

| SP500-PLUS DP500-PLUS | Series Air Compressor Integrator User Manual

Foreword

Thank you for choosing SP500-PLUS DP500-PLUS series air compressor integrator!

SP500-PLUS DP500-PLUS series highly integrated control method of air compressor and ac drive technology, with colorful big HMI, easy to wiring and operation; Use the plug-in connector and proof malfunction plug design for the control circuit terminal; It is highly integration; Built-in 220V AC power supply, Provide 24V DC external output; With kinds of warning function: such as input/output phase loss warning, phase sequence error, motor high temperature warning(PT100 and PTC detection), AC drive overload warning, over current warning, over voltage warning and under voltage ect .

This guide describes the basic info and using instructions for SP500-PLUS DP500 series air compressor integrator , please read this manual carefully before use.

Precautions

- The illustrations in this manual are for illustrative purposes only, and may differ from the product you ordered.
- Our company is committed to continuous improvement of products, will continue to upgrade product function, the information provided is subject to change without notice.
- If you have any problem, please contact our agents or contact customer service.

1 Basic Specifications

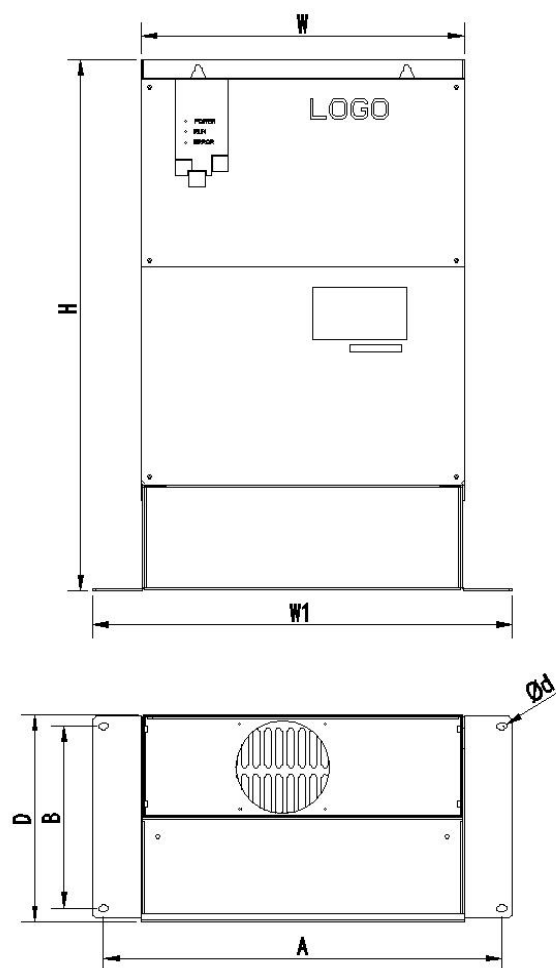
Item		Specification
Basic control functions	Control mode	Open loop vector control, V / F control
	Maximum frequency	Open loop vector control: 0~600Hz, V / F control: 0~600Hz
	Carrier frequency	0.5kHz~15kHz, The carrier frequency is automatically adjusted based on the load features.
	Input frequency resolution	Digital setting: 0.01Hz Analog setting: maximum frequency x 0.025%
	Startup torque	0.5 Hz/150%
	Speed range	1:100
	Speed stability accuracy	± 0.2%
	Torque control accuracy	±10%
	Overload capacity	60s for 150% of the rated current, 3s for 180% of the rated current.
	Torque boost	Fixed boost Customized boost 0.1%~30.0%
	V/F curve	Straight-line V/F curve Multi-point V/F curve N-power V/F curve (1.2-power, 1.4-power, 1.6-power, 1.8-power, square)
	V/F separation	Two types: complete separation; half separation
	Ramp mode	Straight-line ramp S-curve ramp Four groups of acceleration/deceleration time with the range of 0.0~6500.0s
	Communication methods	RS485
	JOG control	JOG frequency range: 0.00Hz~50.00 Hz JOG acceleration/deceleration time: 0.0~6500.0s
	Built-in PID	It realizes process-controlled closed loop control system easily.
	Auto voltage regulation (AVR)	It can keep constant output voltage automatically when the mains voltage changes.
	Frequency source	Digital setting

Input and output interfaces	Analog Input	1 pressure sensor: 4 ~ 20mA input 2 temperature sensor: PT100
	Digital input	2 normal digital input 1 PTC protection circuit (compatible with normal digital inputs) 1 Remote start/stop input
	Digital Output	4 relays output normally open (built in 2 220VAC voltage)
	LED diode display	Standard 3 LED display
protection	Motor overheat protection (PTC), the power-to-ground short-circuit protection, inverter over-current, overload, over voltage, under voltage, overheat, output phase loss, communication fault, current detection fault, EEPROM read-write fault and so on.	
Environment	Installation location	Indoor, free from direct sunlight, dust, corrosive gas,combustible gas, oil smoke, vapor, drip or salt.
	Altitude	Lower than 1000 m
	Ambient temperature	-10°C ~+40°C (Downshift if the ambient temperature is between 40°C and 50°C)
	Humidity	Less than 95%RH, without condensing
	Vibration	Less than 5.9 m/s ² (0.6 g)
	Storage temperature	-20°C~60°C

