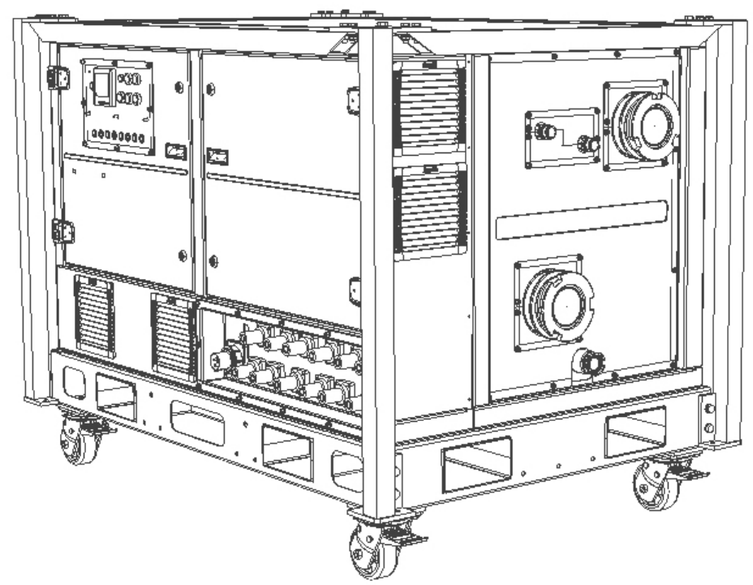
AVTRON
POWER SOLUTIONS

LC35 SERIES Liquid Cooled Load Banks

User Manual

Revision Number: 5238
Revision Date: 1.1 - January 2026

LC35 Load Bank User Manual



Avtron LC35 load banks are manufactured in the UK by:

N J FROMENT & COMPANY LIMITED,
Easton-on-the-Hill,
STAMFORD,
PE9 3NP,
United Kingdom
Tel: +44 (0)1780 920 100
Web: www.avtronpower.com

Introduction

This manual should provide you with all the information that you need to safely setup and operate Avtron LC35 SERIES load bank.

The manual is divided into four chapters:

Chapter One provides an introduction to the general principles of load bank testing and explains how an Avtron load bank makes the process easier, safer and more reliable. It then provides an introduction to liquid cooled load banks and their main features.

Chapter Two covers all of the procedures that need to be carried out before a load bank can be put into operation. It explains how to transport and install the unit safely and then how to commission it to check that it will operate correctly.

Chapter Three explains the basics of how to operate the load bank. It describes the controls and explains how they are used in an emergency.

Chapter Four provides a detailed reference to maintenance and troubleshooting the unit.

In addition to these chapters there are a number of Appendices containing information that did not fit easily within the main body of the text. These include installation drawings, a certificate of conformity and some information about electromagnetic compatibility.

An Important Note on Safety

All Avtron load banks are designed with safety as a very high priority, but their operation does present some risks. In common with other test equipment, the safety of all concerned is dependent on the way that the unit is operated. Do not use this equipment unless you have read and understood this manual, and are familiar with the accepted practice for the industry. The equipment should not be used by unskilled personnel. Misuse could result in serious injury and damage to the equipment.

Be sure to follow all of the safety warnings in this manual. In particular, pay careful attention to the following points:

- Keep all personnel who are not directly involved with tests well away from the load bank and the equipment under test.
- Only operate the load bank with all the guards in place, with doors closed and with all of the covers and protective screens securely in position.
- Always route cables into the terminal compartment through the gland plate or strain relief system provided. The terminal compartment door must be closed during the test.
- Make sure that all equipment is adequately grounded; this applies equally to the Supply-on-Test, and the load bank.
- Ensure all cables are in good condition and adequately rated for the planned load, and that all connections are securely made.
- Ensure all cables are long enough to lay in smooth curves, and are unstressed, undamaged, and protected from mechanical damage. Lay the cables to minimise the risk of personnel tripping or accidentally tugging on the cables.
- Store the equipment in a clean, dry place when not in use. Only install and operate the load bank in environmental conditions suited to the enclosure classification of the load bank.
- Prevent any liquid contamination of the cooling circuit. Always use clean, approved coolant and ensure the system is properly sealed to avoid leaks or ingress of foreign substances.
- Dispose of glycol mixtures and other coolants in accordance with local environmental regulations. Do not discharge fluids to drains or the surrounding area.
- In the event of spills or maintenance requiring coolant handling, ensure clean-up is carried out promptly using appropriate absorbent materials. When using mains water for filling or flushing, confirm the supply is clean and compatible with system requirements.

No content appears on this page.

Chapter One

Introducing Avtron Liquid Cooled Load Banks

If you are not familiar with the use of Avtron load banks then you should start with this chapter. It provides an introduction to the general principles of power supply testing and then it explains how an Avtron load bank makes the process easier, safer and more reliable.

If you are an experienced load bank user you may want to skip the earlier sections, but you should certainly read the introduction to Avtron liquid cooled load banks which appears at the end of the chapter.

Introducing Avtron Liquid Cooled Load Banks

Avtron's liquid-cooled load banks are engineered to deliver reliable and consistent electrical and thermal load testing, supporting the commissioning of cooling systems in modern data centres.

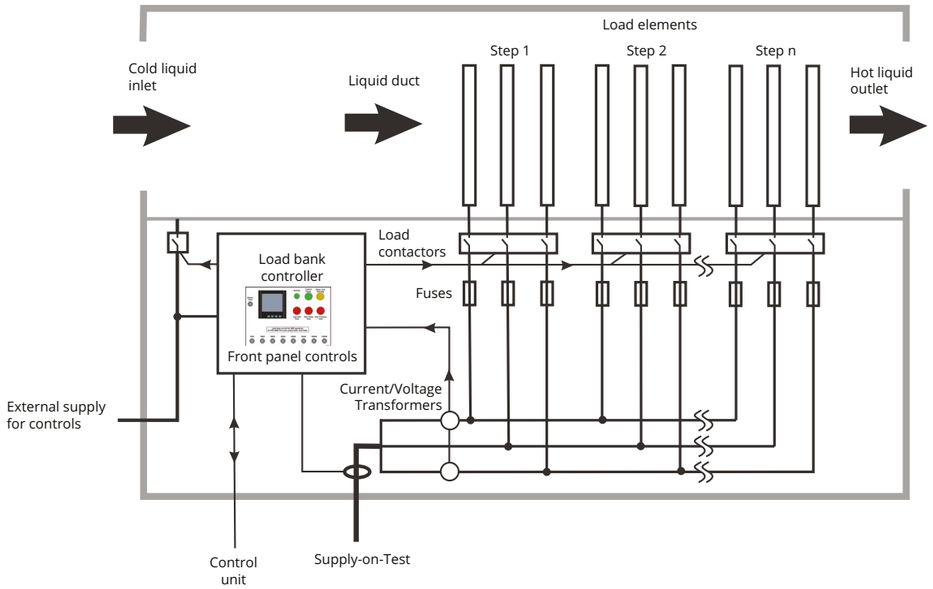


Figure 1-1 Avtron liquid cooled load bank core components

Figure 1-1 shows a simplified schematic of the core components to be found in the LC35.

