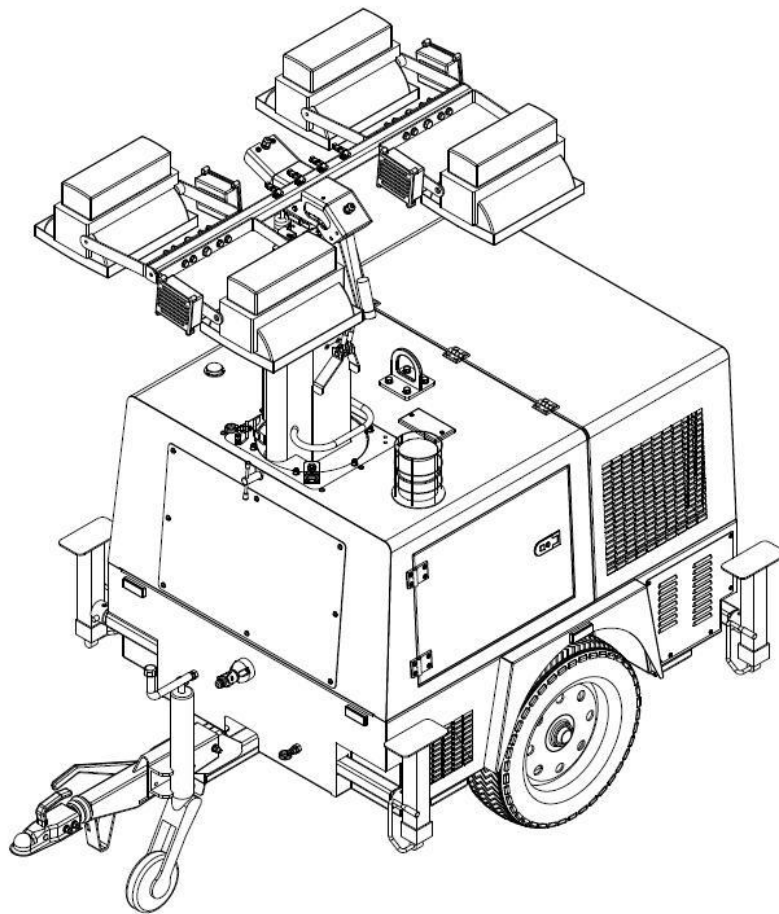




MPMC LIGHTING TOWER LHS Series

OPERATION AND MAINTENANCE MANUAL



This manual contains important safety information and must be made available to personnel who operate and maintain this machine.

NO: OM-LHS
REV: A
DATE: Jun.2020

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2 FOREWORD

The contents of this manual are considered to be proprietary and confidential to MPMC and should not be reproduced without the prior written permission of MPMC.

Nothing contained in this document is intended to extend any promise, warranty or representation, expressed or implied, regarding the MPMC products described herein. Any such warranties or other terms and conditions of sale of products shall be in accordance with the standard terms and conditions of sale for such products, which are available upon request.

This manual contains instructions and technical data covering all routine operation and scheduled maintenance tasks by operation and maintenance staff. Major overhauls are outside the scope of this manual and should be referred to an authorized MPMC service department.

The design specification of this machine is according to the EC directives.

All components, accessories, pipes and connectors added to the machine should be:

- Of good quality, procured from a reputable manufacturer and, wherever possible, be of a type approved by MPMC.
- Accompanied with instructions for safe installation, operation and maintenance.

Details of approved equipment are available from MPMC Service departments.

The use of repair parts / lubricants / fluids other than those included in the MPMC approved parts list may create hazardous conditions over which MPMC has no control. Therefore MPMC cannot be held responsible for equipment in which non-approved repair parts are installed.

MPMC reserves the right to make changes and improvements to products without notice and without incurring any obligation to make such changes or add such improvements to products sold previously.

The intended uses of this machine are outlined below and examples of unapproved usage are also given, however MPMC cannot anticipate every application or work situation that may arise.

The use of the machine in any of the situation types listed in table 1

- a) Is not approved by MPMC**
- b) May impair the safety of users and other persons**
- c) May prejudice any claims made against MPMC.**

TABLE 1

Use of the machine exceeding the ambient temperature range specified in the *GENERAL INFORMATION SECTION* of this manual.

This machine is not intended and must not be used in potentially explosive atmosphere, including situations where flammable gases or vapors may be present.

Use of the machine fitted with non MPMC approved components / lubricants / fluids.

Use of the machine with safety or control components missing or disabled.

GENERATOR

Use of the generator to supply load(s) greater than those specified.

Use of unsafe or unserviceable electrical equipment connected to the generator.

Use of electrical equipment:
(a) Having incorrect voltage and/or frequency ratings.
(b) Containing computer equipment and/or similar electronics.

The company is not liable for errors in translation of this manual from the original English version.

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MPMC POWERTECH CORP.

The warranty Period is based on the purchasing date and operation time. The one which is due first is used as the criterion, unless different specific regulations are made in this manual or in relevant commercial contracts.

- ·1000 working hours, or
- ·Twelve months after the purchase date, or
- ·Fifteen months since the generating sets leave the factory.

The time which occurs first is used as the criterion.

MPMC will provide a new part or repaired part, at its sole discretion, in place of any part that is found to be defective in material and workmanship during the period described above. Such parts will be repaired or replaced without charge to the initial user during normal working hours at the place of business of an MPMC distributor authorized to sell the equipment or other establishment authorized by MPMC. MPMC will log the engine serial numbers with the originating OEM and the MPMC alternators.

The above warranties do not apply to failures occurring as a result of abuse; misuse, negligent repairs, corrosion, erosion and normal wear and tear, alterations or modifications made to the product without express written consent of MPMC; or failure to follow the recommended operating practices and maintenance procedures as provided in the product's operating and maintenance publications.

Accessories or equipment furnished by MPMC, but manufactured by others, including, but not limited to, engines, tires, batteries, electrical equipment, hydraulic unit, shall carry only the manufacturer's warranty, which MPMC can lawfully assign to the initial user.

This warranty policy applies to all the products sold by MPMC POWERTECH CORP. to the distributors or the end users, regardless where the products are purchased. But only the customers who have commercial contract with MPMC POWERTECH CORP. can enjoy the warranty, the end user can enjoy warranty from the equipment supplier.

MPMC After-sales Department, authorized after-sales service centers and your local distributor are committed to providing you with superb service. If you have any problem about MPMC products or need more help, please contact MPMC After-sales Department as following:

MPMC POWERTECH CORP.

Head Quarter: 3rd Floor, 1st Building, Baolong City Square, No. 2449 Jinhai Rd., Pudong District, Shanghai, China 201209

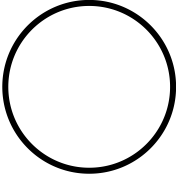
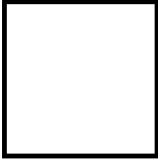
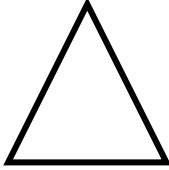
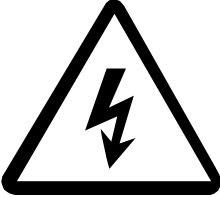

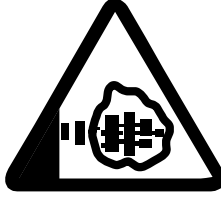
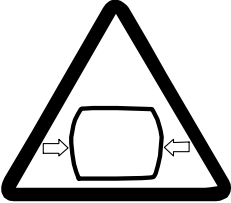
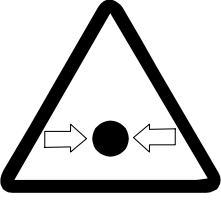



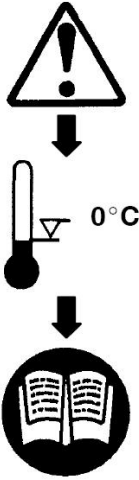
Factory: No. 1199 Development Ave., Binhai New District, Haimen City, Jiangsu Province, China 226151

Tel:+86-15000854420 (Sales director)


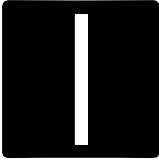


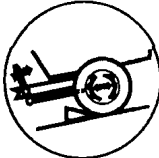




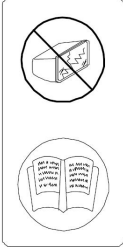
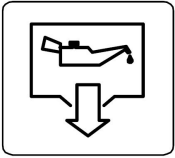
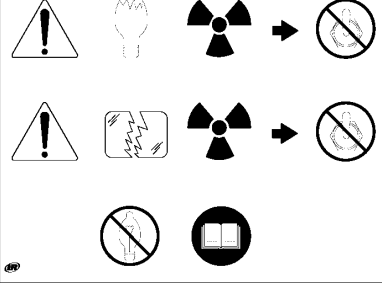
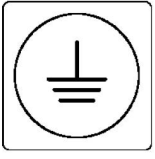
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Email: service@mpmc-china.com

GRAPHIC FORM AND MEANING OF ISO SYMBOLS

		
Prohibition / Mandatory	Information / Instructions	Warning
 <p>WARNING: Electrical shock risk</p>	 <p>WARNING - Hot surface.</p>	 <p>WARNING - Hot and harmful exhaust gas.</p>
<p>v</p>  <p>WARNING - Pressurized vessel.</p>	 <p>WARNING - Pressurized component or system</p>	 <p>WARNING - Flammable liquid.</p>
 <p>WARNING - Maintain correct tyre pressure. (Refer to the GENERAL INFORMATION section of this manual).</p>	 <p>WARNING - Before connecting the tow bar or commencing to tow consult the operation and maintenance manual.</p>	 <p>WARNING - For operating temperature below 0°C, consult the operation and maintenance manual.</p>

 <p>WARNING – Do not undertake any maintenance on this machine until the electrical supply is disconnected.</p>	 <p>WARNING – Consult the operation and maintenance manual before commencing and maintenance.</p>	 <p>WARNING –Chemical risk</p>
 <p>Do not remove the Operation and Maintenance manual and manual holder from this machine.</p>	 <p>Do not stack.</p>	 <p>Do not operate the machine without the guard being fitted.</p>
 <p>Do not exceed the trailer speed limit.</p>	 <p>Do not operate with the doors or enclosure open</p>	 <p>Do not use fork lift truck from this side</p>
 <p>Use fork lift truck from this side only.</p>	 <p>Emergency stop</p>	 <p>Tie down point</p>

 <p>Lifting point</p>	 <p>On (power)</p>	 <p>Off (power)</p>
 <p>Read the Operation and Maintenance manual before operation or maintenance of this machine is undertaken.</p>	 <p>When parking use prop stand, handbrake and wheel chocks.</p>	 <p>No naked flames</p>
 <p>Diesel fuel No open flame</p>	 <p>Parking brake.</p>	 <p>Rough Service Designation. Wet Location Operation.</p>
 <p>Replace any cracked protective shield.</p>	 <p>Oil drain.</p>	 <p>Warning: Ultra violet radiation. Can cause serious skin burn and eye inflammation. Do not operate lights with missing or broken lens. Do not operate if glass bulb is broken or punctured.</p>
 <p>Electrical ground/earth.</p>		

WARNINGS

Warnings call attention to instructions which must be followed precisely to avoid injury or death.

CAUTIONS

Cautions call attention to instructions which must be followed precisely to avoid damaging the product, process or its surroundings.

NOTES

Notes are used for supplementary information.

General Information

Never operate the unit without first observing all safety warnings and carefully reading the operation and maintenance manual shipped from the factory with this machine.

Ensure that the operator reads and understands the decals and consults the manuals before maintenance or operation.

Ensure that the Operation and Maintenance manual, and the manual holder, are not removed from the machine.

Ensure that maintenance personnel are adequately trained, competent and have read the Maintenance Manuals.

This machine is not designed for operating life sustaining equipment. It is equipped with a safety shutdown system that will cause the machine to stop operating whenever a shutdown condition is present.

Hazards may exist on the jobsite should this unit shutdown automatically and all lamps be extinguished. Personnel should be advised of this and have additional lighting.

Hot pressurized fluid – remove cap slowly to relieve PRESSURE from hot radiator. Protect skin and eyes. HOT water or steam and chemical additives can cause serious personal injury.

Electrical shock hazard will cause severe injury or death. Do NOT operate the place light tower under electric power lines.

Improper operation of this machine can result in severe injury or death.

Hazardous Voltage can cause serious injury or

death.

Never inspect or service the unit without first disconnecting battery cable(s) to prevent accidental starting.

Wear eye protection while cleaning unit with compressed air, to prevent debris from injuring eyes.

Do not enter ballast box while engine is running. Do not steam clean ballast box. Capacitor/Ballast can cause severe injury.

Do not operate lights with broken or missing lens or broken glass bulb. Ultra violet radiation can cause serious skin burn and eye inflammation.

Do not place hand in tower recess while tower is being lowered or raised. Pinch points can cause severe injury.

Ground equipment in accordance with applicable codes. (Consult local electrician).

Do not operate electrical equipment while standing in water, on wet ground, with wet hands or shoes.

Use extreme caution when working on electrical components. Battery voltage (12V) is present unless the battery cables have been disconnected. Higher voltage (potentially 500 volts) is present at all times when the engine is running.

Always treat electrical circuits as if they were energized.

Before attempting any repair service, disconnect all leads to electrical power loads.

Do NOT connect or disconnect lamps while the engine is running. Make sure that all protective covers are in place and that the canopy/doors are closed during operation.

The specification of this machine is such that the machine is not suitable for use in flammable gas risk areas. If such an application is required then all local regulations, codes of practice and site rules must be observed. To ensure that the machine can operate in a safe and reliable manner, additional equipment such as gas detection, exhaust spark

arrestors, and intake (shut-off) valves may be required, dependent on local regulations or the degree of risk involved.

A weekly visual check must be made on all fasteners/fixing screws securing mechanical parts. In particular, safety-related parts such as coupling hitch, drawbar components, road-wheels, and lifting bail should be checked for total security.

All components which are loose, damaged or unserviceable, must be rectified without delay.

This machine produces loud noise with the doors open or service valve vented. Extended exposure to loud noise can cause hearing loss. Always wear hearing protection when doors are open or service valve is vented.

Do not use petroleum products (solvents or fuels) under high pressure as this can penetrate the skin and result in serious illness. Wear eye protection while cleaning unit with compressed air to prevent debris from injuring eye(s).

Rotating fan blade can cause serious injury. Do not operate without guard in place.

Use care to avoid contacting hot surfaces (engine exhaust manifold and piping, air receiver and air discharge piping, etc.).

WARNING: Under no circumstances should volatile liquids such as Ether be used for starting this machine.

Never operate unit with guards, covers or screens removed. Keep hands, hair, clothing, tools blow gun tips, etc. well away from moving parts.

Do not alter or modify this machine.

Materials

The following substances may be produced during the operation of this machine:

- . Brake lining dust
- . Engine exhaust fumes

AVOID INHALATION

Ensure that adequate ventilation of the cooling system and exhaust gases is maintained at all

times.

The following substances are used in the manufacture of this machine and may be hazardous to health if used incorrectly:

- engine lubricant
- preservative grease
- rust preventative
- diesel fuel
- battery electrolyte

AVOID INGESTION, SKIN CONTACT AND INHALATION OF FUMES

Safety data sheets for engine lubricants should be obtained from the lubricant supplier.

Never operate the engine of this machine inside a building without adequate ventilation. Avoid breathing exhaust fumes when working on or near the machine.

This machine may include such materials as oil, diesel fuel, antifreeze, brake fluid, oil/air filters and batteries which may require proper disposal when performing maintenance and service tasks. Contact local authorities for proper disposal of these materials.

When recycling or disposing of any electrical components, light bulbs etc., do not mix with general waste.

There is a separate collection system for used electronic products in accordance with legislation that requires proper treatment, recovery and recycling.

Please contact your local authorities for the correct method of disposal or recycling

Battery

A battery contains lead-acid and can give off gases which are corrosive and potentially explosive. Avoid contact with skin, eyes and clothing. In case of contact, flush area immediately with water.

DO NOT ATTEMPT TO SLAVE START A FROZEN BATTERY SINCE THIS MAY CAUSE IT TO EXPLODE.

Exercise extreme caution when using booster battery. To jump battery, connect ends of one booster cable to the positive (+) terminal of each battery. Connect one end of other cable to the negative (-) terminal of the booster battery and other end to a ground connection away from dead battery (to avoid a spark occurring near any explosive gases that may be present). After starting unit, always disconnect cables in reverse order.

Radiator

Hot engine coolant and steam can cause injury. Ensure that the radiator filler cap is removed with due care and attention.

Do not remove the pressure cap from a HOT radiator. Allow radiator to cool down before removing pressure cap.

Generator sets

The generator set is designed for safety in use. However, the responsibility for safe operation rests with those who install, use and maintain it. The following safety precautions are offered as a guide, which, if conscientiously followed, will minimize the possibility of accidents throughout the useful life of this equipment.

Emergency Stop Controls

Important Note:- In addition to the key operated emergency stop control on the main control panel, a second control is provided at the socket control panel in the event of electrical hazards associated with generator operation. Use this second control to immediately isolate all electrical power to all sockets, then use the key control to stop the engine.

Operation of the generator must be in accordance with recognized electrical codes and local health and safety codes.

The generator set should be operated by those who have been trained in its use and delegated to do so, and who have read and understood the operation manual. Failure to follow the instructions, procedures and safety precautions in the manual may increase the possibility of accidents and injuries.

Do not start the generator set unless it is safe to do so. Do not attempt to operate the generator set with a known unsafe condition.

