



-power in control



INSTALLATION INSTRUCTIONS



Advanced Genset Controller, AGC 200

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



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Document no.: 4189340610I
SW version: 4.52.x or later

1. General information

1.1. Warnings, legal information and safety.....	4
1.1.1. Warnings and notes	4
1.1.2. Legal information and disclaimer	4
1.1.3. Safety issues	4
1.1.4. Electrostatic discharge awareness	4
1.1.5. Factory settings	5
1.1.6. UL applications	5
1.2. About the installation instructions.....	5
1.2.1. General purpose	5
1.2.2. Intended users	5
1.2.3. Contents and overall structure	5

2. General product information

2.1. AGC 200 product information.....	6
2.1.1. Introduction.....	6
2.1.2. Type of product.....	6
2.1.3. Options.....	6
2.1.4. Variants.....	6
2.1.5. Available CAN ports.....	7
2.2. Standard functions.....	7
2.2.1. Operation modes.....	7
2.2.2. Engine control (AGC 212/213/222/232/242/243)	8
2.2.3. Generator control (AGC 212/213/222/232/242/243)	8
2.2.4. Protection	8
2.2.5. Display.....	8
2.2.6. M-Logic.....	8
2.2.7. General	8
2.3. Standard and optional applications.....	8
2.3.1. Standard and optional applications	8
2.3.2. Automatic Mains Failure, AMF	9
2.3.3. Island operation.....	10
2.3.4. Fixed power/base load.....	11
2.3.5. Peak shaving.....	12
2.3.6. Load takeover.....	13
2.3.7. Mains power export (fixed power to mains)	14
2.3.8. Multiple gensets, CANshare.....	14
2.3.9. Multiple gensets, load sharing (power management).....	15
2.3.10. Multiple gensets, power management (AGC 24x and 222 only)	16

3. Mounting

3.1. AGC 200 mounting and dimensions.....	17
3.1.1. Mounting of the unit	17
3.1.2. Unit dimensions	17
3.1.3. Panel cutout	18
3.1.4. Mounting instructions	18
3.1.5. Mounting of gasket (option L1)	18
3.1.6. Tightening torques.....	19

4. Hardware

4.1. AGC 200 hardware.....	20
4.1.1. Unit rear side overview.....	20
4.1.2. Terminal strip overview, AGC 21x, 222, 232, 233, 242, 243	21
4.1.3. Terminal strip overview, AGC 244/245/246.....	28

5. Wirings

5.1. AC connections.....	34
5.1.1. AC connections	34

5.1.2. Neutral line (N)	34
5.1.3. Current transformer ground	34
5.1.4. Voltage measurement fuses	34
5.1.5. Breaker wiring	34
5.1.6. 3-phase AGC 213/233/243	35
5.1.7. Single phase AGC 213/233/243	37
5.1.8. 2-phase L1L2 AGC 213/233/243	39
5.1.9. 2-phase L1L3 (split phase)	41
5.1.10. Island mode and power management (AGC 212/222/232/242/243)	43
5.1.11. Power management mains breaker (AGC 245)	45
5.1.12. Power management mains and tie breaker (AGC 246)	47
5.1.13. Power management AGC 244 BTB	49
5.2. DC connections.....	50
5.2.1. Digital inputs	50
5.2.2. Multi-inputs	50
5.2.3. Active transmitter	51
5.2.4. 2-wire transmitter	51
5.2.5. Digital inputs	52
5.2.6. Pt100	52
5.2.7. RMI	53
5.2.8. Magnetic pickup (MPU)	53
5.2.9. NPN sensor	53
5.2.10. PNP sensor	54
5.2.11. Charger generator, W input	54
5.2.12. D+ connection, terminal 93	55
5.2.13. Stop coil	56
5.3. Communication.....	57
5.3.1. CAN bus	57
5.3.2. Modbus (option H2)	58
5.3.3. CAN bus engine communication	59
5.3.4. External I/O module (option H8)	59
5.3.5. Additional operator panel AOP-2 (option X4)	60
6. Technical information	
6.1. Technical specifications.....	62

1. General information

1.1 Warnings, legal information and safety

1.1.1 Warnings and notes

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

Warnings



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

Notes



Notes provide general information, which will be helpful for the reader to bear in mind.

1.1.2 Legal information and disclaimer

DEIF takes no responsibility for installation or operation of the generator set. If there is any doubt about how to install or operate the engine/generator controlled by the Multi-line 2 unit, the company responsible for the installation or the operation of the set must be contacted.



The Multi-line 2 unit is not to be opened by unauthorised personnel. If opened anyway, the warranty will be lost.

Disclaimer

DEIF A/S reserves the right to change any of the contents of this document without prior notice.

The English version of this document always contains the most recent and up-to-date information about the product. DEIF does not take responsibility for the accuracy of translations, and translations might not be updated at the same time as the English document. If there is a discrepancy, the English version prevails.

1.1.3 Safety issues

Installing and operating the Multi-line 2 unit may imply work with dangerous currents and voltages. Therefore, the installation should only be carried out by authorised personnel who understand the risks involved in 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.

1.1.4 Electrostatic discharge awareness

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

1.1.5 Factory settings

The Multi-line 2 unit is delivered from factory with certain factory settings. These are based on average values and are not necessarily the correct settings for matching the engine/generator set in question. Precautions must be taken to check the settings before running the engine/generator set.

1.1.6 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 signaling functions have not been evaluated.

1.2 About the installation instructions

1.2.1 General purpose

These Installation Instructions mainly include general product and hardware information, mounting instructions, terminal strip descriptions, I/O lists and wiring descriptions.

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



Make sure to read this document before starting to work with the Multi-line 2 unit and the gen-set to be controlled. Failure to do this could result in human injury or damage to the equipment.

1.2.2 Intended users

These Installation Instructions are mainly intended for the person responsible for the design and installation. In most cases, this would be a panel builder designer. Naturally, other users might also find useful information in the document.

1.2.3 Contents and 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. General product information

2.1 AGC 200 product information

2.1.1 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 genset builders, who need a flexible generator protection and control unit for small to large genset applications. Being part of the Multi-line product family, the standard functions can be supplemented with a variety of optional functions.

2.1.2 Type of product

The AGC 200 is a micro-processor based control unit containing all necessary functions for protection and control of a genset.

It contains all necessary 3-phase measuring circuits, and all values and alarms are presented on the LCD display.

2.1.3 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. For example, the options cover various protections for generator, busbar and mains, serial communication, additional operator panels, and so on.

2.1.4 Variants

The following variants of the AGC 200 are available:

With engine communication (CAN bus) as standard:

AGC 212: Single generator, island operation

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

With engine communication (CAN bus) and one extra CAN bus connection as standard:

AGC 222: Generator controller with power management

With engine communication (CAN bus) and two extra CAN bus connections as standard:

AGC 232: Generator controller with digital load sharing for island operation

AGC 233: Single generator, mains failure (mains and generator breaker control)

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

2.1.5 Available CAN ports

The table below shows available CAN ports and how each can be configured:

	CAN A	CAN B	CAN C
AGC 212, 213	Not available	Not available	OFF External I/O H5 EIC AOP2
AGC 222	Not available	OFF External I/O PM Secondary CANshare AOP2 PM Primary	OFF External I/O H5 EIC CANshare AOP2
AGC 232, 233	OFF External I/O CANshare AOP2	OFF External I/O CANshare AOP2	OFF External I/O H5 EIC CANshare AOP2
AGC 242, 243	OFF External I/O PM Primary CANshare AOP2 PM Secondary	OFF External I/O PM Secondary CANshare AOP2 PM Primary	OFF External I/O H5 EIC CANshare AOP2
AGC 245, 246	OFF External I/O PM Primary AOP2 PM Secondary	OFF External I/O PM Secondary AOP2 PM Primary	OFF External I/O H5 EIC AOP2

2.2 Standard functions

2.2.1 Operation modes

Operation modes	Variant				
	212/222/232	213/233	242/243	244	245/246
Automatic Mains Failure		X	X	X*	X
Island operation	X	X	X	X*	
Fixed power/base load		X	X	X*	X
Peak shaving		X	X	X*	X
Load takeover		X	X	X*	X
Mains power export		X	X	X*	X



* AGC 244 is always in power management mode and is working in all the above operation modes.

2.2.2 Engine control (AGC 212/213/222/232/242/243)

- Start/stop sequences
- Run and stop coil
- Relay outputs for governor control

2.2.3 Generator control (AGC 212/213/222/232/242/243)

- Relay outputs for AVR control

2.2.4 Protection

- Over-current, 6 levels
- Reverse power, 2 levels
- Voltage-dependent over-current
- Over-voltage, 2 levels
- Under-voltage, 3 levels
- Over-frequency, 3 levels
- Under-frequency, 3 levels
- Overload, 5 levels
- Unbalanced current
- Unbalanced voltage
- Loss of excitation/Q<
- Over-excitation/Q>
- Multi-inputs, 3 configurable
- Digital inputs

2.2.5 Display

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

2.2.6 M-Logic

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

2.2.7 General

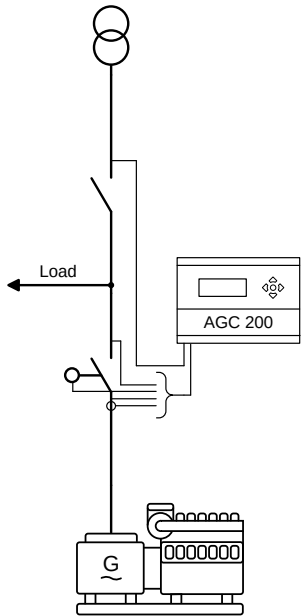
- USB interface to PC
- Free PC utility software for commissioning
- Additional functions available

2.3 Standard and optional applications

2.3.1 Standard and optional applications

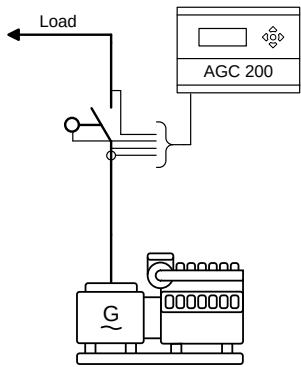
In the following sections, the standard and optional applications of the AGC 200 will be presented. In addition, the correct application configuration for the different applications is listed. It is only possible to use the unit for one of the purposes, for example AMF (Automatic Mains Failure). The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

2.3.2 Automatic Mains Failure, AMF



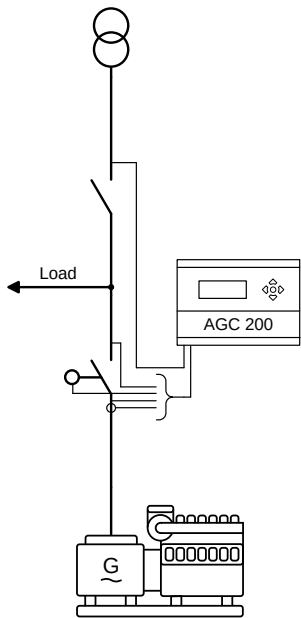
No.	Setting	
6070	Genset mode	AMF

2.3.3 Island operation



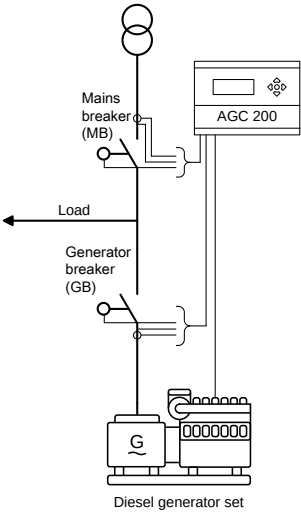
No.	Setting	
6070	Genset mode	Island operation

2.3.4 Fixed power/base load



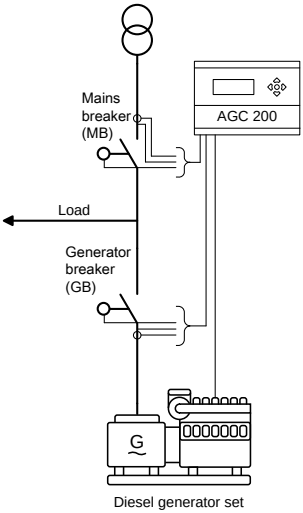
No.	Setting	
6070	Genset mode	Fixed power

