SCC
air compressors

Compressor Controller
MAM – 200

OPERATION MANUAL

Revision 1.0

04.08.2017

Notice

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

Installation of MAM—8 compressor controller can be performed only by professional technicians.**

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

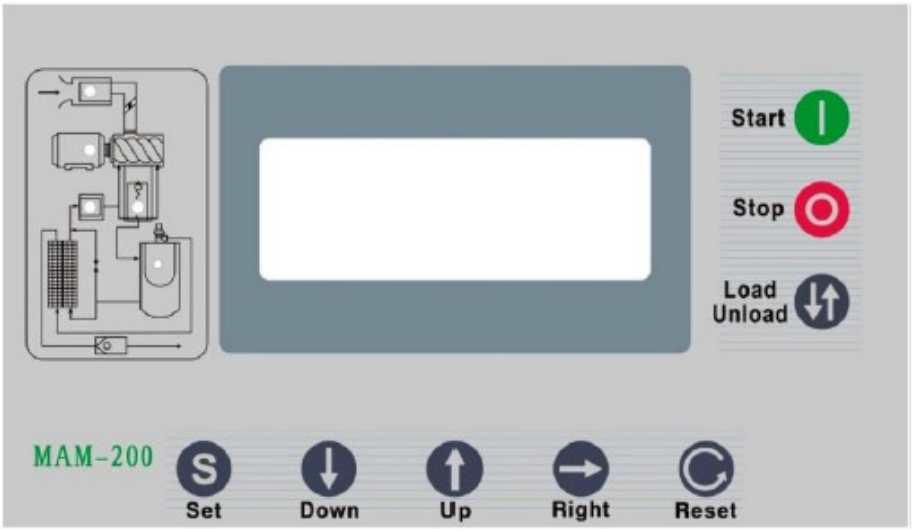
Port connection shall be inspected carefully before power on.

PARAMETER is not allowed to be modified in running and stop delay status. Only user parameter is allowed to be changed at running status

Contents

1. Basic Operations

1.1 Button Explanation



 Start button

- When compressor is at stop status, press this button to start the compressor
- When compressor is set as main (No. 1) in block mode, 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 main (No. 1) in block mode, press this button to stop compressor and block mode as well

 Loading / Unloading button

- When the compressor is at running status, press this button to load or unload

 Set button

- When the compressor is at setting mode, press this button after modification to confirm and save the modified data
- Press this button after input password to verify the password

 Move down button / Decreasing button

- When viewing the menu, press this button to move downward the cursor
- When modifying data, press this button to decrease the data at current position

 Move up button / Increasing button

- When viewing the menu, press this button to move upward the cursor
- When modifying data, press this button to increase the data at current position

 Shift button / Enter button

- When modifying data, press this button to move to the next data bit
- When select menu, press this button to switch to sub menu. If no sub menu available, the controller will shift to data setting mode

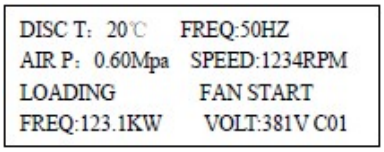
 Return button / Reset button

- When modifying data, press this button to exist data setting mode
- When viewing the menu, press this button to return to prevorious menu
- When the controller is at failure stop status, long press this button to reset

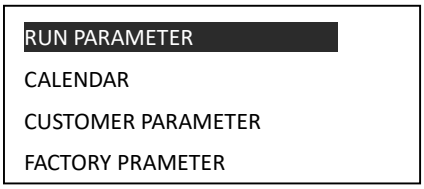
1.2 Status Display and Operations

The Display screen will show as below after powered on:

After 5 seconds the menu will switch as below:

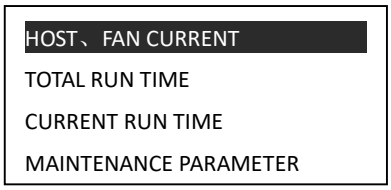


Press  to enter into selection menu:

