

Quick guide of PI9000 operation



My future ,drive and control

1. The introduction of new generation of PI9000
2. The new generation of PI9000 has following feature .
3. Installation of PI9000 procedure :
4. Connection of peripheral devices.
5. Keyboard operating instruction.
6. Trial operation follow chart
7. Wiring Of PI9000 inverter
8. How to perform motor auto-turning
9. Apply the braking unit and braking resistor
- 10.1. Operate the VFD with keyboard
- 10.2 Operating Forward and reverse key of key board for JOG running
- 10.3. Operating VFD by I/O terminals board.
- 10.3.2. wiring of I/O interface terminal
- 10.3.3. FWD and REV running controlled by I/O terminal .
- 10.3.4. FWD and REV JOG running controlled by I/O terminal
- 10.3.5. three line control mode
11. Frequency setting with external potentiometer (Variable resistor)
12. Frequency setting by analog current (AI2)
13. Employ output analog signal for monitoring current , frequency , speed etc.
14. Multi-speed applying with I/O interface terminal
15. Frequency UP and Down controlled by I/O interface terminal board
- 16.1. Application of multi-function output . (1) alarm output
- 16.2. Application of multi-function output 2. (frequency arrival and frequency detecting)
17. PID control for constant pressure water supply-electrical diagram (0-10V signal feedback)
18. PI9000 apply in air compressor retrofitting with PID control function.
19. Application of PI9000 series inverters in crane
20. Fault Diagnosis

1.The introduction of new generation of PI9000 of POWTRAN Technology.



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The PI9000 series inverter is high-performance motor control module and consists of V/F, sensorless vector control (SVC) and torque control. It is mainly responsible for high performance control and overall protection of the motor, controlling the motor through sending running commands to multiple channels or performing close loop vector control through encoder interface. which mainly ,includes most of functions of the inverter, such as PID control, MS speed, and swing frequency and so on .

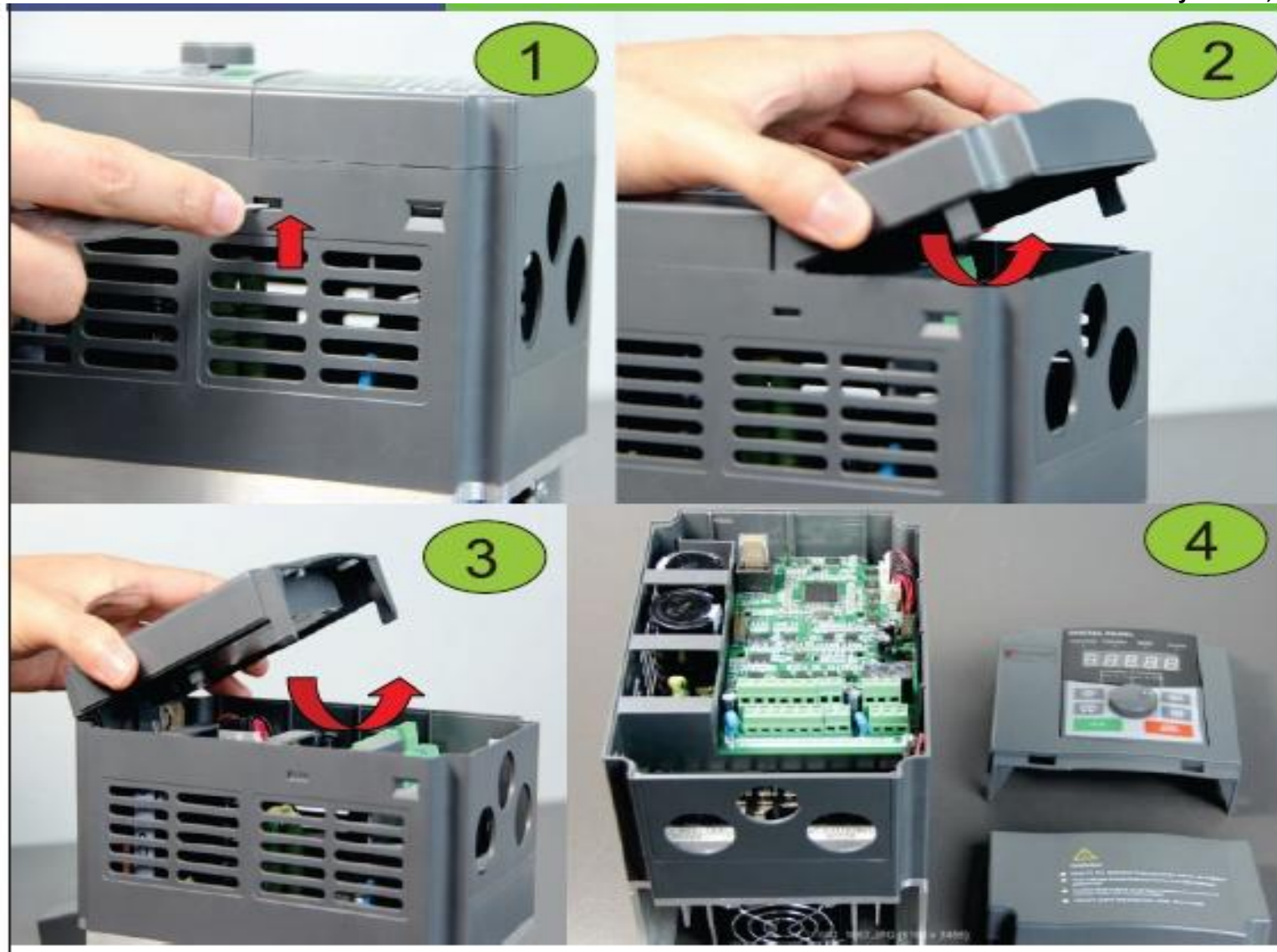


2. The new generation of PI9000 has following feature .

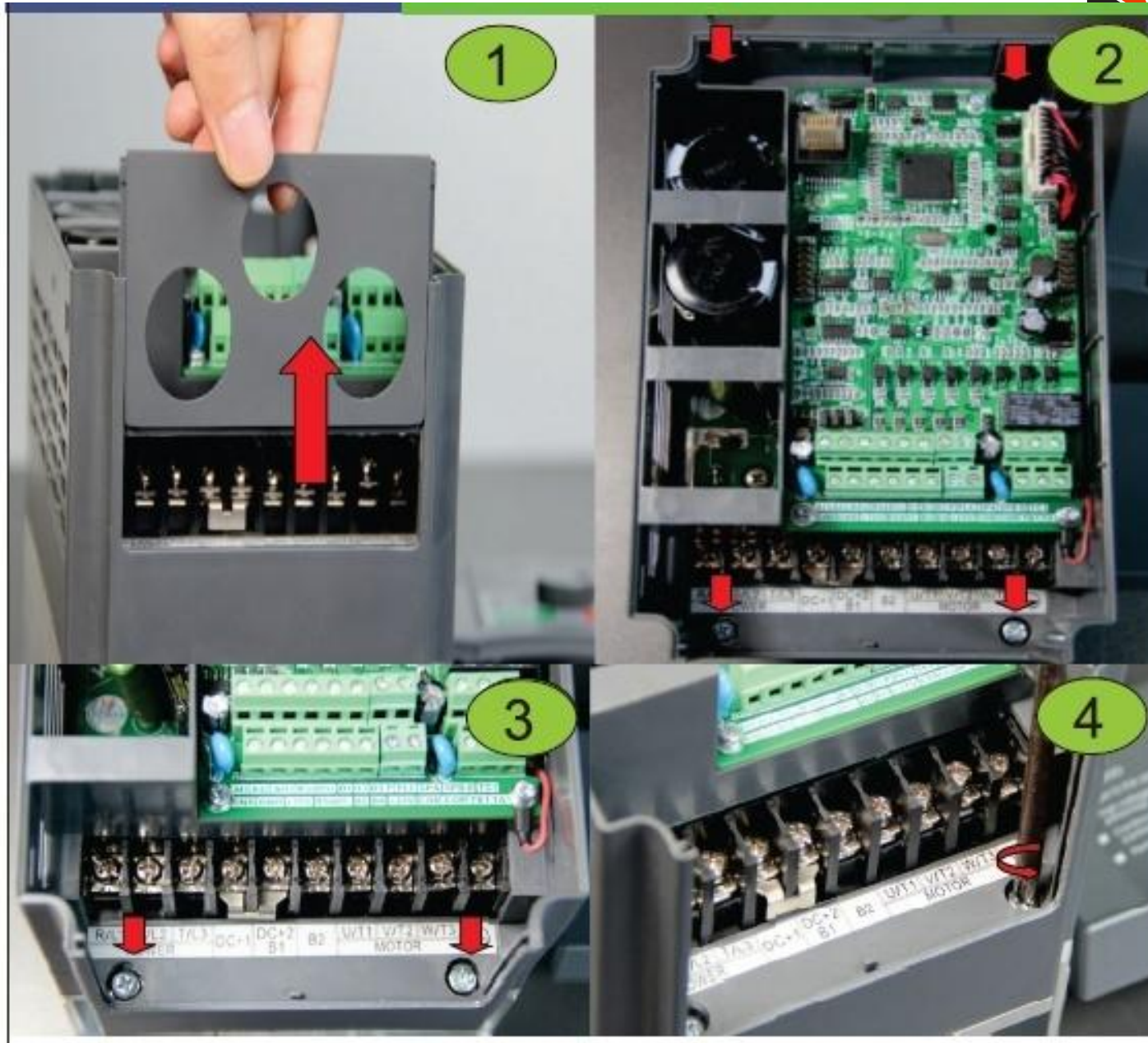
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Input/output terminal	Five digital two analog input signal, two analog output ,two high speed port and one relay
Control mode	0:V/Fz1:open loop flux vector control 2:open loop without sensor flux vector control 3:closed loop with sensor flux vector control
MS speed	Be able to realize 16S speed
PLC Simple PLC	Be able to realize 16S timing operation
Swing frequency and fixed-length control	Available
Swing frequency and	Available
Main/auxiliary setup	Available
Communication function	standard RS485 ,Modbus
PID control	Available
Protection function	It can implement power-on motor short-circuit detection, input/output phase loss protection, over current protection, over voltage protection, under voltage protection, over heat protection and overload protection. Over voltage stall protection ,current limit
Parameter copy	It enables the parameter copy unit to copy the parameters quickly.
Optional parts	LCD operation panel, braking components, communication card,, PG card, water supply card, etc

3. Installation of PI9000 procedure :



Install show picture -1



Install show picture -2

Power on inverter



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keyboard

I/O control terminal

Main Terminal cover

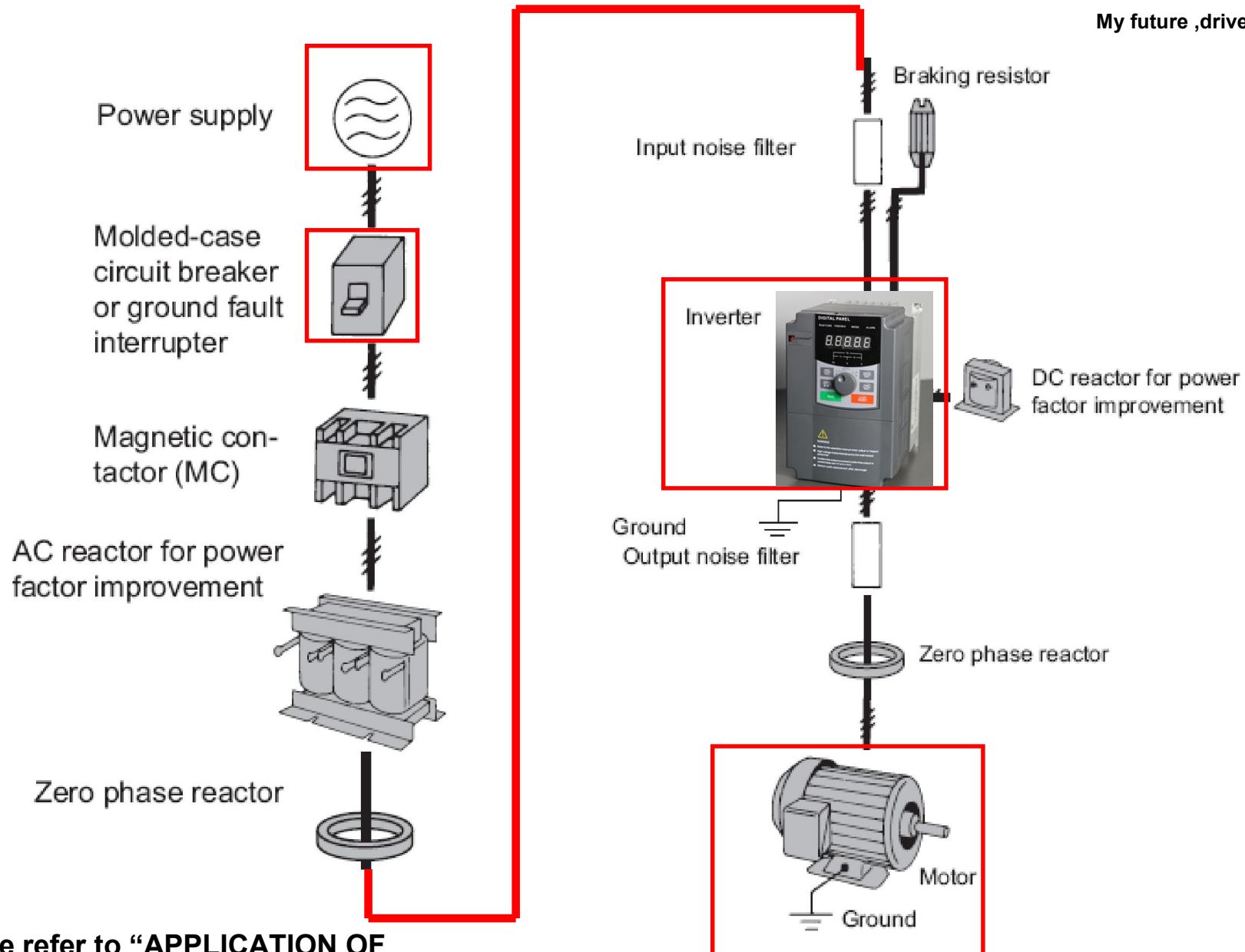


Front cover

4.Examples of connections between the Inverter typical peripheral devices are shown.



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Please refer to “APPLICATION OF OPTIONAL EQUIPMENT ”.

Service center of POWTRAN technology company

5.Keyboard operating instruction._1

The operator interface provides a means for an operator to start and stop the motor and adjust the operating speed.



Escape key :enter into function parameters list or escape it .



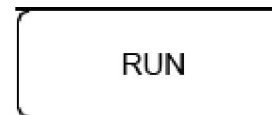
1.Shift the data bit when do a modification .
2:shift the monitor parameters in the stop mode



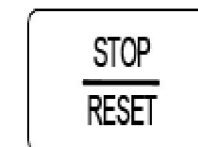
Date or Function code
increase/decrease



Enters menus and parameters, and set validates parameter changes.



Starts the Inverter operation



1.Stop inverter operation
2.Also acts as the Reset key when a fault has occurred.

- 1.Change the U0-UP,E0-E5 in the first Menu
- 2.Change the function code in the second menu
- 3.Change the value of function code in the third menu
- 4.Frequency setting in the run or stop mode.

