Clean Power VFD

AN003 - Connecting the Clean Power VFD to the Ethernet network

Application overview

Connecting the Clean Power VFD to an Ethernet network allows you to remotely monitor and control the motor with different industrial and automation systems.

Seamless connectivity of the Clean Power VFD and using standard communication protocols (such as Modbus TCP, BACnet IP and more):

- **Seamless Integration**: Reduce the need for proprietary solutions, allowing the VFD to integrate seamlessly into existing systems, which reduces set-up time and costs.
- **Enhanced Control and Monitoring**: The Clean Power VFD, with its native protocols, provides real-time control and monitoring capabilities, enabling the PLCs, SCADA, or BMS to adjust speed, torque, and other parameters based on demand and environmental conditions.

Technical Requirements and Considerations:

- **IP Network Infrastructure**: Requires a compatible IP network infrastructure, often within the facility's existing LAN.
- **Security**: Implementing cybersecurity measures like network segmentation, firewalls, and encrypted communication protocols to protect communications from unauthorized access.

Implementation Process

- **Configuration**: Set up and configure the Clean Power VFD with appropriate IP network parameters, including DHCP or static IP address, network mask, gateway, DNS.
- **Testing**: Conduct testing to verify communication reliability and adjust control parameters based on system performance.

Implementation guides

Clean Power VFD Ethernet Ports

The Clean Power VFD has 2 Ethernet ports, they are used to connect to your local area network (LAN). They are currently configured in switch mode. In switch mode, the VFD only has one (1) IP address for both ETH1 and ETH2, and all traffic coming from ETH1 can be forwarded to ETH2 and vice-versa.

IP address assignment	Selectable: Automatic (DHCP) or manual
DNS server assignment	Automatic or manual
Speed	Automatic (10/100/1000 Mbps)
Protocol	IPv4

Network Topologies

Star (Recommended)

The star topology is the recommended network topology to be used when you have multiple VFDs on the network. This topology offers centralized management and troubleshooting, it is more reliable in case of VFD failure, with no impact on the entire network. It is easy to expand by adding new VFDs into the switch. However, the number VFDs connected is limited to the available ports on the switch. And the central switch becomes a single point of failure (unless redundancy of the switch is added).

Daisy Chain

The daisy chain topology is simple and cost-effective to set up. It is easy to expand by adding new VFDs to the end of the chain. However, If one VFD or cable fails, all downstream VFDs are disconnected from the network.

It is recommended to daisy chain up to 8 VFDs, as more VFDs are added, they may increase latency and potential bandwidth bottlenecks.

Ring RSTP (Rapid Spanning Tree Protocol)

The ring RSTP topology is more reliable than the daisy chain topology, if one VFD fails, the other VFDs can still reach by traveling the opposite direction. It is easy to expand by adding new VFDs into the ring. However, to the circular aspect of the ring, it is mandatory to have loop prevention and traffic flow management on the Ethernet switch, which will increase its cost.

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Connect Clean Power VFD to the Ethernet network

Please follow the steps below to connect the Clean Power VFD to the Ethernet network:

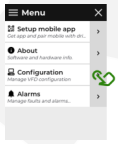
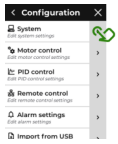
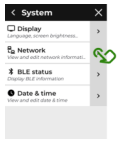
1- Connect Ethernet Cable:

Plug an Ethernet cable from the network switch or Ethernet wall port into the Ethernet port on the Clean Power VFD.

By default, the Clean Power VFD is configured to use DHCP (Dynamic Host Configuration Protocol) to obtain automatically an IP address on the Local Area Network (LAN).

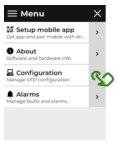
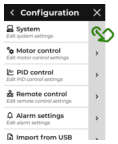
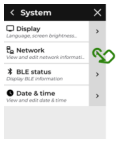
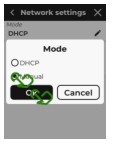
The Clean Power VFD's Ethernet port LED should blink. If not, please make sure that the cable is connected on both ends: Clean Power VFD Ethernet port and the LAN switch/router.

2- Verify if the Clean Power VFD has been assigned an IP address:

Step-by-step on the HMI	
1. Click on the ***Menu*** button to access the menu	
2. Click on ***Configuration*** to access the configuration menu	
3. Click on ***System*** to access the Clean Power VFD configuration	
4. Click on ***Network*** to access the network configuration	
5. Check if the Clean Power VFD has successfully obtained an IP address. 6. The ***Link status*** should indicate ***Up***. 7. The ***IP address*** should have an IP address.	

If you do not want to use DHCP to dynamically assign an IP address to the Clean Power VFD, please follow the step-by-step instructions described in the next section to manually configure the Clean Power VFD with a static IP address.

3- Configure a static IP address on the Clean Power VFD:

Step-by-step on the HMI	
1. Click on the ***Menu*** button to access the menu	
2. Click on ***Configuration*** to access the configuration menu	
3. Click on ***System*** to access the Clean Power VFD configuration	
4. Click on ***Network*** to access the network configuration	
5. Click on ***Network settings*** to change to manual network configuration	
6. Click on the ***pencil*** next to DHCP to change the ***Mode***	
7. Click on ***Manual*** and ***OK*** to set to assign the IP address manually	
8. Click on the ***pencil*** of the ***IP address*** field to specify the IP address	
9. Enter the ***static IP address*** and click on ***OK***	

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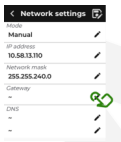
3- Configure a static IP address on the Clean Power VFD (continued)

Step-by-step on the HMI	
10. Click on the ***pencil*** of the ***Network mask*** field to specify the network mask	
11. Enter the ***network mask*** and click ***OK***	
12. Click on the ***pencil*** of the ***Gateway*** field to specify the gateway IP address	
13. Enter the ***gateway IP address*** and click ***OK***	
14. Click on the ***pencil*** of the ***DNS*** field to specify the gateway IP address	
15. Enter the ***DNS IP address*** and click ***OK***	
16. Click on the ***Save*** icon on the top to save the network configuration	
17. Click on ***Yes*** when you are prompt to save and apply the new network configuration	
18. Click on ***OK*** to acknowledge that the new network configuration has been saved and applied	

4- Confirm Link Status:

Check for indicator light on the Ethernet port of the Clean Power VFD, it should blink to confirm an active connection

Conclusion

Connecting the Clean Power VFD to an Ethernet network enables remote monitoring, real-time data analysis, streamlined diagnostics, improved energy management, and centralized control for enhanced system efficiency and reliability.

For further information, detailed specifications, or to initiate an implementation in your operations, please visit our website or contact our support team.

Let SmartD help you achieve operational excellence with cleaner, more efficient power solutions.