


The top half of the page features a dark grey background with a white circuit diagram. The diagram consists of various symbols including circles, lines, and rectangles, representing electrical components and their connections. In the top right corner, there is a blue rectangular box containing the text 'aksa' in white lowercase letters, followed by 'POWER GENERATION' in white uppercase letters. Below this box is a green horizontal bar.

aksa POWER GENERATION

**Parallel Generators and
Synchronization,
Generator Power System Design**





The roots of Kazanci Holding were established in 1950's. Embracing principles of “customer satisfaction and reliance” as its main priority, Kazanci Holding has been one of the leading firms in the Turkish energy market with manufacturing generating sets, natural gas distribution and installation-operation of power plants.

Since its foundation in 1984, being the leading company in the Turkish market; Akxa Power Generation takes place among the top 100 industrial enterprises and exporter firms in Turkey.

In addition, Akxa is rightfully proud of being one of the leading generating sets manufacturers in the world with the total amount of 40.000 gasoline, diesel and natural gas generating sets ranging from 1 to 2500 kVA manufactured per year in its two production facilities in Istanbul (Turkey, 20.000sqm. indoor) and Changzhou (China, 20.000 sqm. indoor).


Today, exporting more than %50 of its production, Akxa Power Generation progresses towards the goal of succes globally. With its 11 international offices, Akxa supplies generating sets all around the world.

Akxa Power Generation keeps continually investing in technology to be a pioneer of innovation. Being one of the first natural gas generating sets manufacturers in the world, Akxa also has a quite advantage in synchronization projects and progressively pursues improvements in generating sets with less fuel consumption, lower sound levels, and lower amounts of exhaust emission through its research and development works.

Akxa Rental is established to meet urgent and mobile power needs of its customers and serves internationally with its wide product range and experienced staff both from Istanbul and Dubai head offices. Mentioned organizations below are some of Akxa Rental's references:

NATO Istanbul Summit 2004; UEFA Champions League Final 2005; Redbull Air Race Golden Horn 2006-2007-2008; Formula 1 Istanbul Park Grand Prix 2006, 2007, 2008, Troya 2008 - 2009.

Akxa Service & Spare Parts company provides around the clock emergency parts and service support for Akxa products. To keep Akxa products in top condition throughout the world, the company is dedicated to offer “the best” to its customers with 110 country-wide authorized dealerships, 500 technical support employees and spare parts stocks in after sales service, assistance and support.



Aksa Istanbul, Turkey



AKSA MAHMUTBEY : 20.000 m² kapalı alan.

Aksa Changzhou, Çin



AKSA CHANGZHOU, ÇİN : 20.000 m² kapalı alan.

International Offices of Aksa Power Generation



Algeria



China



Iraq



Kazakhstan



Russia



Singapore



U.A.E.



United Kingdom



Vietnam

Parallel Generators and Synchronization, Generator Power System Design

Parallel Generators and Synchronization,

Paralleling is the synchronous operation of two or more generator sets connected together on a common bus in order to provide power to common loads as shown in Figure.

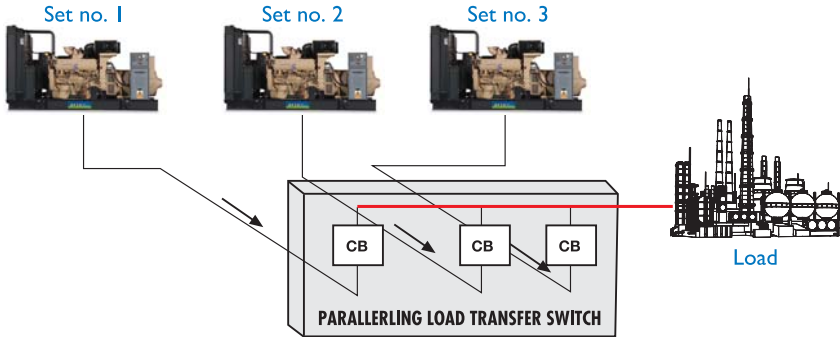


Figure: Parallel generators

In deciding whether a single or multiple generators should be installed there are various factors to be considered, such as:

