ACE Series Explosionproof Variable Frequency Drives

The only Explosionproof VFD solution utilizing a NEMA 7 classified enclosure
ACE Series Explosionproof Variable Frequency Drives
with Allen-Bradley® PowerFlex 700® Series VFD

An industry first – New Explosionproof VFDs deliver installation savings, conserve energy and improve performance

Creative thinking and reliable solutions. That’s what you need in the world’s most demanding environments, and that’s what Cooper Crouse-Hinds is delivering with its new ACE Series Explosionproof Variable Frequency Drives – another Cooper Crouse-Hinds innovation.

ESP Solutions

For more than 100 years, Cooper Crouse-Hinds has exceeded customer expectations when it comes to new ideas and technological advancements. Today, as the electrical industry’s global leader for hazardous environments, we continue to reach beyond the expected – especially with our commitment to ESP (Enhancing Safety and Productivity).

The Class I Dilemma

Until now, a VFD couldn’t be used inside a classified enclosure in Class I, Division 1 or 2 locations. The heat generated by the VFD inside the classified enclosure caused it to fail. To overcome this problem, VFDs had to be stationed in control rooms outside of the hazardous area, resulting in expensive and impractical installation costs.

But what if you could station VFDs exactly where you want them, literally mounting the drives next to motors inside Class I areas? This would provide:

• A significant reduction of construction and installation costs
• The elimination of logistical and engineering problems
• An increase in uptime

Cooper Crouse-Hinds has developed just such a solution – the ACE Series Explosionproof Variable Frequency Drive. It is the only explosionproof enclosure to safely and reliably house a VFD. This revolutionary new product features a NEMA 7 enclosure with patent pending active cooling technology, allowing a traditional VFD to be housed inside the classified enclosure without the risk of overheating.

The ACE Explosionproof VFD is rated Class I, Divisions 1 and 2 for use in the most extreme hazardous environments, and it is designed to match the high requirements of pumps, compressors, fans, separators, and mixers in the following process industries:

• Oil and gas/refineries
• OEM skid builders
• Petrochemical
• Water/waste water
• Pharmaceutical
• Food & beverage manufacturing
An oil refinery utilizes thousands of pumps throughout the facility, many of them in hazardous areas. In an effort to improve their bottom line, the owners would like to control the pumps with VFDs and capture the energy savings they provide.

There is no space in the non-classified control room for the VFDs. Also, the cost to engineer and install conduit and motor cable from the non-classified area to the pumps in the hazardous area is prohibitive.

Install Cooper Crouse-Hinds ACE Series Explosionproof VFDs right next to the motor and pump, tapping into an existing 480V supply.

By using a VFD to optimize pump flow, significant energy savings are realized. Additionally, by installing the VFD next to the pump and motor, installation costs are greatly reduced.
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System Design

Variable Frequency Drive (VFD) in explosionproof enclosure allows installation in classified area, providing significant installation savings.
Stainless steel, captive, triple lead quick release spring loaded bolts install faster and provide clear indication that the cover bolts are fully retracted from the body.

Stainless steel hinges provide convenient and easy access to enclosure interior.

Explosionproof window allows for viewing of the VFD interface module LCD screen.

Heavy duty blower* creates airflow through the enclosure, allowing VFD to operate in ambient temperatures up to 50°C.

Wireless Interface Module Option

Filters* in top and bottom of enclosure allow airflow into and out of the enclosure, cooling the VFD and eliminating risk of overheating.

Pre-filter screens* eliminate clogging of the primary filters, ensuring reliable and consistent airflow. Pre-filter screens can be easily removed and cleaned without shutting down operations.

Explosionproof pilot lights provide run, stop and fault indication.

Optional potentiometer, push-buttons and selector switches

Enclosure epoxy painted for superior corrosion resistance.

