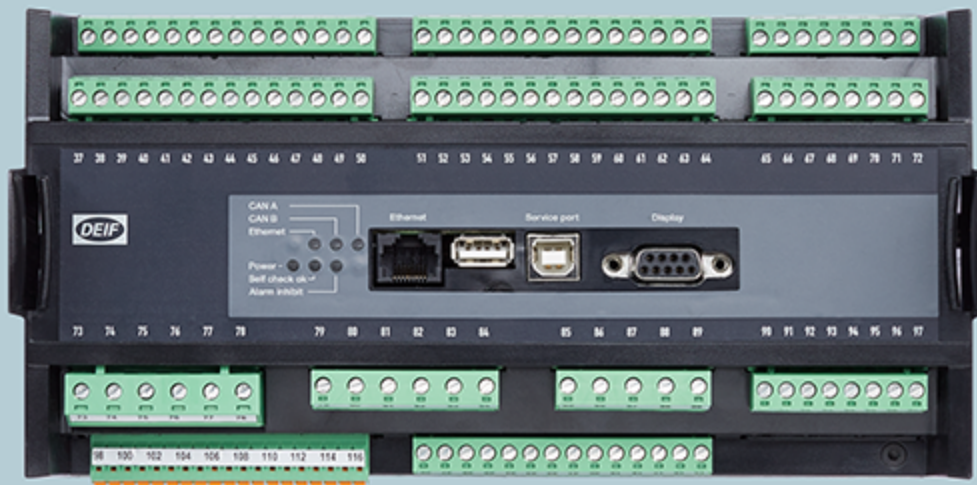




DATA SHEET



Automatic Genset Controller AGC-4



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1. Application information

1.1 General information

1.1.1 Application

The Automatic Genset Controller, AGC, is a control unit containing all necessary functions for protection and control of a genset. It can be used as a single unit for one genset, or a number of AGCs can be connected in a complete power management system for synchronising projects, islanded or paralleled to the mains. The AGC contains all necessary 3-phase measuring circuits, and all values and alarms are presented on the sunshine proof LCD display.

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

Standard plant modes	Applications
Island mode	Power plant with synchronising generators or a stand-alone generator. Can also be used in critical power plants.
Automatic Mains Failure	Critical power/emergency standby plants, black start generator.
Fixed power	Power plant with fixed kW set point (including building load).
Peak shaving	Power plant where generator supplies peak load demand paralleled to the mains.
Load takeover	Plant mode where the load is moved from mains to generator, for example peak demand periods or periods with risk of power outages.
Mains power export	Power plant with fixed kW set point (excluding building load).
Remote maintenance	Used when the generator has to supply the load while a distribution transformer needs to be disconnected for service.

The plant modes are configurable, and it is possible to change the plant mode on the fly both in single and in power management applications.



INFO

All modes can be combined with Automatic Mains Failure mode (AMF).



INFO

Remote maintenance requires a DEIF RMB box (separate product) and a set of cables (option J8).

The plant/genset is easily controlled from the display unit, or an HMI/scada system can be implemented using one of the communication options. Three display units can be installed per control unit.

1.1.2 Application emulation

In order to verify and test the functionality of the application, it is possible to use the emulation tool of the AGC. This tool makes it possible to test a majority of the functionality, for example plant modes and logics, breaker handling, mains and generator operation, without the need for any other connections than DC supply and CAN bus between units.

Application emulation is useful for training, customising plant requirements and testing basic functionality that needs to be set up or verified.

In a power management system it is possible to control the entire plant, with the PC Utility Software tool being connected to only one of the AGC controllers.

1.1.3 Inputs and outputs

The number of inputs and outputs in the AGC can be tailored depending on the option selection. This table includes the number of I/Os in the standard unit (no options present). The four outputs of the governor/AVR card in slot #4 are not included in the table.

In-/outputs	Occupied	Available for other configuration
Multi-selectable inputs	0	3
Digital inputs	2 for breaker ON/OFF feedbacks (4 if MB is present)/1 E-stop	9 (7 if MB is present)
RPM (MPU)	0	1
Relays for engine control	4 (start prepare/crank/stop/run)	0
Relays for breaker control	2 (4 if MB is present)	2 (0 if MB is present)
Relay	1 (status/watchdog)	1
Open collector outputs	0	2

1.1.4 Included functions

General functions	AGC-4 standard (Y3)	AGC-4 DG (Y1)	AGC-4 mains (Y4)	AGC-4 BTB (Y5)
Synchronising	x	x	x	x
Short time parallel	x		x	
USB interface to PC	x	x	x	x
Temperature-dependent cooling down				
Time-based cooling down	x	x		
Emergency cooling down				
kWh meter				
Day/week/month/total	x	x	x	x
kvarh meter				
Day/week/month/total	x	x	x	x
Engine running hours counter, emergency, normal				
Start attempt counter	x	x		
Maintenance counter				
Breaker operation counter	x	x	x	x
Free PC utility SW (Windows)	x	x	x	x
Permission settings in PC utility SW for limited SCADA access	x	x	x	x
Password-protected setup	x	x	x	x
Power derate	x	x		
Nominal settings for rental gensets	x	x		
Battery test, crank or asymmetry	x	x	x	x
Lube oil renewal	x	x		
Mains support (frequency and voltage)	x		x	
Fan control of 4 fans	x	x		
Fuel pump logic	x	x		
Engine block heater control	x	x		
Customised display views	x	x	x	x

General functions	AGC-4 standard (Y3)	AGC-4 DG (Y1)	AGC-4 mains (Y4)	AGC-4 BTB (Y5)
Command timers	x	x	x	x
Master clock	x	x		
Pulse input counters	x	x	x	x
Current thermal demands	x	x	x	x

Control functions	AGC-4 standard (Y3)	AGC-4 DG (Y1)	AGC-4 mains (Y4)	AGC-4 BTB (Y5)
Start/stop sequences	x	x		
Synchronising	x	x	x	x
Close before excitation (fast synchro.)	x	x		
Nos. of breakers/contactors to be controlled	2	1	2/1	1
Run coil	x	x		
Stop coil with wire break	x	x		
Relay outputs for speed control	x	x		
Event log with real-time clock				
Alarm log with real-time clock	x	x	x	x
Battery crank test log with real-time clock				

M-Logic	AGC-4 standard (Y3)	AGC-4 DG (Y1)	AGC-4 mains (Y4)	AGC-4 BTB (Y5)
Logic configuration tool for plant customising	x	x	x	x
Selectable input events, for example plant status	x	x	x	x
Selectable output events, for example plant commands	x	x	x	x

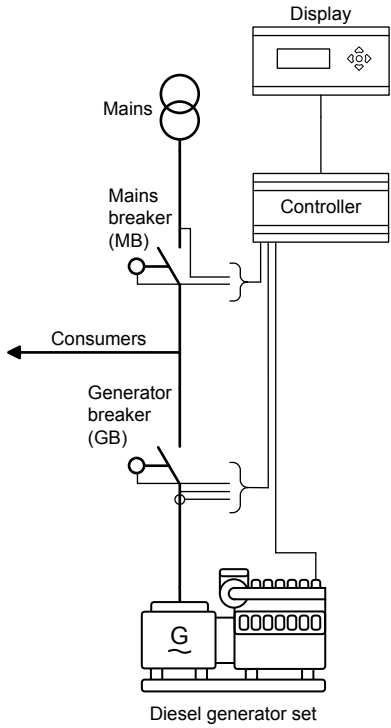
1.1.5 Protections

Protections	No. of	ANSI	AGC-4 standard (Y3)	AGC-4 DG (Y1)	AGC-4 mains (Y4)	AGC-4 BTB (Y5)
Reverse power	x2	32R	x	x	x	
Short circuit	x2	50P	x	x	x	
Over-current	x4	51	x	x	x	x
Voltage-dependent over-current	x1	51V	x	x	x	x
Over-voltage	x2	59P	x	x	x	
Under-voltage	x3	27P	x	x	x	
Over-frequency	x3	81O	x	x	x	
Under-frequency	x3	81U	x	x	x	
Unbalanced voltage	x1	47	x	x	x	x
Unbalanced current	x1	46	x	x	x	x
Under-excitation or var import	x1	32RV	x	x	x	x
Over-excitation or var import	x1	32FV	x	x	x	x
Overload	x5	32F	x	x	x	x

