



Artistic Licence



# Rail-DMX-DALI

## User Guide





Please read these instructions before using the product.

This product has been designed & manufactured for professional use only. It should only be installed by a suitably qualified technician and in accordance with electrical regulations in the country of use.

Unless directed in the instructions there are no user serviceable parts inside the outer case of this product.

Always disconnect from the power supply when not in use.

Any specific IP rating, where appropriate, is given in the instructions. Unless otherwise stated this product is designed for indoor use only. If used outdoors it MUST be installed in an appropriate IP rated cabinet. Do not allow this product to be exposed to rain or moisture.

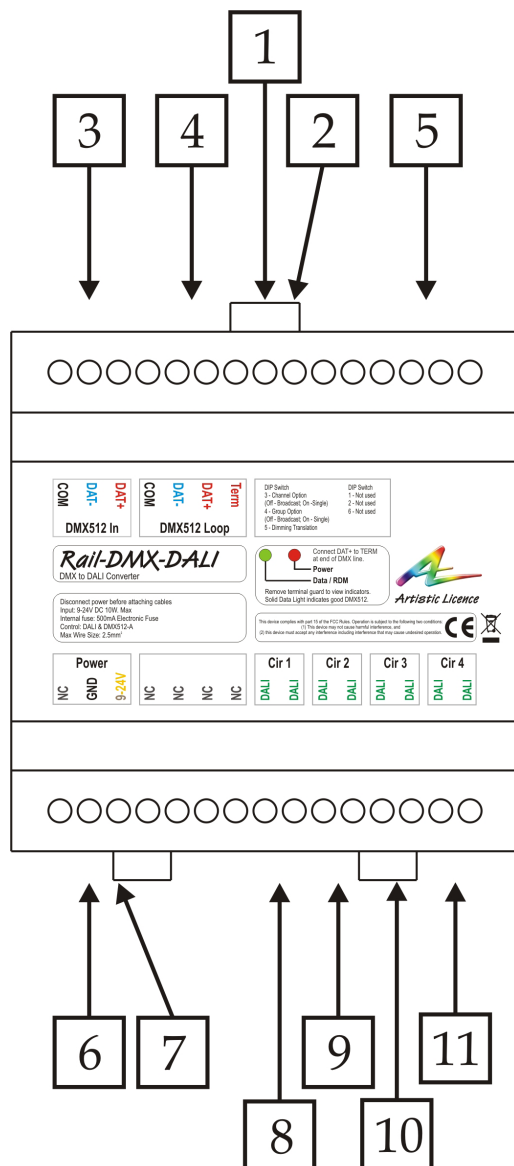
Please recycle all packaging.

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## Connections

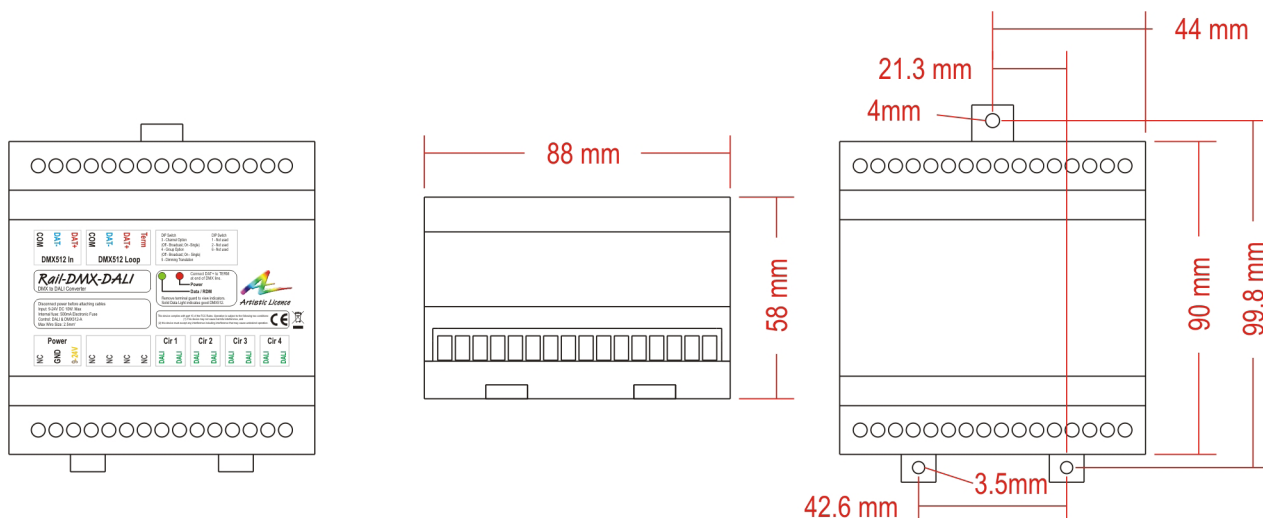


Reference	Type	Description
1	LED	DMX received
2	LED	Power
3	Connection	DMX Input
4	Connection	DMX Loop & Termination**
5	DIP Switch	See table below
6	Power Input	GND Connection
7	Power Input	9-24 VDC
8	Connection	DALI circuit O/P 1
9	Connection	DALI circuit O/P 2
10	Connection	DALI circuit O/P 3
11	Connection	DALI circuit O/P 4

\*\* A passive loop-through connection allows onward connection to other DMX512 devices. If this feature is not required then the signal must be terminated. The product contains an internal termination resistor. This is enabled by fitting a wire link between **Term** and **DAT+**.

Dip Switch	Function
1	Not used
2	Not used
3	Mapping mode -See Table 1
4	Mapping Mode - See Table 1
5	Dimming curve
6	Not used

## Mounting Diagram



## Overview

Rail-DMX-DALI converts DMX values into DALI commands to allow integration between a DMX controller and DALI ballasts.

Up to four DALI circuits can be controlled via DMX allowing up to 256 ballasts to be connected. Simultaneous control over DALI channels, groups and scenes unlocks the flexibility of DALI.

To use Rail-DMX-DALI effectively a good understanding of both DMX and DALI is essential.

## DMX512 - Digital Multiplex

DMX512, released in 1986, was created by the entertainment industry to control 512 channels of lighting fixtures per cable at near-video rates. Since then DMX has been used in the majority of lighting fixtures and, due to its qualities in fading RGB devices, has also migrated into architectural fixtures.

## DALI - Digital Addressable Lighting Interface

DALI is used mainly in commercial lighting to enable office lighting to be controlled in an intelligent and resourceful manner. It was developed to provide two-way communication between controller and ballast, providing both control and feedback of standard lighting products. The International Standard was released in 2002 and has been widely adopted.

The most common DALI device is a fluorescent ballast, around which most of its development has been concentrated. Speed has been sacrificed in favour of flexibility, ease of use and to facilitate two-way communication. This meant it has developed as a slow protocol when compared to DMX.

For more information about DALI, please refer to [www.DALI-ag.org](http://www.DALI-ag.org). A handy guide to DALI for those more familiar with DMX can be downloaded from [www.ArtisticLicence.com](http://www.ArtisticLicence.com).

## Commissioning DALI ballasts

Unlike DMX fixtures, DALI ballasts do not have a default start address. This is because they need unique addresses so that only one ballast replies to the controller at once. When new DALI ballasts are used they must be commissioned by being given a unique start address. This requires a DALI commissioning tool such as an Artistic Licence Dali-Scope, a hand held tool that is low cost and easy to use.



## DALI Bus PSU

For DALI to transmit over a data cable there must be a separate DALI Bus PSU. This provides a voltage on the data line which enables communication. Without this PSU the ballasts will go into a fail mode and switch on as this is considered a fault condition. Artistic Licence offers Rail-PSU-D4, a four-bus PSU device designed to work alongside Rail-DMX-DALI, Rail-DALI-DMX and other DALI controllers.



## Converting DMX to DALI

With increasing crossover between the entertainment, architectural and commercial lighting sectors, it becomes desirable to integrate the two protocols to leverage the benefits of each. A common example is the wish to control DALI ballasts with a DMX controller that is simultaneously being used to control DMX fixtures.

Integration between DMX and DALI equipment requires careful planning as a number of issues must be considered to ensure a successful system. These include the speed

differences between the two protocols, the type of DALI control, dimming curves and the commissioning of fixtures.

