

AGC-4 Mk II

Genset, Mains, BTB, Group, and Plant controller

Installation instructions



Improve
Tomorrow



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1. General information

1.1 Warnings, legal information and safety

1.1.1 Symbols for hazard statements



DANGER!



This shows dangerous situations.

If the guidelines are not followed, these situations will result in death, serious personal injury, and equipment damage or destruction.



WARNING



This shows potentially dangerous situations.

If the guidelines are not followed, these situations could result in death, serious personal injury, and equipment damage or destruction.



CAUTION



This shows low level risk situation.

If the guidelines are not followed, these situations could result in minor or moderate injury.

NOTICE



This shows an important notice

Make sure to read this information.

1.1.2 Symbols for general notes

NOTE This shows general information.



More information

This shows where you can find more information.



Example

This shows an example.



How to ...

This shows a link to a video for help and guidance.

1.1.3 Legal information and disclaimer

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

NOTE 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.

1.1.4 Safety during installation and operation

When you install and operate the equipment, you may have to work with dangerous currents and voltages. The installation must only be carried out by authorised personnel who understand the risks involved in working with electrical equipment.



DANGER!



Hazardous live currents and voltages

Do not touch any terminals, especially the AC measurement inputs and the relay terminals, as this could lead to injury or death.

1.1.5 UL/cUL Listed

The acceptability of the installation is determined as part of the final assembly.

If field-wired in the end application, you must use a physical barrier between the low voltage and higher voltage wiring connections to make sure that the circuits are separated.

1.1.6 Current transformer danger



DANGER!



Electrical shock and arc flash

Risk of burns and electrical shock from high voltage.

Short all current transformer secondaries before breaking any current transformer connections to the controller.

1.1.7 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.

1.1.8 Factory settings

The controller is delivered pre-programmed from the factory with a set of default settings. These settings are based on typical values and may not be correct for your system. You must therefore check all parameters before using the controller.

1.2 About the installation instructions

1.2.1 General purpose

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

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



CAUTION



Installation errors

Read this document before starting to work with the Multi-line 2 unit and the genset to be controlled. Failure to do this could result in human injury or damage to the equipment.

1.2.2 Intended users

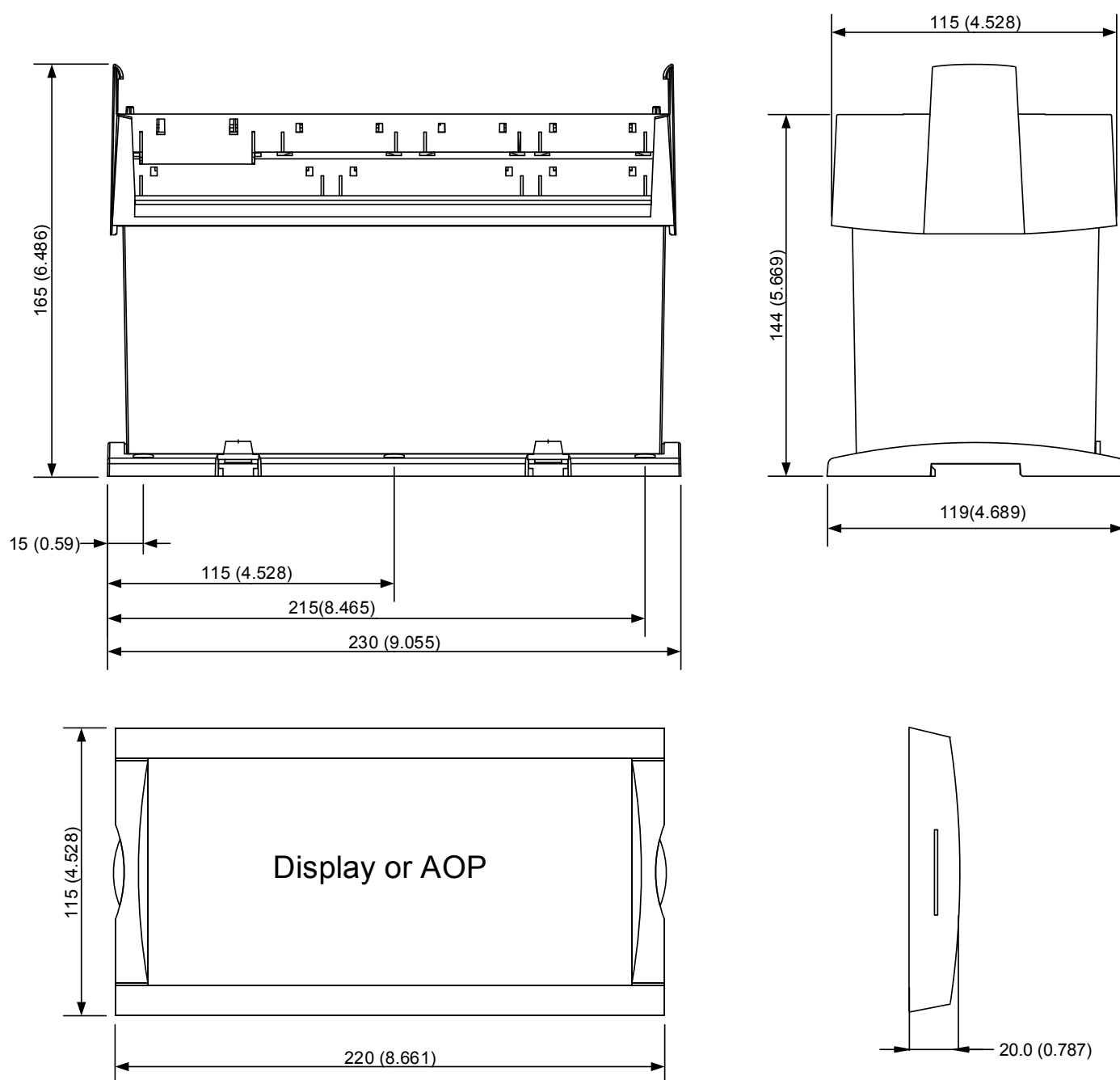
These Installation Instructions are mainly intended for the person responsible for the design and installation. In most cases, this would be a panel builder designer. Naturally, other users might also find useful information in the document.

1.2.3 Drawings

See www.deif.com for the most recent 3D-files, drawings, E-drawings and E-plans.

2. Mounting

2.1 Dimensions



NOTE Dimensions are given in mm (inches).

2.2 Tightening torques

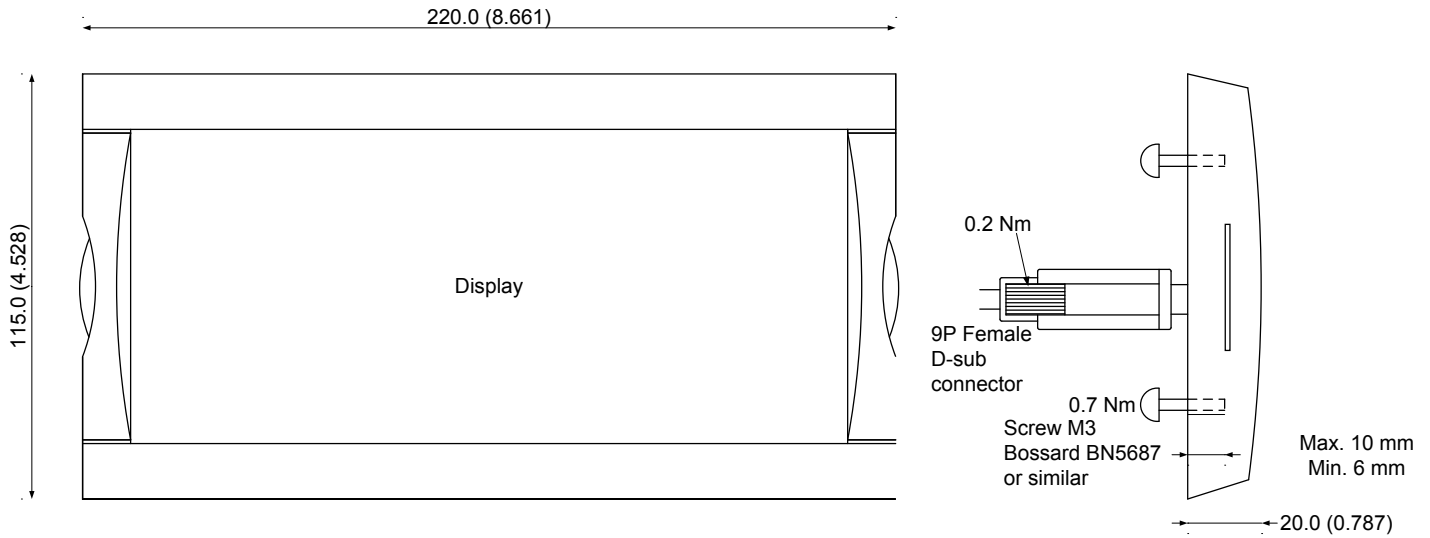
Controller: 1.5 Nm for the six M4 screws (countersunk screws are not to be used)

Plug connections (terminals): 0.5 Nm, 4.4 lb-in

DU-2/AOP-1/AOP-2 (see diagram below)

Panel door mounting: 0.7 Nm, 6.2 lb-in

D-sub screw:	0.2 Nm, 1.8 lb-in
DC-DC converter terminals:	0.5 Nm, 4.4 lb-in



2.3 Mounting of the equipment

The controller is designed for mounting inside the panel. The DU-2 display can be installed on the panel door and connected to the controller with a display cable.

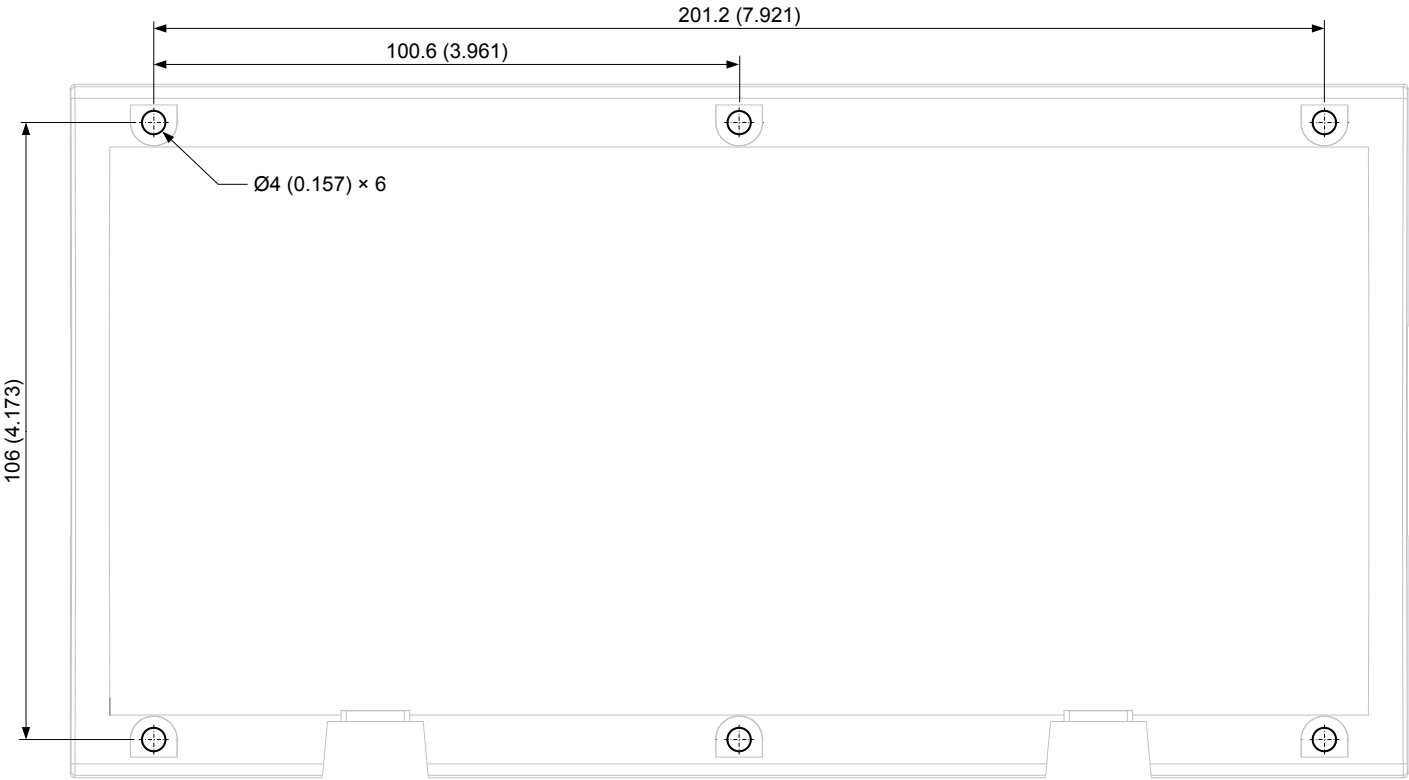
2.3.1 Controller mounting

The controller can be mounted:

1. With screws to the rear side of the cabinet. Six screw holes are available for this.
2. Directly on a DIN rail.

NOTE DEIF recommends using the screw hole fastening.

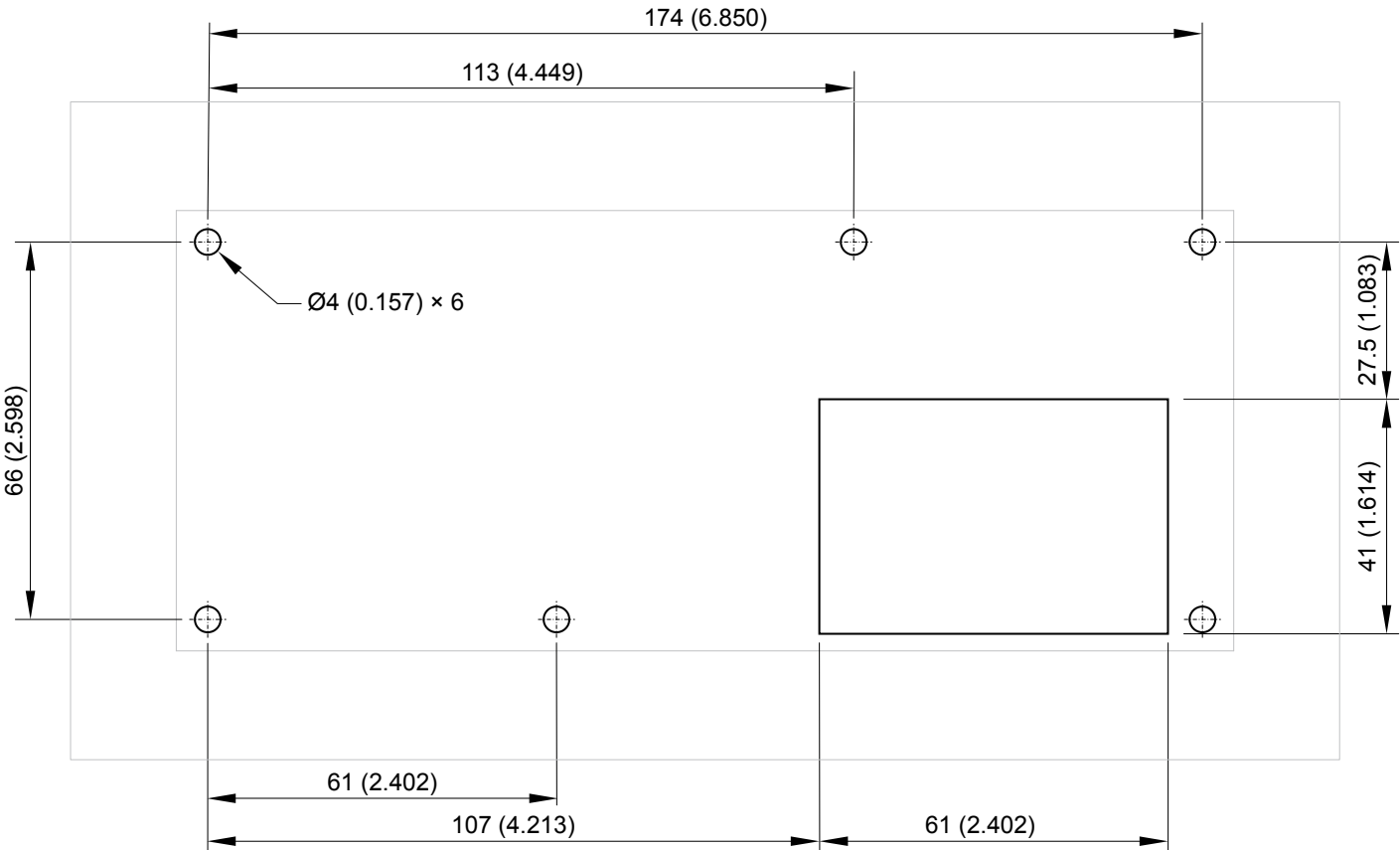
2.3.2 Controller mounting drilling diagram



NOTE Measurements are in mm (inches).

2.3.3 DU-2/AOP display panel cutout

Cut and drill the panel door for the DU-2/AOP according to the diagram below.

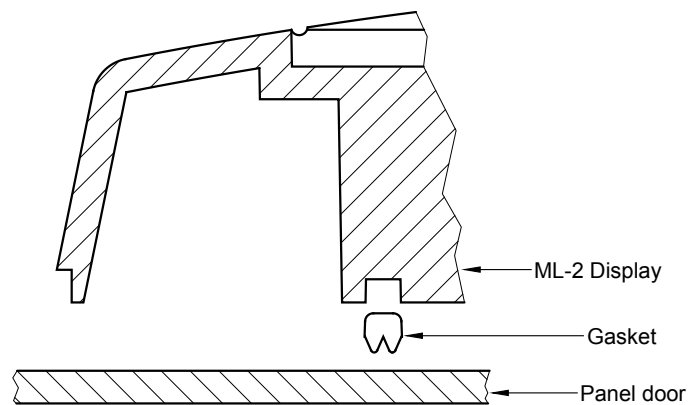


NOTE Dimensions are in mm (inches).