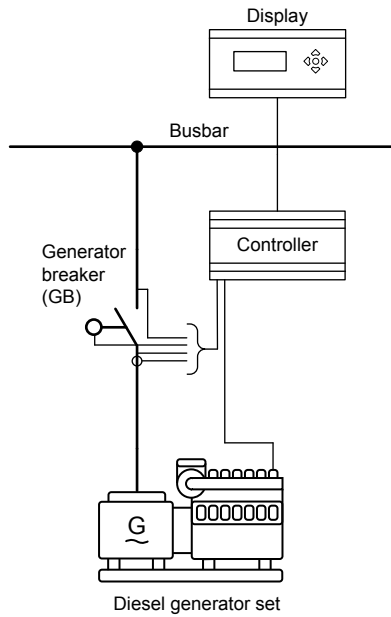
Protections	No. of	ANSI	AGC-4 standard (Y3)	AGC-4 DG (Y1)	AGC-4 mains (Y4)	AGC-4 BTB (Y5)
Busbar/mains over-voltage	x3	59P	x	x	x	x
Busbar/mains under-voltage	x4	27P	x	x	x	x
Load shed, three levels						
via current	x3	51	x	x	x	
via busbar frequency	x3	81	x	x	x	
via overload	x3	32	x	x	x	
via fast overload	x3	32	x	x	x	
Busbar/mains over-frequency	x3	81O	x	x	x	x
Multi-config. inputs with wire break alarms, three inputs	x2	NA	x	x	x	x
Emergency stop	x1	1	x	x		
Overspeed	x2	12	x	x		
Low auxiliary supply	x1	27DC	x	x	x	x
High auxiliary supply	x1	59DC	x	x	x	x
Generator breaker external trip	x1	5	x	x		
Tie/mains breaker external trip	x1	5	x		x	x
Synchronisation failure alarms		25	x	x	x	x
Breaker open failure		52BF	x	x	x	x
Breaker close failure		52BF	x	x	x	x
Breaker position failure		52BF	x	x	x	x
Close before excitation failure	x1	48	x	x		
Phase sequence error	x1	47	x	x	x	x
Deload error	x1	34	x	x		
Crank failure	x1	48	x	x		
Running feedback error	x1	34	x	x		
MPU wire break	x1	NA	x	x		
Start failure	x1	48	x	x		
Hz/V failure	x1	53	x	x		
Stop failure	x1	48	x	x		
Stop coil, wire break alarm	x1	5	x	x		
Engine heater	x1	26	x	x		
Battery test alarm	x1	NA	x	x		
Max. ventilation/radiator fan	x2	NA	x	x	x	x
Not in Auto	x1	34	x	x	x	x
Fuel fill check	x1	NA	x	x		

1.1.6 Single line application diagrams

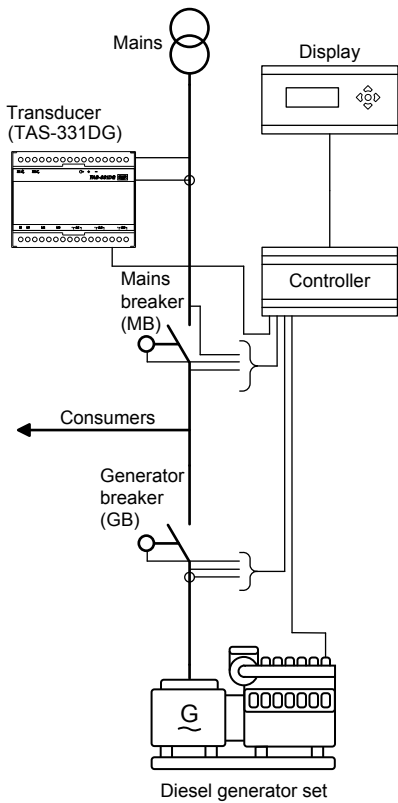
Standard, 1 controller: 1. Automatic mains failure and fixed power/base load



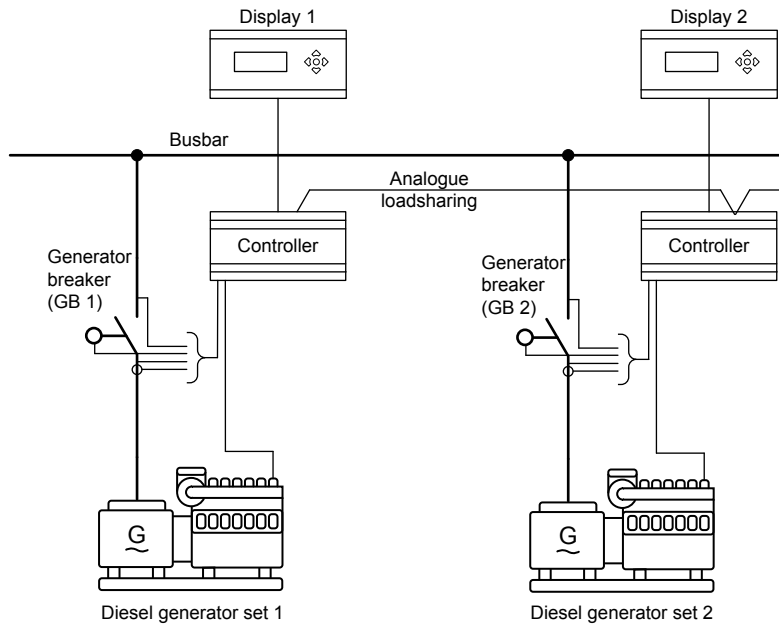
Standard, 1 controller: 2. Island



Standard, 1 controller: 3. Peak shaving, load takeover and mains power export



Optional: 4. Multiple gensets, load sharing (1 controller per genset)

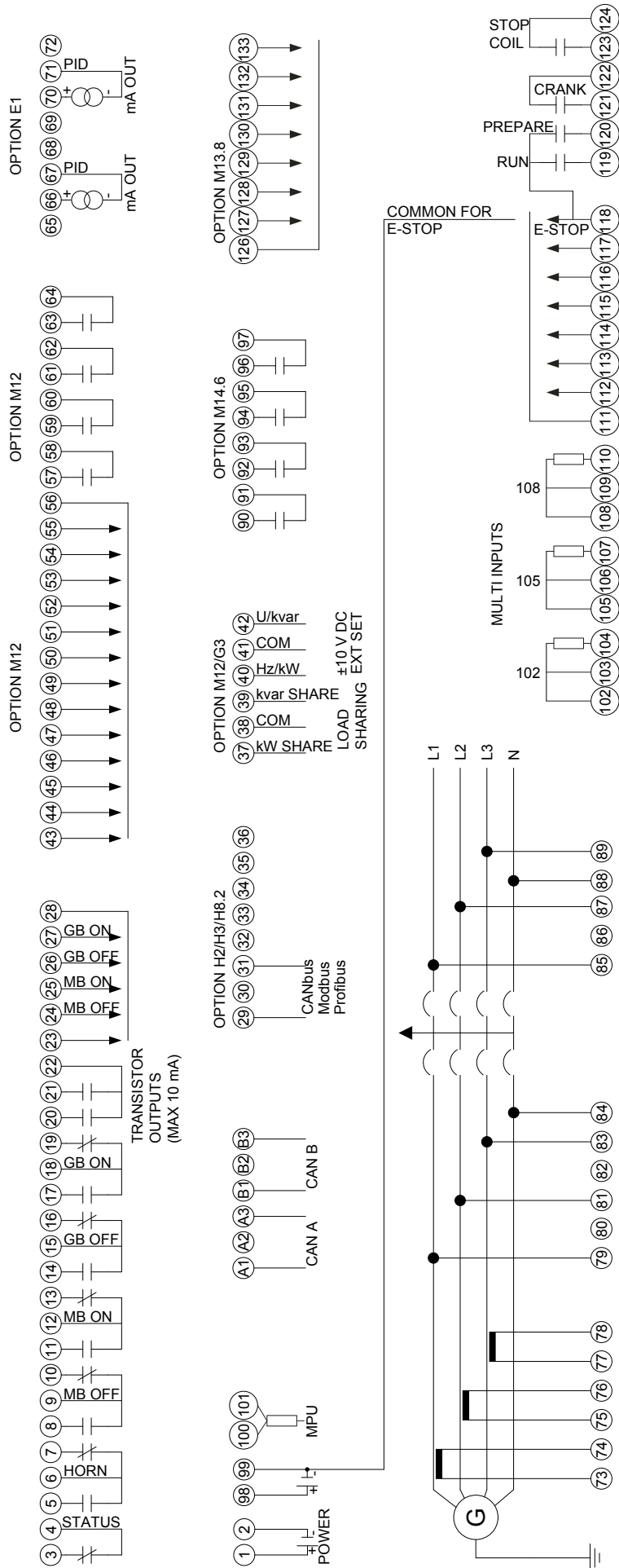


Optional: 5.-9. Power management

See separate page in this data sheet.

