VORTEX COMPRESSOR CONTROLLER

MAM860（Ⅳ）

USER

MANUAL

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CONTENT

1、Basic Operation

1、Overview：

Vortex compressor controller can control compressor to operate automatically including pressure&temperature auto control,compressor error information display,breakdown protection and block mode function.Each page of LCD panel contain 4 lines.User can check and set parameter through HMI.

2、Button Explanation

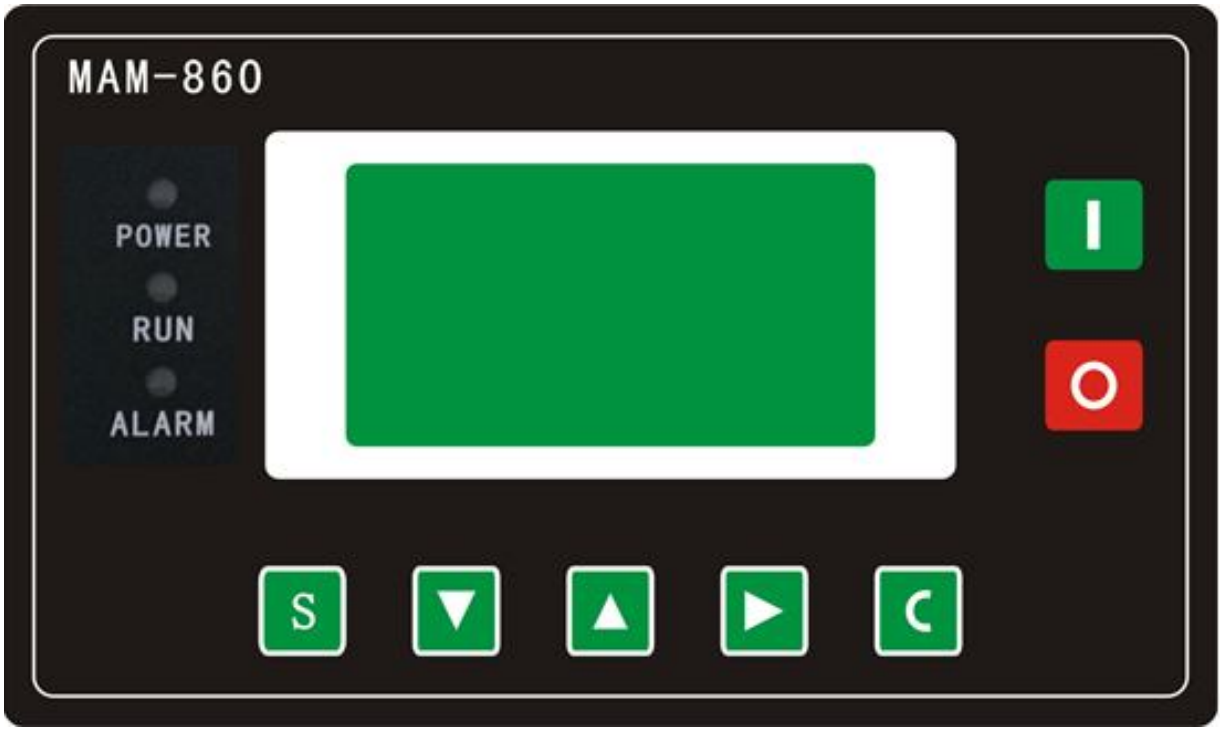


Figure 1.1.1

——Start Button:

1, When compressor is at stop status, press this button to start the compressor.

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

——Stop Button：

1, When the compressor is at running status, press this button to stop the compressor;

2, When compressor is set as master (No.1) in block mode, press this button to stop compressor and block mode function as well;

3, When compressor is at stop status, long press this button to display software edition.

——Set Button /Loading / unloading Button:

1, When the compressor is at running status, press this button to load, unload;

2, When the compressor is at setting mode, press this button after modification to confirm and save the

modified data.


——Move down button / Decreasing button:

1, When viewing the menu, press this button to move downward the cursor;
2,When modifying data, press this button to decrease the data at current position.


——Move up button/Increasing button:

1, When viewing the menu, press this button to move upward the cursor;
2, When modifying data, press this button to increase the data at current position.


