POWER TOWERS
Low Level Powered Access

POWER TOWER nano SP

Working Dimensions

Maximum working height:	4.50 m
Maximum platform height:	2.50 m
Outreach with cantilever deck to cage edge	0.50m
Basket dimensions:	1.00 m x 0.73 m
Basket dimensions with cantilever:	1.50m X 0.73m
Basket dimensions without cantilever:	1.00m x 0.73m
Working footprint:	1.19 m x 0.75 m
Safe working load:	200 kgs (1 person plus tools)
Maximum manual force:	200 N
Max. gradient for operation:	0°
Max. wind force:	12.5m/sec
Maximum weight Inc payload:	478kg + 200kg = 678 kgs
Maximum castor point load	210 kgs (2.10 kN)
Drive Speed Max.	4.6 KpH
Drive Speed Slow	1.0 KpH
Elevated Drive Speed	0.7KpH
Max. Wheel force	2.1KN

Closed Dimensions

Length:	1.20 m
Width:	0.75 m
Height:	1.59 m
Weight:	478 kgs

Power Source/Drive

Standard 24v DC Electric Motor

24V D.C. Motor/Gearbox Drive

Battery Charger Specification

Input Voltage:	90-265V AC
Frequency:	45-65 Hz
Output:	24V DC, 7A

Power Towers Ltd,
West House, West Avenue, Wigston, Leicester LE18 2FB, United Kingdom, **Tel: +44 (0)116 200 1757,** Fax: +44 (0)116 284 9243
sales@powertowers.com | www.powertowers.com

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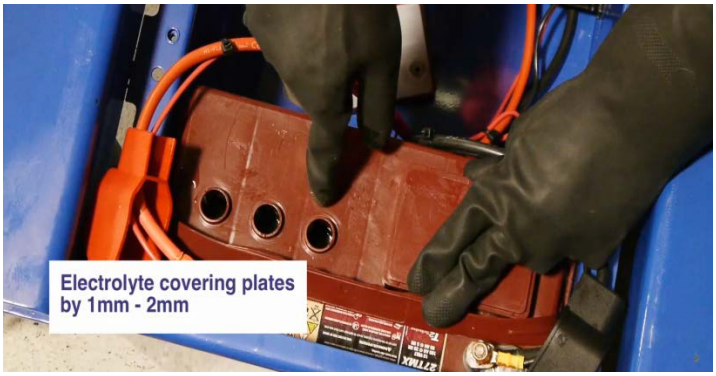
Battery Maintenance

Please ensure, the unit is isolated and you use the correct PPE as indicated.

To gain access to the batteries please remove the covers.

Check the electrolyte level in each of the battery cells.
Please Note; The electrolyte should be covering the plates by one to two millimetres.



Check the connections and make sure the battery is clean

Using a hydrometer, check the specific gravity of each cell in the battery. The hydrometer should read between 1.28 and 1.285, and all cells should be equal.

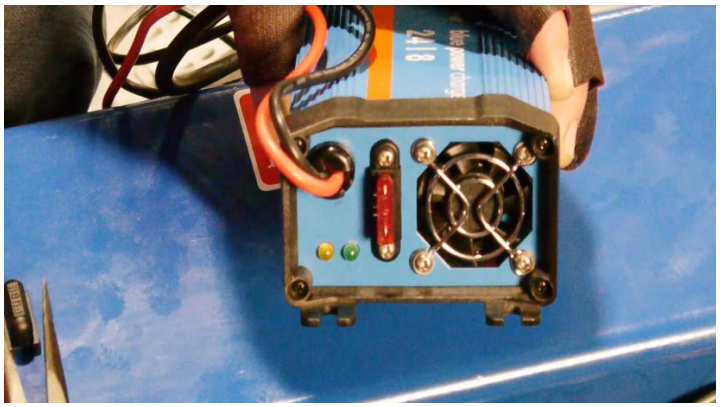
Use a voltmeter to check the voltage. The reading should be approximately 24 volts.

Battery Charging Fault

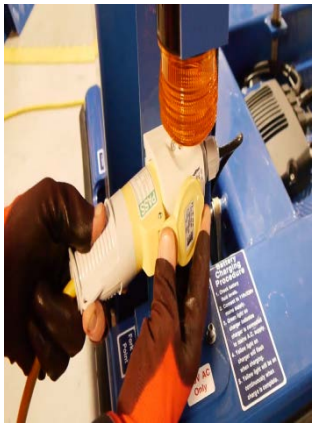
Please ensure, the unit is isolated and you use the correct PPE as indicated.

Check the battery charger lights when first switched on (Display Green LED On, Amber LED blinking fast is bulk load, blinking slowly this is absorption, on float, off storage.)

If the both charger lights flash slowly, check the fuse, battery connections and then the battery condition as outlined in the chapter: 'Battery Maintenance.
Fuse can be found underneath the fuse cover on the charger.



If there are no lights on the charger, check the supply connections which can be found on the right side of the chassis



Checking for Oil Leaks

Please ensure, the unit is isolated and you use the correct PPE as indicated.

Remove the covers, rear ballast plate (Follow the removal of rear ballast procedure.) and the spine end cap. Check the power pack pipe end and check the pipe end connections at the base of the lift cylinder ensure the union is torque to 40Nm.

