# SCREW AIR COMPRESSOR CONTROLLER
# MAM6090

# USER

# MANUAL

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# VOTE OF THANKS

Thank you for your trustworthy and select of PLOT air compressor controller!

Shenzhen Plot Electronic Co., Ltd specializes on the manufacture and R&D of air compressor controller. We are devoted to win customer trust through our high quality products and service.

We try our best to ensure the completeness and correctness of the manual, but PLOT Company shall reserve the rights for continuous research and improvement on its products and assume no obligation for the modification and improvement on the previously delivered products. The design of products is subject to the change without notice.

Please feel free to contact our after-sale service center if you encounter any problem with our product.

You are always welcome to make suggestions and advice!

# ⚠ NOTICE

⚠ **Please read all the operation manual before operating the set and keep this manual for further reference.**

⚠ **Installation of MAM*** compressor controller can be performed only by professional technicians.**

⚠ **Installation position shall be considered carefully in order to ensure good ventilation and reduce electromagnetic interference.**

⚠ **Wiring shall be performed respectively according to regulations for heavy and weak current to reduce electromagnetic interference.**

⚠ **RC snubber must be connected to the two terminals of coil (such as AC contactor, valve, etc), which are controlled by relay output.**

⚠ **Port connection shall be inspected carefully before power on.**

⚠ **Correct ground connection (the third ground) can help increase product capacity of resisting signal interference.**

⚠ **Set rated current of motor: the max current of motor/1.2.**

## Features:

- **Multiple run mode optional**
- **7 inch color screen, with button and touch penal**
- **Support real time power consumption and accumulative power consumption measurement**
- **Scheduled on/off function and scheduled pressure function optional**
- **More accurate in writing frequency to control inverter through 485 communication**
- **Free to control all inverter supporting MODBUS RTU protocol**
- **Open phase, current overload, current unbalance, high voltage, low voltage protection for motor**
- **High integration, high reliability, high cost performance**

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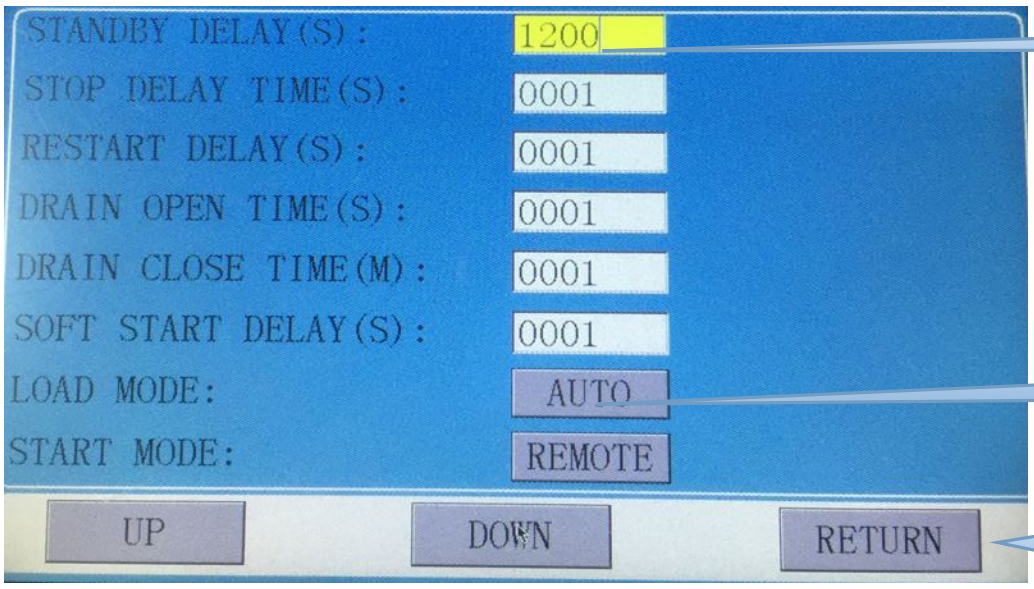
# 1, Basic Operation

## 1.1 Button Explanation


Picture 1.1.1



 ——Start Button:

- When compressor is at stop status, press this button to start the compressor;
- When compressor is set as master (No.1) in block status, press this button to start the compressor and activate block mode function at the same time.

 ——Stop Button:

- When the compressor is at running status, press this button to stop the compressor;
- When compressor is set as master (No.1) in block status, press this button to stop compressor and block function as well.

 ——Set Button; Load/Unload Button:

- When the compressor is at running status ,press this button to load or unload;
- When modifying data in textbox, press this button to save data and exist modification status;
- When cursor is at any page icon, press this button to execute the corresponding function.

 ——Return Button/Reset button:

- When the controller is at alarm and stop status, press this button for 5s to reset;
- When modifying data, press this button to exist data setting mode;
- When viewing the menu, press this button to return to previous menu.

 ——Move Left Button:

- When checking data in textbox, press this button to enter data modifying mode, data starts to blink from right to left;
- When modifying data in textbox, press this button to move the cursor to the left data;
- When modifying data in data set and display icon, press this button to modify and save the data;
- When cursor is in the page icon, press this data to move to the previous icon.

 ——Move Right Button/Enter Button:

- When checking data in textbox, press this button to enter data modifying mode, data starts to blink from left to right ;
- When modifying data in textbox, press this button to move the cursor to the right data;
- When modifying data in data set and display icon, press this button to modify and save the data;
- When cursor is in the page icon, press this data to move to the next icon.

 ——Move Down Button/Decreasing Button:

- When checking the data, press this button to move downward the cursor to next icon;
- When modifying data in textbox, press this button to decrease the current data;
- When the current page is at run parameter, press this button to swift to the next page.

 ——Move Up Button/Increasing Button:

- When checking the data, press this button to move downward the cursor to precious icon;
- When modifying data in textbox, press this button to increase the current data;

➢ When the current page is at run parameter, press this button to swift to the precious page.

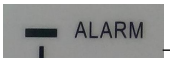
## 1.2 Indicator Explanation


——Power:

Indicator is alight when controller is powered on.


——Run:

Indicator is alight when motor is running.




——Alarm:

Indicator is blinking when controller is alarming;

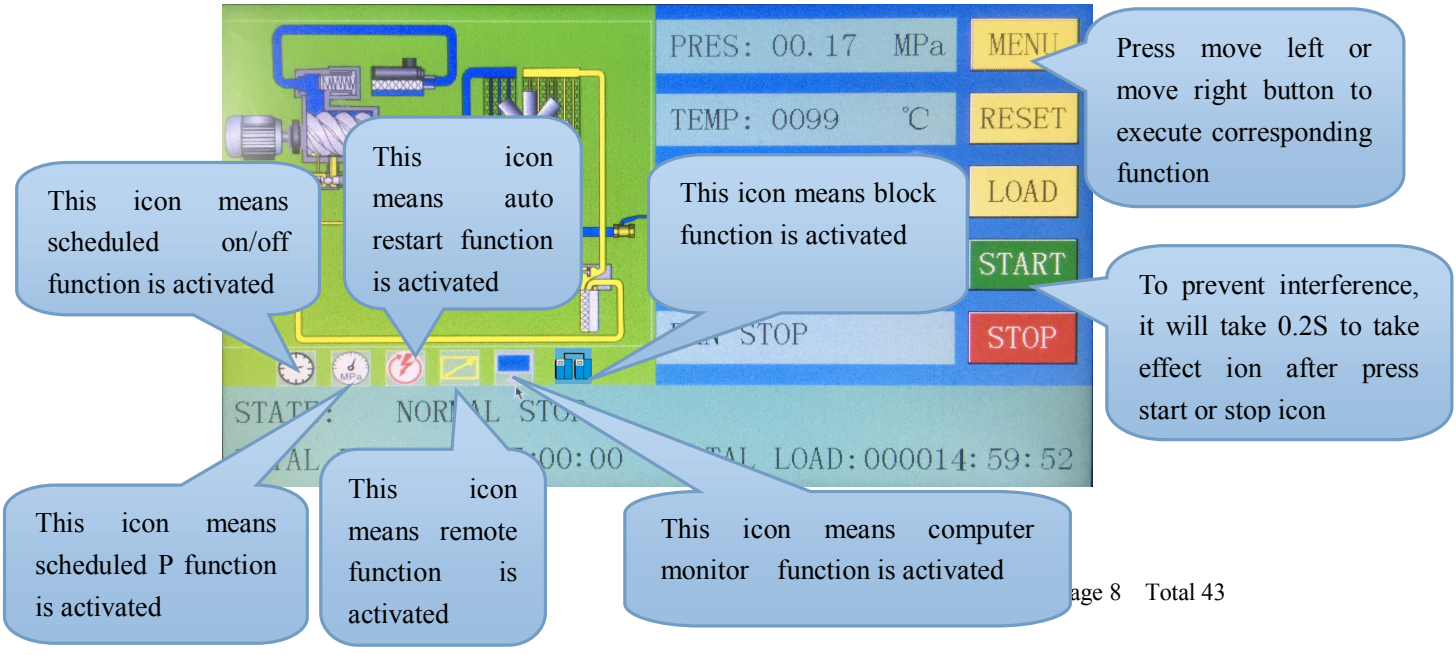
Indicator is alight when compressor is alarm and stop;

Indicator is off after error is cleared and reset.

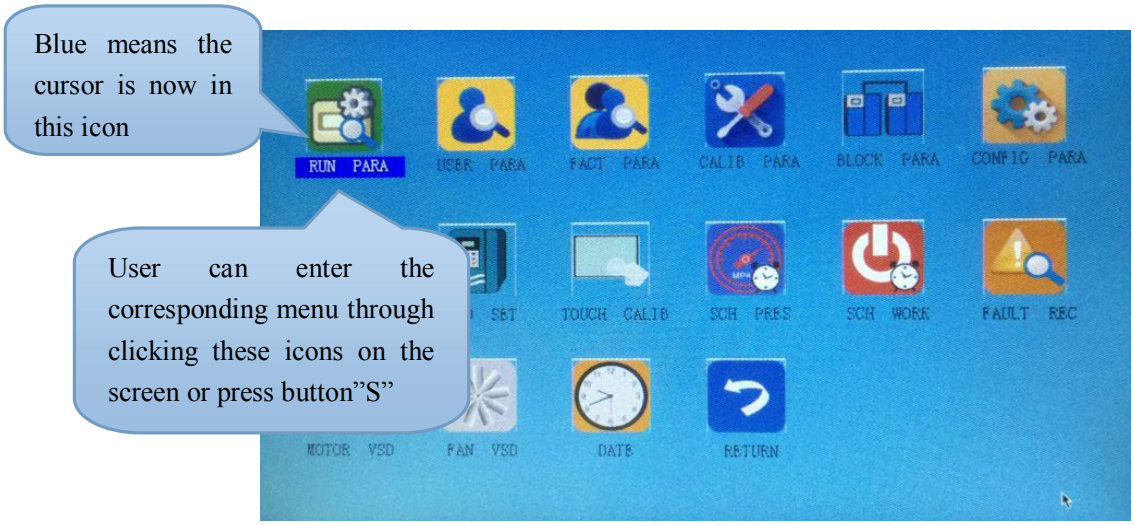
## 1.3 Status Display and Operation

The display screen will show as below after power on and display “MAM-6090 ”for a while:

After 5 seconds, the menu will switch as below:



User can enter the below menu through clicking MENU icons on the screen or press button” > ”




