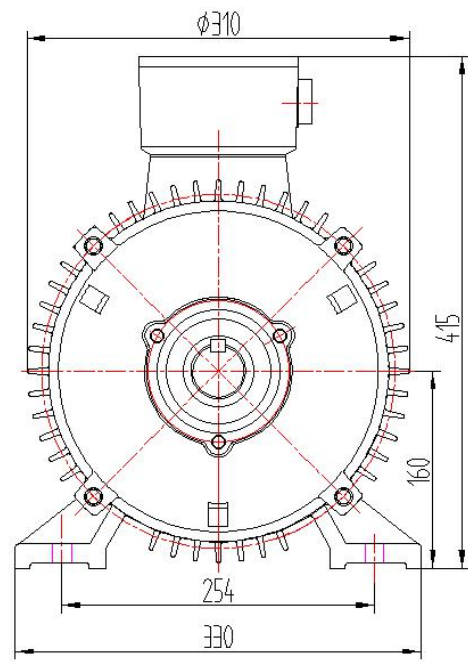
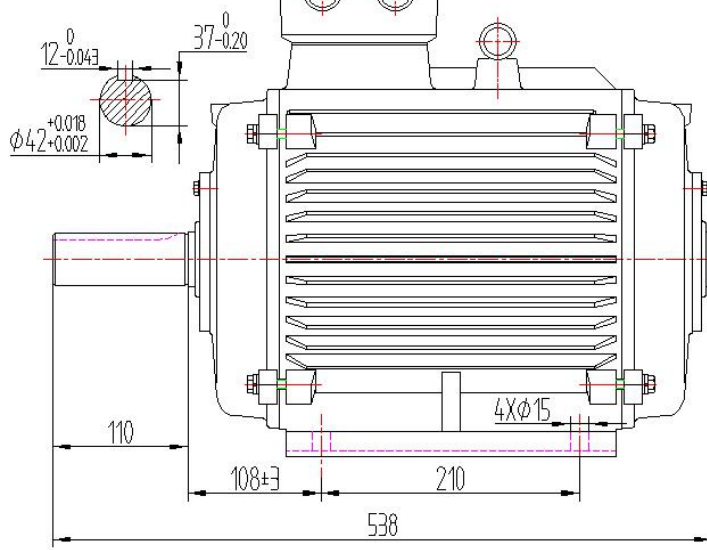


# **1. ANEXOS LOTE 1**

# **ANEXO 1.1**

## **GENERADOR ELÉCTRICO**

Main specifications for the Permanent Magnet Synchronous Generator	
Model	DMF-5
Rated power	5kW
Rated speed	350rpm
Rated voltage	48VAC
Rated current	6A
Phase number	3-phase
Numbers of Poles	16
Rated torque	148Nm
Startup torque	3Nm
Insulation Class:	H
Protection Class	IP54
Efficiency	92%
Power factor	0.97
Cooling	Natural air cooling
Ambient temperature	-25~45℃
Recommended altitude	< 1000m
Bearings	Steel
Winding material	100% Copper
Winding temperature level	180℃
Stator Impregnation type	Vacuum Pressure Impregnation (VPI)
Magnet Material	Neodymium 40SH
Magnet temperature level	150℃
Iron Core	Cold rolled silicon steel sheet
Normal working temperature	90℃
Max working temperature	130℃
Installation	Horizontal
Frame size	160
Weight (Kg)	120
Certificate	CE

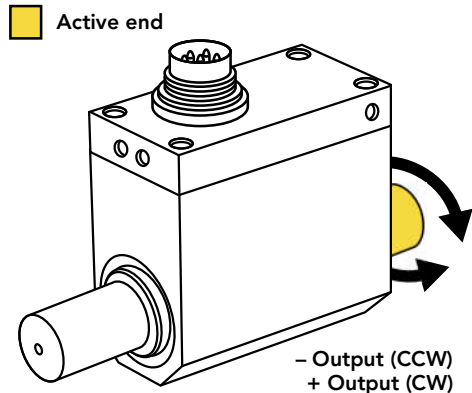


### **3. ANEXOS LOTE 3**



#### FEATURES

- Utilizes strain gauge technology
- Angle speed feedback
- Compact size
- Can operate up to 7000 RPM



#### SPECIFICATIONS

##### PERFORMANCE

Nonlinearity	±0.2% of RO
Hysteresis	±0.1% of RO
Nonrepeatability	±0.2% of RO
Rotational Speed	7000 Max

##### ELECTRICAL

Rated Output (RO)	±5 VDC
Excitation	11–26 VDC, 1 Watt
Connector	12 pin Binder Series #581 (09-0331-90-12)

##### MECHANICAL

Safe Overload	150% of RO
Zero Balance	±1% of RO
Material	Aluminum (Housing), Steel Alloy (Shaft)
IP Rating	IP40

##### TEMPERATURE

Operating Temperature	–13 to 176°F (–25 to 80°C)
Compensated Temperature	41 to 122°F (5 to 50°C)
Temperature Shift Zero	±0.01% of RO/°F (±0.02% of RO/°C)
Temperature Shift Span	±0.01% of RO/°F (±0.02% of RO/°C)

##### CALIBRATION

Calibration Test Excitation	12 VDC
Calibration (standard)	Certificate of Conformance
Calibration (available)	5-pt CW & CCW
Shunt Calibration Value	With sensor fully connected apply 11–26 VDC to Pins A & K to generate 5 VDC nom output

##### ENCODER

Output	Impulse (TTL)
Pulses per Revolution	2 × 360
Excitation	5 VDC, 40 mA max
Angle 1	Leading Pulse
Angle 2	Trailing Pulse (90°)

##### CONFORMITY

RoHS	2014/30/EU
CE	<a href="#">Declaration of Conformity</a>

Model TRS605

TORQUE CONNECTIONS

PIN	COLOR	DESCRIPTION
C	Green	+ Voltage Output
D	White	- Voltage Output
E	Black	Ground
F	Red	Power Supply

ANGLE CONNECTOR CODES

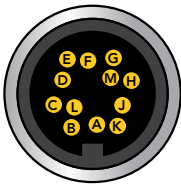
PIN	COLOR	DESCRIPTION
B	Blue	Signal (Angle 1)
E	Black	Ground
G	Brown	Signal (Angle 2)
H	Orange	Power

SHUNT CAL CONNECTOR CODES

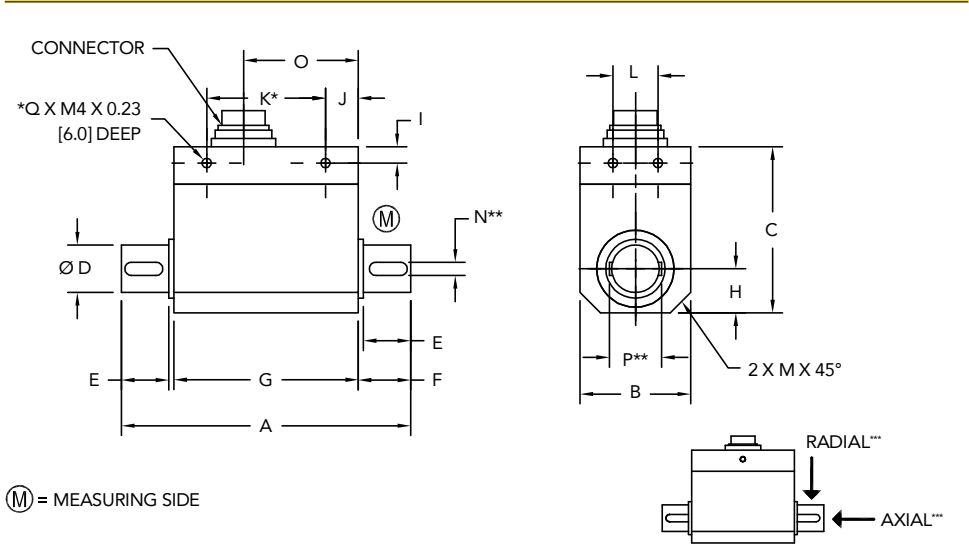
PIN	COLOR	DESCRIPTION
A	Yellow	Ground
K	Purple	Power

