



# Walk-behind Power-driven Laser Screed Machine (S260E) - Operation Manual



Shanghai Yayao Engineering Co., Ltd

## Walk-behind Power-driven Laser Screed Machine S260E Specifications

<b>Overview:</b>	
Model	S260E
Type	Laser controlled concrete leveling machine
Manufacturer	Shanghai Yayao Engineering Co., Ltd
<b>Power system – engine:</b>	
Power system	Japan Honda GX200 generator set
Power	6.5 horse power at the speed of 3600rpm
Fuel	Gasoline with a minimum octane rating of 87
Start mode	Pull start
<b>Drive system – propulsion system:</b>	
Propulsion control	Manual adjustment – servo motor stepless speed regulation
Standard tyre	80/100 x 21 motorcycle tyre, optional AT28 x 10.00-12 all terrain vehicle tyre
<b>Control system:</b>	
Laser control	Microcomputer laser scanning
Laser control effects	Planar, slope, dual-slope (optional)
Electrical control mode	PLC programmable controller control
Electric control effect	With self-locking protection function
<b>Laser system:</b>	
Laser receiver	Leica receiver imported from Switzerland with original packaging
Laser transmitter	Leica transmitter imported from Switzerland with original packaging
Hand-held receiver	Hand-held Leica receiver imported from Switzerland with original packaging
Controller	US Danfoss laser control system
<b>Features:</b>	
Vibrator	High-speed small-torque electric motor, 3000rpm
Exciting force	3000N
Screed elevation control	Electronic linear actuator, laser control
Screed head lifting frame	Linear actuator, manual switchover, machine automatic leveling
Suspension	Independent suspension
<b>Liquid capacity:</b>	
Engine oil	1500mL
Fuel oil	18L

## Walk-behind Power-driven Laser Screed Machine S260E Specifications

**Major parameters:**

Travelling speed	0-20m/min
Working speed	4m/min (freely adjustable)
Travelling torque	300NM
Vibrating beam width	2600mm (3000mm optional)
Net weight	355kg

**Overall dimensions (with screed head excluded):**

Total width	1130mm
Total length	2750mm
Total height	1170mm
Ground clearance	280mm