2 Install dimensions

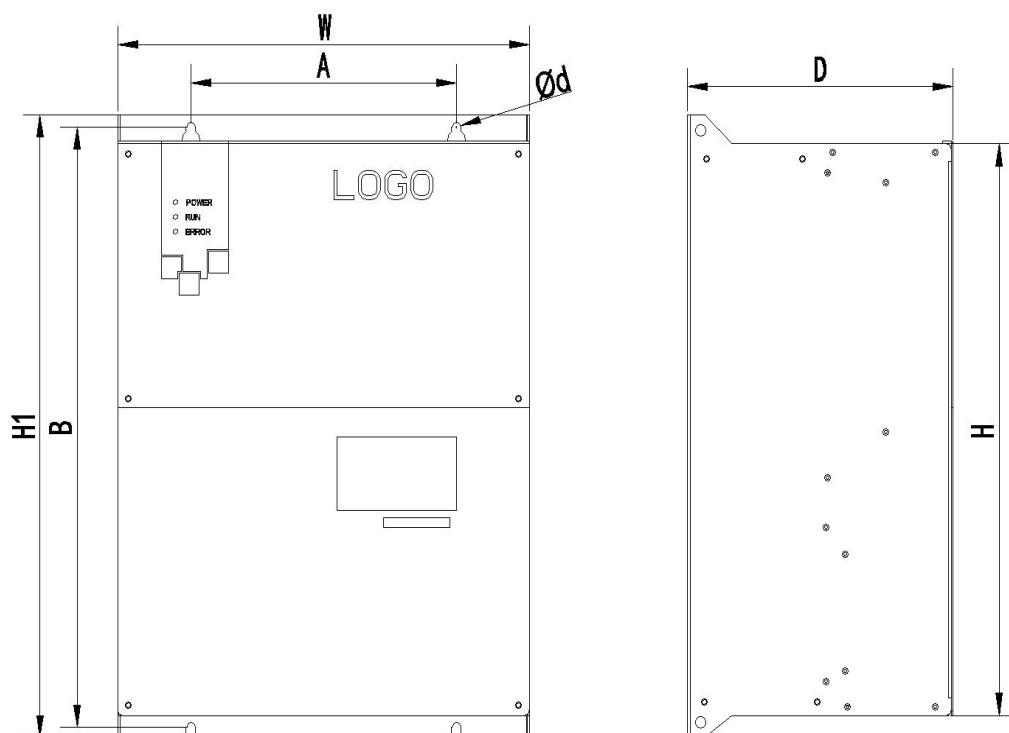
SP500

2.1 Cabinet installation



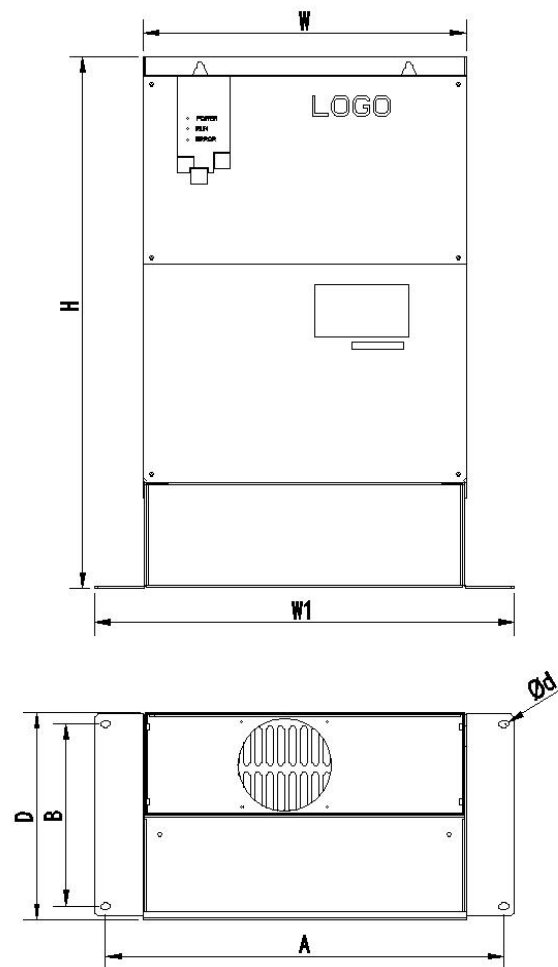
Model	Outline dimension				Install dimension		Hole
	W	W1	H	D	A	B	d
SP500-PLUS-7R5KY-4-N SP500-PLUS-011KY-4-N	160	187	405	157	175	120	5.5
SP500-PLUS-015KY-4-N SP500-PLUS-018KY-4-N SP500-PLUS-022KY-4-N	200	237	455	180	220	155	7
SP500-PLUS-030KY-4-N SP500-PLUS-037KY-4-N	245	282	540	223	264	140	9
SP500-PLUS-045KY-4-N SP500-PLUS-055KY-4-N	300	340	625	275	320	200	9
SP500-PLUS-075KY-4-N SP500-PLUS-090KY-4-N SP500-PLUS-110KY-4-N	275	322	810	310	303	230	9
SP500-PLUS-132KY-4-N SP500-PLUS-160KY-4-N	400	440	967	310	416	240	11