While it is not possible to obtain cost-effectively the full sophistication of DMX-style control over a DALI ballast, with correct understanding and implementation good results can be achieved using a DALI ballast and a conversion product such as Rail-DMX-DALI.

## DALI Control and Speed

The DALI data packet comprises three parts: Address (ballast(s) being signalled), Command (what type of message is being sent) and Data (the value associated with the command). On any given circuit, DALI ballast intensity can be controlled in four ways:

1. Individual Channel level (up to 64 ballasts per circuit).
2. Group intensity (each ballast can be assigned to any of 16 groups, and can also belong to more than one group).
3. Scene selection (each ballast can store up to 16 scenes, each of which has an associated fade time).
4. Broadcast (all fixtures receive a command to respond to a given value - this is equivalent to Group when all fixtures belong to it).

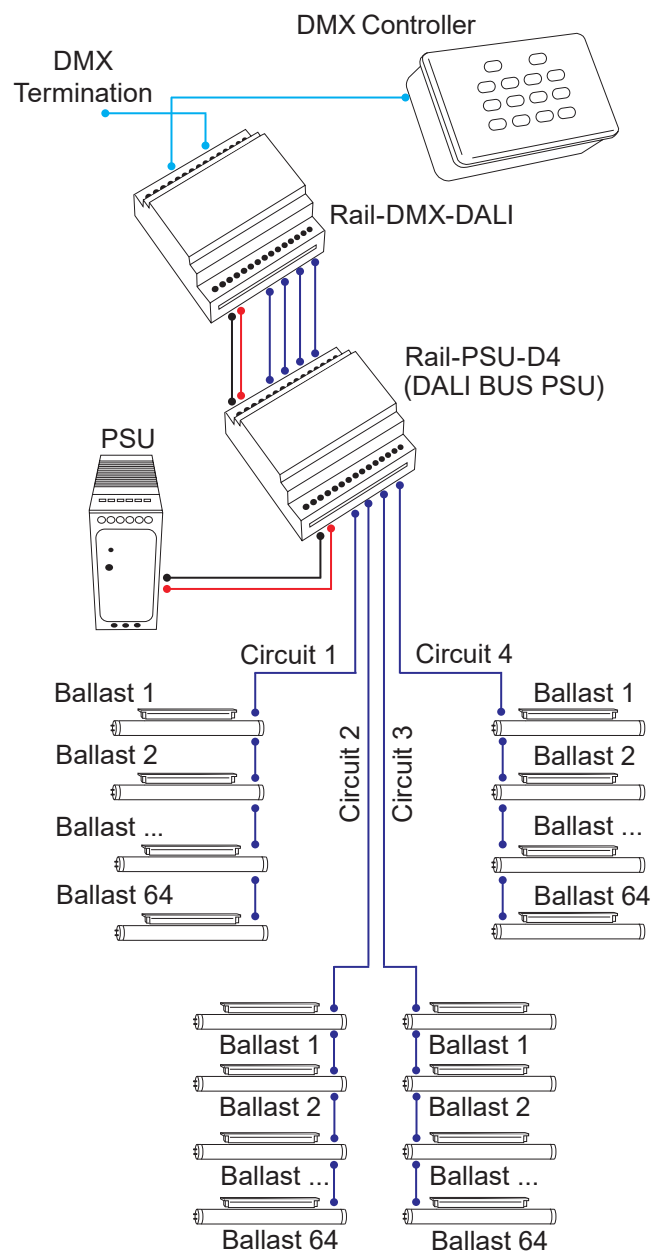
DMX runs at a much higher speed than DALI and so it easily out-runs DALI. If this is not managed, a time lag appears and incoming data will start to be ignored, resulting in a step or 'bump' on the dimming curve. Best results are therefore achieved by sending the lowest number of commands.

Efficiency increases as one moves down the above list, so Individual Channel is the most bandwidth-hungry. Controlling individual channels can cause problems if a large number of ballasts are present due to the high number of commands that need to be sent. If this method is to be used, careful consideration should be given to the bandwidth management.

## Rail-DMX-DALI: Basics

Rail-DMX-DALI converts packets from a DMX controller to DALI commands, enabling control of up to four circuits of 64 DALI ballasts each.

Fig.1 below shows Rail-DMX-DALI being used to its full potential. Each of the four DALI outputs is connected to a DALI bus PSU (Rail-PSU-D4) to allow communications to the ballasts.



**Fig. 1 - Electrical wiring diagram**



## DALI Discovery

An important part of DALI is discovery. This allows a controller to discover what is on a network so that only necessary commands are sent, preserving bandwidth. Rail-DMX-DALI implements this function 5 seconds after power-up and then every two minutes. If ballasts are not found on the individual channels, Rail-DMX-DALI ceases to transmit channel commands when the corresponding DMX channels change. This ensures that maximum conversion rates are achieved.

## DALI Routing Method

Rail-DMX-DALI routes the DALI control signals via its four output circuits (Cir 1, Cir 2, Cir 3 and Cir 4) in two different ways:

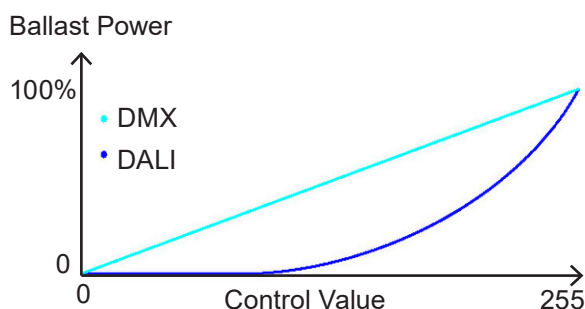
- **Wide** (See Fig. 2 below) Each DALI circuit is controlled by a separate DMX channel (this leads to the largest DMX footprint).
- **Narrow** (See Fig. 3 overleaf) Equivalent entities from each circuit are controlled by a single DMX channel (this leads to the smallest DMX footprint).

In conjunction with the four basic DALI addressing modes (Channel, Group, Scene or Broadcast), this gives the user a high degree of flexibility in addressing the DALI ballasts (see Mapping Modes section).

## Dimming Curves

The majority of DMX devices operate using a linear dimming curve with the level selected by a decimal value between 0 and 255.

DALI works with a non-linear (exponential) curve. As the graph shows, each method produces a different output.



In its default mode of operation, Rail-DMX-DALI employs a one-to-one mapping between the DMX and DALI values, resulting in the native (exponential) dimming curve of the DALI fixture. However, Rail-DMX-DALI can also produce a linear dimming curve by setting DIP switch 5 to be 'ON'. It should be noted that in this mode of operation, the DMX value corresponds to the percentage power level of the fixture. Therefore, any command value above 100 will simply result in 100% power level. Please refer to Dimming Curve Translation in the Appendix for more details.