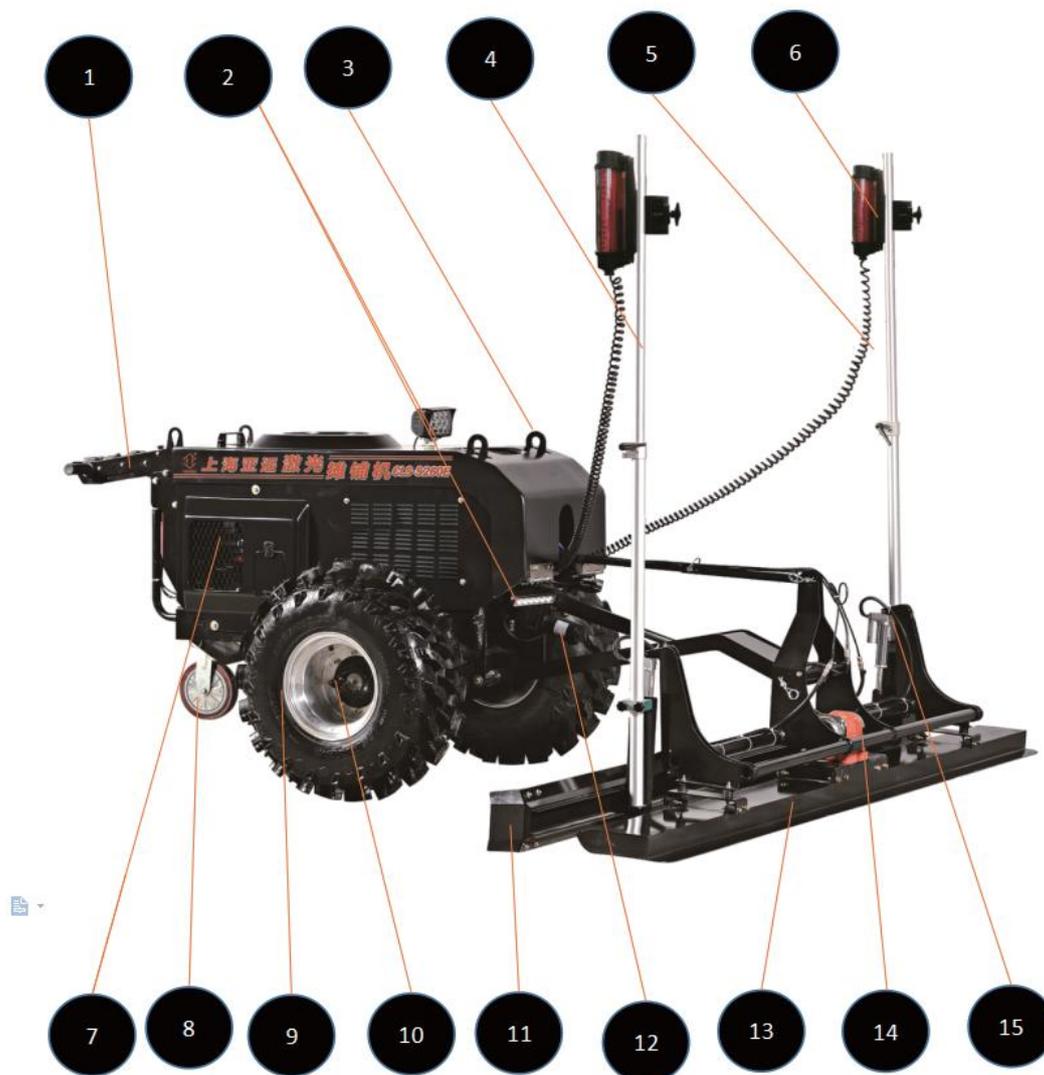
**Working environment:**

Concrete grade	C10-C35
Concrete thickness	50mm-200mm
Concrete slump	180mm±20mm

**Product major components:**

Type: Mechanical power-driven walk-behind type
Power system: SAWAFUJI generator set imported from Japan with original packaging + imported Honda engine
Laser system (optional): Leica transmitter and Leica receiver both imported from Switzerland with original packaging; US Danfoss laser control system
Vibration control: high-speed small-torque vibrating motor (3000rpm)
Electrical control: Mitsubishi FX3U series programmable microcomputer intelligent controller imported from Japan with original packaging
Drive system: Japan Mitsubishi MR-J4 series high-power servo amplifier; Japan Mitsubishi HG series high-power servo motor
Traveling system: manual adjustment; stepless speed change (intelligent adjustment of traveling speed with rotary knob)
Tyre standard: 80/100 x 21 motorcycle tyre, AT28 x 10.00-12 all terrain vehicle tyre (optional)
Suspension system: independent suspension system (to maintain balance of the machine body under complicated working conditions)

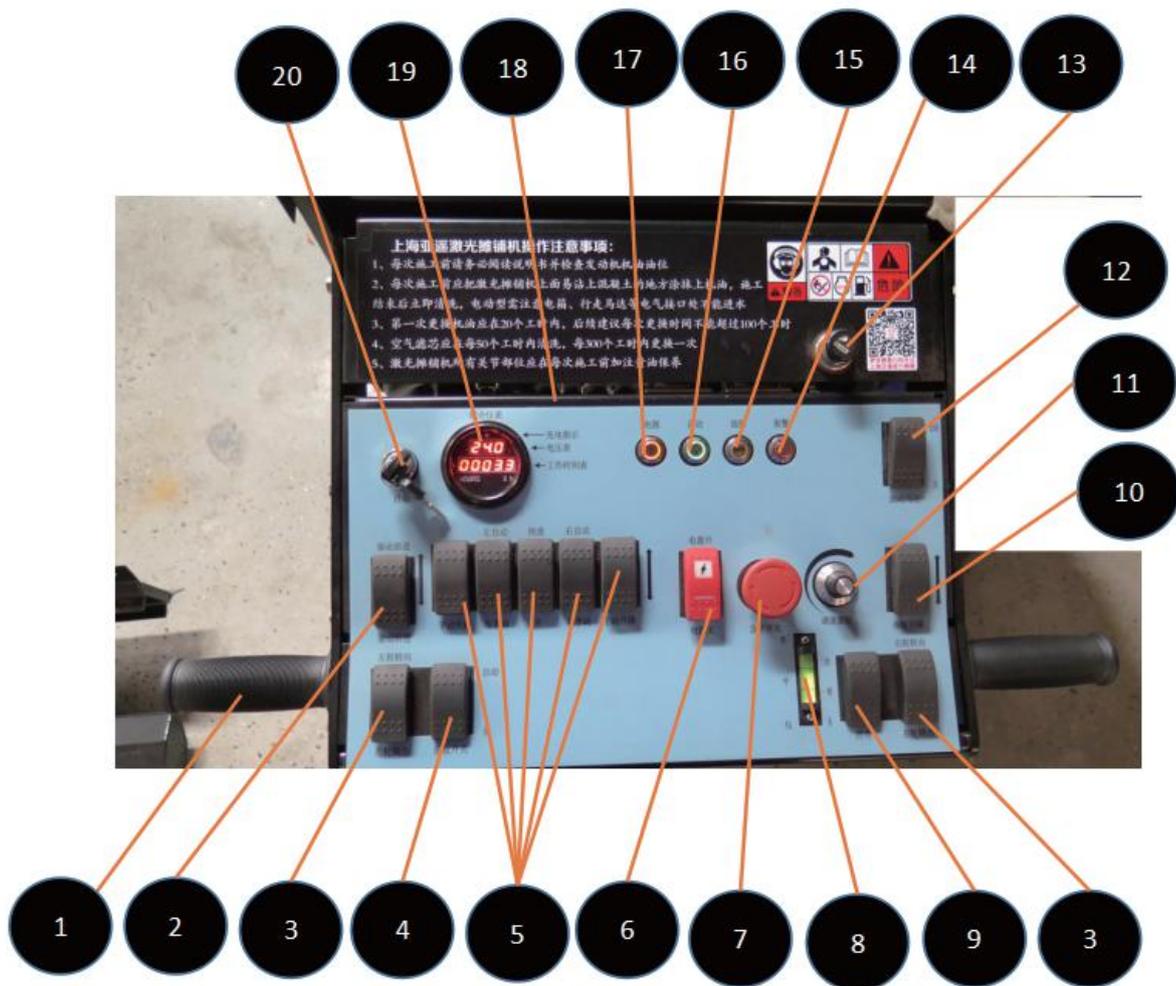
## Structure and Functions of Walk-behind Power-driven Laser Screed Machine S260E



### Instructions

1. Control panel: integrating electrical control circuits and operation control buttons, with operation control button switches on the upper part and the electrical control circuit switch assembly on the lower side.
2. Lamp: used for lighting in the case of poor light on site or construction work at night; 3 lamps are fitted, with one on the top and respectively one on the left side and the right side at the front.
3. Lifting hook: for lifting of laser machine.
4. Pole: for arrangement of laser receiver; height of the laser receiver can be freely adjusted.
5. Laser receiver: to receive the signal from the laser transmitter and then feed it back to the control box.
6. Spring line: the connection line between the control box and the laser receiver.
7. Engine unit: to provide stable and continuous voltage.
8. Vertical caster: to raise and lower the vertical casters with this button; the vertical casters should be in the lower position for the removal of the screed head and the transport machine and in the upper position for leveling.
9. Hub: for traveling.
10. Electric motor: to drive the hubs for traveling.
11. Screed: to remove the excessive concrete.
12. Vibrating plane UP/DOWN: to control rise and fall of the vibrating plate (machine body balance electric cylinder).
13. Vibrating plate: to ram and level the concrete.
14. Vibrator: to provide stable and continuous exciting force.
15. Electric cylinder: to adjust height of the screed