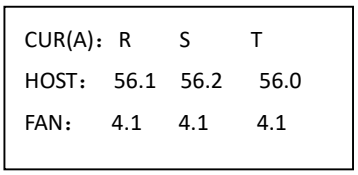


1.3 Operating Parmeter and Menu

Press  or  to move the cursor to “RUN PARAMETER”, then press  to switch to secondary menu:



Move the cursor to “HOST, FAN CURR”, press  to switch to secondary menu:



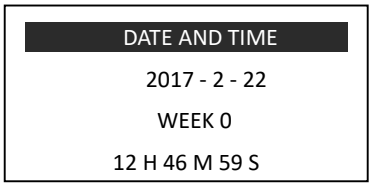
Press  to return to the prevorious menu or main menu. If no operation at the current menu for 120seconds, controller will automatically return to the main menu and turn off the back light simultaneously.

According to above method, use move down button  , move up button  , enter button  ,

and return button  to check TOTAL RUN TIME, THIS RUN TIME, VSD PARAMETER, MAINTENANCE PARAMTER, FAULT RECORD, PROD DATE, SERIAL NUMBER, THIS FAULT and returnto previous menu.

1.4 Calendar

Check and set time of controller



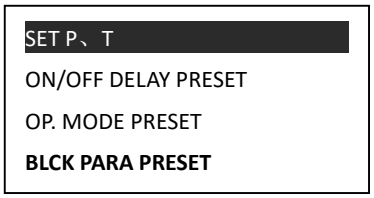
1.5 Custom parameter

1.5.1 Customer Parameter View and Modification

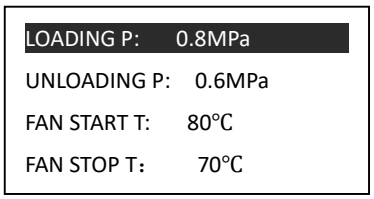
CUSTOMER PARAMETER and FACTORY PARAMETER
are not allowed to be modified in running and stop delay status.

When modifying Customer parameter please refer to run parameter modification method. The modification process of LOADING P is showing as an example below:

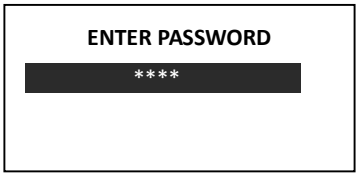
Press  or  to move the cursor to “CUSTOMER PARAMETER”, then press  to switch to secondary menu



Move the cursor to “SET P, T”, press  to switch to secondary menu:



User can check the CUSTOMER PARAMETER in this menu or press  to switch to the following menu which requires an user password input



NOTE: Customer password can be set in CUSTOMER PARAMETER
and FACTORY PARAMETER is fixed as _____

In this menu the first data bit of password blinking, press  or  to modify the first bit of password.

Press  move the cursor to the next data bit, modify the second data bit of password in accordeance with the above. Modify the the third and fourth data of password in sequence, press  to confirm the input data and the menu will switch to the following menu after verification.

The upper right corner with "*" indicates the system verification of the password

BLOCK LOAD P:	0.8MPa	*
BLOCK UNLOAD P:	0.6MPa	
FAN START T:	80℃	
FAN STOP T:	70℃	

In the menu above press  , the first data of LOADING P start to blink, user can press  or  to modify the present data in accordance with the above method. Press  to move to next data bit and modify the target data in sequence. When finished press  to confirm and save the data. Other CUSTOMER PARAMETER share the similar way for modification.

