



SMART DRYKEEP INSTALLATION, OPERATION & MAINTENANCE INSTRUCTIONS

Moisture is the enemy.... DryKeep® is the answer.

We reserve the right to make changes to any described details and technical data contained herein. Continuous product enhancement by DryKeep® and local conditions may result in deviations from this standard product installation.

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DryKeep® is shipped from the factory fully assembled as shown in figure 1 below.

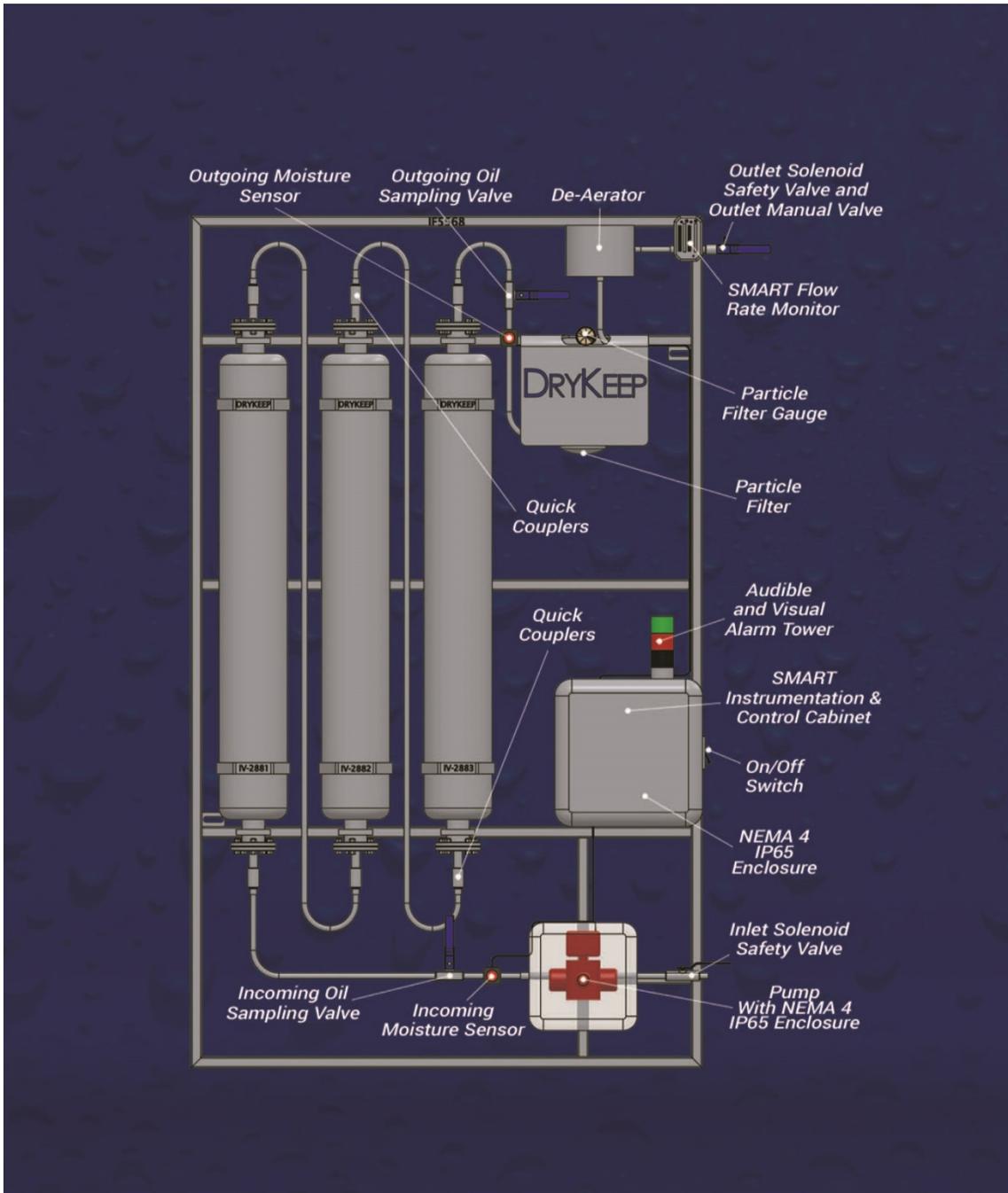


Figure 1: DryKeep® system layout

Although not shown, the installation for the single cylinder model SMART RT-3 is exactly the same.

The cylinders are factory filled with transformer oil and molecular sieve adsorbent beads. The unit can be mounted as received, or the cylinders can be removed prior to mounting to lighten the load and ease the installation process. The rest of the components are to be left on the framework. The DryKeep® system must be mounted vertically with inlet valve and the pump located at the bottom and de-aerator at the top. (Refer to Figure 1).

The installed location of DryKeep® is flexible. It can be installed wherever the customer prefers. For simple installation and optimal performance, DryKeep® should be installed as close to the transformer as possible. Some users elect to bolt or tack-weld the DryKeep® frame directly to the transformer tank as shown in Figure 2 below. Other options include hanging the DryKeep® frame on a wall near the transformer or securing the DryKeep® frame to a stand-alone frame adjacent to the transformer as shown in Figure 3. Contact DryKeep® USA for a recommended fabrication drawing. This remote, stand-alone frame is usually lag bolted to the concrete pad. If the optional climate-control enclosure is furnished, it is a free-standing enclosure which can also be lag bolted to a concrete pad.



Figure 2: DryKeep® installed directly on transformer



Figure 3: Installation adjacent to transformer on customer-fabricated free-standing frame

NOTE: We suggest that when installing the DryKeep® system on to a reactor that it be mounted on a free standing frame or an adjacent structure due to possible vibration influence on pipe work and connections. If mounted directly to the reactor structure, use vibration dampers. Contact us for further details.

FOR TRANSFORMERS IN-SERVICE:

For safety purposes, the transformer should be switched off and made safe before installation commences.

- 1) Upon receipt at the installation site, remove the top of the DryKeep® crate and unscrew the four (4) 1½” lag screws used to bolt the DryKeep® frame to the shipping crate. *Units with climate controlled enclosures are not bolted to the crate.*
- 2) Remove the system from the shipping crate and install the DryKeep® on the transformer, free-standing frame, wall or other structure, or position the optional enclosure to the location desired.
- 3) *Refer to Figures 1, 4, and 5.* To connect DryKeep® to the transformer, first remove the shipping plugs from the DryKeep® inlet and outlet valves.
- 4) Replace the transformer drain and fill valves flanges with flange adapters having ½” NPT unions (not supplied).
- 5) Using ½” NPT flexible stainless steel braided PTFE or other suitable flexible hose (not supplied), connect the bottom drain valve flange adapter to the DryKeep® inlet valve. To return the oil back to the transformer main tank, connect the ½” NPT hose to the DryKeep® outlet valve and then to the transformer fill valve flange adapter. *Optional climate-controlled enclosed units have pre-drilled entry points on the bottom and top of the right side of the enclosure. Use 1/2 in. stainless steel liquidtight cord connector and wire mesh grips to route hoses through enclosure wall to the inlet and outlet valves.*



Figure 4: Connection from transformer to DryKeep® inlet valve.

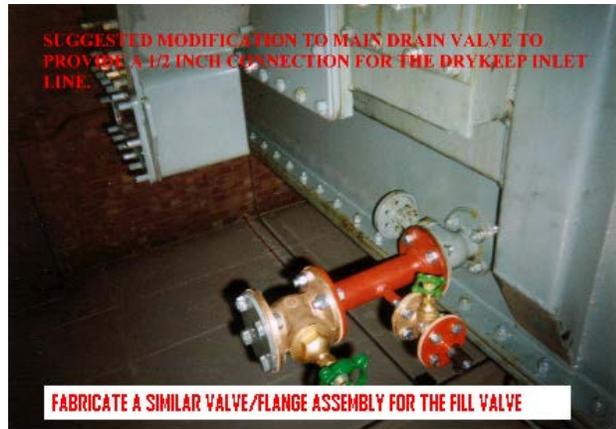


Figure 5: Drain valve adapted for DryKeep® installation

An optional installation kit containing ½” NPT flexible stainless steel braided PTFE hoses, flange adapters and fittings to connect to the transformer at the inlet and outlet is available. Contact DryKeep® USA for details.

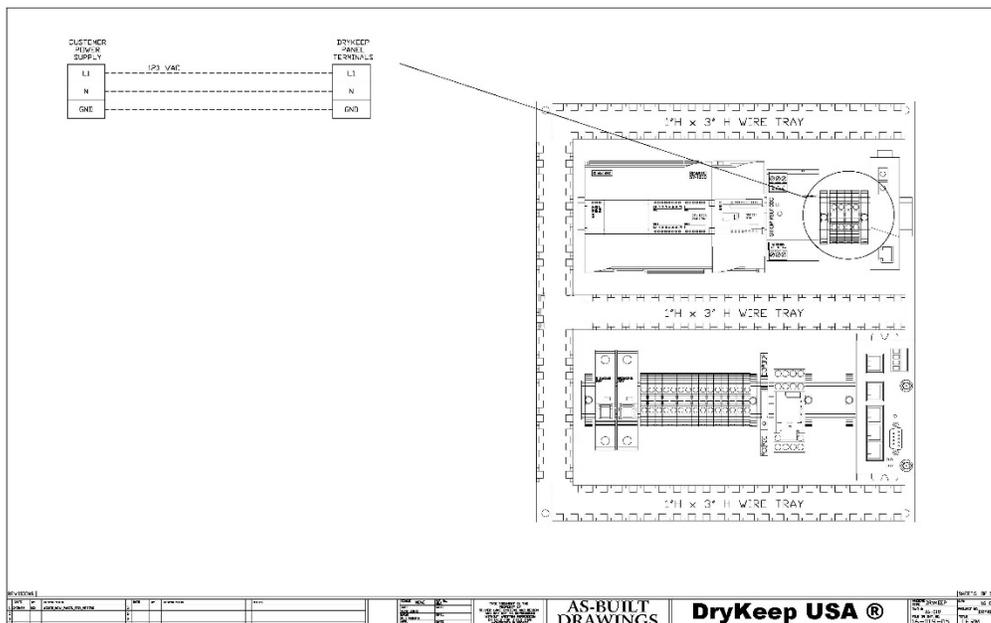
FOR TRANSFORMERS NOT IN SERVICE:

For transformers under repair and not containing oil, modifications can be made to the transformer tank to add entry and exit fittings for the DryKeep® system. The entry and exit fittings need to be diagonally apart from each other (i.e. if top left, then bottom right) to avoid re-circulating the just-dried oil. If this is not an option, DryKeep® can still be installed in the same manner as described above for a transformer in service by using the drain and fill valves of the transformer.

ELECTRICAL CONNECTIONS:

The DryKeep® SMART instrumentation components and pump are shipped internally pre-wired for operation. Only a 120V/60Hz or 240V/50Hz AC power source needs to be provided. Full load current is 3A. For units with the optional climate-controlled enclosure, full load current is 10A.

- 1) Remove the 4 screws in each corner and open the outside door of the instrumentation cabinet. *(Outside door is not supplied when unit is mounted inside the optional climate controlled enclosure.)*
- 2) Remove the top-right and bottom right screws on inner swing panel with LCD screen to open inner swing panel. *Units with the optional climate-controlled enclosure will have the stack lights shipped uninstalled. The stack lights will be shipped inside the instrumentation cabinet. The stack light base is installed on the top-right of the climate-control enclosure and is pre-wired for operation. To install the stack lights, line up the arrow on the stack lights with the arrow on the mounting base, push down and turn.*
- 3) Drill a hole in the instrumentation cabinet sized to accommodate the conduit using the appropriately sized liquidtight fitting (not supplied)**.
- 4) Refer to the supplied electrical wiring diagram. Connect the AC power supply by removing wire duct cover and lay supply wire into the wire duct.
- 5) Connect AC power supply ground wire to green/yellow ground terminal block.
- 6) Connect AC power supply neutral wire to white terminal block labeled N.
- 7) Connect AC power supply line wire to white terminal block labeled L1.



- 8) If connecting SMART DryKeep to SCADA or other CPU retrieval system, drill a second hole into the cabinet and run Ethernet or fiber optic cable into the instrumentation cabinet using the appropriately sized liquidtight fitting (not supplied)**.
- 9) Connect Ethernet cable to an available Ethernet port on the Red Lion RTU. Connect fiber optic cable to the fiber port on the Ethernet to fiber convertor.
- 10) Close inner swing panel and replace screws to secure it to the instrumentation cabinet. Close outer enclosure door (if supplied).

*** For units mounted inside the optional climate-controlled enclosure, drill a hole in the enclosure sized for the conduit. Run the AC power into the enclosure using the appropriately sized liquidtight fitting (not supplied) and connect to the SMART cabinet as per above. Do the same for Ethernet/fiber optic cable for SCADA or CPU connection.*

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COMMISSIONING:

- 1) Check to insure that the quick couplers on the top and bottom of each cylinder are fully tightened. Hand-tighten only. Do not use wrenches.
- 2) Refer to Figure 1. Ensure that the DryKeep® manual outlet valve is closed.
- 3) Open the manual inlet valve of the DryKeep® system. *The inlet and outlet solenoid safety valves will remain closed until the pump is powered on as explained below.*
- 4) Turn main power switch on the right side of the instrumentation cabinet to the “on” position.
- 5) The controller system will take a few minutes to cycle and start up. You will see two connection screens flash on the display screen (HMI). Once those connections are made, the first startup screen will display as shown in Figure 7 and you can press “YES” or “NO” to begin the setup.

