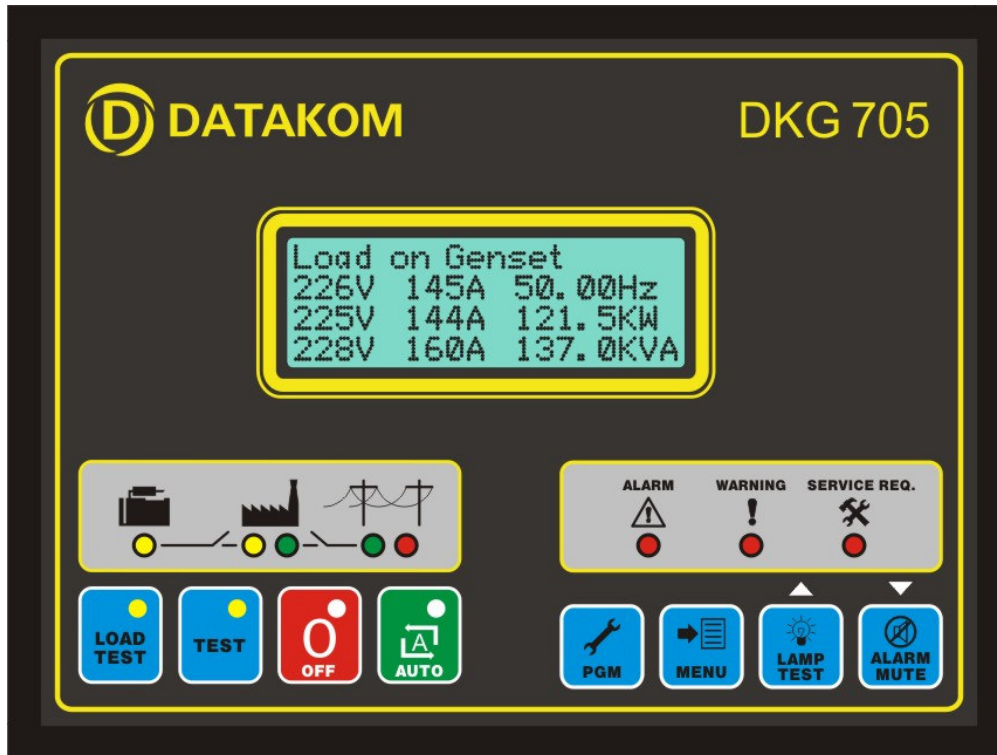


DKG-705 AMF, PARALLEL TO MAINS AND DUAL GENSET SYNCHRONIZATION UNIT WITH J1939 INTERFACE



STANDARD FEATURES

Automatic mains failure
J1939 engine monitoring and control port
Various engine brands and models available
Engine control
Generator protection
Built in alarms and warnings
True RMS measurements
Complete genset power measurements
Complete mains power measurements
Synchroscope
Governor and AVR control interfaces
No break transfer & no break load test
Soft transfer with ramp control
Single set parallel with mains
Dual genset synchronization & parallel with mains
Peak lopping (peak shaving)
Load shedding
Export to mains
KW/KVAr load control
G-59 mains protections
Battery backed-up real time clock
Daily, weekly, monthly exerciser
Remote start operation capability
Gas engine support
Mains simulation input
Engine Idle speed control
Periodic maintenance request indicator
Event logging with time stamp
Statistical counters

Weekly operation schedule programs
Field adjustable parameters
RS-232 serial port
Upgrade software downloadable from serial port
Free MS-Windows Remote monitoring SW:
-local, LAN, IP and modem connection
-monitoring, download of parameters
-download of software updates
-modem networking
GSM SMS message sending on fault
GSM and PSTN modem calls on fault
MODBUS communications
LCD display 4 lines by 20 characters
Dual language support
Output expansion capability
Configurable analogue inputs: 4
Configurable digital inputs: 8
Configurable relay outputs: 7
Survives cranking dropouts
Sealed front panel (IP65)
Plug-in connection system for easy replacement

OPTIONAL FEATURES

Internal modem (9600bps)
External DC voltage measurement
External DC voltage based genset operation
Internal buzzer

DESCRIPTION

The DKG-705 is a comprehensive AMF unit for single or dual generating set operating in **standby** or **parallel with mains** modes.

In AUTOMATIC position, DKG-705 monitors mains phase voltages and controls the automatic starting, stopping and load transfer of the generating set in case of a mains failure and once the generator is running, it monitors internal protections and external fault inputs. If a fault condition occurs, the unit shuts down the engine automatically, indicates the failure source on the LCD display and turns on the red ALARM led.

