

**SMART D**®



Clean Power VFD™

**Not All Drives  
Are Created Equal.**



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# Clean Power VFD™ What is Clean Power?

Clean Power Variable Frequency Drive with Active Front End (AFE) is a compact AC drive utilizing SmartD's patented algorithms combined with SiC MOSFET technology.

Producing a clean and pure sine wave has never been easier. A Clean Power Variable Frequency Drive has essential features built-in for space, wiring and time savings, it eliminates the need for filters on the output, and guarantees longer motor life. Discover the drive without drawbacks...



## All Sines Point to “Yes”

The benefits of Clean Power

### Embedded Active Front End (AFE)

- Ultra low harmonics
- Regenerative capability
- Power Factor near unity

### Pure sine wave 3-phase output

- Fully integrated filters
- Maximized motor life
- Increased efficiency

### Easy setup

- Mobile App with natural language
- Set, monitor and control from the App.

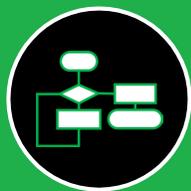
## Secret sauce SiC Tech

The Clean Power VFD design is based on the latest generation of power components: **Silicon Carbide (SiC) MOSFETs**.

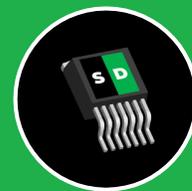
SiC MOSFETs permit high frequency switching with fewer losses while being able to withstand higher temperatures than IGBTs.

Integration of the SiC transistors, patented algorithm for multilevel architecture and embedded filters allows the Clean Power VFD to deliver a pure sine wave to control speed and torque of the AC motor.

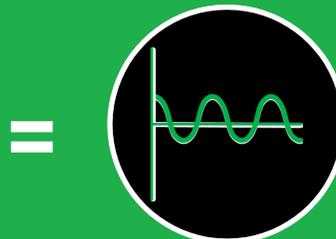
PATENTED  
ALGORITHMS  
for MULTI-LEVEL  
ARCHITECTURE



SiC  
TRANSISTORS



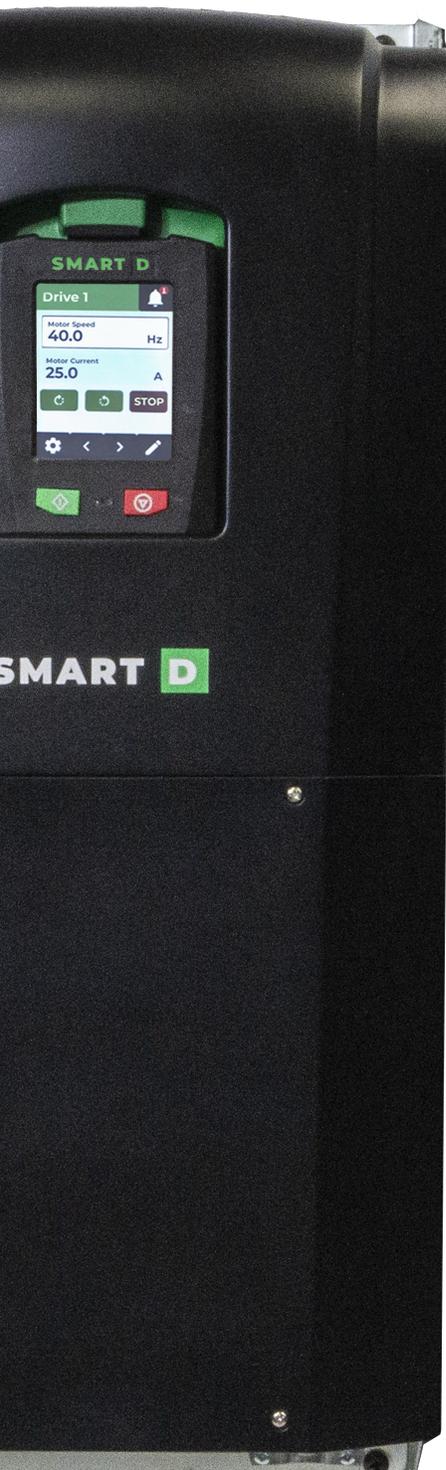
PATENTED  
400X SMALLER  
FILTERS



PURE SINE WAVE SIGNAL

# All Sines Point to “Yes”

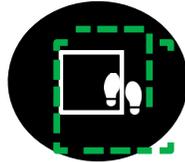
The benefits of Clean Power



**EMBEDDED FILTERS**



**1/2 THE FOOTPRINT**



**LONGER MOTOR LIFESPAN**



**MORE ENERGY SAVINGS**



**OPTIMAL SYSTEM COST**



## The first-ever filterless VFD.

Ordinary drives require the installation of dV/dt filters or sine wave filters on the motor-side in order to mitigate motor and cable issues, as well as passive or active harmonic filters on the grid-side limiting distortion created. The Clean Power VFD does not generate a high rate of voltage rise nor spike, thus the motor can be wired directly to the VFD power output without additional filters. Its converter stage is also Clean Power architecture, producing harmonic distortion lower than IEEE519 recommendations. There is no need to add any filters on the input side to protect your installation, cables and transformers.

## Low harmonics.

With the embedded Active Front End (AFE), the Clean Power VFD ensures Total Harmonic Current Distortion (THDi) remains below 5% under nominal conditions, exceeding industry standards for harmonic compliance.

## Long-lasting motor lifetime.

Thanks to the true sine wave output of the Clean Power VFD, the motor's insulation material is not prematurely aging from overheating. Moreover, when retrofitting a motor system from fixed speed to variable speed with a Clean Power VFD, there's no need to update the motor to a VFD-grade insulated motor.

The balanced 3-phase clean sine wave does not create a destructive common mode voltage. Therefore, the special attention and protections usually applied to the motor bearings are not necessary.

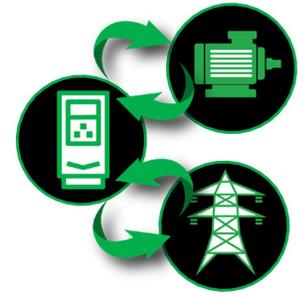
As a benefit, the Clean Power VFD ensures the motor's maximum life expectancy, and the required maintenance operations of the motor can be done between longer time intervals.

## Power factor near unity.

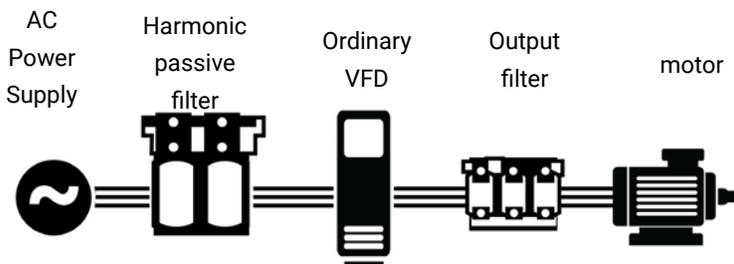
Ordinary VFDs have a power factor between 0.75 and 0.85. The Clean Power VFD has a power factor of 0.98. High Power Factor is beneficial in that there is no need to oversize the power supply and cable capacity, plus financial benefits from the power provider.

## Fully-regenerative drive.

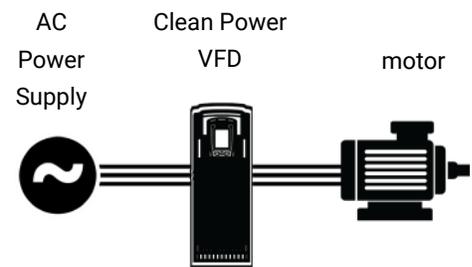
The Clean Power VFD is regenerative by default. When decelerating, the motor's regenerated energy is fed to the grid instead of vanishing in a braking resistor.



