



# MASTER 2.0

## Complete power plant controller with mains paralleling

- Compact module "All in one"
- Fully compatible with GENSYS 2.0 and most of analog load sharers
- 5 isolated serial ports: USB, RS485, 2 Canbus, Ethernet
- SD card reader
- Multi-functions large graphic display
- Internal logic sequence programmable by equations
- Embedded web site

The Master 2.0 is a power plant controller for gensets paralleled with one or several mains.

This "all-in-one" unit includes all the necessary functions:

- ▶ Power plant management with several mains
- ▶ Triphase mains failure
- ▶ Electrical protection for power plant and mains
- ▶ Electrical parameters display for power plant and mains
- ▶ Manual and automatic paralleling with mains (frequency, phase and voltage)
- ▶ KW power management with several modes:
  - ✓ No break change over with load transfer
  - ✓ Permanent paralleling in base load
  - ✓ Permanent paralleling in peak shaving mode
- ▶ Power factor control when paralleling with mains.

The Master 2.0 controller is configurable through its front panel or through a PC without a dedicated software (Master 2.0 has an embedded web site and is exploitable with Internet explorer). It is password protected.

The Gensys 2.0 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: Extension modules (DIN rail mounting) could be added on the Canbus port dedicated to options. The type of inputs 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 Master 2.0 has an inter-unit isolated Canbus port for information transfer with Gensys 2.0 and Master 2.0.

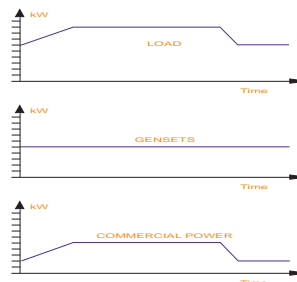
The Master 2.0 also has an analog load sharing line to be compatible with Woodward and Barber Colman analog load sharers.



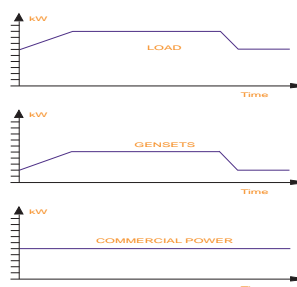
A54Z0

### APPLICATIONS

- **Constant generating set power:** in this mode, the generating sets provide constant power. The commercial power varies according to the load.



- **Constant commercial power:** in this mode, the commercial power (imported or exported) remains constant. The generating sets power varies according to the load.



- **Power plant control with several commercial power**  
1 Master 2.0 by commercial power
- No break change over with load transfer.
- Transfer switch unit control.

embedded electronics



## FUNCTIONS

- **Power plant 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)
- **Mains electrical parameters display:**
  - ▶ Voltage phase-phase (3 phases RMS)
  - ▶ Current (3 phases)
  - ▶ Frequency
  - ▶ Active power
  - ▶ Reactive power
  - ▶ Power factor
  - ▶ Import active power energy (kWh)
  - ▶ Import reactive power energy (kARh)
- **Manual & automatic frequency & phase synchronization** (differential frequency meter + synchroscope available on screen).
- **Manual & automatic voltage synchronization** (differential voltmeter available on screen).
- **Active power control** (by Canbus port, up to 16 Gensys 2.0/ Master 2.0 units)
- **Power factor control** (by Canbus port, up to 16 Gensys 2.0/ Master 2.0 units)
- **Power management with several mains**
- **Phase sequence protection**
- **Phase shift compensation** (ie: DYN 11)
- **Short-circuit protection**
- **Generator electrical protections:** <F, >F, <U, >U, >I, >In, >P, <P, <-P, >Q, <Q, <-Q
- **Mains electrical protections (option) :** <F, >F, <U, >U, >P, <P, <-P, >Q, <Q, <-Q, vector jump, df/dt.
- **The 50 last alarms and 50 last shutdowns are recorded on non volatile memory.**

## FEATURES

- Operating temperature: -20 to +70°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: 45 to 70 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.
- Analog input (+/-20mA or +/-10V): 50 Ohms (current) or 20KOhms (voltage).
- Analog load sharing line: 0 to 3VDC (5Vmax).
- Serial ports: 5 isolated serial ports are available.
  - ▶ USB for PC connection
  - ▶ RS485 for Modbus RTU (read and write) – Sub-D 9 pins male – 120 ohms resistors by microswitch selection.
  - ▶ Canbus for inter-Gensys 2.0 connection – Sub-D 9 pins male - 120 ohms resistors by microswitch selection.
  - ▶ Canbus for options (ie: J1939) – Sub-D 9 pins male - 120 ohms resistors by microswitch selection.
  - ▶ Ethernet (I/O déporté – Remote communication – PC communication): for any requirement, please contact your CRE team.
- LCD characteristics: 114x64mm, back light 60 cd/m<sup>2</sup>, 3 character sizes.
- Terminals: 2 pieces connectors, 2,5mm<sup>2</sup>.
- Languages: English, Spanish, French, German

