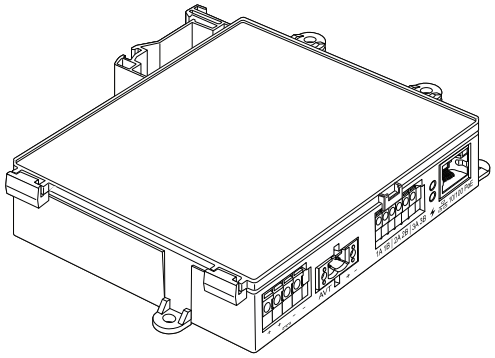
VeriSafe™

VeriSafe Network Module
Subject: User Guide
Lit. No.: B21176
Date: June 19 2023 **Revision:** 3 [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 Emails

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For more information
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1006819, B21176_EN_rev3

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Web Application

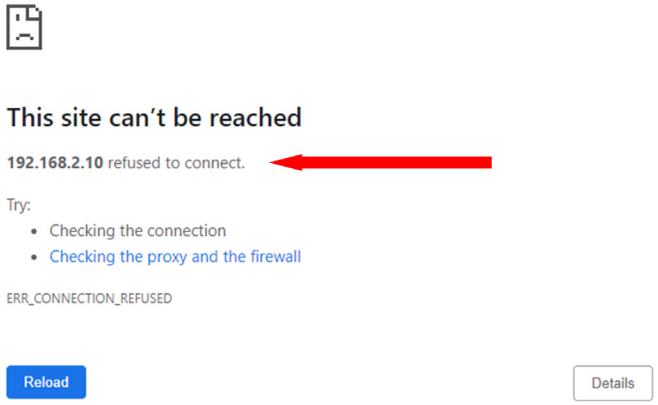
FEATURES

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

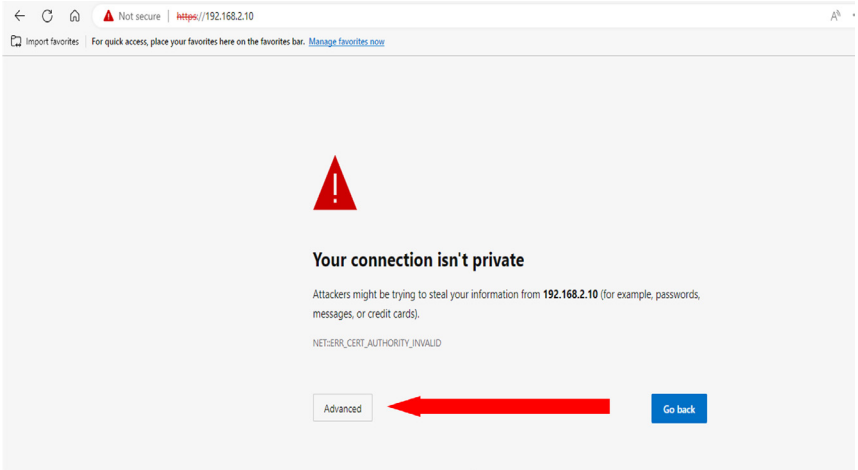
1. Type the network module IP address (default: 192.168.2.10) in a supported browser using HTTPS and not HTTP.
   - Supported browsers: Chrome, Edge, Firefox
2. If the Browser displays “refused to connect” please double check that you are using “https://” protocol and not “http://”

FIGURE 1. REFUSED CONNECTION EXAMPLE



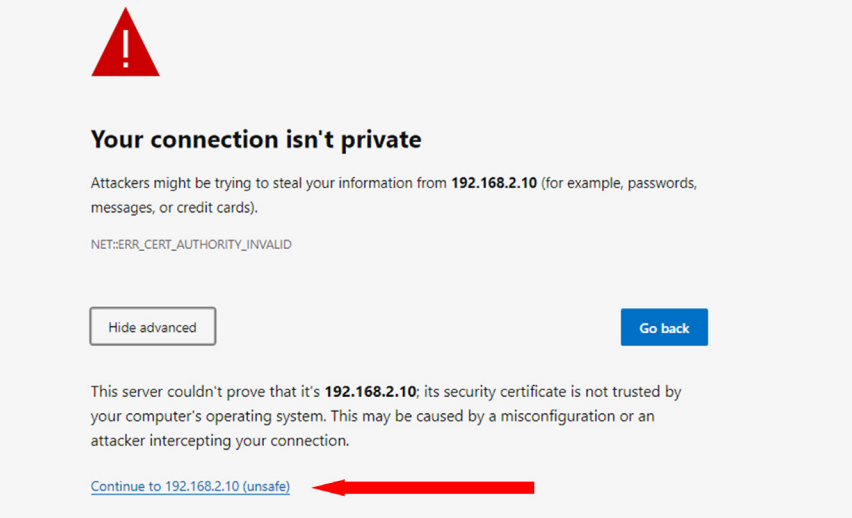
3. By Default, the Web Interface uses a self-signed certificate. Until a CA signed certificate / key is installed, browsers will display a security error. In Chrome browser, click advanced.

FIGURE 2. CERTIFICATE WARNING



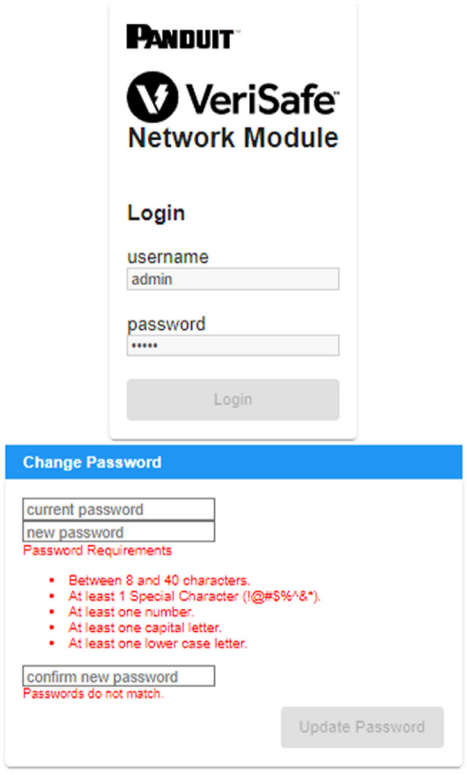
4. Click on “Continue to 192.168.2.10 (unsafe)” and you will be prompted to the VeriSafe Network Module web application page.

