SGC 410

4921240610D

Single Genset Controller

Data sheet

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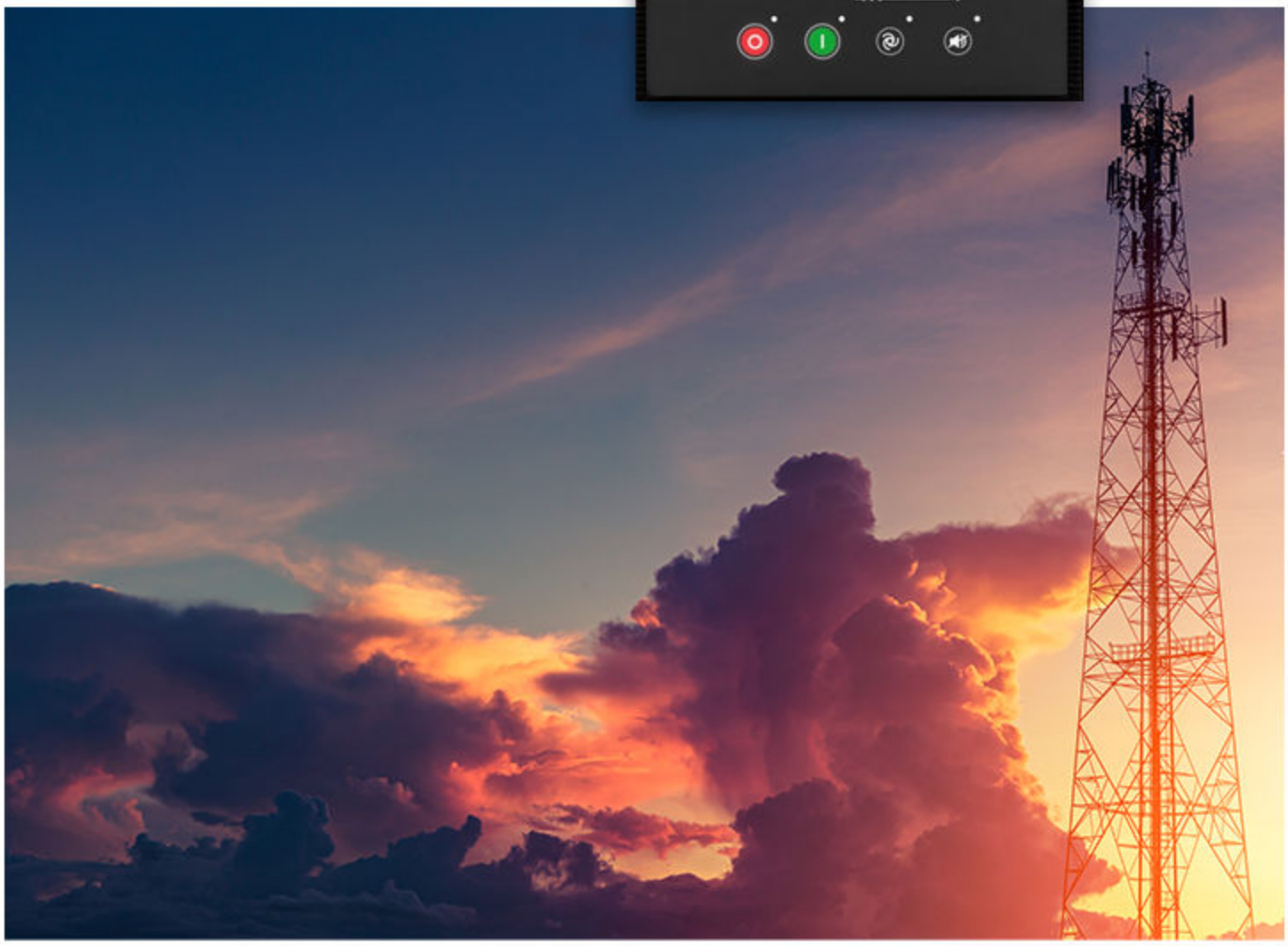


1. Product description

1.1 About SGC 410

SGC 410 is a modern genset controller with user friendly HMI, full graphics LCD, and a highly versatile software. Extensive inputs and outputs support a wide variety of industry standard features in diesel/gasoline genset applications.

