



SMARTEH[®]
LIVING SYSTEMS

USER MANUAL

- ▶ Longo programmable controller
LPC-2.DD4
4 Channel Dimmer module

Version 1

Written by SMARTEH d.o.o.
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User Manual

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STANDARDS AND PROVISIONS: Standards, recommendations, regulations and provisions of the country in which the devices will operate, must be considered while planning and setting up electrical devices. Work on 100 .. 240 V AC network is allowed for authorized personnel only.

DANGER WARNINGS: Devices or modules must be protected from moisture, dirt and damage during transport, storing and operation.

WARRANTY CONDITIONS: For all modules LONGO LPC-2 - if no modifications are performed upon and are correctly connected by authorized personnel - in consideration of maximum allowed connecting power, warranty of 24 months is valid from the date of sale to the end buyer, but not more than 36 months after delivery from Smarteh. In case of claims within warranty time, which are based on material malfunctions the producer offers free replacement. The method of return of malfunctioned module, together with description, can be arranged with our authorized representative. Warranty does not include damage due to transport or because of unconsidered corresponding regulations of the country, where the module is installed.

This device must be connected properly by the provided connection scheme in this manual. Misconnections may result in device damage, fire or personal injury.

Hazardous voltage in the device can cause electric shock and may result in personal injury or death.

NEVER SERVICE THIS PRODUCT YOURSELF!

This device must not be installed in the systems critical for life (e.g. medical devices, aircrafts, etc.).

If the device is used in a manner not specified by the manufacturer, the degree of protection provided by the equipment may be impaired.

Waste electrical and electronic equipment (WEEE) must be collected separately!

LONGO LPC-2 complies to the following standards:

- EMC: EN 61000-6-3:2007 + A1:2011, EN 61000-6-1:2007, EN 61000-3-2:2006 + A1:2009 + A2: 2009, EN 61000-3-3:2013
- LVD: IEC 61010-1:2010 (3rd Ed.), IEC 61010-2-201:2013 (1st Ed.)

Smarteh d.o.o. operates a policy of continuous development. Therefore we reserve the right to make changes and improvements to any of the products described in this manual without any prior notice.

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Longo programmable controller LPC-2.DD4

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1 ABBREVIATIONS

LED	Light emitting diode
MOSFET	Metal oxide semiconductor field effect transistor
AC	Alternating current
DC	Direct current



2 DESCRIPTION

LPC-2.DD4 module is a 4 channel MOSFET dimmer drive intended for dimmable lights (e.g., LEDs, CFLs, incandescent).

Module can also be used for driving AC motors. It is an excellent replacement for traditional relay fan speed regulation. Using LPC-2.DD4 module, step-less fan speed regulation is achieved.

Operational power supply is 90 .. 264 V AC, 50/60 Hz or 11.5 .. 30 V DC.

LEDs indicate state of signal present on corresponding module output. Their brightness corresponds to the output setting.

LPC-2.DD4 is controlled and powered from the main module (e.g., LPC-2.MC8, LPC-2.MC9) via Right internal bus. Loads are powered from external power supply which is connected to PS connector.



