



CONTROL SYSTEMS



UNITY

POWER TO CONTROL

Unity Modular Power System Rack Installation Guide



48 Channels



96 Channels

72 Channel model not shown

LSC Control Systems ©
+61 3 9702 8000
info@lsccontrol.com.au
www.lsccontrol.com.au



Version V 2.05
June 2024

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Contact Details

LSC Control Systems Pty Ltd

ABN 21 090 801 675

65-67 Discovery Road
Dandenong South, Victoria 3175 Australia
Tel: +61 3 9702 8000

email: info@iscontrol.com.au

web: www.iscontrol.com.au

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1 Product Description

1.1 About this Manual

This manual describes the installation of the Unity Modular Power System Rack including all power and control connections to the rack.

The fitting of the control module and the output modules into the rack and the configuration/operation of the modules are described in the Unity User Manual.

1.2 Unity Overview

Unity is a modular dimming and power switching system for permanent installations. It consists of a floor mounted installation rack that contains all input power connections, output load connections and control connections.

The rack has slots for the control and output modules that are shipped separately to the rack and are fitted after all connections have been made to the rack and all building works have been completed.

The rack is fitted with one control module, plus your choice of the following output load modules:

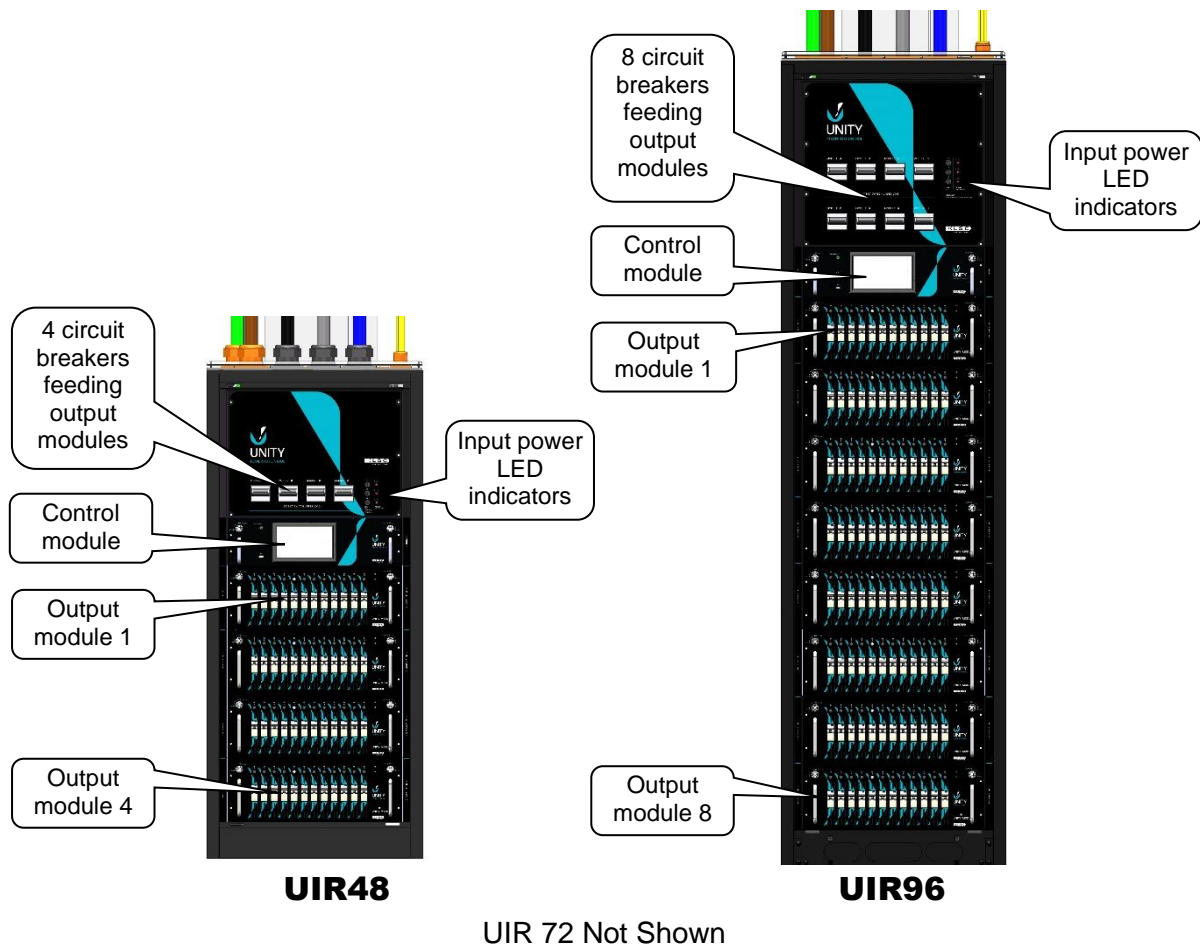
- UDM – 12 channel 10 amp Dimming/TRUPower Relay bypass module
- UDM – 12 channel 16 amp Dimming/TRUPower Relay bypass module
- UDM – 6 channel 25 amp Dimming/TRUPower Relay bypass module (factory fitted option requires special slot allocation)
- ULM - 12 channel 6 amp LED dimming/TRUPower Relay bypass module
- USM - 12 channel 10 amp Switching Relay module
- USM - 12 channel 16 amp Switching Relay module

There are three rack sizes available:

- The UIR48 (UNITY Installation Rack) accommodates 4 output modules giving a total of 48 output channels.
- The UIR72 accommodates 6 output modules giving a total of 72 output channels.
- The UIR96 accommodates 8 output modules giving a total of 96 output channels.

Unity systems can be fitted with any combination of output modules and any type of output module can be fitted in any output module location except for the 25 amp module which is a factory fitted option and is not interchangeable with other module locations.

Note: Ordering a UDM 6 channel 25 amp module reduces the total channel count of the UIR by 6 channels.



1.3 Inspection

Every Unity system is fully checked in the factory before it is shipped. When you receive your Unity rack, check it thoroughly for any signs of damage that may have occurred during shipping. If you find any damage please document and photograph the damage then contact your LSC agent or LSC.

LSC Control Systems Pty Ltd

ABN 21 090 801 675

65-67 Discovery Road
 Dandenong South, Victoria 3175 Australia
 Tel: +61 3 9702 8000

email: info@lsccontrol.com.au

web: www.lsccontrol.com.au

1.4 Safety

All electrical work must be carried out by suitably qualified persons.

Each Unity rack must have its input power supplied by a separate main circuit breaker or other readily accessible input power disconnect device.

2 Types of Load

2.1 Overview

Three different types of 12 channel output modules are available for the Unity rack.

1. LED or conventional dimming/power switching module.
2. Conventional dimming/power switching module.
3. Power switching module.

The type of output modules that are fitted to your Unity rack are usually determined at the design stage of your installation when you specify the types of loads that you want to control.

Therefore, loads of the same type are usually arranged in groups of 12 and connected to a 12 channel output module designed for that type of load.

2.2 LED Dimming Module

The ULM (Unity Led Module) provides 12 output channels. Each channel can be individually configured for either:

- Dimming of leading edge phase controlled dimmable mains powered LED's.
- Dimming of traditional incandescent lamps.
- Remotely controlled power switching.

