CEDAR

Veichi Training 2025 – Frequently Asked Questions

What is a VSD/VFD?

Variable Speed Drive (VSD) Overview

A Variable Speed Drive (VSD), also known as a Variable Frequency Drive (VFD), is an electronic device used to control the speed and torque of electric motors by varying the motor's input frequency and voltage. This precise control enhances motor performance, improves energy efficiency, and reduces wear and tear on mechanical components.

In solar power applications, a VFD, such as the Veichi VFD, can convert DC power generated by solar panels into AC power. This capability allows for the operation of AC motors using solar power. When properly sized, the system can function efficiently without the need for batteries.

What applications can I use this VFD for?

- Soft starting motors (with solar systems)
- Converting current AC motors to DC (solar)
- High yield and deep borehole applications

Can I use a soft start function for motors to prevent excessive strain on the electrical grid or current solar system?

A Variable Frequency Drive (VFD) can reduce startup amps of a motor by gradually ramping up the motor's speed instead of starting it abruptly. This is known as a soft start. Here's how it works:

1. **Controlled Acceleration**: The VFD slowly increases the motor's speed from zero to its full operating speed over a set period. This gradual acceleration reduces the inrush current that typically occurs during a direct-on-line (DOL) start.
2. **Reduced Torque Demand**: By ramping up the motor's speed, the VFD minimizes the initial torque demand, which further helps in reducing the startup current.

Overall, this method lowers mechanical and electrical stress on both the motor and the connected electrical system.

Do you sell AC motors that work with the Veichi drives?

Yes, we import our own range called the Uniflow that pairs well with a Veichi drive. From 0.375 kW and up.

How do you calculate motor amps for programming?

To calculate the motor amps required for programming, use the following formula:
Motor Amps = Motor Wattage / Voltage of the Power Source

In South Africa, the standard AC voltage is 220V. Therefore, the calculation becomes:

Motor Amps = Motor Wattage / 220V

Example Calculation Single Phase (220V)

If you have a motor with a wattage of 2200 watts:
Motor Amps = 2200 watts / 220 volts = 10 amps
Use this method to determine the motor amps for accurate programming of your VFD.

Example Calculation Three Phase (400V)

If you have a motor with a wattage of 7500 watts:
Motor Amps = 7500 watts / 400volts = 18.75 amps
Use this method to determine the motor amps for accurate programming of your VFD.

How do you calculate total voltage of the solar solar panels?

To calculate the total voltage of a solar panel array, you need to consider how the panels are connected—either in series or in parallel.

Series Connection

- **Formula:** Total Voltage = Voltage1 + Voltage2 + Voltage3 + ... + VoltageN
- **Example:** For three panels of 50V each:
- Total Voltage = 50V + 50V + 50V = 150V

Parallel Connection

- **Formula:** Total Voltage = Voltage of One Panel
- **Example:** For three panels of 50V each:
- Total Voltage = 50V

Combined Series and Parallel Connections

For combined series and parallel connections, follow these steps:

1. **Calculate Series Voltage for Each Group**:
   Formula: Total Series Voltage = Voltage1 + Voltage2 + ... + VoltageN

2. **Parallel Groups**:
   - **Formula:** Total Voltage = Voltage of One Series Group

Example:

If you have three strings of eight panels each (each panel is 50V) connected in series, and these three strings are connected in parallel:

3. **Series Calculation for One String**:
   - Total Series Voltage = 50V + 50V + 50V + 50V + 50V + 50V + 50V + 50V = 400V
4. **Parallel Connection**:
   - Total Voltage = 400V (since the parallel connection keeps the voltage the same as one series group)

Thus, the total voltage for the combined series and parallel configuration is 400V.

How do you calculate the Veichi sizing factor manually?

Multiply the number of solar panels by their wattage to get the total wattage. Divide by the motor size to get the sizing factor.

- **Example**: 15 panels x 555W = 8325W total. For a 7.5 kW (7500W) motor, the sizing factor is 8325 / 7500 = 1.11.

Why is oversizing important?

- **Reliability and Stability**: Ensures consistent power even during low irradiance or cloudy weather.
- **No Batteries Needed**: Reduces complexity, cost, and maintenance.
- **Continuous Operation**: Maintains operation throughout the day.