5.Keyboard operating instruction. _2

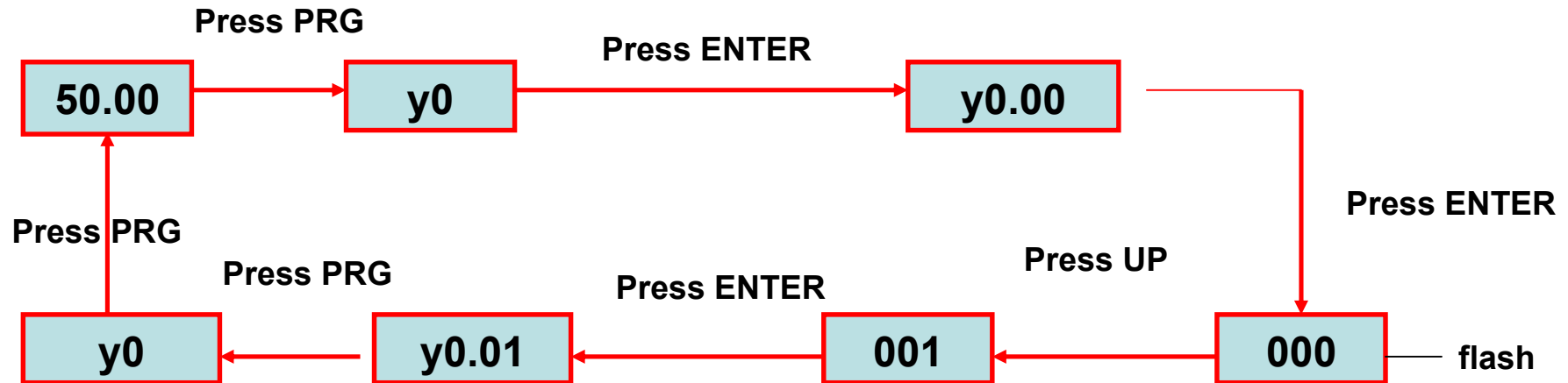


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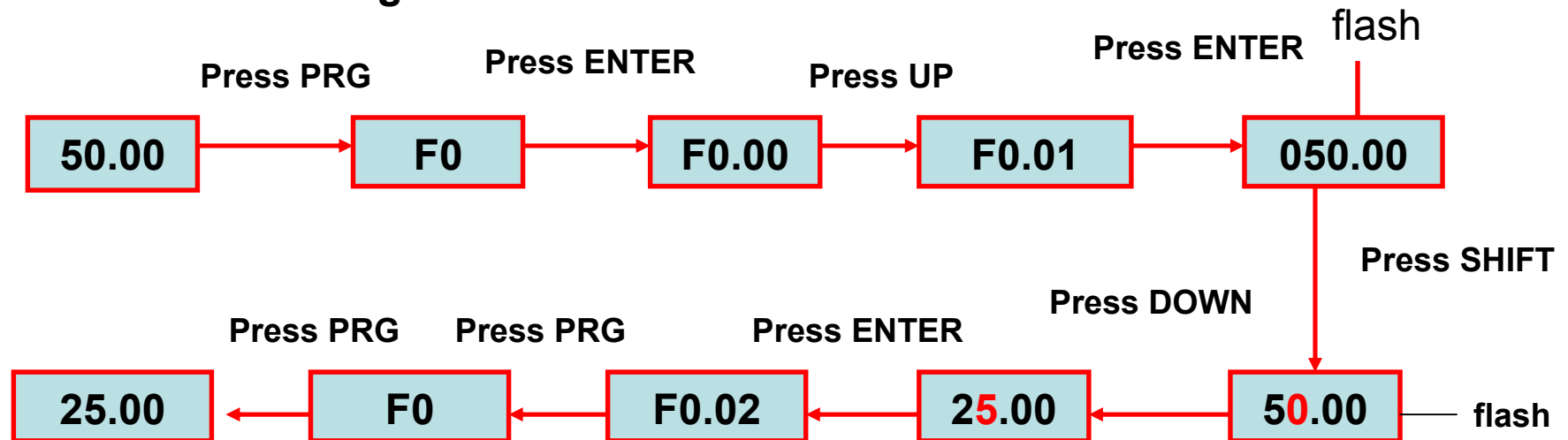
1.The first menu **F0** 2.The second menu:**F0.01**

3.The third menu:**50.00**

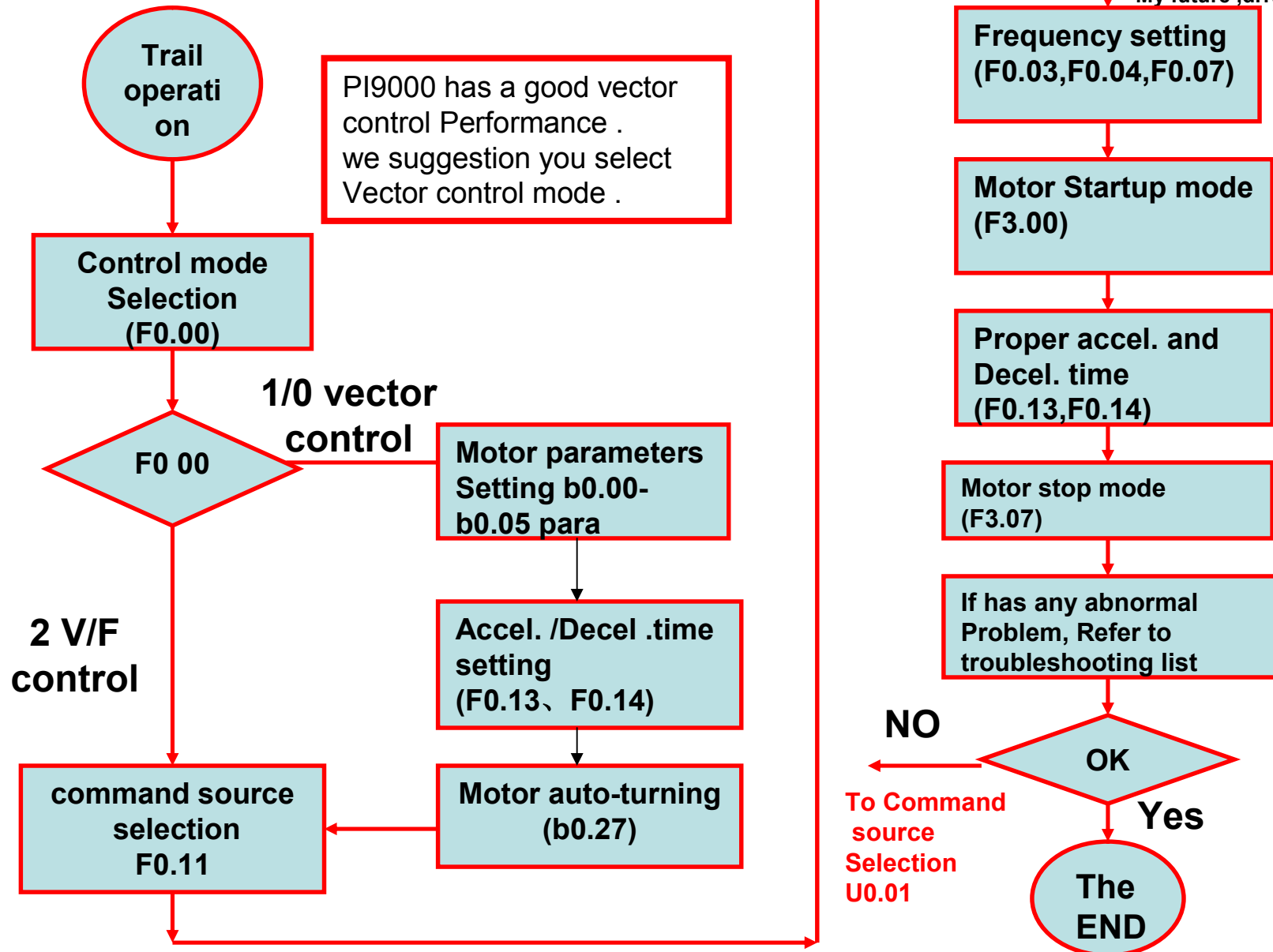
2. Reset parameters to factory setting



3. Parameters setting

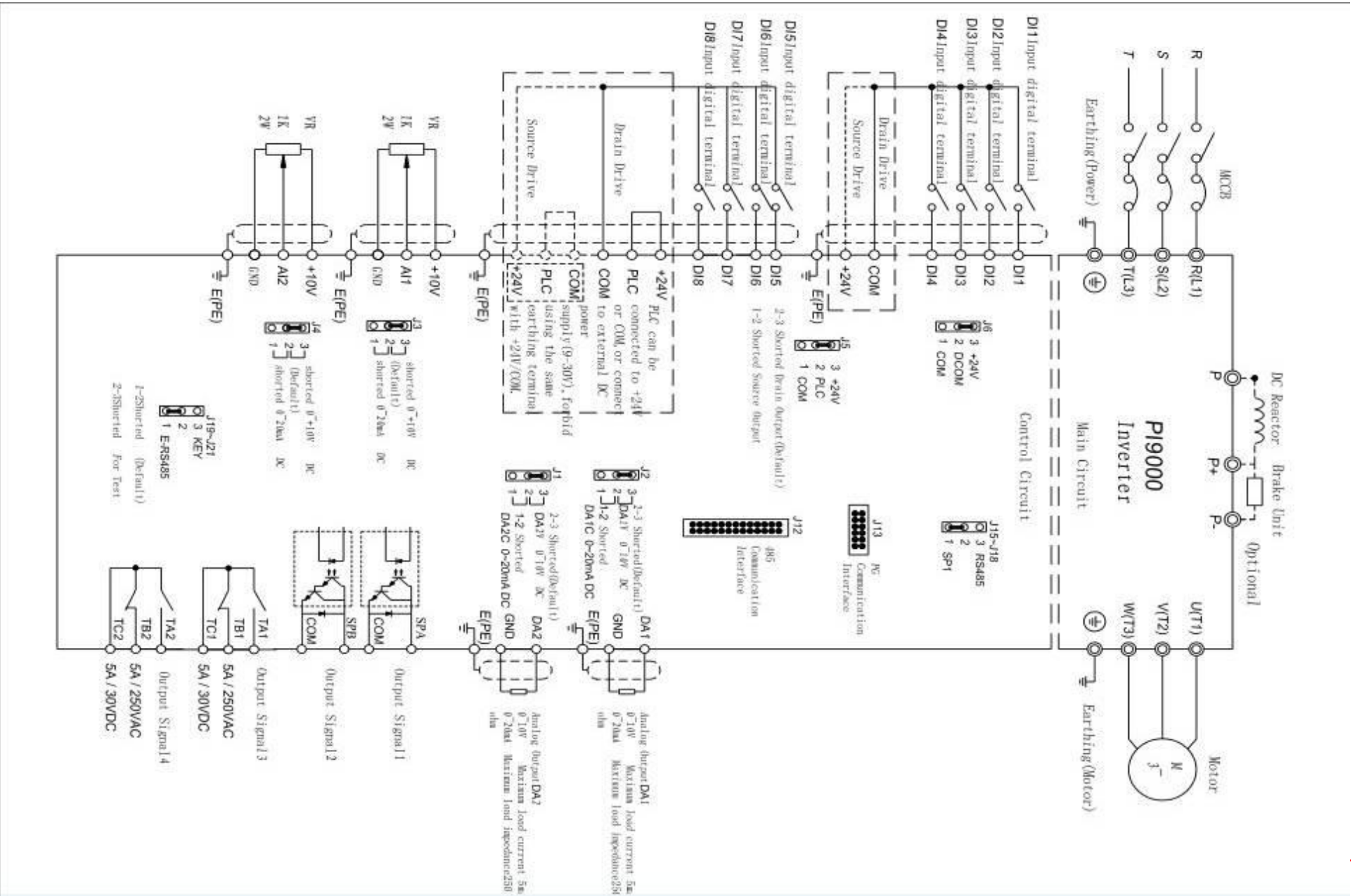


6.Trial operation follow chart



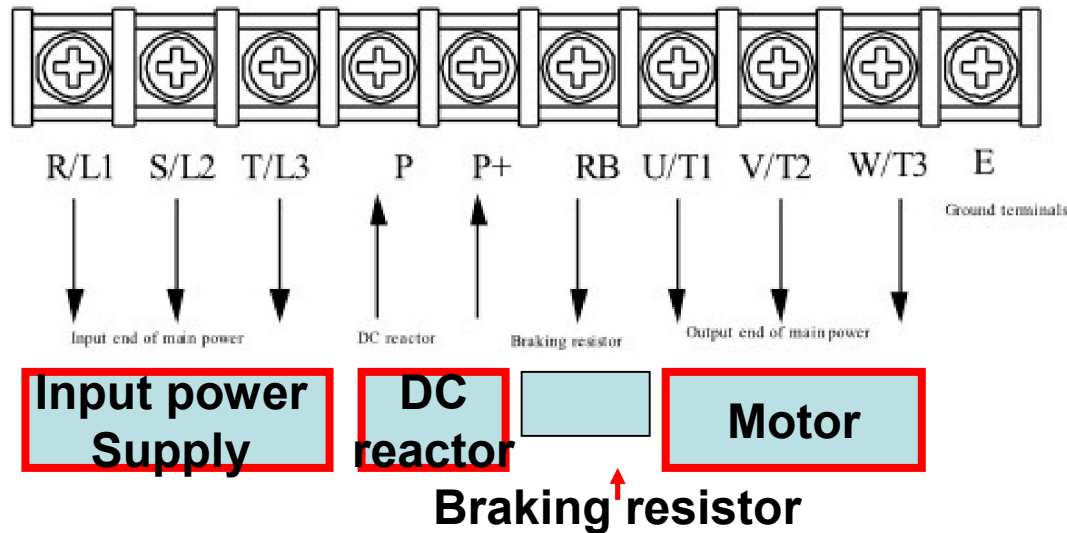
PI9000 has a good vector control Performance . we suggestion you select Vector control mode .

7.Wiring

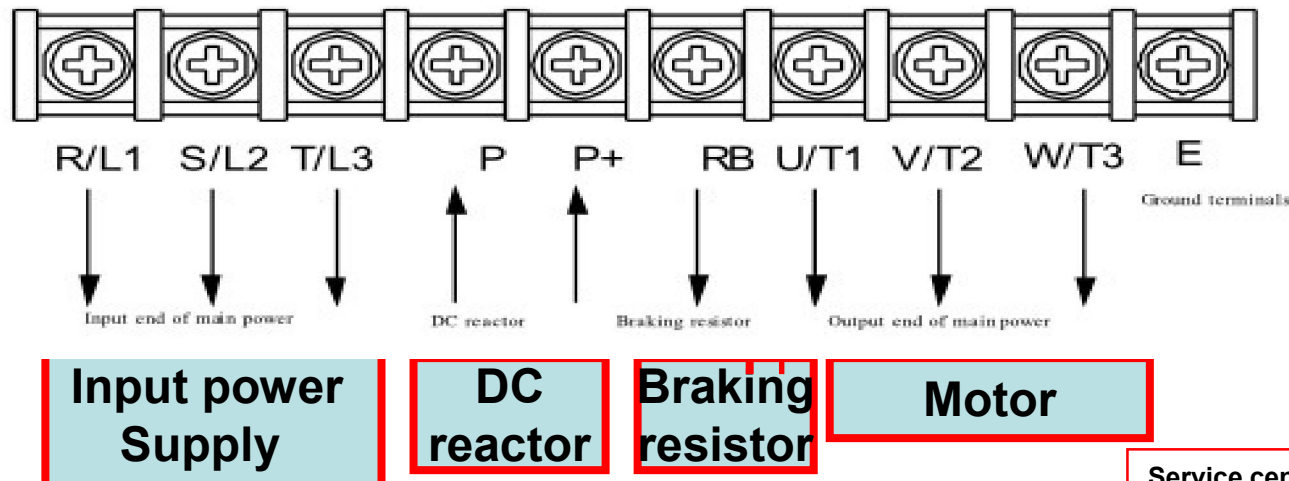


. Main terminal

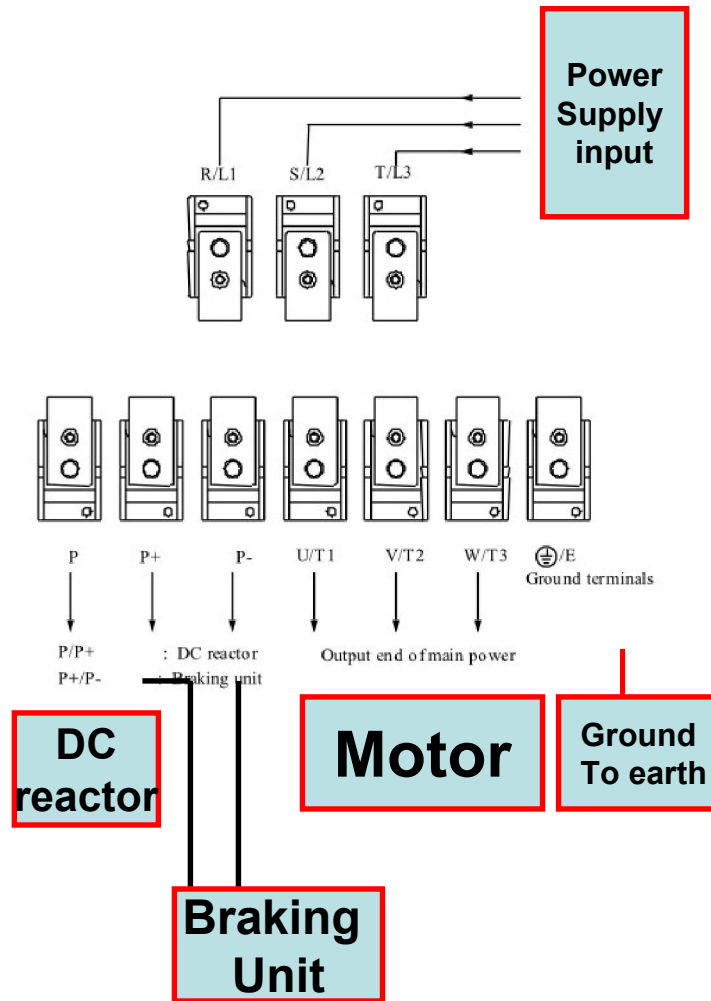
Main circuit terminal(<7.5KW, 380V):



