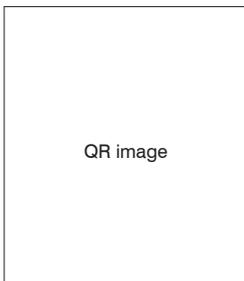# NESS Z-WAVE™
DOOR LOCK CONTROLLER (DLC)

QR image

- Operate your Door Locks, Garage Doors/Gates by Z-Wave commands
- Onboard 12V Lock output
- Onboard relay output
- Onboard Lock/Unlock button
- Aux input for door position sensors
- Supports Z-Wave SmartStart
- RGB LEDs provide status indication
- Programmable re-lock timer
- Powered by a high capacity Li-ion 18650 battery
- Low battery warning and reporting
- USB-C port for battery charging

INSTALLATION & PROGRAMMING NOTES

Rev 1.0

INTRODUCTION

Ness Z-Wave Door Lock Controller (DLC) is a unique access control accessory providing a smart relay output and door position sensor inputs.

DLC provides one relay output and one 12V DC power output for connection to existing devices such as an electric door strike, electromechanical lock, magnetic lock, garage door and gate etc., any of which can be operated remotely via Z-Wave wireless control commands.

Ness DLC is powered by a rechargeable 18650 Li-Ion battery or external USB (C type connector) power.

Two pairs of external terminals are provided for wired door position sensors such as reed switches or Request To Exit (REX) button. The function of each external terminal is configurable via Z-Wave configuration command class.

Ness DLC is a Security Enabled Z-Wave Plus™ V2 empowered wireless control. This product can be operated in any Z-Wave network with other Z-Wave certified devices from other manufacturers with same regional radio frequency. All mains operated nodes within the network will act as repeaters regardless of vendor to increase reliability of the network.

- Provides one relay output and one 12V DC power output.
- The 12V output can operate a Power-To-Open lock (200mA max.)
- Automatically relock as per configured time.
- Also allows manual operation via the on-board lock/unlock pushbutton.
- Supports external sensors such as reed switches to detect door positions
- Supports wired pushbutton/s for Request To Exit.
- The RGB LEDs indicate the operation status.
- Supports Security Enabled encrypted communications S0 and S2 Access.
- Supports SmartStart inclusion
- Supports the Over the Air firmware upgrade (OTA).
- Powered by one rechargeable Li-ion 18650 battery.
- Supports external 5V 2A power supply/charger via USB-C.
- Low battery warning indication and report

ACTION BUTTON (On the PCB)

1. INCLUSION/EXCLUSION MODE

Press once to enter Inclusion/Exclusion mode.

While in Inclusion/Exclusion mode pressing the Action Button once more will exit Inclusion/Exclusion mode (provided that the device is not actively in the Z-Wave inclusion process).

2. FACTORY DEFAULT

To reset Ness DLC to factory default settings, press and hold the Action Button for at least 20 seconds.

The red LED will begin to flash after 3 seconds. Release the button when the red LED stops flashing. The green LED will turn on briefly to indicate successful factory default.

Note, releasing the Action Button while the red LED is flashing will cancel the reset process.

LOCK/UNLOCK BUTTON

MANUAL LOCK/UNLOCK BUTTON

Press to operate the door lock output. Toggle action - Press To Lock / Press To Unlock.

INPUT TERMINALS

SW1 / SW2

Screw terminals to accept dry contact inputs.

Programmable inputs for use as a door position sensor or external Request To Exit (REX) push button .

SW 1 settings by Configuration Parameter #2. (Default: Normally Open door sensor.)

SW 2 settings by Configuration Parameter #3. (Default: Normally Open REX button.)

NOTE. If SW1 or SW2 have been programmed as Manual Unlock/lock Pushbutton the operation is Press On / Press Off same as the main Lock/Unlock Button.

5V INPUT

The 5V input terminals can be used to hardwire a permanent external power supply. Requires a regulated 5V 2A power supply.

Do not connect the USB charger if using the onboard 5V terminals to power the device.

OUTPUT TERMINALS

12V LOCK OUTPUT

Provides 12VDC 200mA max. power output to operate a Power-To-Open door lock.

