

# LoRaWAN® LUMINAIRE CONTROLLER NEMA UL2020



LoRaWAN® Luminaire Controller NEMA is a remote device for HID or LED luminaires equipped with ANSI C136.41 NEMA receptacle socket.

The luminaire is controlled through DALI or 0..10V analog control interfaces, while providing a reliable power interconnect with three robust twist lock contacts.

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 light intensity inputs

## Array control

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

## Power monitoring

Monitor used power and luminaire burn time

# FEATURES

- DALI or Analog interface
- Luminaire intensity control
- Light intensity input
- IP66
- Surge protection
- Power metering

# SPECIFICATIONS

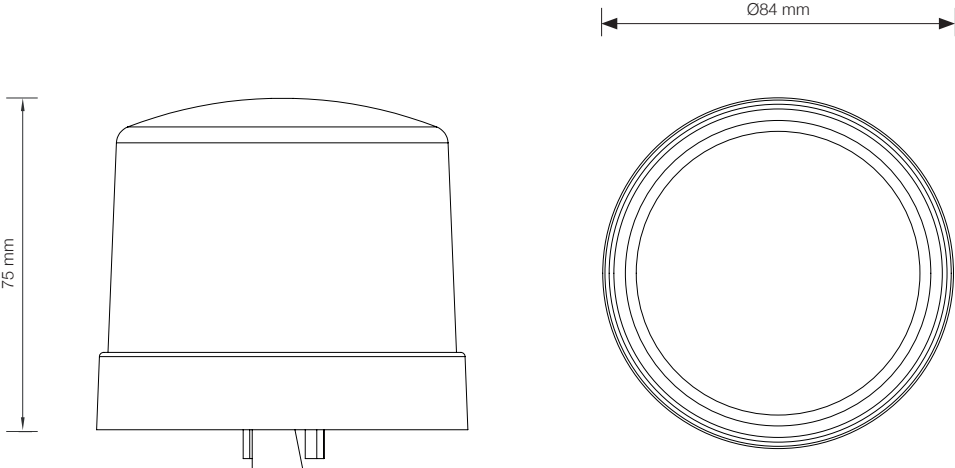
Height:	98.0 mm
Diameter:	84.0 mm
Weight:	ca 99 g
Operating temperature:	-30°C ... +60°C
Power consumption:	230V -15% .. +10% <1V A
Communication range:	up to 15 km* LoRaWAN®
Tx power:	up to +20 dBm
Rx Sensitivity:	-140 dBm
MAC Layer:	LoRaWAN®
Physical Layer:	LoRa®
Body material:	ABS
IP Rating:	IP66
Communication:	LoRaWAN®

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

# INTERFACE SPECIFICATIONS

Relay max current:	6A
Surge protection:	4500V
Analog intensity control output voltage:	0V .. 10V
DALI Interface max number of slaves:	32

# DIMENSIONS



# ACCESSORIES

# PORT LIST

iPort	Function	Transmission	Page
24	Status	↑↑	6
25	Usage	↑↑	10
50	Configuration	↑↓	13
51	Update mode	↓↓	28
52	Multicast	↓↓	29
60	Command	↑↓	31
99	Boot/Debug	↑↑	42

For firmware version >= 0.6.29



## Message sample

Message in base64

```
KOKbWQGOBBb+Hj ICKv7hMg==
```

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 : RFU
0 : RFU
0 : HW error - ok
0 : FW error - ok
0 : RFU
```

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 ..	Byte n
Addr	Reported fields	Payload	
uint_8 0..255**			

Bit #	Parameter	Type and unit
0	Active energy total	uint32, Wh
1	Active energy instant	uint16, W
2	Load side energy total	uint32, Wh
3	Load side energy instant	uint16, W
4	Power factor instant	uint8 ***
5	System voltage	uint8, V
6	RFU	
7	RFU	

\* If driver supports. Also drivers need to have short addresses assigned.

\*\* 0xFF values measured by the controller. If driver value is available, it is preferred over internal measurement.

\*\*\* Needs to be divided by 100.

Usage parameters are reported after driver address in order of the reported fields mapping. If more than one driver are connected, then next drivers address is reported after the last parameter of the first driver and followed by the parameters in the same logic.

## Message sample

Message in base64