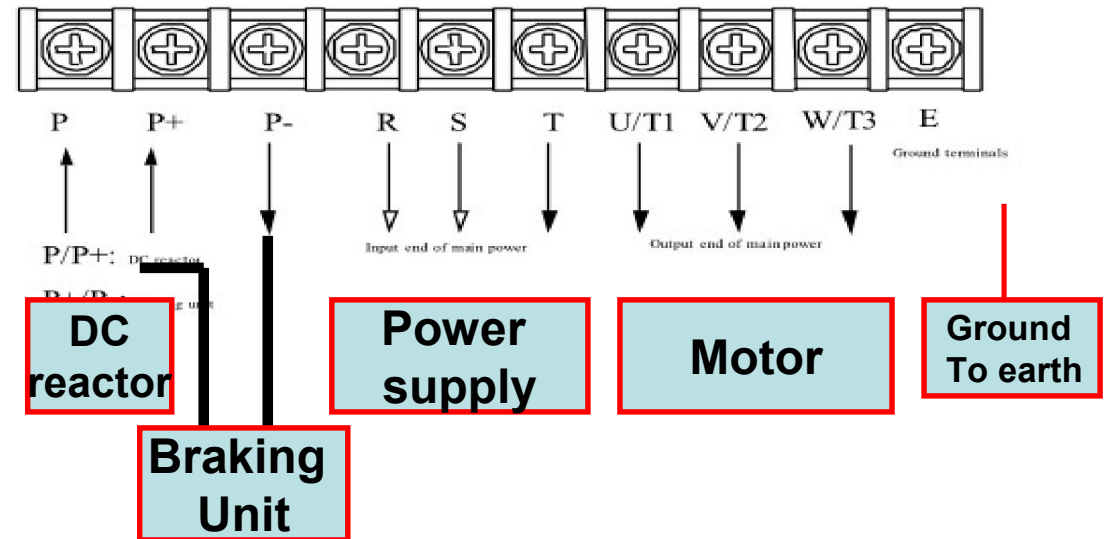
Main circuit terminal(11kW to 15kW, 380V):



The main terminal of 45~220kW (380V) inverter

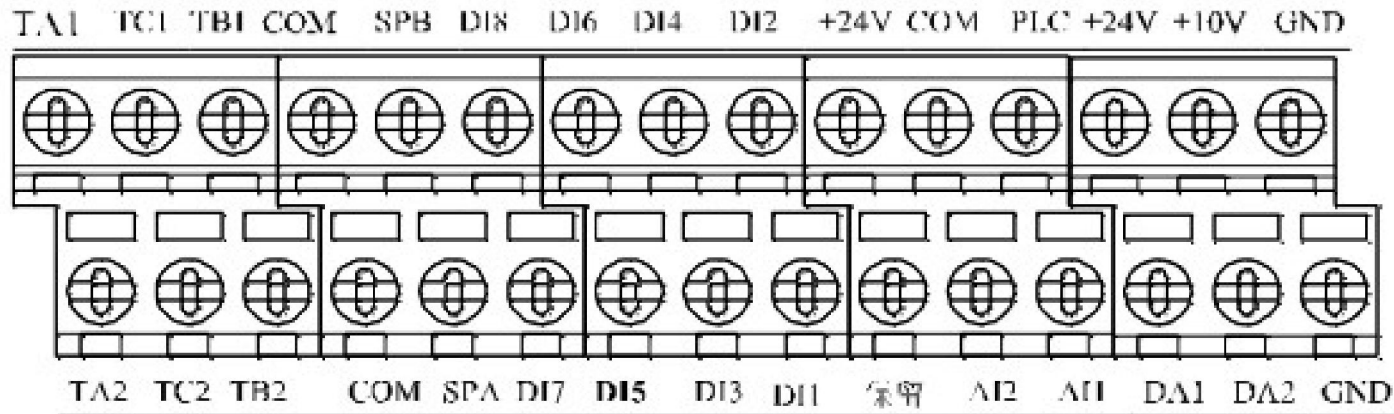


The main terminal of 18.5~355kW (380V) inverter

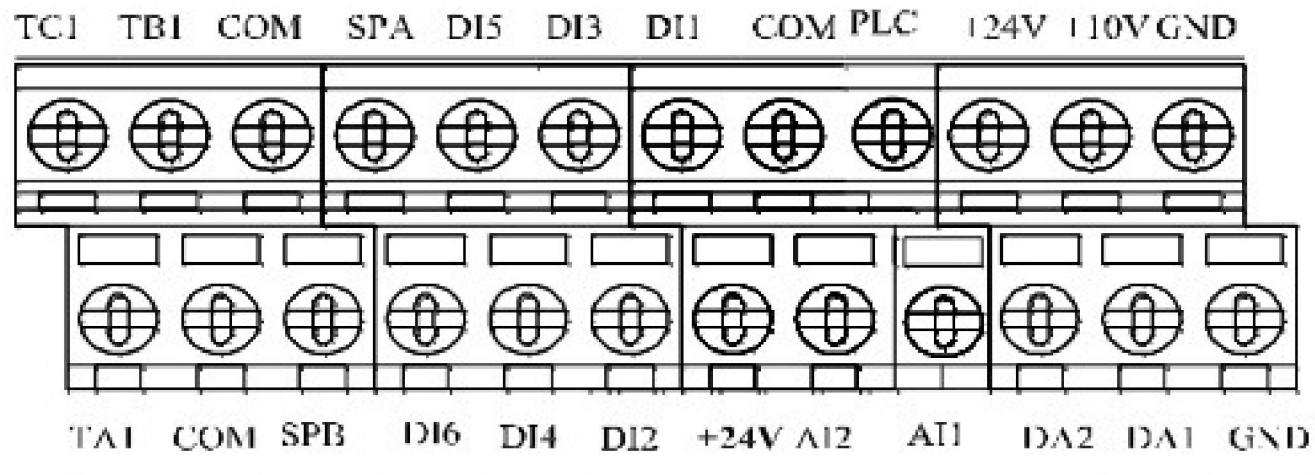


I/O control terminal of PI9000.

There are two type of controller board of PI9000.



The I/O terminal of 9KLCB controller board



The I/O terminal of 9KSCB controller board

8.How to perform motor auto-turning ?

Performing motor auto-turning to get the motor parameters Automatically for vector control application .

1. Set F0.00=1 or 2 refer to whether you have PG card or not . (set corresponding value in parameter b0.28 and b0.29 according to your encoder)
2. Typing motor parameters in parameter b.00-b0.05 according to your motor nameplate.
3. **Disconnect load from motor for performing complete rotational auto-turning.**

b0.00	motor type	0:General asynchronous motor 1:Asynchronous frequency conversion motor 2:permanent magnet synchronous motor
b0.01	rated power	0.1~1000.0KW
b0.02	rated voltage	1~2000V
b0.03	rated current	0.01A~655.35A (rated power <=55KW) 0.1A~6553.5A (rated power >55KW)
b0.04	rated frequency	0.01~F0.19 (maximum frequency)
b0.05	rated rotation speed	0~36000RPM
b0.27	motor auto-turning selection	0:no operation 1,Asynchronous motor parameters still auto tuning. 2.Asynchronous motor parameters comprehensive auto tuning.

8.Motor auto turning _1



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4. Program b0.27=2 and press RUN key ,the auto-turning is going to start.
(If the load can't take away from the motor ,please set b0.27 to 1 to perform stationary auto-turning)
5. The time of auto-turning **is** depended on the parameter F0.13 and F0.14.
6. You can test whether the PG card is OK or not in the parameter d0.33 (ABZ position),Also you can monitor the encoder feedback speed in parameter d0.26.



Motor basic
Parameter
setting



Going to Auto-turning

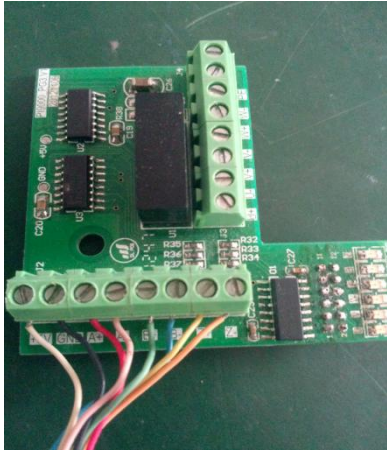


Auto-turning

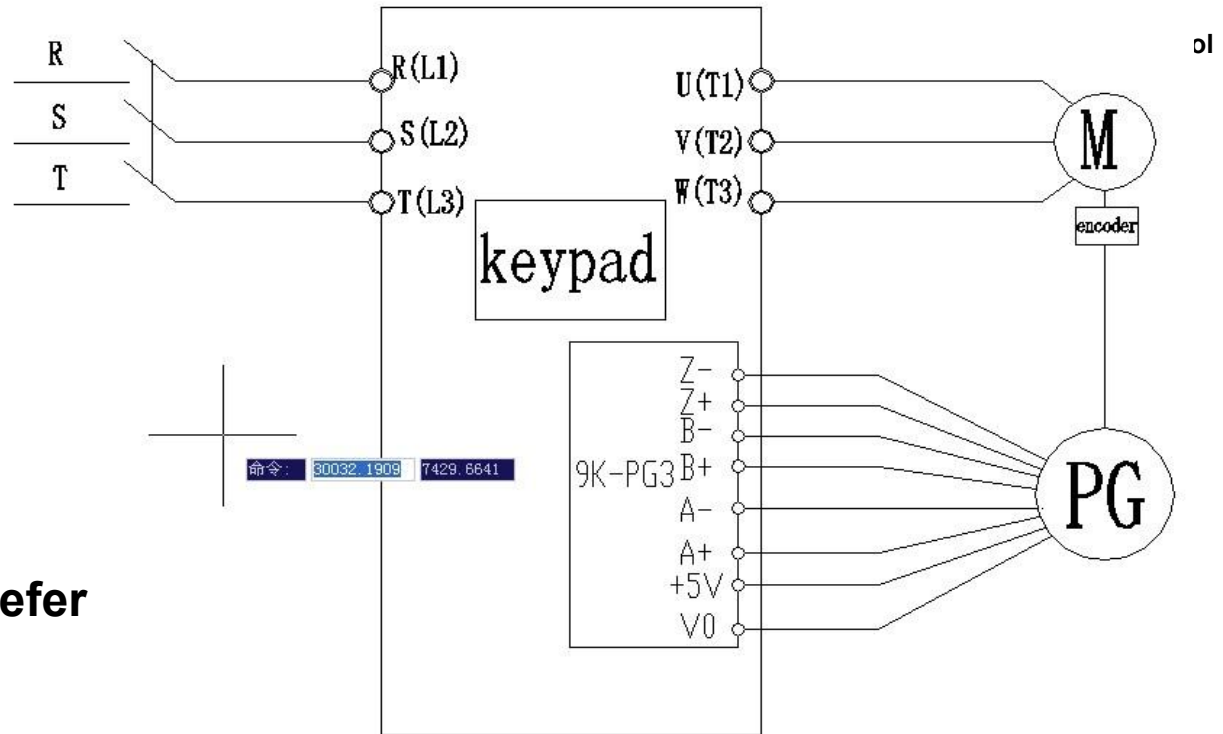


Finish auto-turning

8.1 PG feedback close loop vector control

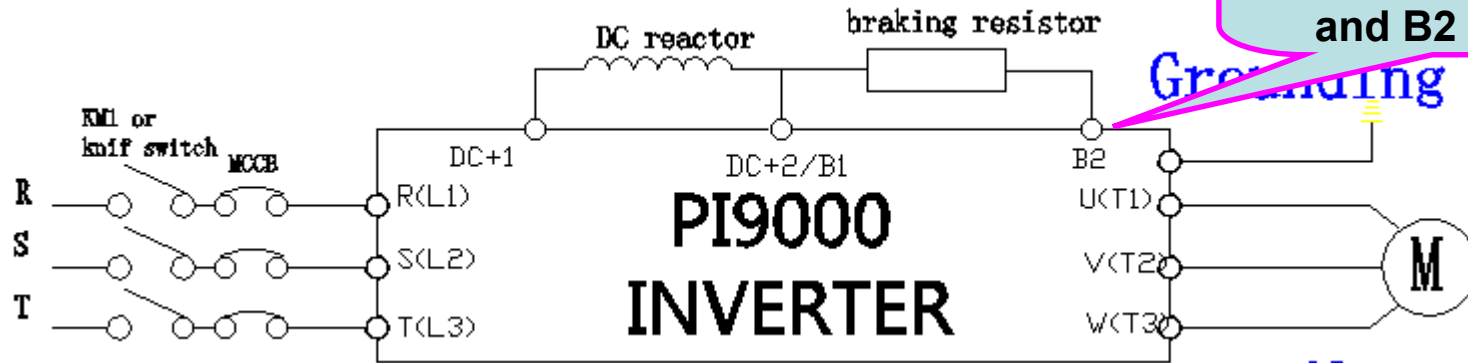


Before use close loop vector control with PG card, first of all ,motor must auto-turning refer to point 8.



F0.00	Control Mode	Sensor feedback close loop vector control	1
b0.27	motor auto-turning selection	0:no operation 1,Asynchronous motor parameters still auto tuning. 2.Asynchronous motor parameters comprehensive auto tuning.	2
b0. 29	PG Pulse	1~65535	2500
b0. 28	PG Type	ABZ incremental encoder	0
b0. 34	PG Dropped Inspection Time	0.1S-10S	0.0

9. Apply the braking unit and braking resistor .



The HP of 22kW of 220V and below and HP of 15 and it is below has built In braking unit inside of inverter ,it can provide maximum of 50% of braking Torque ,if connect to braking unit ,it can provide maximum of 150% torque .

It is no need to set any parameters for connecting the braking unit .

The braking function is activated in default ! The activated of DC braking Voltage is $130\% U_{DC}$

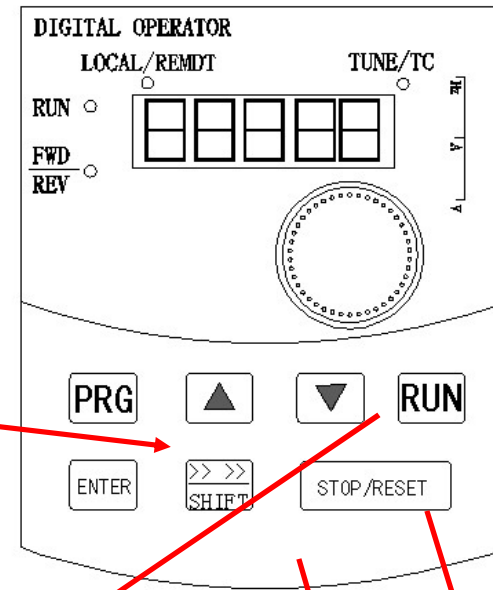
10.1. Operating the VFD with keyboard



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Change the Display content With SHIFT button



F0.24=1
For switchover
FWD and REV
Running
direction

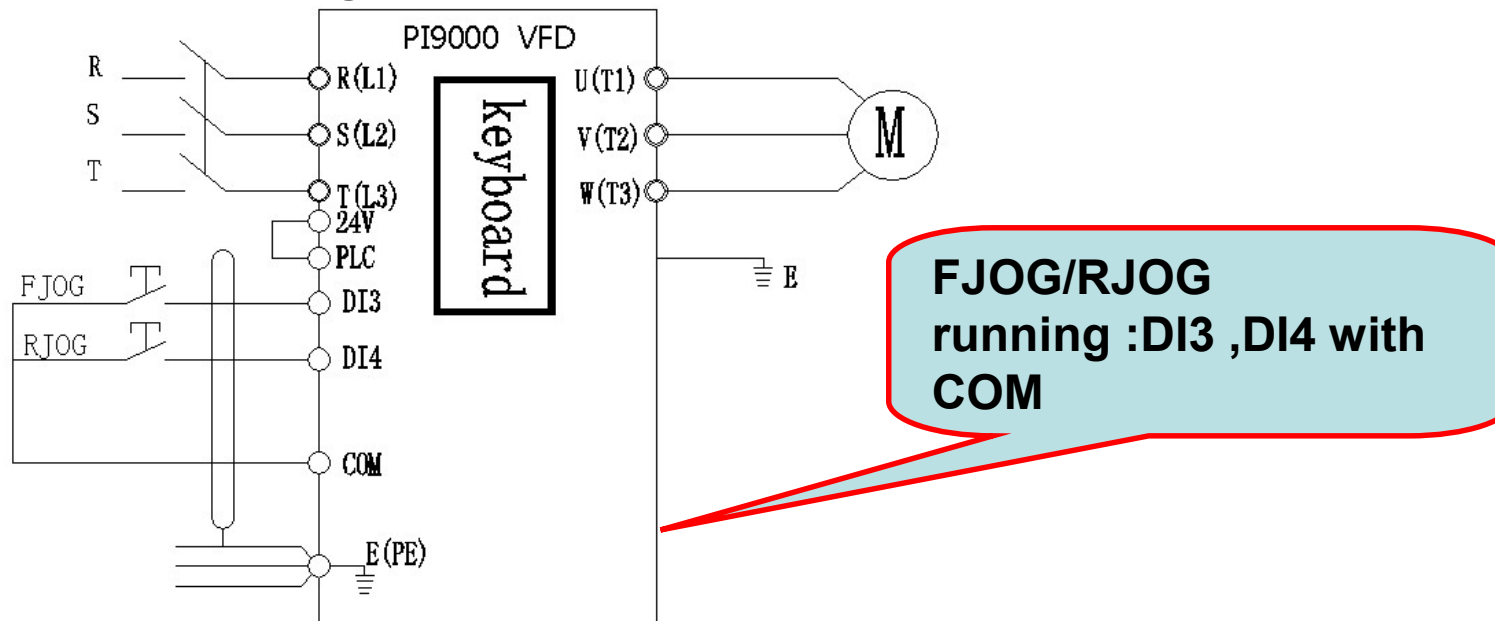


Run command by key board F0.11=0 ,

Stop motor
F0.11=0

Frequency setting
F0.03=4 (keyboard in default)

