

LoRaWAN™ LUMINAIRE CONTROLLER IP68 UL2011



LoRaWAN™ Luminaire Controller is a remote controlling device for LED and HID luminaries using 0...10V analog or DALI control signal.

Control commands from/to dedicated application are to be sent/received using LoRaWAN™ network.

OVERVIEW

Universal

Supports LED and HID luminaires.

APPLICATIONS

Luminaires control

Supports customisable dimming profiles together with various configurable inputs (light intensity, movement etc.).

Array control

Allows to control an array of 32 luminaires over the DALI interface

Auxiliary light control (optional)

Relay for auxiliary light control (decorative lighting etc.).

Power monitoring

Monitor used power and luminaire burn time

FEATURES

- DALI interface
- Relay control
- Luminaire intensity control
- Thermistor input
- Digital input (e.g. movement sensor)
- Analog input (e.g. reflected light level)
- Sensor power supply
- IP68
- Surge protection
- Power metering

SPECIFICATIONS

Length:	134.0 mm
Width:	54.0 mm
Depth:	33.0 mm
Weight:	ca 99 g
Operating temperature:	-30°C ... +60°C
Power consumption:	230V -15% .. +10% <1V A
Communication range:	up to 15 km* LoRaWAN™
Tx power:	up to +20 dBm
Rx Sensitivity:	-140 dBm
MAC Layer:	LoRaWAN™
Physical Layer:	LoRa®
Body material:	ABS
IP Rating:	IP68
Communication:	LoRaWAN™

* Communication range is dependent on the location of the sensor and nearest base station.

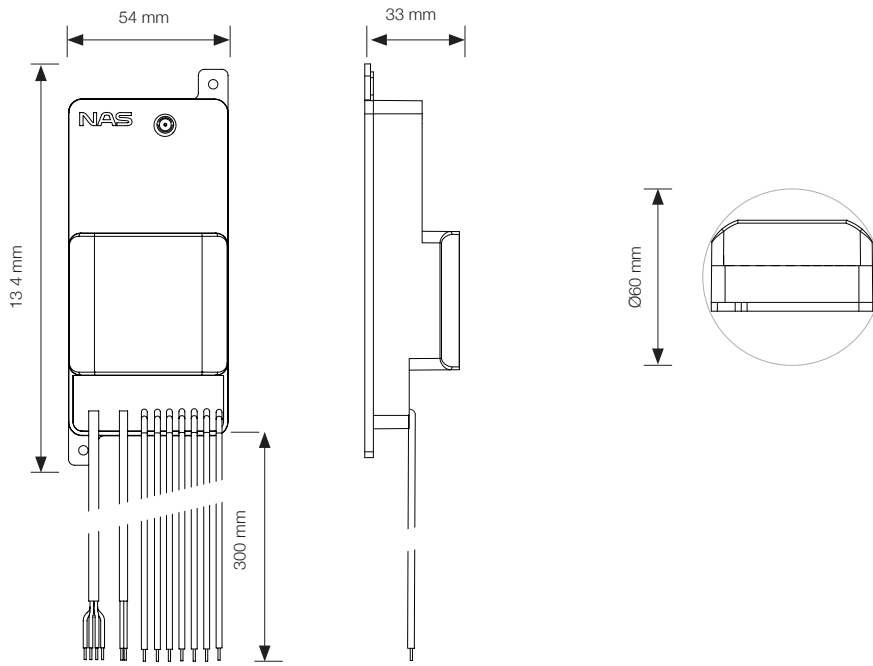
INTERFACE SPECIFICATIONS

Relay max current:	6A
Surge protection:	1500V (3000V on demand)
Intensity control output voltage:	0V .. 10V
DALI Interface max number of slaves:	32
Thermistor input:	12V tolerant
Digital input:	12V tolerant
Analog input:	12V tolerant*
AUX relay max current:	2A (optional)
External Sensor Power supply:	Output voltage: 12V Max output current: 50mA

* Not used together with optional AUX relay.