1.5.2 Customer Parameter Table and Function

First Submenu	Second Submenu	Preset Value	Functions
Set P / T / VF	LOADING P	0,65 MPa	1. In AUTO LOADING status, compressor will load if pressure is below this set data 2. In STANDBY mode, compressor will start if the pressure below this set data
	UNLOAD P	0,80 MPa	1. Compressor will unload automatically if air pressure is above this set data 2.This data should be set above LOADING P, also should be set below UNLD P LIM
	FAN START	0080℃	Fan will start if AIR T is above this set data
	FAN STOP	0070℃	Fan will start if AIR T is above this set data
	VF WORKING	0,70MPa	Set AIR P for VSD compressor to keep running stable, when pressure is fluctuated around this data, controller will adjust operation frequency of inverter to control the pressure close to this data
	RATED POWER	015kW	Set RATED POWER in order to calculate actual power
	RATED SPEED	2600RPM	Set RATED SPEED at 50HZ in order to calculate the actual speed in variable frequency
SET TIME	HOST START TIME	0008s	Set the HOST 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 TIME	0003s	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 TIME	0006S	Interval time from star to delta
	LOAD DELAY TIME	0002S	Unloading in this set time after enter delta running
	EMPTY DELAY TIME	0600S	When unloading continuously, compressor will automatically stop and enter to standby status if over this set time
	STOP DELAY TIME	0010S	For NORMAL STOP operation, compressor will stop after it continuously unloading over this set time
	START DELAY TIME	0100S	Machine cannot be restarted before this set time (stop and over time load free stop till this time)
	VSD UP SPEED	0100	Restrict PID calculations in case the frequency increasing too fast which cause motor speeding up too fast
	VSD DN SPEED	0100	Restrict PID calculations in case the frequency decreasing too fast which cause motor slowing down too fast
Operation mode preset	ON/OFF MODE	Near / Far	NEAR: only the button on the controller can turn on and turn off the machine. FAR: both the button on the controller and the remote-control button can turn on and turn off the machine;
	LOAD MODE	Auto/ Manual	Manual: Only when the pressure is above Unload P, compressor will unload automatically. For any other case, the Load/Unload function can only be executed by pressing “load/unload” key. AUTOMATICAL: the load/unload function can be executed by the fluctuation of AIR P automatically
	COM MODE	Computer Block Prohibited	Prohibited: communication function is not activated. COMPUTER: compressor can communicate with computer or DCS as slave according to MODBUS-RTU. BLOCK: compressors can work in a net
	COM ADRESS	0255	Communication address
Blocking parameter preset	BLOCK STATE	Main/ Slave	1.When service as master in BLOCK, master controls slave; the COM ADD should be set as No.1 2.When service as slave in BLOCK, slave is controlled by master

	BLOCK ON/OFF	Alone/ Order	
	TURN TIME	99 Hours	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 NUMBER	0016	Number of air compressors in block net
	BLOCK LOAD P	*.**MPa	In BLOCK mode, one compressor will start or load when master AIR P is below this set data
	BLOCK UNLOAD P	*.**MPa	In BLOCK mode, one compressor will stop or unload when master AIR P is above this set Data
	BLOCK DELAY	200S	In BLOCK mode, when master sends two commands continuously, second command signal delays for this set data
Maintenance parameter preset	OIL FILTER RESET	0000 HOURS	Record total running time of OIL filter. If changing new oil filter, the data should be reset by manual operation.
	O/A RESET	0000Hours	Record total running time of O/A filter. If changing new O/A separator, the data should be reset by manual operation.
	AIR FILTER RESET	0000Hours	Record total running time of AIR filter. If changing new air filter, the data should be reset by manual operation.
	LUB OIL RESET	0000Hours	Record total running time of LUB OIL. If changing new lubricating oil, the data should be reset by manual operation.
	LUB GREASE RESET	0000Hours	Record total running time of LUB GREASE. If changing new grease, the data should be reset by manual operation.
Max. life time preset	OIL FILTER	9999Hours	1. Alarm prompt when total running time of oil filter is above the set data 2. Set this data to “0000”, alarm function for oil filter running time is not activated
	O/A SEPARATOR	9999Hours	1. Alarm prompt when total running time of O/A separator is above the set data. 2. Set this data to “0000”, alarm function for O/A separator running time is not activated
	AIR FILTER	9999Hours	1. Alarm prompt when total running time of air filter is above the set data. 2. Set this data to “0000”, alarm function for air filter running time is not activated
	LUB. OIL	9999Hours	1. Alarm prompt when total running time of lubricant is above the set data. 2. Set this data to “0000”, alarm function for lubricant running time is not activated.
	LUB GREASE	9999Hours	1. Alarm prompt when total running time of grease is above the set data. 2. Set this data to “0” , alarm function for grease running time is not activated
Language display		English	Change the display language.
User password modification		****	User could modify the user password by old user password or factory password