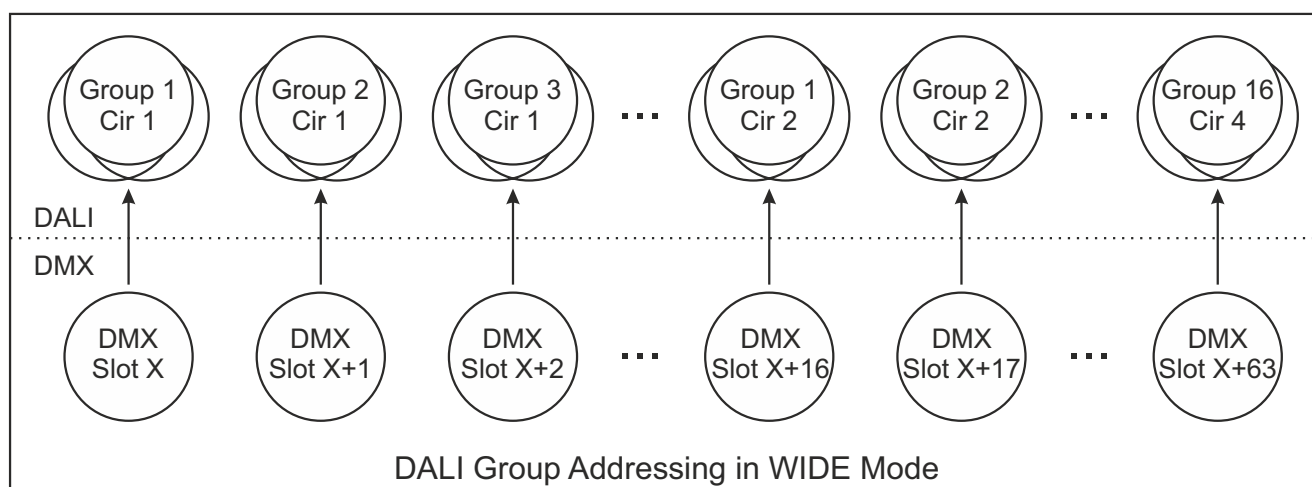
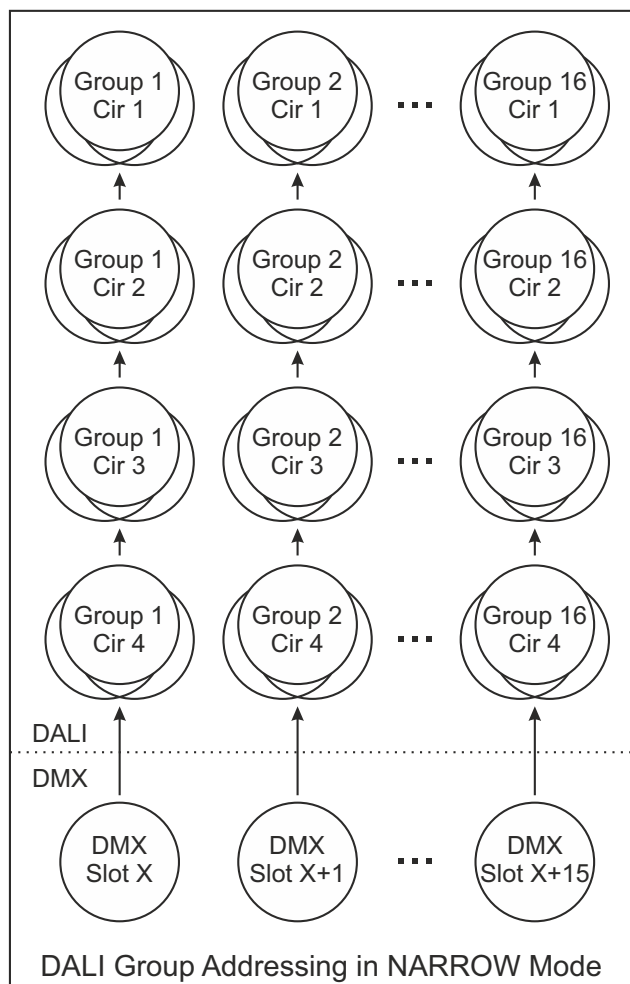


Fig. 2 - DALI Routing (Wide)



**Fig. 3 - DALI Routing (Narrow)**

Mode	DIP Switch 3	DIP Switch 4
A	OFF	OFF
B	OFF	ON
C	ON	OFF
D	ON	ON

**Table 1 - DIP Switch Mode Settings**

## Mapping Modes

As explained previously, the DALI specification allows ballasts to be addressed as individual Channels or in Groups, Scenes or Broadcast modes. Rail-DMX-DALI provides even more control by allowing the user to connect single or multiple (up to 4) DALI circuits to the controller.

For ease of use, Rail-DMX-DALI offers four pre-programmed control modes (termed A, B, C and D), which encompass commonly encountered control scenarios. The control modes are selected using DIP switches 3 and 4 on the product, as shown in Table 1 below.

Tables 2, 3 and 4 collectively explain the relationships between the product control modes A-D, the type of DALI ballast addressing (Broadcast, Channel, Group or Scene), the implemented DALI routing method (**N**arrow or **W**ide), the slot count (in brackets) and the overall DMX footprint.

It should be noted that the DMX footprint (listed in Tables 3 and 4 under the 'Slots' heading') varies between the different Modes. This is an important practical consideration as the user may need to find an acceptable compromise between control level and bandwidth.

**Detailed Mapping Tables for all Modes can be found in the Appendix.**

**Table 2**

Mode	Broadcast	Channel	Group	Scene	DMX Footprint
A	W (4)	-	N (16)	W/N (5)	25
B	W (4)	-	W (64)	W/N (5)	73
C	-	W (256)	N (16)	W/N (5)	277
D	-	W (256)	W (64)	W/N (5)	325

**Table 3**

Broadcast		Channel		Group		Scene	
Modes	Slots	Modes	Slots	Modes	Slots	Modes	Slots
-	1	-	64	A,C	16	A,B,C,D	1

**Table 4**

Broadcast		Channel		Group		Scene	
Modes	Slots	Modes	Slots	Modes	Slots	Modes	Slots
A,B	4	C,D	256	B,D	64	A,B,C,D	4



## Rail-DMX-DALI: Advanced

The functionality of Rail-DMX-DALI can be enhanced using RDM (Remote Device Management).

In Rail-DMX-DALI there are two main uses for RDM:

- Remote Start Address Programming
- RDM Locate Function

Each conversion channel is assigned an RDM sub-device. This allows the DMX-DALI patching to be changed. It also allows conversion options to be disabled to reduce the number of DMX channels.

There are numerous RDM programmers on the market, but generally there are two types: handheld and PC based applications.

- Handheld RDM Programmers

A good example of a handheld RDM programmer is Jump-Start. Jump-Start can be used to manually configure RDM devices and transmit DMX values. Start Address programming and RDM locate are both supported.

- Art-Net to DMX/RDM Converters

As Rail-DMX-DALI uses a high number of RDM Sub-Devices this type of control is recommended as it offers more flexibility and allows all of the data to be displayed at the same time.

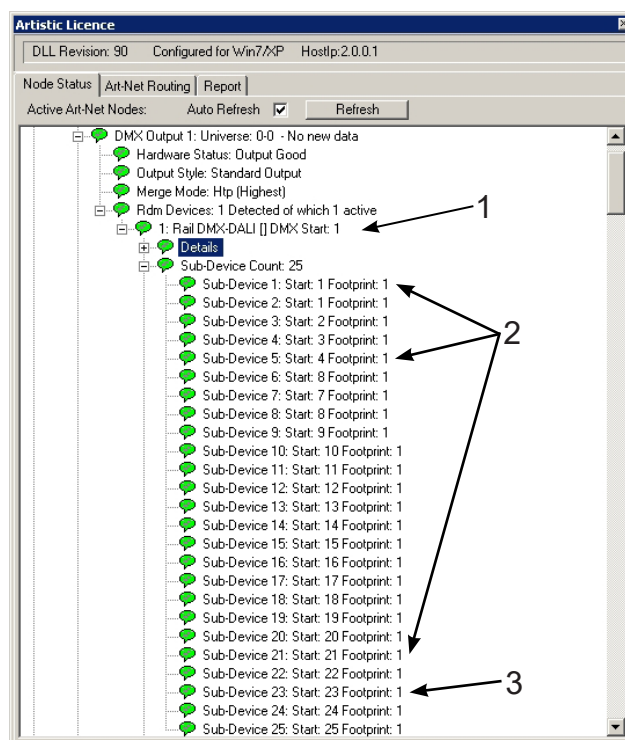
A free application called DMX-Workshop can be used with this type of product. It will interrogate both an Art-Net and RDM network and display the results in a list table.

Examples of Art-Net to DMX/RDM converters available from Artistic Licence are versaSplit mini ethb-5 (desktop/truss mount) and artLynx quad (DIN rail format).

## Start Address Programming

Rail-DMX-DALI can use either 25 (Mode A), 73 (Mode B), 277 (Mode C) or 325 (Mode D) DMX channels (see Appendix).

Using an Art-Net to DMX/RDM converter and DMX-Workshop, all the sub-devices present for each conversion channel can be viewed. The screen shot below demonstrates this for Mode A.



Rail-DMX-DALI default values are set so that the conversion channels are mapped sequentially in the order of broadcast, channels, groups and scenes.

