

## SG Series COMMUNICATION PROTOCOL

A. General: This document specifies the RS232C communication protocol of the referenced Falcon UPS models. The protocol provides the following

Features:

1. Monitor charger status.
2. Monitor battery status and condition.
3. Monitor the utility status.
4. Provide the power switch function for computer to turn on and off the UPS output either directly or on a scheduled basis.

Computer will control information exchange by a query followed by <cr>. The UPS will respond with information followed by a <cr> or by sending data.

B. RS-232 Port Setup:

BAUD RATE	2400 bps
DATA LENGTH	8 bits
STOP BIT	1 bit
PARITY	NONE

CABLING:

**Reference the Falcon Owner's Manual for you specific UPS model to obtain the UPS RS-232 port pin assignments.**

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### C. COMMUNICATION PROTOCOL:

#### 1. Status Inquiry:

Computer: Q1<cr>

UPS: UPS status data stream returned:

(MMM.M NNN.N PPP.P QQQ RR.R S.SS 'IT.T b7b6b5b4b3b2blbO<cr>

UPS status data stream:

There should be a space character between every field for data separation. The meaning of each field is list as followed:

a. Startbyte :(

b. Input Voltage : MMM.M

M is and integer number ranging from 0 to 9.

The unit of measurement is in Volts.

c. Input Fault Voltage : NNN.N

N is and integer number ranging from 0 to 9.

The unit is Volt.

**\*\*For OFF LINE UPS\*\***

The purpose of this data is to identify a short duration voltage glitch which may have caused the OFF line UPS to go to Inverter mode. When this occurs the input voltage will appear normal at the time of query, prior to glitch and will still appear normal at next query.

The Input Fault Voltage will hold glitch voltage until next query. After the query, the Input Fault Voltage will be the same as Input voltage, until next glitch occurs.

**\*\* For ON LINE UPS\*\***

The purpose of this data is to identify a short duration utility fail which may have caused the ON line UPS to go to battery mode. When this occurs the input voltage will appear normal at the time of query, prior to the fail and will still appear normal at next query.

The Input Fault Voltage will hold the utility fail voltage until the next query. After the query, the Input Fault voltage will be the same as input voltage until next utility fail occurs.

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d. Output Voltage : PPP.P

P is an integer number ranging from 0 to 9.

The unit of measurement is in Volts.

e. Output Current : QQQ

QQQ is a percentage of the maximum rated output current, not an absolute value.

f. Input frequency: RR.R

R is an integer number ranging from 0 to 9.

The unit of measurement is HZ.

g . Battery voltage: SS.S or S.SS

S is an integer number ranging from 0 to 9.

For on-line units the battery voltage/cell is provided in the form S.SS.

For standby units the actual battery voltage is provided in the form SS.S

The UPS type in UPS status will determine which reading was obtained.

h. Internal UPS Temperature: TT.T

T is an integer number ranging from 0 to 9.

The unit is degrees centigrade.

i. UPS Status : <U>

<U> is one byte of binary information such as

<b7b6b5b4b3b2b1b0>.

Where bn is a ASCII character '0' or '1'.

UPS status:

Bit	Description
7	1: Utility Fail (Immediate)
6	1: Battery Low
5	1: Bypass/Boost or Buck Active
4	1 : UPS Failed
3	1: UPS Type is Standby (0 is On line)
2	1: Test in Progress
1	1: Shutdown Active
0	1:BeeperOn

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j. Stop Byte : <cr>

-Example: Computer: Q1<cr> UPS

(208.4 140.0 208.4 034 59.9 2.05 35.0 00110000<cr>

Means : Input voltage is 208.4V.

Input fault voltage is 140.OV. Output voltage is 208.4 V.

Output current is 34 %.

Input frequency is 59.9 HZ. Battery voltage is 2.05V.

Internal Temperature is 35.0 degrees of centigrade.

UPS type is On-line , UPS failed. Bypass is active, and shutdown is not active.

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### 2. Test UPS for 10 seconds:

Computer: T<cr>

UPS: Test for 10 seconds and return to utility.

