INSTALLATION INSTRUCTIONS

AGC 200 Advanced Gen-set Controller

- Mounting
- Terminal strip overview
- I/O lists
- Wiring

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Document no.: 4189340610C
SW version 3.5X.X or later

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1. About this document

General purpose

This document is the Installation Instructions for DEIF's flat panel Advanced Gen-set Controller, the AGC 200. The document mainly includes general product information, mounting instructions, terminal strip overviews, I/O lists and wiring descriptions.

The general purpose of these installation instructions is to give the user important information to be used in the installation of the unit.

Please make sure that you read this manual before starting to work with the controller and the gen-set to be controlled. Failure to do this could result in human injury or damage to the equipment.

Intended users

These installation instructions are mainly intended for the panel builder designer in charge. On the basis of this document, the panel builder designer will give the electrician the information he needs in order to install the AGC 200, e.g. detailed electrical drawings. In some cases, the electrician may use these installation instructions himself.

Contents/overall structure

This document is divided into chapters, and in order to make the structure simple and easy to use, each chapter will begin from the top of a new page.

2. Warnings and legal information

Legal information and responsibility

DEIF takes no responsibility for installation or operation of the generator set. If there is any doubt about how to install or operate the generator controlled by the unit, the company responsible for the installation or the operation of the set must be contacted.

The units are not to be opened by unauthorised personnel. If opened anyway, the warranty will be lost.

Electrostatic discharge awareness

Sufficient care must be taken to protect the terminals against static discharges during the installation. Once the unit is installed and connected, these precautions are no longer necessary.

Safety issues

Installing the unit implies work with dangerous currents and voltages. Therefore, the installation of the AGC 200 should only be carried out by authorised personnel who understand the risks involved in the working with live electrical equipment.

Be aware of the hazardous live currents and voltages. Do not touch any AC measurement inputs as this could lead to injury or death.

Notes

Throughout this document, a number of notes with helpful user information will be presented. To ensure that these are noticed, they will be highlighted in order to separate them from the general text.

Note symbol

The notes provide general information which will be helpful for the reader to bear in mind.

Warning symbol

The warnings indicate a potentially dangerous situation which could result in death, personal injury or damaged equipment if certain guidelines are not followed.

UL applications

These flat surface panel mounted controllers are intended to be used in Listed Generator Assemblies where the suitability of the combination has been determined by Underwriters Laboratories.

These devices have been evaluated for fire and shock only. The accuracy and/or reliability of the voltage regulating function have not been evaluated. Metering, monitoring, protection and signalling functions have not been evaluated.

3. General product information

Introduction

The AGC 200 is a part of the DEIF Multi-line 2 product family. AGC 200 is a complete range of multi-function generator protection and control products, integrating all the functions you need into one compact and attractive solution.

The concept of the AGC 200 is to offer a cost-effective solution to gen-set builders, who need a flexible generator protection and control unit for small to large gen-set applications. Being part of the Multi-line product family, the standard functions can be supplemented with a variety of optional functions.

Type of product

The AGC 200 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

Options

The AGC 200 product range consists of different basic versions, which can be supplemented with the flexible options needed to provide the optimum solution. The options cover e.g. various protections for generator, busbar and mains, serial communication, additional operator panels, etc.

Variants

The following variants of the AGC 200 are available:

With engine communication (CANbus) as standard:

AGC 212: Single generator, island operation
AGC 213: Single generator, mains failure (mains and generator breaker control)

With engine communication (CANbus) and 1 extra CANbus connection as standard:

AGC 223: Single generator, mains failure (mains and generator breaker control)
AGC 232: Generator controller with digital load sharing for island operation

With engine communication (CANbus) and 2 extra CANbus connections as standard:

AGC 242: Generator controller with digital load sharing and power management
AGC 243: Generator controller with digital load sharing, power management and mains failure.
AGC 244: Bus tie breaker controller with power management
AGC 245: Mains breaker controller with power management
AGC 246: Mains and tie breaker controller with power management

Standard functions

Operation modes

- Automatic Mains Failure (AGC 213/223/243/245/246)
- Island operation (AGC 213/223/243)
- Fixed power/base load (AGC 213/223/232/242/243/245/246)
- Peak shaving (AGC 213/223/243/245/246)
- Load takeover (AGC 213/223/243/245/246)
- Mains power export (AGC 213/223/243/245/246)

Engine control (AGC 212/213/113/232/242/243)

- Start/stop sequences

- Run and stop coil
- Relay outputs for governor control

Generator control (AGC 212/213/113/232/242/243)

- Relay outputs for AVR control

For all variants:

Protection

- Overcurrent, 6 levels
- Reverse power, 2 levels
- Voltage dependent overcurrent
- Overvoltage, 2 levels
- Undervoltage, 3 levels
- Overfrequency, 3 levels
- Underfrequency, 3 levels
- Overload, 5 levels
- Unbalanced current
- Unbalanced voltage
- Loss of excitation/Q<
- Overexcitation/Q>
- Multi-inputs, 3 configurable
- Digital inputs

Display

- Push-buttons for start and stop
- Push-buttons for breaker operations
- Status texts
- Alarm indication

M-logic

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

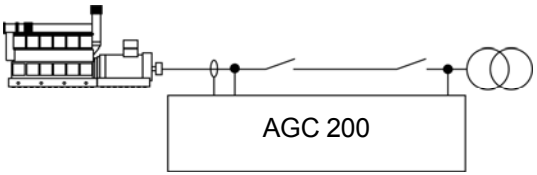
General

- USB interface to PC
- Free PC utility software for commissioning
- Additional functions available

Standard and optional applications

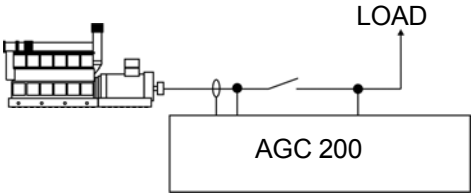
In the following sections, the standard and optional applications of the AGC 200 will be presented. In addition, the correct application configuration for the different applications is listed. It is only possible to use the unit for one of the purposes, e.g. AMF (Automatic Mains Failure). The selection must be made on site.

Automatic Mains Failure, AMF



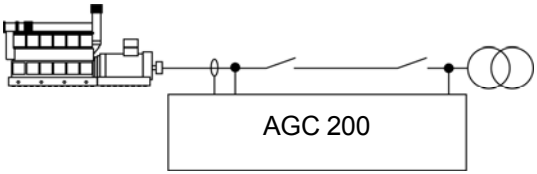
No.	Setting		Setting
6071	Gen-set mode	AMF	AMF

Island operation



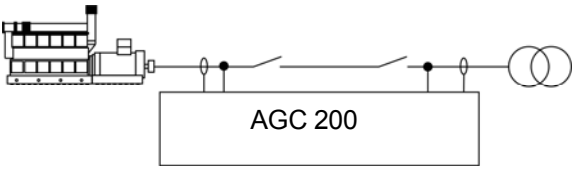
No.	Setting		Setting
6071	Gen-set mode	Island operation	Island operation

Fixed power/base load



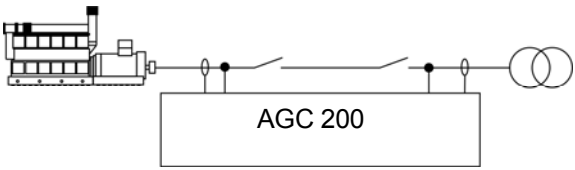
No.	Setting		Setting
6071	Gen-set mode	Fixed power	Fixed power

Peak shaving



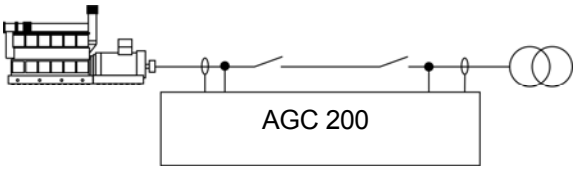
No.	Setting		Setting
6071	Gen-set mode	Peak shaving	Peak shaving

Load takeover



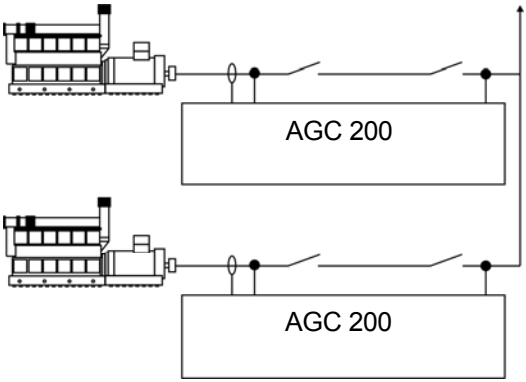
No.	Setting		Setting
6071	Gen-set mode	Load takeover	Load takeover

Mains power export (fixed power to mains)