There are three types of Start Addressing:

1. Global - Sets the start address of the root device and all proceeding sub-devices are readdressed sequentially. This will override any previous changes. Right-click on the Rail-DMX-DALI main entry and select 'Set DMX512 Start Address'.
2. Conversion Method - Sets the first start address of the control method (Channels, Group or Scenes) and readdresses all following channels sequentially. Right-click on the appropriate main sub-device for the conversion method and select 'Set DMX512 Start Address.' In this example,

Sub-Device 1 controls Channels, Sub-Device 5 controls Groups and Sub-Device 21 controls Scenes.

To disable a conversion method, the main sub-device for that cluster of sub-devices must be set to 512. For example, to disable the Group conversions Sub-Device 5 should be given the start address of 512. The remaining start addresses of the sub-devices in that group will not change, however the conversion will be disabled.

3. Individual Control Channel - Each address can be changed independently of other channels. Right Click on any of the Sub-Devices and select 'Set DMX512 Start Address.'

The Appendix Tables include a column entitled 'RDM Sub-Device' which details the above settings.

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## RDM Locate

RDM locate allows a fixture to be identified, aiding remote configuration. It is often used when setting start addresses. When an RDM locate command is sent to Rail-DMX-DALI for a particular sub-device the corresponding DALI ballast will flash.

## Appendix

The Appendix consists of 3 sections:

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### Mapping Tables (pages 11-19)

To clarify the relationship between the DMX control channels and the DALI output circuits, the default assignments for each of the Modes A-D are listed in Tables 5-8 in the following pages.

The DALI Circuit Routing column gives the output circuit number and the Narrow or Wide classification (N or W) discussed earlier in 'DALI Routing Method'.

- Mode A has a DMX footprint of 25. It provides the most limited control over the DALI fixtures.
- Mode B has a DMX footprint of 73.
- Mode C has a DMX footprint of 277.
- Mode D has a DMX footprint of 325. It provides the maximum control over the DALI fixtures.

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### Scene Control (page 20)

This section explains how Scenes are selected according to DMX value. It is referred to in the Mapping Tables.

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### Dimming Curve Translation (pages 20-21)

This section details the function of DIP Switch 5.

## Mapping Tables

**Table 5: Mode A**

Default DMX Start Address	RDM Sub-Device	DALI Control Command	DALI Circuit Routing
1	1: Main	Broadcast	1 (W)
2	2	Broadcast	2 (W)
3	3	Broadcast	3 (W)
4	4	Broadcast	4 (W)
5	5: Main	Group 1	All (N)
6	6	Group 2	All (N)
7	7	Group 3	All (N)
8	8	Group 4	All (N)
9	9	Group 5	All (N)
10	10	Group 6	All (N)
11	11	Group 7	All (N)
12	12	Group 8	All (N)
13	13	Group 9	All (N)
14	14	Group 10	All (N)
15	15	Group 11	All (N)
16	16	Group 12	All (N)
17	17	Group 13	All (N)
18	18	Group 14	All (N)
19	19	Group 15	All (N)
20	20	Group 16	All (N)
21	21: Main	Scene (See Chart)	All (N)
22	22	Scene (See Chart)	1 (W)
23	23	Scene (See Chart)	2 (W)
24	24	Scene (See Chart)	3 (W)
25	25	Scene (See Chart)	4 (W)

**Table 6: Mode B**

Default DMX Start Address	RDM Sub-Device	DALI Control Command	DALI Circuit Routing
1	1: Main	Broadcast	1 (W)
2	2	Broadcast	2 (W)
3	3	Broadcast	3 (W)
4	4	Broadcast	4 (W)
5	5: Main	Group 1	1 (W)
6	6	Group 2	1 (W)
7	7	Group 3	1 (W)
8	8	Group 4	1 (W)
9	9	Group 5	1 (W)
10	10	Group 6	1 (W)
11	11	Group 7	1 (W)
12	12	Group 8	1 (W)
13	13	Group 9	1 (W)
14	14	Group 10	1 (W)
15	15	Group 11	1 (W)
16	16	Group 12	1 (W)
17	17	Group 13	1 (W)
18	18	Group 14	1 (W)
19	19	Group 15	1 (W)
20	20	Group 16	1 (W)
21	21	Group 1	2 (W)
22	22	Group 2	2 (W)
23	23	Group 3	2 (W)
24	24	Group 4	2 (W)
25	25	Group 5	2 (W)
26	26	Group 6	2 (W)
27	27	Group 7	2 (W)
28	28	Group 8	2 (W)
29	29	Group 9	2 (W)
30	30	Group 10	2 (W)
31	31	Group 11	2 (W)
32	32	Group 12	2 (W)
33	33	Group 13	2 (W)
34	34	Group 14	2 (W)
35	35	Group 15	2 (W)
36	36	Group 16	2 (W)
37	37	Group 1	3 (W)
38	38	Group 2	3 (W)
39	39	Group 3	3 (W)
40	40	Group 4	3 (W)

**Table 6: Mode B (continued)**

Default DMX Start Address	RDM Sub-Device	DALI Control Command	DALI Circuit Routing
41	41	Group 5	3 (W)
42	42	Group 6	3 (W)
43	43	Group 7	3 (W)
44	44	Group 8	3 (W)
45	45	Group 9	3 (W)
46	46	Group 10	3 (W)
47	47	Group 11	3 (W)
48	48	Group 12	3 (W)
49	49	Group 13	3 (W)
50	50	Group 14	3 (W)
51	51	Group 15	3 (W)
52	52	Group 16	3 (W)
53	53	Group 1	4 (W)
54	54	Group 2	4 (W)
55	55	Group 3	4 (W)
56	56	Group 4	4 (W)
57	57	Group 5	4 (W)
58	58	Group 6	4 (W)
59	59	Group 7	4 (W)
60	60	Group 8	4 (W)
61	61	Group 9	4 (W)
62	62	Group 10	4 (W)
63	63	Group 11	4 (W)
64	64	Group 12	4 (W)
65	65	Group 13	4 (W)
66	66	Group 14	4 (W)
67	67	Group 15	4 (W)
68	68	Group 16	4 (W)
69	69: Main	Scene (See Chart)	All (N)
70	70	Scene (See Chart)	1 (W)
71	71	Scene (See Chart)	2 (W)
72	72	Scene (See Chart)	3 (W)
73	73	Scene (See Chart)	4 (W)

**Table 7: Mode C**

Default DMX Start Address	RDM Sub-Device	DALI Control Command	DALI Circuit Routing
1	1: Main	Channel 1	1 (W)
2	2	Channel 2	1 (W)
3	3	Channel 3	1 (W)
4	4	Channel 4	1 (W)
5	5	Channel 5	1 (W)
6	6	Channel 6	1 (W)
7	7	Channel 7	1 (W)
8	8	Channel 8	1 (W)
9	9	Channel 9	1 (W)
10	10	Channel 10	1 (W)
11	11	Channel 11	1 (W)
12	12	Channel 12	1 (W)
13	13	Channel 13	1 (W)
14	14	Channel 14	1 (W)
15	15	Channel 15	1 (W)
16	16	Channel 16	1 (W)
17	17	Channel 17	1 (W)
18	18	Channel 18	1 (W)
19	19	Channel 19	1 (W)
20	20	Channel 20	1 (W)
21	21	Channel 21	1 (W)
22	22	Channel 22	1 (W)
23	23	Channel 23	1 (W)
24	24	Channel 24	1 (W)
25	25	Channel 25	1 (W)
26	26	Channel 26	1 (W)
27	27	Channel 27	1 (W)
28	28	Channel 28	1 (W)
29	29	Channel 29	1 (W)
30	30	Channel 30	1 (W)
31	31	Channel 31	1 (W)
32	32	Channel 32	1 (W)
33	33	Channel 33	1 (W)
34	34	Channel 34	1 (W)
35	35	Channel 35	1 (W)
36	36	Channel 36	1 (W)
37	37	Channel 37	1 (W)
38	38	Channel 38	1 (W)
39	39	Channel 39	1 (W)
40	40	Channel 40	1 (W)

