The Bosworth Company

Operator's Guide

Version 3.3*

Model # MS-SCK0n
***requires SapCheck version BW1.3F-33a software or above**

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Table of Contents

SapCheck Operation

SapCheck operates by sending and receiving SMS text messages over the cellular network. No internet connection is needed.

SapCheck will only respond to text messages it receives from users whose phone numbers it recognizes. It maintains a list of such "Command Numbers." When SapCheck receives a text message from a Command Number, it will always reply by texting back a confirming message. If it receives a command it does not recognize, it will respond with "Invalid command". This indicates that SapCheck has received and processed the text message command that you sent.

If you do not receive a text reply from SapCheck it can mean that cellular reception is unavailable. Avoid sending another text message to SapCheck until it has responded to your first message.

Monitoring Functions

SapCheck can provide you with temperature and vacuum information collected from its temperature and vacuum sensors. Additionally, SapCheck will tell you whether or not the level of sap in your sap collection tank has reached the tank float switch. The "get" commands allow you to inquire about the readings from these sensors:

- **get temp** returns current temperature
- **get vac** returns current vacuum
- **get float** returns a message indicating whether or not the sap has reached the sap alert level

  (Note that the sap alert level corresponds to the height at which you have installed the float switch on your sap collection tank.)

Additionally, you can send the following text messages:

- **get status** *OR* **status** returns a message indicating current temperature, vacuum, tank full status and pump operation state.

  Note: This is the most efficient way to monitor conditions at the sugarbush as it returns all information in one text message, as opposed to multiple individual messages for each piece of information.
- get settings returns a message indicating the values of all the control or alert settings you have previously defined.

SAPCHECK OPERATION

- **help** returns a text message listing all the text message commands that SapCheck recognizes. The "?help" command is really the only SapCheck command you need to remember if you do not have access to your Operator's Guide.

SETTING A VACUUM ALERT

To set the vacuum alert level, send the text message

set vac warning *value*

For example, to set the vacuum alert level to 10 in Hg, send the text message

set vac warning 10

If the vacuum measured by SapCheck's vacuum sensor falls below the warning level, SapCheck will send the following message to your cell phone:

Low Vacuum Warning <nn> in. Hg

(The <nn> value is the current vacuum reading.)

SapCheck will send you repeated Low Vac Warnings as long as the vacuum remains below the alert level. If you want to be reminded every "*nn*" minutes, send the command

set vdelay delay *nn*

If you want to turn off vacuum warnings altogether, send the command

set vdelay delay 0

If you cannot remember what value you have specified for the vacuum alert, send the text message

get settings

and it will return the values of all the settings you have specified, including the vacuum alert level.

SAP LEVEL ALERT

When the sap in your collection tank rises to the point where it causes the float switch to close, SapCheck will text the following alert to your cell phone:

Sap at Tank Level

Depending on conditions as your tank fills, the SapCheck float switch sensor may tend to "bob up and down", leading to multiple Sap at Tank Level alerts. SapCheck has a built-in delay that must occur after one such alert before a second is issued. This delay is set at the factory to 5 seconds. You can change the delay by issuing the following command:

set float delay *nn*

where *nn* is the number of seconds of delay

Remotely Starting / Stopping Vacuum Pump

With the optional PowerToggle accessory, you can remotely control your pump to turn on by texting ...

start

To turn your pump to turn off, text ...

stop

If you have previously texted **auto on** to SapCheck to turn on Temperature Auto-Control, you must issue the **auto off** command to take the pump out of auto-temp control mode. Once you have issued the auto-off, you can use the the **start** or **stop** commands to directly control the pump.

To return the pump to Temperature Auto-Control, simply text the "**auto on**" command again to Sapcheck.

Temperature Auto Control

With the optional "PowerToggle" accessory, SapCheck can automatically turn your vacuum pump on/off based on the temperature at your sugarbush. You can define one temperature at which the pump will turn on, and a second temperature at which the pump will turn off. For example, you might want to wait until the temperature warms up to 33˚F before turning the pump on (to be sure that any ice inside the pump has melted) and to keep the pump running until the temperature drops below 30˚F .

Text the following commands:

set temp on 33

set temp off 30

(Note: The "temp on" value must always be larger than the "temp off" value.)

To engage the temperature control mechanism, send the text message

auto on

SapCheck responds with "Temperature Control Engaged" and will turn the pump on/off based on the temperature values you set.

To disengage the temperature control mechanism, send the text

auto off

Note: You cannot control the pump with the "start" or "stop" commands until you have issued the "auto off" command to disengage temperature control. SapCheck will respond with "Operation Not Permitted" if you attempt to do so.

