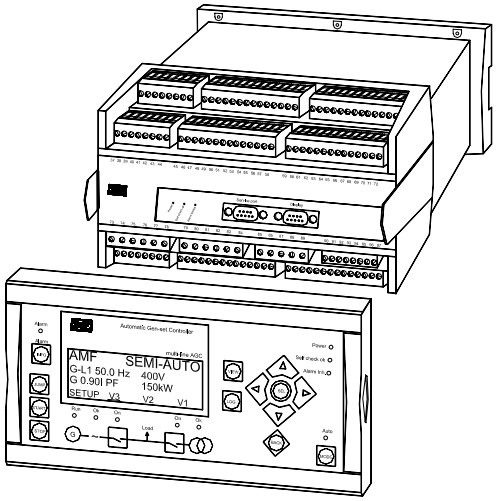
Data sheet

Automatic Gen-set Controller

Multi-line 2

4921240257F



CE

Standard functions

Operation modes

- Automatic mains failure
- Island operation
- Fixed power/base load
- Peak shaving
- Load take over
- Mains power export

Engine control

- Start/stop sequences
- Fuel solenoid selection
- Relay outputs for governor control

Protection (ANSI)

- Overcurrent, 2 levels (51)
- Reverse power (32)
- 4-20 mA inputs
- PT100 or VDO inputs
- Digital inputs

Display

- Prepared for remote mounting
- Push-buttons for start and stop
- Push-buttons for breaker operations
- Status texts

M-logic

- Simple logic configuration tool
- Selectable input events
- Selectable output commands

GSM communication

- SMS messages at all alarms
- Dial up from PC utility software to control unit

DEIF A/S

Application

The Automatic Gen-set Controller is a micro-processor based control unit containing all necessary functions for protection and control of a gen-set. It contains all necessary 3-phase measuring circuits and all values and alarms are presented on the LCD display

The AGC is a compact all-in-one unit designed for the following applications:

1. Automatic mains failure
2. Island operation
3. Fixed power/base load
4. Peak shaving
5. Load take over
6. Mains power export (fixed power to mains)

Optional applications:

7. Multiple gen-sets, load sharing
8. Power management (island operation)
9. Power management (parallel with mains)

The AGC can operate in automatic mains failure mode as a secondary mode regardless of the type of application - except the island applications.

The AGC automatically carries out a cyclical self-test at start-up. If any errors are found, they will be displayed in clear text in the display and indicated with a relay output.

The display is separate and can be installed directly on the main unit or in the front of the switchboard door (requires option J1 – display cable).

The AGC is supplied with an engine interface I/O card. Two selections are possible:

PCB / I/O	**M1** (standard)	**M2** (option)
4-20 mA	4 (3)*	3 (2)*
Tacho	1	1
Digital inputs	5 (3)	9 (7)
PT100	2	-
VDO	-	3
Relay outputs	3 (0)	3 (0)

**Depends on the selected gen-set mode*

The number in parenthesis indicates the number of user configurable digital inputs/relay outputs.

M1 is supplied, if M2 is not specified.

Test

The available gen-set modes except island operation include a test mode. The test can be configured to include either:

- gen-set starting and running for a preset time. Generator breaker is open during the test,

or

- gen-set starting and synchronisation of the generator breaker. The test is carried out for a preset period of time at a fixed power set point parallel to the mains.

Setup

Setup is easily done via a menu structure in the display (password protected) or via the RS232 PC connection and the multi-line 2 Windows® based PC utility software. The PC utility software can be downloaded free of charge from www.deif.com. The utility software offers additional features such as monitoring of all relevant information during commissioning, saving and downloading of settings and downloading of software updates.

Options

In order to perfectly match the product solution to specific applications, the functionality of the AGC can be equipped with a number of available options. The options selected by the customer will be integrated in the standard AGC hereby securing the same user interface unaffected by whether the application needs a highly complex or a more basic gen-set controller.

Unit definitions

AGC: The standard control unit designed for a number of applications (1-9). An extensive list of hardware and software options is available for the AGC.