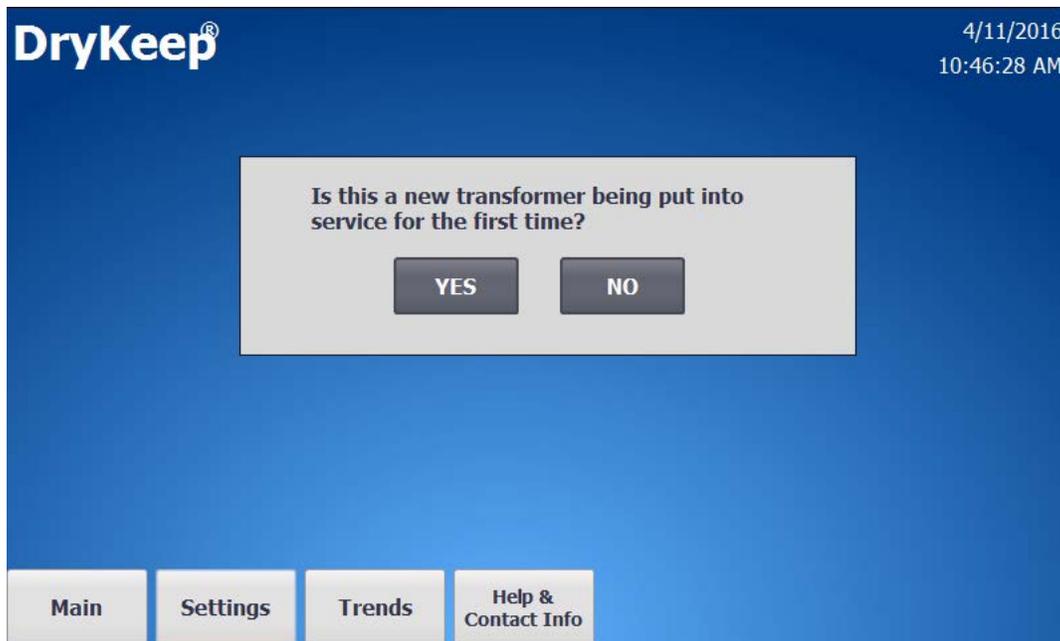


Figure 7: Initial startup screen when system is ready to be put in service

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- 6) For new transformers being placed into service for the first time, pushing “YES” on the screen will start the DryKeep® pump and open the inlet and outlet solenoid safety valves. From here, go to Step 10 below to continue commissioning. *In this mode, the system will be in the “Always Active” cycle. The pump will run continuously to remove residual or new moisture. The SMART display will go to the Main screen shown in Figure 8.*

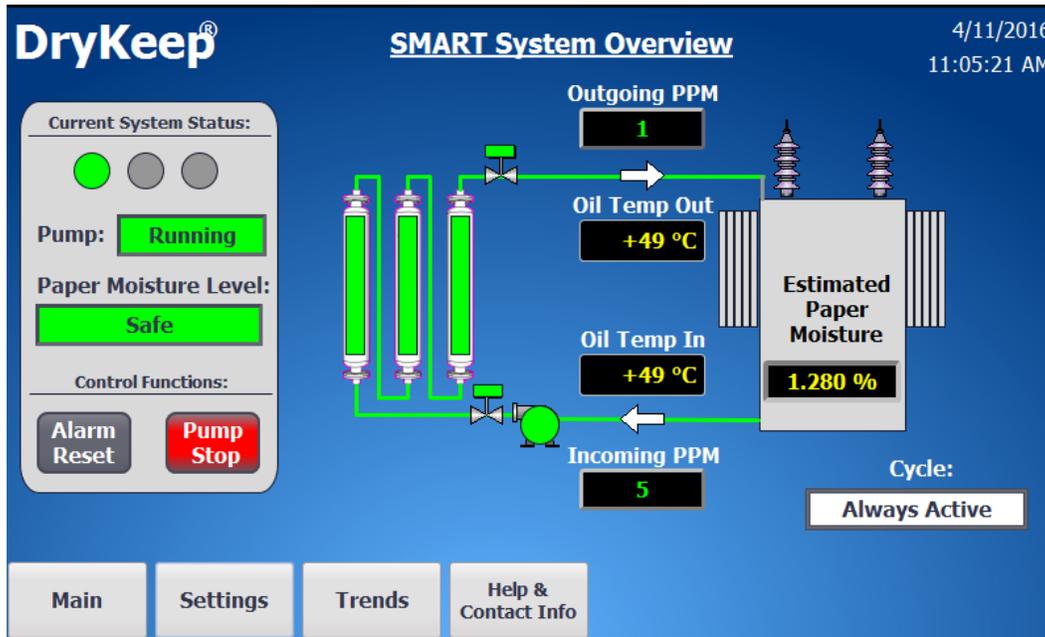


Figure 8: Main screen in Always Active Cycle for new transformers

- 7) If it is not a new transformer, answering “no” to the first question will bring you to the second setup screen shown in Figure 9.

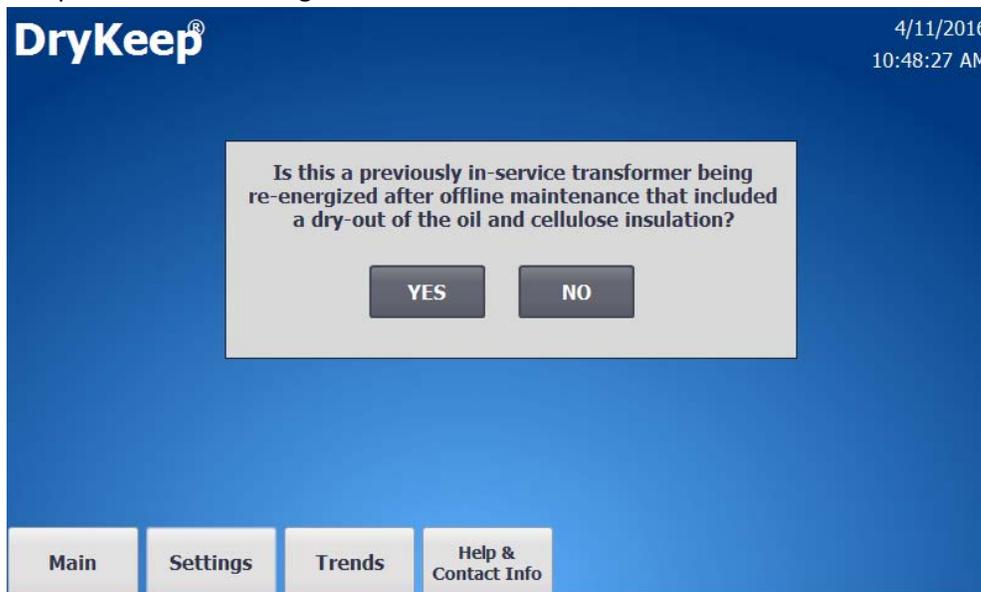


Figure 9: Second startup screen when system is ready to be put in service

- 8) For transformers that have just been dried down to sufficiently bring the level of moisture in the paper down to the acceptable level (at or below 1.3%) just prior to DryKeep® being installed, pushing “YES” on the screen shown in Figure 9 will start the DryKeep® pump and open the inlet and outlet solenoid safety valves. From here, go to Step 10 below to continue commissioning. *In this mode, the system will be in the “Always Active” cycle. The pump will run continuously to remove residual or new moisture. The SMART display will go to the Main screen shown in Figure 8.*
- 9) For transformers that are in-service and are considered to be “wet”, selecting “NO” again will start the DryKeep pump, open the inlet and outlet solenoid safety valves, and the system will enter the “Active” cycle. The SMART display will go to the Main screen shown in Figure 10.

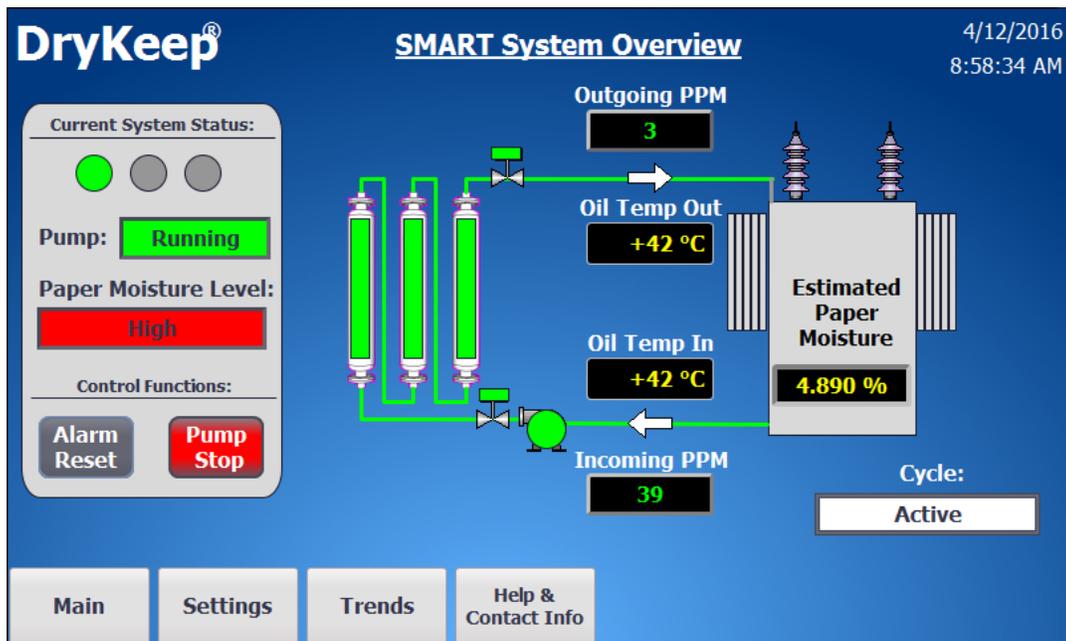


Figure 10: Main screen in Active Cycle for “wet” transformers

- 10) Refer back to Figure 1. Now that the pump is running, slowly open the bleed valve on the de-aerator tank. It is recommended that the installer have a vessel on hand to capture any oil that may come out of the bleed valve tube while it is open. Ensure that all the trapped air in the system escapes through the bleed valve tube on the de-aerator tank.
- 11) Close the bleed valve on the de-aerator tank and slowly open the manual outlet valve of the DryKeep® system.
- 12) Open the bleed valve again after about 15 minutes to remove any additional air from the system that may have collected in the top of the de-aerator. Again, it is recommended that the installer has a vessel on-hand to capture any oil that may come out of the bleed valve tube while it is open.

- 13) Monitor the system closely for 20 minutes to check for oil leaks, oil flow, and for any abnormalities. Once again, open the bleed valve on the de-aerator tank to remove any remaining air. Close the bleed valve. The system is now ready and running.
- 14) The controller will constantly monitor the oil as it enters the system from the transformer and calculate the estimated percent moisture in the paper. When the controller sees that the safe level of moisture has been reached, the controller will place the system in the “Safe Level Pending” cycle as shown in Figure 11 below. The system will continue in the “Safe Level Pending” cycle for 7 days to ensure that the transformer has reached a safe dry-down level.

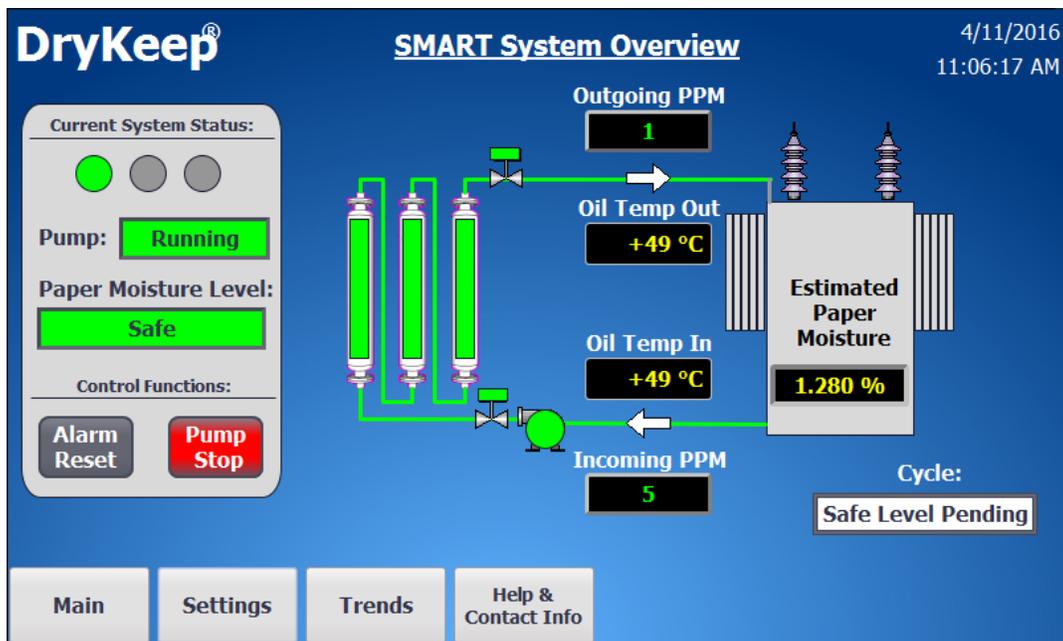


Figure 11: Main screen in Safe Level Pending cycle

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- 15) If the controller confirms during the Safe Level Pending cycle that the optimal percentage of moisture in the paper has been achieved, the controller will place the system into the “30 Day Inactive” cycle. The system pump will shut down for 30 days to prevent over-drying the paper. A counter is supplied under the cycle status to show how many days the pump has been inactive as shown in Figure 12.

