SPECIFICATIN OF SCGC-3GL under-slung

GENERATOR SET FOR REEFER CONTAINER

(15Kw、460V、60Hz output)

1. General

1.1 Structure

The **SCGC-3GL** clip-on generator set is a self-contained, automatic, diesel engine powered generator set that supplies electrical power for container refrigeration systems.

The **SCGC-3GL** under-slung generator set is designed for mounting to the chassis center with quick disconnect clips for easy installation and removal..

The forklift pockets are provided at the bottom of the generator set. The forklift pocket ends are close to prevent refrigeration unit damage.

The unit frame contains the water cooled engine and engine accessories, generator, battery, control box and gauges.

1.2 Structural Frame and Integral Fuel Tank

The fuel tank is tested and cleaned by diesel fuel at 80-120kpa pressure, the frame and outer surface of the fuel tank are primer coated with an epoxy ester chrome-free paint immediately after shot-blasting, and then finish coated with a high solids polyester baked-on enamel paint. Surface color is black.

1.3 Panels and Doors

Metal-door、control box、receptacle box are primer coated with an epoxy-ester chrome-free paint immediately after shot-blasting, and then finish coated with high polyester baked-on enamel paint. Surface color is white.

1.4 Hardware

All hardware and hinges are stainless steel or electro-less nickel plated for maximum protection from salt water corrosion.

1.5 Unit dimension (mm), weight (Kg), Fuel tank capacity (L/gal)

Model	Width	Height	Depth	Weight	Fuel tank capacity
SCGC-3GL	1388	634+180	1595	780	190/50