10.2 Operating Forward and reverse terminal for JOG running



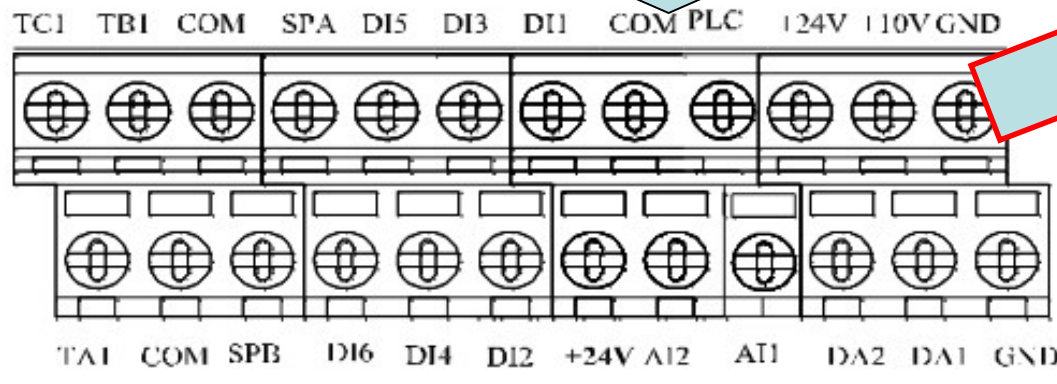
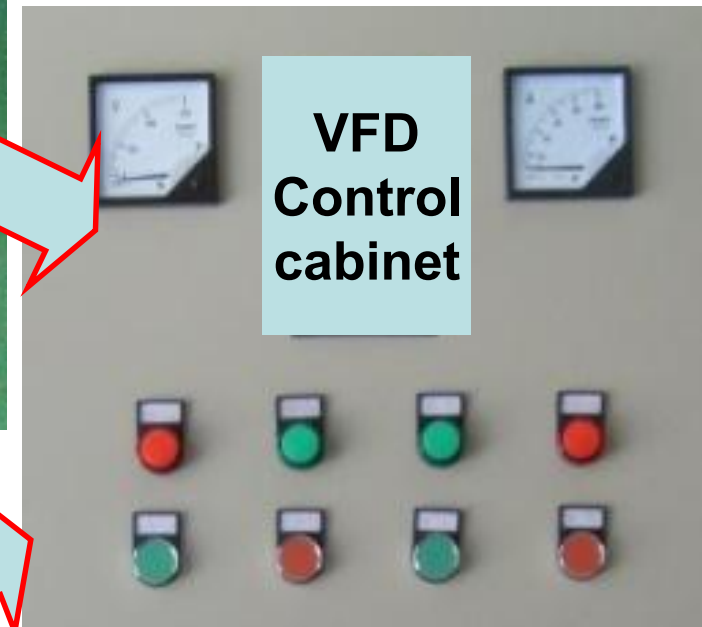
F0.11	Running Control Mode	1: Terminal control	1
F1.02	(DI3) Input Terminal Function Selection	FWD JOG command	4
F1.03	(DI4) Input Terminal Function Selection	REV JOG command	5
F7.00	Jog running frequency	0.00~F0.19 (Maximum frequency)	2.00Hz
F7.01	Jog acceleration time	0.1~3600.0S	20.0S
F7.02	Jog deceleration time	0.1~3600.0S	20.0S

10.3.1. Operating VFD by I/O terminals board.

(I/O) terminals for connecting pushbuttons, switches and other operator interface devices or control signals.



For example: Operating this Button connecting to I/O interface for controlling the Inverter .

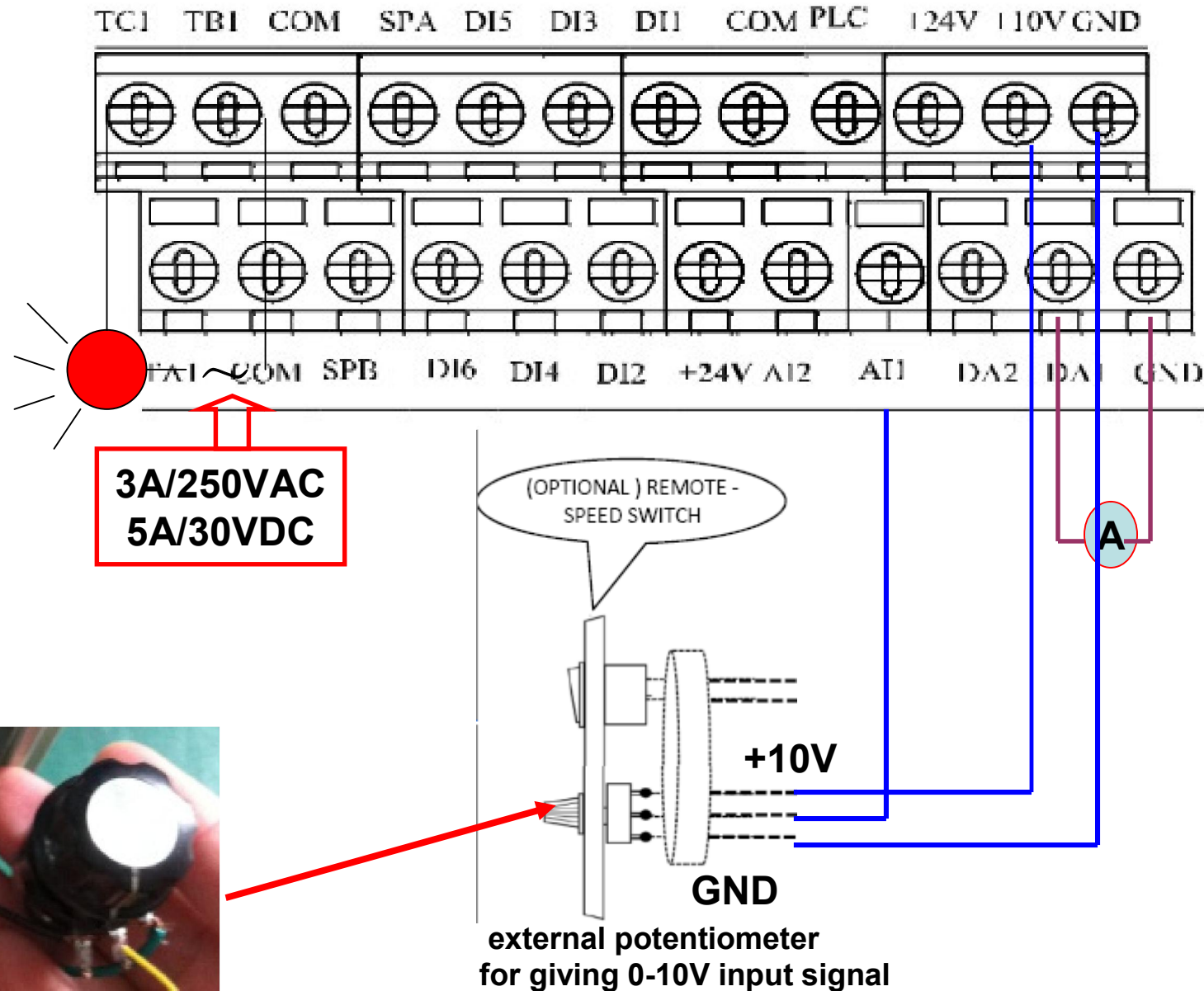


Operate VFD by operating panel

10.3.2. wiring of I/O interface terminal .

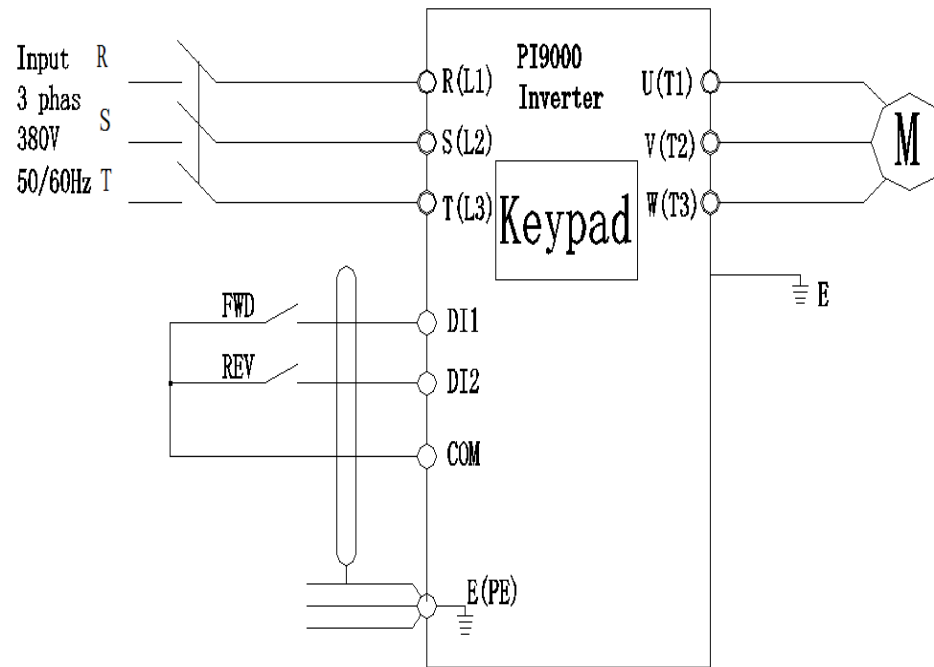


My future drive and control



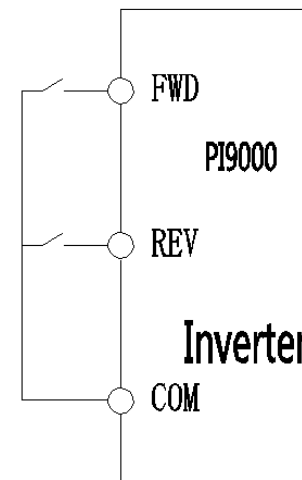
Push button & potentiometer

10.3.3. FWD and REV running controlled by I/O terminal .



Wiring

The two line control mode 1

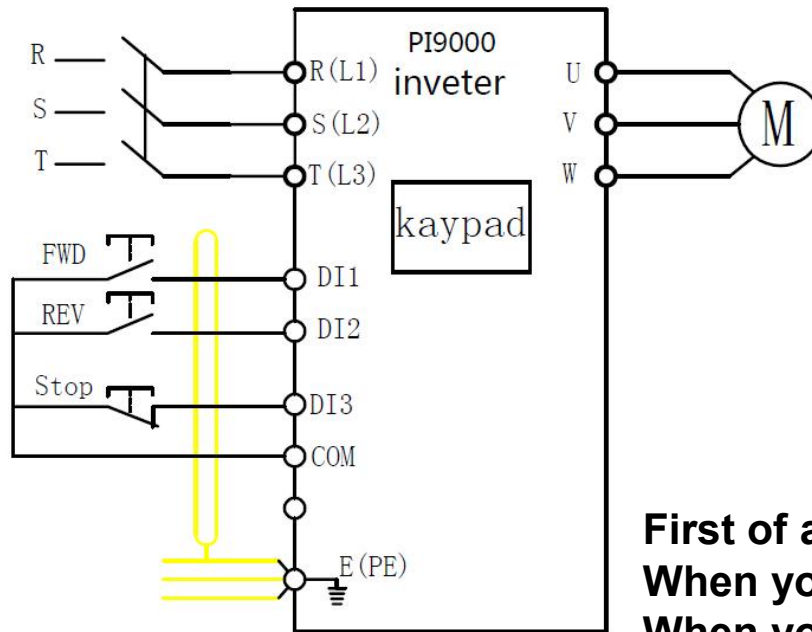


K1	K2	running command
OFF	OFF	stop
ON	OFF	forward
OFF	ON	Reverse
ON	ON	Stop

F0.11	command source selection	1:Terminal command channel (LED ON)	1
F0.24	running direction	0: Consistent direction	0
F1.00	DI1 function selection	1.Forward running direction	1
F1.01	DI2 function selection	2.Reverse running direction	2
F1.10	Terminal command mode	0.two line control mode 1	0

2.Parameters setting

10.3.5. three line control mode



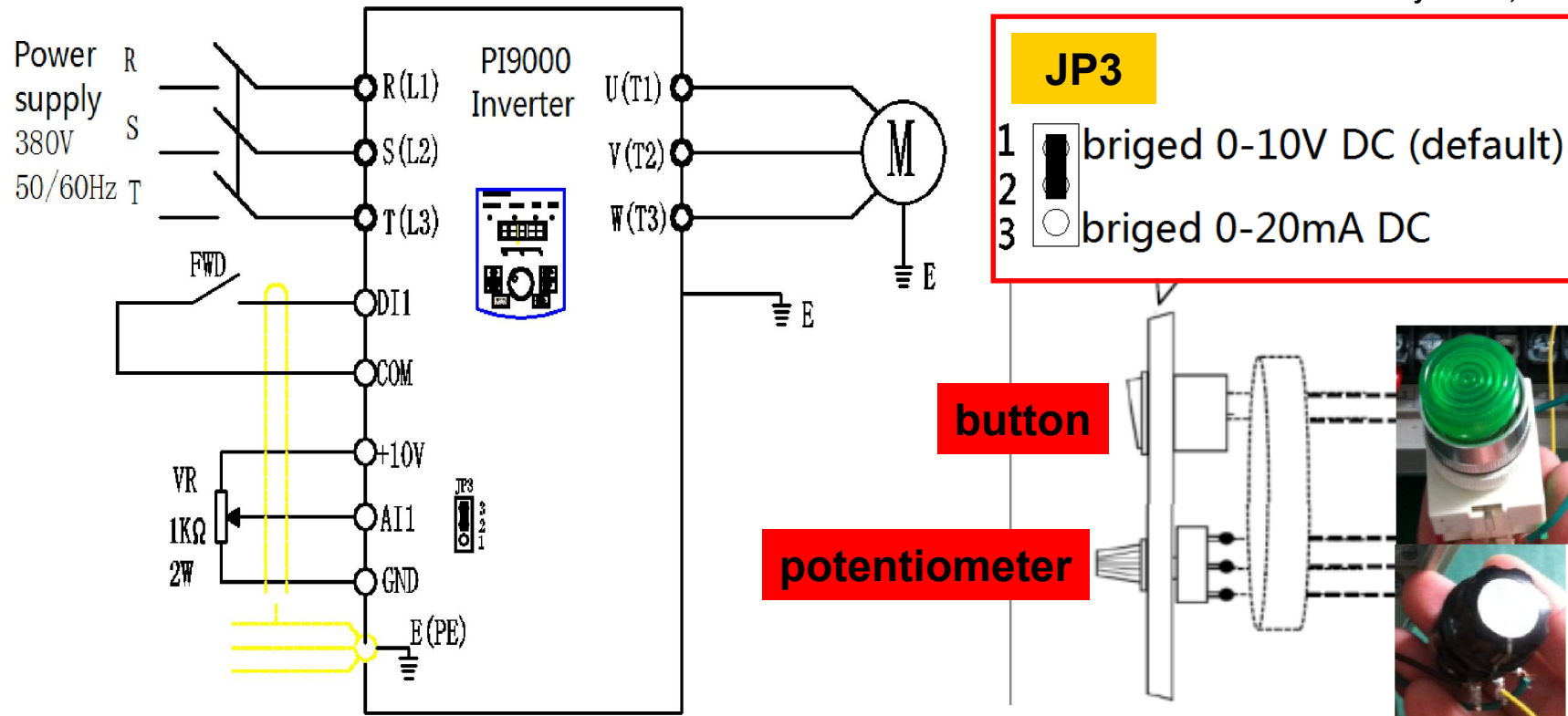
FWD	REV	Stop	Command
on	off	on	FWD
off	on	on	REV
X	X	off	stop

3 wire control mode

First of all , you need short DI3 with COM.
When you short DI1 with COM ,the inverter will run FWD.
When you short DI2 with COM ,the inverter will run REV.
When the DI3 and COM open,the inverter stop.
DI1 and DI2 is pulse signal,and DI3 is switch signal