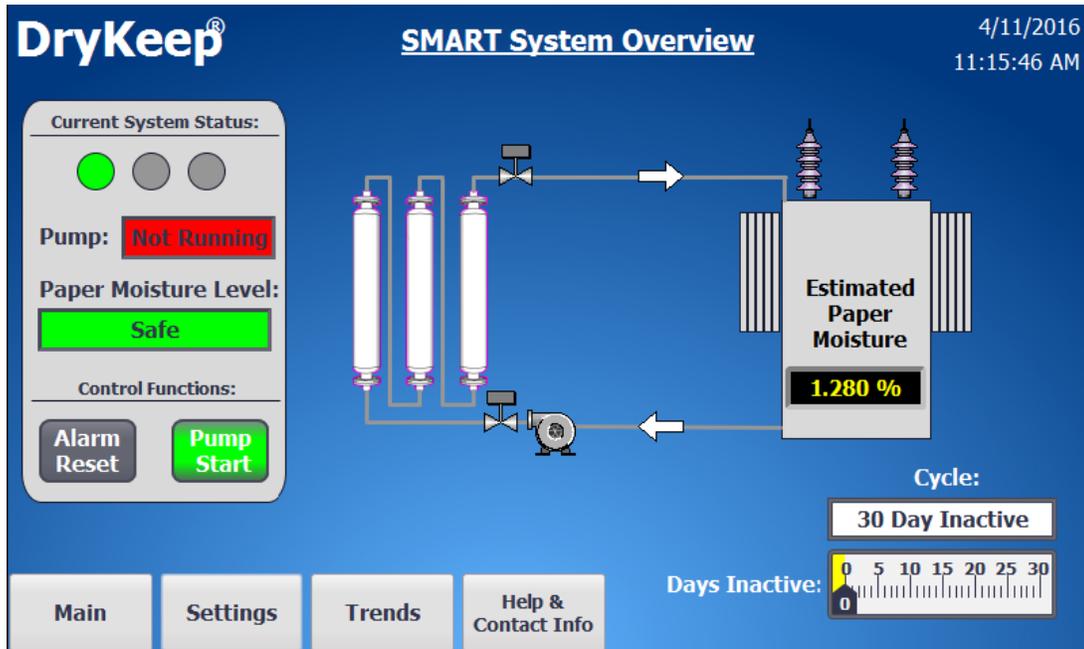


Figure 12: Main screen in 30 Day Inactive cycle

- 16) At any time during the 30 Day Inactive cycle, the user can place the system back into the Active cycle by going to the Settings screen and selecting the “Reset Cycle” button on the HMI as shown in Figure 13 below. The Reset Cycle option is only available during the 30 Day Inactive Cycle.



Figure 13: Settings screen with Reset Cycle option available during 30 Day inactive cycle

- 17) After 30 days, the controller will place the system back into the Active cycle and will analyze the incoming moisture-in-oil sensor readings for a period of 7 days. If the estimated moisture in the paper still shows 1.3% or less, the controller will place the system back into the Safe Level Pending and then 30 Day Inactive cycle. This process will repeat continuously to keep the transformer at a safe dry level, thus removing the risk of over-drying the paper insulation.

- 18) Selecting the Settings tab at the bottom of the Main screen brings up the Setting screen shown in in Figure 13. From the Settings screen,
 - a) The user can change the settings to a new transformer (the controller ignores the incoming moisture-in-oil sensor and never shuts the pump off in this setting unless a low flow/leak is detected),
 - b) Change the temperature displayed on the main screen to Celsius of Fahrenheit,
 - c) Change the system time,
 - d) See the total system running time, current cycle running time, and time since the last cylinder regeneration was performed.

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SCADA/CPU DATA RETRIEVAL

All SMART DryKeep® systems support DNP3 – slave and MODBUS RTU/TCP/ASCII/RTU SCADA protocols. Cellular alarming is also provided with multi-carrier 4G LTE support with 3G and 2G fallback. (Customer needs to provide their own SIM card with data plan for cellular alarming).

The default IP addresses are as follows:

PLC IP: 192.168.2.70

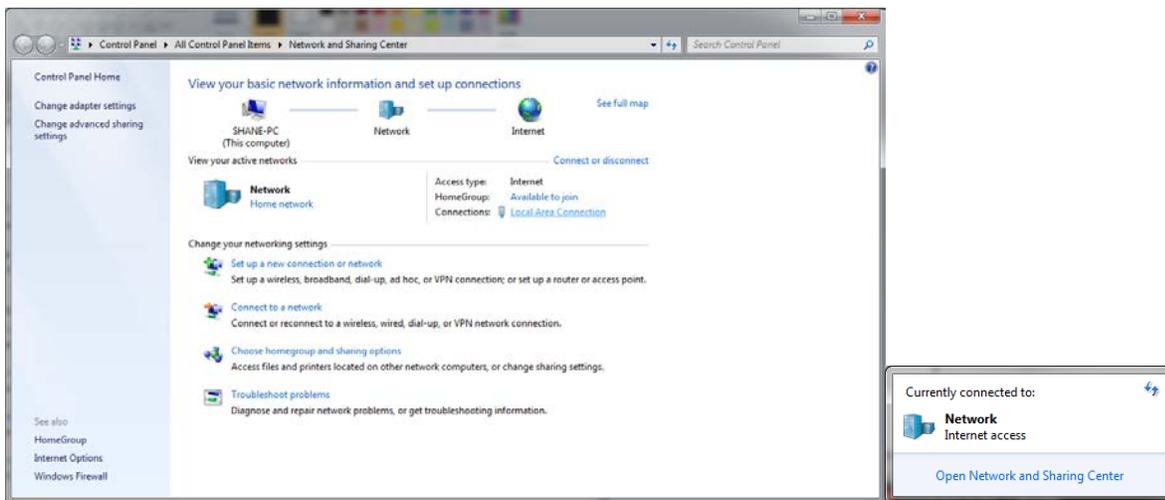
HMI IP: 192.168.2.71

Red Lion SIXNET RTU IP: 192.168.2.72

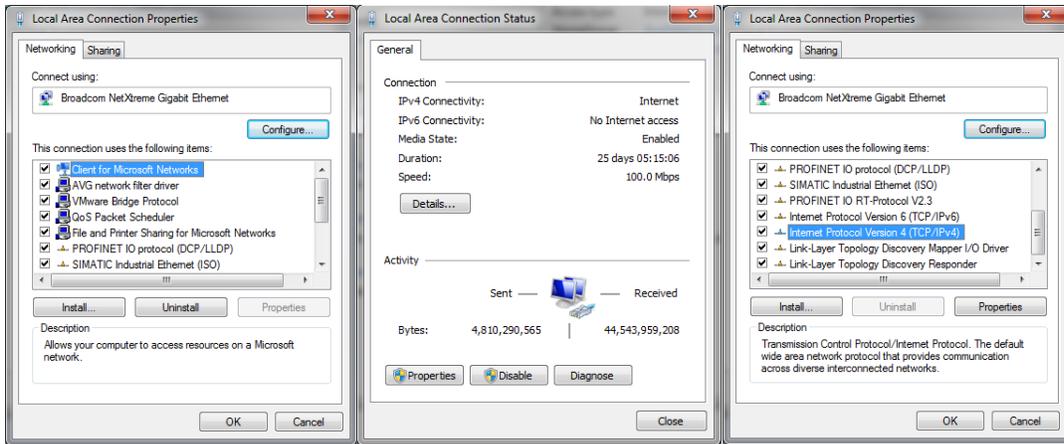
To get the data via Modbus/DNP3 set up the IP address of the Sixnet RTU (192.168.2.72) in your client as a server/slave and have your PC or client setup as a Master.

If the Red Lion SIXNET RTU IP address does not comply with your SCADA network security standards, you can easily change the WAN address of the unit as follows:

1. To access the web interface of the Red Lion Sixnet Cellular RTU, using a CAT-5 Ethernet cable connect a laptop to the SMART DryKeep® system through the RJ45 Ethernet Panel Interface Connector mounted on the inner swing panel of the controller enclosure.
2. To access the SMART DryKeep® network your computer will need an assigned IP address on the network. To do this, access your internet settings. In Windows 7 there will be an icon in the bottom right hand side of the screen. Other operating systems will have something similar.

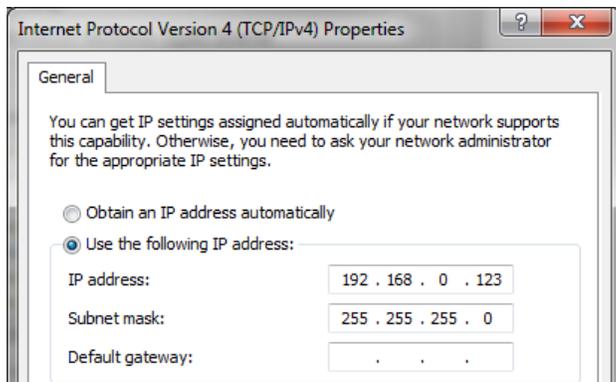


Direct wired connections will show up under “Local Area Connection” in the Network and Sharing Center (Windows 7).



When on the “Local Area Network Status” page, click “Properties” at the bottom left. The window from above in the 2nd and 3rd figures will pop-up. Scroll to “Internet Protocol Version 4 (TCP/IPv4)” and click on the “Properties” button.

This will open the page to configure an IP address. By default, it is typically set to “Obtain an IP address automatically”. For this, we will need to select “Use the following IP address” instead.



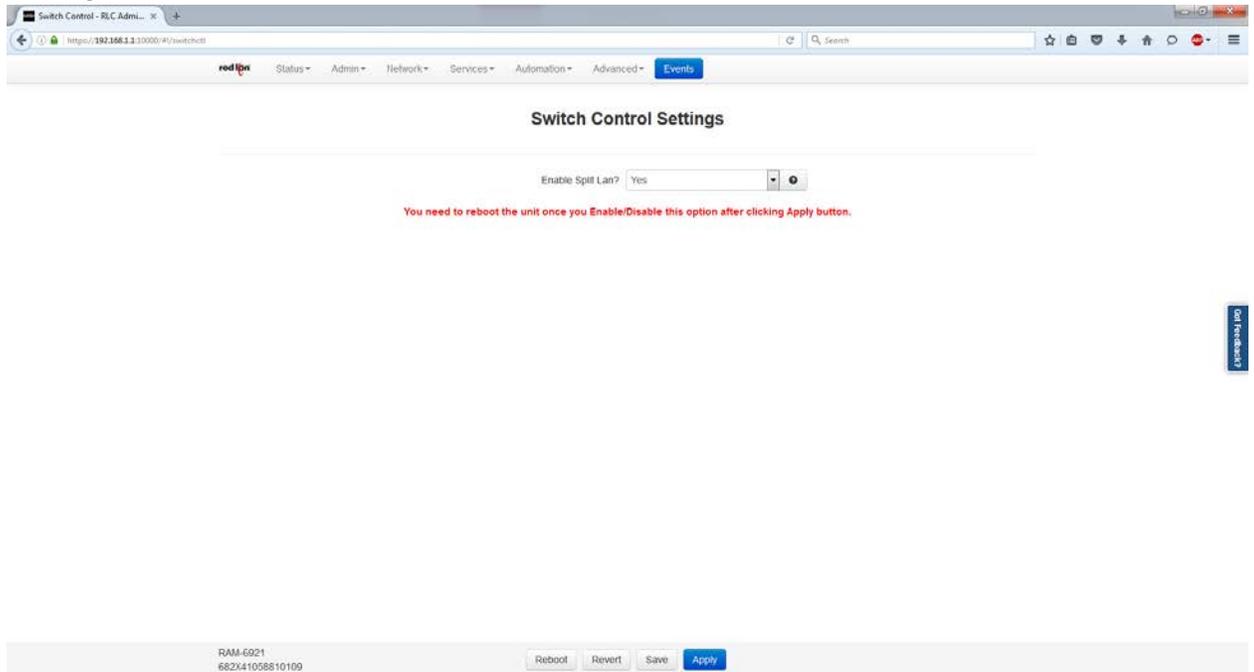
Copy the settings from above. IP address: 192.168.0.123. Subnet Mask: 255.255.255.0. Default gateway can be left blank.

Pressing “OK” at the bottom of the window will assign an IP address on the SMART DryKeep® network.

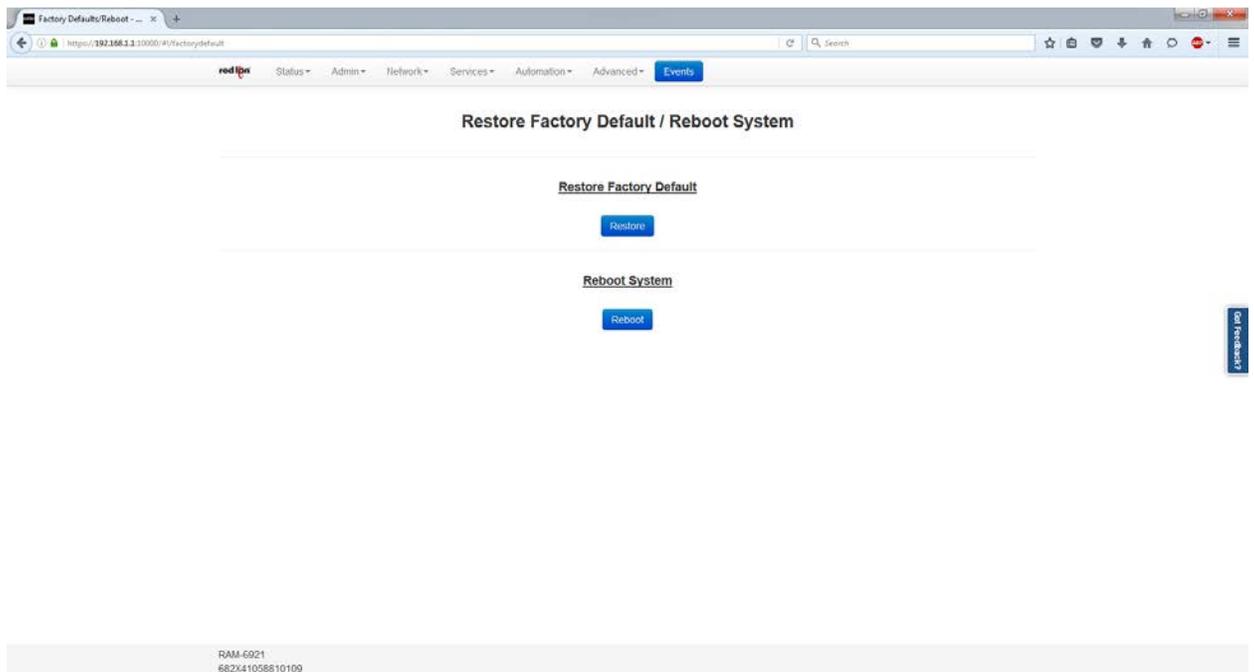
3. Once connected to the SMART DryKeep network, open a web browser on the laptop and type 192.168.2.72:10000 into a web browser address bar. The login is Username: admin Password: Last 6 digits of the serial number on the Sixnet unit. Ex: 570075.