SGC 410 offers Site battery monitoring which significantly reduces fuel consumption. The controllers support Shelter temperature monitoring, Auto (Remote start /stop, Cyclic and Exercise mode), Manual and Test modes.

The DEIF Smart Connect software offers flexibility to configure each individual input and output for a specific function or application. All parameters can also be configured on the controller.

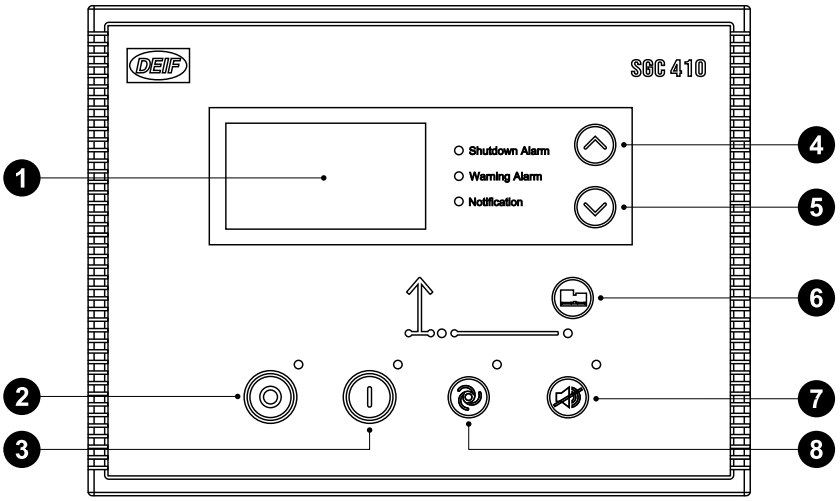
The powerful micro controller in SGC 410 supports a range of complex features, for example:

- LCD display
- True RMS voltage and current monitoring
- RS-485 base communication
- Monitoring of engine and alternator parameters
- Configurable inputs and outputs for a wide range of functions

1.2 Product overview

Features	Specifications
Digital switch input	9
Analogue resistive inputs	5
Analogue current/voltage inputs	2
Differential input (± 60 V DC) for Site battery voltage	Yes
DG alternator voltage input, D+ charging alternator I/O	Yes
Digital outputs	7
Event logs	Yes
USB port for PC based configuration	Yes
RS-485 for Modbus communication	Yes
Operating battery supply voltage (with -32 V reverse protection)	8 to 32 V DC
Operating temperature range (°C)	-20 to 65
Protection class with gasket (included)	IP65
Warning auto clear enable/disable	Yes
Fuel reference selection input	Yes

1.3 Overview of controller buttons



1. Display
2. Stop/Config button
3. Start button
4. Menu navigation up button
5. Menu navigation down button
6. Genset contactor latching button
7. Acknowledge button
8. Mode selection button

2. Safety

2.1 Warnings and safety

This document includes important instructions that should be followed during installation and maintenance of the controller.

Only approved personnel can do the installation and maintenance work. The work must comply with all applicable state and local electrical codes. Efficient and safe operation of the controller is only possible if equipment operation and configuration is correct, and maintenance is completed.

Symbols for hazard statements

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.

Symbols for general notes

NOTE This shows general information.

More information
This shows where you can find more information.

2.2 Electrical safety

You must ground the generator before you install the controller or do maintenance work. Failure to ground the generator can result in injury or death.

Generators produce high electrical voltages. Do not touch terminals, bare wires, and while the generator and related equipment are in operation. If you touch the generator, it can give you an electrical shock and result in death. Do not change the interlocks.

Use the correct size for wires that are used for electrical connections and wirings. This is to make sure that the generator can operate at the maximum electrical current.

2.3 Safety during installation and operation

Before you install the controller, make sure that all power voltage supplies are positively turned off at the source. Remove the panel fuse to prevent accidental start of the generator. Disconnect the battery cables for the generator from the negative battery terminal first. This is shown with a NEGATIVE, NEG, or (–). Reconnect the negative cable last. If not, this can give you an electrical shock and possibly kill you.

Remove the electric power supply before you remove the controller or touch other electrical part. High voltage can cause injury or death.