How much should I oversize for stable performance?

We suggest a 1.6 sizing factor or more. Make sure your panel specs are within the Veichi sizing parameters. We also have a sizing tool available to do automatic or manual sizing at www.cedarpumps.com (Our reseller portal)

What are the differences between SI21, SI23, and SI30?

SI21: IP20 – Not a true hybrid; can use AC or DC but not simultaneously.

Program directly on the unit.

SI23: IP20 – True hybrid; can mix AC and DC power sources. Max input 780V (new late 2024 models max 850V – talk to accountholder).

Program directly on the unit.

SI30: IP65 – Similar to SI23. Max input 850V (setting must be done) F10.07 - 900V.

Needs additional programming keypad NB!

How do I program the Veichi?

Refer to the setup video at YouTube: https://youtu.be/xJtF4Q-0qfk

Or the image below:

Veichi SI23 Programming

For V2 Keypads

- The Veichi drive needs to be configured to work with your AC motor.
- Main Menu goes from F00 - F14
- Each Main menu option has sub menus, so follow closely. e.g. F05.04
- Do not set anything else!

THE FIVE SETTINGS REQUIRED FOR A BASIC SI23 SETUP

Main Menu: F00 *sub-menu:* F00.12 is low speed protection cut-off frequency

Main Menu: F05 *sub-menu:* F05.02 is motor size
F05.04 is operational speed
F05.06 is amps for motor

Main Menu: F14 *sub-menu:* F14.14 is low speed protection detection frequency

THE PROGRAMMING SEQUENCE (VIDEO ON YOUTUBE)

1.Connect keypad (some units have a built-in keypad) and power up the unit. **50:00Hz displays on screen.**

2. Press PRG F00 is displayed on screen. Go to F05 using ▲ and press SET SHIFT

3. Go from F05.00 to F05.02 and press SET SHIFT Enter the motor size (2.2kW, 3kW, 4kW etc.) and press SET SHIFT

4. Go from F05.02 to F05.04 and press SET SHIFT Enter the operational speed of the motor. Default value 2926*. Press SET SHIFT

5. Go from F5.04 to F05.06, press SET SHIFT Enter the Amps for this motor. SET SHIFT

Calculation: current (A) = watts of motor (W) / voltage (V) e.g 1100/220 = 5A Press SET SHIFT

6. Press PRG now you are in main menu again. Go to F14 press SET SHIFT Go to F14.14. Enter 33.00Hz press. SET SHIFT

7. Go from F14.14 to F00.12 using SET SHIFT and ▲ key. Press Set. Enter 33.00Hz and press SET SHIFT

8. Press PRG two times until screen displays 50Hz. Programming is now complete. Press RUN to start the motor.

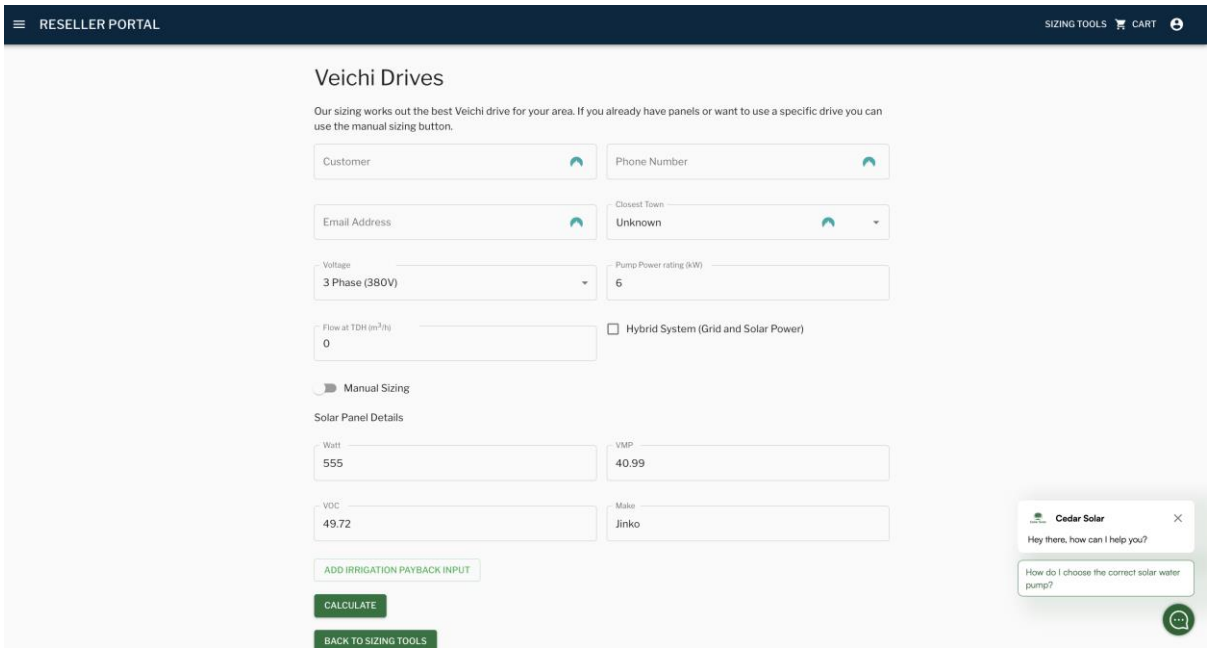
www.youtube.com/cedarsolar
www.cedarsolar.com/downloads

