YASKAWA

Evolution MOTION SOLUTIONS

U1000

INDUSTRIAL MATRIX DRIVE APPLICATIONS

IT'S PERSONAL

MATRIX

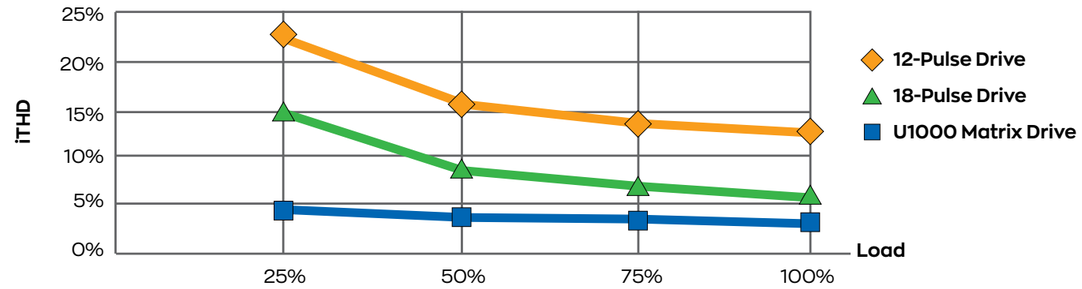
U1000 INDUSTRIAL MATRIX DRIVE

THE GREEN CHOICE

MATRIX

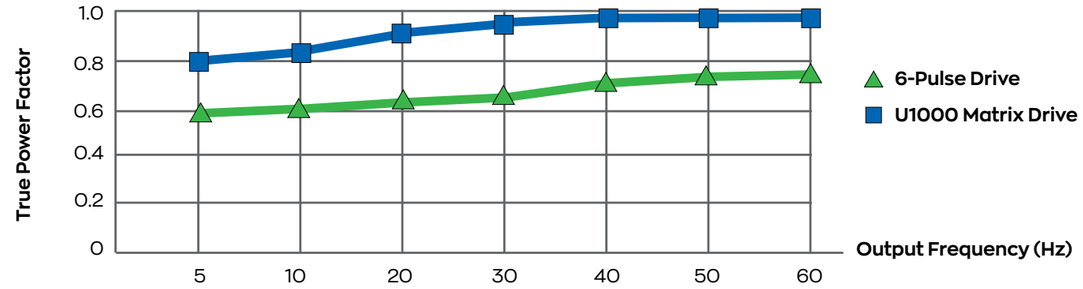
Increase your green space with Yaskawa's U1000 Industrial Matrix Drive, the product that goes beyond conventional drives, providing outstanding harmonic performance and regeneration in a single stand-alone compact drive solution.

LOW INPUT CURRENT HARMONICS

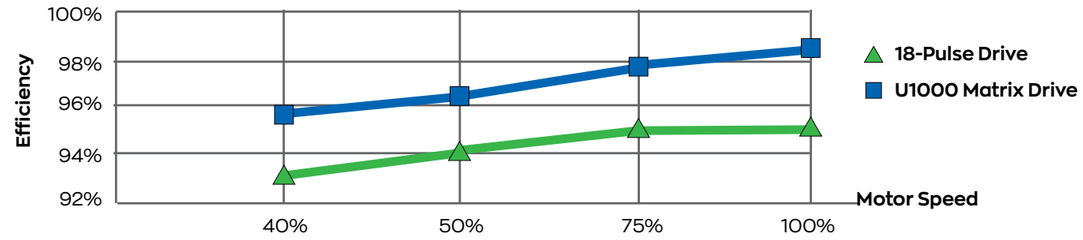


U1000: IEEE-519 Compliant, Excellent performance over wide load range

NEAR UNITY POWER FACTOR

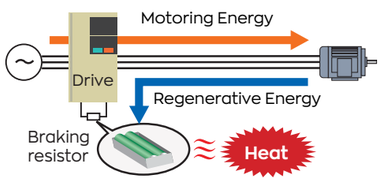


HIGHER SYSTEM EFFICIENCY



POWER REGENERATION

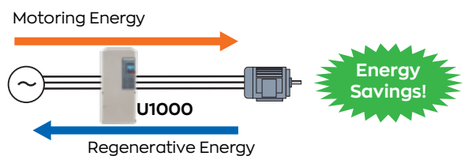
TRADITIONAL DRIVE WITH DYNAMIC BRAKING



Braking resistors waste energy as heat.

