# MODEL DACTS704C

# DIESEL GENERATOR AUTO CONTROLLER

**（Version：6.0）**

# OPERATION INSTRUCTION

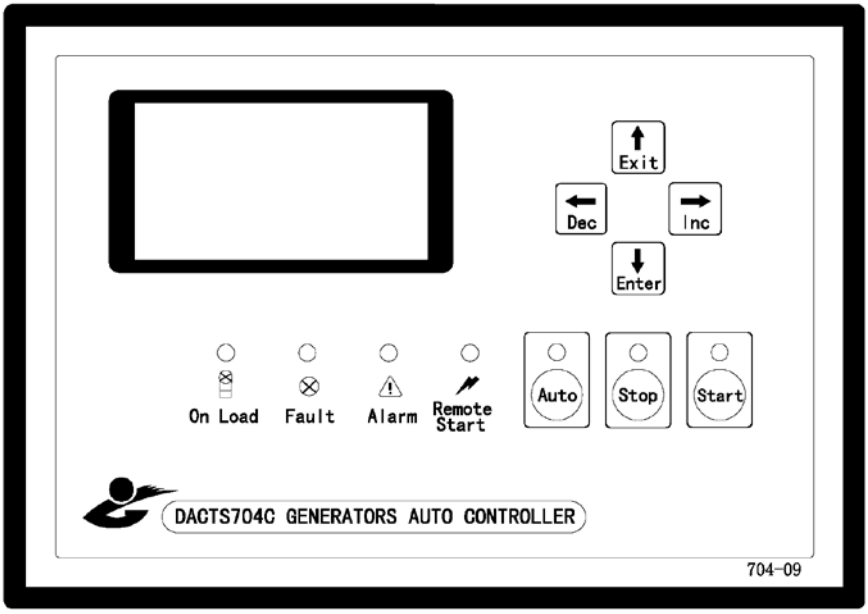
# CONTENTS

## 1. DESCRIPTION

The DACTS704C is a microcontroller-based diesel generator automatic controller, it has a modular concept、high reliability and easy operation, designed to provide the functions necessary for emergency supply.

The controller monitors the status of diesel generator at real-time, automatically starts and stops the diesel generator. It is provided the self-protective function, when a generator fault occurs, the 'alarm' lamp will illuminate, if the fault isn't eliminated after an appropriate time delay ends, the diesel generator will shut down in emergency. This ensures that the diesel generator runs safely and stably.

The optional serial port is a standard RS-232C capable of communicating directly with a personal computer (PC) or any Hayes-compatible modem, which means the user can monitor and control the controller in distance as if he was on site.



## 2. FEATURES

- Automatically controls the diesel generator to start and stop
- Automatically shut down the diesel generator on a fault condition
- Provides two language: Chinese and English
- Configurable system parameters
- Configurable timer settings
- Configurable alarm up and alarm down、stop value and alarm value
- Provides anticipate alarm and alarm/shutdown function
- LED & LCD alarm indication
- Optionally provides remote control function
- Automatically records the total runtime
- Stores the fault records in memory
- Pc configurable via MS windows based software

## 3. SPECIFICATIONS

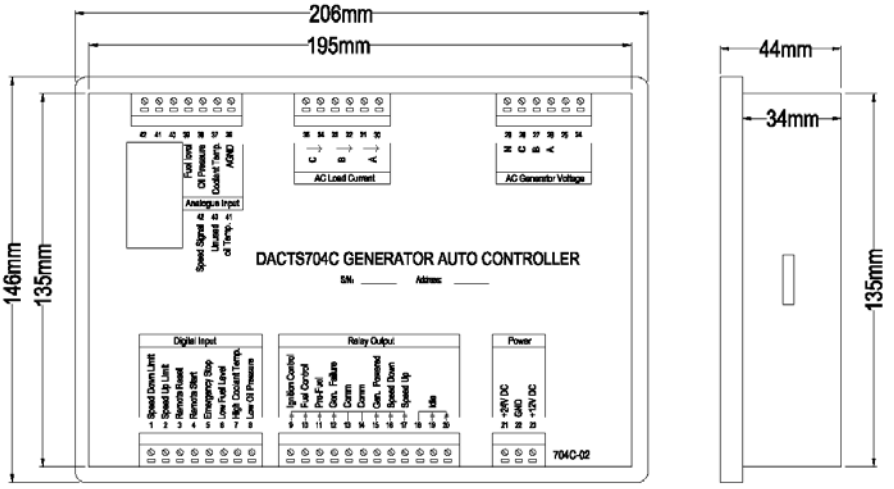
Power Supply：
DC12V（8 to 18V)； DC24V（18 to 36V）
Generator Voltage input Range：
0 to 450V AC，3 phase 4 wire
Generator current input Range：
0 to 5A AC
Generator Frequency input Range：
0 to 99Hz at rated diesel speed
Relay output：
1 Amp DC
Overall Dimensions：
206 X 146 X 44mm (W X H X D)
Operating Temperature Range：
-10℃ to +60℃
Store Temperature Range：
-20℃ to +75℃

## 4. OVERALL AND MOUNTING DIMENSION

The controller has been designed for front panel mounting. The back cover of controller is fitted into cut-out on the install panel, then fitted with the fixing clips removed from the rear.

Overall dimension： 206 X 146 X 44mm (W X H X D)

Cut-out for fix dimension： 197X136mm (W X H)




## 5. PROTECTION FUNCTION

Alarm/Shutdown function: if the controller detects an out of limits condition on any line of voltage, or a problem with generator frequency or speed, the 'alarm' lamp will illuminate to indicate an alarm condition, an appropriate delay begins to time. If the analogue input value returns to within limits during the delay, the delay is reset and the 'alarm' lamp will turn dark. If the value remains out of limits when the delay times out, the diesel generator will shut down in emergency and the LCD will display a failure.

For example, if the voltage is above the value of alarm up, the 'alarm' lamp will illuminate, the 'over generator volts' delay begins to time, if the voltage doesn't return to the within limits when delay times out, the diesel generator shuts down in emergency, the 'fault' lamp illuminates and a high generator voltage failure is shown on the LCD.

