

Aquavx Scout

Remote monitoring and
alarm notification system



User's Manual

Version 1.1
December 1, 2009

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1 Introduction

The Aquavx Scout is the most user-friendly and reliable remote monitoring, reporting and alarm notification system available. Mounted in an NEMA 4X enclosure, the Scout provides simple programming either locally through the integral keypad and display or remotely via the Aquavx internet-based hosted services.

Installation is made easy, as all wiring connections are made through quick disconnect-type connectors.

1.1 General Operation

The Aquavx Scout monitors 8 dry contact/digital inputs, 4 analog inputs, 8 Modbus digital inputs and 8 Modbus analog inputs continuously. Control, either locally or remotely, is available through 8 Modbus digital outputs.

The Scout reports information to the Aquavx hosted-service system based on:

- Time interval
- Channels going into/out of alarm conditions
- Daily statistics reported at the end of day

Alarms and Event History can be viewed locally on the Scout display, allowing the operator an easy method of determining how the system has been operating over time.

The Scout supports Operator login/logout with this information being immediately sent to the hosted-service system.

This manual is applicable to firmware versions 1.0 and later.

1.1.1 Acknowledging Alarms

Alarms are automatically acknowledged once the Aquavx hosted-service system has successfully received the data from the Scout.

The Scout will continue to send information until the internet hosted-service has successfully received the data.

1.1.2 Store and Forward Buffer

The Scout has a 390 entry store and forward buffer to save any records that should be sent to the internet hosted-service in the event that communication to the hosted-service has been interrupted for any reason. When communication is re-established, the buffer is sent all at once.

The buffer can be cleared through the Maintenance Menu – either one entry at a time or all entries at once.

2 Installation

The Scout is shipped mounted inside a NEMA 4X enclosure. The dimensions of the enclosure are shown below.

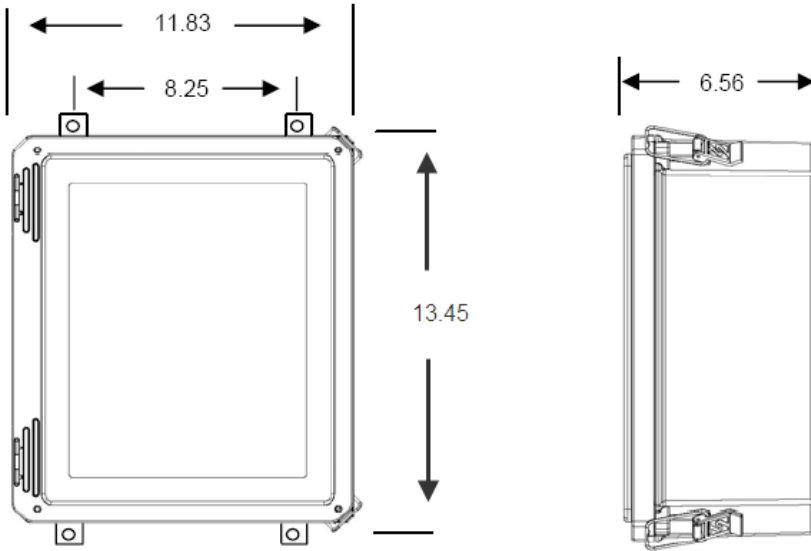


Figure 1 Panel Mount mounting holes

The connectors for Primary Power and I/O use quick disconnect plugs. The diagram below shows the location of these connections.

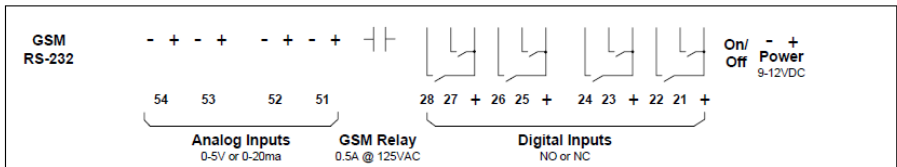
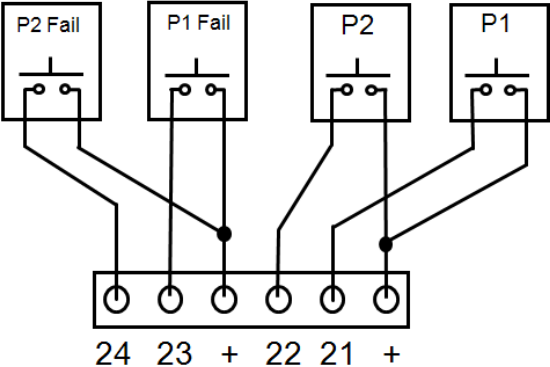
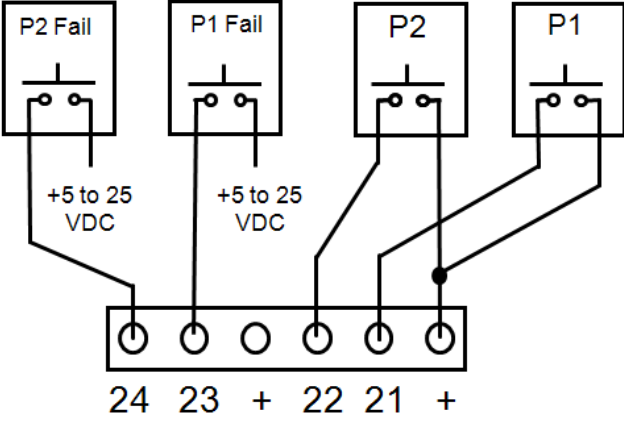
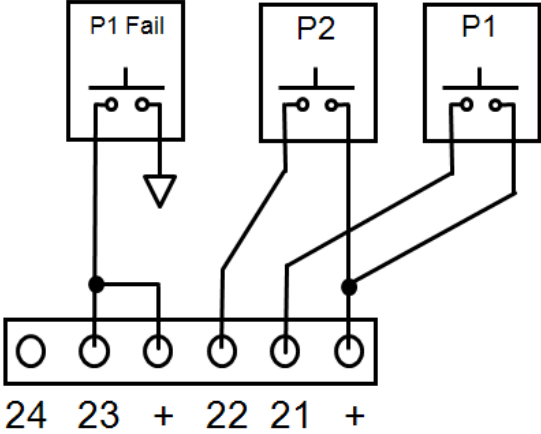
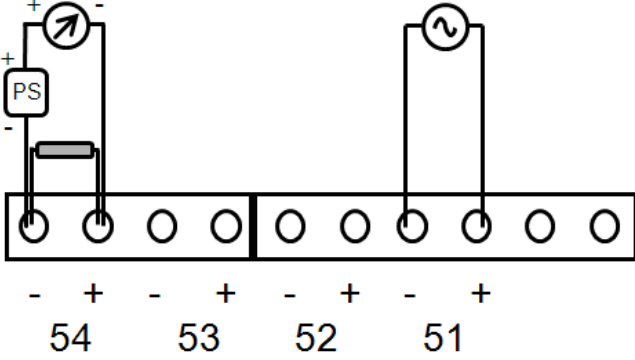


Figure 2 Field wiring diagram

Connection point	Function
<p>Power</p>	<p>Connect the included power connection from the wall-mount power supply to the Scout. Power requirement is 9-12VDC.</p>
<p>On/Off</p>	<p>To supply power to the Scout, flip the switch. The Scout will power up and the display will read "Aquavx Scout".</p>
<p>Digital Inputs</p>	<p>For Dry Contacts: Connect from the '+' to one side of your dry contact and connect from the Channel # to the other side of your contact.</p> <p>NOTE: <i>There are 3 connections for 2 channels.</i></p> <p>In this example, Pump 1 (P1) and Pump 2 (P2) use a common connection point as the source for the contacts.</p> 

Connection point	Function
<p>Digital Voltage Inputs</p>	<p>For Voltage inputs up to 25 VDC: Connect the positive voltage of your input to the Channel # input on the Scout.</p> <p>NOTE: Do not connect anything to the '+' input</p> <p>NOTE: If the grounds are not already common between your device and the Scout, connect the "-" signal of the Scout power supply to a signal ground on your device.</p> 

Connection point	Function
<p>Digital Ground Inputs</p>	<p>For Contacts that close to Ground: Jumper the '+' and Channel # input together. Connect another wire from the Channel # input to the contact that will close to ground.</p> <p>For example: <i>Set channel 23 to Normally Closed</i></p> <p>NOTE: <i>You cannot use the same '+' for any other channel</i></p> 

Connection point	Function
<p>Analog Inputs</p>	<p>For Voltage inputs up to 5 VDC: Connect the positive voltage to the (+) terminal and the negative to the (-) terminal. Example: channel 51 is wired as a voltage input</p> <p>For Current inputs up to 20ma: Connect the supplied precision resistor across the (+) and (-) terminals. Connect the (+) terminal to the (-) lead of the sensor. Connect the (-) terminal to the (-) side of the external power supply. Example: channel 54 is wired as a current input</p>  <p>The diagram illustrates the wiring for two channels on a terminal strip. Channel 54 is a current input channel. It features a precision resistor labeled 'PS' connected between the positive (+) and negative (-) terminals. A sensor is connected between the positive (+) terminal and the negative (-) terminal. Channel 51 is a voltage input channel. It features a sensor connected between the positive (+) and negative (-) terminals. The terminal strip has eight terminals in total, with a vertical line separating the first four (channels 54 and 53) from the last four (channels 52 and 51). The polarity for each channel is indicated below the terminals: 54 (+, -), 53 (-, +), 52 (-, +), and 51 (-, +).</p>

2.1 Enabling power

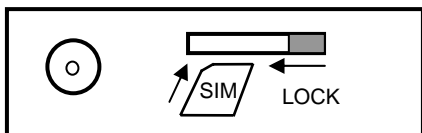
Connect the provided DC power supply, or another source of 9 to 12VDC, to the Power connection. Move the On/Off switch to the up or On position. The Scout will start its power up diagnostics.

Upon completing the power up diagnostics, the Scout displays the HOME screen, which shows the current state of the Scout, the date and time.

2.2 SIM card installation on a GSM modem

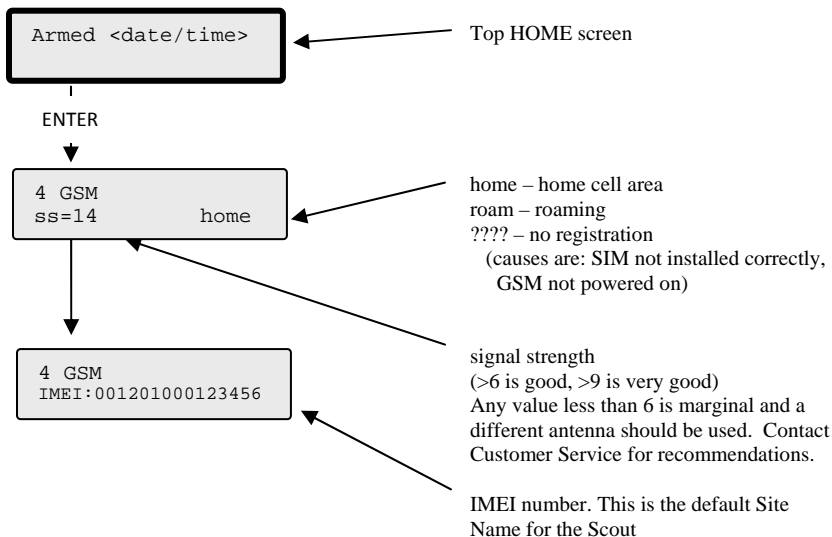
The Scout is equipped with an internal GSM cellular modem. A GSM SIM card must be installed for the Scout to send reports to the hosted-service system. The SIM card is installed in a slot on the side of the GSM modem.

The card is installed with the circuit facing down. Be sure to LOCK the SIM card in place. The SIM should NOT stick out, it should be in far enough to allow the latch to close freely.



2.3 GSM signal strength and registration

The GSM signal strength and registration can be viewed by pressing the ENTER key from the HOME (Armed/Disarmed) screen.

