The Bosworth Company

Operator's Guide

Version 2.2*

Model # MS-SCK-001
***requires SapCheck v7.99B software or above**

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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. 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 you have issued an unrecognized command or that the cellular reception is unavailable.

MONITORING FUNCTIONS—ASKING SAPCHECK A QUESTION (?)

To ask SapCheck a question, you simply begin the text message with a question mark (?) or the word "get". 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** *OR* **?temp** returns current temperature
- **get vac** *OR* **?vac** returns current vacuum
- **get tank** *OR* **?tank** 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** *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** *OR* **?settings** returns a message indicating the values of all the control or alert settings that you have previously defined.
- **get version** *OR* **?version** returns the current version number of the SapCheck software installed in the Controller.

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

Commands that set values for alert or temperature-based pump control are preceded by the equals sign, "=", or you can substitute "set ".

To set the vacuum alert level, send the text message

set vac warning *value* *OR* **=vac warning *value***

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

set vac warning 10 *OR* **=vac warning 10**

If the vacuum measured by SapCheck's vacuum sensor falls below the previously specified alert 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.)

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

get settings *OR* **?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 *value*

where value is the number of seconds of delay. For example, issuing the following command sets the delay to 20 seconds:

set float delay 20

SapCheck responds with:

Float status message delay 20 sec

TEMPERATURE AUTO CONTROL

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 running until the temperature drops below, say, 30°F .

To set the temperature value at which the pump will turn on, send the text message

set temp on *value* *OR* **=temp on *value***

To set the temperature value at which the pump will turn off, send the text message

set temp off *value* *OR* **=temp off *value***

Finally, send the following text message to tell SapCheck to use these temperature settings to automatically turn the pump on and off.

auto on

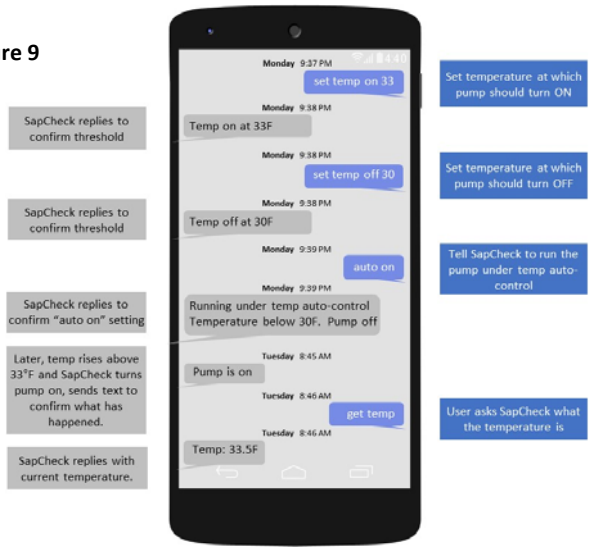
Figure 9 below shows a sample texting session implementing Temperature Auto Control.

To end auto-temp control of the pump, you must issue the text command

auto off

This ends auto temp control and turns the pump off. You can then issue a command to force the pump to turn on, regardless of temperature.

Figure 9



Remotely Starting / Stopping Vacuum Pump

As long as auto temp control mode is not in effect, you can force your pump to turn on, simply text the following message to SapCheck:

start

To force your pump to turn off, text the following message to SapCheck:

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.

Command Phone Numbers

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

set user *xxxyyyzzzz*

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

set user *xxxyyyzzzz* del

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*

SapCheck Operation

Service Mode

For product support purposes, SapCheck can be put into "service mode" by texting the command

service control on

When in service mode, the unit will respond only to command texts from a special Bosworth Service Number. While in service mode, all command-confirming texts are sent only to this number. When this command is initiated, SapCheck texts the following message to the user:

SERVICE CONTROL ON

This message indicates that the unit is currently under "Service Control", and that no commands will be accepted from any user Command Numbers while in this mode.

When service mode is terminated, SapCheck resumes responding to texts from the user's Command Number. The 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, it is possible for sensor accuracy to drift over time. Additionally, you may choose to calibrate SapCheck's vacuum sensor to more closely match vacuum readings of a vacuum gauge installed on your sap line. For these reasons, SapCheck provides a set of commands that you can use to re-calibrate its vacuum sensor.

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 your calibration gauge. 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 1500 monthly message limit. Additional charges apply for messages above the monthly message limit. Contact The Bosworth Company for more details.

