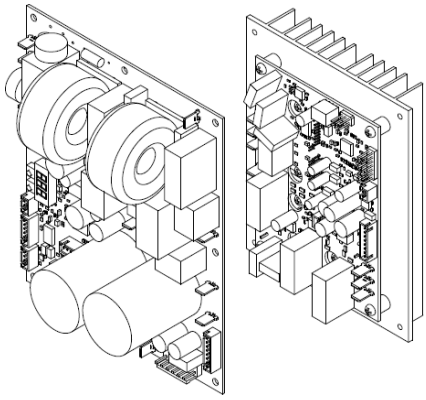
PM20A220

Inverter Power Module

Characteristic

Without rotor position sensor
FOC(Field-oriented control)
SVPWM Sin 180°driver
Synchronized start
Stable speed control
Flexible PFC (auto adjust DC Voltage)
Compressor overload protection
Programmable functions needed for DC compressor
Can control DC fan, EEV and 4 Way valve



Applications

DC compressor/motor
Maximum Power output 2,5kW
Power supply: 220/240Vac

Control method（ customization available ）

0 ~ 10V
PWM
Asynchronous serial communication
RS485

Output

Compressor on/off indication
Operation information
Heat sink cooling fan control
DC Fan Motor control
4 Ways valve control
EEV

1. Functional Diagram and Application Diagram

1.1. Functional Diagram

1.2. PM is composed of DC Inverter Unit and Output Control Unit.

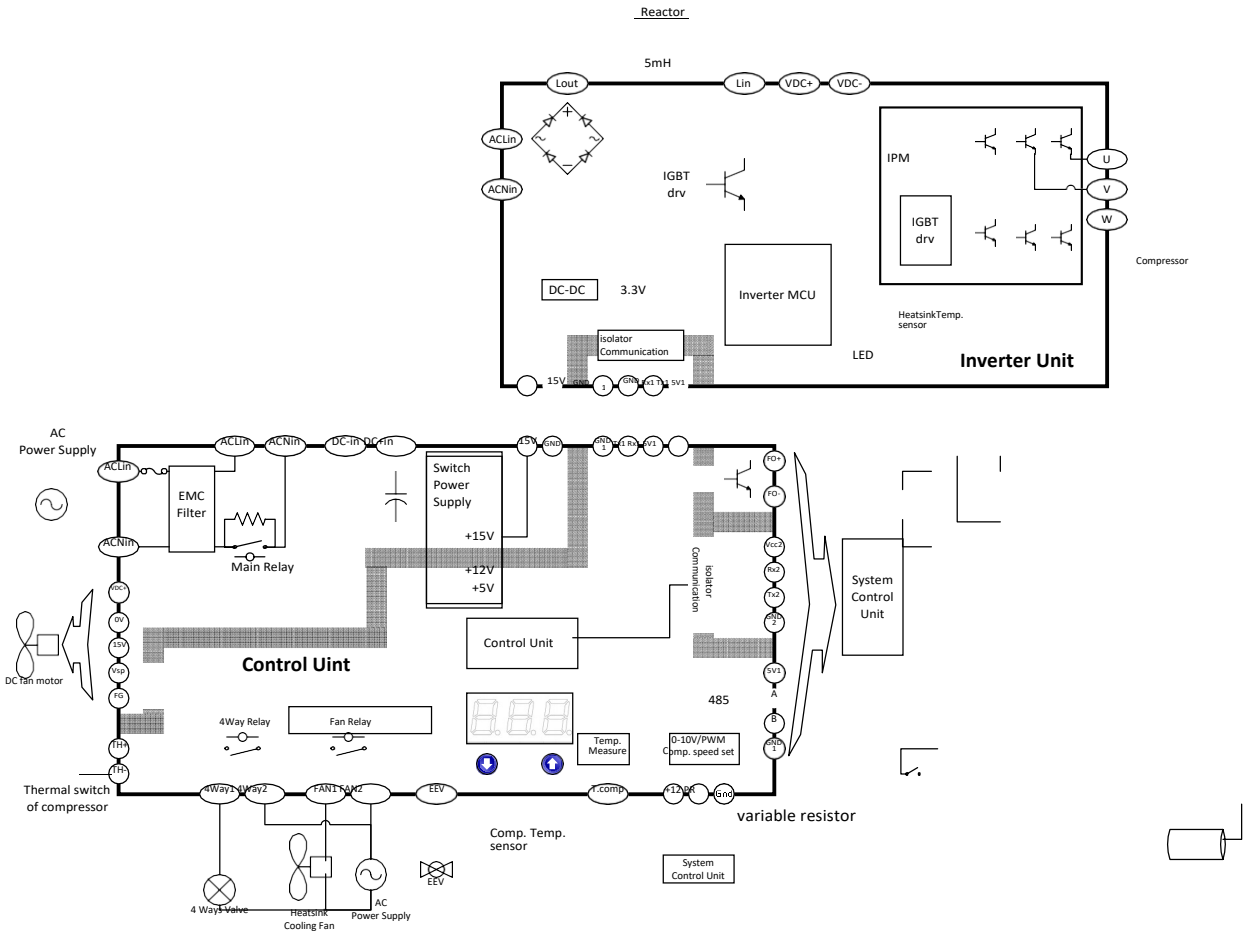
Inverter Unit includes rectification, PFC and inverter circuit. It can drive DC compressor/motor reliably. PFC circuit can control harmonic current effectively.

