



Accsense A2-05 Series

Temperature Monitor

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1. Hardware Checklist



- A) A2-05 User Guide
- B) 2 x Ethernet patch cables
- C) Mains Lead
- D) Power Adaptor
- E) A2-05 Unit

2. Installing the A2-05

2.1 Mounting the A2-05

The A2-05 can be mounted using the Velcro supplied. Make sure to place the A2-05 such that the End Plate (with the LEDs) is visible.

2.2 Insert the Probe

Place the temperature probe(s) into the area to be measured. If in a freezer, do this by either using the access port on the back of the freezer, or by running the lead through the door seal on the hinge side of the door.

Secure the probe to a suitable fixed location e.g. Shelf, with a cable tie.

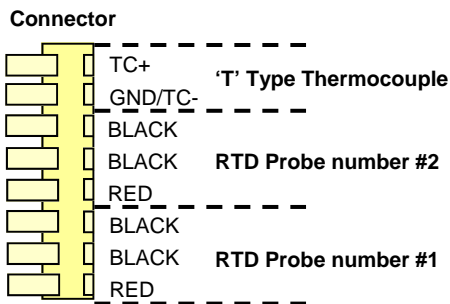
Note: Remember, freezers and refrigerators are not the same temperature everywhere inside. Where you locate the probe **WILL** affect the reading. We recommend using a thermal dampener or liquid to simulate the product in the refrigerator/freezer.

2.3 Connect Probes to A2-05

Slide open the access door at the bottom of the A2-05. Insert the probes through the holes in the side of the case.

The probe connection block shows connections for the 2 RTD and "T" type thermocouple probes.

Push down the tab on the connector and insert the striped end of the probe into the connector, taking note of the colour.

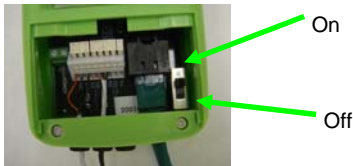


NOTE: for RTD probes that have 2 red and 1 white wire, connect the white wire to the terminal marked RED and connect the 2 white wires to the terminals marked BLACK.

For T type thermocouple probes the colour connections are:

AMERICAN Colour Code		INTERNATIONAL Colour Code	
BLUE	TC+	BROWN	TC+
RED	TC-	WHITE	TC-

2.4 Connecting the Power Supply



Remove the A2-05 from the refrigerator/freezer by separating the Velcro.

Slide open the access door on the bottom of the A2-05.

Slide the On-Off switch to the On position

Follow Standard Power Supply or Power Over Ethernet instructions below.

Standard Power Supply



Connect the A2-05 to the Power Injector by inserting one end of an Ethernet cable into the port on the back of the A2-05 and the other into the **OUT** port of the Power Injector.

Next, insert the second Ethernet cable into the **IN** port of the Power Injector and connect the other end of the cable to a LAN port. .

Plug the Power Injector into 100-240v AC mains using the power cord supplied

Power Over Ethernet (POE)

For Power-Over-Ethernet LANs, no Power Injector is necessary.

Connect the A2-05 direct into the network which supports Power Over Ethernet (POE).

3. LED Guide

Note:

- 1. To save power, the internal battery **goes down** during shipment, so please **disregard** the initial "Internal Battery Low Voltage" alarm.
- 2. A **solid blue** "CONN" light means our Secure Server received the last communication.
- 3. A **flashing blue** "CONN" light indicates communication with Grant/Accsense Secure Servers.

CONN: This will flash blue when communicating to the sever and solid blue when last communication is successful.

PWR: This will appear solid green when the 5v power supply is working, flashing fast green when on internal battery power, or flashing slow green when the internal battery is low (4-Hour life)



LAN LNK: This will appear solid green when the LAN hardware connection is good.

STAT 1: There is a connection problem with the server if this is always on.

LAN ACT: This will flash green when communicating with the LAN

4. IT Information

As shipped the Grant/Accsense A2-05 is plug and play with the following settings:

- The server is DHCP.
- A Proxy server is not being used.
- The MAC address does not require registering.

The A2-05 can be set with a fixed IP address, this can be done with the Remote Gateway Configuration Utility which can be downloaded from the following link: http://www.accsense.com/sp_downloads.html

Note: The IP, DNS and Gateway address all need to be entered correctly for the A2-05 communicate with the server correctly.

The A2-05 support SOCKS4 and SOCKS5 Proxy servers; these can be setup using the Remote Gateway Configuration Utility. In environments where other proxy servers are used an exemption to port 443 outbound on the router/firewall will be required to allow the unit to communicate directly with Grant/Accsense Servers

Generally MAC numbers do not require registering on the network, if it is a requirement simply register the unique MAC number for each A2-05.

All communication with Accsense Servers is initiated from the Accsense unit over HTTPS on port 443 using 128 bit encryption, to guarantee integrity and confidentiality. The units do not accept incoming connections from Accsense Servers; they only need to be able to initiate outbound connections to upload data.

All traffic is initiated from the A2-05 as out going secure web requests.

Aside from needing access to DNS servers, the A2-05 will not communicate with any other hosts on the Internet.

Useful destination addresses for communications for the A2-05 web application are as follows:

72.32.27.228 listener.sensornetworkonline.com
72.32.27.229 secure.sensornetworkonline.com
72.32.2.143 web.sensornetworkonline.com

The above web addresses may need to be added to the whitelist in the firewall to allow outgoing communication to the Accsense sever.

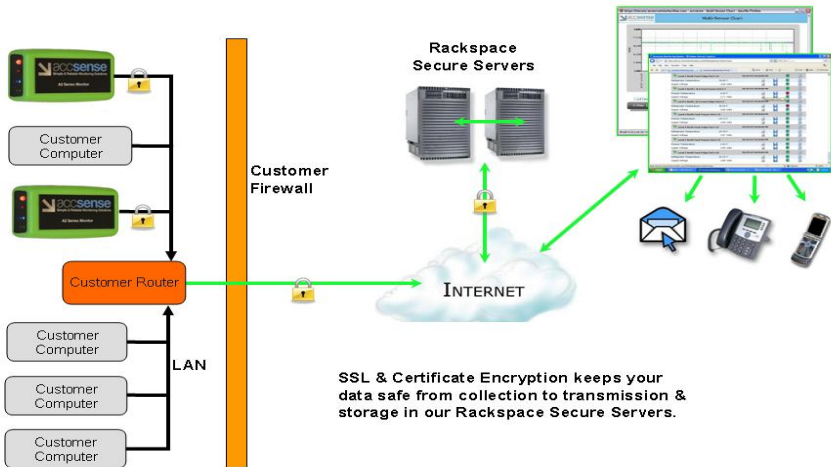
5. Internet Security

Communication from the A2-05 to the Grant/Accsense Secure Servers utilizes the HTTPS protocol and only relies on an outbound connection over port 443. As communication between the A2-05 and the servers is initiated from the A2-05, there is no need to open inbound ports on the firewall. HTTPS over port 443 is a standard communications protocol for secure Web traffic (e.g. credit card transactions).

