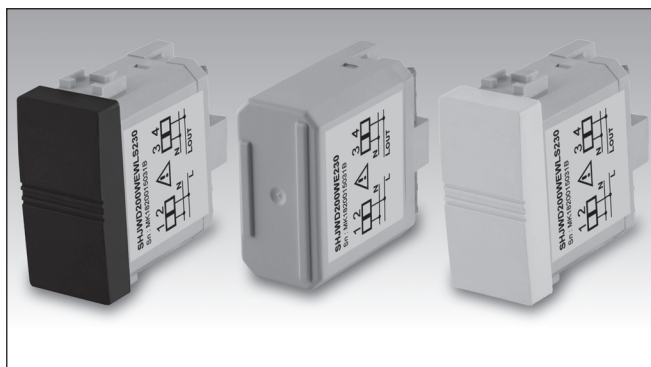


# Smart Dupline® Wireless dimmer with energy reading Type SHJWD200WExxx

CARLO GAVAZZI



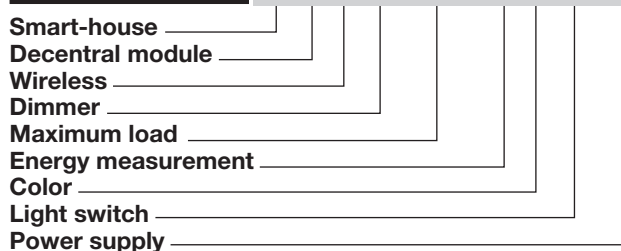
- Universal wireless dimmer up to 200 W for R, L, C load and LED lamps
- Wireless transmission based on IEE802.15.4 @ 2.4 GHz
- Automatic load detection for L, R, C loads
- 1 dimmable output
- Soft start/stop
- Protected against short circuit, overload and high temperature
- Minimum load 3 W
- Programmable routing function
- Spring terminals
- Energy measurement: kWh
- Instantaneous variables readout: A, V, W, Wdmd

## Product Description

This is a 200W wireless universal dimmer with energy reading to fit into eurobox. Single phase variables: A, V, W, Wdmd. Energy measurement: total kWh consumed by the connected load. This universal dimmer is suitable for dimming resistive, inductive and capacitive loads and LED lamps (see LED lamps table). The maximum load of R, L, C type is 200W depending on the temperature: the reduction is described according to the trend in the diagram "derating curve". The dimmer automatically detects if the connected load is resistive, capacitive or inductive,

but if a LED lamp is to be driven, the user has to select the right curve as described below. The dimmer is completely programmable via the Sx tool. The technology used enables to electrically protect the dimmer against short circuit, overload and over-temperature. The SHJWD200WExLS230 version integrates two programmable capacitive push-buttons (K1, K2) and can be mounted into the BTicino frames Luna, Light, Living to substitutes traditional switches.

## Ordering Key SH J W D 200W E W LS 230



## Type Selection

Light switch	Colour	Supply: 220...240 V ±10%	Supply: 110...120 V ±10%
2, programmable (K1, K2)	Grey	SHJWD200WE230	SHJWD200WE115
2, programmable (K1, K2)	White	SHJWD200WEWLS230	
	Black	SHJWD200WEBS230	

## Output Specifications

Maximum load	200 W @ 230V, 100W @ 115 V for R, L, C load Derating curve according to temperature
Minimum load	3 W
Protections	Overload, short circuit, thermal
Output type	Power mosfet
Rated operational voltage	115 and 240 VAC
Operational voltage range	115 and 240 VAC ±10%
Rated operational frequency	50/60 Hz
Dimming speed	Programmable

**Types of dimmable lamps**  
Different types of outputs (L,C) can not be mixed

Incandescent (R)  
LV halogen lamps with electronic ballast (C)  
LV halogen lamps with conventional transformer (L)  
HV halogen lamps (R)  
115/230V dimmable LED lamp  
ESL lamps

**Notes:** if energy saving lamps are used, attention has to be paid to the maximum inrush current at startup: it must not be greater than 3A otherwise the overload protection will be activated.

