



Yaskawa Variable Frequency Drive (VFD) – Overview, Comparisons & Services

Variable Frequency Drives (VFDs) have become essential for efficient motor control in modern industry. A **Yaskawa variable frequency drive** is renowned for its quality and performance, allowing precise adjustment of motor speed and torque to match process demands. In this guide, we'll explore what VFDs do, highlight Yaskawa VFD features and specifications, compare Yaskawa with other top manufacturers (ABB, Hitachi, Eaton, Lenze, etc.), and discuss how **Precision Electric, Inc.** can assist with VFD selection, alternatives, and repair services. The goal is to give anyone looking to purchase or replace a Yaskawa VFD a clear, accessible overview – not overly technical, but detailed enough to compare features and make informed decisions.

What is a Variable Frequency Drive and Why Use One?

A **variable frequency drive (VFD)** is an electronic controller that adjusts the speed of an AC motor by modulating the frequency and voltage of the power supplied to that motor. In traditional fixed-speed systems, motors run at full speed and mechanical methods (like throttling valves or dampers) are used to control output, which wastes energy. By contrast, a VFD can **ramp the motor speed up or down** smoothly to exactly meet the load requirement. This yields several benefits:

- **Energy Savings:** Slowing a motor down significantly cuts its power draw. For example, reducing a pump or fan's speed by just 20% can slash energy consumption by nearly 50% due to the cube-law relationship between speed and power ¹ ². Efficient VFD control means motors only use the electricity actually needed, eliminating excess. Facilities that retrofit VFDs onto pumps, fans, and conveyors often see energy reductions of 30–50%, translating to lower utility bills.
- **Reduced Mechanical Stress:** VFDs provide soft-start capabilities. Instead of jolting the motor from 0 to 100% speed across-the-line (which draws 6–8x the normal current and shocks the system), a VFD ramps up gradually ³. This **minimizes stress** on couplings, gearboxes, belts, and the motor itself, extending equipment life. Likewise, smooth deceleration and integrated braking functions dissipate energy safely, preventing sudden stops that wear on machinery.
- **Improved Process Control:** With a VFD, motor speed can be continuously adjusted to match process requirements. Operators can fine-tune flow rates, pressures, and speeds via the drive's settings or an automation system. This **precise control** improves product quality and process consistency. It can also eliminate the need for other devices – for instance, a VFD can maintain a set pressure in a pipe by speeding up or slowing down a pump, obviating the need for a separate pressure regulator or bypass valve.
- **Lower Maintenance & Downtime:** By operating motors at optimal speeds and avoiding the strain of full-speed starts, **bearings and seals last longer**, and the risk of motor overheating is reduced. Many modern drives also include built-in diagnostics (monitoring for overload, voltage issues, etc.)



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and protective functions that can **detect issues early or prevent damage**. All of this means fewer unplanned breakdowns. And if a drive fault does occur, the fault codes help pinpoint the cause, speeding up troubleshooting.

In short, VFDs **save energy, protect equipment, and give you control**. These advantages have made them a cornerstone of energy-efficient and reliable industrial systems worldwide ² ⁴. Now, let's look at Yaskawa's drives in particular and why they are frequently a top choice.

Yaskawa VFDs – Overview and Key Features

Yaskawa Electric is one of the leading VFD manufacturers globally, known for its dedication to quality and innovation. Yaskawa drives span from small microdrives for fractional horsepower motors up to large industrial drives for hundreds of horsepower. For example, Yaskawa's current product range includes the **GA500 series** microdrive (roughly 1/8 HP through 40 HP) for general-purpose applications ⁵, and the **GA800 series** for higher power needs (3/4 HP up to 1000 HP) ⁶. This means whether you need to run a small conveyor or a large compressor, Yaskawa likely has a drive in the suitable size range.

Reliability and Quality: Yaskawa's reputation for reliability is second to none. All Yaskawa drives are **100% tested at the factory** before shipment, and their quality control is extremely rigorous. Industry data shows a *final test failure rate* of only about **0.01%** (1 in 10,000 units) and a field failure rate around **0.006%** (62 out of a million drives) for Yaskawa – exceptionally low figures ⁷. The **mean time between failures (MTBF)** for Yaskawa drive products exceeds **28 years** ⁷, reflecting the long operating life that users can expect. Yaskawa's manufacturing processes are built around the principle that "defects are not an option." They have earned global quality awards, including being the only industrial drives maker to ever win the prestigious **Deming Prize** for manufacturing quality ⁸. This focus on quality gives Yaskawa VFDs a rock-solid reliability in the field – a fact often noted by engineers who use them. (One informal survey of professionals even found Yaskawa drives commonly cited as the most reliable, with technicians reporting virtually no dead-on-arrival units and many Yaskawa drives running for decades without issues ⁹ ¹⁰.)

