LUBRICURVE ELECTRO 5
Installation & Maintenance Manual

TRACKSIDE ELECTRIC RAIL / WHEEL LUBRICATOR SYSTEM

- **Running Rail**
  - **2 blades**
  - **4 blades**
- **Top of Rail**
  - **2 blades**
  - **4 blades**
- **35kg Capacity**

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An ISO 9001 and ISO 14001 registered company registration no. 7678917

Warning!

This lubricator uses a 12v-100ah battery which contains an acid based fluid, the electrolyte. Care must be taken to avoid the electrolyte coming in contact with the skin or clothing as the electrolyte may cause severe burns.

If the electrolyte contacts the skin wash with large quantities of clean water and seek medical advice.

DO NOT expose the battery to naked flames or cigarettes

During the charging process hydrogen gasses are vented from the battery and these gasses when mixed with the air may explode if ignited.
Do not short circuit the battery terminals, as this may cause a spark or explosion.

Contents

1 General

- Health & Safety legislation requires that rail lubricators are fitted by trained personnel only; warranty will also be affected if un-trained teams work on the LubriCurve products.
  Whitmore Rail provides suitable training courses.

  This Manual should be used in support of training courses.

- This Instruction Manual is intended to be generic and concentrates on the full range of LubriCurve Electro 5 systems to suit flat bottom running rails, both top of rail and gauge corner / face applications; system install differences are highlighted as necessary.

- Only lubricator greases or friction modifiers approved for use by Whitmore Rail and the rail user can be used in these LubriCurve Electro systems. Use of other greases or friction modifiers will invalidate warranty and could affect operation.

2 Product Transport / Storage

- Goods are packed and delivered to the requested address in a form that is suitable for the product, given good practice in the off loading by the receiving company.

- LubriCurve systems are delivered on the basis that they will be installed within one month of receipt.

- Delivered systems are not intended for outside storage, equipment should be off loaded and stored inside a secure watertight building until required for installation.

- All items are carefully checked prior to despatch and any damage or missing parts should be advised to Whitmore Rail within five days of despatch from WHITMORE RAIL premises for consideration.

Note
Keep cabinet upright at all times from transport to install

3 Main Component Definitions

Pump Cabinet	Each trackside Cabinet contains: Reservoir, gear pump, gear pump hose, control panel, battery charger, and cabinet mounting brackets. The grease is delivered from the reservoir via the gear pump to hose at the base of the Cabinet. Feed hoses then transfer grease to the Blade system.
Pump Reservoir	This reservoir holds the rail grease or friction modifier. The LubriCurve Electro 5 reservoir is capable of holding 35 Kg of grease or friction modifier.
Pump	The pump unit consists of a single or twin chamber gear pump driven by a close-coupled 12v DC motor. The unit fits directly to the reservoir underside.
Pump Control	Triggered from the Wheel Sensor the unit allows control of the pump and recording of key data. A number of operational settings are user adjustable to suit the site and application.
Wheel Sensor	The Wheel Sensor clamps to the running rail and provides non-contact sensing of passing wheels. Indicating lamps provide local indication of correct operation during test. Sensor is connected to control box through armoured cable.
Solar Panel	Depending on model, a solar panel is supplied. The unit fits onto the rear of the cabinet and is used to provide power to the battery by utilising sun and ambient light to generate electric power.
Delivery Hose	The delivery hose transfers the grease from the pump outlet to the Blade inlet. Lengths of hose are supplied with each lubricator, which have to be cut into suitable lengths to fit between the trackside Cabinet and Blade assemblies. The hose is secured using a hose clip at each end of the hose.
Blade (Grease Dispensing Unit - GDU)	Blades are provided that allows the grease or friction modifier to be delivered to the gauge corner/gauge face or top of the rail, for the train wheels to pick up and spread along the curve. The quantity supplied is dependent on the application specified.

4 Preparation of Main Components for Installation

Application	Ensure the correct pump type and system options have been selected for the application.
Training	Ensure installation team has been fully trained on the product, sighting and the application.
Packing	The Cabinet is delivered pallet mounted and wrapped, together with the majority of loose items required for the install, and larger items are secured to a separate pallet and wrapped. Ensure package has not been damaged during storage or transport to rail site, damage must be reported to the equipment supplier on initial receipt. Dispose of all waste packaging materials responsibly.
Cabinet	Visually inspect for any defects that will affect its operation. Ensure that all loose items are available with reference to items ordered. Ensure that battery is fully charged with reference to green indicator lamp on the charge controller or the voltmeter display.
Blade	Ensure they are not bent or damaged and all ports are free from blockages. Ensure that all bolts are present and are fitted securely. Ensure that the hose inlet tails, which the delivery hoses attach to, are in place and are not damaged.
Clamps	Ensure that both Sensor and Blade clamps are not damaged. Ensure that the threads on the clamp studs are not damaged. Ensure that the threads on the hook bolts are not damaged.
Hoses (feed and delivery)	Ensure that the hoses are intact and free of holes and splits.
Wheel Sensor and cable	Ensure that the cable and sensor are intact and free of sharp kinks and any damage.
Serial Numbers	Lubricators are supplied with unique serial numbers; these should be recorded prior to installation and recorded on installation record sheets as required. Serial numbers are on both external and internal faces of the cabinet.

5 Equipment Handling

Generally Electro 5 items required for each site are delivered on a pallet. The lubrication system is heavy and care should be taken in general safe mechanical handling of the units from delivery truck off-load to site install (cabinet weight excluding grease is approximately 90kg). The following methods of handling the unit are appropriate:

Fork Lift Truck. Lift with forks fully engaged under the cabinet.

Personnel Two people are required to lift the cabinet – Take care not to trap fingers or feet when lowering to the ground.

The cabinet should be kept vertical at all times, take care to avoid damage to the paint finish as this forms a part of the corrosion resistance and general integrity of the unit.