The diagram contains:

- An array of load elements grouped in small steps that are individually activated by switchgear to allow the load applied to the generator to be precisely controlled.
- A constant liquid flow ensures that the heat generated from the elements during testing is carried away from the load bank liquid tank.
- Fuses and safety interlocks that ensure that the test can be shut down in a controlled fashion if any problems occur.
- A microcontroller based control and three phase instrumentation system connected to a number of highly accurate current transformers. This provides automatic precision control of the test and allow the results to be displayed with 0.5% accuracy.

Avtron Load Bank Control Options

This manual covers the LC35 load bank fitted with the RxMS iLB control system.

The iLB control system provides precise control over the operation of each load element during the test whilst simultaneously measuring the results. The unit also provides safety monitoring and interlocks which shut down the load bank safely should a problem occur.

Figure 1-2 RxMS iLB controlled LC35 liquid cooled load bank front panel

User control interfaces

All LC35 load banks are supplied with a Controls Supply Isolator, Internal/External power supply switch and control cable connectors.

Depending on the application and customer preference, the load bank can be operated locally through the control panel or via the LB View PC software. Further information on control options will appear later in this manual. Please note there is a separate user guide for the LB View software that will be included with your load bank.

Liquid Cooled Load Bank Applications

Commissioning Data Centre Cooling Loops

Liquid-cooled load banks are used during data centre commissioning to simulate the thermal and electrical demands of high-density IT equipment. Unlike traditional air-cooled load banks, these units transfer generated heat directly into the liquid cooling infrastructure—such as cold plates, rear door heat exchangers, or coolant distribution units (CDUs). This allows engineers to test the performance of the cooling loop under realistic conditions, validating flow rates, temperature differentials, and heat rejection capabilities before live servers are installed.

Note: The specific details regarding the frequency and type of test required may also be specified by local regulations or other interested parties.

By integrating with the liquid cooling system, these load banks help identify inefficiencies, confirm redundancy, and ensure the system meets design specifications. They also support dynamic load control and real-time monitoring, enabling fine-tuning of pump speeds and coolant flow. Ultimately, this process reduces commissioning risk, improves energy efficiency, and ensures the cooling loop is ready to support full-scale operations from day one.

Using Multiple Load Banks

The load control system installed on the load banks and the LB View software allows up to 250 LC35 load banks to be connected and controlled in a network. For setup please refer to the control section of this manual or the accompanying LB View manual.

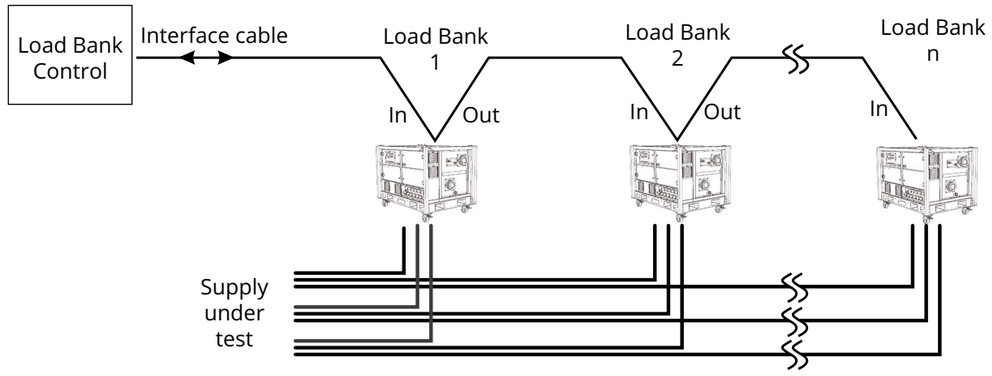


Figure 1-3 Connecting multiple load banks

It is also possible to connect Avtron air cooled load banks into the same network as well to allow for a hybrid load testing model that may be required in certain data centre commissioning applications.

LC35 Load Bank Specifications

Capacity Ratings (kW)

Product Code	3 Phase			Control Circuit	Power Connection Type	Liquid Connection Type
	380V	400V	415V			
	460kW	500kW	500kW	220-240V 50Hz	Powerlock	100mm Non Drip stainless steel couplings

Load Step Resolution	5kW
Overall Tolerance	±2.5% total capacity

Performance & Operation

Short Circuit Rating	5kA
Load Duration	100% load, continuous at rated Voltage. 10% above rated Voltage for short periods.[1]
Connection Options	Powerlock Quick connections
Instrumentation Accuracy	Class 0.5
Insulation Voltage - Power Circuit	1000V DC
Control Platform	RxMS iLB Control with LB View software

[1] short period is defined as 1 hour in 12.

Control Circuit

Control Circuit Consumption	Nominal 6A
Connection External/Internal	External: 16A 1ph + PE plug and socket conforming to IEC 60309-2 Internal: From supply on test
Recommended Protection	16AgG style fuse or equivalent

Design

Construction	2mm Zintec mild steel, folded and welded to form a modular construction
Elements	Immersion type Incoloy 800, non-finned sheathed elements
Finish	Grey RAL7012 - C3 Finish (ISO12944)
Lifting	Forklift pocket
Height	1253mm
Width	1150mm
Length	1646mm
Weight	800kg (Dry Weight), 1000kg (Wet Weight)

Environmental & Liquid

Ambient Operating Temperature	-10°C to +40°C
Storage Temperature	-20°C to +70°C
Degree of Protection	All electrical enclosures to IP54
Operating Humidity	90% relative humidity, non-condensing
Operating Altitude	0-1000m
Flow	See graph on page 1 - 7. (Figure 1 - 5)
Pressure	70 PSI [4.8 bar] Max Working Pressure 72 PSI [5 bar] Over Pressure Release Valve
Temperature	Liquid Outlet: 82°C Max. 0°C Min. Liquid Inlet: 49°C Max. 0°C Min.
Sensors	Over Pressure, Over Temperature, Low Flow Rate (70 LPM Min) Protection, Leak Detection