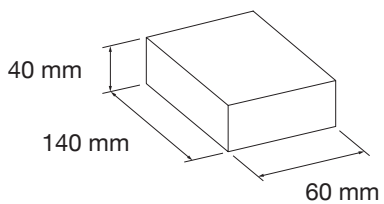
DIMENSIONS / PACKAGING

Dimensions



Packaging

1 pcs box



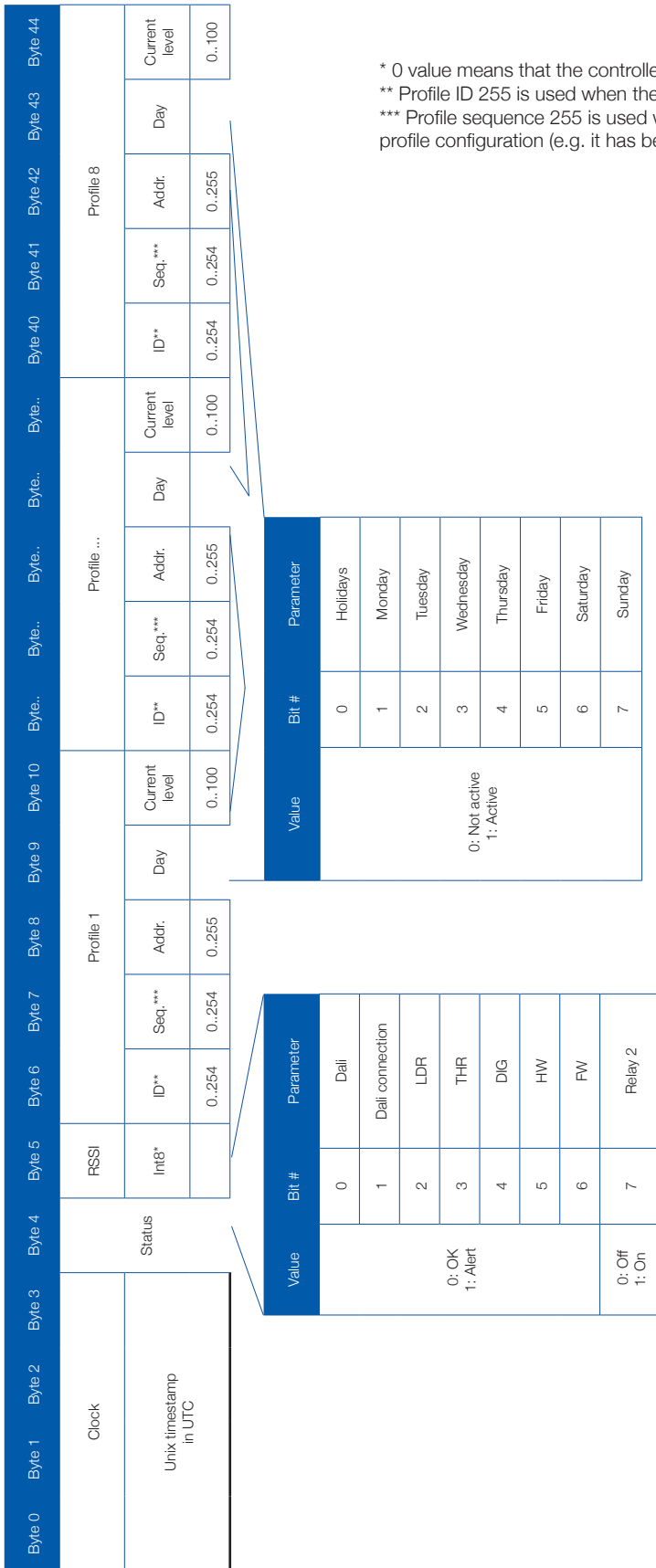
ACCESSORIES

PORT LIST

fPort	Usage	Format	Uplink	Unit	Comment
24	Status	-	yes	-	Defined below
25	Usage	-	yes	-	Defined below
50	Configuration	-	no	-	Defined below
51	Activate OTA	-	no	-	Defined below
60	Command	-	yes	-	Defined below
99	Boot/Debug	-	yes	-	Defined below

For firmware version >= 0.5.0

fPort 24 Status Message



* 0 value means that the controller has not received any packages
 ** Profile ID 255 is used when there is no active profile and the controller is manually controlled.
 *** Profile sequence 255 is used when the current actual light level is not according to the profile configuration (e.g. it has been manually overwritten).

Message sample

Message in base64

```
KOKbWQGOBBb+HjICKv7hMg==
```

Message decoded to HEX

```
28E29B59018E0416FE1E32022AFEE132
```

Device clock `28E29B59` HEX message flip for MSB

```
599BE228
```

HEX message converted to decimal (epoch)

```
1503388200 (seconds)
```

Epoch time converted to date

```
22 August 2017 07:50:00 (UTC)
```

Status HEX message

```
01
```

Status HEX message converted to binary

```
0000 0001
```

Binary converted to statuses (LSB)

```
1 : DALI error - alert
0 : DALI Connection error - ok
0 : LDR error - ok
0 : THR error - ok
0 : DIG error - ok
0 : HW error - ok
0 : FW error - ok
0 : Relay 2 - off
```

Sensor RSSI HEX message

```
8E
```

HEX message converted to signed decimal

```
-114 (dBm)
```

Profile 1 HEX message

0416FE1E32

Profile ID in HEX

04

Profile ID converted to decimal

4

Profile sequence in HEX

16

Profile sequence converted to decimal

22

Profile address in HEX

FE

Profile HEX address converted to DALI address

Broadcast

Profile day setting in HEX

1E

Profile current light dim level converted to binary

00011110

Binary converted to statuses (LSB)

```
0 : Holidays - not active
1 : Monday - active
1 : Tuesday - active
1 : Wednesday - active
1 : Thursday - active
0 : Friday - not active
0 : Saturday - not active
0 : Sunday - not active
```