——Shift button /Enter button:

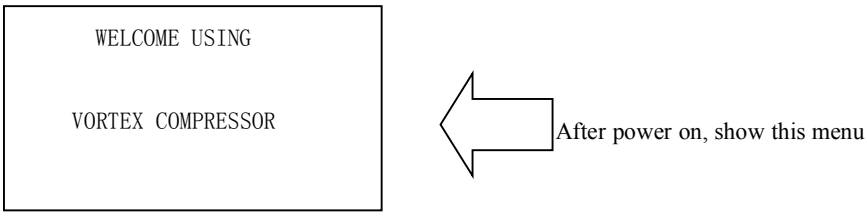
1, When modifying data, press this button to move to the next data bit;
2, When select menu, press this button to switch to submenu. If no submenu available, the controller will shift to data setting mode.


——Return button / Reset button:

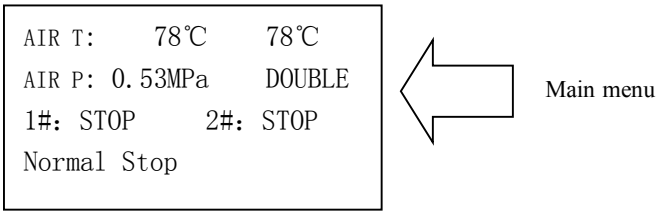
1, When modifying data, press this button to exist data setting mode;
2, When viewing the menu, press this button to return to previous menu;
3, When the controller is at failure stop status, long press this button to reset.

3、Status Display and Operation

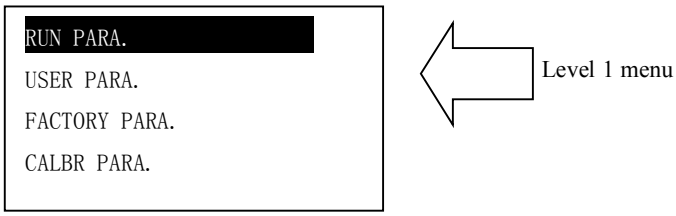
The display screen will show as below after power on:



After 5 seconds, the menu will switch as below:

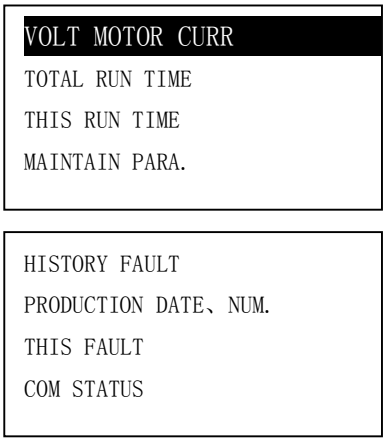


Press “  ” to enter into Selection Menu:

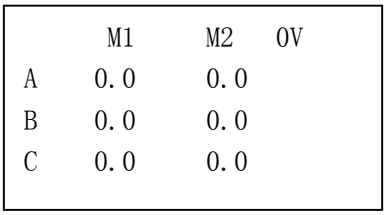


4、Operating Parameter and Menu

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



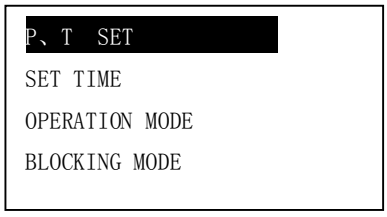
Move the cursor to the corresponding menu item, press “▶” to check the specific parameter. Such as viewing "VOLT MOTER CURR ", move the cursor to the “VOLT MOTER CURR " menu item, press the “▶”, switch to the item of motor , fan data .

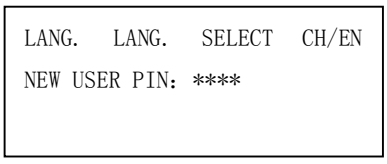


Press the “C” to return to the previous menu or the main menu. If no operation at the current menu for 60 Seconds, controller will automatically return to the main menu and turn off the backlight simultaneously.