### Ordinary VFD system



### Clean Power System

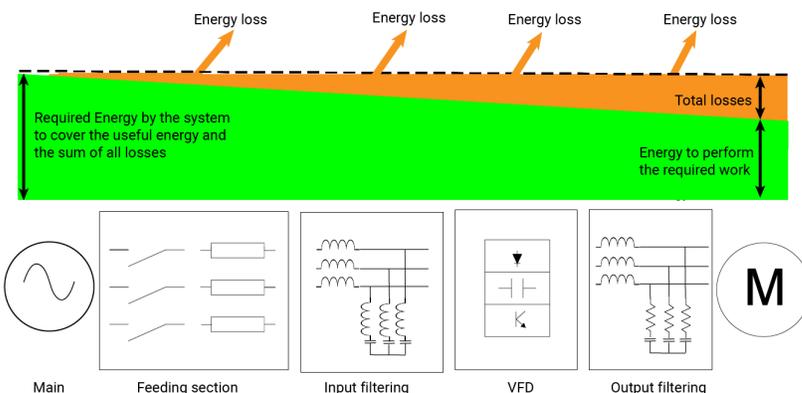


## Improved efficiency.

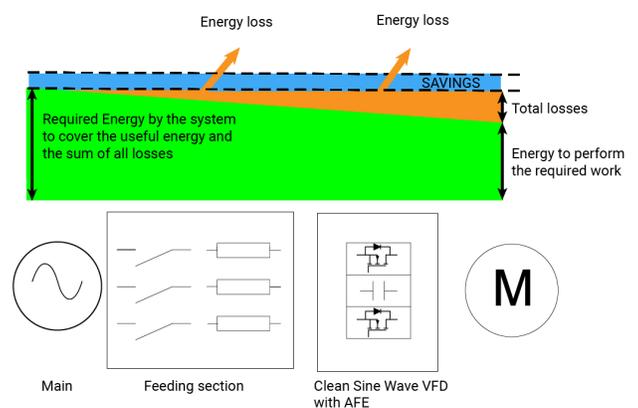
The Clean Power VFD increases the efficiency of every system it is properly deployed in.

First, by decreasing the expensive energy losses: The Clean Power VFD itself has an efficiency higher than 95% full speed / full torque, and about 93% at 50% speed/ full torque. The typical energy losses from mitigating devices no longer exist for the filter-less Clean Power VFD. A motor running on Clean Power faces 15% less thermal losses when compared with an ordinary VFD. Secondly, by increasing the availability of your production resources, not generating any drawbacks, the Clean Power VFD is harmless to the motors and other equipment connected to the same power grid. This drastically decreases the risk of failures, any potential sources of costly and unexpected production downtime.

### Ordinary VFD system



### Clean Power System



# Long Run Motor Cable

## Cable engineering backs to basic first principles.

When you use a Clean Power VFD, your motor gets perfectly smooth, pure sine wave power. This means you don't have to worry about common issues caused by traditional drives, such as reflected waves, common-mode currents, or dV/dt stress.

You only need to consider the basic properties of your cable: its Resistance (R), Inductance (L), and Capacitance (C).

### Standard Power Cables – All You Need

- Cable Insulation: Your cable's insulation just needs to match your motor's standard voltage rating. You don't need special "dV/dt rated" cables.
- Interference (EMI/RFI): Regular cable installation practices are usually enough to prevent electrical interference. Special shielded cables are rarely necessary.
- Cable Arrangement: You can install parallel cables in arrangements like triangular or "trefoil" (three cables together) to keep the electrical balance.

### Cable Resistance

The resistance  $R_{cable} = \rho L / S$  where  $\rho$  is the resistivity of the material, L is the length, and S is the cross-sectional area.

This resistance determines how much voltage reaches your motor:  $V_{motor} = V_{source} - IR_{cable}$

Size conductors so that round-trip voltage drop does not exceed 3 % at rated current.

### Cable Capacitance

With Clean Power VFD, cable capacitance only draws a tiny amount of electrical current – about 100 times less than with older, less efficient drives. This means:

- No Extra Current: The total current drawn by your system increases only slightly.
- Good Power Factor: Your system's "power factor" stays about the same, or even slightly improves with heavily loaded motors.
- No Problems: You won't have issues like over-voltage, electrical resonance, or damaging currents flowing through your motor's bearings.

Because of these benefits, buying expensive, shielded "VFD-rated" low-capacitance cables is unnecessary and doesn't provide any extra benefit when you're using a pure sine wave power source for your motor.

### Motor Cable Length

Max Motor Cable Length	m / ft	4500 / 15,000 without output filter
Sine Wave Cable Compatibility		Standard industrial-grade cables (shielding optional)
Voltage Drop Limit	%	Max 3% of rated motor voltage ( $\sqrt{3} \cdot R \cdot I$ )

## Easy setup

Smartphone application:

### Clean Power VFD mobile application

From purchasing to operations, simplify your deployment and decrease your expenses with a Clean Power VFD: less equipment, less-maintenance, more energy efficiency.

Install the Clean Power VFD with just 3 cables in, 3 cables out. Connect to the app and configure the Clean Power VFD in the palm of your hand. Experience true sine wave output first- hand.

#### Quick

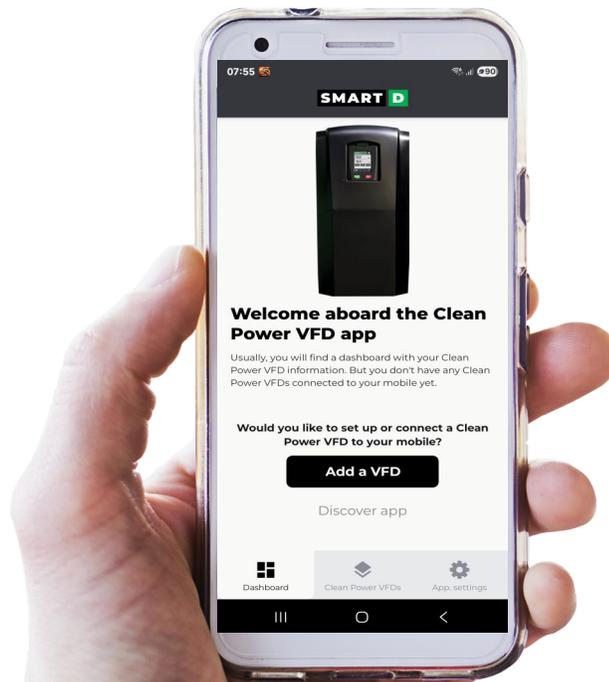
The integrated assistant enables even first- time users to quickly set the configuration of the Clean Power VFD.

#### Convenient

The Clean Power VFD can be configured, controlled and monitored by using the app, pairing it via Bluetooth®.

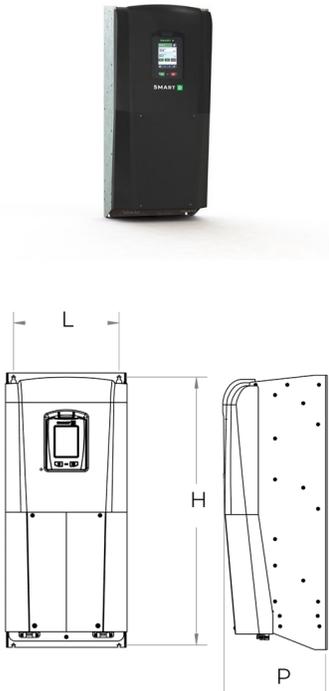


- ✔ Speaks natural user language
- ✔ Assists user during setup process
- ✔ Save, Copy, Clone VFD configurations
- ✔ Control drive operation dashboard
- ✔ Manage alarms



## Select your Clean Power VFD

### Rated voltages and currents



Input Voltage (VAC)	Suitable for Motor	Rated Output Current (Normal Duty)	Size	Part Number
3 ~ 400 to 480	400 V - 11kW/15hp	23 A	S3	<b>SDB-1-2110A</b>
	460 V - 11kW/15hp	22 A		
3 ~ 600Y	575 V - 15kW/20hp	22 A	S3	<b>SDB-2-2150-A</b>
3 ~ 400 to 480	400 V - 15kW/20hp	29 A	S3	<b>SDB-1-2150A</b>
	460 V - 15kW/20hp	28 A		
3 ~ 600Y	575 V - 18.5kW/25hp	28 A	S3	<b>SDB-2-2185-A</b>
3 ~ 400 to 480	400 V - 18.5kW/25hp	35 A	S3	<b>SDB-1-2185-A</b>
	460 V - 18.5kW/25hp	34 A		
3 ~ 600Y	575 V - 22 kW/30hp	34 A	S3	<b>SDB-2-2220-A</b>
3 ~ 400 to 480	400 V - 22kW/30hp	43 A	S3	<b>SDB-1-2220-AL<sup>(1)</sup></b>
	460 V - 22kW/30hp	41 A		

Values are given for the rated operating range -15 to 50°C without derating, 50 to 60°C with derating of 2% per °C. If not specified otherwise.

