MEAN WELL VFD-200C-230 200W General Type Variable Frequency Drive User Manual

Contents

MEAN WELL VFD-200C-230 200W General Type Variable Frequency Drive

Product Information

Specifications

- **Model:** VFD-200C-230
- **Output Voltage:** 0~240V (Three phase line-to-line)
- **Input Voltage Range:** 90~264Vac
- **Output Capacity:** 200W
- **Rated Current:** 0.8A
- **Peak Current:** 1.6A
- **Efficiency:** DC Bus Voltage
- **Input Frequency Range:** 47~63Hz
- **Power Factor:** PF>0.99/115VAC, PF>0.93/230VAC at full load
- **Rated Input Current:** 2A/115VAC, 1.1A/230VAC
- **Inrush Current:** Cold start 50A
- **Leakage Current Inverter PWM Input:** High(2.6V), IGBT OFF: Low(3V), Abnormal: Low(3V, Abnormal < 0.5V)

Description

VFD-200C-230 is a variable frequency drive that can be controlled with an external PWM controller. The input range is from 90VAC to 264VAC, which is suitable for all kinds of installations. VFD-200C-230 is able to deliver 200% peak load and with its fanless design, the lifetime can be extended. It is suitable for three-phase motor drives, such as BLDC, Induction motor, SynRM applications.

Applications

- HVAC

- Fan
- Pump
- Automatic door
- Air condition
- Conveyor
- Medical device
- Fitness equipment

Product Usage Instructions

Step 1: Installation

1. Ensure that the input voltage range of the VFD-200C-230 matches your power supply.
2. Mount the VFD-200C-230 in a suitable location, following the recommended safety guidelines and electrical regulations.
3. Connect the three-phase line-to-line output voltage to your motor.
4. Connect the AC input to your power supply.

Step 2: Control Setup

To control the VFD-200C-230, follow these steps:

1. Obtain an external PWM controller compatible with the VFD-200C-230.
2. Connect the PWM controller to the VFD-200C-230 using the provided control interface.
3. Configure the PWM controller according to your desired motor control method (e.g., SPWM or SVPWM).

Step 3: Motor Operation

- Once the installation and control setup are complete, you can operate your motor using the VFD-200C-230.
- Use the connected external PWM controller to adjust the motor speed and other parameters as needed.

FAQ

- **Q:** What is the input voltage range for the VFD-200C-230?
  - **A:** The input voltage range for the VFD-200C-230 is 90~264Vac.
- **Q:** Can the VFD-200C-230 be used with a BLDC motor?
  - **A:** Yes, the VFD-200C-230 is suitable for use with BLDC motors, as well as Induction motors and SynRM applications.
- **Q:** What protections are provided by the VFD-200C-230?
  - **A:** The VFD-200C-230 provides protections against short circuit and overcurrent.

Features

IEC61800-5-1 BS EN/EN61800-5-1 TPTC004

- 90~264 Vac input, built-in PFC function
- Controllable with external controller
- Fanless design for no-noise and expanding life cycle
- High surge current 200% up to 5 seconds
- **Protections:** Short circuit/OCP
- **Provided multiple sensors for control:**
  - Current sensor- motor torque control
  - DC bus voltage sensor- OVP/UVP
  - Temperature sensor – OTP
- -30~+70 C wide operating temperature
- Suitable for three phase motor drive (BLDC, Induction motor, SynRM)
- 3 years warranty

Applications

- HVAC
- Fan
- Pump
- Automatic door
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- Medical device
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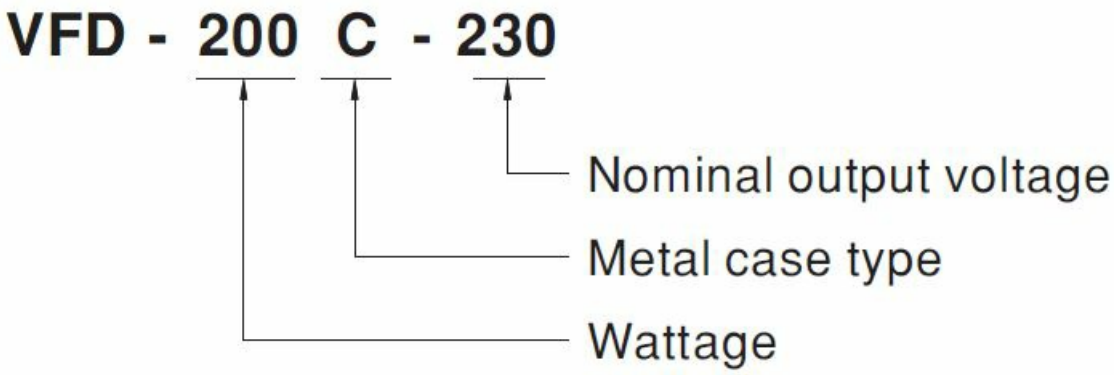
GTIN CODE

- **MW Search:** https://www.meanwell.com/serviceGTIN.aspx

Description

VFD-200C-230 is a variable frequency drive that can be controlled with external PWM controller. The input range is from 90VAC to 264VAC which is suitable for all kinds of installation. VFD-200C-230 able to deliver 200% peak load and with fan-less design, the life time can be extended. VFD is suitable for three-phase motor drive, such as BLDC, Induction motor, SynRM applications.

