LCS

Railway & Industrial
Reliable, Low Maintenance Switchgear and Control Panels

Established 1999

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L.C. Switchgear Ltd

Front Cover Pictures:
Three Bridges Thameslink Train & LCS Road Contactor Panels
Overhead Switchable Trolleys at London Underground Depot

Outdoor Depot Siding Contactor Panels at Fratton Depot

Directions for L.C. Switchgear from the M25

Junction 7- to Gatwick Airport M23
M23 becomes the A23, follow the signs for Brighton
Junction - A27 to Worthing,
see below

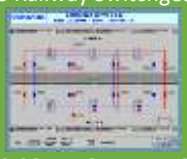
A27 from the WEST
Junction - to Hove A2038
Roundabout - Turn right and cross the A27
Roundabout - Fourth exit A2038

A27 from the EAST
Junction – to Hove A2038
Roundabout - take the third exit A2038

A2038 take the second road on the left as you climb the next hill
A2023 past Hove Greyhound Stadium
Mini roundabout - Straight on.
Traffic lights - Turn Right on to the Old Shoreham Road A270 (See Map Below)
Traffic lights - Turn Left, this is St Joseph's Close
Hove Technology Centre - Turn Left
LCS - Unit 16 L.C. Switchgear Ltd (See Below) - Parking is alongside and in front of this building

Section Product Title Colours & Quick Access

Click on a Picture to select the Section.

1 Switchgear News  Railway Applications	2 Railway Switchgear  SUBSTATION	3 Railway Switchgear  BONDING & SHORT-CIRCUITING DEVICES	4 Railway Switchgear  DEPOT SHORE SUPPLIES
5 Railway Switchgear  BUFFER ZONE	6 Railway Switchgear  TRACKSIDE	7 Railway Switchgear  LINK BOXES & MARSHALLING BOXES	8 Railway Switchgear  CONDUCTOR RAIL HEATING
9 Railway Switchgear  RAILWAY GAP JUMPER LEADS	10 Railway Switchgear  PLC CONTROL PANELS & MIMIC PANELS	11 Railway Switchgear  ROLLING STOCK	12 Railway  DISCONNECTORS
13 Railway  FUSES	14 Railway  AC & DC CONTACTORS	15 LVAC  CONTROL & DISTRIBUTION PANELS	16 LVAC  CABLE MANAGEMENT PANELS
17 Industrial Switchgear  MEDIUM & LOW VOLTAGE	18 Industrial Switchgear  HEAVY DUTY ISOLATORS	19 Industrial  SWITCHES	20 Industrial  FUSES & FUSE ENCLOSURES
21 AC & DC Contactors 	22 Servicing 	23 Training 	24 Installation 
25 Accessories 	26 Adhesives, Lubricants 	27 LCS PROJECT HISTORY 	

Railway Products 'A New Order'

Products now are sorted to provide logical step from:

Substation supply

▼

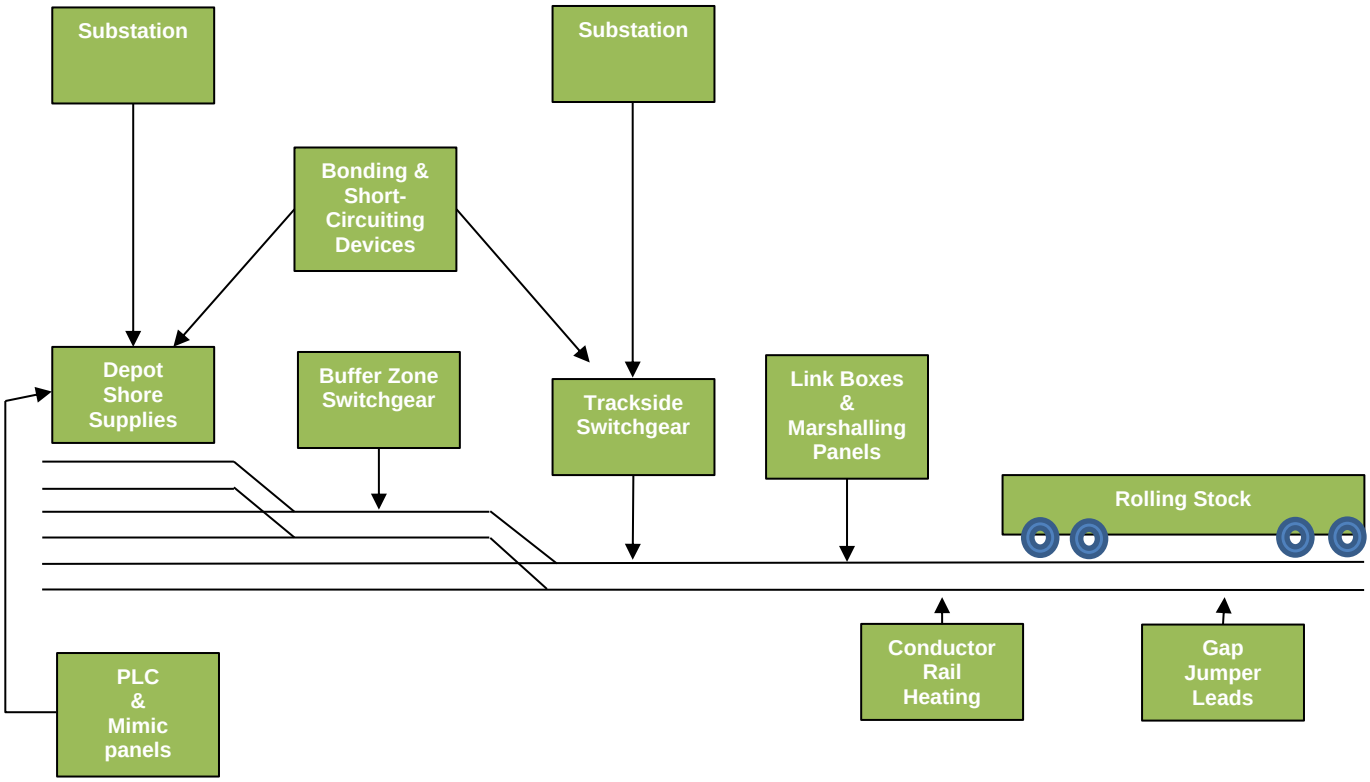
Depot supplies

▼

Trackside equipment

▼

Rolling stock switches.



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See the 'New LCS Products' Section 1.7

1 Switchgear News - Railway Applications - Product Ranges - NR / LU Approvals

Exhibitions

Case Studies

New Products

1.1 LCS to exhibit at Innotrans, Berlin 2022

1.2 LCS at Trako International Railway Fair, Gdańsk, Poland 2019

The LCS stand demonstrated why they are Britain's leading supplier of DC Trackside Switchgear. The stand contained a varied sample of the differing types of DC Railway switchgear in the LCS portfolio.
In the centre was the new Otter OD4L Disconnector which is extensively used as a 'short circuiting device' for safety bonding on the railways.

In the background is the **new 3.6kV Max E Switch Disconnector** was on display.

The centre of the stand had a fully operating **Mimic Panel** with controls and indications for the switches on the stand.
Working with and mirroring the mimic panel was a **Touch Screen** allowing control and indication from 2 independent panels.
A composite insulated **Conductor Rail Mounted Fuse** as used by London Underground was also on display on the centre console.
On the Left-Hand side of the stand.
To the left-hand rear there was a **4000A single pole motor driven tunnel switch** (half tunnel switch). To fit the space on the stand a single positive pole version of the tunnel switch that is extensively used on the London Underground.
LCS also offer servicing, maintenance and on-site commissioning. For further information please do not hesitate to contact us.

1.3 Whole Life Solutions from LCS

Dave Tanner, Engineering Director at L.C. Switchgear Ltd (LCS)
Analysis of LCS product life cycle costs and the savings that can be made by the railway companies

CTS Controlled Track Switches (see above) supplied in the mid 1990's currently in service.
This type requires very little maintenance or servicing throughout it designed service life of 30 years

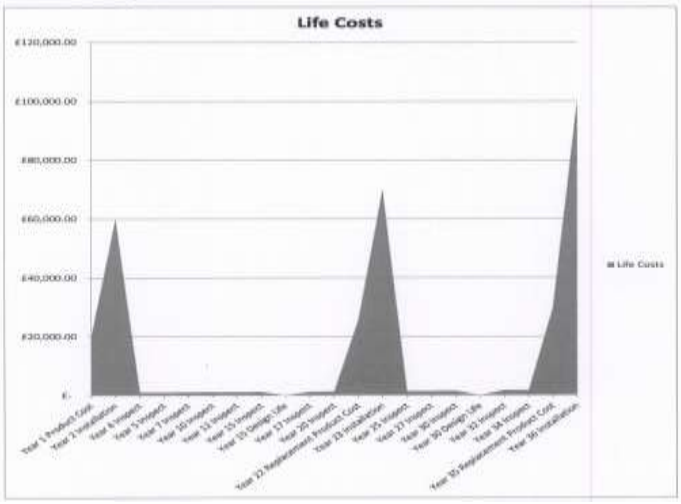
Cheaper components with a shorter design life import considerable extra cost during their life cycle. The graphical example which follows gives an illustration how the costs can escalate and the cheaper product can work out as the more expensive product when the whole life cycle is considered.

It is important to note that in the case of a cheaper product the following costs can also become a major factor:

- Spare Parts
- Maintenance
- Repairs

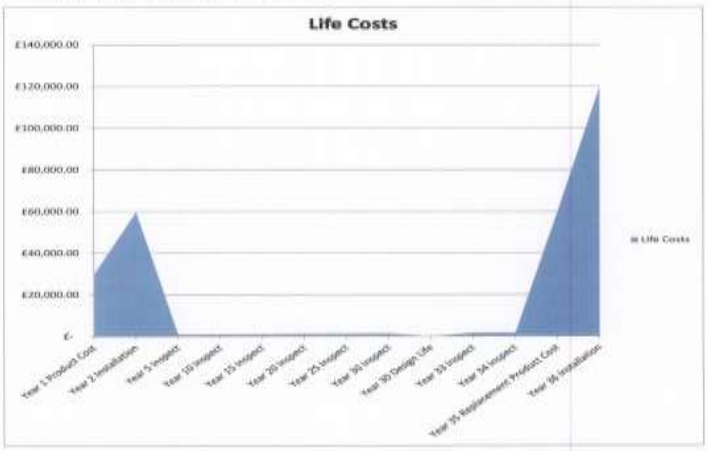
15 Year Design Life Costs

Time		Life Costs
Year 1 Product Cost	£	20,000.00
Year 2 Installation	£	60,000.00
Year 4 Inspect	£	1,000.00
Year 5 Inspect	£	1,000.00
Year 7 Inspect	£	1,100.00
Year 10 Inspect	£	1,100.00
Year 12 Inspect	£	1,100.00
Year 15 Inspect	£	1,200.00
Year 15 Design Life	£	1.00
Year 17 Inspect	£	1,200.00
Year 20 Inspect	£	1,300.00
Year 22 Replacement Product Cost	£	20,000.00
Year 23 Installation	£	70,000.00
Year 25 Inspect	£	1,400.00
Year 27 Inspect	£	1,400.00
Year 30 Inspect	£	1,500.00
Year 30 Design Life	£	1.00
Year 32 Inspect	£	1,700.00
Year 34 Inspect	£	1,700.00
Year 35 Replacement Product Cost	£	30,000.00
Year 36 Installation	£	100,000.00
Whole Life Cost	**£**	**322,702.00**



30 Year Design Life Costs

Time		Life Costs
Year 1 Product Cost	£	30,000.00
Year 2 Installation	£	60,000.00
Year 5 Inspect	£	1,000.00
Year 10 Inspect	£	1,100.00
Year 15 Inspect	£	1,200.00
Year 20 Inspect	£	1,300.00
Year 25 Inspect	£	1,400.00
Year 30 Inspect	£	1,500.00
Year 30 Design Life	£	1.00
Year 33 Inspect	£	1,700.00
Year 34 Inspect	£	1,700.00
Year 35 Replacement Prc	£	60,000.00
Year 36 Installation	£	120,000.00
Whole Life Cost	**£**	**280,901.00**



1.4 LCS approach to Whole-of-Life Cost

LCS have always taken into account the requirement of the railways need for reliable cost effective long life equipment in line with the Customer Specifications.
The following factors are considered in determining the whole of life cost of LCS products.

Initial purchase price
Every attempt is made to ensure that cost can be kept to a minimum as long as quality and endurance are not compromised.

Cost of manuals
The cost of manuals is included in the product price. Replacement manuals readily available but a charge is generally only levied if excessive copies are required.

Cost of maintenance
LCS staff can maintain the products at very competitively prices and are flexible with respect to customer programme dates.

Cost of replacement parts and inventory spares
Spare components and replacement parts are competitively priced.

Environmental costs and Decommissioning and Disposal
Hazardous materials are not used on LCS products and most of the product can be recycled
Electrical Losses
Electrical losses are minimised within LCS products by the selection of suitable copper bus bars for the current rating and traction rated switchgear. Stringent torque settings and Cropico μΩ testing ensure that all electrical bus bar joins and the switchgear component do not import an electrical loss to the rail network.
Cost of installation
LCS do not carry out installation of the switchgear. Every effort is made to provide the best solutions for installation of the switchgear and discussions frequently take place with installers to evaluate quicker methods of installation.
Reliability and cost of failures
L.C. Switchgear has the reputation for high quality reliable products which enable railways to operate more efficiently and safely. The low maintenance requirements provide life cost savings, throughout the long service life of the products.
Lifetime of equipment
The equipment is always designed to comply with the requirements of the specification. LCS products typically will exceed the specified requirement as long as they are maintained. Typically, a product designed for 20-year use will last well beyond by the nature of the equipment and materials that are required to meet the 20-year minimum.
Discount Rate
Quotation for discount rates relating to quantity are always available from LCS.
Cost of staff training
LCS staff training courses are very competitively priced and flexible with respect to numbers of participants and the venue for the training.
Cost of special tools
Where possible LCS avoid special tools unless specifically requested by the customer
Examples of LCS equipment after <u>10 years</u> in service


2 pole Track Disconnectors on London Underground


Contactor panels components after 10 years on load use in a London Underground Depot

Conductor rail pick shoes on a depot trolley


Two examples of remote-control panels.

1.5 Winters retreat as Conductor Rail Heating fights the cold

To reduce operational disruption experienced in past winters caused by icing of the conductor rail, Network Rail required a versatile, reliable and easily maintained system for Conductor Rail Heating. They naturally turned to LCS who has a proven track record in this field, having supplied over 150 successful installations of their Manually Operated Conductor Rail Heating Panel over the last 13 years.

During discussions with Network Rail in 2010, LCS proposed a method of remotely operating the Conductor Rail Heating Panels using auxiliary power derived from the third rail, thus removing the need for costly auxiliary supply installations by the Distribution Network Operators.

LCS developed and subsequently supplied a number of fully functioning remotely operated units to Network Rail. The control system ensures that there is no energy wasted heating the conductor rail when increased ambient temperature prevents the formation of ice and remote control was considered essential because of the dispersal of a large number of units throughout the south east of England, primarily to cover Sussex and Kent.

Future Development

If required LCS can provide a bespoke Remote-Control System to access up to 5000 Conductor Rail Heater Panels using the GPRS mobile phone network. Status Information can be read from each CRHP, displayed and logged. This data can be used to establish the total power consumed number of operations, etc. Each CRHP can be individually controlled from the Remote-Control System, or an entire group of CRHPs can be selected and simultaneously controlled. The supervisory control can also be used to re-program the PLC via GPRS, for example to change the temperature thresholds for the operation of the Motorised Switch. This feature could be used in the future to reduce the ON or OFF thresholds by say 1°C, saving more energy, if the site conditions allow.

All of the Conductor Rail Heating products in the LCS range are fully compliant with Network Rail Standards and UK Legislation and are supported by the appropriate test data. The range of Conductor Rail Heating products should ensure that disruption of the railways due to snow and ice should be a thing of the past.

LCS is proud to play its part in keeping the UK rail system operating throughout the year.

1.6 Case Studies

Fratton Sidings – Old Yard CET Roads 4 & 5 & Old Yard Fuelling Road 3 Block Joint Monitoring

Fratton depot has been upgraded to cater for the stabling of additional rolling stock. Two new electrified sidings are being installed in the Old Yard. These two sidings are fitted with equipment to empty the train holding tanks (CET – Controlled Emission Toilets) and with water supplies to fill the train water tanks. As part of these works Network Rail's Fratton traction substation is being upgraded from 2 x 3MW to 3 x 3MW rectifiers.

Two Outdoor 2kA Contactor Panels with Motorised Bonding allow sections of conductor rail on Old Yard CET sidings No.4 and No.5 to be individually isolated and bonded to traction return so as to allow filling of train water tanks and emptying of toilet holding tanks without the risk of working with hoses and water near to live conductor rails or train shoe gear.

The Contactor Panels include:

- Detection of voltage on the conductor rail to confirm that conductor rails are dead.
- Traction Grade Contactors to switch power to the conductor rails.
- Electrically controlled and interlocked bonding switch to bond the conductor rail to the running rails and protect against accidental re-energisation via miss-routed trains.
- A series of indicator lamps along the edge of the working area, lit to indicate that the associated conductor rail sections are dead and bonded.
- Warning sounders and flashing indicator lights to warn that the conductor rails are about to be energised.
- Emergency Power Off buttons (EPO) that will immediately isolate the two CET roads.

In the event that the Emergency Power Off buttons are pressed this will alert the depot staff via an alarm panel situated in the Ground Frame room.

The Contactor Panels are controlled from a panel behind the control door of the Contactor Panel or from a remote-control panel on the rear of the driver hop ups at the country end of the sidings.

Howdon & Gosforth Depots NEXUS
Depot upgrades to firstly Howdon Depot, to allow stabling and maintenance of the trains while the main depot Gosforth is upgraded to cater for the new Stadler rolling stock.

8800142-V03

8800142-V02

8800368 & 8800369

8800142-V02 Depot Protection Isolator (Howdon)
8800142-V03 Depot Protection Isolator with Surge Protection (Gosforth)
The Depot Protection Isolators consist of a 2.0kA 1.5kV Disconnector in a bespoke enclosure to isolate the Depot Road Supplies
The surge arrestor was fitted to the Gosforth Isolators for extra protection against lightning strikes on to the depot overhead lines.
The depot is sectioned road by road by the standard nexus track isolators 8800368 & 8800369.

Ashford Spurs
Ashford International Station has dual electrified lines which require sections of track passing in and out of the station to be isolated using insulated block joints (IBJ's).
Signal card failures have been occurring on the Class 374 trains as they pass over these IBJ's.
A potential difference across the IBJ's and resultant current returning through the train body is believed to be the cause of the failures, hence the contactor solution.
In principle, the Contactor Panel contactors are connected across the IBJ's effectively shorting them out when the train passes over. The operation of the contactors across the IBJs ensures that the traction return current is through the running rails and not through the train body (as potential difference is removed across the IBJ's).
The contactors will be triggered to Close as a train approaches the IBJ and then open after the train has crossed an IBJ.

Acton TMU Train Maintenance Unit – CLIP Central Line Improvement Project
Stabling roads in the Train Maintenance unit are being upgraded to allow trains to be split to allow the improvement of the old stock, within the sheds behind the sidings via a turntable.
This project keeps the works local within LU, negating the need to transport the trains via road networks to maintenance facilities in central England.
New products such as the 3 Position switchable pedestal, hard wired mimic and bespoke earth fault monitoring have been developed for this project.

LUAS Cross City Extension & Broombridge Depot

L.C. Switchgear Ltd. (LCS) suppled the switchgear for Trackside and Depot Electrical Traction Equipment (ETE) for Sisk Steconfer Joint Venture Utilities Limited (SSJV) and the Luas Cross City Infrastructure Works.

The supply of ETE will be based on our previous designs and updated to SSJV's current.

The ETE comprises of several types and quantities of switchgear, equipment and services as detailed below.

The switchgear suppled was as listed below.

- TDC2 - Line - Trackside distribution cabinet - 2000A - Manual 17
- TDC2M - Line - Motorized trackside distribution cabinet - 2000A 1P - On Load Switch 1
- TDC2M - Depot - Motorized trackside distribution cabinet - 2000A 1P - On Load Switch 1
- TDSC2M - Depot - Motorized trackside distribution cabinet - 2000A 2P - On Load Switch 2
- TDS4 - STABLING AREA - SWITCHING PANEL - 2000A - 4P Switch - Off Load Switch 1
- TDK - WORKSHOP – CONTCTOR PANEL - Contactor - 2000A - 2x2P Contactor 1
- TDSE - CONTACTOR BOXES - Isolator/Earthing - 2000A - 1P (3 position) Off Load Switch 2
- TDKE - CONTACTOR BOXES - 2000A - 2x2P + E - Contactor 2

Grove Park Depot – Roads 8 & 9.

Grove Park Road 9 & 8 have been converted from train stabling to a maintenance & servicing roads. This road is isolated and bonded while the maintenance and servicing is carried out on the train. LCS Emergency stop panels marshal emergency buttons from this road these can be used in emergency to de-energise the Contactor removing the 750V DC supply. The LCS system including overhead status indication and sounders combined with the depot protection ensures a safe area of working for depot staff.

Mersey Rail Track Feeder Switches & Remote-Control Panels PA05/06563

The Track Feeder Switch (TFS) is required to bring isolations of the 750V DC conductor rail into line with the requirements of the Electricity at Work Regulations 1989.

The TFS isolates the live conductor from its sources of energisation (Electricity at Work Act Regulation 12) and securely protects against inadvertent re-energisation from any source (Electricity at Work Act Regulation 13) by being connected to the negative pole of the supply via the bonding switch.

Network Rail CP5 Switchgear

The Direct Current (DC) power supply was upgraded in 2005 for the introduction of the modern rolling stock and again in 2011 for the introduction of 12-car services. The DC traction power supply still operates below an N-1 capability in many places and the strategy in CP5 will be to bring the power supply network to an N-1 position that will give room for service growth and maintenance switch-outs without disrupting the timetabled services. It will be important that the whole system is upgraded where necessary to include the high voltage supply and equipment, the DC supply and associated equipment and the negative return bonding. The CP5 investment will be focused on DC switchgear renewal and electric traction equipment (ETE).

L.C. Switchgear are supplying Controlled Track Switches (CTS) and Negative Short-Circuiting Devices (NSCD) for CP5. The CTSs are used for quick on load DC isolation of the supplies while the NSCD's are used to bond the conductor rails to enable quick SAFE access for maintenance and improvement in overnight possessions. This Smart Isolation is designed to give a longer working envelope in a possession and reducing the cost and duration of maintenance and moving toward a more efficient railway network.

The Controlled Track Switch (CTS) products are the same products used on CP4 and previously on the 2005 Power Supply Upgrade and the Channel Tunnel Reinforcement projects. These Controlled Track Switches (CTS), have been in service for many years. These units are Network Rail Accepted products; refer to Railway Products details. Electrification

The NSCD's are a new product which combines two existing NR approved devices the LCS2 and the Bonding device associated with Depot CTS's into one compact system.

Tube Lines Tranche 2 TIS Replacement Programme (London Underground)

LCS are More Manual and Motorised Track Isolating Switches & Motorised Changeover Switches of the standard frame mounted panels. In addition, a number of tunnel switches are to be supplied to the project with further requirements in 2014/5.

Three Bridges Depot & Williams Way Substation

The new Williams Way Substation has be built to supply the new Three Bridges depot. 4kA Bonding devices supplied by LCS are on the outgoing feeds to the depot which can be used to bond the outgoing supplies for maintenance.

LCS2 Disconnectors and alternative feed interlocked LCS2 Disconnectors are used to configure and isolate the various depot supplies to minimise disruption during routine maintenance. LCS Marshalling Panels collate the microswitch indication from the LCS2 to interlock with the appropriate Supply Circuit breakers.

The Three Bridges depot, which is split into east and west-side facilities either side of the London to Brighton mainline this comprises:

5 road, 12-car, maintenance building with the road supplies provided by LCS contactor panels specifically configured for this site. LCS Emergency stop panels marshal all of the emergency buttons from these roads.

11 train stabling and servicing roads, LCS Emergency stop panels marshal all of the emergency buttons from these roads. These signals are then grouped with equivalent signal from other sections of the depot in a master Emergency Stop Panel

There are 2 two carriage washing machines have DC electrical supplies fed through Wash Road Panels ensuring that the Washing machines are operated with the DC supply isolated and the tracks bonded.

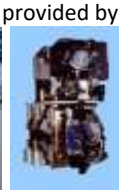
London Underground upgrades Ealing Common and Upminster Depots

Work on Ealing Common is already underway and is first for completion in 2013, with the Upminster depot revamp expected to be completed by 2015.

LCS is providing the complete shore supply system from the Isolating and Changeover Supply Isolators, through the Road Contactor Suites, to Overhead Switchable Trolleys & Pedestals to the train. DDM Mimic Panels & Overhead Status Indicators provide feed-back to the DDM, operators and maintainers. This employs the LU approved products previously supplied to Stonebridge Park, Hainault, Northumberland Park, Ruislip, London Road, Waterloo & City, Neasden & Hammersmith.

Replacement Switches for Eurostar

Changeover Filter Switch for the TMST (Eurostar) rolling stock. These switches have lasted well beyond their design life in the arduous field of the Channel Tunnel. Replacements for these aging switches will be provided by LCS over the next 2 years.

London Underground Tube Lines P400 Power Supply Upgrade

LCS is just starting to supply manual off load / fault make Depot Switches and motorised and manual Tunnel Switches for the Jubilee, Northern and Piccadilly Lines. The products are based on the experience of the Tunnel Switches supplied for the Victoria Line Upgrade, Metropolitan Line Upgrade and the Jubilee Line Upgrade in the mid 90's. The first deliveries will be for High Barnet, Edgeware followed by Cockfosters




Tube Lines (London Underground)

Manual and Motorised Track Isolating Switches & Motorised Changeover Switches specifically designed for Screw Pile Mounting have been jointly developed by LCS & Tube Lines. The pile mounting solution greatly reduces the installation cost which is the major share of the overall cost of a switch to the railway.

London Underground SSL Metropolitan Line Upgrade

LCS is currently supplying manual off load / fault Make **Depot Switches** and motorised and manual **Tunnel Switches** for the Metropolitan Line. The products are based on the experience of the Tunnel Switches supplied for the Victoria Line Upgrade and the Jubilee Line Upgrade in the mid 90's. These tunnel switches are off load / fault make switches of compact design, constructed to meet the stringent London Underground Low Smoke Zero Halogen requirements and to fit into the narrow tunnels of the Metropolitan Line

London Underground Victoria Line Upgrade VLU

LCS has recently completed an order to supply motorised and manual **Tunnel Switches** for the VLU. The products are an updated derivative of the Tunnel Switches supplied for the Jubilee Line in the mid 90's. These are off load / fault make switches of an extremely compact design to fit into the narrow tunnels of the Victoria Line. These also meet the very stringent Low Smoke Zero Halogen requirements of London Underground. Also included in the project are a number of on load **Depot Switches** and **Changeover Switches**.


Network Rail CP4 Switchgear

L.C. Switchgear are supplying Controlled Track Switches (**CTS**) for CP4, which were the same as the Controlled Track Switch (**CTS)** products used on the Power Supply Upgrade and the Channel Tunnel Reinforcement projects. These were Controlled Track Switches (**CTS**), have been in service for many years. These units are **Network Rail Accepted** products; refer to **Railway Products** details.

Docklands Light Railway Beckton Depot Extension

3-car Capacity Enhancement started in early 2010 known as the Capacity Enhancement Project was completed on the DLR routes to Bank and Lewisham. The works would allow the operation of longer 3-car length trains providing greater capacity, reducing crowding on the route and allowing passengers to board the first train - reducing the overall time to complete a journey on the DLR.
LCS is provide the shore supply system from the Road Track Feeders to the Road Contactor Suites, to Overhead Tow Trolleys for the extended depot. This extended depot roads can take the extended 3 car DLR trains without uncoupling to fit into the depot. The new Contactors provide safe isolation and bonding for the depot maintenance.
The improved efficiency of the depot will mean that maintenance time will be reduced and train numbers more easily maintained around the system and mean time between failures substantially increased.

1.7 New Products for 2021-22

1.8 Integrated CTS

8800523-P02 Integrated CTS

Specification

Specification for 750V DC Switchgear NR/L2/ELP/27730 Issue 2.0.
8800523 - 4000A single pole Integrated Controlled Track Switch (CTS) with integrated Short-Circuiting Switches (SCS).
The Integrated Controlled Track Switch comprises combinations of previously approved products in a single package pre-wired and tested unit prior to installation.

- CTS Controlled Track Switch 4kA - PA05/02035
- NSCD Short Circuiting Switch 2.5kA – PA05/06098

APPLICATION – ON LOAD

A custom-built floor standing, four door, GRP cabinet containing a motorised, single pole, 4400A 1000V DC Switch-Disconnector plus two motorised, single pole, 2500A DC Disconnector(s) and a manual 5000A 7200V DC Disconnector.

Installation

Plinth mounted, cable entry via insulated split gland plates

Cabling

Traction Positive Incoming	4 x 1000mm^2 Aluminium cable
Traction Positive Outgoing	4 x 1000mm^2 Aluminium cable
Traction Negative	2 x 240mm^2 Copper cable

Electrical Characteristics & Dimensions

System Voltage	750V DC
System Current	4000A
System overload capability:	
150% for 2 hours	6000A
300% for 1 minute	12000A
On load switch is capable of making on to faults	100kA
Auxiliary Voltage	230V AC ±10%, 50Hz.
Remote Control Voltage	48V DC ±10%
Material	GRP
External Finish	External gel coat - RAL 7035 - Light Grey
Internal Finish	Internal - natural GRP - white
Degree of Ingress Protection	IP55
Approximate Weight	1300 kg
Approximate Dimensions	2510 mm High
	3050 mm Wide
	922 mm Deep

8800545 Integrated CTS Local Control Panel

1.9 Blackpool Tramway Switchgear for Talbot Street Extension - Steconfa

8800346-V05 - DC Isolating (2.5kA) & Bonding (2kA) Device - Motorised

8800346-V05 - 2000A single pole Track Switch (TR) with integrated Short-Circuiting Switch (SCS)
A custom-built floor standing, two door, stainless steel cabinet containing a motorised, single pole, 2000A 1500V DC Switch-Disconnector plus motorised, single pole, 2000A DC Disconnector.
The device is operated in different modes depending upon its requirement but comprises of the following features:
The TR consists of a motorised 2.0kA Switch Disconnector to provide circuit Isolation and switching.
The TR can be operated remotely via a SCADA Interface and at the Isolating & Bonding Device itself for maintenance.
The Short Circuit Switch 2.0kA (SCS) provides a short-circuit path between the DC Traction Supply and the Negative Return to prevent the inadvertent re-energisation of the circuit.
The SCS can be operated remotely via a SCADA Interface and at the Isolating & Bonding Device itself for maintenance.
The enclosure includes panel lighting and anti-condensation heating, and the associated control equipment.
The SCS Disconnector is an off-load, fault make device so voltage monitoring is included to give indication that the DC Traction Supply is live and to inhibit inadvertent operation of the motorised Disconnector

System Voltage	750V DC
System Current	2000A
System overload capability:	
150% for 2 hours	6000A
300% for 1 minute	12000A
On load switch is capable of making on to faults	75kA
Auxiliary Voltage	230V AC ±10%, 50Hz.
Material	Stainless Steel
External Finish	Paint Finish - RAL 9005 – Jet Black
Internal Finish	Paint Finish – White Anti-Condensation Paint
Degree of Ingress Protection	IP55
Approximate Weight	550 kg
Approximate Dimensions	1600 mm high
	2150 mm wide
	700 mm deep
Type	Isolating on-load switch
Number of Poles	1
Number of Positions	2
Rating	2000A 1500V DC
Withstand Current	Up to 66kA / 75kAp 250ms
Type	Bonding on load / Fault make disconnector
Number of Poles	1
Number of Positions	2
Rating	2000A 1000V DC
Withstand Current	Up to 66kA / 75kAp 250ms

1.10 Fratton Depot

8800261-V05 - 2kA 1P Depot Contactor Panel with Motor Driven Bonding Device - Fratton - Outdoor Specification - Sonic Rail Services

The 2000A 750V DC Single Pole Contactor Panel feeds the positive traction supply to the road via Traction Grade 1000A fuses and a DC Overload. The incoming 750V DC can be isolated with the Incoming Positive Isolator SW1.

A voltage monitor connected between the conductor rail and Traction Negative gives a true indication of the supply status on the front panel of the unit via signal lamps on internal door of the Control Section of the enclosure. Indication is also given of the DC Overload state and there are pushbuttons to allow reset and test. The automatic Bonding Switch bonds the outgoing Traction Positive supply to Traction Negative whenever the Contactor is open. The contactor panel also drives the low-level indicators and sounders in a fail-safe manner. A high frequency flasher circuit for the low-level indicators is also incorporated using solid-state switching components for increased reliability and electrical life.

System Voltage	750V DC
System Current	2000A
Auxiliary Voltage AC	110V AC 50Hz
Material	3mm ZINTEC Galvanised Sheet Steel
External Finish	BS4800 00A05 Goose Grey Semi-Gloss
Internal Finish	J124 White Anti-Condensation paint
Degree of Ingress Protection	IP55
Approx. Weight	780kg
Approx. Dimensions	2055mm high, 1650mm wide, 900mm deep

8800549 IBJ Insulated Block Joint Failure Monitor

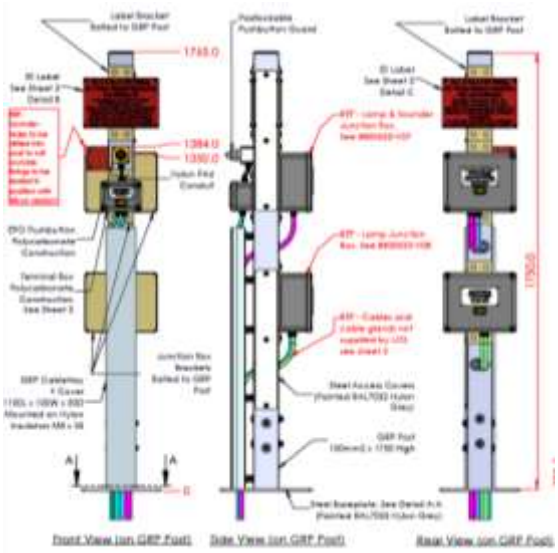
The Block Joint Failure Monitor is connected between the fuels road rails and fuel system earth. It monitors the current flow in this circuit and triggers an alarm after a time delay when it exceeds the set values. It contains: busbars for main cable connections, terminals for auxiliary connections, shunt, isolation amplifier, programmable signal conditioner, timer, plug-in control relay and indicators on the front door.

System Voltage	5-30V DC
System Current	±10A
Auxiliary Voltage DC	48V DC
Material	Heavy duty GRP enclosure
Finish	RAL 7032 grey
Degree of Ingress Protection	IP65
Approximate Weights	26kg
Approximate Dimensions	750mm high, 500mm wide
	420mm deep (door closed) 880mm deep (door open)

8800407-V05 DC Overvoltage Device with Bypass Switch – Non Polarised type, V_f = 100V +/-

The DC Overvoltage Device OVD (or Voltage Limiting Device VLD) is a protective device to limit the voltage which may occur between two points in a system by conducting in a short circuit when the voltage across its terminals exceeds a certain level. A Bypass Switch is provided to allow safe resetting of the tripped device while a leakage current may be flowing

8800522 EPO (Emergency Power Off) buttons and interfaces



8800522-V04	**EPO Gantry Cord Cable & Grab Wire Switches**
8800522-V05	**EPO Pull Cord Cable Interface Panel**
8800522-V06	**EPO Pushbutton Station**
8800522-V07	**Sounder & Lamp Junction Box - Insulating Enclosure with LED Driver**
8800522-V08	**Lamp Junction Box - Insulating Enclosure with LED Driver**

1.11 8800505-V05 + R10 TFS P2P version - Merseyrail

TrackLink P2P units are employed to enable remote control from greater distances. These are specifically used for the TFSs used in the tunnel applications, where the control would need to be mounted close to the TFS in the tunnel which has lots of impracticalities.

TFS with TrackLink P2P

Remote Control with TrackLink P2P

1.12 ISO 9001:2015

L.C. Switchgear is ISO 9001: 2015 accredited so you can be assured of their quality, reliability and service. This accreditation is supported by the extensive product history of L.C. Switchgear Ltd.

1.13 Link-Up

L.C. Switchgear is a member of Link-Up and therefore a registered supplier to the Railway Industry.
An increasing number of customers from all industries are now finding that L.C. Switchgear hold the solutions to their power switching and protection requirements.

1.14 CIRAS

LCS employ the Confidential Reporting for Safety systems within the company to ensure employee safety is paramount in the factory and on site.

1.15 Product History

Switchgear Enclosures			**6162**
Including	CTS Controlled Track Switches for Network Rail	284	
	LCS2 Track Isolating Switches for Network Rail and Depot applications	2012	
	NSCD Negative Short-Circuiting Devices	792	
	Conductor Rail Heating Panels	313	
	Track and Tunnel Switches for London Underground	550	
	Depot Road Supply panels (Contactor panels & Disconnector Panels) for London Underground	239	
	Overhead Switchable Trolleys & Power Pedestals for London Underground	405	
Switch Automation's & Customised Switches			**1169**
Fuse Assemblies and Enclosures			**1404**
Including	Rail Mounted Fuses	1097	
Indicator Assemblies			**475**
Including	COSI Cleaning Road ON / OFF Indicators	70	
	OSI Overhead Indicators	416	
Resistor Assemblies			**989**
Including	Spark Gap & Non Linear Resistors	70	
LVAC Control Panels			**1171**

For a list of satisfied customers, refer to the product history section at the back of this catalogue on page 256.

1.16 Product Ranges

The following section details the major groups of products available from L.C. Switchgear Ltd.
If you require a product that is not listed do not hesitate to contact us and our experienced engineers will be pleased to assist you.

1.17 Railway Enclosures

A wide range of high-quality switchgear enclosures providing combinations of features:

- ❑ Quick and efficient track sectioning
- ❑ Removal of power in emergencies
- ❑ Bonding of tracks for safety when carrying out maintenance
- ❑ Greater flexibility i.e. by-passing a substation in the event of substation failure or maintenance

TL - Tram Line

On-load or **Off-Load** switchgear enclosures for **Metro, Light Rail** or **Tramway** systems.
These range from **1000A - 3000A** typically but can go higher on request.
The functions vary as below:

- ❑ Track/Overhead line Isolation
- ❑ Track/Overhead line Isolation & Bonding
- ❑ Substation Bypass
- ❑ Section Isolation (Track/Overhead line Sectioning)
- ❑ Track/Overhead line Selection

ML - Main Line

On-load and **Off-Load** switchgear enclosures for **Main line Traction** systems.
These range from **2000A - 4400A** typically but applications have been as high as **10000A**.
The functions vary as below:

- ❑ Track Isolation
- ❑ Substation Bypass
- ❑ Section Isolation (Track Sectioning)
- ❑ Track/Overhead line Isolation & Bonding
- ❑ Track Selection (Changeover)
- ❑ Negative Bonding

MLU - Main Line Underground

On and Off Load switchgear enclosures for Main Line Underground Traction systems.
These range from **2000A - 4400A** typically but can go higher on request.
These vary from the ML range because of the **Low smoke and Zero halogen** requirements.
The functions available are as **ML** and vary as above: -

TM – Rolling Stock Switchgear

Off-Load switchgear enclosure for Train Mounted, rolling stock applications.

Switch & Disconnector Types

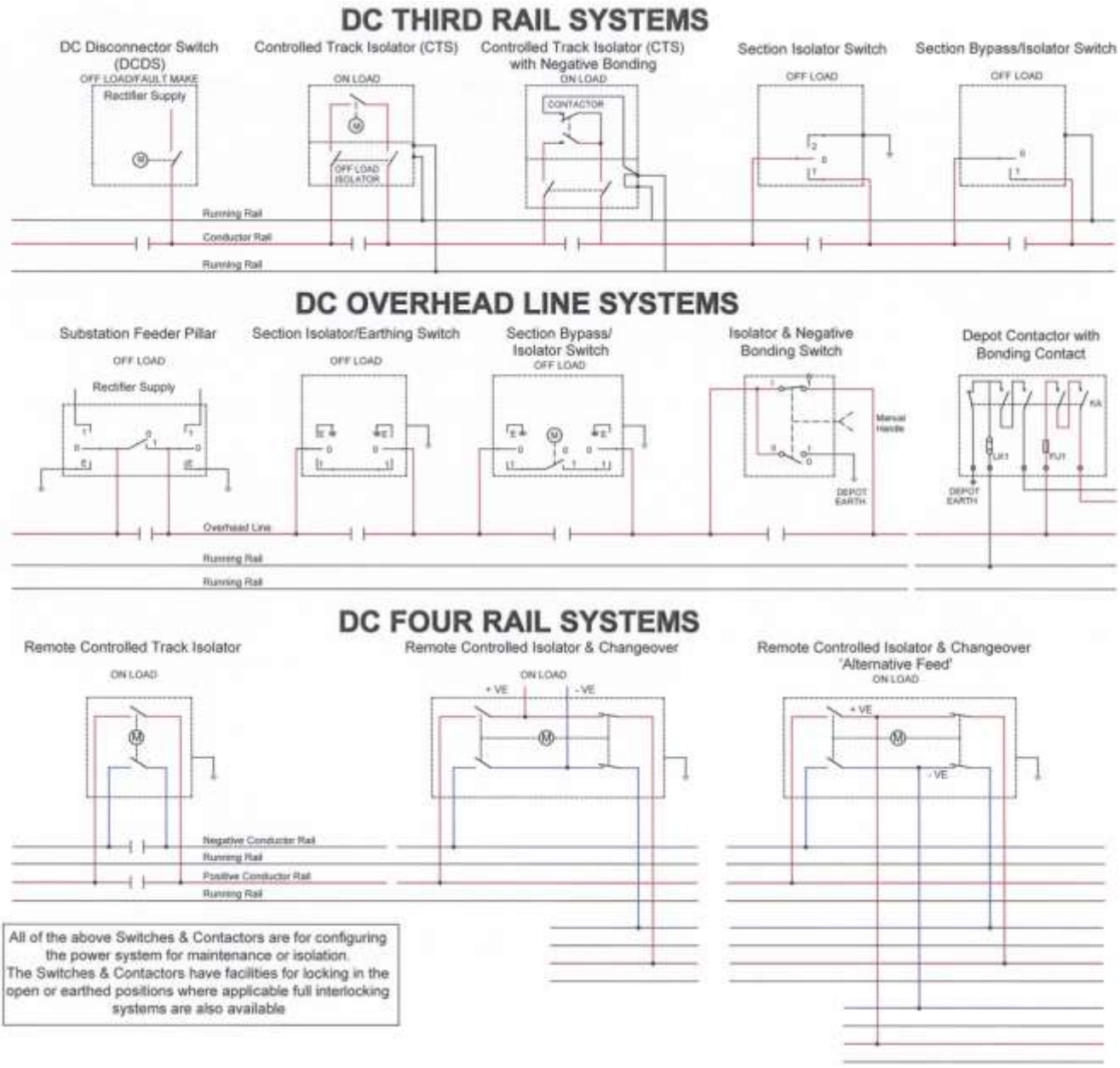
- ❑ Off load
- ❑ Off load, fault make
- ❑ On load fault make

Voltage Systems

- ❑ 500V DC
- ❑ 630V DC
- ❑ 750V DC
- ❑ 1500V DC

Manual pneumatic or electrically driven - Traction grade enclosures up to IP67- Steel or GRP indoor and outdoor enclosures

1.18 Some Typical Railway Applications



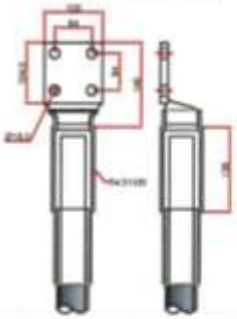
All of the above Switches & Contactors are for configuring the power system for maintenance or isolation.
The Switches & Contactors have facilities for locking in the open or earthed positions where applicable full interlocking systems are also available

1.19 Standard Traction Cables, Lugs & Glands

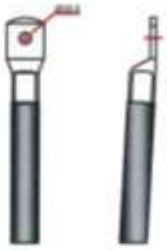
LCS can supply Traction grade cable lugs and glands, some of these are listed in the Accessories section (Page 239) of this catalogue
(Ref Only – Always consult the latest Network Rail, London Underground Standards etc.)

NETWORK RAIL - NR/PS/ELP/21101

POSITIVE
1000mm ALUMINIUM
006/116610
BEND RADIUS = 530mm



POSITIVE
630mm COPPER
006/116612
BEND RADIUS = 360 mm



NEGATIVE
500mm COPPER
-
BEND RADIUS = 325mm

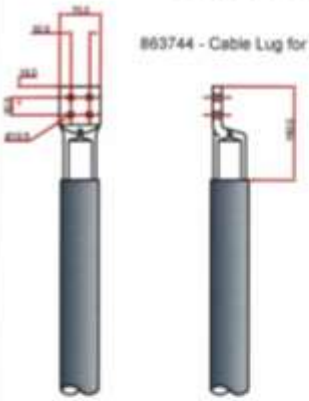
POSITIVE
500mm ALUMINIUM
006/132840
BEND RADIUS = 410mm

NEGATIVE
240mm ALUMINIUM
006/132990
BEND RADIUS = 283mm

LONDON UNDERGROUND

POSITIVE & NEGATIVE
935mm COPPER
BEND RADIUS - 530mm

863744 - Cable Lug for 935mm² Copper Cable



Preferred M75 Gland
For LUL 935mm² Copper Cable

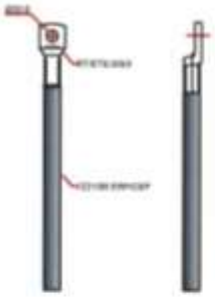
LCS Part No's:
Cable Gland M75 = 863745
Lock Nut M75 = 863746
Sealing Washer M75 = 864305

Non Preferred M75 Gland
For LUL 935mm² Copper Cable

LCS Part No's:
Cable Gland M75 = 863747
Lock Nut M75 = 864300
Sealing Washer M75 = 864301

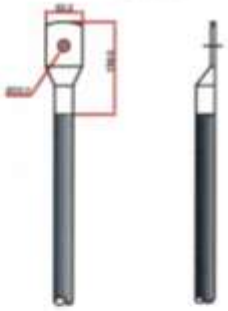
NEXUS

POSITIVE & NEGATIVE
240mm COPPER BEND
RADIUS



DOCKLAND LIGHT RAIL

POSITIVE & NEGATIVE
500mm COPPER BEND
RADIUS



1.20 Network Rail Approvals

LCS has developed specific products to meet the stringent requirements of Network Rail. The following is a list of Network Rail approved products.

The expertise from these products can be used to develop products for other rail systems.

Product			Description	Network Rail Cat No	Approval No	Ref to Page
8800530		3PS	LVAC 3 Panel Switchboard - Modular Type 200A		PA05/02022	
8800515	ML	TFS	Outdoor Remote Panel		PA05/06563	
8800512	ML	CP	TSC Trackside Slave Contactor Panel (Negative)		PA05/03760	
8800505	ML	TFS	Track Feeder Switch 4.0kA TD + 2.5kA SC Switch		PA05/06563	50
8800492	ML	LCP	Local Control Panel for NSCD		PA05/06098	52
8800488	ML	NSCD	2.5kA Negative Short-Circuiting Device		PA05/06098	51
8800463	ML	CRHP	DC Conductor Rail Heating Supply Panel SYSTEM		PA05/05191	
8800441	ML	CRHP	Conductor Rail Heating Supply Panel MKIII	055/162501	PA05/05191	136
8800416	CP	2PS	2 Panel Switchboard 100A Modular type	055/04060	PA05/02022	176
8800415	CP	2PS	2 Panel Switchboard 200A Modular type	055/04060	PA05/02022	176
8800402	ML	CP	Conductor Heating Control Panel		PA05/05191	
8800401	ML	PLCS	PLC Control Panel for Contactor Suite		PA05/04303	147
8800400	ML	CP	2 Pole 3.2kA Thameslink Contactor Panel		PA05/04302	43
8800399	ML		Circuit Breaker and Contactor Suite		PA05/04302	
8800366	ML	CP	2 Pole 3.2kA Thameslink Contactor Panel		PA05/03760	
8800382	CP	3PS	3 Panel Switchboard 100A Modular type	055/04060	PA05/002022	177
8800381	CP	2PS	2 Panel Switchboard 100A Modular type	055/04060	PA05/002022	176
8800345	ML	SD	Supply Disconnector LCS2 (1-0) 4kA Track Switch with Interlocks & Aux Switches	055/028645	PA05/00454	117
8800331	ML	BD	Motor Driven Bonding Device 4.4kA	092/000969	PA05/03165	57
8800330	ML	BD	Motor Driven Bonding Disconnector 2.0kA	092/001037	PA05/02927	
8800315	ML	CRHP	Conductor Rail Heating Supply Panel MKII	055/162502	PA05/04652	139
8800324	ML	BD	Motor Driven Bonding Disconnector 1.6kA	092/001036	PA05/02927	
8800271	SA	DCDS	SF10 1 pole 5.6kA Motorised (BR Spec DCDS)		PA05/02100	46
8800270	SA	DCDS	SF10 1 pole 5.6kA Motorised (BR Spec DCDS)		PA05/02100	46
8800259	ML	CTS	5kA CTS Controlled Track Switch	055/028655	PA05/02033	122
8800258	ML	CTS	3.2kA CTS Controlled Track Switch	055/028654	PA05/02033	122
8800253	ML		LCS2 Mounting Frame	URLT025473		117
8800248	CP		Changeover 50A Switchboard	055/04060	PA05/02022	
8800236	SA	DCDS	SF10 1 pole 5.6kA Motorised (BR Spec DCDS)	055/028662	PA05/02100	46
8800215	CP	2PS	2 Panel Switchboard - London Bridge	055/04060	PA05/02022	172
8800195	CP	3PS	3 Panel Switchboard - London Bridge	055/04060	PA05/02022	172
8800185	ML	SD	Supply Disconnector LCS2 (1-0) 4kA Track Switch	055/028645	PA05/00454	117
8800181	SA	DCDS	SF10 1 pole 4.4kA Motorised (BR Spec DCDS)	055/028661	PA05/02100	46
8800157	ML	SD	Supply Disconnector LCS1 (1-0) I 2kA 3kV Track Switch	055/028644	PA05/454	-
8800113	ML	CTS	4 kA CTS Mk II	055/028658	PA05/02035	117
8800106	ML	CTS	2kA CTS Mk II	055/028657	PA05/02035	117
858961	ML	BD	Motor Driven Bonding Disconnector 1.6kA	092/001035	PA05/02927	86

Other products have been through **Form A & Form B** approvals and already have or will be formally submitted for product approval.

1.21 London Underground Approved Products

LCS has developed specific products to meet the stringent Low Smoke Zero Halogen requirements of LUL.
The following is a list of approved products currently used on the London Underground System. The products in **yellow** are London Underground Framework Products.

Product			Description	Used On	Ref to Page
8800471	**MLU**	**RCTIS**	**Changeover Isolating Switch 4kA 2 Pole**	**Metronet Rail SSL**	**79**
8800445	MLU	MDS	Track Isolating Manual Disconnector Switch 4kA 2 Pole (Top entry Cables)	Metronet Rail SSL	76
8800442		COLR	725 Type Current On Line Relay	Various LU Projects	180
8800435	MLU	MCOD	Manual Changeover Off load Disconnector 4kA 2 Pole	Metronet Rail SSL	78
8800414	MLU	MTTIS	Manual Tunnel Track Isolating Switch 4kA 2 Pole (Tunnel)	Metronet Rail SSL	112
8800411	MLU	RCTIS	RCTIS Remote Controlled Track Isolating Disconnector Switch 4kA 2 Pole	Metronet Rail SSL	
8800410	MLU	MDS	MDS Track Isolating Manual Disconnector Switch 4kA 2 Pole (Slim line)	Metronet Rail SSL	76
8800409	MLU	CP	2 Pole Contactor Panel with Remote Control	Acton Depot	80
8800397	**MLU**	**MDS**	**Track Isolating MDS Manual Disconnector Switch 4kA 2 Pole**	**Metronet Rail SSL**	**76**
8800364	**MLU**	**RCTIS**	**Remote Controlled Track Isolating Switch 4kA 2 Pole (Tunnel)**	**Metronet Rail BCV**	**112**
8800363	**MLU**	**MCOIS**	**Manual Changeover Isolating Switch 4kA 2 Pole**	**Metronet Rail BCV**	**78**
8800361	**MLU**	**MTTIS**	**Manual Track Isolating Switch 4kA 2 Pole (Tunnel)**	**Metronet Rail BCV**	**112**
8800360	**MLU**	**MTIS**	**Manual Track Isolating Switch 4kA 2 Pole**	**Metronet Rail BCV**	**75**
8800352	MLU	RCTIS	4 kA 2 Pole Remote Controlled Track Isolating Switch -	Stanmore 3rd Platform	74
8800327	MLU	TTSS	Motorised Track Isolating Switch RCTIS 2 Pole (Tunnel) & Remote	Baker St	112
8800318	MLU	RCTIS	3kA 2 Pole Motorised Switch - SCADA	Heathrow T5	74
8800317	MLU	RCTIS	3kA 2 Pole Motorised Switch -	Wembley Park Sidings	74
8800314	MLU	COSI	Cleaning Road Overhead Status Indicator (with alarm and beacon)	Upminster Depot	
8800307	MLU	MDDS	Motor Driven Disconnector Switch (London Rd)	BCV DEISIP Project	76
8800306	MLU	MDDS	Motor Driven Disconnector Switch LH (Queens Park)	BCV DEISIP Project	774.24
8800305	MLU	MDDS	Motor Driven Disconnector Switch RH(Queens Park)	BCV DEISIP Project	77
8800303		MP	Mimic Panel Waterloo and City	BCV DEISIP Project	148
8800302		MP	Mimic Panel Queens Park	BCV DEISIP Project	148
8800301		MP	Mimic Panel Hainault	BCV DEISIP Project	148
8800299		MP	Mimic Panel London Road	BCV DEISIP Project	148
8800298		MP	Mimic Panel Ruislip	BCV DEISIP Project	148
8800297		MP	Mimic Panel Northumberland Park	BCV DEISIP Project	148
8800296		MP	Mimic Panel Stonebridge Park	BCV DEISIP Project	148
8800295	MLU		Contactor Panel 200A (Waterloo and City)	BCV DEISIP Project	
8800293	MLU	OSI	Overhead Conductor Rail Status Indicator (less than 60V)	BCV DEISIP Project	69
8800292	MLU	COSI	Cleaning Road Overhead Status Indicator (with alarm and beacon)	BCV DEISIP Project	71
8800291	MLU	PP	Power Pedestal (200A)	BCV DEISIP Project	70
8800290	MLU	OST	Overhead Switchable Trolley 150A	BCV DEISIP Project	69
8800289	MLU	CRCP	Cleaning Road Contactor Panel	BCV DEISIP Project	71
8800288	MLU	CP	Contactor Panel	BCV DEISIP Project	68
8800287	MLU	SBI	Shed Board Isolator	BCV DEISIP Project	71
8800286	MLU	MDS	Manual Disconnector Switch	BCV DEISIP Project	75
8800284	MLU	CWRC	Remote Controlled Wash Road Contactor	Upminster Depot	80
8800283	CP	RCTIS	2 Switch Remote Control Panel Lathe Road	Upminster Depot	
8800268	MLU	MTIS	3kA 2 Pole Manual Track Isolating Switch Depot	Various LUL Projects	
8800219	FU		Rail Mounted Fuse Enclosure	Various LUL Projects	164
8800219A	FU		Rail Mounted Fuse Enclosure (Tunnel lighting Fuse 5A)	Various LUL Projects	164
8800219B	FU		Rail Mounted Fuse Enclosure (With special label TED Fuse 0.8A)	Various LUL Projects	164
8800209	MLU	RCTIS	3kA RCTIS Depot Train Cleaning Road Isolator	Northfields Depot	74
8800203	MLU	RCTIS	3kA RCTIS Depot Under Wheel Lathe Isolator & Remote Control	Various LUL Projects	74
8800115	MLU	TSSN	4kA Surface Switch	Jubilee Line Extension	
8800098	MLU	TTSM	Tunnel switch IP67	Lounsdale Electrical	115
8800076	MLU	TTSS	4kA Tunnel Switch	Jubilee Line Extension	112
8800075	MLU	TCOS	4kA Changeover Switch	Jubilee Line Extension	
8800074	MLU	TSS	4kA Surface Switch	Jubilee Line Extension	114
8800073	MLU	TCOS	2kA Changeover Switch	Jubilee Line Extension	79
8800072	MLU	RCTIS	2 kA RCTIS 2 Pole Remote Controlled Track Isolating Switch	Jubilee Line Extension	77

1.22 SA - Switch Automation

Standard switches can be automated by electric motors, electric actuators or pneumatic actuators.
Old switches can also be automated or refurbished
A range of automation kits for existing switchgear and circuit breakers has been designed and manufactured to give a new lease of life to old manual units.

1.23 CP - Control Panels

Design & manufacture control panels for rail projects such as Multi Circuit Distribution Switchboards, 2 & 3 Panel Changeover Switchboards, conductor rail heating, train heating and mimic panels.
The design team has extensive experience in the Machine Tool industry.
This expertise can be used to produce control panels for a variety of industrial and process control applications.

1.24 PLC's and Mimic Panels

PLC Systems to sequence control and monitor traction power systems which typically comprise Circuit Breakers, Contactors and Disconnectors where a high integrity control is required. The systems can be used to apply a hot standby system which can automatically be invoked if a fault is detected. These systems are often required where a failure would have serious effects on train movements. These losses of trains incur immense penalties to either the system provider or the System operator. The PLC can ensure that this disruption is kept to a minimum thus saving considerable amounts of money.
The PLC's often work with Mimic panels but Mimic panels are often provided for Railway systems even if there is no PLC.

1.25 Switches

AC & DC switches for **on load**, **off load** and **off load – fault make** applications.
These can be manually operated or automated by Electric drive or Pneumatic drive.
Switches of multi pole construction are available typically up to 6 poles for off load switches.
The configurations can be typically:

- Disconnectors (1-0)
- Changeover (1-2)
- Changeover Disconnectors (1-0-2)

Many options are available including;

- Interlocking
- Multiple Auxiliary indication
- Padlock facilities

1.26 Fuses

A full range is available, complete with their accessories, from the smallest electronic fuse to large medium voltage fuses. DC and semi-conductor fuses to North American and European Standards.
International brand names: -AMP-TRAP-TRI-ONIC–Protistor–Ultrasafe–Linder–Linocur–Limitor–Nortroll
Stock of obsolete specialist fuses now available including many DC fuses suitable for a variety of arduous requirements.

1.27 Fuse Assemblies

Specialist fuse assemblies can be designed and manufactured by L.C. Switchgear Ltd.
The experience gained on railway fuse assemblies can be applied to any industrial requirement.

1.28 Contactors & Contactor Panels

L.C. Switchgear Ltd. supply high-power contactors and contactor panels for use throughout industry.
AC & DC contactors for heavy duty industrial and traction applications are a speciality with contactors up to 5000A DC 1000V, typically required for main line traction systems,

1.29 NLR – Spark Gap & Non Linear Resistor Spill Over Devices

Special Resistor assemblies designed to dissipate earth faults via an automatic spark gap spill-over device.
These are designed to meet the specific system fault requirements.

1.30 Switch Refurbishment, Service & Repair

Service and repair of your existing switches can be carried out at competitive rates.
Our expertise allows us to refurbish or repair switches supplied by others, at very competitive prices.

1.31 Operator & Maintenance Training

Training can be given at LCS in Hove, or at your site.
Many managers, operators and maintainers have attended our courses.
Please consult technical sales with your requirements.

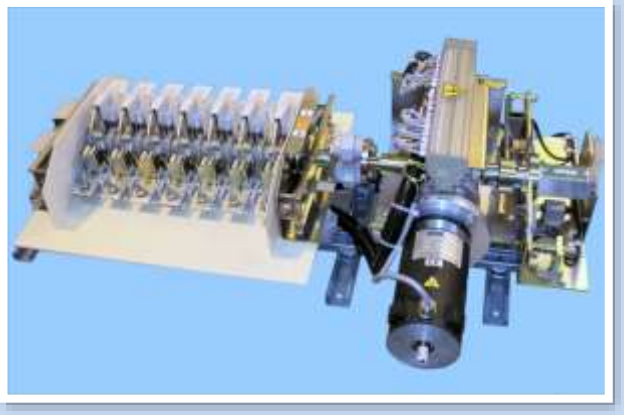
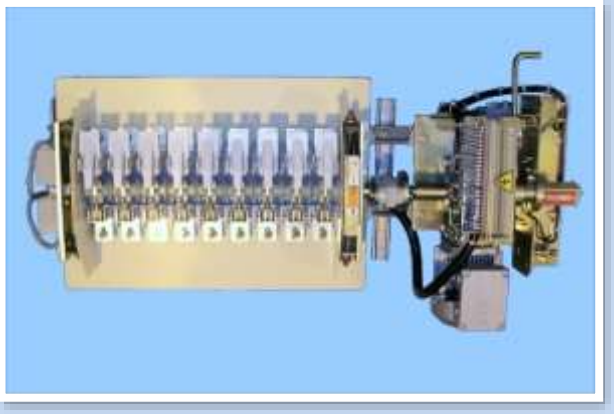
2 Railway Switchgear – SUBSTATION

Power Isolation & Maintenance Switchgear Enclosures for:

Tramway & Light Railway



Main Line

DC Switchgear Enclosures for the following applications:
Substation feeds to Tracks or Overhead Lines with Bonding facilities
Substation feeds to Tracks or Overhead Lines with Bypass facilities
Substation feeds to Tracks or Overhead Lines with automatic Bonding / Negative bonding
Disconnectors for the output from Rectifiers

2.1 TL SSIP – 1 Pole Substation Isolator Panel – 2000A 1500V DC - 8800395, 8800225 LUAS

APPLICATION –OFF LOAD

Distribution of substation feeds to tracks or overhead lines, on **Dublin LUAS**

Construction

2 mm steel indoor enclosure
Heavy duty insulated operating handles.
Padlock facilities for both open and closed.

Features

- ❑ Voltage Monitors
- ❑ Electrical Shot bolt Interlocking

Cabling

4 x 250mm² cables in and out.

Installation

The panel can be installed using M16 anchor bolts to the floor

Switch Features

Large isolation distance
Self-cleaning contacts
High resistance to short circuit currents

Electrical Characteristics

Nominal Current	2000 A
1st wave peak value	150kA
I r.m.s.	70kA for 1 s
Nominal Voltage	1500V

Dimensions

	8800395	8800225
No of Off Load Switches	5	2
Length	2560 mm	1280 mm
Height	2100 mm	2100 mm
Depth	700 mm	700 mm
Weight	950 kg	475 kg

2.2 TL SSBI – 1 Pole Substation Isolator Panel & Motorised Bypass – 2000A 1500V DC- 8800239 LUAS

APPLICATION - OFF LOAD WITH ON LOAD BY PASS

Distribution of substation feeds to tracks or overhead lines with substation bypass facility on **Dublin LUAS**

Construction

2 mm steel indoor enclosure
Heavy duty insulated operating handles
Padlock facilities for both open and closed

Features

- ❑ Voltage Monitors
- ❑ Electrical Shot bolt Interlocking

Cabling

4 x 250mm² cables in and out

Installation

The switch can be installed using M16 anchor bolts to the floor

Switch Features

Large isolation distance
Self-cleaning contacts
High resistance to short circuit currents

Electrical Characteristics

Nominal Current	2000 A
1st wave peak value	150kA
I r.m.s.	70kA for 1 s
Nominal Voltage	1500V

Dimensions

	8800396
No of On Load Bypass Switches	1
No of Off Load Switches	4
Length	2560 mm
Height	2100 mm
Depth	700 mm
Weight	1250 kg

2.3 TL SSIP – 1 Pole Substation Isolator Panel – 3600A 1500V DC - 8800372, 8800373

LUAS

APPLICATION –OFF LOAD

Distribution of substation feeds to tracks or overhead lines, on **Dublin LUAS**

Construction

2 mm steel indoor enclosure

Heavy duty insulated operating handles

Padlock facilities for both open and closed

Features

- ❑ Voltage Monitors
- ❑ Electrical Shot bolt Interlocking

Cabling

4 x 250mm² cables in and out

Installation

The panel can be installed using M16 anchor bolts to the floor

Switch Features

Large isolation distance

Self-cleaning contacts

High resistance to short circuit currents

Electrical Characteristics

Nominal Current	3600 A
1st wave peak value	150kA
I r.m.s.	70kA for 1 s
Nominal Voltage	1500V

Dimensions

	8800373	8800372
No of Off Load Switches	5	3
Length	2560 mm	1280 mm
Height	2100 mm	2100 mm
Depth	700 mm	700 mm
Weight	950 kg	475 kg

2.4 TL SSBI –1 Pole Substation Isolator Panel & Motorised Bypass – 3600A 1500V DC - 8800374

LUAS

APPLICATION - OFF LOAD WITH ON LOAD BY PASS

Distribution of substation feeds to tracks or overhead lines with substation bypass facility on **Dublin LUAS**

Construction

2 mm steel indoor enclosure

Heavy duty insulated operating handles

Padlock facilities for both open and closed

Features

- ❑ Voltage Monitors
- ❑ Electrical Shot bolt Interlocking

Cabling

4 x 250mm² cables in and out

Installation

The switch can be installed using M16 anchor bolts to the floor

Switch Features

Large isolation distance

Self-cleaning contacts

High resistance to short circuit currents

Electrical Characteristics

Nominal Current	3600 A
1st wave peak value	150kA
I r.m.s.	70kA for 1 s
Nominal Voltage	1500V

Dimensions

	8800374
No of On Load Bypass Switches	1
No of Off Load Switches	4
Length	2560 mm
Height	2100 mm
Depth	700 mm
Weight	1250 kg

2.5 TL SSCO –1 Pole Cross Over Panel – 3600A 1500V DC - 8800498

LUAS

APPLICATION - ON LOAD WITH OFF LOAD ISOLATOR

Distribution of substation feeds to tracks or overhead lines with substation bypass facility on **Dublin LUAS**

Construction

2 mm steel indoor enclosure

Heavy duty insulated operating handles

Padlock facilities for both open and closed

Features

- ❑ Voltage Monitors
- ❑ Electrical Shot bolt Interlocking

Cabling

4 x 250mm² cables in and out

Installation

The switch can be installed using M16 anchor bolts to the floor

Switch Features

Large isolation distance

Self-cleaning contacts

High resistance to short circuit currents

Electrical Characteristics

Nominal Current	3600 A
1st wave peak value	150kA
I r.m.s.	70kA for 1 s
Nominal Voltage	1500V

Dimensions

	8800498
No of On Load Switches	2
No of Off Load Switches	1
Length	2500 mm
Height	2000 mm
Depth	700 mm
Weight	1300 kg

2.6 TL ISM– 1 Pole Substation Feeder Isolator – 2000A 750V DC - 8800142

Croydon Tramlink

APPLICATION - OFF LOAD

Isolation and Bonding of high-power traction circuits, where a high short circuit withstand and high voltage isolation is required. Used on **Croydon Tramlink**, where the switch ensures safe track working conditions

Features

- ❑ IP56
- ❑ Protected for external use
- ❑ Flush doors and lower panels for a 'street furniture' finish
- ❑ Switches can be padlocked in any position
- ❑ 50mm Electrical Clearance

Cabling

4 x 250mm² cables in and out

Installation

Plinth mounted, cable entry via aluminium gland plates

Electrical Characteristics

Nominal Current	2000 A
1st wave peak value	150kA
I r.m.s.	70kA for 1 s
Nominal Voltage	750V

Dimensions

	8800142
Voltage	750V
Current	2kA
Length	800 mm
Height	1500 mm
Depth	550 mm
Weight	291kg

2.7 TL SFPI – 1 Pole Substation Feeder Pillar Isolator & Bonding Disconnector - 8800138

Croydon Tramlink

APPLICATION - OFF LOAD

Twin substation feeders with a centrally positioned by pass disconnector. Isolation and Bonding of high-power traction circuits, where a high short circuit withstand and high voltage isolation is required. Used on **Croydon Tramway**, where the switch ensures safe track working conditions

Features

- ❑ IP56
- ❑ Protected for external use
- ❑ Flush doors and lower panels for a 'street furniture' finish
- ❑ Switches can be padlocked in any position
- ❑ 50mm Electrical Clearance

Cabling

4 x 250mm² cables in and out

Installation

Plinth mounted, cable entry via aluminium gland plates.