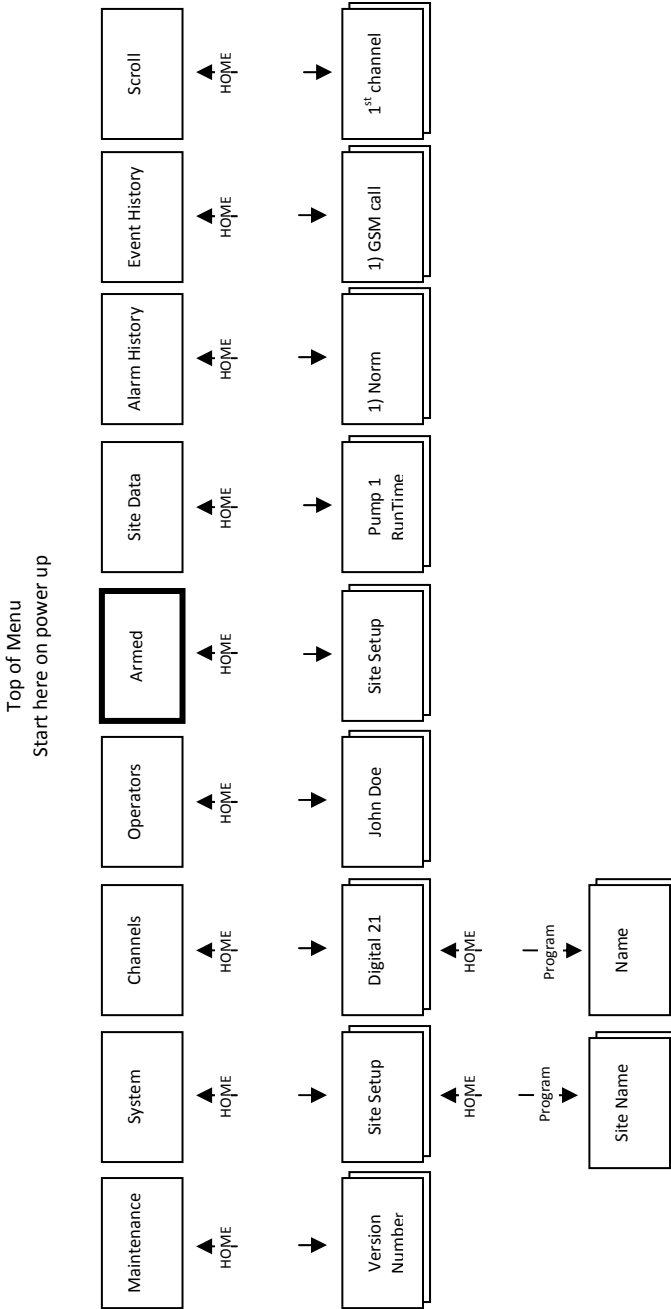


3 Navigating the Menu

Navigating the menu structure is much like a cellular phone. The arrow keys are used to navigate between options using the left and right keys and to drill down into an option by pressing the DOWN arrow (↓).

Key	Function
ENTER	Accept the current entry
←	Move to the Previous option - on this level
→	Move to the Next option - on this level
↓	Menu movement - Move Into this option In PROGRAMMING – select available option for this parameter. Hold down to cycle faster.
↑	In PROGRAMMING – select available option for this parameter. Hold down to cycle faster.
Program	Enter PROGRAMMING for this option
Control	Relay On/Off Control and Operator In/Out Control
Clear	Single press erases the previous character. Holding down erases the entire entry.
HOME	Move Up a level
Arm/Dis	Arm and Disarm the Scout from reporting to the hosted-services
A-Z	In PROGRAMMING – cycle through upper-case alphabet Hold down to cycle faster.
a-z	In PROGRAMMING – cycle through lower-case alphabet Hold down to cycle faster.
0-9	In PROGRAMMING – cycle through numbers, period and minus sign Hold down to cycle faster.
Symbols	In PROGRAMMING – cycle through available symbols. Hold down to cycle faster.
f1-f3	User-defined keys. Press and hold down while on any screen in the entire menu system to save as the function of the key. When pressed again, the Scout will display that screen and jump to that portion of the menu system.

3.2 Menu Structure

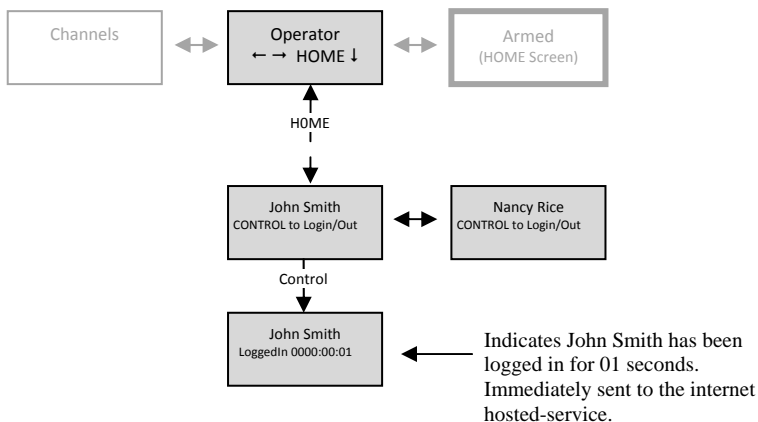


4 Operator Login/Logout

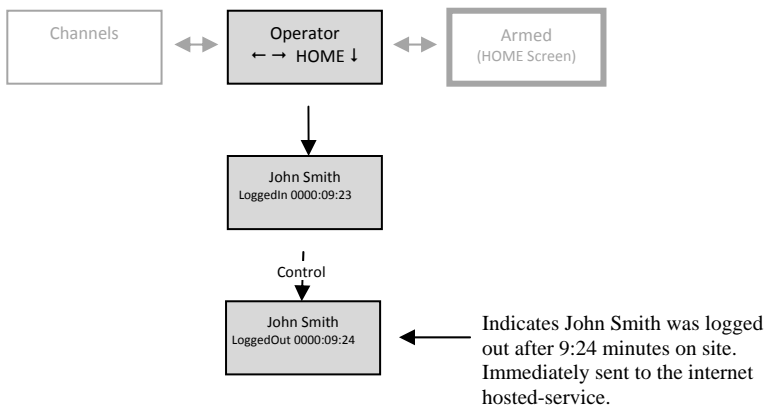
To assist in keeping track of who and when personnel are on-site, the Scout provides an Operator Login/Logout screen. This not only provides validation of on-site visits, but can act as a lone-man or man-down system as well.

The Scout immediately reports both Login and Logout actions to the internet hosted-services.

To Login when arriving on site:



To Logout when leaving a site:



5 Viewing Channel Data

There are two methods available to view channel data:

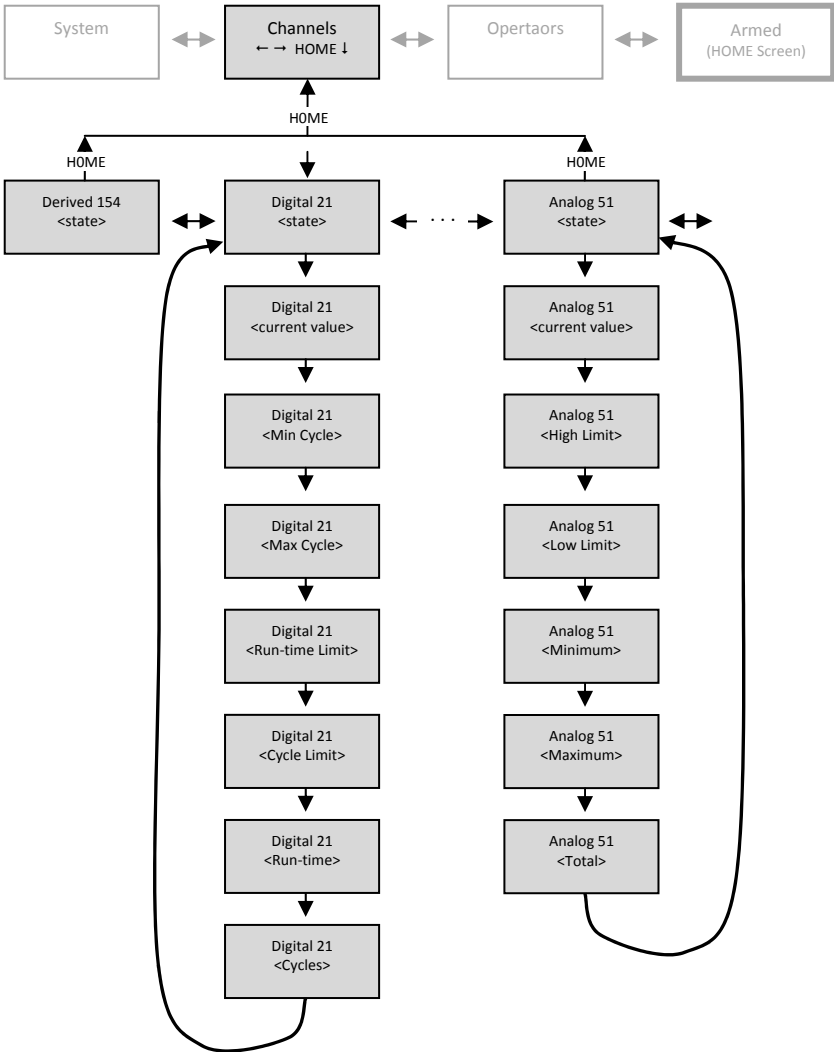
- Automatically using the Scrolling feature
- Manually selecting a desired channel

For each channel being viewed the current value is displayed first. To view more detailed information about a channel, press the DOWN arrow (↓) key.

The following shows the type of information available for each channel type that can be accessed by repeatedly pressing the DOWN arrow once viewing the desired channel. The DOWN arrow can also be used from the Scrolling screen to view more detailed information.

	Digital (system, physical and Modbus)		Analog (physical, Modbus and derived)	
1 st screen	State	Normal, Alarm	State	Normal, Low, High
2 nd screen	Value	Current value	Value	Current value
3 rd screen	Min cycle	Minimum time in non-normal state during a single cycle today.	High limit	Current setting for the high limit
4 th screen	Max cycle	Maximum time in the non-normal during a single cycle state today.	Low limit	Current setting for the low limit
5 th screen	Duration Limit	Current setting for the duration (run-time) limit.	Min	Minimum value for today.
6 th screen	Count Limit	Current setting for the count (cycle) limit.	Max	Maximum value for today
7 th screen	Duration	Total time in the non-normal state for today.	Total	Totalized value for today. Added every second.
8 th screen	Count	Total number of counts (cycles) for today.		

Continuing to press the DOWN arrow cycles the screen back to the top of the list of detail.

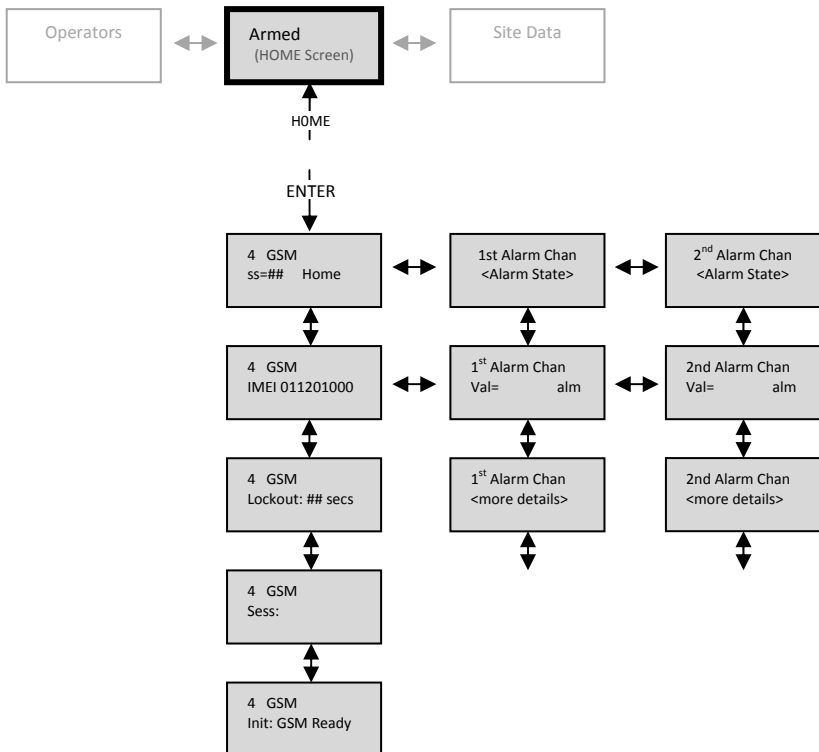


6 Viewing Alarms and GSM status

To View Alarms and GSM status, from the HOME (Armed/Disarmed) screen, press the ENTER key.

When Alarms are active, the HOME screen displays **Alms** in the bottom right-hand corner of the screen. To view active alarms, press the ENTER key. To view additional details about the alarm, continue to press the DOWN arrow (↓) key.

Press the HOME key to move back up the menus, or the UP/DOWN arrow (↑↓) keys to move between detail screens.



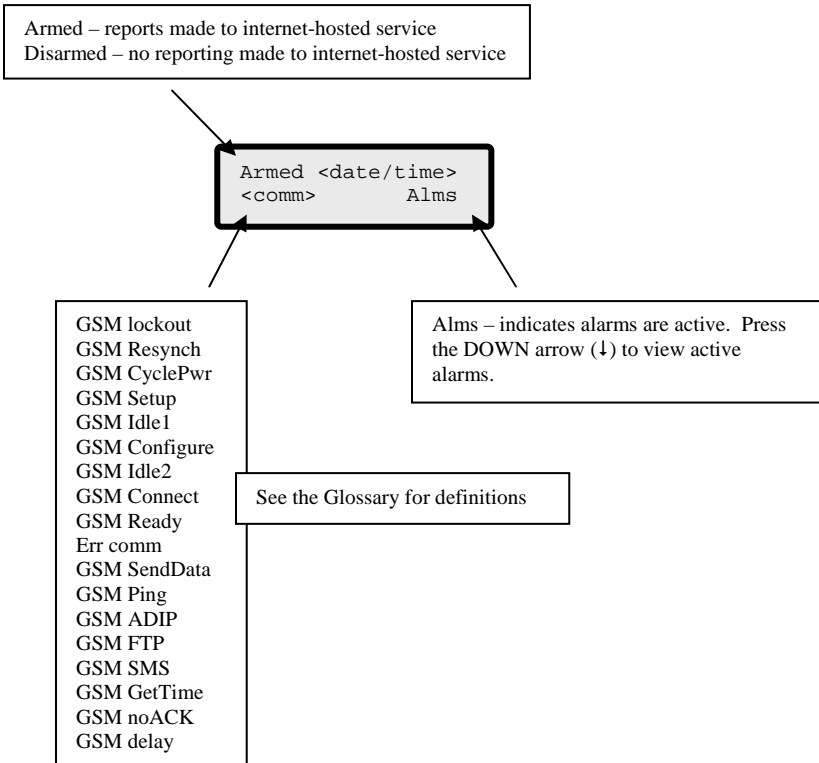
Alarm conditions include:

Alarm State		Meaning
Digital Channels (physical, system and Modbus)		
notnorm		Input is in the Not Normal state for less than the Alarm Delay time specified for this channel.
alm		Input has been in the Not Normal state for more than the Alarm Delay period.
run		A Run (duration) Alarm exists since the input has been in the Not Normal state for longer than the Duration Limit during this day.
starts		A Counts (start) Alarm exists since the input has moved from the Normal to Not Normal state more times than the Counts Limit during this day.
Analog Channels (physical, derived and Modbus)		
lo		Input has been below the Low Limit for longer than the Alarm Delay
hi		Input has been above the High Limit for longer than the Alarm Delay
fsafe		Input has been either above the High Fail Safe or below the Low Fail Safe for longer than the Alarm Delay
notnorm		Input is in the Not Normal state for less than the Alarm Delay time specified for this channel.