When and where can I install the GSM module to enable wireless communication to the unit?

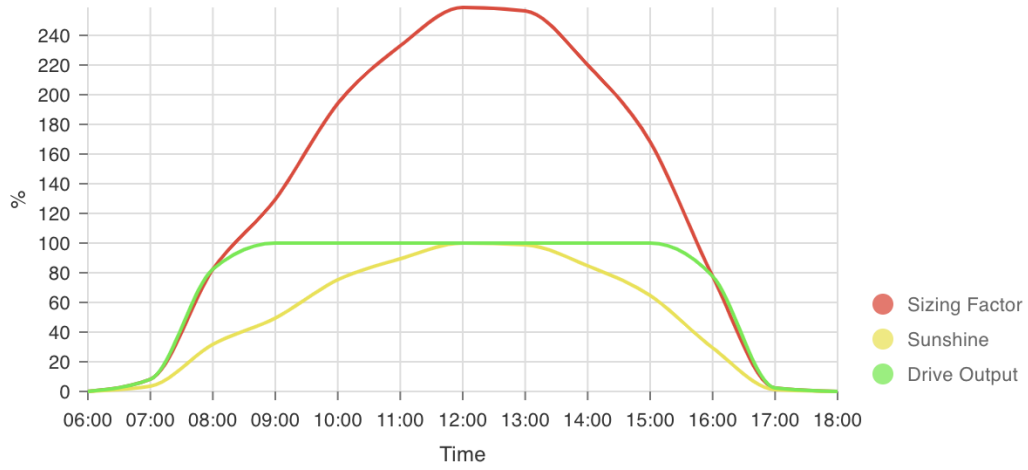
- Install where MTN network or Wi-Fi is available.
- Use a MTN **DATA** SIM card. Only works with DATA sims.
- With this feature you can see all your pumps online and remotely start and stop these pumps.
- Set parameters
- See Fault Codes

Do you have a sizing calucaltor

Yes, resellers can access this at www.cedarpumps.com



Explain the red line (all lines) on the sizing report for Veichi cedarpumps.com



The graph shows the potential energy production of solar panels, actual drive output, and the sunshine curve throughout the day.

- **Red Line**: Represents potential yield from panels (oversized for stability during low irradiance).
- **Green Line**: Actual output from the VSD driving the motor.
- **Yellow Line**: Amount of sunshine throughout the day.

To achieve a solid green line (i.e. stable motor performance) the amount of solar panels must be at least 1.6 times the motor size. This sizing factor enables stable motor performance without batteries.

How does it switch from DC to AC automatically?

If solar power is weak or the sun is setting and the voltage drops below a certain threshold, the drive will switch to the AC power source once the AC voltage is higher than the solar voltage. This is usually set at 400V for 3-phase applications.

I want full hybrid function, what else must I install?

You need to install a contactor when going full hybrid, if the Hertz drops below 50Hz it will open the contactor and pull in AC power.

Does the Veichi have Dry-Run Protection?