Fit a danger notice to the generator set and render it inoperative by disconnecting the battery and disconnecting all ungrounded conductors so others who may not know of the unsafe condition will not attempt to operate it until the condition is corrected.

The generator set should only be used with the earth point connected directly to the general earth/ground mass. An earth spike kit is available as an optional extra for this purpose (refer to the parts catalogue).

<p>WARNING: DO NOT OPERATE THE MACHINE UNLESS IT HAS BEEN SUITABLY EARTHED.</p>

Do not make contact with electrically energized parts of the generator set and/or interconnecting cables or conductors with any part of the body or with any non-insulated conductive object.

Make sure the generator set is effectively grounded in accordance with all applicable Regulations prior to attempting to make or break load connections and prior to attempting operation.

Keep all parts of the body and any hand-held tools or other conductive objects, away from exposed live parts of the generator set engine electrical system. Maintain dry footing, stand on insulating surfaces and do not contact any other portion of the generator set when making adjustments or repairs to exposed live parts of the generator set engine electrical system.

Close and lock all access doors when the generator set is left unattended.

Do not use extinguishers intended for Class A or Class B fires on electrical fires. Use only extinguishers suitable for class BC or class ABC fires.

Keep the towing vehicle or equipment carrier, the light tower, tools and all personnel at least 3 meters from all power lines and buried power cables.

Attempt repairs only in clean, dry, well lighted and ventilated areas. Connect the generator set only to loads and/or electrical systems that are compatible with its electrical characteristics and that are within its rated capacity.

Transport

When loading or transporting machines, ensure that the specified lifting and tie down points are used.

When loading or transporting machines ensure that the towing vehicle, its size, weight, towing hitch and electrical supply are all suitable to provide safe and stable towing at speeds either, up to the legal maximum for the country in which it is being towed or, as specified for the machine model if lower than the legal maximum.

Ensure that the maximum trailer weight does not exceed the maximum gross weight of the machine (by limiting the equipment load), limited by the capacity of the running gear.

Note:

Gross mass (on data plate) is for the basic machine and fuel only, excluding any fitted options, tools, equipment and foreign materials.

Before towing the machine, ensure that:-

- The tyres and towing hitch are in a serviceable condition.
- The canopy is secure.

- All ancillary equipment is stored in a safe and secure manner.
- The brakes and lights are functioning correctly and meet necessary road traffic requirements.
- Break-away cables/safety chains are connected to the towing vehicle.

The machine must be towed in a level attitude in order to maintain correct handling, braking and lighting functions. This can be achieved by correct selection and adjustment of the vehicle towing hitch and, on variable height running gear, adjustment of the drawbar.

To ensure full braking efficiency, the front (towing eye) section must always be set level.

When adjusting variable height running gear:-

Ensure front (towing eye) section is set level

When raising towing eye, set rear joint first, then front joint.

When lowering towing eye, set front joint first, then rear joint.

After setting, fully tighten each joint by hand and then tighten further to the next pin. Refit the pin.

When parking always use the handbrake and, if necessary, suitable wheel chocks.

Make sure wheels, tyres and tow bar connectors are in safe operating condition and tow bar is properly connected before towing.

Do not store or transport hazardous or combustible materials in or on this unit.

Do not suspend this machine with other equipment hanging from the running gear.

The legal requirements for the joint operation of the breakaway cable and safety chains are as yet unidentified by 71/320/EEC or UK regulations. Consequently we offer the following advice / instructions.

Where brakes only are fitted:

a) Ensure that the breakaway cable is securely coupled to the handbrake lever and also to a substantial point on the towing vehicle.

b) Ensure that the effective cable length is as short as possible, whilst still allowing enough slackness for the trailer to articulate without the handbrake being applied.

Where brakes and safety chains are fitted:

a) Loop the chains onto the towing vehicle using the towing vehicle hitch as an anchorage point, or any other point of similar strength.

b) Ensure that the effective chain length is as short as possible whilst still allowing normal articulation of the trailer and effective operation of the breakaway cable.

Where safety chains only are fitted:

a) Loop the chains onto the towing vehicle using the towing vehicle hitch as an anchorage point, or any other point of similar strength.

b) When adjusting the safety chains there should be sufficient free length in the chains to allow normal articulation, whilst also being short enough to prevent the tow bar from touching the ground in the event of an accidental separation of the towing vehicle from the trailer.

Before towing

Make sure wheels, tires and tow bar connectors are in safe operating condition and tow bar is properly connected before towing.

Store the front outriggers and all jacks. To secure each jack handle, wrap the jack positioning pin chain around the handle to keep it from being damaged during towing.

Towing

CAUTION: Do not tow or move with mast extended.

Do not tow this unit with a vehicle whose towing capacity is less than the unit gross weight shown in General Data.

Do not exceed maximum speed of 50km/h (or local legal maximum, if lower) when towing unit.

Welding

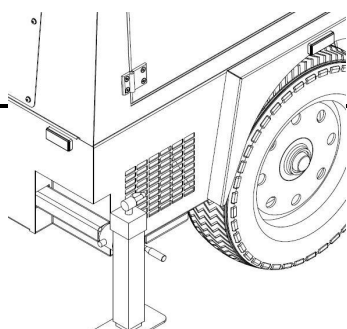
Prior to any welding, disconnect alternator relays, voltage regulator, meters, circuit breakers and battery cables. Open all circuit breakers, and remove any external connections. Connect the welding ground as close as possible to the area being welded.

Mast Operation

Before and during all mast operation, ensure that the area is clear of persons and obstructions over a 2m radius and that there are no obstructions overhead. When the mast is fully extended or is prevented from extending further, immediately release the control switch, to ensure that no cable over tension occurs.

Check that no person is behind the machine (within 10m) while the tower is raised or lowered.

12



The unit must have all outriggers extended and



be level before raising mast. (Use the level bubble on the top of the unit to ensure it is level).

DO NOT climb on tower. Perform repairs and adjustments with the tower in the down (transport) position.

Damaged cables may break during tower operation allowing the tower to fall. Do not operate tower with damaged cables. Replace damaged cables.

Lamps

Inspect lamps and replace broken or missing lamp lens or punctured glass bulbs. Do NOT operate lights with broken or missing lens or broken glass bulb.

Flammable fuels

This machine is fully banded to contain leakages and spillages, which occur within the machine enclosure.

The bund will contain all fluids normally installed in the machine, plus an additional 10%. Drain plugs for the banded base are located underneath the unit.

The machine must only be operated when leveled.

Drains for engine water, engine oil and fuel tank are located at the rear right corner of the machine.

Draining of contaminated fluids

Contaminated fluid must be removed by authorized person only.

Captured fluids can be drained from the bund by removal of the plug at the rear base of the frame. This plug must be replaced after draining.

Drainage of machine fluids

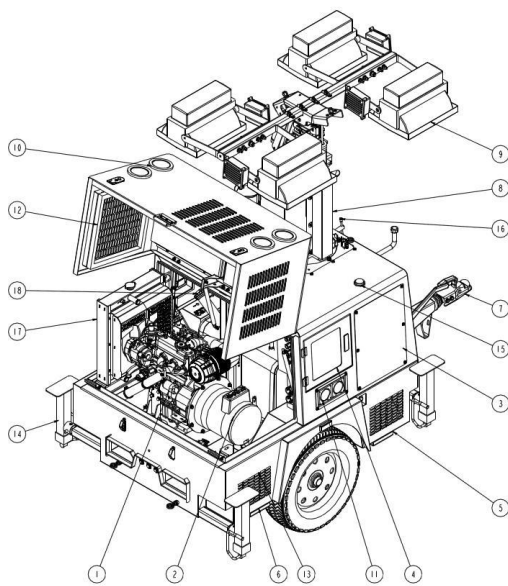
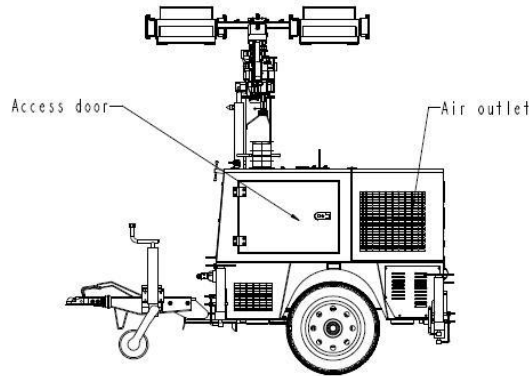
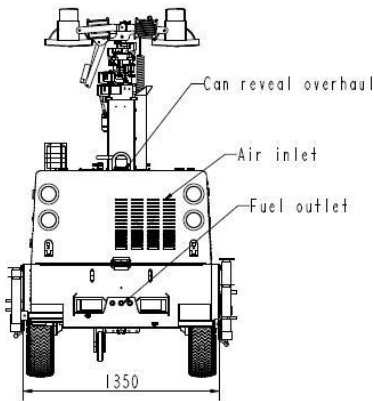
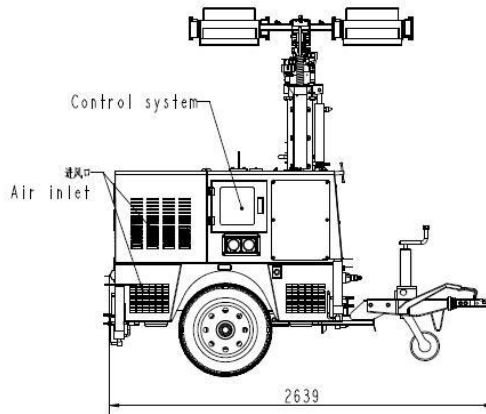
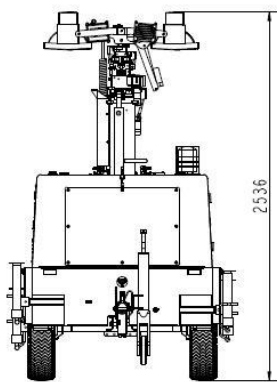
During maintenance operations, drain machine fluids using the drain ports indicated.

WARNING: Major leakages or spillages must be drained before the machine is towed.

Disposal of contaminated fluids from bund

Contaminated fluids removed from bund, must be disposed to designated containers only

Three view of the lighting tower



1. Engine
2. Generators
3. Cabinet
4. Control System
5. Chassis
6. Exhaust System
7. Draw bar
8. Mast
9. Lamps
10. Rear light
11. Output socket
12. Air exhaust port
13. Air inlet
14. Supporting legs
15. Gradienter
16. Fixed screw
17. Radiator
18. Refueling cap

MODEL: MLT4KME-4000LHS

LIGHT TOWER

Rated Power Output–kilowatts	6KVA
Number of Lamps	4
Type of Lamps	Metal–halide 1000 W
Overall Length	2639 mm
Overall Height	2536 mm
Overall Width – Transporting	1350 mm
Overall Width – Operating	2150 mm
Maximum Tower Height	9 m
Maximum wind speed rating	85 km/h (52mph)
Shipping weight.	1150 kg
Tank capacity	75L

HYDRAULIC DATA

Maximum working pressure	168 bar
Hydraulic oil capacity	8 litres
Pump operating voltage	12 VDC

ENGINE

Model	D905(KUBOTA),D1105 Optional
Type	Diesel water cooled
Number of cylinders.	3
Speed at full load.	1500 rpm
Speed at full load.	1800 rpm
Power available at 1500 r/min	6.6Kw
Power available at 1800 r/min	7.8Kw
Fuel Consumption(1500/1800)	1.69/1.91 litre/hr
Oil Capability/	5.1L/API CD Above
Electrical system.	12V negative earth
Alternator	30 amps @ 12 Volts

ALTERNATOR (GENERATOR)

Manufacturer	SINCRO (Italy)
Model	EK2MCT
Rated Output Power	6KVA
Alternator Type	Brushless & Single phase
Excitation mode	Capacitor exciter
Voltage	240 V
Frequency	50/60 Hz
Voltage stability	+/- 6%
Standard socket outlet	2 x 10 Amps, 16/32A Optional

LAMP

Type(Standard)	Metal Halide Floodlight
Lamp	4x1000W
Protection Glass	IP65
Luminous Flux	110 Lumens/Watt
Lamps Rotation	75°Auto

Trailer

Model	1200B Rubber Torsion Axle (Al-ko)
Braking System	Stable Towing Height
Trailer Load	1200KG

Control system

Manufacturer	SmartGen (China)
Model	ALC404
Features	Manual &Auto start control Event log (99events) Remote start input

WHEELS AND TYRES

Number of wheels.	2
Tyre size.	185 R14C
Tyre pressure.	3.5 bar (50 PSI)

Further information may be obtained by request through MPMC customer services department.

MODEL: MLT4PME-4000LHS

LIGHT TOWER

Rated Power Output–kilowatts	6KVA
Number of Lamps	4
Type of Lamps	Metal–halide 1000 W
Overall Length	2836 mm
Overall Height	2536 mm
Overall Width – Transporting	1360 mm
Overall Width – Operating	2160 mm
Maximum Tower Height	9 m
Maximum wind speed rating	85 km/h (52mph)
Shipping weight.	1150 kg
Tank capacity	75L

HYDRAULIC DATA

Maximum working pressure	168 bar
Hydraulic oil capacity	8 litres
Pump operating voltage	12 VDC

ENGINE

Model	403D-11G,403A-11G(Option)(Perkins)
Type	Diesel water cooled
Number of cylinders.	3
Speed at full load.	1500/1800 rpm
Displacement (Liter)	1.131 L
Prime power (1500/1800rpm)	8.6/10.7 KW(Gross)
Standby power (1500/1800rpm)	9.5/11.8 KW(Gross)
Fuel Consumption	2.16/2.55 litre/hr
Oil Capability/	4.9L/API CD Above
Electrical system.	12V negative earth
Starter motor/ Alternator	2KW/12V

ALTERNATOR (GENERATOR)

Manufacturer	Meccalte(Italy)
Model	LT3N-130/4(LT3N-100/4)
Rated Output Power	6KVA
Alternator Type	Brushless & Single phase
Excitation mode	Capacitor exciter
Voltage	230 V
Frequency	50/60 Hz
Voltage stability	+/- 6%
Standard socket outlet	2 x 10 Amps,16/32A Optional

LAMP

Type(Standard)	Metal Halide Floodlight
Lamp	4x1000W
Protection Glass	IP65
Luminous Flux	110 Lumens/Watt
Lamps Rotation	75°Auto

Trailer

Model	1200B Rubber Torsion Axle (Al-ko)
Braking System	Stable Towing Height
Trailer Load	1200KG

Control system

Manufacturer	SmartGen (China)
Model	ALC404
Features	Manual &Auto start control Event log (99events) Remote start input

WHEELS AND TYRES

Number of wheels.	2
Tyre size.	185 R14C
Tyre pressure.	3.5 bar (50 PSI)

Further information may be obtained by request through MPMC customer services department.

16 OPERATING INSTRUCTION

COMMISSIONING

Upon receipt of the lighting tower, and prior to putting it into service, it is important to strictly adhere to the instructions given below **PRIOR TO STARTING**.

Ensure that the operator reads and understands the decals and consults the manuals before maintenance or operation.

Ensure that the **position of the emergency stop device is known** and recognized by its markings. Ensure that it is functioning correctly and that the method of operation is known.

Running gear drawbar – Machines are shipped to some areas with the drawbar removed. Fitting involves four nuts / bolts to secure the drawbar to the axle and two bolts to fit the drawbar to the front of the machine with the saddle and spacer block.

Support the side of the machine, fit the wheel chocks to stop the machine moving and attach the drawbar. Refer to the torque value table in the **MAINTENANCE** section of this manual for the correct torque values.

CAUTION:

This is a safety critical procedure. Double check the torque settings after assembly (see table)

Fit the prop stand and coupling. Remove the supports and set the machine level.

Before towing the unit, ensure that the tyre pressures are correct (refer to the **GENERAL INFORMATION** section of this manual) and that the handbrake is functioning correctly (refer to the **MAINTENANCE** section of this manual). Before towing the unit during the hours of darkness, ensure that the lights are functioning correctly (where fitted).

Ensure that all transport and packing materials are all complete.

Ensure that the correct fork lift truck slots or marked lifting / tie down points are used whenever the machine is lifted or transported.

When selecting the working position of the machine ensure that there is sufficient clearance for ventilation and exhaust requirements, observing any specified minimum dimensions (to walls, floors etc.).

Adequate clearance needs to be allowed around and above the machine to permit safe access for specified maintenance tasks.

Ensure that the machine is positioned securely and on a stable foundation. Any risk of movement should be removed by suitable means, especially to avoid strain on any rigid discharge piping.

Attach the battery cables to the battery(s) ensuring that they are tightened securely. Attach the negative cable before attaching the positive cable.

SET-UP (PRIOR TO RAISING MAST)

1. Make sure the lighting tower is detached from towing vehicle.
2. Make sure the parking brake is correctly engaged.
3. Inspect cables. Cables should not be frayed, cut, abraded, or otherwise damaged. Replace damaged cables.
4. Check hydraulic oil level. Fill if necessary / as required.
5. Ensure no obstruction is overhead within 15 meters.
6. Be sure lamps are secure on cross bar and position as desired.
7. Extend all outriggers fully and insert locking pins fully. Ensure drawbar jack and all outrigger and/or jacks are firmly in contact with ground.
8. Level unit using jacks and bubble level indicator.
9. Jacks must support entire unit weight (tyres off the ground).

BEFORE STARTING THE ENGINE






Before starting the engine, carry out the following checks:


1. Engine oil level: Add as specified.
2. Engine coolant level: Add as specified.
3. Fuel/water filter: Drain any accumulation of water. Clean or replace element as required.
4. Air cleaner service indicator (if equipped): Service when showing "red"
5. Fuel level in tank: Fill, using CLEAN DIESEL fuel, at the end of the day to minimize condensation.

