

Clean Power VFD

AN007 – Clean Power VFD emergency fire mode

Disclaimer

While every effort has been made to ensure the accuracy and completeness of the information contained in these application notes, SmartD makes no warranty, expressed or implied, including warranties of merchantability or fitness for a particular purpose. In no event will SmartD be liable to any party for any direct, indirect, special or other consequential damages for any use of these application notes.

The user must exercise caution and follow all safety protocols when working with VFDs. This includes, but is not limited to, wearing appropriate personal protective equipment (PPE), disconnecting power before working on equipment, and adhering to all applicable local and national electrical codes.

These application notes should not be used as a substitute for professional engineering advice, inspection, or consultation. The user is solely responsible for ensuring that any practices, installations, or actions taken based on these application notes meet all safety and operational requirements.

By using these application notes, the user agrees to indemnify and hold harmless SmartD from and against all losses, expenses, damages, and costs, including reasonable attorneys' fees, resulting from any violation of this disclaimer or any activity related to the user's account (including negligent or wrong conduct) by the user or any other person accessing these application notes using the user's account.

SmartD reserves the right to make changes to these application notes at any time without notice. It is the user's responsibility to ensure they are following the most recent version of these application notes.

Application overview

The Emergency Fire Mode (EFM) for a Variable Frequency Drive (VFD) is a safety feature designed to keep critical systems, like smoke extraction fans or pressurization fans, running during a fire event.

In normal operation, a VFD controls the speed and torque of an electric motor by varying the frequency and voltage of the power supplied to the motor. However, in the event of a fire, certain systems must continue to operate even under adverse conditions.

When the EFM is activated, the VFD bypasses its normal control methods and attempts to keep the connected motor running at full speed, regardless of any faults or abnormal conditions that might otherwise cause it to shut down. This can help to maintain ventilation in a building during a fire, helping to control the spread of smoke and potentially save lives.

Emergency Fire Mode (EFM) operation:

- Fire Alarm System Integration:** The VFD is typically integrated with the building's fire alarm system. When the fire alarm system is activated, it sends a signal to the VFD.
- Signal Interpretation:** The VFD interprets this signal as a command to enter EFM.
- Mode Activation:** The VFD then bypasses its normal operation parameters and attempts to run the connected motor at full speed, regardless of any faults or abnormal conditions.

Due to the critical nature of the EFM, it's typically designed to be activated automatically by a signal from a

fire alarm system rather than manually. However, depending on local standards and rules, and depending on user habits and requests, a manual triggering system could be set and used.

Compliance with safety falls under the user's responsibility not VFD manufacturer.

Implementation guides

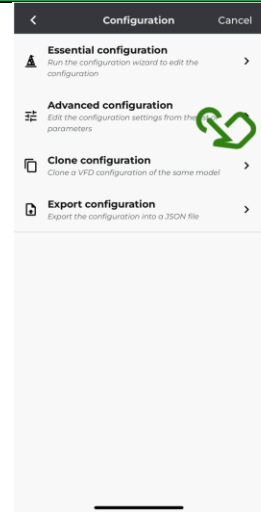
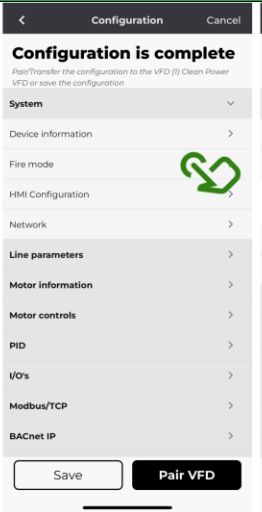
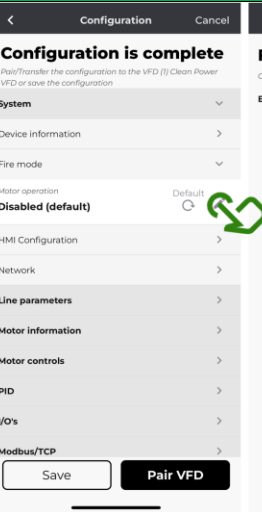
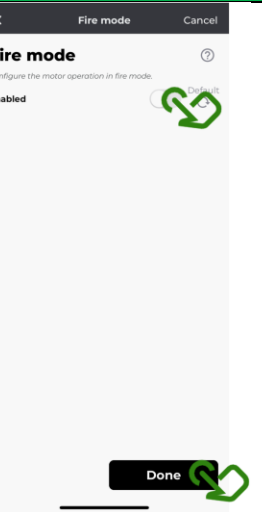
Software Compatibility