7 Viewing the HOME Screen

The HOME screen is reached anytime by pressing the HOME key repeatedly, or upon power up.

The HOME screen displays the current state (armed or disarmed), any alarms that are active and the state of the serial port communications.



8 Armed and Disarmed

The Scout can be manually Disarmed to prohibit reports to internet hosted-services and prohibit controls from being activated.

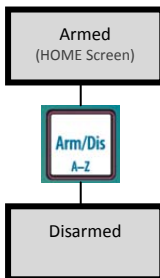
When the Scout is Armed, all channels are monitored, compared to any user-defined limits and if violated a report is immediately sent to the internet hosted-services for alarm notification reporting.

If the Scout is left Disarmed, it will automatically switch back to being Armed after 60 minutes.

The following table shows which operations are suspended when the Scout is Disarmed.

Function	Armed	Disarmed
All channels monitored	✓	✓
Monitored values compared to limits	✓	✓
Computations performed	✓	✓
Alarms created and reported	✓	✗
Relays activated automatically	✓	✗
Relays activated manually	✓	✓

To toggle between the Scout being Armed and Disarmed, press the Arm/Dis key. The HOME screen changes as shown.

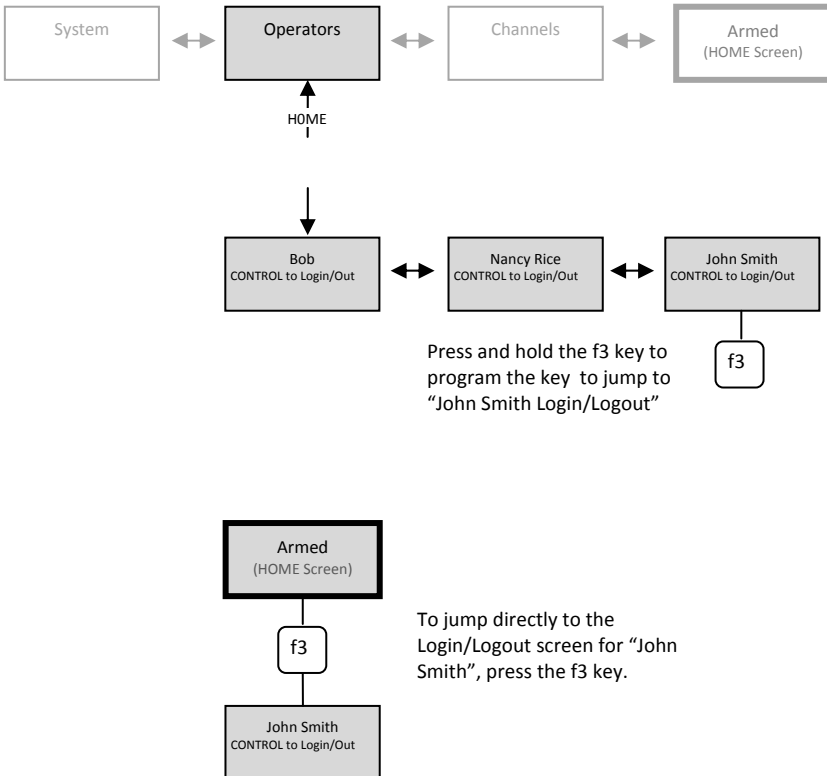


9 User-defined keys

The Scout has three (3) user-defined function keys, f1 f2 f3 that are configurable by the user as “quick-access” to any desired screen. The keys are programmed much like buttons on car radios, when the desired screen is being displayed, press and hold the desired f-key for several seconds.

To use the f-key, press it anytime to move directly to the screen programmed.

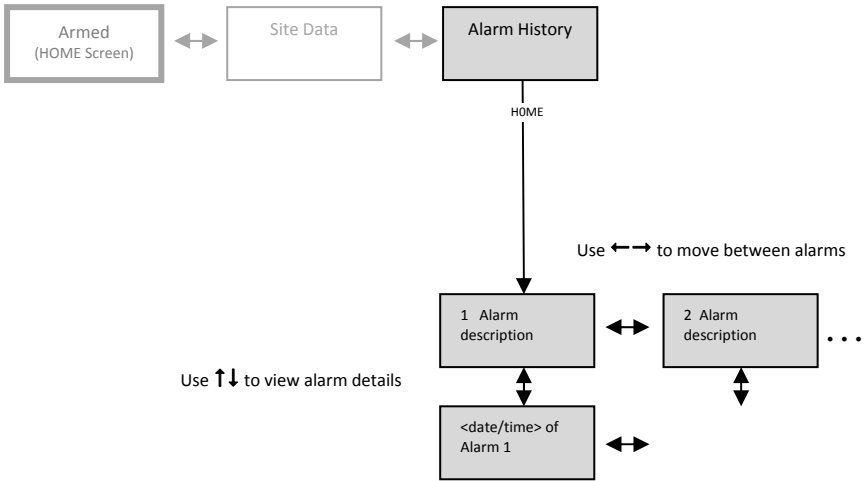
For example, if John Smith was the 3rd person on the Operator list, he could program f3 to immediately bring up the screen for him to Login.



10 Viewing Alarm History

The Scout stores the last 80 alarms that occurred in a local non-volatile log that can be viewed via the Alarm History display.

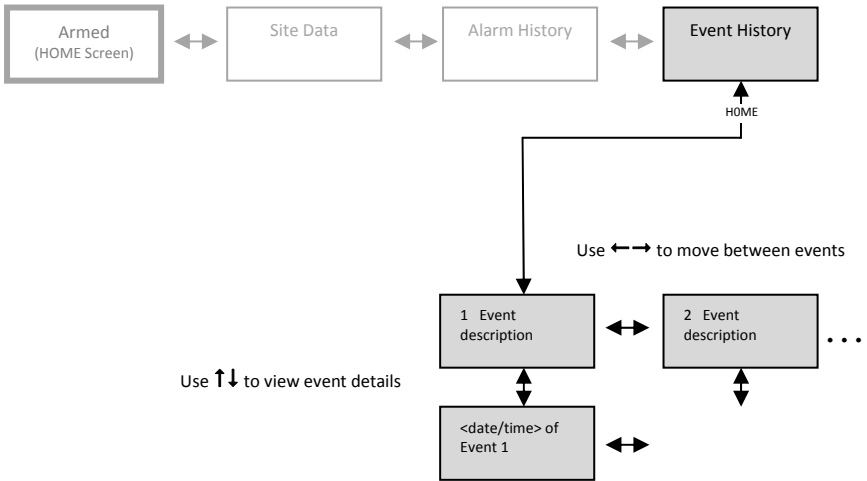
The Alarm History contains all alarm and return to normal events. This allows the operator an easy method to view the history of recent alarms to assist in determining station operation.



11 Viewing Event History

The Scout stores the last 200 events that occurred in a local non-volatile log that can be viewed via the Event History display.

The Event History contains details on GSM communication, power up and down, and reasons for records being sent to the internet hosted-services.



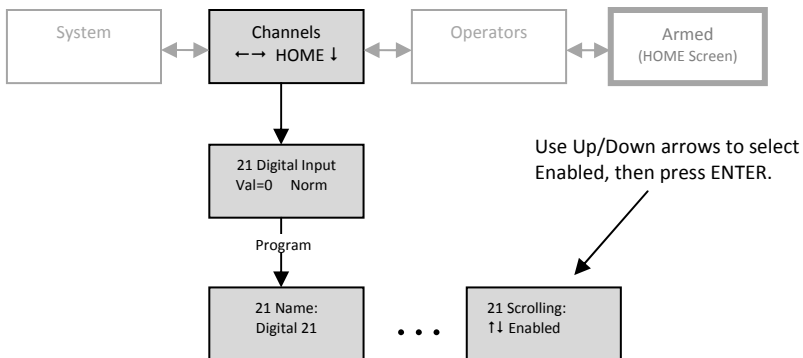
12 Scrolling Channel Status

The Scout has a Scrolling Channel Status screen feature that allows the user to select any channels to be automatically cycled providing the viewer with a quick method to view the status of channels without having to select any functions.

Channels are selected to appear in the Scrolling Channel Status (Scrolling) screen when programming a Channel.

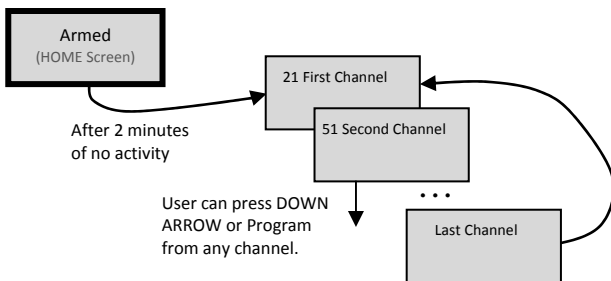
Once channels are selected and there has been no keypad presses for 2 minutes, the Scout will automatically start displaying the current status of each channel in order.

12.1 Program a channel to be included in the Scrolling screens



12.2 Scrolled Channels

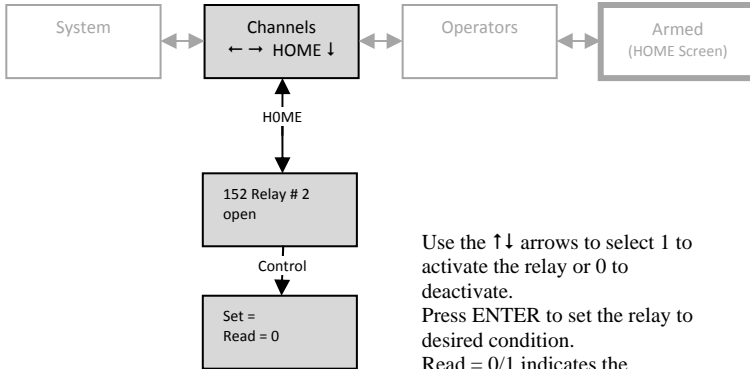
After 2 minutes on the HOME screen without any key pressed, the Scrolling screen is automatically displayed.



13 Manually Controlling Relays

The Scout can control up to 8 Modbus Relays (coils). Once these channels (151-158) have been programmed these can be manually controlled by pressing the Control key while viewing the desired channel.

The channel can be viewed from either the Scroll display or from the Channels menu.



Use the ↑↓ arrows to select 1 to activate the relay or 0 to deactivate.
Press ENTER to set the relay to desired condition.
Read = 0/1 indicates the current state of the relay.

14 Programming from the keypad

In addition to being programmable from the internet hosted-services system, the Scout can be programmed from the front panel by pressing the keypad to access the various portions of the system.

To enter into programming, move to the Menu option desired and press the Program key. For example, to program a channel,

- move to the Menu option “Channels”,
- press the DOWN arrow (↓) to move into the actual channels,
- use the LEFT (←) and RIGHT (→) arrow keys to select the desired channel,
- press the Program key to see the available program parameters.

14.1 How to Read the Program Screen

```
22 Mode
↑↓ Status Only
```

Channel number and Parameter to view/set

Current setting. e.g. Status Only

Use arrows to cycle through available settings.