6 Typical Install Process

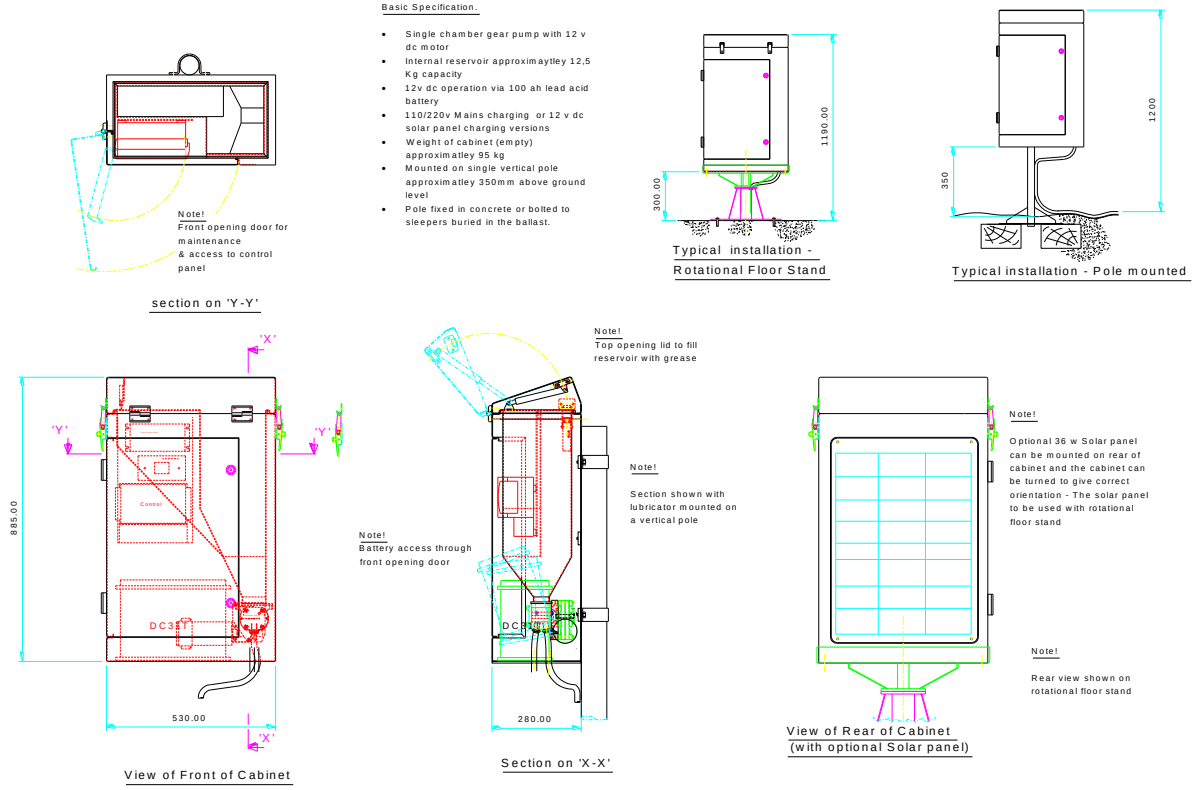
There are several possible sequences that can be followed to efficiently install the lubricator, this will largely depend on personnel available, track access and general conditions – the following is recommended as a guide.

Activity	Manual Section
1. Equipment Handling	5
2. Prepare Base for Cabinet Install	7, 8.1
3. Electrical Connection	8.5, **Error! Reference source not found.**
4. Install Blades	10.2
5. Install Track Mounted Wheel Sensor	**Error! Reference source not found.**
6. Hose connection and routing from Blades to Cabinet	10.4
7. System Priming	10.5
8. System Settings	11

7 Site Preparation

To install a LubriCurve Electro 5 lubricator, a simple base is required to support the vertical pole or the rotational frame on which the Cabinet is mounted. The form and stability of the base is important as it resists the wind loads on the cabinet. For a pole mount the base would typically be formed from concrete with a 60mm diameter tube cast vertically. The tube is approximately 1000mm above the concrete surface. For a rotational frame, the base could be either concrete or two full length sleepers. Either construction the surface of the base must be flat.

Outline and requirements are indicated in the diagram below. Drawings are applicable to Electro 5 pole & rotational frame mounting systems. Suitable poles and frames are available from Whitmore Rail.



- Base and cabinet must be positioned to maintain mandatory track and OLE clearances.
- Vegetation should be cleared around the unit where necessary to ensure a safe working environment.
- The base should be securely bedded into the ground / ballast to ensure stability and tube to be vertical

- The equipment needed for the installation work includes.

    - All relevant P.P.E. needed to carry out the works safely.
    - Shovel or ballast fork whichever one is the most suitable.
    - Orange pipe to protect delivery hose and sensor cable across 4’ and 6‘.
    - Spirit level
    - Compass
    - Lubricator installation tool kit (see Section 14).
    - Wiring termination tools.
    - Cordless or portable drill and bits

Note. Other site specific mounting options may be used.

8 Installation Trackside Items

8.1 Fitting the Trackside Cabinet to mounting tube

8.1.1 The vertical tube is to be installed and the concrete is to be fully cured prior to the installation of the cabinet

8.1.2 The Cabinet includes three clamps to hold the cabinet secure to the vertical tube. All clamps are to be tightened at final fix.

8.1.3 The cabinet is positioned adjacent to the vertical tube and the three clamps are assembled loose around the tube. The cabinet is then lifted approximately 300mm and the clamps are tightened. Note if a solar panel is to be fixed to the rear of the cabinet, ensure the rear of the cabinet is facing south for northern hemisphere and north for southern hemisphere locations.

8.2 Fitting the Trackside Cabinet to Support Frame

8.2.1 The support frame is to be installed on a level firm base, either concrete or two full length sleepers

8.2.2 The support frame is to be bolted to the concrete with M8 x 80 anchor bolts or M8 x 100 coach bolts, if timber sleepers are used.

8.2.3 The Electro 5P cabinet is bolted to the support frame with 4 No. M8 bolts fitted through the base of the cabinet.

8.3 Earth Bond

8.3.1 Subject to local regulation it may be required to bond the unit to the track. A 16.5 mm diameter hole is to be drilled in the rear of the cabinet for a 16mm diameter earth stud (Whitmore Rail part No. LCS105-11).

8.3.2 The bond itself must be supplied and fitted directly by Rail owner authorised personnel and not by the lubricator installer.

8.4 Fitting the Solar Panel

8.4.1 The solar panel is fixed directly to the rear of the cabinet. There are four spacers that hold the solar panel away from the cabinet. Using the M8 security bolts attach the spacers to the rear of the cabinet. The solar panel are fixed to the spacers with M8 security bolts.

8.4.2 The cable from the solar panel is routed through a 20mm gland to the inside of the cabinet and the ends of the cable are connected to the solar panel controller.

