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1. General Information

GU320B generator intelligent controller adopts high performance computer chip, can modify control procedure and protection parameters of generator, which incorporating measure, control, protection and three remote functions and so on, can fully satisfactory different kinds of Genset auto control requirements for generator user and or special assembly factory.

The controller measure and display all output digital parameters for generator, and rpm, oil pressure, water temperature, DC voltage and runtime for engine. And the voltage and current use real virtual value measure to make sure the data more exacter.

- Chinese/English menu for your choice, large LCD display.
- I Can select kinds of preset PT-sensor, and can custom parameter by corresponding software.
- I Keys on control panel are used for selecting control mode, startup running procedure, data display and modify the protection parameter. LED indicator is used for indicating the controller running mode and Genset running status, and LCD display measuring parameter and status.
- I Can select RS485 or RS232 communication port, realizing long distance monitor, and or fully realizing remote signaling, telemetering and remote control functions by communication with PC, can read and setting controller running parameter.
- I The controller is assembled by high strength plasticized panel and powdered steel shell, all connection are connected by pin-like and locked up terminal, more easier and convenient to connect, move, maintain and replace.

This manual only suitable for GU320B generator intelligent controller, user must carefully see manual first.

Note: This controller shell must be grounded to the earth; well low impedance ground can reduce impact to the meter, which from surge and transient process of the electric power system.

2. Configuration and Connection of the Controller

2.1 Following detail sizes:

| Operation Panel | W205mm×H156mm |
|-----------------|---------------------|
| Install Hatch | W186mm ×H137mm |
| Thickness | D68mm (unconnected) |



Front view





Side view

2.2 Connection Port:

| No. | Function | Single | Line |
|-----|--|---|-----------------------|
| A1 | A-phase voltage input | 0-300VAC | 1mm² line |
| A2 | B-phase voltage input | 0-300VAC | 1mm² line |
| A3 | C-phase voltage input | 0-300VAC | 1mm² line |
| A4 | N zero line | | 1mm² line |
| B5 | A-phase current input{S1} | 0-5A(AC) | 1mm ² line |
| B6 | B-phase current input{S1} | 0-5A(AC) | 1mm² line |
| B7 | C-phase current input{S1} | 0-5A(AC) | 1mm² line |
| B8 | Current input com. port{S2} | 0-5A(AC) | 1mm² line |
| C9 | Relay output com. point | | 1.5mm² line |
| C10 | Fuel electromagnetism valve relay output | N.O. dry contact, 10A/30VDC | 1.5mm² line |
| C11 | Start relay output | N.O. dry contact, 10A/30VDC | 1.5mm² line |
| C12 | Charger excitation source output | If not use, forbid connected to cathode | 1mm² line |
| C13 | Genset running output | N.O. dry contact, 3A/30VDC | 1mm² line |
| C14 | Custom output 1# | N.O. dry contact, 3A/30VDC | 1mm² line |
| C15 | Custom output 2# | N.O. dry contact, 3A/30VDC | 1mm² line |
| C16 | Custom output 3# | N.O. dry contact, 3A/30VDC | 1mm² line |
| D17 | Oil pressure test | Pressure sensor $(< 2K\Omega)$ | 1mm ² line |
| D18 | Water temperature test | Temperature sensor (<2KΩ) | 1mm² line |
| D19 | Oil position test | Oil position sensor ($< 2K\Omega$) | 1mm² line |
| D20 | Oil pressure signal | Low potential valid | 1mm² line |
| D21 | Water temperature signal | Low potential valid | 1mm² line |
| D22 | Emergency stop signal | Low potential valid | 1mm² line |
| D23 | Start {external control }signal | Low potential valid | 1mm² line |
| D24 | Aux. on-off input | Low potential valid | 1mm² line |
| D25 | Magnetic sensor signal{+} | 1~70Vac | 2 core shield |
| D26 | Magnetic sensor signal{ $-$ } | Internal connect to DC source line | |
| D27 | Working power source anode {+} | 12V/24V | 1mm² line |
| D28 | Working power source cathode {-} | (8~35VDC continued) | 1mm² line |
| D29 | Protection ground wire | | 1.5mm² line |

Remark: D19 pin is standby analog measure input, can measure 0-5VDC or 0-20mA or resistance signal, preset to resistance signal, if need change should change the hardware first.

2.3 Typical Connection:



3. Operation Panel

The whole operation panel includes 3 sections: measuring parameter display by LED, operation switch and running status LED indication.

3.1 LCD Display and Control Keys:

LCD with 128×64mm lattice can display multi-lines data information in the same time and add background-light function that operator can clearly read information whenever day or night. After pressing any key the background-light can auto turn off in a certain time.

LCD display and its control keys provide a friendly operation interface for operator, and convenient to read information and set running parameter.

3.2 LCD Display Menu System and Running Status

| Function Description | Tag |
|---|-----|
| Entering submenu/modify/confirming modification | |
| Scroll up menu/ value ascend | |
| Scroll down menu/ value descend | |

3.3 Control keys and LED

| Function Description | Tag |
|--|------|
| AUTO/LED The key is used for setting "auto-operation mode". When | |
| controller is running in this mode, the LED above the button will illuminate. According to the "remote control start input signal", the controller control generator start and stop | |
| and stop. | OTUA |

| MAN/LED The key is used for setting "manual-operation mode". When controller is running in this mode, the LED above the button will illuminate. The controller control generator start and stop by pressing "START" and "STOP" key. | MAN |
|--|--------------|
| TEST/LED The key is used for setting "test-operation mode". When controller is running in this mode, the LED above the button will illuminate. According to the valid of analog "remote control start input signal", the controller control generator start. When switch to "Auto operation mode" and analog "remote control start input signal" is disabled, generator stop. | TEST |
| START/LED The key is used for Genset manual startup. When the controller is running in "manual-operation mode", press this key to start the generator. During controller performing start procedure to Genset in normal running, the LED above the key on, and continuously on when the Genset in normal running. | Image: Start |
| STOP/RESET/LED The key is used for generator manual stop, when the controller set in "MAN" mode, this key can stop the Genset. Press this key more than 2 seconds can release the fault stop lock if there is a fault output. (When the controller performing stop procedure LED on; When stop | TOP/RESET |
| MUTE/LAMP TEST It is alarm mute and lamp test key. Press the key more than 2 seconds, all LED on the panel will illuminate. This function used to test all LED on the panel. When warning or fault alarm occur, press this key can mute the buzzer and the lamp above the key illuminate. Press it again will cancel mute function. If controller held on fault status, the buzzer keeping alarm. | L. TEST/MUTE |

4. Installation manual

4.1 Hatch size of panel installation, showing as above attached figure.

- I The controller is fixed by 4 special screws.
- I Must install shock mount, if the housing that installed on controller is directly installed on Genset body or other heavy vibrant device.
- 4.2 Please see above 2.3 typical connection figure and or attached drawing for control line connection.
- 4.3 Genset oil pressure and water temperature sensor installation:



4.4 Kinds of typical connection method for generator winding.





Series angle, 3-phase 4 line







Biangle, 1-phase 2 line



Biangle, 1-phase 3 line



4.5 Typical input connection for corresponding voltage and current connected to different kinds of generator winding.

Series parallel start, 3-phase 4 line



Series parallel angle, 3-phase 3 line



Series angle, 3-phase 4 line



Measure and display data: 3-phase phase voltage L1-N,L2-N,L3-N 3-phase ling voltage L1-L2,L2-L3,L3-L1 3-phase current L1 L2 L3 Frequency Hz 3-phase power and total power PL1 PL2 PL3 ΣP 3-phase power and total reactive power QL1 QL2 QL3 ΣQ 3-phase power factor PFL1 PFL2 PFL3 Active energy(KWh) ΣE Reactive energy(KVArh) ΣE

