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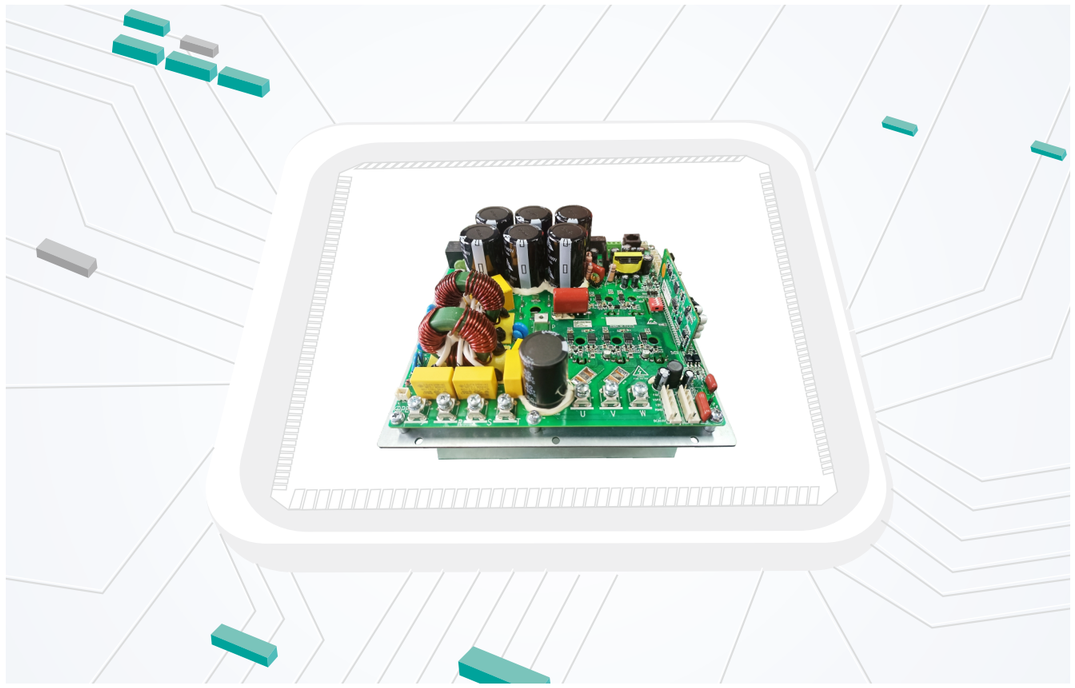
Servo | AC drive | PMSM | PLC | HMI

Simphoenix

FS100 Series Special Drive for Scroll Machine



FS100 Series Special Drive for Scroll Machine

FS100 series (air conditioner) driver is used for BLDC synchronous machine control of scroll compressor, designed with input voltage of single-phase 220V/three-phase 380V and maximum output frequency of 1000Hz. adopts our self-developed open-loop vector control algorithm of scroll machine driver to realise BLDC non-inductive control. It supports multiple protection functions such as undervoltage, overvoltage, overcurrent, overload, overheat and short circuit. The driver adopts forced air-cooled or liquid-cooled programme, the whole machine design life of 10 years, can be configured with EMI filter and DCL DC reactor, to improve its own anti-interference ability, while reducing the interference to the power grid.

EMI filter

DCL reactor

Applications

Modular units, multi-connected units, unitary units, heating units, water heating units, fans, pumps, etc.

Advantages

Control algorithm
Mature and stable vortex drive control algorithm, which can match with mainstream compressor brands in the market.

Communication protocols
Optocoupler-isolated 485 circuit,supports standard Modbus -RTU protocol,can be customised to develop special communication protocol.

Fast torque response, higher speed stability accuracy

- Low-speed high-torque output,zero-speed torque up to 180%
- Stable speed accuracy up to ±0.02%
- Fast torque response, response time less than 25ms

Rich warning and protection functions
Perfect undervoltage,overvoltage,overcurrent, overload,overheating,short circuit and other protection functions improve the stability and reliability of the system.

Drive integrated design
Integrated plate structure design,covering 2P to 45P compressor drive,supports embedded and wall-mounted installation,small volume and easy to install.

EMI filter
Absorb surge voltage and reduce electromagnetic interference.

Technical Parameters

transport enter transport outbound	Input power supply	Single phase 2S: AC 220V(-15%)~240V(+10%), 50/60Hz Three phase 2T: AC 220V(-15%)~240V(+10%), 50/60Hz Three phase 4T: AC 380V(-15%)~415V(+10%), 50/60Hz	
	Output voltage	Single phase 2S: 0~220V■ Three phase 2T: 0~220V■ Three phase 4T: 0~380V	
	Output frequency	Low frequency operation mode 0.5~500.00Hz;High frequency operation mode 5.0~1000.0Hz	
	Frequency resolution	Low frequency operation mode 0.01Hz;High frequency operation mode 0.1Hz	
	Analog input	1 set of analog input AI1 (FS100-2S080P-PFC not supported),default 0-10VDC,can be selected by dialing 4-20mADC	
	Digital input	1 programmable digital input DI1	
	Digital output	1 set of programmable open collector output DO1	
	Relay output	1 set of programmable relay outputs TA/TB/TC	
	DC fan output	2 sets of DC fan interfaces DCFAN1~2 (only supported by FS100-4T080P and FS100-4T150P)	
control characteristics	Control mode	Open loop vector control	V/F control
	Starting torque	0 speed 180%	0 speed 180%
	Speed regulation range	1:200	1:100
	Stable speed accuracy	±0.2%	±0.5%
	Torque control accuracy	±5%	——
	Torque response time	≤25ms	——
	Carrier frequency	2~8.0KHz	
	Acceleration and deceleration time	0.01~600.00Sec	