Standards & Compliance

Standards	ISO 9001 Quality Management, CE, UKCA
Warranty	24 months

LC35 Load Bank Diagram

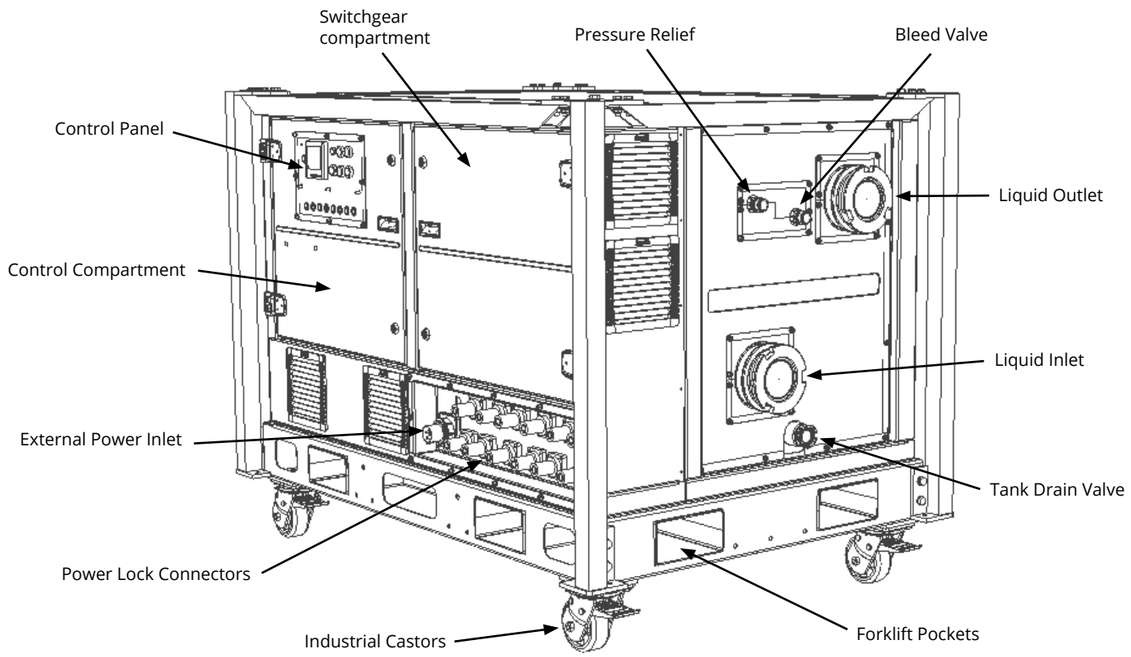


Figure 1-4 Avtron LC35 Load Bank.

Flow rate vs kW for LC35

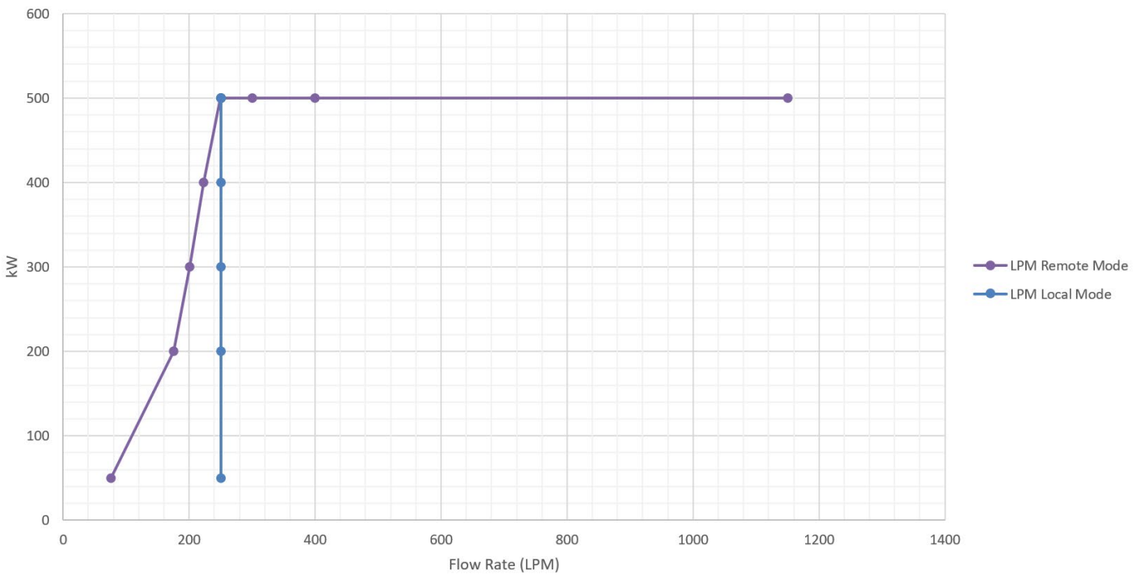


Figure 1-5 Minimum flow rate vs kW for LC35

No content appears on this page.

Chapter Two

Load Bank Installation and Setup

This chapter covers all of the procedures that need to be carried out before an Avtron load bank can be put into operation. It explains how to install the unit safely and how to commission it to check that it will operate correctly.

Important!
The chapter contains a number of important safety instructions. Do not attempt to install or operate your Avtron Load bank until you have read and understood this chapter. Misuse could result in serious injury and damage to the equipment.

Using an Avtron Load Bank Safely

Your safety, and the safety of those around you, is dependent on your knowledge of this equipment's safe operating procedures. Load banks can be dangerous and must not be used by unskilled personnel, or by those who have not familiarized themselves with these instructions.

You should remain alert to potential danger during transport and installation, when the unit is in operation, and when maintenance operations are performed.

There are four main sources of danger:

Handling hazards. Load banks are large, heavy devices and they often have to be manoeuvred in to tight, difficult spaces before they can be installed.

Contact with high voltage electricity. Serious injury or death could result from contact with electrically live parts. Even though the connections to the load bank may be temporary, they must always be made to the same standards as if they were permanent.

Pressurised Liquid. The load bank is designed to operate with pressurised coolant; sudden release during operation or maintenance can cause serious injury from high-temperature fluid or mechanical failure—always de-pressurise and cool before servicing.

Heat hazards. The tank contains resistive elements that become hot during operation; external surfaces including the tank and pipework may reach temperatures that can cause burns on contact.

To avoid these hazards, pay particular attention to the following points:

- Use appropriate lifting and transport equipment, and ensure all personnel involved in moving or installing the load bank are properly trained and experienced.
- Only operate the load bank with all doors, covers, and protective panels securely closed and latched.
- All cables should be securely connected using the single pole connection points provided on the load bank.
- Ensure both the Supply-on-Test and the load bank are correctly grounded before operation.
- Use cables that are undamaged, correctly rated for the test load, and securely connected.
- Lay cables in smooth, unstressed curves, avoiding sharp bends or mechanical strain, and protect them from damage.
- Position cables to minimise the risk of tripping or accidental disconnection.

- Keep non-essential personnel clear of the load bank and test area during operation.
- External surfaces including tank and pipework may become hot during operation and remain hot after shutdown—contact may cause burns.
- Do not shut down the cooling system immediately after testing; allow coolant circulation to continue for at least 5 minutes to safely dissipate residual heat.
- Ensure all switchgear cooling fans are unobstructed and free from debris or loose material.
- Keep combustible materials away from hot surfaces and ensure an approved electrical fire extinguisher is present during operation.

Transporting Avtron Load Banks

The LC35 load bank weights approximately 800kg (dry weight) and 1000kg (wet weight) (see nameplate for the exact weight). The unit has industrial grade castors and can be moved via a forklift. A forklift pocket base is provided as standard.

If you do need to move the load bank it is important to pay attention to the following points:

Lifting by forklift truck

Check the specifications to ensure that the forklift truck has sufficient capacity to safely lift the weight. Add 5% to the specified weight for minimum packing, and 15% for a unit in an export wooden case.