Check the Emergency lowering valve, spool and the valve screw cartridge on the side of the power pack.

How to Change the Oil in the Hydraulic System

Please ensure, the unit is isolated and you use the correct PPE as indicated.

Use a syringe to empty the hydraulic reservoir.

Refill with 4.5 litres of grade 32 mineral oil. Elevate the machine from the ground controls to ensure the platform reaches full travel. If not add a little more oil. Do not keep the pump running with no oil in the tank.

Adjusting the Wear Screws (Mast Section)

Please ensure, the unit is isolated and you use the correct PPE as indicated.

Raise the mast sections using the lift control to gain comfortable access to the wear screws. Align the outer section to the inner section so that the gap between the inner section and the outer section is equidistant from side to side. (18mm)

Screw in the four side wear screws, so that they just make contact with the 0.2 feeder gauge, slightly back if the gauge cannot be withdrawn, and tighten the lock nut. Repeat the process for the middle mast section to lower the mast.

Adjust the two rear plastic wear screws in a similar manner. It is not possible to adjust the clearance between the inner and outer sections with the rear screws. Remove. Operate the lift function to ensure the outer and middle sections do not bind. Back off slightly any wear screws found to be pinching so that both mast sections travel up and down freely.

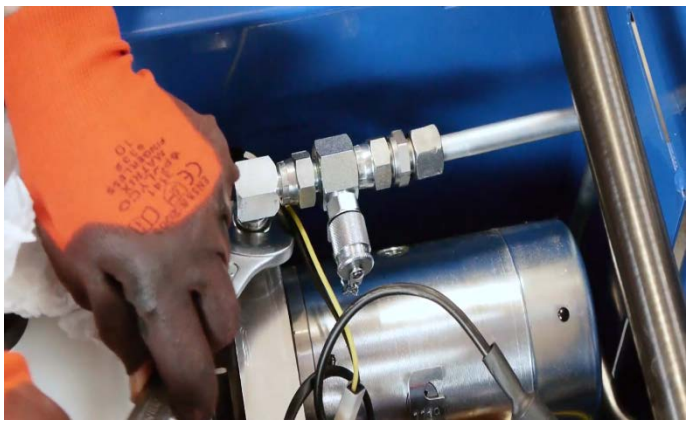
Removing or Replacing the Hydraulic Pipe

Please ensure, the unit is isolated and you use the correct PPE as indicated.

Lower the platform to the transport position, raise the cage and lock the gas strut. Open the manual emergency lowering valve and allow the oil to drain to the tank for a minute or two.

Remove the spine end cap and then disconnect the hydraulic connection to the cylinder

Move to the top of the power pack and remove the chassis cover. Identify the steel pipe connection and undo the fittings. There may be a very small amount of oil loss at this time. Edit point seven from removing and replacing lowering valve. The pipe now can be withdrawn.



The new pipe is refitted in the reverse sequence. Ensure to connect both ends of the pipe loosely to ensure correct alignment and then tighten the cylinder connection first, taking care not to twist the pipe.It may be necessary to slacken the two power pack mounting screws located under the middle of the power pack to enable correct alignment. When

When replacing the power pack mounting screws ensure to apply a small amount of Loctite 648

Remove or Replace the Emergency Lowering Valve

Please ensure, the unit is isolated and you use the correct PPE as indicated.

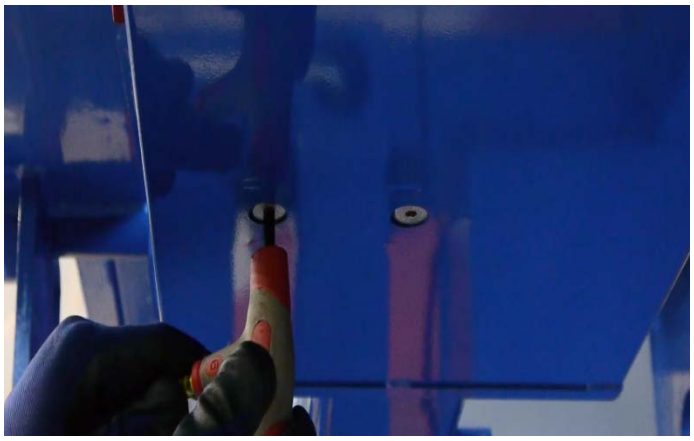
Please Note some of the Picture are taken from the Nano. Procedure is similar for Nano Sp. Please adhere to the instructions.

Fully lower the platform and pull open the emergency-lowering valve for a minute or two, to fully drain the oil. To open the emergency lowering simply pull on the red toggle.

Raise the platform and lock the gas strut. Either lift the machine on a suitable hoist or raise the base of the machine on the emergency lowering valve side and chock up in a safe manner.

Place some oil soak cloths around the power pack pipe connection and undo the pipe connection. Locate the spine cap and remove, loosen the pipe, there may be a small amount of oil spillage. Locate the two power pack fixing screws,

Locate the two power pack fixing screws, located under the base of the machine, below the centre of the power pack and undo.
Move the power pack sideways to gain full access to the lowering valve. Remove the knurled knob and solenoid, and then the valve cartridge



Refit the new or repaired valve cartridge and reassemble using the reverse sequence. Set the knurled knob in the normally closed locked position to close the emergency lowering valve push in and slightly turn clockwise, check that the machine elevates, and remains stationary when elevated, when the machine is back on the ground in a stable condition.

