for specialists qualified in the use of high voltage equipment and aware of the dangers inherent in its use.

Review this safety information carefully to avoid injury and prevent damage to the power supply or any equipment connected to it. There are no user serviceable parts inside this power supply.

Prior to operation, thoroughly review all safety, installation, and operating instructions accompanying this equipment. All instructions must be followed.

Power Source:
- *Use only the power cord specified for this device. The grounding conductor of the cord must be connected to earth ground.*

Environment:
- *Do not operate this power supply in wet or damp conditions or in an explosive atmosphere.*
- *This device is designed to work in an ambient of temperature of 0/+40°C. Do not expose to direct sunlight for an extended period of time.*

The Instrument:

- *DO NOT OPEN THIS POWER SUPPLY. Opening the device is dangerous to the user and will void any and all warrantees.*
- *Do not operate it if its panels are removed or any of the interior circuitry is exposed.*
- *Do not apply a voltage outside the specified range to any of the terminals.*

Warning:
Do not attempt modification, maintenance or repair to this device. All servicing on this equipment must be carried out by UltraVolt service personnel only.

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Warning Symbols:

	Attention symbol: Indicates important installation, operating, and/or maintenance instructions.

	Shock Hazard symbol: Indicates risk of electric shock.

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3. S.C.P.I. Conformance Information:

This power supply (BT series) complies with S.C.P.I. command syntax version 1999.0.

3.1. Used parameter Type :

Label	Type	Examples
<r>	Real number	123 or 1.2 or 2.5e2 Use a dot "." for decimal
<n>	Integer	1 or 200 or 2345
<b>	Boolean with alternative text	0 or 1 alternatively "ON" or "OFF"
<s>	String	"Any text transferred to RS232"
<value>	Any of the given values	
MINimum, MAXimum, DEFault	Sets the value to its minimum, maximum, or default value	
[<unit>]	Optional	

In this document, <numeric_value> is equivalent to <NRf> (i.e. decimal numeric data) unless otherwise specified.

Note:
A command string sent to the device must be terminated with a <carriage return> character (ASCII 13d) or <line feed> character (ASCII 10d) or <NULL> character (ASCII 00d) otherwise a time out occurs 60 seconds later. Command string termination will always reset the current SCPI command path to the root level.
By default, commands are not echoed or acknowledged on the RS232 interface. To turn on the echo use "SYSTem:RESPonse:ECHO on<CR>", for acknowledge use "SYSTem:RESPonse:ACKnowledge on<CR>".

3.2. Units:

This device accepts units for compatibility but they are meaningless. All groups off characters or numbers following a <NRf> (Flexible numeric representation, as describe in section 7.7.2.1 of IEEE 488.2) and only <NRf> will be discarded, in all other case, a "-224, illegal parameter value" execution error will be generated.

3.3. Convention:

Commands enclosed by "[]" are optional.

For example:

SOURce:VOLTage:LEVel:IMMediate:AMPLitude 120.0

Can be written as:

VOLTage 120.0

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3.4. Queries:

The query syntax is identical to command syntax with a "?" appended. For example to query the programmed voltage, send the command:

    SOURce:VOLTage?

A subsequent device read will return a value such as "120.0". All queries are terminated with a carriage return and line feed character (ASCII 13d and 10d).