LED dimming modules are rated at 6 amp per channel.

2.3 Dimmer Output Modules

The UDM (Unity Dimmer Module) provides 12 output (or 6) channels. Each channel can be individually configured for either:

- Dimming of traditional incandescent lamps.
- Remotely controlled power switching.

10 amp, 16 amp and 25 amp per channel modules are available.

2.4 Switching Relay Module

The USM (Unity Switching Module) provides 12 output channels. Each channel can be used for:

- Remotely controlled power switching.

10 amp or 16 amp per channel modules are available.

Note: All remotely controlled power switching occurs when the mains voltage is at zero volts (zero crossing point) to prevent nuisance tripping of breakers.

2.5 Planning Your Load Types

There are two Unity rack sizes available:

- The UIR48 (Unity Installation Rack) accommodates 4 output modules. Each output module has 6 or 12 channels giving a maximum total of 48 output channels.
- The UIR72 accommodates 6 output modules. Each output module has 6 or 12 channels giving a maximum total of 72 output channels.
- The UIR96 accommodates 8 output modules. Each output module has 6 or 12 channels giving a maximum total of 96 output channels.

Any type of output module can be fitted to any output module position except for the 25 amp module as noted below. Therefore, loads of the same type are usually arranged in groups of 6 or 12 and connected to an output module designed for that type of load.

Note: The slot for the 6 x 25 amp module is a factory fitted option and is not interchangeable with other power modules.

If the Unity rack is going to be fitted with only one type of output module to control one type of load, then loads can be connected to any of the outputs of the rack.

However, if different types of output modules (to control more than one type of load) are to be fitted to a Unity rack then you need to plan your load connections so that each type of module has 12 of the appropriate type of loads connected to it.

Example 1:

A UIR48 (4 module rack) is going to be used to control 36 LED's and 12 switched power circuits. The top 3 positions in the rack are fitted with ULM LED dimming modules and the bottom position is fitted with a USM switching module. Therefore, the switched circuits must be connected to the bottom module connectors and the LED circuits to the other three module connectors.

Output Modules	Loads
ULM (Unity LED Module)	12 LED circuits
ULM (Unity LED Module)	12 LED circuits
ULM (Unity LED Module)	12 LED circuits
USM (Unity Switch Module)	12 switched circuits

48 channel rack

Example 2:

A UIR96 (8 module rack) is going to be used to control 36 LED's, 24 conventional lamps and 36 switched outputs. The top 3 positions in the rack are fitted with ULM LED dimming modules, the next 2 positions are fitted with UDM 16 amp incandescent dimming modules and the bottom 3 positions have USM switching modules. Therefore, the loads requiring switched power must be connected to the 3 bottom module connectors, the incandescent dimmer circuits must be connected to the next 2 module output connectors and the LED circuits to the top three module output connectors.

Output Modules	Loads
ULM (Unity LED Module)	12 LED circuits
ULM (Unity LED Module)	12 LED circuits
ULM (Unity LED Module)	12 LED circuits
UDM (Unity Dim Module)	12 16amp dim circuits
UDM (Unity Dim Module)	12 16amp dim circuits
USM (Unity Switch Module)	12 Switched circuits
USM (Unity Switch Module)	12 Switched circuits
USM (Unity Switch Module)	12 Switched circuits
USM (Unity Switch Module)	12 Switched circuits

96 channel rack

Remember that any channel of a ULM (LED dimming module) can also be configured to dim a conventional incandescent load, however its load limit is 6 amps.

A UDM (conventional dimmer module) has a load limit of either 10 or 16 amps depending upon the model.

All 3 types of output module can be configured for remote power switching.

2.6 Multiple Rack Numbering

If more than one rack is being installed then you should arrange the load numbering starting with the left rack and working to the right.

For example, an installation of 3 UIR 96 racks would have the following output load numbering:

UIR96	Rack 1 O/P's	Rack 2 O/P's	Rack 3 O/P's
Module 1 (Top)	1-12	97-108	193-204
Module 2	13-24	110-120	205-216
Module 3	25-36	121-132	217-228
Module 4	37-48	133-144	229-240
Module 5	49-60	145-156	241-252
Module 6	61-72	157-168	253-264
Module 7	73-84	169-180	265-276
Module 8 (Bottom)	85-96	181-192	277-288

2.7 Phasing

In 3 phase power systems it is desirable that the output loads are distributed as evenly as is practical between the 3 input phases. The outputs of each Unity output module are fed from the following input phases:

Output Channel	Input Phase
1	1
2	2
3	3
4	1
5	2
6	3
7	1
8	2
9	3
10	1
11	2
12	3

3 Input Power Requirements

3.1 Input Breaker

A main input circuit breaker or other input power disconnect device should be located close to the rack. See section 4.7 for more information about connecting the input power.

Note: The main input breaker/disconnect device should not disconnect the neutral. However, if the device does switch the neutral, it must disconnect the neutral last and connect the neutral first.

3.2 Input Voltage

The nominal input voltage is 220-240 Volts. 3-phase Star (380-415V). 50-60Hz.

Note: The input power to the rack must only be connected after all the output circuits and control circuits have been connected and tested.

3.3 Input Current

The amount of current that needs to be supplied per phase is dependent upon several factors.

1. The quantity of output channels.
2. The current rating of the channels in each output module.
3. The diversity factor.

Output modules are available with 12 channels at either 6 amps, 10 amps or 16 amps per channel or 6 channels at 25 amp per channel.

To calculate the theoretical maximum required supply current (if all channels are fully loaded), multiply the number of channels by their maximum current and divide by 3 to get the current per phase. For example,

UIR48 UNITY rack fitted with 16 Amp channels.
 The calculation is 48 (channels) multiplied by 16 (Amps) then divided by 3 = 256 Amps per phase.

UIR72 UNITY rack fitted with 10 Amp channels.
 $72 \times 10 / 3 = 240$ Amps per phase.

UIR96 UNITY rack fitted with 16 Amp channels.
 $96 \times 16 / 3 = 512$ Amps per phase.

To calculate the practical maximum current, the theoretical maximum Amps per phase is multiplied by the diversity factor.

Historically, the industry convention has been to use a diversity factor of 60%. This was based on a conventional (tungsten) lighting rig. In modern LED lighting rigs, a diversity factor of 40% may be more appropriate. For example,

UNITY Cabinet	Theoretical max Amps per Phase	60% diversity Amps per Phase	40% diversity Amps per Phase
UIR48, 16 Amps/Chan	256	153.6	102.4
UIR72, 10 Amps/Chan	240	144	96
UIR96, 16 Amps/Chan	512	307.2	204.8

The UNITY cabinet can be connected to power supplies of less than the calculated Amps per phase, provided the supply is protected by the appropriately rated circuit breakers.

3.4 Input Neutral Cable

In all instances of supply current above, the Neutral cable current carrying capacity needs to be a minimum of 50% greater than the current carrying capacity of each phase cable.

For example, a UIR48 UNITY rack fitted with 16 amp channels requires a theoretical maximum supply of 256 Amps per phase. Therefore, its Neutral cable must be capable of carrying at least (256 x 1.5 = 384) 384 Amps.