Anticipated alarm function: the controller provides this function for the analogue inputs as generator power, current overload, low oil pressure, high coolant temperature, high oil temperature, low fuel level. If the analogue value is between alarm value and stop value, the 'alarm' lamp will light to indicate an alarm condition, when the value is out of the stop value, an appropriate delay begins to time, If the value remains out of stop value when the delay times out, the diesel generator will shut down in emergency and the LCD will display a appropriate failure.
For example, if the oil pressure drops below alarm value, the 'alarm' lamp will light, when the oil pressure is below stop value, the low oil pressure delay begins to time, if the oil pressure remains below stop value, the diesel generator will shut down in emergency, and a low oil pressure failure is generated.

The description for alarm up, alarm down, stop value and alarm value of analogue inputs are detailed in section 8.1

The protection function is as following:

- Under/Over generator voltage alarm/shutdown
- Under/Over generator frequency alarm/shutdown
- Over speed alarm/shutdown
- Over generator power anticipated alarm
- Current overload anticipated alarm
- Low oil pressure anticipated alarm
- High coolant temperature anticipated alarm
- High oil temperature anticipated alarm
- Low fuel level alarm/shutdown
- Low battery voltage alarm, not shutdown
- Emergency Stop
- Fail to Start

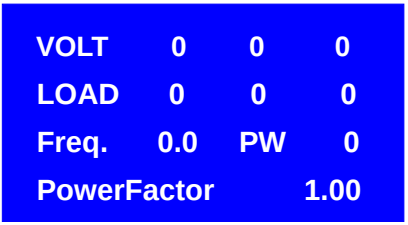
## 6. PHYSICAL STRUCTURE

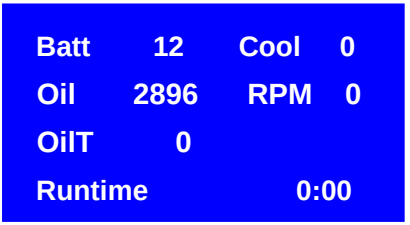
### 6.1 THE FRONT PANEL

The front panel of DACTS704C controller consists of a liquid crystal display (LCD), seven membrane keys and seven high visibility indicated lamps, The simple arrangement provides the operator with complete instrumentation, system information and control.

#### 6.1.1 LCD

The LCD is 4 lines by 15 characters, all menu parameters can be displayed on the LCD by using a simple menu arrangement. Under normal conditions, the LCD displays on the first default page, three phase generator voltage, three phase load current, frequency, engine power, power factor. On the second default page, displays Speed (RPM), battery voltage, coolant temperature, fuel level, oil temperature, oil pressure and Runtime.




| ab. | description | ab. | description |
|---|---|---|---|
| Volt | Generator voltage | Load | Load current |
| freq | Generator frequency | PW | Engine power |
| Batt | Battery voltage | Cool | Coolant temperature |
| Fuel | Fuel level | OilP | Oil Pressure |
| | | OilT | Oil temperature |

Press [←] key, you can transfer between the default page and the system status page.

The controller has two kinds of show language, Chinese and English. Under default page, pressing [Enter] key for 10 seconds, the show language can be transformed between Chinese and English.

6.1.2 KEYS

The seven membrane keys are used to control the DACTS704C, everything is done via the keys.

The function keys are as follows：

**[←/Dec] & [→/Inc]：** The two keys are used by the DACTS704C menu system to scroll through all the items at the same level. Each key scrolls in a different direction, holding [→] or [←] key down will cause a continuous scroll at increasing speed.

The [→] key is also used to increase a numeric value, and the [←] key is used to decrease a numeric value when user is editing a parameter value.

**[↑/Exit]：** The function of the [ ↑ ] key is to 'back up' or exit from your current menu level to the previous level. It can also cancel an editing operation. If you are prompted for a new value and you do not wish to change the original value when you are editing a parameter value, press this key.

**[↓/Enter]：** The [ ↓ ] key will take you to the next level menu each time it is pressed. It can also end an editing operation. When this key is pressed, the value in the numeric field just edited is evaluated. If it is valid, the new value is written to EEPROM(memory), and the editing field is removed. If it is invalid, the editing field also is removed. Pressing this key will transform the language from Chinese to English or reverse.

**[Stop]：** Pressing this key can stop the generator running according to the stop sequence. If the diesel stopped for failure, press this key, all failure on the LCD will be cleared and the controller is reset. The diesel generator is placed in 'stop' mode.

**[Auto]：** Press Auto key, the diesel generator is placed in 'Auto' mode, stopping or starting the diesel generator is controlled by the signal of remote start switch. If the switch is closed, the diesel generator will start according to the remote start sequence. If the switch is open, the diesel generator will stop according to the remote stop sequence.

**[Start]：** The diesel generator will start according to the start sequence if the 'Start' key is pressed.

Note: when the generator is in 'stop' mode, if time delay speed down doesn't end, the 'start' and 'Auto' keys are useless.

6.1.3 LED

On load lamp: if the generator runs normally and the generator voltage and frequency are within limits after warm up time delay, the 'on load' lamp will illuminate.

Fault lamp: When a generator fault occurs, the lamp will illuminate.

Alarm lamp: When an anticipated alarm or an alarm occurs, the 'Alarm' lamp will illuminate.

Remote start lamp: When the remote start switch is closed, the lamp will illuminate, it is indicated that the controller is in 'remote reset' status.

Start, Stop, Auto lamp: indicates the control mode of the controller.