Profile current light dim level in HEX

32

Profile current light dim level converted to decimal

50%

Profile 2 HEX message

022AFEE132

Profile ID in HEX

02

Profile ID converted to decimal

2

Profile sequence in HEX

2A

Profile sequence converted to decimal

42

Profile address in HEX

FE

Profile HEX address converted to DALI address

Broadcast

Profile day setting in HEX

E1

Profile current light dim level converted to binary

11100001

Binary converted to statuses (LSB)

```
1 : Holidays - active
0 : Monday - not active
0 : Tuesday - not active
0 : Wednesday - not active
0 : Thursday - not active
1 : Friday - active
1 : Saturday - active
1 : Sunday - active
```

Profile current light dim level in HEX

32

Profile current light dim level converted to decimal

50%

fPort 25 Usage Message

Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8	Byte 9	Byte 10
Cumulative power consumption - Wh				Current power consumption - W		Luminaire burn time - h		System voltage - V	System current - mA	
uint_32				uint_16		uint_16		uint_8	uint_16	

Message sample

Message in base64

GDEAADoASAXqswM=

Message decoded to HEX

183100003A004805EAB303

Cumulative consumption 18310000 HEX message flip for MSB

00003118

HEX message converted to decimal

12568 (Wh)

Current consumption 3A00 HEX message flip for MSB

003A

HEX message converted to decimal

58 (W)

Burn time 4805 HEX message flip for MSB

0548

HEX message converted to decimal

1352 (h)

System voltage

EA

HEX message converted to decimal

234 (V)

System current B303 HEX message flip for MSB

03B3

HEX message converted to decimal

947 (mA)

fPort 50 Configuration Message

Byte0	Byte ...	Byte n
Header	Payload	

Different headers with their respective payloads are described below

LDR Configuration

Byte 0	Byte 1	Byte 2	Byte 3
Header	Upper threshold (switch off / clear alert)	Lower threshold (switch on / create alert)	Functions
01	uint_8	uint_8	

Bit #	Function	Value
0	Switch lights on	0: disable 1: enable
1	Switch lights off	
2	RFU	
3	RFU	
4	RFU	
5	RFU	
6	RFU	
7	RFU	

Message sample

Message goal: Configure upper threshold to 160, lower threshold to 48 and enable both switching on and off of lights.

Header

Select Header HEX code

```
01
```

Upper threshold

Convert threshold value 160 to HEX

```
A0
```

Lower threshold

Convert lower threshold value 48 to HEX

```
30
```

Light switching

Function selection

```
1 : Switch lights on - enable
1 : Switch lights off - enable
0 : RFU
0 : RFU
0 : RFU
0 : RFU
0 : RFU
0 : RFU
```

Selection converted to binary

```
00000011
```

Selection converted to HEX

```
03
```

Compile message for sending (HEX)

```
01A03003
```

Control value in base64 to control after sending

```
AaAwAw==
```

THR Configuration

Byte 0	Byte 1	Byte 2	Byte 3
Header	Upper threshold (switch off / create alert)	Lower threshold (switch on / clear alert)	Functions
02	uint_8	uint_8	

Bit #	Function	Value
0	Switch lights off	0: disable 1: enable
1	RFU	
2	RFU	
3	RFU	
4	RFU	
5	RFU	
6	RFU	
7	RFU	

Message sample

Message goal: Configure upper threshold to 200, lower threshold to 120 and enable switching off of lights.

Header

Select Header HEX code

```
02
```

Upper threshold

Convert threshold value 200 to HEX

```
C8
```

Lower threshold

Convert lower threshold value 120 to HEX

```
78
```

Light switching

Function selection

```
1 : Switch lights off - enable
0 : RFU
0 : RFU
0 : RFU
0 : RFU
0 : RFU
0 : RFU
0 : RFU
```

Selection converted to binary

```
00000001
```

Selection converted to HEX

```
01
```

Compile message for sending (HEX)

```
02C87801
```

Control value in base64 to control after sending

```
Ash4AQ==
```

DIG Configuration

Byte 0	Byte 1	Byte 2	Byte 3
Header	Switch on time - s		Functions
03	uint_16		

Bit #	Function	Value
0	Switch lights on	0: disable 1: enable
1	RFU	
2	RFU	
3	RFU	
4	RFU	
5	RFU	
6	RFU	
7	RFU	

Message sample

Message goal: Configure switch time to 5 minutes and enable switching on of lights.