Data sent over the Internet utilizes two forms of encryption:

- 1) **SSL Encryption**, the same "padlock" feature that many Web sites use to ensure Web purchases are secure.
- 2) **Certificate Encryption**, each gateway is issued a unique, digitally signed certificate that is associated with its serial number.

LAN-Wired IT Security



A combination of SSL and Certificate Encryption ensures the data has the highest level of security over the internet, as only devices with certificates containing this digital signature are permitted to connect to the Grant/Accsense Servers. Our Website is VeriSign Secured®, providing leading encryption and identity verification.

If a certificate is ever compromised, its unique signature can be revoked, making this virtually un-exploitable to system crackers. These two forms of encryption prevent security problems such as Denial of Service attacks. Secondly, it is virtually impossible to maliciously insert or spoof data - ensuring accurate data, every time.

6. Login

6.1 Creating your Account

Your Grant/Accsense web service account is created automatically as soon as the A2-05 contacts the Grant/Accsense secure server (solid blue LED on the front of the A2-05). **The account will not exist and you will NOT be able to log in until the first successful communication contact with the Accsense server.**

You can login to your account via www.accsense.com

6.2 Login to your Account

The screenshot shows the Accsense login page. On the left, there is a login form with the following fields and options:

- Gateway Mac:
- Login Name:
- Password:
- Remember Gateway Mac
- Login button
- Click [HERE](#) to try the demo site.

On the right, there is a 'software updates' section with the following content:

software updates

LAN-Wired Pods Wireless Pods

New Features	
Advanced Alarming Accounts	<ul style="list-style-type: none">• Sequential Voice Alarming: Acknowledge Directly from any Telephone
All Accounts	<ul style="list-style-type: none">• Improved User Interface• Improved Validation Procedures
Coming soon	<ul style="list-style-type: none">• Advanced Reporting Options

Remember: Your Login Name and Password are Case Sensitive.

You can login to your account with the Gateway MAC number (found on the side of the A2-05) and the default Login Name and Password:

Login Name: Admin

Password: Admin

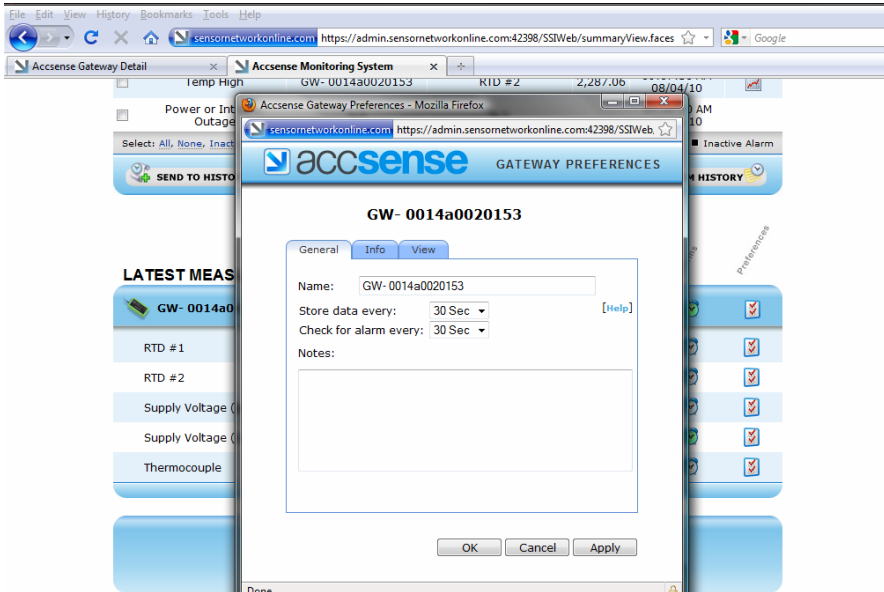
Note: Both the Login Name and Password are Case Sensitive.

Your PC will remember the Gateway Mac number if you check the box.

7. Software Navigation

Once you have logged in, Grant/Accsense software is extremely easy to navigate. From the main screen clicking on the icons brings up pop up windows.

Note: the browser must be set to allow pop ups from the Grant/Accsense web site.




Closing a pop up window returns the user to the main screen.

Welcome Mark Fisher

Time to Next Data Storage: 00:00:17

TRIGGERED ALARMS













ALARM NAME	POD	MEASUREMENT	VALUE	ALARM TIME	CHART
<input type="checkbox"/> Temp High	GW- 0014a0020153	RTD #2	28.287.06	09:07:30 AM 08/04/10	
<input type="checkbox"/> Power or Internet Outage	N/A	N/A		10:36:00 AM 08/05/10	

Select: [All](#), [None](#), [Inactive](#) ■ Active Alarm ■ Inactive Alarm

2 [SEND TO HISTORY](#) [VIEW ALARM HISTORY](#) 4

LATEST MEASUREMENTS

3

GW- 0014a0020153	08/05/10 02:43:30 PM			
RTD #1	28.35 C			
RTD #2	25.05 C			
Supply Voltage (Battery)	3.85 Volts			

↓ Next ↑ Previous Highlight all Match case

- The main screen has four areas
- 1) User Information/Account Settings
 - 2) Triggered Alarms
 - 3) Latest Measurements
 - 4) Alarm History

8. Account Settings

The **Account Settings** pop up has three tabs.

8.1 Primary Contact

The screenshot shows the 'Primary Contact' tab of the 'SYSTEM SETTINGS' dialog. The form contains the following fields:

Full Name*:	Jack Jones
Company*:	Grant Instruments
Address Line1*:	Shepreth Street address, P.O. box, company name, c/o
Address Line2:	Apartment, suite, unit, building, floor, etc.
City*:	Cambridge
State/Province/Region*:	Cambridgeshire
ZIP/Postal Code*:	90210
Country*:	United States
Timezone*:	(GMT) Greenwich Mean Time
Phone Number*:	0123456789
Email Address*:	test@customer.com
Repeat Email Address*:	test@customer.com

* = required

Buttons: OK, Cancel, Apply

The **Primary Contact** tab provides information that can be used by Grant/Accsense if the need arises to contact the customer for any reason. It is important for the users to keep this information up to date.