6.2 THE BACK SHELL

6.2.1 TERMINALS DEFINITION

| Terminal No. | Definition | Remark |
|---|---|---|
| Terminal 1 | Speed down limit | Digital input (Valid when connected with ground). |
| Terminal 2 | Speed up limit | |
| Terminal 3 | Remote reset | |
| Terminal 4 | Remote start | |
| Terminal 5 | Emergency stop | |
| Terminal 6 | Low fuel level | |
| Terminal 7 | High coolant temp. | |
| Terminal 8 | Low oil pressure | |
| Terminal 9 | Ignition control | Relay output contact capacity: 2A/50VDC The idle output is a separate contactor. |
| Terminal 10 | Fuel control | |
| Terminal 11 | Pre-fuel | |
| Terminal 12 | Generator failure | |
| Terminal 13, 14 | Comm | |
| Terminal 15 | Generator powered | |

| | | |
|---|---|---|
| Terminal 16 | Speed down | |
| Terminal 17 | Speed up | |
| Terminal 18～20 | Idle speed | |
| Terminal 21 | +24V DC | 18～36V DC |
| Terminal 22 | GND | |
| Terminal 23 | +12V DC | 8～18V DC |
| Terminal 24, 25 | Null | |
| Terminal 26 | Generator voltage A | AC generator voltage |
| Terminal 27 | Generator voltage B | 0～450V AC |
| Terminal 28 | Generator voltage C | |
| Terminal 29 | Null line | |
| Terminal 30, 31 | Load current A | |
| Terminal 32, 33 | Load current B | AC load current |
| Terminal 34, 35 | Load current C | 0～5A AC |
| Terminal 36 | AGND | |
| Terminal 37 | Coolant temperature | Resistance sensor input |
| Terminal 38 | Oil pressure | Resistance sensor input |
| Terminal 39 | Fuel level | Resistance sensor input |
| Terminal 40 | Oil temperature | Resistance sensor input |
| Terminal 41 | User defined | |
| Terminal 42 | Speed signal | Solenoid sensor input |

### 6.2.2 COMMUNICATION PORT

The controller has a separate communication port, connect with PC by the communication wire. The user can monitor and control the controller via the monitor software provided by the factory. If the communication for long distance is required, please use a RS485 conversion module.

## 7. MENU SYSTEM

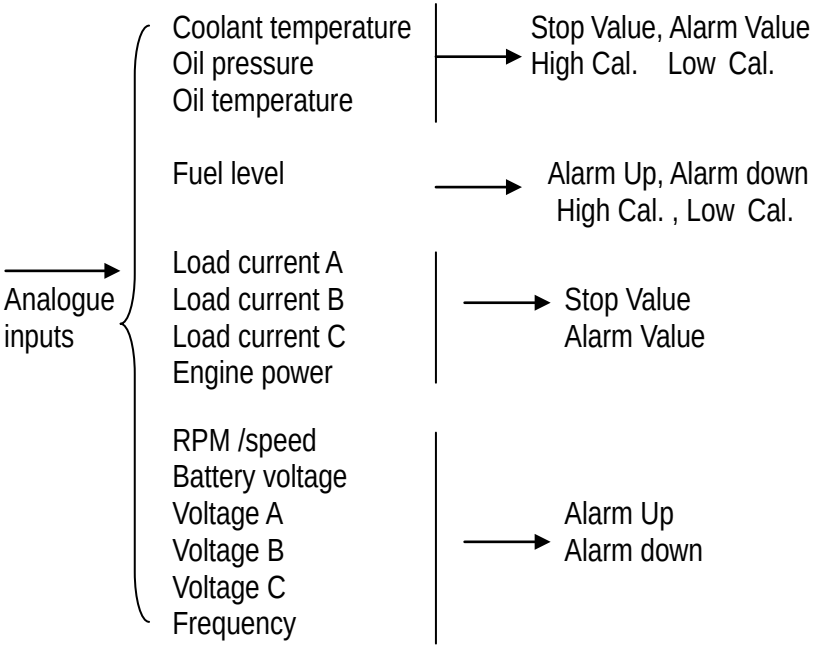
In order to view or set the parameters of the DACTS704C, you are required to enter the password, the password is four-digital (0-9999) and can be changed in system params menu, the default password must be provided by the factory.

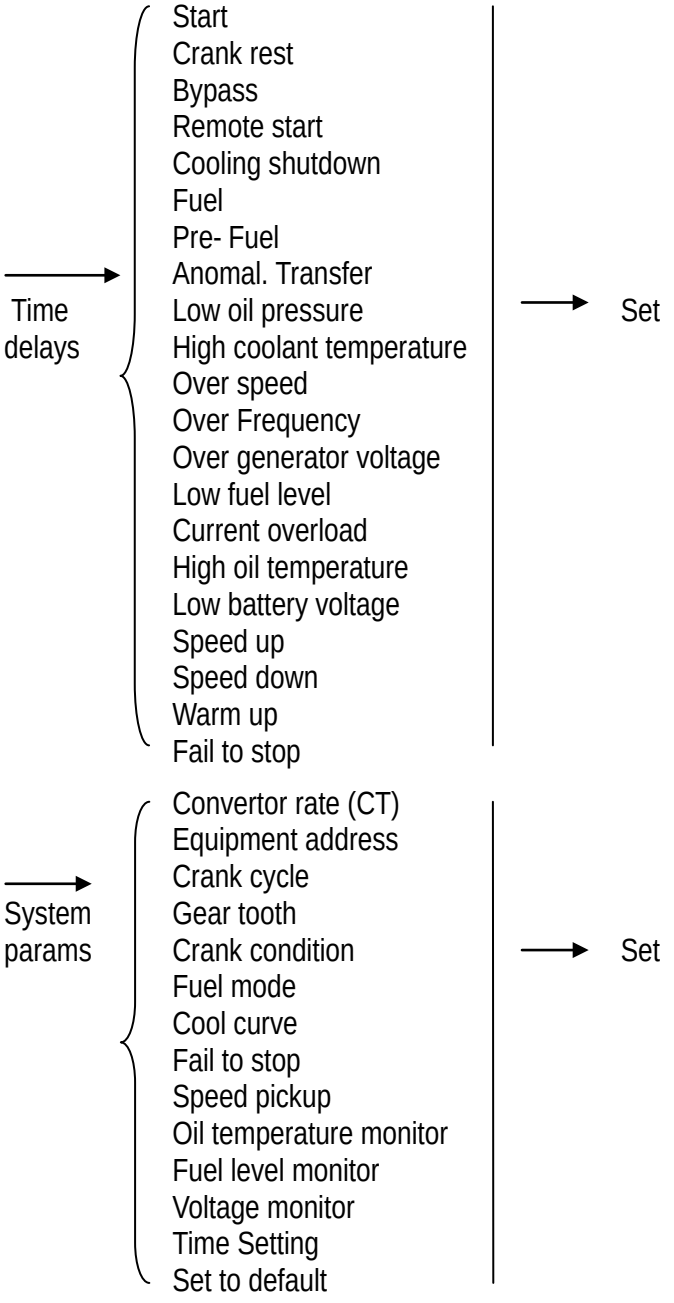
Press the [ ↓ ] key under normal condition, you will be prompted for a password, press the [→] key until the number reaches the first digital of password, then press [ ↓ ] key to end it. Repeat this operation for 4 times, you will get to the parameter menu system.