## 1.4 Run Parameter

Click “RUN PARAMETER” to check the relative data and set below

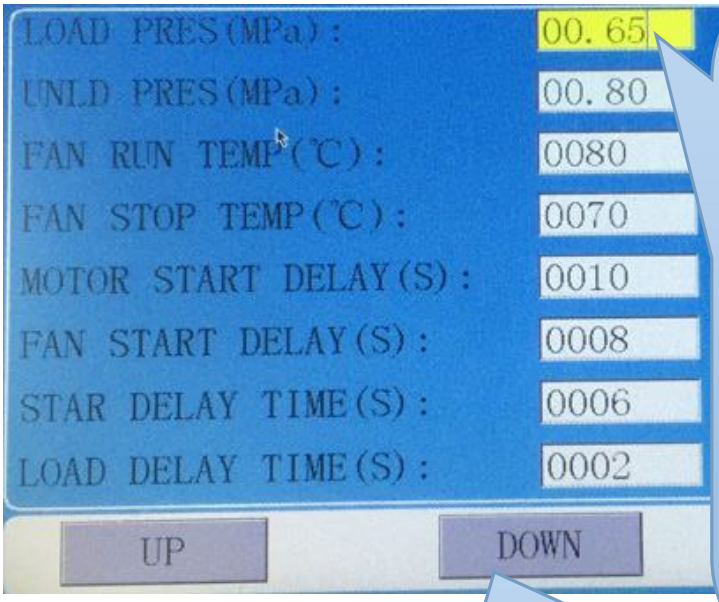
| Menu | Preset Data | Function |
|---|---|---|
| AIR P: | 00.25MPa | Display air pressure |
| DISC T: | -0025°C | Display discharge air temperature |
| SYSTEM P: | 00.00MPa | Display system pressure |
| OIL PRES DIFF: | 00.00MPa | Display oil pressure different in running mode |
| FRONT ROTOR T: | -0050°C | Display front rotor temperature |
| REAR ROTOR T: | -0050°C | Display rear rotor temperature |
| OIL FILTER: | 0020H | Record total running time of oil filter. |
| O/A SEPERATOR: | 0020H | Record total running time of O/A separator |
| AIR FILTER: | 0020H | Record total running time of air filter |
| LUBE: | 0020H | Record total running time of lubricant |
| GREASE: | 0020H | Record total running time of grease |
| SERIAL NO.: | 12345678 | |
| MOTOR CURRENT: | A: 000.0A<br>B: 000.0A<br>C: 000.0A | Display motor current |
| FAN CURRENT: | A: 000.0A<br>B: 000.0A<br>C: 000.0A | Display fan current |

| | | |
|---|---|---|
| PRODUCTION DATE: | 01-12-2016 | |
| THIS RUN TIME | 0000: 00: 00 | Record compressor this run time |
| THIS LOAD TIME: | 0000: 00: 00 | Record compressor this load time |
| SOFTWARE EDITION: | CK0135M0010 | |
| CHECK: | 0000 0000 | |
| INPUT STATE: | 1 2 3 4 5 6 7 8 9 10<br>● ● ● ● ● ● ● ● ● ●<br>1: In accordance with No.24 digital input state<br>2: In accordance with No.23 digital input state<br>3: In accordance with No.22 digital input state<br>4: In accordance with No.21 digital input state<br>5: In accordance with No.20 digital input state<br>6: In accordance with No.19 digital input state<br>Red circle of input state means terminal is connected; Orange circle of input state means terminal is disconnected | |
| OUTPUT STATE: | 1 2 3 4 5 6 7 8 9 10<br>● ● ● ● ● ● ● ● ● ●<br>1: In accordance with No.43 digital output state<br>2: In accordance with No.42 digital output state<br>3: In accordance with No.41 digital output state<br>4: In accordance with No.40 digital output state<br>5: In accordance with No.39 digital output state<br>6: In accordance with No.37 digital output state<br>Red circle of input state means terminal is connected<br>Orange circle of input state means terminal is disconnected | |
| MOTOR RATED SPEED: | 0000 RPM | Display motor actual speed based on the calculation of motor frequency read |
| MOTOR RATED POWER: | 000.0 Hz | Display the output frequency of current motor inverter |
| MOTOR OUTPUT CURRENT: | 000.0 A | Display the output current of current motor inverter |
| MOTOR OUTPUT VOLTAGE: | 000.0 V | Display the output voltage of current motor inverter |
| MOTOR OUTPUT POWER: | 000.0 Kw | Display the real time output power of current motor inverter |
| MOTOR THIS POWER CONSUMPTION: | 0000000.0 Kw.H | Display the accumulative this power consumption based on the motor inverter real time output power |
| MOTOR TOTAL POWER CONSUMPTION: | 0000000.0 Kw.H | Display the accumulative total power consumption based on the motor inverter real time output power |

| | | |
|---|---|---|
| MOTOR STATE DISCRIPTION: | 0000 | Display in the controller motor status area based on the running status register data reads from motor inverter |
| ERROR DISCRIPTION: | 0000 | Display in the controller error area based on the running error register data read from motor inverter |
| WRITE FREQUENCY: | 000.0 | Display the motor frequency based on PID calculation |
| FAN SPEED | 0000 RPM | Display the fan real time speed based on the fan frequency read |
| FAN OUTPUT FREQUENCY: | 000.0 Hz | Display the output frequency of current fan inverter |
| FAN OUTPUT CURRENT: | 000.0 A | Display the output current of current fan inverter |
| FAN OUTPUT VOLTAGE: | 000.0 V | Display output voltage of current fan inverter |
| FAN OUTPUT POWER: | 000.0 Kw | Display the real time output power based on the current fan inverter |
| FAN THIS POWER CONSUMPTION: | 000000.00 Kw.H | Display the accumulative this power consumption based on the fan inverter real time output power |
| FAN TOTAL POWER CONSUMPTION: | 000000.00 Kw.H | Display the accumulative total power consumption based on the fan inverter real time output power |
| FAN STATE DISCRIPTION: | 0000 | Display in the controller fan status area based on the running status register data reads from fan inverter |
| ERROR DISCRIPTION: | 0000 | Display in the controller error area based on the running error register data read from fan inverter |
| WRITE FREQUENCY: | 000.0 | Display the frequency based on the PID calculation |
| PF MOTOR U*I: | 000000.0V.A | Display real time motor current* voltage |
| PF MOTOR THIS POWER CONSUMPTION: | 0000000.0 Kw.H | When set as PF, display the compressor this time power consumption(FYI) |
| PF MOTOR TOTAL POWER CONSUMPTION: | 0000000.0 Kw.H | When set as PF, display the motor total power consumption(FYI) |
| PF FAN U*I: | 000000.0 V.A | Display real time fan current* voltage |
| PF FAN THIS POWER CONSUMPTION: | 0000000.0 Kw.H | When set as FAN PF, display the fan this time power consumption(FYI) |
| PF FAN TOTAL POWER CONSUMPTION: | 0000000.0 Kw.H | When set as FAN PF, display the fan total power consumption(FYI) |

## 1.5 User Parameter

User parameter is used to store relative data. User password is required for modification.




Touch operation: (Yellow background)

1, When the cursor is fixed here, you can revise the parameter by clicking the data box directly if the password has been verified already

2, If the password is not verified yet, a password verification box will prompt. Button operation shows as below

1), In data checking mode, press left or right button to enter data modification mode

2), In data checking mode, press up or down button to move the cursor to next icon

3), In data modification mode, press up or down button to revise current data

4), In data modification mode, press left or right button to move the cursor to next data bit.

When the cursor is in page icon, press "S" to execute corresponding function

Main function is as below:

| Menu | Preset Data | Function |
|---|---|---|
| LOAD P(MPa): | 00.65 | 1,In AUTO load mode, compressor will load if pressure is below this set data<br>2,In STANDBY mode, compressor will start if the pressure is below this set data |
| UNLOAD P(MPa): | 00.80 | 1,Compressor will unload automatically if air pressure is above this set data<br>2.This data should be set above LOAD P, also should be set below UNLD P LIM |
| FAN START T(°C): | 0080 | Fan will start if DISC T is above this set data |
| FAN STOP T(°C): | 0070 | Fan will stop if DISC T is below this set data |
| MOTOR START DELAY(S): | 0008 | Set the MOTOR START TIME. Record time when motor is activated, controller will not start overload protection during this time to avoid impulse starting current stopping the motor. |
| FAN START DELAY(S): | 0003 | Set the FAN START TIME. Record time when fan is activated, controller will not start overload protection during this time to avoid impulse starting current stopping the fan. |
| STAR DELAY(S): | 0006 | Interval time from star start to delta start. |
| LOAD DELAY(S): | 0002 | Unloading in this set time after enter delta running |
| STANDBY DELAY(S): | 0600 | When unloading continuously, compressor will automatically stop and enter to standby status if over this set time |
| STOP DELAY(S): | 0010 | For NORMAL STOP operation, compressor will stop after it continuously unloads over this set time |

| | | |
|---|---|---|
| RESTART DELAY(S): | 0100 | Machine can start only over this set time at any case(after normal stop, standby or alarm &stop) |
| DRAIN OPEN TIME(S): | 0002 | Auto drain control, continuously drain time |
| DRAIN CLOSE TIME(M): | 0060 | Auto drain control, continuously drain interval time |
| SOFT START DELAY(S): | 0006 | Controller starts LOAD DELAY TIME after SOFT-START DELAY (this data is only available in SOFT START mode) |
| LOAD MODE: | MANUAL/AUTOMATIC | MANUAL : only when the pressure is above UNLD P, compressor will unload automatically .For any other case ,the Load/Unload function can only be executed by pressing “load/unload” key<br>AUTOMATICAL: the load/unload function can be executed by the fluctuation of AIR P automatically |
| START MODE: | LOCAL/REMOTE | LOCAL: only the button on the controller can turn on and turn off the machine<br>REMOTE: both the button on the controller and the remote control button can turn on and turn off the machine<br>Note: When one input terminal is set as REMOTE START ENABLE, start mode is controlled by hardware status. It is remote when terminal is close, it is local when terminal is open<br>In this case, the set here is not available |
| RUN MODE: | PF/MOTOR VSD/FAN VSD/MOTOR FAN VSD/SOFT START | Choose the corresponding compressor run mode according to customer requirement and choose the corresponding schematic diagram for reference |
| COM ADD: | 0001 | Set the communication address in COMPUTER or BLOCK mode. This address is unique for every controller in net |
| BACKLIGHT ADJUSTMENT: | 0001 | Adjust the backlight, the higher the data, the brighter the display(from level 1 to level 4) |
| COM MODE: | COMPUTER/BLOCK/DISABLE | DISABLE: communication function is not activated.<br>COMPUTER: compressor can communicate with computer or DCS as slave according to MODBUS-RTU. Baud rate:9600;Data format:8N1; Parity bit: even parity check<br>BLOCK: compressors can work in a net |
| PRESSURE UNIT: | MPa/PSI/BAR | MPa: Pressure unit displays as MPa<br>PSI: Pressure unit displays as PSI<br>BAR: Pressure unit displays as BAR |
| TEMPERATURE UNIT: | °C/°F | °C: Temperature unit displays as °C<br>°F: Temperature unit is displays as °F |
| LANGUAGE: | CHINESE/ENGLISH | ENGLISH: Displays in English<br>CHINESE: Displays in Chinese |
| USER PASSWORD: | **** | User could modify the user password by old user password or factory password |

| | | |
|---|---|---|
| SLEEP BACKLIGHT: | 0007 | Adjust the backlight when no operation in a long time |
| SYS P PROT DELAY (S): | 0060S | Check whether the system pressure is lower than the set low system pressure stop value after start delay lasts for this time |

## 1.6 Factory Parameter

Factory parameter is used to store relative data. Factory password is required for check and modification.

The modification of factory parameter is same with customer parameter. Main function is as below.

| Menu | Preset Data | Function |
|---|---|---|
| MOTOR RATED CURRENT(A): | Maximum motor overload data /1.2 | When the current of motor is more than 1.2 times of the set data , the unit will stop for overload feature. (see table 2.1.1) |
| FAN RATED CURRENT(A): | Maximum fan overload data/1.2 | When the current of fan is more than 1.2 times than the set data , the unit will stop for overload feature |
| ALARM DISC T(°C): | 0105 | When discharge temperature reaches this set data, compressor will alarm |
| STOP DISC T(°C): | 0110 | When the discharge temperature reaches this set data, compressor will alarm and stop |
| FRONT BEARING ALARM (°C): | 0105 | When the front bear temperature is higher than this set data, compressor will alarm |
| REAR BEARING ALARM (°C): | 0105 | When the rear bear temperature is higher than this set data, compressor will alarm |
| FRONT BEARING STOP (°C): | 0115 | When the front bear temperature is higher than this set data, compressor will alarm and stop |
| REAR BEARING STOP (°C): | 0115 | When the rear bear temperature is higher than this set data, compressor will alarm and stop |
| STOP P(MPa): | 00.90 | When pressure reaches this set data ,compressor will alarm and stop |
| SYSTEM STOP T(MPa): | 01.00 | When system pressure is higher than this set data, compressor will alarm and stop |
| UNLD P LIM(MPa): | 00.85 | This data is the maximum of UNLD P. The UNLD P in the customer parameter must be set no higher than this data |
| CURRENT UNBALANCE: | 0006 | When MAX -MIN CURRENT≥(1+ SET DATA*MIN CURRENT/10), the unbalance protection is activated, compressor will alarm and stop, reporting MOTOR CURR UNBAL<br>If the set data ≥ 15, the unbalance protection will not be activated |
| OPEN PHASE PROT(S): | 002.0 | If OPEN PHASE protection ≥20 seconds, OPEN PHASE protection is not activated |
| FAULT RECORD RESET: | **** | Input"8888"and press "set" button to clear all the history fault record |

