

TECHNICAL SPECIFICATION

OF THE CONTROL



JES

**JENBACHER
ENERGIE**



GE-ENERGY RENTALS I & II

JGC 320 GS-N.L

COMPACT CONTAINER UNIFORM DESIGN

Identity No. 326581

Job No.: J A3234440 00

Issued:
ETE/Brindlinger M.

Checked:
ETE

Date:
13.09.00

Index:
-

File
spA323.doc

1. Plant Short Description	4
1.1 Plant Summary	4
1.2 Fuel Gas	4
1.3 Principal Drawing Electric	4
2. Auxiliaries	5
2.1 Starting Equipment	5
2.2 Control System Power Supply	5
2.3 Jacket Water Preheating	5
2.4 Jacket Water Circulating Pump	5
2.5 Intercooling Water Pump	5
2.8 Fresh Oil Pump	5
2.9 Waste Oil Pump	5
2.11 Cool Down Oil Pump:	5
2.14 Engine Room Ventilation	6
2.14 Smoke and Gas Alarm	6
3. Function of the CHP	7
3.2 Priority Electricity – Customers request	7
3.6 Engine Control Functions	7
3.7 Mode of Operation with Mains Failure	8
4. Conditions	9
4.1 Parallel Operation	9
4.2 Grid Monitoring Unit	9
4.3 Safety Loop of the CHP	9
6. Operation Modes of the CHP-plant	10
6.1 Automatic Operation	10
6.2 Manual CHP-Operation	11
6.3 Automatic Synchronizing	12
6.4 Manually Initiated Automatic Synchronizing	13
6.5 Standby Power Supply / Blackout operation	13
7. Electrical Hardware	15
7.1 Module Control Cabinet per Module	15
7.3 Synchronizing Incorporated in Module Control Cabinet	18
7.5 Generator Switchgear Cabinet	19
7.6 Motor Control Panel Incorporated in Generator switch gear	19
8. Remote data transmission(RDT) with HERMES	21
8.1 General	21
8.2 System elements	21
8.3 Function:	21
8.4 Technical prerequisites	23

FAILURE/TRIP MESSAGES MODULE CONTROL APPENDIX A

1. Plant Short Description

1.1 Plant Summary

1 off gas engine genset-container

400V, 50Hz operation:

3 phase 400/231 V + 5%, 50 Hz.

Total electric power: 1048 kW at pf. 1
1036 kW at pf. 0,8

480V, 60Hz operation:

3 phase 480/277 V + 5%, 60 Hz.

Total electric power: 1063 kW at pf. 1
1056 kW at pf. 0,8

1.2 Fuel Gas

Natural gas

1.3 Principal Drawing Electric

See J A3234300 00, +U/ sheet 5

2. Auxiliaries

2.1 Starting Equipment

Starter batteries: SVR Gelled Electrolyte Lead Acid Batteries
24 VDC, 225 Ah per module.

Charger:
24 VDC, 40 A with integrated control system power supply 24 V=, 18 Ah. Used for module controller.
Detailed description see TI 1530-0168.


2.2 Control System Power Supply

24 V=, min. 22 - max. 30 V (inclusive of ripple) at JES terminal. max ripple $U_{ss} = 2,4 V$.

2.2.1 Control voltage for module control cabinet from starter batteries
(diode encoupled).

2.3 Jacket Water Preheating

For 3-phase power supply: 3x 400 V, 50 Hz, 6 kW, and 3x480 V, 60 Hz, 8.7kW
And for 1-phase power supply 1x 208, 230, 240VAC
Thermostatically controlled between 55 - 60°C.

 Status Display (Pict 50) "PREHEATING WATER CIRC. PUMP ON/OFF"
"PREHEATING ON/OFF"

The module will be preheated continuously whilst the service selector is in the manual or auto position.
When service selector switch is "OFF", preheating is switched off. (Electric heating elements, circulating pump, thermostat).


2.4 Jacket Water Circulating Pump

1 x 230V / 240V, 50Hz / 60Hz, 245 W:
Pump operates during engine shutdown and auxiliary cool down phase.


2.5 Intercooling Water Pump

3x 400V, 50 Hz, and 3x480V, 60Hz, 1,1 kW:
Pump operates during module operation and during 5 minutes cool down run.

2.8 Fresh Oil Pump

24VDC, 1,1 kW:
 Operated with a dead man switch near to the pump.

2.9 Waste Oil Pump

24VDC, 1,1 kW:
 Operated with a dead man switch near to the pump.