**Operation panel**



**Function description**

1. Hand grip: hand grips for the operator.
2. Drive switch: when the drive is in operation, the button switch has two positions: “Forward” and “Reverse”.
3. Steering switch/power steering switch: the steering of the machine is forced; when you need to steer the machine, you must press the steering switch. When the machine is moving forward or backward, you need to press the steering switch on the left to turn left and press the steering switch on the right to turn right. Be aware that the power steering switch is not a steering switch although it can realize steering, but it is valid only when the machine is moving backward and the vibrating motor is started. Its functions is to pull material on the side with more material with huge force to balance the machine when the machine pulling force drifts to one side due to the more material on one side of the screed.
4. Vibrating plate switch: machine automatic leveling switch. The machine leveling function is designed to maintain levelness of the machine and perpendicularity of the receiver poles during leveling. It is of significant importance to keep levelness of the machine for leveling operations. Since the initial settings of the machine is made based on machine levelness and receiver rod perpendicularity, the receiver rods will tilt forward or backward when the machine is not level during leveling, thereby reducing height of the laser receiver. If the receiver is lowered, the laser will be directed at the top of the receiver window, the laser control system will considered the ground is excessively low and then raise the actuator to make the laser beam directed at the center of the laser receiver window and the final result is the leveled ground higher than the expected elevation.

## Function description

“Vibrating plate Manual/Auto”: to switch among the positions ON, OFF and AUTO. When the vibrating plate switch is turned off, leveling up/down can only be realized with the switch numbered “10” for balance of the machine body. With the “Vibrating plate switch” switched to AUTO, the machine continuously realizes leveling only in the reverse direction; certainly, when machine leveling is switched off, the machine will not make leveling in any direction. When machine leveling is started, it can maintain levelness of the machine while leveling off the uneven cushion layer. The other benefit of machine leveling is: when the operator pulls down the hand grip to move the machine for the next leveling operation, the screed head will be automatically lifted, so that the leveling function cannot be carried out unless the operator present switch is turned on.

5. Laser leveling system control switches: there are five switches below the timer/battery indicator. These switches jointly control the plough left and right elevations or its height relative to the vibrator screed and also adjust the speed.

AUTO/Manual: to switch between the auto mode and the manual mode. Movement of the screed is tracked with the laser beam in auto mode. Under general leveling conditions, these switches shall be set to “AUTO”. How these switches affect its operation is carefully reviewed here since the plough elevation is of critical importance for high-quality ground. When “Elevation Manual/AUTO switch” is set to “AUTO”, the control cabinet continuously gives instructions to the linear actuator on the screed head to keep the plough at the correct height by receiving reference data of the laser receivers.

If any of the laser receivers losses the reference signal, the control cabinet will send a given correct height to the screed head until the laser transmitter signal is regained. Similarly, if the two laser receivers both loss the reference signal, the control cabinet will make the screed head maintain the correct height given last time. Now, the operator’s manual operations are valid although the machine is in auto mode.

UP/DOWN: the screed will move up or down by setting the switch to UP or DOWN in either “AUTO” or “Manual” mode. At the same time, when any side of the plough is locked due to the loss of reference signal in AUTO mode, the plough can be moved up or down with the elevation switch on the left and right sides if it is necessary to continue with the leveling operation. It allows the operator to control leveling height of one side, without the need for any laser transmitter reference signal. When one switch is turned on, the plough on that side of the screed head will continue moving until the switch is released or the actuator reaches the limit position. The plough will remain in that position unless the reference signal is reactivated or the “Elevation switch” on that side is turned on again. In this mode, as long as any receiver regains the laser reference signal, the control cabinet will automatically adjust height of the plough on the corresponding side of the screed head, thus realizing the reference height. When the other receiver gains the reference signal, the plough will be under automatic control again. When the “Elevation Manual/AUTO switch” is set to “Manual”, the plough height is not affected by the laser transmitter, but the plough elevation is affected by only the left and right elevation switches. As mentioned above, the left and right elevation switches can be still be operated in this mode, to raise or lower the plough on the corresponding side, unless the switch is released or the actuator reaches the limit position.

6. Power switch: 220V; when the power switch is turned on, the power is sent to the distribution box via the AC contactor.