F0.11	command source selection	1:Terminal command channel (LED ON)	1
F1.00	DI1 function selection	1.Forward running direction	1
F1.01	DI2 function selection	2.Reverse running direction	2
F1.02	DI3 function selection	3:Three wire mode running control	3
F1.10	Terminal command mode	2. three line control mode 1	2

11. Frequency setting with extra potentiometer 0-10V (Variable resistor)



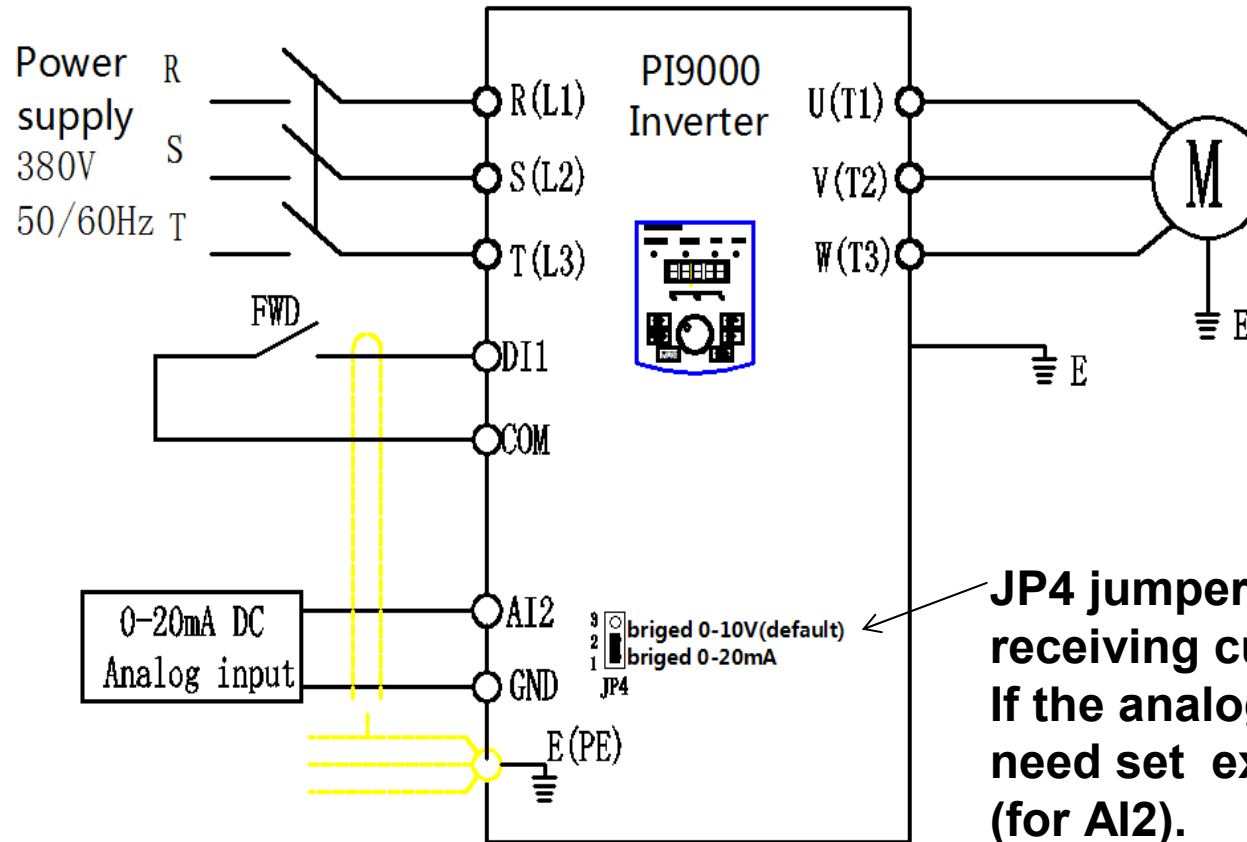
Parameters setting

F0.11	command source selection	1:Terminal command channel (LED ON)	1
F0.03	frequency setting source selection	2:AI1 analog signal input	2
F1.00	DI1 function selection	1.Forward running direction	1
F1.10	Terminal command mode	0.Two line control mode 1	0

12. Frequency setting by current analog input 0~20mA (AI2)



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JP4 jumper is setting for AI2 for receiving current analog signal. If the analog input is 4~20mA ,you need set extra parameter F1.16=2 (for AI2).

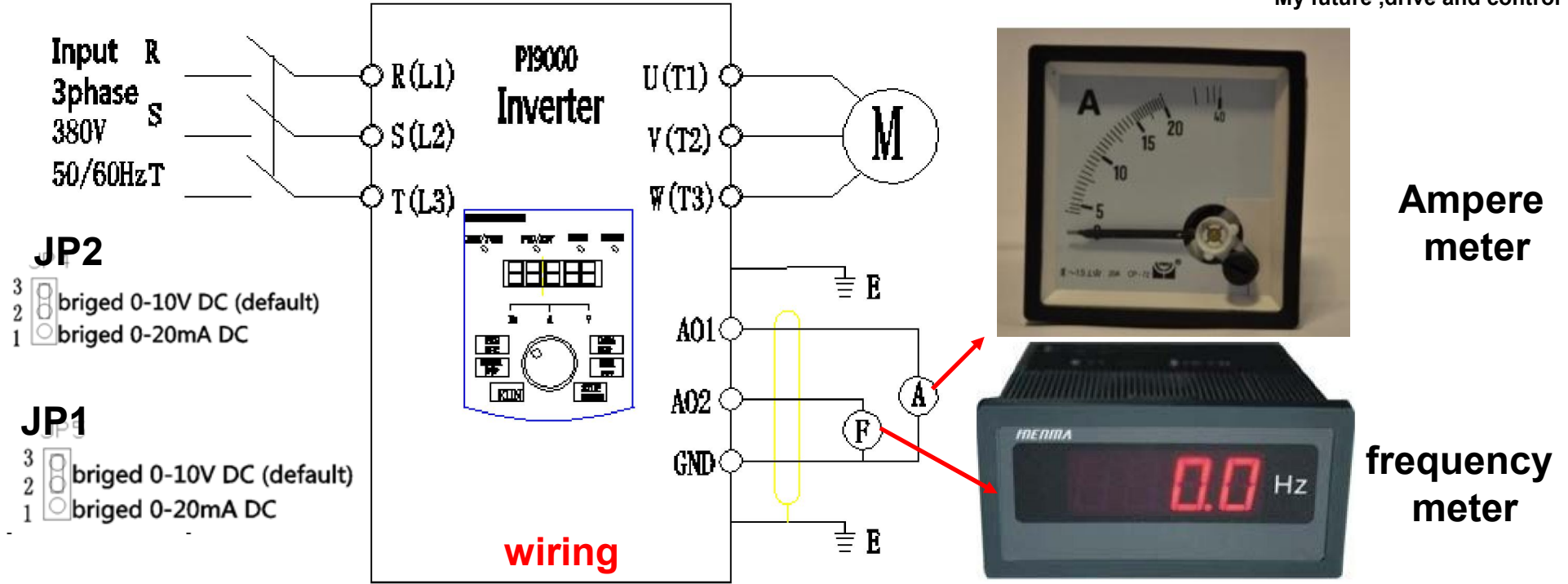
Parameters setting

F0.11	command source selection	1:Terminal command channel (LED ON)	1
F0.03	frequency setting source selection	2:AI2 analog signal input	3
F1.00	DI1 function selection	1.Forward running direction	1
F1.11	Terminal command mode	1.two line control mode 2	1

13. Employ output analog signal for monitoring current ,frequency ,speed etc.



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Ampere meter



frequency meter

F2. 07	DA1 Output Terminal	Actual current	2
F2. 08	DA2 Output Terminal	Actual frequency	1
F2. 16	DA1 Zero bias coefficient	-100%~+100%	0.0%
F2. 17	DA1 gain	-10. 00~+10. 00	1.00
F2. 18	DA2 Zero bias coefficient	-100.0%~+100.0%	0.00%
F2. 19	DA2 gain	-10. 00~+10. 00	1.00

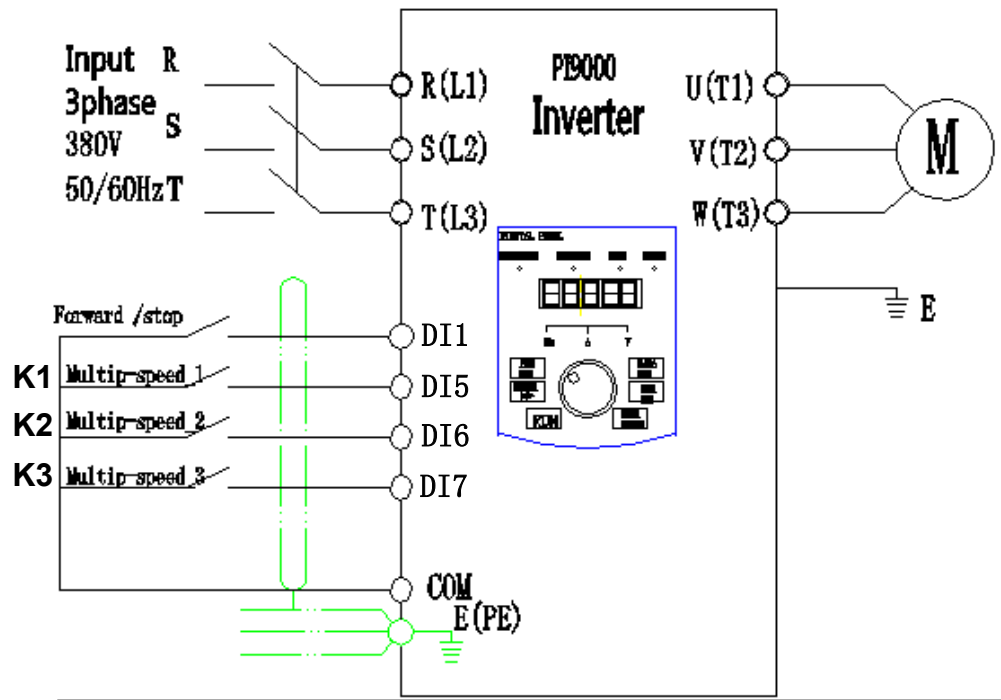
The function code is generally used for correcting the zero drift of analog output and the deviation of the output amplitude. Can also be used for self-definition analog output curve.deviationdeviation.

14. Multi-speed applying with I/O interface terminal



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MS terminal relative to Ms speed table.



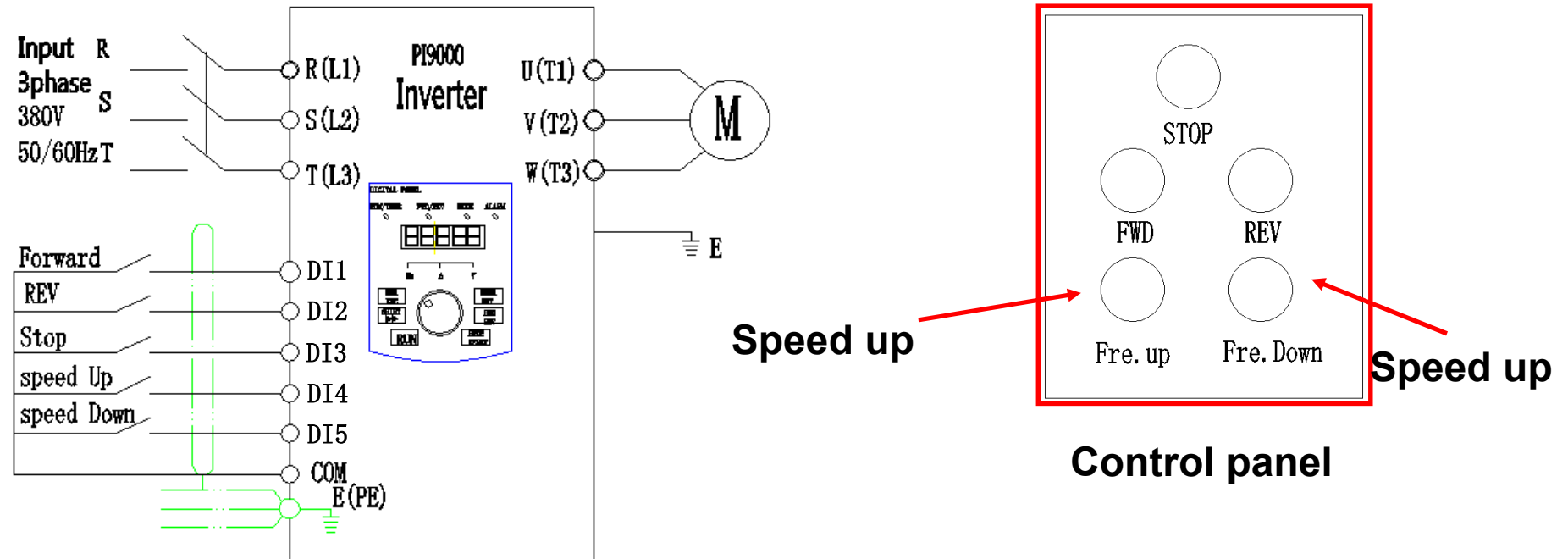
K4	K3	K2	K1
OFF	OFF	OFF	OFF
OFF	OFF	OFF	ON
OFF	OFF	ON	OFF
OFF	OFF	ON	ON
OFF	ON	OFF	OFF
OFF	ON	OFF	ON
OFF	ON	ON	OFF
OFF	ON	ON	ON
ON	OFF	OFF	OFF
ON	OFF	OFF	ON
ON	OFF	ON	OFF
ON	OFF	ON	ON
ON	ON	OFF	OFF
ON	ON	OFF	ON
ON	ON	ON	OFF
ON	ON	ON	ON

MS0
MS1
MS2
MS3
MS4
MS5
MS6
MS7

Parameters setting

CODE	Description	Range of setting	Refer. value
F0.11	command source selection	1:Terminal command channel (LED ON)	1
F0.03	frequency setting source selection	6.multiple-speed frequency setting	6
F1.00	DI1 function selection	Forward rotation	1
F1.04	DI5 function selection	MS speed terminal 1	12
F1.05	DI6 function selection	Ms speed terminal 2	13
F1.06	DI7 function selection	Ms speed terminal 3	14
E1.01	MS speed 1	-100.0~100.0%	20
E1.02	MS speed 2	-100.0~100.0%	50
E1.04	MS speed 3	-100.0~100.0%	100

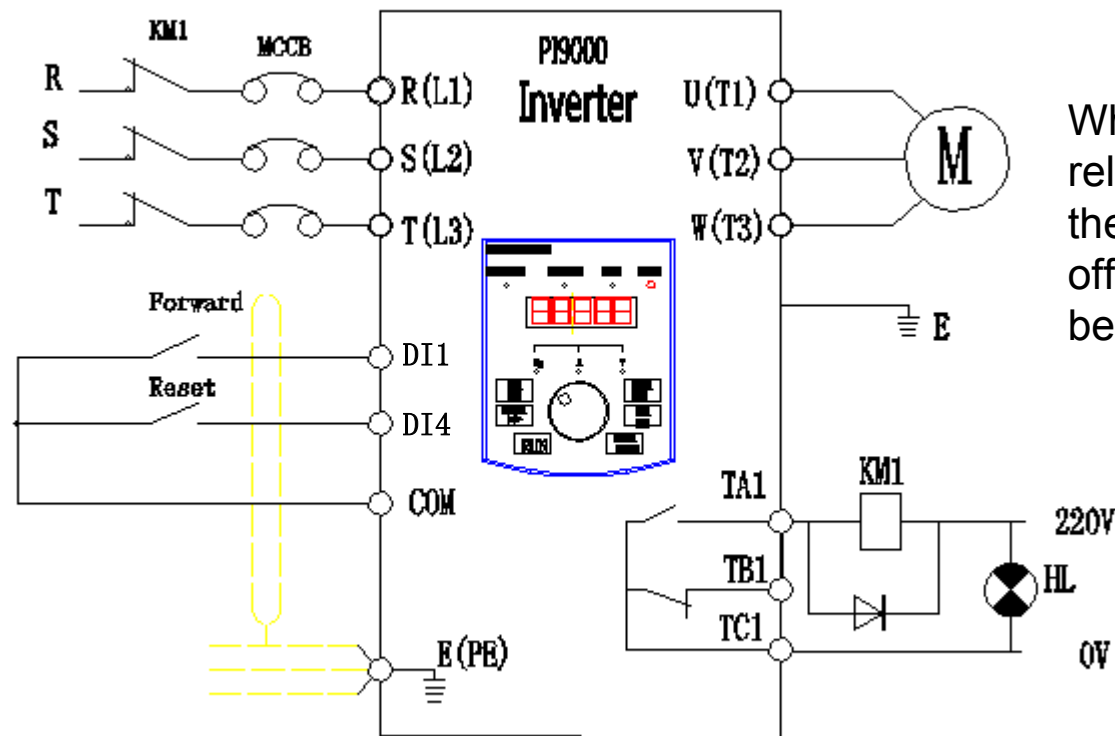
15.Frequency UP and Down controlled by I/O interface terminal board



Parameters setting

CODE	Description	Range of setting	Refer. value
F0.11	command source selection	1:Terminal command channel (LED ON)	1
F1.10	Terminal command mode	Three-wire type 1	2
F1.00	DI1 function selection	Forward rotation	1
F1.01	DI2 function selection	Reverse rotation	2
F1.02	DI3 function selection	Three-wire operation control	3
F1.03	DI4 function selection	9:frequency UP by terminal (UF)	6
F1.04	DI5 function selection	10:frequency Down by terminal (DN)	7
F1.11	change rate of terminal up and down	0.01~100.00Hz/s	1.0Hz

16.1.Application of multi-function output .(1) alarm output



When alarm happen ,the normal open relay will close ,the KM1 will be on, the main switch will be open and cut off the main circuit .The alarm light will be on as well to show there is alarm .