(1) Limited operating range -15 to 40°C.

Frame Size	Width L	Height H	Depth P
<b>S3-up to 34A</b>	11.85 in (30.1 cm)	25.59 in (65 cm)	9.88 in (25.1 cm)

## Accessories and spare parts

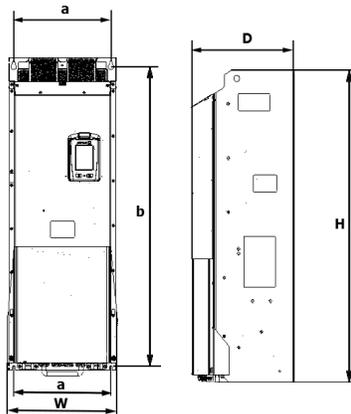
Genuine\* accessories to adapt or maintain your Clean Power VFDs.

Designation	Part Number
Human-Machine Interface (HMI)	<b>SD-HM-01</b>
standard HMI cable	<b>SD-HC-A</b>
5m (16.4 ft) HMI cable	<b>SD-HC-5M</b>
Fans Kit for size S3	<b>SD-MF-S3</b>
Fans Kit for size S4	<b>SD-MF-S4</b>
Fans Kit for size S5	<b>SD-MF-S5</b>

\*Using a non-approved accessory may create issues and void your Clean Power VFD warranty.

# Select your Clean Power VFD

## Rated voltages and currents



Input Voltage (VAC)	Suitable for Motor	Rated Output Current (Normal Duty)	Size	Part Number
3 ~ 400 Y to 480 Y	400 V - 22kW/30hp	43 A	S4	<b>SDB-1-2220-A</b>
	460 V - 22kW/30hp	41 A		
3 ~ 600Y	575 V - 30kW/40hp	44 A	S4	<b>SDB-2-2300-A</b>
3 ~ 400 Y to 480 Y	400 V - 30kW/40hp	57 A	S4	<b>SDB-1-2300-A</b>
	460 V - 30kW/40hp	55 A		
3 ~ 600Y	575 V - 37.5kW/50hp	54 A	S4	<b>SDB-2-2375-A</b>
3 ~ 400 Y to 480 Y	400 V - 37.5kW/50hp	71 A	S4	<b>SDB-1-2375-A</b>
	460 V - 37.5kW/50hp	68 A		
3 ~ 600Y	575 V - 45kW/60hp	66 A	S4	<b>SDB-2-2450-A</b>
3 ~ 400 Y to 480 Y	400 V - 45kW/60hp	85 A	S4	<b>SDB-1-2450-A</b>
	460 V - 45kW/60hp	82 A		
3 ~ 600Y	575 V - 55kW/75hp	79 A	S4	<b>SDB-2-2550-A</b>
3 ~ 400 Y to 480 Y	400 V - 55kW/75hp	92 A	S4	<b>SDB-1-2550-AL<sup>(1)</sup></b>
	460 V - 55kW/75hp	92 A		
3 ~ 400 Y to 480 Y	400 V - 55kW/75hp	100 A	S5	<b>SDB-1-2550-A</b>
	460 V - 55kW/75hp	100 A		
3 ~ 600Y	575 V - 75kW/100hp	107 A	S5	<b>SDB-2-2750-A</b>
3 ~ 400 Y to 480 Y	400 V - 75kW/100hp	134 A	S5	<b>SDB-1-2750-A</b>
	460 V - 75kW/100hp	134 A		
3 ~ 600Y	575 V - 90kW/125hp	130 A	S5	<b>SDB-2-2900-A</b>
3 ~ 400 Y to 480 Y	400 V - 90kW/125hp	156 A	S5	<b>SDB-1-2900-A</b>
	460 V - 90kW/125hp	156 A		
3 ~ 600Y	575 V - 110kW/150hp	156 A	S5	<b>SDB-2-3110-A</b>

Coming soon

Values are given for the rated operating range -15 to 50°C without derating, 50 to 60°C with derating of 2% per °C. If not specified otherwise.

(1) Limited operating range -15 to 40°C.

Frame Size	Width W	Height H	Depth D
<b>S4</b> -up to 82A	13.8 in (35 cm)	36.4 in (92.5 cm)	13 in (32.95 cm)

# Ratings and Performances

## What sets us apart

Input Voltage	<b>3 ~ 400 .. 480 VAC -15% .. +10%</b>
Input Frequency	50 .. 60 Hz -5% .. +5%
THDi Total Harmonic Distortion (current)	<3 % <sup>(1)</sup>
Power factor	near unity

	SDB-1	-2110-A	-2150-A	-2185-A	-2220-AL <sup>(3)</sup>
Size		S3	S3	S3	S3

### Power Line Input

Input Current	A	23	30	36	43
Apparent Power	kVA	20	25	30	38
Isc	kA	50	50	50	50

### Output Capabilities <sup>(2)</sup>

Continuous Output Current - ND	A	22 @ 460 VAC	28 @ 460 VAC	34 @ 460 VAC	41 @ 460 VAC
		23 @ 400 VAC	29 @ 400 VAC	35 @ 400 VAC	43 @ 400 VAC
Continuous Output Current - HD	A	17 @ 460 VAC	22 @ 460 VAC	25 @ 460 VAC	35 @ 460 VAC
		17 @ 400 VAC	22 @ 400 VAC	25 @ 400 VAC	35 @ 400 VAC
Max Transient Output current - ND	A	25 @ 460 VAC	31 @ 460 VAC	38 @ 460 VAC	46 @ 460 VAC
		26 @ 400 VAC	32 @ 400 VAC	38 @ 400 VAC	48 @ 400 VAC
Max Transient Output current - HD		26 @ 460 VAC	33 @ 460 VAC	38 @ 460 VAC	53 @ 460 VAC
		26 @ 400 VAC	33 @ 400 VAC	38 @ 400 VAC	53 @ 400 VAC
Output Speed Frequency	Hz	0.1 .. 120			
Nominal Switching Frequency	kHz	105			
Effective Switching Frequency	kHz	210			

### Indicative motor Power <sup>(3)</sup>

Motor power - Normal Duty	kW	11	15	18.5	22
Motor power - Normal Duty	hp	15	20	25	30
Motor power - Heavy Duty	kW	7.5	11	15	18.5
Motor power - Heavy Duty	hp	10	15	20	25

### Efficiency

IE Class		2
Efficiency	%	96

### Conformity

CE marking	CE	CE	CE	CE
Product Certification	cULus – UL 61800-5-1, and CSA22.2– file E5231214			

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(1) at 50% load or greater on a typical impedance grid

(2) Values are given for the rated operating range -15 to 50°C without derating, 50 to 60°C with derating of 2% per °C) . If not specified otherwise.

(3) Motor power values are indicative. They vary with the motor type, technology, and manufacturer. The Clean Power VFD must not be selected from the motor power rating. The Clean Power VFD must be selected by skilled and experienced personnel. The Clean Power VFD must be selected according to motor FLA, the load's driving force and movement cycle, and the operating environment.