2.3.5 Peak shaving



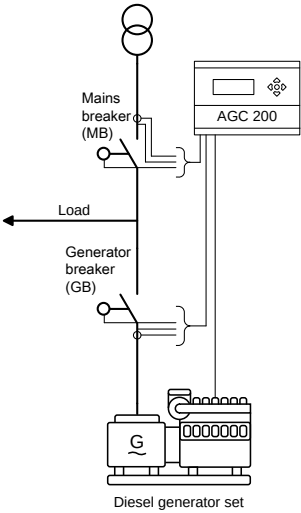
No.	Setting	
6070	Genset mode	Peak shaving

2.3.6 Load takeover



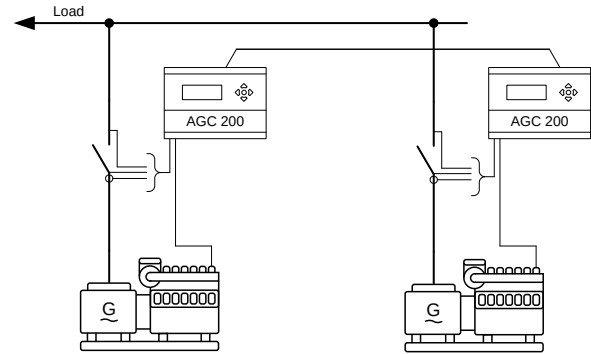
No.	Setting	
6070	Genset mode	Load takeover

2.3.7 Mains power export (fixed power to mains)



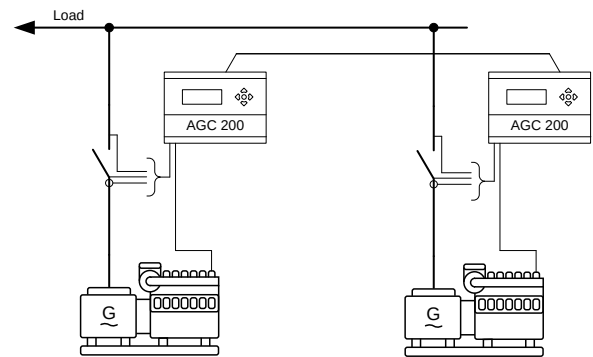
No.	Setting	
6070	Genset mode	Mains power export

2.3.8 Multiple gensets, CANshare



No.	Setting	
6070	Genset mode	Island operation

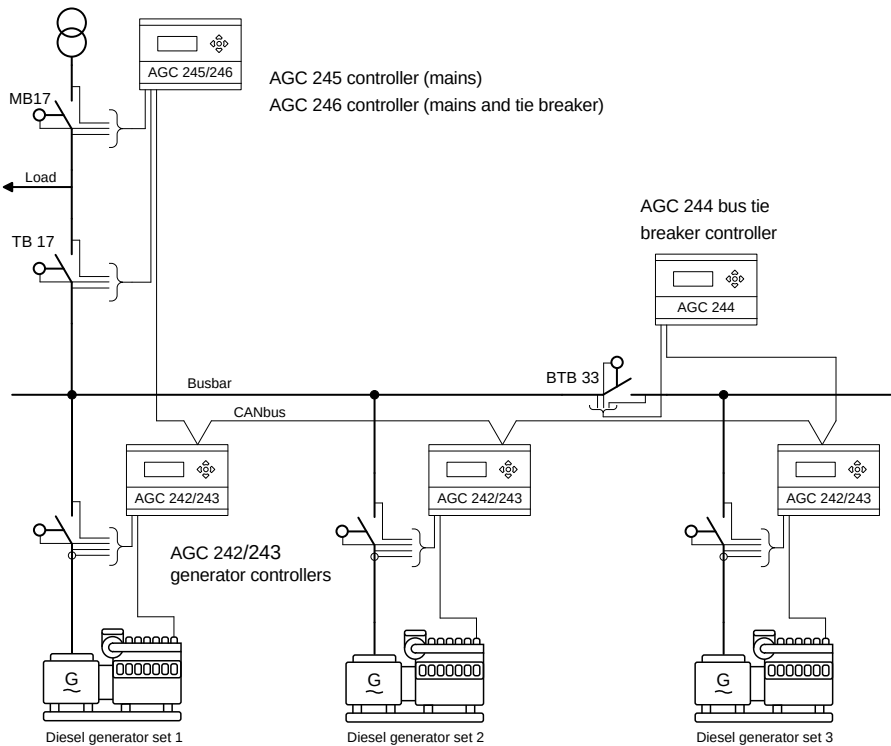
2.3.9 Multiple gensets, load sharing (power management)



No.	Setting	
6070	Genset mode	Power management

i If no mains is configured in a power management system, the genset will automatically be in "island mode", so channel 6071 must be "power management".

2.3.10 Multiple gensets, power management (AGC 24x and 222 only)



No.	Setting	
6070	Genset mode	Power management

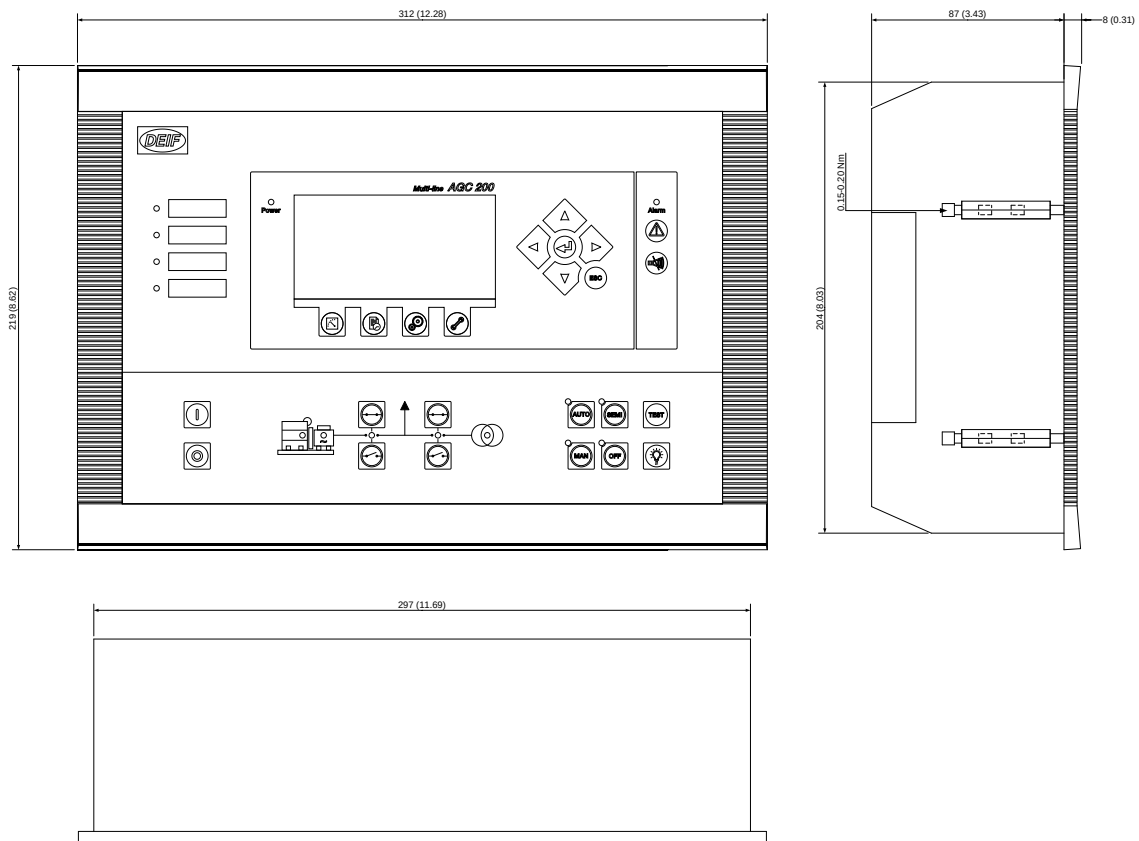
3. Mounting

3.1 AGC 200 mounting and dimensions

3.1.1 Mounting of the unit

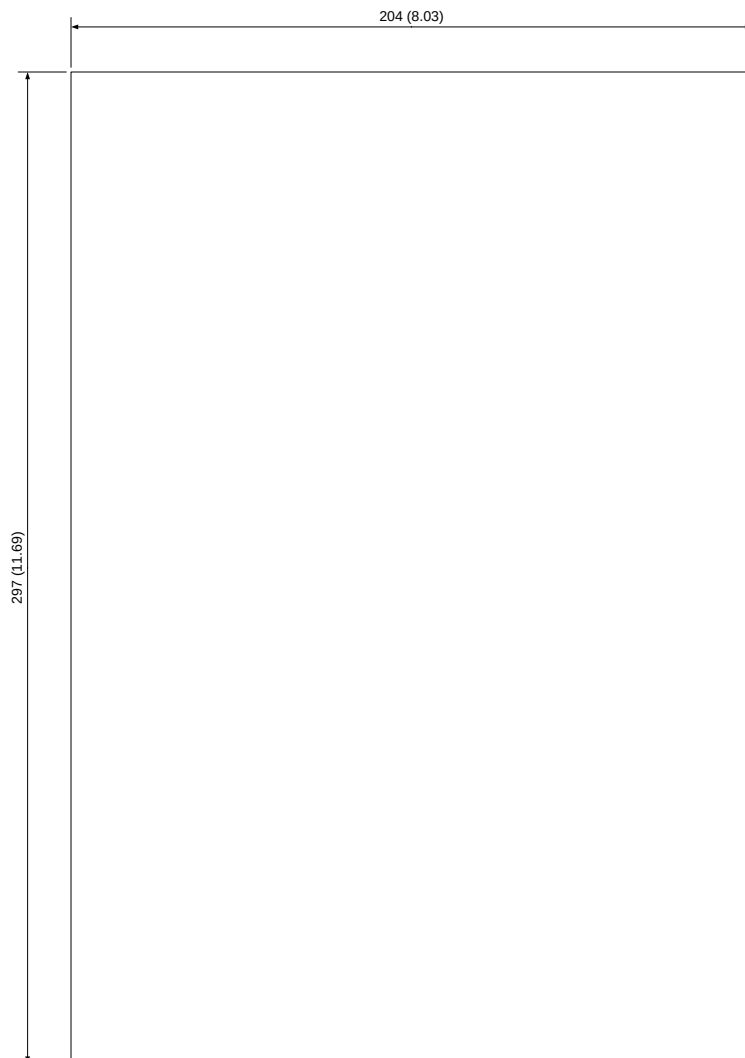
The unit is designed for mounting in the panel front.

3.1.2 Unit dimensions



Dimensions are given in mm (inches).

3.1.3 Panel cutout



 Dimensions are given in mm (inches).

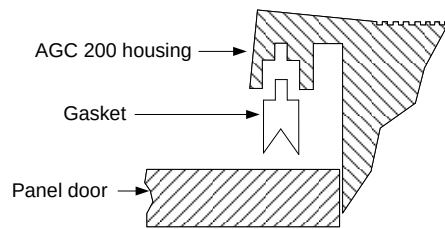
3.1.4 Mounting instructions

Fasten the unit with the screw clamps supplied with the unit. These are to be tightened 0.15-0.20 Nm - see diagram in the chapter Unit dimensions.

3.1.5 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.



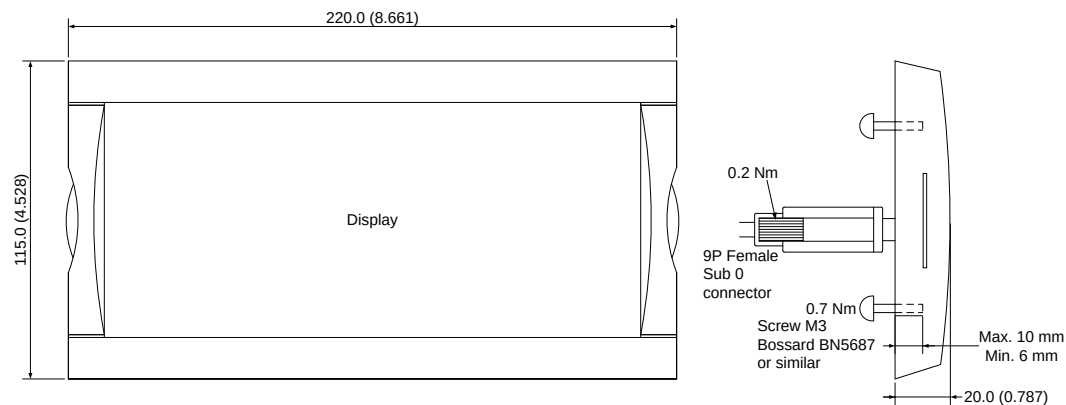
Furthermore, it is necessary to use all 12 screw clamps to ensure IP65 tightness.