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4. Navigate to Network -> Interfaces -> Switch Control.



5. Modify 'Enable Split LAN' from No to Yes, then click 'Apply'. The unit will now need to reboot in order for changes to take effect. Navigate to Admin -> Factory Default/Reboot screen and select Reboot System. Process could take 5+ minutes before the web interface comes back online.



- Once the unit comes back online, navigate to Network -> Interfaces. There will now be an option for LAN and WAN. To change WAN to the necessary IP address, click 'eth0 (WAN)'.
- Ensure eth0 interface is enabled, and modify the IP address and subnet to the desired network. Example shown below.

The screenshot shows the 'Ethernet Interface eth0 (WAN)' configuration page in the Red Hat Network management interface. The page includes the following configuration options:

- Enable eth0 Interface?: Yes
- Interface Speed/Duplex: Auto Detect
- Obtain Network Addresses via DHCP?: No
- Enter IP Address: 192.168.0.1 (Required)
- Enter Subnet Mask: 255.255.255.0 (Required)
- Use Remote Gateway as Default Route?: No
- Enter Remote Gateway: (empty)
- Enter Maximum Transmission Unit (MTU): 1500 (Required)

Below the configuration options is the 'Interface Aliases' section, which contains a table with columns for 'Sub-interface', 'IP Address', and 'Subnet Mask'. To the right of the table are buttons for 'Add', 'Edit', 'Delete', 'Up', and 'Down'.

At the bottom of the page, there is a status bar showing 'RAM-6921 682X41058810109' and buttons for 'Reboot', 'Refresh', 'Save', and 'Apply'. On the right side, it says 'Last Refresh: A few seconds ago'.

- After modifications, click 'Apply'. Repeat the reboot sequence and the WAN network will be accessible from the Ethernet port on the Sixnet unit labeled WAN.

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The data addresses to retrieve data remotely from the system are as follows:

Modbus Mapping

Variable Name	Data Type	Modbus Object Type	Modbus Address
Pump Status	UINT (16 bit)	Analog Output / Holding Register	40001
Cycle Status	UINT (16 bit)	Analog Output / Holding Register	40002
Low Oil Flow Alarm	UINT (16 bit)	Analog Output / Holding Register	40003
Cylinder Saturated Alarm	UINT (16 bit)	Analog Output / Holding Register	40004
Temperature Units	UINT (16 bit)	Analog Output / Holding Register	40005
New Transformer Status	UINT (16 bit)	Analog Output / Holding Register	40006
Total Runtime	UINT (16 bit)	Analog Output / Holding Register	40007
Current Runtime	UINT (16 bit)	Analog Output / Holding Register	40008
Cylinder Regen Runtime	UINT (16 bit)	Analog Output / Holding Register	40009
Incoming Temperature	INT (16 bit)	Analog Output / Holding Register	40010
Outgoing Temperature	INT (16 bit)	Analog Output / Holding Register	40011
Incoming PPM	UINT (16 bit)	Analog Output / Holding Register	40012
Outgoing PPM	UINT (16 bit)	Analog Output / Holding Register	40013
Estimated Percent Moisture in Paper	UINT (16 bit)	Analog Output / Holding Register	40014

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DNP3 Mapping

Variable Name	Data Type	DNP3 Object Type	DNP3 Address
Pump Status	UINT (16 bit)	16-Bit Analog Output	1
Cycle Status	UINT (16 bit)	16-Bit Analog Output	2
Low Oil Flow Alarm	UINT (16 bit)	16-Bit Analog Output	3
Cylinder Saturated Alarm	UINT (16 bit)	16-Bit Analog Output	4
Temperature Units	UINT (16 bit)	16-Bit Analog Output	5
New Transformer Status	UINT (16 bit)	16-Bit Analog Output	6
Total Runtime	UINT (16 bit)	16-Bit Analog Output	7
Current Runtime	UINT (16 bit)	16-Bit Analog Output	8
Cylinder Regen Runtime	UINT (16 bit)	16-Bit Analog Output	9
Incoming Temperature	INT (16 bit)	16-Bit Analog Output	10
Outgoing Temperature	INT (16 bit)	16-Bit Analog Output	11
Incoming PPM	UINT (16 bit)	16-Bit Analog Output	12
Outgoing PPM	UINT (16 bit)	16-Bit Analog Output	13
Estimated Percent Moisture in Paper	UINT (16 bit)	16-Bit Analog Output	14

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Modbus -> DNP3 Mapping Conversion (Via Sixnet)

Data Type	Modbus	DNP
Boolean Inputs	Discrete Input	Binary Input
Boolean Outputs	Coil	Control Relay Output Block (CROB)
Double-bit Boolean Inputs	No	Double Bits
16-bit Input	Input Register	16-bit Counter 16-bit Frozen Counter 16-bit Analog Input 16-bit Frozen Analog Input
16-bit Output	Holding Register	16-bit Analog Output Block
32-bit Input	No	32-bit Counter 32-bit Frozen Counter 32-bit Analog Input 32-bit Frozen Analog Input
32-bit Output	No	32-bit Analog Output
32-bit Floating Point (IEEE-754)	No	Short Floating Point Analog Input
64-bit Floating Point (IEEE-754)	No	Long Floating Point Analog Input
32-bit Floating Point Output (IEEE-754)	No	32-bit Floating Point Output
64-bit Floating Point Output (IEEE-754)	No	64-bit Floating Point Output
Analog Deadband	No	Analog Input Reporting Deadband
Strings	No	Octet string
Virtual Terminal	No	Virtual Terminal Output Block
Time and Date	No	Time and Date Time Delay
File Transfer	No	File Transfer

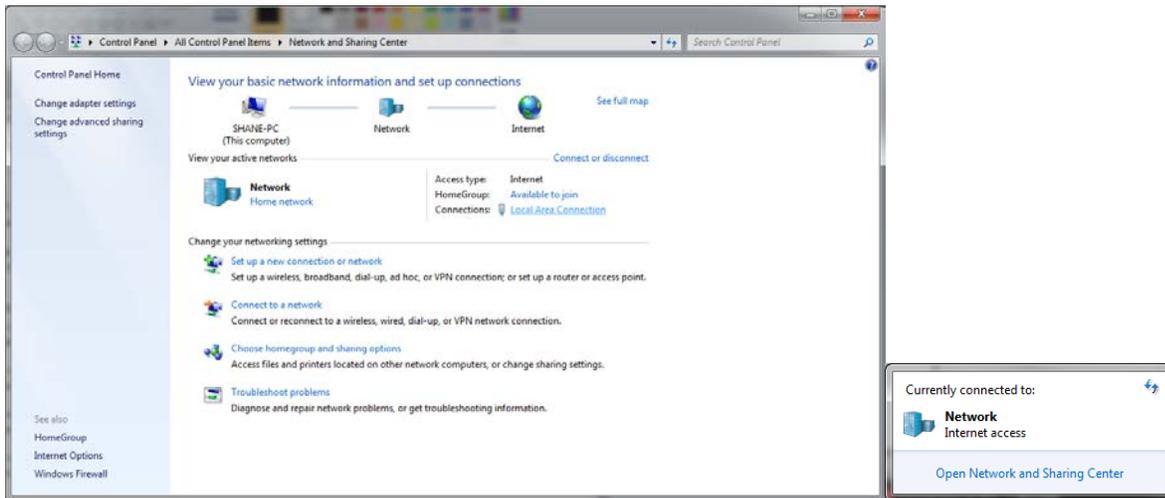
16-bit output is the only one used by SMART DryKeep®. SMART DryKeep® data will be the first 14 addresses of each object type (i.e. Holding Register, 16-bit Analog Output Block) for both Modbus and DNP3.

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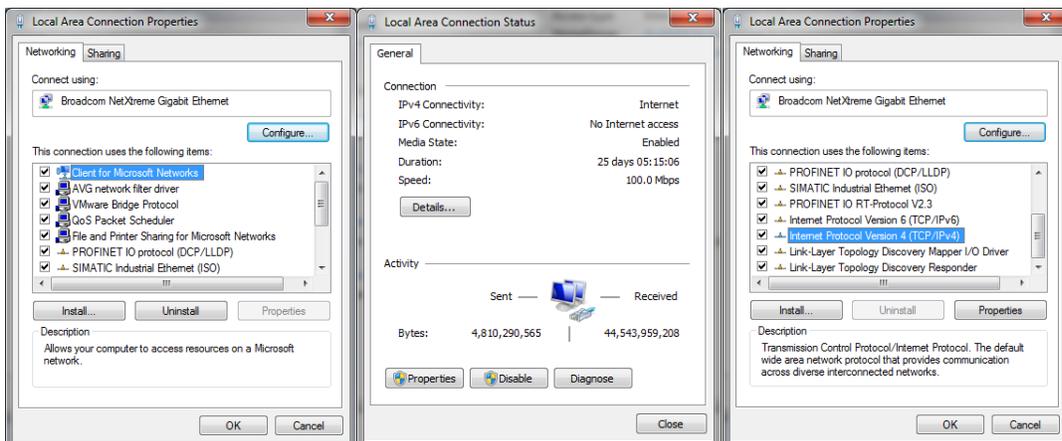
SETTING UP OPTIONAL CELLULAR ALARMING FEATURE

All SMART DryKeep® units have the ability to send the saturated cylinder and leak detection alarms directly to appropriate personnel's mobile devices via cellular service. To set up this feature:

9. Once an activated SIM card from a carrier is obtained, the card is placed in the slot on the top of the Red Lion Sixnet Cellular RTU located inside the SMART instrumentation panel as is facing in the panel. The cut side of the card will be sided forward and left. A pen or small screwdriver will be necessary to push the card into the module, and you will know it is complete when the card clicks in.
10. To access the web interface of the Red Lion Sixnet Cellular RTU, using a CAT-5 Ethernet cable connect a laptop to the SMART DryKeep® system through the RJ45 Ethernet Panel Interface Connector mounted on the outside of the enclosure.
11. To access the SMART DryKeep® network your computer will need an assigned IP address on the network. To do this, access your internet settings. In Windows 7 there will be an icon in the bottom right hand side of the screen. Other operating systems will have something similar.

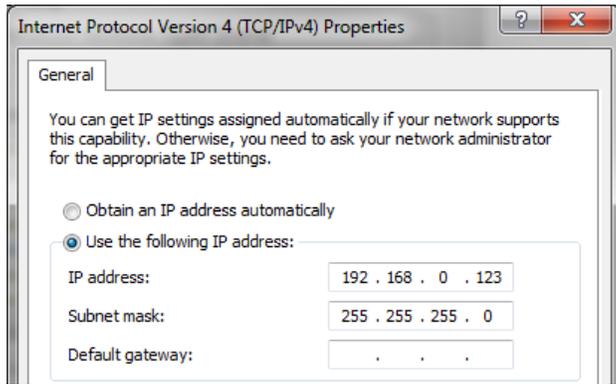


Direct wired connections will show up under “Local Area Connection” in the Network and Sharing Center (Windows 7). Click the link to go to the page below.



When on the “Local Area Network Status” page, click “Properties” at the bottom left. The window from above in the 2nd and 3rd figures will pop-up. Scroll to “Internet Protocol Version 4 (TCP/IPv4)” and click on the “Properties” button.

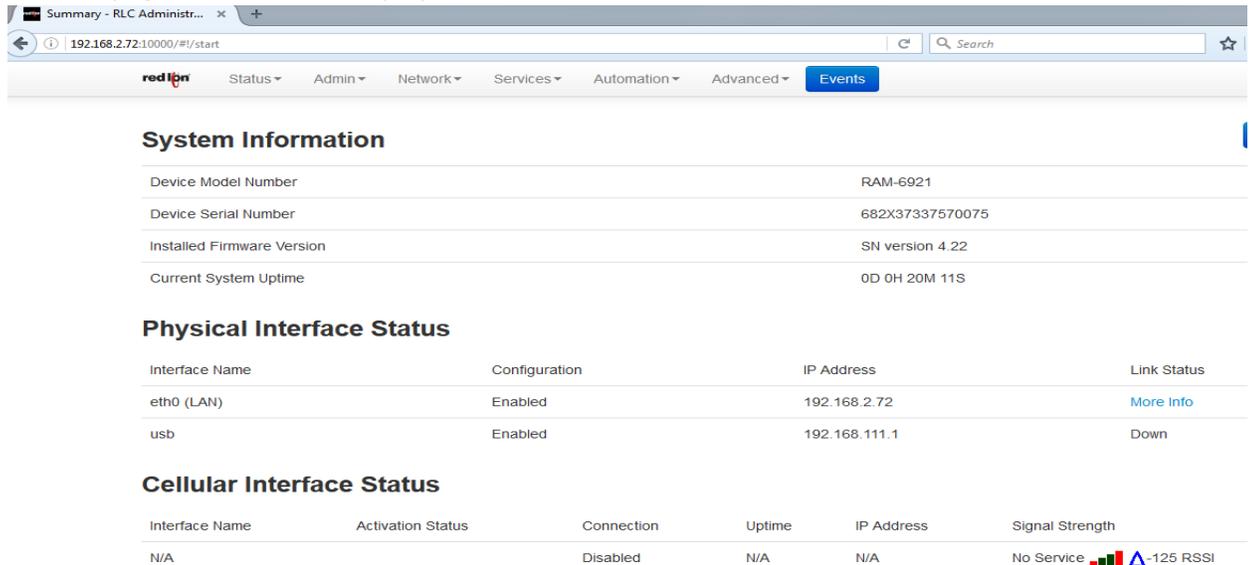
This will open the page to configure an IP address. By default, it is typically set to “Obtain an IP address automatically”. For this, we will need to select “Use the following IP address” instead.