# Ratings and Performances

## What sets us apart

Input Voltage	<b>3 ~ 400 .. 480 VAC -15% .. +10%</b>
Input Frequency	50 .. 60 Hz -5% .. +5%
THDi Total Harmonic Distortion (current)	<3 % <sup>(1)</sup>
Power factor	near unity

	SDB-1	2220-A	-2300-A	-2375-A	-2450-A
Size		S4	S4	S4	S4

### Power Line Input

Input Current	A	43	58	71	86
Apparent Power	kVA	36	49	60	72
Isc	kA	100	100	100	100

### Output Capabilities <sup>(2)</sup>

Continuous Output Current - ND	A	41 @ 460 VAC 43 @ 400 VAC	55 @ 460 VAC 57 @ 400 VAC	68 @ 460 VAC 71 @ 400 VAC	82 @ 460 VAC 85 @ 400 VAC
Continuous Output Current - HD	A	35 @ 460 VAC 35 @ 400 VAC	41 @ 460 VAC 41 @ 400 VAC	55 @ 460 VAC 55 @ 400 VAC	68 @ 460 VAC 68 @ 400 VAC
Max Transient Output current - ND	A	46 @ 460 VAC 48 @ 400 VAC	61 @ 460 VAC 63 @ 400 VAC	75 @ 460 VAC 79 @ 400 VAC	91 @ 460 VAC 91 @ 400 VAC
Max Transient Output current - HD		53 @ 460 VAC 53 @ 400 VAC	62 @ 460 VAC 62 @ 400 VAC	83 @ 460 VAC 83 @ 400 VAC	102 @ 460 VAC 102 @ 400 VAC
Output Speed Frequency	Hz	0.1 .. 120			
Nominal Switching Frequency	kHz	105			
Effective Switching Frequency	kHz	210			

### Indicative motor Power <sup>(3)</sup>

Motor power - Normal Duty	kW	22	30	37.5	45
Motor power - Normal Duty	hp	30	40	50	60
Motor power - Heavy Duty	kW	18.5	22	30	37.5
Motor power - Heavy Duty	hp	25	30	40	50

### Efficiency

IE Class		2
Efficiency	%	96

### Conformity

CE marking		CE	CE	CE	CE
Product Certification		cULus – UL 61800-5-1, and CSA22.2– file E5231214			

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# Ratings and Performances

## What sets us apart

Input Voltage	<b>3 ~ 400 .. 480 VAC -15% .. +10%</b>
Input Frequency	50 .. 60 Hz -5% .. +5%
THDi Total Harmonic Distortion (current)	<3 % <sup>(1)</sup>
Power factor	near unity

	SDB-1		-2550-AL <sup>(4)</sup>	-2550-A	-2750-A	-2900-A
	Size		S4	S5	S5	S5
<b>Power Line Input</b>						
	Input Current	A	92	150	175	
	Apparent Power	kVA	74.5	110	114	
	Isc	kA	100	100	100	100
<b>Output Capabilities<sup>(2)</sup></b>						
	Continuous Output Current - ND	A	92 @ 460 VAC 92 @ 400 VAC	100 @ 460 VAC 100 @ 400 VAC	134 @ 460 VAC 134 @ 400 VAC	156 @ 460 VAC 156 @ 400 VAC
	Continuous Output Current - HD	A	75 @ 460 VAC 75 @ 400 VAC	82 @ 460 VAC 82 @ 400 VAC	99 @ 460 VAC 99 @ 400 VAC	115 @ 460 VAC 115 @ 400 VAC
	Max Transient Output current - ND	A	102 @ 460 VAC 102 @ 400 VAC	110 @ 460 VAC 110 @ 400 VAC	147 @ 460 VAC 147 @ 400 VAC	172 @ 460 VAC 172 @ 400 VAC
	Max Transient Output current - HD		113 @ 460 VAC 113 @ 400 VAC	123 @ 460 VAC 123 @ 400 VAC	149 @ 460 VAC 149 @ 400 VAC	175 @ 460 VAC 175 @ 400 VAC
	Output Speed Frequency	Hz	0.1 .. 120			
	Nominal Switching Frequency	kHz	105			
	Effective Switching Frequency	kHz	210			
<b>Indicative motor Power<sup>(3)</sup></b>						
	Motor power - Normal Duty	kW	55	75	90	
	Motor power - Normal Duty	hp	75	100	125	
	Motor power - Heavy Duty	kW	45	55	75	
	Motor power - Heavy Duty	hp	60	76	100	
<b>Efficiency</b>						
	IE Class		2			
	Efficiency	%	96			
<b>Conformity</b>						
	CE marking		CE			
	Product Certification					

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(4) Values are given for the rated operating range -15 to 40°C without derating, 40 to 50°C with derating of 2% per °C). If not specified otherwise.

# Ratings and Performances

## What sets us apart

Input Voltage	<b>3 ~ 600 VAC -15% .. +10%</b>
Input Frequency	50 .. 60 Hz -5% .. +5%
THDi Total Harmonic Distortion (current)	<3 % <sup>(1)</sup>
Power factor	near unity

	SDB-2	-2150-A	-2185-A	-2220-A
Size		S3	S3	S3
<b>Power Line Input</b>				
Input Current	A	23	30	36
Apparent Power	kVA	24	32	38
Isc	kA	50	50	50
<b>Output Capabilities <sup>(2)</sup></b>				
Continuous Output Current - ND	A	22 @ 575 VAC	28 @ 575 VAC	34 @ 575 VAC
Continuous Output Current - HD	A	17@ 575 VAC	22 @ 575 VAC	25 @ 575 VAC
Max Transient Output current - ND	A	25 @ 575 VAC	31 @ 575 VAC	38 @ 575 VAC
Max Transient Output current - HD		26 @ 575 VAC	33 @ 575 VAC	38 @ 575 VAC
Output Speed Frequency	Hz	0.1 .. 120		
Nominal Switching Frequency	kHz	105		
Effective Switching Frequency	kHz	210		
<b>Indicative motor Power <sup>(3)</sup></b>				
Motor power - Normal Duty	kW	15	18.5	22
Motor power - Normal Duty	hp	20	25	30
Motor power - Heay Duty	kW	11	15	18.5
Motor power - Heavy Duty	hp	15	20	25
<b>Efficiency</b>				
IE Class		2		
Efficiency	%	96		
<b>Conformity</b>				
CE marking				
Product Certification		cULus – UL 61800-5-1, and CSA22.2– file E5231214		

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# Ratings and Performances

## What sets us apart

Input Voltage	<b>3 ~ 600 VAC -15% .. +10%</b>
Input Frequency	50 .. 60 Hz -5% .. +5%
THDi Total Harmonic Distortion (current)	<3 % <sup>(1)</sup>
Power factor	near unity

	SDB-2	-2300-A	-2375-A	-2450-A	-2550-A
Size		S4	S4	S4	S4
<b>Power Line Input</b>					
Input Current	A	47	57	69	83
Apparent Power	kVA	49	60	72	87
Isc	kA	100	100	100	100
<b>Output Capabilities <sup>(2)</sup></b>					
Continuous Output Current - ND	A	44 @ 575 VAC	54 @ 575 VAC	66 @ 575 VAC	79 @ 575 VAC
Continuous Output Current - HD	A	33 @ 575 VAC	44 @ 575 VAC	54 @ 575 VAC	66 @ 575 VAC
Max Transient Output current - ND	A	49 @ 575 VAC	60 @ 575 VAC	73 @ 575 VAC	87 @ 575 VAC
Max Transient Output current - HD		50 @ 575 VAC	66 @ 575 VAC	81 @ 575 VAC	99 @ 575 VAC
Output Speed Frequency	Hz	0.1 .. 120			
Nominal Switching Frequency	kHz	105			
Effective Switching Frequency	kHz	210			
<b>Indicative motor Power <sup>(3)</sup></b>					
Motor power - Normal Duty	kW	30	37.5	45	55
Motor power - Normal Duty	hp	40	50	60	75
Motor power - Heay Duty	kW	22.5	30	37.5	45
Motor power - Heavy Duty	hp	30	40	50	60
<b>Efficiency</b>					
IE Class		2			
Efficiency	%	96			
<b>Conformity</b>					
CE marking					
Product Certification		cULus – UL 61800-5-1, and CSA22.2– file E5231214			

Features described in this documentation are subject to change without notice. This information is provided for reference purposes only and does not constitute a contractual obligation.

