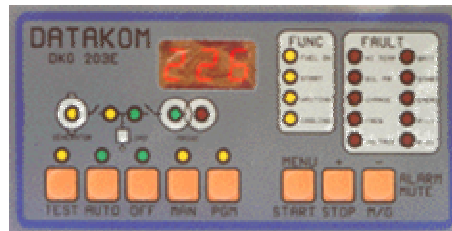




DKG-203 AUTOMATIC MAINS FAILURE UNIT



INPUTS AND OUTPUTS

DC SUPPLY: The positive (+) and negative (-) terminals of the DC Supply shall be connected to these terminals. Be careful for the polarization, in case of polarity error the unit will not operate.

DC Supply negative (-) terminal, mains neutral terminal and the alternator neutral point must be connected outside of the unit.

The unit has different models for 12 volts and 24 volts DC supplies. The operating voltage is written on the rear cover.

R-S-T: Connect the mains phases to these inputs. The mains voltages upper and lower limits are programmable. Neutral terminal of the mains must be connected to DC supply negative (-) terminal.

G: Connect one of the generator phases to this input. The generator phase voltage upper and lower limits are programmable. Neutral terminal of the alternator must be connected to DC supply negative (-) terminal.

MAINS CONTACTOR: This output provides energy to mains contactor. If the voltage of one of the mains voltages is outside limits, the mains contactor will be de-energized. In order to provide extra security, normally closed contact of the generator contactor should be serially connected to this output.

Relay contact rating is 5A/250V-AC

GENERATOR CONTACTOR: This output provides energy to generator contactor. If the generator phase voltage is outside limits, the generator contactor will be de-energized. In order to provide extra security, normally closed contact of the mains contactor should be serially connected to this output.

Relay contact rating is 5A/250V-AC

PROGRAM LOCK INPUT: This input is used to block unwanted modifications to programmed values. If this input is open, program values can be modified, but if this input is connected to (-) it is not possible to change the program values.

HIGH TEMPERATURE SWITCH: Connect the high temperature switch to this input. This switch shall be negative closing switch type.

LOW OIL PRESSURE: Connect the low oil pressure switch to this input. The switch should be negative closing in case of loss of oil pressure. This input must be properly connected for the correct operation of the unit. If oil pressure is provided, the generator will not start and the oil pressure alarm indicator will flash. However, if the oil pressure is removed the unit will resume normal operation.

CHARGE INPUT: Charging alternator lamp terminal may be connected to this input. The unit will alarm if the charging alternator is not generating voltage while the engine is running. If unused this input can be left open.

EMERGENCY STOP INPUT: Emergency stop button is connected to this input. The connection shall be made in order to give (-) to the input when the button is pushed.

A-11 INPUT: It is possible to connect additional generator failure contacts to this input. The contacts must be open when there is no failure and closed when there is a failure. Contact terminals must transfer DC Supply (-) terminal to the input. It is also possible to parallel more than one contact and connect them to this input.

A failure signal received from this input will immediately result to an engine stop.

B-21 INPUT: It is possible to connect additional failure and warning contacts to this input. The contacts must be open when there is no failure and closed when there is a failure. Contact terminals must transfer DC Supply (-) terminal to the input. It is also possible to parallel more than one contact and connect them to this input.

A failure signal received from this input will only result to an alarm output and does not affect the engine operation.

FUEL OUTPUT: This output is used on diesels equipped with a fuel solenoid. The unit activates this output before starting the engine and deactivates it to stop it. By programming, this relay can also control 'activate to stop' type of engines.

Relay contact rating is 5A/28V-DC.

START OUTPUT: Generator start output. Relay automatically turns off when the generator voltage reaches 25 volts or the generator frequency reaches 10Hz.

Relay contact rating is 5A/28V-DC.

ALARM OUTPUT: If an alarm occurs, this relay will be activated. It will be deactivated when the ALARM key is pressed. Additionally, it is possible to provide STOP, PREHEAT or CHOKE functions through this relay by programming.

Relay contact rating is 5A/28V-DC.