Measure and display data: 3-phase ling voltage L1-L2,L2-L3,L3-L1 3-phase current L1 L2 L3 Frequency Hz Active power ΣP Reactive power ΣQ Active energy(KWh) ΣE Reactive energy(KVArh) ΣE

Measure and display data: 3-phase phase voltage L1-N,L2-N,L3-N 3-phase ling voltage L1-L2,L2-L3,L3-L1 3-phase current L1 L2 L3 Frequency Hz Active power ΣP Reactive power ΣQ Active energy(KWh) ΣE Reactive energy(KVArh) ΣE

Biangle, 1-phase 2 line



Measure and display data: Single phase voltage L-N Single phase current L1 Frequency Hz Active power P Reactive power Q Apparent power A Power factor PF Active energy (KWh) ΣE Reactive energy (KVArh) ΣE





Measure and display data: 2-phase phase voltage L1-N, L2-N 2-phase current L1 L2 Frequency Hz Active power PL1 PL2 ΣP Reactive power QL1 QL2 ΣQ Apparent power AL1 AL2 ΣA Power factor P Active energy (KWh) ΣE Reactive energy (KVArh) ΣE

5. Control and Operation Instruction

The controller has 3 types control mode: auto-operation mode, manual- operation mode and test-operation mode.

5.1 Operation Mode Setting:

| Operation | Description |
|--|-------------|
| Press "AUTO" (more than 2 seconds), the LED above the button illuminate, the controller then running in "AUTO" mode. | AUTO |
| Press "MAN" (more than 2 seconds), the LED above the button illuminate, the controller then running in "MAN" mode. | |
| Press TEST" (more than 2 seconds), the LED above the button illuminate, the controller then running in "TEST" mode. | TEST |

Remark: Only can select 1 mode from above 3 modes.

5.2 Start control process:

| Operation | Description |
|---|-------------|
| When controller is running in TEST operation mode, or the remote control start input signal valid in Auto status, or press "START" in MAN status, the controller begin to start procedure, the lamp above the key flashing. | |
| LCD display start delay (MAN start no delay) | START 10 |

| Fuel gate relay action, engine electromagnetic valve open, After delay 200 ms, start relay action, the startup motor begin action, cranking begin. | CRANK 1 | |
|---|---------------------|-----------|
| When engine running speed reaching crank cut speed, controller will stop start output and begin count safety-on delay time. | SAFETY-ON DEL 60 | AY |
| When the normal running speed, output | U=380V | I=0A |
| voltage, oil pressure, water temperature of | P=0kW | F=50.0Hz |
| other failure. then LCD display parameter | SP=1500rpm | OP=470kPa |
| that shown on the right side. | TEMP=70 ℃ | Bat=24V |
| (Scroll page for more details) | RUN | |

When remote control start signal valid, the start delay will be enabled and begin to timing. During the timing, if the remote start signal disable, start delay will stop timing immediately, controller stop start procedure, and return to original "READY" status after finishing stop failure timing.

During cranking or idle, if the remote control start input signal disable, controller stop the following start procedure immediately and control output by closing all relay, then stop the start process, and return to original "READY" status after finishing stop failure timing.

Remark: When cranking, engine ignition, start motor power off when alternator output frequency is reach to desired frequency. Or the start motor power off by following factor:

- a. The magnetic speed pickup device which mounted on engine flywheel has tested the frequency reach to desired frequency.
- b. The output voltage of alternator reach 80% rated voltage.
- c. Engine low oil pressure switch off.

5.3 Start fail and restart process:

| Operation | Description |
|--|-------------|
| During the cranking time, engine can not igniting, and controller will not output starting | CRK-RST |
| signal. FAIL TO START lamp flash. | 15 |
| Once cranking rest over, controller will | CRANK |
| attempt to restart engine again. | 2 |

Above start phenomena repeat again and again until engine successful ignition and or reach the desired start times. Any stop failure occur during start process, controller stop control output immediately, until failure eliminated and reset, then it can be operated again.

5.4 Start failure condition:

| Operation | Description |
|--|---------------|
| When above start phenomena repeat again | |
| and again and reach the desired start times, | ALARM |
| controller will stop control output, LCD | START FAILURE |
| display: | |

Remark:

If occur FAIL TO START, operator must check the whole Genset system to make sure the fault and eliminate, then press " STOP/RESET" key to unlock fault-locked status, and restart the Genset.



5.5 Auto stop process

| Operation | Description |
|--|-----------------------|
| When the remote start input signal disable, the cooling delay begin to count down, running signal cut off (idle delay not at zero)and then LCD display: | COOL 300 |
| When cooling delay time over, controller switch off fuel electromagnetic valve immediately, stop failure timer begin count down, then LCD display: | STOP 20 |
| When stop failure time over and if engine still running, controller will sent out an alarm, LCD display: | ALARM STOP FAILURE |
| If during stop failure allow delay time engine stop running, LCD display: | READY |

When the remote control start input signal disable, cooling delay begin timing, if the remote control start input signal is valid again, cooling delay stop timing immediately, the controller monitor each parameter again, recover auto running status if normal.

5.6 Stop by Man.

| Operation | Description |
|--|-----------------------|
| When Genset in normal running, in "MAN" mode continuously press "STOP/RESET" one time, controller begin cooling delay stop which same as auto stop. Press "STOP/RESET" again, controller switch off fuel electromagnetic valve immediately, Genset start stop. | TOP/RESET |
| Stop failure timer begin timing, LCD display: | STOP 00:24 |
| When stop failure timer overtime and if engine still running, controller will sent out an alarm, LCD display: | ALARM STOP FAILURE |
| If during stop failure allow time engine stop running, LCD display: | READY |

5.7 Fuel gate electromagnetic valve is for start running and stop process of normal open type engine (different from normal close type):

I Start control process:

When start running, controller fuel gate relay no action, fuel gate electromagnetic valve no power source, it means the electromagnet of electromagnetic valve no action.

I Stop control process:

When controller start at stop control process, output fuel gate electromagnetic valve power source, fuel gate electromagnetic valve take action, engine begin to stop. After delay, fuel gate electromagnetic valve power off (According to the desired stop failure delay time).

I Other control process and fuel gate electromagnetic valve is for normal close type engine.

5.8 Idle and Preheat function

Select idle or preheat delay function through "setting idle delay or preheat delay value", select idle and preheat output base to User Relay function. When delay set not for 0 value, realizing idle and preheat function. There are 2 kinds of idle: normal open (N.O) and normal chose (N.C) type, both on working is opposition on close and open status. Now we take N.C for example showing its working principle: when

in READY status for idle, idle relay switch off, controller running start process, idle relay take action at the same time, delay startup timing to fuel gate relay take action, when start successful start motor switch off, in that time idle delay begin count down, when time over, idle relay switch off. Safety-on delay begin timing, if each parameter in normal after time out, Genset running. Cool delay stop begin timing, idle relay no action, after cool delay time out, idle delay begin count down, idle relay take action at the same time, delay over and then stop. Stop over, switch off idle relay. When READY for preheat, preheat relay switch off, start delay procedure begin timing, preheat relay take action at the same time. Crank start successfully and safety-on delay Genset running, preheat relay begin timing, when time over preheat relay switch off, cooling delay for stop, preheat relay no action.