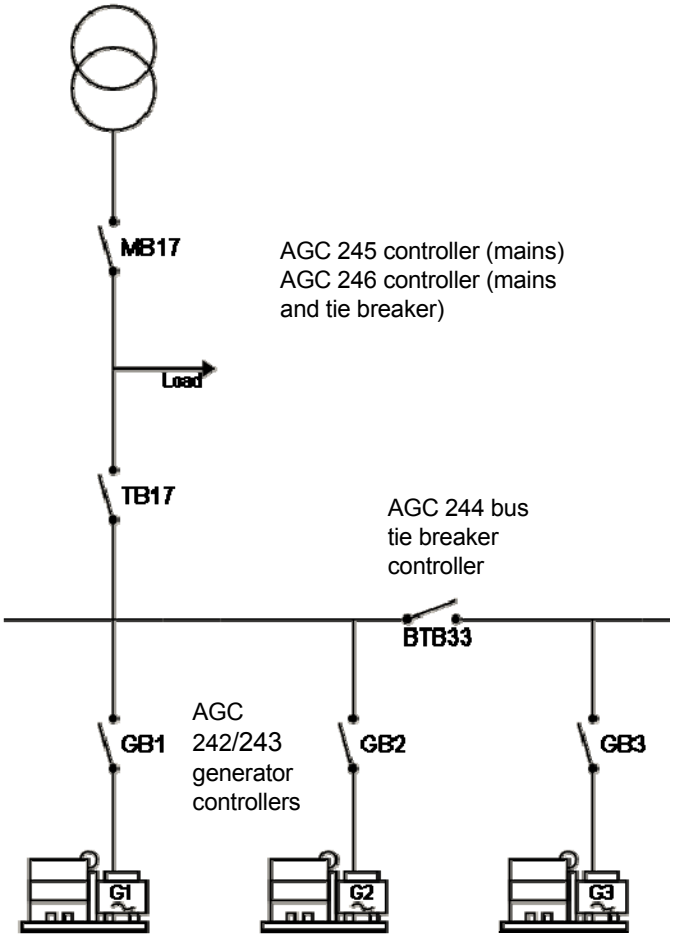
No.	Setting		Setting
6071	Gen-set mode	Mains power export	Mains power export

Multiple gen-sets, load sharing



No.	Setting		Setting
6071	Gen-set mode	Island operation	Island operation

Multiple gen-sets, power management (AGC 24x only)



4. Mounting

Mounting of the unit

The unit is designed for mounting in the panel front. The technical specifications in chapter 7 include detailed information about:

- Unit dimensions
- Panel cutout

Panel cutout

In order to ensure optimum mounting, the switchboard door must be cut out according to the *panel cutout* illustration presented in chapter 7.

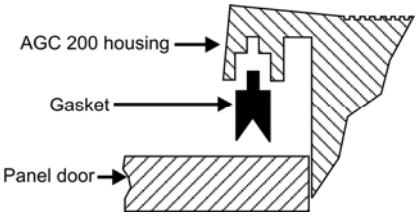
Mounting instructions

Fasten the unit with the screw clamps supplied with the unit. These are to be tightened approx. 0.3 Nm (0.25-0.3 Nm). Tighten with diagonal sequence method.

Mounting of gasket (option L1)

It is important that the gasket is mounted correctly; otherwise the IP65 tightness will not be obtained.

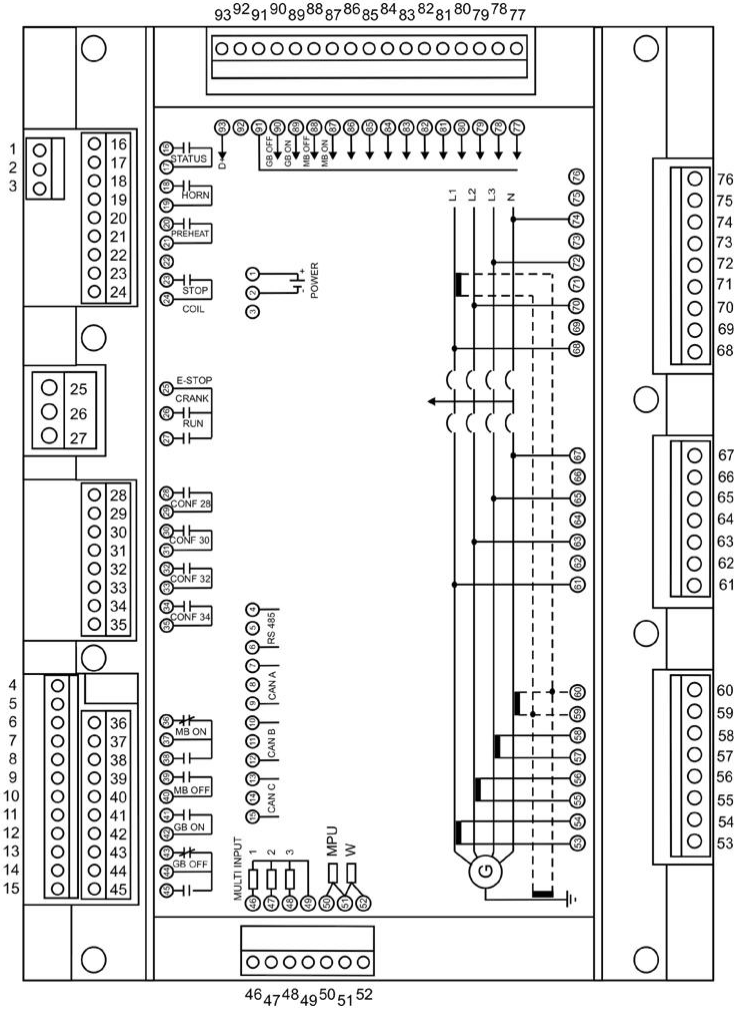
Mount the gasket as shown in the illustration below.



Furthermore, it is necessary to use all 12 screw clamps to ensure IP65 tightness.

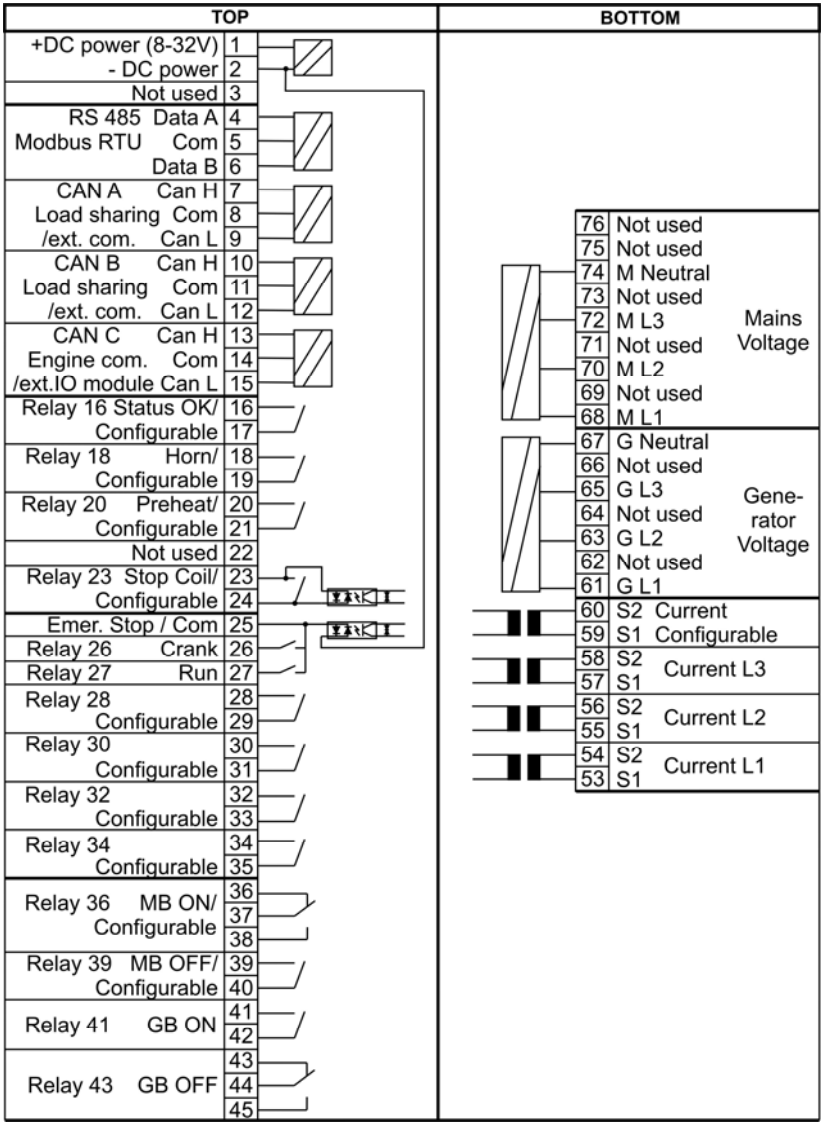
5. Hardware

Unit rear side overview



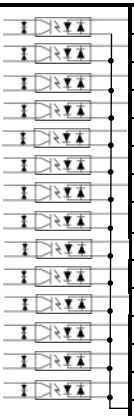
Please notice that not all connections are available in all versions; please see the terminal strip for details.

Terminal strip overview, AGC 21x, 223, 232, 242, 243



AGC 21x: CAN C only.
AGC 22x/23x: CAN A and C only.

LEFT		RIGHT	
Multi-in 1	46	77	Di 77 Configurable
Multi-in 2	47	78	Di 78 Configurable
Multi-in 3	48	79	Di 79 Configurable
Multi-in common	49	80	Di 80 Configurable
RPM MPU/tacho	50	81	Di 81 Configurable
RPM common	51	82	Di 82 Configurable
RPM W/NPN/PNP	52	83	Di 83 Configurable
		84	Di 84 Configurable
		85	Di 85 Configurable
		86	Di 86 Configurable
		87	MB ON / Di 87
		88	MB OFF / Di 88
		89	GB ON
		90	GB OFF
		91	Common
		92	Not used
		93	D+ (charger gen.)