Copy the settings from above. IP address: 192.168.0.123. Subnet Mask: 255.255.255.0. Default gateway can be left blank.

Pressing “OK” at the bottom of the window will assign an IP address on the SMART DryKeep® network.

12. Once connected to the SMART DryKeep network, open a web browser on the laptop and type 192.168.2.72:10000 into a web browser address bar. The login is Username: admin Password: Last 6 digits of the serial number on the Sixnet unit. Ex: 570075.
13. The first page that loads will display the status of the cellular connection.



14. First, click on the Network tab and go to Configuration under the Cellular Connection link.

The screenshot shows a web interface with a navigation menu at the top containing 'Network', 'Services', 'Automation', 'Advanced', and 'Events'. The 'Network' menu is open, showing 'Cellular Connection' selected, with a sub-menu containing 'Configuration', 'Status', and 'Provisioning'. The 'Configuration' sub-menu is also open, showing 'Status' and 'Provisioning' options. Below the navigation, there are buttons for 'Config', 'Status', and 'Provisioning'. The main content area displays 'Detected Modem: MC73xx' and 'Detected Carrier:'. Below this, there are three configuration fields: 'Enable Interface: Yes', 'APN: vzwadmin (APN for context 3 is '3:vzwadmin')', and 'Show Advanced Configuration: No'.

15. For 'Enable Interface' select Yes and enter the APN provided from the carrier of the SIM card.

16. From this point, if the card is activated, the Sixnet has all the information it needs for the cellular connection. It may take 5-10 minutes to fully connect. On the Status->Summary page, you will know it is complete when an IP address and uptime show up under the Cellular Interface Status.

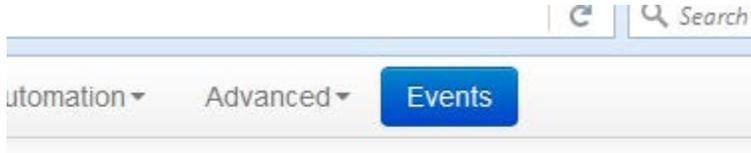
Cellular Interface Status

Interface Name	Activation Status	Connection	Uptime	IP Address	Signal Strength
wwan0	Reg Home	Enabled	0D 0H 0M 6S	100.107.212.102	CDMA 1xRTT  -96 RSSI

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Every SMART DryKeep® system will have the Cylinder Saturation and Low Oil Flow alarms pre-setup. You will just need to edit the mobile number you want those alarms to be sent to. To do so:

1. Under the web interface click the blue 'Events' button.



Events

2. For each of the alarms, click on the event and click the 'Edit' option beside them.

Status

Event	Name	Condition	Last Active	Duration	Clear Alarm
1	SMSLowFlow	Inactive	10/14/2015 00:17:17	00:25:03	Auto
2	SMSCylinder	Inactive	10/14/2015 00:17:17	00:25:03	Auto

[Update Status](#)

[Add Rebool Alert](#) [Add Data Usage Alert](#)

Configuration

Event	Name	Enable	Data Source	Details	Event Type	SP	Alarm	Action Type	Details
1	SMSLowFlow	Yes	IODB	No_Flow_Detected	Data Match		1	SMS	1-912-247-7772
2	SMSCylinder	Yes	IODB	Cylinders_Saturated	Data Match		1	EMAIL	9122477772@txt.att.net

[Add](#)
[Edit](#)
[Delete](#)
[Copy](#)
[Up](#)
[Down](#)

[View Tags](#)

3. This will load a popup to modify the event. Scroll through the options using the 'Next' button until you get to a page that says 'Recipient'. Type in your number with the X-XXX-XXX-XXXX format. Hit 'Finish' when done.

Edit Event Configuration

Action Type: Send SMS Message

Recipient: 1-912-247-7772

Message Format: Custom

Custom Active Message: DryKeep urgent alert. Frame #1 **Required**

Custom Inactive Message: Low Flow Alarm Gone!

Edge Triggering: Rising Only

Level Triggering: No

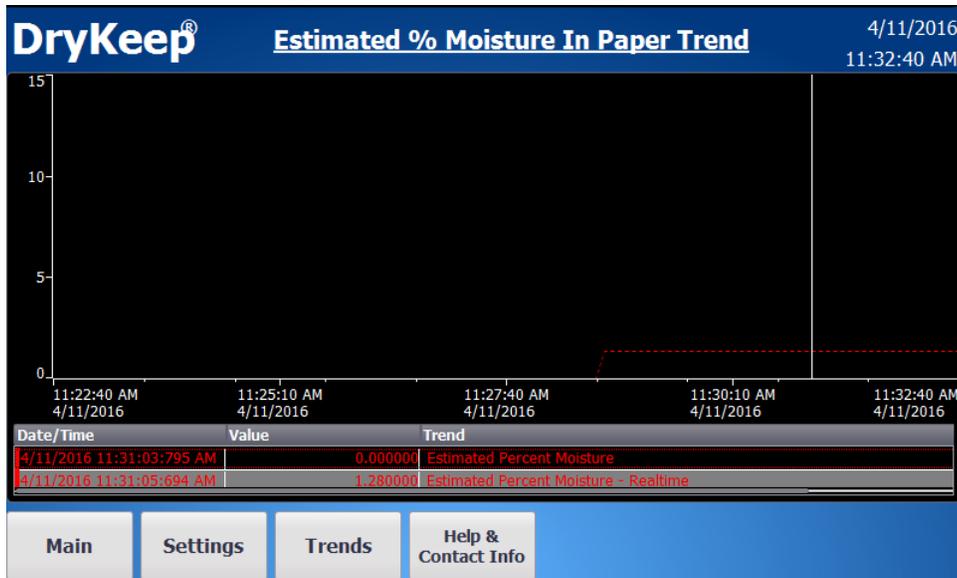
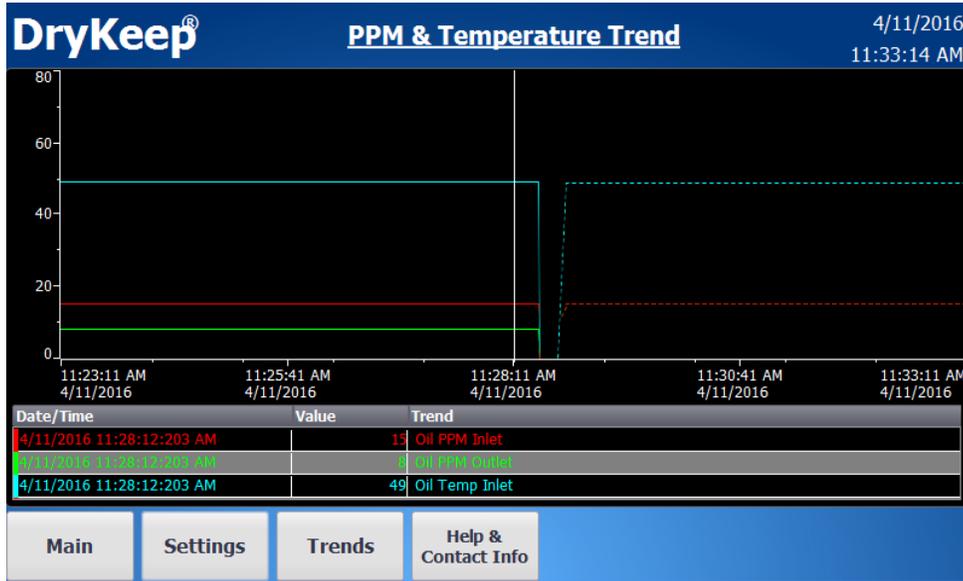
Back Finish

4. If the Red Lion Sixnet Cellular RTU has been successfully connected via cellular, the events will be ready to send out texts when an alarm status is detected.
5. To add additional alarm recipients, select the alarm in the configuration chart (it will highlight it in blue as shown above) and click copy. This will make a copy of original recipient's alarm event. You can then go in and change the recipient number as explained above for the second recipient to be added. You can edit or delete recipients by highlighting the alarm event and using the "Edit" and "Delete" buttons on the configuration screen.

THE REST OF THIS PAGE IS INTENTIONALLY LEFT BLANK. INSTRUCTIONS CONTINUE ON THE NEXT PAGE.

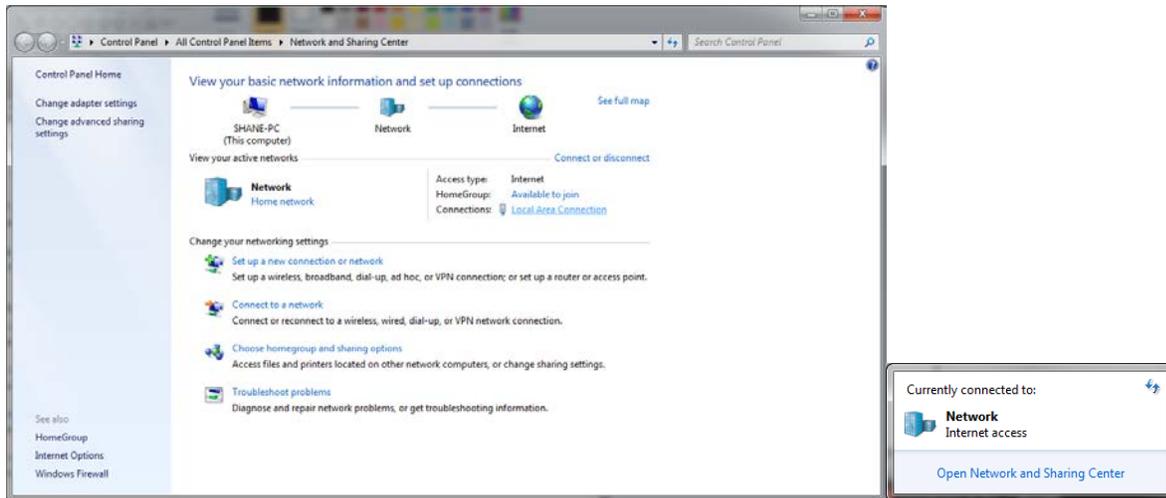
ON-SITE LOGGED DATA RETRIEVAL VIA RJ45 ETHERNET PANEL INTERFACE CONNECTOR

All SMART DryKeep® systems log the incoming and outgoing PPM and temperature values and the estimated percent moisture in paper. PPM and temperature values are logged every fifteen (15) minutes. Estimated percent moisture in the paper is logged once a day. Logged and real-time data is shown on the two trend analysis screens shown under the “Trends” tab.

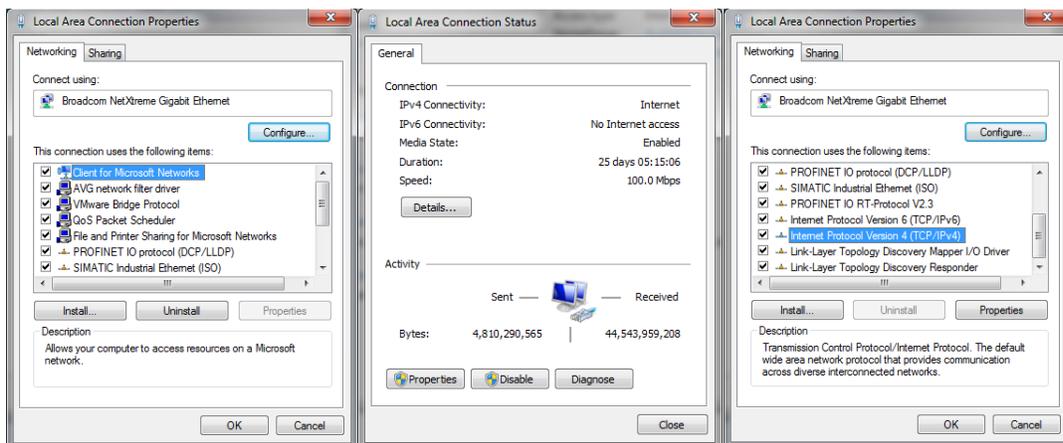


All logged data can easily be downloaded to a laptop in .CSV format through the RJ45 Ethernet Panel Interface Connector Panel mounted on the outside of the enclosure. To download the data:

- 1) Using a CAT-5 Ethernet cable, connect the laptop to the SMART DryKeep® system through the RJ45 Ethernet Panel Interface Connector mounted on the outside of the enclosure.
- 2) To access the SMART DryKeep® network your computer will need an assigned IP address on the network. To do this, access your internet settings. In Windows 7 there will be an icon in the bottom right hand side of the screen. Other operating systems will have something similar.

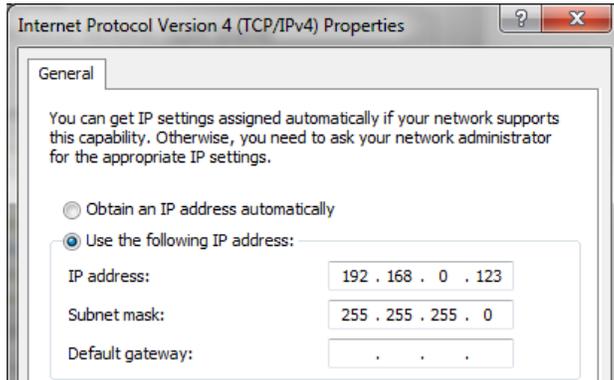


Direct wired connections will show up under “Local Area Connection” in the Network and Sharing Center (Windows 7). Click the link to go to the page below.