1.1.7 Terminal overview

This terminal strip overview shows the terminals of an AGC with commonly used HW options. The diagram might not reflect your actual unit due to different option configuration.



1.2 Power management applications

1.2.1 Power management applications

The purpose of the power management system is to implement one control system that controls all breakers and all gensets. This can for instance be for fuel optimised purposes, for easy implementation of plant logic or for safety reasons.

1.2.2 Application

The plant modes supported by the power management options are:

Standard plant modes	Applications
Island mode	Power plant with synchronising generators or a stand-alone generator. Can also be used in critical power plants with a start signal from an external (ATS) controller
Automatic Mains Failure	Critical power/emergency standby plants, black start generator
Fixed power	Power plant with fixed kW set point (including building load)
Peak shaving	Power plant where generator supplies peak demand
Load takeover	Plant mode where the load is moved from mains to generator, for example peak demand periods or periods with risk of power outages
Mains power export	Power plant with fixed kW set point (excluding building load)

The plant modes are configurable, and it is possible to change the plant mode on the fly both in single and in power management applications.

The plant can be divided by one to eight bus tie breakers making it possible to run the plant with different plant modes, for example for test purposes or when splitting up the load in primary and secondary loads.

1.2.3 Description

The AGC can be equipped with a power management option (G4, G5, G7 or G8). Using this possibility, the AGC will be able to handle simple or advanced applications for a great number of power plant projects within synchronising gensets, critical power/emergency standby applications or power producing applications.

The following number of units can be controlled:

- 32 gensets/mains (256 in plant management applications) with breakers
- 8 bus tie breakers on the generator bus or load bus

The complete power management system can easily be monitored from the PC utility SW through a graphical supervision page. Running status, hours in operation, breaker status, condition of mains and busbars and fuel consumption are just some of the values that are presented.

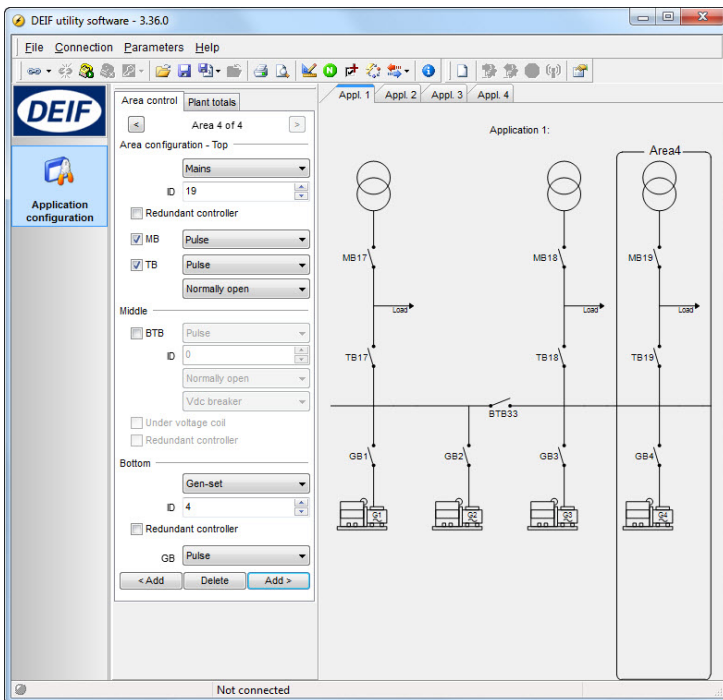
1.2.4 Power management functions

PM functions	AGC-4 DG	AGC-4 mains	AGC-4 BTB
Multi-master system	x	x	x
Redundant CAN bus	x	x	x
Short-time parallel (in same controller (MB/TB))		x	
Load-dependent start/stop	x		
Priority selection, manual and automatic			
Running hours	x		
Load profile			

PM functions	AGC-4 DG	AGC-4 mains	AGC-4 BTB
Manual			
Fuel optimised			
Ground relay	X		
ATS control		X	
Safety stop of DG	X		
Load management	X	X	X
Secured mode (start one extra generator)	X		
Quick setup for rental groups	X	X	
Asymmetric LS for optimal generator load level	X		
Plant PF control		X	
Mains feeder control, feeders paralleled		X	
Mains feeder control, main-tie-main for critical power		X	
Base load running for maintenance (island plants)	X		
Analogue load sharing for backup with option G3	X		
Section power control			X

1.2.5 Easy configuration of single line diagrams

The setup of the application is easily configured using a PC and the DEIF PC utility software.



Your PC tool visualises it - the AGC-4 realises it.

The basic plant control is set up by a few basic plant conditions including mains feeder handling and operation of the generators

1.2.6 Safe power management system

Multi-master system

The AGC power management system is designed as a multi-master system for increased reliability. In a multi-master system all vital data is transmitted between the AGCs, giving all units knowledge of the present power management status (calculations and position) in the application. This philosophy makes the application immune to failing master controllers and makes the AGC suitable for all types of applications, that is emergency standby/critical power applications.

Redundant CAN bus

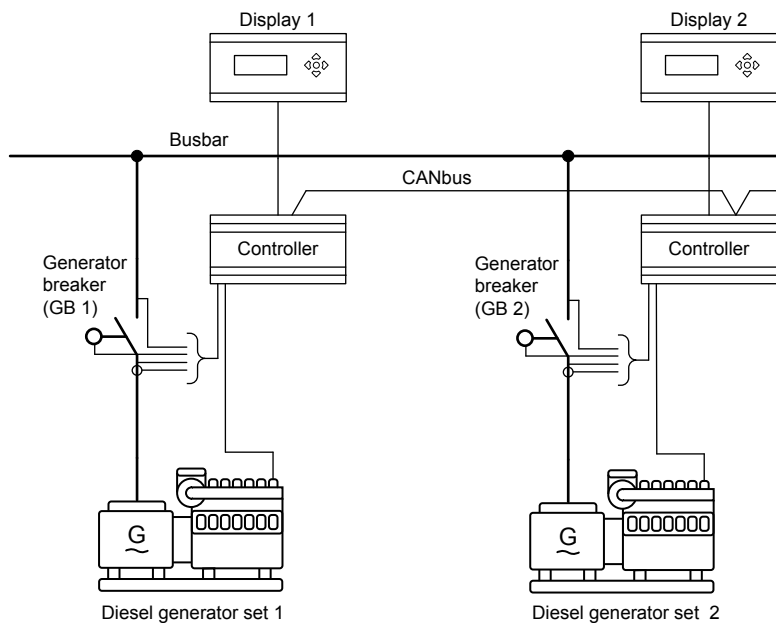
In critical power/emergency standby applications requiring extra operation reliability, redundant CAN bus communication lines can be used to ensure reliable CAN bus communication for power management if one of the CAN lines are damaged.