6. Battery: Keep terminals clean and lightly greased.
7. Engine belts and hoses: Check for proper fit and/or damage. Service as required.
8. Air Vents/Grilles: Both engine radiator and generator cooling air Check for obstructions (leaves, paper, etc.).
9. Visual inspection: Check for excessive fluid leaks, evidence of arcing around control panel, loose wire-routing clamps, etc.

CAUTION: *Call a qualified person to make electrical repairs.*



Reference	Description	Function
1	RUN 	Run/start the engine
2	Auto model 	Auto start mode
3	OFF 	Stop the engine, Reset when alarm
4	Manual Mode 	Manual start mode
5	Light On/Off 	Turn on/off the light
6	Main power breaker	General power control (for all 4 lamps)
7	Socket switch output	Control the outlet socket
8	Control panel power switch	Protects control system circuits
9	Mast down button	Mast down
10	lamp tilt button	Tilts lamp head to required angle
11	Control panel bolt	Screw the bolt can open/close the panel
12	lamp tilt button	Tilts lamp head to required angle
13	Mast raise button	Mast up
14	Control panel lighting LED	Illuminates the switches at night (always on)

1. The Lamp power breaker should be "OFF".
2. Turn the control system power switch "ON".
3. Press the engine start  button to start the engine.
4. Allow the engine to warm up for 3 to 5 minutes.
5. Turn the main power breaker on.
6. The Lamp power breaker may now be switched "ON".

5. Turn control system power "OFF".

NOTE: If the lights are turned off, they should not be restarted for 15 minutes.

WARNING: Keep side doors closed for optimum cooling and safety of unit while running.

NOTE: The engine in this unit is protected with sensors for high coolant temperature and low oil pressure. Should either of these conditions occur, the engine will automatically stop causing a loss of power to all lamps. Before restarting the unit, check the fuel level and engine/radiator thoroughly and correct the problem. The lamps should not be restarted in 15 minutes.

LIGHTING THE LAMPS

When the engine speed is stable, close the main switch, and then close the lamps switch one by one, with special attention, each lamp switch close again after the before lamp light up completely.


NOTE: Recommends that closing each circuit breaker interval 1-3 minutes, according to the actual situation lighting.

SOCKET OUTLETS

With engine running

1. Turn on the socket breakers.
2. Plug the equipment into the sockets.

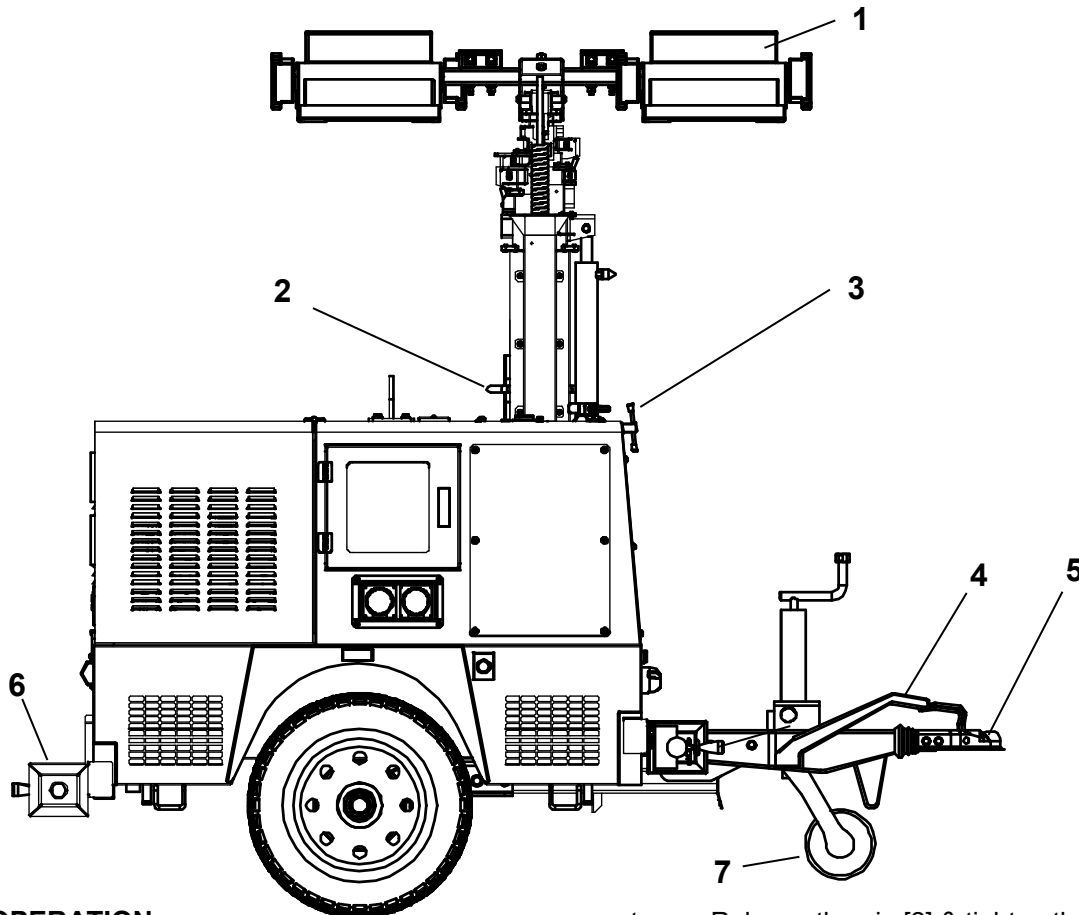
STOPPING THE ENGINE while lights are ON

1. Turn the Lamps "OFF" by switching the main breaker (7) "OFF"
2. Turn the socket breakers "OFF" if they are on.
3. Turn the main power breaker "OFF".
4. Press the stop button  to stop the engine.



Socket outlet (According to the customer required)
(Standard: 10A, 1Phase, 220V)

UNIT SHOWN WITH MAST IN TRANSPORT POSITON



MAST OPERATION

WARNING: Check that no person is behind the machine (within 10m) while the tower is raised or lowered.

Check that no obstruction is overhead.

Before operating the mast, inspect the cable for damage. Replace damaged cables if necessary.

Before and during all mast operation, ensure the area is clear of persons and obstructions within a 2m radius.

When the mast has reached its maximum travel height, immediately release the control switch, to avoid cable over tension.

Raising the tower

1. Remove the transport straps and mast locks
2. Start the engine.
3. Use the mast control switch to raise the tower.
4. Lift the pin [2] & loosen the screw [3] to rotate

tower. Release the pin [2] & tighten the screw [3] after rotating the tower to the desired position.

Adjust the Angle of lamps and lanterns

1. If need lighting larger area press the lamp tilt button (10)- left direction key.
2. After the lighting work is finish, adjust the lamps and lanterns to the horizontal position, press the lamp tilt button (12) right direction key.

Lowering the tower

1. Switch the lamps off.
2. Continues press the mast down button, until the mast can not be lower
3. Loose the screw [3], lift the pin [2] to rotate mast. Release the pin [2] & tie the screw [3] after rotating the mast to the desired position.
4. Make sure that the pin has engaged and locked the mast in position.
5. Use the mast control switch to lower the mast to transport position

TOWING

WARNING: Make sure that the tow vehicle has a towing capacity of the weight of this lighting tower as stated in “GENERAL INFORMATION” section of this manual.

NOTE: This unit is equipped with a mast lowering switch. When parking brake is released the mast will lower. Avoid towing with raised mast

WARNING: Beware of lamps lowering when operating under mast area.

1. Connect the machine to the vehicle.
2. Rotate the lamps to transport position and secure by fitting straps [1] around the lamp bodies.

WARNING: The lamp bodies may be HOT.

3. Make sure that the tow vehicles hitch [5] is the proper size to securely connect to the eye or coupler on the unit.
4. Check eye or coupler bolts for any looseness or wear. Tighten or replace as required.
5. Check the wheels.
6. Position the tow vehicle to align the hitch with the eye or coupler [5].
7. Stand aside while operating the jockey wheel [6] to seat the eye or coupler onto the hitch.
8. Secure the hitch.
9. Make sure outriggers and jacks are stored in transport position and the handles are secured by the chains.
10. Attach the brake actuator breakaway chain /cable [8].
11. Make sure the units towing lights are working properly, in accordance to the towing vehicle's lighting as well as local regulations.
12. Connect the towing lighting plug.
13. Remove wheel chocks.
14. Release hand brake [4].
15. Check that the units brakes are operating correctly.
16. Unit is ready to be towed.

WARNING: Make sure the hitch is completely engaged to the tow vehicle and is secure. Failure to do so could result in serious personal injury.

Do not use the eye or coupler with any bent or otherwise damaged parts.

LIFTING THE MACHINE

Before lifting the machine, carry out the following checks:

1. No loose objects are stored inside or on top of the machine.
2. No additional equipment is hung onto or under the machine.
3. Any device used for lifting is rated at a minimum of 2000kg.
4. No personnel should be on or under the machine at any time during lifting.

Lifting can be done by either:

1. Using the lifting eye on the top of the unit or
2. Using the forklift holes at the rear of the unit

RE-STARTING AFTER AN EMERGENCY STOP

If the machine has been switched off because of a machine malfunction, then identify and correct the fault before attempting to re-start. Check the DSE controller for error messages.

If the machine has been switched off for reasons of safety, then ensure that the machine can be operated safely before re-starting.

Refer to the *PRIOR TO STARTING and STARTING THE UNIT* instructions earlier in this section before re-starting the machine.

MONITORING DURING OPERATION

Should any of the safety shut-down conditions occur, the unit will stop. These are:

- Low engine oil pressure
- High engine water temperature

22 OPERATING INSTRUCTION

DECOMMISSIONING

When the machine is to be permanently decommissioned or dismantled, it is important to ensure that all hazard risks are either eliminated or notified to the recipient of the machine. In particular:-

- Do not destroy batteries or components containing asbestos without disposing the materials safely.
- Do not dispose of any pressure vessel that is not clearly marked with its relevant data plate information or rendered unusable by drilling, cutting etc.
- Do not allow lubricants or coolants to be released into land surface or drains.
- Do not dispose of a complete machine without documentation relating to instructions for its use.

MAINTENANCE SCHEDULE

	Initial		Daily	Weekly	Hours	Monthly / Hours			
	km (miles)	Hours			200/400	1/-	3/250	6/500	12/1000
	850(500)	50							
Engine Oil Level			C						
*Radiator Coolant Level			C						
Gauges/Lamps			C						
*Air Cleaner Service Indicators			C						
Fuel Tank (Fill at end of day)			C						
*Fuel/Water Separator Drain			C						
Oil Leaks			C						
Fuel Leaks			C						
Drain Water From Fuel Filters			C						
Coolant Leaks			C						
Header Tank Cap.			C						
Fan/Alternator Belts				C					
Battery Connections				C					
Tire Pressure and Surface				C					
*Wheel Lug Nuts						C			
Hoses (Oil, Air, Intake, etc.)						C			
Automatic Shutdown System						C			
Air Cleaner System						C			
*Engine Rad/Oil Cooler Exterior						C			
Fasteners, Guards							C		
Air Cleaner Elements								R/WI	
*Fuel/Water Separator Element								R	
Engine Oil Change		R			R/-				
Engine Oil Filter		R			R/-				
*Water Pump Grease.									R
*Wheels (Bearings, Seals, etc.)								C	
*Engine Coolant								C	

*Disregard if not appropriate for this particular machine. (1) or 3000 miles/5000km whichever is the sooner (2) or as defined by local or national legislation
C = Check (adjust, clean or replace as necessary)
CBT =check before towing.
CR = Check and report
D = Drain

G = Grease
R=Replace
T = Test
W I =or when indicated if earlier.
Refer to specific sections of the operation manual for more information.

	Initial.		Daily	Weekly	Hours	Monthly / Hours			
	km (miles)	Hours			200/400	1/-	3/250	6/500	12/1,000
	850(500)	50							
Fuel Filter Element					-/R				
*Injection Nozzle Check								C	
Shutdown Switch Settings									T
*Feed Pump Strainer Cleaning.									C
Coolant Replacement									R
*Valve Clearance Check									C
Lights (running, brake, & turn)			CBT						
Pintle Eye Bolts			CBT						
*Brakes	C					C			
*Brake linkage	C								
Emergency stop		T							
Fasteners		C							
Running gear linkage						G			
Running gear bolts(1)							C		
Evidence of Arcing Around Elect. Terminals			C						
Tower Cables			C						
Nylon Guides / Slide check			C						
Hydraulic Oil Level			C					R	
Loose Wire Routing Clamps			C						
Proper Grounding Circuit			C						
Wiring Insulation			C						
Obstructions in Air Vents			C						
Control Compartment (Interior)								C	
Engine Shutdown System Switches (setting)									C
Exterior Finish	As needed								
Engine	Refer to Engine Operation Manual								
Decals	Replace decals if removed, damaged or missing								

*Disregard if not appropriate for this particular machine.

(1) or 3000 miles/5000km whichever is the sooner

(2) or as defined by local or national legislation

C = Check (adjust, clean or replace as necessary)

CBT =check before towing.

CR = Check and report

D = Drain

G = Grease

R=Replace

T = Test

W I =or when indicated if earlier.

Refer to specific sections of the operation manual for more information.

Do not tow this unit with a vehicle that has a towing capacity that is less than the unit gross weight shown in General Data.

ROUTINE MAINTENANCE

This section refers to the various components which require periodic maintenance and replacement.

The *SERVICE/MAINTENANCE CHART* indicates the various components' descriptions and the intervals when maintenance has to take place. Oil capacities, etc., can be found in the *GENERAL INFORMATION* section of this manual.

For any specification or specific requirement on service or preventative maintenance for the engine, refer to the *Engine Manufacturer's Manual*.

Ensure that maintenance personnel are adequately trained, competent and have read the Maintenance Manuals.

Prior to attempting any maintenance work, ensure that:-

- The machine cannot be started accidentally or otherwise, by posting warning signs and/or fitting appropriate anti-start devices.
- All residual electrical power sources (mains and battery) are isolated.

Prior to opening or removing panels or covers to work *inside* a machine, ensure that:-

- Anyone entering the machine is aware of the reduced level of protection and the additional hazards, including hot surfaces and intermittently moving parts.
- The machine cannot be started accidentally or otherwise, by posting warning signs and/or fitting appropriate anti-start devices.

Prior to attempting any maintenance work on a *running* machine, ensure that:-

- The work carried out is limited to only those tasks which require the machine to run.
- The work carried out with safety protection devices disabled or removed is limited to only those tasks which require the machine to be running with safety protection devices disabled or removed.
- All hazards present are known (e.g. pressurized components, electrically live components, removed panels, covers and guards, extreme temperatures, inflow and outflow of air, intermittently moving parts, safety valve discharge etc.).
- Appropriate personal protective equipment is worn.
- Loose clothing, jewelry, long hair etc. is made safe.

- Warning signs indicating that *Maintenance Work is in Progress* are posted in a position that can be clearly seen.

Upon completion of maintenance tasks and prior to returning the machine into service, ensure that:-

- The machine is suitably tested.
- All guards and safety protection devices are refitted.
- All panels are replaced, canopy and doors closed.
- Hazardous materials are effectively contained and disposed of.

ELECTRICAL SYSTEM

WARNING: Always disconnect the battery cables before performing any maintenance or service.

Inspect the safety shutdown system switches and the instrument panel relay contacts for evidence of arcing and pitting. Clean where necessary.

Check the mechanical action of the components.

Check the security of electrical terminals on the switches and relays i.e. nuts or screws loose, which may cause local hot spot oxidation.

Inspect the components and wiring for signs of overheating i.e. discoloration, charring of cables, deformation of parts, acrid smells and blistered paint.

ELECTRICAL TERMINALS

Check daily for evidence of arcing around the electrical terminals

GROUNDING CIRCUIT

Daily check that the grounding circuit is in accordance with local code requirements. Check to ensure continuity between the grounding terminal, frame, generator and engine block.

WIRING INSULATION

Daily check for loose, or frayed wiring insulation or sleeving.

BATTERY

Keep the battery terminals and cable clamps clean and lightly coated with petroleum jelly to prevent corrosion.

The retaining clamp should be kept tight enough to prevent the battery from moving.

INSTRUMENTS

Inspect the instrument lamps, gauges and switches prior to start-up and during operation to ensure proper functioning.

CONTROL COMPARTMENT

Every six months or 500 hours with the unit "OFF", perform visual inspection for loose connections, dirt, arcing, damage to electrical components.

TOWER CABLES

Each day the tower lifting cables should be inspected to ensure the ends are attached securely. The cables should be checked for fraying or other damage and replaced if damaged. Also the pulleys should be checked for unusual wear or damage and replaced if worn excessively or damaged.

WIRE ROUTING CLAMPS

Daily check for loose wire routing clamps. Clamps must be secure and properly mounted. Also check wiring for wear, deterioration and vibration abrasion.

TOWER GUIDES

Every month inspect all of the tower guides for proper operation. Clean sliding surfaces. Replace any missing or damaged parts before raising the tower.

ENGINE RADIATOR

Check the coolant level in the radiator. The coolant must cover the tubes in the top tank (approximately 1 inch high on a clean measuring rod, inserted down filler neck).

WARNING: Remove cap slowly to relieve Pressure from HOT radiator. Protect skin and eyes. Hot water or steam and chemical additives can cause serious personal injury.