Removal and Assembly of the Telescopic Mast

Please ensure, the unit is isolated and you use the correct PPE as indicated.

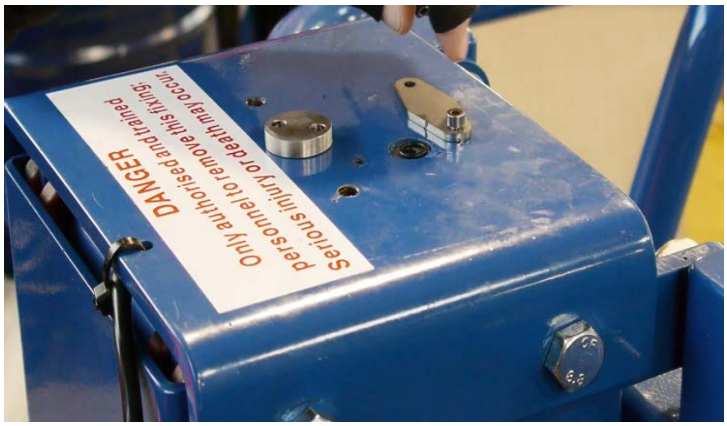
Please Note some of the Picture are taken from the Nano. Procedure is similar for Nano Sp. Please adhere to the instructions.

Fully lower the platform and pull open the emergency-lowering valve for a minute or two, to fully drain the oil. To open the emergency lowering valve pull on the red toggle.

Tilt the platform upward and support with a sling or hoist. Remove the gas strut.

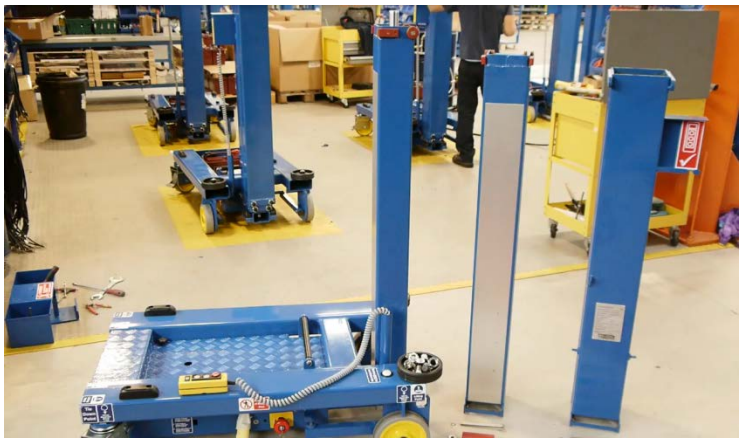
Lower the cage and undo the two main fixing bolts. With the sling or hoist, remove the complete cage.

Remove the tool tray on top of the mast. Undo the four bolts surrounding the mast cap and remove.
Under no circumstances are you to remove the centre fixing as this could lead to serious injury.



With the hoist, raise the mast outer section a short distance to a convenient position and remove the roller and wear screws. When removed lift the mast section clear of the mast using the hoist taking care to clear the inner stop blocks as the mast is raised.

Repeat the process for the mast middle section. Access can now be gained for any maintenance or remedial work required. Reverse the procedure to reassemble the mast and platform. When reassembling the mast cap please ensure to apply a small amount of Loctite 648 to the locking bolts and torque to 30 Nm



Castor and Wheel Maintenance

Please ensure, the unit is isolated and you use the correct PPE as indicated.

Ensure the Castor Fixing bolt is torque to 55Nm as well as the caster axle bolt. Ensure the wheel spins freely and rotates on the castor if the wheel doesn't move freely after being tightened to the required torque then fit a spacer washer. Check for any damage, the breaking latch moves freely and the castor is not twisted.

Replacement of Castor Wheel

Please ensure, the unit is isolated and you use the correct PPE as indicated.

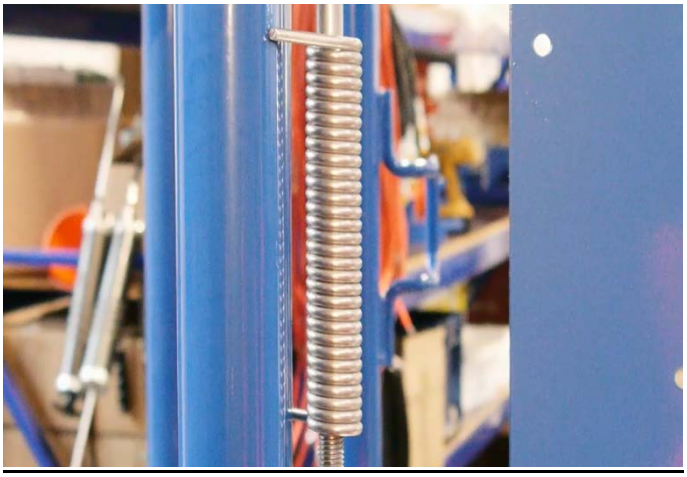
Raise the machine from the ground with a suitable hoist or block the front of the machine so the castor wheels are clear of the ground by approximately 50 millimetres. Undo the axle bolt and remove wheel. Undo the fixing bolt and remove HD swivel caster.

