

User Guide

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1.0 Introduction

The purpose of this User Guide is to describe the operation of SolSat 5 Satellite Telemetry, including programing, installation, and data collection.

SolSat 5 Satellite Telemetry is an advanced system designed to send data from Solinst dataloggers in the field via Iridium satellite communication to a secure web portal, or for download via the SolSat 5 Wi-Fi App.

Initial setup for each SolSat 5 is done wirelessly using the integral SolSat 5 Wi-Fi App in your mobile device or laptop browser.

Each SolSat 5 is programmed with a data plan based on your needs. The data plans offer hourly sample rates and various report/transmission rates. The sample rate is the rate at which the SolSat 5 collects data from the attached datalogger, and the report/transmission rate is the rate at which the SolSat 5 reports the collected data via satellite transmission. You can also receive daily current and max/min readings.

High or low level alarms can be set for the connected datalogger. An internal barometer allows barometrically compensated water level data to be reported. Optionally, dataloggers themselves can be set up to record and store data independently of the SolSat 5 as a backup.

1.1 Compatibility

Each SolSat 5 can connect one Solinst datalogger. SolSat 5 Satellite Telemetry is compatible with the Levelogger 5, Barologger 5, Levelogger 5 Junior, Levelogger 5 LTC, and LevelVent 5 using the following firmware versions (or higher):

Datalogger	Firmware Version
Levelogger 5	1.006
Barologger 5	1.006
Levelogger 5 Junior	1.006
Levelogger 5 LTC	1.006
LevelVent 5	1.006

Table 1-1 Compatible Datalogger Firmware Versions

Note: See the Levelogger and Vented Dataloggers User Guides for more information on the dataloggers.

Note: The firmware version of the SolSat 5 can be found in the About section of the Wi-Fi App.





2.0 SolSat 5 Satellite Telemetry Overview

The SolSat 5 is a simple, convenient device designed to wirelessly send data from Solinst dataloggers in the field via Iridium satellite technology to a secure web portal, or for download using the integral SolSat 5 Wi-Fi App.

2.1 SolSat 5 Telemetry Stations

A SolSat 5 Satellite Telemetry station is designed to be used in almost any water monitoring application. It features a robust weatherproof, IP66-rated housing. It has an operating temperature from -20°C to +55°C.

Each SolSat 5 includes a satellite modem, high-performance helical antenna, built-in solar panel and an integral Wi-Fi App for wireless system configuration using any mobile device or laptop. There is an LED activity light on the top of the SolSat 5 that flashes with operation.

There is a power connection for charging the two 3.4 Ah LiPo batteries via USB, or for connecting an additional solar panel.

The internal barometer allows barometrically compensated water level data to be reported and an ambient temperature sensor provides added data. A Gore plastic vent plug in the SolSat enclosure protects the barometer. A SolSat 5 can store up to 100,000 data logs. A GPS module provides geo-tagged data.

Each SolSat 5 station can connect one datalogger.



Note: Reader Cables and Levelogger Direct Read Cables to connect to dataloggers are available separately.

Figure 2-1 SolSat 5 Telemetry Station

olSat 5 Satellite
9603 Iridium SI
Global coverag and battery life)
High-performar
Sent via SMS,
Wi-Fi App (brov
2 x 3.4 Ah LiPo
USB 5 volts, bu solar panel
100,000 readin
-20°C to +55°C
535 grams (18.
19.1 cm x 16.4
IP66
30 kPa – 110 kF
±0.1 kPa (1 cm)

Table 2-1 SolSat 5 Specifications

SolSat 5 User Guide

e Telemetry Specifications

BD Satellite Modem

e (*clear view to the sky required for best performance

nce helical (SMA connector)

export as .csv or .xle

wser) on your smart device or laptop

batteries

uilt-in 2 Watt 325 mAh solar panel, optional additional

gs (wrap-around memory)

.9 ounces)

cm x 6.4 cm (7.5" x 6.5" x 2.5")

Pa

2.2 Data Plan Options

There are three data plan options to choose from when first registering your SolSat 5 Satellite Telemetry at https://portal.solinstsat.com.

The SolSat 5 uses TextAnywhere two-way global satellite messaging service to send the data. The plans do not require any contracts and include logged hourly samples, alarm notifications, battery voltage and 24/7 secured web access.

SolSat 5	SolSat 5 Satellite Telemetry Data Plan Options		
Plan	Sample Rate	Reporting Rate	
1x Daily	Samples Hourly	Reports daily min/max and current reading	
4x Daily	Samples Hourly	Reports 24 readings per day Includes up to 3 data points (e.g. barometric pressure, depth, battery voltage)	
Hourly	Samples Hourly	Reports hourly Includes up to 3 data points (e.g. barometric pressure, depth, battery voltage)	

Table 2-2 SolSat 5 Data Plan Options

2.3 SolSat 5 Batteries

A SolSat 5 uses two 3.4 Ah LiPo batteries. They are charged via the built-in 2 Watt solar panel. The SolSat 5 is also supplied with a 5 volt USB charging cord. The same 2-pin Bulgin power connection on the SolSat 5 can be used to attach an optional solar panel to increase the battery charging capacity.

Note: Using a higher voltage (over 6 volts) to charge the SolSat 5 will damage the electronics.

The batteries are fully charged at 4.2 volts, at 3.4 volts the SolSat 5 needs to be recharged. The battery voltage can be checked when connected to the SolSat 5 Wi-Fi App, or can be sent with each data report.