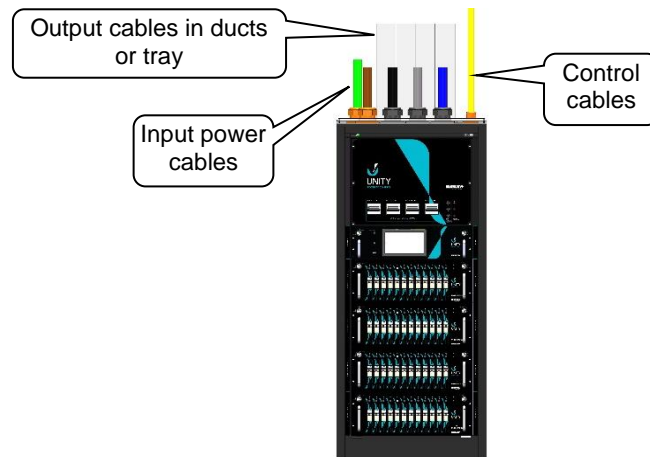
If a diversity factor has been applied to the supply current (see section 3.3) then it can also be applied to the Neutral cable rating.

For example,

UNITY Cabinet	Max Neutral Rating	60% diversity	40% diversity
UIR48, 16 Amps/Chan	384 Amps	230.4 Amps	153.6 Amps

4 Installation

4.1 Summary



All Cable Access is from Above

The basic steps to installing a Unity rack are summarised here to give you an overall view of the task ahead. Detailed descriptions of the installation procedures are described in the following sections. Do not install modules until after all these tasks are completed.

1. Mount the rack frame onto a plinth or to a level floor. See section 4.3
2. Remove the cable shutters and centre cable access plate on the top of the rack. See section 4.4
3. Unscrew and move the hinged load terminals to one side and temporarily secure with cable ties. The bottom load terminals can be left in position. See section 4.5
4. Feed the load cables into the rear of the rack observing the cable order shown in section 4.5.4
5. Select the 12 load cables for module A and whilst holding them up, move their load terminal block back into position and secure it. Terminate the 12 load cables.
6. Move the module B terminal block back into position with its cables above it then secure it. Terminate the 12 load cables for this module.
7. Repeat the above procedure working towards the bottom until all loads are connected.
8. Test the load circuits. See section 4.5.6
9. Feed the control circuit cables into the rack via a cable gland (not supplied) and connect them to the rack. See section 4.6
10. Feed the input power cable cables into the rack via cable glands (not supplied) and clean, connect and torque them to the bus bars. See section 4.7
11. Perform the final tasks and tests described in sections 4.8, 4.9 and 4.10
12. Carry out the installation check list. See section 5

4.2 Rack Frame Location

The rack should be located in a clean, dust free and temperature-controlled room. LSC recommends that the room should have restricted public access to prevent tampering.

4.2.1 Cooling

Ventilation of the rack is provided by fans in each output module that draw in cool room air from the front and expel it into the rear cavity of the rack. The air is then exhausted from the top of the rack by 4 fans located in the top cover.

The air conditioning plant for the room should be of sufficient capacity to maintain the room at approximately 25 degrees Celsius.

The heat generated by a Unity rack will vary depending upon several factors.

- The quantity of output channels
- The load on each channel
- The quantity and type of Modules fitted into the rack

The maximum BTU (British Thermal Unit) output of a Unity rack can be calculated by adding the BTU of each module fitted to the rack:

Module Type	Maximum BTU
UCM	50
ULM 12 channel 6 amp LED	3276
UDM 12 channel 10 amp Dim/Switch	2460
UDM 12 channel 16 amp Dim/Switch	3024
UDM 6 channel 25 amp Dim/Switch	2358
USM 12 channel 10 amp switch	400
USM 12 channel 16 amp switch	400

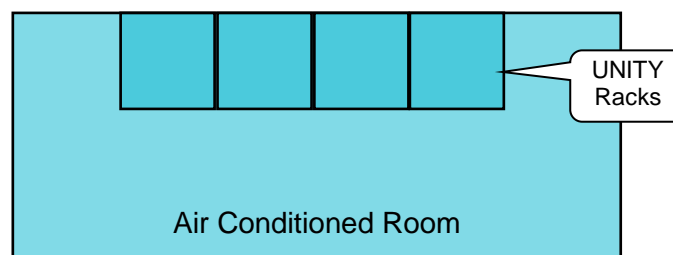
4.2.2 Rack Clearance and Cable Access

The rack can be positioned against a wall and racks can be mounted adjacent to each other.

- No rear or side access is required.
- All connections to the rack are accessed from the front.
- All cable entry to the rack is from above.

A minimum clearance of 300mm is required above the rack to allow cable entry and ventilation.

A minimum clearance of 600mm is required at the front of the rack to allow electronics modules to be inserted or removed.



Typical Four Rack Installation

4.3 Mounting the Rack Frame

Remove the Unity rack from its shipping pallet. The rack is heavy and must be securely mounted to onto a solid plinth or to the floor.

4.3.1 Plinth Mounting

If the rack is to be mounted on a plinth, it is important that the top of the plinth is flat and level so that the rack is not distorted when it is secured to the plinth.

4.3.2 Floor Mounting

If the rack is to be bolted directly to the floor, it is important that the floor is flat and level so that the rack is not distorted when it is secured to the floor. Position the rack then use a spirit level to check that the rack is plumb. Use suitable shims under the corners to ensure that the rack evenly supported in all corners.

4.3.3 Mounting Holes

Mounting holes are provided in the four corners at the bottom of the rack to secure the rack to the floor or plinth.



Rack Mounting Holes

4.4 Cable Access

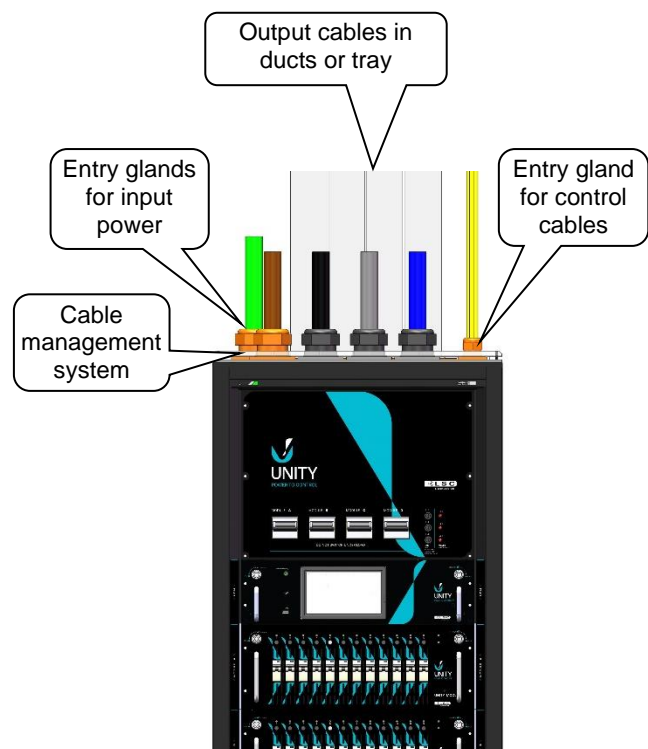
The top of the rack is fitted with a “cable management system” of shutters and clamps to maintain a tight seal around the cables. This allows the 4 exhaust fans on the top of the rack to operate efficiently.

