

MINCO 410

ENGINE CONTROLLER MANUAL INSTRUCTION



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1、 Summarization

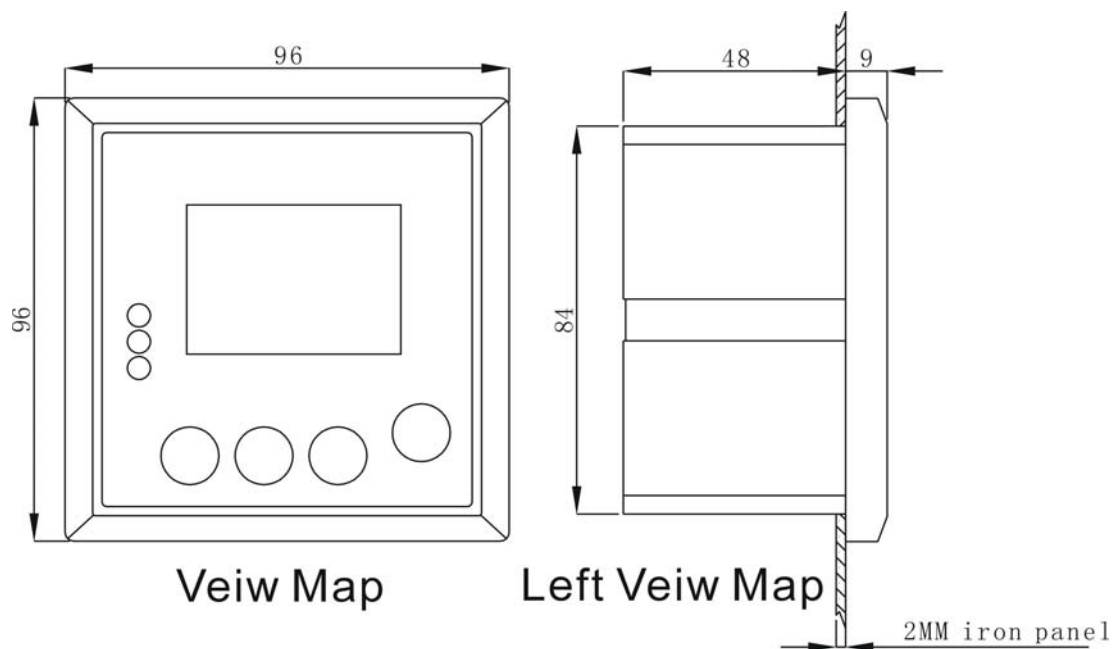
Minco 410 controller uses high performance microprocessor and industry components. It has measuring , controlling, protection, remote control, flexible software setting functions and user-defined to the input and output port, it can display all the measuring parameter, control parameters and the running state. The anti-jamming ability is strong, actually meets different types of engine auto control requirements.

2、 Charateristics

1. Wide-screen LCD display with 128×64 lattice and black-light;
2. Chinese and English double language menu, mutual operation, can be set and operated without computer;
3. Auto start, auto protection, auto load control;
4. Perfect auto protection, warning details and working status can display directly through character, fault record more than 50 items;
5. Plenty of connected parameters, such as cool temp., oil pressure, fuel level etc. ;
6. All relay contact capability of start and fuel is above 10A/250VAC/30VDC, the other is 5A;
7. User-defined to the input and output port, timing start or stop function;
8. RS485 communication, attached “remote control” monitor software.

3、 Fixup dimension drawing

Operate panel	W 96 x H 96mm
Install hole	W 85 x H 85mm
Depth	D 56.5mm



4、 Function define and operate instruction

1). Operate panel function instruction

Operate panel is composed of 128x64 LCD display, operation keys with state indicator light, and system menu operate press keys three parts.

(1).LCD display

Controller runs in normal (not setting state or not fault state) , display all the measure parameters and present status of engine. Each display screen can be alternately through pressing “set “key.