Technical Parameters

featured functions	RS485 communication	1-way RS485,support MODBUS-RTU protocol
	Hardware station address	Support hardware station address dialing settings
	General functions	Fault self recovery,motor parameter dynamic/static self identification,start delay,overcurrent suppression,overvoltage/ undervoltage suppression,custom curve,and wire breakage detection
	Macro parameter	Using macro parameters,typical applications can be implemented with just one click
protection function	Power supply	Undervoltage protection,three-phase power imbalance protection,and power phase loss protection (only applicable to 4T models)
	Operation protection	Overcurrent protection,overvoltage protection,driver overheat protection,driver overload protection,motor overload protection, output phase loss protection,IGBT drive protection
working environment	Installation environment	No dust, corrosive,flammable gas,no oil mist,water vapor,no dripping water,no salt
	Altitude	0~1000 meters. For every 1000 meters rise,the output current capacity will be derated by 10%
	Working environment temperature	-20°C ~ +60°C
	Storage environment temperature	-30°C ~ +70°C
	Environmental humidity	below 95%,no water droplets condensing
	Vibration	$<6m/s^2$

Driver Model Description

FS100- 4 T 150 P C -R

Serial No.	
FS100-	air conditioner driver

Voltage Class	
2	220V
4	380V

Power Phase Number	
S	single phase
T	three-phase

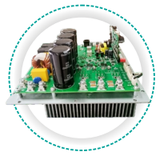
Adapted Load Power (P)	
020	2P
080	8P
...	...
450	45P

Customized Code	
default	general
-R	customization

Cooling Method	
default	air-cooling
C	refrigerant heat dissipation
F	forced air cooling

Adaptation Load Type	
P	compressor load

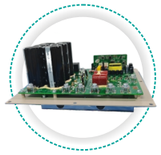
Drive Model Table

Model	FS100-2S020P	FS100-2S080P-PFC	FS100-2T080P-ZP	FS100-4T020P-R
Input voltage (VAC)	single-phase 220V	single-phase 220V	three-phase 220v	three-phase 380V
Maximum capacity (KVA)	2.9	12.6	12.6	2.4
Maximum current (A)	7.5	33	33	3.7
Adapted motor (kW)	1.5	7.5	7.5	1.5
Adaptive filter	External	Built-in	Built-in	External
Adapted reactor	Not supported	SFDR-042*2	SFDR-042	Not supported



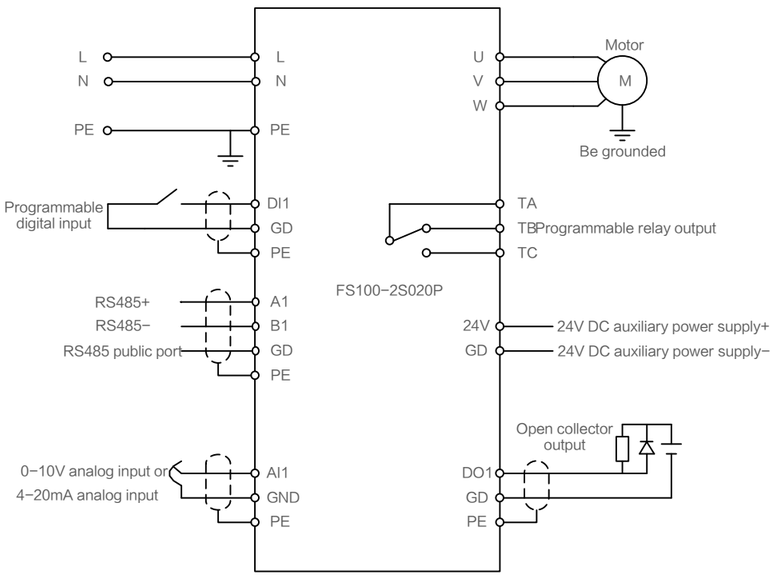

Model	FS100-4T080P	FS100-4T120P-RA1	FS100-4T150P	FS100-4T180P-R
Input voltage (VAC)	three-phase 380V	three-phase 380V	three-phase 380V	three-phase 380V
Maximum capacity (KVA)	11.2	16.5	21.7	25.7
Maximum current (A)	17	25	33	39
Adapted motor (kW)	7.5	11	15	18.5
Adaptive filter	Built-in	External	Built-in	External
Adapted reactor	SFDR-041	SFDR-041	SFDR-042	SFDR-043