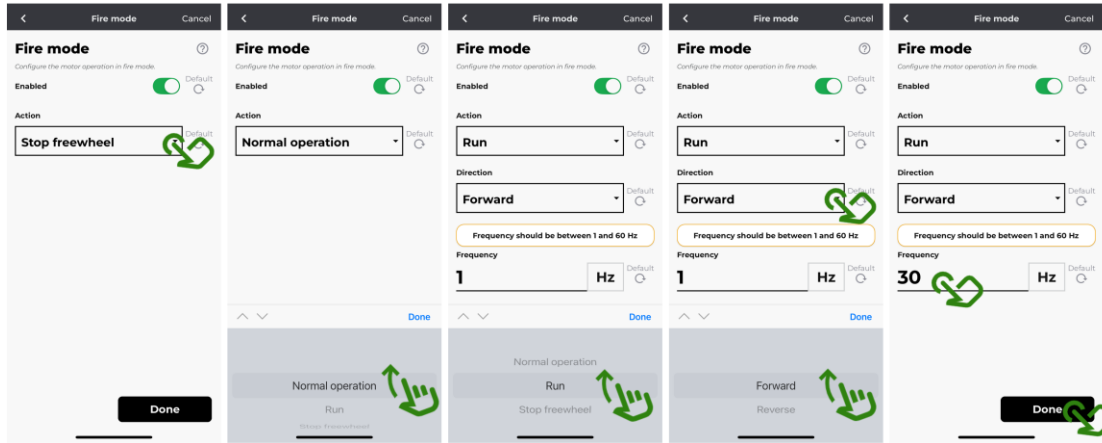
Please make sure to update your Clean Power VFD's firmware to version 2025.01.00 or later to enable the Emergency Fire Mode feature.

You can find the link to download the firmware in the latest firmware release notes on the [SmartD Help Center](#).

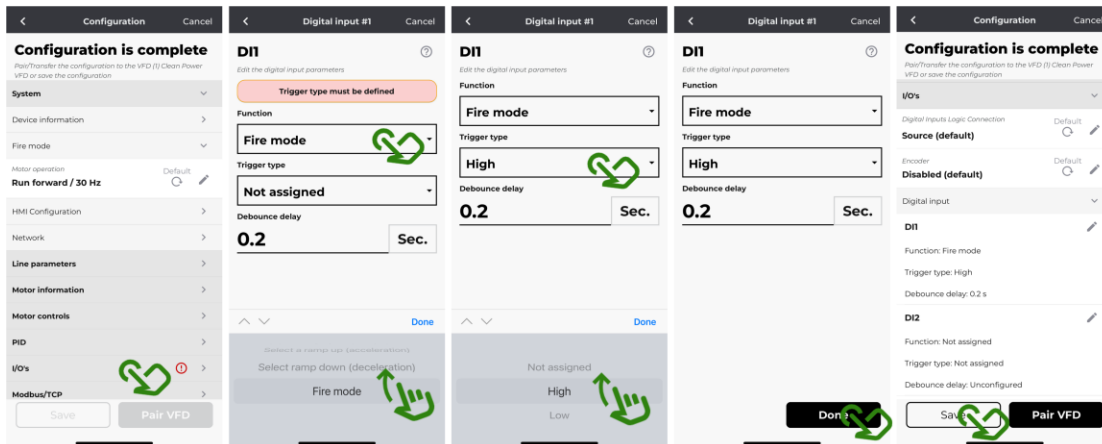
Step-by-step instructions

Step-by-step instructions on integrating and configuring the Clean Power VFD's Emergency Fire Mode feature.