Terminal 93 (D+) has two purposes. Please see chapter 6 for details.

The placement of terminals (top, bottom, left, right) is seen from the rear side of the unit.

Input/output lists

In the I/O lists below, the following terms will be used in connection with the relay outputs:

NO means Normally Open
NC means Normally Closed
Com. means common terminal

Plug #1, power supply

Term.	Function	Technical data	Description
1	+12/24V DC	12/24V DC +/-30%	Power supply
2	0V DC		
3		Not used	

Plug #2, communication

Term.	Function	Technical data	Description
4	Data+ (A)	RS485	Modbus RTU, max. 115 kBps
5			
6	Data- (B)		
7	CAN A H	CAN port A	CANshare, power management, AOP-2 and external I/O modules
8			
9	CAN A L		
10	CAN B H	CAN port B (AGC 242 only)	CANshare, power management, AOP-2 and external I/O modules
11			
12	CAN B L		
13	CAN C H	CAN port C	J1939 governor and AVR analogue regulation
14			
15	CAN C L		

Plug #3, relay group 1

Term.	Function	Technical data	Description
16	Relay 16	8A, 30V DC/ 250V AC	Status OK/configurable
17			
18	Relay 18	8A, 30V DC/ 250V AC	Horn/configurable
19			
20	Relay 20	8A, 30V DC/ 250V AC	Preheat/configurable
21			
22	Not used		Not used
23	Relay 23	8A, 36V DC	Stop coil/configurable With wire break monitoring
24			

Plug #4, E-stop and start

Term.	Function	Technical data	Description
25	+12/24V DC Digital in	Optocoupler	Emergency stop and common for relay outputs 26 and 27
26	Relay 26	16A, 36V DC	Crank (starter)
27	Relay 27	16A, 36V DC	RUN coil

Plug #5, relay group 2

Not available for AGC 212/213.

Term.	Function	Technical data	Description
28	Relay 28	8A, 30V DC/ 250V AC	Configurable
29			
30	Relay 30	8A, 30V DC/ 250V AC	Configurable
31			
32	Relay 32	8A, 30V DC/ 250V AC	Configurable
33			
34	Relay 34	8A, 30V DC/ 250V AC	Configurable
35			

Plug #6, GB and MB relays

Term.	Function	Technical data	Description
36	NC Relay	8A, 30V DC/ 250V AC	Mains breaker ON/ configurable
37	Com 36		
38	NO		
39	Relay 39	8A, 30V DC/ 250V AC	Mains breaker OFF/ configurable
40			
41	Relay 41	8A, 30V DC/ 250V AC	Generator breaker ON
42			
43	NC Relay	8A, 30V DC/ 250V AC	Generator breaker OFF
44	Com 43		
45	NO		

Plug #7, multi-inputs and RPM pick-up

Term.	Function	Technical data	Description
46	Multi-in 1	Input	VDO/4-20 mA/Pt100/binary
47	Multi-in 2	Input	VDO/4-20 mA/Pt100/binary
48	Multi-in 3	Input	VDO/4-20 mA/Pt100/binary
49	Common	Input	Com. for inputs 46, 47 and 48
50	MPU	RPM input	Magnetic pick-up/tacho generator
51	Com	Common	Com. for inputs 50 and 52
52	W	RPM input	Charge gen. W NPN/PNP pick-up

Plug #8, AC current inputs

CT on terminals 59-60: Not available for AGC 212/213.

Term.	Function	Technical data	Description
53	L1 s1	1 or 5A AC	Current phase L1
54	L1 s2		
55	L2 s1	1 or 5A AC	Current phase L2
56	L2 s2		
57	L3 s1	1 or 5A AC	Current phase L3
58	L3 s2		
59	L4 s1	1 or 5A AC	Configurable: Differential current, neutral current, ground current or mains current
60	L4 s2		

Plug #9, generator AC voltage inputs

Term.	Function	Technical data	Description
61	L1	100-690V AC	Generator line 1
62		Not used	
63	L2	100-690V AC	Generator line 2
64		Not used	
65	L3	100-690V AC	Generator line 3
66		Not used	
67	N		Generator neutral

All AC voltage inputs are galvanically separated from the rest of the unit. Voltages are indicated in phase-phase values.

Plug #10, mains AC voltage inputs

Term.	Function	Technical data	Description
68	L1	100-690V AC	Mains line 1
69		Not used	
70	L2	100-690V AC	Mains line 2
71		Not used	
72	L3	100-690V AC	Mains line 3
73		Not used	
74	N		Mains neutral
75		Not used	
76		Not used	

All AC voltage inputs are galvanically separated from the rest of the unit. Voltages are indicated in phase-phase values.

Plug #11, digital inputs and breaker positions

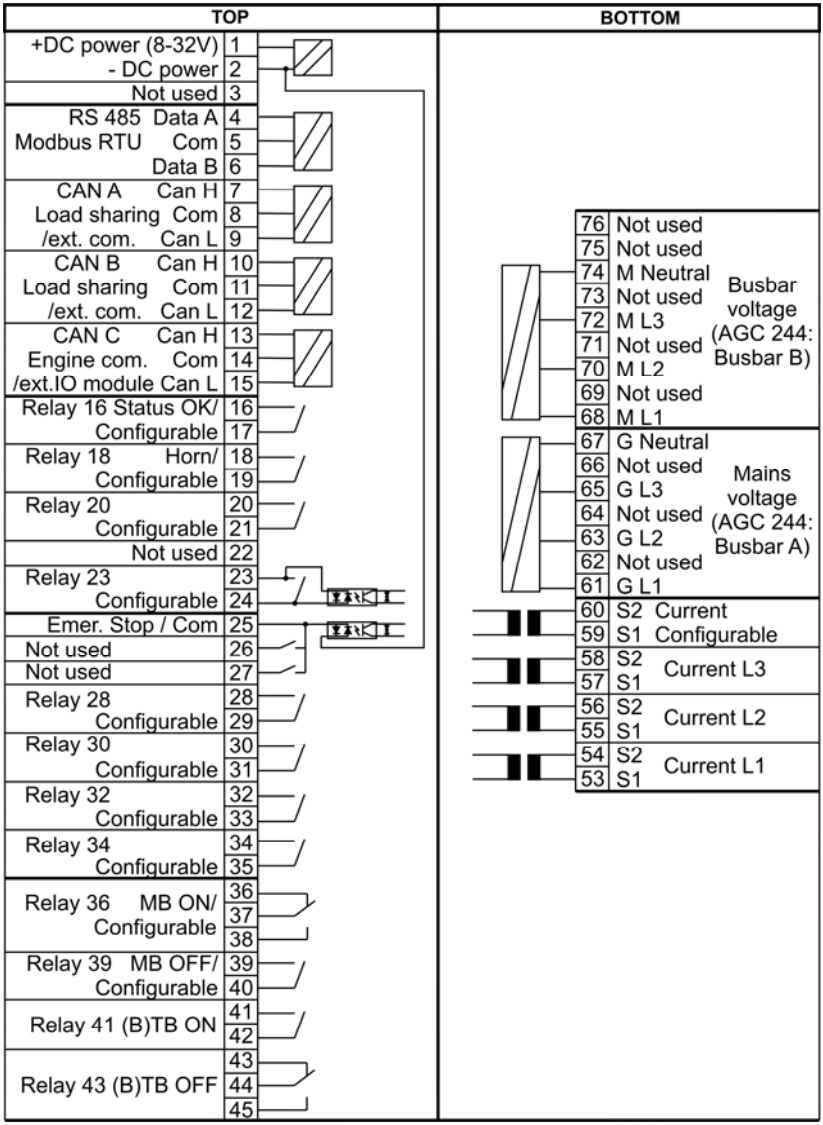
Term.	Function	Technical data	Description
77	Di 77	Optocoupler	Configurable
78	Di 78	Optocoupler	Configurable
79	Di 79	Optocoupler	Configurable
80	Di 80	Optocoupler	Configurable
81	Di 81	Optocoupler	Configurable
82	Di 82	Optocoupler	Configurable
83	Di 83	Optocoupler	Configurable
84	Di 84	Optocoupler	Configurable
85	Di 85	Optocoupler	Configurable
86	Di 86	Optocoupler	Configurable
87	Di 87	Optocoupler	MB ON/configurable
88	Di 88	Optocoupler	MB OFF/configurable
89	Di GB ON	Optocoupler	Gen. breaker ON feedback
90	Di GB OFF	Optocoupler	Gen. breaker OFF feedback
91	Com	Common	Common for inputs 77 to 90
92		Not used	
93	Di	D+	Charger generator D+ running feedback and digital running feedback

The digital inputs 77-90 are bi-directional, meaning that common can be - or +, whichever is preferred.

Socket connections

Term.	Function	Technical data	Description
SD	Memory	SD memory	Additional memory space for lifetime logging of data
USB	PC conn	USB B	Connection for PC programming
RJ45	TCP/IP	Ethernet	Modbus TCP/IP connection

Terminal strip overview, AGC 244/245/246



Relays 41 and 43 are not available in AGC 245.
Relays 36 and 39 are configurable in AGC 244.