8.5 Battery Charger Electrical Connection

The majority of the electrical termination is completed in the Whitmore Rail factory prior to despatch, a maximum of three site connections (including one for the Wheel Sensor, Section 10.1.4) are required, for battery charging:

8.5.1 Solar Panel Cabinet Mounted – (see section 8.6)

8.5.2 Mains Power – two pole MCB for incoming 110 or 220vac fused and earthed mains power (see section 8.7)

Warning!

This lubricator uses a 12v-115ah battery which contains an acid based fluid, the electrolyte. Care must be taken to avoid the electrolyte coming in contact with the skin or clothing as the electrolyte may cause severe burns.

If the electrolyte contacts the skin wash with large quantities of clean water and seek medical advice.

DO NOT expose the battery to naked flames or cigarettes

During the charging process hydrogen gasses are vented from the battery and these gasses when mixed with the air may explode if ignited.

8.6 Solar Systems

Solar panel charged lubricator model uses the charger shown in the picture. Cable connection is directly into the left hand side screw terminals indicated on the charger.

The battery feed cable will have been factory connected, the free end with ring terminals should be connected to the battery terminals; blue core to negative and brown core to positive.

The round solar panel cable connects to terminals indicated with the solar panel legend; Brown '+', Blue '-'

Damage will result if incorrectly connected.

The controller contains two indicator lamps:

- A Green LED and this will be illuminated as soon as there is power from the module. When the controller starts to limit the charge current the LED will flash.
- The second LED can change colour from Red via Yellow to Green. Battery voltage is shown by the colour and legend on the controller - Green full charge, Red low battery charge.
- When the battery voltage falls below approximately 11v the multi colour LED will start to flash FAST. While the battery remains at a low charge the LED will continue to flash slowly.

8.7 Mains Powered Systems

If solar charging is not possible an alternative system that utilises local mains power to maintain battery charge may be used. Cable routing and connection should be undertaken by trained and authorised personnel only. Using the following procedure:

8.7.1 A suitable cable should be routed from the local trackside power source to the cabinet via suitable armoured cable and routed into the cabinet through a suitable waterproof gland. The cabinet can be drilled towards the base to suit the gland; care should be taken to avoid damage to any internal cabinet components.

8.7.2 The cable incoming cable should be armoured and suitably routed and protected to avoid a hazard.

8.7.3 Cable rating should be 220/110 volt at 5 amps.

8.7.4 Connection should be made on the two pole MCBs to the left of the main Control Box. All other power wiring will have been completed during product assembly.

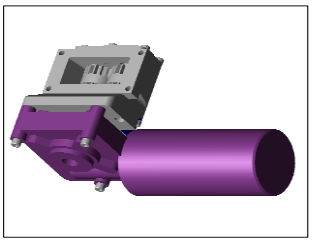
8.7.5 Connection should only be undertaken with the lubricator installer present.

The mains charger is suitable for input voltage between 95 and 240 volts ac or dc.
The battery connections from the mains charger are:-

- Cable with RED sleeve is connected to the positive battery terminal [Note: the cable insulation is smooth]
- Cable with no sleeve is connected to the negative battery terminal [Note: the cable insulation has three longitudinal ribs]

9 System Wiring Diagram

Gear Pump

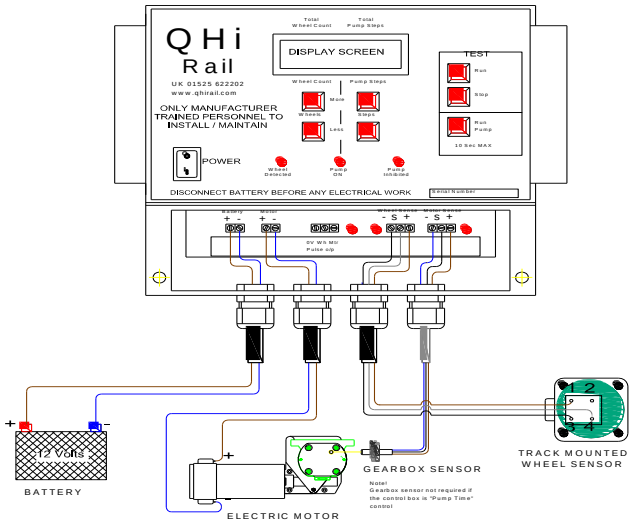


Brown cable from motor spade to Motor + terminal in Control Box

Blue cable from motor spade to Motor - terminal in Control Box

Gearbox shaft turns clockwise for correct pump operation

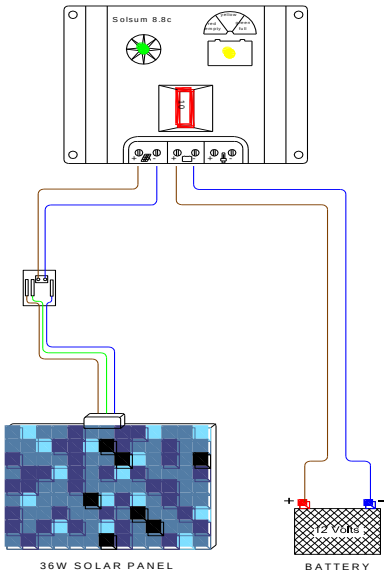
Control Panel



Note – Timed version control box does not have a gearbox sensor

Power Options

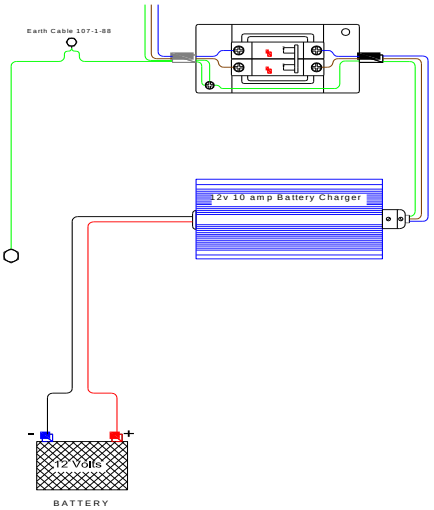
Solar Power



Mains Power

Mains Supply
220 / 110v
50/60hZ
By Others

Mains wiring by others
Plug & MCB supplied with Charger



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During the charging process, hydrogen gasses are vented from the battery and these gasses , when mixed with the air, may explode if ignited. Do not short circuit the battery terminals, as this may cause a spark or explosion.

Electro 5 Wiring Diagram [110-2-25]

10 Installation of Track Items

This aspect of the installation involves fixing of the Wheel Sensor to the running rail, fixing of the Blade system and running of the feed delivery hose system

10.1 Wheel Sensor

10.1.1 The Wheel Sensor is a non-contact proximity device that will detect a passing wheel when correctly set. The unit is pre-assembled on an aluminium mounting plate and needs to be clamped to the rail 3 to 6 metres upstream from the furthest rail mounted Blade. The sensor will be in the 4' and can be on either rail as best suited to the site.