Command Phone Numbers

SapCheck will only respond to text commands from cell phone numbers that have been registered with it using the **set user** command. To add a new Command Number for a user with cell phone xxx-yyy-zzzz, text the command …

set user *xxxyyyzzzz*

To delete xxx-yyy-zzzz from the command number list, text ...

set user *xxxyyyzzzz* del

Active and Inactive Users

Any active command number can issue a SapCheck command, and all active command numbers will receive SapCheck alerts. Only the command-issuing number will receive a response to a SapCheck query.

To make a command number inactive, text

set user *xxxyyyzzzz* act off

Inactive command numbers will not receive SapCheck alerts, and SapCheck will not process any command from an inactive number with the exception of the command to make the number active

set user *xxxyyyzzzz* act on

The "get user" text command returns a list of all Command Numbers and their status (active/inactive).

Note: Canadian users must add the prefix "+1" when specifying a phone # in a SapCheck text command; e.g.,

set user *+1xxxyyyzzzz*

Data Logging to Your SapCheck Account on the Web

SapCheck can periodically send vacuum, temperature and pump on/off status and tank status information to your SapCheck account on www.thebosworthco.com. To actiate this data logging feature, text the command …

set datalogging nn

SapCheck will send a data reading to your account every nn minutes.

(Note: nn cannot be less than 10)

To turn off data logging, text

set datalogging 0

Log onto your SapCheck account on www.thebosworthco.com and click on the Data panel to view charts of these data values at your sugarbush. You can view your SapCheck history data from any device that connects to the Internet.

Service Mode

For product support purposes, SapCheck can be put into "service mode". When in service mode, the unit will respond to command texts from a special Bosworth Service Number, in addition to commands from its user list. When this command is initiated, SapCheck texts the following message to the users:

SERVICE CONTROL ON

This message indicates that the unit is currently under "Service Control".

When service mode is terminated, SapCheck resumes responding to texts just from the device's user list. Each active user receives the following text to indicate that service mode has been terminated:

SERVICE CONTROL OFF

Calibrating SapCheck's Vacuum Sensor

The SapCheck vacuum sensor is factory-calibrated prior to product shipment. However, you may choose to calibrate SapCheck's vacuum sensor to more closely match vacuum readings of a vacuum gauge installed on your sap line.

Re-calibrating the SapCheck vacuum sensor involves setting two different vacuum readings, one at zero vacuum (atmospheric pressure) and one at as a high a vacuum as you can obtain on your system as read by the analog vacuum gauge that you're using for calibration. Follow the steps below:

1) With your pump system running so that your calibrating gauge reads 0 in Hg vacuum, text the following command to SapCheck:

   set calibrate lowvac 0.0

2) With your pump system running so that your calibrating gauge reads as high a vacuum reading as possible, text the following command to SapCheck

   set calibrate hivac ##.#

   where ***##.#*** is the vacuum reading on your calibrating gauge.

3) After setting the low and high vacuum points, text the following command to SapCheck

   set calibrate

   The Calibrate command causes SapCheck to install the new calibration settings and automatically reboot.

When SapCheck restarts, the new calibration settings will be used for reporting vacuum sensor readings.

SapCheck Activation; Monthly Text Message Limits

Your SapCheck Support Plan provides cellular network connectivity for your SapCheck unit. SapCheck units become active once a Support Plan is purchased.

A SapCheck Support Plan provides up to 3000 messages per month and can be purchased to cover from 1 to 6 months' operation. Both messages "sent" and "received" by the SapCheck unit are counted toward the 3000 monthly message limit. Additional charges apply for messages above the monthly message limit. Contact The Bosworth Company for more details.

LIST OF COMMANDS

Text Message Command	Meaning
auto *<on/off>*	auto on/off engages/disengages temperature control of the pump
get accessory	Returns the name and status of the PowerToggle device
get calibrate	Returns the vacuum sensor calibration settings, as well as the current vacuum reading and raw count values coming from the vacuum sensor
get control	Returns Service Control mode/status
get datalogging	Returns the data logging posting interval value (in minutes)
get float	Generates text message indicating tank status (full or not full)
get mprls	Returns status of the solid state vacuum sensor
get name	Retrieves the current system ID
get report	Returns the hourly frequency at which SapCheck automatically send status messages (as set by the set report command.)
get settings	Generates text message containing current temperature and vacuum warning settings, as well status report interval.
get signal	Returns a % indicator of cell phone communication strength where SapCheck is located
get status *or* status	Generates text message containing current operating state of pump (on/off), vacuum and temperature readings, whether or not sap has reached alert level in tank
get temp	Generates text message containing current temperature reading (°F) measured by sensor
get usage	Returns current cycle start date for the current monthly text cycle, the user's monthly text allotment (monthly text message limit) and usage this cycle (number of text messages used this cycle, including the command message and its reply.)
get user	Returns the list of SapCheck command numbers and their active/inactive status
get vacuum	Returns current vacuum reading (in Hg) measured by sensor
get vdelay	Returns the value (minutes) of the vacuum warning message delay

