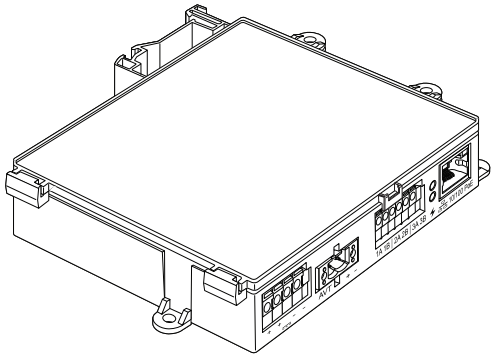
VeriSafe™

VeriSafe Network Module
Subject: User Guide
Lit. No.: B21176
Date: SEP 2022 **Revision:** 1 [English]
Model No: VS2-NET

Table of Contents

The network module is designed to be an optional accessory that enables network capabilities for the VeriSafe 2.0 Absence of Voltage Tester (AVT). The network module provides an integrated web application that is delivered by an on board web server. The web application monitors data from the AVT and provides integration, configuration and firmware update capabilities. The network module supports AVT data over EtherNet/IP and Modbus TCP protocols. The voltage presence discrete outputs may be used as an indication of voltage presence with or without a network connection. The network module provides the ability to log various pieces of data based on built in triggers (see **Data Logs Page** for more information).

Before attempting to physically install the network module in hazardous or ordinary locations, refer to document no. B21148 (VeriSafe Network Module Installation Requirements Manual) for physical installation requirements including; connectivity, ratings and environmental specifications for the network module.



TO REDUCE THE RISK OF INJURY, USER MUST READ INSTRUCTION MANUAL

NOTE: In the interest of higher quality and value, Panduit™ products are continually being improved and updated. Consequently, pictures may vary from the enclosed product.
NOTE: Updates to this Instruction Manual may be available. Check www.panduit.com for the latest version of this manual.

Tech Support

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Web Application

FEATURES

The network module web application can be used to configure and monitor the AVT. Access the web application by typing the network module IP address in a supported browser.

FIRST LOGIN

1. Type the network module IP address (default: 192.168.2.10) in a supported browser.
   - Supported browsers: Chrome, Edge, Firefox
2. On first login the user is required to change the admin password
   Web App Login (factory default setting)
   - Username: admin
     Password: admin

WEB APPLICATION LAYOUT

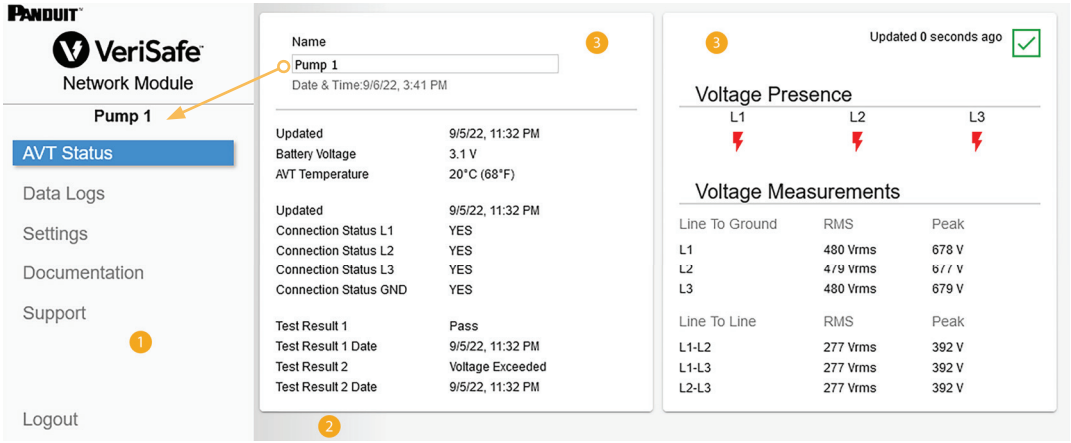
The web application layout consists of a left sidebar menu and a content area loaded with content cards.

LOGIN
On login the user will be directed to the AVT Status page.

Sidebar Menu

Content Area

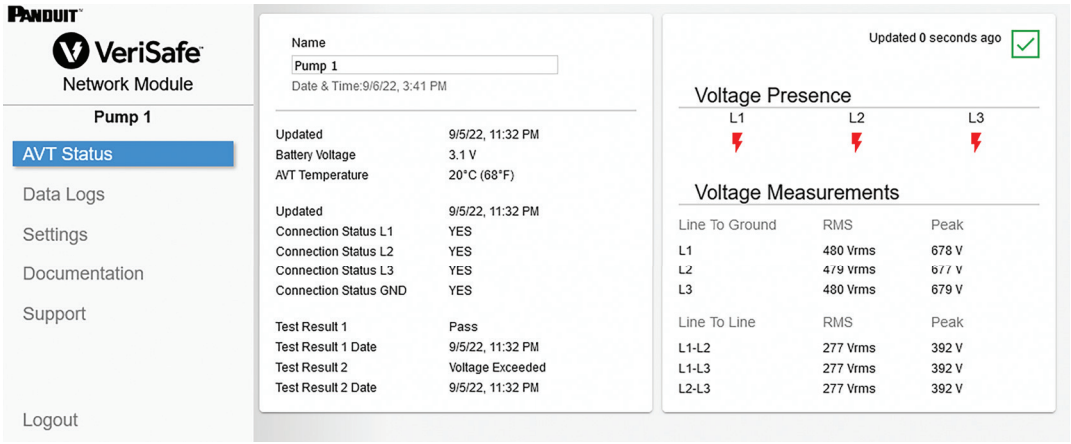
Card



AVT STATUS PAGE

After the user has logged in they will be redirected to the AVT Status page. This page consists of two data cards with views that will be determined by the type of AVT in use and the user settings. This page automatically refreshes content at a static rate of once every 2 seconds.