Operation	Description
Main screen 1	SPEED : 0000 RPM COUNT : 00:00:00 HOURS : 00000:00 BATT V: 12.0 V
Main screen 2	COOL T: 100 °C OIL P : 0.20 MPa FUEL L: 90 % CHARGE: 12.0 V
Main screen 3	<u>STOP/OFF STATUS</u> <u>08-06-03/09:12:15</u>

Attention: Main screen 3 is dynamic status screen, all status of engine start, running and protection will display on real time in this screen, also including the delay of engine, such as pre-fuel timer, crank timer, bypass timer, idle timer, warm up timer etc., and all the alarm and fault information.

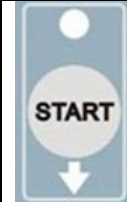
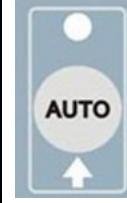

For example: all important information of engine working from start to stop can be read as following::

AUTO STATUS <u>10-06-10/09:12:12</u>	AUTO STATUS ENG. START:05 <u>10-06-10/09:12:15</u>	ENGINE START PRE_FUEL: 006 <u>10-06-10/09:12:20</u>	ENGINE START CRANK TIME: 006 1 <u>10-06-10/09:12:26</u>
ENGING IDLE RUN IDLE START: 010 <u>10-06-10/09:12:30</u>	ENGING RATED RUN WARMING UP:010 <u>10-06-10/09:12:40</u>	ENGING LOAD RUN <u>10-06-10/09:12:50</u>	ENGING LOAD RUN RETRANSFORM:005 <u>10-06-10/09:15:00</u>
ENGING RATED RUN COOLING DOWN:020 <u>10-06-10/09:15:05</u>	ENGING IDLE STOP IDLE STOP:015 <u>10-06-10/09:15:25</u>	AUTO STATUS E. TO STOP:30 <u>10-06-10/09:15:40</u>	AUTO STATUS <u>10-06-10/09:16:10</u>

If “display change mode” set in “auto” switch state, the LCD display screen will switch to next page after each 10 seconds, correspond to press once **SET** key; if “background light control” set in auto state, the LCD screen background light will auto turn off after three minutes without any operate. Till to the fault appear or press any key the background light turns on. During the period of turning off the background light, the LCD display can not be seen, but not mistake for controller failure. If “Background light” control setting as “constant light” state, the LCD background light will keep lighting.

(2). Operation keys

Content	Function
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	<p>Press the key, and above green LED keep bright, the controller is in “start” state, start the engine in manual and keep running.</p>
	<p>Press the key, and above yellow LED keep bright, the controller is in “auto” state, the controller receive “remote start” signal, if this switch close, the engine will be delay started; otherwise will be delay stopped. If the timer start is effective, the engine will be started also, when the timer start is over, the engine will be delay stopped.</p>
	<p>Press the key, and above red LED keep bright, the controller works in “stop / reset” state, it will unload, and through decelerate and idle delay to cut off the ignition. During the decelerate and idle, the indicator keeps flash and keep light after stop.</p>

(3) System menu operate keys

Press “set” key, holding 10 seconds, then to parameter setting menu, here the “reset” key is redefined to exit “←”, “auto” key is redefined to add “↑”, “start” keys redefined to reduce “↓”, “set” key redefined to “→”

Content	Function
→	Parameter setting /enter to next menu/confirm to revise
←	Exit/back to the superior menu
↑	Page up the menu/add value
↓	Page down the menu/ degrade value

(4).State indicator light

Content	Function
	<p>Indicate the engine failure, protected stop, fault content display in the LCD screen, if start failure, over speed, oil pressure lower etc., the fault reason will be locked, must press “reset” key to put right date display and restart the engine.</p>
	<p>Indicate the engine warning information, which has no influence on engine normal working, alarm detail see screen, such as low battery, low oil level etc.. If appear many alarm informations, which will be displayed on the LCD display alternately.</p>
	<p>Indicate “remote start” input port status. Normally is used to monitor mains supply.</p>






