YASKAWA

VFD: Swap it or Upgrade?

There's a lot to know behind the process of replacing a drive.

Considerations for VFD Replacement

We live in a time where variable frequency drives (VFDs) are now the standard when it comes to motor control. As they're being installed primarily in commercial and industrial buildings, both new and old applications are reaping the benefits these intelligent devices bring. But just like all electronics, VFDs do not last forever.

For example, a replacement may be needed due to a failure from a power surge. Or, perhaps a twenty-year-old VFD isn't compatible with the BMS (building management system) and remote monitoring is crucial for the application. In either of these two scenarios, replacing a VFD may not be as easy as merely swapping the unit, powering up and walking away.

On the other hand, the task can actually be quite simple when knowing what to look for and how to properly go about it. This article will summarize and provide guidance for two main scenarios most people are faced with when needing to replace a VFD.

Yaskawa's GA800 variable frequency drive will tackle any industrial application with exceptional motor control and a user friendly experience.

Scenario 1: Replacing a VFD with the Same Exact Model

C/C : GA80U4023ABM REV : B

MODEL: CIPR-GA80U4023ABMA-AAAANA-XXXX

	Uin	AC3PH 380 - 480V DC 513 - 679V	AC3PH 460 - 480V DC 650 - 679V
INPUT	I (ND/HD)	AC3PH 30.6A/21.2A DC 37.5A/26.0A	AC3PH 25.3A/17.5A DC 31.0A/21.5A
	F	50/60Hz	
OUTPUT	U	AC3PH 0 - 480V	
	Pmot (ND/HD)	11kW/7.5kW	15HP/10HP
	I (ND/HD)	AC3PH 23.4A/18A	AC3PH 21A/14A
	F	0 - 590Hz	

O/N : 6W9999 - 9 - 999 MASS : 4.2 kg
S/N : 1W9999999999999 PRG : 090XX
FRONT : IP20
BACKSIDE : IP20/TYPE1 ENCLOSURE
MAX SURROUNDING AIR TEMPERATURE : 50 °C

YASKAWA ELECTRIC CORPORATION ASSEMBLED IN USA
2-1 Kurosaki-shiroishi, Yahatanishi-Ku, Kitakyushu 806-0004 Japan

The drive nameplate provides useful information when verifying compatibility with the motor

There are a few things worth examining when changing out a VFD with one of the same, as simple as it sounds.

First and foremost is the model number as well as the voltage class and current/HP rating. It is imperative these numbers match on both units. This also verifies dimensionally the new VFD will fit in the existing space.

Next, all wiring must be landed on the same terminal designation. This ensures the input/output functionality of the new VFD equates to that of the old. Lastly, parameter settings should match which are key for the application. Thankfully, there are many forms of backup especially if the old VFD can still be powered up. If accessed, parameter settings can be written down, stored in a software program, or even saved to the keypad's memory and transferred to the new VFD. Ideally, this should be done before the replacement process takes place. Also, in many cases when the VFD is incorporated in a bigger piece of equipment, the OEM (original equipment manufacturer) may even have their own parameter listing. Worst case is the drive will have to be setup manually and optimized for the application by the user.

On a side note, it actually may prove beneficial to save a few parts from the old VFD. Depending on the intensity of the failure, certain components such as the keypad, cooling fans, and control/terminal board may have been left unscathed and can be reused at some point down the road. The main circuitry parts of the VFD including capacitors, should not be kept as there may be internal damage or extensive wear.

Scenario 2: Replacing VFD with a Different or Newer Model

The slightly more complicated situation is upgrading or replacing a variable frequency drive with a completely different model.

Bypass and configured packages include a replaceable variable frequency drive

This time there are a few more factors involved. For starters, sizing and obtaining the correct model should be approached as if the drive is for a brand new application. Variables such as amperage, voltage, enclosure, de-ratings, and application type need to be taken into account. The former VFD may not have been sized correctly in the first place.