Without an added solar panel, basic usage would allow the SolSat 5 batteries to last over 1 year. On average, the batteries will last 2–3 years based on hourly samples and one satellite transmission per day. With the solar panel recharging, they should last indefinitely.

Note: Contact Solinst if the batteries need replacing. Do not try replacing the batteries yourself.

Keep in mind, a clear view to the sky/satellite is required for best performance and battery life, and more frequent data transmissions will use more battery power.



2.4 Connecting Dataloggers

Each SolSat 5 has a single port to connect one datalogger.

2.4.1 Connecting Leveloggers

Leveloggers are connected to the SolSat 5 using a 6 foot long Reader Cable connected to the Levelogger's Direct Read Cable.

To connect a Reader Cable to the SolSat 5, line up the holes in the connectors, push the Reader Cable connector into the connection on the SolSat 5 and screw the Reader Cable into the SolSat 5 until finger-tight. Connect the other end of the Reader Cable to the top end of the Levelogger's Direct Read Cable.

Note: An L5 Threaded Adaptor can be used in place of a Direct Read Cable when installing a Barologger. The Adaptor can not be submerged.

Note: See the Levelogger User Guide for more information on connecting Direct Read Cables to your Leveloggers.



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Direct Read Cable

Figure 2-2 Levelogger Connection

2.4.2 Connecting a LevelVent

A LevelVent is connected to the SolSat 5 using a 6 foot long Reader Cable connected to the LevelVent Wellhead.

To connect a Reader Cable to the SolSat 5, line up the holes in the connectors, push the Reader Cable connector into the connection on the SolSat 5 and screw the Reader Cable into the SolSat 5 until finger-tight. Connect the other end of the Reader Cable to the LevelVent Wellhead.

Note: See the Vented Dataloggers User Guide for more information on LevelVent components and connections.



Figure 2-3 LevelVent Connection



3.0 SolSat 5 Wi-Fi App

The SolSat 5 Wi-Fi App provides an easy-to-use graphical interface to configure your SolSat 5 Satellite Telemetry network, view and send information, and download data.

3.1 Connecting to the Wi-Fi App

- power button for 2 seconds. Within 1 minute, a Wi-Fi signal will start broadcasting.
- away, wait an additional 2 minutes, then refresh the Wi-Fi list.

Note: The default password is 8006612023, you can change this later using the Settings in the App.

bar, then press "go" or enter.

Note: If the App does not open, clear your browser history and try again. If it still doesn't open, check your firewall settings.

screen goes blank, it will go to sleep after 3 minutes.

Note: When not in use, turn the SolSat 5 OFF using the Settings menu in the App.

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1. When received, the SolSat 5 will be in deep sleep mode. Turn on/wake up the SolSat 5 by pressing the

2. In your mobile device's Wi-Fi settings menu, select the "SolSat 5" SSID signal. If this does not appear right

3. With the Wi-Fi connected, open the web browser on your device and enter "10.10.10.10" in the address

4. The built-in App will open. To navigate the App, use the Main Menu at the top left of the screen. The SolSat 5 will stay ON as long as you are connected by Wi-Fi to the App. Once you disconnect or the

3.2 Wi-Fi App Main Menu

The Main Menu icon at the top left of the App will expand when clicked in a mobile device; it can be viewed fully expanded on a laptop or computer browser.

The first menu item is the SolSat 5 Main Screen. This screen provides a quick check of current and/or max/min readings from the connected datalogger, internal barometer reading, battery voltage, your satellite connection, and GPS coordinates.

Because the SolSat 5 uses TextAnywhere global satellite messaging, you can use the App to add and edit Contacts to send and receive text messages or email in the SolSat 5 Mailbox. Send Email and Send Text allow you to select an added contact, or type in a new contact, to send an email or text message to.

About provides information about your specific device including firmware version, SSID (name that identifies the Wi-Fi network), battery level, and SolSat 5 memory.

Settings has a number of options, including "Wi-Fi Security Setup" to change the security settings for your Wi-Fi connection, "Check Satellite" connection, "Turn Off Power" to the SolSat 5, and "Download Log Files".

The "Setup" allows you to set up your selected data plan/schedule, the time(s) for the data report send, your preferred data measurement parameters (e.g. depth, depth to water), alarm settings, and data transmission preference.

You can also select your preferred "GPS Coordinates Style", and review your network settings and "Status" once programmed.

 SolSat 5 Mailbox Send Email 	SolSat 5 Satellite Telemetry
🗣 Send Text	
Contacts	Settings
Settings	Wi-Fi Security Setup
i About	Check Satellite
<u>Solinst</u>	Edun
	Seup
	Turn Off Power
	Download Log Files

Figure 3-1 SolSat 5 Main Menu and Settings Menu



3.3 SolSat 5 Wi-Fi App Main Screen

In the **SolSat 5** Main Screen, the current readings from the SolSat 5 will be displayed, including:

SolSat Baro Pressure: the barometric pressure reading from the internal SolSat barometer

Solinst Datalogger Pressure: pressure reading from the connected Solinst datalogger.

pressure.

Water Temp: the temperature reading from the connected Solinst datalogger.

SolSat Battery: the current voltage of the SolSat 5 batteries.

Note: The batteries are fully charged at 4.2 volts, at 3.4 volts the SolSat 5 needs to be recharged.

Ambient Temp: the temperature reading from the internal SolSat thermometer.

LTC Levelogger Conductivity: the conductivity reading from an LTC Levelogger, if connected.

Level min: the minimum water level recorded in the last day (Plan 1).

