GENSYS MARINE

Complete generating set controller

- **Compact module "All in one"**
- **Fully compatible with all speed governors and AVRs**
- **4 serial ports: RS232, RS 485, Canbus protocol**
- **Multi-functions large graphic screen**
- **Internal logic sequence programmable by equations**
- **Predefines sequences dedicated marine applications**
- **Embedded web site**
- **BV, DNV & LR Marine certification**

The Gensys Marine controller is a microprocessor based unit dedicated to marine control panel for generating sets.
This "all in one" module includes all the required features as:

- Engine start/stop, control and protections
- Generator control and protections
- Mechanical parameters visualization
- Electrical parameters visualization
- Breaker control
- Speed governor: analog or pulse output
- AVR: analog or pulse output
- Synchronization with others generators
- Synchronization with shore
- KW load sharing and control by Canbus
- KVAR load sharing and control by Canbus
- …

The Gensys Marine controller is configurable through it front panel or through a PC without a dedicated software (Gensys has an embedded web site and is exploitable with Internet explorer). It is password protected.

The Gensys Marine is also a real PLC unit where equations and sequence could be programmed directly by the user.

There is no limitation with inputs and outputs: Exension modules (DIN rail mounting) could be added on the Canbus port dedicated to options. The types of inputs and outputs are:

- Digital inputs
- Digital outputs (relay or transistor)
- Analog inputs (PT100, Thermocouple, 0-10VDC, 4-20mA...)
- Analog outputs (0-10VDC, 0-20mA, 4-20mA)
- …

The Gensys Marine controller has also an analog load sharing line to be compatible with Woodward, Barber Colman and DEIF (multiline) analog load sharing.

A40Z1

MARINE TYPE APPROVALS

(pending)

APPLICATIONS

- Synchronization and Power Management System module (without engine control).
- 1 generator in change over mode with shore.
- 2 to 16 generators in parallel and change over with shore.
- 2 to 16 generators set in parallel and paralleled with shore for load transfer.
- 2 to 16 generators set in parallel with tie breaks management.

AVAILABLE OPTIONS

- Shore paralleling (1 generator)
- Connection to electronic engine governor
- Watchdog output
- CAT/Perkins PWM 500 Hz

FUNCTIONS

■ Manual, semi-automatic & automatic engine control.

■ Engine parameters display: Oil pressure, water temp, speed, hour run meter….

■ Generator electrical parameters display:
- Voltage phase-phase (3 phases RMS)
- Voltage phase-neutral (3 phases RMS)
- Current (3 phases RMS)
- Frequency
- Active power (3 phases + total)
- Reactive power (3 phases + total)
- Power factor (3 phases+ total)
- Active power energy (KWh)
- Reactive power energy (KVARh)

■ Shore electrical parameters display (option):
- Voltage phase-phase (1 phase)
- Current (1 phase)
- Frequency
- Active power
- Reactive power
- Power factor
- Import active power energy (KWh)
- Import reactive power energy (KVARh)

■ Manual & automatic frequency & phase synchronization (differential frequency meter + synchroscope available on screen).

■ Manual & automatic voltage synchronization (differential voltmeter available on screen).

■ Isochronous KW load sharing control (by Canbus serial port, up to 16 generators)

■ Iso-voltage KVAR load sharing control (by Canbus serial port, up to 16 generators)

■ Frequency center / dedrooping function

■ Dead bus bar management.

■ Generator electrical protections: <F, >F, <U, >U, >I, >In, >P, <P, <-P, >Q, <Q, <-Q

■ Shore electrical protections (option) : <F, >F, <U, >U, >P, <P, <-P, >Q, <Q, <-Q, vector jump, df/dt.

■ The 20 last alarms and 20 last shutdowns are recorded with time and hour.

■ Automatic start/stop control according with load demand.

■ Help request on fault function

■ Broadcast data inter Gensys:
Each Gensys can send through Canbus : 2 analog and 10 digital values.

■ Tie breakers synchronisation through the Canbus.

■ Read and write ModBus functions (from 3 to 6 functions).