Control Unit can receive dictate sign from User through 0-10V, PWM, RS485 protocol and serial communication. Through peripheral sensor, compressor discharge temperature can be detected by Control Unit. It has some functions which are necessary for DC inverter compressor, such as overheat protection of compressor. User can set parameter to set those function. Control Unit can feedback some information through communication or indication port. It can measure the heatsink temperature and control a peripheral fan to cool heatsink. Peripheral thermostat on compressor can control the power supply used for Inverter Unit through hardware, thus can ensure system safety.

PM can control 4 Ways value and DC fan motor. Through communication, User can command PM to control the operation of these components
PM

The communication between Inverter Unit and Output Control Unit is realized by isolated optocoupler. Whole Control Unit is safety isolated.

Situation information of PM can be shown with a digital LED and keys.



1.3. System Application

User need to install power supply, PFC reactor, Flier capacitor, DC compressor, circuit of compressor target speed (Speed signal, RS485 or serial communication), discharge temperature sensor (If it isn't needed, it need to be set disabled), Thermal switch (If it isn't needed, TH+ and TH- ports need to be connected directly), heatsink fan (If not need, it needn't to install)

1.3.1 DC fan motor, 4 way valve and EEV control are disabled

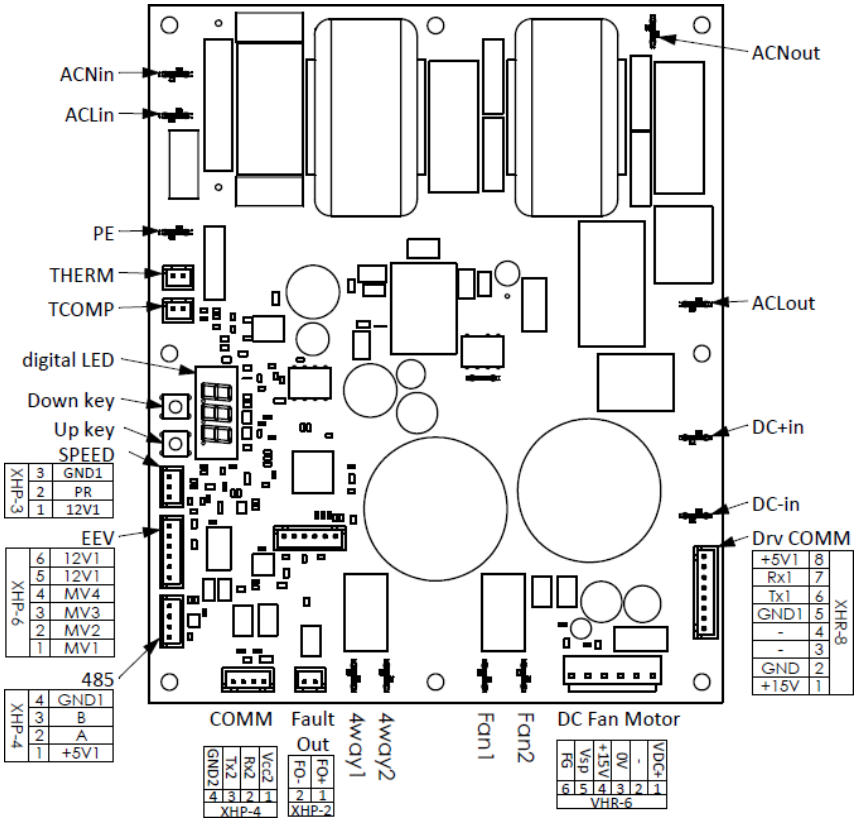
1.4. Independent Application Diagram

1.5. PM can work independently without Central unit of system. User can use a variable resistor (10kΩ or more) to control the compressor target speed. Other is same as System Application.