## PROGRAMMING BY EQUATIONS

The Master 2.0 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
    
```

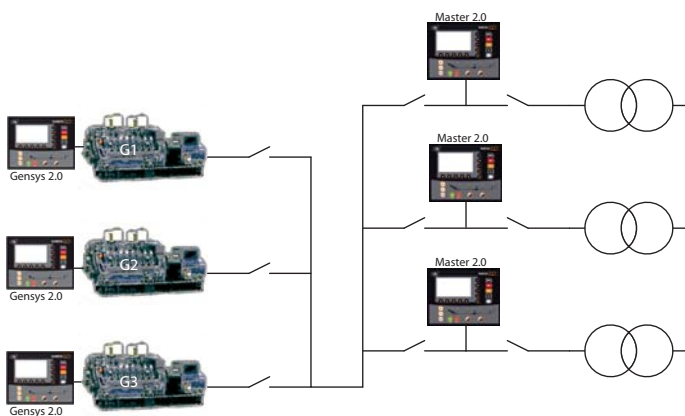
Note: The equations are executed every 100ms.

## CABLES & CONNECTORS

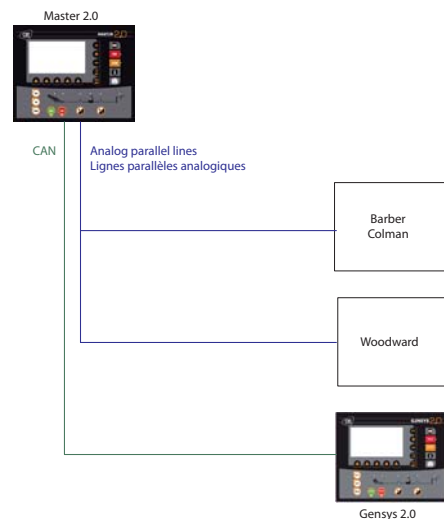
- A40W0: GENSYS 2.0 to PC cable - DB9/DB9 - 3m.
- A40W8: CAN© inter GENSYS 2.0 cable for 2 generators - DB9/DB9 - 120 Ohms end resistor included on both side - 7m.
- A40W6: CAN© inter GENSYS 2.0 cable for more than 2 generators or CanOpen© I/O modules - DB9/free wires - 120 Ohms end resistor included 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.

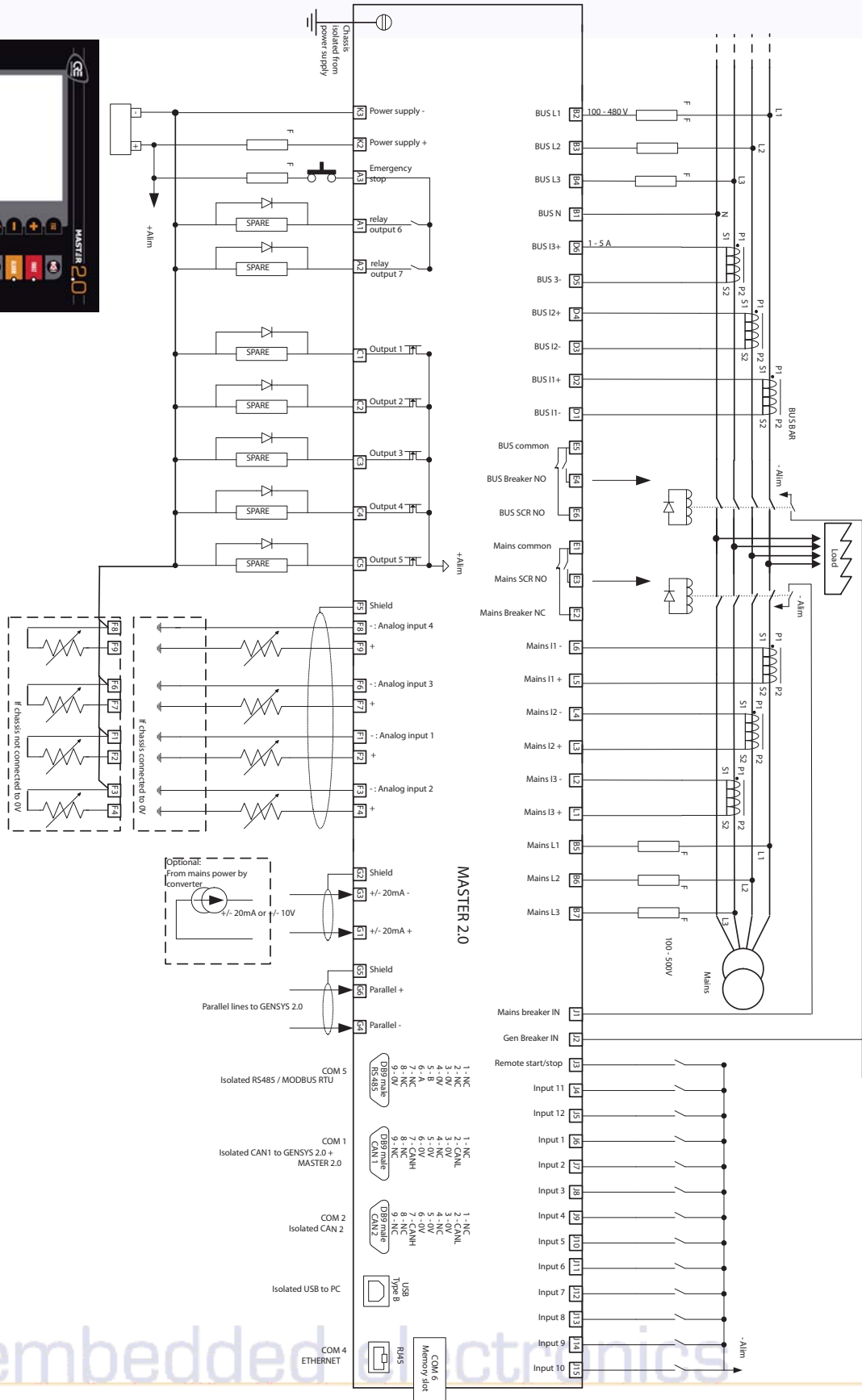
## WIRING EXAMPLES

- Power plant control with several mains



- Power plant control with different load sharers units





CRE TECHNOLOGY	
Wiring MASTER 2.0 AS4Z0	
Version	1.0
Date	10/2018
Author	AS4Z0 B
Drawn	
Checked	
Approved	