FIGURE 3. CONTINUE TO WEB APPLICATION LINK



5. On first login the user is required to change the admin password
   Web App Login (factory default setting)
   - Username: admin
     Password: admin

FIGURE 4. CHANGE PASSWORD



6. Before using the Network Module with an AVT unit, please ensure the firmware is updated to the latest version by selecting the image below. This will take you to Panduit’s products software/firmware page where the latest firmware version of the Network Module can be found.

WEB APPLICATION LAYOUT

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

FIGURE 5. WEB APPLICATION DASHBOARD

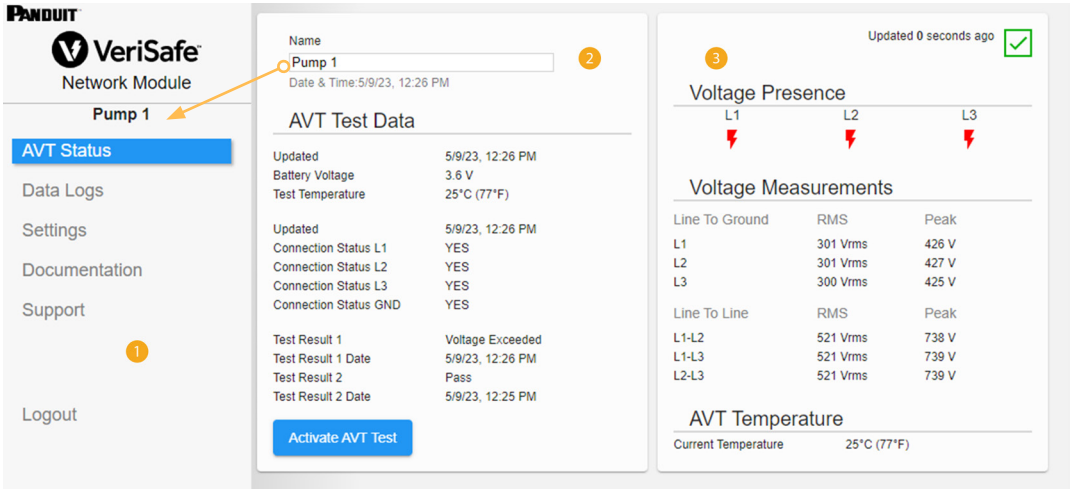
LOGIN

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

Sidebar Menu 1

1st Card 2

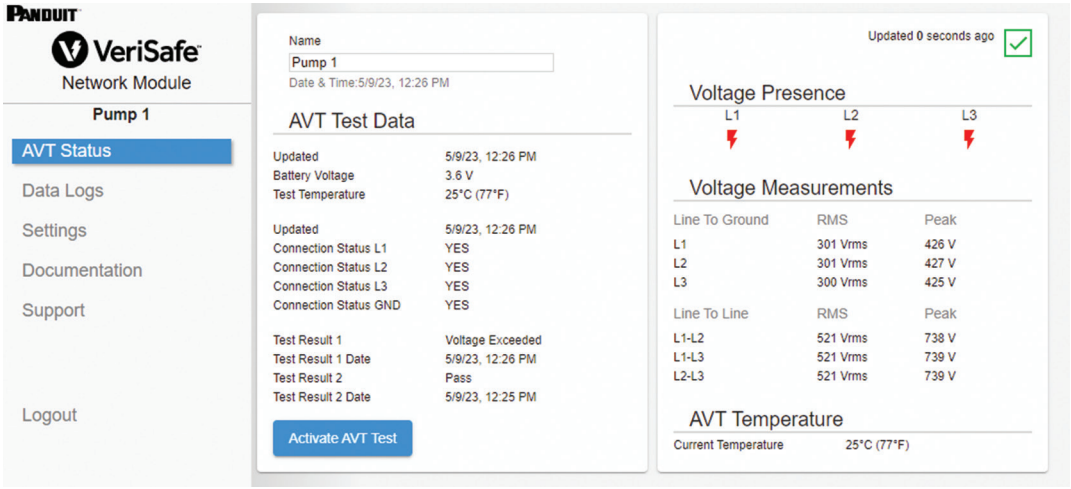
2nd Card 3



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.

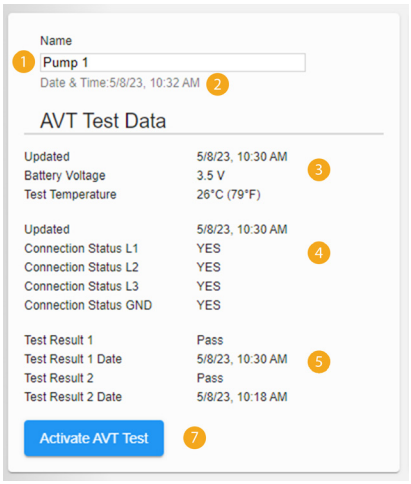
FIGURE 6. AVT STATUS PAGE 3-PHASE AVT (VS2-AVT-3P)



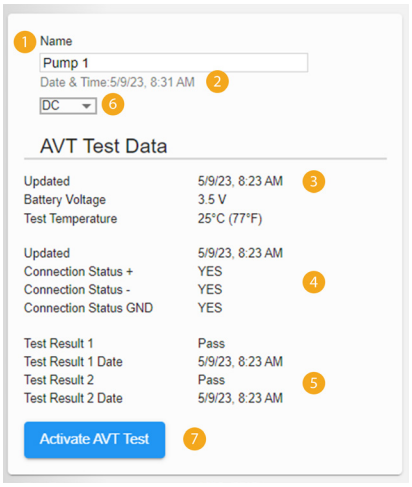
AVT STATUS PAGE FIRST CARD

Data presented in this card is updated as described in table 1. 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 7. AVT STATUS PAGE 1ST CARD VIEWS