It is recommended that this output be disabled if not used. The default is disabled.

12V Output and Relay settings by Configuration Parameter #1 (Default: Momentary 10 seconds.)

The power output can be enabled/disabled by configuration parameter #6 (Default: Disabled.)

RELAY OUTPUT

Normally open solid-state relay output 24V 2A Max with programmable momentary output programmable from 1~300 seconds (or Latching).

Use to operate an electric lock via an external power supply for the lock. See Connection Diagrams.

12V Output and Relay settings by Configuration Parameter #1 (Default: Momentary 10 seconds.)

Both the 12V and Relay output can be programmed to operate in Latching Mode (Parameter #1 =0).

CAUTION. When using LATCHING MODE, Ness DLC must be powered by an external power supply.

USB POWER PORTS

USB-C connector (2 x USB ports, internal & external) for a 5V 2A power supply and battery charger.[1]

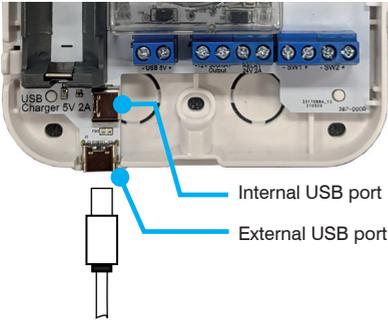The USB input can be used to permanently power the device as well as maintaining battery charge.

The battery can be omitted if using permanent external power.

A bi-colour CHARGE LED near the USB power inputs indicates:

Charging	ORANGE
Battery full	GREEN
Battery Fault	RED (Battery is faulty or under/over temperature)

This LED is visible when the cover is off.

[1] Power Supply / Charger is not included.

Internal USB port

External USB port

USB-C POWER PORT

The USB input can be used to permanently power the device as well as maintaining battery charge. Two USB ports are provided.
• External USB-C port for easy connection of a battery charger.
• Internal USB-C port for permanent concealed power input and/or charging.

CONNECT TO ONLY ONE USB PORT

+ Optional Hardwired 5V Power Supply
−
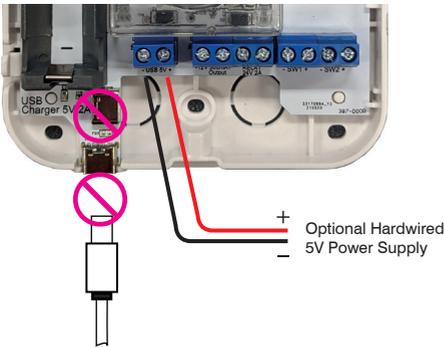
DO NOT CONNECT A USB CHARGER IF USING THE EXTERNAL 5V POWER INPUT

EXTERNAL POWER SUPPLY OPTION

Powering Ness DLC via a hardwired 5V power supply. In this case DO NOT connect the USB charger to either of the USB ports.

The battery is optional if using permanent external power.

USB 5V — +   LOCK −12V+   RELAY N/O   SW1   SW2

Optional Door Reed Switch

Optional Unlock Button (Momentary N/O)

12V Door Lock 200mA Max.
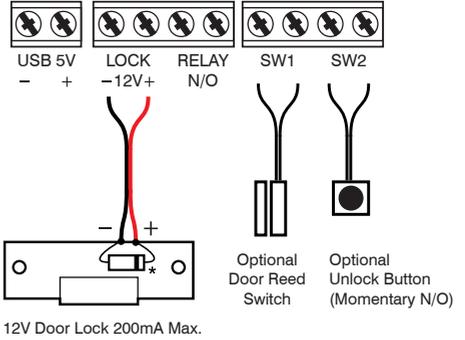
CONNECTION EXAMPLE 1

Door Lock directly powered by the 12V Lock Output. (12V 200mA max.)

