SELV

■ Features

· Universal AC input / Full range (up to 305VAC)
· Convert DALI signal to PWM signal
· 4 DALI addressable output channels
· Built-in push dim function
· Comply with DALI standards (IEC62386-101, 102, 207)
· DALI address selectable by jumper
· Linear or logarithm dimming curve selectable (comply with IEC62386-207)
· Dimming range : 1 ~ 100%
· Built-in relay for ON/OFF control of LED power supply
· Fully isolated plastic case
· Class Ⅱ power unit, no FG
· IP20 design
· Power consumption < 0.5W (Note.1)
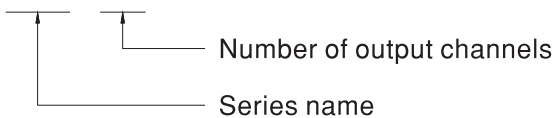· 3 years warranty

■ Applications

· Indoor lighting
· Office lighting
· Decorative lighting
· Input signal : DALI or push dim
  Output signal : open collector PWM signal

■ Description

DAP-04EU is a "DALI signal to PWM signal" converter, specifically working with the MEAN WELL AC/DC LED power supplies with 3-in-1 dimming function (1~10V / PWM / Resistance).

■ Model Encoding

DAP - 04 EU

Number of output channels

Series name

SPECIFICATION

MODEL		DAP-04EU
OUTPUT	NUMBER OF OUTPUT CHANNELS	4
	OUTPUT SIGNAL	PWM, 1KHz (Typ.)
	Nr. of DALI address selectable	4 or 1 DALI address selectable by jumper ; Factory setting is 4 address
	DIMMING RANGE	1 ~ 100%
INPUT	VOLTAGE RANGE	90 ~ 305VAC 127 ~ 431VDC [DC input operation possible by connecting AC/L(+), AC/N(-)]
	FREQUENCY RANGE	47 ~ 63Hz
	AC CURRENT (Typ.)	0.1A
	INRUSH CURRENT (Typ.)	COLD START 15A(twidth=500μs measured at 50% Ipeak) at 230VAC
	LEAKAGE CURRENT	<0.5mA / 240VAC
	POWER CONSUMPTION (Typ.)	0.5W
	INPUT SIGNAL	DALI or push dim
FUNCTION	RELAY SWITCH	240VAC / 8A, ON / OFF control refer to DIM1
ENVIRONMENT	WORKING TEMP.	-30~ +60℃
	WORKING HUMIDITY	20 ~ 90% RH non-condensing
	STORAGE TEMP., HUMIDITY	-40 ~ +80℃, 10 ~ 95% RH
	VIBRATION	10 ~ 500Hz, 2G 10min./1cycle, period for 60min. each along X, Y, Z axes
SAFETY & EMC	SAFETY STANDARDS	EN61347-1, EN61347-2-11, EN61058-1 Clause 8/17/20/25 approved
	DALI STANDARDS	Comply with IEC62386-101, 102, 207
	WITHSTAND VOLTAGE	I/P-O/P:3.75KVAC
	ISOLATION RESISTANCE	I/P-O/P:>100M Ohms / 500VDC / 25℃ / 70% RH
	EMC EMISSION	Compliance to EN55015, EN61000-3-2,3
	EMC IMMUNITY	Compliance to EN61000-4-2,3,4,5,6,8,11, EN61547 light industry level (surge 2KV), criteria A
OTHERS	MTBF	246.9K hrs min. MIL-HDBK-217F (25℃)
	DIMENSION	165*46*23mm (L*W*H)
	PACKING	0.16Kg; 84pcs/14.4Kgs/1.14CUFT
NOTE		1. Power consumption<0.5W is measured at 230VAC.