| | | |
|---|---|---|
| ALARM LONG STOP (H): | 0000 | When controller detects oil filter，air filter, O/A separator lubricant and grease running over the max time and alarm over the data set, compressor will alarm and stop |
| MAX RUN TIME(H): | 0000 | 1, When the compressor is in a stop status and the TOTAL RUN TIME is over this MAX TIME set, compressor will alarm and stop, reporting USER MISTAKE<br>2, Set the data to '0000', this function is not activated |
| FACTORY PASSWORD 2: | | Set a FACTORY PASSWORD which can be modified |
| HIGH VOLTAGE(V): | 0410 | When voltage is detected higher than HIGH VOLTAGE, the controller will alarm and stop<br>When set as 0000, HIGH VOLTAGE protection function is not activated |
| LOW VOLTAGE(V): | 0350 | When voltage is detected lower than LOW VOLTAGE, the controller will alarm and stop<br>When set as 0000, LOW VOLTAGE protection function is not activated |
| VSD COM OVERTIME(S): | 002.0 | Record time when controller sent first data, if controller failed to receive the feedback from inverter within this set time, controller is regarded overtime and will send command again |
| VSD COM INTERRUPT(S): | 0020 | If controller failed to receive feedback from inverter for this set time, VSD COM is interrupted |
| VSD COM RESTORE: | 0015 | After VSD COM is interrupted, and controller receives the correct data more than this set times, VSD COM is regarded restored |
| SCHEDULED ON/OFF: | DISABLE/ENABLE | ENABLE: SCHEDULED ON/OFF is valid<br>DISABLE: SCHEDULED ON/OFF is invalid |
| SET P SECTION: | DISABLE/ENABLE | ENABLE: S SET P SECTION is valid<br>DISABLE: SET P SECTION is invalid |
| TOTAL RUN TIME(H): | 000100 H:00M | Revise total run time |
| TOTAL LOAD TIME(H): | 000095 H:00M | Revise total load time |
| LOW TEMP PRO(°C): | -0050 | After power on, if the temperature is detected lower than the set data,it is not allowed to turn to.Two minutes after power on, if the temperature is detected lower than the set data, it is reported temperature sensor fault and stop |
| AUTO RESTART: | DISABLE/ENABLE | Set the function of auto restart after power on again |
| PF MOTOR POWER COEF: | 1.72 | Set the coefficient for the calculation of motor power |
| MOTOR PF POWER CONSUMPTION (Kw.H): | 0000000.0 | Set and modify the motor power consumption in PF mode |
| PF FAN POWER COEF: | 1.72 | Set the coefficient for the calculation of fan power |

| | | |
|---|---|---|
| FAN PF POWER CONSUMPTION (Kw.H): | 000000.00 | Set and modify the fan power consumption in PF mode |
| FREQ SELECT: | 50HZ | Set the power frequency |
| OIL PRES DIFF ALARM (MPa): | 00.15 | In loading mode,when air pressure and tank pressure are all above 0.5Mpa,and tank pressure-air pressure-line pressure resistance> oil pres diff alarm, controller will alarm |
| OIL PRES DIFF STOP(MPa): | 00.20 | In loading mode,when air pressure and tank pressure are all above 0.5Mpa,and tank pressure-air pressure- line pressure resistance> oil pres diff stop, controller will stop |
| LINE PRESSURE RESISTANCE(MPa): | 00.05 | line pressure resistance |
| SERIAL NO.: | 12345678 | Factory serial number |
| PRODUCTION DATE | 01-01-2015 | Factory production date |
| SYS P LOW STOP (MPa): | 00.30 | When the system pressure is lower than this data after protection delay, compressor will alarm and stop |

## 1.7 Calibration Parameter

Calibration parameter is used to store relative data. Calibration password is required for check and modification. Main function is as below.

| Menu | Preset Data | Function |
|---|---|---|
| MOTOR A COEF: | 1.000 | Input the coefficient to calibrate current<br>Controller display current=sample current*coefficient.<br>The range of coefficient: 0.800-2.000 |
| MOTOR B COEF: | 1.000 | |
| MOTOR C COEF: | 1.000 | |
| FAN A COEF: | 1.000 | |
| FAN B COEF: | 1.000 | |
| FAN C COEF: | 1.000 | |
| T 1 COEF: | 1.000 | Input the coefficient when calibrate discharge temperature.<br>Controller display temperature=sample temperature*coefficient<br>The range of coefficient: 0.800-2.000 |
| T 2 COEF: | 1.000 | Note: this parameter is reserved in MAM6090 |
| T 3 COEF: | 1.000 | |
| T 4 COEF: | 1.000 | |
| T 5 COEF: | 1.000 | |
| T 6 COEF: | 1.000 | |
| P 1 COEF: | 1.000 | Input the coefficient to calibrate air pressure. Controller display pressure = sample pressure*coefficient<br>The range of coefficient:0.800-2.000 |
| P 2 COEF: | 1.000 | Note:this parameter is reserved in MAM6090 |

| | | |
|---|---|---|
| P COEF: | 1.000 | Input the coefficient to calibrate air pressure. Controller display pressure = sample pressure*coefficient.<br>The range of coefficient:0.800-2.000 |
| MOTOR CURR CYCLE: | 0004 | Control the current update speed |
| VOLT CYCLE: | 0004 | Control the voltage update speed |
| T 1 ZERO: | 0002 | Calibrate controller temperature zero. Calibrate temperature to -20°C when controller pressure sensor terminal connects the resistance in accordance with -20°C. For the calibration of temperature, it is required to calibrate T zero first and then calibrate coefficient |
| T 2 ZERO: | 0002 | Note: This parameter is reserved in MAM6090 |
| T 3 ZERO: | 0002 | |
| T 4 ZERO: | 0002 | |
| T 5 ZERO: | 0002 | |
| T 6 ZERO: | 0002 | |
| P 1 ZERO: | 0002 | When AIR P is below this set value, the pressure is displayed as 0.00.It is used to avoid air pressure transmitter from increasing |
| P 2 ZERO: | 0002 | When P 2 is below this set value, the pressure is displayed as 0.00.It is used to avoid pressure zero from increasing |
| P1 SENSOR RANGE: | 01.60MPA | Set the range of pressure sensor that is connected to No.13 terminal of the controller |
| P2 SENSOR RANGE: | 01.60MPA | Set the range of pressure sensor that is connected to No.12 terminal of the controller |
| PHASE PROT(V): | 000.9 | If the Three phase voltage is detected lower than the data set here, controller will report PHASE WRONG<br>If PHASE PROT = 0 second, PHASE PROT is not activated |
| OPEN PHASE PROT(V): | 000.0 | If the open phase voltage is detected lower than the data set here,controller will report PHASE WRONG<br>If OPEN PHASE protection = 0 second, OPEN PHASE protection is not activated<br>Note: This parameter is reserved in MAM 6090 |
| MOTOR CURR RATIO: | 020 | Motor rated current/5 |
| FAN CURR RATIO: | 001 | Fan rated current /2.5 |
| STANDBY: | | For manufacturer calibration |

## 1.8 Block Parameter

Block parameter is used to store relative data. Block password is required for check and modification. Main function is as below.

| Menu | Preset Data | Function |
|---|---|---|
| BLOCK NUMBER: | 0002 | Number of air compressors in block net |

| | | |
|---|---|---|
| BLOCK LOAD P(MPa): | 00.63 | In BLOCK mode, one compressor will start or load when master AIR P is below this set data |
| BLOCK UNLOAD P(MPa): | 00.78 | In BLOCK mode, one compressor will stop or unload when master AIR P is above this set data |
| BLOCK DELAY(S): | 0020 | In BLOCK mode, when master sends two commands continuously, second command signal delays for this set data |
| TURN TIME(M): | 0060 | When master pressure is between BLOCK LOAD P and BLOCK UNLD P, master determines slave to work alternatively after working over this set time |
| BLOCK MODE: | PF-PF<br>VSD-PF<br>VSD-VSD | PF-PF: PF compressor and PF compressor work in block mode<br>VSD-PF: VSD compressor and PF compressor work in block mode<br>VSD-VSD: VSD compressor and VSD compressor work in block mode |

## 1.9 Hardware Parameter

Hardware parameter is used to set the function from 17~24 31 32 33 terminals. Main function is as below.

| Menu | Preset Data | Function |
|---|---|---|
| 24 TERMINAL: | EMERGENCY | NO FUNCTION/EMERGENCY/REMOTE ON/REMOTE OFF/REMOTE INCHING/KEEP REMOTE / LACK WATER (N.C.)/REMOTE LOAD/REMOTE START ENABLE/REMOTE LOAD/UNLD /TANK HIGH T (N.C.)/ COIL HIGH T (N.C.)/ BEARING HIGH T (N.C.)/ ELEC FAULT (N.C.)/MOTOR OVLD (N.C.)/FAN OVLD (N.C.)/OIL BLOCK (N.C.)/ OIL BLOCK (N.O.)/ O/A BLOCK (N.C.)/O/A BLOCK (N.O.)/AIR FILTER BLOCK (N.C.)/AIR FILTER BLOCK (N.O.)/ AIR FAULT (N.C.)/DRYER FAULT (N.C.)/ MOTOR INV FAULT (N.O.)/ MOTOR INV FAULT (N.C.)/ FAN INV FAULT (N.O.)/ FAN INV FAULT (N.C.). Note: User can set different digital input function |
| 23 TERMINAL: | / | |
| 22 TERMINAL: | LACK WATER | |
| 21 TERMINAL: | OIL FILTER | |
| 20 TERMINAL: | O/A SEPERATOR | |
| 19 TERMINAL: | AIR FILTER | |
| 18 TERMINAL: | MULTIFUNCTIONAL | |
| 17 TERMINAL: | REMOTE ON-OFF | |
| 33 RELAY FUNCTION: | RUN | NO FUNCTION/ALARM/RUN/FAULT/READY/REMOTE/ START MOTOR INVERTER/START FAN INVERTER<br>Note: User can set different relay output function |
| 32 RELAY FUNCTION: | FAULT | |
| 31 RELAY FUNCTION: | ALARM | |

## 1.10 Maintenance Parameter

Maintenance parameter is used to store maintenance data. Maintenance password is required for check and

modification. Main function is as below.

| Menu | Preset Data | Function |
|---|---|---|
| OIL FILTER RUN TIME(H): | 0000 | Record total running time of oil filter. If changing new oil filter, the data should be reset by manual operation. |
| O/A SEPERATOR RUN TIME(H): | 0000 | Record total running time of O/A separator. If changing new O/A separator, the data should be reset by manual operation |
| AIR FILTER RUN TIME(H): | 0000 | Record total running time of air filter .If changing new air filter, the data should be reset by manual operation |
| LUBRICANT RUN TIME(H): | 0000 | Record total running time of lubricant. If changing new lubricant, the data should be reset by manual operation |
| GREASE RUN TIME(H): | 0000 | Record total running time of grease. If changing new grease, the data should be reset by manual operation |
| OIL FILTER MAX RUN TIME(H): | 2000 | 1, Alarm prompt when total running time of oil filter is above the set data .<br>2,Set this data to “0000” , alarm function for oil filter running time is not activated |
| O/A SEPERATOR MAX RUN TIME(H): | 2000 | 1, Alarm prompt when total running time of O/A separator is above the set data.<br>2,Set this data to “0000” ,alarm function for O/A separator running time is not activated |
| AIR FILTER MAX RUN TIME(H): | 2000 | 1, Alarm prompt when total running time of air filter is above the set data.<br>2,Set this data to “0000” , alarm function for air filter running time is not activated |
| LUBRICANT MAX RUN TIME(H): | 2000 | 1, Alarm prompt when total running time of lubricant is above the set data.<br>2, Set this data to “0000”, alarm function for lubricant running time is not activated. |
| GREASE MAX RUN TIME(H): | 2000 | 1, Alarm prompt when total running time of grease is above the set data.<br>2,Set this data to “0” , alarm function for grease running time is not activated |