2.11 Cool Down Oil Pump:

24VDC, 250 W
Is used for the cool down of the ABB turbocharger controlled by the PLC.
Runningtime is 15 minutes after engine stop.

2.14 Engine Room Ventilation

2.14.3 Outlet air / Dump Cooling ventilators 2x 3x 400/480V, 50/60Hz, 10 kW:

Ventilators are in operation during engine operation. (At gas prealarm the ventilator will also operate.)
At GASALARM the ventilators are switched off.

2.14.4 Outlet air / Dump Cooling ventilators 2 x3x 400/480V, 25-60 Hz, 10 kW:

The ventilator(s) are speed controlled by frequency converter. The speed is controlled according to the room temperature, jacket water temperature and fuel mixture cooling water temperature with maximum selection. but the ventilators will always run with a minimum speed during engine operation. (At gas prealarm the ventilator will operate at max. speed.)

At GASALARM the ventilators are switched off.

PID regulation device to ensure the desired room / jacket water / or fuel mixture temperature.

Consists of:

- Frequency converter
- Pt 100 sensor (PTC)
- PID – controller



Display on controller:

- x = Actual room/ jacket water/fuel mixture cooling water temperature
- y = Command to frequency converter
- w = Desired temperature (set point)

If the engine room temperature reaches 45°C, the engine (module) is stopped.



Signal " ROOM TEMPERATURE HIGH"

2.14 Smoke and Gas Alarm

- a) One smoke sensor at the engine room and control room with alarm and stop device.
In event of a smoke alarm, an emergency stop for the total plant will be activated.
All louvres will be closed and the Ventilators stopped.



Signal "FIRE ALARM"

- b) One gas-leakage sensor per module with alarm and stop device.
At 20% lower explosion limit the module will stop. All louvres will be opened/remain open and the room-ventilators run on full speed/continue to operate.



Signal "GAS-PREALARM"

At 40% lower explosion limit the plant should be switched free from all AC-circuits. The louvres remain open, the room-ventilators will be switched off. The 24 VDC supply remains in order to keep monitoring systems active.



Signal "GASALARM"

3. Function of the CHP

The start/stop selection of each individual module in order to suit the requirements of the plant should be performed in such a way that there is a minimum of 1 to 3 hrs between each start and stop of each module. The choice of which module to operate should also be related to the operating hours completed for each module.

Warning: In order to keep within specified exhaust emission levels, module load should be between 50 - 100% of nominal load.

3.2 Priority Electricity – Customers request

The module is requested into operation via a customer supplied potential free contact (interface No. 15), or selecting the demand on position at the engine generator control panel.

Contact closed = Module operation

Contact open = Module stop

The start/stop selection of each individual module in order to suit the requirements of the plant should be performed in such a way that there is a minimum of 1 to 3 hrs between each start and stop of each module. The choice of which module to operate should also be related to the operating hours completed for each module.


3.6 Engine Control Functions

3.6.1 Knocking Control: Some cylinders of the engine are fitted with analogue knocking sensors which produce

4-20 mA signals proportional to the knocking intensity.

These knocking signals are analysed and a knocking control thus effected.

If the knocking signal exceeds background level, the ignition timing point will be adjusted (delayed) and as a further measure the fuel/air mixture temperature will be reduced and as a last resort, the engine power will be reduced during parallel operation with the mains with a specific time constant until the knocking signal is once again less than or equal to the background level. Once this is achieved, the engine power is once again raised to the nominal load, but at a higher time constant. If, due to knocking, the engine power must be reduced to 50% or less than nominal output, the module will be shut down for reasons of safety.

 Failure Message "KNOCKING TROUBLE"

3.6.2 Power Reduction Related to Mixture Temperature

If mixture temperature exceeds 51°C (61°C for operation with 60Hz), then the engine power will be reduced during parallel operation with the mains by 5% per °C excess. If mixture temperature exceeds 55°C (65°C for operation with 60Hz) the engine will be shut down and the message "FUEL MIXTURE TEMPERATURE HIGH" will be displayed.

3.6.3 Power Reduction due to Misfiring


Every detected misfire is displayed.

If, within 12 seconds, 4 misfires are detected then a misfire counter will be incremented. Every 10 minutes, this counter will be automatically decremented by 1 unit.

If the misfire detector exceeds during parallel operation with the mains a value of 10 % nearly the engine power will be reduced and continue to be reduced to a minimum of 50% power if the misfire counter reaches 20.