2.2 Wall installation



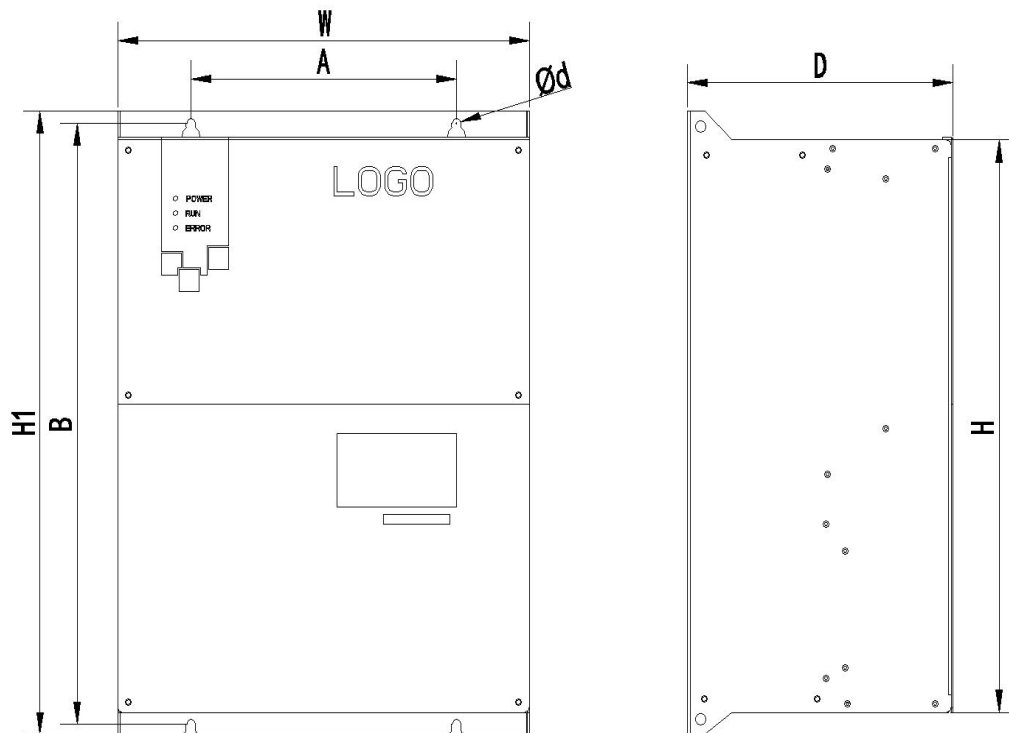
Model	Outline dimension				Install dimension		Hole
	W	H	H1	D	A	B	d
SP500-PLUS-7R5KY-4-N SP500-PLUS-011KY-4-N	160	290	320	150	120	305	5.5
SP500-PLUS-015KY-4-N SP500-PLUS-018KY-4-N SP500-PLUS-022KY-4-N	200	335	370	180	150	355	7
SP500-PLUS-030KY-4-N SP500-PLUS-037KY-4-N	245	390	425	223	180	410	9
SP500-PLUS-045KY-4-N SP500-PLUS-055KY-4-N	300	440	470	275	210	455	9
SP500-PLUS-075KY-4-N SP500-PLUS-090KY-4-N SP500-PLUS-110KY-4-N	275	590	630	310	200	612	9
SP500-PLUS-132KY-4-N SP500-PLUS-160KY-4-N	400	675	715	310	320	695	11

2.1 Cabinet installation



Model	Outline dimension				Install dimension		Hole
	W	W1	H	D	A	B	d
DP500-PLUS-011KY-4-N DP500-PLUS 015KY-4-N DP500-PLUS-018KY-4-N DP500-PLUS-022KY-4-N	260	356	490	200	343	155	7
DP500-PLUS -030KY-4 DP500-PLUS -037KY-4	310	402	540	200	382	175	7
DP500-PLUS-045KY-4-N DP500-PLUS-055KY-4-N	300	340	625	275	320	200	9
DP500-PLUS-075KY-4-N DP500-PLUS-090KY-4-N DP500-PLUS-110KY-4-N	275	322	810	310	303	230	9
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2.2 Wall installation



Model	Outline dimension				Install dimension		Hole
	W	H	H1	D	A	B	d
DP500-PLUS-011KY-4-N DP500-PLUS-015KY-4-N DP500-PLUS-018KY-4-N DP500-PLUS-022KY-4-N	260	340	375	200	200	360	7
DP500-PLUS -030KY-4 DP500-PLUS -037KY-4	310	390	425	200	200	410	7
DP500-PLUS-045KY-4-N DP500-PLUS-055KY-4-N	300	440	470	275	210	455	9
DP500-PLUS-075KY-4-N DP500-PLUS-090KY-4-N DP500-PLUS-110KY-4-N	275	590	630	310	200	612	9
DP500-PLUS-132KY-4-N DP500-PLUS-160KY-4-N	400	675	715	310	320	695	11