■ Block Diagram
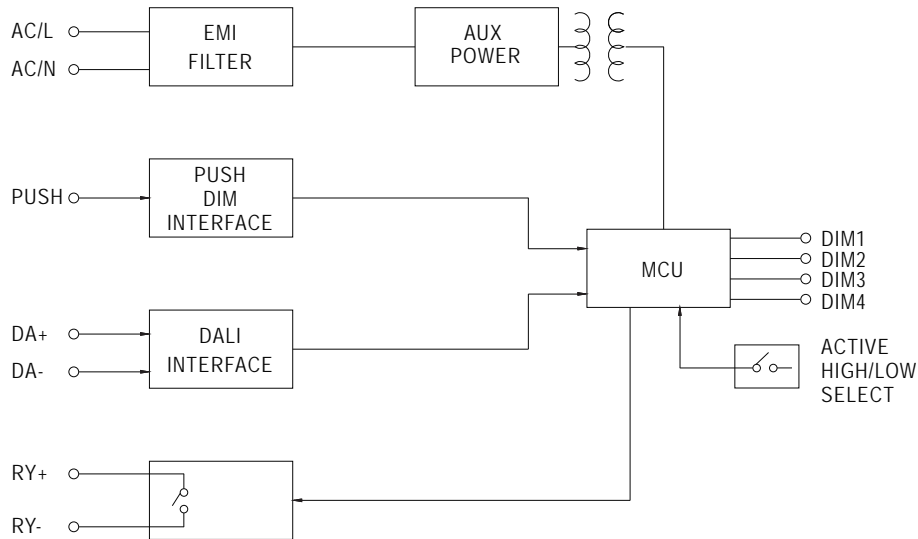
■ DIMMING OPERATION

※ PUSH dim(primary side)

| Function	Pushing time
No change of state	<0.05 sec.
Turn ON-OFF	0.1~1 sec.
Dimming up or down	1.5~10 sec.
Setting light to 100%	>11 sec.

· Maximum length of the cable, from push button to last driver, is 20 meter.
· Factory default dimming setting : 100%.
· Every long pushing action will change the dimming direction.

※ DALI interface(primary side)
· DALI protocol including 16 groups and 64 addresses.

■ Connection of Dimming Operation

· DALI Dimming solution :

DAP-04EU with MEAN WELL's LED power supply

MEAN WELL's AC/DC LED PSU

LED Lighting Fixture

DAP-04EU
(DALI-PWM signal converter)
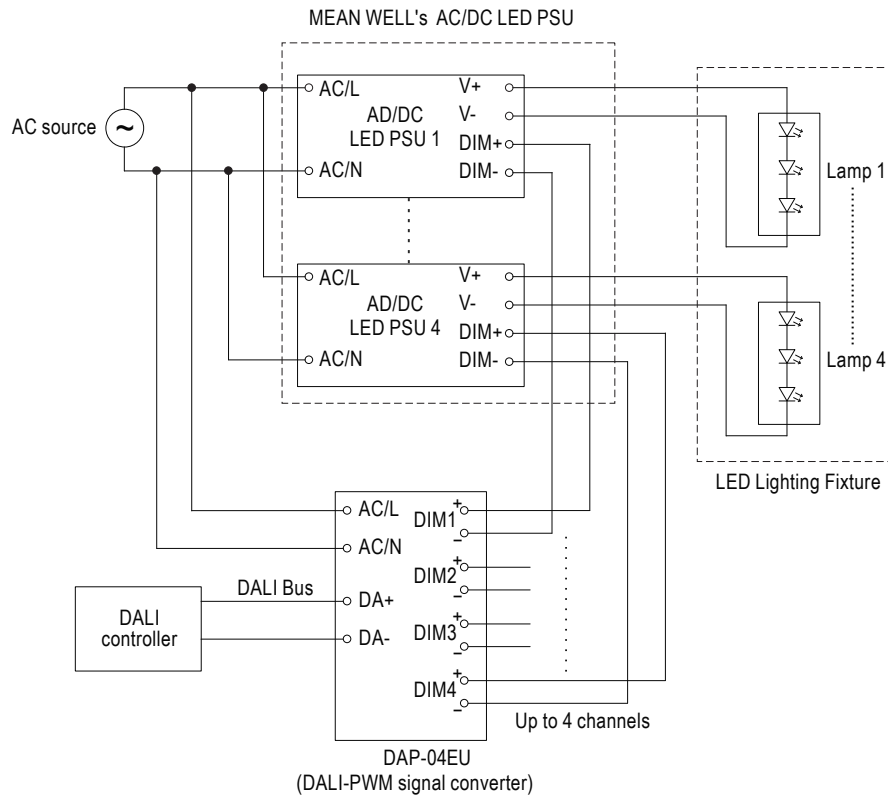
※Note: Choose a suitable cable for connecting the DAP-04EU and DALI controller and make sure the maximum voltage drop between these two units should not be higher than 2V. (Maximum cable length for 1.5mm^2 cables is 300m.)