1.5.3 Factory Parameter

The view and modification of factory parameter requires a factory password, The modification step is same as customer parameter modification. Main function is as below:

Menu	Initial Value	Functions
HOST RATED CURRENT		After the starting delay time, when the motor current is greater than 1.2 times of the set value and less than 4 times of the set value, the unit will jump as per overload feature.
FAN RATED CURRENT		Same as above
PRE-ALARM T	105℃	Pre-alarm when the temperature reaches this set value
STOP T	110℃	Alarm when the air exhausting temperature reaches this set value.
STOP P	1.00MPa	Alarm and stop the machine when the air supply temperature reaches this set value
UNLOAD P. UPPER LIMIT	0.80MPa	The Unload Limit Pressure in the Customer Parameter must be set lower than this value.
LOAD TIME	****Hours	Total load time
TOTAL TIME	****Hours	Total run time
HISTORY FAULT RESET	****	Input the history failure password to clear all the history failures.
UNBALANCE SCOPE	0006	When (the max. phase current / min. phase current) is greater than (1+set value), the unbalance protection will stop the machine. If the set value is greater than 15, the unbalance protection will be unavailable.
LACK PHASE PROTECTION	0005	Set the LACK PHASE TIME ≥20S, the Lack phase protection will be disabled
RUN MODE	VF Commercial F	VF: Inverter will run Commercial F: Star-delta will run

1.6 Operating Authorization and Password

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

Customer Password: factory set _____
Permissions: Allows to modify all Customer Parameter
Factory Password: fixed _____
Permissions: Allows user to modify all Parameter

2 Controller Function and Technical Parameter

- Phase sequence protection:
  When compressor is at stop mode an detects open phase, response time <2ms

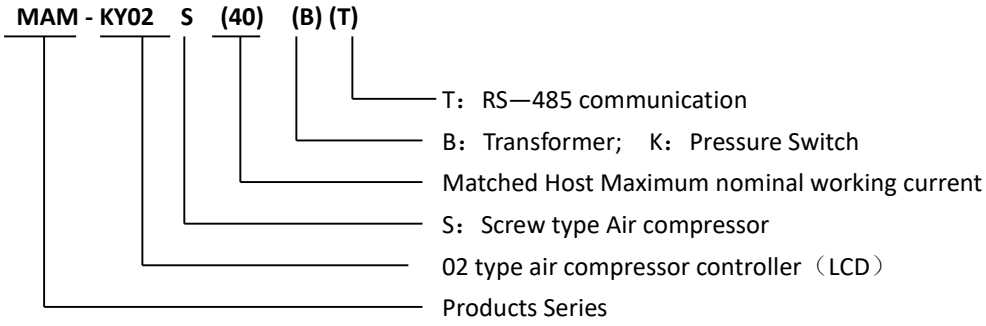
- Open phase protection
  When any phase opens, the response time equals to set time: This fuinction is not activated when OPEN PHASE PROTECTION time iss et over 20s

- Motor protection: This control unit has the following 5 basic protection functions to the motor and fan.
  - Rotor lock protection: After the starting oft he motor, if the working current reaches 4 or 8 times oft he set value, the protection activates. The activate time is less than 0,2s.
  - Short.circuit protection: If the detected current reaches 8times or more above the set value, the protection activates, the activate time is less then 0,2s
  - Lack phase protection: Any oft the phase lack, the protection activates and theactivate time ist he setting time
  - Unbalance protection: The current difference between any of the two phases reaches the percentage of the setting value, the protection activates and the activate time is less than 5s.
  - Protection features of overload, please see following table for your reference. Multiple＝Iactual ／ Iset , response time is shown in following table according to overload multiples from 1.2 times an 3.0times.