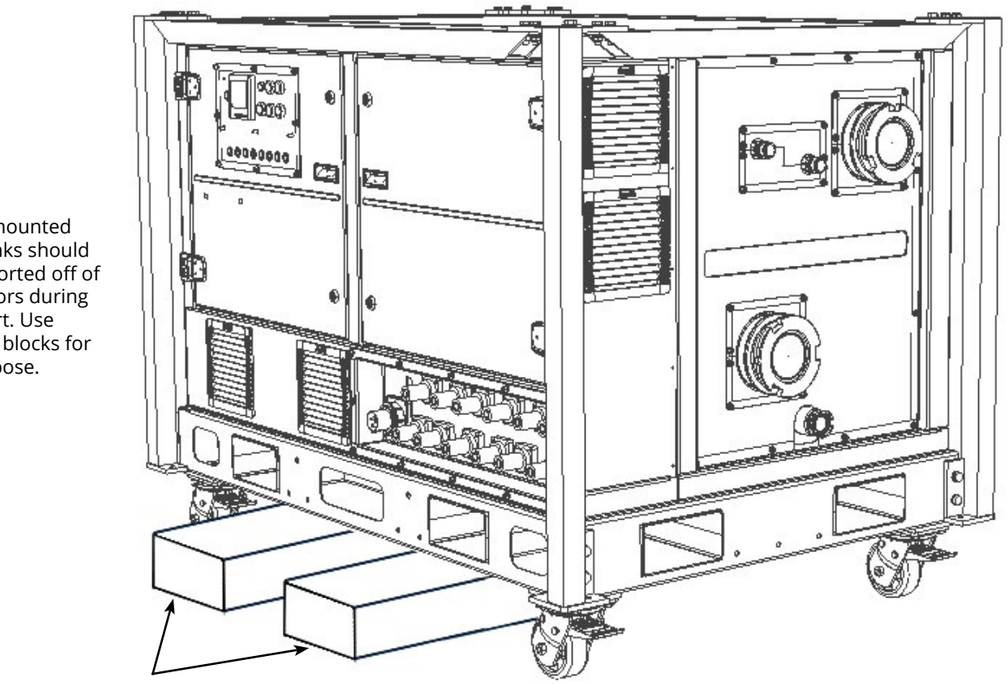
Stacking Units

The LC35 can be stacked **2 HIGH MAXIMUM** during storage and transport. A stacking bracket set is required to stack the units.

Protection and securing on transport

The units are available to be positioned on a custom pallet for transport from the factory. If unavailable we recommend lifting the unit onto blocks for transport.

Castor mounted load banks should be supported off of the castors during transport. Use wooden blocks for the purpose.



Note: Avoid over-tightening ropes or webbing. The tie-down should be made through the pockets in the forklift pocket base.

Figure 2-2 Castor-mounted load banks should be supported off the castors and firmly fixed down

Storage

The original transport packaging should be left in place on the load bank and it should be stored under cover, in a heated warehouse, until it is ready to be installed and commissioned. If storing for a long period of time we recommend raising the units off of the castors.

Safety and Monitoring Devices Fitted

- **Pressure Relief Valve** – This is located on the top of the tank and is factory set and calibrated to 5Bar. The ½" dry break connector must be inserted for this to operate correctly.
- **Temperature sensors** – the tank and pipework have x3 temperature sensors located on the inlet, outlet and in the main tank. These sensors will detect any over temperature in the system and drop the load within 5 seconds. See separate table for temperature values.
- **Pressure sensors** – the load bank has a single sensor fitted to the main tank. This sensor will detect any over pressure in the system and drop the load within 5 seconds of reaching 4.8Bar.
- **Leak Detection** – a single leak sensor is located under the main tank body. If a leak should be detected an alarm lamp will illuminate on the main control door alerting the used to a potential problem.
- **Low Flow Detection** – The integral flow meter will shut down the applied load if the flow drops below a set amount. Please see separate table for flow rate values.

Please note all information is available within the LB View software.

Installing Avtron Load Banks

There are a number of factors that need to be considered before you select a load bank for a particular installation. Obviously it is important to ensure that the load bank has sufficient electrical capacity to test the supply, but you also need to ensure that it can operate correctly and safely in the position you have chosen.

Refer to the Appendices for details of the installation requirements of the LC35.

Location

The first thing to decide when installing a load bank is where the unit is to be located. You need to consider the following to ensure that the unit can be operated safely:

Environment. The LC35 load bank is designed for indoor use only. It can be used in an ambient temperature between -10°C and +40°C, at 90% relative humidity (non condensing), and at altitudes up to 1000m above sea level. The load bank should be located (including when in storage) where the environmental conditions will not exceed the IP classification of the load bank, bearing in mind the required cable runs and safety procedures.

Loading. The load bank is heavy and must be installed on a level surface that is capable of supporting its weight (see nameplate).

Space. There must be sufficient space to provide access for maintenance to all of the doors and panels. Also there must be enough free space to allow for electrical cables and liquid hoses connections.

Packaging

Before starting the installation remove all packaging. Dispose of it in the appropriate way.

Electrical Installation

Note: The Load Bank supply cables must be protected by a Short Circuit Protective Device (SCPD), which is suitably rated to the capacity of the supply cables.

The electrical installation for a load bank consists of making connections both for the Supply-on-Test and for an external supply that is used to power the load bank's control system.

The requirements for the two supplies are described separately here, but the following general points apply in both cases:

- The work must be carried out by a person with the appropriate training, qualifications and experience.
- All cables should be appropriately rated and installed in accordance with current standards and accepted practice.
- The cables for the supply must be sized appropriately and properly fitted terminals must be used.

Voltage and frequency ratings

Ensure the external supply rating matches the voltage and frequency of the control circuit.

Exceeding the voltage ratings or supplying the wrong frequency can cause damage to the load bank so please check the plate carefully before setup.

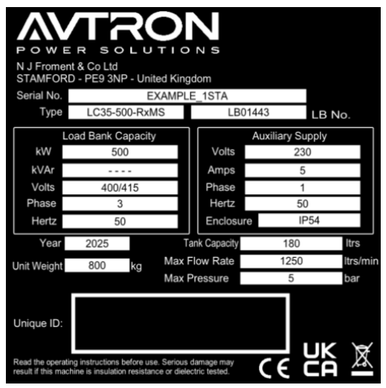


Figure 2-2 Consult the load bank's name plate for voltage and current ratings before making connections

External supply wiring - controls power source

We recommend that you use an external power supply that is independent of the Supply-on-Test. This ensures that the load bank will continue to operate without interruption if the Supply-on-Test becomes unstable or fails.

Refer to the load bank's rating plate for the external power supply requirements. Load banks are fitted with an external power input plug on the outside of the load bank.

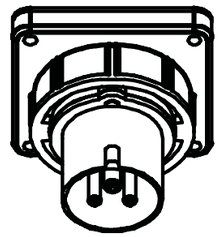
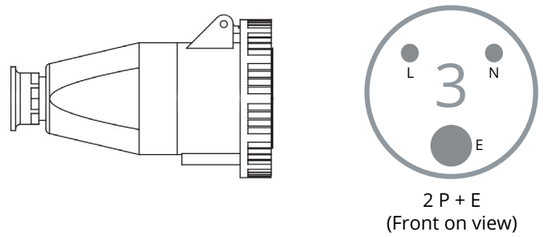


Figure 2-3 16A single phase, external power inlet for the control circuit

The load bank is supplied with a 16A external cable coupler. Refer to figure 2-4 for correct wiring configuration.