When on the “Local Area Network Status” page, click “Properties” at the bottom left. The window from above in the 2nd and 3rd figures will pop-up. Scroll to “Internet Protocol Version 4 (TCP/IPv4)” and click on the “Properties” button.

This will open the page to configure an IP address. By default, it is typically set to “Obtain an IP address automatically”. For this, we will need to select “Use the following IP address” instead.

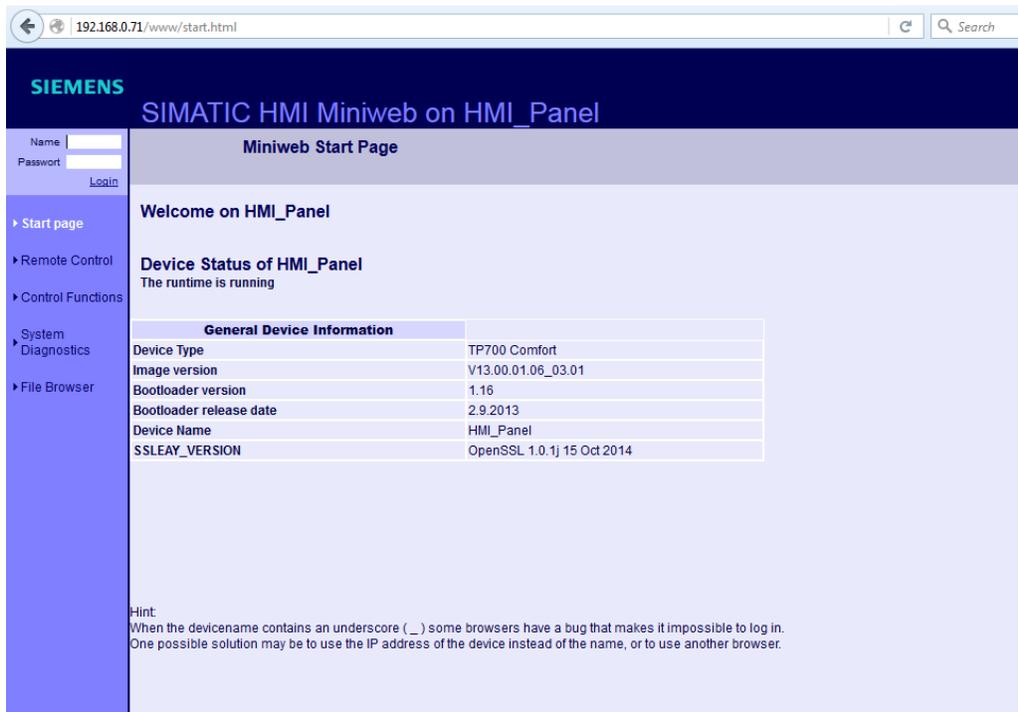


Copy the settings from above. IP address: 192.168.0.123. Subnet Mask: 255.255.255.0. Default gateway can be left blank.

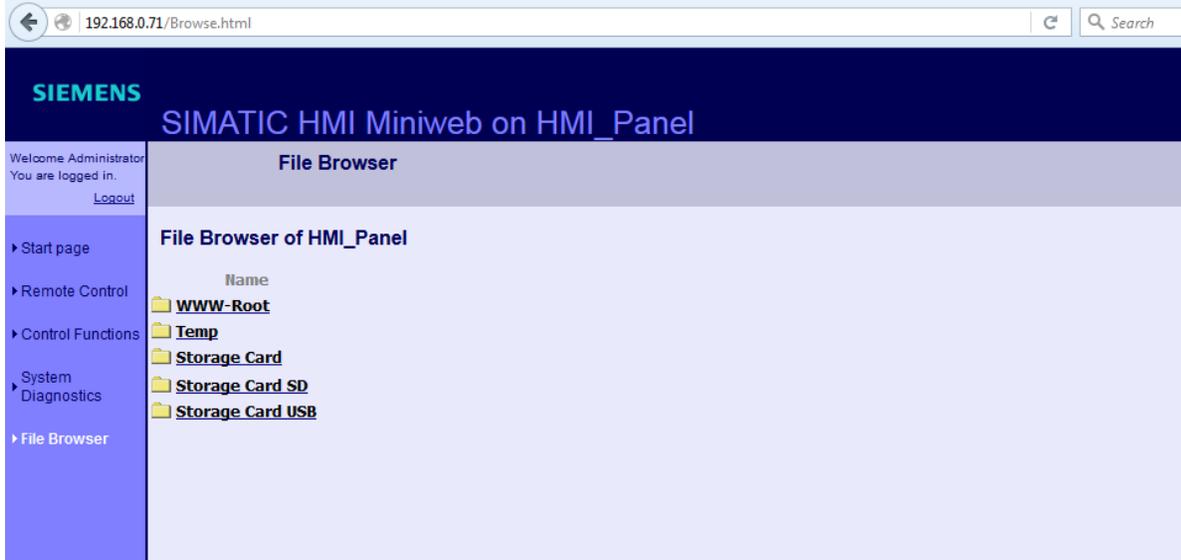
Pressing “OK” at the bottom of the window will assign an IP address on the SMART DryKeep® network.

- 3) Once connected from Steps 1 and 2 above, open up a web browser and type in the following into the address bar: <http://192.168.0.71>.

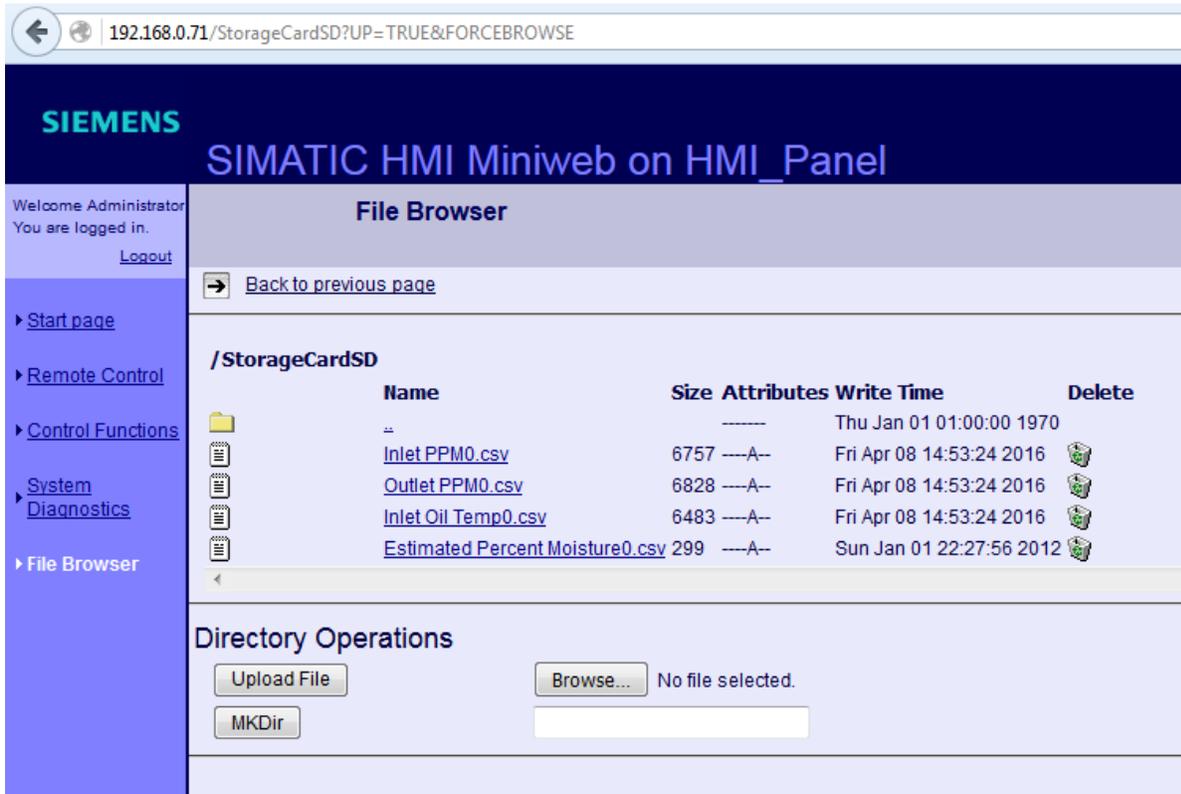
If connected correctly, the web page below will load.



Login using the login field in the top left of the web page. Username is “Administrator” and password is “admin”.



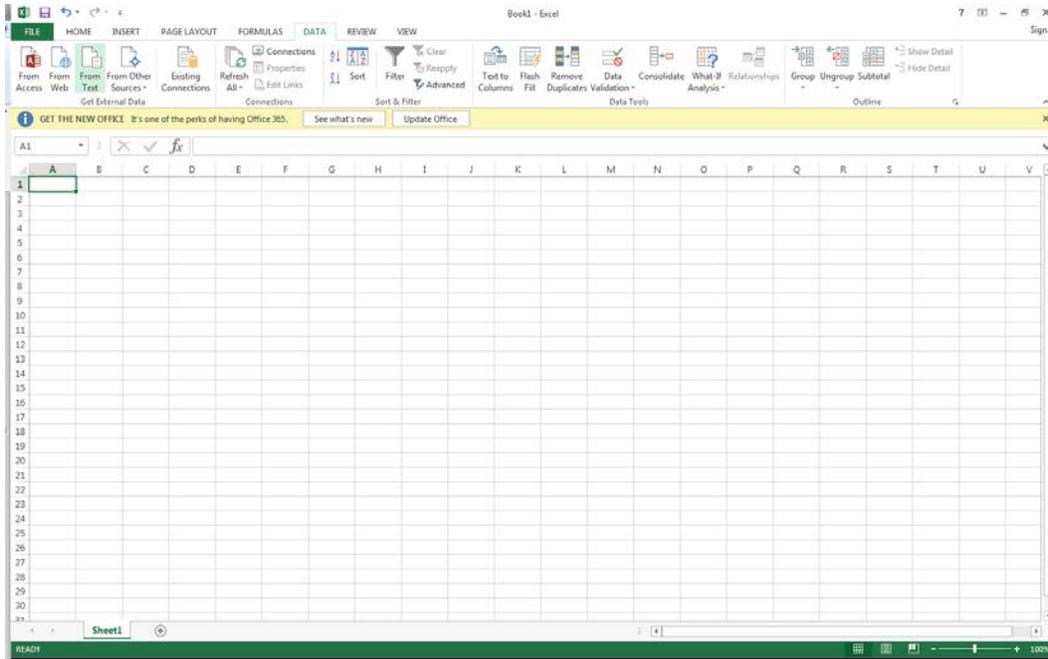
Once logged in, navigate to the “File Browser” link from the left sidebar. All logs will be stored on the “Storage Card SD”.



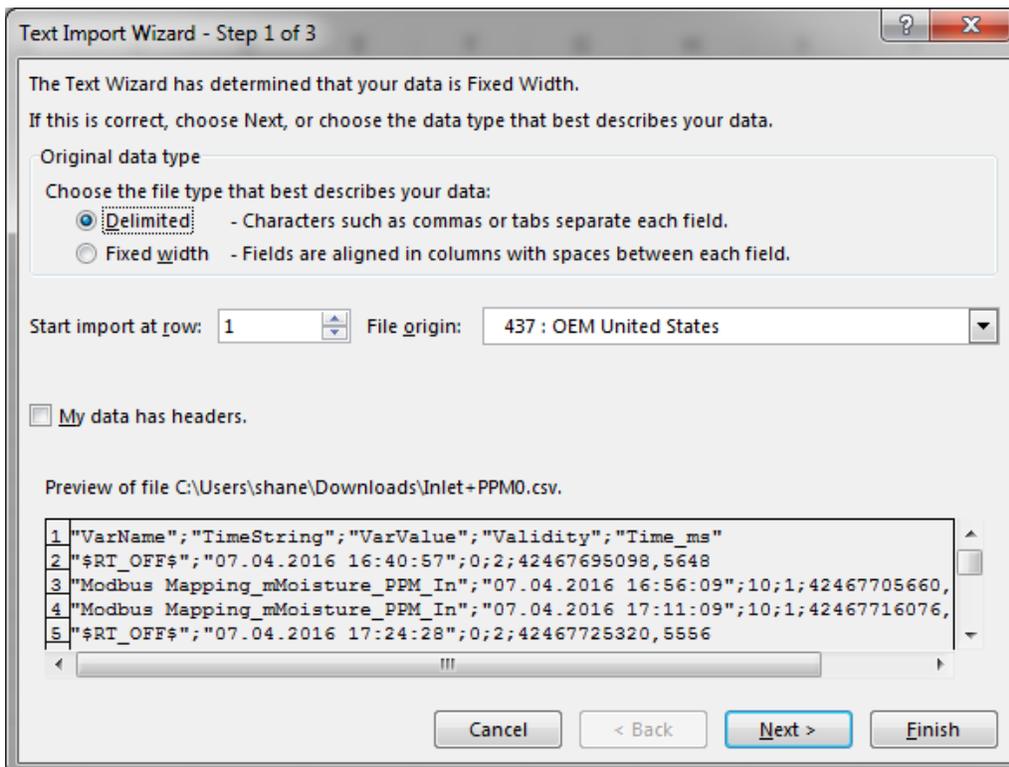
To download the log, click on the link under “Name” and a prompt will allow the file to be downloaded.

To import to Excel, open a new blank spreadsheet.