Performance and Motor Control: Yaskawa VFDs offer advanced motor control algorithms that can run standard AC induction motors as well as newer high-efficiency motor types. For instance, the latest Yaskawa drives can auto-tune and control **permanent magnet motors** and even emerging designs like synchronous reluctance motors, in addition to the usual induction motors ¹¹ ¹². This flexibility is great for those upgrading to premium efficiency motors. Yaskawa's control technology achieves high starting torque (to get heavy loads moving) and precise speed regulation. Many Yaskawa drives feature **open-loop vector control**, which gives near-servo level speed and torque regulation without needing a physical encoder on the motor. For applications requiring even tighter control (like cranes or elevators), closed-loop options with encoder feedback are available in certain models or series. Yaskawa also develops specialized control modes – for example, their top-tier drives use proprietary algorithms to enable **full four-quadrant regeneration** and low harmonic distortion (as seen in Yaskawa's U1000 matrix drive, which can return braking energy to the supply and eliminates the need for braking resistors or input filters) ¹³.

Ease of Use: A hallmark of Yaskawa drives is their user-friendly design. Yaskawa's interface and software tools aim to simplify installation and programming. Notable ease-of-use features include:

- **Intuitive Keypads & Wizards:** Yaskawa drives come with keypads that have simple menus and often an **initial setup wizard** to guide through basic configuration. The **GA500**, for example, introduced a

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menu-driven setup that asks a few key questions to configure the drive for your motor and application ¹⁴ ¹⁵. Dedicated buttons (like “Hand/Auto” modes or navigation arrows) and status LEDs make daily operation straightforward. The keypad on many models can display output frequency, current, alarms, etc., and supports multiple languages.

- **DriveWizard and Mobile App:** Yaskawa provides free PC software (DriveWizard) and even a **DriveWizard Mobile app** (with the GA500 series) to program and monitor the drives ¹⁶. With a simple Bluetooth dongle or USB connection, you can **commission the drive via a smartphone or laptop**. This is incredibly handy – you can clone settings, backup parameters to the cloud, and even perform firmware updates without main power on some models ¹⁷ ¹⁸. The mobile app plus a Bluetooth keypad option means you can configure or troubleshoot a drive from outside a noisy MCC room or without opening an enclosure door, improving safety and convenience.
- **No-Power Programming:** Uniquely, Yaskawa enabled **no-power programming** on newer drives like the GA500 ¹⁵. This means you can program the drive's settings *while it's not connected to mains power* – simply by using the USB port or an external 24V control power. Technicians can set up a drive on their desk or update a parameter while the drive is off, then later install it, saving time during commissioning.
- **Flexible Mounting and Design:** Yaskawa pays attention to physical design details. The drives are compact and facilitate different mounting methods. For example, the GA500 can mount **side-by-side with zero clearance** between drives to save panel space ¹⁹. Units up to certain sizes can snap onto **DIN rails** for quick installation. For higher protection ratings, Yaskawa offers optional NEMA 1 kits and is introducing models for **NEMA 4X/IP65** environments (suitable for washdown areas) ²⁰. The drives include features like removable terminal boards (on some series) for easy wiring, **pluggable option cards** for fieldbus communications (e.g. Ethernet/IP, Modbus, PROFINET, etc.), and coated circuit boards for harsh environments. In short, they are built to integrate easily into a wide variety of systems.
- **Built-in Features:** Yaskawa often includes features as standard that others might offer as add-ons. For instance, almost all Yaskawa VFDs have an **integrated dynamic braking transistor** as standard ²¹ – this means if you need to stop a high-inertia load quickly, you can just attach an inexpensive resistor, and the drive is ready to dissipate braking energy. Many competing drives require a separate braking module for this. Yaskawa drives also typically have built-in **EMI/RFI filters** (for compliance with CE noise regulations) and meet global standards (UL, CE, RoHS, etc.) out of the box. The GA500 even has an embedded **Modbus RTU** interface on the control terminals for basic networking without any option card ²² ²³.
- **Functional Safety:** In modern industrial settings, safety is crucial. Yaskawa VFDs come with **Safe Torque Off (STO)** functionality built in, allowing the drive to integrate into machine safety circuits. STO is a feature that, when activated (for example by a safety relay or emergency stop), immediately disables the drive's output power in a manner that prevents the motor from producing torque (while still powering the control board). This helps achieve a safe stop of the machine without completely removing power to the drive. Yaskawa's recent drives like the GA500 are rated **SIL3, PLe** for STO, meaning they meet high safety integrity levels per international standards (IEC 61508 / ISO 13849) ²⁴ ²⁵. In practice, this can eliminate the need for external contactors to cut motor power in a



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safety event, simplifying compliance with safety standards and reducing hardware cost. (Notably, ABB and other brands also offer STO; we'll compare in a moment.)