## Supply Specifications

<b>Power supply</b>	Overvoltage cat. II (IEC 60664-1, par. 4.3.3.2)
Rated operational voltage	
SH...230	220...240 VAC ±10%
SH...115	110...120 VAC ±10%
<b>Rated impulse voltage</b>	2.5 kV
<b>Rated operational power</b>	1 W, 2.5 VA
<b>Power on delay</b>	Typ. 2 s
<b>Power on reset</b>	The module doesn't save the output status. This will be done by the Sx2WEB24

## WiDup Specifications

<b>Bus</b>	Wireless dupline
<b>Frequency</b>	IEEE 802.15.4, @ 2.4 Ghz
<b>Diagnostic</b>	1. Field strength 2. network activities 3. Devices' presence
<b>Network Topology</b>	Star with max two wireless repeaters
<b>Antenna</b>	Internal
<b>Transmission power</b>	According to IEEE 802.15.4
<b>Sensitivity</b>	According to IEEE 802.15.4
<b>Number of slave nodes</b>	Up to 250
<b>Transmission range</b>	< 700 m in the open air

## Input Specifications

<b>Keypad</b>	2 touch buttons	SHJWD200WEWLS230 SHJWD200WEBLS230
---------------	-----------------	--------------------------------------

## Electrical Values Readout

<b>Rated values</b>		
A (direct)		0 to 10000 mA
V		
	SHJWD200WE115	103 to 126.0 V
	SHJWD200WE230	216 to 264.0 V
W		0.1 to 300.0 W
kWh		0.1 to 99999999.9 kWh with roll over
Wdmd		0.1 to 300.0 W
<b>Accuracy</b>		
A		1% read value ± 2 mA
V		1% read value
W		2% read value ± 0.5 W
kWh		2% read value
Wdmd		1% read value

## General Specifications

<b>Address assignment</b>	Automatic: the controller recognises the module through the SIN (Specific Identification Number) that has to be fitted in the Sx Tool	<b>Weight</b>	65 g
<b>Fail-safe mode</b>	In case of interruption of the smart-house connection, the channel will be forced into a specific optional status as described below	<b>Approvals</b>	cULus, according to UL60950; R&TTE
<b>Environment</b>		<b>CE Marking</b>	Yes
Degree of protection	IP 20	<b>EMC</b>	
Pollution degree	3 (IEC 60664)	Immunity	EN 61000-6-2
Operating temperature	-20° to +50°C (-4° to 122°F)	- Electrostatic discharge	EN 61000-4-2
Storage temperature	-50° to +85°C (-58° to 158°F)	- Radiated radiofrequency	EN 61000-4-3
Humidity (non-condensing)	20 to 90% RH	- Burst immunity	EN 61000-4-4
<b>LED's indication</b>		- Surge	EN 61000-4-5
Power / Output LED	1 green	- Conducted radio frequency	EN 61000-4-6
WiDup LED	1 blue	- Power frequency magnetic fields	EN 61000-4-8
<b>Housing</b>		- Voltage dips, variations, interruptions	EN 61000-4-11
<b>E230, E115</b>	40.8 x 45.5 x 21.5 mm	Emission	EN 61000-6-3
<b>LS230</b>	43.7 x 47.4 x 21.5 mm	- Conducted and radiated emissions	CISPR 22 (EN55022), cl. B
		- Conducted emissions	CISPR 16-2-1 (EN55016-2-1)
		- Radiated emissions	CISPR 16-2-3 (EN55016-2-3)

## LEDs Indication

### Green LED:

#### Power and Output status

On: Supply ON and output OFF

Fast blinking: Supply ON and output ON

Slow blinking: output ON but no load is connected

OFF: Supply OFF

- 1 short blink every 4

seconds: high current warning (> 1 Arms).

- 2 short blinks every 4

seconds: High peak current

- 3 short blinks every 4

seconds: High temperature error

- 4 short blinks every 4

seconds: Wrong frequency error

- 5 short blinks every 4

seconds: Short circuit protection enabled and high current detected (> 3 A)

### Blue LED: WiDup

Short blink: Sending data when associated to a SH2WBU230x

Long blink: Sending data

when not associated to any SH2WBU230x or when receiving a network configuration

On: During network configuration when configured as a router

## Mode of Operation

### Faulty lamps recognition

If the measured current is lower than 20mA, the relay module gives a message of faulty load (the connected lamp might be broken). This information is sent to Sx2WEB24 that makes it available to the user via the Sx tool, Webserver, e-mail, SMS, ...

### Fail/safe condition

The output status of the dimmers, when the Dupline® bus is not connected or faulty, is programmed via the Sx Tool and the user can choose between the following options:

1. Output always OFF
2. Output always ON
3. The output maintains the status they had before the disconnection.

As default, output is factory set to OFF.

### Energy measurement

The electrical values measured by the SHJWD200WExxx are: current, voltage, power, energy. These readouts are sent to the Sx2WEB24 and logged there, the instant values and the logged ones are accessible to the user by connecting to the webserver resi-

dent in the Sx2WEB24, via sms, emails or modbus.