**Table 7: Mode C (continued)**

Default DMX Start Address	RDM Sub-Device	DALI Control Command	DALI Circuit Routing
41	41	Channel 41	1 (W)
42	42	Channel 42	1 (W)
43	43	Channel 43	1 (W)
44	44	Channel 44	1 (W)
45	45	Channel 45	1 (W)
46	46	Channel 46	1 (W)
47	47	Channel 47	1 (W)
48	48	Channel 48	1 (W)
49	49	Channel 49	1 (W)
50	50	Channel 50	1 (W)
51	51	Channel 51	1 (W)
52	52	Channel 52	1 (W)
53	53	Channel 53	1 (W)
54	54	Channel 54	1 (W)
55	55	Channel 55	1 (W)
56	56	Channel 56	1 (W)
57	57	Channel 57	1 (W)
58	58	Channel 58	1 (W)
59	59	Channel 59	1 (W)
60	60	Channel 60	1 (W)
61	61	Channel 61	1 (W)
62	62	Channel 62	1 (W)
63	63	Channel 63	1 (W)
64	64	Channel 64	1 (W)
65	65	Channel 1	2 (W)
66	66	Channel 2	2 (W)
67	67	Channel 3	2 (W)
68	68	Channel 4	2 (W)
69	69	Channel 5	2 (W)
70	70	Channel 6	2 (W)
71	71	Channel 7	2 (W)
72	72	Channel 8	2 (W)
73	73	Channel 9	2 (W)
74	74	Channel 10	2 (W)
75	75	Channel 11	2 (W)
76	76	Channel 12	2 (W)
77	77	Channel 13	2 (W)
78	78	Channel 14	2 (W)
79	79	Channel 15	2 (W)
80	80	Channel 16	2 (W)
81	81	Channel 17	2 (W)

Default DMX Start Address	RDM Sub-Device	DALI Control Command	DALI Circuit Routing
82	82	Channel 18	2 (W)
83	83	Channel 19	2 (W)
84	84	Channel 20	2 (W)
85	85	Channel 21	2 (W)
86	86	Channel 22	2 (W)
87	87	Channel 23	2 (W)
88	88	Channel 24	2 (W)
89	89	Channel 25	2 (W)
90	90	Channel 26	2 (W)
91	91	Channel 27	2 (W)
92	92	Channel 28	2 (W)
93	93	Channel 29	2 (W)
94	94	Channel 30	2 (W)
95	95	Channel 31	2 (W)
96	96	Channel 32	2 (W)
97	97	Channel 33	2 (W)
98	98	Channel 34	2 (W)
99	99	Channel 35	2 (W)
100	100	Channel 36	2 (W)
101	101	Channel 37	2 (W)
102	102	Channel 38	2 (W)
103	103	Channel 39	2 (W)
104	104	Channel 40	2 (W)
105	105	Channel 41	2 (W)
106	106	Channel 42	2 (W)
107	107	Channel 43	2 (W)
108	108	Channel 44	2 (W)
109	109	Channel 45	2 (W)
110	110	Channel 46	2 (W)
111	111	Channel 47	2 (W)
112	112	Channel 48	2 (W)
113	113	Channel 49	2 (W)
114	114	Channel 50	2 (W)
115	115	Channel 51	2 (W)
116	116	Channel 52	2 (W)
117	117	Channel 53	2 (W)
118	118	Channel 54	2 (W)
119	119	Channel 55	2 (W)
120	120	Channel 56	2 (W)
121	121	Channel 57	2 (W)
122	122	Channel 58	2 (W)



**Table 7: Mode C (continued)**

Default DMX Start Address	RDM Sub-Device	DALI Control Command	DALI Circuit Routing
123	123	Channel 59	2 (W)
124	124	Channel 60	2 (W)
125	125	Channel 61	2 (W)
126	126	Channel 62	2 (W)
127	127	Channel 63	2 (W)
128	128	Channel 64	2 (W)
129	129	Channel 1	3 (W)
130	130	Channel 2	3 (W)
131	131	Channel 3	3 (W)
132	132	Channel 4	3 (W)
133	133	Channel 5	3 (W)
134	134	Channel 6	3 (W)
135	135	Channel 7	3 (W)
136	136	Channel 8	3 (W)
137	137	Channel 9	3 (W)
138	138	Channel 10	3 (W)
139	139	Channel 11	3 (W)
140	140	Channel 12	3 (W)
141	141	Channel 13	3 (W)
142	142	Channel 14	3 (W)
143	143	Channel 15	3 (W)
144	144	Channel 16	3 (W)
145	145	Channel 17	3 (W)
146	146	Channel 18	3 (W)
147	147	Channel 19	3 (W)
148	148	Channel 20	3 (W)
149	149	Channel 21	3 (W)
150	150	Channel 22	3 (W)
151	151	Channel 23	3 (W)
152	152	Channel 24	3 (W)
153	153	Channel 25	3 (W)
154	154	Channel 26	3 (W)
155	155	Channel 27	3 (W)
156	156	Channel 28	3 (W)
157	157	Channel 29	3 (W)
158	158	Channel 30	3 (W)
159	159	Channel 31	3 (W)
160	160	Channel 32	3 (W)
161	161	Channel 33	3 (W)
162	162	Channel 34	3 (W)
163	163	Channel 35	3 (W)

Default DMX Start Address	RDM Sub-Device	DALI Control Command	DALI Circuit Routing
164	164	Channel 36	3 (W)
165	165	Channel 37	3 (W)
166	166	Channel 38	3 (W)
167	167	Channel 39	3 (W)
168	168	Channel 40	3 (W)
169	169	Channel 41	3 (W)
170	170	Channel 42	3 (W)
171	171	Channel 43	3 (W)
172	172	Channel 44	3 (W)
173	173	Channel 45	3 (W)
174	174	Channel 46	3 (W)
175	175	Channel 47	3 (W)
176	176	Channel 48	3 (W)
177	177	Channel 49	3 (W)
178	178	Channel 50	3 (W)
179	179	Channel 51	3 (W)
180	180	Channel 52	3 (W)
181	181	Channel 53	3 (W)
182	182	Channel 54	3 (W)
183	183	Channel 55	3 (W)
184	184	Channel 56	3 (W)
185	185	Channel 57	3 (W)
186	186	Channel 58	3 (W)
187	187	Channel 59	3 (W)
188	188	Channel 60	3 (W)
189	189	Channel 61	3 (W)
190	190	Channel 62	3 (W)
191	191	Channel 63	3 (W)
192	192	Channel 64	3 (W)
193	193	Channel 1	4 (W)
194	194	Channel 2	4 (W)
195	195	Channel 3	4 (W)
196	196	Channel 4	4 (W)
197	197	Channel 5	4 (W)
198	198	Channel 6	4 (W)
199	199	Channel 7	4 (W)
200	200	Channel 8	4 (W)
201	201	Channel 9	4 (W)
202	202	Channel 10	4 (W)
203	203	Channel 11	4 (W)
204	204	Channel 12	4 (W)



**Table 7: Mode C (continued)**

Default DMX Start Address	RDM Sub-Device	DALI Control Command	DALI Circuit Routing
205	205	Channel 13	4 (W)
206	206	Channel 14	4 (W)
207	207	Channel 15	4 (W)
208	208	Channel 16	4 (W)
209	209	Channel 17	4 (W)
210	210	Channel 18	4 (W)
211	211	Channel 19	4 (W)
212	212	Channel 20	4 (W)
213	213	Channel 21	4 (W)
214	214	Channel 22	4 (W)
215	215	Channel 23	4 (W)
216	216	Channel 24	4 (W)
217	217	Channel 25	4 (W)
218	218	Channel 26	4 (W)
219	219	Channel 27	4 (W)
220	220	Channel 28	4 (W)
221	221	Channel 29	4 (W)
222	222	Channel 30	4 (W)
223	223	Channel 31	4 (W)
224	224	Channel 32	4 (W)
225	225	Channel 33	4 (W)
226	226	Channel 34	4 (W)
227	227	Channel 35	4 (W)
228	228	Channel 36	4 (W)
229	229	Channel 37	4 (W)
230	230	Channel 38	4 (W)
231	231	Channel 39	4 (W)
232	232	Channel 40	4 (W)
233	233	Channel 41	4 (W)
234	234	Channel 42	4 (W)
235	235	Channel 43	4 (W)
236	236	Channel 44	4 (W)
237	237	Channel 45	4 (W)
238	238	Channel 46	4 (W)
239	239	Channel 47	4 (W)
240	240	Channel 48	4 (W)
241	241	Channel 49	4 (W)
242	242	Channel 50	4 (W)
243	243	Channel 51	4 (W)
244	244	Channel 52	4 (W)
245	245	Channel 53	4 (W)