Switches

- ❑ Two (1-0-2) manual feeder / bonding disconnectors
- ❑ One (1-0) manual by pass disconnector

Electrical Characteristics

Nominal Current	2000 A
1st wave peak value	150kA
I r.m.s.	70kA for 1 s
Nominal Voltage	750V

Dimensions

	8800138
Voltage	750V
Current	2kA
Weight	497kg
Length	1800 mm
Height	1500 mm
Depth	550 mm

2.8 TL RCTIS– 2 Pole Remote Controlled Track Isolating Switch – 2000A 750V DC - 8800387

Metrolink

APPLICATION – OFF LOAD

The 2000A 750V DC Two Pole Remote Controlled Track Isolating Switch (RCTIS) isolates the Supply System 2000A 750V DC from the Conductor Rails. The switch can be used for alternative feed Isolation and switching.

The RCTIS is a motorised, remotely operated on-load isolating switch with local controls and a manual handle facility.

Used on **Manchester Metrolink** for Isolation of the supplies in the substation.

The RCTIS is based on:

- ❑ CTS and built to comply with the principles of **NR/SP/ELP/21025**

Switch

Motor driven - on load, two position isolating switch consisting of 2 x IF Switch 2000A 1000V DC

Features

- ❑ IP54
- ❑ 60mm Electrical Clearance
- ❑ Auxiliary Supply 50 V DC
- ❑ Mechanical interlocking

Cubicle Construction

Material	2 mm Zintec ™ galvanised sheet steel
Finish - Internal	Painted - White Anti-Condensation paint
Finish - External	Painted Grey BS381-C 632 Dark Admiralty Grey Semi-Gloss

Cabling

Traction Positive in & out	4 x 500mm^2 Copper cable
Traction Negative in & out	4 x 500mm^2 Copper cable

Electrical Characteristics & Dimensions

	8800387
Voltage	750V DC
Current	2000A
Length	1790 mm
Height	1758 mm
Depth	605 mm
Weight	470kg

2.9 TL MDS– 2 Pole Manual Disconnector Switch 4kA – 4000A 750V DC - 8800388

Metrolink

APPLICATION - ON LOAD

The Manual Disconnector incorporates a traction grade off-load switch, specifically designed for isolating the 750V DC Traction Supply in substations.

Switches

One (1-0) 2 pole manually operated 4000A 1500V DC switch

Features

- ❑ 100mm electrical clearance
- ❑ Mechanical interlocking

Cubicle Construction

Material	2 mm Zintec galvanised sheet steel
Finish - Internal	Painted - White Anti-Condensation paint
Finish - External	Painted Grey BS381-C 632 Dark Admiralty Grey Semi-Gloss

Installation

Plinth mounted, cable entry from below via aluminium gland plates.

Cabling

Traction Positive in & out	4 x 500mm^2 Copper cable
Traction Negative in & out	4 x 500mm^2 Copper cable

Electrical Characteristics & Dimensions

	8800388
Voltage	750V DC
Current	4000A
Length	1000 mm
Height	1700 mm
Depth	820 mm
Weight	330kg

2.10 Substation Bypass & Isolation Panels - 8800473

Midland Metro

Application

The Substation Switch and Isolation Panels consists of one or two manual off-load 2kA 1.5kV Isolating Switches and a motorised on-load 2kA 1.5kV Bypass Switch.
Used on Midland Depot extension 8800473-V01 + 8800473-V02

Cubicle Construction

Material 2mm sheet steel
External Finish Storm Grey BS00A13
Internal Finish Anti Condensation Paint J124
Degree of Ingress Protection IP54

On-Load Bypass Switch Specification

2kA 1.5kV DC 1 Pole Motorised Disconnector

Off-Load Isolator Specification

2kA 1.5kV DC 1 Pole

Auxiliary Supply

110V AC 50Hz

Electrical Characteristics & Dimensions

	8800473-V01	8800473-V02
Voltage	1000V DC	1000V DC
Current	2000A	2000A
Length	1280mm	1280mm
Height	2100mm	2100mm
Depth	726mm	726mm
Weight	407kg	407kg

2.11 LVAC Hex Spider Panel - 8800458

London Underground

APPLICATION

Current monitoring of the interface between the LU and Network Rail earth systems on the Heathrow Express Line.

Features

- ❑ IP66 & NEMA 4X,12, 13
- ❑ 2.5mm galvanised steel mounting plate

Cubicle Construction

Material 1.4mm 304 S15 pre grained stainless steel plate
Finish Internal Painted - White Anti-Condensation paint
Finish External Painted BS381C-- L309 Canary Yellow Semi -Gloss
Baseplate Orange Paint Gloss Finish RAL 2004

Installation

Wall mounted, cable entry from below via insulating gland plates

Cabling

35mm² and 50mm² PVC/PVC cables for the LU bonds
50mm² and 75mm² PVC cables for the Network Rail bonds

Electrical Characteristics & Dimensions

	8800458-V01	8800458-V02	8800458-V03	
Length	600 mm			
Height	600 mm			
Depth	210 mm			
Weight	27kg			

2.12 2 Pole DC Changeover Switch Enclosure - 8800389

London Underground

Switch Technical Data
Category - DC21
Voltage - 250V AC/DC
Current - 40A
Box Technical Data
Material - 1.5mm Steel Plate
Body - Folded & seam Welded
Door - Hinged Left
Lock - Sash Lock with 3mm Toe
Gland Plates - Top Only
(Side Gland plates upon request)
Finish - Powder Structure Paint Grey RAL 7035
Protection - IP55 & NEMA12
Mounting Plate - 2.5mm Mounting Plate Zinc Coated

	8800389
Supply	50 or 100V dc
Current	40A
Length	300 mm
Height	300 mm
Depth	225 mm
Weight	9kg

2.13 Ludgate Cellars Contactor Suites System – Thameslink

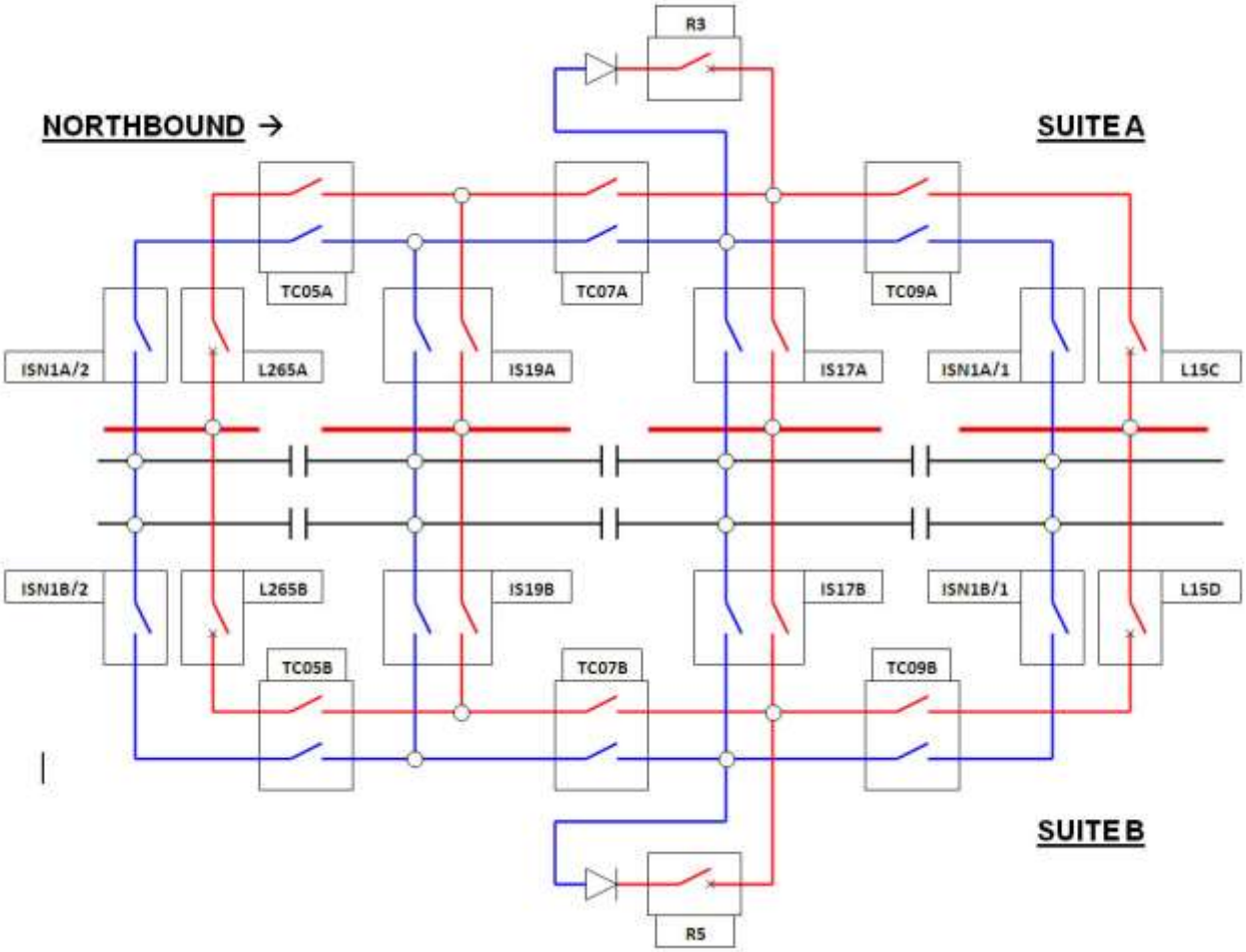
NetworkRail

AC/DC system separation is provided by the Contactor Suite where there is a need for a train to pass from a track with 25kV AC electrification to a track with 660/750V DC electrification and vice versa.

Changeover of train power systems is usually accomplished on track that is dual electrified which means that the running rails are earthed and can therefore enable the easy passage of DC stray currents to and from nearby metallic structures and equipment with the possibility of ensuing electrolytic corrosion. To minimise the effect of DC stray currents the dual electrified section of track is kept as short as possible and a DC changeover section provided to enable trains to move from and to 660/750V DC electrified track with unearthed running rails.

The DC changeover section uses three double pole contactors per track because to the future requirement for twelve car trains and short signalling sections.
Normally the two entry contactors are closed and the exit contactor open.
When the train approaches the exit contactor signalling track circuit information enables the length of the train to do be determined and opens the entry contactor just behind the end of the train.
As soon as this contactor has opened the exit contactor closes. As the train moves forward and clears track circuit overlaps contactors behind the train open and close sequentially until the system is reset.
There is no brief loss of traction supply owing to the provision of a rectifier between the last entry contactor and the exit contactor. This ensures that even trains operating in a 'bunched' situation will not cause all insulated block joints to be shorted.

DC Electrification circuit diagram of the Northbound Line via suites A and B with Hot Standby Changeover



2.14 2 Pole Circuit Breaker / Contactor / Motorised Isolator Suite 3600A1000V DC - 8800399

NetworkRail

APPLICATION - ON LOAD WITH OFF LOAD ISOLATION

Distribution of substation feeds to the DC section of the AC/DC changeover system tracks. Each Suite is a fully integrated assembly of Circuit Breakers, Contactors, Motorised Isolators, Frame Leakage panels and Cable Connection panels. As used on **Thameslink**

Construction

2mm steel indoor enclosure
Cable Connection Panels
Full bus bar connection chamber at the rear
Heavy duty insulated operating handles
Full Interlock system
Padlock facilities for both open and closed

Features

- ❑ Voltage Monitors
- ❑ Electrical Interlocking
- ❑ Mechanical Interlocking

Cabling

4 x 1000mm^2 Aluminium cables in to each Breaker Connection Panel

Installation

The suite can be installed using M12 insulated bolts to the substation floor
The suite is mounted on an insulating mat

Suite Features

Large isolation distance 100mm
Self-cleaning contacts
High resistance to short circuit currents
Frame Leakage system

Electrical Characteristics

Nominal Current	3600 A
Nominal Voltage	1500V

Dimensions

	8800399
No of Circuit Breakers	3
No of On Load Contactors	3
No of Off Load Switches	3
No of Frame Leakage Panels	1
No of Cable Connection Panels	3
Length	9000 mm
Height	2140 mm
Depth	1526 mm

2.15 2 Pole Contactor & Motorised Isolator Panel 3200A 1000V DC - PA05/03760 - 8800400

NetworkRail

APPLICATION – ON LOAD

Isolation and/or switching of high-power circuits, where a high short circuit withstand and high voltage isolation is required. Used at **Ludgate Cellars** for AC DC Changeover zone switching.

The Contactor & Motorised Isolator Panel is based on:

- CTS and built to comply with the principles of **NR/SP/ELP/21025**
- Farringdon Trial Contactor suites **PA05/03760/T**

Contactor

Load break 2 pole, two position Contactor CBC 98, 48VDC Coil

No of Poles	2
Voltage	1000 Volts DC
Current	3200 Amps

Switches

1 x (1-0) Electric Actuation - Off load, two position isolating switch 2 pole 7200 V DC 4000 A

(**Lockable maintenance switch, these switches can be used to isolate the Buffer Zone panel for Maintenance**)

Features

- IP54
- 100mm Electrical Clearance
- Fully Isolated 230 V AC ±10%, 50 Hz, single phase 3.5A
- Anti-Condensation Heaters thermostat controlled to operate at 10ºC and below

Installation

For installation refer to the Suite page 42

Cubicle Construction

Material	2 mm sheet steel
Finish - Internal	Painted - White Semi-gloss
Finish - External	Painted Grey RAL7038 Semi-gloss

Cabling

Traction Positive Outgoing	4 x 1000mm^2 Aluminium cable
Traction Negative	3 x 1000mm^2 Aluminium cable

Electrical Characteristics & Dimensions

	8800400
Voltage	750V
Current	3.2kA
No of poles	2
Weight	1800kg
Length	1960 mm
Height	2140 mm
Depth	1526 mm

2.16 TSC Trackside Slave Contactor Panel - Side & Rear Entry Versions - 8800512

Customer Specification

N000 NRT REM EP 00002 1.0 - Mini Slave Contactor Trial – Technical Requirements

Application

Each TSC consists of an arrangement a Contactor, a Manual Maintenance Disconnector, and associated control gear. The contactor which can both be operated locally or remotely.

The TSC is controlled by an interface panel 8800516 Negative Slave Contactor Control Panel to switch the negative according to the passage of trains through the isolating sections between the floating Negative return and earthed AC return systems at the AC / DC electrification interface between Blackfriars and Farringdon.

Contactor

Load break 1 pole, Contactor CBC 98 2560 1.0 TS 1000VDC, 110VAC Coil

No of Poles	1
Voltage	1000 Volts DC
Current	2560 Amps
Auxiliary Voltage	230V AC 50Hz

Cubicle Construction

Material	GRP / Ply board / 50mmBrockslab* \ RW3 / Fireboard / GRP
Finish - Internal	Painted - White Semi-gloss
Finish - External	Grey RAL7035 semi-gloss
Ingress Protection	IP54
Fire resistance	Constructed using fire retardant resin to provide self-extinguishing laminates to BS476 part 7 class 2

Compliance with BS476 part 22, ONE HOUR fire resistance
* 50mm Brockslab for noise reduction

It is locked by an EZZ181 Union / Yale style Lock and Quarter turn locks to ensure cubicle sealing.

	8800512
Weight	510kg
Length	1230 mm
Height	2000 mm
Depth	835 mm

2.17 Negative Slave Contactor Control Panel - 8800516

Customer Specification
N000 NRT REM EP 00002 1.0 - Mini Slave Contactor Trial – Technical Requirements
L.C. Switchgear Specification
8800516-V01 - TSC (SCP) Negative Slave Contactor Control System Suite Level Control Panel
Brief Description

The TSC (SCP) Negative Slave Contactor Control System Suite Level Control Panel interfaces between the existing Ludgate Cellars PLC & Contactor Suites and the new TSC Contactors which are at Blackfriars close to the block joint connections to the track.

The TSC (SCP) switches the Slave contactors in synchronization with the existing Master contactors according to the passage of trains through the isolating sections between the floating Negative return and earthed AC return systems at the AC / DC electrification interface between Blackfriars and Farringdon.

The TSC (SCP) ensures that the negative switching is done by the Slave contactors close to the block joints removing the long inductive circuit from the main negative contactors. The inductive circuit had been causing arcing over the wheels of the train and damage has been occurring to both train wheels and the running rails at the block joints.

General Specification
8800516 Negative Slave Contactor Control System Suite Level Control Panel
Panel Rating

System Voltage	50VDC
System Current	4A

Cubicle Construction

Fixing:	Floor mounting.
Cable Installation:	Top and Bottom entry via aluminium gland plates.
Door Locking:	4 point locking with double bit 3mm insert.

Cubicle Construction

Material	1.5mm Mild Steel
Finish - Internal	Grey RAL7035 semi-gloss Structured Power Coating
Finish - External	Grey RAL7035 semi-gloss Structured Power Coating
Ingress Protection	IP55

	8800516
Weight	240kg
Length	1200 mm
Height	2005 mm
Depth	513 mm

2.18 PLC Control

For details of the PLC Control System employed at Ludgate Cellars refer to Page 147

2.19 IBJ Insulated Block Joint Contactor Panel 8800512 – V03

Ashford International Station has dual electrified lines which require sections of track passing in and out of the station to be isolated using insulated block joints (IBJ's). Signal card failures have been occurring on the Class 374 trains as they pass over these IBJ's. A potential difference across the IBJ's and resultant current returning through the train body is believed to be the cause of the failures, hence the contactor solution. In principle, the Contactor Panel contactors are connected across the IBJ's effectively shorting them out when the train passes over. The operation of the contactors across the IBJs ensures that the traction return current is through the running rails and not through the train body (as potential difference is removed across the IBJ's).
The contactors will be triggered to close as a train approaches the IBJ and then open after the train has crossed an IBJ.
Brief Description
Each IBJ Contactor Panel consists of an arrangement two contactors, two manual maintenance disconnectors, a Logic Controller, a Frauscher Advanced Counter Rack, and associated control components.
The two contactors within the Contactor Panel are connected together in parallel connection and operate simultaneously, thus providing redundancy and security that at least one will operate. The operation of the Contactors is controlled by the Logic Controller which receives a digital signal from the Frauscher Rack to indicate if a track section is 'Occupied' or 'Not Occupied' based on the Frauscher Track Sensors.
When a track section is occupied, the Logic Controller closes the Contactors and when a track section is Not Occupied it opens the Contactors. The Logic Controller also initiates 'Minor' and 'Major' alarms under certain circumstances by monitoring the 110V AC supplies, availability for service, operational status of the of the Contactors, detection system track section errors and track occupation time.
The IBJ Contactor Panel alarms can be monitored remotely via volt-free contacts that indicate if a minor or major alarm has occurred.
Maintenance facilities are provided to allow maintenance on a single contactor section leaving the other available for service.

System Voltage	1000V DC
System Current	630A
Mains Supply Voltage AC	230V AC 50Hz
Control Voltages	110V AC / 24V DC
Material	GRP / Plywood / Fireboard / GRP
External Finish	Pale Grey RAL7035 semi-gloss
Internal Finish	GRP White
Degree of Ingress Protection	IP55
Fire resistance	Kiosk is to be fully lined with encapsulated fireboards. Constructed using fire retardant resin to provide self-extinguishing laminates to BS476 part 7 class 2. Compliance with BS476 part 22, ONE HOUR fire resistance
Approximate Weight	950kg
Approximate Dimensions	2050mm high
	2830mm wide
	825mm deep

2.20 SA DCDS 1 Pole DC Disconnector Switch – 4400A & 5600A 750V DC - PA05/02100 – 8800181 & 8800236

NetworkRail

APPLICATION - OFF LOAD – FAULT MAKE

Isolation of tramway / metro supplies from the substation rectifiers, or track sectioning

Conforms with **RT/E/S/21023**

Switches

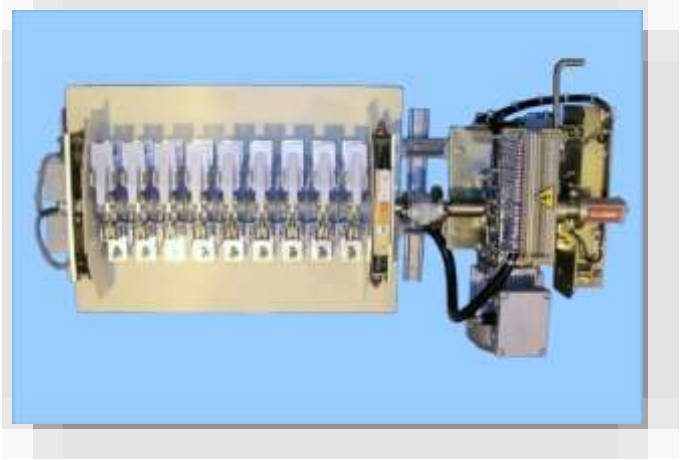
(1-0) 1 pole motorised isolators off load / fault make.

Features

- ❑ Emergency manual handle
- ❑ Motor control & auxiliary microswitches
- ❑ Lockable in the Open position

Electrical Characteristics & Dimensions

	8800181	8800236
Voltage	750V	750V
Current	4.4kA	5.6kA
Length	1015 mm	1160 mm
Height	605 mm	605 mm
Depth	334 mm	334 mm
Weight	54kg	60kg
Motor Voltage	230V AC	230V AC



2.21 SA DCDS 1 Pole DC Disconnector Switch – 4400A & 5600A 750V DC - PA05/02100 – 8800270 & 8800271

APPLICATION - OFF LOAD – FAULT MAKE

Isolation of tramway / metro supplies from the substation rectifiers, or track sectioning

Conforms with **RT/E/S/21023**

Switches

(1-0) 1 pole motorised isolators off load / fault make

Features

- ❑ Emergency manual handle
- ❑ Motor control & auxiliary microswitches
- ❑ Lockable in the Open position

Electrical Characteristics & Dimensions

	8800270	8800271
Voltage	750V	750V
Current	4.4kA	5.6kA
Length	1090 mm	1190 mm
Height	710 mm	710 mm
Depth	334 mm	334 mm
Weight	57kg	63kg
Motor Voltage	50V DC	50V DC

2.22 SA - 2 Pole Disconnector – 2000A 750V DC - 8800130

APPLICATION - OFF LOAD – FAULT MAKE

Isolation of tramway / metro supplies from the substation, or track sectioning

Switches

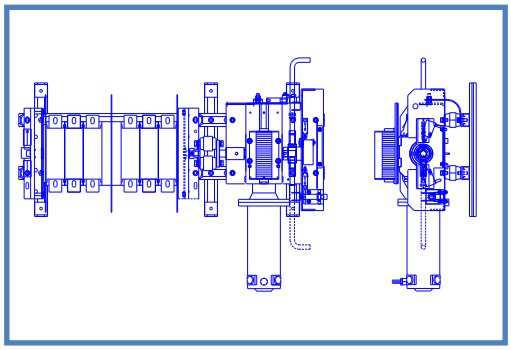
(1-0) 2 pole motorised isolators off load / fault make

Features

- ❑ Emergency manual handle
- ❑ Motor control & auxiliary microswitches
- ❑ Lockable in the Open position

Electrical Characteristics & Dimensions

	8800130
Voltage	1kV
Current	2kA
Length	960 mm
Height	735 mm
Depth	320 mm
Weight	kg
Motor Voltage	48V DC
Motor Current	10A



2.23 ML CPS AC Overvoltage Device 25kV/11kV - 8800343

Channel Tunnel Rail Link

APPLICATION - ON LOAD

Used in substations for **Channel Tunnel Rail Link**, where the device limits overvoltage by providing an 'Earth Bridge' between the HV and LV circuits.

Features

- ❑ IP56
- ❑ Heavy duty RAL 7032 grey GRP cabinet
- ❑ 100mm Electrical Clearance
- ❑ Removable link bars for testing

Cabling

2 x 150mm² cables in and out

Installation

Wall mounted, cable entry via cabinet floor

Device

- ❑ PSNP Overvoltage Device to NFC15-100
- ❑ Device can be manually reset

Electrical Characteristics

Tripping Voltage	430V AC
Nominal Current	750 A
Short Time Current 0.3s	15kA
Short Time Current 10s	4kA
Short Time Current 42s	2kA
Short Time Current 25min	1kA

Dimensions

	8800343
No of poles	1
Weight	82kg
Length	800 mm
Height	1500 mm
Depth	340 mm

2.24 ML CPS DC Overvoltage Device - 8800407

APPLICATION - ON LOAD

Used for a test track at Ashford Depot, where the device limits overvoltage by providing an 'Earth Bridge' between the HV and LV circuits, removing touch potential risk.

Features

- ❑ IP56
- ❑ Heavy duty RAL 7032 grey GRP cabinet
- ❑ 100mm Electrical Clearance

Cabling

4 x 150mm² cables in and out.

Installation

Frame mounted, cable entry via cabinet floor

Device

- ❑ PSNP (Non-polarised) Overvoltage Device to NFC15-100
- ❑ Device can be manually reset

Electrical Characteristics

Tripping Voltage	50V DC
Nominal Current	750 A
Short Time Current 0.3s	15kA
Short Time Current 10s	4kA
Short Time Current 42s	2kA
Short Time Current 25min	1kA

Dimensions

	8800407-V01 & V02	8800407-V03
No of poles	1	1
Weight	54kg	39kg
Length	800 mm	
Height	1000 mm	
Depth	360 mm	
Cabling	**4 x 150mm²** in and out	2 x 240mm² in and out
Special Features		**Bypass Switch for reset**

3 Railway Switchgear - BONDING & SHORT-CIRCUITING DEVICES

Power Isolation & Maintenance Switchgear Enclosures for:

DC Switchgear enclosures for the following applications:
Conductor Rail Bonding for fast safe and efficient Railway Possession

Bonding switches are required to bring isolations of the DC conductor rail into line with the requirements of the Electricity at Work Regulations 1989.

The Bonding switches isolate the live conductor from its sources of energisation (Electricity at Work Act Regulation 12) and securely protect against inadvertent re-energisation from any source (Electricity at Work Act Regulation 13) by being connected to the negative pole of the supply via the bonding switch.

3.1 ML TFS – Track Feeder Switch 4.0kA + 2.5kA SC Switch 750V DC & Remote-Control Option - 8800505

The Track Feeder Switch (TFS) is required to bring isolations of the 750V DC conductor rail into line with the requirements of the Electricity at Work Regulations 1989.
The TFS isolates the live conductor from its sources of energisation (Electricity at Work Act Regulation 12) and securely protects against inadvertent re-energisation from any source (Electricity at Work Act Regulation 13) by being connected to the negative pole of the supply via the bonding switch.
The TFS can also isolate traction substations and track paralleling huts from the conductor rail (Electricity at Work Act Regulations 12 & 13) whilst allowing the conductor rail to remain energised, maintaining the operation of electric trains.
This is intended to improve safety in general and to smooth the progress of isolation and possession planning.
The TFS application is for use on the main line isolations prior work on the track commencing. It is intended to replace the existing practice of fitting a bonding cable that is clamped to the rails manually at the start of a possession and removed manually before the possession is over. It is necessary for the potential of the rail to be checked prior to fitting the bonding strap.
The TFS, depending on its location, may be connected in one of two applications:
From the outgoing terminals of the substations and track paralleling huts to the track mounted conductor rails
From the outgoing terminal of the rectifier circuit breaker(s) to the substation positive bus bar.

Electrical Characteristics
Traction Current
4kA continuously rated, 8kA for 1 minute every 15 minutes.
Shorted Current
2.5kA continuously rated
Fault Currents: 64kA peak
200kA prospective, T=15ms, clearance 25ms (“near” fault)
100kA prospective, T=63ms, clearance 250ms (“distant” fault)
Three position switch (two interlocked switches)
Short Circuiting Switch - Off-Load / Fault Make
1000 VDC rated.
2500 A (2.5 kA) current rated.
64 kA Short Circuit withstand capacity.
Silver-plated thermal contacts.
Visible break with a large isolation distance.
DC electric motor with electromagnetic holding brake.
Isolating Switch - Off-Load
1500 VDC Rated.
4000 A (4.0 kA) Current rated.
100 kA Short Circuit withstand capacity.
Self-cleaning silver-plated contacts.
Visible breaking with a large isolation distance.
DC electric actuator with safety electromagnetic shot-bolt.

Features
Fortress Interlocking with key retention.
Provision for SCADA systems (option).
Electro-Mechanical locks to prevent incorrect operations.
Operating temperature range +40°C to -25 °C.
Low maintenance, 10000 operations between major maintenance periods.
Earth Fault Relay with Test and Reset facilities.
Suitable for 230 VAC or 110 VAC operation.
5 kV isolation transformer within an insulated ‘enclosure’.
Low energy Lighting is provided per compartment.
Thermostatically controlled Anti-Condensation Heaters.
Clearance and creepage distances to BSEN 50123.

Enclosure - metal segregated painted with lockable doors.
Goose Grey Semi-Gloss with Anti-Graffiti varnish coat.
Internal surfaces painted with white Anti-Condensation paint.
Hot Zinc Sprayed.
IP 55 rated.
Dimensions

	8800505-V04	8800515-V01	8800515-V02
	TFS	Remote Indoor	Remote Outdoor
Length	1950 mm	430 mm	600 mm
Height	2100 mm	530 mm	800 mm
Depth	770 mm	200 mm	310 mm
Weight	670kg	12kg	45kg

3.2 ML NSCD – Negative Short Circuiting Device - 2500A 750V DC – NR Smarter Isolations Project - 8800488

NSCD – Negative Short-Circuiting Device 8800488

The Negative Short Circuit Device 2kA (NSCD) provides a short-circuit path between the DC Traction Supply and the Negative Return to protect against the inadvertent re-energisation of the circuit.

The NSCD can be operated remotely via a SCADA Interface, locally via a **Local Control Panel** (details follow) and at the NSCD itself for maintenance.

The NSCD consists of a motorised 3.2kA Disconnector to provide the short-circuit path, a manual 2.5kA Disconnector to isolate the motorised Disconnector for maintenance, panel lighting and anti-condensation heating, and the associated control equipment.

Both Disconnectors are off-load devices so voltage monitoring is included to give indication that the DC Traction Supply is live and to inhibit inadvertent operation of the motorised Disconnector.

Switch

(1-0) 3.2kA 1 pole motorised Off Load / Fault make Switch

One (1-0) 2.5kA 2 pole manual Off Load Switch (*for maintenance isolation*)

Construction

- ❑ IP56
- ❑ Heavy duty GRP cabinets
- ❑ Hot Press Moulded, Reinforced Polyester RAL 7032
- ❑ Protected for external use
- ❑ Complies with general requirements for empty enclosures conforming to EN 62208: 2003 (EN 50298: 1999).
- ❑ Resistance to external mechanical impact: IK 10 (5 joules) conforming to EN 50 102.
- ❑ External & Internal Colour - RAL 7032 Grey
- ❑ IP 56 sealing conforming to IEC 529 (EN 60529)
- ❑ Self-extinguishing conforming to IEC 695-2-1 (960 °C)
- ❑ Temperature resistance: – 50...+ 150 °C
- ❑ Resistant to principal chemical agents and corrosive atmospheres & UV light stabilised.
- ❑ Comply with constraints relating to installation of double insulated panels conforming to standard IEC 439-1 (EN 60439-1)
- ❑ Front panel has Network Rail approved 3-point locking with a barrel to suit Network Rail.
- ❑ Insulating Gland Plates

Features

- ❑ 100mm Electrical Clearance
- ❑ Fully Isolated 110V AC / 50V DC Control Supply (Fed from the LCP see below)
- ❑ Padlock facilities

Installation

Frame mounted, the entry of cables is in through the base of the cabinet, via cable glands in the gland plates.

Cabling

V02 - Two 240mm^2 or two 500mm^2 Positive cables can be connected to the Conductor Rail Lug

V03 Two 1000mm^2 Positive cables can be connected to the Conductor Rail Lug

Up to four 240mm^2 Negative cables can be connected to the Running Rails Lug.

Electrical Characteristics & Dimensions

	8800488-V02	8800488-V02
Voltage	750V	750V
Current	2.5kA	2.5kA
Peak let through Current Ic	10,000 A	10,000 A
Rated Short Term Withstand Current 1 min	4,800 A	4,800 A
Rated Short Circuit making capacity	63,000 A	63,000 A
Length	1000 mm	1000 mm
Height	1938 mm	1938 mm
Depth	420 mm	420 mm
Weight	175kg	175kg

Refer to the following page for the associated Power Supply Panels

3.3 ML LCP – GRP Local Control Panel for NSCD's – NR Smarter Isolations Project – 8800492, 8800514

Construction

- IP56
- Heavy duty GRP cabinets
- Hot Press Moulded, Reinforced Polyester RAL 7032
- Protected for external use
- Complies with general requirements for empty enclosures conforming to EN 62208: 2003 (EN 50298: 1999).
- Resistance to external mechanical impact: IK 10 (5 joules) conforming to EN 50 102.
- External & Internal Colour - RAL 7032 Grey
- IP 56 sealing conforming to IEC 529 (EN 60529)
- Self-extinguishing conforming to IEC 695-2-1 (960 °C)
- Temperature resistance: – 50.+ 150 °C
- Resistant to principal chemical agents and corrosive atmospheres & UV light stabilised.
- Comply with constraints relating to installation of double insulated panels conforming to standard IEC 439-1 (EN 60439-1)
- Front panel has Network Rail approved 3-point locking with a barrel to suit Network Rail.
- Insulating Gland Plates

Features

- Fully Isolated 110V AC / 50V DC Control Supply (Feeds to the NSCD see previous)
- Padlock facilities

Installation

Frame mounted, the entry of cables is in through the base of the cabinet, via cable glands in the gland plates.

Electrical Characteristics & Dimensions

	8800492-V01	8800492-V05	8800492-V06
Controls X no of NSDCs	2	4	8
Voltage	110V & 48VDC	110V & 48VDC	110V & 48VDC
Length	1000 mm	1000 mm	1000 mm
Height	1938 mm	1938 mm	1938 mm
Depth	420 mm	420 mm	420 mm
Weight	140kg	150kg	200kg

3.4 ML LCP – P2P Extended Range Local Control Panel for NSCD's PA05/06098

LOCAL P2P INTERFACE PANEL 8800492-V07

This interface panel is one of a pair of enclosures providing the Local Control over a greater distance than can be achieved with a standard local control panel.

Enclosure

The enclosures are manufactured from GRP, finished to meet the customer specification.

Enclosure Access

Access to the enclosure is gained via the doors with the use of the correct key.

The incoming 230V/110V AC Supply is separated from the rest of the panel by a plastic box and an isolated 110V AC Supply is provided by the transformer to power the local heater and the heating and lighting in the connected NSCDs. The transformer also provides a 24V Supply which is then rectified and used to power the local panel lighting.

P2P LOCAL CONTROL PANEL 8800492-V08

This P2P Local control panel is part of a pair of enclosures providing the Local Control over a greater distance than can be achieved with a standard local control panel.

Enclosure

The enclosures are manufactured from GRP, finished to meet the customer specification.

Enclosure Access

Access to the enclosure is gained via the doors with the use of the correct key.

The incoming 230V AC Supply is separated from the rest of the panel by a plastic cover and a Power Supply is provided to 48V DC Control power. A second Power Supply provides a 24VDC Supply which is used to power the local panel lighting.

Electrical Characteristics & Dimensions

	8800492-V07	8800492-V08
Controls X no of NSDCs	4	4
Voltage	110V & 48VDC	110V & 48VDC
Length	1000 mm	1000 mm
Height	1938 mm	1938 mm
Depth	420 mm	420 mm
Weight	150kg	200kg

3.5 ML LCP – Stainless Steel Local Control Panel for NSCD's

This panel operates the same as the 8800492.

Electrical Characteristics & Dimensions

	8800489-V02	8800489-V04
Controls X no of NSDCs	2	4
Voltage	110V & 48VDC	110V & 48VDC
Length	700 mm	700 mm
Height	700 mm	700 mm
Depth	400 mm	400 mm
Weight	63kg	70kg

3.6 NSCD Status & SDADA Inhibit Panel -0092/002127 8800514-V08

NSCD Interlocking and SCADA Inhibit Panel - 8800514-V08

The NSCD Interlocking and SCADA Inhibit Panel provides volt-free contacts which are available to be utilised to prevent the DC Circuit Breakers (DCCB) from being closed when the NSCDs are closed. Each panel interfaces to two or four NSCD.

Where the circuits for each NSCD are identical, the designations A through to H are replaced with 'x' in the descriptions in this section.

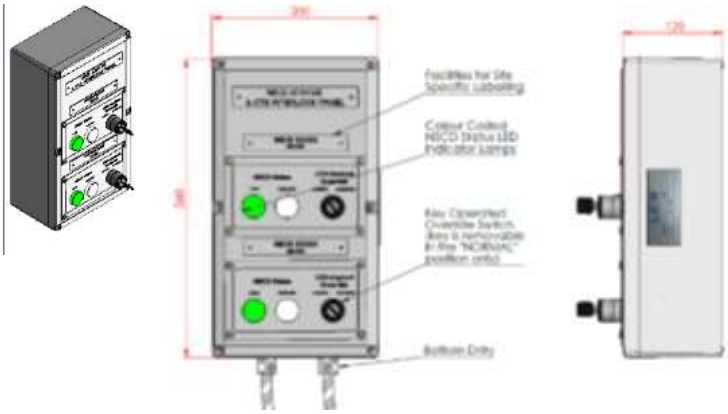
Without Override Flasher Relay

Material	Glass Reinforced Plastic (GRP)
Finish	RAL 7032 Grey
Ingress Protection	IP54
Height	647mm
Length	436mm
Depth	250mm
Approx. Weight	16kg

3.7 NSCD/CTS Interlocking Panel, 2 Way, For installation in CTS enclosure - 0055/162002 8800514-V05

NSCD Interlocking and SCADA Inhibit Panel - 8800514-V05

The NSCD Interlocking and SCADA Inhibit Panel provides volt-free contacts which are available to be utilised to prevent the Controlled Track Switch (CTS) from being closed when the NSCDs are closed.



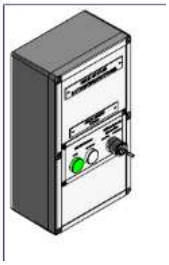
Each panel interfaces to two NSCDs.

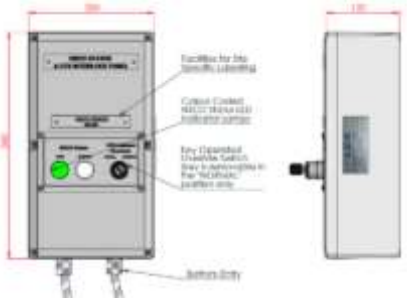
Material	Glass Reinforced Plastic (GRP)
Finish	RAL 7032 Grey
Ingress Protection	IP54
Height	340mm
Length	200mm
Depth	120mm
Approx. Weight	3.5kg

3.8 NSCD/CTS Interlocking Panel, 1 Way, For installation in CTS enclosure 8800514-V06

NSCD Interlocking and SCADA Inhibit Panel - 8800514-V05

The NSCD Interlocking and SCADA Inhibit Panel provides volt-free contacts which are available to be utilised to prevent the Controlled Track Switch (CTS) from being closed when the NSCDs are closed.
Each panel interfaces to one NSCD.





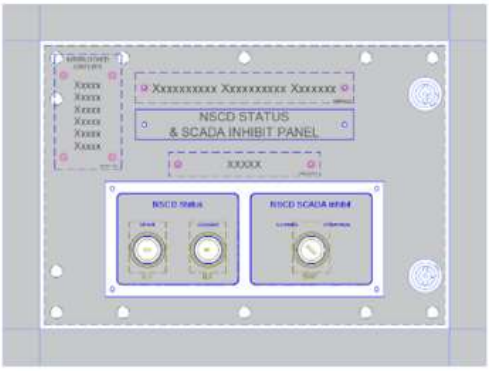
Material	Glass Reinforced Plastic (GRP)
Finish	RAL 7032 Grey
Ingress Protection	IP54
Height	340mm
Length	200mm
Depth	120mm
Approx. Weight	3.5kg

3.9 B5 NSCD Status & SCADA Inhibit Panel for GRP LCP 8800514-V09

The key requirement being that a solution was required to interlock multiple devices (which might be in several different locations) from 1 NSCD.
A significant constraint was that it is impractical to add additional auxiliary contacts to an existing NSCD, necessitating a variation of the previous inhibit panel design, as it is not particularly suited to parallel connection of the multiple inhibit and override circuits.
The arrangements used at other B5 sites prior to this have never been disclosed to LCS.

The limit of up to 6 interlocked devices for a single inhibit panel with the current proposal comes both from a practical limit of the maximum number of contacts that may be fitted to the override key switch (which was previously specified to be a Schneider key switch with 455 key)

It was agreed in the discussions that 6 devices should accommodate the requirements for a single module in most locations, but as the new design is extensible, it is easy to add more panels as required.



	8800492-V07
Controls X no of NSDCs	1
Interlocks x Devices	6
Voltage	110V & 48VDC
Length	400 mm
Height	300 mm
Depth	270 mm
Weight	50kg

3.10 ML IB – Track Isolator & Negative Bonding Device - 2000A 750V DC - 8800346

APPLICATION – ON LOAD & OFF LOAD – FAULT MAKE

Depot road isolation and interlocked negative bonding of conductor rails at **Ashford Depot.**
The manual handles are interlocked so that the isolator cannot be closed at the same time as the bonding switch.

Switches

One (1-0) 1 pole on load manual switch & one (1 -0) 1 pole off load/ fault make switch & one (1-0) 2 pole off load switch (100mm clearance)

Construction

- ❑ IP55
- ❑ 3mm sheet steel
- ❑ Protected for external use

Features

- ❑ 100mm Electrical Clearance
- ❑ Padlock facilities

Installation

Plinth mounted, cable entry from below via aluminium gland plates

Cabling

1 x 1000mm^2 Aluminium Traction Positive Cable in and out of the positive switch
2 x 240mm^2 Copper traction negative cable in and out of the negative bonding switch

Electrical Characteristics & Dimensions

	8800346-V01	
Voltage	750V	
Switch	Isolator	Bonding
Current	2,000 A	2,000 A
Peak let through Current Ic	10,000 A	10,000 A
Rated Short Term Withstand Current 1 min	6,000 A	4,800 A
Rated Short Circuit making capacity	66,000 A	63,000 A
Length	1915 mm	
Height	2230 mm	
Depth	970 mm	
Weight	1000kg	

	8800346-V02
Variant	Without maintenance disconnector
Features	
Length	2165 mm
Height	1430 mm
Depth	970 mm
Weight	900kg

	8800346-V03
Variant	Extra Cable Management
Features	6 Incoming cables
Length	2165 mm
Height	1430 mm
Depth	970 mm
Weight	1000kg

	8800346-V04
Variant	Reduced height plinth Mounted, rear cable entry
Features	Mounting facility for Road ISO indicator Control Panel
Length	2165 mm
Height	1430 mm
Depth	970 mm
Weight	650kg

Refer also to 8800479 - Track Indicator Interface Panel, this is often used in conjunction to provide overhead indication on the Road of the Track supply / bonding status. Refer to page 187

3.11 ML BD – 1 Pole Contactor Panel Motor Driven Bonding Disconnectors 1.6kA - Network Rail PA05/02927

APPLICATION – OFF LOAD / FAULT MAKE

The motor driven switch is to be used to bond the 750 Volt positive track feed connection to the negative rail and is electrically interlocked with its associated Contactor from which it obtains its control supply. Opening of the Contactor will cause the bonding device to close. The device is operated from the Contactor control circuit or automatically following the loss of the emergency circuit i.e. Emergency stop button activated.

Switch

(1-0) 1 pole motorised Off Load / Fault make Switch

Features

- ❑ IP56
- ❑ Protected for external use
- ❑ Fully Isolated 110V AC Control Supply (Fed from the Contactor)
- ❑ Anti-Condensation Paint

Installation

Mounted directly on to contactor panel, bus bar connection via insulating gland plates

Electrical Characteristics & Dimensions

	858961	863118 *
Voltage	750V DC	750V DC
Current	1.6kA	1.6kA
Maximum Fault levels	85kA 150ms 70kA 250ms	85kA 150ms 70kA 250ms
Weight	135kg	158kg
Length	1500 mm	1500 mm
Height	500 mm	500 mm
Depth	750 mm	750 mm

* This version allows the bonding device and Contactor to be lifted in a single lift i.e. it includes additional structural components in the sheet metal design. The 858961 version needs to be fitted after the contactor is installed

3.12 ML BD – 1 Pole Motor Driven Bonding Disconnectors 1.6kA and 2kA - Network Rail PA05/02927

NetworkRail

APPLICATION – OFF LOAD / FAULT MAKE

The switch is to be used to bond the 750 Volt positive track feed connection to the negative rail and is electrically interlocked with its associated Controlled Track Switch from which it obtains its control supply. Opening of the CTS will cause the bonding device to close. The device can be operated from the CTS or automatically following the loss of the emergency circuit i.e. Emergency stop button activated.

Switch

(1-0) 1 pole motorised Off Load / Fault make Switch

Features

- ❑ Hot Press Moulded, Reinforced Polyester RAL 7032
- ❑ IP56
- ❑ Protected for external use
- ❑ 100mm Electrical Clearance
- ❑ Fully Isolated 110V AC Control Supply (Fed from the CTS)

Installation

Frame mounted, cable entry via undrilled aluminium gland plates.

Cabling

Traction Negative Incoming	**2 x 240mm² Copper Cable**
Traction Negative Outgoing	**2 x 240mm² Copper Cable**

Electrical Characteristics & Dimensions

	8800324	8800330
Voltage	750V DC	750V DC
Current	1.6kA	2kA
Maximum Fault levels	85kA 150ms 70kA 250ms	90kA 150ms 85kA 250ms
Weight	70kg	71kg
Length	1800 mm	1800 mm
Height	2290 mm	2290 mm
Depth	1090 mm	1090 mm

3.13 ML TINB – 1 Pole Motorised Bonding Device - 4400A 750V DC – Network Rail No PA05/03165- 8800331

APPLICATION – OFF LOAD – FAULT MAKE

Single pole bonding of high-power circuits, where a high short circuit withstand and high voltage isolation is required.

The device is designed for external connection to the Track Feeder Output circuit to short the output to the running rail (Rectifier Negative).

The bonding Device automatically closes following the opening of the DC Track Feeder Breaker and opens before the DC Track Feeder Breaker closes.

Switch

One (1-0) 1 pole Motorised Off Load, fault make switch.

Handle with Padlock facility.

Interlock facility for the bonded position.

Features

- ❑ IP55
- ❑ Protected for external use
- ❑ 100mm Electrical Clearance

Installation

Plinth mounted, cable entry from below via aluminium gland plates

Cabling

2 x 1000mm² Incoming Traction Positive cables

2 x 1000mm² Outgoing Traction Positive cables

	8800331
Voltage	1000V
Current	4.4kA
Length	1500 mm
Height	2200 mm
Depth	840 mm
Weight	650kg

3.14 Other Isolation Switchgear with Bonding Devices

The list below includes other Isolation Switchgear with Bonding Devices and the page where the details can be found (in page order).

Product			Description	Deployed	Ref to Page
800160	TM	PSCS	1P 2kA Shoe gear Isolating & Bonding Switch (Eurostar)	Eurostar	153
8800138	TL	SFPI	1P Substation Feeder Isolator with Bonding	Croydon Tramlink	37
8800139	TL	SSM	2 x 1P 1.25kA Section Isolating & Bonding Switch	Croydon Tramlink	109
8800140	TL	SSM	2 x 1P 2kA Section Isolating & Bonding Switch	Croydon Tramlink	109
8800142	TL	ISM	1P Substation Feeder Isolator with Bonding	Croydon Tramlink	36
8800143	TL	SISM	2 x 1P 1.25kA Section Isolating & Bonding + Isolator Switch	Croydon Tramlink	110
8800144	TL	SISM	2 x 1P 2kA Section Isolating & Bonding + Isolator Switch	Croydon Tramlink	110
8800148	TM	SES	2P 2kA Shoe gear Isolating & Bonding Switch (Electrostar)	Bombardier	152
8800217	TL	SIS	3P 2000A Feeder Isolator with Bonding	Nexus	108
8800258	ML	CTS	3.2kA CTS Controlled Track Switch	Network Rail	122
8800259	ML	CTS	5kA CTS Controlled Track Switch	Network Rail	122
8800261	ML	DCP	1P 2000A Depot Contactor Panel with Bonding Device	Southern Rail	85
8800288	MLU	CP	2P 500A Depot Contactor Panel with Bonding	LU	68
8800289	MLU	CRCP	2P 500A Depot Cleaning Road Contactor Panel with Bonding	LU	71
8800320	ML	CO	1P 25kV AC 1250A 1.5kV / 1.5kV DC 800A / 3kV DC 400A	Eurostar	88
8800328	TL	FBI	1P 2000A Feeder Isolator with Bonding	Dockland Light Rail	102
8800336			2P Bonding Changeover Panel	Rutherford Appleton	201
8800358			4P Isolator & Bonding Switch	UKAEA	201
8800368	TL	SIS	1P 2000A Feeder Isolator with Bonding	Nexus	108
8800378	TL	OINB	1P Overhead Line Isolating & Negative Bonding Switch	Dublin LUAS	63
8800386	ML	DCP	1P 1000A Depot Contactor Panel with Bonding Device	Southern Rail	87
8800391	MLU	CP	2P 630A Depot Contactor Panel with Bonding	LU	68
8800392	MLU	CRCP	2P 630A Depot Cleaning Road Contactor Panel with Bonding	LU	71
8800420	TL	FBI	1P 2000A Feeder Isolator with Bonding	Metrolink	104

4 Railway Switchgear – DEPOT SHORE SUPPLIES

Power Isolation & Maintenance Switchgear Enclosures for:

Tramway & Light Railway



Underground









Main Line




DC Switchgear enclosures for the following applications:
Track to depot road feeds where ground level conductor rails are present.
Isolation & Bonding of depot roads, Depot road feeds to overhead lines with automatic negative bonding
Overhead Switchable Trolley's & Pedestals for connections to the trains, Changeover switching of depot roads
Emergency Power off Control Panels

4.1 TL – RCP Single and Twin Depot Road Contactor Panels - 8800482, 8800495

Dockland Light Railway – Beckton Depot

APPLICATION – ON LOAD

The Road Contactor Panels contain one or two 1000A 2 Pole Contactors which feed the Positive Overhead Trolleys or the outdoor siding track via 500A traction grade fuses and DC Overloads.

The Contactor Panels can switch on and off the road supply via the contactor, and also isolate the road supply and bond the outgoing circuits via in interlocked pair of disconnectors for safe electrical working on the road sections.

The Contactor Panel is operated remotely via the Remote Pendant at the stinger trolleys.

Switches and Contactor

1000A 2 Pole Contactor
2000A 2 Pole 1500V DC Incoming Disconnector
1250A Outgoing Bonding Switch

Enclosure

Material 2mm Zintec Sheet Steel
External Finish Goose Grey BS4800 Semi-Gloss 00A05
Internal Finish White Anti-Condensation paint

Features

- ❑ IP54
- ❑ 500A Traction Grade Fuse
- ❑ DC Overload Protection
- ❑ Anti-Condensation Heaters
- ❑ Anti-Condensation Paint

Installation

Floor mounted
Cable entry from the rear via split insulating plates

Cabling

Incoming Positive 2 x 1000mm^2 Aluminium
Outgoing Positive 1# 2 x 185mm^2
Outgoing Positive 2# 1 x 1000mm^2 Aluminium
Incoming Negative 2 x 250mm^2
Earth 1 x 150mm^2

	8800482	8800495
	Single RCP	Twin RCP
Voltage	750V DC	750V DC
Current	1kA	1kA
Length	1500 mm	2600 mm
Height	2205 mm	2200 mm
Depth	855 mm	855 mm
Weight	488kg	830kg

Tow Trolley Control Panel

The Road Contactor Panel is operated from the Remote Control Panel using a “Trolley Pendant Control” (not supplied).

The control panel provides signals to operate a Klaxon and to operate overhead 750V DC status Bulkhead Lights, neither of which are supplied by LCS.

Lifting Jacks interlock is an option

	8800309-V03	8800309-V04
	w/o Jacks	With Jacks
Length	415 mm	415 mm
Height	515 mm	515 mm
Depth	230 mm	230 mm
Weight	15kg	15kg

4.2 2kA 2 Pole (1-0-2) Feeder Isolator Switch 8800544-V01

NEXUS

Howdon Depot switchgear for NEXUS, the Feeder Isolator Switch consists of a 2.0kA 1.5kV 2P Disconnector in a bespoke enclosure.
The Disconnector has three positions, Earthed, Open and Closed and each position has a volt-free microswitch, wired out to terminals, available for external use. The Disconnector can be padlocked in all three positions and the enclosure door can be padlocked closed.

System Voltage	1500V DC
System Current	2000A
Material	3mm Hot Zinc Sprayed Sheet Steel
External Finish	Grey BS4800 00A05 (Goose Grey) Semi-Gloss
Internal Finish	White Anti-Condensation paint
Degree of Ingress Protection	IP54
Approx. Weight	240kg
Approx. Dimensions	1100 high, 800mm wide, 770mm deep

4.3 2kA 1.5kV 2 Pole (1-0) Off Load Bypass Switch 8800546-V01

NEXUS

The Off Load Bypass Switch consists of a 2.0kA 1.5kV 2P Disconnector in a bespoke enclosure.
The Disconnector has two positions, Open and Closed and each position has a volt-free microswitch, wired out to terminals, available for external use. The Disconnector can be padlocked in both positions and the enclosure door can be padlocked closed.

System Voltage	1500V DC
System Current	2000A
Material	3mm Hot Zinc Sprayed Sheet Steel
External Finish	Grey BS4800 00A05 (Goose Grey) Semi-Gloss
Internal Finish	White Anti-Condensation paint
Degree of Ingress Protection	IP54
Approx. Weight	230kg
Approx. Dimensions	1100 high, 800mm wide, 770mm deep

4.4 2kA 1 Pole (1-0-2) Depot Protection Isolator 8800142-V02

NEXUS

The Depot Protection Isolator consists of a 2.0kA 1.5kV Disconnector in a bespoke enclosure.
The Disconnector has three positions, Earthed, Open and Closed and each position has a volt-free microswitch, wired out to terminals, available for external use.
The Disconnector can be padlocked in all three positions and the enclosure can be padlocked closed.

System Voltage	1500V DC
System Current	2000A
Material	3mm Hot Zinc Sprayed Sheet Steel
External Finish	Grey BS4800 00A05 (Goose Grey) Semi-Gloss
Internal Finish	White Anti-Condensation paint
Degree of Ingress Protection	IP54
Approx. Weight	230kg
Approx. Dimensions	1100 high, 800mm wide, 550mm deep

4.5 8800142-V03 2kA 1 Pole Depot Protection Isolator with Lightning Arrester

NEXUS

The Gosforth Depot Protection Isolator consists of a 2.0kA 1.5kV Disconnector in a bespoke enclosure.
The Disconnector has two positions, Open and Closed and each position has a volt-free microswitch, wired out to terminals, available for external use. The Disconnector can be padlocked in both positions and the enclosure can be padlocked closed.
The surge arrestor is used to prevent damage in the event of a temporary overvoltage.
Note: The surge arrestor was specified by the customer. Part number: ABB POLIM-H 1.5 SD

System Voltage	1500V DC
System Current	2000A
Material	3mm Hot Zinc Sprayed Sheet Steel
External Finish	Grey BS4800 00A05 (Goose Grey) Semi-Gloss
Internal Finish	White Anti-Condensation paint
Degree of Ingress Protection	IP54
Approx. Weight	380kg
Approx. Dimensions	1858mm high x 1300mm wide x 855mm deep

4.6 TL DCP – 1 Pole Depot Contactor Panel - 2000A 1500V DC – 8800231, 8800232, 8800338
LUAS

APPLICATION – ON LOAD

2 pole switching of high-power circuits, where a high short circuit withstand and high voltage isolation is required.
Depot overhead line isolation for the **Dublin LUAS**

Contactors

8800231 - 4 Contactors 2000A
8800232 - 3 Contactors 2000A
8800338 - 2 Contactors 2000A

Features

- ❑ IP55
- ❑ Protected for external use
- ❑ 100mm Electrical Clearance
- ❑ Separate Control panel able to be mounted locally or remote from the contactor suite

Installation

Plinth mounted, cable entry from below via aluminium gland plates.

Cabling

4 x 250mm² cables in and out.

	8800231	8800232	8800338
Voltage	1500V	1500V	1500V
Current	2kA	2kA	2kA
Length	5940 mm	4650 mm	4520 mm
Height	2200 mm	2200 mm	2200 mm
Depth	1020 mm	1020 mm	1020 mm
Weight	2900kg	2250kg	1580kg

4.7 TL OINB – 1 Pole Overhead Line Isolator & Negative Bonding Switch - 2000A 1500V DC - 8800378
LUAS

APPLICATION – OFF LOAD

Single pole isolation and bonding of high-power circuits, where a high short circuit withstand and high voltage isolation is required.
Overhead line isolation and negative bonding on the **Dublin LUAS** to allow safe maintenance and possession.

Switch

One (1-0-2) 1 pole Manual Off Load, switch.
Padlockable handle
Interlock facility for the bonded position.

Features

- ❑ IP55
- ❑ Protected for external use
- ❑ 60mm Electrical Clearance

Installation

Plinth mounted, cable entry from below via aluminium gland plates.

Cabling

2 x 250mm² Incoming Traction Positive cables
2 x 250mm² Outgoing Traction Positive cables

	8800378
Voltage	1500V
Current	2kA
Length	800 mm
Height	1500 mm
Depth	550 mm
Weight	220kg

4.8 TL SSIP – 1 Pole Depot Stabling Panel – 2000A 1500V DC - 8800379, 8800228, 8800337

LUAS

APPLICATION –OFF LOAD

Distribution of Depot feeds to tracks or overhead lines, on **Dublin LUAS**

Construction

3 mm steel hot zinc sprayed outdoor enclosure.
Heavy duty insulated operating handles.
Padlock facilities for both open and closed.

Features

Interlocked with the control room

Cabling

4 x 185mm² cables in and out

Installation

The panel can be secured using M16 anchor bolts to the floor

Switch Features

Large isolation distance
Self-cleaning contacts
High withstand to short circuit currents

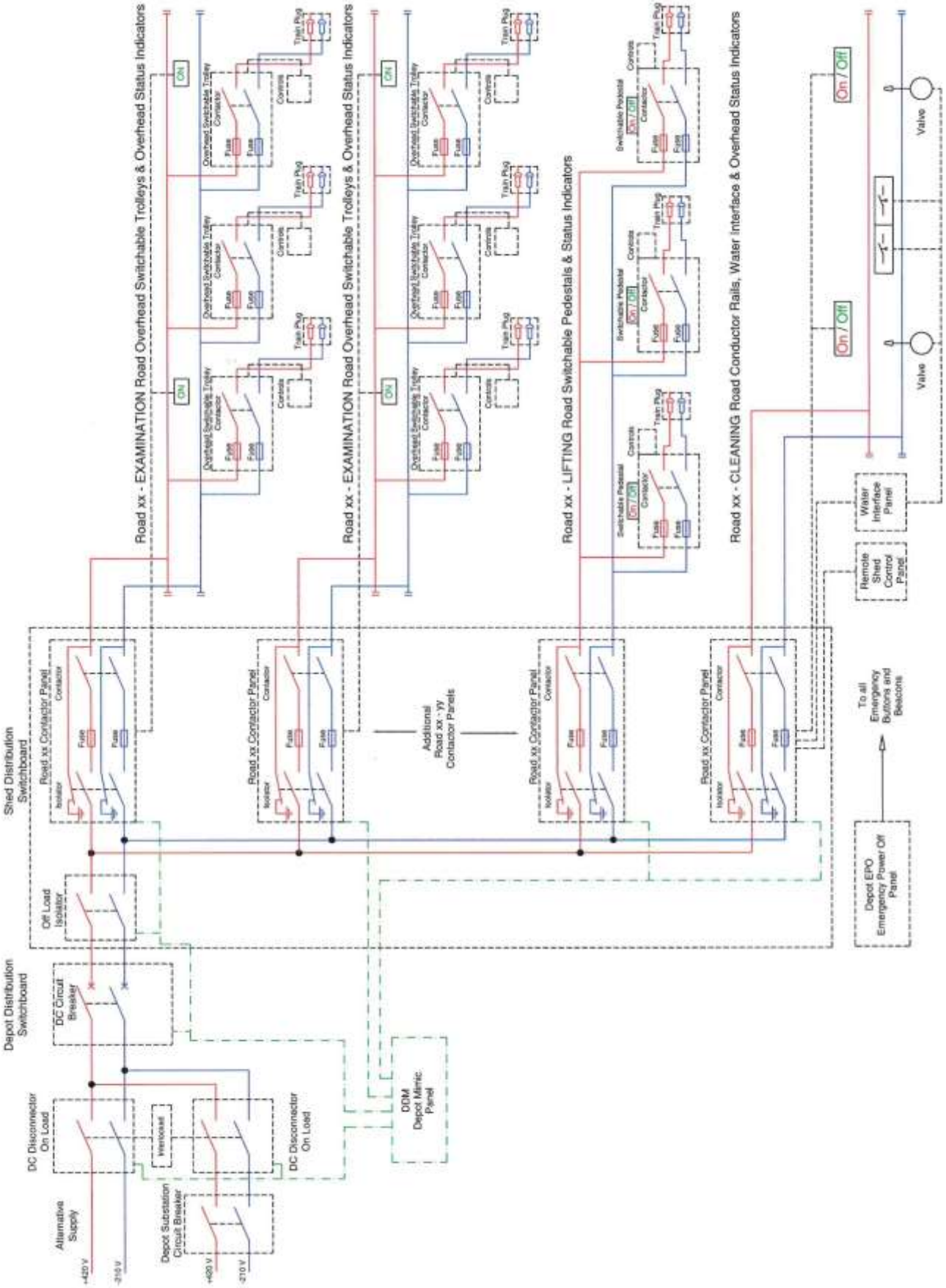
Electrical Characteristics

Nominal Current	2000 A
1st wave peak value	150kA
I r.m.s.	70kA for 1 s
Nominal Voltage	1500V

Dimensions

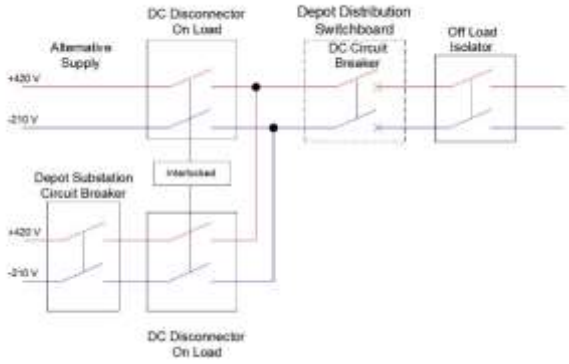
	8800379	8800228	8800337
No of Off Load Switches	5	3	7
Length	3900 mm	2490 mm	5320 mm
Height	1600 mm	1600 mm	1600 mm
Depth	550 mm	550 mm	550 mm
Weight	850 kg	570kg	1130 kg

4.9 Depot Shore Supply Systems 2 Pole (Typically for London Underground)

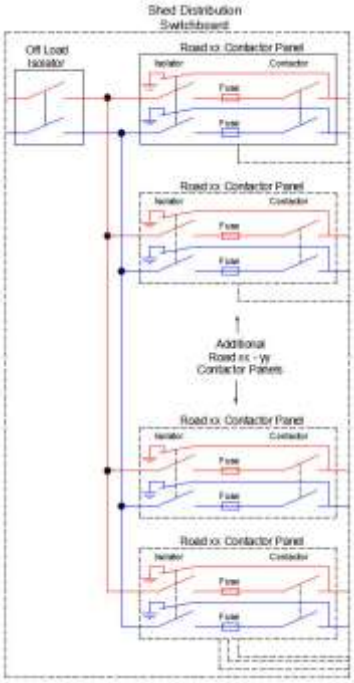


The complete system is isolated OR alternatively supplied via **On Load DC Disconnectors**.

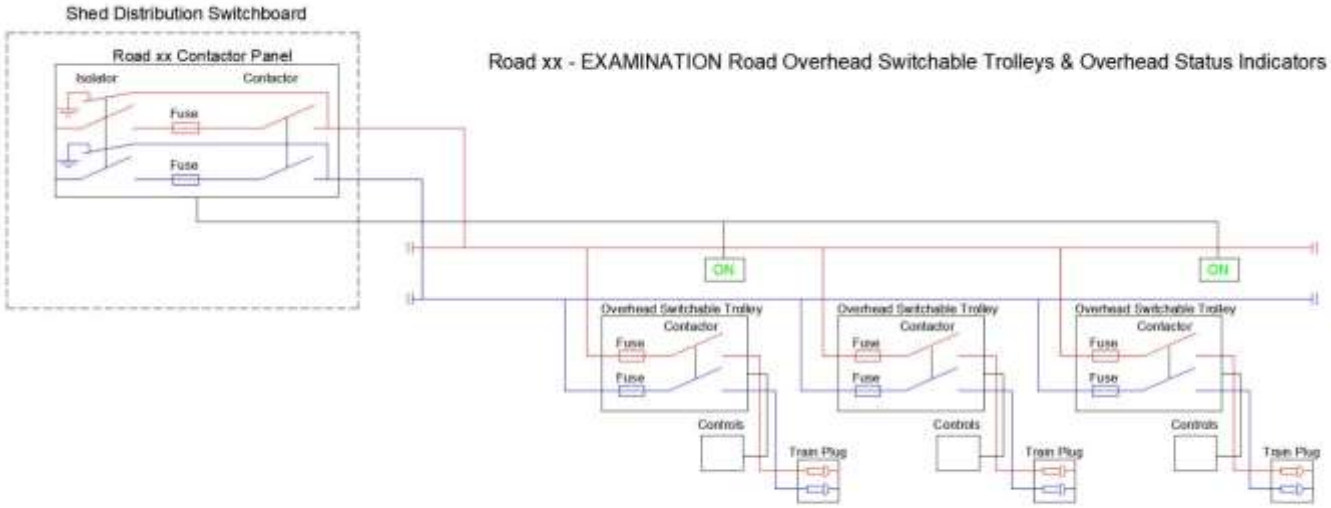
The depot is then protected by Depot Distribution Circuit Breakers.
The Breakers feed suites of Depot Road Contactors, typically for a particular shed or section of a shed. Each Suite has its own Incoming Off Load Isolator for contactor suite maintenance.