6. Measuring Display

| Generator phase voltage V | L1-N | L2-N | L3-N |
|----------------------------------|------------------------------------|-------|-------|
| Generator line voltage V | L1-L2 | L2-L3 | L3-L1 |
| Generator current A | L1 | L2 | L3 |
| Generator frequency Hz | HZ | | |
| Generator apparent power kVA | L1 L2 L3 three phase and their sum | | |
| Generator active power kW | L1 L2 L3 three phase and their sum | | |
| Generator power factor PF | L1 L2 L3 three phase | | |
| Generator reactive power kVAr | L1 L2 L3 three phase and their sum | | |
| Generator active energy kWh | | | |
| Generator reactive energy kVArh | | | |

6.1 Electric section measuring data

Due to frequency measure from L1 phase of generator, the connection in this section must be confirmed no problem when use.

6.2 Other measuring data

| Engine oil pressure (kPa) | This data from an external sensor |
|-------------------------------|------------------------------------|
| Cooling water temperature (℃) | This data from an external sensor |
| Oil position measuring (%) | This data from an external sensor |
| RPM (RPM) | This data from speed sensor |
| Running hours (RUN Hour) | Precise to 0.1hour |
| Battery voltage (V) | Adopt working power source voltage |

7. Alarm and Stop failure

7.1 Alarm

(NOTE: Warning is a very serious failure status, it will not damage generator system for the moment, only remind operator the improper condition and need solve to make sure system continuous running. When warning occurs, the status indicator illuminate, the buzzer alarm but failure will not be locked and the unit non stop. Once failure has been eliminated alarm lamp auto turn off.)

Charge Failure Controller has tested voltage lower than "low charge warning setting value" from excitation contact of auxiliary AC charge, LCD status file display "WARN: CHARGE FAILURE", buzzer alarm.

Battery Voltage Low Controller has tested voltage lower than "low charge warning setting value", LCD status file display "WARN: BATTERY LOW", buzzer alarm.

Battery Voltage High Controller has tested voltage lower than "low charge warning setting value", LCD status file display "WARN: BATTERY HIGH", buzzer alarm.

Low Oil Pressure After safety-on delay timing over, controller has tested engine oil pressure reduced to oil pressure setting alarm value, LCD status file display "WARN: LOW OIL PRESSURE", buzzer alarm.

High Temperature Controller has tested engine coolant temp over than "high temp setting alarm value", LCD status file display "WARN: COOLANT TEMP", buzzer alarm.

Over Speed If engine rpm over than "setting alarm value", LCD status file display "WARN: OVER SPEED", buzzer alarm.

Under Speed If engine rpm lower than "setting alarm value", LCD status file display "WARN: UNDER SPEED", buzzer alarm.

Gen. High Voltage Alarm If controller has tested generator output voltage over than "setting alarm value", LCD status file display "WARN: GEN. V HIGH", buzzer alarm.

Gen. Low Voltage Alarm If controller has tested generator output voltage reduced to "setting alarm value", LCD status file display "WARN: GEN. V LOW", buzzer alarm.

Over Current Alarm If controller has tested generator output current over than "setting alarm value", LCD status file display "WARN: OVER CURRENT", buzzer alarm.

Standby Input If standby auxiliary input set as alarm input for use, when input signal valid, LCD status file display "WARN: AUX ALARM", buzzer alarm.

7.2 Stop Failure

(Note: Stop failure locks system immediately and generator stop running, it only can operated controller again after eliminating failure and press "reset" key to release failure locked)

Start Failure If engine start times over desired setting value and still can not run, that is start failure, LCD status file display "WARN: START FAILURE", failure indicator illuminate "FAIL TO START", buzzer alarm, failure relay close output.

Stop Failure If after stop time delay over engine can not stop, then buzzer alarm, LCD status file display "WARN: STOP FAILURE", failure relay close output.

Emergency Stop When emergency stop input signal valid, controller immediately stop all relay control output except alarm, LCD status file display "WARN: E. STOP", failure indicator illuminate "EMERGENCY STOP", buzzer alarm, failure relay close output.

Low Oil Pressure After safety-on delay timing over, controller has tested engine oil pressure still lower than oil pressure failure value or oil pressure switch in close status, engine stop immediately, then LCD status file display "WARN: LOW OIL PRESSURE", failure indicator illuminate "LOW OIL PRESSURE", buzzer alarm, failure relay close output.

High Temperature Controller has tested engine coolant temp over than "high water failure value" or temp switch in close status, engine stop immediately, LCD status file display "WARN: COOLANT TEMP", failure indicator illuminate "HIGH TEMP", buzzer alarm, failure relay close output.

Over Speed Controller has tested engine rpm over than "over speed failure value", engine stop immediately, LCD status file display "WARN: OVER SPEED", buzzer alarm, failure relay close output.

Under Speed Controller has tested engine rpm lower than "under speed failure value", engine stop immediately, LCD status file display "WARN: UBDER SPEED", buzzer alarm, failure relay close output.

High Voltage Failure If controller has tested generator output voltage over than "Gen. high voltage failure", after delay engine confirmed stop, LCD status file display "WARN: GEN. V HIGH", buzzer alarm, failure relay close output.

Low Voltage Failure After safety-on delay timing over, controller has tested generator output voltage low than "Gen. low voltage failure", after delay engine confirmed stop, LCD status file display "WARN: GEN. V LOW", buzzer alarm, failure relay close output.

Over Current Failure Controller has tested generator output current over than "Gen. high current failure value", after delay engine confirmed stop, LCD status file display "WARN: OVER CURRENT", buzzer alarm, failure relay close output.

Standby Input If standby auxiliary input set as failure stop for use, when input signal valid, engine stop immediately, LCD status file display "WARN: AUX ALARM", buzzer alarm, failure relay close output.

Remark:

- U Oil pressure and water temp on-off warning or failure stop, we can through setting 3.29 and 3.30 menu realizing, the data from oil pressure and water temp sensor on-off status(on or off) test.
- Oil pressure and water temp analog warning or failure stop, we can through setting parameter range on 3.22, 3.23, 3.24 and 3.25 menu realizing warning or failure stop request, the data from oil pressure and water temp sensor onoff status(on or off) test.
- Lengine rpm normal from flywheel speed sensor frequency which mounted on engine, if system not mounted speed sensor, controller will auto use generator output voltage frequency as control and failure protection parameter, for user convenience, some data expressed by rpm, RPM=HZ*30.
- Generator failure during generator running: after high water temp, low oil pressure, over speed and under speed occurred, stop immediately no delay, and non idle function only play protection function by set idle delay at "0" during cooling delay, under speed, low oil pressure, or will not play.

8. Parameter Setting

| NO. | Item | Default | Value Range |
|-----|------------------|---------|-------------|
| 1.0 | Quit | | |
| 1.1 | СТ | 100 | 1~5000 |
| 1.2 | VT | 1 | 1~100 |
| 1.3 | Voltage Type | 1 | 1~5 |
| 1.4 | Comm. Address | 1 | 1~255 |
| 1.5 | Default settings | | |
| 1.6 | Language >中文 | | |
| 1.7 | Firmware update | | |

8.1 System

Remark: After changing communication address only restart working power source can become effective.