Hold arrow key down to cycle faster.
Press ENTER key to save the setting.

```
51 Alarm Delay
0-65535: 3
```

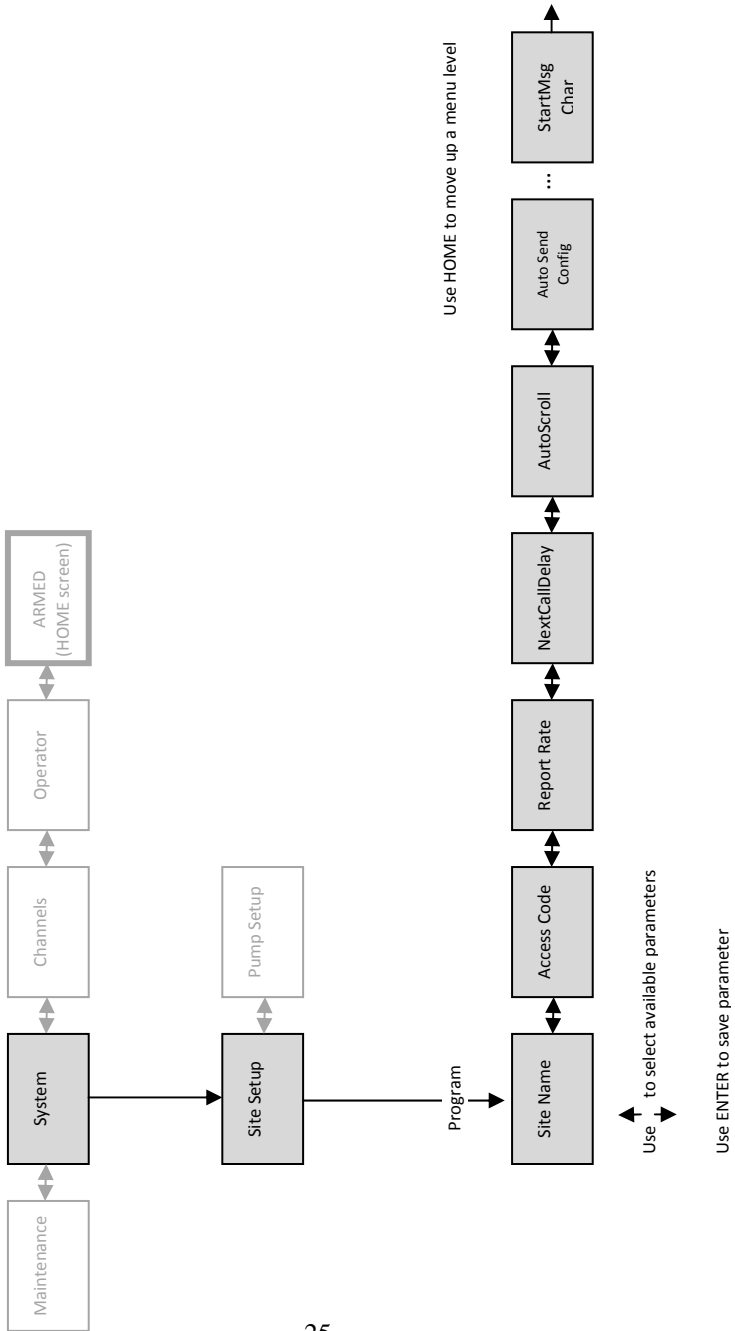
Channel number and Parameter to view/set

Current value of the parameter.

Range of valid values.
e.g. Alarm Delay is currently set to 3 seconds

Use A-Z, a-z, 0-9 and Symbol keys to enter values.

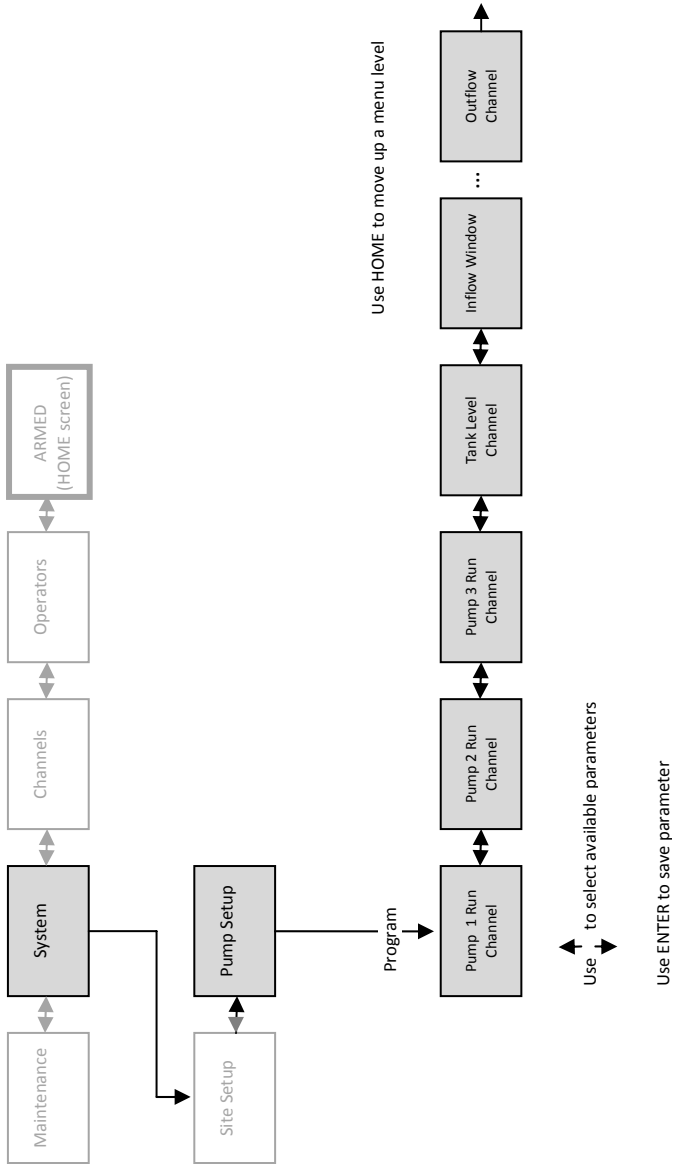
14.2 Site Setup



The Site Setup section allows the user to program the following:

Site Name	Name of this specific site. Used to uniquely identify this site to the internet hosted-services system.
Access Code	A 4 digit value to limit access to all programming and control functions.
Report Rate	1-1440 minutes Frequency of the Periodic Report to the hosted-services.
Next Call Delay	5– 3600 seconds Amount of time to wait between successive calls to the hosted services. Used to minimize the network traffic.
Auto Scroll	Selections: disable, enable Turn on or off the scrolling display that automatically cycles through the user-selected channels after no keypad activity for 60-seconds.
Auto Send Configuration	Selections: disable, enable Automatically sends the entire Scout configuration to the internet hosted-services system whenever a change is made to any settings. The configuration is sent 15 minutes after the last change is made. This enables the internet hosted-services system to always be in sync with the Scout.
Time Zone	Selections: GMT, Atlantic, Eastern, Central, Mountain, Pacific, Alaska, Hawaii
Daylight Saving	Selections: disable, enable Scout automatically adjusts its time for daylight savings. Only affects the local display, not the date/time reported to the internet hosted-services.
Set Date/Time	Manual method to enter the date/time. Typically not used as the Scout will automatically set the time nightly from time servers.
Dampen ADC	Selections: disable, enable Averages the analog input readings on the physical input channels 51-54 to smooth out noisy signals.
Add Checksum	Selections: disable, enable Adds the checksum to the end of all reports sent to the internet hosted-services system
Delimiter Character	Field delimiter character used in the protocol between the Scout and the internet hosted-services. Entered in decimal.
Start Msg Character	Start Message character used in the protocol between the Scout and the internet hosted-services. Entered in decimal.

14.3 Pump Setup



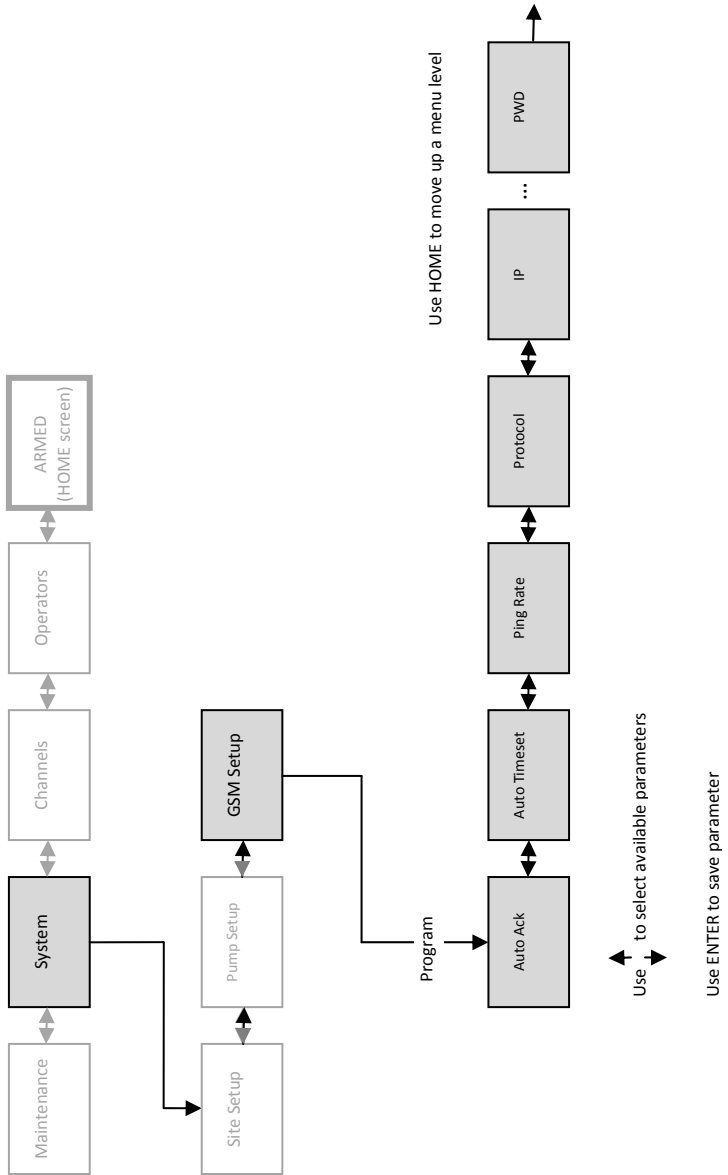
14.3.1 Pump Parameters

For the Scout to compute volumetric inflow and outflow, the Pump Setup must be configured.

The Pump Setup section allows the user to program the following:

Pump 1 Run Channel Pump 2 Run Channel Pump 3 Run Channel	The Channel number that is used to monitor the run-time for each of up to 3 pumps. These are typically channels 21, 22 and 23.
Tank Level Channel	The Channel number that monitors the Tank Level. This is typically physical analog channel 51, but could be a Modbus channel.
Inflow Window	The inflow window specifies an amount of time the Scout monitors the inflow to determine the Inflow Rate that is used in the volumetric calculation. This time must be less than the amount of time between turning all pumps off and turning a pump back on. Specified in seconds from 15 to 300.
Tank Section Area	Surface area of the tank in square feet.
Inflow Channel	The Channel number to receive the derived (computed) Inflow Rate. This channel is typically 171.
Outflow Channel	The Channel number to receive the derived (computed) Outflow volume. This channel is typically 172.

14.4 GSM Setup



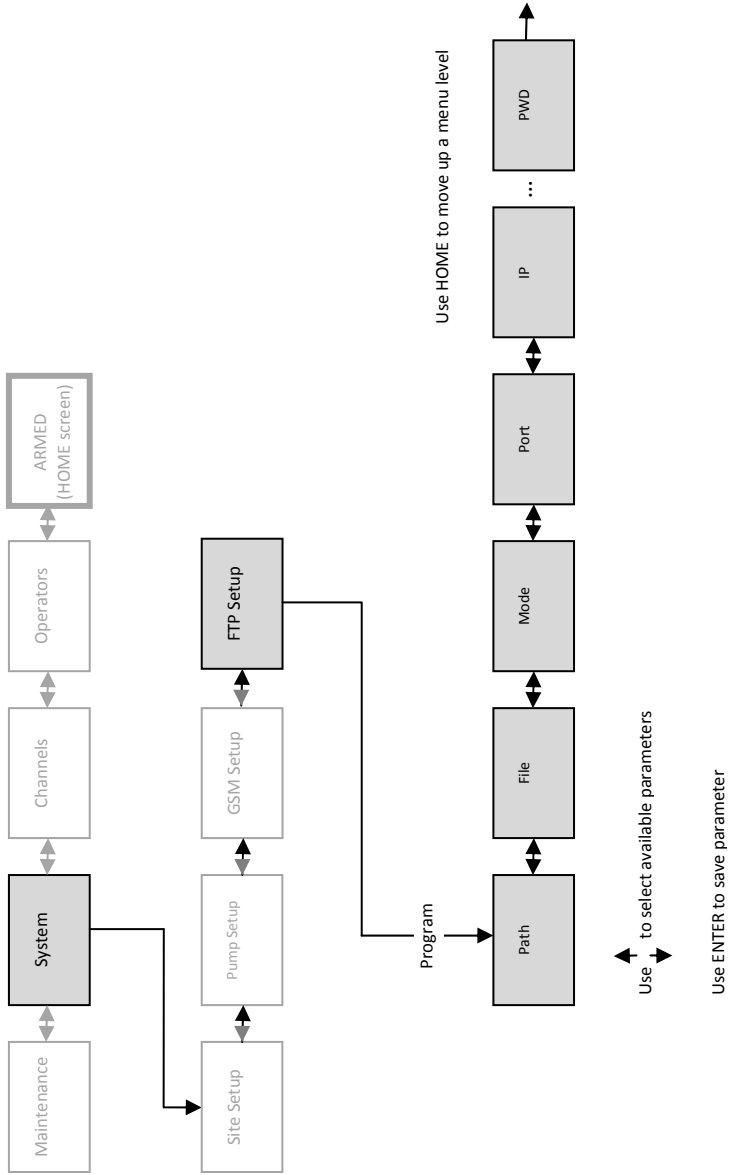
14.4.1 GSM Parameters

The GSM Setup configures communication from the Scout to the internet hosted-services via the GSM network.