3-Phase View



DC/Single-Phase View

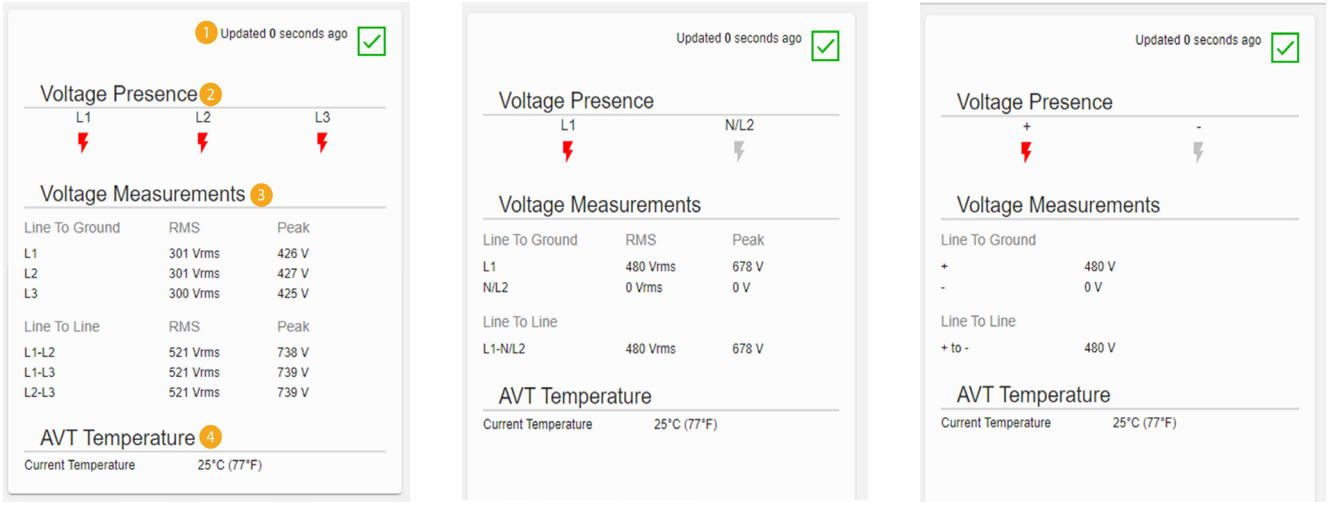
TABLE 1.

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 Test 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)**	Selects the appropriate power system. This will update the card view. Changes are automatically saved.
7. Activate AVT Test Button	Starts the absence of voltage test

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 (table 1, item 6 AC/DC selection).

FIGURE 8. AVT STATUS PAGE SECOND CARD VIEWS



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

TABLE 2.

1. AVT Connection Status	Indicates status of the connection between the isolation module and network module. ☑ OK ⓘ DISCONNECTED
2. Voltage presence ↯	▪ Reflects the status of the voltage presence indicators (Red LEDs) on the indicator module ▪ Reflects the status of the voltage presence contacts on the network module.
3. Voltage Measurements	▪ Measured peak voltage line to ground ▪ Calculated RMS and line to line voltages
4. AVT Temperature	▪ Represents the current temperature inside the AVT that is updated every 2 seconds.

AC Range	*Accuracy
0-33 VAC	± 7V
34-99 VAC	± 5V
100-300 VAC	± 2%
301-1000 VAC	± 1.5%

DC Range	*Accuracy
0-100 VDC	± 5V
101-300 VDC	± 4%
301-700 VDC	± 2%
701-1000 VDC	± 1.5%

To get the most accurate voltage readings, ensure the appropriate power system configuration is selected in the web application.

*All values in this table are to be used as a reference and are expected to be within these ranges.

Note: The absence of voltage indication from the AVT utilizes a separate circuit that is 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 9. DATA LOGS PAGE DETAILS

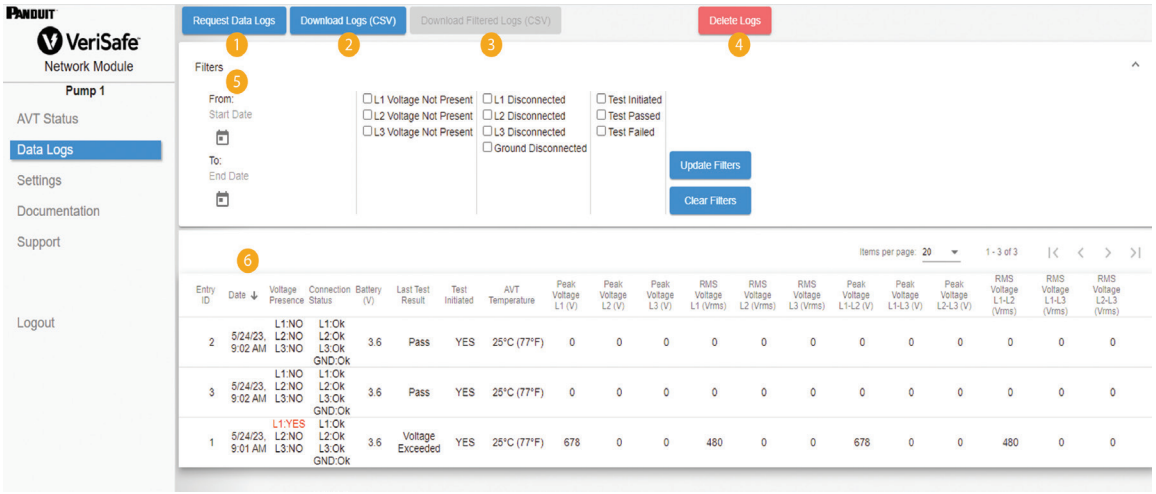


TABLE 3.

