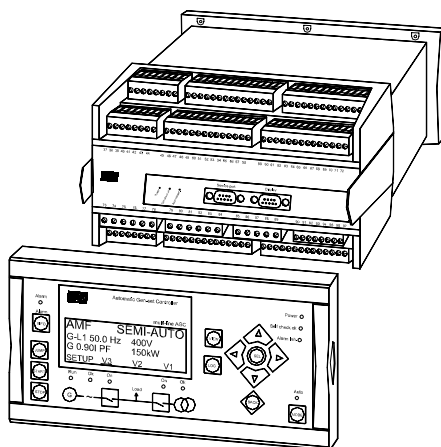


Installation Instructions



-power in control-

Automatic Gen-set Controller 4189340259K (UK)



- *Mounting*
- *Board slot positions*
- *Terminal strip overview*
- *I/O lists*
- *Wiring*



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1. About this document

General purpose

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

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



Please make sure that you read this manual before starting to work with the Multi-line 2 controller and the gen-set to be controlled. Failure to do this could result in damaging the equipment or even worse injury of personnel.

Intended users

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

Contents/overall structure

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

2. Warnings and legal information

Legal information and responsibility

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

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

Electrostatic discharge awareness

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

Safety issues

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



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

Notes

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

Note symbol



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

Warning symbol

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

3. General product information

Introduction

The AGC is part of the DEIF Multi-line 2 product family. Multi-line 2 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 is to offer a cost-effective solution to gen-set builders, who need a flexible generator protection and control unit for medium to large gen-set applications. Being part of the Multi-line product family, the standard functions can be supplemented with a variety of optional functions.

Type of product

The Automatic Gen-set Controller is a micro-processor based control unit containing all necessary functions for protection and control of a gen-set.

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

Options

The Multi-line 2 product range consists of different basic versions, which can be supplemented with the flexible options needed to provide the optimum solution. The options cover e.g. various protections for generator, busbar and mains, voltage/VAr/PF control, various outputs, power management, serial communication, additional operator display, etc.

Standard functions

In the following paragraphs the standard functions of the AGC are listed.

Operation modes

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

Engine control

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

Protection (ANSI)

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

Display

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

M-logic

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

GSM communication

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

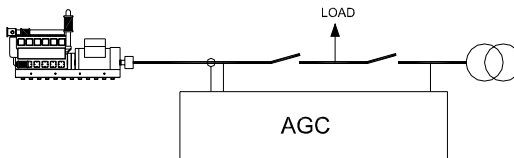
Standard and optional applications

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



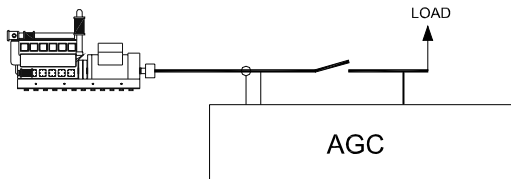
All units are supplied with AMF as factory setting.

Automatic mains failure, AMF



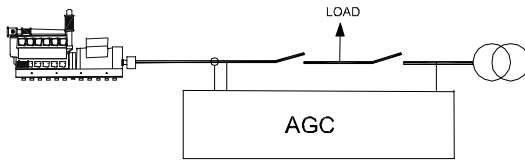
No.	Setting		Setting
6061	Gen-set mode	AMF	AMF

Island operation



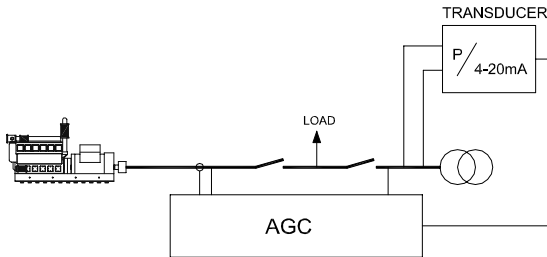
No.	Setting		Setting
6061	Gen-set mode	Island operation	Island operation

Fixed power/base load



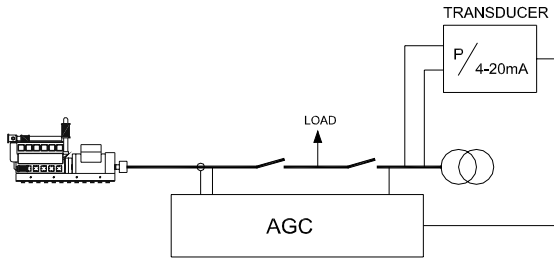
No.	Setting		Setting
6061	Gen-set mode	Fixed power	Fixed power

Peak shaving



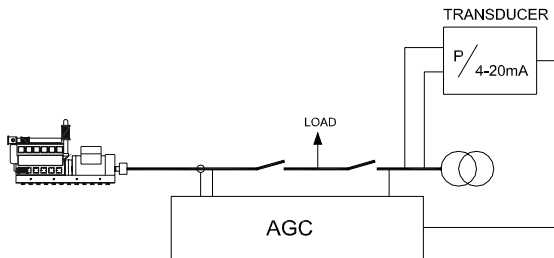
No.	Setting		Setting
6061	Gen-set mode	Peak shaving	Peak shaving

Load takeover



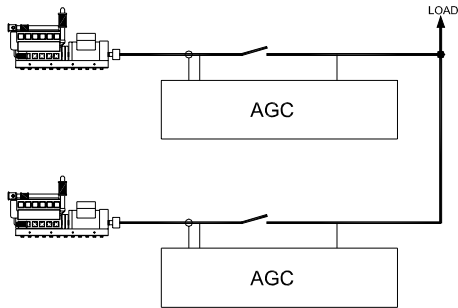
No.	Setting		Setting
6061	Gen-set mode	Load takeover	Load takeover

Mains power export (fixed power to mains)



No.	Setting		Setting
6061	Gen-set mode	Mains power export	Mains power export

Multiple gen-sets, load sharing



No.	Setting		Setting
6061	Gen-set mode	Island operation	Island operation



For information about the Power Management application, refer to 'Description of options' (G5).

4. Mounting

Mounting of the unit

The unit is designed for mounting inside the switchboard. The display can be installed on the switchboard door and connected to the main unit with a display cable. The technical specifications in chapter 7 include detailed information about:

- Unit dimensions
- Panel cutout
- Screw hole positions and dimensions

Panel cutout

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

Mounting instructions

The unit can be mounted in two different ways:

1. Mounted directly on a DIN rail.
2. Fastened with screws to the rear side of the cabinet. Six screw holes are available for this mounting method.



DEIF recommends using the screw hole fastening.

5. Hardware

Board slot positions

The unit housing is divided into board slot positions. This means that the unit 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 illustrated below.