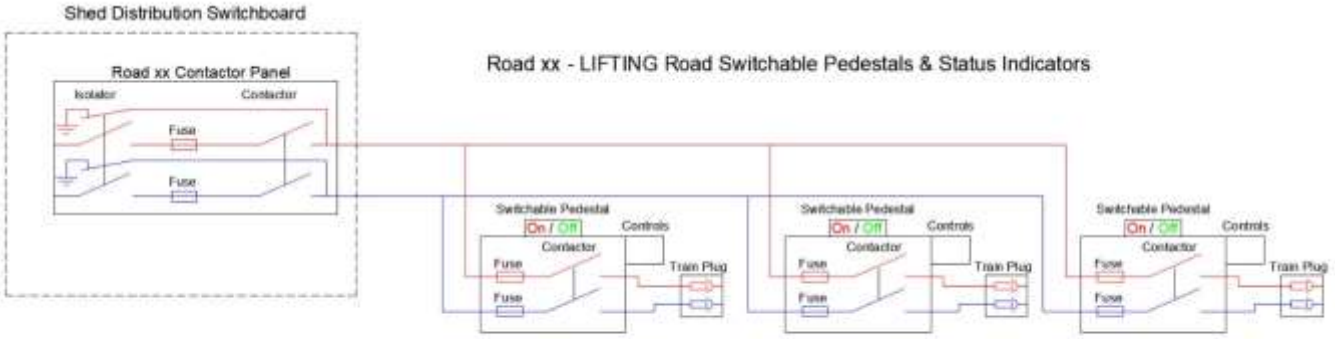
The makeup of this Contactor Suite can contain Examination or Lifting Road Contactors OR Cleaning Road Contactors.



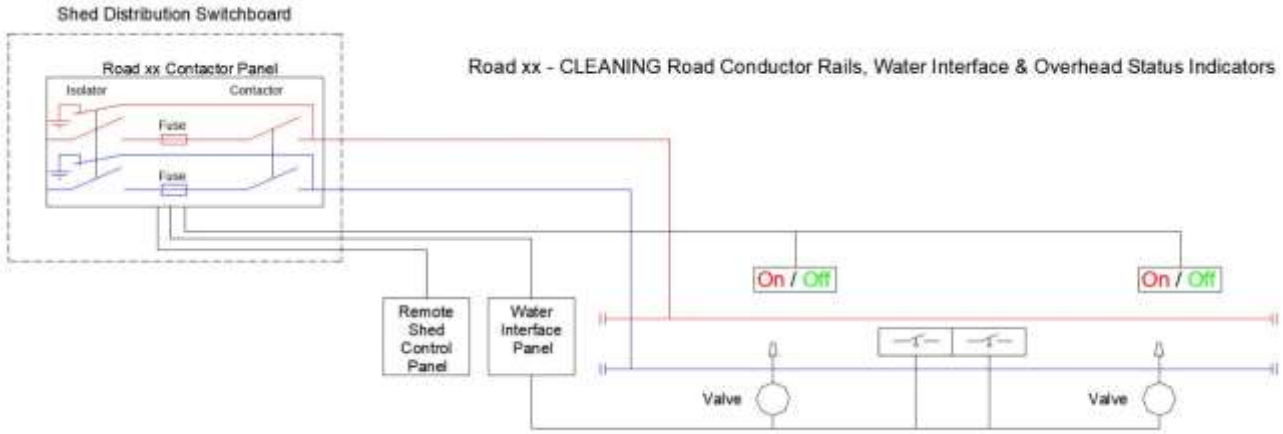
Examination Road Contactors feed Overhead bus bars which in turn feed Overhead Switchable Trolleys.



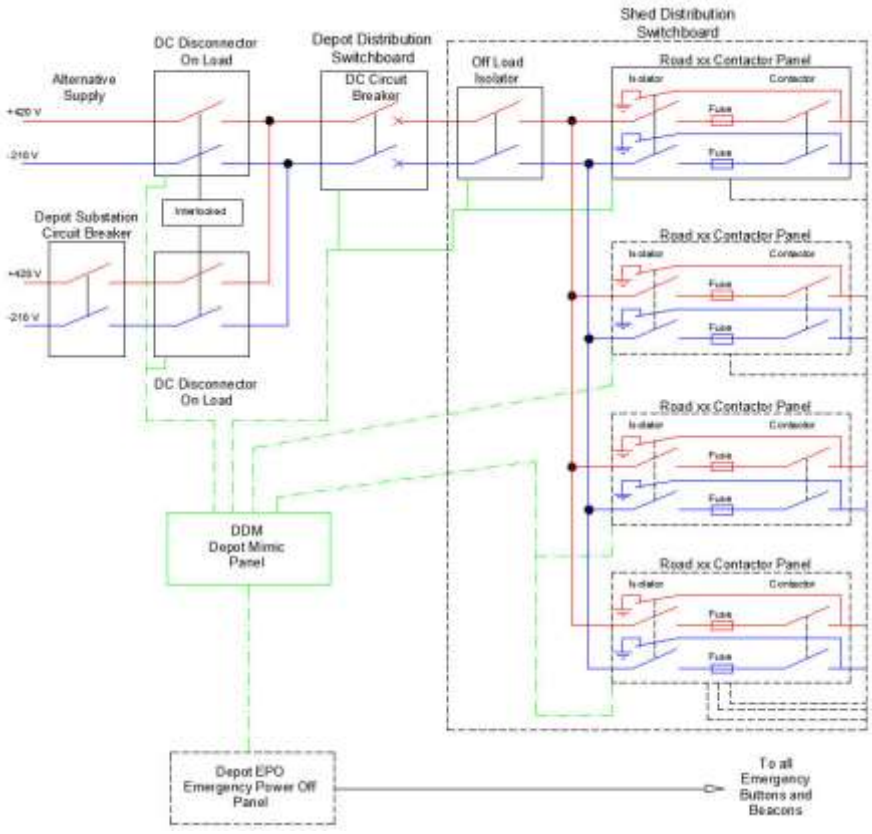
Lifting Shed Contactors feed Switchable Pedestals.



Cleaning Road Contactors contain more monitoring equipment because they feed the Conductor Rails of the Cleaning Road. This panel is interfaced with the Water supplies and controls Overhead Status Indicators for the Conductor Rail Status.



A Mimic Panel in the DDM office monitors the status of each piece of equipment in the depot power system.
An EPO Emergency Power Off Panel comprises approved Safety Relays which monitor groups of Emergency Power Off pushbuttons which are distributed throughout the depot.



ALL DEPOT CONTACTORS ARE AVAILABLE FROM 500A UPWARDS

4.10 MLU CP – 2 Pole Exam Road Depot Contactor Panel - 500A or 630A 630V DC - 8800288, 8800391

London Underground

APPLICATION – ON LOAD

The 630V DC is then fed directly from the Contactor to the Road Shore Supply for the Overhead Switchable Trolleys (8800290) OR to the Lifting Shed Power Pedestals (8800291).

The 630V DC is fed to the 2 pole contactor via:
4 pole Isolating & Bonding Disconnector, which has interlocks for Maintenance and Secure Isolations. These prevent contactor operation and the 630V DC supply when maintenance is being performed.
The Contactor provides signals to the Overhead Status Indicators OSI and the Mimic Panel in the DDM Office.
When the Disconnector is moved to the Earthed position the outgoing supplies to the Examination or Lifting Sheds are earthed and can be locked, making them safe for maintenance.

Contactor
Traction grade bar type 500A or 630A 2 Pole Contactor
Fuse
Positive and negative traction grade fuses
Switch
One (1-0-E) 4 pole Manual Off Load, switch
Pad lockable handle
Interlock facility for the bonded position & open positions.
Features

- ❑ IP54
- ❑ Protected for internal use
- ❑ 60mm Electrical Clearance
- ❑ Anti-Condensation paint

Installation
Plinth mounted, 630V DC supply is derived from the bus bar chamber at the bottom.
Cabling
2 x 250mm² Incoming Traction Positive cables
2 x 250mm² Outgoing Traction Positive cables

	8800288	8800391
Voltage	630 Volts DC (900V DC Max.)	630 Volts DC (900V DC Max.)
Current	500A	630A
No of Poles	2	2
Length	1300 mm	1300 mm
Height	2100 mm	2100 mm
Depth	600 mm	600 mm
Weight	420kg	450kg

Shed Board Isolator
Application – Off Load
The 630V DC is fed from a Shed Board Isolator (8800287) via bus bars which connect into the suite of Contactor Panels. This is interlocked with the contactors so that all of the contactors will de-energise if the isolator is operated ensuring off load operation.
Cabling
1 x 935mm² Incoming Traction Positive cable
1 x 935mm² Incoming Traction Negative cable

	8800287
Voltage	630 Volts DC (900V DC Max.)
Current	2000A
No of Poles	2
Length	800 mm
Height	1800 mm
Depth	600 mm
Weight	325kg

4.11 OST 2 Pole Overhead Switchable Trolley - 8800290, 8800304

London Underground

APPLICATION – ON LOAD

The Overhead Switchable Trolley mounts on a 4 inch wide overhead 'I' beam.
The Road 630V DC is then fed directly from the Contactor to the 630V DC Traction Power supply overhead supply bars. The Trolley Brush collectors pick up the supply from the supply bars.
Two 110V AC control supply collectors pick up the supply from two control bars fitted along the length of each road.
The Shore Supply Plug is fitted with a Plug Engaged sensor which inhibits the application of Traction Power to the train unless a magnet in the train receptacle to detected.
The Trolley supplies Traction Power to trains in the depot area via a Shore Supply Plug. The Shore Supply Plug is stowed in the area underneath the Local Operator Station and hangs from the Trolley.
There is a high level frangible link that disconnects under strain thus preventing damage to the trolley should the train be moved out of the depot with the plug remaining in the train receptacle.

Contactor

Traction grade bar type 2 Pole Contactor

Fuse

Positive and negative traction grade fuses.

Features

- ❑ IP32
- ❑ Protected for internal use
- ❑ 60mm Electrical Clearance
- ❑ Self-compensating shock absorber
- ❑ Stainless steel carriage & wheels
- ❑ EMC Tested
- ❑ Tested to an inductive time constant of 150ms

The enclosure is segregated into three areas:

- ❑ The left hand section houses the two traction fuses.
- ❑ The centre section houses the contactor, the voltage monitor & fuses, and isolation relay.
- ❑ The right hand section houses the earth leakage detector and control equipment

Installation

The carriage mounts on a 4 inch wide overhead 'I' beam

Cabling

1 x 50mm² Outgoing Traction Positive cable
1 x 50mm² Outgoing Traction Negative cable

	8800290	8800304
Voltage	630 Volts DC (900V DC Max.)	630 Volts DC (900V DC Max.)
Current	150A	200A
Length	1013 mm	1085 mm
Height	526 mm	744 mm
Depth	426 mm	520 mm
Weight	105kg	150kg

Overhead Status Indicator 8800293

The OSI indicates when a voltage less than 60V detected (fail safe) on the overhead bars that feed the 630V DC to the trolley. More than one unit is required for each road and typically 3 are deployed on each road.

4.12 PP 2 Pole Power Pedestal 150A or 200A with Optional Boom - 8800291, 8800452

London Underground

APPLICATION – ON LOAD

The Road 630V DC is then fed directly from the Contactor to the Power Pedestal.
Two 110V AC control supply is also derived from the respective Contactor panel.
The Shore Supply Plug is fitted with a Plug Engaged sensor which inhibits the application of Traction Power to the train unless a magnet in the train receptacle to detected.
The Pedestal supplies Traction Power to trains in depot lifting sheds via a Shore Supply Plug. The Shore Supply Plug is stowed in the area underneath the Local Operator Station and the cable is coiled either on the end of a middle road enclosure or on the boom or wall bracket for outer road enclosures.
There is a frangible link that disconnects under strain thus preventing damage to the pedestal should the train be moved out of the depot with the plug remaining in the train receptacle.
Shore supply status beacons are positioned on top of the Power Pedestal enclosure

Contactor

Traction grade bar type 2 Pole Contactor

Fuse

Positive and negative traction grade fuses

Features

- ❑ IP54
- ❑ Protected for internal use
- ❑ 60mm Electrical Clearance
- ❑ Doors that give access for maintenance are interlocked with the road contactor panel isolator

The enclosure is segregated into three areas:

- ❑ The lower left hand section houses the two traction fuses and the supply connection lugs
- ❑ The top section houses the contactor, the voltage monitor & fuses, isolation relay and earth leakage CT
- ❑ The lower right hand section houses the earth leakage detector and the control equipment

Installation

Floor mounted

Cabling

8800291	8800452
1 x 50mm^2 Outgoing Traction Positive cable	1 x 75mm^2 Outgoing Traction Positive cable
1 x 50mm^2 Outgoing Traction Negative cable	1 x 75mm^2 Outgoing Traction Negative cable

	8800291	8800452
Voltage	630 Volts DC (900V DC Max.)	630 Volts DC (900V DC Max.)
Current	150A	200A (For S- Stock)
Length	1013 mm	1050 mm
Height	526 mm	1500 mm
Depth	426 mm	600 mm
Weight	105kg	275kg

Optional Overhead Boom

The overhead boom ensures that a clear walkway is maintained through the lifting shed. The trip hazard is limited to beyond the yellow passage markings. The local control station is situated on the other end of the boom along with the cable stowage.

Parked Overhead Boom

Overhead Boom in use

4.13 MLU CRCP – 2 Pole Depot Cleaning Road Contactor Panel - 500A or 630A 750V DC – 8800289, 8800392

London Underground

APPLICATION – ON LOAD

These 630V DC bus bars are connected into a suite of Contactor Panels and the incoming supply to these bus bars is fed by a Shed Board Isolator (8800287). The 630V DC is then fed directly from the Contactor to the Cleaning Road conductor rails. The 630V DC is fed to the 2-pole contactor via: 4 pole Isolating & Bonding Disconnector, which has interlocks for Maintenance and Secure Isolations. These prevent contactor operation and the 630V DC supply when maintenance is being performed. The Contactor provides signals to the Cleaning Road Overhead Status Indicators COSI and the Mimic Panel in the DDM Office.

When the Disconnector is moved to the earthed position the outgoing supplies to the Cleaning Road Conductor Rails earthed and can be locked, making them safe for maintenance.

Control of the contactor supply can be done at a remote-control panel at the end of the road or at local control buttons at the contactor in the Switch room.

The contactor panel is interlocked with the Depot Fire Alarm, Sump Pumps and Flood Sensors

Contactor

Traction grade bar type 500A or 630A 2 Pole Contactor

Fuse

Positive and negative traction grade fuses.

Switch

One (1-0-E) 4 pole Manual Off Load, switch.

Pad lockable handle

Interlock facility for the bonded position & open positions.

Features

- ❑ IP54
- ❑ Protected for internal use
- ❑ 60mm Electrical Clearance
- ❑ Anti-Condensation paint

Installation

Plinth mounted, 630V DC supply is derived from the bus bar chamber at the bottom.

Cabling

1 x 935mm² Outgoing Traction Positive cable

1 x 935mm² Outgoing Traction Negative cable

	8800289	8800392
Voltage	630 Volts DC (900V DC Max.)	630 Volts DC (900V DC Max.)
Current	500A	630A
Length	1300 mm	1300 mm
Height	2100 mm	2100 mm
Depth	600 mm	600 mm
Weight	450kg	450kg

Remote Control Panel

Shed Board Isolator

Application – Off Load

The 630V DC is fed from a Shed Board Isolator (8800287) via bus bars which connect into the suite of Cleaning Road Contactor Panels. This is interlocked with the contactors so that all of the contactors will de-energise if the isolator is operated ensuring off load operation.

Cabling

1 x 935mm² Incoming Traction Positive cable

1 x 935mm² Incoming Traction Negative cable

	8800287
Voltage	630 Volts DC (900V DC Max.)
Current	2000A
Length	800 mm
Height	1800 mm
Depth	600 mm
Weight	325kg

Cleaning Road Overhead Status Indicator COSI 8800292

The overhead status indication of the conductor rail 630V DC power (for more details refer to 15.19).

London Underground

4.14 EPO Emergency Power Off Interface Panel - 8800444

The Emergency Power Off Panel comprises approved **Safety Relays** which monitor groups of Emergency Power Off pushbuttons which are distributed throughout the depot.

Features

- Degree of Ingress Protection IP54
- Material2mm Sheet Steel
- Finish RAL 7032 Grey

Supply Voltage

110V AC ±10% 50Hz

Internal Control Voltages

110V AC ±10% 50Hz

48V DC ±10%

The EPO Panel should be permanently connected to a 110VAC 50Hz power supply. This should be a 'secure power supply', supported by a UPS.

	8800444-V01	8800444-V02	8800444-V03
EPO Beacon Supply	20A	5A	5A
Length	800 mm	400 mm	600 mm
Height	1500 mm	1000 mm	1000 mm
Depth	215 mm	215 mm	215 mm
Weight	112kg	36kg	45kg

4.15 Water Interface Panel - 8800443

The Cleaning Road Water Interface Panel ensures that the Road 630V DC supply and the Cleaning Road Water supplies cannot be 'on' at the same time.

Initiation of 630V DC power supply to the road at the Contactor Panel Remote Control causes the water systems to be isolated and upon receipt of confirmation that they are isolated the Contactor will close.

Switching off the 630V DC at the Road Contactor Remote panels will reinstate the Cleaning Water supply.

Features

- Degree of Ingress Protection IP55 & NEMA12
- Material 1.5mm Sheet Steel
- Finish RAL 7035 Grey

	8800443-V01
UPS supported Secure Supply	110V ac
Rated Service Current I	2A
Length	800 mm
Height	1000 mm
Depth	300 mm
Weight	67kg

4.16 Battery Charger Changeover Panel - 8800460

The Battery Charger Changeover Panel has been design for the purpose of interfacing the 110V DC battery chargers used to supply the DC traction switchgear in Neasden depot E1 switch room.

The panel enables two battery chargers to be used in a redundant configuration, allowing either to be isolated for maintenance without interrupting the supply from the other one. In normal use both battery chargers are used to supply 110V DC in parallel.

Diode blocking prevents a fault on one charger from affecting the supply from the other.

The panel also allows the mains supply for either charger to be manually switched over from the usual 230V LVAC supply to the UPS fed 110V AC supply in the case of a supply fault, to further increase availability.

	8800460
Battery Supply	110V dc
Length	400 mm
Height	500 mm
Depth	210 mm
Weight	18kg

London Underground

4.17 Siding Outlet Plunger Box - 8800457

These drivers' plunger switches are intended for train driver to inform the signalman he is ready to move
The door needs is hinged at the top and a non-locking latch at the bottom which can be lifted up to access the plunger which prevents unintentional operation and the rain getting at the switch.
They are 100v AC (5amp) single push to make closed contacts and spring return to an open contacts when not pushed.
They mount on a concrete post which is 150mm wide.

Construction

- ❑ 3.0mm Stainless Steel Sheet 1.4003
- ❑ Stainless steel concealed hinges
- ❑ Colour BS381C - Light Admiralty Grey No.697 Semi -Gloss Finish

	8800457
Supply	100V ac
Length	150 mm
Height	300 mm
Depth	150 mm
Weight	6kg

4.18 EPO/Emergency Shower Interface Panel - 8800455

Monitors a proximity sensor for the emergency shower.
Beacon activated when the sensor is operated.
The system can be reset via a Padlockable reset switch when the conditions are back to normal.

	8800455
Supply	100V ac
Current	0.25A
Length	300 mm
Height	300 mm
Depth	225 mm
Weight	9kg

4.19 4kA 2 Pole Off-Load Disconnector in GRP Enclosure - 8800438

London Underground

APPLICATION - OFF LOAD
Manual road isolation for **Depots**
Switches
One (1-0) 2 pole off load manual disconnector
Construction

- ❑ IP55
- ❑ GRP insulating enclosure
- ❑ Protected for external use

Features

- ❑ 60mm electrical clearance
- ❑ Mechanical interlocking

Installation
Insulating plinth mounted, cable entry from below via aluminium gland plates.
Cabling
Traction Positive 2 x 935mm^2 cable
Traction Negative 2 x 935mm^2 cable
Electrical Characteristics & Dimensions

	8800438
Voltage	630V DC
Current	4000 A
Length	1070 mm
Height	1875 mm
Depth	750 mm
Weight	178kg

4.20 MLU RCTIS & CRI – 2P Remote Controlled Track Isolator or Cleaning Road Isolator– 3150/4000A 630V DC

London Underground

APPLICATION - ON LOAD

Road Isolation for various applications with a remote-control panel for **Depots**.

Switches

Two (1-0) 1 pole 230V AC motorised switch

Construction

- ❑ IP55
- ❑ 3mm sheet steel
- ❑ Protected for external use

Features

- ❑ 60mm electrical clearance
- ❑ Mechanical interlocking

Installation

Plinth mounted, cable entry from below via aluminium gland plates.

Cabling

Traction Positive 1 or 2 x 935mm^2 cable in and out

Traction Negative 1 or 2 x 935mm^2 cable in and out

Electrical Characteristics & Dimensions

Northumberland Park RCTIS
8800203-V01

Northfields CRI
8800209

Heathrow RCTIS
8800318

	8800203	8800209	8800317	8800318	8800352
	Various depots	Northfields	Heathrow T5	Heathrow T5	Stanmore
Type	**RCTIS**	**CRI**	**RCTIS**	**RCTIS**	**RCTIS**
Voltage	630V DC	630V DC	630V DC	630V DC	630V DC
Current	3150A	3150 A	3150A	3150A	4000A
Length	2380 mm	2380 mm	2380 mm	2380 mm	2380 mm
Height	1850 mm	1850 mm	1850 mm	1850 mm	1850 mm
Depth	750 mm	750 mm	750 mm	750 mm	750 mm
Weight	775kg	775kg	775kg	775kg	805kg

Remote Control Units configured to the different applications:

Neasden
8800203

Neasden
8800203

Northfields
8800203

Northfields
8800209

Heathrow T5
8800317 & 318

Stanmore
8800352

4.21 MLU MTIS – 2 Pole Manual Track Isolating Switch - 3150A or 4000A 630V DC - 8800360

London Underground

APPLICATION - ON LOAD

Depot Shed Switchroom Isolation, Depot Road Isolation and Main Line sectioning.

Supplied to London Underground on the **BCV DEISIP Project, VLU Victoria Line Upgrade & SSR Metropolitan Line Upgrade**

Switches

Two (1-0) 1 pole on load switches

Construction

- ❑ IP55
- ❑ 3mm sheet steel
- ❑ Protected for External use

Features

- ❑ 60mm electrical clearance
- ❑ Mechanical interlocking

Installation

Plinth mounted, cable entry from below via aluminium gland plates.

The 4000A MTIS has rear mounting straps (not visible in the picture) for alternative mounting. Pile mounting version is also available.

Cabling

Traction Positive Incoming 2 x 935mm^2 cables
Traction Negative Incoming 2 x 935mm^2 cables
Traction Positive Outgoing 2 x 935mm^2 cables
Traction Negative Outgoing 2 x 935mm^2 cables

Electrical Characteristics & Dimensions

Voltage	630V DC
Current	4000A
Length	2380 mm
Height	1850 mm
Depth	750 mm
Weight	762kg

8800360-V01	**Manual Track Isolating Switch 4kA 2 Pole – Standard**	
8800360-V02	**Manual Track Isolating Switch 4kA 2 Pole – Rear Mounting Straps**	
8800360-V03	**Motorised Locally Controlled Track Isolating Switch 4kA 2 Pole**	
8800360-V04	**Manual Track Isolating Switch 4kA 2 Pole – Pile Mounting**	
8800360-V05	**Manual Track Isolating Switch 4kA 2 Pole – Without Torque Limiter**	
8800360-V06	**Manual Track Isolating Switch 4kA 2 Pole - Base Increased by 355mm in height**	
8800360-V07	**Manual Track Isolating Switch 4kA 2 Pole – Slimline**	
8800360-V08	**2 Pole 4kA MTIS with 4 × 935 mm² Cable Connections**	
8800360-V09	**2 Pole 4kA MTIS with KNICK Transducers**	
8800286	**Manual Track Isolating Switch 3.15kA 2 Pole**	

4.22 MLU MDS – 2 Pole Manual Disconnector Switch - 3150A 630V DC - 8800397, 8800445

London Underground

Application, Electrical Characteristics & Dimensions

As per page 75.

8800397	**MDS – 2 Pole Manual Disconnector Switch - 4000A**

8800445	**MDS – 2 Pole Manual Disconnector Switch - 4000A With Top Entry**

4.23 MLU MDDS – 2 Pole Motor Driven Track Isolator - 3150A or 4000A 630V DC - 8800307

London Underground

APPLICATION - ON LOAD

Depot Shed Switchroom or Road isolation

Switches

Two (1-0) 1 pole

Construction

- ❑ IP55
- ❑ 3mm sheet steel
- ❑ Protected for external use

Features

- ❑ 60mm electrical clearance
- ❑ Mechanical interlocking
- ❑ Local external open / closed indication

Installation

Plinth mounted, cable entry from below via aluminium gland plates

Electrical Characteristics, Cabling & Dimensions

	8800307
Voltage	630V DC
Current	3150A
Length	2380 mm
Height	1850 mm
Depth	750 mm
Weight	722kg
Traction Positive	Up to 2 x 935mm^2 cable
Traction Negative	Up to 2 x 935mm^2 cable

4.24 MLU MDDS – 2 Pole Motor Driven Track Isolator LH & RH - 2000A 630V DC - 8800305, 8800306

London Underground

APPLICATION - ON LOAD

Depot Shed Switchroom or Road isolation

Switches

Two (1-0) 1 pole

Construction

- ❑ Lightweight two part cubicle
- ❑ Left Hand & Right Hand configurations
- ❑ IP55
- ❑ 3mm sheet steel
- ❑ Protected for External use

Features

- ❑ 60mm electrical clearance
- ❑ Mechanical interlocking

Installation

Plinth mounted, cable entry from below via aluminium gland plates.

Cabling

Traction Positive 1 x 935mm^2 cable

Traction Negative 1 x 935mm^2 cable

Electrical Characteristics & Dimensions

	8800305	8800306
	Left Hand	Right Hand
Voltage	630V DC	630V DC
Current	2000A	2000A
Length	1650 mm	1650 mm
Height	1650 mm	1650 mm
Depth	615 mm	615 mm
Weight	250kg	250kg

4.25 MLU DTS – 2 Pole Depot Track Switch - 2000A 630V DC - 8800072

London Underground

APPLICATION - ON LOAD

Depot road isolation for **LUL Depots**

Switches

One (1-0) 2 pole 230V AC motorised switch

Construction

- ❑ IP55
- ❑ 3mm sheet steel
- ❑ Protected for external use

Features

- ❑ 60mm electrical clearance
- ❑ Mechanical interlocking

Installation

Plinth mounted, cable entry from below via aluminium gland plates

Cabling

Traction Positive 1 x 935mm^2 cable

Traction Negative 1 x 935mm^2 cable

Electrical Characteristics & Dimensions

	8800072
Voltage	630V DC
Current	2000A
Length	1790 mm
Height	1505 mm
Depth	600 mm
Weight	307kg

4.26 MLU MCOIS – 2 Pole Manual Changeover Isolator Switch - 4000A 630V DC - 8800363

London Underground

APPLICATION – ON LOAD

Isolation and/or switching of high-power circuits, where a high short circuit withstand and high voltage isolation is required.
Typically used by **London Underground** for depot track road changeover switching.

Disconnector

Manually operated on load, fault make / load break Disconnector

Features

- ❑ IP56
- ❑ Protected for external use
- ❑ Anti-Graffiti Paint Finish
- ❑ 60mm Electrical Clearance
- ❑ Interlocking between supplies 1# & 2# to ensure only one can be on at a time
- ❑ Interlocking for full isolation of both supplies

Installation

Plinth mounted or wall mounted from rear straps (not visible in the picture), cable entry un-drilled Aluminium gland plates.

Cabling

Traction Positive Incoming	3 x 935mm² Copper Cable
Traction Negative Incoming	3 x 935mm² Copper Cable
Traction Positive Outgoing 1#	3 x 935mm² Copper Cable
Traction Negative Outgoing 1#	3 x 935mm² Copper Cable
Traction Positive Outgoing 2#	3 x 935mm² Copper Cable
Traction Negative Outgoing 2#	3 x 935mm² Copper Cable

Electrical Characteristics & Dimensions

	8800363
Voltage	630V DC
Current	4000A
Weight	1180kg
Length	2450 mm
Height	2392 mm
Depth	1171 mm

4.27 MLU MCOD - 2 Pole Manual Changeover Off load Disconnector 4000A 630V DC - 8800435

London Underground

APPLICATION – OFF LOAD

Isolation and/or switching of high-power circuits, where a high short circuit withstand and high voltage isolation is required.
Typically used by **London Underground** for depot track road changeover switching.

Disconnector

Manually operated off load, fault make Disconnector

Features

- ❑ IP56
- ❑ Protected for external use
- ❑ Anti-Graffiti Paint Finish
- ❑ 60mm Electrical Clearance
- ❑ Interlocking between supplies 1# & 2# to ensure only one can be on at a time
- ❑ Interlocking for full isolation of both supplies

Installation

Plinth mounted, cable entry un-drilled Aluminium gland plates.

Cabling

Traction Positive Incoming	3 x 935mm² Copper Cable
Traction Negative Incoming	3 x 935mm² Copper Cable
Traction Positive Outgoing 1#	3 x 935mm² Copper Cable
Traction Negative Outgoing 1#	3 x 935mm² Copper Cable
Traction Positive Outgoing 2#	3 x 935mm² Copper Cable
Traction Negative Outgoing 2#	3 x 935mm² Copper Cable

Electrical Characteristics & Dimensions

	8800435
Voltage	630V DC
Current	4000A
Weight	780kg
Length	2050 mm
Height	2040 mm
Depth	743 mm

4.28 MLU RCTIS – 2 Pole Motor Driven Changeover Isolator Switch with Remote Panel - 4000A 630V DC- 8800471

APPLICATION – ON LOAD

Isolation and/or switching of high-power circuits, where a high short circuit withstand and high voltage isolation is required. Typically used by **London Underground** for depot track road changeover switching.

Disconnector

Motor Driven on load, fault make / load break Disconnector

Features

- ❑ IP56
- ❑ Protected for external use
- ❑ Anti-Graffiti Paint Finish
- ❑ 60mm Electrical Clearance
- ❑ Interlocking between supplies 1# & 2# to ensure only one can be on at a time
- ❑ Interlocking for full isolation of both supplies

Installation

Plinth mounted or Pile mounted, cable entry un-drilled Aluminium gland plates.

Cabling

Traction Positive Incoming	3 x 935mm² Copper Cable
Traction Negative Incoming	3 x 935mm² Copper Cable
Traction Positive Outgoing 1#	3 x 935mm² Copper Cable
Traction Negative Outgoing 1#	3 x 935mm² Copper Cable
Traction Positive Outgoing 2#	3 x 935mm² Copper Cable
Traction Negative Outgoing 2#	3 x 935mm² Copper Cable

Electrical Characteristics & Dimensions

	8800471-V01	8800471-V02
Voltage	630V DC	630V DC
Current	4000A	4000A
Weight	1202kg	1180kg
Length	2450 mm	2450 mm
Height	1980 mm	2280 mm
Depth	1172mm	943 mm

Pile Mounting

Plinth Mounting

MLU TCOS – 2 Pole Track Changeover Switch - 2000A 630V DC - 8800073

London Underground

APPLICATION - ON LOAD

2 pole changeover switching of depot roads on **LUL Depots**

Switches

Two (1-0) 2 pole chain driven 230V AC motorised switches

Construction

- ❑ IP55
- ❑ Protected for external use
- ❑ Low Smoke Paint Finish

Features

- ❑ 60mm Electrical Clearance
- ❑ Padlocking facility

Cabling

4 x 935mm² cables in and out

Installation

Plinth mounted, cable entry from below via aluminium gland plates

Electrical Characteristics & Dimensions

Nominal Current	2000 A
Peak let through Current Ic	10 000 A
Rated Short Term Withstand Current 1 min	6 000 A
Rated Short Circuit Peak value	75 000 A
Nominal Voltage	1000V

	8800073
Voltage	630V DC
Length	1800 mm
Height	2200 mm
Depth	750 mm
Weight	520kg

4.29 MLU CWRS – 2 Pole Remote Controlled Wash Road Contactor - 3200A 630V DC - 8800284

London Underground

APPLICATION – ON LOAD

Isolation and/or switching of high-power circuits, where a high short circuit withstand and high voltage isolation is required. Typically used by **London Underground** for depot track wash road switching.

Contactor

Motor driven On Load, fault make / load break contactor

Features

- ❑ IP56
- ❑ Protected for external use
- ❑ Anti-Graffiti Paint Finish
- ❑ 60mm Electrical Clearance
- ❑ Earth Fault Current Detection
- ❑ High Speed under voltage release

Installation

Plinth mounted cable entry un-drilled Aluminium gland plates

Cabling

Electrical Characteristics & Dimensions

	8800284
Voltage	630V DC
Current	3200A
Weight	909kg
Length	1995 mm
Height	2540 mm
Depth	1100 mm

4.30 MLU CWRS – 2 Pole Remote Controlled Wash Road Contactor - 8800409

London Underground

APPLICATION – ON LOAD

Isolation and/or switching of high-power circuits, where a high short circuit withstand and high voltage isolation is required. Typically used by **London Underground** for depot track wash road switching. Local or Remote Control via a purpose-built stainless steel remote panel.

Contactor

2 pole On Load, fault make / load break contactor

Disconnector

2 x Off Load / fault make 2000A 1kV switches

Traction Grade Fuses

2 x Match pair 1000A 1500V DC Fuses (2000A rating)

Features

- ❑ IP56
- ❑ Protected for external use
- ❑ Anti-Graffiti Paint Finish
- ❑ 60mm Electrical Clearance
- ❑ High Speed under voltage release
- ❑ Emergency pushbutton interface

Installation

Plinth mounted, cable entry un-drilled Aluminium gland plates.

Cabling

Traction Positive Incoming & Outgoing	1 x 935mm^2 Copper Cable
Traction Negative Incoming & Outgoing	1 x 935mm^2 Copper Cable

Electrical Characteristics & Dimensions

	8800409
Voltage	630V DC
Current	2000A
Weight	962kg (75kg Remote Control)
Length	2120 mm
Height	2300 mm
Depth	1030 mm

Remote Control Panel

- ❑ IP56
- ❑ Stainless Steel construction
- ❑ Controls on a secondary internal door

4.31 WLCP / GRPH Wheel Lathe Road Contactor Panel 630A 1000V DC 8800518-V01

Specification

Based on the General specification for a 630A 900V DC Contactor Panel for Examination Roads and incorporating features of the 630A 900V DC Contactor Panel for Cleaning Roads in London Underground maintenance depots.

To comply with LUL Document: **SUP-PSEB1071-SSL-SPC-00001 Issue A1**

[Based on a hybrid combination of Examination Road Contactor Panel 630A – 8800391 & Cleaning Road Contactor Panel – 8800392]

Brief Description

The Wheel Lathe Road Contactor Panel supplies the 630V DC Shore Supply from the Manual Disconnector Switch (formerly motorised) to the wheel Lathe Conductor Rail to enable safe train movements and isolation of the road whilst the lathe is in use.

The Contactor Panel consists of a 2 pole 630A 1000V DC Contactor with associated control equipment, 600A traction grade fuses, and a 4 pole 1250A 1000V DC Disconnector for maintenance. Local controls are fitted on the front of the Panel for maintenance but the contactor is operated from a Remote Control panel.

The Contactor Panel has provision for signals to the Overhead Status Indicators and to the Mimic Panel.

Supply Panel Rating

System Voltage	630V DC (900V DC Maximum)
System Current	630A
Auxiliary Voltage AC	110V AC 50Hz

Contactor Cubicle Construction

Material	2mm Sheet Steel
External Finish	BS831C Shade 697 Light Admiralty Grey
Internal Finish	J124 White Anti-Condensation paint
Degree of Ingress Protection	IP52
Height	2100
Length	1300mm
Depth	600mm
Approx. Weight	550kg

Disconnector Specification

Type	Max-E-Switch Disconnector
Number of Poles	4
Voltage	1500V DC
Current	1250A

Contactor Specification

Type	CBC 75
Number of Poles	2
Voltage	1000V DC
Current	630A
Coil Voltage	110V AC

GRP Enclosure Construction

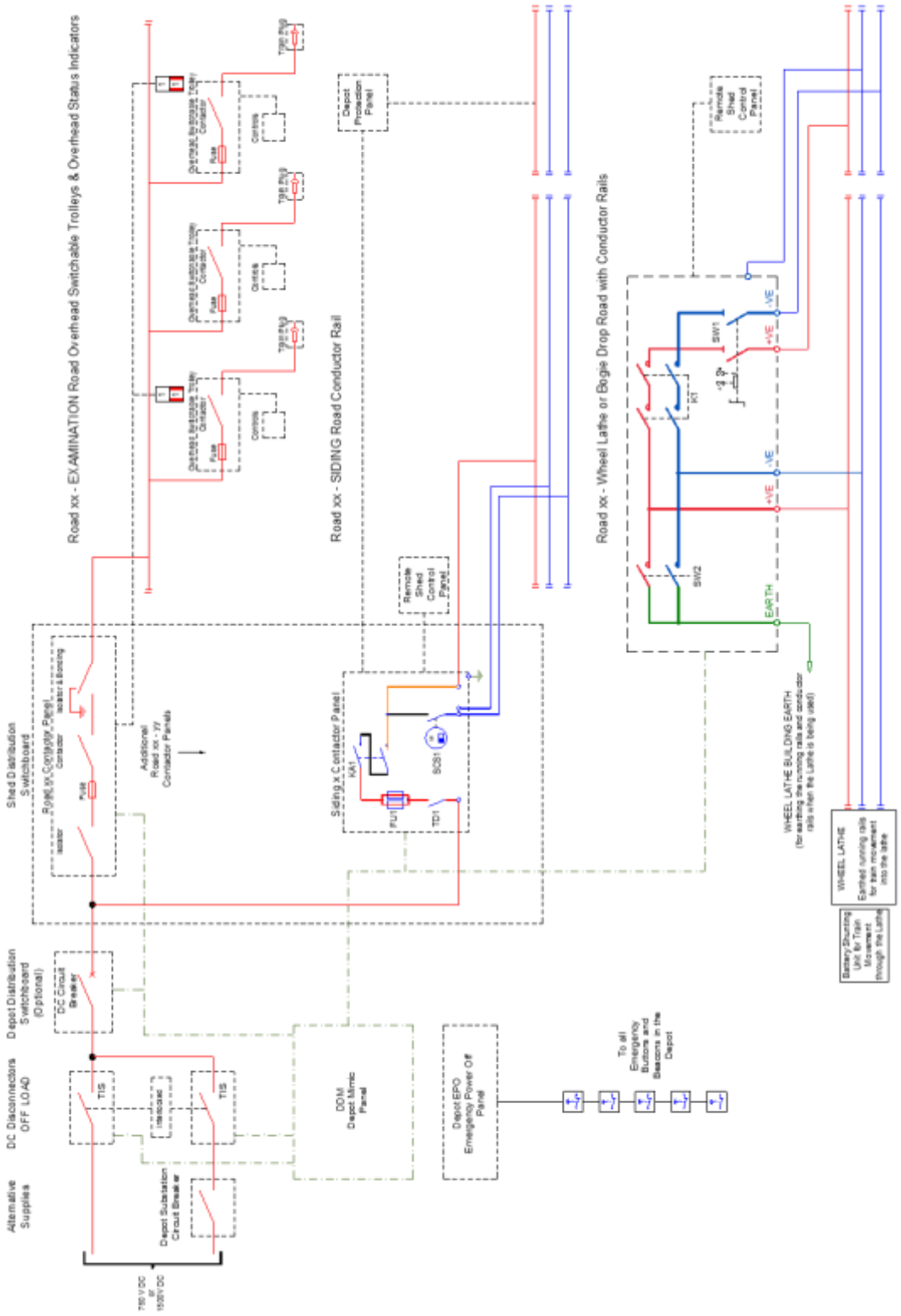
Material	GRP/Plywood/GRP
External Finish	Gloss finish gel coat - colour: 18-B-25 Dark admiral grey
Internal Finish	White GRP
Degree of Ingress Protection	IP55
Height	2500mm
Length	2500mm
Depth	1000mm
Approx. Weight	414kg
Access	Maximum height double door fitted with • Stainless steel hinges • Automatic hold open stays • Night latch lock
Ventilation	Louvered vents complete with internal meshed back closers
Fire resistance	Constructed using fire retardant resin to provide self-extinguishing laminates to BS476 part 7 class 2 In compliance with BS476 part 22, half hour fire resistance
U value	2.2 W/M2/ºC
Fixing down	The Enclosure has an open base with all around 100mm internal GRP fixing flange, for fixing down with anchor bolts on to prepared concrete base, (concrete base by others). It is recommended that the concrete base has a rebate formed into the perimeter to prevent water ingress.

Remote Control Cubicle Construction

Material	1.2mm Sheet Steel
External Finish	BS831C Shade 307 Canary Yellow
Internal Finish	BS831C Shade 307 Canary Yellow
Degree of Ingress Protection	IP66
Height	500mm
Length	500mm
Depth	210mm
Approx. Weight	14kg

4.32 Single Pole Depot systems

Examples of Single Pole **systems.**



The depot is typically protected by Depot Distribution Circuit Breakers.
The Breakers feed suites of Depot Road Contactors, typically for a particular shed or section of a shed. The makeup of this Contactor **Examination Road Contactors** feed Overhead bus bars which in turn feed **Overhead Switchable Trolleys**.
Cleaning Road Contactors contain more monitoring equipment because they feed the Conductor Rails of the Cleaning Road.
Overhead Status Indicators for the Conductor Rail Status.
A **Mimic Panel** monitors the status of each piece of equipment in the depot power system.
An EPO Emergency Power Off Panel comprises approved Safety Relays which monitor groups of Emergency Power Off pushbuttons which are distributed throughout the depot

4.33 ML DCP – 1 Pole Depot Contactor Panel - 1000A 750V DC - 8800262

SOUTHERN

APPLICATION – ON LOAD

1 pole changeover switching of high-power circuits, where a high short circuit withstand and high voltage isolation is required.

Road isolation in **Southern Depots**

Switches and Contactor

Contactors 1000A with Negative Bonding Contact

Incoming Disconnector 1250A

Features

- ❑ IP55
- ❑ 1000A Traction Grade Fuse
- ❑ DC Overload Protection
- ❑ Anti-Condensation Heaters
- ❑ Anti-Condensation Paint

Installation

Floor mounted

Cable entry from below via insulating gland plates

Cabling

Incoming Positive 1 x 1000mm^2 Aluminium

Outgoing Positive 1 x 1000mm^2 Aluminium

Incoming Negative 2 x 250mm^2

Earth 1 x 250mm^2

	8800262
Voltage	750V DC
Current	1kA
Length	1500 mm
Height	2200 mm
Depth	850 mm
Weight	450kg

4.34 ML DCP – 2 Pole Depot Contactor Panel - 1000A 750V DC - 8800260, 8800265

SOUTHERN

APPLICATION – ON LOAD

2 pole changeover switching of high-power circuits, where a high short circuit withstand and high voltage isolation is required.

Road isolation in **Southern Depots**

Switches and Contactor

1000A 2 Pole Contactor

2000A Incoming Disconnector

1250A Outgoing Bonding Switch

Features

- ❑ IP55
- ❑ 1000A Traction Grade Fuse
- ❑ DC Overload Protection
- ❑ Anti-Condensation Heaters
- ❑ Anti-Condensation Paint

Installation

Floor mounted

8800260 - Cable entry from below via insulating gland plates

8800265 – Cable entry from the rear via split insulating plates

Cabling

Incoming Positive 2 x 1000mm^2 Aluminium

Outgoing Positive 1# 2 x 185mm^2

Outgoing Positive 2# 1 x 1000mm^2 Aluminium

Incoming Negative 2 x 250mm^2

Earth 1 x 250mm^2

	8800260-V01	8800260-V03	8800265
	Standard	Slimline	
Voltage	750V DC	750V DC	750V DC
Current	1kA	1kA	1kA
Length	1500 mm	1500 mm	1500 mm
Height	2200 mm	2200 mm	2200 mm
Depth	850 mm	500 mm	850 mm
Weight	470kg	450kg	470kg

4.35 ML DCP – 1 Pole Depot Contactor Panel 2000A 750V DC with 'Integrated' MD Bonding Device – 8800261-V03

southeastern

APPLICATION – ON LOAD

1 pole changeover switching of high-power circuits, where a high short circuit withstand and high voltage isolation is required.

The motor driven switch is to be used to bond the 750 Volt positive track feed connection to the negative rail and is electrically interlocked with its associated Contactor from which it obtains its control supply. Opening of the Contactor will cause the bonding device to close. The device is operated from the Contactor control circuit or automatically following the loss of the emergency circuit i.e. Emergency stop button activated.

Road isolation and bonding in **SouthEastern Grove Park Depot**.

Switches and Contactor

Contactors 1 Pole 2000A with 1600A Motor Driven Negative Bonding Switch (integrated)

Incoming Disconnector 2000A

Features

- ❑ IP55
- ❑ 2000A Traction Grade Fuse
- ❑ DC Overload Protection
- ❑ Anti-Condensation Heaters
- ❑ Anti-Condensation Paint

Installation

Floor mounted cable entry from below via insulating gland plates.

Cabling

Incoming Positive 4 x 1000mm^2 Aluminium
Outgoing Positive 2 x 1000mm^2 Aluminium
Incoming Negative 2 x 250mm^2
Earth 1 x 250mm^2

	8800261-V03
Voltage	750V DC
Current	2kA
Length	1500 mm
Height	2705 mm
Depth	850 mm
Weight	470kg
Maximum Fault levels	85kA 150ms
	70kA 250ms

Integrated Bonding Device

Older 8800261 Contactor Panels had external Bonding Devices 858961 & 863118

4.36 ML BD – 1 Pole Contactor Panel MD Bonding Disconnector 1.6kA - Network Rail PA05/02927

APPLICATION – OFF LOAD / FAULT MAKE

The motor driven switch is to be used to bond the 750 Volt positive track feed connection to the negative rail and is electrically interlocked with its associated Contactor from which it obtains its control supply. Opening of the Contactor will cause the bonding device to close. The device is operated from the Contactor control circuit or automatically following the loss of the emergency circuit i.e. Emergency stop button activated.

Switch

(1-0) 1 pole motorised Off Load / Fault make Switch

Features

- ❑ IP56
- ❑ Protected for external use
- ❑ Fully Isolated 110V AC Control Supply (Fed from the Contactor)
- ❑ Anti-Condensation Paint

Installation

Mounted directly on to contactor panel, bus bar connection via insulating gland plates

Electrical Characteristics & Dimensions

	858961	863118 *
Voltage	750V DC	750V DC
Current	1.6kA	1.6kA
Maximum Fault levels	85kA 150ms 70kA 250ms	85kA 150ms 70kA 250ms
Weight	135kg	158kg
Length	1500 mm	1500 mm
Height	500 mm	500 mm
Depth	750 mm	750 mm

* This version allows the bonding device and Contactor to be lifted in a single lift i.e. it includes additional structural components in the sheet metal design. The 858961 version needs to be fitted after the contactor is installed

4.37 ML DCP – 1 Pole Changeover Depot Contactor Panel - 1000A 750V DC - 8800264

SOUTHERN

APPLICATION – ON LOAD

2 pole changeover switching of high-power circuits, where a high short circuit withstand and high voltage isolation is required.
Road isolation and bonding in **Southern Depots**

Switches and Contactor

1000A Contactor with Negative Bonding Contact
1250A Incoming Disconnector
1250A Changeover & Bonding Isolator

Features

- ❑ IP55
- ❑ 1000A Traction Grade Fused
- ❑ DC Overload Protection
- ❑ Anti-Condensation Heaters
- ❑ Anti-Condensation Paint

Installation

Floor mounted, cable entry from the rear via split insulating plates

Cabling

Incoming Positive	2 x 1000mm^2 Aluminium
Outgoing Positive 1#	2 x 185mm^2
Outgoing Positive 2#	1 x 1000mm^2 Aluminium
Negative	2 x 250mm^2
Earth	1 x 250mm^2

	8800264
Voltage	750V
Current	1kA
Length	1500 mm
Height	2200 mm
Depth	850 mm
Weight	450kg

4.38 ML DCP – 1 Pole Depot Contactor Panel 1000A 750V DC - 8800386

SOUTHERN

APPLICATION – ON LOAD

1 pole switching of high-power circuits, where a high short circuit withstand and high voltage isolation is required.
Road isolation and bonding in **Selhurst Depot**.

Switches and Contactor

Contactor 1 Pole 1000A 1kV
Incoming 1 pole Manual Disconnector 2000A 1.5kV
Outgoing 1 pole Manual Bonding Disconnector 1250A 1.5kV

Features

- ❑ IP55
- ❑ 1000A 1kV Traction Grade Fuse
- ❑ 1600A DC Overload Protection
- ❑ Anti-Condensation Heaters
- ❑ Anti-Condensation Paint

Installation

Floor mounted, cable entry from below via insulating gland plates

Cabling

Incoming Positive	2 x 1000mm^2 Aluminium
Outgoing Positive	2 x 185mm^2
Incoming Negative	2 x 240mm^2
Earth	2 x 240mm^2

	8800386
Voltage	750V
Current	1kA
Length	1500 mm
Height	2705 mm
Depth	850 mm
Weight	460kg

4.39 ML DRC – 1 Pole Train Wash Contactor Panel - 1000A 600V DC - 8800413

SPT - STRATHCLYDE PASSENGER TRANSPORT

APPLICATION – ON LOAD

1 pole changeover switching of high-power circuits, where a high short circuit withstand and high voltage isolation is required.

Train Wash Road isolation in **Glasgow Metro Depot**

Switches and Contactor

Contactors 1000A

Incoming Disconnector 1250A

Features

- ❑ IP55
- ❑ 1000A Traction Grade Fuse
- ❑ Anti-Condensation Heaters
- ❑ Anti-Condensation Paint

Installation

Floor mounted

Cable entry from below via insulating gland plates

Cabling

Incoming Positive 1 x 1000mm^2 Aluminium

Outgoing Positive 1 x 1000mm^2 Aluminium

Incoming Negative 2 x 250mm^2

Earth 1 x 250mm^2

	8800413
Voltage	600V
Current	1kA
Length	1500 mm
Height	2200 mm
Depth	850 mm
Weight	450kg

4.40 ML CO 1 Pole 25kV AC 1250A / 1.5kV DC 800A / 3kV DC 400A Changeover Switch - 8800320

Channel Tunnel Rail Link

APPLICATION - ON LOAD

Depot Road Isolation, Changeover and Bonding for **Temple Mills Depot**

Switches

One (1-E-2) 2 pole 230V AC motorised switch

Construction

- ❑ IP55
- ❑ 3mm sheet steel
- ❑ Protected for internal use

Features

- ❑ Tested to BIL - 250kV
- ❑ 500mm electrical clearance
- ❑ Mechanical interlocking

Installation

Plinth mounted, cable entry from below via aluminium gland plates.

Cabling

Traction Positive 25kV type cable — 120mm² single core copper 25/44kV

Traction Positive 3kV/1.5kV type cable — 240mm² single core copper 11kV

Earth — 160mm² single core copper negative return type cable

Output Cable — 120mm² single core copper 25/44kV type cable

Electrical Characteristics & Dimensions

	8800320	
Voltage	1,5kV / 3kV DC	25kV AC
Current	800 / 400A	1250A
Aux Voltage	230V AC ±10%, 50Hz Single Phase	
Length	3000 mm	
Height	3000 mm	
Depth	1700 mm	
Weight	1700kg	

4.41 ML NECO – Negative & Earth Changeover Switch - 1250A/2000A 750V DC - 8800193

SOUTHERN

APPLICATION - ON LOAD

Motorised wheel lathe road changeover to ensure isolation of Traction Negative from Earth at Southern Selhurst Depot

Switches

(1-0-2) 1250A or 2000A 1 pole with 230V AC motor

Construction

- ❑ IP55
- ❑ 3mm sheet steel

Features

- ❑ 100mm electrical clearance
- ❑ Mechanical interlocking

Installation

Plinth mounted, cable entry from below via aluminium gland plates

Cabling

Traction Negative 2 x 240mm^2 cable
Earth 2 x 240mm^2 cable

Electrical Characteristics & Dimensions

	8800193-V01	8800193-V02
Voltage	750V DC	750V DC
Current	1250A	2000A
No of Poles	1	1
Length	1250 mm	1250 mm
Height	1850 mm	1850 mm
Depth	670 mm	670 mm
Weight	350kg	350kg

4.42 ML WLCP – Wheel Lathe Road Contactor Panel- 2000A 750V DC - 8800494

APPLICATION - ON LOAD

The Wheel Lathe Panel contains a Contactor and a fault make / off load make Bonding Switch, and an off-load 2.5kA 1.5kV Disconnector.
The Wheel Lathe Panel switches the Wheel Lathe Road from the Sidings Supply to the Wheel Lathe building Earthed Running Rails.
To allow maintenance of the Contactor and Bonding Switch, a Disconnector is fitted to the Sidings Supply input to the Panel.
The Contactor and Switch can be operated locally or remotely at the Remote-Control Panel.

Contactor

1000A 2 pole 1000V DC Contactor

Bonding Switch

2000A 2 pole 1000V DC Fault Make / off Load Disconnector

Maintenance Switch

2500A 2 pole 1500V DC off Load Disconnector

Construction

- ❑ IP55
- ❑ 3mm hot zinc sprayed sheet steel

Features

- ❑ 100mm electrical clearance
- ❑ Mechanical interlocking
- ❑ LED lighting

Installation

Plinth mounted, cable entry from below via aluminium gland plates

Cabling

Traction Positive 2 x 1000mm^2 cable
Traction Negative 2 x 240mm^2 cable
Earth 2 x 240mm^2 cable

Electrical Characteristics & Dimensions

	8800494-V01	8800494-V02
	Three Bridges depot	Wimbledon Depot
Voltage	750V DC	750V DC
Current	2000A	2000A
No of Poles	2	2
Length	3330 mm	3330 mm
Height	2300 mm	2300 mm
Depth	1000 mm	1000 mm
Weight	1700kg	1700kg

4.43 Emergency Power Off System – Depot - 8800493, 8800503, 8800504

Application

The Emergency Pushbutton Interface Panel (8800493-V01) collects the status of the Emergency Pushbuttons from the Emergency Pushbutton Indication and Override Panel (8800503-V01) and if any have been operated, illuminates the indicators on the front door. The Panel operates relays to provide volt-free contacts to the depot Circuit Breakers and Bonding Devices.

The Emergency Pushbutton Indication and Override Panel (8800503-V01) takes the status of the Emergency Pushbuttons from the Emergency Pushbutton Indication Panels (8800504-V01/V02/V03) and if any have been operated, illuminates the indicators on the front door. The operated status of most of the Emergency Pushbuttons can be individually overridden with a key switch and is then passed on to the Emergency Pushbutton Interface Panel (8800493-V01). The Panel also displays the status of the Auxiliary Supplies at the Emergency Pushbutton Indication Panels and the status of the Insulated Block Joints, passed from the Insulated Block Joint Monitoring Panel (8800497-V01) via the Buffer Zone Panel (8800347-V01), on Indicators on the front of the Panel. This Panel has a battery backed Auxiliary Supply.
There are four Emergency Pushbutton Indication Panels, Up Sidings (8800504-V01/01), Down Sidings (8800504-V01/02), Tilgate Sidings (8800504-V02/03) and MFB (Main Facility Building) (8800504-V03/04). The Emergency Pushbuttons are connected directly to the Emergency Pushbutton Indication Panels and their status is displayed by illuminating the indicators on the front of the Panel and passed on to the Emergency Pushbutton Indication and Override Panel (8800503-V01).
All except the MFB Panel have a battery backed Auxiliary Supply.

Construction

Material 2mm Sheet Steel
Finish RAL 7032 Grey
Degree of Ingress Protection IP54

Types of panel

8800493-V01	Emergency Pushbutton Interface Panel
Voltage	48V DC
Current	2A
Length	800 mm
Height	1500 mm
Depth	200 mm
Weight	110kg

8800503-V01	Emergency Pushbutton Indication & Override Panel
Voltage	230V AC
Current	1.5A
Control Panel Voltage	24V DC
Field Circuits Voltage	48V DC
Length	800 mm
Height	900 mm
Depth	240 mm
Weight	87kg

8800504-V01	Emergency Pushbutton Indication Panel (8 Way) Up and Down Sidings
Voltage	230V AC
Current	1.5A
Control Panel Voltage	24V AC
Emergency PB Circuits Voltage	48V AC
Length	500 mm
Height	700 mm
Depth	240 mm
Weight	42kg

8800504-V02	Emergency Pushbutton Indication Panel (6 Way) Up and Down Sidings
Voltage	110V AC
Current	1.0A
Control Panel Voltage	48V AC
Length	500 mm
Height	700 mm
Depth	240 mm
Weight	30kg
Degree of Ingress Protection	IP65

8800504-V03	7-Way Local Indication EPB Panel
Voltage	110V AC
Current	1.0A
Control Panel Voltage	48V AC
Length	500 mm
Height	700 mm
Depth	240 mm
Weight	30kg
Degree of Ingress Protection	IP65

8800504-V04	1-2 Way Local Indication EPB Panel (suitable for upgrade to 6 Way)
Voltage	110V AC
Current	1.0A
Control Panel Voltage	48V AC
Length	500 mm
Height	700 mm
Depth	240 mm
Weight	30kg
Degree of Ingress Protection	IP65

4.44 EPB Button Wall Mounted 8800522-V01 & EPB Pendant - 8800522

8800522-V01 EPO Button Wall Mounted

8800522-V01	Wall mounted
Voltage	110 / 230V AC
Current	1.0A
Length	150 mm
Height	255 mm
Depth	120 mm
Weight	-kg
Degree of Ingress Protection	IP65

8800522-V02 EPO Pendant Mounted

8800522-V04	Pendant mounted Double cut
Voltage	110 / 230V AC
Current	1.0A
Length	150 mm
Height	3100mm
Depth	120 mm
Weight	-kg
Degree of Ingress Protection	IP65

8800522-V04 Wall Mounted Double cut

8800522-V04	Wall mounted Double cut
Voltage	110 / 230V AC
Current	1.0A
Length	150 mm
Height	255 mm
Depth	120 mm
Weight	-kg
Degree of Ingress Protection	IP65

4.45 Shore Supply Contactor / Fuse Unit 1kA Single Pole – Depot - 8800490

SOUTH WEST TRAINS

1000A 750V DC Single Pole Contactor Panel to feed the Entry/Exit Road to the Bogie Drop Building from Siding No 16.
Via a key operated interlock scheme, the Entry/Exit Road can be live, fed from Siding No 16, bonded to Traction Negative or bonded to earth.

Contactor Specification

Type CBFC 75 1000 2 Pole Contactor
1000A and 750V DC Load make/load break/fault make single pole with arcing contacts.

Disconnector SW1 Specification

1250A 1500V DC 1Pole Max-E-Switch

Disconnector SW2 Specification

1250A 1500V DC 1Pole Max-E-Switch

Changeover Switch SW3 Specification

1250A 1500V DC 1Pole Max-E-Switch

Construction

- ❑ IP54
- ❑ 2mm Zintec sheet steel
- ❑ BS4800 Goose Grey 00A05 Semi-Gloss
- ❑ White Anti-condensation

Electrical Characteristics & Dimensions

	8800490
	Three Bridges depot
Voltage	750V DC
Current	1250A
No of Poles	1
Length	2200 mm
Height	2205 mm
Depth	650 mm
Weight	704kg

5 Railway Switchgear – BUFFER ZONE

Traction grade Switchgear
Vibration and Shock Resistant to suit Trackside requirements

DC Switchgear & Indicator enclosures for the following applications:
Buffer Zone changeover supply

5.1 The Buffer Zone System

Buffer Zone Equipment

A Buffer Zone System can comprise the following:

- ❑ Electrically Operated Buffer Zone Changeover Panel
- ❑ Buffer Zone Remote Control Panel
- ❑ Manually Operated Buffer Zone Panel
- ❑ Insulated Block Joint Monitoring
- ❑ Buffer Zone Exit Indicator
- ❑ LED Shunt Indicators

Buffer Zone Explained

The Electrically & Manually operated Buffer Zone Changeover cubicles are changeover panels whilst able to operate independently are part of a single Buffer Zone Electrification System.
In normal operation the Electrically Operated Buffer Zone Panel is used to Changeover the North Washer Road (Depot Earth) and the Washer (Traction Negative) road supplies to the Buffer Zone from the Buffer Zone Remote Control Panel. This ensures that the Traction Negative and Depot Earth are never connected together.

A monitoring system for Insulated Block Joint Failure is incorporated in the Mechanically Operated Buffer Zone Panel to ensure that the insulation between Traction Negative and Depot Earth is maintained.

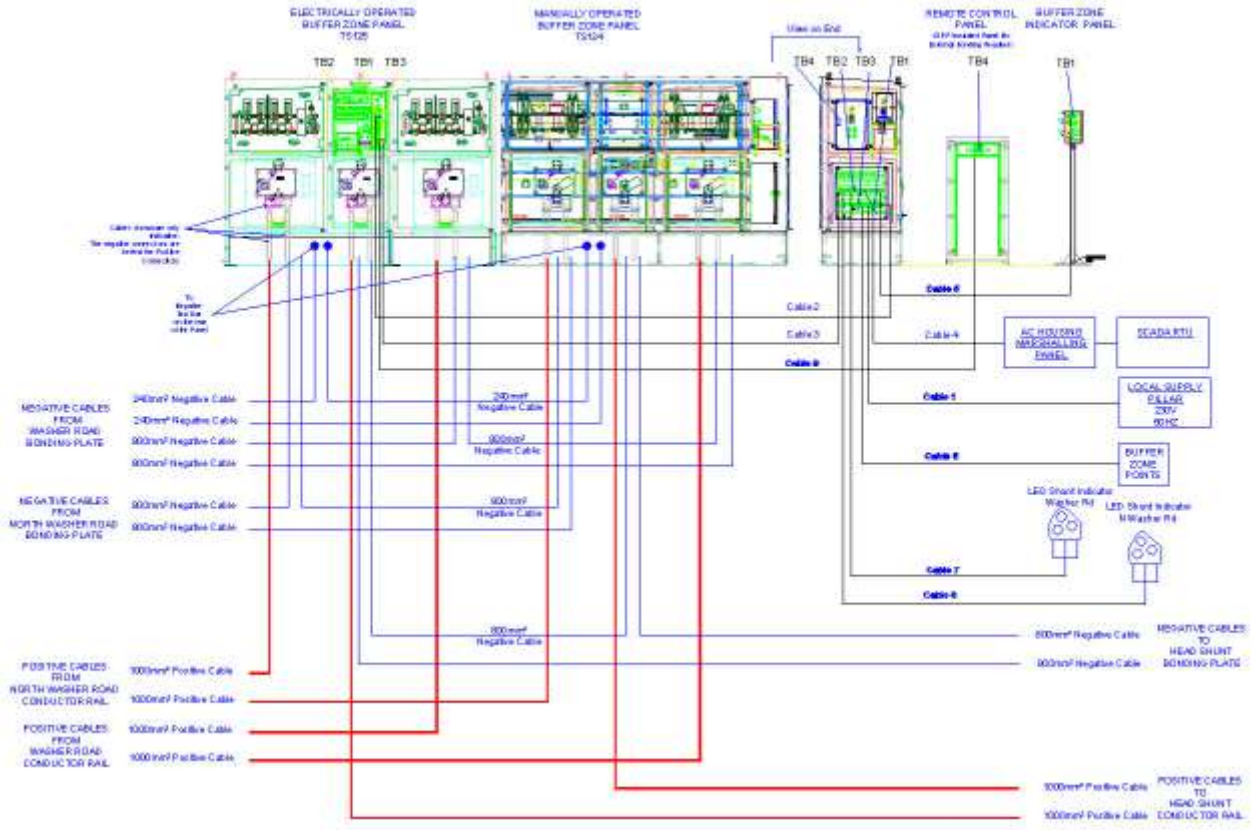
To allow maintenance on the contactors in the Electrically Operated Buffer Zone Panel the Buffer Zone Changeover can be switched to the Manually Operated Buffer Zone Panel.
This should ensure no loss of train movements from the depot.

Typical Train Movements:
10 each morning & 10 each evening i.e. 20 per day

At the manual panel interlocks prevent incorrect operation of the switches, and interlocks prevent the Electrically Operated Buffer Zone Panel from providing 750V to the Buffer Zone.

The Buffer Zone Changeover Panels provide the signals for the Buffer Zone Exit Indicator and the LED Shunt Indicators.

Below is a diagram of a typical Buffer zone.