2 P + E
(Front on view)

Figure 2-4 16A single phase external cable coupler

Load banks are fitted with a 3-position supply selection switch. If powering the control circuit using the cable coupler, set the switch position to 'External'. If using the supply on test to power the control circuit, set this switch to the 'Internal' position.

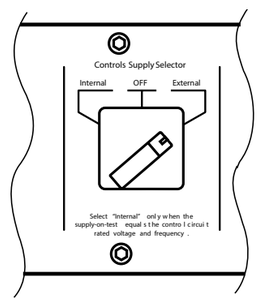


Figure 2-5 The controls supply selector

Supply-on-Test Connectors

The load bank is fitted with 400A, single pole connectors, 3 per phase, to allow quick connection and disconnection of the cables.

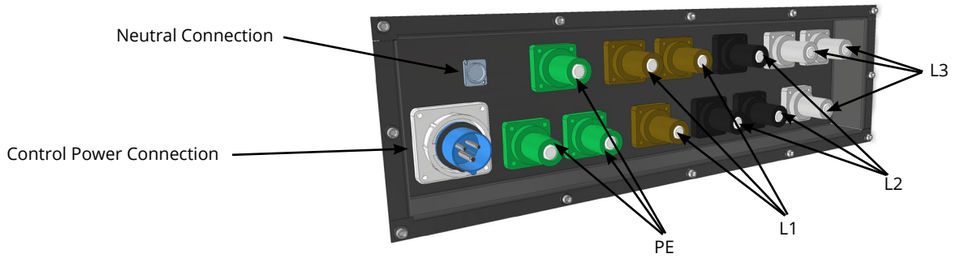


Figure 2-6 400A, Single pole connectors

If the control circuit is to be derived from the supply on test, ensure a neutral cable is connected into the neutral socket.

Supply-on-Test wiring - general points

- It is good practice to route the three phase conductors in a close tre-foil layout, held together with cable-ties. This minimises stray magnetic fields from the cable array, and reduces inductive losses in the cables. In the event of a high fault current flowing this arrangement minimises the risk of sudden and violent cable movements.
- If the connections are made using more than one conductor for each phase connection all the cables on any one phase should be of exactly the same length, and laid along a similar route. Ensure that the three phase conductors are equally shared between multiple cable entry openings, to minimise eddy current losses.
- The load bank supply cables must be protected by the short circuit protective device (SCPD) which is suitably rated to the capacity of the supply cables.

Is a local isolator required?

When planning the installation consider if a local isolator switch is required. If the output circuit breaker of the Supply-on-Test is easily accessible, then this can perform the isolating function.

Protective earth connection

An earth conductor must always be bonded to the frame of the Supply-on-Test and connected to the grounding terminal of the load bank (marked PE).

Control System Connections

Please refer to control section of this manual and the RxMS LB View Manual for further information.

Chapter Three

Load Bank Operation

This chapter explains how to operate the load bank's local control panel. It describes the function of each control and explains the operation of the status indicator lamps. It then provides specific examples of how the control panel is used to carry out a load function test and how it can be used to operate the load bank.

Before Operating the Load Bank

Ensure that:

- The load bank has been installed according to the instructions and safety warnings in Chapter Two.
- The external supply for controls is connected according to the instructions in Chapter Two.
- The supply under test is connected according to the instructions in Chapter Two.

Safety warning

Do not attempt to operate the load until you have read and understood this manual. Misuse could result in serious injury and damage to the equipment.

- Keep all personnel who are not directly involved with testing the supply well away from the load bank and from the equipment under test.
- The discharge liquid can be very hot and can cause serious burns. Do not touch the outlet pipe while the load bank is running, or for a few minutes afterwards.
- Only operate the load bank with all the guards in place, with doors closed and with all of the covers and protective screens securely in position.
- After removing the load at the end of a test allow the liquid to continue to run for five minutes to dissipate the residual heat.

Turning the load bank on and off

The controls supply isolator provides a method of quickly starting and shutting down the load bank:

Warning! Operating the control Supply Isolator or Stop Button does not isolate the Supply-on-Test from the load bank wiring. Some of circuits within the load bank will remain live.

The Controls Supply Isolator. This is a two position switch which isolates the power supply to the controls when it is in the off position. It can be used to perform an emergency stop, but it can also be padlocked in the off position and this means it can be used to secure the load bank from unauthorised operation.

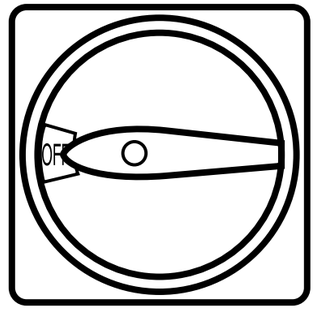


Figure 3-1 The Controls Supply Isolator

Filling the Tank

The following set of procedures should be followed when filling the tank.

- Connect the 4” inlet and outlet pipes to the load bank. Hose coupling should be offered up to the couplings on the load bank and secured with a 180degree turn. This will open the coupling allowing flow.
- Connect the 1/2” connector pipe into the bleed pipe outlet. The other end of this pipe should be fed into customers waste tank.
- Open any valves that are on the incoming/return flow pipes (customer circuit)
- Liquid will start to fill the tank
- When liquid appears from the bleed hose, the tank is full. PLEASE MAKE SURE ALL AIR IS EXPELLED BEFORE RUNNING THE LOAD BANK.
- Remove 1/2” connector from the bleed pipe.
- Connect the same 1/2” connector the pressure relief pipe. This pipe MUST be connected for effective operation of the Pressure Relief Valve (PRV).
- The load bank is now ready to run. (The tank is also fitted with x2 Automatic Air Release Valves.)

Note: After finishing testing, please allow liquid to flow without load to dissipate any residual heat.

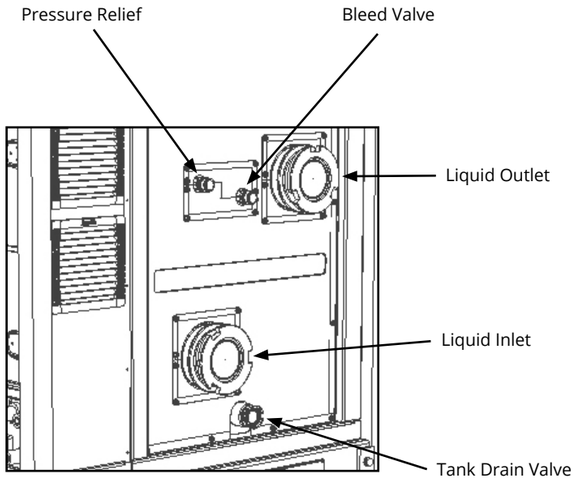


Figure 3-1 Fluid connection points.

To Drain the Tank

The following set of procedures should be followed when draining the tank. It is vital that the tank is drained and dried when not in use.

Warning! Liquid within the tank may be hot and care must be taken.

