

PowerXL™**DE1 Variable Speed Starters
Fire Mode**

Level 2	1 – Fundamental – No previous experience necessary 2 – Basic – Basic knowledge recommended 3 – Advanced – Reasonable knowledge required 4 – Expert – Good experience recommended
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Danger! - Dangerous electrical voltage!

- Disconnect the power supply of the device.
- Ensure that devices cannot be accidentally restarted.
- Verify isolation from the supply.
- Cover or enclose any adjacent live components.
- Follow the engineering instructions (AWA/IL) for the device concerned.
- Only suitably qualified personnel in accordance with EN 50110-1/-2 (VDE 0105 Part 100) may work on this device/system.
- Before installation and before touching the device ensure that you are free of electrostatic charge.
- The functional earth (FE, PES) must be connected to the protective earth (PE) or the potential equalization. The system installer is responsible for implementing this connection.
- Connecting cables and signal lines should be installed so that inductive or capacitive interference does not impair the automatic control functions.
- Suitable safety hardware and software measures should be implemented for the I/O interface so that an open circuit on the signal side does not result in undefined states.
- Deviations of the mains voltage from the rated value must not exceed the tolerance limits given in the specification, otherwise this may cause malfunction and/or dangerous operation.
- Emergency stop devices complying with IEC/EN 60204-1 must be effective in all operating modes. Unlatching of the emergency-stop devices must not cause a restart.
- Devices that are designed for mounting in housings or control cabinets must only be operated and controlled after they have been properly installed and with the housing closed.
- Wherever faults may cause injury or material damage, external measures must be implemented to ensure a safe operating state in the event of a fault or malfunction (e.g. by means of separate limit switches, mechanical interlocks etc.).
- Variable Speed Starters may have hot surfaces during and immediately after operation.
- Removal of the required covers, improper installation or incorrect operation of motor or Variable Speed Starter may destroy the device and may lead to serious injury or damage.
- The applicable national safety regulations and accident prevention recommendations must be applied to all work carried on live Variable Speed Starters.
- The electrical installation must be carried out in accordance with the relevant electrical regulations (e. g. with regard to cable cross sections, fuses, PE).
- Transport, installation, commissioning and maintenance work must be carried out only by qualified personnel (IEC 60364, HD 384 and national occupational safety regulations).
- Installations containing Variable Speed Starters must be provided with additional monitoring and protective devices in accordance with the applicable safety regulations. Modifications to the Variable Speed Starters using the operating software are permitted.
- All covers and doors must be kept closed during operation.
- To reduce the hazards for people or equipment, the user must include in the machine design measures that restrict the consequences of a malfunction or failure of the frequency inverter (increased motor speed or sudden standstill of motor). These measures include: – Other independent devices for monitoring safety related variables (speed, travel, end positions etc.).
 - Electrical or non-electrical system-wide measures (electrical or mechanical interlocks).
 - Never touch live parts or cable connections of the Variable Speed Starter after it has been disconnected from the power supply. Due to the charge in the capacitors, these parts may still be alive after disconnection. Consider appropriate warning signs.

Disclaimer

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1 General

Devices of the series **PowerXL™ DE1** have internal protective functions, to prevent them from being destroyed. When a protective function is activated, either the device is switched off or a message is displayed.

In case of a fire, the lives of human beings and animals must be protected. For that reason it is important, that smoke extractors and sprinklers still work, even in case of a fault, which normally leads to a shutdown.

Depending on the application different requirements exist, how a device has to behave in case of fire. It starts with bypassing of electronic devices and a direct connection of the motor to the supply-mains to the point of a special behavior of the Variable Speed Starter. The operating mode of the Variable Speed Starter in case of fire is called Fire Mode.

The Variable Speed Drives Group of the British Manufacturers Organization GAMBICA defines the Fire Mode as follows:

Fire Mode is a special operating mode of the VSD that is activated by a dedicated signal that specifically indicates a fire condition. Once operating in Fire Mode the VSD will ignore or reset faults in order to maintain availability.

Fire Mode cannot be triggered by any other signal or manual option. Once the VSD enters Fire Mode, it cannot exit this mode until the fire condition signal is reset.

2 Configuration of DE1 for Fire Mode

2.1 Activation of the Fire Mode

The function "Fire Mode" is activated by setting parameter P-45 "FireMode Function" to 1...4. It defines the behavior of the device in applications, where Fire Mode is used. The Fire Mode signal is connected to terminal 3 (DI3). During normal operation a HIGH signal must be present at this terminal. An inversion of this signal by using P-19 "DI3 Logic" is not possible in Fire Mode.

P-15 may only be set to values, where an external fault signal (EXTFLT) is assigned to terminal 3 (P-15 = 1, 3, 5, 7, 9). An operation of the variable speed starter in Fire Mode is indicated by the LED "Status" on the front of the device (3 flashes, followed by a pause of 2 s). During Fire Mode the signals START, FWD and REV are not effective.