5.2 ML BZ – 2 Pole Electrically Operated Buffer Zone Changeover Panel - 2000A 1000V DC - 8800347

APPLICATION – ON LOAD

Isolation and/or switching of high-power circuits, where a high short circuit withstand and high voltage isolation is required. Used at **Ashford Depot & Three Bridges Depot** for buffer zone switching. The Buffer zone panel is based on the CTS and built to comply with the principles of **NR/SP/ELP/21025**

Contactor

2 x Type CBC 71 - Load break Two pole, two position Contactor

No of Poles	2
Voltage	1000 Volts DC
Current	2000 Amps

Switches

3 x (1-0) Manual - Off load, two position isolating switch 2 pole 7200 Volts DC 3200 Amps

(**Lockable maintenance switch, these switches can be used to isolate the Buffer Zone panel for Maintenance**)

Features

- ❑ IP55
- ❑ Protected for external use
- ❑ Anti-Graffiti Paint Finish (**RT98-RT/CE/S/039**)
- ❑ 100mm Electrical Clearance
- ❑ Fully Isolated 230 V AC ±10%, 50 Hz, single phase 3.5A
- ❑ Anti-Condensation Heaters thermostat controlled to operate at 10ºC and below

Installation

Plinth mounted, cable entry via insulated split gland plates

Cubicle Construction

Material	3 mm sheet steel hot zinc sprayed
Finish - Internal	Painted - white anti-condensation paint
Finish - External	Painted Light Grey BS381C Semi-Gloss Shade 631 Anti-Graffiti paint

Cabling

Traction Positive Incoming	2 x 1000mm^2 Aluminium cable
Traction Positive Outgoing	2 x 1000mm^2 Aluminium cable
Traction Negative	2 x 240mm^2 Copper cable

Electrical Characteristics & Dimensions

	8800347
Voltage	750V
Current	2kA
Weight	1800kg
Length	3330 mm
Height	2300 mm
Depth	970 mm

Three Bridges --

5.3 ML MBZ – 2 Pole Manually Operated Buffer Zone Changeover Panel - 2000A 1000V DC - 8800348

APPLICATION – ON LOAD

Isolation and/or switching of high-power circuits, where a high short circuit withstand and high voltage isolation is required. Used at **Ashford Depot** for buffer zone switching. The Buffer zone panel is based on the CTS and built to comply with the principles of **NR/SP/ELP/21025**

Switches

2 x (1-0) IF - Load break 2 pole, two position isolating switch 1000 Volts DC 2000 Amps
3 x (1-0) Manual - 2 pole Off load, two position isolating switch 7200 Volts DC 3200 Amps (**Lockable maintenance switch, these switches can be used to isolate the Buffer Zone panel for Maintenance**)

Features

- ❑ IP56
- ❑ Protected for external use
- ❑ Anti-Graffiti Paint Finish (**RT98-RT/CE/S/039**)
- ❑ 100mm Electrical Clearance
- ❑ Fully Isolated 230 V AC ±10%, 50 Hz, single phase 3.5A
- ❑ Anti-Condensation Heaters thermostat controlled to operate at 10ºC and below

Installation

Plinth mounted, cable entry via insulated gland plates

Cubicle Construction

Material	3 mm sheet steel hot zinc sprayed
Finish - Internal	Painted - white anti-condensation paint
Finish - External	Painted Light Grey BS381C Semi-Gloss Shade 631 Anti-Graffiti paint

Cabling

Traction Positive Incoming	2 x 1000mm^2 Aluminium cable
Traction Positive Outgoing	2 x 1000mm^2 Aluminium cable
Traction Negative	2 x 240mm^2 Copper cable

Electrical Characteristics & Dimensions

	8800348
Voltage	750V
Current	2kA
Weight	2000kg
Length	3510 mm
Height	2300 mm
Depth	970 mm

Associated Buffer Zone Equipment

Buffer Zone Exit Indicator 8800371 - See page 183
LED Shunt Indicator 860578 – See page 185

5.4 ML CP Buffer Zone Contactor Panel 2000A 750V DC - 8800426

East London Line New Cross Depot

APPLICATION – ON LOAD

Isolation and/or switching of high-power circuits, where a high short circuit withstand and high voltage isolation is required. Used at **New Cross Depot** for buffer zone switching in the Depot Road for the Wheel Lathe. The Buffer zone panel is based on the CTS and built to comply with the principles of **NR/SP/ELP/21025**

Contactor

Type CBC 71 - Load break two pole Contactor

No of Poles	2
Voltage	1000 Volts DC
Current	2000 Amps

Switches

(1-0) Manual - Off load, two position isolating switch 2 pole 1500 Volts DC 2500 Amps (**Lockable maintenance switch, these switches can be used to isolate the Buffer Zone panel for Maintenance**)

Features

- ❑ IP55
- ❑ Protected for external use
- ❑ Anti-Graffiti Paint Finish (**RT98-RT/CE/S/039**)
- ❑ 100mm Electrical Clearance
- ❑ Fully Isolated 230 V AC ±10%, 50 Hz, single phase 3.5A
- ❑ Anti-Condensation Heaters thermostat controlled to operate at 10ºC and below

Installation

Plinth mounted, cable entry via insulated split gland plates

Cubicle Construction

Material	3 mm sheet steel hot zinc sprayed
Finish - Internal	Painted - white anti-condensation paint
Finish - External	Painted Light Grey BS381C Semi-Gloss Shade 631 Anti-Graffiti paint

Cabling

Traction Positive Incoming	2 x 1000mm^2 Aluminium cable
Traction Positive Outgoing	2 x 1000mm^2 Aluminium cable
Traction Negative	2 x 240mm^2 Copper cable

Electrical Characteristics & Dimensions

	8800426
Voltage	750V
Current	2kA
Weight	1083kg
Length	2100 mm
Height	2300 mm
Depth	1082 mm

5.5 Buffer Zone Control Panel - 8800430

The Buffer Zone Control Panel controls the switchgear to the electrical buffer zone at New Cross Gate Depot. The buffer zone maintains electrical isolation between negative traction return running rails and the earthed rails in the wheel lathe. The Buffer Zone Control Panel displays switchgear status, controls the correct switching sequence, and interfaces with the depot protection system

Features

- ❑ IP54
- ❑ Resistance to Mechanical Impact IK 10

Cubicle Construction

Material	Hot press moulded; glass reinforced polyester (GRP)
External	Finish Grey RAL 7032

Electrical Supply

Voltage	230V AC 50Hz
Max load	2500 VA
Control supply isolation level	5kV

Electrical Characteristics & Dimensions

	8800430
Voltage	750V
Current	2kA
Weight	150kg
Length	750 mm
Height	2600 mm
Depth	350 mm

6 Railway Switchgear – TRACKSIDE

Power Isolation & Maintenance Switchgear Enclosures for:

Tramway & Light Railway




Underground



Main Line



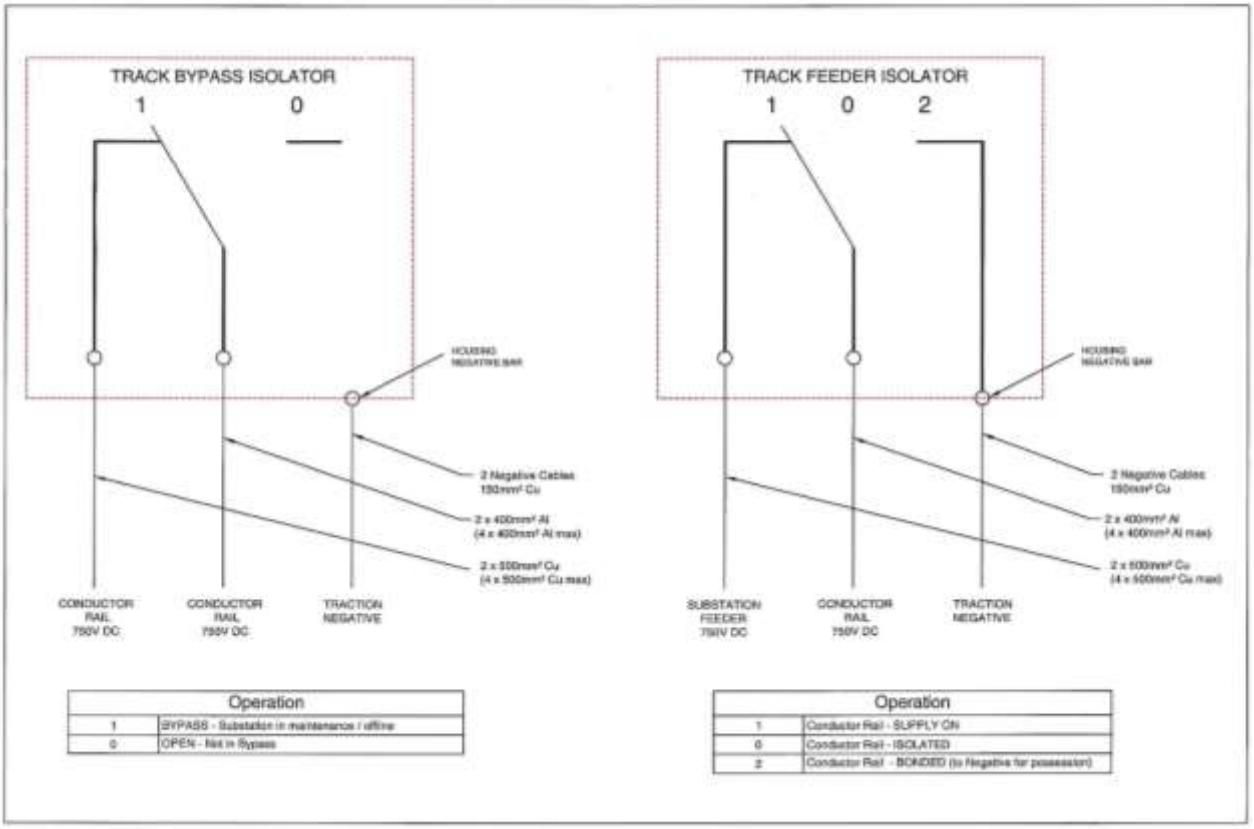



DC Switchgear enclosures for the following applications:
Track isolation
Controlled Track Switching
Controlled Track Switching with automatic negative bonding

6.1 Dockland Light Railway FBI & FI - 2000A 750V DC – A quick guide

Dockland Light Railway

Track Isolator Circuits



The Types

No.			Poles		Description
8800481	TL	FI	1	MAN	Track Isolator Off Load 3 Position 2kA Manual
8800480	TL	FBI	4	MAN	4 x Disconnector Enclosure Assembly Manual
8800385	TL	FBI	1	MAN	Trackside Bypass/Isolator 2kA Manual
8800357	TL	FBI / FI	1	MTR	Track Isolator Off Load - Underground Section 12
8800356	TL	FBI	1	MTR	Track Bypass/Isolator Off Load 2 Position
8800328	TL	FI	1	MTR	Track Feeder Isolator Off Load 3 Position
8800208	TL	FBI	1	MTR	Track Bypass/Isolator Refurbishment
8800151	TL	FBI	1	MTR	Track Bypass/Isolator Off Load 2 Position - Underground Section 12
8800150	TL	FI	1	MTR	Track Isolator Off Load 3 Position - Underground Section 12
8800056	TL	FBI	1	MTR	Track Bypass/Isolator Off Load 2 Position (Obsolete)
8800055	TL	FI	1	MTR	Track Isolator Off Load 3 Position (Obsolete)
8800054	TL	FBI	1	MTR	Track Bypass/Isolator Refurbishment (Obsolete)

Refer to the following pages for details

6.2 TL FBI- 1 Pole Manual Feeder Bypass Isolator - 2000A 750V DC - 8800385

Dockland Light Railway

APPLICATION – OFF LOAD

Substation feed selection and switching of high-power circuits, where a high short circuit withstand and high voltage isolation is required.

Used on **Docklands Light Railway**, where the switch ensures safe track working conditions

Switches

(1-0) Manual Off Load Switch

Features

- ❑ IP55
- ❑ Protected for outside use
- ❑ 50mm Electrical Clearance
- ❑ Standard equipment & paint finish

Installation

Single post mounted, cable entry from below via insulated split insulating gland plates

Cabling

Traction Positive Incoming 4 x 250mm^2 cables
Traction Positive Outgoing 4 x 250mm^2 cables
Traction Negative 2 x 250mm^2 cables

Electrical Characteristics & Dimensions

	8800385
Type	(1-0)
Voltage	750V
Current	2kA
No of poles	1
Weight	95kg
Length	800mm
Height	785mm
Depth	400mm

6.3 TL FBI- 1 Pole Remote Controlled Feeder Bypass Isolator & Track Isolator - 2000A 750V DC - 8800328

Dockland Light Railway

APPLICATION – OFF LOAD

Substation feed selection and twin Isolation / Bonding and/or switching of high-power circuits, where a high short circuit withstand and high voltage isolation is required.

Used on **Docklands Light Railway**, where the switch ensures safe track working conditions

Switches

(1-0-2) Actuated Off Load Switch ('0' position manual)
or (1-0) Actuated Off Load Switch.

Features

- ❑ IP55
- ❑ Protected for outside use
- ❑ 50mm Electrical Clearance
- ❑ Standard equipment & paint finish (* Low smoke zero halogen to LUL Section 12 Specification)
- ❑ 110V AC control

Installation

Single post mounted, cable entry from below via insulated split insulating gland plates

Cabling

Traction Positive Incoming 4 x 250mm^2 cables
Traction Positive Outgoing 4 x 250mm^2 cables
Traction Negative 2 x 250mm^2 cables

Electrical Characteristics & Dimensions

	8800328	8800356	8800357-V01 *	8800357-V02 *
Type	(1-0-2)	(1-0)	(1-0)	(1-0-2)
Voltage	750V	750V	750V	750V
Current	2kA	2kA	2kA	2kA
No of poles	1	1	1	1
Weight	114kg	110kg	110kg	114kg
Length	800mm	800mm	800mm	800mm
Height	785mm	785mm	785mm	785mm
Depth	400mm	400mm	400mm	400mm

6.4 TL FBI- 1 Pole 3 Position Manual Feeder Bypass Isolator & Track Isolator - 2000A 750V DC - 8800481

Dockland Light Railway

APPLICATION – OFF LOAD

Substation feed selection and twin Isolation / Bonding and/or switching of high-power circuits, where a high short circuit withstand and high voltage isolation is required.

Used on **Docklands Light Railway**, where the switch ensures safe track working conditions

Switches

(1-0-2) Manual Off Load Switch

Features

- ❑ IP55
- ❑ Protected for outside use
- ❑ 50mm Electrical Clearance
- ❑ Standard equipment & paint finish

Installation

Single post mounted, cable entry from below via insulated split insulating gland plates

Cabling

Traction Positive Incoming 4 x 500mm^2 cables
Traction Positive Outgoing 4 x 500mm^2 cables
Traction Negative 2 x 150mm^2 cables

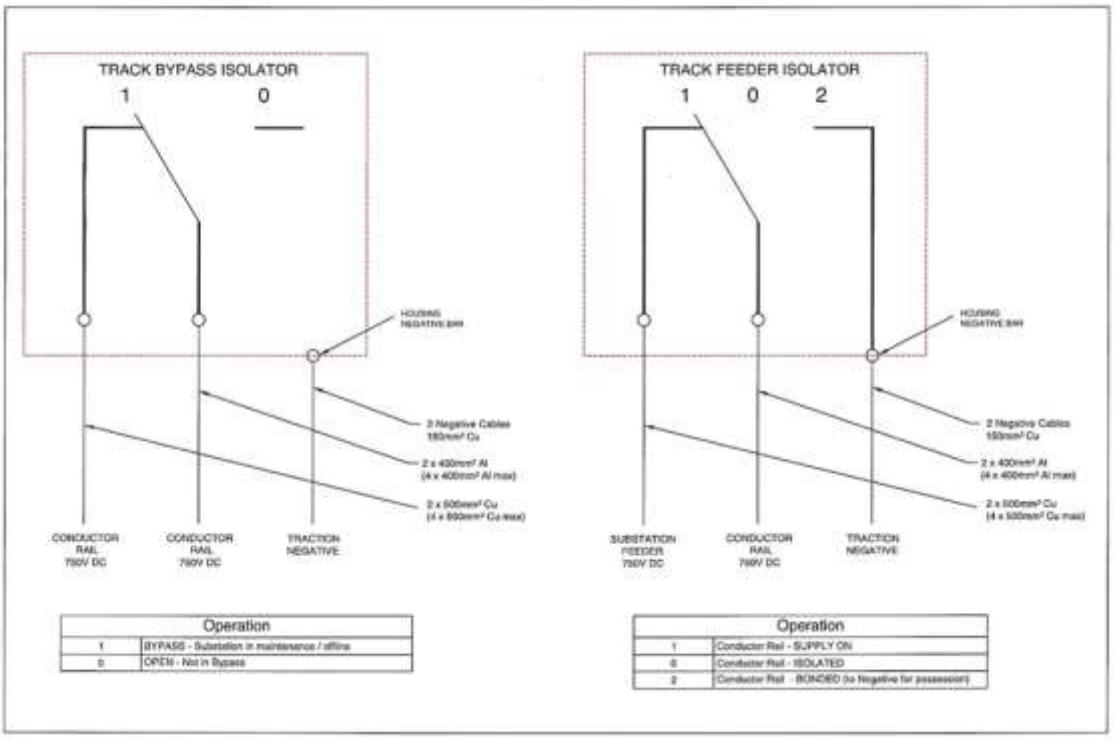
Electrical Characteristics & Dimensions

	8800481-V01
Type	(1-0-2)
Voltage	750V
Current	2kA
No of poles	1
Weight	100kg
Length	800mm
Height	785mm
Depth	400mm

6.5 Metrolink & Blackpool GMI Ground Mounted Isolator 'Street Furniture' - 2000A 750V DC – A quick guide

Metrolink & Blackpool Tramway

Track Isolator Circuits



6.6 TL GMI- Ground Mounted Feeder Bypass & Track Isolator - 2000A 750V DC – 8800420 8800484, 8800485

APPLICATION – OFF LOAD

Substation feed selection and twin Isolation / Bonding and/or switching of high-power circuits, where a high short circuit withstand and high voltage isolation is required. This panel is mounted in a heavy-duty enclosure for secure power isolation

Used on **Manchester Metro & Blackpool Tramway**, where the switch ensures safe track working conditions

Switches

(1-0-2) Actuated Off Load Switch ('0' position manual)
or (1-0) Actuated Off Load Switch
or Manual versions of either configuration

Features

- ❑ IP00
- ❑ Protected for use inside a heavy duty **'Street furniture'** enclosure
- ❑ 50mm Electrical Clearance
- ❑ 110V AC control

Installation

Ground mounted, cable entry from below via insulated split insulating gland plates

Cabling

Traction Positive Incoming 4 x 250mm^2 cables
Traction Positive Outgoing 4 x 250mm^2 cables
Traction Negative 2 x 250mm^2 cables
Refer to sales for other cabling requirements

Electrical Characteristics & Dimensions

	8800420	8800484	8800485
Type	(1-0-2)	(1-0)	(1-0-2)
Voltage	750V	750V	750V
Current	2kA	2kA	2kA
Weight	100kg	200kg	200kg
Length	800mm	950mm	950mm
Height	785mm	1000mm	1000mm
Depth	400mm	470mm	470mm

6.7 GMI - 2 Position Motorised Bypass Isolator & 3 Position Feeder Bypass Isolator – Variants

These are supplied with the 'Street Furniture' stainless steel enclosure as shown below.

Used on **Manchester Metro & Blackpool Tramway**, where the switch ensures safe track working conditions

FEEDER ISOLATOR WITHOUT ENCLOSURE			Variant
8800420	Remote Controlled Feeder Isolator without Enclosure		
BYPASS ISOLATOR (1-0)			
8800484-V01	2 Position Motorised Switch		
8800484-V02	2 Position Motorised Switch		Silver Grey RAL 7001
8800484-V03	2 Position Motorised Switch		Jet Black RAL 9005

FEEDER ISOLATOR (1-0-2)			
8800485-V01	Track Feeder Isolator 3 Position		Silver Grey RAL 7001
8800485-V02	Track Feeder Isolator 3 Position		Anthracite Grey RAL 7016
8800485-V03	Track Feeder Isolator 3 Position		Jet Black RAL 9005
8800485-V04	Track Feeder Isolator 3 Position MANUAL		Jet Black RAL 9005

6.8 TL SIS- 1 Pole Remote Controlled Section Isolator Switch – 2000A 1500V DC - 8800216

NEXUS

APPLICATION – OFF LOAD

Track Sectioning of high-power circuits, where a high short circuit withstand and high voltage isolation is required.
Used on **NEXUS** Metro systems, where the switch ensures safe track working conditions.

Switches:

(1-0) Actuated Off Load Switch

Features:

- ❑ IP55
- ❑ Protected for external use
- ❑ 50mm Electrical Clearance.
- ❑ Standard equipment & paint finish
- ❑ 110V AC control

Installation:

Single post mounted, cable entry from below via insulated split gland plates

Cabling

Traction Positive Incoming 2 x 250mm^2 cables
Traction Positive Outgoing 2 x 250mm^2 cables
Traction Negative 2 x 250mm^2 cables

Electrical Characteristics & Dimensions

	8800216
Type	(1-0)
Voltage	750V
Current	2kA
Length	800mm
Height	785mm
Depth	400mm
Weight	60kg

6.9 TL SIS- 1, 2, & 3 Pole Manual Traction Isolating Switches – 2000A 1500V DC – 8800368-8800370, 8800217

NEXUS

APPLICATION – OFF LOAD

Overhead line Supply / Isolation/ Bypass & Bonding for maintenance, where a high short circuit withstand and high voltage isolation is required.

Used on **NEXUS** Metro systems, where the switch ensures safe track working conditions.

Switches:

(1-0) and / or (1-0-2) Manual Off Load Switch

Features:

- ❑ IP54
- ❑ 50mm electrical clearance.
- ❑ Insulating gland plates for cable entry into the cubicle
- ❑ locked in position with a padlock of type: Union 3104

Cubicle Specification

Door Hinged at the top

2.5mm sheet steel - Hot zinc spray (BS2569 Part 1 1964)

External Two coat paint finish - Colour: BS381C: 1988-ref 631, Light Grey - Semi Gloss.

Internal Single coat Anti-condensation paint finish - Colour: White

Installation:

Pole mounted, cable entry from below via insulated gland plates

Pole to be standard universal steel columns & circular section masts, between 6” to 10” width / diameter.

Pole and clamps provided by the installer.

Cabling

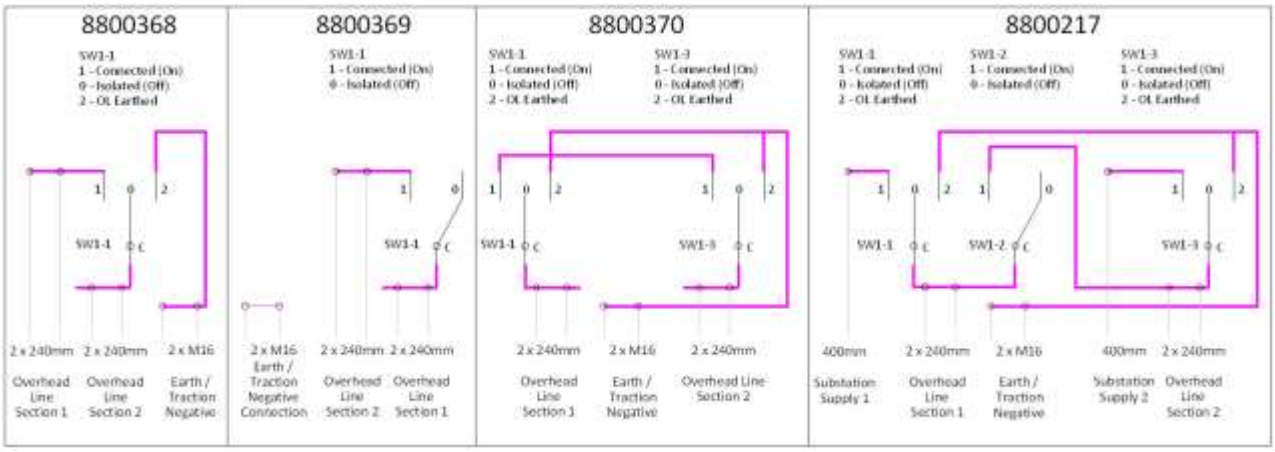
Refer to circuits below for the cable configuration and size

Electrical Characteristics & Dimensions

	8800368	8800369	8800370	8800217
Poles	1	1	2 (Independent)	3 (Independent)
Type	(1-0-2)	(1-0)	(1-0-2 / 1-0-2)	(1-0-2 / 1-0 / 1-0-2)
Voltage	1500V	1500V	1500V	1500V
Current	2kA	2kA	2kA	2kA
Length	350mm	350mm	550mm	550mm
Height	920mm	920mm	920mm	920mm
Depth	695mm	695mm	695mm	695mm
Weight	93kg	93kg	150kg	150kg

8800368 8800369 8800370 * 8800217*

Circuits:



* Other combinations or Isolator, Changeover or Bonding are available upon request i.e. 1-0 / 1-0-2 – 1-0-2 / 1-0 / 1-0

6.10 TL ISM – 1 Pole Isolating & Bonding Switch Manual - 1250A / 2000A 750V DC – 8800141, 8800142

Croydon Tramlink

APPLICATION – OFF LOAD

Isolation / Earthing and/or switching of high-power circuits, where a high short circuit withstand and high voltage isolation is required.
Used on **Croydon Tramway**, where the switch ensures safe track working conditions

Features

- ❑ IP56
- ❑ Protected for outside use
- ❑ Flush doors and lower panels for a 'street furniture' finish
- ❑ Switches can be padlocked in any position
- ❑ 50mm Electrical Clearance

Installation

Plinth mounted, cable entry via aluminium gland plates

Switch

(1-0-2) Manual Off Load Disconnector BSEN50123

DC Rated Thermal current I_{Ne}		**1250**	**2000**
Nominal voltage Un:	**kV**	1.5	1.5
Dielectric Voltage Withstand @ 50Hz for 1 min.	**kV**	20	20
Rated impulse voltage U_{Ni}	**kV**	20	20
Rated Peak Current I_{NSS}	**kA**	81	92
Rated short circuit capacity I_{NCW} for 250ms.	**kA**	65	65
Rated short circuit capacity I_{NCW} for 300ms.	**kA**	57	57

Cabling

Traction Positive Incoming	2 x 250mm^2 cables
Traction Positive Outgoing	2 x 250mm^2 cables
Traction Negative	1 x 250mm^2 cables

Electrical Characteristics & Dimensions

	8800141	**8800142**
Voltage	750V	750V
Current	1.25kA	2kA
Length	800mm	800mm
Height	1500mm	1500mm
Depth	550mm	550mm
Weight	286 kg	291 kg

6.11 TL SSM – 1 Pole Section Isolating & Bonding Switch Manual - 1250A / 2000A 750V DC – 8800139, 8800140

Croydon Tramlink

APPLICATION – OFF LOAD

Isolation / Bonding and/or switching of high-power circuits, where a high short circuit withstand and high voltage isolation is required. Used on **Croydon Tramway**, where the switch ensures safe track working conditions

Features

- ❑ IP56
- ❑ Protected for outside use
- ❑ Flush doors and lower panels for a 'street furniture' finish
- ❑ Switches can be padlocked in any position
- ❑ 50mm Electrical Clearance

Installation

Plinth mounted, cable entry via aluminium gland plates

Switches

Two (1-0-2) Manual Off Load Switch

Cabling

Traction Positive Incoming #1	2 x 250mm^2 cables
Traction Positive Incoming #2	2 x 250mm^2 cables
Traction Negative	1 x 250mm^2 cables

Electrical Characteristics & Dimensions

	8800139	**8800140**
Voltage	750V	750V
Current	1.25kA	2kA
Length	1220mm	1220mm
Height	1500mm	1500mm
Depth	550mm	550mm
Weight	315kg	324kg

6.12 TL SISM- 1 Pole Section Switch Motorised - 2000A 750V DC - 8800143, 8800144

Croydon Tramlink

APPLICATION – OFF LOAD

Isolation / Bonding and/or switching of high-power circuits, where a high short circuit withstand and high voltage isolation is required.

Used on **Croydon Tramway**, where the switch ensures safe track working conditions

Features

- ❑ IP56
- ❑ Protected for outside use
- ❑ Flush doors and lower panels for a **'street furniture'** finish
- ❑ Switches can be padlocked in any position
- ❑ 50mm Electrical Clearance

Installation

Plinth mounted, cable entry via aluminium gland plates

Switches

Two (1-0-2) Manual Off Load Switch (*One for 8800144) & a (1-0) Motorised Off Load Switch.

Remote and local electrical control of the Section Bypass switch

Anti- condensation heaters

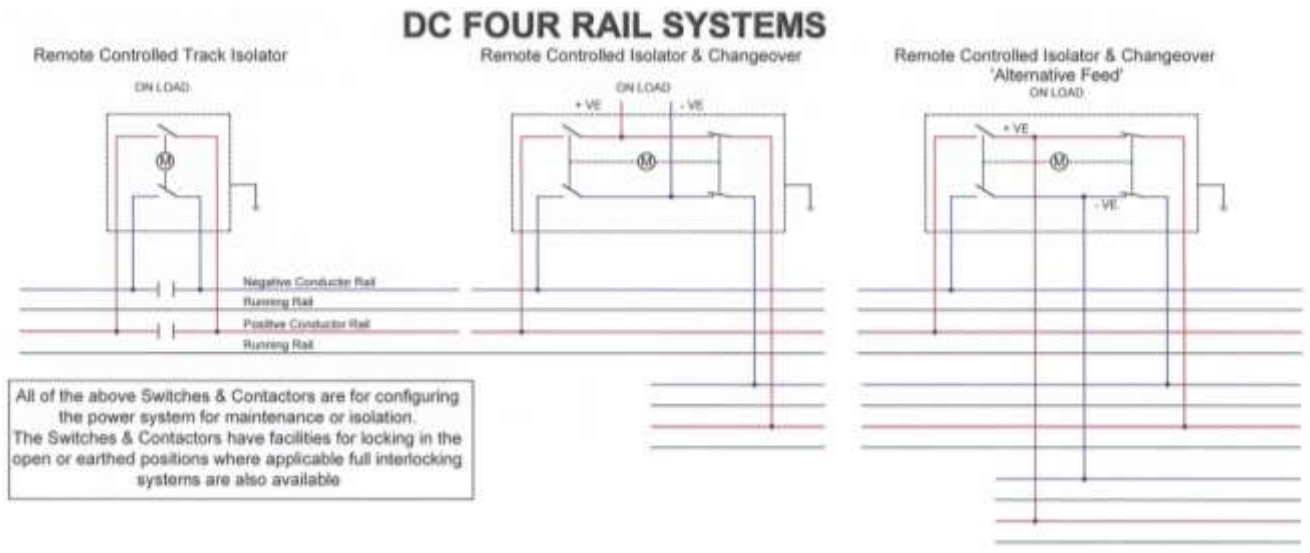
Cabling

Traction Positive Incoming #1	2 x 250mm^2 cables
Traction Positive Incoming #2	2 x 250mm^2 cables
Traction Negative	1 x 250mm^2 cables

Electrical Characteristics & Dimensions

	8800143	8800144 *
Voltage	750V	750V
Current	2kA	2kA
Weight	604kg	587kg
Length	1800mm	1800mm
Height	1850mm	1850mm
Depth	550mm	550mm

6.13 MLU - 2 Pole DC Railway – (Typically London Underground)



6.14 MLU RCTIS – 2 Pole Remote Controlled Track Isolating Switch – 4000A 630V DC - 8800433

London Underground

APPLICATION – ON LOAD, FAULT MAKE

2 pole isolation and/or switching of high-power circuits, where a high short circuit withstand and high voltage isolation is required.
Used by **London Underground** for track sectioning.

Switches

(1-0) Motor driven On Load, fault make switch

Features

- ❑ IP56
- ❑ Low Smoke Zero Halogen Components
- ❑ Protected for external use
- ❑ Low Smoke Paint Finish **(To LUL Section 12 Specification)**
- ❑ 60mm Electrical Clearance
- ❑ 110V Control Supply

Installation

Refer to table below.

Cabling

Traction Positive Incoming 2 x 935mm^2 Copper Cable
Traction Positive Outgoing 2 x 935mm^2 Copper Cable
Traction Negative Incoming 2 x 935mm^2 Copper Cable
Traction Negative Outgoing 2 x 935mm^2 Copper Cable

Electrical Characteristics & Dimensions

	8800433-V03	8800433-V04	8800433-V05	8800433-V06
Mounting	Pile Mounting	Slim line Post	Frame	Slimline wall / post
Voltage	630V	630V	630V	630V
Current	4kA	4kA	4kA	4kA
Length	2380 mm	2600 mm	2380 mm	2600 mm
Height	1250 mm + 600 pile	1070 mm	1850 mm	1070 mm
Depth	770 mm	510 mm	750 mm	510 mm
Weight	690kg	520kg	710kg	520kg

This product supersedes the original design below:

6.15 MLU STSS – 2 Pole Surface Track Section Switch – 4000A 630V DC - 8800074

London Underground

APPLICATION – ON LOAD

2 pole isolation and/or switching of high-power circuits, where a high short circuit withstand and high voltage isolation is required.
Used by **LUL Jubilee Line** for track sectioning.

Switches

(1-0) Motor driven On Load; fault make load break switch.

Features

- ❑ IP56
- ❑ Protected for external use
- ❑ Low Smoke Paint Finish **(To LUL Section 12 Specification)**
- ❑ 60mm Electrical Clearance
- ❑ 110V AC Control Supply

Installation

Wall mounted, external cabling with heat-shrink covers

Cabling

Traction Positive Incoming 3 x 935mm^2 Copper Cable
Traction Positive Outgoing 3 x 935mm^2 Copper Cable
Traction Negative Incoming 3 x 935mm^2 Copper Cable
Traction Negative Outgoing 3 x 935mm^2 Copper Cable

Electrical Characteristics & Dimensions

	8800074
Voltage	630V
Current	4kA
Length	2990 mm
Height	1070 mm
Depth	510 mm
Weight	502kg

6.16 MLU TTSS – 2 Pole Tunnel Track Section Switch – 4000A 630V DC - 8800361, 8800364, 8800414

London Underground

APPLICATION – OFF LOAD, FAULT MAKE

2 pole isolation and/or switching of high-power circuits, where a high short circuit withstand and high voltage isolation is required.

Used by **LUL Jubilee & Victoria Lines** for track sectioning.

Switches

(1-0) Motor driven Off Load, fault make switch

Features

- ❑ IP56
- ❑ Low Smoke Zero Halogen Components
- ❑ Protected for external use
- ❑ Low Smoke Paint Finish **(To LUL Section 12 Specification**)
- ❑ 60mm Electrical Clearance
- ❑ 110V Control Supply

Installation

Wall mounted, external cabling with heat shrink-sleeving

Cabling

Positive and negative cables feed through their respective poles but incoming and outgoing are connected to opposing ends of the enclosure.

The cable connections are external to the enclosure and must be covered by heat shrink-sleeving of a suitable material to ensure that accidental contact cannot be made with live connections.

Traction Positive Incoming 2 x 935mm^2 Copper Cable
Traction Positive Outgoing 2 x 935mm^2 Copper Cable
Traction Negative Incoming 2 x 935mm^2 Copper Cable
Traction Negative Outgoing 2 x 935mm^2 Copper Cable

Electrical Characteristics & Dimensions

	8800076	8800361	8800364	8800414
System	Jubilee Line	Victoria Line	Victoria Line	Metropolitan Line
Variant	Electrical + Remote Control Panel	Manual	Electrical + Remote Control Panel	Manual
Voltage	630V	630V	630V	630V
Current	4kA	4kA	4kA	4kA
Length	2375 mm	2335 mm	2335 mm	2335 mm
Height	670 mm	670 mm	670 mm	670 mm
Depth	325 mm	319 mm	319 mm	319 mm
Weight	450kg	414kg	427kg	335kg

The products in yellow are London Underground Framework Products.

Special frame mounted variant with Remote Control Box

2 pole isolation and/or switching of high-power circuits, where a high short circuit withstand and high voltage isolation is required.

Used at **Baker Street** for track sectioning.

100mm high frame for mounting to ensure train clearance from the front of the switch.

	8800327
Voltage	630V
Current	4kA
No of poles	2
Length	2375 mm
Height	670 mm
Depth	320 mm
Weight	550kg

6.17 MLU RCTIS Remote Controlled Track Isolating Disconnector Switch (Tunnel) 4kA 2 P Slimline 8800411

London Underground

APPLICATION – OFF LOAD, FAULT MAKE

2P isolation and/or switching of high-power circuits, where a high short circuit withstand and high voltage isolation is required.

Used by **LUL Northern Line** for tunnel track sectioning with up to **2km Remote Control**.

Switches

(1-0) Motor driven Off Load, fault make switch

Features

- ❑ IP56
- ❑ Low Smoke Zero Halogen Components
- ❑ Protected for external use
- ❑ Low Smoke Paint Finish **(To LUL Section 12 Specification**)
- ❑ 60mm Electrical Clearance
- ❑ 230VAC Control Supply with 110VDC Control Supply for the long-distance Remote-Control Panel.

Installation

Wall mounted, external cabling with heat shrink-sleeving

Cabling

Positive and negative cables feed through their respective poles but incoming and outgoing are connected to opposing ends of the enclosure.

Traction Positive Incoming 2 x 935mm^2 Copper Cable
Traction Positive Outgoing 2 x 935mm^2 Copper Cable
Traction Negative Incoming 2 x 935mm^2 Copper Cable
Traction Negative Outgoing 2 x 935mm^2 Copper Cable

Electrical Characteristics & Dimensions

	8800411
System	Northern Line
Variant	Electrical with up to 2km Remote Control Panel
Voltage	630V
Current	4kA
Length	2380 mm
Height	1850 mm
Depth	500 mm
Weight	500kg

6.18 MLU TTSM – 2 Pole Tunnel Track Section Switch Manual IP67 – 4000A 630V DC - 8800098

London Underground

APPLICATION – ON LOAD

2 pole isolation and/or switching of high-power circuits, where a high short circuit withstand and high voltage isolation is required. Used by **LUL Northern Line** for track sectioning.

Switches

(1-0) Manual on Load, fault make/ fault break switch.

Features

- ❑ IP67 (Type test available)
- ❑ Protected for external use
- ❑ Low Smoke Paint Finish **(To LUL Section 12 Specification**)
- ❑ 60mm Electrical Clearance

Installation

Wall / Post mounted, cable entry from below via Aluminium gland plates.

Cabling

Traction Positive Incoming 2 x 935mm^2 Copper Cable
Traction Positive Outgoing 2 x 935mm^2 Copper Cable
Traction Negative Incoming 2 x 935mm^2 Copper Cable
Traction Negative Outgoing 2 x 935mm^2 Copper Cable

Electrical Characteristics & Dimensions

	8800098
Voltage	630V
Current	4kA
Length	2375 mm
Height	670 mm
Depth	320 mm
Weight	550kg

6.19 4kA Disconnection Panel (Cable Marshalling Box) - 8800448

London Underground

APPLICATION – ON LOAD

The disconnection panel is used to a reduction of the cabling from 2 x 935mm^2 down to 1 x 935mm^2 or 3 x 935mm^2 down to 2 x 935mm^2 this can save long runs of expensive cable and installation cost where there is not a sufficient current demand for this cable.

Features

- ❑ IP54
- ❑ Low Smoke Zero Halogen Composite construction
- ❑ Protected for external use
- ❑ Low Smoke Paint Finish **(To LUL Section 12 Specification**)
- ❑ 60mm Electrical Clearance

Installation

Plinth mounted, cable entry from below via insulating gland plates.

Cabling

Traction Positive Incoming 3 x 935mm^2 Copper Cable
Traction Positive Outgoing 3 x 935mm^2 Copper Cable
Traction Negative Incoming 3 x 935mm^2 Copper Cable
Traction Negative Outgoing 3 x 935mm^2 Copper Cable

Electrical Characteristics & Dimensions

	8800448
Voltage	630V
Current	4kA
Length	1030 mm
Height	1480 mm
Depth	480 mm
Weight	120kg

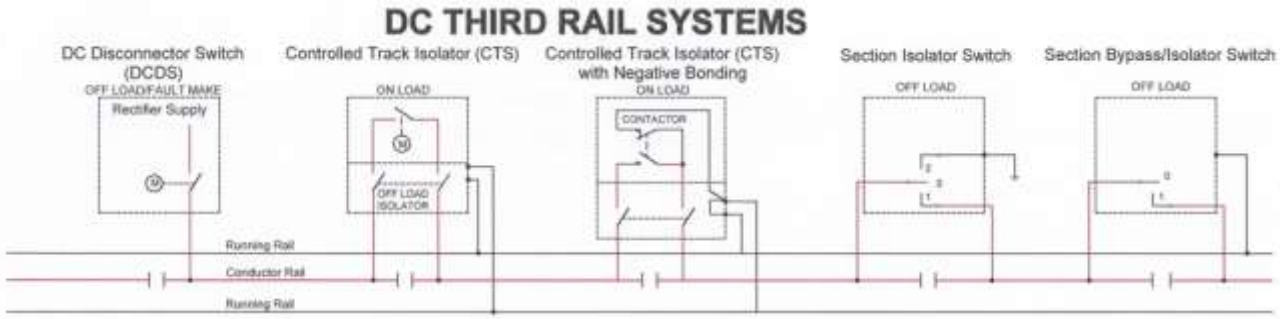
6.20 Depot Switches that are also suitable for Trackside Applications

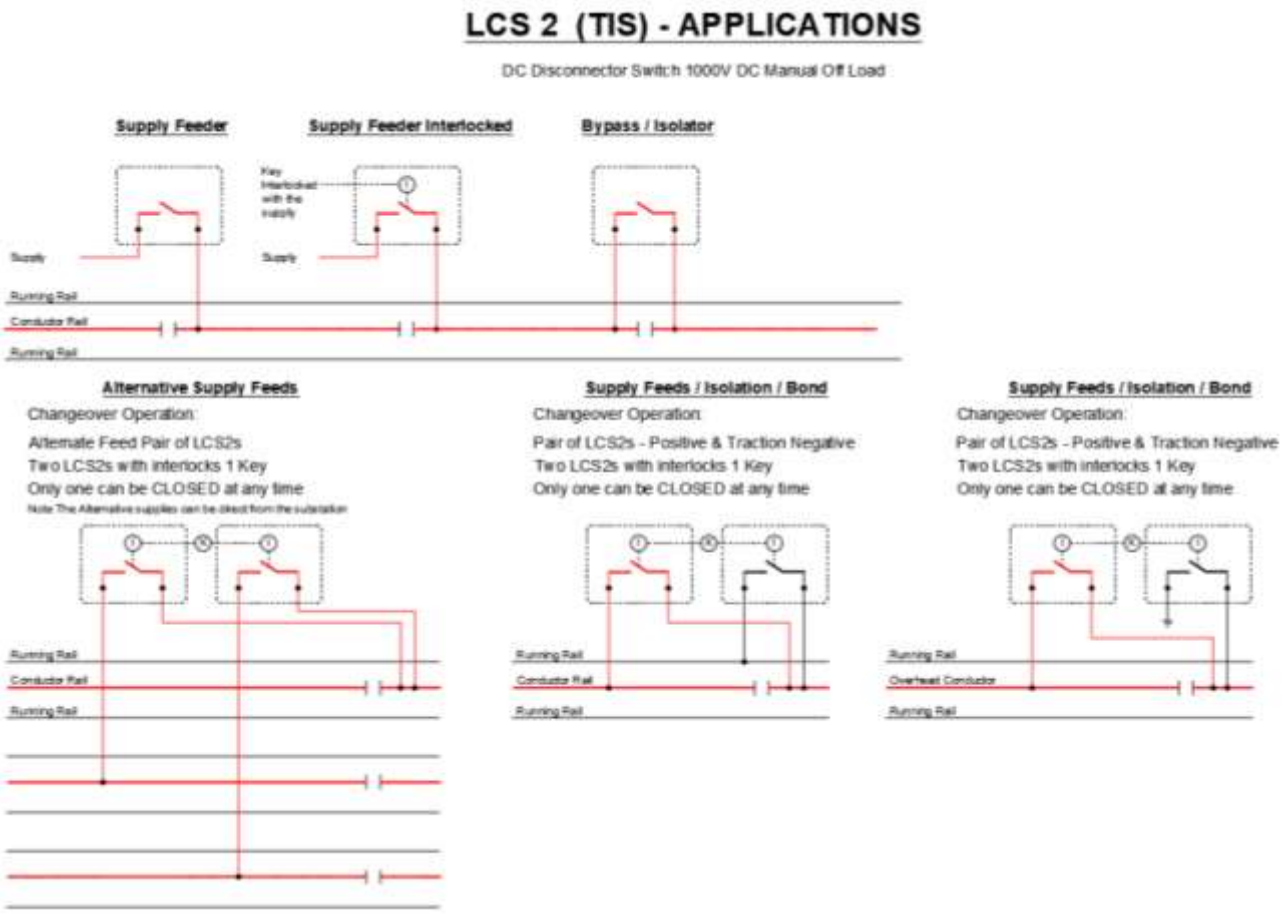
London Underground

Depot switches can be used in many Trackside applications where space is not a constraint.
The details for all of the following products can be found in the Depot section of this catalogue.

Product			Description	Ref to Page
8800445	MLU	MDS	Track Isolating Manual Disconnector Switch 4kA 2 Pole (Top entry Cables)	76
8800435	MLU	MCOD	Manual Changeover Off load Disconnector 4kA 2 Pole (Slimline)	
8800410	MLU	MDS	MDS Track Isolating Manual Disconnector Switch 4kA 2 Pole (Slimline)	
8800397	MLU	MDS	Track Isolating MDS Manual Disconnector Switch 4kA 2 Pole	76
8800363	MLU	MCOIS	Manual Changeover On Load Isolating Switch 4kA 2 Pole	78
8800360	MLU	MTIS	Manual Track Isolating Switch 4kA 2 Pole	75
8800352	MLU	RCTIS	4 kA RCTIS 2 Pole Motorised Switch -	74
8800318	MLU	RCTIS	3kA RCTIS 2 Pole Motorised Switch - SCADA	74
8800317	MLU	RCTIS	3kA RCTIS 2 Pole Motorised Switch -	74
8800307	MLU	MDDS	Motor Driven Disconnector Switch (London Rd)	76
8800306	MLU	MDDS	Motor Driven Disconnector Switch LH (Queens Park)	77
8800305	MLU	MDDS	Motor Driven Disconnector Switch RH(Queens Park)	77
8800286	MLU	MDS	Manual Disconnector Switch	75
8800268	MLU	MTIS	3kA MTIS II Depot	

6.21 ML – Single Pole DC Rail Systems





6.22 SD –LCS2 (TIS / TD) 1 Pole Supply Disconnector - 4000A 750V DC - Network Rail No PA05/00454 - 8800185

NetworkRail

APPLICATION - OFF LOAD

Distribution of power from substations and track isolation

Construction

5mm and 10mm heavy duty GRP enclosure

Low profile allowing the enclosure to be mounted close to the track

Features

- ❑ IP56
- ❑ Padlock facilities for both open and closed
- ❑ Heavy duty insulated operating handle
- ❑ Insulating Gland Plates

Installation

The switch can be installed by the following methods:

- ❑ Back-to-back mounting frame (Available from LCS see below)
- ❑ Wall mounted (Vertical)

Cabling

4 x 1000mm^2 Aluminium positive cable in and out

Switch Features

Large isolation distance

Self-cleaning contacts

High resistance to short circuit currents

Electrical Characteristics

Nominal Current	4000 A
1st wave peak value	150kA
I r.m.s.	70kA for 1 s
Nominal Voltage	7.2kV

Dimensions

Length	1200 mm
Height	815 mm
Depth	400 mm
Weight	**83 kg**

Versions

Description	No	NR Part No	
LCS 2 Standard	**8800185**	**055/028645**	
LCS 2 with Interlock facility and microswitches to ensure that only one of the pair can be 'CLOSED' at a time	**8800345**		

Alternative Feed Applications

Where two alternative feeds are required two LCS2's can be provided on one twin frame.

These LCS2's need to be the **8800345** version which have an interlock facility and microswitches to ensure that only one of the pair can be 'CLOSED' at a time.

Mounting Frames

Part No	NR Part No	Description	
8800253-V01	**URLT025473**	LCS / CRHP Mounting Frame Length 790 mm Height 1705 mm Depth 700 mm Weight **55 kg**	
8800253-V05		LCS GRP Mounting Frame for Concrete Plinth or Platform mounting Length 1260 mm Height 1697 mm Depth 83 mm Weight **43 kg**	
8800349-V01		LCS2 Twin Mounting Frame Length 2690 mm Height 1705 mm Depth 700 mm Weight **124 kg**	

Cable Clamping Kits

Part No	NR Part No	Description	
8800531-V01 **856203** **856202**	**URLT025474**	LCS2 Cable Mounting Kit Unistrut Cable Clamps Mounting Kit frame fixings	
8800531-V02 **869567** **856202**		LCS2 Cable Mounting Kit Insulated cleats Insulated Cable Clamps Mounting Kit frame fixings	

6.23 8800185-V05 - 4 x LCS2 in a GRP Enclosure - 8800185-V05

This panels consists of four LCS2 switches which have Product Approval No: - PA05/454.
8800185-V05 LCS2-4-4 (1-0) 4kA Track Isolator Switches - Single Enclosure.
The LCS2-4-4 is a product made up of 4 manually operated 1 pole, off-load, 1000V DC, 4000A Disconnector.
The switch located on the bottom left position is electrically isolated and segregated from the rest.

System Requirements

System Voltage	1000V DC
System Current	4000A

Cubicle Construction

Material	GRP
Finish	Grey RAL 7038
Degree of Ingress Protection	IP54
Approximate Weight	Full Product weight - 600kg
	1700mm high
	2000mm wide
Approximate Dimensions	825mm deep, 1752mm deep (doors open)

6.24 HOOK SWITCH - 1600A 750V DC – (NOT SUITABLE for High Current Rail Applications)

APPLICATIONS - OFF LOAD

Distribution of power and track isolation where low current is required

Features

- Good Electrical Clearance
- Clamped Contacts to withstand the traction environment.
- Fits onto standard Conductor Rail.
- Hook hole for operation via an insulated pole (supplied by others)

Electrical Characteristics

Description	Ref No	Current	Voltage
Mk VII Right Hand	**856903**	1600 A	750V
Mk VII Left Hand	**856068**	1600 A	750V

(NOT SUITABLE for High Current Rail Applications)

Note: For high current rail applications the:
Network Rail Product Approved PA05/00454 SD- LCS2 should be used.
(See previous)

6.25 SD –LCS2-2 - 2 Pole Supply Disconnector - 2000A 750V DC (TIS / TD) - 8800394

NetworkRail

APPLICATION - OFF LOAD

Distribution of power from substations and track isolation

Construction

5mm and 10mm heavy duty GRP enclosure

Low profile allowing the enclosure to be mounted close to the track

Features

- ❑ IP56
- ❑ Padlock facilities for both open and closed
- ❑ Heavy duty insulated operating handle
- ❑ Insulating Gland Plates

Installation

The switch can be installed by the following methods:

- ❑ Back mounting frame (Available from LCS see below)
- ❑ Wall mounted (Vertical)

Cabling

2 x 240mm^2 cable in and out of each pole

Switch Features

Large isolation distance

Self-cleaning contacts

High resistance to short circuit currents

Electrical Characteristics

Nominal Current	**2000 A**
Nominal Voltage	**1.5kV**

Dimensions

Description	No	Length	Height	Depth	Weight
LCS2	**8800394**	1200 mm	815 mm	400 mm	**83 kg**
Mounting Frame	**8800253**	790 mm	1705 mm	700 mm	**55 kg**

Alternative Feed Applications

These are designed for applications where two alternative feeds require two LCS2-2's which have an interlock facility and microswitches to ensure that only one of the pair can be 'CLOSED' at a time.

6.26 SMS Alarm & Status Indicator, transmitter and receiver - 8800465

SOUTHERN

Alarm & status transmitter

Monitors CTS's TS113 & TS114 open/closed & control power supply status

Battery backed power supply, fed from TS 113

SMS alarms sent to up to 5 mobile phone numbers

Alarm phone numbers re-programmable by SMS

SMS alarms may be configured to be only trip alarms, all changes of state, or inhibited for maintenance

CTS open / closed status transmitted to indicator unit in shunter's accommodation

Status indicator / receiver

Indicator unit displays open / closed status of each CTS

Resettable alarm sounds on CTS trip

Transmitter 1

Communications

All communication between units by SMS via GSM network will work with any UK mobile phone network operator

2 off SIM cards required (1 for transmitter, 1 for receiver) contract with unlimited SMS allowance recommended

Receiver 2

	8800465
Supply	230V AC
Current	6A
Length	245 mm
Height	345 mm
Depth	160 mm
Weight	kg

6.27 ML CTS – 1 Pole Controlled Track Switch MK 2 - 2000A / 4000A 750V DC NR No PA05/02035 - 8800113

NetworkRail

APPLICATION – ON LOAD

Isolation and switching of high-power circuits, where a high short circuit withstand and high voltage isolation is required. Typically used by **Network Rail** for track sectioning. The CTS is built to **NR/SP/ELP/21025**

Switches

(1-0) Motor driven On Load, fault make / load break switch &
(1-0) 2 pole Manual Off Load Switch
(**Lockable maintenance switch, no need for external 'Hook' switches**)

Features

- ❑ IP56
- ❑ Protected for external use
- ❑ Anti-Graffiti Paint Finish (**RT98-RT/CE/S/039**)
- ❑ 100mm Electrical Clearance
- ❑ Fully Isolated 240V AC Control Supply

Installation

Plinth mounted, cable entry via insulated split gland plates

Cabling

Traction Positive Incoming	2 x 1000mm^2 Aluminium cable
Traction Positive Outgoing	2 x 1000mm^2 Aluminium cable
Traction Negative	2 x 240mm^2 Copper cable

Electrical Characteristics & Dimensions

	8800106	8800113
Voltage	750V	750V
Current	2kA	4kA
Weight	700kg	750kg
Length	1490 mm	1490 mm
Height	2201 mm	2201 mm
Depth	855 mm	855 mm

6.28 ML CTS – 1P Controlled Track Switch (Mk 3) – 3000A & 5000A 750V DC - PA05/02033 - 8800259

NetworkRail

APPLICATION – ON LOAD

Isolation and switching of high-power circuits, where a high short circuit withstand and high voltage isolation is required. Typically used by **Network Rail** for track sectioning and electrical distribution from rectifiers and transformers. The CTS is built to **NR/SP/ELP/21025.**

Contactor

Motor driven On Load, fault make / load break contactor

Switch

(1-0) 2 pole Manual Off Load Switch
(**Lockable maintenance switch, no need for external 'Hook' switches**)

Features

- ❑ IP56
- ❑ Protected for external use
- ❑ Anti-Graffiti Paint Finish (**RT98-RT/CE/S/039**)
- ❑ 100mm Electrical Clearance
- ❑ Fully Isolated 240V Control Supply
- ❑ High Speed under voltage release

Installation

Plinth mounted, cable entry via insulated split gland plates.

Cabling

	8800258	8800259
Traction Positive Incoming	2 x 1000mm^2 Aluminium Cable	5 x 1000mm^2 Aluminium Cable
Traction Positive Outgoing	2 x 1000mm^2 Aluminium Cable	4 x 1000mm^2 Aluminium Cable
Traction Negative Incoming	2 x 240mm^2 Copper Cable	2 x 240mm^2 Copper Cable
Traction Negative Outgoing	2 x 240mm^2 Copper Cable	2 x 240mm^2 Copper Cable

Electrical Characteristics & Dimensions

	8800258	8800259
Voltage	750V	750V
Current	3.2kA	5kA
Weight	933kg	976kg
Length	1800 mm	1800 mm
Height	2290 mm	2290 mm
Depth	1090 mm	1090 mm

6.29 ML 3 Position Motorised Isolator – 1250A 3600V DC - 8800429

North London Line

APPLICATION – OFF LOAD / FAULT MAKE

The switch is to be used to connect the AC Running Rails of a test track or the Earth Bar to the 25kV DC immune Isolating Transformer. This electrically actuated switch can be part of the supply system for a 25kV track.

Switch

1250A 1-0-2 3.6kV 1Pole OFF LOAD motorised.

Cubicle Features

- IP 55
- Fully hot zinc sprayed purpose-built cabinet.
- External - Painted Light Grey BS381C Semi-gloss Shade 631
- Internal - white anti-condensation paint
- Control Compartment Door has Yale / Union Lock

Installation

Plinth mounted, cable entry via undrilled aluminium gland plates into body of cubicle.

Cabling

Prepared for 19/4.22 PVC insulated stranded aluminium cables

Prepared for M12 Fixings

Electrical Characteristics & Dimensions

	8800429
Voltage	3600V DC
Current	1250A
Weight	560kg
Length	2100 mm
Height	1080 mm
Depth	960 mm

6.30 2 Pole Contactor & Manual Isolator – 2000A 750V DC - 8800428

North London Line

APPLICATION

The 2 Pole Contactor and Isolator Panel consists of a 2 pole 2500A 1500V Disconnector and a 2 Pole 3200A 1500V Contactor, together with associated ancillary equipment.

This unit is based on and designed in line with the **Network Rail** approved CTS which are built to **NR/SP/ELP/21025.**

Contactor

CBC 98 2Pole 3200A 1500V DC - Coil 110V AC

Disconnector

Max-E-Switch Disconnector 2 Pole manual 2500A 1500V DC

(**Lockable maintenance switch, no need for external 'Hook' switches**)

Features

- ❑ IP55
- ❑ 3mm Hot Zinc Sprayed Sheet Steel
- ❑ External Finish - BS381C Shade 631 Light Grey Semi-Gloss
- ❑ Internal Finish - J124 White Anti-Condensation paint
- ❑ Anti-Condensation Heaters Thermostatically controlled to operate above 5ºC

Cabling

Traction Positive Incoming	2 x 1000mm^2 Aluminium Cable
Traction Positive Outgoing	4 x 1000mm^2 Aluminium Cable
Traction Negative Incoming	2 x 240mm^2 Copper Cable
Traction Negative Outgoing	4 x 240mm^2 Copper Cable

Electrical Characteristics & Dimensions

	8800428
Voltage	750V DC
Current	2.0kA
Weight	1100kg
Length	1800 mm
Height	2200 mm
Depth	1114 mm

6.31 SCADA Control Panel

APPLICATION

Signal acquisition and conversion for communication with SCADA. This unit can be placed near to the equipment which requires a SCADA interface. The unit also provides an interface with the remote signalling REB.

Features

- ❑ MS146 Slave Controller – 8 inputs
- ❑ Hot Press Moulded, Reinforced Polyester RAL 7032
- ❑ IP56
- ❑ Protected for external use

Auxiliary Supply

Voltage AC230V AC 50Hz

Electrical Characteristics & Dimensions

	863616
Voltage	750V DC
Current	2.0kA
Weight	1100kg
Length	750 mm
Height	1000 mm
Depth	320 mm

6.32 Bypass Isolator 2 Pole 2.5kA 1500V - 8800432

North London Line

APPLICATION

The Bypass Switch 2 Pole 2.5kA comprises of a motorised, 2 position 2 pole 2.5kA 1.5kV Disconnector together with associated control equipment.

The Bypass Switch will switch the positive and negative traction feeds and is used to bypass other equipment in the event of its failure.

Switch

Max-E-Switch (1-0) 2 Pole 2500A 1500V DC Motorised Off-load Disconnector

Features

- ❑ IP55
- ❑ 3mm Hot Zinc Sprayed Sheet Steel
- ❑ External Finish - BS381C Shade 631 Light Grey Semi-Gloss
- ❑ Internal Finish - J124 White Anti-Condensation paint
- ❑ Anti-Condensation Heaters Thermostatically controlled to operate above 5ºC
- ❑ 100mm Electrical Clearance
- ❑ Fully Isolated 230V Control Supply
- ❑ Auxiliary Voltage 230V AC 50Hz
- ❑ Auxiliary Current 2A

Electrical Characteristics & Dimensions

	8800432
Voltage	1500V DC
Current	2.5kA
Length	2160 mm
Height	1800 mm
Depth	1115 mm
Weight	745kg

6.33 ML SGNLR – Spark Gap & Non-Linear Resistor Cubicle – 6000A or 9000A rms for 0.2s – 8800244, 8800342

NetworkRail

APPLICATION

Where there is 25kV overhead lines and 750V DC, the non-linear resistors provide a path back to source for currents flowing in short circuits of the 25kV AC overhead lines, while limiting the current which flows during the normal operation of the railway.

Operation

The spark gap device triggers to limit earth voltage to a safe level.

The resistors limit the running rail touch voltage to within safe levels.

This restricts the risk of stray DC currents.

Resistors

Non-Linear Ceramic Disc Resistor assemblies

(This must be matched to system requirements)

Features

- ❑ IP55
- ❑ Protected for external use
- ❑ Anti-Graffiti Paint Finish (**RT98-RT/CE/S/039**)
- ❑ Conformance to BSEN 50122
- ❑ Independently type tested to Network Rail Specification

Installation

Plinth mounted.

Cable entry from below via insulating gland plates

Cabling

Incoming & Outgoing 2 x 95mm^2 XPLE Copper Cable

Electrical Characteristics & Dimensions

	8800244	8800342
Current	6kA for 0.2s	9kA for 0.2s
Length	910 mm	910 mm
Height	1570 mm	1570 mm
Depth	630 mm	630 mm
Weight	276kg	276kg

6.34 ML SGNLR – Spark Gap & Non-Linear Resistor Cubicle – 2000A, 4000A & 8000A rms for 0.2s - 8800322

NetworkRail

APPLICATION

Where there is 25kV overhead lines and 750V DC, the non-linear resistors provide a path back to source for currents flowing in short circuits of the 25kV AC overhead lines, while limiting the current which flows during the normal operation of the railway.

Operation

The spark gap device triggers to limit earth voltage to a safe level.
The resistors limit the running rail touch voltage to within safe levels.
This restricts the risk of stray DC currents.

Resistors

Non-Linear Ceramic Disc Resistor assemblies
(This must be matched to system requirements)

Features

- ❑ IP55
- ❑ Stainless Steel Enclosure
- ❑ Conformance to BSEN 50122
- ❑ Independently type tested to Network Rail Specification

Installation

Plinth mounted.
Cable entry from below via insulating gland plates

Cabling

Incoming 2 x 95mm^2 XPLE Copper Cable
Outgoing 2 x 95mm^2 XPLE Copper Cable

Electrical Characteristics & Dimensions

	8800322	8800321	8800427	8800279
Current	2kA for 0.2s	4kA for 0.2s	6kA for 0.2s	8kA for 0.2s
Special Features			No Spark Gap Device	
Length	910 mm	910 mm	910 mm	910 mm
Height	1570 mm	1570 mm	1570 mm	1570 mm
Depth	630 mm	630 mm	630 mm	630 mm
Weight	225kg	225kg	225kg	276kg

6.35 ML DNLR – Diode & Resistor Panel - 8800323

APPLICATION

Where there are 25kV overhead lines and 750V DC, a pair of diode assemblies connected in series by bus bars with a non-linear resistor in parallel across both diodes ensures a path back to source for currents flowing in short circuits of the 25kV AC overhead lines. To meet **Network Rail Z148/303** North London Line OLE Structure Foundations, Detailed Design for Stray Current Control Equipment. Technical Specification for Diode Equipment Document Reference: 5014193-051-001 Issue 3.doc

Operation

The Diode pair ensures a directional path for the stray DC currents

This restricts the risk of stray DC currents.

Resistors & Diode

Matched pair Diode Set

Non-Linear Ceramic Disc Resistor assemblies

(This must be matched to system requirements)

Features

- ❑ IP55
- ❑ Stainless Steel Enclosure

Installation

Plinth mounted.

Cable entry from below via aluminium gland plates

Cabling

Incoming 2 x 95mm^2 XPLE Copper Cable

Outgoing 2 x 95mm^2 XPLE Copper Cable

Electrical Characteristics & Dimensions

	8800323
Length	910 mm
Height	1570 mm
Depth	630 mm
Weight	276kg

6.36 ML RCI – 1 Pole Return Current Isolator – 500A 500V AC - 8800245

Channel Tunnel Rail Link

APPLICATION ON LOAD

Where there is 25kV overhead lines and 750V DC, the AC/DC Compound Return current Isolators are used in conjunction with the power supply and the spark gap non-linear resistor assemblies to isolate the return paths during maintenance and inspection.

Switches

One (1-0) 1 pole Manual Disconnector
Voltage Withstand 2500V 50Hz for 1 minute
Max Fault Current 6kA rms

Features

- ❑ IP55
- ❑ Zinc Sprayed
- ❑ Interlocking in Open & Closed

Installation

Plinth mounted, cable entry from below via aluminium gland plates

Cabling

Incoming 2 x 95mm^2 XPLE Copper Cable
Outgoing 2 x 95mm^2 XPLE Copper Cable

Electrical Characteristics & Dimensions

	8800245
Voltage	500V
Current	500A
Length	800 mm
Height	1300 mm
Depth	400 mm
Weight	123kg

6.37 ML RCI – 2 Pole Return Current Isolator – 500A 500V AC - 8800246

Channel Tunnel Rail Link

APPLICATION ON LOAD

Where there is 25kV overhead lines and 750V DC, the AC/DC Compound Return current Isolators are used in conjunction with the power supply and the spark gap non-linear resistor assemblies to isolate the return paths during maintenance and inspection.

Switches

One (1-0) 2 pole Manual Disconnector.
Voltage Withstand 2500V 50Hz for 1 minute
Max Fault Current 6kA rms

Features

- ❑ IP55
- ❑ Zinc Sprayed
- ❑ Interlocking in Open & Closed

Installation

Plinth mounted, cable entry from below via aluminium gland plates

Cabling

Incoming 1# 2 x 95mm^2 XPLE Copper Cable
Outgoing 1# 2 x 95mm^2 XPLE Copper Cable
Incoming 2# 2 x 95mm^2 XPLE Copper Cable
Outgoing 2# 2 x 95mm^2 XPLE Copper Cable

Electrical Characteristics & Dimensions

	8800246
Voltage	500V
Current	500A
Length	800 mm
Height	1300 mm
Depth	400 mm
Weight	125kg

7 Railway Switchgear – LINK BOXES & MARSHALLING BOXES

Traction grade Link Boxes
Vibration and Shock Resistant to suit the arduous trackside requirements







DC & AC Link enclosures for the following applications:
Supply Isolation
Negative Isolation
Supply Changeover

7.1 TL TDC (2) 3.6kA Trackside Connection Box (2 Link) - 8800375, 8800403

LUAS

APPLICATION OFF LOAD

A Substation Section Isolating links are used to connect and disconnect the power to the overhead lines.

Once Isolated the Trackside Connection Box Links can be removed ensuring a safe working environment for the overhead lines.

Cubicle Construction

Material GRP 4 to 16mm thick

Finish Light Grey RAL7035 Semi - Gloss

Features

- ❑ IP54-9+

Installation

Plinth mounted, cable entry from below via insulating split-plates

Cabling

Incoming 8 x 240mm^2 Copper Cable

Outgoing 8 x 240mm^2 Copper Cable

Electrical Characteristics & Dimensions

	8800375	8800403
Voltage	1500V	1500V
Current	3600A	2000A
Length	1065 mm	1065 mm
Height	1275 mm	1275 mm
Depth	745 mm	745 mm
Weight	152kg	152kg

7.2 TL TDC (2) 2kA Trackside Connection Box (3 Link) - 8800436

LUAS

APPLICATION OFF LOAD

A Substation Section Isolating links are used to connect and disconnect the power to the overhead lines.

Once Isolated the Trackside Connection Box Links can be removed ensuring a safe working environment for the overhead lines.

Cubicle Construction

Material GRP 4 to 16mm thick

Finish Light Grey RAL7035 Semi - Gloss

Features

- ❑ IP54-9+
- ❑ VLD Voltage Limiter Device

Installation

Plinth mounted, cable entry from below via insulating split-plates

Cabling

Incoming 12 x 240mm^2 Copper Cable

Outgoing 12 x 240mm^2 Copper Cable

Electrical Characteristics & Dimensions

	8800436
Voltage	1500V
Current	2000A
Length	2010 mm
Height	1590 mm
Depth	910 mm
Weight	468kg

7.3 TL TDC2M 3.6kA Trackside Connection Box (2 Link) Motorised Bypass - 8800376 LUAS

APPLICATION ON LOAD

The Trackside Connection Box is used to bypass the Traction Supply from the substations to the overhead flexible feeder cables along the tramway. For maintenance purposes, links in the cabinet can be removed to isolate the overhead flexible feeder cables from the supply substations. As used on the **Dublin LUAS**.

Cubicle Construction

Material GRP 4 to 16mm thick

Finish Light Grey RAL7035 Semi – Gloss

Switch

Single pole on load motorised isolator 3600A 1500V DC

Features

- ❑ IP55
- ❑ Zinc Sprayed
- ❑ Interlocking in Open & Closed

Installation

Plinth mounted, cable entry from below via insulating split-plates

Cabling

Incoming 8 x 240mm^2 Copper Cable

Outgoing 8 x 240mm^2 Copper Cable

Electrical Characteristics & Dimensions

	8800376
Voltage	1500V
Current	3600A
Length	2000 mm
Height	1575 mm
Depth	745 mm
Weight	500kg

7.4 TL TDC2M 2kA Trackside Connection Box (2 Link) Motorised Bypass - 8800404 LUAS

APPLICATION ON LOAD

The Trackside Connection Box is used to bypass the Traction Supply from the substations to the overhead flexible feeder cables along the tramway. For maintenance purposes, links in the cabinet can be removed to isolate the overhead flexible feeder cables from the supply substations. As used on the **Dublin LUAS**.

Cubicle Construction

Material GRP 4 to 16mm thick

Finish Light Grey RAL7035 Semi – Gloss

Switch

Single pole on load motorised isolator 2000A 1500V DC

Features

- ❑ IP55
- ❑ Zinc Sprayed
- ❑ Interlocking in Open & Closed

Installation

Plinth mounted, cable entry from below via insulating split-plates

Cabling

Incoming 4 x 240mm^2 Copper Cable

Outgoing 4 x 240mm^2 Copper Cable

Electrical Characteristics & Dimensions

	8800404
Voltage	1500V
Current	2000A
Length	2000 mm
Height	1575 mm
Depth	745 mm
Weight	345kg

7.5 Negative Connection Box (2 Link) - 8800405

LUAS

APPLICATION OFF LOAD

A Substation negative connection box

Cubicle Construction

2mm thick sheet steel

Finish Light Grey RAL7035 Semi - Gloss

Features

- ❑ IP54
- ❑ Voltage Limiter facility

Installation

Plinth mounted, cable entry from below via gland plates

Cabling

Main Negative Bar 12 x 185mm^2 Copper Cable

Outgoing Negative 6 x 185mm^2 Copper Cable

Electrical Characteristics & Dimensions

	8800405
Voltage	1500V
Current	2000A
Length	1500 mm
Height	1800 mm
Depth	450 mm
Weight	255kg

7.6 Broken Neutral Cable Link Box - 8800398

NetworkRail

APPLICATION OFF LOAD

12kV 400A bolted link in an outdoor enclosure.