 Message "POWER REDUCTION - MISFIRE" (Picture 40)

If due to misfiring, the engine power must be reduced to 50% output then a module shutdown is performed due to safety reasons.

 Failure Message "MISFIRING TROUBLE"

3.6.4 Power Reduction due to Underfrequency

If during mains parallel operation, the frequency drops below 49 Hz and no loss of mains trip results, then for every Hz under 49, the power will be reduced 10% of nominal power.

 Message "POWER REDUCTION - UNDERFREQUENCY" (Picture 40)

3.7 Mode of Operation with Mains Failure

After response of the grid monitoring relay (ANSI code: 27,59,81,78)-(G59 for G.B.) following a mains failure (disturbance), the generator switchgear will be opened.

The module will be shut down without any cool-down run. After return of stable mains conditions for 5 minutes duration, the module will resume operation.

4. Conditions

4.1 Parallel Operation

The module(s) operate(s) in parallel with the mains. The relevant standards for parallel operation with the mains are complied with.

Terminal point electricity: Generator Switchgear

4.2 Grid Monitoring Unit

Monitoring of the mains voltage regarding: (G59 for G.B.)

Overvoltage 3-ph	110% UN
Undervoltage 3-ph	90% UN
Overfrequency 1-ph	51,5 Hz, 61.5Hz respectively
Underfrequency 1-ph	49 Hz, 59 Hz respectively

Auto reclosure, detected by a 3 phase vector shift relay within 100 msec.

After response of the mains protection relay caused by a mains disturbance, the generator circuit breaker (GCB) will be commanded open.

The maximum opening time of the GCB must not exceed 60 msec following a mains short interruption of minimum 200 msec (3 ph).

4.3 Safety Loop of the CHP

4.3.1 CHP Plant Safety Loop

For the total CHP plant , a current loop safety circuit for the following is provided.

- Emergency stop (contact external/JES)
- Gas alarm (contact JES)
- Fire alarm (contact JES)

Tripping of the safety loop produces an immediate shut down of the total CHP plant.

4.3.2 Gas Engine Safety Loop

For each engine /CHP module, a current loop safety circuit for the following is provided.

- Emergency stop for total plant
- Overspeed
- Ignition monitoring
- Control of switchgear undervoltage trip device for,
 - Alternator reverse power
 - Shutdown fault
 - Missing power signal
 - Power signal overload
 - Comms failure PLC (Module control) - RPS (Engine control)

Tripping of the safety loop shuts down only the appropriate module/engine.

6. Operation Modes of the CHP-plant

After release of the safety loop.

6.1 Automatic Operation

According the CHP-functions for all available modules.

- with the demand selector-switch in pos. "REMOTE" via interface no.15 from the customer or by Hermes
- with the demand selector-switch in pos. „ON“

Conditions for Automatic-start:

- ☞ Service selector switch in position "Automatic"
- Safety chain is o.k.
- No malfunction of the module (module specific)
- Jacket water temperature > 40°C
- Engine is not running

 Visual signal "READY FOR AUTOMATIC START - ENGINE STOPPED"

Voltage free signal "ready for automatic start"

"Demand" from the customer.

- Contact closed: Engine starts up
- Contact open: Engine stop's

The demand causes:

 Visual signal: "START PROGRAM RUNNING"

6 sec. after release for start:


 Visual signal: "AUTOMATIC START IS RUNNING"

Starter on, ignition on

With answer back "Ignition operating", the gas valves are opened.

The engine ignites and powers up:


The starter will be disengaged when the speed is higher start speed.

 Visual signal: "START PROGRAM ENGINE RUNNING UP TO RATED SPEED"

Jacket water preheating off.


If the engine doesn't ignite a 2nd attempt will follow.

If the 3rd attempt is also not successfull, a further start is blocked.


 Visual signal "START UP TROUBLE" and further start attempts are prevented.

Operational Messages:

10 seconds after engine start and power up, the lube oil pressure monitoring is activated.

 Visual signal "ENGINE IDLE OPERATION -"

Potential free contact "Operation/Engine running" issued to master control and for customer.

 Visual signal " ENGINE IDLE OPERATION
SYNCHRONIZE-/LOAD RELEASE".

Synchronizing:

- ☞ The synchronizing is performed automatically when synchronising selector switch is in

automatic position.


 Visual signal "MAINS PARALLEL OPERATION".

Automatic Loading:

After the closure of generator CB, the module power will be raised to its set point.