P-45 = 0 → Fire Mode disabled

P-45 = 1 → Fire Mode 1

- At removing the signal at terminal 3, Fire Mode is activated and the motor turns clockwise (FWD).
- The speed reference during Fire Mode is the analog reference at terminal 4 (AI1).
- When this reference fails or in case it is zero at the time of activating Fire Mode, the motor runs with fixed frequency 4 (f-Fix4 = P-23). This remains, even when the analog value comes back.

2: Fire Mode 2

- At removing the signal at terminal 3, Fire Mode is activated and the motor turns counter clockwise (REV).
- The speed reference during Fire Mode is the analog reference at terminal 4 (AI1).
- When this reference fails or in case it is zero at the time of activating Fire Mode, the motor runs with fixed frequency 4 (f-Fix4 = P-23). This remains, even when the analog value comes back.

3: Fire Mode 3

- At removing the signal at terminal 3, Fire Mode is activated and the motor turns clockwise (FWD).
- The speed reference during Fire Mode is fixed frequency 4 (f-Fix4 = P-23).

4: Fire Mode 4

- At removing the signal at terminal 3, Fire Mode is activated and the motor turns counter clockwise (REV).
- The speed reference during Fire Mode is fixed frequency 4 (f-Fix4 = P-23).

PNU	Parameter	Name	Range	Default
640.0	P-45	Fire Mode Function	0 = Fire Mode disabled 1 = Fire Mode 1 2 = Fire Mode 2 3 = Fire Mode 3 4 = Fire Mode 4	0

2.2 Start Mode (P-30) and DC Braking (P-25)

During Fire Mode fault messages are ignored. In case of fault conditions, in which the device is physically not able to operate, e.g. with a short circuit at the output, the device trips and performs an automatic restart afterwards. This automatic reset does not depend on the setting of P-30 "Start Mode". P-30 determines the number of automatic restarts in case of a fault, which occur when Fire Mode is not active. In case of Fire Mode the variable speed starter continuously tries to reactivate the device after a fault.

In addition it is recommended to enable DC braking before start ($P-25 = 2$ or 3) to prevent trips because of overcurrent, when starting a spinning motor. This is quite often the case with fans having a big inertia.

See also: Application Note AP040029EN „Start, Stop and Operation“.

2.3 Display values

When Fire Mode is active, it is displayed with the LED „Status“ on the front of the device (3 flashes, followed by a pause of 2 s).

The following information about Fire Mode are displayed when using a keypad.

PNU	Parameter	Name
841.58370	P00-21	FaultCounter Fire detected
821.11	P00-22	t-FireMode active

Parameters P00-21 and P00-22 give historical information about Fire Mode. They are located inside Level 2 of the parameter menu. This level can be accessed by entering the respective password at parameter P-14. The default password is “101”.

See also AP040020EN “Access to Parameter Level 2 – Parameter Lock – Load default”

P00-21 “FaultCounter Fire detected” indicates, how many times a fire was detected.

P00-22 “t-FireMode active” indicates the total operating time of the VSS in Fire Mode in hours, minutes and seconds. Pressing the ▲ key on the VSS keypad will change the display from "hours" to "minutes and seconds".

3 How does the device DE1 behave in Fire Mode?

3.1 Which protective functions are deactivated?

In Fire Mode the following protective functions are deactivated:

Message	Possible cause
It-trP	Motor is overloaded. The thermal protection has tripped after delivering > 100 % of the current set in P-08 for a certain time.
O-t	Heatsink overtemperature. The drive is too hot.
U-t	Undertemperature. This message is displayed, when the ambient temperature is below – 10 °C.
th-FLt	Thermistor on the heatsink is faulty.
SC-trP	Loss of the serial communication
Ph-I b	Phase imbalance of the input voltage
P-LOSS	Loss of an input phase (only at devices with a 3 phase supply)
4-20 F	Analog input current out of range

In case one of the faults listed below occurs, the variable speed starter trips and restarts automatically for an infinite number of trials.

Message	Possible cause
O-I	Instantaneous overcurrent on the drive output
h-OI	Fast overcurrent trip
OUt-F	Variable speed starter output fault, output stage trip
OVolt	Overvoltage in the d.c. link
UVolt	Undervoltage in the d.c. link

3.2 Behavior of the device

During normal operation the Fire Mode signal is applied and terminal 3 (DI3) has HIGH potential. In case of a fire detection the signal turns to LOW and the variable speed starter reacts as defined with P-45 "FireMode Function".

NOTE: The variable speed starter returns to normal operation as soon as the voltage at terminal 3 recovers. When the Fire Mode signal needs to be latched, because an intentional reset needs to be done manually, the latching has to be foreseen external from the variable speed starter. In many cases this function is part of the fire alarm system.

During Fire Mode the signals START, FWD and REV are ignored.