The DKG-705 unit is able to transfer the load between mains and genset in 4 different ways:

-transfer with interruption: there will be a power interruption period during the transfer

-no break transfer without synchronization: transfer will be made without power interruption. The unit waits until mains and generator phases match and makes a quick transfer.

-no break transfer with synchronization: transfer will be made without power interruption. The unit operates the governor and AVR control outputs to synchronize the generator voltages with the mains and makes a quick transfer.

-soft transfer: transfer will be made without power interruption. The unit operates the governor and AVR control outputs to synchronize the generator voltages with the mains and makes a smooth ramped transfer.

The operation of the unit is controlled with front panel pushbuttons. The LOAD TEST, TEST, AUTO and OFF pushbuttons select the operating mode. Other buttons select the program mode entry/exit, display parameter scroll, alarm mute and lamp test functions.

The DKG-705 provides a comprehensive set of digitally adjustable timers, threshold levels, input and output configurations and operating sequences. The unauthorized access to program parameters is prevented by a 3 level password system. All programs may be modified via front panel pushbuttons, and do not require an external unit.

The fault conditions are considered in 3 categories as Warnings, Load-dumps and Alarms. Measured values have separate programmable limits for warning and alarm conditions.

The service request indicator lamp turns on at the expiration of either engine hours or time limits.

It is possible to monitor the operation of the system locally or remotely with the WINDOWS based PC utility program. Remote connection is made through GSM or PSTN modems.

The unit is designed for front panel mounting. Connections are made with 2 part plug and socket connectors.

J1939 ENGINE COMMUNICATIONS

The unit connects to ECU controlled electronic engines through its standard J1939 CANBUS port, providing engine control, protection and instrumentation without extra senders. Various engine parameters are available in display pages. The ECU alarms are displayed in text together with SPN-FMI codes. Various engine brands and models are supported.

MODBUS COMMUNICATION

The unit supports MODBUS protocol enabling communication with PLCs and building management systems. The MODBUS protocol is also supported through GSM and PSTN modems.

MEASUREMENTS

Generator Volts: U-N, V-N, W-N, U-V, V-W, W-U
Generator Amps: U, V, W
Generator KW: U, V, W, total
Generator KVA: U, V, W, total
Generator KVAr: U, V, W, total
Generator pf: U, V, W, average
Generator Frequency,
Mains Volts: R-N, S-N, T-N, R-S, S-T, T-R
Mains Amps: R, S, T
Mains KW: R, S, T, total
Mains KVA: R, S, T, total
Mains KVAr: R, S, T, total
Mains pf: R, S, T, average
Mains Frequency,
Synchronoscope Phase Angle
Synchronoscope Voltage Match U-R
Battery Voltage
Engine RPM
Engine Coolant Temperature
Engine Oil Pressure
Engine Oil Temperature
Engine Fuel Level

OPTIONAL MEASUREMENTS

External DC voltage

STATISTICS

Following incremental counters provide statistics about past performance of the generating set:

- Generator KWh, KVAh, KVArh
- Engine Hours Run
- Engine Hours to Service
- Time to Service
- Number of Engine Cranks
- Number of Genset Runs
- Number of Genset on Load

DIGITAL INPUTS

The unit has 8 fully configurable digital inputs. Each input has following programmable parameters:

- input channel name: selectable from a list of 32,
- alarm type: shutdown / load-dump / warning / no alarm
- alarm polling: on engine running / always
- latching / non-latching operation,
- contact type: NO / NC
- switching: BAT+ / BAT-

ANALOG INPUTS

Engine analog inputs are provided for following functions:

- Coolant temperature
- Oil pressure
- Oil temperature
- Fuel level

The analog inputs connect to resistive sender units to provide precise and adjustable protection. The inputs have programmable sensor characteristics so that they are suitable for any type and any brand of sensors.

RELAY OUTPUTS

The unit provides 7 relay outputs with programmable functions, selectable from a list of 128 entries.

In addition to genset control signals any specific alarm information may be output as a relay contact.

Using two DKG-705 Relay Expansion Modules, the number of relays may be increased up to 23, 16 of them being volt-free contacts.