Refitting is a reverse of this procedure ensure it is torque to 55Nm. Ensure the wheel moves freely.

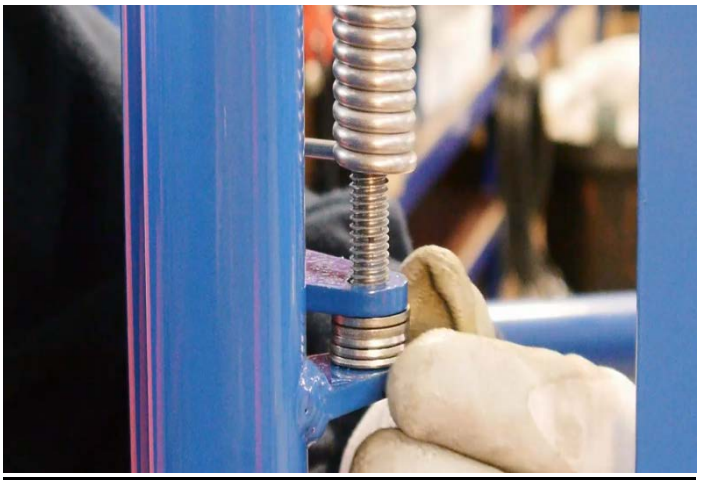
Gate Latch Adjustment

Please ensure, the unit is isolated and you use the correct PPE as indicated.

Offer the gate to the hinges and pass the long pivot bolt downward through the top hinge bracket. When feeding downward, slide the bolt though the spring until just before passing through the lower hinge bracket. Twist the lower arm of the spring behind the gate upright and then pass the pivot bolt through the lower hinge.



Allow the gate to close, and check that the “U” pin locates correctly in the jaw of the of the gate latch. If the “U” pin is too low, raise the pivot bolt slightly above the lower hinge and fit one or two M10 washers as required. Pass the pivot bolt all the way through the hinge plates, fit and tighten a lock nut and washer



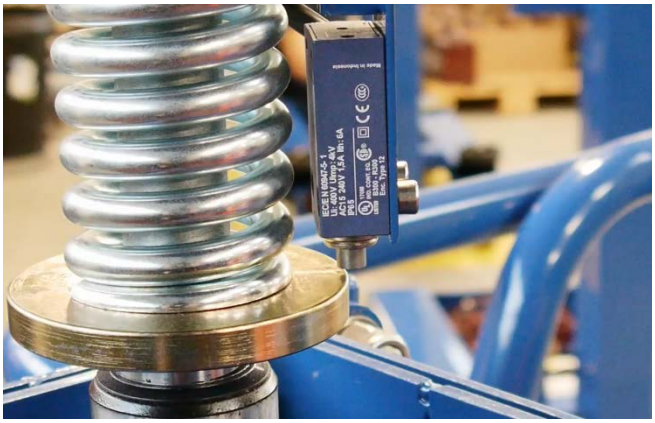
Replacement of Load Sensor and Reset Procedure

Please ensure, the unit is isolated and you use the correct PPE as indicated.

Remove the Tool Tray.
Undo the four bolts and operate the lift function from the ground controls so that the mast caps complete with spring assembly, clears the mast section.

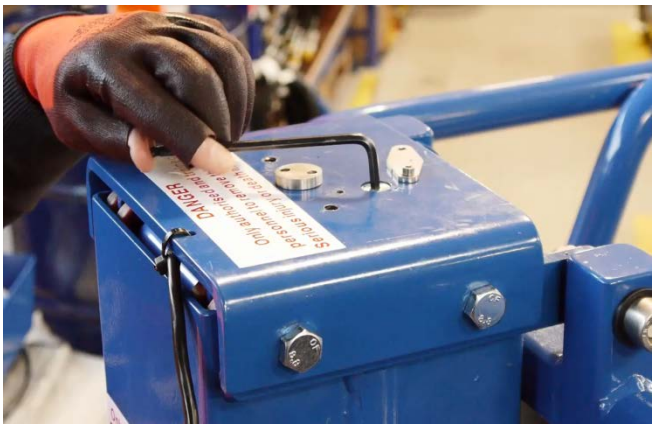
The Sensor is identified by the red arrow.

Replace Load Sensor.
Lower and reassemble the mast cap using Loctite 648 when refitting the 4 locking bolts. It will be necessary to ensure the cylinder and spring assembly is central to the mast section otherwise the spring mounting collar can catch and jam on the inner wear pad fixing screws. Torque to 30 Newton metres.



To reset the switch, Place 200 kilograms in the retracted platform.