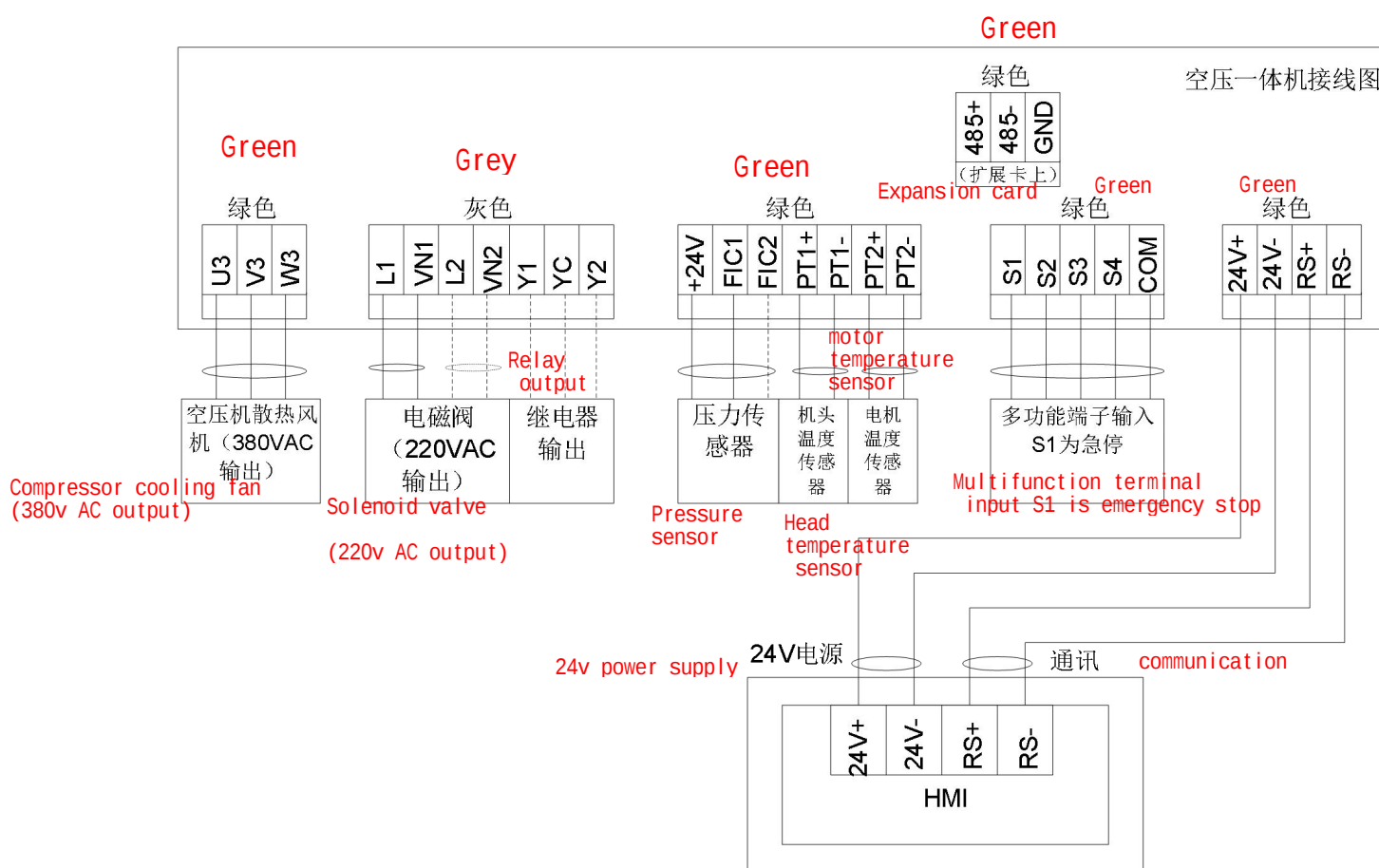
3 Terminal Definition

3.1 Main circuit terminal definitions

Terminal symbol	Terminal functions
R、S、T	Three-phase AC input terminals
U1、V1、W1	The main three-phase AC inverter output terminals
U2、V2、W2	Fan three-phase AC output terminal
PE	Ground terminal

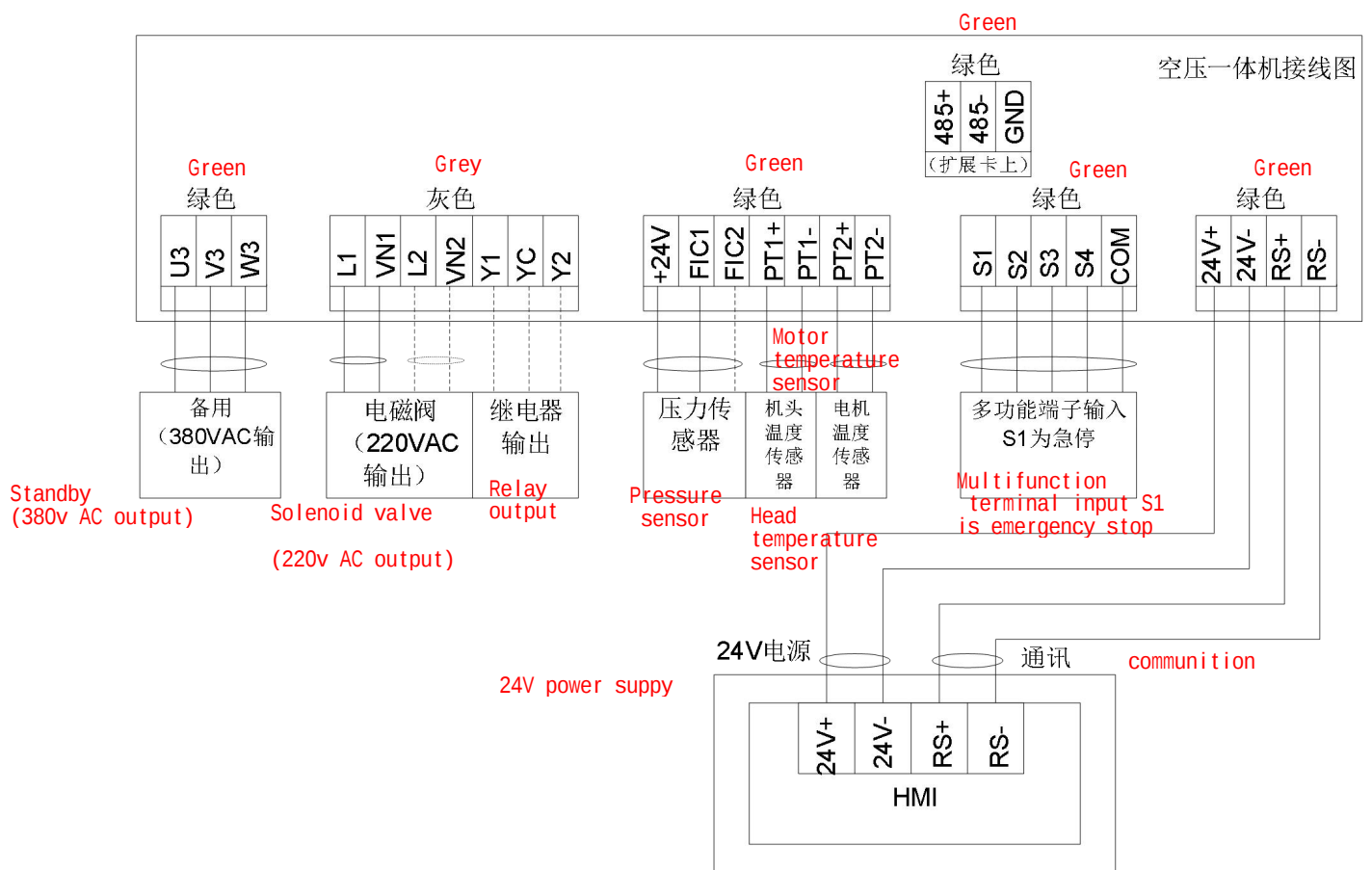
3.2 Definition of the control terminal and wiring