The engine coolant system is normally filled with a 50/50 mixture of water and ethylene glycol. This permanent type anti-freeze contains rust inhibitors and provides protection to -35°F (-37°C). The use of such a mixture is recommended for both summer and winter operation.

It is recommended to test the freezing protection of the coolant every six months or prior to freezing temperatures. Replenish with a fresh mixture every twelve months.

Each month, inspect the radiator exterior for obstructions, dirt and debris. If present, blow water or compressed air containing a non-flammable solvent between the fins in a direction opposite the normal air flow. Should the radiator be clogged internally, reverse flushing, using a commercial product and the supplier's recommended procedure, may correct the problem.

ENGINE PROTECTION SHUTDOWN SYSTEM

The operation of the engine protection shutdown system should be checked every month, or whenever it appears to be not operating properly. The three switches involved in this protective shutdown system are the engine coolant high temperature switch, the engine oil pressure switch and the low fuel level switch (optional).

The engine oil pressure switch prevents the engine from operating with low oil pressure. Once a month, remove a wire from the engine oil pressure switch to check the shutdown system for proper operation.

Test the engine oil pressure switch by removing it and connecting it to a source of controlled pressure while monitoring an ohmmeter connected to the switch terminals.

As pressure is applied slowly from the controlled source, the switch should close at 12 psi (84 kPa) and show continuity through the contacts. As the pressure is slowly decreased to 10 psi (70 kPa) the contacts should open and the ohmmeter should show a lack of continuity through the contacts. Replace a defective switch before continuing to operate the unit.

Once a year, the temperature actuated switch should be tested by removing it from the unit and placing it in a bath of heated oil. The engine coolant high temperature switch will require a temperature of approximately 220°F (104°C) to actuate.

CAUTION: Never operate the unit with a defective safety shutdown switch or by by-passing a switch.

AIR FILTER ELEMENTS

The air filter should be inspected regularly (refer to the SERVICE/MAINTENANCE CHART) and the element replaced when the restriction indicator shows red or every 6 Months (500 hours), whichever comes first. The dust collector box(es) should be cleaned daily (more frequently in dusty operating conditions) and not allowed to become more than half full.

Removal

CAUTION: *Never remove and replace element(s) when the machine is running.*

Clean the exterior of the filter housing and remove the filter element by releasing the nut.

Inspection

Check for cracks, holes or any other damage to the element by holding it up to a light source, or by passing a lamp inside.

Check the seal at the end of the element and replace if any sign of damage is evident.

Reassembly

Assemble the new element into the filter housing ensuring that the seal seats properly.

Reset the restriction indicator by depressing the rubber diaphragm. Assemble the dust collector box parts, ensuring that they are correctly positioned.

Before restarting the machine, check that all clamps are tight.

VENTILATION

Always check that the air inlets and outlets are clear of debris etc.

CAUTION: *NEVER clean by blowing air inwards.*

COOLING FAN DRIVE

Periodically check that the fan mounting bolts in the fan hub have not loosened. If, for any reason, it becomes necessary to remove the fan or re-tighten the fan mounting bolts, apply a good grade of commercially available thread locking compound to the bolt threads and tighten to the torque value shown in the TORQUE SETTING TABLE later in this section.

The fan belt(s) should be checked regularly for wear and correct tensioning.

FUEL SYSTEM

The fuel tank should be filled daily or every eight hours. To minimize condensation in the fuel tank(s), it is advisable to top up after the machine is shut down or at the end of each working day. At six month intervals drain any sediment or condensate that may have accumulated in the tank(s).

FUEL FILTER WATER SEPARATOR

The fuel filter water separator contains a filter element which should be replaced at regular intervals (see the SERVICE/MAINTENANCE CHART).

LUBRICATION

The engine is initially supplied with engine oil sufficient for a nominal period of operation (for more information, consult the Engine section of this manual).

CAUTION: *Always check the oil levels before a new machine is put into service.*

If, for any reason, the unit has been drained, it must be re-filled with new oil before it is put into operation.

ENGINE LUBRICATING OIL

The engine oil should be changed at the engine manufacturer's recommended intervals. Refer to the Engine section of this manual.

ENGINE LUBRICATING OIL SPECIFICATION

Refer to the Engine section of this manual.

ENGINE OIL FILTER ELEMENT

The engine oil filter element should be changed at the engine manufacturer's recommended intervals. Refer to the Engine section of this manual.

TYRES/TYRE PRESSURE

See the GENERAL INFORMATION section of this manual.

RUNNING GEAR/WHEELS

Check the wheel nut torque 20 miles (30 kilometers) after refitting the wheels. Refer to the TORQUE SETTING TABLE later in this section.

Lifting jacks should only be used under the axle.

The bolts securing the running gear to the chassis should be checked periodically for tightness (refer to the SERVICE/MAINTENANCE CHART for frequency) and re-tightened where necessary. Refer to the TORQUE SETTING TABLE later in this section.

RUNNING GEAR WHEEL BEARINGS

Wheel bearings should be packed with grease every 6 months. The type of grease used should conform to specification MIL-G-10924.

BRAKES

Check and adjust the brake linkage at 500 miles (850Km) then every 3000 miles (5000Km) or 3 months (whichever is the sooner) to compensate for any stretch of the adjustable cables. Check and adjust the wheel brakes to compensate for wear.

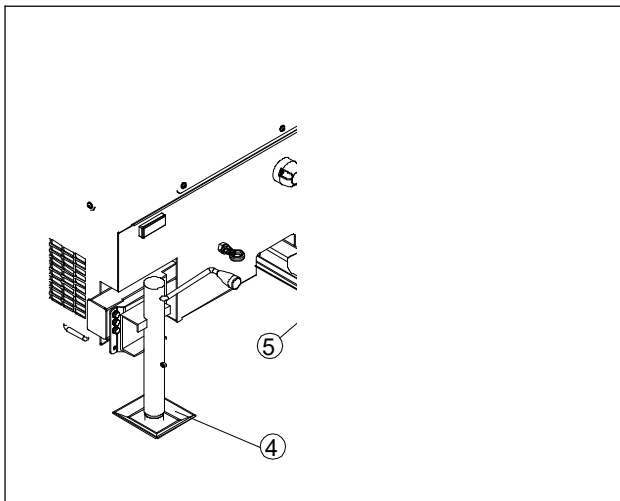
ADJUSTING THE OVERRUN BRAKING SYSTEM

1: Preparation

Jack up the machine

Disengage the handbrake lever [1].

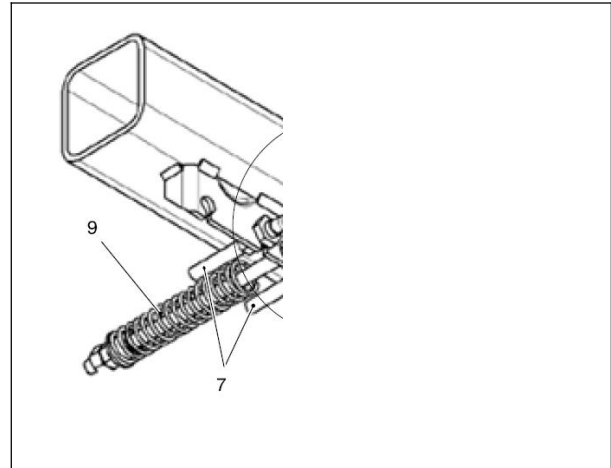
Fully extend the draw bar [2] on the overrun braking system.



- 1 Parking brake
- 2 Drawing ball
- 3 Supporting wheel
- 4 Supporting leg
- 5 Brake cable
- 6 Draw bar

The brake actuators must not be pre-tensioned – if necessary loosen the brake linkage [7] on the brake equalization assembly [8].

Check that brake actuators and cables [11] operate smoothly.



- 7 Brake linkage
- 8 Equalization assembly
- 9 Compression spring
- 10 Equalizer plate
- 11 Cable

CAUTION

The compression spring [9] must only be lightly pre-tensioned and when operating must never touch the axle tube.

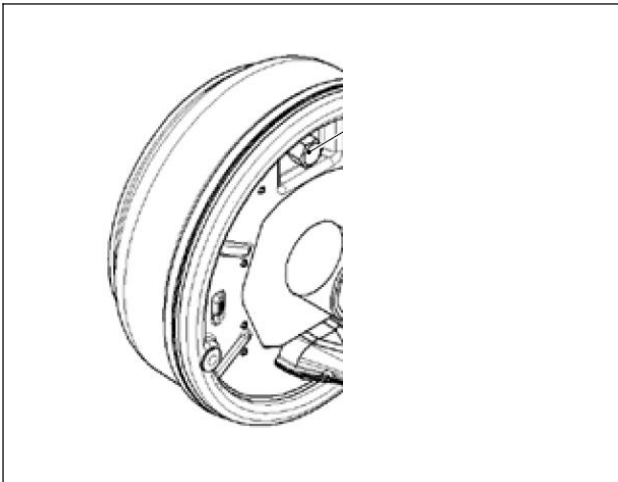
Never adjust the brakes at the brake linkage [7].

Requirements:

During the adjustment procedure always start with the wheel brakes. Always rotate the wheel in the direction of forward movement.

Ensure that an M10 safety screw is fitted to the handbrake pivot.

2. Brake Shoe Adjustment



12 Adjusting screw

13 Cable entry

Width across flats of adjusting screw [12]

Brake size	Key width
60x35 / 200x50	SW 17
250x40	SW 19
300x60	SW 22

Tighten adjusting screw [12] clockwise until the wheel locks.

Loosen adjusting screw [12] anti-clockwise (approx. ½ turn) until the wheel can be moved freely.

Slight dragging noises that do not impede the free movement of the wheel are permissible.

This adjustment procedure must be carried out as described on both wheel brakes.

When the brake has been adjusted accurately the actuating distance is approximately 5–8mm on the cable [11]

3: Compensator assembly adjustment

Variable Height models

Fit an M10 safety screw to the handbrake pivot. Disconnect the handbrake cable [5] at one end.

Pre-adjust brake linkage [7] lengthways (a little play is permissible) and re-insert the cable [5], adjusting it to give a small amount of play.

Remove the M10 safety screw from the handbrake pivot.

All Models

Engage the handbrake lever [1] and check that the position of the equalizer plate [10] is at right angles to the pulling direction. If necessary correct the position of the equalizer plate [10] on the cables [11].

The compression spring [9] must only be slightly pre-tensioned and when engaged must not touch the axle tube.

4: Brake linkage adjustment

Adjust the brake linkage [7] lengthways without pre-tension.

Readjustment

Engage the handbrake lever [1] forcefully a number of times to set the brake.

Check the alignment of the equalization assembly [8], this should be at right angles to the pulling direction

Check the play in the brake linkage [7]

If necessary adjust the brake linkage [7] again without play and without pre-tensioning

There must still be a little play in cable [5] (Variable Height Only)

Check the position of the hand brake lever [1]. The start of resistance should be approximately 10–15mm above the horizontal position.

Check that the wheels move freely when the handbrake is disengaged.

Final test

Check the fastenings on the transmission system (cables, brake equalization system and linkage).

Check the handbrake cable [5] for a small amount of play and adjust if necessary (Variable height only)

Check the compression spring [9] for pre-tensioning.

Test run

If necessary carry out 2–3 test brake actions.

Test brake action

Check the play in brake linkage [7] and if necessary adjust the length of brake linkage [7] until there is no play.

Apply the handbrake while rolling the machine forward, travel of the handbrake lever up to 2/3 of maximum is allowed.

Re-adjusting the overrun braking system

Re-adjustment of the wheel brakes will compensate for brake lining wear. Follow the procedure described in 2: Brake Shoe Adjustment.

Check the play in the brake linkage [7] and re-adjust if necessary.

Important

Check the brake actuators and cables [11]. The brake actuators must not be pre-tensioned.

Excessive operation of the handbrake lever, which may have been caused by worn brake linings, must not be corrected by re-adjusting (shortening) the brake linkage [7].

Re-adjustment

The handbrake lever [1] should be engaged forcefully several times to set the braking system.

Check the setting of the brake equalization assembly [8], which should be at right angles to the pulling direction.

Check the play in the brake linkage [7] again, ensuring that there is no play in the brake linkage and that it is adjusted without pre-tension. Check the position of the hand brake lever [1], cable [5] (with little play) and the compression spring [9] (only slight pre-tension). The start of resistance of the handbrake lever should be approximately 10–15mm above the horizontal position.

Final test

Check the fastenings on the transmission system (cables, brake equalization system and linkage).

Apply the handbrake while rolling the machine forward, travel of the handbrake lever up to 2/3 of maximum is allowed.

Check the handbrake cable [5] for a small amount of play and adjust if necessary (Variable height only)

Check the compression spring [9] for slight pre-tensioning.

CAUTION: Check the wheel nut torque 20 miles (30 kilometers) after refitting the wheels (Refer to the TORQUE SETTING TABLE later in this section).

GENERAL CLEANING INSTRUCTIONS

Keeping the machine clean of any oil and dirt is recommended for both appearance and maximum service life of the equipment. The frequency of cleaning will be dependent on local conditions and the severity and frequency of operation.

NOTE: Do not use high pressure water, steam or solvent on the exterior finish of the unit housing.

TORQUE VALUES

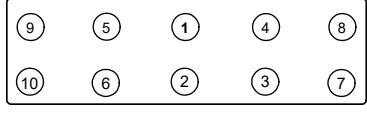
TABLE 1

	ft lbf	Nm
Engine mounts to engine	29–35	39–47
Air filter to bracket	16–20	22–27
Autella clamp to exhaust	9–11	12–15
Enclosure	9–11	12–15
Drop Leg	53–63	72–85
Exhaust flange to manifold	17–21	23–28
Fan guard	9–11	12–15
Fan to hub	12–15	16–20
Running gear front to chassis	63–69	82–93
Running gear rear to chassis	63–69	82–93
Running gear drawbar to axle	29–35	39–47
Band clamp on hose	106–133	143–180
Wheel nuts	50–80	67–109

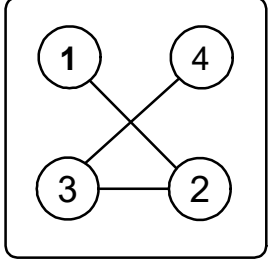
USE VALUES FROM TABLE 2 IF NOT SPECIFIED IN TABLE 1

TABLE2 METRIC FASTENERS

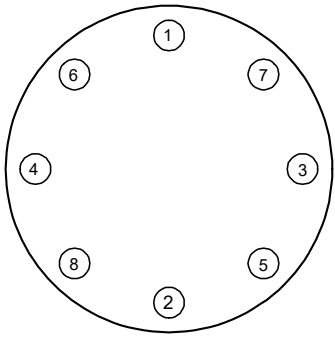
CAPSCREW OR NUT THREAD SIZE AND PITCH	NOMNAL DESIGN TORQUE					
	PROPERTY GRADE 8.8 (HEAD MARKING)		PROPERTY GRADE 10.9 (HEAD MARKING)		PROPERTY GRADE 12.9 (HEAD MARKING)	
	(Nm.)	(FT-LBF)	(Nm.)	(FT-LBF)	(Nm.)	(FT-LBF)
M6×1.0	11	8	15	11	18	13
M8×1.25	26	19	36	27	43	31
M10×1.5	52	36	72	53	84	62
M12×1.75	91	67	126	93	147	109
M14×2	146	107	200	148	234	173
M16×2	226	166	313	231	365	270
M20×2.5	441	325	610	450	713	526