USB 5V — +   LOCK −12V+   RELAY N/O   SW1   SW2

Optional External Power Supply

Door Lock up to 24V 2A Max.
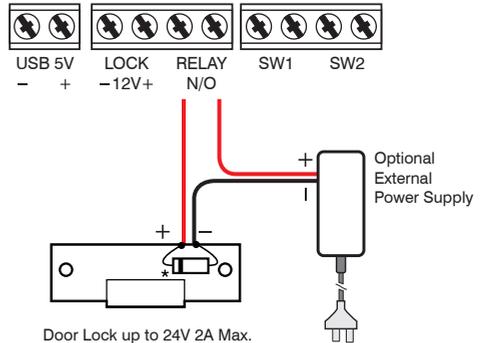
CONNECTION EXAMPLE 2

Door Lock switched by the onboard relay and powered by an optional external power supply. This permits the use of a higher current lock. (24V 2A max.)

* A reverse biased diode is required to be fitted at the door lock to prevent spikes. (Diode is not supplied with Ness DLC.)

OPERATION

LOCK/UNLOCK BUTTON
Press On / Press Off

LOCK STATUS LED
GREEN: Unlocked
BLUE: Locked
RED: System indications,
    see Inclusion/
    Exclusion, Factory
    Default

Bi-Colour CHARGE LED
Not visible with the cover in
place

External USB port

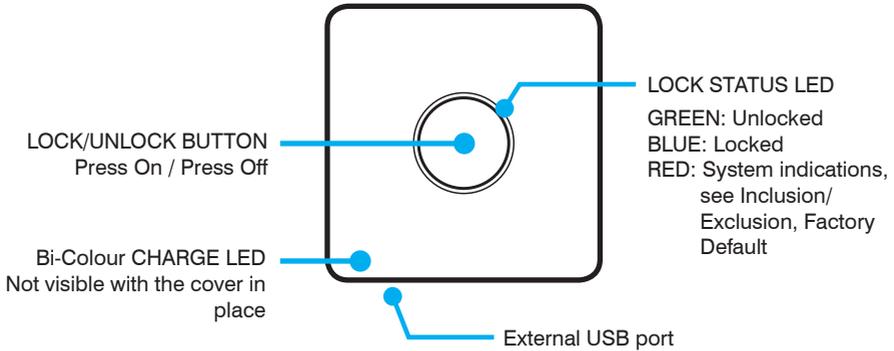| DOOR LOCK OPERATION SET COMMAND	
Action	Door Lock Mode
OPEN	Door Unsecured 0x00
CLOSE	Door Secured 0xFF

BASIC SET COMMAND	
Action	Door Lock Mode
OPEN	0x00
CLOSE	0xFF

OPERATION – VIA THE ON-BOARD MANUAL UNLOCK BUTTON

Press to operate the 12V Lock Output and Relay Output. PRESS ON / PRESS OFF.

OPERATION – VIA THE EXTERNAL TERMINALS

Either SW1 or SW2 can be used to connect a hardwired Request To Exit (REX) pushbutton to operate the door lock output from an optional REX button or other device. See Input Terminals, page 4.

RGB LEDs	DESCRIPTION
RED	The Red LED indicates operation status as follows: FAST FLASH (ON 100mS, OFF 100mS) a) Inclusion/exclusion: Press the action button once to enter learn mode. The Red LED starts Fast flash. Pressing the action button again before the learning process starts will cancel learn mode, the Red LED stops flashing. When Inclusion/Exclusion is completed, the Red LED stops flashing and the green LED will turn on for 2 seconds. b) The red LED flashes fast during the Factory Default process. See Action Button / Factory Default, page 4. SLOW FLASH (ON 100mS, OFF 4 sec) Continuous slow flashing when the onboard battery voltage is low and there is no external power connected. The RED Led is the device indicator that can be identified using the Indicator Command Class with the Indicator ID 0x50 (identify), and Properties ID 0x03, 0x04 and 0x05.
GREEN	The Green LED indicates: • ON: The Lock output is in unlocked status. • ON for 2 second when the device is powered up. • ON for 2 second when Inclusion/Exclusion is completed and when device manual reset completed.
BLUE	The blue LED indicates the door strike in Locked status. • If the device is powered by USB power supply the blue LED will remain on while the door lock is in locked status. • If Ness DLC is powered by the onboard battery, the blue LED will be on for only 30 seconds after the door lock status changes to Locked.