Shutdown during Automatic Operation

Reason: "Demand Module" signal from customer is removed in pos. „REMOTE“ of the demand selector-switch or with the demand selector-switch in pos. „OFF“

 The load is reduced. Once load is less than 10% PN, the generator C.B. will be opened by the synchronizing.

 Visual signal " STOP PROGRAM: ENGINE COOL DOWN RUN"

After one minute cool down run, the gas valves are closed.

Contact "operation" is removed.

 Visual signal "STOP PROGRAM : ENGINE STOP SEQUENCE".

Ignition off and once engine speed is less than start speed


 Visual signal "READY FOR AUTOMATIC START ENGINE STOPPED"

Shut down check of gas train (leakage detection)


Turbocharger cool down for 15 minutes switched on

Auxiliaries operate for 5 minutes (hot water circulating pump).


6.2 Manual CHP-Operation

 The CHP module can be operated manually by setting the service selector switch in position "Manual". The load up/down of the module is thus manually operated. The synchronizing function is automatic or manual (manually started auto synchronizing) depending on synchronizer selector switch position.

Conditions for the Manual Start:

 Service selector switch in pos. manual.
Safety chain is o.k.
No module malfunction (module specific)
Engine is not running

 Visual signal: "READY FOR MANUAL START ENGINE STOPPED"


 Press start button for "start preparation"

The demand causes:

 Visual signal: "START PROGRAM RUNNING"

If all conditions are o.k.:

 Visual signal "START ENGINE (PUSH START BUTTON) "


 Press start button

Starter on, Ignition on

With answer back "Ignition operating", the gas valves are opened.

The engine ignites and starts up.


 Visual signal "START PROGRAM : ENGINE RUNNING UP TO RATED SPEED".

 Release start button

The starter will be disengaged when the speed is higher than the start speed.
The cooling water preheating is switched off.

Operation signals:


10 sec. after start and power up, lube oil monitoring is switched on

 Visual signal: "ENGINE IDLE OPERATION"

Voltage free signal: "Operation/run" to the customer

Synchronizing:

The synchronizing is possible in 2 modes: manual (manual initiated automatic synchronization) and full automatic.


 Manual loading (load control):

With keys on the dia.ne in the control panel.


Shut down in Manual Operation:

Before shutting down engine, decrease load using the dia.ne.

 Synchronizing selector switch in position "Manual" or "Off"

 Switch off generator CB with < 10 % engine power.

 Visual signal: "ENGINE IDLE OPERATION
SYNCHRONIZE-/LOAD RELEASE"

 After 1 min. cool down run , stop engine with "Stop" button.

"Generator CB Release" is removed and the engine is shut down.

Turbo charger cool down pump runs for 15 minutes.

Afterwards the gas safety line will be checked.

 Visual signal: "READY FOR MANUAL START - ENGINE STOPPED"

6.3 Automatic Synchronizing

 Synchronizer selector switch in position "Automatic"

Release from the module control (Synchronizer/Load Release)

- Engine operating
- Jacket water temperature > 55 °C (when service selector switch is "Automatic")
- Generator C.B is open
- Generator C.B is ready for closure

Automatic synchronizing selection

 Status display "SYNCHRONIZING IS RUNNING"

 Illuminated button "SYNCHRONIZING SELECTION" lights up



- Select busbar voltage
- Select generator voltage
- Preparation of the synchronizer
- Select generator C.B
- Select speed adjustment

Automatic tuning of the generator voltage to the busbar voltage




Automatic tuning of the generator frequency to the bus bar frequency by the synchronizing unit.



Closing command to the generator C.B by the synchroniser at the moment of

synchronizing.

-  Answer back "Generator C.B closed" (picture 10).
-  Status display "Mains-Parallel Operation"

6.4 Manually Initiated Automatic Synchronizing



-  Synchronizer selector switch in position "Manual"
 -  Service selector switch in position "Manual"
- Release from the module control (Synchronizer/Load Release)
- Engine operating
 - Generator C.B. is open
 - Generator C.B. is ready for closure
-  Press synchronizing selection button

-  Status display "Synchronizing is running"
-  Illuminated button "Synchronizing Selection" lights up
- Select busbar voltage
- Select generator voltage
- Select generator C.B.
- Select speed adjustment

Automatic tuning of the generator voltage to the busbar voltage

Automatic tuning of the generator frequency to the busbar frequency by the synchronizing unit.

Closing command to the generator C.B. by the synchroniser at the moment of synchronizing.