2.3.4 Mounting of DU-2/AOP gasket (option L1)

It is important to mount the gasket correctly to have an IP65 seal. You must use all six DU-2 or AOP screws to ensure IP65.

Mount the gasket as shown below.



3. Hardware

3.1 Board slot positions

The controller housing is divided into board slot positions. This means that the controller consists of a number of printed circuit boards (PCB) mounted in numbered slots. The green terminal blocks are then mounted in the PCBs. Some of these board slots are standard and some are intended for options. The board slot positions are arranged as shown below.

NOTE Only the controller hardware options are included in the table. The software options are listed in the PC utility software, and can also be seen in the data sheet.

Slot type	Hardware option	Slot 1	Slot 3	Slot 5	Slot 7
Terminals		1-28	37-64	73-89	98-124, A1-A3, B1-B3
Power supply	Standard	●			
AC measurements	Standard			●	
Engine interface	Standard/M4				●
Power management (software option G5)	Standard				●
I/O extension/load sharing*	M12		●		

Slot type	Hardware option	Slot 2	Slot 4	Slot 6	Slot 8
Terminals		29-36	65-72	90-97	126-133
Analogue transducer outputs	F1			●	
Combination outputs	EF5/EF6		●		
Serial communication	H2/H3/H9	●			
Engine communication	H6/H13				●
CAN bus communication for: Engine communication, DVC, external I/O, CANshare, PMS lite, and/or extended power management**	H12.2/H12.8***	●			●
I/O extension cards	M13.2/M14.2	●			
I/O extension cards	M13.6/M14.6/M15.6/M16.6			●	
I/O extension cards	M13.8/M14.8/M15.8/M16.8				●

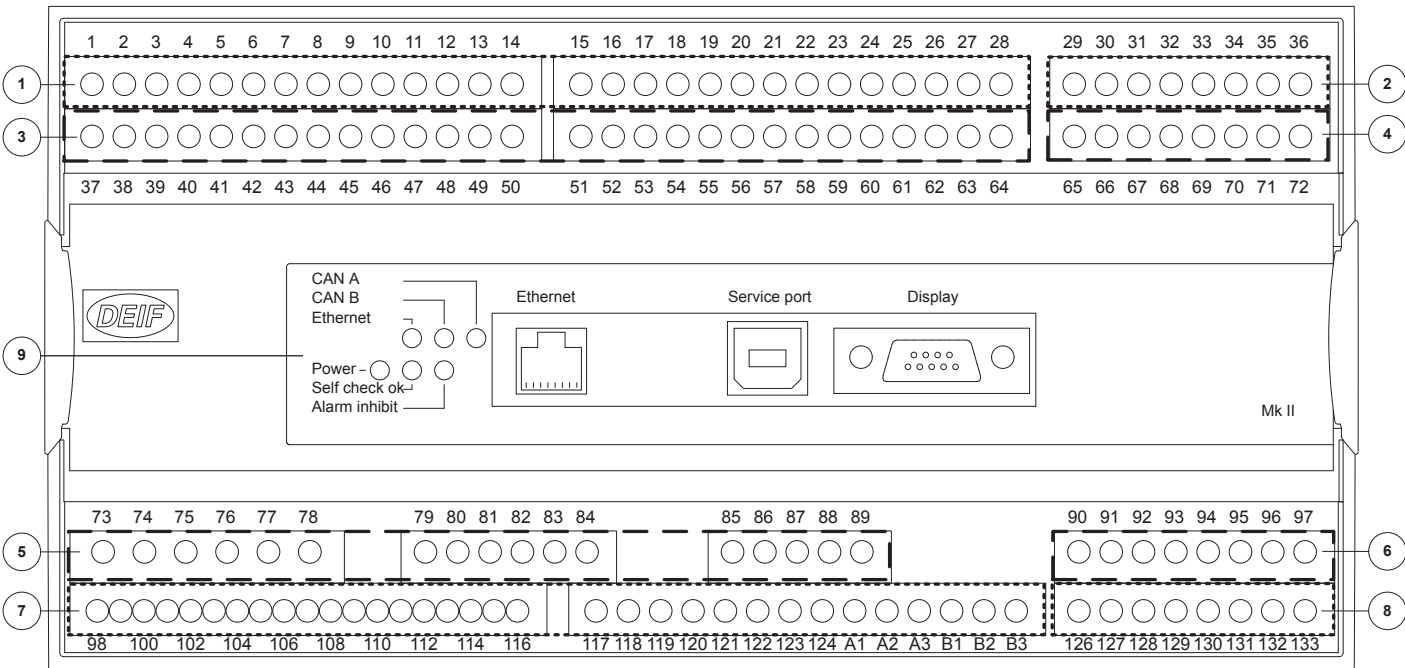
NOTE * Analogue load sharing (option G3) is standard when option M12 is installed.

NOTE ** The CIOs and IOMs can be connected in series with the engine control unit (ECU) or DVC communication on the CAN line. The group controller uses H12.2 or H12.8 for extended power management CAN communication.

NOTE *** Select either H12.2 or H12.8 (not both).

3.2 Controller top side overview

An overview of the terminals is presented below. The slot positions are as follows:

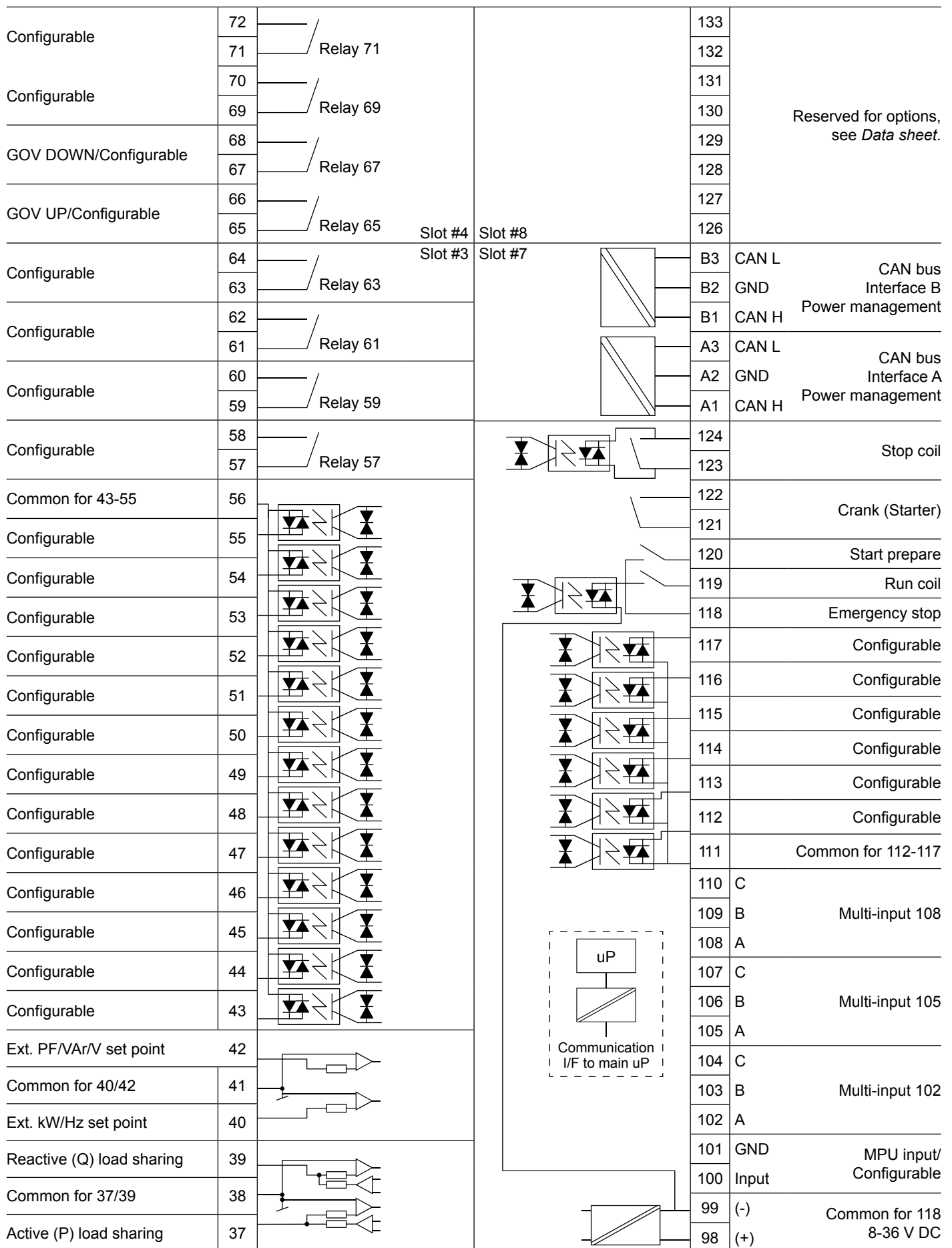


① These numbers are the slot numbers.

Slot	Terminals	Function
1	1-28	Power supply (standard)
2	29-36	Communication and I/O extensions
3	37-64	In-/outputs/load sharing
4	65-72	Governor, AVR, in-/outputs (standard)
5	73-89	AC measuring (standard)
6	90-97	In-/outputs
7	98-124, A1-A3, B1-B3	Engine I/F (standard)
8	126-133	Engine communication, in-/outputs
9	-	Interfaces and LEDs

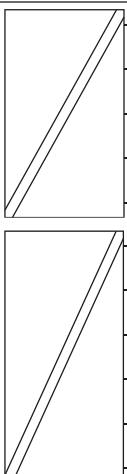
3.3.1 Genset controller

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NOTE The hardware shown in slot #3 is option M12. For details, see the option manual.

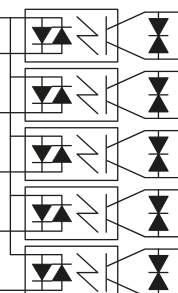
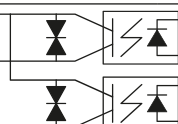
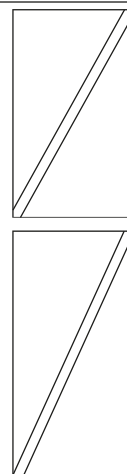
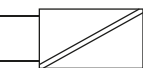
3.3.2 Mains controller

Reserved for options, see <i>Data sheet</i> .	36				97	Reserved for options, see <i>Data sheet</i> .			
	35				96				
	34				95				
	33				94				
	32				93				
	31				92				
	30				91				
	29						Slot #2	Slot #6	90
Common for 23-27	28		Slot #1	Slot #5					
TB Closed/Configurable	27								
TB Open/Configurable	26								
MB Closed/Configurable	25								
MB Open/Configurable	24								
Configurable	23								
Common for 20/21	22								
kVArh pulse/Relay 21	21								
kWh pulse/Relay 20	20								
Close Tie Breaker/ Configurable	19		Relay 17		89	L3	BUSBAR VOLTAGE		
	18				88	Neutral			
	17				87	L2			
Open Tie Breaker/ Configurable	16		Relay 14		86				
	15				85	L1			
	14								
Close Mains Breaker/ Configurable	13		Relay 11		84	Neutral	MAINS VOLTAGE		
	12				83	L3			
	11				82				
Open Mains Breaker/ Configurable	10		Relay 08		81	L2			
	9				80				
	8								
Alarm horn/ Configurable	7		Relay 05		79	L1			
	6				78	S2 (I)		L3 AC current	
	5				77	S1 (k)	L3 AC current		
Status relay	4		Status relay		76	S2 (I)	L2 AC current		
	3				75	S1 (k)	L2 AC current		
DC power supply 8-36 V DC	(-)	2					74	S2 (I)	L1 AC current
	(+)	1					73	S1 (k)	L1 AC current

Configurable	72		Slot #4	Slot #8		133	Reserved for options, see <i>Data sheet</i> .			
	71					132				
Configurable	70					131				
	69					130				
Configurable	68					129				
	67					128				
Configurable	66					127				
	65					126				
Configurable	64		Slot #3	Slot #7		B3	CAN bus Interface A Power management			
	63					B2				
Configurable	62					B1				
	61					A3	CAN bus Interface B Power management			
Configurable	60					A2				
	59					A1				
Configurable	58					124	Not used			
	57					123				
Common for 43-55	56					122	Not used			
Configurable	55					121				
Configurable	54					120	Not used			
Configurable	53					119				
Configurable	52					118	Emergency stop			
Configurable	51					117				
Configurable	50					116	Configurable			
Configurable	49					115				
Configurable	48					114	Configurable			
Configurable	47					113				
Configurable	46					112	Configurable			
Configurable	45					111				
Configurable	44					110	Multi-input 3			
Configurable	43					109				
Ext. PF/VAr/V set point	42					108				
Common for 40/42	41					107	Multi-input 2			
Ext. kW/Hz set point	40					106				
Not used	39					105				
	38					104	Multi-input 1			
	37					103				
Not used						102				
						101	Not used			
Not used						100				
						99	Common for 118 8-36 V DC			
						98				

NOTE The hardware shown in slot #3 is option M12. For details, see the option manual.

3.3.3 BTB controller

Reserved for options, see <i>Data sheet</i> .	36				97	Reserved for options, see <i>Data sheet</i> .		
	35				96			
	34				95			
	33				94			
	32				93			
	31				92			
	30				91			
	29				90			
Common for 23-27	28		Slot #2 Slot #1	Slot #6 Slot #5				
BTB Closed/Configurable	27							
BTB Open/Configurable	26							
Configurable	25							
Configurable	24							
Configurable	23							
Common for 20/21	22							
kVArh pulse/Relay 21	21							
kWh pulse/Relay 20	20							
Close Bus Tie Breaker/ Configurable	19		Relay 17		89	L3	BUSBAR B VOLTAGE	
	18				88	Neutral		
	17				87	L2		
Open Bus Tie Breaker/ Configurable	16		Relay 14		86			
	15				85	L1	BUSBAR A VOLTAGE	
	14				84	Neutral		
Configurable	13		Relay 11		83	L3		
	12				82			
	11				81	L2		
Configurable	10		Relay 08		80			
	9				79	L1		
	8							
Alarm horn/ Configurable	7		Relay 05		78	S2 (I)	L3 AC current	
	6				77	S1 (k)	L3 AC current	
	5							
Status relay	4		Status relay		76	S2 (I)	L2 AC current	
	3				75	S1 (k)	L2 AC current	
DC power supply 8-36 V DC	(-)	2				74	S2 (I)	L1 AC current
	(+)	1				73	S1 (k)	L1 AC current

Configurable	72		Relay 71			133	Reserved for options, see <i>Data sheet</i> .		
	71					132			
Configurable	70		Relay 69			131			
	69					130			
Configurable	68		Relay 67			129			
	67					128			
Configurable	66		Relay 65	Slot #4	Slot #8	127			
	65					126			
Configurable	64		Relay 63	Slot #3	Slot #7	B3	CAN bus Interface B Power management		
	63					B2			
Configurable	62		Relay 61			B1			
	61					A3	CAN bus Interface A Power management		
Configurable	60		Relay 59			A2			
	59					A1			
Configurable	58		Relay 57			124	Not used		
	57					123			
Common for 43-55	56					122	Not used		
Configurable	55					121			
Configurable	54					120	Not used		
Configurable	53					119			
Configurable	52					118	Emergency stop		
Configurable	51					117			
Configurable	50					116	Configurable		
Configurable	49					115			
Configurable	48					114	Configurable		
Configurable	47					113			
Configurable	46					112	Configurable		
Configurable	45					111			
Configurable	44					110	Common for 112-117		
Configurable	43					109			
Not used	42					108			
Not used	41					107	Multi-input 3		
	40					106			
Not used	39					105			
	38					104	Multi-input 2		
Not used	37					103			
						102			
Not used						101	Multi-input 1		
						100			
Not used						99			
						98	Common for 118 8-36 V DC		

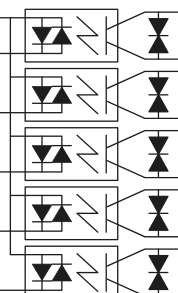
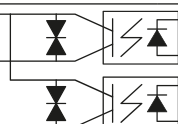
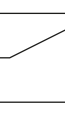
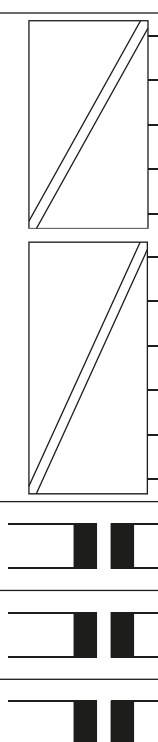
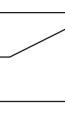
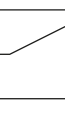
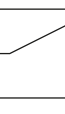
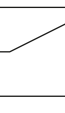
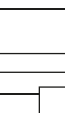
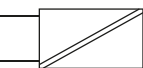
NOTE The hardware shown in slot #3 is option M12. For details, see the option manual.