1.6 Operation temperature range

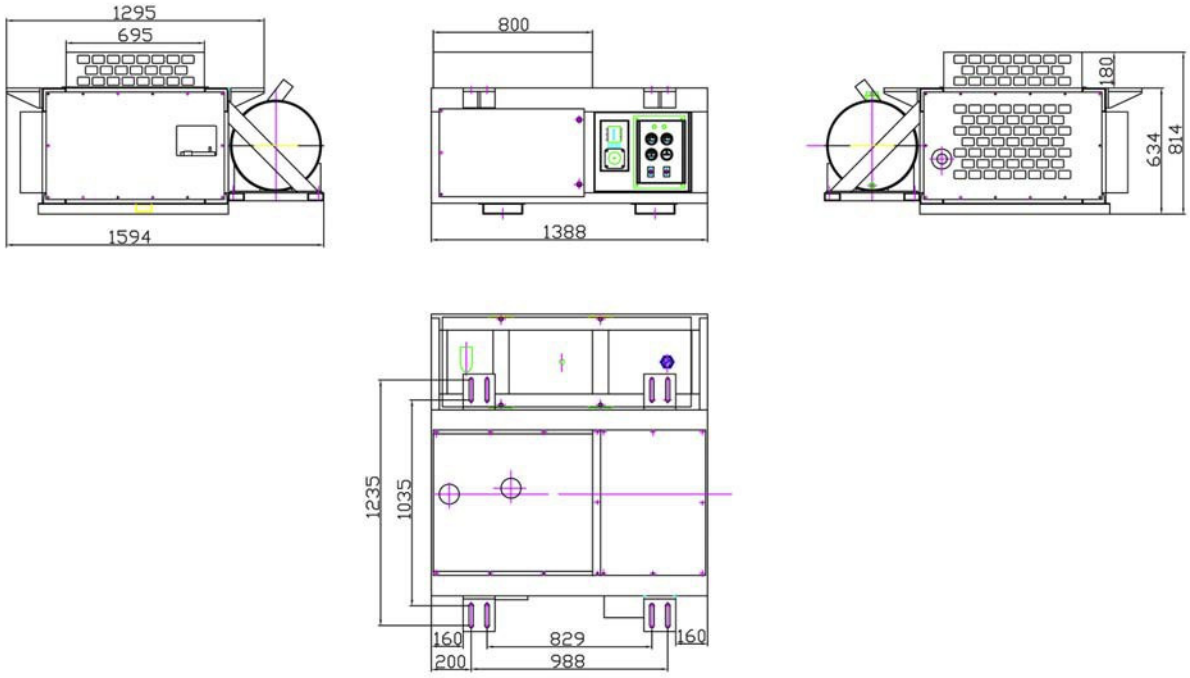
-25℃ to +55℃

1.7 Alternator set rating

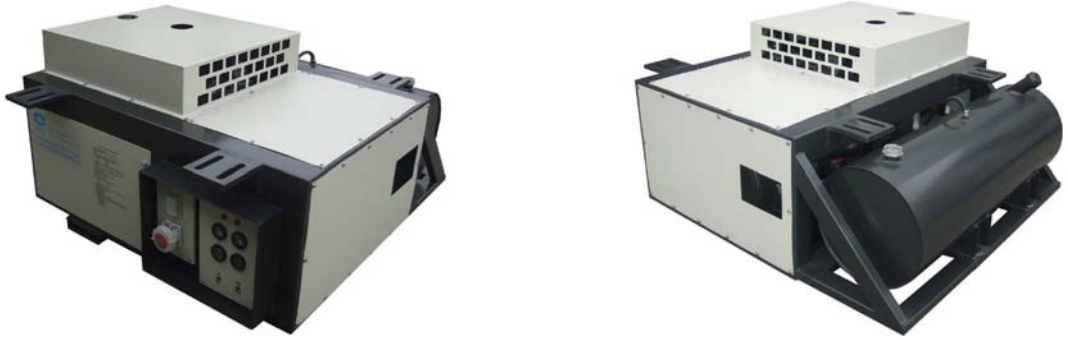
15.0kW, 18.75kVA at 0.8 power factor

460 V、3-phase

60Hz at 1800rpm.



SCGC-3GL under-slung generator set outline drawing



SCGC-3GL under-slung generator set appearance

SCGC-3GL under-slung generator set inner structure

2. Engine

2.1.1 Manufacturer: **SHAN DONG HUAYUAN LAIDONG ENGINE CO., LTD.**

2.1.2 Model: **4L22BD-RF**

2.1.3 Emission regulation :

4L22BD-RF engine appearance

2.1.4 Technical specification of 4L22BD-RF engine:

Type	Vertical in-line, water-cooled , 4-cycle diesel engine
Number of cylinders	4
Bore	85mm
Stroke	95mm
Total displacement	2.156L
Max. rated output (kW)	21/1800rpm
Continuous rated output (kW)	19/1800rpm
Specific fuel consumption	258 g/ kW.h at rated output
Firing order	1-3-4-2 -1(order from FAN)
Direction of rotation	Counterclockwise viewed from flywheel end
Fuel injection pump	KANGDA made
Fuel filter	paper element
Cooling system	liquid-cooled with radiator
Coolant capacity	8-10L (including reserve tank)
Coolant high temperature switch	97℃±2℃
Lubricating system	Forced lubrication with trochoid pump
Oil filter	paper element
Oil tank capacity	6L
Oil pressure	245kPa~ 441kPa at 1800rpm
Low oil pressure switch	100kPa±20kPa
Air cleaner type	Heavy-duty oil bath filter air cleaner
Starting system	Starting motor DC12V, 3.2kW
Starting aid	Air heater 12VDC, 380W, 35A
Charging generator	DC14V, 350W

3. Generator

Manufacturer: **MARATHON**

Model: **RF-15-CIMC**

3.1 General

RF-15-CIMC three phase A.C. synchronous brushless generator is based on the technology of Marathon Electric CO. It is combined with diesel engine to make movable electrical power for container refrigeration system. RF-15-CIMC generator is of unique design, advanced construction, excellent performance, reliable operation, easy, small volume and light weight.

1) RF-15-CIMC generator is manufactured in accordance with NEMA ODP type (IP22). It consists of main generator, AC brushless exciter, rotating diode, auxiliary winding, terminal box, etc.

2) Class H insulation per NEMA MG-1-1.65, maximum temp rise:125℃.

3) The frame is made of steel plate. The design of stator lamination is unique. 10 lead wires is supplied.

4) Main rotor use the single piece 4-pole salient pole lamination, coupled with die cast or welding damping winding, field winding to form a unirotor construction, the field winding is layer wound with thermo setting epoxy for high mechanical and electrical integrity.

1) Drive disc radial fan cooling method.

2) Laminations and wiring are protected against salt water with epoxy primers, epoxy impregnation (three times) and epoxy coating.