I_{act}/I_{set} Time Para	≥1.2	≥1.3	≥1.5	≥1.6	≥2.0	≥3.0
response time (s)	60	48	24	8	5	1

3 Model and Specification

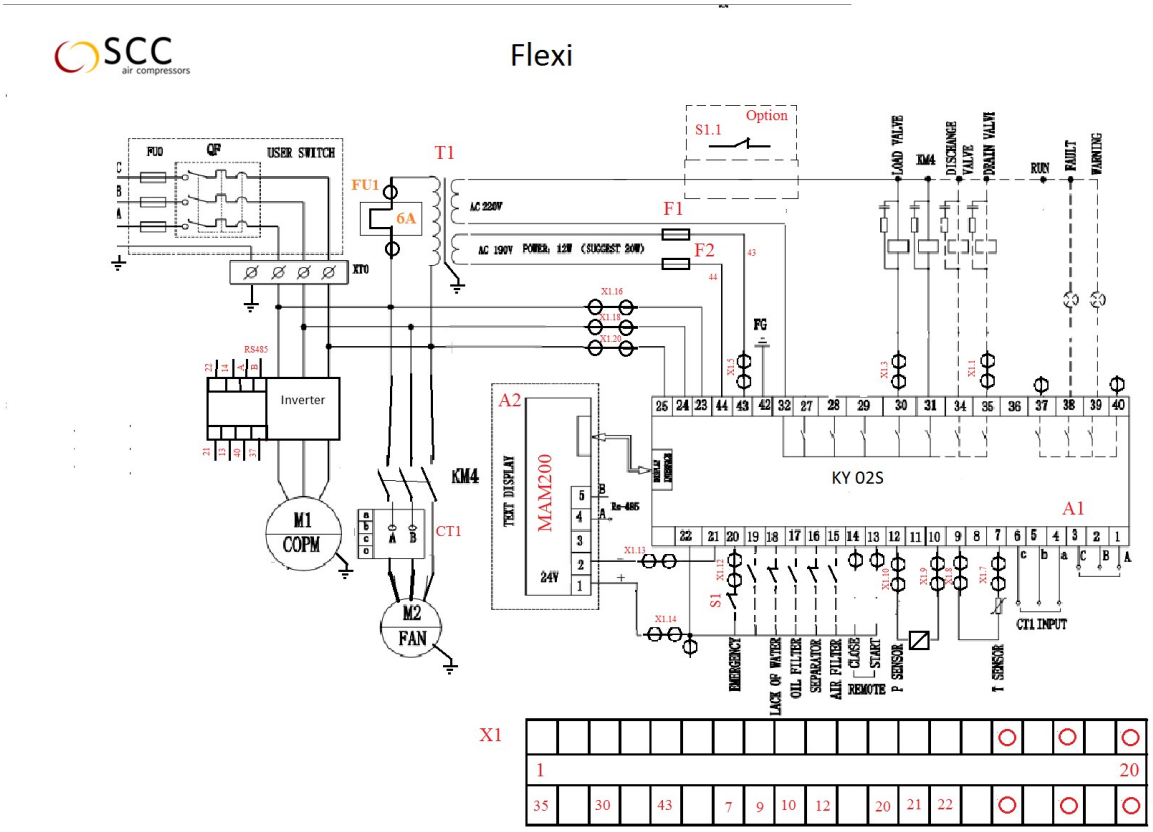
- Main controller model description



- Power consumption table for corresponding motor

Parameter / Spec.	Current Range（A）	Adopted Host Motor Power（KW）	Remarks	Descriptions
MAM—KY02S（20）	8～20	4～10		Fan has three levels of current. Such as 0.2-2.5A, 1-5A and 4-10A, determined by current of motor.
MAM—KY02S（40）	16～40	8～20		
MAM—KY02S（100）	30～100	15～50		
MAM—KY02S（200）	80～200	40～100		
MAM—KY02S（400）	160～400	80～200		
MAM—KY02S（600/5）	100～600	50～300	Connect to CT	

- Electrical basic wiring installation



Attention: the magnetic coil must be connected to the surging absorber when wiring

4 Alarm Function

4.1 Monitor text

4.1.1 Air Filter Alarm

1. Use switching signal to detect alarm
   The monitor displays AIR FILTER BLOCK by checking air filter differential pressure switch
2. Set AIR filter max. time
   The monitor displays AIR LIFE END when the run time of air filter exhausts