LEFT		RIGHT	
Multi-in 1	46	77	Di 77 Configurable
Multi-in 2	47	78	Di 78 Configurable
Multi-in 3	48	79	Di 79 Configurable
Multi-in common	49	80	Di 80 Configurable
Not used	50	81	Di 81 Configurable
Not used	51	82	Di 82 Configurable
Not used	52	83	Di 83 Configurable
		84	Di 84 Configurable
		85	Di 85 Configurable
		86	Di 86 Configurable
		87	MB ON / Di 87
		88	MB OFF / Di 88
		89	(B)TB ON
		90	(B)TB OFF
		91	Common
		92	Not used
		93	Not used

Inputs 87 and 88 are configurable in AGC 244.

The placement of terminals (top, bottom, left, right) is seen from the rear side of the unit.

Input/output lists

In the I/O lists below, the following terms will be used in connection with the relay outputs:

NO means Normally Open
NC means Normally Closed
Com. means common terminal

Plug #1, power supply

Term.	Function	Technical data	Description
1	+12/24V DC	12/24V DC +/-30%	Power supply
2	0V DC		
3		Not used	

Plug #2, communication

Term.	Function	Technical data	Description
4	Data+ (A)	RS485	Modbus RTU, max. 115 kBps
5			
6	Data- (B)		
7	CAN A H	CAN port A	Power management, AOP-2 and external I/O modules
8			
9	CAN A L		
10	CAN B H	CAN port B	Power management, AOP-2 and external I/O modules
11			
12	CAN B L		
13	CAN C H	CAN port C	Not used
14			
15	CAN C L		

Plug #3, relay group 1

Term.	Function	Technical data	Description
16	Relay 16	8A, 30V DC/ 250V AC	Status OK/configurable
17			
18	Relay 18	8A, 30V DC/ 250V AC	Horn/configurable
19			
20	Relay 20	8A, 30V DC/ 250V AC	Configurable
21			
22	Not used		Not used
23	Relay 23	8A, 36V DC	Configurable With wire break monitoring
24			

Plug #4, E-stop and start

Term.	Function	Technical data	Description
25	+12/24V DC Digital in	Optocoupler	Emergency stop
26	Relay 26	16A, 36V DC	Not used
27	Relay 27	16A, 36V DC	Not used

Plug #5, relay group 2

Term.	Function	Technical data	Description
28	Relay 28	8A, 30V DC/ 250V AC	Configurable
29			
30	Relay 30	8A, 30V DC/ 250V AC	Configurable
31			
32	Relay 32	8A, 30V DC/ 250V AC	Configurable
33			
34	Relay 34	8A, 30V DC/ 250V AC	Configurable
35			

Plug #6, MB and (B)TB relays

Term.	Function	Technical data	Description
36	NC Relay	8A, 30V DC/ 250V AC	Mains breaker ON/ configurable
37	Com 36		
38	NO		
39	Relay 39	8A, 30V DC/ 250V AC	Mains breaker OFF/ configurable
40			
41	Relay 41	8A, 30V DC/ 250V AC	(Bus) tie breaker ON
42			
43	NC Relay	8A, 30V DC/ 250V AC	(Bus) tie breaker OFF
44	Com 43		
45	NO		

Plug #7, multi-inputs

Term.	Function	Technical data	Description
46	Multi-in 1	Input	VDO/4-20 mA/Pt100/binary
47	Multi-in 2	Input	VDO/4-20 mA/Pt100/binary
48	Multi-in 3	Input	VDO/4-20 mA/Pt100/binary
49	Common	Input	Com. for inputs 46, 47 and 48
50	Not used		
51	Not used		
52	Not used		

Plug #8, AC current inputs

Term.	Function	Technical data	Description
53	L1 s1	1 or 5A AC	Current phase L1
54	L1 s2		
55	L2 s1	1 or 5A AC	Current phase L2
56	L2 s2		
57	L3 s1	1 or 5A AC	Current phase L3
58	L3 s2		
59		Not used	
60			

Plug #9, mains/busbar A AC voltage inputs

Term.	Function	Technical data	Description
61	L1	100-690V AC	Mains line 1 (AGC 244: BB A)
62		Not used	
63	L2	100-690V AC	Mains line 2 (AGC 244: BB A)
64		Not used	
65	L3	100-690V AC	Mains line 3 (AGC 244: BB A)
66		Not used	
67	N		Neutral

All AC voltage inputs are galvanically separated from the rest of the unit. Voltages are indicated in phase-phase values.

Plug #10, busbar/busbar B AC voltage inputs

Term.	Function	Technical data	Description
68	L1	100-690V AC	Busbar line 1 (AGC 244: BB B)
69		Not used	
70	L2	100-690V AC	Busbar line 2 (AGC 244: BB B)
71		Not used	
72	L3	100-690V AC	Busbar line 3 (AGC 244: BB B)
73		Not used	
74	N		Neutral
75		Not used	
76		Not used	

All AC voltage inputs are galvanically separated from the rest of the unit. Voltages are indicated in phase-phase values.

Plug #11, digital inputs and breaker positions

Term.	Function	Technical data	Description
77	Di 77	Optocoupler	Configurable
78	Di 78	Optocoupler	Configurable
79	Di 79	Optocoupler	Configurable
80	Di 80	Optocoupler	Configurable
81	Di 81	Optocoupler	Configurable
82	Di 82	Optocoupler	Configurable
83	Di 83	Optocoupler	Configurable
84	Di 84	Optocoupler	Configurable
85	Di 85	Optocoupler	Configurable
86	Di 86	Optocoupler	Configurable
87	Di 87	Optocoupler	MB ON/configurable
88	Di 88	Optocoupler	MB OFF/configurable
89	Di (B)TB ON	Optocoupler	(B)TB ON feedback
90	Di (B)TB OFF	Optocoupler	(B)TB OFF feedback
91	Com	Common	Common for inputs 77 to 90
92		Not used	
93		Not used	

The digital inputs 77-90 are bi-directional, meaning that common can be - or +, whichever is preferred.

Socket connections

Term.	Function	Technical data	Description
SD	Memory	SD memory	Additional memory space for lifetime logging of data
USB	PC conn	USB B	Connection for PC programming
RJ45	TCP/IP	Ethernet	Modbus TCP/IP connection

6. Wirings

AC connections

The AGC 200 can be wired up in three-phase, single phase or split phase configuration.

Contact the switchboard manufacturer for accurate information about required wiring for the specific application.

Neutral line (N)

When three-phase distribution systems are used, the neutral line (N) is only necessary if it is a three-phase + neutral system. If the distribution system is a three-phase system without neutral, then leave the terminals 67 and 74 empty.

Current transformer ground

The current transformer ground connection can be made on s1 or s2 connection, whichever is preferred.

Voltage measurement fuses

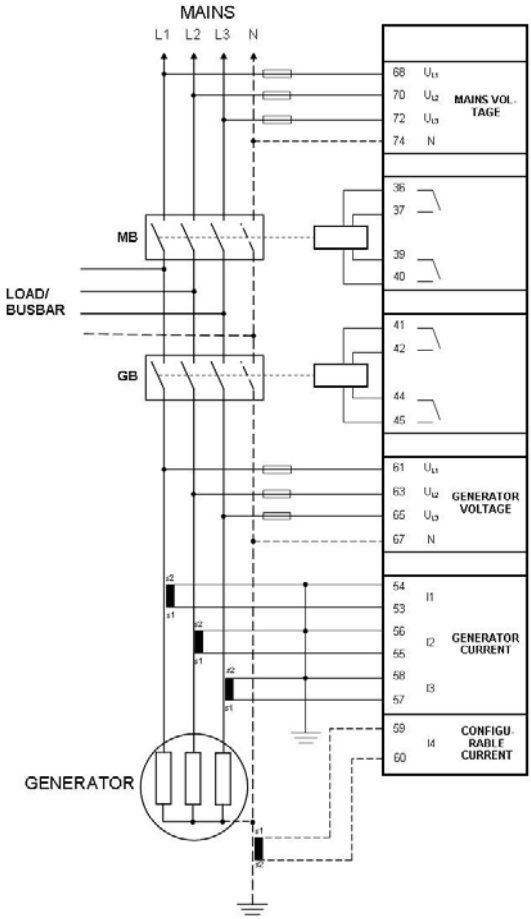
If the wires/cables are protected with fuses, use 2A slow blow or higher, dependent on the wires/cables being protected.

Breaker wiring

The breaker wiring is an example only.

3-phase AGC 213/223/243

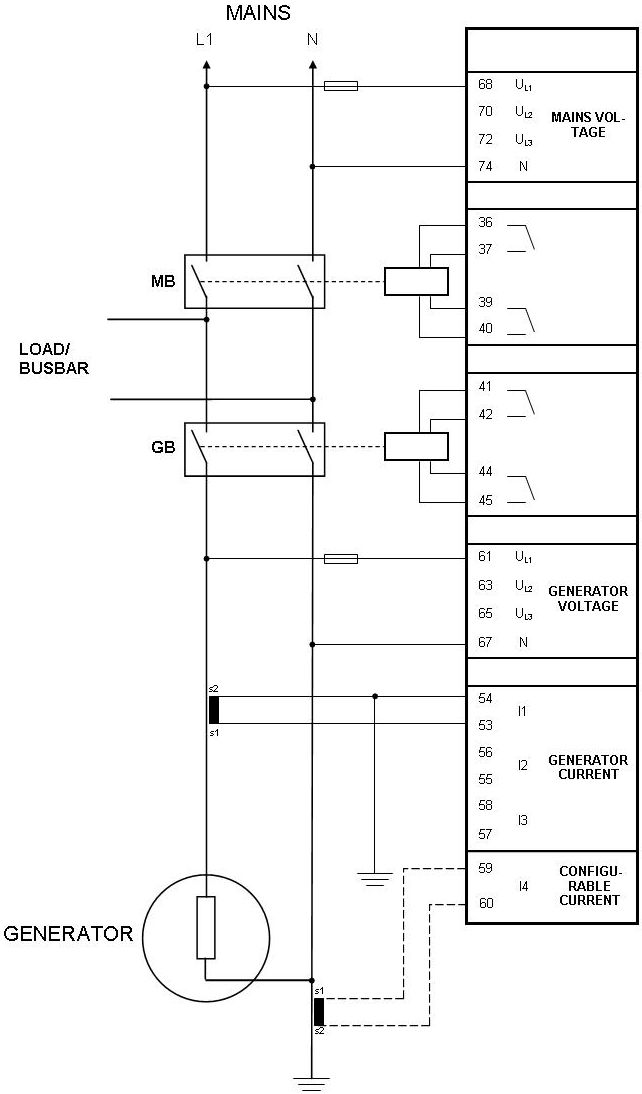
AMF, fixed power, peak shaving, load takeover, mains power export.