When the variable resistor is installed, all the communication ports will not receive instruction signal.

2. Ports Function

2.1. Control Unit Ports

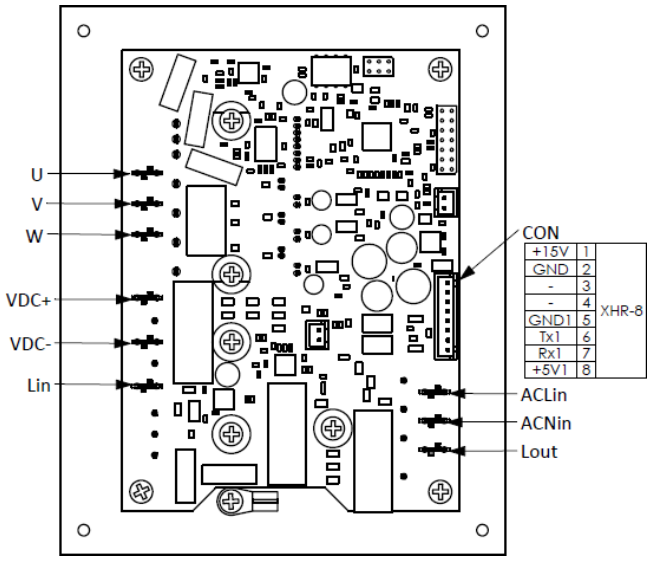


2.2.

N.	Nome	Symbol	Description
1	Power Input	ACNin	Connected with "N" of power supply
		ACLin	Connected with "L" of power supply
		PE	Connected with "PE" of power supply
2	THERM	THERM	Connected with thermal switch of compressor shell.

3	TCOMP	TCOMP	Connected with compressor discharge temperature sensor.
4	Speed	+12V1	Target speed signal (Linear Voltage signal or PWM signal)input to give the instruction of compressor target speed, Simultaneously supply +12V power.
		PR	
		GND	
5	EEV	12V1	Connected with EEV.
		12V1	
		MV4	
		MV3	
		MV2	
		MV1	
6	RS485 Communication	GND	Connected with RS485 communication bus.
		B	
		A	
		+5V1	
7	Asynchronous serial communication	Vcc2	Communication port, isolated by optocoupler. It can be directly connected with peripheral asynchronous communication circuit
		Rx	
		Tx	
		Gnd2	
8	Fault Output	FO+	Output the compressor running or stop status by isolated optocoupler
		FO-	
9	4Way Valve	4Way1	Connected with 4way valve.
		4Way2	
10	Heat sink fan	Fan1	Connected with heat sink fan.
		Fan2	
11	DC Fan Motor	VDC+	Connected with VDC+ port of DC motor.。
		0V	Connected with GND port of DC motor.。
		+15V	Connected with +15V port of DC motor.
		Vsp	Connected with Vsp port of DC motor.
		FG	Connected with FG port of DC motor.
12	Drv COMM	+15V	Connected with +15V port of Driver unit.
		GND	Connected with GND port of Driver unit.
		GND1	Connected with GND1 port of Driver unit.
		Tx1	Connected with Tx1 port of Driver unit.
		Rx1	Connected with Rx1 port of Driver unit.
		+5V1	Connected with +5V1 port of Driver unit.
13	DCin	DC+in	Connected with VDC+ port of Driver unit.
		DC-in	Connected with VDC- port of Driver unit.
14	ACout	ACLout	Connected with ACLin port of Driver unit.
		ACNout	Connected with ACNin port of Driver unit.

2.3. Inverter Unit Ports



N.	Nome	Symbol	Description
	Compressor	U	Connected with “U” of DC compressor
		V	Connected with “V” of DC compressor
		W	Connected with “W” of DC compressor
	VDC Bus	VDC+	Connected with DC+in port of Control unit.
		VDC-	Connected with DC-in port of Control unit.
	Reactor	Lin	Connected with one terminal of PFC reactor
		Lout	Connected with the other terminal of PFC reactor
	ACin	ACLin	Connected with ACLout port of Control unit.
		ACNin	Connected with ACNout port of Control unit.
12	CON COMM	+15V	Connected with +15V port of Control unit.
		GND	Connected with GND port of Control unit.
		GND1	Connected with GND1 port of Control unit.
		Tx1	Connected with Tx1 port of Control unit.
		Rx1	Connected with Rx1 port of Control unit.
		+5V1	Connected with +5V1 port of Control unit.