· Push Dimming Solution :

DAP-04EU with MEAN WELL's LED power supply

MEAN WELL's AC/DC LED PSU

LED Lighting Fixture

DAP-04EU
(DALI-PWM signal converter)
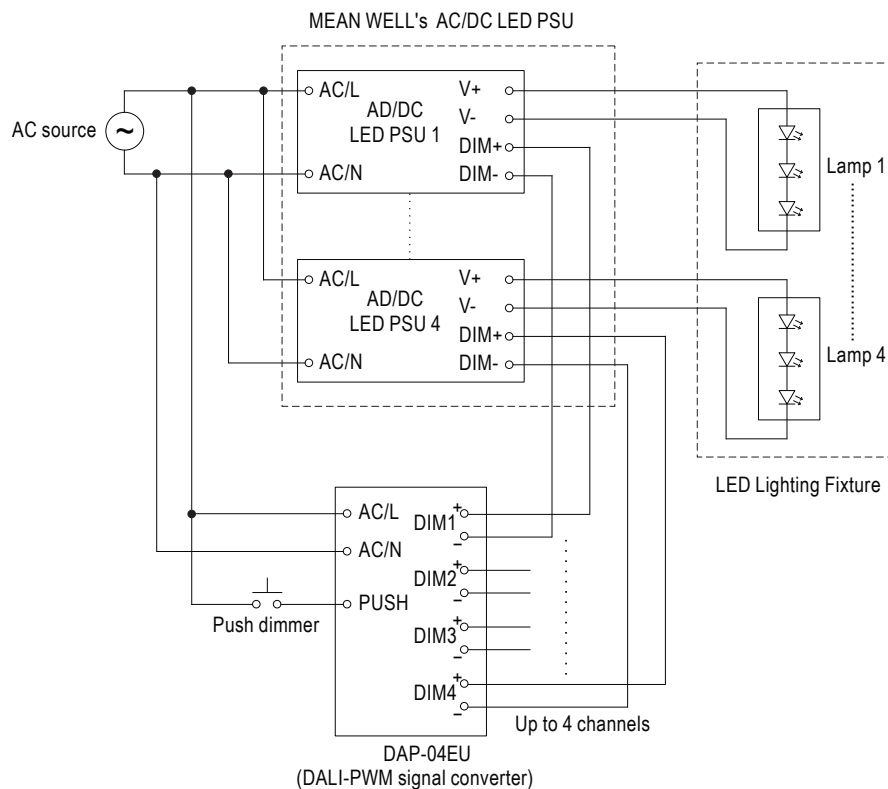
※Note: Only use Normally Open Push Button without light indicator .

■ Dimming with LED PSU ON/OFF

· The DAP-04EU is equipped with a relay that can be used to turn ON/OFF MEAN WELL LED PSUs. The relay is in the closed position when the DIM1 generates dimming signal; the relay is in the open position when there is no output signal on the DIM1.