ADDING A NESS Z-WAVE DLC INTO A Z-WAVE NETWORK

INCLUSION

To add the device into the Z-Wave network:

1) Power on device and ensure it has been factory defaulted.
2) Set the primary controller into inclusion mode.
3) Click the Action Button once the device enters the inclusion mode and the Red LED starts fast flashing.

Note: Inclusion mode can be cancelled by clicking the Action Button once again before the device starts learning process (controller has not yet started inclusion mode), the device exits the learning mode and Red LED stops fast flash.

4) The inclusion is processing.
5) If your Z-Wave controller supports S2 Access encryption and DSK, enter the first 5 digits of the DSK located at bottom of the QR image.
6) If the inclusion is successful, the Red LED stops fast flashing and the Green LED turns on for 2 second.

REMOVING NESS Z-WAVE DLC FROM A Z-WAVE NETWORK

You may need to refer to your Z-Wave gateway's instructions for removing devices.

EXCLUSION

To remove the device from the Z-Wave network:

1) The device is powered
2) Set the primary controller into exclusion mode.
3) Click the Action Button once the device enters the inclusion mode and the Red LED starts fast flashing. Click the Action Button once again before the device starts the learning process (controller has not yet started inclusion mode), the device exits the learning mode and Red LED stops fast flash.
4) If the exclusion is successful, the Red LED stops flashing and the Green LED turns on for 1 second.

ADDING WITH SmartStart*

Ness Z-Wave DLC is a SmartStart enabled device allowing it to be added into a Z-Wave network by scanning its Z-Wave QR Code with a controller providing SmartStart inclusion. No further action is required and the SmartStart product will be added automatically within 10 minutes of being switched on in the network vicinity.

Requires a SmartStart compatible controller and app. Ness Z-Wave DLC must be within network range.

Scan the QR code on the rear of Ness Z-Wave DLC

TO FACTORY DEFAULT NESS Z-WAVE DLC

Please use this procedure only when the network primary controller is missing or otherwise inoperable.

Reset the device to factory Default:

1) The device is powered

2) Press and hold the action button down for 20 seconds. When the action button has been held for greater than 3 seconds, the Red LED starts Fast flash, and the Fast flash will stop after 20 seconds. Once the action button is released, the Green LED will turn on for 1 second indicating that the device has been reset.

3) Release the action button while the Red LED is fast flashing (before 20 seconds), the device reset will be cancelled, and the Red LED will stop fast flash.

After the device been reset to factory default settings:

• If the device was included within a Z-Wave network, the device will send a "Device Reset Locally" message to the main controller.

• The device will be excluded from existing Z-Wave network;

• Any configured Association setting, power measure value, Scene Configuration settings will be reset.

Any Configured Parameter Number entries will be set to their default values.

Z-WAVE SETUP

DEVICE TYPE	
Device Type	Identifiers
Door Lock - Keypad	GENERIC_TYPE_ENTRY_CONTROL
	SPECIFIC_TYPE_DOOR_LOCK

Z-WAVE PLUS 2 INFO			
Role Type	Node Type	Installer Icon Type	User Icon Type
Listening Sleeping Slave (LSS)	Z-Wave Plus node	0x0300 GENERICDOORLOCKKEY-PAD	0x0300 GENERICDOORLOCK_KEY-PAD

ASSOCIATION GROUP INFORMATION			
Group ID	Group Name	Max Nodes	Description
1	Lifeline	5	BATTERY_REPORT, DOOR_LOCK_OPERATION_REPORT_ DOOR_LOCK_CONFIGURATION_REPORT NOTIFICATION_REPORT, DEVICE_RESET_LOCALLY_NOTIFICATION, INDICATOR_REPORT

MANUFACTURER			
Model	Manufacturer ID	Product Type	Product ID
ZA-116001	0x0189 Ness	0x0204 0x02 − ANZ, 0x04 - Z-Wave Plus 2	0x0101 0x01 − Door Lock Key Pad, 0x01 - Hardware V1
ZU-116001	0x0189 Ness	0x0104 0x01 − US, 0x04 - Z-Wave Plus 2	0x0102 0x01 − Door Lock Key Pad, 0x02 - Hardware V2