TYPICAL RECTANGULAR TORQUE PATTERN

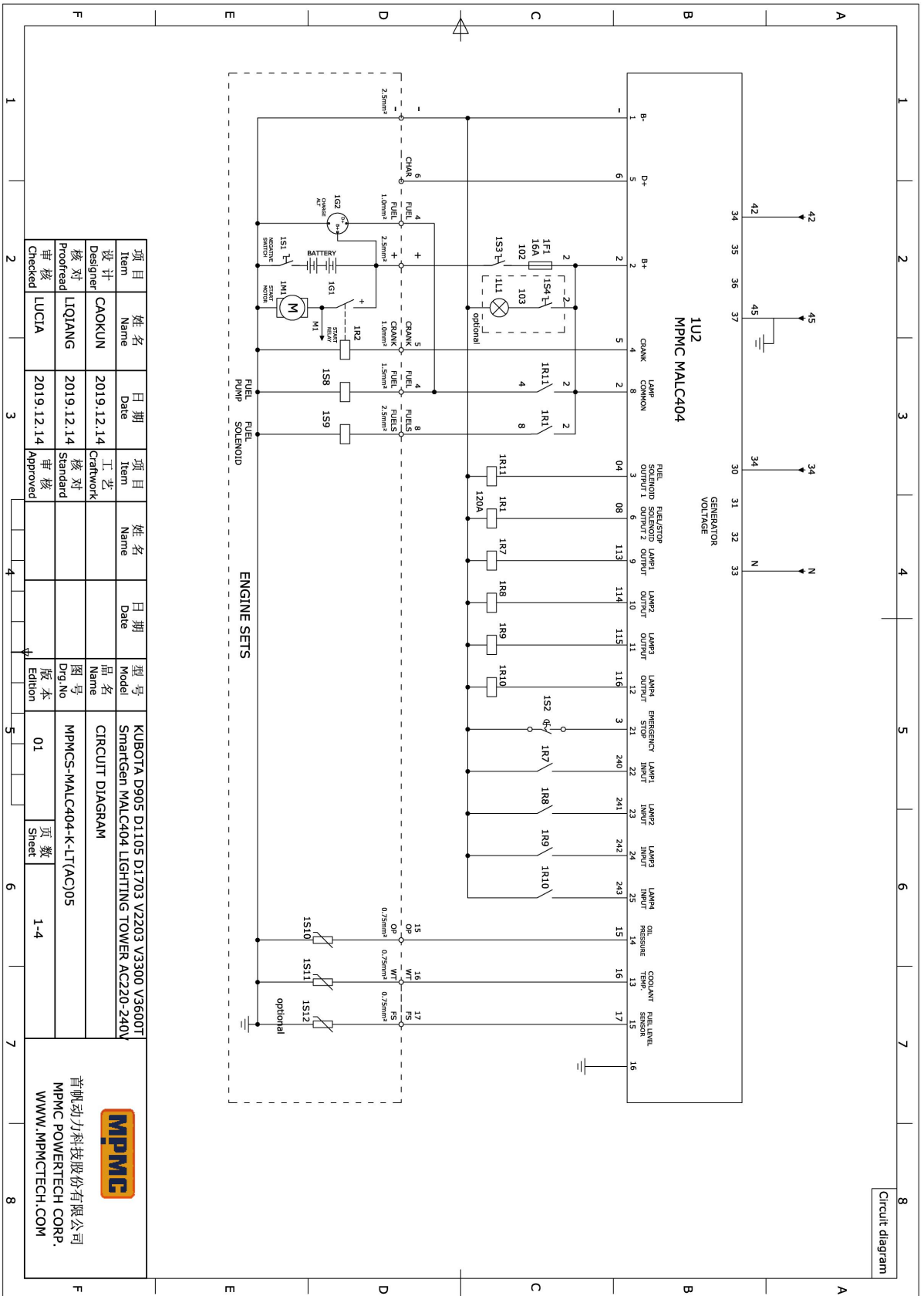


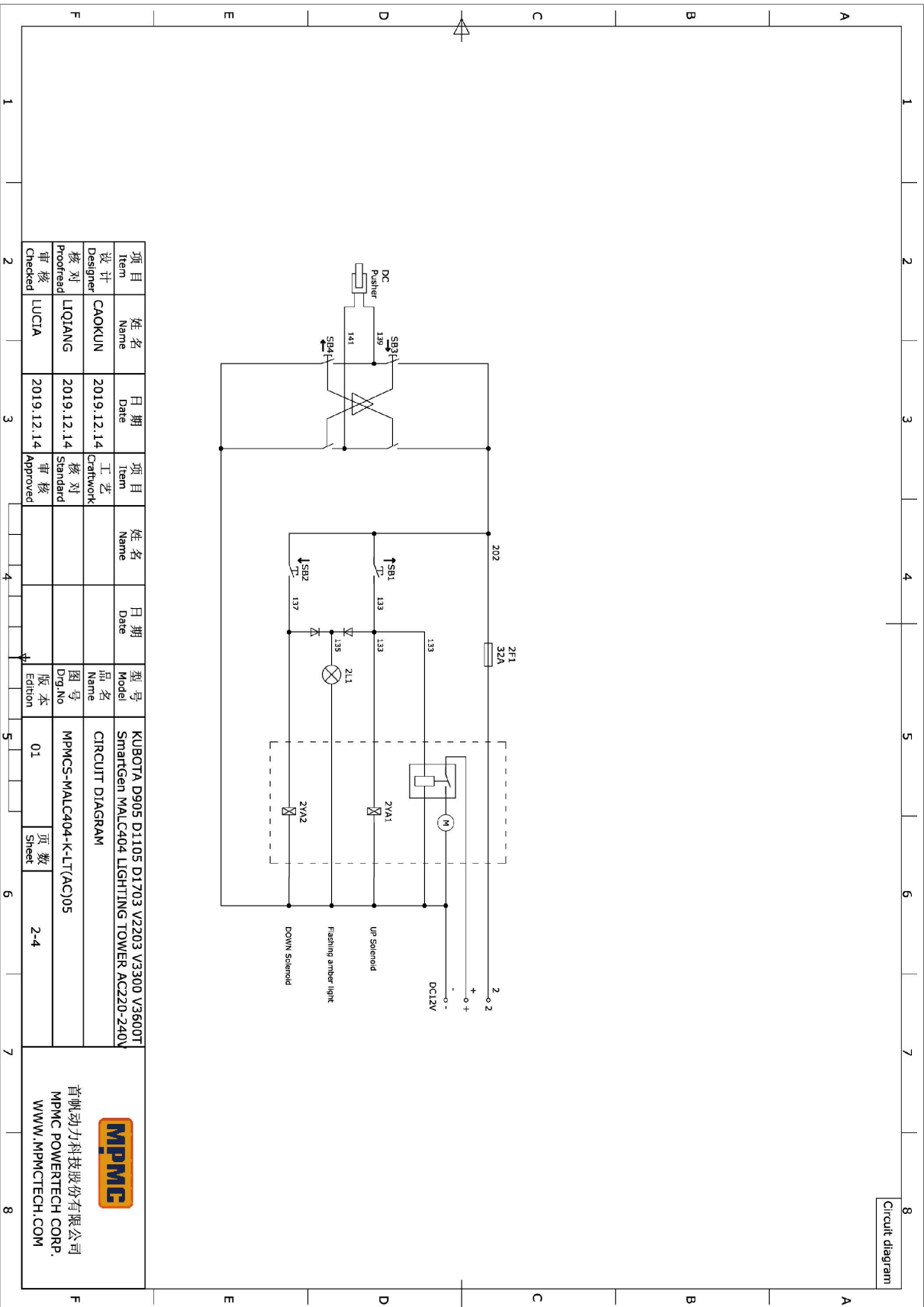
TYPICAL SQUARE TORQUE PATTERN



TYPICAL CIRCULAR TORQUE PATTERN

SCHEMATIC DIAGRAM FOR AC ELECTRICAL HARNESS





项目 Item	姓名 Name	日期 Date	项目 Item	姓名 Name	日期 Date	型号 Model
设计 Designer	CAOKUN	2019.12.14	工艺 Craftwork			KUBOTA D905 D1105 D1703 V2203 V3300 V3600T
校对 Proofread	LIQIANG	2019.12.14	核对 Standard			SmartGen MALC404 LIGHTING TOWER AC220-240V
审核 Checked	LUCIA	2019.12.14	审核 Approved			

CIRCUIT DIAGRAM

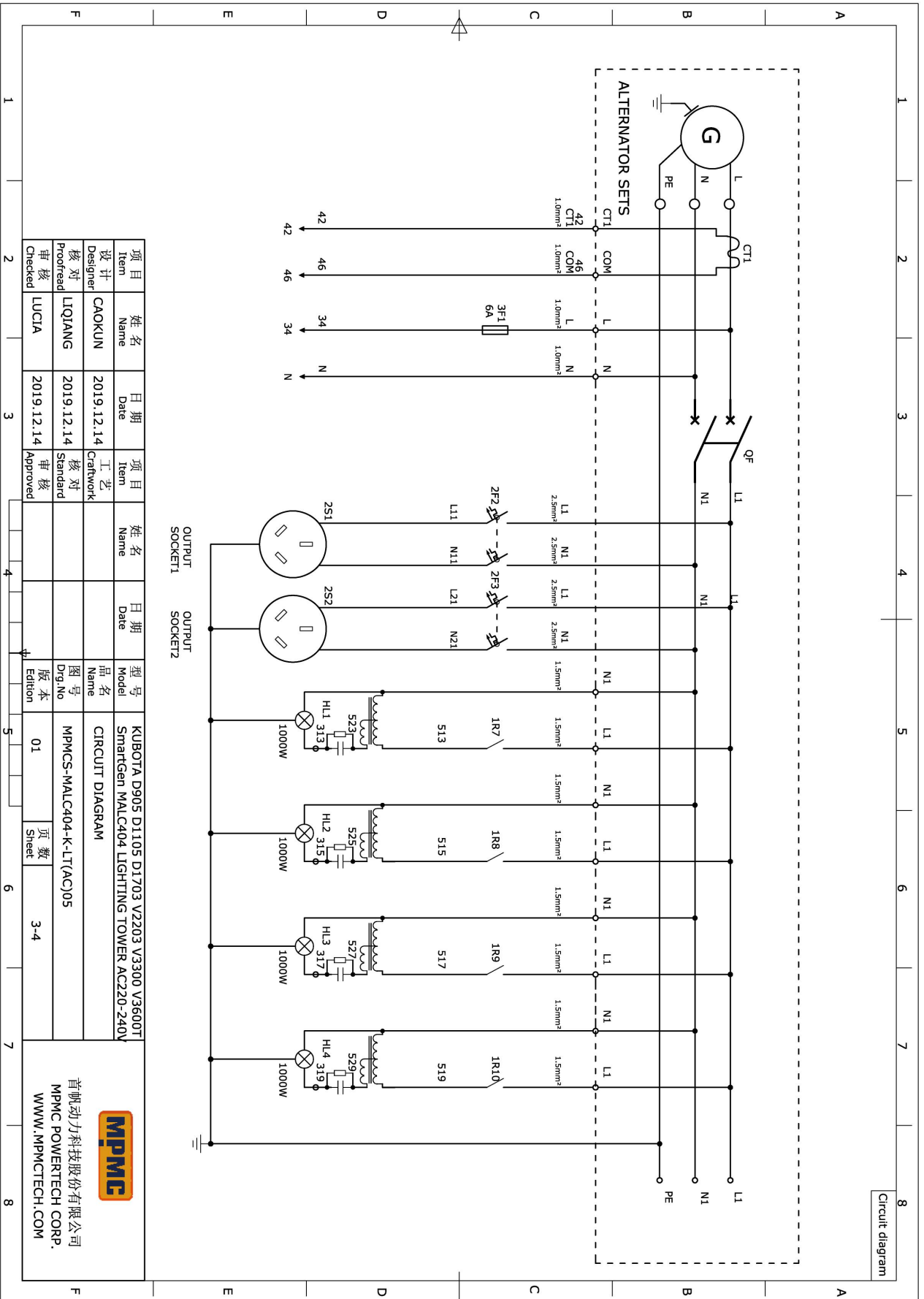
MPMCS-MALC404-K-LT(AC)05


01

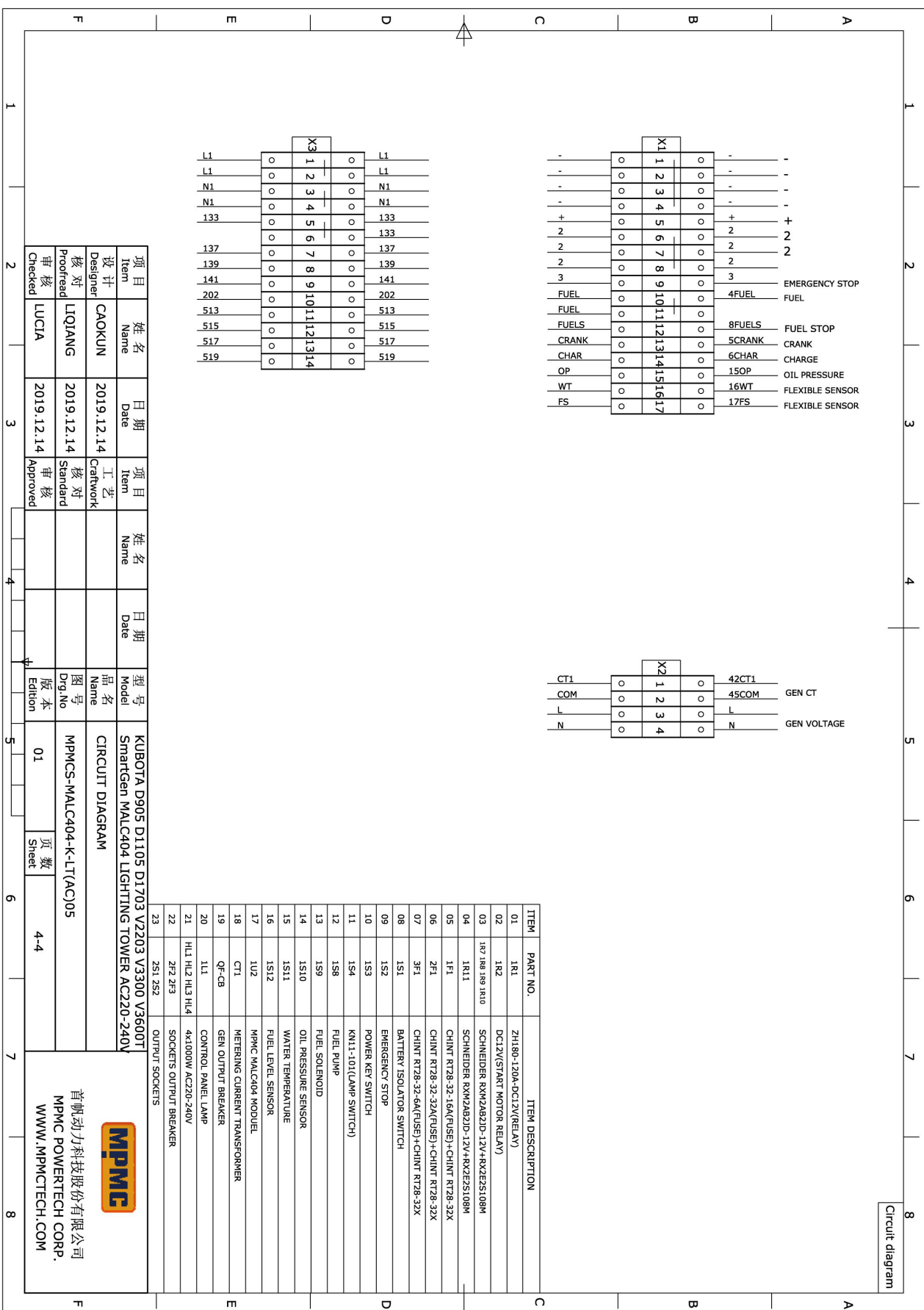
2-4

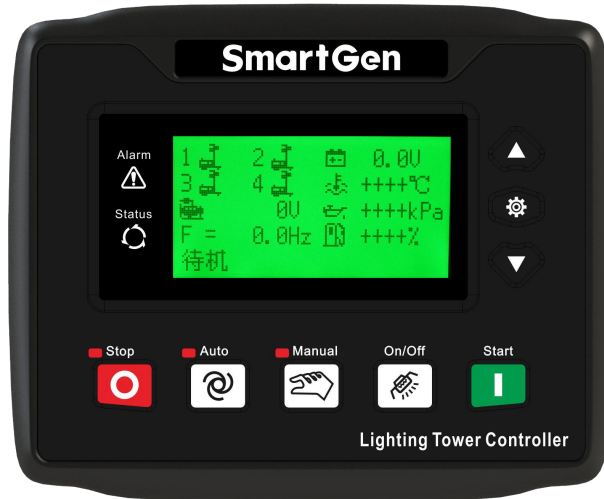


首帆动力科技股份有限公司
MPMC POWERTECH CORP.
WWW.MPMCTECH.COM



项目 Item	姓名 Name	日期 Date	项目 Item	姓名 Name	日期 Date	型号 Model	首帆动力科技股份有限公司 MPMC POWERTECH CORP. WWW.MPMCTECH.COM	
设计 Designer	CAOKUN	2019.12.14	工艺 Craftwork			KUBOTA D905 D1105 D1703 V2203 V3300 V3600T		
核对 Proofread	LIQIANG	2019.12.14	核对 Standard			Smartgen MALC404 LIGHTING TOWER AC220-240V		
审核 Checked	LUCIA	2019.12.14	审核 Approved			CIRCUIT DIAGRAM		
						MPMCS-MALC404-K-LT(AC)05		
				图号 Dwg.No	版本 Edition	页码 Sheet	3-4	





1 OVERVIEW

ALC404 Lighting Tower Controller, suits for both AC and DC light tower set, is used for automation and monitor control systems of single light tower unit (diesel/petrol genset) to achieve not only scheduled start/stop, sunrise and sunset start/stop, manual start/stop as well as start/stop genset via remote input port but also turn on/off the flashlights of the light tower in proper order. It integrates with digitalization, intellectualization and network technologies and enjoys functions including precise data measurement, alarm protection as well as remote control, remote measuring and remote communication.

ALC404 Lighting Tower Controller adopts micro-processor technology and combines automation control function with beacon lights control function. It fits with performance including LCD display, selectable Chinese/English languages interface, modular design, compact structure, reliable operation and simple connections, which is very easy to use and convenient to maintain.