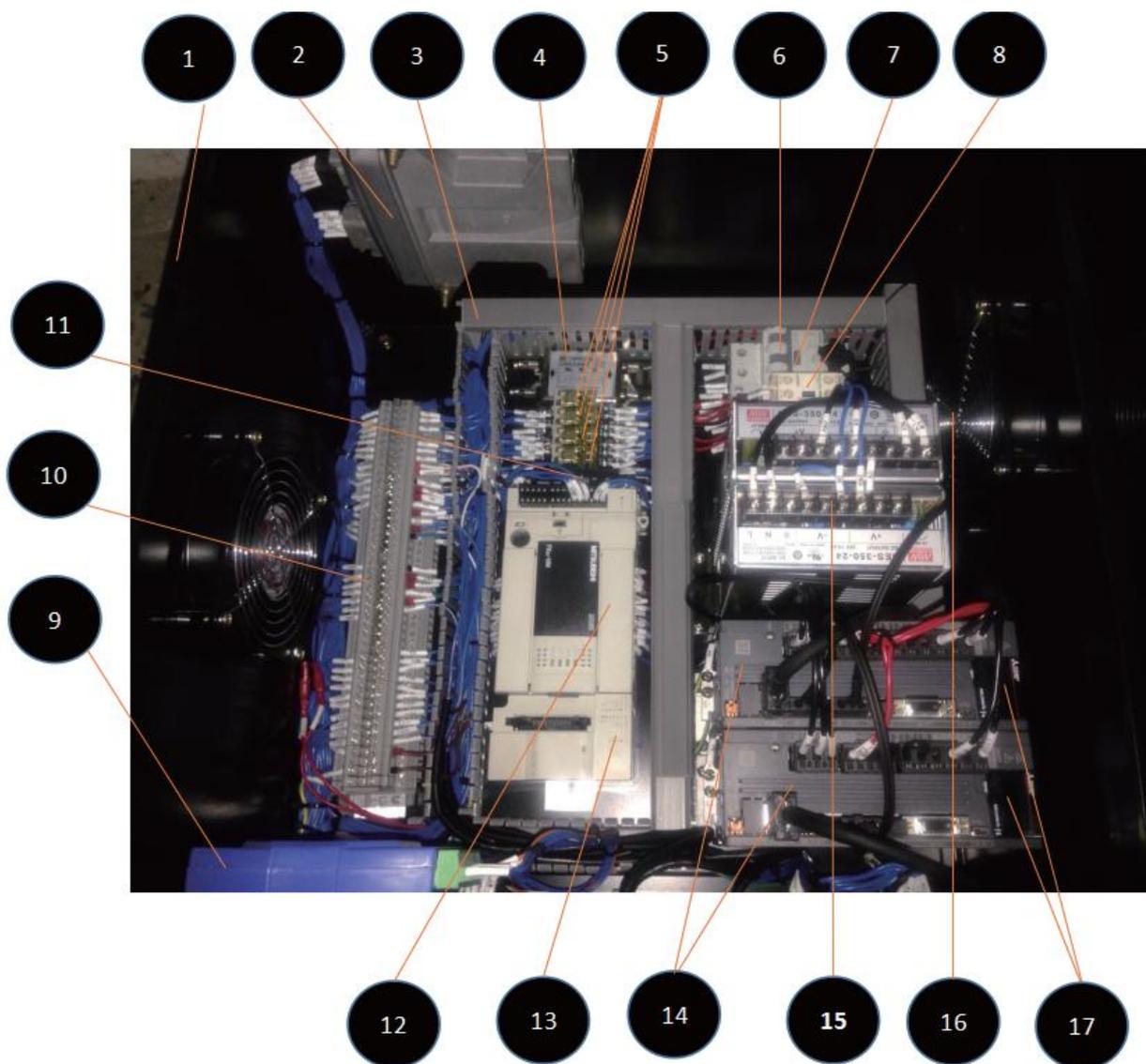
7. Engine stop switch: turn the “Engine stop switch” clockwise to start the engine. Press this control again to stop the engine; hence, it can be used as the emergency brake switch.

8. Spirit level: this level is used to indicate whether the screed machine is properly positioned for the leveling operation. This is of special importance, because unlevelled machine will cause incorrect impact angle of the screed head and hence poor leveling effect. The levelness shall be checked each time during operation to confirm the machine and the screed head are properly centered.

## Function description

9. Lighting switch: working lamps are mounted at the front end of the machine, so that the operator can clearly see the ploughs and concrete at the front under conditions with poor light.
10. Screed head lift switch: to move the screed head up and down for machine leveling. To make a turn on the work site, you need to lift the screed head to the maximum height with this switch.
11. Governor rotary knob: turn the switch clockwise to raise the traveling speed and counterclockwise to reduce the traveling speed.
12. Vibrator switch: the vibrator main switch is intended to set the vibrator to “AUTO” or completely shut it down. When this switch is set to AUTO, the vibrator will not run if the machine is set to forward drive position. However, the vibrator will run automatically when the machine is set to reverse and the “Operator present switch” is pressed.
13. Cigarette lighter/high-pressure flusher power plug: With the machine shut down, inset the high-pressure flusher power plug into this hole to remove concrete on the machine with the flusher.
14. Alarm indicator: the red indicator flashes, indicating PLC fails or is not started.
15. Fault indicator: the yellow indicator flashes when traveling, vibrating plate lifting, vibration or other elements fail.
16. Start indicator: the green light indicates it is normal.
17. Power indicator: the red light indicates it is normal.
18. Reset type fuse: **it will automatically cut off the power in the case of such faults as circuit overcurrent, overload and short circuit, to protect circuit safety of the entire machine.**
19. Timer/24V power indicator: the timer starts as long as power is on and it also shows total running time of the machine.
20. Key: engine stop switch.

