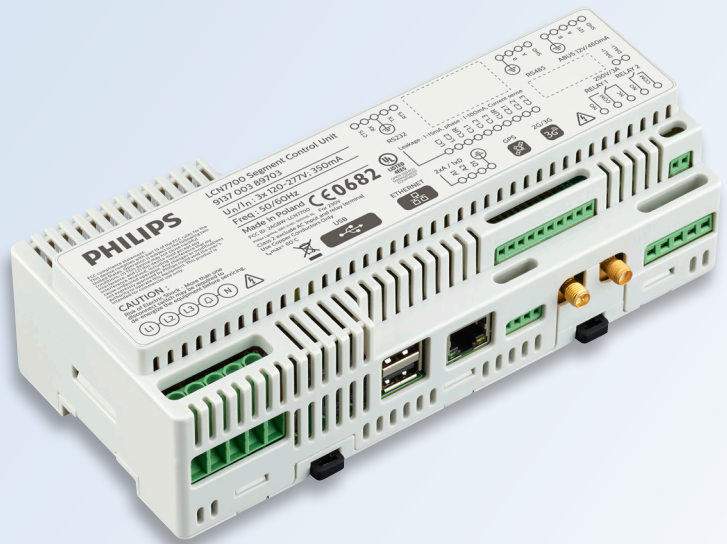


PHILIPS

Segment Control
Unit



Product guide

LCN7700

The Segment Control Unit is central processing unit (CPU) in the cabinet system. Equipped with a powerful ARM Cortex A5 (550MHz) processor and a Linux kernel.

Commonly used interfaces for Energymeter, load current and leakage measurement, relays for contactor mains switching are integrated into the Segment Control Unit for ease of wiring and compactness.

Direct communication between the optional modules takes place by means of an A-Bus interface, which is based on the industrially proven RS485 technology.

LCN7700

The Segment Control Unit serves as a WAN communications and data concentrator module. Two-way communication with the central server takes place via Ethernet, GPRS (3G/2G) or SMS. The module has the ability to automatically switch between different available communications carriers in order to provide stable and reliable communication.

Data are either delivered to the server immediately or stored locally in the built-in flash or external SD card memory of the Segment Control Unit until scheduled delivery. Software and configurations are updated remotely from the server and stored on the Segment Control Unit enabling it to autonomously execute tasks, e.g. turn the streetlight on/off or collect meter readings based on the configurations set up by the user.

Voltage values on all three phases of the main supply are monitored by the Segment Control Unit. If the module is installed together with a Battery module, the Segment Control Unit will be supplied with backup power via the A-Bus in the event of power failure. This enables the Segment Control Unit to store data and send a main power failure alarm to the central server before it shuts down safely.

For more detailed information see the specific module manuals & guides.

Applications

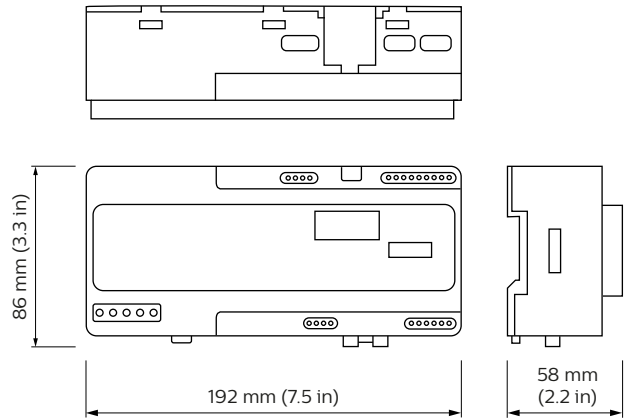
The Segment Control Unit is a power grid monitoring and group lighting control device. It is designed to be installed inside an IP65 rating outdoor street cabinet. This control unit is designed as a local controller for group light controls as in road and street, expressway, premises/campus area lighting, public parks or in tunnel lighting applications.

For remote connectivity, 2G/3G network can be used or Ethernet connectivity in case the cabinet is located indoors.

The accurate current measurement can help to detect power thefts when the current value goes beyond a threshold limit defined. The inbuilt GPS locator helps to detect the location of the installed controller remotely to enable ease of commissioning. The DALI interface gives opportunity to control other DALI enabled devices like a group of luminaires in a high mast pole in airport or port applications with dimming capability. The wide input power supply voltage range from 120-277V makes the controller to be used in wide geographical locations. The use of an external surge protection module is highly recommended to protect the Segment Control Unit from surges.