### Hardware short circuit protection

As described in the "Lighting Circuit Design", if more capacitive transformers have to be connected in parallel for a total load higher than 180W @20°, the hardware short circuit protection has to be disabled.

This protection has to be disabled via the Sx tool as described below in "Programming".

If the hardware short circuit protection is enabled, it is always active when the output is both on and off. If the protection is disabled, it is active only when the load is off, in this situation care has to be taken to avoid short circuits when the output is active, otherwise the dimmer will be damaged.

### Programming

The dimmer SHJWD200WExxx is fully programmable via the Sx tool and the programmable parameters are the following ones:

- 1) Ramp time. It is the time the dimmer takes to switch the light on from 0% to

100% (and from 100% to 0%). It can be set from a minimum of 2 seconds to a maximum of 31 seconds

2) Load type. This dimmer can drive

- RLC load (RLC curve): e.g. incandescent, halogen lamps

- LED lamps dimmable with trailing edge curve (P1 curve)

- LED lamps dimmable with leading edge curve (P2 curve)

- LED lamps dimmable with leading edge curve and no soft start (P3 curve)

Please see LED lamp dimming paragraph for more details.

3) Fail safe state. The user can program the three different behaviour previously described.

- Output always off

- Output always on

- The output maintains the status it had before the disconnection.

4) Short circuit protection. The user can enable/disable the hardware short circuit protection.

5) Scenario changing enabled. With this option the user can block the changing of a dimming scenario in a dimming function (e.g. hotel,

public places, ...).

6) Scenario saving enabled (unlock). With this option the user can block the saving of a change in a scenario in a dimming function.

7) Soft start ramp. Using the Sx tool, the user can define a different soft start ramp for each scenario. The soft start can be programmed from 1 to 62 seconds.

8) Soft stop ramp. Using the Sx tool, the user can define a different soft stop ramp for each scenario. The soft stop can be programmed from 1 to 62 seconds.

The dimmer SHJWD200WExxx can also be used, coupled with any of the smart Dupline® lux sensor, in dimming functions with constant light programming.

### Coding/Addressing

No addressing is needed since the module is provided with a specific identification number (SIN): the user has only to insert the SIN number in the Sx tool when creating the system configuration.

## Lighting Circuit Design

Some general rules have to be taken into consideration when designing lighting circuits.

### Ferromagnetic transformers

When using halogen lighting with ferromagnetic transformers, pay attention to the output of the transformers. To maximise efficiency, load these transformers with at least 80% of their normal power. Pay attention to the output of the transformer when determining the total load of the dimmer. The transformer has to be suitable for dimming.

### Electronic transformers

Electronic transformers present a capacitive load to the dimmer but if the cable between the transformer and the dimmer is significant this will introduce an additional inductive load, and the dimmer would see a combination of the two types of load (inductive and capacitive).

It is recommended that an electronic transformer is loaded to at least 75% of its maximum rated loading, this reduces the possibility of lamp flicker when dimming, as is common with electronic transformers. Refer to the manufacturer's specifications for the electronic trans-

former being used.

Pay attention to the output of the transformer when determining the total load of the dimmer (average efficiency is around 90%). The transformer has to be suitable for dimming.

When a capacitive load is initially connected there may be a substantial surge of current through the primary winding called the inrush current.

This inrush current may last for 2-3 seconds and can have a peak of 10 times the RMS current stated by the manufacturer of the transformer (this is also valid for CFL fittings).

If many electronic transformers are connected in parallel, the value of the total current is given by the sum of the current peaks generated by each transformer.

If the total inrush current is higher than 3.5 A, the dimmer's hardware short circuit protection will be activated. As a general rule if the short circuit protection is enabled, a total load of 30% of the nominal dimmer output power can be connected to the dimmer (100W@20°C).

## Transmission range

The main factors that influence the transmission range of the SHJWD200WExxx are the antenna location of the receivers and transmitters, the building structure and the number of obstacles in the connection path.

Other factors are noise sources (wi-fi routers, micro oven, blue tooth devices,...) that affect the receiver and dead spots caused by signal

reflection from nearby conductive objects.

Since the anticipated transmission range depends on these system conditions, range tests should be performed before a specific range is determined for an application.

The following transmission ranges are to be viewed as general guidelines:

Device Position	Operating Distance
In the open air	Approx. 700 m
Plaster-board/wood	Approx. 30 m Max. 5 walls
Tile and cellular concrete	Approx. 20 m Max. 3 walls
Reinforced concrete walls/ceilings	Approx. 10 m Max. 1 ceiling/wall

The transmission range is limited by:

- insulation material with metal foil
- intermediate ceilings with metal or carbon fibre panels
- lead glass or metal-coated glass
- mounting wall transmitters on metal walls

For more information about how to install a wireless network, please read here ([link](#)).