5、User Parameter View and Modification

In first menu, press the “▲” and “▼” to move the cursor to the "USER PARA." item, press the “▶” to switch to the following menu:



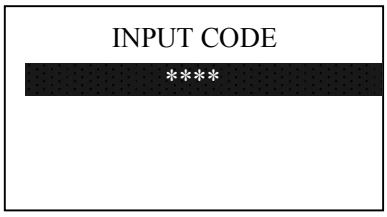


First menu	Second menu	Preset Data	Function
SET P. T.	SING.LD	00.50MPa	Set the load pressure in single machine mode
	SING.UL	00.90MPa	Set the unload pressure in single machine mode
	FAN START	0080℃	Fan will start if discharge air temperature is above this set data
	FAN STOP	0070℃	Fan will stop if discharge air temperature is below this set data
	D.SEQ LD	00.60MPa	Set the load pressure in double machine mode
	D.SEQ UL	00.80MPa	Set the unload pressure in double machine mode
TIME SET	M1 DELAY T	0006S	Set the master 1 start time, record time when master 1 is activated, controller will not start overload protection during this time to avoid stopping the master by impulse starting current
	M2 DELAY T	0006S	Set the master 2 start time, record time when master 2 is activated, controller will not start overload protection during this time to avoid stopping the master by impulse starting current
	LOAD DELAY	0005S	Unloading in this set time after enter delta running
	STOP DELAY	0010S	For NORMAL STOP operation or pressure is above SING.UL, compressor will stop after it continuously unloading over this set time
	RESTART T	0008S	Machine can be restarted only over this set time at any case(after NORMAL STOP, STANDBY or FAILURE STOP)
	D. SEQ TIME	0030S	In double machine mode, when send two commands continuously to start or stop master, second command signal delays for this set data.
	D. SEQ TURN	0002H	In double machine mode, two machines work alternatively over this set time.
OPERATION MODE PRESET	RUN MODE	LOCAL/ REMOTE	1, When set as LOCAL, only the button on the controller can turn on and turn off the machine. 2,When set as REMOTE mode, both the button on the controller and the remote control button can turn on and off the machine;

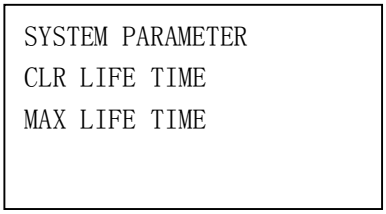
	LOAD MODE	AUTO/MANUAL	1,When set as the MANU: only when the pressure is above “unloading pressure”, compressor will unload automatically .For any other case, the Loading/Unloading function can only be executed by pressing “loading /unloading ” key. 2,When set as AUTO ,the loading/ unloading function can be executed by the fluctuation of air pressure automatically
	COM MODE	PROHIBIT/ COMPUTER/BLOCK	1,When set as PROHIBIT, the communication function is invalid. 2,When set as COMP. ,compressor function as a slave and is able to communicate with computer or DCS 3,When set as BLOCK, compressor can net control
	COM ADD	0001	Set the communication ADD in block mode(0-16) or when communicate with monitoring center(0-99). This ADD is unique for every controller in net
	COMP	SINGLE/ DOUBLE	SINGLE or DOUBLE machine control
	SING.RUNMOT	No.1/No.2	No.1 or No. 2 optional
BLOCKING MODE SETTING	BLOCK MODE	MASTER/ SLAVE	1,When service as master in BLOCK. Master controls slave, the COM ADDRESS should be No.1 2,When service as slave in BLOCK, slave is controlled by master to start, stop, load and unload
	TURN TIME	0099H	When master pressure is between BLOCK LOAD P and BLOCK UNLOAD P, master determine slave work alternatively over this set time .
	BLK NUMER	0000	Number of air compressors in block net
	BLK MIN	00.00MPa	In BLOCK, one compressor will start or load when pressure is below this set data
	BLK MAX	00.00MPa	In BLOCK mode, one compressor will stop or unload when pressure is above this set data
	BLK DELAY	0050S	In BLOCK mode, when master sends two commands continuously, second command signal delays for this set data.
LANG.SEL	CHINESE/ ENGLISH	ENGLISH	1,Set to “EN” , Display in English 2,Set to “CH” , Display in Chinese
NEW USER PIN	****	****	User could modify the user password by old user password or factory password

6、Factory Parameter View and Modification

FACTORY PARAMETER store relatively parameter set by factory. To check FACTORY PARAMETER, you have to verify password first. In the first menu, press " ▲ " and " ▼ " to FACTORY PARAMETER, press " ▶ "to switch to the menu below.