BUILT IN ALARMS

Under/Over Generator Volts
Under/Over Generator Frequency
Under/Over Engine RPM
High Battery Voltage
Low Fuel Level
High Oil Temperature
High Coolant Temperature
Low Oil Pressure
Fail to Stop
Fail to Start
Slave Unavailable
Generator Phase Sequence Fail
Communication Lost
J1939 Communication Fail

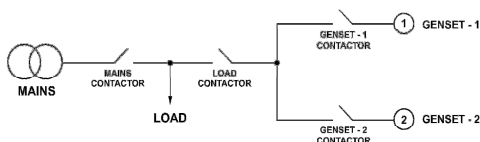
BUILT IN LOADDUMPS

Generator Reverse Power
Generator Excess Power
Overcurrent

BUILT IN WARNINGS

Under/Over Generator Frequency
Under/Over Engine RPM
Synchronization Fail
High/Low Battery Voltage
Low Fuel Level
High Oil Temperature
High Coolant Temperature
Low Oil Pressure
Mains Phase Sequence Fail
Charge Fail
AVR Control Fail
Governor Control Fail
Parallel Mains Fail
Mains Reverse Power
Mains Frequency Fail
No Mains Frequency
ROCOF df/dt Fail
Vector Shift df/dt Fail
Communication Lost
J1939 ECU Warnings
Service Request

DUAL GENSET SYNCHRONIZATION



The unit allows the synchronization scheme defined in the above picture. The application is made with standard units and standard software, no extra cost is needed. The same unit is used in both single and dual genset applications.

Basic features are below:

- automatic mains monitoring and load control,
- automatic starting, stopping and synchronization,
- both active and reactive load sharing,
- synchronization and soft transfer to and from mains,
- equal aging,
- selectable automatic/manual master-slave switching,
- automatic stop, restart and quick start of the slave,
- gensets do not need to be identical,

WEEKLY OPERATION SCHEDULE

In AUTO mode only, the unit offers the capability of defining a weekly operation schedule. Programmable parameters allow the genset to operate automatically only in defined time limits of each weekday. The internal battery backed-up real time clock will allow precise switching times.

EVENT LOGGING

The DKG-705 records last 32 events with date and time stamp. Recorded events are:

- alarms, load-dumps and warnings
- generator on-load/off-load information

An example record may be as follows:

```
EVENT LOGGING 12
17-11-07 14:48.58
SHUTDOWN ALARM
LOW OIL PRESS. SWITCH
```

GSM SMS MESSAGE SENDING

The unit is able to send a GSM SMS message to a programmed telephone number in case of alarm.

A sample GSM SMS message is given below:

```
DKG705 <SITE-ID>
STOP :LOW OIL PR.
WARNING :ECU WARN.
END OF ALARM LIST
```

TELEMETRY AND REMOTE PROGRAMMING

The DKG-705 module provides the user with large telemetry facilities via its standard RS-232 serial port. The unit can be either connected to a PC or a modem for remote communication.

The PC software offers local, Local Area Network (LAN), internet and modem operation capabilities. In **local mode**, the PC is directly connected to the DKG-705.

In **LAN mode**, additionally to the local connected PC, all PCs located in the same LAN may use the remote monitoring program.

In **internet mode**, the local PC should have an internet connection with its own IP address. The DKG-705 may be monitored anywhere in the world via internet.

In **modem mode**, both the PC and the DKG-705 will be connected to modems. The connection will be established over the telephone network. Note that the modem mode is also compatible with LAN and internet modes, so that the modem data may be served by PC for reuse in the LAN or internet.

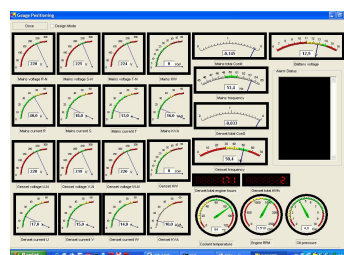
The PC program is used for below purposes:

-software download: the DKG-705 unit's software is downloadable from serial port. This provides the user with field upgrading capability to new versions.

-parameter upload/download: program parameters may be saved to the PC or downloaded from PC. This provides the user with the capability of preparing standard configurations for different applications and taking backup copies of parameter values.

-remote monitoring: all measured values, statistics and event records may be visualized on the PC screen. The displays simulate analog meters with user selectable size, position, range and multiple zones with green, yellow and red colors. There are more than 60 possible displays and the user may design his own screen selecting between them. The values are also stored on disk for further analysis.

-diagnostics and analysis: the daily evolution of recorded values may be displayed or printed in a graphical form. This provides the service personnel with the capability of examining the history of an eventual fault condition.