## LED Lamp Dimming

As described in "Programming", when using LED lamps, the dimmer needs to be programmed with curve P1/P5 when the LED manufacturer recommends trailing edge dimming (capacitive), P2/P3/P4 when the LED manufacturer recommends leading edge dimming (inductive). The selection of these curves also implements a different response curve. This curve is the relationship between lamp brightness and the power supplied to it.

LED lamps have a different curve compared to standard inductive loads.

Please see table here for manufacturer's recommendation. If your LED lamp is not listed, please refer to the manufacturer for advice on their preference for leading or trailing edge dimming.

If many LED lamps are connected in parallel, we suggest the following rule to define the maximum number of LED lamps, the maximum total LED lamp power  $\leq 1/10$ th of dimmer's maximum rated power. The maximum load depends on the capacitive input impedance of the LED lamps, so it can vary according to the LED lamp type.

If the green LED on the SHJWD200WExxx dimmer starts blinking 2 short blinks every 4 seconds as soon as the load is applied, this suggests that the total load has become more capacitive than inductive (the total capacitance is done by the sum of the capacitance of each connected LED lamp) and can not be driven anymore by the P2 curve.

The explanation of this is as follows, as previously described most LED lamps have to be dimmed as an inductive load with leading edge dimming (P2), but if more LED lamps are con-

nected in parallel, the load becomes more capacitive (total capacitance is the sum of capacitance for each connected).

Since a capacitive load can not be dimmed with leading edge dimming (because of the currents peaks) the dimming curve must be set to P1. In this situation the dimming performance may be reduced.

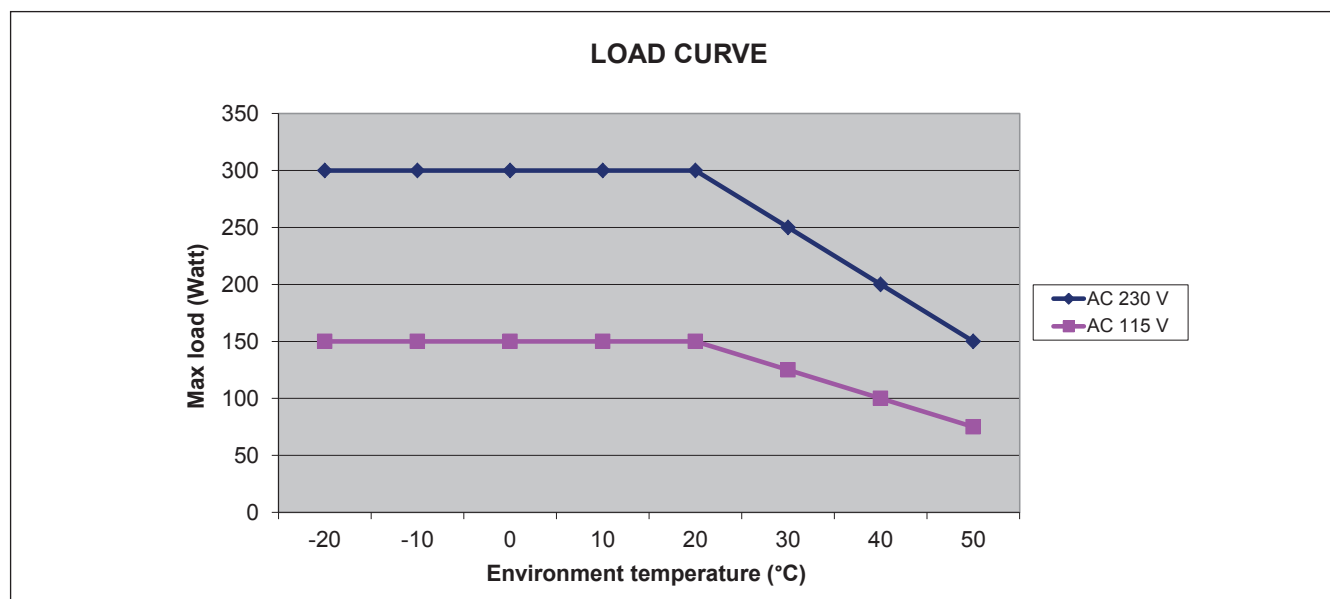
A compromise between dimming performance and the total load that can be connected has to be decided by the installer.