Header

Select Header HEX code

```
03
```

Upper threshold

Convert switch time value 300 to HEX

```
12C
```

Flip HEX value for LSB

```
2C01
```

Light switching

Function selection

```
1 : Switch lights on - enable
0 : RFU
0 : RFU
0 : RFU
0 : RFU
0 : RFU
0 : RFU
0 : RFU
```

Selection converted to binary

```
00000001
```

Selection converted to HEX

```
01
```

Compile message for sending (HEX)

```
03|2C01|01
```

Control value in base64 to control after sending

```
AywBAQ==
```


Relay 2 Configuration

Byte 0	Byte 1	Byte 2	Byte 4	Byte 5	Byte 6	Byte *	Byte *	Byte 35	Byte 36
Header	Profile ID	Profile seq.	Day	Switching step 1		Switching step ..		Switching step 10	
05	0..254	0..254		Step time*	Switch val.	Step time*	Switch val.	Step time*	Switch val.
				0..143	00 - off FF - on	0..143	00 - off FF - on	0..143	00 - off FF - on

Value	Bit #	Parameter
0: not selected 1: Selected	0	Holidays
	1	Monday
	2	Tuesday
	3	Wednesday
	4	Thursday
	5	Friday
	6	Saturday
	7	Sunday

* Step time is 10 min increment from 00:00:00. Look at the profile step time chart for more details.

Message sample

Message goal: Apply profile 22 sequence 3 to external relay to switch on lights at 20:00 and off at 03:30 on Fridays, Saturdays, Sundays and holidays.

Header

Select Header HEX code

05

Profile ID

Convert profile ID 22 to HEX

16

Sequence

Convert profile sequence 3 to HEX

03

Day

Day selection

```
1 : Holidays - active
0 : Monday - not active
0 : Tuesday - not active
0 : Wednesday - not active
0 : Thursday - not active
1 : Friday - active
1 : Saturday - active
1 : Sunday - active
```

Selection converted to binary

```
11100001
```

Selection converted to HEX

```
E1
```

Switch step 1

Choose desired time

```
20:00
```

Convert time to offset

```
120 (see step time conversion map)
```

Convert offset to HEX

```
78
```

Choose desired switch

```
on
```

Convert switch HEX

```
FF
```

Switch step 2

Choose desired time

```
03:30
```

Convert time to offset

```
21 (see step time conversion map)
```

Convert offset to HEX

```
15
```

Choose desired switch

```
off
```

Convert switch HEX

```
00
```

Compile message for sending (HEX)

```
051603E178FF1500
```

Control value in base64 to control after sending

```
BRYD4Xj/FQA=
```

Sunrise/Sunset offset configuration

Byte 0	Byte 1	Byte 2
Header	Sunrise offset - min	Sunset offset - min
06	int_8	int_8

Message sample

Message goal: Set lights to turn off 30 minutes before sunrise and turn on 30 minutes after sunrise.

Header

Select Header HEX code

06

Sunrise offset

Convert offset -30 to HEX

E2

Sunset offset

Convert offset 30 to HEX

1E

Compile message for sending (HEX)

06E21E

Control value in base64 to control after sending

BuIe

Status reporting configuration

Byte 0	Byte 1	Byte 2	Byte 3	Byte 4
Header	Status interval* - s			
07	uint_32			

* Minimum value - 600

Message sample

Message goal: Set status reporting to 1 hour

Header

Select Header HEX code

07

Reporting interval

Convert interval 3600 to HEX

E10

Flip HEX value to LSB

100E0000

Compile message for sending (HEX)

07100E0000

Control value in base64 to control after sending

BxAOAAA=

Profile configuration

Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte *	Byte *	Byte 35	Byte 36
Header	Profile ID	Profile seq.	Addr.	Day	Dimming step 1		Dimming step ..		Dimming step 10	
08	0..254	0..254	0..255		Step time*	Dimming val.	Step time*	Dimming val.	Step time*	Dimming val.
					0..143	0..100	0..143	0..100	0..143	0..100

Value	Bit #	Parameter
0: not selected 1: Selected	0	Holidays
	1	Monday
	2	Tuesday
	3	Wednesday
	4	Thursday
	5	Friday
	6	Saturday
	7	Sunday

* Step time is 10 min increment from 00:00:00. Look at the profile step time chart for more details.

Message sample

Message goal: Apply profile 22 sequence 3 to Broadcast address to dim the lights (01:00 to 30%, 06:00 to 80%, 10:00 to 30%, 17:00 to 80%) on Mondays, Tuesdays, Wednesdays and Thursdays.

Header

Select Header HEX code

08

Profile ID

Convert profile ID 22 to HEX

16

Sequence

Convert profile sequence 3 to HEX

03

Address

Convert Broadcast address to HEX

FE

Day

Day selection

```
0 : Holidays - not active
1 : Monday - active
1 : Tuesday - active
1 : Wednesday - active
1 : Thursday - active
0 : Friday - not active
0 : Saturday - not active
0 : Sunday - not active
```

Selection converted to binary

```
00011110
```

Selection converted to HEX

```
1E
```

Dimming step 1

Choose desired time

```
01:00
```

Convert time to offset

```
6 (see step time conversion map)
```

Convert offset to HEX

```
06
```

Choose desired dimming level

```
30%
```

Convert level to HEX

```
1E
```

Dimming step 2

Choose desired time

```
06:00
```

Convert time to offset

```
36 (see step time conversion map)
```

Convert offset to HEX

```
24
```

Choose desired dimming level

```
80%
```

Convert level to HEX

```
50
```

Dimming step 3

Choose desired time

10:00

Convert time to offset

60 (see step time conversion map)