3.1.6 Tightening torques

Unit panel door mounting:	0.15-0.20 Nm, 1.4-1.8 lb-in
Plug connections (terminals):	0.5 Nm, 4.4 lb-in

Display, AOP-1 and AOP-2 (see diagram below)

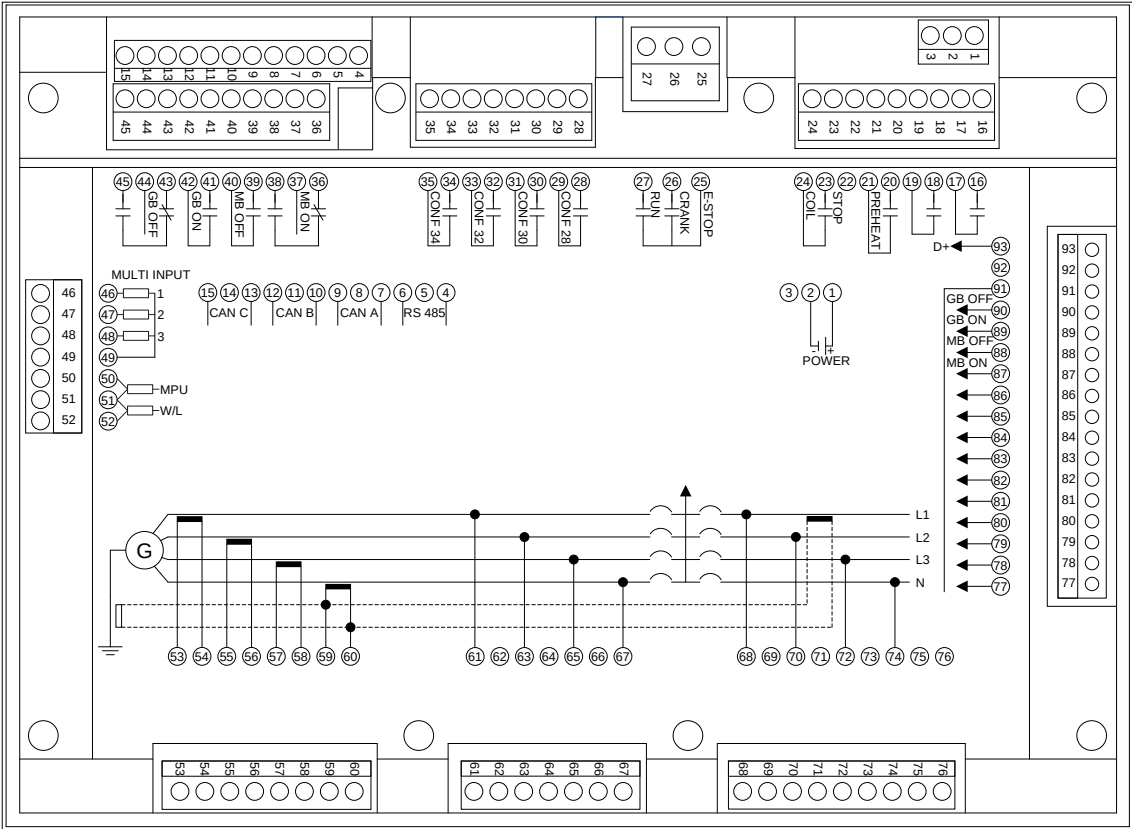
Panel door mounting:	0.7 Nm, 6.2 lb-in
Sub-D screw:	0.2 Nm, 1.8 lb-in
DC-DC converter terminals:	0.5 Nm, 4.4 lb-in



4. Hardware

4.1 AGC 200 hardware

4.1.1 Unit rear side overview



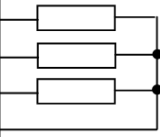
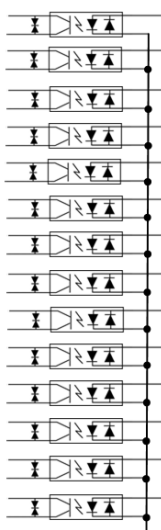
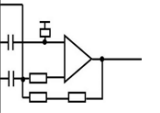
Notice that not all connections are available in all versions; see the terminal strip for details.

4.1.2 Terminal strip overview, AGC 21x, 222, 232, 233, 242, 243

TOP		BOTTOM	
+DC power (8-32V)	1		
- DC power	2		
Not used	3		
RS 485 Data A	4		
Modbus RTU Com	5		
Data B	6		
CAN A Can H	7		
Load sharing Com	8		
/ext. com. Can L	9		
CAN B Can H	10		
Load sharing Com	11		
/ext. com. Can L	12		
CAN C Can H	13		
Engine com. Com	14		
/ext.IO module Can L	15		
Relay 16 Status OK/	16		
Configurable	17		
Relay 18 Horn/	18		
Configurable	19		
Relay 20 Preheat/	20		
Configurable	21		
Not used	22		
Relay 23 Stop Coil/	23		
Configurable	24		
Emer. Stop / Com	25		
Relay 26 Crank	26		
Relay 27 Run	27		
Relay 28	28		
Configurable	29		
Relay 30	30		
Configurable	31		
Relay 32	32		
Configurable	33		
Relay 34	34		
Configurable	35		
Relay 36 MB ON/	36		
Configurable	37		
	38		
Relay 39 MB OFF/	39		
Configurable	40		
Relay 41 GB ON	41		
	42		
	43		
Relay 43 GB OFF	44		
	45		
		76	Not used
		75	Not used
		74	M Neutral
		73	Not used
		72	M L3
		71	Not used
		70	M L2
		69	Not used
		68	M L1
		67	G Neutral
		66	Not used
		65	G L3
		64	Not used
		63	G L2
		62	Not used
		61	G L1
		60	S2 Current
		59	S1 Configurable
		58	S2 Current L3
		57	S1
		56	S2 Current L2
		55	S1
		54	S2 Current L1
		53	S1



AGC 21x: CAN C only.
AGC 222: CAN B and C.
AGC 23x/24x: CAN A, B and C.
AGC 21x, 22x: Terminals 28 to 35 and 22 to 24 are not available.

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. See chapter 6 for details.
-  The placement of terminals (top, bottom, left, right) is seen from the rear side of the unit.
-  Terminals 77 to 81 are not available in AGC 21x and 22x.

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	+12/24 V DC	12/24 V DC +/-30 %	Power supply
2	0 V DC		
3		Not used	

Plug #2, communication

Term.	Function	Technical data	Description
4	Data+ (A)	RS-485	Modbus RTU, max. 115 kbps
5			
6	Data+ (B)		
7	CAN A H	CAN port A (not 21x, 22x series)	CANshare, power management, AOP-2 and external I/O modules
8			
9	CAN A L		
10	CAN B H	CAN port B (not 21x series)	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	8 A, 30 V DC/250 V AC	Status OK/configurable
17			
18	Relay 18	8 A, 30 V DC/250 V AC	Horn/configurable
19			
20	Relay 20	8 A, 30 V DC/250 V AC	Preheat/configurable
21			
22	Not used		Not used
23	Relay 24	8 A, 36 V DC (not 21x, 22x series)	Stop coil/configurable With wire break monitoring
24			

Plug #4, E-stop and start

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

Plug #5, relay group 2



Not available for AGC 21x/22x.

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

Plug #6, GB and MB relays

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

Plug #7, multi-inputs and RPM pickup

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

Plug #8, AC current inputs



CT on terminals 59-60: Not available for AGC 21x/22x.

Term.	Function	Technical data	Description
53	L1 s1	1 or 5 A AC	Current phase L1
54	L1 s2		
55	L2 s1	1 or 5 A AC	Current phase L2
56	L2 s2		
57	L3 s1	1 or 5 A AC	Current phase L3
58	L3 s2		
59	L4 s1	1 or 5 A 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	L 1	100 to 690 V AC	Generator line 1
62		Not used	
63	L 2	100 to 690 V AC	Generator line 2
64		Not used	
65	L 3	100 to 690 V 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	L 1	100 to 690 V AC	Mains line 1
69		Not used	
70	L 2	100 to 690 V AC	Mains line 2
71		Not used	
72	L 3	100 to 690 V 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 to 90 are bi-directional, meaning that common can be - or +, whichever is preferred.



Terminals 77 to 81 are not available in AGC 21x and 22x.



Terminals 87 to 90 are configurable in AGC 222.

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

4.1.3 Terminal strip overview, AGC 244/245/246

TOP		BOTTOM	
+DC power (8-32V)	1		
- DC power	2		
Not used	3		
RS 485 Data A	4		
Modbus RTU Com	5		
Data B	6		
CAN A Can H	7		
Load sharing Com	8		
/ext. com. Can L	9		
CAN B Can H	10		
Load sharing Com	11		
/ext. com. Can L	12		
CAN C Can H	13		
Engine com. Com	14		
/ext.IO module Can L	15		
Relay 16 Status OK/ Configurable	16		
	17		
Relay 18 Horn/ Configurable	18		
	19		
Relay 20 Preheat/ Configurable	20		
	21		
Not used	22		
Relay 23 Stop Coil/ Configurable	23		
	24		
Emer. Stop / Com	25		
Relay 26 Crank	26		
Relay 27 Run	27		
Relay 28	28		
Configurable	29		
Relay 30	30		
Configurable	31		
Relay 32	32		
Configurable	33		
Relay 34	34		
Configurable	35		
Relay 36 MB ON/ Configurable	36		
	37		
	38		
Relay 39 MB OFF/ Configurable	39		
	40		
Relay 41 GB ON	41		
	42		
	43		
Relay 43 GB OFF	44		
	45		

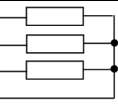
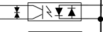
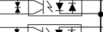
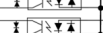
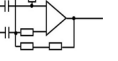
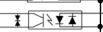
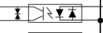
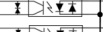
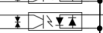
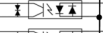
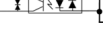
	76	Not used	
	75	Not used	
	74	M Neutral	
	73	Not used	
	72	M L3	Mains Voltage
	71	Not used	
	70	M L2	
	69	Not used	
	68	M L1	
	67	G Neutral	
	66	Not used	
	65	G L3	Generator Voltage
	64	Not used	
	63	G L2	
	62	Not used	
	61	G L1	
	60	S2 Current	
	59	S1 Configurable	
	58	S2 Current L3	
	57	S1	
	56	S2 Current L2	
	55	S1	
	54	S2 Current L1	
	53	S1	



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
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.)



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	+12/24 V DC	12/24 V DC +/-30 %	Power supply
2	0 V DC		
3		Not used	

Plug #2, communication

Term.	Function	Technical data	Description
4	Data+ (A)	RS-485	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	8 A, 30 V DC/250 V AC	Status OK/configurable
17			
18	Relay 18	8 A, 30 V DC/250 V AC	Horn/configurable
19			
20	Relay 20	8 A, 30 V DC/250 V AC	Configurable
21			
22	Not used		Not used
23	Relay 23	8 A, 36 V DC	Configurable With wire break monitoring
24			

Plug #4, E-stop and start

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

Plug #5, relay group 2

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

Plug #6, MB and (B)TB relays

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

Plug #7, multi-inputs

Term.	Function	Technical data	Description
46	Multi-in 1	Input	RMI/4 to 20 mA/Pt100/binary
47	Multi-in 2	Input	RMI/4 to 20 mA/Pt100/binary
48	Multi-in 3	Input	RMI/4 to 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 5 A AC	Current phase L1
54	L1 s2		
55	L2 s1	1 or 5 A AC	Current phase L2
56	L2 s2		
57	L3 s1	1 or 5 A 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	L 1	100 to 690 V AC	Mains line 1 (AGC 244: BB A)
62		Not used	
63	L 2	100 to 690 V AC	Mains line 2 (AGC 244: BB A)
64		Not used	
65	L 3	100 to 690 V 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	L 1	100 to 690 V AC	Busbar line 1 (AGC 244: BB A)
69		Not used	
70	L 2	100 to 690 V AC	Busbar line 2 (AGC 244: BB A)
71		Not used	
72	L 3	100 to 690 V AC	Busbar line 3 (AGC 244: BB A)
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 to 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

5. Wirings

5.1 AC connections

5.1.1 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.