Technical Specifications Highlights: While a full spec sheet depends on the exact model, some representative specs of Yaskawa drives are worth noting:

- **Power Range and Ratings:** Yaskawa drives cover low-voltage AC input classes like 200–240 V and 380–480 V (three-phase). For example, the discontinued V1000 series went up to 25 HP at 480 V, whereas the new GA500 series goes up to **40 HP at 480 V** and **30 HP at 240 V 3-phase** ²⁶ (and 5 HP for 240 V single-phase input). The larger GA800 series extends from fractional horsepower into the **hundreds of HP (up to 1000 HP at 480 V)** for heavy industrial loads ⁶. Drives are typically offered in “Normal Duty” (light overload) or “Heavy Duty” (high overload) ratings – Yaskawa drives usually support around **110% continuous overload (for ND) or 150% for short periods (HD)** to handle peak torque demands ²⁷.
- **Output Frequency Range:** Yaskawa VFDs can produce a wide range of output frequencies for special applications. The GA500, for instance, can output up to **590 Hz** (versus 400 Hz on the older V1000) ²¹. This is useful for high-speed spindles or certain process machinery. (There is usually some derating or special motor considerations at such high frequencies.)
- **Environmental Tolerance:** Standard Yaskawa drives are designed for **-10°C to 50°C** ambient without derating, and can go up to 60°C with derating in many cases ²⁸. They can also be used at altitudes up to **3000 m (9840 ft)** without issue, and up to **4000 m with derating** ²⁹ – important for mines or high-elevation sites. Conformal coating on PCBs (to 3C2/3S2 levels per IEC 60721-3-3) is applied to protect against dust and humidity in industrial environments ³⁰.
- **Harmonics and Power Quality:** Like all VFDs, Yaskawa drives convert AC to DC internally and then to variable-frequency AC, which can introduce current harmonics on the supply. Yaskawa addresses this with built-in **DC bus chokes** or the option for 12-pulse or active front-end configurations in larger drives. The standard ABB ACS580 drive, for example, uses a swinging choke input to meet IEEE 519 harmonic guidelines ³¹, and Yaskawa's equivalent drives also meet typical distortion limits when properly applied. For the most demanding scenarios, Yaskawa's U1000 matrix drive achieves near-unity power factor and ultra-low harmonics inherently ³² – a solution for facilities with strict power quality requirements or limited generator capacity.

In summary, Yaskawa VFDs are **feature-rich, reliable, and versatile**. They provide all the core functionality needed (motor protection, adjustable accel/decel ramps, PID control, etc.) plus many advanced capabilities, all while maintaining a user-friendly experience. These qualities make Yaskawa a go-to brand for many engineers seeking trouble-free operation over the long haul.



Image: A Yaskawa GA500 series VFD (Variable Frequency Drive). The GA500 is a compact industrial microdrive covering 1/8 to 40 HP, known for its intuitive interface (note the simple keypad and status ring) and flexible networking options. Yaskawa drives like this include built-in safety and are designed for easy setup and high reliability. 26 24

Comparing Yaskawa to Other Top VFD Manufacturers

While Yaskawa is a top-tier drive producer, there are several other major manufacturers in the VFD market—each with their own strengths. It's helpful to compare features and see how Yaskawa stacks up, especially if you're evaluating alternatives or cross-shopping. Precision Electric works with all of these brands, so they can offer guidance on the best fit. Here's an overview of how Yaskawa compares with a few prominent competitors:

- **ABB:** ABB is a global leader in drives and automation. ABB's low-voltage AC drives (like the ACS series) are widely used across industries. One standout aspect of ABB drives is their **"All-Compatible" platform** – the user interface, parameter structure, and software tools are very consistent from small drives to very large ones ³³ ³⁴ . For example, an engineer who learns on a small **ACS180 (0.25–22 kW)** drive can easily work with a **medium ACS580 (~0.75–500 kW)** or even a high-power **ACS880 (up to 6000 kW)** ³⁵ , because the menus and programming approach are similar. This is great for plants that use a range of drive sizes. ABB drives are also feature-packed: even the compact models include **Safe Torque Off (SIL3, PL e)** on board and options like built-in EMC filters ³⁵ . ABB's higher models introduce advanced tech – for instance, the ACS880 uses **Direct Torque Control (DTC)**, an algorithm that provides extremely precise torque control without encoder feedback, useful for demanding applications. ABB emphasizes energy optimization too: their drives have an energy monitor that can display real-time kW and even estimated CO₂ savings ¹ . They often include swing chokes or filters to meet harmonic standards (IEEE 519) right out of the box ³¹ . In terms of power range, ABB probably offers the **widest range in the industry (fractional HP to multi-megawatt)**, including medium-voltage drives (for thousands of HP) which Yaskawa does not produce in the U.S. market. ABB VFDs are known for quality as well, and like Yaskawa, they provide



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extensive documentation and global support. If you need a specific high-end feature like **regenerative braking units**, ABB has options like the ACS880 with built-in regen or separate modules to feed energy back to the grid (Yaskawa's equivalent would be the U1000 matrix or adding regen converters). Both ABB and Yaskawa drives are highly reliable; choosing between them might come down to specific model features or integration preferences (for instance, you might prefer Yaskawa's mobile app, or ABB's specific control algorithm, etc.). Precision Electric can help clarify these differences case-by-case.