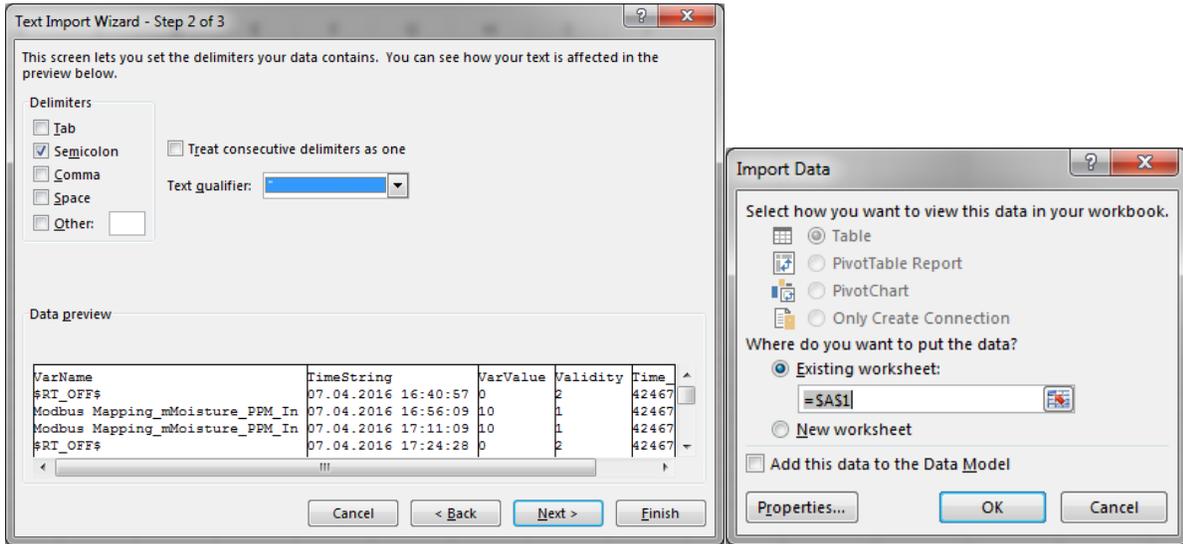
Under the “Data” tab, there will be an option to “Import From Text”. Click on that and browse to the .CSV just downloaded.



A window as below will appear with import options. Choose the “Delimited” option and continue using the “Next” button.



On the next screen, select the “Semicolon” option. Then hit “Finish”. A new “Import Data” window will open. Press “OK”



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ACCESSING THE SMART SYSTEM REMOTELY FOR CONTROL, MONITORING AND DATA LOGGING VIA VPN

All SMART DryKeep® systems can be accessed remotely from a computer that has access to the Internet. All that is required for the SMART DryKeep® system is a customer-supplied data SIM card with a static (public) IP address installed in the Sixnet RTU. The client computer that will access the SMART DryKeep® system remotely will require OpenVPN and the appropriate security certificate. Once the client computer is connected to the Sixnet RTU through the VPN, you will gain access to the SMART DryKeep® HMI for remote monitoring and control of the SMART DryKeep® system and will be able to download the logged data to the accessing computer.

NOTE: By default, cellular carriers will provide a SIM card with a dynamic IP address. You must request a publicly accessible IP address (static IP address) from your cellular carrier in order to access the SMART DryKeep® system.

NOTE: For cyber-security purposes, only a single port will be opened up for communication. Double authentication is required between two security certificate keys that reside on the accessing computer and on the Sixnet RTU.

DOWNLOADING AND CONFIGURING OPENVPN ON THE CLIENT COMPUTER:

The OpenVPN program can be downloaded onto any computer for free from the OpenVPN website. You can use the following link to select the appropriate installer for your operating system:

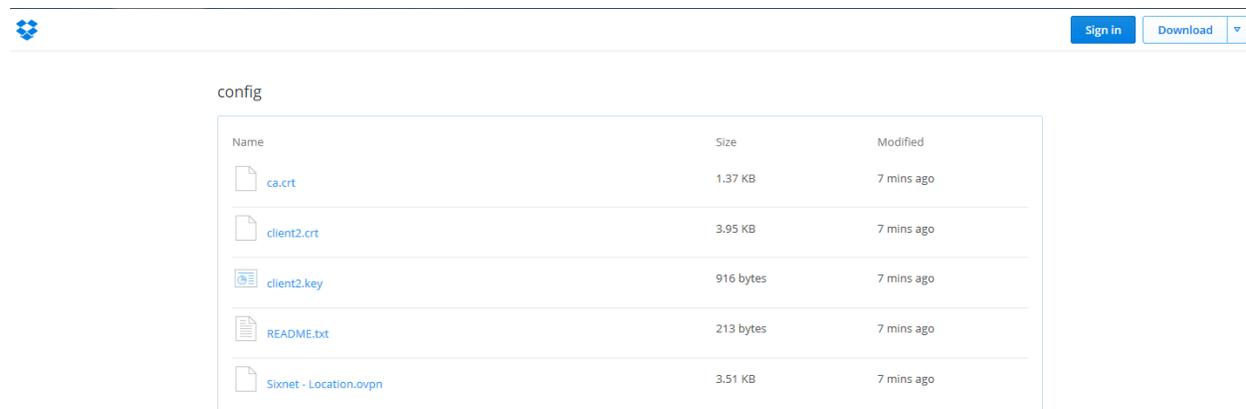
<https://openvpn.net/index.php/open-source/downloads.html>

Extract the files to a Program Files directory.

Next use the following Dropbox link to download the client ZIP folder:

<https://www.dropbox.com/sh/p2vdp7hi5v3ot35/AAC1T6OyV33GUHNW5IGRHXSwa?dl=0>

The link will bring you to the following webpage:



Choose the Download option on the top right of the Dropbox screen.

A dropdown menu will appear below the Download button.

The screenshot shows a file manager interface. At the top right, there are two buttons: 'Sign in' and 'Download'. A dropdown menu is open below the 'Download' button, showing two options: 'Direct download' and 'Save to my Dropbox'. Below the buttons, the folder name 'config' is displayed. A table lists the files in the folder:

Name	Size	Modified
ca.crt	1.37 KB	7 mins ago
client2.crt	3.95 KB	7 mins ago
client2.key	916 bytes	7 mins ago
README.txt	213 bytes	7 mins ago
Sixnet - Location.ovpn	3.51 KB	7 mins ago

Select Direct download to download all of the files onto your computer.

Your computer will ask you if you want to open or save the config.zip folder.

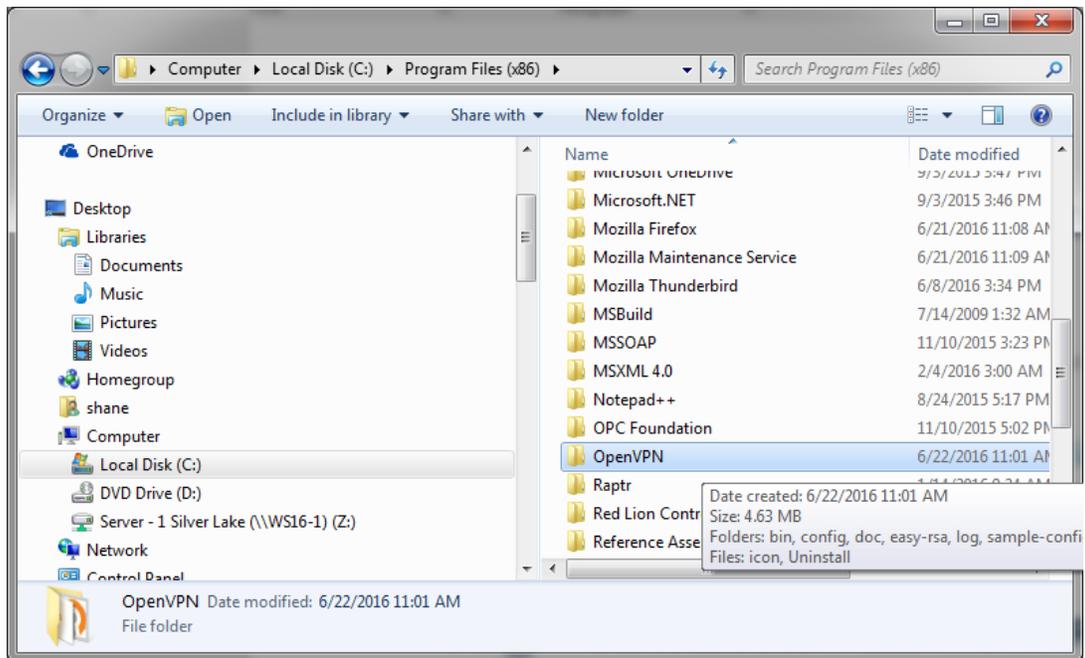
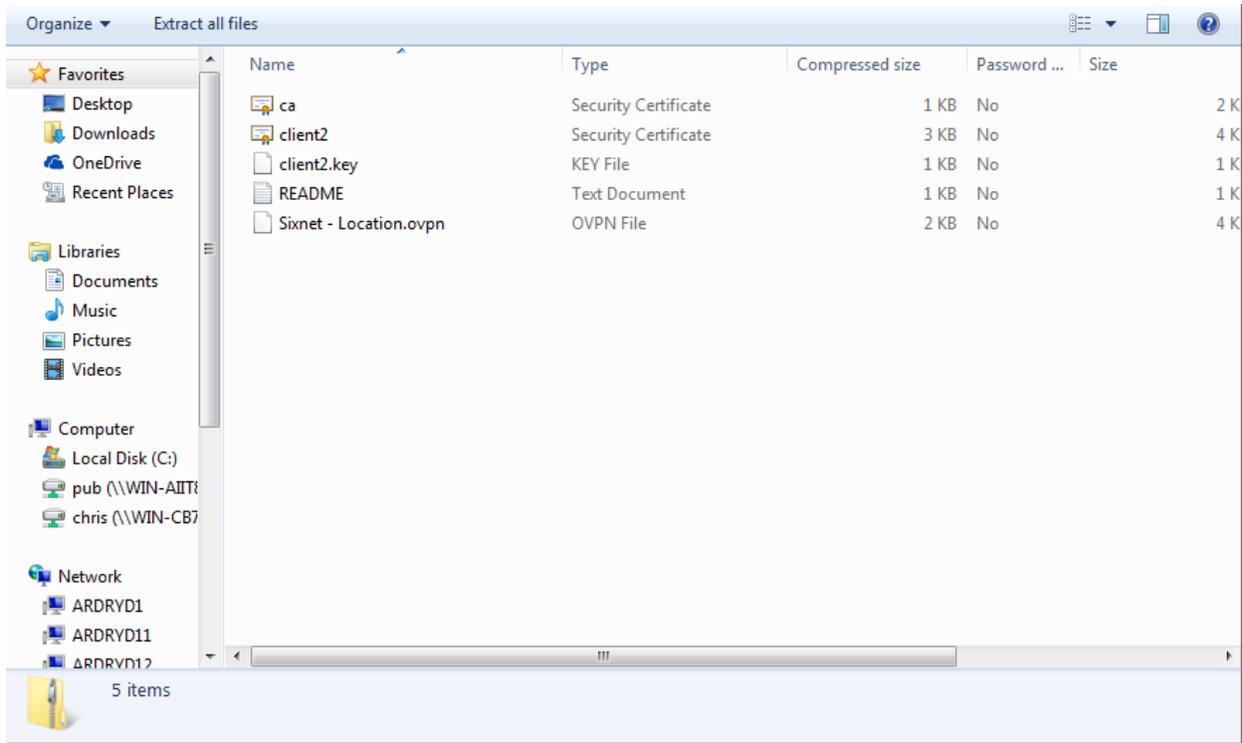
The screenshot shows the same file manager interface as above, but the 'Direct download' option is now selected in the dropdown menu. The table of files remains the same:

Name	Size	Modified
ca.crt	1.37 KB	7 mins ago
client2.crt	3.95 KB	7 mins ago
client2.key	916 bytes	7 mins ago
README.txt	213 bytes	7 mins ago
Sixnet - Location.ovpn	3.51 KB	7 mins ago

The screenshot shows a Windows file dialog box with a yellow background. The text reads: "Do you want to open or save config.zip from dl.dropboxusercontent.com?". There are three buttons: "Open", "Save", and "Cancel". The "Save" button has a dropdown arrow next to it, indicating that a menu is open.

Choose Save As and save the zip folder to your computer.

Navigate to zip folder on your computer and extract the files. Select all of the files inside the folder where they are extracted to and copy and paste them into the OpenVPN/config folder on your computer.



Once the files are placed in the Program Files folder, navigate into the folder and to OpenVPN/config and open the file Sixnet – Location.ovpn with Notepad or a similar text editing utility.

```

22 # the firewall for the TUN/TAP interface.
23 ;dev tap
24 dev tun
25
26 # Windows needs the TAP-Win32 adapter name
27 # from the Network Connections panel
28 # if you have more than one. On XP SP2,
29 # you may need to disable the firewall
30 # for the TAP adapter.
31 ;dev-node MyTap
32
33 # Are we connecting to a TCP or
34 # UDP server? Use the same setting as
35 # on the server.
36 proto tcp
37 ;proto udp
38
39 # The hostname/IP and port of the server.
40 # You can have multiple remote entries
41 # to load balance between the servers.
42 remote 192.168.0.1 1194
43 ;remote my-server-2 1194
44
45 # Choose a random host from the remote
46 # list for load-balancing. Otherwise
..

```

The only modification that needs to be made is changing the line:

```
remote 192.168.0.1 1194
```

To:

```
remote XXX.XXX.XXX.XXX 1194,
```

where the XXX.XXX.XXX.XXX needs to be changed the public static IP address assigned by the cellular carrier.

Save changes to finalize settings. Some operating system versions will not allow you to save the file in the OpenVPN/config folder. You may have to save it to your desktop first and then copy and paste it into your OpenVPN/config. Make sure once it is placed in the OpenVPN/config folder that it shows up as a OpenVPN Config File (.ovpn)

The file name 'Sixnet – Location' can also be renamed to a more detailed reference name for clarity/convenience. This is especially useful if you will be remoting into several DryKeep units as you can name the .ovpn file for each connection after each transformer or substation or other reference you choose.