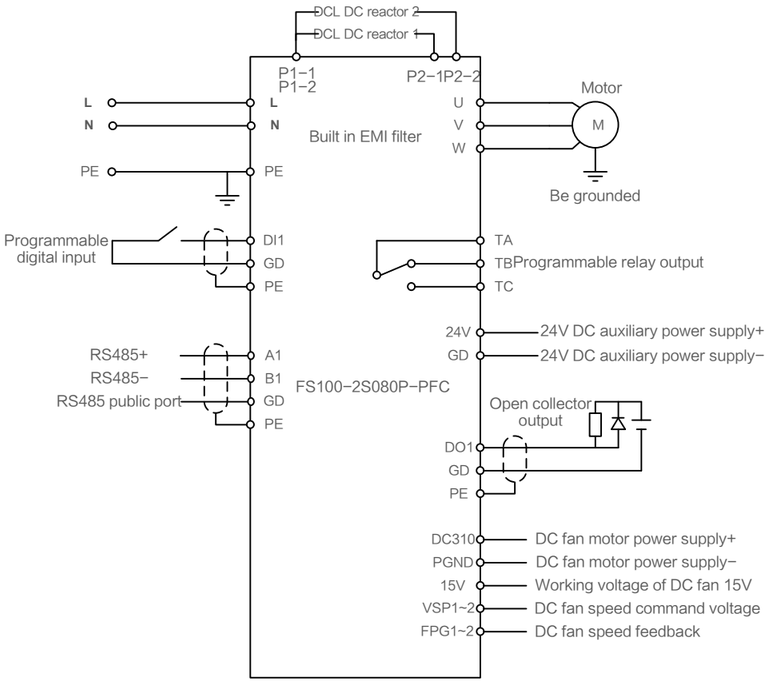
Model	FS100-4T180P	FS100-4T220P(C)	FS100-4T370P(C)	FS100-4T450P(C)
Input voltage (VAC)	three-phase 380V	three-phase 380V	three-phase 380V	three-phase 380V
Maximum capacity (KVA)	25.7	29.6	39.5	49.4
Maximum current (A)	39	45	60	75
Adapted motor (kW)	18.5	22	30	37
Adaptive filter	External	External	External	External
Adapted reactor	SFDR-043	SFDR-043	SFDR-044	SFDR-031

Driver Standard Wiring Diagram

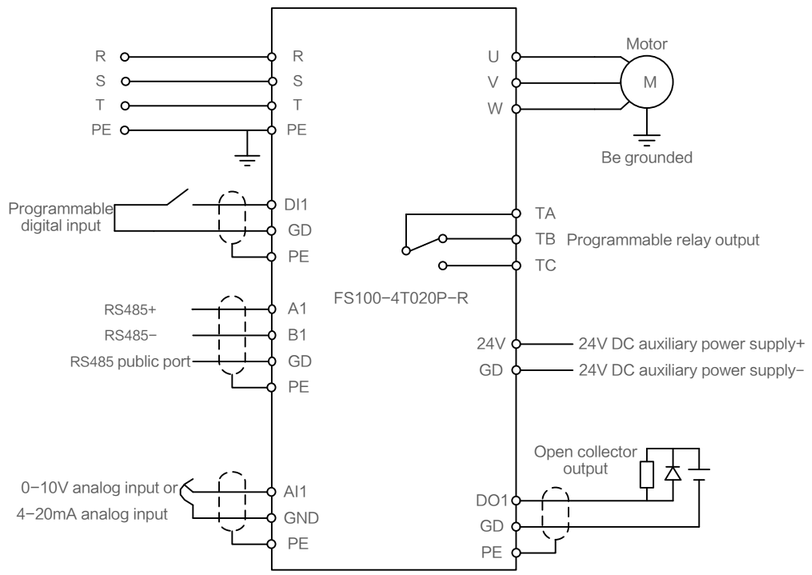
Ⅰ Applicable models for class wiring diagram: FS100-2S020P



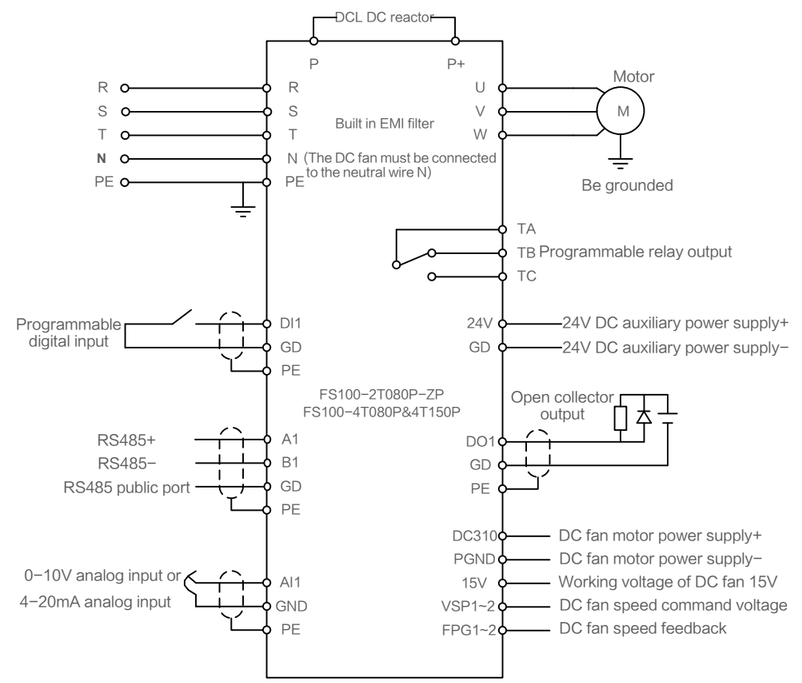
Ⅱ Applicable models for class wiring diagram: FS100-2S080P-PFC