2). Connection port definition

Port No.	Function
<p style="text-align: center;">Power supply 8~36VDC, normal working current <300mA</p>	
1	“-” battery cathode input
2	“+” battery anode input
<p style="text-align: center;">Analog input (input voltage range 0~5.0VDC)</p>	
6	Coolant temperature sensor (N/A)

7	Oil pressure sensor (N/A)
8	Fuel level sensor (N/A)
18	Excitation/charge failure input (charge engine D+port input, forbid to connect ground) (N/A)
Speed Sensor input	
9	Speed sensor input 1
10	Speed sensor input 2
RS485 Communication port	
11	RS485+
12	RS485-
Switch output port(Relay insulated, start、fuel contact capability is 10A/250VAC/30VDC, others are 5A)	
13	Crank
14	FUEL
15	Common port (common port for fuel and CRANK contact)
3	Auxiliary Output 1
4	Auxiliary Output 2
5	Auxiliary Output 3
16、17	Auxiliary Output 4
Switch input port(That entering adds photoelectric isolator, the short circuit is effective with GND)	
19	Remote start
20	Emergency stop
21	Auxiliary Input 1
22	Auxiliary Input 2
23	Auxiliary Input 3
24	Auxiliary Input 4

5. Parameter set

All parameter can be read and write through communication port,details see communication protocol. Except coolant temp., oil press, fuel level sensor input curve date, all the parameters can be set on the spot by the controller operation panel key.

Press  key	Enter to parameter setting interface		
	Switch inputs	Alarm limit set	Timing start set
	Relay outputs	Measure regulate	Cool T sensor
	Shutdown Record	Delay time set	Oil P sensor
	Date and time	System set	Fuel L sensor
Press  or  key	Select the examine/setting parameter content(reversed display when selected)		
Press  key	Enter to the next menu of selected item		
Press  key	Exit the parameter set state		







Attention:If didn' t press any keys over three minutes,it will auto exit the parameter setting state,to avoid illegimate operation the controller.

1). Parameter setting instruction

inputs status	Real time display controller input port state	
	Remote run: 0	Emergency stop: 0

	<p>Auxiliary input 1: 0 Auxiliary input 2: 0 Auxiliary input 3: 0 Auxiliary input 4: 0 Attention: Press any menu key will be exit</p>
Outputs status	<p>Real time display controller output port state Crank: 0 Fuel: 0 Auxiliary output 1: 0 Auxiliary output 2: 0 Auxiliary output 3: 0 Auxiliary output 4: 0 Attention: Press any menu key will be exit</p>
Shutdown Record	<p>SHUTDOWN records 01/04 (Fault serial number/total number) Engine CRANK failure!! (SHUTDOWN record) 09-06-03/11:26:38 (HAPPEN time) Attention:press <input type="button" value="↑"/>、<input type="button" value="↓"/>key, display up and down fault record; press <input type="button" value="→"/> or <input type="button" value="←"/> will be exit.</p>
Date and time set	<p>Date: year-month-day/week Time: hour: minute: second Press <input type="button" value="↑"/>、<input type="button" value="↓"/>key to change the reverse display data; Press <input type="button" value="←"/>reverse display move to the left, move to the first position then press <input type="button" value="←"/>then back to the superior menu, date and time will not changed; press <input type="button" value="→"/>reverse display move to the right, move to the last position press <input type="button" value="→"/>then back to the superior menu, date and time display according to the new setting.</p>
Alarm limit set	<p>Acceleration limit:1550 HIGH Coolant temp:0096 Deceleration Limit:0750 HIGH FUEL level:0080 Reservated:0000 LOW FUEL level:0020 High speed alarm:1600 LOW Battery:0105 Low speed alarm:1350 LOW Charger:0080 Over speed:1650 LOW Oil pressure:0020 Under speed:1270</p> <p>Press <input type="button" value="↑"/> or <input type="button" value="↓"/>, choose content and content reversed display; press <input type="button" value="←"/>back to the superior menu; Press <input type="button" value="→"/>, enter choosing parameter setting state, the selected parameter is underline, it means the parameter is being operated. The first bit of this parameter reversed display, shows the data of bit can be changed. Enter the parameter setting state, press <input type="button" value="↑"/>、<input type="button" value="↓"/>key to change the reversed displayd data; press <input type="button" value="←"/>move reversed bit to the end of left, press <input type="button" value="←"/>and back to the superior menu, parameter will be not changed; press <input type="button" value="→"/>reversed display move to the end of right, press <input type="button" value="→"/>and back to the superior menu, parameter changed and saved. Attention: the unit of charge and battery is 0.01V、the unit of oil level is 0.01MPa</p>
Measurements Calibration	<p>Input password: 8421(default) Battery voltage: 0167 Charge voltage: 0000</p>