- Turn off the supply flow and isolate any valves leading to the load bank.
- Remove both the 4” inlet and outlet hose connectors by twisting 180 degrees and pulling away from the load bank
- Attached the 1” dry break coupling and hose to the tank drain, located at the bottom of the unit (labelled Drain). A trickle of liquid should start to flow. The hose should be directed either back into the circuit or into a separate waste tank.
- Remove the ½” coupling from the pressure relief pipe and insert into the bleed pipe. This will allow air into the system and the liquid to drain faster. The load bank may have to be tipped towards drain slightly.
- Once the liquid has stopped flowing from the drain, remove the 1” coupling.

Using Local Control

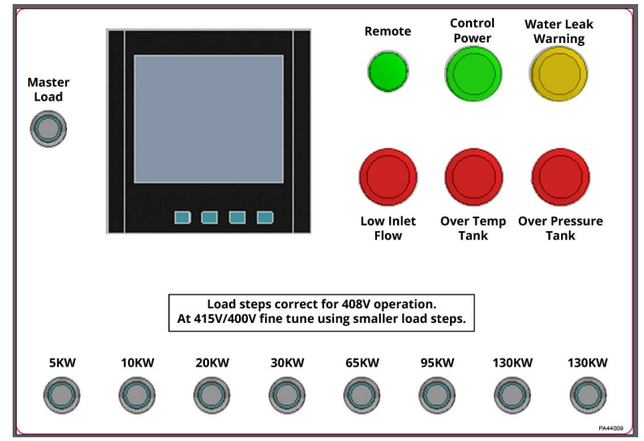


Figure 3-1 LC35 Local control panel.

The control panel is for local control only and instrumentation is displayed on the load bank power meter.

Applying Load

Press any combination of the load switches to chose the required load in kW. LED’s will illuminate of those selected. For example, if 100kW is required, press 5kW, 30kW, 65kW. Then press the Master Load on to apply the selection.

Rejecting Load

Press the Master Load off to reject all selected load.

Note: load switch values are at the load banks nominal operating voltage. Power adjustments should be made where the actual operating voltage is different to nominal.

Adjusting Load

Select and deselect any combination of load switches to adjust the load to a required value.

Master Load

Master Load applies any load selected when turned on and rejects all load when turned off. The Master Load LED will illuminate when turned on and extinguish when turned off.

To avoid unintended load application, on initial start-up or after an error condition, irrespective of switch position, the Master Load switch will not be active. Turn the switch off and on again to reapply the selected load.

Remote

LED lamp will illuminate when connection is made to the load bank through the LB View software.

Control Power

LED lamp will illuminate when the load bank control circuit is energized.

Water Leak Warning

If water is detected in the base of the load bank the Water Leak Warning lamp will illuminate. Load will be rejected.

Low Inlet Flow

LED lamp will illuminate if liquid flow rate to the load bank is insufficient.

Over Temp Tank

LED lamp will illuminate if liquid temperature within the tank exceeds limit.

Over Pressure Tank

LED lamp will illuminate if pressure within the tank exceeds limit.

Chapter Four

Maintenance & Troubleshooting

This chapter describes both the routine maintenance procedures needed to keep LC35 load banks operating correctly and the procedures you may need to troubleshoot the equipment if you run in to a problem using it.

Safety Warning

Maintenance work should be undertaken only by qualified personnel who are fully aware of the danger involved and who have taken adequate safety precautions.

Always isolate all the supplies to the equipment before inspecting, moving equipment, removing or replacing parts.

Work on the equipment while the electrical supplies are connected is not normally necessary. If it should become necessary for any reason, take extreme care not to come in to contact with live parts.

You should remain alert at all times when the unit is in operation. There are four main sources of danger:

Handling hazards. Load banks are large, heavy devices and they often have to be manoeuvred in to tight, difficult spaces before they can be installed.

Contact with high voltage electricity. Serious injury or death could result from contact with electrically live parts. Even though the connections to the load bank may be temporary, they must always be made to the same standards as if they were permanent.

Pressurised Liquid. The load bank is designed to operate with pressurised coolant; sudden release during operation or maintenance can cause serious injury from high-temperature fluid or mechanical failure—always de-pressurise and cool before servicing.

Heat hazards. The tank contains resistive elements that become hot during operation; external surfaces including the tank and pipework may reach temperatures that can cause burns on contact.

To avoid these hazards, pay particular attention to the following points:

- Use appropriate lifting and transport equipment, and ensure all personnel involved in moving or installing the load bank are properly trained and experienced.
- Only operate the load bank with all doors, covers, and protective panels securely closed and latched.
- All cables should be securely connected using the single pole connection points provided on the load bank.
- Ensure both the Supply-on-Test and the load bank are correctly grounded before operation.
- Use cables that are undamaged, correctly rated for the test load, and securely connected.
- Lay cables in smooth, unstressed curves, avoiding sharp bends or mechanical strain, and protect them from damage.
- Position cables to minimise the risk of tripping or accidental disconnection.

Routine Maintenance Procedures

To keep the load bank in good working order, carry out the following maintenance tasks at the specified intervals:

Daily (after transportation or before each use of the load bank):

- Inspect the equipment for signs of damage.
- Check that both the external supply and the Supply-on-Test are properly connected.
- Visually check that all cable connections are tight and that there is no sign of overheating.
- Check that the connecting cables are free from damage.
- Check that all cables are secured and routed so that they do not present a safety hazard.
- Inspect the doors and door gaskets to ensure they are undamaged and make a good seal to the main frame. Replace if necessary.
- Ensure that all opening panels are securely closed.

Monthly

- Clean and inspect painted surfaces for damage or corrosion and touch up as necessary.
- Check all fluid connections are secure.
- Check for debris and corrosion on the fluid connection points.
- Check the inside of the tanks and pipes for corrosion.
- Check that the anti condensation heaters (if fitted) are working.
- Open the load bank switchgear cabinets and visually inspect the wiring, fuses and contactors for signs of overheating.
- Inspect all door seals for damage and replace where necessary.

Note: The recommended interval for a calibration check is one year, unless the equipment has been subject to misuse or damage. If adjustment is not necessary the calibration check interval could be increased to three years.

In addition, carry out a load check to ensure that load contactors and elements are operating correctly:

1. Connect a supply (at the load bank's rated voltage) to the load bank.
2. Set and apply loads at 30%, 60%, and 100%, and make a note of the power value shown on the instrumentation (or external metering).
3. Check that the power values are within 5% of the load set on the controller.

Annually

- We recommend inspecting the inside of the pipes and tanks to check for any corrosion or debris.
- Check that there is no build up of dirt or debris on the load elements.
- Check resistance and insulation resistance of the load elements.
- Verify the load bank instrumentation's calibration. If adjustment is required contact Avtron for advice.

Fault Finding

The following chart covers some of the typical faults you might encounter and some possible solutions.