■ Marine sequences (information below)

SPECIFICATIONS

■ **Operating temperature:** 0°C to +55°C
■ **Storage temperature:** -30 to +70°C
■ **Humidity:** 5 to 95%. Tropic-proof circuits for normal operation in humid conditions. Front panel IP54 protection. Back panel IP20 protection.
■ **Altitude:** 2000m
■ **Size:** 248x197x57mm (9.76x7.76x2.24in)
■ **Panel cut out:** 177x228mm (6.97x8.98in)
■ **Mounting:** Attitude at any position, but consideration of the display orientation should be considered.
■ **Weight:** 1.9kg (4.2oz)
■ **European Union Directive CE:** EN 50081-2, EN 50082-2, 73/23EEC
■ **DC supply power voltage input:** 8 to 35VDC, 600mA at 12VDC & 300mA at 24VDC.
■ **AC voltage inputs:** 100 to 480Vac, 100mA max. Neutral terminal could be or not could be connected.
■ **AC current inputs:** 0 to 5A, 1VA. Each phase is isolated from the others.
■ **AC current overload:** 15A during 10s.
■ **Frequency measurement:** 35 to 65 Hz – 15Vac minimum between phase and neutral.
■ **Magnetic pick up input:** 100 to 10.000Hz, 2Vac minimum.
■ **Digital inputs:** NO or NC to ground.
■ **Emergency stop input:** Norm. Closed 24V.
■ **Relays outputs (crank & fuel):** 16A. The 24V is provided trough the emergency push button.
■ **Relays outputs (breakers):** 5A, 230VAC max. NO + NC available.
■ **Transistors outputs:** 350mA, Over current protected.
■ **Analogue inputs (oil press & water temp):** 0 to 400 Ohms. Calibration is configurable.
■ **Analogue inputs (spare 1 & spare 2):** 0 to 10KOhms. Calibration is configurable.
■ **Analogue input (+/-20mA or +/-10V):** 50 Ohms (current) or 20KOhms (voltage).
■ **Analog load sharing line:** 0 to 3VDC (5Vmax).
■ **Speed control signal:** The speed and frequency control is made either by a +/-10VDC output with adjustable span and offset or by 2 contacts +speed/-speed.
■ **Voltage control signal:** The voltage control (AVR) is made either by a +/-10VDC output with adjustable span and offset or by 2 contacts +voltage/-voltage.
■ **Serial ports:** 4 serial ports are available.
- RS232 for PC connection – Sub-D 9 pins female.
- RS485 for Modbus RTU (read and write) – Sub-D 9 pins male.
- Canbus for inter-Gensys connection – Sub-D 9 pins male.
- Canbus for options – Sub-D 9 pins male.
■ **LCD characteristics:** 114x64mm, back light 60 cd/m2, 3 character sizes.
■ **Terminals:** 2 pieces connectors, 2,5mm2.
■ **Languages:** English, Spanish, French, German, Dutch, Italian

embedded electronics

PROGRAMMING BY EQUATIONS

The Gensys Marine controller allows the user to program equations without any software tool needed. The programming is written with a basic text editor software.

The logical and arithmetic operators available are:
AND, OR, XOR, ! (not), +, -, *, /, $ (hexadecimal value with letter in capital).

The comparators operators available are:
EQ (equal), NE (not equal), GT (greater than), LT (lower than), GE (greater or equal), LE (lower or equal).

Example of equation bloc:
```
        BLOC
        TEST E2202 EQ 1 THEN
                TEST E2440 GT 600 THEN        E2020:=1
                ELSE INC E2440
                TEND
        ELSE E2440:=0
        TEND;
        TEST E2069 OR E2205 EQ 1 THEN
        E2020:=0 TEND
        BEND
```
Note: The equations are executed every 100ms.

MARINE SPECIFIC FEATURES

■ **Heavy consumer control:**
Analysis between Gensys to supply heavy consumer (crane, bow thrusters, ...)

■ **Load dependent start/stop:**
Gensys calculates the power per genset prior to the generator breaker opening.

Genset are started and stopped depending on load request. The user has the choice between several sequences (running hours, priority member, ...)

■ **Non essential consumer tripping:**
Units monitors the load to trip non-essential consumer if generator(s) reached overload or under frequency treshold.

CABLES & CONNECTORS

The following cables and connectors are available:
■ A40W0: GENSYS Marine to PC cable - DB9/DB9 - 3m.
■ A40W1: CAN© inter GENSYS Marine cable for 2 generators - DB9/DB9 - 120 Ohms end resistor included on both side - 7m.
■ A40W2: CAN© inter GENSYS Marine cable for more than 2 generators or CanOpen© I/O modules - DB9/free wires - 120 Ohms end resistor included on DB9 side - 7m.
■ A40W3: DB9/Terminals connector to be used with more than 2 generators for double connection (with screws).
■ A40W4: Communication cable (RS485, CAN, RS232) - per meter.
■ A40W5: DB9 end resistor connector.