	<p>Coolant Temp. : 0010 Oil pressure: 0999 Fuel level: 0100</p> <p style="text-align: center;">Password authentication input method</p> <p>Press <input type="button" value="↑"/>、<input type="button" value="↓"/> to change the reversed display data; press <input type="button" value="←"/> to move the selected content to the left, press <input type="button" value="←"/> key and back to the superior menu when the selected content move to the first bit, press <input type="button" value="→"/> key, move the selected to the end of right, enter the password press <input type="button" value="→"/>, if the password is correct then get through the next menu.</p> <p>Users according the error value of the controller measuring data and the real data to decide whether you need to data adjust. The controller already adjusted before leave factory, but it may be some warp in the use environment, if the warp is in the error range, we suggest not adjusting the data, especially the engine current and power.</p> <p>Press <input type="button" value="↑"/>、<input type="button" value="↓"/> choose content reversed display, press <input type="button" value="←"/> back to superior menu; press <input type="button" value="→"/> enter to choose data adjustment state, and the adjusting parameter underline., it means the parameter is being operated. The first bit of parameter reversed display, shows the data of bit can be changed.</p> <p>Enter to data adjusting state, press <input type="button" value="↑"/>、<input type="button" value="↓"/> to change the data, press <input type="button" value="←"/> key, the reversed display turn left, when move to the first bit, press <input type="button" value="←"/> then back to the superior menu, data adjustment is cancelled. Press <input type="button" value="→"/> the reversed display turn right, move to the fourth position press <input type="button" value="→"/> back to the superior menu, data adjustment achieved, parameter changed saved.</p> <p>For battery voltage, charge voltage, coolant temperature, oil pressure and FUEL level adjustment, MINCO410 controller provide battery voltage adjustment, charge voltage adjustment, coolant temp. adjustment, oil pressure adjustment, oil level adjustment to adjust the measuring data, the scope of adjustment is $\pm 10\%$. Special explain, for coolant temp., oil pressure, FUEL level sensors maybe positive modulus (it means the sensor output added along with input added), it maybe negative modulus (it means the sensor output minish along with input added), add or minish adjust value lead to adjust result decide by the real situation.</p>														
<p>Delay time set</p>	<p style="text-align: center;">Password input: 8421 (default)</p> <table border="0"> <tr> <td>Cool down:020</td> <td>Aux. input 2 delay:005</td> </tr> <tr> <td>Engine start:005</td> <td>Aux. input 3 delay:005</td> </tr> <tr> <td>Crank interval delay:015</td> <td>Aux. input 4 delay:005</td> </tr> <tr> <td>Crank Time:008</td> <td>Charger fail delay:030</td> </tr> <tr> <td>Bypass time:020</td> <td>Low battery delay:020</td> </tr> <tr> <td>Energize to stop:000</td> <td>Retransformation delay:002</td> </tr> <tr> <td>Pre-fuel delay:005</td> <td>Loss speed delay:030</td> </tr> </table>	Cool down:020	Aux. input 2 delay:005	Engine start:005	Aux. input 3 delay:005	Crank interval delay:015	Aux. input 4 delay:005	Crank Time:008	Charger fail delay:030	Bypass time:020	Low battery delay:020	Energize to stop:000	Retransformation delay:002	Pre-fuel delay:005	Loss speed delay:030
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Cooltant temp. Set/Oil pressure Set/Fuel level set	Input password: 8421 (default) 1_ 0.66V / 120 °C 5_ 1.94V / 70 °C 2_ 1.04V / 100 °C 6_ 2.36V / 60 °C 3_ 1.27V / 090 °C 7_ 3.00V / 40 °C 4_ 1.62V / 080 °C 8_ 4.09V / 10 °C
	Setting of coolant temp. oil pressure, fuel level sensor are similar. Every sensor has eight data point, sixteen data, which was displayed in two pages. Press  ,  key to change the data of reversed display; press  to turn left, when the reversed display move to the first bit of the left, press  key to back to the superior menu, the data will not be changed; press  to turn right, when the reversed display move the end of the right, press  key to back to the superior menu, the data setting will be saved. Different sensor has different curves, MINCO430/440 controller can deposit curve data from different sensors to achieve common to different sensor. (eg. coolant sensor, takes eight typical temperature and corresponding internal resistance values R, MINCO430/440 controller with 150 ohm pull-up resistor, based on partial pressure of formula $5R/(150+R)$, calculates the voltage values corresponding to different temperature point, input the controller (must be voltage from low to high order). As per the measured voltage values and interpolated eight voltage/temperature point, controller calculates the actual temperature value. (below the minimum temperature or higher than the maximum temperature points Controller displays minimum temperature or maximum temperature data.)