VERSION				
Model	Protocol Library	Protocol	Firmware	Hardware
ZA-116001	0x03 Slave_Enhance_232_Library	0x070E SDK V7.15	0x0103 V1.3	0x01
ZU-116001	0x03 Slave_Enhance_232_Library	0x070E SDK V7.15	0x0103 V1.3	0x02

Z-WAVE SETUP

FIRMWARE ID	
Model	Firmware ID
ZA-116001	0x2411 2 − ANZ, 4 - Z-Wave Plus 2, 1 − Door Lock Key Pad, 1 - Hardware V1
ZU-116001	0x1412 1 − US, 4 - Z-Wave Plus 2, 1 − Door Lock Key Pad, 2 - Hardware V2

NOTIFICATION REPORTS			
Event	Event Type	Event	CPN#
Door Opened	Access control0x06	Door is open 0x16	2, 3
Door Closed	Access control0x06	Door is closed 0x17	2, 3

DOOR LOCK OPERATION REPORTS						
Current Mode	Handles Mode	Door Condition	Lock Timeout M	Lock Timeout M	Target Mode S	Duration
0x00 Unsecured	0x00	0x00	0xFE	0xFE	0x00 Unsecured	0x00
0xFF Secured	0x00	0x00	0xFE	0xFE	0xFF Secured	0x00

BATTERY LEVEL REPORTS				
Event	Command Class	Command	Value	CPN#
Battery Level	Battery	Battery Report	%	5
Low Battery	Battery	Battery Report	0xFF	4

DEVICE MANUAL FACTORY RESET			
Command Class	Indicator ID	Property ID	Details
Indicator	Node Identify 0x50	0x03 On/Off Periods	
		0x04 On/Off Cycles	
		0x05 On time within an On/Off period	

COMMAND CLASSES SUPPORTED			
Time	Command Class	Version	Required Security Class
1	Association	2	S0 or Access Control
2	Association Group Information	3	S0 or Access Control
3	Basic	2	S0 or Access Control
4	Device Reset Locally	1	S0 or Access Control
5	Door Lock	4	S0 or Access Control
6	Configuration	4	S0 or Access Control
7	Firmware Update Meta Data	5	S0 or Access Control
8	Indicator	3	S0 or Access Control
9	Manufacturer Specific	2	S0 or Access Control
10	Multi Channel Association	3	S0 or Access Control
11	Notification	8	S0 or Access Control
12	Battery	1	S0 or Access Control
13	Powerlevel	1	S0 or Access Control
14	Security 0	1	None
15	Security 2	1	None
16	Supervision	1	None
17	Transport Service	2	None
18	Version	3	S0 or Access Control
19	Z-Wave Plus Info	2	None
20	Application Status	1	None

This device supports COMMAND_CLASS_CONFIGURATION V4, however, the CONFIGURATION_ BULK_SET, CONFIGURATION_BULK_GET and CONFIGURATION_BULK_REPORT commands are not supported.

In the "Door Lock Configuration Set" command, only the value in data field "Hold and release time" (16 bytes in range 0 ~ 300) will be accepted, any other data fields of this command will be ignored.

BASIC COMMAND CLASS MAPPING	
Basic Command	Mapped to Door Lock Command
Basic Set (Value)	Door Lock Operation Set (Door Lock Mode)
Basic Report (Door Unsecured= 0x00)	Door Lock Operation Report (Door Unsecured = 0x00)
Basic Report (Door Secured= 0xFF)	Door Lock Operation Report (Door Secured=0xFF)