## 1.11 Inverter Set

Inverter set is used to set inverter data. Inverter password is required for check and modification. Main function is below. (The following chart is an example of Shneider inverter ATV61, ATV71 )

| Menu | Preset Data | Function |
|---|---|---|
| INVERTER NAME: | 0ATV61 | Set inverter name, communicate any inverter supporting modbus |
| RUN(W) ADD1: | 2135 | Corresponding address 1 of inverter start command |

| | | |
|---|---|---|
| RUN VALUE: | 0001 | This data is inverter start data (please refer to communication chapter in inverter manual for different inverter.) |
| RUN(W) ADD2: | 2135 | Corresponding address 2 of inverter start command |
| RUN VALUE: | 0001 | This data is inverter start data (please refer to communication chapter in inverter manual for different inverter.) |
| STOP(W) ADD: | 2135 | Corresponding address of inverter stop command |
| RUN VALUE: | 0001 | This data is inverter start data (please refer to communication chapter in inverter manual for different inverter.) |
| RESET(W) ADD: | 2135 | Corresponding address of inverter reset command |
| RUN VALUE: | 0001 | This data is inverter start data (please refer to communication chapter in inverter manual for different inverter.) |
| FREQ(W) ADD: | 2136 | Corresponding register address of inverter running frequency source |
| FREQ(R) = | REC*0001÷0001 | The REC value is frequency value with one decimal. Use formula to transfer to corresponding value based on different inverter and send it to inverter.<br>Example: 50HZ running frequency，REC value:500<br>For inverter with write frequency of 2 decimals, formula: REC**0001÷0010<br>For inverter with write frequency of 1 decimal, formula: REC**0001÷0001<br>For the inverter whose max output frequency is in corresponding with 10000, the formula: REC*0020÷0001 |
| STATE(R) ADD: | 2135 | Read inverter running status address |
| RUN S = | R AND 0001=0001 | Check if inverter has run the formula (please refer to communication chapter in inverter manual) |
| COM FORM: | 8N1-N | Set the data format of controller and inverter communication. This set should be consistent with inverter communication format<br>8N1-N: 1start bit,8 data bits,1 stop bit, no parity bit<br>8N1-E: 1start bit,8 data bits,1 stop bit, even parity bit<br>8N1-O: 1start bit,8 data bits,1 stop bit, odd parity bit<br>8N2-N: 1start bit,8 data bits,2 stop bit, no parity bit<br>Note: Communicate with inverter, the baud rate is fixed: 9600 |
| FREQ(R) ADD: | 0C82 | Read inverter frequency address(refer to inverter manual ) |
| FREQ(R) = | REC*0001÷0001 | Calculate inverter frequency formula. Controller will transfer the frequency to one decimal. |
| VOLT(R) ADD: | 0C88 | Read inverter voltage address |
| VOLT(R) = | REC*0001÷0001 | Calculate inverter voltage formula. Controller will transfer the voltage to one decimal |

| | | |
|---|---|---|
| CURR(R) ADD: | 0C84 | Read inverter current address |
| CURR(R) = | REC*0001÷0001 | Calculate inverter current formula. Controller will transfer the current to one decimal |
| POWE(R) ADD: | 0C8B | Read inverter power address |
| POWE(R): | REC*S*0001÷0100 | Calculate inverter power formula. Controller will transfer the power to one decimal |
| ERR ADD | 6500 | Read inverter error address |
| ERR S = | R AND 0000≠0000 | Inverter reports error formula or not |
| EMERGENCY ADD: | 2135 | Corresponding add of inverter emergency stop command |
| RUN VALUE: | 0001 | This data is inverter start data (please refer to communication chapter in inverter manual for different inverters.) |

## 1.12 Touch Calibration

Touch calibration is used to adjust touch accuracy. Touch calibration password is required for adjustment. After entering touch calibration menu, use fingertip or other tool with sharp head to click A ,B ,C ,D in sequence. Press "S" button to restart and save the modification; If user wants to calibrate again, press reset button and reset following precious step.

## 1.13Scheduled P

Scheduled P is used to set scheduled pressure. Scheduled P password is required for check and modification. Main function is below.

| Menu | Preset Data | Function |
|---|---|---|
| LOAD P(MPa): | 00.65 | During P START TIME and P STOP TIME,<br>compressor will load if AIR P is below this set data |
| UNLOAD P(MPa): | 00.80 | During P START TIME and P STOP TIME,<br>compressor will unload if AIR P is above this set data |
| SCHEDULED VSD P (MPa): | 00.70 | During P START TIME and P STOP TIME,<br>set AIR P in VSD mode to keep running stable. When pressure is fluctuated around this data, controller will adjust operating frequency of inverter to control the pressure close to this data (This data is only available in MOTOR VSD or MOTOR/FAN VSD mode) |
| P START TIME: | 00:00 | Set this data to activate P SECTION SEL function.<br>Set this data to "0", this function is not activated |
| P STOP TIME: | 00:00 | Set this data to activate P SECTION SEL function.<br>Set this data to "0",this function is not activated |

## 1.14 Scheduled On-Off

Scheduled On-Off is used to set one week scheduled on-off time, four period is allowed to set in one day. Scheduled On-Off password is required for check and modification. Main function is below.When set to 00:00, the correspondent function is invalid.

## 1.15 History Record

Record history fault for user to find causes and solutions.100 items are allowed to record.

## 1.16 Motor VSD

Motor VSD is used to set Motor VSD data. Motor VSD password is required for check and modification. Main function is below.

| Menu | Preset Data | Function |
|---|---|---|
| VSD P(MPa): | 00.70 | Set AIR P in VSD mode to keep running stable. When pressure is fluctuated around this data, controller will adjust operating frequency of inverter to control the pressure close to this data (This data is only available in MOTOR VSD or MOTOR/FAN VSD mode) |
| MOTOR UP SPEED: | 1000 | Restrict PID calculations in case the frequency increasing too fast which cause motor speeding up too fast |
| MOTOR DN SPEED: | 1000 | Restrict PID calculations in case the frequency decreasing too fast which cause motor slowing down too fast |
| MOTOR RATED POWER(KW): | 022.0 | Set MOTOR RATED POWER in order to calculate actual power in VSD mode (This data is only available in MOTOR VSD or MOTOR/FAN VSD mode) |
| MOTOR RATED SPEED(RPM): | 1500 | Set MOTOR RATED SPEED at 50HZ in order to calculate the actual speed in VSD mode (This data is only available in MOTOR VSD or MOTOR/FAN VSD mode) |
| MOTOR INT INITIAL: | 0080 | When detected AIR P<(PID TARGET P -INTEGRAL SCALE) or<br>Detected AIR P>(PID TARGET P +INTEGRAL SCALE)<br>Integral calculation is based on this data |
| MOTOR INT SCALE(Mpa): | 00.05 | (PID TARGET P - INTEGRAL SCALE)< detected AIR P < (PID TARGET P + INTEGRAL SCALE), INTEGRAL GAIN works |
| MOTOR POWER COEF: | 0.800 | Coefficient to calculate motor power |
| MOTOR PROP GAIN: | 0025 | Track speed of PID TARGET P, the bigger the data, the faster the track; the smaller the data, the slower the track |
| MOTOR INT GAIN: | 0030 | Track the speed of PID TARGET P and STEADY STATE ERROR, the bigger the data ,the faster the track and smaller the STEADY-STATE ERRORS; the smaller the data ,the slower the track and bigger the STEADY-STATE ERRORS |
| MOTOR DIFF GAIN: | 0000 | Track the hysteresis system (such as temperature), it is not used very often and normally set as “0000” |
| MOTOR MAX FREQ (HZ): | 050.0HZ | The maximum operating frequency in loading status |

| | | |
|---|---|---|
| MOTOR MIN FREQ(HZ): | 030.0HZ | In the process of adjustment, The minimum operating frequency when pressure is over the LOAD P pressure and not reach the UNLD P |
| MOTOR UNLD FREQ(HZ): | 025.0HZ | Permitted operating frequency in UNLD MODE |
| MOTOR INVERTER ADD: | 001 | Set the MOTOR VSD ADD and keep it consistent with VSD COM ADD |
| MOTOR PID CYCLE(S): | 000.8S | Set the PID calculation interval time to adjust motor speed. |
| MOTOR INVERTER MODEL: | ATV61 | Controller can prestore at most 10 different inverter communication address ( Inverter should support MODBUS RTU protocol for communication ) |
| MOTOR STOP MODE: | SLOW/FREE | 1, INVERTER START MODE to COM ON-OFF：<br>SLOW: When controller receives stop command, INLET VALVE terminals will open. Controller sends stop command to inverter to slow stop inverter<br>FREE: When controller receives stop command, INLET VALVE terminals will open. Controller sends write frequency through RS485.Controller frequency will decrease and send stop command to inverter 1S before stop delay finished.<br>2, INVERTER START MODE to TERMINAL ON-OFF:<br>SLOW: When compressor receives stop command, INLET VALVE terminals will open and MOTOR INVERTER RUN terminal will open. The compressor will stop according to STOP DELAY set.<br>FREE: When compressor receives stop command, Inlet valve will open. MOTOR INVERTER RUN terminal will keep closed to control inverter frequency decreasing and it will open until 1 S before STOP DELAY finishes |
| INVERTER START MODE: | COM / TERMINAL | COM ON-OFF: Start or stop inverter through RS485 TERMINAL ON-OFF: Start or stop inverter through digital input<br>Note:<br>1, Controller set should be accordance with INVERTER START MODE<br>2, When controller is set to PF/VF mode,terminal 12 functions as inverter control terminal so only COM ON-OFF is available to control inverter |
| INVERTER START NO.: | 0006 | Maximum allowable time Controller sends start command to inverter with no response. |
| INVERTER STOP NO.: | 0006 | Maximum allowable time Controller sends stop command to inverter with no response. |
| VSD MOTOR POWER CONSUMPTION Kw.H: | 0000000.0 | Set the accumulative motor VSD running power consumption. |

| | | |
|---|---|---|
| MOTOR INVERTER DELAY(S): | 1.0 | Press start button, motor sends start command to inverter after this set time. |
| CONSTANT POWER PRESSURE 1(MPa): | 0.60 | In constant power running mode, when pressure is above the data set here, Max output frequency is set as CONSTANT POWER FREQUENCY1 |
| CONSTANT POWER PRESSURE 2(MPa): | 0.70 | In constant power running mode, when pressure is above the data set here, Max output frequency is set as CONSTANT POWER FREQUENCY2 |
| CONSTANT POWER PRESSURE 3(MPa): | 0.80 | In constant power running mode, when pressure is above the data set here, Max output frequency is set as CONSTANT POWER FREQUENCY3 |
| CONSTANT POWER PRESSURE 4(MPa) | 0.90 | In constant power running mode, when pressure is above the data set here, Max output frequency is set as CONSTANT POWER FREQUENCY4 |
| CONSTANT POWER PRESSURE 5(MPa): | 1.00 | In constant power running mode, when pressure is above the data set here, Max output frequency is set as CONSTANT POWER FREQUENCY5 |
| CONSTANT POWER PRESSURE 6(MPa): | 1.10 | In constant power running mode, when pressure is above the data set here, Max output frequency is set as CONSTANT POWER FREQUENCY6 |
| CONSTANT POWER PRESSURE 7(MPa): | 1.20 | In constant power running mode,when pressure is above the data set here, Max output frequency is set as CONSTANT POWER FREQUENCY7 |
| CONSTANT POWER FREQUENCY 1(HZ): | 180.0 | See Note1: |
| CONSTANT POWER FREQUENCY 2(HZ): | 160.0 | |
| CONSTANT POWER FREQUENCY 3(HZ): | 140.0 | |
| CONSTANT POWER FREQUENCY 4(HZ): | 120.0 | |
| CONSTANT POWER FREQUENCY 5(HZ): | 100.0 | |
| CONSTANT POWER FREQUENCY 6(HZ): | 80.0 | |
| CONSTANT POWER FREQUENCY 7(HZ): | 60.0 | |
| INT GAIN 2：<br>Track the speed of PID TARGET P and steady state error, the bigger the data ,the faster the track and smaller the steady-state errors; the smaller the data ,the slower the track and bigger the steady-state errors | | |
| INT GAIN SCALE(MPa)：<br>Set the function scale of INT GAIN 2. | | |

Note 1: In constant power running mode

CONSTANT POWER PRESSURE 1<= CONSTANT POWER PRESSURE 2<= CONSTANT POWER PRESSURE 3<= CONSTANT POWER PRESSURE 4<= CONSTANT POWER PRESSURE 5<= CONSTANT POWER PRESSURE 6<= CONSTANT POWER PRESSURE 7

Note 2: CONSTANT POWER FREQUENCY 1>= CONSTANT POWER FREQUENCY 2>= CONSTANT POWER FREQUENCY3>= CONSTANT POWER FREQUENCY 4>= CONSTANT POWER FREQUENCY 5>= CONSTANT POWER FREQUENCY 6>= CONSTANT POWER FREQUENCY 7

Note 3: Suppose M>N, When CONSTANT POWER PRESSURE N set to 00.00, CONSTANT POWER PRESSURE M and CONSTANT POWER FREQUENCY M, the set is invalid.