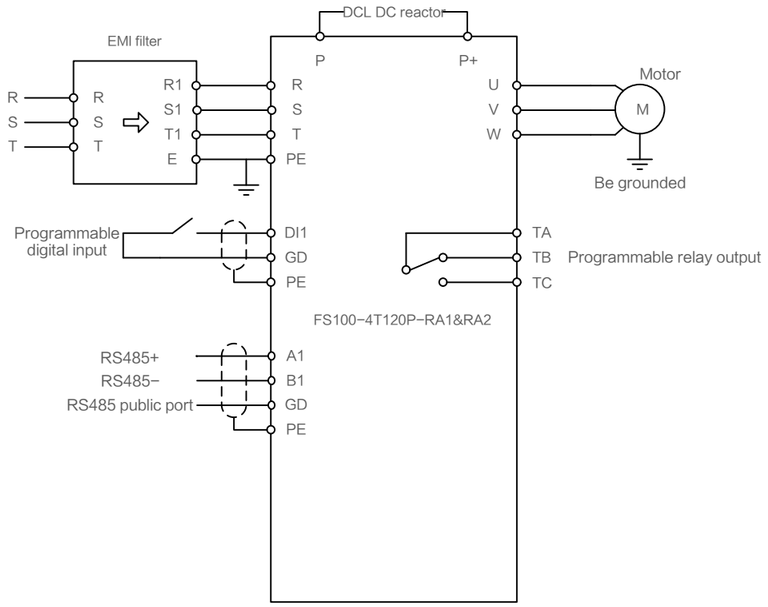
Ⅲ Applicable models for class wiring diagram: FS100-4T020P-R



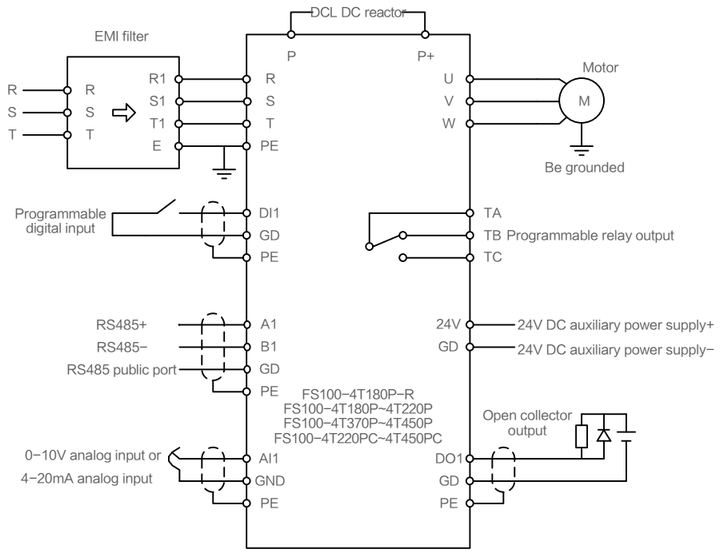
Ⅳ Applicable models for class wiring diagram: FS100-2T080P-ZP/FS100-4T080P/FS100-4T150P



Ⅴ Applicable models for class wiring diagram: FS100-4T120P-RA1&RA2



Ⅵ Applicable models for class wiring diagram: FS100-4T180P-R/FS100-4T180P~4T450P/ FS100-4T220PC~4T450PC

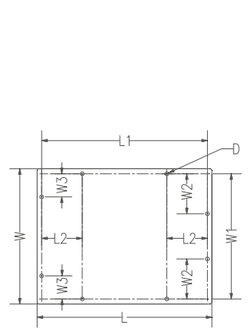


Drive boundary, installation, and air channel slotting dimensions (unit: mm)

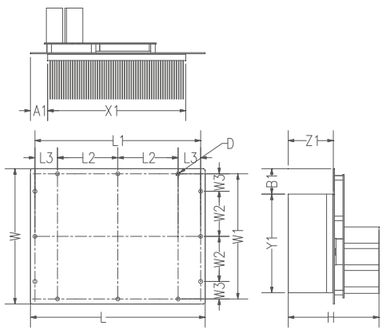
Model	External dimensions			Installation dimensions							Recommended size for air duct slotting				
	L	W	H	L1	L2	L3	W1	W2	W3	D	X	Y	Z	A	B
2S020P	140	175	110	126	–	0	161	–	0	6.0	132	97	35	4	47
2S080P-PFC	226	232	120	219	91	18.5	224	91	21	5.0	166	214	50	51	9
2T080P-ZP	237	242	146	225	112.5	0	230	–	0	6.0	200	150	37	18.5	58
4T020P-R	175	210	113	125	–	0	197	–	0	5.0	134	105	51	21	85
4T080P	227	236	112	219	90.8	18.8	224	90.8	21.3	5.0	135	202	50	29	22
4T120P-RA1	310	240	150	294	72	–	222	71	41	7.0	250	181	85	28	42
4T150P	250	260	163	236	118	0	246	123	0	6.0	181	131	87	46	90
4T180P-R	275	300	200	261	130.5	0	286	143	0	7.0	245	115	96	15	141
4T180P	275	275	176	261	130.5	0	261	130.5	0	7.0	185	136	85	59	115
4T220P	275	275	186	261	130.5	0	261	130.5	0	7.0	185	136	85	59	115
4T370P	275	300	191	261	130.5	0	286	143	0	7.0	203	155	95	52	110
4T450P	275	300	201	261	130.5	0	286	143	0	7.0	203	155	95	52	110
4T220PC	275	275	130	261	130.5	0	261	130.5	0	7.0	185	136	29	59	115
4T370PC	275	300	125	261	130.5	0	286	143	0	7.0	203	155	29	52	110
4T450PC	275	300	135	261	130.5	0	286	143	0	7.0	203	155	29	52	110

Explanation: The direction of the frequency converter is based on the radiator blade as the up and down direction, and the input and output terminals are facing left or beyond the bottom as the standard.