Slot type	Option	Slot #1	Slot #3	Slot #5	Slot #7
Terminals		1-28	37-64	73-89	98-125
Power supply	Standard	X			
Measuring	Standard			X	
Engine interface	Standard (M1)				X
Engine interface	M2				X
Load sharing	G3		X		
Input output extension	M12		X		

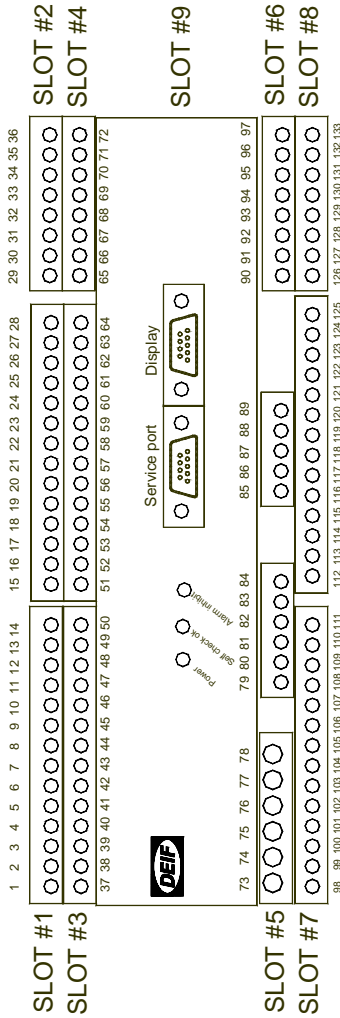
Slot type	Option	Slot #2	Slot #4	Slot #6	Slot #8
Terminals		29-34	65-72	90-97	126-133
Voltage/VAr/PF control	D1		X		
Analogue controller outputs	E1		X		
Analogue transducer outputs	F1			X	
Combination outputs	EF2/EF4		X		
PWM output	EF3		X	X	
PWM output	EF5		X		
Power management	G5				X
Serial communication	H2/H3	X			
Engine communication	H4/H5/H6				X
I/O extension cards	M13/M14/M15			X	



Only hardware options, which will affect the hardware of the unit, are represented in the table. The software options will be seen through the PC utility software. The absent software options can be located in the data sheet.

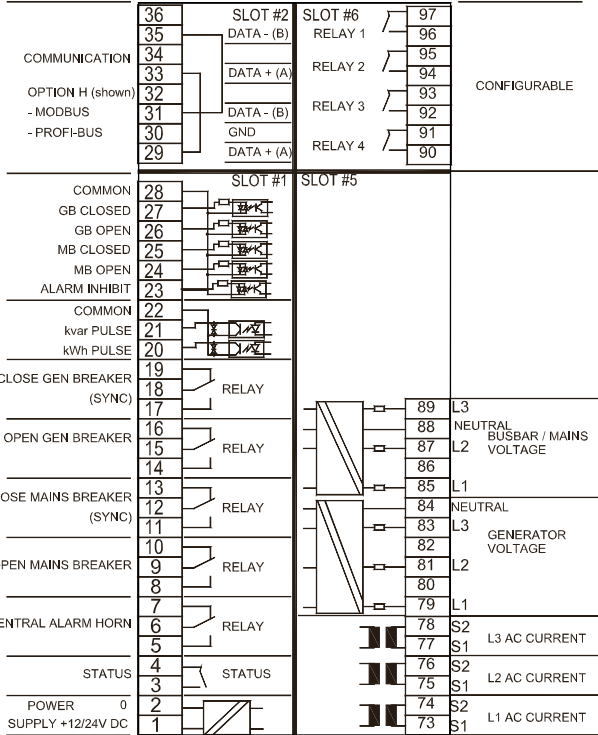
Unit top side overview

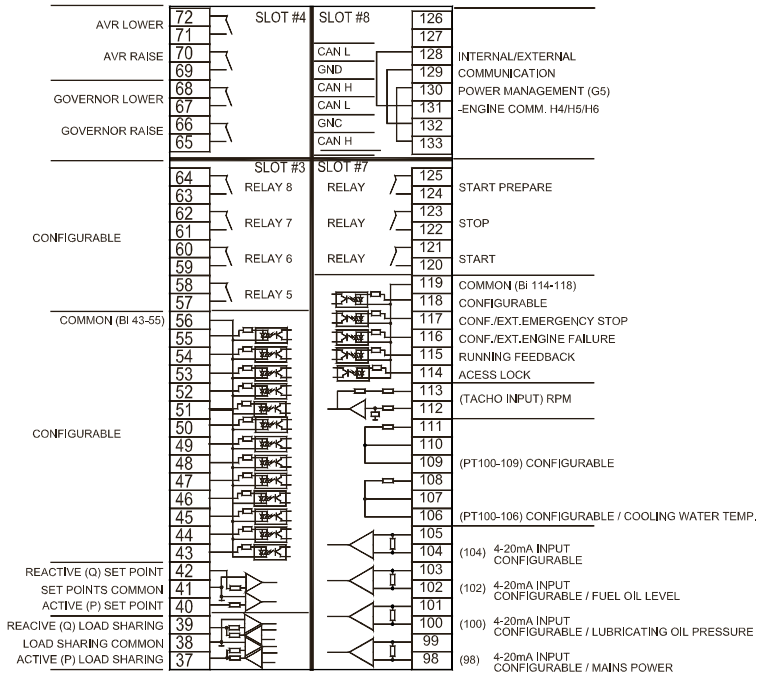
An overview of the terminals is presented below. The slot positions are as follows:



Terminal strip overview

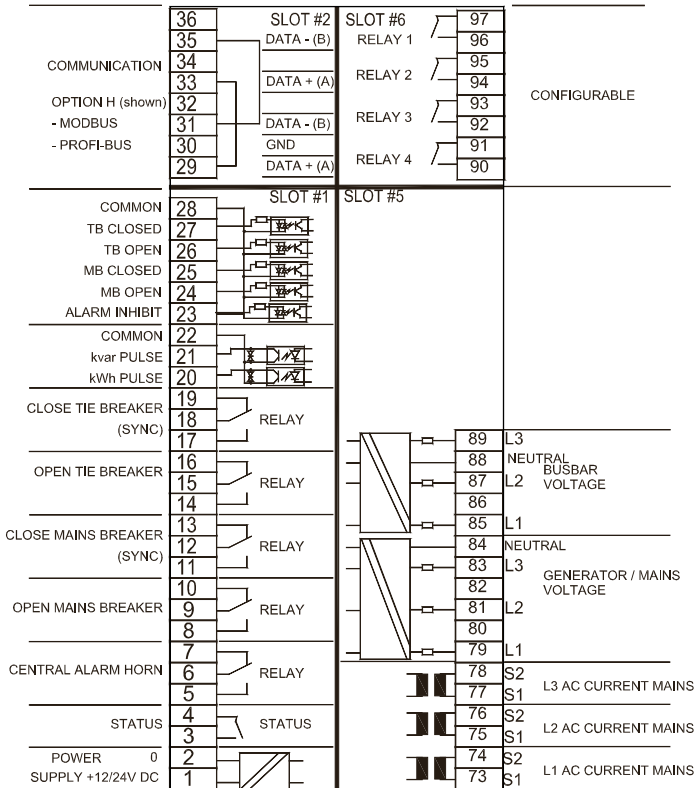
Standard unit





Terminal strip overview

Mains 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

Power supply PCB, slot #1

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

Term.	Function	Technical data	Description
22	Com.	Common	Common terminal for terminals 20 and 21
23	Digital input 23	Optocoupler	Alarm inhibit
24	Digital input 24	Optocoupler	Mains breaker open
25	Digital input 25	Optocoupler	Mains breaker closed
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

Power supply PCB, slot #1 – AGC mains unit

The I/O list below is for the AGC mains unit.