The load terminals at the rear of the rack are hinged allowing them to be moved to one side to allow clear access for the load cables to be run down the rear of the rack.

Connect the cables to the rack in the following order:

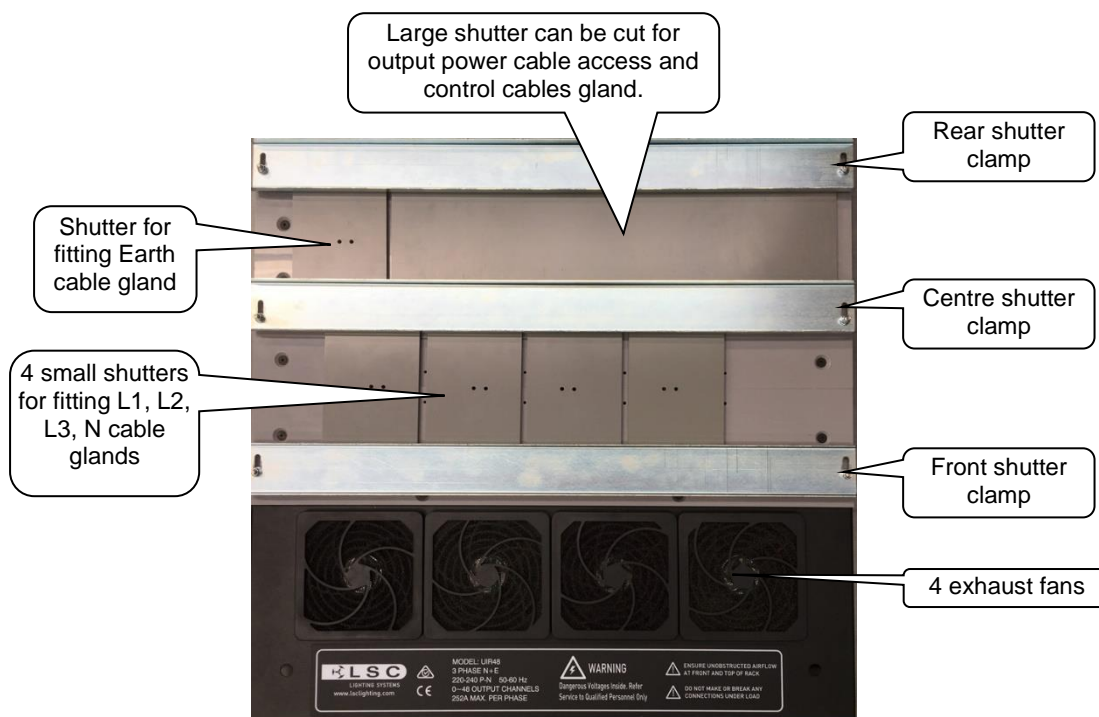
1. Output load cables.
2. Control cables.
3. Input power cables.

Following this order will give you maximum working space when fitting off the cables.



All Cable Entry is from Above

4.4.1 Cable Management System



Top View showing Cable Management System

The rear, centre and front “shutter clamps” hold the cable shutters in place. The cable shutters allow the cables to enter the rack with minimum air gaps so that the exhaust fans can operate efficiently.

The large cable shutter is for the output load cables and the control cables. You can cut the large cable shutter into two parts and use one part to fit a gland (not supplied) for the entry of the control cables.

The remainder of the large shutter is used for the output load cables. It can be cut and adapted to attach cable ducts to the rack or it can be shaped to fit around the load cables entering from a cable tray.

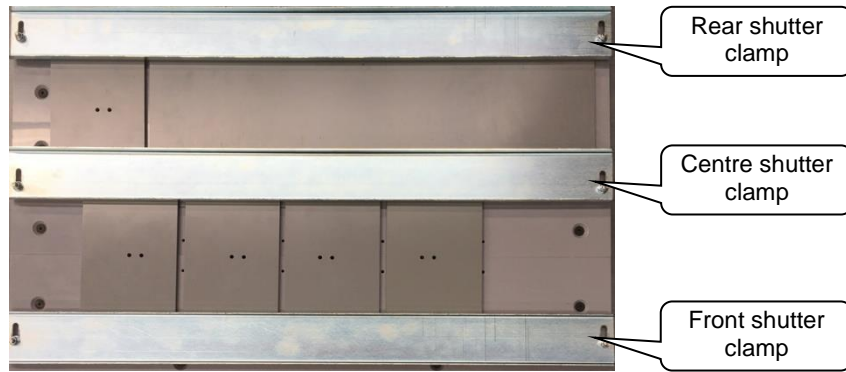
The 5 small cable shutters (Line 1, Line 2, Line 3, Neutral and Earth) have pre-drilled pilot holes, ready for you to drill holes and fit cable glands (not supplied) to suit your power input cable diameters. Typically, you will use the centre pilot hole for the cable gland so that the cable enters directly above the lug when it is bolted to the bus bar.

In a small installation (for example, 48 channels of 6 amp LED dimming) you might use smaller input power cables. In this case, use the offset pilot hole so that the smaller cable still enters directly above the lug when it is bolted to the bus bar. This allows the shutters to remain in their correct positions above the bus bars without any air gaps between the shutters.

Note: Do not drill and fit the cable glands at this stage. The input cables are fitted after all the output load cables have been connected. This will give you the maximum amount of working room when running the output load cables.

4.4.2 Opening the Cable Management System

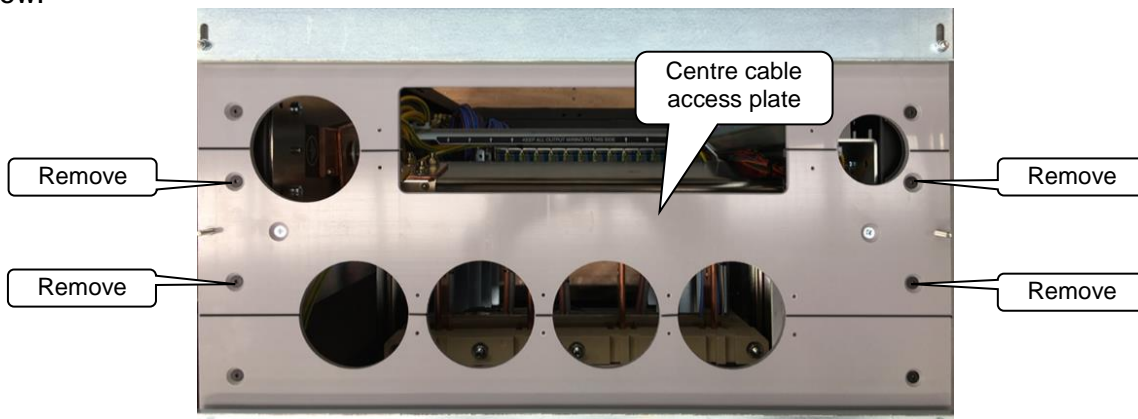
Completely remove the centre shutter clamp. Safely store the nylock nuts, washers and spacer nuts.