SHIELD CONNECTOR CODES

PIN	COLOR	DESCRIPTION
M	Floating	Shield



DIMENSIONS inches [mm]



\* ANTI-ROTATION HOLES. NOT TO BE USED TO SUPPORT LOAD.  
\*\*FEATHER KEYWAYS APPLY TO 20 AND 50 Nm PER DIN 6885, KEYWAYS COME PRE-INSTALLED

MASS MOMENT OF INERTIA (kg × cm²)

ITEM #	Measuring End	Drive End
FSH02052	0.0146	0.0147
FSH02053	0.0146	0.0147
FSH02054	0.015	0.015
FSH02055	0.015	0.015
FSH02056	0.9	1.02
FSH02057	0.91	1.04

CAPACITIES

ITEM #	Nm [in-lb]	Ø D	A	B	C	E	F	G	H	I	J	K*	L	M	N**	O	P**	Q*	*** Max Axial Force lb [N]	*** Max Radial Force lb [N]	Weight lb [kg]	Torsional Stiffness Nm/rad
FSH02052	1 [9]	0.394 [10] g6	3.62 [92]	1.10 [28]	2.04 [52]	0.63 [16]	0.67 [17]	2.28 [58]	0.55 [14]	0.19 [5]	0.43 [11]	-	0.31 [8]	0.31 [8]	N/A	1.46 [37]	N/A	6	4.5 [20]	1 [5]	0.7 [0.30]	317
FSH02053	2 [18]																		11 [50]	1 [5]		317
FSH02054	5 [44]																		11 [50]	2 [10]		855
FSH02055	10 [89]																		34 [150]	4.5 [20]		855
FSH02056	20 [177]	0.630 [16] g6	4.09 [104]	1.49 [38]	2.28 [58]	0.78 [20]	0.90 [23]	2.32 [59]	0.75 [19]	0.19 [5]	0.47 [12]	1.38 [35]	0.55 [14]	0.40 [10]	0.197 [5]	1.50 [38]	0.787 [20]	8	34 [150]	7 [30]	1.3 [0.60]	5450
FSH02057	50 [443]																		45 [200]	11 [50]		8190

# Model TRS605

## TORQUE CONNECTIONS

PIN	COLOR	DESCRIPTION
C	Green	+ Voltage Output
D	White	- Voltage Output
E	Black	Ground
F	Red	Power Supply

## ANGLE CONNECTOR CODES

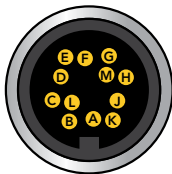
PIN	COLOR	DESCRIPTION
B	Blue	Signal (Angle 1)
E	Black	Ground
G	Brown	Signal (Angle 2)
H	Orange	Power

## SHUNT CAL CONNECTOR CODES

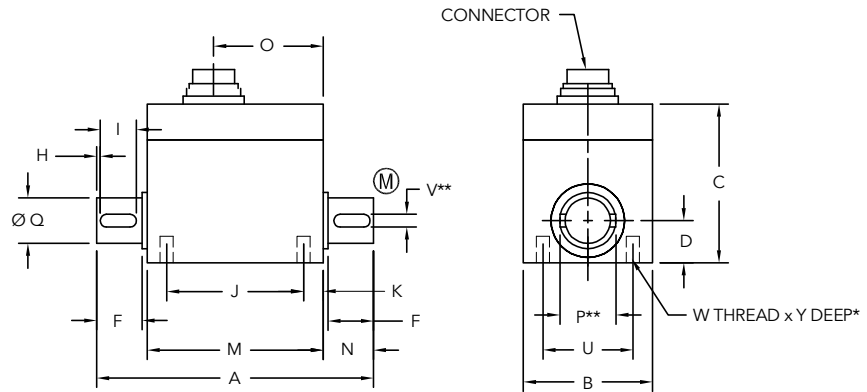
PIN	COLOR	DESCRIPTION
A	Yellow	Ground
K	Purple	Power

## SHIELD CONNECTOR CODES

PIN	COLOR	DESCRIPTION
M	Floating	Shield



## DIMENSIONS inches [mm]

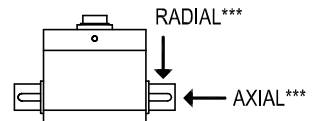


(M) = MEASURING SIDE

\* ANTI-ROTATION HOLES, NOT TO BE USED TO SUPPORT LOAD.

\*\* FEATHER KEYWAYS COME PRE-INSTALLED.

\*\*\* MAXIMUM LOAD ALLOWED. NOT FOR MEASUREMENT.



## MASS MOMENT OF INERTIA (kg × cm<sup>2</sup>)

ITEM #	Measuring End	Drive End
FSH02058	0.665	0.605
FSH02059	0.68	0.62
FSH02060	3.2	2.63
FSH02061	3.21	2.67

## CAPACITIES

ITEM #	Nm [in-lb]	Ø Q	A	B	C	D	F	H	I	J	K	M	N	O	P**	U	V**	W	Y	*** Max Axial Force lb [N]	*** Max Radial Force lb [N]	Weight lb [kg]	Torsional Stiffness Nm/rad
FSH02058	100 [885]	1.102 [28] g6	4.92 [125]	2.28 [58]	2.99 [76]	1.14 [29]	1.06 [27]	0.08 [2]	0.87 [22]	1.54 [39]	0.49 [12.5]	2.52 [64]	1.20 [30.5]	1.57 [40]	1.34 [34]	1.69 [43]	0.315 [8] p9	M5	0.31 [8]	90 [400]	56 [250]	2.3 [1.06]	28600
FSH02059	200 [1770]																			90 [400]	67 [300]		45845
FSH02060	500 [4425]	1.654 [42] g6	7.76 [197]	2.87 [73]	3.54 [90]	1.44 [36.5]	2.28 [58]	0.12 [3]	1.97 [50]	1.46 [37]	0.71 [18]	2.87 [73]	2.44 [62]	1.73 [44]	1.89 [48]	2.05 [52]	0.551 [14] p9	M6	0.39 [10]	180 [800]	90 [400]	6.4 [2.90]	130000
FSH02061	1000 [8851]																			225 [1000]	90 [400]		173600

Drawing Number: FI1410-C

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RoHS



U.S. Manufacturer





## FEATURES

- USB 2.0 Communication Link
- USB Bus-Powered (5V)
- Input/Output Short Circuit Protection
- Streaming ASCII Output
- Offered with DLL/Mac Dynamic Library
- CE Approved Class A (required for Medical and Aerospace applications)
- Industrial metallic enclosure
- Integrated DIN rail mount
- Supports, VDC, mA, mV and TTL type input
- Lends itself to a multitude of industry applications through its support of amplified input

**IMPORTANT NOTE: ONLY CONNECT DEVICE TO USB 2.0 PORT**

## SPECIFICATIONS

### GENERAL

Sampling Rate	Up to 4800 SPS
Bandwidth (Hz)	Sampling Rate (SPS) / 4
Internal Resolution	24 bits
Resolution (Noise Free)	See Chart on Page 3
Non Linearity (max)	± 0.005% of FSR
Output	Digital Packetized Data
Integrated Digital Filter	50 Hz/60 Hz Rejection (100 dB)
On Chip Memory	1 Kilobyte
Stored Calibration	Up to 16 Points
Weight	0.43 lb (195 g)
On Chip Sensor Profiles	Up to 4
ASCII Output Update Rate	10 SPS
IP Rating	IP50