Figure 1

DAP-04EU
(DALI-PWM signal converter)
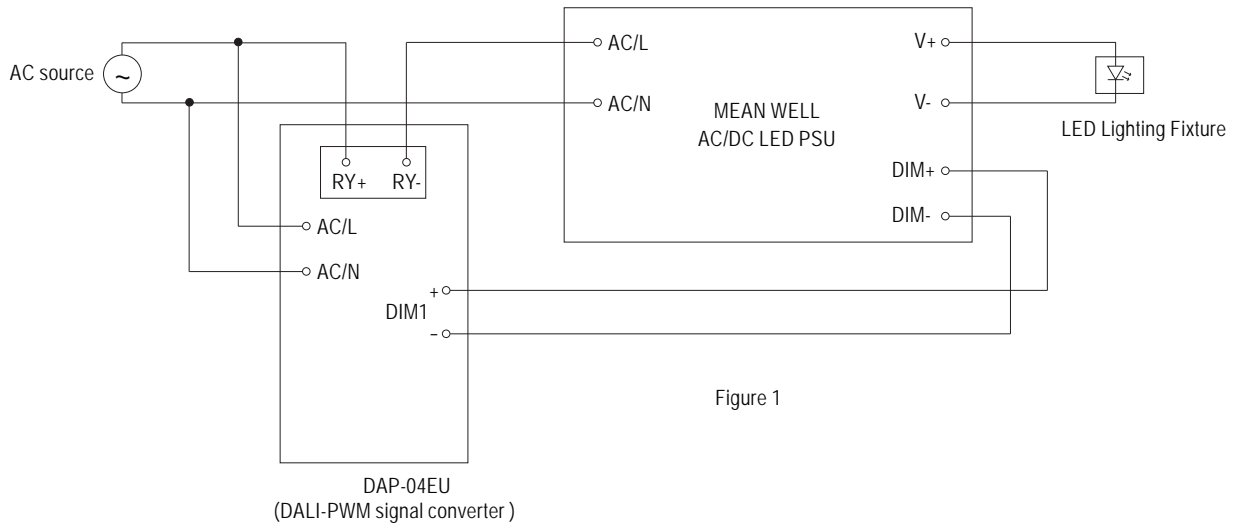
· An additional magnetic switch is needed when the total input current of the selected LED PSUs is higher than 8A or used with LED PSUs whose inrush current is greater than 50A, please refer to the figure 2.

Figure 2

DAP-04EU
(DALI-PWM signal converter)
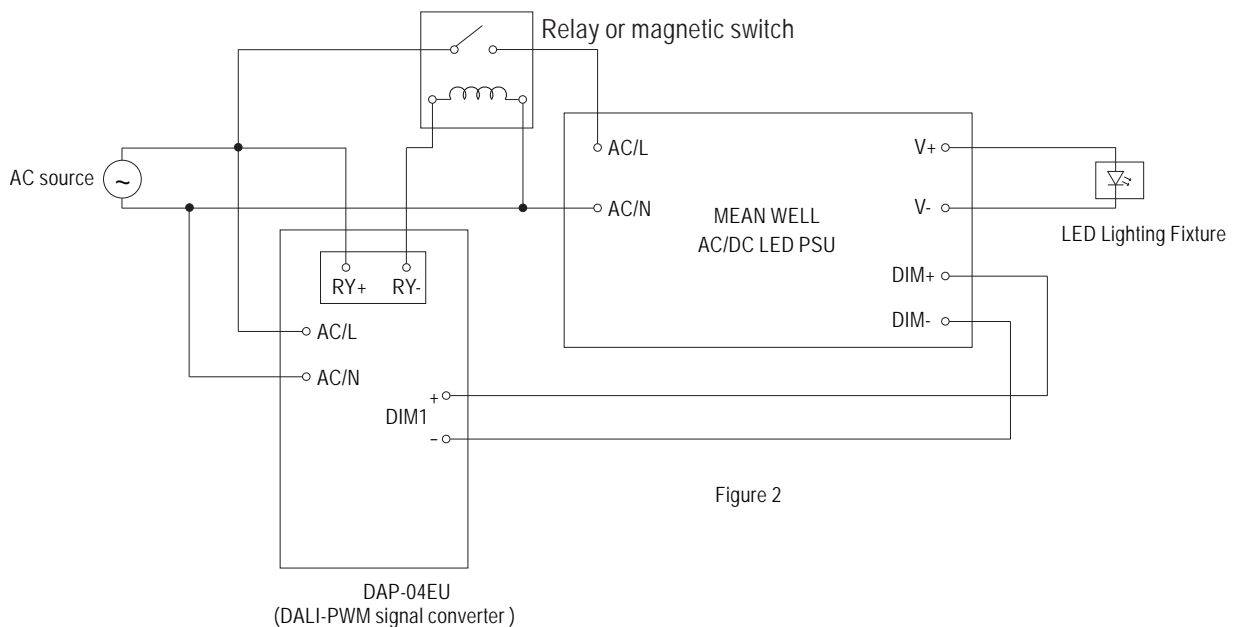
■ **SYNCHRONIZATION OPERATION**