(1) at 50% load or greater on a typical impedance grid

(2) Values are given for the rated operating range -15 to 50°C without derating, 50 to 60°C with derating of 2% per °C) . If not specified otherwise.

(3) Motor power values are indicative. They vary with the motor type, technology, and manufacturer. The Clean Power VFD must not be selected from the motor power rating. The Clean Power VFD must be selected by skilled and experienced personnel. The Clean Power VFD must be selected according to motor FLA, the load's driving force and movement cycle, and the operating environment.

# Ratings and Performances

## What sets us apart

Input Voltage	<b>3 ~ 600 VAC -15% .. +10%</b>
Input Frequency	50 .. 60 Hz -5% .. +5%
THDi Total Harmonic Distortion (current)	<3 % <sup>(1)</sup>
Power factor	near unity

	SDB-2	-2750-A	-2900-A	-3110-A
Size		S5	S5	S5
<b>Power Line Input</b>				
Input Current	A	112	137	165
Apparent Power	kVA	117	142	172
Isc	kA	100	100	100
<b>Output Capabilities <sup>(2)</sup></b>				
Continuous Output Current - ND	A	107 @ 575 VAC	130 @ 575 VAC	156 @ 575 VAC
Continuous Output Current - HD	A	80 @ 575 VAC	110 @ 575 VAC	120-@ 575 VAC
Max Transient Output current - ND	A	118 @ 575 VAC	143 @ 575 VAC	172 @ 575 VAC
Max Transient Output current - HD		120 @ 575 VAC	160 @ 575 VAC	180 @ 575 VAC
Output Speed Frequency	Hz	0.1 .. 120		
Nominal Switching Frequency	kHz	105		
Effective Switching Frequency	kHz	210		
<b>Indicative motor Power <sup>(3)</sup></b>				
Motor power - Normal Duty	kW	75	90	110
Motor power - Normal Duty	hp	100	125	150
Motor power - Heay Duty	kW	55	75	90
Motor power - Heavy Duty	hp	30	100	125
<b>Efficiency</b>				
IE Class		2		
Efficiency	%	96		
<b>Conformity</b>				
CE marking				
Product Certification				

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(1) at 50% load or greater on a typical impedance grid

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## 24VDC Power in

A 24VDC external power supply can be connected to the terminals Pwr In (terminals +24VC and 0). The 24VDC auxiliary supply will power the Clean Power VFD control board in the absence of line power, allowing both communications and the HMI to continue to operate.

## 24VDC Power out

Clean Power VFD provides the user with a 24VDC power out on the terminals Pwr Out (terminals +24VC and 0). This power is used to energize the digital inputs, or to energize some sensors.

## Digital Input Terminals

Marking	Name	Default Operation
1	Digital input 1	User settable. Can be assigned to phase A of an encoder. Default: not used
2	Digital input 2	User settable. Can be assigned to phase B of an encoder. Default: not used
3	Digital input 3	Run forward
4	Digital input 4	Run reverse
5	Digital input 5	Stop
6	Digital input 6	Speed Control Selection
+24	Common terminal for digital inputs	

## STO Terminals

The Clean Power VFD is providing users with 2 built-in torque deactivation inputs. to prevent the VFD from generating torque to the motor and forbid the motor from restarting as long as the Torque Deactivation function is activated.

Marking	Name
STO 1	Safe torque off – input 1
STO 2	Safe torque off – input 2
+24	Safe torque off 24 V power supply

## Relay Output Terminals

The operation of the 3 independent relay outputs of the Clean Power VFD can be set by the user.

Marking	Name	Default Operation
C	Common	Relay 1 : alarm relay
NO	Normally opened contact	The relay is energized (C & NO connected) when there is no alarm
NC	Normally closed contact	The relay is de-energized (C & NC connected) when there is an alarm or loss of power supply

Marking	Name	Default Operation
C	Common	
NO	Normally opened contact	Relay 2: Energized for VFD ready to run Relay 3: Energized for VFD running

## Analog Input Terminals

Analog inputs from AI1 to AI3 can be assigned by the user to various functions and various electrical signals.

- Speed (frequency Hz) setpoint
- Velocity (RPM) setpoint
- Torque (%) setpoint, max and min values
- PTC motor thermal sensor
- PID values: setpoint, process feedback, forced output

Marking	Name	Default Operation
1	Analog input 1	Speed reference. Preset used as potentiometer input.
2	Analog input 2	Un-assigned
3	Analog input 3	Un-assigned
+ 10	Reference power supply 10 VCC / 20 mA max.	
C	Common terminal for analog inputs	

Analog inputs can be used for electrical signals: 0..10VDC, 4..20mA, PTC ; and scaled to user's engineering values and units.

## Analog Output Terminals

Analog outputs 1 and 2 can be assigned by the user to various functions and various electrical signals.

Marking	Name	Default Operation
1	Analog output 1	Factory preset to the motor frequency. The preset signal is 0..10VDC
2	Analog output 2	Factory preset to the motor current Irms total. The preset signal is 0..10VDC
C	Common terminal for analog outputs	

Available choices for the functions :

- Motor Current
- Motor Frequency
- Motor Velocity
- Motor Torque
- Motor Active Power

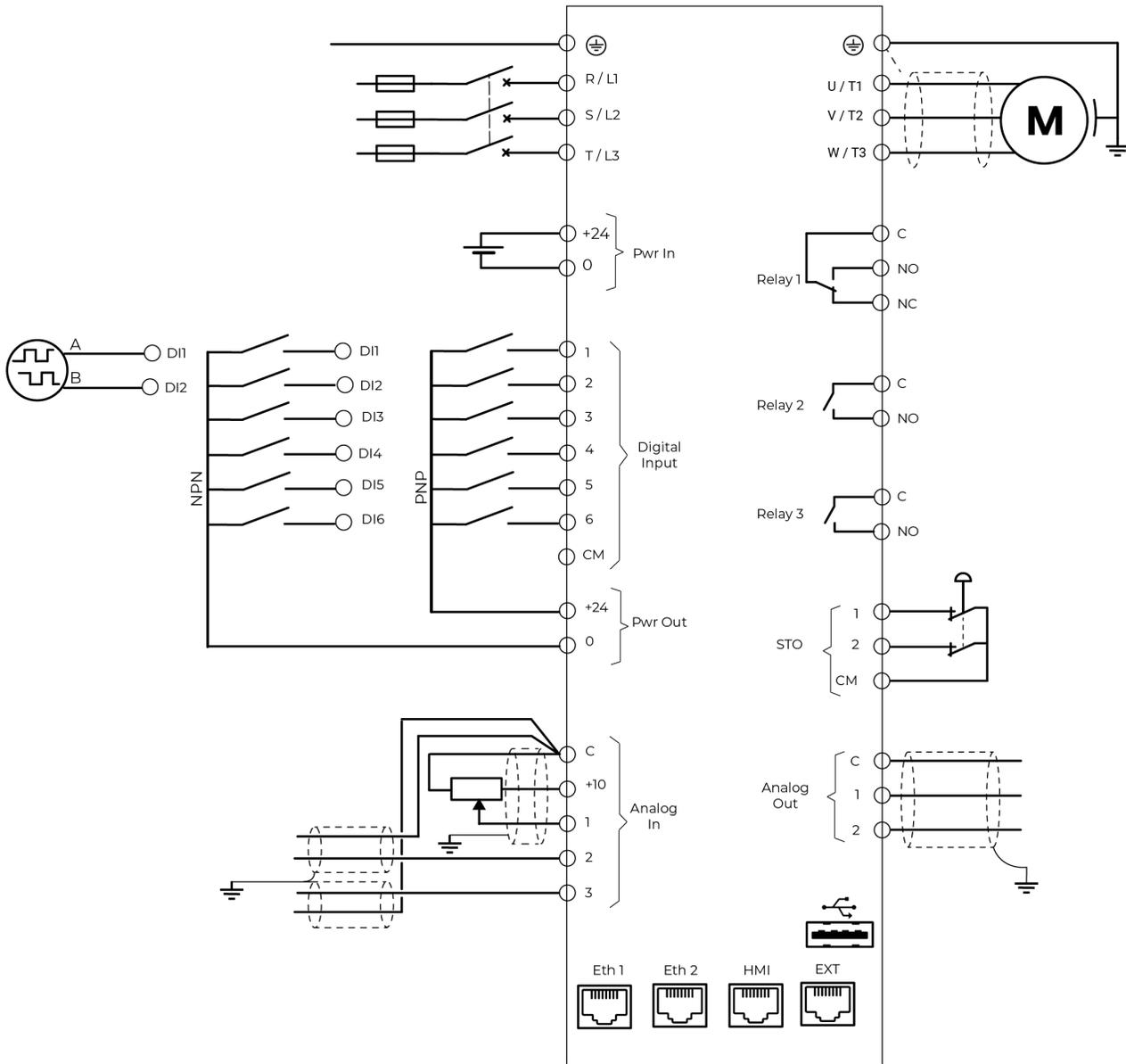
Signal delivered by Analog output :