FIGURE 1. AVT STATUS PAGE 3-PHASE AVT (VS2-AVT-3P)

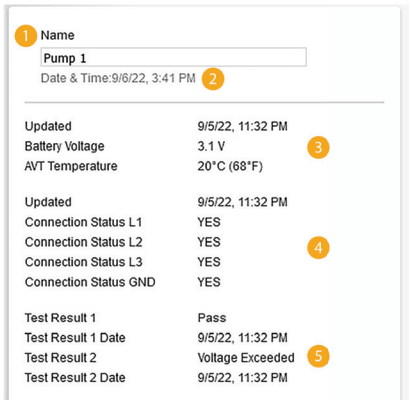


AVT STATUS PAGE FIRST CARD

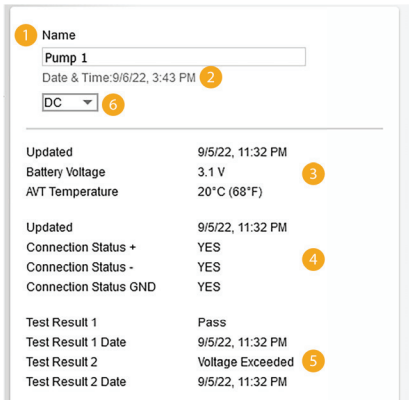
Data presented in this card is updated as described in Table 5. The user is presented with time stamps to indicate when the data was last updated. Some data will not be shown until an absence of voltage test is

completed.

FIGURE 2. AVT STATUS PAGE 1ST CARD VIEWS



3-Phase View



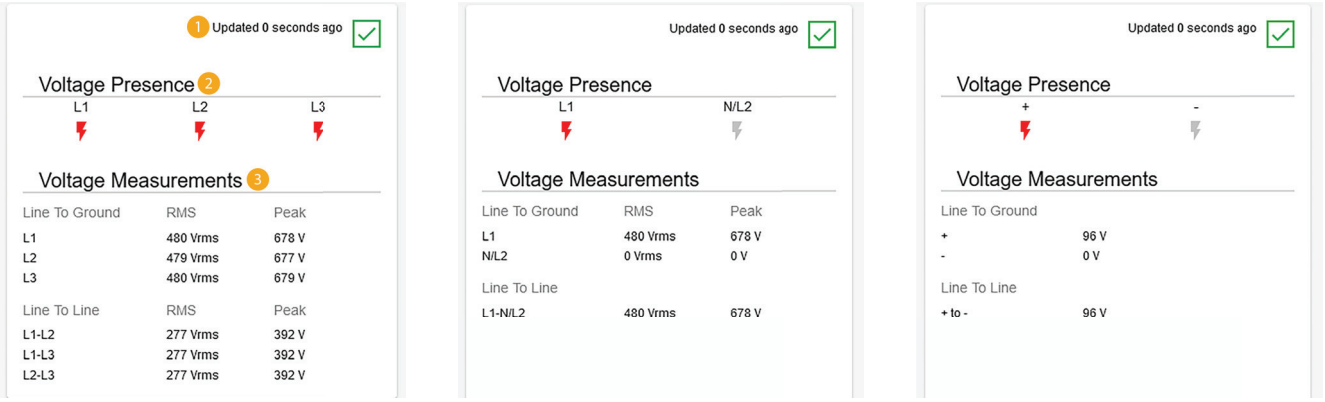
DC/Single-Phase View

1. Name	User defined AVT name (Default blank). This is used to identify data log files and appears in the side bar menu. Changes are automatically saved.
2. Date/Time	Current Date/Time of the network module. Updated every 2 seconds.
3. Battery Voltage and AVT Temperature	Last measured value of the battery voltage and Internal temperature of the AVT. ■ Updated when the user presses the test button and during the wakeup cycle ■ Recommended to replace battery in the AVT when measured below 2.9V.
4. Connection Status	Status of the connectivity between each pair of sensor leads based on the last completed test performed when no voltage is present.
5. Test Result 1	Show the most recent test result from the AVT
Test Result 1 Date	Date/Time of AVT test result 1
Test Result 2	Show the test result prior to test result 1
Test Result 2 Date	Date/Time of AVT test result 2
6. AC/DC Selection ***(VS-AVT-1P Single phase units only)**	Select appropriate power system. This will update the card view. Changes are automatically saved.

AVT STATUS PAGE SECOND CARD

Data in this card is updated every 2 seconds. For single phase systems the view shown is determined by selection on card 1 (item 6 AC/DC selection).