3 FEATURES

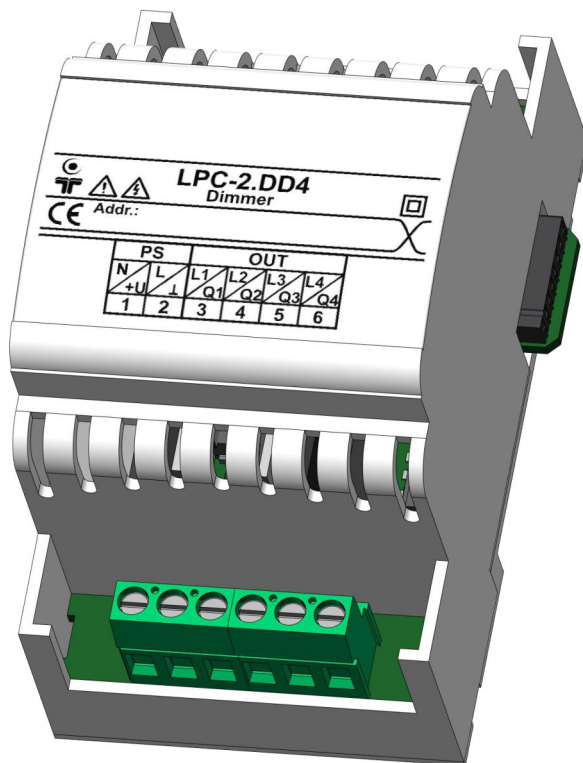


Figure 1: LPC-2.DD4 module

Table 1: Features

4 channel MOSFET dimmer drive for dimmable lights or AC motor fans.

Operational power supply 90 .. 264 V AC, 50/60 Hz or 11.5 .. 30 V DC.

Max. power consumption at 230 V AC is 210 VA on L1/Q1 and 150 VA on L2/Q2, L3/Q3, L4/Q4.

Overload protected.¹

SW adjustable trailing-edge or leading-edge dimmer type, separately for each one of 4 channels.

SW adjustable fade-in and fade-out time effect, separately for each one of 4 channels.

Phase dependent driver for output which makes this module a lot more resistant to electrical disturbances than commonly used amplitude dependent drivers.

Standard DIN EN50022-35 rail mounting

¹ Protected against overloads that lasts for less than 5 minutes.



4 OPERATION

Module parameters can be read or written via Smarteh IDE software.

4.1 Parameters

If parameter is set to logical “1”, is considered to be active, enabled or set. If parameter has logical value “0”, is considered to be inactive, disabled or cleared.

Parameter can be an output, input, status or setting. Output and input parameters correspond to the physical output and input pins of the module. Status parameters are used for additional information from the module, where setting parameters are used to select different settings on the module.

Output:

L1/Q1 - Dimmer output [OUT1]: Output setting

Type: UINT

If *PSINtype*

is “0”:

Raw to engineering data: 500 .. 10000 → 5.00 .. 100.00 %
 1 .. 499 → Output off with fade-out effect
 0 → Immediate output off

is “1”:

Raw to engineering data: 2 .. 10000 → 0.02 .. 100.00 %
 1 → Output off with fade-out effect
 0 → Immediate output off

L2/Q2 - Dimmer output [OUT2]: Output setting

Type: UINT

If *PSINtype*

is “0”:

Raw to engineering data: 500 .. 10000 → 5.00 .. 100.00 %
 1 .. 499 → Output off with fade-out effect
 0 → Immediate output off

is “1”:

Raw to engineering data: 2 .. 10000 → 0.02 .. 100.00 %
 1 → Output off with fade-out effect
 0 → Immediate output off

L3/Q3 - Dimmer output [OUT3]: Output setting

Type: UINT

If *PSINtype*

is “0”:

Raw to engineering data: 500 .. 10000 → 5.00 .. 100.00 %
 1 .. 499 → Output off with fade-out effect
 0 → Immediate output off



is “1”:

Raw to engineering data: 2 .. 10000 → 0.02 .. 100.00 %
 1 → Output off with fade-out effect
 0 → Immediate output off

L4/Q4 - Dimmer output [OUT4]: Output setting

Type: UINT

If *PSIN*type

is “0”:

Raw to engineering data: 500 .. 10000 → 5.00 .. 100.00 %
 1 .. 499 → Output off with fade-out effect
 0 → Immediate output off

is “1”:

Raw to engineering data: 2 .. 10000 → 0.02 .. 100.00 %
 1 → Output off with fade-out effect
 0 → Immediate output off

Setting:

Fade-in effect timer for L1/Q1 [OUT1FadeInTimer]: Time of fade-in effect from 0 % to 100 % output setting.

Type: USINT

Raw to engineering data: 0 .. 36 → 3.6 s (default value)
 37 .. 100 → 3.7 .. 10 s

Fade-in effect timer for L2/Q2 [OUT2FadeInTimer]: Time of fade-in effect from 0 % to 100 % output setting.

Type: USINT

Raw to engineering data: 0 .. 36 → 3.6 s (default value)
 37 .. 100 → 3.7 .. 10 s

Fade-in effect timer for L3/Q3 [OUT3FadeInTimer]: Time of fade-in effect from 0% to 100 % output setting.