Convert offset to HEX

3C

Choose desired dimming level

30%

Convert level to HEX

1E

Dimming step 4

Choose desired time

17:00

Convert time to offset

102 (see step time conversion map)

Convert offset to HEX

66

Choose desired dimming level

80%

Convert level to HEX

50

Compile message for sending (HEX)

081603FE1E061E24503C1E6650

Control value in base64 to control after sending

CBYD/h4GHrQPb5mUA==

Time settings

Byte 0	Byte 1	Byte 2	Byte 3	Byte 4
Header	Device clock (Unix timestamp in UTC)			
09	uint32			

Message sample

Message goal: Set device clock to 22 August 2017 11:50:00

Header

Select Header HEX code

09

Device clock

Choose desired time

22 August 2017 11:50:00 (UTC)

Convert to epoch

1503402600

Covert to hex

599C1A68

Flip HEX value for LSB

681A9C59

Compile message for sending (HEX)

09681A9C59

Control value in base64 to control after sending

CWganFk=

Default settings

Byte 0		Byte 1		Byte 2		
Header		Default light 0..100		Alert enable		
OA		uint8				

Bit #	Function	Value
0	LDR alarm enable	0: off (default) 1: on
1	THR alarm enable	
2	DIG alarm enable	
3	DALI alarm enable	
4	RFU	
5	RFU	
6	RFU	
7	RFU	

Message sample

Message goal: Set default light to 0% and enable DALI alerts

Header

Select Header HEX code

0A

Default light

Convert default light dim level 0% from decimal to HEX

00

Alerts

Alert selection

```
0 : LDR alarm - disable
0 : THR alarm - disable
0 : DIG alarm - disable
1 : DALI alarm - enable
0 : RFU
0 : RFU
0 : RFU
0 : RFU
```

Selection converted to binary

00001000

Selection converted to HEX

08

Compile message for sending (HEX)

0A0008

Control value in base64 to control after sending

CgAI

Usage reporting configuration

Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5
Header	Usage interval* - s			System voltage**	
0B	uint_32			uint_8	

* Minimum value - 600

** Default 230

Message sample

Message goal: Set usage reporting to 1 hour and system voltage to 240V.

Header

Select Header HEX code

0B

Reporting interval

Convert interval 3600 to HEX

E10

Flip HEX value to LSB

100E0000

System voltage

Convert voltage 240 to HEX

F0

Compile message for sending (HEX)

0B100E0000F0

Control value in base64 to control after sending

CxAOAADw

Holiday configuration

Byte 0	Byte 1	Byte 2	Byte ..	Byte ..	Byte 49	byte 50
Header	Holiday 1		Holiday ..		Holiday 25	
0C	0..355		0..355		0..355	

Holiday are marked with days from January 1. Maximum of 25 holidays is supported. Sending in configuration for new holidays will replace old config

Message sample

Message goal: Configure January 1st, Febraury 24th, May 1st, June 23rd, August 20th and December 23rd as holidays.

Header

Select Header HEX code

0C

Holiday 1

Choose desired day

January 1st

Convert to day number in year

1

Convert value to HEX

01

Flip HEX value for LSB

0100

Holiday 2

Choose desired day

February 24th

Convert to day number in year

55

Convert value to HEX

37

Flip HEX value for LSB

3700

Holiday 3

Choose desired day

May 1st

Convert to day number in year

121

Convert value to HEX

79

Flip HEX value for LSB

7900

Holiday 4

Choose desired day

June 23rd

Convert to day number in year

174

Convert value to HEX

AE

Flip HEX value for LSB

AE00

Holiday 5

Choose desired day

August 20th

Convert to day number in year

234

Convert value to HEX

E2

Flip HEX value for LSB

E200

Holiday 6

Choose desired day

December 23rd

Convert to day number in year

357

Convert value to HEX

165

Flip HEX value for LSB

6501

Compile message for sending (HEX)

0c010037007900AE00E2006501

Control value in base64 to control after sending

DAEANwB5AK4A4gB1AQ==

Clear Configuration

Byte 0	Byte 1	Byte 2	Comment
Header	Function		
FF	01	N/A	Clear LDR settings
	02	N/A	Clear THR settings
	03	N/A	Clear DIG settings
	04	Addr. 0..255	Clear profile from addr.
	05	N/A	RFU

Message sample

Message goal: Clear configuration from DALI broadcast address

Header

Select Header HEX code

FF

Function

Select clear profile function

04

Destination address

Convert DALI Broadcast address to HEX

FE

Compile message for sending (HEX)

FF04FE

Control value in base64 to control after sending

/wT+

fPort 51 OTA Activation Message

Byte 0	Comment
Header	
FF	Activates OTA for 2 minutes

Message sample

Message goal: Enable OTA mode

Header

Select Header HEX code

FF

Compile message for sending (HEX)

FF

Control value in base64 to control after sending

/w==

fPort 60 Command Message

Byte0	Byte ...	Byte n
Header	Payload	

Different headers with their respective payloads are described below

Query detailed DALI status

Byte 0	Byte 1
Header	Address
00	0..254*

* Value 254(0xFE) Queries all the automatically detected ballasts and sends the statuses as an array (Maximum of 25 items).