Independently tested to:

12kA for 3sec

28kA rated power frequency withstand voltage

75kV Lightning Impulse

Cubicle Construction

Material - **Stainless Steel**

Dark Admiralty Grey BS381C

Features

- ❑ IP55
- ❑ Interlocking on Link Bar-Option
- ❑ Door prepared for interlocking

Installation

Frame mounted, cable entry from below via insulating gland plates

Cabling

Incoming 1 x 240mm^2 Copper Cable

Outgoing 1 x 240mm^2 Copper Cable

Electrical Characteristics & Dimensions

	8800398
Voltage	12kV
Current	400A
Length	805 mm
Height	1960 mm
Depth	475 mm
Weight	158kg

Mounting Frame: 8800408

London Underground

7.7 2 Pole 4kA Disconnection Panel (Cable Marshalling Box) - 8800477

2 Pole, 4kA Marshalling Panel for 4 x 935mm^2 Copper Cables in and 4 x 935mm^2 Copper Cables out , housed in a steel enclosure.
Segregated Positive & Negative Poles.

Enclosure Construction

Material 3mm sheet steel hot zinc sprayed
Finish Canary Yellow BS381C-L309 Semi-Gloss
Degree of Ingress Protection IP54

Electrical System

System Voltage 630V DC
System Current 4kA

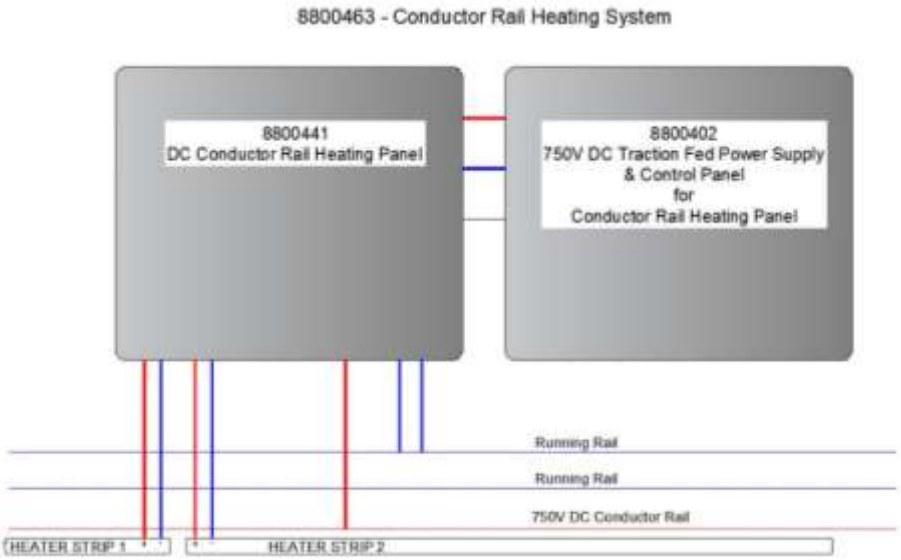
	8800477
Voltage	630V DC
Current	4000A
Length	1800 mm
Height	1600 mm
Depth	600 mm
Weight	350kg

8 Railway Switchgear - CONDUCTOR RAIL HEATING

Power Isolation & Maintenance Switchgear Enclosures for:

DC Switchgear enclosures for the following applications:
Conductor Rail Trace Heating Strip switching, isolation & GPRS remote control

8.1 SD –CRHP DC Conductor Rail Heating Supply Panel SYSTEM- PA05/05191 - 8800463



The System Comprises: Power Supply & Control Panel, Heating Panel & mounting frame

Why 750V DC Conductor Rail Heating System not a Points Heating System?

Heating strips applied to the 750V DC conductor rails have very different requirements to the heating strips on the running rails and points heating

- ❑ Traction Isolation levels are required between controls and the 750V DC Conductor Rail
- ❑ Traction Grade protection of the Heating Strip (Due to proximity to the Conductor Rail)

Features

- ❑ Derives the control and heating power from the 750V DC Traction supply
- ❑ No need for separate DNO system supply

8800463-V01	Conductor Rail Heating Ground Mounted Assembly with 63A Fuse
8800463-V02	Conductor Rail Heating Ground Mounted Assembly with 125A Fuse
8800463-V03	Conductor Rail Heating Ground Mounted Assembly with 160A Fuse STANDARD
8800463-V04	Conductor Rail Heating Ground Mounted Assy MAN -160A Fuse
8800463-V05	Conductor Rail Heating Ground Mounted Assy MAN -125A Fuse

The 8800463-V03 Standard Assembly consists of:

Number	Description	Page
8800402-V02	TFPS 250W 750V DC Traction Fed Power Supply Panel 750V DC - 24V DC + PLC	138
8800441-V05	CRHP AUTOMATED 2 Pole Conductor Rail Supply Panel	137
8800253-V02	Mounting Frame for Heating & Supply & control Panel	137

Refer to the following pages for further details.

8.2 SD –CRHP Automated 2P Conductor Rail Supply Disconnector - 250A 750V DC MK V - PA05/05191 - 8800441

APPLICATION - ON LOAD

Actuator driven Isolation and fuse protection for 2 lengths of conductor rail heating strip
The circuit is protected by four traction grade fuses.

General Features

- Separate sections & 100mm clearance with central barriers EM42 for positive and negative poles for:
- Fuses
- Switch Disconnector SD 1
- Switch Disconnector SD 2
- Statutory safety labels

Construction

Heavy duty GRP cabinets, hot press moulded, reinforced polyester enclosure, Complies with general requirements for empty enclosures conforming to EN 62208: 2003 (EN 50298: 1999).

- Resistance to external mechanical impact: IK 10 (5 joules) conforming to EN 50 102.
- External & Internal Colour - RAL 7032 Grey
- IP 56 sealing conforming to IEC 529 (EN 60529)
- Self-extinguishing conforming to IEC 695-2-1 (960 °C)
- Temperature resistance: – 50...+ 150 °C
- Resistant to principal chemical agents and corrosive atmospheres & UV light stabilised.
- Comply with constraints relating to installation of double insulated panels conforming to standard IEC 439-1 (EN 60439-1)
- Front panel has Network Rail approved 3 point locking with a barrel to suit Network Rail.
- Low profile allowing the enclosure to be mounted close to the track
- Insulating Gland Plates

Installation

The switch can be installed by the following methods:

- Mounting frame (Available from LCS see below)
- Wall mounted (Vertical)

Cabling

2 x 240mm^2 Aluminium incoming Traction Negative cable
1 x 240mm^2 Aluminium incoming Traction Positive cable
1 x 16mm^2 Twin core copper cable to each Heater Strip

SD1 Disconnector Features

250A 1000V DC on load / fault make motorised DC21A duty

SD2 Disconnector Features

250A 1000V DC on load / fault make manual DC21A duty
Heavy duty insulated Handle Pad lockable in 'OPEN' or 'CLOSED' positions.

1000V DC Fuses FS1 - FS4

63A Fuses (De-rated to 56A in fuse holders) or 125A Fuses or 160A Fuses depending upon heater strip type (See Variants below)

Electrical Characteristics

Nominal Current	**63 A**
Nominal Voltage	**1.0kV**

Dimensions

Description	No	Fuse Rating	Length	Height	Depth	Weight
Supply Disconnector	**8800441-V03**	**63A**	1000 mm	750 mm	420 mm	**93 kg**
Supply Disconnector	**8800441-V04**	**125A**	1000 mm	750 mm	420 mm	**93 kg**
Supply Disconnector	**8800441-V05**	**160A**	1000 mm	750 mm	420 mm	**93 kg**
Mounting Frame	**8800253 – V02***		910 mm	865 mm	750 mm	**55 kg**

* this mounting frame can also mount the 750VDC Track Fed Power Supply 8800402-V02 which is suitable to power and control the Supply Disconnector

Special Features available on request

Frame for mounting of CRHP
750VDC Track Fed Power Supply (see 8.3)
Cable support kit
Cable lugs

8.3 TFPS Track Fed Power Supply 750V DC to 24V DC with PLC Control 150W - 1000W - PA05/05191 - 8800402

APPLICATION

Derives the power from the Conductor Rail and Running Rail of a track supply to power equipment at the trackside without the expensive DNO supply planning and installation costs. The unit can accommodate the voltage peaks and under-voltage requirements of a traction system whilst maintaining a stable supply.
750V DC to 24V DC power supply with high voltage isolation for the extreme traction environment.

PLC

Ruggedized Industrial Control System & Power Supply
GPRS Modem & antenna
Current Transformer (measuring Heater Current)
Ambient Temperature Sensor
Control Gear
Communication method is GPRS
Remote control of Rail Heater from the Control Centre
Autonomous local control of the Rail Heater using the ambient temperature sensor as a fall-back in case of GPRS network failure etc.
Monitoring of the Switch position. Notification of Alarms to the control centre.
Monitoring of Heater Current. Notification of 'out of limit' operation to the control centre.
Calculation of Power consumed
Logging of data for analysis at control centre

General Features

Separate sections & 100mm clearance with central barriers EM42 for positive and negative poles for:
Switch Disconnector SD 3
Statutory safety labels

Construction

Heavy duty GRP cabinets, hot press moulded, reinforced polyester enclosure, Complies with general requirements for empty enclosures conforming to EN 62208: 2003 (EN 50298: 1999).

- ❑ Resistance to external mechanical impact: IK 10 (5 joules) conforming to EN 50 102.
- ❑ External & Internal Colour - RAL 7032 Grey
- ❑ IP 56 sealing conforming to IEC 529 (EN 60529)
- ❑ Self-extinguishing conforming to IEC 695-2-1 (960 °C)
- ❑ Temperature resistance: – 50...+ 150 °C
- ❑ Resistant to principal chemical agents and corrosive atmospheres & UV light stabilised.
- ❑ Comply with constraints relating to installation of double insulated panels conforming to standard IEC 439-1 (EN 60439-1)
- ❑ Front panel has Network Rail approved 3 point locking with a barrel to suit Network Rail.
- ❑ Low profile allowing the enclosure to be mounted close to the track
- ❑ Insulating Gland Plates

Installation

The switch can be installed by the following methods:

- ❑ Mounting frame (Available from LCS see below)
- ❑ Wall mounted (Vertical)

Electrical Characteristics

Type	150W	250W	500W	1000W
Nominal Input Voltage V	600/750	600/750	600/750	600/750
Input Voltage Range V	400 - 975	420 - 1100	400 - 975	400 - 940
Nominal Output Voltage V	24	24	24	24
Nominal Current A	6.25	10	21	41

NOTE: other AC & DC outputs are available

Dimensions

Description	No	Length	Height	Depth	Weight
150W 750V/24V DC Supply Panel with PLC	**8800402-V01**	1000mm	750 mm	320mm	**46 kg**
250W 750V/24V DC Supply Panel with PLC	**8800402-V02**	1000mm	750 mm	320mm	**46 kg**
500W 750V/24V DC Supply Panel with PLC	**8800402-V03**	1000mm	750 mm	320mm	**52 kg**
1000W 750V/24V DC Supply Panel with PLC	**8800402-V04**	1000mm	750 mm	320mm	**57 kg**
Mounting Frame *	**8800253-V02**	910 mm	865 mm	750 mm	**55 kg**

* The mounting frame can also accommodate the 750VDC CRHP Conductor Rail Heating Panel 8800441-V03 or V04 or V05

8.4 SD –CRHP Manual 2P Conductor Rail Supply Disconnector - 1600A 750V DC MK III - PA05/04652 - 8800441

APPLICATION - OFF LOAD

Manual Isolation and fuse protection for 2 lengths of conductor rail heating strip
The circuit is protected by four 63A traction grade fuses.

Construction

- ❑ 5mm and 10mm heavy duty GRP enclosure
- ❑ Heavy duty insulated operating handle.
- ❑ Padlock facilities for both open and closed.
- ❑ Low profile allowing the enclosure to be mounted close to the track
- ❑ Insulating Gland Plates

Installation

The switch can be installed by the following methods:

- ❑ Floor mounting frame (see below)
- ❑ Wall mounted (Vertical)

Cabling

2 x 240mm^2 incoming Traction Negative cable
1 x 240mm^2 incoming Traction Positive cable
1 x Twin core 16mm^2 cable to each Heater Strip

Switch Features

- ❑ Switch 4 pole 250A 1000VDC
- ❑ Self-cleaning contacts
- ❑ High resistance to short circuit currents

Electrical Characteristics

Nominal Current	**250 A**
Nominal Voltage	**1.0kV**

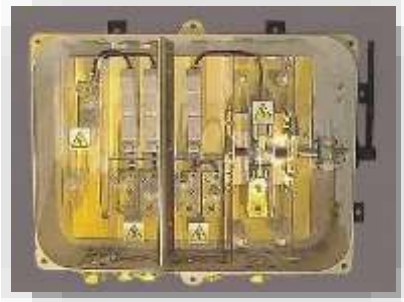
Dimensions

Description	No	Fuse	Length	Height	Depth	Weight
Manual Supply Disconnector	8800441-V06	160A	1200 mm	815 mm	400 mm	71 kg
Manual Supply Disconnector	8800441-V07	125A	1200 mm	815 mm	400 mm	71 kg
Mounting Frame	8800253		790 mm	1705 mm	700 mm	55 kg

8.5 SD –CRHP Manual 2P Conductor Rail Supply Disconnector Mk II- 1600A 750V DC - PA05/04652/T - 8800315

APPLICATION - OFF LOAD-FAULT MAKE

Isolation and fuse protection for conductor rail heating strip



Construction

- ❑ 5mm and 10mm heavy duty GRP enclosure
- ❑ Heavy duty insulated operating handle.
- ❑ Padlock facilities for both open and closed.
- ❑ Low profile allowing the enclosure to be mounted close to the track
- ❑ Insulating Gland Plates

Installation

The switch can be installed by the following methods:
Frame or wall mounted (Vertical)

Cabling

2 x 240mm^2 cables in and out

Switch Features

- ❑ Large isolation distance
- ❑ Self-cleaning contacts
- ❑ High resistance to short circuit currents

Electrical Characteristics

Nominal Current	1600 A
1st wave peak value	150kA
I r.m.s.	70kA for 1 s
Nominal Voltage	750V DC

Dimensions

	Length	Height	Depth	Weight
8800184	1200 mm	815 mm	400 mm	65 kg
8800315	1200 mm	815 mm	400 mm	65 kg

9 Railway GAP JUMPER LEADS, EARTH FAULT TESTING & TOUCH POTENTIAL MONITOR

Traction grade Conductor Rail Gap Jumpers
Designed to suit the arduous trackside requirements

Earth Fault Test Boxes

Touch Potential Monitors

9.1 TL GJL Conductor Rail Gap Jumper Leads (Pair) - 8800464

London Underground

APPLICATION OFF LOAD

The Gap Jumper Lead is used to connect a supply to a stranded (Gapped) Train.

This is where a train current collector shoe (pick up shoe) is no longer in connection with the power supply conductor rails.

Cubicle Construction

Material Micam EM42

To assist with correct positioning the Gap Jumper Leads are colour coded Red for positive and Blue for negative.

(This is an LUL colour requirement which could be tailored to suit other rail networks)

Features

The LCS Gap Jumper Lead design incorporates the following features:

A shoe assembly that houses the conduction plate with integral magnets to suit various conductor rails, the cable connection point, cable restraint gland and conductor rail location guides.

The conduction plate is made from plated Brass which is plated to provide good corrosion resistance.

Connection force and stability assisted by the use of magnets. (Previously only the weight of the shoe with support of the cables by the operator)

Magnets are located within the conduction plate to enable the magnetic field to interact with the conductor rail/s

An insulated lifting handle is positioned towards the top of the connection shoe to allow easy positioning on the conductor rails.

The supply cable enters the shoe assembly horizontally (previously the cable entered via the top of the shoe assembly, hence the need for support by the operator)

The design allows the re-use of existing cables.

The lift handle allows the removal of the shoe by tilting the assembly to disconnect the magnetic forces. Lift of force 16kgf.

The rail guides also serve to provide a barrier by distance to the magnetic field.

The Gap Jumper shoe fits all 4 of the Conductor Rail profiles used by London Underground including the composite Stainless Steel / Aluminium rail.

Cabling

The cable connection is made directly to the top of the conduction plate.

Positive Shoe 1 x 50mm^2 Copper Cable

Negative Shoe 1 x 50mm^2 Copper Cable

Electrical Characteristics & Dimensions

	8800464-V01
Voltage	630V
Current	700A for 20 sec
Length	230 mm
Height	185 mm
Depth	132 mm
Lift of force	16kgf

9.2 TL EFTB Earth Fault Test Box

London Underground

Application

The Earth Fault Relay Test Set is designed to provide two independently adjustable 0-500Vdc supplies, one Positive and one Negative about a common point. Voltages are displayed on digital panel meters.
It is intended primarily for testing the London Underground Traction Earth Detection (TED) equipment.
The two supplies are in separate robust portable cases for ease of movement. In normal use the two supplies are linked together to provide the required functionality. However, the Positive unit may be used on its own as a single variable dc supply.

Basic Specification

Input: 230Vac 50Hz
Nominal positive output voltage:
High range - +490Vdc
Low range - +285Vdc
Nominal negative output voltage:
High range - –490Vdc
Low range - –285Vdc
Current rating: 0.5A

Preparation for Use

Place the two power supply cases adjacent to each other on a flat surface, with the Positive (Main) supply on the left and the Negative (Auxiliary) supply on the right, and open the lids.
On each power supply, ensure that the Mains Isolator is turned to its 'Off' (anticlockwise) position, the Mains Input and DC Fault circuit breakers are in the 'Off' (down) position, the Output Range switch is in the 'Off' (central) position and the 'Output Control' knob is turned to the 0% (fully anticlockwise) position.

Power Supply Interconnections

Two colour coded output coupling leads are provided with the Test Set. These are terminated in 4mm plugs with fixed shrouds.
A mains interconnection cable is also provided. This is terminated with 10A IEC60320 C13/C14 connectors.

- Link the yellow 4mm sockets on the two power supplies using the yellow coupling lead.
- This establishes the common point of the Positive and Negative supplies.
- Link the white 4mm sockets on the two power supplies using the white coupling lead.
- This provides the positive connection to the Total DC Output panel meter in the Negative supply.
- Link the mains IEC receptacles using the mains interconnection cable.
- This provides the mains supply to the Negative (Auxiliary) supply.

9.3 TL – TVP Touch Voltage Panels - 8800528

Dockland Light Railway

The Touch Voltage Relay Panel (8800528-V01) monitors the voltage between the running rails and earth, with regard to a series of voltage levels and their associated permitted durations advised by Docklands Light Railway and referenced to their curve representing the body voltage criteria in BS EN 50122-1:2011+A1:2011.
The voltage levels are split into two groups, viz. the lower voltage 'Warning' range, and the higher voltage 'Alarm' range.
In the event that a particular voltage has been present for a duration exceeding that permitted, then the normally energised Warning Relay or Alarm Relay, as appropriate to the group, is de-energised, providing a signal to SCADA.
A lamp on the front panel illuminates to indicate whenever the lowest warning voltage level of 60V is exceeded. In addition, a panel meter displays the current Touch Voltage.

Panel Rating

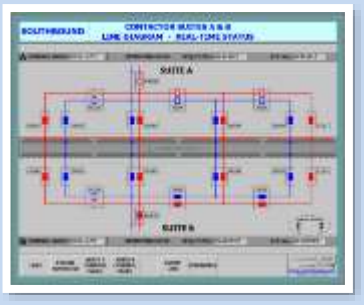
	8800528
Supply Voltage	110VDC
Supply Current	1A
Supply Inrush	<15A, I2t <0.6A2s
Control Panel Voltage	110VDC & 24VDC

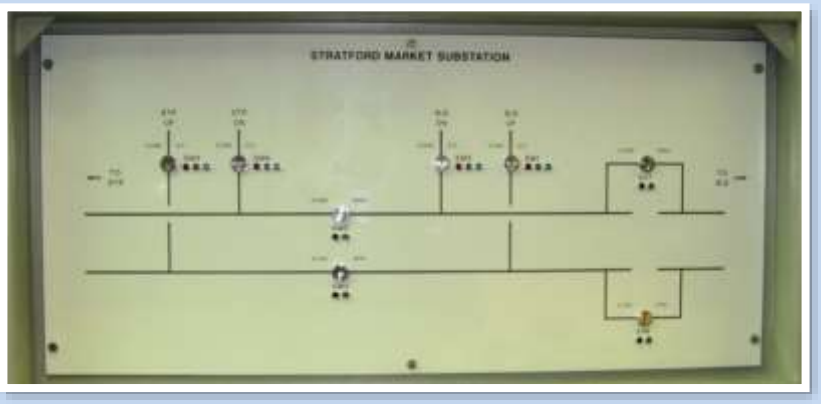
Enclosure Construction

Material	1.4mm Sheet Steel
Finish	RAL 7035 Light Grey
Degree of Ingress Protection	IP54
Height	400mm
Length	600mm
Depth	210mm
Weight	22kg

10 Railway Switchgear - PLC CONTROL PANELS & MIMIC PANELS

PLC Control Panels & Mimic Panels





PLC & Mimic panels for the following applications:
Automatic Control & Monitoring of Plant and Equipment
Status indication and sequence control
Event history recording
Remote monitoring of equipment (up to 10km)
Hot standby redundancy for high availability

10.1 PLCS – Railway and Industrial PLC systems - General

APPLICATION

PLC Systems to sequence control and monitor traction power systems which typically comprise Circuit Breakers, Contactors and Disconnectors where a high integrity control is required.
The systems can be used to apply a hot standby system which can automatically be invoked if a fault is detected.

These systems are often required where a failure would have serious effects on train movements. These losses of trains incur immense penalties to either the system provider or the System operator.
The PLC can ensure that this disruption is kept to a minimum thus saving considerable amounts of money.

The PLC's often work with Mimic panels but Mimic panels are often provided for Railway systems even if there is no PLC.

Sequencing
Proven Sequence Control
Hot Standby Redundancy for high reliability

User Interfaces
Configurable Touch Sensitive displays
Mimic panels for clear indication and sequence indication

Monitoring
Full System Status Monitoring
Automatic Monitoring and Control of Plant & Equipment
Environment monitoring, Alerting and Control
Condition Monitoring
Direct Monitoring of Remote Equipment (up to 10km)

Diagnostics and Faults
Diagnostic Information and Fault Finding Guidance
Automatic alerting for Scheduled Maintenance and Servicing
Downloadable History Logs of Events

Networking
Connection to Networks for Remote Control and Interrogation

10.2 Ludgate Cellars PLC 'Hot Standby' Suite System – Thameslink - 8800401

NetworkRail

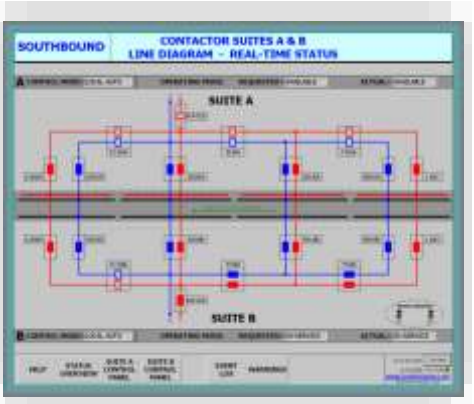
The PLC system has been developed to comply with the Network Rail operations diagram that detailed four suites.
The specific requirements are given in N244 Procurement Specification 22. Ludgate Cellars Contactor Control system Functional Requirements version 2.0
The key requirements are

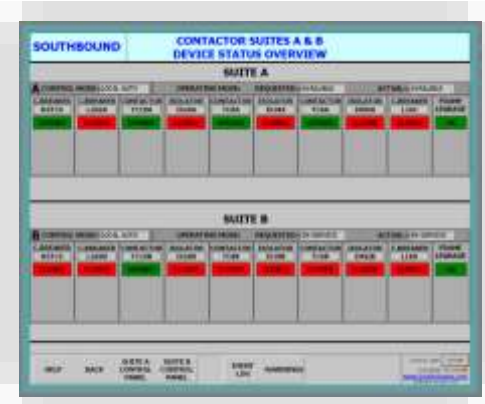
- That each suite has a PLC.
- That if as a result of a PLC failure it shall be possible to changeover to off line and standby suite shall continue normal operation.
- The control of each track Northbound and Southbound shall be fully independent.
- The system be 100% redundancy referred to as bomb proof or as near as possible.
- Each suite shall have a local display and shall be capable of indicating the status of the contactor suite in the other half of the substation.

This uses a total of 4 PLCs. Two for each direction of traffic. (A and B section of the substation)
Each PLC has its own HMI (screen), inputs and outputs. Each pair of PLCs is connected using the various data cables shown. These are fibre optic in some cases which reduce the risk of interference or noise from unclean earth connections.
The main interconnecting optic cables are routed differently within the substation to minimise the risk of damage to both.
Each pair of PLCs is synchronized so that they act as one master and standby and give full redundancy in the event of a single failure. This gives the ability for them to change from master to standby very quickly.
The PLC takes track circuit signals to determine which circuit is made and communicate with the SCADA system which controls the main power devices in the system.

Enclosure
Steel enclosure painted RAL 7035 grey
Environmental rating IP54
Cable entry arranged through the top
Features

- Master / hot stand-by PLC
- 19" colour touch screen
- Digital input and output modules
- SCADA interface
- SCADA controlled latching relay
- 48V to 24V DC - DC power supply





Typical PLC Screen Shots

	8800401
Voltage	50V DC
Current	6A
Ingress protection	54
Length	1200mm
Height	2100mm
Depth	512mm
Weight	290kg

10.3 CP- WMM – Wall Mounted Mimic Panel System

London Underground

APPLICATION

Mimic for a depot supply system with indication of the power supply configuration and status.
The Mimic Panel System consists of three cabinets:

i. Mimic Panel Display Cabinet (located within the DDM office)
ii. Status Monitor Cabinet 1 (located within Switchroom)
iii. Status Monitor Cabinet 2 (located within Switchroom)

The cabinets are interconnected by a two-wire communications link (data-bus) for data exchange.
The cabinet has an engraved front-panel that shows a simple geographic plan of the depot.
Status Indicators on the panel will be illuminated to indicate the status of all monitored equipment.

- Incomers / Circuit Breakers (CB)
- Uninterruptible Power Supply (UPS) Systems
- Emergency Power Off (EPO) Systems
- Shed Isolators
- Road Power Supplies
- Overhead Status Indicators (OSIs)

The Mimic Panel Status Indicators (LEDs) are connected to the Output Modules located inside the Mimic Panel Display Cabinet.
The depot equipment Status Signals are connected to the Input Modules located inside the Status Monitor Cabinet(s).
The PLC executes a software program that is specifically written for each depot.
This program is stored on the memory cartridge installed into the PLC. The PLC communicates with the Input / Output Modules via the Master Module and data-bus.
All depot Status Signals are repeatedly scanned and analysed every 136mS.
If any Changes of Status or Fault conditions are identified the audible alarm will be sounded and the appropriate Status Indicator(s) are flashed.
As used on the BCV Metronet DEISIP Project

Features

- Engraved & Filled Aluminium
- Welded sheet steel enclosure
- IP 52
- Painted Grey. RAL 7032
- Clear interlocking procedures for maintenance
- LED Indication for a long life
- 110V AC ±10%, 50Hz, single phase

Installation

Wall mounted in DDM control rooms

Cabling

Control cabling via un-drilled steel gland plates

Dimensions

	8800296	8800297	8800298	8800299	8800301	8800302	8800303
Length	1000mm	1000mm	1000mm	1000mm	1000mm	1000mm	1000mm
Height	600mm	600mm	600mm	600mm	600mm	600mm	600mm
Depth	260mm	260mm	260mm	260mm	260mm	260mm	260mm
	50 kg	50 kg	50 kg	50 kg	50 kg	50 kg	50 kg

10.4 CP- WMM – Wall Mounted Hardwired Mimic Panel System

General specification for Mimic Panel for use in London Underground Train Maintenance Unit.
To generally comply with LUL Document:
V119/BCV/SPEC/C/090/0 Draft and BVL0006/E – Addendum, and relevant TQs to this product.
Purpose of the Mimic Panel

- A system to monitor and display the operational status of the Depot Shore Supply Equipment.
- To notify personnel of an EPO (Emergency Power Off) being pressed by sounding an audible alarm and illuminating the relevant status indicator.

	8800439
Height	550 mm
Length	900 mm
Depth	260 mm
Weight	40 kg

10.5 CP- FSM – Floor Standing Mimic Panels

Dockland Light Railway

APPLICATION

Mimic for a transit system with indication of switch position and power supply configuration and status.
The control panel also acts as an interface between the SCADA system and the track section/bypass switches and their track indicators.
The power for all these signals is derived from the Mimic panel supply.

Features

- ❑ Engraved mimic display
- ❑ Clear interlocking procedures for maintenance
- ❑ LED Indication for a long life
- ❑ IP54
- ❑ External Colour – RAL7032 Grey

Installation

Floor standing in control rooms

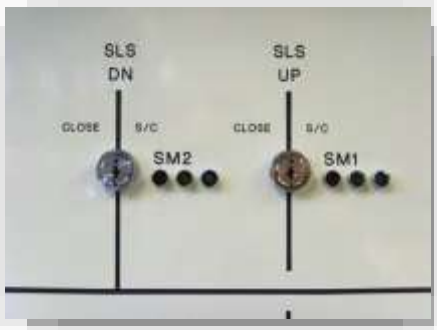
Cabling

Control cabling via un-drilled aluminium gland plates

Dimensions

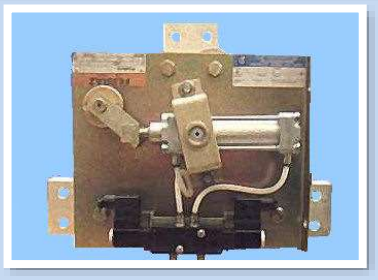
	8800281	8800282	8800350	8800422	8800423
Voltage	230V ac ±10%	230V ac ±10%	230V ac ±10%	230V ac ±10%	230V ac ±10%
Length	1200mm	1200mm	1200mm	1200mm	1200mm
Height	1800mm	1800mm	1800mm	1800mm	1800mm
Depth	600mm	600mm	600mm	600mm	600mm
Weight	200kg	200kg	200kg	200kg	200kg

	8800424	8800425	8800461		
Voltage	230V ac ±10%	230V ac ±10%	230V ac ±10%		
Length	1200mm	1200mm	1200mm		
Height	1800mm	1800mm	1800mm		
Depth	600mm	600mm	600mm		
Weight	200kg	250kg	250kg		



11 Railway Switchgear – ROLLING STOCK

Traction grade Switchgear
Vibration and Shock Resistant to suit the arduous train mounted requirements



DC Switchgear & Switchgear enclosures for the following applications:
Shoegear Isolation
Shoegear Isolation & Bonding
Supply Changeover

11.1 TM SES – 2 Pole Shoegear Switches – 530 - 2000A 750V DC - 8800148

APPLICATION – OFF LOAD

Selection of third rail shoe gear or shore supplies for disconnecting and Bonding shoe gear during train maintenance.

Switch

(1-2) or (1-0-2) 2 pole Manual Off Load, Traction Specification Compliant Switch.

Features

- ❑ IP56
- ❑ Protected for external use
- ❑ 50mm Electrical Clearance
- ❑ Control cable connector
- ❑ Interlocking to suit customer

Installation

Beam mounted, underneath **Electrostar** trains

Cabling

	8800148	8800148-V02
Shoe Gear	3 x 400mm2 Cable	
Shore	2 x 240mm2 Cable	
Bonding	1 x 185mm2 Cable	

Electrical Characteristics & Dimensions

	8800148	8800148-V02
Configuration	1-0	1-0-2
Voltage	750V	750V
Current	2kA	0.53kA
Length	945mm	945mm
Height	506mm	506mm
Depth	500mm	500mm
Weight	113kg	Xx kg

11.2 TM SIS – 2 Pole Shoegear Isolation Switch - 2000A 750V DC - 8800175

APPLICATION – OFF LOAD

Selection of third rail shoe gear or shore supplies for disconnecting shoe gear during train maintenance.

Switch

(1-0) 2 pole Manual Off Load, Traction Specification Compliant Switch.

Features

- ❑ IP56
- ❑ Protected for external use
- ❑ 50mm Electrical Clearance
- ❑ Control cable connector
- ❑ Interlocking to suit customer

Installation

Beam mounted, underneath **Electrostar** trains

Cabling

3 x 400mm^2 Cable
2 x 240mm^2 Cable
1 x 185mm^2 Cable

Electrical Characteristics & Dimensions

	8800175
Voltage	750V
Current	2kA
Length	945mm
Height	506mm
Depth	500mm
Weight	113kg

11.3 TM PSIS – 1 Pole Pneumatic Shoegear Disconnectors - 800A 750V DC

APPLICATION – OFF LOAD, FAULT MAKE

Bonding shoe gear during train maintenance on **Eurostar** Rolling stock

Switch

SF 1 pole Pneumatic Off Load/Fault Make
Traction Specification Compliant Switch

Features

- ❑ High Shock resistance
- ❑ Vibration resistance
- ❑ Large number of operations
- ❑ Pneumatic

Installation

Mounted on-board **Eurostar** trains

Electrical Characteristics & Dimensions

	8800018
Voltage	750V
Current	1.6kA
Length	435mm
Height	300mm
Depth	250mm
Weight	kg

11.4 TM PSCS – 1 Pole Pneumatic Shoegear Changeover Disconnectors – 2000A 750V DC

APPLICATION – OFF LOAD

1 pole switching of high-power circuits, where a high short circuit withstand and high voltage isolation is required.
Selection of third rail shoe gear or shore supplies for disconnecting and shoe gear Bonding during train maintenance.

Switch

(1-2) 1 pole Pneumatic Off Load
Traction specification compliant switch

Features

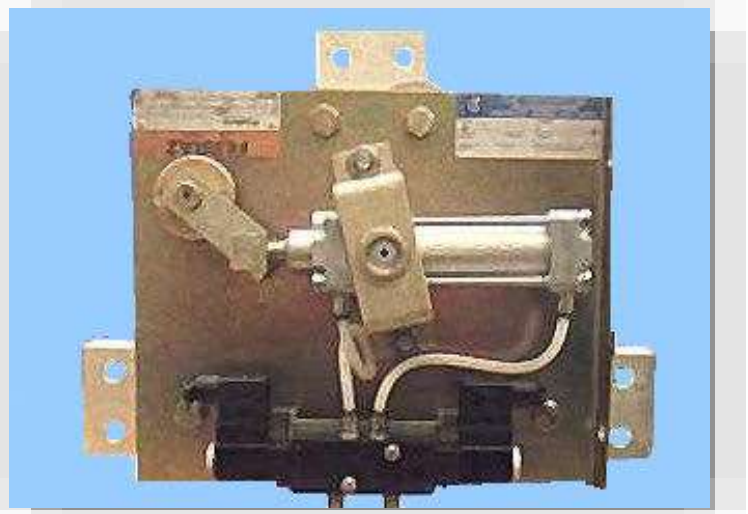
- ❑ High Shock resistance
- ❑ Vibration resistance
- ❑ Large number of operations
- ❑ Pneumatic
- ❑ 50mm Electrical Clearance

Installation

On-board trains

Electrical Characteristics & Dimensions

	800160
Voltage	750V
Current	2kA
Length	410mm
Height	325mm
Depth	245mm
Weight	kg



11.5 TM TMST – 1 / 2 Pole Pneumatic Shoegear Changeover Disconnectors – 2000A 750V DC

APPLICATION – OFF LOAD

Changeover Filter Switch for the TMST (Channel Tunnel) rolling stock. A single pole (top) and double pole (bottom) stacked pair of switches for high-power circuit selection, where a high short circuit withstand and high voltage isolation is required.

Switch

(1-2) 1 pole Pneumatic Off Load
(1-2) 2 pole Pneumatic Off Load
Traction specification compliant switches

Features

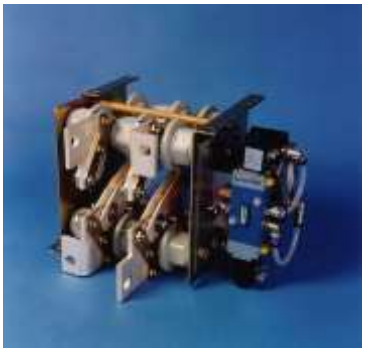
- ❑ High Shock resistance
- ❑ Vibration resistance
- ❑ Large number of operations
- ❑ Pneumatic
- ❑ 30mm Electrical Clearance

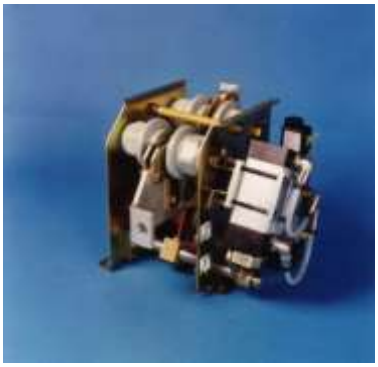
Installation

Integrated into the power changeover system of **TMST (Channel Tunnel)** trains

Electrical Characteristics & Dimensions

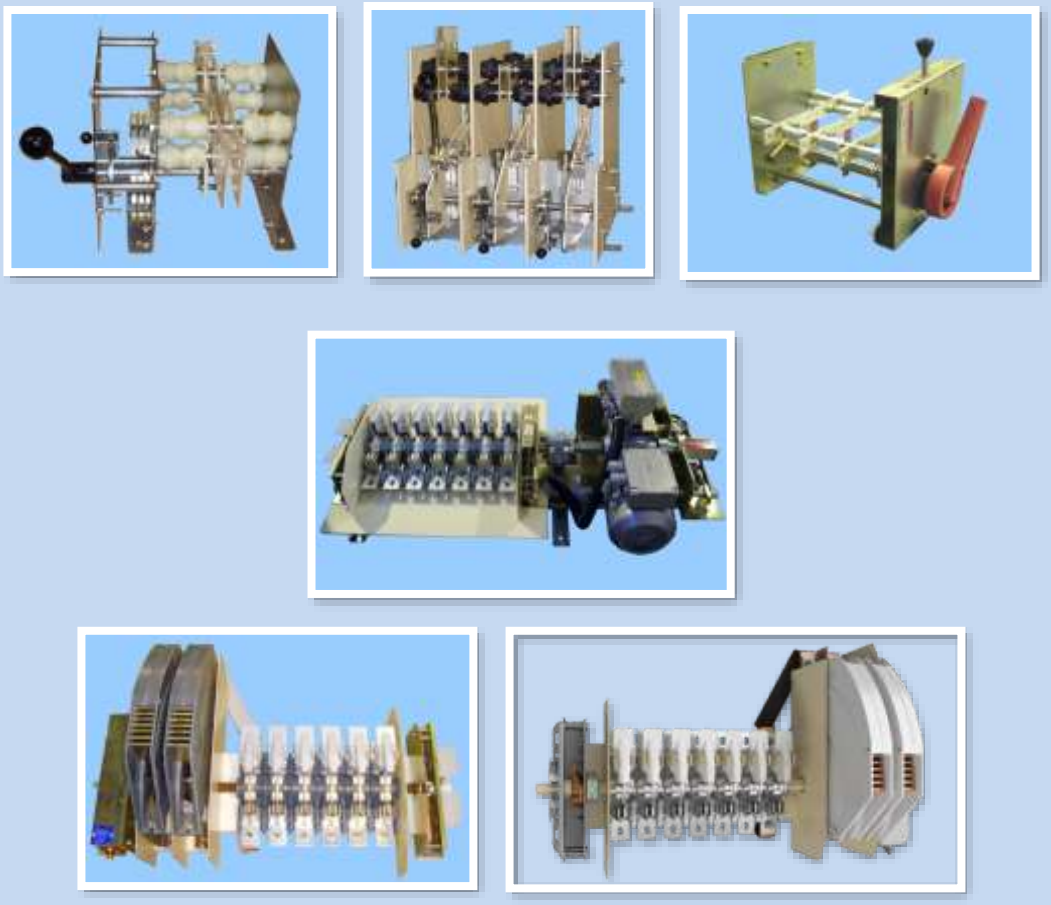
	8800033	8800034
Voltage	750V	750V
Current	2kA	2kA
No of poles	1	2
Configuration	(1-2)	(1-2)
Length	310mm	240mm
Height	200mm	200mm
Depth	260mm	235mm
Weight	kg	kg





12 Railway Disconnectors

Traction Power Isolation & Bonding



12.1 Switch Finder

Range	Switch Type	ON LOAD or OFF LOAD	Number of Poles	A.C.					D.C.			
				Current Range		Voltage Range		Freq.	Current Range		Voltage Range	
				A	kA	kV	kV	Hz	kA	kA	kV	kV
Max-E-Switch	Disconnectors & Changeover	**OFF LOAD**	1 to 6	**1250**	**4.00**	1.50		175	**1.25**	**4.00**	1.50	
FA	Disconnectors & Changeover		1 to 6	**500**	**6.30**	3.00		175	**0.5**	**6.30**	3.00	
F	Disconnectors & Changeover		1 to 6	**500**	**6.30**	7.20	12.00	175	**0.5**	**6.30**	7.20	12.00
ODxL**	Heavy duty off load disconnector	**ON LOAD (Fault Make)**	1	**200**	**7.50**	1.00	1.50	50/60	**0.200**	**7.50**	1.00	1.50
SF *	Heavy duty off load disconnector		1 to 2	**200**	**7.50**	1.00	1.50	50/60	**0.200**	**7.50**	1.00	1.50
OSxL	DC Load break disconnector	**ON LOAD**	1	-	-	-		-	**0.8**	**6.30**	1.00	1.50
IF	DC Load break disconnector		1 to 2	-	-	-		-	**0.8**	**6.30**	1.00	1.50

If you have other, switchgear requirements please consult Technical Sales

* ODxL disconnectors are capable of fault make, which makes them ideal for Earthing / Bonding applications.
*** Refer to Technical Sales for details.

12.2 Max-E-Switch – Railway AC / DC Disconnectors to BS EN 50123

TECHOV Range 1250 – 4000A 1500V AC / DC




Construction

Off load isolator and changeover disconnectors specifically designed and tested to comply to:

BS EN 50123 & BS EN 50124 Railway Standards

Features

- **Stainless steel parts**
- 1 to 6 poles
- Clear isolation distance between contacts
- Switch design produces stable temperature rise characteristics
- High short circuit current withstand
- Flexible foot mounting Unistrut compatible

Design

- Self-cleaning silver-plated contacts
- Insulating parts made from highly durable materials
- Spring tensioned twin blade contacts provide excellent electrical contact

Applications

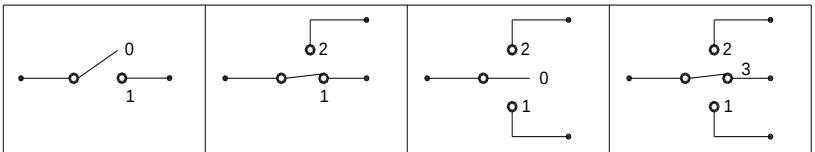
Isolation of railway installations where a high voltage withstand is required

Electrical Characteristics AC & DC

Rated thermal current in accordance with **BS EN 50123** i.e. maximum temperature rise of 70°C

AC Rated Thermal current **A 50/60 Hz**		**1250**	**2000**	**2500**	**4000**
DC Rated Thermal current I_{Ne}		**1250**	**2000**	**2500**	**4000**
Nominal voltage Un:	**kV**	1.5	1.5	1.5	1.5
Rated voltage U_{Ne}	**kV**	1.8	1.8	1.8	1.8
Rated insulation voltage U_{Nm}	**kV**	2.3	2.3	2.3	2.3
Overvoltage category		OV4	OV4	OV4	OV4
Pollution degree:		PD4	PD4	PD4	PD4
Dielectric Voltage Withstand @ 50Hz for 1 min.	**kV**	20	20	20	20
Dielectric Voltage Withstand / Aux contacts @ 50Hz for 1 min.	**kV**	2	2	2	2
Rated impulse voltage U_{Ni}	**kV**	20	20	20	20
Rated Peak Current I_{NSS}	**kA**	81	92		142
Rated short circuit capacity I_{NCW} for 250ms.	**kA**	65	65		100
Rated short circuit capacity I_{NCW} for 300ms.	**kA**	57	57		
Maximum operating temperature	**ºC**	140	140	140	140
Mechanical endurance in cycles		5,000	5,000	10,000	10,000

Switch Configuration



Disconnector (1-0)	Changeover (1-2) [there is no isolation gap between position 1 & 2]	Changeover Disconnector (1-0-2)	3 Position Changeover (1-3-2)

Options

- Auxiliary Microswitches
- Interlocking cam
- Interlocks
- Padlocking facilities

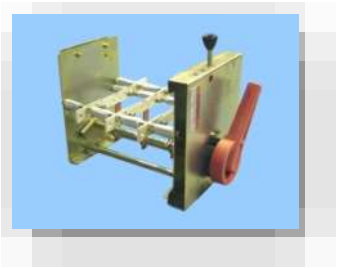
De-rating

For **higher frequencies** or **high ambient temperatures**, please consult technical sales

12.3 FA – Disconnectors & Changeover AC / DC Disconnectors

Standard Range 500 – 8000A 3000V AC / DC up to 175Hz

Rated Insulation V	Rated Thermal Current I
3.0 kV - AC/DC	500 – 6300 A - AC
7.2 kV - AC/DC	500 – 8000 A - DC



Construction

The FA off load switch conforms to: - IEC 129, IEC 694 & IEC 77

Features

- ❑ 1 to 6 poles
- ❑ Visible breaking with a large isolation distance between contacts
- ❑ The contacts are specifically designed to produce stable temperature rise characteristics
- ❑ High short circuit current withstand

Design

- ❑ Self-cleaning contacts
- ❑ Insulating parts made from glass reinforced polyester (VO level to UL94)
- ❑ Silver plated contacts
- ❑ Knife blade contacts provide good electrical contact, because the knife blades provide two contact surfaces (one each side of the blade) unlike a contact point in a pressure system. Therefore, the temperature rise is reduced.

Applications

Isolation of electrical installations where a high short circuit withstand is required.

Hoists and Handling

Isolation of industrial cranes using DC electric motors

Inverters and Rectifiers

DC supply isolation of excitation circuits of generators.

Isolation of rectifiers and inverters, it is possible to isolate the DC and AC simultaneously with one operation.

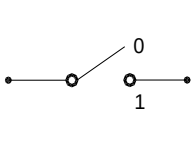
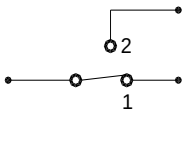
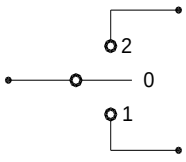
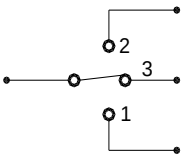
Electric Traction

Subways, tramways, trolleybuses, and railways

Fixed equipment: distribution of power from substations and track sectioning.

Rolling equipment: - general isolation of traction power or Earthing of shoe gear.

Switch Configuration

			
Disconnector (1-0)	Changeover (1-2) [there is no isolation gap between position 1 & 2]	Changeover Disconnector (1-0-2)	3 Position Changeover (1-3-2)

Electrical Characteristics AC & DC

Rated thermal current in accordance with IEC 408 i.e. maximum temperature rise of 70°C

Rated Thermal current **A** **50/60 Hz AC**	**500**	**1250**	**2000**	**2500**	**3200**	**4000**	**6300**
Rated Thermal current **A** **DC**	**500**	**1250**	**2000**	**2500**	**4000**	**5000**	**8000**
No of Poles Available	**1-6**	**1-6**	**1-6**	**1-6**	**1-5**	**1-4**	**1-3**
Dielectric Voltage Withstand @ 50Hz for 1 min. **kV**	20	20	20	20	20	20	20
Dielectric Voltage Withstand / Aux contacts @ 50Hz for 1 min **kV**	2	2	2	2	2	2	2
Impulse Voltage Withstand (IEC 694) 1.2/50µs **kV**	20	20	20	20	20	20	20
Rated short circuit capacity **kA** 1st wave peak value	75	90	90	150	150	150	150
Rated short circuit capacity **kA** I r.m.s. for 1 sec.	15	35	35	70	70	70	70
Maximum operating temperature **ºC**	140	140	140	140	140	140	140
Mechanical endurance in cycles	5,000	5,000	5,000	10,000	10,000	10,000	10,000

De-rating

If the frequency is between 60 & 175 Hz a 5% de-rating factor should be applied.

For ambient temperatures over 40ºC the de-rating percentage is = $\frac{1}{\sqrt{[(110 - \theta) / 70]}}$ θ = Ambient Temperature of the environment

Please consult Technical Sales: -

- Rated Insulation voltage = 7.2kV, 12kV & 24kV
- Greater mechanical endurance.

Available options

Electric motor or actuator drive

Pneumatic drive

Special interlocking requirements

12.4 Otter DC Switch - OS1L - OS7R

The latest range of Otter switches and disconnectors is designed for high current DC applications including but not limited to; rail, trams, renewable energy, electric vehicle charging, DC distribution networks and industrial processes e.g. aluminium smelting, arc furnaces.

The modular design adapts to various functions including isolation, fault making and load breaking. Designed and manufactured to high quality standards and comprehensively tested, ensuring high reliability and minimal maintenance. The switch can be offered as a standalone product, with or without a motor drive, or as part of a full switchgear assembly.

SPECIFICATIONS

Load Break/Make Switch capable of Making on Fault

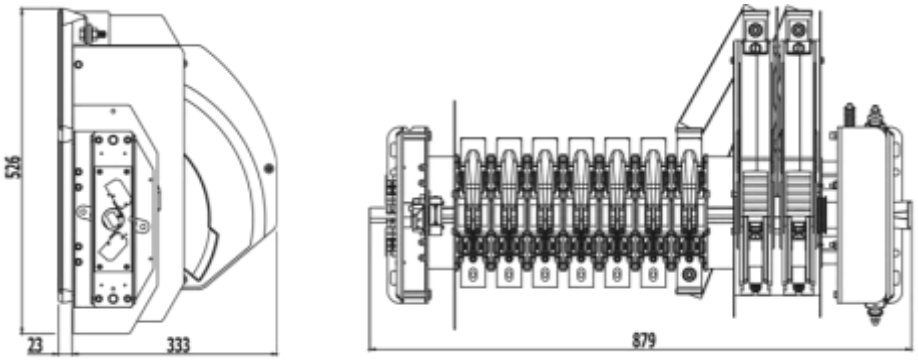
Type tested to BS EN 50123-1 & 3 / IEC 62497-1 / IEC 61992-1
Fast acting over-centre spring mechanism Manual or motor driven options
High performance double break contacts
Separate current carrying and current breaking contacts
800A to 4400A Normal current rating depending upon number of modules installed.
Position indication by micro switch or auxiliary switch in addition to visual indication.
Ultra-low smoke insulation material (LU approved)
Left hand, right hand and double pole options

Rated Voltage	1800VDC
Rated Insulation Voltage	2.3kV
Overvoltage Level (BSEN 50123-1)	OV4
Rated impulse withstand voltage	12.0/14.4kVp
Power frequency withstand voltage	5.5/6.6kV
Categories (BSEN 50123-3)	VI
Normal Current	800 - 4400A
Making Current	Up to 65kA
Breaking Current	Up to 13.2kA
Withstand Current	Up to 70kA / 100kAp 250ms
Mechanical Endurance	M2: 10000 Operations

VARIANTS / NOMENCLATURE

O	Otter - Switch Series
S	S = Switch (Arcing contacts)
1-7	Number of current carrying modules (1 to 7)
L/R	Left or right hand configuration

OS7L



OSxL & OSxR- Switches

	OS1L	OS2L	OS3L	OS4L	OS5L	OS6L	OS7L
Rated Thermal current **A**	800	1600	2000	2500	3150	4000	4400
Number of current carrying modules	1	2	3	4	5	6	7
Number of breaking modules	2	2	2	2	2	2	2
Approx. length **mm**	400	460	520	580	635	695	750
Approx. height **mm**	500	500	500	500	500	500	500
Approx. depth **mm**	390	390	390	390	390	390	390
Weight **kg**	30	32	34	35	37	38	40

12.5 Otter DC Disconnector - OD1L - OD7R

The latest range of Otter switches and disconnectors is designed for high current DC applications including but not limited to; rail, trams, renewable energy, electric vehicle charging, DC distribution networks and industrial processes e.g. aluminium smelting, arc furnaces.

The modular design adapts to various functions including isolation, fault making and load breaking. Designed and manufactured to high quality standards and comprehensively tested, ensuring high reliability and minimal maintenance. The switch can be offered as a standalone product, with or without a motor drive, or as part of a full switchgear assembly.

SPECIFICATIONS

Disconnector Off Load, capable of Making on Fault

Type tested to BS EN 50123-1 & 3 / IEC 62497-1 / IEC 61992-1
Fast acting over-centre spring mechanism Manual or motor driven options
High performance double break contacts
800A to 4400A Normal current rating depending upon number of modules installed Position indication by micro switch or auxiliary switch in addition to visual indication. Ultra-low smoke insulation material (LU approved)
Left hand, right hand and double pole options

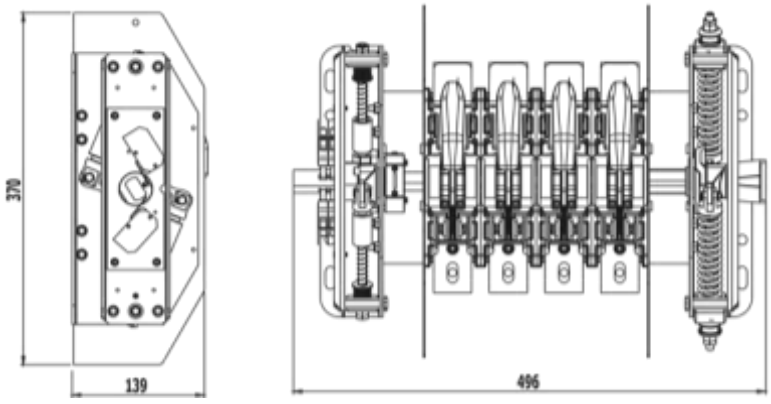
Rated Voltage	1800VDC
Rated Insulation Voltage	2.3kV
Overvoltage Level (BSEN 50123-1)	OV4
Rated impulse withstand voltage	12.0/14.4kVp
Power frequency withstand voltage	5.5/6.6kV
Categories (BSEN 50123-3)	V
Normal Current	800 - 4400A
Making Current	Up to 65kA
Withstand Current	Up to 70kA / 100kAp 250ms
Mechanical Endurance	M2: 10000 Operations

VARIANTS / NOMENCLATURE

O	Otter - Switch Series
D	D = Disconnector (No arcing contacts)
1-7	Number of current carrying modules (1 to 7)
L/R	Left or right hand configuration

DIMENSIONS

OD4L



ODxL & ODxR– Disconnector

	OD1L	OD2L	OD3L	OD4L	OD5L	OD6L	OD7L
Rated Thermal current **A**	**800**	**1600**	**2000**	**2500**	**3150**	**4000**	**4400**
Number of current carrying modules	1	2	3	4	5	6	7
Approx. length **mm**	400	460	520	580	635	695	750
Approx. height **mm**	500	500	500	500	500	500	500
Approx. depth **mm**	390	390	390	390	390	390	390
Weight **kg**	-	-	-	15	-	-	-

12.6 SF – Off Load, Fault Make AC / DC Disconnectors

Standard Range 800 – 7500A 1000 or 1500V AC / DC

Construction

The SF off load / fault make switch consists of:

The disconnector unit which carries the rated current of the switch via an assembly of knife blades and jaws mounted in parallel

Features

- ❑ Visible breaking with a large isolation distance due to the opening angle of 90°
- ❑ The contacts are specifically designed to produce stable temperature rise characteristics

Design

- ❑ Insulating parts made from glass reinforced polyester.
- ❑ Stainless steel springs, mechanism and clamps.
- ❑ Silver-plated thermal contacts.
- ❑ Thermal contacts with knife blades and jaws, providing:

a) Better electrical contact, the knife blades - jaws system provides two contact surfaces (one each side of the blade) unlike a contact point in a pressure system. This minimises the switch temperature rise.

b) Better short circuit withstand current is obtained using the dynamic electric-force that results from the shape of the blades.

Applications

Hoists and Handling

Isolation of industrial cranes using DC electric motors

Inverters and Rectifiers

DC supply isolation of excitation circuits of generators.

Breaking and isolation of either the rectifier or the inverter (isolation for repairing one unit without interruption of the others)

For the above applications, it is possible to isolate the DC and AC simultaneously with one operation.

Electric Traction

Subways, tramways, trolley busses, and railways

Fixed equipment: - distribution of power from substations and track sectioning.

Rolling equipment: - general isolation of traction power.

Electrical Characteristics AC & DC, Configuration & Weight

Rated Thermal current **A**	**200**	**800**	**1600**	**2000**	**2500**	**3150**	**3800**
Rated Insulation Voltage **V**	1000	1000	1000	1000	1000	1000	1000
Number of current carrying poles	1	1	2	3	4	5	6
Approx. length **mm**	75	115	175	235	380	435	495
Approx. height **mm**	190	300	300	370	370	370	370
Approx. depth **mm**	106	145	145	145	145	145	145
Weight **kg**	15	27	29	31	32	34	35
Mechanical Endurance Cycles	10 000	10 000	10 000	10 000	10 000	10 000	10 000
Dielectric Voltage Withstand @ 50Hz for 1 min. **V**	7500	7500	7500	7500	7500	7500	7500
Rated short circuit **making** capacity **kA**	50	50	63	66	66	66	66

Rated Thermal current **A**	**4400**	**5000**	**5700**	**6300**	**7000**	**7500**	
Rated Insulation Voltage **V**	1000	1000	1000	1000	1000	1000	
Number of current carrying poles	7	8	9	10	11	12	
Approx. length **mm**	550	615	675	735	786	850	
Approx. height **mm**	370	370	370	370	370	370	
Approx. depth **mm**	145	145	145	145	145	145	
Weight **kg**	37	39	41	43	45	47	
Mechanical Endurance Cycles	10 000	10 000	10 000	10 000	10 000	10 000	
Dielectric Voltage Withstand @ 50Hz for 1 min. **V**	7500	7500	7500	7500	7500	7500	
Rated short circuit **making** capacity **kA**	100	100	100	100	100	100	

Please consult Technical Sales for switch characteristics: -

Rated Insulation voltage = 1500V & 1800V

800 - 2500A versions are available in 2 pole versions and other multi-pole combinations are available for AC applications.

12.7 IF – Load Break DC Disconnectors

Standard Range - 800 to 6300A - 1000V or 1500V DC

Construction

The IF load break switch consists of two separate switch units assembled along the same shaft and connected to the same drive mechanism:
The disconnector unit which is an assembly of knife blades and jaws, mounted in parallel. These carry the rated current of the switch.
The load break unit provides the final load interruption through arc quenching chambers.

Features

- ❑ Visible breaking with a large isolation distance because of the opening angle of 90°.
- ❑ Total separation of the current carrying and breaking functions. This allows the contacts to be specifically designed for these different requirements, resulting in stable temperature rise characteristics and high current breaking characteristics.

Design

- ❑ Insulating parts made from glass reinforced polyester.
- ❑ Stainless steel springs, mechanism and clamps.
- ❑ Silver plated thermal contacts and breaking contacts on silver discs
- ❑ Thermal contacts with knife blades and jaws, providing:

a) Better electrical contact, the knife blades - jaws system provides two contact surfaces (one each side of the blade) unlike a contact point in a pressure system; therefore the temperature rise is reduced.

b) Better short circuit withstand current is obtained using the dynamic electric-force that results from the shape of the blades.

Applications

Electric Traction

Subways, tramways, trolleybuses, and railways
Fixed equipment: distribution of power from substations and track sectioning
Rolling equipment: general breaking and disconnection of traction power

Hoists and Handling

Isolation of industrial cranes using DC electric motors

Inverters and Rectifiers

DC supply isolation of excitation circuits of generators.
Breaking and isolation, of either the rectifier or the inverter (isolation for repairing one unit without interruption of the others).
For the above applications, it is possible to isolate the DC and AC simultaneously with one operation.

Electrical Characteristics DC, Configuration & Weight

Rated Thermal current **A**	**800**	**1600**	**2000**	**2500**	**3150**	**4000**	**4400**	**5000**	**5700**	**6300**
Rated Insulation Voltage **V**	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
Number of current carrying poles	1	2	3	4	5	6	7	8	9	10
Number of breaking poles	2	2	2	2	2	2	2	2	2	2
Approx length **mm**	400	460	520	580	635	695	750	810	870	930
Approx height **mm**	500	500	500	500	500	500	500	500	500	500
Approx depth **mm**	390	390	390	390	390	390	390	390	390	390
Weight **kg**	30	32	34	35	37	38	40	41	42	43
Rated Breaking Capacity										
Recovery Voltage (Ur) **V** *	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
Peak let Through Current (Ic) **A**	10 000	10 000	10 000	10 000	10 000	10 000	10 000	10 000	10 000	10 000
Time Constant **ms**	5	5	5	5	5	5	5	5	5	5
Electric Endurance Cycles (1000V = 5000A - L/R 20ms) **	100	100	100	100	100	100	100	100	100	100
Mechanical Endurance Cycles	10 000	10 000	10 000	10 000	10 000	10 000	10 000	10 000	10 000	10 000
Rated Short Term Withstand Current 1 min. **A**	2700	4800	6000	7500	9500	11500	13200	15000	17100	19000
Rated Short Term Withstand Current 2 hr. **A**							6000			
Rated conditional short circuit current (Peak value) **kA** **	50	75	75	75	75	75	75	75	75	75
Rated short circuit making capacity **kA** **	50	63	66	66	66	66	66	66	66	66

* The recovery voltage is 10% higher than the working voltage; it is the voltage, which appears across the terminals of a pole during breaking capacity tests, after the breaking of current.

** These values are minimum values since the switch was not been tested to a greater numbers of cycles.

Please consult Technical Sales for:

Rated Insulation voltage = 1500V or 1800V
L/R = 20ms
800 - 2500A versions are available 2 pole
They have twice as many current carrying poles and breaking poles.

13 Railway Fuses

Conductor Rail Fuses

Pantograph Fuses

13.1 Conductor Rail Mounted Fuse Assembly - 8800219

The rail mounted fuse box is a custom designed and machined composite assembly, to meet the customer specification. The fuse box houses, **20 x 127 fuses** of differing current ratings depending upon the application.

Installation

The box must be fixed using the mounting facilities provided on a level surface, squarely to eliminate mechanical distortion and secured with the fixings provided.

Orientation

The box must be mounted horizontally.

Ingress protection

The installation company must ensure that the cable entry provisions to the box maintain the specified level of ingress protection.

Power Cables

The 1 x 4mm^2 triple insulated cable enters via the gland at the end of the box.

Connection is made using the screw connection to the fuse lug provided.

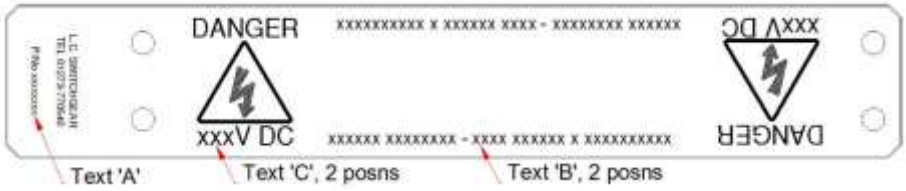
Electrical Characteristics

System Voltage	630 or 750 VDC
Nominal Voltage Rating	1000 VDC
Test Voltage	5kVAC (5000 VAC)

Box Construction

Material	Composite
Degree of ingress protection	IP 65
Approximate weight	1.5 kg
Approximate Height	66 mm
Approximate Width	362 mm
Approximate Depth	62 mm

Variants & Part Numbers



Label Variation for Versions 8800219-V02 - V09

Adaptor kit

	LCS Part No	Text 'A'	Text 'B'	Text 'C'
Adaptor Kit *	8800219-V00			
Standard	8800219-V01			630
TED Fuse Rating 800mA (Formerly 8800219A)	8800219-V02	8800219-V02	TED – FUSE RATING 0.8 AMP	630
Tunnel Lighting – Fuse Rating 6 Amp (Formerly 8800219B)	8800219-V03	8800219-V03	TUNNEL LIGHTING – FUSE RATING 5 AMP	630
Current On Line relay – Fuse Rating 1A	8800219-V04	8800219-V04	CURRENT ONLINE RELAY – FUSED 1A	750
Bleed Resistor – Fuse Rating 2A	8800219-V05	8800219-V05	BLEED RESISTOR – FUSED 2A	750
Tunnel Lighting – Fuse Rating 1 Amp	8800219-V06	8800219-V06	TUNNEL LIGHTING – FUSE RATING 1 AMP	750
Tunnel Lighting – Fuse Rating 5 Amp	8800219-V07	8800219-V07	TUNNEL LIGHTING – FUSE RATING 5 AMP	750
Standard	8800219-V08	8800219-V08		750
TED Fuse Rating 800mA	8800219-V09	8800219-V09	TED – FUSE RATING 0.8 AMP	750

* Adaptor kit is required for use with composite conductor rail

Adaptor kit

Composite conductor rail requires an adaptor kit to allow the fuse box to fit the profile of the rail.
This kit is Part No 8800219-V00 and is shown in the picture.

Fuses

No Fuses are supplied with the Rail Mounted Fuse Assembly. These need to be purchased separately to suit the circuit requirements. Refer to table below for fuse sizes available.

Spare 20 x 127 Fuses

Fuse Assy Part No	Suffix	Suffix	Rating of Fuse (A)	Part No With Indicator	Part No W/O Indicator
8800219	V02	V09	0.8	851397	856167
8800219	V04	V06	1.0	854825	856168
			1.5		856169
8800219	V05		2.0	856105	856080
			3.15	860911	856170
			4.0		856171
8800219	V03	V07	5.0	860912	856172
			6.0	855269	856173
			8.0		856174
			10.0		856175

13.2 Pantograph Fuse Boxes 1000A 1900V DC - 8800176

Application

DC Traction fuses in roof top pantograph mounting box
Traction Grade Fuse rated 1000A 1900V DC

- ❑ IP56 Enclosure
- ❑ Stainless Steel

Dimensions

	Length	Height	Depth	Weight
88000176	790 mm	670 mm	325 mm	45 kg

13.3 Custom Fuse Assemblies 1000A 1900V DC - 8800111

Application

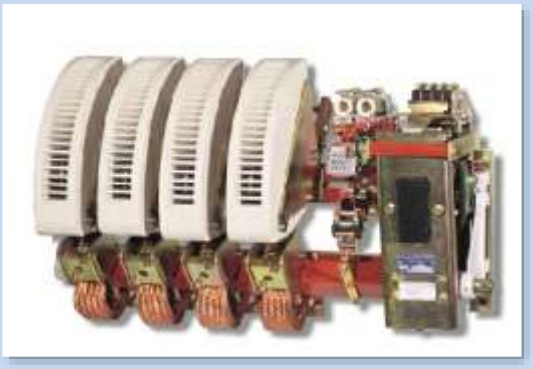
Fuse assembly, including, mounting and termination kit
Designed to replace obsolete fuses using the existing mountings
Traction Grade Fuse rated 1000A 1900V DC

Dimensions

	Length	Height	Depth	Weight
88000111	790 mm	670 mm	325 mm	45 kg

14 Railway AC & DC Contactors

DC Contactors



2 Pole Contactors

14.1 CBFC 75

Standard versions

1 to 4 single pin main poles with silver pad contacts.
Closing electromagnet mounted on the right side of the poles, and laminated magnetic circuit.
Control circuit supplied from an AC source:

- ❑ For currents 400 (1 to 4 poles), 500 and 630 (1 to 2 poles), without economy resistor.
- ❑ Over, rectified and power-saved current via a rectifier mounted on the contactor.
- ❑ Control circuit supplied from a DC source: power-saved circuit with economy resistor.