Term.	Function	Technical data	Description
1	+12/24V DC	12/24V DC +/-30%	Power supply
2	0V DC		
3	NC	Status relay 24V DC/1A	Normally closed relay, processor/power supply status supervision
4	Com.		
5	NO	Relay 250V AC/8A	Central alarm HORN
6	Com.		
7	NC		
8	NO	Relay 250V AC/8A	Open mains breaker
9	Com.		
10	NC		
11	NO	Relay 250V AC/8A	Close mains breaker (synchronising)
12	Com.		
13	NC		
14	NO	Relay 250V AC/8A	Open tie breaker (deload)
15	Com.		
16	NC		
17	NO	Relay 250V AC/8A	Close tie breaker
18	Com.		
19	NC		
20	Open col- lector 1	Transistor out	Pulse output 1, kWh counter
21	Open col- lector 2	Transistor out	Pulse output 2, kVArh counter
22	Com.	Common	Common terminal for termi- nals 20 and 21
23	Digital input 23	Optocoupler	Alarm inhibit

Term.	Function	Technical data	Description
24	Digital input 24	Optocoupler	Mains breaker open
25	Digital input 25	Optocoupler	Mains breaker closed
26	Digital input 26	Optocoupler	Tie breaker open
27	Digital input 27	Optocoupler	Tie breaker closed
28	Com.	Common	Common for terminals 23 to 27

Slot #2, serial communication (option H)

Modbus (option H2)

Term.	Function	Description
29	DATA + (A)	Modbus RTU, RS485
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.

Profibus (option H3)

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

The serial communication line should be terminated between DATA + and DATA - with a resistor equal to the cable impedance. The terminals 29/32, 30/33 and 31/34 are internally connected.

Use shielded twisted pair cable.

Slot #3, load sharing control

Term.	Function	Technical data	Description
37	-5...0...5V DC	Analogue I/O	Active load sharing line
38	Com.	Common	Common for load sharing lines
39	-5...0...5V DC	Analogue I/O	Reactive load sharing
40	-10...0...10V DC	Analogue I/O	f/P setpoint (passive)
41		Common	Common for 40/42
42	-10...0...10V DC	Analogue I/O	U/Q setpoint (passive)
43	Not used		
44			
45			
46			
47			
48			
49			
50			
51			
52			
53			
54			
55			
56			
57			
58			
59			
60			
61			
62			
63			
64			

Slot #3, 13 binary inputs and 4 relay outputs

Term.	Function	Technical data	Description
37	Not used		
38			
39			
40			
41			
42			
43	Binary input	Optocoupler	Configurable
44	Binary input	Optocoupler	Configurable
45	Binary input	Optocoupler	Configurable
46	Binary input	Optocoupler	Configurable
47	Binary input	Optocoupler	Configurable
48	Binary input	Optocoupler	Configurable
49	Binary input	Optocoupler	Configurable
50	Binary input	Optocoupler	Configurable
51	Binary input	Optocoupler	Configurable
52	Binary input	Optocoupler	Configurable
53	Binary input	Optocoupler	Configurable
54	Binary input	Optocoupler	Configurable
55	Binary input	Optocoupler	Configurable
56	Com.	Common	Common for terminals 43 to 55
57	NO	Relay 5 250V AC/8A	Configurable
58	Com.		
59	NO	Relay 6 250V AC/8A	Configurable
60	Com.		
61	NO	Relay 7 250V AC/8A	Configurable
62	Com.		
63	NO	Relay 8 250V AC/8A	Configurable
64	Com.		

Slot #4, governor and AVR control relay outputs

Term.	Function	Technical data	Description
65	NO	Relay 250V AC/8A	Generator GOV: Increase frequency
66	Com.		
67	NO	Relay 250V AC/8A	Generator GOV: Decrease frequency
68	Com.		
69	Not used	Relay 250V AC/8A	Generator AVR: Increase voltage (option D1)
70	Com.		
71	Not used	Relay 250V AC/8A	Generator AVR: Decrease voltage (option D1)
72	Com.		

Slot #4, analogue outputs for governor and AVR control (option E)

Term.	Function	Description
65	Not used	
66	+/-20mA out	Speed governor setpoint output
67	0	
68	Not used	
69	Not used	
70	+/-20mA out	AVR voltage setpoint output (option D1)
71	0	
72	Not used	

Slot #4, PWM output (option EF3 or EF5 and option D)

Term.	Function	Description
65	ANA +	Analogue +/-20mA for AVR
66	ANA -	
67	PWM +	PWM speed governor signal
68	PWM -	
69	Relay	Relay output for AVR. Raise voltage (option D1)
70	Relay	
71	Relay	Relay output for AVR. Lower voltage (option D1)
72	Relay	

Slot #4, PWM output (option EF3 or EF5 and not option D)

Term.	Function	Description
65	Not used	
66	Not used	
67	PWM +	PWM speed governor signal
68	PWM -	
69	Not used	
70	Not used	
71	Not used	
72	Not used	

Slot #4, governor/AVR output (option EF4)

Term.	Function	Description
65	ANA +	Analogue +/-20mA for GOV
66	ANA -	
67	Not used	
68	Not used	
69	Relay	Relay output for AVR. Raise voltage (option D1)
70	Relay	
71	Relay	Relay output for AVR. Lower voltage (option D1)
72	Relay	

Term.	Function	Description
65	ANA +	Analogue +/-20mA for AVR
66	ANA -	
67	Not used	
68	Not used	
69	Relay	Relay output for GOV. Increase frequency
70	Relay	
71	Relay	Relay output for GOV. Decrease frequency
72	Relay	

Slot #5, AC measuring

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

Slot #5, AC measuring – AGC mains unit

The I/O list below is for the AGC mains unit.

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

Slot #6, optional I/O cards

It is only possible to install one of the following optional cards in slot #6.

Option M13, 7 binary inputs

Term.	Function	Technical data	Description
90	Com.	Common	Common for terminals 90-97
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

Option M14, 4 relay outputs

Term.	Function	Technical data	Description
90	NO	Relay 4 250V AC 8A	Configurable
91	Com.		
92	NO	Relay 3 250V AC 8A	Configurable
93	Com.		
94	NO	Relay 2 250V AC 8A	Configurable
95	Com.		
96	NO	Relay 1 250V AC 8A	Configurable
97	Com.		

Option M15, 4 analogue inputs 4-20mA

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

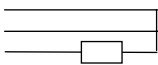

Option F1, analogue transducer output

Term.	Function	Description
90	Not used	
91	0	Analogue output 1, selectable
92	0(4)-20mA out	
93	Not used	
94	Not used	
95	0	Analogue output 2, selectable
96	0(4)-20mA out	
97	Not used	

Option EF3, droop output

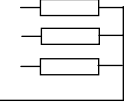
Term.	Function	Description
90	Not used	
91	Not used	
92	PWM +	PWM speed governor signal
93	PWM -	
94	Not used	
95	Not used	
96	Not used	
97	Not used	

Slot #7, Engine interface card (standard board – M1)