2 PERFORMANCE AND CHARACTERISTICS

- Based on microprocessor, fitted with 132x64 LCD screen with graphic icons and backlit, selectable Chinese/English languages interface and pushbuttons;
- Be compatible with both AC and DC light tower sets;
- Deep sleep function;
- Reducing the number of the lighting lamps along with the fuel level drops;
- With lamp fault check function;

- Starting battery under voltage condition can start gen-set to charge the start battery;
- Not only suitable for 3P4W, 3P3W, 1P2W, 2P3W(120V/240V) power system with 50Hz/60Hz frequency, but also suitable for DC power supply system;
- Collect and display parameters including generator/mains 3 phase voltage and current, frequency, and power as below,

Generator

Line voltage: Uab, Ubc, Uca

Phase voltage: Ua, Ub, Uc

Frequency: Hz

Load

Current: Ia, Ib, Ic Unit: A

Total active power: P Unit: kW

Total reactive power: Q Unit: kVar

Total apparent power: S Unit: kVA

Power factor: λ Unit: 1

Accumulated power generated: W Unit: kWh

Current accumulated power generated: W Unit: kWh

Mains(mains supply is active)

Line voltage: Uab, Ubc, Uca

Phase voltage: Ua, Ub, Uc

Frequency: Hz

- Generator with over voltage, under voltage, over frequency, under frequency, and over current functions; mains with over voltage, under voltage, over frequency and under frequency functions;
- Detect DC voltage, current, and power while controlling of DC light tower set;
- Precise collect generator parameters as below,

Temperature(programmable) ° C/°F

Engine oil pressure (programmable) kPa/Bar/Psi

Fuel level (programmable) % Fuel left L

Engine speed r/min(RPM)

Starter battery voltage V

D+ voltage of charger V

Accumulated start times

Accumulated running time

Currently running time

- Precise real-time clock and real-time calendar functions allow scheduled start/stop (every day, every week, every month and custom week), sunrise and sunset start/stop light tower set; moreover, scheduled start time, running duration time, sunrise time and sunset time can be set by users as users' wish;
- Remote start/stop function;
- Manual start/stop control of light tower set and manual on/off control of lighting lamps;

- Standard USB communication port makes it easier to communicate with PC and faster to configure parameters; network monitoring can be achieved via USB port;
- CANBUS interface can connect with J1939 EFI engine, which can not only monitor the normal data of EFI engine (like water temp., oil pressure, speed, and fuel consumption), but also control gen-set start/stop and rise/drop speed via CANBUS port.
- Mains can supply power for controller lighting lamps or manual on/off control of lighting lamps.
- Gen-set running accumulation and output energy accumulation functions convenient for users to regular maintenance and fuel consumption statistics;
- Scheduled start time and various delays can be set on the spot and also comes with password protection in case of laypeople disoperation.
- ALC404 controller can control up to 4 lamps and 4 feedback indicators were be fitted on the panel. In addition, the turn on interval time between two lights can be set by users.
- 99 pieces of event logs can be circularly stored and inquired on the spot; also can be print or be inquired via PC.
- More kinds of curves of temperature, oil pressure, fuel level can be used directly and users can select "User Configured" sensor curves for unknown engine sensor;
- Widely power supply range DC(8~35)V, suitable to different starting battery voltage environment;
- Modular design, pluggable terminal, built-in mounting, compact structure with easy installation;

3 SPECIFICATION

Table 3 – Technical Parameters















Items	Contents
Working Voltage	DC8. 0V to 35. 0V, uninterruptible power supply
Overall Consumption	<3W (Standby mode: ≤2W; Deep Sleep mode: ≤0.2W)
Gen./Mains Voltage Input:	
3 Phase 4 Wire	15V AC - 360V AC (ph-N)
3 Phase 3 Wire	30V AC - 620V AC (ph-ph)
Single Phase 2 Wire	15V AC - 360V AC (ph-N)
2 Phase 3 Wire	15V AC - 360V AC (ph-N)
DC	0V DC - 75V DC
Alternator Frequency	50/60Hz
Speed Sensor Voltage	1. 0 V to 24 V (RMS)
Speed Sensor Frequency	Maximum 10,000 Hz
Starter Relay Output	5A DC B+ power supply output
Configurable Relay Output 1	5A DC B+ power supply output
Configurable Relay Output 2	1A DC B+ power supply output
Configurable Relay Output 3	1A DC B+ power supply output
Configurable Relay Output 4	1A DC30V volt free output
Configurable Relay Output 5	1A DC30V volt free output
Configurable Relay Output 6	1A DC30V volt free output
Configurable Relay Output 7	1A DC30V volt free output
Case Dimensions	135 mm x 110 mm x 44 mm
Panel Cutout	116mm x 90mm
AC CT Secondary Current	Rated: 5A
DC Current Input	Hall sensor's secondary side current: (4~20)mA
Working Conditions	Temperature: (-25~+70)°C Relative Humidity: (20~93)%RH
Storage Conditions	Temperature:(-25~+70)°C
Protection Level	IP65: rubber seal installed between the controller enclosure and panel fascia.
Insulation Intensity	Apply AC2.2kV voltage between high voltage terminal and low voltage terminal; The leakage current is not more than 3mA within 1min.
Weight	0.34kg

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4 OPERATION

4.1 PUSHBUTTONS

Table 4 – Keys Description

Icon	Function	Description
	Stop/Reset	Stop running light tower set; Reset alarms in stop mode; Lamp test in stop mode (press at least 3 seconds); Quick stop in stopping process.
	Start	Start lighting tower set in manual mode; Quick start in starting process (press once to jump one status of light tower set).
	Manual Mode	Press this key to configure tower set as manual start mode.
	Auto Mode	Press this key and controller enters into auto start mode select interface; use   to select Auto Start mode and press  or  to confirm the selection.
	Light On/Off	Press this key to change-over screens between mains screen and light On/Off screen. In light On/Off screen (in manual mode), press  to turn off the light and press  to turn on the light.
	Menu / Confirm	Press this key to enter into menu screen. In parameter setting page press this key to right shift cursor and confirm the setting information.
	Up / Config. "+"	Press this key to scroll screens in parameter display page, menu page and records query page; Up cursor and increase value in parameter setting page. Press this key to wake up controller while controller is in deep sleep mode; In light On/ Off screen (in manual mode), press this key to control the number of lighting lamps (press once to turn on one lamp).
	Down/Config. "-"	Press this key to scroll screens in parameter display page, menu page and records query page; Down cursor and decrease value in parameter setting page. Press this key to wake up controller while controller is in deep sleep mode; In light On/ Off screen (in manual mode), press this key to control the number of lighting lamps (press once to turn off one lamp).

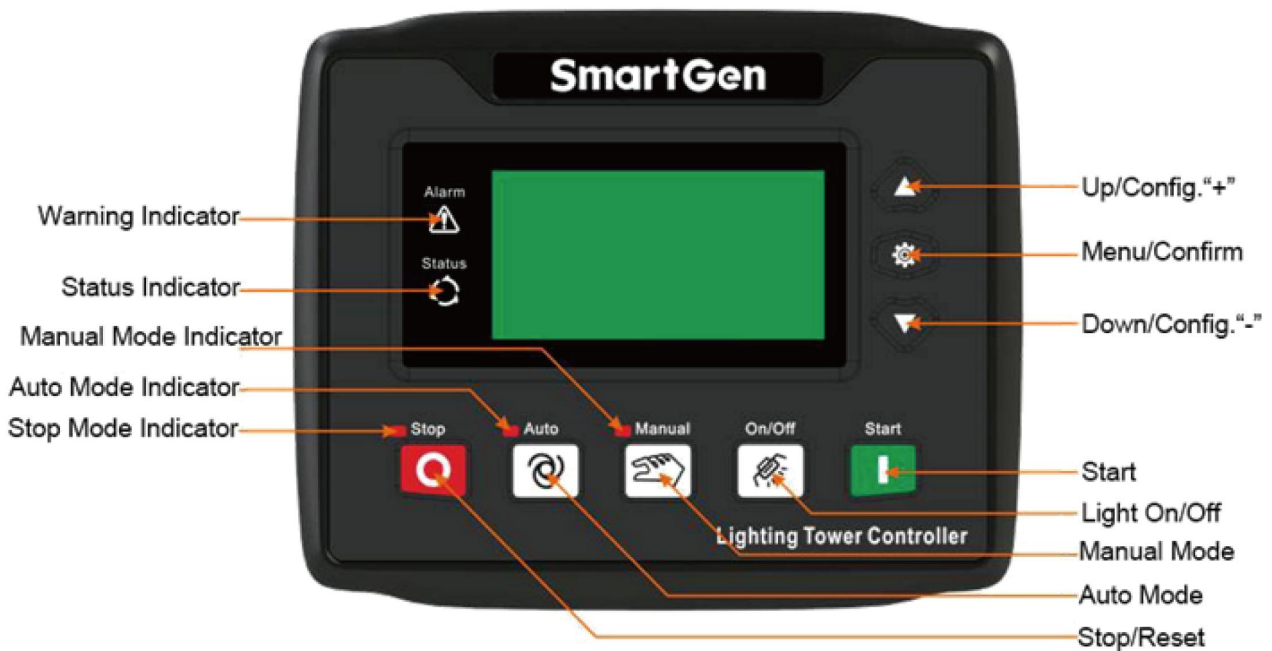


Fig.1 - ALC404 Front Panel

NOTE: Partial indicators description,

Alarm Indicator: slowly flash when warning alarms occur; fast flash when shutdown alarms occur; not illuminate if no alarms occur.

Status Indicator: not illuminate while genset is standby; normally illuminate while genset is normal running.

LCD DISPLAY

Table 5 - Main Screen Display

Mains Screen	Description
	<p>First screen displays all lights status, average voltage, generator frequency, generator speed, water temperature, oil pressure, fuel level, light tower set running status, and alarm information.</p> <p> Light On; Light Off; Battery; Speed; Generator; Mains; Coolant Temp.; Oil Pressure; Fuel Level; </p> <p>Note: coolant temp., oil pressure, and fuel level its related data collected by the sensors (if connect with EFI engine, data of coolant temp. and oil pressure are provided by ECU)</p>

Mains Screen	Description
<p>Manual Mode Manual Start Current Time 14:45:15 Gens Normal Running 1 2 3 4 </p>	<p>Second screen display: Lighting tower set running status, current time, alarm information and etc.</p>
<p>Generator UL-L 399 399 399 V UL-N 230 230 230 V F = 50.0 Hz 1500RPM 1 2 3 4 </p>	<p>Press button The screen displays generator line voltage(L1-L2, L2-L3, L3-L1), phase voltage(L1 、 L2 、 L3), frequency and engine speed. DC light tower set without this page.</p>
<p>Load Current 19.9 19.9 19.9 A Power 13.7kW 0.0kVar PF = 1.00 PS 13.7kVA 1 2 3 4 </p>	<p>Press button The screen displays load current, total active power, total apparent power, total reactive power and power factor. If current and power values below 100, parameters will retain one decimal; if current and power values equal or above 100, no decimal will be displayed, and users can check precise data via PC software. The screen display DC voltage, current and power when DC current is fitted.</p>
<p>Engine Temp. 80°C Oil Pressure 400 kPa Fuel Level 80 % Gens Normal Running 1 2 3 4 </p>	<p>Press button The screen displays lighting tower set input values of flexible sensors. If one sensor is configured as “Not Used”, no information about this sensor will be displayed; if the sensor open circuit, “++++” will be displayed; if the sensor curve configured as “DIN High Activate” or “DIN Low Activated”, “HHHH” or “LLLL” will be displayed.</p>

Mains Screen	Description
	<p>Press  button</p> <p>The screen displays battery voltage, charger voltage, engine speed of lighting tower set and current time of controller (the number in the parentheses is week information).</p>
	<p>Press  button</p> <p>The screen displays accumulated start times, accumulated output active energy, accumulated run time (HH: MM: SS).</p>
	<p>Press  button</p> <p>The screen displays currently start time (HH: MM: SS) and output active energy of this time.</p>
	<p>Press  button</p> <p>The screen displays alarms information that detected by the controller.</p>


















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











4.4 Scheduled START/STOP OPERATION

4.4.1 SCHEDULED START Mode SELECT OPERATION

Scheduled start operation has four modes to choose (00 daily, 01 weekly, 02 monthly and 03 custom week). The following content take the Scheduled Start (00 daily) as the example, and the other modes' operation method is likewise. Detailed operation process is as below,

Table 6 – Scheduled Start Setting

No.	Process	Description	Panel Display
1	Enter into Auto Start Mode Selection navigation screen	Press  key to enter into Auto Start mode, indicator besides it illuminates, simulteniouly, Auto Start Mode Selection screen will be displayed. Then choose 02 Scheduled Start via pressing  or  .	Auto Start Mode Selection 01 Remote Start Mode 02 Auto Timer Mode 03 Sunrise/set Mode
2	Enter into Auto Timer Mode detailed setting navigation screen	Press  key to enter into Auto Timer Mode setting screen, and select 03 Timer Configure option via pressing  or  . Then press  or  to enter into Timer Runing Action setting page and choose 01 Timer Mode Select through pressing  and  .	Timer Running Action Return 01 Mode Start 02 Mode Close 03 Timer Configure Timer Running Action Return 01Timer Mode Select 02Auto Run Timer Set
3	Timer Mode Select	Press  key to enter into 01 Timer Mode Select setting screen, and press  again to select 00 Daily option via pressing  or  . Then press  to confirm and save the setting. At this time, through pressing  or  to return to auto timer mode detailed setting navigation screen.	01Timer Mode Select 00Daily 00Daily



























No.	Process	Description	Panel Display				
4	Auto Run Timer Set	<p>In auto timer mode detailed setting screen, press  or  to select 02Auto Run Timer Set.</p> <p>Press  to enter into 02Auto Run Timer Set screen, and then press  again to configure Start Time and Duration Time through ,  and  keys.</p> <p>If setting completely, press  or  to return to the auto timer mode detailed setting navigation screen and select Return by pressing  or  keys.</p> <p>Press  to return to Auto Timer Mode detailed setting navigation screen, and select Return through  or , and then press  to return to Timer Running Action confirmation screen.</p>	<p>Timer Running Action Return 01Timer Mode Select 02Auto Run Timer Set</p> <p>Timer Running Action 02Auto Run Timer Set</p> <table border="0"> <tr> <td>Start Time</td> <td>Duration</td> </tr> <tr> <td>18:30</td> <td>12:00</td> </tr> </table> <p>Timer Running Action Return 01Timer Mode Selection 02Auto Run Timer Set</p>	Start Time	Duration	18:30	12:00
Start Time	Duration						
18:30	12:00						
5	Timer Running Action Start/Close	<p>Select 01 Mode Start via  or  key and press  to confirm the action. Controller will jump to the 2nd page of main screen, at this point, Auto Mode (Daily) start.</p> <p>Select 02 Mode Close via  or  keys and press  to confirm the action. Controller will jump to the 2nd page of main screen, at this point, Auto Mode (Daily) closed.</p>	<p>Timer Running Action Return 01 Mode Start 02 Mode Close 03 Timer Configure</p> <p>Auto Timer Mode (Daily) Start Time 18:30:00 Current Time 18:29:45 Standby 1  2  3  4 </p>				

4.4.2 SCHEDULED START OPERATION PROCESS

Table 7 – Scheduled Start/Stop Operation

No.	Operation Process	Panel Display
1	<p>Configure the controller as scheduled start mode and choose “Timer Mode (00 Daily)”, and start time set as 18:30, continuous running time (hours run) set as 12:00(12hours).</p>	<p>Auto Timer Mode (Daily) Start Time 18:30:00 Current Time 18:29:45 Standby 1 2 3 4 </p>
2	<p>When there are 10s left from start time, audible alarm relay is active (if configured, when start time is up, audible alarm relay will stop output). When start time is up and start remaining time is more than 0s, light tower set begin cranking. Continuous running countdown will be displayed on the first line.</p>	<p>Time Left 11:59:55 Start Time 18:30:00 Current Time 18:29:50 Standby 1 2 3 4 </p> <p>Time Left 11:59:55 Start Time 18:30:00 Current Time 18:29:50 Cranking 2s 1 2 3 4 </p>
3	<p>If engine speed, generator voltage and frequency has reached on-load requirements (speed ≥ on-load speed, voltage ≥ on-load voltage and frequency ≥ on-load frequency), all the lights will illuminate in proper order and the illumination interval delay is 2s (can be set as 1~300s).</p>	<p>Time Left 11:58:57 Start Time 18:30:00 Current Time 18:31:02 3# Light On 2s 1 2 3 4 </p> <p>Time Left 11:58:48 Start Time 18:30:00 Current Time 18:31:11 Gens Normal Running 1 2 3 4 </p>
4	<p>When “stop delay” time is 00:00:00 manually select 02 Mode Close in Auto Timer Mode screen (01 Mode Start must be reselect if another time scheduled start is needed), and then press to confirm the act. then 1#~#4 lights will off in proper order and the extinguishing interval delay can be set as 1s~300s. The light tower set begin stopping when all the lights off.</p>	<p>Time Left 00:00:00 Start Time 18:30:00 Current Time 06:30:00 4# Light Off 2s 1 2 3 4 </p> <p>Auto Timer Mode (Daily) Start Time 18:30:00 Current Time 06:30:39 Cooling Delay 29s 1 2 3 4 </p>

Remark: The auto timer mode will be canceled automatically when select other auto start mode! if select Auto Timer Mode(Daily), lighting tower set will be auto started everyday at the pre-set time.