5.1.2 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.

5.1.3 Current transformer ground

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

5.1.4 Voltage measurement fuses

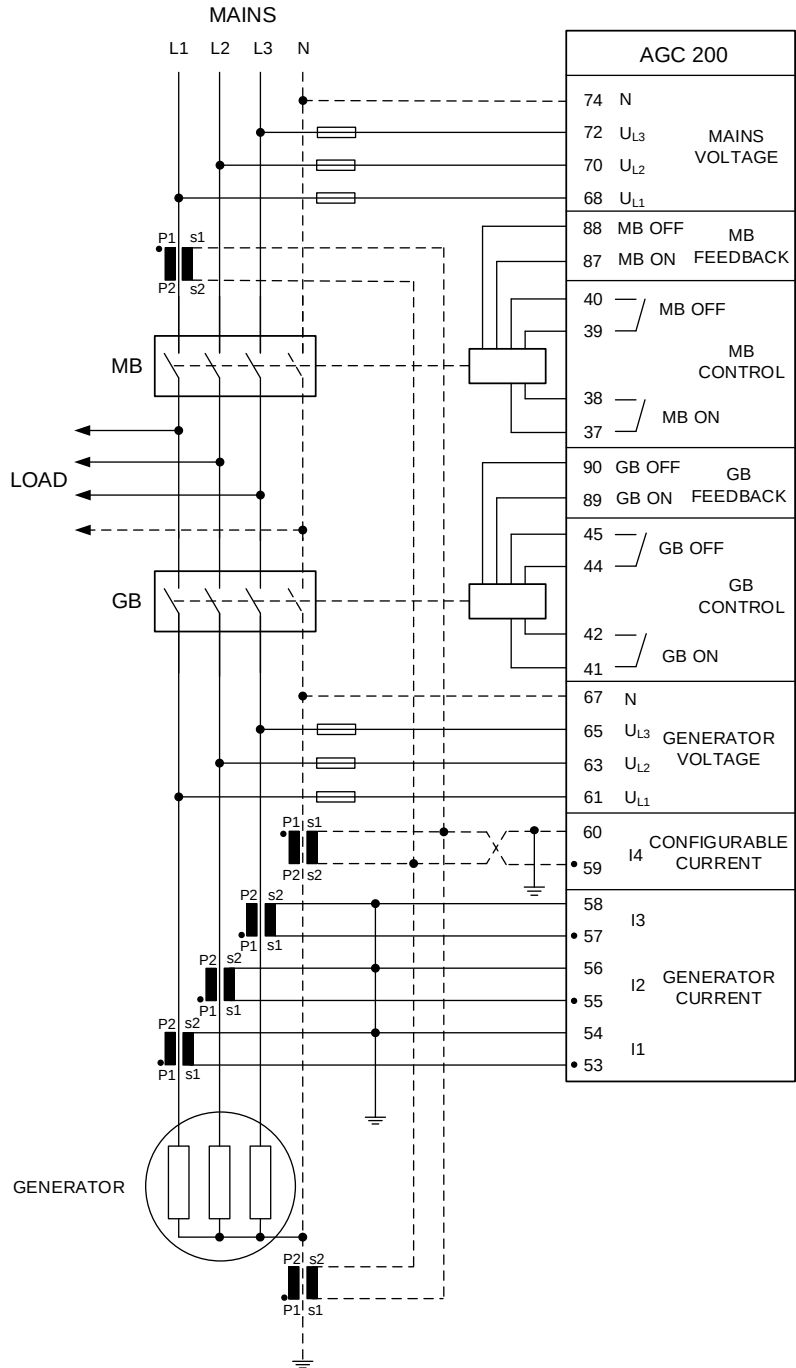
If the wires/cables are protected with fuses, use 2 A slow blow or higher, dependent on the wires/cables being protected.

5.1.5 Breaker wiring

The breaker wiring is an example only.

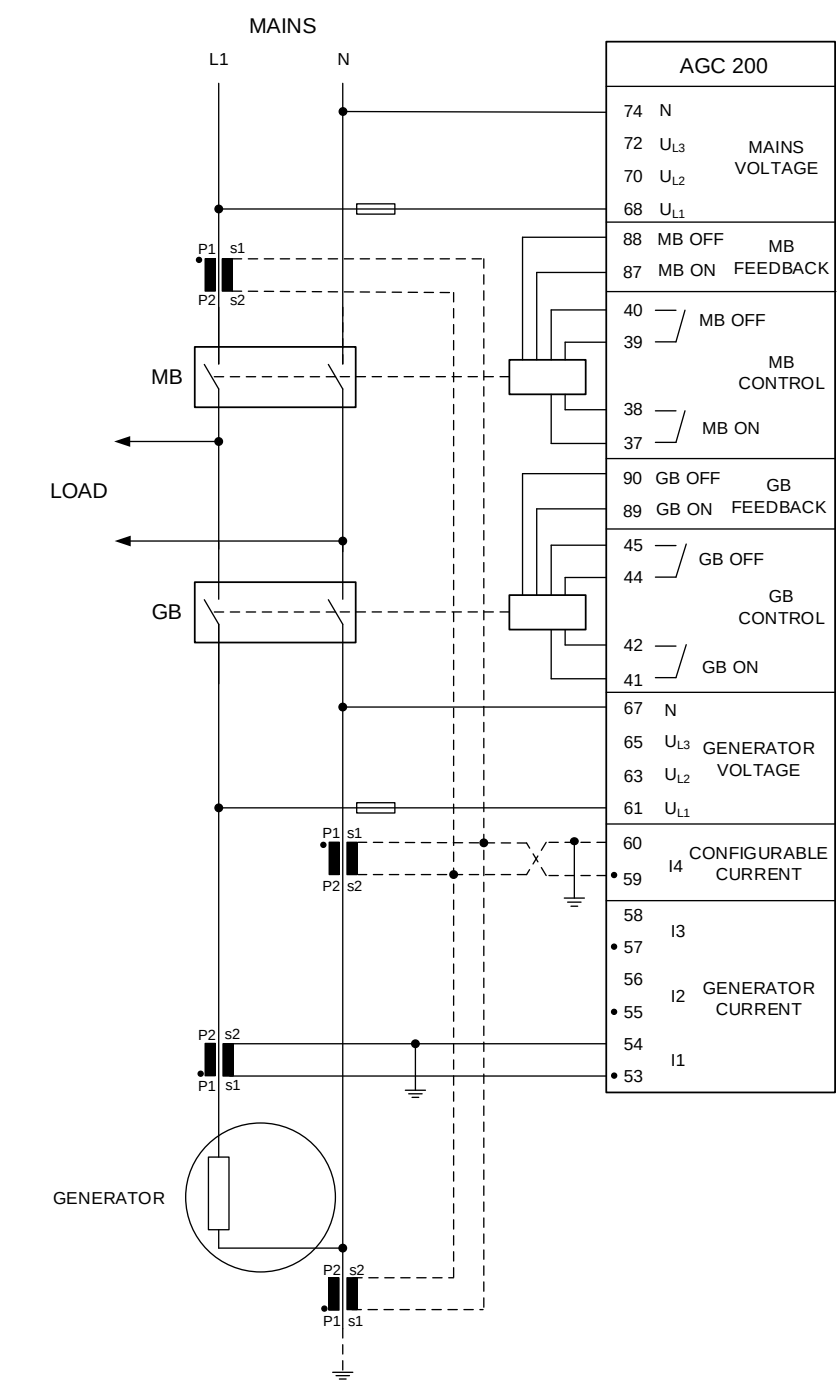
5.1.6 3-phase AGC 213/233/243

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



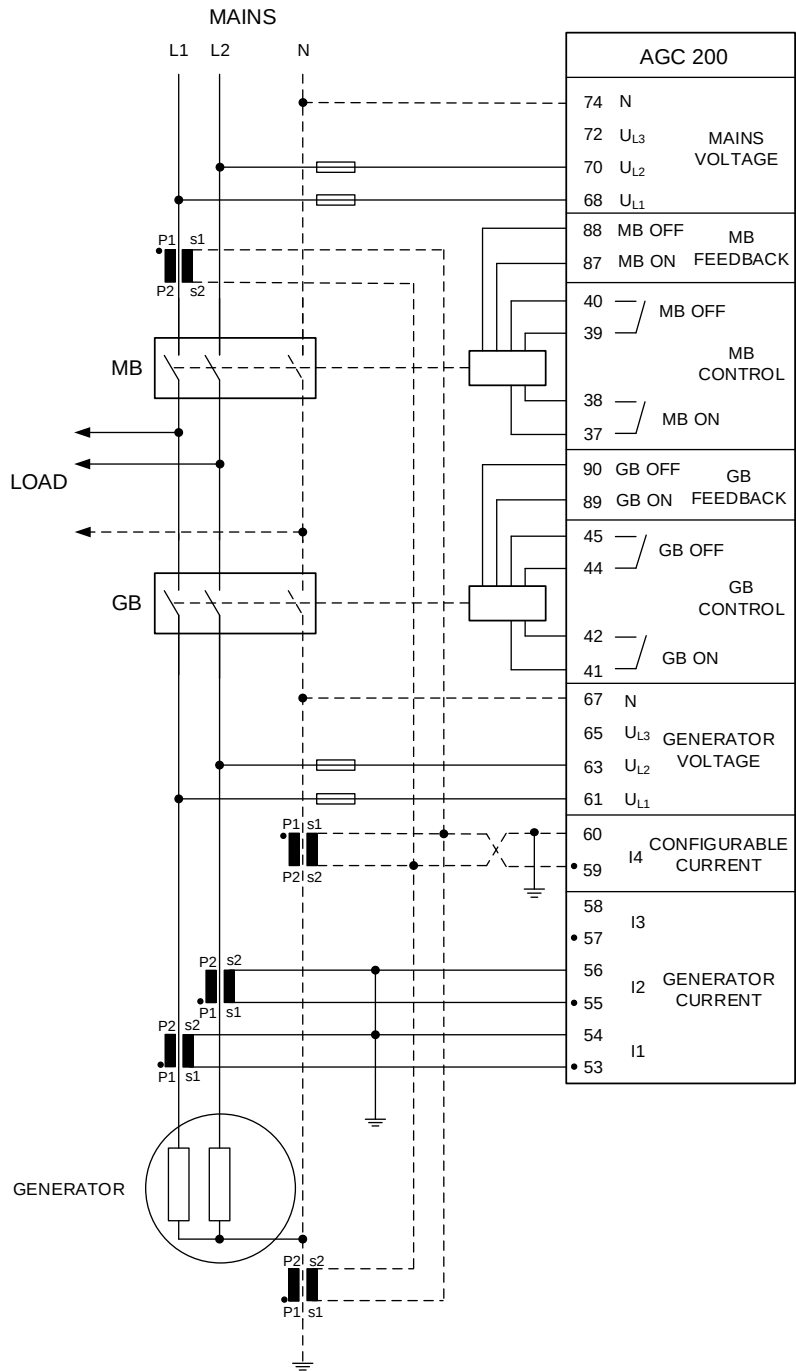
-  **Wiring indicated with dashed line is optional.**
-  **For peak shaving, load takeover and mains power export, the configurable current input can be used to measure phase L1 current.**
-  **The application shown is for pulse breakers.**
-  **Terminals 59 and 60 are not available on AGC 21x and AGC 22x.**
-  **Be aware that the inputs for feedbacks shown above also need a common wire on terminal 91. (Terminal 91 is common for 77 to 90).**