Overvoltage fault would occur without braking resistors

U1000 INDUSTRIAL MATRIX DRIVE



U1000 INDUSTRIAL MATRIX DRIVE

APPLICATIONS

TEST STANDS

Test Stands require compact design, efficient and effective use of utility power, full regeneration, and multiple motor control methods. Engine test stands, tire load testers, transmission dynes, wind tunnel balancing equipment, etc. are examples of applications that take advantage of each and every benefit of the U1000.

WINDERS

Winding is a procedure designed to take up and package material in roll form, for more efficient handling or preparation for another operation. In a typical industrial use, winders are employed to roll up or unroll a continuous or limited length of material such as wire, paper, film, metal or textiles. The U1000 is ideal for unwinding applications providing constant tension. IEEE-519 compliant ultra-low harmonic Matrix technology provides full regenerative capability and continuous operation, eliminating down time due to braking resistor overheating or high DC bus overvoltage fault conditions.

METALWORKING

Metalworking is a process of working with metals to create individual parts, assemblies or large-scale structures. This includes rolling mills, punch/stamping presses, ram presses, steel bar grinders, spindles, lathes, and welders. The U1000 is ideal for these applications due to its small compact design and full regenerative capabilities. The compact design allows for easy retrofits into limited space applications, while the full regenerative capability can effortlessly handle the cyclic regenerative nature of stamping presses, ram presses, and steel bar grinding applications.

PUMPJACKS

Pumpjacks are used above ground to drive liquid from deep submersible wells using a reciprocating piston pump. The weight of the horse head used to push/pull the rod creates an unbalanced load condition, even with a counterweight. As the rod falls, its speed passes the operating speed of the pumpjack and creates a regenerative condition that can be as high as 50% of the cycle of the pump. The U1000 seamlessly switches back and forth from operating in a motoring condition to a regenerative condition, thereby saving the energy instead of wasting it with bulky dynamic braking resistors. Ultra-low harmonics produce less transformer heating, which means a smaller transformer can be used to power the system.

DECANTER CENTRIFUGES

Decanter centrifuge design consists of a solid container or bowl, which rotates at high speeds. Inside the bowl tube, a screen conveyor (scroll) rotates in the same direction, but at a slightly different speed. The slower scroll speed causes the materials entering the centrifuge to separate. However, the bowl puts the scroll in constant regeneration due to the speed differential. The U1000 can operate the scroll in its continuous regenerative state without the need for additional peripheral components or bulky and wasteful braking resistors. Both the scroll and bowl have extremely large load inertias and can easily take over 20 minutes to coast to a stop. U1000 can dramatically reduce the stop time and improve cycle time, saving the energy by putting it back onto the line.

SOLID BOWL CENTRIFUGES

Centrifuges run at high speeds to separate solid material from liquids and generate very large load inertias. The U1000's inherent automatic regenerative capability eliminates intermittent load changes that cause nuisance overvoltage trips due to unbalanced load conditions. Full continuous regeneration allows centrifuges to be repeatedly stopped, without the need for external dynamic braking packages, with quicker, repeatable stop times, reducing cycle time and increasing production without increasing cost.

WATER/WASTEWATER TREATMENT

Water/wastewater treatment consists of a wide variety of pump and fan applications. Pumping applications include mixers, sludge pumps, and chemical feed pumps, while fan applications include blowers and aerators. Installation space limitations and low input current harmonics requirements in public works facilities result in high-cost solutions. The U1000 Industrial Matrix Drive provides a compact all-in-one solution that can be smaller (60+%), lighter (80+%), less complex (70+% less wiring with fewer components), better performing (lower iTHD levels), and more efficient (+19%), compared to other low harmonic options.

