W21 Magnet Drive System

Quick Guide

快速指南

Read carefully this manual before installing and configuring the equipment

This manual contains all necessary information for the installation and configuration of the W21 Magnet Drive System. In order to ensure safety and proper operation of the equipment, follow the instructions of this guide. For further information or explanations, check our FAQ at ***www.weg.net/br/faq*** *or contact Customer Service at +86-513-85920153.*

在安装和配置设备之前，请仔细阅读本手册的指示说明

本手册包含安装和配置 W21 Magnet 驱动系统的所有必要信息。为确保设备的安全和正常运行，请按照本指南的说明进行操作。欲了解更多信息或解释，请登陆 www.weg.net/br/faq 查询我们的常见问题或联系客户服务部门，电话 +86-513-85920153.

English

1 - Technology

W21 Magnet Drive System is a system composed of the W21 Magnet permanent magnet synchronous motor and the WEGPM frequency inverter.

The W21 Magnet motor features three-phase stator winding, similar to an induction motor, and rotor assembled with permanent magnets instead of a squirrel cage. The permanent magnets eliminate the need of current induction on the rotor (magnetizing current); therefore, with no load the motor presents a very low current, just enough to make up for the losses. Besides the magnetizing current, the W21 Magnet does not require slip compensation either, since the shaft speed does not vary with the load.

Note! All W21 Magnet motors present a single configuration of six poles.

Since this motor is not designed to be connected directly to the power line, all the motors of this line present a single configuration of six poles and variable electric frequency. For example, the electric frequency of the 1500 and 3000 rpm motors is:

$$\frac{1500 \text{ rpm} \times 6 \text{ poles}}{120} = 75 \text{ Hz} \qquad \frac{3000 \text{ rpm} \times 6 \text{ poles}}{120} = 150 \text{ Hz}$$

Note! W21 Magnet motors can be driven by the PM with encoder and Sensorless PM control options only.

2 - Safety measures

Any service on the internal parts of the motor must be performed by qualified personnel only, since, due to the attraction between metallic parts caused by the magnets, risk of accident is present both in the assembly and disassembly of the motor.

People that use pacemakers cannot handle these motors. The permanent magnets can also cause disturbances or damages to other electric equipment and components during service.

- Before opening the terminal box of the motor, make sure the motor shaft is not spinning.
- Never touch the motor terminals while the rotor is spinning, because, even with the inverter shut down, risk of electric shock is present. If it is observed the possibility of the load to accelerate the motor shaft, it is necessary to install a disconnecting device between the inverter and motor terminals.
- W21 Magnet motors feature PTC temperature sensors which must be connected to the inverter so that the motor will be shut down in case of overheating.

In order to connect the PTC temperature sensor, it needs to connect the input X7 & COM (refer to section 3 - *Inverter Installation and Connections - Standard Connection Diagram*) and setting the function F2.06 to 9: External Fault Input (refer to Section 4 - *Configuration of the inverter*) where X7 shall be set as Normally Closed.

Note! For further information on the motor installation and maintenance, refer to the instruction booklet supplied with it.

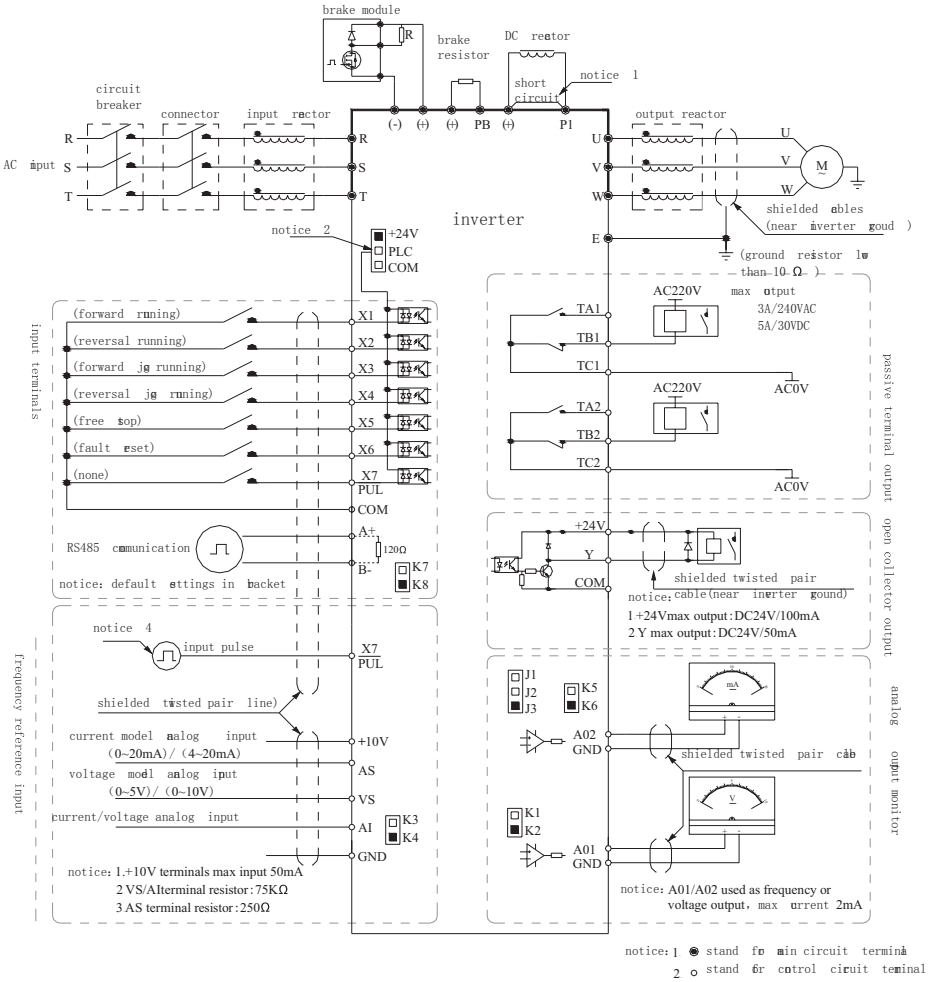
3 - Inverter installation and connections

Note! Read the WEGPM User's Manual which is supplied with the inverter before installing, powering up or operating the inverter.