5.1.7 Single phase AGC 213/233/243



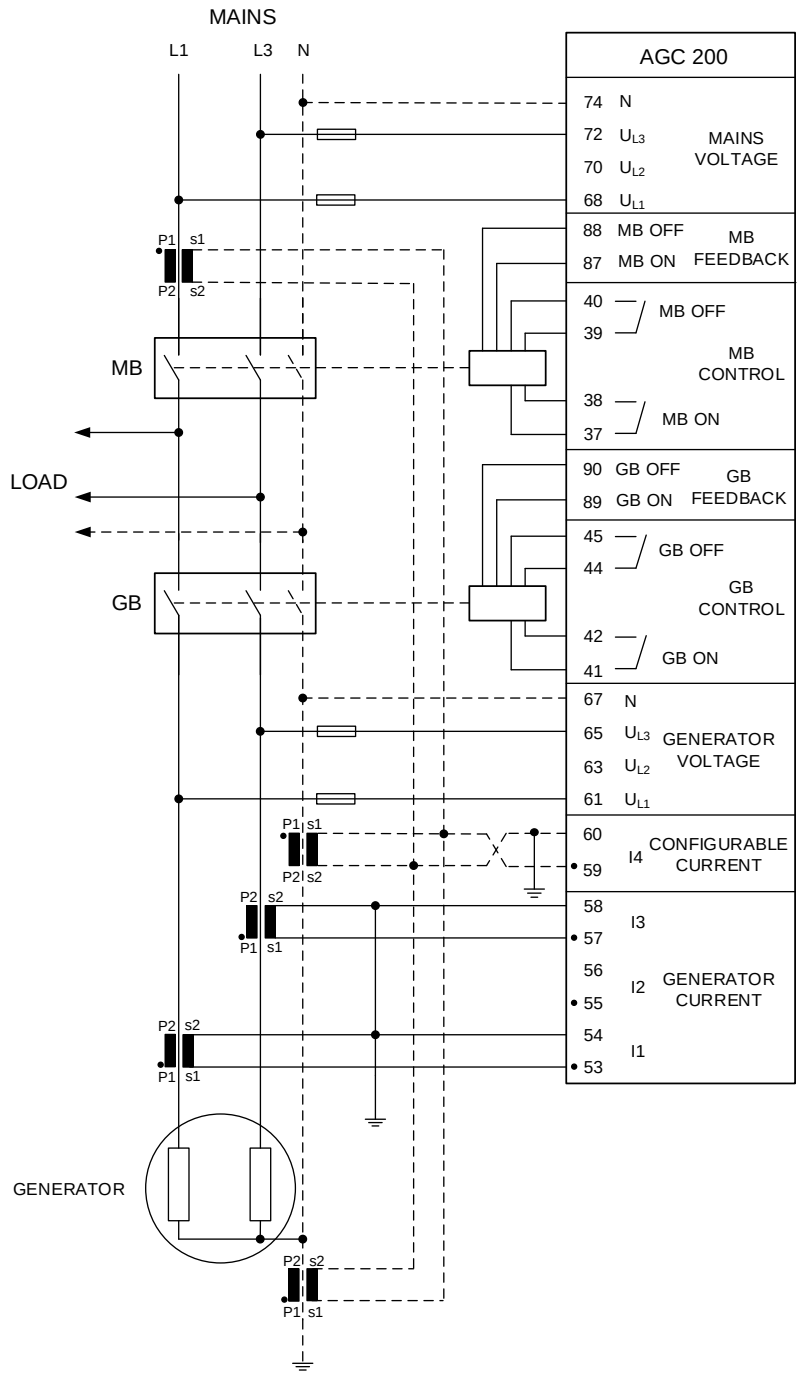
-  **Wiring indicated with dashed line is optional.**
-  **The application shown is for pulse breakers.**
-  **Terminals 59 and 60 are not available on AGC 21x and AGC 22x.**
-  **Be aware that the inputs for feedbacks shown above also need a common wire on terminal 91.
(Terminal 91 is common for 77 to 90).**

5.1.8 2-phase L1L2 AGC 213/233/243



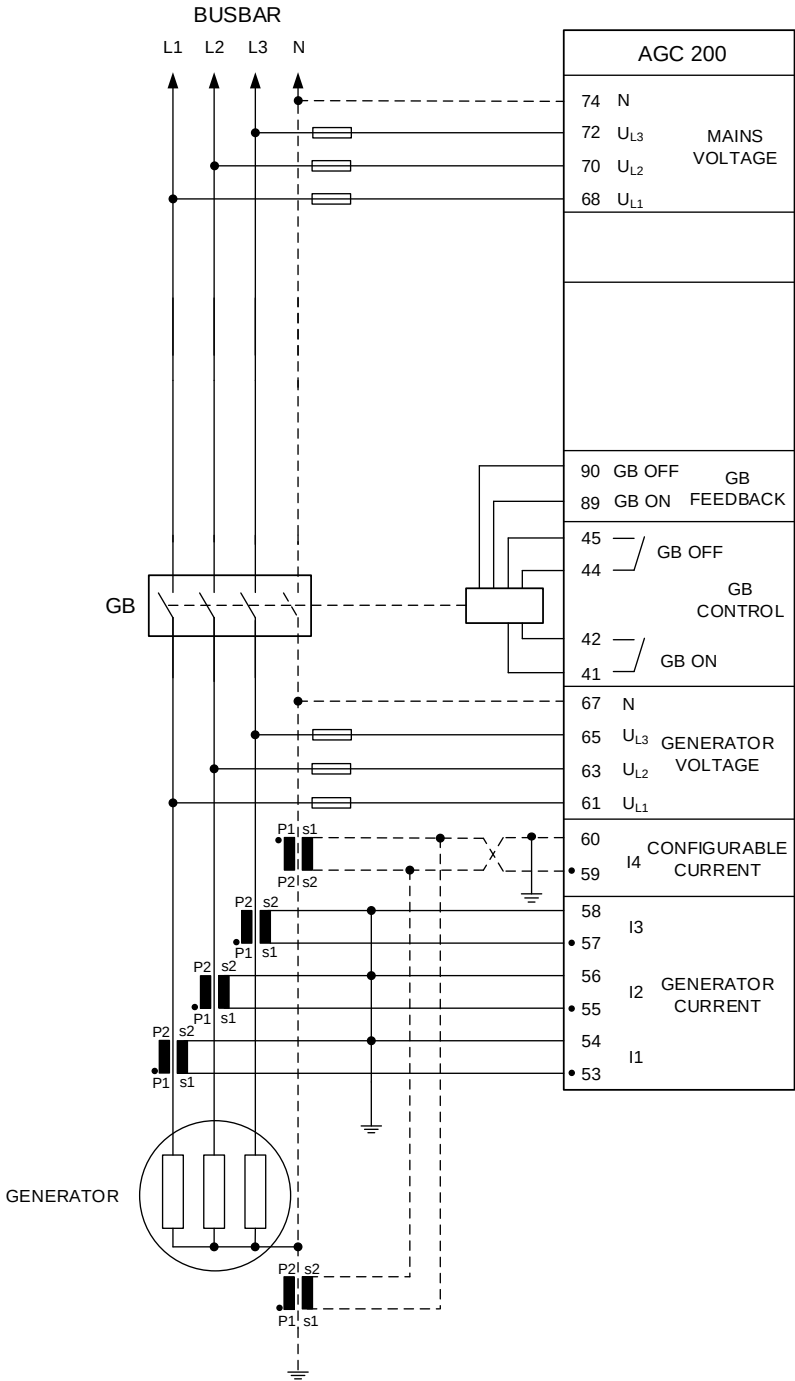
-  **Wiring indicated with dashed line is optional.**
-  **The application shown is for pulse breakers.**
-  **Terminals 59 and 60 are not available on AGC 21x and AGC 22x.**
-  **Be aware that the inputs for feedbacks shown above also need a common wire on terminal 91.
(Terminal 91 is common for 77 to 90).**

5.1.9 2-phase L1L3 (split phase)



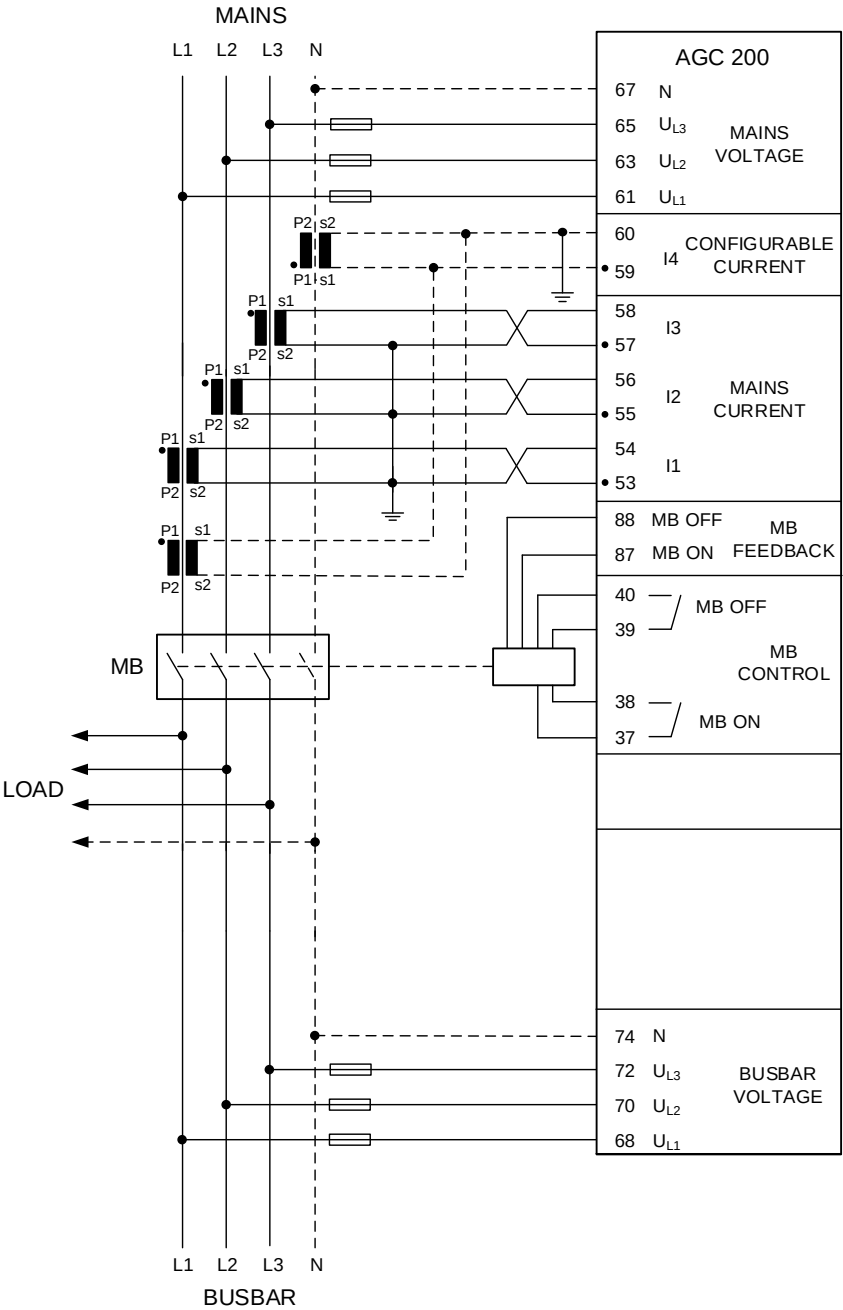
-  Wiring indicated with dashed line is optional.
-  The phase angle between L1 and L3 voltages is 180°.
-  The application shown is for pulse breakers.
-  Terminals 59 and 60 are not available on AGC 21x and AGC 22x.
-  Be aware that the inputs for feedbacks shown above also need a common wire on terminal 91.
(Terminal 91 is common for 77 to 90).

5.1.10 Island mode and power management (AGC 212/222/232/242/243)



-  **Wiring indicated with dashed line is optional.**
-  **1-phase and 2-phase systems are also supported.**
-  **The application shown is for pulse breakers.**
-  **Terminals 59 and 60 are not available on AGC 21x and AGC 22x.**
-  **Be aware that the inputs for feedbacks shown above also need a common wire on terminal 91.
(Terminal 91 is common for 77 to 90).**

5.1.11 Power management mains breaker (AGC 245)



 Wiring indicated with dashed line is optional.