Model Encoding



SPECIFICATION

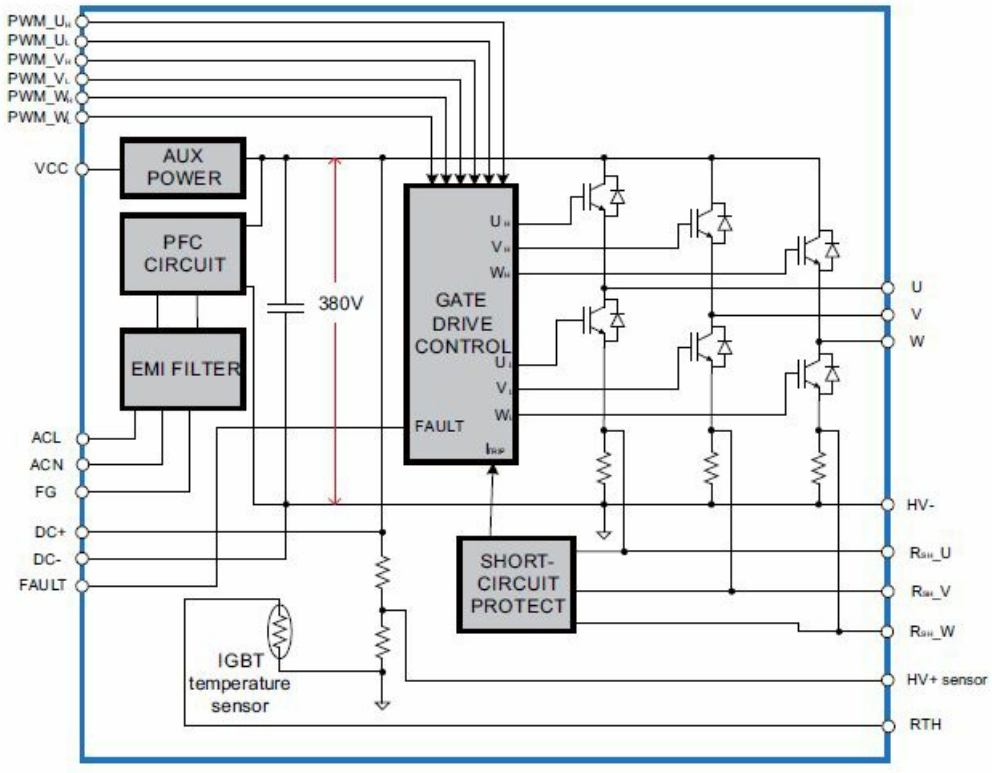
MODEL NO.		**VFD-200C-230**
OUTPUT	**VOLTAGE RANGE(UVW) Note.1**	Three phase line-to-line 0~240V, suit for 200-240V class motor
	OUTPUT CAPACIT Y	200W
	RATED CURRENT	0.8A
	PEAK CURRENT Note.2	1.6A
	EFFICIENCY Note.3	92%
	DC BUS VOLTAGE	380±5VDC
INPUT	**RATED INPUT VOL TAGE**	90 ~ 264Vac
	INPUT FREQUENC Y RANGE (Hz)	47 ~ 63Hz
	POWER FACTOR (T yp.)	PF>0.99/115VAC, PF>0.93/230VAC at full load
	RATED INPUT CUR RENT	2A /115VAC 1.1A/230VAC
	INRUSH CURRENT	Cold start 50A
	LEAKAGE CURRENT	<2mA/240VAC

FUNCTION **(Note.5)**	**INVERTER PWM INPUT**	PWM control signal input for driving inverter IGBTs. (PIN8~13 of CN93) TTL input : IGBT ON: High(>2.6V); IGBT OFF: Low(<0.8V) ; Iin =2mA		
	FAULT SIGNAL	Inverter fault signal(Short circuit/OCP, PIN7 of CN93). TTL input: Normal: High(>3V); Abnormal: Low(<0.5V)		
	DC BUS VOLTAGE SENSOR	DC BUS voltage sensor output(HV+ sensor, PIN1 of CN93): 2.5V@DC BUS 380V		
	THREE PHASE CURRENT SENSOR	Built-in 100mΩ low-side shunt resisor (each phase), (PIN4~6 of CN93)		
	THERMAL SENSOR	Built-in 10KΩ NTC for sensing IGBTs operating temperature. (TSM2A103F34D1R (Thinking Electronic), PIN2 of CN93)		
	AUXILIARY POWER VCC	Non-isolated 15V output power for user's application. Max current : 0.1A, Ripple:1V		
PROTECTION	**SHORT CIRCUIT**	Protection type : Shut down o/p voltage, re-power on to recover		
OUTPUT FREQUENCY	**SWITCHING FREQUENCY RANGE**	2.5KHz ~ 15KHz		
ENVIRONMENT	**COOLING SYSTEM**	Air convection		
	WORKING TEMP.	-30 ~ +70℃ (Refer to "Dreating Curve")		
	WORKING HUMIDITY	20 ~ 90% RH non-condensing		
	STORAGE TEMP., HUMIDITY	-40 ~ +85℃, 10 ~ 95% RH non-condensing		
	VIBRATION	10 ~ 500Hz, 5G 10min./1cycle, period for 60min. each along X, Y, Z axes		
	SAFETY STANDARDS	CB IEC61800-5-1,TUV BS EN/EN61800-5-1,EAC TP TC004 approved		
	WITHSTAND VOLTAGE	I/P-FG:2KVAC		
	ISOLATION RESISTANCE	I/P-FG:100M Ohms/500VDC/25℃/ 70%RH		
		Parameter	**Standard**	**Test Level / Note**

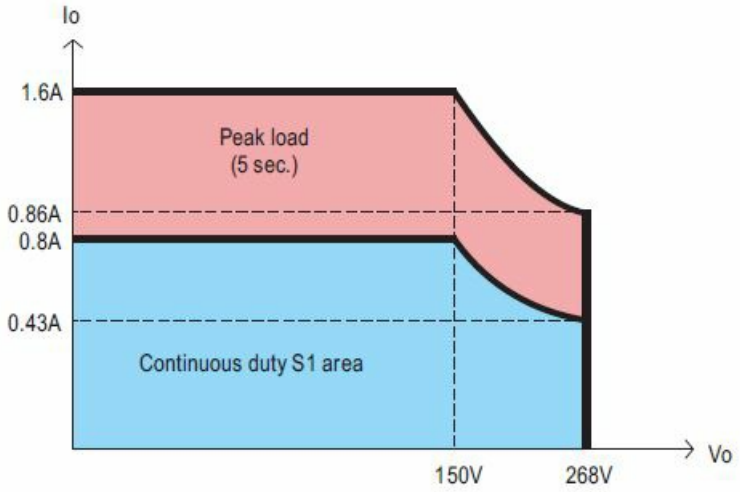
SAFETY & EMC	**EMC EMISSION**	Conducted	BS EN/EN IEC61800-3	Class A, C2
		Radiated	BS EN/EN IEC61800-3	Class A, C2
		Harmonic Current	BS EN/EN IEC61000-3-2	Class A
		Voltage Flicker	BS EN/EN61000-3-3	___
	EMC IMMUNITY	BS EN/EN IEC61800-3, second environment		
		Parameter	**Standard**	**Test Level /Note**
		ESD	BS EN/EN61000-4-2	Level 3, 8KV air ; Level 2, 4KV contact
		Radiated	BS EN/EN IEC61000-4-3	Level 3
		EFT/Burest	BS EN/EN61000-4-4	Level 3
		Surge	BS EN/EN61000-4-5	Level 3, 2KV/Line-Earth ; Level 3, 1KV/Line-Line
		Conducted	BS EN/EN61000-4-6	Level 3
		Magnetic Field	BS EN/EN61000-4-8	Level 4
		Voltage Dips and Interruptions	BS EN/EN IEC61000-4-11	>95% dip 0.5 periods, 30% dip 25 periods, >95% interruptions 250 periods
		Voltage deviation	IEC 61000-2-4 Class 2	±10% Un
		Total Harmonic distortion (THD) Individual Harmonic orders	IEC 61000-2-4 Class 3 IEC 61000-4-13 Class 3	THD 12 %
		Frequency variations	IEC 61000-2-4	±4%