4.1.2 Oil Filter Alarm

1. Use switching signal to detect alarm
   The monitor displays OIL FILTER BLOCK by checking oil filter differential pressure switch
2. Set OIL filter max. time
   The monitor displays OIL LIFE END when the run time of the oil filter exhausts

4.1.3 O/A Alarm

1. Use switching signal to detect alarm
   The monitor displays O/A BLOCK by checking O/A filter differential pressure switch
2. Set O/A max. time
   The monitor displays O/A LIFE END when the run time of the O/A separator exhausts

4.1.4 Lubricating Oil Alarm

The monitor displays LUBE LIFE END when run time of lubrication oil exhausts

4.1.5 Grease Alarm

The monitor displays GREASE LIFE END when run time of the grease exhausts

5 Controller Protection

5.1 Motor Protection

MAM-200 compressor controller provides short circuit, block, overload, lack phase and unbalance protection on motor.

Electronic Failure	Failure Display	Reasons
Short circuit	Display “MOTOR / FAN OVERLOAD”	Short circuit or wrong current set
Current block	Display “MOTOR / FAN BLOCK”	Overload, bearing wear off or other mechanical failures
Overload	Display “MOTOR / FAN OVERLOAD”	Overload, bearing wear off or other mechanical failures
Lack phase	Display “MOTOR / FAN LACK PHASE”	Power supply, contactor and open phase of motor
Unbalance	Display “MOTOR / FAN UNBALANCE”	Poor contact of contactor, inside open-loop of motor

5.2 Protection of Air Temperature High

When AIR T is above the STOP DISC T, the controller will alarm and stop the machine.
This fault displays DISC T HIGH

5.3 Protection of Air Compressor Reversal

When the phase sequence of the power connected to the air compressor is not conforming to the set of the controller, the local failure displays “Wrong phase sequence” and as a result the controller cannot start the motor. It is needed to check and alternate any two of the phase sequence and investigate the motor rotation direction.

5.4 Protection of Air Pressure High

When the AIR P is above the STOP P, the controller will send out the alarm to shut down the machine and this fault displays AIR P HIGH

5.5 Protection of Sensor Failure

When the cable of the pressure sensor or the temperature sensor is broken, the controller will alarm and stop the machine and the local failure displays “** sensor failure”.

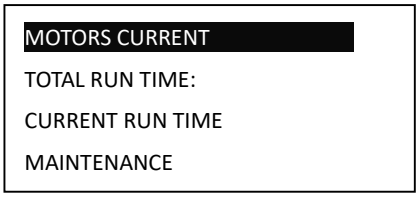
5.6 Interlock Protection

The Motor is running and the air exhaust temperature reaches the fan starting temperature but the fan does not run, the controller alarm, the local failure displays “FAN is stopped”.

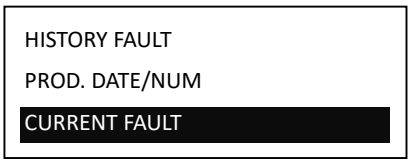
6 Troubleshooting

Failure stop caused by the external parts of controllers may be removed by checking this fault or history fault, method is shown as below.

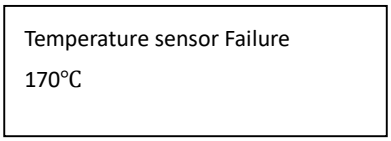
Press  or  to move the cursor to “RUN PARAMETER”, then press  to switch to secondary menu



Press  to move the cursor to “CURRENT FAULT”



Then press  to reach the following failure cause:



Check the temperature sensor to confirm if there is any line broken or damage.