8.2 User Accounts

The screenshot shows the 'User Accounts' tab of the 'SYSTEM SETTINGS' dialog. It contains two sections:

Administrator	Read-Only Account		
Login Name*:	Admin	Login Name*:	Reader
Password:		Password:	
Repeat Password:		Repeat Password:	
First Name:	Accsense	First Name:	Accsense
Last Name:	Administrator	Last Name:	Reader

Buttons: OK, Cancel, Apply

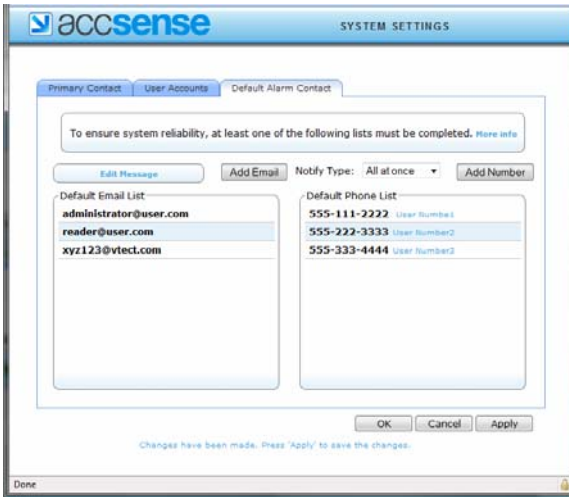
The **User Accounts** tab allows two levels of system access to be created Administrator and Read-Only.

Administrator - Can change any parameters, such as alarm levels, the details of the alarm contacts etc.

Reader - Can only view the information from the system, but cannot change any system parameters.

If the Administrator forgets their password, contact Grant/Accsense to have the password reset.

8.3 Default Alarm Contact



The **Default Alarm Contact** tab contains a list of email/txt message addresses and/or phone numbers. When enabled, phone numbers can be called in sequence rather than all at once by selecting **Default List** when enabling an alarm for a sensor.

Alarms will be sent once per event, unless sequential alarming mode is selected.

In sequential alarming mode, the list will be repeated twice if no user takes responsibility by pressing **5** in response to a phone call from the Accsense server.

For information on Sequential Alarming see section 16 on Page 27.

9. Latest Measurements



[SETTINGS](#) | [SUPPORT](#) | [LOGOUT](#)

Welcome

Time to Next Data Storage: 00:00:28

TRIGGERED ALARMS

ALARM NAME	POD	MEASUREMENT	VALUE	ALARM TIME	CHART
<input type="checkbox"/> Temp High	GW-0014a0020153	RTD #2	2,287.06	09:07:30 AM 08/04/10	
<input type="checkbox"/> Power or Internet Outage	N/A	N/A		10:36:00 AM 08/05/10	

Select: All, None, Inactive ■ Active Alarm ■ Inactive Alarm

[SEND TO HISTORY](#) [VIEW ALARM HISTORY](#)

LATEST MEASUREMENTS

GW-0014a0020153	08/05/10 03:04:30 PM			
RTD #1	28.48 C			
RTD #2	25.03 C			
Supply Voltage (Battery)	3.72 Volts			

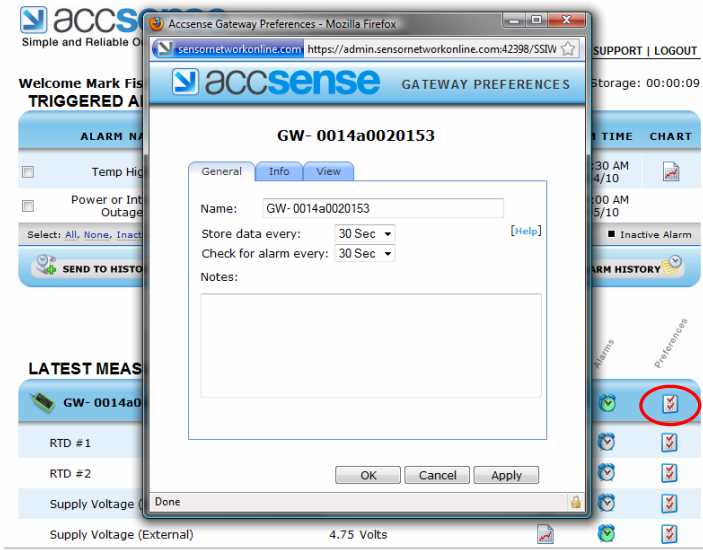
Change Data Log and Columns
Admin
Refresh

The **LATEST MEASUREMENTS** area of the main window displays the measurements selected as **Visible** from the Gateway Preferences View pop up.

Note: That multiple A2-05 can be displayed in the same window, and a single login by joining multiple accounts. Please contact Grant/Accsense to join accounts together.

10. Gateway Preferences Icon

10.1 General Tab

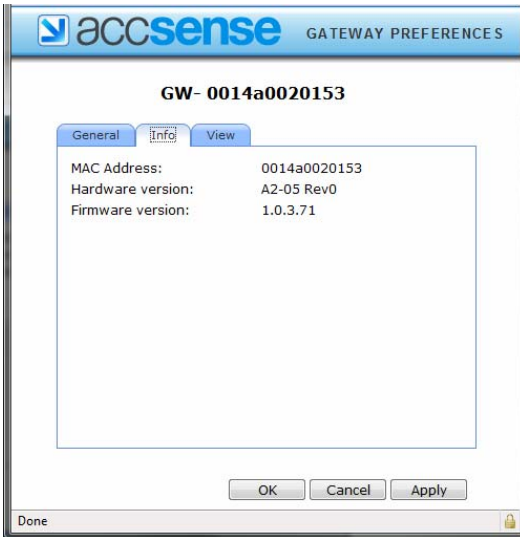


The **General** tab allows the users to name the A2-05 (A2-05 will be listed on the screen in alphabetical order), set the sampling rates (how often measurements are made) and record notes about the A2-05.