- Reliability
- Performance
- Cost
- Load types
- Efficiency
- Load variation
- Generator room sizes
- Flexibility

Reliability is the primary factor in the decision to use paralleling in most emergency/standby applications, such as hospitals, computer centers and pumping stations. The reliability of Power Supply is important since the loads connected are critical. In these cases, use of multiple generator sets and prioritized loading of the system allows the more critical loads,

In systems where all the loads are required for proper operation; redundant generator sets are provided, so that failure of a generator set will not disable the facility. Paralleling normally requires the ability to sequence loads in steps, and the ability to shed loads to allow the generator sets to operate within their load ratings in event of generator failure.

A multiple set installation should be sized to allow a generator set to be taken out of the system for routine maintenance or repair without jeopardizing the supply to the load.

The capacity of the aggregated generator sets relative to individual loads is much greater than it would be with single generator sets serving separate loads. Because the bus capacity is greater, the impact of the transient loads applied to the generator sets by individual loads is minimized. In addition, a multi-set system will allow duty cycling so that the "lead set" can be selected, thus spreading the work evenly between a number of gen-sets. A multi-set system will allow for one set to be out of commission for servicing, while still maintaining a back-up power supply.

Parallel Generators and Synchronization, Generator Power System Design

It is not economical to utilise one large set at times when the full load capability of the set is not required. The gen-set will not be operating at its optimum rating, the specific fuel consumption of the set will be affected, thus increasing the cost per kW of power being produced, and the overall cost of maintenance and servicing of the gen-set will also be increased, whereas to operate a multi gen-set system with automatic synchronising and load share enables the system to accept varying loads more economically by only bringing the necessary number of sets into operation to supply the load more efficiently.

Electrical power generation is ranged from low voltage 400V to medium (high) voltage 13,8kV. Depending on the purpose of Power Plant, diesel generators may be operated in various configurations:

- single generator set supplying an isolated bus,
- multiple generator sets paralleled supplying an isolated bus,
- multiple generator sets standby to single or multiple mains supply
- single or multiple generator sets paralleled with mains (infinite power network)
- single or multiple generator sets no break return with mains paralleling system.

Advantages multiple paralleled generators:

- In general, multiple paralleled generator sets will cost less than a single gen-set of the same capacity.
- Multiple generating sets allow running one or two units at certain times, therefore provide less-fuel efficiency rather than running a lightly loaded large generator set.
- Step load acceptance on a multi-set system will be better than on one large set.
- The reduced workload on each individual set will ensure a longer useful life for each set.

Medium or High Voltage Systems:

Practically, to use medium or high voltage shall be suitable for electrical system capacity with 4000 Amps or more. The cost of the high voltage gen-sets which are lower than 1000kW will be expensive. Generally these range generators that produce low voltage output and multiple gen-sets in parallel are used with step-up transformers. 2MVA or higher gen-sets can provide medium or high voltage output. These systems use multiple gen-sets in parallel systems.

Multiple Generators:

There are many reasons for requiring more than one generator on the same site. The most common reasons are described below:

- Multiple generator sets paralleled supplying an isolated bus

In this example, the site has three generating sets, used as the primary power source. One genset will be running all the time, to provide power to the site. If the load demand of the site increases, one or more generators will be automatically called to start. They will then synchronise onto the bus, and provide power in parallel with the other set(s).

Parallel Generators and Synchronization, Generator Power System Design

Using multiple generating sets rather than one large set allows for maintenance to be performed on one of the sets while the other set(s) are still available for duty.

Additionally, if load demands are low, individual generators can be started as required, rather than one large generator being used at (for instance) only 25% of its full load rating.

If the overall size of the load increases, for instance due to factory expansion another set can be added to increase capacity with minimal disruption to the rest of the system.

Using this system, “redundancy” can be built in by utilizing a larger number of gensets than is required to supply the load. This way, the load can still be supplied if one or more sets are unavailable due to engine failure or maintenance.