Wiring indicated with dashed line is optional.

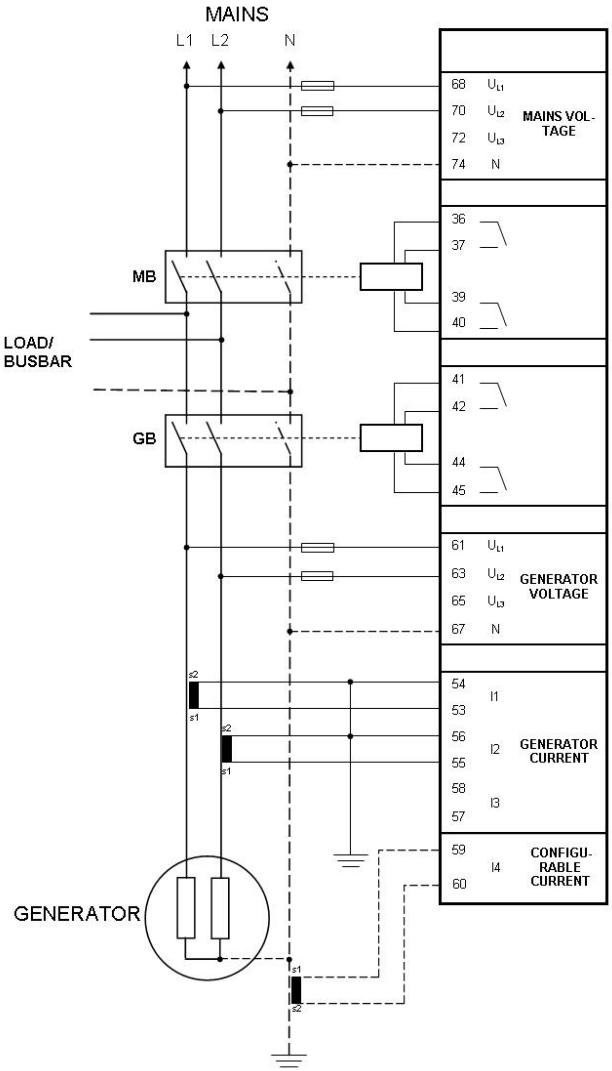
For peak shaving, load takeover and mains power export, the configurable current input can be used to measure phase L1 current.

Single phase AGC 213/223/243



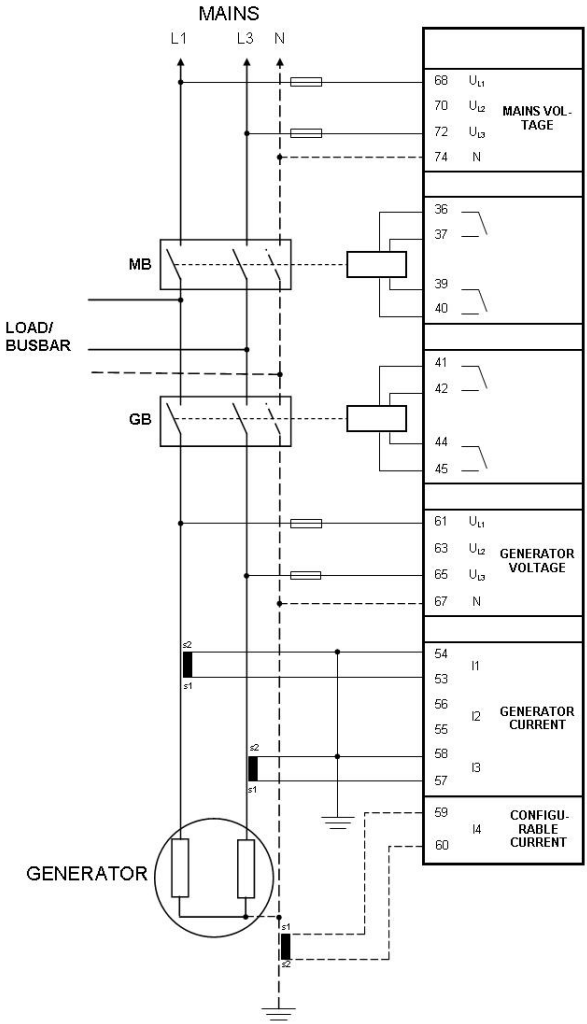
Wiring indicated with dashed line is optional.

2-phase L1L2 AGC 213/223/243



Wiring indicated with dashed line is optional.

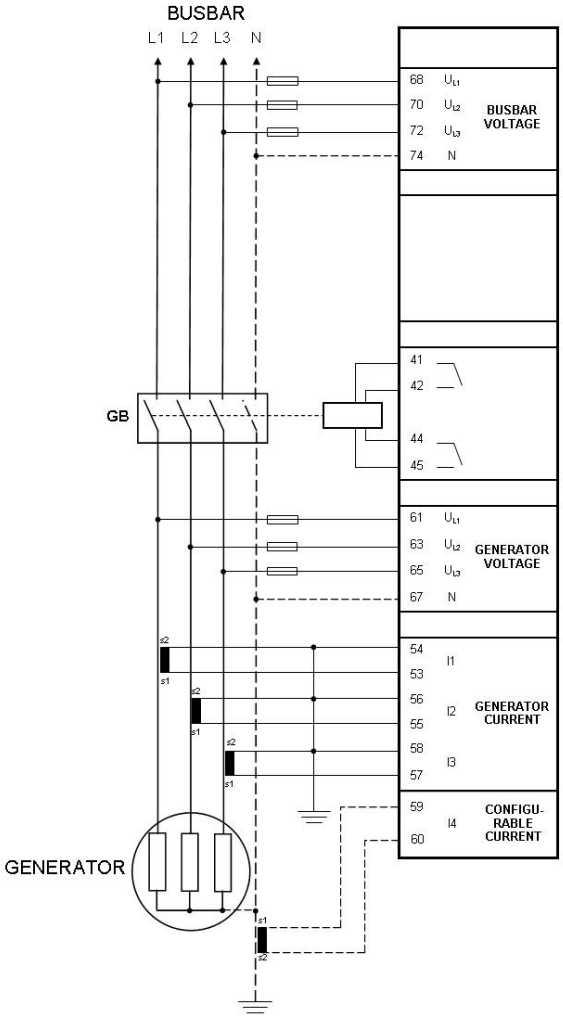
2-phase L1L3 (split phase)



Wiring indicated with dashed line is optional.

The phase angle between L1 and L3 voltages is 180°.

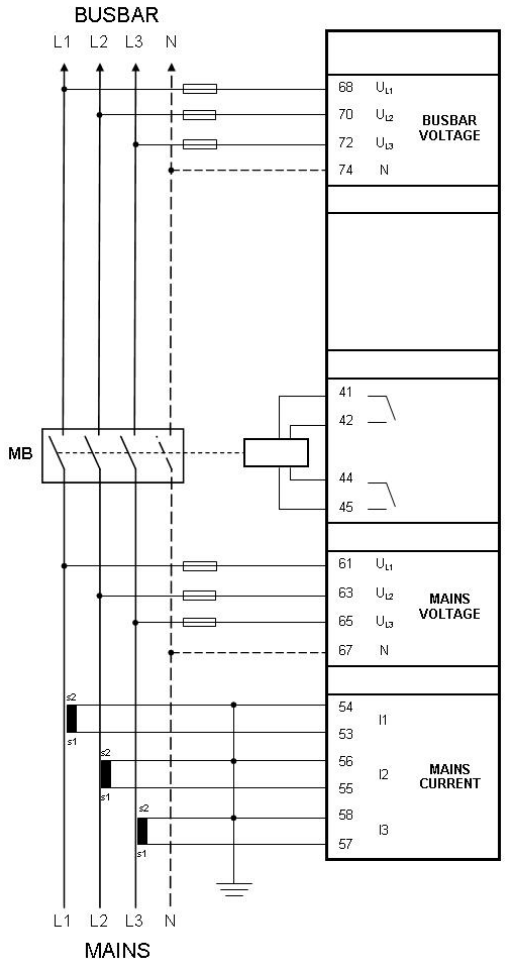
Island mode and power management (AGC 212/232/242/243)



Wiring indicated with dashed line is optional.

1-phase and 2-phase systems are also supported.