### ENCODER INPUT

Encoder Input	Quadrature Leading and Lagging Pulse (TTL)
Speed Measurement	Up to 150k Pulses Per Second <sup>1</sup>
Angle Measurement (α)	Up to 10k Pulses Per Rotation (PPR) <sup>1</sup>
Angle/Speed Measurement (Update Rate)	100 ms

### STRAIN GAUGE mV/V INPUT

Bridge Excitation	4.6 VDC
Standard Input Range	± 3.4 mV/V (factory default)
Optional Input Range	Up to ± 400 mV/V
Min. Bridge Resistance	50 Ohm
Max. Bridge Resistance	5000 Ohm

### VOLTAGE INPUT

Supply Voltage	Selectable 5,9,10,12,15,18,20,24 VDC/1W
Standard Input Range	± 10 VDC (Factory Default)

### CURRENT INPUT

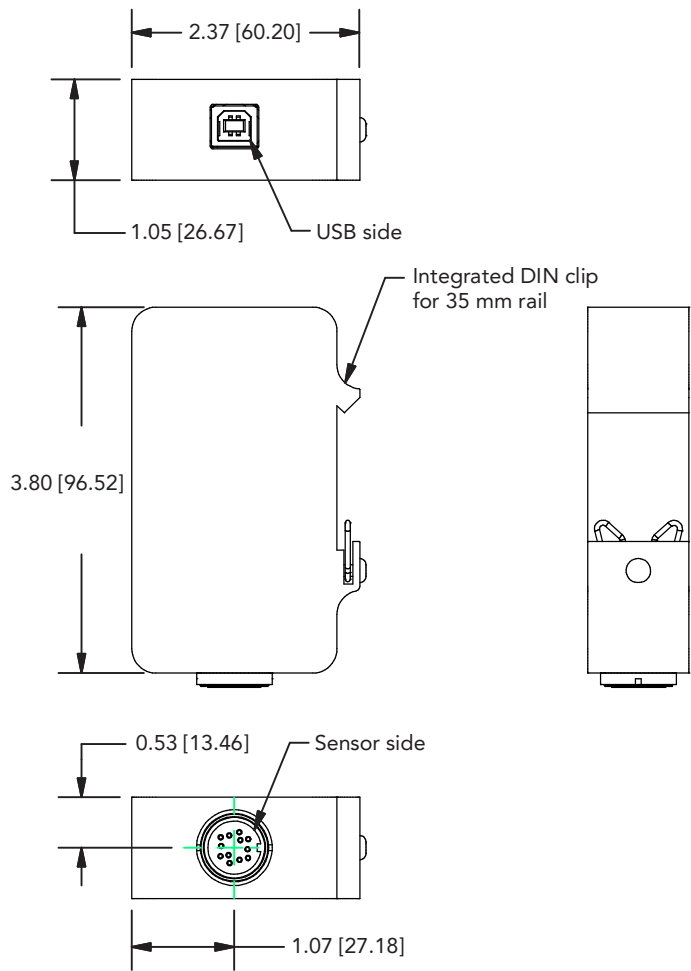
Supply Voltage	Selectable 5,9,10,12,15,18,20,24 VDC/1W
Standard Input Range	0-20 mA (Factory Default)

### CONNECTORS

Sensor Connector	Binder 09 0132 90 12
Mating Connector	Binder 99 5129 00 12
USB 2.0 Connector	Type B

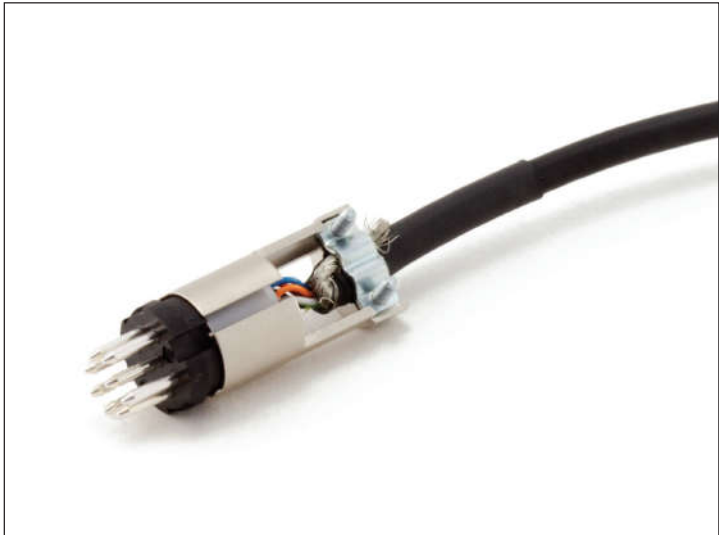
<sup>1</sup> Speed =  $\Delta \alpha \times 60 / \text{PPR}$

DIMENSIONS inches [mm]



SPECIFICATIONS (continued)

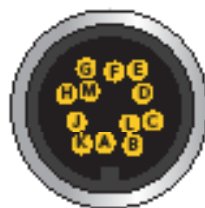
ENVIRONMENT	
Operating Temperature	-13°F to 185°F [-25°C to 85°C]
Storage Temperature	-40°F to 257°F [-40°C to 125°C]
CONFORMITY	
RoHS	2011/65/EU
CE	EN61326-1:2013; EN55011:2009 (Amended by A1:2010)



**Note:** Shield should be connected to cable clamp of binder cable assembly when connecting on instrument side. Sensor cable shield connections should be grounded on one end, either the sensor side or the instrument side, to avoid potential ground loops.

## SAMPLING RATE

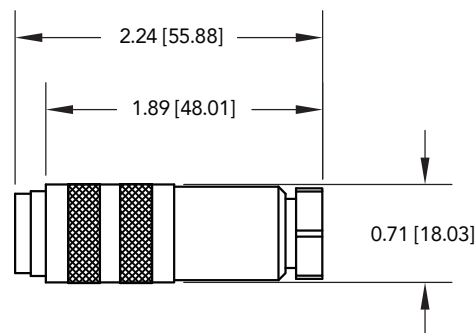
SAMPLES PER SECOND (SPS)	mV/V RESOLUTION	mA AND VDC INPUT RESOLUTION
5	18	20.5
50	16.5	19.5
100	16.3	19.2
300	15.8	18.2
1200	14.6	17.0
2400	13.6	16.0
4800	13.6	16.0

12-PIN BINDER MATING CONNECTOR  
(99 5129 00 12)

PIN	SYMBOL	DESCRIPTION
A	+E	+ Excitation / + Sense
B	+S	+ Signal
C	-E	- Excitation / - Sense / Shield
D	-S	- Signal
F	+Vcc	Supply Output
G	Gnd	Ground / Shield
H	4.75 Out	4.75 VDC Output
J	-V	- Amplified Input
K	+V	+ Amplified Input
L	PLEAD	Leading Pulse
M	PLAG	Lagging Pulse

## ACCESSORIES

- **FUTEK's SENSIT™ Software** (FSH03189)  
14 Day Trial - Available to download on FUTEK website. A license is required, per seat, after 14 days to benefit the features such as data logging, graphing, etc. Trial version turns into basic read-out ONLY after 14 days and a product key is required to enable the features.
- **USB 2.0 Hi-Speed A/B Cable** (GOD04123, included)
- **12-PIN Binder Male Plug**, 99 5129 00 12 (GOD02975 , included)