- 0..10VDC,
- 4..20mA



# Installation

## Wiring



Follow all the recommendations as defined in the user guide in regards to cables selection, fusing, grounding, EMC best practices.

## Environmental specifications

Installation area	The Clean Power VFD must be mounted in a well-ventilated electrical cabinet, respecting the clearance distances described in the user guide.
Operating temperature	The normal operating range of the Clean Power VFD is <b>-15 to 50°C without derating</b> , 50 to 60°C with derating of 2% per °C. If not specified otherwise (e.g., SDB-1-2220-AL) When using an enclosure, install a cooling fan or air conditioner in the area to ensure the air temperature inside the housing does not exceed the specified levels.
Relative humidity	Below 95% non-condensing.
Surrounding environment pollution degree	2, conforming to IEC61800-5-1
Storage temperature	-40...70 °C / -40...158 °F
Surrounding area	Mount in an area free of <ul style="list-style-type: none"><li>• oil mist and dust-metal shavings, oil, water, or other foreign materials</li><li>• radioactive materials</li><li>• combustible materials</li><li>• toxic or corrosive gases and liquids</li><li>• excessive vibration</li><li>• chlorides</li><li>• direct sunlight</li><li>• EMI source and other electronic devices that are sensitive to EMI</li></ul>
Altitude	<b>Up to than 2000 m/6600 ft without derating.</b> Contact SmartD Technologies Inc. if you intend to use the Clean Power VFD at a higher altitude.
Vibrations	Mount in a location where vibrations are less than an amplitude of 1.5 mm peak to peak (f= 2...13 Hz) and acceleration lower than 1 gn (f= 13...200 Hz).
Ingress Protection	IP 20

## Compliances & Certifications

Conformity to standards	UL61800-5-1 and IEC61800-5-1 Adjustable Speed Electrical Power Drive systems IEC 61800-3 EMC requirements IEC 61000-4-2 electrostatic discharge immunity IEC 61000-4-3 radiated, radio-frequency, electromagnetic field immunity IEC 61000-4-4 electrical fast transient/burst immunity IEC 61000-4-5 surge immunity IEC 61000-4-6 immunity to conducted disturbances, induced by radio-frequency IEC 61000-4-11&34 voltage dips, short interruptions and voltage variations immunity IEC 61800-9 -2 Ecodesign for power drive systems IEC63000 restriction of hazardous substances
Product certifications	UL United States Standards – Listed – UL 61800-5-1 – file E5231214 UL Canadian National Standards – Listed – CSA 22.2 – file E5231214
CE marking	Some Clean Power VFDs are marked according to the European low voltage (2014/35/EU), Electromagnetic Compatibility (2014/30/EU), Ecodesign (2019/1782/EC), and Restriction of Hazardous Substances (2011/65/EU) directives

# Communications Network

## 2 integrated Ethernet ports

The Clean Power VFD is equipped with advanced communication features to integrate seamlessly into industrial and building automation networks.

It includes dual-port Ethernet supporting **EtherNet/IP**, **Modbus TCP** and **BACnet/IP**, providing flexible connectivity for a wide range of applications.

EtherNet/IP and Modbus TCP enable real-time data exchange with controllers and SCADA systems, allowing monitoring of key parameters such as current, voltage, speed, and fault status. Engineers can remotely control the drive, adjust speed references, and access diagnostic information directly over the network.

For building automation, native BACnet/IP support simplifies integration into BMS environments. The drive implements standard BACnet objects—including Device, Binary and Analog Inputs/Outputs, and Value objects—providing comprehensive control and monitoring capabilities.

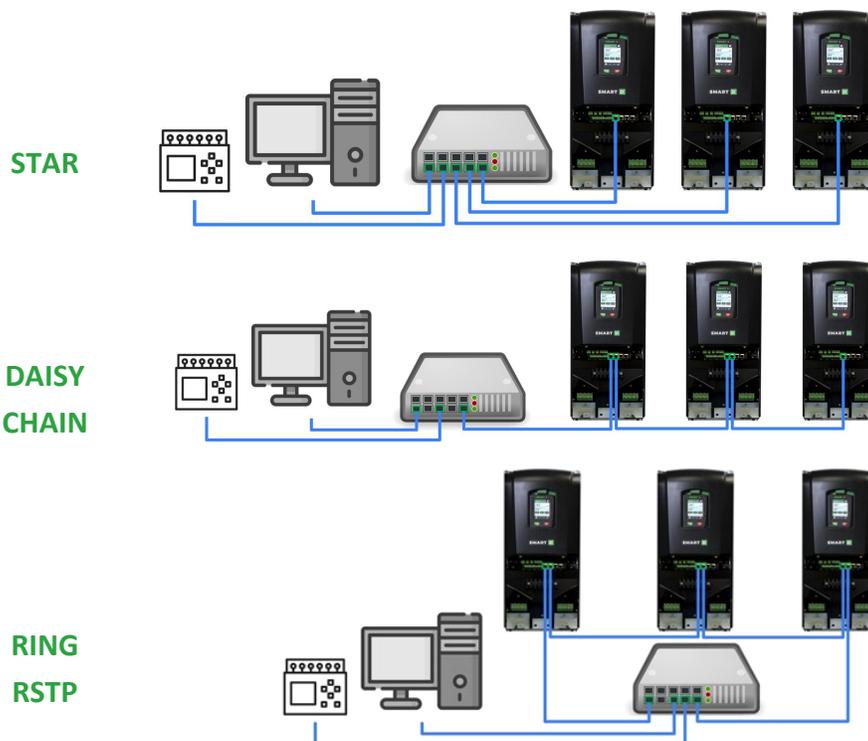
All network parameters—such as IP addresses, subnet masks, gateways, and protocol-specific settings—are fully configurable via the drive’s HMI or network menus, enabling precise adaptation to any system architecture.

### Network Topologies

The Clean Power VFDs can be implemented into **Star** topology, **Daisy Chain** topology, or **Ring RSTP** topology. The star topology provides centralized management, easier troubleshooting, and higher reliability since a single VFD failure won’t disrupt the entire network.

Daisy Chain topology is a cost-effective and simple option, daisy chaining allows easy expansion by adding VFDs in sequence.

The ring RSTP topology is more reliable than the daisy chain topology, if one VFD fails, the other VFDs can still reach by traveling in the opposite direction. It is easy to expand by adding new VFDs into the ring.



## Main Functions

### Main Functions of the Clean Power VFD



#### Control Modes

Supports V/f control and Indirect Field-Oriented Control (Vector control) for high-performance torque and speed regulation.

#### Acceleration & Deceleration

Programmable linear or multi-segment ramps, user-configurable up to 3600 s for precise process adaptation.

#### Low-Speed Torque Compensation

Ensures stable torque output at low frequencies, improving motor performance in demanding low-speed applications.