4. Power on Condition:

S.C.P.I. Status Reporting:
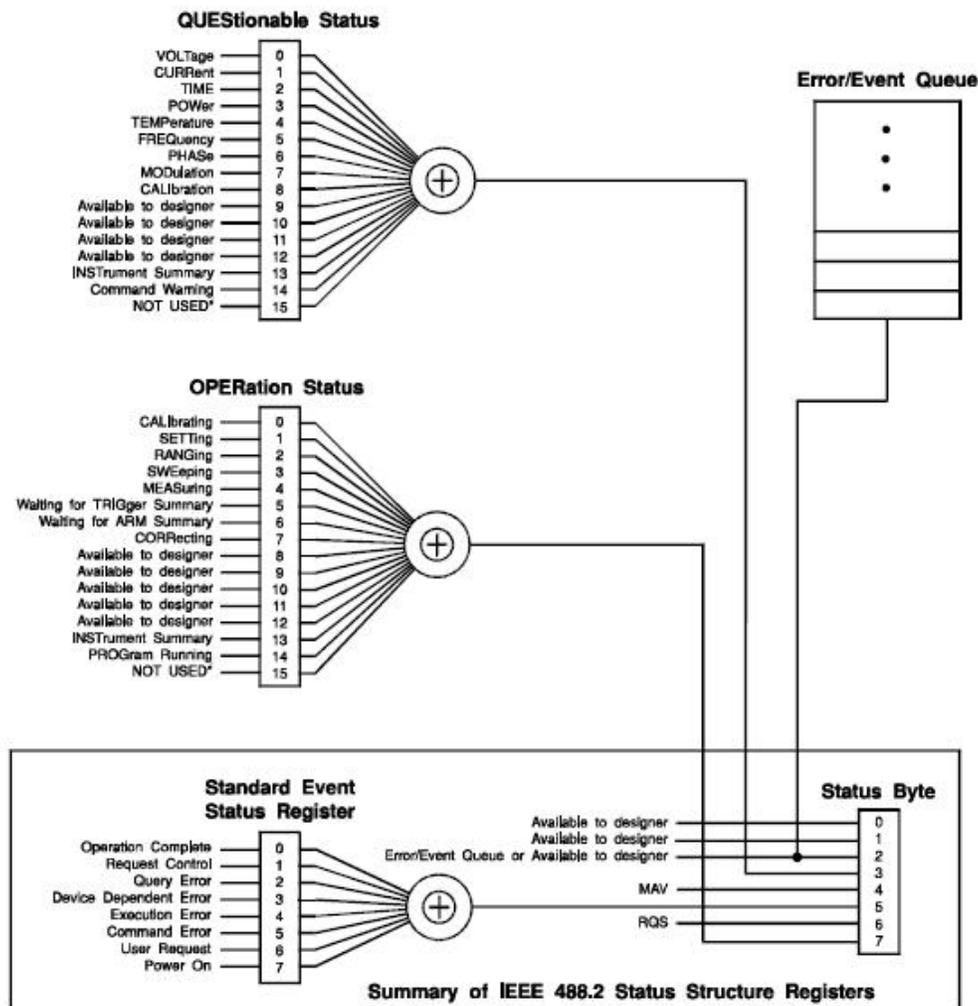
Table 1 : Status reporting structure.

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5. S.C.P.I. Common Command and Register Definition :

5.1. Register definition :

The S.C.P.I. supports the IEEE-488.2 and SCPI-1999.0 status reporting data structure. These structures are comprised of status register and status registers enable mask pairs. The following section describes these pairs.

5.1.1. Status byte register:

The Status Byte register (STB) can be read by *STB? Command, this will clear the status byte register. It will also be cleared by *CLS command.

Status Byte register (STB).		
Bit #	Weight	Description
7	128	Not used
6	64	Master Summary Status Bit (MSS). This bit is set if one of the bits in STB becomes true and the corresponding bit in the SRE is enabled.
5	32	Event Summary Bit (ESB). This bit is set if one of the bits in ESR becomes true and the corresponding bit in the ESE is enabled.
4	16	Message Available Bit (MAV). This bit is set if there is a message in the output buffer available.
3	8	Questionable Summary Bit (QUE). This bit is set if one of the bits in Questionable Status register becomes true and the corresponding bit in the Questionable Event register is enabled.
2	4	Error/Event Queue message Available Bit (EEQ). This bit is set if there is a message in the Error/Event Queue buffer available.
1	2	Not used
0	1	Not used

Table 2 : Status Byte Register.