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

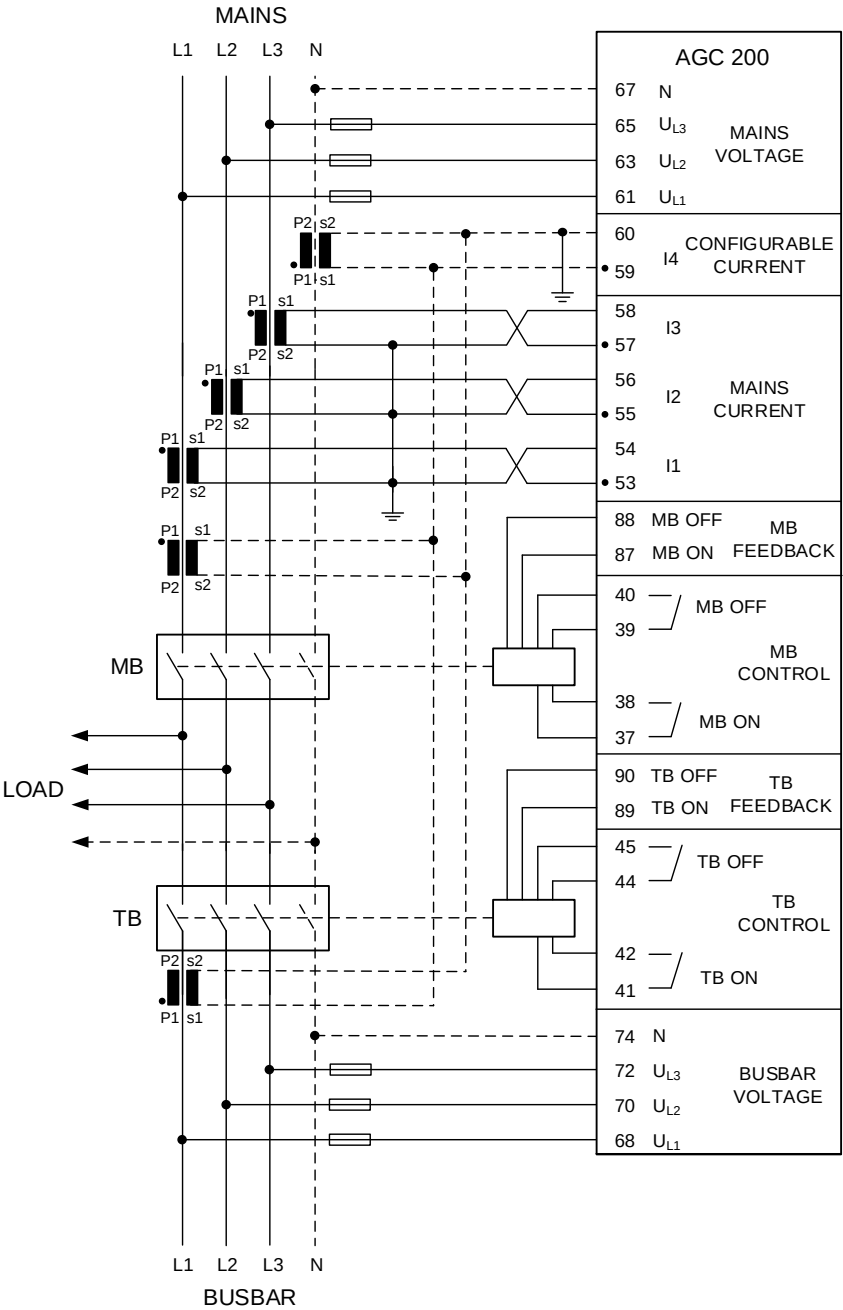


The application shown is for pulse breakers.



**Be aware that the inputs for feedbacks shown above also need a common wire on terminal 91.
(Terminal 91 is common for 77 to 90).**

5.1.12 Power management mains and tie breaker (AGC 246)



 Wiring indicated with dashed line is optional.



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

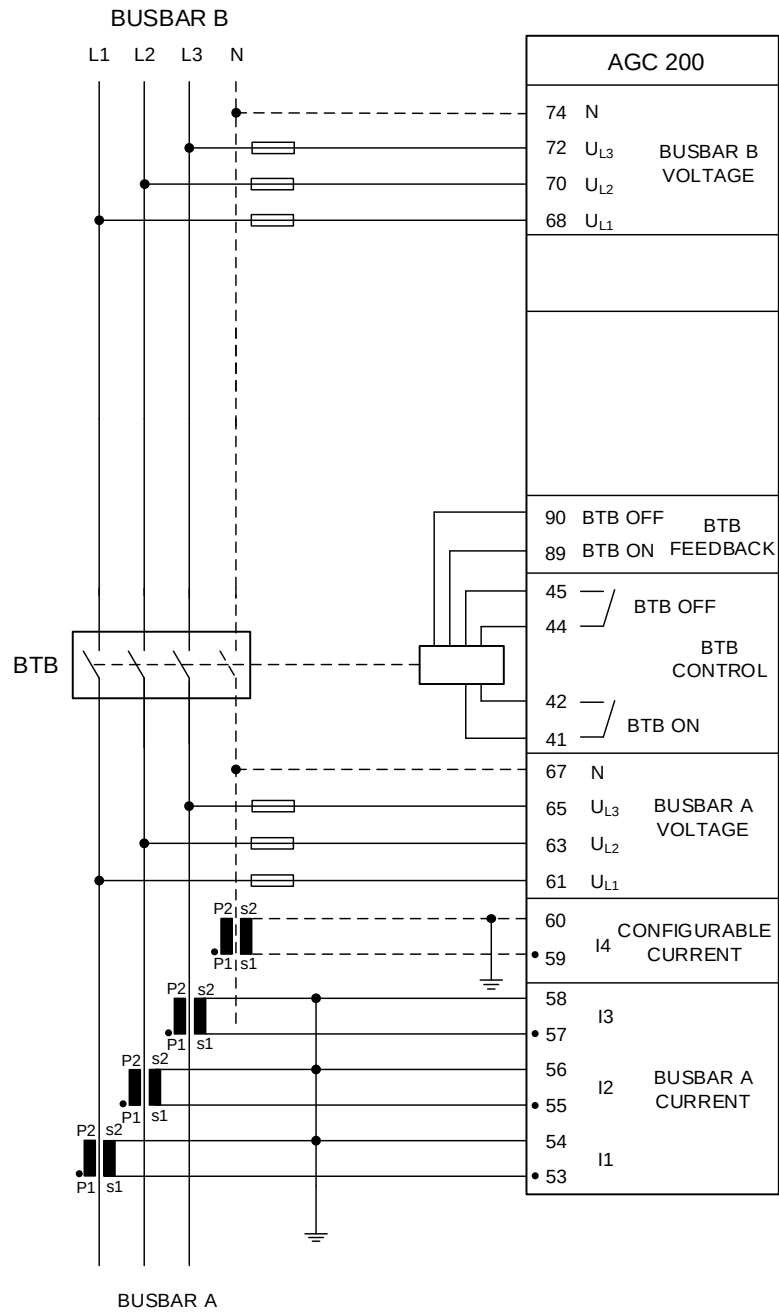


The application shown is for pulse breakers.



**Be aware that the inputs for feedbacks shown above also need a common wire on terminal 91.
(Terminal 91 is common for 77 to 90).**

5.1.13 Power management AGC 244 BTB

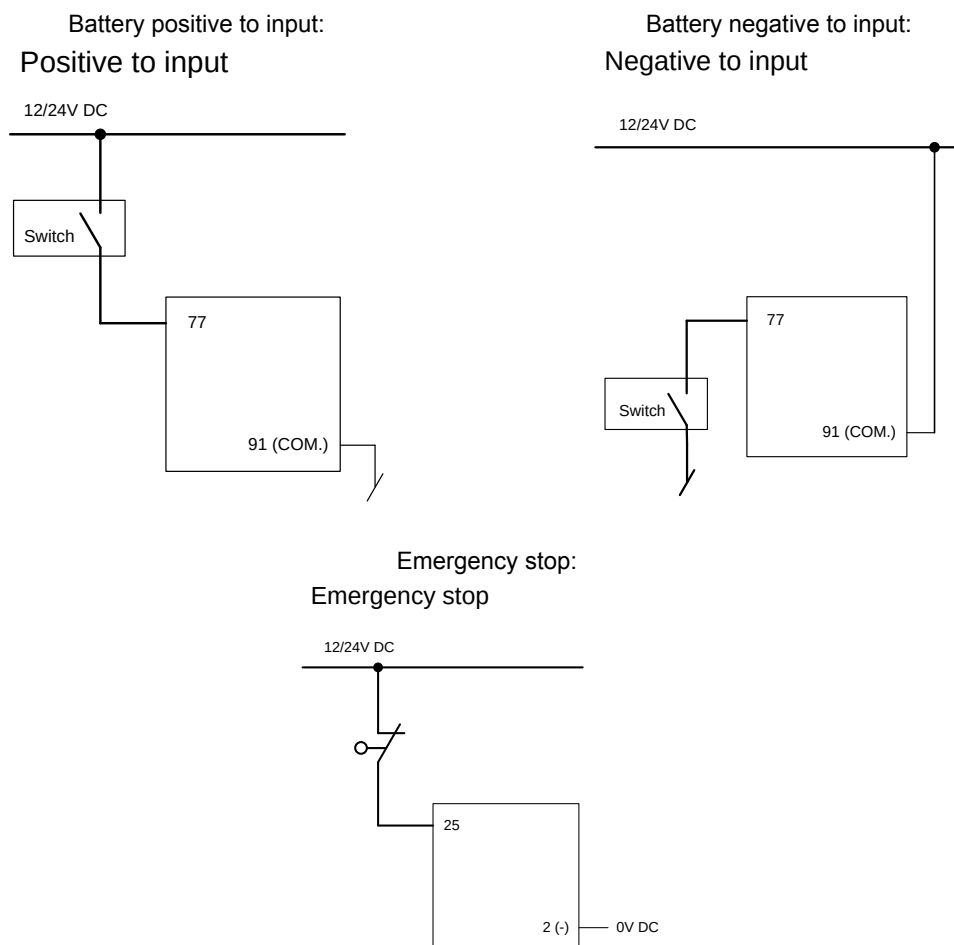


 Wiring indicated with dashed line is optional.

-  1-phase and 2-phase systems are also supported.
-  The application shown is for pulse breakers.
-  Be aware that the inputs for feedbacks shown above also need a common wire on terminal 91. (Terminal 91 is common for 77 to 90).

5.2 DC connections

5.2.1 Digital inputs



5.2.2 Multi-inputs

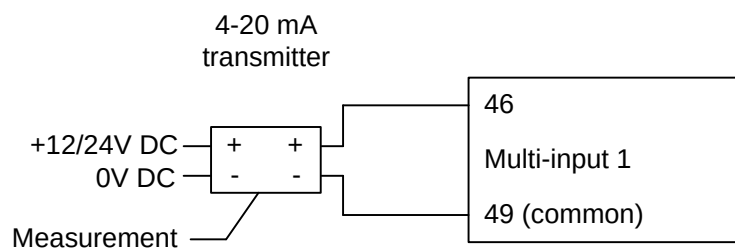
The AGC 200 unit has three multi-inputs, which can be configured to be used as the following input types:

1. 4 to 20 mA
2. Pt100

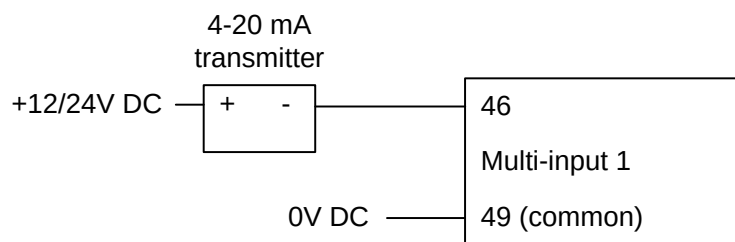
3. RMI oil
4. RMI water
5. RMI fuel
6. Digital

See the following sub-chapters for installation instructions for these input types. For further information regarding multi-inputs, see the "Designer's Reference Handbook".