Level max: the maximum water level recorded in the last day (Plan 1).

satellite and positioning information is also listed.



- Water Depth: the current depth of water calculated by subtracting the barometric pressure from the datalogger
- The status of the satellite, including network availability and time, is also displayed. The GPS coordinates, and

SollSa Satellite T	t 5 elemetry
Name	Value
SolSat Baro Pressure	9.99 m
Solinst Datalogger Pressure	10.06 m
Water Depth	0.08 m
Water Temp	22.5 C
Solsat Battery	4.1
Ambient Temp	33.8 C
LTC Levelogger Conductivity	12478.80 uS/cm
Satell	ite
Network Ava Satellite Time:	ilable: No 1689107560

Figure 3-2 SolSat 5 Wi-Fi App Main Screen

3.4 Wi-Fi App Configuration

3.4.1 Wi-Fi Security Setup

It is recommended to change your password from the default. To do this, go to Settings and select "Wi-Fi Security Setup". Enter your desired password (it is case sensitive).

You can also update your security settings. From the drop-down menu, select either WPA or WPA2 (WPA2 is the most secure)

You can also select a different Channel for your Wi-Fi, if required. Certain channels may have less interference. 1 is the default.

Enter a different SSID (Wi-Fi network identifier/name) if desired.

Click OK once you are finished with the settings.

Security Type:	
WPA	
WPA (Password is case-sensitive)	
Change Channel (If Required):	
1	~
Enter Desired SSID:	
SolSat	
ок	

Figure 3-3 Wi-Fi Security Setup

3.4.2 GPS Coordinates Style

To change the GPS Coordinates Style that displays for your data, go to Settings and under "User Preferences" there is a drop-down menu with three options. Decimal Degrees (0.000, 0.000) is default, Degrees Decimal Minutes (0° 0.00' N, 0° 0.0' E) or Degrees Minutes Seconds (0° 0' 0" N, 0° 0' 0") are options.

User Preterences		
GPS Coordinate Style:	Decimal Degrees (0.000, 0.000)	~

Figure 3-4 GPS Coordinates Style



4.0 SolSat 5 Setup

To set up your SolSat 5 Satellite Telemetry, go to Settings, then select "Setup". The first step will provide you with a Glossary of terms to help with the setup. Barometric Pressure (BP): Atmospheric pressure; measured by SolSat 5. Water Pressure (WP): Absolute pressure; measured by the Solinst datalogger. Water Depth (WD): Calculated water height over the Solinst datalogger zero point (WD=WP-BP). Depth to Water: The distance between the reference point and the water level. **Reference Point:** The user-defined point of reference (top of casing, ground level, etc.) Water Probe Distance: Depth to water + Water depth Click Next to start the setup.

Glossary

- Barometric Pressure (BP) Atmospheric pressure; measured
- · Depth to Water The distance between the referen
- Water Pressure (WP) Absolute Pressure; measured by
- Reference Point The user-defined point of reference etc.)
- · Water Depth (WD) Calculated water height over prob
- Water Probe Distance Depth to water + Water Depth

000

	×
by SolSat 5.	
ce point and the water level.	
he Water probe/sensor.	
e (top of casing, ground level,	
e/sensor (WD=WP-BP).	
Next	

Figure 4-1 SolSat 5 Setup Glossary



4.1 Select Your Plan

Use the drop-down menu to select the data plan that has been registered to your SolSat 5.

Click Next to continue the setup.

Plan 1: Hourly	samples transmitting daily min, max, and current va ${\color{black}\sim}$	
Collect data hou every 24 hours.	rly and transmit the min, max, and current values	
TX Rate: Sample: Registers:	Daily Hourly Fixed: Current, High, Low	
	Previous	Next
	• • • • • • • • • •	
Select you	Ir Plan	
Select you Plan 2: Hourly Collect data hou	Ir Plan samples transmitted 4x per day	
Select you Plan 2: Hourly Collect data hou TX Rate: Sample: Registers:	Ir Plan samples transmitted 4x per day ~ rly and transmit hourly data every 6 hours. 4x per day Hourly Baro Pressure, Sensor Pressure, Battery	
Select you Plan 2: Hourly Collect data hou TX Rate: Sample: Registers:	Ir Plan samples transmitted 4x per day rly and transmit hourly data every 6 hours. 4x per day Hourly Baro Pressure, Sensor Pressure, Battery Previous	łext

Plan 3: Hourly	samples transmitted hourly	~
Collect and trans	smit data hourly.	
X Rate:	Hourly	
ample:	Hourly	
Registers:	Baro Pressure, Sensor Pressure, Battery	
	Previous	Next

Figure 4-2 SolSat 5 Plan Selection



4.2 Current Time Offset

Use the drop-down menu to select the GMT Time Offset for your SolSat 5 Satellite Telemetry location.

Select the time(s) of day you want to receive data reports.

Click Next to continue the setup.

Note: SolSat settings can be updated remotely using the options in solinstsat.com web portal. See Section 5.1.2.

ne offset		
	~	
	~	
Previous	Next	
	_	
	Previous	re offset Previous Next

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Figure 4-3 SolSat 5 Time Settings





4.3 Data Format

In this step, select the desired data format for the reported data:

Depth: reports the calculated water depth from the Solinst datalogger.

For absolute water level sensors, the barometric data from the internal SolSat 5 barometer is used to subtract from the water level sensor reading, to provide the depth of water above the water level sensor zero point.