5.1.2. Standard event status register:

The Standard Event Status Register (ESR) can be read by *ESR? Command. Reading this register or the *CLS command will clear the ESR. A bit in the ESR will only be set when the corresponding bit in the Standard Events Status Enable register (ESE) is set. Use the *ESE <mask> to set the bit and *ESE? to read this register.

Event Status Register (ESR).		
Bit #	Weight	Description
7	128	Power On
6	64	Not used
5	32	Command error
4	16	Execution error
3	8	Device dependant error
2	4	Query error
1	2	Not used
0	1	Operation complete

Table 3 : Event Status Register.

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5.1.3. *Questionable status register:*

The Questionable Status Register is defined in the table below:

Bit	Hex value	Description
0	0x0001	Not regulating at voltage limit (Unused).
1	0x0002	Not regulating at current limit (Unused).
2	0x0004	Time (Unused).
3	0x0008	Power (Unused).
4	0x0010	Temperature
5	0x0020	Frequency (Unused).
6	0x0040	Phase (Unused).
7	0x0080	Modulation (Unused).
8	0x0100	Calibration (Unused).
9	0x0200	(Unused).
10	0x0400	(Unused).
11	0x0800	(Unused).
12	0x1000	(Unused).
13	0x2000	(Unused).
14	0x4000	(Unused).
15	0x8000	(Unused).

Table 4 : Questionable Status Register.

5.2. IEEE-488.2 common command:

Some of the IEEE 488.2 commands can be sent from RS232 however not all of these commands are useful.

Mnemonic	Common Command Description	Group
*CLS	Clear status	Status & Event
*ESR?	Event status register query	Status & Event
*ESE	Event status enable	Status & Event
*ESE?	Event status enable query	Status & Event
*SRE	Service request enable	Status & Event
*SRE?	Service request enable query	Status & Event
*STB?	Read status byte query	Status & Event
*OPC	Operation complete	Synchronization
*OPC?	Operation complete query	Synchronization
*WAI	Wait to complete	Synchronization
*IDN?	Identification query	System Data
*RST	Reset	Internal Operations
*TST?	Self-test query	Internal Operations

5.2.1. *Clear Status:*

Syntax   ***CLS**
Description   Clears the Status Byte (STB) and the Event Status Register (ESR).

5.2.2. *Event Status Register Quer :*

Syntax   ***ESR?**
Description   Returns the content and clears the event status register (ESR).
Response   An integer in the range of 0 to 255.

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Note   If the corresponding bit in the ESE register is set, the STB bit in the STB is set.

5.2.3.   Event Status Enable register:

Syntax   ***ESE <n>**
Description   Sets the event status enable register.
                           0 to 255
Value   Only bit 0, bit 3, bit 5 and bit 7 are used in the ESR, so the meaningful
                           combinations are <1>, <8>, <32>, <128> and any sum of them.

Event Status Enable Register (ESE).		
Bit #	Weight	Description
7	128	Enable ESB when Power On
6	64	Not used
5	32	Enable ESB when Command error occur
4	16	Enable ESB when Execution error occur
3	8	Enable ESB when Device dependant error occur
2	4	Enable ESB when Query error occur
1	2	Not used
0	1	Enable ESB when Operation complete

Table 5 : Event Status Enable Register.

5.2.4.   Event Status Enable Register Query:

Syntax   ***ESE?**
Description   Returns the content of the Event Status Enable Register.
Response   An integer in the range of 0 to 255.

5.2.5.   Service Request Enable:

Syntax   ***SRE <n>**
Description   Sets the service request enable register. If one of the corresponding bits of the
                          Status Byte is true (except MSS naturally) the MSS bit in the STB is set.
Value   0 to 255

5.2.6.   Service Request Enable Query:

Syntax   ***SRE?**
Description   Returns the content of the service request enable register.
Response   An integer in the range of 0 to 255.

5.2.7.   Status Byte Query:

Syntax   ***STB?**
Description   Returns the content of the status byte register (STB).
Response   An integer in the range of 0 to 255.
Note   If the corresponding bit in the ESE register is set, the STB bit in the STB is set.

