

PowerFlex® Active Front End Solutions

Regenerate Power Back to the Utility and Lower Harmonics

The PowerFlex Active Front End (AFE) is a great fit for applications that require regeneration of power back to the utility and/or low harmonics to meet IEEE-519 and CE standards. The AFE is a regenerative DC bus supply used to provide DC power to a line-up of common bus AC drives or a single common bus drive. The AFE utilizes a pulse width modulated (PWM) controlled IGBT converter to allow bi-directional power flow to the AC line.

Advantages

Regenerative Braking for Energy Savings and Elimination of Braking Resistors

The AFE helps reduce machine footprint and maintenance by eliminating the need to install and maintain large resistor banks. These resistor banks can also create a great deal of unwanted heat and must frequently be cleaned. Regenerative braking technology helps reduce operating costs by reusing motor braking energy rather than wasting it as heat.

Low AC Input Harmonics

The active front end provides low harmonics to meet IEEE-519 and CE at its input terminals.

Improved Power Factor

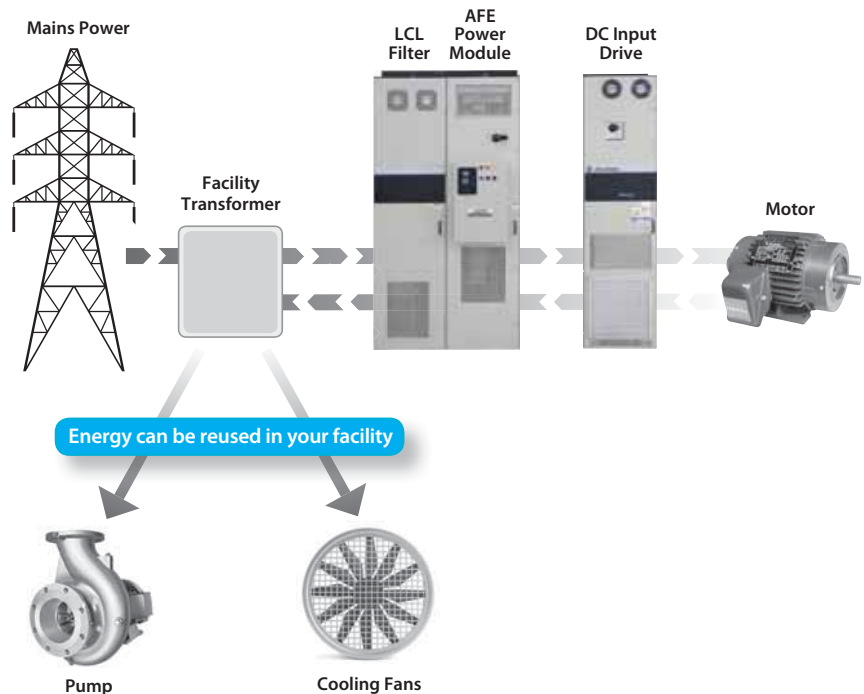
The AFE itself actively controls the power factor regardless of motor speed and load. In addition, it can be used for power factor correction on the power system.

Voltage Boost

The AFE allows "input voltage boost" operation, providing full 480V AC to the motor, even when operating on 380V AC power lines. This voltage boost also helps reduce downtime by protecting critical processes from the potentially disruptive effects of input voltage dips and sags.

Enclosure Options

PowerFlex Active Front End solutions offer packaging flexibility with a choice of enclosures.



The illustration above shows the power flow through an Active Front End system. By applying AFE technology, a facility is able to recover dissipated energy and re-use that energy for other applications.

Premier Integration

For simplified drive start-up and reduced development time, the PowerFlex AFE can be configured with Studio 5000™ software. This single software approach simplifies parameter and tag programming while still allowing stand-alone drive software tool use on the factory floor.

Internal communication options help you to cost-effectively assemble highly integrated applications. Options include: EtherNet/IP,™ DeviceNet,™ ControlNet,™ and other open communications including Profibus™ and Interbus-S. In addition, the PowerFlex AFE uses the same HIMs, communication modules, software and configuration tools as the PowerFlex Architecture-class drives.