Term.	Function	Technical data	Description
98	Analogue input 98 +	+4...20mA in	4...20mA input/mains power – peak shaving/configurable
99	Analogue input 98 -	GND	
100	Analogue input 100 +	+4...20mA in	4...20mA input/lubricating oil pressure/configurable
101	Analogue input 100 -	GND	
102	Analogue input 102 +	+4...20mA in	4...20mA input/fuel oil level/configurable
103	Analogue input 102 -	GND	
104	Analogue input 104 +	+4...20mA in	4...20mA input/configurable
105	Analogue input 104 -	GND	
106	PT100 input 106 – P		3-wire PT100 input/cooling water temp./configurable -40...+250°C According to EN 60751 and IEC 751
107	PT100 input 106 – I		
108	PT100 input 106 – O		
109	PT100 input 109 – P		3-wire PT100 input/configurable -40...+250°C According to EN 60751 and IEC 751
110	PT100 input 109 – I		
111	PT100 input 109 – O		
112	Tacho input	0.5...70V AC/ 10...10.000Hz	RPM/magnetic pickup/overspeed
113	Tacho input		
114	Binary input 114	Optocoupler	Access lock, not configurable
115	Binary input 115	Optocoupler	Running feedback, not configurable
116	Binary input 116	Optocoupler	External engine failure, configurable

Term.	Function	Technical data	Description
117	Binary input 117	Optocoupler	External emergency stop activated, configurable
118	Binary input 118	Optocoupler	Configurable
119	Com.	Common	Common for terminals 114-118
120	NO	Relay	Start
121	Com.	250V AC/8A	
122	NO	Relay	Stop
123	Com.	250V AC/8A	
124	NO	Relay	Start prepare
125	Com.	250V AC/8A	

Slot #7, Engine interface card (M2 board)

Term.	Function	Technical data	Description/preconfiguration
98	Analogue input 98	+4...20mA in	4...20mA input/mains power - peak shaving, configurable
99	Analogue input 98	GND	
100	Analogue input 100	+4...20mA in	4...20mA input/lubricating oil pressure, configurable
101	Analogue input 100	GND	
102	Analogue input 102	+4...20mA in	4...20mA input/fuel oil level, configurable
103	Analogue input 102	GND	
104	VDO 104		Configurable (oil pressure)
105	VDO 105		Configurable (water temperature)
106	VDO 106		Configurable (fuel tank level)
107	Common		Common for terminals 104-106
108	Tacho input	0.5...70V AC 10...10.000 Hz	RPM/magnetic pickup/overspeed
109	Tacho input		
110	Digital input 110	Optocoupler	Configurable
111	Digital input 111	Optocoupler	Configurable
112	Digital input 112	Optocoupler	Configurable
113	Digital input 113	Optocoupler	Configurable
114	Digital input 114	Optocoupler	Access lock, not configurable
115	Digital input 115	Optocoupler	Running feedback, not configurable
116	Digital input 116	Optocoupler	External engine failure, text configurable
117	Digital input 117	Optocoupler	External emergency stop activated, text configurable

Term.	Function	Technical data	Description/preconfiguration
118	Digital input 118	Optocoupler	Configurable
119	Com.	Common	Common for terminals 110-118
120	NO	Relay	Start/crank
121	Com.	250V AC/8A	
122	NO	Relay 9	Stop coil/run (fuel) coil (selectable)
123	Com.	250V AC/8A	
124	NO	Relay	Start prepare
125	Com.	250V AC/8A	

Slot #7, Engine interface card (standard board – M1) AGC mains

Term.	Function	Technical data	Description
98	Not used		Not used
99	Not used		Not used
100	Not used		Not used
101	Not used		Not used
102	Not used		Not used
103	Not used		Not used
104	Not used		Not used
105	Not used		Not used
106	Not used		Not used
107	Not used		Not used
108	Not used		Not used
109	Not used		Not used
110	Not used		Not used
111	Not used		Not used
112	Not used		Not used
113	Not used		Not used
114	Binary input 114	Optocoupler	Access lock, not configurable
115	Not used		Not used
116	Not used		Not used
117	Binary input 117	Optocoupler	External emergency stop activated, configurable
118	Binary input 118	Optocoupler	Configurable
119	Com.	Common	Common for terminals 114-118
120	Not used		Not used
121	Not used		Not used
122	Not used		Not used
123	Not used		Not used
124	Not used		Not used
125	Not used		Not used

Slot #7, Engine interface card (M2 board) AGC mains

Term.	Function	Technical data	Description/preconfiguration
98	Not used		Not used
99	Not used		Not used
100	Not used		Not used
101	Not used		Not used
102	Not used		Not used
103	Not used		Not used
104	Not used		Not used
105	Not used		Not used
106	Not used		Not used
107	Not used		Not used
108	Not used		Not used
109	Not used		Not used
110	Digital input 110	Optocoupler	Configurable
111	Digital input 111	Optocoupler	Configurable
112	Digital input 112	Optocoupler	Configurable
113	Digital input 113	Optocoupler	Configurable
114	Digital input 114	Optocoupler	Access lock, not configurable
115	Not used	Optocoupler	Not used
116	Not used	Optocoupler	Not used
117	Digital input 117	Optocoupler	External emergency stop activated, text configurable
118	Digital input 118	Optocoupler	Configurable
119	Com.	Common	Common for terminals 110-118
120	Not used		Not used
121	Not used		Not used
122	Not used		Not used
123	Not used		Not used
124	Not used		Not used
125	Not used		Not used

Slot #8, power management (option G5)

Term.	Function	Description
126	Not used	Internal communication
127	Not used	
128	Can-L	
129	GND	
130	Can-H	
131	Can-L	
132	GND	
133	Can-H	

The internal communication is used for power management purposes.

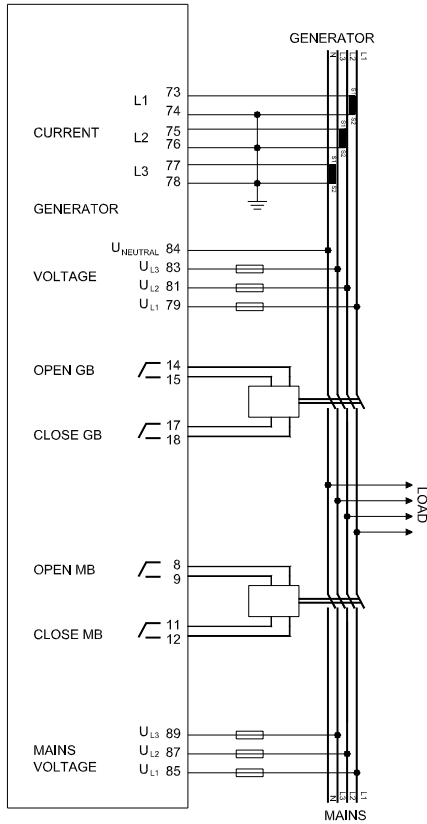
Slot #8, Caterpillar® CCM communication (option H4)

Term.	Function	Description
126	Not used	
127	Not used	
128	RxD	RS232 receive data from other unit
129	Not used	
130	TxD	RS232 transmit data from Multi-line
131	Not used	
132	GND	Ground
133	Not used	