At any time, you can find out how many text messages you have used in a cycle by issuing the command

get usage

This text message returns

Current Plan Start: <mm/dd/yyyy>	start date of the current monthly communications plan
Ending Date: <mm/dd/yyyy>	Ending date of current communications plan
Monthly Text Allotment: <nnnn>	monthly message limit
Usage This Month: <zzzz>	number of messages used this month, including the current message

LIST OF COMMANDS

Text Message Command	Meaning
auto <on/off>	auto on initiates temperature control of pump. auto off terminates temperature control of pump.
get help *OR* ?help	Generates 4 successive text messages listing all user text commands recognized by SapCheck
get settings *OR* ?settings	Generates text message containing current temperature and vacuum warning settings, as well status report interval.
get status *OR* ?status	Generates text message containing current operating state of pump (on/off), vacuum and temperature readings, whether or not tank has reached sap alert level in tank
get tank *OR* ?tank	Generates text message containing tank full status (full or not full)
get temp *OR* ?temp	Generates text message containing current temperature reading (°F) measured by sensor
get usage *OR* ?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 *OR* ?user	Returns the list of SapCheck command numbers and their active/inactive status
get vacuum *OR* ?vac	Generates text message containing current vacuum reading (in of Hg) measured by sensor
get version OR ?version	Reports software/firmware version # that the unit is running.
reboot	Turns SapCheck off and then back on. When the unit turns back on, it issues the "SapCheck is ON …" message to the command number.

LIST OF COMMANDS (CONT'D)

Text Message Command	Meaning
service control on	Turns "Service Control" on. Unit will only respond to text commands from the "Service" phone #.
set calibrate lowvac *##.#*	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 0.0 is entered for *##.#*
set calibrate hivac *##.#*	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 units of in Hg) reported by the second, calibrating gauge.
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 float delay *value*	After issuing a **Sap At Tank Level** alert, *value* is the number of seconds that SapCheck waits before issuing a followon alert.
set report *value*	Sets the time interval in hours at which SapCheck will automatically send status message texts. Useful if you want to see status information on a regular basis without having to issue "?status" text messages for each report.
set temp off *value* *OR* =temp off *value*	Sets the "falling" temperature value when the pump will turn off under auto-temp control. If the temperature is already below this temperature, the pump will turn off if under auto-temp control.
set temp on *value* *OR* =temp on *value*	Sets the "rising" temperature value when the pump will turn on under auto-temp control. If the temperature is already above this temperature, the pump will turn on if under auto-temp control.

LIST OF COMMANDS (CON'TD)

Text Message Command	Meaning
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!* **NOTE:** Canadian users must specify "+1" before
set user *xxxyyyzzzz* del Canadian: set user +1*xxxyyyzzzz* del	Deletes phone # xxxyyyzzzz from the command number list. **NOTE:** Canadian users must specify "+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. **NOTE:** Canadian users must specify "+1" before the phone number.
set vac warning *value* *OR* =vac warning *value*	Sets the (falling) vacuum value at which a warning text is sent to the user
get signal *OR* ?signal	Returns a % indicator of cell phone communication strength where the SapCheck Controller is located.
start	Starts the pump, regardless of sensor input; sends confirming text
stop	Stops the pump, regardless of sensor input; sends confirming text
update	Issued to upload new 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 connecting the USB port on the SapCheck Controller to a USB (thumb) drive onto which the latest version of the software has been downloaded. The file containing the SapCheck software must be named **sapcheck.bos**

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 back side of the SapCheck Controller. From the command cell phone issue the text command

update

If the software on the thumb drive is newer than the release that SapCheck is running, SapCheck will install the new software from the thumb drive.

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; namely, **SapCheck version X.YY.ZZ**. 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 re-naming 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.

Additionally, ensure that the thumb drive to which you are download the Sap-Check software is formatted as NTFS. The software update process will not work if the thumb drive is formatted under the older FAT32 format. You can Google NTFS on the web for instructions about reformatting your thumb drive using NTFS.

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. If you do not receive any confirming text, it may be due to any of the following causes: • you did not send a correctly formatted text to SapCheck. (Ensure that you are entering the command with all words spelled correctly and with any required spaces; also take care that you are not entering any spaces or punctuation that are not required.)

TROUBLESHOOTING (CONT'D)

Problem	Things to check
SapCheck is not responding to any of my text commands	• 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. • If, after 5 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.
Vacuum pump is not responding to temperature control	Text **auto** command to ensure that SapCheck is operating the pump under auto-temp control. Text **?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 box 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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