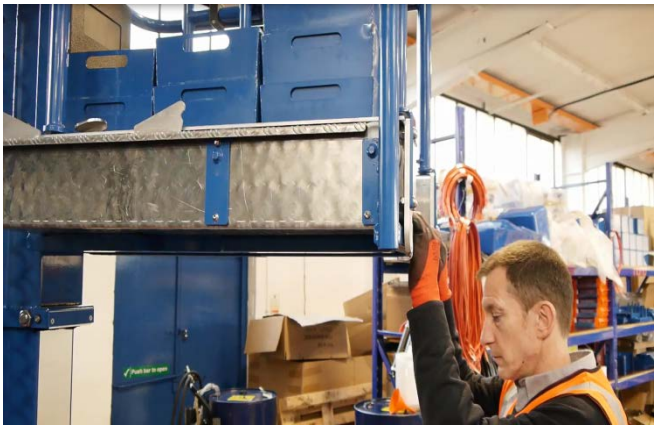
Turn the load sensor adjuster screw so that the switch can be heard to “click”, and then back off, turning clockwise, for 1. 5 turns.



Elevate the platform to approximately two metres so that the second mast section is lifted approximately 400 millimetres.

Apply an additional load to the platform, maximum 40 kilograms, so that the alarm and cut out operate.

There is a delay of 2 seconds when the switch operates.



If the alarm does not operate, lower the platform and turn the adjuster screw anti clockwise until the alarm does operate, ideally with 20 to 25 kilograms additional force.

If the alarm operates prematurely then lower the platform and turn the adjuster screw clockwise to set.

Remove the additional load, leaving the 200 kilograms in the platform, and elevate the machine to full height from the ground controls to ensure the alarm does not operate prematurely

Lower the platform and remove the 200 kilograms. Fit the adjuster screw capping plate and “O” ring, and then refit the tool tray.

Platform Load Sensor Testing and Reset

Please ensure, the unit is isolated and you use the correct PPE as indicated.

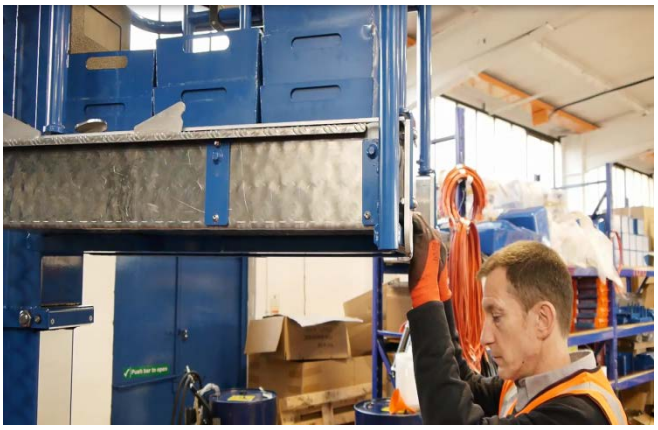
To reset the switch, Place 200 kilograms in the retracted platform.

Turn the load sensor adjuster screw so that the switch can be heard to “click”, and then back off, turning clockwise, for 1. 5 turns.

Elevate the platform to approximately two metres so that the second mast section is lifted approximately 400 millimetres.

Apply an additional load to the platform, maximum 40 kilograms, so that the alarm and cut out operate.

There is a delay of 2 seconds when the switch operates.



If the alarm does not operate, lower the platform and turn the adjuster screw anti clockwise until the alarm does operate, ideally with 20 to 25 kilograms additional force.

If the alarm operates prematurely then lower the platform and turn the adjuster screw clockwise to set.

Remove the additional load, leaving the 200 kilograms in the platform, and elevate the machine to full height from the ground controls to ensure the alarm does not operate prematurely

Lower the platform and remove the 200 kilograms. Fit the adjuster screw capping plate and “O” ring, and then refit the tool tray.

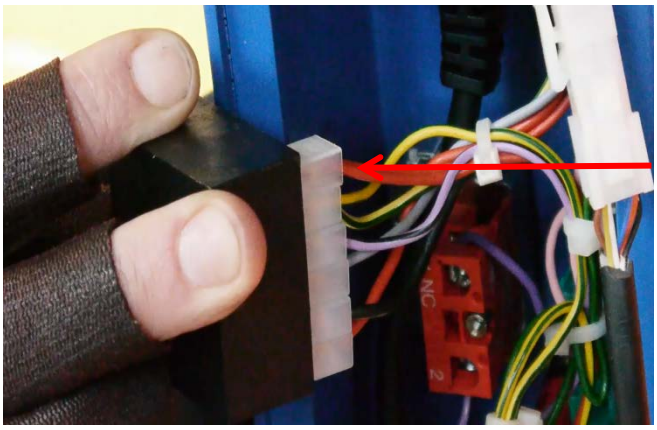
Platform Alarm Fault when in the Down Position

Please ensure, the unit is isolated and you use the correct PPE as indicated.