CRE TRAININGS

CRE Technology offers specific trainings to control the large Gensys applications and program the module.
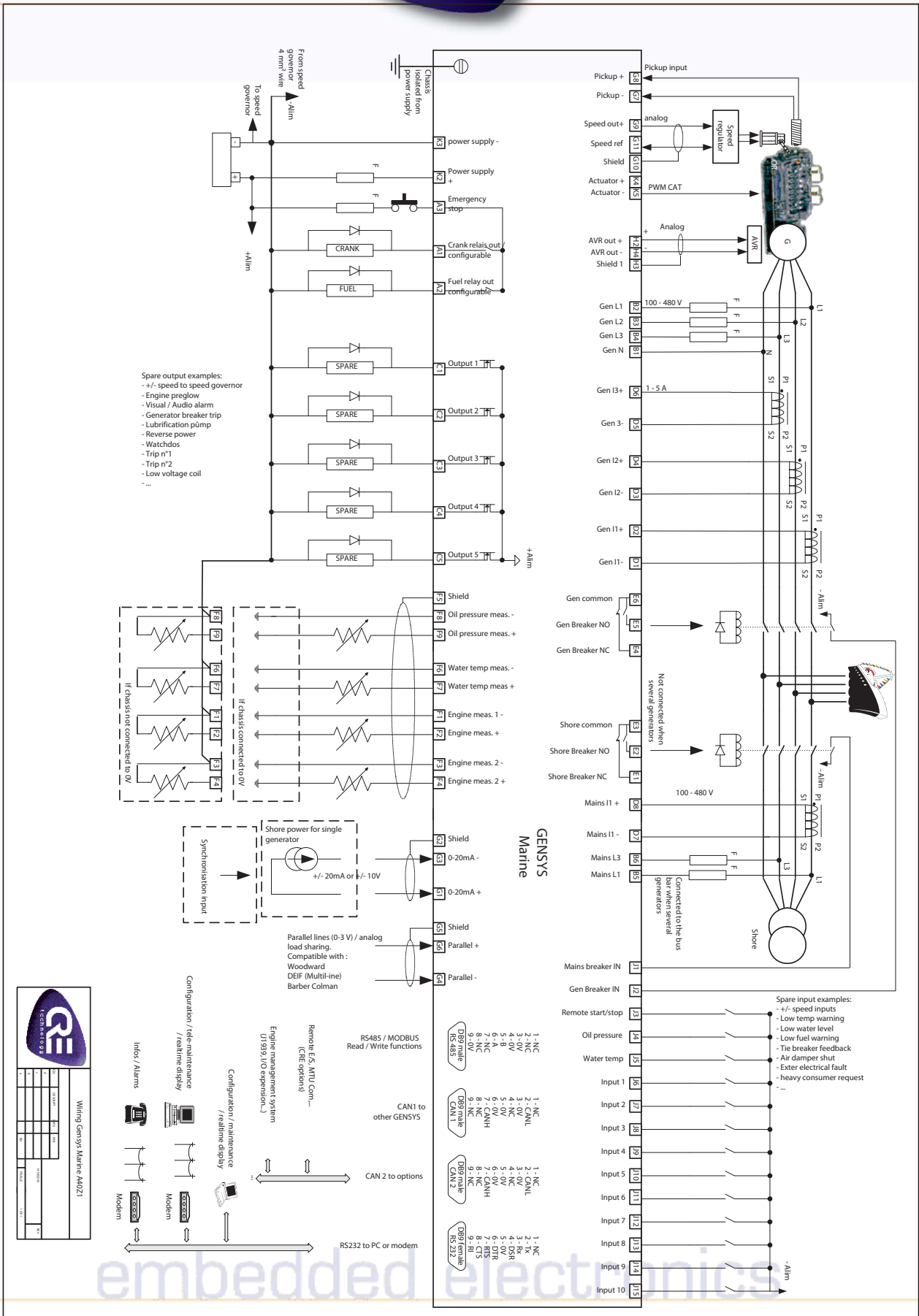
APPLICATION ENGINEERING