- Sensor rail fixing clamps are similar to the EasiBlade arrangement and fitting is generally covered in Section10.3, key differences are:
- Clamp the sensor to the M16 rail clamp studs with the sensor uppermost.
- Adjust the height of the sensor to 42 / 45mm below the rail head crown and securely tighten the M16 fixings.

Note if required by site conditions the sensor can be reversed on the sensor mounting plate such that the cable exits in the opposite direction.

10.1.2 Run the cable from the sensor along the foot of the rail on the cess or field side, fix to each rail clip using cable ties and into the trackside Cabinet through the lower mast pivot point and into the cabinet.

10.1.3 The cable must route through protective pipe when running across the 4' or 6', in third rail applications the cable should pass through robust insulated pipe work below the conductor rail.

10.1.4 Route the cable within the Cabinet to the Control box. The sensor cable is armoured and the ends will need to be prepared prior to connection.

10.1.5 Remove the two screw connector strip cover screws and route the sensor cable through the cable gland and terminate all three cores as indicated

10.1.6 Cable connections are as follows:

Control Box:		Wheel Sensor:	
Brown:	+ve terminal	Brown	terminal 1
Black:	–ve terminal	Black	terminal 3
White:	S terminal	White	terminal 4

Care should be taken to ensure connections are made correctly, that the terminals are not over-tightened and damaged.

Note! On very small rails a simple plate with shims are used to mount the Wheel Sensor – see site specific layout/ install drawings

10.2 Blade System

The system allows use of a range of grease distribution units:

- Running Rail Blades
  - 2 blades on high rail
  - 4 blades on the high rail and 4 blades on the low rail

10.3 EasiBlade Installation

10.3.1 EasiBlades are supplied as complete single units. From the 4' / Gage and midway between Sleepers / Ties slide the base (W bracket) over the rail foot as shown. Locate the hook bolt around the opposite side of the foot and tighten the single Nyloc nut. Fully bed the base onto the rail using a hammer on the vertical faces of the 'W' bracket. Retighten the Nyloc nut.

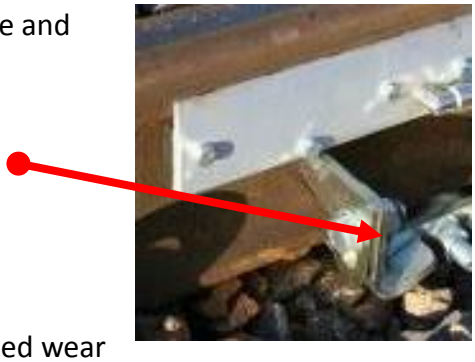
10.3.2 Where 4 blades per rail systems are installed it is important that the two inner blades are in adjacent beds an empty bed and then the outer blades. This arrangement allows wheel circumference pick-up and also benefits hose layouts

10.3.3 The blades are provided in left and right hand forms; the difference being the direction the hose tail points, the correct layout is shown in the adjacent picture, outer pairs with hose tails pointing towards each other.

10.3.4 Tilt the blade up so that the blade tip is towards the rail head and as high as possible, lightly tighten the two pivot bolts.

10.3.5 Decide the required blade height and tap the two steel lugs on the blade evenly down using a hammer to achieve the required height. The setting gauge should be used to verify heights.

10.3.6 There may be a slight gap between the tip of the blade and the rail. To close this gap tap the corner of the lug as necessary, **do not hammer the blade itself**.



10.3.7 Repeat process for each EasiBlade.

Note!

Blade height should be set at approximately 6mm below the indicated wear line on the gauge face of the rail. If no wear line is apparent a good starting point is 22mm below the top of the rail

Routing of delivery hoses, Cabinet to blade

10.3.8 As outlined previously there are a number of options to allow connection to the relevant Blade option. Picture shows EasiBlade layout with empty bay between end sleepers.

10.3.9 Hoses are 16mm bore for systems with pump distances up to 8 metres. The correct type and length of hose will have been despatched with the system.

10.3.10 Irrespective of hose type the principals of running the hose are similar and shown below for a typical installation with blades on both rails.

10.3.11 Hoses should be protected within suitable piping when passing under rails across the 4'

10.3.12 Running Rail Systems

- Two blades have single hose from cabinet to a T piece centrally between the two blades.
- Four blades have single hose from cabinet to a Y piece near each rail linked in turn to T piece centrally between each blade pair.

10.3.13 Top of Rail Systems

- Two blades have single hose from cabinet to a T piece centrally between the two blades.
- Four blades have single hose from cabinet to a Y piece near each rail linked in turn to T piece centrally between each blade pair.

10.3.14 Specific hose routing will depend on each site, note, to assist balanced flow:

- Main delivery hose runs should be of the same length.
- Individual hose lengths between each interconnection should be the same length.

10.4 Fitting the Main Delivery Hoses

10.4.1 Having first filled the reservoir operate the pump by pressing the 'run' button until grease is present at hose tail fitting.

10.4.2 Fit one end of a delivery hose to the hose tail inlet on the Blade with a hose clip and after routing and filling the delivery hose connect to the hose tails on the outside of the pump.

10.4.3 Repeat the procedure for the other hose (If using a twin chamber pump with two hose outlets).

10.5 Fill the Hoses and Blade's

- The main lubricator pump can be used to pump grease from the reservoir to the Blades.
- On the Control Panel periodically press the Pump Run button.
- Continue cycle until grease is evident at all Blade ports.

10.6 Top of Rail (TOR) EasiBlade Installation

Process Applicable for Single Port TOR EasiBlade and 8 Port TOR EasiBlade

10.6.1 TOR EasiBlades are supplied as complete single units. From the Field side and midway between Sleepers / Ties slide the base (W bracket) over the rail foot. Locate the hook bolt around the opposite side of the foot and tighten the single Nyloc nut. Fully bed the base onto the rail using a hammer on the vertical faces of the 'W' bracket. Retighten the Nyloc nut.