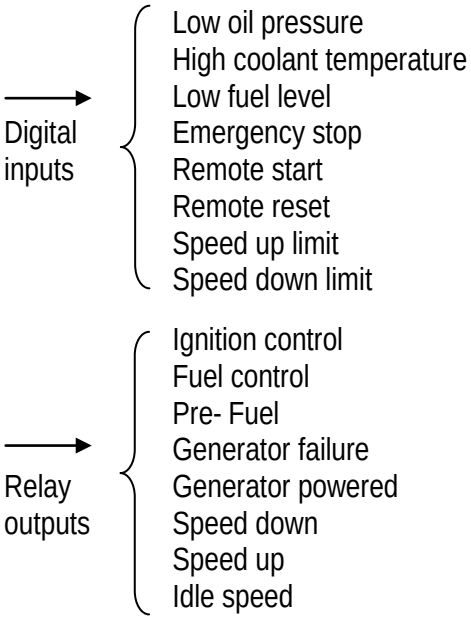
The parameter menu consists of the following items: analogue input, time delay, digital input, relay output, system params, fault records.

To select an item from the menu, use the [←] and [→] key, and press [ ↓ ] key when you want to progress to the next menu level. If you want to go back a level, press [ ↑ ].

The menu layout:




Time delays
Start
Crank rest
Bypass
Remote start
Cooling shutdown
Fuel
Pre- Fuel
Anomal. Transfer
Low oil pressure
High coolant temperature
Over speed
Over Frequency
Over generator voltage
Low fuel level
Current overload
High oil temperature
Low battery voltage
Speed up
Speed down
Warm up
Fail to stop
Set
System params
Convertor rate (CT)
Equipment address
Crank cycle
Gear tooth
Crank condition
Fuel mode
Cool curve
Fail to stop
Speed pickup
Oil temperature monitor
Fuel level monitor
Voltage monitor
Time Setting
Set to default
Set




## 8. PARAMETER DESCRIPTION

### 8.1 analogue inputs

The DACTS704C controller provides 14 analogue input channels, they are Battery voltage, Coolant temperature, Oil pressure, Fuel level, Oil temperature, Engine speed (RPM/speed), Generator voltage phase A、B、C, Load current phase A、B、C, Frequency, Engine power.

The voltage unit is volt, the load current unit is ampere, frequency unit is Hz, power unit is Kw, the temperature unit is Celsius degree, oil pressure unit is Kpa, speed unit is Rpm, runtime unit is hour.

Each analogue input has two groups of parameters. The first group defines the calibration, it includes high calibration point and low calibration point. The second group consists of alarm up and alarm down. The parameter values can be changed.

8.1.1 alarm up and alarm down: this two parameters are used for alarm/shutdown protective function. If an analogue input is above the alarm up or below the alarm down value, an alarm will occur.

8.1.2 alarm value: this parameter is used for anticipated alarm function. If an analogue input is within alarm and stop value, an alarm will occur.

8.1.3 stop value: this parameter also is used for anticipated alarm function. If an analogue input is out of stop value, after an appropriate time delay, the analogue value still remains, a failure is generated and the diesel generator shuts down in emergency.

8.1.4 high calibration and low calibration:
the term scaling means to calibrate the displayed value to accurately reflect the measured value. The controller provides calibration function for coolant temperature, oil temperature, oil pressure and fuel level.

Notice: only professional can change the high and low calibration value, or the analogue input may cause display error.

The default setting of analogue inputs

| NO. | Analogue | Alarm up | | Alarm down | |
|---|---|---|---|---|---|
| 1 | Battery voltage | 28.0 V | | 10.0 V | |
| 2 | VB, VB, VC | 440 V | | 320 V | |
| 3 | Frequency | 55.0 Hz | | 47.0 Hz | |
| NO. | Analogue | Stop value | Alarm value | High Cal. | Low Cal. |
| 4 | Coolant temp. | 95 ℃ | 90 ℃ | 100 ℃ ) | 20 ℃ |
| 5 | Oil pressure | 200 Kpa | 250 Kpa | 600 Kpa | 0 Kpa |
| 6 | Fuel level | 80 % | 20 % | 100 % | 0 % |
| 7 | Oil temperature | 110 ℃ | 105 ℃ | 100 ℃ | 0 ℃ |
| 8 | Speed | 1650 Rpm | 300 Rpm | | |
| 9 | IA, IB, IC | 400 A | 390 A | | |
| 10 | Engine power | 200 Kw | 190 Kw | | |

## 8.2 Time delays：

The DACTS704C has 21 time delays. Each of the 21 time delays have one adjustable parameter：setpoint. This parameter sets the initial value for the time delay, the delay has decrement of 0.1 second from this value to 0.The value of setpoint can be changed by the operator.

◆ Time Delay Start

The time delay begins to time when generator is signaled to start, during the delay period, if the speed rises over the low setpoint value or generator voltage is above the value of voltage setpoint (described in 8.3 System params section), the delay is reset, and the generator is started successfully.

◆ Time delay crank rest

It provides a delay between crank attempts assuming the crank cycle is set more than one. When the delay times out, the crank cycle will increases 1.

◆ Time delay bypass

After the time delay speed up ends, the bypass delay begins to time.

The time delay bypass inhibits diesel shutdown due to low oil pressure, high coolant temperature, high oil temperature, current overload and over generator voltage failure during the delay period. If any of the five parameters are still out of limits when the delay times out, the generator is shut down and locked out.

◆ Time delay remote start

If the controller is in 'Auto' mode, when the 'remote start' switch is closed, the delay begins to time, when the delay times out, the generator is signaled to start.