3. Technology Characteristic

3.1. Working Conditions

Item	Symbol	Min	Type	Max	Unit	Note
working condition	T_opr	-20		60	℃	
store condition	T_stg	-25		75	℃	
Environment Humidity	H_env	10		90	%	

3.2. Electrical Characteristic

Item	Symbol	PM20A220			Unit	Note
		Min	Type	Max		
Power Supply Voltage		170	220	265	Vac	
Power Supply Frequency		-	50/60	-	Hz	
Consumption f Inverter Unit		-	-	2.5	kW	
Current of power supply			-	12	A	
Power Dissipation		-	-	80	W	
Overload temperature of heatsink	$T_{heatsink\_S}$	100	110	120	℃	
Release temperature of heatsink	$T_{heatsink\_R}$	82	85	88	℃	
Shortcut current of Compressor		-	22	-	A	
Thermo switch current		Min 1.0			A	
PR voltage		0 - 10			Vdc	
PR input Resistance		7.8 - 10			kΩ	
Output current of “+12”		Max 20			mA	
Input current of PWM		2 - 10			mA	
Input voltage of PWM		5 - 15			Vdc	
PWM carry Frequency		50 - 10k			Hz	
DC Voltage		240 - 375			Vdc	
Current for Heat Sink fan		Max 1			A	

Iutput current of compressor running status feed back		Max 10	mA	
Output voltage of compressorrunning status feed back		Max 30	Vdc	
Carry Frequency of DC Driving		4/8/16	kHz	
Carry Frequency of PFC PFC		16/32	kHz	
Parameter programming and erasure endurance		Max 10000	Times	

3.3. Peripheral Parts

Item	PM20A220
PFC reactor	5mH 12A
Temperature sensor	R0=187.25kΩ, B0/100=3979K
Variable resistor	10k
Compressor	For different type of compressor, calibrated test needed respectively.

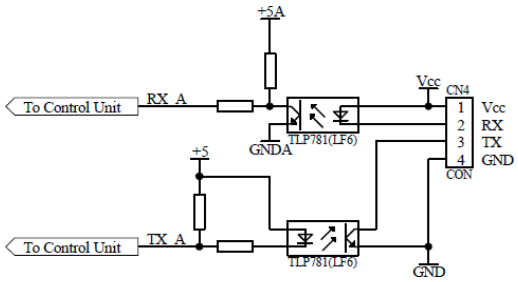
4. Communication

4.1. Serial Communication

PM can communicate with central unit of system through optocoupler isolated asynchronous serial circuit. User can control the PM operate and set parameter through this port.

For protocol please refer to PM communication protocol document

Serial communication circuit in PM，



4.2. RS485 Communication

4.3. PM can communicate with central unit of system through RS485 bus. User can control the PM operate and set parameter through this port.

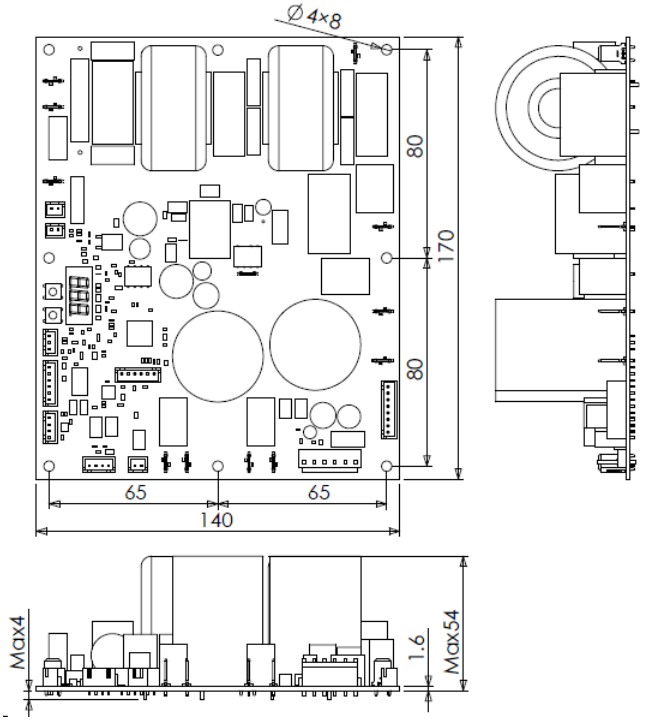
PM use same one serial port of Control MCU to realize the serial communication and RS485 communication. So these 2 type communication mode can’t be use together at same time.

RS485 mode supports MOBUS protocol.

If needed, RS485 protocol can be developed according to user requirement.

5. Figure

5.1. Figure of Control Unit



5.2. Figure of Inverter Unit