Two different sample rates can be selected:

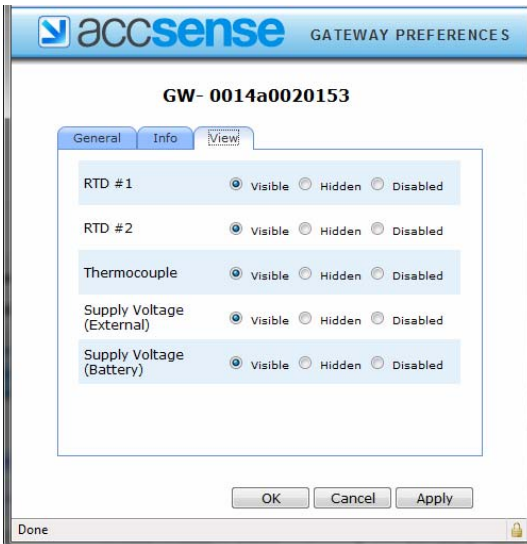
- Store data every - Records data if the measurements are within limits usually slower
- Check for alarm every - checks measurements against alarm limits, usually faster

10.2 Info tab



The Info tab provides information about the A2-05 and firmware. This information can be useful when diagnosing system problems remotely.

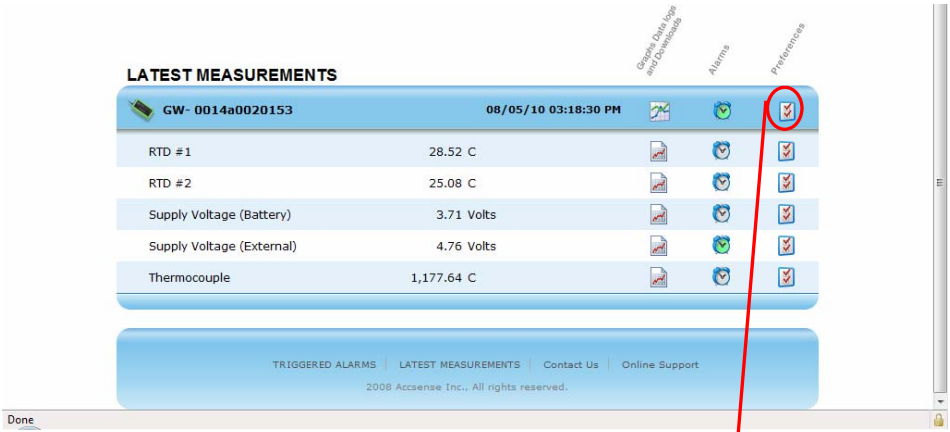
10.3 View tab



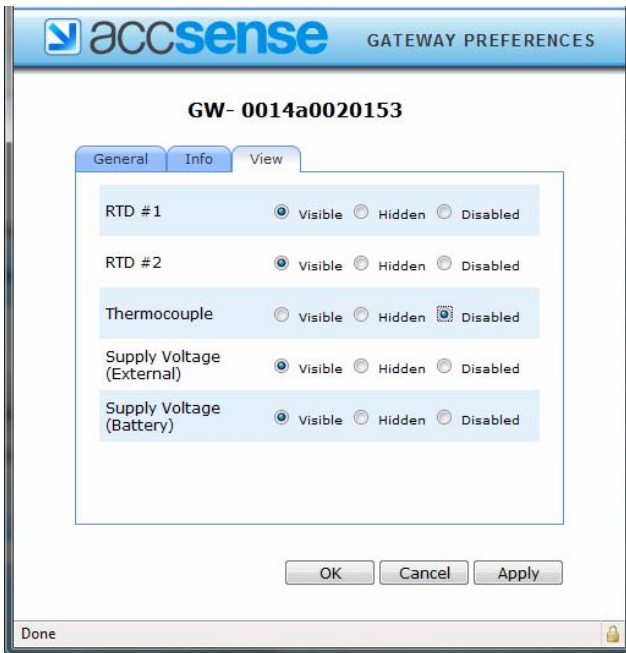
View tab allows users to set which measurements are:

- Visible (Shown in measurement window)
- Hidden (recorded but not displayed)
- Disabled (Not recorded or displayed)

11. Hiding the Thermocouple Reading



To hide or disable the thermocouple reading click on the Gateway Preference Icon. Select the **View** tab



The thermocouple readings then be **Disabled** or **Hidden** by checking the appropriate box. Then click on **OK**.

The Thermocouple reading will now not be displayed in the Latest Measurements of the Gateway

12. Gateway Alarms



SETTINGS | SUPPORT | LOGOUT

Welcome

Time to Next Data Storage: 00:00:05

TRIGGERED ALARMS

ALARM NAME	POD	MEASUREMENT	VALUE	ALARM TIME	CHART
<input type="checkbox"/> Temp High	GW-0014a0020153	RTD #2	2,287.06	09:07:30 AM 08/04/10	
<input type="checkbox"/> Power or Internet Outage	N/A	N/A		10:36:00 AM 08/05/10	

Select: All, None, Inactive ■ Active Alarm ■ Inactive Alarm

SEND TO HISTORY VIEW ALARM HISTORY

GATEWAY COMMUNICATION ALARM

GW- 0014a0020153

General

Alarm Enabled

Alarm Description

Name: [Add Notes](#)

Notify List:

This will notify every min.
The list is located in main page.

Done

10 03:26:30 PM

The Gateway Alarm window allows users to set alarms which are triggered if the Grant/Accsense secure remote servers lose contact with the A2-05.

Note: Only ONE alarm is issued in the event of communication being lost.

13. Sensor Preferences

Welcome Mark Fisher
TRIGGERED ALARMS

Time to Next Data Storage: 00:00:18

ALARM NAME	POD	MEASUREMENT	VALUE	ALARM TIME	CHART
<input type="checkbox"/> Temp High	GW- 0014a0020153	RTD #2	2,287.06	09:07:30 AM 08/04/10	
<input type="checkbox"/> Power or Internet Outage	N/A	N/A		10:36:00 AM 08/05/10	

Select: All, None, Inactive ■ Active Alarm ■ Inactive Alarm

[SEND TO HISTORY](#) [VIEW ALARM HISTORY](#)