#### Slip Compensation

Automatically adjusts output frequency to maintain motor speed under varying load conditions.

#### Speed Setting Methods

Speed reference can be configured in RPM or Hz. Sources include analog inputs, preset speeds (up to 8 steps), communication protocols (e.g. Modbus), integrated HMI, or mobile app connectivity.

#### Control Source Selection

Flexible switching between local (keypad or HMI) and remote (external inputs or network) control.

#### PID Control

Integrated PID regulator for process control, enabling direct regulation of parameters like pressure, flow, or temperature.

#### HVAC Fan & Damper Control

The Clean Power VFD provides natively a simple fan and damper control logic using its embedded I/Os

#### Emergency Fire Mode

Force the motor to run at a predefined speed during a fire event, overriding normal controls to keep critical systems like smoke extraction fans operational

#### Low Voltage Ride Through (LVRT)

LVRT allows to keep running during short voltage dips, preventing process interruptions. It uses the motor's inertia to power the drive's electronics and is available in VELOCITY\_FOC and TORQUE\_FOC modes.

#### Automatic Restart

Configurable auto-restart function after power loss or fault clearance for uninterrupted operation.

#### Motor Parameter Auto-Tuning

Performs automatic motor identification to optimize drive performance and efficiency.

#### Metrics

The Clean Power VFD tracks key metrics like motor starts, motor runtime, VFD runtime, and fans runtime, helping users plan maintenance and ensure reliable operation

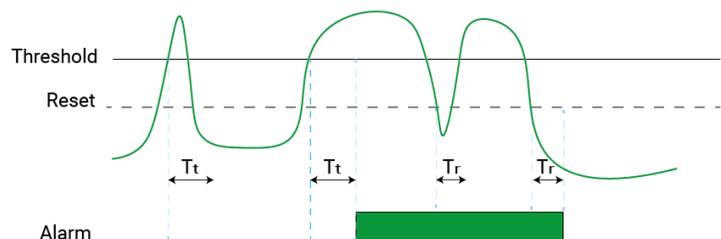
## Main Functions

### Key protections and alarms

The Clean Power VFD integrates a comprehensive suite of alarms and protective functions to maintain system integrity and prevent damage under fault conditions. These protections continuously monitor parameters such as phase currents, DC bus voltage, thermal status, and load behavior. When thresholds are exceeded—due to conditions like overcurrent, undervoltage, thermal overload, or phase loss—the drive responds with warnings, controlled shutdowns, or immediate trips to safeguard both the power electronics and connected motors. This proactive approach minimizes unplanned downtime, enhances operational reliability, and ensures the drive operates within its specified performance envelope.

Alarm / Protection	Description
<b>Unbalanced Current Deviation</b>	Detects significant current differences between motor phases to prevent overheating damage.
<b>Overcurrent Protection</b>	Activates when motor current exceeds rated limits, immediately halting output to safeguard both motor and drive.
<b>Undercurrent/Load Loss Protection</b>	Triggers if current drops below the expected level—indicating motor disconnection or no-load conditions—and stops the drive.
<b>Overvoltage Protection</b>	Engages when the DC bus exceeds safe voltage levels (e.g. during rapid deceleration), avoiding damage or trip events.
<b>Undervoltage Protection</b>	Prevents operation under low-voltage conditions that could cause stalling or circuit failure.
<b>Drive Overtemperature Protection</b>	Monitors internal temperature and shuts down the VFD if overheating risk is detected.
<b>Motor Overtemperature</b>	Uses external sensors to stop the VFD if the motor overheats.
<b>Phase Loss Protection</b>	Detects a missing phase supply and trips to prevent motor damage due to imbalanced or absent supply.
<b>Short Circuit Protection</b>	Instantly cuts power if a short appears between phases or to ground, safeguarding the VFD's power electronics.
<b>Stall/Overload Protection</b>	Stops output if the motor stalls or draws excessive torque over time, protecting mechanical components and drive.

An alarm triggers only if a monitored parameter exceeds its threshold for longer than the trigger delay ( $T_t$ ), filtering out brief transients. Similarly, the alarm resets only if the parameter returns below the reset threshold for longer than the reset delay ( $T_r$ ), avoiding false resets from short-duration fluctuations.



# Main Applications

## Pumps

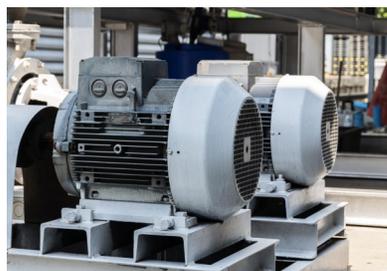
Applications	Market Segment	Benefits from using VFDs	Why the Clean Power VFD stands out.
Water Supply & Distribution	Water & Wastewater Treatment, Municipal Infrastructure	Energy savings , precise pressure control, reduced water hammer, extended pump life.	Utility-grade sine-wave at the motor terminals – no dV/dt filters, no shielded-cable headaches. 98 %-efficient SiC inverter runs cool and silent, shrinking the panel by 50 %. Built -in AFE holds unity PF and recovers braking energy, so you slash both energy and demand charges while keeping pump bearings happy for years.
Sewage & Wastewater Treatment	Water & Wastewater Treatment	Optimised aeration, smoother flow	Eliminates motor insulation stress, bearing damage, and electrical noise due to pure sine wave. Enhances efficiency, reduces energy costs, and minimizes downtime.
HVAC Chilled/Hot/Condenser Water Circulation	Commercial & Residential Buildings (HVAC), Data Centers, Hospitals	Energy savings by matching flow to cooling/heating demand, precise temperature control, reduced noise, extended pump and chiller life.	Pure sine output lets you run long cable without bulky reactors , simplifying wiring and reducing footprint. Regenerative braking reclaims energy.
Oil & Gas Pumping (Crude, Refined Products)	Oil & Gas	Energy efficiency in pipeline transport and processing, precise flow control, reduced wear on pipes and valves, enhanced safety.	Prevents equipment damage from harmonic distortion, leading to extended equipment life.

### Water and wastewater



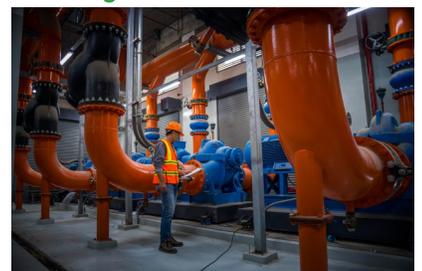
Pumps for intake, boosting, lifting, aeration blower, ...

### Oil & Gas



Pumps for injection, pipeline transfer, loading and unloading, ...

### Buildings



Fluid circulating and boosting, fire sprinkler pressure control, ...

# Main Applications

## Pumps

Applications	Market Segment	Benefits from using VFDs	Why the Clean Power VFD stands out.
Chemical Fluid Transfer & Mixing	Chemical & Petrochemical	Precise flow and dosage control, energy savings in variable processes, reduced cavitation, improved product quality.	Clean-Power THDi < 3 % prevents issues that upsets analyzers and PLCs. Filter-less topology frees floor space.
Food & Beverage Process Pumping	Food & Beverage	Hygienic flow control, energy efficiency for different product viscosities, reduced product degradation from less agitation, extended pump life.	Maintains stable power quality, crucial for consistent product quality and system reliability. Smooth sine-wave means zero micro-pitting and cooler motor casings – less risk of lubricant migration into product.
Mining Slurry & Dewatering Pumps	Mining & Metals	Energy savings for varying slurry densities and water levels, reduced erosion on pump components, improved process stability.	Cable-length freedom lets you mount drives safely topside while motors work in the pit. , and harmonic-free output stops premature stator failures.
Agriculture Irrigation Pumps	Agriculture	Optimized water delivery based on crop needs and soil conditions, substantial energy savings, reduced wear on irrigation systems.	High efficiency plus unity PF slashes diesel-gen oversizing and solar array costs. No filters = fewer enclosure penetrations for field rodents or moisture.
Boiler Feed & Circulation Pumps	Power Generation	Precise control of water flow for optimal boiler efficiency, energy savings, reduced thermal stress on boiler components.	Protects motors from harmful electrical stresses, extending their operational life.