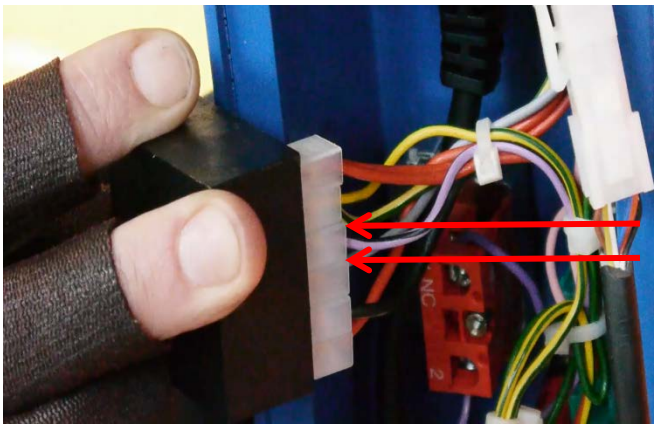
Identify whether the fault is with the mast overload switch or in the control arm. Disconnect the 2 pin plug at the base of the control arm and with a single core wire, link the two pins of the plug on the control arm side. If the alarm stops, then the Fault is most likely to be with the load sensor switch setting. Follow the 'Replacement of Load Sensor and Reset Procedure'.

If the setting is OK, then check the switch plunger and connections by removing the tool tray and undo the four bolts and operate the lift function from the ground controls so that the mast caps complete with spring assembly, clears the mast section.

If the alarm does not stop, then check the wire connections from the plug to the black timer module. This can be found in the control arm.
Also check the supply voltage is 24 volts on the two red wires to the timer module. This can be identified by the red arrow.



If all this is OK, then check the electrical continuity between the grey and purple wires on the timer module.
The Purple and Grey cables are identified by the red arrow.
If there is no continuity, then replace the timer module.



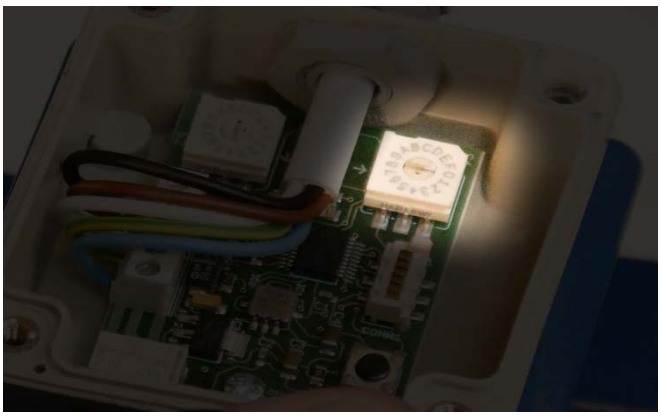
Tilt Switch Reset

Please ensure, the unit is isolated and you use the correct PPE as indicated.

Remove the chassis side panel. Remove the tilt switch and mounting bracket.

Remove the enclosure lid.
Check the wire connections to ensure they are tight in the terminals.
The left dial should read “0”.

The right dial should read “7 or 8”.

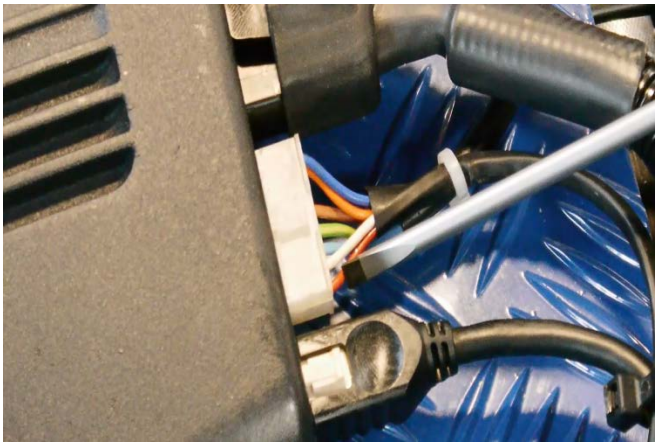


The reset button is located in the bottom corner.
Refit the tilt switch to the chassis, ensuring there's clearance between the tilt head and the underside of the chassis.
Turn to power to "on" and depress the reset button.
Check the machine operation. If it's OK, refit the tilt switch lid. If not, try the reset button again.

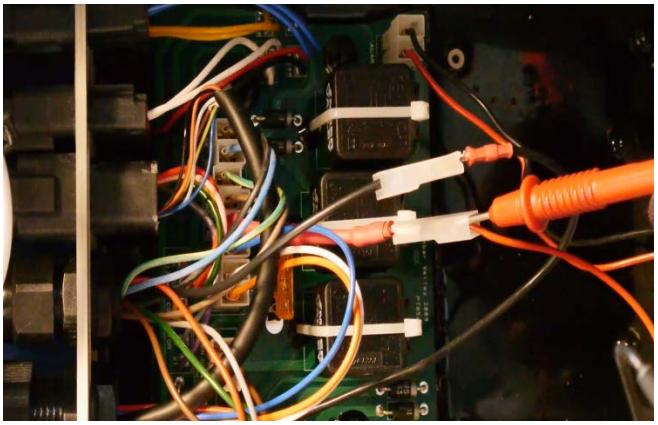
Inhibit fault, No platform or Ground Controls

Please ensure, the unit is isolated and you use the correct PPE as indicated.