5A/250VAC
5A/30VDC

Parameters setting

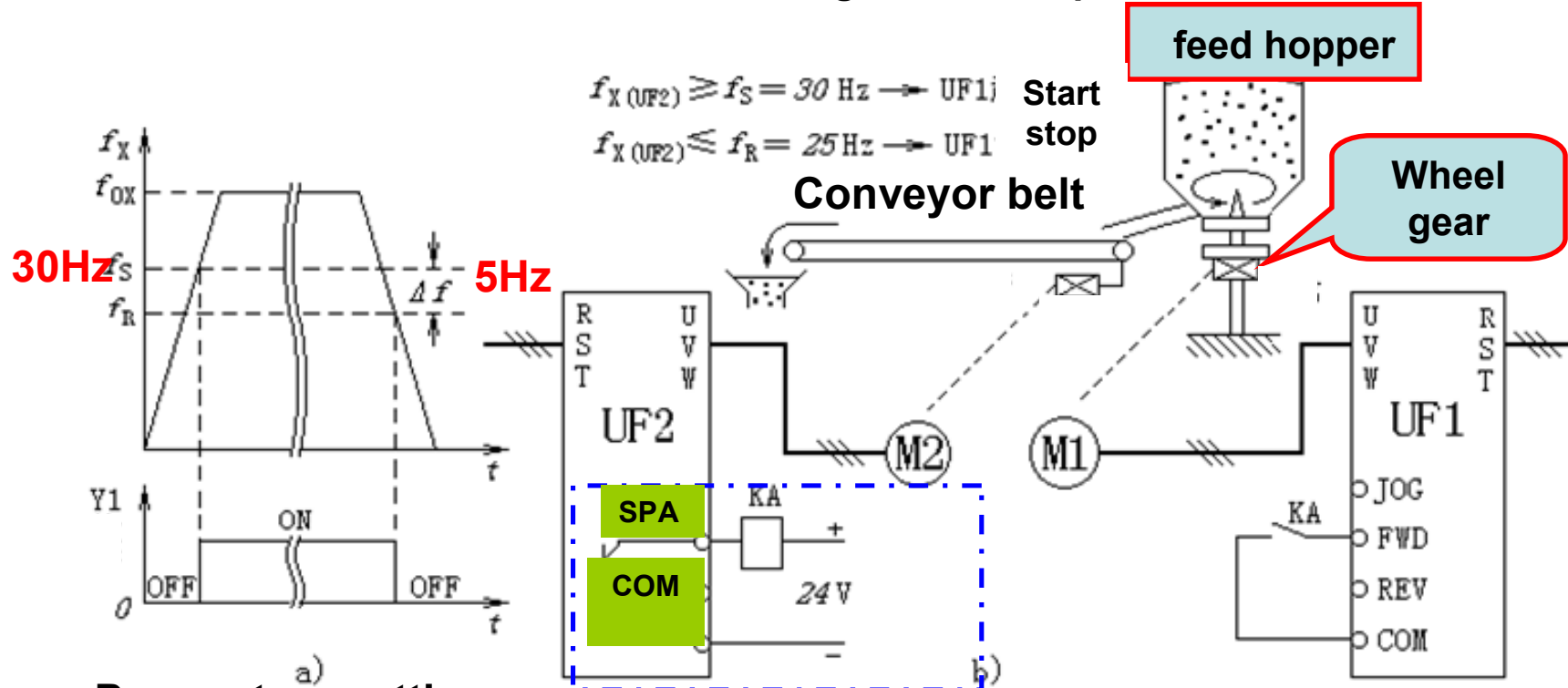
CODE	Description	Range of setting	Refer. value
F0.11	command source selection	1:Terminal command channel (LED ON)	1
F1.00	DI1 function selection	Forward rotation	1
F1.03	DI4 function selection	Fault reset	9
F2.02	Relay output selection	0: No output 1: motorforward running 2: Fault output 3: Frequency level detection FDT output 4: Frequency arrival 5: in Zero speed operation .6~40: Reserved	2

16.2.Application of multi-function output 2. (frequency arrival and frequency detecting)



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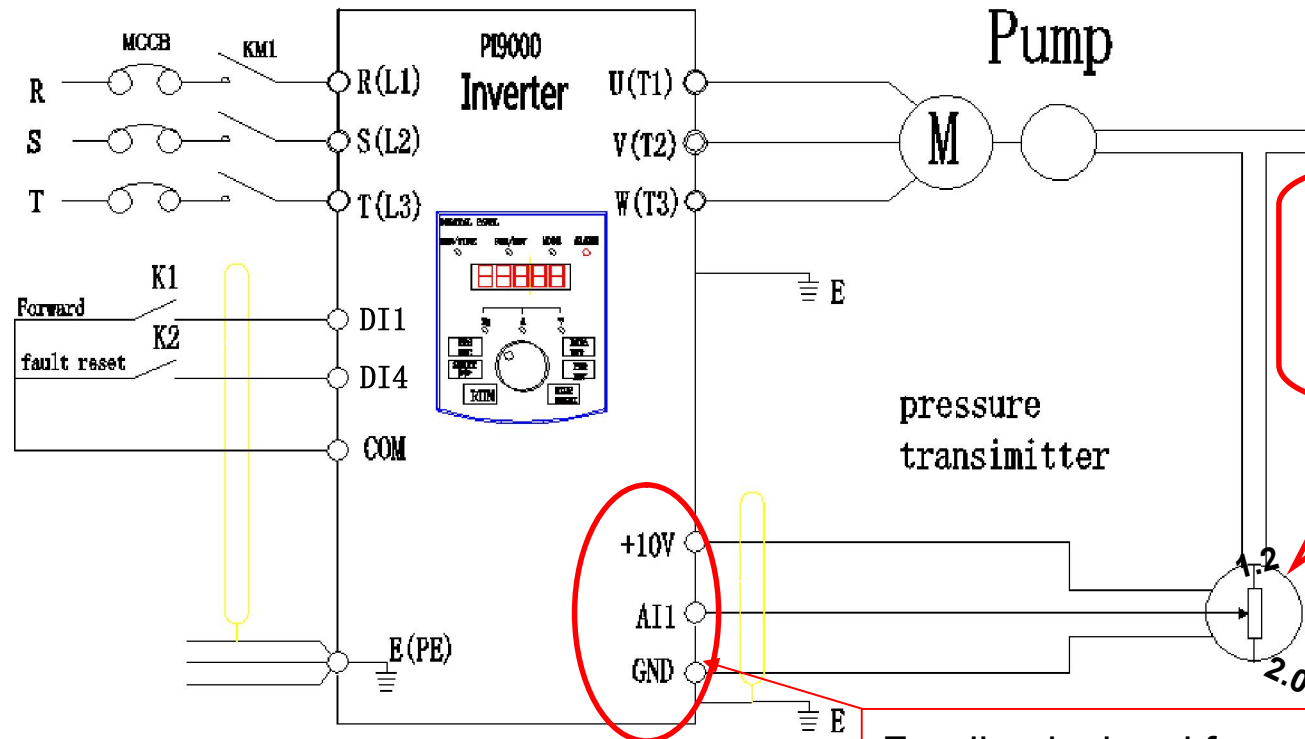
VFD 1 will start once the fre. of VF2 arriving at 30Hz,stop when fre. of VF2 limit 25Hz.



Parameters setting

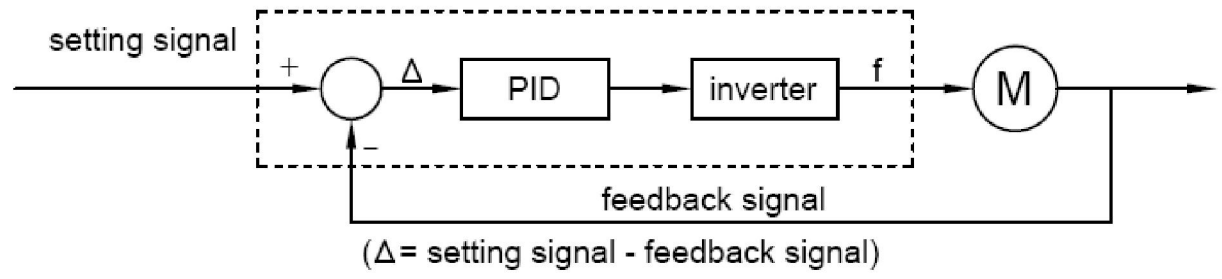
CODE	Description	Range of setting	Refer. value
F0.11	command source selection	1:Terminal command channel (LED ON)	1
F1.00	DI1 function selection	Forward rotation	1
F2.02	Relay output selection	4:Frequency level detection FDT output	4
F7.23	(FDT) frequency detection value	0.00~U0.10(Maximum frequency)	35Hz
F7.24	FDT detection hysteresis	0.0%~100.0%(FDT level)	5Hz

17. 1.PID control for constant pressure water supply -electrical diagram (0-10V signal feedback)



The maximum range Of meter is 2 Mbar. It is need to keep 1.2 Mbar Pressure all the time . E2.01 should be set to $1.2/2.0 \times 100\% = 60\%$

Feedback signal from pressure transmitter



negative action, when $\Delta > 0$ is positive, frequency rises and when $\Delta < 0$ is negative, frequency falls. For constant Pressure water supply.

PI8000/PI8100 PID regulation

PID control for constant pressure water supply for 0~10V

Parameters setting

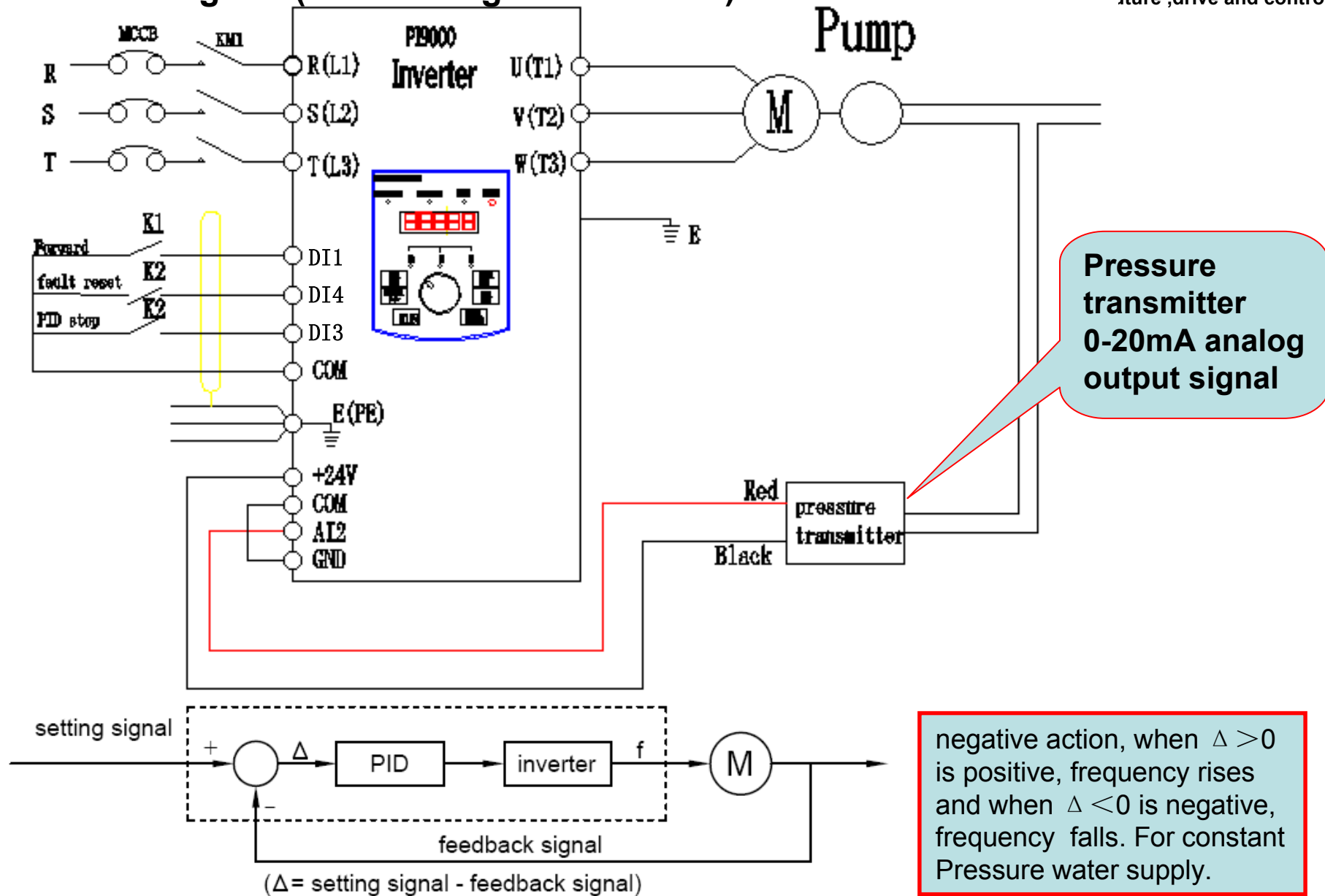


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F0.00	Control mode	2:V/F	2
F0.03	frequency setting source selection	8:PID control setting	8
F0.13	acceleration time	0.1~3600.0s	25
F0.14	deceleration time	0.1~3600.0s	25
F0.11	Command source selection	Terminal control	1
F1.00	DI1 terminal function selection	DI1 use for FWD	1
F1.03	DI4 terminal function selection	DI4 use for fault reset	9
E2.01	PID value set by keyboard	0.0%~100.0%	60
E2.02	PID feedback source	0:analog input feedback signal AI1	0
E2.04	PID setting feedback range	0 ~65535	100
E2.05	PID inversion cutoff frequency	0 . 00 to F0.19(maximum frequency)	0.00HZ
E2.13	proportional gain (Kp)	0.00~100.00	100.00
E2.14	integration time (Ti)	0.00~100.00	0.25s
F7.46	Awakens frequency	dormancy frequency (F7.48) to maximum frequency (F0.19)	0.00Hz
F7.47	Awakens delay time	0.0s to 6500.0s	0.0s
F7.48	Dormancy frequency	0.00Hz to awakens frequency(F7.46)	0.00Hz
F7.49	Dormancy delay time	0.0s to 6500.0s	0.0s

17.2.PID control for constant pressure water supply -electrical diagram (0-20mA signal feedback)

ature ,drive and control



PI8000/PI8100 PID regulation

PID control for constant pressure water supply for 4~20mA

Parameters setting



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F0.00	Control mode	2:V/F	2
F0.03	frequency setting source selection	8:PID control setting	8
F0.13	acceleration time	0.1~3600.0s	25
F0.14	deceleration time	0.1~3600.0s	25
F0.11	Command source selection	Terminal control	1
F1.00	DI1 terminal function selection	DI1 use for FWD	1
F1.03	DI4 terminal function selection	DI4 use for fault reset	9
F1.02	DI3 terminal function selection	DI3 use for PID pause function	22
E2.01	PID value set by keyboard	0.0%~100.0%	60
E2.02	PID feedback source	0:analog input feedback signal AI2	1
E2.04	PID setting feedback range	0 ~65535	100
E2.05	PID inversion cutoff frequency	0 . 00 to F0.19(maximum frequency)	0.00HZ
E2.13	proportional gain (Kp)	0.00~100.00	100.00
E2.14	integration time (Ti)	0.00~100.00	0.25s
F7.46	Awakens frequency	dormancy frequency (F7.48) to maximum frequency (F0.19)	0.00Hz
F7.47	Awakens delay time	0.0s to 6500.0s	0.0s
F7.48	Dormancy frequency	0.00Hz to awakens frequency(F7.46)	0.00Hz
F7.49	Dormancy delay time	0.0s to 6500.0s	0.0s

PS:

In factory setting, AI2 is voltage input,if you want to change it to current input (0~20mA), you need change the position of J4 jumper.

If your current signal is 4~20mA, you need to set one more parameter: For AI2 terminal: set parameter F1.16=2.

Suggestion :

1.Check the direction of running . Press “FWD” for 1 sec ,if the direction of motor running is wrong, ,please cut off the input power supply ,and change the order of input power phase .

2. E2.01 (PID value set by keyboard),the value should be sett according the law , Target of pressure want to keep up (P)/ maximum pressure range of meter *100%.