8.2 Generator

| NO. | ltem | Default | Value Range |
|-----|------------------|---------|--------------------------|
| 2.0 | Quit | | |
| 2.1 | Gen-V Low Alarm | 0V | AC45~20000V / 0 (no set) |
| 2.2 | Gen-V Low preARM | 198V | AC45~20000V / 0 (no set) |

| 2.3 | Gen-V High preARM | 253V | AC45~20000V /29999(no set) | |
|-----|-------------------|--------|-------------------------------|--|
| 2.4 | Gen-V High Alarm | 29999V | AC45~20000V /29999(no set) | |
| 2.5 | Gen-Hz Low Alarm | 45Hz | 10~100.0Hz / 0 (no set) | |
| 2.6 | Gen-Hz High Alarm | 57Hz | 10~100.0Hz /999.9(no set) | |
| 2.7 | I High preALM | 9999A | 1~9999A / 9999 (no set) | |
| 2.8 | l High Alarm | 9999A | 1~9999A / 9999 (no set) | |
| 2.9 | Alarm Delay | 10S | 0~600S | |

8.3 ENGINE

| NO. | Item | Default | Value Range |
|------|------------------|--------------|----------------------------|
| 3.0 | Quit | | |
| 3.1 | Rated speed | 1500 | 99-9999 RPM |
| 3.2 | Pickup frequency | 3000 | 1-9999 Hz |
| 3.3 | Set pickup now | | |
| 3.4 | Pair of Poles | 2 | 1~4 |
| 3.5 | Fuel mode | 0 | 0 N.C. Type / 1 N.O. Type |
| 3.6 | T-sensor mode | 1 | 0~8 / 0 (no use) |
| 3.7 | P-sensor mode | 1 | 0~9 / 0 (no use) |
| 3.8 | H-sensor mode | 0 | 0~1 / 0 (no use) / 1(use) |
| 3.9 | Start delay | 10S | 0~300 S |
| 3.10 | Crank attempt | 3Times | 1~10 Times |
| 3.11 | Crank time | 8S | 0~30 S |
| 3.12 | Crank rest | 15S | 0~300 S |
| 3.13 | Crank disconnect | 300rpm | 1-9999 RPM |
| 3.14 | ldle delay | 0S | 0~9999S |
| 3.15 | Pre-heat delay | 0S | 0~9999S |
| 3.16 | Safety-on delay | 60S | 0~600S |
| 3.17 | Cooling delay | 300S | 0~600 S |
| 3.18 | Stop delay | 20S | 0~60S |
| 3.19 | Under SP Alarm | 0 RPM | 0-9999 RPM / 0 (no set) |
| 3.20 | Under SP preALM | 1440rpm | 0-9999 RPM / 0 (no set) |
| 3.21 | Over SP preALM | 1600rpm | 1-9999 RPM / 9999 (no set) |
| 3.22 | Over SP Alarm | 1710rpm | 1-9999 RPM / 9999 (no set) |
| 3.23 | Oil-P low Alarm | 140kPa | 5~300 kPa / 0 (no set) |
| 3.24 | Oil-P low preALM | 220kPa | 5~300 kPa / 0 (no set) |
| 3.25 | Coolant preALM | 95 ℃ | 70~320°C / 9999 (no set) |
| 3.26 | Coolant Alarm | 105 ℃ | 70~320°C/ 9999 (no set) |
| 3.27 | Batt low preALM | 8V | 1~25V / 0 (no set) |

| 3.28 | Batt high preALM | 35.0V | 1~35V / 99.9 (no set) |
|------|-----------------------|-------|--|
| 3.29 | External Alarm | 0 | 0 (warning) /1(stop) |
| 3.30 | Fuel level input | 2 | 0 no use 1 unit is "%" according to resistance type data 2 Custom Input |
| 3.31 | Oil-P Stop (On-Off) | 1 | 0~1 / 0 (warning) / 1 (stop) |
| 3.32 | Coolant Stop (On-Off) | 1 | 0~1 / 0 (warning) / 1 (stop) |
| 3.33 | Fuel pump ON | 20% | 0~100% |
| 3.34 | Fuel pump OFF | 70% | 0~100% |
| 3.35 | User Relay 1 | 2 | 0~80 |
| 3.36 | User Relay 2 | 3 | 0~80 |
| 3.37 | User Relay 3 | 4 | 0~80 |
| 3.38 | ALT. low preALM | 8.0V | 1~25V / 0 (no set) |

8.4 Name Explanation on View Menu

| Menu Name | EXPLANATION | Menu Name | EXPLANATION |
|-------------|---------------------|-----------|------------------|
| 0.QUIT | Quit | 1.SYSTEM | System Parameter |
| 2.GENERATOR | Generator Parameter | 3.ENGINE | ENGINE |

Appendix: Relay can custom content

| Code | Define Failure Type | Code | Define Failure Type |
|------|----------------------|------|---------------------|
| 0 | No Use | 1 | Over Current Output |
| 2 | Failure Alarm Output | 3 | Warning Output |
| 4 | Idle Output (N. C.) | 5 | Preheat Output |
| 6 | Reserved | 7 | Reserved |
| 8 | Fuel pump Control | 9 | Running |
| 10 | System in Auto Mode | 11 | System in Test Mode |
| 12 | System in Man. Mode | 13 | Reserved |
| 14 | Idle Output (N. O.) | 15 | Reserved |
| 16 | Reserved | 17 | Start Failure |

Voltage Input Type: use different winding connect type, on behalf of different winding by selecting menu.

| 1. Series parallel start, three-phase four-line | 2. Series parallel angle, three phase three-line |
|---|--|
| 3. Island angle, three-phase four-line | 4. Biangle, one-phase two-line |
| 5. Biangle, one-phase three-line | |

Remark:

- U When menu 3.8 set at "0" and not using speed sensor, generator running speed set by 3.4 pole logarithm, when pole logarithm at "2" running speed is 1500 rpm, when pole logarithm at "1" running speed is 3000 rpm.
- When menu 3.8 set at "1" and using speed sensor, through manual setting 3.2 frequency input value, generator running speed display by setting menu 3.1.
- U When menu 3.8 set at "1" and using speed sensor, through below 11.6 showing method auto setting frequency input value, then menu 3.4 pole logarithm and 3.1 generator running speed should be correctly setting.

8.5 PT-Sensor Explanation

According to below table difference sensor type of oil pressure sensor and water temp sensor express by difference number, if the using sensor not listed in the table, can through software logging into controller base on sensor offered data parameter, and the sensor type should select the last "custom" type listed in the type at parameter setting.

| No. | Pressure Sensor Type | | Temp Sensor Type | |
|-----|------------------------------|----|-----------------------|----------|
| 0 | NOT USE | | NOT USE | |
| 1 | VDO 10 bar | | VDO 120 degrees C | |
| 2 | KD 10 bar | KD | KD 120 dc | KD |
| 3 | YG962 1J1M | ZJ | WGJ 900131 | ZJ |
| 4 | KP 6 bar | KP | KP 130 dc | KP |
| 5 | 3846 N-010-B2 | DX | 21YB054 | DX |
| 6 | 3967251 | KL | 3967250 | KL |
| 7 | MHI 10 bar | SL | MHI 98 dc | SL |
| 8 | Datcon 10 bar | | Custom (Base on sense | or data) |
| 9 | Custom (Base on sensor data) | | | |

9. LCD display and Menu System

Adopting 128×64 lattice LCD can display multi-lines data information at the same time. And LCD has background-light function, after pressing any key the background-light can auto turn off in a certain time. Set a different parameter in every page and control by the setting, each item load electrical parameter displayed in main page, press " and " " scroll to display each electrical parameter and oil machine measuring data. If no failure occurs, LCD keep stay at

current page, when failure occurs, LCD display failure information in status file immediately, when not only one failure, LCD just display one of them.

For parameter setting and modify by gradually increase and decrease, when continuously press increase or decrease key, the single digit change one by one, then the tens digit changed after ten single digit changed, follow this logic, and the hundreds digit changed after ten. In any page continuously press " ? 2s to enter setting status, then can use " and " rand" rescale to a setting status, then can use " and " rand" rescale to a setting tent into next submenu, select need modify item, press " rand "

status after finishing modify.