With floors of metal or concrete, use rubber insulation mats placed on wooden platforms, when you do work near the generator or other electrical equipment. Make sure you wear dry clothes and shoes, and that your hands and feet are dry when you operate electric devices or work with wires. Do not wear jewellery. Jewellery can cause a short circuit, which can result in shock or burning.

If an accident caused by electric shock occurs, stop the electrical power source immediately. If this is not possible, use a non-conducting object (for example a rope or a wooden stick) to remove the person with the injuries from the live conductor. Do not touch the person with injuries. If the person with injuries is unconscious, use first aid and get medical help immediately.

3. Alarms

3.1 Alarms

When a Shutdown alarm occurs the controller commands the genset to stop. The controller does not send the start command if the Shutdown alarm is not acknowledged.

When an Electrical trip alarm occurs, the controller opens the genset contactor and then commands the genset to stop. The controller does not send the start command if the Electrical trip alarm is not acknowledged.

If the Warning alarm occurs while the genset runs, the controller does not send the stop command. But if the Warning alarm is not acknowledged when the genset is stopped, the genset cannot be started.

If Auto warning clear is enabled, the Warning alarms are automatically cleared when the conditions that triggered the alarm are cleared.

Alarm types

No.	Alarm actions	Description
1	Shutdown	Load is taken off from the genset and the genset is immediately stopped by skipping the Engine cooling time.
2	Electrical trip	Load is taken off from the genset, the Engine cooling timer begins, after which the genset is stopped.
3	Warning	Warning alarms draw the operator's attention to an undesirable condition without affecting the genset's operation. The genset cannot be started without acknowledging the Warning alarms
4	Notification	The controller shows the message on the display. The genset start/stop operation is not affected.

Alarms and their causes

No.	Alarms	Causes/Indication	Actions
1	Low Oil Pressure (Sensor)	Indicates that the oil pressure measured is below the preset threshold.	None Shutdown Warning
	Low Oil Pressure (Switch)	Indicates that the oil pressure measured is low through switch.	None Shutdown Warning Electrical Trip Notification
2	LOP Res Sensor - Ckt Open	The oil pressure sensor is not detected (circuit open).	None Shutdown Warning Electrical Trip Notification
3	High Eng Temp (sensor)	Indicates that the engine temperature is above the preset threshold. This condition is detected only when engine is on.	None Shutdown Warning
	High Eng Temp (Switch)	Indicates that the engine temperature measured is high through switch.	None Shutdown Warning Electrical Trip Notification
4	Eng Temp - Ckt Opn	The temperature sensor is not detected (circuit open).	None

No.	Alarms	Causes/Indication	Actions
			Shutdown Warning Electrical Trip Notification
5	Low Fuel level (Sensor)	Indicates that the amount of fuel level is below the preset threshold. This condition is detected only when engine is on.	None Shutdown Warning
	Low Fuel level (Switch)	Indicates that the amount of fuel level measured is low through switch.	None Shutdown Warning Electrical Trip Notification
	Fuel level - Ckt Open	The fuel level sensor is not detected (circuit open).	None Shutdown Warning Electrical Trip Notification
6	Fuel Theft	The fuel consumption has exceeded the preset threshold.	Warning
7	Low Water Level Switch	Indicates that radiator water level is below the preset threshold.	None Shutdown Warning Electrical Trip Notification
8	Shelter Temp - Ckt Open	Shelter temperature sensor is not detected (circuit open).	Notification
9	Aux S2 - Ckt Open	Auxiliary sensor S2 is not detected (circuit open).	None Shutdown Warning Electrical Trip Notification
10	Auxiliary Input (for example, Aux_A - P)/user defined name	Configured auxiliary input has triggered longer than the preset duration.	None Shutdown Warning Electrical Trip Notification
11	Emergency Stop	When emergency stop switch is pressed and immediate shutdown is required.	Shutdown
12	Fail To Stop	It is detected that genset is still running after sending stop command.	Shutdown
13	Fail To Start	Indicates that genset has not started after the preset number of start attempts.	Shutdown
14	L1 Phase Over Voltage	Indicates that genset (L1) phase voltage has exceeded the preset over-voltage threshold.	Shutdown Warning
15	L2 Phase Over Voltage	Indicates that genset (L2) phase voltage has exceeded the preset over-voltage threshold.	Shutdown Warning
16	L3 Phase Over Voltage	Indicates that genset (L3) phase voltage has exceeded the preset over-voltage threshold.	Shutdown Warning
17	L1 Phase Under Voltage	Indicates that genset (L1) phase voltage has fallen below the preset under-voltage threshold.	Shutdown Warning