◆ Time delay cooling shutdown

After time delay anomalistic transfer ends, this delay begins time. At the same time, the 'generator powered' relay is en-energized, the diesel generator is allowed to run without load at rated speed, when delay cooling shutdown times out, the time delay idle shutdown begins to time.

◆ Time delay fuel

This time delay is available only when the fuel mode is configured with stop

output. Once the generator is stopped, the fuel relay is energized and the delay fuel beings to time. When the delay times out and a low oil pressure failure is detected, the fuel relay will be de-energized.

◆ Time delay Re-fuel

The time delay begins to time before the generator startup, at the same time, the Re-fuel relay is energized. When the delay times out, the relay will be de-energized and the generator will begin to start.

◆ Time delay anomalistic transfer

If the controller is in 'Auto' mode, when remote start switch turns to open from closed, the delay time begins. During the delay, the 'generator powered' relay remains energized, the load is powered by the diesel generator.

◆ Time delay low oil pressure

If oil pressure drops below the stop value, this delay begins to time. If oil pressure remains when the delay times out, a low oil pressure failure is generated. If oil pressure rises within the limits before the delay ends, the time delay is reset.

◆ Time delay high coolant temperature

Be similar to time delay low oil pressure

◆ Time delay over speed

Be similar to time delay low oil pressure

◆ Time delay over generator frequency

Be similar to time delay low oil pressure

◆ Time delay over generator voltage

Be similar to time delay low oil pressure

◆ Time delay low fuel level

Be similar to time delay low oil pressure

◆ Time delay current overload

Be similar to time delay low oil pressure

◆ Time delay high oil temperature

Be similar to time delay low oil pressure

◆ Time delay low battery voltage

Be similar to time delay low oil pressure

◆ Time delay speed up

The delay speed up begins to time after the generator is started, during the delay period, the 'speed up' relay remains energized. When 'the speed up limit' switch is closed, the delay is reset.

◆ Time delay speed down

Before the generator is stopped, the delay speed down begins time. After the delay times out, the fuel relay is de-energized. On emergency condition, for example the generator failure occurs or the 'stop' key is pressed, the generator is stopped immediately, at the same time the delay speed down begins to time.

◆ Time delay warm up

After time delay speed up ends, the time delay warm up begins to time. When the delay times out, if the generator voltage and frequency are within the limits, the 'generator powered' relay is energized

◆ Fail to stop

Only when the system parameter fail to stop is configured with 'monitor', this delay is available.

The delay begins to time when the generator is singled to stop. When the delay times out, if the low oil pressure signal hasn't been detected, a 'fail to stop' failure occurs.

Each of the 21 time delays have one adjustable parameter: setpoint. This parameter sets the initial value for the time delay, the delay will begin to time from this value to 0. The value of setpoint can be changed.

As an example, the following is the procedure for changing the value of bypass setpoint to 30.0 seconds:

1) Under normal condition, press [→] key, enter the password (detailed operation see the foregoing section).
2) the LCD displays 'analogue', press [→] key, 'Time delay' appears.
3) press [ ↓ ] key.
4) Press the [→] key until 'Bypass' is displayed, and press [ ↓ ].

5) the LCD displays 'set：15.0'. Press [ ↓ ] to reach the edit status.
6) press [→] and [←] key to adjust the numerical value to 30.0, then press [ ↓ ] to save the value.
7) You can press [ ↑ ] key to return to whatever level of menu you wish.

The default setting of time delay

| No. | Time delays | Default value | Setting range |
|---|---|---|---|
| 1. | Start | 6.0s | 3 ～ 10s |
| 2. | Crank rest | 30.0s | 10 ～ 60S |
| 3. | Bypass | 15.0s | 5 ～ 180S |
| 4. | Remote start | 5.0s | 5 ～ 990s |
| 5. | Cooling shutdown | 5.0s | 5 ～ 180s |
| 6. | Fuel | 15.0s | 5 ～ 15s |
| 7. | Pre-fuel | 5.0s | 0 ～ 20s |
| 8. | Anomal. Transfer | 15.0s | 5 ～ 60s |
| 9. | Low oil pressure | 3.0s | 3 ～ 10s |
| 10. | High cool temp. | 10.0s | 3 ～ 20s |
| 11. | Over speed | 10.0s | 2 ～ 20s |
| 12. | Over gen. frequency | 15.0s | 5 ～ 20s |
| 13. | Over gen. voltage | 60.0s | 5 ～ 60s |
| 14. | Low fuel level | 5.0s | 5 ～ 600s |
| 15. | Current overload | 10.0s | 5 ～ 20s |
| 16. | High oil temp. | 10.0s | 3 ～ 20s |
| 17. | Low battery voltage | 15.0s | 10 ～ 120s |
| 18. | Speed up | 10.0s | 10 ～ 60s |
| 19. | Speed down | 15.0s | 10 ～ 120s |
| 20. | Warm up | 2.0s | 5 ～ 20s |
| 21. | Fail to stop | 30.0s | 5 ～ 60s |

## 8.3 System params：

The system parameters, stored in EEPROM of the controller, are used for different request of the customer, they can be change according to actual need.

- Convertor rate（CT）
  Range from 5 to 5000.
- Equipment address
  Range from 1 to 254
- Crank cycles
  The controller provides from one to eight crank cycles. If more than one cycle is selected, a rest period is inserted between crank attempts. The crank time and rest time are independently adjustable.
- Gear tooth
  When the speed signal comes from the magnetic pickup, the speed results from gear tooth.
- Crank condition

| | |
|---|---|
| 0 (Easy-crank) | If the generator can be started within 3 seconds, then set crank condition to '0'. |
| 1 (Hard-crank) | For some large generator units or the generators that are hardly started in cold condition, please set the value of crank condition to '1'. |

- Fuel mode

| | |
|---|---|
| *Run output* | The fuel relay is energized once the generator is started, and remains energized until the generator is signaled to stop or shut down for failure. |
| Stop output | Under normal condition, the fuel relay remains en-energized. During the generator runs, if the generator is signaled to stop or shut down for failure, the fuel relay will be energized and the generator will be stopped. The fuel relay is de-energized until the time delay fuel times out and the generator is completely stopped. |