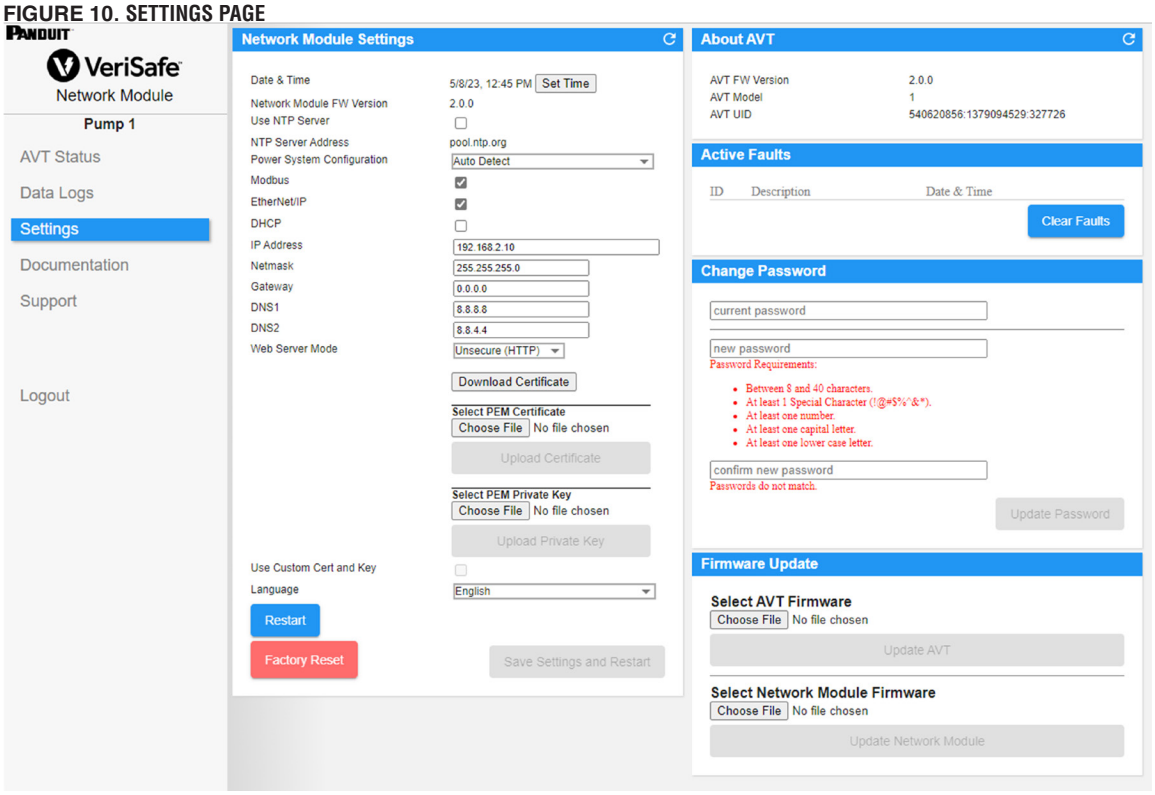
1. Request Data Logs	Request data log file from the network module
2. Download Logs (CSV)	Download the data log file to local PC in CSV form
3. Download Filtered Logs (CSV)	If filters are applied download the filtered data set only
4. Delete Logs	Deletes all entries from the data log file
5. Filters	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

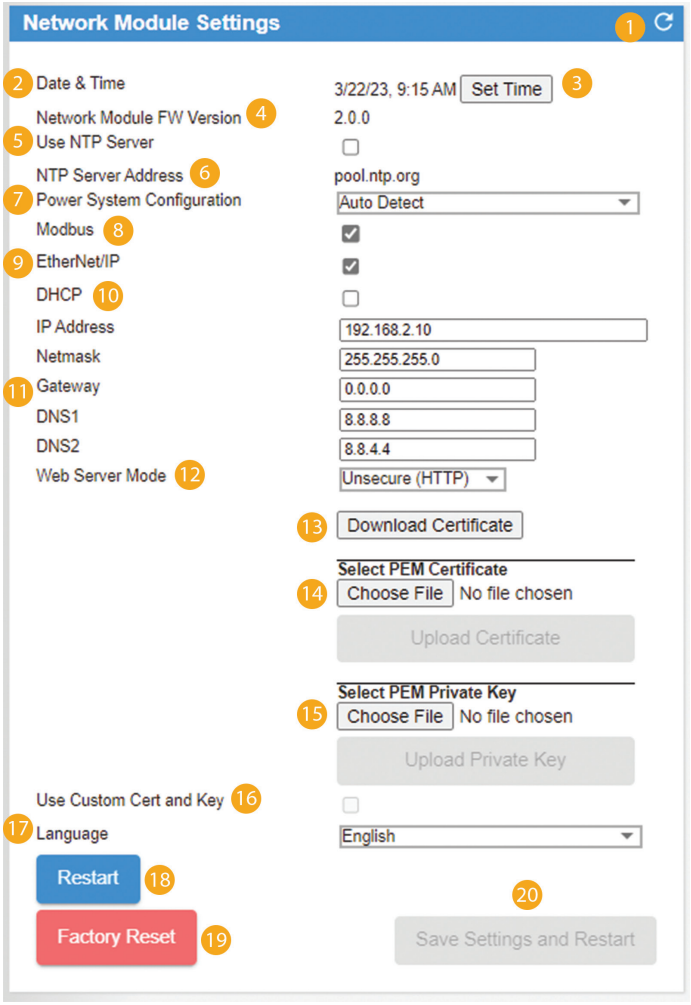
The settings page allows the user to configure and view the current state of the network module, retrieve AVT information, check active faults, and update firmware.

FIGURE 10. SETTINGS PAGE



NETWORK MODULE SETTINGS

FIGURE 11. NETWORK MODULE SETTINGS CARD DETAILS



REFRESH 1

Replace all data in fields with the last saved settings.

SAVE SETTINGS AND RESTART 20

Saves modified settings and restarts the network module.

RESTART 18

Restart the network module without saving changes to settings.

FACTORY RESET 19

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 (refer to document no. B21148 VeriSafe Network Module Installation Requirements Manual under the System Overview Section for location on the Network Module).

TABLE 4.

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 correct power system configuration must be selected. Default is Auto-Detect *
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

Continued on next page

12. Web Server Mode	The web server can be configured for either HTTP or HTTPS (default is HTTPS)
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**

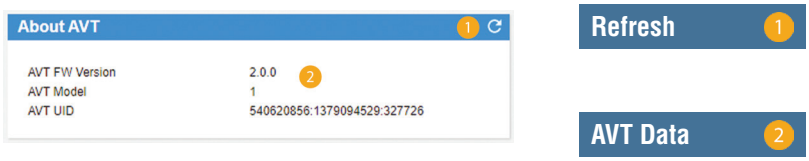
The AVT measures voltage between the sensor leads and ground leads and computes the associated phase-to-phase and RMS voltages. The voltage measurements are then reported to the network module.

To report accurate voltage data, the appropriate 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

FIGURE 12. ABOUT AVT CARD DETAILS

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



ACTIVE FAULTS

FIGURE 13. ACTIVE FAULTS CARD DETAILS

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

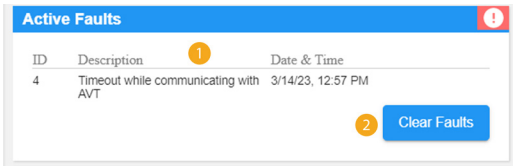


TABLE 5.