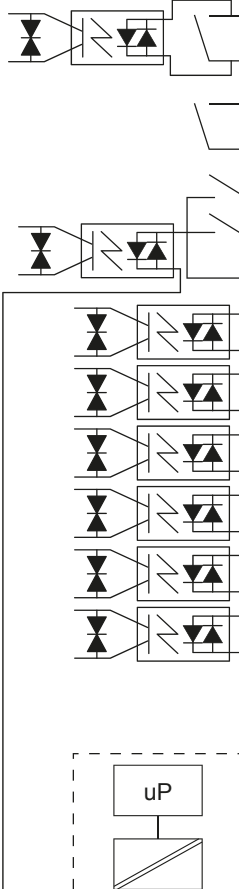
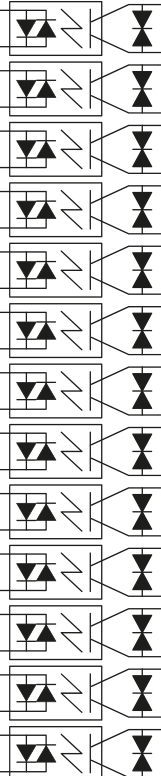
3.3.4 Group controller

3-level application communication to Group/Plant	Not used	36				97	Reserved for options, see <i>Data sheet</i> .
	Not used	35				96	
	CAN L	34				95	
	GND	33				94	
	CAN H	32				93	
	CAN L	31				92	
	GND	30				91	
	CAN H	29		Slot #2	Slot #6	90	
Common for 23-27		28		Slot #1	Slot #5		
TB Closed		27					
TB Open		26					
Configurable		25					
Configurable		24					
Configurable		23					
Common for 20/21		22					
kVArh pulse/Relay 21		21					
kWh pulse/Relay 20		20					
Close Tie Breaker (sync.)		19		Relay 17			GENERATOR BUSBAR VOLTAGE
		18					
		17					
Open Tie Breaker		16		Relay 14			GROUP BUSBAR VOLTAGE
		15					
		14					
Configurable		13		Relay 11			GENERATOR BUSBAR VOLTAGE
		12					
		11					
Configurable		10		Relay 08			GROUP BUSBAR VOLTAGE
		9					
		8					
Alarm horn/ Configurable		7		Relay 05			GENERATOR BUSBAR VOLTAGE
		6					
		5					
Status relay		4		Status relay			GENERATOR BUSBAR VOLTAGE
		3					
DC power supply 8-36 V DC	(-)	2					GENERATOR BUSBAR VOLTAGE
	(+)	1					
						78	S2 (I) L3 AC current
						77	S1 (k) L3 AC current
						76	S2 (I) L2 AC current
						75	S1 (k) L2 AC current
						74	S2 (I) L1 AC current
						73	S1 (k) L1 AC current

Reserved for options, see <i>Data sheet</i> .	72		Slot #4 Slot #3	Slot #8 Slot #7		133	Reserved for options, see <i>Data sheet</i> .
	71					132	
	70					131	
	69					130	
	68					129	
	67					128	
	66					127	
	65					126	
Configurable	64				B3	CAN L	CAN bus Interface B Power management
	63			B2	GND		
	62			B1	CAN H		
Configurable	61				A3	CAN L	CAN bus Interface A Power management
	60			A2	GND		
	59			A1	CAN H		
Configurable	58				124		Not used
	57				123		
Common for 43-55	56				122		Not used
Configurable	55				121		
Configurable	54				120		Not used
Configurable	53				119		
Configurable	52				118		Not used
Configurable	51				117		
Configurable	50				116		Configurable
Configurable	49				115		
Configurable	48				114		Configurable
Configurable	47				113		
Configurable	46				112		Configurable
Configurable	45				111		
Configurable	44				110		C
Configurable	43				109		
Ext. PF set point	42				108		A
Common for 40/42	41				107		
Ext. kW set point	40				106		B
Not used	39				105		
Not used	38		104		C		
Not used	37		103			B	
			102		A		
			101			Not used	
			100		Not used		
			99			(-)	
			98		(+)		

3.3.5 Plant controller

Reserved for options, see <i>Data sheet</i> .	36				97	Reserved for options, see <i>Data sheet</i> .		
	35				96			
	34				95			
	33				94			
	32				93			
	31				92			
	30				91			
	29				90			
Common for 23-27	28		Slot #2 Slot #1	Slot #6 Slot #5				
Configurable	27							
Configurable	26							
MB Closed	25							
MB Open	24							
Configurable	23							
Common for 20/21	22							
kVArh pulse/Relay 21	21							
kWh pulse/Relay 20	20							
Configurable	19		Relay 17		89	L3	GROUP BUSBAR VOLTAGE	
	18				88	Neutral		
	17				87	L2		
Configurable	16		Relay 14		86			
	15				85	L1		
	14							
Close Mains Breaker (sync.)	13		Relay 11		84	Neutral	MAINS VOLTAGE	
	12				83	L3		
	11				82			
Open Mains Breaker	10		Relay 08		81	L2		
	9				80			
	8				79	L1		
Alarm horn/ Configurable	7		Relay 05		78	S2 (I)	L3 AC current	
	6				77	S1 (k)	L3 AC current	
	5							
Status relay	4		Status relay		76	S2 (I)	L2 AC current	
	3				75	S1 (k)	L2 AC current	
DC power supply 8-36 V DC	(-)	2				74	S2 (I)	L1 AC current
	(+)	1				73	S1 (k)	L1 AC current

Reserved for options, see <i>Data sheet</i> .	72		Slot #4 Slot #3	Slot #8 Slot #7		133	Reserved for options, see <i>Data sheet</i> .
	71				132		
	70				131		
	69				130		
	68				129		
	67				128		
	66				127		
	65				126		
Configurable	64				B3	CAN L	CAN bus Interface B Power management
	63			B2	GND		
Configurable	62				B1	CAN H	CAN bus Interface A Power management
	61			A3	CAN L		
Configurable	60				A2	GND	
	59			A1	CAN H		
Configurable	58				124	Not used	
	57			123			
Common for 43-55	56				122	Not used	
Configurable	55			121			
Configurable	54			120	Not used		
Configurable	53			119	Not used		
Configurable	52			118	Not used		
Configurable	51			117	Configurable		
Configurable	50			116	Configurable		
Configurable	49			115	Configurable		
Configurable	48			114	Configurable		
Configurable	47			113	Configurable		
Configurable	46			112	Configurable		
Configurable	45			111	Common for 112-117		
Configurable	44			110	Multi-input 108		
Configurable	43			109			
Ext. PF set point	42			108			
Common for 40/42	41		107				
Ext. kW set point	40		106	Multi-input 105			
Not used	39	105					
Not used	38	104	Multi-input 102				
Not used	37	103					
		102	Not used				
		101					
		100	Not used				
		99					
		98	Common for 118 8-36 V DC				

3.4 Input/output lists

The I/O lists use these abbreviations for the relay outputs:

NO: Normally Open

NC: Normally Closed

NE: Normally Energised

ND: Normally De-energised

Com.: Common terminal

3.5 Slot 1

3.5.1 Power supply - Genset controller

Term.	Function	Technical data	Description
1	+12/24 V DC	12/24 V DC	Power supply
2	0 V DC	+/-30 %	
3	NO	Status relay	Normally open relay, processor/power supply status supervision
4	Com.	24 V DC/1 A	
5	NO	Relay 05 250 V AC/8 A	Central alarm HORN/configurable
6	Com.		
7	NC		
8	NO	Relay 08 250 V AC/8 A	Open mains breaker/configurable
9	Com.		
10	NC		
11	NO	Relay 11 250 V AC/8 A	Close mains breaker (synchronising)/configurable
12	Com.		
13	NC		
14	NO	Relay 14 250 V AC/8 A	Open generator breaker
15	Com.		
16	NC		
17	NO	Relay 17 250 V AC/8 A	Close generator breaker (synchronising)
18	Com.		
19	NC		
20	Open collector 1	Transistor output/Relay 20 36 V DC, 10 mA	Pulse output 1, kWh counter/configurable
21	Open collector 2	Transistor output/Relay 21 36 V DC, 10 mA	Pulse output 2, kvarh counter/configurable
22	Com.	Common	Common terminal for terminals 20 and 21
23	Digital input 23	Optocoupler	Configurable
24	Digital input 24	Optocoupler	Mains breaker open/configurable
25	Digital input 25	Optocoupler	Mains breaker closed/configurable
26	Digital input 26	Optocoupler	Generator breaker open
27	Digital input 27	Optocoupler	Generator breaker closed
28	Com.	Common	Common for terminals 23 to 27

3.5.2 Power supply - Mains controller

Term.	Function	Technical data	Description
1	+12/24 V DC	12/24 V DC	Power supply
2	0 V DC	+/-30 %	
3	NO	Status relay	Normally open relay, processor/power supply status supervision
4	Com.	24 V DC/1 A	

Term.	Function	Technical data	Description
5	NO	Relay 05 250 V AC/8 A	Central alarm HORN/configurable
6	Com.		
7	NC		
8	NO	Relay 08 250V AC/8 A	Open mains breaker/configurable
9	Com.		
10	NC		
11	NO	Relay 11 250 V AC/8 A	Close mains breaker (synchronising)/configurable
12	Com.		
13	NC		
14	NO	Relay 14 250 V AC/8 A	Open tie breaker/configurable
15	Com.		
16	NC		
17	NO	Relay 17 250 V AC/8 A	Close tie breaker (synchronising)/configurable
18	Com.		
19	NC		
20	Open collector 1	Transistor output/Relay 20 36 V DC, 10 mA	Pulse output 1, kWh counter/configurable
21	Open collector 2	Transistor output/Relay 21 36 V DC, 10 mA	Pulse output 2, kvarh counter/configurable
22	Com.	Common	Common terminal for terminals 20 and 21
23	Digital input 23	Optocoupler	Configurable
24	Digital input 24	Optocoupler	Mains breaker open/configurable
25	Digital input 25	Optocoupler	Mains breaker closed/configurable
26	Digital input 26	Optocoupler	Tie breaker open/configurable
27	Digital input 27	Optocoupler	Tie breaker closed/configurable
28	Com.	Common	Common for terminals 23 to 27

3.5.3 Power supply - BTB controller

Term.	Function	Technical data	Description
1	+12/24 V DC	12/24 V DC +/-30 %	Power supply
2	0 V DC		
3	NO	Status relay 24 V DC/1 A	Normally open relay, processor/power supply status supervision
4	Com.		
5	NO	Relay 05 250 V AC/8 A	Central alarm HORN/configurable
6	Com.		
7	NC		
8	NO	Relay 08 250 V AC/8 A	Configurable
9	Com.		
10	NC		

Term.	Function	Technical data	Description
11	NO	Relay 11 250 V AC/8 A	Configurable
12	Com.		
13	NC		
14	NO	Relay 14 250 V AC/8 A	Open bus tie breaker
15	Com.		
16	NC		
17	NO	Relay 17 250 V AC/8 A	Close bus tie breaker (synchronising)
18	Com.		
19	NC		
20	Open collector 1	Transistor output/Relay 20 36 V DC, 10 mA	Configurable
21	Open collector 2	Transistor output/Relay 21 36 V DC, 10 mA	Configurable
22	Com.	Common	Common terminal for terminals 20 and 21
23	Digital input 23	Optocoupler	Configurable
24	Digital input 24	Optocoupler	Configurable
25	Digital input 25	Optocoupler	Configurable
26	Digital input 26	Optocoupler	Configurable
27	Digital input 27	Optocoupler	Configurable
28	Com.	Common	Common for terminals 23 to 27

3.5.4 Power supply - Group controller

Term.	Function	Technical data	Description
1	+12/24 V DC	12/24 V DC +/-30 %	Power supply
2	0 V DC		
3	NO	Status relay 24 V DC/1 A	Normally open relay, processor/power supply status supervision
4	Com.		
5	NO	Relay 05 250 V AC/8 A	Central alarm HORN/configurable
6	Com.		
7	NC		
8	NO	Relay 08 250 V AC/8 A	Configurable
9	Com.		
10	NC		
11	NO	Relay 11 250 V AC/8 A	Configurable
12	Com.		
13	NC		
14	NO	Relay 14 250 V AC/8 A	Open tie breaker
15	Com.		
16	NC		

Term.	Function	Technical data	Description
17	NO	Relay 17 250 V AC/8 A	Close tie breaker (synchronising)
18	Com.		
19	NC		
20	Open collector 1	Transistor output/Relay 20 36 V DC, 10 mA	Configurable
21	Open collector 2	Transistor output/Relay 21 36 V DC, 10 mA	Configurable
22	Com.	Common	Common terminal for terminals 20 and 21
23	Digital input 23	Optocoupler	Configurable
24	Digital input 24	Optocoupler	Configurable
25	Digital input 25	Optocoupler	Configurable
26	Digital input 26	Optocoupler	Tie breaker open
27	Digital input 27	Optocoupler	Tie breaker closed/configurable
28	Com.	Common	Common for terminals 23 to 27

3.5.5 Power supply - Plant controller

Term.	Function	Technical data	Description
1	+12/24 V DC	12/24 V DC +/-30 %	Power supply
2	0 V DC		
3	NO	Status relay 24 V DC/1 A	Normally open relay, processor/power supply status supervision
4	Com.		
5	NO	Relay 05 250 V AC/8 A	Central alarm HORN/configurable
6	Com.		
7	NC		
8	NO	Relay 08 250 V AC/8 A	Open mains breaker/configurable
9	Com.		
10	NC		
11	NO	Relay 11 250 V AC/8 A	Close mains breaker (synchronising)/configurable
12	Com.		
13	NC		
14	NO	Relay 14 250 V AC/8 A	Configurable
15	Com.		
16	NC		
17	NO	Relay 17 250 V AC/8 A	Configurable
18	Com.		
19	NC		
20	Open collector 1	Transistor output/Relay 20 36 V DC, 10 mA	Pulse output 1, kWh counter/configurable
21	Open collector 2	Transistor output/Relay 21 36 V DC, 10 mA	Pulse output 2, kvarh counter/configurable

Term.	Function	Technical data	Description
22	Com.	Common	Common terminal for terminals 20 and 21
23	Digital input 23	Optocoupler	Configurable
24	Digital input 24	Optocoupler	Mains breaker open/Configurable
25	Digital input 25	Optocoupler	Mains breaker closed/configurable
26	Digital input 26	Optocoupler	Configurable
27	Digital input 27	Optocoupler	Configurable
28	Com.	Common	Common for terminals 23 to 27

3.6 Slot 2

3.6.1 Serial communication (option H)

Modbus RTU, RS-485 (option H2)

Term.	Function	Description
29	DATA + (A)	Modbus RTU, RS-485
30	GND	
31	DATA - (B)	
32	Not used	
33	DATA + (A)	
34	Not used	
35	DATA - (B)	
36	Not used	

The serial communication line should be terminated between DATA + and DATA - with a resistor equal to the cable impedance. The terminals 29/33 and 31/35 are internally connected.

NOTE Never connect the GND terminal 30 to earth. Only connect it to a third wire in the communication cable!

Modbus RTU, RS-232 (option H9)

Term.	Function	Description
29	Not used	Modbus RTU, RS-232
30	GND	
31	Not used	
32	TxD	
33	Not used	
34	RxD	
35	Not used	
36	Not used	

NOTE Never connect the GND terminal 30 to earth. Only connect it to a third wire in the communication cable!

Profibus (option H3)

Term.	Function	Description
29	DATA + (B)	Pin 3 on 9-pole D-sub connector Pin 5 on 9-pole D-sub connector Pin 8 on 9-pole D-sub connector
30	GND	
31	DATA - (A)	
32	DATA + (B)	
33	GND	
34	DATA - (A)	
35	Not used	
36	Not used	

NOTE Never connect the GND terminal 30 to earth. Only connect it to a third wire in the communication cable!

3.6.2 Dual CAN (option H12.2)

Term.	Function	Description
29	CAN-H	The H12 dual CAN bus can be used for: - Engine interface communication - DVC 550/350 communication - External I/O module (CIO 116/208/308 and/or IOM 220/230) - CANshare - PMS lite - Group controller: Extended power management (option G7) communication
30	CAN-GND	
31	CAN-L	
32	CAN-H	
33	CAN-GND	
34	CAN-L	
35	Not used	The terminals are configurable: Terminals 29-31: CAN C Terminals 32-34: CAN D
36	Not used	

3.6.3 7 digital inputs (option M13.2)

Term.	Function	Technical data	Description
29	Digital input 29	Optocoupler	Configurable
30	Digital input 30	Optocoupler	Configurable
31	Digital input 31	Optocoupler	Configurable
32	Digital input 32	Optocoupler	Configurable
33	Digital input 33	Optocoupler	Configurable
34	Digital input 34	Optocoupler	Configurable
35	Digital input 35	Optocoupler	Configurable
36	Com.	Optocoupler	Common for terminals 29 to 35

3.6.4 Relay outputs (option M14.2)

Term.	Function	Technical data	Description
29	NE/ND	Relay 29 250 V AC/5 A	Configurable
30	Com.		
31	NE/ND	Relay 31 250 V AC/5 A	Configurable
32	Com.		
33	NE/ND	Relay 33 250 V AC/5 A	Configurable
34	Com.		
35	NE/ND	Relay 35 250 V AC/5 A	Configurable
36	Com.		

3.7 Slot 3

3.7.1 Load sharing, 13 digital inputs, 4 relay outputs (option M12)

Term.	Function	Technical data	Description
37	-5 to 0 to 5 V DC	Analogue load sharing	Active load sharing line
38	Com.	Common	Common for load sharing lines
39	-5 to 0 to 5 V DC	Analogue load sharing	Reactive load sharing
40	-10/+10 V DC	Analogue input	f/P set point
41	Com.	Common	Common for 40/42
42	-10/+10 V DC	Analogue input	U/Q set point
43	Digital input	Optocoupler	Configurable
44	Digital input	Optocoupler	Configurable
45	Digital input	Optocoupler	Configurable
46	Digital input	Optocoupler	Configurable
47	Digital input	Optocoupler	Configurable
48	Digital input	Optocoupler	Configurable
49	Digital input	Optocoupler	Configurable
50	Digital input	Optocoupler	Configurable
51	Digital input	Optocoupler	Configurable
52	Digital input	Optocoupler	Configurable
53	Digital input	Optocoupler	Configurable
54	Digital input	Optocoupler	Configurable
55	Digital input	Optocoupler	Configurable
56	Com.	Common	Common for terminals 43 to 55
57	NE/ND	Relay 57	Configurable
58	Com.	250 V AC/5 A	
59	NE/ND	Relay 59	Configurable
60	Com.	250 V AC/5 A	
61	NE/ND	Relay 61	Configurable
62	Com.	250 V AC/5 A	
63	NE/ND	Relay 63	Configurable
64	Com.	250 V AC/5 A	

3.8 Slot 4

3.8.1 Relay outputs (option M14.4, standard)

Term.	Function	Technical data	Description
65	NE/ND	Relay 65 250 V AC/5 A	Generator GOV: Increase frequency/configurable
66	Com.		
67	NE/ND	Relay 67 250 V AC/5 A	Generator GOV: Decrease frequency/configurable
68	Com.		
69	Not used	Relay 69 250 V AC/5 A	Configurable
70	Com.		
71	Not used	Relay 71 250 V AC/5 A	Configurable
72	Com.		