9.1 Static LCD display:

When controller standby

| Operation | Description | | |
|---|-----------------|-----------|--|
| | U=0V | I=0A | |
| When controller has not tested engine data such as running speed, oil pressure, water temp, etc. the related data display at "0", LCD display: | P=0kW | F=0.0Hz | |
| | SP=0rpm | OP=0.0kPa | |
| | TEMP=0 ℃ | Bat=24V | |
| | READY | | |

When controller set without PT-sensor

| Operation | Description | | |
|--|-------------|---------|--|
| | U=0V | I=0A | |
| When controller has not tested engine data such as running speed, oil pressure, water temp, etc. On standby or running the related data all display at "", LCD display: | P=0kW | F=0.0Hz | |
| | SP=0rpm | OP= | |
| | TEMP= | Bat=24V | |
| | READY | | |

When controller normal running

| Operation | Descri | ption | |
|--|------------------|-----------|--|
| | U=220V | I=0A | |
| This page display voltage/current value at the | P=0kW | F=50.0Hz | |
| average of three-phase Press " \triangle "or" \bigtriangledown " | SP=1500rpm | OP=475kPa | |
| can switch display page | TEMP=70 ℃ | Bat=25.4V | |
| | RUN | | |
| | V1=220V | U12=380V | |
| | I1=0A | A1=0kVA | |
| Press" an switch display page | P1=0kW | PF1=1.00 | |
| | Q1=0kVAr | | |
| | RUN | | |
| | V2=220V | U23=380V | |
| | 12=0A | A2=0kVA | |
| Press" an switch display page | P2=0kW | PF2=1.00 | |
| | Q2=0kVAr | | |
| | RUN | | |
| | V3=220V | U31=380V | |
| | I3=0A | A3=0kVA | |
| Press" an switch display page | P3=0kW | PF3=1.00 | |
| | Q3=0kVAr | | |
| | RUN | | |
| | Run Hour=12.0 | | |
| | KWHr=1000 | | |
| Press" an switch display page | KVArHr=250 | | |
| | AI=0% | | |
| | RUN | | |
| | Relay Outputs | | |
| | | | |
| Press" an switch display page | Digital Inputs | | |
| | | | |
| | RUN | | |
| | P=0KW | | |
| | A=0KVA | | |
| Press" 🚺 " can switch display page | Q=0KVAr | | |
| | | | |
| | RUN | | |

9.2 Setting running parameter

Example: (setting current transformer rate at 1000 /5, then CT should be set at 200)

| Operation | Description |
|--|---|
| Continuously press " D " 2s, enter into parameter setting menu, then LCD display: | < <setting 参数设定="">> 0.QUIT</setting> |
| Press " \blacksquare " and " \blacktriangleright ", and then press " \blacksquare " again, then LCD display: | 1. CT =1000 |
| Press" " and then press " ", prompt enter password, key in password " " " " " " " " " " " " | 1. CT Password:***** |
| Press" Tor " Tor " Press" Pres | 1. CT 200 |
| Press" \triangleright " confirm after changing , then press" \triangleright " and " \triangleright ", then LCD display: | < <setting 参数设定="">> 1. System</setting> |
| Press" " and " " again for quit, or continuously press " " more that 2s also can quit, then LCD display: | READY |

Example: (setting controller crank attempt at 2)

| Operation | Description |
|---|--|
| Continuously press " D " 2s, enter into parameter setting menu, then LCD display: | < <setting 参数设定="">> 0.QUIT</setting> |
| Press" 7 3 times and then press " 7, then LCD display: | 3. ENGINE 0. QUIT |
| Press" 7 10 times and then press " 7, then LCD display: | 10. Crank attempt =3 |
| Press" | 10. Crank attempt Password:***** |

| $\mathbf{D}_{\mathbf{r}}$ or " $\mathbf{\nabla}$ " observe peremeter above | | |
|--|---|-------------------------|
| at 2 , Press " , confirm change, and then continuously press " , 2s can quit parameter setting menu = 10. Crank attempt =2 | Press" Tor " Tor " Press" change parameter, change at 2, Press" Press" confirm change, and then continuously press " Press" 2s can quit parameter setting menu | 10. Crank attempt =2 |

Example: (Reset controller all parameter to factory default)

| Operation | Description |
|---|--|
| Continuously press " > " 2s, enter into parameter setting menu, then LCD display: | < <setting 参数设定="">> 0.QUIT</setting> |
| Press " \checkmark " and " \triangleright ", and then press " \checkmark " 5 times again, then LCD display: | 5. Default Settings |
| Press" T, prompt enter password, key in change password: " ?"" ?"" ?"" ?"" ?"" ?"" ?"" ?"" ?"" ? | 5. Default Settings Password:***** |
| Press "▶" recover default, press"▲" again and then continuous press "▶" 2s can quit parameter setting menu | 5. Default Settings DONE |

Example: (Set controller at line program mode)

| Operation | Description |
|--|--|
| Continuously press " D " 2s, enter into parameter setting menu, then LCD display: | < <setting 参数设定="">> 0.QUIT</setting> |
| Press " \checkmark " and " \triangleright ", and then press " \checkmark " once again, then LCD display: | 7. Firmware update |
| Press" T, prompt enter password, key in change password: " ?"" ?"" ?"" ?"" ?"" ?"" ?"" ?"" ?"" ? | 7. Firmware update Password:***** |
| Press "D" again enter into program mode, in this mode the supply source must make sure normal, after using special program software correctly duplication by communication line connect, auto repeat reset, or will not quit this status, until working power source cut off. | Firmware Update Download from PC. Don't turnoff power, Before finished! |

The setting and operate method for other parameters similar to above method.

10.Communication Function

10.1Brief Introduction

Brief Introduction

The controller has a "RS CONNECTOR" communication port, this port need to match use with CI485A (CI232A) communication interface module, then controller has "RS485/RS232" industrial standard COM. This COM adopt photoelectricity seclusion design and has circuit protection function to prevent common mode Voltage interfere and damage by error connection, and adopt 9600 baud rate. The controller that has communication function has following features:

- I 100% remote signaling, including running and failure status.
- I 100% remote regulating, including all settable parameters in controller.
- I 100% telemetering data, including all measuring data in controller.
- I 100% remote control, including all panel control function.

10.2CI485 communication connection

Controller has RS485 COM after add CI485A accessory, following typical wiring diagram:



Controller has RS232 COM after add CI232A accessory, following typical wiring diagram:



The communication interface offers user a route: from which you can get more information that can not get from the panel, can display all measured parameter and status information by matching software and possible to setting all parameters. The controller that has RS485 COM allow 1 communication bus can most connect 247 same series of controllers by line type connection mode, each device has one and only ID NO., only can connect to PC or MODEM by matching with another RS485/RS232 shifter in that time. Following typical wiring diagram:



Note: Communication cable use high quality shielded twisted-pair cable, and its amount length must not exceed 1000m. RS485 anode and cathode port in each controller must be properly connected, and the cable shield only can be connected to the earth at one side.

10.3Communication Protocol

When working controller adopts 9600 baud rate and MODBUS-RTU communication protocol, when it is working, computer will send out a string of instruction to controller and then waiting for the return data string. Modbus protocol is one kinds of universal language that applied in electronics controller. Using this protocol, controllers can communication with each other, the controller can communication with other device through network (such as Ethernet). It has become a universal industry standard. Using it, the control device that manufactured by different manufacturer can connect to industry network, processing concentration monitor.

This protocol defined a message construction that controller can identify, no matter which network it used to communication. If response request from other device it describes the process that a controller request to access other device and how to detect error and make a record. It has set up message structure and content common format.

When communicating in Modbus network, this protocol decides each controller must know their device address, and identify message that send out from address, and according it to decide take which action. If need respond, controller will create return massage and send out by Modbus protocol. In other network, the message that including Modbus protocol will be translated into frame or package structure that used in network.