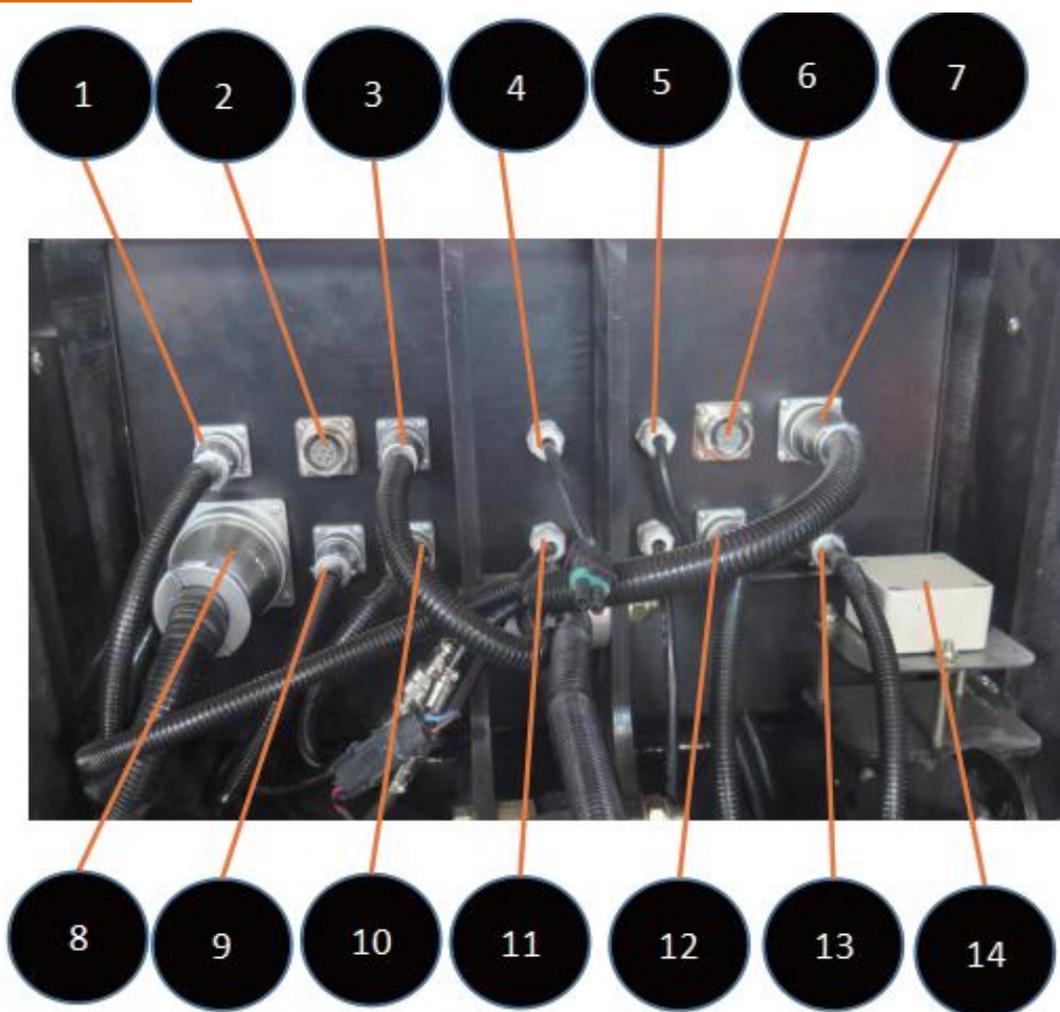
**Electric control cabinet**



**Instructions**

1 – Distribution box	
2 – Laser leveling control system	
3 – Wiring duct	
4 – Filter	
5 – Relay (5.1 – Large electric cylinder UP; 5.2 – Large electric cylinder DOWN, 5.3 – Side lock; 5.4 – Vibrating motor)	
6 – Leakage protector (AC220V) power switch	
7 – Air switch	
8 – AC contactor	13 – Driving control module
9 – Left-side laser communication converter	14 – Driver (left and right wheel traveling)
10 – Terminal strip	15 – Switching power supply
11 – Traveling speed governor converter	16 – Cooling fan
12 – PLC central control unit	17 – Servo control display

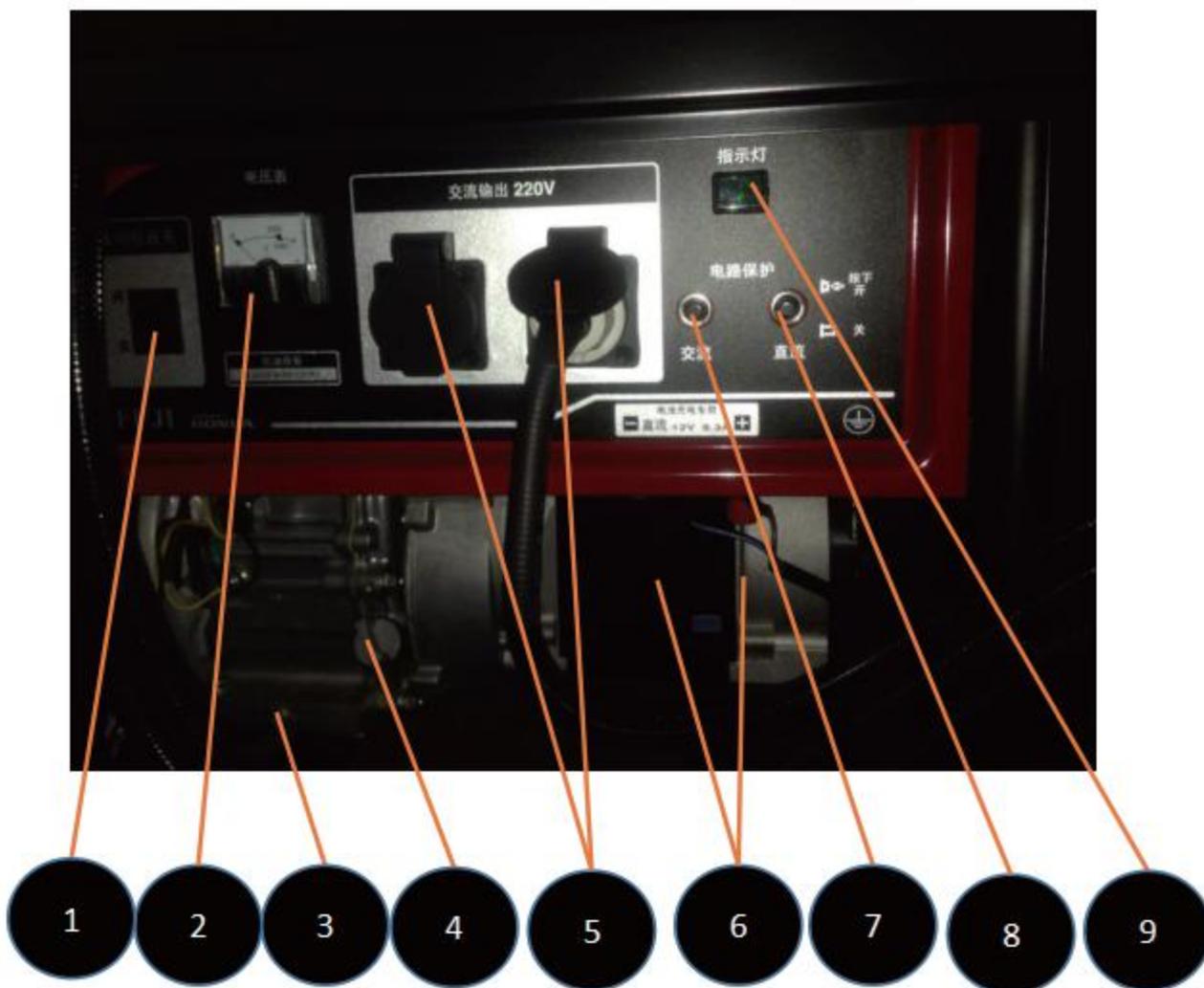
**Electric control cabinet**



**Instructions**

1 – AC220V incoming line interface
2 – Right laser spiral line interface
3 – Horizontal leveling electric cylinder interface
4 – Left lamp
5 – Right lamp
6 – Left laser spiral line interface
7 – Vibrating plate lifting electric cylinder, vibrating motor and side lock electric cylinder interface
8 – Control panel interface
9 – Right traveling motor main line interface
10 – Right traveling motor encoder line interface
11 – Headlamp interface
12 – Left traveling motor main line interface
13 – Left traveling motor encoder line interface
14 – Vehicle body horizontal inclination sensor