3.2.1 SP500-PLUS 37KW and below wiring diagram

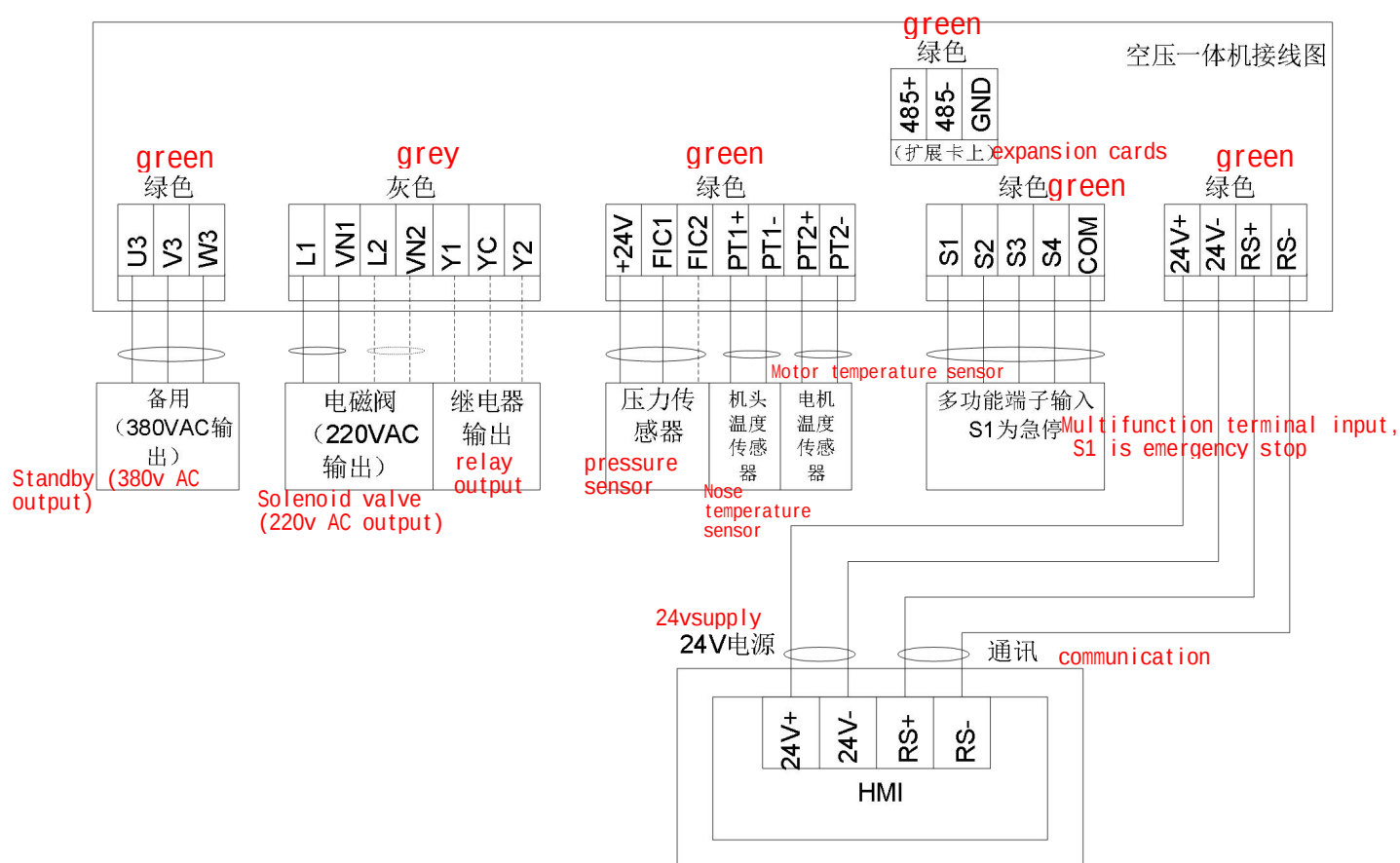


Note: Fan output terminals are U3、V3、W3, No U2、V2、W2.