· DAP-04EU provides 4-channel outputs; every channel controls up to 20 units of MEAN WELL LED PSU.
The 4 channels can thus control up to 80 units of MEAN WELL LED PSU. (Note. 1)
· The dimming percentage of the MEAN WELL LED PSUs controlled by the same channel of DAP-04EU is the same.
The dimming percentage per DAP-04EU channel can be controlled independently.
· The maximum allowable voltage drop between the DAP-04EU and LED PSUs should not be higher than 0.5V.

DAP-04EU
(DALI-PWM signal converter)
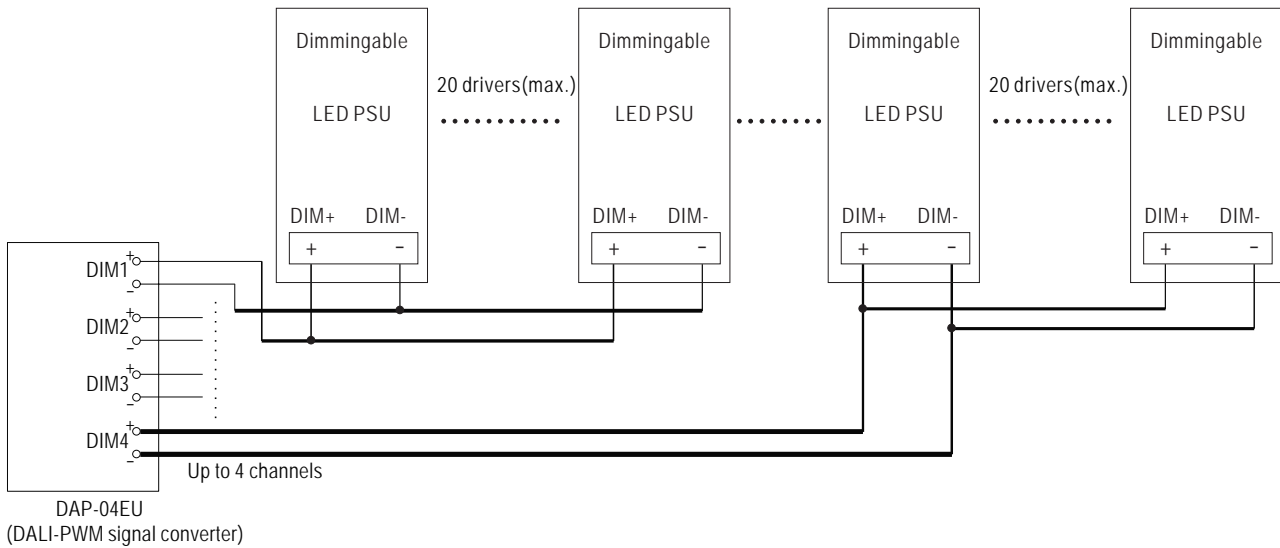
Note. 1 : Light intensity of LEDs in the same group may be decreased when one of the LED PSUs is AC OFF.