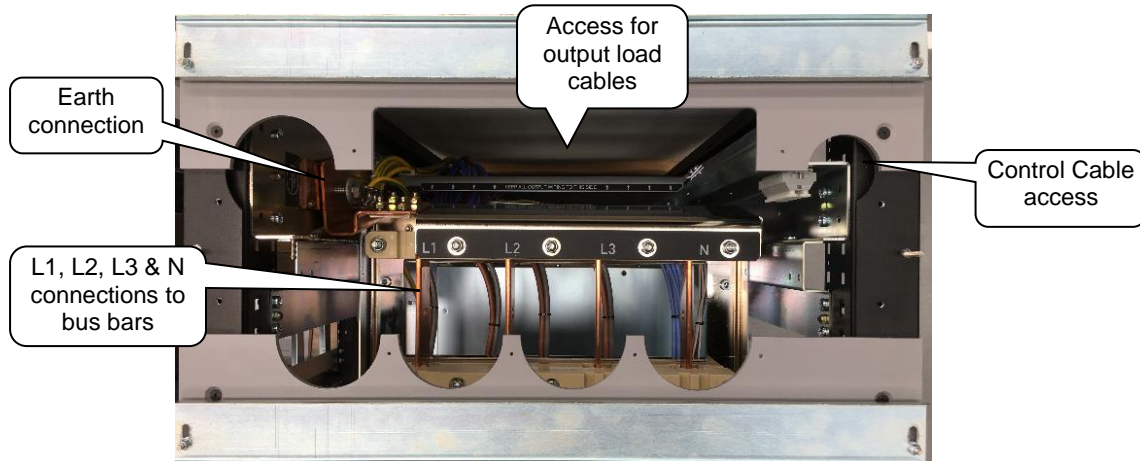
Remove the Centre Shutter Clamp

Slightly loosen the nylock nuts on the front and rear “shutter clamps” then slide out all 6 cable shutters and place them aside.

Remove the centre cable access plate by undoing the 4 screws (10mm Hex Key) indicated below.



Remove 4 Screws and Centre Cable Access Plate



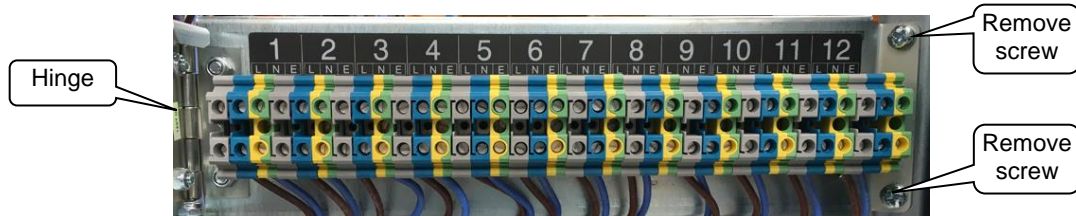
Centre Plate Removed for Cable Access

4.5 Output Load Connections

Note: Each load circuit requires its own separate neutral. Shared or common neutrals are not permitted.

4.5.1 Moving the Load Terminals

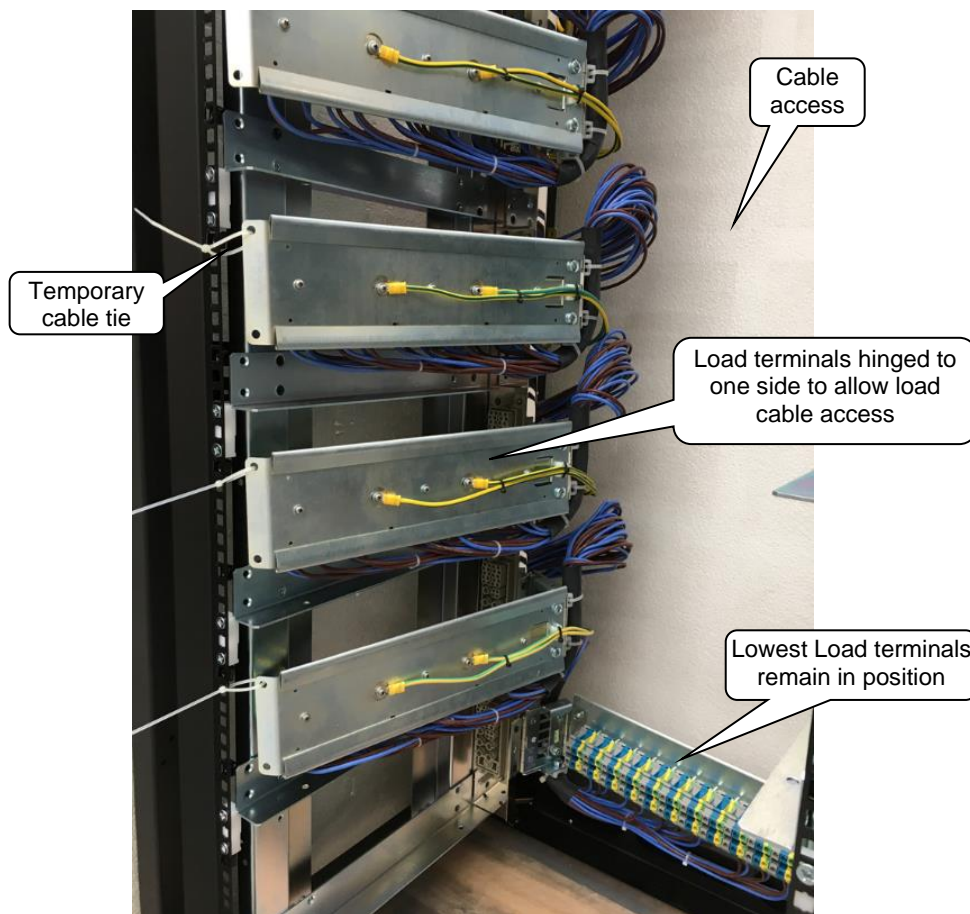
The load terminals for each module at the rear of the rack are hinged and can be moved to one side to allow clear access for the load cables to be fed into the rear of the rack from above.



Hinged Load Terminals

Remove the 2 screws (captive nuts) indicated above then push the load terminals to the left and hinge them forwards and towards the left side. The load terminals can be held to the side with a temporary cable tie.

There is usually no need to move the bottom load terminals.



Load Terminal held to one side with Temporary Cable Ties

4.5.2 Output Load Types

Three different types of 12 channel output modules are available for the Unity rack.

1. LED/conventional dimming and power switching module.
2. Conventional dimming and power switching module.
3. Power switching module.

The type of output modules that are fitted to your Unity rack are usually determined at the design stage of your installation when you specify the types of loads that you want to control. Loads of the same type are usually arranged in groups 12 and connected to a 12 channel output module designed for that type of load.

See section 2 for more information on arrangement of different types of loads.

4.5.3 Load cable Numbering

Output modules in each rack number from top to bottom.