-  Answer back "Generator C.B closed " (picture 10).
-  Status display " MAINS-PARALLEL OPERATION"

6.5 Standby Power Supply / Blackout operation

General:


- In every case of black out operation, the customer is responsible for load shedding
- After a module is connected to the standby distribution system, the standby loads must be added in steps .(first step: Max 30-40% of the nominal rating, next steps: according the load management diagram)
- dia.ne will ensure correct load sharing of the operating modules.
- Reactive power balance is performed through static adjustment of the generators. In multiple module installations, the voltage adjustment of each generator must be identical.
- Power factor correction equipment must be disconnected during standby operation to minimise the danger of overvoltage and capacitive generator operation. The plant power factor should not be less than 0.8 (inductive).
- Module power range:
 - The modules are rated for 40% to 85% of nominal output for standby operation.
- External Auxiliary Supply must be active during engine black out operation, or the supply must be manually switched to internal power supply.

Standby Power Supply during Automatic Operation

-  Synchroniser and service selector switch in position "Automatic"

Black Start

- Island Selector switch in position „on“
- Bus Bar voltage dead
- no other engine connected to the busbar is running or starting
- Switch black out release switch on.
 - The module will be demanded
- Once expiry of the synchronizing selection time is complete, the module will be connected to the voltage free (dead) busbar.

 Status display "Island Operation"

Mains Failure during Module Shutdown

- Island Selector switch in position „on“
- Bus Bar voltage free
- no other engine connected to the busbar is running or starting
- Switch black out release switch „on“.
 - The module can be manually started

7. Electrical Hardware

Design of the enclosures:

All enclosed, steel, free standing cabinet with front opening door, rubber door seals, completed to terminal strips for interconnection by customer via a cable channel (double floor). Cable exit from underneath. Cabinet ventilation from above.

design according EN 60 439-1/1990 or IEC 439-1 (2 issue)

and DIN VDE 0660, part 500 and DIN 6280, part 7

ambient temperature 5-40°C

relative humidity 70 %

Rittal enclosures, type PS 4000

colour RAL 7032

degree of protection IP40 exterior

IP10 interior (protection against accidental bodily contact with live components)

7.1 Module Control Cabinet per Module

Comprising;

- Engine - Management - System dia.ne (Dialogue Network)

Main systems:

a) User interface software

b) Central engine control (CPU) / Module control system

a) User interface software:

Industrial PC (486) with 10,4" VGA TFT colour screen, 10 function keys, mains menu keys,

keypad for direct numerical entry, extra keys for START,STOP, Lamp test and special functions.

Interfaces:

- RS485 to central engine controller and multi-transducer.

Class of protection:IP65 (front)

Dimensions: approx. 310mm(W) x 470mm(H) x 95mm(D)

On screen, a clear and functional summary of major operating parameters is displayed with real time graphical presentation.The operation of the GUI is performed by dedicated menu and function selection keys. The complete GUI is presented in respective language if available.

Mains menu displays:








Genset interconnection (with electrical measurement values as well as generator excitation voltage, generator winding temperatures, generator bearing temperatures.)





Engine oil/jacket water circuits with display of oil pressure/temperature and jacket water pressure/temperature.



Bar chart display of cylinder exhaust gas temperatures (deviation from average).

-  Engine controller.
-  Auxiliary PID module controllers (i.e for 3 way water control valves).
-  Module auxiliaries (status).
-  Operational data (operating hrs, hrs to service, No. of starts, total kWh output, total kVAR output , measurements for operational log) .
-  System setup (time, password and access level, contrast, diagnostics).


Graphical data logging & trend display for up to 16 signal channels:

-  Long time trend (1 month storage capacity, sample rate 1minute).
-  Short duration trend (20 minute rotating buffer storage, sample rate 1 second)
- at each module trip the buffered data is stored.

System configuration:

Adjustment, display and storage of all module parameters using a user friendly system configuration menu.

Alarm management:

-  User friendly, powerful diagnostic instrument with storage and display of all failure messages in tabular format in order of occurrence and with time/date stamp.

b) Central engine control (CPU) / Module control system:

A realtime, dedicated, modular industrial control system performing all control and monitoring functions for the engine.

Interfaces:

- RS485 to decentralised I/O system in module interface cabinet
- RS485 to visualization unit and multi transducer

Control functions:

- Speed control during idle and standby (Island) power supply
- Power control for mains parallel operation using internal or external power setpoint depending on contract specification.
- LEANOX control for control of the boost pressure depending on generator output and mixture temperature. Control of motorised gas mixing valve.
- Knocking Control: Compensation of the ignition timing point, power output and depending on the plant design, the mixture temperature upon detection of engine knocking whilst engine is operating.
- Load sharing between modules in standby power operation
- Proportional power reduction as a result of excessive mixture temperature and misfiring.
- Module and engine logic control
(start up program, start, stop, cool down run, auxiliaries control).