2). System parameter description

Trip SPEED	When start the engine, if examine the engine frequency > trip frequency, it considers the engine start successfully and stop the crank output (trip speed generally setting to 1 / 3 of engine rated frequency).
GEAR teeth	The defination of this parameter is related with “speed source option”. when “speed source option” is zero, the speed can be obtained by measuring frequency, this parameter is the ratio of speed to frequency, when “speed source” is 1, this parameter is the flywheel teeth of engine.
Change password	Leave factory password 8421, please change the password on your own.
Address	Only use for multiple equipment networking control, in order to differentiate the equipment.
Output 1 setting	Auxiliary output definition: 0—SHUTDOWN; 1—Aux STOP; 2—Clutch (LOAD); 3—Automation; 4—Idle(close); 5—Idle(open); 6—Pre-fuel; 7—Pre-heat; 8—Acceleration; 9—Deceleration; 10—OVER SPEED; 11—Buzzer, 12—Rated speed, 13—battery low, 14—pumps, 15—alarm.
Output 2 setting	
Output 3 setting	
Output 4 setting	
Input 1	Auxiliary input definition: 0—Monitor, 1—Low oil pressure; 2—High

setting	cool temp.; 3—Acceleration limit; 4—Deceleration limit; 5—High JW
Input 2 setting	temp; 6—Low fuel level (alarm but non-stop), 7—High fuel level, 8
Input 3 setting	—Float failure alarm, 9—Alarm, 10—alarm non-stop (running period),
Input 4 setting	11 — alarm stop. 12—Oil pressure permissive. 13—Remote OFF (Aux.shutdown). Definition 16-31 are same as function of definition 0-15, 0-15 effective when they are closed, 16-31 effective when they are cut-off.
Starting Method	0: Detect low oil press when crank 1: Not Detect low oil press when crank
Display mode	0: Switch in manual 1: Auto switch
Language selection	0: Chinese 1: English
Backlight select	0: Auto shut down 1: Constant light

Auxiliary output definition instruction:

Shutdown: Any of failure for engine protection stop can bring public failure output;

Auxiliary shutdown: engine stop to output, when energize to stop DELAY is over, the output is over;

LOAD: After the engine working normally, if the remote starts switch closed, engine supply will bring output;

Automation: if controller in auto state, auto relay has output;

Idle(close)、idle(open): output will be brought during the period of idle start and idle stop, but the state of which are opposite;

Pre-fuel: Output will be brought during the period of pre fuel;

Pre-heat: Output will be brought before the pre-fuel delay and engine start successfully;

Acceleration、deceleration: Output will be brought during the acceleration delay and deceleration delay, which coordinate to finish the mechanical speed governing;

Over Speed: Output will be brought when the engine is over speed;

Buzzer: Output will be brought when the pre-fuel delay and shutdown.