Yes, and closely related to the motor's ampere draw. Properly programming the motor size during initial setup is crucial. When water levels are low, the pump motor encounters

minimal resistance and may spin faster, causing a significant increase in amperage. If the current exceeds a safe threshold, power is cut to the motor to prevent damage. There will be a delay to allow the borehole to recover before the system attempts to pump again.

How do you connect U, V, & W? Where does all the wires go?

The models can differ slightly from each other so look in the instruction manual to make sure but in general it works like this:

OUTPUT
U - Black form pump
V - Blue from pump
W - Red/Brown from pump

DC INPUT
+ Solar Positive
— Solar Negative

AC INPUT
R Input 3 phase side AC in
S Input 3 phase side AC in
T Input 3 phase side AC in

What are minimum and maximum voltages?

- **SI21 Single Phase: > 330V & <450V**
- **SI23 Single Phase: > 330V & <450V**
- **SI21 Three Phase: > 620V & <850V**
- **SI23 Three Phase: > 620V & <850V**
- **SI30 Three Phase: > 620V & <850V**

The above considerations focus on voltage, but it's also crucial to account for wattage and proper sizing. Under sizing pumps can lead to motor damage or inadequate water supply, causing ongoing issues. Ensure you get it right from the start!

Additional protection for SI30 installations

1) Combiner Boxes to combine panel strings between the panel array and the Veichi drive.
2) Earth the Veichi System

What is in the combiner box:

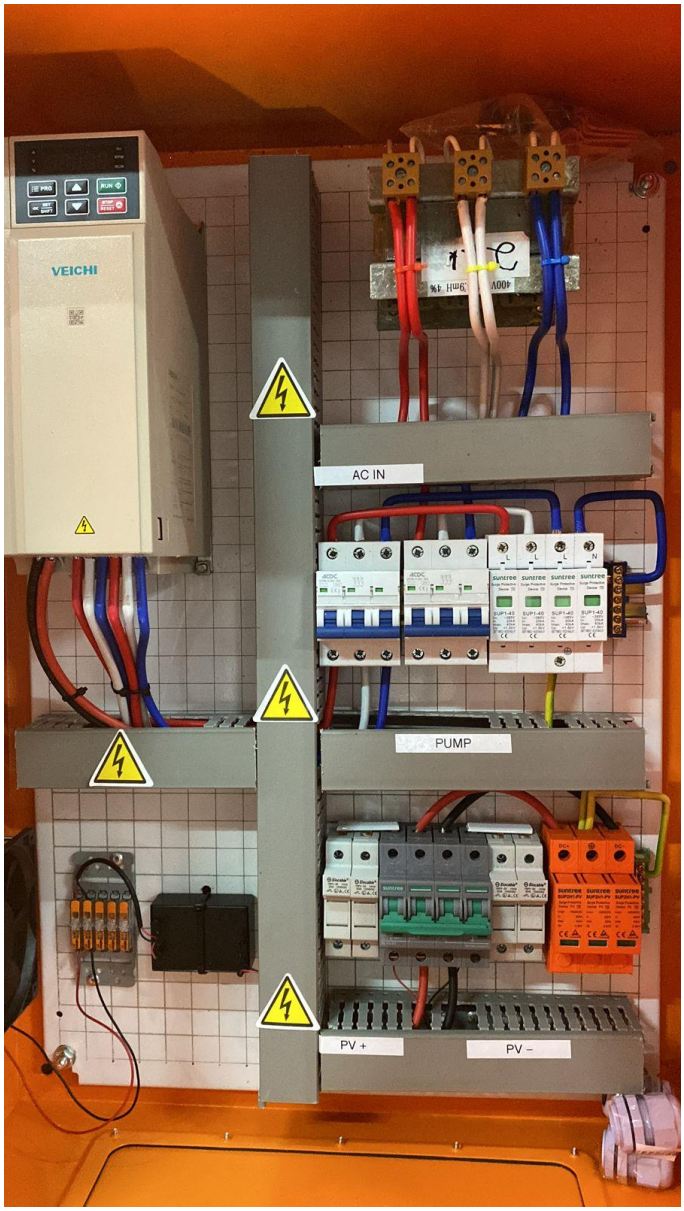
Fuses and Circuit Breakers: These protect the individual strings of solar panels from overcurrent situations. Each string of panels has its own fuse or breaker to ensure that if there is a problem with one string, it doesn't affect the others.