AGC mains: A special power management control unit used in the parallel with mains power management application (9). Several options are available for the AGC mains.

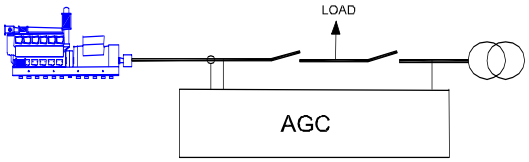
M-logic

This configuration tool is part of the PC utility software which is free of charge. With this tool it is possible to customise the application to your needs. It is possible to dedicate specific functions or logical conditions to different inputs and outputs.

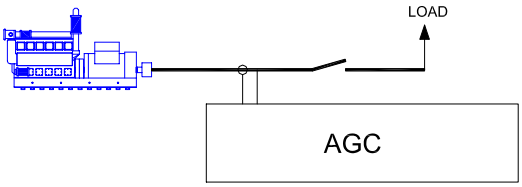
Single line application diagrams

Standard

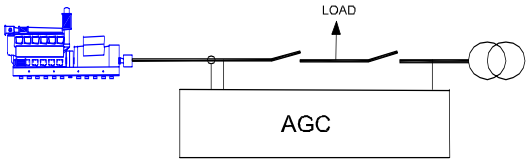
Automatic mains failure **(1)**



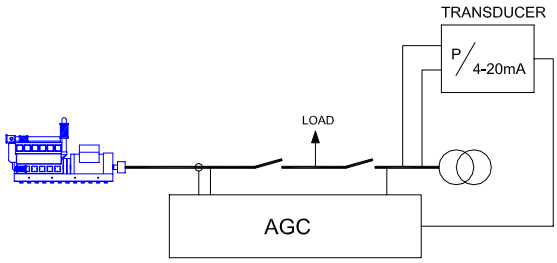
Island operation **(2)**



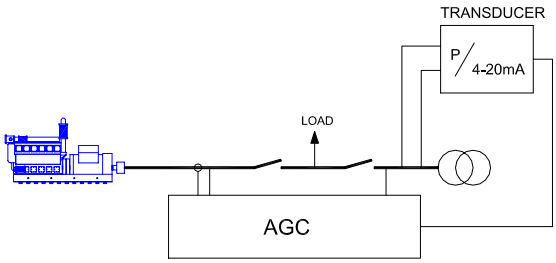
Fixed power/base load **(3)**



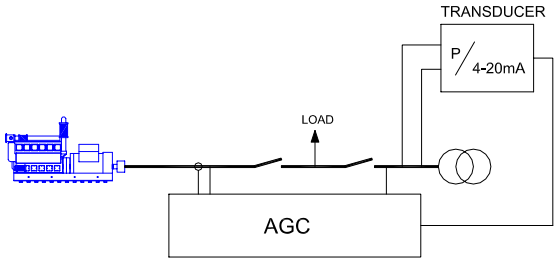
Peak shaving **(4)**



Load take over **(5)**

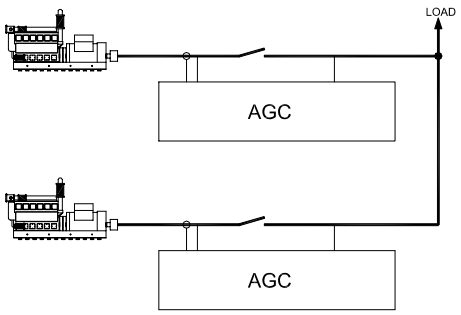


Mains power export **(6)**



Optional

Multiple gen-sets, load sharing **(7)**



Power management **(8-9)**

See separate page in this data sheet

Power management (option G5)

Description
The AGC can be equipped with a power management option (G5). Using this possibility the AGC will be able to handle applications with up to 16 gen-sets.

The basic functions are:

- Multi-master system
- Control of up to 16 gen-sets
- Load dependent operation
- Priority selection
- Ground relay control
- Tie breaker control (selectable)
- Mains breaker control

In a multi-master system the power management control is automatically performed by the available gen-set AGCs. This means that the system is not dependent on one master unit. The communication between the AGC units is CAN bus.