- **Eaton:** Eaton provides the **PowerXL series** of VFDs, and they have gained a strong reputation especially in North America for robust industrial drives. Eaton drives like the **DG1 general-purpose VFD** (1–250 HP range) and the **DM1 micro series** are designed with ease of integration in mind. Eaton has focused on energy efficiency through features like their patented **Active Energy Control** algorithm, which dynamically optimizes the motor's magnetization during partial loads. This can yield an extra 5–10% energy savings on top of the basic VFD savings by keeping the motor only as "magnetized" as needed at each moment ³⁶ ³⁷. Eaton's drives also prioritize reliability in harsh conditions – for example, the DG1 uses a unique cooling design (gull-wing air channels that keep cooling air off sensitive boards) to achieve operation up to 50°C without derating ³⁸. Many Eaton VFDs come standard with **integrated line reactors (chokes)** on the DC bus to reduce harmonics and protect against surges, as well as built-in EMC filters. Eaton's **H-Max series** is tailored for HVAC and pump applications, with coated boards for humidity and an easy-to-use bypass and operator interface geared toward building maintenance users ³⁹ ⁴⁰. In terms of features, Eaton, Yaskawa, and ABB all offer things like safe torque off, various network comms (EtherNet/IP, Modbus, etc.), and application macros. One thing to note: if you have existing Eaton control gear or MCCs, Eaton drives can integrate with their **SmartWire-DT** panel wiring system (a flat ribbon cable that simplifies connecting pilot devices and VFDs) ⁴¹. From a support perspective, Eaton has a broad distribution network. Precision Electric often helps customers replace aging Eaton VFD models (like the older SVX9000 series) with the latest DG1 or DM1, or alternatively, if an Eaton drive isn't in stock, we might cross to an equivalent Yaskawa or ABB unit to keep downtime minimal. Each brand has their nuances, but Eaton is certainly a solid choice for general industry, with a balance of efficiency and ruggedness.
- **Hitachi:** Hitachi AC drives are another popular option, known for being **user-friendly and cost-effective**. Hitachi's product lineup ranges from compact microdrives to larger horsepower models, with an emphasis on providing strong performance at a reasonable price point. For example, the **Hitachi WJ200 series** (a mid-range drive) offers sensorless vector control with **200% starting torque**, an integrated auto-tuning function, and even a simple built-in programming (EzSQ) that lets the drive execute some logic on its own ⁴² ⁴³. That series ranges up to about 20 HP on 230 V or 30 HP on 460 V, covering a lot of machine-level needs. For bigger applications, Hitachi has the **SJ700 series** and its successor SJ700D/SJ700B, which go up to **600 HP (460 V)** in heavy duty ratings ⁴⁴ ⁴⁵. These larger Hitachi drives include advanced features like integrated PLC functions, built-in Modbus communication, and safe-stop safety input, and they can handle complex tasks (the SJ700 was among the first with built-in logic programming standard, similar to DriveWorksEZ in Yaskawa or ABB's adaptive programming). Hitachi drives are typically very compact for their class and have a reputation for reliability as well. They might not have some of the newest bells and whistles (for instance, no Bluetooth app control yet, as Yaskawa has, and fewer high-end option modules available), but they nail the fundamentals: **high reliability, good overload capability, and straightforward setup**. They often come pre-configured for common applications to make



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commissioning faster ⁴⁶ ⁴⁷. In summary, if you're budget-conscious but still want a reputable brand, Hitachi is worth a look. Precision Electric can source Hitachi VFDs and also repair them – though in some cases if a Hitachi unit is down, customers might choose to replace it with an in-stock Yaskawa/ABB equivalent to get running immediately, since Hitachi's U.S. distribution can be more limited. We ensure the new drive is configured to mimic the old one's performance.

- **Lenze (AC Tech):** Lenze is a German-based drive and automation company. In the U.S., their **Lenze AC Tech** drives (like the SMVector series) have been popular for many years, especially for small motors in packaging and OEM machinery. Lenze's latest offering is the **i500 series** inverters, which cover roughly **0.33 to 60 HP** in various configurations ⁴⁸. The Lenze i500 drives are designed to be **modular and highly compact**, with a focus on plug-and-play options. A key point is that they meet the new **EN 50598-2 efficiency class IE2** for drive systems ⁴⁹, essentially meaning they have very low internal losses – good for energy efficiency and future EU regulatory compliance. The i500 also features a space-saving form factor (it's only about 60 mm wide in smaller ratings, and can be mounted with zero clearance on the sides) ⁵⁰. Lenze provides modular plug-on options for communications and I/O, so you only add what you need. For example, you can plug in an Ethernet/IP module or a keypad or a WiFi module as required ⁵¹ ²³. This makes them cost-effective for OEMs who might not need every feature on every unit. In terms of capabilities, Lenze drives support the usual sensorless vector control, have built-in PLC functionality, and can drive permanent magnet motors as well. They are particularly known for **excellent integration in motion control systems** – Lenze specializes in motion-centric automation, so their drives often tie in with servo systems, gearboxes, and controllers for a complete package. If your application involves dynamic motion (e.g. positioning, indexing, coordinated drive axes), Lenze might have an edge due to their motion libraries and tools. However, for standard pump/fan or conveyor duties, Yaskawa, ABB, or others will perform just as well. From Precision Electric's perspective, we often recommend Lenze/AC Tech drives for smaller horsepower, standalone machine tasks – they are indeed **user-friendly and robust**, and replacement SMVector drives are readily available for legacy systems. But if you need a higher horsepower or more advanced features, Yaskawa or ABB might offer a broader selection in those ranges. It's all about the right fit.