FIGURE 3. AVT STATUS PAGE SECOND CARD VIEWS



Three-Phase View | Single-Phase View | DC View

1. AVT Connection Status	Indicates status of the connection between the isolation module and network module. ☑ OK ⓘ DISCONNECTED
2. Voltage presence ϟ	Reflects the status of the voltage presence indicators (red LEDs) on the indicator module and voltage presence contacts on the network module.
3. Voltage Measurements	▪ Measured peak voltage line to ground ▪ Calculated RMS and line to line voltages

AC Range	Accuracy
40*-200 VAC	± 4V
201-300 VAC	± 2%
301-1000 VAC	± 1.5%

DC Range	Accuracy
40*-300 VDC	± 9V
301-700 VDC	± 2%
701-1000 VDC	± 1.5%

*The Network module is designed to report measured values between 40-1000 V. The Network module is not optimized to report voltages under 40V. However, the absence of voltage indication from the AVT utilizes a separate circuit that is highly accurate and optimized for the 3V threshold.

DATA LOGS PAGE

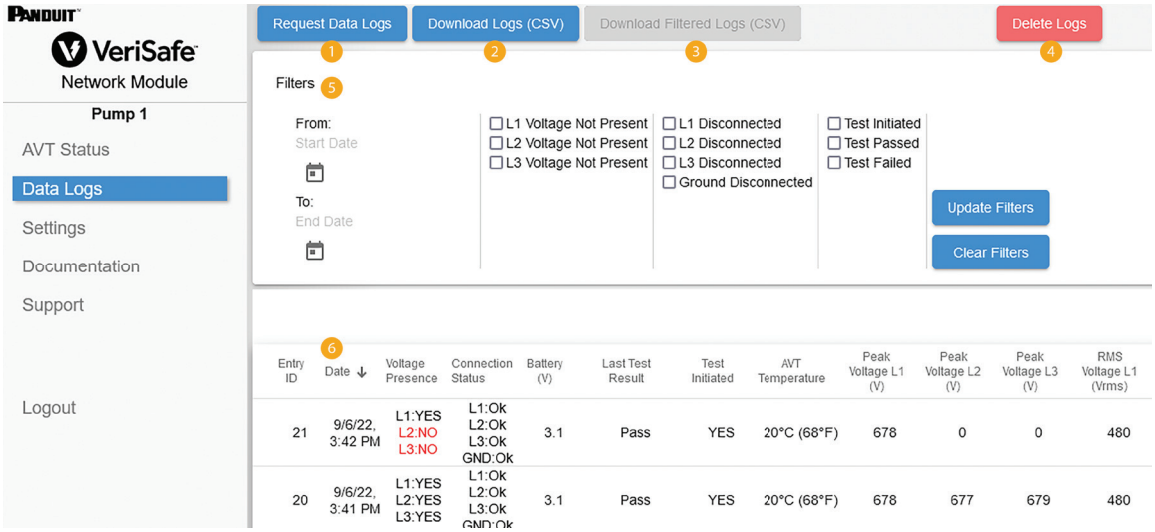
This page allows the user to manage the log data stored on the network module SD card.

LOG TRIGGERS

Log entries are triggered by specific AVT events:

- Change in state of any voltage presence indicator
- Initiating the absence of voltage test
- Daily AVT wakeup cycle

FIGURE 4. DATA LOGS PAGE DETAILS



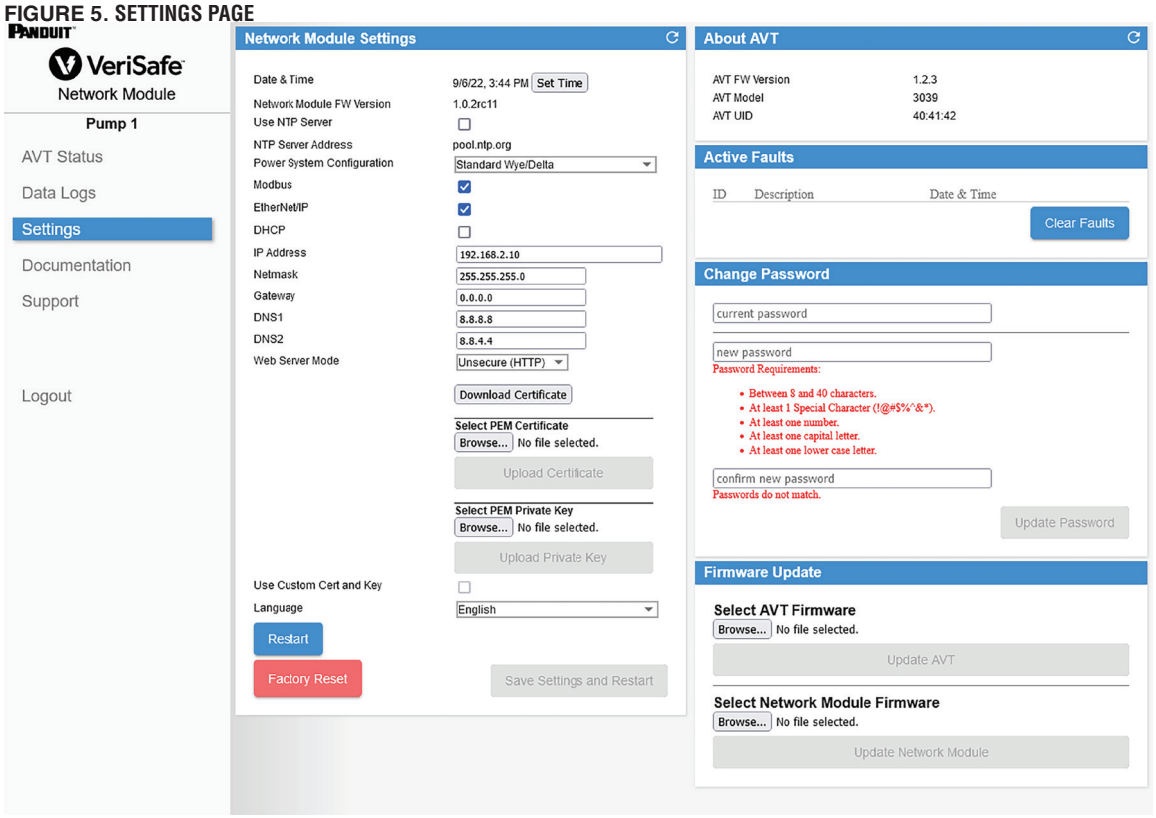
1.	Request Data Logs	Request data log file from the network module
2.	Download Logs (CSV)	Download the data log file to local PC in CSV form
3.	Download Filtered Logs (CSV)	If filters are applied download the filtered data set only
4.	Delete Logs	Delete entries from the data log file
5.	Filters	Select filters. Use **Update Filters** and Clear Filters to manage selections.
6.	Log Items	Data associated with each log entry.