DISPLAYS

DIGITAL DISPLAY: This display shows:

- (R) phase voltage, if mains are on
- Alternator frequency, if the generator is on
- Program values in program mode

Below values can be read in sequence by pushing MENU key in AUTOMATIC or TEST modes:

- (R) phase voltage
- (S) phase voltage
- (T) phase voltage
- (G) phase voltage
- DC Supply voltage
- (G) phase frequency (engine RPM)

GENERATOR: (yellow) it turns on if the (G) phase voltage is within programmed limits.

LOAD GENERATOR: (YELLOW) it turns on when the generator contactor is activated.

LOAD MAINS: (GREEN) it turns on when the mains contactor is activated.

MAINS OK: (green) it turns on when all (R-S-T) phase voltages are within the programmed limits.

MAINS FAILURE: (red) It turns on when at least one of the phase voltages is outside limits.

FUEL: (yellow) it turns on when the fuel relay is activated.

WAITING: (yellow) it turns on during mains waiting period, before and between starts and contactor periods.

COOLING: (yellow) it turns on while the engine runs for cooling.

TEST/AUTO/OFF/PGM/MAN: It turns on when the related operation mode is selected. One of these LEDs is always on and indicates which operation mode is selected.

ALARMS

There are two types of alarms: major and minor alarms. Major alarms cause the engine to stop immediately. Minor alarms activate the alarm relay but do not affect the genset operation.

If an alarm occurs, the related LED will turn on and the alarm relay will be activated. If the (ALARM) key is pressed, the alarm relay will be deactivated. Alarm LED will stay on until the alarm disappears.

Major alarm LEDs will stay on and disable the operation of the generator even if the alarm source is removed. In order to reset the alarm condition, first choose OFF mode than resume to the previous mode of operation.

The EMERGENCY STOP signal will cause the engine to stop and the related alarm led to turn on, but it will not activate the ALARM relay output. Unlike other alarms, when the emergency stop signal is removed, the alarm led will turn off and the unit will resume normal operation.

HIGH TEMPERATURE ALARM: (red-major) it is on when a signal comes from the high temperature input.

OIL PRESSURE ALARM: (red-major) it is on when a signal comes from the oil pressure input. This alarm will be controlled 8 seconds after the engine is running. If oil pressure is provided when the unit attempts to start the engine the oil pressure alarm indicator will flash and the unit will wait until oil pressure disappears.

CHARGE ALARM: (red-minor) it is on when a signal arrives from charge input when the engine is running. This alarm will be controlled 5 seconds after the engine is running.

FREQUENCY ALARM: (red-major) it is on when the generator frequency is out of the programmed limits for a longer period than programmed timer. Generator frequency will be controlled 4 seconds after the generator contactor is on.

VOLTAGE ALARM: (red-major) it is on when (G) phase voltage is out of the limits. Generator voltage will be controlled 4 seconds after the generator contactor is on.

DC SUPPLY ALARM: (red-major) it is on when DC Supply voltage is above programmed limit.

FAIL TO START: (red-major) It is on if the engine cannot start to run after the programmed number of start attempts. This alarm will be erased when the mains are on in order to keep the engine ready for the next mains failure.

EMERGENCY STOP: (red-major) it arises if emergency stop button (or front panel STOP key) has been pushed. This alarm is not latched. The alarm condition disappears when the signal is removed. This input is also used externally to prevent the operation of the generator (for ex. by a timer).

A-11 ALARM: (red-major) it arises if a signal from A-11 input has been received.

B-21 ALARM: (red-minor) it arises if a signal from B-21 input has been received.

MODES OF OPERATION

The modes of operation are selected by pressing front panel keys. If the mode is changed while the generator is operating the engine will be stopped.

Press ALARM key to stop the audible alarm.

OFF: In this mode, the mains contactor will be energized if mains phase voltages are present.

MANUAL: It is used to start and stop the generator manually. If the manual mode is selected the fuel relay will be activated and the generator will be ready to be started. If the generator is not running after 1 minute, the fuel relay will be deactivated.