Application
The power management option supports two basic configurations only:

- Island operation
- Parallel to mains

The gen-set modes supported by the power management option are:

- Automatic mains failure
- Island operation
- Fixed power/base load
- Peak shaving
- Load take over
- Mains power export (fixed power to mains)

These are the selectable gen-set modes of the entire plant, and they are adjusted on the *AGC mains* unit. The AGC mains is not necessarily in island operation configuration, since no mains breaker is to be controlled.

Test
The available gen-set modes except island operation include a test mode. The test can be configured to include either:

- gen-set starting and running for a preset time. Generator breaker is open during the test, or
- gen-set starting and synchronisation of the generator breaker. The test is carried out for a preset period of time at a fixed power set point parallel to the mains.

Priority selection
The priority routines in the AGC are based on:

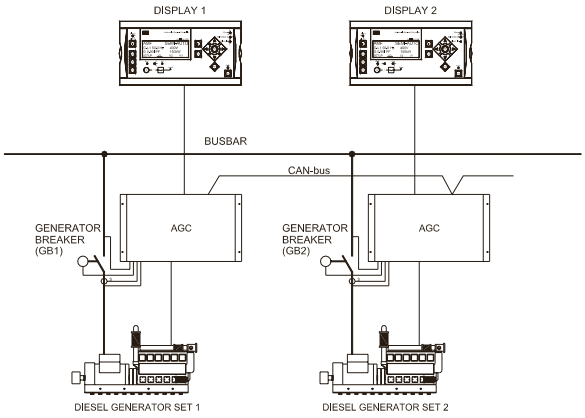
- manual selection
- running hours
- fuel optimising

Load dependent operation
The load dependent starting and stopping of the gen-sets are based on a *power available* calculation. The next generator will start, when the available power decreases below the adjustable set point. It will stop, when too much power is available.

Ground relay
If configurable relays are available in the specific AGC units (option dependent), it is possible to control the star point ground connection of the generators. This is in order to have only one ground connection at a time.

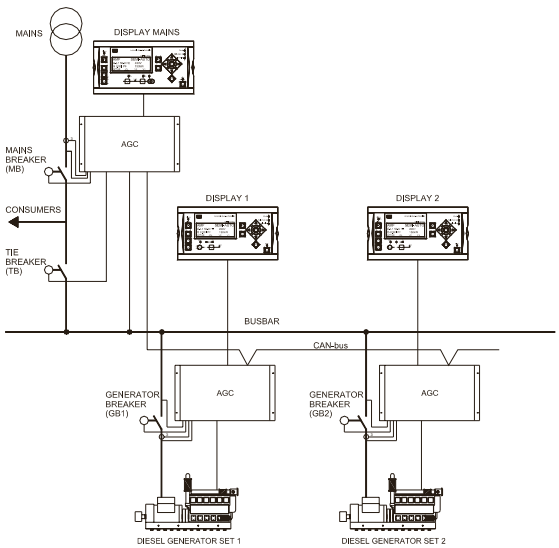
Optional power management applications

Island operation application **(8)**



Parallel with mains application **(9)**

The tie breaker can be selected on the AGC mains depending on applicational needs.



Available options

Please notice that not all options can be selected for the same unit. Please refer to page 8 in this data sheet for further information about the location of the options in the unit.