Default DMX Start Address	RDM Sub-Device	DALI Control Command	DALI Circuit Routing
246	246	Channel 54	4 (W)
247	247	Channel 55	4 (W)
248	248	Channel 56	4 (W)
249	249	Channel 57	4 (W)
250	250	Channel 58	4 (W)
251	251	Channel 59	4 (W)
252	252	Channel 60	4 (W)
253	253	Channel 61	4 (W)
254	254	Channel 62	4 (W)
255	255	Channel 63	4 (W)
256	256	Channel 64	4 (W)
257	257: Main	Group 1	All (N)
258	258	Group 2	All (N)
259	259	Group 3	All (N)
260	260	Group 4	All (N)
261	261	Group 5	All (N)
262	262	Group 6	All (N)
263	263	Group 7	All (N)
264	264	Group 8	All (N)
265	265	Group 9	All (N)
266	266	Group 10	All (N)
267	267	Group 11	All (N)
268	268	Group 12	All (N)
269	269	Group 13	All (N)
270	270	Group 14	All (N)
271	271	Group 15	All (N)
272	272	Group 16	All (N)
273	273: Main	Scene (See Chart)	All (N)
274	274	Scene (See Chart)	1 (W)
275	275	Scene (See Chart)	2 (W)
276	276	Scene (See Chart)	3 (W)
277	277	Scene (See Chart)	4 (W)

**Table 8: Mode D**

Default DMX Start Address	RDM Sub-Device	DALI Control Command	DALI Circuit
1	1: Main	Channel 1	1 (W)
2	2	Channel 2	1 (W)
3	3	Channel 3	1 (W)
4	4	Channel 4	1 (W)
5	5	Channel 5	1 (W)
6	6	Channel 6	1 (W)
7	7	Channel 7	1 (W)
8	8	Channel 8	1 (W)
9	9	Channel 9	1 (W)
10	10	Channel 10	1 (W)
11	11	Channel 11	1 (W)
12	12	Channel 12	1 (W)
13	13	Channel 13	1 (W)
14	14	Channel 14	1 (W)
15	15	Channel 15	1 (W)
16	16	Channel 16	1 (W)
17	17	Channel 17	1 (W)
18	18	Channel 18	1 (W)
19	19	Channel 19	1 (W)
20	20	Channel 20	1 (W)
21	21	Channel 21	1 (W)
22	22	Channel 22	1 (W)
23	23	Channel 23	1 (W)
24	24	Channel 24	1 (W)
25	25	Channel 25	1 (W)
26	26	Channel 26	1 (W)
27	27	Channel 27	1 (W)
28	28	Channel 28	1 (W)
29	29	Channel 29	1 (W)
30	30	Channel 30	1 (W)
31	31	Channel 31	1 (W)
32	32	Channel 32	1 (W)
33	33	Channel 33	1 (W)
34	34	Channel 34	1 (W)
35	35	Channel 35	1 (W)
36	36	Channel 36	1 (W)
37	37	Channel 37	1 (W)
38	38	Channel 38	1 (W)
39	39	Channel 39	1 (W)
40	40	Channel 40	1 (W)
41	41	Channel 41	1 (W)

Default DMX Start Address	RDM Sub-Device	DALI Control Command	DALI Circuit
42	42	Channel 42	1 (W)
43	43	Channel 43	1 (W)
44	44	Channel 44	1 (W)
45	45	Channel 45	1 (W)
46	46	Channel 46	1 (W)
47	47	Channel 47	1 (W)
48	48	Channel 48	1 (W)
49	49	Channel 49	1 (W)
50	50	Channel 50	1 (W)
51	51	Channel 51	1 (W)
52	52	Channel 52	1 (W)
53	53	Channel 53	1 (W)
54	54	Channel 54	1 (W)
55	55	Channel 55	1 (W)
56	56	Channel 56	1 (W)
57	57	Channel 57	1 (W)
58	58	Channel 58	1 (W)
59	59	Channel 59	1 (W)
60	60	Channel 60	1 (W)
61	61	Channel 61	1 (W)
62	62	Channel 62	1 (W)
63	63	Channel 63	1 (W)
64	64	Channel 64	1 (W)
65	65	Channel 1	2 (W)
66	66	Channel 2	2 (W)
67	67	Channel 3	2 (W)
68	68	Channel 4	2 (W)
69	69	Channel 5	2 (W)
70	70	Channel 6	2 (W)
71	71	Channel 7	2 (W)
72	72	Channel 8	2 (W)
73	73	Channel 9	2 (W)
74	74	Channel 10	2 (W)
75	75	Channel 11	2 (W)
76	76	Channel 12	2 (W)
77	77	Channel 13	2 (W)
78	78	Channel 14	2 (W)
79	79	Channel 15	2 (W)
80	80	Channel 16	2 (W)
81	81	Channel 17	2 (W)
82	82	Channel 18	2 (W)

**Table 8: Mode D (continued)**

Default DMX Start Address	RDM Sub-Device	DALI Control Command	DALI Circuit
83	83	Channel 19	2 (W)
84	84	Channel 20	2 (W)
85	85	Channel 21	2 (W)
86	86	Channel 22	2 (W)
87	87	Channel 23	2 (W)
88	88	Channel 24	2 (W)
89	89	Channel 25	2 (W)
90	90	Channel 26	2 (W)
91	91	Channel 27	2 (W)
92	92	Channel 28	2 (W)
93	93	Channel 29	2 (W)
94	94	Channel 30	2 (W)
95	95	Channel 31	2 (W)
96	96	Channel 32	2 (W)
97	97	Channel 33	2 (W)
98	98	Channel 34	2 (W)
99	99	Channel 35	2 (W)
100	100	Channel 36	2 (W)
101	101	Channel 37	2 (W)
102	102	Channel 38	2 (W)
103	103	Channel 39	2 (W)
104	104	Channel 40	2 (W)
105	105	Channel 41	2 (W)
106	106	Channel 42	2 (W)
107	107	Channel 43	2 (W)
108	108	Channel 44	2 (W)
109	109	Channel 45	2 (W)
110	110	Channel 46	2 (W)
111	111	Channel 47	2 (W)
112	112	Channel 48	2 (W)
113	113	Channel 49	2 (W)
114	114	Channel 50	2 (W)
115	115	Channel 51	2 (W)
116	116	Channel 52	2 (W)
117	117	Channel 53	2 (W)
118	118	Channel 54	2 (W)
119	119	Channel 55	2 (W)
120	120	Channel 56	2 (W)
121	121	Channel 57	2 (W)
122	122	Channel 58	2 (W)
123	123	Channel 59	2 (W)
124	124	Channel 60	2 (W)

Default DMX Start Address	RDM Sub-Device	DALI Control Command	DALI Circuit
125	125	Channel 61	2 (W)
126	126	Channel 62	2 (W)
127	127	Channel 63	2 (W)
128	128	Channel 64	2 (W)
129	129	Channel 1	3 (W)
130	130	Channel 2	3 (W)
131	131	Channel 3	3 (W)
132	132	Channel 4	3 (W)
133	133	Channel 5	3 (W)
134	134	Channel 6	3 (W)
135	135	Channel 7	3 (W)
136	136	Channel 8	3 (W)
137	137	Channel 9	3 (W)
138	138	Channel 10	3 (W)
139	139	Channel 11	3 (W)
140	140	Channel 12	3 (W)
141	141	Channel 13	3 (W)
142	142	Channel 14	3 (W)
143	143	Channel 15	3 (W)
144	144	Channel 16	3 (W)
145	145	Channel 17	3 (W)
146	146	Channel 18	3 (W)
147	147	Channel 19	3 (W)
148	148	Channel 20	3 (W)
149	149	Channel 21	3 (W)
150	150	Channel 22	3 (W)
151	151	Channel 23	3 (W)
152	152	Channel 24	3 (W)
153	153	Channel 25	3 (W)
154	154	Channel 26	3 (W)
155	155	Channel 27	3 (W)
156	156	Channel 28	3 (W)
157	157	Channel 29	3 (W)
158	158	Channel 30	3 (W)
159	159	Channel 31	3 (W)
160	160	Channel 32	3 (W)
161	161	Channel 33	3 (W)
162	162	Channel 34	3 (W)
163	163	Channel 35	3 (W)
164	164	Channel 36	3 (W)
165	165	Channel 37	3 (W)
166	166	Channel 38	3 (W)