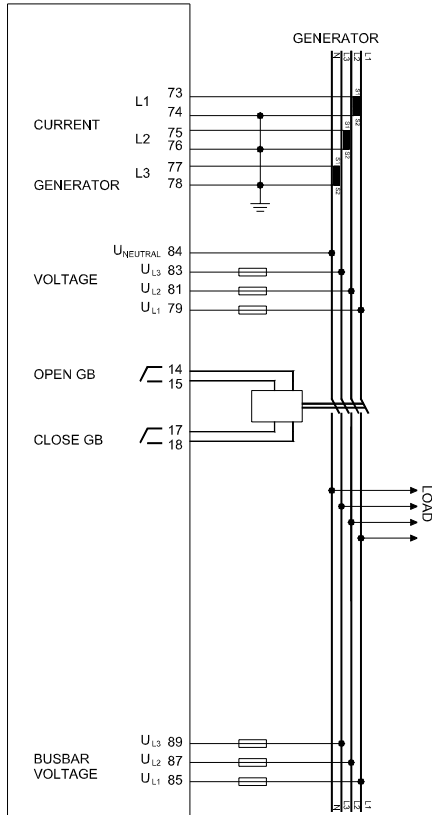
6. Wirings

AC connections

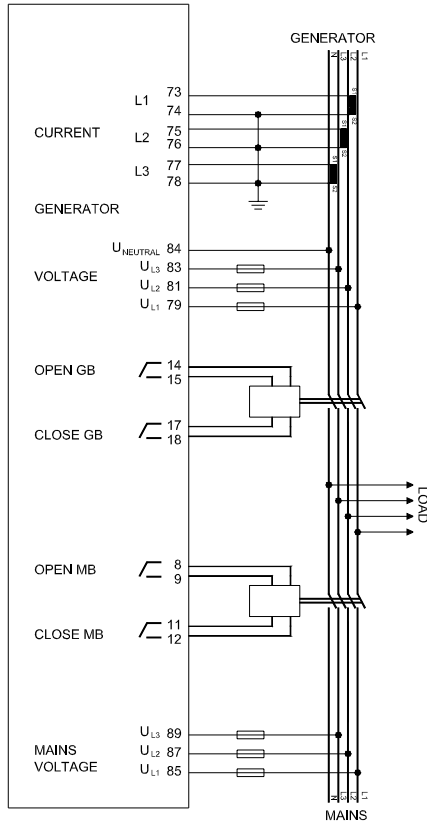
- AMF
- Fixed power/base load
- Peak shaving
- Load take over
- Mains power export



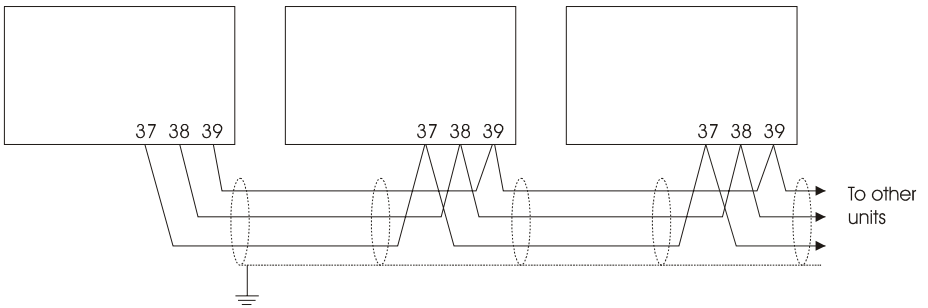
Island mode unit



Power management – AGC mains



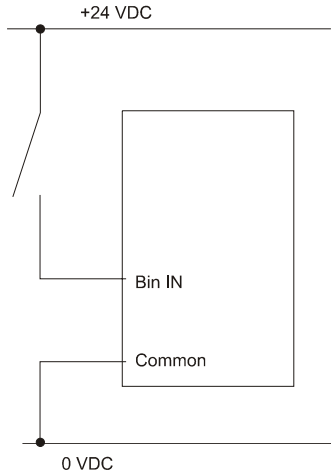
Load sharing lines



Always use a screened cable.

Binary inputs

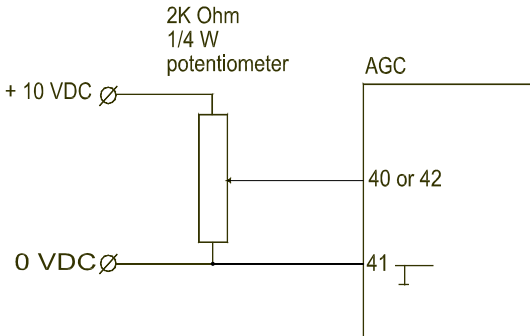
All binary inputs are 24V DC bi-directional optocoupler. Typical input is:



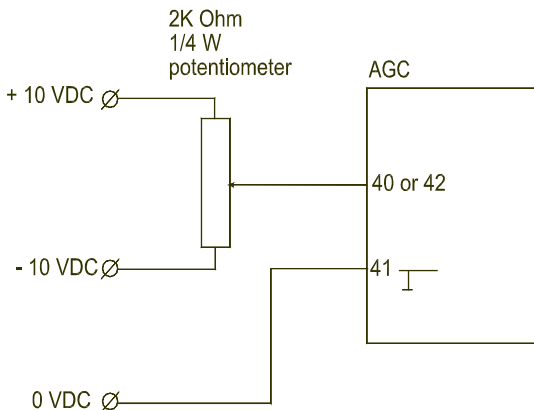
Analogue inputs (external setpoints)

The setpoint inputs are passive, i.e. an external power source is needed. This can be an active output from e.g. a PLC, or a potentiometer can be used.