- Install the inverter according to Chapter 3 - Installation and connections of the Manual.
- Prepare the drive and power up the inverter according to Chapter 4 - configuration of the inverter of the Manual.

Standard Connection Diagram

- Standard Connection Diagram

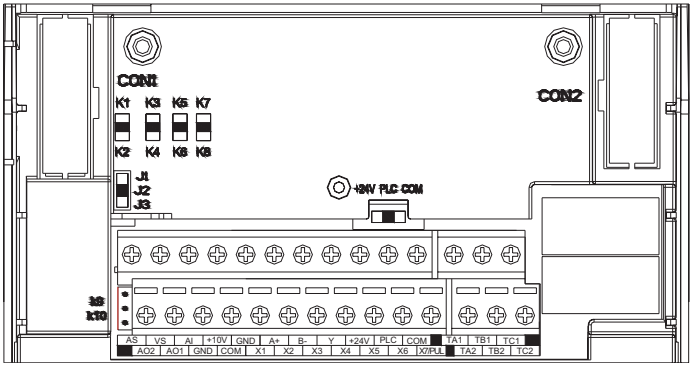


Note:
1.When installing DC reactor, make sure to dismantle the short connector between terminal P1 and (+).
2.NPN or PNP transistor signal can be selected as input of multi-function input terminal (X1~X7/PUL). Inverter built-in power supply (+24V terminal) or external power supply (PLC terminal) can be chosen as bias voltage. Factory setting '+24V' short connect with 'PLC'.
3. Analog monitor output is the special output for meters such as frequency meter, current meter and voltage meter. It can't be used for control operations such as feedback control.
4. As there are multi pulse styles, please refer to the line connect mode description details.

- Auxiliary Terminal Output Capacity

Terminal	Function Definition	Max Output
+10V	10V auxiliary power supply output, constitutes loop with GND.	50mA
A01/A02	Analog monitor output, constitutes loop with GND.	Max output 2mA as frequency, voltage signal,
+24V	24V auxiliary power supply output, constitutes loop with COM.	100mA
Y	Collector open circuit output; can set the action-object by program.	DC24V/50mA
TA1/TB1/TC1 TA2/TB2/TC2	Passive connector output; can set the action-object by program.	3A/240VAC 5A/30VDC

- Connection Function Specification of Switch Terminals



Switch Terminal	Selecting Position	Function Specification
S1	K1	AO1:0～20mA or 4～20mA current output
	K2	AO1:0～10V voltage output
S2	K3	AI:0～20mA or 4～20mA input current
	K4	AI: 0～10V input voltage
S3	K5	AO2: 0.0～50kHz (J1 on), open collector circuit output
	K6	AO2:0.0～50kHz (J1 on), active source output
S4	K7	RS485: connect with 120Ω terminal resistor
	K8	RS485:connect without 120Ω terminal resistor
S5	J1	AO2:0.0～50kHz frequency output
	J2	AO2:0～20mA or 4～20mA current output
	J3	AO2:0～10V voltage output
S6	+24V	Short +24V terminal and PLC terminal
	PLC	PLC terminal receiving external power input
	COM	Short PLC terminal and COM terminal
S7	K9	Disconnect GND terminal and PE discharge loop
	K10	Connect GND terminal and PE discharge loop

4 - Configuration of the inverter

4.1 - Inverter's key functions

Figure - HMI of Inverter

Key	Name	Function
PRG	Menu Key	Enter function menu when standby or running. Press this key to return when modifying parameter. Press for 1 sec to enter condition monitoring interface when in standby or running condition.
SET	**Confirm/ modify key**	Press to modify parameter when in menu interface. Press again to confirm after modifying. Press to change LED monitoring items at down time when in standby or running condition.
▲ ▼	**Up/down key**	Select parameter group in menu interface. Modify parameter in modifying interface. Modify given frequency, PID, given torque or magnetic powder clutch given torque when at standby or condition monitoring state (When given frequency, PID, given torque or magnetic powder clutch given torque are set by keyboard, please set [F4.04])
≪	**Shift key**	Select digit of function number modified by up/down key; Select parameter digits modified by up/down key.
FWD	Forward run key	When run/stop is controlled by keyboard, press this key, the inverter forwardly rotate and the indicator is always on. When reverse, the indicator sparks.
JOG REV	Jog/reverse key	This key function can be defined by parameter [F4.02]. Press it, the machine reverses and indicator is off if this key is defined as REVERSE; the machine jogs and indicator is on if this key is defined as JOG.
STOP RESET	**Stop/reset key**	The machine stops if press it while run/stop is controlled by keyboard. Its efficiency range is defined via function no [F4.03]. Inverter resets if press it in fault state (the machine would not reset if the fault is not solved).
	Keyboard potentiometer	Can be used as input channel for given frequency, upper frequency limit, given torque, given PID or PID feedback setting

4.2 - Indicator light meanings

Name		Status	Meaning
Unit Indicator Light	Hz	Spark	Digital display given frequency.
	Hz	On	Digital display output frequency.
	A	On	Digital display actual output current.
	V	On	Digital display input voltage.
	V	Spark	Digital display output voltage.
	S	On	Time unit is second.
	S	Spark	Time unit is ms, min, or h.
	RPM	On	Digital display motor speed.
	%	Spark	Digital display given PID.
	%	On	Digital display PID feedback.
State Indicator Light	FWD	On	Inverter is forwardly rotating.
	FWD	Spark	Inverter is reversely rotating.
	FWD	Off	Inverter stops.
Function indicator light	REV/JOG	On	Jog.
	REV/JOG	Off	Reverse.