Option	Description	Type	Note
A	**Loss of mains protection package**		
A1	Over- and undervoltage (generator and busbar/mains) **(27/59)** Over- and underfrequency (generator and busbar/mains) **(81)** Vector jump **(78)** df/dt (ROCOF) **(81)**	Software option	
A2	Over- and undervoltage (generator and busbar/mains) **(27/59)** Over- and underfrequency (generator and busbar/mains) **(81)** df/dt (ROCOF) **(81)**	Software option	
A3	Over- and undervoltage (generator and busbar/mains) **(27/59)** Over- and underfrequency (generator and busbar/mains) **(81)** Vector jump **(78)**	Software option	
A4	Positive sequence (mains voltage low) **(27)**	Software option	
B	**Generator/busbar/mains protection package**		
B1	Over- and undervoltage (generator and busbar/mains) **(27/59)** Over- and underfrequency (generator and busbar/mains) **(81)**	Software option	
C	**Generator add-on protection package**		
C1	Over- and undervoltage (generator) **(27/59)** Over- and underfrequency (generator) **(81)** Overload **(32)** Peak current **(50)** Current unbalance **(46)** Voltage asymmetry **(47)** Reactive power import (excitation loss) **(32)** Reactive power export (overexcitation) **(32)**	Software option	This option is not available for AGC mains
C2	Negative sequence voltage high **(47)** Negative sequence current high **(46)** Zero sequence voltage high **(59)** Zero sequence current high **(50)**	Software option	This option is not available for AGC mains
D	**Voltage/var/PF control**		This option is not available for AGC mains
D1	Selection between: Constant voltage control (stand-alone) Constant reactive power control (parallel with mains) Constant power factor control (parallel with mains) Reactive load sharing (island paralleling with other generators)	Software option	Not with EF2
E	**Analogue controller outputs**		This option is not available for AGC mains
E1	+/-20mA for speed governor +/-20mA for AVR	Hardware option	AVR outputs are available if D1 is selected Refer to page 8 See note 2
EF	**Combination outputs**		
EF2	+/-20mA for speed governor 1 x 0(4)...20mA transducer output	Hardware option	Refer to page 8 See note 2
EF3	1 x PWM (Pulse Width Modulated) output for CAT speed governor 1 x PWM (Pulse Width Modulated) output for droop +/-20mA for speed governor or AVR 2 x relay outputs for speed governor or AVR	Hardware option	Refer to page 8 See note 2
EF4	+/-20mA for speed governor or AVR 2 x relay outputs for speed governor or AVR	Hardware option	Refer to page 8 See note 2
F	**Analogue transducer outputs**		This option is not available for AGC mains
F1	2 transducer outputs, 0...20mA or 4...20mA	Hardware option	Refer to page 8
G	**Load sharing/power management**		
G3	Load sharing with analogue lines	Hardware option	M12 is possible Refer to page 8 This option is not available for AGC mains
G5	Power management, 16 gen-sets	Hardware option	Refer to page 8

H	**Serial communication**		
H2	Modbus RTU	Hardware option	Refer to page 8
H3	Profibus DP	Hardware option	Refer to page 8
H4	CAT CCM	Hardware option	Refer to page 8 This option is not available for AGC mains
H5	**CAN bus (J1939)** MTU Detroit Deutz John Deere Volvo Penta		Refer to page 8 This option is not available for AGC mains
H6	Cummins GCS	Hardware option	Refer to page 8 This option is not available for AGC mains
J	**Cables**		
J1	Display cable with plugs, 3 m. UL94 (V1) approved	Other	
J2	Display cable with plugs, 6 m. UL94 (V1) approved	Other	
J3	PC cable for utility software (RS232). UL94 (V1) approved	Other	
J6	Display cable with plugs, 1 m. UL94 (V1) approved	Other	
K	**Designer's reference handbook (hard copy)**	Other	
L	**Display gasket for IP54**	Other	Standard is IP52
M	**Configurable engine control cards**		
M1	Engine control card with Pt100 sensor inputs 4 x 4…20mA inputs 2 x Pt100 inputs 1 x tacho input (magnetic pick-up) 5 x binary inputs 3 x relay outputs	Hardware option	Refer to page 8 See note 1
M2	Engine control card with VDO sensor inputs 3 x 4…20mA inputs 3 x VDO (resistor) inputs 1 x tacho input (magnetic pick-up) 9 x binary inputs 3 x relay outputs	Hardware option	Refer to page 8 See note 1
M	**Configurable I/O extension cards**		
M12	13 x binary inputs, 4 x relay outputs	Hardware option	G3 is possible Refer to page 8
M13	7 binary inputs, configurable	Hardware option	Refer to page 8
M14	4 relay outputs	Hardware option	Refer to page 8
M15	4 analogue inputs, configurable, 4...20mA	Hardware option	Refer to page 8
N	**Ethernet TCP/IP communication**		
N1	Integrated WebServer with web pages for plant presentation	Hardware option	Option H2 is required Refer to page 8
P	**Printer**		
P1	Event and alarm printer software	Software option	Printer and cable are included in this option
X	**Display**		
X3	Additional operator panel (AOP) 16 configurable LEDs and 8 configurable buttons	Other	
Y	**Display layout**		
Y1	AGC display for island operation (no mains breaker)	Other	