In general, the Philips Segment Control Unit can be used for remote light management in diverse outdoor Lighting applications.

Dimensional drawing




Philips quality

Lifetime: 70000 Hrs @ 10% failure rate.

Functional specifications

The Ethernet connection is, in addition to this, functionally insulated with respect to the secondary connections. See for detailed information the technical specification section.


Primary

Power (L1, L2, L3, , N)

Three mains rated phase (line) inputs: L1, L2 and L3

One mains rated alarm monitor input: 

One mains neutral input: N

The Segment Control Unit can be mains powered by one, two, or three phases plus neutral. When powered by multiple phases, the Segment Control Unit is able to detect phase faults on the mains power supply. If a fault occurs on one or two phases, the Segment Control Unit will still be powered by the remaining phase(s). In this case, the Segment Control Unit will send an alarm to the central server. The alarm monitor () is a mains rated input (related to mains Neutral (N)) for cabinet door monitoring.

Secondary

USB	2x USB 2.0 host port for additional devices
Inputs	
2x Analog	Low voltage measurement inputs analog input 1 and analog input 2 (positive voltage w.r.t. GND).
1x Digital	Low voltage input digital input (positive voltage w.r.t. GND).
Ethernet	RJ-45 connector, 100/10 Mbps, half & full duplex, functional insulated from the secondary connections.

GSM/GPRS	SMA connector for external GSM antenna. GSM850, E-GSM900, GSM1800 (DCS1800), GSM1900 (PCS1900).
SIM Card	Micro SIM card is inserted on top part of the Segment Control Unit.
Micro SD card	Micro SD card is inserted on top part of the Segment Control Unit.
A-Bus	1x5 internally connected signals that are used for the A-Bus. The internal connection makes it easier to daisy-chain to other controller modules.
RS485	Supports multiple baud rates. Default value is 9600 bps.
DALI	DALI master without DALI Power Supply.
Current Sensing	Phase current sensing and leakage current sensing.
RS232 interface	For use with RS232 power meters, maximum data transfer rate 115.2 Kbps.
GPS Antenna	Insert the antenna in the antenna socket of the Segment Control Unit and tighten it gently with your fingers. Do not use tools.
GPRS Antenna	Insert the antenna in the antenna socket of the Segment Control Unit and tighten it gently with your fingers. Do not use tools.

Reliability & Maintainability

Software upgrade/ installation	The software on the Segment Control Unit can be updated remotely from the central server. New software is transferred without interrupting the normal functionality of the Segment Control Unit. When the software has been transferred, the integrity of the software is checked and the software is installed.
Multi-layer system	Various internal processes ensure that the system is up and running at all times.
System health	In case a process has failed, it is restarted without disturbing other processes.
Self-test	A built-in self-test is performed after power-up.

Installation

The Segment Control Unit should be protected from dust and water, preferably by enclosing the system in a metal IP class 65 (NEMA type 4) outdoor cabinet.

Connections on the primary side

Keep wiring short from the mains circuit breaker towards the mains power input. When using a surge protection module, the wires between the surge protection module and the Segment Control Unit may not exceed 0.15 m. Philips recommends for outdoor applications to use a surge protection module.

At least one GROUND connection needs to be connected to Earth or screwed GPS or 2G/3G antenna is connected and installed on cabinet.

Connections on the secondary side

All cables on secondary side should preferably be shielded, with the shield connected to GND (pin5 for the A-Bus).

EU directives	Use shielded twisted pair (2x2) cable. The Segment Control Unit can be connected to any client module e.g. AmpLight RS485, AmpLight Switch. Double connections on the A-Bus makes daisy-chaining of the signals easy. For detailed information, see wiring diagrams.
A-Bus cable	cable length < 3 m
RS485	cable length < 3 m
Analog/Digital Input	cable length < 3 m
Current Sensing Input	cable length < 3 m
DALI	cable length < 10 m
USB	cable length < 3 m
RS232	cable length < 3 m
Ethernet	cable length < 3 m
Mains Input	cable length < 1.5 m

Technical data

Environmental

Storage temperature	-40° C – +85° C
Operating temperature	-20° C – +60° C
Max humidity	90% (non-condensing)