Input the correct password to switch to the FACTORY PARAMETER menu as below:



PARAMETER		Initial Data	Function
SYSTEM PARAMETER	MOTOR 1 CUR	Maximum motor overload data /1.2	When the current of motor 1 is more than 1.2 times of the set data, the unit will stop for overload feature. (see table2.1.1)
	MOTOR 2 CUR	Maximum motor overload data /1.2	When the current of motor 2 is more than 1.2 times of the set data, the unit will stop for overload feature.
	ALARM T 1.	105℃	When motor 1 discharge air temperature reaches this set data, compressor will alarm
	STOP T 1.	110℃	When motor 1 discharge air temperature reaches this set data, compressor will alarm and stop
	STOP P.	1.00MPa	When pressure reaches this set data ,compressor will alarm and stop
	MAX U.L.	0.80MPa	This data is the maximum of UNLOADING P. The UNLOADING P in the customer parameter must be set no higher than this data.
	MOT1 TIME	000000H	Revise motor 1 run time
	MOT2 TIME	000000H	Revise motor 2 run time
	CLR FAULT	0000	Input the password 8888 and press "set "button to clear all the history failure record.
	ALARM T2.	105℃	When motor 2 discharge air temperature reaches this set data, compressor will alarm
	STOP T 2.	110℃	When motor 2 discharge air temperature reaches this set data, compressor will alarm and stop

	PROD DATE	9999-99-99	Production date
	PROD NO	99999999	Product serial No.
	PHASE PROT..	ON/OFF	ON: turn on phase sequence protection OFF: turn off phase sequence protection
	POWER FREQ	50Hz/60Hz	Set the operation power frequency. The current will be deviated if this frequency is not set correctly
	BLK MODE	ADV/COMPATIBLE	Standby
	HIGH VOL.	0000V	1, Controller detects the voltage higher than this set data, the shutdown protection starts and reports HIGH VOL. 2,Set this data to 0000, the HIGH VOL. protection function is invalid
	LOW VOL.	0000V	1, Controller detects the voltage lower than this set data, shutdown protection starts and reports LOW VOL. 2,Set this data to 0000, the LOW VOL. protection function is invalid
	LOW T PRO	-0005℃	1,In stop mode, air compressor is not allowed to start when discharge air temperature is lower than this set data 2,Two minutes after turn on, when the air temperature is below this data, compressor will stop and display T SENSOR FAULT
	TIME LIM	0000H	1,When the compressor is in a stop status and the TOTAL RUN TIME exceeds this TIME LIM set, the controller will stop the compressor and display USER MISTAKE; 2,If this data is set to '0000', TIME LIMIT function is invalid.
	ALM STOP	0010H	Controller detects oil filter, O/A separator, air filter, lubricate oil ,grease and belt running with alarming over this ALARM STOP set, compressor will stop and report "ALARM LONG STOP "
	COM SET PARA	ON/OFF	Set to ON,DCS is allowed to set parameter through ,MODBUS Set to OFF,DCS is NOT allowed to set parameter through ,MODBUS Only when compressor is at normal stop mode, it is allowed to revise the parameter.
	PARA1	0000	After entering factory parameter, please set and save this data .this data is used to check all factory parameter and modify part of factory parameter.
	CUR UN.BAL.	0010	MAX-MIN = (1+SET/10) ,unbalance protection will start If the set data ≥ 15, the unbalance protection will be invalid.
	OPEN PAHSE	000.0S	If OPEN PHASE protection ≥20 seconds, OPEN PHASE protection is invalid
CLR LIFE TIME	OIL FILTER	0000H	Record total running time of oil filter, if changing new oil filter, the data should be reset by manual operation.
	O/A	0000H	Record total running time of O/A separator. If changing new