CONFIGURATION PARAMETERS TABLE				
Parameter (Hex/ASCII)	Description	Default Value	Valid Values	Size (bytes)
0x01/1	The Relock Timer Sets the output duration for the RELAY Output and the 12V Lock Output. Output ON duration in seconds. Range: 0 ~ 300. Default: 10 0 = Latching Operation	10	0~300	2
0x02/2	Function Options for Input Terminal SW1 Range:0 ~ 3. Default: 2 • Value = 0: The input is disabled • Value = 1: Normally Closed Door sensor • Value = 2: Normally Open Door sensor • Value = 3: External unlock pushbutton input (close circuit to unlock)	2	0~3	1
0x03/3	Function Options for Input Terminal SW2 Range:0 ~ 3. Default: 3 • Value = 0: The input is disabled • Value = 1: Normally Closed Door sensor • Value = 2: Normally Open Door sensor • Value = 3: External unlock push button input (close circuit to unlock)	3	0~3	1
0x04/4	Battery Low Setting Reporting the battery low warning message when battery level reaches this value in percentage. Range:10 ~ 50 (10% to 50%) Default: 10%	10	10~50	1
0x05/5	Battery Scheduled Report Interval The battery level scheduled report interval time is based on every 30 minutes per kick. The value N related to the time in minutes is Nx 30minutes. Range: 0~120. Default: 12 (12x30 =360minutes). Value = 0 Disable Battery level scheduled report.	12	0~120	1
0x06/6	The 12V DC Power Output Options This parameter is used to enable/disable the 12V DC power output at the power output terminal. Range: 0~1. Default: 0 Value = 0: The power output is disabled. Value = 1: The power output is enabled.	0	0~1	1

PRODUCT DETAILS

Product Name	Ness Z-Wave Door Lock Controller (DLC)	
Part Number	ZA-116001	921.4 MHz for ANZ Region
	ZU-116001	908.42 MHz for US Region
Firmware Version	ZA-116001	V1.3.1 Hardware version: 1
	ZU-116001	V1.3.2 Hardware version: 2
Brand Name	Ness	
Product Line	Entry Controller	
Product Description	Door Lock Controller	
Product Type	Z-Wave Plus v2 devices	
Z-Wave Plus V2 Certification No		

SPECIFICATIONS

Z-Wave Compatibility	Z-Wave Plus V2 certified controllers
Z-Wave Frequency	921.4 MHz (ANZ model ZA-116001)
	908.42 MHz (US model ZU-116001)
Z-Wave Security Product	Ness DLC is a security device and only supports:
	1. Security 0
	2. Security 2 Access
	A Security Enabled Z-Wave Controller must be used in order to include the device in Security mode.
Z-Wave Radio Range	40m
Application	Indoor use only
External power/charging	Supports external power/charging via USB-C port
	Requires 5V 2A adapter (not supplied)
Relay Output	Solid-state normally open relay output. 24V 2A load max.
On-board Pushbutton	"Lock/Unlock" button on the housing for manual operation
SW Terminals	2 x SW terminals on-board for wired REX buttons or door position sensors
Visual Indicator	RGB LED
Battery	18650 Li-Ion rechargeable
Quiescent current	$25\mu A$
Operating Temperature	0~40°C / 32~104°F
Dimensions	100 x 115 x 33mm (WxHxD)

TERMINOLOGY

Inclusion - The process of adding a node to the Z-Wave network.

Exclusion - The process of removing a node from the Z-Wave network.

Association - is a control relationship between a controlling device and a controlled device.

OTA - Over The Air, used for wireless transfer of firmware images for updating a device.

QR Code - 2D barcode format that can contain large amounts of information in a small square of encoded blocks resembling a random checkerboard pattern. In Z-Wave, it is used to represent the S2 public part of the DSK on a device, as well as additional information needed for the inclusion process.

Security S2 - Z-Wave's unique security model ensuring secure inclusion and secure communication in the Z-Wave network.

SmartStart - SmartStart enabled products can be added into a Z-Wave network by scanning the Z-Wave QR Code present on the product with a controller providing SmartStart inclusion. No further action is required and the SmartStart product will be added automatically within 10 minutes of being switched on in the network vicinity

DSK - This Device Specific Key can be compared against the Z-Ware UI, PC Controller dialog box, or other Controller UI. If needed, the first decimal group of the DSK can be typed in for S2 secure inclusion.

Blank

NESS

CORPORATION