- decentral I/O system connected via an RS485 interface with the central engine control system in the module control cabinet.

- speed relays with trip points for start and over speed (over speed relay also monitored by the central engine control system software.
- measurement transducer for generator exciter voltage.

- Interface relays/contacts as per the interface list
- Multi transducer for collection of the following generator measurements:
 - 🖥️ Current per phase (with display of high recorded value since last start)
 - 🖥️ Neutral current
 - 🖥️ Voltage (phase to phase & phase to neutral)
 - 🖥️ Power output (with display of high recorded value since last start)
 - 🖥️ Reactive power
 - 🖥️ kVA output
 - 🖥️ Power factor
 - 🖥️ Frequency
 - 🖥️ Total output (kWh)
 - 🖥️ Total reactive output (kvar)

Connection to the central control system with RS485 interface.

Additional 0-20mA analogue output for the power output and pulse output for the total output.

- Lockable service selector switch with the following positions:
 - ☞ "Stop": No start up possible
If the engine runs and the switch is turned to "STOP" the engine stops immediately.
 - ☞ "Manual": Full manual operation (start ,stop) possible.
The module is not available for full automatic operation.
 - ☞ "Automatic": Full automatic operation in case of request from the master control or potential free contact.
 - Automatic start
 - Fully automatic operation with internal/external power command
 - Shut down of module includes 1 minute engine cool down run and 5 minute cool down run for the auxiliaries.

- Module demand selector-switch with the settings:

- ☞ external demand not available. („OFF“)
- ☞ external demand. („REMOTE“)
- ☞ external demand contacts shorted.(„ON“)

🖥️ STATUS MESSAGES

In the status bar of the GUI, the current operational status of the module will be displayed. eg.


SERVICE SELECTOR SWITCH OFF
 SERVICE SELECTOR SWITCH MANUAL NOT READY TO START
 SERVICE SELECTOR SWITCH AUTOMATIC NOT READY TO START
 READY FOR MANUAL START ENGINE STOPPED
 READY FOR AUTOMATIC START ENGINE STOPPED
 START PROGRAM RUNNING
 START ENGINE (PUSH START BUTTON) (IN MANUAL OPERATION)
 WAITING TIME BEFORE RELEASE OF NEXT MANUAL START (IN MANUAL OPERATION)
 AUTOMATIC START IS RUNNING (IN AUTOMATIC OPERATION)
 START PROGRAM: ENGINE RUNNING UP TO RATED SPEED
 ENGINE IDLE OPERATION NO SYNCHRONIZE-/LOAD RELEASE

ENGINE IDLE OPERATION SYNCHRONIZE-/LOAD RELEASE
 SYNCHRONIZING IS RUNNING
 MAINS-PARALLEL OPERATION
 ISLAND OPERATION
 STOP PROGRAM: ENGINE COOL DOWN RUN
 STOP PROGRAM: ENGINE STOP SEQUENCE
 MODULE LOCKED OUT


 FAILURE/TRIP MESSAGES MODULE CONTROL (ALARM MANAGEMENT): see APENDIX A !

Dimensions:
 height =2000 mm
 width = 1000 mm
 depht = 500 mm

7.3 Synchronizing Incorporated in Module Control Cabinet

For the parallel operation of the module with the mains .
 Selection of manual or automatic synchronizing is performed with the lockable selector switch.

7.3.2 Manually Initiated Automatic Synchronizing:

 Pressing the synchronizing selection button activates the automatic synchronizing. See para 6.4

7.3.3 Automatic Synchronisation:






Fully automatic synchronization device with frequency control and with automatic synchronisation process control. See para 6.3


Synchronizing Monitoring

7.3.4 Synchronizing with Dia.ne





a) Generator C.B monitoring

Fault messages:

	"GENERATOR CB 0-SIGNAL FAILURE"	Caused by PLC hardware monitoring
	"GENERATOR CB 1-SIGNAL FAILURE"	Caused by PLC hardware monitoring
	"Generator CB Closing FAILURE "	Caused by 5 failed closing attempts
	"Generator CB Opening FAILURE "	Failed C.B opening after opening command
	"GENERATOR CB status signal FAILURE "	False C.B status answerback signal

 <p>"Bus Bar Voltage Sensor FAILURE "</p>	<p>Defective busbar voltage monitoring unit</p>
--	---