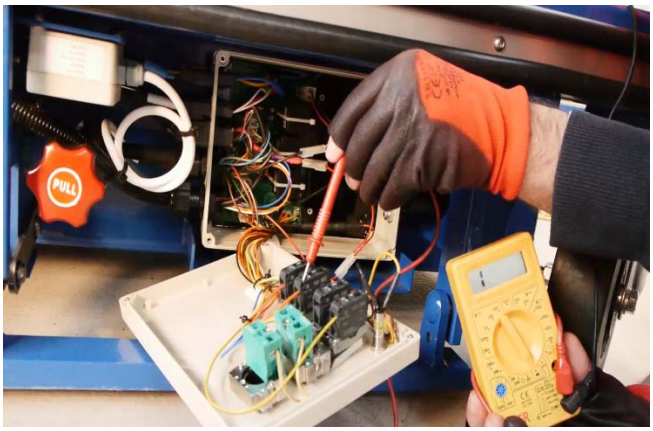
Check the wiring continuity from red on the 14-pin connector on the ECU, to battery negative. If there is no continuity then check the circuit as follows.



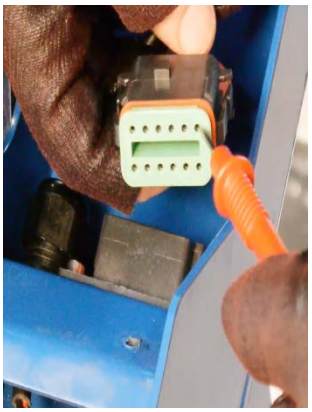
Using a continuity meter, follow the red wire into the ground enclosure and check the continuity.
Then check the continuity from the red spade on the PCB to the two yellow wires at the top left hand side of the ground enclosure.

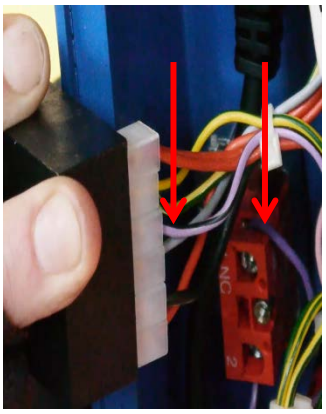


From these two yellow wires check the continuity to the orange wires through the ground emergency stop switch and PCB

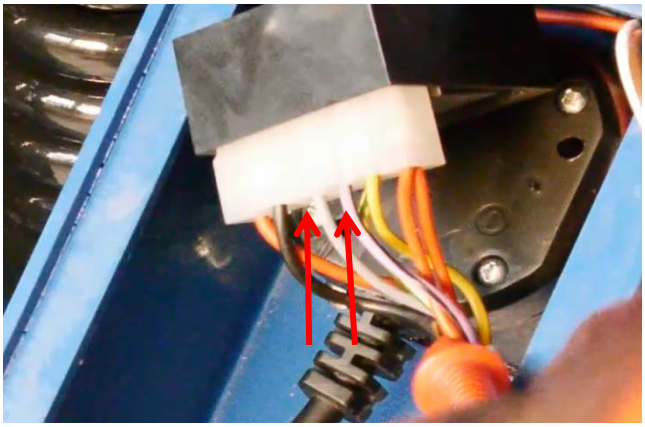


From the orange wires check the purple feed from the PCB, through the ‘Suzi’ cable and into the platform emergency stop switch at the control arm of the platform.
These can be identified by the red arrow.

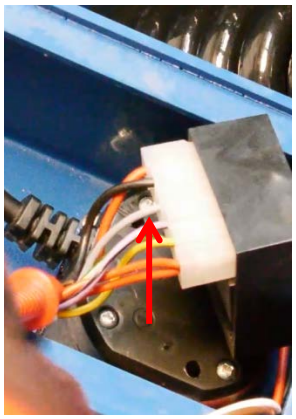


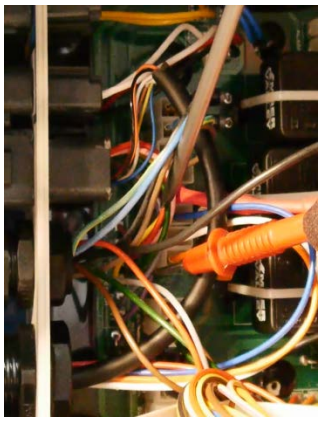


Check the continuity between the Grey and Purple cable. These can be identified by the red arrow.
No Continuity then replace the timer module.
Continuity then proceed to the next step



Then check from the switch to the timer module, and from the timer module, from the grey, through the
‘Suzi’ cable and back down to the PCB board.
There will be a break in this circuit somewhere.





Limit Switch Fault

Please ensure, the unit is isolated and you use the correct PPE as indicated.

Raise the machine a short way off the ground.
Check that when the mast moves down it moves the arm of the limit switch and that the limit switch arm is not loose. This can be found on either side of the mast.

Remove the limit switch to check the internal operation.
Check that the arm is at a 45-degree angle.

Using a continuity meter, check the two terminals and make sure the plunger makes and breaks the contact as the arm is moved.
Note; the tilt override limit switch is located at the base of the mast below the flashing beacon. The Hi/Low speed switch is on the opposite side.