CRE Technology and their distributors can pre-programm Gensys according to customer requirements.

embedded electronics

CRE technology

GENSYS Marine

Chassis isolated from power supply

To speed governor
From speed governor 4 mm² wire
-Alim
+Alim

Terminal	Label
K3	power supply -
K2	Power supply +
A3	Emergency stop
A1	Crank relais out / configurable
A2	Fuel relay out configurable

CRANK
FUEL

Spare output examples:
- +/- speed to speed governor
- Engine preglow
- Visual / Audio alarm
- Generator breaker trip
- Lubrification pûmp
- Reverse power
- Watchdos
- Trip n°1
- Trip n°2
- Low voltage coil
- ...

SPARE

Terminal	Label
C1	Output 1
C2	Output 2
C3	Output 3
C4	Output 4
C5	Output 5

+Alim

If chassis not connected to 0V
If chassis connected to 0V

Terminal	Label
F5	Shield
F8	Oil pressure meas. -
F9	Oil pressure meas. +
F6	Water temp meas. -
F7	Water temp meas +
F1	Engine meas. 1 -
F2	Engine meas. +
F3	Engine meas. 2 -
F4	Engine meas. 2 +

Synchronisation input
Shore power for single generator
+/- 20mA or +/- 10V

Terminal	Label
G8	Shield
G7	0-20mA -
G7	0-20mA +
G5	Shield
G6	Parallel +
G4	Parallel -

Parallel lines (0-3 V) / analog load sharing.
Compatible with :
Woodward
DEIF (Multil-ine)
Barber Colman

Pickup input

Terminal	Label
E8	Pickup +
E7	Pickup -
G9	Speed out+
G11	Speed ref
G10	Shield
K4	Actuator +
K5	Actuator -
H2	AVR out +
H3	AVR out -
H3	Shield 1

analog
Speed regulator
PWM CAT
Analog
AVR
G

Terminal	Label
B2	Gen L1
B3	Gen L2
B4	Gen L3
B1	Gen N
D6	Gen I3+
D5	Gen 3-
D4	Gen I2+
D3	Gen I2-
D2	Gen I1+
D1	Gen I1-

100 - 480 V
1 - 5 A
L1 L2 L3 N
P1 S1 P2 S2

Terminal	Label
E6	Gen common
E5	Gen Breaker NO
E4	Gen Breaker NC
E3	Shore common
E2	Shore Breaker NO
E1	Shore Breaker NC
D8	Mains I1 +
D7	Mains I1 -
B6	Mains L3
B5	Mains L1

Not connected when several generators
100 - 480 V
Connected to the bus bar when several generators
-Alim
Shore

Terminal	Label
J1	Mains breaker IN
J2	Gen Breaker IN
J3	Remote start/stop
J4	Oil pressure
J5	Water temp
J6	Input 1
J7	Input 2
J8	Input 3
J9	Input 4
J10	Input 5
J11	Input 6
J12	Input 7
J13	Input 8
J14	Input 9
J15	Input 10

Spare input examples:
- +/- speed inputs
- Low temp warning
- Low water level
- Low fuel warning
- Tie breaker feedback
- Air damper shut
- Exter electrical fault
- heavy consumer request
- ...

-Alim

Infos / Alarms
Configuration / tele-maintenance / realtime display
Configuration / maintenance / realtime display
Engine management system (J1939, I/O expension...)
Remote E/S, MTU Com... (CRE options)
Modem

RS485 / MODBUS Read / Write functions
DB9 male RS 485
1 - NC
2 - NC
3 - 0V
4 - 0V
5 - B
6 - A
7 - NC
8 - NC
9 - NC

CAN1 to other GENSYS
DB9 male CAN 1
1 - NC
2 - CANL
3 - 0V
4 - NC
5 - 0V
6 - 0V
7 - CANH
8 - NC
9 - NC

CAN 2 to options
DB9 male CAN 2
1 - NC
2 - CANL
3 - 0V
4 - NC
5 - 0V
6 - 0V
7 - CANH
8 - NC
9 - NC

RS232 to PC or modem
DB9 female RS 232
1 - NC
2 - Tx
3 - Rx
4 - DSR
5 - 0V
6 - DTR
7 - RTS
8 - CTS
9 - RI

Wiring Gensys Marine A4071

Cfr0345