		Frequency rate of change	IEC 61000-2-4	2%/s
OTHERS	**MTBF**	2568.7K hrs min.Telcordia SR-332 (Bellcore) ; 203.8K hrs min.MIL-HDBK-217F (25℃)		
	DIMENSION (L*W*H)	146*55*26mm		
	PACKING	0.31kg; 40pcs/13.3kg/0.87CUFT		
NOTE	1. 3-phase 220V motor is recommended. Please consider the rated current when used for 100-120 V class motor. 2. Refer to peak load usage definition. 3. Efficiency is tested by 200W with 150VAC output line-to-line voltage. 4. All parameters NOT specially mentioned are measured at 230VAC input, rated load and 25℃ of ambient temperature. 5. Please refer to page 4 for more details. ※ Product Liability Disclaimer For detailed information, please refer to **https://www.meanwell.com/serviceDisclaimer.aspx**			

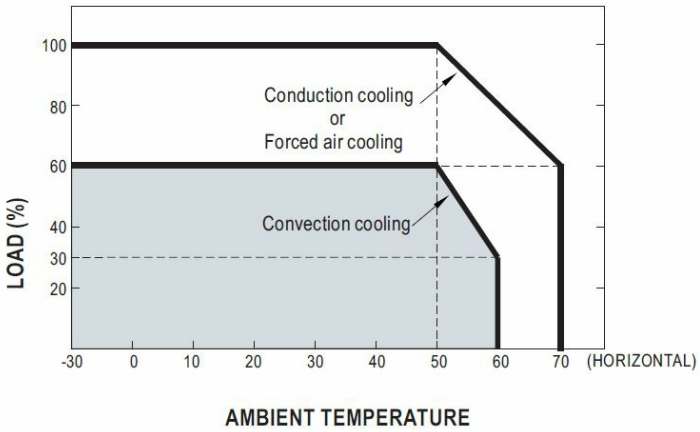
Block Diagram

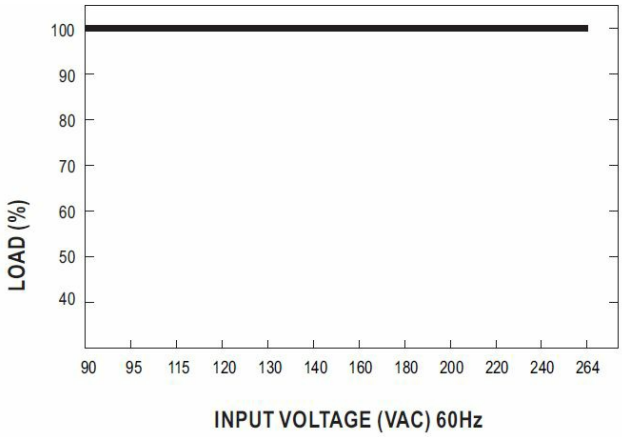


V/I CURVE

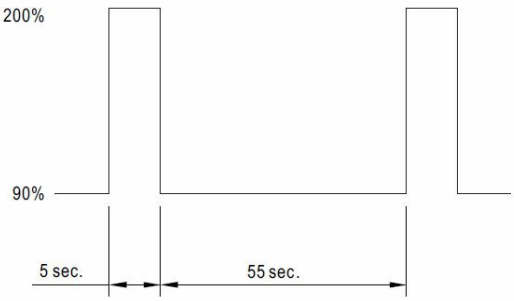


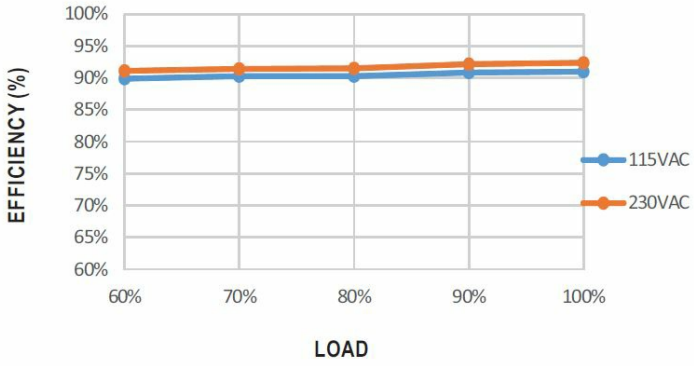
Derating Curve / Output Derating VS Input Voltage