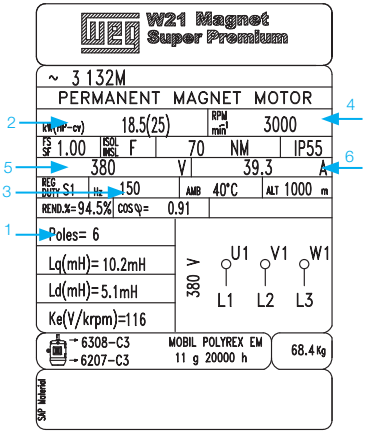
4.3 - Number and characters chart

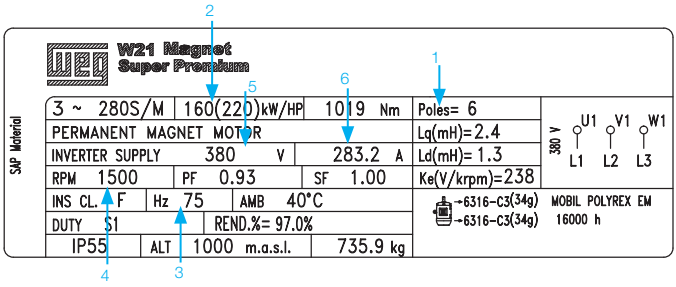
Number	Display	Chart	Display	Chart	Display
0	0	C	C	O	o
1	1	D	d	P	P
2	2	E	E	Q	q
3	3	F	F	R	r
4	4	G	G	S	S
5	5	H	H	T	t

Number	Display	Chart	Display	Chart	Display
6	6	I	I	U	U
7	7	J	J	V	v
8	8	K	K	W	W
9	9	L	L	X	No display
A	A	M	M	Y	y
B	b	N	n	Z	No display

4.4 - Procedures for oriented start-up

- In order to perform the oriented start-up, follow the procedures described below by entering the motor nameplate data.





1 - Poles	*4 - Rated Speed*
2 - Output	*5 - Rated Voltage*
3 - Frequency	*6 - Rated Current*

Note! The configuration through the "Oriented Start-up" results in the automatic modification of the content of parameters and internal variables of the inverter regarding the control and the motor. That ensures a stable operation of the control and maximum efficiency of the motor.

Procedure for oriented start-up (using nameplate data of motor 18.5kW as example)					
1	Press "***PRG***"		**2**	- Select group "***F0***". - Press "***Set***".	
3	- Set "***F0.00***" according to motor control algorithm "***5: PM Vector Control***". - Press "***Set***".		**4**	- Set "***F0.11***" according to the upper frequency. - Press "***Set***".	
5	- Set "***F0.08***" according to the frequency aim. - Press "***Set***".		**6**	- Set "***F0.09***" according to the maximum frequency. - Press "***Set***".	
7	- Select group "***F5***". - Press "***Set***".		**8**	- Set "***F5.01***" according to the motor number of poles. - Press "***Set***".	
9	- Set "***F5.02***" according to the motor rated power. - Press "***Set***".		**10**	- Set "***F5.03***" according to the motor rated frequency. - Press "***Set***".	
11	- Set "***F5.04***" according to the motor rated speed. - Press "***Set***".		**12**	- Set "***F5.05***" according to the motor rated voltage. - Press "***Set***".	
13	- Set "***F5.06***" according to the motor rated current. - Press "***Set***".		**14**	- Set "***F5.12***" as "***2: Static Self-Tune***". - Press "***Set***".	
To end press "*Reset*".			**To run the motor press "FWD".**		

5 - Solution of faults

This chapter explains the display content and measures of the inverter fault, alarm and operation fault. In addition, the poor condition caused by the inverter and motor failures and the corresponding processing measures will be briefly described. Tuning Guide on trial use is also referred to in this chapter.

5.1 - Fault Types

Type	Inverter Action When Fault Happens
Equipment Fault	When inverter detects a fault, the following conditions would happen: ● Keyboard display character showing fault content. ● Inverter output stops. Motor free slide stops. ● When function [F2.29] is 3(output fault), Y terminal outputs valid open-collector digital output. ● When function [F2.30\F2.31] is 3(fault output), TA1-TC1, TA2-TC2 terminals output open passive digital output. ● For faults like OL, OC, SC, OV, UL2, if [FA.22] is not 0, the inverter will restart automatically after the time interval set by [FA.23].
External Fault	In certain application occasions, external related equipments fault signals are considered in the inverter control system as usage of monitoring, protection and switch control. At this time, if one multi function terminal is defined as “external fault”, and when the external related equipments fault signals are effective, the inverter stops output and give out alarm signal.

5.2 - Fault Information and Details

Keyboard Display	Fault Code	Fault Type	Possible Causes	Treatment Measures
	L.U.1	Too low when stop	● Power supply is too low ● Voltage detection circuit is abnormal	● Check input power, eliminate fault. ● Seek support from vendor.
	E.LU2	Under voltage in run	● Power supply is too low ● Power capacitance is too small, or there is enormous impact current in the power grid. ● Inner DC main contactor is not closed.	● Check input power, eliminate fault. ● Improve power-supply system. ● Seek support from vendor.
	E.oU1	Acc over-voltage	● Power voltage fluctuation over limit. ● Start motor when running.	● Detect power voltage and eliminate fault. ● Restart motor until it totally stop; Set F1.00 to 1or 2.