Supply characteristics

Input voltage	UL: 120 – 277 VAC (3P + N) CE: 220 – 240 VAC (3P + N) Nominal voltage: 230 VAC, Nominal frequency: 50/60 Hz (± 5 Hz).
Relay Endurance on given maxima 100.000 operations COM1, NO 1 750 VA COM1, NC 1 750 VA COM2, NO 2 750 VA	Max switching voltage: for CE: Max 250V; for UL: 120 – 277V. Max switching current: 3 A (resistive).
Power consumption	<3 W, Segment Control Unit only, no load on A-Bus and USB.
Nominal system power consumption	< 5.5 W, Segment Control Unit with one AmpLight Switch, one AmpLight Current and one AmpLight Battery.
Maximum system power consumption	< 18 W, Segment Control Unit and 460 mA on A-Bus and each 250 mA on 2x USB .
Current consumption (powered via A-Bus)	Typical 100 mA, Max 300 mA at 12 V.
USB Maximum	250 mA, 5 V.

Measurement characteristics

Input mains	Accuracy within 120 – 277 VAC range: ± 5% FSD (Full Scale Deflection)
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Analog inputs	Input range 0-10 V, 4-20 mA (0-20 mA): Impedance = 510 ohm (DC) Accuracy = ± 2% FSD at 25° C When used as digital input: Threshold of approximately 1 V Absolute maximum input voltage = 12 V (A-Bus voltage can be used).
Digital input	Internal 100 Kohm resistor - 1 Mohm pull-up resistor. Connect terminal to GND for a digital low. Make sure that the terminal to GND resistance is below 1 Kohm (current internally limited to 3 uA). Keep wires connected to this high impedance input away from disturbing networks.
Current Sense	Sensor input detection range: 170 – 1000 mA. Use with LCU7591 AmpLight Leak Coil only. Input range: 5 – 15 mA (including = 5 mA), abs. accuracy ± 5% FSD; 1-5 mA, abs. accuracy ± 10% FSD Current sensor input(s) Detection range: 5 – 65 A. Use with LCU7590 AmpLight 3-Phase Coil only. Input range: 5 – 100 mA (including = 5 mA), abs. accuracy ± 5% FSD; 1-5 mA, abs. accuracy ± 10% FSD

GSM/GPRS/EDGE

Bands	Supports GSM 850, E-GSM 900, DCS 1800, PCS 1900
Transmit power	GSM 850/ E-GSM 900: max. 33 ± 2 dBm DCS 1800/PCS 1900: max. 30 ± 2 dBm

GPRS	<p>DTM (simple class A) operation.</p> <p>GPRS Multislot class 10 (no backoff) – Four Rx slots (maximum), two Tx slots (maximum), five active slots total.</p> <p>Coding schemes CS1, CS2, CS3 and CS4.</p> <p>GEA1, GEA2 and GEA3 ciphering.</p> <p>WCDMA/GERAN system selection.</p>
EDGE	<p>E2 power class for 8 PSK.</p> <p>DTM (simple Class A), Multislot class 12.</p> <p>EGPRS – Multislot class 12 (with backoff).</p> <p>BEP reporting.</p> <p>SRB loopback and test modes A and B.</p> <p>8-bit and 11-bit RACH.</p> <p>Support PBCCH.</p> <p>One-phase /two-phase access procedures.</p> <p>Link adaptation and IR.</p> <p>NACC, extended UL TBF.</p> <p>Support PFC/PFI (Packet Flow context/Packet Flow identifier).</p> <p>GPRS/EDGE MSC 12-EDA – permits allocation of more than two uplink timeslots for GPRS/EDGE.</p> <p>Enh DL RLC/MAC Segmentation – permits reception of MAC control messages that exceed one radio block capacity in length.</p> <p>Enhanced Ext UL TBF – dummy block transmission is punctured for current saving purposes.</p> <p>2G PS handover – packet-switched equivalent of CS handover to ensure faster cell change and improved throughput.</p>

SMS	SMS MO and MT. CS and PS support. SMS saving and reading from UIM card or ME storage.
SIM card	Support Micro SIM card. Micro SIM card is inserted on top part of the Segment Control Unit.
SD card	Micro SD card is inserted on top part of the Segment Control Unit.
GNSS	RPSMA connector for external GNSS antenna. GPS (1575.42 ± 1.023 MHz) and GLONASS (1597.5 – 1605.9 MHz).

WCDMA

Bands	Support B1, B2, B5, B8
Transmit power	Class 3bis (21 ± 2 dBm) at all bands.
WCDMA R99	All modes and data rates for WCDMA FDD. PS data rates of 384 kbps DL and 384 kbps UL.