LATEST MEASUREMENTS

GW- 0014a0020153	08/05/10 03:34:00 PM			
RTD #1	28.37 C			
RTD #2	25.02 C			

General Data Setup and Parameters
Alarms
Preferences

13.1 General tab

accsense SENSOR PREFERENCES

RTD #1

General | Info | Advanced

Name: RTD #1

Units: C

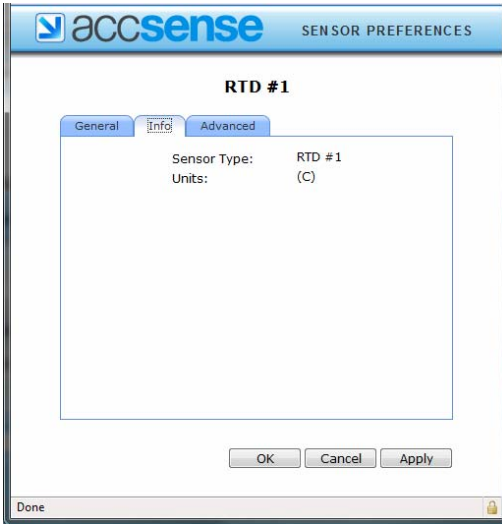
Notes:

OK Cancel Apply

Done

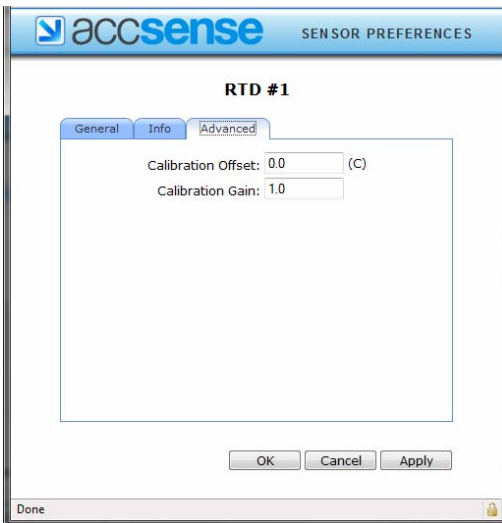
The **General** tab allows users to name the sensor, and either select the measurement units or enter the units.

13.2 Info tab



The **Info** tab provides information about the sensor: Type of Sensor and measurement units

13.3 Advanced tab



The Advanced tab provides calibration information about the sensor.

The calibration offset can be used to adjust the temperature to match other displays. Information on this can be found in Section 16 Calibration Instruction. (Page 27)

14. Sensor Alarms

Welcome

Time to Next Data Storage: 00:00:26










TRIGGERED ALARMS

ALARM NAME	POD	MEASUREMENT	VALUE	ALARM TIME	CHART
<input type="checkbox"/> Temp High	GW- 0014a0020153	RTD #2	2,287.06	09:07:30 AM 08/04/10	
<input type="checkbox"/> Power or Internet Outage	N/A	N/A		10:36:00 AM 08/05/10	

Select: All, None, Inactive ■ Active Alarm ■ Inactive Alarm

 SEND TO HISTORY  VIEW ALARM HISTORY

LATEST MEASUREMENTS

GW- 0014a0020153	08/05/10 03:39:30 PM			
RTD #1	28.48 C			
RTD #2	24.97 C			

Graph Data Log
and Parameters
Alarms
Preferences

14.1 General tab

 ALARM DEFINITION

GW- 0014a0020153 - RTD #1

General **Trigger**

Alarm Enabled

Alarm Description
Name: [Add Notes](#)

Notify List:
This will notify everyone on the "Default Notify List".
The list is located in the "Settings" menu on the main page.

Done 

The **General** tab allows users to enable/disable the alarm, and to name the alarm (important, since voice alarms will carry this name).

This pop up also allows the users to specify the **Default List** of people to be alarmed, or a **Custom List** of people who will be alarmed for only this sensor.

14.2 Trigger tab

The screenshot shows the 'ALARM DEFINITION' window for 'GW- 0014a0020153 - RTD #1'. The 'Trigger' tab is active. The 'Alarm Limits' section contains two sensor value fields: the first is set to '<' and '20', and the second is set to '>' and '30', with an 'OR' condition selected. The 'Advanced' section shows 'Trigger Mode' set to 'Auto-Rearm' and a 'Filter' set to '3 occurrences in 5 consecutive samples'. At the bottom are 'OK', 'Cancel', and 'Apply' buttons. The window title bar includes the ACCsense logo and the text 'ALARM DEFINITION'. A 'Done' button is visible in the bottom left corner of the window frame.

The **Trigger** tab allows users to specify the conditions under which an alarm will be sounded.

The trigger mode of **Auto-Rearm** means that every time an alarm condition STARTS TO EXIST, and the alarm will be sounded. For Example if an alarm condition exists, then goes away, then re-occurs, Two alarms will be sounded.

The filter setting of more than 1 occurrence means that the alarm condition must exist for more than ONE measurement. This prevents multiple alarms being sent for what really is a single alarm event.

15. Sensor Graph

The screenshot shows the ACCsense dashboard. At the top left is the ACCsense logo with the tagline "Simple and Reliable Online Monitoring". On the top right, there are links for "SETTINGS | SUPPORT | LOGOUT" and a "Welcome" message with the text "Time to Next Data Storage: 00:00:26".

The "TRIGGERED ALARMS" section contains a table with the following data:

ALARM NAME	POD	MEASUREMENT	VALUE	ALARM TIME	CHART
<input type="checkbox"/> Temp High	GW- 0014a0020153	RTD #2	2,287.06	09:07:30 AM 08/04/10	
<input type="checkbox"/> Power or Internet Outage	N/A	N/A		10:36:00 AM 08/05/10	

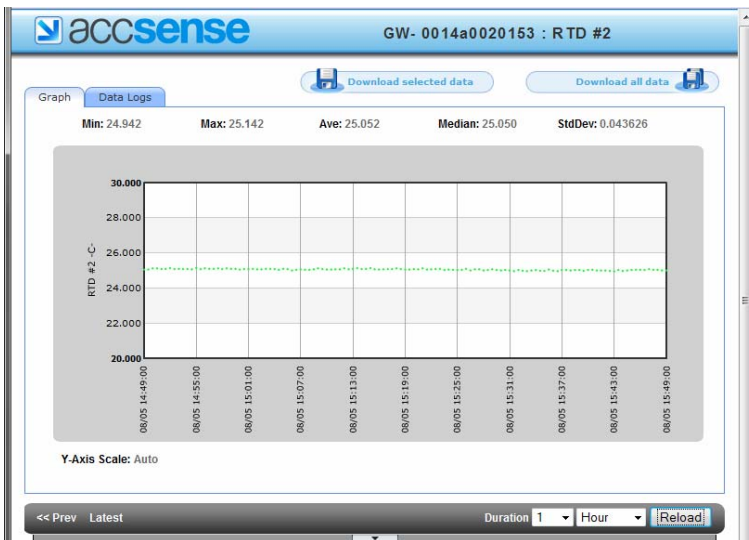
Below the table are buttons for "SEND TO HISTORY" and "VIEW ALARM HISTORY".