7) Generator Rating:

15 kW、18.75 kVA 、0.8 power factor or
RPM: 1800
Voltage: 460
Phases: 3
Frequency: 60 Hz

8) Dust-proof bearing, sealed and lubricated with synthetic hydrocarbon.

RF-15-CIMC generator appearance

3.2 Generator function-voltage regulation

1) starting excitation

The initial excitation of the generator is supplied by permanent magnet steel which is

mounted on exciter field.

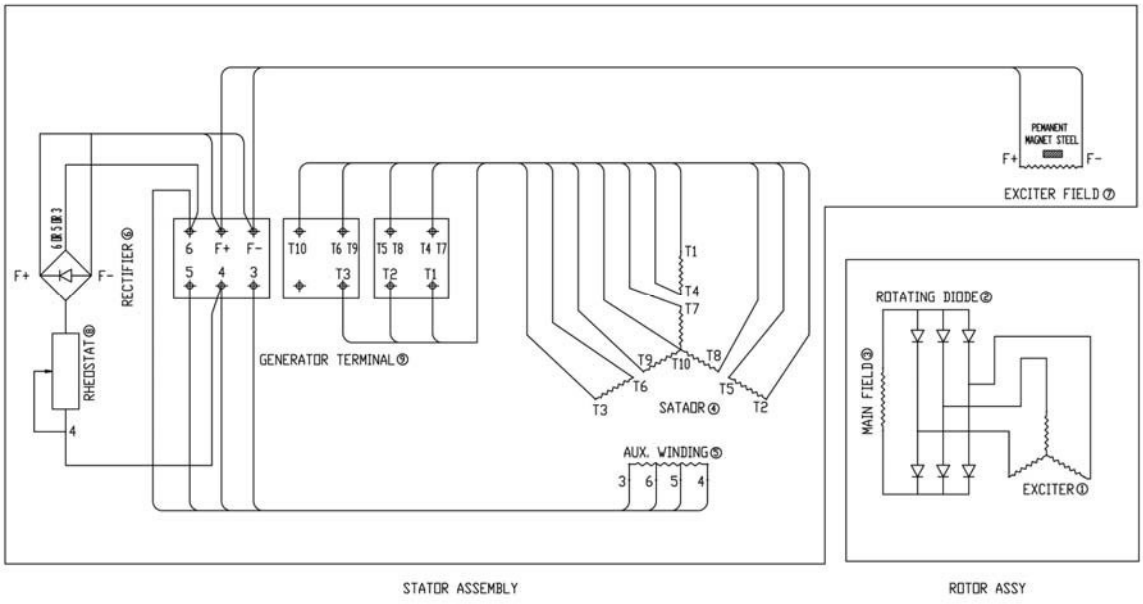
2) Running excitation and control

The rectifier (6) is fed by an auxiliary winding (5) located in the stator.

When starting the residual magnetism creates a current in the exciter armature (1). This current is rectified by the rotating diodes (2) and feeds the main field (3). The induced voltage in the auxiliary winding (5) is then used to increase the excitation power via rectifier (6) to exciter field (7) so as to ensure a rapid and smooth build up of output voltage in the main stator winding (4).

3) Boosted output current during temporary over load periods such as motor or compressor start up.

The auxiliary winding (5) is triple-frequency harmonic winding. For temporary over loads (such as refrigeration unit start up), the excitation control system utilizes the auxiliary winding to handle the overload. When an overload occurs, the increase current flow from the alternator stator, which causes an immediate increase in the auxiliary winding current. This increased output boosts the output of the alternator to handle the temporary overload by exciter field.



4. Control system

4.1 Components of control panel:

Engine hour meter、water temperature gauge、oil pressure gauge、charging ammeter

Preheat/start switch、on-off switch

Fault display lamps

Safety stop control units

SCGC series generator set control box

4.2 Unit control

1. **ON-OFF SWITCH:** The unit ON-OFF switch energizes the electrical system of the unit when in the ON position. In the OFF position, it de-energizes the fuel solenoid to stop the engine.
2. **PREHEAT/START SWITCH:** When pressed to PREHEAT, the PREHEAT/START switch energizes the air heater to aid in starting the diesel engine. When pressed to START, the PREHEAT/START switch energizes both the air heater and the starting motor. Hold the switch on START until the engine starts to fire and picks up speed. DO NOT release the switch from the START position prematurely when engine is extremely cold.
3. **ENGINE SHUTDOWN INDICATOR:** Indicates an over load、low oil pressure and high coolant temperature