[Single Port EasiBlade, above]

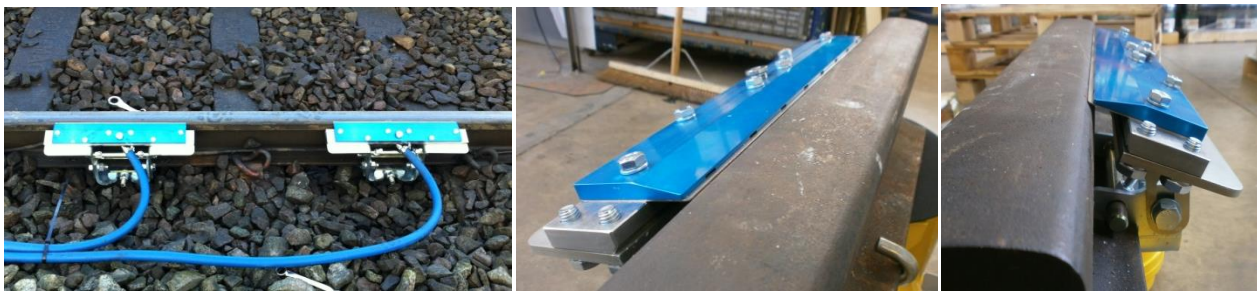
10.6.2 Tilt the blade up so that the blade tip is towards the rail head and as high as possible, lightly tighten the two pivot bolts.

10.6.3 Decide the required blade height and tap the two steel lugs on the blade evenly down using a hammer to achieve the required height.

10.6.4 There may be a slight gap between the tip of the blade and the rail. To close this gap tap the corner of the lug as necessary, **do not hammer the blade itself**.

10.6.5 Tighten the two M16 bolts. Adjust the nuts on the two lock bars to restrain the blade from vibration.

10.6.6 Repeat process for each EasiBlade.



[Eight Port EasiBlade, above]

11 Commissioning / Setting

11.1 Filling the Reservoir

The Electro 5 lubricators have been designed with a direct fill reservoir via a secure opening lid. This direct fill method is the quickest and most user friendly filling method.

Access the Grease Reservoir

- Open the lid on top of the cabinet. There are two latches (padlocks may be used to secure the lid) that need to be released and the lid can then be hinged upwards. There is a stay in the lid that prevent the lid from closing accidently. When the lid is open you will be able to see the grease reservoir.

***Note** – ensure only approved grease or friction modifier enters the reservoir. Any non-approved materials could severely damage the electric pump.*

Filling the Grease Reservoir

- Grease can be poured directly from the drum or storage bag, into the reservoir. Electro 5 reservoir will hold 25 kg.
- Do not over fill the reservoir.
- Once filled close the lid by closing the lid slightly then opening to release the lock and then the lid can be closed fully. Press firmly shut and secure using the latches. It is important that the lid is locked correctly; if the lid is left open the grease / modifier may biodegrade rapidly.

11.2 Wheel Sensor Heights and Operation

Procedure for height adjustment and testing operation are covered in Section 12.10.

11.3 Pump Setting

The Electro 5 Lubricators are controlled and set by a control panel located inside the cabinet. The control panel allows the user to set the grease output from the Blade blades with respect to the rail traffic using the line.

The following steps explain how to set and adjust the Lubricator once installed.

The buttons and indicator lamps have been numbered to help explain these instructions.

The first wheel of the train initiates the pump. The control panel counts the set number of wheels and then operates the pump, grease / friction modifier is then dispensed every time the set number of wheels has been detected.

The volume output is set in two ways depending on the application:

Running Rail

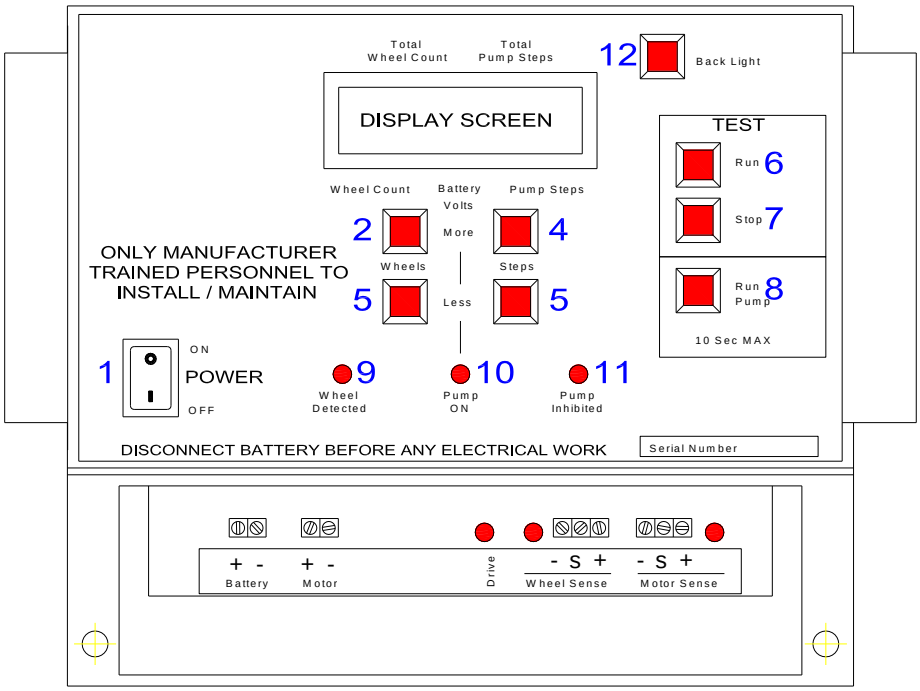
The control box pump setting can be either pump step or pump time variable [the control boxes are different and the pump time variant is denoted by a “T” prefixing the serial number]. Set the desired pump output by the number of steps or the run time in seconds.

Top of Rail

For TOR applications the control box is similar to the pump step version with a continuous train operation and is identified by TOR prefixing the serial number. This type of control box does not reset for individual trains.

All types of control panel look very similar and the method of setting the pump step and pump run time / steps is similar.

11.3.1 Backlight & voltage display feature panel - Running Rail pump step type shown.



NOTE!
All control boxes look similar.
The Time Pump version has “Pump Sec” & “Sec” adjacent to the buttons 4&5 & “T” prefixing the serial number.
TOR version is the same as the running rail version shown, but with “TOR” prefixing the serial number.

- In order to access the control panel, open the main door of the cabinet
- Ensure the control panel is switched on. Power button (1) must be pressed on the I rather than the O. The controls are now sitting in a neutral state with the battery power allowing basic function.
- The Electro 5 Lubricators are activated by the Wheel Sensor ‘seeing’ the first wheels of a train. When this occurs the Wheel Detected lamp (9) will illuminate as the sensor registers a passing wheel. This situation can be replicated by passing a steel object over the sensor.