The GSM Setup section allows the user to program the following:

AutoACK	Evert report is to be acknowledged from the internet hosted-services. Selections: none, demand, auto
Auto Timeset	Time is automatically set via timeservers. Selections: disabled, enabled
Ping Rate	Frequency to send a Ping packet. 0 – 1440 minutes
Protocol	Selections: UDP, TCP
Port	0-65535
IP	DNS or IP number
Service Provider	Selections: Kore, TMobile, ATT
APN	Enter the APN for the Service Provider
USR	Enter a username if needed
PWD	Enter a password if needed

14.5 FTP Setup



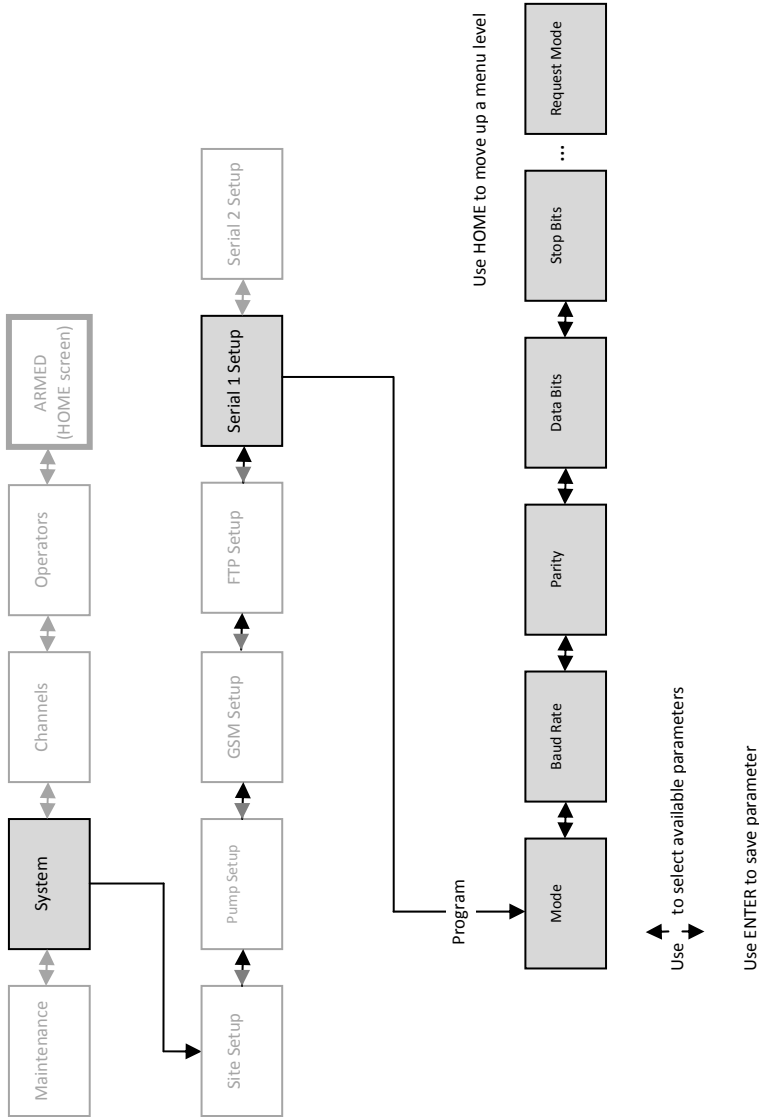
14.5.1 FTP Parameters

The FTP Setup configures the Scout to send and receive files via FTP.

The FTP Setup section allows the user to program the following:

Path	Path to a folder/directory on the FTP server to get files from or send files to. For example, <code>/</code> specifies the root directory
File	Name of the file to get from the FTP server or send to the FTP server.
Mode	Indicates if the FTP server is a passive or active site. Typically if the FTP site is behind a firewall, it is an active site. Selections: passive, active
Port	FTP port to use. Typically 21 for FTP sites.
IP	DNS or IP number
USR	Username of FTP account
PWD	Password of FTP account

14.6 Serial ports 1 & 2 Setup



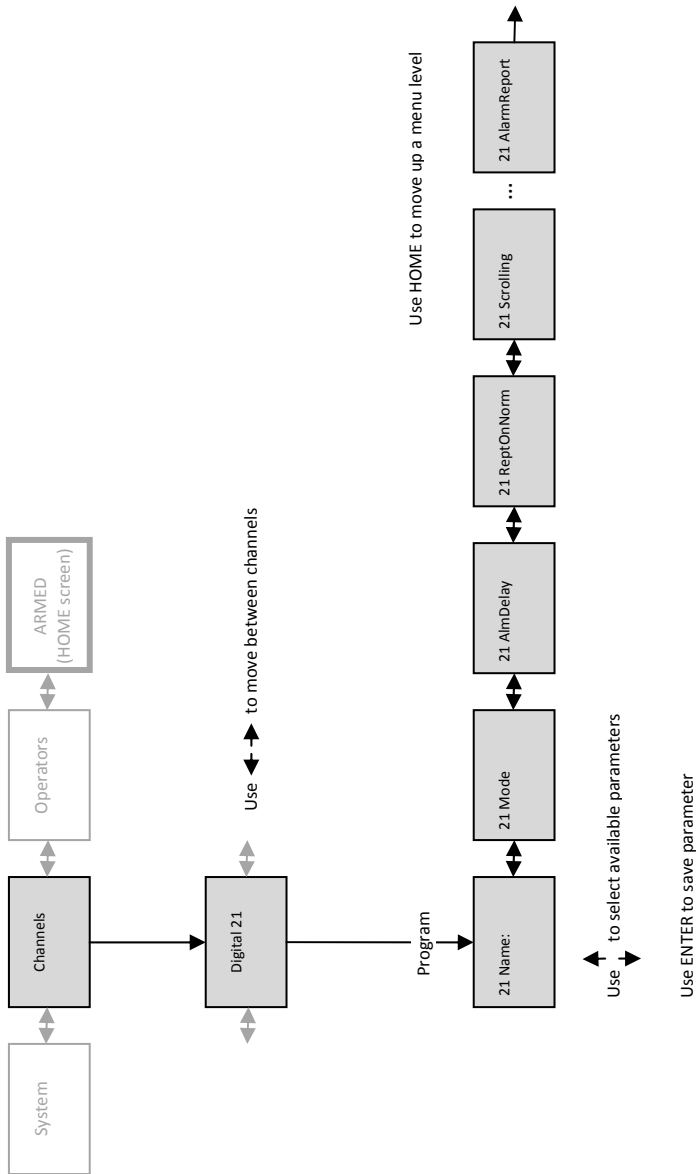
14.6.1 Serial Port Parameters

The Serial Port Setup configures the 2 serial ports of the Scout for use as Modbus, GSM or Debug.

The Serial Port Setup section allows the user to program the following:

Mode	Serial Port 1 (DB9) is configured as GSM as shipped from the factory. Serial Port 2 (header on printed circuit board) is configured as None as shipped from the factory. Selections: None, GSM, Debug, Master
Baud Rate	Selections: 1200 – 115200
Parity	Selections: None, Even or Odd
Data Bits	Selections: 7 or 8
Stop Bits	Selections: 1 or 2
Max Idle	Amount of time the Scout waits for the next character to be received after receiving a character. Typically used for Modbus applications. 5-4000 milliseconds
Response Timeout	Maximum amount of time the Scout waits for a response after issuing a command. 100-10000 milliseconds
Scan Rate	Frequency the Scout requests data via Modbus. 1-60 seconds.
Request Mode	Specifies is the Scout should request each Modbus register one at a time (single) or request a block or series of registers in each message from the Modbus slave devices back to the Scout (block). Selections: single, block

14.7 Channel Setup



14.7.1 System Channel Parameters

The Channel Setup section allows the user to configure the following types of channels:

- Digital (physical)
- Modbus digital input
- Modbus coil output
- System
- Analog (physical)
- Modbus analog
- Derived

The Channel Setup section allows the user to program the following:

System – channels 1-5	
Name	Label to identify this channel 1-Power, 2-Low battery, 3-Low Low battery, 4-GSM, 5-Comm
Mode	Selections: disabled, status only, call on violation
Alarm Delay	Amount of time input must be in the non-Normal state before it goes into alarm. 0-65535 seconds
Report on return to Normal	Send report to the internet hosted-services when the input returns to Normal state Selections: disabled, enabled
Scrolling	Include channel in the automatic Scrolling display. Selections: not included, included
Alarm relay channel	Relay to activate when channel goes into alarm. Selections: Channel 151-158.
Periodic reports End-of-Day reports Alarm reports	Selections: not included in report current value included in report current value + totals (counts and duration) current value + totals + max/min

14.7.2 Digital Input Parameters

Digital Input (physical) – channels 21-28	
Name	Label to identify this channel
Mode	Selections: disabled, status only, call on violation
Normal State	normally open, normally closed NOTE: <i>An alarm occurs when the input transitions out of the 'normal' state.</i>
Alarm Delay	Amount of time input must be in the non-Normal state before it goes into alarm. 0-65535 seconds
Report on return to Normal	Send report to the internet hosted-services when the input returns to Normal state Selections: disabled, enabled
Scrolling	Include channel in the automatic Scrolling display. Selections: not included, included
Counts limit	An alarm limit on the number of times that the channel has transitioned to the non-Normal condition.
Duration limit	An alarm limit on the total time that the channel is in the non-Normal condition. Specified in seconds.
Alarm relay channel	Relay to activate when channel goes into alarm. Selections: Channel 151-158.
Periodic reports End-of-Day reports Alarm reports	Selections: not included in report current value included in report current value + totals (counts and duration) current value + totals + max/min

14.7.3 Analog Input Parameters

Analog Input (physical) – channels 51-54																																											
Name	Label to identify this channel																																										
Mode	Selections: disabled, status only, call on violation																																										
Alarm Delay	Amount of time input must be in the non-Normal state before it goes into alarm. 0-65535 seconds																																										
Report on return to Normal	Send report to the internet hosted-services when the input returns to Normal state Selections: disabled, enabled																																										
Scrolling	Include channel in the automatic Scrolling display. Selections: not included, included																																										
Display precision	Number of digits to the right of the decimal. 0-6																																										
Engineering units	<table> <tbody> <tr> <td>0</td> <td>none</td> <td>7</td> <td>rpm</td> <td>13</td> <td>kmeters</td> </tr> <tr> <td>1</td> <td>pct</td> <td>8</td> <td>psi</td> <td>14</td> <td>liters</td> </tr> <tr> <td>2</td> <td>ppm</td> <td>9</td> <td>degC</td> <td>15</td> <td>kliters</td> </tr> <tr> <td>3</td> <td>gals</td> <td>10</td> <td>degF</td> <td>16</td> <td>grams</td> </tr> <tr> <td>4</td> <td>gpm</td> <td>11</td> <td>inches</td> <td>17</td> <td>kg</td> </tr> <tr> <td>5</td> <td>gph</td> <td>12</td> <td>meters</td> <td>18</td> <td>lbs</td> </tr> <tr> <td>6</td> <td>ft</td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	0	none	7	rpm	13	kmeters	1	pct	8	psi	14	liters	2	ppm	9	degC	15	kliters	3	gals	10	degF	16	grams	4	gpm	11	inches	17	kg	5	gph	12	meters	18	lbs	6	ft				
0	none	7	rpm	13	kmeters																																						
1	pct	8	psi	14	liters																																						
2	ppm	9	degC	15	kliters																																						
3	gals	10	degF	16	grams																																						
4	gpm	11	inches	17	kg																																						
5	gph	12	meters	18	lbs																																						
6	ft																																										
Input type	Selections: 0-5V 1-5V 0-20ma 4-20ma NOTE: Use a precision resistor for current inputs.																																										
Zero scale	The engineering unit value at the lowest input level. For example, for a 4-20ma signal, this is the engineering unit value at 4ma with the specified decimal point position.																																										
Full scale	The engineering unit value at the highest input level.																																										
Low limit	If the current reading is below the Low Limit or above the High Limit for the Alarm Delay period, the channel initiates an alarm report and/or relay activation.																																										
High limit																																											
Low fail safe	If the current reading is below Low Fail Safe or above the High Fail Safe, the channel is NOT in alarm.																																										
High fail safe																																											
Low alarm relay	Relay to activate when Low Limit is violated, 151-158																																										
High alarm relay	Relay to activate when High Limit is violated, 151-158																																										
Periodic reports End-of-Day reports Alarm reports	Selections: not included in report current value included in report current value + totals (totalizer) current value + totals + max/min																																										

14.7.4 Modbus Digital Input Parameters

Modbus Digital Input – channels 91-98	
Name	Label to identify this channel
Slave ID	ID of slave device for this channel. 0-247
Register type	Selections: RdCoil or RdStatus
Register number	0-xxxxxx
Mode	Selections: disabled, status only, call on violation
Normal State	Selections: normally open, normally closed NOTE: <i>An alarm occurs when the input transitions out of the 'normal' state.</i>
Alarm Delay	Amount of time input must be in the non-Normal state before it goes into alarm. 0-65535 seconds
Report on return to Normal	Send report to the internet hosted-services when input returns to Normal state Selections: disabled, enabled
Scrolling	Include channel in the automatic Scrolling display. Selections: not included, included
Alarm relay channel	Relay to activate when channel goes into alarm. Selections: Channel 151-158.
Periodic reports End-of-Day reports Alarm reports	Selections: not included in report current value included in report current value + totals (totalizer) current value + totals + max/min