1. Faults

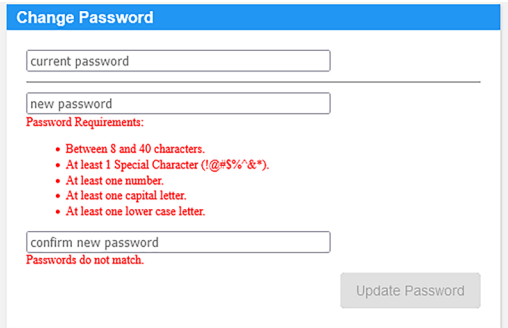
ID	Description
0	Network Module Hardware Failure. Flash code 2 during boot up
1	Power from the network module to the AVT is over the limit.
2	Indicate the network module has been reset to factory defaults
3	Data received from AVT was unable to be processed
4	Timeout while communicating with AVT
5	General 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

2. Clear Faults — The Clear Faults button allows the user to clear any faults on the network module. If the fault condition is still present then 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.

FIGURE 14.

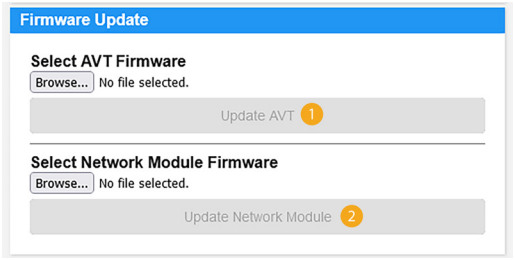


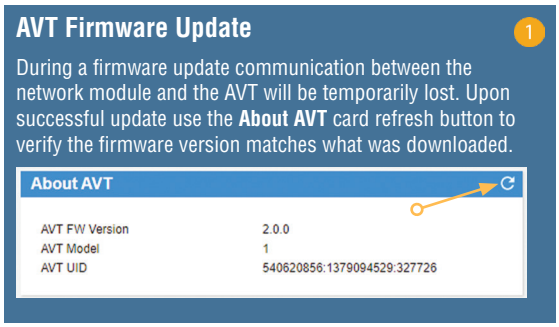
UPDATE FIRMWARE

Download the latest firmware at www.panduit.com

Select **Browse**, 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.

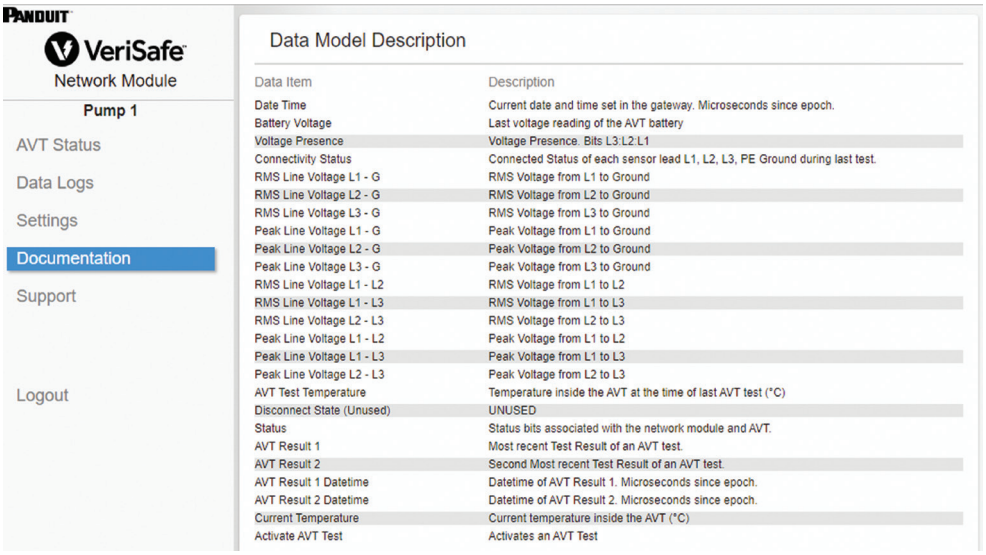
FIGURE 15. UPDATE FIRMWARE CARD





DOCUMENTATION PAGE

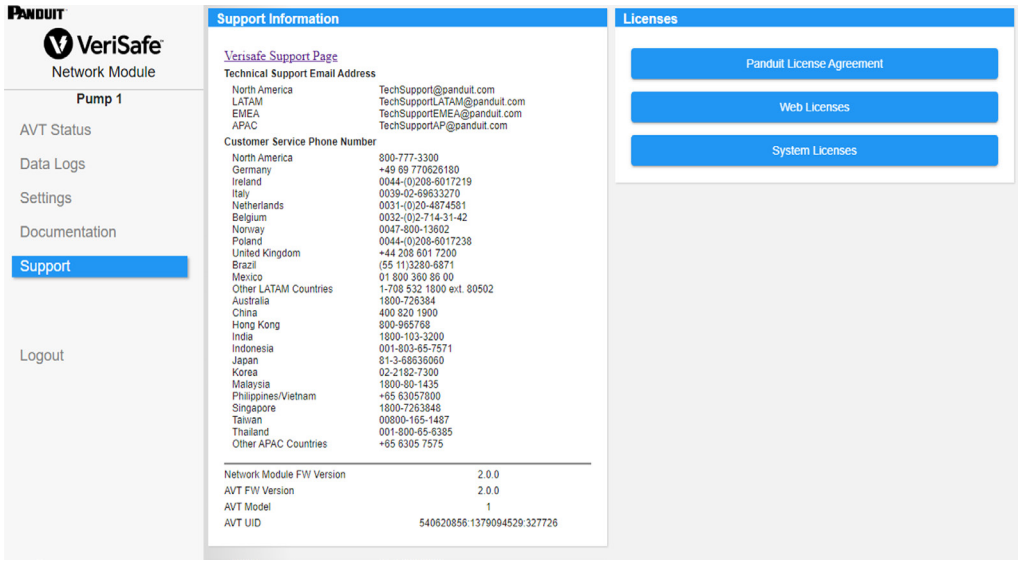
This page provides the user with the information necessary to utilize the **EtherNet/IP™** (EDS file download) and Modbus TCP communications protocols. The web-application documentation page has the appropriate EDS file readily available. For all other information regarding the communication protocols, please refer to page 14 on this manual for the EtherNet/IP™ data model and page 19 for the Modbus TCP data model.