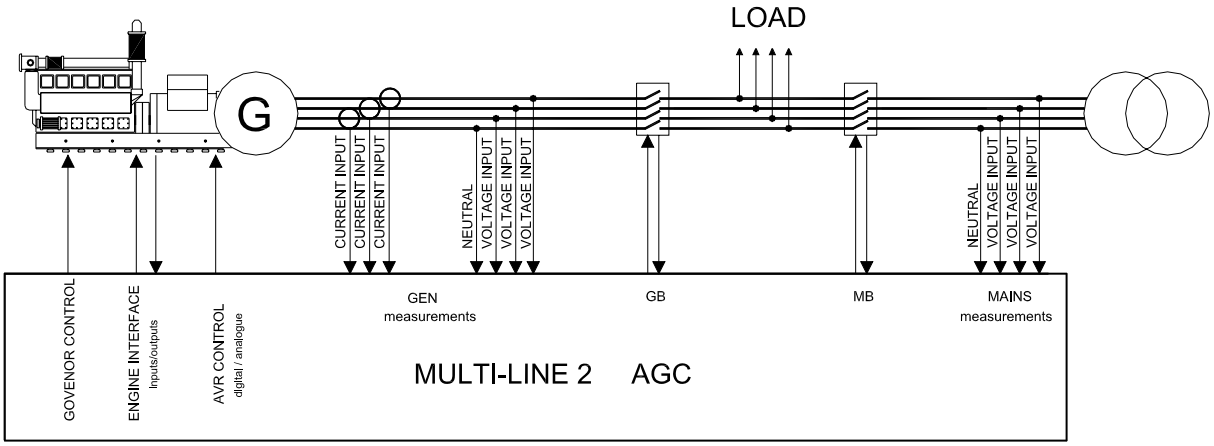
(ANSI# as per IEEE Std C37.2-1996(R2001) in parenthesis).

Option M1/M2 is used for engine control/protection. Option M1 is delivered as standard in the AGC. If option M2 is selected, it will replace option M1.

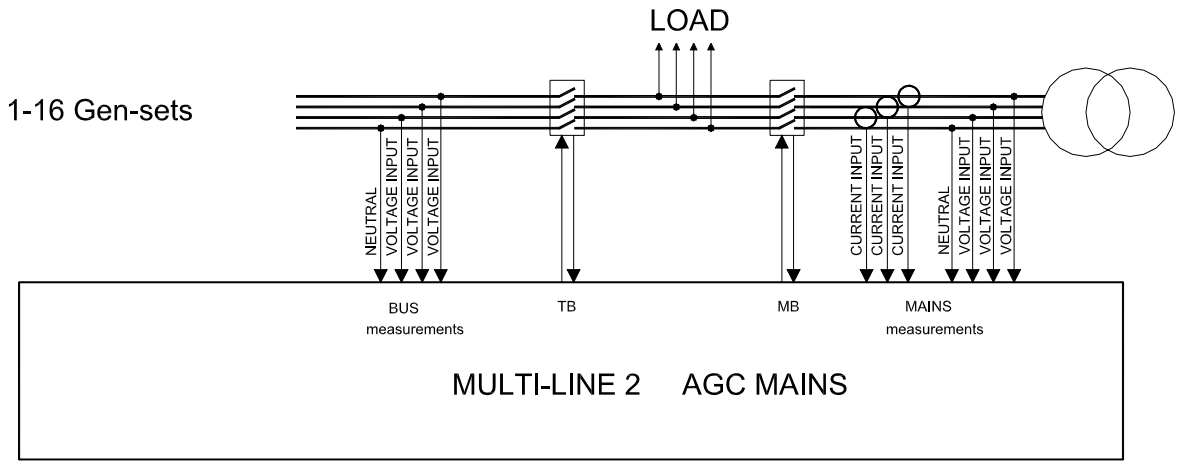
Options E1, EF2, EF3 and EF4 are used for GOV/AVR control. 4 relays are used as standard in the AGC for GOV/AVR control. If selected, these options will replace the 4 relays.