```
BAMAAAAAAAAAGA xUUAAAAA==
```

Message decoded to HEX

```
04030000000000000603151400000000
```

Address 1

DALI address in HEX

```
04
```

Profile HEX address converted to DALI address

```
Single address 2
```

Reported fields in HEX

```
03
```

Reported fields converted to binary

```
00000011
```

Binary converted to statuses (LSB)

```
1 : Active energy total - sent
1 : Active energy instant - sent
0 : Load side energy total - not sent
0 : Load side energy instant - not sent
0 : Power factor instant - not sent
0 : System voltage - not sent
0 : RFU
0 : RFU
```

Active energy total 

```
00000000
```

 HEX message flip for MSB

```
00000000
```

HEX message converted to decimal

```
0 (Wh)
```

Current consumption 

```
0000
```

 HEX message flip for MSB

```
0000
```

HEX message converted to decimal

```
0 (W)
```

Address 2

DALI address in HEX

```
06
```

Profile HEX address converted to DALI address

```
Single address 3
```

Reported fields in HEX

03

Reported fields converted to binary

00000011

Binary converted to statuses (LSB)

```
1 : Active energy total - sent
1 : Active energy instant - sent
0 : Load side energy total - not sent
0 : Load side energy instant - not sent
0 : Power factor instant - not sent
0 : System voltage - not sent
0 : RFU
0 : RFU
```

Active energy total 15140000 HEX message flip for MSB

00001415

HEX message converted to decimal

5141 (Wh)

Current consumption 0000 HEX message flip for MSB

0000

HEX message converted to decimal

0 (W)

# 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==
```

## Sunrise/Sunset offset configuration\*

Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6
Header	Sunrise offset - min	Sunset offset - min	Latitude		Longitude	
06	int_8	int_8	int_16**		int_16**	

\*0x06FFFFFFFF will disable the sunrise/sunset calendar  
\*\*2 decimals times 100. Example : 59.425284 > 59.43 > 5943

### Message sample

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

#### Header

Select Header HEX code

06

#### Sunrise offset

Convert offset -30 to HEX

E2

#### Sunset offset

Convert offset 30 to HEX

1E

#### Latitude

Convert coordinates 65.500226 to 2 decimals

65.50

Multiply with 100 to get rid of the decimal places

6550

Convert to HEX

1996

Flip HEX value to LSB

9619

Longitude

Convert coordinates 24.833547 to 2 decimals

24.83

Multiply with 100 to get rid of the decimal places

2483

Convert to HEX

9B3

Flip HEX value to LSB

B309

Compile message for sending (HEX)

06E21E9619B309

Control value in base64 to control after sending

BuIelhmzCQ==



## 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	RFU	
2	RFU	
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 : RFU
0 : RFU
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)

0B|100E0000|F0

### 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 1<sup>st</sup>, Febraury 24<sup>th</sup>, May 1<sup>st</sup>, June 23<sup>rd</sup>, August 20<sup>th</sup> and December 23<sup>rd</sup> as holidays.

Header

Select Header HEX code

0C

Holiday 1

Choose desired day

January 1<sup>st</sup>

Convert to day number in year

1

Convert value to HEX

01

Flip HEX value for LSB

0100

Holiday 2

Choose desired day

February 24<sup>th</sup>

Convert to day number in year

55

Convert value to HEX

37

Flip HEX value for LSB

3700

Holiday 3

Choose desired day

May 1<sup>st</sup>

Convert to day number in year

121

Convert value to HEX

79

Flip HEX value for LSB

7900

Holiday 4

Choose desired day

June 23<sup>rd</sup>

Convert to day number in year

174

Convert value to HEX

AE

Flip HEX value for LSB

AE00

Holiday 5

Choose desired day

August 20<sup>th</sup>

Convert to day number in year

234

Convert value to HEX

E2

Flip HEX value for LSB

E200

Holiday 6

Choose desired day

December 23<sup>rd</sup>

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	RFU
	03	N/A	RFU
	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 52 Configure Multicast\*

\* The Multicast key provisioning is not yet according to LoRa Alliances "LoRaWAN Remote Multicast Setup Specification v1.0.0"

## Set Multicast

Byte 0	Byte 1..Byte 4	Byte 5..Byte 20	Byte 21..Byte 36
Header	DevAddr	NwkSKey	AppSKey
0x01..0x03 Multicast group number*	HEX	HEX	HEX

\* Upto 3 different sets of Multicast keys can be configured. When the same set number is used, then the old keys are overwritten.