NOTE: When log data is critical it is recommended the user periodically download the logs or to integrate the system (**EtherNet/IP™** or Modbus TCP) with an external data logging system.

SETTINGS PAGE

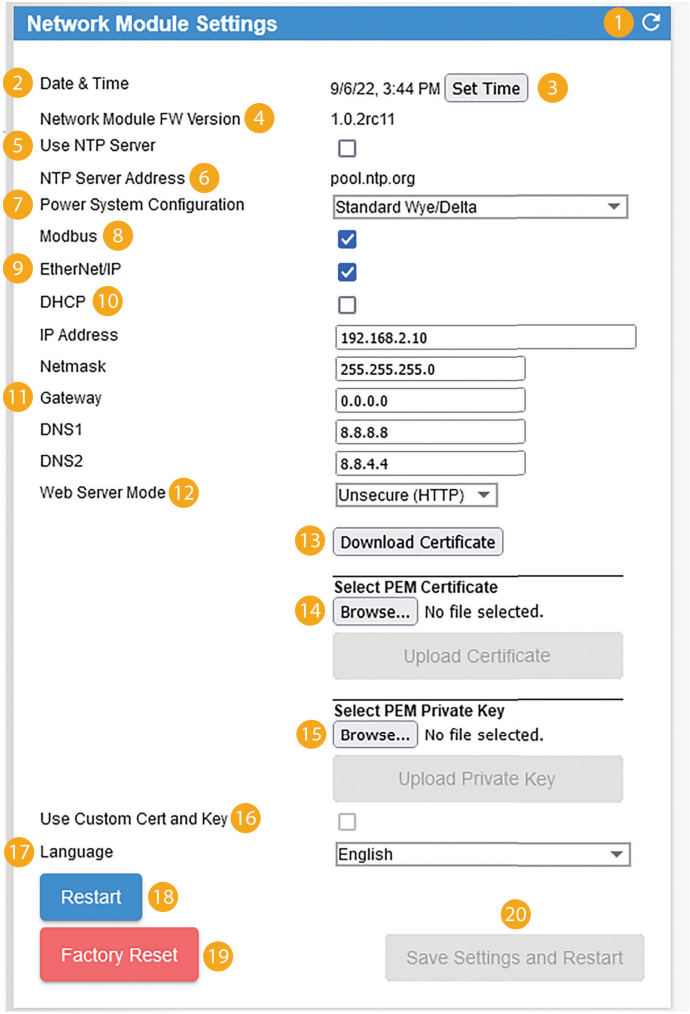
The settings page allows the user to configure and view the current state of the network module, retrieve AVT information, check active faults, and update firmware.

FIGURE 5. SETTINGS PAGE



NETWORK MODULE SETTINGS

FIGURE 6. NETWORK MODULE SETTINGS CARD DETAILS



REFRESH

Replace all data in fields with the last saved settings.

SAVE SETTINGS AND RESTART

Saves modified settings and restarts the network module.

RESTART

Restart the network module without saving changes to settings.

FACTORY RESET

Reset the network module to factory default settings (see Table 4).

NOTE: If the web application is unavailable, the network module can be physically reset by depressing the User Reset Button (see Figure 1 for location on the Network Module).