INDUSTRIAL FANS/PUMPS

Industrial Fans/Pumps have long taken advantage of a VFD's ability to save energy by reducing speed. The U1000 offers the same advantage but with the additional benefits of IEEE-519 compliant ultra-low harmonics and near unity power factor. The addition of Eco-Mode allows the U1000 drive to pass line power directly to the motor to improve drive efficiency and eliminate any input current harmonics. Using Eco-Mode during periods of peak demand allows the drive's IGBTs to avoid switching on and off during the highest load demand, which results in longer life for the drive.

DOWNHILL CONVEYORS

Conveyors are used in a broad range of industries and applications to move packaged goods, assemblies, process byproducts, or any material from one place to another. A process designer will typically look for opportunities to use the force of gravity to accomplish product movement. Electric motors are commonly used when gravity cannot be employed or when the speed of a gravitational fall needs to be controlled. During these conditions the conveyor will be in continuous regeneration. The U1000 provides a compact all-in-one solution to continuously regenerate rated power conditions back onto the utility line. Remote installations can reduce transformer sizing by taking advantage of the U1000's low harmonic capabilities and near unity power factor.

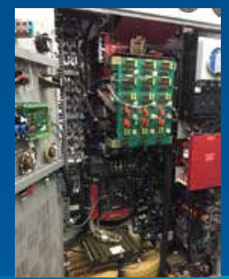
ESCALATORS/MOVING WALKWAYS

Escalators and moving walkways provide quick and effortless access across vast distances or between floors of a building. Located in tight, high demand locations, escalators and moving walkways can take advantage of the U1000's highly efficiency, all-in-one compact package. Downhill versions of these people movers can benefit from the continuous regenerative capability of the drive. Intermittent loading and unloading of the equipment due to people entering and leaving is seamlessly handled by the U1000 drive. The low harmonic and high true power factor provided by Matrix technology results in effective use of pre-existing power structures.

18-PULSE RETROFIT

350 HP 18-Pulse Drive Retrofit with U1000 for Northeast U.S. Water Treatment Facility

- Exceeded input harmonic current capabilities of previous package at rated power
- Provided excellent harmonic current levels throughout load range
- Increased system efficiency, allowing previous system cooling fans to be turned off
- Existing cabinet reused to save space and cost
- All existing controls easily integrated with U1000



Before Retrofit

After Retrofit

U1000 INDUSTRIAL MATRIX DRIVE

KEY BENEFITS

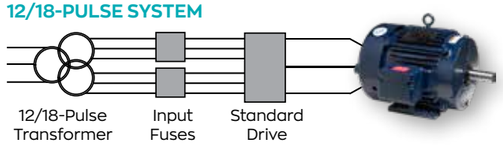
COMPACT AND EASY

The U1000 design advantages, compared to conventional dynamic braking solutions, continues in saving installation space (up to 50%), reduced weight and 100% save of wasted energy. All you need to connect is 3 wires in and 3 wires out.

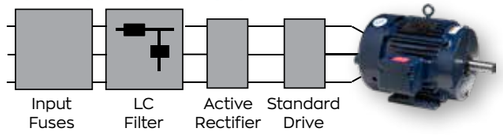
- Smaller panels
- Very compact footprint
- Simple installation in shortest time
- Perfectly fits in existing installations - easy retrofit