If battery low occur during testing, UPS will return to utility immediately.

### 3. Test until battery low:

Computer: TL<cr>

UPS: Test until battery low and return to utility.

### 4. Test for specified time period:

Computer: T<n><cr>

UPS : Test for <n> minutes.

- a. During testing, UPS returns to utility immediately, if battery low occurs.
- b. <n> is a number ranging from 01 to 99.

### 5. Turn On/Off Audible Alarm -Toggle the UPS Audible Alarm:

Computer : Q<cr>

When the AC power fails, the UPS will generate an audible warning alarm to inform the user. The user can toggle the audible alarm either off or on by sending this command.

6. Shutdown Command:

Computer: S<n><cr>

UPS : Shut UPS output off in <n> minutes.

- a. The UPS output will be turned off in <n> minutes, even if the utility power is present.
- b. If the battery low occurs before <n> minutes, the output is turned off immediately.
- c. After UPS shutdown, the controller of UPS monitors the utility power. If the utility recovers, the UPS will wait for 10 seconds and connect the utility to output.
- d. <n> is a number ranging from .2 ,.01,02, ...,up to 10.

For example: S.3<cr> --- shut output off in (.3) minutes

7. Shutdown and Restore Command:

Computer: S<n>R<m><cr>

UPS: Shut UPS output off in <n> minutes, and wait  
for <in> minutes, then turn on UPS output again.

- a. The shutdown sequence is the same as the previous command. When the <in> minutes expire, the utility does not restore, the UPS will wait until utility has been restored.
- b. If UPS is in shutdown waiting state, the “C” command will cancel the shutdown process.
- c. If UPS is in a restore waiting state, the “C” command will turn on the UPS output.  
UPS must be hold off at least 10 seconds. (if utility is present)
- d. <n> is a number ranging from .2 ,.01, 02, ..., up to 10. e. <in> is a number ranging from 0001 to 9999.

8. Cancel Shutdown Command:

Computer: C<cr>

UPS: Cancel the SN<n><cr> and SN<n>R<m><cr> command.

- a. If UPS is in a shut down waiting state, the shut down command is cancelled.
- b. If UPS is in a restore waiting state, the UPS output is turned on, but UPS will be held off for at least 10 seconds. (if utility is present)

9. Cancel Test Command:

Computer: CT<cr>

UPS: Cancel all test activity and connect the utility to output immediately.

10. UPS Information Command:

Computer: I<cr>

UPS : :#Company Name UPS\_Model Version<cr>

This function will cause the UPS to respond with the basic information about the manufacture of the UPS, the UPS model name and the version number of the UPS firmware. The length of every field is listed as follows:

Company\_Name : 15 characters, leave space if less than 15 characters

UPS\_Model :10 characters, leave space if less than 10 characters.

Version : 10 characters, leave space if less than 10 characters

There must be a space character between every field for separation.

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### 11. UPS Rating Information:

Computer: F<cr>

UPS : #MMM.M QQQ SS.SS RR.R<cr>

This function instructs the UPS to send the rating value of UPS. There must be a space character between every field for separation. The UPS's response contains the following information field:

- a. Rating Voltage: MMM.M
- b. Rating Current QQQ
- c. Battery Voltage SS.SS or SSS.S
- d. Frequency: RR.R

#### D: COMMAND SUMMARY:

ITEM	COMMAND	DESCRIPTION
Ia	D	Status Inquiry *disable
1		Status Inquiry
2	T	10 Seconds Test
3	TL	Test until Battery Low
4	T<n>	Test for Specified Time Period
5		Turn On/Off Audible Alarm
6	S<n>	Shut Down Command
7	S<n>R<m>	Shut Down and Restore Command
8	C	Cancel Shut Down Command
9	CT	Cancel Test Command
10	I	UPS Information Command
11	F	UPS Rating Information

#### E. Invalid Command/information Handling

If the UPS receives any command that it could not handle, the UPS should echo the received command back to the computer. The host should check if the command sent to UPS been echo or not.

Should the UPS respond with the @ character, this indicates the last command sent was corrupt or was an invalid command. Resend last command should be resent.