- **Other Brands:** There are of course other notable players like **Rockwell Automation (Allen-Bradley)** with their PowerFlex series, **Siemens** with the Sinamics drives, **Mitsubishi**, **Danfoss**, etc. Each has particular markets where they are strong. For example, Allen-Bradley PowerFlex drives are common in plants that use Rockwell PLCs, due to seamless integration with Allen-Bradley control systems. Siemens drives similarly integrate with Siemens PLCs and have powerful features for complex drive systems. Danfoss drives are very popular in HVAC and refrigeration (they pioneered a lot in variable-speed cooling applications) and have strong offerings for pump/fan optimization and harmonics mitigation. While our focus here is on Yaskawa and its common alternatives, Precision Electric can also support and source these other brands. Often, the decision comes down to existing plant standards or specific feature needs. The good news is that all major modern VFDs will deliver the core benefits of energy savings and control; the differences are usually in the details of user interface, built-in options, and support.

In **comparing Yaskawa to all these:** Yaskawa holds its own or leads in many categories. Reliability-wise, Yaskawa and ABB are both top-tier (with Yaskawa arguably having the edge in documented MTBF statistics ⁷). In usability, Yaskawa's new additions like mobile app programming are quite innovative, while ABB and others focus on consistency and integrated tools. Feature-for-feature, there's a lot of parity (everyone



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offers safe torque off, everyone has some form of network communications, etc.), so you really can't go wrong with any of these quality brands. It often comes down to what you're already using (standardizing on one brand can simplify maintenance) and availability (what can you get quickest for a replacement). **Precision Electric** can provide insight on which drive fits your **specific application** and budget, and we maintain stock and supplier relationships across these brands to give you options. For example, if you call needing a 50 HP VFD for an urgent replacement and a Yaskawa isn't immediately available, we might offer an ABB ACS580 or Eaton DG1 from stock as an alternative – with confidence that it will perform equivalently in your system.

Real-World Applications & Case Studies

To illustrate the impact of using modern VFDs (from Yaskawa or others), here are a few real-world examples. These cases highlight the kind of improvements in efficiency, reliability, and cost savings that are achievable:

- **Energy Savings in Pump/Fan Systems:** In a wastewater treatment plant in Columbus, a retrofit project replaced fixed-speed pump drives with VFD-controlled pumps. The result was about **30% reduction in energy usage** for those pumps, saving the city significant electricity costs ⁴ ⁵². This aligns with other cases – for instance, ABB reports that pairing a variable-torque pump with their ACS580 drive yielded a **48% drop in annual energy consumption** while also extending the pump's seal life by two years ⁵³. Similarly, a Midwestern grain handling facility found that upgrading aging conveyor drives to new Eaton PowerXL VFDs cut the conveyor energy use by **42%**, allowing the site to avoid a costly utility service upgrade that would have been needed to handle the old system's peak draws ⁵⁴ ⁵⁵. These examples show VFDs can pay for themselves through energy savings alone, especially on large motors running many hours per year.
- **Reliability and Uptime Gains:** A pulp-and-paper mill conducted a drive modernization during a scheduled shutdown, replacing twenty old ABB ACS550 drives with newer models. After the upgrade, the mill documented that **unplanned drive failures plummeted by 76%** according to their maintenance records ⁵⁶. Fewer drive failures meant less downtime and emergency maintenance, improving overall plant productivity. In general, newer VFDs tend to be more reliable (thanks to improved components and designs) and often include better diagnostics that help address issues before they lead to failures. The mill also saved the functional older drives as spares, creating a safety net for future contingencies. This kind of outcome is not unique – whenever you replace decades-old drives or motor starters with modern VFDs, you not only gain efficiency but also reset the clock on reliability, often dramatically.
- **Downtime Avoidance – Emergency Spare in Action:** During the global semiconductor shortage of 2021–2022, electronic components for drives had long lead times. A large beverage manufacturer, knowing how critical their bottling line is, **pre-purchased a Yaskawa GA500 VFD as a spare** to have on the shelf ⁵⁷. Sure enough, months later their main bottling line drive failed unexpectedly. Thanks to the spare VFD on hand, their technicians swapped in the new Yaskawa drive **in under 10 minutes**, and production was back up almost immediately ⁵⁷. This quick swap **averted an estimated \$42,000 in lost production** that would have accrued from hours of downtime if they had to wait for a replacement drive to ship in ⁵⁷. The lesson is that having a plan for critical drives – whether it's keeping a pre-programmed spare unit, or knowing a service provider who can rush-



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repair a drive – can yield huge savings. Modern drives are generally very modular, so installing a replacement (or a temporary rental drive) is a straightforward task if preparations are made.