3.8.2 PWM, relay and analogue outputs for GOV/AVR (option EF5)

Term.	Function	Description
65	+/-25 mA	AVR set point output
66	0	
67	PWM +	PWM speed governor signal
68	PWM -	
69	NO	Relay output for AVR. Raise voltage
70	Com.	
71	NO	Relay output for AVR. Lower voltage
72	Com.	

NOTE AVR control requires software option D1. This is included as a standard option in AGC-4 Mk II.

3.8.3 PWM and analogue outputs for GOV/AVR (option EF6)

Term.	Function	Description
65	Not used	
66	Not used	
67	0	Speed governor, AVR or transducer output 68
68	+/-25 mA	
69	PWM -	PWM speed governor signal
70	PWM +	
71	0	Speed governor, AVR or transducer output 72
72	+/-25 mA	

NOTE Connect PWM - to the engine battery negative and PWM + to the engine control system S-SPD (speed) input (called RATED SPEED on the ADEM controller and PRIMARY THROTTLE on the PEEC controller).

3.9 Slot 5

3.9.1 AC measuring - Genset controller

Term.	Function	Technical data	Description
73	I L1, s1	Generator current L1	x/1 A or x/5 A input
74	I L1, s2		
75	I L2, s1	Generator current L2	x/1 A or x/5 A input
76	I L2, s2		
77	I L3, s1	Generator current L3	x/1 A or x/5 A input
78	I L3, s2		
79	U L1	Generator voltage L1	Max. 690 V AC phase-phase value
80		Not used	
81	U L2	Generator voltage L2	Max. 690 V AC phase-phase value
82		Not used	
83	U L3	Generator voltage L3	Max. 690 V AC phase-phase value
84	U _{NEUTRAL}	Generator voltage neutral	
85	U L1	Mains/bus voltage L1	Max. 690 V AC phase-phase value
86		Not used	
87	U L2	Mains/bus voltage L2	Max. 690 V AC phase-phase value
88	U _{NEUTRAL}	Mains/bus voltage neutral	
89	U L3	Mains/bus voltage L3	Max. 690 V AC phase-phase value

3.9.2 AC measuring - Mains controller

Term.	Function	Technical data	Description
73	I L1, s1	Mains current L1	x/1 A or x/5 A input
74	I L1, s2		
75	I L2, s1	Mains current L2	x/1 A or x/5 A input
76	I L2, s2		
77	I L3, s1	Mains current L3	x/1 A or x/5 A input
78	I L3, s2		
79	U L1	Mains voltage L1	Max. 690 V AC phase-phase value
80		Not used	
81	U L2	Mains voltage L2	Max. 690 V AC phase-phase value
82		Not used	
83	U L3	Mains voltage L3	Max. 690 V AC phase-phase value
84	U _{NEUTRAL}	Mains voltage neutral	
85	U L1	Bus voltage L1	Max. 690 V AC phase-phase value
86		Not used	
87	U L2	Bus voltage L2	Max. 690 V AC phase-phase value

Term.	Function	Technical data	Description
88	U _{NEUTRAL}	Bus voltage neutral	
89	U L3	Bus voltage L3	Max. 690 V AC phase-phase value

3.9.3 AC measuring - BTB controller

Term.	Function	Technical data	Description
73	I L1, s1	Bus A current L1	x/1 A or x/5 A input
74	I L1, s2		
75	I L2, s1	Bus A current L2	x/1 A or x/5 A input
76	I L2, s2		
77	I L3, s1	Bus A current L3	x/1 A or x/5 A input
78	I L3, s2		
79	U L1	Bus A voltage L1	Max. 690 V AC phase-phase value
80		Not used	
81	U L2	Bus A voltage L2	Max. 690 V AC phase-phase value
82		Not used	
83	U L3	Bus A voltage L3	Max. 690 V AC phase-phase value
84	U _{NEUTRAL}	Bus A voltage neutral	
85	U L1	Bus B voltage L1	Max. 690 V AC phase-phase value
86		Not used	
87	U L2	Bus B voltage L2	Max. 690 V AC phase-phase value
88	U _{NEUTRAL}	Bus B voltage neutral	
89	U L3	Bus B voltage L3	Max. 690 V AC phase-phase value

3.9.4 AC measuring - Group controller

Term.	Function	Technical data	Description
73	I L1, s1	Generator current L1	x/1 A or x/5 A input
74	I L1, s2		
75	I L2, s1	Generator current L2	x/1 A or x/5 A input
76	I L2, s2		
77	I L3, s1	Generator current L3	x/1 A or x/5 A input
78	I L3, s2		
79	U L1	Generator voltage L1	Max. 690 V AC phase-phase value
80		Not used	
81	U L2	Generator voltage L2	Max. 690 V AC phase-phase value
82		Not used	
83	U L3	Generator voltage L3	Max. 690 V AC phase-phase value
84	U _{NEUTRAL}	Generator voltage neutral	
85	U L1	BB voltage L1	Max. 690 V AC phase-phase value
86		Not used	

Term.	Function	Technical data	Description
87	U L2	BB voltage L2	Max. 690 V AC phase-phase value
88	U _{NEUTRAL}	BB voltage neutral	
89	U L3	BB voltage L3	Max. 690 V AC phase-phase value

3.9.5 AC measuring - Plant controller

Term.	Function	Technical data	Description
73	I L1, s1	Mains current L1	x/1 A or x/5 A input
74	I L1, s2		
75	I L2, s1	Mains current L2	x/1 A or x/5 A input
76	I L2, s2		
77	I L3, s1	Mains current L3	x/1 A or x/5 A input
78	I L3, s2		
79	U L1	Mains voltage L1	Max. 690 V AC phase-phase value
80		Not used	
81	U L2	Mains voltage L2	Max. 690 V AC phase-phase value
82		Not used	
83	U L3	Mains voltage L3	Max. 690 V AC phase-phase value
84	U _{NEUTRAL}	Mains voltage neutral	
85	U L1	BB voltage L1	Max. 690 V AC phase-phase value
86		Not used	
87	U L2	BB voltage L2	Max. 690 V AC phase-phase value
88	U _{NEUTRAL}	BB voltage neutral	
89	U L3	BB voltage L3	Max. 690 V AC phase-phase value

3.10 Slot 6

3.10.1 7 digital inputs (option M13.6)

Term.	Function	Technical data	Description
90	Com.	Common	Common for terminals 90 to 97
91	Binary input 91	Optocoupler	Configurable
92	Binary input 92	Optocoupler	Configurable
93	Binary input 93	Optocoupler	Configurable
94	Binary input 94	Optocoupler	Configurable
95	Binary input 95	Optocoupler	Configurable
96	Binary input 96	Optocoupler	Configurable
97	Binary input 97	Optocoupler	Configurable

3.10.2 4 relay outputs (option M14.6)

Term.	Function	Technical data	Description
90	NE/ND	Relay 90 250 V AC 5 A	Configurable
91	Com.		
92	NE/ND	Relay 92 250 V AC 5 A	Configurable
93	Com.		
94	NE/ND	Relay 94 250 V AC 5 A	Configurable
95	Com.		
96	NE/ND	Relay 96 250 V AC 5 A	Configurable
97	Com.		

3.10.3 4 analogue inputs (option M15.6)

Term.	Function	Technical data	Description
90	Analogue input 91 -	Common	Configurable
91	Analogue input 91 +	4 to 20 mA in	
92	Analogue input 93 -	Common	Configurable
93	Analogue input 93 +	4 to 20 mA in	
94	Analogue input 95 -	Common	Configurable
95	Analogue input 95 +	4 to 20 mA in	
96	Analogue input 97 -	Common	Configurable
97	Analogue input 97 +	4 to 20 mA in	

3.10.4 4 multi-inputs (option M16.6)

Term.	Function	Technical data	Description
90	Multi-input 91	Common	Configurable: 4 to 20 mA/0 to 5 V/Pt100
91	Multi-input 91	Analogue in	

Term.	Function	Technical data	Description
92	Multi-input 93	Common	Configurable: 4 to 20 mA/0 to 5 V/Pt100
93	Multi-input 93	Analogue in	
94	Multi-input 95	Common	Configurable: 4 to 20 mA/0 to 5 V/Pt100
95	Multi-input 95	Analogue in	
96	Multi-input 97	Common	Configurable: 4 to 20 mA/0 to 5 V/Pt100
97	Multi-input 97	Analogue in	

3.10.5 Analogue outputs for transducer (option F1)

Term.	Function	Description
90	Not used	Transducer output
91	0	
92	0(4) to 20 mA out	
93	Not used	Transducer output
94	Not used	
95	0	
96	0(4) to 20 mA out	Transducer output
97	Not used	

NOTE The option F1 cannot be used for GOV/AVR outputs.

3.11 Slot 7

3.11.1 Engine interface card - Genset controller

Term.	Function	Technical data	Description
98	+12/24 V DC	12/24 V DC +/-30 %	DC power supply
99	0 V DC		
100	MPU input	2 to 70 V AC/ 10 to 10,000 Hz	Magnetic pickup with wire break
101	MPU GND		
102	A	0(4) to 20 mA Digital Pt100 Pt1000 RMI 0 to 40 V DC	Multi-input 1
103	B		
104	C		
105	A		Multi-input 2
106	B		
107	C		
108	A		Multi-input 3
109	B		
110	C		
111	Com.	Common	Common for terminals 112 to 117
112	Digital input 112	Optocoupler	Configurable
113	Digital input 113	Optocoupler	Configurable
114	Digital input 114	Optocoupler	Configurable
115	Digital input 115	Optocoupler	Configurable
116	Digital input 116	Optocoupler	Configurable
117	Digital input 117	Optocoupler	Configurable
118	Digital input 118	Optocoupler	Emergency stop and common for 119 and 120
119	NO	Relay 24 V DC/5 A	Run coil
120	NO	Relay 24 V DC/5 A	Start prepare
121	Com.	Relay 250 V AC/5 A	Crank (starter)
122	NO		
123	Com.	Relay 24 V DC/5 A	Stop coil w/wire failure detection
124	NO		
A1	CAN-H		CAN bus interface A Used for option G5: Power management
A2	GND		
A3	CAN-L		
B1	CAN-H		CAN bus interface B Used for option G5: Power management
B2	GND		
B3	CAN-L		

3.11.2 Engine interface card - Mains/BTB/Group/Plant controller

Term.	Function	Technical data	Description
98	+12/24 V DC	12/24 V DC +/-30 %	DC power supply
99	0 V DC		
100	MPU input	2 to 70 V AC/ 10 to 10,000 Hz	Magnetic pickup
101	MPU GND		
102	A	0(4) to 20 mA Digital Pt100 Pt1000 RMI 0 to 40 V DC	Multi-input 1
103	B		
104	C		
105	A		Multi-input 2
106	B		
107	C		
108	A		Multi-input 3
109	B		
110	C		
111	Com.	Common	Common for terminals 112-117
112	Digital input 112	Optocoupler	Configurable
113	Digital input 113	Optocoupler	Configurable
114	Digital input 114	Optocoupler	Configurable
115	Digital input 115	Optocoupler	Configurable
116	Digital input 116	Optocoupler	Configurable
117	Digital input 117	Optocoupler	Configurable
118	Digital input 118	Optocoupler	Emergency stop and common for 119 and 120
119	NO	Relay 24 V DC/5 A	Not used
120	NO	Relay 24 V DC/5 A	Not used
121	Com.	Relay 250 V AC/5 A	Not used
122	NO		
123	Com.	Relay 24 V DC/5 A	Not used
124	NO		
A1	CAN-H		CAN bus interface A Used for option G5: Power management
A2	GND		
A3	CAN-L		
B1	CAN-H		CAN bus interface B Used for option G5: Power management
B2	GND		
B3	CAN-L		

3.12 Slot 8

3.12.1 Cummins engine interface communication (option H6)

Term.	Function	Description
126	Not used	Modbus RTU (RS-485)
127	DATA - (B)	
128	Not used	
129	DATA + (A)	
130	Not used	
131	DATA - (B)	
132	GND	
133	DATA + (A)	

3.12.2 7 digital inputs (option M13.8)

Term.	Function	Technical data	Description
126	Com.	Common	Common for terminals 127 to 133
127	Digital input 127	Optocoupler	Configurable
128	Digital input 128	Optocoupler	Configurable
129	Digital input 129	Optocoupler	Configurable
130	Digital input 130	Optocoupler	Configurable
131	Digital input 131	Optocoupler	Configurable
132	Digital input 132	Optocoupler	Configurable
133	Digital input 133	Optocoupler	Configurable

3.12.3 4 relay outputs (option M14.8)

Term.	Function	Technical data	Description
126	NE/ND	Relay 126 250 V AC/5 A	Configurable
127	Com.		
128	NE/ND	Relay 128 250 V AC/5 A	Configurable
129	Com.		
130	NE/ND	Relay 130 250 V AC/5 A	Configurable
131	Com.		
132	NE/ND	Relay 132 250 V AC/5 A	Configurable
133	Com.		

3.12.4 4 analogue inputs (option M15.8)

Term.	Function	Technical data	Description
126	Analogue input 127 -	Common	Configurable
127	Analogue input 127 +	4 to 20 mA in	

Term.	Function	Technical data	Description
128	Analogue input 129 -	Common	Configurable
129	Analogue input 129 +	4 to 20 mA in	
130	Analogue input 131 -	Common	Configurable
131	Analogue input 131 +	4 to 20 mA in	
132	Analogue input 133 -	Common	Configurable
133	Analogue input 133 +	4 to 20 mA in	

3.12.5 4 multi-inputs (option M16.8)

Term.	Function	Technical data	Description
126	Multi-input 127	Common	Configurable: 4 to 20 mA/0 to 5 V/Pt100
127	Multi-input 127	Analogue in	
128	Multi-input 129	Common	Configurable: 4 to 20 mA/0 to 5 V/Pt100
129	Multi-input 129	Analogue in	
130	Multi-input 131	Common	Configurable: 4 to 20 mA/0 to 5 V/Pt100
131	Multi-input 131	Analogue in	
132	Multi-input 133	Common	Configurable: 4 to 20 mA/0 to 5 V/Pt100
133	Multi-input 133	Analogue in	

3.12.6 Dual CAN (option H12.8)

Term.	Function	Description
126	Not used	The H12 dual CAN bus can be used for: • Engine interface communication • DVC 550/350 communication • External I/O module (CIO 116/208/308 and/or IOM 220/230) • CANshare • PMS lite • Group controller: Extended power management (option G7) communication
127	Not used	
128	CAN-L	
129	GND	
130	CAN-H	
131	CAN-L	
132	GND	
133	CAN-H	The terminals are configurable: Terminals 128-130: CAN E Terminals 131-133: CAN F

4. Wiring

4.1 AC connections

The controller can be wired up in a 1-phase, 2-phase or 3-phase configuration. 3-phase examples are included for each controller type.

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

Neutral line (N)

For three phases systems, the neutral line (N) is only required if the system is a three-phase + neutral system. If the distribution system is a three-phase system without neutral, do not connect terminals 84 and 88.

Current transformer grounding

The current transformers can be grounded using the s1 or s2 connections.

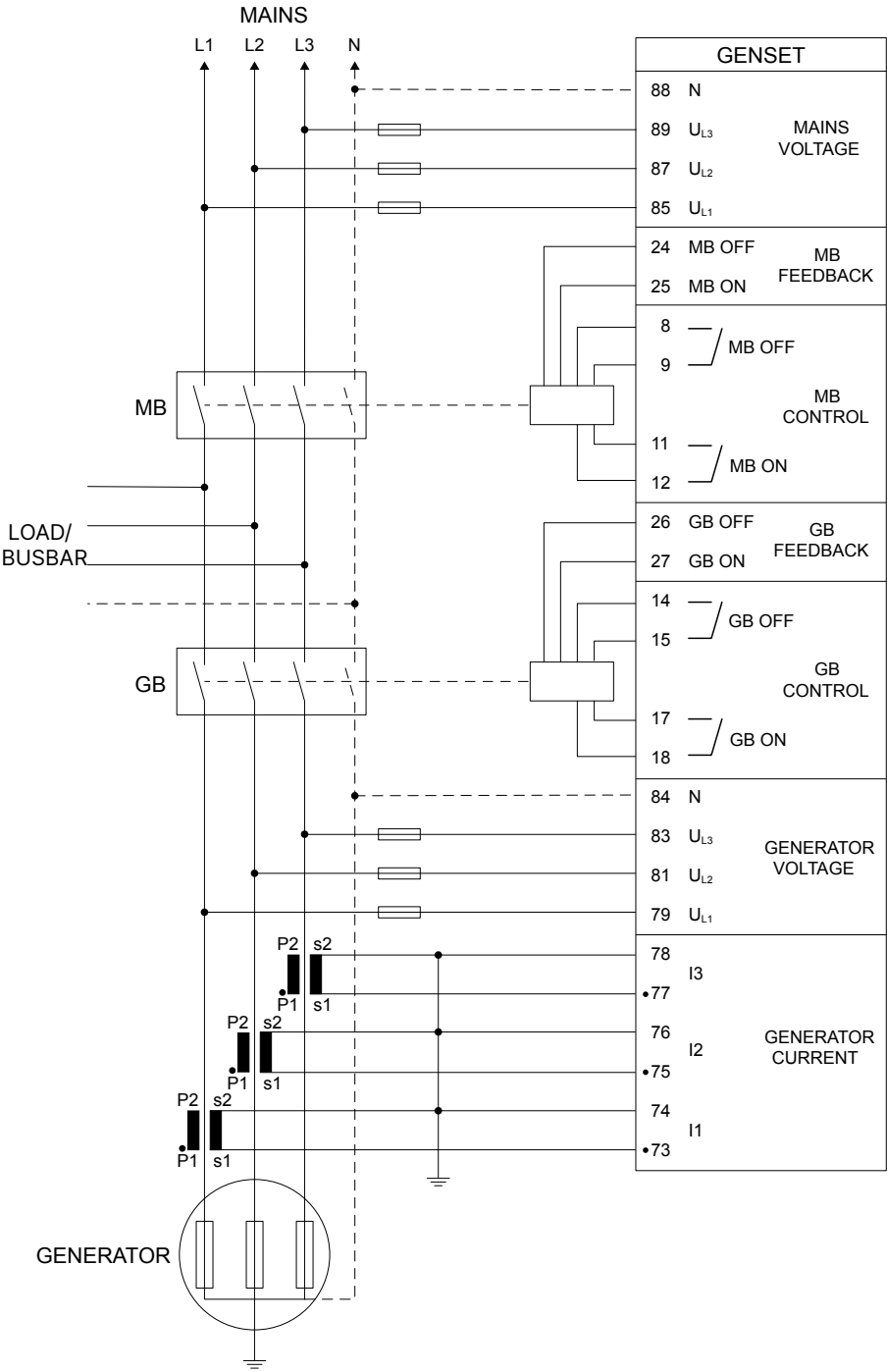
Fuses

Protect the AC voltage measurement cables with 2 A time-delay fuses.