## Message sample

Message goal: Set Multicast group 1 keys to DevAddr: 82840c70,  
NwkSKey: 82840c7056429b143d21974557f93a53, AppSKey: 82840c70c08494b931fe2fa6f8835c6a

### Header

Select Header HEX code

```
0x01
```

### DevAddr

DevAddr in HEX

```
82840c70
```

### NwkSKey

NwkSKey in HEX

```
82840C7056429B143D21974557F93A53
```

### AppSKey

AppSKey in HEX

```
82840C70C08494B931FE2FA6F8835C6A
```

### Compile message for sending (HEX)

```
01|82840c70|082840c7056429b143d21974557f93a53|82840c70c08494b931fe2f  
a6f8835c6a
```

### Control value in base64 to control after sending

```
AYKEDHCChAxwVkJbFD0h10VX+TpTgoQMCElLkx/i+m+INcag==
```

## Clear Multicast Configuration

Byte 0	Byte 1
Header	Multicast group
0xFF	0x01..0x03 Clear group number 0xFF - Clear all groups

### Message sample

Message goal: Clear Multicast group number 2

Header

Select Header HEX code

0xFF

Group number

Group number in HEX

0x02

Compile message for sending (HEX)

FF02

Control value in base64 to control after sending

/wI=

# 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 <sup>st</sup> device		.. device		25 <sup>th</sup> 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

1<sup>st</sup> 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

2<sup>nd</sup> 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



3<sup>rd</sup> 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

## 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

### 1<sup>st</sup> Query

Destination address

Convert DALI Single device 36 address to HEX

48

Convert Max level query code 161 to HEX

A1

### 2<sup>nd</sup> Query

Destination address

Convert DALI Single device 36 address to HEX

48

Convert Min level query code 162 to HEX

A2

### 3<sup>rd</sup> Query

Destination address

Convert DALI Single device 36 address to HEX

48

Convert Power on level query code 163 to HEX

A3

### 4<sup>th</sup> Query

Destination address

Convert DALI Single device 36 address to HEX

48

Convert System failure level query code 164 to HEX

A4

### 5<sup>th</sup> 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

1<sup>st</sup> 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

2<sup>nd</sup> 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

3<sup>rd</sup> 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

4<sup>th</sup> 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

## 5<sup>th</sup> 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==

## Request input statuses

Byte 0	Byte 1
Header	Request
06	FF - All inputs

## Message sample

Message goal: Request all input values

Header

Select Header HEX code

06

Request

All values

FF

Compile message for sending (HEX)

06FF

Control value in base64 to control after sending

Bv8=

## Answer for custom DALI request

Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6
Header	DIG	Value	LDR	Value	THR	Value
03	01	00 - low 01 - high FF - n/a	02	0..254 FF - n/a	03	0..254 FF - n/a