3 .proportional gain (Kp) and integration time (Ti) setting method :

A, program a little value for proportional gain (Kp), and pre-set integration time (Ti) to 20~30s about .

B, Increase the Kp value gradually until oscillation happen in system ,and then make the value pre-set of Kp to it's half .

C, Decrease Ti value gradually until oscillation happen in system ,and then set 150% or pre-set instead .

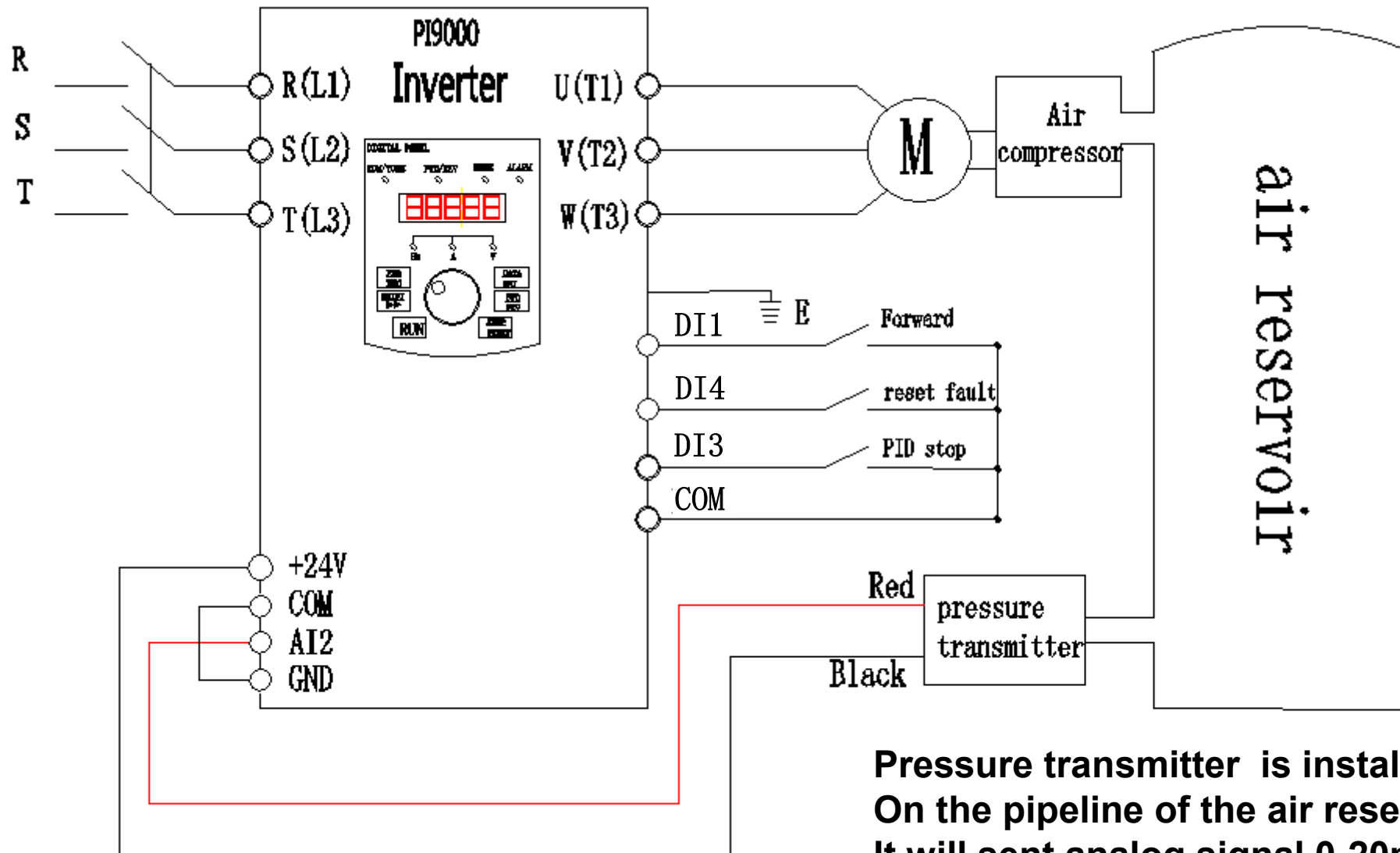
In common ,everything will ok according above mentioned setting . if a little oscillation happen ,please set Kp a little small ,or set Ti a little big ,if the system need to air restore soon after air leaking ,please set Kp a little big ,or set the Ti a little small .

18. PI9000 apply in air compressor retrofitting with PID control function.

The air compressor variable frequency control system is mainly composed of a frequency converter, a pressure sensor (pressure transmitter).

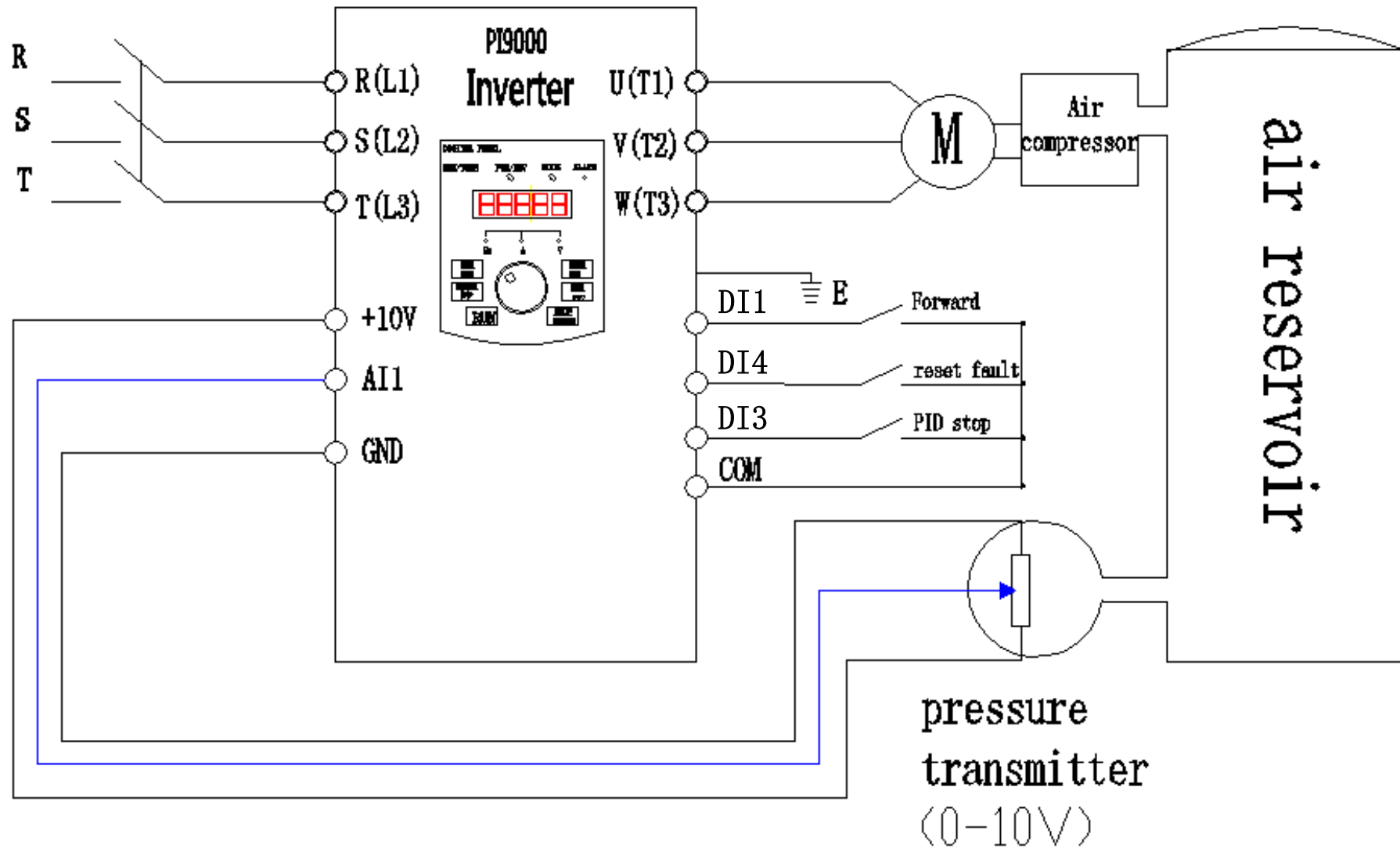
A pressure sensor component is first used to test the pressure in the reservoir . Next, the detection display instrument sends the output pressure analog signal to the frequency converter, which then compares to the feedback signal and the given objective signal, using the internal PID of the frequency converter to carry out automatic output frequency regulation, allowing for automatic adjustment of compressor motor speed and output power. This creates a closed-loop feedback system that maintains constant pressure and automatic control in the pipe network.

Wirings of electrical diagram with 0-20mA type of pressure transmitter



**Pressure transmitter is installed
On the pipeline of the air reservoir
It will sent analog signal 0-20mA
to inverter .**

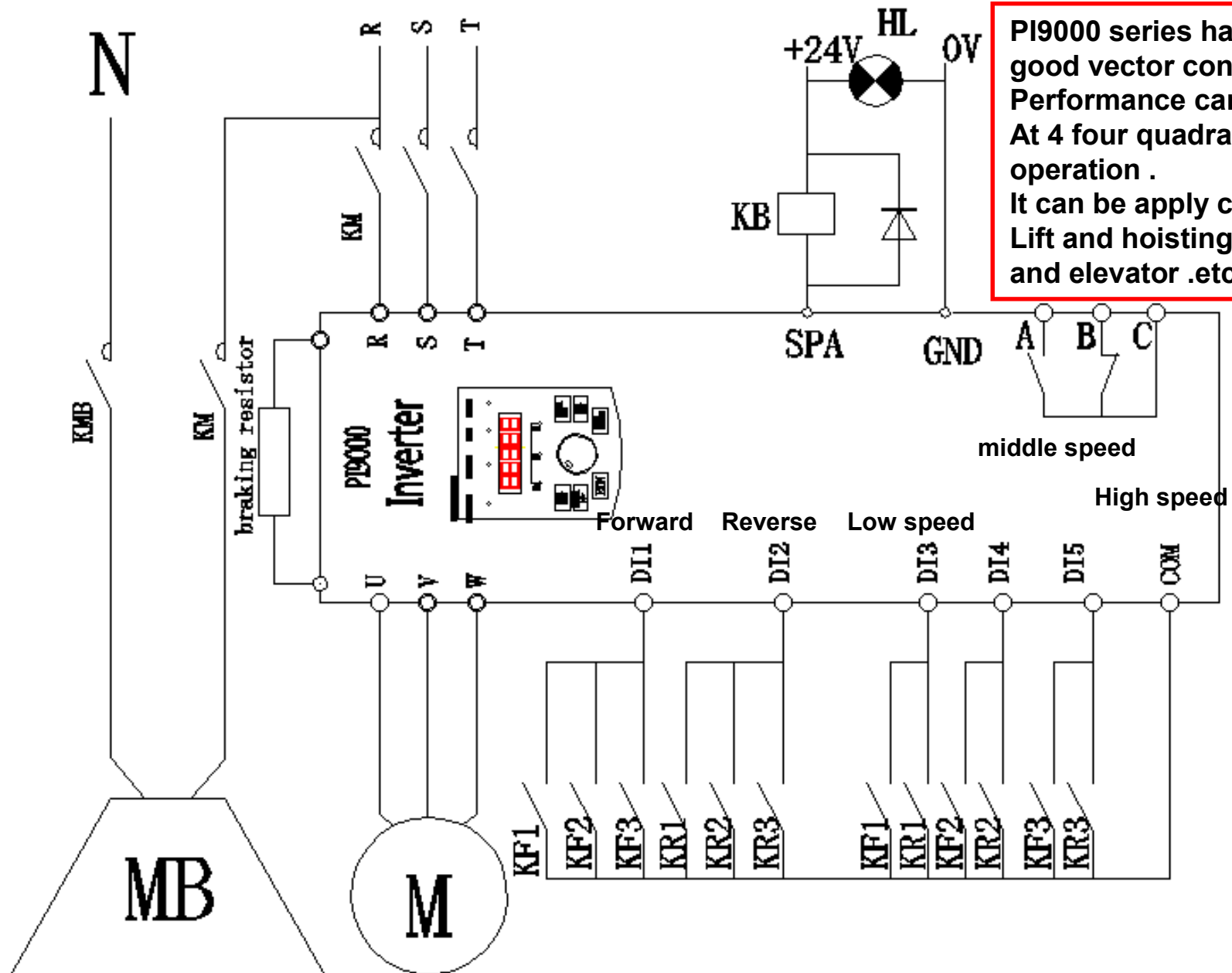
Wirings of electrical diagram with 0-10V type pressure transmitter



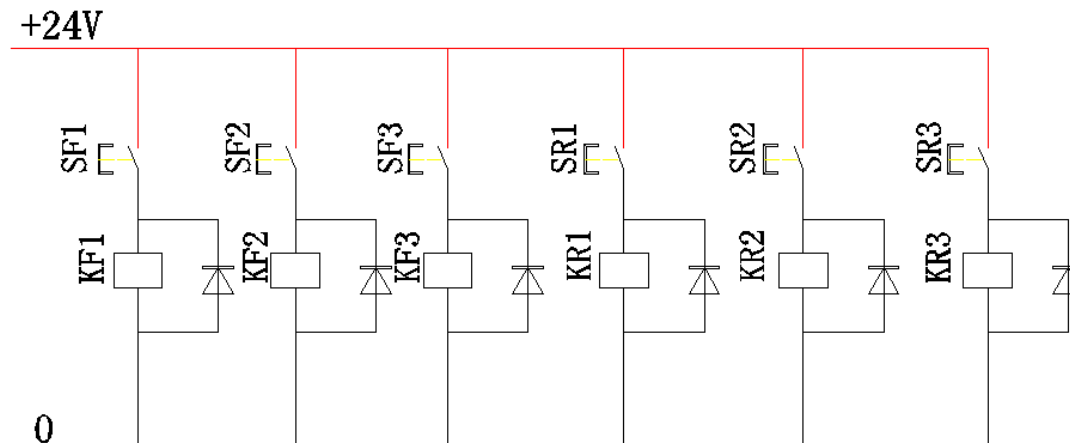
Parameters setting table

F0.00	Control mode	2:V/F	2	Control
F0.11	command source selection	1:Terminal command channel (LED ON)	1	
F0.03	frequency setting source selection	8:PID control setting	8	
F0.13	acceleration time	0.1~3600.0s	25	
F0.14	deceleration time	0.1~3600.0s	25	
E2.00	PID setup source	key board (E2.01)	0	
E2.01	PID value set by keyboard	0.0%~100.0%	50	
E2.02	PID feedback source	0:analog input feedback signal AI1 /AI2	0/1	
E2.03	PID action direction	0:positive action	0	
E2.13	proportional gain (Kp)	0.00~100.00	1.0	
E2.14	integration time (Ti)	0.00~100.00	0.10s	
E2.15	Differential time (Td)	0.00~100.00	0.10s	
E2.06	PID control Deviation limit	0.0~100.0%	0	
E2.11	PID feedback missing detection value	0.1%-100%	0.0%	
E2.12	PID feedback missing detection time	0.0S-20S	0S	
F1.00	DI1 function selection	1.Forward running direction	1	
F1.03	DI4 function selection	9:fault reset	9	
F1.02	DI3 function selection	22.PID pause	22	

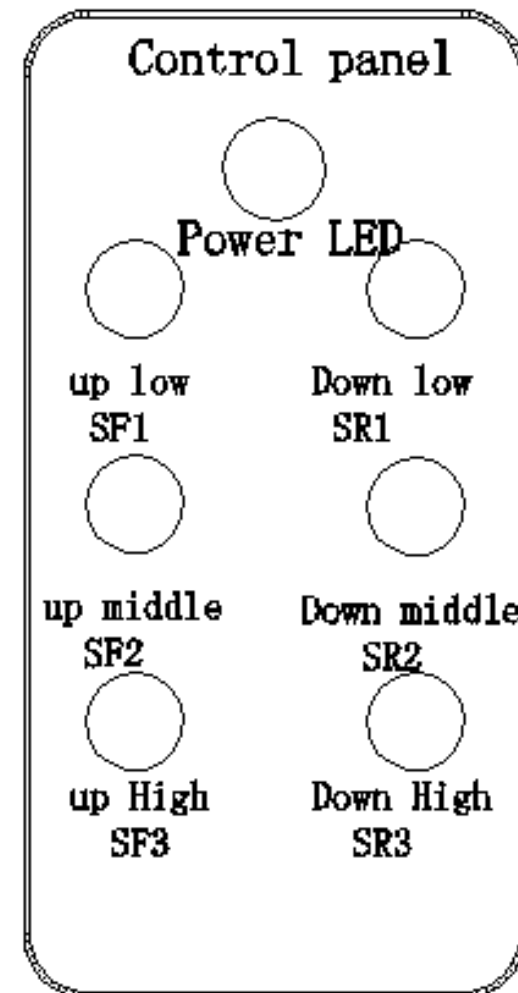
19. Application of PI9000 series inverters in crane



PI9000 series has good vector control Performance can run At 4 four quadrant operation . It can be apply crane Lift and hoisting machine and elevator .etc



- DI1 – lift up the load**
- DI2 – Down the load**
- DI3- MSS1 for low speed running**
- DI4-MSS 2 for middle speed running**
- DI5-MSS 3 for high speed running .**



We can select the DC brake function before running to hold the Motor for prolong the working life of mechanical of brake . Also can using the DC braking function before stop to protecting From load loss suddenly . U6 parameter group

1. Must perform motor auto-turning first when apply the vector control mode

1.Disconnect the load from motor .(This is important ,otherwise can't get the Motor parameters precision ,the perform of vector can't work well)

2. put the b.01 , b0.02, b0.03, b0.04, b0.05 according nameplate of motor.