Type: USINT

Raw to engineering data: 0 .. 36 → 3.6 s (default value)
 37 .. 100 → 3.7 .. 10 s

Fade-in effect timer for L4/Q4 [OUT4FadeInTimer]: Time of fade-in effect from 0 % to 100 % output setting.

Type: USINT

Raw to engineering data: 0 .. 36 → 3.6 s (default value)
 37 .. 100 → 3.7 .. 10 s

Fade-out effect timer for L1/Q1 [OUT1FadeOutTimer]: Time of fade-out effect from 100 % to 0 % output setting.

Type: USINT

Raw to engineering data: 0 → 3.6 s (default value)
 1 .. 100 → 0.1 .. 10 s



Fade-out effect timer for L2/Q2 [OUT2FadeOutTimer]: Time of fade-out effect from 100 % to 0 % output setting.
Type: USINT

Raw to engineering data: 0 → 3.6 s (default value)
1 .. 100 → 0.1 .. 10 s

Fade-out effect timer for L3/Q3 [OUT3FadeOutTimer]: Time of fade-out effect from 100 % to 0 % output setting.
Type: USINT

Raw to engineering data: 0 → 3.6 s (default value)
1 .. 100 → 0.1 .. 10 s

Fade-out effect timer for L4/Q4 [OUT4FadeOutTimer]: Time of fade-out effect from 100 % to 0 % output setting.
Type: USINT

Raw to engineering data: 0 → 3.6 s (default value)
1 .. 100 → 0.1 .. 10 s

Dimmer type for L1/Q1 [OUT1DimmerType]: Selection between leading-edge type and trailing edge type. See chapter 4.2. Applicable only when *PSINtype* = 0 (AC).
Type: BOOL

Raw to engineering data: “0” → Leading-edge
“1” → Trailing-edge

Dimmer type for L2/Q2 [OUT2DimmerType]: Selection between leading-edge type and trailing edge type. See chapter 4.2. Applicable only when *PSINtype* = 0 (AC).
Type: BOOL

Raw to engineering data: “0” → Leading-edge
“1” → Trailing-edge

Dimmer type for L3/Q3 [OUT3DimmerType]: Selection between leading-edge type and trailing edge type. See chapter 4.2. Applicable only when *PSINtype* = 0 (AC).
Type: BOOL

Raw to engineering data: “0” → Leading-edge
“1” → Trailing-edge

Dimmer type for L4/Q4 [OUT4DimmerType]: Selection between leading-edge type and trailing edge type. See chapter 4.2. Applicable only when *PSINtype* = 0 (AC).
Type: BOOL

Raw to engineering data: “0” → Leading-edge
“1” → Trailing-edge

Power supply input type [PSINtype]: Selection on what kind of power supply for loads is connected to N/+U and L/⊥.
Type: BOOL

Raw to engineering data: “0” → AC
“1” → DC



Status:

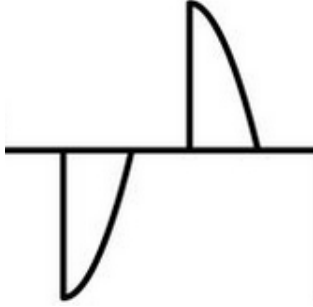
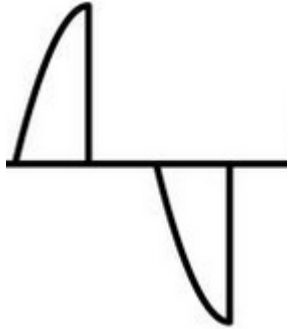
Timer of overload protection [OverloadTimer]: Timer countdown until the output is switched on again (after output overload).

Type: UINT

Raw to engineering data: 0 → overload protection is switched off
 1 .. 200 → 0.1 .. 20 s

4.2 Dimmer type setting

Table 2: Dimmer type setting for type of load

Dimmer type setting	Oscillogram of 50 % chopped sinus wave	Load types
Leading-edge		Inductive character loads, e.g. AC motor.
Trailing-edge		Resistive and capacitive character loads, e.g. lights.