- On detecting a wheel the electric pump will operate and the Pump ON lamp (10) will illuminate. When the electric pump operates, grease will be despatched onto the rail through the Blade blades.
- The pump will run for the set number of steps or the set period of time. The higher the number of steps or longer the pump runs for, the more grease will be despatched onto the rail. 17 steps or 1.25 seconds equals one revolution of the pump gears.
- The number of pump steps or pump seconds can be adjusted by pressing the Pump steps/Seconds buttons, either (4) for More second or (5) for Less seconds. A usual setting for Pump steps would be < 6 steps and for Pump seconds would be around <0.5 seconds
- Once the pump has been activated the controller enters an inhibited period, and the Pump Inhibited lamp (11) will be illuminated. The Wheel Sensor will continue to detect wheels but will not operate the pump again until the set number of wheels has been detected.
- The Wheel Count function controls the period between pump operations. To adjust the Wheel Count press buttons (2) for More wheels to count or (3) for Less wheels to count. As a train passes over the Wheel Sensor the number of wheels will be counted. When the number of wheels reaches the set amount, the pump will be activated for the set number of Pump Steps or pump seconds. Note – For Running Rail Applications - This inhibited period function will reset after 45 seconds if the set number of wheels have not been counted. This means the pump will be ready to go every time a new train passes over the Wheel Sensor. For TOR Applications – There is no resetting of the inhibited period therefore the TOR control box carries the wheel count settings from one train to the next.
- To more easily view the display panel press backlight button (12), the light will automatically extinguish after a set time.
- Central to the display is a battery voltage read-out; this is disabled while the pump is running.

Variation for TOR operation:
The Electro 5 is active once the control panel is switched on. The pump is activated every time the control panel counts the set number of wheels. The wheel count may be split between two trains.

Typical Settings
Setting the wheel count and pump seconds is accomplished as described in section above

11.3.2 The required pump settings will vary for each site and depend on such items and train type and speed. For guidance the tables below should be followed and then adjustments made to suit local conditions during subsequent visits.

Initial Electro 5 Settings – Running Rail - Pump Time

Speed		Carriages 2		Carriages 3		Carriages 4	
Speed mph	Speed kph	Wheel Count	Pump Secs	Wheel Count	Pump Secs	Wheel Count	Pump Secs
<15	<25	3	0.3	3	0.3	4	0.4
<50	<80	3	0.3	3	0.3	4	0.4
<75	<120	3	0.3	4	0.3	6	0.4
<100	<160	3	0.3	4	0.3	6	0.4
<125	<200	-	-	-	-	-	-

Initial Electro 5 Settings – Running Rail – Pump Steps

Speed		Carriages 2		Carriages 3		Carriages 4	
Speed mph	Speed kph	Wheel Count	Pump Steps	Wheel Count	Pump Steps	Wheel Count	Pump Steps
<15	<25	3	4	3	4	4	5
<50	<80	3	4	3	4	4	5
<90	<120	3	4	4	4	6	5
<100	<160	3	4	4	4	6	5
<125	<200	-	-	-	-	-	-

Speed		Carriages 8+		Carriages 20+	
Speed mph	Speed kph	Wheel Count	Pump Steps	Wheel Count	Pump Steps
<15	<25	4	4	3	4
<50	<80	6	4	8	5
<90	<120	6	5	30	10
<100	<160	40	8	-	-
<125	<200	40	8	-	-

Initial Electro 5 Settings - TOR applications

These settings are determined by site conditions. Typical settings are 2 Steps & 20 Wheels but this is dependent on the Friction Modifier used.

11.3.3 For maintenance log purposes the display screen also records the total wheel count and also the total pump steps. It is possible to zero the display following direct discussion with Whitmore Rail.

11.3.4 The set of Test Buttons, Test Run (6) and Test Stop (7) can be used to run the pump settings without the Wheel Sensor being activated. These buttons are useful during initial Lubricator set-up or maintenance periods.

11.3.5 The Run Pump Button (8) can be pressed and held for continuous pump operation. This button is useful during the initial priming of the pipes and Blade blades.

12 Routine Maintenance

Prior to any maintenance it is necessary to have the following data.

- The date that the lubricator was last maintained.
- The final depth of the reservoir when the lubricator was last maintained.
- Blade and Wheel Sensor heights when the lubricator was last maintained.
- Any works that were carried out when the lubricator was last maintained that could change the grease output.
- Any work that was identified but not carried out on the previous visit.

12.1 Control Panel

12.1.1 The control panel incorporates all operational functions for pump setting and also historic data logging of activities.

12.1.2 Record the Total Wheel Count and Current Wheel Count Setting from the Panel LCD readout.

12.1.3 Record the Total Pump Steps or Seconds and Current Pump Steps or Time Setting from the Panel LCD readout.

12.1.4 Note these 'total' settings can be zeroed by depressing the buttons adjacent to the readout but this should be recorded as a specific maintenance activity.

12.2 Pump Setting

12.2.1 Record the settings shown on the display as per Section 12.1.

12.2.2 Establish by visual inspection that grease / modifier output is correct or requires adjustment (plus or minus):

- If **additional** grease/modifier output is required then:
  - Increase Pump Steps or Seconds setting by press and hold of the 'more' button.

    Or
  - Reduce the Wheel Count Inhibit such that the pump will operate for a second cycle after fewer wheels have passed. It may also be necessary to reduce Pump Steps/Time as part of this adjustment to prevent over output.
  - Assess Blade output and make further adjustments as necessary.
- If **reduced** grease output is required then:
  - Reduce Pump Steps or Seconds setting by press and hold of the 'less' button.

    Or
  - Increase the Wheel Count Inhibit time such that the pump will operate for a second cycle after a greater number of wheels has passed.
  - Assess Blade output and make further adjustments as necessary.

12.3 Measuring the Reservoir

- This measurement is the only true guide to how much grease the lubricator has used since it was last visited. It is necessary to have the previous recordings of the last inspection, this will enable you to make judgements and carry out corrective action if needed without any guesswork.
- Using a flexible steel tape, insert it through the top of the reservoir, holding the tape vertical extend until the end is touching the top of the grease.
- Check exactly the measurement (in millimetres) against the face of the top reservoir cover.
- Record this measurement and compare it to the data that you have brought to site.
- By subtracting the final measurement recorded from the last time the lubricator was maintained from the measurement you have recorded this time would give you the grease used in millimetres.