**Table 8: Mode D (continued)**

Default DMX Start Address	RDM Sub-Device	DALI Control Command	DALI Circuit
167	167	Channel 39	3 (W)
168	168	Channel 40	3 (W)
169	169	Channel 41	3 (W)
170	170	Channel 42	3 (W)
171	171	Channel 43	3 (W)
172	172	Channel 44	3 (W)
173	173	Channel 45	3 (W)
174	174	Channel 46	3 (W)
175	175	Channel 47	3 (W)
176	176	Channel 48	3 (W)
177	177	Channel 49	3 (W)
178	178	Channel 50	3 (W)
179	179	Channel 51	3 (W)
180	180	Channel 52	3 (W)
181	181	Channel 53	3 (W)
182	182	Channel 54	3 (W)
183	183	Channel 55	3 (W)
184	184	Channel 56	3 (W)
185	185	Channel 57	3 (W)
186	186	Channel 58	3 (W)
187	187	Channel 59	3 (W)
188	188	Channel 60	3 (W)
189	189	Channel 61	3 (W)
190	190	Channel 62	3 (W)
191	191	Channel 63	3 (W)
192	192	Channel 64	3 (W)
193	193	Channel 1	4 (W)
194	194	Channel 2	4 (W)
195	195	Channel 3	4 (W)
196	196	Channel 4	4 (W)
197	197	Channel 5	4 (W)
198	198	Channel 6	4 (W)
199	199	Channel 7	4 (W)
200	200	Channel 8	4 (W)
201	201	Channel 9	4 (W)
202	202	Channel 10	4 (W)
203	203	Channel 11	4 (W)
204	204	Channel 12	4 (W)
205	205	Channel 13	4 (W)
206	206	Channel 14	4 (W)
207	207	Channel 15	4 (W)
208	208	Channel 16	4 (W)

Default DMX Start Address	RDM Sub-Device	DALI Control Command	DALI Circuit
209	209	Channel 17	4 (W)
210	210	Channel 18	4 (W)
211	211	Channel 19	4 (W)
212	212	Channel 20	4 (W)
213	213	Channel 21	4 (W)
214	214	Channel 22	4 (W)
215	215	Channel 23	4 (W)
216	216	Channel 24	4 (W)
217	217	Channel 25	4 (W)
218	218	Channel 26	4 (W)
219	219	Channel 27	4 (W)
220	220	Channel 28	4 (W)
221	221	Channel 29	4 (W)
222	222	Channel 30	4 (W)
223	223	Channel 31	4 (W)
224	224	Channel 32	4 (W)
225	225	Channel 33	4 (W)
226	226	Channel 34	4 (W)
227	227	Channel 35	4 (W)
228	228	Channel 36	4 (W)
229	229	Channel 37	4 (W)
230	230	Channel 38	4 (W)
231	231	Channel 39	4 (W)
232	232	Channel 40	4 (W)
233	233	Channel 41	4 (W)
234	234	Channel 42	4 (W)
235	235	Channel 43	4 (W)
236	236	Channel 44	4 (W)
237	237	Channel 45	4 (W)
238	238	Channel 46	4 (W)
239	239	Channel 47	4 (W)
240	240	Channel 48	4 (W)
241	241	Channel 49	4 (W)
242	242	Channel 50	4 (W)
243	243	Channel 51	4 (W)
244	244	Channel 52	4 (W)
245	245	Channel 53	4 (W)
246	246	Channel 54	4 (W)
247	247	Channel 55	4 (W)
248	248	Channel 56	4 (W)
249	249	Channel 57	4 (W)
250	250	Channel 58	4 (W)

**Table 8: Mode D (continued)**

Default DMX Start Address	RDM Sub-Device	DALI Control Command	DALI Circuit
251	251	Channel 59	4 (W)
252	252	Channel 60	4 (W)
253	253	Channel 61	4 (W)
254	254	Channel 62	4 (W)
255	255	Channel 63	4 (W)
256	256	Channel 64	4 (W)
257	257: Main	Group 1	1 (W)
258	258	Group 2	1 (W)
259	259	Group 3	1 (W)
260	260	Group 4	1 (W)
261	261	Group 5	1 (W)
262	262	Group 6	1 (W)
263	263	Group 7	1 (W)
264	264	Group 8	1 (W)
265	265	Group 9	1 (W)
266	266	Group 10	1 (W)
267	267	Group 11	1 (W)
268	268	Group 12	1 (W)
269	269	Group 13	1 (W)
270	270	Group 14	1 (W)
271	271	Group 15	1 (W)
272	272	Group 16	1 (W)
273	273	Group 1	2 (W)
274	274	Group 2	2 (W)
275	275	Group 3	2 (W)
276	276	Group 4	2 (W)
277	277	Group 5	2 (W)
278	278	Group 6	2 (W)
279	279	Group 7	2 (W)
280	280	Group 8	2 (W)
281	281	Group 9	2 (W)
282	282	Group 10	2 (W)
283	283	Group 11	2 (W)
284	284	Group 12	2 (W)
285	285	Group 13	2 (W)
286	286	Group 14	2 (W)
287	287	Group 15	2 (W)
288	288	Group 16	2 (W)
289	289	Group 1	3 (W)
290	290	Group 2	3 (W)
291	291	Group 3	3 (W)
292	292	Group 4	3 (W)

Default DMX Start Address	RDM Sub-Device	DALI Control Command	DALI Circuit
293	293	Group 5	3 (W)
294	294	Group 6	3 (W)
295	295	Group 7	3 (W)
296	296	Group 8	3 (W)
297	297	Group 9	3 (W)
298	298	Group 10	3 (W)
299	299	Group 11	3 (W)
300	300	Group 12	3 (W)
301	301	Group 13	3 (W)
302	302	Group 14	3 (W)
303	303	Group 15	3 (W)
304	304	Group 16	3 (W)
305	305	Group 1	4 (W)
306	306	Group 2	4 (W)
307	307	Group 3	4 (W)
308	308	Group 4	4 (W)
309	309	Group 5	4 (W)
310	310	Group 6	4 (W)
311	311	Group 7	4 (W)
312	312	Group 8	4 (W)
313	313	Group 9	4 (W)
314	314	Group 10	4 (W)
315	315	Group 11	4 (W)
316	316	Group 12	4 (W)
317	317	Group 13	4 (W)
318	318	Group 14	4 (W)
319	319	Group 15	4 (W)
320	320	Group 16	4 (W)
321	321: Main	Scene (See Chart)	All (N)
322	322	Scene (See Chart)	1 (W)
323	323	Scene (See Chart)	2 (W)
324	324	Scene (See Chart)	3 (W)
325	325	Scene (See Chart)	4 (W)



## Scene Control

It should be noted that, for Scene control, the particular Scene that is selected is defined by the DMX value as follows:

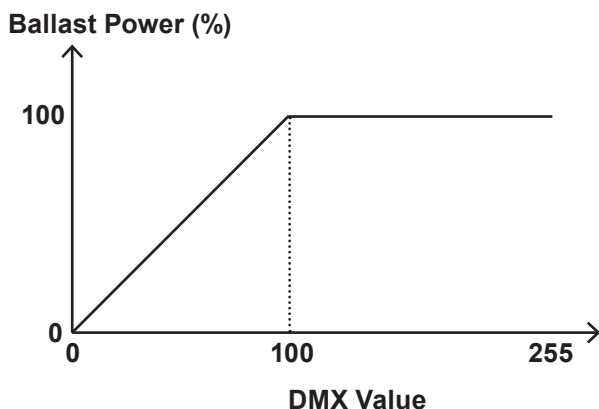
DMX Value	Scene
01-15	1
16-31	2
32-47	3
48-63	4
64-79	5
80-95	6
96-111	7
112-127	8
128-143	9
144-159	10
160-175	11
176-191	12
192-207	13
208-223	14
224-239	15
240-255	16

**Chart: Scene Conversion**

N.B. A DMX value of zero results in no Scene commands.