NOTE: When using LPC-2.DD4 to control dimmable lights, check manufacturer dimmer type recommendation. Set LPC-2.DD4 accordingly.

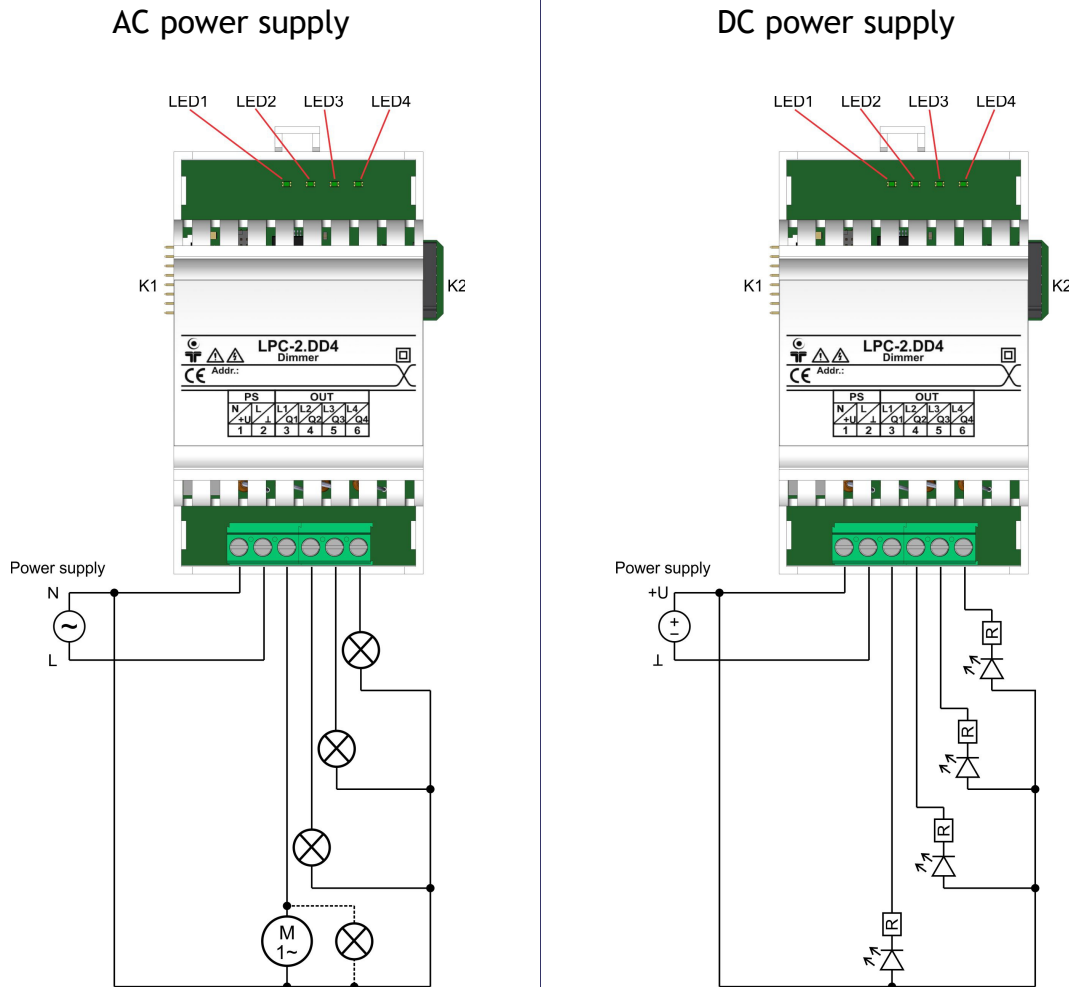
NOTE: Using LPC-2.DD4 set as trailing-edge dimmer type controlling inductive load or using LPC-2.DD4 set as leading-edge dimmer type controlling capacitive load, may result in LPC-2.DD4 module failure.