0...10V DC input using potentiometer



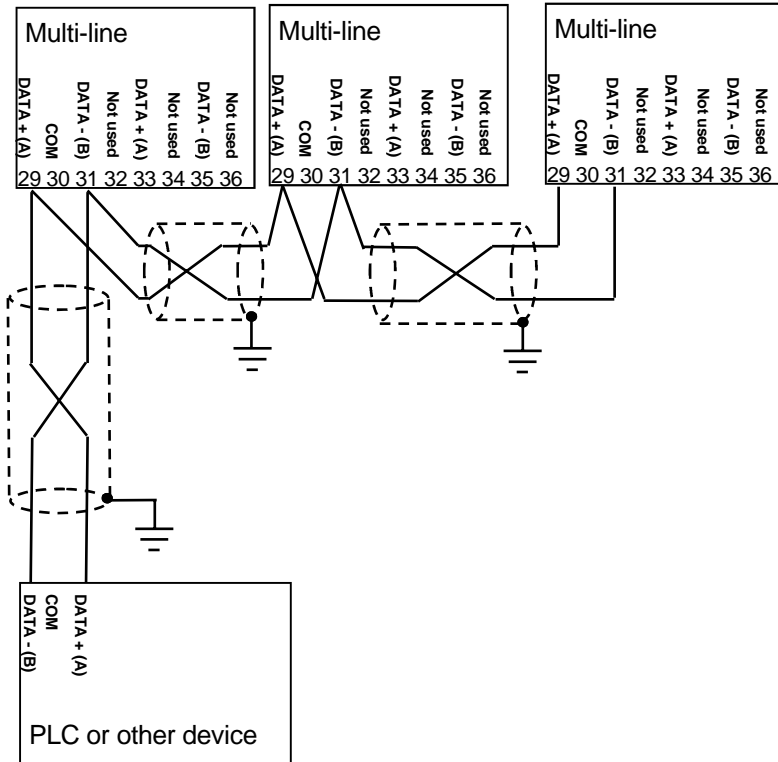
+/-10V input using potentiometer



External communication

Option H2, Modbus RTU

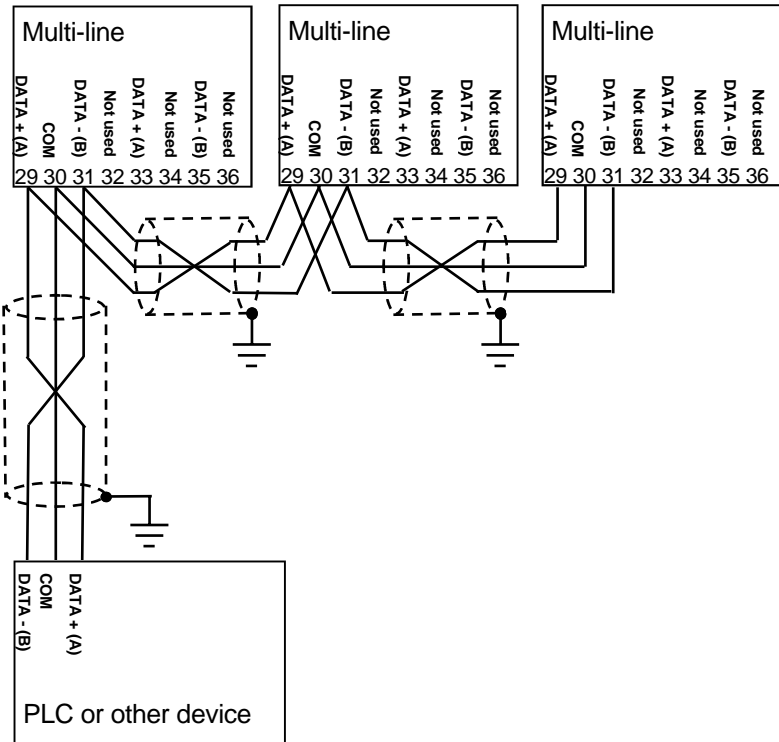
Connection with 2-wire screened cable (recommended):



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

i Use shielded twisted cable.

Connection with 3-wire shielded cable:



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



Use shielded twisted cable.



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

Normally, the Modbus does not need bias resistors (end terminators). These are only needed in case of very long lines and/or many nodes (>32) on the Modbus network. If bias resistors are needed, the calculation should be based on the following data:



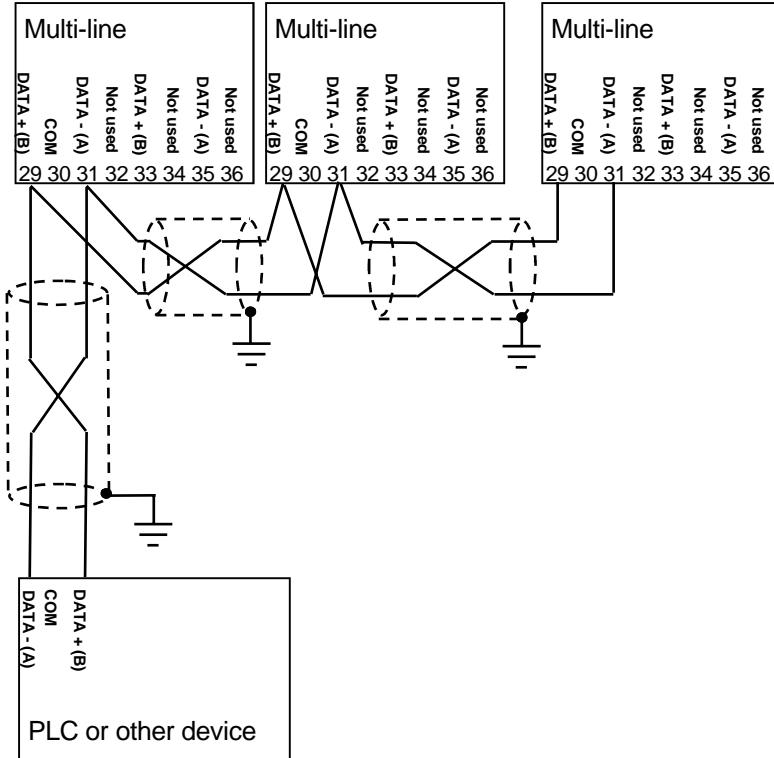
- A line internal pull-up bias resistor: 22k Ω
- B line internal pull-down bias resistor: 22k Ω
- Receiver input sensitivity: +/-200mV
- Receiver input impedance: 12k Ω



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

Option H3, Profibus DP

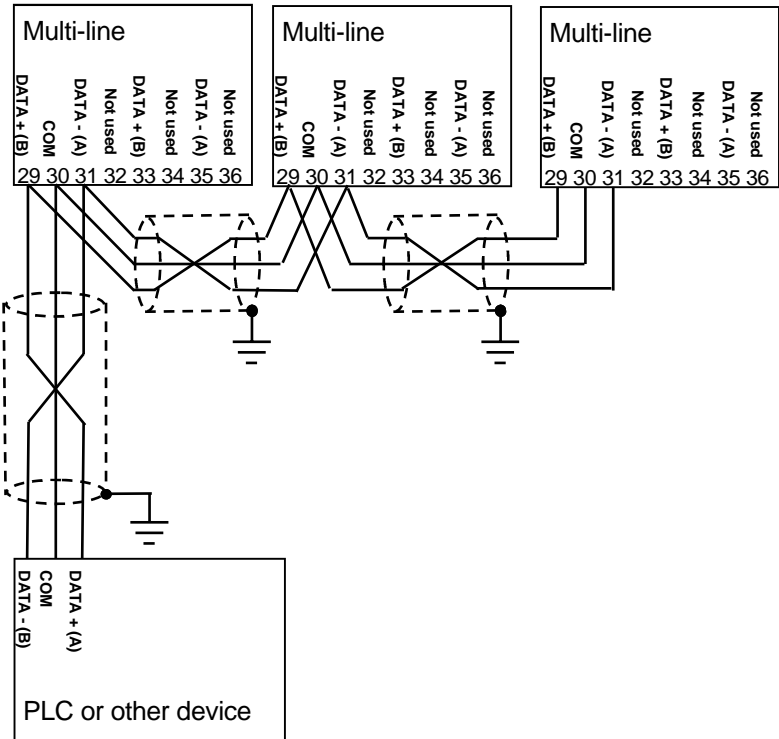
Connection with 2-wire screened cable (recommended):



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

i Use shielded twisted cable.

Connection with 3-wire shielded cable:



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

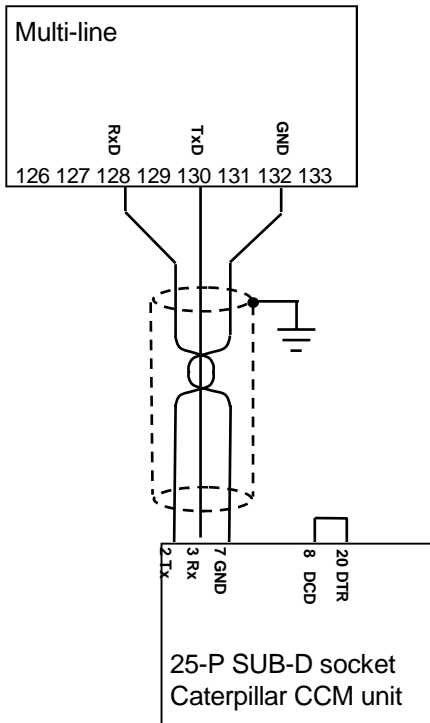
i Use shielded twisted cable.