WCDMA R5 HSDPA	<p>PS data speeds up to 42 Mbps (UE category 24) on the downlink.</p> <p>HS-DSCH (HS-SCCH, HS-PDSCH and HS-DPCCH). Maximum of 15 HS-PDSCH channels, both QPSK and 16 QAM modulation.</p> <p>Support for 3GPP-defined features.</p> <p>Switching between HS-PDSCH and DPCH channel resources, as directed by the network.</p> <p>STTD on both associated DPCH and HS-DSCH simultaneously.</p> <p>CLTD mode 1 on the DPCH when the HS-PDSCH is active.</p> <p>STTD on HS-SCCH when STTD or CLTD mode 1 are configured on the associated DPCH.</p> <p>Support SCH-IC.</p> <p>Support HS-DSCH DRX.</p>
WCDMA R6 HSUPA	<p>E-DCH data rates of up to 5.76 MB/s for 2 ms TTI (UE category 6) uplink.</p> <p>Support for 3GPP-defined features.</p> <p>STTD on all HSUPA downlink channels.</p> <p>CLTD mode 1 on HS-PDSCH and DPCH along with HSUPA channels.</p> <p>Switch between HSUPA channels and DPCH channel resources, as directed by network.</p> <p>Handover using compressed mode with simultaneous E-DCH and HS-DSCH interactive, background, and streaming.</p> <p>QoS classes.</p> <p>Support DPCCH DTX.</p>

Mechanical

Housing

Top part	Polycarbonate Light Gray (RAL 7035)
Base part	Polycarbonate Light Gray (RAL 7035)
Coating	PCBA conformal coated
Mounting	DIN-rail (EN50022)
Weight	385 gr

Connections

Mains power connector	0.82 - 1.5 mm ² (18 - 14 AWG) solid/stranded; copper conductors only, wire rating 65° C min.; wire strip length: 8~9 mm; tightening torque: 0.40 - 0.50 Nm.
Analog/Digital inputs, A-Bus, RS485, RS232, Current sensing connectors	0.14 - 0.5 mm ² (26 - 20 AWG) solid/stranded; wire strip length: 5 mm; tightening torque: 0.20 - 0.24 Nm.
DALI connectors	0.14 - 0.5 mm ² (26 - 20 AWG) solid/stranded; wire strip length: 5 mm; tightening torque: 0.15- 0.20 Nm.
Relay connector	0.82 - 1.5 mm ² (18 - 14 AWG) solid/stranded; wire strip length: 6 mm; tightening torque: 0.40 - 0.44 Nm.
Ethernet	Tab-Down RJ-45 meets IEEE 802.3 Standard with minimum of 1500 Vrms isolation.
USB	USB2.0, Type-A Receptacle.
2G/3G Antenna	SMA female; Impedance 50 ohm, Tightening torque: max 0.5 Nm.
GPS Antenna	RPSMA female; Impedance 50 ohm, Tightening torque: max 0.5 Nm.

Standards and approvals

CE/CB

EN60950 for LVD

R&TTE with CISPR22 for RF certification and EMC

RoHS with EU directive 2011/65/EC (Philips RSL latest update)

REACH with EU directive 2006/1907/EC (Philips RSL latest update)

UL listed

UL 916 for safety

FCC Part 15 Subpart B, FCC PART 22/24 & MPE OET65

FCC Statement

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules.

Operation is subject to the following two conditions:
(1) this device may not cause harmful interference, and
(2) this device must accept any interference received, including interference that may cause undesired operation.

These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications.

Notice:

- (1) Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment
- (2) The manufacturer is not responsible for any radio or TV interference caused by unauthorized modification to this equipment. Such modifications could void the user's authority to operate the equipment.
- (3) This equipment complies with FCC RF radiation exposure limits set forth for an uncontrolled environment. This equipment must not be co-located or operating in conjunction with any other antenna or transmitter. The equipment must be installed to provide a separation distance of at least 30 cm.

Packing data

Type	Box dimensions (mm)	Qty/Box	Material	Box Weight (kg)	
				net	gross
LCN7700 Segment Control Unit	711 x 581 x 159	20	Cardboard	7.7	10.7

Ordering Data

Type	MOQ	Ordering number	EAN code level 1	EAN code level 3	EOC
LCN7700 Segment Control Unit	1	9137 003 89703	8727900 947489	8727900 947496	947489 00

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