External dimensions and installation dimensions of the driver



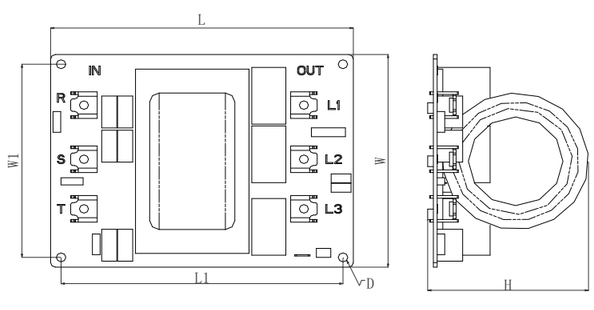
Installation diagram 1: Adapted model: FS100-4T120P-RA1



Installation diagram 2: Adapted model: FS100-2S020P、4T020P-R~4T080P、4T120P-RA2~4T450P

EMI filter external and installation dimensions (unit: mm)

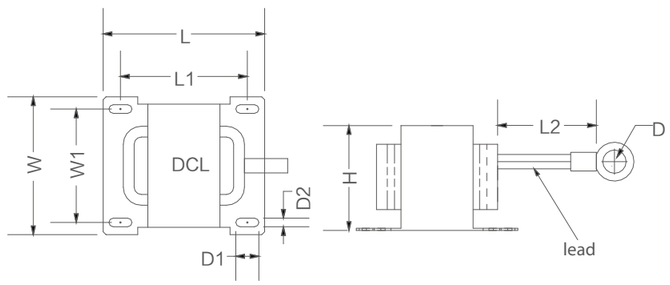
EMI filter model	External dimensions			Installation dimensions		
	L	W	H	L1	W1	D
EEF-T15L23-C2	80	48	42	74	40	3.5
EEF-F30L40-C3	140	80	62	132	72	3.5
EEF-F80L23-C3	160	120	85	149	109	5.0



EMI Filter installation diagram

External and installation dimensions of DC Reactors (unit: mm)

DC reactor model	External dimensions			Installation hole size				Lead size	
	L	W	H	L1	W1	D1	D2	Lead length L2	Lead terminal D
SFDR-041	112	93	80	88	79	16	6	–	M5
SFDR-042	112	93	80	88	79	16	6	–	M5
SFDR-043	110	105	89	88	79	16	6	–	M5
SFDR-044	110	105	89	94	84	6	6	500	M5
SFDR-031	130	133	117	115	120	7	7	500	M6



DC reactor installation diagram

Instructions for independent fan

FS100 series air conditioning drive full series of no fan, for FS100-4T150P and above models, drive radiator on both sides of the air plate installed fixed hole, buy Simphoenix independent fan set can be installed directly, drive installation plate also reserved the fan power line through the hole, plus the fan tear off the protective sticker on the back of the installation board, the O rubber ring 0070M0018 (φ16.5) installed in the fan power line through the hole, Details of the fan package are shown in the table below:

Model	Specifications	electric fan quantity	Air duct plate specifications	Fan Power Supply Specifications	Fan power	Fan air volume (CFM)	Fan speed (RPM)	Fan noise (dB)
FS100-4T150P	SP-F141-01	2	AB9091M0004	HDR-60-24	0.95A/20.8W @24VDC	128.5	6000	55.4
FS100-4T180P	SP-F151-01	2	AB8163M0003	LRS-75-24	1.5A/35W @24VDC	181.36	8500	64.8
FS100-4T220P	SP-F151-01	2	AB8163M0003	LRS-75-24	1.5A/35W @24VDC	181.36	8500	64.8
FS100-4T370P	SP-F151-01	2	AB8160M0043	LRS-75-24	1.5A/35W @24VDC	181.36	8500	64.8
FS100-4T450P	SP-F151-01	2	AB8160M0043	LRS-75-24	1.5A/35W @24VDC	181.36	8500	64.8

Air duct slotting dimensions when using independent fans (unit: mm)

Model	Increase the recommended size of the air duct slot after the fan				
	X	Y	Z	A	B
FS100-4T150P	193	200	90	40	20
FS100-4T180P	197	220	105	53	30
FS100-4T220P	197	220	105	53	30
FS100-4T370P	225	241	105	35	24
FS100-4T450P	225	241	105	35	24

Description: the frequency converter direction to the radiator blade as the upper and lower direction, and the input and output terminal facing left or over down as the standard.