- Cool curve

  The controller provides four categories of curve of temperature sensor. Serial number of the curve is from 0 to 3. The following table shows the temperature and resistance value of every curve.

| Temp. | 0 | 20 | 40 | 60 | 80 | 90 | 100 | 120 | ℃ |
|---|---|---|---|---|---|---|---|---|---|
| Curve 0 | 2999 | 1000 | 400 | 170 | 85 | 62 | 43 | 28 | Ω |
| Curve 1 | 2999 | 2284 | 569 | 218 | 123 | 90 | 80 | 70 | Ω |
| *Curve 2* | *2050* | *820* | *330* | *150* | *72* | *52* | *38* | *22* | Ω |
| Curve 3 | 1893 | 1138 | 499 | 225.5 | 141 | 83.3 | 50.6 | 36.8 | Ω |

- Fail to stop

| | |
|---|---|
| *Not monitor* | Not monitor the fail to stop failure |
| Monitor | Monitor the fail to stop failure |

- Speed pickup

| | |
|---|---|
| *frequency* | Speed comes from generator frequency |
| magnetic pickup | Speed comes from magnetic pickup |

- Oil temperature monitor

| | |
|---|---|
| *Not monitor* | The controller doesn't monitor the oil temperature analogue input. Under normal condition, the LCD doesn't display the oil temperature, |
| Monitor | The controller monitors the oil temperature analogue input. The oil temperature is displayed on the default page. |

- Fuel level monitor

| | |
|---|---|
| *Not monitor* | The controller doesn't monitor the fuel level analogue input. Under normal condition, the LCD doesn't display the fuel level. |
| Monitor | The controller monitors the fuel level analogue input. The fuel level is displayed on the default page. |

◆ Voltage monitor

| | |
|---|---|
| *Three phase* | The controller monitors three phase generator voltage and load current. |
| Single phase | The controller monitors only A phase generator voltage and load current. |

◆ Time setting

Data format： year-month-date A/P hour：minute：second

Year： two-digital ( eg.06 )

Month： two-digital ( 01 through 12 )

Date： two-digital ( 01 through 31 )

A/P： two-digital ( A– a.m.； P– p.m. )

Hour： two-digital ( 01 through 12 )

Minute： two-digital ( 00 through 59 )

Second： two-digital (00 through 59 )

◆ Set to defaults

| | |
|---|---|
| *Analogue* | All of the analogue inputs are set to factory default values. |
| Delay and System | All of time delays and system parameters are set to factory default values. |

It is important to notice, however, that all of the configuration parameters are reset when you perform this function.

The default setting of system parameters

| No. | System params. | Default value | Setting range |
|---|---|---|---|
| *1.* | Convertor rate | 500（：5） | 5 ～ 9999 |
| *2.* | Equipment address | 120 | 0 ～ 255 |
| *3.* | Crank cycles | 3 | 1 ～ 8 |
| *4.* | Gear tooth | 128 | 1 ～ 255 |
| *5.* | Crank condition | 0 | 0 / 1 |
| *6.* | Fuel mode | Run output | Run output / Stop output |
| *7.* | Cool curve | 2 | 0 ～ 3 |

| | | | |
|---|---|---|---|
| *8.* | Fail to stop | Not monitor | Not monitor / Monitor |
| *9.* | Speed pickup | Frequency | Diesel frequency / Magnetic pickup |
| *10.* | Oil temp. monitor | Not monitor | Not monitor / Monitor |
| *11.* | Fuel level monitor | Not monitor | Not monitor / Monitor |
| *12.* | Voltage monitor | Three phase | Three phase / Single phase |

## 8.4 digital inputs

The controller accepts the following digital inputs：low oil pressure, high coolant temperature, low fuel level, emergency stop, remote start, remote reset, speed up limit, speed down limit.

Digital input status is either 0 or 1. A value of 0 indicates the switch is open, a value of 1 indicates the switch is closed. When the value is 1, the display background of digital input is light, and the value is 0, the background is normal.

## 8.5 Relay outputs

Relay outputs are provided for ignition control, fuel control, pre-fuel, generator failure, generator powered, speed down, speed up, idle.

Relay output status is either 0 or 1. A value of 0 indicates the relay is de-energized, a value of 1 indicates the relay is energized. When the value is 1, the display background of relay output is light, and the value is 0, the background is normal.

The status of any input can be monitored by scrolling through the digital inputs menu. Similarly any relay output can be monitored by scrolling through the relay outputs menu.

## 8.6 Fault records

The controller can store at best eight records in memory. On this menu, show the total numbers of the diesel faults and record time. The last one record is displayed on the first.

## 9. Notice

- If the output termianl is connected with inductive load (eg.relay), the operator should put the current absorption circuit in external circuit. The connection is described in the DACTS704C diagram of wiring.
- Generally, many parameters needs to change during testing the controller, they are three phases load current, alarm value and stop value of engine power, alarm up and alarm down of battery voltage, gear tooth, CT rate, fuel mode.
- The external wiring of load current should adopt 1.5mm$^2$ flexible wire, Other wirings may adopt 1mm$^2$ flexible wire.
- Connect the terminals of power supply according to the capacity of battery voltage.if the LCD displays nothing when the controller is powered up, please check if polarity reversal. Wrong connection may cause the damage of controller.
- The analouge input and digital input reversal connection of oil pressure and coolant temperature sensors, may cause the mis-stop or abnormality of start output.
- The parameter 'set to default' in system params menu, can set all the analogue inputs, time delays, system parameters and calibration of analogue inputs to factory default value.

## 10. Control procedure

Manual start sequence

Press [start] key→ pre-fuel→ start→ speed up→ run normally

Relevant parameter: time delay pre-fuel, time delay start, time delay crank rest, time delay bypass, time delay speed up, crank cycles, fuel mode, voltage setpoint.

Relevant output: pre-fuel, start, fuel, speed up, idle speed.

Auto start sequence

In Auto mode, remote start switch is closed→ time delay remote start → pre-fuel → start→ speed up→ warm up → generator powered→ run

normally

Relevant parameter: time delay remote start, time delay pre-fuel, time delay start, time delay crank rest, time delay bypass, time delay speed up, time delay warm up, crank cycles, fuel mode, voltage setpoint.
Relevant output: pre-fuel, start, fuel, speed up, idle speed, generator powered.