Busbars: Busbars are used to combine the outputs of the multiple strings of solar panels into a single, higher current output that can then be sent to the inverter. They provide a central point for the connection of multiple conductors.

Surge Protection Device (SPD): This device protects the solar power system from voltage spikes or surges, such as those caused by lightning strikes or other transient voltage events. It helps to prevent damage to the panels, inverters, and other components of the solar power system.

Do you sell en enclosure with protection for the SI20 and SI23?

Yes we can build these enclosures for you and mount the Veichi in this housing, it looks like this:



How do you earth a Veichi system (including panels)?

- **Grounding the Solar Panels**:
  - Connect frames using grounding lugs and a grounding conductor.
  - Attach to an 8-foot grounding rod.
- **Grounding the VSD**:
  - Connect the inverter's grounding terminal to the main grounding point at the AC service panel or main disconnect switch.

Is the required flow important when sizing?

Yes, for new installations, it's crucial to select a pump and motor that meet the client's water delivery requirements. For conversions, the existing pump is already providing the necessary water; the goal is to switch it to solar power. Once the Veichi is set to 50 Hertz, it will deliver the same power from solar energy as it would from the grid, ensuring similar performance. However, for solar-only installations, weather conditions can impact the system's efficiency and yield.

Can I use high voltage panels?

Yes, if you operate within the specified parameters. This approach can sometimes make the system more cost-effective, as fewer panels or panel strings may be required to achieve the desired sizing factor while still maintaining a minimum of 1.6.

What is different with Single Phase Drives & Sizings?

The Veichi pushes up the amps of the single phase motors. That is why we do not put a single phase drive if the cable run is more than 100m between pump and drive. The amps go to high and the motor cuts out. Since not installing single phase drives over 100m problems have reduced significantly. Even when using a capacitor the amps are too high and we experience issues. Betwen 80m – 100m single phase install a capacitor. Also ask customers, sometimes they ahve capacitor installed already. If you need to choose between two options always go 3 phase for new installations.

What is an output reactor?

In Variable Speed Drives (VSDs), an output reactor is used to reduce harmonics, improve power quality, and protect the drive and motor from electrical disturbances. It smooths the current flowing to the motor, reducing stress on components and improving efficiency.

How big must the output reactor be and why do I need one?

Match the output reactor to the **motor rating** to protect the motor from high-frequency switching effects, such as voltage spikes and electrical noise, enhancing system performance and extending motor life.

When do I need an output reactor?

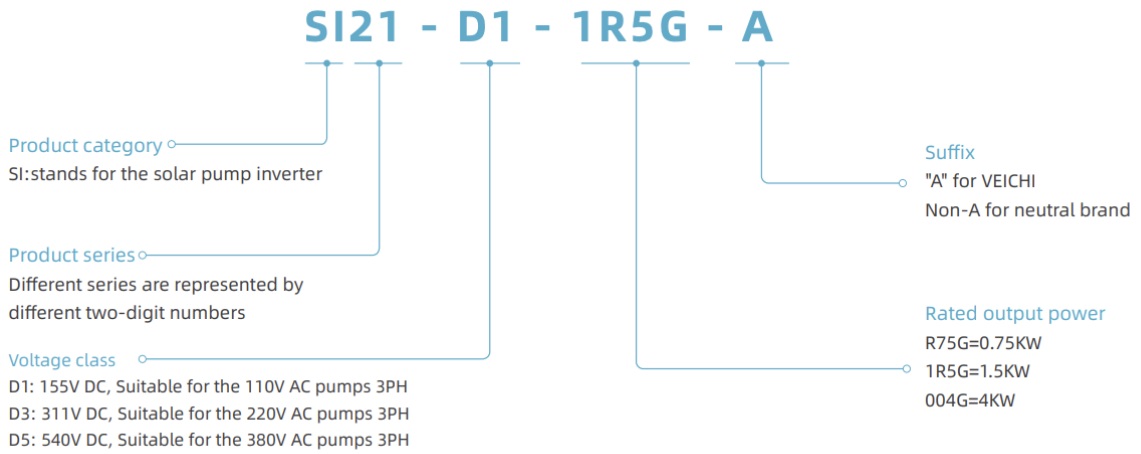
Three Phase: When your cable run between the pump and the Veichi is more than 100 meters.