Redundant controller

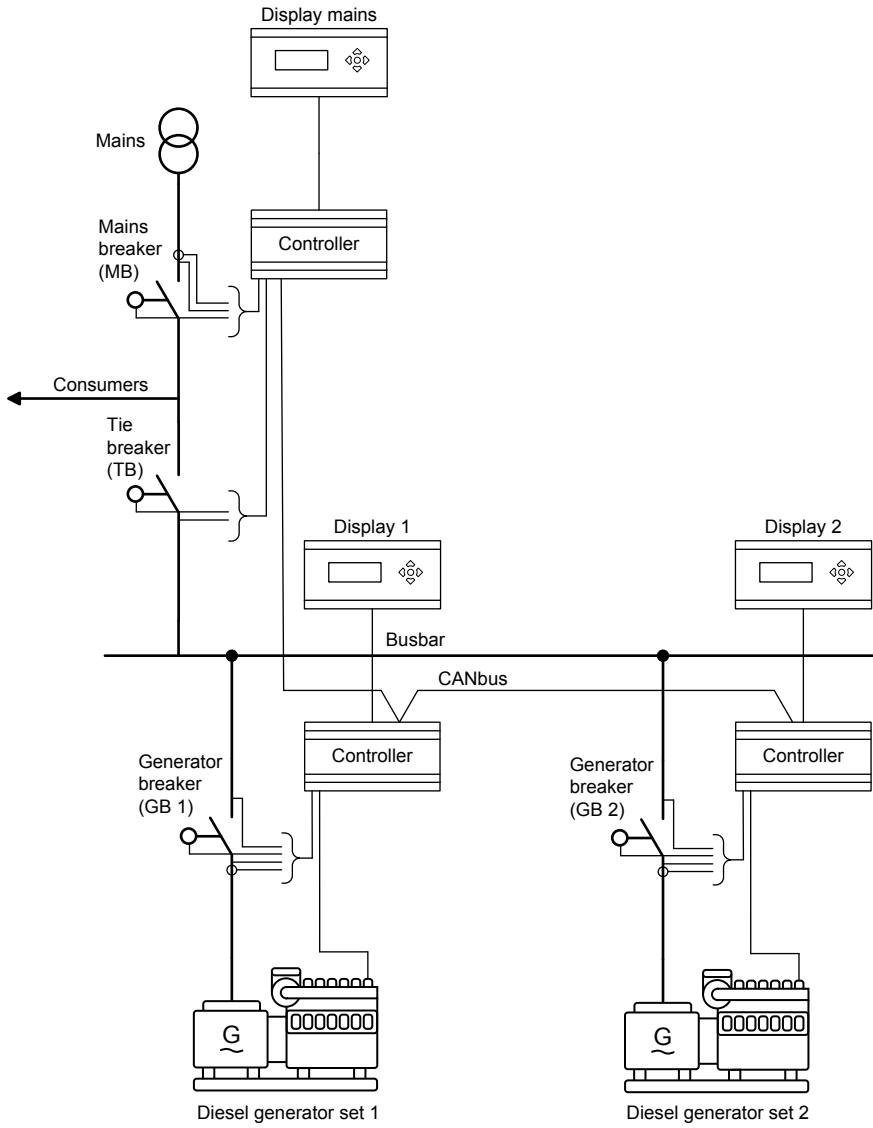
With the Critical Power option (T1) it is possible to have redundant controllers in the application. The redundant controller is connected on the CAN line as a hot standby unit and is therefore always updated with the system status and ready to become the primary controller.

1.2.7 Optional power management applications

5. Island operation

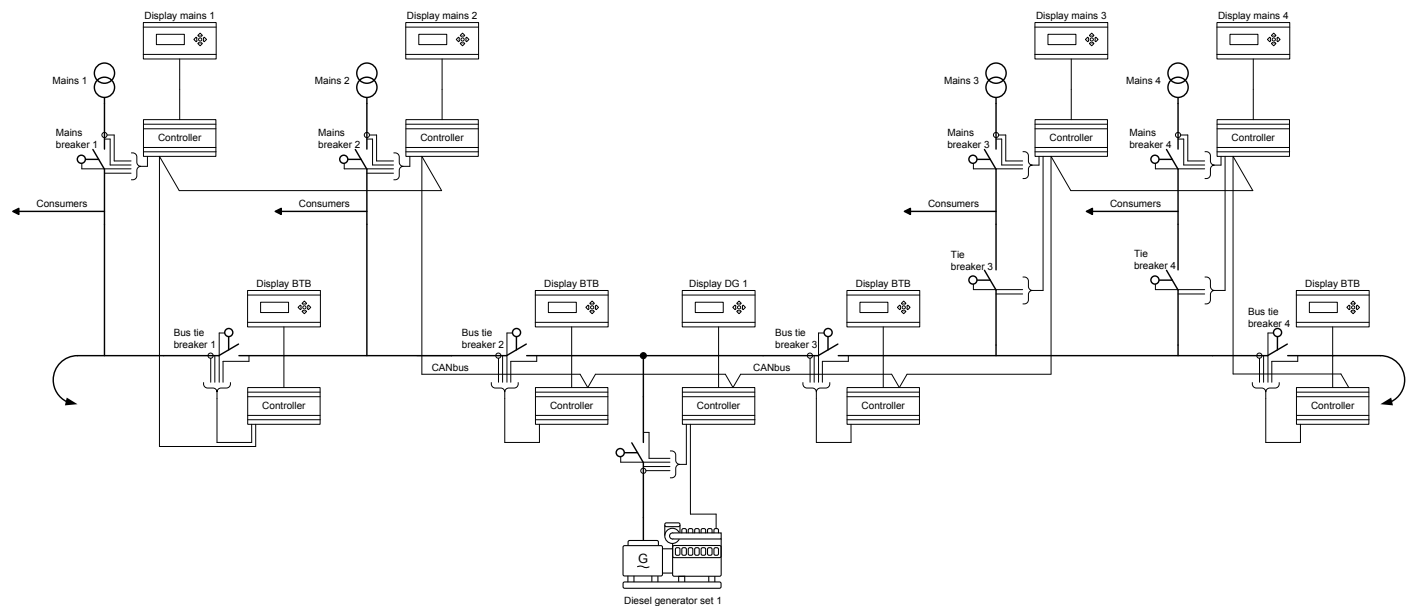


6. Parallel with mains



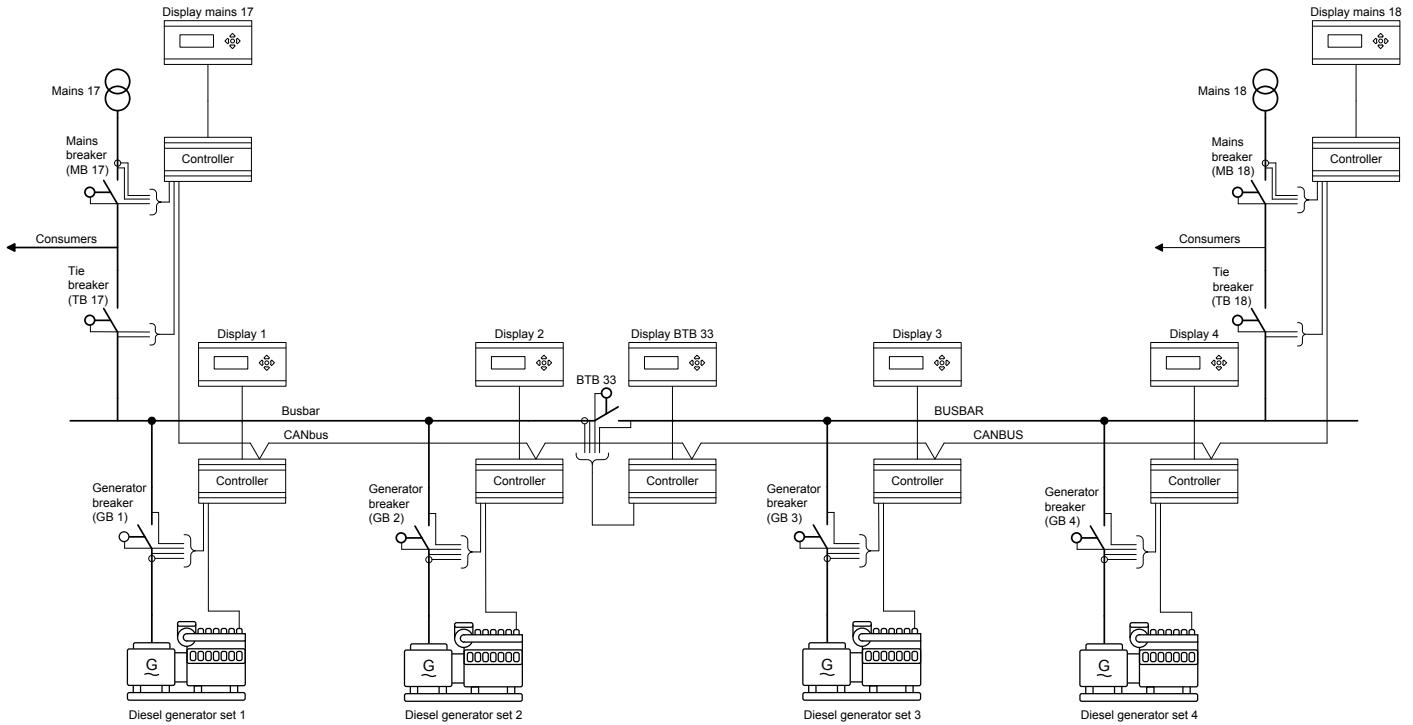
The tie breaker is selectable depending on application needs.