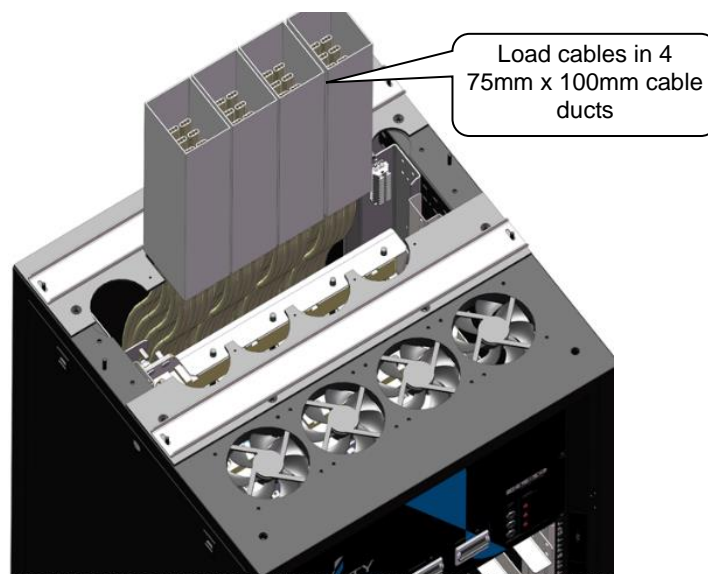
UIR48 Rack	Output Numbers
Module 1 (Top)	1-12
Module 2	13-24
Module 3	25-36
Module 4 (Bottom)	37-48

UIR96 Rack	Output Numbers
Module 1 (Top)	1-12
Module 2	13-24
Module 3	25-36
Module 4	37-48
Module 5	49-60
Module 6	61-72
Module 7	73-84
Module 8 (Bottom)	85-96

UIR72 Rack	Output Numbers
Module 1 (Top)	1-12
Module 2	13-24
Module 3	25-36
Module 4	37-48
Module 5	49-60
Module 6 (Bottom)	61-72

4.5.4 Load Cable Order

All load cable access is from the top of the rack. The cables can be contained within ducts or attached to a vertical cable tray.



Load Cables in Ducts

Arrange the cables in the ducts or on a cable tray as shown below with the low numbers towards the front and numbering from left to right. Following this order minimizes cable crossovers in the confined space inside the rack.

37	38	39	40	41	42	43	44	45	46	47	48
25	26	27	28	29	30	31	32	33	34	35	36
13	14	15	16	17	18	19	20	21	22	23	24
1	2	3	4	5	6	7	8	9	10	11	12

48 Output Load Cables viewed from above

61	62	63	64	65	66	67	68	69	70	71	72
49	50	51	52	53	54	55	56	57	58	59	60
37	38	39	40	41	42	43	44	45	46	47	48
25	26	27	28	29	30	31	32	33	34	35	36
13	14	15	16	17	18	19	20	21	22	23	24
1	2	3	4	5	6	7	8	9	10	11	12

72 Output Load Cables viewed from above

85	86	87	88	89	90	91	92	93	94	95	96
73	74	75	76	77	78	79	80	81	82	83	84
61	62	63	64	65	66	67	68	69	70	71	72
49	50	51	52	53	54	55	56	57	58	59	60
37	38	39	40	41	42	43	44	45	46	47	48
25	26	27	28	29	30	31	32	33	34	35	36
13	14	15	16	17	18	19	20	21	22	23	24
1	2	3	4	5	6	7	8	9	10	11	12

96 Output Load Cables viewed from above

Run the load cables into the rack ensuring that they are behind the curved cable guide as shown below.

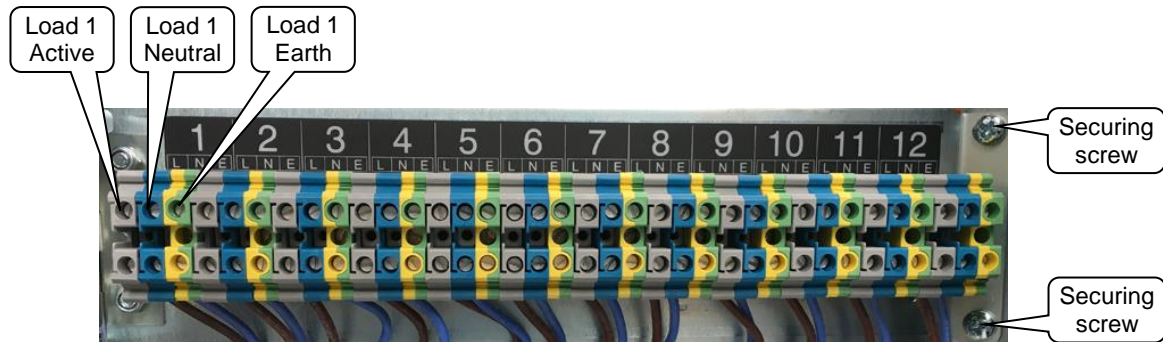


Ensure all Output Load Cables are run behind the Cable Guide

4.5.5 Connecting Load Cables

Select the 12 load cables for module A and whilst holding them up, move their load terminal block back into position. Secure the terminal block bracket with its 2 screws then terminate the load cables to the top connectors of the terminal blocks.

The numbers above the load terminals represent the numbers for that particular output module. The actual output channel number will depend upon the output module position, A, B, C, etcetera. See section 4.5.3 The module position letters are shown on the front edge of the rack adjacent to each module.



Output Load Terminals

- Maximum cable sizes for Output Load Terminals:
 Solid cable: 10 sq. mm.
 Flexible cable with ferrule: 6 sq. mm.
- Cable strip length: 10mm.

When the module A loads have been connected, move the module B terminal block back into position with its cables above it then secure it with the screws. Terminate the loads for module B.

Repeat the above procedure working towards the bottom until all loads are connected.

4.5.6 Testing the Load Circuits

Each load circuit must be tested before input power is connected to the Unity rack.

Note: If a load device has already been connected to the other end of the circuit then it must be disconnected before this test is performed.

With the load cables connected to the Unity rack and no load connected at the end of the load cable, use a “Megger” to perform the following resistance checks on each load circuit at the Unity rack load terminals.

Test	Resistance
Phase to neutral	500K ohm or higher
Phase to earth	500K ohm or higher
Neutral to earth	500K ohm or higher

Load Circuit Tests

4.6 Control Circuit Connections

Connections are provided for Unity to be controlled by:

- DMX512.
- Fire Alarm.
- GPIO (General Purpose Input Output).
- Ethernet. Used for sACN, ArtNet and HOUSTON X (LSC's monitoring and remote configuration tool)

All control circuits enter the top of the rack through a common cable gland (not supplied). The gland is fitted to the large cable shutter or to a section cut from the large cable shutter.