Rated speed: Output will be brought when engine running at rated speed;

Battery low: Output will be brought when the battery voltage is low;

Pumping: Output will be brought when low fuel level is measured to alarm, output will be vanished when high fuel level is measured, auto fuel can be realized.

Alarm: Output will be brought when engine alarm BUT NOT STOP.

Auxiliary input definition instruction:

Monitor: no participate control, only monitor the state, needless input can set up to monitor;

Low oil pressure: engine will shutdown when the low fuel level is measured;

High Cool temperature: engine will shutdown when the high COOL temperature is measured

Acceleration limit、deceleration limit: realize mechanical speed adjustment in cooperate with output of acceleration and deceleration.

High JW temperature: engine will protection stop when high JET WATER temperature is

detected.

Low fuel level: alarm when low fuel level is detected, but engine will not stop.

High fuel level: realize pumping function with low fuel level together.

Alarm: user-defined alarm, instruct to assistant input 1-4 alarm;

Alarm non-stop: user-defined alarm, but only during the period of engine working, instruct to assistant input 1-4 alarm;

Alarm stop: user-defined alarm, cause to shutdown when engine is running, instruct to assistant input 1-4 stop.

Oil pressure permissive: after engine start, this signal must be effective during the setting time of delay, otherwise will protection stop.

Remote off (Aux. shutdown): Reset fault when genset stop normally if it has been protected to stop, it's equivalent to press "0" button again.

Attention: display, alarm and protection of coolant temp.、oil pressure and fuel level can be realized by measuring the analog volume, and also can be realized by defining the high coolant temp., low oil pressure, fuel level to the auxiliary input portion. If the auxiliary volume and alarm input are exist together in the system, then any of alarm can come into being protection.. If the switch alarm protection is no need, please define the auxiliary input to another function; if the analog volume alarm protection is no need, please set the alarm up-low limit to the measurement limit so as to not alarm.

Output of acceleration and deceleration are in coordination with limit of acceleration and deceleration to realize mechanical speed adjustment. Normal speed adjustment function can be realized by definite output of acceleration and deceleration even if no according limit input, but no alarm.

Sine output and input can be user-defined, Minco410 controller's input and output function actualized is much more than the real amount of input and output. Although some function of controller has been appointed, which can't execute wherever there is no definition to input and output corresponding. For example, when the engine normally running, if the remote start input closed, the engine will work on load, but if no supply output definition, there is no supply action, it would means the engine has being run normally able to load..

3). Delay time instruction

Delay of "cool down"	When the controller is in "Auto" state, once the "Remote start" switch turn off and auto start finish, then to delay, the engine will be stopped after delay.
Delay of "engine start"	When the controller is in "Auto" state, once the "Remote start" switch turn off, then to delay, the engine will be stopped after delay.
Delay of "Crank Interval"	When the cranking time delay ended, if the start succeed condition is not satisfied and not reach the crank times limit, the delay will be repeated and crank times add 1.
Delay of "start running"	When the engine start and begin to delay, if the start succeed condition is satisfied (engine frequency > trip frequency), it's