12.4 Cabinet Maintenance

12.4.1 The Cabinet should be cleaned at each site visit and any damage to the paintwork attended to help prevent corrosion, damage could result from stone chips and general trackside activity in the vicinity.

12.4.2 It is important that both door locks are lubricated at each visit to ensure effective long-term operation.

12.4.3 Any water from rain or condensation should be removed so the inside of the cabinet is dry. In extreme environments where condensation forms then a suitable desiccant or dryer should be installed.

12.5 Battery Maintenance

Warning!

This lubricator uses a 12v-100ah battery which contains an acid based fluid, the electrolyte. Care must be taken to avoid the electrolyte coming in contact with the skin or clothing as the electrolyte may cause severe burns.

If the electrolyte contacts the skin wash with large quantities of clean water and seek medical advice.

DO NOT expose the battery to naked flames or cigarettes

During the charging process hydrogen gasses are vented from the battery and these gasses when mixed with the air may explode if ignited.

12.5.1 The battery is not maintenance free and standard practices should be employed to correctly maintain by trained operatives. This test will include:

12.5.2 Check battery fluid levels regularly, and top up with distilled water as necessary. Typically checks should be at two to three months intervals and this should tie in with normal lubricator maintenance schedules.

12.5.3 Integrity of battery connections should be checked; in particular the positive and negative post terminals should be cleaned and suitable anti-corrosion material applied. WARNING: Do not short circuit the battery as this may cause an explosion

12.5.4 Battery should be checked for signs of physical damage and replaced should anything be found

12.5.5 Maintenance records should be include details of battery with indelible marking of 'replace by date'

12.5.6 Batteries should be changed with new units at 2 (max 3) year intervals.

12.6 Solar Panel Maintenance

12.6.1 The panel will become dirty over time. At regular intervals to suit general environment conditions the panel should be cleaned with water and a mild detergent using a sponge or soft cloth, scrub brush or abrasive materials should not be used.

12.6.2 If the panel surface is physically damaged it must be replaced.

12.6.3 Check the mechanical integrity of the unit and its alignment.

12.6.4 Check electrical connections are tight and free from corrosion

12.7 Replacing the Pump Sensor

12.7.1 Disconnect battery

12.7.2 Remove control box terminal cover and disconnect the three core grey cable from the terminals and draw clear of the control box through the cable gland (see wiring diagram in Section 9), remove any cable ties and pull cable to base of cabinet at rear.

12.7.3 The sensor is secured to the pump body with two M8 nuts (13mm open spanner needed). Loosen the outer nut, loosen the inner nut and then unscrew the sensor fully from the pump body.

12.7.4 The new sensor is supplied with two loose nuts and one lock washer. Discard the lock washer and spin both nuts along the sensor and over the grey cable.

12.7.5 Wind the sensor into the pump body by hand until it cannot be turned further; turn the sensor back one revolution. Holding the sensor in that position fit the first nut tight to the pump body and then tighten the locknut.

12.7.6 Route the cable behind the drum plate and to the control box. Reconnect the three cores.

12.7.7 Reconnect the battery.

12.7.8 Press pump run and ensure the 'motor sense' LED next to the sensor cable (just connected) flashes.

- If lamp flashes all is correct
- If lamp does not flash then loosen the sensor and reset by turning it clockwise or anti-clockwise.

12.8 Cleaning the Lubricator and Surrounding Site

12.8.1 The lubricator and site must be cleaned so that when maintenance checks are made, you will be able note measurements and assess the operations of the lubricator accurately and carry out the works in a cleaner and safer environment.

12.8.2 The whole of the lubricator must be cleaned thoroughly.

12.8.3 The site must be cleared of excess grease.

12.8.4 If oil absorbent granules are being used, the existing, soiled granules should be removed and replaced with fresh granules. This must be done with extreme caution, if the granules are allowed to get into the lubricator system via the blades, the system may become blocked.

12.8.5 The surrounding rail chairs and clips, all rails in the immediate vicinity and the insulator pots need to be cleaned. 3rd and 4th rail are needed to be cleaned to ensure they are free of grease and dirt, this is to avoid causing a fire risk and hazardous under footing.

Do not attempt to clean live traction current rails with the current switched on.

12.9 Checking for Leaks

12.9.1 The lubricator should be checked for leaks. With some leaks it will be necessary to take the leak into consideration in regards to the grease output that you have noted.

12.9.2 Leaks on the primary side (i.e. within the cabinet) of the lubricator will cause an increase in grease output that is not due to the settings of the lubricator.

12.9.3 Tighten any hose clips or nuts / bolts / screws that maybe the cause of the leak and / or replace the faulty part that is causing the leak.

12.10 Measuring / Testing the Wheel Sensor

12.10.1 The sensor height to be measured is the vertical distance between the top of the green sensor body, and the top of the crown of the rail.

12.10.2 The sensor height should be set at 42 to 45mm. below the top of the rail

12.10.3 If the lubricator has not used the amount of grease that is required for this lubricator since the last time that it was maintained.

- Check that the sensor heights are the same as when the lubricator was last maintained.
- You may find that the sensor height has changed due to loose bolts on the mounting bracket causing the assembly unit to move, check the bolts and tighten if necessary. If necessary reset the heights once all other checks have been carried out.
- If the sensor height has been reset on this visit record the new heights.

12.10.4 Check the sensor is operating:

- With the Control Panel powered a ‘green’ LED will be visible at one end of the Wheel Sensor (opposite end to cable entry). If the lamp is not illuminated there is no power to the sensor and the cause should be investigated.
- With the Control Panel powered move a solid metallic ferrous object (i.e. 2lb Ball Pein hammer) over the sensor. The second indicating LED should illuminate ‘yellow’ to show the sensor has ‘seen’ the object.
- Repeat the test with a person viewing the red sensor-indicating lamp on the Control Panel. The lamp should illuminate when the sensor is activated.

12.11 Checking for Airlocks

The following shows steps taken to check for airlocks.

- Remove the delivery hoses from the Cabinet hose outlet. Operate the Run button on the control panel and check grease flows freely from each outlet.
- Remove delivery hoses from the Blade's. Operate the Run button on the control panel and check grease flows freely from each outlet.

Note:

- If the test was not satisfactory,
  - Check the reservoir is full of grease.
  - Clear the block within the grease path.
  - Operate the Pump by activating the 'Run' button.

Do not run for more than 5 seconds with a 20 second interval between operations.

Air locks that are present on arrival at the lubricator will give you certain information into why the lubricator has not had a sufficient grease output.