No.	Process	Description	Panel Display
4	Sunset start time delay setting	<p>Press  to enter into Sunset Time Delay setting screen, and configure the delay value through  or  key after pressing  (delay value can be configured as "+" ahead of preset start time and "-" after of preset start time). And then press  key to save the setting into the controller. Meanwhile, press  or  to return to Sunrise/set Action setting screen.</p>	<p>03 Sunset Time Delay</p> <p>CurrentVal +00000min +00000</p>
5	Sunset stop time delay setting	<p>In Sunrise/set Action setting navigation screen, press  or  to select 04 Sunrise Time Delay and press  to enter the setting page. Press  again and configure the delay value through  or  key (delay value can be configured as "+" ahead of preset stop time and "-" after preset of stop time). And then press  key to save the setting into the controller. Meanwhile, press  or  to return to Sunrise/set Action setting screen.</p>	<p>Sunrise/set Action</p> <p>01 Mode Start 02 Mode Close 03 Sunset Time Delay 04 Sunrise Time Delay</p> <p>04 Sunrise Time Delay</p> <p>CurrentVal +00000min +00000</p>
6	Timer Running Action Start/Close	<p>Select 01 Mode Start via  or  key and press  to confirm the action. Controller will jump to the 2nd page of main screen, at this point, Sunrise/set Mode set completely.</p> <p>Select 02 Mode Close via  or  keys and press  to confirm the action. Controller will jump to the 2nd page of main screen, at this point, Sunrise/set Mode closed.</p>	<p>Sunrise/set Action</p> <p>Return</p> <p>01 Mode Start 02 Mode Close 03 Sunset Time Delay</p> <p>Auto Sunrise/set Mode</p> <p>Start Time 16:55:00 Current Time 16:54:50 Standby</p> <p>1  2  3  4 </p>

4.5.2 SUNRISE/SUNSET START/STOP OPERATION PROCESS

Table 9 – Sunrise/Sunset Start/Stop Operation Process




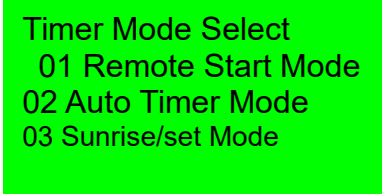

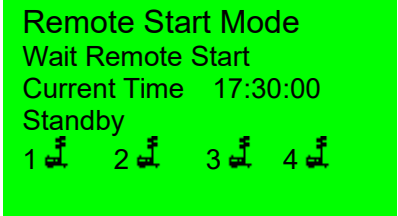




No.	Operation Process	Panel Display
1	Configure the controller as Auto Sunrise/set Mode, city information as Beijing via PC software, sunset start time delay as +0min and sunrise stop time delay as +0min. The actual start time is 16:55:00 and stop time is 07:06:00.	<p>Auto Sunrise/set Mode Start Time 16:55:00 Current Time 16:54:50 Standby 1 2 3 4 </p>
2	When there are 10s left from start time (start time can be configured via PC software), audible alarm relay is active (if configured, when start time is up, audible alarm relay will stop output). When start time is up, light tower set begin cranking. Stop time will be displayed on the first line.	<p>Auto Sunrise/set Mode Start Time 16:55:00 Current Time 16:54:50 Standby 1 2 3 4 </p> <p>Stop Time 07:06:00 Start Time 16:55:00 Current Time 16:55:00 Fuel Output Delay 1s 1 2 3 4 </p>
3	If engine speed, generator voltage and frequency has reached on-load requirements (speed ≥ on-load speed, voltage ≥ on-load voltage and frequency ≥ on-load frequency), all the lights will illuminate in proper order and the illumination interval delay is 2s (can be set as 1~300s).	<p>Stop Time 07:06:00 Start Time 16:55:00 Current Time 16:55:54 2# Light On 2s 1 2 3 4 </p> <p>Stop Time 07:06:00 Start Time 16:55:00 Current Time 15:56:00 Gens Normal Running 1 2 3 4 </p>
4	When “Current Time” is 07:06:00 (controller’s current time can be set via PC software) manually select 02 Mode Close(if select, light tower set will not start according to the sunset time unless to reselect 01 Mode Start), then 1#~4# lights will off in proper order and the extinguishing interval delay can be set as 1s~300s. The light tower set begin stopping when all the lights off.	<p>Stop Time 07:06:00 Start Time 16:55:00 Current Time 07:06:00 4# Light Off 2s 1 2 3 4 </p> <p>Auto Sunrise/set Mode Start Time 16:55:00 Current Time 07:06:09 Stop Cooling Delay 59s 1 2 3 4 </p>
<p>Remark: The Sunrise/Sunset mode will be canceled automatically when select other auto start mode!</p>		

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4.6 AUTO REMOTE START/STOP OPERATION

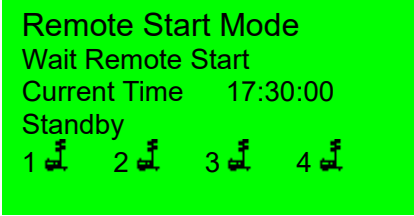




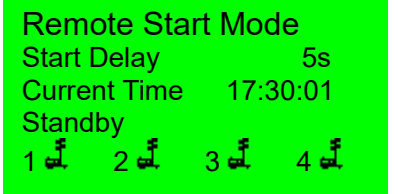




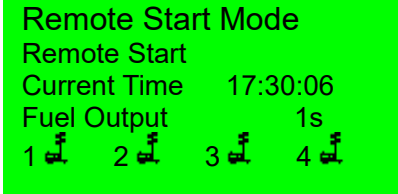




4.6.1 AUTO REMOTE START MODE SETTING

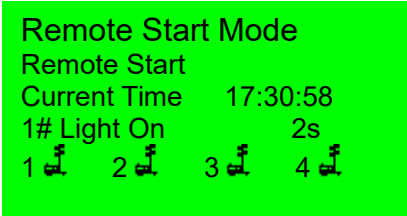
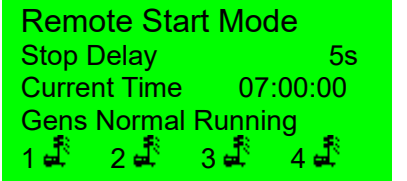
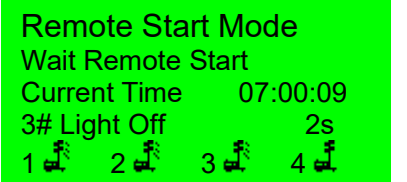
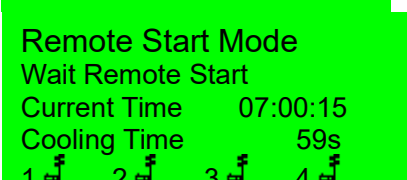
Table 10 – Auto Remote Start Mode Setting

No.	Process	Description	Panel Display
1	Config input port	Configure input port 1 as Remote Start Input.	/
2	Enter into Auto Timer Mode detailed setting navigation screen	Press  , its indicator lights on, and lighting tower set enters into Auto Start Mode . Meanwhile, the panel display Timer Mode Select screen; Press  and  to select 01 Remote Start Mode.	 <p>Timer Mode Select 01 Remote Start Mode 02 Auto Timer Mode 03 Sunrise/set Mode</p>
3	Confirm remote start mode	Press  to confirm remote start mode, and then controller will jump to the 2nd page. Meanwhile, remote start mode set completely.	 <p>Remote Start Mode Wait Remote Start Current Time 17:30:00 Standby 1  2  3  4 </p>

4.6.2 AUTO REMOTE START/STOP PROCESS OPERATION

Table 11 – Remote Start/Stop Operation

No.	Operation Process	Panel Display
1	Configure controller as Remote Start Mode.	 <p>Remote Start Mode Wait Remote Start Current Time 17:30:00 Standby 1  2  3  4 </p>
2	<p>When remote start input port is active, remote start delay begins and audible alarm relay is active (if configured).</p> <p>When remote start delay is over and remote start signal is active, light tower set begins cranking.</p>	 <p>Remote Start Mode Start Delay 5s Current Time 17:30:01 Standby 1  2  3  4 </p>  <p>Remote Start Mode Remote Start Current Time 17:30:06 Fuel Output 1s 1  2  3  4 </p>

No.	Operation Process	Panel Display
3	If engine speed, generator voltage and frequency has reached on-load requirements (speed ≥ on-load speed, voltage ≥ on-load voltage and frequency ≥ on-load frequency), all the lights will illuminate in proper order and the illumination interval delay is 2s (can be set as 1~300s).	
4	When remote start input port is inactive, remote stop delay begins; when stop delay is over, 1#~4# lights will off in proper order and the extinguishing interval delay can be set as 1s~300s. The light tower set begin stopping when all the lights off.	  

4.7 MANUAL START/STOP OPERATION

Table 12 - Light On/Off Screen

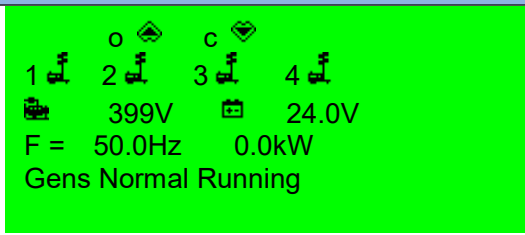
































































Main Screen	Description
	<p>Press  key to inter into Light On/Off screen, and press  again to exit. This screen shows users how to manually turn on/off lights.</p> <p>“O” stands for “Open”,  refers to  and  means  is active;</p> <p>“C” stands for “Close”,  refers to  and  means  is active;</p>

Table 13 - Manually Start/Stop Unit Operation

No.	Operation Process	Panel Display
1	Press  , its indicator lights on, and controller enters Manual Mode. Press  , light tower set begins cranking	<pre> Manual Mode Wait Manual Start Current Time 17:00:00 Standby 1  2  3  4  Manual Mode Manual Start Current Time 17:00:02 Cranking 5s 1  2  3  4  </pre>
2	If light tower set high-speed warming up is over, meanwhile, engine speed, generator voltage and frequency has reached on-load requirements (speed \geq on-load speed, voltage \geq on-load voltage and frequency \geq on-load frequency), and then light tower set enters into normal running process.	<pre> Manual Mode Manual Start Current Time 17:00:58 Gens Normal Running 1  2  3  4  </pre>
3	Press  enters into Light On/Off screen, press  1#~4# lights will off in proper order (press once, one light off). If manually turn off the light, press  4#~1# lights will off in proper order (press once, one light off).	<pre>      399V  24.0V F = 50.0Hz 0.0kW Gens Normal Running      399V  24.0V F = 50.0Hz 3.4kW 1# Lamp Off </pre>
4	If manually turn off the light, press  in Light On/Off screen, 4#~1# lights will off in proper order (press once, one light off).	<pre>      399V  24.0V 24.0V F = 50.0Hz 10.3kW      399V  24.0V F = 50.0Hz 0.0kW Gens Normal Running </pre>

No.	Operation Process	Panel Display
5	<p>If users need to stop the light tower set, press , 1#~4# lights will off in proper order when all lights are in closed status, and the extinguishing interval delay can be set as 1 ~ 300s (can be configured). The light tower set begin stopping when the lights are off. Press  again during this procedure will lead to all lights off at the same time and controller enters into ETS status.</p>	<pre> 1  2  24.0V 3  4  80°C 399V 400kPa F = 50.0Hz 80% 4# Lamp Off Delay 2s Manual Mode Manual Stop Current Time 07:00:10 Cooling Time 59s 1  2  3  4 </pre>

4.8 FORCE START OPERATION

Simultaneously pressing  and  in manual mode can force start light tower set, at the moment, starter disconnect controlled by the operator instead of judging from crank disconnect conditions. When light tower set successfully start, operator will release the keys and controller enters into safety running delay.

5 PROTECTIONS

5.1 WARNING ALARMS

Warnings are not lead to light tower set shutdown and alarm information will be displayed on the LCD.

Table 14 - Warning Alarms

No.	Type	Description
1	High Temperature	When controller detects the high temperature input is active, it will send warning signal and the corresponding alarm information will be displayed on the LCD.
2	Low Oil Pressure	When controller detects the low oil pressure warning input is active, it will send warning signal and the corresponding alarm information will be displayed on the LCD.
3	Over Speed	When controller detects the engine speed of light tower set is higher than the set value, it will send warning signal and the corresponding alarm information will be displayed on the LCD.
4	Under Speed	When controller detects the engine speed of light tower set is lower than the set value, it will send warning signal and the corresponding alarm information will be displayed on the LCD.
5	Loss of Speed Signal	When controller detects the engine speed of light tower set is 0, and action select "Warning", it will send warning signal and the corresponding alarm information will be displayed on the LCD.
6	Generator Frequency Over	If it is enabled, when controller detects the frequency of light tower set is higher than the set value, it will send warning signal and the corresponding alarm information will be displayed on the LCD.
7	Generator Frequency Under	If it is enabled, when controller detects the frequency of light tower set is lower than the set value, it will send warning signal and the corresponding alarm information will be displayed on the LCD.
8	Generator Over Voltage	If it is enabled, when controller detects the voltage of light tower set is higher than the set value, it will send warning signal and the corresponding alarm information will be displayed on the LCD.
9	Generator Under Voltage	If it is enabled, when controller detects the voltage of light tower set is lower than the set value, it will send warning signal and the corresponding alarm information will be displayed on the LCD.
10	Generator Over Current	If it is enabled, when controller detects the current of light tower set is higher than the set value, it will send warning signal and the corresponding alarm information will be displayed on the LCD.
11	Fail to Stop	If light power set fail to stop after the "ETS solenoid hold/ wait for stop delay" is expired, it will send warning signal and the corresponding alarm information will be displayed on the LCD.

No.	Type	Description
12	Low Fuel Level	When controller detects the low fuel level warning input is active, it will send warning signal and the corresponding alarm information will be displayed on the LCD.
13	Charge Alt Fail	If it is enabled, when controller detects the charger voltage of light tower set is lower than the set value, it will send warning signal and the corresponding alarm information will be displayed on the LCD.
14	Battery Under Voltage	If it is enabled, when controller detects the battery voltage is lower than the set value, it will send warning signal and the corresponding alarm information will be displayed on the LCD.
15	Battery Over Voltage	When controller detects the battery voltage is higher than the set value, it will send warning signal and the corresponding alarm information will be displayed on the LCD.
16	Low Coolant Level	When controller detects coolant level warning input is active, it will send warning signal and the corresponding alarm information will be displayed on the LCD.
17	Input 1 Warning	When input port 1-5 is selected as user defined and action type choose warning alarm, if input port is active, controller will send warning signal and the corresponding alarm information will be displayed on the LCD. If input name is configured by users as xxx, then "xxx Warning" will be displayed on the LCD.
18	Input 2 Warning	
19	Input 3 Warning	
20	Input 4 Warning	
21	Input 5 Warning	
22	External Charge Fail	When controller detects external charge fail input is active, it will send warning signal and the corresponding alarm information will be displayed on the LCD.
23	Light Fault Warning	If it is enabled, when controller detects the beacon lamp failure, and action select warning, it will send warning signal and the corresponding alarm information will be displayed on the LCD.
24	Sensor 1 Low	If it is enabled, when controller detects the sensor value is lower than the minimum set value, it will send warning signal and the corresponding alarm information will be displayed on the LCD. If the sensor name is configured by users as xxx, then "xxx Low" warning will be displayed on the LCD.
25	Sensor 2 Low	
26	Sensor 3 Low	
27	Sensor 1 High	If it is enabled, when controller detects the sensor value is higher than the maximum set value, it will send warning signal and the corresponding alarm information will be displayed on the LCD. If the sensor name is configured by users as xxx, then "xxx High" warning will be displayed on the LCD.
28	Sensor 2 High	
29	Sensor 3 High	
30	Sensor 1 Open Circuit	When controller detects the programmable sensor is open circuit, meanwhile, action select as warning, it will send warning signal and the corresponding alarm information will be displayed on the LCD. If the sensor name is configured by users as xxx, then "xxx Open Circuit" warning will be displayed on the LCD.
31	Sensor 2 Open Circuit	
32	Sensor 3 Open Circuit	

No.	Type	Description
33	ECU Warning	When controller receives engine warning alarm signals via J1939, it will send warning signal and corresponding alarm information will be displayed on the LCD.
34	ECU Coolant Temp. High	If it is enabled, when controller detects the coolant temperature transferred by EFI engine is higher than the maximum limit of preset value, it will send warning signal and the corresponding alarm information will be displayed on the LCD.
35	ECU Oil Pressure Low	If it is enabled, when controller detects the oil pressure transferred by EFI engine is lower than the minimum limit of preset value, it will send warning signal and the corresponding alarm information will be displayed on the LCD.
36	Low Fuel Level Light-off	If it is enabled, when controller detects the fuel level of light tower set is lower than the preset light-off value, it will send warning signal and the corresponding alarm information will be displayed on the LCD.
37	Mains Over Frequency	If it is enabled, when controller detects the frequency of mains is higher than the maximum limit of preset value, it will send warning signal and the corresponding alarm information will be displayed on the LCD.
38	Mains Under Frequency	If it is enabled, when controller detects the frequency of mains is lower than the minimum limit of preset value, it will send warning signal and the corresponding alarm information will be displayed on the LCD.
39	Mains Over Voltage	If it is enabled, when controller detects the voltage of mains is higher than the maximum limit of preset value, it will send warning signal and the corresponding alarm information will be displayed on the LCD.
40	Mains Under Voltage	If it is enabled, when controller detects the voltage of mains is lower than the minimum limit of preset value, it will send warning signal and the corresponding alarm information will be displayed on the LCD.

5.2 SHUTDOWN ALARMS

When controller detects shutdown alarm, it will send signal to turn off #1 ~ #4 lights and shuts down generator and corresponding alarm information will be displayed on LCD.

Table 15 - Shutdown Alarms


No.	Type	Description
1	Emergency Stop	When controller detects emergency stop signal, it will send a shutdown signal and the corresponding alarm information will be displayed on the LCD.
2	High Temp. Shutdown	When controller detects the High Temp. Shutdown input is active, it will send a shutdown signal and the corresponding alarm information will be displayed on the LCD.
3	Low Oil Pressure Shutdown	When controller detects the Low Oil Pressure Shutdown input is active, it will send a shutdown signal and the corresponding alarm information will be displayed on the LCD.
4	Light Fault Shutdown	If it is enabled, when controller detects the beacon lamp failure, and action select shutdown, it will send shutdown signal and the corresponding alarm information will be displayed on the LCD.
5	Over Speed	When controller detects the generator speed is higher than the maximum limit of preset value, it will send a shutdown signal and the corresponding alarm information will be displayed on the LCD.
6	Under Speed	If it is enabled, when controller detects the generator speed is lower than the minimum limit of preset value, it will send a shutdown signal and the corresponding alarm information will be displayed on the LCD.
7	Loss of Speed Signal	When controller detects the generator speed is 0, meanwhile, action select as shutdown, it will send a shutdown signal and the corresponding alarm information will be displayed on the LCD.
8	Over Frequency	If it is enabled, when controller detects the generator frequency is higher than the maximum limit of preset value, it will send a shutdown signal and the corresponding alarm information will be displayed on the LCD.
9	Under Frequency	If it is enabled, when controller detects the generator frequency is lower than the minimum limit of preset value, it will send a shutdown signal and the corresponding alarm information will be displayed on the LCD.
10	Over Voltage	If it is enabled, when controller detects the generator voltage is higher than the maximum limit of preset value, it will send a shutdown signal and the corresponding alarm information will be displayed on the LCD.
11	Under Voltage	If it is enabled, when controller detects the generator voltage is lower than the minimum limit of preset value, it will send a shutdown signal and the corresponding alarm information will be displayed on the LCD.