	E.oU2	Dec over-voltage	● Deceleration time is too short. ● Load potential energy or inertia is too large. ● Power voltage fluctuation over limit.	● Prolong deceleration time properly. ● Reduce load inertia or improve inverter capacitance or add braking unit. ● Detect input power and clear fault.
	E.oU3	Constant speed over-voltage	● Power voltage fluctuation over limit.	● Detect input power voltage and eliminate fault. ● Install input reactor.
	E.oU4	Over-voltage when stop	● Power voltage fluctuation over limit.	● Check input power, eliminate fault. ● Seek support from vendor.
	E.oC1	Acc over--current	● Acceleration time is too short. ● Start motor when running. ● V/F curve setting is not suitable. Or torque boost too high. ● Inverter capacitance is too small.	● Prolong acc time. ● Restart motor until it totally Stop; Set F1.00 to 1or 2. ● Reset V/F curve or torque boost value. ● Select inverter with right capacitance.
	E.oC2	Dec over--current	● Deceleration time is too short. ● Load potential energy or inertia is too large. ● Power voltage fluctuation over limit.	● Prolong deceleration time. ● Connect external braking resistance or braking unit. ● Select inverter with right capacitance.
	E.oC3	Constant speed over--current	● Sudden load change. ● Power grid voltage is too low.	● Check load change and eliminate it. ● Check input power, eliminate fault.
	E.oL1	Motor over-load	● V/F curve setting is not suitable. Or torque boost too high. ● Power grid voltage is too low. ● Wrong overload protection setting. ● Locked-rotor run or too heavy load. ● Universal motor runs at low speed for a long time	● Reset V/F curve or torque boost value. ● Check input power, eliminate fault. ● Unreasonable F5.06 setting. ● Adjust load or select inverter with right capacitance. ● If long-term low-speed operation is needed, please choose special motor for inverter.

	E.oL2	Inverter over-load	● Load is too heavy. ● Acceleration time is too short. ● Start motor when running. ● V/F curve setting is not suitable. Or torque boost too high.	● Select inverter with right capacitance. ● Prolong acceleration time ● Restart motor until it totally stops. Set [F1.00] as 1or2. ● Reset V/F curve or torque boost value.
	E. SC	System abnormal	● Acceleration time is too short. ● Short circuit between inverter output phases or earth. ● Module is damaged. ● Electromagnetic disturb.	● Prolong acceleration time properly. ● Check peripheral equipments and restart after fault eliminating. ● Seek support from vendor. ● Check system wiring, earth, shield and deal as required.
	E.oH1	Inverter over-heat	● Temperature is too high. ● Air channel is blocked. ● Fan connection parts loose. ● Fan is damaged. ● Temperature detection circuit fault	● Meet the environment requirement. ● Clear the air channel. ● Check and reconnect the wire ● Change the same new fan. ● Seek support from vendor.
	E.oH2	Rectifier over-heat	● Temperature is too high. ● Air channel is blocked. ● Fan connection parts loose. ● Fan is damaged. ● Temperature detection circuit fault	● Meet the environment requirement. ● Clear the air channel. ● Check and reconnect the wire. ● Change the same new fan. ● Seek support from vendor.
	E.Fb1	PID feedback over upper limit	● PID feedback wire breaks. ● PID feedback channels parameter is wrong. ● Analog feedback channel is abnormal.	● Check PID feedback wire. ● Check the PID feedback channel parameter setting. ● Seek support from vendor.
	E.Fb2	PID feedback over lower limit	● PID feedback wire breaks. ● PID feedback channels parameter is wrong. ● Analog feedback channel is abnormal.	● Check PID feedback signal wire. ● Check the PID feedback channel parameter setting. ● Seek support from vendor.
	E.TE1	Motor static detection fault	● Detection overtime ● Start static detection when motor is running. ● Capacitance difference is too big between motor and inverter. ● Motor parameter setting mistake.	● Check motor connection wire. ● Detect after motor stops totally. ● Change inverter model. ● Reset parameter according to nameplate.

	E.TE2	Motor rotation detection fault	● Detect when motor is running. ● Detect with load. ● Detection overtime ● Capacitance difference is too big between motor and inverter. ● Motor parameter setting mistake.	● Detect after motor stops totally. ● Re-detect without load. ● Check motor connection wire. ● Change inverter model. ● Reset parameter according to nameplate.
	E.EEP	Storage failure	● Electromagnetic disturb in storage period. ● EEPROM damage.	● Resume load and save. ● Seek support from vendor.
	LIFE	Reserved	●	● Seek support from vendor.
	E.ILF	Input side open phase	● 3-phase input power open phase.	● Check 3-phase power supply and the phase. ● Check 3-phase power supply wiring.
	E.oLF	Output side open phase	● 3-phase output power open phase	● Check 3-phase output voltage and current. ● Check wiring.
	E.Gnd	Output earth	● Output earth terminal short circuit.	● Check wiring and insulation.
	E.HAL	Current detection fault	● Detect circuit fault. ● Phase imbalance	● Seek for technical support. ● Check motor and wiring.
	E. EF	Inverter external fault	● Peripheral equipment fault protection.	● Check peripheral equipment.
	E.PAn	Keyboard connect fault	● Keyboard wire fault. ● Keyboard component damage.	● Check keyboard wire. ● Seek support from vendor.
	E. CE	Rs-485com-munication fault	● Unsuitable baud rate setting. ● Communication wire breaks. ● Communication format does not match upper machine.	● Set suitable baud rate setting. ● Check communication wire. ● Set right communication format.
	E.CPE	Parameter copy fault	● Parameter copy communication is fault. ● Copy keyboard is not match the inverter.	● Check wire. ● Select the specified external keyboard model.

	E.ECF	Extend card connection fault	● Communication between extend card and frequency inverter overtime. ● Extended card does not match with frequency inverter.	● Check connector, and re-insert wire. ● Choose the named card.
	E.PG	PG card connection abnormal	● PG card and inverter connection failure	● Check the connection
	E.PID	PID feedback failure	● PID feedback upper limit of disconnection alarm is improper ● PID feedback lower limit of disconnection alarm is improper ● PID feedback wiring unreliable ● Sensor with feedback failure ● Feedback input loop failure	● Confirm the sensor state, if broken, change it. ● Repair the wiring. ● Confirm the setting value of [Fb.16] and [Fb.17].