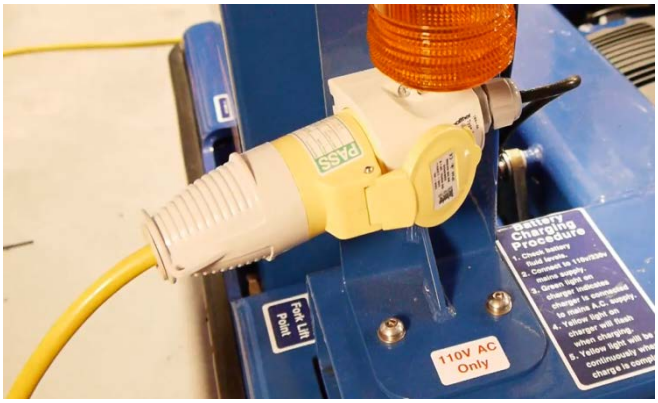
When checking the Hi/Low speed switch contact operation, depress the isolator switch. Failure to do so may lead to an ECU failure if a short circuit occurs

Elevation Fault

Please ensure, the unit is isolated and you use the correct PPE as indicated.

This is due to low voltage being detected by ECU. Voltage being lower than 16.5 V.

The solution is to recharge the batteries and allow the ECU reset voltage to be achieved by letting the voltage reach 27.4 volts or over within the batteries, this will need to be monitored with a volt meter.



Charge Condition Indicator Fault

Please ensure, the unit is isolated and you use the correct PPE as indicated.

When turning the joystick on the control arm and the joystick displays a red LED just above the Power button.
This occurs because the batteries are not correctly fully recharged, or the batteries are in a poor condition.

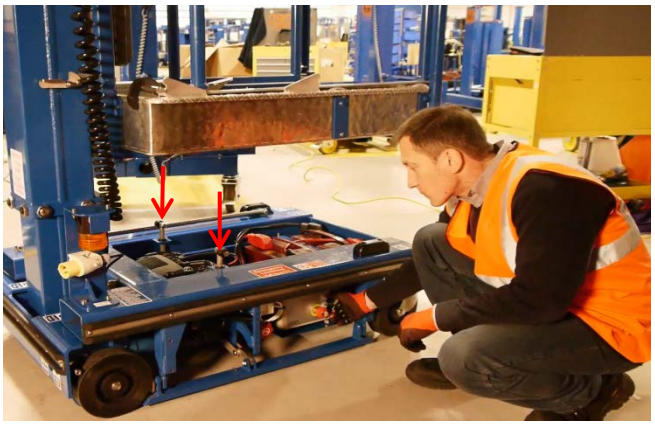
Ensure the battery charger is allowed to go through a full charge cycle. Check the battery condition and connections.

- **Check the Electrolyte Level**
- **Check the Battery Connections.**
- **Check the voltage within the batteries (24v), any less than 16.5 volts then proceed to reset the Ecu by charging over 27.4v.**

Maintenance of Pot Hole Bars and Interlock Brackets

Please ensure, the unit is isolated and you use the correct PPE as indicated.

With the platform raised, depress the plunger. These can be identified by the red arrow.



Check the pivots are tight.

Check the mounting bolt for the hook is tight.

Removal of Rear Ballast Plate

Please ensure, the unit is isolated and you use the correct PPE as indicated.

Remove the chassis side panels to gain access to the end fixings of the rear buffer strip.

Remove the end buffer strip fixing bolts and bend back the buffer strip to reveal the M12 ‘c/sink’ screw heads.

Place a suitable block under the ballast plate and undo the four M12 ‘c/sink’ screws and slide the ballast block clear of the machine to reveal the spine and cap.

Removal and Assembly of the Telescopic Mast

Please ensure, the unit is isolated and you use the correct PPE as indicated.

Please Note some of the Picture are taken from the Nano. Procedure is similar for Nano Sp. Please adhere to the instructions.

Fully lower the platform and pull open the emergency-lowering valve for a minute or two, to fully drain the oil. To open the emergency lowering valve simply pull the red toggle towards you.

Tilt the platform upward and support with a sling or hoist. Remove the gas strut. (This has been demonstrated on a Nano same procedure for Nano Sp.)

Lower the cage and undo the two main fixing bolts. With the sling or hoist, remove the complete cage. (This has been demonstrated on a Nano same procedure for Nano Sp.)

Remove the tool tray on top of the mast. Undo the four bolts surrounding the mast cap and operate the lift function from the ground controls so that the mast caps complete with spring assembly, clears the mast section.

DO NOT REMOVE THE CENTRE FIXING WHICH CAN BE IDENTIFIED BY THE RED ARROW; FAILING TO DO THIS COULD CAUSE SURRIOUS INJURY.

Remove the side panels and rear ballast plate follow removal of rear ballast plate procedure for instructions.

Disconnect the Cylinder from the Hydraulic pipe and lift the cylinder out intact with the mast cap

With the hoist, raise the mast outer section a short distance to a convenient position and remove the roller and wear screws. When removed lift the mast section clear of the mast using the hoist taking care to clear the inner stop blocks as the mast is raised.

Repeat the process for the mast middle section. Access can now be gained for any maintenance or remedial work required. Reverse the procedure to reassemble the mast and platform. When reassembling the mast cap please ensure to apply a small amount of Loctite 648 to the locking bolts and torque to 30 Nm