Principle diagrams

AGC



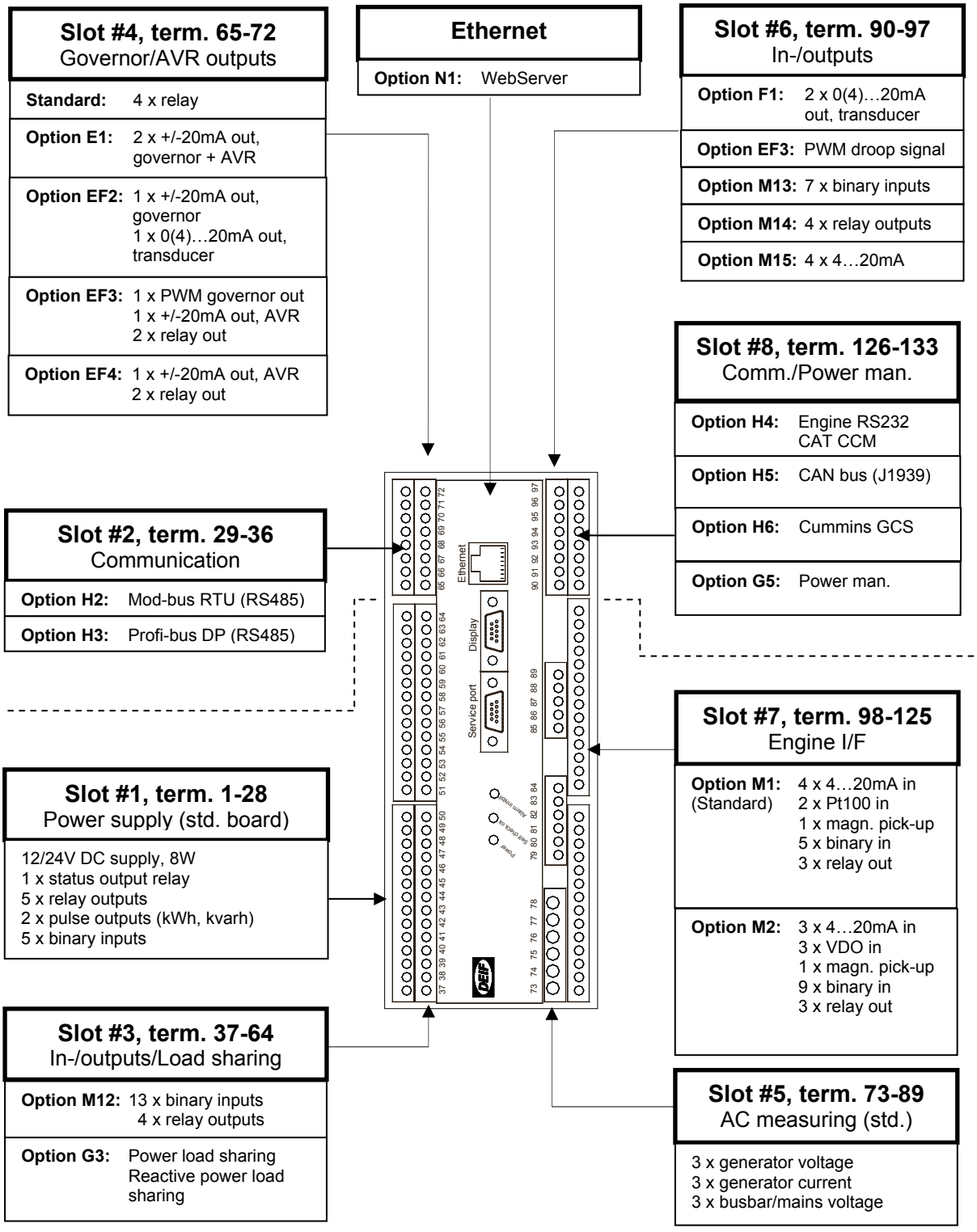
AGC mains



Hardware overview

There can only be one hardware option in each slot. It is e.g. not possible to select option H2 and option H3 at the same time because both options require a PCB in slot #2.

Besides the hardware options shown on this page it is possible to select the software options mentioned on page 5 in this data sheet. Options A, B, C, D and P are software options.



Technical specifications

Accuracy: Class 1.0
Class 2.0 for neg. seq. current

(To IEC 688)

Operating temp.: -25…70°C (-13...158° F)

Galvanic separation: Between AC voltage, AC current and other I/Os: 3250V AC, 50Hz, 1 min.

Between analogue outputs: 500V DC, 1 min.

Meas. voltage: 100-690V AC +/-20%

Consumption: Max. 0.25VA/phase

Meas. current: -/1 or -/5A AC

Consumption: Max. 0.3VA/phase

Current overload: 4 x I_n continuously
20 x I_n, 10 sec. (max. 75A)
80 x I_n, 1 sec. (max. 300A)

Meas. frequency: 30…70Hz

Aux. supply: 12/24V DC (8...36V continuously, 6V 1 sec.)
Max. 8W consumption

Recommended power supply is DEIF's DCP-2

Binary inputs: Optocoupler, bi-directional
ON: Input voltage 8…36V DC
Impedance typically 4.7kΩ