No.	Alarms	Causes/Indication	Actions
18	L2 Phase Under Voltage	Indicates that genset (L2) phase voltage has fallen below the preset under-voltage threshold.	Shutdown Warning
19	L3 Phase Under Voltage	Indicates that genset (L3) phase voltage has fallen below the preset under-voltage threshold.	Shutdown Warning
20	DG Phase Reversed	Alternator phase sequence (L1-L2-L3) is not correct.	None Shutdown Warning Electrical Trip Notification
21	Mains Phase Reversed	Mains is in unhealthy condition.	None Notification
22	Over Frequency	Indicates that genset output frequency has exceeded the preset threshold.	Shutdown Warning
23	Under Frequency	Indicates that genset output frequency has fallen below the preset threshold.	Shutdown Warning
24	Over Current	Indicates that genset current has exceeded the preset threshold.	None Shutdown Warning Electrical Trip Notification
25	Over Load	Indicates that the measured kW load rating has exceeded the preset threshold.	None Shutdown Warning Electrical Trip Notification
26	Unbalanced Load	Load on any phase is greater or less than other phases by a threshold value.	None Shutdown Warning Electrical Trip Notification
27	Over Speed	Indicates that genset speed has exceeded the preset overspeed threshold. Genset will shut down after Overspeed delay.	Shutdown
28	Gross Over Speed	Indicates that genset speed has exceeded the preset Gross overspeed threshold. Genset will shut down immediately without any delay.	Shutdown
29	Under Speed	The engine speed has fallen below the preset RPM.	Shutdown
30	Charge Fail	The charge alternator voltage has dropped below the preset threshold.	None Shutdown Warning Electrical Trip Notification
31	Battery Under Voltage	The battery voltage has fallen below the preset threshold.	None Shutdown Warning Electrical Trip Notification
32	Battery Over Voltage	The battery voltage has exceeded the preset threshold.	None Shutdown Warning Electrical Trip Notification

No.	Alarms	Causes/Indication	Actions
33	High Oil Press Detected	Lube oil pressure is detected above the crank disconnect threshold when the engine is off.	Warning
34	Maintenance Due	Indicates that engine running hours has exceeded the preset hours limit or maintenance due date has occurred and filter servicing is required.	Warning Notification
35	Battery Charger Fail	Indicates the battery is not getting charged by the charger.	None Shutdown Warning Electrical Trip Notification
36	Smoke Fire	Controller has detected smoke / fire through its digital input.	None Shutdown Warning Electrical Trip Notification
37	Aux S2/user defined name	Auxiliary sensor S2's threshold being crossed.	None Shutdown Warning Electrical Trip Notification

4. Technical specifications

4.1 Electrical specifications

4.1.1 Power supply

Category	Specification
Controller terminals	1 (Ground) 2 (Battery or DC+)
Supply voltage range	Nominal voltage: 12/24 VDC Operating range: 8 to 32 V DC
Cranking drop out period	50 ms
Maximum reverse voltage protection	-32 V DC
Measurement accuracy (battery voltage)	±1 % full scale
Resolution	0.1 V
Maximum current consumption	~ 200 mA, 12/24 V DC (excluding the current load for the DC outputs)
Standby current consumption	180 mA, 12 V DC 140 mA, 24 V DC

4.1.2 Genset voltage and frequency measurements

Category	Specifications
Controller terminals	54 (Neutral) 55 (L3) 56 (L2) 57 (L1)
Measurement type	True RMS
Phase-to-neutral voltage	32 to 300 V AC RMS
Phase-to-phase voltage	32 to 520 V AC RMS
Voltage accuracy	±1 % of full scale for phase-to-neutral ±1.5 % of full scale for phase-to-phase
Voltage resolution	1 V AC RMS for phase-to-neutral 2 V AC RMS for phase-to-phase
Frequency range	5 to 75 Hz
Frequency accuracy	0.25 % of full scale
Frequency resolution	0.1 Hz

NOTE For single phase applications, it is mandatory to connect:

- The genset phase (L1) to terminal 57 on the controller.
- The genset neutral to terminal 54 on the controller.