Message sample

Message goal: Get status of all connected DALI devices

Header

Select Header HEX code

00

Destination address

Convert DALI Broadcast address to HEX

FE

Compile message for sending (HEX)

00FE

Control value in base64 to control after sending

AP4=

Answer for detailed DALI status query (uplink only)

Byte 0	Byte 1	Byte 2	Byte *	Byte *	Byte 49	Byte 50
Header	1 st device		.. device		25 th device	
	Addr.	Status	Addr.	Status	Addr.	Status
00	0..255	0..255	0..255	0..255	0..255	0..255

Message sample

Message in base64

AAIEBgIMAg==

Message decoded to hex

00020406020c02

Header 00 decoded

Answer for detailed DALI status request

1st Device status

Profile address in HEX

02

Profile HEX address converted to DALI address

Single device 1

DALI status in HEX

04

HEX value converted to status

Ballast is off

2nd Device status

Profile address in HEX

06

Profile HEX address converted to DALI address

Single device 3

DALI status in HEX

02

HEX value converted to status

Lamp is burned out

3rd Device status

Profile address in HEX

0C

Profile HEX address converted to DALI address

Single device 6

DALI status in HEX

02

HEX value converted to status

Lamp is burned out

Set Dimming level

Byte 0	Byte 1	Byte 2	Byte *	Byte *	Byte 9	Byte 10
Header	Addr.	Dim level	Addr.	Dim level	Addr.	Dim level
01	0..255	0..100	0..255	0..100	0..255	0..100

Message sample

Message goal: Set all luminaires to 100%

Header

Select Header HEX code

01

Destination address

Convert DALI Broadcast address to HEX

FE

Dimming level

Convert light dimming level 100% from decimal to HEX

64

Compile message for sending (HEX)

01FE64

Control value in base64 to control after sending

Af5k

Switch relay 2

Byte 0		Byte 1	
Header		Function	
02		00 - Off FF - On	

Message sample

Message goal: Switch external relay on.

Header

Select Header HEX code

02

Switch

Select switching direction

On

Conver value to HEX

FF

Compile message for sending (HEX)

02FF

Control value in base64 to control after sending

Av8=

Custom DALI request

Byte 0	Byte 1	Byte 2	Byte *	Byte *	Byte 9	Byte 10
Header	Addr.	Query	Addr.	Query	Addr.	Query
03	0..255	0..255	0..255	0..255	0..255	0..255

Message sample

Message goal: Ask Max level, Min Level, Power on level, System failure level and Fade time/rate from device 36

Header

Select Header HEX code

03

1st Query

Destination address

Convert DALI Single device 36 address to HEX

48

Convert Max level query code 161 to HEX

A1

2nd Query

Destination address

Convert DALI Single device 36 address to HEX

48

Convert Min level query code 162 to HEX

A2

3rd Query

Destination address

Convert DALI Single device 36 address to HEX

48

Convert Power on level query code 163 to HEX

A3

4th Query

Destination address

Convert DALI Single device 36 address to HEX

48

Convert System failure level query code 164 to HEX

A4

5th Query

Destination address

Convert DALI Single device 36 address to HEX

48

Convert Fade time/rate query code 165 to HEX

A5

Compile message for sending (HEX)

0348A148A248A348A448A5

Control value in base64 to control after sending

A0ihSKJIo0ikSKU=

Answer for custom DALI request

Byte 0	Byte 1	Byte 2	Byte 3	Byte *	Byte *	Byte *	Byte 47	Byte 48	Byte 49
Header	Addr.	Query	Answer	Addr.	Query	Answer	Addr.	Query	Answer
03	0..255	0..255	0..255	0..255	0..255	0..255	0..255	0..255	0..255