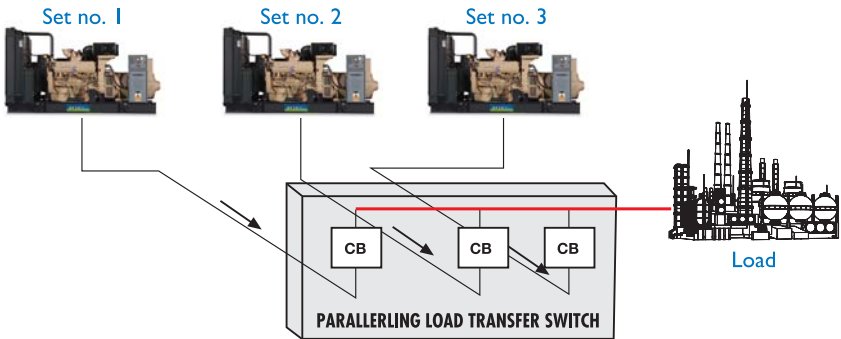


Figure: Multiple generator sets paralleled supplying an isolated bus.

- Multiple generator sets standby to mains supply

If multiple gensets in parallel are used to backup the mains supply, care should be taken when designing the system. In the example above for instance, should the mains supply fail, two possibilities exist. Firstly, if only two generating sets are providing power to the bus, they must be capable of supplying the currently active load. Secondly, if none of the sets are available, they will all start up simultaneously.

The first set will close onto the bus, and supply power to the load. Again the set must be capable of supplying this power to the currently active load.

Two solutions exist:

- a) Ensure each generating set is capable of supplying the entire load.
- b) Ensure before closing the load switch and powering the load with the generating sets, that all of the generating sets are available and synchronised onto the generator bus. While running in this manner, not in parallel with the mains supply, this is called 'islanded mode'.

Parallel Generators and Synchronization, Generator Power System Design

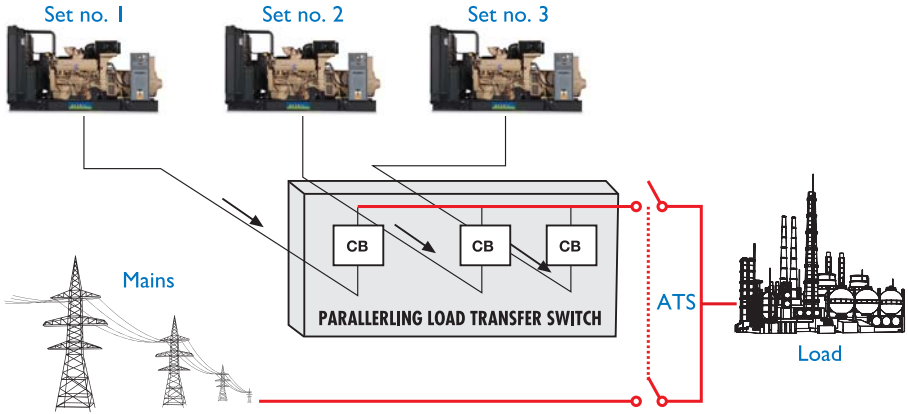
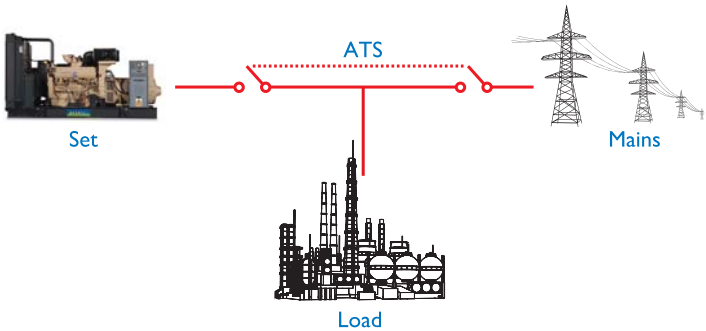


Figure: Multiple generator sets standby to mains supply

- Single or multiple generator sets no break return with mains paralleling system.