## Message sample

Message in base64

```
BgH/AuQD/w==
```

Message decoded to hex

```
0601FF02E403FF
```

Header 06 decoded

```
Answer for input value request
```

Digital input 01 value in HEX

```
FF
```

HEX value translated to status

```
n/a
```

LDR input 02 value in HEX

```
E4
```

HEX value converted to decimal

```
234
```

THR input 03 value in HEX

```
FF
```

HEX value translated to status

```
n/a
```

# 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

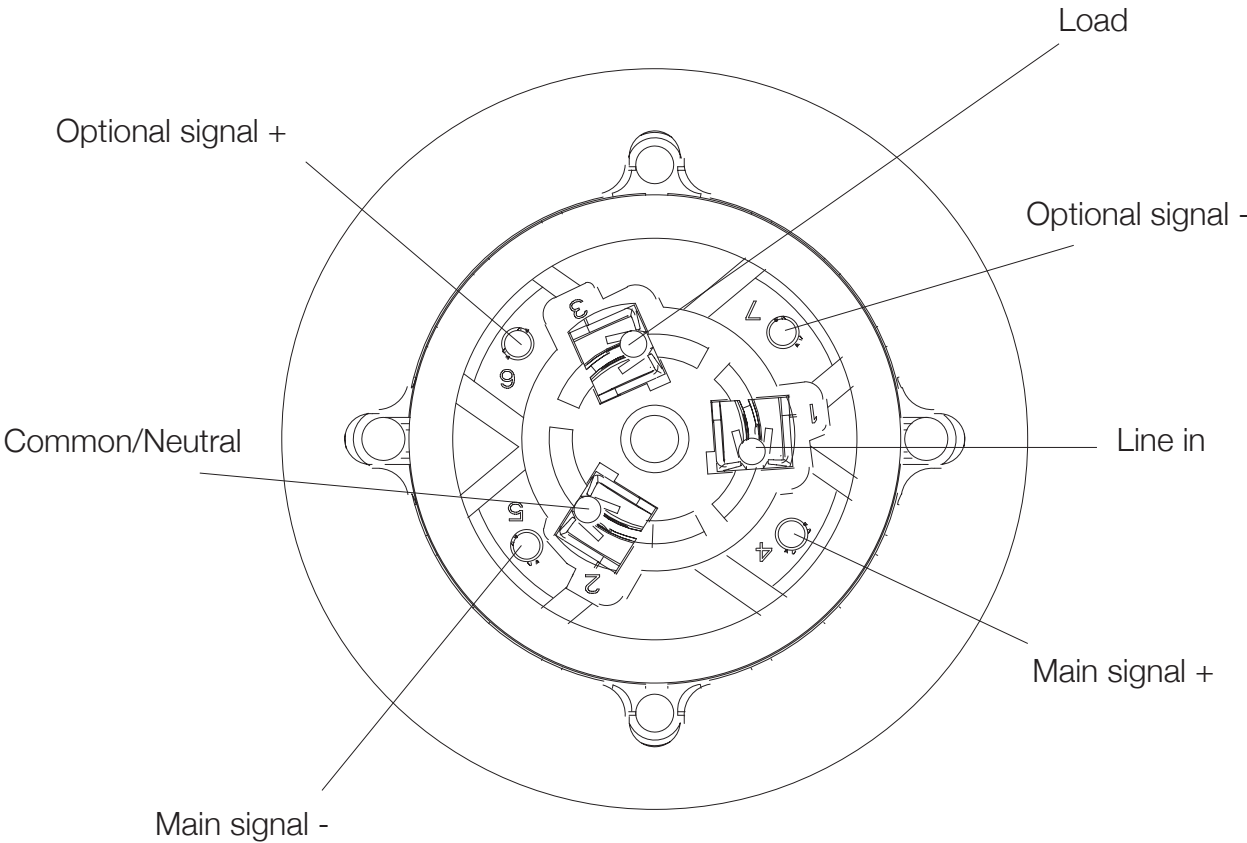
# DALI Address / Destination mapping

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

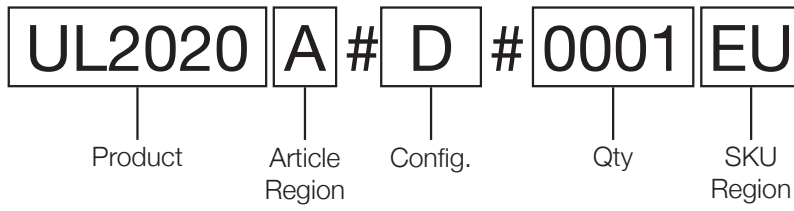
## PROFILE STEP TIME CHART

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 DIAGRAM / PINOUT



# ORDERING INFORMATION



Product/SKU	Package qty	IP Rating
UL2020x#x#0001xx	1	IP66

Article region	SKU region	Band
A	EU	EU868
B	AU	AU915
C	US	US915
D	AS	AS923
F	KR	KR920
I	IN	IN865

Model	Configuration*	
		Optional
UL2020	<b>D</b> - Main & optional signal DALI	<b>X**</b> - custom request
	<b>A</b> - Main & optional signal Analog (0..10V)	

\*Select only upto one option from each column  
 \*\* Need to confirmed before ordering

# CONTACT INFORMATION

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# REVISION HISTORY

1.0 - First draft

1.1 - New format for usage message. Calendar user configurable. Possible to request input statuses.

1.2 - Added Multicast configuration

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.