1. Refresh	Replace all data in fields with the last saved settings
2. Date & Time	Displays current date and time associated with the network module.
3. Set Time	Applies local web browser time to the network module.
4. Network Module FW Version	Firmware version of the network module
5. Use NTP server	Check to enable the use of NTP (Network Time Protocol)
6. NTP server address	Enter server address to set time using NTP. Editable if **Use NTP Server** is checked.
7. Power System Configuration*	Configuration of the power system that the AVT is monitoring. To report accurate voltage data, the power system configuration must be selected. Default is Standard wye/delta *
8. Modbus	Enable or disable the Modbus TCP interface (default enabled)
9. **EtherNet/IP™**	Enable or disable the **EtherNet/IP™** interface (default enabled)
10. DHCP	Enable or disable DHCP (default disabled)
11. IP Address Netmask Gateway IP DNS1 DNS2	Current IP address, Netmask and Gateway IP (read-only when DHCP is enabled) DNS1 & DNS2 are always editable
12. Web Server Mode	The web server can be configured for either HTTP or HTTPS (default is HTTP)

Continued on next page

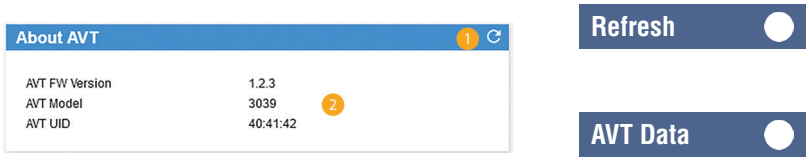
13. Download Certificate	Download the network module certificate.
14. Upload PEM Certificate	Upload a user supplied PEM certificate (default uses on board PEM certificate)
15. Upload PEM Private Key	Upload a user supplied PEM private key (default uses on board PEM private key)
16. Use Custom Cert and Key	Check to enable use of the user supplied certificate and private key for HTTPS. Disabled if HTTPS is not selected for Web Server Mode.
17. Language	Select desired language from the drop-down menu. English, French, French (Canada), German, Italian, Korean, Spanish (Latin America), Chinese
18. Restart	Restart the network module without saving changes to settings
19. Factory Reset	Reset the network module to factory default settings
20. Save Settings and Restart	Saves modified settings and restarts the network module.

***POWER SYSTEM CONFIGURATION**

The AVT measures voltage between the sensor leads and ground leads and computes the associated phase-to-phase and RMS voltages reported by the network module. To report accurate voltage data, the power system configuration must be selected. The Standard selection (default) assumes a wye or delta power system and is sufficient for most applications. If a special configuration (corner grounded delta, high-leg delta, and single-phase 3-wire) is desired, select the appropriate application from the drop-down menu.

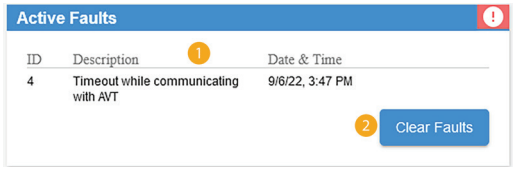
ABOUT AVT

Displays firmware version, model number and universal identifier (UID) of the AVT. Use the refresh button to update the card.



ACTIVE FAULTS

This card will display active faults in the network module. The fault information is updated automatically every 3 seconds. See Troubleshooting for additional information.



21. Faults

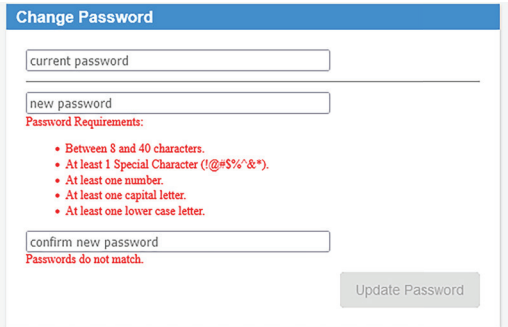
ID	Description
0	Hardware Failure. Flash code 2 during boot up
1	Power from the network module to the AVT is over the limit.
2	Indicate the network module has been reset to factory defaults
3	Data received from AVT was unable to be processed
4	Timeout while communicating with AVT
5	General SD card error
6	SD card is full
7	Time has not updated
8	Time not set
9	Web server could not load custom certificate

22. Clear Faults

The Clear Faults button allows the user to clear any faults on the network module. If the fault condition is still present the fault may be presented after some time.

CHANGE PASSWORD

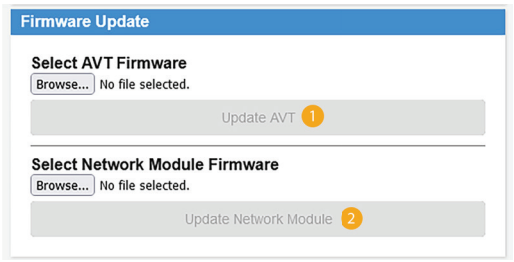
On initial login and factory reset the user will be prompted to change the password.



UPDATE FIRMWARE

Download the latest firmware at www.panduit.com

Select **Choose File**, navigate to the firmware file, and click the appropriate **Update** button.. The firmware update process for both the network module and AVT should take approximately one minute.



AVT Firmware Update

During a firmware update communication between the network module and the AVT will be temporarily lost. Upon successful update use the **About AVT** card refresh button to verify the firmware version matches what was downloaded.