| Step-by-step mobile configuration | | | | |
|---|--|--|---|---|
|  |  |  |  | <ul style="list-style-type: none">• Open the Advanced configuration• Expand the System and click on Fire mode• Click on the pencil to edit the Fire mode• Toggle the Enabled switch to enabled the Fire Mode• Click on Done |



- Once enabled, click on **Action**
- There are 3 possible actions:
 1. **Stop freewheel**
 2. **Normal operation** (keep as it)
 3. **Run** (preset values)
- Scroll up and down to select the desired action
- If you select **Run**, you can select the direction **Forward** or **Reverse** and enter the **preset frequency (Hz) or speed (RPM)**
- Click on **Done**



- You need to assign a digital input (DI) to enter and exit the Emergency Fire Mode
- Click on **I/O's** and expand the **Digital Inputs** section, click on the **pencil** of the DI used for Emergency Fire Mode
- Click the **Function** and scroll up to select **Fire mode** and click on **Done**
- Click the **Trigger type**, scroll up to select **High** or **Low** and click on **Done**
- Click on **Done** to complete the I/Os configuration

- Click on **Save**

- Click on **Transfer** or **Pair** to connect and transfer the configuration to the VFD

Test the system

Safety precautions:

- Ensure proper grounding of all electrical components.
- Make sure to have safety barriers and equipment to protect test personnel.
- Make sure that an emergency stop is available.

Pre-test setup:

- Make sure that the Emergency Fire Mode is configured and enabled.
- Make sure that the assigned digital input for fire mode is properly connected to the “fire mode” device triggering the start and end of the emergency fire mode.

Emergency fire mode activation:

Please follow the steps below to test the Emergency Fire Mode activation:

1. Normal operation:
 - a. Run the motor at a predefined speed or load.
 - b. Confirm that the motor operates as expected.
2. Activate fire mode:
 - a. Activate the “fire mode” device, it should activate the selected Clean Power VFD’s digital input, then the Clean Power VFD enters the emergency fire mode.
 - b. The HMI and mobile application should indicate that the VFD is in fire mode state.
 - c. Depending on the configured action, check that the Clean Power VFD performs the right configured action:
 - Normal operation: The Clean Power VFD keeps the current operation as it.
 - Run (preset values): The Clean Power VFD runs at the pre-configured frequency/speed and direction.
 - Stop freewheeling: The Clean Power VFD stops the motor (freewheeling/coasting)
3. Verification:
 - a. If it does not perform the right action, please check the Fire mode configuration and the DI configuration. Make required changes and restart the test from the beginning.
 - b. If it is performed the expected action:
 - Document and save your configuration securely.
 - Perform the test for exiting emergency fire mode.

Emergency fire mode deactivation:

Please follow the steps below to test the Emergency Fire Mode deactivation:

1. Deactivate fire mode:
 - a. Deactivate the “fire mode” device, it should deactivate the selected Clean Power VFD’s digital input, then the Clean Power VFD exits the emergency fire mode.
 - b. The HMI and mobile application should indicate that the VFD is no longer in fire mode state.
2. Verification:
 - a. Verify that the VFD resumes its normal operating state.
 - b. Monitor any alarm during the mode transition.

Emergency Fire Mode – Alarms Handling

Please note that when the Emergency Fire Mode is enabled, the Clean Power VFD ignores all major, medium and minor alarms. Only critical alarms will stop the VFD and will require a manual reset.

Certain major and medium alarms can affect the lifetime of the Clean Power VFD. Please review the alarms list on the HMI or mobile app or Audit Logs after the emergency fire mode deactivation.

Conclusion

Enabling the Emergency Fire Mode on the Clean Power VFD ensures critical operation during emergencies, keeping essential systems (e.g. smoke extraction fans, fire pumps) running even under hazardous conditions.

For further information, and detailed specifications, or to initiate an implementation in your operations, please visit our website: <https://smartd.tech/> or contact us at +1-866-776-2783

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