Peak Load / Efficiency vs Load

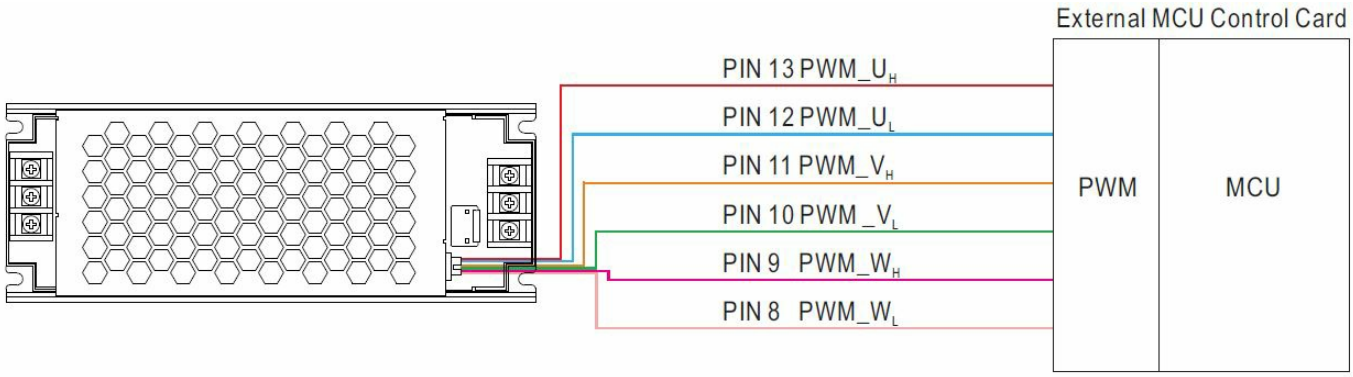




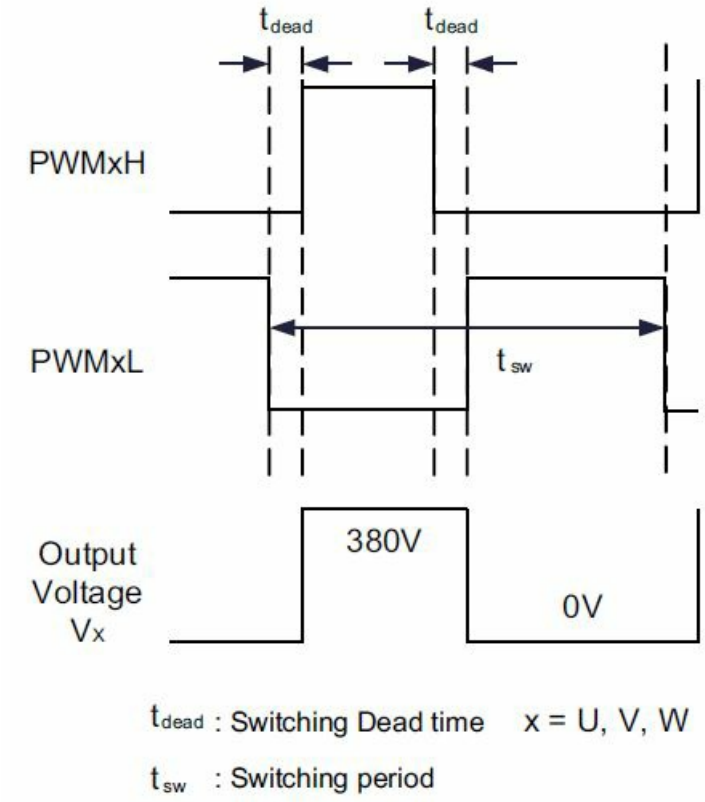
Function Manual

3-phase PWM Control

- VFD-200C-230 provides six-switch circuit by using 3 half-bridge IGBTs. IGBTs of each phase is controlled by PWM_U,/U, PWM_V,/V, and PWM_W,/W, (PIN 8~13).
- The input requirement for PWM is compatible with both TTL and CMOS 3.3V signals. Please refer to the diagram below.



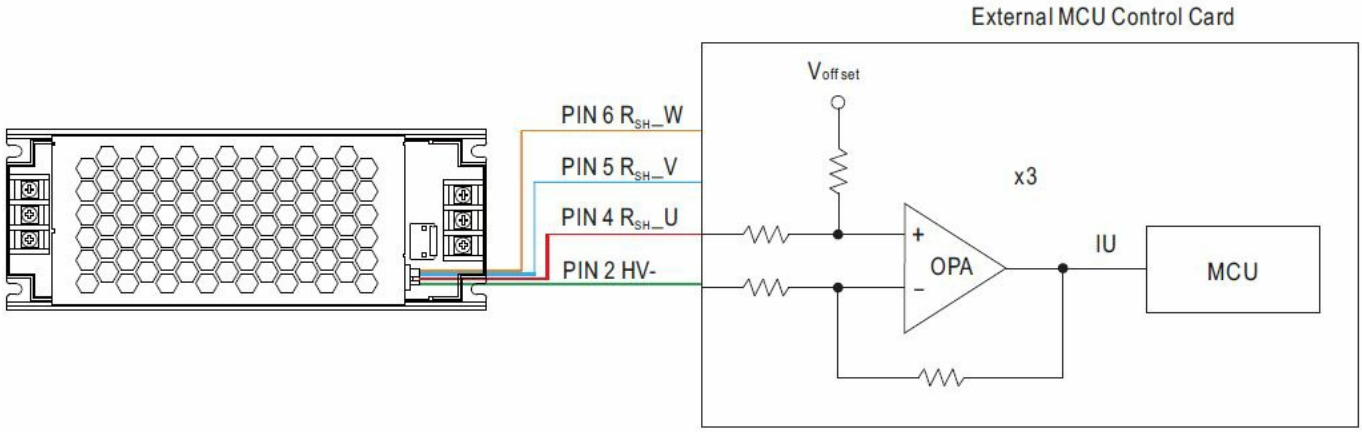
WARNING: It is necessary to keep minimum dead-time 300ns between the upper and lower switch of each phase.



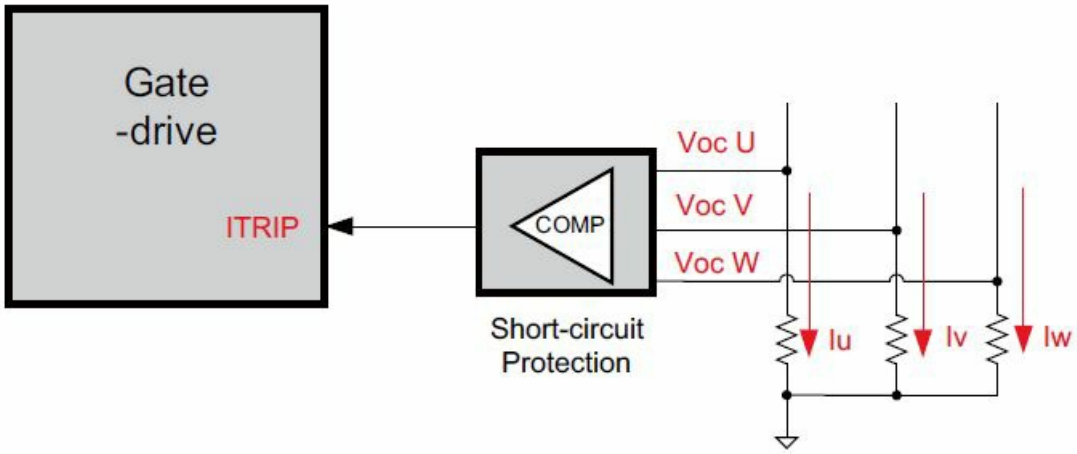
- **t dead (Min.):** 300ns

DC bus current Detection & Overcurrent Protection

- Low-side shunt resistors are installed on each phase of VFD-200C-230 for current measurement and short-circuit detection.
- It's suggested to shorten the length of external detection circuit and detect the signal with a OPAs. Please refer to diagram below.