Drawing Number: FI1389-H

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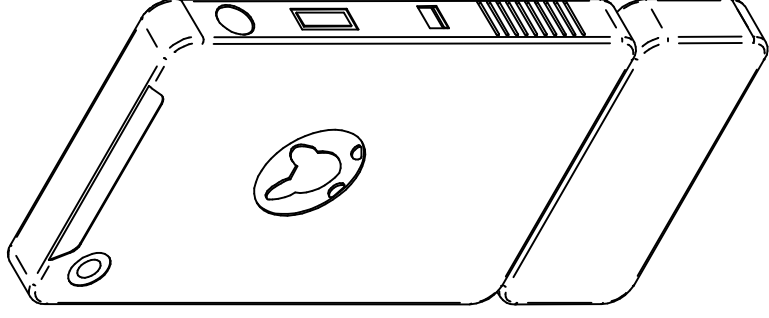
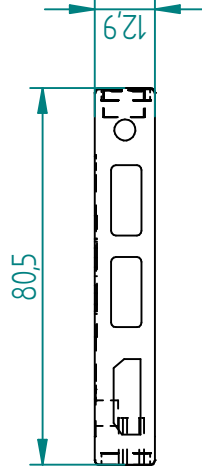
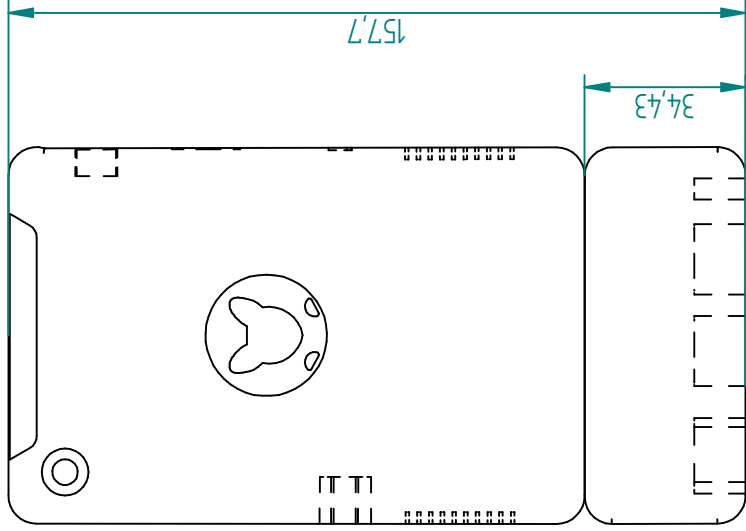
Fax: (949) 465-0905



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	Revisa				
	Aprueba				
	Valida				
Salvo indicación contraria, cotas en milímetros, ángulos en grados, tolerancias $\pm 1$ y $\pm 1^\circ$					

## TECHNICAL SPECIFICATION

OS	Windows 10 - Home edition
CPU	Intel Atom x5-Z8500 Processor (2M Cache, up to 2.24 GHz)
Graphics	Intel® Processor Graphics Gen8
Video Memory	Sharing System Memory
Memory	2GB LPDDR3
Hard Drive	32GB eMMC
Wireless	Wi-Fi 802.11 A/C (Dual Band) / Bluetooth 4.0
Expansion Slot	microSD
Security	Fingerprint reader
Battery Life	4 hours (casual use)
Dimensions	Computing module : 80.5 x 124 x 12.9mm / Base : 80.5 x 46.9 x 12.9mm
Weight	200g (without adapter & power cord) / 470g (including adapter & power cord)
Ports	Computing module: microSD, Micro USB (charge only) Base: USB 2.0 x 1, USB 3.0 x 1, HDMI x 1, DC-IN
Audio	Supported through HDMI
Cloud	OneDrive
Power Adapter	Input: 100V-220V ~ 1A, 50-60Hz / Output: 12V/3A
Accessories included	Software - OSLinX (requires USB cable), dock, power supply, cables

# Off Grid Wind Turbine Controller

## User Manual

★ Read the user manual carefully before use





## The Safety Matter

Please read this user manual carefully before installation, running, maintenance or check-up.

As electronic product, it is all dangerous when touching the electricity part.



Warning: Dismantlement of the dump load in the use is forbidden. The dump load must be connected in accordance with the wiring diagram strictly. Otherwise the wind turbine will be damaged because loss of control and the controller will be damaged due to the over voltage!

Prohibit operating the fuse when it is on load. Please cut off all loads when checking, replacing and operating the fuse!



Attention : This device must request electrician to install.

## Using Direction

- Make sure read this user manual carefully before appliance;
- The equipment must be installed by professionals;
- To avoid personal injury, make sure it must be a good ground connection when installation;
- No running in humidity or high temperature, volatile gases or flammable environment;
- When moving machines, please put down carefully;
- Open the package, please check controller and its attachment. If you find any missing parts or damaged parts in the process of transportation, please contact us in time, then you will get satisfactory service;
- If the controller is damaged, as not follow instructions of this manual to install the controller, our company shall have the right not to supply guarantee.



## Contents

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PWM Model Product Characteristics .....	04
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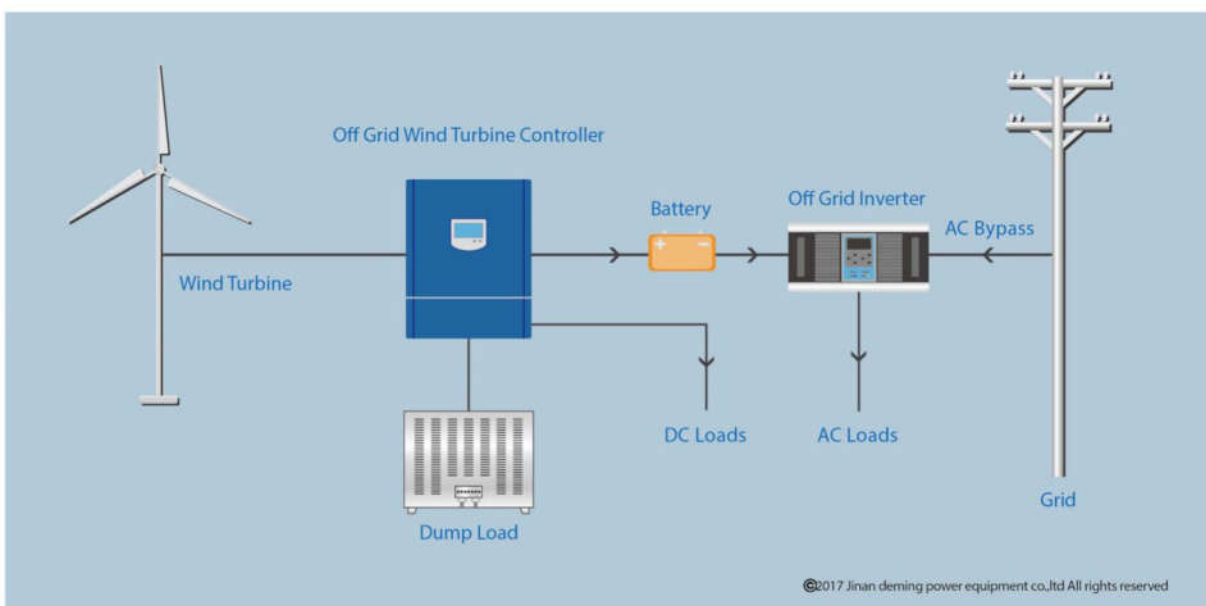
## Overview

Our company is a high-tech enterprise which specializes in the research and development, production, sales and service for renewable energy and power equipment used in wind and solar power. It has a high reputation in the industry and it is also a permanent member of China Wind Energy Association. Our Products are designated products for State Aid Projects abroad and 90% of our products are exported overseas.