	SEPARATOR		O/A separator, the data should be reset by manual operation
	AIR FILTER	0000H	Record total running time of air filter .If changing new air filter, the data should be reset by manual operation
	LUBE	0000H	Record total running time of lube. If changing lubricate ,the data should be reset by manual operation
MAX LIFE TIME	OIL FILTER	9999H	1, Alarm prompts when total running time of oil filter is above the set data. 2,Set this data to "0" to clear oil filter running time
	O/A SEPARATOR	9999H	1, Alarm prompts when total running time of O/A separator is above the set data. 2,Set this data to "0" to clear O/A separator running time
	AIR FILTER	9999H	1, Alarm prompts when total running time of air filter is above the set data. 2,Set this data to "0" to clear air filter running time
	LUBE	9999H	1, Alarm prompts when total running time of lubricate is above the set data. 2 , Set this data to "0" to clear lubricate running time.

7、Calibration Parameter

You can set relative data of controller in CALBR PARA. Please verify the password before view and modification. The modification of CALBR PARA is similar with CUSTOMER PARA. Main function is shown as below.

Menu		Preset Data	Function
MOTOR 1-A	TARGET CUR	0000	1,When calibrate the current of motor 1 A, input the standard current ,current coef=input data/current detect. Calculate and save current coef .The standard current is only used for calculation.
	COEF	1.000	When calibrate the current, revise coefficient. Current data in display=sample data*coefficient
	CUR	***.*A	Display the current sample after calibration .This data is qret and can not be set
MOTOR 1-B	TARGET CUR	0000	1,When calibrate the current of motor 1 B, input the standard current ,current coef=input data/current detect. Calculate and save current coef .The standard current is only used for calculation.
	COEF	1.000	When calibrate the current, revise coefficient. Current data in display=sample data*coefficient
	CUR	***.*A	Display the current sample after calibration .This data is qret and can not be set
MOTOR 1-C	TARGET CUR	0000	1,When calibrate the current of motor 1 C, input the standard current ,current coef=input data/current detect. Calculate and save current coef .The standard current is only used for calculation.
	COEF	1.000	When calibrate the current, revise coefficient. Current data

			in display=sample data*coefficient
	CUR	***.*A	Display the current sample after calibration .This data is qret and can not be set
MOTOR 2-A	TARGET CUR	0000	1,When calibrate the current of motor 2A, input the standard current ,current coef=input data/current detect. Calculate and save current coef .The standard current is only used for calculation.
	COEF	1.000	When calibrate the current, revise coefficient. Current data in display=sample data*coefficient
	CUR	***.*A	Display the current sample after calibration .This data is qret and can not be set
MOTOR 2-B	TARGET CUR	0000	1,When calibrate the current of motor 2 B, input the standard current ,current coef=input data/current detect. Calculate and save current coef .The standard current is only used for calculation.
	COEF	1.000	When calibrate the current, revise coefficient. Current data in display=sample data*coefficient
	CUR	***.*A	Display the current sample after calibration .This data is qret and can not be set
MOTOR 2-C	TARGET CUR	0000	1,When calibrate the current of motor 2 C, input the standard current ,current coef=input data/current detect. Calculate and save current coef .The standard current is only used for calculation.
	COEF	1.000	When calibrate the current, revise coefficient. Current data in display=sample data*coefficient
	CUR	***.*A	Display the current sample after calibration .This data is qret and can not be set
TARGET T		0000℃	1,When calibrate the discharge temperature , input the standard temperature ,temperature coef=input data/discharge temperature detect. Calculate and save temperature coef .The standard temperature is only used for calculation.
COEF		1.000	When calibrate the temperature, input the coefficient. Temperature data in display=(sample temperature-zero point)*coefficient
ZERO		0000℃	Compensation of hardware zero piont deviation
T2		0000℃	Display the temperature after calibration .This data is qret and can not be set
TARGET P		00.00MPa	1,When calibrate the air pressure , input the standard pressure ,pressure coef=input data/air pressure detect. Calculate and save pressure coef .The standard pressure is only used for calculation.
COEF		1.000	When calibrate the pressure, input the coefficient. Pressure data in display=sample pressure*coefficient
ZERO		00.00MPa	It displays as 0.00MPa when air pressure is less than the data set here
P		00.00MPa	Display the pressure after calibration, this value is qret and

		not able to be set
STANDARD VOLT	0000V	1,When calibrate the voltage , input the standard voltage, voltage coef=input data/air voltage detect. Calculate and save voltage coef .The standard voltage is only used for calculation.
COEF	1.000	When calibrate the voltage, input the coefficient. voltage data in display=(sample voltage–zero point) *coefficient
CURRENT VOLT	0000V	Display the voltage after calibration, this value is qret and not able to be set
CURR MODE	DEBUG/WORK	Set the update speed of current display DUBUG: data will update soon; WORK: data will update slow
LED NUM	3LED	set to 3LED