4.1.3 Genset current measurements

Category	Specifications
Controller terminals	43 and 42 (for phase L1) 45 and 44 (for phase L2) 47 and 46 (for phase L3)
Measurement type	True RMS
Maximum CT secondary current rating	5 A
Burden	0.25 VA
Measurement accuracy	±1.4 % of nominal

4.1.4 Earth leak measurements

Category	Specifications
Controller terminals	48 and 49
Measurement type	True RMS
Maximum CT secondary current rating	5 A
Burden	0.25 VA
Measurement accuracy	±1.4 % of nominal

NOTE Follow the recommended phase sequence while connecting the current transformer (CT).

4.1.5 Digital inputs

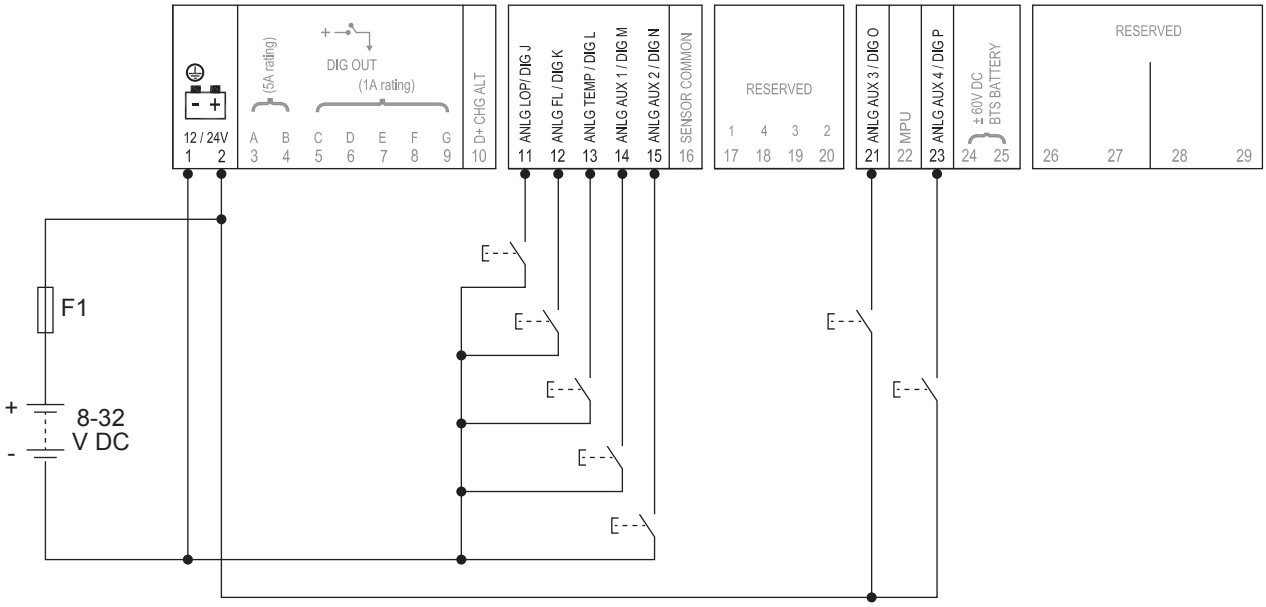
Category	Specifications
Controller terminals	33, 34, 35, 36, 37, 38, 39, 40, 41
Number of inputs	9
Type	Negative switching
Maximum input voltage	+32 V
Minimum input voltage	-24 V
Current source	5 mA
Configurable parameters with software	For example, emergency stop, and remote start and stop.

4.1.6 Analogue resistive sensor inputs

Category	Specifications
Controller terminals	11 (Oil pressure) 12 (Fuel) 13 (Temperature) 14 (Aux 1) 15 (Aux 2)
Number of inputs	5
Type	Ratio-metric sensing
Range	10 to 5000 Ω
Open circuit detection	Above 5.5 kΩ
Measurement accuracy	±2 % of full scale (up to 1000 Ω)

4.1.7 Analogue inputs used as digital inputs

You can use the analogue inputs as digital inputs when you wire the inputs as shown.