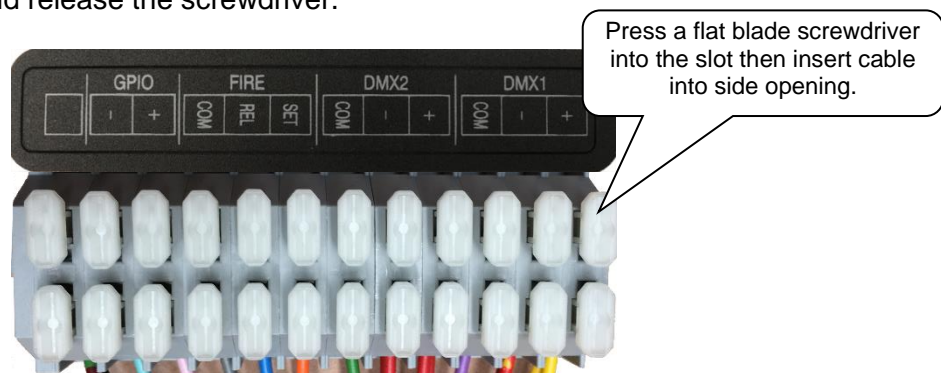
All control connectors are located behind the UCM (Unity Control Module). If necessary, remove the UCM to gain access to the connectors.



Ethernet and Control Connectors (UCM removed)

The ethernet connector is a RJ45 socket.

The DMX, Fire and GPIO connectors are quick connect type for wires up to 2.5 sq.mm. Stripping length is 8-9mm. To make a connection, press a flat blade screwdriver into the slot then insert the cable and release the screwdriver.



Control Connectors

4.6.1 DMX512 Control

There are two DMX inputs, DMX1 and DMX2. Each Unity output channel can be individually assigned to be controlled by either DMX1 or DMX2.

Each DMX input has an internal terminating resistor connected to it and the DMX is internally distributed to each output module and the control module. This provides a failsafe method of feeding DMX directly to every module.

When DMX is to be connected to multiple Unity racks, each rack should be fed from a separate output of a DMX splitter. Do not loop the DMX from one rack to another. DMX splitters also provide isolation so that a fault in one DMX circuit does not affect any other DMX circuit. DMX splitters are available from LSC.

Only use specific DMX cable. LSC recommends using Beldon 9842 (or equivalent) or shielded CAT 5 or CAT 6 cable.

4.6.2 Fire Input

The “Fire” input provides emergency evacuation lighting that can be easily recalled by either a simple “Fire” or “Evacuate” button or it can be connected to a BMS (Building Management System) so that it is automatically operated when a fire alarm is activated.

Activating “Fire” recalls a “Fire Memory” in the Unity system. This memory will typically contain channel levels that will provide suitable lighting for evacuation purposes. See the Unity User Manual for details on how to program a fire memory. (Future feature).

The “Fire” function uses two connections, one to activate (SET) and one to release (REL). Both connections share the one COM (common) connection.

A momentary contact closure between SET and COM will activate the Fire memory.

A momentary contact closure between REL and COM will release the Fire memory.



Fire Connectors

4.6.3 GPIO

A GPIO (General Purpose Input/Output) allows a contact closure be used to activate a function in Unity or Unity to activate an external function. (Future feature).

4.6.4 Network Control

A single RJ45 network connection socket allows Unity channels to be controlled by ArtNet or sACN lighting control protocols. It also allows Unity to be configured and monitored by LSC’s HOUSTON X software, to connect to a Syslog server and to connect to the internet.

4.7 Input Power Connections

The nominal input voltage is 220-240 Volts. 3-phase Star (380-415V). 50-60Hz.

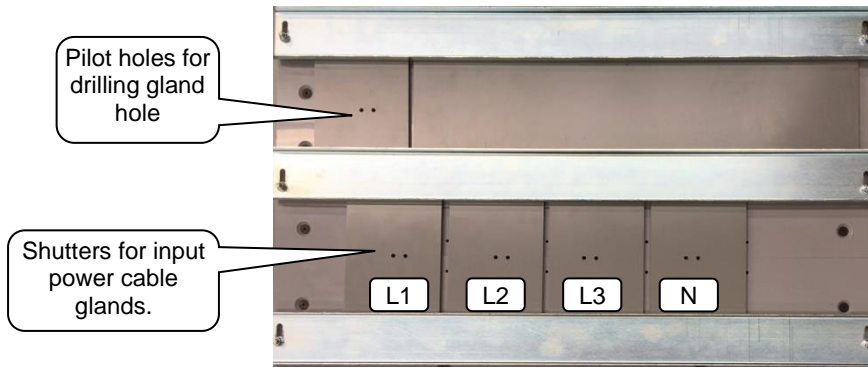
See section 3.3 for details on input current requirements.

In all instances of supply current, the Neutral cable current carrying capacity needs to be a minimum of 50% greater than the current carrying capacity of each phase cable.

A main input circuit breaker or other input power disconnect device should be located close to the rack. If the main breaker/disconnect device is not in the same room then it must have a physical means to be locked off to allow safe access to the rack.

Note: The main input breaker/disconnect device should not disconnect the neutral. However, if the device does switch the neutral, it must disconnect the neutral last and connect the neutral first.

The 5 input power cables (L1, L2, L3, N, Earth) enter the top of the rack through individual cable glands (not supplied). The glands are fitted to their individual shutters allowing each cable to be individually positioned. Two pilot holes for the glands are provided on each input shutter to suit different cable diameters to position the cable so that it enters directly above the lug when it is clamped flush on the bus bar. Drill the shutters and fit the glands to suit your cable sizes.

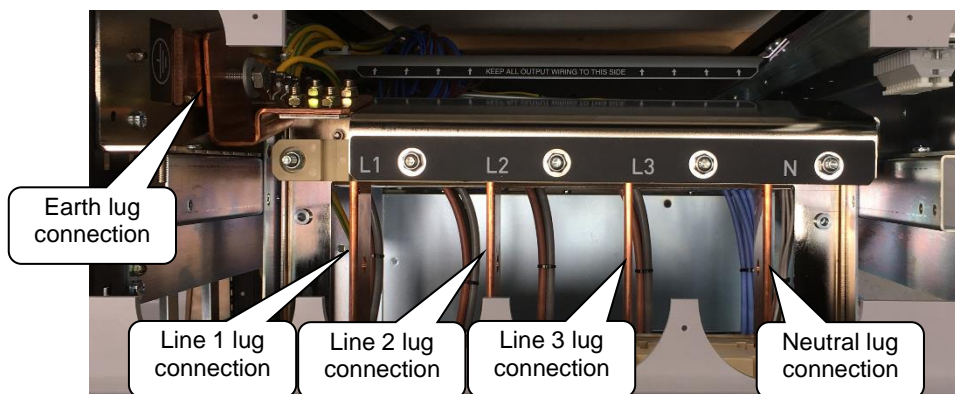


Cable Gland Shutters



Typical Cable Gland fitted to a Shutter

Pass each cable through its gland then then crimp a lug (not supplied) onto each cable. The bus bars accept a lug with a 12mm hole.