中文

1 - 技术

W21 Magnet 驱动系统是由 W21 Magnet 永磁同步电机和 WEGPM 变频器组成的驱动系统。

W21 Magnet 电机具有三相定子绕组，类似于感应电动机，转子装有永磁体，而不是鼠笼式转子。永磁体消除了在转子上所需的感应电流（励磁电流）；因此，电机在空载状态下具有极低的电流，足以弥补电气损耗。除了励磁电流以外，W21 Magnet 也不需要滑差补偿，因为轴转速不随负载而变化。

注意！ 所有 W21 Magnet 电机均为单一的六极配置。

由于该电机没有被设计成直接连接供电电源，该产品线的所有电机均为单一的六极配置并可变频。举个例子，1500 rpm 转速的电机和 3000 rpm 转速的电机频率分别为：

$$\frac{1500 \text{ rpm} \times 6 \text{ 极}}{120} = 75 \text{ Hz} \qquad \frac{3000 \text{ rpm} \times 6 \text{ 极}}{120} = 150 \text{ Hz}$$

注意！ W21 Magnet 电机仅可由 PM 带编码器和 PM 无传感器控制选项来驱动。

2 - 安全措施

任何在电机内部部件的服务必须由具备专业资质的人员操作，由于金属部件之间的磁力吸引力，因此，无论在电机的组装和拆卸过程中均存在风险。

使用心脏起搏器的人员不得操作此类电机。
永磁体也可以在服务过程中造成干扰或损坏其他的电气设备。

- 在打开电机的接线盒之前，确保电机轴处于停止状态。
- 绝对禁止在转子旋转时触碰电机的接线端子，因为即便变频器处于关机状态，触电的危险依旧存在。如果观察到负载有可能加速电机轴的可能性，有必要在变频器和电机端子之间安装断开装置。
- W21 Magnet 电机带有 PTC 温度传感器，它必须连接到变频器上，确保电机在过热的情况下被停机。

为连接PTC 温度传感器，可将输入信号与 X7 和 COM 端口连接 （端口位置参照 第3章-变频器的安装和连接 - 标准连接图）并设置变频器参数组 F2.06 为 9: 外部故障输入 (设置方法参照第4章-变频器的配置)，注意，X7的端子极性应设置为常闭，即断开有效。