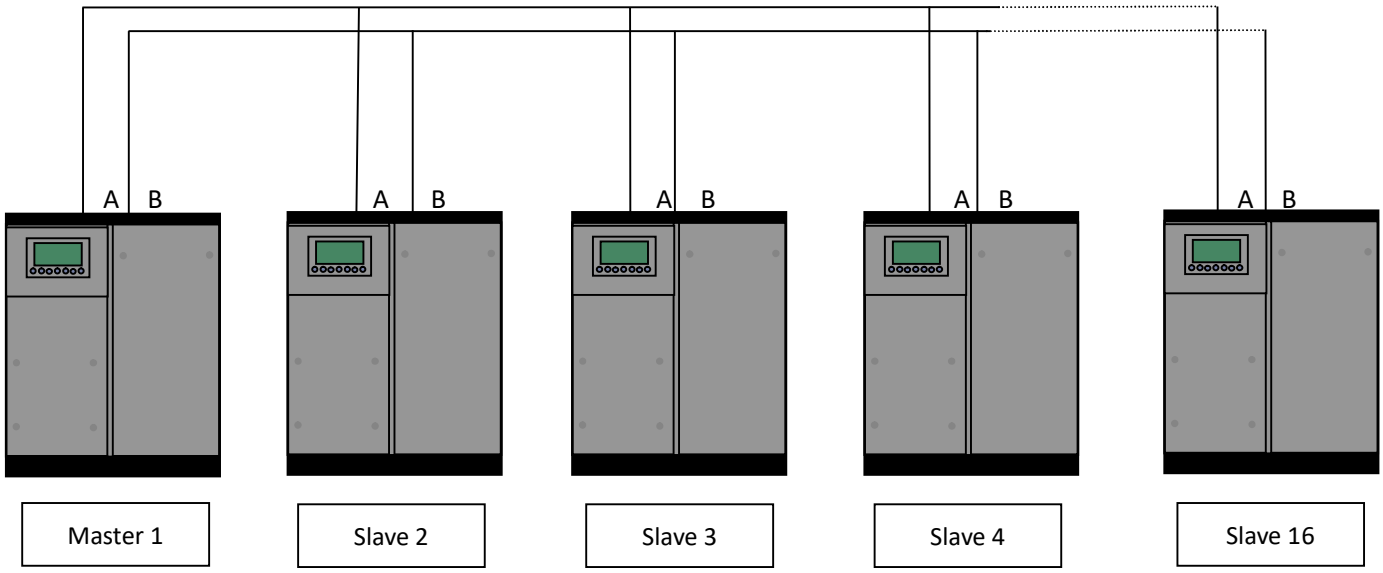
User can reset the error according to the following information:

Failure	Causes	Measurement to take
AIR T HIGH	Bad vent condition, Oil lacking etc.	Check the vent condition and lubricant amount etc.
AIR T SENSOR FAULT	Cable off or PT1OO damaged	Checking the wiring and PT100
AIR P HIGH	The pressure too high or the pressure sensor failure	Check the pressure and the pressure sensor
AIR P SENSOR FAULT	Cable off, Sensor damaged or the cable connected reversed	Check the wiring and sensor transformer
LACK WATER	Water Pressure switch damaged	Check the water pressure switch
LACK PHASE	Power phase lacking or the Contactor terminal damaged	Check the power and contactors
OVERLOAD	Voltage too low, tubes blocked, bearing wear off or other mechanical failure or wrong set data etc.	Check the set data, Voltage, bearings, tubes and other mechanical system.
UNBALANCE	Power unbalance, contactor damaged or the internal open of the motor	Check the power, contactors and the motor
BLOCK	Voltage too low, tubes blocked, bearing wear off or other mechanical failure or wrong set data etc.	Check the set data, Voltage, bearings, tubes and other mechanical system.
SHORT CIRCUIT	Wrong cable connection, wrong set data	Checking the wiring and set the data correctly
WRONG PHASE SEQUENCE	Reversed Phase sequence or phase off	Check the wiring
Fan stopped	Fan damaged, Contactor damaged, no control output	Check the wiring and control output
Overload or Rotor locking during starting process	Start time set too less than the star delta time delay	Reset the host starting time to be longer than star delta delay + load delay time
Main Contactor activate time to time	The emergency button loose	Check the wiring

7 Sequence Mode Control and Network

7.1 Sequence Mode Control

MAM-860 controller can operate with other MAM series compressor (with communication function). 16 pcs compressors are allowed in the net at most. The cable connection for block mode is as below….