3.2.2 SP500-PLUS 37KW and above wiring diagram



3.2.3 DP500-PLUS wiring diagram

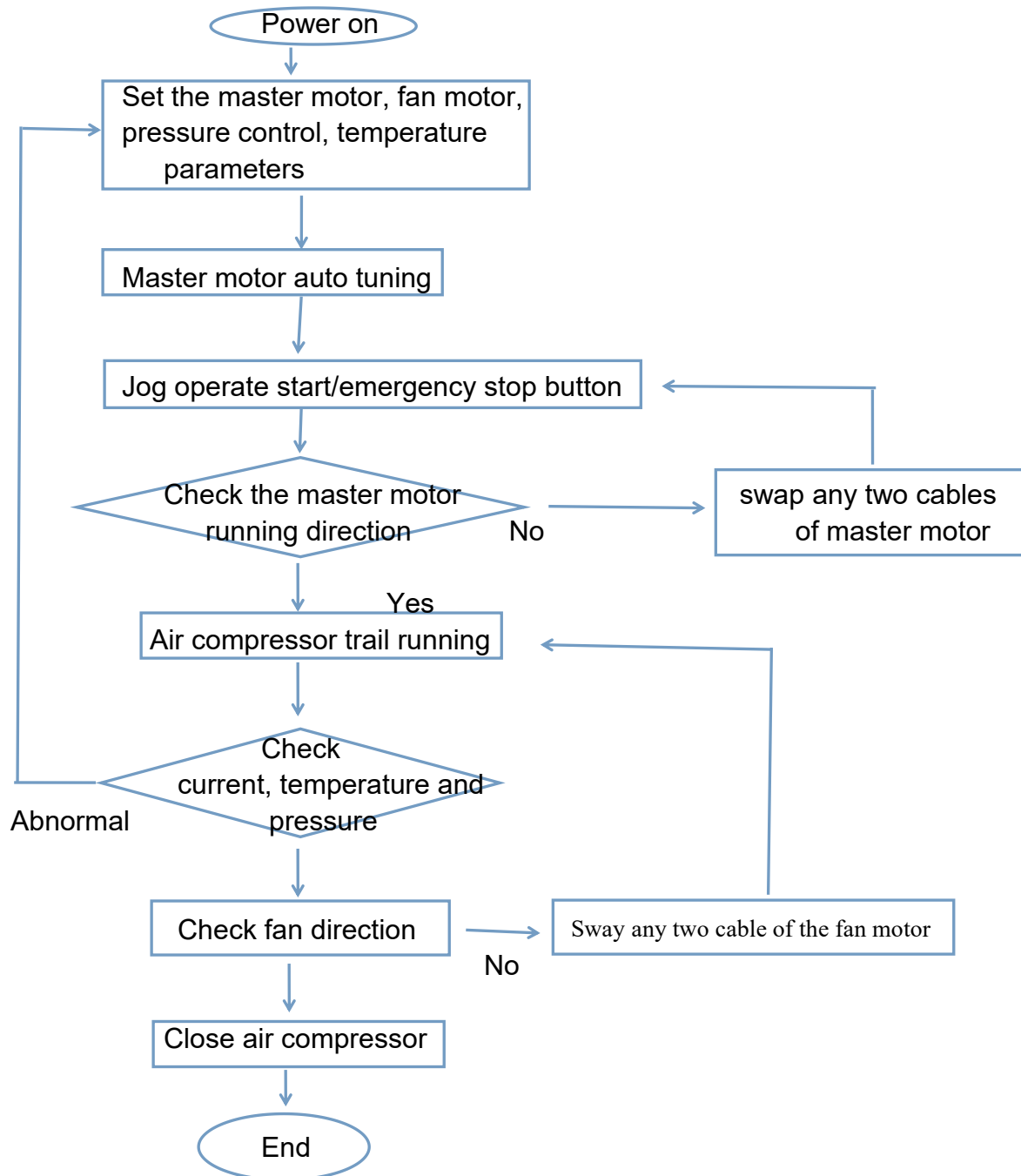


Note:

- 1) PT2 +, PT 2- is the of motor PT100 terminals, please shorted connect, otherwise it will report the motor overheating fault.
- 2) S3 is the Motor PTC terminal, please shorted connect with COM(or set P212 = 0), otherwise it will report the motor overheating fault.

	air compressor fan	Main motor fan	P534(P117=8 auto modify)
DP500-PLUS	U2, W2 W2 → v2	U3, V3, W3	Any value
SP500-PLUS >37KW	U2, W2, W2	U3, V3, W3	0
SP500-PLUS ≤37KW	U3, V3, W3		1

4 Debugging Process



5 Function parameter

Group P0 Monitoring Parameter			
Code	Function	Accuracy	Type of data
P0.00	Display selection	0-32	Read-only
P0.01	Set frequency	0.01Hz	Read-only
P0.02	Output frequency	0.1Hz	Read-only
P0.03	Output current	0.1A	Read-only
P0.04	Operating speed	1rpm	Read-only
P0.05	DCV	0.1V	Read-only
P0.06	Inverter temperature	1℃	Read-only
P0.07	Pressure of air compressor 1(FIC)	0.01 kgf/cm2	Read-only
P0.09	Output voltage	0.1V	Read-only
P0.10	PID stage status	0: Start delay 1: Loading delay 2: Running 3: Relieving pressure 4: Sleeping 10: Stop delay 11: Standby 12: Restart delay 13: Fault	Read-only
P0.11	PID timing for each stage	1s	Read-only
P0.13	Head temperature	1℃ (PT1+/PT1-)	Read-only
P0.14	Inverter fault	Bit 0: Inverter fault Bit 1: Air compressor overheat	

		Bit 2: Air compressor over voltage Bit 3: Emergency stop Bit 4: Fan status 0: Stop 1: Run Bit 5: Phase sequence fault Bit 6: Pressure sensor fault (<2Ma) Bit 7: Motor overheat PT100 Bit 8: Motor fault PTC Bit 9: Communication fault Bit10: The electromagnetic valve 0:Unload 1: Load Bit 11: The electromagnetic valve overload warning Bit 12: Fan motor over current warning Bit 13: Fan motor change frequency warning	
P0.15	Air filter used time	1 hour	Read-only
P0.16	Oil filter used time	1 hour	Read-only
P0.17	Separator used time	1 hour	Read-only
P0.18	lubricating oil used time	1 hour	Read-only
P0.19	Grease used time	1 hour	Read-only
P0.20	Power	0.1KW	Read-only
P0.21	Motor temperature	1℃ (PT2+/PT2-)	Read-only
P0.22	Total running time	1hour	Read-only
P0.23	Total loading time	1hour	Read-only
P0.24	Total unloading time	1 hour	Read-only

P0.25	Current of fan	0.0A	Read-only
P0.26	Power	1kwh	Read-only
P0.28	Inverter status	1: Forward; 2: Reverse; 3: Stop	Read-only
P0.29	Running minutes		Read-only
P0.31	Fan frequency		Read-only
P0.32	Main inverter fault code	0: No fault 2: Overload during acceleration 3: Overload during deceleration 4: Overload during constant speed 5: Over voltage during acceleration 6: Over voltage during deceleration 7: Over voltage during constant speed 8: Snnuber resistor overload 9: Under voltage 10: AC drive overload 11: Motor overload 12: Input phase loss 13: Output phase loss 14: Module overheat 15: External fault 16: Communication abnormal 17: Contactor abnormal 18: Current detection fault 19: Motor auto-tuning fault 20: Encoder/PG card fault 21: Parameter read-write error 22: AC drive hardware fault 23: Motor ground connect fault 26: Running time reached	Read-only