Mechanical locking: vertical type.

Auxiliary contacts

- ❑ 2 NO + 2 NC available on D blocks on the whole range (2 extra D blocks can be mounted on request).
- ❑ Control circuit supplied from an AC source: one M block, form F2.01Y, on calibres 500 and 630, from 3 to 4 poles

and on calibres 800 and 1000; from 1 pole as control circuit is rectified and coil power -saved via 1 NC overlap contact, 1 NO + 1 NC free auxiliary contacts.
Control circuit supplied from a DC source: on the whole range, one block type F2.01Y with one NC overlap contact for inserting the economy resistor and 1 NO + 1 NC free auxiliary contacts.

Options

- ❑ NO or NC delayed block, TP 86 type (this one also includes 4 free instant contacts, i.e. 3 NO + 1NF).
- ❑ Addition of D type and M type auxiliary contact blocks according to different versions.
- ❑ Device to hold the contactor closed in case of untimely micro-cuts for contactors that are not equipped with a mechanical latching.
- ❑ Mechanical latching with single or double electrical release.
- ❑ Self-protective device for the release coil(s).
- ❑ Metallic support for 'Ronis type' lock (lock not supplied).
- ❑ Horizontal or back-to-back mechanical locking.
- ❑ Poles of different currents and supplied with different currents.

CB 75 400 to 1000 A

Technical features CBFC 75 400 to 1000 A

DC contactors
Ue up to 2000 V⎓

Standards: IEC 947-4-1

Direct current			CBFC Type 75									
			400		500		630		800		1000	
Thermal nominal current(1) DC_1		A	500/500		500/500		630/630		800/800		1000/1000	
Nominal insulating voltage		V	1000		1000		1000		1000		1000	
connecting section		mm²	240		300		400		500		600	
Nominal operating voltage		V	500	1000(6)	500	1000(6)	500	1000(6)	500	1000(6)	500	1000(6)
Maximum controlled powers												
	voltage	V	220/250	440/500	220/250	440/500	220/250	440/500	220/250	440/500	220/250	440/500
	DC*2 - DC_4 duty cycle	kW	90	180	110	220	110	220	175	350	175	350
Short-time current, t ≤ 40°C												
	1 s	kA	10		12		14		24		26	
	5 s	kA	4.5		5.75		6.5		11		12.5	
	10 s	kA	3.25		4		4.5		7.8		8.5	
	15 s	kA	2.7		3.4		3.8		6.5		7	
	30 s	kA	1.9		2.4		2.7		4.6		5	
	1 min	kA	1.4		1.78		2		3.3		3.65	
	3 min	kA	0.88		1.1		1.3		2		2.3	
	10 min	kA	0.62		0.79		0.92		1.38		1.6	
Allowable overcurrent / time		kAeffs	4.5/5		5.75/5		6.5/5		11/5		12.5/5	
Current switch-off rating L/R = 15 ms												
	voltage applied	V	500	700 1000	500	700 1000	500	700 1000	500	700 1000	500	700 1000
	single-pole	kA	6		8		8		19		19	
	two-pole(5)	kA		6 5		10 7		10 7		17 10		17 10
	voltage applied	V	1500	1800 2000	1500	1800 2000	1500	1800 2000	1500	1800 2000	1500	1800 2000
	three-pole(5)	kA	5	2 1.5	7	2.5 2.5	7	2.5 2.5	10	8 6	10	8 6
	four-pole(5)	kA		5		7		7		10		10
Current switch-on rating L/R = 15 ms		kA	6/500 V		10.5/500 V		10.5/500 V		19/500 V		19/500 V	
Mechanical endurance	millions of operations		3		3		3		3		3	
Control circuit												
Nominal voltage	AC, 50 Hz	V	24 - 48 - 110 - 127 - 220 - 380 - 500									
	DC	V	24 - 48 - 115 - 220 - 440 - 500									
Maximum consumptions	inrush/hold											
AC(2)	1P	VA	2000/175		2000/175		2000/175		**500/30**		**500/30**	
	2P	VA	2000/175		2000/225		2500/225		**500/30**		**500/30**	
	3P	VA	2000/175		**525/30**		**525/30**		**750/66**		**750/66**	
	4P	VA	2000/175		**525/30**		**525/30**		**750/66**		**750/66**	
DC	1P	W	**400/26**		**400/26**		**400/26**		**500/30**		**500/30**	
	2P	W	**400/26**		**525/30**		**525/30**		**500/30**		**500/30**	
	3P	W	**400/26**		**525/30**		**525/30**		**750/66**		**750/66**	
	4P	W	**525/30**		**525/30**		**525/30**		**750/66**		**750/66**	
Average time of operation at nominal voltage(4)												
Constant L/R rate of electromagnet open/closed												
Closing time at Un	AC	ms	40		40		40					
	DC	ms	90		90		90		120		120	
Opening time at Un between command and separation of contacts												
	AC	ms	20		20		20					
	DC	ms	25		25		25		38		38	

(1) in open air.
(2) bold type ratings: rectified and power-saved control circuit voltage.
(3) diodes are warranted up to a network overload of 3 Un efficient.
(4) closing time is measured from the time of supply of the closing coil until the time of contact of the main poles. Opening time is measured from the time of supply of the tripping coil until the time of separation of the main poles.
(5) dielectric testing voltage according to insulation voltage can reach 8 kV for specific applications.
(6) for applications with Ue > 500 V, please consult our technical department to select the contactor (specific dimensions and insulation).

•Temperature factor to be applied to the poles or the current controlled according to the ambient temperature (around the contactor):

1.04	40 < t < 45°C
1.08	45 < t ≤ 50°C
1.12	50 < t ≤ 55°C
1.19	55 < t ≤ 60°C

•Factor to be applied to the contactor for poles connected in parallel, this factor already includes a safety margin:

	2 poles in parallel	3 poles in parallel
DC	I.th 1 pole x 2 x 0.8	I.th 1 pole x 3 x 0.75

•The current switch-off rating of poles connected in parallel remains the same as for a single pole.

•Maximum consumptions:
Bold type ratings:
- AC: control circuit is supplied with rectified and power-saved current via a rectifier mounted on the contactor(3).
- DC: control circuit is power-saved.

For technical features of opening poles, see p. 70.

14.2 CBC 71

Standard versions

1 to 4 single pin main poles with copper contacts for calibre 1250 A (silver pad contact on request) and silver contacts for calibres 1600 and 2000 A.

Arc-blowout coil operates only during opening.

Closing electromagnet mounted on the right side of the poles, solid iron magnetic circuit with 2 coils.

- control circuit supplied from an AC source via a rectifier and power-saved coils (device mounted and cabled on the contactor).
- control circuit supplied from a DC source with power-saved coils (device mounted and cabled on the contactor).

Auxiliary contacts

- ❑ two M type contact blocks with 3 contacts 3 NO + 3 NC, instant contacts or form to be specified when you order.
- ❑ number of M type contact blocks can be increased to 6 blocks.

Mechanical locking - vertical type.

Options

- ❑ Silver pad contact pins for current 1250 A.
- ❑ NO or NC delayed block TP 86 type (this one also includes 4 free instant contacts, i.e. 3 NO + 1 NF).
- ❑ More than 6 M type contact blocks can be mounted on the contactor by mounting them below the contactor to reduce its total dimensions.
- ❑ Device to hold the contactor closed in case of untimely micro-cuts for contactors that are not equipped with a mechanical latching.
- ❑ Mechanical latching with single or double electrical release (does not change the total dimensions of the contactor).
- ❑ Self-protective device for the release coil(s).
- ❑ Metallic support for «Ronis type» lock (lock not supplied).
- ❑ Horizontal or back-to-back mechanical locking.
- ❑ Poles of different calibres and supplied with different currents.
- ❑ Poles without magnetic blowout.
- ❑ Reinforced insulation.
- ❑ Double insulation for specific applications.
- ❑ Tropical treatment n° 2.

CB 71 1250 to 2000 A

Technical features CBC 71 1250 to 2000 A

DC contactors
Ue: 600 and up to 2000 V⎓

Circuit current		CBC Type 71								
		1250			1600			2000		
Thermal nominal current(1) DC_1		A 1250			1600			2000		
connecting section	mm² >300				1400			1600		
Nominal insulating voltage(1)	V >500				1000			1000		
Nominal operating voltage(1)	V 600	700(2)	1000(3)		600	700(2)	1000(3)	600	700(2)	1000(3)
Maximum operating current										
permanent duty	A 1250				1600			2000		
8 hours duty	A 1250				1600			2000		
temporary duty without openings on load 10 minutes	A 2000				2400			3500		
temporary duty without openings on load 30 minutes	A 1400				1700			2500		
temporary duty without openings on load 60 minutes	A 1250				1600			2000		
temporary duty with openings on load 10 minutes	A 2400				2400			3600		
temporary duty with openings on load 30 minutes	A 1700				1700			2500		
temporary duty with openings on load 60 minutes	A 1500				1600			2000		
continuous duty	A 1250				1600			2000		
Short-time current t < 40 °C										
1 s	kA 41				30			35		
5 s	kA 20				15			30		
10 s	kA 13.5				10.9			21		
15 s	kA 11.8				8.7			17.9		
30 s	kA 7.9				8			12		
1 min	kA 5.5				4.5			8.5		
3 min	kA 3.3				3			5		
10 min	kA 2				2.2			3.2		
Allowable overcurrent / time	kA > 25/3				25/1.6			25/7		
Current switch-off rating	voltage V 550	700	1000		550	700	1000	550	700	1000
	one-pole kA 23	18			23	18		23	18	
	bipole(2) kA	23	19			23	19		23	19
	voltage V 1500		2000		1500		2000	1500		2000
	tripole(2) kA 19		8		19		8	19		8
	tetrapole(2) kA		19				19			19
Current switch-on rating	L/R = 15 ms kA 25/550 V				25/550 V			25/550 V		
Poles inductance	H 2.94 10-3				2.38 10-3			2.82 10-3		
Poles resistance	cold Ω 5.35 10-6				7.19 10-6			4.01 10-6		
	hot Ω 5.96 10-6				7.99 10-6			4.72 10-6		
Number of openings on load at nominal current	50000				100000			50000		
Number of openings on load under 440 V before contact replacement	for I = 1250 A 50000				150000			150000		
	for I = 1600 A 25000				100000			100000		
	for I = 2000 A				50000			50000		
Mechanical endurance	millions of operations				1			1		
Control circuit										
Nominal voltage AC 50 Hz:	V 24 - 48 - 110 - 127 - 220 - 380 - 500(4)									
DC	V 24 - 48 - 110 - 127 - 220 - 440 - 500(4)									
Maximum consumptions	inrush/hold									
AC(5) 1P	VA 780/14				780/14			780/14		
2P	VA 380/24				380/24			380/24		
3P	VA 860/50				860/50			860/50		
4P	VA 1700/88				1700/88			1700/88		
DC 1P	W 165/17.5				165/17.5			165/17.5		
2P	W 360/35				360/35			360/35		
3P	W 836/55				836/55			836/55		
4P	W 1600/110				1600/110			1600/110		
Constant L/R rate of electromagnet operclosed	ms 11841				11841			11841		
Closing time(6) at Un	ms 140				180			180		
at 0.85 Un	ms 215				215			215		
Opening time(6) at Un	ms									
-between command and - separation of contacts	ms 60				60			60		
- total opening of electromagnet	ms 80				80			80		
- complete opening	ms 300				300			300		

15 LVAC Control & Distribution Panels, Current On Line Relays, DNO Panels, & Indicators

Standard and Custom Built Control Panels & Indicator Units










Switchgear enclosures for the following applications:
Circuit Protection & Isolation
Circuit Isolation & Bonding
Supply Changeover
Tunnel Lighting Distribution & Current On Line Relays
Trackside Indicators

15.1 LVAC Two Panel Switchboard –300A 415V AC 3ph 4 Wire – Network Rail No PA05/02022 - 8800215

NetworkRail

APPLICATION - ON LOAD

The equipment comprises a 2 panel changeover switchboard to **Railtrack PLC** specification **RT/E/S/21026**, and is intended to maximise the reliability of the 415 V AC domestic supply by using automatic selection to choose between a DNO and a Railway supply.

Incoming and Outgoing Isolators

Type 4 pole rotary type load break switch
Rating 315amps AC23 690V

Fuse Switch

Type 4 pole rotary type fuse switch (with 3 fuses + link)
Rating 315amps AC23 690V

Contactors

Type 3 pole bar type contactor
Rating 300 amps AC3 660V

Features

- ❑ IP 54
- ❑ Modular Form 4 design (up to type 7)
- ❑ Mechanically and Electrically Interlocked
- ❑ Fully Automatic

Installation

Floor mounted in substations or control rooms.

Electrical Characteristics & Dimensions

	8800215
Voltage	415V
Frequency	50Hz
Current	300A
Length	1580mm
Height	2405mm
Depth	630mm
Weight	800 kg

50 to 300A Two Panel Switch boards are available in 415 or 440V versions, contact technical sales.

15.2 LVAC Three Panel Switchboard – 200A 650V AC 1ph 50Hz - Network Rail No PA05/02022 - 8800195

NetworkRail

APPLICATION- ON LOAD

The equipment comprises a 3 panel changeover switchboard to **Railtrack PLC** specification **RT/E/S/21026**, and is intended to maximise the reliability of the 650 V AC signalling supply by using automatic selection to choose between two Railtrack supplies and a separate DNO supply.

Incoming and Out Going Isolators, and Bus Section Switches

Type 3 pole rotary type load break switch
Rating 200amps AC 690V

Fuse Switches

Type 3 pole rotary type fuse switch
Rating 200 amps AC 690V

Contactors

Type 4 pole clapper type contactor (poles connected in series pairs)
Rating 200 amps AC3 650V

Features

- ❑ IP 54
- ❑ Modular Form 4 design (up to type 7)
- ❑ Mechanically and Electrically Interlocked
- ❑ Fully Automatic

Installation

Floor mounted in substations or control rooms.

Electrical Characteristics & Dimensions

	8800195
Voltage	650V
Frequency	50Hz
Current	200A
Length	3100mm
Height	2405mm
Depth	630mm
Weight	1600kg

50 to 200A Three Panel Switch boards are available, contact technical sales.

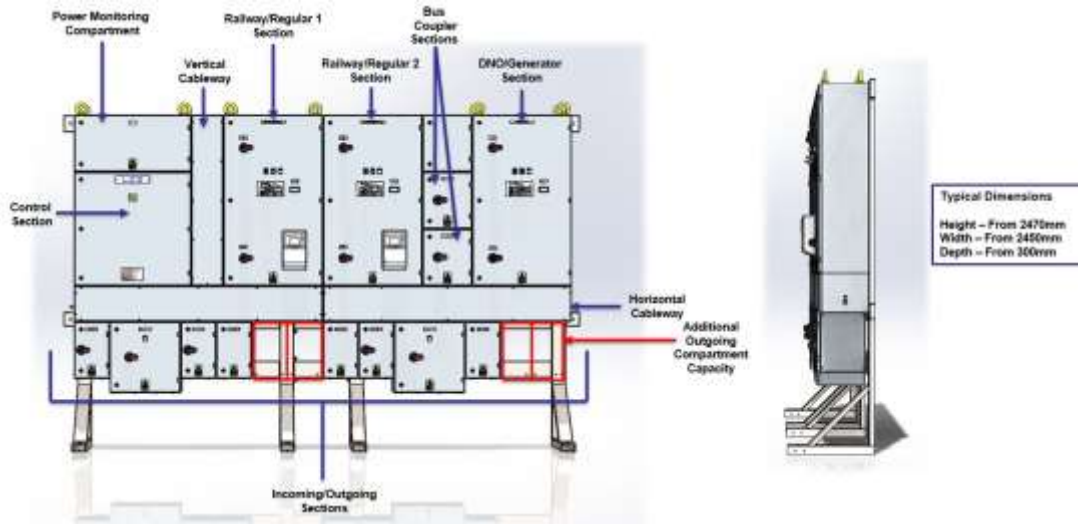
15.3 LVAC – NEW - Modular Changeover Switchboard Range - Network Rail No PA05/02022 – 8800536, 8800537

Four pole (3P+N) AC switchboard with LVAC Changeover Switchboard Range changeover function from a primary Railway/Regular supply to a secondary Railway/Regular supply or a DNO*/Generator supply when the primary Railway/Regular supply is lost.

The switchboard feeds outgoing circuits; which some can be critical.
When a supply is lost the system changes over to an available supply to keep the outgoing circuits in use.
The switchboard can be disassembled for easy transportation and installation into limited access switch rooms.

'Two Panel' LVAC Changeover Switchboard

'Three Panel' LVAC Changeover Switchboard



The LVAC Changeover Switchboard current design can accommodate up to 400V-440V 300A AC.

The system can provide a maximum of three bottom entry incoming supply circuits. The first being railway/regular supply 1, then railway/regular supply 2 and a DNO/generator supply; railway/regular supply 1 has priority.
Each supply section consists of an incoming 4 pole Switch Disconnector followed by a 3 pole contactor and then an isolating 4 pole Switch Disconnector.
The outputs from the isolating Switch Disconnectors feed wired bus radial circuits and these are can be bus coupled with four pole bus isolating Switch Disconnectors.
The bus feeds the outgoing supply circuits, via four 4 pole Fuse Switches or 4 pole MCCBs
Associated equipment includes provision for energy meters. These measure the total energy consumption of supplies and can allow remote reading with GSM.

Other equipment can include an analogue voltage transducer, phase loss relays for both incoming and outgoing supplies and synchronisation relays for comparing the supply voltages.
SCADA Features:

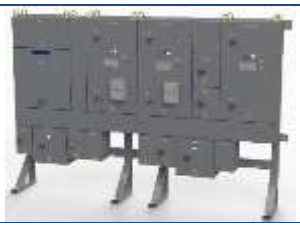
- ❑ Incoming Supply Monitoring
- ❑ Outgoing Supply Monitoring
- ❑ Contactor Status
- ❑ Remote Contactor Control

The compartments provide segregation between different parts of the circuit. The modular design allows for additional output compartments to be configured if required.
The product is provided with a frame that all of the compartments are fixed to.

Key Points

- Standard modular approach with flexible output options.
- High-power hard wiring kept simple - Compartment – Wired Bus Chamber - Outputs.
- Low power control wiring between compartments configured using multi-core cable between dedicated terminal rails.
- Can be disassembled for easy transportation and installation.
- The compartments provide segregation between different parts of the circuit.
- The modular design allows for additional output compartments to be configured if required.
- The product is provided with a frame that all of the compartments are fixed to.

Supply	
Voltage	400V-440V
Frequency	50Hz

Part No	Description	
8800536-V01	**2 Panel Switchboard 4 Outgoing Feeds** Current **250A** Length 2800 mm Height 2470 mm Depth 400 mm Weight 710 kg	
8800536-V02	**2 Panel Switchboard** 6 **Outgoing Feeds** Current **250A** Length 3200 mm Height 2470 mm Depth 400 mm Weight 780 kg	
8800536-V03	**2 Panel Switchboard 10 Outgoing Feeds** Current **250A** Length 3200 mm Height 2470 mm Depth 400 mm Weight 840 kg	
8800536-V04	**2 Panel Switchboard 8 Outgoing Feeds** Current **300A** Length 2900 mm Height 2470 mm Depth 400 mm Weight 900 kg	
8800536-V05	**2 Panel Switchboard 6 Outgoing Feeds** Current **200A** Length 2450 mm Height 2470 mm Depth 400 mm Weight 750 kg	
8800537-V01	**3 Panel Switchboard** 9 Outgoing Feeds Current **200A** Length 3700 mm Height 2370 mm Depth 355 mm Weight 950 kg	

Please Consult LCS for:

Proposal Panel designs to meet your site requirements and number of outgoing feeds

15.4 LVAC 2 Panel Modular Switchboard –100A 400/440V AC 3ph 4 Wire – Network Rail No PA05/02022 - 8800487

NetworkRail

The system comprises two incoming 400V-440V 100A AC supply circuits. Each consists of an incoming 4 pole 690V 100A Switch-Disconnector followed by a 3 pole 660V 100A contactor and then an isolating 4 pole 690V 100A Switch-Disconnector.
The outputs from the isolating Switch-Disconnectors feed a bus and this is sectioned with a 4 pole 690V 100A bus isolating Switch-Disconnector.
To customer specification **NR/SP/ELP/21026**
The bus feeds the four outgoing supply circuits via 4 pole 1000V 63A Switch-Fuses.

Switch Disconnector Specification

Type	OT100F4
Number of Poles	4 pole (3P+N)
Voltage	690V AC 50Hz
Current	100A

Switch Fuses Specification

Type	OS100GB04
Number of Poles	4 pole (3P+N)
Voltage	1000V AC 50Hz
Current	100A

Contactor Specification

Type	CBPA
Number of Poles	3 pole
Voltage	660V AC 50Hz
Current	150A
Control Circuit	48V DC

Cubicle Construction

Material	1.2mm electro zinc-coated mild steel
Finish	Pale Grey RAL 7035 leatherette
Degree of Ingress Protection	IP30

Features

- ❑ Modular Form 4 design
- ❑ Mechanically and Electrically Interlocked
- ❑ Large number of operations
- ❑ Fully Automatic

Installation

Floor / Wall mounted in substations or control rooms

	8800487
Voltage	400V-440V
Frequency	50Hz
Current	100A
Length	2300mm
Height	2000mm
Depth	325mm
Weight	400kg
Outgoing Feeds	4 Pole (3P+N) – 63A 4 Pole (3P+N) – 63A 4 Pole (3P+N) – 63A 4 Pole (3P+N) – 63A

15.5 LVAC 2 Panel Switchboard –100A 400/440V AC 3ph 4 Wire – Network Rail No PA05/02022 - 8800381

NetworkRail

APPLICATION - ON LOAD

The 2 panel changeover switchboard to **Network Rail** specification **NR/SP/ELP/21026**, and is intended to maximise the reliability of the 415 V AC supply by using automatic selection to choose between two supplies. The equipment comprises two incoming 400V-440V 100A AC supply circuits. Each consists of an incoming 4 pole 600V 100A Switch Disconnector followed by a 3 pole 660V 100A contactor and then an isolating 4 pole 600V 100A Switch Disconnector. The outputs from the isolating Switch Disconnectors feed a bus and this is sectioned with a pole 600V 100A bus isolating Switch Disconnector. The bus feeds the four outgoing supply circuits, two via 4 pole 500V 100A Switch Fuses and two via 3 pole 500V 100A Switch Fuses.

Associated equipment includes a kWh meter, an analogue voltage transducer, phase loss relays and a synchronisation relay.

Switch Disconnector Specification

Type	OT100E4
Number of Poles	4 pole (3P+N)
Voltage	600V AC 50Hz
Current	100A

Switch Fuses Specification

Type	OS100B22
Number of Poles	4 pole (3P+N)
Voltage	500V AC 50Hz
Current	100A

Type	OS100B12
Number of Poles	3 pole
Voltage	500V AC 50Hz
Current	100A

Type	OS100B03
Number of Poles	3 Pole (2P+N)
Voltage	500V AC 50Hz
Current	100A

Contactor Specification

Type	CBPA
Number of Poles	3 pole
Voltage	660V AC 50Hz
Current	150A
Control Circuit	48V DC

Cubicle Construction

Material	1.2mm electro zinc-coated mild steel
Finish	Grey RAL 7032 leatherette
Degree of Ingress Protection	IP30

Features

- ❑ Modular Form 4 design
- ❑ Mechanically and Electrically Interlocked
- ❑ Large number of operations
- ❑ Fully Automatic

Installation

Floor / Wall mounted in substations or control rooms

Electrical Characteristics & Dimensions

	8800381	8800415	8800416
Voltage	**400V-440V**	**400V-440V**	**400V-440V**
Frequency	**50Hz**	**50Hz**	**50Hz**
Current	**100A**	**100A**	**100A**
Length	**2100mm**	**3100mm**	**2600mm**
Height	**1750mm plus 300mm for frame**	**1750mm plus 300mm for frame**	**1750mm plus 300mm for frame**
Depth	**300mm plus 25mm for frame**	**300mm plus 25mm for frame**	**300mm plus 25mm for frame**
Weight	**463kg**	**650kg**	**500kg**
Outgoing Feeds	**4 Pole (3P+N) – 63A** **4 Pole (3P+N) – 63A** **3 Pole (3P) – 63A** **3 Pole (3P) – 63A**	**4 Pole (3P+N) – 63A** **4 Pole (3P+N) – 63A** **4 Pole (3P+N) – 63A** **3 Pole (3P) – 63A** **3 Pole (3P) – 63A** **3 Pole (2P+N) – 63A** **3 Pole (2P+N) – 63A** **3 Pole (2P+N) – 63A**	**4 Pole (3P+N) – 63A** **4 Pole (3P+N) – 63A** **3 Pole (3P) – 63A** **3 Pole (3P) – 63A** **3 Pole (2P+N) – 63A** **3 Pole (2P+N) – 63A**

50 to 300A Two Panel Switch boards are available up to 650V versions, contact technical sales.

15.6 LVAC 3 Panel Switchboard – 100A 400/440V AC 3ph 4 Wire - Network Rail No PA05/02022 - 8800382

NetworkRail

APPLICATION- ON LOAD

The comprises a 3 panel changeover switchboard to **Network Rail** specification **NR/SP/ELP/21026**, and is intended to maximise the reliability of the 415 V AC supply by using automatic selection to choose between three supplies.

The equipment comprises three incoming 400V-440V 100A AC supply circuits. Each consists of an incoming 4 pole 600V 100A Switch Disconnector followed by a 3 pole 660V 100A contactor and then an isolating 4 pole 600V 100A Switch Disconnector.
The outputs from the isolating Switch Disconnectors feed a bus and this is sectioned with two 4 pole 600V 100A bus isolating Switch Disconnectors.
The bus feeds the four outgoing supply circuits, two via 4 pole 500V 100A Switch Fuses and two via 3 pole 500V 100A Switch Fuses.
Associated equipment includes a kWh meter, an analogue voltage transducer, phase loss relays and a synchronisation relay.

Switch Disconnector Specification

Type	OT100E4
Number of Poles	4 pole (3P+N)
Number of Positions	2
Voltage	600V AC 50Hz
Current	100A

Switch Fuses Specification

Type	OS100B22
Number of Poles	4 pole (3P+N)
Number of Positions	2
Voltage	500V AC 50Hz
Current	100A

Type	OS100B12
Number of Poles	3 pole
Number of Positions	2
Voltage	500V AC 50Hz
Current	100A

Contactor Specification

Type	CBPA
Number of Poles	3 pole
Voltage	660V AC 50Hz
Current	150A
Control Circuit	48V DC

Cubicle Construction

Material	1.2mm electro zinc-coated mild steel
Finish	Grey RAL 7032 leatherette
Degree of Ingress Protection	IP30
Approximate Weight	

Features

- ❑ Modular Form 4 design
- ❑ Mechanically and Electrically Interlocked
- ❑ Large number of operations
- ❑ Fully Automatic

Installation

Floor / Wall mounted in substations or control rooms.

Electrical Characteristics & Dimensions

	8800382
Voltage	400V-440V
Frequency	50Hz
Current	100A
Length	2700mm
Height	1700mm plus 300mm for frame
Depth	300mm plus 25mm for frame
Weight	572kg

50 to 300A Two Panel Switch boards are available up to 650V versions, contact technical sales.

15.7 LVAC Multi-circuit Distribution board - 8800202

NetworkRail

APPLICATION- ON LOAD

The equipment comprises a Multi-Circuit Distribution Switchboard to Railtrack Plc specification, and is designed to provide distribution of a number of incoming supplies to their various load circuits.

A system is provided for recognising and identifying a blown fuse in the switchboard to facilitate rapid restoration of a supply in the event of a fuse failure. The switchboard, pictured above, provides a power supply for signalling, where the continuity of the supply is critical.

System Voltage

Various DC and single phase AC voltages, as below:

650V AC
230V AC
110V AC
24V AC
130V DC
50V DC

Switches & Fuses

Isolators

3 pole rotary type load break switch rated 80 amps 690 V AC
3 pole rotary type load break switch rated 135 amps 415 V AC
3 pole rotary type load break switch rated 200 amps 400 V AC
3 pole rotary type load break switch rated 400 amps 400 V AC
4 pole rotary type load break switch rated 400 amps 200 V DC

Fuse Switches

3 pole rotary type fuse switch rated 63 amps 690V AC

Fuses/Links

14 x 51 indicating fuses, rated 4A, 10A and 32A
14 x 51 links
22 x 58 indicating fuses, rated 16A, 20A, 63A, 80A and 100A
22 x 58 links

Fuse Blown Indication System

Custom designed indication system comprising 24V DC power supplies, relays, and LED's.

Features

- ❑ IP 54
- ❑ Modular Form 4 design (up to type 7)
- ❑ Mechanically and Electrically Interlocked
- ❑ Large number of operations
- ❑ Fully Automatic

Installation

Floor mounted in substations or control rooms.

Cabling

Various cables circuit dependent.

Electrical Characteristics & Dimensions

	8800202	8800202
	Sections 1-5	Sections 6-8
Length	5950 mm	2530 mm
Height	2405 mm	2405 mm
Depth	630 mm	630 mm
Weight	See Below	See Below

Approximate weight:

Section 1	650V AC Supply 1	400Kg
Section 2	110V AC Supply 1	450Kg
Section 3	130V DC Supply 1	700Kg
Section 4	110V AC Supply 3	450Kg
Section 5	24V AC Supply 1	600Kg
Section 6	110V AC Supply 2	300Kg
Section 7	50V DC Supply 1	600Kg
Section 8	230V AC Supply 1	175Kg

Option – Alarm Panel Monitoring

An alarm panel can be supplied monitoring faults, providing remote indication

	Length	Height	Depth
88000239	800 mm	1000 mm	280 mm

15.8 LVAC 125A Changeover Panel - 8800500

APPLICATION

LVAC Changeover Panel – 125A 3P+N3ϕ+N Changeover Switch with 3 position Padlockable Handle (padlock in all positions). DNO to Generator changeover panel.
125A

Technical Data

- ❑ Mild Steel Enclosure 1.2mm Wall, 1.6mm Door & 2mm Glandplates
- ❑ Door Hinged on Left Hand Side
- ❑ 1 Polyamide 3-Point Lock with 8mm Triangular Insert.
- ❑ Glandplate on Top & Bottom Face
- ❑ Polyester based Powder Structure Paint Grey RAL 7035 Leatherette Finish
- ❑ Mounting Plate painted Orange RAL 2004.
- ❑ Terminals of all devices are accessible after removing covers.

	8800500
Voltage	400V (3P+N) 50Hz
Current	125A
Length	300mm
Height	800mm
Depth	300mm
Weight	39kg

15.9 LVAC Switchboard 250A - 8800365

London Underground

APPLICATION

Three phase AC Switchboard with a single four pole isolator and four Switch Fuse supplies.

Switch Disconnector Specification

Number of Poles	4 pole (3P+N)
Number of Positions	2
Voltage	1000V AC 50Hz
Current	250A

Switch Fuses Specification

Number of Poles	4 pole (3P+N)
Number of Positions	2
Voltage	1000V AC 50Hz
Current	160A

Features

- ❑ 2mm Aluzinc
- ❑ Colour Grey RAL 7032
- ❑ IP54

Installation

Floor standing in control rooms

Cabling

Cabling via un-drilled aluminium gland plates

Dimensions

	8800365
Voltage	415V (3P+N) 50Hz
Current	250A
Length	630mm
Height	1800mm
Depth	630mm
Weight	190kg

15.10 LVAC Tunnel Lighting Switchboard 50A - 8800437

London Underground

APPLICATION

Single phase AC Switchboard with an automatic changeover from the LU supply to a DNO supply when the LU supply is lost.
The switchboard feeds four tunnel lighting circuits which are automatically invoked when their associated traction supply is switched off.
The switchboard can be divided into three sections to enable installation into limited access switch rooms.

2 x Incoming Changeover Supply Switch/Fuse Disconnector Specification

Number of Poles	2 pole (P+N)
Voltage	1000V AC 50Hz
Current	50A

4 x Lighting Circuit Switch/Fuse Disconnector Specification

Number of Poles	2 pole (P+N)
Voltage	1000V AC 50Hz
Current	25A

Features

- ❑ 2mm Electro Zinc Plated Mild Steel
- ❑ Colour Light Admiralty Grey BS 381C 697 semi-gloss
- ❑ IP54

Installation

Floor standing in control rooms

Cabling

Cabling via un-drilled Electro Zinc Plated Mild Steel gland plates

Dimensions

	8800437
Voltage	230V (P+N) 50Hz
Current	50A
Length	1800mm (Splits into 3 x 600mm sections)
Height	2000mm
Depth	325mm
Weight	420kg

15.11 COLR - 725 Type Current On Line Relay (Tunnel Lighting) - 8800442

London Underground

APPLICATION - ON LOAD

The 725 Type Current On-Line Relay consists of a Bar and Shaft Type Contactor mounted in a stainless steel enclosure. This automatically switches on the tunnel lighting when the traction power supply is switched off or is lost due to a fault.

Bar and Shaft Type Contactor 3 Pole

Coil voltage	500 to 900V DC
Contact voltage	80 to 110V AC 50Hz
Contact Load	<200mA (Resistive Load)

Cubicle Construction

- ❑ External protection to IP54
- ❑ 1.5mm Stainless Steel Sheet 316
- ❑ External Surfaces natural Stainless Steel

Electrical Characteristics & Dimensions

	8800442
Voltage	630V DC
Current	200mA
Length	360 mm
Height	450 mm
Depth	220 mm
Weight	25kg

15.12 LVAC SER Signalling Equipment Room LVAC Panel 40A - 8800451

London Underground

APPLICATION - ON LOAD

Twin circuit breaker distribution low voltage A.C. distribution

2 x Distribution MCCB, Tmax T1, 40A 4 poles, 25kA

Number of Poles	3 pole (+N)
Voltage	690V AC 50Hz
Current	40A

Cubicle Construction

- ❑ External protection to IP54
- ❑ 1.5mm Stainless Steel Sheet 304
- ❑ Internal Surfaces White Anti Condensation Paint
- ❑ External Surfaces Colour BS381C - L309 Canary Yellow

Electrical Characteristics & Dimensions

	8800451
Voltage	415V AC
Current	40A
Length	600 mm
Height	640 mm
Depth	270 mm
Weight	30kg

Variant	Features	Length	Height	Depth
8800451-V01	Leyton	600	600	270
8800451-V02	SER LVAC Panel 40A - South Woodford	600	600	270
8800451-V03	2 x 100A MCCB	600	600	270
8800451-V04	1 x 100A MCCB	600	600	270
8800451-V05	2 x 100A MCCB	800	800	270
8800451-V06	3 x 100A MCCB	800	800	270
8800451-V07	2 x 100A MCCB - see dims	600	800	270
8800451-V08	IDP Trunking Switch Panel 3 x 100A Isolators	800	800	270

15.13 LVAC D.N.O. Distribution Panel 200A AC - 8800377

NetworkRail

APPLICATION

The D.N.O. (Distribution Network Operator) Distribution Panel for various applications including Points Heating supplies, consisting of a 200A Isolator, a 200A Fuse Switch and two 100A Fuse Switches.

The panel is also fitted with an Internal Light, Anti-Condensation heaters and a 30mA RCD protected 230V 13A Switched Socket.

Switch Disconnector Specification

Type	MEM 203GNL
Number of Poles	3 Pole + Neutral (TPN)
Voltage	415V AC 50Hz
Current	315A (AC21A)

Fuse Switch Specifications

Type	MEM 204GC
Number of Poles	3 Pole + Switched Neutral (TPSN)
Voltage	415V AC 50Hz
Current	200A

Type	MEM 101GNC
Number of Poles	1 Pole + Switched Neutral (SPSN)
Voltage	415V AC 50Hz
Current	100A

Cubicle Construction

Material	2.5mm Stainless Steel
Finish	Abraded
Degree of Ingress Protection	IP54

Dimensions

	8800377
Voltage	415V (3P+N) 50Hz
Current	200A
Length	1600mm
Height	1800mm
Depth	500mm

Other Ratings are available, consult Technical Sales.

NOTE: **GRP Insulated Enclosures** are also available

15.14 LVAC Supply Over-current Protection Panel - 8800362

NetworkRail

APPLICATION

The Panel is designed to provide a signal to a Load Shedding Panel that supplies the Air Conditioning.

This enables the Air Conditioning load to be shed under any of the following three conditions in order to minimise the load on the DNO Supply:

- ❑ The TDI Panel power source switches from Traction to DNO supply.
- ❑ The Domestic Supply Current in any phase of the unbalanced 3-phase Domestic Supply exceeds the Pre-determined value.
- ❑ The Signalling Supply switches from Traction Signalling Supply to DNO Supply in the event of a Traction Signalling Supply Failure.

Dimensions

	8800326
Voltage	415V (3P+N) 50Hz
Current	250A
Length	630mm
Height	1800mm
Depth	630mm
Weight	190kg

15.15 LVAC Compactor & Baler Control Panels

APPLICATION

A series of control panels which provide motor control for Waste Compactors and Balers with various special options.
A number of variations of these panels all have the following features:

- Material - 1.5mm Steel Plate, folded & seam welded
- Door - Hinged Right or Left
- Finish - Powder Structure Paint Grey RAL 7035
- Protection- IP55 & NEMA12

Quality components - Consistent construction techniques - Extensively tested

Dimensions

	8800467	8800339	8800340	8800418	8800421
Type	**GGPC14 Compactor**	**GGS3 Compactor**	**GGS3 Compactor**	**GGPC14 Compactor**	**GGS3 Compactor**
Voltage	240V (1P) 50Hz	400V (3P) 50Hz	400V (3P) 50Hz	400V (3P) 50Hz	400V (3P) 50Hz
Current	9 - 13A	12 - 18A	12 - 18A	12 - 18A	12 - 18A
Motor Control	**3.6kW**	**7.5kW**	**7.5kW**	**7.5kW**	**7.5kW**
Control Voltage	24V AC	110V DC	24V AC	24V AC	24V AC
Length	300mm	300mm	400mm	300mm	400mm
Height	400mm	400mm	400mm	400mm	400mm
Depth	210mm	160mm	210mm	160mm	210mm
Features	Pressure Indication Oil Level Warning Safety Relay Cycle Timer	Pressure Indication Oil Level Warning	Pressure Indication Oil Level Warning Safety Relay Cycle Timer	Pressure Indication Oil Level Warning	Pressure Indication Oil Level Warning Cycle Timer

	8800341	8800354	8800466
Type	**GGS4 Compactor**	**GGS4 Compactor**	**GGS4 Compactor**
Voltage	400V (3P) 50Hz	400V (3P) 50Hz	400V (3P) 50Hz
Current	16 - 24A	16 - 24A	16 - 24A
Motor Control	**11kW**	**11kW**	**11kW**
Control Voltage	24V AC	24V AC	24V AC
Length	400mm	400mm	400mm
Height	400mm	400mm	400mm
Depth	210mm	210mm	210mm
Features	Pressure Indication Safety Relay Cycle Timer	Pressure Indication Safety Relay Cycle Timer Bin Lift	Pressure Indication Safety Relay Cycle Timer Remote facility

	8800380	8800417	8800434	8800446
Type	**GGV550 Baler**	**GGV550 Baler**	**GGV550 Baler**	**GGV550 Baler Horizontal**
Voltage	400V (3P) 50Hz	400V (3P) 50Hz	400V (3P) 50Hz	400V (3P) 50Hz
Current	12 - 18A	12 - 18A	12 - 18A	12 - 18A
Motor Control	**7.5kW**	**7.5kW**	**7.5kW**	**7.5kW**
Control Voltage	24V AC	24V AC	240V AC	24V AC
Length	400mm	400mm	400mm	400mm
Height	400mm	400mm	400mm	400mm
Depth	210mm	210mm	210mm	210mm
Features	Safety Relay Ejection Ram control	Safety Relay Ejection Ram control Cycle Timers	Safety Relay Ejection Ram control Cycle Timers	Safety Relay Ejection Ram control Cycle Timers


8800339


8800340


8800341


8800417

15.16 TI - Trackside Route Indicators - 8800371

APPLICATION

The Buffer Zone Exit Indicator provides a visual indication to train drivers and shunters preparing to exit the Buffer Zone controlled by the Buffer Zone Changeover Panels.

The Indicator displays one of a number of messages depending on the state of the Buffer Zone Changeover Panels:

- ❑ Stop – No route set
- ❑ Await shunter's instructions – Route set North sidings
- ❑ Await shunter's instructions – Route set South sidings

The Indicator is of a stencil type, internally illuminated by long life discharge lamps, with electronic control gear.

Lamp Specification:

2 x 18W T8 long life fluorescent lamps per display

- ❑ Ultra long life type continuous service in excess of 70,000 hours
- ❑ Tri-phosphor lamps colour temperature of 4000K to give a display colour complying with Signal White (Class C) to BS1376

Indicator Enclosures:

Material	Extruded aluminium alloy
Finish	Painted Matt Black
Degree of ingress protection	IP 65

Frame

Material	Mild steel
Finish	Galvanised

Installation

Floor mounted trackside

Cabling

Control cabling via undrilled aluminium gland plates

Dimensions

	8800371
Voltage	110 V AC, 50 Hz, Centre Tap Earthed
Current	<1A
Length	300mm
Height	2220mm (including Mounting post)
Depth	750mm
Weight	190kg

15.17 TI - Trackside Indicators - 8800061

Dockland Light Railway

APPLICATION

Trackside Indication for conductor rail:

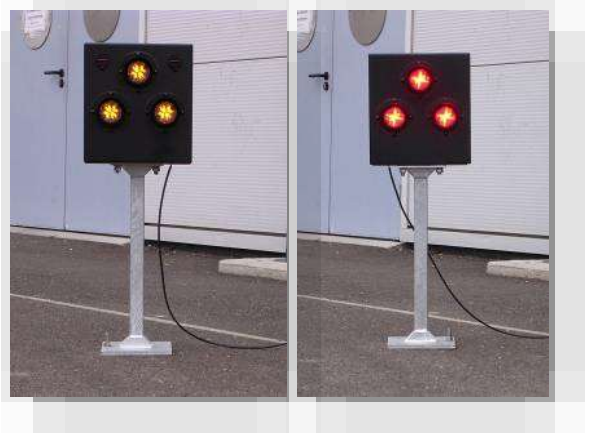
- ❑ Power On
- ❑ Power Off

Indication is by low maintenance LED's and can be mono-colour or dual-colour.

Used on the **Dockland Light Railway** System

Features

- ❑ Protected for outdoor use
- ❑ Dual circuit for enhanced safety
- ❑ LED Indication for a long life



Installation

Floor mounted trackside

Cabling

Control cabling via undrilled aluminium gland plates

Dimensions

	8800061
Voltage	110V
Length	300mm
Height	870mm
Depth	600mm
Weight	25kg

15.18 LED Shunt Indicator

APPLICATION

Trackside Indication for Route selection:

- ❑ No Route
- ❑ Route

Used on the **Southern Depots**

Features

- ❑ Protected for outdoor use
- ❑ LED Indication for a long life

Installation

Post mounted trackside

	860578
Voltage	110V AC ±10%, 50 Hz, single phase
Current	115mA
IP	65
Weight	-kg
Length	400 mm
Height (inc. post)	450 mm
Depth	280 mm

15.19 COSI Cleaning Road Overhead Status Indicator - 8800292

London Underground

APPLICATION

The Cleaning Road Overhead Status Indicator is a roof mounted unit that displays the electrical status of the roads fitted with ground mounted conductor rails.
It is controlled by the associated Cleaning Road Contactor.
The control circuit is easily accessible at the end of the unit.
The unit is controlled by a high integrity circuit that is built into the Cleaning Road Contactor Panel.
An Audible Alarm and Flashing Beacon are activated as a warning prior to traction current being switched on.
They sound and flash for approximately 8 seconds.

Features

- ❑ Alpha display of either ON or OFF
- ❑ Two sets of LEDs face in opposite directions
- ❑ Cowls to shield the display area sunlight
- ❑ High Intensity LEDs
- ❑ Supply ‘OFF’ is illuminated with green LEDs.
- ❑ Supply ‘ON’ is illuminated with red LEDs.
- ❑ Audible alarm and flashing beacon
- ❑ IP 65
- ❑ Black semi – gloss with anti-condensation paint inside

Installation

Hangs from the roof on Unistrut ™ or an equivalent framework.

Dimensions

	8800292
Voltage	110V
Length	1080mm
Height	500mm
Depth	750mm
Weight	62kg

Also available in other colours and configurations:

15.20 OSI Modular Overhead Status Indicator - 8800496

8800496-V01 - OSI Modular Overhead Status Indicator

APPLICATION

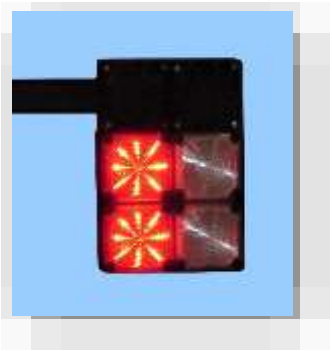
Overhead status indicator lights for bogie drop road
Red & white lights to indicate 750V dc contactor switched on or off
High brightness led beacons (steady illumination, long 50,000 hr life) 110-230V AC
Mounted to structure with Unistrut arm
Cable or conduit entry via M20 glands

Features

- ❑ Two sets of LEDs face in opposite directions
- ❑ Supply 'OFF' is indicated with white LEDs.
- ❑ Supply 'ON' is indicated with red LEDs.
- ❑ IP 65
- ❑ Black semi – gloss

Installation

Wall mounts



Dimensions

	8800496-V01
Voltage	110-230V
Length	311mm
Height	257mm
Depth	150mm
Weight	

Also available in other colours and configurations:

8800496-V02 - LED Overhead Road Status Indicator

APPLICATION

Overhead status indicator lights for bogie drop road
Red & white lights to indicate 750V dc contactor switched on or off
High brightness led beacons (steady illumination, long 50,000 hr life) 110V AC
Mounted to structure with Unistrut arm
Cable or conduit entry via M20 glands

Indication of status of 750V DC
RED aspect

- ❑ Conductor rail LIVE (750V DC ON)

WHITE aspect

- ❑ Conductor rail isolated (750V DC OFF)
- ❑ Conductor rail bonded to running rails
- ❑ Road protected (DPPS wheel stop raised)

NO LIGHTS

- ❑ System fault or unknown status

Assume conductor rail is live and road unprotected!
Electric trains may only enter shed when conductor rail live

Features

- ❑ Two sets of LEDs face in opposite directions
- ❑ Supply 'OFF' is indicated with white LEDs.
- ❑ Supply 'ON' is indicated with red LEDs.
- ❑ IP 65
- ❑ Black semi – gloss

Installation

Wall mounts

Dimensions

	8800496-V02
Voltage	110V AC
Length	308mm
Height	675mm
Depth	153mm
Weight	8kg

Also available in other colours and configurations:

15.21 Track Indicator Control Panels - 8800479

Track Indicator Control Panels for 1 Road – 8800479-V04

APPLICATION

The Isolator & Short Circuiting Switch supplies the 750V DC Road Supply or isolates and negative bonds the road.
The Track Indicator Control Panel provides secure signals to the Overhead Track Status Indicators and replicates them on its front Panel.

Track Indicators OFF Indication

The circuit must only illuminate the OFF White Lights when the Voltage Detectors do not sense a voltage present, and have indication from the Isolating switch that it is open and the Negative Bonding Switch is closed.

Track Indicators ON Indication

The circuit must only illuminate the ON Red Lights when the Voltage Detectors sense a voltage present, and have indication from the Isolating switch that it is closed.

Dual Voltage detector circuits are employed to avoid a single fault providing an incorrect indication. A check circuit raises an indicator fault on the control panel and forces all of the indicators NOT to illuminate ensuring that a false signal will not be displayed.
An audible fault indicator could be fitted in the shed to highlight this fault for each road.

If the BOTH of the Road Track Status Indicators are NOT illuminated it MUST be assumed that the Road Supply is LIVE

Supply Panel Rating

System Voltage	750V DC (1000V DC Maximum)
Auxiliary Voltage AC	110V AC 50Hz
Auxiliary Current AC	3A

Dimensions

Material	GRP Glass Reinforced Polyester
Finish	RAL 7035 - Grey
Ingress Protection	IP52
Height	615mm
Length	413mm
Depth	250mm
Approx. Weight	18kg

Other Variants

8800479-V01	Track Indicator Control Panel - 2 Road	
8800479-V02	Track Indicator Control Panel - 4 Road	
8800479-V03	Track Indicator Interface Panel - 1 Road	

Overhead Indicator Control Circuit Requirements

The Voltage Monitor circuit gives a secure indication of the status of the outgoing 750V DC and this is used to operate the Overhead Track Status Indicators, the indicators on the front of the Track Indicator Control Panel cubicle.
Dual Voltage Monitors VM1 and VM2 (Track Alive Relays) are both connected to the outgoing side of Contactor KI and will therefore be energised when 630V DC is present on the output connection.
These to voltage monitor output contacts are cross checked for parity via DCON and DCOF relays.
These DCON and DCOF then provide cross checked signals to the:
Track Alive – TA Relay
Track Not Alive – TNA Relay
These in turn then switch the overhead Status Indicators for the road.

Track Alive –	RED	750V DC ON
Track Not Alive –	WHITE	750V DC OFF & Bonded

If there is a disparity between the Voltage monitors, a fuse blown in the VM circuit, or a connection problem in the VM circuit this will force both Track Alive and Track Not Alive to de-energise producing a fault condition i.e. there will be no White or Red indicators displayed.

WARNING
If BOTH of the Road Track Status Indicators are NOT illuminated, this is an Indicator Fault condition and it MUST be assumed that the Road Supply is LIVE
Action must be taken to rectify this fault.
This system is extensively employed throughout London Underground Depots and is the standard method employed for their indications.

15.22 EMOIII Station Oscillator Control Panel - 8800533

EMO III Oscillating Shower Control Panels for the Kadant Lamort AB (Sweden)


V01


V04


V08

	8800533-V01	8800533-V04	8800533-V08
Height	500mm	1000mm	1000mm
Length	400mm	800mm	800mm
Depth	210mm	300mm	300mm
Approx. Weight	..kg	..kg	..kg

16 LVAC Cable Management Panels

Power & Control Cable Marshalling, Termination and Interface Enclosures

Railway and Industrial

16.1 Cable Marshalling Panels - 8800478

Various Cable Marshalling Panels to suit a variety of cabling applications





	Type		Material	Height	Width	Depth
8800478-V01	Disconnection Box - 19 Ways (Stainless steel)	LUL Nominee BCV Ltd	**St Steel**	**306**	**306**	**155**
8800478-V02	Marshalling Panel - 60 Ways - (Stainless steel)	VolkerFitzpatrick Ltd	St Steel	600	400	210
8800478-V03	Marshalling Panel - Manchester Metro - Victoria Station	Morgan Sindall	Steel	900	900	255
8800478-V04	Marshalling Panel - 60 Ways - (GRP)		GRP	620	415	230
8800478-V05	Marshalling Panel - 22 Ways - (GRP)	VolkerFitzpatrick Ltd	GRP	415	315	170
8800478-V06	Marshalling Panel - 20 Ways - (Mild Steel)	Antagrade Electrical	Steel	300	300	225
8800478-V07	Marshalling Panel - 618 Ways - (Mild Steel)	Siemens	Steel	2100	800	620
8800478-V08	Marshalling Panel - 101 Ways - (Mild Steel)	HVMS	Steel	800	600	400
8800478-V09	Marshalling Panel - 101 Ways - (Mild Steel)	HVMS	Steel	800	600	210
8800478-V10	Marshalling Panel - 165 Ways - (Mild Steel)	HVMS	Steel	1000	600	210
8800478-V11	Marshalling Panel - Bescot - (Mild Steel)	Siemens	Steel	1000	800	300
8800478-V12	Marshalling Panel - Brereton - (Mild Steel)	Siemens	Steel	1000	800	300
8800478-V13	Marshalling Panel - Hednesford - (Mild Steel)	Siemens	Steel	1000	800	300
8800478-V14	Marshalling Panel - Grid Interface - (Mild Steel)	Siemens	Steel	600	380	210
8800478-V15	Marshalling Panel - IS1M - (Mild Steel)	UKPNS	Steel	1200	800	400
8800478-V16	Marshalling Panel - IS2M - (Mild Steel)	UKPNS	Steel	1200	800	400
8800478-V17	Marshalling Panel -CES Switchroom A - (Mild Steel)	UKPNS	Steel	2100	800	620
8800478-V18	Marshalling Panel - CES Switchroom B - (Mild Steel)	UKPNS	Steel	2100	800	620
8800478-V19	Marshalling Panel - Grove Hill	Siemens	Steel	2000	800	400
8800478-V20	Marshalling Panel - High Brooms	Siemens	Steel	2000	800	400
8800478-V21	Marshalling Panel - Grid Interface - (Mild Steel)	Siemens	Steel	600	380	210
8800478-V22	Marshalling Panel - (Mild Steel)		Steel	1000	600	300
8800478-V23	Marshalling Panel - Rotherhithe – with Plinth		Steel	1900	800	412
8800478-V24	Marshalling Panel - Rotherhithe 405 Terminals		Steel)	1900	800	412
8800478-V25	Marshalling Panel - Rotherhithe 76 Way	Siemens	Steel	600	380	210
8800478-V26	Marshalling Panel – Grid Interface – Top & bottom entry		Steel	600	380	210
8800478-V27	Interface (Marshalling) Cabinet For 3 - 6 NSCDs		Steel			
8800478-V28	Interface (Marshalling) Cabinet For 1 - 2 NSCDs		Steel			
8800478-V29	Marshalling Panel - Poplar Substation - 589 Terminals	RJ Power	Steel	1600	1000	390

16.2 ML TLB Translay Send & Receive Boxes - 8800384

APPLICATION

The Translay system is made up of two cubicles, each containing Translay 'S' Differential Feeder and Transformer Feeder Protection units and associated equipment.
Manufactured to the Power Supply Upgrade Specification A437-00-DC-32 511

Cubicle Construction

Cubicle Material	2mm electro zinc coated mild steel
Cubicle Finish	Grey RAL7032
Baseplate Material	3mm electro zinc coated mild steel
Baseplate Finish	Orange RAL2004
Degree of Ingress Protection	IP41

Equipment

MMLG 01	Test block
MVAA 11	Single element relay with self-reset contacts
MCBI 01	Pilot wire differential protection relay
MRTP 01	AC pilot supervision relay with injection filter
MRTP 02	AC pilot supervision injection filter

Electrical Characteristics

DC Auxiliary Supply	60V DC
AC Auxiliary Supply	220V AC

Dimensions

	8800384
Weight	62kg
Length	600 mm
Height	800 mm
Depth	400 mm

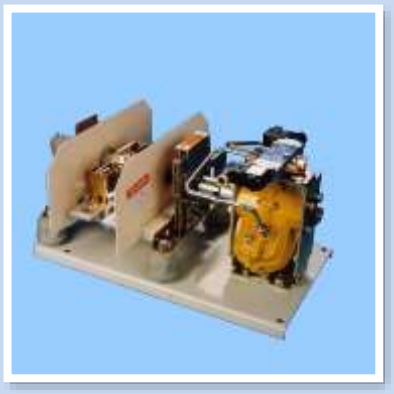
16.3 ML PB Pilot Box - 8800383

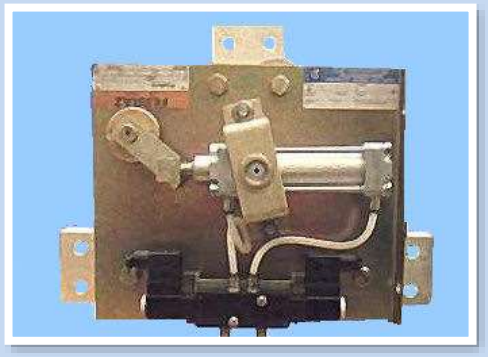
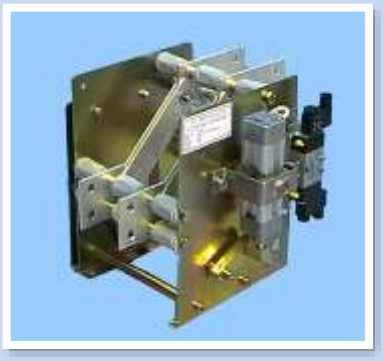
Pilot Boxes of various sizes and different numbers of ways can be provided to Network rail specifications.
These incorporate the spring loaded screw clamp style of terminals as specified.

8800383	**20 Pair** Cable Terminal Box - Indoor
8800383-V02	**30 Pair** Cable Terminal Box - Indoor-
8800383-V03	**30 Pair** Cable Terminal Box - Indoor-
8800383-V04	**20 Pair** Cable Terminal Box - Indoor-
8800383-V05	**20 Pair** Cable Terminal Box - Indoor-
8800383-V06	**20 Pair** Cable Terminal Box - Outdoor-
8800383-V07	**20 Pair** Cable Terminal Box - Indoor -
8800383-V08	**20 Pair** Cable Terminal Box - Indoor-
8800383-V09	**40 Pair** Cable Terminal Box - Indoor-

17 Industrial Switchgear - MEDIUM & LOW VOLTAGE CUSTOMISED & AUTOMATED

Switch Automation & Customisation




Automation of standard switches by electric motors, electric actuators or pneumatic actuators
Automation & Refurbishment of old switchgear
Customisation of Switchgear to include special interlocking, special indication, additional microswitches

17.1 SA Three Pole Switch – 630A 12kV AC

APPLICATION – ON LOAD

Isolation of transformer & motor supplies for general maintenance or operational requirements

Switch

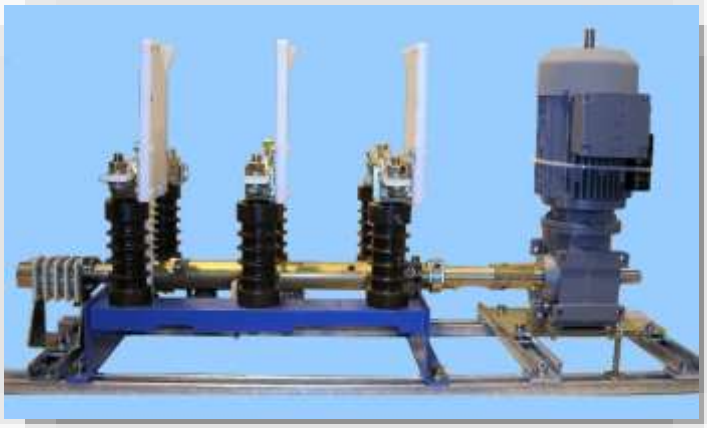
(1-0) 3 pole motorised isolator on load / fault make.

Features

- ❑ Emergency rotary manual handle
- ❑ Motor control & auxiliary microswitches

Electrical Characteristics & Dimensions

	8800128
Voltage	12kV
Current	630A
Length	930 mm
Height	380 mm
Depth	570 mm
Weight	kg
Motor Voltage	240V AC



17.2 SA Three Pole Switch & Manual Earth Switch – 630A 12kV AC

APPLICATION – ON LOAD

Isolation of 3kV, 6.6kV and 12kV transformer & motor supplies

Switch

(1-0) 3 pole motorised isolator on load / fault make.

Manual Bonding switch, with a mechanical interlock with the main switch

Features

- ❑ Emergency rotary manual handle on the main switch. Motor control & auxiliary microswitches.
- ❑ Removable manual handle for Earth switch operation.
- ❑ Auxiliary microswitches for the Earth switch.

Electrical Characteristics & Dimensions

	8800127
Voltage	12kV
Current	630A
Length	930 mm
Height	810 mm
Depth	570 mm
Weight	100kg
Motor Voltage	230V AC

17.3 SA Two Pole Disconnector – 1250A 3000V DC

APPLICATION – OFF LOAD

Isolation of test bed supplies from the substation, or track sectioning

Switches

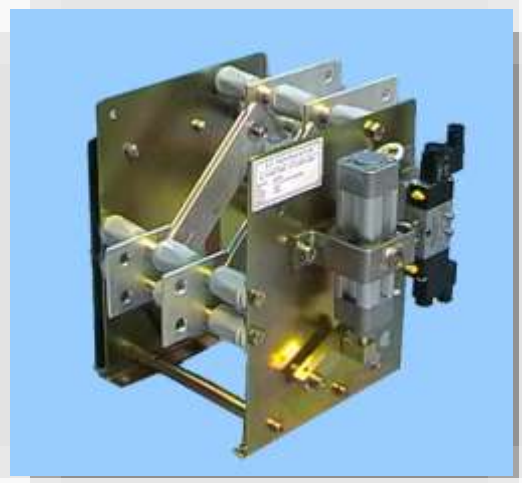
(1-0-2) 2 pole pneumatically driven off load isolators

Features

- ❑ Auxiliary microswitches

Electrical Characteristics & Dimensions

	8800169
Voltage	3kV
Current	1250A
Length	370 mm
Height	334 mm
Depth	356 mm
Weight	16kg
Pressure	9 Bar



17.4 SA Automation of Existing Medium Voltage Circuit Breakers

Give a new lease of life to your old circuit breakers. Automation kits are the economic solution compared to replacing old circuit breakers with new automated breakers

- **Short lead times** until installation
- **Short down time** when installation is taking place
- **Increased safety** for the operator

17.5 Ringmaster Mk 1.5 SF6 Ring Main Unit

Features

- Linear Actuation
- Control box with Interface for the Remote Control Unit (RMU)

Operation remote electrical or manual override, using the standard Yorkshire Switchgear operating handle

Electrical Characteristics

	8800089
Current **A**	4
Voltage **V**	110

17.6 Charging &Trip Mechanism for Type C4X Circuit Breaker

OEM - Hawker Siddeley -

Features

- Motor Charging of Trip Mechanism
- Trip via solenoid coil

Operation remote electrical or manual override, using the standard operating handle

Electrical Characteristics

	8800107	8800161
Current **A**	4	2
Voltage **V**	110V DC	240V AC
Charging cycle **min.**	3	4

17.7 Trip Mechanism for Type SC Form A1 Circuit Breaker

OEM - British Thomson-Houston -

Features

- Trip via solenoid coil
- Operation remote electrical or manual override, using the standard operating handle

Electrical Characteristics

	8800158
Current **A**	4
Voltage **V**	110V AC

18 Industrial Switchgear - HEAVY DUTY ISOLATORS

High-power Isolation












Custom built Isolator cubicles to suit a wide range of Industrial Applications

18.1 Industrial Isolator - Voltage: up to 1000V AC - Current: 40A to 1600A

Features

Multi-pole construction 2, 3 or 4 pole standard, On Load Disconnector
Visible breaking contacts (through window).
High speed mechanism
Silver plated copper contacts.
Breaking chambers on all poles made from GRP (UL 94 VO)
High make and break capacity (AC23 & DC23 rating)

- ❑ Right hand side operation
- ❑ Wall Mounting
- ❑ Cases with a degree of protection to IP 547
- ❑ Padlocking handles (3 padlocks to IEC947-3)
- ❑ Top and bottom cable entry

Options

Fuse Switches.
Control or indication microswitches

Applications

Isolation in Steel works, foundries, industrial plants where a high degree of protection & reliability is required.

Electrical Characteristics & Dimensions

Conform to IEC 408. NFC 63130 & EN 60947-3

	8800166
Voltage	1000V
Current	40-1600A
Length	266 mm
Height	335 mm
Depth	156 mm

18.2 Heavy Duty Industrial Isolator - Voltage: 1000V AC/DC - Current: 500A

Features

3 pole Off Load Disconnector
Visible breaking contacts (through window).
Silver plated copper contacts

- ❑ Left hand side operation
- ❑ Wall Mounting
- ❑ Cases with a degree of protection to IP 547
- ❑ Heavy Duty Continuously Welded Construction
- ❑ Padlocking handle
- ❑ Bottom cable entry

Options

Control or indication microswitches

Applications

Isolation in Steel works, foundries, industrial plants where a high degree of protection & reliability is required.

Electrical Characteristics & Dimensions

	8800014
Voltage	1,000V
Current	500A
Length	380 mm
Height	500 mm
Depth	282 mm

18.3 1 Pole Isolator & Bonding Changeover Switch - Voltage 1000V AC - Current: 400A

Features

Single Pole

Silver plated copper contacts

- ❑ Right hand side operation
- ❑ Wall Mounting
- ❑ Degree of protection to IP 54
- ❑ Padlocking handle
- ❑ Top and bottom cable entry

Options

Control or indication microswitches

Applications

Isolation in industrial plants where a high degree of protection & reliability is required

Electrical Characteristics & Dimensions

	8800263
Voltage	1000V
Current	400A
Length	600 mm
Height	600 mm
Depth	400 mm
Weight	36 kg

18.4 3 Pole Disconnector - Voltage 1000V AC - Current: 500A

Features

Three Pole

Silver plated copper contacts

- ❑ Front operation
- ❑ Wall Mounting
- ❑ Degree of protection to IP 66
- ❑ Padlocking handle
- ❑ Bottom cable entry

Applications

Isolation of Wind Turbine installations or industrial plant where a high degree of protection & reliability is required

Electrical Characteristics & Dimensions

	8800486
Voltage	1000V
Current	500A
Length	600 mm
Height	600 mm
Depth	210 mm
Weight	25 kg

18.5 4 Pole Changeover Isolator - Voltage 750V AC - Current: 1000A

Features

4 pole construction.

Silver plated copper contacts

- ❑ Right hand side operation
- ❑ Floor standing
- ❑ Degree of protection to IP 54
- ❑ Padlocking handle
- ❑ Top & Bottom cable entry

Options

Control or indication microswitches

Applications

Changeover of supply from Furnace 1 to Furnace 2 in steelworks, where a high degree of protection & reliability is required.

Electrical Characteristics & Dimensions

	8800182
Voltage	750V
Current	1000A
Length	800 mm
Height	1420 mm
Depth	560 mm
Weight	140 kg

18.6 MV TIL & TIR - Medium Voltage Twin Isolator Left & Right Hand – 430A 3.3 to 12kV

APPLICATION – ON LOAD

Isolation of Medium Voltage **motor / transformer** supplies, 3.3kV to 12kV, for maintenance.

Switches

Two MV(1-0) manual isolators on load.

Features

- ❑ IP56
- ❑ Separate motor / transformer isolator bays, with top cable entry for 3ph armoured cables.
- ❑ Manual handle / isolator door interlocks.
- ❑ Auxiliary switch terminals accessible at the top of the panel.

Electrical Characteristics & Dimensions

	8800152	8800153
	Left Hand	Right Hand
Voltage	3.3kV to 12kV	3.3kV to 12kV
Current	430A	430A
Length	890mm	890mm
Height	2000mm	2000mm
Depth	760mm	760mm
Weight	307 kg	307 kg

18.7 MV I - Medium Voltage Isolator – 300A 3.3kV

APPLICATION – ON LOAD

Isolation of Medium Voltage **motor / transformer** supplies, 3.3kV, for maintenance.

Switches

C79 Off-Load 350A 3 Pole Disconnector off load

Features

- ❑ IP54
- ❑ Top cable entry for 3ph armoured cables.
- ❑ Manual handle / isolator door interlocks.
- ❑ Auxiliary switch terminals accessible at the top of the panel.