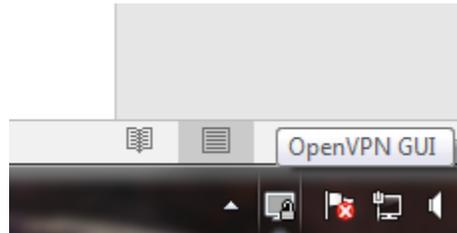
FUTURE EXPANSION

The OpenVPN software can be used to access multiple SMART DryKeep systems. If another unit is added in the future, all that is needed is to copy the before-mentioned 'Sixnet – Location.ovpn' (or renamed) file, rename it to reference the new system, and change the IP address using Notepad or your other text editor to the public IP address of the new unit as done in Step 1 above.

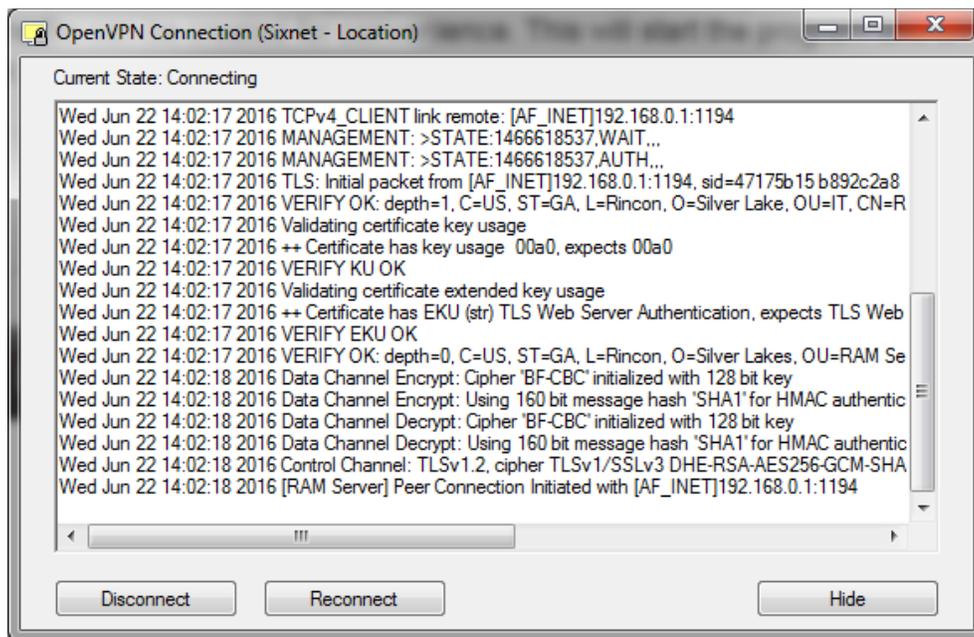
OPENVPN CONNECTION ON CLIENT COMPUTER

1. Open Software

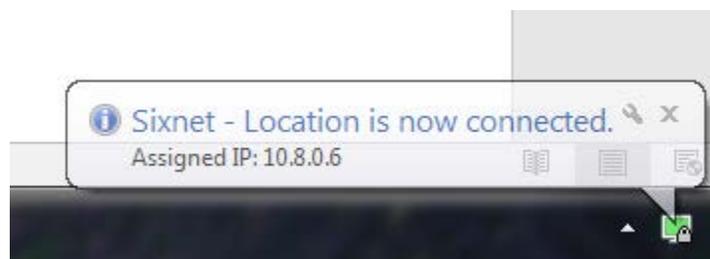
The OpenVPN software can be started by navigating to and executing the Program Files/OpenVPN/bin/openssl-gui.exe. A shortcut to the file can be created for convenience. This will start the program and an icon will appear on the bottom right taskbar.



By right clicking the icon, a menu will pop-up. Click the 'Connect' option to open the VPN tunnel to the Sixnet unit.



A window will load showing the connection status. When successful it will display as 'Connected' and close the window, showing the notification below.



The VPN tunnel to the Sixnet is now open and the SMART DryKeep® HMI can be accessed.

ACCESSING THE SMART DRYEEP® HMI REMOTELY VIA OPENVPN

Once connected via OpenVPN, the HMI can be accessed through the client computer's web browser at <http://192.168.2.71>.

Note: Java is required to run this remote application. Google Chrome does not support Java. You must use a web browser that supports Java such as Internet Explorer or Firefox.

The default login will be:

User: Administrator

Pass: admin



The screenshot shows the SIMATIC HMI Miniweb interface. At the top, there is a blue header with the SIEMENS logo and the text "SIMATIC HMI Miniweb on HMI_Panel". Below the header, there is a grey bar with the text "Miniweb Start Page". The main content area is white and contains the following elements:

- A navigation menu on the left side with the following items: Start page, Remote Control, Control Functions, System Diagnostics, and File Browser.
- A welcome message: "Welcome on HMI_Panel".
- A section titled "Device Status of HMI_Panel" with the text "The runtime is stopped".
- A table titled "General Device Information" with the following data:

General Device Information	
Device Type	TP1200 Comfort
Image version	V13.00.01.06_03.01
Bootloader version	1.10
Bootloader release date	22.2.2012
Device Name	HMI_Panel
SSLEAY_VERSION	OpenSSL 1.0.1j 15 Oct 2014

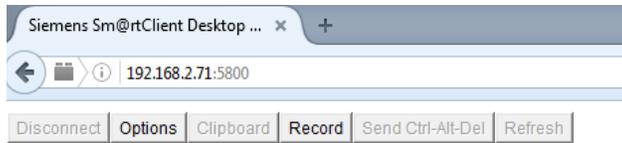
Select the 'Remote Control' link on the left navigation pane.



The screenshot shows the SIMATIC HMI Miniweb interface with the "Remote Control" page selected. The page has a blue header with the text "SIMATIC HMI Miniweb on HMI_Panel" and a grey bar with the text "Remote Control". The main content area is white and contains the following elements:

- A section titled "Remote Maintenance over the Internet Explorer".
- A warning message: "Internet Explorer V6.0 SP1 or higher is required for remote maintenance. For further information, refer to the service downloads."
- A link: "Start Sm@rtClient".

On the next page, click the link to Start Sm@rtClient. This will redirect to a page where the HMI can be controlled and monitored. **Java is required to run this application.** Modern browsers will prompt the user to the correct download if they do not have it installed.

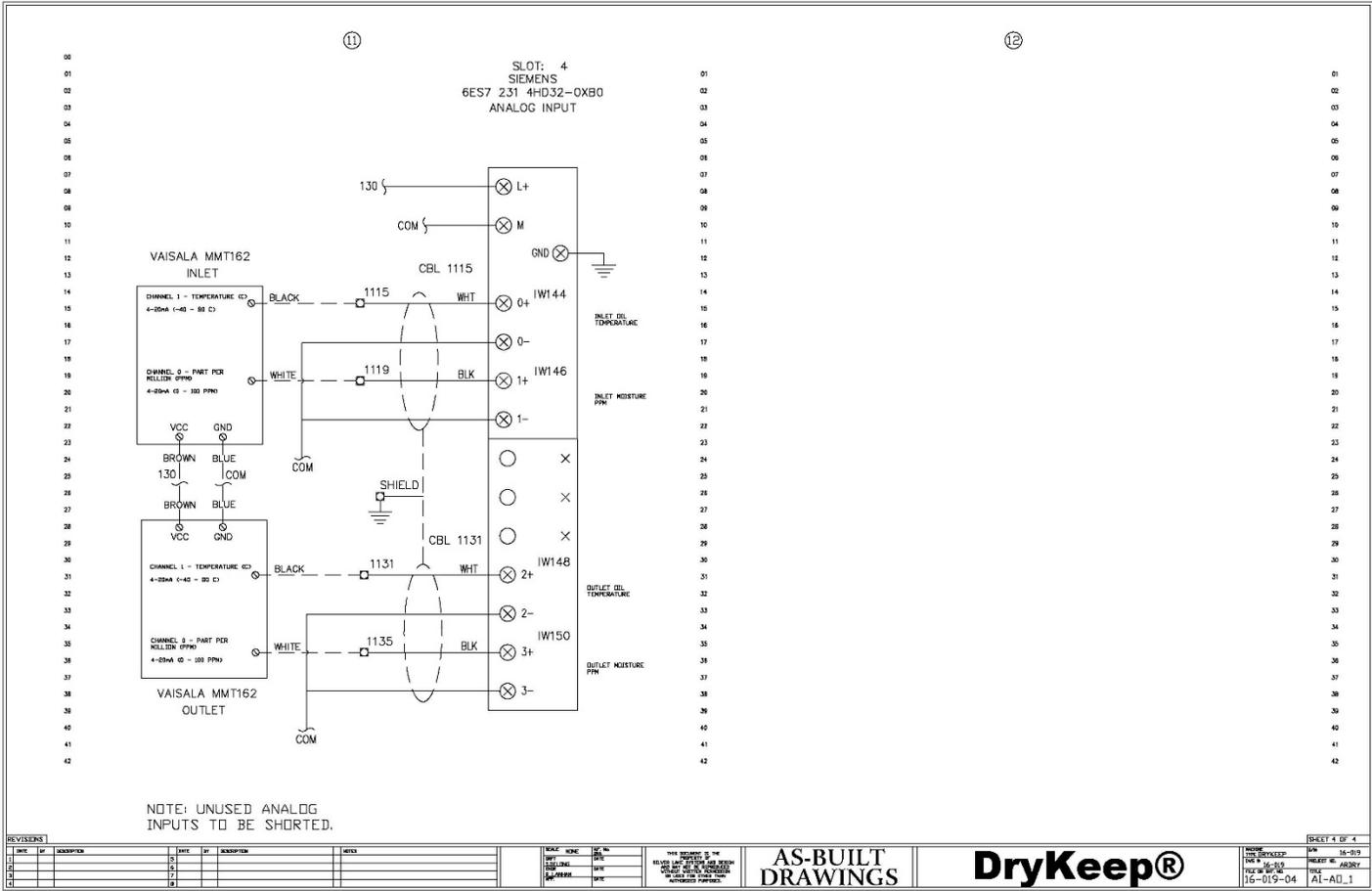


VNC Authentication

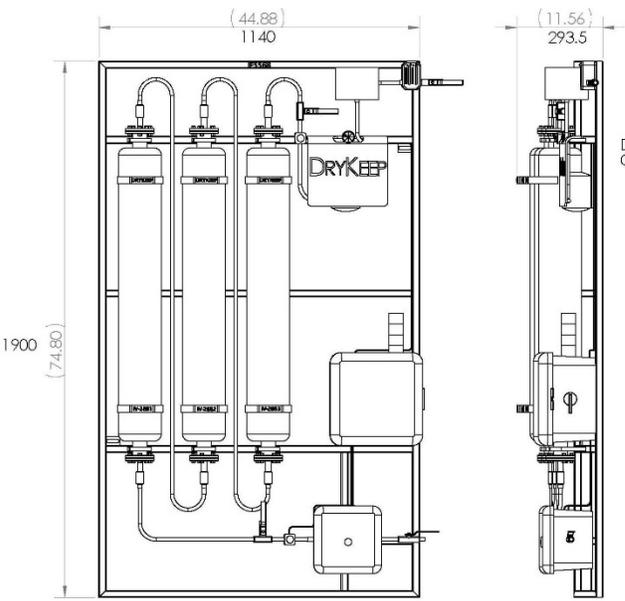
Password:

After being redirected, a password is needed to log in to Sm@rtserver. The password is 'drykeep'. After submitting the password, the HMI view will display as below. Anything that could be done locally at the HMI is available to monitor or control through this application.

A screenshot of the DryKeep SMART System Overview HMI interface. The window title is "Siemens Sm@rtClient Desktop ...". The address bar shows "192.168.2.71:5800". The menu bar includes "Disconnect", "Options", "Clipboard", "Record", "Send Ctrl-Alt-Del", and "Refresh". The main interface has a dark blue background. At the top left is the "DryKeep®" logo. At the top center is "SMART System Overview". At the top right is the date and time: "5/1/2009 3:57:22 AM". On the left side, there is a "Current System Status" panel with three indicator lights, "Pump: Not Running" (in a red box), "Paper Moisture Level: Safe" (in a green box), and "Control Functions" with "Alarm Reset" and "Pump Start" buttons. In the center is a schematic diagram of the system showing three vertical tanks, a pump, and a large "Estimated Paper Moisture" unit with a digital display showing "#####". On the right, there is a "Cycle: Active" button. At the bottom are navigation buttons: "Main", "Settings", "Trends", and "Help & Contact Info".



Analog Input Wiring Diagram



ESTIMATED WEIGHT : 400 LBS.
 DOES NOT INCLUDE ELECTRICAL
 COMPONENTS INSIDE BOX

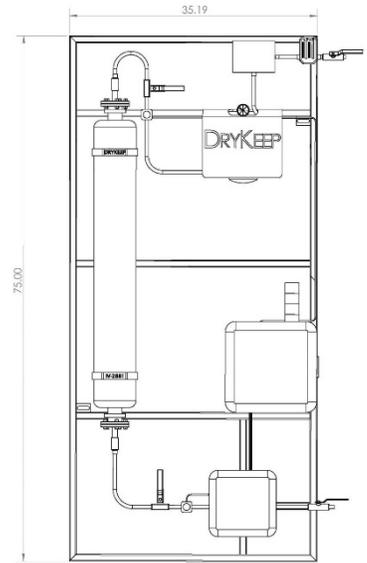


Figure 14: SMART RT-9 dimensional drawing

Figure 15: SMART RT-3 dimension drawing

We reserve the right to make changes to any described details and technical data contained herein. Continuous product enhancement by DryKeep® and local conditions may result in deviations from this standard product installation.