P0.33	Fan ac drive fault code		Read-only
P0.34	Main motor fan current	Unit: 0.1A	Read-only
P0.38	Main pressure 2	Unit: 0.01 kgf/cm2	Read-only
Group P0 Monitoring parameters			
D0.06	Fan output frequency		0.01hz
D0.07	Fan set frequency		
D0.08	Fan bus voltage		
D0.09	Variable frequency fan current		0.01A
D0.10	AI1 voltage		
D0.11	AI2 voltage		
D0.12	AI3 voltage		
D0.13	AI4 voltage		
D0.14	Fan output voltage		
D0.15	Fan output power		
D0.16	Fan ac drive temperature		
D0.21	Input grid voltage Urs	0.1V	Read-only
D0.22	Input grid voltage Ust	0.1V	Read-only
D0.23	Input grid voltage Utr	0.1V	Read-only
D0.27	Phase sequence	>=32768 is reverse phase sequence, others is	

	detection signal	forward phase sequence	
Group P1 Master motor Basic parameters and motor parameters			
Code	Function	Setting range	Factory default
P1.00	Keypad setting frequency	0~P1.05	00.00Hz
P1.01	Control mode	0:Vector control without PG 1:V / F control	0
P1.02	Frequency setting	0:KEY 1:FIC:4-20mA 2:RS485 communication	0
P1.03	Operation mode	0: KEY 1: I/O 2: Communication control	0
P1.04	Reversed		
P1.05	Upper limit frequency	50.00Hz	50.00Hz
P1.06	Lower limit frequency	00.00Hz	00.00Hz
P1.07	Acceleration time	0.1~999.9S	Changing
P1.08	Deceleration time	0.1~999.9S	Changing
P1.09	Stop mode	0-Deceleration stop; 1- Coast to stop	0
P1.12	Power coefficient	0~200.0%	100.0%
P1.13	Carrier	1.0-15.0k	Changing
P1.17	Factory Reset	8:Factory Reset 9: Clear fault record and running info	0
P1.18	Parameter lock	0: Unlock parameters 1: Lock parameters	0

P1.19	Inverter maximum frequency	Rated motor frequency~500.00hz	50Hz
Master Motor parameters			
P1.20	Motor type	0-Asynchronous; 2-Synchronous	Refer to the motor
P1.21	Rated motor power	0.1~1000.0kW	Refer to the motor
P1.22	Rated motor voltage	0~690V	Refer to the motor
P1.23	Rated motor current	0.01~655.35A	Refer to the motor
P1.24	Rated motor frequency	0.00~500.00HZ	Refer to the motor
P1.25	Rated motor speed	0~65536rpm	Refer to the motor
P1.26	Motor Back EMF	0.1V~6553.5V	Refer to the motor
P1.28	Rated fan current	0.00~655.35A	Refer to the motor
P1.29	Minimum frequency percentage of fan	00.00~50.00Hz	20.00Hz
P1.30	Motor Auto-tuning	1: Static state 2: dynamic state	0
P1.31	Stator resistance	0.001Ω~65.535Ω	Refer to the motor
P1.32	LD	0.01mH~655.35mH	Refer to the motor
P1.33	LQ	0.01mH~655.35mH	Refer to the motor

P1.34	Inverter function code	0~65535	0
P1.35	Inverter data	0~65535	0
P1.39	Fan G/P display	1: G type 2: P type	1
P1.41	Fan variable frequency running command source	0: Start/stop by P103, if set P103=0, can use key operate start or stop; if set P600=1, PID setting frequency. 1: Start/stop by motor head temperature or fan ac drive	
P142	Fan frequency setting	If P600=1, P142 set 8, select PID setting frequency If P600=0, P142 can set 0~9	
P149	Fan maximum frequency		
P151	Fan upper limit frequency		
P1.54	Fan carrier		
P1.56	Fan acceleration time 1		
P1.57	Fan deceleration time 1		
Group P2 Multi-function input / output			
P2.00	0.0℃ correction		Changing
P2.02	103.4℃ correction		Changing
P2.04	Local/remote selection	1: Local control 2: Remote terminal control	0
P2.20	Temperature PID-P	0.0~500.0	300.0
P2.01	Temperature	0.0~10.00s	2.00s

	PID-I		
P2.02	Temperature PID-D	● 0.000~10.000	0.000
P2.03	Temperature PID deviation limit	Percentage of setting value If set as 80℃, P203=0.5%, then $80 \times 0.5\% = 0.4^\circ\text{C}$, if less than 0.4, PID don't adjust	0.5%
P2.04	Temperature PID output length	Maximum value of twice temperature PIC output deviation	2.00Hz
P2.25	Range of pressure 2	0.00~50.00bar	16.00Bar
P2.26	Reserved		
P2.30	Fan switch mode	0: Automatic 1: Open 2: Close	0
P2.34	Motor temperature warning threshold	0~200.0℃	125.0℃
P2.36	Fan power	0.1~55.00kw	Changing
P2.37	Rated fan voltage	1~1000v	380V
P2.38	Rated fan current	Change P1.28, P2.38 will auto changed	Changing
P2.39	Rated fan frequency	0.00~500.00hz	50.00Hz
P2.40	Rated fan rotation speed	1~65535	1460rpm
Group P4 Multi-function Input/Output			
P4.00	S1	0: No function	8
P4.01	S2	8: EMERGENCY stop normal closed	00
P4.02	S3	32: Motor overheating protection	33
P4.13	FIC minimum input	0.00V~P4.15	2.00V