Note: For more information on the operating principles of Solinst dataloggers, see the Levelogger and Vented Datalogger User Guides.



Figure 4-4 SolSat 5 Depth Measurement

Depth to Water: reports the depth to static water level based on a Reference Point.

The Probe Distance is entered as the distance between your selected Reference Point (e.g. top of well casing, ground level) and your water level sensor zero point. The Depth to Water is calculated by subtracting the water Depth (see above) from the Probe Distance.



Pressure: reports the uncompensated pressure from the connected datalogger.

Note: SolSat settings can be updated remotely using the options in the solinstsat.com web portal. See Section 5.1.2.

Click Next to continue the setup.



....

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	. h	d en ti				
vater	base	d on ti	he pro	vided		
vater	base	d on ti	he pro	vided		
vater	base	d on ti	he pro	vided	Nex	

Figure 4-5 SolSat 5 Depth to Water Measurement

and barometric pressure.	
Previous	Next

Figure 4-6 SolSat 5 Pressure Measurement



4.4 Alarm Settings

If set, an alarm message will be sent once per day if the alarm parameter is met.

For Plans 1 and 2, select the check-box to Set the Alarm. The alarm will be based on your selected data format (see Section 4.3).

Note: If you have selected Plan 3, you can set alarms using the solinstsat.com web portal. See Section 5.1.3.

You can select a Value (positive or negative) that if the sampled measurement goes Above or Below will trigger an alarm message to be sent.

Click Next to continue the setup.

Note: Alarms can also be set remotely using the options in the solinstsat.com web portal. See Section 5.1.3.

Set Alarm:		
Alarm On:	Depth to water	
Current water depth:	0.08 m	
Current depth to water:	-0.00 fl	
ype:		
Above	° ~	
Aluo *		
/alue.		
alue. *		

Figure 4-7 SolSat 5 Alarm Setup – Plans 1 and 2

Set Alarm		
All samples are transmitted in this plan. O data center portal.	Configure your alarms on th	he
	Previous	Next

Figure 4-8 SolSat 5 Alarm Setup - Plan 3



4.5 Parameter Settings

In the next steps you will select the parameters and units of measurement that you want to use for reporting the temperature, pressure, and conductivity if you are using an LTC datalogger.

First, select the unit of measurement for the temperature sensor.

Select Tem	perature Sens
°C	

Based on your data plan, select which parameters you would like to be reported. Click Next. There will be no Option for Plan 1.

~	Water Temperature	
~	Ambient Temperature	
	Conductivity	
	•	

Based on the selected options, select the units of measurement for each parameter.

S	Select Pressure Sensor			ι		
	m					
				•	•	0

Figure 4-11 SolSat 5 Pressure Sensor Units



Figure 4-9 SolSat 5 Temperature Sensor Units

Previous	Next

Figure 4-10 SolSat 5 Temperature Sensor Units



uS/cm		v
f applicable to installed se	ensor.	
	Previous	Next
	Previous	Next

Figure 4-12 SolSat 5 Conductivity Sensor Units

4.6 Data Transmission Settings

In this step, select the data that you want sent with each report/transmission.

The options are:

Transmit GPS and current values.

Transmit current values.

Do not transmit, save only. You can download the data directly from the SolSat 5 using the Wi-Fi App when within range (see Section 5.2). The SolSat 5 can store up to 100,000 data logs.

Click Submit to finish the setup.



Figure 4-13 SolSat 5 Data Transmission Settings



5.0 SolSat 5 Data and Site Management

5.1 Solinstsat.com Web Portal

An account is created when you register a SolSat 5 using https://portal.solinstsat.com, which includes access to this secure web application for viewing and exporting data from all of your SolSat devices.

To access your data, go to: https://www.solinstsat.com, then enter your username and password.

Note: solinstsat.com also allows you to create reports, manage account users, project sites, devices and alarms.

5.1.1 Site Index

The Site Index shows a summary of your sites, including the number of devices, the last report time, and the alarm status.

Soli	i <u>nst</u>			
			Company: SolSat - So User:	linst Canada Ltd
Navigation Site Index	Site Index			
Change Password	Site	Received	Units	Status
Logout	Georgetown	30-Aug-23 1:00 PM	2	OK
Master Reports				
Create Report Manage Reports				
User Management				
Create New User Manage Users				
Site Management				

5.1.1.1 Site Management

To create a site, go to Manage Site under Site Management in the side Navigation menu. Click Add New Site then enter a name for the site and click Create New Site. Use the tree view on the left to assign devices to the site.

The Site Configuration page also allows you to change the appearance of your site (Manage Image), Delete the site, as well as define the incoming data from your devices using the navigation tree (Site Index and Site Graph).

Navigation Site Index	Configuration
Logout	😑 SolSat - Solinst Canada Ltd Solinst T
User Management	Georgetown
Create New User Manage Users	
Alarm Management	
Contacts Devices	

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Figure 5-1 Site Inde:



Figure 5-2 Site Configuration



5.1.1.2 Manage Virtual Units

The Virtual Unit System allows a virtual device to be created that generates its data based on values returned by other physical units. Data generated by virtual units pass through all existing systems (such as alarming), but is generated at least 15 minutes after physical units return their data. Click Create Virtual Unit to add a new Virtual Unit, or click Manage Virtual Unit to Edit or Delete a Virtual Unit.