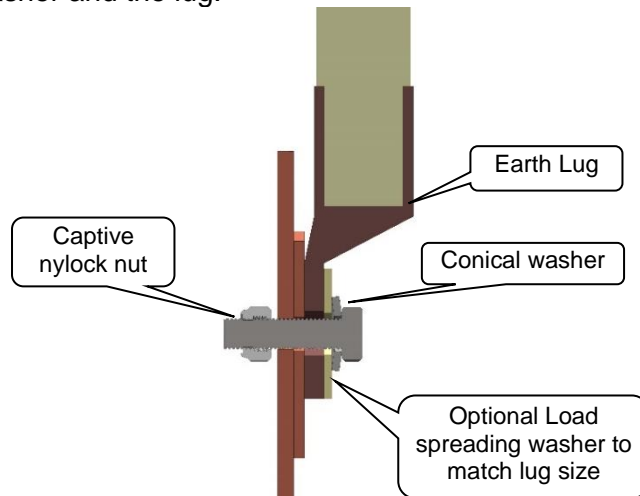


Top View

The three phase input connections are labelled L1 (phase No. 1), L2 (phase No. 2,) and L3 (phase No. 3). The Neutral busbar is labelled N and the earth bus bar has the earth symbol.

All input connections (lugs and bus bars) need to be cleaned prior to connection to remove surface oxidation. LSC recommends using a fine steel wool but great care must be taken to prevent any material falling into the rack. After cleaning apply a thin layer of dielectric grease to the mating surfaces prior to assembly. All input connection bolts must be tightened using a torque wrench. The recommended torque is 75Nm ±5Nm.

Fit the earth cable first. The Earth busbar is fitted with a M12 bolt and a load spreading conical washer. There is a captive nylock nut located inside the rack. If the lug size is larger than the conical washer then a load spreading flat washer equal in size to the lug should be inserted between the conical washer and the lug.

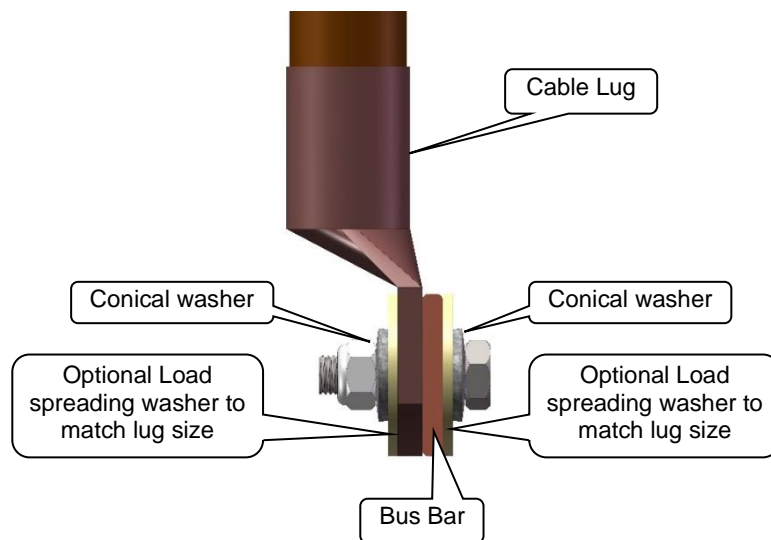


Earth Lug Connection

Fit the L1 cable next, then the L2, L3 and N cables. Fitting the cables in this order allows maximum space for tool access.

The Phase and Neutral busbars have a M12 hole fitted a M12 x 45mm full thread 316 SS hex head bolt, 2 load spreading conical washers and a M12 316 SS Nylock nut.

If the lug size is larger than the conical washer, then load spreading flat washers equal in size to the lug should be inserted under the conical washers.



Phase and Neutral Lug Connection

4.8 Final Checks

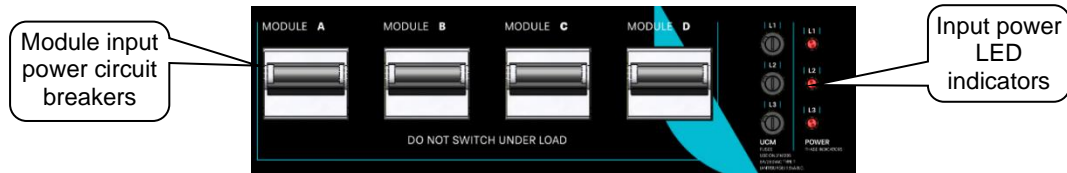
Perform the following tasks before you close-up the cable management system (on the top of the rack) and switch on the power. Do not install modules until after all these tasks are completed.

- Use a vacuum cleaner to remove any installation debris from the rack.
- Blow out any remaining debris using compressed air.
- Check all connections are tight.

- Check for any damage to the cables.
- Ensure that you have performed the load circuit tests described in section 4.5.6

4.9 Switch On Power

Switch off all the module input circuit breakers on the front panel.



Distro Panel

Switch on the 3 phase supply to the rack and observe that the three input power LED indicators (on the distro panel) show the 3 phase power is available.

Before installing any modules into the rack use a voltmeter to check that all the phase to neutral input voltages on the bus bars are correct.

4.10 Closing the Cable Management System

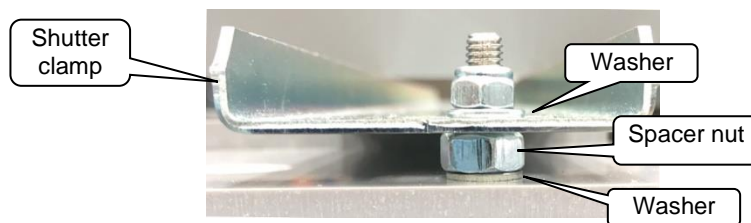
Replace the “centre cable access plate” and secure it with its 4 screws.



Centre Cable Access Plate

Position the cables shutters for no air gaps to ensure correct ventilation.

Replace the centre “shutter clamp” ensuring that the washers and spacer nuts are in position.



Shutter Clamp Fixing

Tighten the nylock nuts on all three shutter clamps.

4.11 Install the Modules

The fitting of the control module and the output modules into the rack and the configuration/operation of the modules are described in the Unity User Manual.

The cam-locks hold the modules securely in place and no rack screws are required, however rack screws can be fitted if extra security is needed. All the modules have holes for rack screws, and the rack frame has facility for matching cage nuts.

5 Installation Check List

Check each item and confirm by ticking the box.

	Rack is securely mounted.
	All installation debris removed from the rack.
	All output terminals are tight.
	All load circuits tested. See 4.5.6
	All power input lug connections cleaned. See 4.7
	Dielectric grease applied to all lug connections. See 4.7
	All lug bolts torqued to spec. See 4.7
	Input phase voltages checked.
	Cable Management System secured. See 4.10
	Room air conditioning is operational.

6 Compliance Statements

UNITY from LSC Control Systems Pty Ltd meets all required CE (European) and RCM (Australian) standards.

CENELEC (European Committee for Electrotechnical Standardization).



Australian RCM (Regulatory Compliance Mark).



WEEE (Waste Electrical and Electronic Equipment).



The WEEE symbol indicates that the product should not be discarded as unsorted waste but must be sent to separate collection facilities for recovery and recycling.



For more information about how to recycle your LSC product, contact the dealer where you purchased the product or contact LSC via email at info@lsccontrol.com.au

You can also take any old electrical equipment to participating civic amenity sites (often known as 'household waste recycling centres') run by local councils. You can locate your closest participating recycling centre using the following links.

- AUSTRALIA <http://www.dropzone.org.au>.
- NEW ZEALAND <http://ewaste.org.nz/welcome/main>
- NORTH AMERICA <http://1800recycling.com>
- UK www.recycle-more.co.uk.

END