START: It is used to manually start the generator unlimited times. In order to start it is needed not to have oil pressure. Otherwise the engine will not crank and the oil pressure alarm indicator will flash. When G phase voltage reaches 25 volts or G phase frequency reaches 10Hz, starting will be automatically disabled even if the button is pressed.

STOP: It is used to manually deactivate the fuel solenoid as long as it is desired. When stop button is pressed the generator contactor will also be deactivated.

MAINS/GENERATOR: It is used to transfer the load manually. If this button is pressed once, the generator contactor will be activated, if it is pressed one more time, the mains contactor will be activated.

AUTOMATIC: It is used for generator and mains automatic transfer. If at least one of the mains phase voltages is outside limits, mains contactor will be deactivated.

The diesel will be started for programmed times after the wait period. When the generator runs the start relay will be immediately disabled. After the G phase voltage is within the limits, the unit will wait for the contactor period and the generator contactor will be energized.

When all the mains phase voltages are within the limits, the engine will continue to run for mains waiting period. At the end of this period the generator contactor is deactivated and mains contactor will be energized. If a cooling period is given, the generator will continue to run during cooling period. At the end of the period, the fuel solenoid will be de-energized and the diesel will stop. The unit will be ready for the next mains failure.

It is possible to stop the generator, by pushing the STOP button, even if the generator is operating.

TEST: It is used to test the generator when the mains are on, or keep the generator waiting in emergency backup. The operation of the generator is similar to the AUTOMATIC mode, but the mains contactor will not be deactivated if the mains are not off. If the mains are off, mains contactor will be deactivated and the generator contactor will be activated. When the mains are again on, a changeover to the mains will be made, but the diesel is kept running. In order to stop the engine, push the STOP button.

PROGRAM: It is used to program the timers and operational limits. The display shows (Pr) if program mode is selected. Each time the MENU key is pushed, the next program number will displayed and whenever it is released program value will be shown. For example if you push MENU key and keep pushing, you will see (P1) on the display. When you release MENU key you will see P1 value and you can increase or decrease this value by using (+) and (-) keys. If you push one more time the MENU key you will see (P2) on the display and when you release it you will see P2 value. You can continue on this order until P18. After P18 you will turn back to P1. Programmed values are stored in a special memory, which is not affected by energy failures.

P1 = MAINS VOLTAGE LOWER LIMIT: (30 - 250 volts) if one of the mains phases goes under this limit, it means that the mains are off and it starts the transfer to the generator in automatic mode.

P2 = MAINS VOLTAGE UPPER LIMIT: (100 - 400 volts) If one of the mains phases goes over this limit, it means that the mains are off and it starts the transfer to the generator in automatic mode.

P3 = GENERATOR VOLTAGE LOWER LIMIT: (30 - 250 volts) if the generator phase voltage goes under this limit when feeding the load, this will mean a generator voltage failure and the engine will stop in automatic or test mode.

P4 = GENERATOR VOLTAGE UPPER LIMIT: (100 - 400 volts) if the generator phase voltage goes over this limit when feeding the load, this will mean a generator voltage failure and the engine will stop in automatic or test mode.

P5 = FREQUENCY LOWER LIMIT: (10 - 60 Hz) If (G) phase frequency goes under this value for a period longer than frequency delay timer, during automatic, test or manual modes, while the generator is feeding the load, it causes frequency alarm (underspeed) and the generator will stop immediately. This limit is not controlled in the first 4 seconds after the generator contactor has been energized.

P6 = FREQUENCY UPPER LIMIT: (50 - 100 Hz) if (G) phase frequency goes over this value for a period longer than frequency delay timer during automatic, test or manual modes, while the generator is feeding the load, it causes frequency alarm (overspeed) and the generator will stop immediately. This limit is not controlled in the first 4 seconds after the generator contactor has been energized.

P7 = FREQUENCY DELAY TIMER: (0 - 15 Hz) if (G) phase frequency goes out of the programmed values for a period longer than frequency delay timer during automatic, test or manual mode while the generator is feeding the load, it causes frequency alarm and the generator will stop immediately.