7. Main - tie - main application



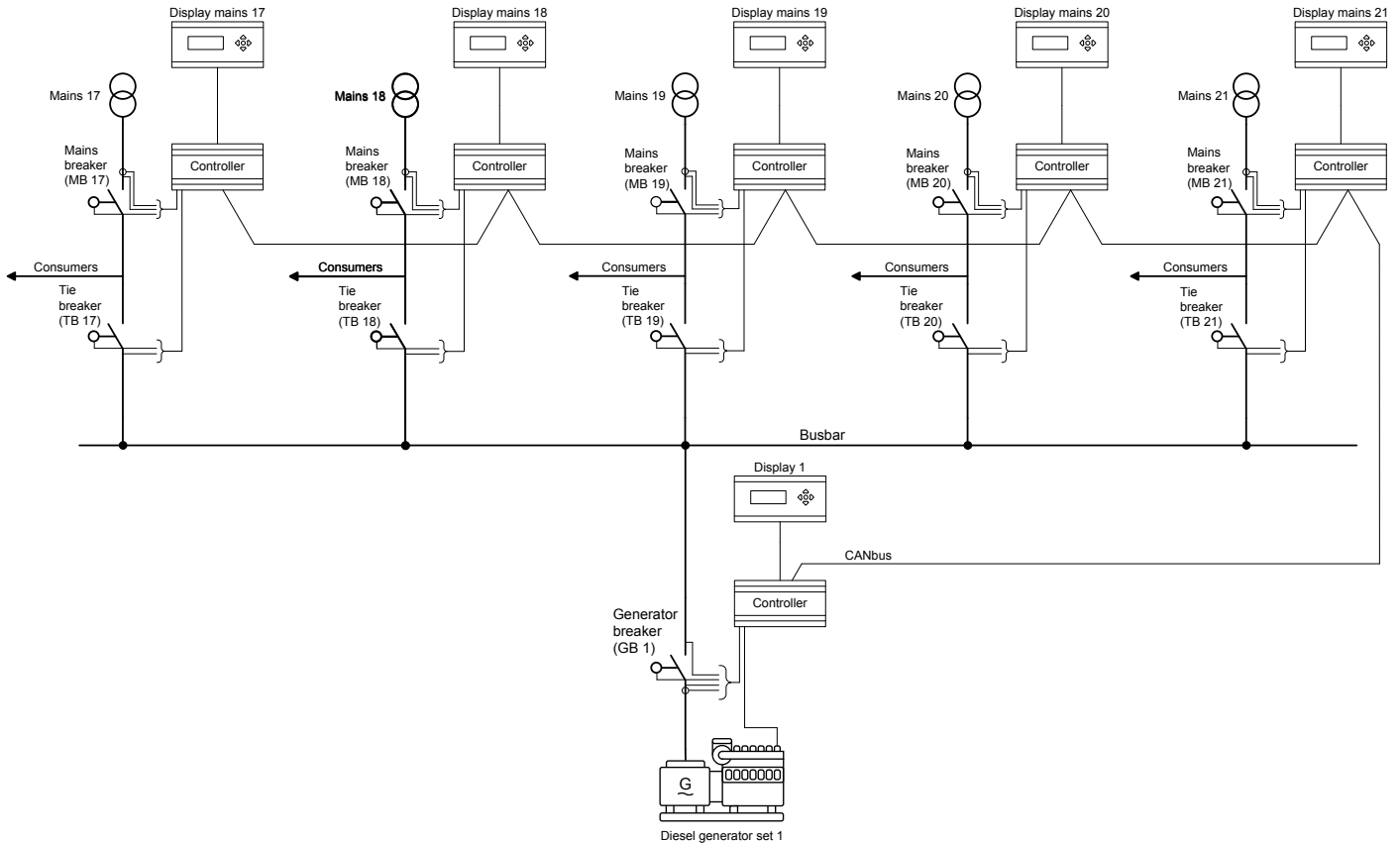
Ring bus may be used depending on application needs.

8. H-coupling



The tie breaker controlled by the AGC mains is selectable depending on application needs. The bus tie breaker can be present without an AGC controller (open/closed feedbacks are needed).

9. X mains and 1 DG



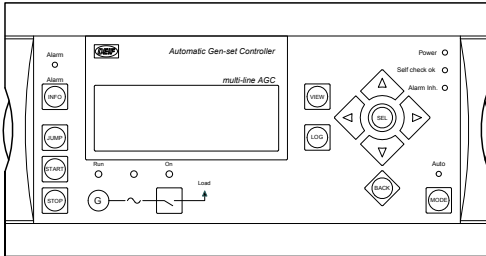
The tie breaker controlled by the AGC mains is selectable depending on application needs.

2. Optional functionality

2.1 Display layouts

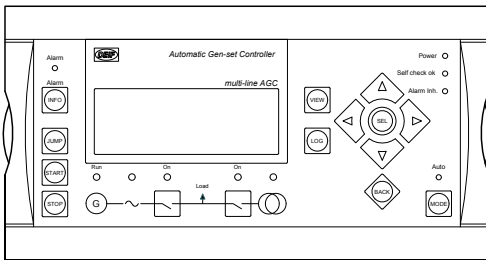
2.1.1 Option Y1

Engine and generator breaker control (island). Used for island applications and for synchronising gensets.



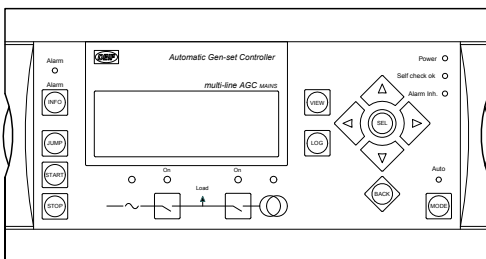
2.1.2 Option Y3

Generator breaker and mains breaker control. Typically used by rental companies or for single genset applications with one mains.



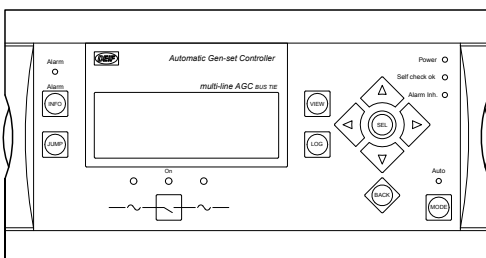
2.1.3 Option Y4

Tie breaker and mains breaker control. Used for AGC mains.



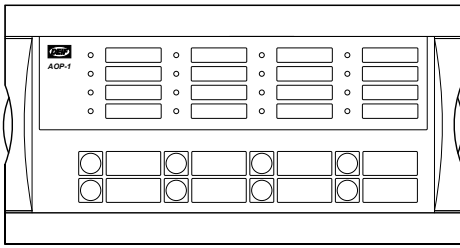
2.1.4 Option Y5

Bus tie breaker control. Used for AGC BTBs.



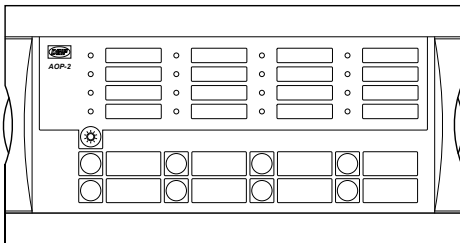
2.1.5 Option X3

Additional operator panel - AOP-1. Used for plant and/or genset control and status/alarm indication.



2.1.6 Option X4

Additional operator panel - AOP-2. Used for plant and/or genset control and status/alarm indication (maximum five per AGC).



