

Subject: Mixer Overview	Product: V7 and F7 Drives	Doc#: AO.AFD.52
Title: Mixer		

Mixer

Application Overview

Mixers are used in a wide range of industries to combine different materials together to form one final product from the mixing process. The mixed materials can be mixed from low to high viscosity, high to low viscosity, or mixed at a constant viscosity. Mixtures may require the mixer to operate at various speeds throughout the mixing process. The properties of the mixed material are a primary consideration when defining mixing applications.

Application Challenges:

- High starting torque – High viscosity materials will require a high amount of starting torque to get the mixer blades rotating.
- Mixture status – Determine the viscosity of the mixture while the mixer is operating.
- “Trip-less” operation – The drive must be capable of continuous operation or automatic restart after a momentary power loss or fault (< 5 ms).
- Multiple mixing speeds – Capable of changing mixing speeds throughout the mixing process for different mixtures.
- Equipment protection – Capable of detecting seizing or jamming of the mixing equipment (shaft, mixer blades, mixer paddles, etc.) and respond to avoid damage to the equipment.

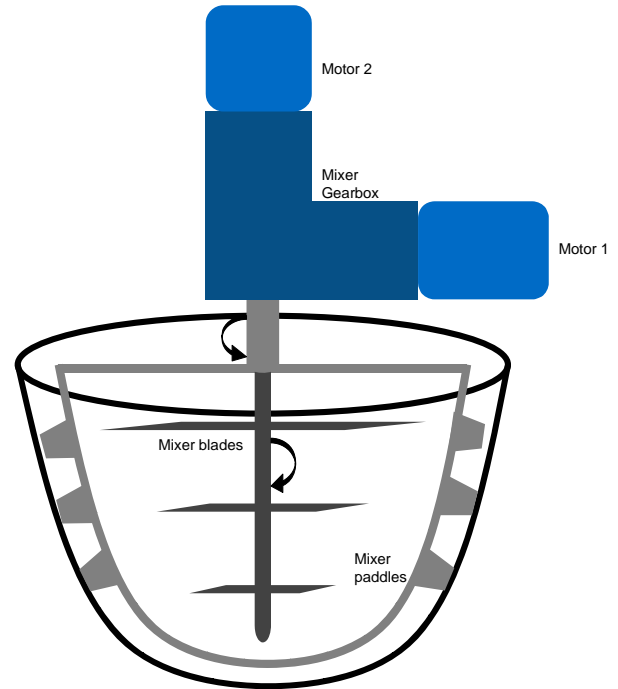
Yaskawa Products:

Product	Feature	Benefit
V7 or F7 Drive	Open Loop Vector and V/Hz Control with Torque Compensation (Closed Loop Vector with F7)	Provides excellent breakaway torque for thick materials and constant torque to maintain mixing speeds under heavy loads.
	Overtorque Detection	Provides early warning of damaging torques as a result of seizing mixer blades.
	Torque Reference programmable to an analog output	The applied mixing torque is fine tuned or adjustable for different material.
	Preset frequency reference	Preset mixing patterns can be established for different materials.
	Auto-Restart after momentary power loss	Mixing can quickly restart after fault or momentary power loss. This keeps perishable foods from spoiling in process.
	Power loss Ride-Through	The mixing process is not interrupted during brief power loss (< 5 ms).

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Application Details:

A variety of materials can be placed into a mixer to be combined or blended together. This variety of material results in varied torque requirements for the mixing process. The torque requirement throughout the mixing process may also vary due to the changing viscosity as the materials are mixed together. This change in viscosity is dependent on the interaction of the mixed materials. Yaskawa's V7 and F7 vector control is fully capable of handling the starting torque requirement of the mixture and the varying torque requirement throughout the mixing process. Whether the process speed is commanded through the drive's analog input or via the preset speed function from the digital inputs, the drive will be capable of supplying the required torque throughout its speed range.



The drive is capable of supplying high torque when demanded; however, this torque must be limited if the demand is excessive. Excessive torque can be a sign of seizing or jamming, which can result in damage to the mixing equipment. The Torque Detection function of Yaskawa V7 and F7 drives can be used to avoid equipment damage in excessive torque situations. The Torque Detection function can alert the operator of damaging torque conditions and stop the drive if required. The F7 drive also has a Torque Limit function that can limit the amount of torque being produced in the motor. These two features can be used in conjunction to limit motor torque, shut down the drive, and alert the user before equipment damage occurs.

Viscosity often varies throughout the mixing process, resulting in a varying torque requirement. The required torque can be monitored using the drive's Torque Monitor. The drive's Torque Monitor can eliminate the need for costly strain gauge equipment. This torque can be programmed to an analog output monitored by an external device. Torque monitoring can assist in determining mixture status without the need to stop mixing to check the mixture.

Momentary line power loss (< 5 ms) can cause mixing to stop and spoil a batch of material. The Yaskawa V7 and F7 drives can continue to operate through a momentary loss of line power and decrease the chance of losing a batch.

Yaskawa V7 and F7 drives are fully capable of meeting the challenges that are faced in mixing applications. Yaskawa drives can be applied as standalone units or integrated into a control system for total process control. For standalone units, a standard NEMA 1 enclosure is offered for both drives. Additionally, the V7 and F7 drives have NEMA 4X/12 enclosures for wash down environments.