If the lubricator has not used any grease, but no air locks are present other corrective actions should be undertaken.

12.12 Inspection of the Blade's

12.12.1 Visually check the Blade's for damage and / or wear. Record and report findings.

12.12.2 Check that each port is clear and that there is a vertical stand of grease from each running rail Blade.

12.12.3 Check Blade height with reference to initial installation height settings

12.12.4 Check that the fastenings are secure.

12.12.5 Operate the pump from the Test button and ensure all of the ports on the top face of the spreader bar are dispersing grease. This will show if there is hardened grease, inside the Blade and/or if the Blade slots are blocked.

12.12.6 If Blade are partially blocked:

- For each delivery hose run close flow valves on all Blades other than the Blade to be worked on (note on two blade systems there are no flow valves).
- Cover each working port while operating pump, this should clear minor blocks.
- If blockage persists then strip and clean Blade

12.12.7 If Blades are fully blocked then remove, strip and clean.

12.12.8 Record your findings and any works carried out.

12.13 Filling the Reservoir

12.13.1 Refer to Section 11.1

12.14 Periodic Replacement of Components

12.14.1 It is recommended that various system items are replaced periodically; exchange will be dependent on traffic frequency and should be monitored during maintenance visits but as a minimum should include the following.

Item	Exchange Frequency
Battery	2 years
Control Box	5 years
Fasteners	5 years
Hose	2 years
Wheel Sensor	3 years

Whitmore Rail Electro Lubricator Maintenance Log Sheet

Maintained By	Maintainers Name	Maintain Date	Lubricator No.	
			Mileage	
Lub' Manufacturer	W' Rail		ELR	
Pump Model		Serial	Road	
			Rail Type	

GDU / Blade Config	2 - 4 - 8	Power Source	Solar	Wind	Mains	Battery
Special Product Notes						

1. Reservoir Capacity	Initial 0 – ¼ - ½ - ¾ - full	Final 0 –¼ - ½ - ¾ - full

2. Grease Integrity / Leakage		Comments on leakage
2.1 Pump	Yes / No	
2.2 Reservoir	Yes / No	
2.3 Hoses	Yes / No	
2.4 Blades	Yes / No	

3. Wheel sensor:	*Initial Height*	*mm*	*Final Height*	*mm*
3.1 Sensor LED test	PASS / FAIL			
3.2 Control panel sensor indicating lamp	PASS / FAIL			

4. Battery charger unit panel			
4.1 Battery volts	Volts	n/a	Comment
4.2 Wind turbine volts	Volts	n/a	Comment
4.3 Solar panel volts	Volts	n/a	Comment

5. Solar panel condition	PASS / FAIL n/a	Panel Cleaned Yes / No	6. Wind turbine operation	PASS / FAIL n/a	7. Mains charger	PASS / FAIL n/a
If failed, action taken						

8. Pump settings	Initial	Final
8.1 Wheel Inhibit		
8.2 Pump Steps		
8.3 Total wheel count reading		
8.4 Total pump steps reading		

9. Pump:	
9.1 Operation Test	PASS / FAIL
If above test failed, action taken	
9.2 Airlocks	PASS / FAIL
If above test failed, action taken	

10. Blade height.	1	2	3	4	5	6	7	8
Initial								
Final								

	LH Rail / Running-on	RH Rail / Running-off
9.1 Visual check	PASS / FAIL	PASS / FAIL
9.2 Pumped through GDUs	PASS / FAIL	PASS / FAIL
9.3 Removed & cleaned plates	YES / NO	YES / NO
9.4 Fitted new plates	YES / NO	YES / NO

11. Grease distribution through curve		
11.1 Over rail head	YES / NO	
11.2 If yes, number of sleepers		
11.3 Grease distribution	¼ - ½ - ¾ - Full Curve	PASS / FAIL
110.4 Total Miles Covered	Miles	
If any part of section 10 has failed what action, if necessary, was taken		

12. Lubricator fastenings check	YES / NO

WORK / GENERAL	Enviromental/Waste		Spares Required
	Any waste including packing and empty grease tubs handed over to Client for appropriate disposal		

Post Install site accepted by:					
Customer		Name		Date	

12.15 Maintenance Log Sheet Example

13 Parts List

Contact Whitmore Rail for advice / availability

14 Basic Installation Tool Kit

A selection of hand tools are suggested to correctly fit and maintain the pumps, specific recommended Whitmore Rail products are referenced above.

Ratchet Handle 1/2" Drive
Combination Spanner 24mm
Combination Spanner 19mm
Combination Spanner 17mm
Combination Spanner 13mm
Combination Spanner 10mm
Nut Spinner 7mm
Socket 13mm 1/2" drive
Socket 17mm 1/2" drive
Socket 19mm 1/2" drive
Socket 24mm 1/2" drive
1lb Ball Pein Hammer
Sharp Knife
Side Cutter
Junior Hacksaw and Blades
Screwdriver 6" x 1/4" flat blade, flared tip
Screwdriver Pozidrive No. 0, 1 & 2
Terminal Screwdriver
Cordless Drill
8mm Drill Bit

WHITMORE Europe

EC Declaration of Conformity

In accordance with EN ISO 17050-1:2004

We Whitmore Europe Limited

of City Park
Watchmead
Welwyn Garden City
Hertfordshire AL7 1LT

in accordance with the following Directive(s):

2006/42/EC The Machinery Directive
2004/108/EC The Electromagnetic Compatibility Directive

Hereby declare that:

Equipment Electro 5, 6, 10, 15, 20 & 30, Track Mounted, Electrical, Rail & Wheel Flange Lubricator System

Model number LCS103, 105, 108, 110, 113, 115, 120, 121, 205, 206, 210, 211, 212, 213 Series Lubricators and accessories.

is in conformity with the applicable requirements of the following documents

Ref. No.	Title	Edition/date
ISO 9001	Quality Management System Requirements	2008
ISO 14001	Environmental Management System	2004

I hereby declare that the equipment named above has been designed to comply with the relevant sections of the above referenced specifications and is in accordance with the requirements of the Directive providing the Lubricator has been installed in accordance with Whitmore Europe's Installation & Maintenance Manual

Signed by:

Name: Craig Foster

Position: Managing Director

Whitmore Europe Ltd., Welwyn Garden City AL7 1LT

On 5th February 2017

The technical documentation for the machinery is available from:
Name: Operations Director
Address: Whitmore Europe Ltd., Welwyn Garden City AL7 1LT

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