Fault	Possible Causes	Possible Solutions
No load is being applied	Supply-on-test is not switched on.	• Confirm that the Supply-on-Test circuit breaker is switched on.
	Load bank over temperature trip	• Allow the load bank to cool and reset over temperature trip.
	Faulty or damaged connecting lead	• Check that the lead and connectors are not damaged. Use local operation for testing.
	Low inlet temperature	• Inlet temperature is too low and may cause freezing - increase inlet liquid temperature above 2°C
	High inlet temperature	• Inlet temperature is too high - reduce inlet liquid temperature below 49°C
	High outlet temperature	• Load of the load bank must be reduced or inlet temperature reduce to lower the delta T
	Tank under temperature	• Tank temperature too low. Increase inlet temperature to bring tank above 2°C
	Tank over temperature	• Tank temperature too high. Decrease Increase inlet temperature or reduce load.
	Tank under pressure	• Water supply pressure to tank has become negative and load cannot be applied, check supply to load bank.
	Tank over pressure	• Tank pressure has risen above operating limit, reduce system pressure to apply load.
	Flow meter Low	• Flow dropped below minimum level. Increase flow or reduce load to continue.
	Flow meter High	• Flow too high to operate load bank, reduce system flow to below load banks max flow rate.
	Tray Leak Sensor	• Build up of liquid detected in load bank, load unable to be applied while leak detected.
Incorrect or wrong load is applied	Supply-on-test voltage	• Ensure the working voltage and connection settings are correct.
	Excessive volt drop	• Check rating of cables. • Check generator AVR droop settings.
	Loading problem	• Check the load fuses. • Check the load contactors. • Check the load elements.

No content appears on this page.

Appendices

The following pages contain additional information that may be useful but does not easily fit in with the rest of the text. This includes a specification for the LC35 SERIES load banks and a number of installation diagrams that show dimensions and space requirements.