Message sample

Message in base64

BEih/kiiqEij/kik/kilBw==

Message decoded to hex

0448A1FE48A2A848A3FE48A4FE48A507

Header 04 decoded

Answer for custom DALI request

1st Answer

Profile address in HEX

48

Profile HEX address converted to DALI address

Single device 36

Query in HEX

A1

HEX value converted to decimal

161

Decimal value translated to query

Max level

Answer in HEX

FE

HEX value converted to decimal

254

2nd Answer

Profile address in HEX

48

Profile HEX address converted to DALI address

Single device 36

Query in HEX

A2

HEX value converted to decimal

162

Decimal value translated to query

Min level

Answer in HEX

A8

HEX value converted to decimal

168

3rd Answer

Profile address in HEX

48

Profile HEX address converted to DALI address

Single device 36

Query in HEX

A3

HEX value converted to decimal

163

Decimal value translated to query

Power on level

Answer in HEX

FE

HEX value converted to decimal

254

4th Answer

Profile address in HEX

48

Profile HEX address converted to DALI address

Single device 36

Query in HEX

A4

HEX value converted to decimal

164

Decimal value translated to query

Failure level

Answer in HEX

FE

HEX value converted to decimal

254

5th Answer

Profile address in HEX

48

Profile HEX address converted to DALI address

Single device 36

Query in HEX

A5

HEX value converted to decimal

165

Decimal value translated to query

Fade time/rate

Answer in HEX

07

HEX value converted to status

<0.7s / 45 steps/s

Custom DALI command

Byte 0	Byte 1	Byte ..	Byte 50
Header	Data	Data	Data
04	0..255	0..255	0..255

Message sample

Message goal: Set Single device 1 minimum light level to 127.

Header

Select Header HEX code

04

DALI command

DALI command in HEX

027F0321032B

Compile message for sending (HEX)

04027F0321032B

Control value in base64 to control after sending

BAJ/AyEDKw==

fPort 99 Boot/Debug Message

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8	Byte 9	Byte 10	Byte 11	Byte 12	Byte 12	Byte 12
Header (HEX)	Payload												
0x00 Boot	Serial (HEX)			Firmware (HEX)			Clock - Unix timestamp UTC (uint)			HW (HEX)	Opt. (HEX)		
0x01 Shutdown													
0x10 Error code	Error code (uint)												

Error codes

Code	Comment
02	Multiple unconfigured drivers detected

Message sample

Message in base64

```
AP8AEEcABAXDFEFZBQA=
```

Message decoded to hex

```
00FF001047000405C31441590500
```

Header 00 decoded

```
Boot message
```

Device serial FF001047 HEX message flip for MSB

```
471000FF
```

Firmware version

Major version in HEX

```
00
```

HEX value converted to decimal

```
0
```

Minor version in HEX

```
04
```

HEX value converted to decimal

```
4
```

Patch version in HEX

```
05
```

HEX value converted to decimal

```
5
```

Device clock C3144159 HEX message flip for MSB

```
594114C3
```

HEX message converted to decimal (epoch)

```
1497437379 (seconds)
```

Epoch time converted to date

```
14 June 2017 10:49:39 (UTC)
```

Hardware configuration

Hardware setup in HEX

```
05
```

HEX value converted to setup

```
DALI & 0..10V & NC Realy
```

Optional features in HEX

```
00
```

HEX value converted to optional features

```
None
```

Cells marked with X contain address bits

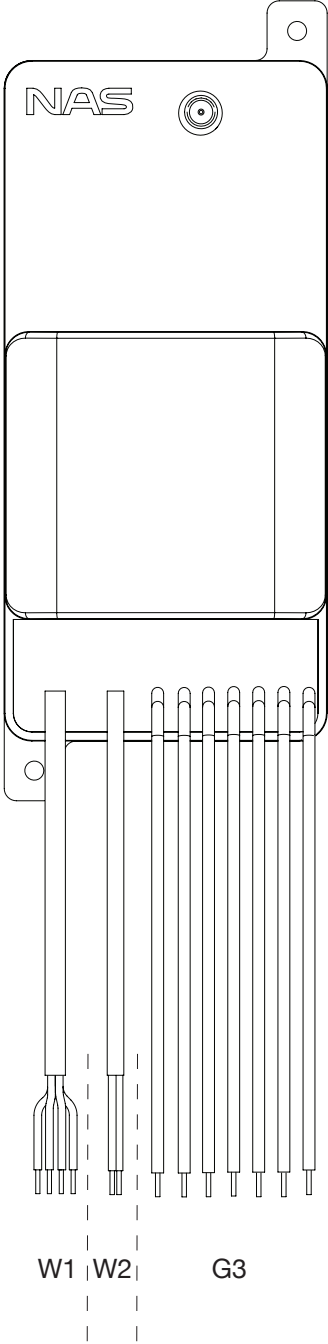
DALI Address / Destination mapping

Bit #	Single address	Group address	Broadcast
Addr.	0-63	0-15	n/a
0	0	0	0
1	x	x	1
2	x	x	1
3	x	x	1
4	x	x	1
5	x	0	1
6	x	0	1
7	0	1	1