**Engine unit**



**Instructions**

1 – Power switch
2 – Voltmeter (AC220V)
3 – Engine oil drainage port
4 – Engine oil dipstick (filler port)
5 – Power socket
6 – DC12V power supply
7 – AC220V power supply reset type fuse
8 – DC12V power supply reset type fuse
9 – AC220V power indicator

## Method for adjustment of exciting force of the vibrator

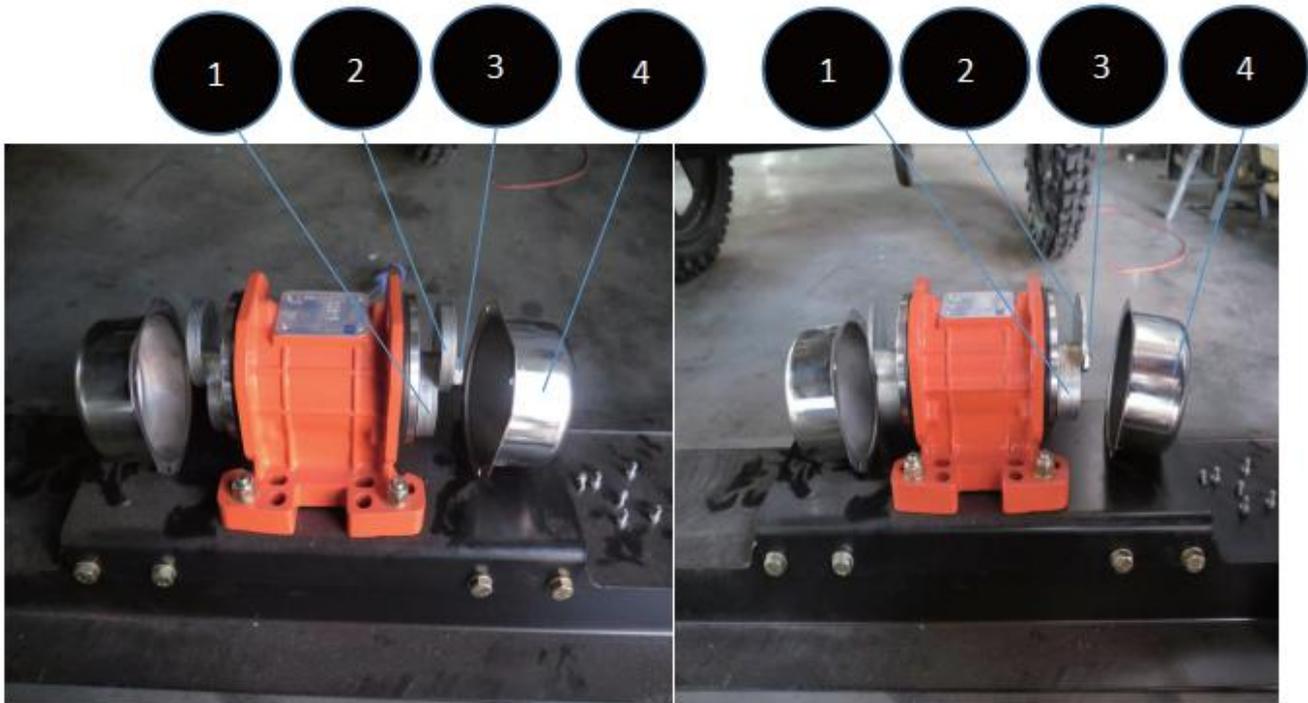


Figure 1

Figure 2

1 – Eccentric block lower position 2 – Eccentric block upper position 3 – Nut 4 – Protective shield

### Adjustment method:

1. Loosen the eccentric gear protective shields (4) on both the left and the right side.
2. Loosen the eccentric block nuts (3).
3. There are respectively 12 eccentric blocks on the left and the right side. Remove the eccentric block nuts on both sides; respectively place 5 eccentric blocks in the upper position (2) and 7 eccentric blocks in the lower position (1) on both sides (or 7 in the upper position (2) and 5 in the lower position (1)); the numbers of eccentric blocks on the left and right sides need to be consistent, as shown in Figure 1.
4. Remove left and right eccentric block nuts and respectively place 2 eccentric blocks in the upper position (2) and 10 eccentric blocks in the lower position (1) on both sides (or 10 in the upper position (2) and 2 in the lower position (1)); the numbers of eccentric blocks on the left and right sides need to be consistent, as shown in Figure 2.
5. The eccentric block position adjusted according to Figure 1 results in the minimum exciting force and that adjusted according to Figure 2 results in the maximum exciting force. When there are respectively 6 eccentric blocks in the lower and upper positions, there is no exciting force.