注意！ 如需更多关于电机安装和维护的信息，请参照随电机提供的安装维护操作手册。

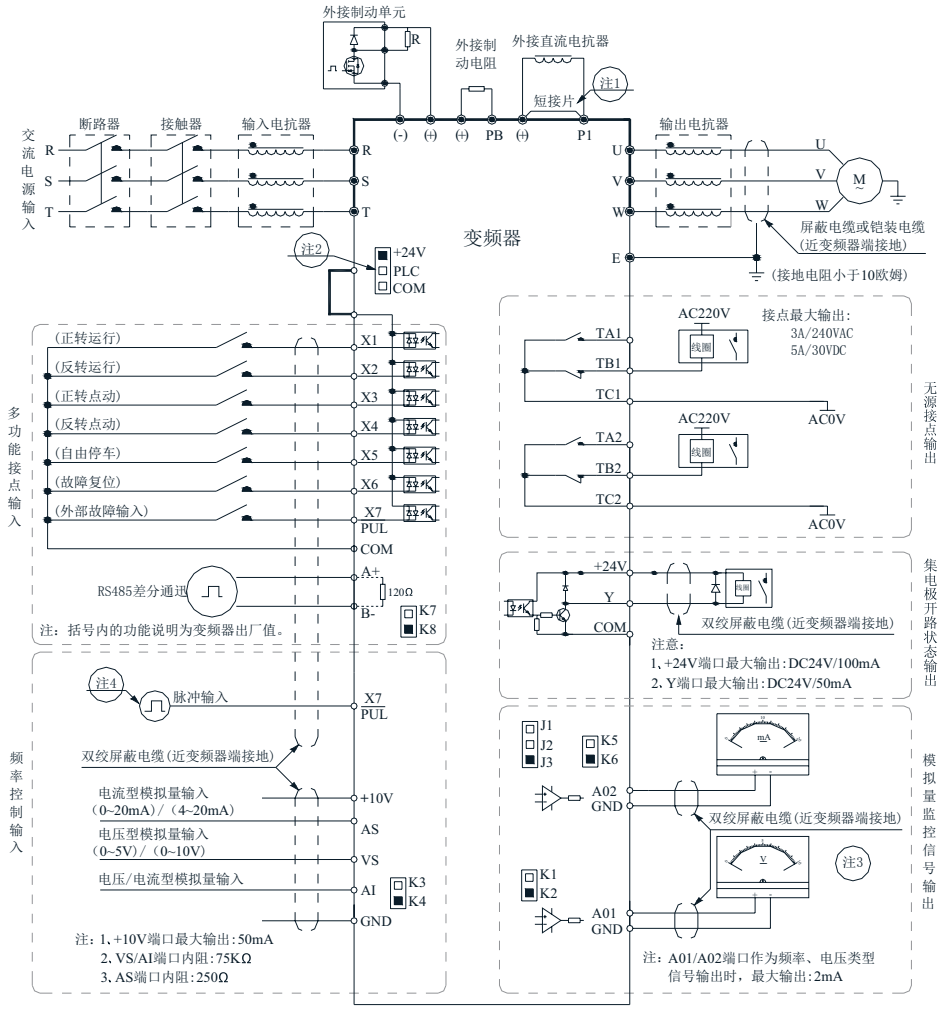
3 - 变频器的安装和连接

注意！ 在安装，通电或操作变频器之前，请仔细阅读随变频器附送的 WEGPM 变频器用户手册。

- 请根据本手册第三章 - 变频器的安装和连接 进行安装。
- 请根据本手册第四章 - 变频器的配置 对变频器进行配置和通电。

标准连接图

- 标准连接图

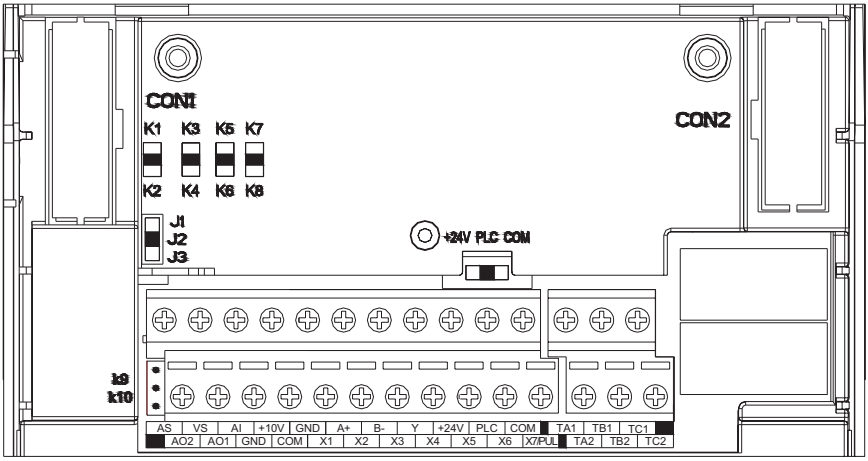


注： 1、安装 DC 电抗器时，请务必拆下 P1, (+) 端子间的短接片；
2、多功能输入端子(X1～X7/PUL)可选择NPN或PNP晶体管信号作为输入，偏置电压可选择变频器内部电源(+24V端子)，也可以选择外部电源(PLC 端子)，出厂值图示转换开关拨至 +24 档表示 '+24V' 与 'PLC' 为短接状态。
3、模拟量监视输出为频率表、电流表、电压表等指示表专用的输出，不能用于反馈控制等控制类操作。
4、由于实际使用中存在多种脉冲类型，具体接线方式请参见详细描述。

● 辅助端子输出能力

端子	功能定义	最大输出
+10V	10V 辅助电源输出，与 GND 构成回路。	50mA
A01/A02	模拟量监控输出，与 GND 构成回路。	作为频率、电压类型信号时最大输出 2mA
+24V	24V 辅助电源输出，与 COM 构成回路。	100mA
Y	集电极开路输出，可程序设定动作对象。	DC24V/50mA
TA1/TB1/TC1 TA2/TB2/TC2	无源接点输出，可程序设定动作对象。	3A/240VAC; 5A/30VDC

● 转换开关功能图例及说明



位号	选择位置	功能说明
S1	K1	AO1输出0～20mA 或4～20mA
	K2	AO1输出0～10V
S2	K3	AI 输入0～20mA 或4～20mA
	K4	AI 输入0～10V
S3	K5	AO2为0.0～50kHz输出时(J1开通)，转AO2为开路集电极输出
	K6	AO2为0.0～50kHz输出时(J1开通)，转AO2为有源输出
S4	K7	RS485通讯接入120欧终端电阻
	K8	RS485通讯断开120欧终端电阻
S5	J1	AO2接口0.0～50kHz频率输出
	J2	AO2接口0～20mA电流输出或4～20mA电流输出
	J3	0～10V电压输出
S6	+24V	+24V与PLC短接
	PLC	PLC接收外部电源输入
	COM	PLC与COM短接
S7	K9	断开工作地GND与机壳PE泄放回路
	K10	连接工作地GND与机壳PE泄放回路

4 - 变频器的配置

4.1 - 变频器按键功能

变频器键盘界面

按键符号	按键名称	功能描述
PRG	菜单键	待机或运行时进入功能菜单界面；在参数修改状时，按下该键退出修改；待机或运行时长按该键（1 秒），直接进入状态监控界面。
SET	确认/修改键	菜单界面时按下该键进入参数修改状态，修改完毕后再次按下该键确认修改值；在待机或运行状态下按下该键可以直接更改停机时LED 监视项。
▲ ▼	上下键	菜单界面时选择参数组；在参数修改状态时修改参数值；待机或运行监视状态下修改给定频率、PID、转矩给定量、磁粉离合器转矩给定量（当给定频率、PID、转矩给定量、磁粉离合器转矩给定量为键盘数字设定时,需设定[F4.04]）。
≪	移位键	菜单界面时用于选择上下键所修改的功能号的位数；参数修改状态时用于选择上下键所修改的参数的位数。
FWD	正转运行键	当运行/停止由键盘控制时,按下该键变频器正转。正转运行时，状态指示灯常亮，反转运行时，状态指示灯闪烁。
JOG REV	反转/点动键	该键可以通过参数[F4.02]定义功能。当定义为反转键（REV）功能时，按下该键变频器反转运行，按功能指示灯灭。当该键定义为点动键时，按下该键变频器点动运行，按键功能指示灯亮。
STOP RESET	停车/复位键	当命令给定通道设定为键盘控制时，按下该键变频器停止运行；也可通过参数[F4.03]定义其扩大有效范围；故障状态时按下该键变频器复位。（当故障未消除时将不能复位）。
	键盘电位器	可用做给定频率、上限频率、给定转矩、PID 给定、PID 反馈等设定值的输入通道。

4.2 - 指示灯含义

名称		状态	含义
单位指示灯	Hz	闪烁	数码管显示的值为给定频率。
	Hz	亮	数码管显示的值为输出频率。
	A	亮	数码管显示的值为输出电流实际值。
	V	亮	数码管显示的值为输入电压。
	V	闪烁	数码管显示的值为输出电压。
	S	亮	表示时间单位为秒。
	S	闪烁	表示时间单位为毫秒、分或是小时。
	RPM	亮	表示此时4位数码显示的值为电机转速。
	%	闪烁	表示此时4位数码显示的值为PID给定量。
	%	亮	表示此时4位数码显示的值为PID反馈量。
状态指示灯	FWD	亮	变频器正转运行中。
	FWD	闪烁	变频器反转运行中。
	FWD	灭	变频器停机。
功能指示灯	REV/JOG	亮	该键定义为点动按键。
	REV/JOG	灭	该键定义为反转按键。