2.2 Available options

2.2.1 Available variants

Type	Variant	Description	Item no.	Note
AGC-4	12	AGC-4 without display	2912410040-12	
AGC-4	13	AGC-4 w. display + J1	2912410040-13	One 3 m display cable is included as standard
AGC-4	07	AGC-4 BTB without display + G4	2912410040-07	
AGC-4	06	AGC-4 BTB w. display + G4 + J1	2912410040-06	One 3 m display cable is included as standard
AGC-4	09	AGC-4 Mains without display + A1 + G5	2912410040-09	
AGC-4	08	AGC-4 Mains w. display + A1 + G5 + J1	2912410040-08	One 3 m display cable is included as standard

2.2.2 Available software options

Option	Description	Slot no.	Option type	Note
A	Loss of mains protection package			
A1	Time-dependent under-voltage (27t) Under-voltage and reactive power low (27Q) Vector jump (78) df/dt (ROCOF) (81)		SW	
A4	Positive sequence (mains voltage low) (27)		SW	
A5	Directional over-current (67)		SW	

Option	Description	Slot no.	Option type	Note	
A10	Advanced protections <ul style="list-style-type: none"> VDE AR-N 4110 compliant VDE AR-N 4105 compliant ENA EREC G99 compliant EN 50549-1:2019 compliant 		SW	Requires options D1, A1, C2 and Q1	
C2	Negative sequence voltage high (47) Negative sequence current high (46) Zero sequence voltage high (59) Zero sequence current high (50) Power-dependent reactive power (40) Inverse time over-current (51) (according to IEC 60255-151)		SW		
D	Voltage/var/cos phi control			Not available for AGC mains and AGC bus tie	
D1	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)		SW		
G	Load sharing/power management/plant management				
G3	Load sharing with analogue lines	3	HW/ SW	If M12 is present, G3 is a software option	
G4	Power management, 32 gensets, 8 bus tie breakers	7	SW	Not with G5 or G8	
G5	Power management, 32 gensets/mains, 8 bus tie breakers	7	SW	Not with G4 or G8	
G8	Power management, 32 gensets (island mode)	7	SW	Not with G4 or G5	
H	Serial communication				
H5	Caterpillar Cummins CM850/570 Detroit Diesel (DDEC) Deutz (EMR) Iveco (NEF/CURSORS) John Deere (JDEC) PSI/Power Solution	MTU SmartConnect MTU ADEC MTU MDEC M302/M303 Perkins Scania (EMS) Scania (EMS S6) Volvo Penta (EMS) Volvo (EMS2)	2, 8	HW/ SW	
H7	Caterpillar Cummins CM850/570 Detroit Diesel (DDEC) Deutz (EMR) Iveco (NEF/CURSORS) John Deere (JDEC)	MTU SmartConnect MTU ADEC Perkins Scania (EMS) Scania (EMS S6) Volvo Penta (EMS) Volvo (EMS2)	7	SW	Not with H5, H6, H12 or H13 Not all measurements are available on Caterpillar (see option H5/H7/H12/H13 manual)
H12	Caterpillar Cummins CM850/570 Detroit Diesel (DDEC) Deutz (EMR) Iveco (NEF/CURSORS) John Deere (JDEC) PSI/Power Solution	MTU SmartConnect MTU ADEC MTU MDEC M302/M303 Perkins Scania (EMS) Scania (EMS S6) Volvo Penta (EMS) Volvo (EMS2) External I/O (H8)	2, 8	HW/ SW	H12 is a dual CAN. Includes H5 and H8 H13 can be added H5, H7 and H8 cannot be added
H13	MTU ADEC M.501 + same engine types as H5		8	HW/ SW	

Option	Description	Slot no.	Option type	Note
I	Application emulation			
I1	Emulation, PC-controlled emulation of your application		SW	
T	Special applications			
T1	Critical power, redundant controller, short-circuit limitation		SW	Option T1 is only functional if G4, G5 or G8 is already selected
T2	Digital AVR: DEIF DVC 310 - Leroy Somer D510C		SW	Option T2 is only functional if H5, H7, H12 or H13 and D1 are already selected

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



INFO

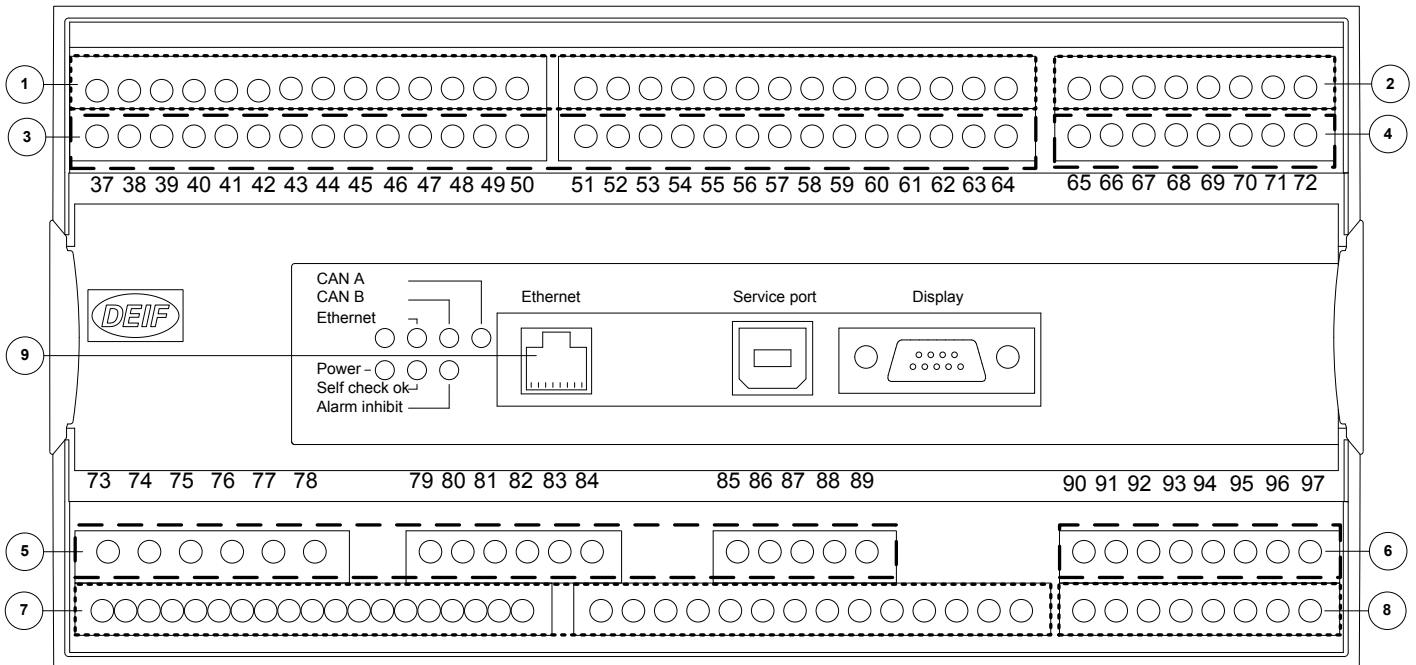
Notice that not all options can be selected for the same unit. Refer to the chapter "Hardware overview" in this data sheet for further information about the location of the options in the unit.

2.2.3 Available accessories

Accessory	Description	Option type	Note
J	Cables		
J1	Display cable with plugs, 3 m. UL94 (V1) approved	Other	
J2	Display cable with plugs, 6 m. UL94 (V1) approved	Other	
J4	PC cable for option N-programming (Ethernet cable crossed), 3 m. UL94 (V1) approved	Other	
J6	Display cable with plugs, 1 m. UL94 (V1) approved	Other	
J7	PC cable for utility software (USB), 3 m. UL94 (V1) approved	Other	
J8	Display CAN cable for DU-2 connection and 2 x plugs for cables for the Remote Maintenance Box	Other	RMB connector kit
L	Display gasket for IP54	Other	Standard is IP40
Q	Measurement accuracy	Hardware	
Q1	Verified class 0.5	Other	
X	Additional displays		
X2	Additional standard display (DU-2). CAN bus comm.	Other	Two options X2 can be ordered for each AGC unit
X3	Additional operator panel (AOP-1): 16 configurable LEDs and 8 configurable push-buttons	Other	
X4	Additional operator panel (AOP-2): 16 configurable LEDs, 8 configurable buttons and 1 status relay. CAN bus comm.	Other	Five options X4 can be ordered for each AGC unit
Y	Display layout	Hardware	
Y1	Engine and generator breaker control (island)	Other	Available for AGC genset controller
Y3	Generator breaker and mains breaker control	Other	Available for AGC genset controller

Accessory	Description	Option type	Note
Y4	Tie breaker and mains breaker control	Other	Available for AGC mains controller
Y5	Bus tie breaker control	Other	Available for AGC BTB controller

2.2.4 Hardware options and slot number location



① : The numbers in the drawing above refer to the slot numbers indicated in the table below.