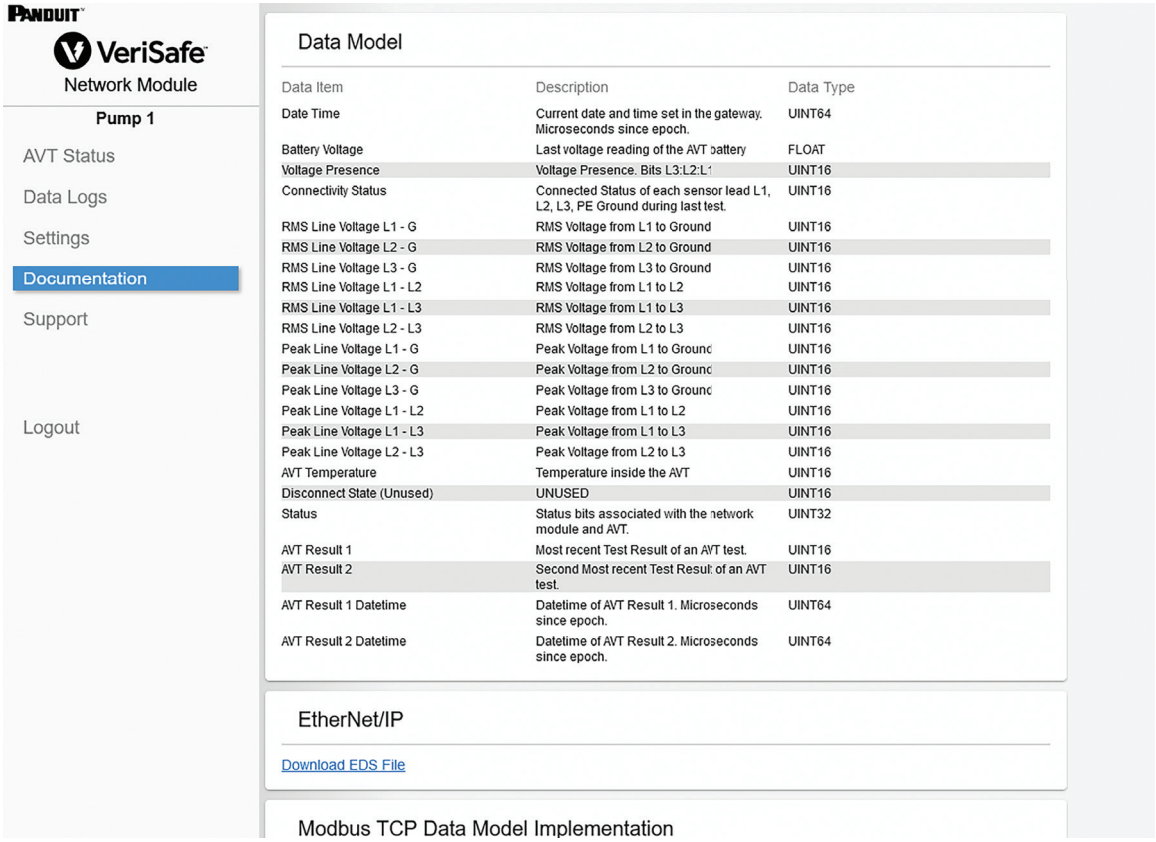
Network Module Firmware Update

Upon successful firmware update the network module will restart and you will be prompted to login.

DOCUMENTATION PAGE

This page provides the user with the information necessary to utilize the **EtherNet/IP™** (EDS file download) and Modbus TCP communications protocols.

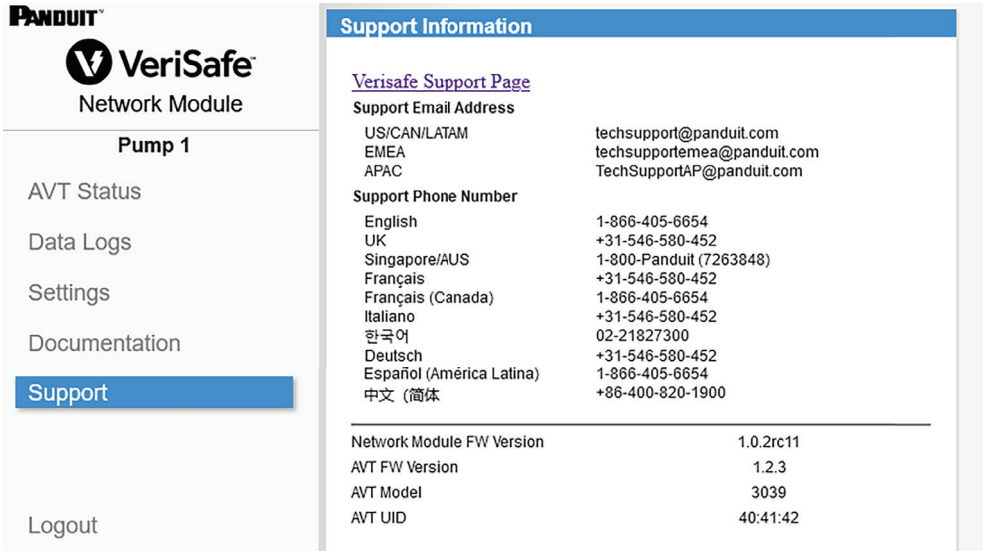
FIGURE 7. DOCUMENTATION PAGE



SUPPORT PAGE

- Provides contact information and a link to the VeriSafe landing page on www.panduit.com
- Queries the AVT and network module for product information to assist in technical support.

FIGURE 8. SUPPORT PAGE



Network Module Firmware Update

Upon successful firmware update the network module will restart and you will be prompted to login.

Data Model

The network module uses the same data model for both **EtherNet/IP™** and Modbus TCP protocols.