The "LATEST MEASUREMENTS" section shows a table with the following data:

MEASUREMENT	VALUE	STATUS
RTD #1	28.45 C	
RTD #2	25.03 C	

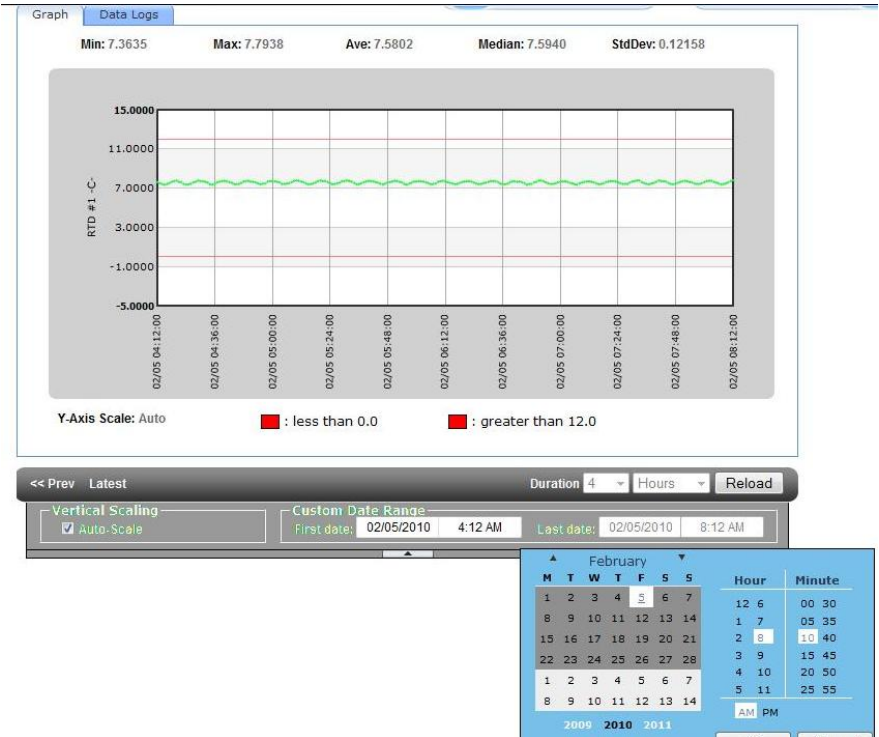
Annotations with arrows point to the "Graph icon" and "Alert icon" for RTD #1.

15.1 Main Graph



The Sensor Graph Icon brings up a pop up graph with a default time window of 1 day. Statistics for the data displayed are located across the top of the graph. If alarms are set, red bars will appear across the graph at the one or two alarm levels set.

15.2 Change Data Range



To view data for specific ranges of values and time, click on the small arrow at the bottom of the graph to open the manual range selection area.

Set the ranges as desired, then press the **Reload** button.

The Duration of the data displayed on the graph can be changed, this can be set to Hours, Days, or Months. With up to 3 Months of data being displayed on the graph at any one time. This can be changed by clicking on the drop down arrows for the Duration times and then clicking on **Reload**.



Note: The graph can display a maximum of 360 data points, when this has been reached there will be a footnote under the lower right hand side of the graph, this will signify that the data has been condensed to fit the screen. Even though the data is condensed it is done so any spikes will be viewable.

15.3 Multiple Traces on a Graph

It is possible to display more than one trace on a graph for each A2-05, this could be used to compare temperature graphs from two different probes.

In the Latest Measurements click on the graph icon for the A2-05

LATEST MEASUREMENTS			Generate Data logs and Downloads	Alarms	Preferences
GW- 0014a0020153	05/18/10 09:20:00 AM				
RTD #1	26.93 C				
RTD #2	23.29 C				
Supply Voltage (Battery)	3.75 Volts				
Supply Voltage (External)	4.75 Volts				
Thermocouple	23.76 C				

In the Multi Sensor Selection highlight the required sensors to be displayed. This is done by holding down **Ctrl** and click on the sensors. When the sensors required are highlighted click on **Draw Chart**.

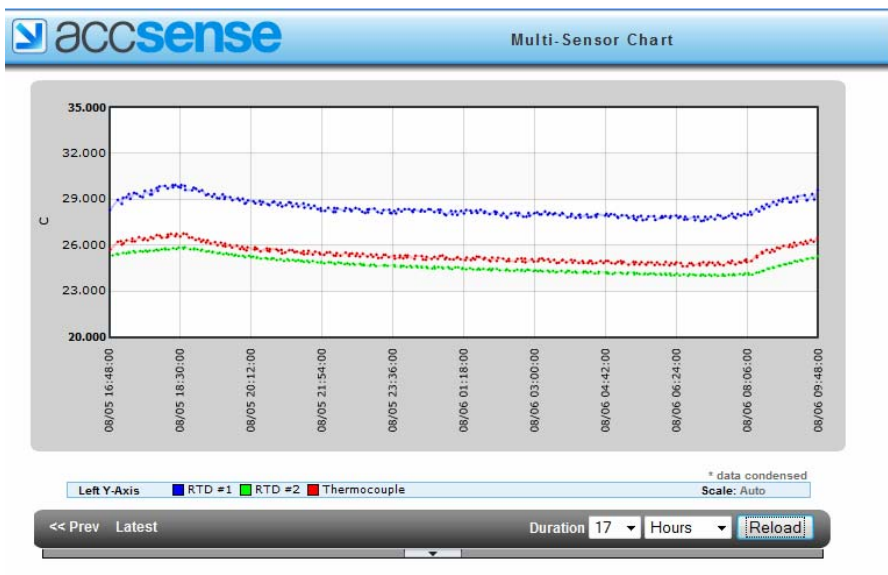
accsense MULTI-SENSOR SELECTION

Select sensors to chart:
(Use CTRL key to select multiple sensors)