If a 'mains controller' is fitted, to monitor the mains supply and power supplied by the mains to the load, additional possibilities exist, the most important of which are :

- 1) Should the mains supply fail, the 'mains controller' can call for the generating sets, which will synchronise and close onto the generator bus. When the sets are available on the generator bus the 'mains controller' can close the generator bus interconnecting load switch. When the mains supply returns, the generator bus can be synchronised and closed in parallel with it, to allow a no break return to the mains supply.
- 2) As the power being supplied by the mains is also being monitored, the mains controller can pass this information to the generator controllers, allowing load sharing between the generator bus and the mains supply.



Aksa paralleling systems deliver the flexibility demanded by your complex applications. These systems deliver the features and performance you require.

Parallel Generators and Synchronization, Generator Power System Design

System Requirements:

- Aksa paralleling system and control module specifications

Deep Sea Electronics, model 8610 Auto Start & Multi-generator Load Share Module

Deep Sea Electronics, model 8660 Auto Transfer Switch & Single or Multi Mains Control Module

COMAP, model IntelliGen-NT Auto Start & Multi-generator Load Share Module

COMAP, model IntelliMains-NT Auto Transfer Switch & Mains Control Module

WOODWARD Easygen 3200 Generator & Mains Control Module

DIEF, AGC 200 Auto Start & Multi-generator Load Share Module

System requirements:

Engine make & model	
Governor make & model	
Alternator make & model	
AVR make & model	
Number of Mains(utility) & situation	
Number of Generator & Mains	
Number of Circuit Breakers	
Generator voltage	
Mains voltage	
Special requirements	

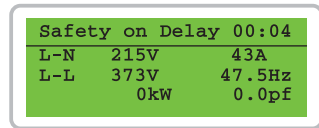
Parallel Generators and Synchronization, Generator Power System Design

Deep Sea Electronics, model 8610 Auto Start & Multi-generator Load Share Module Specifications:

- It is designed to synchronise up to 32 generators.
- Manual start / Automatically starting or stopping the engine on load demand or fault condition
- Voltage measurement
- Back-lit LCD 4-line text display
- Built-in governor and AVR control
- Peak lopping
- Sequential set start
- Automatic hours run balancing
- Generator load demand
- Direct governor and AVR connections/controls
- Volts and frequency matching
- kW and kVAr load sharing
- Dead bus sensing
- Bus failure detection
- ROCOF and vector shift
- Manual voltage/frequency adjustment
- Multi event exercise timer
- RS232 & RS485 remote communications
- Modbus RTU
- PLC functionality
- SMS alert messaging
- Five Step Load Shedding support
- Configuration Suite PC Software
- High number of inputs and outputs



DSE 8610 Auto Start Load Share Module



Genset running

Protections

Warnings

- Charge failure
- Battery under/over voltage
- Fail to stop
- Low fuel level
- kW over load
- Earth fault
- Negative phase sequence
- Maintenance due
- Low oil pressure
- Engine high temperature
- Engine low temperature
- Over/under speed
- Generator over/under frequency
- Generator over/under voltage
- Generator high current

Parallel Generators and Synchronization, Generator Power System Design

Shutdowns

- Earth fault
- Fail to start
- Emergency stop
- Low oil pressure
- Engine high temperature
- Phase rotation
- Generator high current
- Over/under speed
- Generator over/under frequency
- Generator over/under voltage
- Negative phase sequence
- kW over load
- Maintenance due

Instrument Pages

Engine

- Engine Speed
- Oil Pressure
- Coolant Temperature
- Engine Battery Volts
- Run Time
- Engine Maintenance Due

Generator

- Voltage (ph-N, ph-ph)
- Frequency
- Current
- Earth Current
- Load kW
- Load kVA
- Load kVA_r
- Load kWh, kVAh, kVA_rh
- Power Factor
- Phase Sequence
- Synchroscope display

Bus

- Voltage (ph-N, ph-ph)
- Frequency
- Phase Sequence



Multi Gen Sets and Multi Mains Parallel System

Environmental Testing Standards

Enclosure Protection

- (front of module)
- IP65 (optional gasket)
- IP42 (without gasket)

Electromagnetic Compatibility

- BS EN 61000-6-2
- BS EN 61000-6-4

Electrical Safety

- BS EN 60950

Temperature

- BS EN 60068 (-30°C)
- BS EN 60068-2-2 (+70°C)