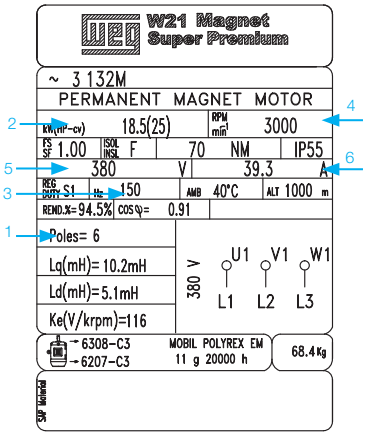
4.3 - 数字文字对照表

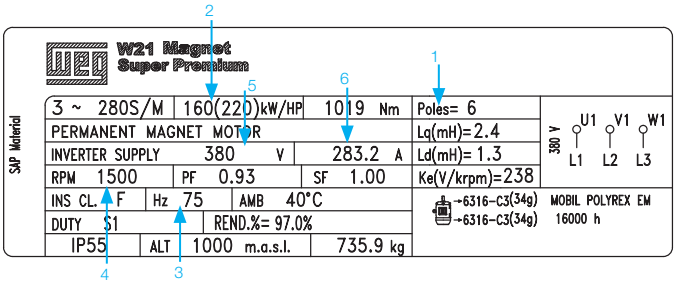
数字	LED显示	字母	LED显示	字母	LED显示
0	0	C	C	O	o
1	1	D	d	P	P
2	2	E	E	Q	q
3	3	F	F	R	r
4	4	G	G	S	S
5	5	H	H	T	t

数字	LED显示	字母	LED显示	字母	LED显示
6	6	I	I	U	U
7	7	J	J	V	v
8	8	K	K	W	W
9	9	L	L	X	无显示
A	A	M	M	Y	y
B	b	N	n	Z	无显示

4.4 - 定向启动的设置步骤

- 为了定向启动的设置，请参照下面的步骤输入电机铭牌的数据。





1 - 极数	*4* - 额定转速
2 - 功率	*5* - 额定电压
3 - 频率	*6* - 额定电流

注意! 通过“定向启动”的配置，将自动修改变频器内与控制和电机相关的参数和内部变量的内容。 这确保了控制的稳定操作和电动机的最大效率。

定向启动配置步骤 (以18.5kW电机铭牌数据为例)					
1	按 “*PRG*”		2	- 选择 “*F0*” 组. - 按 “*Set*”.	
3	- 根据电机控制算法 “5：PM矢量控制” 设定 “*F0.00*” . - Press “*Set*”.		4	- 根据电机频率上限设定 “*F0.11*” 。 - 按 “*Set*”.	
5	- 根据目标频率设置 “*F0.08*” 。 - 按 “*Set*”.		6	- 根据最大频率设置 “*F0.09*” 。 - 按 “*Set*”.	
7	- 选择 “*F5*”组. - 按 “*Set*”.		8	- 根据电机极数设置 “*F5.01*” 。 - 按 “*Set*”.	
9	- 根据电机额定功率设置 “*F5.02*” 。 - Press “*Set*”.		10	- 根据 额定 设置 “*F5.03*” 。 - 按 “*Set*”.	
11	- 根据电机额定转速设置 “*F5.04*”。 - 按 “*Set*”.		12	- 根据电机额定电压设置“*F5.05*” 。 - 按 “*Set*”.	
13	- 根据电机额定电流设置 “*F5.06*” 。 - 按 “*Set*”.		14	- 将 “*F5.12*” 设置为 “*2: Static Self-Tune*“. - 按 “*Set*”.	
结束设置按 “*Reset*”.			启动电机按 “*FWD*”.		

5 - 故障诊断和对策

本章对变频器的故障、警报、以及操作时的故障等，在变频器上的显示内容及其对策进行说明。另外，本章还对变频器及电机的故障所引起的不良状况及其解决方法进行简单说明。关于试运行时变频器的调整指南也请参照本章。

5.1 - 故障类型

种类	故障发生时的变频器的动作
设备故障	变频器检测出故障时，会出现以下状况： ● 键盘上出现表示故障内容的文字； ● 变频器输出被切断，电机自由滑行停止； ● 功能 [F2.29] 选择为 3（故障输出）时，Y 端子输出有效的集电极开路开关量输出； ● 功能 [F2.30\F2.31] 选择为 3（故障输出）时，TA1~TC1、TA2~TC2 端子输出闭合的无源开关量输出，TB1~TC1、TB2~TC2 端子输出断开的无源开关量输出； ● 对于过载 (OL)、过流 (OC)、系统异常 (SC)、过压 (OU)、运行中欠压 (LU2) 类型的故障现象，如果 [FA.22] 选择不是 0，此时，如果发生上述故障，变频器经过 [FA.23] 设定的时间间隔后，自动重新启动。
外部故障	某些应用场合，将外部关联设备的故障信号纳入变频控制系统，作为监控、保护、切换控制等用途，此时，如果定义了某个多功能接点输入端子为“外部故障”，当外部关联设备的故障信号有效时，变频器封锁输出给出报警信号。

5.2 - 故障信息及详细内容

键盘显示	故障代码	故障类型	可能故障原因	故障对策
	L.U.1	停机时过低	● 电源电压太低； ● 电压检测电路异常。	● 检查输入电源，排除故障； ● 寻求厂家技术支持。
	E.LU2	运行中欠压	● 电源电压太低； ● 电网容量太小，或电网内有较大冲击电流； ● 变频器内部直流主接触器未吸合。	● 检查输入电源，排除故障； ● 改善供电系统； ● 寻求厂家技术支持。
	E.oU1	加速过电压	● 电源电压波动超限； ● 启动正在旋转的电机。	● 检测电网电压，排除故障； ● 等电机完全停止后再启动、将 [F1.00] 设置为 1 或者 2。
	E.oU2	减速中过压	● 减速时间设置过短； ● 负载势能或惯量太大； ● 电源电压波动超限。	● 适当延长减速时间； ● 减少负载惯量，或增大变频器容量，或增设制动单元； ● 检查输入电源，排除故障。