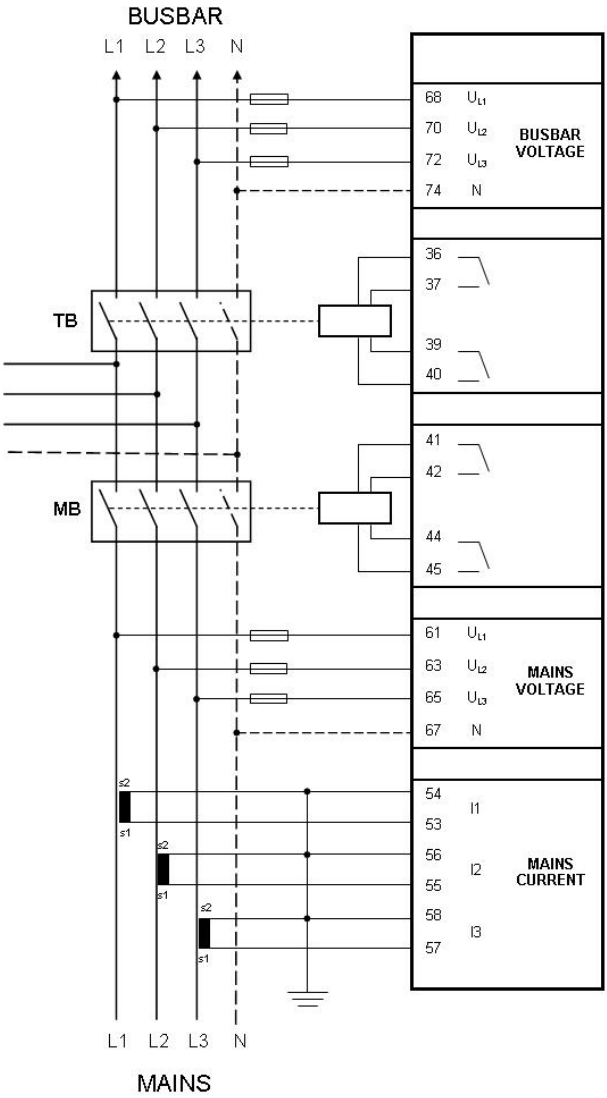
Power management mains breaker (AGC 245)



Wiring indicated with dashed line is optional.

1-phase and 2-phase systems are also supported.

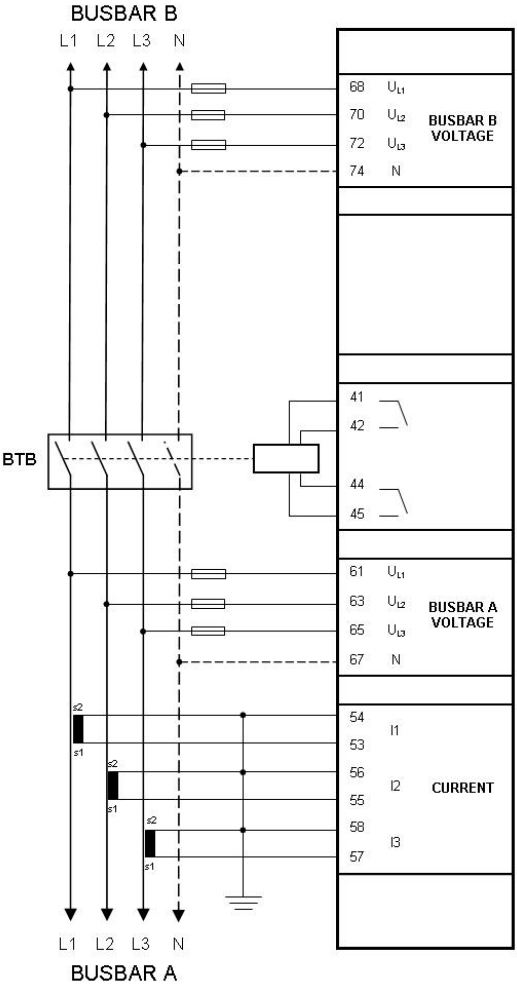
Power management mains and tie breaker (AGC 246)



Wiring indicated with dashed line is optional.

1-phase and 2-phase systems are also supported.

Power management AGC 244 BTB



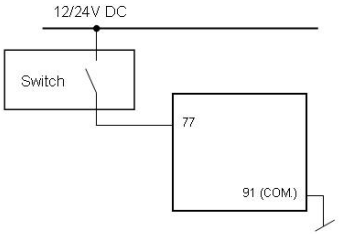
Wiring indicated with dashed line is optional.

1-phase and 2-phase systems are also supported.

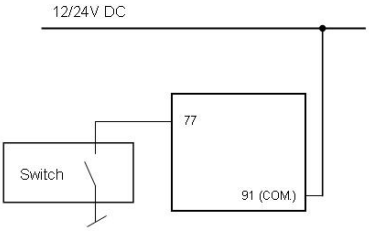
DC connections

Digital inputs

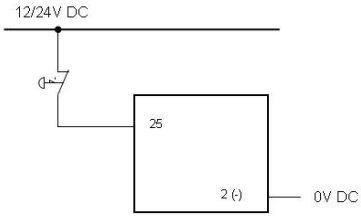
Battery positive to input:



Battery negative to input:



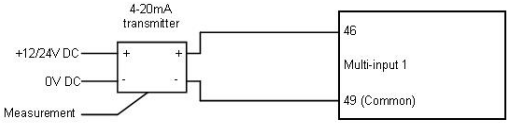
Emergency stop:



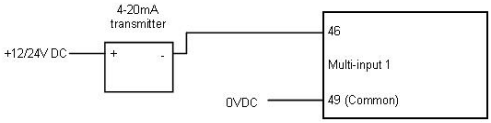
Multi-inputs

(0)4-20 mA

Active transmitter

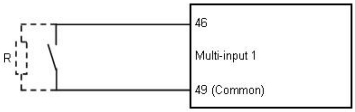


2-wire transmitter



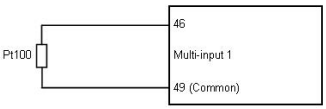
If the 2-wire transmitter has its own battery supply, the voltage must not exceed 30V DC.

Digital inputs



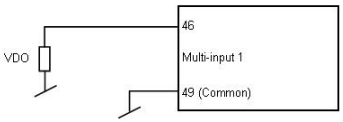
Wire break monitoring resistor (if needed): R = 240 Ω.

Pt100

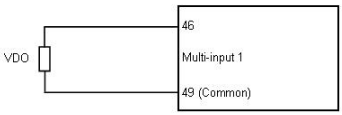


VDO

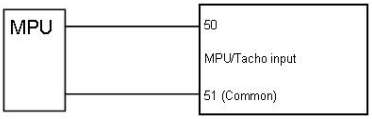
1-wire



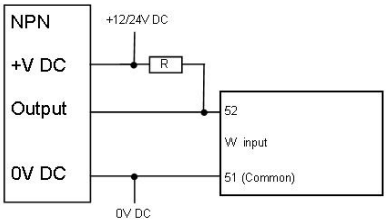
2-wire



Magnetic pick-up (MPU)

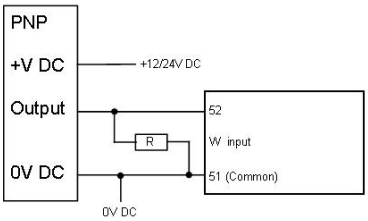


NPN sensor



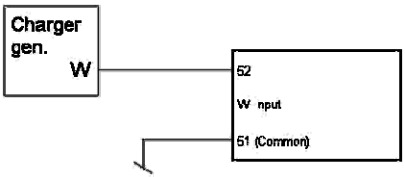
R = 1200Ω@24V DC, 600Ω@12V DC

PNP sensor

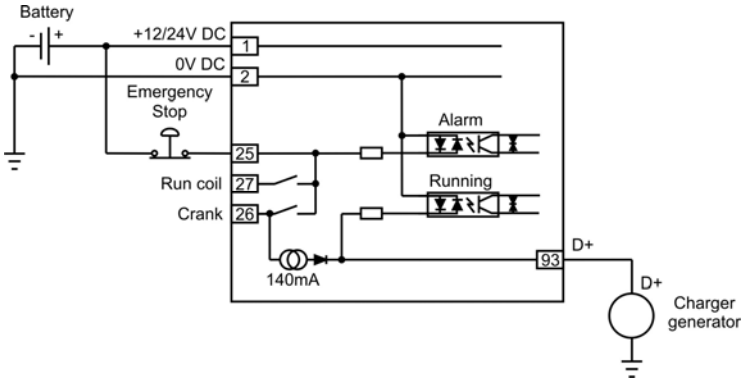


R = 1200Ω@24V DC, 600Ω@12V DC

Charger generator, W input



D+ connection, terminal 93

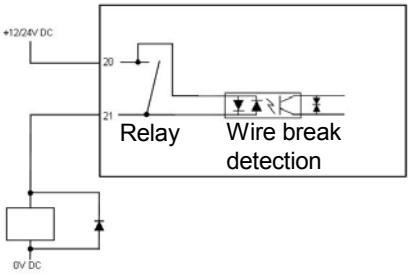


The D+ connection is used for two purposes:

1: Detection of engine running (in case the RPM input is not used). This is done by detection of the 12/24V DC build-up of the charger generator. When voltage comes up, the engine is running.

2: Helping the charger generator build up voltage. When the crank relay output activates, it is fed 12/24 V from the emergency stop input (normally closed). At the same time, a 140 mA DC constant current generator will feed current into the terminal 93 (D+) connection. This will help excite the charger generator.