Vibration

- BS EN 60068-2-6

Parallel Generators and Synchronization, Generator Power System Design

Deep Sea Electronics, model 8660 Auto Transfer Switch & Single or Multi Mains Control Module

Specifications

- It is designed to synchronise single or multiple gen-set with single or multiple mains (utility) supplies.
- Automatically control the change over from mains to generator supply.
- Run generators in synchronisation with the mains
- No-break, peak looping and peak shaving power solutions.
- Sequential set start
- Automatic hours run balancing
- Manual voltage/frequency adjustment
- Generator load demand
- RCOF and vector shift
- Bus failure detection
- Volts and frequency matching
- Automatic start/manual start
- High number of inputs and outputs
- Back-lit LCD 4-line text display
- Multi event exercise timer
- Configuration Suite PC Software
- RS232 & RS485 remote communications
- SMS alert messaging
- Modbus RTU



DSE 8660 Auto Transfer Switch & Mains Control Module

Safety on Delay 00:00			
L-N	215V	43A	
L-L	373V	47.5Hz	
	0kW	0.0pf	

Genset running

Protections

Warnings

- Battery under/over voltage
- kW over load

Instrument Pages

Mains

- Voltage (ph-N, ph-ph)
- Frequency
- Current
- kW
- kVA
- kVAr
- kWh, kVAh, kVArh
- Battery voltage
- Synchroscope
- Configuration type
- Power Factor

Environmental Testing Standards

Enclosure Protection (front of module)

- IP65 (optional gasket)
- IP42 (without gasket)

Electromagnetic Compatibility

- BS EN 61000-6-2
- BS EN 61000-6-4

Electrical Safety

- BS EN 60950

Temperature

- BS EN 60068 (-30°C)
- BS EN 60068-2-2 (+70°C)

Vibration

- BS EN 60068-2-6

Trips

- Mains over/under voltage
- Mains over/under frequency

Bus

- Voltage (ph-N, ph-ph)
- Frequency
- kW
- kVAr

Deep Sea Electronics, model 7520 Automatic Mains Failure & Instrumentation Control Module

Specifications

- It is designed to provide advanced load share functionality for single set and parallel with mains.
- Mains (utility) failure detection
- Manual start / Automatic start
- Automatic load transfer
- Voltage measurement
- Back-lit LCD 4-line text display
- No-break transfer & return capability
- Peak shaving / peak lopping
- Volt & Frequency matching
- Direct governor and AVR connections/controls
- Dead bus sensing
- kW and kVAr load sharing
- ROCOF and vector shift
- Manual voltage/frequency adjustment
- Exercise timer
- RS232 & RS485 remote communications
- Modbus RTU
- PLC functionality
- SMS alert messaging
- Configuration Suite PC Software
- Inputs and outputs



DSE 7520 Auto Mains Failure & Instrumentation Control Module



DSE 8610 Auto Start Load Share Module

Protection

Warnings

- Charge failure
- Battery under/over voltage
- kW over load
- Earth fault
- Negative phase sequence
- Over/under speed
- Low oil pressure
- Engine high temperature
- Generator over/under frequency
- Generator over/under voltage
- Generator high current

Shutdowns

- Earth fault
- Fail to start
- Emergency stop
- Low oil pressure
- Engine high temperature
- Phase rotation
- Generator high current
- ROCOF/ vector shift
- Over/under speed
- Generator over/under frequency
- Generator over/under voltage
- Negative phase sequence
- kW over load
- Reverse power
- Out of synchronise

Parallel Generators and Synchronization, Generator Power System Design

Instrument Pages

Engine

- Engine Speed
- Oil Pressure
- Coolant temperature
- Engine Maintenance Due
- Engine Battery Volts
- Run Time
- Number of starts

Generator

- Voltage (ph-N, ph-ph)
- Frequency
- Current
- Earth Current
- Load kW
- Load kVA
- Load kVAr
- Load kWh, kVAh, kVArh
- Power Factor
- Phase Sequence
- Synchroscope display

Mains

- Voltage (ph-N, ph-ph)
- Frequency
- Current
- Load kW
- Load kVAr
- Power Factor
- Phase Sequence
- Load kVA