5 INSTALLATION

5.1 Connection scheme

Figure 2: Connection scheme²



NOTE: Correct dimmer type setting of LPC-2.DD4 module is essential. In-correct dimmer type setting for certain type of connected load may result in output failure. See chapter 4.2 for correct setting depending on the type of connected load.

NOTE: AC motor shall only be connected to L1/Q1 terminal on LPC-2.DD4 module.

NOTE: Circuit breaker, fuse, switch etc. is only allowed to be connected in series with LPC-2.DD4 PS.1 or/and PS.2 terminal. Using circuit breaker, fuse, switch etc. in series with LPC-2.DD4 module output terminals and load can result in LPC-2.DD4 module failure.

² Outputs must not be connected together. Use only same type of load on same output.



Table 3: PS

PS.1	N/+U	Power supply input for loads AC: neutral DC: 11.5 .. 30 V DC
PS.2	L/⊥	Power supply input for loads AC: line 90 .. 264 V AC, 50/60 Hz DC: GND

Table 4: OUT

OUT.3	L1/Q1	MOSFET dimmer output for AC motors or lights
OUT.4	L2/Q2	MOSFET dimmer output for lights only
OUT.5	L3/Q3	MOSFET dimmer output for lights only
OUT.6	L4/Q4	MOSFET dimmer output for lights only

Table 5: K1

Internal BUS	Data & DC power supply	Connection to I/O module
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Table 6: K2

Internal BUS	Data & DC power supply	Connection to I/O module
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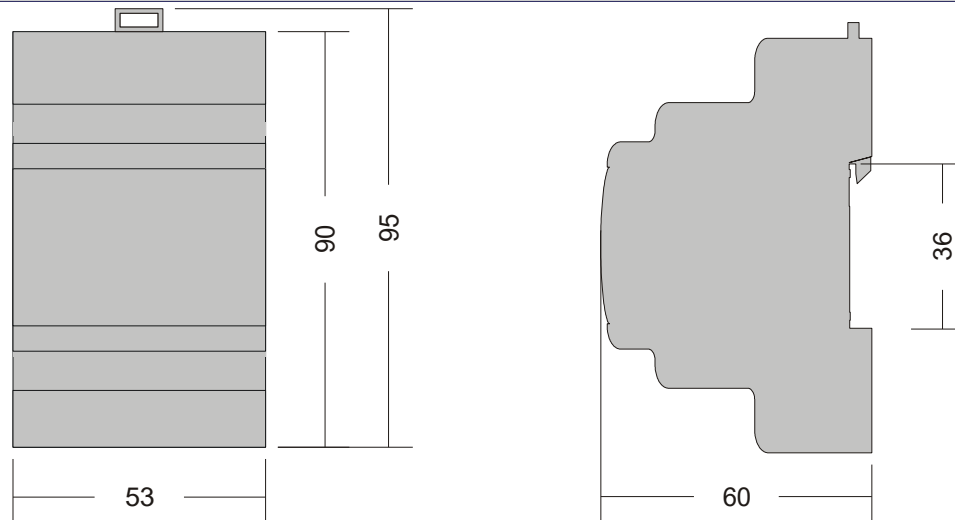
Table 7: LEDs

LED1: green	Dimmer output state	ON (gradually): L1/Q1 output on (conductive) OFF: output not powered
LED2: green	Dimmer output state	ON (gradually): L2/Q2 output on (conductive) OFF: output not powered
LED3: green	Dimmer output state	ON (gradually): L3/Q3 output on (conductive) OFF: output not powered
LED4: green	Dimmer output state	ON (gradually): L4/Q4 output on (conductive) OFF: output not powered



5.2 Mounting instructions

Figure 3: Housing dimensions



Dimensions in millimeters.



All connections, module attachments, loads replacement and assembling must be done while module is not connected to the power supply.