**Method for adjustment of exciting force of the vibrator**

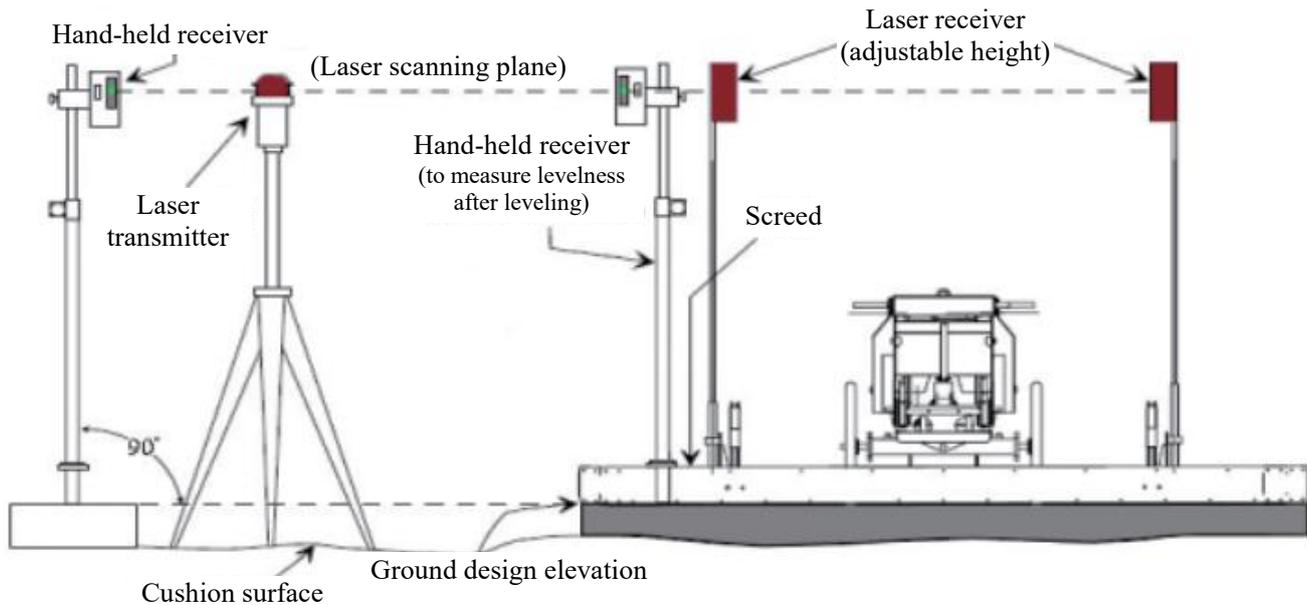
Walk-behind power-driven laser screed machine (S260E)



Inspection and safety check before startup:
1. Check engine oil level.
2. Check fuel oil level.
3. Check air filter.
4. Check engine cooling air inlet and outlet for foreign matters.
5. Check conditions of the tyres.
6. Check electric circuits for loose and disconnected ones.
7. Confirm whether all shields and safety stickers are in good condition.
8. Level off the machine with screed head lifting frame or machine automatic leveling function.
9. Confirm laser/electronic elements are functioning properly.
10. Check the vibrator and confirm the vibration velocity.

Start:
1. Confirm power switch, emergency stop switch and speed governor rotary knob are in the OFF position.
2. Turn the key switch clockwise to set it to ON.
3. If the engine is in cold start mode, pull the damper upward to the CLOSE position and quickly push the damper down to the OPEN position during starting; to restart the hot-state engine, set the damper to the OPEN position.
Stop:
1. Confirm power switch, emergency stop switch and speed governor rotary knob are in the OFF position.
2. Shut it down with the key.
3. Close the fuel valve.
4. Remove the concrete on the machine with high-pressure flusher. (Do not wash the generator set during flushing.)

## Operation method for laser system of S260E laser screed machine



Operation diagram of CLS-S260 laser screed machine laser system

### Laser leveling technical principle:

The laser transmitter gives rotating laser and the laser receiver on the screed machine receives the signal which is analyzed by the laser measuring and control system; the error is then reported to the sensitive computer control system on the machine and the left and right linear actuators adjust the screed height, thereby ensuring the leveling accuracy.

The concrete laser screed machine realizes the designed elevation by removing the excessive concrete and primarily leveling it out. The power-driven vibrating motor vibrates at 3000rpm to vibrate the concrete by driving the entire vibrating plate. Laser screed machine leveling requires no control line or side formwork to control the ground elevation, but real-time control is realized with the laser measuring and control system on the machine. As long as the laser transmitter is not interfered, the overall ground elevation after pavement can be ensured to be independent from the machine wherever it travels.

### 3. Mounting and operating methods (as shown on the figure)

- (1) First, set the laser emitter to the height of approx. 2m higher than ground design elevation; for arrangement of the laser transmitter, its channel shall be ensured unimpeded and undisturbed.
- (2) Determine hand-held receiver height on the pole and mount it.
- (3) Set the machine on the concrete, confirm the transmitter signal can be effectively received in the middle of the two laser receivers and switch screed elevation to the position of Manual.
- (4) Automatically level the machine out with the screed head lifting frame based on the spirit level.
- (5) Set the hand-held receiver pole ring onto the angle plate near the laser receiver pole and keep it upright.
- (6) Adjust height of the screed with manual lifting control until the hand-held receiver displays the correct height.
- (7) Repeat step (6) on the other side and recheck the original side.
- (8) With the elevation determined, press the reset button to lock it.
- (9) Switch manual control of elevation to auto control.
- (10) After leveling for approx. 2m, check the height and if necessary, adjust it again.

## Disposal of faults affecting leveling operation conditions of the laser control system

1. The following conditions will cause interference between the laser transmitter and the receiver.

- (1) Fog and rain
- (2) Dust
- (3) Diesel exhaust
- (4) Non-uniformly heated air
- (5) The column clamps on the main frame, wind or other interference factors will cause its swing which is too minor for the eyes to recognize but enough to cause unstable signal. This problem may be eliminated with a tripod.
- (6) Bulldozer, vibrating road roller or other large equipment working near it will cause violent vibration of the ground, thus affecting stability of the transmitter. If it is impossible to stop the large equipment, try to place the transmitter away from the vibration source and mount it on a tripod; do not use column clamps.