14.7.5 Modbus Analog Input Parameters

Modbus Analog Input– channels 121-128																					
Name	Label to identify this channel																				
Slave ID	ID of slave device for this channel. 0-247																				
Register type	Selections: RdHolding or RdInput																				
Register number	0-xxxxxx																				
Mode	Selections: disabled, status only, call on violation																				
Alarm Delay	Amount of time input must be in the non-Normal state before it goes into alarm. 0-65535 seconds																				
Report on return to Normal	Send report to the internet hosted-services when the input returns to the Normal state. Selections: disabled, enabled																				
Scrolling	Include channel in the automatic Scrolling display. Selections: not included, included																				
Display precision	Number of digits to the right of the decimal. 0-6																				
Engineering units	<table> <tr> <td>none</td> <td>gpm</td> <td>psi</td> <td>meters</td> <td>grams</td> </tr> <tr> <td>pct</td> <td>gph</td> <td>degC</td> <td>kmeters</td> <td>kg</td> </tr> <tr> <td>ppm</td> <td>ft</td> <td>degF</td> <td>liters</td> <td>lbs</td> </tr> <tr> <td>gals</td> <td>rpm</td> <td>inches</td> <td>kliters</td> <td></td> </tr> </table>	none	gpm	psi	meters	grams	pct	gph	degC	kmeters	kg	ppm	ft	degF	liters	lbs	gals	rpm	inches	kliters	
none	gpm	psi	meters	grams																	
pct	gph	degC	kmeters	kg																	
ppm	ft	degF	liters	lbs																	
gals	rpm	inches	kliters																		
Register Signed	Selections: 16-bit signed, 16-bit unsigned Defines how the value read by the Scout is interpreted.																				
Register Scaled/Unscaled	Unscaled - the value being read is in the desired units Scaled - the value being read is in counts, then it can be scaled to engineering units in the Scout, set to. (Scaling uses the Zero and Full scale parameters)																				
Zero scale	The engineering unit value at the lowest input level. For example, for a 4-20ma signal, this is the engineering unit value at 4ma with the specified decimal point position.																				
Full scale	The engineering unit value at the highest input level.																				
Low limit	If the current reading is below the Low Limit or above the High Limit for the Alarm Delay period, the channel initiates an alarm report and/or relay activation.																				
High limit																					
Low alarm relay	Relay to activate when Low Limit is violated, 151-158																				
High alarm relay	Relay to activate when High Limit is violated, 151-158																				
Periodic reports End-of-Day reports Alarm reports	Selections: not included in report current value included in report current value + totals (totalizer) current value + totals + max/min																				

14.7.6 Modbus Digital Output Parameters

Modbus Digital Output – channels 151-158	
Name	Label to identify this channel
Slave ID	ID of slave device for this channel. 0-247
Register type	WrCoil
Register number	0-xxxxxx
Mode	Selections: disabled, status only (enabled)
Pulse Duration	Number of seconds to keep the relay activated. 0 – 65535, 0 means not automatically de-activated
Scrolling	Include channel in the automatic Scrolling display. Selections: not included, included
Periodic reports End-of-Day reports Alarm reports	Selections: not included in report current value included in report current value + totals (counts and duration) current value + totals + max/min

14.7.7 Derived Analog Parameters

Derived analog – channels 171-174	
Name	Label to identify this channel
Mode	Selections: disabled, status only, call on violation
Alarm Delay	Amount of time input must be in the non-Normal state before it goes into alarm. 0-65535 seconds
Report on return to Normal	Send report to the internet hosted-services when the input returns to the Normal state Selections: disabled, enabled
Scrolling	Include channel in the automatic Scrolling display. Selections: not included, included
Display resolution	Number of digits to the right of the decimal. 0-6
Engineering units	Selections: none gpm psi meters grams pct gph degC kmeters kg ppm ft degF liters lbs gals rpm inches kliters
Low limit	If the current reading is below the Low Limit or above the High Limit for the Alarm Delay period, the channel initiates an alarm report and/or relay activation.
High limit	
Low alarm relay	Relay to activate when Low Limit is violated, 151-158
High alarm relay	Relay to activate when High Limit is violated, 151-158
Periodic reports End-of-Day reports Alarm reports	Selections: not included in report current value included in report current value + totals (totalized values) current value + totals + max/min

15 Receiving SMS commands

15.1 Overview

The Scout can receive and act on SMS commands to perform several functions. SMS commands are rarely used as the internet hosted-services system allows for all of these operations. However, if the user does not have access to the internet, issuing these commands via a cell-phone can prove to be very useful.

15.2 SMS Commands

SMS command format	Parameter description	Function
<CNFG(x, <i, >y, zzzz)>	x = line type code <i, > = optional index value y = field type code zzzz = field value	See Making Configuration Changes Page 45 for details on valid values.
<RELY(cnum, state)>	cnum = channel # state = 0 (de-activate) or 1 (activate)	Activates or deactivates the specified relay (Modbus Digital Output, channel 151-158)

SMS command format	Parameter description	Function
<ACTN(x)>	x = action number	1 Send standard report to server after sending ACK to sender
		2 Send status report via SMS to mobile device that sent this ACTN command.
		3 Reset modem after sending ACK to sender
		4 Clear store and forward buffer
		5 Clear oldest record in store and forward buffer
		6 Set Scout to Armed
		7 Set Scout to Disarmed
		8 Send End-Of-Day report to server after sending ACK to sender. Daily totals are not reset.
		10 Get firmware update via current FTP settings
		12 Get configuration file via current FTP settings

15.3 Making Configuration Changes

Configuration changes are performed by entering a Configuration Line either through the Debug port, via SMS or through an always-on over-the-air (OTA) connection.

Any configuration changes made are stored in non-volatile memory.

The format for the Configuration Line is the same regardless of the method being used.

The Configuration Line format via the Debug Menu is:

```
x, <i, >y, zzzz, y, zzzz, y, zzzz <CR> <LF>
```

Example, setting analog channel 51, low limit=4.0 high limit=21.2:
9, 51, 15, 4.0, 16, 21.2 <CR> <LF>

The Configuration Line format via SMS is:

```
<cnfg(x, <i, >y, zzzz, y, zzzz, y, zzzz)
```

Example, setting analog channel 51, low limit=4.0 high limit=21.2:
<cnfg(9, 51, 15, 4.0, 16, 21.2)>

The Configuration Line format via OTA is:

```
&& | 258, x, <i, >y, zzzz, y, zzzz, y, zzzz | <CR> <LF>
```

Example, setting analog channel 51, low limit=4.0 high limit=21.2:
&& | 258, 9, 51, 15, 4.0, 16, 21.2 | <cr> <lf>

Where:

x	Line type code
<i , >	Optional index value (function of the line type code) e.g. Channel number, Port number, Geofence number
Y	Field type code
zzzz	Field value
<CR><LF>	Line terminator (use one or both)

Line Type Codes		
1	Site	System wide settings
2	Options	Optional settings
3	GSM	GSM communication settings
4	FTP	FTP settings
9	Channels	Physical digital and analog and Modbus channel settings
12	Reports	Updates to the web server
20	Pump	Settings to perform volumetric inflow and outflow calculations
21	Operator	List of operators that can be onsite

Field Type Codes for Site (1)		
1	ID (name)	30 character unique site name
2	Access code (acc)	4 character value, -001 means none assigned
3	Keypad sensitivity (ksens)	1-5
4	Daylight Savings enabled (dst)	0 – not enabled, 1 - enabled
5	Timezone (tzone)	0 – GMT, 1 – Atlantic, 2 – Eastern, 3 – Central, 4 – Mountain, 5 – Pacific, 6 – Alaska, 7 - Hawaii
6	Call Delay (calldly)	0-32000 seconds
7	Report Rate (reprate)	1-1440 minutes
8	Delimiter (delim)	0-255, decimal value to specify an ASCII character to be used as the delimiter by the Scout Protocol. Defaults to 58.
9	Start Message Character (start)	0 – no start character used 1-255 – insert two (2) of this character at the beginning of every report when using the Scout Protocol. Defaults to 38.
<p>Example:</p> <p>Via debug menu: 1,1,MySite,7,120<CR><LF></p> <p>Via OTA: && 258,1,1,MySite,7,120 </p> <p>Via SMS: <cnfg(1,1,MySite,7,120)</p> <p>Name the site “MySite” and report every 120 minutes.</p>		

Field Type Codes for Options (2)		
3	Dampen analog input values (damp)	1 – enable, 0 - disable
4	Allow automatic scrolling of the status of user-selected channels (scroll)	1 – enable, 0 – disable
8	Add Msg Checksum (checksum)	1 – enable, 0 – disable
9	Automatically send the configuration to the backend whenever it changes (sendcfg)	1 – enable, 0 – disable
<p>Example:</p> <p>Via Debug Menu: 2, 8, 0<CR><LF></p> <p>Via SMS: <cnfg(2, 8, 0)></p> <p>Via OTA: && 258, 2, 8, 0 </p> <p>options, checksum, 0 = checksum option set to disabled</p>		

Field Type Codes for GSM (3)		
1	Wait on ACK from server when sending any Report (ack)	1 – ack required for each Report sent. If not received, record is stored in store and forward buffer. 0 – no ack is expected
2	Auto set of time from Time Servers (settime)	1 – set real-time clock automatically on power up and at midnight 0 – do not set time
3	PING rate (ping)	In minutes
4	UDP or TCP protocol (prot)	1 – TCP, 0 – UDP
5	UDP or TCP port number (port)	
6	UDP or TCP (ip)	127 characters – specify IP or DNS address. e.g www.myip.com
7	Service provider ID (sp)	When set, the APN, Username and Password are automatically filled. 0 – Tmobile, 1 – ATT, 2 – Cingular, 3 - Kore
8	APN (apn)	63 characters
9	Username (uname)	63 characters
10	Password (pword)	63 characters
<p>Example:</p> <p>Via Debug Menu: 3,1,1,4,0,5,2291,6,www.ourserver.com<CR><LF></p> <p>Via SMS: <cnfg(3,1,1,4,0,5,2291,6,www.ourserver.com)></p> <p>GSM, Ack enabled, UDP, port 2291, IP is www.ourserver.com</p>		

Field Type Codes for FTP (4)		
1	Get filename (fname)	63 characters e.g. scout-hdr.bin
2	Get path on server (path)	63 characters e.g. ./ Would be the top or root directory.
3	FTP mode (mode)	1 – active, 0 - passive
4	Server port number (port)	Typically 21
5	Server IP (ip)	127 characters IP or DNS address e.g. 11.22.333.44
6	Login username (uname)	63 characters
7	Login password (pword)	63 characters
<p>Example:</p> <p>Via debug Menu:</p> <pre>4,1,new_config.cfg,2,./liftstations/, 5,111.22.333.44,6,ftpuser,7,secret<CR><LF></pre> <p>Settings to get a new configuration file “new_config.cfg” from the folder ./liftstations on ftp server 111.22.333.44 using the specified username and password</p> <p>NOTE: Once the port, IP, username and password have been sent, those parameters do not need to be sent again unless they need to change.</p>		

Field Type Codes for Physical Analog Channels (9) (use optional <i>, to specify channel number 51-54)		
1	Channel name (name)	30 characters
7	Mode (mode)	0 – disabled, 1 – status only, 2 – report on violations
8	Alarm delay (almdly)	0-65535 seconds
9	Report on return to normal (repnorm)	0 – disabled 1 – enabled, report when the channel returns to the normal condition
10	Report Flags (repflgs)	Reserved
11	Display Precision (prec)	# of digits to the right of the decimal, 0-6
12	Input Type (type)	0 – 0-5V 1 = 1-5V 2 = 0-20ma 3 = 4-20ma
13	Zero (zscale)	+/- 999999.99999
14	Full Scale (fscale)	+/- 999999.99999
15	Low alarm limit (loalm)	+/- 999999.99999
16	High alarm limit (hialm)	+/- 999999.99999
17	Low fail safe (lofs)	+/- 999999.99999
18	High fail safe (hifs)	+/- 999999.99999
19	Low alarm relay (lorly)	151-158, channel of a relay
20	High alarm relay (hirly)	151-158, channel of a relay
<p>Example:</p> <p>Via debug menu: 9,51,1,Tank Level (feet),5,1,6,15,9,1,12,3, 13,0.0,14,23.1,16,8.5<CR><LF></p> <p>Via SMS: <cnfg(9,51,1,Tank Level (feet),5,1,6,15,9,1,12,3, 13,0.0,14,23.1,16,8.5)></p> <p>Via OTA: && 258,9,51,1,Tank Level (feet),5,1,6,15,9,1,12,3, 13,0.0,14,23.1,16,8.5 </p> <p>Channel 51., name is Tank Level (feet), 4-20ma input, 0 to 23.1, high level alarm at 8.5</p>		