Environmental Testing Standards

Enclosure Protection (front of module)

- IP65 (optional gasket)
- IP42 (without gasket)

Electromagnetic Compatibility

- BS EN 61000-6-2
- BS EN 61000-6-4

Electrical Safety

- BS EN 60950

Temperature

- BS EN 60068 (-30°C)
- BS EN 60068-2-2 (+70°C)

Vibration

- BS EN 60068-2-6



Controller to modem connect

COMAP, model IntelliGen-NT Auto Start & Multi-generator Load Share Module

Specifications

- It is designed to synchronise up to 32 gen-sets.
- Single and multiple gen-sets operating in standby or parallel modes
- Built-in synchronizer and digital isochronous load sharer
- Total integrated solution for gen-set in standby, island parallel or mains parallel
- Automatic synchronizing and power control
- Baseload, Import/Export
- Peak shaving / peak lopping
- Volt & Frequency matching
- Direct governor and AVR connections/controls
- kW and kVAr load sharing
- Vector shift
- RS232 & RS485 remote communications
- ModBus support
- PLC functionality
- Extension features
- SMS alert messaging
- Configuration Suite PC Software
- Inputs and outputs



ComAp model IntelliGen-NT

Protections

- | | |
|------------------------------|----------------------------------|
| • Earth fault | • Over/under speed |
| • Fail to start | • Generator over/under frequency |
| • Emergency stop | • Generator over/under voltage |
| • Low oil pressure | • Voltage unbalance |
| • Engine high temperature | • kW over load |
| • Phase rotation | • Reverse power |
| • Generator high current | • Charge failure |
| • Battery under/over voltage | • Current unbalance |

Parallel Generators and Synchronization, Generator Power System Design

Instrument Pages

Engine

- Engine Speed
- Oil Pressure
- Coolant Temperature
- Battery Volts
- Run Time
- Number of start

Generator

- Voltage (ph-N, ph-ph)
- Frequency
- Current
- Load kW
- Load kVA
- Load kVAr
- Load kWh, kVArh
- Power Factor
- Phase Sequence
- Synchroscope

Bus

- Voltage (ph-N, ph-ph)
- Frequency

Mains

- Voltage (ph-N, ph-ph)
- Frequency
- Current
- Load kW
- Load kVAr
- Load kVA
- Power Factor
- Phase Sequence
- Synchroscope



Multi Gen-Set & Multi Mains Paralleling System

Environmental Standards

Electromagnetic Compatibility

89/336/EEC

92/59/EEC

93/68/EEC

Low voltage regulations

73/23/EEC

Applicable standards

EN61010-1

EN50081-1

EN50082-1

COMAP, model IntelliMains-NT; Auto Transfer Switch & Mains Control Module

Specifications

- It is designed for multiple gen-sets operating in parallel to mains.
- It can serve as abus-tie synchronizing controller between two groups of gen-sets.
- AMF function based on mains failure, outputs a signal to start the gen-set group
- Baseload, Import/Export
- Vector shift
- Peak shaving
- Load Shedding -3steps
- Inputs and outputs
- PLC functionality
- RS232 & RS485 remote communications
- SMS alert messaging
- Configuration Suite PC Software

Protections

- Mains over/under frequency
- Mains over/under voltage
- Voltage unbalance
- Current unbalance
- Over load
- Mains Reverse power
- Phase rotation
- Mains Import/Export
- Vector shift
- Bus over/under frequency
- Bus over/under voltage
- Bus Voltage unbalance

Instrument Pages

Mains

- Voltage (ph-N, ph-ph)
- Frequency
- Current
- kW
- kVA
- kVAr
- kWh exp.
- kWh imp.
- kVArh exp
- kVArh imp
- Power Factor
- Gen-Sets kWh, kVArh
- Synchroscope