*Heavy duty blower, shroud, filters, and pre-filter screens not included with units containing 1.5 to 5.0 horsepower VFDs.
Downtime Reduction

A Petrochemical plant is experiencing an unacceptable amount of downtime in critical processes, costing the facility tens of thousands of dollars per hour. The Plant Manager has been tasked with determining the problem and proposing a solution.

Problem

The motors throughout the facility are controlled by basic “across-the-line” motor starters, and unexpected motor failure is the biggest reason for unscheduled down time.

Solution

Installing Cooper Crouse-Hinds ACE Series Explosionproof VFDs throughout the facility will provide access to real-time equipment and process data. Employees can monitor rises in average motor current, accurately predicting imminent bearing failure.

Benefit

Using VFDs to access and analyze real-time equipment data significantly reduces plant downtime, as the Plant Manager is now able to proactively schedule motor changeout maintenance during non-production hours.

The Cooper Crouse-Hinds Solution That Drives Many Benefits

ACE Explosionproof VFDs are the optimal choice for motor control in Class I, Division 1 and 2 locations for a number of reasons.

- **Simple and Cost Effective Installations** – ACE Explosionproof VFDs can be installed inside hazardous areas right next to the operation, eliminating expensive, complicated installations. There is no need to run long lines of conduit and motor cable, navigate around obstacles and hazards, or build off-site control rooms in non-hazardous areas to house VFD clusters.

- **Reduced Energy Usage** – ACE Explosionproof VFDs allow you to adjust the motor’s level of power to exactly what is needed for optimal performance, significantly lowering energy consumption.

- **Reduced Downtime** – Built-in diagnostics monitor equipment information and operating conditions, bringing visibility to potential issues before they become problems. Maintenance can be proactively scheduled during non-production hours.

- **Lower Maintenance Costs** – The ACE Explosionproof VFDs ability to lower system speeds and loads, as well as its soft start and stop capabilities, helps eliminate water hammer effects, increase life on bearings and seals and reduce stress on the overall electrical system.
A waste water treatment plant wants to reduce maintenance costs by installing VFDs on their pumps to eliminate the effects of water hammer in their pipes, which causes damage to the pipe system and its appendages.

The cost to run motor cable and conduit, coupled with the added cost of filters to mitigate the effects of Reflected Wave Syndrome (due to long cable lengths), makes installing the VFDs in a non-classified area impractical.

Install Cooper Crouse-Hinds ACE series Explosionproof VFDs in the classified area, thereby eliminating costly installations and protecting against the possibility of reflected wave syndrome by keeping motor cable runs short. Additionally, the VFDs soft start and stop capabilities eliminate water hammer.

Total cost of ownership is reduced by protecting both the piping system and the motor itself with a classified solution that is easy to install.

In many cases the energy and installation savings realized with the ACE Series will pay for the drive in 1 year.
Applications

• For speed control of pumps, compressors, fans, conveyors, separators, mixers, and other process equipment.

• Designed to meet the high reliability and safety requirements of process industries such as oil and gas, chemical and mining.

ACE Series System Benefits

Simple, Cost-Effective Installations

• ACE Explosionproof VFDs are installed ‘on-machine’ inside the hazardous areas, eliminating expensive, complicated installations.

• There is no need to run long lines of conduit and motor cable, dig up roadways and sidewalks, navigate around obstacles and hazards or build off-site control rooms in non-hazardous areas to house VFD clusters.

• Reflected Wave Syndrome is eliminated due to short motor cable runs.

Additional VFD Benefits

Reduce Energy Costs Through Improved Process Control

• Fine speed and torque control optimizes system performance and reduces energy consumption.

Reduce Operation and Maintenance Costs

• Reduce stress on electrical system

• Reduce water hammer effects with soft start capability

• Lower speed/load on bearings and seals

• Reduce risk of system damage due to cavitation

Avoid Downtime with Real-Time Equipment and Process Data

• Diagnostics help locate disturbances to the system and suggest remedies, allowing proactive maintenance decisions to be made.