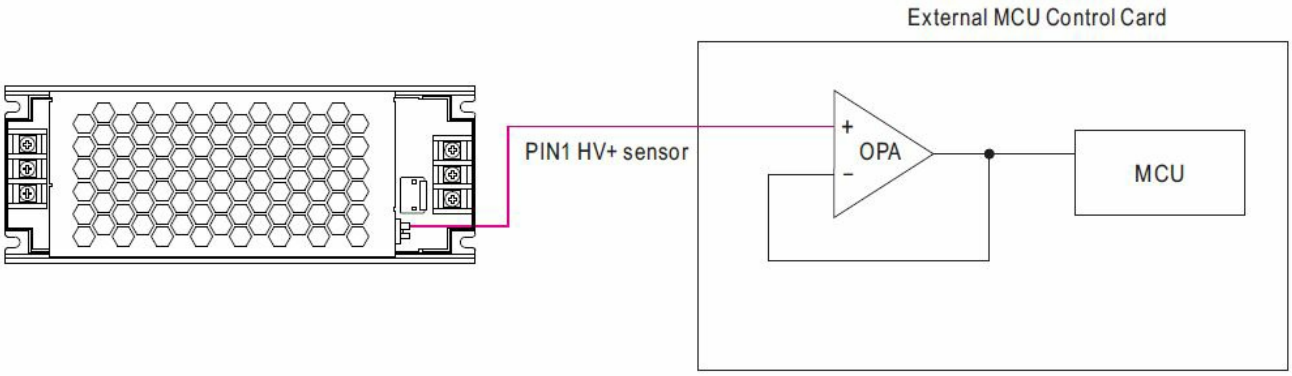


- If output current exceed 200% of rated value, the protection circuit will be triggered and shut down the gate driver for protection.



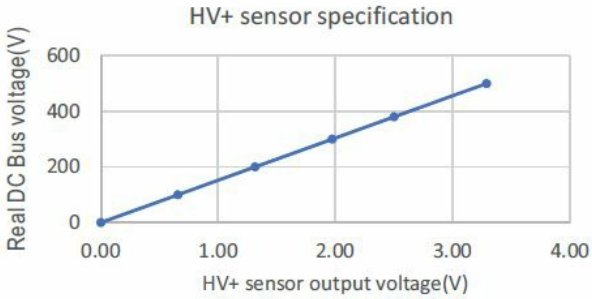
DC BUS Voltage Detection

VFD-200C-230 is built-in with DC bus voltage sensor(HV+ sensor, PIN 1). Refer to the recommended circuit. The sensor can provides a 2.5V output when DC bus voltage is at 380V. It's suggested to detect the signal by OPAs. When the voltage of the DC bus exceed 420V, the PWM input signal must shut down for protection.

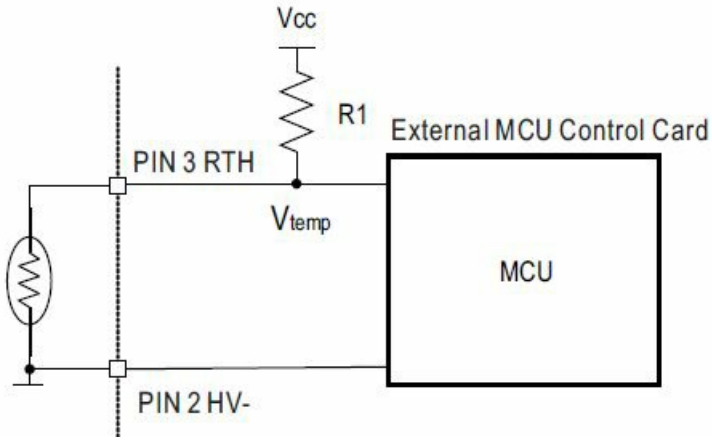


Equation for DC bus voltage calculation:

$$V_{DC\ BUS} = \frac{380 \times HV+sensor}{2.5}$$

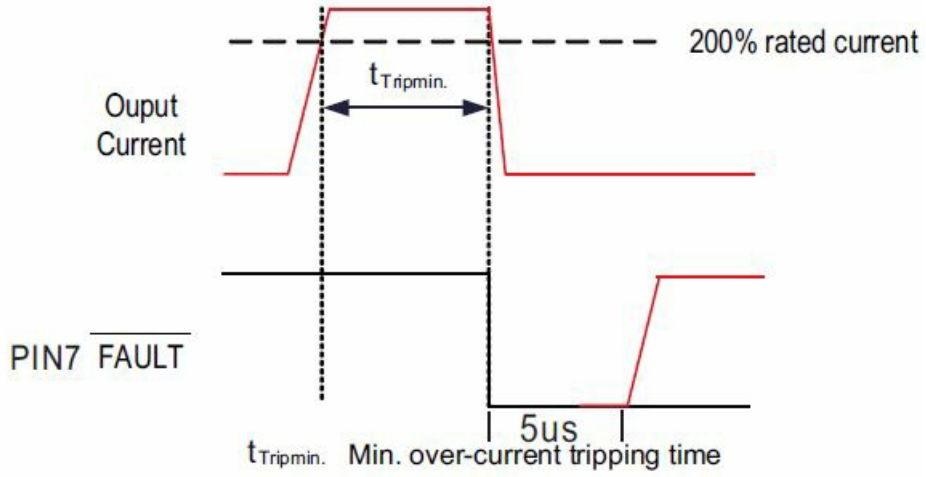


IGBT Temperature Detection



VFD-200C-230 is built-in a NTC resistor for detecting IGBTs temperature. Users can detect IGBTs temperature for protection. (NTC type: TSM2A103F34D1R, Thinking Electronic) The recommended detection circuit is below. It's suggested to shutdown the PWMs input, if the temperature is above 95°C.