Single Phase: When your cable run between the pump and the Veichi is 80 - 100 meters. Don't install single phase drives if cable run is more than 100m.

What should be the motor vs Veichi ratio?

Choose a Veichi that is one size larger than the motor rating (e.g., a 4 kW motor needs a 5.5 kW Veichi) to compensate for efficiency losses at higher altitudes and ensure adequate cooling.

How do I read the product code?



I want to delve deeper! Where can I learn more about the drives and find manuals and instructions?

SI21:

https://www.veichi.com/product/si21-solar-pump-inverter.html

SI23:

https://www.veichi.com/product/si23-solar-pump-inverter.html

SI30:
https://www.veichi.com/product/si30-synchronous-solar-pump-inverter.html

The 3 phase pump is pumping but not giving me nearly enough water, all connections seem to be correct?

- Switch cables U & W on the drive and see if yield improves

What do I need to know about single-phase sizing?

- Don't install single phase drives over 100m
- 80-100m requires an output reactor.
- Cable sizing needs to be correct. See cable sizing section in this document.

When can we install single-phase VEICHI drives?

- The cable run must be under 100m.
- For runs between 80-100m, an output reactor is required.

I have a 220V 3 phase motor? Can it take a Veichi.

This motor is not commonly used, which can be counterintuitive since it's a 3-phase motor. However, in this uncommon scenario, our focus is on the voltage. We typically use the SI23 single-phase device with these motors, usually the SI23 D3 (Single Phase) 4kW model. It provides an output of 220V, which is required by this motor.

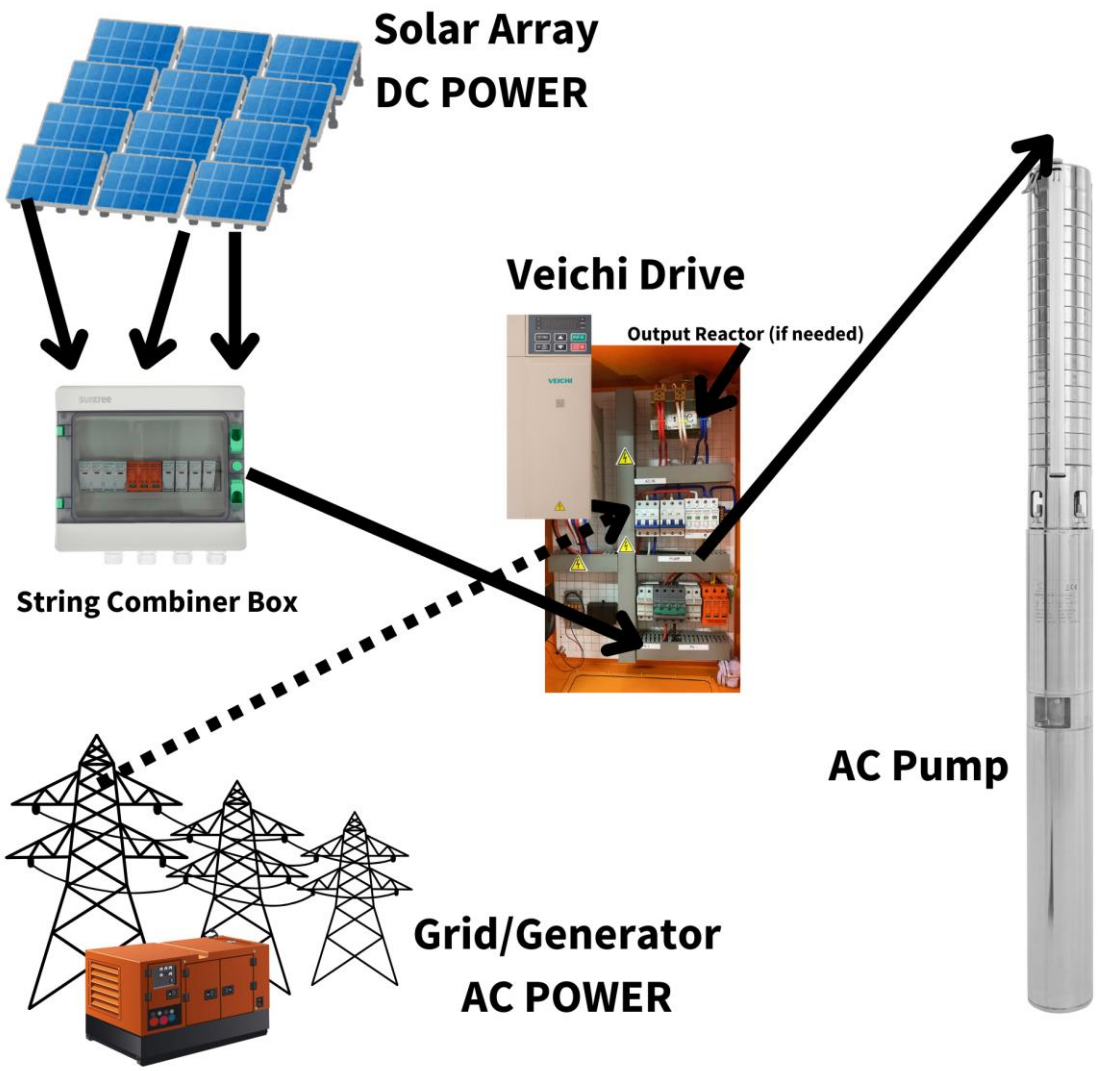
When will a drive damage a motor?