PROFILE STEP TIME CHART

0 - 00:00	29 - 04:50	58 - 09:40	87 - 14:30	116 - 19:20
1 - 00:10	30 - 05:00	59 - 09:50	88 - 14:40	117 - 19:30
2 - 00:20	31 - 05:10	60 - 10:00	89 - 14:50	118 - 19:40
3 - 00:30	32 - 05:20	61 - 10:10	90 - 15:00	119 - 19:50
4 - 00:40	33 - 05:30	62 - 10:20	91 - 15:10	120 - 20:00
5 - 00:50	34 - 05:40	63 - 10:30	92 - 15:20	121 - 20:10
6 - 01:00	35 - 05:50	64 - 10:40	93 - 15:30	122 - 20:20
7 - 01:10	36 - 06:00	65 - 10:50	94 - 15:40	123 - 20:30
8 - 01:20	37 - 06:10	66 - 11:00	95 - 15:50	124 - 20:40
9 - 01:30	38 - 06:20	67 - 11:10	96 - 16:00	125 - 20:50
10 - 01:40	39 - 06:30	68 - 11:20	97 - 16:10	126 - 21:00
11 - 01:50	40 - 06:40	69 - 11:30	98 - 16:20	127 - 21:10
12 - 02:00	41 - 06:50	70 - 11:40	99 - 16:30	128 - 21:20
13 - 02:10	42 - 07:00	71 - 11:50	100 - 16:40	129 - 21:30
14 - 02:20	43 - 07:10	72 - 12:00	101 - 16:50	130 - 21:40
15 - 02:30	44 - 07:20	73 - 12:10	102 - 17:00	131 - 21:50
16 - 02:40	45 - 07:30	74 - 12:20	103 - 17:10	132 - 22:00
17 - 02:50	46 - 07:40	75 - 12:30	104 - 17:20	133 - 22:10
18 - 03:00	47 - 07:50	76 - 12:40	105 - 17:30	134 - 22:20
19 - 03:10	48 - 08:00	77 - 12:50	106 - 17:40	135 - 22:30
20 - 03:20	49 - 08:10	78 - 13:00	107 - 17:50	136 - 22:40
21 - 03:30	50 - 08:20	79 - 13:10	108 - 18:00	137 - 22:50
22 - 03:40	51 - 08:30	80 - 13:20	109 - 18:10	138 - 23:00
23 - 03:50	52 - 08:40	81 - 13:30	110 - 18:20	139 - 23:10
24 - 04:00	53 - 08:50	82 - 13:40	111 - 18:30	140 - 23:20
25 - 04:10	54 - 09:00	83 - 13:50	112 - 18:40	141 - 23:30
26 - 04:20	55 - 09:10	84 - 14:00	113 - 18:50	142 - 23:40
27 - 04:30	56 - 09:20	85 - 14:10	114 - 19:00	143 - 23:50
28 - 04:40	57 - 09:30	86 - 14:20	115 - 19:10	

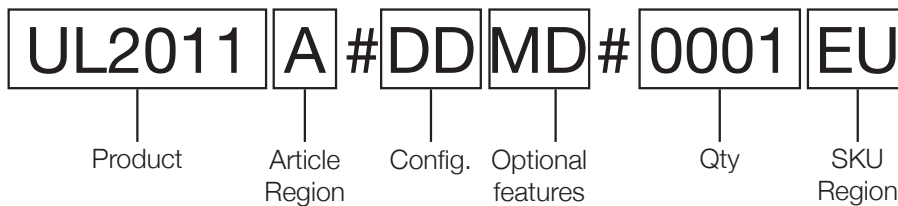
WIRING



Amount of wires in each section is dependant of the ordered configuration

Description	
W1 - Wire 1:	
Brown	Normally closed or open AC 230V relay output to driver
Blue	230V AC neutral output to driver
Grey	DALI+ control signal to driver
Black	DALI- control signal to driver
W2 - Wire 3:	
Brown	AC 230V input
Blue	230V AC neutral input
G3 - Group 3	
White	0..10V+ control signal to driver
White/Blue	0..10V- control signal to driver
Red	+12V output for sensor powering
Pink	THR in
Yellow	LDR in
Green	DIG in
Red/Grey	Ground for DIG sensor

ORDERING INFORMATION



Product/SKU	Package qty	IP Rating
UL2011x#xx#0001xx	1	IP68

Article region	SKU region	Frequency
A	EU	868 MHz
B	AU	922 MHz
C	US	915 MHz
D	AS	923 MHz
E	CN	780 MHz
F	KR	922 MHz
G	EU	433 MHz
H	CN	470 MHz
I	IN	866 MHz

Model	Description	Optional features (Choose only 1 from each column)						
UL2011	DD - DALI only	M - Metering	T - THR	D - DIG	L - LDR O - Relay 2	F - fixed antenna P - wired antenna	S - extra surge protection	X* - custom request
	DC - DALI & NC relay							
	DO - DALI & NO relay							
	AC - 0..10V & NC relay							
	AO - 0..10V & NO relay							
	UC - DALI & 0..10V & NC relay							
	UO - DALI & 0..10V & NO relay							
	UU - DALI & 0..10V & NC relay & NO relay							

* Custom request must be verified with sales before ordering. On order X must be accompanied with the description of agreed functionality.

CONTACT INFORMATION

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REVISION HISTORY

- 1.0 - First version
- 1.1 - Added configuration details.
- 1.2 - Added configuration details.
- 1.3 - Updated communication protocol
- 1.4 - Wiring diagram and ordering information
- 1.5 - fw 0.5.0 support, power metering
- 2.0 - Split from ULw datasheet

All content contained herein is subject to change without notice. Nordic Automation Systems reserves the right to change or modify the content at any time.