Note 4: When constant power function is not required,set CONSTANT POWER PRESSURE to 00.00MPa

## 1.17 Fan VSD

Fan VSD is used to set Fan VSD data. Fan VSD password is required for check and modification. Main function is below.

| Menu | Preset Data | Function |
|---|---|---|
| FAN VSD T(°C): | 0078°C | In VSD mode, set DISC T to keep running stable. When DISC T is fluctuated around this data, controller will adjust operating frequency of fan inverter to control DISC T close to this data (This data is only available in FAN VSD or MOTOR/FAN VSD mode) |
| MAX VSD T(°C): | 0085°C | When DISC T is above or equal to this data, control fan inverter output frequency to FAN MAX FREQ (This data is only available in FAN VSD or MOTOR/FAN VSD mode) |
| FAN UP SPEED: | 1000 | Restrict PID calculations in case the frequency increasing too fast which cause fan speeding up too fast |
| FAN DN SPEED: | 1000 | Restrict PID calculations in case the frequency decreasing too fast which cause fan slowing down too fast |
| FAN RATED POWER: | 001.5KW | Set FAN RATED POWER to calculate the actual fan power in FAN VSD mode (This data is only available in FAN VSD or MOTOR/FAN VSD mode) |
| FAN RATED SPEED: | 1500RPM | Set the corresponding fan speed in 50HZ to calculate actual fan speed in FAN VSD mode (This data is only available in FAN VSD or MOTOR/FAN VSD mode) |
| VSD FAN START T(°C): | 0070°C | VSD fan will start if DISC T is above this set data (This data is only available in FAN VSD or MOTOR/FAN VSD mode) |
| VSD FAN STOP T(°C): | 0065°C | VSD fan will stop if DISC T is below this set data(This data is only available in FAN VSD or MOTOR/FAN VSD mode) |
| FAN INT INITIAL: | 0020 | When detected DISC T<(PID TARGET T -INTEGRAL SCALE) or<br>Detected DISC T>(PID TARGET T +INTEGRAL SCALE)<br>Integral calculation is based on this data |
| FAN INT SCALE(°C): | 0005°C | (PID TARGET T - INTEGRAL SCALE)< detected DISC T < (PID TARGET T + INTEGRAL SCALE），INTEGRAL GAIN works.<br>Beyond this range, INT INITIAL works. |

| | | |
|---|---|---|
| FAN PROP GAIN: | 0100 | Track speed of PID TARGET T , the bigger the data, the faster the track and the less stable the data; the smaller the data the slower the track and the slower the adjustment |
| FAN INT GAIN: | 0020 | Track the speed of PID TARGET T and steady state error, the bigger the data ,the faster the track and smaller the steady-state errors; the smaller the data ,the slower the track and bigger the steady-state errors |
| FAN DIFF GAIN: | 0000 | Normally set as“0000”, this function is not activated |
| FAN MAX FREQ(HZ): | 050.0HZ | In the process of adjustment, The maximum operating frequency when temperature is over the VSD work temperature |
| FAN MIN FREQ(HZ): | 010.0HZ | In the process of adjustment, The minimum operating frequency when temperature is below the VSD work temperature |
| VSD FAN POWER COEF: | 0.900 | Coefficient to calculate vsd fan power |
| FAN INVERTER ADD: | 2 | Set the FAN VSD ADD and keep it consistent with VSD COM ADD |
| FAN PID CYCLE(S): | 001.5S | Set the PID calculation interval time to adjust fan speed. |
| FAN INVERTER MODEL: | ATV31 | Choose inverter protocol |
| FAN INVERTER START MODE: | COM/ TERMIN AL | Set fan inverter start mode |
| VSD FAN ELEC(Kw.H): | 000000.00 | VSD fan power consumption |

## 1.18 Date

Check and set time

## 1.19 Operation Authorization and Password

Controller provides multiple passwords and access management. According to different levels of passwords, controller provides different levels of operating authorization, details as following:

### 1.19.1 CUSTOMER PASSWORD: factory set

Permissions: Allows to modify all CUSTOMER PRAMETER.

### 1.19.2 FACTORY PASSWORD: fixed

Permissions: Allows to modify all CUSTOMER PRAMETER.

Permissions: Allows to modify BASIC PARAMETER, MOTOR VSD PARAMETER, FAN VSD PARAMETER in FACTORY PARAMETER

### 1.19.3 CALIBRATE PASSWORD: fixed

Permissions: Allows to modify all CALIBRATE PARAMETER

### 1.19.4 BLOCK PASSWORD

Permissions: Allows to modify all BLOCK PARAMETER

### 1.19.5 HARDWARE CONFIG PASSWORD: fixed

Permissions: Allows to modify all HARDWARE CONFIG

1.19.6 MAINTENANCE PARAMETER PASSWORD

Permissions: Allows to modify all MAINTENANCE PARAMETER.

1.19.7 INVERTER SET PASSWORD

Permissions: Allows to modify all INVERTER SET

1.19.8 TOUCH CALIBRATION PASSWORD

Permissions: Allows to modify TOUCH ACCURACY

1.19.9 SCHEDULED P PASSWORD

Permissions: Allows to modify all SCHEDULED P PARAMETER.

1.19.10 SCHEDULED ON/OFF PASSWORD

Permissions: Allows to modify all SCHEDULED ON-OFF PARAMETER

1.19.11 MOTOR VSD PASSWORD: fixed

Permissions: Allows to modify all MOTOR VSD PARAMETER

1.19.12 FAN VSD PASSWORD: fixed

Permissions: Allows to modify all FAN VSD PARAMETER

# 2, Controller Function and Technical Parameter

2.1 Ambient temperature: -20°C～+60°C; Humidity: ≤98%;

2.2 Digital input& output: 8 points of digital input (function optional), 10 points of digital relay output

2.3 Analog input& output: 3 points of Pt100 temperature input. 2 point 4-20mA pressure input, 2 groups of three phases current input (CT provided).

2.4 Input voltage of phases: 380V/ 220V.

2.5 High voltage, low voltage protection.

2.6 Controller operation power supply: AC16-28V, 20VA

2.7 Measurement:

2.7.1 DISC T:-50~350°C; Accuracy: ±1°C.

2.7.2 Running time: 0~999999H.

2.7.3 Current: 0~999.9A.

2.7.4 Pressure: 0~1.60MPa; Accuracy: 0.01Mpa.

2.8 Phase anti-reversal protection: When compressor is at stop mode and detects phase reversal, response time≤ 1s

2.9 Motor protection: This controller provides open phase, unbalance and overload protection to motor, and also, provides overload protection to fan.

2.9.1, Open phase protection：When any phase opens, the response time equals to set time；This function is not activated when OPEN PHASE PROTECTION time is set over 20s;

2.9.2, Unbalance protection: when MAX-MIN current >= SET DATA *MIN current/10 ,respond time is 5s;

2.9.3, Protection features of overload (time unit: second), please see following table (table 2.9.3.1) for your reference. Multiple＝$I_{actual}$ / $I_{set}$ ,response time is shown in following table (table 2.9.3.1) according to overload multiples from 1.2 times and 3.0 times;

| $I_{actual}/I_{set}$ Time parameter | ≥1.2 | ≥1.3 | ≥1.5 | ≥1.6 | ≥2.0 | ≥3.0 |
|---|---|---|---|---|---|---|
| Response time (S) | 60 | 48 | 24 | 8 | 5 | 1 |

Table 2.9.3.1 curve table for protection of motor

2.10 Temperature protection: when actual temperature measured is higher than temperature set; response time≤2s;

2.11 Contact capacity of output relay: 250V,5A； Contact endurance: 500000 times;

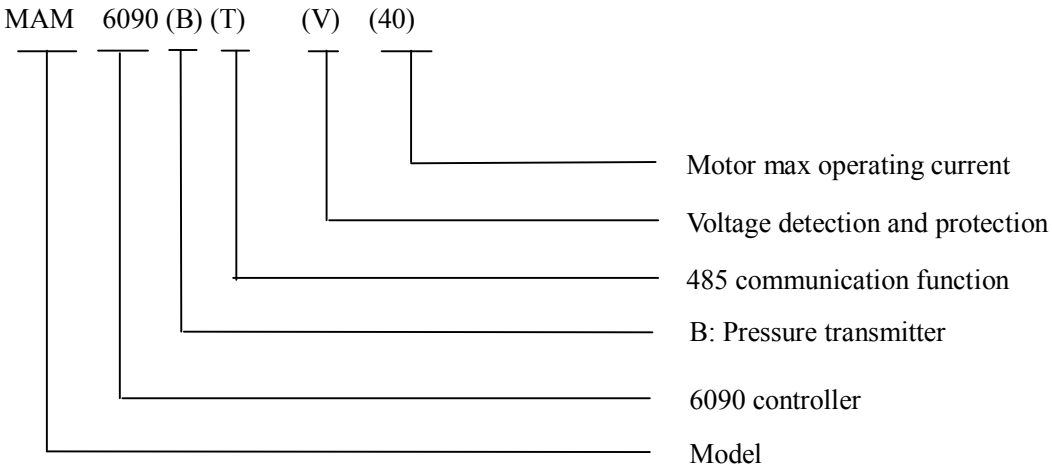
2.12 Current error is less than 1.0%;

2.13 points of RS485communication port. 1 point is for block mode or computer communication; The other point is for inverter communication like reading inverter run parameter, controlling inverter on-off or adjusting inverter frequency;

2.14 Remote control compressor: When set as REMOTE, user can remotely control the compressor.

# 3, Model and Specification

## 3.1 Model Explanation




## 3.2 Power Specification Sheet for Corresponding Motor

| Specification | Current Range (A) | Corresponding Main Motor Power (KW) | Remark | Description |
|---|---|---|---|---|
| MAM6090 (20) | 8~20 | Below 11 | | Fan has three levels of current, such as 0.2-2.5A, |
| MAM6090 (40) | 16~40 | 11-18.5 | | |
| MAM6090 (100) | 100 | 22-45 | | |

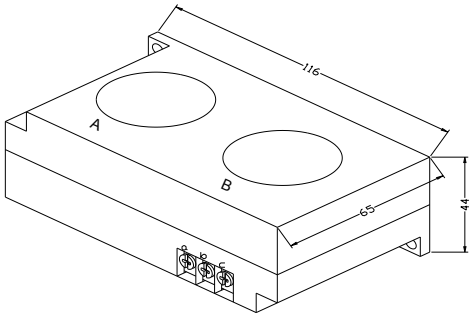
| | | | | |
|---|---|---|---|---|
| MAM6090 (200) | 200 | 55-90 | | 1-5A and 4-10A, determined-by current of motor |
| MAM6090 (400) | 400 | 110 | | |
| MAM6090 (600/5) | 600/5 | 200-250 | With CT | |

Table 3.2.1 Power specification sheet for corresponding motor

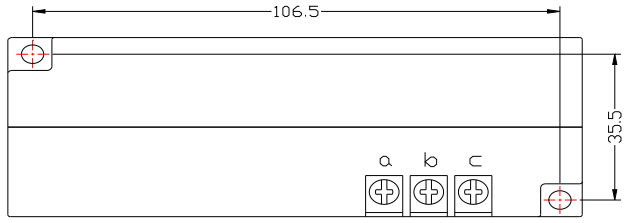
# 4, Installation

## 4.1 Mechanical Installation

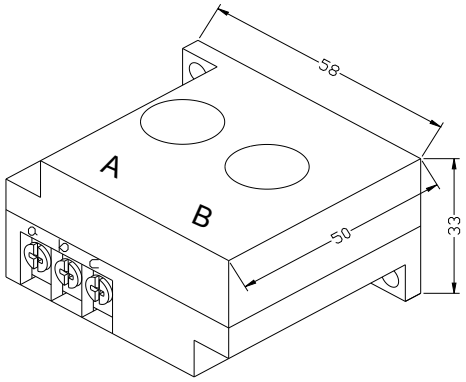
The CT shall be installed at a place where the current of motor cable can be measured, thus, controller can be set according to instructions on motor nameplate, and the detailed dimension is shown as below:



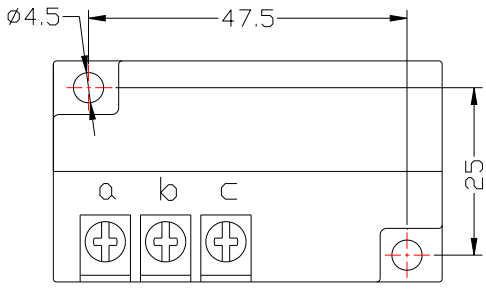

Picture 4.1.1 Structural dimension of CT1（ϕ36hole）




Picture 4.1.2 Installation dimension of CT1



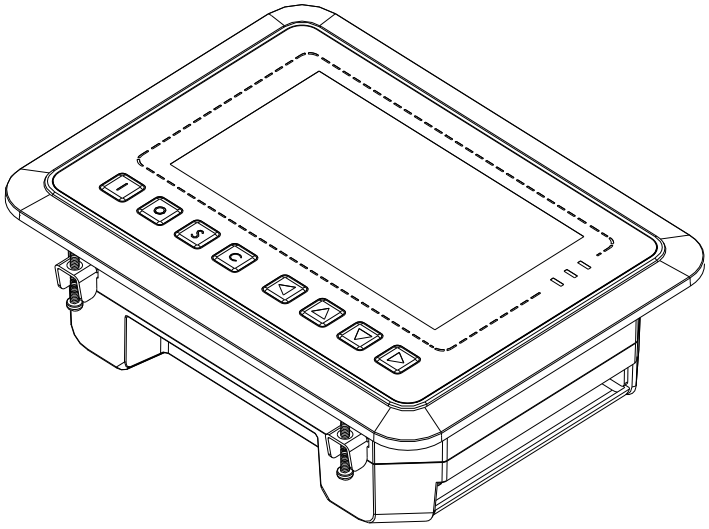

Picture 4.1.3 Structural dimension of CT2（ϕ10hole）

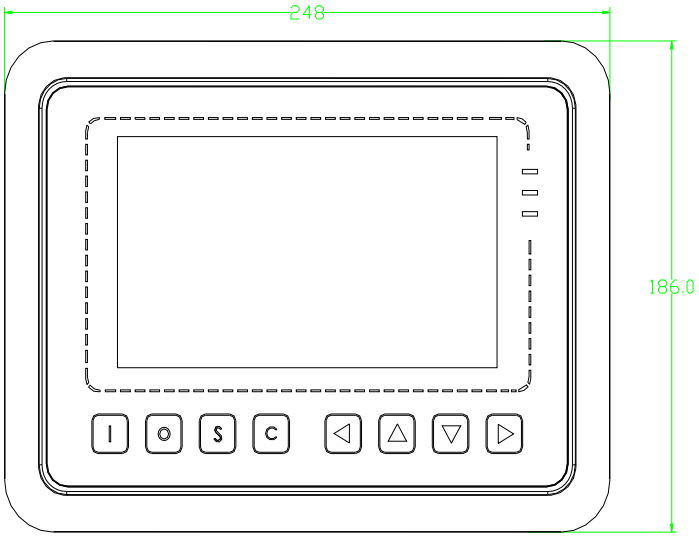


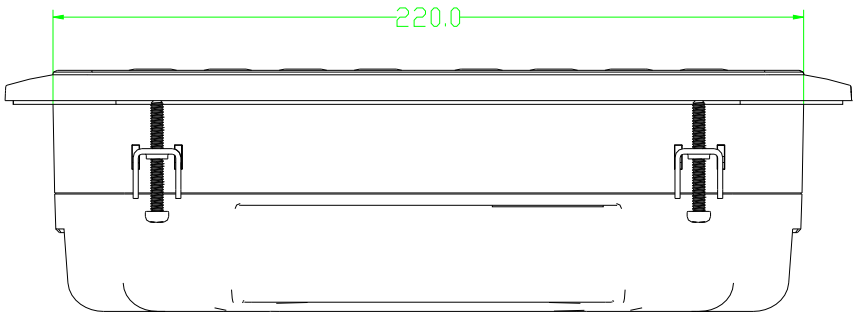

Picture 4. 1.4 Installation dimension of CT2

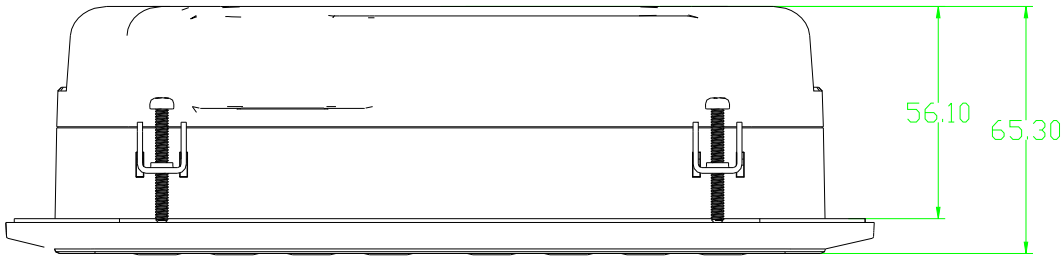
## 4.2 Controller installation

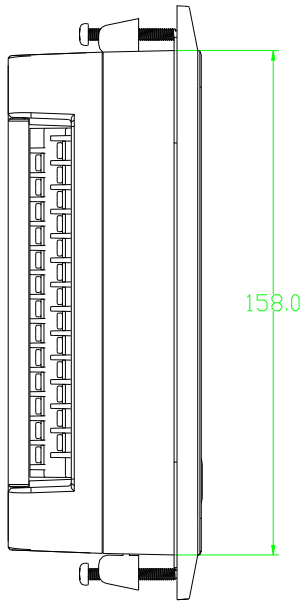
When install the controller, room should be left around controller for wiring. The specific dimension is shown as below:



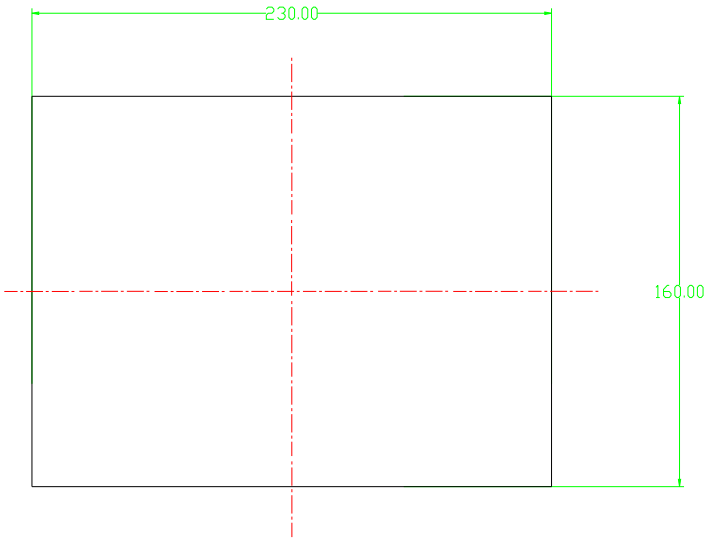





4. 2.1 Controller structure dimension




Picture 4.2.3 Hole size

**Note:** Though rear cabinet is 220mm,the hole size should be at least 230mm.After connect the cable in the rear cabinet, there will be about 10-15mm more space requested. You can save the step of dispatch cable when install controller.

# 5, Alarm Function

## 5.1 Air Filter Alarm

①Air filter block check. (In HARDWARE CONFIG , there is air check function set in digital input terminal)

The monitor displays AIR BLOCK by checking pressure differential switch close.

② Air filter running time alarm

The text displays AIR TIME END when running time of the air filter is exhausted.

## 5.2 Oil Filter Alarm

① Oil filter block check. (In HARDWARE CONFIG, there is oil check function set in digital input terminal)

The monitor displays OIL BLOCK by checking pressure differential switch close.

② Oil filter running time alarm

The text displays OILTIME END when running time of the oil filter is exhausted.

## 5.3 O/A Separator Alarm

① O/A separator block check. (In HARDWARE CONFIG, there is O/A check function set in digital input terminal)

The monitor displays O/A BLOCK by checking pressure differential switch close.

② O/A filter running time alarm

The text displays O/A TIME END when running time of the oil filter is exhausted.

## 5.4 Lubricant Alarm

The text displays LUBE TIME END when running time of the lubricant is exhausted.

## 5.5 Grease Alarm

The text displays GREASE TIME END when running time of the grease is exhausted.

## 5.6 Discharge High Temperature Alarm

The text displays DISC T HIGH when DISC T is higher than ALARM DISC T set in FACTORY PARAMETER.

# 6, Controller Protection

## 6.1 Motor Protection

MAM6090 compressor controller provides overload, open phase, unbalance, high voltage, low voltage protection to motor and overload protection to fan.

| Electronic Failure | Failure Display | Reason |
|---|---|---|
| Overload | Display ":MOTOR/FAN CURR OVLD" | Overload, bearing wear and other mechanical failure |
| Open phase | Display "MOTOR CUR OPEN PHASE" | Power supply, contactor and open phase of motor |
| Current Unbalance | Display "MOTOR CURR UNBAL" | Poor contact of contactor, inside open loop of motor |
| High Voltage | Display "HIGH VOLTAGE" | Motor voltage high |
| Low Voltage | Display "LOW VOLTAGE" | Motor voltage low |

## 6.2 Protection of Discharge Temperature High

When DISC T is above the STOP DISC T, the controller will alarm and stop the machine. THIS FAULT displays DISC T HIGH

## 6.3 Protection of Air Compressor anti-reversal

When compressor is at stop status and three phases sequence is not in order, THIS FAULT displays PHASE WRONG1, and the controller cannot start the motor. Change the position of any arbitrary two phase power lines and check the rotation of motor.

## 6.4 Protection of Air compressor Open Phase

When compressor is at stop status and open phase is detected, THIS FAULT displays PHASE WRONG2, and the controller cannot start the compressor. Check the three phase.

## 6.5 Protection of Air Pressure High

When the AIR P is above the MAX LIM P, the controller will alarm and stop the machine. THIS FAULT displays HIGH P.

## 6.6 Protection of Sensor Fault

When pressure sensor or temperature sensor is disconnected, the controller will alarm and stop the machine. THIS FAULT displays **SENSOR FAULT.

# 7, Trouble Shooting

| Failure | Reason | Solution |
|---|---|---|
| High discharge temperature | Bad vent condition, Oil shortage etc. | Check the vent condition and lubricant amount etc. |
| Temperature Sensor Failure | Cable broken or PT100 failure | Check the wiring and PT100 |
| High Pressure | Pressure too high or the pressure sensor failure | Check the pressure and the pressure sensor |
| Pressure Sensor Failure | Cable broken, Sensor failure or the cables connect reversely | Check the wiring and pressure transmitter |
| Open Phase | Power open phase or the contactor failure | Check the power and contactors |
| Overload | Voltage too low, tubes block, bearing wear off or other mechanical failure or wrong set data etc. | Check the set data, voltage, bearings, tubes and other mechanical system. |
| Unbalance | Current unbalance, contactor failure or the internal open loop of the motor | Check the power, contactor and the motor |
| Wrong Phase Sequence | Phase sequence reversal or open phase | Check the wiring |
| Motor overload during start | Master start time set to less than the star delta delay time | Reset the master start time longer than star delay + 2 seconds |

| | | |
|---|---|---|
| Main Contactor shakes frequently | The emergency stop button is loose or controller is reset by interference | Check if the coil of contactor connects with RC snubber or not |
| Inverter Communication Fault | Wrong set of relatively parameter of controller and inverter; Communication cable loose | Check the set data; Check the cable |

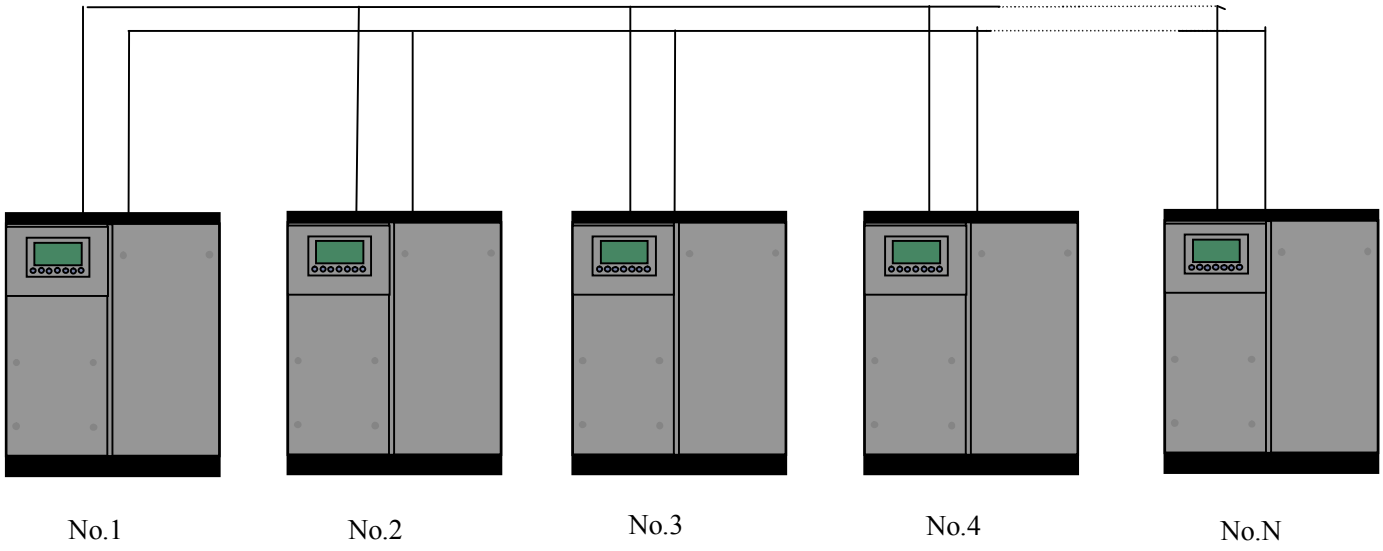
# 8, Block control and network communication

## 8.1 Block Control：

MAM6090 controller can work in block mode with MAM series compressor (with communication function).16 pieces compressors can work together in a net at most. Block mode can be set as VSD –VSD,PF-PF or VSD- PF .The cable connection for block mode control is as below....1,2 terminals ( RS485 terminal ) are used for block mode.