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

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

Option H4, Caterpillar CCM

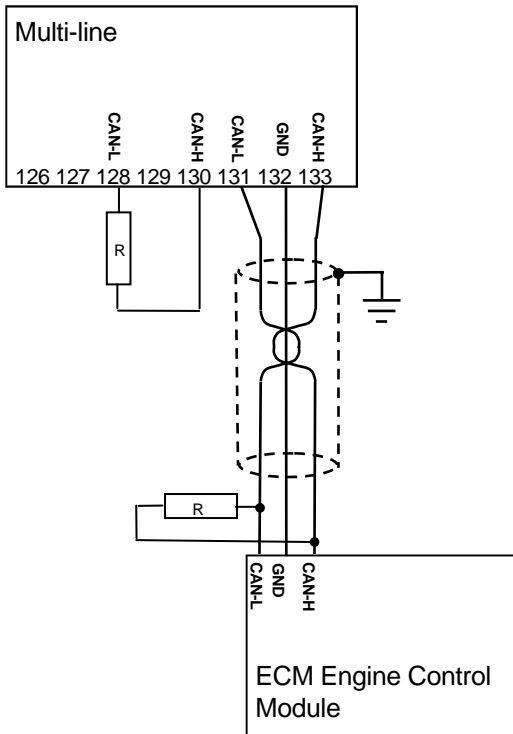


Connect shield to ground at one end only. Shield ends must be insulated with tape or insulation tubing.



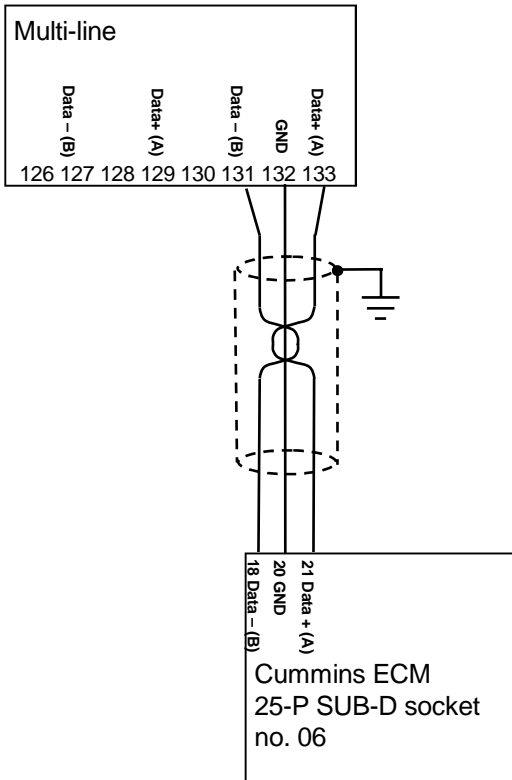
Use shielded twisted cable.

Option H5, J1939 and MTU MDEC



- i** ML-2 terminal 128 and 131 are internally connected.
ML-2 terminal 130 and 133 are internally connected.
- i** Connect shield to ground at one end only. Shield ends must be insulated with tape or insulation tubing.
- i** Use shielded twisted cable.
- i** End resistor R = 120 Ohm.

Option H6, Cummins engine communication



ML-2 terminal 127 and 131 are internally connected.
ML-2 terminal 129 and 133 are internally connected.



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



Use shielded twisted cable.

Normally, the communication does not need bias resistors (end terminators). These are only needed in case of very long lines between the 2 modules. If bias resistors are needed, the calculation should be based on the following data:



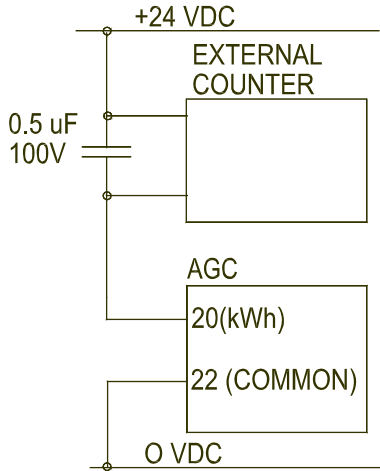
- A line internal pull-up bias resistor: 22k Ω
- B line internal pull-down bias resistor: 22k Ω
- Receiver input sensitivity: +/-200mV
- Receiver input impedance: 12k Ω



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

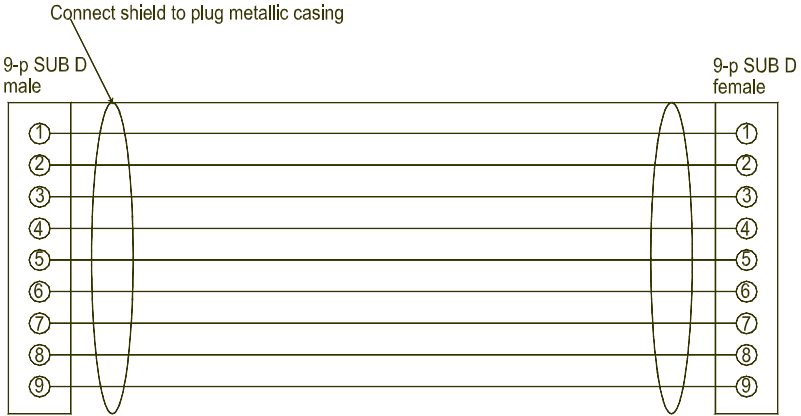
Optocoupler outputs for external counter

The kWh counter (terminals 20-22) and kVArh counter (terminals 21-22) outputs are low-power outputs. For that reason the following circuit must be applied:



Display cable (option J)

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

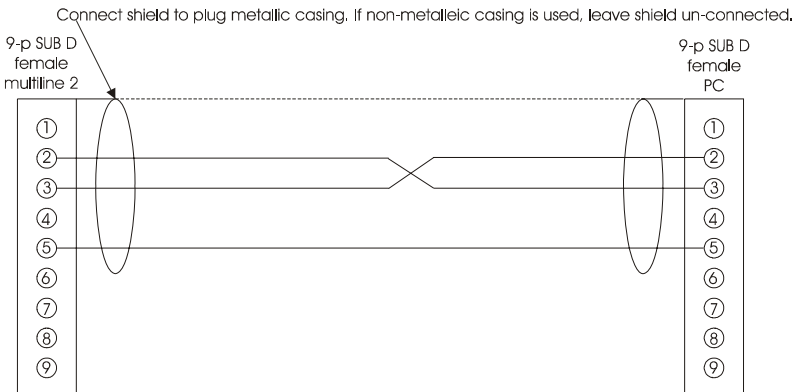


Wires min. 0.22m², max. cable length 6m.

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

Serial cable for PC with utility software (option J3)

A standard computer null-modem cable can be used (9-pole SUB-D female/female plugs), or a cable can be tailored:



NULL-MODEM CABLE.