COMPLEX

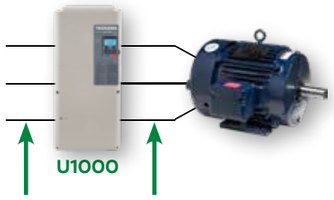
12/18-PULSE SYSTEM



ACTIVE COMPONENT SYSTEM



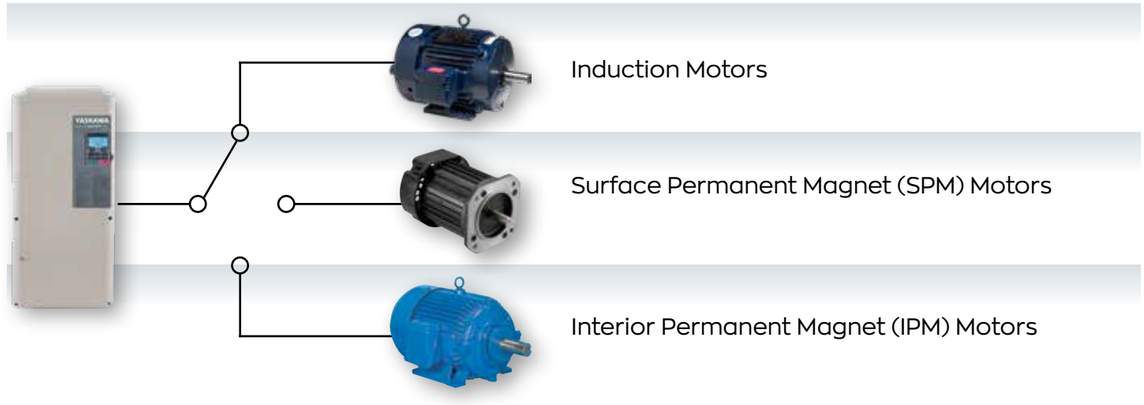
SIMPLE



3 WIRES IN, 3 WIRES OUT

- Fewer components
- Less Space
- Faster Setup
- Higher Efficiency

PERMANENT MAGNET MOTOR CONTROL



COST SAVINGS

- U1000 can monitor and provide power data.
- Instant feedback (kW or $) on energy saved.

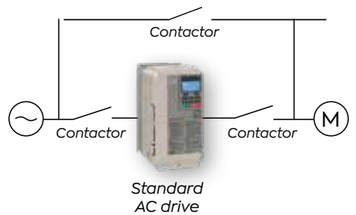
SEE THE $AVINGS!

ECO-MODE - BUILT-IN ACROSS-THE-LINE (BYPASS) FUNCTION

The U1000 has a built-in bypass function. Whenever an application is matching the grid frequency, the U1000 can synchronize the motor to grid frequency. This built-in bypass function eliminates switching losses. It also eliminates any drive generated current harmonics and electrical motor noise.

- Eliminates drive noise (EMC/RF)
- Eliminates all drive generated harmonics
- Prolonged drive motor lifetime
- Drive fault detection monitoring still active
- Eliminates audible motor noise

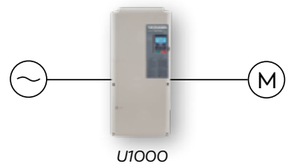
CONVENTIONAL



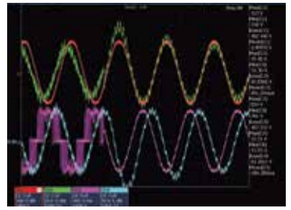
Standard AC drive

Conventional VFDs require external contactors to "bypass" the drive

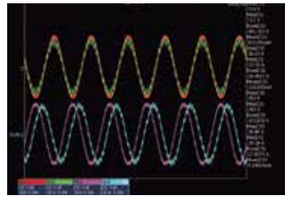
U1000 MATRIX



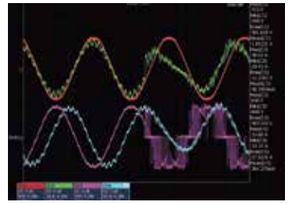
Built-in automatic Bypass (Synchronous transfer from VFD to Grid and vice versa)



Entering Eco-Mode



While in Eco-Mode



Leaving Eco-Mode

YASKAWA.COM

Yaskawa is the leading global manufacturer of low and medium voltage variable frequency drives, servo systems, machine controllers and industrial robots. Our standard products, as well as tailor-made solutions, are well known and have a high reputation for outstanding quality and reliability.

YASKAWA

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