5.2.3 Active transmitter

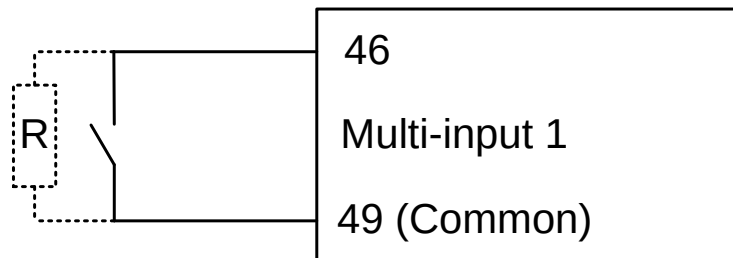


5.2.4 2-wire transmitter



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

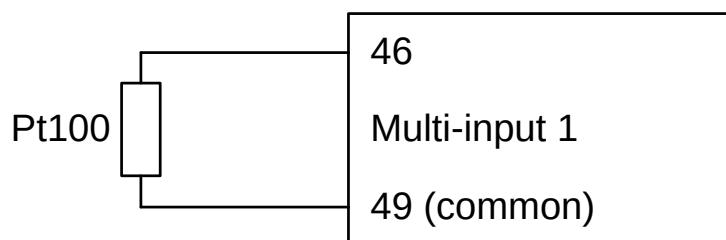
5.2.5 Digital inputs



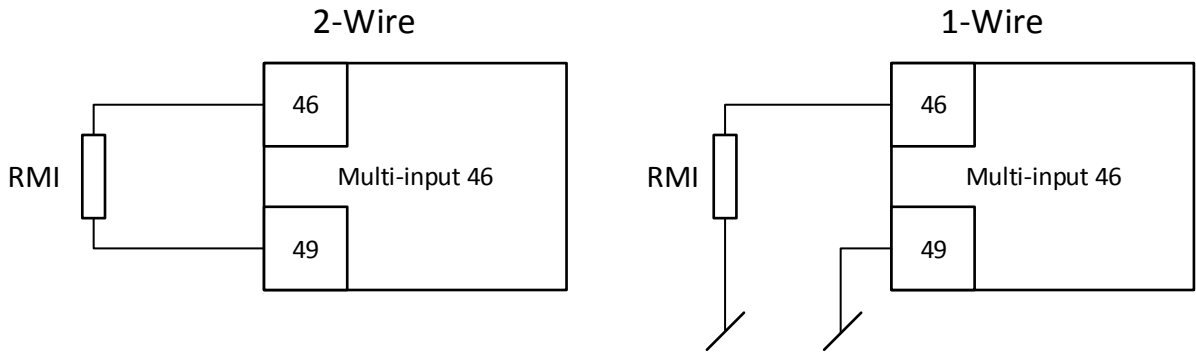
i Wire break monitoring resistor (if needed): $R = 240 \, \Omega$.

5.2.6 Pt100

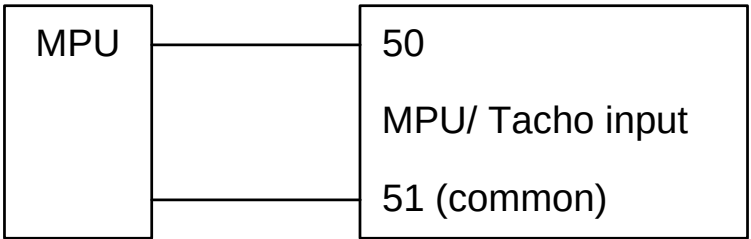
2-wire connections



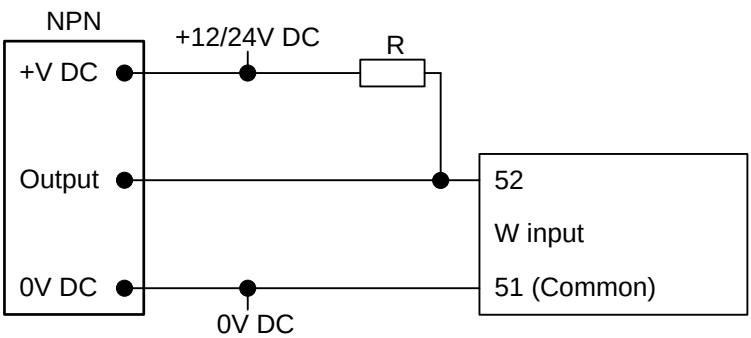
5.2.7 RMI



5.2.8 Magnetic pickup (MPU)

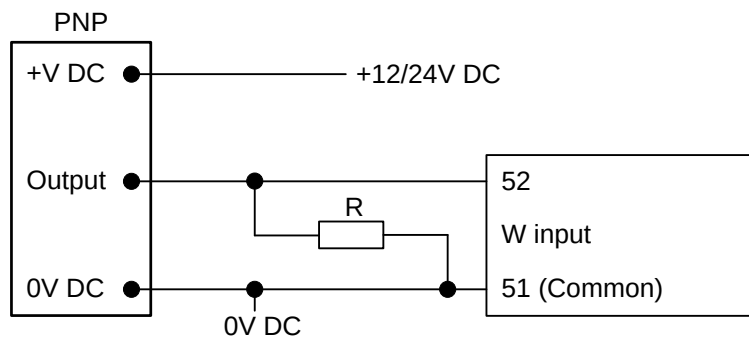


5.2.9 NPN sensor



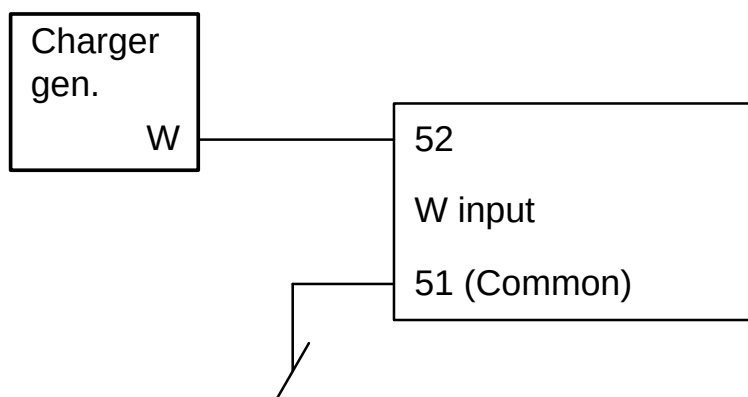
R = 1200Ω@24 V DC, 600Ω@12 V DC

5.2.10 PNP sensor

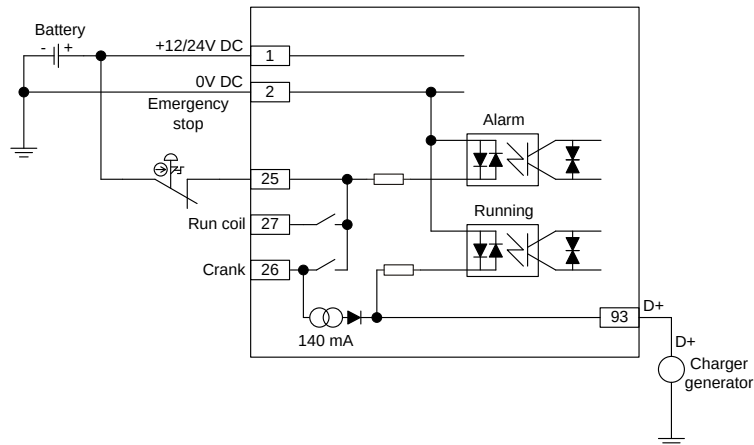


$R = 1200\Omega @ 24\text{ V DC}, 600\Omega @ 12\text{ V DC}$

5.2.11 Charger generator, W input



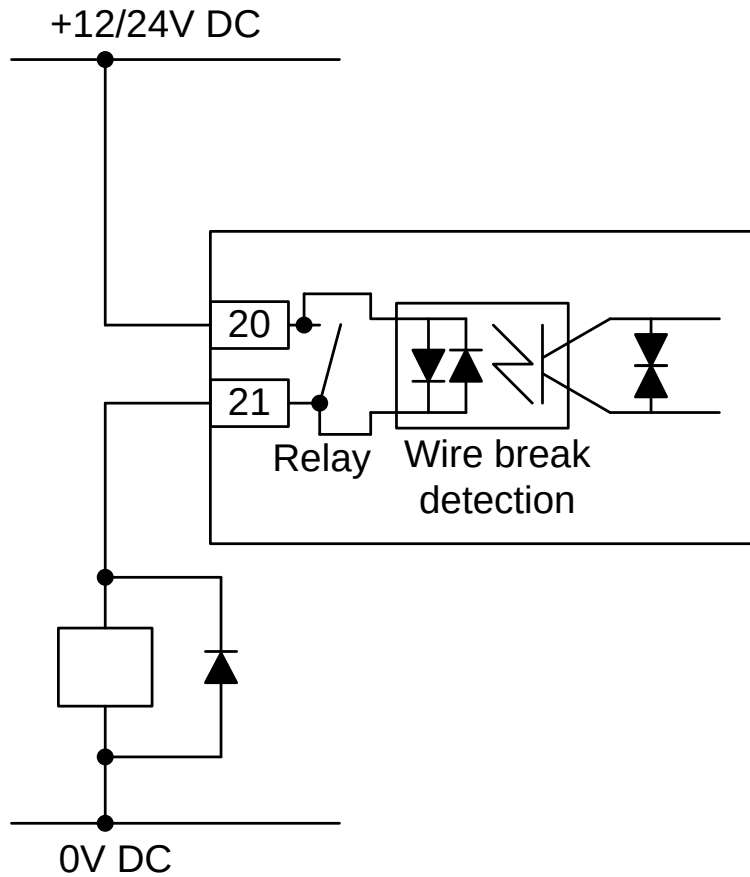
5.2.12 D+ connection, terminal 93



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 12/24 V 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.

5.2.13 Stop coil



Remember to mount the freewheeling diode.



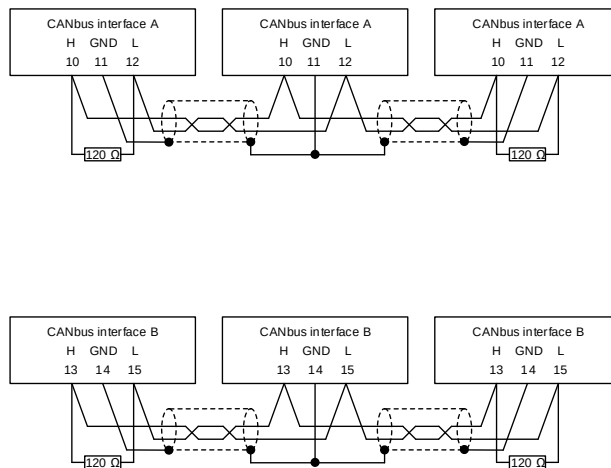
The wire break detection is only active when the output is OFF.

5.3 Communication

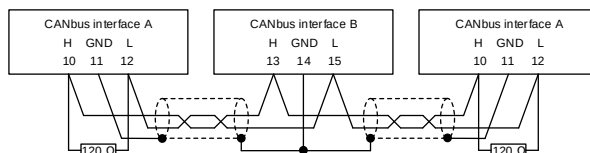
5.3.1 CAN bus

Examples with three AGC 242 units connected.

Until SW version 4.5x.x it is not possible to mix CAN bus wiring interface A and B. It has to be wired separately, as illustrated below.



From SW version 4.5x.x it is possible to mix the CAN wiring between A and B interfaces, if the interfaces that are wired together are configured to use matching protocols (channel 7840). For more information about available configuration of the CAN ports, see chapter "Available CAN ports". Below is an example of mixed CAN A and B.



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

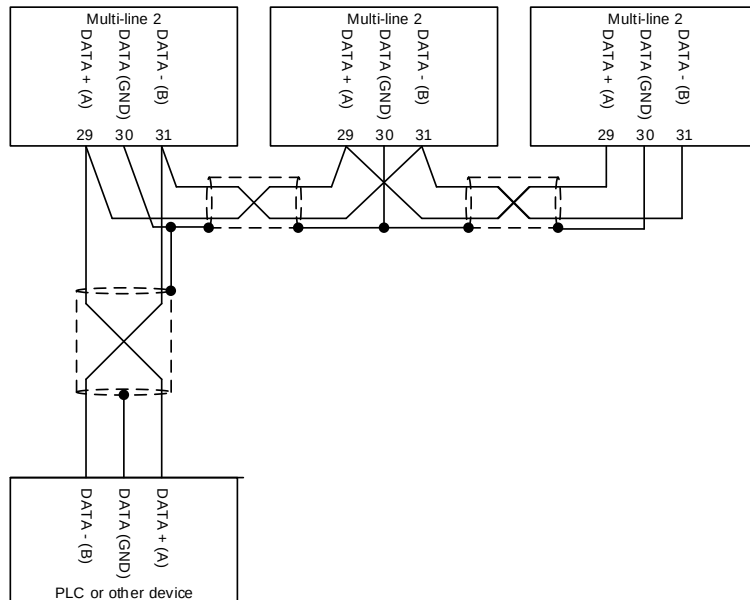


Use shielded twisted cable.



End resistor R = 120 Ohm.

5.3.2 Modbus (option H2)



Connect AGC GND to AGC GND only via cable screen. Shield ends must be insulated with tape or insulation tubing.



The AGC GND terminal connection to cable screen must NOT be connected to 3rd party equipment unless the RS-485 gateway of this equipment is galvanically isolated from the rest. Do not connect cable screen to ground.