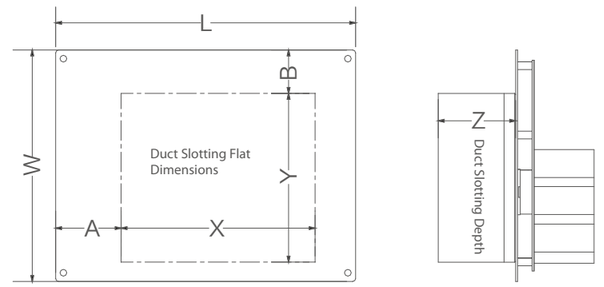
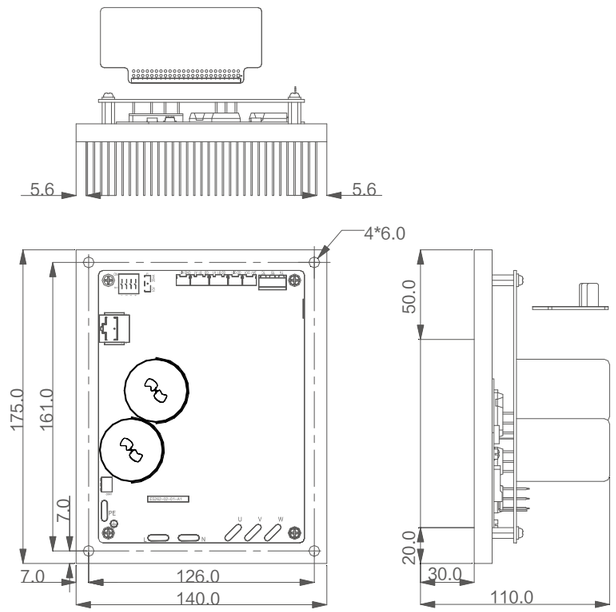
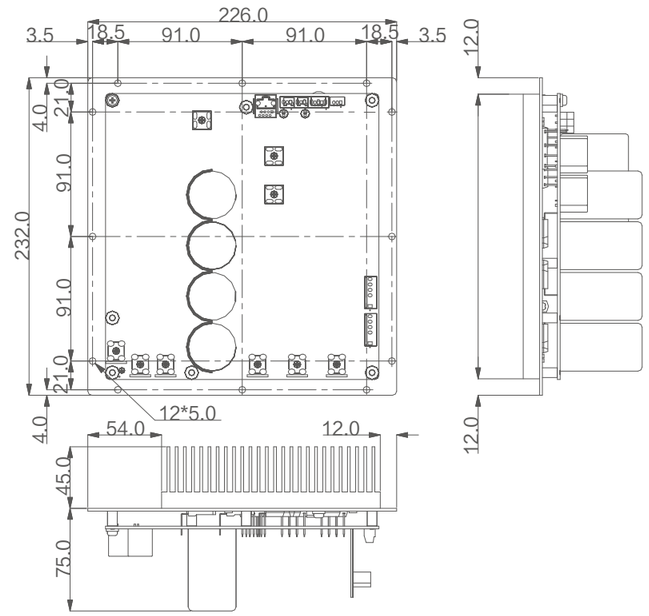