2. The fluorescent lamp may produce physical infrared signal and the countermeasure is:

- (1) Turn off the fluorescent lamp;
- (2) Mount protective roof over the receiver.

3. Weak transmitter battery may result in:

- (1) Weak signal; weak and instable laser beam;
- (2) No signal when it is too far away;
- (3) Excessively slow emitted light rotor speed.

4. The reflecting surface at the same height as the transmitter, such as glass or galvanized metal plate, will cause wrong laser reflection on the receiver, thus resulting in instable and excessively high or low signals. The countermeasure is:

- (1) Place a non-reflective material on the reflecting surface at the same height as the transmitter;
- (2) Cover the side of the receiver that receives the reflected signal with tape;
- (3) Place a non-reflective separator between the transmitter and the reflector;
- (4) Cover the side of the transmitter with reflector with tape.

5. If already finished concrete is found broken in a separate area, it may be caused by the interference of the support legs at four corners of the transmitter shell with the laser beam.

## Laser machine structure maintenance



Proper maintenance of the two-wheeled laser leveling machine during the construction process on site can improve service life of the machine and the key points for maintenance are as follows:

1. Apply used oil onto each part of the laser leveling machine in contact with the concrete before work, to facilitate washing of them after work, such as the vibrating plate, traveling wheel hub, etc.
2. Remove mud, burnt-on sand and asphalt accumulating on the surface of the machine; remove dust and oil dirt on the engine, the machine body and other component surfaces. Do not get dirt into any filler port or air filter.
3. Check connection and tightness of each part and component of the machine.
4. Check conditions of the air filter of the engine, engine oil level and fuel level and add new oil to the level required on the oil level indicators.
5. Check whether the grease at each lubricating point is of proper amount.
6. Check whether any electric plug has come loose.

Walk-behind power-driven laser screed machine (S260E)



**Electric line troubleshooting**

Fault	Cause(s)	Elimination Method
Generator set system	1. It is difficult to start or it will not start.	1. Check whether the generator set gasoline and engine oil are proper. 2. Check whether the air filter is functioning properly. 3. Check whether generator set fixation is good. 4. Check whether the stop switch connecting wire is good. 5. Check whether the voltmeter fails. 6. Check whether the generator set speed is proper.
	2. The generator set flames out itself.	
	3. The generator set produces abnormal noise.	
	4. The generator set voltmeter shows no reading.	
	5. The generator set voltmeter shows the voltage is too low.	
Operating system	1. The instrumentation and indicators are not lit when the main power switch is turned on.	1. Check whether generator voltage is correct. 2. Check whether generator set residual current circuit breaker works properly. 3. Check whether residual current circuit breaker and AC contactor in the distribution box are sound. 4. Check whether the switches, connecting lines and plugs are in good condition.
	2. Manual machine leveling and automatic machine leveling (vibrating plate lifting) are not activated.	1. Check whether the switches, connecting lines and plugs are in good condition. 2. Check whether the vibrating plate lifting electric cylinder is good. 3. Check whether the two relays (5.1, 5.2) in the distribution box are good. 4. Check whether the automatic lifting sensor is good (tilt sensor).

Laser system fails	3. The traveling unit is not moving, turns itself or will not turn.	<ol style="list-style-type: none"> <li>1. Check whether the coupling shaft of the wheel hub connecting flange is intact.</li> <li>2. Check whether the connecting flange and the shaft are good.</li> <li>3. Check whether the steering switch is good and whether there is steering operation.</li> <li>4. Check for power failure alarm.</li> <li>5. Check for display alarm in the distribution box.</li> </ol> Check whether the servo motor works properly.
	1. The laser transmitter won't start.	<ol style="list-style-type: none"> <li>1. Check the transmitter for flashing red light.</li> <li>2. Remove and then install the battery and restart it.</li> <li>3. Charge it.</li> </ol>
	2. The laser transmitter is not displaying properly.	<ol style="list-style-type: none"> <li>1. Check whether the transmitter is out of power.</li> <li>2. Remove and then install the battery and restart it.</li> </ol>
	3. The laser receiver display is not working.	<ol style="list-style-type: none"> <li>1. Check for loose plug.</li> <li>2. Check whether the fuse in the control box is good.</li> </ol>
	4. The laser receiver is not displaying properly.	<ol style="list-style-type: none"> <li>1. Check for loose plug.</li> <li>2. Check whether the fuse in the control box is good.</li> </ol>
	5. The lifting electric cylinder moves up and down with the laser system in AUTO mode when the machine stops.	<ol style="list-style-type: none"> <li>1. Check whether the electric cylinder wiring is correct.</li> <li>2. Shut down and then restart the machine.</li> </ol>
Others	1. The illuminating lamp is not lit.	<ol style="list-style-type: none"> <li>1. Check the wiring for breakage, damage, etc.</li> <li>2. Check the bulb and replace if it fails.</li> </ol>
	2. The emergency stop switch fails.	<ol style="list-style-type: none"> <li>1. Check the wiring for breakage, damage, etc.</li> <li>2. Replace it.</li> </ol>

Maintenance Cycle							
Maintenance item Conduct maintenance according to the given month or service hour interval, whichever is earlier.	Every use	Every month or 20h	Every 3 months or 50h	Every 6 months or 100h	Every year or 300h	Every 2000h	Lubricant
Check engine oil level	√						
Replace engine oil			√				
Check air filter	√						
Clean air filter			√				
Replace air filter					√		
Clean the sediment cup				√			
Clean and readjust the spark plug				√			
Replace the spark plug					√		
Check and adjust idling speed					√		
Check/readjust valve clearance					√		
Clean fuel tank and strainer					√		
Check fuel pipeline	Every two years (replace if necessary)						
Check fuel oil level	√						
Check electric wiring					√		
Clean engine oil cooler interior and exterior				√			
Check engine oil cooler hose					√		
Check tightness of wheel lug nuts				√			
Bearing lubrication	√						2#

# **Walk-behind Power-driven Laser Screed Machine**

**----Operation Manual**