Bus

- Voltage (ph-N, ph-ph)
- Frequency
- Current

Environmental Standards

Electromagnetic Compatibility

- 89/336/EEC
- 92/59/EEC
- 93/68/EEC

Low voltage regulations

73/23/EEC

Applicable standards

- EN61010-1
- EN50081-1
- EN50082-1



ComAp model IntelliMains-NT



Multi Gen-Set & Multi Mains Paralleling System

Parallel Generators and Synchronization, Generator Power System Design

WOODWARD Easygen 3200 Generator & Mains Control Module

Specifications

- Single and multiple gen-sets operating in standby or parallel modes
- Built-in synchronizer and digital isochronous load sharer
- Total integrated solution for gen-set in standby, island parallel or mains parallel
- Automatic synchronizing and power control
- Automatic load transfer
- Baseload, Import/Export
- Peak shaving
- Direct governor and AVR connections/controls
- RS232 & RS485 remote communications
- ModBus RTU
- Counters for Maintenance call
- Configuration Suite PC Software
- Inputs and outputs

Protections

Engine

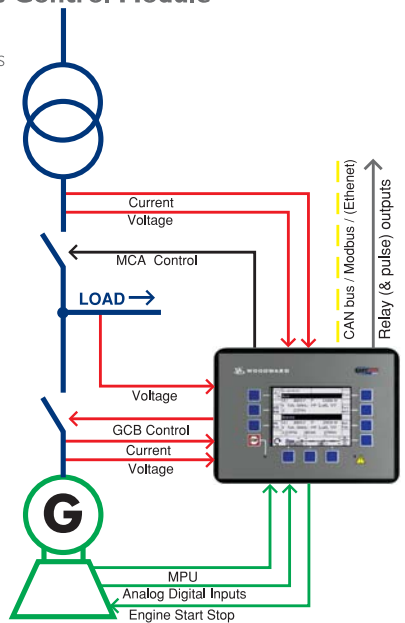
- _ Fail to start
- _ Emergency stop
- _ Low oil pressure
- _ Engine high temperature
- _ Over/under speed
- _ Battery under/over voltage

Generator

- _ Phase rotation
- _ Generator over/under frequency
- _ Generator over/under voltage
- _ Voltage unbalance
- _ Load unbalance
- _ Dead bus detection
- _ Over load
- _ High current
- _ Ground fault
- _ Reverse power
- _ Charge failure

Mains

- _ Load
- _ Frequency
- _ Voltage
- _ Active/Reactive power



Control Panel with Woodward Easygen 3200

Parallel Generators and Synchronization, Generator Power System Design

Instruments Pages

Engine

- Engine Speed
- Oil Pressure
- Coolant Temperature
- Engine Battery Volts
- Run Time
- Number of start

Generator

- Voltage (ph-N, ph-ph)
- Frequency
- Current
- Load kW
- Load kVA
- Load kVAr
- Power Factor
- Synchroscope display

Bus

- Voltage (ph-N, ph-ph)

Mains

- Voltage (ph-N, ph-ph)
- Current
- Load kW
- Load kVA
- Load kVAr
- Power Factor
- Phase Sequence

Environmental Testing Standards

Electrical Safety

- EN 60255-21-2

Temperature

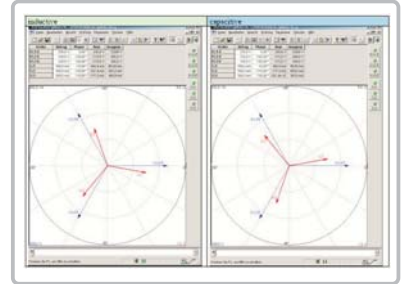
- IEC 60068-2-2 (-20°C)
- IEC 60068-2-1 (+70°C)

Humidity

- IEC 60068-2-30 (95%)

Vibration

- EN 60255-21-1



DEIF, AGC 200 Auto Start & Multi-generator Load Share Module

Specifications

- It is designed to synchronise up to 16 generators up to 8 tie breakers
- Single and multiple gen-sets operating in standby or parallel modes
- Multiple gen-set load sharing (128)
- Total integrated solution for gen-set in standby, island parallel or mains parallel
- Generator load demand
- Load management
- Automatic load transfer
- Peak shaving
- Mains power export operation
- Control of mains or tie breaker
- RS232 & RS485 remote communications
- Priority selection of gen-sets
- Full text LCD display (240x128 pixel)
- Engine, generator and load protection
- Configurable inputs and outputs