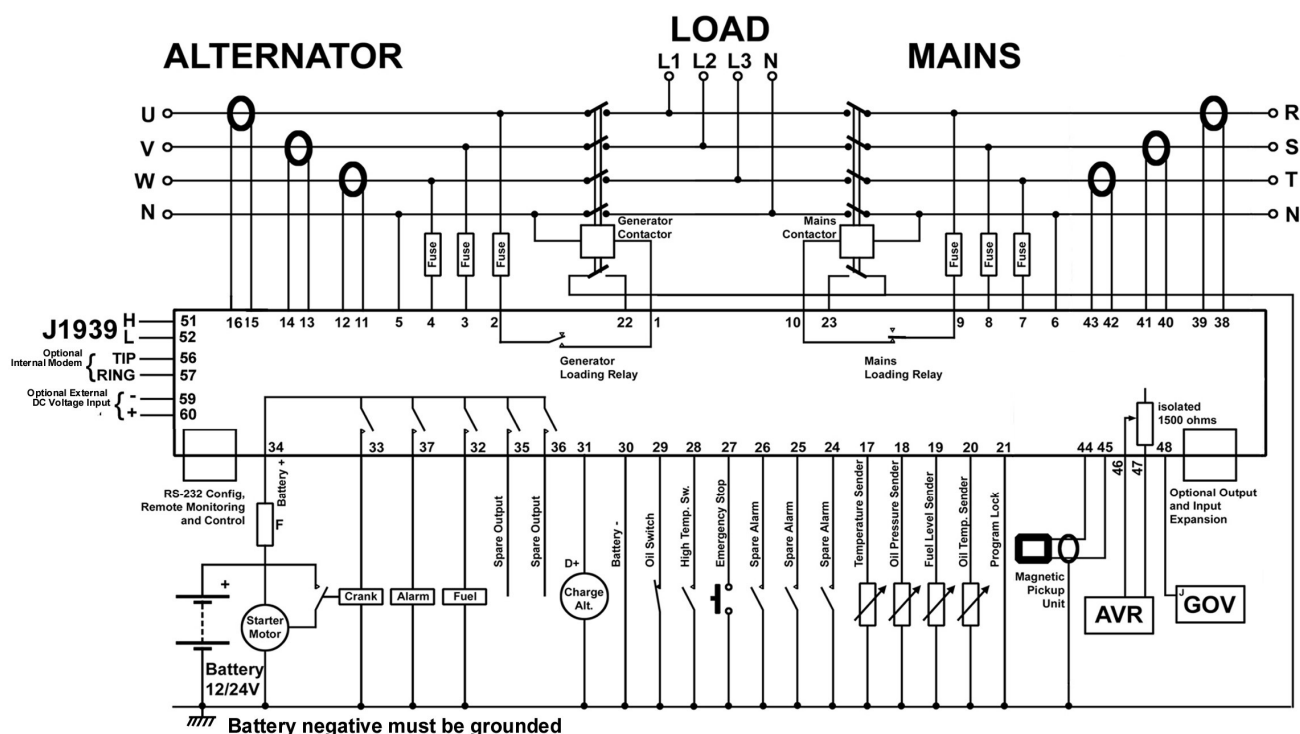


TECHNICAL SPECIFICATIONS

Alternator voltage: 0 to 300 V-AC (Ph-N)
Alternator frequency: 0-200 Hz.
Mains voltage: 0 to 300 V-AC (Ph-N)
Mains frequency: 0-200 Hz.
DC Supply Range:
 12V selection: 9.0 to 17.0 V-DC
 24V selection: 18.0 to 33.0 V-DC.
Cranking dropouts: survives 0 V for 100ms.
Typical Standby Current: 75 mA-DC
Maximum Operating Current: 400 mA-DC (Relay outputs open)
Generator Contactor Relay Output: 16 A / 250V
Mains Contactor Relay Output: 16 A / 250V
DC Relay Outputs: 10 A / 28V
Current inputs: from CTs, .../5A. Max load 0.7VA per phase.
Magnetic pick-up voltage: 0.5 to 70 Vpk.
Magnetic pick-up frequency: 20 KHz max.
Gov Control Output: 0 – 10 V-DC
AVR Control Output: adjustable for 1K to 200K trippot inputs.

Charge excitation current: min 150mA / 10 to 30 V-DC.
Analog input range: 0-5000 ohms.
Serial port: RS-232, 9600 bauds, no parity, 1 bit stop
Operating temp.: -20°C (-4°F) to 70 °C (158°F).
Storage temp.: -40°C (-40°F) to 80 °C (176°F).
Maximum humidity: 95% non-condensing.
IP Protection: IP65 from front panel, IP30 from the rear.
Dimensions: 192 x 144 x 49 mm (WxHxD)
Panel Cut-out Dimensions: 187x139 mm minimum.
Mounting: Front panel mounted with rear retaining steel spring.
Weight: 800 g (approx.)
Case Material: High Temperature ABS (UL94-V0, 100°C)
Conformity (EU directives)
 -2006/95/EC (low voltage)
 -2004/108/EC (electro-magnetic compatibility)
Norms of reference:
 EN 61010 (safety requirements)
 EN 61326 (EMC requirements)

TYPICAL CONNECTIONS



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