5.2.8.   Operation Complete:

Syntax   ***OPC**

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Description	Not applicable. The OPC bit in the ESR is set to 1.
Note	This command is implemented only to avoid any error message when the controller sends this command.

5.2.9. Operation Complete Query:

Syntax	***OPC?**
Description	Not applicable. Returned a 1.
Response	1
Note	This command is implemented only to avoid any error message when the controller sends this command.

5.2.10. Wait:

Syntax	***WAI**
Description	Not applicable.
Note	This command is implemented only to avoid any error message when the controller sends this command.

5.2.11. Identification Query:

Syntax	***IDN?**
Description	Returns the device identification string.
Response	<Manufacturer>,<Model>,<Serial Number>,<Firmware Version>

5.2.12. Reset:

Syntax	***RST**
Description	The device will perform a hardware reset.

5.2.13. Self Test Query:

Syntax	***TST?**
Description	Returns the result after performing the self-test.
Response	0 or 1.

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6. <u>Device Command:</u>

Keyword	Parameter form	Notes
OUTPut		See text
[:STATe]	<Boolean>	
[SOURce]		
:VOLTage		
[:LEVel]		
[:IMMediate]		
[:AMPLitude]	<numeric_value>	No units accepted
MEASure		
[:SCALar]		
:VOLTage		
[:DC]?	[<expected_value>[,<resolution>]]	Query only
SYSTem		
:CONTrol		
:REMote	<Boolean>	
:LOCal		Query only
:COMMunicate		
:SERial		
:CONTrol		
:RTS	ON|OFF|RFR	
[:RECeive}		
:BAUD	<numeric_value>	
:TRANsmit		
:AUTO?		Query only
:BAUD	<numeric_value>	
:RESPonse		
:ECHO	<Boolean>	
:ACKnowledge	<Boolean>	
:ERRor		
:ALL?		Query only
:CODE		Query only
[:NEXT]?		Query only
:COUNT?		Query only
[:NEXT]?		Query only
STATus		
:PRESet		Not questionable
:QUEStionable		
:CONDition?		Query only
:ENABle	<numeric_value>	
[:EVENt]?		Query only
:OPERation		
:CONDition?		Query only
:ENABle	<numeric_value>	
[:EVENt]?		Query only

6.1. <u>OUTPut subsystem:</u>

The OUTPut command subsystem is used to switch the high voltage output on and off.

Keyword	Parameter form	Notes
OUTPut		See text
[:STATe]	<Boolean>	

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6.1.1. OUTPut[:STATe] <boolean>

The STATe function controls whether the output voltage is active or not. Valid arguments are "ON" (1) or "OFF" (0). *RST and power on value is OFF.

6.2. SOURce subsystem:

The SOURce command subsystem controls the high voltage output value.

Keyword	Parameter form	Notes
[SOURce] 　　:VOLTage 　　　　[:LEVel] 　　　　　　[:IMMediate] 　　　　　　　　[:AMPLitude]	<numeric_value>	No units accepted

6.2.1. SOURce:VOLTage[:LEVel][:IMMediate][:AMPLitude] <numeric_value>

This function controls the output voltage value. Valid arguments are real values in the voltage output range of this device. The parameter is size limited to 7 digits after the mnemonic (space included). *RST and power on value is 0.

Example:

VOLT 489.2

6.3. MEASure subsystem:

Keyword	Parameter form	Notes
MEASure 　　[:SCALar] 　　　　:VOLTage 　　　　　　[:DC]?	[<expected_value>[,<resolution>]]	Query only

6.3.1. MEASure[:SCALar]:VOLTage[:DC]? <expected_value>[,<resolution>]]

This function measures the output voltage value in Volts. The <expected_value> and <resolution> parameters are included solely for compatibility with the Command Reference and are ignored by the device.