### Manual sop sequence

Press [stop] key→speed down → stop
Relevant parameter: time delay speed down, time delay fuel, fuel mode.
Relevant output: fuel, speed down, idle speed.

### Auto stop sequence

In Auto mode, remote start switch is opened→ time delay anomalistic transfer → generator powered relay is de-energized → cooling shutdown→ speed down→ stop

Relevant parameter: time delay anomalistic transfer, time delay cooling shutdown, time delay speed down, time delay fuel, fuel mode.
Relevant output: fuel, speed down, idle speed, generator powered.

### Fuel output

The operator should configure the fuel mode according to the control mode of the throttle.

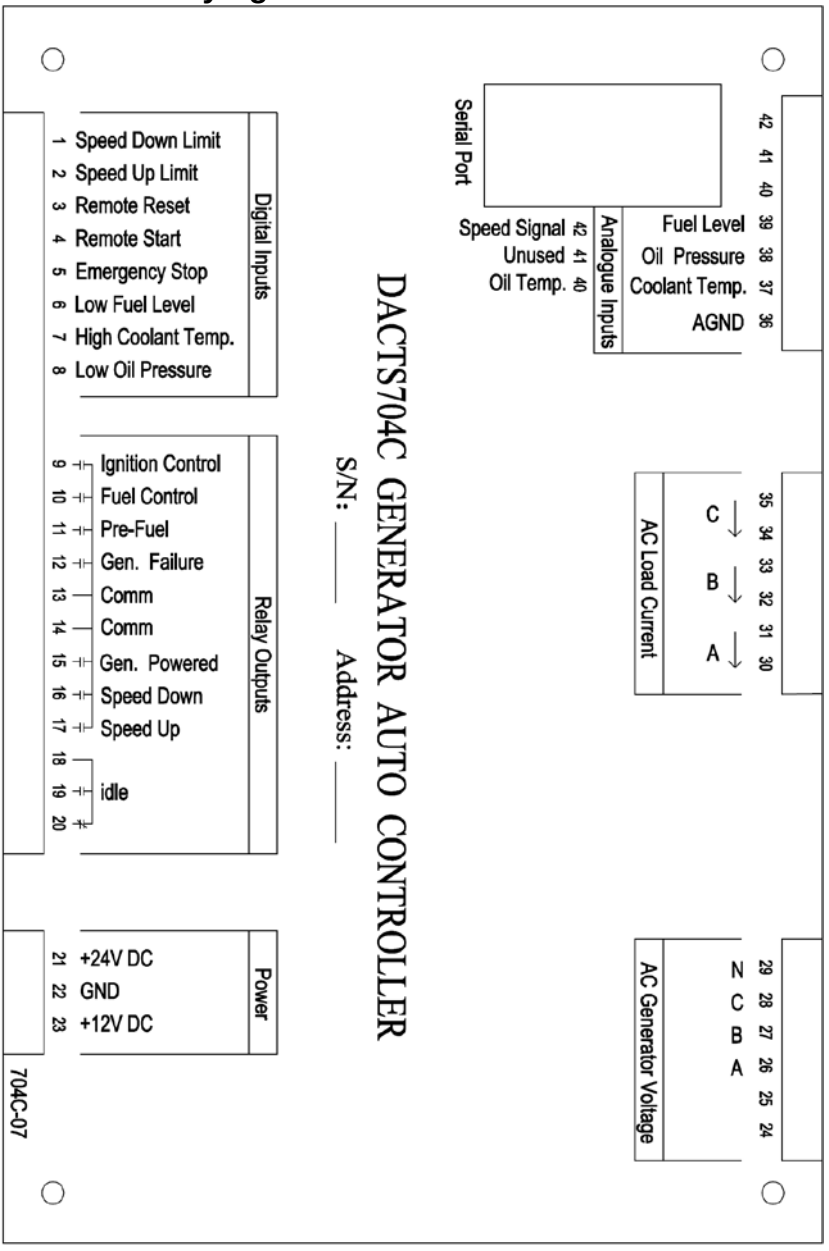
### Speed up, speed down and idle speed outputs

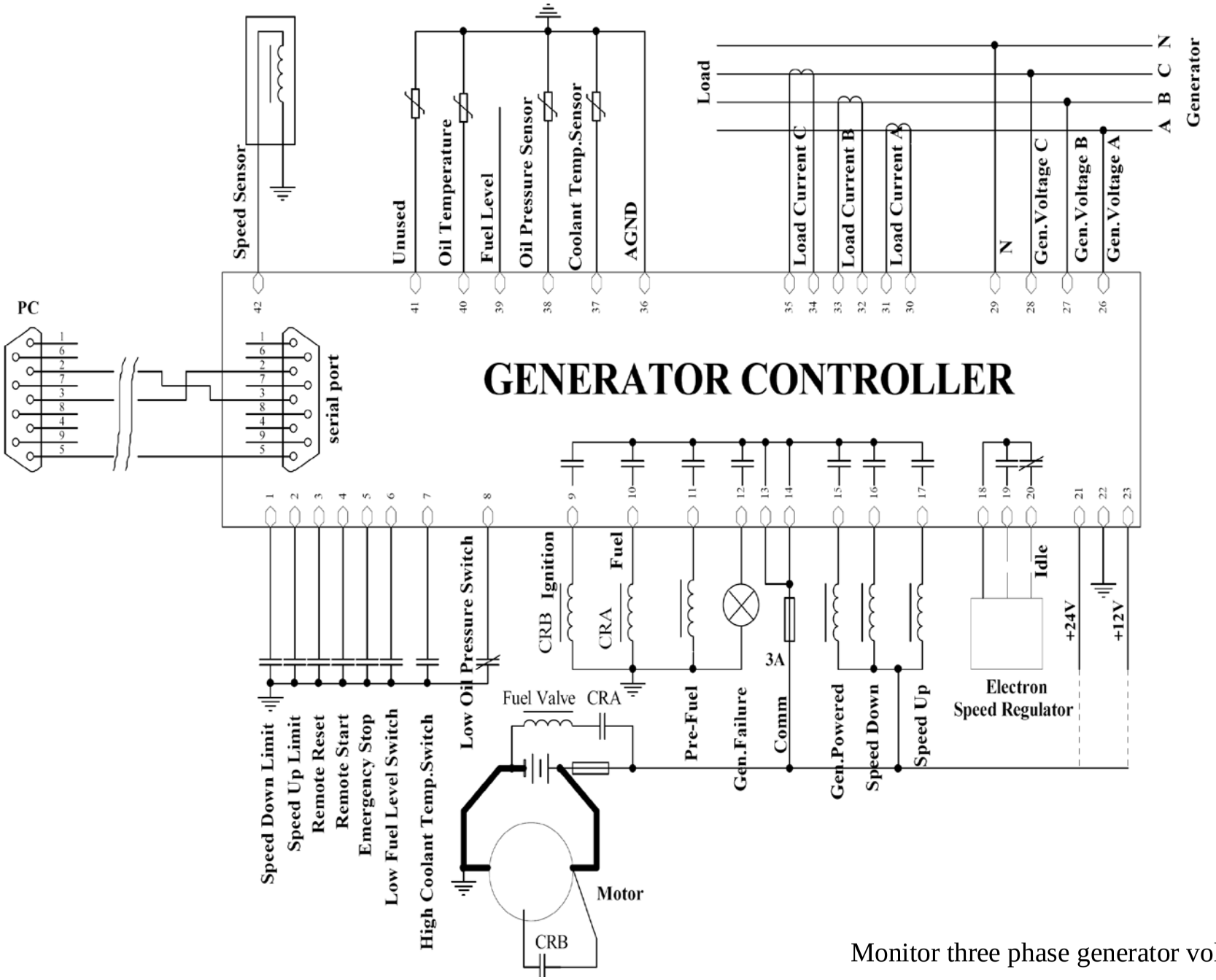
The speed up output, speed down output, associated the appropriate speed limit switch, can control the electric speed governing mechanism.