### Agriculture



Pumps for well lifting, draining, slurry, ...

### Mining



Dewatering, raw water supply, ...

### Power Generation



Circulation pumps

# Main Applications

## Fans & Blowers

Applications	Market Segment	Benefits from using VFDs	Why the Clean Power VFD stands out.
HVAC Air Handling Units (AHUs), Supply/Return Fans	Commercial & Residential Buildings, Data Centers, Hospitals	Significant energy savings, precise temperature and humidity control, improved indoor air quality, reduced noise, extended fan life.	Pure sine wave output means no need for output filters, saving space and cost. Improves power factor. And wipes out acoustic whining often blamed on VFDs.
Industrial Exhaust & Ventilation Fans	Manufacturing, Mining & Metals, Chemical, Food & Beverage	Energy savings by matching ventilation to contaminant levels/heat load, improved air quality for worker safety, reduced noise.	Contributes to a cleaner electrical environment, beneficial for sensitive industrial equipment.
Cooling Tower Fans	Power Generation, Commercial Buildings (HVAC), Chemical	Energy savings by matching cooling capacity to load, optimized condenser pressure, reduced water evaporation, extended fan and motor life.	Reduces motor stress and heat, leading to longer fan and motor lifespan. No common-mode spikes= bearings last longer despite humid drift. Unity PF ends "kVAR" penalty headaches at peak summer load.
Boiler Draft Fans (Forced, Induced, Primary Air)	Power Generation, Pulp & Paper	Precise control of combustion air for optimal boiler efficiency and emissions control, significant energy savings.	Enhanced energy efficiency through regenerative braking and unity power factor.
Dryer & Kiln Fans	Pulp & Paper, Cement, Food & Beverage	Energy efficiency in drying processes, precise control over drying rates, improved product consistency.	Maintains optimal performance and reduces downtime by protecting equipment from electrical disturbances.

### Power Generation



Cooling fans, ventilation, extractors ...

### Cement



Kiln fans, Clinker cooler ...

### Datacenter



Exhaust, pressurization CRAC&CRAH cooling, ...

# Main Applications

## Compressors

Applications	Market Segment	Benefits from using VFDs	Why the Clean Power VFD stands out.
HVAC Centrifugal Chillers (Compressor Drive)	Commercial Buildings (HVAC), Data Centers, Hospitals	Major energy savings, especially at part-load conditions (chillers spend most time at part load), precise temperature control, extended compressor life, reduced maintenance.	“Motor-sees-mains” waveform extinguishes bearing currents that ruin oil-film compressors. 50 % smaller footprint eases retrofit into existing chiller panels; regen offsets fast unload cycles.
Industrial Air Compressors (Rotary Screw, Centrifugal)	Manufacturing, Automotive, General Industrial	Energy savings by matching air output to demand, stable air pressure, reduced idle time and associated energy waste, extended compressor life.	Harmonic-free input current ends the need for oversized transformers. Pure-sine output keeps idler motors cool.
Gas Compressors	Oil & Gas	Energy efficiency in gas processing and transport, precise flow and pressure control, reduced mechanical stress on the compressor.	High reliability and reduced maintenance needs due to elimination of common VFD-related issues. Protects process motors deep in the field – install once, forget filters forever.

### Hospitals



HVAC centrifugal chillers

### Oil & Gas



Gas compression station

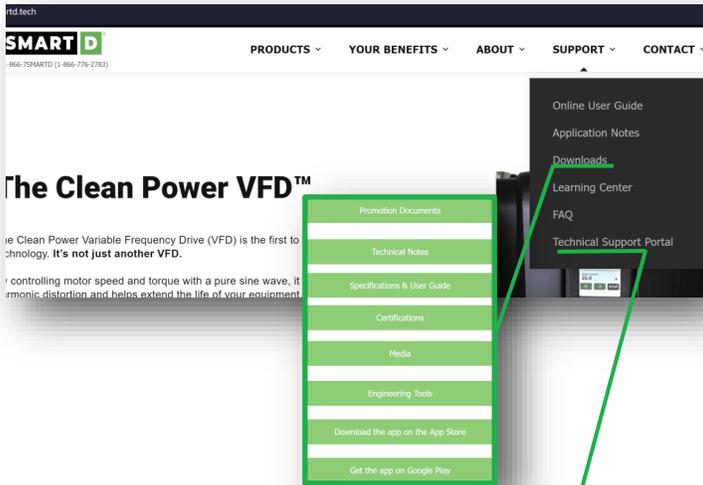
### Manufacturing



Air compressor

## How to find and download Smartd resources ?

Path: <https://smartd.tech/smartd-downloads-resources-you-need/>

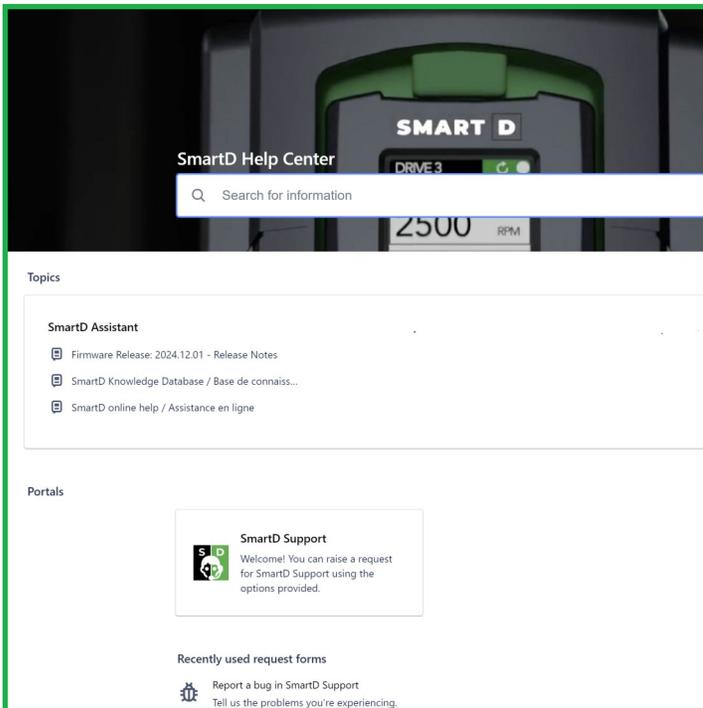


Access a wide range of resources in the download area, including:

- **Promotional assets:** Find catalogs to help with product selection, as well as promotional leaflets and brochures.
- **Technical notes:** Download detailed information on specific technical topics and concepts.
- **Product documentation:** Get product datasheets, engineering specifications, and user guides.
- **Certifications:** Access certifications applicable to your variable frequency drives.
- **Articles and whitepapers:** Explore articles and in-depth whitepapers to learn about the full benefits of the Clean Power VFD.
- **Mobile app and CAD files:** Get everything you need to build, configure, control, and monitor your SmartD VFDs on the go with our mobile app, along with downloadable CAD files.

## Your Gateway to personalized support?

Path: <https://smartd.tech/technical-support-portal-smartd-technologies/>



Unlock expert assistance and tailored resources with the **SmartD Help Center**—designed to support you at every step of your SmartD VFD journey.

- **Firmware Updates:** Access the latest firmware to keep your systems running smoothly.
- Access a wealth of **technical resources** and receive real-time, personalized assistance to help you with any issues .
- **SmartD Support:** Submit and track support requests easily, ask for new features and enhancements.

### How to Get Started ?

To experience personalized support, simply create an account. Once registered, you'll have access to:

- In-depth technical documentation and release notes.
- Customized help tailored to your specific needs.
- Direct communication with our SmartD experts for faster problem-solving.

**Sign up today** and make the most of the SmartD Help Center—**your gateway to personalized support** for all things SmartD VFD!





**support@smartd.tech**

1-866-7-SMART-D

**Access the online help:**

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