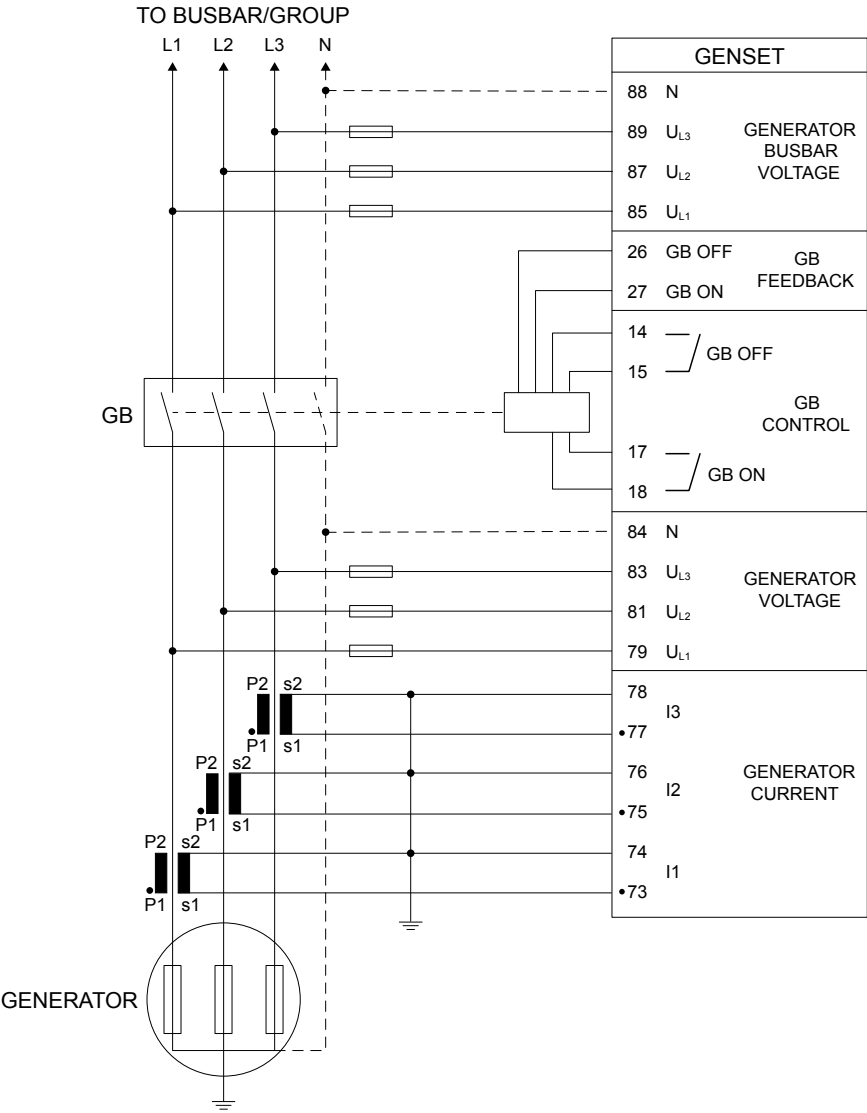
Breaker wiring

The examples are for pulse breakers. Breaker open/off wiring is not required for a continuous breaker.

4.1.1 Genset controller (stand-alone)

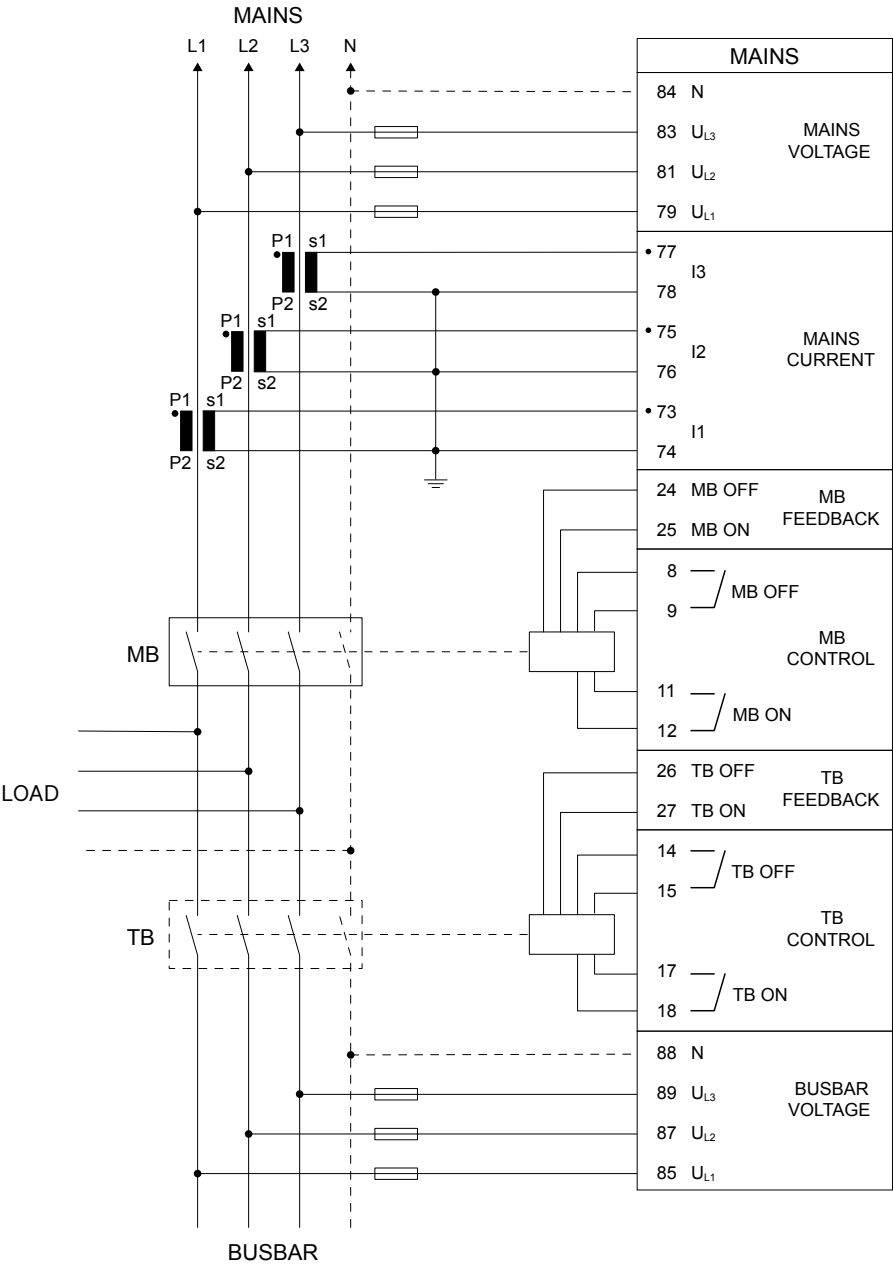


4.1.2 Genset controller (island/power management)

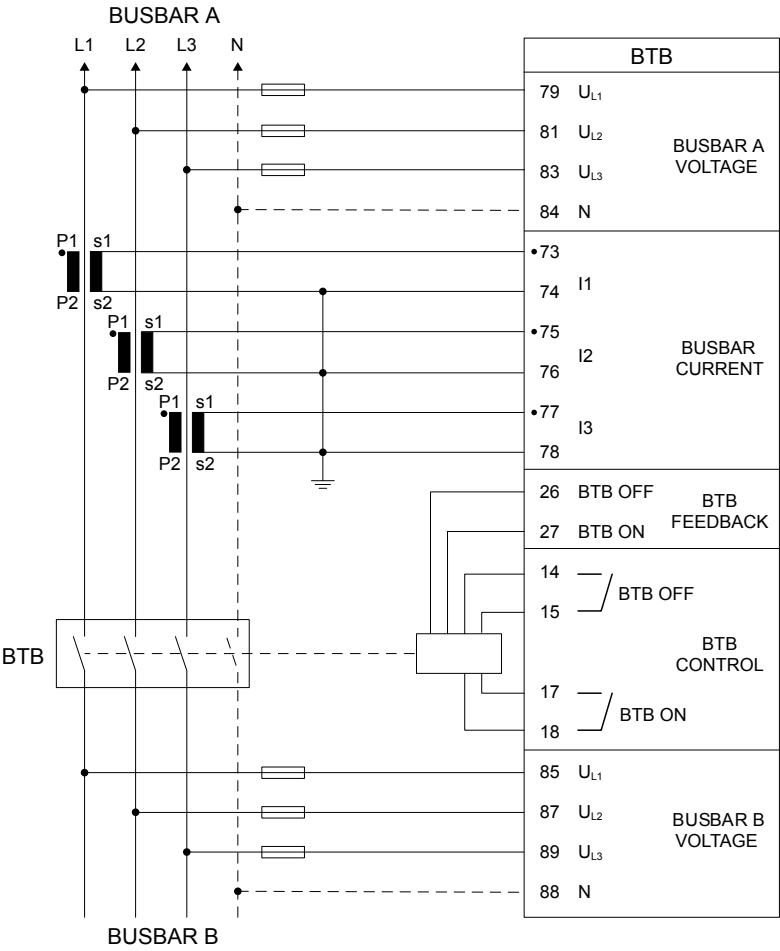


This wiring also applies to genset controllers in CANshare and PMS lite applications.