4.1.8 Site battery inputs

Category	Specifications
Controller terminals	24, 25
Number of inputs	2
Type	Differential
Range	±60 V
Resolution	0.1 V
Accuracy	±2 % of full scale

Run hours for the site battery

The controller calculates the amount of hours the site uses the battery to operate.

The controller calculates the run hours when:

- The mains and genset breakers are open
- The site battery voltage is more than the set point for low battery voltage.

4.1.9 Magnetic pickup (MPU) input/W-point frequency input

Category	Specifications
Controller terminal	22
Measurement type	Single ended
Frequency range	10 Hz to 10 kHz
Input voltage range	200 mV to 45 V AC RMS

The magnetic pickup (MPU) is an inductive sensor that is installed on the engine flywheel. It is used for engine speed sensing. The output of the MPU is a sine-wave signal.

4.1.10 D+ charger alternator

Category	Specifications
Controller terminal	10
Voltage range	0 to V_{BATT} V_{BATT} = 8 to 32 V DC
Excitation	PWM (power limited to 3 W, 12 V/250 mA, 24 V/125 mA)
Accuracy	±2 % of full scale

The charge fail is a combined input and output terminal. When the genset starts, the terminal provides controlled power output to excite the charging alternator. After excitation, the controller monitors the output voltage for the charging alternator. You can configure the action for charge fail.

4.1.11 Sensor common point

Category	Specifications
Controller terminal	16
Range	±2 V
Accuracy	±2 % of full scale

Connect terminal 16 (SCP) to a solidly grounded point on the engine, for example the engine frame. Do not share the cable used for this connection with other electrical connections.

4.1.12 Communication ports

Category	Specifications
USB	USB 2.0 type B for connection to PC with DEIF Smart connect software
RS-485 serial port	Half duplex Max. baud rate: 115200 bps Data connection: 2-wire Common-mode operating range Maximum distance of line: 200 m Termination resistor of 120 Ω is provided between output terminals A and B
Controller terminals	30 (GND) 31 (A) 32 (B)
CAN	Baud rate: 250 kbps Packet size: 8 bytes Termination resistor of 120 Ω is provided
Controller terminals for CAN	58 and 59

Recommended cable: Belden 3105A or equivalent, 24 AWG (0.5 mm^2) twisted pair, shielded, impedance 120 Ω, <40 mΩ/m, min. 95% shield coverage.

When wiring is more than 10 m, the terminal 30 must be connected to GND.

4.1.13 Digital outputs

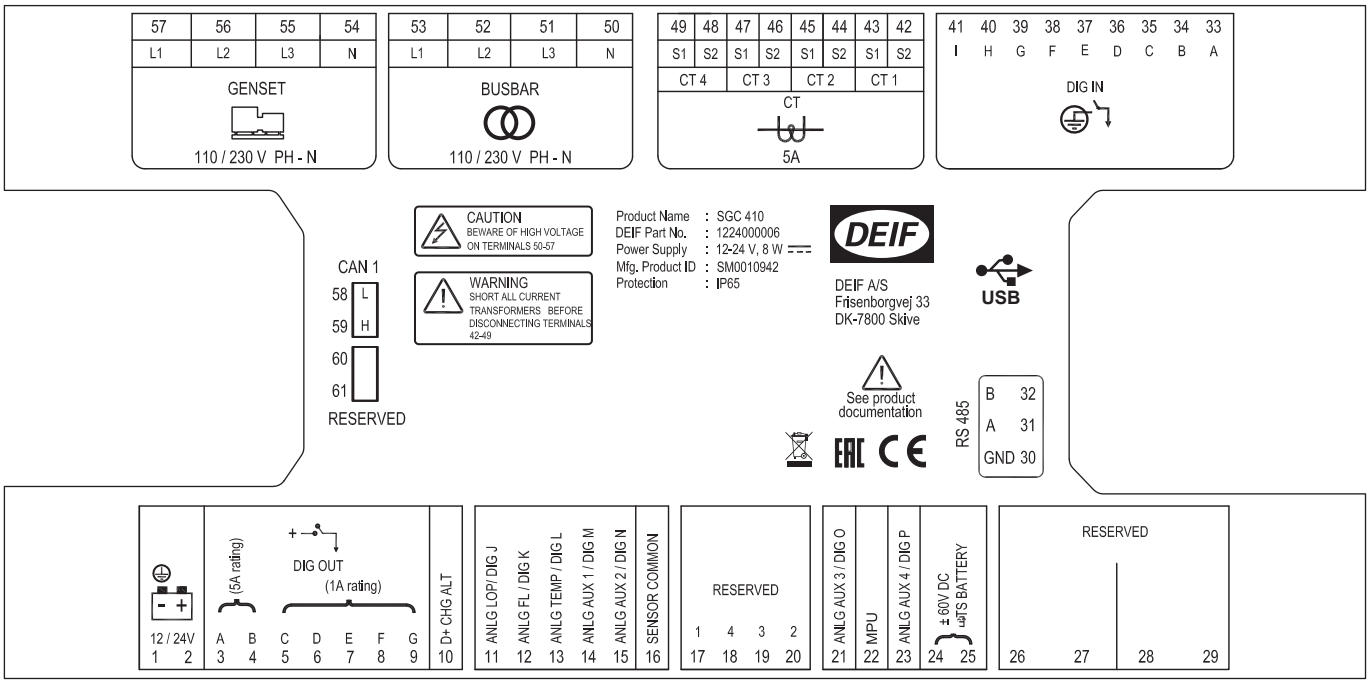
Category	Specifications
Controller terminals	3, 4, 5, 6, 7, 8, 9
Number of outputs	7
Type	DC outputs
Maximum current rating	5 A (3 and 4) 1 A (5, 6, 7, 8, 9)
Software configurable options	Start relay, Fuel relay, Close genset contactor, Stop solenoid and many more (see **Controller overview, Configurable parameters** in the **User manual** for more details).