## LED Lamp Dimming (cont.)

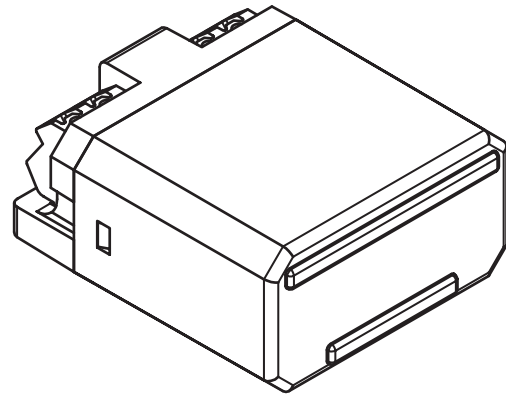
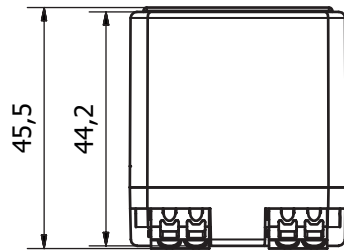
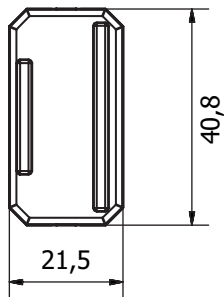
Error detection				
Warning /Error type	Cause	Correction	Output status	Green LED status
Warning: No load	Output ON but no load is connected	Check the status of the connected load	The output replicates the function status	Slow blink
Warning: high current	Current is higher than 1 Arms	Current is lower than 0,8 Arms	The output replicates the function status	1 short blink every 4 seconds
Warning: high peak current	When a trailing edge curve is selected but the load is a leading edge one or viceversa. RLC selection: the load might be faulty	The correct type of load is selected	The output replicates the function status	2 short blinks every 4 seconds
Error: high temperature	High temperature error: this error will be triggered if the internal temperature raises above 100°C	Please wait until the inside temperature goes below 80°C. The reset of the error is automatic once the temperature is within the operating range.	The output of the dimmer is OFF even if the function status is ON	3 short blinks every 4 seconds
Error: Frequency outside correct range	If the measured frequency is out of the range 48-52 Hz or 58-62 Hz: the error will be triggered.	The frequency is in the correct range	The output of the dimmer is OFF even if the function status is ON	4 short blinks every 4 seconds
Error: short circuit	Short circuit protection active and a current higher than 3A is detected	To reset it, switch the dimmer OFF, remove the short circuit and wait for 30 seconds. After a short circuit, the dimmer doesn't accept any command for 30 seconds	The output of the dimmer and the one of the relevant dimmer function are set to OFF	5 short blinks every 4 seconds

## Derating Curve

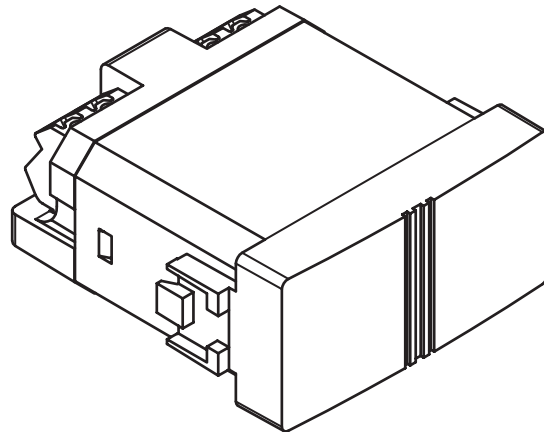
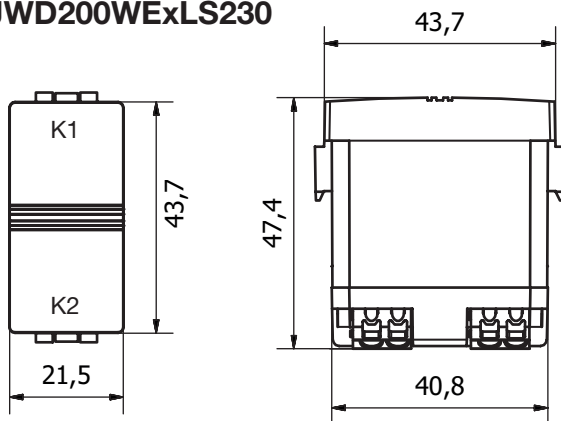


## Dimensions

### SHJWD200WExxx



### SHJWD200WExLS230



## Wiring Diagram