P8 = DC SUPPLY UPPER LIMIT: (12.0 - 33.0 volts) If DC Supply voltage exceeds this limit it will cause DC Supply alarm.

P9 = NUMBER OF STARTS: (1-6) In automatic or test mode the generator start attempts cannot exceed this number.

P10 = WAIT BEFORE START TIMER: (0 - 240 seconds) In automatic or test mode waiting period before start. (Also preheat timer if preheat output is selected)

P11 = WAIT TIMER BETWEEN STARTS: (2 - 30 seconds) In automatic or test mode waiting period between starts.

P12 = START TIMER: (2 - 15 seconds) In automatic or test mode start period.

P13 = STOP TIMER: (0 - 60 seconds) in automatic or test mode it adjusts stop solenoid energizing period in order to stop the generator.

P14 = MAINS WAITING TIMER: (0 - 7.5 minutes) this is the time between the mains voltages entered in the limits and the load transferred from the generator to the mains.

P15 = COOLING TIMER: (0 - 7.5 minutes) this is the period that the engine runs with no load, after the load changeover to the mains.

P16 = MAINS CONTACTOR TIMER: (0 - 15 seconds) this is the period after the generator contactor has been deactivated and before the mains contactor has been activated.

P17 = GENERATOR CONTACTOR TIMER: (0 - 15 seconds) this is the period after the mains contactor has been deactivated and before the generator contactor has been activated.

P18 = RELAY CONFIGURATION: (0 - 7) FUEL and ALARM relay configuration can be selected according to this parameter.

0: FUEL - START - ALARM

4: STOP - START - ALARM

1: FUEL - START - STOP

5: STOP - START - STOP

2: FUEL - START - PREHEAT

6: STOP - START - PREHEAT

3: FUEL - START - CHOKE

7: STOP - START - CHOKE

TROUBLESHOOTING

When the AC mains fails, the unit energizes the fuel solenoid, but does not start. Then it gives FAIL TO START alarm:

Oil pressure switch not connected.

Oil pressure switch connection wire may be cut.

Oil pressure switch may be faulty.

When the AC mains fails, the engine starts to run but the unit gives FAIL TO START alarm and then the engine stops:

The generator phase voltage is not connected to the unit. Measure the AC voltage between terminals (G) and (-) at the rear of the unit while engine is running. The fuse protecting the generator phase may be failed. A misconnection may be occurred. If everything is OK, turn all the fuses off, and then turn all the fuses on, starting from the DC supply fuse. Then try the unit again.

The engine does not run after the first start attempt, and then the unit does not start again and then gives FAIL TO START alarm:

The oil pressure switch closes very lately. As the unit senses an oil pressure, it does not start. It may be necessary to change the oil pressure switch.

The genset starts to operate while AC mains is OK:

Check connection between AC Neutral and DC Supply (-) terminal.

AC mains voltages may be outside programmed limits. Read AC voltages by pressing the MENU button.

Upper and lower limits of the mains voltages may be too tight. Get in the PROGRAM mode and check for the AC voltage upper and lower limits. If necessary widen the limits.

AC voltages displayed on the unit are not correct:

The error margin of the unit is +/- 5 volts. If there is a larger error then check connection between AC Neutral and DC Supply (-) terminal.

If there are faulty measurements only when the engine is running, there may be a faulty charging alternator or voltage regulator on the engine. Disconnect the charging alternator connection and check if the error is removed.

The unit is inoperative:

Measure DC-supply voltage between (+) and (-) terminals at the rear of the unit. If OK, turn all the fuses off, then turn all the fuses on, starting from the DC supply fuse. Then try the unit again

TECHNICAL SPECIFICATIONS

Operating temperature: -10 to +70 degrees C.