Cubicle Construction

Material-	2.0 mm thick steel
Finish-	Painted Grey RAL 7032
Degree of ingress protection-	IP 54
Fittings-	Stainless Steel
Lock-	2 triangular 8mm 90° turn stainless steel
locks	

Electrical Characteristics & Dimensions

	8800312
Voltage	3.3kV
Current	300A
Length	700mm
Height	700mm
Depth	600mm
Weight	75 kg

18.8 4 Pole Isolating and Bonding Unit - 415V AC 250A

APPLICATION – ON LOAD

Isolating and Bonding Unit for a nuclear research centre Magnet power supply.

Consisting of an on-load Contactor, a motorised off-load Disconnector, fuses and a control circuit.

Isolation of 415V supplies, for maintenance.

Switches

Off load (1-2) 4 Pole 500A Disconnector driven by a 230V AC motor

The changeover switch, switches the output between the 415V AC Supply and Earth

Contactor

415V AC 400A AC3

Features

- ❑ IP54
- ❑ Separate Fuse & Control / isolator & Contactor bays
- ❑ Top cable exit for 3ph armoured cables
- ❑ Bottom cable entry for 3ph armoured cables
- ❑ Manual handle interlock
- ❑ Isolator door interlock
- ❑ LED Indicators to show the status of the 415V Supply output

Cubicle Construction

- ❑ 2mm sheet steel
- ❑ Internal Finish White anti-condensation paint
- ❑ External Finish Grey RAL 7032

Electrical Characteristics & Dimensions

	8800358
Voltage	415V AC (3ph + E)
Current	250A
Length	975mm
Height	1905mm
Depth	630mm
Weight	220 kg

18.9 2 Pole Bonding Changeover Switch Panel (twin isolators)

APPLICATION – OFF LOAD

250V DC supply is derived from the Magnet Power Supply.
The 250V DC is fed to the respective 2 pole disconnector, via 2 x 150mm^2 cables coming in from the base of the enclosure
When the Disconnector is moved to the earthed position the outgoing supplies to the respective magnet are earthed and can be interlocked, making them safe for maintenance.
Tool operated doors prevent access to sections containing 250V DC

Switches

1250A 900V DC Off-load knife type 2 pole three position Disconnector (Centre position not used)

- ❑ Two Interlocks

Cubicle Construction

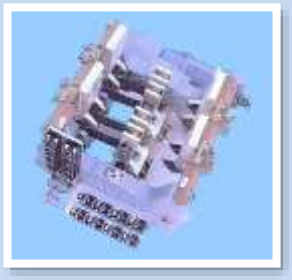
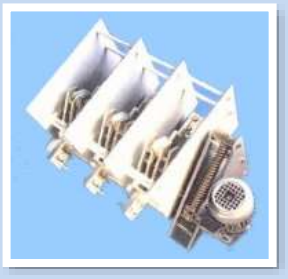
- ❑ 2mm sheet steel
- ❑ Internal finish White anti-condensation paint
- ❑ BS4800 Goose Grey 00A 05 Semi-gloss
- ❑ IP54

Electrical Characteristics & Dimensions

	8800336
Voltage	250V DC
Current	500A
Length	975mm
Height	1905mm
Depth	600mm
Weight	250 kg

19 Industrial Switches









19.1 Industrial Switch Finder

Range	Switch Type	ON /OFF Load	Number of Standard Poles	A.C.							D.C.			
				Current Range		Voltage Range				Freq.	Current Range		Voltage Range	
				A	kA	kV	kV	kV	kV	Hz	kA	kA	kV	kV
Low Current														
RS	Rotary	**ON**	Various	**20**	**0.63**	0.38	0.50			50/60	**0.002**	**0.63**	0.25	0.50
ITC	Fused Disconnector	**ON**	3 to 4	**25**	**0.63**	0.69				50/60	***	***	***	
IMC	Fused Disconnector	**ON**	3 to 4	**32**	**1.60**	0.66	1.00			50/60	***	***	***	
IM	Disconnector	**ON**	3 to 4	**40**	**0.20**	0.69				50/60	***	***	***	
MV	Medium Voltage	**ON**	3	**400**	**0.63**		12.00	24.00	36.00	50/60	-	-	-	-
Medium Current														
HAL	Disconnector	**ON**	2 to 3	**100**	**2.00**	0.50				50/60	***	***	***	
HUVL	Changeover	**ON**	3	**100**	**2.00**	0.50				50/60	***	***	***	
IT	Disconnector	**ON**	3 to 4	**125**	**3.15**	0.69				50/60	***	***	***	
HAZ	Single Pole Disconnector	**OFF**	1	**100**	**3.15**	1.00				50/60	**1.600**	**3.10**	1.20	
HA	Disconnector	**OFF**	1 to 3	**100**	**3.15**	1.00				50/60	**1.600**	**3.10**	1.20	
HUV	Changeover	**OFF**	2 to 3	**100**	**3.15**	1.00				50/60	***	***	***	
HAZS	Single Pole Disconnector	**OFF**	1	**400**	**4.00**	3.60				50/60	***	***	***	
HUVS	Changeover	**OFF**	1 to 3	**400**	**6.30**	3.60				50/60	***	***	***	
HAS	Disconnector	**OFF**	1 to 3	**400**	**12.00**	3.60	12.00	24.00	36.00	50/60	***	***	***	
ETM	Earthing Disconnector	**ON**	3	**400**	**12.00**	3.60	12.00	24.00	36.00	50/60	***	***	***	
MF **	High Frequency Disconnectors & Changeover	**OFF**	1 to 6	**500**	**6.00**	3.00				3000	**0.500**	**6.30**	3.00	
High Current														
NORD	High current Disconnectors	**OFF**	1	-	-	-				-	**14.0**	**140.00**	1.50	
PDB	High current Disconnectors - Plain Bar	**OFF**	1 to 2	-	-	-				-	**20.0**	**160.00**	2.00	
MDB	High current Disconnectors - Multi Bar	**OFF**	1 to 2	-	-	-				-	**5.0**	**60.00**	2.00	
SHORT	Shorting	**ON**	1	-	-	-				-	**70.0**	***	***	

If you have other, switchgear requirements please consult Technical Sales

** MF rating depends on no of poles, connection & Hz.
*** Refer to Technical Sales for details.

19.2 RS – AC / DC Rotary Switches

Standard Range - 16 to 630A * up to 500V DC *

Construction

Conforming to **IEC408** and **VDE0666**

These switches have self-cleaning contacts (wiping action); their basic design and robust construction make them suitable for many industrial applications, they are often chosen by heavy industry, the chemical industry, railways, electrical, shipping and everywhere a reliable contact is required. The switches are approved for naval applications where they are required to withstand shock and vibration, and many other arduous and abnormal ambient conditions.

Design

AC/DC

RS range rotary switches are normally supplied with a quick make and break mechanism designed for use on DC voltages as it's high speed of operation is independent of the operator, it is also of course suitable for AC. This quick make and break mechanism is also available with spring return to a normal position. The switches fitted with this mechanism index at 90°.

AC only

For other applications a slow break quick make mechanism can be supplied suitable for AC only, switches fitted with this mechanism index at 45° or 90°.

Options

Standard types:

- ❑ Panel Mounting
- ❑ Base Mounting
- ❑ Surface Mounting with an insulating cover

Accessories:

Escutcheon Plate with an aluminium insert

Door coupling

Cases with a degree of protection to IP 54

Terminal covers to VBG 4 (for 16 A and 25 A switches)

Key locking or padlocking handles

Applications

RS Range rotary switches comply with the requirements of the German Navy, and have been shock and vibration tested, test certificates are available. They can also be supplied as non-magnetic switches. The switches also comply with the requirements of: Germanischer Lloyd, Lloyd's Register of Shipping, Bureau Veritas, Det Norske Veritas etc.

Standard Electrical Characteristics

Range	Current (A)	DC Voltage (V)	AC Voltage (V)
P16.....	16	250	380
P25.....	25	250	380
P40.....	40	250	380
P63.....	63	500	500
P100.....	100	500	500
P160.....	160	500	500
P350.....	350	500	500
P630.....	630	500	500

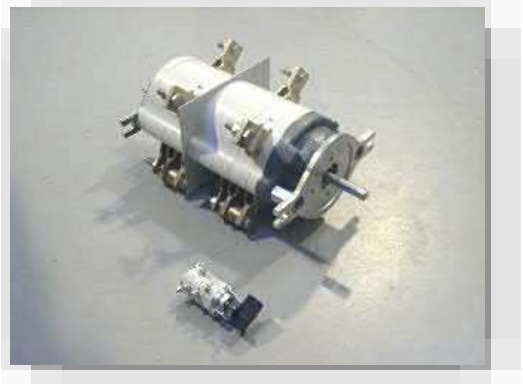
Please consult **Technical Sales** for further details and accessories.

*** Special Electrical Characteristics**

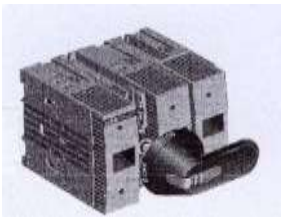
The switches are available in ratings from **10 to 1000** Amps, at various voltages both DC and AC, including **440 and 660 V & up to 1000V**.

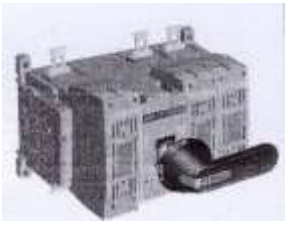
We are pleased to offer our clients specially made items details on request.

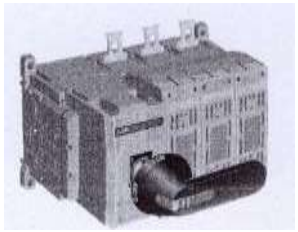
P16 & P630 2 pole shown in picture



19.3 Switch Fuses – Switch Disconnectors- ABB


OS32…63 type


OS100…160 type


OS100…160 type

Switch Fuses

- ❑ Front operated
- ❑ Includes terminal bolt kit (OS100…160)
- ❑ Black ON / OFF plastic handle and Shaft as standard
- ❑ Handle is IP65 protected, Padlockable in the OFF position and with door interlock in the OPEN position
- ❑ Shaft is adjustable for a range of installation depths.

L.C.S. Part No.	Rated current AC-20…23 ≤690V [A]	Rated power AC-23 400/500/690V [kW}	Fuse Size	No. of Poles	ABB Ref. No.
Protected tunnel terminals, IP20 Terminal shroud OSS63G1 needed for maintaining IP20 rating for wire sizes <10mm^2					
854557	50	22 / 30 / 37	14 x 51	3	OS50F12
855841	63	30 / 37 / 55	AS, A3	4	OS63B22N1
Terminal width 15mm					
862311	100	55 / 60 / 90	A2, a3	3	OS100B03
862312	100	55 / 60 / 90	A2, a3	4	OS100B04N2
861834	100	55 / 55 / 90	A2, A3	3	OS100B12
861835	100	55 / 55 / 90	A2. A3	4	OS100B22N1
Mechanism at the end of the switch fuse Terminal width 20mm					
860849	160	75 / 90 / 132	A2, A3, A4[1)]	4	OS160BO4N2W

Suitable for Switches	Included Shaft	Included Handle	Included Terminal Bolts
OS100…160	OXP6X161	OHB65J6	M6 x 20
OS100-W…160-W	OXP6X161	OHB65J6	M8 x 25

Switch Fuse Accessories

L.C.S. Part No.	Type of Accessory	Accessory Description	Suitable for Switches	ABB Ref. No.
860871	Terminal Shroud	1 Pole terminal shroud, IP20 Snap-on fitting with knockouts. Low type. Transparent.	OS100…160	OSS160T1L
860870	Terminal Shroud	3 Pole terminal shroud, IP20. Snap-on fitting with knockouts	OS100…160	OSS160G3

19.4 Front operated Switch Disconnectors, Base and DIN – Rail mounting

OT16 type

OT45 type

OT100 type

Includes protected terminal clamps, IP20

Handle and extension shaft not included – select from handles and shafts on the following pages

L.C.S. Part No.	No of Poles	I_{th} (open) [A]	Cable mm^2	Operational currents AC22A / AC23A 400V	Shaft Size - mm	ABB Ref. No.
855316	3	25	0.75…10	16 / 16	6	OT16F3
855879	4	25	0.75…10	16 / 16	6	OT16F4N2
862887	3	32	0.75…10	24 / 20	6	OT25F3
862992	4	32	0.75…10	25 / 20	6	OT16F4N2
855421	3	63	1.5…35	63 / 45	6	OT63F3
855488	4	63	1.5…35	63 / 45	6	OT63F4N2
864096	3	63	1.5…35	63 / 45	6	OT63F3
861832	4	115	10…70	100 / 80	6	OT100F4N2
862309	3	200		200 / 200	6	OT200E03P
862310	4	200		200 / 200	6	OT200E04P

NOTE This switch disconnector includes Handle OHB65J6, IP65, and Shaft OXP6x210mm

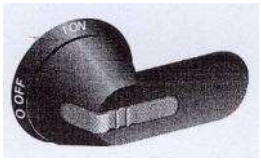
854558	3	200	-	200 / 135	6	OT125F3

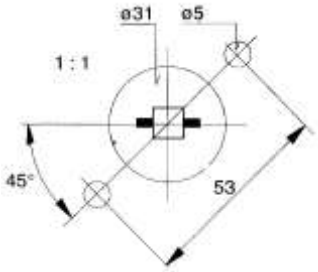
19.4.1 Switch Disconnector Accessories

L.C.S. Part No.	Accessories type and Description	Suitable for Switches	Other information	ABB Ref. No.
855426	Change-over switch mechanism	OT16 - 125	Shaft Distance 90+(0 – 10)x15mm	OTZW6
855489	Auxiliary contact block	OT16 – 125F	1N/O	OA1G10
855882	Auxiliary contact block	OT16 – 125F	1N/O & 1 N/C	OA2G11
855883	Optional handle IP 65	OS Mini	Order No. 1SCA022380R9660	OHB65J6
855881	Terminal Shroud 4 Pole	OTP80F	For 1 to 4 pole switches	OTS63T1
855880	Terminal Shroud 3 Pole	OT63 -80F3 -FT3	For 3 pole switches	OTS63T3
862315	Terminal Shroud 4-pole	OT200	Grey plastic Long Type	OTS250G1L/4
862314	Terminal Shroud 3-pole	OT200	Grey plastic Long Type	OTS250G1L/3

19.5 Switch OH type Handles - ABB

Pistol type handles and extension shafts – for switch fuses and disconnectors above



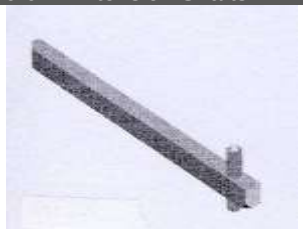


Door drilling for OH handles

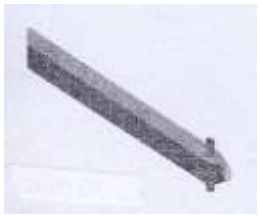
Handles for front operated, base & DIN – rail mounted switches above

L.C.S. Part No.	Shaft Size - mm	Colour	Handle Length - mm	Suitable for Switches	ABB Ref. No.
864083	6	Black	45	OT…125E	OHB45J6
855883	6	Black	65	OT63…250	OHB65J6
862024	6	Black	80	OT160…250-P	OHB80J6
856176	12	Black	125	OT630…800-P	OHB125J12
858417	12	Black	275	OETL1000…3150	OHB275J12

19.6 Extension Shafts – ABB



OXP6 type



OXP12 type

Extension Shafts for Handles and switches above

L.C.S. Part No.	Shaft Size – mm	Shaft Length	Depth of Panel	Suitable for Switches	ABB Ref. No.
855884	6	150mm	-	OT16…125E	OXP6X150
861833	6	265mm	-	OT16…125E	OXP6X265
861946	6	400mm	-	OT16…125E	OXP6X400
856795	6	210mm	185…215	OT200… 250-P	OXP6X210
862313	6	290mm	269… 334	OT200… 250-P	OXP6X290
861947	6	430mm	405…435	OT200… 250-P	OXP6X430
856794	6	161mm	140…205	OT200… 250-P	OXP6X161
856792	8	140mm	-		OXP8X140
856793	12	166mm	146…226	OT315…400-P	OXP12X166

19.7 IM - Disconnector

Standard Range40A to 200A - up to 690V AC - 500V DC

Features

Conforming to IEC 947-1 & 3, BS5419, & NF C 63130.

- ❑ Visible double breaking contacts
- ❑ High speed mechanism
- ❑ Silver plated copper contacts
- ❑ Breaking chambers on all poles made from GRP (UL 94 VO)
- ❑ High make and break capacity (AC22, AC23 & DC23 * rating)
- ❑ Multi-pole construction II-III-IV pole standard

Poles need to be linked see table below

Applications

Isolation of motors and other industrial equipment, where a high integrity of isolation and contact is required

Switch Characteristics & Ref. Numbers

Type			IM40	IM63	IM80	IM160	IM200
Basic Switch Ref. 2 pole -		II	R080515	N080512	K080509	N091276	C075626
Basic Switch Ref. 3 pole -		III	Q080515	M080511	J080508	P091277	D075627
Basic Switch Ref. 4 pole -		IV	P080513	L080510	L080507	Q091278	E075628
Thermal Rated Current @ 40°C	Ith	A	40	63	80	160	200
	Tthe	A	40	63	80	160	200
Rated Insulation Voltage (U_i)		V	690	690	690	690	690
Maximum short circuit current with Ferraz fuses am or gG		kA	100	100	100	100	100
Fuse Rating		A	40	63	80	160	160
Acceptable peak short circuit current		kA	7	10	11	23	30
Dielectric Voltage withstand (U_{imp})		kV	8	8	8	12	12
Rated Breaking Capacity AC23:Ie	400V	A	40	63	63	125	150
(For Synchronous motors)	500V	A	40	63	63	125	160
	690V	A	-	-	-	125	160
Rated Breaking Capacity AC23	500V	A	160	250	400	630	750
	690V	A	160	250	250	250	250
Rated Breaking Capacity DC23-A	250V	A	40/2	63/2	63/2	160/1	200/2
/n denotes the No of poles in series.	400V	A	32/2	63/4	63/4	160/2	200/2
	500V	A	32/4	-	-	160/3	200/4
Mechanical endurance: Number of operating cycles			10000	5000	10000	10000	10000
Electrical endurance:	500V		-	-	500	150	150
Number of operating cycles with Ith & cos.Ψ 0.65	660V		1000	300	-	-	-
Power dissipated per pole In (Without fuses)		W	16	18	37	60	90
Tightening Torque	Min.	Nm	18	30	30	30	30
	Max.	Nm	24	44	44	44	44
Max. operating Torque for 3 poles		Nm	6.5		25	60	65

Please consult **Technical Sales** for accessories & further details.

19.8 IMC – Fuse Disconnectors

Standard Range - 160A to 1600A - up to 1000V AC

Features

Conforming to **IEC 947-1 & 3**

- ❑ Visible double breaking contacts
- ❑ High speed mechanism
- ❑ Silver plated copper contacts
- ❑ Breaking chambers on all poles made from GRP (UL 94 VO)
- ❑ High make and break capacity (AC23 & DC23 rating)
- ❑ Multi-pole construction II-III-IV pole standard.

Applications

Isolation and protection of motors and other industrial equipment, where a high integrity of isolation and contact is required

Switch Characteristics & Ref. Numbers

Type			IMC160	IMC315	IMC400	IMC630	IMC1250	IMC1600
Basic Switch Ref. 3 pole -		III	L096863	J091019	M091022	Q091025	R096684	H081726
Basic Switch Ref. 4 pole -		IV	M096864	K091020	N091023	P096682	R096685	Y081740
Thermal Rated Current @ 40°C	Ith	A	160	515	400	630	1250	1600
	Tthe	A	160	250	400	630	1000	1250
Rated Insulation Voltage (U_i)		V	1000	1000	750	750	750	750
Fuse Size DIN43620 EN60296 (NH type)			0	1	2	3	4	4 x 2
Maximum short circuit current with Ferraz fuses am or gG		kA	100	100	100	100	100	100
Fuse Rating		A	160	250	400	630	1250	1600
Acceptable peak short circuit current		kA	30	40	55	73	-	-
Dielectric Voltage withstand (U_{imp})		kV	12	12	12	12	12	12
Rated Breaking Capacity AC23:Ie	400V	A	1280	1500	3200	5040	6000	6000
	500V	A	1280	1500	3200	5040	6000	2000
	690V	A	1280	1500	3200	2000	2000	2000
Rated Breaking Capacity AC23	380V	A	160	250	400	630	1000	750
	500V	A	160	250	400	630	750	750
	690V	A	160	250	250	250	250	250
Rated Breaking Capacity AC22	400V	A	160	315	400	630	1250	1600
	500V	A	160	315	400	630	1250	1600
	690V	A	160	315	400	630	630	630
Mechanical endurance: Number of operating cycles			10000	5000	10000	10000	10000	10000
Electrical endurance:	500V		-	-	500	150	150	150
Number of operating cycles with Ith & cos.Ψ 0.65	660V		1000	300	-	-	-	--
Power dissipated per pole In (Without fuses)		W	16	18	37	60	90	110
Tightening Torque	Min.	Nm	18	30	30	30	30	30
	Max.	Nm	24	44	44	44	44	44
Max. operating Torque for 3 poles		Nm	6.5		25	60	65	75

Please consult **Technical Sales** for accessories & further details.

19.9 HAS - Medium Voltage Disconnectors

Standard Range - 400 A to 6.3 kA - 3.6 kV A.C. up to 175 Hz

Features

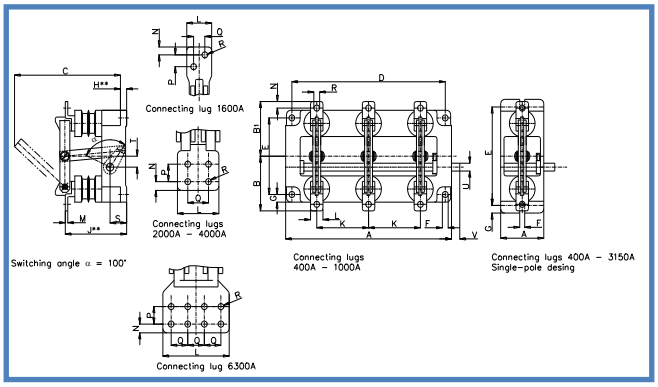
- ❑ Large isolation air and creepage path
- ❑ Self-cleaning blade contacts
- ❑ True opening and visible distance
- ❑ Rugged anti-torsion construction

Electrical Characteristics

Rated thermal current	AC	400A	630A	1.0kA	1.6kA	2.0kA	3.15kA	4.0kA	6.3kA
	DC	400A	630A	1.25kA	1.9kA	2.4kA	3.75kA	5.3kA	7.5kA
RMS 1 sec short-time withstand current		20kA	20kA	40kA	52kA	63kA	71kA	71kA	81kA
Rated peak current		50kA	50kA	100kA	130kA	160kA	177kA	177kA	214kA
Dielectric withstand voltage 1 min/50 Hz									
Phase to earth and between poles		10 kV	10 kV	10 kV	10 kV	10 kV	10 kV	10 kV	10 kV
Across the isolating distance		12 kV	12 kV	12 kV	12 kV	12 kV	12 kV	12 kV	12 kV
Rated impulse withstand voltage BIL									
Phase to earth and between poles		40 kV	40 kV	40 kV	40 kV	40 kV	40 kV	40 kV	40 kV
Across the isolating distance **kV**		46	46	46	46	46	46	46	46

Options include

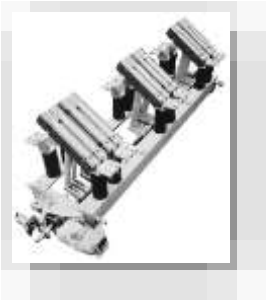
Manual, motor, pneumatic drives
Auxiliary switches, blocking magnets
Conforms to IEC 60-129
No-load operation
Indoor type – only vertical mounting
Mechanical endurance: ≤ 1kA = 25 000 cycles; >1kA = 50 000 cycles (open / close)
Maximum temperature withstand at 130° C without damages to the switch
Electrical contact by contact knives with pressed on hard silver contact rivets and silver-plated electrolytic copper plates
Small making / breaking capacity
Supporting insulators made of cast epoxy resin (fire classification to UL94-V1)



Main Dimensions

		Dimensions in mm																					
Amp (AC)	Poles	A	B=B1	C	D	E	F⍰	G	H(**)	J(**)	K	L	M	N	P	Q	R	S	T	U⍰	V	**	Drive
400	1	105	125	270	-	235	11	12.5	15	148	-	30	6	15	-	-	11	40	25	18	60	-	1A
630			135									40		20			14						
1 000			144	285						156			10										
1 600		110	200	365		320	14	20	20	181		60	12	18	27	27		48	29	25	80		1B
2 000			223	375						192		80	18	20	40	40							
3 150				385						198		100				50							
4 000		220	249	420	190	240		42.5		205		120	20			60			32	30			1C
6 300			269	480						225		160				40	18						
400	2	275	125	270	245	175	18	17.5	15	148	125	30	6	15	-	-	11	40	25	18	60	-	1B
630			135									40		20			14						
1 000			144	285						156			10										
1 600		465	200	375	415	220		27.5	30	191	200	60	12	18	27	27		58	29	25	80	15	2
2 000			223	385						202		80	18	20	40	40				30			
3 150				395						208		100				50							
4 000		600	249	430	550	240		42.5	36	215	300	120	20			60			32			35	
6 300			269	465					60	235		160				40	18						
400	3	400	125	270	370	175	14	17.5	15	148	125	30	6	15	-	-	11	40	25	18	60	-	1B
630			135									40		20			14						
1 000			144	285						156			10										
1 600		665	200	375	615	220	18	27.5	30	191	200	60	12	18	27	27		58	29	25	80	15	2
2 000			223	385						202		80	18	20	40	40				30			
3 150				395						208		100				50							
4 000		800	249	430	750	240		42.5	36	215	250	120	20			60			32			35	3
6 300		904	269	465	850				60	235	300	160				40	18						

Standard Range 8 kA to 12 kA - 12 kV, 24 kV, 36 kV up to 175 Hz



Features

- ❑ Large isolation air and creepage path
- ❑ Self-cleaning blade contacts
- ❑ True opening and visible distance
- ❑ Rugged anti-torsion construction

Options

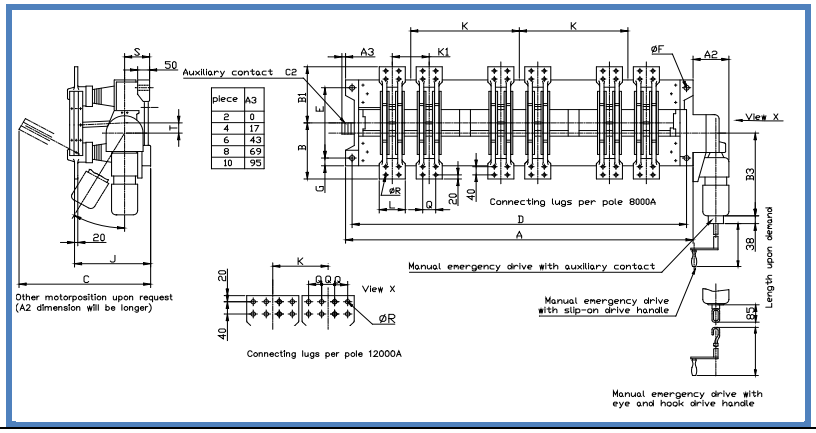
Manual, motor, pneumatic drives
Auxiliary switches, blocking magnets
Conforms to IEC 60-129

Electrical Characteristics

Rated Insulation Voltage	12 kV	24 kV	36 kV	12 kV	24 kV	36 kV
Rated thermal current AC	8.0 kA	8.0 kA	8.0kA	12.0 kA	12.0 kA	12.0 kA
RMS 1 sec short-time withstand current	110 kA	100 kA	100kA	121 kA	110 kA	110 kA
Rated peak current	275 kA	250 kA	250kA	300 kA	275 kA	275 kA
Dielectric withstand voltage 1 min/50 Hz						
Phase to earth and between poles	28 kV	50 kV	70 kV	28 kV	50 kV	70 kV
Across the isolating distance **kV**	32 kV	60 kV	80 kV	32 kV	60 kV	80 kV
Rated impulse withstand voltage BIL						
Phase to earth and between poles	75 kV	125 kV	170 kV	75 kV	125 kV	170 kV
Across the isolating distance **kV**	85 kV	145 kV	195 kV	85 kV	145 kV	195 kV

No-load operation
Indoor type – only vertical mounting
Mechanical endurance: 50 000 cycles (open / close)
Maximum temperature withstand at 130° C without damages to the switch
Electrical contact by blades with pressed hard silver contact rivets and silver-plated electrolytic copper plates
Small making / breaking capacity (as option)
Supporting insulators made of cast epoxy resin (fire classification according to UL94-V1)

Main Dimensions



			Dimensions in mm															
kV	kA	No of poles	A	A2	B=B1	B3	C	D	E	G	J	K	K1	L	Q	RØ	S	T
12	8	1	700	189	274.5	390	614	640	344	38	347	500	170	120	60	14	122	50
	12		730		294		654	670			367		185	160	40	18		
	8	2	1200		274.5	405	614	1140			347		170	120	60	14		
	12		1230		294		654	1170			367		185	160	40	18		
	8	3	1700	219	274.5	508	614	1640			347		170	120	60	14		
	12		1730		294		654	1670			367		185	160	40	18		
24	8	1	700	189	336.5	390	820	640	414	41	450	600	170	120	60	14	110	60
	12		730		356		855	670			470		185	160	40	18		
	8	2	1300		336.5	405	820	1240			450		170	120	60	14		
	12		1330		356		855	1270			470		185	160	40	18		
	8	3	1900	219	336.5	508	820	1840			450		170	120	60	14		
	12		1930		356		855	1870			470		185	160	40	18		
36	8	1	700	189	376.5	390	994	640	520	55	550	700	170	120	60	14	120	110
	12		730		396	405	1040	670			570		185	160	40	18		
	8	2	1400		376.5		994	1340			550		170	120	60	14		
	12		1430	219	396	508	1040	1370			570		185	160	40	18		
	8	3	2100		376.5		994	2040			550		170	120	60	14		
	12		2130		396		1040	2070			570		185	160	40	18		

19.10 MV – Medium Voltage Switches

Standard Range12kV AC up to 630A

Construction

Conforming to **IEC265**

The main contacts of these 3 pole switches are self-cleaning (wiping action), and there are smaller arcing contacts associated with each of these poles. The arcing contacts ensure the long life of the switch and can be swiftly replaced during switch maintenance.

The basic design and robust construction make them suitable for many medium voltage applications, they are often chosen by the shipbuilding industry, the oil industry, and the electricity industry, and everywhere that requires economical and reliable medium voltage switching.

Design

The MV switches are available in three configurations: -

Standard On Load Isolator (1-0)

On Load Isolator with Earthing Switch (1-M)

On Load Isolator with Earthing Switch & fuses*

* For further details, consult Technical Sales

Options

Switch position microswitches

RH/LH & Remote manual operation

A.C. or D.C. electrical operation

Key locking or padlocking handles

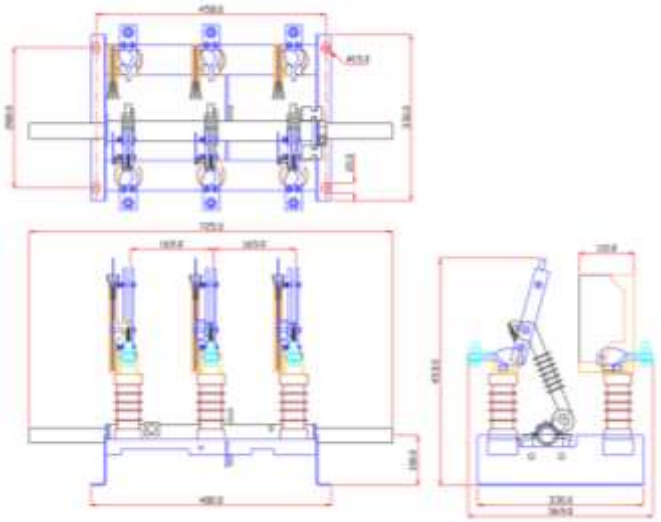
Applications

Medium voltage applications from **3kV** where transformers, motors, generators etc. require isolation, isolation & earthing or isolation, earthing & fuse protection

Ideal for **11kV power transmission** applications

Electrical Characteristics

Operating Voltage	12	kV
Insulating Values (indoor use)		
Impulse Voltage Test		
Phase to Earth	75	kV
Across open contacts	85	kV
Voltage @ 50Hz for 1 min		
Phase to Earth	28	kV
Across open contacts	32	kV
Short Circuit Withstand		
Short Circuit current duration		
1 second	25	kA
3 seconds	14	kA
Peak Current Value	63	kA
Peak Making Capacity	63	kA
Current Rating	400/630	A
Breaking Capacity		
20 operations @ $\cos\theta \geq 0.7$	400/630	A
200 operations @ $\cos\theta \geq 0.7$	32	A
20 operations @ $\cos\theta \leq 0.15$ inductive	10	A
20 operations @ $\cos\theta \leq 0.1$ capacitive	50	A
No of Mechanical Operations	2500	



Manual handle not shown

Please consult **Technical Sales** for further details including mounting into enclosures.

12kV Isolator with earth switch below

19.11 NORD – High Current Disconnectors

Standard Features 16kA – 140kA 1500V DC

Construction

Single pole / double pole / Change-over
Aluminium or Copper Terminals
Able to accommodate bus bar distortion because of built-in deformability i.e. flexible joints are not necessary.

Design

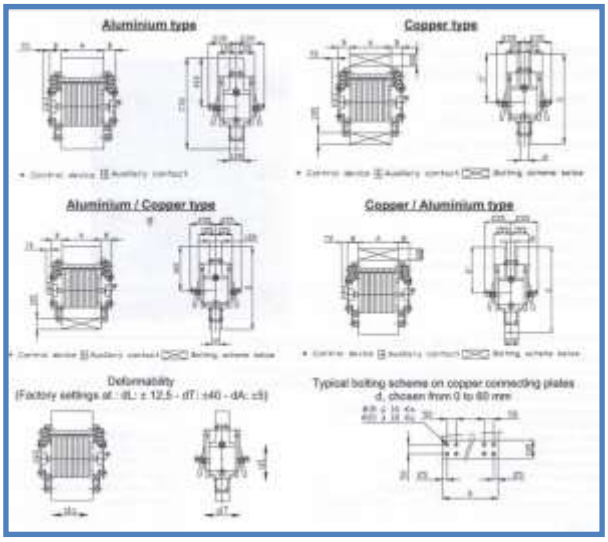
Visible break by direct seeing of the mobile silver-plated copper contacts
Mechanically independent mobile contact arms with high-pressure springs
Electrical contact with silver-to-silver contact
Insulation with fibreglass reinforced polyester insulators
Operation mechanism of galvanized steel by a toggle-closed system
Disconnectors are self-supporting - Bus bar support must be sized to withstand the disconnector additional weight

Options

Choice of input and output terminals in aluminium or silver-plated copper
Two poles or change-over design by side association of two disconnectors
Actuators (motor, pneumatic, manual)
Auxiliaries (limit switches, locks, control boxes)

Features

Low and constant voltage drop
Self-cleaning effect on contact
High short-circuit current withstand
Large insulation and creepage distances
Easy connections to:
Aluminium bus bars by welding
Copper bus bars using bolts



Electrical Characteristics

Temperature rise at nominal current (with 40°C max. ambient temperature) less than	65°C
Typical temperature rise at nominal current (with 40°C max. ambient temperature)	15°C above bus bars
Typical voltage drop at nominal current	40 mV
Peak short-circuit current withstand (upon circuit configuration)	10 x (Nominal current)
Dielectric withstand strength	
Between live parts in open position	10 kV - 50 Hz - 1 min
Between live parts and earth	10 kV - 50 Hz - 1 min
Between auxiliary contacts and earth	2 kV - 50 Hz - 1 min
Between motor (AC) and earth	2,5 kV - 50 Hz - 1 min
SCR leakage current breaking capacity (upon request)	1 A - 100 V DC L/R = 5 ms
Power breaking capacity up to 100 kA100 V DC - L/R < 20 msec	Upon request

Mechanical Characteristics

Built-in standard deformability (longitudinally (dL) / transversally (dT) / axially (dA))	25 / 80 / 10 mm
Higher values available upon request	
Mechanical endurance (with respect to maintenance instructions)	20 000 Cycles
Higher endurance upon request	
Typical duration of opening or closing operation	
Motor operation	3 to 12 seconds
Pneumatic operation	Less than 1 second
Max. contact temperature on live parts withstand without equipment damages	140° C

Nominal current	(kA)	14	18	22	27	32	35	39	43	47	51	55	58	62	66	70
No. contacts		12	16	20	24	28	32	36	40	44	48	52	56	60	64	68
A	mm	200	255	310	365	420	475	530	585	640	695	750	805	860	915	970
B	mm	25	90	90	90	90	90	90	90	90	90	97	97	97	97	97
Weight	kg	130	150	175	200	225	250	280	305	330	355	380	410	435	460	485

In	C	C'	D	E	E'
> 47 kA	892.5	460.8	42.5	820	460
47 kA	802.5	432.5	780	792.5	432.5

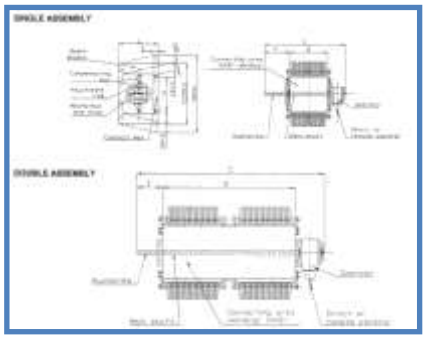
19.12 PBD –High Current Disconnectors

Standard Range 2000V DC20kA to 160kA

Construction

Single pole / double pole / Change-over

Aluminium terminals able to accommodate bus bar distortion due to built-in deformability i.e. flexible joints are not necessary.



Design

Visible break

Electrical contact with silver-to-silver contact

Operation mechanism of bi-chromate galvanized steel by a toggle-closed system

Disconnectors are self-supporting - Bus bar support must be sized to withstand the disconnector additional weight

Options

Actuators (motor, pneumatic, manual)

Auxiliaries (limit switches, locks, control boxes)

Features

Low and constant voltage drop

Self-cleaning effect on contact

High short-circuit current withstand

Large insulation and creepage distances

Easy connections to Bus bars by welding to high section aluminium bus bars

Electrical Characteristics

Temperature rise at nominal current (with 40°C max. ambient temperature)	Less than: 65°C
Typical voltage drop at nominal current	60 mV
Peak short-circuit current withstand (upon circuit configuration)	10 x (Nominal current)
Dielectric withstand strength	
Between live parts in open position	10 kV - 50 Hz - 1 min
Between live parts and earth	10 kV - 50 Hz - 1 min
Between auxiliary contacts and earth	2 kV - 50 Hz - 1 min
Between motor (AC) and earth	2,5 kV - 50 Hz - 1 min

Mechanical Characteristics

Built-in standard deformability (longitudinally (dL) / transversally (dT) / axially (dA))	25 / 80 / 10 mm
Mechanical endurance (with respect to maintenance instructions).	1 000 Cycles
Typical duration of opening or closing operation	
Motor operation	less than 20 seconds
Pneumatic operation	Less than 1 second
Contact temperature on live parts withstand without equipment damage	140° C

Configurations

All contacts are solid silver, high temperature brazed (special process)

Mechanically independent mobile contact arms with high-pressure springs

Electrical contact with solid pure silver, point to point, contact tips.

Upon request, two poles or change-over design by side association of two disconnectors

	Ir	No. of Blades	Blade	B	C	E	L	Weight
	(kA)		(A/mm)²	(mm)	(mm)	(mm)	(mm)	(kg)
	20	2 x 7	0.45	290	830	90	530	200
	25	2 x 9	0.43	350	890	90	530	220
	30	2 x 10	0.47	380	920	90	530	235
	35	2 x 12	0.46	440	1000	90	530	270
Single	40	2 x 14	0.45	500	1060	90	530	305
Assembly	45	2 x 16	0.44	560	1120	90	530	340
	50	2 x 18	0.43	620	1180	90	530	375
	55	2 x 20	0.45	680	1240	90	530	410
	60	2 x 22	0.47	740	1300	90	530	445
	70	2 x 24	0.46	800	1350	120	560	500
	80	4 x 14	0.45	1120	1660	120	560	750
	90	4 x 16	0.44	1240	1790	120	560	830
	100	4 x 17	0.46	1300	1850	120	560	880
Double	110	4 x 19	0.45	1420	1970	120	560	1080
Assembly	120	4 x 20	0.47	1480	2030	120	560	1120
	130	4 x 22	0.46	1600	2150	120	560	1200
	140	4 x 24	0.46	1720	2210	120	560	1290
	150	4 x 26	0.45	1840	2390	120	560	1370
	160	4 x 27	0.46	1900	2450	120	560	1500

In	C	C'	D	E	E'
> 47 kA	892.5	460	842.5	820	460
47 kA	802.5	432.5	780	792.5	432.5

Dimensions: A: standard = 500 mm (600 or 700 mm as option) - F: standard = 250 mm, Blade section = 160 x 20 mm²

20 Industrial Fuses & Fuse Enclosures

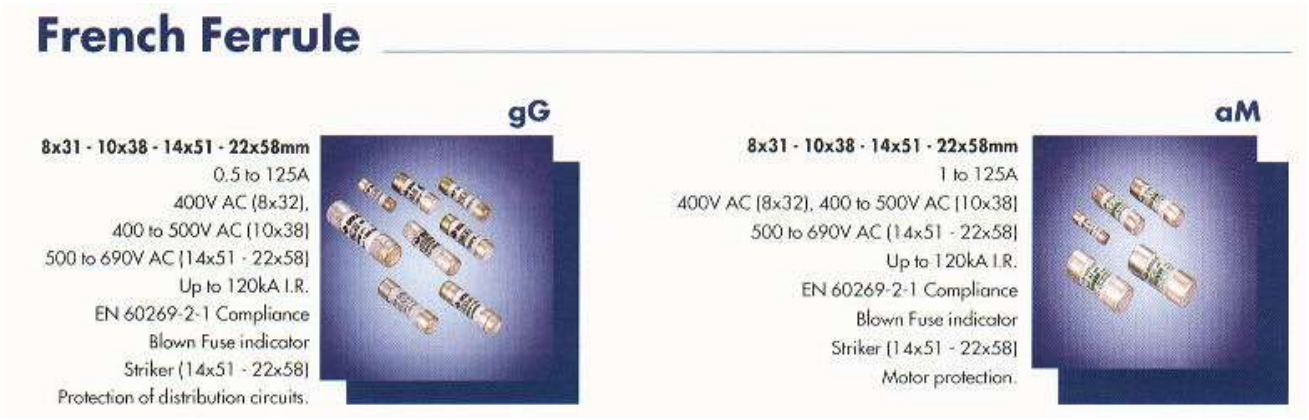
Fuses

A full range is available, complete with their accessories
From small electronic fuses to large medium voltage fuses
D.C. and semi-conductor fuses to North American and European Standards
International brand names:
Ferraz Shawmut - AMP-TRAP TRI-ONIC Protistor Ultrasafe
Plus other manufacturers – Linder, Linocur, Limitor, Nortroll etc.

Fuse Assemblies

IP Box ratings up to IP67- Stainless steel- Anti-Graffiti Paint Finish
Insulated boxes- Special adaptations- Advice on replacements for obsolete fuses

20.1 General Purpose AC Fuses –Types; gG and aM



French Ferrule Fuses – Ferraz –Types gI, gG, aM - **Standard**

L.C.S. Part No.	Size	Type	Current Rating	Rated Voltage	Indicator	Striker
854467	8 x 32	gI gG	4A	400V	without	without
853602	10 x 38	gI gG	1A	500V	without	without
851401	10 x 38	gI gG	2A	500V	without	without
852145	10 x 38	aM	4A	500V	without	without
854725	10 x 38	gI.gG	6A	500V	without	without
854837	10 x 38	aM	10A	500V	without	without
856962	14 x 51	gI gG	32A	500V	without	without

French Ferrule Fuses – Ferraz –Types gI, gG, with **blown fuse indicator**

L.C.S. Part No.	Size	Type	Current Rating	Rated Voltage	Indicator	Striker
856543	14 x 51	gI gG	2A	690V	with	without
856542	14 x 51	gI gG	4A	690V	with	without
856541	14 x 51	gI gG	6A	690V	with	without
855900	14 x 51	gI gG	25A	690V	with	without

French Ferrule Fuses – Ferraz –Types gI, gG, **with striker**

L.C.S. Part No.	Size	Type	Current Rating	Rated Voltage	Indicator	Striker
854567	14 x 51	gI gG	10A	500V	without	with
854678	14 x 51	gI gG	16A	500V	without	with
854679	14 X 51	gI gG	20A	500V	without	with
855827	14 x 51	gI gG	25A	500V	without	with
854568	14 x 51	gI gG	32A	500V	without	with
854600	22 x 58	gI gG	16A	690V	without	with
854911	22 x 58	gI gG	20A	690V	without	with
854601	22 x 58	gI gG	63A	500V	without	with
854569	22 x 58	gI gG	80A	500V	without	with

20.2 Modular Fuse Holders for French Ferrule - 8 x 32, 10 x 38 & 14 x 51 General Purpose Fuses

Fuse Holders Type MSC and CMS - 8 x 32, 10 x 38 & 14 x 51 – Standard without indicator

L.C.S. Part No.	Fuse Size	Poles	Type	Current	Voltage	Ref. No.
	8 x 32	1	MSC	4A	400V	8 x 31 MSC 8
857051	10 x 38	1	CMS	32A	690V	CMS101
857050	10 x 38	1 + N	CMS	32A	690V	CMS101N
858815	14 x 51	3	CMS	50A	690V	CMS143

20.3 Fuse Holders for French Ferrule type 8 x 32, 10 x 38 & 14 x 51 fuses

Type ST8 (for 8 x 32 fuses)

L.C.S. Part No.	Type	Colour	Poles	Ref. No.
854086	ST8	Grey	1	ST8
854087	ST8		N	US1ON

Type ST10 (for 10 x 38 fuses)

L.C.S. Part No.	Type	Colour	Poles	Ref. No.
851400		Grey	1	US101
854087	ST10		N	ST810 N
854866		Grey	2	US102

Type ST14 (for 14 x 51 fuses)

L.C.S. Part No.	Type	Colour	Poles	Ref. No.
852305	ST14	Grey	1	ST14
854525	ST14		1	ST14D
854562	ST14	Grey/Black	N	ST14N
854537	ST14	Black	N	ST14IN

Type ST22 (for 22 x 58 fuses)

L.C.S. Part No.	Type	Colour	Poles	Ref. No.
854628	ST22		1	ST22
854526	ST22		1	ST22D
854565	ST22	Grey	N	ST22N

Type SKI (salt spray-proof model) – Fuse Holder for ferrule type fuses 14 dia.

L.C.S. Part No.	Size	Code
856049	SI 14	SKI 14

20.4 NH General Purpose Fuses

500V Type gI – gG

L.C.S. Part No.	Size	Current Rating	Watts loss
857026	000/C00	32A	2.7
857024	1	160A	11.7
856761	1	250A	19.7
857454	2	63A	6.0
857455	2	200A	14.0
856252	2	400A	30.2
855717	3	500A	44.0
857023	3	630A	47.5
859082	2	300A	22.5

500V Type gG blade style fuses – with blown fuse indicator

L.C.S. Part No.	Size	Current Rating	Watts loss
856820	1	250A	23
854294	2	250A	23
854295	2	315A	24
856821	2	400A	33
855507	3	500A	36

500V Type aM blade style fuses – with trip indicator

L.C.S. Part No.	Size	Current Rating	Watts loss
855702	0	160A	11.5
855183	1	250A	17.0

690V Type gI – gG blade style fuses

L.C.S. Part No.	Size	Current Rating	Watts loss
855742	1	200A	16
856124	3	500A	43

20.5 NH Fuse Bases

NH Plastic Fuse Bases – Types, 00-TP, 0-EP* and 0 to 3PP

DIN Rail Mounting

L.C.S Part No.	Type	No. Of Poles	For Fuse Link Type
854803	00-TP	3	NH-
856982	00-EP*	1	NH-0
856760	1-PP	1	NH-1
856759	1-PP	2	NH-1
855773	1-PP	3	NH-1
856758	2-PP	2	NH-2
856253	2-PP	3	NH-2
857456	3-PP	1	NH-3
855502	3-PP	3	NH-3
856931	3-PP	4	NH-3

*EP bases have square contacts – PP bases have clips contacts

Screw Mounting

L.C.S. Part No.	Type	No. Of Poles	For Fuse Link Type
859070	0-PP	3	NH-0
857308	3-PP	3	NH-3

NH Plastic Fuse Base Accessories

Insulating Barrier

L.C.S. Part No.	Size	Current Rating	Ref No.
859069	0	160A	44504
855777	1 – 2	400A	44510
855506	3	630A	44512

Separator

L.C.S. Part No.	Size	Current Rating	Ref No.
855775	1 – 2	-	44610
855504	3	-	44612

Fuse Shields

L.C.S. Part No.	Size	Current Rating	Ref No.
859073	0	-	44804
855774	1 – 2	-	44810
855503	3	-	44812

Terminal Shields

L.C.S. Part No.	Size	Current Rating	Ref No.
855776	1	-	44702
855913		-	44708
856688	2	-	44710
855505	3	-	44712

Fuse Link Pull Handle without arm cuff

L.C.S. Part No.	Size	Ref No.
856670	00bis 4	08022.000000

20.6 DC Semiconductor (Traction Grade) Fuses - French Ferrule Type

600V DC Fuses 27 x 60- Type gRB

L.C.S. Part No.	Size	Current Rating	Watts loss 0.8 I_N	Watts loss I_N	Ref No.
852734	27 x 60	1A	0.25	0.4	CC 6.621 CP gRB 27 x 60/1

Minimum trip voltage: 20V

1000V DC Protistor Fuses – Type gRK

L.C.S. Part No.	Current Rating	Catalogue No.
856097	1000A	CC1000 CI gRK 90 149 TTD 1000

1000V DC Fuses 20 x 127–Types gRB and gRC

L.C.S. Part No.	Size	Current Rating	Watts loss 0.8 IN	Watts loss IN	Ref No.
855269	20 x 127	6A	2.0	3.5	CC 1051 CP gRB 20 x 127/ 6 D 100 gRB 006 VI
856175	20 x 127	10A	2.4	4.2	CC 1051 CP gRB 20 x 127/10 D 100 gRB 010 VI
856751	20 x 127	12A	3.0	5.3	CC 1051 CP gRB 20 x 127/12 D 100 gRB 012 VI
858537	20 x 127	16A	3.7	6.6	CC 1051 CP gRB 20 x 127/16 D 100 gRB 016 VI
853858	20 x 127	20A	4.4	7.7	CC 1051 CP gRB 20 x 127/20 D 100 gRB 020 VI
853887	20 x 127	32A	6.0	10.5	CC 1051 CP gRB 20 x 127/32 D 100 gRB 032 VI
854220	20 x 127	40A	7.3	13.2	CC 1051 CP gRC 20 x 127/40 D 100 gRC 040 VI
* 854097	20 x 127	* 63A	9.6	17.4	CC 1051 CP gRC 20 x 127/63 D 100 gRC 063 VI

* Note Use R.M.S. current less than 56 A when mounting in fuse-isolator

1500V DC Fuses 20 x 127– Type gRB and gRD

Without fuse blown indicator

L.C.S. Part No.	Size	Current Rating	Watts loss		Ref No.
851397	20 x 127	0.8A	0.5	0.9	CC 1551 CP gRB 20 x 127/0.8 D 150 gRB 0.8 VI
854825	20 x 127	1A	0.5	0.9	CC 1551 CP gRB 20 x 127/1 D 150 gRB 001 VI
856105	20 x 127	2A	0.9	1.6	CC 1551 CP gRB 20 x 127/2 D 150 gRB 002 VI
860911	20 x 127	3.15A	1.2	2.1	
860912	20 x 127	5A			
853238	20 x 127	10A	3.5	6.1	CC 1500 CP gRD 20 x 127/10 D 150 gRD 010 V
857621	20 x 127	16A	5.0	8.9	CC 1500 CP gRD 20 x 127/16 D 150 gRD 016 V

With fuse blown indicator

L.C.S. Part No.	Size	Current Rating	Watts loss		Ref No.
856167	20 x 127	0.8A	0.5	0.9	CC 1500 CP gRB 20 x 127/08 D 150 gRB 0.8 V
856168	20 x 127	1A	0.5	0.9	CC 1500 CP gRB 20 x 127/1 D 150 gRB 001 V
856169	20 x 127	1.5A	0.8	1.4	CC 1500 CP gRB 20 x 127/1.5 D 150 gRB 01.5 V
856080	20 x 127	2A	0.9	1.6	CC 1500 CP gRB 20 x 127/2 D 150 gRB 002 V
856170	20 x 127	3.15A	1.2	2.1	CC 1500 CP gRB 20 x 127/3.15 D 150 gRB 3.15 V
856171	20 x 127	4A	1.3	2.1	CC 1500 CP gRB 20 x 127/4 D 150 gRB 004 V
856172	20 x 127	5A	1.4	2.3	CC 1500 CP gRB 20 x 127/5 D 150 gRB 005 V
856173	20 x 127	6A	3.4	6.3	CC 1500 CP gRD 20 x 127/6 D 150 gRD 006 V
856174	20 x 127	8A	3.3	6.0	CC 1500 CP gRD 20 x 127/8 D 150 gRD 008 V
856175	20 x 127	10A			

Minimum trip voltage: 50V

20.7 AC Semiconductor Fuses - European French Ferrule Type 'U.O.S.'

1000V AC Miniature Semiconductor Fuses – 'Type FA' – Very Fast Acting

L.C.S. Part No.	Size	Current Rating	Rated Voltage	Ref No.
857497	6 x 46	0.8	1000V	1 000 V FA 0.800A 6 X 46

660V AC and 690V AC Fuses Types; gRB, gRC and UCR
Type 660 – gRB – without Trip Indicator

L.C.S. Part No.	Size	Current Rating	Voltage AC	Ref No.
856122	10 x38	2A	660V	660 gRB 10-02
856184	10 x 38	4A	660V	660 gRB 10-04
856123	10 x 38	10A	660V	660 gRB 10-10

Type 6.600 – 6.621 cp UR– without Trip Indicator

L.C.S. Part No.	Size	Current Rating	Voltage AC	Ref No.
858814	14 x 51	40A	660V	6.600 CP URC 14.51/40
859164	14 x 51	50A	660V	6.600 CP URC 14.51/50

Type 6.921 cp URC– without Trip Indicator

L.C.S. Part No.	Size	Current Rating	Voltage AC	Ref No.
856102	14 x 51	16A	690V	6.900 Cp gRC 14.51 16
856103	14 x 51	20A	690V	6.900 Cp gRC 14.51 20
856104	14 x 51	25A	690V	6.900 Cp gRC 14.51 25

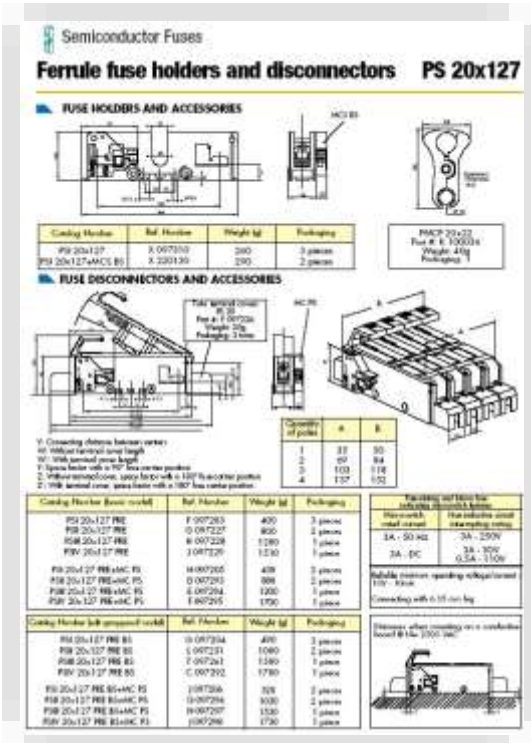
Type 6.921 cp URC– with Trip Indicator

L.C.S. Part No.	Size	Current Rating	Voltage AC	Ref No.
856197	14 x 51	6A	690V	6.921 Cp gRC 14.51 6

20.8 Fuse Holders - for Ferrule Type 'O.U.S.' - Semiconductor Fuses

Type PS 20 x 127 for Ferrule Type DC Fuses – Dimensions and Information


Blocks & Holders
Semiconductor Fuses
Ferrule fuse holders and disconnectors PS 20x127
FUSE HOLDERS AND FUSE DISCONNECTORS FOR FERRULE-TYPE FUSES 20x127
MAIN CHARACTERISTICS


Semiconductor Fuses
Ferrule fuse holders and disconnectors PS 20x127
FUSE HOLDERS AND ACCESSORIES
FUSE DISCONNECTORS AND ACCESSORIES

Type 20 x 127 Fuse Holders

L.C.S. Part No.	Ref No.	Microswitch
851396	PSI 20 x 127 + MCS BS	with
Standard		
854224	PSI 20 x 127 PRE	without
855403	PSII 20 x127 PRE	without
857401	PSI 20 x127 PRE +MC PS	with
Salt spray proof Holders		
853819	PSI 20 x127 PRE BS	without
853750	PSII 20 x 127 PRE BS	without
851505	PSI 20 x 127 PRE BS+MC PS	with

Type 27 x 60 Fuse Holder

L.C.S. Part No.	Ref No.	Microswitch
852733	PSI 27 x 60 PRE BS+MC PS	with

Fuse Holder Accessories

L.C.S. Part No.	Size	Accessory Type
851398	20 x 127	Terminal Cover (pair)
853629	27 x 60	Fuse Clip – MR5 CI

20.9 American Round Semiconductor Fuses

Form 101 Type A50QS – blade / bolt-on fuse

L.C.S. Part No.	Current Rating	Ref No.
857071	80A	A50QS80-4

20.10 American and European Square-Body Semiconductor Fuses

French Standard PSC – 600VAC Blades

L.C.S. Part No.	Size	Base	Ref No.
854054	32	SE32	6,6 URD 32 EF 0500

20.11 DC Square Body Semiconductor Fuses

Types – gRC, SRF, SRG and gRE

L.C.S. Part No.	Size	Current Rating	Voltage DC	Type	Ref No.
854216	120	125	750V	gRC	CC 7.5 gRC 120 EF 0125
853955	120	160	750V	gRC	CC 7.5 gRC 120 EF 0160
854301	122	350A	750V	gRC	CC 7.5 gRC 122 EF 0350
858324	123	500A	750V	gRC	CC 7.5 gRC 123 TTF 0500
857388	70	160A	1200V	SRF	CC 12 SRF 70 QF 0160
857389	70	200A	1200V	SRF	CC 12 SRF 70 QF 0200
857390	72	420A	1200V	SRG	CC 12 SRG 72 QF 0420
854219	300	80A	2000V	gRE	CC 20 gRE 300 QF 0080
854218	302	200A	2000V	gRE	CC 20 gRE 302 QF 0200

Accessories for square-body fuses

L.C.S. Part No.	Accessory Type	Contact	Ref No.
854860	Microswitch 1 N/O 1 N/C	Standard	MC3E 1-5N
855718	Microswitch	-	MS 4L 2.5 B6 + PRES

20.12 Square Body Fuse Holder / Bases

Types SP and SE for Square Body Semiconductor Fuses ref. Section 4.5 above

L.C.S. Part No.	Ref No.
854217	SP 36 120
854300	SE 122

20.13 Miniature Semiconductor Fuses

Type SA – Medium time lag and FA - Very fast time lag

L.C.S. Part No.	Size	Rated Voltage	Current Rating	Designation	Ref. No
853628	5 x 20	250V	0.5A	250V SA 0.500A 5 x 20	SA
855571	6.3 x 32	500V	1.6A	500V SA 1.600A 6.3 x 32	SA
857497	6 x 46	1000V	0.8A	1000V FA 0.800A 6 x 46	FA

20.14 Miniature Fuse Holders

For Miniature Semiconductor fuses ref. Section 20.13 above

Type SI 6.32

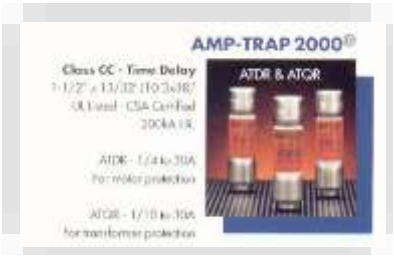
L.C.S. Part No.	For Fuse Size	Connecting	Ref. No.
855570	6.3 x 32	6.3mm clips	SI 6.32 LL PRE
857463	6 x 46	Used on	Manufactured

Accessories for 4.8 / 9 above

L.C.S. Part No.	For fuse Size	Access Type	Ref. No
857499	6 x 32	Clip	MR 6 VI

20.15 Type AMP-TRAP Fuses

Class CC Time Delay ATDR AC / DC



L.C.S. Part No.	Size mm	Current Rating	Ref. No
854320	10 x 38	1	ATDR1
854321	10 x 38	2	ATDR2
854322	10 x 38	3	ATDR3
854626	10 x 38	5	ATDR5
854627	10 x 38	10	ATDR10

Class CC Class C ATMR AC only

L.C.S. Part No.	Size mm	Current Rating	Ref. No
854323	10 x 38	1	ATMR1
854524	10 x 38	2	ATMR2

20.16 Fuse Holder - Type USBCC

UltraSafe Holder for use with Class CC Fuse types ATDR and ATMR

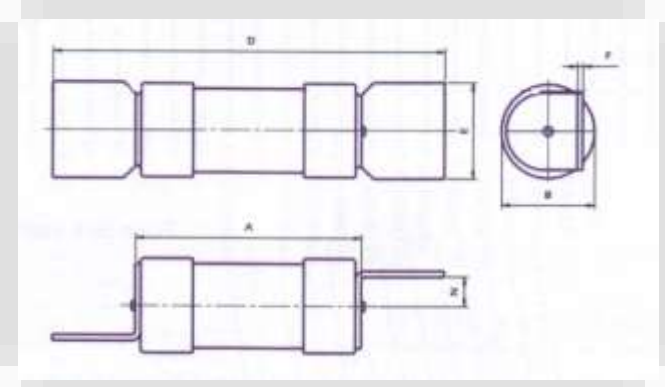
L.C.S. Part No.	No. Of Poles	Description	Ref. No.
854319	1	1 Pole without indicator	USBCC1

20.17 BS 88 Blue Dot Fuses

Blue Dot Series Fuses – Offset tags: 2 – hole fixing

Rated Voltage 415V AC – Breaking Capacity: 80kA

L.C.S Part No.	Current Rating (A)	Ref. No	Blue Dot Type	BS Standard Ref.	IEC Standard Ref.
861857	2	BNS42V2	F1	BS88-6	IEC602269-2
	4	BNS42V4	F1	BS88-6	IEC602269-2
861856	6	BNS42V6	F1	BS88-6	IEC602269-2
861855	10	BNS42V10	F1	BS88-6	IEC602269-2
	16	BNS42V16	F1	BS88-6	IEC602269-2
861854	20	BNS42V20	F1	BS88-6	IEC602269-2
	25	BNS42V25	F1	BS88-6	IEC602269-2
	32	BNS42V32	F1	BS88-6	IEC602269-2
	25	BNS42VM25	F1	BS88-6	IEC602269-2
	32	BNS42VM32	F1	BS88-6	IEC602269-2



BS Ref.	Fuse Type	Dimensions (mm)					
		A	B	D	E	F	N
F1	BNS	35.5	13.5	61.0	12.7	0.8	3.5

20.18 BS 88 Blue Dot Fuse Holders

BS 88 Blue Dot Fuse Holders

L.C.S. Part No.	Current Rating	Colour	Max. Cable Size	Ref No.	For Fuse Type
861852	32A	Black	16mm^2	32NNSF	F1
861853	32A	White	16mm^2	32NNSFW	F1

20.19 BS 88 Red Spot Fuses

660V Type CP without trip indicator

L.C.S. Part No.	Size	Ref No.
855710	17 x 49	6,6 URS 17/35

BS 88 Red Spot HRC Fuse links

Red Spot Standard Fuses – Offset tags: 2 – hole fixing

L.C.S. Part No.	Red Spot Type	Fixing Centres	Current Rating	Voltage AC Max.	Voltage DC Max.
853834	Standard – A1	44.5	4A	550V	250V
856050	Standard – A1	44.5	6A	550V	250V
854388	Standard – A2	73.0	2A	660V	469V
854387	Standard – A2	73.0	6A	660V	460V
853833	Standard – A2	73.0	10A	660V	460V

Red Spot Standard Fuses – Central tags: 2 – hole fixing

L.C.S. Part No.	Red Spot Type	Fixing Centres	Current Rating	Voltage AC Max.	Voltage DC Max.
855383	Standard – B2	111.0	160A	660V	350V
854344	Standard – B2	111.0	200A	660V	350V
855384	Standard – B2	111.0	200M315A	550V	-
855016	Standard – B3	111.0	315M355A	660V	460V

Red Spot 400 Series Fuses – Offset tags: 2 – hole fixing

L.C.S Part No.	Red Spot Type	Fixing Centres	Current Rating	Voltage AC Max.
854481	400 series-A1	44.5	10A	440V
854398	400 series-A1	44.5	20A	440V
854536	400 series-A2	73.0	2A	440V
854535	400 series-A2	73.0	6A	440V
855901	400 series-A3	73.0	50A	440V

20.20 BS 88 Fuse Holders

BS 88 Red Spot Fuse Holders Front Connected

L.C.S. Part No.	Current Rating	Colour	Max. Cable Size	For Fuse Type
7850164	20A	White	$10mm^2$	NIT / GNIT
853830	32A	Black	$16mm^2$	TIA / GTIA
853831	32A	White	$16mm^2$	TIA / GTIA
855852	63A	White	$50mm^2$	TIS / GTIS
850991	200A	Black	$120mm^2$	TF / GTF

BS 88 Red Spot Accessories – Copper Links

L.C.S. Part No.	Current Rating	For use with	
		Fuse	Fuse Holder
851012	20A	A1	RS20
853832	32A	A2	RS32
855853	63A	A3	RS63

20.21 Special Purpose Surge PAV Suppression Fuses

Type PAV

L.C.S. Part No.	Imax (Ka) one pulse	Current Rating	Voltage Rating	Breaking Capacity	Ref No.
857025	20	63A	500V	500V-100kA	gG 22- 63
856960	25	80A	500V	500V-100kA	gG 22- 80
856961	35-40	100A	500V	500V-100kA	gG 22-100

20.22 Insulated Fuse Box 1000A 2000V DC

DC Fuses in wall mounted insulated box.
Special test house application

- Fuse rated 1000A 2000V DC
- Termination provided to suit the specific cabling requirements.
- Lightweight ergonomic design

	Length	Height	Depth	Weight
88000173	790 mm	670 mm	325 mm	45 kg

20.23 Generator Fuse Assembly 1300A 5000V 3ph 60Hz AC

Application

The fuse panel provides protection for a Four Quadrant Load Generator in the event of a fault to a Four Quadrant Load Converter.
The Four Quadrant Load Train is used to simulate various propeller characteristics in a land based evaluation of ship technology.