The idle speed output can control the electron speed regulator. The coil of relay is powered up when the diesel runs at high speed, the operator should use either normally open contact or normally-closed contact according to practical situation.

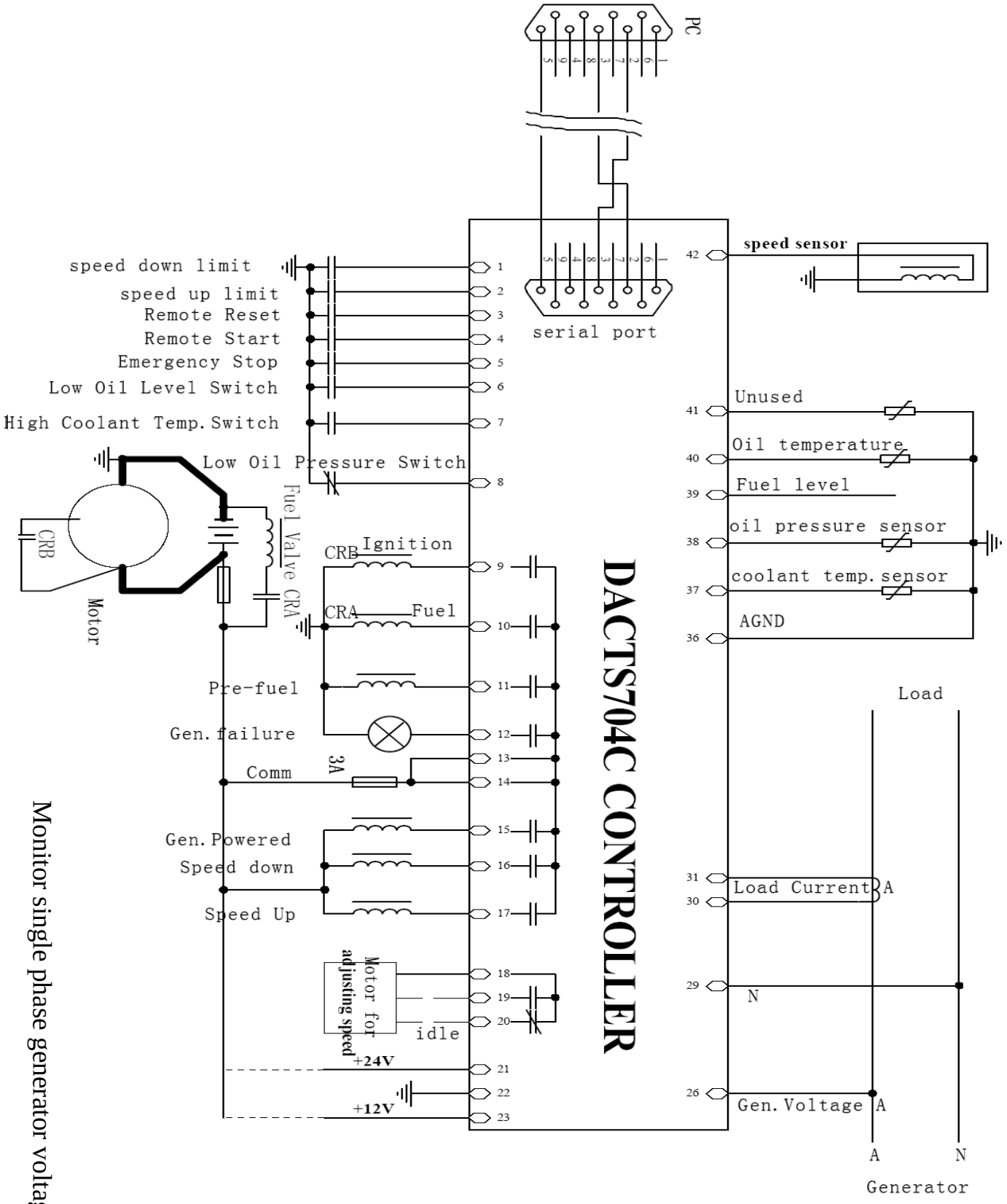
If the diesel hasn't speed governing mechanism, speed up output, speed down output, and idle speed output are unused.

## 11. Accessory figure






Monitor three phase generator voltage




Monitor single phase generator voltage