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.
- Contains a Licenses section outlining the Panduit License Agreement as well as the Web and System licenses used in the creation of this product.

FIGURE 16. SUPPORT PAGE



Data Models

The following data models will describe the parameters utilized in the EtherNet/IP™ and Modbus TCP communication protocols.

ETHERNET/IP™ DATA MODEL

- Network Module Unit Object (100~Decimal, 64~Hex - 1 Instance)
- All attribute IDs are in decimal value for each data item.
- All attribute IDs are Instance 1 except for the revision item located in the first row of the table.

Item Name	Description	Value Type (size bytes)	Range
Revision (Instance 0)	Revision Number Attribute ID: 1 Access Rule: Get	UINT(2)	Data Value: 2
Battery Voltage	Last voltage reading of the AVT battery (last test) Attribute ID: 1 Access Rule: Get	REAL(4)	0.0 to 4.0 V
Date/Time	Current Date/Time set in the network module Attribute ID: 2 Access Rule: Get	ULINT(8)	microseconds since epoch
Voltage Presence	Bit field status of the phase indicator LEDs (red LEDs) Attribute ID: 3 Access Rule: Get	WORD(2)	Bit 0: Present L1 POS Bit 1: Present L2 NEG Bit 2: Present L3 0: Voltage not detected 1: Voltage detected
Connectivity Status	Connected status of each sensor lead L1, L2, L3, PE Ground during last test. Attribute ID: 4 Access Rule: Get	WORD(2)	Bit 0: Connected L1 Bit 1: Connected L2 Bit 2: Connected L3 Bit 3: Connected PE GND 0: Sensor lead disconnected 1: Sensor lead connected

Continued on next page

Item Name		Description	Value Type (size bytes)	Range
Line to Ground RMS Voltage	L1-G	L1 to Ground Attribute ID: 5 Access Rule: Get	INT(2)	0 to 1100 Vrms
	L2-G	L2 to Ground Attribute ID: 6 Access Rule: Get		
	L3-G	L3 to Ground Attribute ID: 7 Access Rule: Get		
Line to Ground Peak Voltage	L1-G	L1 to Ground Attribute ID: 8 Access Rule: Get		0 to 1500 V
	L2-G	L2 to Ground Attribute ID: 9 Access Rule: Get		
	L3-G	L3 to Ground Attribute ID: 10 Access Rule: Get		
Line to Line RMS Voltage	L1-L2	L1 to L2 Attribute ID: 11 Access Rule: Get		0 to 1100 Vrms
	L1-L3	L1 to L3 Attribute ID: 12 Access Rule: Get		
	L2-L3	L2 to L3 Attribute ID: 13 Access Rule: Get		
Line to Line Peak Voltage	L1-L2	L1 to L2 Attribute ID: 14 Access Rule: Get		0 to 1500 V
	L1-L3	L1 to L3 Attribute ID: 15 Access Rule: Get		
	L2-L3	L2 to L3 Attribute ID: 16 Access Rule: Get		
Test temperature		Temperature inside the AVT at the time of the last AVT test (°C) Attribute ID: 17 Access Rule: Get		-40°C to 85°C (-40°F to 185°F)
Disconnect state [NOT IMPLEMENTED]		Disconnect phase open or closed Attribute ID: 18 Access Rule: Get	WORD(2)	Bit 0: L1 open Bit 1: L2 open Bit 2: L3 open 0: Blade closed 1: Blade open

Continued on next page

Item Name	Description	Value Type (size bytes)	Range
Status	Status bits associated with the network module and AVT Attribute ID: 19 Access Rule: Get	DWORD(4)	

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

Continued on next page

<table>
<tr><th>Item Name</th><th>Description</th><th>Value Type (size bytes)</th><th>Range</th></tr>
<tr>
<td>AVT Result 1</td>
<td>Most recent test result of an AVT test

Attribute ID: 20
Access Rule: Get</td>
<td>WORD(2)</td>
<td>
<table>
<tr><th>Bit</th><th>Result</th></tr>
<tr><td>0</td><td>Passed
0F</td></tr>
<tr><td>1</td><td>Battery Voltage Low
1F</td></tr>
<tr><td>2</td><td>Voltage Exceeded
2F</td></tr>
<tr><td>3</td><td>Temperature not in range
3F</td></tr>
<tr><td>4</td><td>Connectivity not Confirmed
4F</td></tr>
<tr><td>5</td><td>Diagnostic 5
5F</td></tr>
<tr><td>6</td><td>Diagnostic 6
6F</td></tr>
<tr><td>7</td><td>Diagnostic 7
7F</td></tr>
<tr><td>8</td><td>Diagnostic 8
8</td></tr>
</table>
#F indicates the number of flashes that will be seen on the AVT indicator module for this error code
0: false
1: true
</td>
</tr>
</table>

Continued on next page

<table>
<tr><th>Item Name</th><th>Description</th><th>Value Type (size bytes)</th><th>Range</th></tr>
<tr><td>AVT Result 2</td><td>Second most recent test result of an AVT test

Attribute ID: 21
Access Rule: Get</td><td>WORD(2)</td><td>
<table>
<tr><th>Bit</th><th>Result</th></tr>
<tr><td>0</td><td>Passed
0F</td></tr>
<tr><td>1</td><td>Battery Voltage Low
1F</td></tr>
<tr><td>2</td><td>Voltage Exceeded
2F</td></tr>
<tr><td>3</td><td>Temperature not in range
3F</td></tr>
<tr><td>4</td><td>Connectivity not Confirmed
4F</td></tr>
<tr><td>5</td><td>Diagnostic 5
5F</td></tr>
<tr><td>6</td><td>Diagnostic 6
6F</td></tr>
<tr><td>7</td><td>Diagnostic 7
7F</td></tr>
<tr><td>8</td><td>Diagnostic 8
8</td></tr>
</table>
#F indicates the number of flashes that will be seen on the AVT indicator module for this error code
0: false
1: true
</td></tr>
<tr><td>AVT Result 1 Date/Time</td><td>Date/Time of AVT result 1
Attribute ID: 22
Access Rule: Get</td><td>ULINT(8)</td><td>Microseconds since epoch</td></tr>
<tr><td>AVT Result 2 Date/Time</td><td>Date/Time of AVT result 2
Attribute ID: 23
Access Rule: Get</td><td>ULINT(8)</td><td>Microseconds since epoch</td></tr>
<tr><td>Current Temperature</td><td>Current Temperature inside the AVT (°C)
Attribute ID: 24
Access Rule: Get</td><td>INT(2)</td><td>-40°C to 85°C (-40°F to 185°F)</td></tr>
<tr><td>Activate AVT Test</td><td>Starts the absence of voltage test
Attribute ID: 25
Access Rule: Get/Set</td><td>DINT(4)</td><td>0: Test not activated
1: Test activated</td></tr>
</table>