OFF: <2V DC

Relay outputs: 250V AC/24V DC, 8A
(Unit status output: 1A)

Analogue inputs: -10…0…+10V DC
Not galvanically separated
Impedance min. 100kΩ

4-20 mA: Impedance max 50Ω, not galvanically separated

PT100: According to EN/IEC 60751 + A2

VDO: Resistor inputs, internal supply max. 480Ω

Mounting: DIN-rail mount or base mount with 6 screws

Climate: Class HSE, to DIN 40040

Load sharing lines: -5…0…+5V DC

Analogue outputs: 0(4)...20mA
Galvanically separated
Active output (internal supply)
Load max. 500Ω

Safety: To EN 61010-1, installation category (overvoltage category) III, 600V, pollution degree 2

Protection: Unit: IP20
Display: IP52 (IP54 with gasket: Option L)

To IEC 529 and EN 60529

EMC/CE: To EN 50081-1/2, EN 50082-1/2 SS4631503 (PL4) and IEC 255-3

Material: All plastic materials are self-extinguishing according to UL94 (V1)

Plug connections: AC current: 4.0 mm^2 multi stranded

Other: 2.5 mm^2 multi stranded

Display: 9-pole Sub-D female

PC: 9-pole Sub-D male

Protection: Unit: IP20

Display: IP52 (IP54 with gasket: Option L)

To IEC 529 and EN 60529

Governors: multi-line 2 interfaces to all governors, including GAC, Barber-Colman, Woodward and Cummins.