Our main products include off-grid wind charge controller, on grid wind charge controller, solar charge controller, wind solar hybrid controller, wind solar hybrid streetlight controller, on grid inverter and off grid inverter, etc.

We take technical innovation as our company's fundamental development, and we invest not less than 20% of sales revenue every year in products research and development. We have been continuously exploring advanced technology in the field of new energy power, such as wind turbines electromagnetic control technology, MPPT technology, remote monitoring of wind solar hybrid system, etc. Now, we have five National Invention Patents for core technologies, eight Utility Model Patents. Our wind turbine control technology has reached international advanced level.

All products have perfect quality assurance system and ISO:9001 Certificate. We carry out comprehensive, all-staff and whole-process quality control system, and all products are strictly tested one by one before delivery from factory. The performance of each product is superior to national relevant standards, and all products have passed CE Certification to ensure safety and reliable use for customers.



## PWM Model Product Characteristics

- The product is manufactured according to the JB/T6939.1-2004 industrial standard and GB/T 19115.1-2003 national standard, and also with users' technical requirements.
- Big LCD Display. The graphics visually show the working status of controller. Abundant data display: real-time wind turbine voltage, current, power; battery voltage, current, accumulative total generating electricity (The main-board is with battery, in the case of power off, history data can be stored for 30 days.)
- Two sets of control systems: PWM constant voltage system and three-phase dump load system.
- PWM constant voltage control is 120% of the rated power of the wind turbine. In case exceeding of PWM's capacity, the three-phase dump load will automatically start immediately to ensure safe running of the overall wind turbine system.
- Under the circumstances of disconnecting or damage of the battery, the three-phase dump load will start automatically to avoid the idling for wind turbine and the occurrence of runaway accident.
- When strong or super-strong wind, PWM control to ensure battery charged by the wind turbine with constant voltage and current.
- The protection function: Battery reverse polarity protection; Battery disconnected protection; Battery damage protection;
- Over-charging protection of the battery: When the battery is full (the battery voltage getting 125% of the rated voltage), three-phase dump load of controller will automatically start and stop charging the battery. The wind turbine will be on braking status.
- Auto recharging of battery: When the battery voltage reduces to 108% of the rated voltage, controller stops three-phase dump load automatically and recharge battery.
- The controller is equipped with manual three-phase dump load switch. To using this switch, the wind turbine will carry out three-phase dump load forcibly.
- The inside of controller is equipped with surge arrester. Limit instantaneous over voltage into wind generator within the controller or system bearable voltage range, or conduct the strong lightening current into earth to protect the equipment from lightning shock damage.

- ▲ Adopt Modbus communication protocol. It is convenient for customers to develop again.
- ▲ Adjust controller technical parameters, through RS485 interface. It is convenient for professional customers to adjust different wind turbines.
- ▲ Support WIFI and GPRS. Customer can monitor the working status of wind solar hybrid system in real time through PC or mobile terminal, or check historical working status. Mobile terminal is compatible with Android and IOS.
- ▲ Solar panel control system can be added according to customers' demand.
- ▲ For different wind turbines type, the controller can be equipped with mechanical yawing, furlled empennage, mechanical or hydraulic, pneumatic, electric magnetic and other brake functions.

## Pictures Of Controller





## Operation Steps

### **1. The controller shall be strictly operated by professional personnel in accordance with operation steps and wiring diagram :**

- Before operation, keep the Battery Switch in the state of OFF, the Manual Brake of wind turbine in the state of STOP, PWM dump load breaker in the state of OFF, then install and wire the controller.
- PWM dump load terminal of dump load is connected with PWM dump load terminal of controller, and three-phase dump load terminal of dump load is connected with three-phase dump load terminal of controller.(see the wiring diagram)
- Connect the three phase wires from generator with three phase wires terminals of controller. (see the wiring diagram)
- Keep the Battery Switch (or fuse) in the state of OFF, connect the battery group; misconnecting of positive electrode and negative electrode of the battery is forbidden.
- Connect the grounding wire with the controller grounding terminal; Connect the grounding terminal of dump load with the grounding wire. Grounding connection must be reliable and well.
- Optional connection: RS485 communication cable connection  
RS485 terminal is connected with two wires (A and B). These two wires should be also connected to RS485/232 converter terminals, then connected with the supervising computer.

### **2. Manual three-phase dump load switch:**

- When the battery is connected correctly, place the switch of the wind turbine on the back plate on RUM, the wind turbine is in operation state.
- When the machine is not in use or the wind is too strong or in dismantlement of the battery, loof the wind turbine, then place the switch of the wind turbine on STOP and make the wind turbine in three-phase dump load state.

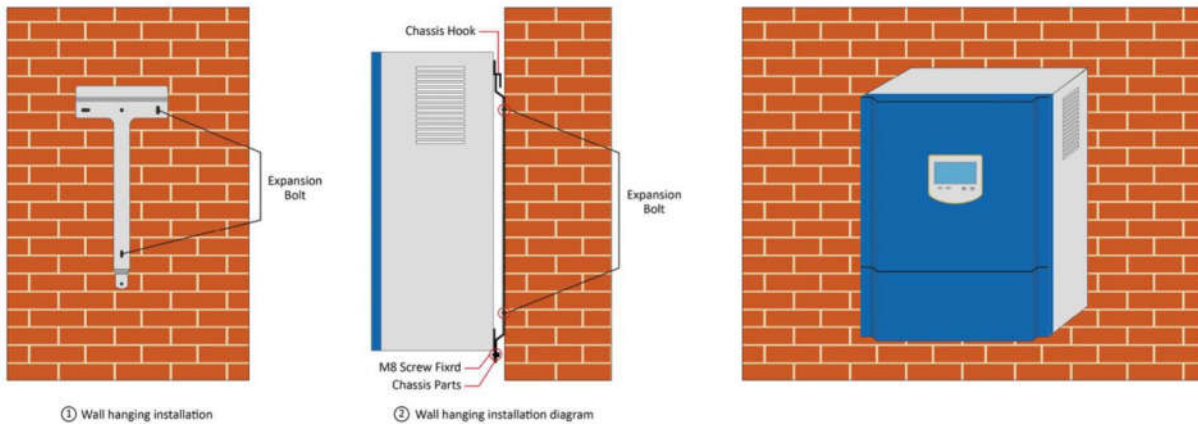
### **3. Follow operation steps to start the controller:**

- Place the PWM breaker in the state of ON and connect well;
- Place the battery switch (or fuse) in the state of ON;
- Place the Manual Brake of wind turbine in the state of RUN.

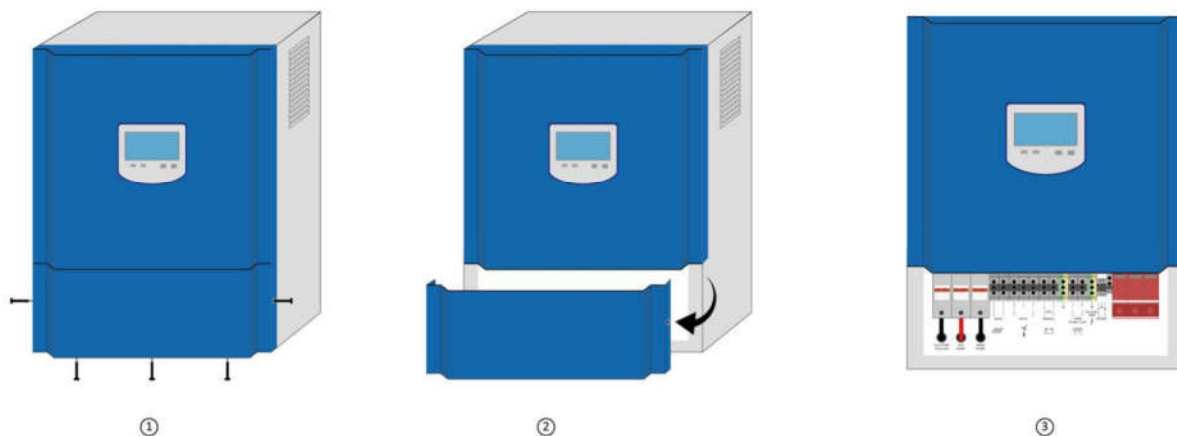
#### 4. When the controller is maintained regularly, Please follow the operation steps as bellow:

- Before operation, keep the Manual Brake of wind turbine in the state of STOP;
- Place the Battery Switch (or fuse) in the state of OFF;
- Maintain or repair the controller;
- Start up the controller and place the battery switch (or fuse) in the state of ON;
- Place the Manual Brake of wind turbine in the state of RUN.