8、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 as following:

1. User password：factory set：_____
   Permissions：Allows to modify all CUSTOMER PRAMETER.
2. Mmanufacturer sales password: factory set:_____
   Permissions: Allows users to modify all CUSTOMER PRAMETER, the NEW USER PASSWORD, some MANUFACTURER PARAMETER, MANUFACTORY SALES PASSWORD.
3. Mmanufacturer Password: fixed:_____
   Permissions: Allows users to modify all CUSTOMER PRAMETER, the NEW USER PAAWORD, some MANUFACTURER PARAMETER,CURRENT SET in CALIBRATION PASSWORD.

4、Factory Super Password: factory set：_____
   Permissions: Allows users to modify TOTAL RUN TIME,PHASE SEQUENCE PROTECTION, FREQUENCY SELECTION,TIME LIMIT after user enter factory parameter and verify supper password.

2, Controller Function and Technical Parameter

1、Digital input&output：6 points of digital input，4 points of digital relay output
2、Analog input：2 point of Pt100 temperature input，1 point of 4～20mA pressure signal input，two groups of three phases current inputs(CT provided）；
3、Input voltage of phases:380V/220V。
4、Compressor protection of high operation voltage and low operation voltage; It is allowed to set low pressure and high pressure limit.
5、Controller power supply：AC20V、10VA。
6、Measurement
   ①、Discharge air temperature：-50～150℃，Accuracy：±1℃。
   ②、Operation time：0～999999 hours.
   ③、Current：0～999.9A。

④、Pressure：0～1.60MPa。Accuracy：±0.01Mpa。

7、Phase sequence protection: When compressor is at stop mode and detects wrong phase sequence, respond time≤1s (optional)；

8、Fan protection: This controller provides overload protection for fan.

Iactual/Iset / Time parameter	≥1.2	≥1.3	≥1.5	≥1.6	≥2.0	≥3.0
Response time （S）	60	48	24	8	5	1

Table 2.1.1 curve table for protection of motor

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

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

11、Current error is less than 1.0%.； 。

12、RS485 communication function

1, Block mode control

2,Communicate with-external devices as slave through MODBUS RTU, baud rate 9600BPS,1start bit,8 data bits,1 stop bit and even parity

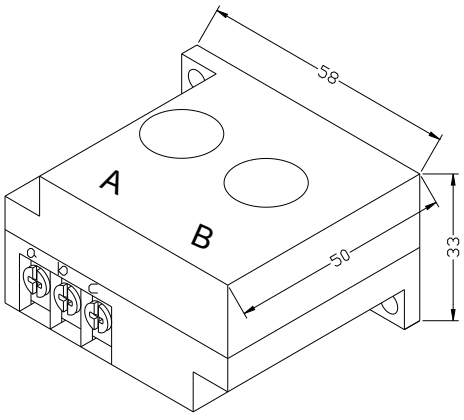
13、Remote control compressor: When set as remote control mode, user can remotely control the compressor.

14、Remote and local start block mode function

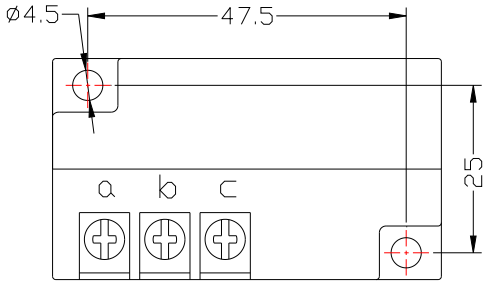
3,Installation

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, the detailed dimensions is shown as below:



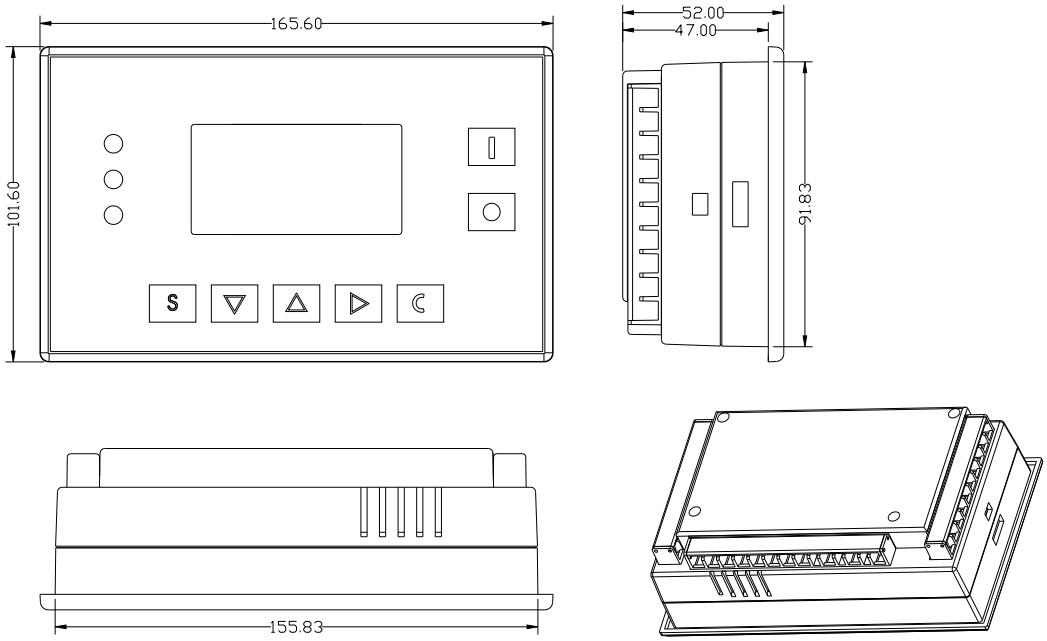
Structure dimensions of CT（ϕ10 through hole）



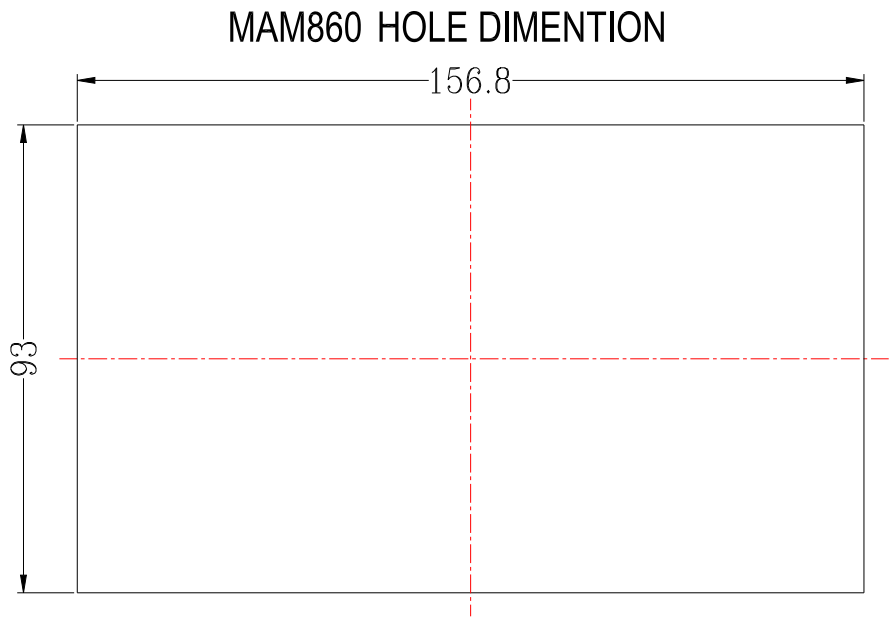
Installation dimensions of CT

2、Controller installation

A certain room should be left around controller for wiring. The specific dimension is shown as below:



4.1.5 Controller structure dimension



4.1.6 Hole size

4,Schematic Diagram