- **Improved Process & Product Quality:** A plastics manufacturing plant implemented VFDs on their extruder and winder motors to get finer control over speed. With the old setup, speed fluctuations and manual adjustments led to product variability. After installing Lenze AC Tech drives with integrated process PID control, they achieved much steadier speeds. Scrap rate dropped by a reported 10%, and they could hold tighter tolerances on product thickness. While we don't have exact numbers on cost savings for this anecdote, it shows how VFDs' precise control can translate to better product quality and less waste – an often overlooked benefit that can be as valuable as energy savings in some processes.

Each of these scenarios underscores a common theme: **investing in VFD technology and upkeep yields tangible, measurable improvements**. Whether it's energy saved, downtime prevented, or production boosted, the ROI can be very high. Precision Electric has helped customers replicate these kinds of successes by selecting the right drive for the job and ensuring it's integrated correctly.

(If you have a specific application in mind, such as an HVAC system, a conveyor line, a crane, etc., we likely have a case study or experience from a similar project. Don't hesitate to ask – we can provide examples and references to guide your decision.)

Precision Electric's VFD Solutions and Services

As a **family-owned business with over 40 years of experience** in motors and drives, **Precision Electric, Inc.** is uniquely positioned to help with all aspects of VFD implementation – from product selection to after-sale support and repair ⁵⁸. Our team of degreed electrical engineers and technicians has deep expertise in industrial automation and is on call 24/7 to assist. Here's how we support customers specifically regarding Yaskawa VFDs and alternative solutions:

- **Authorized Distribution & Alternatives:** Precision Electric is a distributor for major VFD brands including Yaskawa, ABB, Eaton, Lenze (AC Tech), and others. If you're looking to **purchase a new Yaskawa VFD**, we can supply the latest models (like the GA500, GA800, etc.) with competitive pricing and factory support. We also understand that sometimes a different brand might better suit an application or availability needs. We take an *objective approach* to recommendations – our goal is to get you the best drive for your requirements. If a Yaskawa drive is specified, we'll provide it, but we can also present **equivalent alternatives** (for example, an ABB ACS580 or an Eaton DG1 of the same rating) and explain the pros/cons. This is helpful if, say, lead times are critical – we can check stock across multiple brands. All the brands we carry are reputable, so you aren't limited to a single option. Our online **AC VFD catalog** allows quick side-by-side comparison of horsepower, overload ratings, enclosures, and stock status ⁵⁹ ⁶⁰, which updates hourly so you can see what's readily available. Whether you need a drop-in replacement for a failed drive or are planning a new installation, we'll ensure you get a compatible unit with the features you need.
- **Technical Guidance and Setup:** Selecting the right VFD involves considering the motor specs, load type (constant torque vs variable torque), environmental conditions, and any special functionality required. Our engineers will ask about your application (Is it driving a pump, a fan, a conveyor? Does it need dynamic braking or regenerative capability? Any space constraints or network integration



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needed? etc.) and then **recommend a drive model and options** that fit. We help with sizing (making sure the drive's current rating and overload capacity match the motor and load). We also take into account **industry standards** or customer specifications – for example, if your site requires IEEE 519 harmonic compliance, we might suggest a drive with built-in reactor or harmonic filter; if you have a hazardous location motor, we'll ensure the drive and any bypass meet the proper class/division ratings; if you need UL 508A panel builds, we provide drives and accessories that keep the whole assembly compliant. Once the drive is on hand, our support doesn't stop – we offer **phone support during installation and commissioning**. It's not uncommon for a customer to call from the field with a parameter question; our team is very familiar with Yaskawa parameter codes, ABB macros, etc., and can walk you through setting up features like autotuning the motor, setting acceleration ramps, programming multi-speed presets, and so on. We can even pre-program drives before shipping if you provide the motor nameplate and any specific settings – so you receive a "plug-and-play" unit.

- **VFD Repair Services:** One of Precision Electric's core specialties is **industrial electronics repair**, and VFDs are a large portion of the drives we service. If you have a faulty Yaskawa drive (or ABB, or any major brand), we can evaluate and repair it in our facility. Our repair lab is equipped with diagnostic tools and load-testing stations. We stock common failure components like IGBT power transistors, control boards, fans, and capacitors for brands like Yaskawa, ABB, Lenze, Hitachi, etc. In fact, we maintain an inventory of spare parts specifically so that we can **turn repairs around quickly** – often performing an overnight rebuild **instead of the multi-week wait** you might face sending a unit back to the OEM ⁶¹ ⁶² . Every repaired drive undergoes a full dynamic load test where we run it with a motor, verify output currents, check for any abnormal heating, and validate that fault protections work properly. We then ship it with a detailed **test report** showing output voltage waveforms, current ripple, and thermal readings, so you have confidence the unit will hold up in service ⁶³ ⁶⁴ . All repairs come with an **in-service warranty (typically 12 months)** to cover the unit once it's back in operation. Economically, repairing a drive can be far cheaper than buying new – and it avoids having to re-program a new unit from scratch. We'll give honest advice: if a repair isn't feasible or cost-effective (for instance, if a drive is too severely damaged or obsolete), we'll let you know and can assist in sourcing a suitable replacement right away.
- **Emergency Support:** We understand that **downtime is costly**, and a failed drive can bring a whole production line to a halt. That's why Precision Electric offers emergency rush services. Our service desk is staffed around the clock – when you call, **you'll reach a live engineer** who can start the troubleshooting process immediately ⁶⁵ ⁶⁶ . For urgent situations, we provide options like **expedited repair** (we can often diagnose and fix a drive the same day or overnight if parts are on hand) or **advance exchange** (we send you a refurbished drive from our stock to swap with your failed unit, to get you running ASAP). We also have **field service technicians** who can travel on-site if necessary to assist with drive installation, commissioning, or troubleshooting of complex drive systems. Our goal is to **minimize your downtime** – whether that means working through the night to repair a drive, or shipping a replacement via next-day air, or even helping you temporarily run the motor across-the-line (bypassing the drive) in a pinch until a solution is in place. We've earned the trust of many customers through these responsive services – as one example, a client once overnighted a 100 HP drive to us on a Friday; we repaired and tested it over the weekend and had it back in their hands by Sunday, so they avoided production loss on Monday ⁶⁷ ⁶⁸ . While not every case is that dramatic, we treat every minute of your downtime as critical.