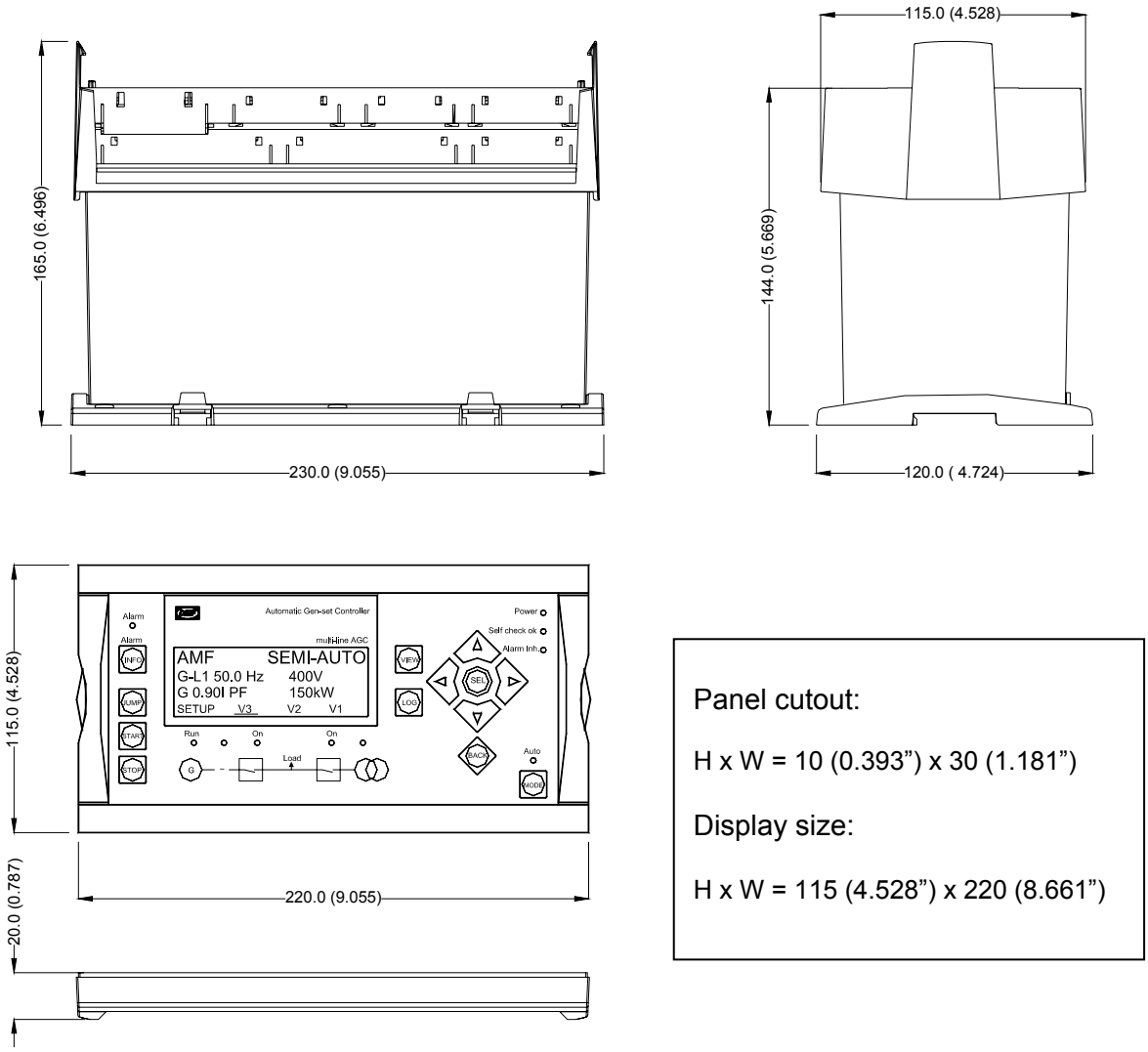
See interfacing guide at www.deif.com

Open collector outputs: Supply 8…36V DC, max. 10mA

Weight: Main unit: 1.6 kg (3.5 lbs.)
Option J1/J3: 0.2 kg (0.4 lbs.)
Option J2: 0.4 kg (0.9 lbs.)

Approval: UL 508

Unit dimensions in mm (inches)



Panel cutout:

H x W = 10 (0.393”) x 30 (1.181”)

Display size:

H x W = 115 (4.528”) x 220 (8.661”)

Order specifications

AGC – □ – □ – □

Option
Option
Option

Example: AGC - C1- E1 - H2

AGC mains – G5 – □ – □

Option
Option
Option

Example: AGC mains - A2 - F1 - G5 - H2
As the AGC mains unit is only usable with option G5, this option is already included when ordered.

Due to our continuous development we reserve the right to supply equipment which may vary from the described.

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