	E.oU3	恒速中过压	● 电源电压波动超限。	● 检查输入电源，排除故障； ● 安装输入电抗器。
	E.oU4	停机时过压	● 电源电压波动超限。	● 检查输入电源，排除故障； ● 寻求厂家技术支持。
	E.oC1	加速中过流	● 加速时间设置过短; ● 启动正在旋转的电机； ● V/F 曲线设定不适或转矩提升值过高； ● 变频器容量偏小。	● 适当延长加速时间； ● 等电机完全停止后再启动、将 [F1.00] 设置为 1 或者 2； ● 重新设定 V/F 曲线或转矩提升值； ● 选用容量等级匹配的变频器。
	E.oC2	减速过电流	● 减速时间设置过短; ● 势能负载或负载惯量较大； ● 变频器容量偏小。	● 适当延长减速时间； ● 外接制动电阻或制动单元； ● 选用容量等级匹配的变频器。
	E.oC3	恒速过电流	● 负载突变； ● 电网电压偏低。	● 检查负载的变化情况并消除之； ● 检查输入电源，排除故障。
	E.oL1	电机过载	● V/F 曲线设定不适或转矩提升值过高； ● 电网电压偏低； ● 电机过载保护系数设置不当； ● 电机堵转运行或负载太重； ● 通用电机长时间低速运行。	● 重新设定 V/F 曲线或转矩提升值； ● 检查输入电源； ● [F5.06/18] 参数设置不合理； ● 调整负载工况或选用容量等级匹配的变频器； ● 需要长期低速运行时，请选择变频专用电机。
	E.oL2	变频器过载	● 负载太重 ● 加速时间设置过短; ● 启动正在旋转的电机； ● V/F 曲线设定不适或转矩提升值过高。	● 选用容量等级匹配的变频器； ● 适当延长加速时间； ● 等电机完全停止后再启动、将 [F1.00] 设置为 1 或者 2； ● 重新设定 V/F 曲线或转矩提升值。
	E. SC	系统异常	● 加速时间设置过短; ● 变频器输出相间或对地短路； ● 模块损坏； ● 电磁干扰。	● 适当延长加速时间； ● 检查外围设备，排除故障后重启； ● 寻求厂家技术支持； ● 检查系统布线、接地、屏蔽等情况并按照要求处理。
	E.oH1	逆变器过热	● 环境温度过高； ● 风道堵塞； ● 风扇连线插件松动; ● 风扇损坏； ● 温度检测电路故障。	● 使变频器运行环境符合规格要求； ● 疏通风道； ● 检查并重新连线； ● 更换同型号风扇； ● 寻求厂家技术支持。

	E.oH2	整流桥过热	● 环境温度过高； ● 风道堵塞； ● 风扇连线插件松动； ● 风扇损坏； ● 温度检测电路故障。	● 使变频器运行环境符合规格要求； ● 疏通风道； ● 检查并重新连线； ● 更换同型号风扇； ● 寻求厂家技术支持。
	E.Fb1	PID 反馈达上限	● PID 反馈断线； ● PID 反馈通道参数设置错误； ● 模拟量反馈通道电路异常。	● 检查 PID 反馈信号线； ● 检查 PID 反馈通道参数设置； ● 寻求厂家技术支持。
	E.Fb2	PID 反馈达下限	● PID 反馈断线； ● PID 反馈通道参数设置错误； ● 模拟量反馈通道电路异常路。	● 检查 PID 反馈信号线； ● 检查 PID 反馈通道参数设置； ● 寻求厂家技术支持。
	E.TE1	电机静态检测故障	● 电机检测超时； ● 电机旋转中启动静态检测； ● 电机与变频器容量差别过大； ● 电机参数设置错误。	● 检查电机连线； ● 待电机停稳后进行检测； ● 更换变频器型号； ● 按电机铭牌重新设置。
	E.TE2	电机旋转检测故障	● 电机旋转中启动检测; ● 电机带负载检测； ● 电机检测超时； ● 电机与变频器容量差别过大； ● 电机参数设置错误。	● 待电机停稳后进行检测； ● 脱开电机负载，重新检测； ● 检查电机连线； ● 更换变频器型号； ● 按电机铭牌重新设置。
	E.EEP	存储故障	● 存储期间电磁干扰； ● EEPROM 损坏。	● 重新输入并存储； ● 寻求厂家技术支持。
	LIFE	保留	●	寻求厂家支持。
	E.ILF	输入侧缺相	● 变频器三相输入电源缺相。	● 检查三相输入电源电压及相数； ● 检查三相输入电源配线。
	E.oLF	输出侧缺相	● 变频器三相输出缺相。	● 检查三相输出电压及电流； ● 检查电机配线。
	E.Gnd	输出接地	● 变频器输出侧对地短路。	● 检查接线、电机绝缘。

	E.HAL	电流检测故障	● 检测电路故障； ● 电机相间不平衡。	● 寻求技术支持； ● 检查电机及配线。
	E. EF	变频器外部故障	● 外部设备故障保护动作。	● 检查外部设备。
	E.PAn	键盘连接故障	● 键盘连线故障； ● 键盘组件损坏。	● 检查键盘连线； ● 寻求厂家技术支持。
	E. CE	Rs485 通讯异常	● 波特率设置不当； ● 通讯连线断线； ● 通讯格式与上位机不匹配。	● 设置匹配的波特率； ● 检查通讯连线； ● 设置匹配的通讯格式。
	E.CPE	参数拷贝异常	● 参数拷贝通讯错误; ● 键盘连线故障。	● 检查连线； ●寻求厂家技术支持。
	E.ECF	扩展卡连接异常	● 扩展卡与变频器通讯超时； ● 扩展卡与变频器不匹配。	● 检查连接器，重新插线； ● 选用指定型号的扩展卡。
	E.PG	PG 卡连接异常	● PG 卡与变频器通连接故障	● 检查连线
	E.PID	PID 反馈故障	● PID 反馈断线报警上限值设定不当 ● PID 反馈断线报警下限值设定不当 ● PID 反馈接线不良 ● 反馈用传感器故障 ● 反馈输入回路故障	● 确认传感器状态，如有损坏，则更换传感器 ● 修正接线 ● 确认 Fb.16 与 Fb.17 的设定值

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