This motor can only be damaged if the sizing is incorrect and the voltage is insufficient. By adhering to the specified minimum and maximum voltage requirements, you can ensure that the motor remains protected and does not sustain damage.

What is the biggest you can go?

400kW Drive (Two 200kW drives in parallel)

Do you have a basic layout of the system?



Do you have a drive that takes 220V in and 380/400V output?

These are drives that convert AC single-phase into AC three phase out. We don't offer this product right now.

What cable thickness must I use?

Cable Thickness Selection Table for Submersible Motors									
Single Phase Motors									
Length in Meters									
KW	Amps	Voltage	1.5mm	2.5mm	4.0mm	6.0mm	10.0mm	16.0mm	25.0mm
0.37KW	3.5	230	100	160	280	430			
0.55KW	4.7	230	80	120	210	310	500		
0.75KW	5.8	230	60	100	170	250	440		
1.10KW	8.1	230	40	70	120	180	320	500	
1.50KW	10.7	230	30	50	90	130	230	350	540
2.20KW	14.7	230	20	40	70	90	150	240	360
Three Phase Motors									
Length in Meters									
KW	Amps	Voltage	1.5mm	2.5mm	4.0mm	6.0mm	10.0mm	16.0mm	25.0mm
0.37KW	1.6	400	350						
0.55KW	2.1	400	300						
0.75KW	2.4	400	250	450					
1.10KW	3.2	400	190	320					
1.50KW	4.4	400	120	240	400				
2.20KW	5.9	400	100	170	270	420			
3.00KW	8.2	400	60	120	190	280	450		
4.00KW	8.9	400	50	90	160	250	400		
5.50KW	11.8	400	40	70	120	190	320		
7.50KW	16.7	400	30	50	90	120	220	380	500

Is 380/400V motors an issue?

No, the motor is clearly marked. Typically, motors up to 1.5 kW use 380V, while those larger than 1.5 kW use 400V. Simply refer to the motor's specifications and use the correct voltage in your calculations.

HERTZ (Hz) What is the minimum a motor can run on?

The motor should not operate below 30 Hz, as running at lower frequencies can risk damaging the windings. We implement a setup sequence to automatically cut off the motor if it drops below this threshold, ensuring protection. The optimal operating frequency is 50 Hz.

Do you have a list of the drives you stock?

What we stock at our warehouse and quantity is on the reseller portal www.cedarpumps.com. If you need anything bigger (110kw+) we have a lead-time of 7 working days.

Where can me or my customer see all your troubleshooting videos?

www.cedarsolar.com/downloads is available to resellers and end-users.
www.cedarpumps.com is only for registered resellers.