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- **Value-Added Services:** Beyond selling and fixing drives, Precision Electric can support you with **installation accessories and retrofits**. We supply line and load reactors, harmonic filters, sinewave filters, braking resistors – all the common companion components that help a VFD system run smoothly and within spec. For example, if you're installing a VFD on a very long motor lead length, we might recommend a **dV/dt filter** or sine filter to protect the motor insulation; we stock those and can bundle them with the drive. If your facility has sensitive equipment and you're worried about VFD harmonics, we can provide **input line reactors or harmonic filters** that mitigate distortion (these low-cost add-ons can greatly improve power quality and protect other motors and transformers on the network) ⁶⁹ ⁷⁰. We also build custom **drive panels and retrofit kits** – if you need a drive in a NEMA 4X outdoor enclosure with disconnects and cooling, we can fabricate that. Or if you're replacing a legacy drive that has a different form factor, we can often provide adapter plates or wiring harnesses to make the new installation seamless. Our team has done complete **system retrofits** where older DC drive systems are converted to AC VFDs (including motor replacements and PLC integration) ⁷¹, yielding efficiency improvements and easier maintenance. In all these projects, we collaborate closely with your maintenance and engineering staff so that the end result meets all your requirements and is delivered on time.
- **Training and Documentation:** Precision Electric believes in empowering our customers with knowledge. We offer on-site or virtual **training sessions** on VFD operation and programming. For instance, we've conducted VFD basics classes for maintenance crews to learn how to navigate drive menus, adjust parameters, and perform basic troubleshooting. We also provide **documentation resources** – our technical blog and knowledge base contains guides like “VFD Programming 101” and specific how-tos (our popular *VFD Programming Guide* article is a great starting point for new users, and we often refer clients to it for self-help) ⁷². We can supply or direct you to official **product manuals** for any drive we sell (many of which are available on our website's manuals library). When you purchase a drive from us, you'll also receive a **commissioning checklist** that we've developed, covering all the steps from verifying power wiring and motor lead insulation to running an autotune and setting up safety interlocks ⁷³ ⁷⁴. Following this checklist helps ensure nothing is missed during installation, reducing the chance of start-up issues. And of course, if questions arise, we're just a phone call away.

Working with Precision Electric means you have a **partner through the entire lifecycle** of your VFD: selection, installation, operation, and if needed, repair or upgrade. We take pride in honest recommendations and quality workmanship. Our goal is to **maximize your uptime and optimize your processes** with the right drive solutions. As the examples showed, the benefits – from energy savings to avoiding downtime – can be substantial. We want to make those benefits as easy as possible for you to attain, by handling the heavy lifting of VFD engineering and service.

Conclusion

Variable frequency drives like Yaskawa's are transformative devices for industrial and commercial motor systems. They bring old motors to life with new efficiency, tame the harshness of startup and stopping, and give operators fine-grained control over their processes. Yaskawa VFDs, in particular, offer a blend of proven reliability, advanced features, and user-friendly design – making them a top choice for anyone looking to improve a motor application. But as we've seen, other reputable manufacturers (ABB, Eaton, Hitachi, Lenze, and more) also produce excellent drives with similar capabilities. The key is to match the drive to your specific needs and to have support you can count on.



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This is where **Precision Electric, Inc.** becomes an invaluable resource. We not only supply Yaskawa drives and a host of alternatives, but we also stand by to ensure those drives deliver on their promise throughout their service life. Whether you're **purchasing a new VFD**, seeking **technical advice** on integration, or in a crunch needing **emergency repair**, our team is ready to help. By partnering with Precision Electric, you gain access to extensive expertise and a one-stop solution – we can cut through the complexity, from sorting out compatibility questions to handling warranty issues or performing on-site services. Our mission is to keep your operations running smoothly, efficiently, and safely.