Stop coil



Remember to mount the free wheel diode.

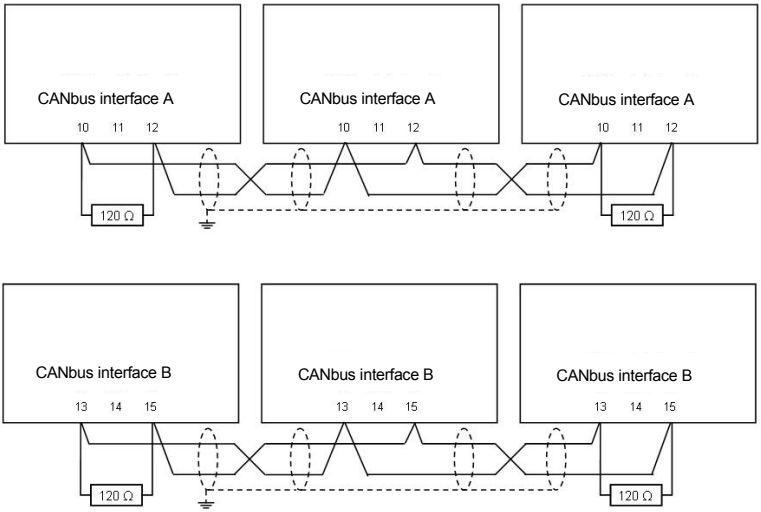
The wire break detection is only active when the output is OFF.

Communication

CANbus

Examples with three AGC 242 units connected.

It is not possible to mix CANbus wiring interface A and B.



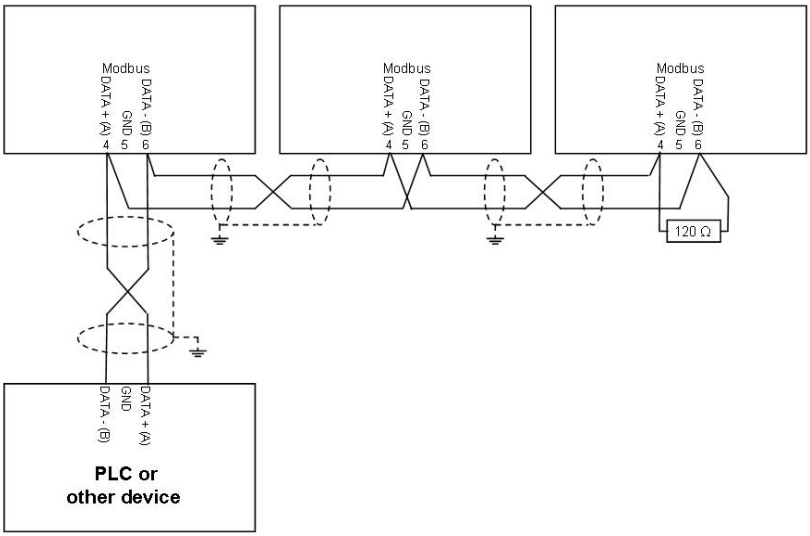
Connect shield to earth at one end only. Shield ends must be insulated with tape or insulation tubing.

Use shielded twisted cable.

End resistor R = 120 Ohm.

Modbus (option H2)

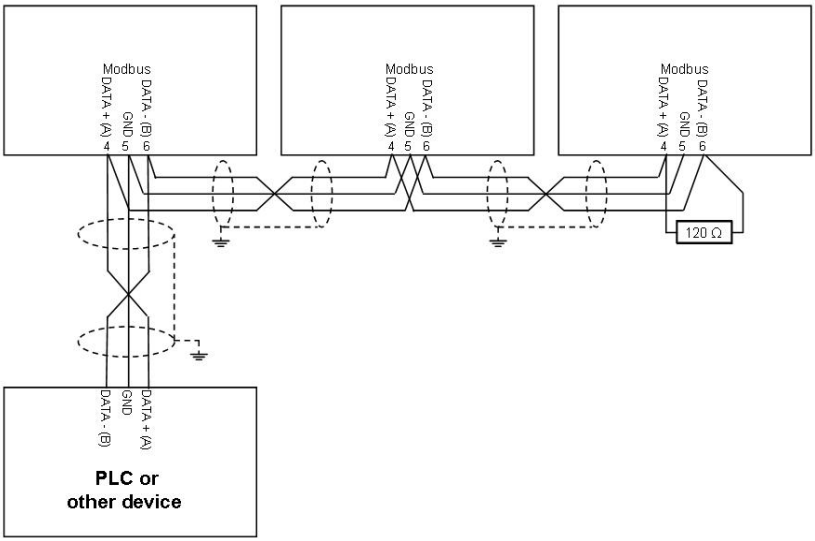
Connection with 2-wire screened cable (recommended).



Connect shield to ground at one end only. Shield ends must be insulated with tape or insulation tubing.

Use shielded twisted cable.

Connection with 3-wire shielded cable.



Connect shield to ground at one end only. Shield ends must be insulated with tape or insulation tubing.

Use shielded twisted cable.

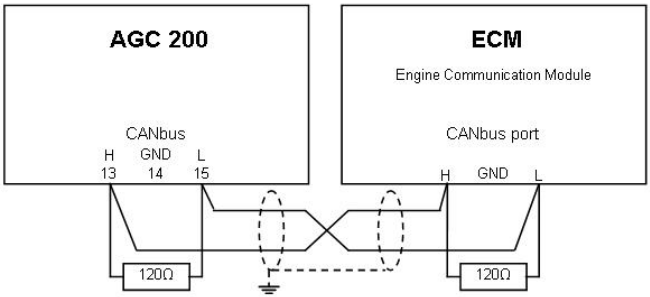
This solution is only feasible if the COM line is insulated. Check PLC/other device before connecting.
A non-insulated COM line may result in damage to the equipment.

Cable: Belden 3105A or equivalent. 22 AWG (0.6 mm^2) twisted pair, shielded, <40 mΩ/m, min. 95% shield coverage.

Normally, the Modbus does not need bias resistors (end terminators). These are only needed in case of very long lines and/or many nodes (>32) on the Modbus network. If required, use 120 Ω 1/4 W resistors.

The AGC 200 has a fail-safe biasing function. It has internal 4.7 kΩ pull-up and pull-down resistors.
Only one set of pull-up and pull-down resistors should be used at a time.
It is fixed that the Modbus ID = 1 has the fail-safe biasing function.

CANbus engine communication



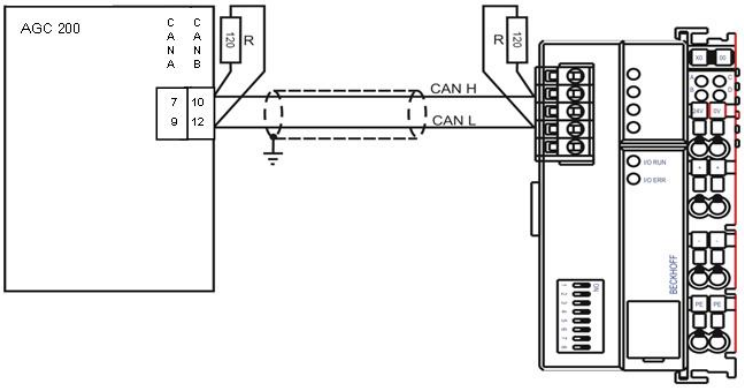
Connect shield to ground at one end only. Shield ends must be insulated with tape or insulation tubing.

Use shielded twisted cable.

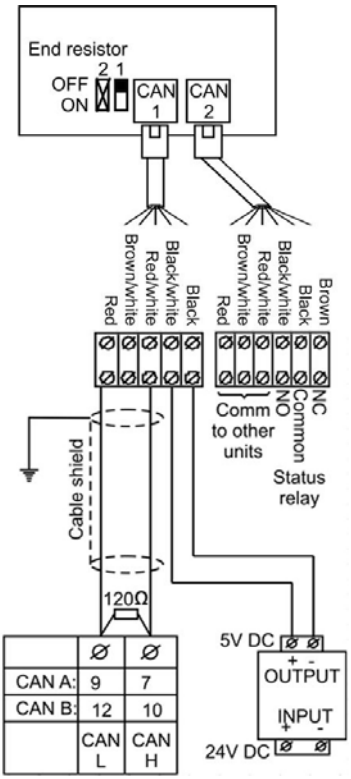
End resistor R = 120 Ohm 1/4 W.

The terminating resistor at the engine side may not be needed if it is incorporated in the engine controller. Please refer to the engine manufacturer's literature.

External I/O module (option H8)



Additional operator's panel AOP-2 (option X4)



If option H8 is used together with AOP-2, the total end resistance of the AOP-2 and the external I/O controller must be 120 Ω.

A DC/DC converter for the DC supply voltage and 2 x 1 m cable with an RJ12 plug in one end and stripped wires in the other end are included in the AOP-2 delivery.