<table>
<tr><th>Item Name</th><th>Description</th><th>Value Type (size bytes)</th><th>Range</th></tr>
<tr><td>Date/Time</td><td>Current Date/Time set in the network module</td><td>LINT(8)</td><td>microseconds since epoch</td></tr>
<tr><td>Battery voltage</td><td>Last voltage reading of the AVT battery (last test)</td><td>REAL(4)</td><td>0.0 to 4.0 V</td></tr>
<tr><td>Voltage presence</td><td>Bit field status of the phase indicator LEDs (red LEDs)</td><td>WORD(2)</td><td><table><tr><th>Bit</th><th>Bit Name</th></tr><tr><td>0</td><td>Present L1 POS</td></tr><tr><td>1</td><td>Present L2 NEG</td></tr><tr><td>2</td><td>Present L3</td></tr></table>0: Voltage not detected
1: Voltage detected</td></tr>
<tr><td>Connectivity status</td><td>Connected status of each sensor lead L1, L2, L3, PE Ground during last test.</td><td>WORD(2)</td><td><table><tr><th>Bit</th><th>Bit Name</th></tr><tr><td>0</td><td>Connected L1</td></tr><tr><td>1</td><td>Connected L2</td></tr><tr><td>2</td><td>Connected L3</td></tr><tr><td>3</td><td>Connected PE GND</td></tr></table>0: Sensor lead disconnected
1: Sensor lead connected</td></tr>
<tr><td>Line voltage</td><td>RMS voltage</td><td rowspan="10">INT(2)</td><td rowspan="5">0 to 1100 Vrms</td></tr>
<tr><td>L1-G</td><td>L1 to Ground</td></tr>
<tr><td>L2-G</td><td>L2 to Ground</td></tr>
<tr><td>L3-G</td><td>L3 to Ground</td></tr>
<tr><td>L1-L2</td><td>L1 to L2</td></tr>
<tr><td>L1-L3</td><td>L1 to L3</td></tr>
<tr><td>L2-L3</td><td>L2 to L3</td></tr>
<tr><td>Peak line voltage</td><td>Peak voltage</td><td rowspan="5">0 to 1500 V</td></tr>
<tr><td>L1-G</td><td>L1 to Ground</td></tr>
<tr><td>L2-G</td><td>L2 to Ground</td></tr>
<tr><td>L3-G</td><td>L3 to Ground</td></tr>
<tr><td>L1-L2</td><td>L1 to L2</td></tr>
<tr><td>L1-L3</td><td>L1 to L3</td></tr>
<tr><td>L2-L3</td><td>L2 to L3</td></tr>
<tr><td>AVT temperature</td><td>Temperature inside the isolation module</td><td>-40°C to 85°C (-40°F to 185°F)</td></tr>
<tr><td>Disconnect state [NOT IMPLEMENTED]</td><td>Disconnect phase open or closed</td><td>WORD(2)</td><td><table><tr><th>Bit</th><th>Description</th></tr><tr><td>0</td><td>L1 open</td></tr><tr><td>1</td><td>L2 open</td></tr><tr><td>2</td><td>L3 open</td></tr></table>0: Blade closed
1: Blade open</td></tr>
</table>

Continued on next page

Status bits associated with the network module and AVT

	DWORD(4) Bit							
	0	1	2	3	4	5	6	7
	Battery Warning Indicator	**AVT Temperature Fault**	**AVT Power Source**	**Phase Number**	**User Threshold Triggered**	**Disconnect Module Present**	**AVT Internal Fault**	**Network Module Fault**
Status	0: Battery OK 1: Check battery (low or not present)	0: OK 1: Fault	0: Battery 1: Aux	0: 3 Phase 1: Single phase	[NOT IMPLEMENTED] 0: Not triggered 1: Triggered If any user defined threshold is triggered this bit will go to active (1)	[NOT IMPLEMENTED] 0: No 1: Yes	0: OK 1: Fault	0: OK 1: Fault

Item Name	Description	Value Type (size bytes)	Range
AVT result 1 Date/Time	Date/Time of AVT result 1	LINT(8)	microseconds since epoch UTC

- Most recent test result of an AVT test
- This report has the following possible bit states to indicate a passed test or the reason for a failed AVT test

	DWORD(2) Bit								
	0	1	2	3	4	5	6	7	8
	Passed	**Battery Voltage Low**	**Voltage Exceeded**	**Temperature not in Range**	**Connectivity not Confirmed**	**Diagnostic 5**	**Diagnostic 6**	**Diagnostic 7**	**Diagnostic 8**
AVT Result 1	0F	1F	2F	3F	4F	5F	6F	7F	8

#F indicates the number of flashes that will be seen on the AVT indicator module for this error code

0: false
1: true

AVT result 2 Date/Time	Date/Time of AVT result 2	LINT(8)	microseconds since epoch UTC

- Second most recent test result of an AVT test
- This report has the following possible bit states to indicate a passed test or the reason for a failed AVT test

	DWORD(2) Bit								
	0	1	2	3	4	5	6	7	8
	Passed	**Battery Voltage Low**	**Voltage Exceeded**	**Temperature not in Range**	**Connectivity not Confirmed**	**Diagnostic 5**	**Diagnostic 6**	**Diagnostic 7**	**Diagnostic 8**
AVT Result 2	0F	1F	2F	3F	4F	5F	6F	7F	8

#F indicates the number of flashes that will be seen on the AVT indicator module for this error code

0: false
1: true

MODBUS TCP DATA MODEL IMPLEMENTATION

All values are contained in input registers (offset 30000).