NOTE

- Do not connect the Starter motor relay and the Stop solenoid directly to the controller's output terminals. It is recommended to connect terminals 3 and 4 to Start and Stop.
- Genset contactor latching relays should be compiled against 4 kVA surge as per IEC-61000-4-5 standard.

4.2 Terminal details

Rear view of the controller with terminal details.



Terminal	Text	Description	Connector
1	GND	Power ground	BCP-508-10GN
2	BATT +	Power supply positive	
3	DIG OUT A	DC output - A	
4	DIG OUT B	DC output - B	
5	DIG OUT C	DC output - C	
6	DIG OUT D	DC output - D	
7	DIG OUT E	DC output - E	
8	DIG OUT F	DC output - F	
9	DIG OUT G	DC output - G	
10	D+ CHG ALT	Input for charging alternator control	
11	ANLG LOP / DIG J	Analogue input from Lube Oil Pressure Sensor/ Digital Input J	BCP-508-6GN
12	ANLG FUEL LEVEL / DIG K	Analogue input from Fuel Level Sensor/Digital Input K	
13	ANLG ENG TEMP / DIG L	Analogue input from Engine Temperature Sensor/Digital Input L	
14	ANLG AUX 1 / DIG M	Analogue input auxiliary/Analogue input from Shelter Temperature Sensor/Digital Input M	
15	ANLG AUX 2 / DIG N	Analogue input auxiliary/Digital Input N	
16	SCP	Sensor common point	