Slot #	Option/standard	Description
1		Terminal 1-28, power supply
	Standard	8 to 36 V DC supply, 11 W; 1 x status output relay; 5 x relay outputs; 2 x pulse outputs (kWh, kvarh or configurable open collector outputs); 5 x digital inputs
2		Terminal 29-36, communication
	H2	Modbus RTU (RS-485)
	H3	Profibus DP
	H5.2	J1939 engine comm. and MTU (ADEC/MDEC)
	H9	Modbus RS-232 for modem
	H8.2	External I/O modules
	H12.2	Dual CAN includes H5 (engine communication) and H8 (external IO)
	M13.2	7 x binary inputs
	M14.2	4 x relay outputs
3		Terminal 37-64, in-/outputs/load sharing
	M12	13 x digital inputs; 4 x relay outputs (SW option if G3 is present)

Slot #	Option/standard	Description
	G3	Active power load sharing; reactive power load sharing (requires D1) (SW option if M12 is present)
4		Terminal 65-72, governor, AVR, in-/outputs
	Standard	4 x relay
	E1	2 x +/-25 mA out
	E2	2 x 0(4) to 20 mA out
	EF2	1 x +/-25 mA out; 1 x 0(4) to 20 mA out
	EF4	1 x +/-25 mA out; 2 x relay
	EF5	1 x +/-25 mA out; 1 x PWM out; 2 x relay
	EF6	2 x +/-25 mA out; 1 x PWM out
5		Terminal 73-89, AC measuring
	Standard	3 x generator voltage; 3 x generator current; 3 x busbar/mains voltage
6		Terminal 90-97, in-/outputs
	F1	2 x 0(4) to 20 mA out, transducer
	M13.6	7 x digital inputs
	M14.6	4 x relay outputs
	M15.6	4 x 4 to 20 mA inputs
	M16.6	4 x Multi-inputs (4 to 20 mA or 0 to 5 V or Pt100)
7		Terminal 98-125, engine I/F
	Standard	8 to 36 V DC supply, 5 W; 1 x magnetic pickup (MPU); 3 x multi-inputs; 7 x digital inputs; 4 x relay outputs
	H7	J1939 engine comm. and MTU ADEC
8		Terminal 126-133, engine communication, in-/outputs
	H5.8	J1939 engine comm. and MTU (ADEC/MDEC)
	H12.8	Dual CAN includes H5 (engine communication) and H8 (external IO)
	H13	MTU ADEC M.501 (without SAM module) + J1939 engine comm. and MTU (ADEC/MDEC)
	H6	Cummins GCS
	H8.8	External I/O modules
	M13.8	7 x digital inputs
	M14.8	4 x relay outputs
	M15.8	4 x 4 to 20 mA inputs
	M16.8	4 x Multi-inputs (4 to 20 mA or 0 to 5 V or Pt100)
9		LED I/F
	N	- Modbus TCP/IP - EtherNet/IP

Slot #	Option/standard	Description
		- SMS/e-mail alarms



INFO

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



INFO

Besides the hardware options shown on this page, it is possible to select the software options mentioned in the chapter "Available options".



INFO

If option H7 is selected, it is not possible to have options H5, H13 and H6 even though slot #8 is free.



INFO

It is only possible to select one of the options: H8.2 or H8.8 and H12.2 or H12.8.

3. Technical information

3.1 Specifications and dimensions

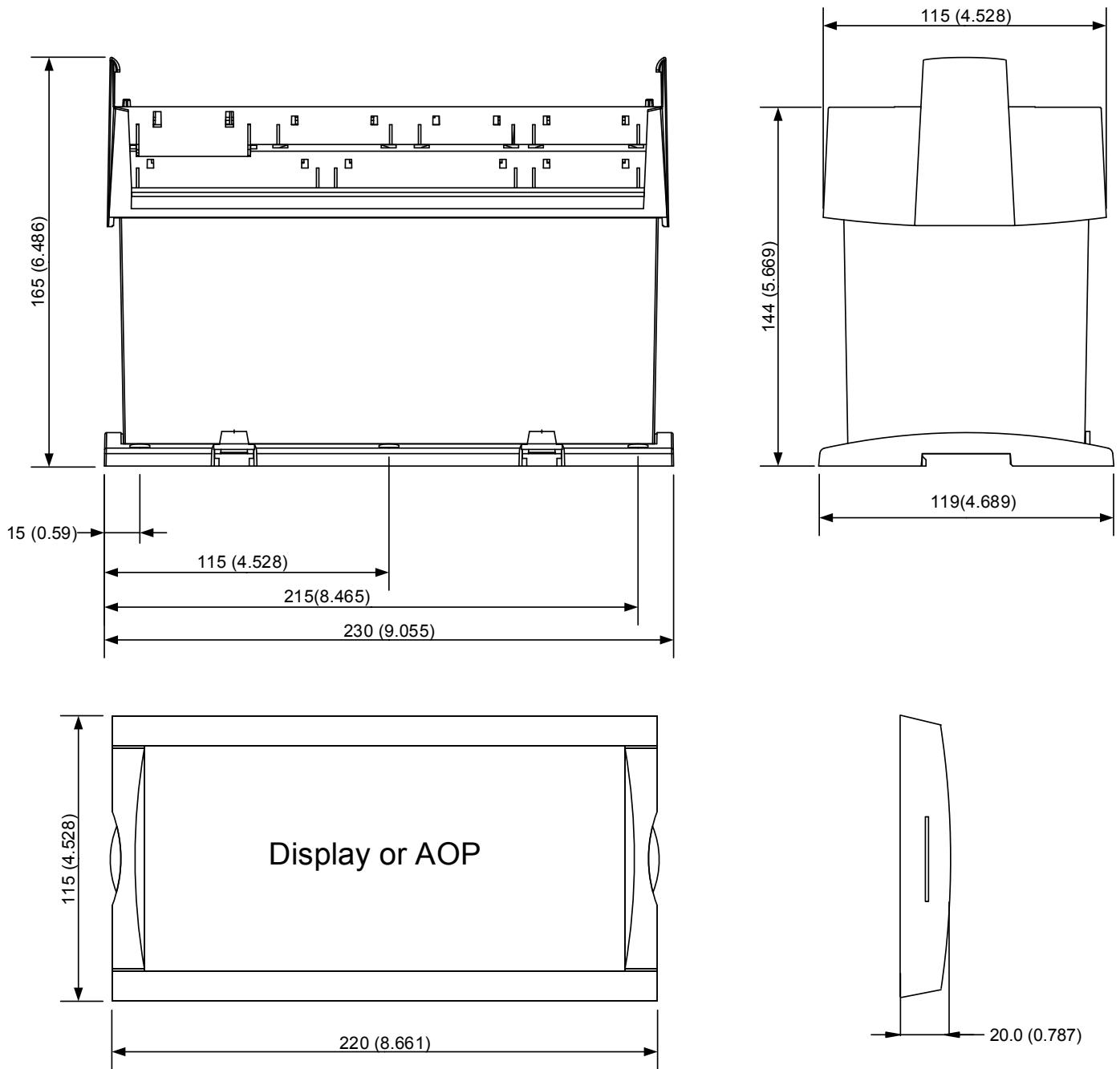
3.1.1 Technical specifications

	<p>Class 1.0 -25 to <u>15 to 30</u> to 70 °C Temperature coefficient: +/-0.2 % of full scale per 10 °C Class 0.5 with option Q1</p>
Accuracy	<p>Positive, negative and zero sequence alarms: class 1 within 5 % voltage unbalance Class 1.0 for negative sequence current Fast over-current: 3 % of 350 %*In Analogue outputs: class 1.0 according to total range Option EF4/EF5: class 4.0 according to total range To IEC/EN60688</p>
Operating temperature	<p>-25 to 70 °C (-13 to 158 °F) -25 to 60 °C (-13 to 140 °F) if Modbus TCP/IP (option N) is available in the controller. (UL/cUL Listed: max. surrounding air temperature: 55 °C/131 °F)</p>
Storage temperature	-40 to 70 °C (-40 to 158 °F)
Climate	97 % RH to IEC 60068-2-30
Operating altitude	<p>0 to 4000 m above sea level Derating 2001 to 4000 m above sea level: Max. 480 V AC phase-phase 3W4 measuring voltage Max. 690 V AC phase-phase 3W3 measuring voltage</p>
Measuring voltage	<p>100 to 690 V AC +/-20 % (UL/cUL Listed: 600 V AC phase-phase) Consumption: max. 0.25 VA/phase</p>
Measuring current	<p>-/1 or -/5 A AC (UL/cUL Listed: from CTs 1-5 A) Consumption: max. 0.3 VA/phase</p>
Current overload	<p>4 x I_n continuously 20 x I_n, 10 sec. (max. 75 A) 80 x I_n, 1 sec. (max. 300 A)</p>
Measuring frequency	30 to 70 Hz
Aux. supply	<p>Terminals 1 and 2: 12/24 V DC nominal (8 to 36 V DC operational). Max. 11 W consumption Battery voltage measurement accuracy: ±0.8 V within 8 to 32 V DC, ±0.5 V within 8 to 32 V DC @ 20 °C Terminals 98 and 99: 12/24 V DC nominal (8 to 36 V DC operational). Max. 5 W consumption 0 V DC for min. 10 ms when coming from at least 24 V DC (cranking dropout) The aux. supply inputs are to be protected by a 2 A slow blow fuse. (UL/cUL Listed: AWG 24)</p>
Binary inputs	<p>Optocoupler, bi-directional ON: 8 to 36 V DC Impedance: 4.7 kΩ OFF: <2 V DC</p>
Analogue inputs	<p>-10 to +10 V DC: not galvanically separated. Impedance: 100 kΩ (G3) 0(4) to 20 mA: impedance 50 Ω. Not galvanically separated (M15.X)</p>
RPM	RPM (MPU): 2 to 70 V AC, 10 to 10000 Hz, max. 50 kΩ
Multi-inputs Engine interface board slot #7	<p>0(4) to 20 mA: 0 to 20 mA, +/-1 %. Not galvanically separated Binary: max. resistance for ON detection: 100 Ω. Not galvanically separated Pt100/1000: -40 to 250 °C, +/-1 %. Not galvanically separated. To IEC/EN60751 RMI: 0 to 1700 Ω, +/-2 %. Not galvanically separated</p>