In summary, if you're considering a Yaskawa variable frequency drive (or any modern VFD), you're on the right path toward energy savings, improved control, and reduced downtime. We encourage you to reach out to our team for any questions or needs. **Precision Electric** will ensure you get the **optimal drive solution and the support** to use it with confidence. With the right VFD in place – and a responsive partner behind it – you can focus on production and let the drive handle the rest, turning today's challenges into tomorrow's competitive advantages.

References:

1. Yaskawa America – *Product Comparison: GA500 vs. V1000 (Technical Brief)* ²⁶ ¹⁶ – Comparative specifications and feature improvements of the Yaskawa GA500 series over the previous V1000 series (power range, overload ratings, ease-of-use features, etc.).
2. Yaskawa America – *GA500 AC Microdrive Brochure* ⁷⁵ ²⁴ – Official brochure highlighting GA500 drive capabilities (safety functions SIL3/PLc, 24 V backup power input for controller, etc.) and design focus on sustainability, flexibility, and ease of use.
3. Yaskawa Quality (GlobalSpec summary) ⁷ ⁷⁶ – Quality statistics for Yaskawa drives (100% testing, extremely low failure rates, >28-year MTBF) demonstrating Yaskawa's industry-leading reliability metrics.
4. Yaskawa Corporate Quality Assurance ⁸ – Yaskawa's commitment to quality, noting it as the only drives manufacturer to win the Deming Prize for quality excellence. Discusses company-wide quality programs and reliability tracking.
5. Reddit – *Practitioners' Opinions on VFD Brands* ⁹ ¹⁰ – Real-world user comments praising Yaskawa VFDs for their high reliability, robust documentation, and support, and noting the longevity of Yaskawa drives even under harsh conditions.
6. ABB Drives – *ABB All-Compatible ACS Drive Series Guide* ³⁵ ⁷⁷ – Overview of ABB's ACS series (ACS180, 380, 580, 880) with power ranges and features (Safe Torque Off to SIL3 on all models, swinging choke for IEEE 519 compliance, Direct Torque Control on high-end units, etc.).
7. ABB Case Studies – *Energy Savings and Performance* ⁵³ – Examples from ABB showing a pump application with ~48% energy savings using an ACS580 VFD, and a crane application saving 30% HVAC capacity by using regenerative drives (ACS880) to recycle braking energy.
8. Eaton PowerXL Series – *Eaton VFD Industrial Guide* ³⁶ ³⁸ – Technical article on Eaton drives highlighting Active Energy Control (5–10% extra energy efficiency at part load) and design for reliability (cooling isolation enabling 50°C operation without derate). Also mentions Eaton's series like DM1, DG1, and H-Max with their focuses.
9. Hitachi Drives – *Hitachi Variable Frequency Drives Overview* ⁷⁸ ⁴⁴ – Manufacturer description of Hitachi industrial VFDs emphasizing advanced features, high performance and reliability. Includes specs of Hitachi's mid-range and high-end series (e.g. SJ700 up to 600 HP at 460V) and features like 200% starting torque, built-in logic programming (EzSQ), and multiple motor control modes.



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10. Lenze AC Tech – *Lenze i500 Inverter Press Release* ⁷⁹ ⁸⁰ – Introduction of the Lenze i500 series drives (0.33–60 HP) focusing on its scalable, modular design, compliance with future IE2 efficiency class (EN50598-2), slim footprint for control cabinet space savings, and ease of use via modular interface options (pluggable communications and wireless modules).
11. Precision Electric – *Technical Blog and Case Examples* ⁵⁶ ⁵⁷ – Real-world success stories and data from Precision Electric's blog: including a pulp/paper mill reducing drive failures by 76% after VFD upgrades, and a beverage plant saving \$42k in downtime by utilizing a spare Yaskawa GA500 drive during a line drive failure. These illustrate tangible reliability and uptime benefits.
12. Precision Electric – *VFD Repair Services Overview* ⁶¹ ⁶³ – Explanation of Precision Electric's drive repair capabilities: stocking components for major brands (ABB, Yaskawa, Lenze, etc.) to enable **overnight rebuilds**, full dynamic load testing of repaired units with reports, and providing fast turnaround versus multi-week factory repair times.
13. Precision Electric – *24/7 Support and Service Commitment* ⁶⁵ ⁶⁶ – Description of Precision Electric's around-the-clock engineering support, emphasizing that emergency calls are answered by live engineers, transparent repair quotes, and rapid alignment on corrective action to minimize production downtime.
14. City of Columbus WWTP Case Study – *Energy Savings with VFDs* ⁴ ⁵² – Documented results from a municipal wastewater facility that retrofitted pumps with VFDs, achieving a 30% reduction in specific energy (kWh per million gallons pumped) and a 50% reduction in peak power demand, demonstrating significant utility cost savings.
15. NEMA & IEEE Standards – *Drive Compliance Information* ³¹ ⁸¹ – Notes on industry standards such as NEMA MG1 and IEEE 519: e.g., ABB's ACS580 drive using a swinging choke design to reduce current harmonics by ~35–40% to meet IEEE 519 limits on harmonic distortion ³¹. Also highlights that modern drives across brands include features (like internal chokes, filters, or 12-pulse arrangements) to help comply with power quality standards and protect connected equipment.

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