In BLOCK PARAMETER SET menu, set as VSD-VSD or PF-PF,master chooses compressor to work according to the TOTAL RUN TIME. Compressor with shorter running time is chosen to start and compressor with longer running time is chosen to stop with priority.

In BLOCK PARAMETER SET menu,, set as VSD-PF, master works first, other compressors work according to the TOTAL RUN TIME. Compressor with shorter running time is chosen to start and compressor with longer running time is chosen to stop with priority.




Pitcure8.1.1.1

Compressor with COM ADD 0001 is master, others are slave. Any one MAM series compressor can be set as master or slave.

8.1.1 Block Control Set:

8.1.2.1 Set as Master:

Set rhe COM ADD in USER PARAMTER to 001

According to user requirement, set COM MODE, BLOCK NUMBER, TURN TIME, BLOCK LOAD P, BLOCK UNLD P, BLOCK DELAY, BLOCK MODE .After set, controller needs to be powered off and restart to save setting.

8.1.2.2 Set as Slave:

When MAM6090 controller serves as slave, it is only necessary to set COM MODE as BLOCK, COM ADD can be set from2-16 in sequence according to the quantity of compressors, .BLOCK STATUS set as SLAVE.

8.1.2 Start, Stop Block mode:

Make sure block cables connect correctly, also the parameter of compressor in block mode is set correctly. Activate master, master controls the compressor in net automatically according to the AIR P detected. When manually stop the master, block control stops at the same time, thus, master will no longer send command to compressors in net.

## 8.2 Network Communication

MAM6090 controller supports MODBUS RTU protocol and can serve as slave when connects with other equipment .It is supports 03, 06, 16 MODBUS command. Communication baud rate: 9600BPS, 1 start bit, 8 data bits, 1 stop bits and even parity. For MODBUS register address, please see MODBUS communication manual.

# 9, Inverter Control

## 485 communication control

There is one spare port for RS485 to communicate with inverter. User can start or stop controller through RS485,it transfers the output frequency based on PID calculation to inverter through 485 port. This is how to adjust inverter output frequency and realize constant pressure and temperature. The baud rate is fixed as 9600BPS when RS485 control inverter. Different inverter data format can be set in INVERTER SET in FACTORY PARAMETER. MOTOR INVERTER is suggested to be set as 0001, FAN INVERTER is 0002.

In order to be compatible with different inverter, set the item such as CURR(R) ADD, VOLT(R) ADD, FREQ(R) ADD, POWE(R) ADD, RUN (W) ADD, ERR STATE(R) ADD, FREQ(W) , RESET(W) ADD. For different inverter, amplification of current, voltage, frequency, power is different. Write a formula to every parameter to transfer current, voltage, frequency, power of inverter to one digit data.

Relative parameter introduction is as below, please take the Schneider 67, 71 inverter as example.

| Item | Data Set | Explanation |
|---|---|---|
| INVERTER NAME | 0ATV61 | Set inverter name |
| RUN(W) ADD1 | 2135 | Corresponding address 1 of inverter start command |

| | | |
|---|---|---|
| RUN VALUE | 0001 | This data is inverter start data (please refer to communication chapter in inverter manual for different inverter.) |
| RUN(W) ADD2 | 2135 | Corresponding address 2 of inverter start command |
| RUN VALUE | 0001 | This data is inverter start data (please refer to communication chapter in inverter manual for different inverter.) |
| STOP(W) ADD | 2135 | Corresponding address of inverter stop command |
| RUN VALUE | 0001 | This data is inverter start data (please refer to communication chapter in inverter manual for different inverter.) |
| RESET(W) ADD | 2135 | Corresponding address of inverter reset command |
| RUN VALUE | 0001 | This data is inverter start data (please refer to communication chapter in inverter manual for different inverter.) |
| FREQ(W) ADD | 2136 | Corresponding register address of inverter running frequency source |
| FREQ(R) = | REC*0001÷0001 | The REC value is frequency value with one decimal. Use formula to transfer to corresponding value based on different inverter and send it to inverter.<br>Example： 50HZ running frequency，REC value:500<br>For inverter with write frequency of 2 decimals, formula: REC**0001÷0010<br>For inverter with write frequency of 1 decimal, formula: REC**0001÷0001<br>For the inverter whose max output frequency is in corresponding with 10000,the formula :REC*0020÷0001 |
| STATE(R) ADD | 2135 | Read inverter running status address |
| RUN S = | R AND 0001=0001 | Check if inverter has run the formula(please refer to communication chapter in inverter manual) |
| COM FORM | 8N1-N | Set the data format of controller and inverter communication. This set should be consistent with inverter communication format<br>8N1-N: 1start bit,8 data bits,1 stop bit, no parity bit<br>8N1-E: 1start bit,8 data bits,1 stop bit, even parity bit<br>8N1-O: 1start bit,8 data bits,1 stop bit, odd parity bit<br>8N2-N: 1start bit,8 data bits,2 stop bit, no parity bit<br>Note: Communicate with inverter, the baud rate is fixed: 9600 |
| FREQ(R) ADD | 0C82 | Read inverter frequency address(refer to inverter manual ) |
| FREQ(R) = | REC*0001÷0001 | Calculate inverter frequency formula. Controller will transfer the frequency to one decimal. |
| VOLT(R) ADD | 0C88 | Read inverter voltage address |
| VOLT(R) = | REC*0001÷0001 | Calculate inverter voltage formula. Controller will transfer the voltage to one decimal |

| | | |
|---|---|---|
| CURR(R) ADD | 0C84 | Read inverter current address |
| CURR(R) = | REC*0001÷0001 | Calculate inverter current formula. Controller will transfer the current to one decimal |
| POWE(R) ADD | 0C8B | Read inverter power address |
| ERR S = | R AND 0000≠0000 | Inverter reports error formula or not |
| EMERGENCY ADD | 2135 | Corresponding add of inverter emergency stop command |
| RUN VALUE | 0001 | This data is inverter free stop data (please refer to communication chapter in inverter manual for different inverter.) |

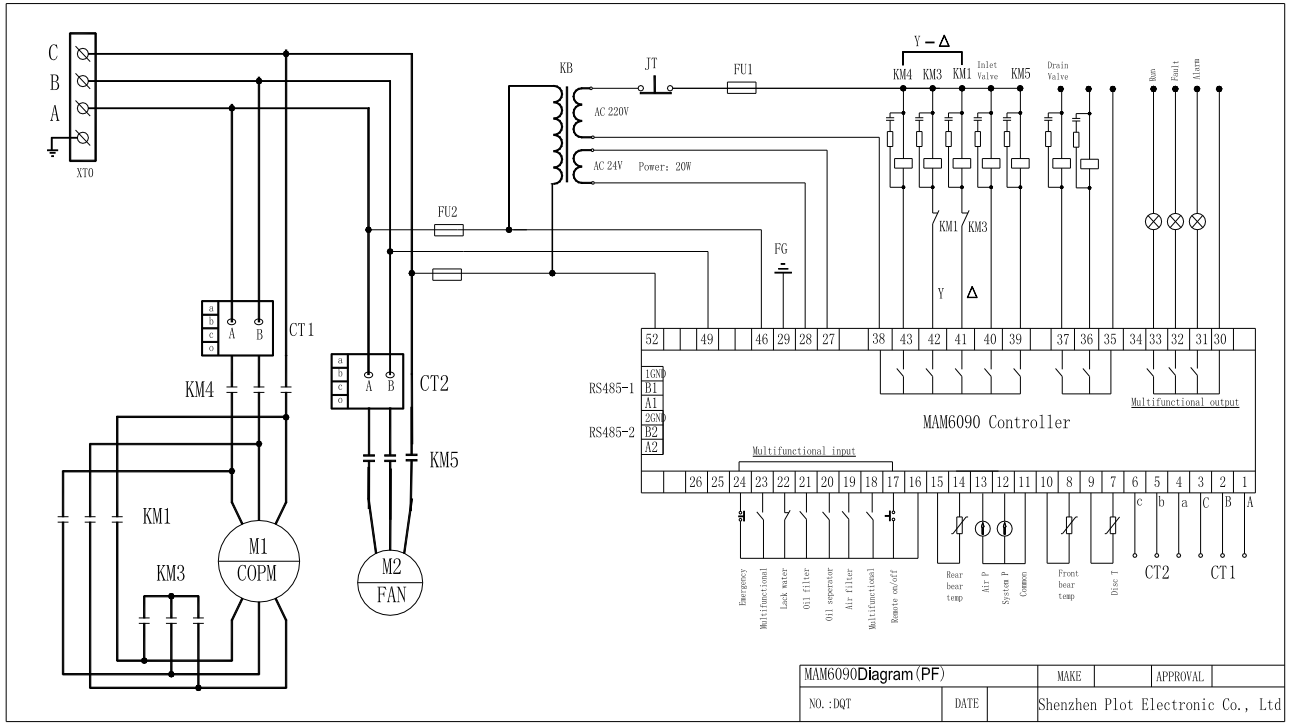
Firstly, controller sends 0 to corresponding register of"STATE(R) ADD" through inverter. After delay for a while, sends 1 to corresponding register of "RUN1(W) ADD". After another delay, reads" RUN S"register, and judges if the inverter is running based on the set formula. Calculate the output frequency based on the comparison of pressure detected and pressure set and send this value to corresponding address of "FREQ(R) ADD" through formula operation.

Schneidel inverter parameter set:

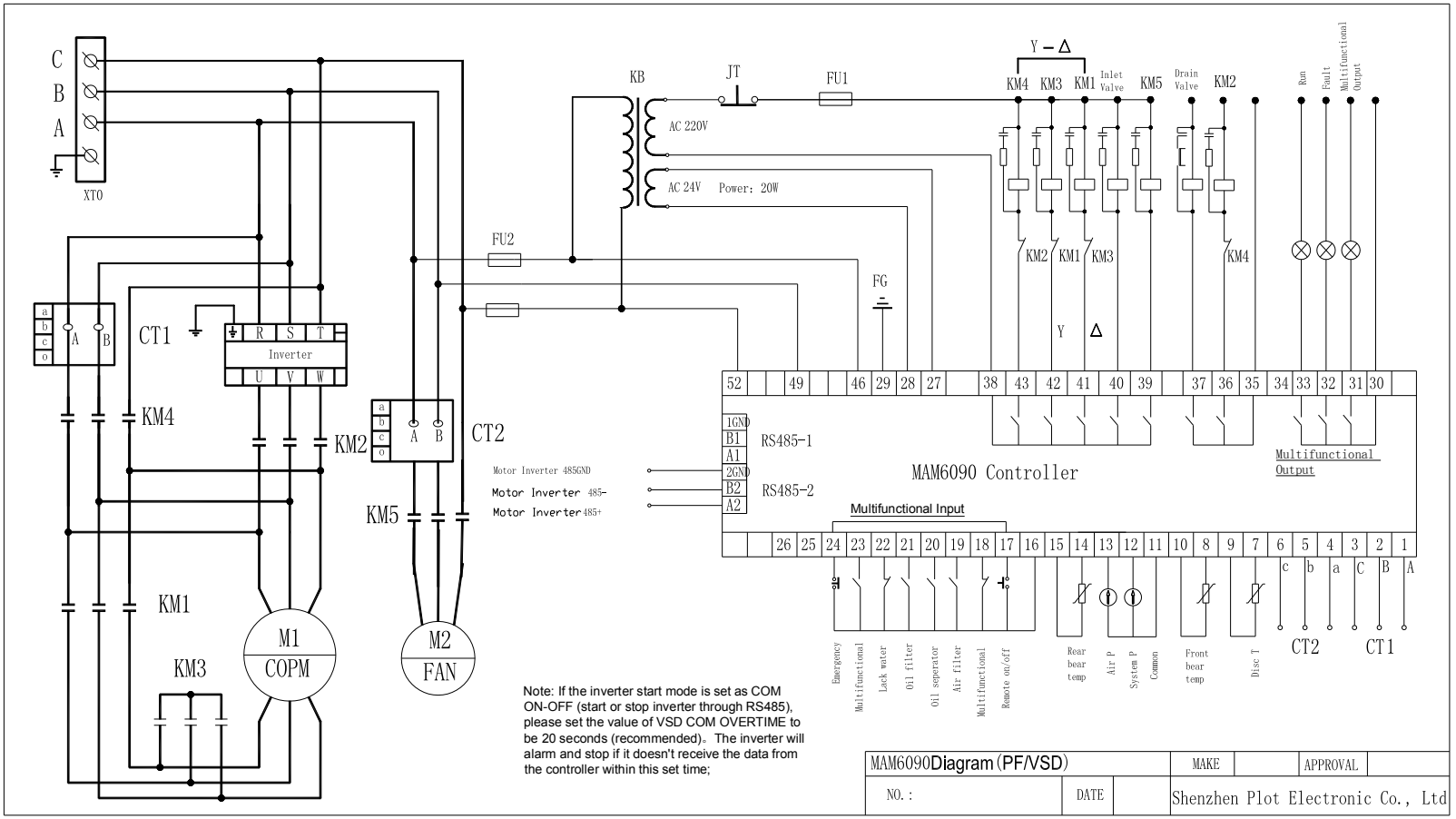
1、CON |AD2-
|AD1-|ADD :1
|EBr :96
|EFO :8N1
|EEO :15
CTL- | Fr1 :ndb
|rln
|PST
|CHCF :IO
|CD1 ： ndb
Flt- | PTC-
|rST- | rSF :C107