LIST OF COMMANDS (CONT'D)

Text Message Command	Meaning
reboot	Reboots SapCheck system
set accessory on *<name>*	Assigns a name to the secondary device that you have plugged into the PowerToggle. (e.g., "HeatLamp")
set accessory off *<name>*	Turns off any reference to a secondary device in status messages
set calibrate	Installs the "lowvac" and "hivac" points specified by the set calibrate lowvac and hivac commands and automatically reboots SapCheck. Vacuum sensor re-calibration will take effect when SapCheck restarts.
set calibrate hivac *##.# or ##*	Sets the high vacuum endpoint used for calibrating the SapCheck vacuum sensor. Usually, this is chosen when the system is running at or near the highest vacuum as indicated by a second, calibrating gauge. The value entered for *##.#* is the value (in Hg) reported by the second, calibrating gauge.
set calibrate lowvac *##.# or ##*	Sets the low vacuum endpoint used for calibrating the SapCheck vacuum sensor. Usually, this is chosen when the system is running so that a second, calibrating gauge reads 0 in Hg. In that case, the value entered for *##.#* is 0.0
set datalogging *<value>*	Sets the interval in minutes for posting vacuum, temperature, pump and tank status values to user's SapCheck account on the web. Default (and minimum): 10
set float *<value>*	After issuing a **Sap At Tank Level** alert, *value* is the number of seconds that SapCheck waits before repeating the alert. Default: 30
set motor on/off	Determines if the pump will automatically turn on or stay off after reboot or power cycling
set mprls *on/off*	Enables/disables use of solid state vacuum sensor
set name *<id>*	Sets the unique identifier for the system
set report *<value>*	Sets the time interval in hours at which SapCheck will automatically send status message texts.
set temp off *<value>*	Sets the "falling" temperature value when the pump will turn off when temp control is engaged. Pump will turn off if the temperature is already below this temperature.

LIST OF COMMANDS (CON'TD)

Text Message Command	Meaning
set temp on *value*	Sets the "rising" temperature value when the pump will turn on under auto-temp control. Pump will turn on, if the temperature is already above this temperature.
set user *xxxyyyzzzz* *Example:* set user 4011234567 Canadian: set user +1*xxxyyyzzzz*	Sets the user phone # (area code + number; no dashes!) which the unit will recognize as a "command-generating" number. **IMPORTANT!** *Be very careful using this command. If you do not enter the phone # correctly, you may enable command of your SapCheck unit by an unknown party!* **Canada Users:** "+1" before the phone number.
set user *xxxyyyzzzz* del Canadian: set user +1*xxxyyyzzzz* del	Deletes phone # xxxyyyzzzz from the command number list. **Canada Users:** "+1" before the phone number.
set user *xxxyyyzzzz* act on/off Canadian: set user +1*xxxyyyzzzz* act on/off	Sets the status of command number to either active ("on") or inactive ("off"). Inactive command numbers do not receive any alerts and cannot issue any text commands with the exception of the command to change their status to active. **Canada Users:** "+1" before the phone number.
set vac warning *value*	Sets the (falling) vacuum value at which a warning text is sent to the user
set vdelay delay *nn*	Sets the vacuum warning message delay in minutes
shutdown	Shuts down the SapCheck device. Power must first be turned off and then back on to restart SapCheck after issuing the shutdown comman.
start	Starts the pump, regardless of sensor input; sends confirming text. Only works if temperature control is disengaged.
stop	Stops the pump, regardless of sensor input; sends confirming text. Only works if temperature control is disengaged.
update	Uploads SapCheck software version from thumb drive. Thumb drive must be inserted into USB port when command is texted.

Note:

Commands are not case-sensitive, but **all characters in a command must be typed as shown, including spaces.** The <*value*> entries should be replaced by a number. For example, sending the text message ...

=temp on 33

... will set the "temp on" value to 33°F.

The "get" and "set" versions of the commands are designed to be used with voice-recognition, if available, on your cell phone.

Support

Each SapCheck unit must have access to a cellular communications network to function. Cellular network connectivity is provided through a SapCheck Support Plan that is purchased from The Bosworth Company. SapCheck Support Plans provide for cellular network connectivity as well as access to software upgrades and new releases.