	V DC: 0 to 40 V DC, +/-1 %. Not galvanically separated
Multi-inputs (M16.X)	0(4) to 20 mA: 0 to 20 mA, +/-2 %. Not galvanically separated Pt100: -40 to 250 °C, +/-2 %. Not galvanically separated. To IEC/EN60751 V DC: 0 to 5 V DC, +/-2 %. Not galvanically separated
Relay outputs	Electrical rating: 250 V AC/30 V DC, 5 A. (UL/cUL Listed: 250 V AC/24 V DC, 2 A resistive load) Thermal rating @ 50 °C: 2 A: continuously. 4 A: t_{on} = 5 sec., t_{off} = 15 sec. (Unit status output: 1 A)
Open collector outputs	Supply: 8 to 36 V DC, max. 10 mA (terminal 20, 21, 22 (com))
Analogue outputs	0(4) to 20 mA and +/-25 mA. Galvanically separated. Active output (internal supply). Load max. 500 Ω. (UL/cUL Listed: max. 20 mA output) Update rate: transducer output: 250 ms. Regulator output: 100 ms
Load sharing lines	-5 to 0 to +5 V DC. Impedance: 23.5 kΩ
Galvanic separation	Between AC voltage and other I/Os: 3250 V, 50 Hz, 1 min. Between AC current and other I/Os: 2200 V, 50 Hz, 1 min. Between analogue outputs and other I/Os: 550 V, 50 Hz, 1 min. Between binary input groups and other I/Os: 550 V, 50 Hz, 1 min.
Response times (delay set to min.)	Busbar: Over-/under-voltage: <50 ms Over-/under-frequency: <50 ms Voltage unbalance: <250 ms Generator: Reverse power: <250 ms Over-current: <250 ms Fast over-current: <40 ms Directional over-current: <150 ms Over-/under-voltage: <250 ms Over-/under-frequency: <350 ms Overload: <250 ms Current unbalance: <250 ms Voltage unbalance: <250 ms Reactive power import: <250 ms Reactive power export: <250 ms Voltage-dependent I>: <250 ms Negative sequence I: <500 ms Negative sequence U: <500 ms Zero sequence I: <500 ms Zero sequence U: <500 ms Overspeed: <500 ms Digital inputs: <250 ms Emergency stop: <200 ms Multi-inputs: 800 ms Wire failure: <600 ms Mains: df/dt (ROCOF): <130 ms (4 periods) Vector jump: <40 ms Positive sequence: <60 ms Time-dependent under-voltage, $U_{I<}$: <50 ms Under-voltage and reactive power low, $U_{Q<}$: <250 ms
Mounting	DIN-rail mount or base mount with six screws
Safety	To EN 61010-1, installation category (over-voltage category) III, 600 V, pollution degree 2 To UL 508 and CSA 22.2 no. 14-05, over-voltage category III, 600 V, pollution degree 2
EMC/CE	To EN 61000-6-2, EN 61000-6-4, IEC 60255-26.
Vibration	3 to 13.2 Hz: 2 mm _{pp} . 13.2 to 100 Hz: 0.7 g. To IEC 60068-2-6 & IACS UR E10

	<p>10 to 58.1 Hz: 0.15 mm_{pp}. 58.1 to 150 Hz: 1 g. To IEC 60255-21-1 Response (class 2) 10 to 150 Hz: 2 g. To IEC 60255-21-1 Endurance (class 2) 3 to 8.15 Hz: 15 mm_{pp}. 8.15 - 35 Hz 2g. To IEC 60255-21-3 Seismic (class 2)</p>
Shock (base mount)	<p>10 g, 11 ms, half sine. To IEC 60255-21-2 Response (class 2) 30 g, 11 ms, half sine. To IEC 60255-21-2 Endurance (class 2) 50 g, 11 ms, half sine. To IEC 60068-2-27</p>
Bump	20 g, 16 ms, half sine. To IEC 60255-21-2 (class 2)
Material	All plastic materials are self-extinguishing according to UL94 (V1)
Plug connections	<p>AC current: 0.2 to 4.0 mm² stranded wire. (UL/cUL Listed: AWG 18) AC voltage: 0.2 to 2.5 mm² stranded wire. (UL/cUL Listed: AWG 20) Relays: (UL/cUL Listed: AWG 22) Terminals 98-116: 0.2 to 1.5 mm² stranded wire. (UL/cUL Listed: AWG 24) Other: 0.2 to 2.5 mm² stranded wire. (UL/cUL Listed: AWG 24) Display: 9-pole Sub-D female Service port: USB A-B</p> <p>Tightening torque: For further information, please refer to the "Installation Instructions"</p>
Protection	Unit: IP20. Display: IP40 (IP54 with gasket: option L). (UL/cUL Listed: Type Complete Device, Open Type). To IEC/EN 60529
Governors and AVRs	<p>Multi-line 2 interfaces to all governors and AVRs using analogue, relay control or CAN-based J1939 communication See interfacing guide at www.deif.com</p>
Approvals	<p>UL/cUL Listed to UL508 Applies to VDE-AR-N 4105</p>
UL markings	<p>Wiring: use 60/75 °C copper conductors only Mounting: for use on a flat surface of type 1 enclosure Installation: to be installed in accordance with the NEC (US) or the CEC (Canada)</p> <p>AOP-2: Maximum ambient temperature: 60 °C Wiring: use 60/75 °C copper conductors only Mounting: for use on a flat surface of type 3 (IP54) enclosure. Main disconnect must be provided by installer Installation: to be installed in accordance with the NEC (US) or the CEC (Canada)</p> <p>DC/DC converter for AOP-2: Tightening torque: 0.5 Nm (4.4 lb-in) Wire size: AWG 22-14</p> <p>Tightening torque: For further information, please refer to the "Installation Instructions"</p>
Weight	<p>Base unit: 1.6 kg (3.5 lbs.) Option J1/J4/J6/J7: 0.2 kg (0.4 lbs.) Option J2: 0.4 kg (0.9 lbs.) Option J8: 0.3 kg (0.58 lbs.) Display: 0.4 kg (0.9 lbs.)</p>

3.1.2 Unit dimensions in mm (inches)



4. Ordering information

4.1 Order specifications and disclaimer

4.1.1 Order specifications

Variants

Mandatory information			Additional options to the standard variant				
Item no.	Type	Variant no.	Option	Option	Option	Option	Option

Example:

Mandatory information			Additional options to the standard variant				
Item no.	Type	Variant no.	Option	Option	Option	Option	Option
2912410040-13	AGC-4 w. display + J1	13	C2	M12			



INFO

The AGC mains unit is only usable with option G5; this option is already included when ordered. The AGC bus tie unit is only usable with option G4 or G5.



INFO

Specify the AGC type: DG/mains/BTB unit.

Accessories

Mandatory information		
Item no.	Type	Accessory

Example:

Mandatory information		
Item no.	Type	Accessory
1022040065	Accessories for AGC-4	USB cable, 3 m (J7)

4.1.2 Disclaimer

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