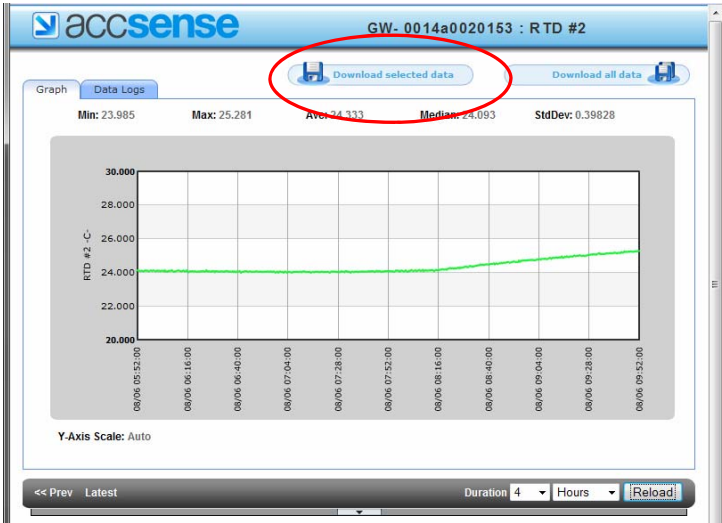
- GW- 0014a0020153
- RTD #1 (C)
- RTD #2 (C)
- Supply Voltage (Battery) (Volts)
- Supply Voltage (External) (Volts)
- Thermocouple (C)

Draw Chart

The multiple traces will then be displayed on the graph as below, the date range can then be changed as required.



15.4 Download to Excel



To download the data shown on the graph to an Excel spreadsheet (.csv format), simply press the **Download Selected Data** button at the top right of the screen.

The screenshot shows the Accsense web interface for station GW-0014a0020153 : RTD #2. The 'Data Logs' tab is active and circled in red. The interface shows a table of data logs with columns for Value (°C) and Time. The table is scrollable, and the 'Download selected data' button is visible at the top.

Value (°C)	Time
25.281	08/06/10 09:52:00 AM
25.266	08/06/10 09:51:30 AM
25.266	08/06/10 09:51:00 AM
25.235	08/06/10 09:50:30 AM
25.251	08/06/10 09:50:00 AM
25.220	08/06/10 09:49:30 AM
25.220	08/06/10 09:49:00 AM
25.220	08/06/10 09:48:30 AM
25.251	08/06/10 09:48:00 AM
25.220	08/06/10 09:47:30 AM
25.235	08/06/10 09:47:00 AM
25.204	08/06/10 09:46:30 AM

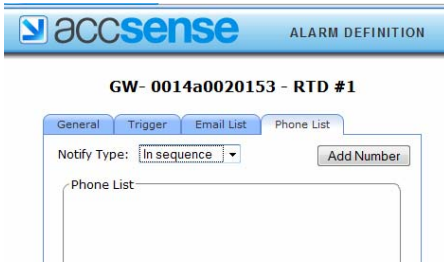
To view the data as a table, click on the Data Logs tab and scroll through the data. The time stamp on the data is the time the data was recorded.

16. Sequential Alarming

16.1 Sequential Alarming

Sequential alarming can only be set if the User has a Level 3 account and is using the voice alarm notification.

Sequential alarming can either be set in the Default Alarm Contacts or the Phone Lists for the individual A2-05 or for the Sensor Alarms.



The screenshot shows the 'ALARM DEFINITION' interface for 'GW-0014a0020153 - RTD #1'. It features four tabs: 'General', 'Trigger', 'Email List', and 'Phone List'. The 'Phone List' tab is active, showing a 'Notify Type' dropdown menu set to 'In sequence' and an 'Add Number' button. Below this is a 'Phone List' input field.

Change the Notify Type to **In sequence**

Each phone number on the list will be dialed in sequence until a response has been received that a recipient is going to take responsibility for the alarm notification. The user takes responsibility for the alarm by pressing **5** in response to a call from the Accsense server.

The phone list will be repeated twice if no user takes responsibility for the alarm.

16.2 Voice Notification Script

The voice notification comprises of the following script.

This is an alarm notification from your Accsense wireless monitoring system.

*The (sensor name) sensor on Pod (pod name) reported a (alarm name) alarm at **date/time**, in (your local time zone) time.*

*Sensor value is **value***

*I repeat the (sensor name) sensor on Pod (pod name) reported a (alarm name) alarm at **date/time**, in (your local time zone) time.*

*Sensor value is **value***

Please login to your Accsense account at www.accsense.com for details

Please press 5 to acknowledge receipt. [When 5 is pressed] You have now taken responsibility for this alarm. Thank you, Goodbye.

All (*bracketed*) values are read from the user-configured settings for each pod. If you change the name of a sensor or pod, it will read in the message. All **bold** values are read from the actual stored data that triggered the alarm, which may not be the most recent data point.

In the case of a filtered alarm (X occurrences in Y samples), the alarm will read off the time stamp and value of the most recent data point, the one which triggered the alarm.

17. Calibration Instructions

17.1 Calibration Requirements

The calibration requirements for the A2-05 will depend on the Quality processes of the end user, generally this would be once a year.

17.2 Single Point Calibration

If the temperature being measured is always going to be around the same value $\pm 5^{\circ}\text{C}$ then all that is needed is a single point calibration.

Requirements

A2-05


Temperature probe connected to the A2-05


Grant/Accsense software - access to Grant/Accsense software including login & password .

Calibrate temperature source/thermometer

Calibration Instructions

In the Sensor Preferences make sure the **Calibration Offset** is set to **0.0** and the **Calibration Gain** is set to **1.0**

This is done by clicking on the **Preferences Icon**  for that probe. In the Sensor Preferences window click on the **Advanced** Tab, and then enter the two values.

- Set the temperature source to the required temperature (this will need to be the temperature that is being permanently measured) if it is not calibrated verify using a thermometer.
- Place the temperature probe installed in the Grant/Accsense A2-05 into the temperature source and allow to settle down, this may take a while.
- Take a note of the temperature of the temperature/thermometer and the temperature probe connected to the A2-05 through the Grant/Accsense web service.
- If both readings are the same then the calibration of the A2-05 is correct.
- If there is a difference between the two readings then work out the value of the temperature source reading – the A2-05 reading.
- This value now needs to be entered into the Grant/Accsense web service for that probe. This is done by clicking on the Preferences Icon  for that probe. In the Sensor Preferences window click on the **Advanced** Tab. Enter the value of the difference between the two readings into the **Calibration Offset** box.