6.4. SYSTem:CONTrol subsystem :

Keyword	Parameter form	Notes
SYSTem 　　:CONTrol 　　　　:REMote 　　　　:LOCal	<Boolean>	Query only

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6.4.1. SYSTem:CONTrol:REMote LOCal|REMote

This function commands the control mode of the device. Valid arguments are "LOCal" or "REMote". *RST and power on value is LOCAL.
In "LOCAL" mode, the front panel push buttons or rear panel analog control connector controls the power supply as reflect by the state of "LOCAL/REMOTE" connector pin 6. In "REMOTE" mode, the power supply is controlled through the real panel digital control RS-232.

6.4.2. SYSTem:CONTrol:LOCal

This function is query only. It returns the local control mode of the device. Response is "LOCAL" or "REMOTE".
In "LOCAL" mode the power supply is controlled via the front panel elements. In "REMOTE" mode the power supply is controlled through the rear panel analogical control remote connector. This query reflects the input state of "LOCAL/REMOTE" remote connector pin.

6.5. SYSTem:COMMunicate subsystem:

Keyword	Parameter form	Notes
SYSTem 　　:COMMunicate 　　　　:SERial 　　　　　　:CONTrol 　　　　　　　　:RTS 　　　　　　[:RECeive} 　　　　　　　　:BAUD 　　　　　　:TRANsmit 　　　　　　　　:AUTO? 　　　　　　　　:BAUD 　　　　　　:RESPonse 　　　　　　　　:ECHO 　　　　　　　　:ACKnowledge	 ON|OFF|RFR <numeric_value> <numeric_value> <Boolean> <Boolean>	 Query only

6.5.1. SYSTem:COMMunicate:SERial:CONTrol:RTS ON|OFF|RFR

The RTS function controls the output state of the RTS line of the RS-232 serial port. Valid arguments are "ON" (1) or "OFF" (0) and RFR. *RST and power on value is ON.
For the "OFF" state RTS line is de-asserted, and for the "ON" state RTS line is asserted. A common use of the RTS line that has evolved is that of pacing. The RFR (Ready For Receiving) parameter sets the RTS line to indicate when the device is ready to receive. The device also monitors the state of CTS and stops transmission if that line becomes de-asserted.

6.5.2. SYSTem:COMMunicate:SERial[:RECeive]:BAUD <numeric_value>

The BAUD function controls the RS-232 serial port speed. Valid arguments are numeric values between 9600 and 115200 Baud. *RST and power on value are 57600. Standard values for this parameter are: 9600, 14400, 19200, 38400, 57600, and 115200. You can choose other values in this range but they are submitted to internal clock test. If accuracy can't be guaranteed an error message is sent to error/event queue.
Reception and transmission characteristics are coupled. Modifying this value affects the transmission speed.

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6.5.3. SYSTem:COMMunicate:SERial:TRANsmit:AUTO?

This function is query only. The response is "ON".

6.5.4. SYSTem:COMMunicate:SERial:TRANsmit:BAUD <numeric_value>

The BAUD function controls the RS-232 serial port speed. Valid arguments are numeric values between 9600 and 115200 Baud. *RST and power on value is 57600. Standard values for this parameter are: 9600, 14400, 19200, 38400, 57600, and 115200. You can choose other value in this range but they are submitted to internal clock test. If accuracy can't be guaranteed an error message is sent to error/event queue.
Reception and transmission characteristics are coupled. Modifying this value affects the transmission speed.

6.5.5. SYSTem:COMMunicate:SERial:RESPonse:ECHO ON|OFF

The ECHO function allows echoing of input command. Valid arguments are "ON" (1) or "OFF" (0). *RST and power on value is OFF.

6.5.6. SYSTem:COMMunicate:SERial:RESPonse:ACKnowledge ON|OFF

Turns ON or OFF the "OK" acknowledge and the error messages after each command. Valid arguments are "ON" (1) or "OFF" (0). *RST and power on value is OFF.