Driver Fault signal

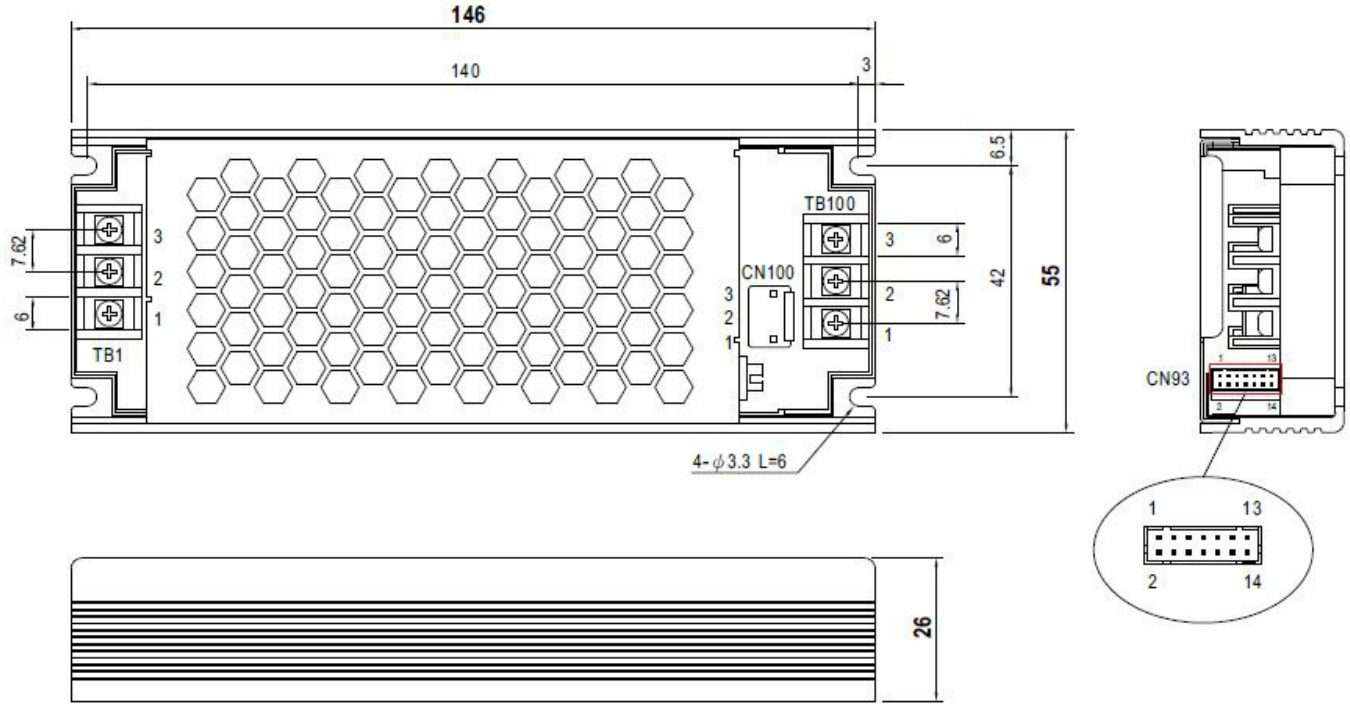


The FAULT signal would be active(active-low) to notify external controller or circuit, if VFD-200C-230 encounter the overcurrent state and keep the state for minimum overcurrent tripping time.

- **t Tripmin. (Max.):** 1us

Mechanical Specification

- **Case No.:** 249E
- **Unit:** mm



AC Input Terminal Pin NO. Assignment (TB1)

Pin No.	Assignment
1	AC/L
2	AC/N
3	⏚

Output Terminal Pin NO. Assignment (TB100)

Pin No.	Assignment
1	U
2	V
3	W

380V DC Bus Connector(CN100): JST B3P-VH or equivalent

Pin No.	Assignment
1	DC+
2	No Pin
3	DC-

- **Mating housing:** JST VHR or equivalent
- **Terminal:** JST SVH-21T-P1.1 or equivalent

CN100 is used for installing regenerative brake device, avoiding VFD-200C-230 damage.

Control Pin NO. Assignment (CN93): HRS DF11-14DP-2DS or equivalent

Pin No.	Assignment	Pin No.	Assignment
1	HV+ sensor	8	PWM_WH
2	HV-	9	PWM_WL
3	RTH	10	PWM_VH
4	RSH_U	11	PWM_VL
5	RSH_V	12	PWM_UH
6	RSH_W	13	PWM_UL
7	FAULT	14	VCC

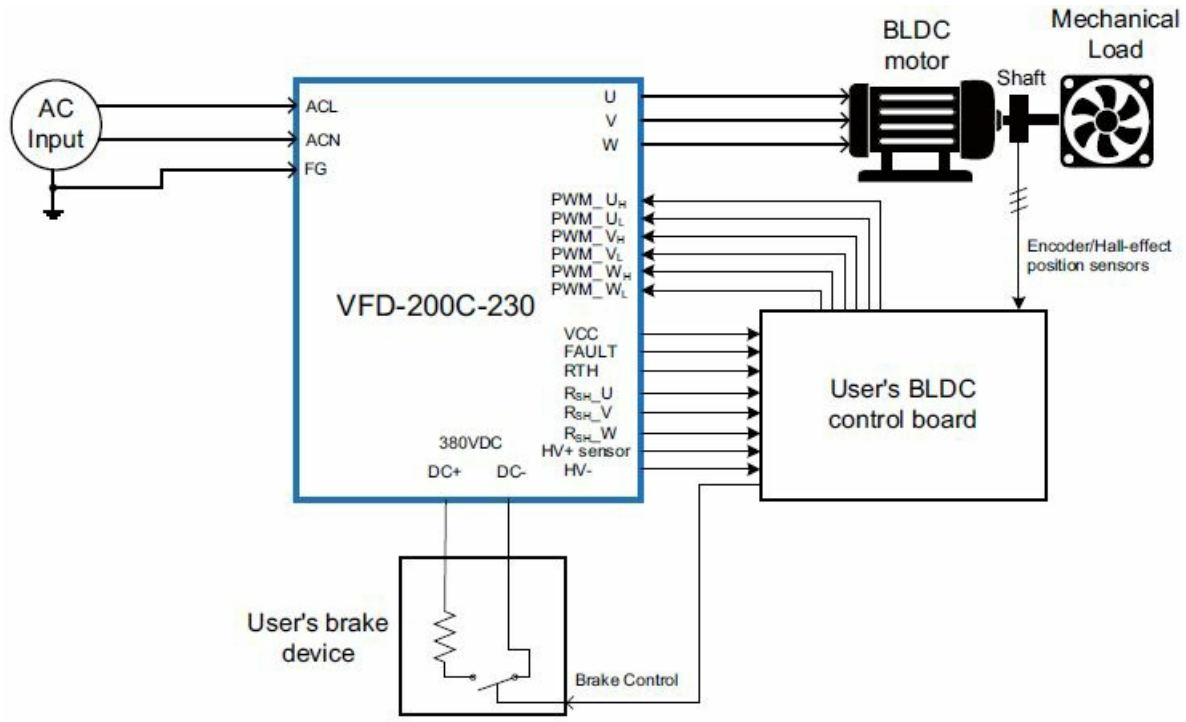
- **Mating housing:** HRS DF11-14DS or equivalent
- Terminal HRS DF11-**SC or equivalent