DEIF, AGC200

Parallel Generators and Synchronization, Generator Power System Design

Protections

- Fail to start
- Emergency stop
- Low oil pressure
- Engine high temperature
- Phase rotation
- Battery under/over voltage
- Over/under speed
- Generator over/under frequency
- Generator over/under voltage
- Voltage unbalance
- kW over load
- Reverse power
- Current unbalance
- Synchronisation failure

Instruments

Engine

- Engine Speed
- Oil Pressure
- Coolant temperature
- Engine Battery Volts
- Run Time
- Engine Maintenance counter

Busbar

- Voltage (ph-N, ph-ph)

Generator

- Voltage (ph-N, ph-ph)
- Frequency
- Current
- Load kW
- Load kWh
- Power Factor

Environmental Testing Standards

Enclosure Protection (front of module)

- IP66 (optional gasket)
- IP52 (without gasket)

Electromagnetic Compatibility

- EN 61000-6-1/2/3/4
- IEC 60255-26

Electrical Safety

- EN 61010-1

Temperature

- BS EN 60068 (-25°C)
- BS EN 60068-2-2 (+70°C)

Vibration

- IEC 60068-2-6



Multi Gen-Set & Multi Mains Paralleling System

Parallel Generators and Synchronization, Generator Power System Design

Multiple Generator Sets Standby to Mains Supply

The Project: Five 2000kVA, 6300 Volt, 50 Hz Paralleling System

CASE HISTORY

ADNAN MENDERES AIRPORT PROJECT IZMİR - TURKEY



The Project

Customer

- National Airport Authority and TAV

Location

- Izmir, Turkey

In Brief

- 5 x 2,000 kVA, 6,300 Volts, 50 Hz, Aksa Power Generation sets
- Powered by Cummins QSK60 sixteen cylinder diesel engine driving Stamford alternators
- All fully automatic synchronising, load sharing and load management control system. Starting on utility power failure

Parallel Generators and Synchronization, Generator Power System Design

The Project: Four 2000kVA, 6300 Volt, 50 Hz Paralleling System

CASE HISTORY

AIR FORCE - TURKEY



The Project

Customer

- Air Force

Location

- Turkey

In Brief

- 4 x 2,000 kVA, 6,300 Volts, 50 Hz, Aksa Power Generation sets
- Powered by Cummins QSK60 sixteen cylinder diesel engine driving Stamford alternators
- All fully automatic synchronising, load sharing and load management control system. Starting on utility power failure

Parallel Generators and Synchronization, Generator Power System Design

The Project: Seven 2000kVA, 10000 Volt, 50 Hz Paralleling System

CASE HISTORY

GATA PROJECT - ANKARA - TURKEY



The Project

Customer

- Gulhane Army Medical Academy

Location

- Ankara, Turkey

In Brief

- 7 x 2,000 kVA, 10,000 Volts, 50 Hz, Aksa Power Generation sets
- Powered by Cummins QSK60 sixteen cylinder diesel engine driving Leroy Somer alternators
- All fully automatic synchronising, load sharing and load management control system. Starting on utility power failure

Parallel Generators and Synchronization, Generator Power System Design

AKBATI AVM PROJECT- ISTANBUL



- 7 x 2250 kVA, 400 Volt, 50 Hz Aksa Generator Sets and 7 x 0,4 / 34,5 kV step-up transformer. Multiple Generator Sets no break return with mains paralleling system

KARTAL COURTHOUSE - ISTANBUL



- 4 x 2250 kVA, 10 kV, 50 Hz, Aksa Generator Sets. Multiple Generator Sets Parallel standby to mains supply

HABERTURK JOURNAL PRINTING CENTER - ISTANBUL



- 4 x 1375 kVA, 2 x 880 kVA, Aksa Generator Sets and 3 mains supply Multiple Generator Sets standby to multiple mains supply

ANTALYA AIRPORT - ANTALYA



- Manual and Automatic Paralleling System 3 x 2200 kVA, 6300 Volt, 50 Hz and 3 mains supply Multiple Generator Sets standby to multiple mains supply

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