No.	Type	Description
12	Over Current	If it is enabled, when controller detects the current is higher than the maximum limit of preset value, meanwhile, action select as shutdown, it will send a shutdown signal and the corresponding alarm information will be displayed on the LCD.
13	Fail To Start	If gen-set start failure within setting of start times, it will send a shutdown signal and the corresponding alarm information will be displayed on the LCD.
14	Pressure Sensor Open Circuit	When controller detects the Pressure Sensor Open Circuit input is active, it will send shutdown signal and the corresponding alarm information will be displayed on the LCD.
15	Input 1 Shutdown	When input port 1 is selected as user defined and action type choose shutdown alarm, if input port is active, controller will send warning signal and the corresponding alarm information will be displayed on the LCD. If input name is configured by users as xxx, then "xxx Shutdown" will be displayed on the LCD.
16	Input 2 Shutdown	When input port 2 is selected as user defined and action type choose shutdown alarm, if input port is active, controller will send warning signal and the corresponding alarm information will be displayed on the LCD. If input name is configured by users as xxx, then "xxx Shutdown" will be displayed on the LCD.
17	Input 3 Shutdown	When input port 3 is selected as user defined and action type choose shutdown alarm, if input port is active, controller will send warning signal and the corresponding alarm information will be displayed on the LCD. If input name is configured by users as xxx, then "xxx Shutdown" will be displayed on the LCD.
18	Input 4 Shutdown	When input port 4 is selected as user defined and action type choose shutdown alarm, if input port is active, controller will send warning signal and the corresponding alarm information will be displayed on the LCD. If input name is configured by users as xxx, then "xxx Shutdown" will be displayed on the LCD.
19	Input 5 Shutdown	When input port 5 is selected as user defined and action type choose shutdown alarm, if input port is active, controller will send warning signal and the corresponding alarm information will be displayed on the LCD. If input name is configured by users as xxx, then "xxx Shutdown" will be displayed on the LCD.
20	Low Fuel Level	When controller detects the Low Fuel Level input is active, it will send shutdown signal and the corresponding alarm information will be displayed on the LCD.

No.	Type	Description
21	Sensor 1 Low	If it is enabled, when controller detects the sensor 1 value is lower than the minimum limit of preset value, it will send shutdown signal and the corresponding alarm information will be displayed on the LCD. If the sensor name is configured by users as xxx, then “xxx Low” shutdown information will be displayed on the LCD.
22	Sensor 2 Low	If it is enabled, when controller detects the sensor 2 value is lower than the minimum limit of preset value, it will send shutdown signal and the corresponding alarm information will be displayed on the LCD. If the sensor name is configured by users as xxx, then “xxx Low” shutdown information will be displayed on the LCD.
23	Sensor 3 Low	If it is enabled, when controller detects the sensor 3 value is lower than the minimum limit of preset value, it will send shutdown signal and the corresponding alarm information will be displayed on the LCD. If the sensor name is configured by users as xxx, then “xxx Low” shutdown information will be displayed on the LCD.
24	Sensor 1 High	If it is enabled, when controller detects the sensor 1 value is higher than the maximum limit of preset value, it will send shutdown signal and the corresponding alarm information will be displayed on the LCD. If the sensor name is configured by users as xxx, then “xxx High” shutdown information will be displayed on the LCD.
25	Sensor 2 High	If it is enabled, when controller detects the sensor 2 value is higher than the maximum limit of preset value, it will send shutdown signal and the corresponding alarm information will be displayed on the LCD. If the sensor name is configured by users as xxx, then “xxx High” shutdown information will be displayed on the LCD.
26	Sensor 3 High	If it is enabled, when controller detects the sensor 3 value is higher than the maximum limit of preset value, it will send shutdown signal and the corresponding alarm information will be displayed on the LCD. If the sensor name is configured by users as xxx, then “xxx High” shutdown information will be displayed on the LCD.
27	Temp. Sensor Open Circuit	When controller detects the Temp. Sensor Open Circuit Shutdown input is active, it will send shutdown signal and the corresponding alarm information will be displayed on the LCD.
28	Sensor 1 Open Circuit	When controller detects the programmable sensor 1 is open circuit, meanwhile, action select as shutdown, it will send shutdown signal and the corresponding alarm information will be displayed on the LCD. If the sensor name is configured by users as xxx, then “xxx Open Circuit” shutdown will be displayed on the LCD.

No.	Type	Description
29	Sensor 2 Open Circuit	When controller detects the programmable sensor 2 is open circuit, meanwhile, action select as shutdown, it will send shutdown signal and the corresponding alarm information will be displayed on the LCD. If the sensor name is configured by users as xxx, then "xxx Open Circuit" shutdown will be displayed on the LCD.
30	Sensor 3 Open Circuit	When controller detects the programmable sensor 3 is open circuit, meanwhile, action select as shutdown, it will send shutdown signal and the corresponding alarm information will be displayed on the LCD. If the sensor name is configured by users as xxx, then "xxx Open Circuit" shutdown will be displayed on the LCD.
31	Coolant Level Low	When controller detects the Coolant Level Low Shutdown input is active, it will send shutdown signal and the corresponding alarm information will be displayed on the LCD.
32	ECU Shutdown	When controller receives engine shutdown alarm signals via J1939, it will send shutdown signal and corresponding alarm information will be displayed on the LCD.
33	ECU Communicate Fail	When engine is firing, controller receives no data via J1939, it will send shutdown signal and the corresponding alarm information will be displayed on the LCD.
34	ECU Coolant Temp. High	If it is enabled, when controller detects the coolant temperature transferred by EFI engine is higher than the maximum limit of preset value, it will send shutdown signal and the corresponding alarm information will be displayed on the LCD.
35	ECU Oil Pressure Low	If it is enabled, when controller detects the oil pressure transferred by EFI engine is lower than the minimum limit of preset value, it will send shutdown signal and the corresponding alarm information will be displayed on the LCD.
36	Low Voltage Start Charging Timeout	After low starter battery voltage start is active, if charging time exceeds the pre-set max. charging time, it will send shutdown signal and the corresponding alarm information will be displayed on the LCD.

 **NOTE:** The shutdown alarm types of input ports are active only when they are configured by users.

 **NOTE:** for ECU warning and shutdown alarm illustration, if detailed alarm content displayed, users can check engine according to the details; otherwise, users can check engine manual based on the SPN alarm codes to achieve the information.

5.3 TRIP AND STOP ALARMS

When the controller detects trip and stop signal, it will send signal to turn off #1 ~ #4 lights and then generator cooling down and stop.

Table 16 – Trip and Stop Alarms


No.	Type	Detection range	Description
1	Over Current	Always active	When controller detects the current is higher than the maximum limit of preset value, it will send a “trip and stop” signal and the corresponding alarm information will be displayed on the LCD.
2	Digital Input 1 Trip and Stop	User-defined	When the controller detects digital input port 1 trip alarms, it will send a “trip and stop” alarm signal and the corresponding alarm information will be displayed on the LCD. If the input port name is configured by users as xxx, then “xxx trip and stop” will be displayed on the LCD.
3	Digital Input 2 Trip and Stop	User-defined	When the controller detects digital input port 2 trip alarms, it will send a “trip and stop” alarm signal and the corresponding alarm information will be displayed on the LCD. If the input port name is configured by users as xxx, then “xxx trip and stop” will be displayed on the LCD.
4	Digital Input 3 Trip and Stop	User-defined	When the controller detects digital input port 3 trip alarms, it will send a “trip and stop” alarm signal and the corresponding alarm information will be displayed on the LCD. If the input port name is configured by users as xxx, then “xxx trip and stop” will be displayed on the LCD.
5	Digital Input 4 Trip and Stop	User-defined	When the controller detects digital input port 4 trip alarms, it will send a “trip and stop” alarm signal and the corresponding alarm information will be displayed on the LCD. If the input port name is configured by users as xxx, then “xxx trip and stop” will be displayed on the LCD.
6	Digital Input 5 Trip and Stop	User-defined	When the controller detects digital input port 5 trip alarms, it will send a “trip and stop” alarm signal and the corresponding alarm information will be displayed on the LCD. If the input port name is configured by users as xxx, then “xxx trip and stop” will be displayed on the LCD.

NOTE: The trip and stop alarm types of digital input ports are active only when they are configured by users.

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6 PARAMETERS SETTING

6.1 SETTING MENU DESCRIPTION

Start the controller, then press  to enter into the parameters setting menu, menu items are as follows:

- Return
- Set Parameters
- Time Calibration
- Language Select
- Event Log
- Controller Information

Users can select item as their required in parameters setting menu screen.

6.2 PARAMETERS SETTING

When entered password interface, inputting “00318” can set all parameter items in table 7.1 *AUTO START PARAMETER SETTINGS* and table 7.2 *GENERIC PARAMETER SETTINGS*. If the password is changed only input the password same as controllers’, can the parameter be set via PC software. If there is need to set more parameters or password is forgotten, please contact the factory.






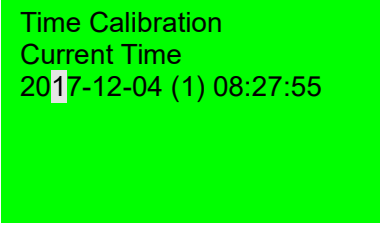
NOTES:

- a) Please change the controller parameters when generator is in standby mode (e. g. Crank disconnect conditions selection, digital inputs, relay outputs, various delays), otherwise, shutdown and other abnormal conditions may occurs.
- b) Over voltage set value must be higher than under voltage set value, otherwise over voltage and under voltage condition may occur simultaneously.
- c) Over speed set value must be higher than under speed set value, otherwise over speed and under speed condition may occur simultaneously.
- d) Please set the generator frequency value as low as possible when cranking, in order to make the starter be separated quickly as soon as possible.
- e) Auxiliary input 1~7 cannot set as same items; otherwise, there are abnormal functions. However, the auxiliary output 1~6 can be set as same items.
- f) Flexible sensor 1~3 can be configured as temperature sensor, pressure sensor or fuel level sensor. Simultaneously, sensors must connect to related coolant temperature, oil pressure and fuel level display on the mains screen (when EFI engine set is controlled, only fuel level display is connected).

6.3 CONTROLLER TIME CALIBRATION

6.3 CONTROLLER TIME CALIBRATION

Table 30 – Time Calibration Process

No.	Operation Process	Panel Display
1	<p>After controller power on, press , then select Time Calibration, press  again to the Date and Time Setting interface. The date and time displayed will be stopped and digital that highlight with black is currently adaptable for user by pressing  key and  key to increase and decrease the value. Press  key to confirm setting and the bit will right move automatically. Number “1” in the parenthesis is the week information. It is set by the microprocessor based on current date, so the user does not need to modify it.</p>	

NOTE: Press  at any time during setting process can interrupt current setting and return to the main menu.

6.4 LANGUAGE SELECTION

In this screen, Chinese and English can be optional.







6.5 EVENT LOG

Maximum 99 pieces of event logs (time of start/stop and fault shutdown events) can be circularly stored into ALC404 controller, and fault shutdown events include fault shutdown type and occurs time and date. If the alarm records are more than 99 pieces, then the latest record will replace the oldest one.

Event log display please to see the following table,

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Table 31 – Event Logs

No.	Operation Process	Panel Display
1	<p>Press  in main screen, and then select Event Log, press  again to inquiry the event log (See right picture). Press  and  to read records and  or  to exit directly.</p>	<p>Event Log 01/29 Manual Start 2017-12-04 08:12:09</p> <p>Event Log 02/29 Fail to Start Shutdown 2017-12-04 08:13:09</p> <p>Event Log 03/29 Remote Start 2017-12-04 08:17:09</p>

6.6 CONTROLLER INFORMATION

Controller information page displays release information (software/hardware version and issue date), boot screen and input/output ports status.

7 INSTALLATION

7.1 FIXING CLIPS

- Controller is panel built-in design; it is fixed by clips when installed.
- Withdraw the fixing clip screw (turn anticlockwise) until it reaches proper position.
- Pull the fixing clip backwards (towards the back of the module) ensuring two clips are inside their allotted slots.
- Turn the fixing clip screws clockwise until they are fixed on the panel.

▲ Note: Care should be taken not to over tighten the screws of fixing clips.

7.2 OVERALL and cutout DIMENSIONS

ALC404 controller is panel built-in design, and fixed by clips when installed. Overall dimension and cutout dimension are as follows,

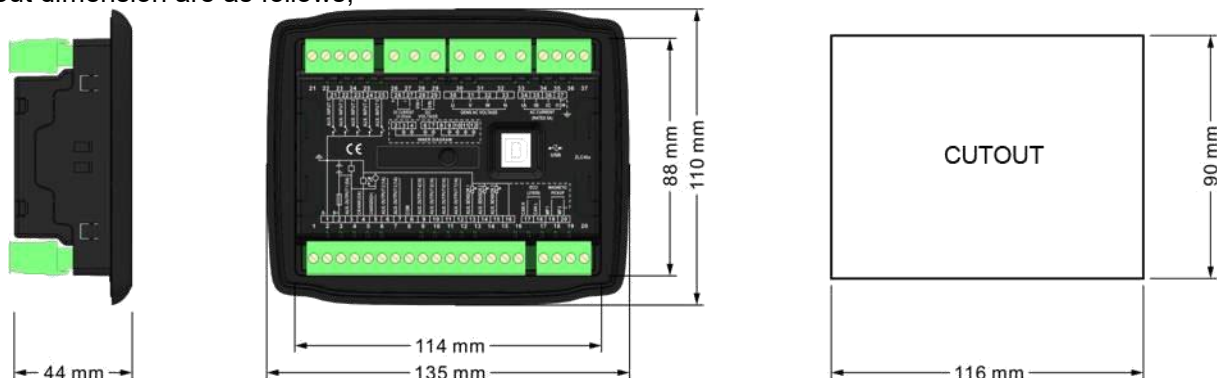


Figure 9 - Overall Dimensions

7.3 WIRING CONNECTION DESCRIPTION

Battery Voltage Input: ALC404 controller can suit for widely range of battery voltage DC (8~35) V. Negative of battery must be connected with the engine shell. Diameter of wire that connects from power supply to battery must be over 1.5mm². If floating charge configured, please firstly connect output wires of charger to battery's positive and negative directly, then, connect wires from battery's positive and negative to controller's positive and negative input ports in order to prevent charge disturbing the controller's normal working.

Speed Sensor Input: Speed sensor is the magnetic equipment which be installed in starter and for detecting flywheel teeth. Its connection wires to controller should apply for 2 cores shielding line. The shielding layer should connect to No. 20 terminal in controller and the else two signal wires are connected to No.19 and No.20 terminals in controller. The output voltage of speed sensor should be within (1~24) VAC (effective value) during the full speed. 12VAC is recommended (in rated speed). When install the speed sensor, let the sensor is spun to contacting flywheel first, then, port out 1/3 lap, and lock the nuts of sensor at last.

Output and Expand Relays: All outputs of controller are relay contact output type. If need to expand the relays, please add freewheel diode to both ends of expand relay's coils (when coils of relay has DC current) or, increase resistance-capacitance return circuit (when coils of relay has AC current), in order to prevent disturbance to controller or others equipment.

AC Current Input: Current input of ALC404 controller must be connected to outside current transformer. And the current transformer's secondary side current must be 5A. At the same time, the phases of current transformer and input voltage must correct. Otherwise, the current of collecting and active power maybe not correct.

▲NOTE:

- a) ICOM port must be connected to negative pole of battery.
- b) When there is load current, transformer's secondary side prohibit open circuit.

DC Current Input: Current input of ALC404 controller must be external connected to DC Hall sensor with output current 4~20mA.

Withstand Voltage Test: When controller had been installed in control panel, if need the high voltage test, please disconnect controller's all terminal connections, in order to prevent high voltage into controller and damage it.

8 TROUBLESHOOTING

Here are the common faults and troubleshooting. If there is any other problem, please feel free to contact SmartGen's service.

Symptoms	Possible Solutions
Controller no response with power.	Check starting batteries; Check controller connection wirings; Check DC fuse.
Light tower set shutdown	Check whether the water/cylinder temperature is too high or not; Check the generator AC voltage; Check DC fuse.
Controller emergency stop	Check emergence stop button is correct or not; Check whether the starting battery positive be connected with the emergency stop input; Check whether the circuit is open circuit.
Low oil pressure alarm after crank disconnect	Check the oil pressure sensor and its connections.
High water/cylinder temp. alarm after crank disconnect	Check the temperature sensor and its connections.
Shutdown Alarm in running	Check related switch and its connections according to the information on LCD; Check programmable inputs.
Start Failure	Check fuel circuit and its connections; Check starting batteries; Check speed sensor and its connections; Refer to engine manual.
Starter no response	Check starter connections; Check starting batteries.

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