7. Technical information

Technical specifications

Accuracy:	Class 1.0
	-40…15…30…70ºC
	Temperature coefficient: +/-0.2% of full scale per 10ºC
	Short circuit: 5% of 3.5*nominal current
	Earth current: 2% of 1A or 5A
	To IEC/EN 60688
Operating temp.:	-25…70°C (-13...158°F)
UL/cUL Listed:	Max. ambient temp. 50°C/122°F
With option L2:	-40…70°C (-40...158°F)
Storage temp.:	-40…70°C (-40...158°F)
Climate:	97% RH to IEC 60068-2-30
Operating altitude:	Up to 3000 m above sea level
Meas. voltage:	100…690V AC (+20%)
UL/cUL Listed:	100…600V AC
	Phase to phase
Load:	1.5 MΩ
Frequency:	30…70 Hz

Meas. current: 1A or 5A AC from current transformer

Consumption max.: 0.3 VA/phase

UL/cUL Listed: Use listed or R/C (XODW2.8) current transformers

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

Magnetic pick-up input:
Voltage: 2-70 V peak
Frequency: 10-10000 Hz
Resistance: 250-3000 Ω

Aux. supply: 6-36V DC continuously
UL/cUL Listed: 9-32.5V DC

0V DC for 50 ms when coming from at least 12V DC (cranking dropout)

Max. 25 W consumption

With option L2 -40ºC (-40ºF)
Max. 45 W consumption

The aux. supply inputs are to be protected by a 12A slow-blow fuse

Passive binary input voltage:
Bi-directional optocoupler
ON: 8…36V DC
<2 V: OFF
Impedance: 4.7 kΩ

Emergency stop input voltage:
ON: +8…36V DC (term. 25)
<2 V: OFF
Impedance: 4.7 kΩ

Multi-functional inputs:

Current input:
0(4)-20 mA
From active transmitter:
0-20 mA, +/-1%
Impedance: 50 Ω

Binary input:
Dry contact inputs
3V DC internal supply, with cable supervision
Max. resistance for ON detection: 100 Ω

Pt100:
-40…250ºC (-40…482ºF) +/-1%
To IEC/EN 60751

VDO:
0-2500 Ω, +/-1%

Relay outputs, electrical rating:

Relays 16-20 and 28-43:	250V AC/30V DC 8A
UL/cUL Listed:	250V AC/30V DC 6A General use B300 Pilot duty
Relay 23:	36V DC 8A
UL/cUL Listed:	24V DC 8A General use
Relay 26 and 27:	36V DC 16A
UL/cUL Listed:	24V DC 16A General use

Mounting: Panel mounted

Front size: 312 x 219 mm (122.8 x 86.2 in)

Display: 240 x 128 pixel backlight STN

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

To UL508 and CSA22.2 No. 14-05
Installation category (overvoltage category) III, 600 V, pollution degree 2

Protection: Front: IP52/NEMA type 1
(IP66/NEMA type 1 with gasket, option L)
Terminals: IP20/NEMA type 1
To IEC/EN 60529

EMC/CE: To EN 61000-6-1/2/3/4
IEC 60255-26
IEC 60533 power distr. zone
IACS UR E10 power distr. zone

Vibration: 3…13.2 Hz: 2 mm_{pp}
13.2…100 Hz: 0.7 g
To IEC 60068-2-6
To IACS UR E10

10…60 Hz: 0.15 mm_{pp}
60…150 Hz: 1 g
To IEC 60255-21-1 Response (class 2)

10…150 Hz: 2 g
To IEC 60255-21-1 Endurance (class 2)

Shock: 10 g, 11 msec, half sine
To IEC 60255-21-2 Response (class2)

30 g, 11 msec, half sine
To IEC 60255-21-2 Endurance (class2)

50 g, 11 msec, half sine
To IEC 60068-2-27

Bump: 20 g, 16 msec, half sine
To IEC 60255-21-2 (class2)

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

Plug connections: AC voltage/current inputs:
3.5 mm^2 (13 AWG) multi-stranded

Other:
1.5 mm^2 (16 AWG) multi-stranded

Service port: USB A-B
TCP/IP: RJ 45

Tightening torque min.:
AC voltage input: 0.5 Nm (5-7 lb-in)
Other: 0.5 Nm (5-7 lb-in)

Weight:
AGC 200: 1.6 kg (3.5 lbs.)
Option J6: 0.2 kg (0.4 lbs.)
AOP-2: 0.4 kg (0.9 lbs.)

Response times:
(Delay set to min.)

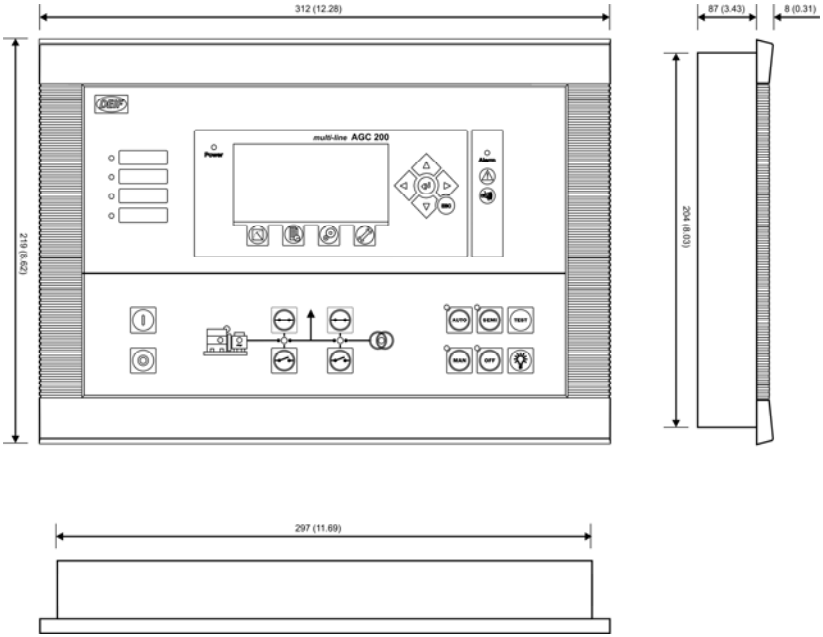
Busbar:	Over-/undervoltage:	< 50 ms
	Over-/underfrequency:	< 50 ms
Generator:	Reverse power:	<200 ms
	Overcurrent:	<200 ms
	Short circuit:	< 40 ms
	Directional overcurrent:	<100 ms
	Over-/undervoltage:	<200 ms
	Over-/underfrequency:	<300 ms
	Overload:	<200 ms
	Current unbalance:	<200 ms
	Voltage unbalance:	<200 ms
	React. power import:	<200 ms
	React. power export:	<200 ms
	Negative sequence I:	<400 ms
	Negative sequence U:	<400 ms
	Zero sequence I:	<400 ms
	Zero sequence U:	<400 ms
	Overspeed:	<400 ms
	Digital inputs:	<250 ms
	Analogue input:	<250 ms
	Emergency stop:	<200 ms
	Earth current:	<100 ms

Mains:	df/dt (ROCOF):	<130 ms (4 periods)
	Vector jump:	< 40 ms
	Positive sequence:	< 60 ms

UL markings:

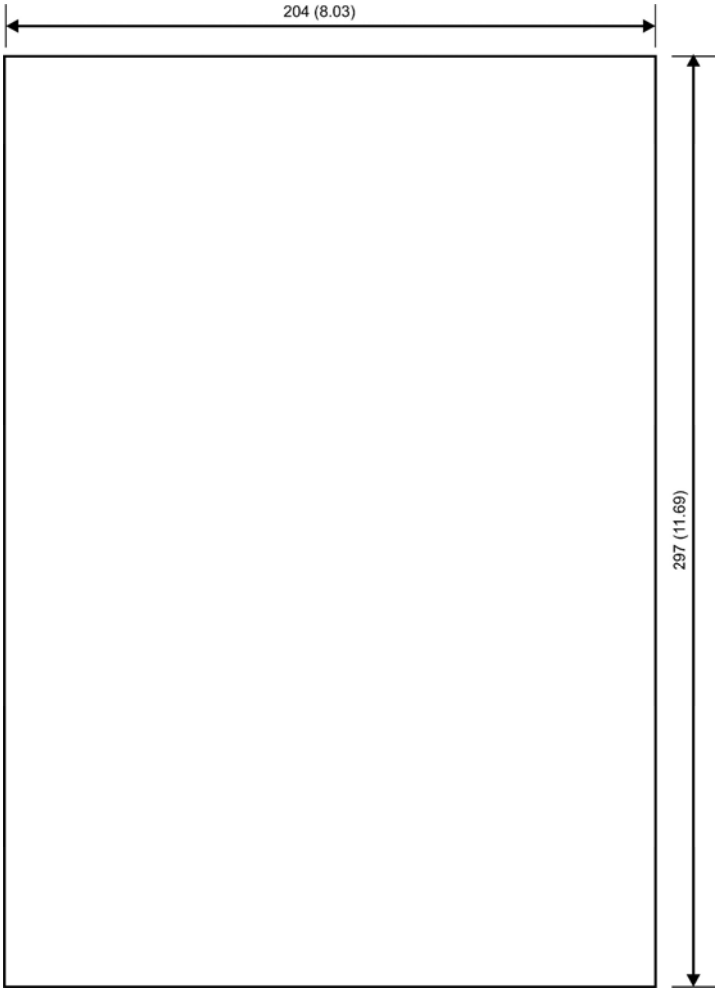
Wiring:	Use 60/75ºC copper conductors only
Wire size:	AWG 30-12
Terminal tightening torque:	5-7 lb-in
Mounting:	For use on a flat surface of a type 1 enclosure
Installation:	To be installed in accordance with the NEC (US) or the CEC (Canada)

Unit dimensions



Dimensions are given in mm (inches).

Panel cutout



Dimensions are given in mm (inches).

DEIF A/S reserves the right to change any of the above.