■ Mechanical Specification

Case No.DAP-04   Unit:mm
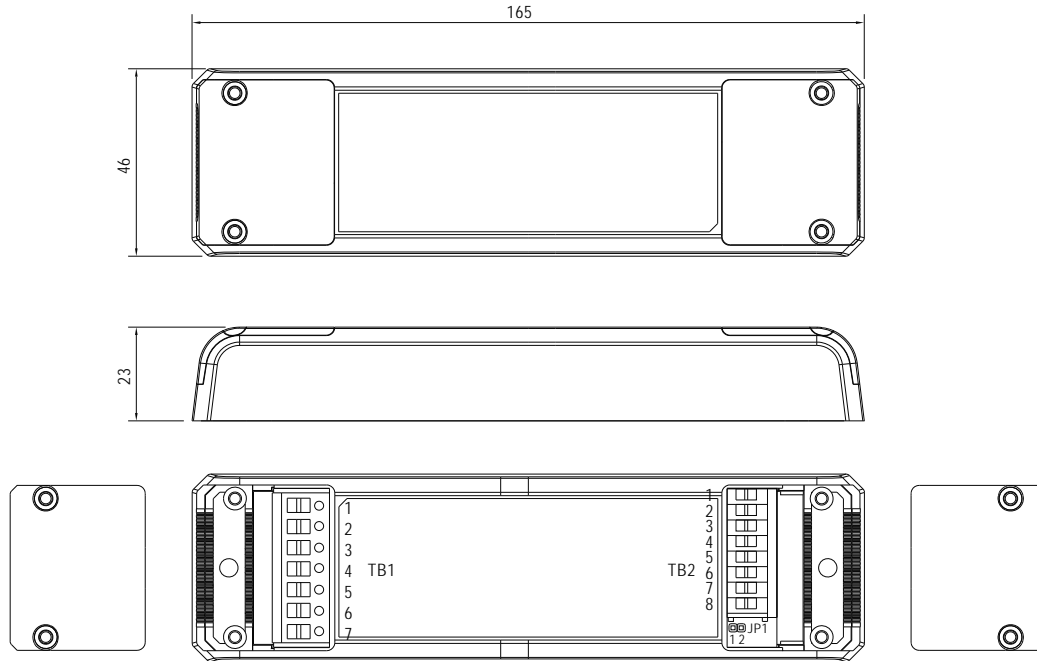
Terminal Pin No. Assignment(TB1)

Pin No.	Assignment	Pin No.	Assignment
1	AC/L	5	DA-
2	AC/N	6	RY+
3	PUSH	7	RY-
4	DA+		

Terminal Pin No. Assignment(TB2)

Pin No.	Assignment	Pin No.	Assignment
1	DIM1+	5	DIM3+
2	DIM1-	6	DIM3-
3	DIM2+	7	DIM4+
4	DIM2-	8	DIM4-

Terminal Pin No. Assignment(JP1)

Pin No.	Assignment
1,2	DALI Nr.

■ Function Description of TB1

Pin No.	Function	Description
1	AC/L	AC Line connection.
2	AC/N	AC Neutral connection.
3	PUSH	Dimming input. One pushbutton connected between the PUSH and AC/L.
4	DA+	DALI Signal positive.
5	DA-	DALI Signal negative.
6,7	RY+ / RY-	Relay contact rating(max.) : 240VAC / 8A resistive "Short" when DIM1 output duty cycle >0 ; "Open" when DIM1 output duty cycle=0

■ Function Description of TB2

Pin No.	Function	Description
1,3,5,7	DIM+	Dimming output Connect to DIM+(Blue) line of dimmingable LED power.
2,4,6,8	DIM-	Dimming output Connect to DIM-(White) line of dimmingable LED power.

■ Function Description of JP1

Pin No.	Function	Description
1,2	DALI Nr.	Nr. of DALI address shown on DALI BUS Short : 4 Open : 1 Factory setting : 4

■ Installation Manual

Please refer to : http://www.meanwell.com/search/dap-04/DAP-04.pdf

11/Dec/2014

DAP-04EU features

Preface:

The standard DAP-04 is a nice device to upgrade the existing Mean Well LED driver with 3-in-1 dimming function to DALI driver. Another feature of using DAP-04 is to have push dimming function which could be very useful for home lighting application.