	consider to be engine start successful and stop delay.
Delay of “bypass time”	After the engine start successfully, begin to start delay of the bypass, “ low oil pressure” , “ high coolant temp. ” etc. will not be monitored during the delay to avoid mistake alarm when engine in start early.
Delay of “energize to stop”	Auxiliary stop relay have output when engine stop, “ energize to stop” delay begin, when delay ended, auxiliary stop relay don’ t work.
Delay of “pre-fuel”	Before the engine start, the delay of pre-fuel has begun. At the same time, the relay of pre-fuel closed, after the delay be over , the relay of pre-fuel cutoff, the engine start to crank.
Delay of “idle start”	After the engine start successfully, the delay of idle start is begin, the relay of “idle start” begin to work at same time.
Delay of “idle stop”	When engine stop, the delay of “idle stop” is begin after deceleration is over, the idle relay begin to work.
Delay of “Auxiliary input 1”	Delay begin at time of the auxiliary input 1 closed, delay will interrupt when the state is normal, if the input still closed after delay is over, it will be alarm.
Delay of “Auxiliary input 2”	Delay begin at time of the auxiliary input 2 closed, delay will interrupt when the state is normal, if the input still closed after delay is over, it will be alarm.
Delay of “Auxiliary input 3”	Delay begin at time of the auxiliary input 3 closed, delay will interrupt when the state is normal, if the input still closed after delay over, it will be alarm.
Delay of “Auxiliary input 4”	Delay begin at time of the auxiliary input 4 closed, delay will interrupt when the state is normal, if the input still closed after delay over, it will be alarm.
Delay of “low battery”	When battery voltage is lower than limit, delay is begin, which will interrupt when the state is normal, if the input still closed after delay over, it will be low battery alarm.
Delay of “loss speed”	Delay begins when no speed signal during the running, if the speed signal wasn’ t be detected untill the delay finish , then alarm to loose speed.
Delay of “over speed”	Delay begins when engine speed is over limit and alarm when delay finish, if the speed becomes normal, delay will interrupt.
Delay of “under speed”	While engine running at rate speed, if speed is lower than low limit, delay will begin. When speed becomes normal, delay will interrupt. When delay is over, speed is still lacking, auto starter will alarm.
Delay of “warm up”	Happened during the time when the engine starting successfully. To extend the time of power supply switching to engine on load. Power supply untill the engine reach to optimum state if not emergency, and availably reduce the abrasion.
Delay of deceleration	Begin when engine stop, deceleration relay will close, if signal of deceleration wasn’ t detected after delay is over, MC4100 will alarm for “deceleration failure” .

4). Timing start instruction

Timing start is only valid on the automatical state of MINCO410.

MINCO410 estimate the now date(month-day/week) to be correct or not, if it' s correct, then start the machine to work or stop the machine to halt at the setting time(hour: minute).

For example: The date of timing start is set to:00-00/00 Time is:09:00-13:00 and 14:00-18:00 Means at every day of every week on every month,the engine will start at 9:00, stop at 13:00, and start secondly at 14:00, stop at 18:00