6.6. SYSTem:ERRor subsystem:

This subsystem collects commands and queries related to the reading and control of the error/event queue. The error/event queue contains items that include a numerical and textual description of the error or event. Querying for the full queue item (for example, with SYSTem:ERRor[:NEXT]?) will return a response with the following syntax:
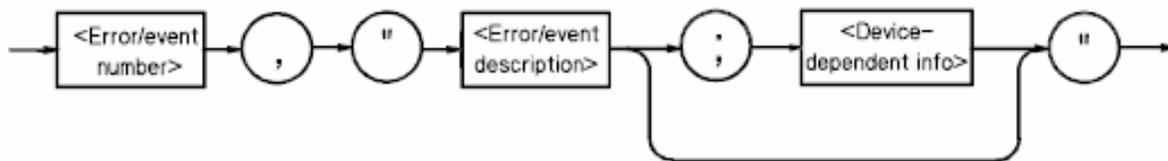
Figure 1 : Error/Event Syntax.

The <Error/event_number> is a unique integer in the range [-32768, 32767]. All positive numbers are instrument-dependent. All negative numbers are reserved by the SCPI standard with certain standard error/event codes described in this document. The value, zero, is also reserved to indicate that no error or event has occurred. The second parameter of the full response is a quoted string containing an <Error/event_description> followed by optional <Device-dependent info> text. Each <Error/event_number> has a unique and fixed <Error/event_description> associated with it.

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Keyword	Parameter form	Notes
SYSTem		
:ERRor		
:ALL?		Query only
:CODE		Query only
[:NEXT]?		Query only
:COUNT?		Query only
[:NEXT]?		Query only

6.6.1.   SYSTem:ERRor:ALL?

This function is query only. Queries the error/event queue for all the unread items and removes them from the queue. The response returns a <CR><LF> separated list of numbers, string pairs in FIFO order. If the queue is empty, the response is 0,"No error".

Note: If the queue is not empty, the 0,"No error" is not sent.

6.6.2.   SYSTem:ERRor:CODE[:NEXT]?

This function is query only. Queries the error/event queue for the next item and removes it from the queue. The response returns only the error/event code number omitting the string. Except for the shortened response, the query operates identically to SYSTem:ERRor[:NEXT]?

6.6.3.   SYSTem:ERRor:COUNT?

This function is query only. Queries the error/event queue for the number of unread items.

Note: If the queue is empty, the response is 0.

6.6.4.   SYSTem:ERRor[:NEXT]?

This function is query only. Queries the error/event queue for the next item and removes it from the queue. The response returns the full queue item consisting of an integer and a string as described in the introduction to the SYSTem:ERRor subsystem.

6.7. Status subsystem:

This subsystem controls the SCPI-defined status-reporting structures.

Keyword	Parameter form	Notes
STATus		
:PRESet		Not questionable
:QUEStionable		
:CONDition?		Query only
:ENABle	<numeric_value>	
[:EVENt]?		Query only
:OPERation		
:CONDition?		Query only
:ENABle	<numeric_value>	
[:EVENt]?		Query only

6.7.1. STATus:PRESet

The PRESet command affects only the enable register, the transition filter registers, and the queue enabling for the SCPI-mandated and device-dependent status data structures. For the device-dependent status data structures, this command sets the enable register to all 1's.

6.7.2. STATus:QUEStionable:CONDition?

Returns the contents of the condition register associated with the questionable status. Reading the condition register is non-destructive.

6.7.3. STATus:QUEStionable:ENABle

Sets the enable mask which allows true conditions in the event register to be reported in the summary bit. If a bit is 1 in the enable register and its associated event bit transitions to true, a positive transition will occur in the associated summary bit.
The command accepts parameter values of either format in the range 0 through 65535 (decimal) without error.

6.7.4. STATus:QUEStionable[:EVENt]?

This query returns the contents of the event register associated with the questionable status.

6.7.5. STATus:OPERation:CONDition?

Returns the contents of the condition register associated with the operation status. Reading the condition register is non-destructive.