The standard DAP-04 has designed to have four channel outputs. Each channel represents one DALI address. Therefore 4 DALI address in total can be found on the DALI environment. Only channel 1 has possibility to use relay for which it is used to AC switch On/Off the corresponding LED driver. Other three channels have unfortunately not equipped with such relay due to limited space. For this reason, some applications only connect the channel 1 and leave other channels open. However, the DALI controller still can search four addresses out of the single unit of DAP-04. It means three unused addressed are occupied by the DAP-04 and therefore the DALI system is not used efficiently.

The min dimming level of DAP-04 is set to 0.8% by default. In case it is used with Mean Well LED driver with 3-in-1 dimming function, user may find the dimming response is slow especially in low dimming level.

The DAP-04EU is designed to solve two issues described above.

New features:

1) **4 or 1 DALI address selectable by jumper JP1. Default is set at 4 addresses.**

The standard DAP can select the output PWM dimming signal high/low by JP1. However such function is not very practical and it is better to use same JP1 for other function. The new firmware is designed to have 4 DALI address by default. In case JP1 jumper (red rectangle in the figure) is removed, the DALI address is reduced to 1 address and also only channel 1 has output PWM dimming signal.
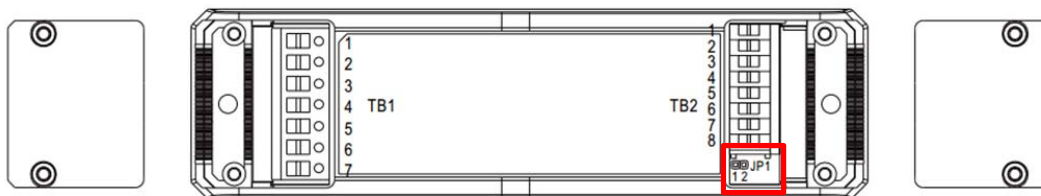
2) **Programmable minimum push dim level via DALI. Default min push dim level is set at 10%.**

Slow push dim response of standard DAP-04 is due to following reasons:

a) The min. push dim level of DAP-04 is 0.8%.

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b) The fade rate of push dim is set at 29.16 step/sec.
c) The generic min dim level of MW LED driver without any problem is 10% while the min dim level of new MW LED driver (e.g. NPF, PWM, LCM series) is 6%.
d) The push dim response is logarithmic. In the 8 bit dimming system (e.g. DALI system), the 0.8% light output is corresponding to 77 steps (shown in appendix) while the 6% is at 151 steps and 10% is at 170 steps.
e) In case the user would like to dim up from 0.8 to 6%, it means that the step is going up from 77 to 170 and the fade rate is 29.16 step/sec depicting that the time is (151-77)/29=2.5 seconds.
f) It means the user has to wait for 2.5 seconds and see nothing change due to the characteristic of LED driver. In case the dimmed level is higher than the physical dim level of LED driver e.g. 6% for NPF series, then the user can see the difference in light.

The solution is to set the push dimming minimum dimming level to at least the physical dimming level of LED driver. Therefore, the new firmware set the default min. push dim level set at 10% which will improve the dimming experience using push dim. Furthermore, minimum push dimming level is linked with DALI minimum dimming level. It means the minimum dimming level of DAP-04EU is set at 10% as well. In case the user would like to get back to 0.8%, it can be changed via DALI command.

Summary:

DAP-04EU with new firmware helps to enhance user experience and dimming performance with following features.

1) **4 or 1 DALI address selectable by jumper JP1. Default is 4 address.**
2) **Better push dimming performance by setting both push diming and DALI minimum dimming level at 10%. The parameter is programmable via DALI command.**

Please contact your sales representative at MWEU for further information.