## Dimming Curve Translation

To force Rail-DMX-DALI to output a linear dimming curve, set DIP Switch 5 to be ON. As can be seen from the curve below, the power level reaches its maximum value of 100% at a DMX value of 100. This ensures that the desired power level can be set very simply by dialling it in as a DMX value.



The table below shows how the DMX control values are translated within the product to achieve this outcome.

The table expresses the function:

$$y = 10 \exp [(3/253)(x-1) - 1]$$

where x is the DALI value and y is the DMX value. It is derived from the DALI specification.

DMX Value (equals % Ballast Power)	DALI Value
0	0
1	86
2	111
3	126
4	137
5	145
6	151
7	157
8	162
9	166
10	170
11	174
12	177
13	180
14	182
15	185
16	187
17	190
18	192
19	194
20	196
21	197
22	199
23	201
24	202
25	204
26	205
27	207
28	208
29	209
30	210
31	212
32	213
33	214
34	215



DMX Value (equals % Ballast Power)	DALI Value
35	216
36	217
37	218
38	219
39	220
40	221
41	222
42	223
43	223
44	224
45	225
46	226
47	227
48	227
49	228
50	229
51	230
52	230
53	231
54	232
55	232
56	233
57	234
58	234
59	235
60	235
61	236
62	237
63	237
64	238
65	238
66	239
67	239
68	240
69	240
70	241
71	241
72	242
73	242
74	243
75	243
76	244

DMX Value (equals % Ballast Power)	DALI Value
77	244
78	245
79	245
80	246
81	246
82	247
83	247
84	248
85	248
86	248
87	249
88	249
89	250
90	250
91	251
92	251
93	251
94	252
95	252
96	253
97	253
98	253
99	254
100	254

**When DIP Switch 5 is OFF, the actual DMX level number is sent to the DALI ballast.**

## Troubleshooting

No power light	<ol style="list-style-type: none"> <li>1. Check that the DC power wires are connected to the correct terminals and correct polarity.</li> <li>2. Check power is switched on.</li> <li>3. Disconnect all non power cables. Switch off product and leave for 20 minutes (this allows the thermal fuse to reset). Switch on. If power light illuminates, it is likely that an external fault or wiring error is causing the problem.</li> </ol>
No DALI ballasts respond to any commands	<ol style="list-style-type: none"> <li>1. Ballasts not powered on.</li> <li>2. No DALI bus PSU present.</li> <li>3. Conversion can be disabled by setting the relevant start address to 512. Check that none of the sub-device start addresses are set to 512.</li> </ol>
DALI ballasts respond to Broadcast and Group commands only	<ol style="list-style-type: none"> <li>1. The DALI ballasts have not been commissioned. Use a DALI tool such as DALI-Scope to commission the ballasts.</li> </ol>
DALI ballasts do not respond to Group commands	<ol style="list-style-type: none"> <li>1. Check that the ballasts have been assigned to groups.</li> </ol>
DALI ballasts do not respond to Scene commands	<ol style="list-style-type: none"> <li>1. Check that the ballasts have been programmed with scenes.</li> </ol>
All four DALI circuits respond to same DMX channels	<ol style="list-style-type: none"> <li>1. Product set to Narrow mode. Review Tables in 'Mapping Modes'.</li> <li>2. Advanced start address configuration has been implemented using RDM. To reset to factory defaults (sequential addressing) use RDM to set the start address of the root device. (See 'Start Address Programming' point 1).</li> </ol>
DALI ballasts are missing steps	<ol style="list-style-type: none"> <li>1. This is generally caused by over use of DALI channel addressing. Change to Group or Scene addressing.</li> </ol>
I send a new value to the ballast but it fades to the new level	<ol style="list-style-type: none"> <li>1. Most DALI ballasts have a Fade time function that determines how quickly a ballast can change level. Try changing this value.</li> </ol>
DALI ballasts behaving erratically	<ol style="list-style-type: none"> <li>1. This is most often caused when the DMX is unintentionally transmitting Channel, Group or Scene commands at the same time. Review your DMX map.</li> <li>2. Can be caused by having a ballast assigned to multiple groups and then DMX transmitting differing values to those addresses.</li> </ol>

# Rail-DMX-DALI Specification

<b>Mechanical</b> <ul style="list-style-type: none"><li>• Housing: DIN rail case</li><li>• Material: Lexan Plastic - UL94-V0 rated</li><li>• Overall dimensions: 90 mm (H) x 88 mm (W) x 58 mm (D)</li><li>• Weight: 0.2 kg</li><li>• Mounting: 35 mm DIN rail or surface mount</li><li>• Country of manufacture: UK</li></ul>	<b>DALI Outputs</b> <ul style="list-style-type: none"><li>• Output mode: optically isolated</li></ul>
<b>Environmental</b> <ul style="list-style-type: none"><li>• Operating temperature: 0°C to 40°C</li><li>• Storage temperature: -10°C to +50°C</li><li>• Operating relative humidity (max): 80% non-condensing</li><li>• IP rating: IP20 indoor use only</li><li>• Certification: CE, WEEE, RoHS</li><li>• Warranty: 2-year (return to base)</li></ul>	<b>DMX512 Input</b> <ul style="list-style-type: none"><li>• Input mode: non-isolated</li><li>• Input ESD protection: 12 kV</li><li>• Input voltage protection: +/- 80 V</li></ul>
<b>Power &amp; Electrical</b> <ul style="list-style-type: none"><li>• Input voltage: 9-24 VDC</li><li>• Input connector: (1) 2-pin screw terminal</li><li>• Input power (max): 10 W</li><li>• Duty cycle: 80% @ 25°C</li><li>• DC fuse: internal resettable fuse for control electronics</li></ul>	<b>Control</b> <ul style="list-style-type: none"><li>• Input Protocols: DMX512, DMX512 (1990), DMX512-A, RDM V1.0 (E1.20 - 2006 ESTA Standard)</li><li>• Output Protocols: DALI</li></ul>
	<b>Configuration</b> <ul style="list-style-type: none"><li>• DIP Switch</li><li>• RDM configuration</li></ul>
	<b>Data Connections</b> <ul style="list-style-type: none"><li>• 3-pin Screw Terminal DMX Input (1 no.)</li><li>• 3-pin Screw Terminal DMX Loop (1 no.)</li><li>• 2-pin Screw Terminal DALI Outputs (4 no.)</li></ul>
	<b>LED Indication</b> <ul style="list-style-type: none"><li>• Power / DMX input</li></ul>
	<b>Package Contents</b> <ul style="list-style-type: none"><li>• Rail-DMX-DALI</li><li>• User guide</li></ul>
	<b>Ordering Info</b> <ul style="list-style-type: none"><li>• Product code: Rail-DMX-DALI</li></ul>
	<b>Accessories (not included)</b> <ul style="list-style-type: none"><li>• PSU-24-2-DR</li><li>• Rail-PSU-D4</li><li>• Jump-Start</li></ul>

## CE Compliance

Rail-DMX-DALI is CE compliant when installed in a shielded and earthed metal case

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## Warranty

All products are covered from date of purchase by a two year return to base warranty.

By return to base, we mean that the customer is responsible for all costs of transport to and from Artistic Licence.

Returns will not be accepted without prior authorisation. In order to discuss a request to return goods, please email:

[Sales@ArtisticLicence.com](mailto:Sales@ArtisticLicence.com)

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## Compliance

All Products manufactured or sold by Artistic Licence Engineering Ltd are fully compliant with the appropriate CE and RoHS regulations. Product specific information is available on request.

## Waste Electrical & Electronic Equipment (WEEE)

Artistic Licence is a member of a WEEE compliance scheme and will happily recycle any of our products that you, at your expense, return to us.



### Artistic Licence

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Due to our policy of continuing product improvement  
specifications are subject to change without notice