Normally, the Modbus does not need end terminating resistors. These are only needed in case of very long lines. If required, use $2 \times 120 \Omega$ 1/4 W resistors; place one resistor at each end of the RS-485 bus.

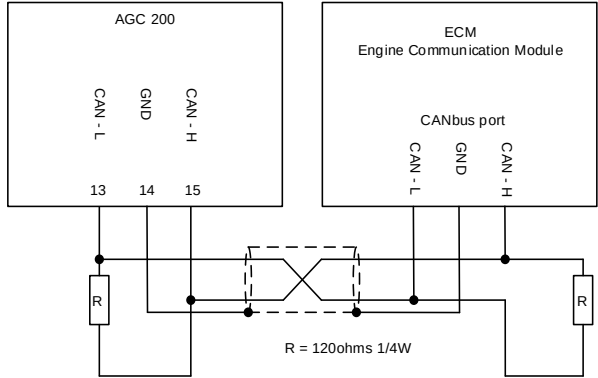


Cable: Belden 3105A or equivalent. 22 AWG (0.6 mm^2) twisted pair, shielded, $<40 \text{ m}\Omega/\text{m}$, min. 95 % shield coverage.



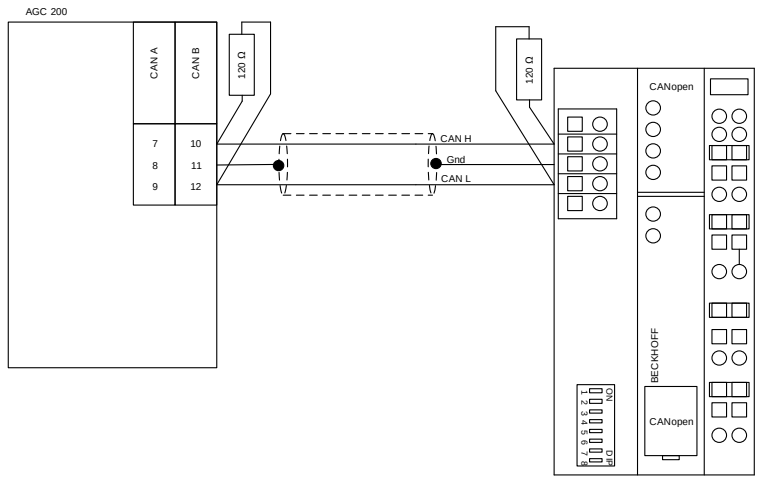
The AGC 200 has a fail-safe biasing function. It has internal 750Ω pull-up and pull-down resistors. Only one set of pull-up and pull-down resistors should be used at a time. Enable in one unit only. The biasing is selected in setting 7513.

5.3.3 CAN bus engine communication

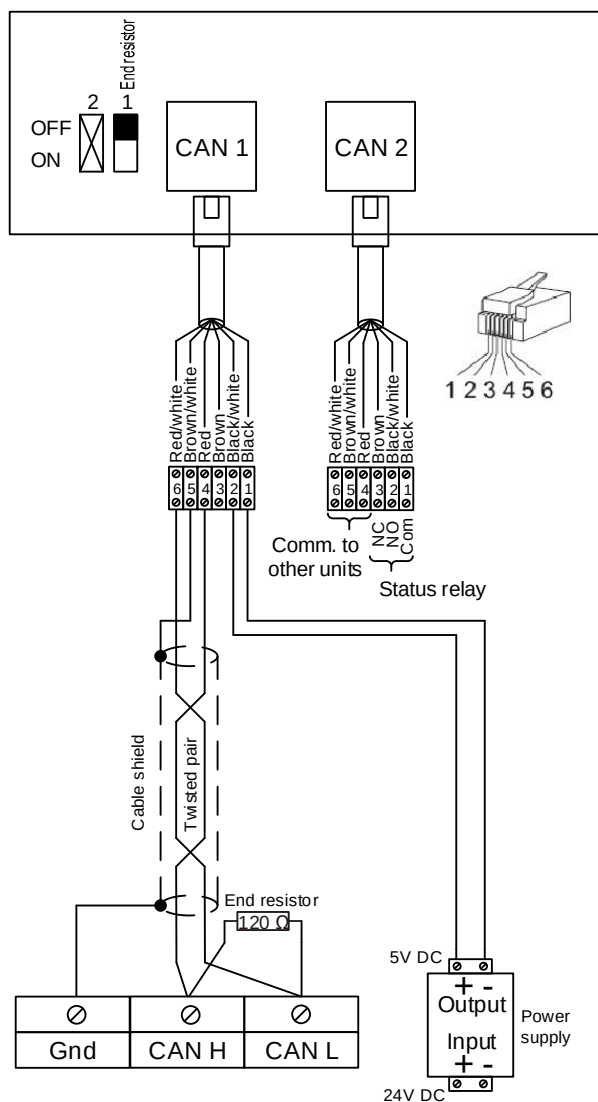


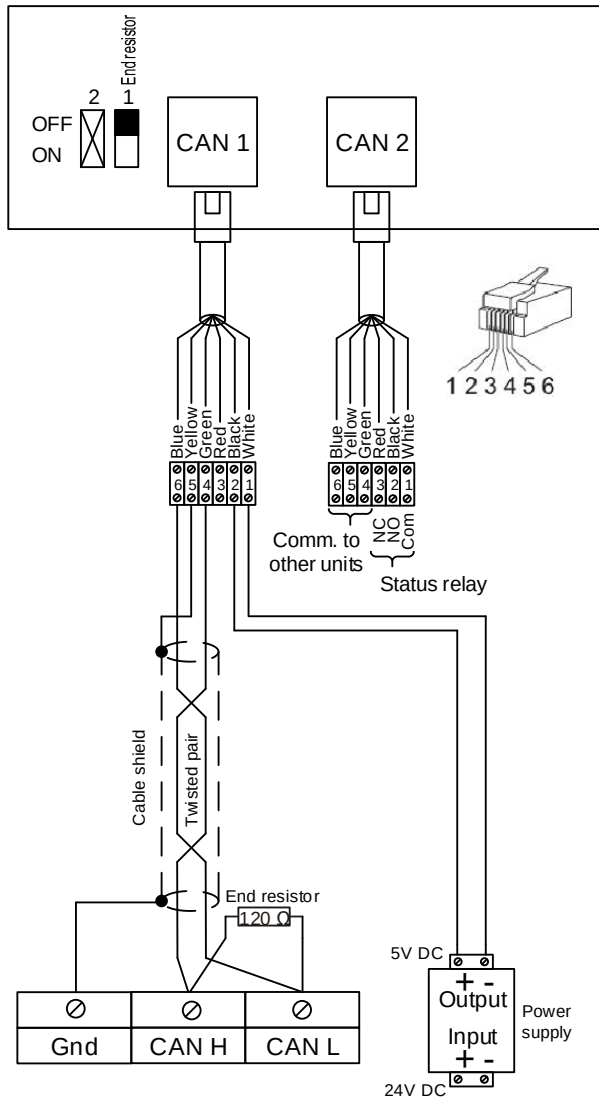
-  Shield ends must be insulated with tape or insulation tubing.
-  Use shielded twisted cable.
-  The terminating resistor at the engine side may not be needed if it is incorporated in the engine controller. See the engine manufacturer's literature.

5.3.4 External I/O module (option H8)



More information on option X4 can be found in "Option X4 Additional Operator Panel AOP-2", document no. 4189340484.





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

6. Technical information

6.1 Technical specifications

Accuracy	Class 1.0 -40 to <u>15 to 30</u> to 70 °C Temperature coefficient: +/-0.2 % of full scale per 10 °C Short circuit: 5 % of 3.5*nominal current Earth current: 2 % of 1 A or 5 A To IEC/EN 60688
Operating temperature	-25 to 70 °C (-13 to 158 °F) UL/cUL Listed: Max. ambient temp. 50 °C/122 °F With option L2: -40 to 70 °C (-40 to 158 °F)
Storage temperature	-40 to 70 °C (-40 to 158 °F)
Climate	97 % RH to IEC 60068-2-30
Operating altitude	Up to 3000 m above sea level
Measuring voltage	100 to 690 V AC (+20 %) UL/cUL Listed: 100 to 600 V AC Phase to phase Load: 1.5 MΩ
Frequency	30 to 70 Hz
Measuring current	1 A or 5 A AC from current transformer Consumption max.: 0.3 VA/phase UL/cUL Listed: Use listed or R/C (XODW2.8) current transformers
Current overload	The unit has been tested with the following currents: I_n 20 A: 60 s I_n 100 A: 10 s I_n 300 A: 1 s

Magnetic pick-up input	Voltage: 2 to 70 V peak Frequency: 10 to 10000 Hz Resistance: 250 to 3000 Ω
Aux. supply	6 to 36 V DC continuously UL/cUL Listed: 9 to 32.5 V DC 0 V DC for 50 ms when coming from at least 12 V DC (cranking dropout) Reverse protection: -36 V continuously Battery voltage measurement accuracy: ± 0.8 V within 8 to 30 V DC at -25 °C to 70 °C ± 0.5 V within 8 to 30 V DC at 20 °C Max. 25 W consumption With option L2 -40 °C (-40 °F) Max. 45 W consumption The aux. supply inputs are to be protected by a 12 A slow-blow fuse
Passive binary input voltage	Bi-directional optocoupler ON: 8 to 36 V DC <2 V: OFF Impedance: 4.7 kΩ
Emergency stop input voltage	ON: +8 to 36 V DC (term. 25) <2 V: OFF Impedance: 4.7 kΩ
Multi-functional inputs	Current input: 0(4) to 20 mA From active transmitter: 0 to 20 mA, +/-1 % Impedance: 50 Ω Binary input: Dry contact inputs 3 V DC internal supply, with cable supervision Max. resistance for ON detection: 100 Ω Pt100: -40 to 250 °C (-40 to 482 °F) +/-1 % To IEC/EN 60751 RMI: 0 to 2500 Ω, +/-1 %

Relay outputs, electrical rating	Relays 16 to 20 and 28 to 43: 250 V AC/30 V DC 8 A UL/cUL Listed: 250 V AC/30 V DC 6 A General use B300 Pilot duty Relay 23: 36 V DC 8 A UL/cUL Listed: 24 V DC 8 A General use Relay 26 and 27: 36 V DC 16 A UL/cUL Listed: 24 V DC 16 A General use
Galvanic separation AGC 222, 232 AGC 242, 243 AGC 244 AGC 245, 246 AGC 212, 213	Between AC voltage and other I/Os: 3250 V AC, 50 Hz, 1 minute Between AC current and other I/Os: 2200 V AC, 50 Hz, 1 minute Between relay outputs and other I/Os: 2200 V AC, 50 Hz, 1 minute Between aux. supply and other I/Os: 550 V AC, 50 Hz, 1 minute. Between binary input groups and other I/Os: 550 V AC, 50 Hz, 1 minute Between analogue input groups and other I/Os: 550 V AC, 50 Hz, 1 minute The same as above, but with no galvanic separation on analogue input groups
Mounting	Panel-mounted
Front size	312 × 219 mm (122.8 × 86.2 in)
Panel cutout	297 × 204 mm (11.69 × 8.03 in) Tolerance: +0.4/-0 mm
Display	240 × 128 pixel backlight STN
Safety	To EN 61010-1, installation category (over-voltage category) III, 600 V, pollution degree 2 To UL508 and CSA22.2 No. 14-05 Installation category (over-voltage category) III, 600 V, pollution degree 2
Protection	Front: IP52/NEMA type 1 (IP66/NEMA type 1 with gasket, option L1) 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 to 13.2 Hz: 2 mm_{pp}. 13.2 to 100 Hz: 0.7 g. To IEC 60068-2-6 and IACS UR E10 10 to 60 Hz: 0.15mm_{pp}. 60 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)
Shock	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
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	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	For further information, see chapter 3 "Mounting"
Approvals	UL/cUL Listed to UL508 UL/cUL Recognized to UL2200
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 minimum)	Busbar: Over-/under-voltage: < 50 ms Over-/under-frequency: < 50 ms Generator: Reverse power: <200 ms Over-current: <200 ms Short circuit: < 40 ms Directional over-current: <100 ms Over-/under-voltage: <200 ms Over-/under-frequency: <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
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	Positive sequence: < 60 ms Time-dependent under-voltage, $U_t < 50$ ms Under-voltage and reactive power low, $U_Q < 250$ ms
UL markings	Wiring: Use 60/75 °C 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)