Certifications and Compliances

UL Classified

• Class I, Divisions 1 and 2, Groups B, C, D

cUL Classified

• Class I, Divisions 1 and 2, Groups B*, C, D

* 5HP and below listed for Group B

Standards

• UL1203

Environmental Ratings

• NEMA 3, 4X*, 7BCD

* Please consult factory

• Raintight

• Wet Locations

Operating Temperature Range

• 0°C to 50°C (32°F to 122°F)

Horsepower Ratings

• Available up to 50HP

• Higher horsepower ratings coming soon

Standard Materials and Finishes

• Body and Cover – Copper-free aluminum, epoxy powder coated

• Operating Handle – Copper-free aluminum, epoxy painted

• Window – Tempered soda lime glass

• Blower – Aluminum, natural

• Filters – Stainless steel, natural

• Pre-filters – Stainless steel, natural

• Disconnect – Stainless steel, natural

• Shroud – Copper-free aluminum, epoxy painted

• Cover Hinges, Bolts, Washers and Springs – Stainless Steel, natural

• Internal Brackets – Stainless steel, natural

• Manifold and Intake – EDPM rubber, natural

VFD System Specifications

• Allen-Bradley® PowerFlex 700® Series low voltage, compact AC drives
Step 1 – Select VFD Horsepower Rating

<table>
<thead>
<tr>
<th>Catalog Number</th>
<th>Nominal HP (KW)</th>
<th>Max Disconnect Rating (Amps)</th>
<th>Disconnect Fuse Type</th>
<th>Enclosure Size</th>
<th>Input Rating (Amps)</th>
<th>Max Output Rating (Amps)*</th>
<th>Power Loss (Watts)**</th>
<th>Temp Rating</th>
<th>VFD Manufacturer Part#</th>
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Above data is for a 480V drive. For 600V drive please consult factory

* De-rating may be required to account for specific environmental conditions (high ambient temperature, altitude, etc). Consult factory for de-rating information.

** When not installed in a well ventilated environment, provisions must be made to account for heat generation to ensure proper operation of the device.

Step 2 – Add Desired Options

<table>
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<th>Description</th>
<th>Add Suffix</th>
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<td>Communication Modules</td>
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<td>Profibus</td>
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<td>Devicenet</td>
<td>CD</td>
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<td>CAN Open</td>
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<td>Modbus</td>
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<td>RR3</td>
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<tr>
<td>Push Button Start-Stop</td>
<td>PB23</td>
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<td>600 VAC VFD²</td>
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Notes:
1 RR3 and PB23 cannot be ordered together
2 600 suffix option can only be used for ACE20 units with nominal HP of 5 or less

Catalog Number Example

Catalog Number Example

<table>
<thead>
<tr>
<th>Catalog Number</th>
<th>Communication Module &amp; Options</th>
<th>Current Rating</th>
<th>Fuse Type</th>
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<td>Allen-Bradley® VFD With 50 HP Rating</td>
<td>Ethernet Communications</td>
<td>Fuse (81A requirement + 5A for blower, rounded up to 90)</td>
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<td>Note: Add 5 Amps to your requirements to account for cooling system blower and round up to the nearest increment of 5</td>
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Step 3 – Add Current Rating for Cooper Bussmann Fuses

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<td>Note: Add 5 Amps to your requirements to account for cooling system blower and round up to the nearest increment of 5</td>
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</table>
ACE Series Explosionproof Variable Frequency Drives
with Allen-Bradley® PowerFlex 700® Series VFD

Dimensions - Enclosure Size 1 (1.0 to 5.0 Horsepower VFDs)

Note: Units containing 1.0 to 5.0 horsepower VFDs do not require filters.

Dimensions - Enclosure Size 2 (7.5 to 50 horsepower VFDs)
For more information:
If further assistance is required, please contact an authorized Cooper Crouse-Hinds Distributor, Sales Office, or Customer Service Department.

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