Data Item		Start Address	Size (16bit words)	End Address
Date/Time		0	4 (uint64)	3
Battery voltage		4	2 (float)	5
Voltage presence		6	1 (uint16)	6
Connectivity status		7		7
Line voltage	L1-G	8	1 (int16)	8
	L2-G	9		9
	L3-G	10		10
Line voltage peak	L1	11		11
	L2	12		12
	L3	13		13
Line voltage	L1-L2	14		14
	L1-L3	15		15
	L2-L3	16		16
Line voltage peak	L1-L2	17		17
	L1-L3	18		18
	L2-L3	19		19
Temperature		20	1 (int16)	20
Disconnect state		21	1 (uint16)	21
Status		22	2 (uint32)	23
AVT result 1		24	1 (uint16)	24
AVT result 2		25		25
AVT result 1 Date/Time		26	4 (uint64)	29
AVT result 2 Date/Time		30		33

EtherNet/IP™ IMPLEMENTATION

The network module supports **EtherNet/IP™**. The EDS file can be found on the documentation page of the web application or by going to panduit.com.

Rockwell Automation Integration

The **EtherNet/IP™** protocol is supplemented by a Add-On Profile (AOP) for easy integration with products from Rockwell Automation. The AOP supports the Automatic Diagnostics feature.

- AOP available in Studio 5000 Logix Designer V33.01 or greater

AUTOMATIC DIAGNOSTIC AOP ITEMS

REQUIREMENTS

- Logix controller must be V33 or greater
- Factory Talk View software must be V12 or greater

CONNECTIVITY STATUS

WORD(2)

- Sensor lead status is based on the last completed test. This value will only be updated when a test is completed with no voltage present.

TABLE 1.

	Bit			
	0	**1**	**2**	**3**
Connectivity Status	Connected L1	Connected L2	Connected L3	Connected PE GND
Diagnostic Message	0: L1 Sensor lead disconnected 1: L1 Sensor lead connected	0: L2 Sensor lead disconnected 1: L2 Sensor lead connected	0: L3 Sensor lead disconnected 1: L3 Sensor lead connected	0: PE GND Sensor lead disconnected 1: PE GND Sensor lead connected

STATUS

DWORD(4)

- Status bits associated with the network module and AVT. This value will only be updated when an abcense of voltage test is completed.

TABLE 2.

	Bit			
	0	**1**	**2**	**3**
Status	**Battery Warning Indicator** 0: Battery OK 1: Check battery (Battery low or not present)	**AVT Temperature Fault** 0: OK 1: Fault	**AVT Internal Fault** 0: OK 1: Fault	**Network Module Fault** 0: OK 1: Fault
Diagnostic Message	0: Battery OK 1: Check battery	0: AVT temperature OK 1: AVT temperature fault	0: AVT OK 1: AVT Internal fault	0: Network module OK 1: Network module fault

AVT RESULT 1
WORD(2)

- Most recent test result of an AVT test
  - This report has the following possible bit states to indicate a passed test or the reason for a failed AVT test

TABLE 3.

	Bit				
	0	1	2	3	4
AVT Result 1	Passed 0F	Battery voltage low 1F	Voltage exceeded 2F	Temperature not in range 3F	Connectivity not confirmed 4F
Diagnostic Message	0: AVT test failed 1: AVT test passed	0: OK 1: AVT battery low	0: OK 1: Voltage exceeds AVT limits	0: OK 1: AVT temperature outside supported range	0: OK 1: AVT sensor lead disconnected

	Bit continued			
	5	6	7	8
AVT Result 1	Diagnostic 5 5F	Diagnostic 6 6F	Diagnostic 7 7F	Diagnostic 8
Diagnostic Message	0: OK 1: AVT diagnostic 5	0: OK 1: AVT diagnostic 6	0: OK 1: AVT diagnostic 7	0: OK 1: AVT diagnostic 8

Troubleshooting

FAULTS

When a fault is active the user will also see an exclamation point in the left sidebar and in the active faults menu of the settings page

Fault	Troubleshooting
Hardware Failure (0) Network module system status indicator 2 flash error code	Contact Panduit support
Power over limit (1)	Check AVT connection for proper termination.
Settings files reset to factory defaults(2)	Expected if new unit or user initiated a factory reset, do nothing in this case If repeatedly occurs replace unit
Data received from AVT was unable to be processed (3)	Check AVT connection Check AVT and Network module termination resistor switch positions.
Timeout while communicating with AVT (4)	Move AVT connection cable away from possible noise sources
SD card error (5)	Contact Panduit for support around SD Card errors and possibly reseating or replacing the SD Card.
SD card full (6)	download logs (if necessary) and then delete logs from the web interface. restart the unit and confirm the system is able to log.
Stale Time (7)	Check NTP server can be reached from device location
Time not set (8)	Set time using the settings page (set time button or NTP time setup)
Could not load custom certificate(9)	Check that the certificate was generated properly and upload again.

CLEARING FAULTS

The user has the ability to clear active faults (see **Faults** section). If the network module determines the fault is still active it will repopulate. To verify a fault has been cleared restart the network module.

Warranty

PANDUIT LIMITED PRODUCT WARRANTY

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