7.3.5 The Synchronizing Incorporates:

- Synchronizing selection switch
 -  Synchronizing selection - illuminated button per module
- Synchronizing unit - with frequency balance and following displays:
 -  Double voltmeter - for monitoring of bus bar and generator voltage
 -  Double frequency meter - for monitoring of bus bar and generator frequency
 -  Synchroscope - for monitoring of the synchronizing function during synchronization
- Mains protection relay ($f <>$, $V <>$, $\Delta\theta$) - G59 for G.B.
- All required control , display and command devices
- Various switches

7.5 Generator Switchgear Cabinet

Nominal current: 1871 A

comprising:

- 1 motorised air C.B. , IA = 100kA, draw-out construction.
thermal and magnetic overcurrent protection,
with 24 VDC shunt trip coil , 24VDC undervoltage trip coil and 24VDC closing coil.
Suitable for synchronizing.
- 3 current transformers 2000/5 A, for measurement
1FS5, 30VA.

Fuses for different outgoing feeders

Thermostatically controlled 35W cabinet ventilator.

Cabinet dimensions:

- width = 800 mm
- height = 2000 mm
- depth = 600 mm

7.6 Motor Control Panel Incorporated in Generator switch gear

All components UL listed
Panel with UL components.

Equipment:

- Lockable safety disconnect switches
- Motorstarters
- 4 Motorstarter

Motor starters and contactor furnished with 24VDC coil.

With single phase step down transformer 480/240V, 50Hz, 4kVA,
Protected via circuit breakers on primary and secondary side.

240V distribution: via micro C.B.s

1 change over switch internal /external supply

1 change over switch bypass transformer.

Disconnect switches and motorstarters equipped with auxiliary contacts (1NOC), wired to control-terminal strip.

8. Remote data transmission(RDT) with HERMES

8.1 General

Remote data transmission (RDT) with HERMES (high speed electronic remote message) for **dia.ne** sites offers both customers and JES service personnel a high-capacity instrument for remote control and remote maintenance of JES engines and plants. In conceiving the RDT system special attention was paid to ensure all possibilities of transmitting remote messages from local installations.

8.2 System elements

Each module is equipped with a visualization system (industrial PC with a 10.4" TFT-VGA display unit). All modules are cross-linked with a network connection over 10Base2 Ethernet. Up to 16 modules (+A1 to +A16) can be linked through this network with a so-called modem server (+DF). With this processor, which is usually without a display and keyboard, any number of RDT control stations can communicate with one another via a modem (resp. a further LAN). If necessary, a Jenbacher station visualization system for the entire plant can be integrated into the network system.

In an RDT control center standard PC's with a modem provide the link to any number of modem servers. The service personnel also has the possibility of data and message transfer to fax and with Internet access to eMail users (incl. SMS - short message service - of cellular phones and pagers).

8.3 Function:

8.3.1 Remote control (operating and observing of the display and the keyboard)

To facilitate the complete operability of every **dia.ne** visualization system, a standard software package (pcANYWHERE) was drawn on which is developed for this purpose. This package allows the remote control of the display and the keyboard of any number of PC's via a modem or network link. Here one basically differentiates between so-called host PC's (remote-controlled PC's) and remote PC's (remote-controlling PC's).

On the module visualization units pcANYWHERE is activated in the host mode. From the modem server one uses pcANYWHERE to establish a remote link via the network to the individual module visualization units (+A1 to +A16) or to the JES station visualization unit (+ST).

On the modem server pcANYWHERE is also activated additionally in the host mode. This allows remote control of the modem server from an RDT control center and consequently also of the individual module and station visualization units. The modem server therefore establishes a "gateway" to all visualization units in the network.

8.3.2 Automatic data and message transmission with dia.ne remote message control

The **dia.ne r.m.c.** software package contains an automated data and message transmission function from modem servers to RDT control centers and the relaying of these data and messages via Fax(with customers fax software) and eMail (incl. SMS for cellular phones, if available, and pagers). The messages and data archived in a RDT control center are readily available via LAN-linked workstations for further processing.

To carry out these tasks, the software package is sub-divided into three programs:

- dia.ne message**
- dia.ne control**
- dia.ne report**

8.3.2.1 dia.ne message

dia.ne message is installed on the modem servers of the plants. It is responsible for the transmission of messages and data to **dia.ne control** in the RDT control centers.