Illustration of air duct slot dimensions when using independent fans

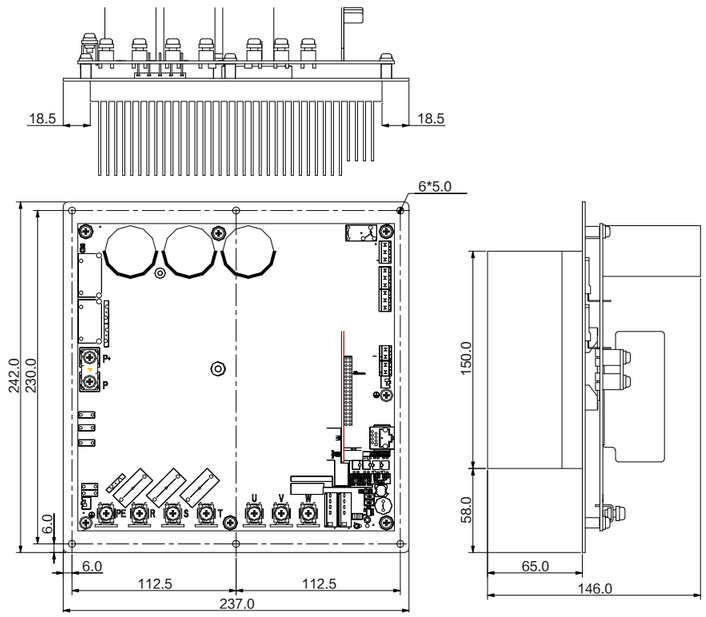
FS100-2S020P Dimensional Drawing



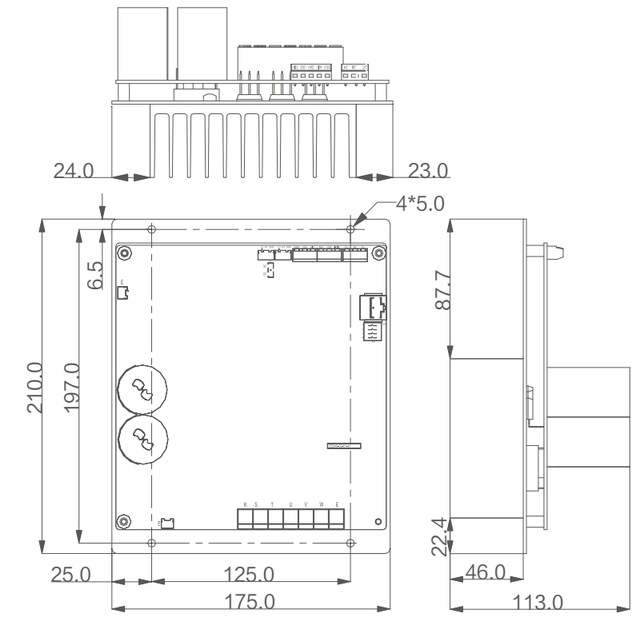
FS100-2S080P-PFC Dimensional Drawing



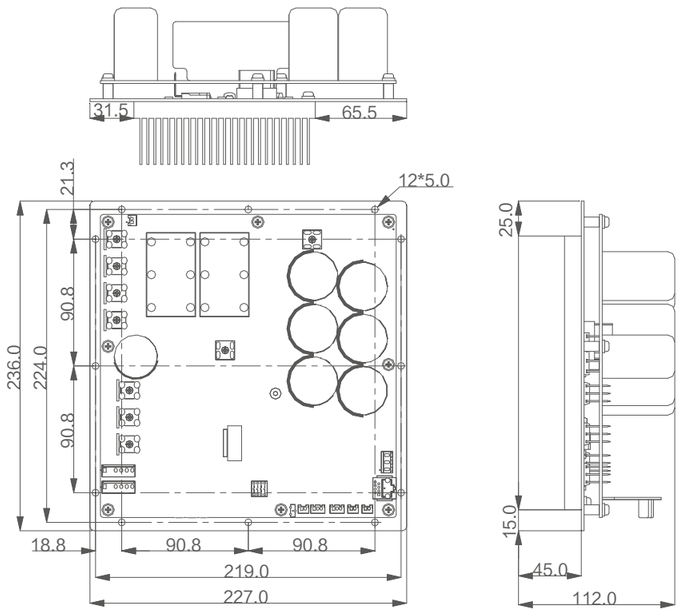
FS100-2T080P-ZP Dimensional Drawing



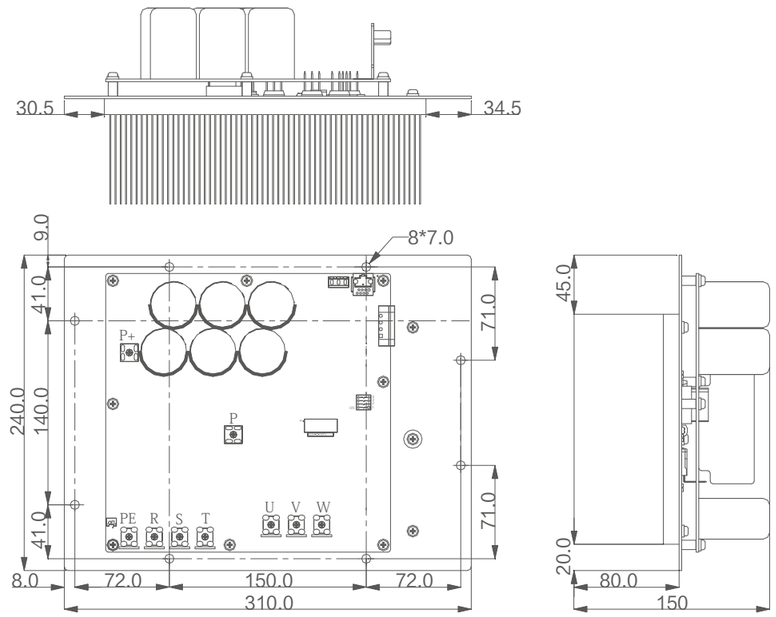
FS100-4T020P-R Dimensional Drawing



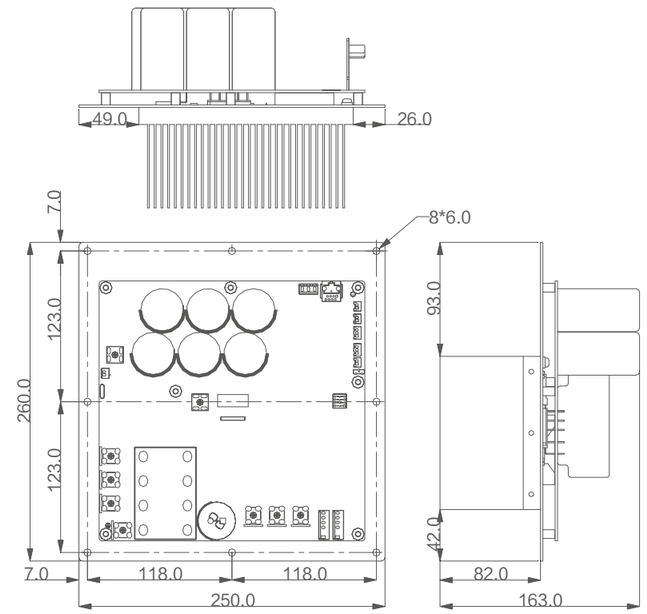
FS100-4T080P Dimensional Drawing