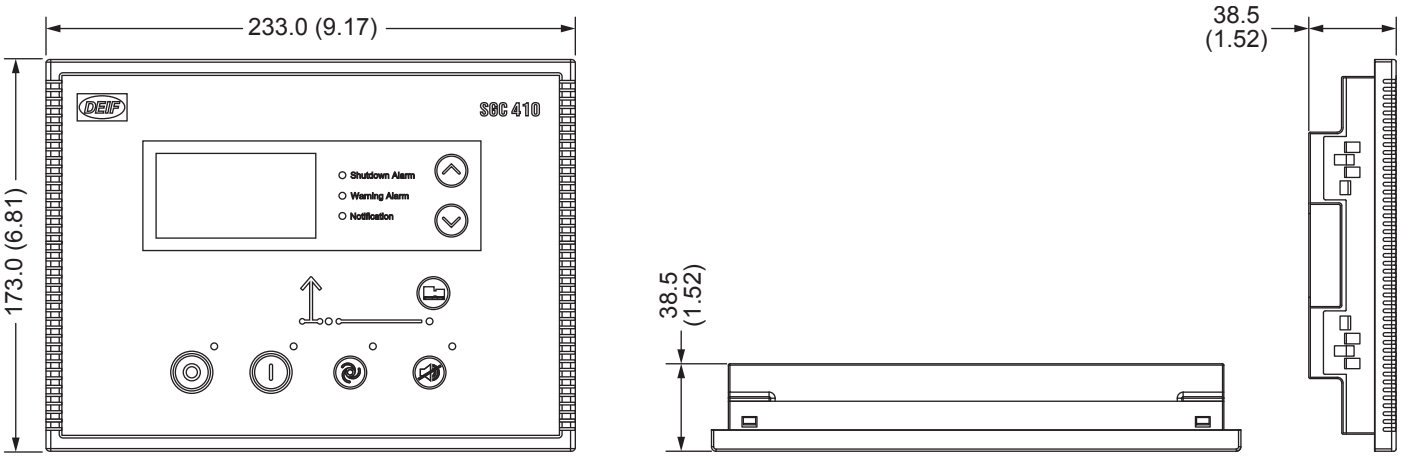
Terminal	Text	Description	Connector
17	Reserved	-	N/A
18	Reserved	-	
19	Reserved	-	
20	Reserved	-	
21	ANLG AUX 3/DIG 0	Analogue input auxiliary/0-5 V/4-20 mA (LOP)/ Digital Input O	BCP-508-5GN
22	MPU	Input from engine speed sensor (Inductive)	
23	ANLG AUX 4/DIG P	Analogue input auxiliary/0-5 V/4-20 mA/Digital Input P	
24	Site BATT I/P	Input 1 from Site battery	
25	Site BATT I/P	Input 2 from Site battery	
26	Reserved	-	N/A
27	Reserved	-	
28	Reserved	-	
29	Reserved	-	
30	RS 485 GND	RS-485 GND	BCP-508-3GN
31	RS 485 A	RS-485 A	
32	RS 485 B	RS-485 B	
33	DIG IN A	Input from switch A	BCP-508-9GN
34	DIG IN B	Input from switch B	
35	DIG IN C	Input from switch C	
36	DIG IN D	Input from switch D	
37	DIG IN E	Input from switch E	
38	DIG IN F	Input from switch F	
39	DIG IN G	Input from switch G	
40	DIG IN H	Input from switch H	
41	DIG IN I	Input from switch I	
42	GEN CT IN L1-2	CT input 2 from Phase L1	BCP-508-8GN
43	GEN CT IN L1-1	CT input 1 from Phase L1	
44	GEN CT IN L2-2	CT input 2 from Phase L2	
45	GEN CT IN L2-1	CT input 1 from Phase L2	
46	GEN CT IN L3-2	CT input 2 from Phase L3	
47	GEN CT IN L3-1	CT input 1 from Phase L3	
48	GEN CT IN EL2	CT input 2 from Earth Leakage	
49	GEN CT IN EL1	CT input 1 from Earth Leakage	

Terminal	Text	Description	Connector
50	Reserved	-	BCP-508-7GN-4PA
51	Reserved	-	
52	Reserved	-	
53	Reserved	-	
54	GEN V N	Voltage input from Gen Neutral	
55	GEN V L3	Voltage input from Gen L3	
56	GEN V L2	Voltage input from Gen L2	
57	GEN V L1	Voltage input from Gen L1	
58	CAN L (Reserved)	CAN Low	BCP-508-4GN
59	CAN H (Reserved)	CAN High	
60	Reserved	-	
61	Reserved	-	

4.3 Approvals

Standards	
CE	Comply to the EU Low Voltage Directive: EN 61010-1 Safety requirements for electrical equipment for measurement, control, and laboratory use - Part 1: General requirements Comply to the EU EMC: Directive EN 61000-6-2, 4

4.4 Dimensions



Dimensions	
Dimensions	Length: 233.0 mm (9.17 in) Height: 173.0 mm (6.81 in) Depth: 38.5 mm (1.52 in)
Panel cut-out	Length: 219.0 mm (8.62 in) Height: 158.0 mm (6.22 in) Tolerance: ± 0.3 mm (0.01 in)

5. Legal information

Warranty

NOTICE
 **Warranty** The controller is not to be opened by unauthorised personnel. If opened anyway, the warranty will be lost.

Disclaimer

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