Note: The Calibration Gain stays as 1.0

Example: if the Source reading is 25.00°C and the A2-05 reading is 22.80°C . The Calibration Offset would be $25.00 - 22.80 = 2.2^{\circ}\text{C}$ (2.2 is the value entered into the Calibration Offset box as on the next page)

RTD #1

The screenshot shows a configuration window for 'RTD #1'. It has three tabs: 'General', 'Info', and 'Advanced'. The 'Advanced' tab is selected. Inside the window, there are two input fields: 'Calibration Offset: 2.2 (C)' and 'Calibration Gain: 1.0'.

If the other sensors need calibrating on the A2-05 they are done in the same way.

17.3 Two Point Calibration

If the temperature being measured is across a range (for example between +25°C and -25°C) then a two point calibration should be used.

Requirements

A2-05


Temperature probe connected to the A2-05.

Grant/Accsense software - access to Grant/Accsense software including login & password

Calibrate temperature source/thermometer

Calibration Instructions

In the Sensor Preferences make sure the **Calibration Offset** is set to **0.0** and the **Calibration Gain** is set to **1.0**

This is done by clicking on the **Preferences** icon  for that probe. In the Sensor Preferences window click on the **Advanced** Tab, and then enter the two values.

- Set the temperature source to the required temperature (this will need to be the temperature that is being permanently measured) if it is not calibrated verify using a thermometer.
- Place the temperature probe installed in the A2-05 into the temperature source and allow to settle down, this may take a while.
- Take a note of the temperature of the temperature/thermometer and the temperature probe connected to the A2-05 through the Grant/Accsense web service.
Note: This needs to be done at the two calibration points that are required.
- When there are two points then the gain needs to be worked out first which can be found from (higher calibration point – lower calibration point) / (higher A2-05 value – lower A2-05 value).

For example, if the calibration points are 25.00°C and 73.00°C, and the A2-05 reads 26.25°C and 76.25°C, then the gain is $(73.00 - 25.00) / (76.25 - 26.25) = 48.00 / 50.00 = 0.96$.

- Next the offset needs to be calculate by multiplying either (or both) of the A2-05 values by the gain and then subtracting that from the calibration value as before.

Carrying on with the above example, $26.25 * 0.96 = 25.20^{\circ}\text{C}$ and $25.00 - 25.20 = -0.20^{\circ}\text{C}$ and similarly $76.25 * 0.96 = 73.20$ and $73.00 - 73.20 = -0.20^{\circ}\text{C}$ so the offset is still -0.20°C . If there are two different answers (allowing for rounding errors) then please check your calculations.

17.4 Using Excel to do the calculation

By using excel to do the calculation a multi point (two or more) calibration can be achieved using linear regression (least squares linear regression).


- As above take the calibration reading and the A2-05 readings, and then using linear regression (least squares linear regression) on a computer is the best to find the Offset and Gain values.

- Using Excel, enter two columns of figures with the calibration values in the left hand column and the A2-05 values in the right hand column. Next highlight two cells where the result is to appear and use the array function LINEST to calculate the least squares result.

Note: that it is an array function so press CTRL+SHIFT+ENTER to make it produce both results. An example is shown below.

Calibration	A2-05		
values	values		
25.00	26.25		
55.00	57.50		
73.00	76.25		
		gain	offset
		0.96	-0.20

- These values need to be entered into the Accsense web service for that probe.

This is done by clicking on the Preferences Icon  for that probe. In the Sensor Preferences window click on the **Advanced** Tab. Enter the Offset value into the **Calibration Offset** box and the gain value into the **Calibration Gain** box

The example figures can be seen in the Sensor Preferences window below.

RTD #1

General Info **Advanced**

Calibration Offset: (C)

Calibration Gain:

If the other sensors need calibrating on the A2-05 they are done in the same way.

18. Trouble Shooting

There is a problem with the Ethernet port that the A2-05 is plugged into.

- If this is a new installation, verify the Ethernet connection is active.
 - On the A2-05 there is a LINK LED on the front. If there is a hardware connection, the LED will be illuminated. If the LED is not illuminated, verify the connection by removing the cable from the A2-05 and plug it into a computer to make sure that the Ethernet port is active.

The facility does not use DHCP

- If the network uses static IP addresses instead of DHCP, the A2-05 will not be able to obtain initial IP address, DNS or gateway information.
 - On the A2-05 the STAT1 LED will be on to indicate that there is a problem connecting to the server.
 - The solution is to use the Remote Gateway Configuration tool to establish a local connection to the A2-05 and manually configure it. The tool can be downloaded from the following webpage:
http://www.accsense.com/sp_downloads.html.
Download this program and install it on a PC that is on the same subnet as the A2-05. Start the program and it will search the local network for any Grant/Accsense system. If it finds them, they will be displayed in the list box on the left of the configuration tool. Click on the MAC address of the A2-05 that requires configuration, go to the IP tab and uncheck "**Obtain Network Address Automatically**". Then, fill in the IP address that you want to assign to the A2-05 along with the subnet mask, at least one DNS address and the route or gateway address.

Note: the A2-05 may take several tries, as this unit will keep rebooting in an attempt to get an address.

The alternative to programming the A2-05 with the IP address, subnet mask and DNS address is to connect the A2-05 directly to the PC Ethernet port using a cross over cable. Once connected the Remote Gateway Configuration tool can be used as described above. This is a much easier way to program the A2-05 as the unit does not repeatedly reboot its self.

Once this is done, click the submit changes button to save the settings in the A2-05. This will then restart with the new settings and after about a minute it should show up in the Gateway Configuration software. Verify that the new settings are correct and check to see that the Connect LED is on for the A2-05.

The facility uses a Proxy server for communication to the Internet.

- Just like configuring the IP address, use the Remote Gateway Configuration software to enter the information for the Proxy server. Click on the Proxy tab and enter the information for your server.

The facility has blocked outgoing communications.

- There are several possibilities
 - Port 443 in the firewall between the local network and the internet is blocked. The IT department will be required to open port 443 for HTTPS communication.
 - Unsolicited outgoing communications for the facility to the internet is blocked. This may have been done to prevent malicious software from sending data out. The IT department will need to add the address of the Grant/Accsense servers to the whitelist in the firewall this is to allow the outgoing communications from the system to pass through.

Useful destination addresses for communications for the A2-05 web application are as follows:

72.32.27.228 listener.sensornetworkonline.com
72.32.27.229 secure.sensornetworkonline.com
72.32.2.143 web.sensornetworkonline.com



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