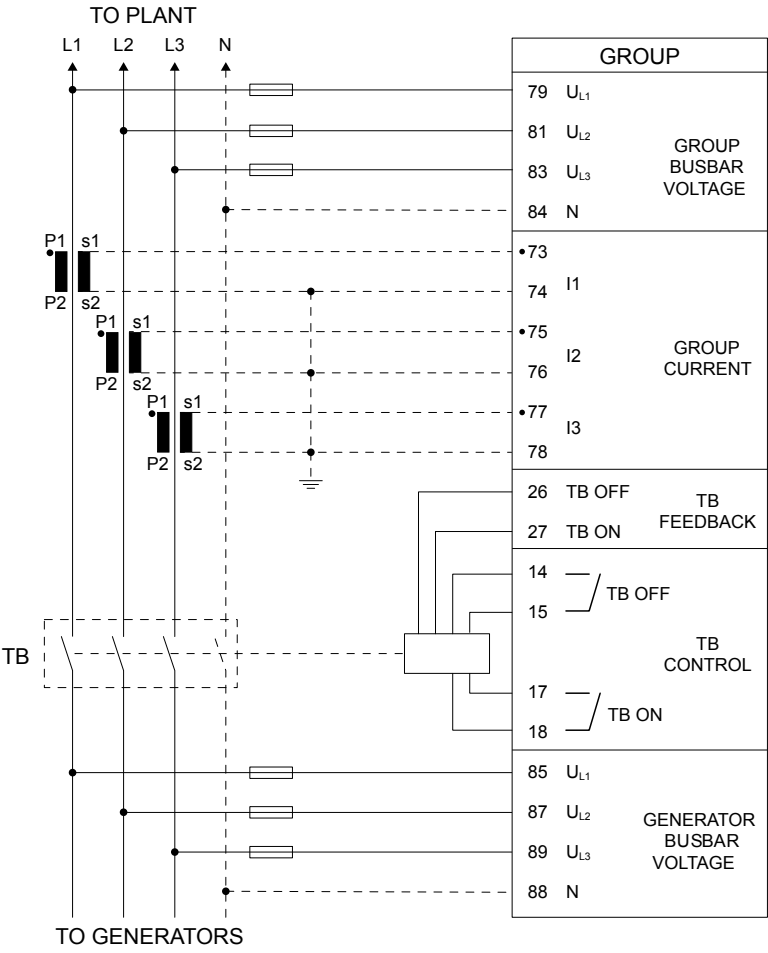
4.1.3 Mains controller



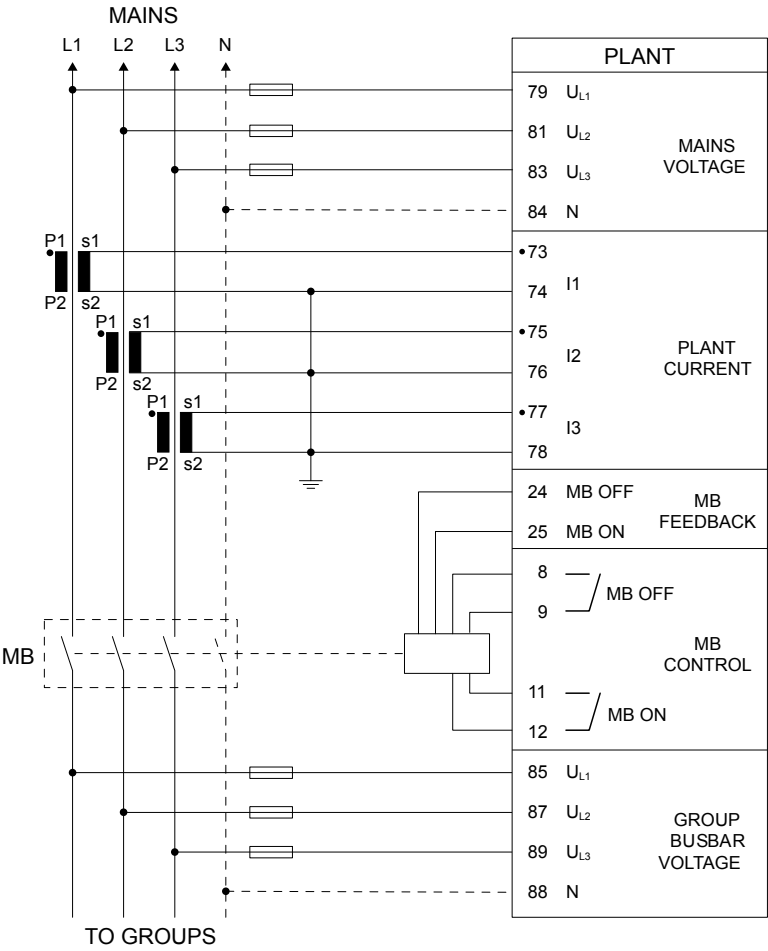
4.1.4 BTB controller



4.1.5 Group controller

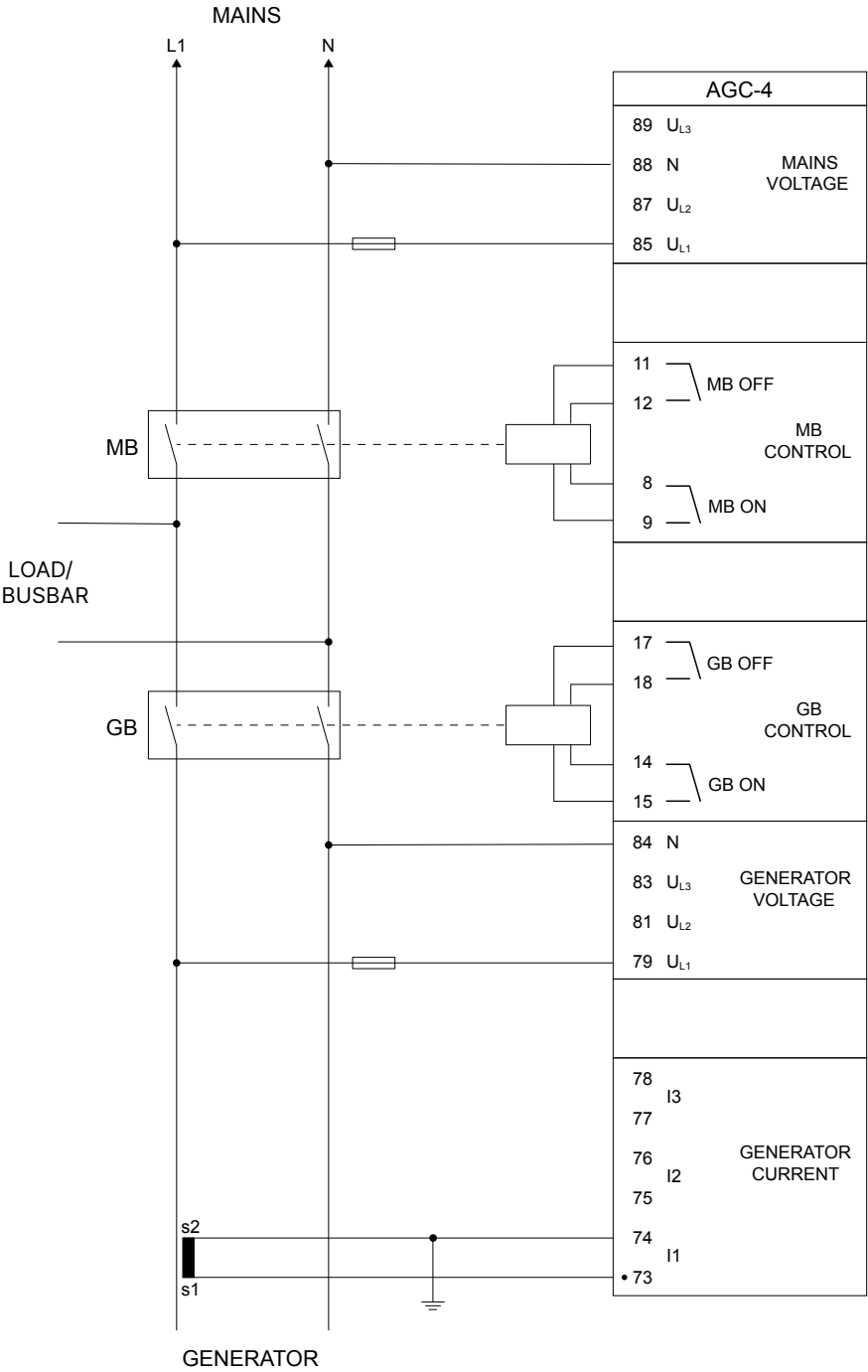


4.1.6 Plant controller

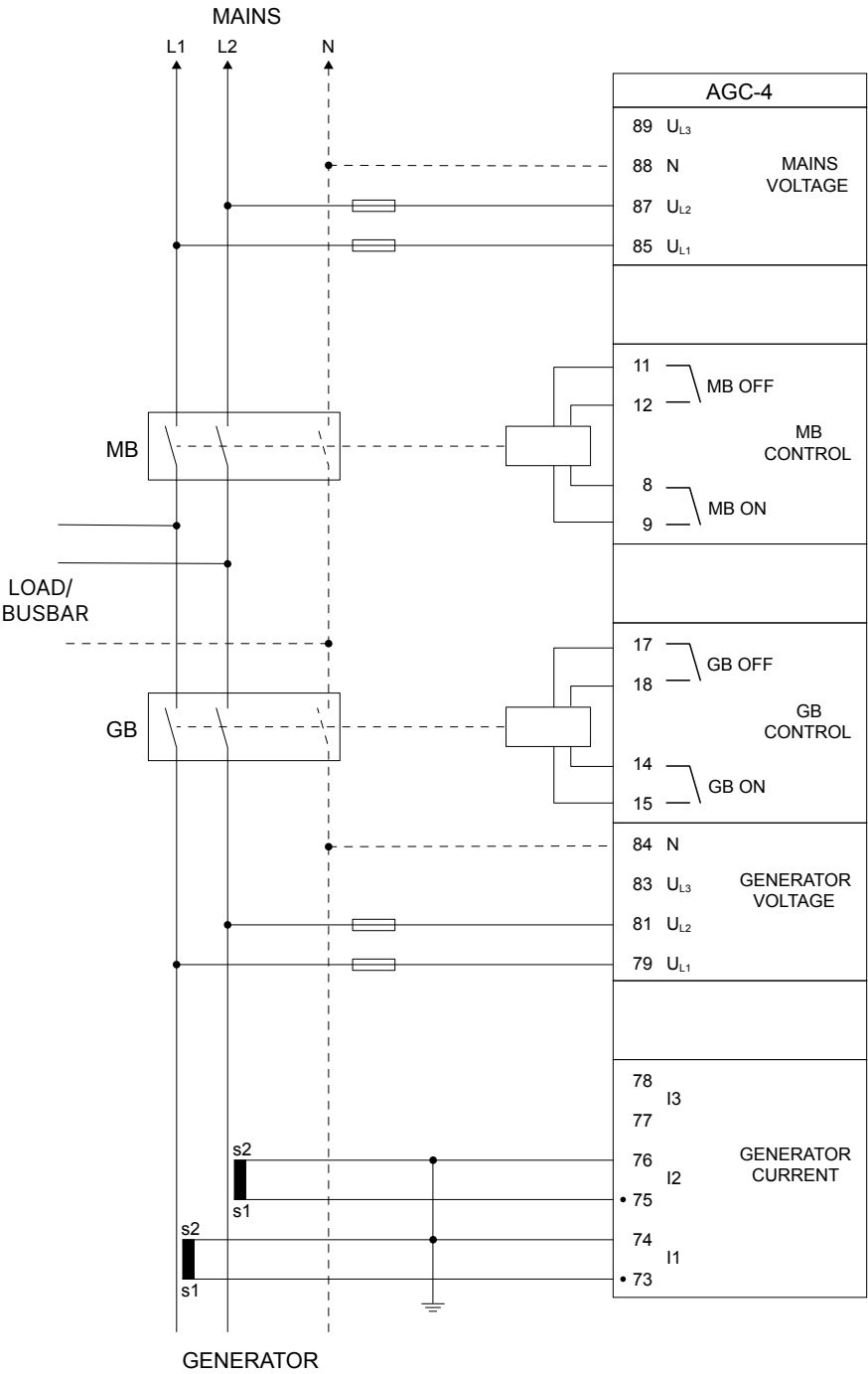


4.1.7 Single-phase and 2-phase AC wiring

Single-phase (stand-alone genset controller)



2-phase L1L2 split-phase (stand-alone genset controller)



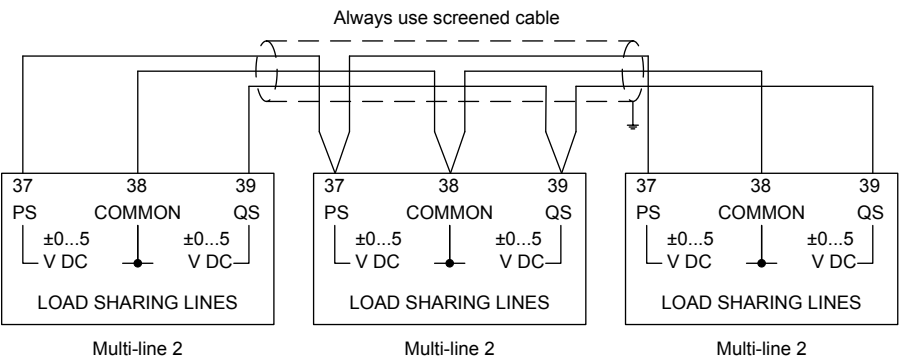
NOTE For split-phase, the waveforms are offset by a half-cycle (180 °) from the neutral wire. Split-phase is also called L1-N-L2, or single phase in the USA.

4.2 DC connections

4.2.1 Fuse requirements (UL/cUL Listed)

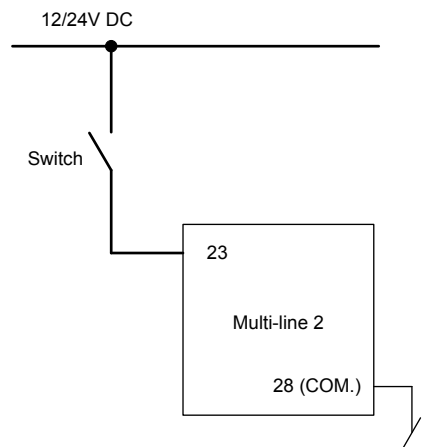
All inputs and outputs (except the AC voltage terminals): These must only be connected to limited voltage circuits from the engine starting battery protected by a 2 A DC max. time-delay fuse.

4.2.2 Load sharing lines (option G3)

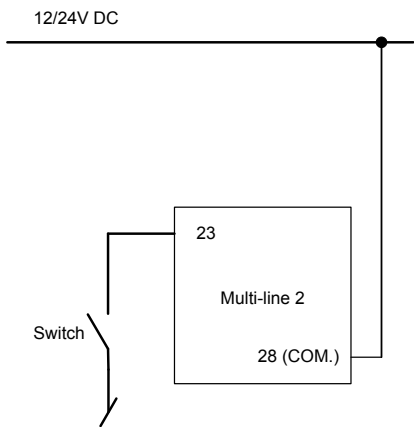


4.2.3 Digital inputs

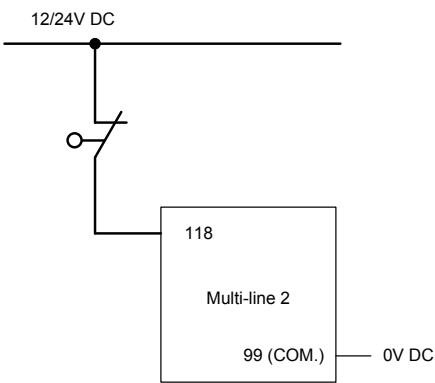
Battery positive to input:



Battery negative to input:



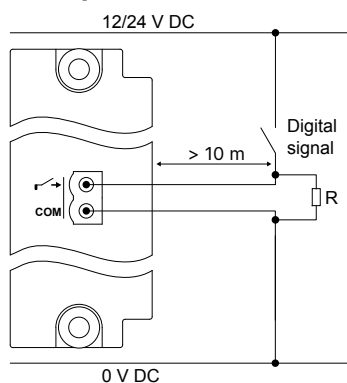
Emergency stop:



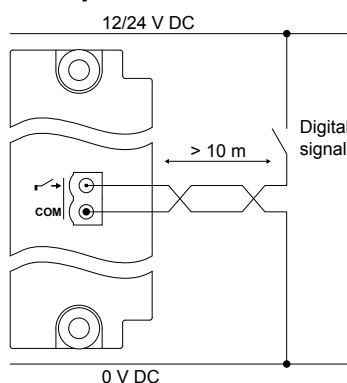
Compliance with EN60255-26

If the wire to an open contact is over 10 m long, then additional measures are required for compliance with EN60255-26. You can use a 1 k Ω resistor to common, or you can use a twisted or shielded wire to the open contact.

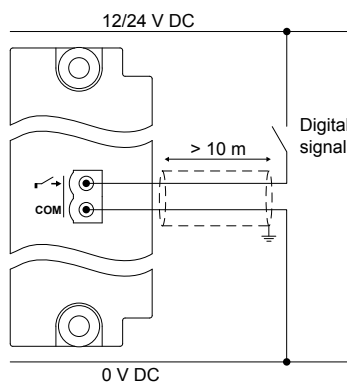
Example: 1 k Ω resistor to common for compliance with EN60255-26



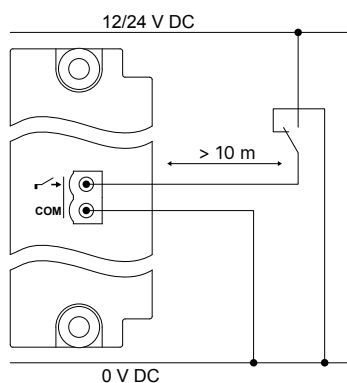
Example: Twisted wire for compliance with EN60255-26



Example: Shielded wire for compliance with EN60255-26

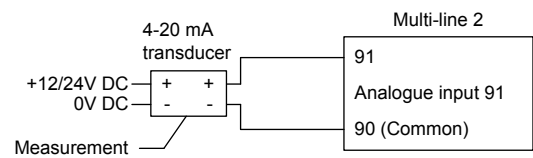


Example: Closed contact for compliance with EN60255-26

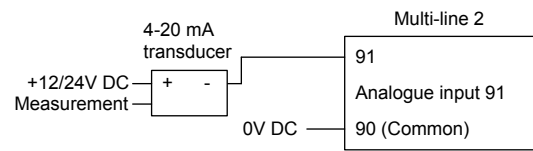


4.2.4 Analogue inputs (option M15.X)

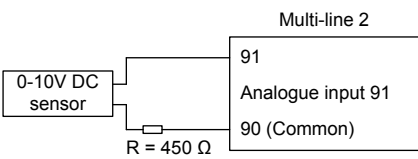
4 to 20 mA - Active transducer



4 to 20 mA - Passive transducer

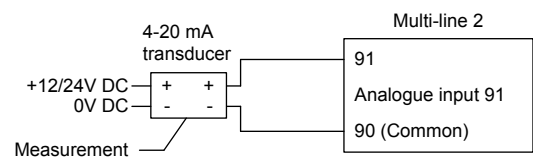


V DC sensor

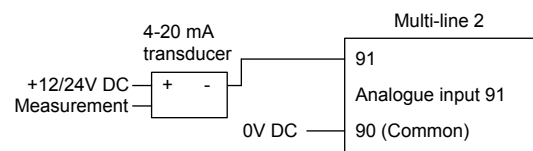


4.2.5 Multi-inputs (option M16.X)

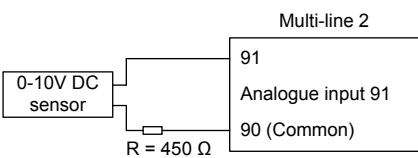
4 to 20 mA - Active transducer



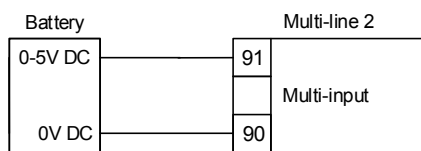
4 to 20 mA - Passive transducer



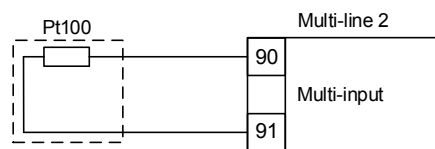
V DC sensor



0 to 5 V DC



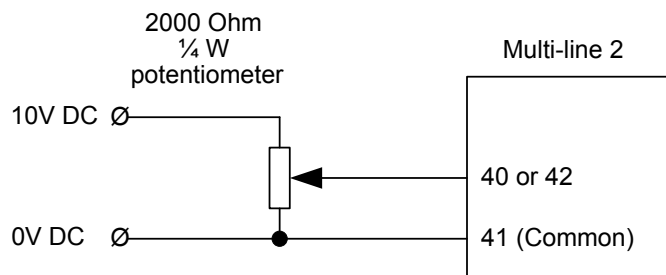
Pt100



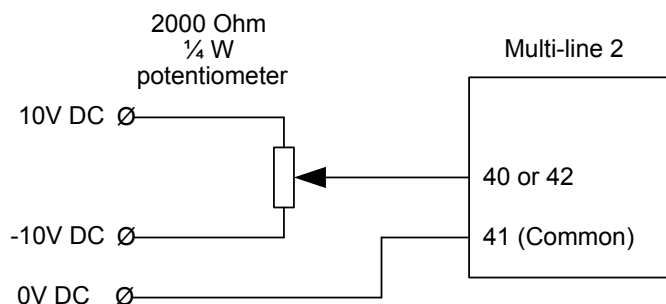
4.2.6 External set points (option G3/M12)

The set point inputs are passive, that is, an external power source is needed. This can be an active output from, for example, a PLC, or a potentiometer can be used.

0 to 10 V DC input using potentiometer



+/-10 V DC input using potentiometer

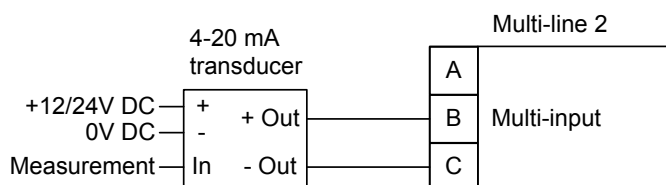


4.2.7 Multi-inputs (102, 105, 108)

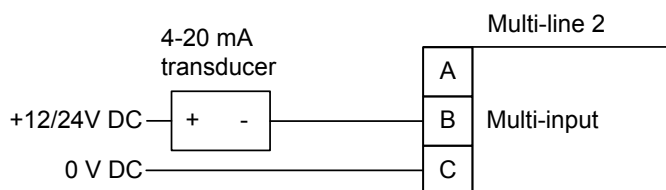
0(4) to 20 mA

The multi-inputs are placed in slot #7. The terminal numbers for the individual multi-inputs can be seen under [Slot #7](#).

Active transducer

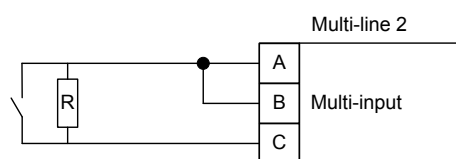


Passive transducer



NOTE If the passive sensor has its own battery supply, the voltage must not exceed 30 V DC.

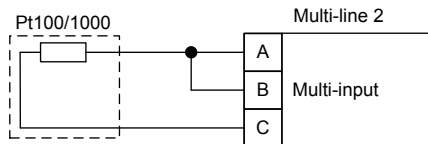
Digital inputs



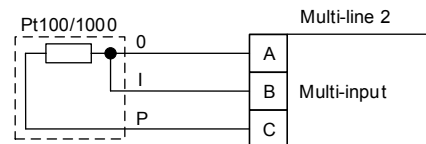
NOTE The resistor is only mounted if wire fail supervision is required. The value of the resistor should be 270 Ω +/-10 %.