P4.15	FIC maximum input	P4.15~10.00V	9.75V
P4.18	FIC2 minimum input	0.00V~P4.20	2.00V
P4.20	FIC3 maximum input	P4.18~10.00V	9.75V
Group P5 Air compressor constant pressure control specific parameters (set P6.00 = 1 is valid)			
P5.00	Inverter pressure	P5.02~P5.01	7.00kgf/cm2
P5.01	Unloading pressure	P5.00~P5.03	8.00kgf/cm2
P5.02	Loading pressure	0~P5.00	6.50kgf/cm2
P5.03	Stop pressure	P5.01~30.00kgf/cm2	10.00kgf/cm2
P5.04	Pressure gauge range	0.00~30.00kgf/cm2	16.00kgf/cm2
P5.05	Fan start temperature	Fan stop temperature~120.0C℃	80℃
P5.06	Fan stop temperature	0~Fan start temperature	70℃
P5.07	Stop Temperature	Fan start temperature~200℃	100℃
P5.08	Start delay	0~100s	3s
P5.09	Loading delay	0~3000s	20s
P5.10	Unloading delay	0~3000s	120s
P5.11	Restart delay	0~3000s	5s
P5.12	Stop delay	0~3000s	30s
P5.13	Air filter setting time	0~65535hour	500
P5.14	Oil filter setting time	0~65535hour	500

P5.15	Separator setting time	0~65535hour	500
P5.16	Lubricating oil setting time	0~65535hour	500
P5.17	lubricating grease setting time	0~65535hour	500
P5.22	Fan current coefficient	0.0~1000%	100%
P5.23	Sleep pressure	00.00~20.00kgf/cm2	9.00kgf/cm2
P5.31	Fan overload coefficient	0.10~10.00 , the larger coefficient, the longer time for the overload <115% no limit time; 115% 1 hour; 150% 60S; >180% 2s	1.00
P5.34	Fan current detection selection	1: Main board U3 V3 W3 0: Contactor fan U2 V2 W2 P1.17=8, will auto select according to AC drive 37KW and below, P5.34=1 37KW above, P5.34=0	
P5.38	Fan proportional gain		
P5.39	Fan integral gain		
P5.52	Relay Y1		
P5.53	Loading relay L1 VN1 (220V output)	0: No function; 1: Running; 2: Fault 10: Loading; 11: Air compressor fan	10(loading)
P5.54	3 phase 380V fan relay U3 V3 W3		11
P5.55	Relay L2 VN2		1

	(220V output)		
P5.56	Relay Y2		2
Group P6 Air compressor PID constant control parameters			
P6.00	Constant voltage control mode of air compressor	0- Invalid 1- Valid	0
P6.02	Fan frequency temperature	0.0~120.0	75.0℃
P6.07	PID-P	0.0~200.0	80.0
P6.08	PID-I	0.0~200.0s	2.0s
P6.10	PID Steps	0.00~10.00Hz	5.00Hz
P6.21	PID feedback loss warning mode	0: No warning 1: Warning and no stop, fault code "20" 2: Warning and stop, fault code "20"	2
P6.22	PID feedback loss detection value	Range: 0-10.00V (If select 4~20mA, <2mA disconnect; set P622=2mA*500Ω=0.50V)	1.00V
P6.23	PID feedback loss detection time	0.0s~20.0s	1.0s
P6.24	PID setting		
Fan start/stop parameters			
P6.43	Fan start mode	0: Direct start 1: Rotational speed tracking then start 2: Pre-excitation start (AC asynchronous motor)	0
P6.44	Rotational speed tracking mode	0: Start from stop 1: Start from zero speed 2: Start from maximum frequency	2
P6.45	Rotational speed tracking speed	1~100	20
P6.46	Start frequency	0.00Hz~10.00Hz	0.00Hz
P6.47	Start frequency hold time	0.0s~100.0s	0.0s
P6.48	Startup DC brake current/Pre-excitation current	0%~100%	60%
P6.49	Startup DC brake time/Pre-excitation time	0.0s~100.0s	3.0s

P6.50	Acceleration/Deceleration mode	0: Linear acc/dec 1: S curve acc/dec A 2: S curve acc/dec B	0
P6.51	Time proportion of S-curve start segment	0.0%~ (100.0%-P1.09)	30.0%
P6.52	Time proportion of S-curve end segment	0.0%~ (100.0%-P1.08)	30.0%
P6.53	Stop mode	0: Decelerate to stop 1: Coast to stop	0
P6.54	Initial frequency of stop DC braking	0.00Hz ~ Maximum frequency	0.00Hz
P6.55	Waiting time of stop DC braking	0.0s~100.0s	0.0s
P6.56	Stop DC braking current	0%~100%	0%
P6.57	Stop DC braking time	0.0s~100.0s	0.0s
P6.58	Brake use ratio	0%~100%	100%
Group P8 Advanced parameters			
P8.14	Temperature correction coefficient	0-200.0%	100%
P8.16	Fan work mode	DP500 55kW and below: 0-Fan variable frequency SP500 55kW and below: 1- Fan power frequency DP500 75kW and above: 2-Fan variable frequency SP500 75kW and above: 3-Fan power frequency	0
Air compressor controller fault type			
OP		Overvoltage warning	
OH		Over-temperature warning	

PTC	Motor overheating protection,PTC detection
ES	EMERGENCY stop
CO	Communication failure (inverter)
PHAS	Phase sequence fault
PIDE	Pressure Sensor disconnection fault
Main motor inverter fault	
oC1 oC2 oC3	Over current
oU1 oU2 oU3	Over voltage
LU	Under voltage
CBC	Rapid current limit over time
Lo	Output phase lose
oL1	Motor overload
oL2	Inverter overload
oH	Inverter over heat
IE	Current detection abnormal
CE	Communication overtime
EF	External fault
RAY	Relay abnormal
Fan inverter fault	
F-oL	Fan overload