Message transmission:

The processing of alarm messages on the module visualization units is carried out by AMM (Alarm Management) from Interact. AMM records operational messages, warnings and malfunctions leading to shutdowns (the latter two are also designated as alarm messages).

Prior to a transmission the messages generated by the modules are examined according to various criteria so that the message transmission can be influenced in a specific way. The following criteria can be set:

Module, Message designation, Message number, Message type, Weekday, Time of the occurrence

If a message is classified as "to be transmitted", it is then augmented with the plant code, plant number, module designation and the module number and transmitted to the configured RDT control centers.

Data transmission:

The HTM (Historical Trend Management) function records measured values cyclically on the **dia.ne** visualization units and stores them in so-called log files.

With the RPM (Report Management) function reports (e.g. operational logbook) can be automatically generated which then are available as report files.

These files, which are stored in the modules, can be transferred manually or automatically to any desired RDT control centers.

8.3.2.2 dia.ne control

In the RDT control centers **dia.ne control** regulates the reception and archiving of all incoming messages and data. Additionally, the relaying of messages and reports via Fax and eMail (incl. SMS for cellular phones and pagers) is organized for communication with service personnel.

Messages which are received from the plants are examined according to various criteria prior to being relayed so that communication can be purposely influenced. The following criteria can be set:

Plant code, Plant number, Module, Message designation, Message number, Message type
Weekday, Time of the occurrence, Communication type (Fax, eMail, SMS)

For automatic protocolling, all recorded messages can be printed out daily. A connection check can be activated to examine the RDT link between the modem servers and the RDT control centers. This ensures that a check call is carried out on a daily basis.

8.3.2.3 dia.ne report

With **dia.ne report** one can display and print out messages received in an RDT control center on any number of workstations (standard PCs). To do this, the PC must be linked via a LAN to the RDT control center. For the message display one can select both the language and the desired plants.

For automatic protocolling all received messages can be printed out daily regarding specific plants. Through dia.ne report it is also possible to print out manually compiled protocols at any time.

8.3.3 Remote demand with HERMES

If the service selector switch at the module control panel is in pos."atomic" and the demand-selector switch in pos."Remote", it is possible to enable (demande) or disable (demand off) the module with a remote controllable key at the visualisation.

Note:

With this option it makes no sense to have an additional clients demand (via hardware or databus) or a selfguidet operation (via JES mastercontrol, grid import /export etc.).

8.3.4 Remote - reset (acc. TI 1100-0111)

The following alarms can be remote reseted:

JACKET WATER TEMPERATURE HIGH	(1021)
START UP FAILURE	(1023)
START CONDITIONS MISSING	(1024)
ENGINE OPERATION CONDITIONS MISSING	(1025)
GAS PRESSURE LOW IN GAS TRAIN 1	(1028)
SYNCHRONIZING FAILURE	(1039)
MISFIRING FAILURE	(1047)
HIGH GAS PRESSURE IN GAS TRAIN 1	(1057)
FAILURE WITH AUXILIARIES	(1129)
EXHAST GAS BACKPRESSURE HIGH	(1131)
ROOM TEMPERATURE HIGH	(1135)

If the failure is no more present, the module control in automatic - mode and the demand is given, the engine will automatically restart after the remote reset is done.

8.4 Technical prerequisites

The customer has the responsibility to ensure that a telephone line with a separate number is available no later than the start-up of operations. The connection must be installed in the modul control cabinet in which the modem server is installed. The telephone line must be operative and the number known. No charge (=tariff) impulses may be applied to the line since they could interfere with data transmission

8.4.1 System Requirements - Modem

Desktop Modem external
 Type: 56k Voice Faxmodem
 Company: 3COM - US Robotics
 With appropriate telecom approval and CE mark

Note: The Modem must comply **100%** with the above - **No deviation** from model type or manufacturer is allowed.

OPTION (not in the scope of supply):

8.4.2 System Requirements - Remote PC

PC with 166MHz Pentium Processor or higher
100% IBM Compatible
Windows NT Operating System
RAM] 64 MB
Minimum 2GByte Hard Disc
3.5" Floppy Drive
CD ROM Drive
VGA Graphics Card 2MByte or higher (1024 x 768)
Mouse or compatible pointing device
PC/AT Keyboard (101/102 keys)
Serial Interface COM1 : RS232 with 16Byte FIFO upto 115kBaud, 16C550 compatible
Serial Interface COM2 : RS232 with 16Byte FIFO upto 115kBaud, 16C550 compatible
Parallel Interface LPT1 for printer
17" Colour Monitor 1024x768 or higher