Control Pin No. Assignment(CN93)

Pin No.	Function	Description
1	HV+ sensor	DC BUS voltage sensor output 2.5V, reference to pin 2(HV-)
2	HV-	DC BUS voltage sensor output ground
3	RTH	Temperature sensor
4	RSH_U	U phase current sensor output
5	RSH_V	V phase current sensor output
6	RSH_W	W phase current sensor output
7	FAULT	Over current detection. Normal > 3V, Abnormal < 0.5V
8	PWM_WH	W phase high side logic input, on > 2.6V ; off < 0.8V
9	PWM_WL	W phase low side logic input, on > 2.6V ; off < 0.8V
10	PWM_VH	V phase high side logic input, on > 2.6V ; off < 0.8V
11	PWM_VL	V phase low side logic input, on > 2.6V ; off < 0.8V
12	PWM_UH	U phase high side logic input, on > 2.6V ; off < 0.8V
13	PWM_UL	U phase low side logic input, on > 2.6V ; off < 0.8V
14	VCC	Auxiliary voltage output 14.5~15.5V reference to pin(HV-). The maximum load current is 0.1 A

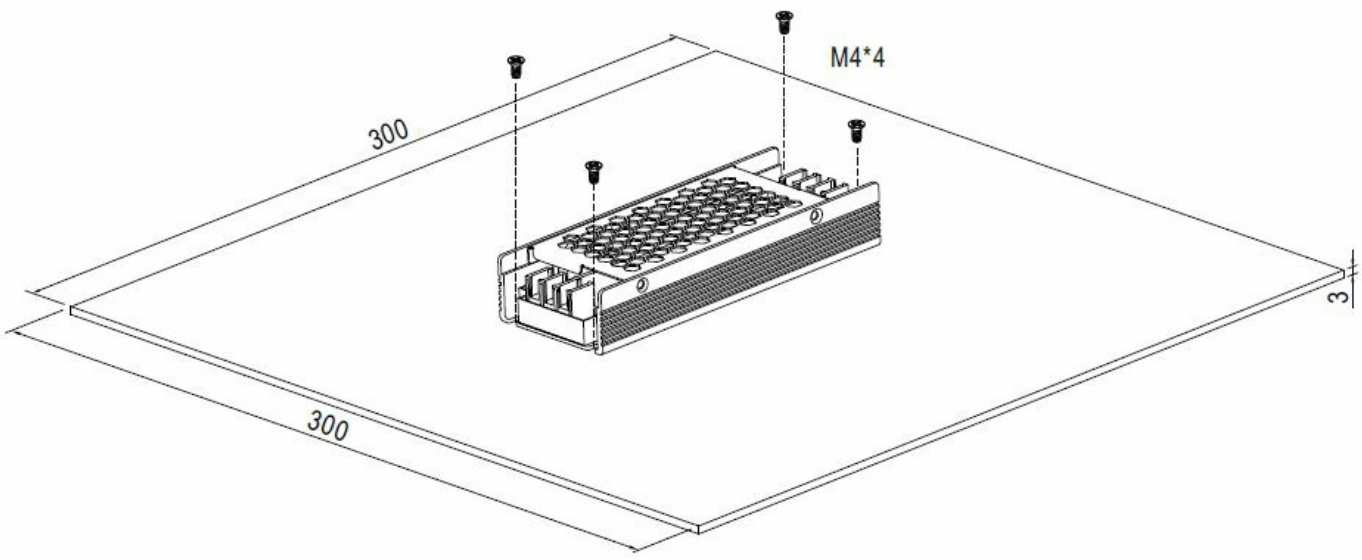
Application

Application example: BLDC drive application



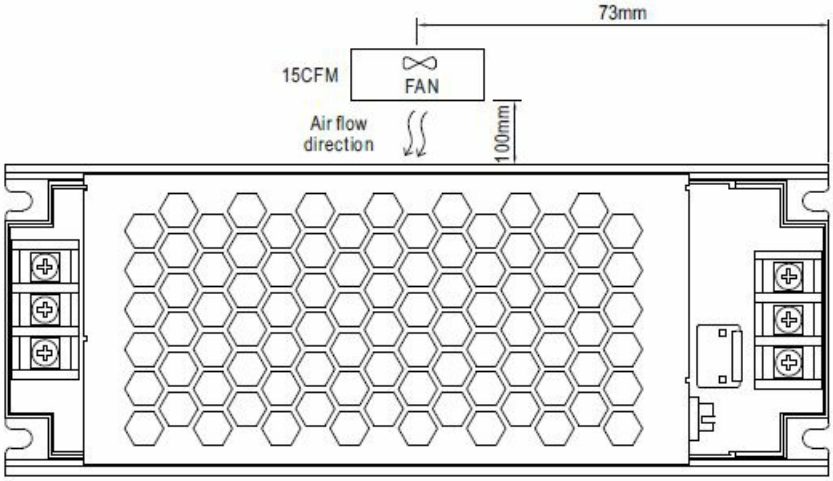
1. The figure shows the BLDC drive system which set up with VFD-200C-230.
2. Developers can control the PWM signal of 6-switch by using SPWM or SVPWM, etc. for 3-phase voltage modulation, and build the control method base on the current shunt sensors on 3-phase low-side switch(RSHU/V/W) and the DC BUS voltage sensor(HV+ sensor) which provided by VFD-200C-230.
3. Developers select the appropriate BLDC position sensors such as encoder or Hall-effect sensors to fit their applications.
4. It's suggested to install the brake circuit/device at the DC+/DC- pin(DC BUS) for avoiding the DC BUS OVP when BLDC is decelerating.
5. It's suggested to shut down the PWM input or connect to brake resistor device for safety when DC Bus voltage is higher than 420V.
6. If VFD-200C-230 were applied non-appropriate control, such as accelerating too quickly or bad current control, it might trig the VFD-200C-230's fault-state to shut down the output voltage(low-level on FAULT pin).