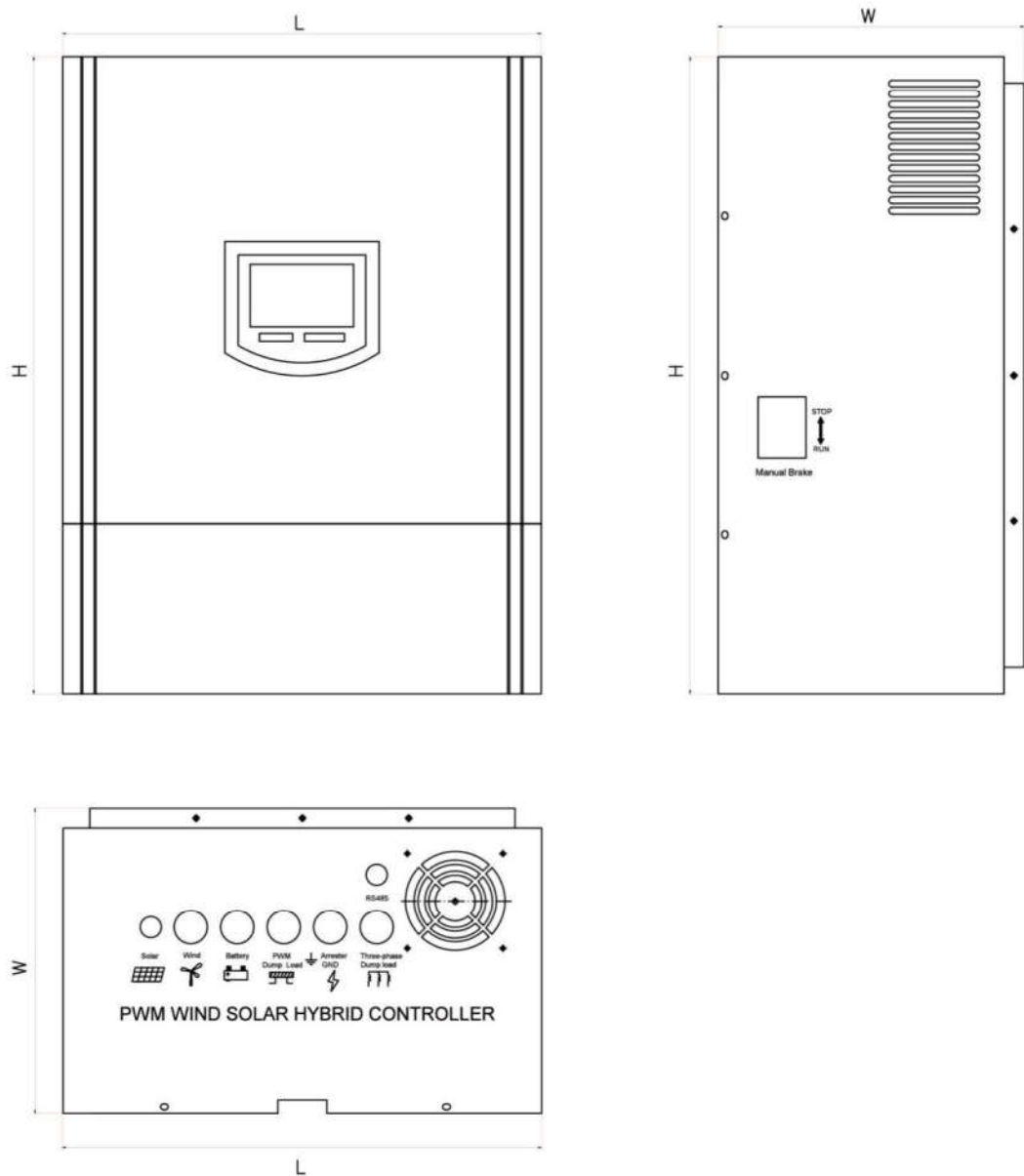
### Installation Diagram



### Remove Controller Wiring Step



## Case Dimensions

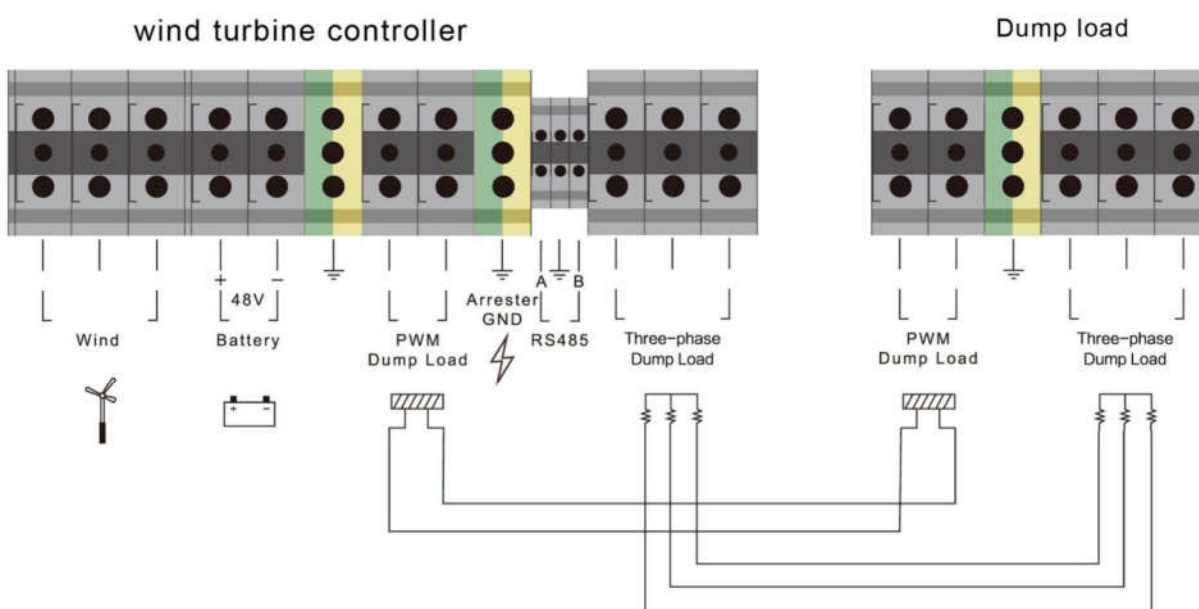
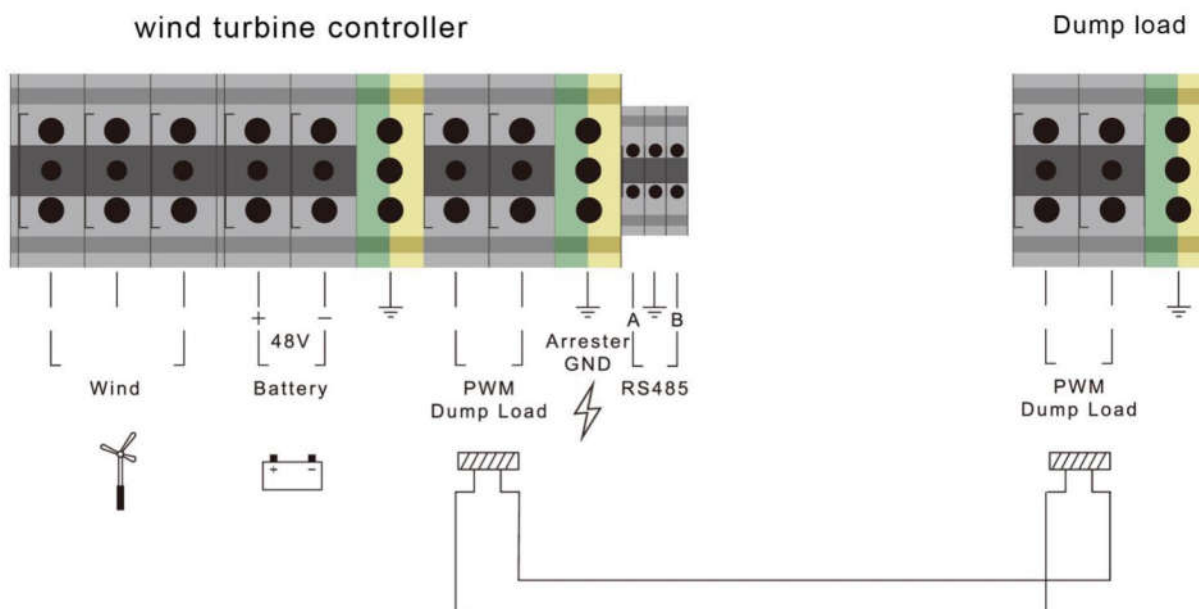