# 10, Schematic Diagram

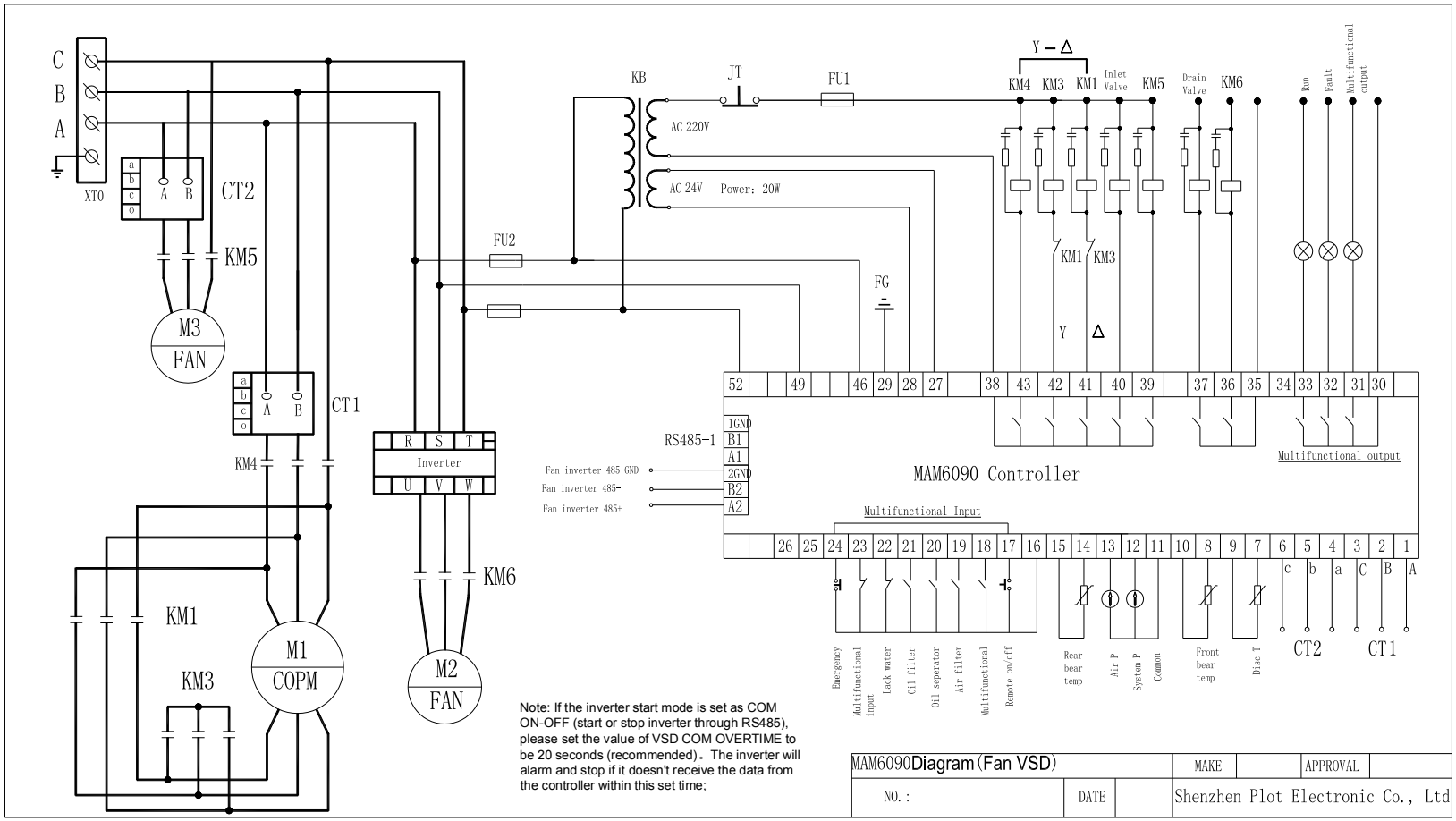
10.1 PF



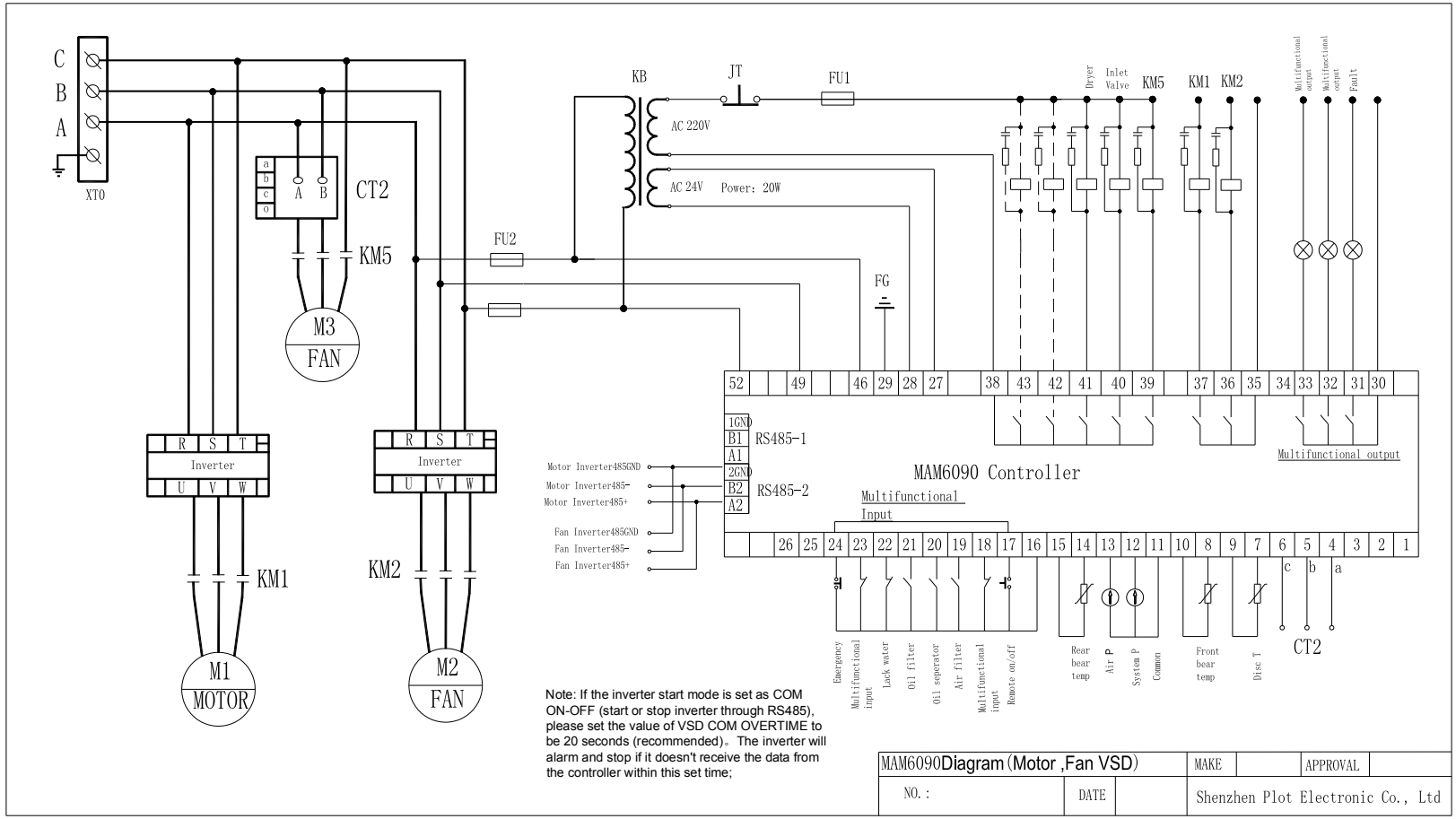
10.2 PF/VSD


C
B
A
XT0
KB
JT
FU1
AC 220V
AC 24V Power: 20W
Y – Δ
KM4 KM3 KM1 Inlet Valve KM5 Drain Valve KM2
Run
Fault
Multifunctional Output
FU2
FG
KM2 KM1 KM3 KM4
Y Δ
CT1
Inverter
R S T
U V W
KM4
KM2
CT2
KM5
KM1
KM3
M1
COPM
M2
FAN
Motor Inverter 485GND
Motor Inverter 485-
Motor Inverter 485+
1GND B1 A1 2GND B2 A2
RS485-1
RS485-2
MAM6090 Controller
Multifunctional Output
Multifunctional Input
52 49 46 29 28 27 38 43 42 41 40 39 37 36 35 34 33 32 31 30
26 25 24 23 22 21 20 19 18 17 16 15 14 13 12 11 10 8 9 7 6 5 4 3 2 1
c b a C B A
CT2 CT1
Emergency
Multifunctional
Lack water
Oil filter
Oil seperator
Air filter
Multifunctional
Remote on/off
Rear bear temp
Air P
System P
Common
Front bear temp
Disc T
Note: If the inverter start mode is set as COM ON-OFF (start or stop inverter through RS485), please set the value of VSD COM OVERTIME to be 20 seconds (recommended)。The inverter will alarm and stop if it doesn't receive the data from the controller within this set time;
MAM6090Diagram(PF/VSD)
MAKE
APPROVAL
NO.:
DATE
Shenzhen Plot Electronic Co., Ltd

10.3 FAN VSD


C
B
A
XT0
CT2
KM5
M3
FAN
CT1
KM4
KM1
KM3
M1
COPM
FU2
R S T
Inverter
U V W
KM6
M2
FAN
KB
JT
FU1
AC 220V
AC 24V Power: 20W
FG
Y – Δ
KM4 KM3 KM1
Inlet Valve
KM5
Drain Valve
KM6
Run
Fault
Multifunctional output
KM1 KM3
Y Δ
RS485-1
1GND
B1
A1
2GND
B2
A2
Fan inverter 485 GND
Fan inverter 485-
Fan inverter 485+
MAM6090 Controller
Multifunctional output
Multifunctional Input
52 49 46 29 28 27 38 43 42 41 40 39 37 36 35 34 33 32 31 30
26 25 24 23 22 21 20 19 18 17 16 15 14 13 12 11 10 8 9 7 6 5 4 3 2 1
c b a C B A
CT2 CT1
Emergency
Multifunctional input
Lack water
Oil filter
Oil seperator
Air filter
Multifunctional
Remote on/off
Rear bear temp
Air P
System P
Common
Front bear temp
Disc T
Note: If the inverter start mode is set as COM ON-OFF (start or stop inverter through RS485), please set the value of VSD COM OVERTIME to be 20 seconds (recommended)。The inverter will alarm and stop if it doesn't receive the data from the controller within this set time;
MAM6090Diagram(Fan VSD)
MAKE
APPROVAL
NO.:
DATE
Shenzhen Plot Electronic Co., Ltd

10.4 MOTOR/FAN VSD



10.5 SOFT START