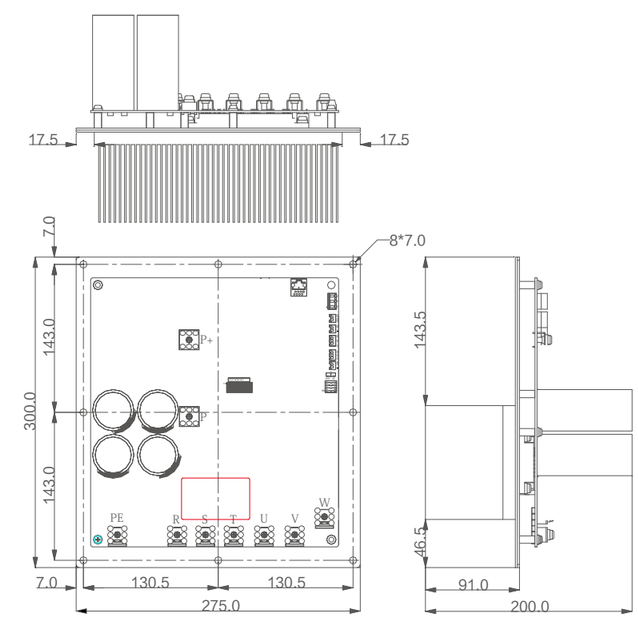
FS100-4T120P-RA1 Dimensional Drawing



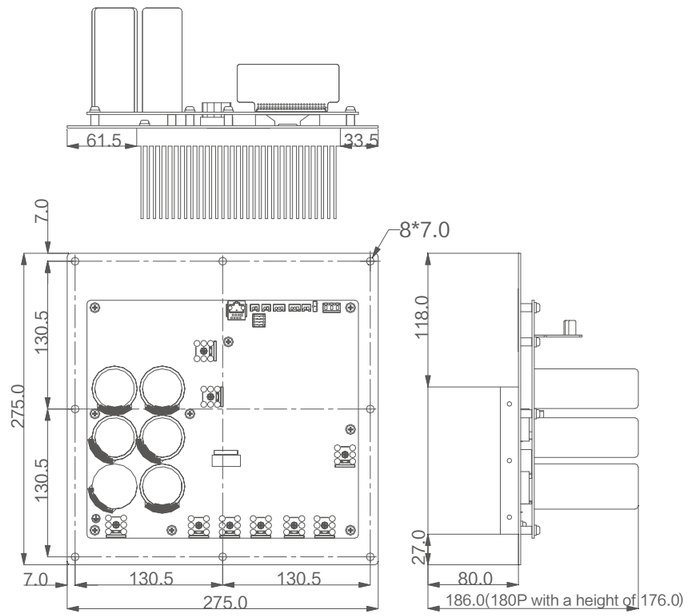
FS100-4T150P Dimensional Drawing



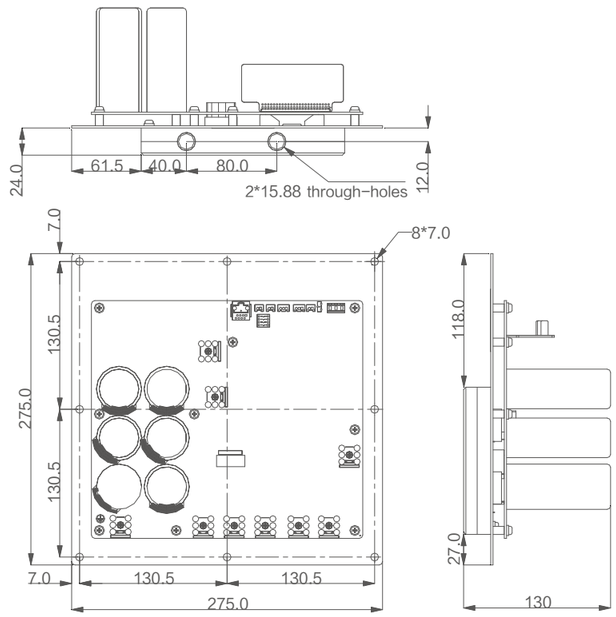
FS100-4T180P-R Dimensional Drawing



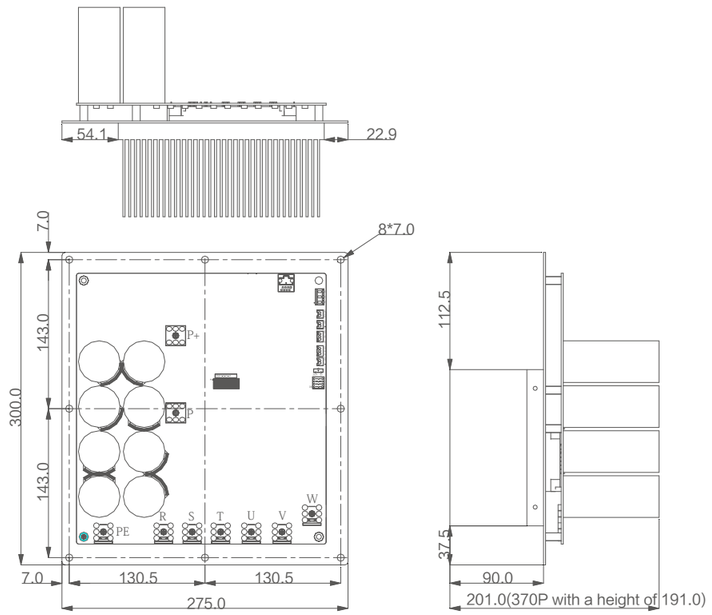
FS100-4T180P&4T220P Dimensional Drawing



FS100-4T220PC Dimensional Drawing



FS100-4T370P&4T450P Dimensional Drawing



FS100-4T370PC&4T450PC Dimensional Drawing