On/off switch

Preheat/start switch

4.3 Unit instrument

1. **AMMETER:** The ammeter indicates battery charging and discharging amperage during engine operation. The charging amperage varies according to the needs of the battery. The ammeter also indicates the amount of current draw by the air heater during preheat.
2. **HOURMETER:** The engine hour-meter records the total hours that the engine is in operation so proper maintenance can be scheduled.
3. **OIL PRESSURE GAUGE:** The oil pressure gauge indicates engine oil pressure. Engine oil pressure should rise immediately on starting.
4. **ENGINE COOLANT TEMPERATURE GAUGE:** The engine coolant temperature gauge indicates the temperature of the engine coolant in the block.
5. **FUEL GAUGE:** A gauge mounted in the integral fuel tank indicates the level of diesel fuel in tank.

Charging ammeter

Hour meter

Oil pressure gauge

temperature gauge

4.4 Unit protection device

LOW OIL PRESSURE SWITCH: Engine oil pressure shall rise immediately when starting. A low oil pressure switch will ground, stop the engine and the low oil pressure shutdown indicator will light if oil pressure drops below 100±20kpa.

ENGINE COOLANT HIGH TEMPERATURE SWITCH: If the engine coolant temperature rises 97±2℃, the coolant high temperature switch will ground, stop the engine and the high temperature shutdown indictor will light.

CIRCUIT BREAKER: A circuit breaker (CB1) is located behind the generator terminal box face or the receptacle box face. It will trip、the aux. contact will ground and stop the engine if the 460 VAC power circuit overloads above 25 amps under operation and the overload shutdown indicator will light.

The circuit breaker must be manually reset.