### Case Dimensions

Model	L	H	W
1-3KW off grid wind turbine controller	360mm	480mm	230mm
5-15KW off grid wind turbine controller	400mm	550mm	230mm

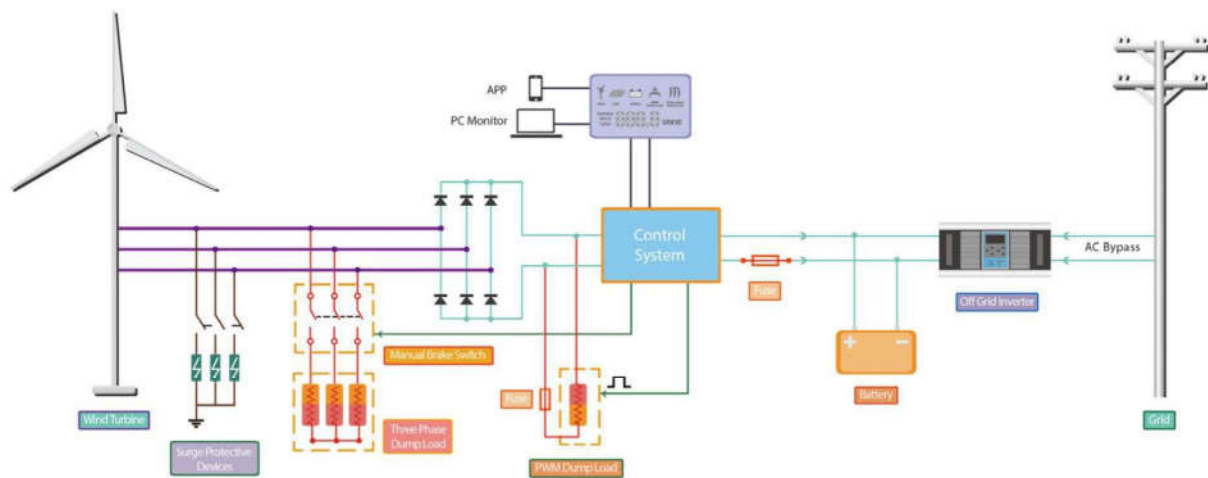
## Wiring Diagram

The connection wires adopt insulated copper cables. You can select cables according to 5A/mm<sup>2</sup> current density (for reference only). When connecting wires, ensure all wires reliable. Prevent terminal block and burned from overheating by large current phenomenon.





# Functional Diagram



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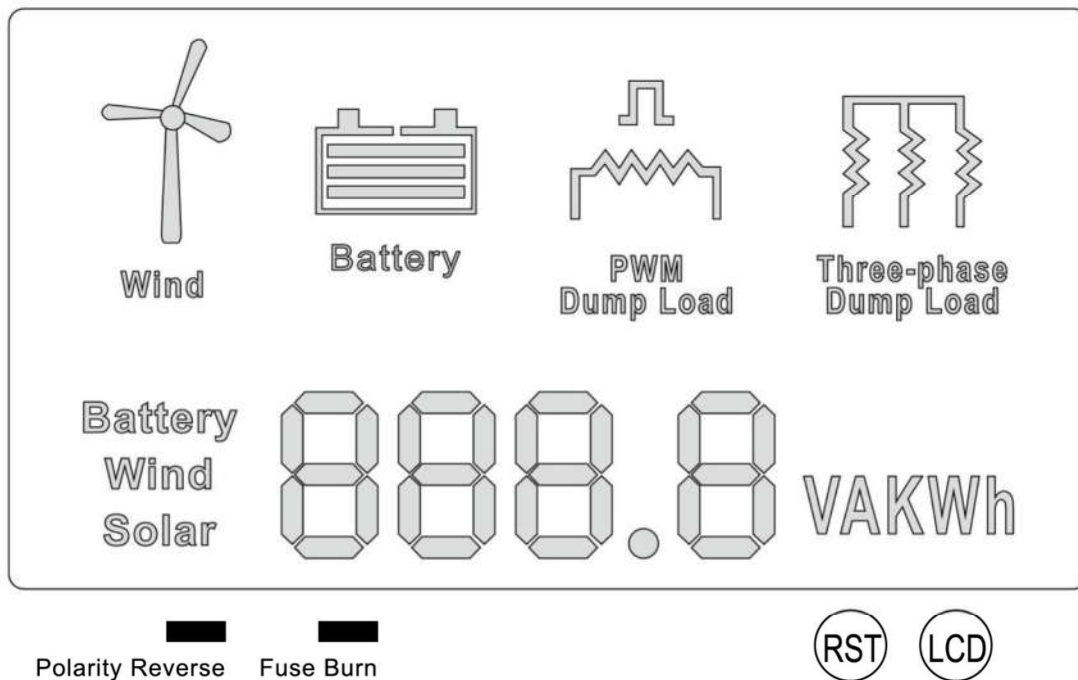
## Liquid Crystal Screen Operation And Display

### 1. Operation Explanation


Press the front panel of the case, LCD screen light. Each press, parameters change again. Stop the operation 1 minute, LCD screen automatically put out, to save electricity.

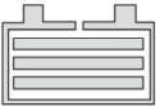
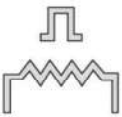
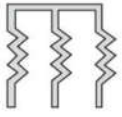
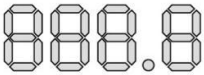
### 2. Display Explanation

LCD Screen Complete Content.