Navigation Site Index Manage Virtual Units	Manage Virtual Unit
Lengut	Virtual Unit Name: Test
Logout	Virtual Unit ID: vRID109
	Enabled: 🗹
	Update
	Device References (Add New)
	Device References (Add New) Ident Device Title A RID2435 - SALES DESK X
	Device References (Add New) Ident Device Title A RID2435 - SALES DESK X Virtual Registers (Add New)
	Device References (Add New) Ident Device Title A RID2435 - SALES DESK X Virtual Registers (Add New) Register Formula Notes Enabled

Figure 5-3 Manage Virtual Unit

5.1.1.3 Manage Notifications

To add a Transmission Notification, go to Manage Notifications and click Add, then enter the required information and Save. To Edit a notification, click on the Name of the Transmission Notification in the table. You can add a contact to receive an email notification when a transmission has occurred at the specified time interval. You can also Delete a Transmission Notification.

Navigation	Transmission Notifications (Add)							
Site Index	Name	Threshold	Check Hour	Enabled	#			
Logout	Test	24	0	~	Delete			
User Management								
Create New User								
Manage Users								
Site Management								
Manage Users Site Management Manage Site Manage Virtual Units								
Manage Users Site Management Manage Site Manage Virtual Units Alarm Management								

Figure 5-4 Transmission Notifications



5.1.2 Device Index

Click on a site name from the table in the Site Index to view the Device Index. The Device Index shows a list of each SolSat 5 at that site and their last report time and alarm status. Click on a device name to view the Device Detail. Any Virtual Units created will also be listed (a small "v" in front of the name indicates a virtual unit). Click on a device name to view the Device Detail.

Navigation Site Index	Georgetown		
Logout	Device	Received	Status
	RID2435 - SALES DESK	31-Aug-23 12:00 PM OK	
User Management	vRID109	31-Aug-23 9:00 AM OK	
Create New User Manage Users			
Site Management			
Manage Site Manage Virtual Units			
Alarm Management			
Contacts Devices			
Quick Help			
The Device Index provides			
a snapshot of all devices			
in a site. The snapshot			
includes the date and time			
of the last reading and			
current alarm status.			
To view details of a			
specific device, click on			
the device name.			

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Figure 5-5 Device Index

5.1.2.1 Device Detail

The Device Detail page allows you to view historical data for the selected device. Along with the water level and temperature data, each report includes battery voltage for the SolSat 5 as well as geographic coordinates.

You can change the data range by clicking the Report Time drop-down box and choosing a new value. All date ranges are referenced to the last received message.

Data can be exported as a .csv or .xle file. Clicking "Export to CSV" or "Export to XLE" automatically creates a file and saves it in the Downloads folder on your device.

Data can also be accessed in Graph View or you can select Date Range View to view a range of data in more detail.

Navigation Site Index Georgetown	RID2435	- SAL	.ES 2, FW/SV	DES	K 1.006						
Logout	Report Time: 24 Hr	s v									
Reporting	Switch to: Gra	ph View	Date Ra	ange Vie	w	Export to	CSV E	xport to			
Create new report Manage reports User Management	Received	Baro Leve	Water Level ft	Water Temp C	Battery Voltage (volts)	Min Max	Ambient (C)	Depth to Water	Conductivity uS/cm	Lat Lr	ng
Create New User	21 4.4 22 12:00 PM		45.02	10.62			21.66	(cm)			
Manage Users	31-Aug-23 12:00 PM		45.93	19.63			31.66				_
Site Management	31-Aug-23 11:00 AM		14.00	18.88			35.38				-
Manage Site	31-Aug-23 9:00 AM		13.00	16.99			25.23				-
Manage Device	31-Aug-23 9:00 AM		13.70	16.51			15 54				-
Configure Graph	31-Aug-23 7:00 AM		13.71	16.78			15.54				-
	31-Aug-23 6:00 AM		13.70	17.10		-	15.30				
Alarm Management	31-Aug-23 5:00 AM		13.74	17.44			16.11				-
Contacts	31-Aug-23 4:00 AM		13.75	17.79		-	16.53				
Devices	31-Aug-23 3:00 AM	· · · · · · · · · · · · · · · · · · ·	13.82	18.18			16.77				
	31-Aug-23 2:00 AM		13.86	18.62			17.15				
Quick Help	31-Aug-23 1:00 AM		13.77	19.10			17.57				
The Device Detail page	31-Aug-23 12:00 AM		13.78	19.62			18.16				
allows you to view	30-Aug-23 11:00 PM		13.81	20.16			18.93				
allows you to view	30-Aug-23 10:00 PM		13.85	20.69			19.92	9			
historical data for the	30-Aug-23 9:00 PM	1	13.81	21.19			21.13				
selected device. You can	30-Aug-23 8:00 PM		13.84	21.65			22.75				
change the data range by	30-Aug-23 7:00 PM		13.87	22.04			24.87				
clicking the report time	30-Aug-23 6:00 PM		13.96	22.17			26.87				
drop down box and	30-Aug-23 5:00 PM		14.11	22.13			27.44				
choosing a new value. All	30-Aug-23 4:00 PM		14.01	22.04			27.74				
date ranges are	30-Aug-23 3:00 PM		14.15	21.92			27.82				
referenced to the last	30-Aug-23 2:00 PM		14.17	21.77			27.28				
referenced to the last	30-Aug-23 1:00 PM		14.15	21.61			27.65				
received message.	30-Aug-23 12:00 PM		14.38	21.39			30.23				

Figure 5-6 Device Detail



5.1.2.2 Manage Device

To update a device with new details including name and registers (parameters) go to Manage Device in the Navigation menu. You can also Clone your Registers set up to apply to another device.