PowerFlex Active Front End Solutions are designed to save energy and lower harmonics, with a choice of enclosures.

LISTEN.
THINK.
SOLVE.™

A Choice of Enclosures to Meet Your Application Needs

PowerFlex Active Front End solutions offer packaging flexibility with a choice of enclosures

Rittal Enclosure

The Active Front End solution with a Rittal enclosure has IP21/NEMA 1 environmental ratings. It is designed to work with a variety of PowerFlex drives including the PowerFlex 700, 753 and 755 wall mount drives. The PowerFlex 700AFE includes:

- Motor-controlled circuit breaker and precharge
- Input power with bottom entry
- DC bus connections with top right side exit



Active Front End with an IP21/NEMA 1 Rittal enclosure



Active Front End with an IP20/NEMA 1
MCC-style enclosure

MCC-style Enclosure

The PowerFlex AFE offers the option of an MCC-style enclosure designed for use with a PowerFlex 755 floor mount drive. The result is a unified lineup incorporating the benefits of the flexible, full-featured PowerFlex 755 AC drive. The PowerFlex AFE has IP20/NEMA 1 ratings and offers these features:

- **Lower installation costs through improved mechanical integration with PowerFlex 755 common bus drives.** MCC DC Bus connections align with PowerFlex 755 floor mount drives for reduced installation time and lower installation costs.
- **A choice of two colors** allows you to match the MCC-style enclosure to the selected PowerFlex 755 floor mount drive for a unified appearance.
- **Benefit from Commonality** – Protect your investment in PowerFlex AC drives with an Active Front End solution that shares common software, accessories, communications and HIMs.
- **PowerFlex AFE includes:**
 - A circuit breaker and precharge
 - Input power connections with top entry
 - DC bus connections from either the right or left side

Flexible Enclosures and Configurations

PowerFlex Active Front End solutions can be arranged in a variety of configurations with a choice of PowerFlex drives to best meet the needs of your application. Some of the recommended configurations are shown below.



Use a Rittal enclosure with wall-mount PowerFlex drives.



Use an MCC-style enclosure with an empty option bay containing PowerFlex wall-mount drives.



Use an MCC-style enclosure with a PowerFlex 755 floor-mount drive.

Applications that Benefit from AFE Solutions

The PowerFlex Active Front End is an excellent solution for common bus or single drive applications that require AC line regeneration and/or low harmonics.

Regeneration for Fast Stop

- Paper machines
- Metals process lines
- Converting

Continuous Regeneration

- Unwinders

Regeneration where the Motor is Overdriven by the Load

- Test stands

Regeneration for Dynamic Deceleration

- Cutoff applications for glass, board or metal

Regeneration for Lowering and Deceleration

- Cranes and hoists

Regeneration for Frequent Deceleration

- Centrifuges

PowerFlex 750-Series AC Drives are Designed for Ease of Use and Flexibility

With a complete power range of 0.75 to 1500 kW (1 to 2000 Hp) and 400/480 and 600/690 volt availability, the PowerFlex 750-Series is a comprehensive drive family providing productivity-enhancing benefits to a wide range of global applications. Consider these key features of the PowerFlex 750-Series drives and how they can help maximize your productivity:

Communications – The drive supports a comprehensive range of network protocols to ease integration into your architecture

Simplified Integration with Logix – Helps to simplify and enhance configuration, programming, commissioning, diagnostics and maintenance

Safe Torque-off and Safe Speed Monitor – Help protect personnel and equipment while reducing machine downtime