3.Put the b0.27to 2, the light of TUN will on in the keyboard ,and then press The RUN key ,motor will start auto-turning automatic .

4. It will display 'END" in the menu at the end of auto-turning .it means the auto Turning has performed successfully .

CODEb	Description of Code	Range of setting
b0.01	rated power	15.000
b0.02	rated frequency	50Hz
b0.03	rated rotation speed	1450
b0.04	rated voltage	380V
b0.05	rated current	32A
b0.37	motor auto-turning selection	2:complete Rotational auto-tuning

Parameters setting table :

CODE	Description of Code	Range of setting	Refer. value	control
F0.00	Control mode	0:Vector control mode	0	
F0.11	command source selection	1:Terminal command channel (LED ON)	1	
F0.03	frequency setting source selection	4:Multiple speed setting	4	
F0.13	acceleration time	0.1~3600.0s	10	
F0.14	deceleration time	0.1~3600.0s	10	
F1.00	DI1 function selection	1:Forward running direction	1	
F1.01	DI2 function selection	2:Reverse rotation (REV)	2	
F1.02	DI3 function selection	12:MS speed terminal 1	12	
F1.03	DI4 function selection	13:MS speed terminal 2	13	
F1.04	DI5 function selection	14:MS speed terminal 3	14	
F2.04	SPA collector output selection	4:Frequency level detection FDT output	4	
F3.00	Startup mode	1:star up before apply DC braking	2	
F3.05	DC brake current at start	0.0~100%	60%	
F3.04	DC brake keep time	0.0~50.s	1.0s	
F3.03	DC brake beginning frequency at stop	0.00~F01.07	4Hz	
F3.06	Dc brake time	0.0~50.s	1s	
E1.01	MS speed 1	-100.0~100.0%	10	
E1.02	MS speed 2	-100.0~100.0%	50	
E1.04	MS speed 4	-100.0~100.0%	100	

20. Fault Diagnosis

PI9000 inverter has a number of warning information and protection function. In case of abnormal fault, the protection function will be invoked, the inverter will stop output, and the faulty relay contact of the inverter will start, and the fault code will be displayed on the display panel of the inverter.

- | | |
|---|---|
| 1:over current during acceleration (Err.02) | 12:over heat of IGBT(Err.14) |
| 2:over current during deceleration (Err.03) | 13:external device fault (Err.15) |
| 3:over current when constant speed (Err.04) | 14:communication fault (Err.16) |
| 4:over voltage during acceleration (Err.05) | 15:current detection fault (Err.18) |
| 5:over voltage during deceleration (Err.06) | 16:Motor auto-turning fault(Err.19) |
| 6:over Voltage when constant speed (Err.07) | 17:EEPROM read and write fault (Err.21) |
| 7:lower voltage in DC bus (Err.09) | 18:PID feedback has fault(Err.31) |
| 8.motor over load (Err.11) | |
| 9:inverter over load(Err.10) | |
| 10:input phase of power failure (Err.12) | |
| 11:output phase of power failure (Err.13) | |

21. VFD RS232 communication with PC

I-1-3 Protocol description

PI9000 series inverter communication protocol is a asynchronous serial master-slave communication protocol, in the network, only one equipment(master) can build a protocol (known as "Inquiry/Command"). Other equipment(slave) only can esponse the "Inquiry/Command"of master by providing data or perform the corresponding action according to the "Inquiry/Command"of master. Here, the master refers to a Personnel Computer(PC), an industrial control device or a programmable logic controller (PLC), etc. and the slave refers to PI9000 inverter.

Master can communicate with individual slave, also send broadcasting information to all the lower slaves. For the single "Inquiry/Command"of master, slave will return a signal(that is a response) to master; for the broadcasting information sent by master, slave does not need to feedback a response to master.

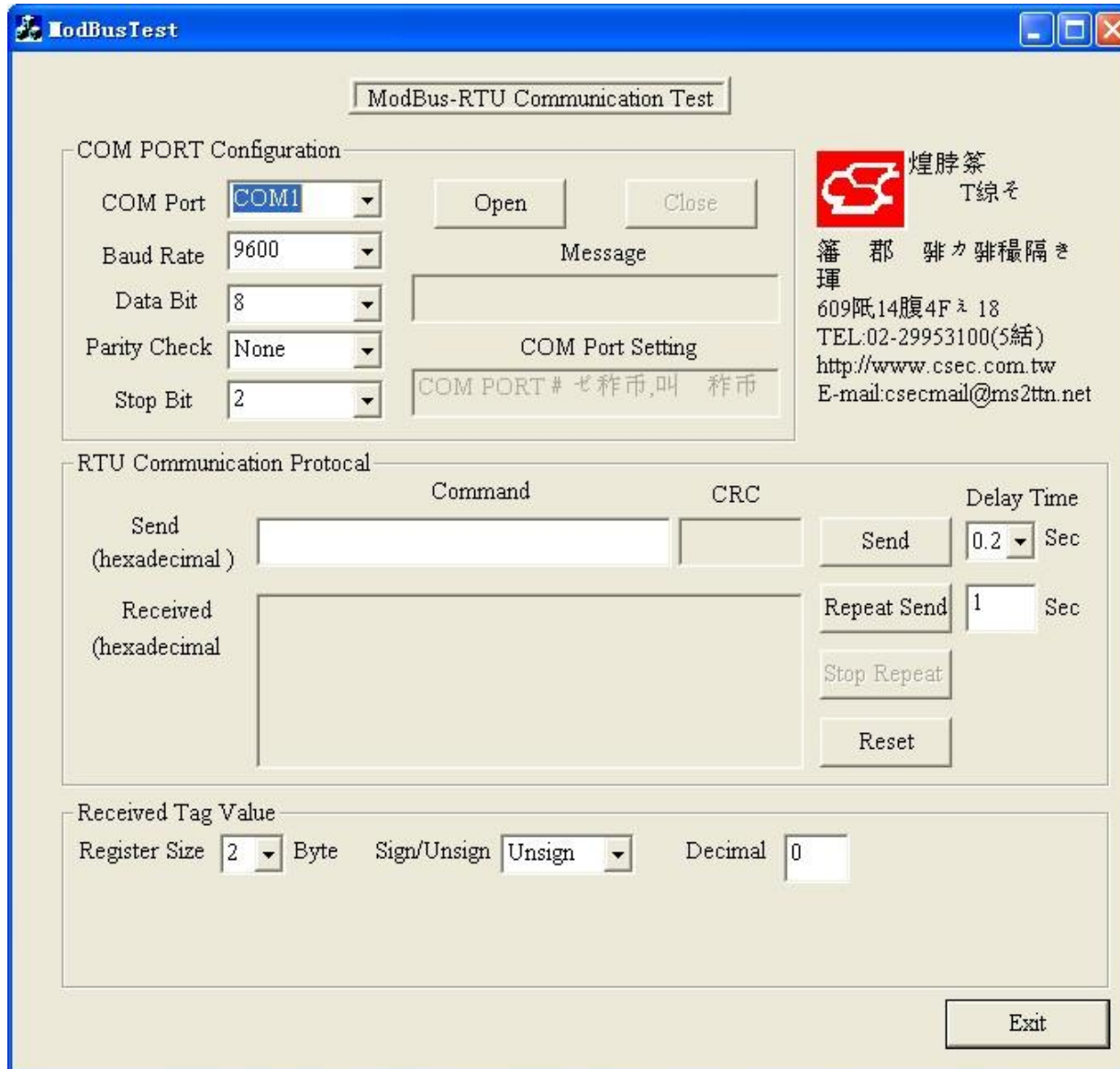
Communication data structure PI9000 series inverter's Modbus protocol communication data format is as follows: in RTU mode, messages are sent at a silent interval of at least 3.5 characters. There are diverse character intervals under network baud rate, which is easiest implemented (as shown in Figure T1-T2-T3-T4). The first field transmitted is the device address. The allowable characters for transmitting are hexadecimal 0 ... 9, A ... F. The networked devices continuously monitor network bus, including during the silent intervals. When the first field (the address field) is received, each device decodes it to find out if it is sent to their own. Following the last transmitted character, a silent interval of at least 3.5 characters marks the end of the message. A new message can begin after this silent interval. The entire message frame must be transmitted as a continuous stream. If a silent interval of more than 1.5 characters occurs before completion of the frame, the receiving device will flushes the incomplete message and assumes that the next byte will be the address field of a new message. Similarly, if a new message begins earlier than the interval of 3.5 characters following a previous message, the receiving device will consider it as a continuation of the previous message. This will result in an error, because the value in the final CRC field is not right.

RTUframe format :

Frame headerSTART	Time interval of 3.5characters
Slave address ADR	Communication address: 1 to 247
Command codeCMD	03: read slave parameters; 06: write slave parameters
Data contentDATA(N-1)	Data content: address of function code parameter, numbers of function code parameter, value of function code parameter, etc.
Data contentDATA(N-2)	
.....	
Data contentDATA0	
CRC CHKhigh-order	
CRC CHKlow-order	Detection Value:CRC value.
END	Time interval of 3.5characters

CMD (Command) and DATA (data word description)

1.Soft setting: PC com port com1,inverter Baud rate 9600, Data format, no parity: data format <8, N, 2>



ModBus Test

ModBus-RTU Communication Test

COM PORT Configuration

COM Port: COM1 [Open] [Close]

Baud Rate: 9600 [Message]

Data Bit: 8

Parity Check: None

Stop Bit: 2

COM Port Setting: COM PORT # 七祚币,叫 祚币

煌脖笨 T線そ

藩 郡 骈カ骈穰隔き 璉

609厖,14厖4F 18

TEL:02-29953100(5結)

http://www.csec.com.tw

E-mail:csecmail@ms2ttt.net

RTU Communication Protocol

	Command	CRC	Delay Time
Send (hexadecimal)			0.2 Sec
Received (hexadecimal)			Repeat Send: 1 Sec
			Stop Repeat
			Reset

Received Tag Value

Register Size: 2 Byte Sign/Unsign: Unsign Decimal: 0

[Exit]

2.Inverter setting:

F0.11	Command source selection	2.Communications command control
F9.00	Baud rate	5: 9600BPS
F9.01	Data format	0: no parity: data format <8, N, 2>
F9.02	This unit address	1
F9.03	Response delay	2ms
F9.04	Communication	0.0S
F9.05	Communication	0
F9.06	Communication read	0

4. Command code: 03H , reads N words (max.12 words), for example: for the inverter with slave address 01, its start address F0.02 continuously reads two values.

ModBusTest

ModBus-RTU Communication Test

COM PORT Configuration


COM Port:

Baud Rate:

Data Bit:

Parity Check:

Stop Bit:



煌脖筳
T線そ

藩郡 驛カ驛糧隔き
環

609厩14腹4F 2 18
TEL:02-29953100(5結)
<http://www.csec.com.tw>
E-mail:csecmail@ms2ttt.net

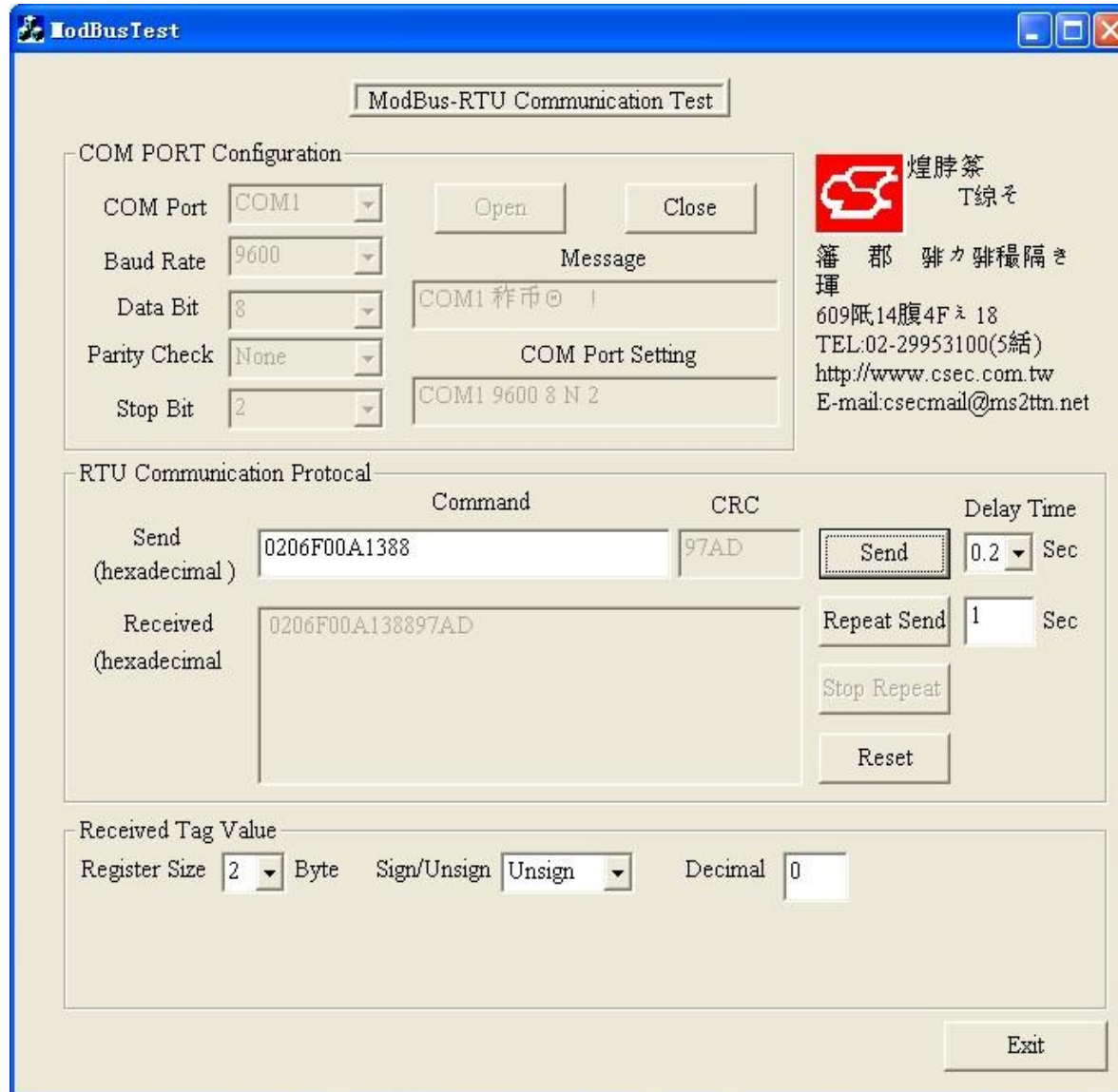
RTU Communication Protocol

	Command	CRC	Delay Time
Send (hexadecimal)	<input type="text" value="0103F0020002"/>	<input type="text" value="56CB"/>	<input type="button" value="Send"/> <input type="text" value="0.2"/> Sec
Received (hexadecimal)	<input style="width: 100%; height: 100%;" type="text" value="0103000400000000182C7"/>		<input type="button" value="Repeat Send"/> <input type="text" value="1"/> Sec
			<input type="button" value="Stop Repeat"/>
			<input type="button" value="Reset"/>

Received Tag Value

Register Size: Byte Sign/Unsign: Decimal:

5. Command Code: 06H, write a word. For example: Write 5000(1388H) into the address F00AH of the inverter with slave address 02H.



The screenshot shows the ModBusTest software interface. The window title is "ModBusTest". The main area is titled "ModBus-RTU Communication Test".

COM PORT Configuration:

- COM Port: COM1
- Baud Rate: 9600
- Data Bit: 8
- Parity Check: None
- Stop Bit: 2

RTU Communication Protocol:

	Command	CRC	Delay Time
Send (hexadecimal)	0206F00A1388	97AD	0.2 Sec
Received (hexadecimal)	0206F00A138897AD		1 Sec

Received Tag Value:

Register Size: 2 Byte Sign/Unsign: Unsign Decimal: 0

Buttons: Open, Close, Send, Repeat Send, Stop Repeat, Reset, Exit.