7. Technical information

Technical specifications

Accuracy:	Class 1.0 Class 2.0 for neg. seq. current To IEC/EN 60688
Operating temp.:	-25...70°C (-13...158°F) (UL/cUL Listed: Max. surrounding air temp.: 55°C/131°F)
Storage temp.:	-40...70°C (-40...158°F)
Galv. separation:	Between AC voltage, AC current and other I/Os: 3250V AC, 50Hz, 1 min. Between analogue outputs and other I/Os: 500V DC, 1 min. Between binary input groups and other I/Os: 500V DC, 1 min.
Meas. voltage:	100-690V AC +/-20% (UL/cUL Listed: 110-480V AC phase-phase)
Consumption:	Max. 0.25VA/phase
Meas. current:	-1 or -5A AC (UL/cUL Listed: From CTs 1-5A)
Consumption:	Max. 0.3VA/phase
Current overload:	4 x I _n continuously 20 x I _n , 10 sec. (max. 75A) 80 x I _n , 1 sec. (max. 300A)
Meas. frequency:	30...70Hz

- Aux. supply:** 12/24V DC (8...36V continuously, 6V 1 sec.)
Max. 8W consumption
The aux. supply inputs are to be protected by a 2A slow blow fuse
Recommended power supply is DEIF's DCP-2 (UL/cUL Listed: AWG 24)
- Binary inputs:** Optocoupler, bi-directional
ON: Input voltage 8...36V DC
Impedance typically 4.7k Ω
OFF: <2V DC
- Relay outputs:** 250V AC/24V DC, 5A
(Unit status output: 1A)
(UL/cUL Listed: 250V AC/24V DC, 2A resistive load)
- Analogue inputs:** -10...0...+10V DC
Not galvanically separated
Impedance min. 100k Ω
4-20mA
Impedance max. 50 Ω
Not galvanically separated
PT100
According to IEC/EN 60751
VDO
Resistor inputs, internal supply max. 480 Ω
- Mounting:** DIN-rail mount or base mount with 6 screws
- Climate:** 97% RH to IEC 60068-2-30
- Load sharing lines:** -5...0...+5V DC
- Analogue outputs:** 0(4)...20mA
Galvanically separated
Active output (internal supply)
Load max. 500 Ω
(UL/cUL Listed: Max. 20mA output)

Safety:	To EN 61010-1, installation category (overvoltage category) III, 600V, pollution degree 2 To UL 508 and CSA 22.2 no. 14-05, overvoltage category III, 300V pollution degree 2
Protection:	Unit: IP20 Display: IP52 (IP54 with gasket: Option L) (UL/cUL Listed: Type Complete Device, Open Type) To IEC/EN 60529
EMC/CE:	To EN 61000-6-1/2/3/4 IEC 60255-26 IEC 60533 power distr. zone IACS UR E10 power distr. zone
Vibration:	3...13.2Hz: 2mm _{pp} 13.2...100Hz: 0.7g To IEC 60068-2-6 & IACS UR E10 10...60Hz: 0.15mm _{pp} 60...150Hz: 1g To IEC 60255-21-1 Response (class2) 10...150Hz: 2g To IEC 60255-21-1 Endurance (class2)
Shock (base mount):	10g, 11msec, half sine To IEC 60255-21-2 Response (class2) 30g, 11msec, half sine To IEC 60255-21-2 Endurance (class2) 50g, 11msec, half sine To IEC 60068-2-27
Bump:	20g, 16msec, half sine To IEC 60255-21-2 (class2)
Material:	All plastic materials are self-extinguishing according to UL94 (V1)

Plug connections: AC current: 4.0mm² multi stranded
(UL/cUL Listed: AWG28-10)
Tightening torque:
0.5-0.6 Nm (4.4-5.3 lb-in)

Other: 2.5mm² multi stranded
(UL/cUL Listed: AWG28-10)
Tightening torque:
0.5-0.6 Nm (4.4-5.3 lb-in)

Display: 9-pole Sub-D female
PC: 9-pole Sub-D male

Governors: Multi-line 2 interfaces to all governors, including GAC, Barber-Colman, Woodward and Cummins.
See interfacing guide at www.deif.com

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

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

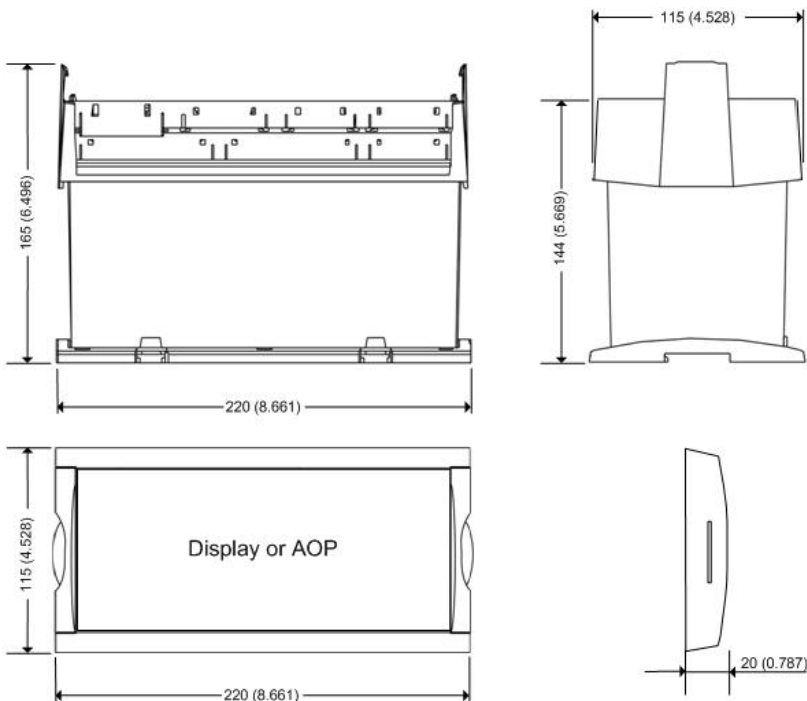
Approval: UL/cUL Listed to UL508

UL markings: Wiring:
Use 60/75°C copper conductors only
Mounting:
For use on a flat surface of type 1 enclosure
Installation:
To be installed in accordance with the NEC (US)
or the CEC (Canada)

Unit dimensions

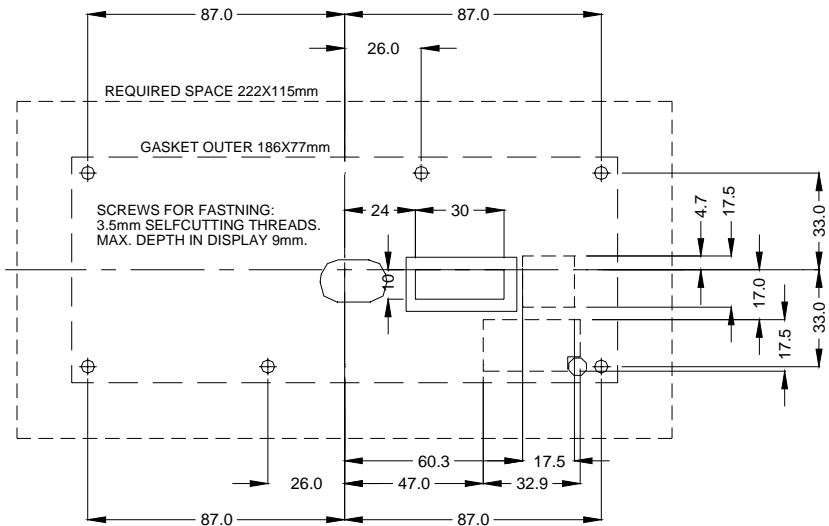


Dimensions are given in mm (inches).



Panel cutout (mm)

Panel cutout:
 H x W = 10 (0.393") x 30 (1.181")
 Display size:
 H x W = 115 (4.528") x 220 (8.661")



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