LC35 - Installation Diagram

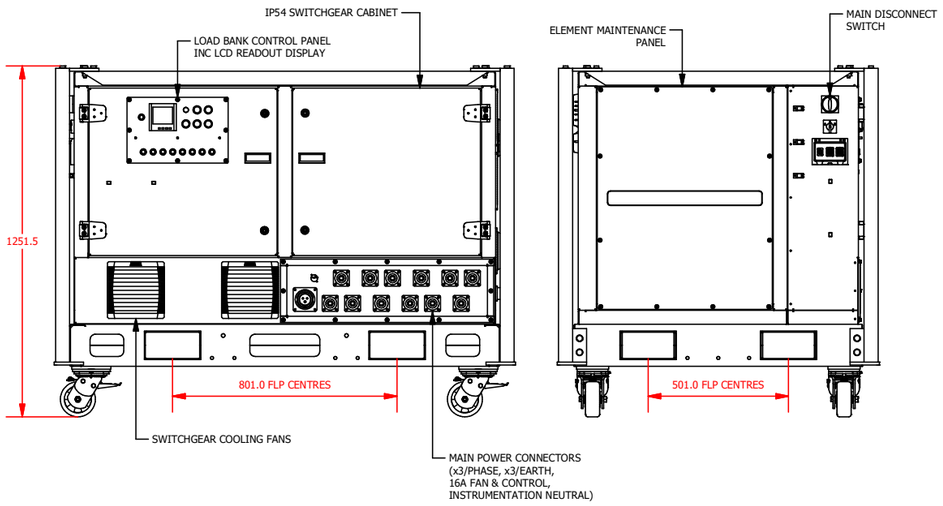


Figure A-1 LC35 Load Bank General Arrangement - Front and Side

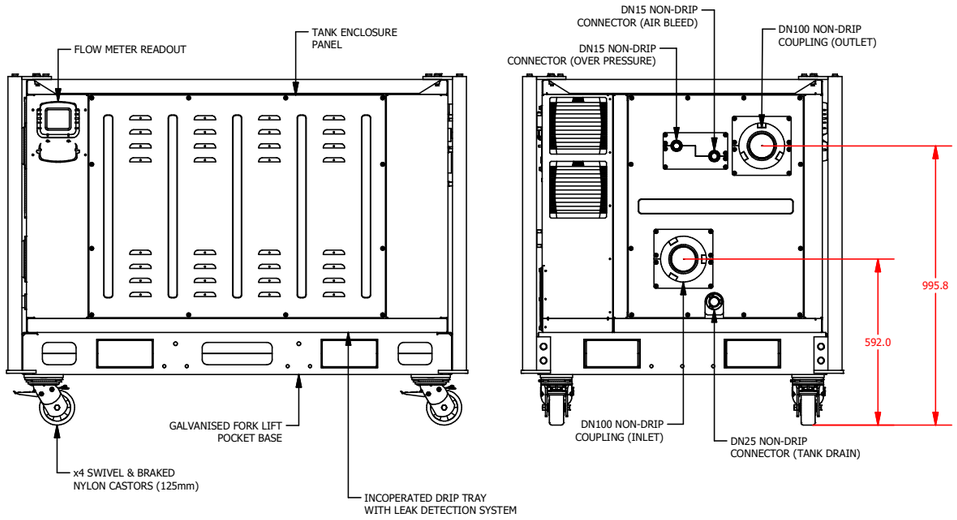


Figure A-2 LC35 Load Bank General Arrangement - Rear and Side

LC35 - Installation Diagram

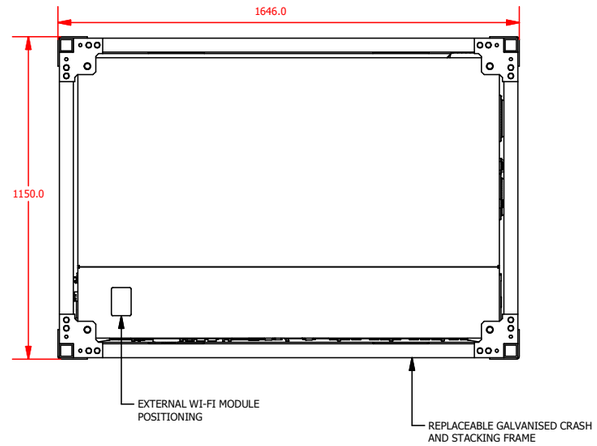


Figure A-3 LC35 Load Bank General Arrangement - Plan View

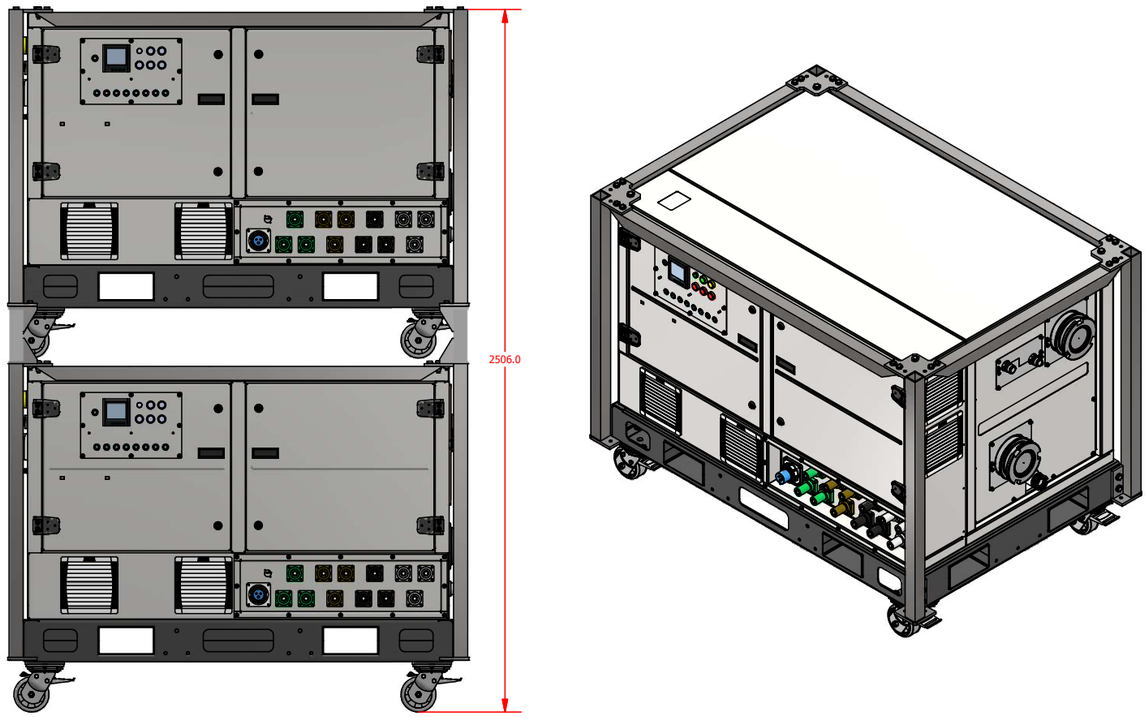


Figure A-4 LC35 Load Bank General Arrangement - Stacked and 3D

Declaration of Conformity

EU Declaration of Conformity

Product:	Liquid Cooled Load Bank
Name of Manufacturer:	N J Froment & Company Limited, Easton-on-the-Hill, STAMFORD, PE9 3NP, United Kingdom
Telephone	+44 (0) 1780 920 100
e-mail	support@avtronpower.com
Website	www.avtronpower.com
Country of Origin	United Kingdom

This declaration of conformity is issued under our sole responsibility of the manufacturer

Object of Declaration:	LC35 (RxMS Controlled)

The object of the declaration described above is in conformity with the relevant Union harmonisation legislation:

2014/30/EC	Electromagnetic Compatibility Directive
2014/35/EU	Low Voltage Directive
EU 2015/863	RoHS Directive – EEE Category 9.
EC 1907/2006	REACH

References to the relevant harmonised standards used or references to the other technical specifications in relation to which conformity is declared:

BS EN 60204-1:2018	Safety of Machinery. Electrical Equipment of Machines.
BS EN 55011:2009 (+A1)	Radio-frequency disturbance characteristics
IEC 61000-4-2:2008	EMC - Electrostatic discharge immunity test
IEC 61000-4-3:2010	EMC - Radiated immunity test
IEC 61000-4-4:2012	EMC - Electrical Fast Transient/Burst immunity test (PENDING)
IEC 61000-4-5:2005	EMC - Surge immunity test
IEC 61000-4-6:2008	EMC - Immunity to conducted disturbances (PENDING)
IEC 61000-4-8:2009	EMC - Power frequency magnetic field immunity test
BS EN 13445-(1 to 5):2021	Unfired Pressure Vessels
Basis of self attestation:	**Quality Assurance to BS EN ISO 9001:2015** Registered Firm Certification No: FM 38927
Signed for and behalf of:	N J Froment & Company Limited
Place of Issue:	Easton-on-the-Hill, STAMFORD, UK
Date of Issue:	1st October 2025
Name & Position:	J. Clarke Director
Signature:	(PENDING)

CE

One copy of this declaration accompanies each load bank, for customer retention

Electromagnetic Compatibility

This equipment has been designed and constructed to comply with the European Community Directive 89/336/EEC. To ensure that the requirements of the Directive and related standards are satisfied it is essential that the equipment is used as intended and in full accordance with the operating instructions.

Immunity to external interference (EN 61000: Part 6-2:2001)

- This equipment will not suffer permanent damage, or become dangerous or unsafe as a result of electromagnetic interference at the levels set in the standards. Normally it will continue to operate as intended. Electrostatic discharges or breaks in the power supply may cause the equipment to shut down until it is manually re-set and re-started.
- Exposure to higher levels of electromagnetic disturbance, above the prescribed limits (for example by the operation of a hand-held transmitter close to the remote controller) may result in out-of-tolerance readings on the instrumentation.

Electromagnetic emissions (EN 61000: Part 6-3:2001)

- Electromagnetic disturbances generated by this equipment do not exceed the prescribed levels that could cause interference to radio, telecommunications or television reception apparatus. There will be no interference provided the reception equipment itself is constructed and used in accordance with the applicable standards, and its antenna is located more than 10 metres away.
- If highly susceptible apparatus is used nearby, particularly if its faulty operation could cause danger, then you must take additional measures to minimise the risks.
- This test equipment is intended to cause controlled changes in the load on an electrical power supply. Such tests may result in disturbances in the Supply-on-Test that are outside prescribed limits. If susceptible apparatus is connected to the Supply-on-Test, particularly if its faulty operation could cause danger, then it should be switched off, or disconnected, during the tests.

Useful Equations

Apparent Power (kVA)

$$kVA = \sqrt{kW^2 + kVAr^2}$$

$$kVA = \frac{V \times I \times \sqrt{3}}{1000}$$

$$kVA = \frac{kW}{pf}$$

$$kVA = \frac{kVAr}{\sqrt{1 - pf^2}}$$

Resistive Power (kW)

$$kW = kVA \times pf$$

$$kW = \frac{V \times I \times pf \times \sqrt{3}}{1000}$$

$$kW = \sqrt{kVA^2 - kVAr^2}$$

Reactive Power (kVAr)

$$kVAr = kVA \times \sqrt{1 - pf^2}$$

$$kVAr = \frac{V \times I \times \sqrt{1 - pf^2} \times \sqrt{3}}{1000}$$

$$kVAr = \sqrt{kVA^2 - kW^2}$$

Power Factor (pf)

$$pf = \cos\phi = \frac{kW}{kVA}$$

Current (A)

$$I = \frac{kVA \times 1000}{V \times \sqrt{3}}$$

$$I = \frac{kW \times 1000}{V \times pf \times \sqrt{3}}$$

De-rate from Nominal Voltage and Frequency

$$kW = \left(\frac{V}{V_{nom}}\right)^2 \times kW_{nom}$$

$$kVAr = \left(\frac{V}{V_{nom}}\right)^2 \times \frac{F_{nom}}{F} \times kVAr_{nom}$$

Note: All voltages are phase-to-phase values and assume a 3-phase system.

No content appears on this page.

No content appears on this page.

Avtron Power Solutions

6255 Halle Drive
Cleveland, OH 44125, USA
Tel: 216 573 7600
LBsales@avtronpower.com

Cliffe Road, Easton-on-the-Hill
Stamford PE9 3NP, United Kingdom
Tel: +44 (0) 1780 480033
froment.sales@avtronpower.com

avtronpower.com
customercare@avtronpower.com