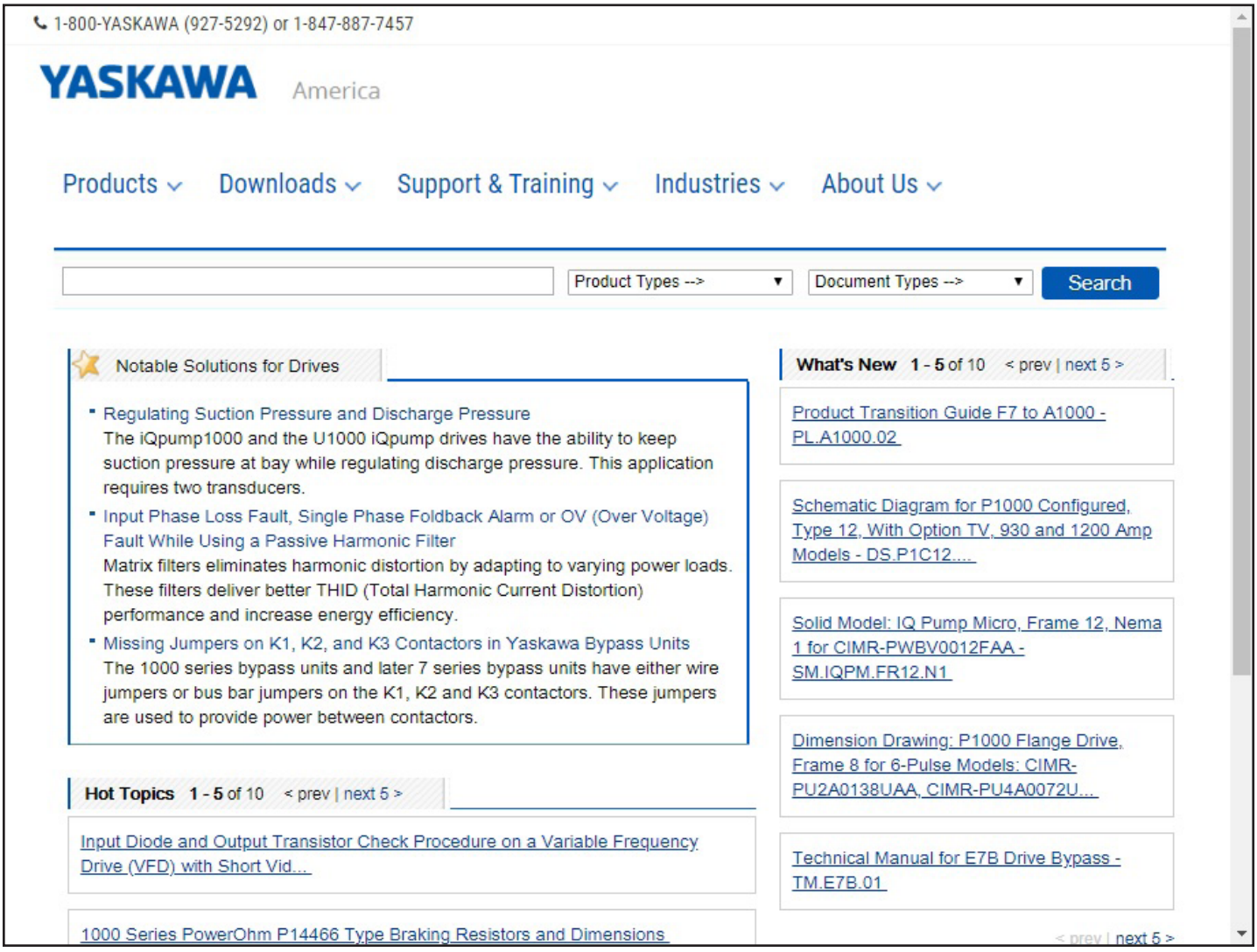
Even before installation takes place, there are a few other considerations, physical sizing being of the highest importance for obvious reasons. Generally, newer VFDs are smaller and more compact than that of the previous generation but that's not always the case. This also holds true when switching to a different manufacturer. It is always recommended to check a dimensional drawing to verify space requirements. An existing package or setup will also need to be closely examined.

Most stand-alone VFDs are simply rated for an indoor environment with little to no protection against airborne debris. They are often put inside of an enclosure which offers greater resistance against harmful elements such as dust and water. Replacing the unit as a whole (drive and enclosure) can get pricy and only the drive itself may have failed.

Therefore, swapping the VFD may seem logical but components such as circuit breakers, filters, bypass configurations, and other electrical equipment need to be examined for compatibility.

Once the above checks are complete, wiring can then take place. Assuming the terminal designations have no match from one VFD to the next, a simple breakdown of the I/O (inputs/outputs) type can help clarify where the wires should be landed. Once the main circuitry wiring is completed, the control wires and terminal designations on the new VFD can be categorized into 5 types. These are digital inputs, digital outputs, analog inputs, analog outputs, and other I/O. It's best to reference a wiring schematic to obtain the exact function of the terminals.

As one of the final steps, programming is once again what makes the application. If a parameter list with non-default values can be obtained from the old VFD, then setting up the new will be less troublesome. Contrary to this, the VFD may just need to be configured from the start. In this case, breaking down the basics a drive needs such as a frequency and run command will make setup much easier. The advanced features can be programmed last. Typically, the VFD user manual will have detailed information on specific functions and a complete parameter list. The keypad may even have some type of setup wizard with a step-by-step procedure.



Bypass and configured packages include a replaceable variable frequency drive

Other Considerations

Another option besides replacing a failed VFD is repair. This nonetheless, depends on factors such as availability of parts, model or sizing of the drive, and the extent of damage. Spare parts are usually available even for older models and may be the inexpensive option. A well-maintained, repaired unit may last another decade.

One last consideration often overlooked is determining the root cause of the VFD failure. Most drives are replaced without this ever being questioned and rarely are VFDs just plain defective. Environmental issues such as humidity, dust, temperature, and exposure to corrosion should first be considered. Other failure means are generally external from the VFD itself. These include but are not limited to motor problems and input voltage fluctuations which put strain on internal components such as capacitors. VFD protection and preventative maintenance are crucial and should never be undervalued.

Yaskawa America, Inc.
Drives & Motion Division
yaskawa.com

Document WP.AFD.28
02/20/2020

YASKAWA