Including all contents displayed

IMAGE	EXPLANATION
 <p>Wind</p>	<p><b>Wind Turbine</b></p> <p>The wind turbine images display, showed that wind generators running normally.</p>

 <p>Battery</p>	<p><b>Battery</b></p> <p>Battery internal strip graphics, showed battery power.</p> <p>When the battery charged enough, the battery voltage reached 125% of the rated voltage. The wind turbine will automatically carry out three-phase dump load discharging to stop charging. The 3 strip graphics in battery box all display. When the battery voltage drops to 108% of the rated voltage, the wind turbine recovers to charge the battery.</p> <p>When the battery voltage is too low, the frame of the battery image will flashing, remind users battery is low voltage, at this time, please stop using battery, to charge battery, until stop flashing, just can be used.</p>
 <p>PWM Dump Load</p>	<p><b>PWM Dump Load</b></p> <p>In the conditions of strong or super-strong wind, battery charged by the wind turbine generator under constant voltage and current. Then this image display. When voltage of the battery drops to 108% of the rated voltage, the image not displayed.</p>
 <p>Three-phase Dump Load</p>	<p><b>Three-phase Dump Load</b></p> <p>When the battery is full (the battery pressure reaching 125% of the rated pressure), the controller will automatically carry out three-phase dump load discharging to stop charging battery. Then this image display.</p> <p>When the battery voltage reduces to 108% of the rated pressure, the three-phase dump load will stop discharging to automatically recover battery charging. Then the image not displayed.</p>
	<p>LCD display in digital form show the parameters value.</p>
<p>Fuse burn</p>	<p>Fuse burn indicator light, when fuse burn, remind users replace the fuse.</p>

### 3.LCD display parameters browse

(1) After plus electric, system is in viewing conditions, LCD display battery voltage: Battery XXX.XV.

(2) In viewing conditions, press the front panel of the case, will according to the following order cyclic display parameters.

Battery voltage → charge current → charge power → Wind turbine voltage → Wind turbine charge current → Wind turbine power → Battery voltage.

## Attentions

The controller has been fully designed to take into account the possibility of various accidents and take the corresponding protective measures. But not all protection measures are perfect, Frequently start some protection functions, such as short circuit protection and reverse connection protection, it will cause damage to the internal components of controller. So users should not rely on these protection functions, and the following notices are very important to extend the service life of controller.



1. When wind turbine is running, it is strictly prohibited to open or replace fuse, to prevent people from being injured or prevent the controller from being damaged. When replacing fuse, please place wind generator in three-phase dump load status and close off all switches of the controller, disconnect battery bank switch before checking or replacing fuse.



### 2. Operating Environment

- The operating environment shall be dry, clean and well ventilated.
- Avoid to use it in direct sunlight, exposed to sunshine, rain, humidity, acid fog environment.
- Avoid to use it in dust and dirt environment.
- The controller should be fixed on dry insulation board and equipped with a dust cover, where it is with good ventilation and heat dissipation; It is strictly prohibited to use in inflammable and explosive gases environment, be ware of sparks.



### 3. Running out of battery or battery bank, and poor connection is one of the main factors causing fault.

- Running out of battery or poor connection, it will cause the charging voltage be too high or too low, over- discharge or overcharge protection function and frequent stop action cannot work normally
- It is suggested that you check the battery capacity (check them with battery special measuring tool, please do not use multimeter), voltage, connection status periodically, clean rust stains on the terminals of positive and negative electrodes. (wind turbine should be in three-phase dump load status when checking the battery)





- When the battery voltage drops to less than 85% of rated voltage, **Battery** image will flash, please stop using battery immediately, and charge battery timely. Otherwise, battery will be damaged.
- This controller can not charge the running out or damaged battery. When battery voltage is 75% lower than the rated voltage, please replace the battery in time or charge the battery separately.



4. The maintenance-free battery shall be maintained periodically in accordance with user manual.



5. Do not connect inversely connect positive and negative electrodes of the battery.



6. The dump load matching with this controller produces high temperature when it is working, please place it in the place with better ventilation and heat dispersion , 2 meters away from the controller where human or livestock can not reach easily. Please do not cover it with other articles, do not use it in flammability, explosive gas environment to prevent from fire.



7. The controller should be managed by professional people for your personal safety, and it should be well and reliably grounded in case of electric shock. Grounding resistance should be less than 1  $\Omega$ , and connecting should be more than 10<sup>2</sup>mm.

## Failure Analysis

1. When wind turbine is running normally but the controller makes repeated pi-pa noises (or wind turbine can not work), please turn off wind turbine immediately and check whether the fuse is burn, whether battery positive and negative is disconnected or batteries are damaged.
2. After batteries are connected, but wind turbine can not work and the indicator is not on, please check whether the charging fuse is burn out, whether batteries are connected well, whether battery positive and negative is disconnected or batteries are damaged.

## Battery Maintenance

Battery maintenance is very important in daily work. Different maintenance methods are used to different types and series of batteries.

For lead-acid battery, except maintenance free type, the following points should be noted for daily maintenance:

1. Keep the battery clean always.
2. Prevent any external impurities falling into the battery.
3. All tools and materials must be kept in clean and covered place.
4. Sulfuric acid traces and dust on entire external of battery must be cleaned periodically.
5. The contact devices and connecting wires among every battery must be completely reliable.
6. If there is sealing cap and vent hole on the battery, it is necessary to check and clean the vent hole.
7. Pay attention to the liquid height of the electrolyte level, do not let the pole plate and the partition board be out of the level.
8. The electrolyte must be adjusted at normal density (1.26—1.28)g/cm<sup>3</sup>. (This parameter can be based upon user manual) and it can only be adjusted after battery is finished charging.
9. During the discharge process, the terminal voltage and electrolyte density of each battery should be checked frequently and pay close attention to the discharge degree of battery and never allow the electrolyte density and terminal voltage to be lower than the allowable range of this type battery discharge rules.
10. The electrolyte temperature shall not exceed the rated value in the user manual, which is usually 45℃.
11. If the battery is laid aside for a long time, in order to avoid excessive self-discharge and severe sulfuric acid salination, it should be recharged once a month.
12. Check the battery once a month, and replace those batteries which are damaged or with excessively low capacitance.

## Technical Parameters

Type	5KW-48Vdc	5KW-96Vdc	5KW-240Vdc
Wind turbine rated power	5KW	5KW	5KW
Wind turbine max. power	10KW	10KW	10KW
Battery	48Vdc	96Vdc	240Vdc
Function	Rectifier,charge, control		
Display mode	LCD		
Display content	Wind turbine voltage, wind turbine current, wind turbine power, solar panel voltage, solar panel current, solar panel power, battery voltage, charge current		
PWM constant pressure voltage	>57Vdc	>116Vdc	>290 Vdc
3-phase load voltage of the wind turbine	59±1Vdc	120±2Vdc	300±5Vdc
Wind turbine recovery charging voltage	54±1Vdc	108±2Vdc	270±5Vdc
Low-voltage of the battery	40±1Vdc	80±2Vdc	180±5Vdc
Self-provided connecting wire of the battery	>20mm <sup>2</sup>	>10mm <sup>2</sup>	>6mm <sup>2</sup>
PWM fuse	125A	63A	40A
Charging fuse	160A	63A	32A
DC Output	48V 60A		
Work environment temperature	-30-60°C		
Relative humidity	< 90% No condensation		
Noise (1m)	< 40dB		
Degree of protection	IP20 (Indoor)		
Cooling method	Forced air cooling		
*Communication interface (optional, extra charged)	RS485/USB/GPRS/Ethernet/GPRS/WIFI		
*Temperature compensation (optional, extra charged)	-4mv/°C/2V,-35°C~ +80°C, Accuracy:±1°C		
Size of the controller (mm)	560*400*245	480*360*240	480*360*240
Weight of the controller	26Kg	21Kg	21Kg
Size of the dump load (mm)	660*510*450	660*510*450	660*510*450
Weight of the dump load	31Kg	31Kg	31Kg