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Appendix:

A logarithmic dimming curve from 0.1% to 100% shall be defined according to the formula:

$$X(n) = 10^{\frac{n-1}{253/3} - 1}$$

$$\left| \frac{X(n) - X(n+1)}{X(n)} \right| = constant = 2.8\%$$

where *X(n)* represents dimming level and *n* represents the step.
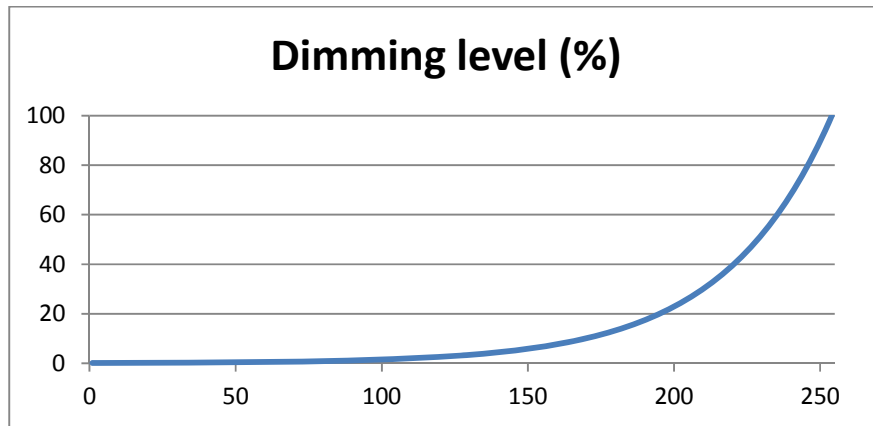
The calculated result based on above formula is listed in below for reference.

Step	Dimming level (%)
1	0,1
2	0,102767953
3	0,105612522
4	0,108535828
5	0,111540049
6	0,114627425
7	0,117800259
8	0,121060915
9	0,124411825
10	0,127855486
11	0,131394466
12	0,135031404
13	0,13876901
14	0,142610072
15	0,146557452

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16	0,150614094
17	0,154783021
18	0,159067343
19	0,163470253
20	0,167995033
21	0,172645058
22	0,177423792
23	0,1823348
24	0,187381742
25	0,192568381
26	0,197898584
27	0,203376325
28	0,209005687
29	0,214790867
30	0,220736178
31	0,226846052
32	0,233125045
33	0,239577837
34	0,24620924
35	0,253024197
36	0,260027789
37	0,267225237
38	0,274621907
39	0,282223313
40	0,290035122
41	0,298063159
42	0,306313408
43	0,314792021
44	0,323505317
45	0,332459793
46	0,341662125
47	0,351119173
48	0,360837988
49	0,370825815
50	0,381090101
51	0,391638497
52	0,402478868
53	0,413619295
54	0,425068085
55	0,436833771
56	0,448925126

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57	0,461351164
58	0,474121149
59	0,487244601
60	0,500731304
61	0,514591313
62	0,528834961
63	0,543472866
64	0,558515941
65	0,573975402
66	0,589862773
67	0,606189899
68	0,622968953
69	0,640212443
70	0,657933225
71	0,676144509
72	0,694859874
73	0,714093271
74	0,73385904
75	0,754171915
76	0,775047042
77	0,796499983
78	0,818546731
79	0,841203722
80	0,864487849
81	0,888416469
82	0,913007423
83	0,938279042
84	0,964250168
85	0,990940163
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87	1,046556901
88	1,075525108
89	1,105295141
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91	1,167330078
92	1,19964123
93	1,232846739
94	1,266971362
95	1,302040538
96	1,338080413
97	1,375117854

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137	4,098719721
138	4,21217037

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174	11,25598224
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177	12,21677349
178	12,55492808
179	12,90244263

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202	24,1768218
203	24,84602495
204	25,53375133
205	26,24051365
206	26,96683883
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210	30,07882518
211	30,91139303
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215	34,47858286
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217	36,41370103
218	37,42161528
219	38,45742814
220	39,5219118

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234	57,92230682
235	59,52556925
236	61,17320924
237	62,86645513
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243	74,05684692
244	76,10670589
245	78,21330401
246	80,37821177
247	82,60304317
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249	87,23915743
250	89,65389661
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253	97,30659874
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