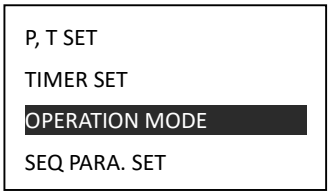


Compressors with net communication address 0001 is master, others are slave. Any one MAM-series compressors can be set as master or slave

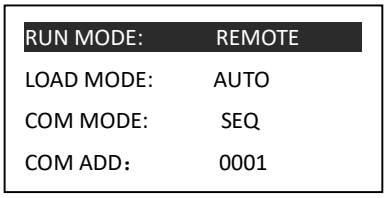
7.2 Sequence Mode Setting

7.2.1 Set as Master

Press  or  to move the cursor to “USER PARAMETER”, then press  to switch to the menu below:



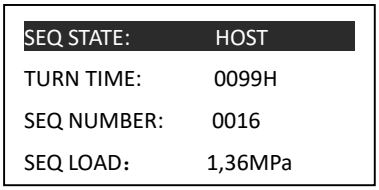
Move the cursor to the “OPERATION MODE”, then press  to switch to the menu below.

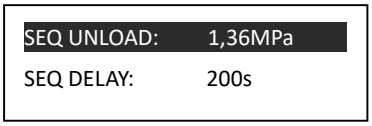


Set “COM MODE” as SEQ

Set “COM ADD” as 0001

Return to the previous menu, move the cursor to “SEQ PARA SET” press  to switch to the menu below.





According to user requirement, set SEQ STATE as Host, set TURN TIME, SEQ NUMBER, SEQ LOAD, SEQ UNLOAD and SEQ DELAY according to user´s need.

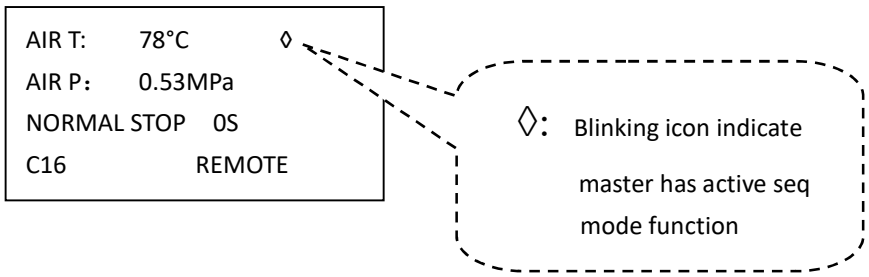
Attention: After setting, controller needs to be powered off and restarts to the settings!

7.2.2. Set as Slave

When MAM controller serves as slave, it is only necessary to set COM MODE as SEQ. Set COM ADD from 2 – 16 with sequence according to the quantity of compressors, and SEQ STATE as SLAVE.

7.3 Start, Stop Sequence Control:

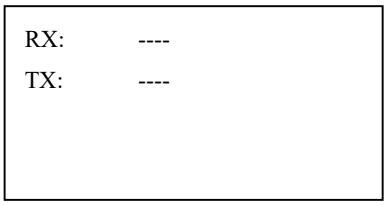
Make sure sequence cables connect correctly and the parameter of compressors in net set correctly. Activate master, master controls the compressors in net automatically according to the air pressure detected. Sequence control stops at the same time when manually stop the master. So, master will no longer send command to compressor in net.



7.4 Sequence Communication Receiving and Sending Message:

The message received and sent by RS485 can be displayed by the corresponding indication screen which is convenient for customer to make sure if they have received and feedback data in SEQ MODE or COM MODE. The method to switch to communication menu is as below:

Press  or  in main menu and select “RUN PARAMETER” and move down the cursor to communication menu. Press  to switch to the menu below:



When controller receives data, RX “—“ and “*” display alternately. When sends data, TX “—“ and “*” display alternately. When controller is in SEQ mode or communicates with monitoring center, user can confirm the establishment of communication through this menu.

7.5 Network

MAM-860 controller supports MODBUS RTU protocol and can serve as slave when connect with other equipment and supports 03, 06, 16 MODBUS command.

- Communication baud rate: 9600BPS
- 1 start bit
- 8 data bits
- 1 stop bit
- even parity

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Tolpec GmbH
Wertstrasse 44
D- 73240 Wendlingen
Telephone: +49 (0)7022 789 604-0
E-mail: contact@tolpec.com