Pt100/Pt1000

2-wire

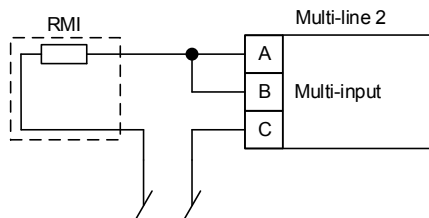


3-wire

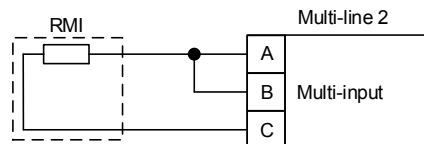


RMI

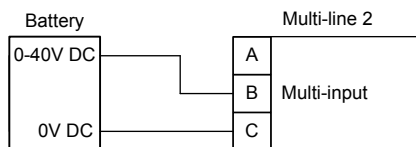
1-wire



2-wire

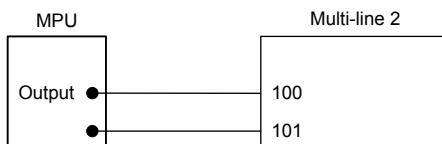


0 to 40 V DC

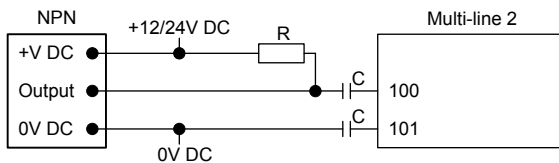


4.2.8 RPM input

Magnetic pickup (MPU)



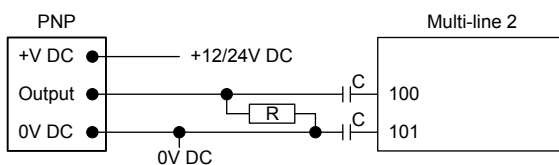
NPN sensor



C = 22 nF, 100 V foil type

R = 1200 Ω @ 24 V DC, 600 Ω @ 12 V DC

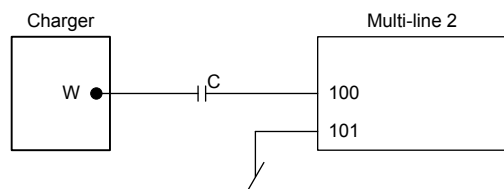
PNP sensor



C = 22 nF, 100 V foil type

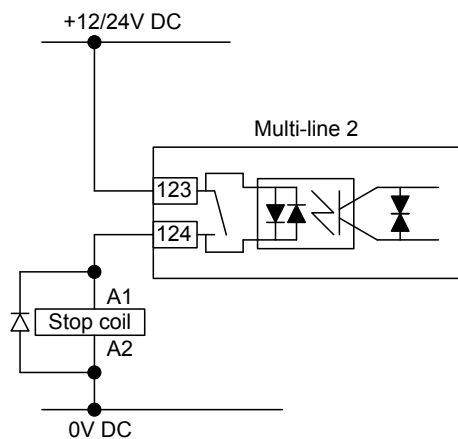
R = 1200 Ω @ 24 V DC, 600 Ω @ 12 V DC

Charger, W output



C = 22 nF, 100 V foil type

4.2.9 Stop coil



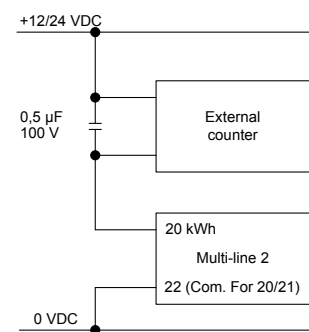
NOTE Remember to mount the freewheeling diode.

4.2.10 Transistor outputs (open collector outputs)

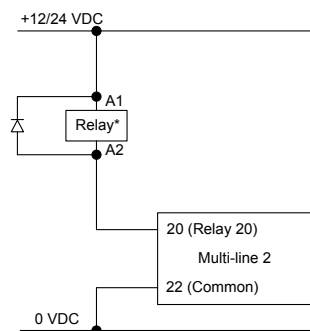
The open collector outputs can be used as kWh and kvarh counter outputs or as relay outputs. The outputs are low power outputs. For that reason, one of the following circuits must be applied.

Maximum load on the open collector outputs is 10 mA at 24 V DC.

External counter

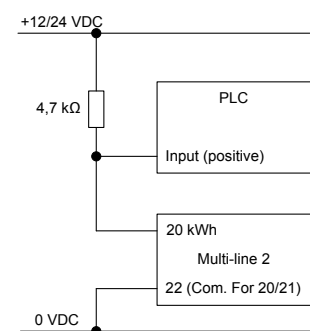


Relay outputs



NOTE * Remember to mount the freewheeling diode. If the external relay does not have a built-in diode, you can use a 1N4007 (1000 V/1 A) diode.

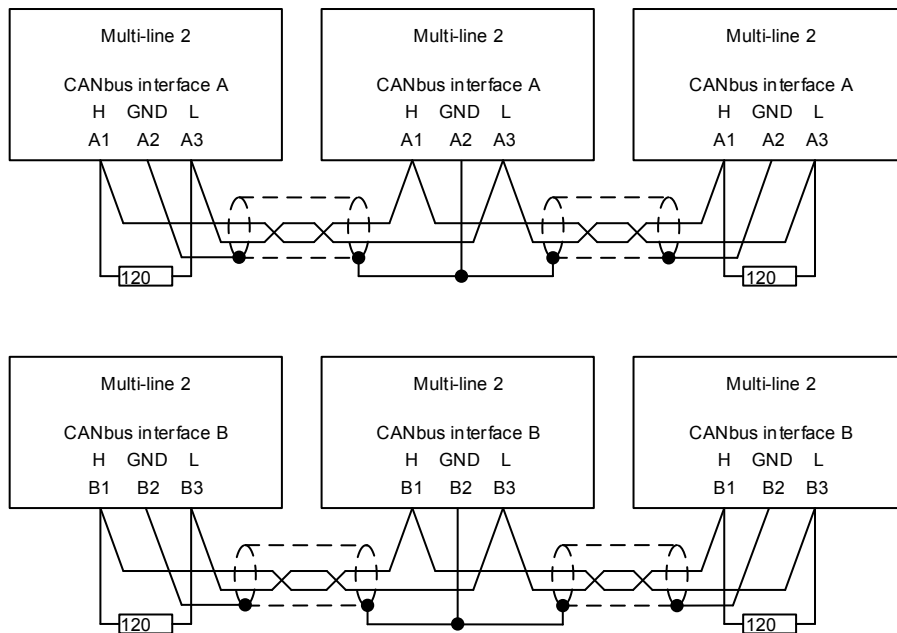
Connection to PLC



4.3 Communication

4.3.1 CAN bus for power management (option G5)

Examples with three controllers connected (for example, one mains controller and two genset controllers).



NOTE Use shielded twisted cable.

NOTE End resistor R = 120 Ohm.

4.3.2 CAN bus for extended power management (option G7)

The CAN bus communication and the controllers must be wired as two separate systems.

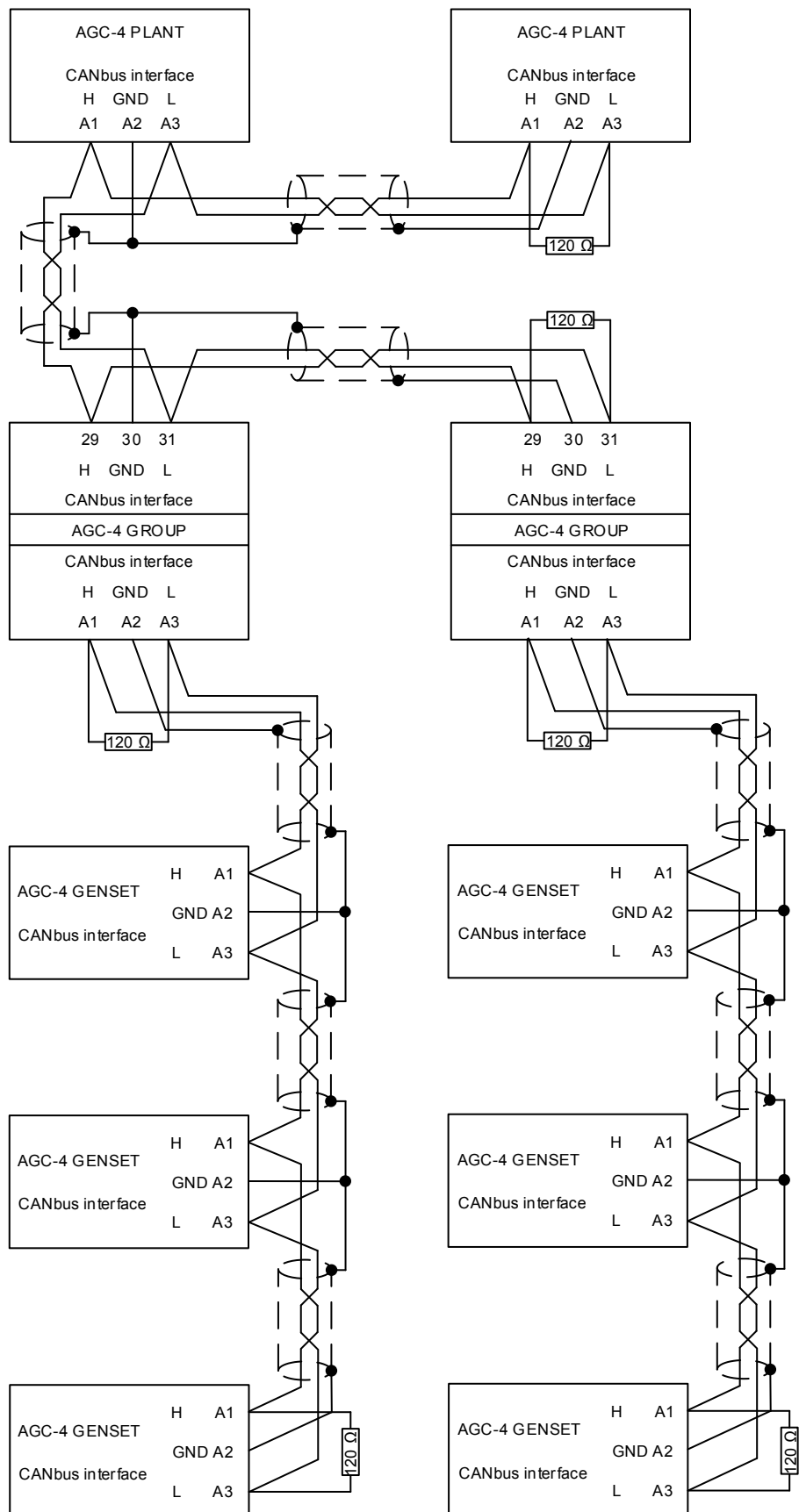
The first CAN bus is wired between the plant and group controller.

The other CAN bus line is wired from one group controller and down to the gensets in the specific genset group.

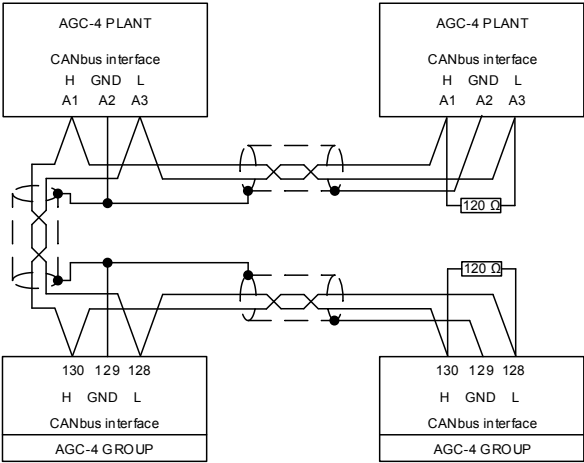
NOTE Use shielded twisted cable. Connect shield to earth at one end only. Shield ends must be insulated with tape or insulation tubing.

NOTE End resistor R = 120 ohm.

Plant-Group-Genset CAN bus with option H12.2 in the group controller

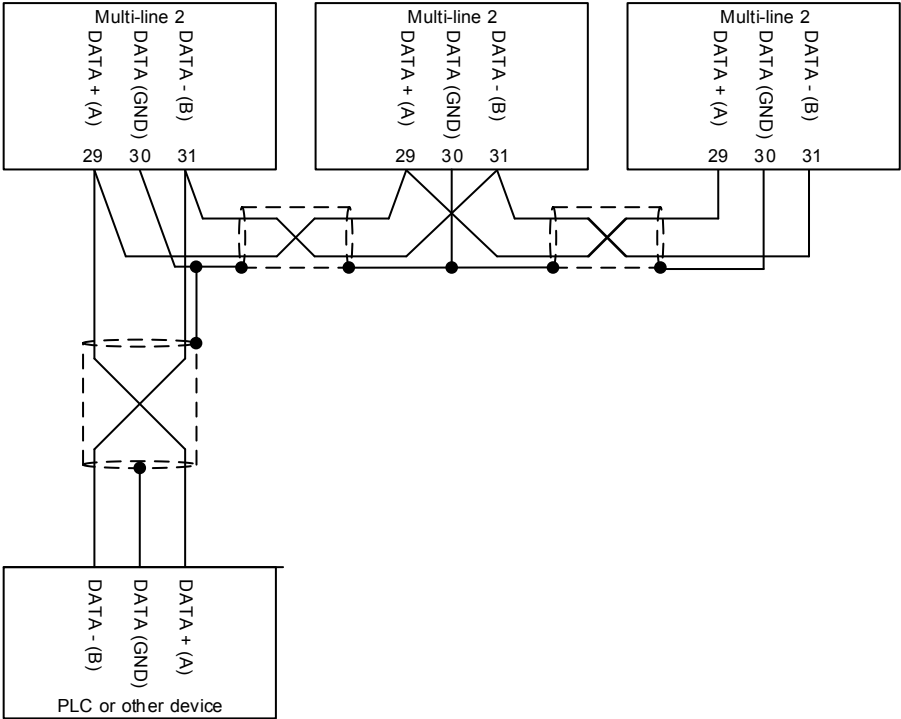


Plant-Group CAN bus with option H12.8 in the group controller



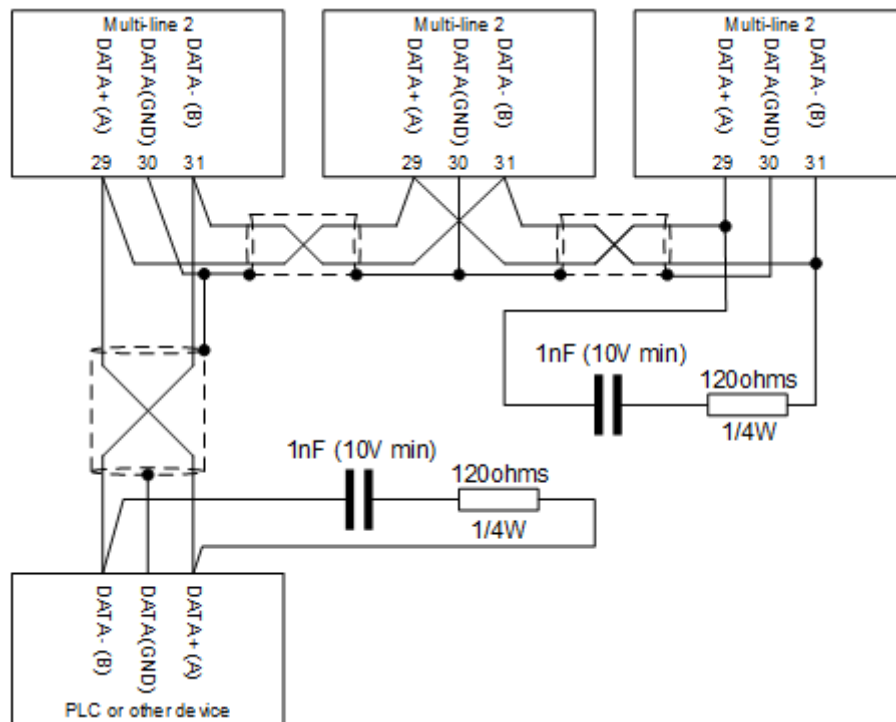
4.3.3 Modbus RS-485 (option H2)

Example with three controllers connected



NOTE Use shielded twisted cable.

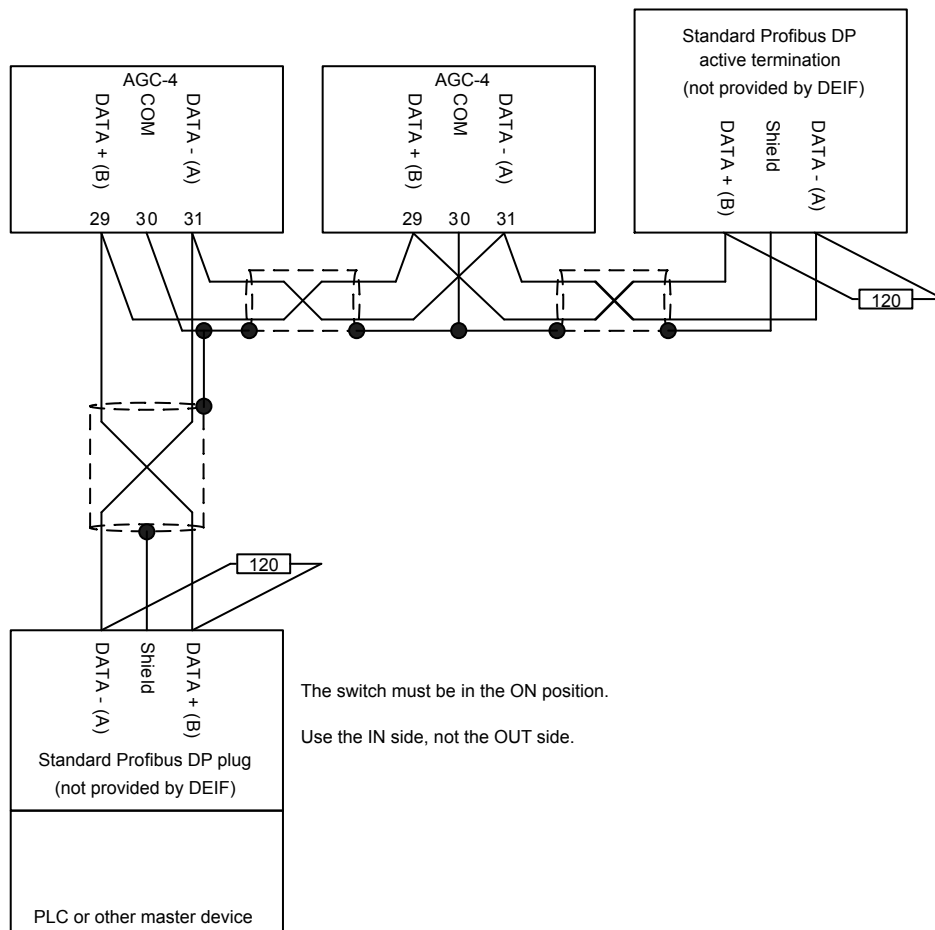
**RS-485 Modbus lines need end resistors (end terminators) when the bus length exceeds 30 m:
Recommended installation**



NOTE Cable: Belden 3105A or equivalent. 22 AWG (0.6 mm²) twisted pair, shielded, <40 mΩ/m, min. 95 % shield coverage.