MODBUS TCP DATA MODEL

INPUT DATA

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

Input Data Item	Description	Value Type (size bytes)	Range
Date/Time	Current Date/Time set in the network module Start Address: 1 End Address: 4	uint64_t(8)	Microseconds since epoch
Battery Voltage	Last voltage reading of the AVT battery (last test) Start Address: 5 End Address: 6	float(4)	0.0 to 4.0 V
Voltage Presence	Bit field status of the phase indicator LEDs (red LEDs) Start Address: 7 End Address: 7	uint16_t(2)	Bit / Bit Name 0 / Present L1 POS 1 / Present L2 NEG 2 / Present L3 0: Voltage not detected 1: Voltage detected
Connectivity Status	Connected status of each sensor lead L1, L2, L3, PE Ground during last test. Start Address: 8 End Address: 8	uint16_t(2)	Bit / Bit Name 0 / Connected L1 1 / Connected L2 2 / Connected L3 3 / Connected PE GND 0: Sensor lead disconnected 1: Sensor lead connected

Continued on next page

Input Data Item		Description	Value Type (size bytes)	Range
Line to Ground RMS Voltage	L1-G	L1 to Ground Start Address: 9 End Address: 9	int16_t(2)	0 to 1100 Vrms
	L2-G	L2 to Ground Start Address: 10 End Address: 10		
	L3-G	L3 to Ground Start Address: 11 End Address: 11		
Line to Ground Peak Voltage	L1-G	L1 to Ground Start Address: 12 End Address: 12		0 to 1500 V
	L2-G	L2 to Ground Start Address: 13 End Address: 13		
	L3-G	L3 to Ground Start Address: 14 End Address: 14		
Line to Line RMS Voltage	L1-L2	L1 to L2 Start Address: 15 End Address: 15		0 to 1100 Vrms
	L1-L3	L1 to L3 Start Address: 16 End Address: 16		
	L2-L3	L2 to L3 Start Address: 17 End Address: 17		
Line to Line Peak Voltage	L1-L2	L1 to L2 Start Address: 18 End Address: 18		0 to 1500 V
	L1-L3	L1 to L3 Start Address: 19 End Address: 19		
	L2-L3	L2 to L3 Start Address: 20 End Address: 20		
Test temperature		Temperature inside the AVT at the time of the last AVT test (°C) Start Address: 21 End Address: 21		-40°C to 85°C (-40°F to 185°F)
Disconnect state [NOT IMPLEMENTED]		Disconnect phase open or closed Start Address: 22 End Address: 22	uint16_t(2)	Bit / Description 0 L1 open 1 L2 open 2 L3 open 0: Blade Closed 1: Blade Opened

Continued on next page

Input Data Item	Description	Value Type (size bytes)	Range	
			Bit	**Bit Name**
Status	Status bits associated with the network module and AVT Start Address: 23 End Address: 24	uint32_t(4)	0	**Battery Warning Indicator** 0: Battery OK 1: Check battery (low or not present)
			1	**AVT Temperature Fault** 0: OK 1: Fault
			2	**AVT Power Source** 0: Battery 1: Aux
			3	**Phase Number** 0: 3 Phase 1: Single phase
			4	**User Threshold Triggered** [NOT IMPLEMENTED] 0: Not triggered 1: Triggered If any user defined threshold is triggered this bit will go to active (1)
			5	**Disconnect Module Present** [NOT IMPLEMENTED] 0: No 1: Yes
			6	**AVT Internal Fault** 0: OK 1: Fault
			7	**Network Module Fault** 0: OK 1: Fault

Continued on next page

<table>
<tr><th>Input Data Item</th><th>Description</th><th>Value Type (size bytes)</th><th>Range</th></tr>
<tr>
<td>AVT Result 1</td>
<td>Most recent test result of an AVT test

Start Address: 25
End Address: 25</td>
<td>uint16_t(2)</td>
<td>
<table>
<tr><th>Bit</th><th>Result</th></tr>
<tr><td>0</td><td>Passed
0F</td></tr>
<tr><td>1</td><td>Battery Voltage Low
1F</td></tr>
<tr><td>2</td><td>Voltage Exceeded
2F</td></tr>
<tr><td>3</td><td>Temperature not in range
3F</td></tr>
<tr><td>4</td><td>Connectivity not Confirmed
4F</td></tr>
<tr><td>5</td><td>Diagnostic 5
5F</td></tr>
<tr><td>6</td><td>Diagnostic 6
6F</td></tr>
<tr><td>7</td><td>Diagnostic 7
7F</td></tr>
<tr><td>8</td><td>Diagnostic 8
8</td></tr>
</table>
#F indicates the number of flashes that will be seen on the AVT indicator module for this error code
0: false
1: true
</td>
</tr>
</table>

Continued on next page

<table>
<tr><th>Input Data Item</th><th>Description</th><th>Value Type (size bytes)</th><th>Range</th></tr>
<tr><td>AVT Result 2</td><td>Second most recent test result of an AVT test
Start Address: 26
End Address: 26</td><td>uint16_t(2)</td><td>
<table>
<tr><th>Bit</th><th>Result</th></tr>
<tr><td>0</td><td>Passed
0F</td></tr>
<tr><td>1</td><td>Battery Voltage Low
1F</td></tr>
<tr><td>2</td><td>Voltage Exceeded
2F</td></tr>
<tr><td>3</td><td>Temperature not in range
3F</td></tr>
<tr><td>4</td><td>Connectivity not Confirmed
4F</td></tr>
<tr><td>5</td><td>Diagnostic 5
5F</td></tr>
<tr><td>6</td><td>Diagnostic 6
6F</td></tr>
<tr><td>7</td><td>Diagnostic 7
7F</td></tr>
<tr><td>8</td><td>Diagnostic 8
8</td></tr>
</table>
#F indicates the number of flashes that will be seen on the AVT indicator module for this error code
0: false
1: true
</td></tr>
<tr><td>AVT Result 1 Date/Time</td><td>Date/Time of AVT result 1
Start Address: 27
End Address: 30</td><td>uint64_t(8)</td><td>Microseconds since epoch</td></tr>
<tr><td>AVT Result 2 Date/Time</td><td>Date/Time of AVT result 2
Start Address: 31
End Address: 34</td><td>uint64_t(8)</td><td>Microseconds since epoch</td></tr>
<tr><td>Current Temperature</td><td>Current Temperature inside the AVT (°C)
Start Address: 35
End Address: 35</td><td>int16_t(2)</td><td>-40°C to 85°C (-40°F to 185°F)</td></tr>
<tr><td>Data Model Version</td><td>Version number of the data model
Start Address: 36
End Address: 36</td><td>int16_t(2)</td><td>Data Value: 2</td></tr>
</table>