Field Type Codes for Physical Digital Channels (9) (use optional <i>, to specify channel number 21-28)		
1	Channel name (name)	30 characters
5	Mode (mode)	0 – disabled, 1 – status only, 2 – report on violations
6	Alarm delay (almdly)	0-65535 seconds
7	Report on return to normal (repnorm)	0 – disabled 1 – enabled, report when the channel returns to the normal condition
8	Report Flags (repflgs)	Reserved
9	Normal state (norm)	0 – normally open, 1 – normally closed
10	Starts limit (strtlm)	0-999999
11	Run Limit (durlim)	0-999999
12	Alarm Relay (almrly)	Channel number of relay to control when in alarm (0,151-158)
<p>Example:</p> <p>Via debug menu: 9,24,1,Pump 2 Fail,9,1,5,2,6,15<CR><LF></p> <p>Via SMS: <cnfg(9,24,1,Pump 2 Fail,9,1,5,2,6,15)></p> <p>Channels 24, name is Pump 2 Fail, normally closed, report alarms, alarm delay is 15 seconds</p>		

Field Type Codes for Modbus Channels (9) Read Coil and Read Input Status only (use optional <i>, to specify channel number 91-106)		
1	Channel name (name)	30 characters
2	Slave ID (slave)	0-247, 0 if disabled 1-247 for Modbus Slave ID
3	Function code (fcode)	0-5 0 – Null 1 – Read Coil 2 – Read Status
4	Register number (regnum)	0-9999
5	Mode (mode)	0 – disabled, 1 – status only, 2 – report on violations
6	Alarm delay (almdly)	0-65535 seconds
7	Report on return to normal (repnorm)	0 – disabled 1 – enabled, report when the channel returns to the normal condition
9	Normal state (norm)	0 – normally open, 1 – normally closed
12	Alarm Relay (almrly)	Channel number of relay to control when in alarm (0,151-158)
<p>Example:</p> <p>Via debug menu: 9,91,2,101,3,1,4,21,5,2,6,15,9,0</p> <p>Via SMS: <cnig(9,91,2,101,3,1,4,21,5,2,6,15,9,0)></p> <p>Modbus channel 91, read coil, register number 21, mode is report violations, Alarm delay is 15 seconds and the channel state is normally open.</p>		

Field Type Codes for Modbus Channels (9) Read Holding and Read Input only (use optional <i>, to specify channel number 121-136)		
1	Channel name (name)	30 characters
2	Slave ID (slave)	0-247 0 - disabled
3	Function code (fcode)	0 – Null 3 – Read Holding 4 – Read Input
4	Register number (regnum)	0-9999
5	Modbus value signed/unsigned (signed)	0 – unsigned, 1 - signed
6	Modbus register scaled (scaled)	0 – unscaled, 1 - scaled (if scaled, scales the 0-65535 value to the zero and full scale specified)
7	Mode (mode)	0 – disabled, 1 – status only, 2 – report on violations
8	Alarm delay (almdly)	0-65535 seconds
9	Report on return to normal (repnorm)	0 – disabled 1 – enabled, report when the channel returns to the normal condition
11	Display Precision (prec)	0-6, # of digits to the right of the decimal
13	Zero scale	+/- 999999.99999 Zero value that corresponds to the minimum value in counts
14	Full scale	+/- 999999.99999 Full scale value that corresponds to the maximum value in counts
15	Low alarm limit (loalm)	+/- 999999.99999
16	High alarm limit (hialm)	+/- 999999.99999
19	Low alarm relay (lorly)	151-158, channel of a relay
20	High alarm relay (hirly)	151-158, channel of a relay
<p>Example:</p> <p>Via debug menu: 9,121,1,Pump 1 Amps,2,15,3,1,4,23,5,2,6,30, 16,12.3,20,151<CR><LF></p> <p>Via SMS: <cnfg(9,121,1,Pump 1 Amps,2,15,3,1,4,23, 5,2,6,30,16,12.3,20,151)></p> <p>Modbus channel 121, Slave ID = 15, Holding Register Number 23, Mode is report violations, Alarm Delay is 30 seconds, High alarm limit is 12.3 amps, relay to trigger on high alarm is 151</p>		

Field Type Codes for Modbus Channels (9)		
Force Coil only (use optional <i>, to specify channel number 151-158)		
1	Channel name (name)	30 characters
2	Slave ID (slave)	0-247 0 - disabled
3	Function code (fcode)	0 – Null 5 – Write Coil
4	Register number (regnum)	0-9999
5	Mode (mode)	0 – disabled, 1 – status only
13	Pulse Duration (pulsedur)	0 – 86400 seconds
<p>Example:</p> <p>Via debug menu: 9,151,1,Alarm Relay,2,123,3,5,4,11,5,1,13,0</p> <p>Via SMS: <cnfg(9,151,1,Alarm Relay,2,123,3,5,4,11,5,1,13,0)></p> <p>Modbus channel 151, Write Coil, Slave ID = 123, Register number 11, Mode is status only, Pulse duration is 0 (relay stays on until explicitly told to go off)</p>		

Field Type Codes for Derived (Computed) Analog Channels (9) (use optional <i>, to specify channel number 171-174)		
1	Channel name (name)	30 characters
7	Mode (mode)	0 – disabled, 1 – status only, 2 – report on violations
8	Alarm delay (almdly)	0-65535 seconds
9	Report on return to normal (repnorm)	0 – disabled 1 – enabled, report when the channel returns to the normal condition
10	Report Flags (repflgs)	Reserved
11	Display Precision (prec)	# of digits to the right of the decimal, 0-6
15	Low alarm limit (loalm)	+/- 999999.99999
16	High alarm limit (hialm)	+/- 999999.99999
19	Low alarm relay (lorly)	151-158, channel of a relay
20	High alarm relay (hirly)	151-158, channel of a relay
<p>Example:</p> <p>Via debug menu: 9,171,1,Inflow,7,2,14,40.0<CR><LF></p> <p>Via SMS: <cnfg(9,171,1,Inflow,7,2,14,40.0)></p> <p>Via OTA: && 258,9,171,1,Inflow,7,2,14,40.0 </p> <p>Channel 171,, name is Inflow, high alarm is 40.0 cubic feet per second</p>		

Field Type Codes for Computed Digital Channels (9) (use optional <i>, to specify channel number 201-204)		
1	Channel name (name)	30 characters
5	Mode (mode)	0 – disabled, 1 – status only, 2 – report on violations
6	Alarm delay (almdly)	0-65535 seconds
7	Report on return to normal (repnorm)	0 – disabled 1 – enabled, report when the channel returns to the normal condition
8	Report Flags (repflgs)	Reserved
9	Normal state (norm)	0 – normally open, 1 – normally closed
10	Starts limit (stalm)	0-999999
11	Run Limit (runlim)	0-999999
12	Alarm Relay (almrly)	Channel number of relay to control when in alarm (0,151-158)
<p>Example:</p> <p>Via debug menu: 9,202,9,1,5,2,6,15<CR><LF></p> <p>Via SMS: <cnfg(9,202,9,1,5,2,6,15)></p> <p>Channels 52, normally closed, report alarms, alarm delay is 15 seconds</p>		

Field Type Codes for Report Flags (12) (use optional <i>, to specify channel number)		
3	Periodic reports (per) Reported at report rate specified in Sites configuration	0 – not included 1 – current value 2 – current value, cycle counts, run- time duration value, min and max
4	End of Day reports (eod)	0 – not included 1 – current value, cycle counts, run- time duration value or flow totalization 2 – current value, cycle counts, run- time duration value or flow totalization
6	Alarm reports (alm)	0 – not included 1 – current value 2 – current value, flow totalization value, min and max
<p>NOTE:</p> <p>Digital values Counts and Duration values are only reported if their value is > 0</p> <p>Analog values Total, Max and Min are only reported if the value is > 0</p> <p>Example:</p> <p>Via debug port: 12, 21, 3, 0, 4, 2, 6, 2<CR><LF></p> <p>Via SMS: <cnfg(12, 21, 3, 0, 4, 2, 6, 2)></p> <p>Report flags for physical digital channel 21, Do not report anything in the periodic report, Report the current state and any duration or count data at the end of the day or when an alarm occurs.</p>		

Field Type Codes for Pump (20)		
1	Pump 1 run channel (p1ch)	Select a digital input, physical or Modbus. Typically the first physical digital channel, 21
2	Pump 2 run channel (p2ch)	Select a digital input, physical or Modbus. Typically the first physical digital channel, 22
3	Pump 3 run channel (p3ch)	Select a digital input, physical or Modbus. Typically the first physical digital channel, 23 if 3 pumps are being used.
4	Tank level channel (lvlch)	Select an analog input, physical or Modbus. Typically the first physical analog channel, 51.
5	Inflow time window (infwin)	Amount of time used to compute the inflow rate. This value must be less than the amount of time between when pumps go off and can go back on. Specified in seconds, 0 – 9999.
6	Tank area (area)	Cross sectional area of the tank specified in square feet. 0 - 9999.9999
7	Inflow channel (infch)	Channel to save the inflow calculated rate into. Typically the first computed analog channel, 171. The total daily inflow is in the totalizer for this channel.
8	Outflow channel (outfch)	Channel to save the outflow calculated volume into. Typically the second computed analog channel, 172. The total daily outflow is in the totalizer for this channel.
<p>NOTE:</p> <p>Set channels for a 2 pump station:</p> <p>Via debug port: 20,1,21,2,22,4,51,5,15,6,15.7,171,8,172<CR><LF></p> <p>Via SMS: <onfg(20,1,21,2,22,4,51,5,15,6,15.7,171,8,172)></p> <p>Tank cross-sectional area for a 5' diameter tank.</p>		

Field Type Codes for Operator (21) (use optional <i>, to specify operator number)		
1	Operator Name	Name of an operator, 30 characters
<p>NOTE:</p> <p>Set 3 operator names</p> <p>Via debug port: 21,1,1,John Doe<CR><LF> 21,1,2,Roger Thompson<CR><LF> 21,1,3,Carla Brindal<CR><LF></p> <p>Via SMS: <cnfg(21,1,1,John Doe)> <cnfg(21,1,2,Roger Thompson)> <cnfg(21,1,3,Carla Brindal)></p>		

16 Customer Service

Aquavx customer service can be reached toll-free at 877-628-0709.

Email: helpdesk@aquavx.com

17 Warranty

LIMITED WARRANTY - Products, parts and components produced by M2M Data Corporation are warranted to be free of defects in material and workmanship under normal use and service for a period of twenty-four (24) months from date of shipment. Products, parts and components produced by outside vendors are warranted to the extent of the original manufacturers' warranty or that of M2M Data Corporation produced products, whichever comes sooner.

This warranty shall not apply to any product that has been:

- I. repaired, worked on, modified or altered by persons unauthorized and/or not dispatched by M2M Data Corporation, at M2M Data Corporation's sole discretion, in such a manner as to injure, in M2M Data Corporation's sole judgment, the performance, stability, reliability or safety of the product;
- II. subjected to misuse, negligence, accident, fires, force of the elements or environmental disasters; or
- III. connected, installed, adjusted or used otherwise than in accordance with the instructions furnished by M2M Data Corporation.

Product warranty, as stated herein, will be made void if instrument malfunction indicators are not appropriately responded to.

Repairs, replacement of parts and servicing covered by warranty will be performed at M2M Data Corporation's factory, or at such other locations as M2M Data Corporation may designate, transportation prepaid. M2M Data Corporation obligations under this warranty do not include the cost of furnishing any labor in connection with the removal or installation of repaired or replaced equipment or parts thereof, nor does it include the cost of transportation. In the event the customer requires field repair of such equipment, M2M Data Corporation shall provide qualified personnel to affect such repair at no charge for on-site labor during standard working hours; however, customer shall pay travel and living expenses at cost and travel time, premium labor differential, and layover charges; if any, according to the then published rates in effect. If the performance of warranty services at M2M Data Corporation factory, or other M2M Data Corporation designated location, reveals that the repairs are either unnecessary or were occasioned by customer's misuse, improper storage, abnormal operating conditions or customer modification not authorized by M2M Data Corporation, the service call will be subjected to M2M Data Corporation's normal out-of-warranty service call rate, transportation and expenses.

The following items are specifically excluded from this warranty; data and power cables, and consumables. Check with factory for further clarification and exclusions.

The foregoing "limited warranty" states our entire liability for any claim of damages whatever arising out of the supplying of equipment, or its use, and is made by M2M Data Corporation and accepted by purchaser **IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING THE WARRANTY OF MERCHANTABILITY AND FITNESS FOR PARTICULAR PURPOSE, M2M DATA CORPORATION IS NOT LIABLE FOR PROPERTY, INCIDENTAL, OR CONSEQUENTIAL DAMAGE RESULTING FROM THE MANUFACTURE, PACKAGING, DELIVERY, STORAGE, OR USE OF THE PRODUCTS OR FOR INJURY FROM ITS USE. ANTICIPATED OR LOST OF PROFITS, OR FOR ANY OTHER CAUSE.**

If this product was purchased directly from M2M Data Corporation, or through an authorized reseller or distributor of M2M Data Corporation, then and only then does this warranty apply.