4.3.4 Profibus DP (option H3)

Example with two controllers connected.

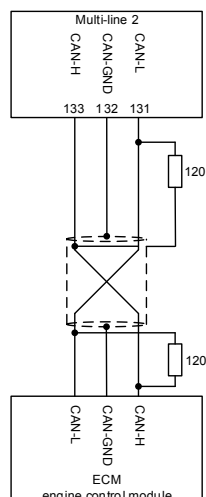


NOTE Use shielded twisted cable.

NOTE End resistor R = 120 Ohm.

4.3.5 CAN bus engine communication (option H12.2/H12.8)

Wiring example for H12.8

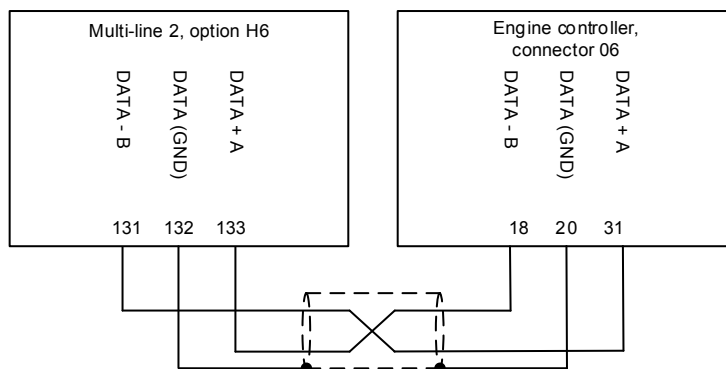


NOTE Use shielded twisted cable.

NOTE End resistor R = 120 Ohm.

NOTE The terminating resistor at the engine side might not be needed, see the engine manufacturer's literature.

4.3.6 Cummins GCS (option H6)



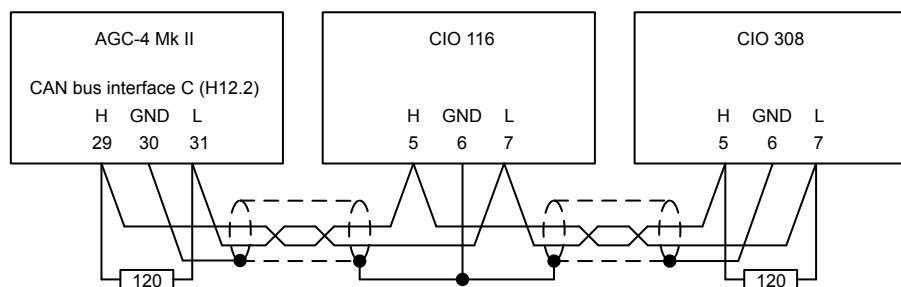
NOTE Use shielded twisted cable.

NOTE Cable: Belden 3105A or equivalent. 22 AWG (0.6 mm²) twisted pair, shielded, <40 mΩ/m, min. 95 % shield coverage.

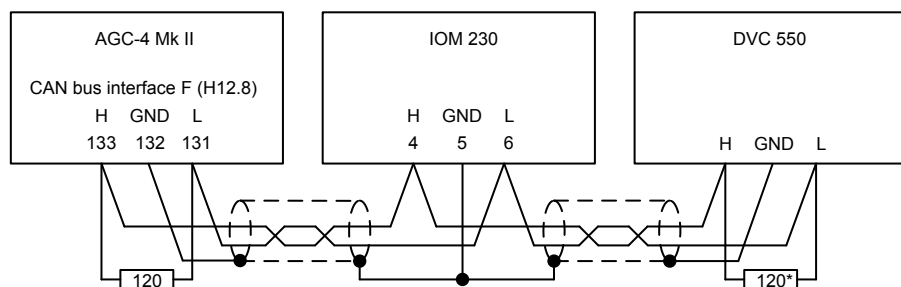
4.3.7 External I/O module CIO/IOM (option H12.2/H12.8)

As long as the baud rate is the same, CAN bus communication to external CIOs or IOMs can be connected in series with CAN bus engine communication and DVC communication. That is, a number of CIO 116, 208, 308, and/or IOM 220, 230, can be connected in series on the CAN bus communication line.

CAN bus C communication to CIO 116 and CIO 308 example



CAN bus F communication to IOM 230 and DVC 550 example



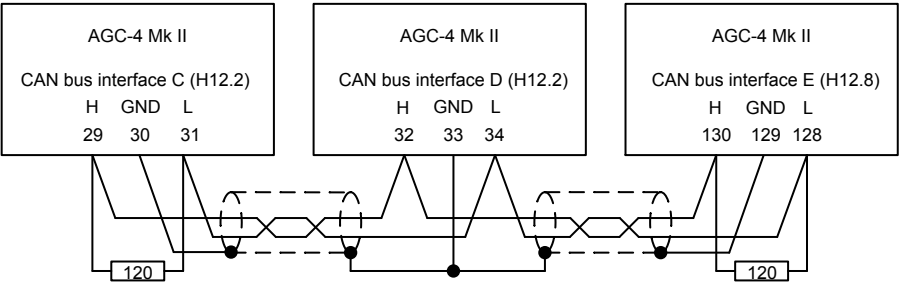
NOTE * The connector supplied with the DVC 550 includes a 120 ohm end resistor.

4.3.8 CANshare (option H12.2/H12.8)

Use the CAN bus C to F interfaces (on option H12.2 or H12.8) to connect the AGC-4 Mk II controllers in series for CANshare.

NOTE You do not have to use the same CAN bus interface in all of the controllers. However, using the same CAN bus interface is recommended.

CANshare communication using CAN bus interfaces example

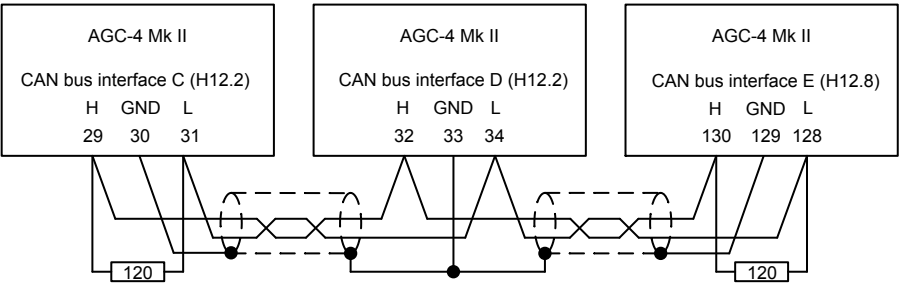


4.3.9 PMS lite (option H12.2/H12.8)

Use the CAN bus C to F interfaces (on option H12.2 or H12.8) to connect the AGC-4 Mk II PMS lite controllers in series.

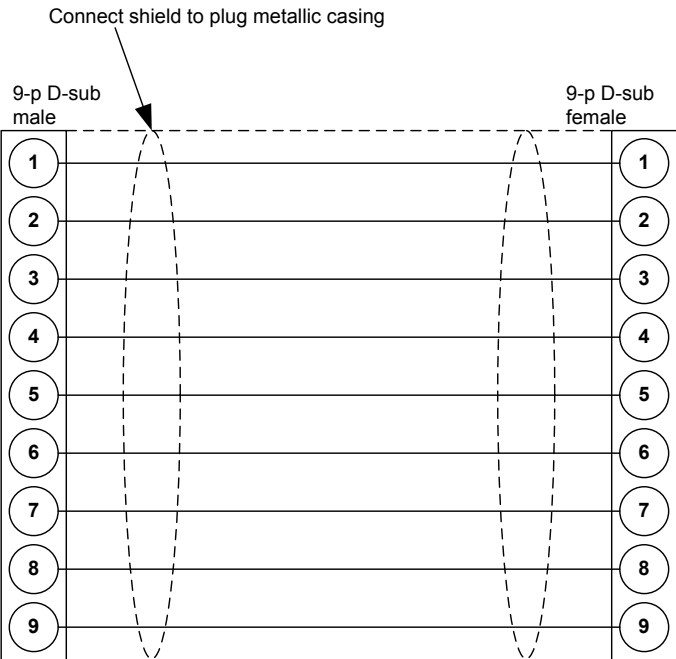
NOTE You do not have to use the same CAN bus interface in all of the controllers. However, using the same CAN bus interface is recommended.

PMS lite communication using CAN bus interfaces example



4.3.10 Display cable (option J)

A standard computer extension cable can be used (9-pole D-sub male/female plugs) or a cable can be tailored.



Wires min. 0.22 mm², max. cable length 6 m.

Cable types: Belden 9540, BICC H8146, Brand Rex BE57540 or equivalent.

NOTE Do not use tools or brute force when tightening the finger-screws on the display cable.

5. Technical specifications

AC measurements and protections

The controller measures the voltage and current on one side of a breaker, and the voltage on the other side.

Voltage measurements: All voltages are phase-to-phase AC voltages. There are specifications for **Low** and **High** voltage ranges. The voltage range is determined by U_n . For terminals 79 to 84, U_n is the voltage transformer secondary in parameter 6042. For terminals 85 to 89, U_n is the voltage transformer secondary in parameters 6052/6062. For voltages below the truncation level, 0 V is shown.

Current measurements: All currents are AC currents. There are specifications for **Low** and **High** current ranges. The current range is determined by I_N , the current transformer secondary in parameter 6044. For currents below the truncation level, 0 A is shown.

The voltage range is independent of the current range, and vice versa.

All specifications are within the reference conditions, unless otherwise mentioned.

Voltage measurements	Nominal value (U_n): 100 to 690 V. Low: $100 \leq U_n \leq 240$ V High: $240 < U_n \leq 690$ V Reference range: Low: 65 to 324.0 V High: 156.7 to 931.5 V Measurement range: Low: 5.0 to 324.0 V, Truncation: 2 V High: 12.0 to 931.5 V, Truncation: 5 V Accuracy: Low: 5.0 to 324.0 V: ± 0.5 % or ± 0.5 V (whichever is greater) High: 12.0 to 931.5 V: ± 0.5 % or ± 1.2 V (whichever is greater) UL/cUL Listed: 600 V AC phase-phase Consumption: Maximum 0.25 VA/phase
Voltage and altitude	Operating altitude: 0 to 4000 m above sea level 2001 to 4000 m: Maximum 480 V AC phase-phase for measuring 3W4 voltage. No derating for 3W3.
Voltage withstand	$U_n + 35$ % continuously $U_n + 45$ % for 10 seconds
Current measurements	Nominal value (I_N): Low: 1 A AC from current transformer High: 5 A AC from current transformer Measurement range: Low: 0.005 to 4.0 A, Truncation: 4 mA High: 0.025 to 20.0 A, Truncation: 20 mA Accuracy: Low: 0.005 to 4.0 A: ± 0.5 % or ± 5 mA (whichever is greater) High: 0.025 to 20.0 A: ± 0.5 % or ± 25 mA (whichever is greater) UL/cUL Listed: From listed or R/C (XODW2.8) current transformers 1 or 5 A Consumption: Maximum 0.3 VA/phase

Current withstand	10 A continuous 20 A for 1 minute 20 x I _N for 10 seconds (maximum 75 A) 80 x I _N for 1 second (maximum 300 A)
Frequency measurements	Nominal value: 50 Hz or 60 Hz Reference range: 45 to 66 Hz Measurement range: 10 to 75 Hz System frequencies Accuracy: 45 to 66 Hz ±10 mHz, within the temperature operating range and the voltage range: Low: 30 to 324.0 V High: 72 to 931.5 V Phase frequencies Accuracy: 45 to 66 Hz: ±15 mHz, within the temperature operating range 10 to 75 Hz: ±50 mHz, within the temperature operating range
Phase angle (voltage) measurement	Measurement range: -179.9 to 180° Accuracy: -179.9 to 180°: 0.2°, within the temperature operating range
Power measurement	Accuracy: ±0.5 % of measured value or ±0.5 % of U _n * I _N , whichever is greater, within the current measurement range
Temperature and accuracy	Reference range: 15 to 30 °C (59 to 86 °F) Reference range option Q2 (AC voltage only): -25 to 60 °C (-13 to 140 °F) Operating range: -25 to 70 °C (-13 to 158 °F) Temperature-dependent accuracy outside the reference range: Voltage: Additional: ±0.2 %, or ±0.2 V (Low) / ±0.5 V (High) per 10 °C (18 °F) (whichever is greater) Current: Additional: ±0.2 %, or ±2 mA (Low) / ±10 mA (High) per 10 °C (18 °F) (whichever is greater) Power: Additional: ±0.2 %, or ±0.2 % of U _n * I _N per 10 °C (18 °F) (whichever is greater)

General specifications

Aux. supply	Terminals 1 and 2: 12/24 V DC nominal (8 to 36 V DC operational). Maximum 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). Maximum 5 W consumption 0 V DC for maximum 10 ms when coming from at least 24 V DC (cranking dropout) The aux. supply inputs are to be protected by a 2 A time-delay fuse. UL/cUL Listed: AWG 24
Digital inputs	Optocoupler, bi-directional ON: 8 to 36 V DC Impedance: 4.7 kΩ OFF: <2 V DC
Analogue inputs	-10 to +10 V DC: Not galvanically separated. Impedance: 100 kΩ (analogue load sharing lines) 0(4) to 20 mA: Impedance 50 Ω. Not galvanically separated (M15.X)
RPM	RPM (MPU): 2 to 70 V AC, 10 to 10000 Hz, maximum 50 kΩ
Multi-inputs Engine interface board slot #7	0(4) to 20 mA: 0 to 20 mA, ±1 %. Not galvanically separated Digital: Maximum resistance for ON detection: 100 Ω. Not galvanically separated Pt100/1000: -40 to 250 °C, ±1 %. Not galvanically separated. To EN/IEC60751 RMI: 0 to 1700 Ω, ±2 %. Not galvanically separated 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 EN/IEC60751

	V DC: 0 to 5 V DC, $\pm 2\%$. 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: $t_{on} = 5$ seconds, $t_{off} = 15$ seconds. (Controller status output: 1 A)
Open collector outputs	Supply: 8 to 36 V DC, maximum 10 mA (terminal 20, 21, 22 (com))
Analogue outputs	0(4) to 20 mA and ± 25 mA. Galvanically separated. Active output (internal supply). Load maximum 500 Ω . UL/cUL Listed: Max. 20 mA output Update rate: Transducer output: 250 ms. Regulator output: 100 ms Accuracy: Analogue outputs: Class 1.0 according to total range Option EF5: Class 4.0 according to total range To EN/IEC60688
Load sharing lines	-5 to 0 to +5 V DC. Impedance: 23.5 k Ω
Material	All plastic materials are self-extinguishing according to UL94 V1
Plug connections	Controller AC current: 0.75 to 4.0 mm ² stranded wire. UL/cUL Listed: AWG 18 AC voltage: 0.5 to 2.5 mm ² stranded wire. UL/cUL Listed: AWG 20 Relays: UL/cUL Listed: AWG 22 Terminals 98-116: 0.2 to 1.5 mm ² stranded wire. UL/cUL Listed: AWG 24 Other: 0.2 to 2.5 mm ² stranded wire. UL/cUL Listed: AWG 24 Tightening torque: 0.5 N·m (5-7 lb-in) Service port: USB B Ethernet/Modbus TCP/IP connector: RJ-45 DU-2 display 9-pole D-sub female Tightening torque: 0.2 N·m
Governors and AVR	Interfaces to all governors and AVR's using analogue, relay control or CAN-based J1939 communication See interfacing guide at www.deif.com
Approvals	UL/cUL Listed to UL/ULC6200:2019 1.ed See www.deif.com for the most recent approvals.
UL/cUL Listed	Controller A suitable type 1 (flat surface) enclosure is required: Unventilated/ventilated with filters for controlled/pollution degree 2 environment Flat surface mounting - Type 1 enclosure Installation: To be installed in accordance with the NEC (US) or the CEC (Canada) Use 90 °C copper conductors only Wire Size: AWG 30-12 Tightening torque: 5-7 lb-in. All inputs and outputs (except the AC voltage terminals): These must only be connected to limited voltage circuits from the engine starting battery protected by a 2 A DC max. time-delay fuse. Communication circuits: Only connect to communication circuits of a listed system/equipment DU-2 Display Flat surface mounting - Type 1 enclosure Power supply: The controller, or a separate Class 2 source AOP-2 Wiring: Use 90 °C copper conductors only

	Mounting: For use on a flat surface of type 1 enclosure. Main disconnect must be provided by installer. Installation: To be installed in accordance with the NEC (US) or the CEC (Canada) DC/DC converter for AOP-2 Tightening torque: 0.5 Nm (4.4 lb-in) Wire size: AWG 22-14 Tightening torque: Panel door mounting 0.7 N·m, D-sub screw 0.2 N·m
Weight	Controller: 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.) DU-2 display or AOP: 0.4 kg (0.9 lbs.)

For the TDU technical specifications, see the **TDU Data sheet**. For more information, see www.deif.com/products/tdu-series

5.1 Environmental specifications

Operating temperature (including DU-2 display and AOP)	-25 to 70 °C (-13 to 158 °F) UL/cUL Listed: Max. surrounding air temperature: 55 °C (131 °F)
Storage temperature (including DU-2 display and AOP)	-40 to 70 °C (-40 to 158 °F)
Climate	97 % RH to IEC 60068-2-30
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 digital input groups and other I/Os: 550 V, 50 Hz, 1 min.
Mounting	DIN-rail mount or base mount with six screws Tightening torque: 1.5 N·m
Safety	To EN/IEC 61010-1, installation category (over-voltage category) III, 600 V, pollution degree 2 To EN/IEC 60255-27 over-voltage category III, 600 V, pollution degree 2 To UL/ULC 6200:2019 1.ed, over-voltage category III, 600 V, pollution degree 2
EMC	To EN/IEC 61000-6-2, EN/IEC 61000-6-4, EN/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 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)
Shock (base mount)	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)
Protection	Controller: IP20. DU-2 display and AOP: IP40 (IP54 with gasket: Option L). UL/cUL Listed: Type Complete Device, Open Type. To EN/IEC 60529