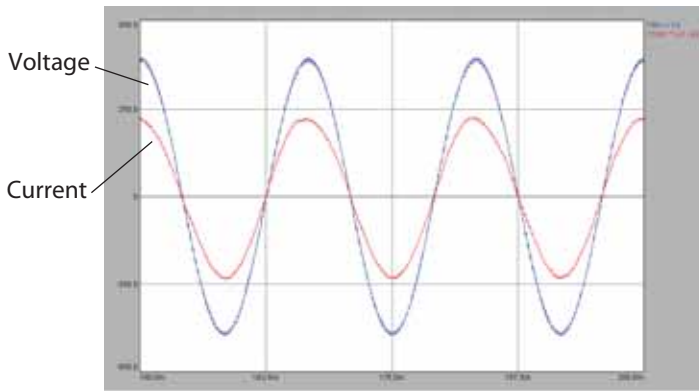
Configure for Your Application – The drive has a slot-based hardware architecture, allowing you to select the options you need to provide flexibility

Predictive Diagnostics – Helps reduce unplanned downtime

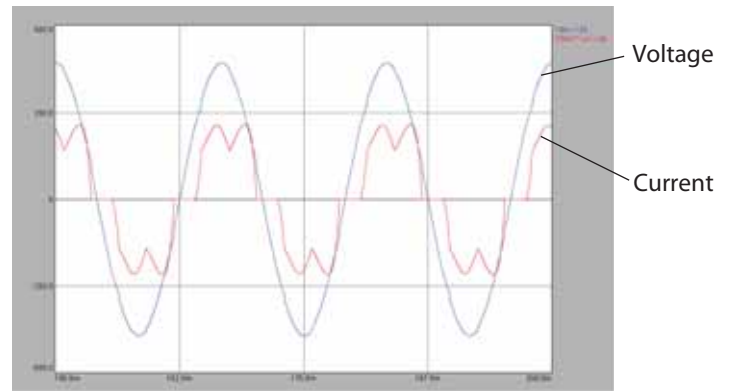


Low AC Input Harmonics and Improved Power Factor

The PowerFlex Active Front End actively controls the power factor regardless of motor speed and load. The AFE can be used for power factor correction on the power system.



Typical current and voltage waveforms for a PowerFlex 700AFE ($I_{THD} = 3-5\%$)



Typical current and voltage waveforms for a non-regenerative converter (6-Pulse) ($I_{THD} = 30-50\%$ with DC choke)

Ratings Information Applies to Both Rittal and MCC-style Enclosures

400V AC Input Ratings

Catalog Number	Frame Size	kW Rating		PWM Freq. kHz	AC Input Amps		DC Amps Cont.	Typical Watts Loss (Watts)
		ND	HD		Cont.	1 Min.		
20YD460	10	309		3.6	460	506	520	8,000
			258	3.6	385	578	435	
20YD1K3	13	873		3.6	1300	1430	1469	23,000
			772	3.6	1150	1725	1299	

480V AC Input Ratings

Catalog Number	Frame Size	Hp Rating		PWM Freq. kHz	AC Input Amps		DC Amps Cont.	Typical Watts Loss (Watts)
		ND	HD		Cont.	1 Min.		
20YD460	10	497		3.6	460	506	520	8,000
			416	3.6	385	578	435	
20YD1K3	13	1404		3.6	1300	1430	1469	23,000
			1242	3.6	1150	1725	1299	

600V AC Input Ratings

Catalog Number	Frame Size	Hp Rating		PWM Freq. kHz	AC Input Amps		DC Amps Cont.	Typical Watts Loss (Watts)
		ND	HD		Cont.	1 Min.		
20YF325	10	439		3.6	325	358	367	8,000
			324	3.6	240	392	272	
20YF1K0*	13	1390		3.6	1030	1133	1164	26,000

690V AC Input Ratings

Catalog Number	Frame Size	kW Rating		PWM Freq. kHz	AC Input Amps		DC Amps Cont.	Typical Watts Loss (Watts)
		ND	HD		Cont.	1 Min.		
20YF325	10	376		3.6	325	358	367	8,000
			278	3.6	240	360	272	
20YF1K0*	13	1193		3.6	1030	1133	1164	26,000

* Heavy duty rating is not applicable to Frame 13 600 or 690V.

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