Data frames format

| Address | Function Code | Data Quantity | Data 1 | | Data n | CRC High Bit | CRC Low Bit |
|---------|------------------|------------------|-----------|--|-----------|-----------------|----------------|
|---------|------------------|------------------|-----------|--|-----------|-----------------|----------------|

10.4Communication Agreement

Use RTU mode, sending message at least using 3.5 characters interval to start, which is easy to realize under network baud rate with multi character interval (showed as following figure T1-T2-T3-T4). The first transferred field is device address, can use transfer characters are hexadecimal 0...9, A...F. The network device continued to detect network bus, including in the interval. When received the first field (address field), each device decode it to judge whether it is sent to itself. After the last character be transferred, an interval at least 3.5 characters decide finish the whole message. After this a new message may be start.

The entire message frame must transfer as a continuous flow. Receiver will refresh uncompleted message and assume the next byte is address field of a new

message if over 1.5 characters interval before finishing frame. Likewise, if another new message follows the last message sent out less than 3.5 characters interval, receiver will identify it as the continuous of the last message. That will cause an error, because the value in the final CRC field impossible correct. Typical message frame as following:

| Start Bit | Device Address | Function Code | Data | CRC Parity | Stop Bit |
|-------------|-------------------|------------------|--------|------------|-------------|
| T1-T2-T3-T4 | 8Bit | 8Bit | n*8Bit | 16Bit | T1-T2-T3-T4 |

Address code

Message frame address field including two characters: ASCII or 8 bit RTU. The possible slave address is 0...247(algorism). Single device address range is 1...247. Master select slave by putting salve address which to be contacted into address filed in message. When slave send out response message, it will put itself address into response address field, in order to master know which device send out response.

Address 0 used to be broadcast address, so that all slaves can identify. When Modbus protocol used in higher level network, broadcast maybe not allow or use other mode to replace.

Function Code

- 1. Read register command code 03H) read the maximum words is (word) 40
- 2. Write register command code (10H) write the maximum words is 38

Data Field

Data field is structured by two hex number set, range 00...FF. According network transfer mode, it can be structured by 1 pair ASCII or RTU characters.

The message data field sent out from master to slave including additional message: slave must use this message to implement action that defined by function code. This including discontinuous register address, the quantity of items will to be handled, really data bytes in the field.

For example, if master need slave read a set of hold register (function code 03), the start register and the quantity of register to be read is specified by data field. If master write a set of slave register (function code 10 hex), then data field specify start register and the quantity of register to be wrote. Data bytes in data field need to write into register data.

If no error, data field return from slave including request data. If occur error, this field will including an exception code, master application can use it to judge the next action.

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In some message, data field can be inexistent (0 length). For example, master requires slave response communication event record (function code 0B, hex), slave no need any additional message.

Error Correction Code (CRC)

Standard Modbus network has two error test methods. Content in test field depend on selected test method.

When select RTU mode as character frame, error test field including a 16 bits value (realized by two 8 bits character). Content in error test field has test out by message content processing CRC. CRC field append at the end of the message, add from low byte to high byte. So the high byte of CRC is the last byte in send out message.

Use RTU mode, message including an error test field which based on CRC method. CRC field has test the entire message content.

CRC field is two bytes including a 16 bits binary value, which added into message after calculated by transmission device. Receiver recalculates CRC that received message and compared with the value in CRC field. If any difference, there must be some error.

CRC first fold in a 16 bit register which all value at "1", and then transfer a process, compare the continuous 8 bits byte in a message with value in currently register. Only 8 bit data in each character is valid for CRC, start bit, stop bit and parity are not valid.

During CRC produce, each 8 bit character will OR with register content respectively, result moving to the low valid bit, use 0 fill out the highest valid bit. LSB is pick out for testing, if LSB is 1, register OR with default respectively, if LSB is 0, no action. The whole process need repeat 8 times. After finishing the last bit (the eighth bit), the next 8 bit byte will OR with the register default respectively. At last, the value in register is CRC value after all bytes in message are processing.

Information frame format example

Example on Using RTU Mode Read Entire Data

| Master Request | | | | | | |
|----------------|------------------|---|--|--|---|---------------------|
| Address | Function Code | High address of the first register | Low address of the first register | High bit on the register quantity | Low bit on the register quantity | Error Correction |
| 01 | 03 | 00 | 38 | 00 | 01 | XX |

| Slave Request | | | | | | |
|---|---------------|---------------|-------------------|------------------|---------------------|--|
| Address | Function Code | Byte quantity | Data high byte | Data low byte | Error Correction | |
| 01 | 03 | 2 | 41 | 24 | XX | |
| Hex number 4124 is express algorism integer 16676, error correction value decided by transmission mode. | | | | | | |

Controller Data Cell Address

| Address | Byt | Content | Unit |
|---------|-----|-------------------------------------|-------------|
| \$1000 | 1 | L3-N Voltage C-phase phase voltage | Unit: V |
| \$1001 | 1 | L2-N Voltage B-phase phase voltage | Unit: V |
| \$1002 | 1 | L1-N Voltage A-phase phase voltage | Unit: V |
| \$1003 | 1 | L3-L1 Voltage AC-phase line voltage | Unit: V |
| \$1004 | 1 | L2-L3 Voltage BC-phase line-voltage | Unit: V |
| \$1005 | 1 | L1-L2 Voltage AB-phase line voltage | Unit: V |
| \$1006 | 1 | L3 Current C-phase phase current | Unit: A |
| \$1007 | 1 | L2 Current B-phase phase current | Unit: A |
| \$1008 | 1 | L1 Current A-phase phase current | Unit: A |
| \$1009 | 1 | L3 PF C-phase power factor | |
| \$100A | 1 | L2 PF B-phase power factor | |
| \$100B | 1 | L1 PF A-phase power factor | |
| \$100C | 1 | Frequency Gen. frequency | Unit: 0.1Hz |
| \$100D | 1 | L3 VA C-phase apparent power | Unit: kVA |
| \$100E | 1 | L2 VA B-phase apparent power | Unit: kVA |
| \$100F | 1 | L1 VA A-phase apparent power | Unit: kVA |
| \$1010 | 1 | L3 W C-phase active power | Unit: kW |
| \$1011 | 1 | L2 W B-phase active power | Unit: kW |
| \$1012 | 1 | L1 W A-phase active power | Unit: kW |
| \$1013 | 1 | L3 VAr C-phase Reactive power | Unit: kVAr |
| \$1014 | 1 | L2 Var B-phase Reactive power | Unit: kVAr |
| \$1015 | 1 | L1 VAr A-phase Reactive power | Unit: kVAr |
| \$1016 | 1 | Tacho speed sensor rpm | Unit: RPM |

| \$1017 | 1 | Oil Pressure Oil Pressure sensor value | Unit: kPa |
|--------|---|--|-----------|
| \$1018 | 1 | Coolant Water temp sensor value | Unit: °C |
| \$1019 | 1 | VBAT Battery voltage | Unit: V |
| \$101A | 1 | VALT Charging excitation voltage | Unit: V |
| \$101B | 1 | AI Standby input voltage | Unit: mV |
| | | Bit0—Oil Pressure | |
| | | Bit1—Water temp | |
| \$101C | 1 | Bit2—Emergency stop | |
| | | Bit3—Remote start signal | |
| | | Bit4—Standby on-off signal | |
| | | Bit0— | |
| | | Bit1— | |
| | | Bit2—Custom 3 output | |
| ¢101D | 1 | Bit3—Custom 2 output | |
| φισιο | 1 | Bit4—Custom 1 output | |
| | | Bit5—Unit normal running status | |
| | | Bit6—Oil machine start | |
| | | Bit7—Oil machine fuel gate | |
| | | Bit0— | |
| | | Bit1— | |
| | | Bit2—STARTLED | |
| | | Bit3—TEST LED | |
| | | Bit4—AUTO LED | |
| | | Bit5—MAN LED | |
| | | Bit6— | |
| ¢101E | 1 | Bit7—STOP LED | |
| φIUIE | 1 | Bit8— | |
| | | Bit9— | |
| | | Bit10—Charge failure LED | |
| | | Bit11—Start failure LED | |
| | | Bit12—Low oil pressure LED | |
| | | Bit13—High water temp LED | |
| | | Bit14—Over speed LED | |
| | | Bit15—E stop LED | |