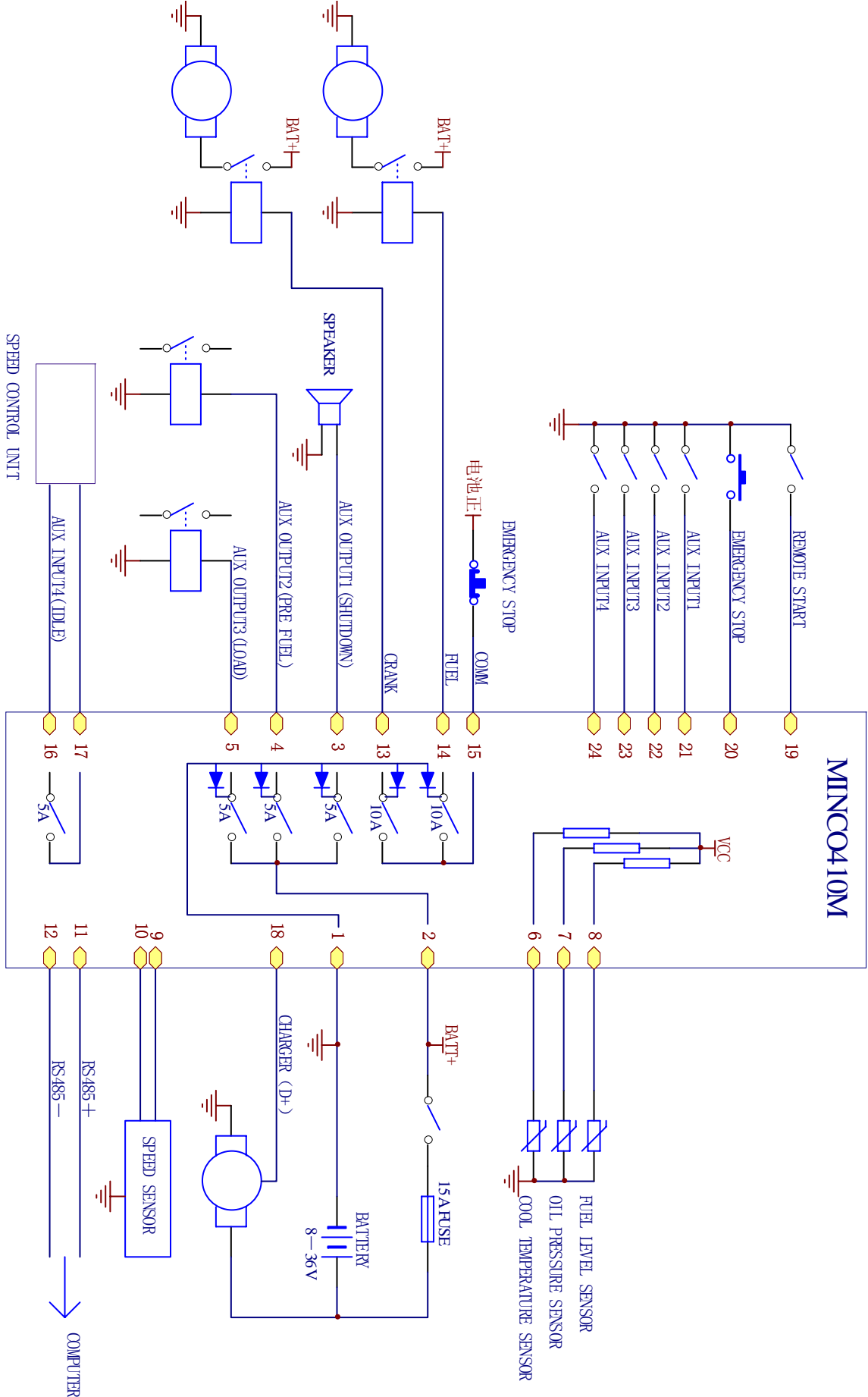
Three times interval can be set on every day, please set" 0" to no-use time interval.

6. Normal failure and trouble shooting method

Failure	Description	Solution
Manual start failure	Press the start key, the green light isn' t bright on the aboved and motor doesn' t work.	Check whether the greenlight is broken,if the LED light isn' t broken,please contact with the factory ; if the LED light is broken,please see below solution.
	Press start key, the green light is bright on the aboved and the motor doesn' t work.	Check the menu of "low oil pressure" in the "input port state",if display "0",please check whether the oil pressure sensor is ok;if display "1",the oil pressure sensor is ok,now please pree start key,measuring the module port 34 "start" whether there' s 24Vwith a multimeter,if the voltage is 24V,check whether the outside middle relay,start moter is broken,and whether the battery voltage is enough;If port 34 no output,the module might be damaged.
Auto start failure	Module in Auto state , inspection "remote start " have input,the "remote start" state light is bright on and the motor doesn' t work.	Check the menu of "remote start" in the "input state", if the "remote start" display "0"means that the outside timer etc module relay is broken cause didn' t receive the input signal;If display "1",the module might be broken.
	Module in Auto state , inspection" remote start" have input,the "remote start" state light is brightonand the motor doesn' t work;	Check the oil pressure sensor;switch to the manual start,check whether there are output signal of the port 34- "start" ,the outside components and the battery voltage.
Wheel tooth is fighting when start	Start successful and motor keep running, the wheel tooth is fighting.	Lower down the trip speed;;

7、Outside wire connection drawing

MINCO410M GENSET CONTROLLER LINE CONNECTION



8、 Controller front & back panel diagram