All Sapcheck units purchased directly from Bosworth are shipped with an active support plan. ***In the case of a SapCheck unit purchased through a dealer, the user must contact The Bosworth Company to purchase a support plan.***

Support plans can be purchased either by going on the following Bosworth website page …

www.thebosworthco.com/SapCheck/activate

or by calling The Bosworth Company at 1-888-438-1110. You must provide the your SapCheck ID # (printed on the bottom of the Controller box) to purchase a support plan.

Once a plan has been purchased, the telecommunications capability within SapCheck is activated and the unit is assigned a telephone number. The user can then send commands to SapCheck by texting messages to this SapCheck phone number.

Software Upgrades

Software upgrades are installed by inserting a thumb drive into the USB port on the front of the SapCheck Controller that has the latest version of the SapCheck software file, **sapcheck.bos**. (To inspect the version number of software in the file, open the file with Notepad. The version number is contained in the first several characters of the file.)

Once the sapcheck.bos software has been downloaded onto a thumb drive, and while the SapCheck Controller is powered on, insert the USB drive into the USB port on the SapCheck Controller. From the command cell phone issue the text command

update

Note: *The Update command will load whatever sapcheck.bos file it finds on the thumb drive that has been inserted into its USB port, regardless of whether it is the latest version or an older version of the software.*

SapCheck will reboot to complete the software installation. This process will take approximately 2 minutes. When the reboot has finished, SapCheck will text the power-on message, confirming the software version that it is running; namely, **Bosworth v.*<version>***. Once this has occurred, the update process has successful completed and the thumb drive can be removed.

Software Upgrades (cont'd)

Each SapCheck user has a user SapCheck account on The Bosworth Company website. The most current version of the SapCheck software is available on the user's SapCheck account and can be downloaded from his/her account onto a temporary directory on a computer.

If there is already a previous version of sapcheck.bos on the thumb drive that you are going to use to update your SapCheck software, be sure to rename this file on the thumb drive to some other filename (e.g., sapcheck.bos_old) before moving or copying the latest version of the sapcheck software onto the thumb drive. If you do not do this, the copying/moving operation may result in renaming the newer sapcheck.bos file with a different name (e.g., sapcheck.bos(1)), and, as a result, the updating procedure will not find this file to upload it on the SapCheck controller.

Troubleshooting

The most likely cause of poor SapCheck functionality is poor or spotty cell phone communication at the sugarbush. The table below presents some additional troubleshooting suggestions to help diagnose and correct performance issues.

Problem	Things to check
SapCheck did not respond to my text command	The most likely cause of this is a temporary problem with the cellular network. The simplest solution is to simply re-issue the command. Best practice is to wait a minimum of 5 seconds before issuing a follow-on command.
SapCheck is not responding to any of my text commands	When SapCheck recognizes a command, it replies with a confirming text. I f SapCheck does not recognize a text command, it responds by with a text that says "Invalid command" If you do not receive any confirming text, it may be due to any of the following causes: • you sent a correctly entered text command, but not from the "command phone #". SapCheck will only respond to commands from the phone # identified by the **set user *xxxyyyzzzz*** command. • cell phone communication has been interrupted or is not functioning with sufficient strength at the sugarbush • SapCheck is not powered on. • Antenna is not properly screwed into the antenna receptacle. Improperly installing the antenna can cause the center conducting pin of the antenna to be pushed back into the antenna plug-in, resulting in no electrical contact and a loss of communications signal. If this has happened and the center contact pin cannot be pulled back out to enable proper contact when the antenna is re-installed, you will need to purchase a replacement antenna. If, after 2 minutes, SapCheck is not responding, and you have confirmed that you have cell-phone connectivity at your sugarbush where SapCheck is deployed, then "power-cycle" SapCheck by unplugging it and then plugging it in again to power. This effectively "reboots" the SapCheck device and should clear up any communications problem.

TROUBLESHOOTING (CONT'D)

Problem	Things to check
Vacuum pump is not responding to temperature control	Text **auto on** command to ensure that SapCheck is operating the pump under auto-temp control. Text **get settings** command to ensure the temperature and vacuum thresholds are correct. • Temp on value should be higher than temp off value. • Check that pump is powered on and connected to SapCheck controller.
My temperature reading seems to be "frozen" at a certain value and is not accurate	• The most likely cause of a "frozen" temperature reading is that the sensor input cable was disconnected from the unit and then re-connected after the unit was powered up. To fix this, ensure that the sensor input cable is properly plugged into the Controller box and then power the SapCheck controller off and then back on. • If you are certain that the sensor cable is properly plugged into the box and you are not at your sugarbush, you can also "power-cycle" the unit by issuing the **reboot** command from your command phone #.

YOUR NOTES

Manufactured by The Bosworth Company
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