avigation ite Index	Manag	e Devi	се						
evice Detail	Title		RID2	435 - SALI	ES DES	к			
ogout	Description	Description			Testing Unit				
	Time Offset	Time Offset Add +1 in Daylight Saving Time			-4 ~				
evice Config	Add +1 in [
it Image Map	Enable Calo	ulated Field							
w Config Messages	Update Devic	e							
er Management									
eate New User	Registers (dit) (Clone)		<u>v</u>					
anage Users	Register	Title	Formula	Units	Active	Format Code			
e Management	Register 1	Baro	z		~				
nage Site	Register 2	Level	Z		~				
rm Management	Register 3	Water Level	Z*3.28	ft	~				
ntacts vices	Register 4	Water Temp	Z/100	с	~				
	Register 5	Battery Voltage	Z/100	(volts)	~				
	Register 6	Min	z		~				
	Register 7	Max	z		\checkmark				
	Register 8	Ambient	Z/100	(C)	~				
	Register 9	Depth to Water	z	(cm)	4				
	Register 11	Conductivity	z	uS/cm	~				
	Register 10022	Lat	castint32(Z)/1000	00	4				
	Register 10024	Lng	castint32(Z)/1000	00	~				

Figure 5-7 Manage Device

Form here, using the Navigation, you can also Edit the Graph parameters, Edit the Image Map; which allows you to set an image for the site and create hot spots (e.g. where devices are located), and View Configuration Messages that provide a record when updates to devices were made.



5.1.2.3 Date Range View

In Date Range View, You can change the data range by selecting the Range Start and Range End dates in the calendar boxes. All date ranges are referenced from midnight of the start date to 23:59:59 of the end date. This will provide you with statistics and daily max, min and mean average data.

Georgetown	Range St	art:	2022-08-	21		Range End	: 2023	09.21		Re	freeh		
Logout	Switch to		Graph	Range V	iew	Detail Vie	N 2023	-00-31			licon		
Reporting	Data	Stat	istics	Daily Min	Daily I	Max Dail	Mean	Ava					
Create new report Manage reports	Export	to CS	v		I. south			_					
Jser Management Create New User		Baro	Level	Water Level ft	Water Temp C	Battery Voltage (volts)	Min	Max	Ambient (C)	Depth to Water (cm)	Conductivity uS/cm	Lat	Lng
lanage Users	Count	0.00	0.00	14.00	14.00	0.00	0.00	0.00	14.00	0.00	0.00	0.00	0.00
te Management	Min			13.70	16.51				15.54				
ite Hallagement	Max			45.93	20.09				35.38				
lanage Site	Mean		1	18.37	18.18				21.70				
Configure Granh	Median		0	13.78	18.01				17.36				

Figure 5-8 Date Range View

5.1.2.4 Configure Graph

Go to Configure Graph from the Navigation menu (or Edit Graph in the Manage Device section) to set up the axis and parameter information for your graph.

Navigation Site Index	Edit Graph		
Georgetown Device Detail	Base Graph Propertie	5	
Manage Device	Show Legend 🗹		
Logout	Title Test		
User Management	Graph Axis Configurat	tion	
Create New User		Axis 1	Axis 2
Manage Users	Title	Parameter	Time
Site Management	Auto Scale		
Manage Site	Min (if not auto)	0.0000	0.0000
Alarm Management	Max (if not auto)	100.0000	100.0000
Contacts	Start from Zero (if au	ito) 🗹	
Devices	Format Code:		
	Graph Slot Configurat	ion	
	Data Point Axis		
	Water Level V Axis 1	-	
	Water Temp V Axis 1	2	
	Battery Voltage V Axis 1	2	
	Ambient V Axis 1	2	
	Save Graph Settings Ca	ncel	

Figure 5-9 Edit Graph



5.1.2.5 Graph View

The Graph View page allows your to view historical data for the selected device in a line chart. You can change the data range by clicking the Report Time drop-down box and choosing a new value. All date ranges are referenced to the last received message. You can select Graph Range View to view a range of data in more detail.



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Figure 5-10 Graph Detail



5.1.2.6 Graph Range View

In Graph Range View, You can change the data range by selecting the Range Start and Range End dates in the calendar boxes. All date ranges are referenced from midnight of the start date to 23:59:59 of the end date.



Figure 5-11 Graph Range View



5.1.3 Alarm Management

5.1.3.1 Alarm Contacts

To add a new contact to receive alarm notifications, select Contacts under Alarm Management in the Navigation menu. To create a new contact, enter a contact name into the text box and click Create Contact. To delete a contact, place a check mark next to the contacts to delete and click Remove Contact.

Navigation Site Index	Manage Contacts
Alarm Location view	SolSat - Solinst Canada Ltd Solin
Logout	
User Management	
Create New User Manage Users	
Site Management	
Manage Site	

5.1.3.2 Create Alarm

To create a new alarm or edit an existing one, go to Devices under Alarm Management in the Navigation Menu. To create a new alarm, choose one device (Location) to connect the alarm to by clicking the device on the navigation tree.

There are two types of alarms: Normal Alarms and Trend Alarms. A Normal Alarm allows you to trigger based on a single value (such as if a value is greater than 5 or less than 3). Normal alarms also allow aggregation to create alarms such as "alarm if the average value for the last 3 days is over 10 units". Trend alarms compare a current value to a previous value. A typical alarm could be "Alarm if the current reading has changed more than 5 units from the reading 7 days ago". Select the desired alarm type, then click Create Alarm. Then select the alarm from the navigation tree to complete the alarm setup.

managing your alarms.