Mounting instructions:

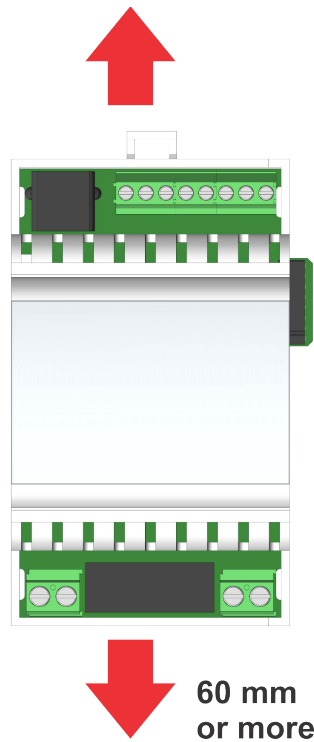
1. Switch off main power supply.
2. Mount LPC-2.DD4 module to the provided place inside an electrical panel (DIN EN50022-35 rail mounting).
3. Mount other LPC-2 modules (if required). Mount each module to the DIN rail first, then attach modules together through K1 and K2 connectors.
4. Connect digital inputs and outputs wires according to the connection scheme in Figure 2.
5. Check that every output has correct dimmer type setting selected. See chapter 4.2.
6. Switch on main power supply.

Dismount in reverse order. For mounting/dismounting modules to/from DIN rail a free space of at least one module must be left on the DIN rail.

NOTE: LPC-2 main module should be powered separately from other electrical appliance connected to LPC-2 system. Signal wires must be installed separately from power and high voltage wires in accordance with general industry electrical installation standard.



Figure 4: Minimum clearances



The clearances above must be considered before module mounting.



5.3 Module labeling

Figure 5: Label

Label (sample):

```
XXX-N.ZZZ  
P/N: AAABBBCCDDDEEE  
S/N: SSS-RR-YYXXXXXXXXXX  
D/C: WW/YY
```

Label description:

1. **XXX-N.ZZZ** - full product name.
 - **XXX-N** - Product family
 - **ZZZ** - product
2. **P/N: AAABBBCCDDDEEE** - part number.
 - **AAA** - general code for product family,
 - **BBB** - short product name,
 - **CCDDD** - sequence code,
 - **CC** - year of code opening,
 - **DDD** - derivation code,
 - **EEE** - version code (reserved for future HW and/or SW firmware upgrades).
3. **S/N: SSS-RR-YYXXXXXXXXXX** - serial number.
 - **SSS** - short product name,
 - **RR** - user code (test procedure, e.g. Smarteh person xxx),
 - **YY** - year,
 - **XXXXXXXXXX** - current stack number.
4. **D/C: WW/YY** - date code.
 - **WW** - week and
 - **YY** - year of production.

Optional

1. **MAC**
2. **Symbols**
3. **WAMP**
4. **Other**



6 TECHNICAL SPECIFICATIONS

Table 8: Technical specifications

Power supply ³	from internal BUS
Power consumption ³	1 W
Rated power supply input for loads on PS connector	AC: 115/230 V AC, 50/60 Hz DC: 12/24 V DC
Operational power supply input for loads on PS connector	AC: 90 .. 264 V AC, 50/60 Hz DC: 11.5 V .. 30 V DC
Rated load current on channel L1/Q1	0.9 A
Rated load current on channel L2/Q2	0.65 A
Rated load current on channel L3/Q3	0.65 A
Rated load current on channel L4/Q4	0.65 A
Number of drive outputs	4
Load capacitance ⁴	max. 1 μ F
Fuse	no
Connection type	screw type connectors for stranded wire 0.75 to 2.5 mm ²
Dimensions (L x W x H)	90 x 53 x 60 mm
Weight	70 g
Ambient temperature	0 to 50 °C
Ambient humidity	max. 95 %, no condensation
Transport and storage temperature	-20 to 60 °C
Pollution degree	2
Overvoltage category	II
Electrical equipment	Class II (double insulation)
Protection class	IP 30

³ Of internal logic only.

⁴ Applicable when using DC power supply input.



7 SPARE PARTS

For ordering spare parts following Part Numbers should be used:

LPC-2.DD4 module, 4 channel dimmer module	
LPC-2.DD4	P/N: 225DD419001002



8 CHANGES

The following table describes all the changes to the document.

Date	V.	Description
24/07/19	1	The initial version, issued as <i>LPC-2.DD4 module UserManual</i> .





9 NOTES