Operate with additional aluminum plate



In order to meet the“Derating Curve”and the “Static Characteristics” ,VFD series must be installed onto an aluminum plate(or the cabinet of the same size) on the bottom.The size of the suggested aluminum plate is shown as below. And for optimizing thermal performance, the aluminum plate must have an even and smooth surface (or coated with thermal grease), and VFD series must be firmly mounted at the center of the aluminum plate.

With 15CFM forced air

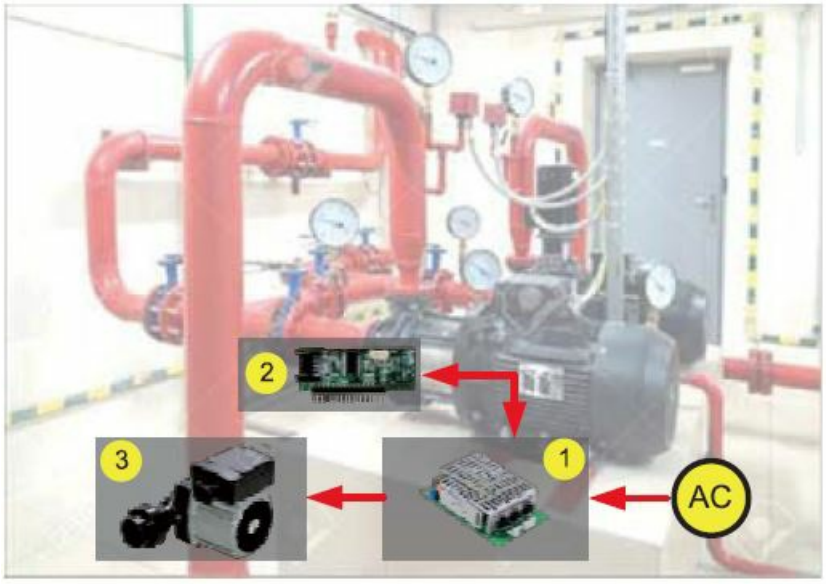


Accessory List

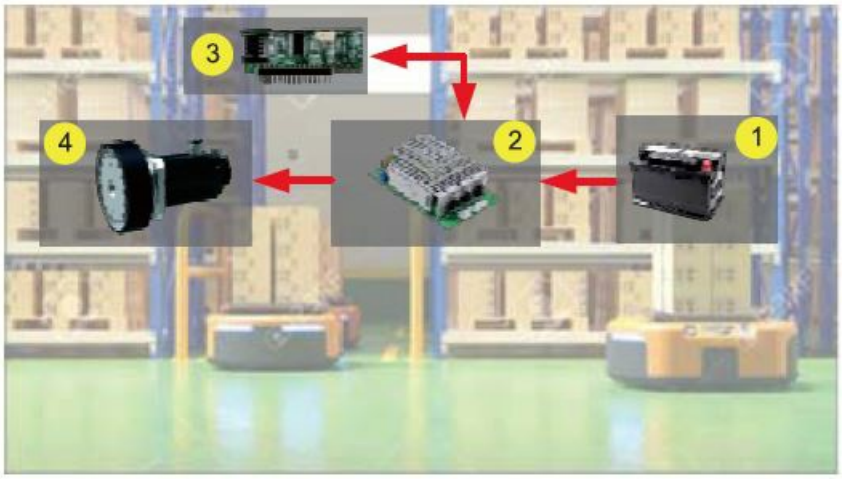
If you have any control requirement of a specific application, please consult MEAN WELL for more details.

MW’s order No.	Control Board	Assembly Suggestion	Quantity
VFD-CB (optional)			1

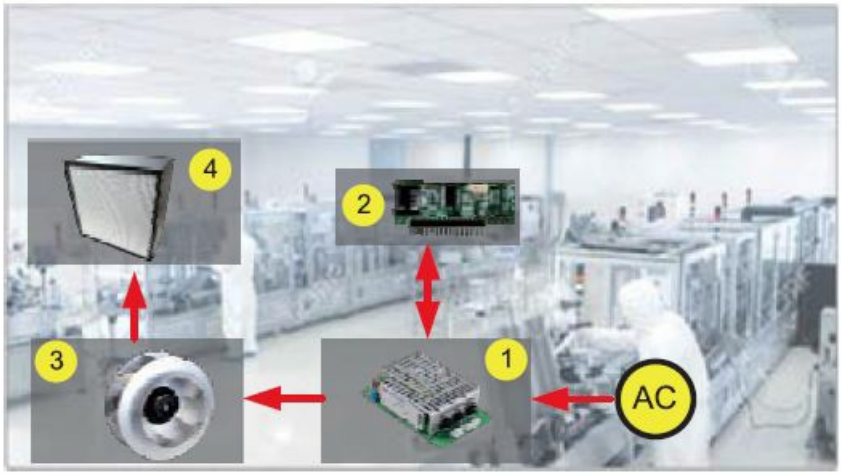
Typical Application



1. Variable Frequency Module (VFD series)
2. Control board of Variable Frequency Drive (Designed by User or Soluton Provided by MEAN WELL
3. Three-phase Pump Motor



1. Battery
2. Variable Frequency Module (VFD series)
3. Control board of Variable Frequency Drive (Designed by User or Solution Provided by MEAN WELL
4. Three-phase Wheel Motor for AGV Application



1. Variable Frequency Module (VFD series)
2. Control board of Variable Frequency Drive (Designed by User or Solution Provided by MEAN WELL
3. Three-phase Fan Motor
4. HEPA for Filtering Air

Installation Manual

- **Please refer to:** http://www.meanwell.com/manual.html

Documents / Resources

	MEAN WELL VFD-200C-230 200W General Type Variable Frequency Drive [pdf] User Manual VFD-200C-230 200W General Type Variable Frequency Drive, VFD-200C-230, 200W General Type Variable Frequency Drive, Type Variable Frequency Drive, Variable Frequency Drive, Frequency Drive

References

- TÜV Rheinland - Home | US | TÜV Rheinland
- Installation Manual-MEAN WELL Switching Power Supply Manufacturer
- Global Trade Item Number (GTIN)-MEAN WELL Switching Power Supply Manufacturer
- User Manual