Navigation Site Index Alarm Contact View	Manage Locations	
Logout User Management Create New User	କ୍ର SolSat - Solinst Canada Ltd Solinst Test କ୍ର ଦିRID2435 - SALES DESK ଦିvRID109	This view allows you to manage alarms by location. To create a new alarm, click the location in the tree. To create new contacts, switch to contact view.
Navigation Site Index Alarm Contact View	Manage Locations	
	SolSat - Solinst Canada Ltd Solinst Test	RID2435 - SALES DESK
Logout	RID2435 - SALES DESK	Create a new alarm:

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est	Create New Contact	
	Name	
	Create Contact	
	Delete Contacts	
	Delete Contacts	

Figure 5-12 Alarm Contacts

Note: You can copy an alarm from one device to another by going to Copy Alarms in the Navigation menu while



Site Index Alarm Contact View			
Rightin Contact them	SolSat - Solinst Canada Ltd Solinst Test	Alarm Details	
Logout	ANRID2435 - SALES DESK	Alarm Name	Alarm
User Management	Alarm	Reading Point	Baro ~
Create New User	1-110105	Operation	Equal to Low Value ~
manage users		Low Value	0
Site Management		High Value	0
Manage Site Copy Alarms		Enabled	
		Aggregation:	No Aggregation ~
Quick Help		Andregate over 0	days
To edit the details of an		Figgregate over o	
alarm, make the change		Send this alarm:	Once per message
to the appropriate fields			Once per condition
and click "Save Details".			Once per burst
The operation list defines		Message	default alarm message
the type of alarm. Use the			
low value and high value			
fields to define the range			
of the alarm.		Notes	
The aggregation list			
defines aggregation			
options. An alarm is sent			
if the aggregated value		Save Details	
from the most recent			
reading to x days back		Additional Con	ditions (Add)
(where x is defined by the		No other condition:	5
"aggregate over x days"		Attached Cont	acts
field) is within the defined		Save Contacts	
alarm range.		Attached Loca	tions
		- @»	- ····
The per message or per		RID2435 - 1	SALES DESK L VRID109
condition radio buttons		Delete Alarm fr	om All Locations

Figure 5-13 Alarm Details



5.1.4 Master Reports

5.1.4.1 Create Report

To create a blank report, enter a report name and click Create Report. You will then be taken to the report editing page.

To add a new data point, select the device and click "set", followed by choosing the data point to be added and click "Add Data Point. The default name of the data point will be its title. You may want to include the device's name in the title for clarity.

Data points can be re-ordered by clicking the arrow buttons or removed by clicking the "x" button.

Navigation Site Index	Edit
Change Password	Report Nam
Logout	Add Data
User Management	Device:
Create New User	Report D
Manage Users	De
Site Management	RID2435 - 3
Manage Site	
Manage Virtual Units	
Manage Notifications	

Figure 5-14 Creating a Master Report

5.1.4.2 Manage Reports

The master report system allows reports to be generate across multiple devices. To run a previously generated report, click "Run Report". To edit the reading points on a report, click "Edit Report". To permanently remove a report, click "Delete".

Navigation Site Index	Man
Change Password	Report:
Logout	Run Rep
User Management	
Create New User	
Manage Users	

Figure 5-15 Managing Reports

Test		Change
nt		
	RID2435 -	SALES DESK V
Points		
	Register	Header Title
	Dama	

	Test	\sim
ort	Edit Report	Delete Report

5.1.5 User Management

5.1.5.1 Create New User

To create a new user go to Create New User in the Navigation menu, and enter the information in the fields then click Create User. If the user needs site administration privileges, place a check next to 'Set as site admin'.

User names must be at least 5 characters long. Passwords must be at least 6 characters long. Click Create User.

Navigation Site Index	Create User		
Manage Users	Company: SolSat - Solinst Canada Ltd Solinst Test		
Logout	Username:		
Site Management	Real Name:		
Manage Site	Password:		
Alarm Management	Confirm Password:		
Contacts	Options: Set as site admin		
Devices	Create User		
Quick Help			

Figure 5-16 Create User

5.1.5.2 Manage Users

Go to Manage Users to make any changes to the account users. To edit a user, click 'edit' beside the user's name. To reset a user's password, click 'Reset Password'. To delete a user, click the Delete icon.

Navigation Site Index	Manage Users					
Create User	_	Name	Username	Site Admin		
Logout	Edit	Test	Test@Solinst.com	True	Reset Password 🗙	
Site Management Manage Site						

Figure 5-17 Manage Users



5.2 Download Data Logs

When connected to the SolSat 5 via the Wi-Fi App, you can download stored data logs from the SolSat 5 directly to your connected mobile device or computer. The SolSat 5 can store up to 100,000 data logs (wraparound memory).

Note: The memory status of the SolSat 5 can be viewed in the About section of the Wi-Fi App.

To download the data logs, go to Settings and select "Download Log Files". A progress bar and percentage will be shown as the data is downloading.

	×
Download Log file	
Generating file:	
0 %	

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Figure 5-18 Download Log Files



6.0 SolSat 5 Email and Text Messages

Because the SolSat 5 uses TextAnywhere global satellite messaging, you can use the Wi-Fi App to send and receive email and text messages.

6.1 SolSat 5 Mailbox

The SolSat 5 Wi-Fi App Mailbox allows you to view email or text messages sent to the SolSat 5. The status bar across the top of the Wi-Fi App will show if there are any unread messages by a number beside the mail icon. You can get to the Mailbox using the Main Menu or by clicking the status bar.