18 Certifications

UL: Pending

Industry Canada registration number: IC: 4825A-SCOUT

CE Mark

FCC

19 Glossary

Access Code	4 character code used to limit access to any Control or Programming capabilities in the Scout.
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Action (ACTN) Command	Commands that can be sent OTA or via SMS to request the Scout to perform a specific action. All commands sent via SMS are acknowledged back to the sender of the SMS.
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Analog Input Type	Specifies the type of input the A/D converter is hardware configured to accept. Supported types are 0-20ma, 4-20ma, 0-5VDC and 1-5VDC.
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Add Checksum	If enabled, the reports sent to the internet backend have a CRC-16 appended to the message. The Checksum is appended to the very end of the message, after a <CR><LF> is the message is terminated using those characters.
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Alarm Delay	The amount of consecutive seconds an input needs to exceed a Limit before it goes into alarm. [0-65535 seconds] (default is 3 seconds) Channel state goes to NotNorm until the input goes back to Normal or into Alm.
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Alarm Types	<p>Alarm notifications are generated from either Digital, Analog or System channels or from a timed event. System channels are treated as Digital channels.</p> <p>The Digital channels have three types of alarms:</p> <ul style="list-style-type: none"> • Transition to: Closed or Open • Duration (Run) Limit exceeded before midnight • Starts (Cycles) Limit exceeded before midnight <p>Analog Inputs have three types of alarms, which are triggered on the transition into each state.</p> <ul style="list-style-type: none"> • High – exceeds high limit • Normal • Low – exceeds low limit • Failsafe – exceeds high or low failsafe limits. <p>Each of these alarms is independent of the other.</p>
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APN	Internet address provided by the cellular provide for the Scout to connect to for GPRS communication.
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AutoACK	<p>If set Auto the Scout expects every transmission to the Internet application to be positively acknowledged according to the Protocol being used. If the message is not acknowledged, the Scout sends the message again after a pre-defined time delay.</p> <p>Any messages not successfully sent are stored and forwarded when communication is again successful.</p> <p>If set to None, the Scout assumes the message was received, and does not save the record in the store and forward.</p> <p>If set to Demand, the value of 100000 is added to the Event Code.</p>						
AutoScroll	Enables or Disables the automatic Scroll display.						
AutoSendConfig	Enables or Disables the Scout automatically sending any configuration change to the internet hosted-services. The configuration is sent after a time delay from the last change.						
AutoTimeSet	<p>If set to 1 (enabled), the Scout automatically sets its real-time clock based on GPS time if available or via government-managed websites that provide exact time. If via GPS, then the Time Zone and Daylight Savings are ignored. The time is checked every day at midnight and adjusted if off more than 15 seconds.</p> <p>If set to 0 (disabled), the real-time clock time is not automatically set.</p>						
Auto Updates	When enabled, the Scout automatically sends Reports to the internet back-end application according to the Report Rate.						
Baud Rate	The serial port baud rate for communication via the Serial Ports. The Scout support from 1200 to 115200 baud.						
Call Delay	This parameter sets the minimum amount of time between sending Reports out via GSM or over the serial port. This parameter is generally used to limit the speed at which connections are made to the wireless network to prevent too frequent network usage in the event that a monitored condition is cycling rapidly.						
Channel Mode	<p>Indicates whether the channel is Disabled, Status Only or one of the Alarm modes.</p> <table border="0"> <tr> <td data-bbox="295 1211 373 1235">Disabled</td> <td data-bbox="458 1211 852 1235">the channel is not being scanned or processed</td> </tr> <tr> <td data-bbox="295 1243 397 1268">Status Only</td> <td data-bbox="458 1243 929 1292">Digital and Analog - the channel is being scanned, but not evaluated for alarms.</td> </tr> <tr> <td data-bbox="295 1292 378 1341">Call on Violation</td> <td data-bbox="458 1292 940 1406"> Digital – goes into alarm when the channel goes from the Normal setting to the Non-normal setting (e.g. from Open to Closed on a Normally Open channel) Analog - goes into alarm when the value exceeds either the Low or High Limits. </td> </tr> </table>	Disabled	the channel is not being scanned or processed	Status Only	Digital and Analog - the channel is being scanned, but not evaluated for alarms.	Call on Violation	Digital – goes into alarm when the channel goes from the Normal setting to the Non-normal setting (e.g. from Open to Closed on a Normally Open channel) Analog - goes into alarm when the value exceeds either the Low or High Limits.
Disabled	the channel is not being scanned or processed						
Status Only	Digital and Analog - the channel is being scanned, but not evaluated for alarms.						
Call on Violation	Digital – goes into alarm when the channel goes from the Normal setting to the Non-normal setting (e.g. from Open to Closed on a Normally Open channel) Analog - goes into alarm when the value exceeds either the Low or High Limits.						
Channel Name	A 20-character name associated with a channel.						

Checksum	When enabled, a CRC16 is computed over the entire set of data being sent, including the <CRLF>. The CRC16 is formatted in to human-readable form. The range is 0000-FFFF.
Dampen ADC	If enabled, the analog input channel is internally averaged to remove noise.
Databits	Length of the data byte for serial communications. 7 or 8.
Daylight Savings	If set to No, the Scout will NOT adjust time for daylight savings. If set to Yes, the Scout WILL adjust.
Debug port	<p>If enabled, then the serial ports can be connected to a laptop or PC for viewing diagnostics (status, event log, etc.) or for programming.</p> <p>The laptop/PC should use Hyperterminal or some other terminal emulation program.</p> <p>When connected, press the Enter key. A menu of options is displayed.</p>
Decimal Precision	<p>Number of digits to the right of the decimal. The default is 2, but can be adjusted from 0 to 9.</p> <p>For example, if the Decimal Position is 3, then values are presented as: xx.xxx</p>
DelimiterChar	The delimiter character used in the protocol to send data to the internet hosted-service. The default is “:”.
Digital channel	A digital channel is one that can take on a value of on or off. This refers to system channels that have only these two states, physical and Modbus Digital inputs.
Disabled	Channel is not scanned or evaluated for alarms.
Dur Limit	<p>Duration Limit – On a digital channel, anytime the input transitions from the Normal condition to the non-Normal condition, the Scout accumulates the total non-Normal time for the day.</p> <p>The total time is reset at midnight. If the total time exceeds the Dur Limit before midnight, a message is sent with the appropriate Duration Event code for the channel.</p>
Event Log	<p>The event log stores the 200 most recent events that have occurred in the Scout. The information that is stored is alarm conditions, call-outs, and call-ins. All events are logged with the following information:</p> <ul style="list-style-type: none"> • <Date and Time> <Event logged information>
File	Filename for the FTP service to use to Get or Put.
Full Scale	Specifies the full scale value in engineering units for the on-board analog input signal. When the signal is at its highest detectable value.

GSM statuses

Status	Meaning
GSM lockout	<p>The Scout has determined that the battery does not have enough power to use the GSM. The Scout enters into a Lockout mode to allow the Scout time to charge the battery without the GSM modem powered up.</p> <p>The Scout keeps the GSM power off for an hour, then powers it up to determine if the battery has enough power, if not, the process is repeated.</p>
GSM Resynch	<p>Synchronization between the Scout and the GSM has been lost – can be due to change of baud rate, APN connection, etc.</p> <p>The Scout automatically detects the loss and tries to re-establish communication.</p>
GSM CyclePwr	The Scout periodically turns the power to the GSM modem off to fully re-establish communication to the cellular tower.
GSM Setup	The Scout has started to program the GSM modem for operation.
GSM Idle1	During the GSM programming sequence, there is a point that the Scout is waiting for the modem to respond that can take up to 60 seconds.
GSM Configure	The GSM modem has been requested to save all programming commands.
GSM Idle2	During the GSM programming sequence, there is a point that the Scout is waiting for the modem to respond that can take up to 60 seconds.
GSM Connect	The GSM has connected to the cellular network.
GSM Ready	The GSM modem has responded that it is ready to receive data.
Err comm	Error in serial port communications with either the GSM or Modbus devices..
GSM SendData	The Scout is currently sending data to the internet hosted-service.
GSM Ping	The Scout is sending a PING packet to the internet hosted-service.
GSM ADIP	Remote diagnostic Over-The-Air (OTA) tool is being used.
GSM FTP	FTP session in progress.
GSM SMS	Scout is receiving an SMS command.
GSM GetTime	Scout is getting time from Internet time servers.
GSM noACK	No Ack was received from the internet hosted-service for the last report.
GSM delay	Scout is waiting the Next Call Delay period before the next report can be sent to the internet hosted-service.

High Limit	<p>A value that defines a limit that the current analog value is compared against to determine if the associated Channel is in alarm. When the current analog value rises above this limit for the Alarm Delay number of seconds, the Channel is considered to be in Alarm. If the Channel Mode is set to Call on Violation, or Call on Violation, then a Report is sent to the server .</p> <p>This value is entered as a real number, e.g. 100.25</p>
IP (FTP)	Internet address of the FTP server, can be specified as xxx.xxx.xxx.xxx or a DNS.
IP (GSM)	Internet address of the back-end application, can be specified as xxx.xxx.xxx.xxx or a DNS.
Low Limit	<p>A value that defines a limit that the current analog value is compared against to determine if the associated Channel is in alarm. When the current analog value falls below this limit for the Alarm Delay number of seconds, the Channel is considered to be in Alarm. If the Channel Mode is set to Call on Violation then a Report is sent to the server.</p> <p>This value is entered as a real number, e.g. 100.25</p>
Max and Min	The Scout keeps track of the Max and Min values for all analog channels for each day. These values can be reported using the Scout Protocol in Periodic, Alarm and End of Day reports. These values are reset after being sent at the end of the day.
Modbus	Protocol supported by the Scout to communicate via a serial port to another device, typically a PLC or PC.
Mode (channel)	<p>Alarm mode –</p> <ul style="list-style-type: none"> • Disabled – channel is not evaluated or monitored • Status Only – channel is monitored but not compared to limits (thresholds) • Call On Violation – channel is monitored, compared to limits and messages sent if limits are violated
Mode (FTP)	Active or Passive. Usually indicates if the FTP server is behind a firewall (active) or not.
Mode (serial port)	For each serial port, the Mode specifies the current function of that port. For example, GSM, Serial, Modbus Master, Debug, etc.
Next Call Delay	Amount of time the Scout waits until the next transmission is sent to the internet application. This is used to regulate the frequency of data being sent to the internet application.
Norm	<p>Indicates the current state of a channel. Viewable when requesting a Report from the Debug Menu or a Daily Report via FTP.</p> <p>Norm means that the current value has not exceeded any of the limits specified.</p>

Normal	Specifies the Normal condition for a digital input channel. Valid values are: Normally Open or Normally Closed
Notnorm	Indicates the current state of a channel. Viewable when requesting a Report from the Debug Menu or a Daily Report via FTP. Notnorm means that the current value has exceeded one of the limits specified.
Parity	Parity on the dataframe for the serial ports. None, Odd or Even.
Path	Path to a folder on the FTP site to Get files from or Put files to.
PINGrate	Rate the Scout sends a PING to the server to maintain an always-on connection.
Port (FTP)	FTP sites are usually port 21. If you FTP site is different, enter the appropriate port number.
Port (GSM)	Port number of the UDP or TCP application connection. Valid from 0-65535.
Protocol	Specify UDP or TCP.
PWD	Password for APN or FTP connection, if required by cellular service provider.
Reg Addr	Register address – the Modbus register address for a channel in the Scout.
Register Number	A valid Modbus register number from 1 to 9999. Some PLCs refer to registers as a combination of the Register Type and the Register Number. For example, a PLC may reference register 40100. In the Scout, this would be a Modbus Analog Read Holding and Register Number 100.
Report Rate	The frequency that periodic reports are sent to the server. Periodic reports are sent when there are no channels in alarm and provide current operational information.
RequestMode	Used for Modbus communication to optimize the packing of analog and digital channels being read. When enabled, the Scout attempts to pack the data to minimize the serial traffic. Valid values are Block (try to pack the data) or Single (request each channel separately).
Reset Modem	An SMS command that cycles the power on the GSM Modem.
Reset to System Defaults	Performing this function erases all user programming and sets the Scout back to the factory settings. This can be accomplished through the Debug menu in the Maintenance Section or using the Reset command (256).

RespTout	The Response Timeout is the maximum amount of time the Scout waits for a response from the serially connected device when it transmits a message. 100 to 10000 ms.
ScanRate	The rate the Scout scans the Modbus channels for data. From 1 to 60 seconds. NOTE: be careful not to make the Scan Rate longer than the Alarm Delay on the Modbus channels.
Service Provider	Provider of the SIM card. ATT, T-Mobile, Kore, etc. Kore is the default.
Site Name	A 20 character name that the user enters to identify the unit.
Slave ID	Modbus ID number of the Slave device. Modbus uses a Master to initiate communication to a number of Slaves.
SMS Commands	SMS commands can be issued to the Scout to perform certain actions. When an SMS command is received, an Acknowledgement (ACK) or Not Acknowledgement (NAK) is sent to the internet to indicate if the command was performed.
ss	Signal strength of the GSM. Even if the GSM modem has not registered on the GSM network, there is a Signal Strength available. A value less than 6 provides marginal and intermittent connections. A value between 6 and 9 provides an adequate connection. A value greater than 9 provides a reliable connection.
StartMsgChar	Start Message Character used by the protocol to send data to the internet hosted-service. The default is "&".
Status Only	Analog and digital channel is scanned but not evaluated for alarms.
StopBits	Number of bits to end the dataframe on serial communications. 1 or 2.
Time Zone	Specifies the time zone that the Scout is operating in. This is only used if there is no GPS being used.
USR	Username for APN or FTP connection, if required by cellular service provider.
Zero Scale	Specifies the zero scale value in engineering units for the on-board analog input signal. When the signal is at its lowest detectable value.



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