Coolant temperature sender and switch

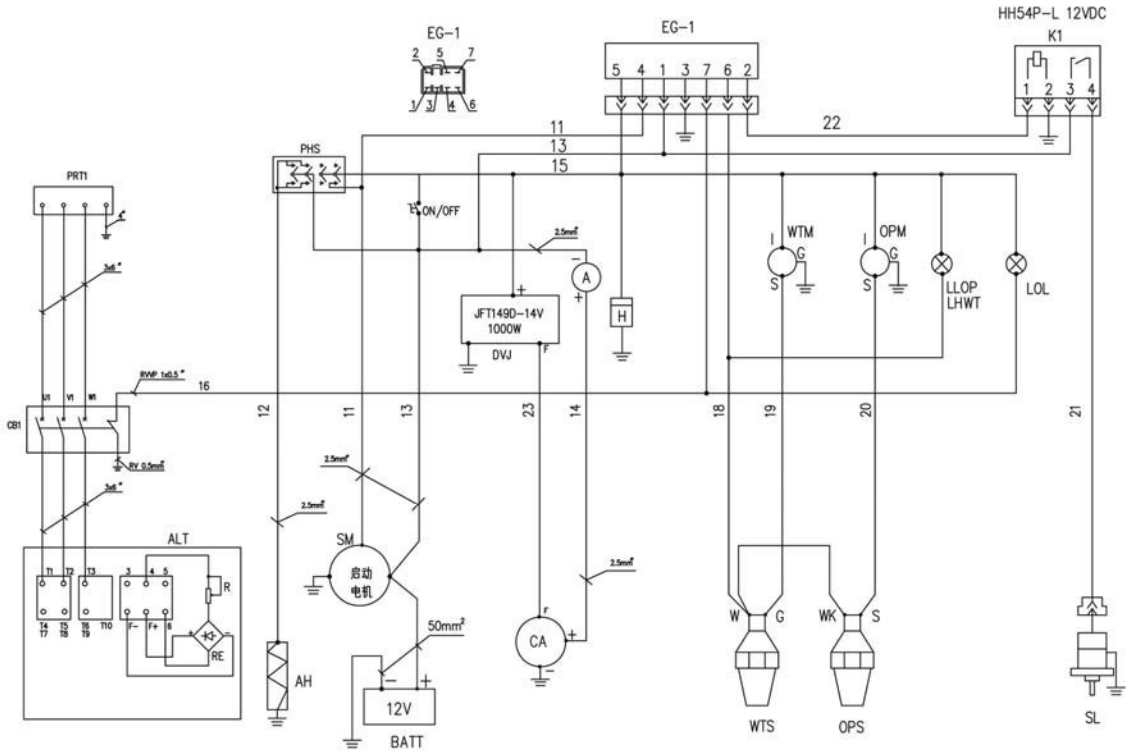
Oil pressure sender and switch

Circuit breaker

Solenoid

4.5 Protection Feature

- Safety stop control for engine low oil pressure
- Safety stop control for engine high coolant temperature
- Safety stop control for generator short circuit or over load



LEDGEND:

PRT1: Power cable receptacle (32A,460V)
CB1: Circuit breaker((32A,460V)
ALT：Generator terminal
R：Resistor
RE: Bridge rectifier
EG-1：Safety stop control unit
H: Hour meter
LOL: Over load lamp
LLOP: Low oil pressure lamp
LHWT: High coolant temperature lamp
PHS: Preheat/start switch
ON/OFF: On/off switch
A: Charging ammeter
WTM: Coolant temperature gauge
OPM：Oil pressure gauge
AH：Air heater
BATT：Battery
SM：Starter
CA：Charging alternator
DVJ: Charging alternator adjuster
WTS：Coolant temperature sender and switch
OPS：Oil pressure sender and switch
EFP: Electrical fuel feed pump
SL：Solenoid
K1: Glow relay

5. Auxiliary systems

5.1 12VDC maintenance-free battery

Engine battery shall be maintenance-free with 625 cold cranking amps at -18℃.

Cold Cranking Amps: 625Amps for 30 seconds at -18℃

Reserve capacity: 25Amps output for 160 min. at 27℃

Battery charging current is supplied by the DC charging generator

5.2 ISO standard power cable receptacle

Electric power receptacle shall be designed in accordance with the C.E.E. standards and I.E.C. recommended specifications, including I.S.O, and to operate when the nominal voltage measured among phases is as below :

a) 60HZ; 400V min., 500V max.
b) 32 Amperes, 3 wire-4 pole, C.E.E. Earth contact position -3 h.

Battery

Power cable receptacle

6. Acceptance certificate

SCGC

GENERATOR SET ACCEPTANCE CERTIFICATE

UNIT MODEL:	UNIT SERIAL NUMBER:
CUSTOMER NAME:	CUSTOMER UNIT No:
CHECK-OUT SITE:	CHECK-OUT DATE:
TECHNICIAN:	CUSTOMER SIGNATURE:

VISUAL INSPECTION

1 Inspect all components, ensure none are missing or physically damaged ( )

UNIT FUNCTION INSPECTION

1 Check for leaks ( )
2 Inspect the wiring for loose connections ( )
3 Check belt tension ( )
4 Check the anti-freeze, radiator full and 50/50 mixture ( )
5 Check engine oil level, add if necessary (API type CD or CF-4) ( )
6 Connect the battery ( )
7 Check engine fuel level, add if necessary ( )
8 Start the unit (refer to maintenance manual of section 3) ( )
9 Inspect for leaks: fuel ( ) coolant ( ) oil ( ) gas ( )
10 Check abnormal noise and vibration ( )
11 Check oil pressure gauge (within 3.5±1.0kg/cm^2 in cold state) ( )
12 Check hour meter ( )
13 Safety stop control system (engine stops and lamps display) ( )
a) coolant high temperature ( )
b) low oil pressure ( )
c) main breaker tripping ( )
14 Check voltage and frequency ( )
Under load (8 kW～15kW, 0.75～0.80 power factor)
Volts(v) L1-L2( ) L2-L3( ) L3-L1( ) Volt. within 420～500V
Freq.(Hz) ( ) Freq. within 58.2～61.8Hz
15 Comments:

7. The under-slung generator set installation

The under-slung generator set is totally contained within the steel, chassis center-mount frame with quick disconnect clips for easy installation and removal. The fork lift pockets are provided at the bottom of the generator set.

Dismantle the remora about the generator set mounting position.

Remove and lift the generator set into mounting position beneath the container chassis.

Mount clips on top of the container chassis frame, Tighten the mounting bolt and lock-nut.