1111110010	Sounsi				
🖾 Send Email	1 Probe Reading				
🗣 Send Text					
Contacts				Mailbox	
Settings		-	norenly@textany.ca	Welcome to TextAnywhere, the global text and email	
i About		\sim	2:27 PM 8/30/2023	application.	

Figure 6-1 SolSat 5 Mailbox

6.2 SolSat 5 Contacts

To add a Contact to email or text message, go to Contacts from the Main Menu and select "Add Contact". Enter the Contact's name and phone number/email address in the appropriate fields, then click "Add Contact".

A list of the Contacts will be shown. You can Delete or Edit a Contact.

	Ca i Frum neiurig	
Send Text		
Contacts	Add Contact	
Settings		
100		
🗣 Send Text		
Contacts	Name:	
Settings		
i About	Phone Number / E-Mail Address:	
	Add Contact	

Figure 6-2 SolSat 5 Contacts



6.3 Send Email

To send an email, go to Send Email in the Main Menu. In the Recipient field, use the drop-down menu to select a Contact or manually type in an email address. The body of the email can be a maximum of 160 characters. Click Send when ready.

Send Email	
	2 1 Probe Reading
Send Text	Dacidant
Contacts	Contact Name or E-Mail Address
Settings	
i About	
	Characters: 0
	Send
	Cancel

6.4 Send Text

To send a text message, go to Send Text in the Main Menu.

From the drop-down menu, select the region you are sending the text from. Messages can be sent globally, and without extra fees in some regions.

In the Recipient field, use the drop-down menu to select a Contact or manually type in the phone number.

The body of the text can be a maximum of 160 characters.

Click Send when ready.

Send Text		
Contacts	+1 (Canada/US)	•
Callinga	Recipient:	
Settings	Contact Name or Phone Number	
About	Characters: 0	
	Send	
	Cancel	

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Figure 6-3 SolSat 5 Send Email

Figure 6-4 SolSat 5 Send Text



7.0 SolSat 5 Installation

The SolSat 5 robust weatherproof enclosure is designed to be installed anywhere that suits your water monitoring application.

Remember, a clear view to the sky is required for best performance and battery life.

The SolSat 5 has an IP rating of 66, so it is dust-proof and can withstand heavy rain, but can not be submerged. The operating temperature range is -20° C to $+55^{\circ}$ C.

The SolSat 5 comes with a high-performance helical antenna. It is designed to work in any situation. The antenna uses an SMA connection, therefore, you can source other antennas or an antenna cable extension with an SMA male connector, if required.

See the Levelogger and Vented Dataloggers User Guides for details on proper deployment of these instruments.



Figure 7-1 SolSat 5 with Levelogger 5 Connected



7.1 Optional Solar Panel

The SolSat 5 has a built-in 2 Watt solar panel to charge the 2 x 3.4 Ah LiPo batteries.

However, if you wish to increase the battery charging capacity and prolong the battery life, an additional solar panel can be connected to the SolSat 5 via the 2-pin Bulgin power connection.

Keep in mind, the batteries have nearly 7ah of capacity and the built in charging circuit for the SolSat 5 is rated at 1 amp, so any external power supply over 1 amp has no additional benefit. Also, using higher voltages (over 6 volts) to charge the SolSat 5 will damage the electronics. Contact Solinst for more information if you are interested in adding a second solar panel.

An extra solar panel is recommended when you have more frequent transmission rates, or if you are deploying your system in a remote or hard to access area and want to extend the time needed between trips to the field for maintenance.

8.0 SolSat 5 Maintenance

As with any groundwater or surface water monitoring project, you should select the proper equipment and determine a maintenance schedule based on the monitoring environment specific to your application.

For the SolSat 5, and Solinst dataloggers, this means selecting the appropriate pressure range, ensuring the monitoring temperatures are within the instruments specifications, and making sure the wetted materials are compatible with site chemistry. See the Levelogger and Vented Dataloggers User Guides for important information about maintaining your dataloggers.

Recharge the batteries as required. The SolSat 5 is fully charged at 4.2 volts, at 3.4 volts the SolSat 5 needs to be recharged.

Note: Contact Solinst if the batteries need to be replaced. Do not try replacing them yourself.

When not in use, the Reader Cable and power cable should be disconnected and the dust cap replaced on the power connection. The SolSat 5 should also be powered down; you can turn the SolSat 5 OFF using the Settings menu in the Wi-Fi App.

Note: If the SolSat 5 is stored without turning it off, the batteries will slowly drain. Once 2.6 volts is reached, the batteries may not recover or lose storage capacity.



9.0 SolSat 5 Diagnostics & Troubleshooting

Each report from the SolSat 5 includes battery voltage, therefore it can be monitored remotely and action taken only when needed.

Note: The batteries are fully charged at 4.2 volts, at 3.4 volts the SolSat 5 needs to be recharged.

When connected to the Wi-Fi App, you can view important status information in the SolSat 5 Main Screen, including battery voltage and satellite network availability.

If there is a suspected network issue, you can check the satellite connection in Settings by selecting "Check Satellite". The Settings section also displays the Status of the SolSat 5, including network availability and if an Alarm has been set.

The **About** section also displays the battery voltage, as well as firmware version and SolSat 5 memory, all which could also help diagnose a potential problem.

Alarms can also be set and monitored for various parameters in the Solinstsat.com web portal.



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