6.7.6. STATus:OPERation:ENABle

Sets the enable mask which allows true conditions in the event register to be reported in the summary bit. If a bit is 1 in the enable register and its associated event bit transitions to true, a positive transition will occur in the associated summary bit.
The command accepts parameter values of either format in the range 0 through 65535 (decimal) without error.

6.7.7. STATus:OPERation[:EVENt]?

This query returns the contents of the event register associated to the operation status.

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7. S.C.P.I. error code:

7.1. Command error:

An <error/event number> in the range [-199 , -100] indicates that a *S.C.P.I.* syntax error has been detected by the parser. The occurrence of any error in this class causes the command error bit (bit 5) in the event status register (*IEEE 488.2*, section 11.5.1) to be set.

Error number	Error	Description
-100	Command error	Generic syntax error.
-102	Syntax Error	An unrecognized command or data type was encountered.
-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.
-104	Data type error	The parser has recognized a data element different than one allowed.
-108	Parameter not allowed	More parameters were received than expected for the header.
-109	Missing parameter	Fewer parameters were received than required for the header;
-110	Command header error	An error was detected in the header.
-112	Program mnemonic too long	The header contains more than twelve characters.
-114	Header suffix out of range	The value of a numeric suffix attached to a program mnemonic, makes the header invalid.
-120	Numeric data error	This error is generated when parsing a data element, which appears to be numeric, including the non-decimal numeric types.
-134	Suffix too long	The suffix contained more than 12 characters.
-138	Suffix not allowed	A suffix was encountered after a numeric element which does not allow suffixes.
-158	String data not allowed	A string data element was encountered but was not allowed by the device at this point in parsing.

7.2. Execution error:

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 causes the execution error bit (bit 4) in the event status register (*IEEE 488.2*, section 11.5.1) to be set.

Error number	Error	Description
-200	Execution error	Generic execution error.
-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.
-224	Illegal parameter value	Used where exact value, from a list of possibilities, was expected.

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7.3. Device-specific error:

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.

Error number	Error	Description
-330	Self-test failed	
-350	Error queue overflow	This code indicates that there is no room in the error queue and an error occurred but was not recorded.
-363	Input buffer overrun	Software or hardware input buffer on serial port overflows with data caused by improper or nonexistent pacing.
-365	Time out error	This is a generic device-dependent error.
+227	Query only command	Attempts write on query only command.
+351	Output queue overflow	This code indicates that there is no room in the output queue.
+366	Baud set error	Specified baud value is incompatible with system clock frequency.

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8. Maintenance and Service:

There are no user serviceable parts inside this power supply.

Warning: All servicing on this equipment must be carried out by UltraVolt factory-qualified service personnel only.

Caution: For any troubleshooting, turn the unit off, disconnect it from the AC supply, and contact UltraVolt.

The equipment can be returned to UltraVolt for maintenance and repair. To prepare and ship this product to UltraVolt:

- Attach a tag to the power supply indicating the owner's name and address, the person to contact, the serial number.
- Wrap the product with polyethylene sheeting or equivalent material.
- If the original packing material and carton are not available, obtain a corrugated cardboard shipping carton with inside dimensions at least 15 cm (6 in) taller, wider, and deeper than the this product. The shipping carton must be constructed of cardboard with a minimum 170 kg (375 lb) test strength. Cushion the unit in the shipping carton by tightly packing foam on all sides between the carton and the power supply. Allow 7.5 cm (3 in) on all sides, top, and bottom.
- Seal the shipping carton with shipping tape.

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9. Protection

A line fuse is located on the rear panel. Always replace with the same type and ratings – 5x20mm, 250VAC, 250mA slow blow.

A power switch located on the rear panel allows to turn on or to turn off the device. Press the symbol | for ON and the symbol ○ for OFF.