| \$101F | 1 | Warn Warning Cod | | Refer to | |
|--------------|---|----------------------------|----------------|--------------|--|
| \$1020 | 1 | Alarm Alarm Code | | failure code | |
| | | 03: Oil machine stop | | | |
| | | 04: Oil machine start | | | |
| ¢4004 | 4 | 05: Enter test status | | | |
| ΦΙΟΖΙ | | 06: Enter Man status | | | |
| | | 07: Enter Auto status | | | |
| | | 08: Reset | | | |
| \$1022 | 1 | SN | | | |
| \$2001 | 1 | Comm Address | | | |
| \$2002 | 1 | Language | | | |
| \$2003 | 1 | СТ | | | |
| \$2004 | 1 | GEN-V Low Alarm | | Unit: V | |
| \$2005 | 1 | GEN-V Low PreALM | | Unit: V | |
| \$2006 | 1 | GEN-V High PreALM | | Unit: V | |
| \$2007 | 1 | GEN-V High Alarm | | Unit: V | |
| \$2008 | 1 | I High PreALM | | Unit: A | |
| \$2009 | 1 | I High Alarm | Unit: A | | |
| \$200A | 1 | GEN-HZ Low Alarm | | Unit: Hz | |
| \$200B | 1 | Standby | | | |
| \$200C | 1 | Standby | | | |
| \$200D | 1 | GEN-HZ High Alarm | | Unit: Hz | |
| \$200E | 1 | Standby | | | |
| \$200F | 1 | Standby | | | |
| \$2010 | 1 | Standby | | | |
| \$2011 | 1 | Alarm delay | | Unit: S | |
| \$2012 | 2 | KWH | | Unit: kWh | |
| \$2014 | 2 | KVArH | KVArH Unit: kV | | |
| \$2016 | 1 | VT | | | |
| \$2017 | 1 | Pair of Poles | | | |
| \$2018 | 1 | Rated speed | | Unit: RPM | |
| \$2019 | 1 | Pickup frequency Unit: RPM | | | |
| \$201A | 1 | Fuel mode | | | |
| \$201B | 1 | T-sensor mode | | | |

| \$201C | 1 | P-sensor mode | |
|--------|---|--------------------------|-------------------------|
| \$201D | 1 | H-sensor mode | |
| \$201E | 1 | Start delay | Unit: S |
| \$201F | 1 | Crank attempt | |
| \$2020 | 1 | Crank time | Unit: S |
| \$2021 | 1 | Crank rest | Unit: S |
| \$2022 | 1 | Crank disconnect | Unit: RPM |
| \$2023 | 1 | Idle delay | Unit: S |
| \$2024 | 1 | Safety-on delay | Unit: S |
| \$2025 | 1 | Cooling delay | Unit: S |
| \$2026 | 1 | Stop delay | Unit: S |
| \$2027 | 1 | Low SP Alarm | Unit: RPM |
| \$2028 | 1 | Low SP PreALM | Unit: RPM |
| \$2029 | 1 | Over SP PreALM | Unit: RPM |
| \$202A | 1 | Over SP Alarm | Unit: RPM |
| \$202B | 1 | Oil-P Low Alarm | Unit: kPa |
| \$202C | 1 | Oil-P Low PreALM | Unit: kPa |
| \$202D | 1 | Coolant PreALM | Unit: ℃ |
| \$202E | 1 | Coolant Alarm | Unit: ℃ |
| \$202F | 1 | Batt Low PreALM | Unit: V |
| \$2030 | 1 | RUNHr | Unit: HOUR |
| \$2031 | 1 | External Alarm | |
| \$2032 | 1 | Fuel level input | Unit: 0: V / 1 –2: % |
| \$2033 | 1 | Oil-P Stop | |
| \$2034 | 1 | Coolant Stop | |
| \$2035 | 1 | Pre-Heat delay | Unit: S |
| \$2036 | 1 | Fuel pump on level | Unit: % |
| \$2037 | 1 | Fuel pump off level | Unit: % |
| \$2038 | 1 | Custom Relay 1 | |
| \$2039 | 1 | Custom Relay 2 | |
| \$203A | 1 | Custom Relay 3 | |
| \$203B | 1 | Batt High PreALM Unit: V | |
| \$203C | 1 | ALT. Low PreALM Unit: V | |

| \$203D | 1 | Voltage Type | | |
|--|---|-----------------------------|------------|--|
| \$2040 | 1 | V1 | | |
| \$2041 | 1 | V2 | | |
| \$2042 | 1 | V3 | | |
| \$2043 | 1 | 11 | | |
| \$2044 | 1 | 12 | | |
| \$2045 | 1 | 13 | | |
| \$2046 | 1 | Oil pressure | Correction | |
| \$2047 | 1 | Water temp | Correction | |
| \$2048 | 1 | Battery voltage Correction | | |
| \$2049 | 1 | Excitation charging voltage | Correction | |
| \$204A | 1 | Aux. input voltage | Correction | |
| \$204B ——— \$205E P-sensor data table, ordered according to resistance (0.1Ω) from small to big and resistance-corresponding value- resistance. | | | | |
| \$205F ——— \$2072 T-sensor data table, ordered according to resistance(0.1Ω) from small to big and resistance- corresponding value- resistance | | | | |
| \$2073 — \$2086 Oil position sensor data table, ordered according to resistance(0.1Ω) from small to big and resistance-corresponding value-resistance | | | | |

Appendix: Failure Code

| Code | Failure Type | Remark | | Code | Failure Type | Remark |
|------|------------------|--------------------------------|--|------|--------------|----------------------------|
| 0 | NO ERROR | No failure | | | | Low |
| 1 | NO PICKUP | No speed signal | | 10 | LOW | voltage alarm |
| 2 | OVER SPEED | Over speed failure | | 10 | CHARGE | Charging |
| 3 | UNDER SPEED | Under speed failure | | 12 | FAILURE | alarm |
| 4 | P-SENSOR OPEN | Oil pressure sensor open | | 13 | V LOW | Low voltage alarm |
| 5 | LOW OILPRESS | Low oil pressure failure | | 14 | V HIGH | High voltage failure |

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|--------------------------|------------------|-------------------------|--|----|--------|----------------------------|
| 6 | T-SENSOR OPEN | Water temp sensor open | | 15 | I HIGH | High current failure |
| 7 | COOLANT TEMP | High water temp failure | | | | |
| 8 | START FAIL | Start failure | | | | |
| 9 | STOP FAIL | Stop failure | | | | |

11. Preparation before Start the Controller

- 11.1Make sure controller is fixed well and its install ambient meet requirement.
- 11.2Confirm controller all control connection meet electric specification and corresponding to "typical wiring diagram 2.3". Especially need confirm DC supply source has added fusing element to protect, and correct polarity. Otherwise, it maybe damage controller.
- 11.3 Controller must be ground well.
- 11.4 We suggest install "E- stop" key in external, connecting E-stop signal input terminal to "E- stop" key N. O. contact, and another contact connected to the cathode of battery power source
- 11.5 Switch on DC working power source, make sure default parameter meet practical condition, such as current ratio, speed sensor mode, pressure sensor mode, temp sensor mode, etc.
- 11.6 If speed sensor is electromagnetism type sensor, then must according to below steps to correct speed measuring parameter:

Method 1:

After switch on power source, set controller on manual operation mode, LED on "MAN" key illuminate. Base on rate speed and the number of tooth of engine flywheel calculate sensor measuring input frequency (F), F= tooth * Rate speed / 60, just input this calculated value to controller directly and finish setting, detailed steps as following:

| Operation | Description |
|--|---|
| Controller in ready status: | READY |
| Continuously press " > " 2s, enter into parameter setting menu, then LCD display: | < <setting 参数设定="">> 0. QUIT</setting> |
| Press " \blacksquare " 3 times and then press " \blacktriangleright ", then LCD display: | 3. ENGINE 0. QUIT |

| Press $"$ 2 times and then press " , then LCD display: | 2. Pickup frequency =0 |
|--|---------------------------------------|
| Press" , prompt enter password, key in change password: " , " , " , " , " , " , " , " , " , " | 2. Pickup frequency Password:***** |
| This time can press" ▲" or " ▼" change parameter, input calculated value of sensor measuring input frequency, then LCD according to setting value display: | 2. Pickup frequency = |
| press" " confirm and then continuous press " " 2s can quit parameter setting menu | READY |

Method 2:

| Operation | Description |
|---|---|
| Controller in ready status: | READY |
| Continuously press " > " 2s, enter into parameter setting menu, then LCD display: | < <setting 参数设定="">> 0. QUIT</setting> |
| Press" \blacksquare " 3 times and then press " \blacktriangleright ", then LCD display: | 3. ENGINE 0. QUIT |
| Press" 🔽 " 3 times again then LCD display: | 3. ENGINE 3. Set pickup now |
| Leave engine running, after engine running stable then press" ", controller compare rpm of speed sensor with engine voltage frequency immediately, switch to measuring frequency which under 1500RPM running. When " DONE " disappear, finish speed measuring setting immediately. Press" " and then continuously press " " 2s quit parameter setting men, stop Genset. | 3. ENGINE 3. Set pickup now DONE |

NOTE: Must according to above instruction corrected setting pole pairs 3.4, during speed measuring parameter correction, the protection of controller is imperfection, operator should take more attention to Genset running status. When abnormity occurs, stop correction immediately. Before operated again check out failure. If

possible, suggest operator base on practical condition install a protection circuit or device in external.

12. Technical Specifications

Voltage range: 12V/24V (8~35V) Continued Max working current: @12V 0.4A, @24V 0.2A AC input voltage: phase voltage15~300VAC RMS (AC frequency≥26 Hz) AC current input: $0.05 \sim 5A$ real valid value. AC measure precision: 0.5 class AC input frequency: $3 \sim 70$ Hz (voltage≥15V) Fuel gate/start control relay output 10A/30VDCAux. relay output 3A/30VDCRunning ambient temperature $-20 \sim 50^{\circ}C$ Storage ambient temperature $-40 \sim 80^{\circ}C$ Humidity: $(20\% \sim 75\%)$ RH no condensation Air pressure: $(86 \sim 106)$ kPa IEC shell defend level: IP54B SEN60529 IEC529, BS5490 Vibration standard: ISO10816-1: 1995, GB/T6075.1-1999

13. Troubleshooting

| Failure | Phenomenon | Failure Eliminate |
|---------------------------|---|---|
| Genset no start action | In " MAN" mode press " START" key or in "AUTO" mode, remote control start, input signal is valid. Or in "Test" mode no start action. | Check failure LED, or check LCD display to confirm if failure display. Check DC voltage on controller "C9" terminal, if no voltage, check related circuitry fuse. Such as low voltage, use charger charging battery, after battery fully charging, start again. Check DC voltage on controller C10 and C11 terminal before start, if no voltage, need change controller. Use DC voltage meter cathode measure contact upon magnet of start motor, if have voltage, it is magnet failure, must change, if no voltage, check controller panel connection to confirm if loose or short. |

| | | 1. Check fuel oil position. |
|-------------------------|----------------------|--|
| | | 2. Check DC voltage on controller C10 terminal, |
| | | if no voltage need change controller. |
| | Controller LCD | 3. Check connection and voltage on fuel control |
| | display "start | magnet. |
| | failure": "START | 4. Check fuse on one side of alternator. |
| Diagol start | FAILURE", diesel | 5. Check fuel manifold and filter if jam. |
| Diesei start foiluro | rotating but can not | 6. If has white smoke release from exhaust |
| ranure | start or diesel stop | system, that means fuel has gone into engine, |
| | after start, start | but diesel not start. Please refer to "Diesel |
| | failure LED | Manual" for further check. |
| | illuminate. | 7. If ambient temp low and has heat start |
| | | function, please use it. |
| | | 8. Once failure eliminate, press "RESET" key, |
| | | let control system reset. |
| | | 1. Check controller temp sensor modes "T- |
| | | sensor mode" correct or not, if error need |
| | | reset. |
| | | 2. Check diesel over or not. |
| | | 3. Check radiator jam or not. |
| | Controller LCD | 4. Check fan belt loose or tighten. |
| Diesel | display high water | 5. Check ambient temperature if meet generator |
| hiah | temp failure : | usage range. |
| temp | "HIGH | 6. After diesel cooling, check cool position, do not |
| stop | TEMPERATURE", | add a great deal of cooling water into diesel |
| p | high water temp | before it is not cooling, or will cause serious |
| | LED illuminate. | damage to it. |
| | | 7. Refer to "Diesel Manual" |
| | | 8. Once failure eliminate, press "RESET" key, |
| | | let control system reset. |
| | | 9. Run Genset 10 minutes under unload |
| | | condition let it cooling and then load. |

| Low oil pressure failure stop | Controller LCD display: "LOW OIL PRESSURE", low oil pressure failure LED illuminate. | Check controller pressure sensor modes "P-sensor mode" correct or not, if error need reset. Check oil position, if oil not enough, add oil. Refer to "Diesel Manual" Check oil pressure switch by test meter, if any problem change it. Once failure eliminate, press "RESET" key, let control system reset. |
|--|--|---|
| Diesel over speed failure stop | Controller LCD display : "OVER SPEED", over speed LED illuminate. | Check frequency input value of speed sensor in controller correct or not, if error need reset. Check if governor speed level shaft moved, if yes correct it. If installed electronics governor check level shaft if can freely move, correct it if necessary. Refer to "Diesel Manual" Once failure eliminate, press "RESET" key, let control system reset. |
| Speed not satisfy stop | LCD display low frequency failure | Check frequency input value of speed sensor in controller correct or not, if error need reset. Check if supply fuels enough. Check if governor moved, if yes correct it. If installed electronics governor check level shaft if can freely move, correct it if necessary. Correct diesel speed when it is running. Refer to "Diesel Manual" |
| Too low voltage stop | LCD display low voltage failure | Switch off load on alternator, eliminate failure after stop and restart Genset. Check setting value of generator low voltage failure, make sure data correction. If voltage still low, adjust generator output voltage setting potentiometer, recover to normal value. Refer to "Alternator Manual" |

| Too high voltage stop | LCD display high voltage failure | Switch off load on alternator, eliminate failure after stop and restart Genset. Check setting value of generator high voltage failure, make sure data correction. Check controller measuring voltage, if voltage normal, check load and make sure it is non capacitive, (power factor compensation device will casual cause a capacitive load). If voltage still high, adjust generator output voltage setting potentiometer recover to normal value. Refer to "Alternator Manual" |
|-----------------------------|---|--|
| Engine can not stop | Generator still running after stop, LCD display "stop failure" | Check fuel gate electromagnetic valve in diesel (or level shaft), make sure completely close oil channel under close status. Check fuel gate control electromagnetic valve, change it if necessary. |

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