Equipment

3 x 1300A, 5000V Fuses
3 x 1A, 5000V Fuses (For indication)
Fuse failure microswitches

Cable

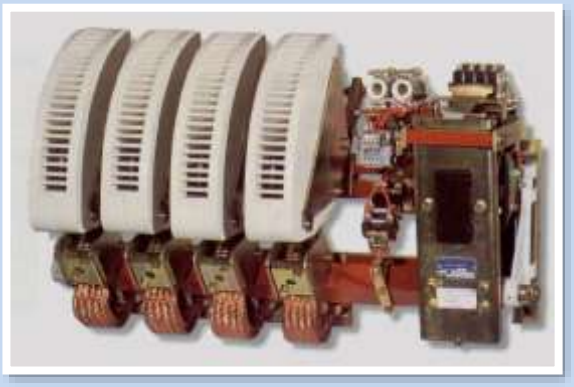
300mm^2 Armoured Cable
3 core 25mm^2 SWA Cable for Aux supply

Dimensions

	Length	Height	Depth	Weight
88000210	1000 mm	1800 mm	920 mm	45 kg

21 AC & DC Contactors

DC Contactors



21.1 Contactors - Voltage: up to 1000V AC or 2000V DC - Current: up to 25,000A

Features

- ❑ Modular construction
- ❑ Ability to mix AC and DC poles
- ❑ High fault withstand capability
- ❑ Silver-plated copper contacts
- ❑ High make and break capacity (AC1 & DC1 rating)
- ❑ Mechanical latch facility
- ❑ Manual release facility
- ❑ Arc blow out coil with cages
- ❑ Wide range of coil voltages
- ❑ Locking facility
- ❑ No Asbestos parts

Options

Enclosures to customer specifications
Control or indication microswitches
Special higher current ratings available on request
Can be fitted as part of a system

Applications

Railways, Trams, Metros, Underground, Trolley buses, Mining industries, Power generation and UPS supply.

Electrical Characteristics

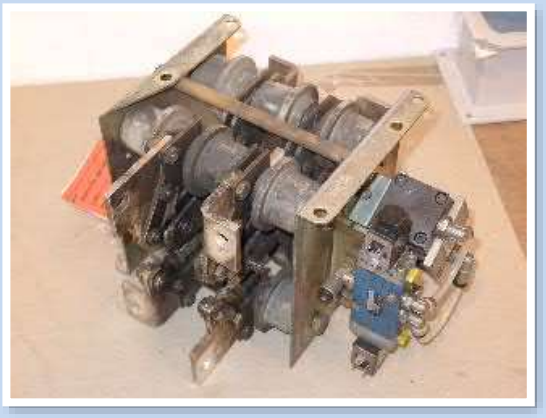
Conform to IEC 158-1 VDE0660. NFC 63100, EN 60947-4 and SNCF Cat 1 & 2
Please consult **Technical Sales** for further details and special ratings.

Typical Railway Applications refer to 'Depot', 'Trackside' and 'Control Panel' Sections of this Catalogue

22 Servicing

On Site Service and Commissioning

In house Switch Refurbishment



Maintaining or servicing your equipment could save £££ over the years

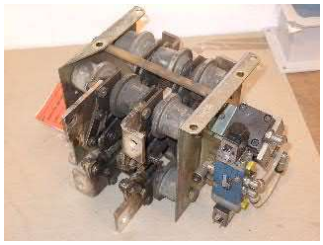
22.1 Repair, Refurbishment, Maintenance & Service

Whilst our product range consists of equipment which requires little maintenance, regular servicing will extend the life of your products.
An LCS service package could save you significant costs over the life of your system.
We pride ourselves on a quick efficient service and endeavour to return products as quickly as we can.





8800033 - Pneumatic Rolling Stock Switch Refurbishment
Rolling Stock Switch showing the condition as it was received at L.C. Switchgear.




After extensive work the switch can be seen after testing ready for packing and dispatch
All items returned for overhaul are fully tested prior to despatch.

Old Railway 2 Panel Switchboard Refurbishment

The old 2 panel switchboard in the adjacent picture was completely cleaned and rewired to the current standards giving it a new lease of life.
The switchboard was thoroughly tested prior to installation.

Maintenance

- **4hr response times available**
- **24/7 on-call available**
- **LU and NR trained staff**

Servicing & Refurbishment

- **Ensure product performance and longevity**
- **Renew existing products**

Contact us and plan your Support Package
+ 44 (0) 1273 770540

23 Training & Consultancy & Repair Service

23.1 Training

Detailed training courses can be provided for Maintenance or Operation.
Training can be given at LCS in Hove or at your site.
Many Operators and Maintenance Technicians have attended our courses.
Please consult technical sales with your training requirements.

LCS

CERTIFICATE OF TRAINING

LOCATION OR NAME OF PROJECT

THIS IS TO CERTIFY THAT

NAME OF TRAINEE

OF

NAME OF COMPANY

HAS COMPLETED AN L. C. SWITCHGEAR LTD

TRAINING COURSE FOR THE

NAME OF COURSE (OPERATION, MAINTENANCE ETC)

NAME OF UNIT OR SWITCH OR ENCLOSURE

LCS SS NUMBER

ON

DATE

TRAINER ..... (TRAINER'S NAME)

DATE DATE .....

Certificate Number

23.2 Consultancy

Experience with a wide variety of DC traction systems makes L.C. Switchgear able to give advice on different solutions, depending upon budget or technical requirements.

Impartial advice on the best solution is not clouded by OEM product driven decisions.

L.C. Switchgear is not tied to specific OEM products and therefore is able to recommend the best products on the market that meet your needs.

24 Installation

24.1 London Bridge Signal Box

Three & Two panel Changeover Switchboards feeding Multi Circuit Switchboards for the power supplies at London Bridge Signal Box were designed & supplied by L.C. Switchgear.

The whole installation was also undertaken including the integration of:

- UPS's,
- Transformers
- PLC Alarms
- Battery systems

The automatic Changeover of power supplies has already proven its worth on a number of occasions during unexpected interruption of the supplies to London Bridge.

Fully compliant with the latest Network Rail standards

The multi circuit distribution board is fitted with fuse blown indication to reduce downtime in the event of a failure.

Fuse location and change times have been reduced from 10-15 minutes to 2-3 minutes, which offers considerable savings in the event of failure due to circuit overload.

Supervisory cover for changing from the old to new systems was provided during night time possessions.

24.2 Rye Signal Box

UPS Switchgear and battery enclosure assembly

A modular design, to suit the requirements of a small signal box switch room.

Permits continued use of the signalling equipment in the event of an external supply failure.

The current rating and time constant can be accommodated to suit the requirement at site installation.

The unit was remotely positioned and was supplied with a signal box warning panel to alert the signal staff to the failure mode.

25 Accessories

25.1 Cable Glands for 935mm² Copper Traction Cable (LU Standard)

These are the glands for London Underground Standard 935mm² Copper cables used for the Positive and Negative supplies.
For indoor/outdoor use

- Seals on the cable sheath, to IP68.
- Specially formulated elastomeric seals.
- Wide sealing range
- Precision manufactured from high quality brass

There are two types that are offered by LCS.

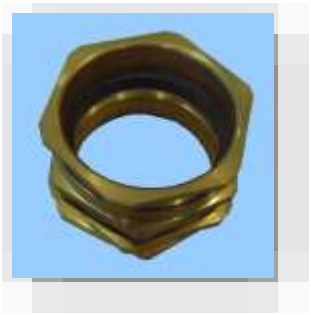
Nickel plated gland

The more commonly used type is the larger Nickel plated gland shown in the pictures this requires a greater pitch between cables due to the large dimension A/C across corners.

Un-plated brass

Less commonly used is the un-plated brass indoor & outdoor cable gland for use with all types of un-armoured cable, providing mechanical cable retention and an environmental seal on the cable outer sheath.

Plated



Un-plated

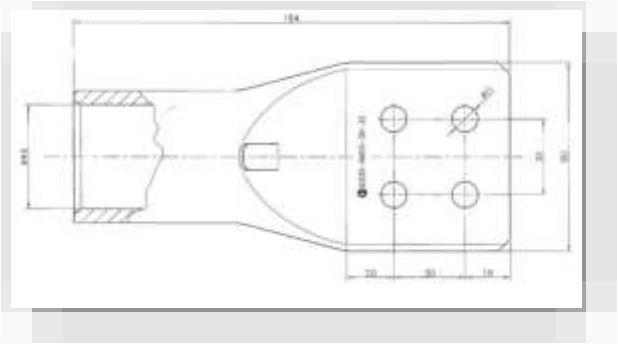
Part No.	Type	Height	Across Flats	Across Corners
863745	M75 Gland – Nickel Plated	66mm	96mm	110mm
863747	M 75 Gland - Un-plated Natural Brass	51mm	85mm	95mm
863746	M75 Nickel Plated Brass Locknut (Required for either of the above)	7.5mm	96mm	110mm
864305	M75 Sealing Washer (Required for either of the above)			

25.2 Cable Lugs for 935mm² Copper Cable (LU Standard)

These are the lugs for London Underground Standard 935mm² Copper cables used for the Positive and Negative supplies.
Copper tube lugs

- High purity electrolytic copper tube annealed and tin plated
- Four hole stud fixing
- Hydraulic Crimp tool fitting

LCS does not supply the cold shrink shown below.



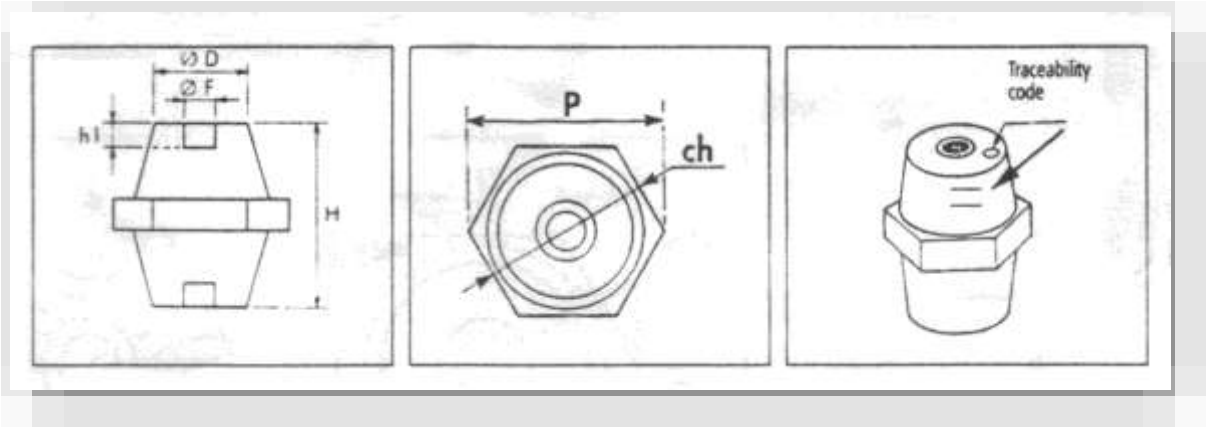
Part No.	Ref.	Fixing Size	Length	Palm	Horizontal Pitch	Vertical Pitch
863744	A200	M10	184 mm	80mm	32mm	30mm

25.3 Insulators Low Smoke Zero Halogen

Approvals & Specification

NFF 16-101 F2, UL recognised

Self-extinguishing:	UL 94 HB
Material	Polyamide material reinforced with glass fibre, halogen free.
Insert Materials:	Bi-chromate zinc plated steel inserts, threaded according to ISO standard.
Working temperature	-40°C + 130°C



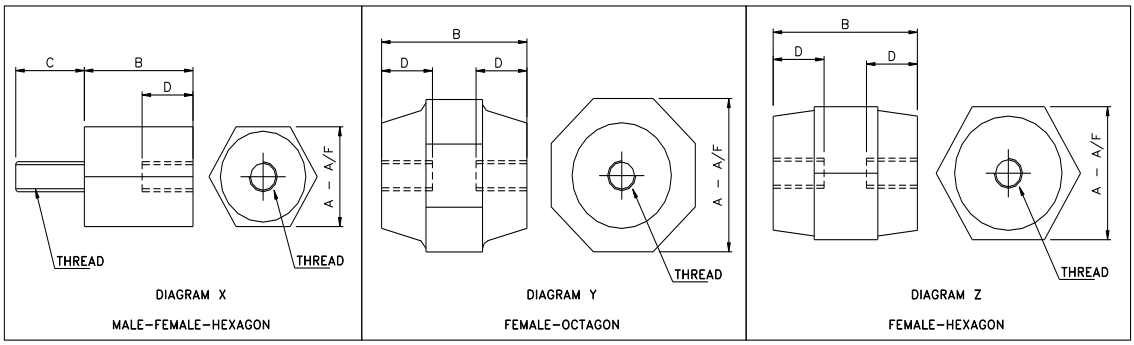
L.C.S. Part No	Description	H	Ch	F	h1	D Dia.	P	Nominal Voltage	Nominal Voltage	Tensile Strength	Bending Strength	Weight
		mm	mm	mm	mm	mm	mm	V dc	V ac	↓ daN	← daN	kg
855709	ISO 50M6	50	50	M6	9	41	57	1000	1500	2000	1000	0,152
853404	ISO 30M8	30	30	M8	8	26	34	750	900	600	300	0,046
855831	ISO 35M8	35	41	M8	8	34	46	750	900	1100	800	0,074
855830	ISO 40M8	40	46	M8	8	40	53	1000	1200	1100	800	0,104
855829	ISO 45M8	45	41	M8	15	34	47	1000	1200	1100	650	0,136
855828	ISO 45M8L	45	50	M8	15	41	57	1000	1200	1800	1000	0,132
854468	ISO 50M8	50	50	M8	15	41	57	1000	1500	2000	1000	0,148
856887	ISO 60M8	60	55	M8	15	44	63	1000	1500	2200	1000	0,192
855027	ISO 35M10	35	41	M10	10	34	46	750	900	1100	800	0,092
856321	ISO 40M10	40	46	M10	10	40	53	1000	1200	1100	800	0,102
855719	ISO 45M10	45	50	M10	10	41	57	1000	1200	1800	1000	0,116
853405	ISO 50M10	50	50	M10	10	41	57	1000	1500	2000	1000	0,196
855225	ISO 60M10	60	55	M10	10	44	63	1000	1500	2200	1000	0,380
862182	ISO 70M12	75	65	M12	14	52	75	1000	1500	2500	1600	0,470
862183	ISO100M12	100	65	M12	14	46	75	1000	1500	3000	1500	0,476

Please note these are **not suitable** for use in London Underground 'Tunnel' Applications

25.4 Insulators Low Smoke

Approvals: NFF101/102 10/F1 & UL94 – VO

Material	DMC (Developed Polyester Molding Compound), low smoke emissions with high fire retardancy
Limiting Oxygen index	> 70% to ISO4589
Insert Material;	Female – Brass
	Male – Mild steel zinc & yellow passivate
Working temperature	+ 160 degrees
Nominal Insulation Voltage	690V ac
Nominal Working Voltage	440V ac
Flexural Strength	80 Mpa
Tensile Strength	30 Mpa

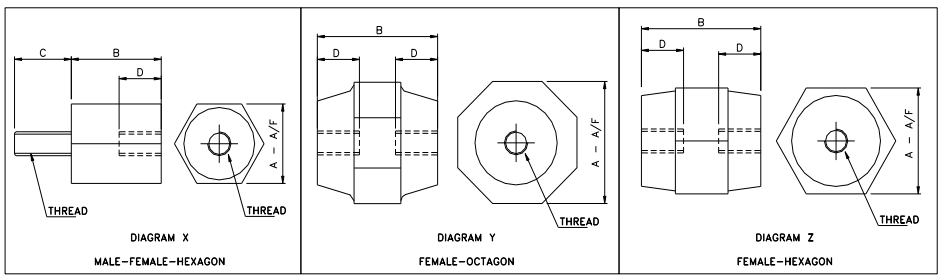


L.C.S. Part No.	Ref.	Diagram Type	Thread M	A mm	B mm	C mm	D mm	Tightening Torque Nm	Creepage mm
850470	LSH835H28	X	M8	35	25	28	10	14	35
851162	L3850	Y	M8	51	51		10	17	57
850465	L31050	Y	M10	51	51		16	33	57
7850137	L31250	Y	M12	51	51		16	40	57
855119	L31060	Z	M10	55	60		16	33	63
852828	L3870	Z	M8	55	70		10	17	73
851842	L31070	Z	M10	55	70		16	33	73
850421	L31270	Z	M12	55	70		16	57	73

Test voltage for L31050 & L31070 is 32.5Kv

25.5 Insulators Ultra Low Smoke – Suitable for London Underground Tunnels

Approvals; - LU – NF F-16-101 – NFT 51-071 – NFC 20-455 – UL94 VO



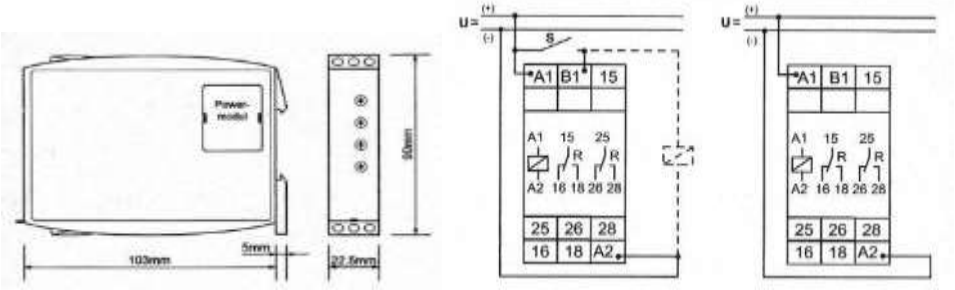
Insert Material;- Female – Brass / Male - Mild steel zinc & yellow passivate

Ultra Low Smoke Insulators – for use in tunnels – LUL Approved

L.C.S. Part No.	Diagram Type	Thread	Dimensions – mm				Tightening Torque	Creepage	Ref. No.
			A	B	C	D			
860751	Y	M10	51	51	-	16	33	57	U31050
860752	Z	M10	55	60	-	16	33	63	U31060
860753	Z	M10	55	70	-	16	33	73	U31070

25.6 Timer Relays

Gamma Series



Time Relay G2Z

Tele Automation - Multifunctional Timer Relay – Gamma series - TS 35 Rail mounted

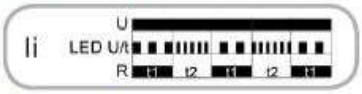
L.C.S. Part No.	Voltage	Controls	Tele Automation Ref. No.
860014	12 – 240V AC / DC	2 – Time function	G2ZI20

Functions

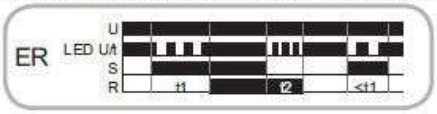
The function has to be set before connecting the relay to the supply voltage.

Asymmetric flasher pause first (Ip)
When the supply voltage U is applied, the set interval t1 begins (green LED U/t flashes slowly). After the interval t1 has expired, the output relay R switches into on-position (yellow LED illuminated) and the set interval t2 begins (green LED U/t flashes fast). After the interval t2 has expired, the output relay switches into off-position (yellow LED not illuminated).
The output relay is triggered at the ratio of t1:t2 until the supply voltage is interrupted.

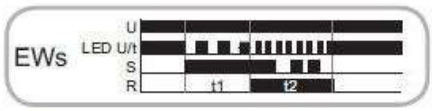
Asymmetric flasher pulse first (Ii)
When the supply voltage U is applied, the output relay R switches into on-position (yellow LED illuminated) and the set interval t1 begins (green LED U/t flashes slowly). After the interval t1 has expired, the output relay switches into off-position (yellow LED not illuminated) and the set interval t2 begins (green LED U/t flashes fast). After the interval t2 has expired, the output relay switches into on-position (yellow LED illuminated). The output relay is triggered at the ratio of t1:t2 until the supply voltage is interrupted.



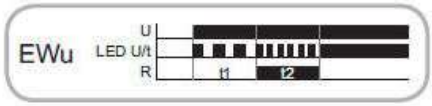
ON delay and OFF delay with control input (ER)
The supply voltage U must be constantly applied to the device (green LED U/t illuminated).
When the control contact S is closed, the set interval t1 begins (green LED U/t flashes slowly). After the interval t1 has expired (green LED U/t illuminated), the output relay R switches into on-position (yellow LED illuminated). If the control contact is opened, the set interval t2 begins (green LED U/t flashes fast). After the interval t2 has expired (green LED U/t illuminated) the output relay switches into off-position (yellow LED not illuminated).
If the control contact is closed during timing of t2 the expired interval is erased, and the off delay restart next time the control contact is opened.



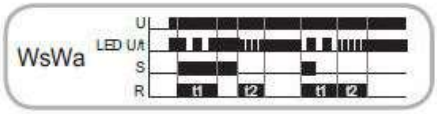
ON delay and single shot leading edge with control input (EWs)
The supply voltage U must be constantly applied to the device (green LED U/t illuminated).
When the control contact S is closed, the set interval t1 begins (green LED U/t flashes slowly). After the interval t1 has expired (green LED U/t illuminated), the output relay R switches into on-position (yellow LED illuminated) and the set interval t2 begins (green LED U/t flashes fast). After the interval t2 has expired (green LED U/t illuminated) the output relay switches into off-position (yellow LED not illuminated).
During the interval, the control contact can be operated any number of times.
A further cycle can only be started when the cycle run has been completed.



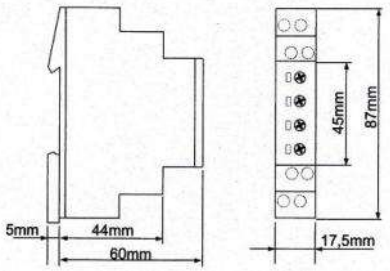
ON delay and single shot leading edge voltage controlled (EWu)
When the supply voltage U is applied, the set interval t1 begins (green LED U/t flashes slowly). After the interval t1 has expired the output relay R switches into on-position (yellow LED illuminated) and the set interval t2 begins (green LED U/t flashes fast). After the interval t2 has expired (green LED U/t illuminated) the output relay switches into off-position (yellow LED not illuminated).
If the supply voltage is interrupted before the interval t1+t2 has expired, the interval already expired is erased and is restarted when the supply voltage is next applied.

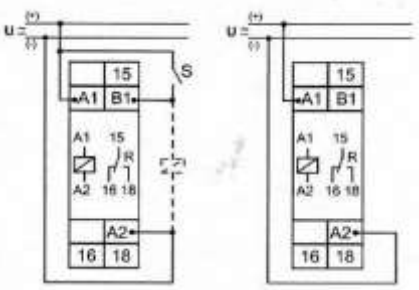


Single shot leading and single shot trailing edge with control contact (WsWa)
The supply voltage U must be constantly applied to the device (green LED U/t illuminated).
When the control contact S is closed, the output relay R switches into on-position (yellow LED illuminated) and the set interval t1 begins (green LED U/t flashes slowly). After the interval t1 has expired, the output relay R switches into off-position (yellow LED not illuminated). If the control contact is opened, the output relay again switches into on-position (yellow LED illuminated) and the set interval t2 begins (green LED U/t flashes fast). After the interval t2 has expired the output relay switches into off-position (yellow LED not illuminated). If the control contact opens before the interval t1 has expired, t1 continuous according to the adjusted period and the single shot trailing edge impulse (t2) follows directly after t1. During the interval, the control contact can be operated any number of times.



Enya Series multifunction timer relay



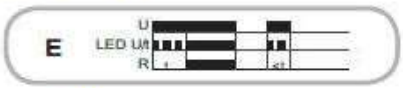


Time relay E1ZM
T35 Rail mounted

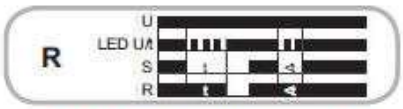
Part No.	Voltage	Controls	Tele Automation Ref.
859957	12-240V AC / DC	Time - Function	E1ZM10

Functions

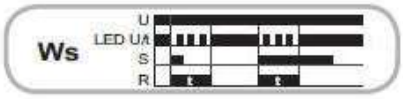
ON delay (E)
When the supply voltage U is applied, the set interval t begins (green LED U/t flashes). After the interval t has expired (green LED U/t illuminated) the output relay R switches into on-position (yellow LED illuminated). This status remains until the supply voltage is interrupted. If the supply voltage is interrupted before the expiry of the interval t, the interval already expired is erased and is restarted when the supply voltage is next applied.



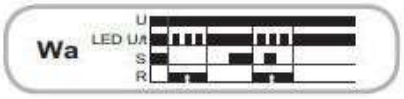
OFF delay (R)
The supply voltage U must be constantly applied to the device (green LED U/t illuminated). When the control contact S is closed, the output relay R switches into on-position (yellow LED illuminated). If the control contact is opened, the set interval t begins (green LED flashes). After the interval t has expired (green LED U/t illuminated) the output relay switches into off-position (yellow LED not illuminated). If the control contact is closed again before the interval t has expired, the interval already expired is erased and is restarted.



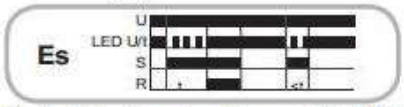
Single shot leading edge with control input (Ws)
The supply voltage U must be constantly applied to the device (green LED U/t illuminated). When the control contact S is closed, the output relay R switches into on-position (green LED U/t illuminated) and the set interval t begins (green LED U/t flashes). After the interval t has expired (green LED U/t illuminated) the output relay switches into off-position (yellow LED not illuminated). During the interval, the control contact can be operated any number of times. A further cycle can only be started when the cycle run has been completed.



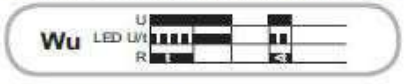
Single shot trailling edge with control input (Wa)
The supply voltage U must be constantly applied to the device (green LED U/t illuminated).
Closing the control contact S has no influence on the condition of the output R. When the control contact is opened, the output relay switches into on-position (yellow LED illuminated) and the set interval t begins (green LED U/t flashes). After the interval t has expired (green LED U/t illuminated), the ouput relay switches into off-position (yellow LED not illuminated). During the interval, the control contact can be operated any number of times. A further cycle can only be started when the cycle run has been completed.



ON delay with control input (Es)
The supply voltage U must be constantly applied to the device (green LED U/t illuminated).
When the control contact S is closed, the set interval t begins (green LED U/t flashes). After the interval t has expired (green LED U/t illuminated) the output relay R switches into on-position (yellow LED illuminated). This status remains until the control contact is opened again.
If the control contact is opened before the interval t has expired , the interval already expired is erased and is restarted with the next cycle.



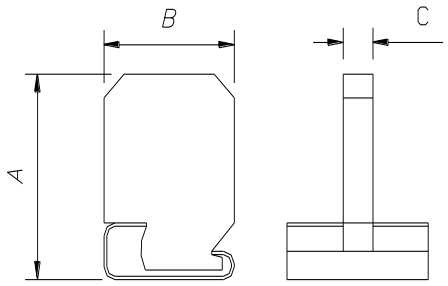
Single shot leading edge voltage controlled (Wu)
When the supply voltage U is applied, the output relay R switches into on-position (yellow LED illuminated) and the set interval t begins (green LED U/t flashes). After the interval t has expired (green LED U/t illuminated) the output relay switches into off-position (yellow LED not illuminated). This status remains until the supply voltage is interrupted. If the supply voltage is interrupted before the interval t has expired, the output relay switches into off-position. The interval already is erased and is restarted when the supply voltage is next applied.



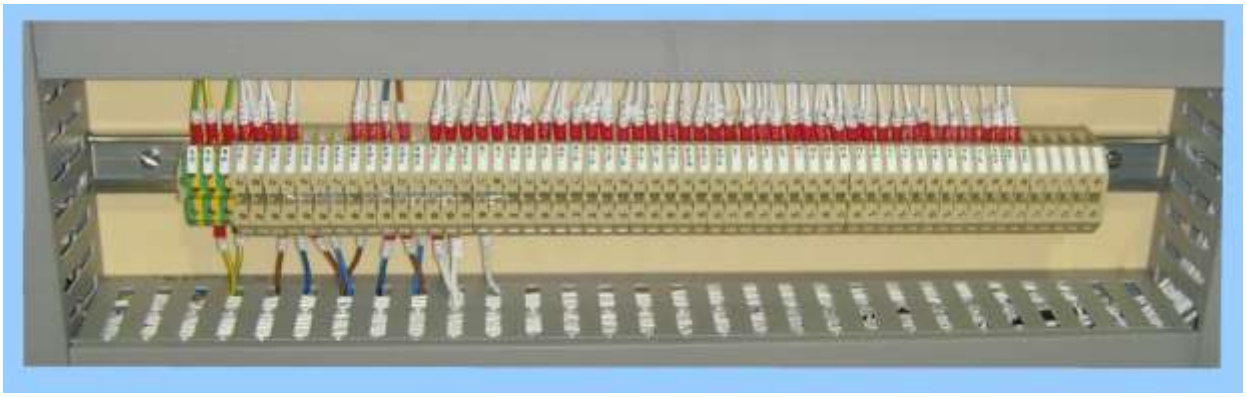
Flasher pause first (Bp)
When the supply voltage U is applied, the set interval t begins (green LED U/t flashes). After the interval t has expired, the output relay R switches into on-position (yellow LED illuminated) and the set interval t begins again. After the interval t has expired, the output relay switches into off-position (yellow LED not illuminated).
The output relay is triggered at a ratio of 1:1 until the supply voltage is interrupted.

25.7 Terminals & Accessories – RSF Spring Clamp & Screw Type – TS32 'G' Rail

This Range of Terminals are often Specified for **Railway Applications** – Consult Specifications



Type	mm	RSF3	RSF1
L.C.S. Part No		**850681**	**850682**
Voltage (V)		500	600
Current (A)		36	50
Height (mm)	**A**	60	60
Depth (mm)	**B**	50	50
Thickness (mm)	**C**	8	11
Accessories			
Rail TS32 ('G' Rail)		851256	851256
Rail TS32 (6mm Slots)		7850188	7850188
End Bracket EWK1	(8.5)	850685	850685
End Bracket EWK2	(15)		
End Plate AP	(3)	850683	
End Plate AP	(3)		850684
Partition TW	(2)	850697	850697
Cross Connector QL4		852785	
Cross Connector QL10		850688	
Sleeve VH13.5		850686	
Screw BS M3x20		850690	
Cross Connector QL10			850689
Sleeve VH17.5			850687
Screw BS M3x25			850691
Test Plug		852121	
Cable Range mm^2		0.5 - 4.0	0.5 - 10.0
Thickness in brackets (in mm)			



25.8 Terminals WDU TYPE Spring Loaded Cable Clamps

TS 35 'Top Hat Rail' OR TS32 'G Rail' Dual Mounting Terminals
This Range of Terminals are often Specified for **Railway Applications** – Consult Specifications

Type WDU 4

Type WDU 10

TS35 & TS32 Rail mounting

TYPE	WDU 4 SL/EN	WDU 10 SL/EN
L.C.S. Part No.	**862800**	**865748**
Ordering Code	9537450000	9537490000
Rated Voltage	500V	500V
Rated Current	32A	57A
Rated Cross Section	$4mm^2$	$10mm^2$
Height (mm)	47	47
Length (mm)	60	56.6
Thickness (mm)	6.1	9.9
Material	Wemid	Wemid
Colour	Dark beige	Dark beige
Accessories		
Screw-in cross-connection WQV4/2 2 pole 41A Order No. 1051960000	**863393**	**863393**
Screw-in cross-connection WQV 4/3 3 pole 41A Order No. 1054560000	**863394**	**863394**
Screw-in cross-connection WQV 4/4 4 pole 41A Order No. 1054660000	**863395**	**863395**
Screw-in cross-connection WQV 4/10 10 pole 41A	**862862**	**862862**
End plate WAP 2.5-10 Oder No. 1050000000	**861809**	**861809**
Partition WAP 16+35 WTW 2.5-10 Order No. 1050100000	**863351**	**863351**
End bracket – WEW 35/2 Order No. 1061200000 H 47mm, L 56mm, W 8mm	**855567**	**855567**
Marking tags – WS 12/6	**863588**	**863588**

25.8.1 W Type Terminal Cross Connector assembly instructions

a) b) c)

Assembly instructions
Type WQV 4 shown above is a 2 Pole version, Part No. 863393
Extending number of Poles, Pre-fitted cross connections can be set one after the other to produce any required number of poles.
Example in ref. b above is a 3 Pole version (Part No. 863394) first, remove the fixing screw and screwdriver guide (insulated part) at one of the outer contact points of one the cross connection.
Insert the 3 Pole connector without fixing screw and insulating part. At the same time, insert (for example) another unmodified 3 pole connection in parallel so as to produce an overlap at the connection. The connection is screwed tight using the fixing screw of the unmodified connection.
When used together with W series terminals, WQV insulated cross-connection units guarantee absolute safety for finger and back-hand in accordance with the accident prevention regulations 'Electrical systems and equipment' (VGB4).
However, if a cross connector (e.g. 10 Pole Pt. No. 862862) is cut down to a shorter number of segments it is recommended to place a Partition (WTW) or End Plate (WAP) adjacent to the exposed cut end of the cross connector.

25.9 LED Enclosure Lighting

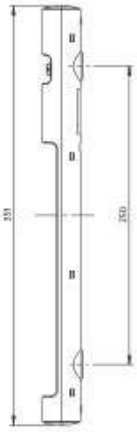
- > Wide voltage range
- > Integrated power unit
- > Long-lived and maintenance-free by LED technology
- > Daisy chain
- > On/off switch or movement sensor
- > Magnet, screw or clip fixing

The lamp series LED 025 is suitable for all types of panels and enclosures, especially where space is at a premium. The lamps have a very long service life thanks to the use of LED technology. Three different fixing options provide more flexibility for installation. The power output allows up to 10 lamps to be connected to each other (12VDC versions up to 5 lamps). Both the power input and output connectors snap lock into their sockets. With the integrated power unit and the plugs the lamp can quickly be connected.

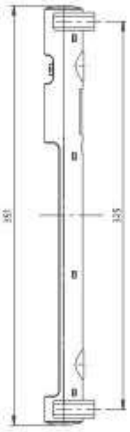
TECHNICAL DATA

Power consumption	max. 5W
Luminosity	290Lm at 120° (870Lm at 360° or equivalent 75W light bulb)
Lamp type	LED, angle of radiation 120° light color: daylight, color temperature: 6,500K
Service life	60,000h at +20°C (+68°F)
Connection	2-pole connector with snap lock AC: max. 2.5A / 240VAC, color: white DC: max. 2.5A / 60VDC, color: blue
Mounting	magnet fixing or screw fixing (M5), clip fixing (M6), torque 2Nm max.
Casing	plastic, transparent
Dimensions	see drawings
Weight	0.2kg
Operating/Storage temperature	-30 to +60°C (-22 to +140°F) / -40 to +85°C (-40 to +185°F)
Operating/Storage humidity	max. 90% RH (non-condensing)
Protection type/Protection class	IP20 / II (double insulated), 12VDC: IP20 / III (extra-low voltage)

LED 025 with magnet or screw fixing



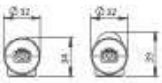
LED 025 with clip fixing



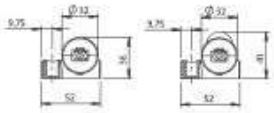
Mounting options: The lamps are available with magnet fixing for easy positioning in any steel cabinet or enclosure. A classic is the LED 025 with screw fixing. And the specifically designed clip holders for clip fixing of the LED 025 can also be positioned anywhere in the cabinet. The clip holders are screwed to the cabinet wall, the lamp is simply snapped into the clip holders and can be turned as needed for a perfect illumination.

Note: The lamp must not be used for household lighting.

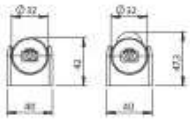
Side view magnet fixing



Side view screw fixing

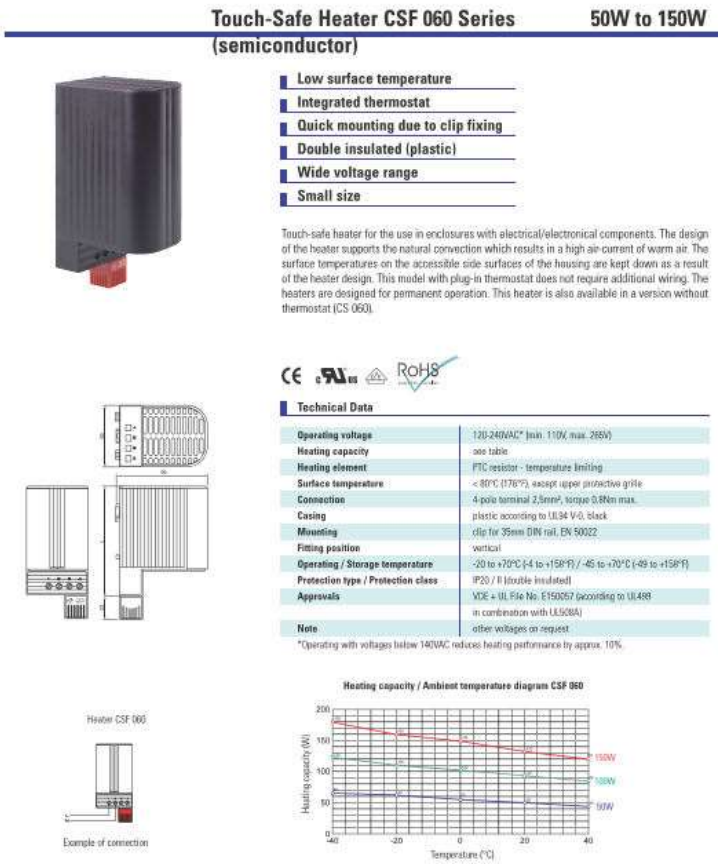


Sideview clip fixing



867935	LED 025 Panel Lamp 24 - 48V DC Ref 02540.1-01 (Standard Version - On/Off Switch)
867165	LED 025 Panel Lamp 100 - 240VAC Ref 02540-0-01 (Standard Version - On/Off Switch)
866096	LED 025 Panel Lamp 100 - 240VAC Ref 02541-0-01 with PIR
866097	AC Connection Cable + connector for LED 025 Lamp 244356
867937	DC Extension Cable, 1m Long, for interconnecting LED025 lamp. Ref: 244362
867936	DC Connection Cable, 2m Long, with Female connector for LED 025 Lamp. Ref: 244360
863294	Din Rail Mounting Bracket (STEGOFIX) ref: 282-1001. - Self Adhesive

25.10 Heaters – Anti-Condensation



L.C.S. Part No.	Type
866522	Heater 20W 110V- 240V without thermostat type 06030.0-00
862522	Heater PTC 30W 120V- 240V DIN Rail Mount. Type HG040 ref.
863287	Heater 50W 110V- 240V with thermostat type 06001.0-00 15 Degrees
863809	Heater 100W 110V- 240V without thermostat. type 06010.0-00
862371	Heater 100W 110V- 240V with thermostat 15 Degrees type 06011.0-00
866027	Heater 150W 110V- 240V with thermostat 15 Degrees type 06021.0-00
863810	Thermostat N/C. DIN rail mount. On 5°C, Off 15°C type 01160.0-00

25.11 Thermostats - Cooling / Heating

Anti-Condensation Heaters– Bi-metal Thermostat – Adjustment Range –0 to 60ºC
Mounting; clip mounting on 35mm DIN rail – 250V a.c.-6A – IP30

L.C.S. Part No.	Thermostat Type	Contacts	Colour	Dimensions mm		
				H	B	D
855586	Cooling	N/O	Blue	60	33	35
855462	Heating	N/C	Yellow	60	33	35

25.12 Thermostats – Bi-Metallic

N/C Types OPEN on Temperature Rise - N/O Types CLOSE on Temperature Rise
Height (Incl. Terminals) 21.4mm x Width 30mm x Dia. 16mm - Fixing centers 23.8 x 6BA
Contact Rating 250V AC 10A - Contact Resistance <50 mΩ - Dielectric strength 2000V AC

L.C.S. Part No.	Type	Opening Temp.	Re-closing Temp.
852796	N/C	20^0C +3^0C	10^0C +4^0C

25.13 Ventilator

The Ventilator is surface mounted and provides an ingenious system of features to avoid ingress:

- Deflector plates
- Angled ventilation holes
- Rubber seal
- Drain holes

L.C.S. Part No.	Type
85	Single Grey

25.14 Trackside Equipment Transformer

Enclosed Transformer Assembly

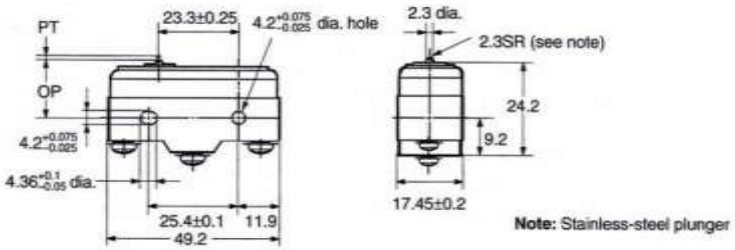
Features

- 5kV Single Phase Isolating Transformer 230V Primary / 230V Secondary Earth Free
- 20A SP Fusing
- Steel Enclosure IP44 Hot Dip Galvanised

L.C.S. Part No.	Type
861232	20A

25.15 Door Microswitches

SPDT Contacts – Rating: 15A @ 250VAC Omron

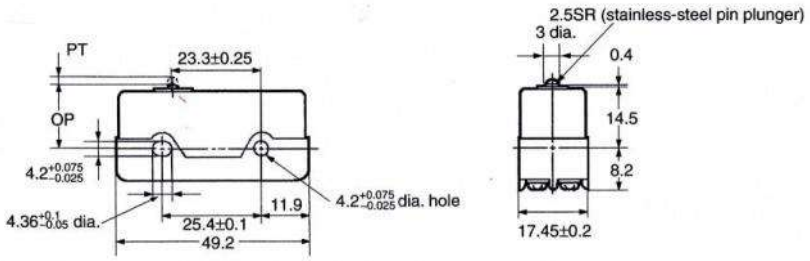


Type Z-15

Stainless Steel Plunger — Screw Terminals

L.C.S. Drawing No.	Operating Force - N	Pre-Travel mm	Over-Travel mm	Operating Position - mm	Omron Ref. No.
860987	2.45 to 3.43	0.4 max.	0.13 min.	15.9 +/. 0.4	Z-15G-B

DPTP Contacts – Rating: 10A @ 250VAC Omron

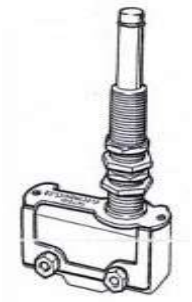


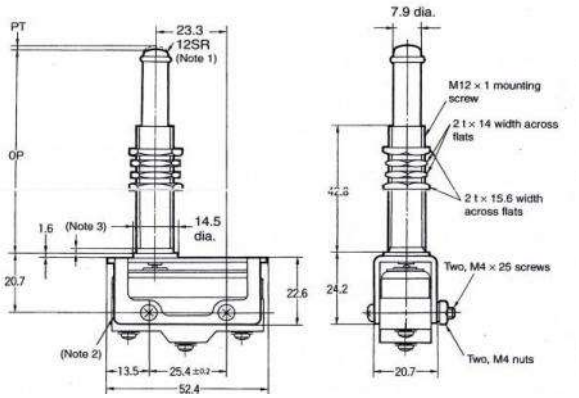
Type DZ-10

Stainless Steel Plunger — Screw Terminals

L.C.S. Drawing No.	Operating Force - N	Pre-Travel mm	Over-Travel mm	Operating Position - mm	Omron Ref. No.
860988	5.6 max.	1.7 max.	0.13 min.	15.9 +/. 0.4	DZ-10G-1B

Long Travel Panel Mount Microswitch Plunger Omron





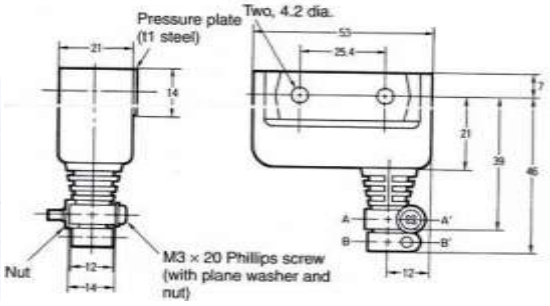
Type ZAQ

Bronze Frame – Stainless Steel Pin Plunger

L.C.S.	Over-Travel	Operating	Omron
Drawing No.	mm	Position - mm	Ref. No.
860989	20.5 min	69.1⁺/. 1.5	ZAQ-1

Note; Operating Force and Pre-Travel dimension is dependent on type of microswitch being used.
Refer to drawing for individual values.

Microswitch Dust Covers – Omron



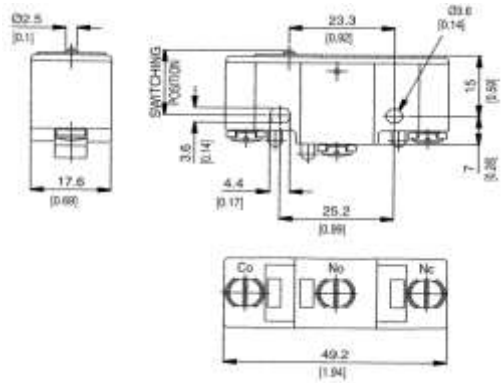
Type AP-

For use with microswitches ZAQ-1 Types - ref. 5.1.3.1 and 5.1.3.2 above

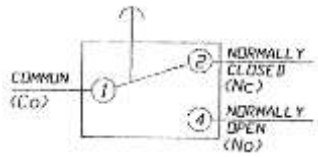
L.C.S.	Omron
Part No.	Ref. No.
860990	AP-Z

Microswitches – Saia-Burgess – Snap-action – PN4 Type

Up to 250V AC 15A – Temperature range -10°C to + 85°C – IP 40

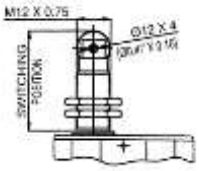


Type PN4 dimensions

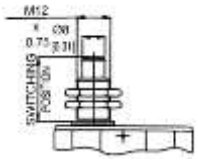


Circuit diagram

PN4GK26 type



PN4G type



PN41 type

Side / Panel mounting - Screw/washer Terminals – Silver Contacts

L.C.S. Part No.	Type of Actuator	Actuator Material	Lever Material	Saia-Burgess Ref. No.
850864	Roller	Stainless steel	Zinc plated mild steel	PN4GK26
855335	Spring plunger In line Roller	Stainless steel	-	PN4G
860439	Long over travel plunger	-	-	PN41
855334	Accessory	for above	Terminal Cover	PN4

25.16 Limit Switches Metal Enclosed

Type XCMD includes; ZCE02 Type

Type ZCMD + ZCY Type +ZCE01 Type

Ordering examples

Types ZCMD + ZCY + ZCE will be supplied as individual items and will require assembling.

Type XCMD and ZCE02 above should be supplied assembled, but may be supplied as three items, will need assembling the above shown plus the lead.

When delivered to stores, these will be bag the items with the L.C.S. Part No. attached.

1 N/C & 1 N/O contacts – with Flying Leads – 240V 1.5A at AC15 to IEC947-1-1 – IP67

L.C.S. Part No.	Actuator Type	Lead Length m	Telemecanique Ref. No.
850695	Roller Plunger Head	5	XCMD2102L5
850628	Roller Plunger Head	1	XCMD2102L1
850696	Roller Lever	5	ZCMD21L5 + ZCY15 + ZCE01

26 Adhesives, Lubricants, Cleaning Materials and Toolkits

26.1 Thread lock Type 222

Threadlocking Adhesive - low strength. Easy disassembly. Suitable for all metal threaded assemblies.
LOCTITE 222 is a low-strength threadlocker that allows the adjustment of screws including countersunk head screws and set screws. Good on low-strength metals which could fracture during disassembly, e.g. aluminium or brass. The product works on all metals, including passive substrates such as stainless steel, aluminium and plated surfaces. It is proven to be tolerant of minor contamination due to industrial oils, e.g. engine oils, corrosion prevention oils and cutting fluids.

Ideal for low-strength threadlocking of adjusting screws, countersunk head screws and set screws
Prevents loosening on vibrating assemblies, e.g. pumps, gear boxes or presses
Permits disassembly with hand tools
Especially suited to small thread sizes
P1 NSF Reg. No.: 123002

Technical Data
Colour: Purple
Max. thread size: Up to M36
Service temperature range: -55 to +150°C
Breakaway torque: 6 Nm
Approvals: P1 NSF Reg. No.: 123002
Fixture time steel: 15 min.
Fixture time brass: 8 min.
Fixture time stainless steel: 360 min.

L.C.S. No	Description	Ref. No.
T00186	Type 222 lower strength	222

26.2 Thread Lock Type 270

LOCTITE HYSOL GR 2710 has been formulated to provide the best possible mouldability and as wide a molding latitude as possible. Although molding and curing conditions will vary from situation to situation, recommended starting ranges are shown above.
High Strength for locking and sealing of threaded fasteners and close-fitting parts after assembly

Technology	Epoxy
Appearance	Gold
Cure	Heat cure
Product Benefits	Green product
	Low stress
	High Tg
	High flexural strength
	Mold at low temperatures
	Fast cycle time
Filler Weight,	% 81.7
Flammability 94 V-0	

L.C.S. No	Description	Ref. No.
T00076	Type 2701 High strength	2701

26.3 Adhesive Type 454

An instant adhesive designed for the assembly of difficult-to-bond materials which require uniform stress distribution and high tensile and/or shear strength. The product provides for the rapid bonding of a wide range of materials, including metals, plastics and elastomers. The gel consistency enables overhead and vertical application. LOCTITE 454 is also suited to bonding porous materials such as wood, paper, leather and fabric. Perfect for all quick repair jobs.

Gap fill: 0.25mm.
Colour: clear.
Temperature: -40 to +120°C.

L.C.S. No.	Description	Ref. No.
T00072	Type 454 general purpose	454

26.4 Loctite 511 Thread Sealant x 50ml

General purpose, low strength thread sealant for metal threaded pipes and fittings. The product cures rapidly when confined in the absence of air between close fitting metal surfaces. Maximum pipe size: 3" Disassembly strength: Low Service temperature range: -50°C - +150°C Breakaway torque: 6 Nm

For use on Air fittings thread sealing

L.C.S. No	Description	Ref. No
T00071	Type 511 pipe sealant	511

26.5 Acetoxy Silicone Sealant, fast cure tack free in one hour

L.C.S. No.	Description
T00397	Colour – Clear

26.6 Freezer aerosol

Freezer aerosol, powerful non-corrosive refrigerant for use as a rapid and safe method of cooling small components, particularly electrical and electronic equipment

L.C.S. No.	Description
T00329	Freezer aerosol 400ml

26.7 Multipurpose grease

Type 556

Maintains low contact resistance on all types of wiping, sliding and non-arcing electrical contacts, including low power make-and break switches

L.C.S. No.	Description
T00077	Multipurpose grease 50ml tube

26.8 SGB 2GX Contact Treatment Grease (up to 2,500A)

The switch contacts should be re-greased using Electrolube 2GX (SGB) contact treatment grease. Do not use any other oil or grease, including special products for electrical contacts

20ml syringe - 35ml syringe - 1Kg - 5Kg -
Product code: SGB20S - SGB35SL - SGB01K - SGB05K - SGB12.5K

SGB (2X Grease) was developed as an extension of the No 2 Range (SFA, SGA and SOA) with increased plastics compatibility. This product development was necessary due to the use of thermoplastics in the electronics and automotive industries. SGB will significantly increase contact performance and lifetime. Separate data sheets are available for the diluted oil (EML), oil (SOB), the red standard grease (SGBR) and the low penetration grease (SGBH).

Key Properties:
High quality, non-melting contact grease
Hard consistency version SGBH) and oil version (SOB)
Reduces contact wear and arcing
Good plastics compatibility

L.C.S. No.	Description	Ref. No.
T00425	Contact Treatment Grease	SGB35SL

26.9 Copaslip Grease (500g tin) High Current

Copaslip is a High and low temperature assembly compound that protects against seizure, fusion and corrosion in extreme conditions. Reduces wear and torque in areas of high friction. Prevents galling and pitting. Use to ensure easy dismantling and re-assembly of metal fittings. Can be used on all joints including nuts, bolts, battery terminals and spark plug threads. Copaslip offers protection from -40°C to over 1100°C.

L.C.S. No.	Description	
853978	Copa Slip Grease (500g tin)	

26.10 Section Switch Tool Kit

L.C. SWITCHGEAR LTD.

SECTION SWITCH TOOL KIT.

8800170

This tool kit is primarily for the replacement of the main arc chute contacts and removal of the spring actuating assembly for use on IF/SF switches.

ITEM	DRG	PART NO	QTY	DESCRIPTION	DCN
1		853906	1	10MM COMBINATION SPANNER	
2		853907	1	13MM COMBINATION SPANNER	
3		853908	1	17MM COMBINATION SPANNER	
4		853909	1	¼" RATCHET HANDLE	
5		853910	1	M10 X ¼" SOCKET	
6		853911	1	¼" DRIVE EXTENSION (250MM)	
7		853912	1	5MM LONG SERIES ALLEN KEY	
8		853913	1	8MM TAPERED SCREWDRIVER	
9		853914	1	TOOLCASE	
10					

A	1843	FIRST ISSUE	EU	MAR 00	L.C. SWITCHGEAR LTD.	Section Switch Tool Kit
REV	DCN	DESCRIPTION OF CHANGE	BY	DATE		DRAWING NUMBER 853905

27 Email Enquiry Form – Notes - Project History

Print fill in and email to sales@lcswitchgear.com

★L.C. Switchgear to complete

Company		Quote No★	
Contact Name		Customer Order No★	
Title		LCS Order No★	
Company Address			
☎ Tel.			
💻 E-mail			
Inquiry Date		Catalogue Required	Yes / No

Application	On load ☐	Off Load ☐
Description of the project requirements	Please attach sketch of the circuit.	
Quantity		
Delivery required		

Poles	1	2	3	4	5	6	Other: -

System	DC		AC	
Voltage		V		V
Frequency				Hz
Current				A
Clearance *				mm
Creepage *				mm

System Faults	DC		AC	
Voltage		V		V
Frequency				Hz
Current				A
Time Const.				ms

* If specified.

Operation							
Manual	Lever						
	Hand wheel						
Automatic	Motor		V	DC/AC	Hz	PH	
	Actuator		V	DC/AC	Hz	PH	
	Pneumatic		Bar	Solenoids	V	DC/AC	Hz

Auxiliary Indication	Type	No per position	Positions required
	N/O - N/C		
	N/O + N/C		
	Pneumatic		
Locking	Type	No per position	Positions required
	Padlock		
	Key lock		

Cabling Requirements	
Cables Per Pole	
Type	
Cable CSA	mm^2
Max. OD	mm
Min Bend Radius	mm
Space Available	
Height	mm
Width	mm
Depth	mm

Environment	Ingress Protection Degree	Max. Humidity	Typ. Max. Ambient Temperature	Typ. Min. Ambient Temperature
	IP	% @ ° C	° C	° C
EMC	State Requirements -			
Materials	Normal	Low Smoke	Zero Halogen	Low smoke / zero halogen
Documents	Manuals **	Tests**	Labelling Language**	Special Packing **

** Please state: -

Rev★		Date★		Authority★	

27.1 Project History

The extensive product history includes:

Customer Title	Major Projects	Year
Govia Thameslink Railway	Depot Switchgear Replacement - Brighton, Littlehampton and Selhurst	2022
Edina	DC Array Panel	2022
South Western	Fratton Depot Switchgear	2021
Network Rail	Primrose Hill ICTS's	2021
RJ Power	Beckton Depot Switches	2021
NEXUS	Gosforth Depot Switchgear	2021
Blackpool Tramway	Fleetwood Tramway Extension	2021
London Underground Ltd	Neasden Depot	2021
NEXUS	Howdon Depot Switchgear	2020
LUL Nominee SSL Ltd	Farringdon Switchgear	2019
Balfour Beatty Rail	Northern Line Extension Tunnel Lighting	2019
Network Rail	CP5 additional works	2019
London Underground Ltd	Ealing & Upminster Depot Enabling Works	2019
Emico	Acton Depot CLIP Project	2019
Network Rail	CP5 Trackside Switchgear	2018-2021
Lowery Ltd	Rotherhithe Panelboards	2018
McNicholas	Trackside Switchgear	2018
BCM Construction	Trackside Switchgear	2017
HVMS Power Engineering	LCS2 Supply Disconnectors & Frames	2015
LUL Nominee SSL Ltd	Modular MCOIS Switch and Hammersmith Depot work	2015
Network Rail	NSCD Status Indication & Training	2015
Network Rail	TFS Track Feeder Switches - Merseyrail	2015
EFACEC Sistemas Electronica	Substation Panels Dublin	2015
Network Rail	LCS2 Supply Disconnectors & Frames	2015
Govia Thameslink Railway	Maintenance and Service Support Contract	2015
Colas Rail	LCS2's & Frames	2015
Cairn Cross Civil Engineering Ltd	Wheel Lathe Road Contactor	2015
London Underground Limited	Gap Jumper Leads	2015
LUL Nominee SSL Ltd	Power Pedestal Components	2015
Transformers and Rectifiers	4.5kA Disconnectors Manual & Motorised	2014
Unipart Rail	LCS2's	2014
Siemens Plc	LVAC Panels	2014
EFACEC Sistemas Electronica	Substation Panels Dublin	2014
Tube Lines Ltd	Tranch 2 TIS Replacement	2014
Brecknell Willis & Co	Track Isolators and Contactor Panels - Beckton Ext	2014
Volker Fitzpatrick	LCS2's & Marshalling Boxes - Three Bridges	2014
Balfour Beatty Rail Infrastructure Services	4kA CTS's & LCS2's	2014
Tube Lines Ltd	MTIS Switches & RCTIS Changeover Switches	2014
Network Rail	2.5kA NSCD with LCP	2014
Network Rail	4kA CTS	2014
Network Rail	2.5kA NSCD with LCP	2014
London Underground Ltd	COLR Current Online Relays & Fuses	2014
UK Power Network Services	2.5kA NSCD with LCP	2014
Tube Lines Ltd	Track Isolating Switches	2014
LUL Nominee SSL Ltd	Upminster Depot	2014
LUL Nominee SSL Ltd	Ealing Common Depot	2014
Network Rail	Conductor Rail Heating Supply & Control Panels	2013
Tube Lines Ltd	Track Isolating Switches	2013
Brecknell Willis & Co	Midland Metro Substation Panels	2013
LUL Nominee SSL Ltd	Track Isolating & Changeover Switches	2013
LUL Nominee SSL Ltd	Current Online Relays & Fuses	2013
Network Rail	4kA CTS's	2013
Network Rail	4kA CTS's	2013
UK Power Network Services	4 kA CTS's	2013

Network Rail	4 kA CTS's	2013
Southern Railway Ltd	Selhurst Wheel Lathe	2012
Network Rail	LCS2 Supply Disconnectors & Frames	2012
Unipart Rail (Eurostar International Ltd)	Replacement Switches for Eurostar	2012
LUL Nominee SSL Ltd	Manual Track Isolating Switches	2012
Network Rail	Fuse Retrofits	2011
Eurostar (UK) Ltd	Coils Pistons & Cylinders	2012
LUL Nominee SSL Ltd	Track Isolating Switches	2011
HVMS Power Engineering	Dockland Track Isolators & Mimic Lime House Sub	2011
LUL Nominee SSL Ltd	Track Isolating Switches -Upminster	2011
Network Rail	Conductor Rail Heating Supply & Control Panels	2011
LUL Nominee SSL Ltd	Neasden Depot- Phase 2	2011
LUL Nominee SSL Ltd	Hammersmith Depot	2011
Network Rail	Conductor Rail Heating Supply Panels	2011
LUL Nominee SSL Ltd	Track Isolating Switches	2011
Network Rail	Conductor Rail Heating Supply Panels	2010
Lowery Ltd	LCS2 Supply Disconnectors & Frames	2010
BAM Nuttall Ltd	Neasden Depot - Phase 1	2010
LUL Nominee BCV Ltd	Current on line relays and Rail mounted Fuses	2010
LUL Nominee SSL Ltd	Track Isolating Switches	2010
Tube Lines Ltd	Track Isolating Switches	2010
BAM Nuttall	Neasden Depot	2010
EFACEC Sistemas Electronica	Dublin Light Rail A1 Extension	2010
Nexus	Tyne & Wear Metro Traction Isolating Switches	2010
Network Rail	Conductor Rail Heating Supply Panels	2010
LUL Nominee SSL Ltd	SSL Track Isolating Switches	2010
Brecknell Willis & Co	Docklands Extension (Stratford P6)	2009
Antagrade Electrical Ltd	Manchester Metro	2009
Carillion Rail	North London Line	2009
BBCJV (Balfour Beatty Carillion Joint Venture)	East London Line - New Cross Depot	2009
LUL Nominee BCV Ltd	Rail Mounted Fuses	2009
Metronet BCV	Acton Contactor Panel	2008
Brecknell Willis & Co	Dublin Light Rail C1 Extension	2008
Network Rail	Thameslink Contactors Ludgate Cellars	2008
Antagrade	Docklands Track Isolators & Indicators	2008
Metronet Rail SSL	SSL Track Isolating Switches	2008
Ultra-Electronics (PMES)	East London Line	2008
EMICO-Rail	New Cross Depot Contactor Panels	2008
Network Rail	Thameslink Contactors Farringdon	2008
Eurostar	TMSTG Hafner Valve Retrofit	2008
EFACEC Sistemas Electronica	Dublin Light Rail B1 & Sandyford Depot Extension	2008
Metronet	DEISIP Phase II	2008
Metronet	Victoria Line Upgrade VLU	2008
Eurostar	Switch pneumatic kits	2007
Tube Lines	RCTIS's for Stanmore	2007
Fitzpatrick Contractors	Ashford Depot Buffer Zone	2007
Brecknell Willis & Co.	Dockland Light Railway - Woolwich Arsenal Extension	2007
UKAEA	Contactor Switch panel	2007
Birse Process	Spark Gap 25kv/11kv CTRL Channel Tunnel Rail Link	2007
Ultra Electronics	Bonding devices LCS2s Ramsgate Depot	2007
Alstom (Brazil)	Traction Equipment	2007
Bam Rail bv	Dublin Light Rail LUAS Red Cow Depot Extension	2007
CCLRC (Rutherford Appleton Lab)	Bonding Switch assemblies	2007
Ultra Electronics	Bonding devices Ashford Depot	2007
AMEC Capital Projects	Bonding devices All Southern Depots	2007
Ultra Electronics	Bonding devices Ashford Depots	2006
Metronet SSL	Tunnel Switch	2006
Mowlem Ltd	Dockland Light Rail Beckton Depot	2006

Balfour Beatty Rail	Temple Mills 25kv Switchgear	2006
Network Rail	Spark Gap & Non Linear Resistors North London Line	2006
Tube Lines	RCTIS's for Heathrow	2006
Tube Lines	RCTIS's for Wembley Park	2006
Network Rail	LCS2's for the Power Upgrade	2006
Network Rail	LCS2's for the Power Upgrade	2005
Network Rail	Conductor Rail Heating	2005
ACT Joint Venture	Spark Gap & Non Linear Resistors CTRL Channel Tunnel Rail Link	2005
Bailey Rail	DEISIP Infraco BCV Depot Improvement	2005
Bailey Rail	DEISIP Infraco JNP Depot Improvement	2005
Network Rail	LCS2's for the Wessex Power Upgrade	2004
Bailey Rail	Upminster Wheel Lathe Project	2004
AMEC Capital Projects	LCS2's for the GoVia Depot Upgrade	2004
Brecknell Willis & Co.	Dockland Light Rail City Airport Extension	2004
AMEC SPIE	Spark Gap & Non Linear Resistors CTRL Channel Tunnel Rail Link	2003
Blackpool Transport	Depot Isolator	2003
Railtrack	2 Panel Switchboard for Greenwich Substation	2003
AMEC Capital Projects	GoVia Depot Contactor panels	2003
AMEC Capital Projects	Depot Controlled track Switch CTS Mk 3's and LCS2's	2003
Network Rail	LCS2's for the Power Supply Upgrade	2003
Bombardier	Electrostar Shoe gear Isolation Switches	2002
Balfour Beatty Rail	Supply Disconnectors	2002
Infraco BCV	Depot Isolator	2002
Infraco JNP	Depot Isolator	2002
Mowlem Railways	Controlled Track Switch	2002
NEXUS	OHL Section Isolators	2002
Railtrack	Multi panel Distribution Switchboard London Bridge Signal Box	2002
Railtrack	Complete Installation for London Bridge Signal Box	2002
Railtrack	2 Panel Switchboard for London Bridge Signal Box	2002
Railtrack	Depot Isolator/bonding switch	2002
Brecknell Willis & Co.	Dublin Light Rail LUAS Electrification	2002
ABB	Link Box West Coast Main Line	2001
Railtrack	3 Panel Switchboard for London Bridge Signal Box	2001
Semple Cochrane	Supply Disconnectors	2001
Ultra Electronics	DCDS for CTRL	2001
URENCO	Test Bed Switches	2001
Roche Products Ltd	MV Medium voltage switches, twin motor isolators	1999
Ultra Electronics	Hays Chemical Plant - Chlorine Cell Rectifier supply.	1999
Railtrack	Conductor Rail heating	1999
Adtranz/Bombardier	Electrostar Shoe gear Bonding Switches	1999
CEGELEC Beautiel	Medium voltage switches for Oil Rigs	1998
Elequip Projects Ltd	MV Control panel	1998
UKAEA	Nuclear Research Equipment Isolators	1998
AMEY McAlpine	Croydon Tramway	1998
Brecknell Willis & Co.	Dockland Light Railway Extension	1998
London Electricity	Automation of existing manual Ringmaster Circuit Breakers	1998
Balfour Beatty	ML-CTS Units	1997
Brecknell Willis & Co.	Midland Metro	1997
Lounsdale Electrical	MLU- TTSM IP67 tunnel switches for LUL	1997
Railtrack	ML-CTS Units for Railtrack	1997
GEC Alsthom	Inchon & Pusan Line 2 Fuse Assembly	1997
Gatwick Airport	Gatwick Airport Terminal Transit System	1996
Hunslett Barclay	Mining traction Equipment	1996
JET	Joint Taurus project	1996
CEGELEC Projects Ltd	London Underground Jubilee Line Extension	1996
Deeside Electrical Ltd	Wirral Tramway	1995
Dockland Light Railway	Dockland Light Railway	1995
LUL	MLU - TIS double pole isolating switches	1995

T & R	Automated transformer tap changer switches	1995
Hill Graham	Power Generation and traction applications	1995
Brush Traction	SF800 Bonding Switch Class 92	1994
CEGELEC Projects Ltd	Ankara Rapid Transit System	1994
GEC Alsthom	Ankara Train Switch	1994
GEC Manchester & Preston	Test Bed Switches	1994
N.E. Water	Automated FA Switches	1994
Railtrack	ML-CTS Units on Waterloo to Channel Tunnel.	1994
Brentford Electric	British Rail DCDS DC Disconnector switch project	1993
GEC Alsthom TMST	Battery Isolator	1993
Thorn Automation	British Rail DCDS Switches	1993
Whipp & Bourne	British Rail - Waterloo 10kA Substation Switches	1993
GEC Alsthom TMST	Converter Changeover Switches on Channel Tunnel TMST	1993
GEC Alsthom TMST	SF 800 Shoe gear Bonding switches	1992

27.2 LCS 2022 Christmas Card

Merry Christmas from LCS

LCS PRODUCTS:

8800495 – **DCP** 1kA Depot Twin Contactor & Fuse Panel (DLR)
8800545 **FBI** 2kA 1.5kV 2P (1-0) Off Load Bypass Switch (NEXUS)
8800482 – **DCP** 1kA Depot Contactor & Fuse Panel (DLR)
8800360 – **MTIS** Manual Track Isolating Switch 4kA 2 Pole (LU)
8800452 – **PP** Power Pedestal (200A) Remote Stowage (LU)

If you would like to receive the 2023 LCS Xmas Card, please contact mail@lcswitchgear.com with your full postal address details.

Notes