OUTPUT DATA

Output Coils Available (offset 0)

Output Coil	Description	Bit Number
Activate AVT Test	0: Coil resets to 0 once test is complete 1: Activates an AVT test	1

Rockwell Automation Integration

The **EtherNet/IP™** protocol is supplemented by an 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 6.

	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 absence of voltage test is completed.

TABLE 7.

	Bit			
	0	1	6	7
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 8.

	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

Security

The Network Module contains software that stores user entered data. All data entered by the user is stored in non-volatile storage on the system running the software.

NON-VOLATILE STORAGE

- The Network Module uses non-volatile storage to store all configuration information.

AUTHENTICATION DATA

- Passwords used for managing the software are stored as a one way bcrpyt hash.
- Passwords that the user enters are not returned to the customer.
  (They are 'write only' from a user perspective)

NETWORK TRANSPORT SECURITY

- The product generates a random SSH RSA 2048-bit private host key the first time the product starts up.
- The product has a randomly generated RSA 2048-bit private key configured by the factory. This key is used to generate a HTTPS certificate the first time the product boots up.
- The user may upload a custom HTTPS certificate and private key.
  - The HTTPS certificate should use a SHA-256 signature.
  - The private key should be RSA 2048-bit or prime256v1 (SECP256R1).
  - Other private key types may work, but performance may be negatively impacted if greater private key sizes are used: RSA 3072-bit, RSA 4096-bit; ECC curves: SECP192R1, SECP224R1, SECP256R1, SECP384R1, SECP521R1, SECP192K1, SECP224K1, SECP256K1, BP256R1, BP384R1, BP512R1, CURVE25519.
- The product uses TLS 1.2 to communicate with HTTPS browser clients.
- Secure communication cipher negotiation with HTTPS clients uses these Cipher Suites:
  - Cipher Suite: TLS_ECDHE_ECDSA_WITH_AES_128_GCM_SHA256 (0xc02b)
  - Cipher Suite: TLS_ECDHE_RSA_WITH_AES_128_GCM_SHA256 (0xc02f)
  - Cipher Suite: TLS_ECDHE_ECDSA_WITH_AES_256_GCM_SHA384 (0xc02c)
  - Cipher Suite: TLS_ECDHE_RSA_WITH_AES_256_GCM_SHA384 (0xc030)
  - Cipher Suite: TLS_ECDHE_ECDSA_WITH_CHACHA20_POLY1305_SHA256 (0xcca9)
  - Cipher Suite: TLS_ECDHE_RSA_WITH_CHACHA20_POLY1305_SHA256 (0xcca8)
  - Cipher Suite: TLS_DHE_RSA_WITH_AES_128_GCM_SHA256 (0x009e)
  - Cipher Suite: TLS_DHE_RSA_WITH_AES_256_GCM_SHA384 (0x009f)

NETWORK CONFIGURATION DATA

- Network Configuration, including Static IP addresses and addresses obtained by DHCP are exposed on a "Settings" page, to aid in network management of the product.

SECURE BOOT PROTECTION

- The product uses industry standard code signature algorithms to protect firmware booted by the device.
- A signature block is appended to the bootloader.
- The signature block contains a signature of the bootloader and the RSA 3072-bit public key.
- A digest of the RSA 3072-bit public key is stored in a write-once eFuse (which cannot be read or written to after being set) and used to verify the signature block.
- The public key signature is verified against the signature block and a digest of the bootloader to establish authenticity and integrity of the bootloader.
- The bootloader continues the chain of trust by verifying the authenticity and integrity of the application executable, by applying the same algorithm as used by the ROM bootloader to load the bootloader.

FIRMWARE UPDATE PROTECTION

- The product uses industry standard cryptography to verify a firmware update package, to establish authenticity and integrity.
- The package contains a manifest that describes items contained in the package payload.
- The items are described as a chunk size and a SHA256 hash of each sub-item and the payload container in the package.
- The manifest is hashed using SHA256 and signed using an RSA 4096 bit key.
- The package contains the signature of the hash of the manifest.
- The package contains a payload container holding the sub-items.
- The signature of the payload is verified before parsing the content of the manifest or the payload.

OTHER FEATURES

- The product includes a real-time clock and a capacitor that maintains time for a short amount of time when no power is applied. When combined with NTP, accurate timestamps on logs are provided.

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)	■ Power from the Network Module to the AVT is over the limit. ■ Check AVT connection to the Network Module 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) Timeout while communicating with AVT (4)	■ Check AVT connection to the Network Module ■ Check that the AVT and Network module termination resistor switches are positioned to the right (factory default) when facing the port. Refer to document no. B21148 (VeriSafe Network Module Installation Requirements Manual under the System Overview Section) ■ Move AVT connection cable away from possible noise sources ■ Ensure the Network Module and AVT have the latest firmware installed. This can be checked on the Network Module Settings Page.
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 **Settings Page** under the **Active 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

1. **Limited Product Warranty.** For purposes of this Limited Product Warranty, "**Panduit products**" mean all Panduit-branded products that Panduit sells. Unless a different time period is set forth in the Panduit product manual, user guide or other product documentation, Panduit warrants that the Panduit product, and each part or component of the Panduit product, will comply with Panduit's published specifications and will be free from defects in material and workmanship for a period of 1 year from the date of invoice from Panduit or its authorized distributor, not to exceed 18 months from the original date of shipment from Panduit's facility.
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