Relative humidity: %10 to %90

DC Supply:

DKG-203/12V: 9 to 18 volts.
4.0-18 V while cranking

DKG-203/24V: 18 to 33 volts
8.0-33 V while cranking

Power consumption: 1 Watt (In automatic mode, when the mains are on)
3 Watt max. (Relay outputs left open)

Dimensions: 144 x 72 x 50mm (WxHxD)

Mounting hole dimensions: 138 x 66mm minimum.

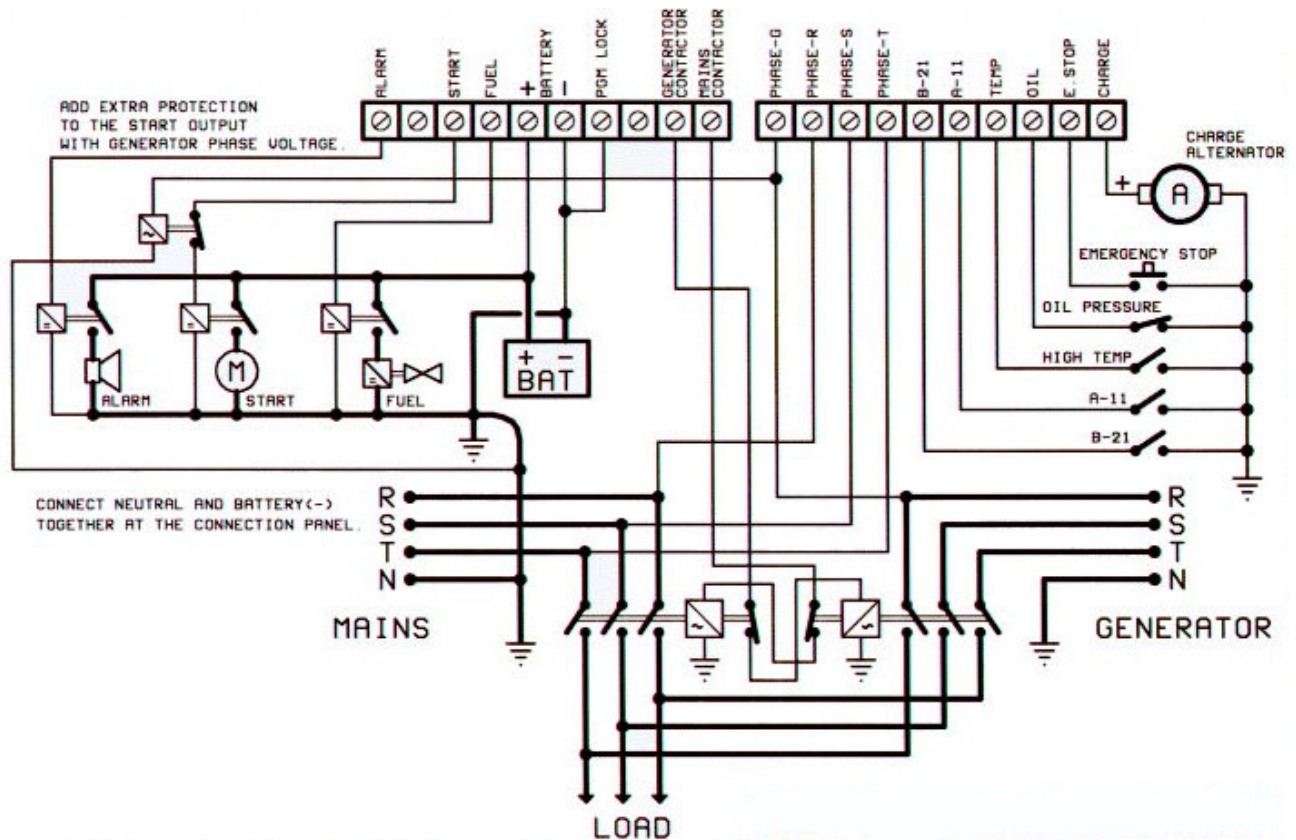
Weight: 500 g (approx.)

Accuracy:

Phase voltages : 2% + 1v

DC supply voltage : 2% + 0.2v

Generator frequency : +/- 0.5 Hz



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