10. Standards

This power supply meets or exceeds the requirements of the following standards:

- *Directive 73/23/EEC of 19 February 1973 on electrical equipment designed for use within certain voltage limits: the "Low Voltage" Directive. Modified by Directive 93/68/EEC of 22 July 1993. Applicable standard is IEC 61010-1 of 13 February 2001: Safety requirements for electrical equipment for measurement, control, and laboratory use.*
- *Directive 89/336/EEC of 3 May 1989 on electromagnetic compatibility (EMC). Applicable standards for Residential, Commercial, and Light Industrial Environments are EN 50081-1:1992 for Generic Emissions, and EN 61000-6-2 for Immunity for industrial environments.*
- *EN 61000-3-2 : Electromagnetic compatibility (EMC) - Part 3-2: Limits - Limits for harmonic current emissions (equipment input current up to and including 16 A per phase).*
- *EN 61000-3-3 :Voltage fluctuations and flicker limits Electromagnetic compatibility (EMC) - Part 3-3: Limits - Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current up to and including 16 A per phase and not subject to conditional connection.*

Every component and material used in this product comply with UL 94-V0.

11. Product Label

The sticker is located on the top. It features a model number and serial number.

In any communication with UltraVolt about one of its products, please use both the model and the serial number of the product.

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12. Warranty:

WARRANTY: The Seller warrants all goods supplied hereunder will conform to any sample approved by the parties and will be the kind described herein or in any specification, performance requirement, or drawing approved by the Seller, and will be of merchantable quality and free from defects in material or workmanship under normal use and prescribed maintenance for a period of one (1) year from the date of shipment. To the extent the Buyer does not furnish the Seller with written specifications, the goods will be manufactured in accordance with industry accepted standards. This warranty shall not apply to any goods delivered hereunder that have been damaged or subjected to alteration, nor shall it apply to negligent treatment after delivery or to any defects attributed to artwork or drawings furnished by the Buyer. Also, unless specifically stated, the warranty does not extend to the electrical performance of any assemblies or subassemblies to which the goods furnished hereunder are affixed, but is restricted to the electrical continuity properties of such goods.

The Seller's only obligation for breach of this warranty shall be the repair or replacement, without charge, of any goods or parts thereof that within such one (1) year period is proven to the Seller's satisfaction to have been defective, provided (1) the Buyer shall have notified the Seller of the defect within such one (1) year period, and (2) the Seller shall have the option of requiring the return of the defective material or goods at the Buyer's expense to establish the claim provided; however, the Seller will bear any transportation costs incurred in repairing or replacing any goods that are shown to be defective during the warranty period. The cost of any repairs made by the Seller to goods no longer covered by this warranty shall be borne by the Buyer. The Buyer must contact the UltraVolt Customer Service Department prior to the return of any material(s) to obtain an RMA number which will be used to track the material. Material found to be out of warranty will be repaired or replaced at the Seller's discretion based on quantity (please contact the Customer Service Department for more information). The Seller shall in no event be liable for the Buyer's manufacturing costs, lost profits, good will, or any other special, consequential, incidental, or other damages resulting from a breach of the foregoing warranty. There are no other warranties expressed or implied (including the warranty of merchantability) that extend beyond the warranty set forth herein or that extend beyond the description of the goods contained herein.

We at UltraVolt know that when developing new high-voltage applications, power supplies may sometimes become unintentionally damaged. We, therefore, offer an enhanced warranty beyond the scope of our basic one-year warranty to support customers' efforts in new-product development. Should a power supply unintentionally fail or become damaged through incorrect application, UltraVolt will repair or replace the first unit at no charge during the Warranty period. Then, if the same unit is unintentionally damaged again while still within the warranty period, UltraVolt will provide another replacement at half price. For any such replacement, UltraVolt Applications Engineering must first review the customer's new product application. This is done to ensure mechanical installation and electrical connections are in accordance with UltraVolt published datasheets and application notes. The combined free replacement and expert UltraVolt engineering review is just one of many ways UltraVolt is *Making High Voltage Easier!*®

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