Advanced Information Product Manual

Alfred DB2S

Engineering Specification

Advanced Information Product Manual

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Version	1.0
Description	This document mainly introduces the new generation Alfred Door Lock – ML2. The content mainly includes its interfaces, accessories, features, specifications, quick start, and software function definition. This device must be used in conjunction with a security enabled Z-Wave® controller in order to fully utilize all implemented functions. This product can be operated in any Z-Wave network with other Z-Wave certified devices from other manufacturers. All non-battery operated nodes within the network will act as repeaters regardless of vendor to increase reliability of the network.
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Version	Date	Brief description of changes
1.0	2024.07.09	First revision.

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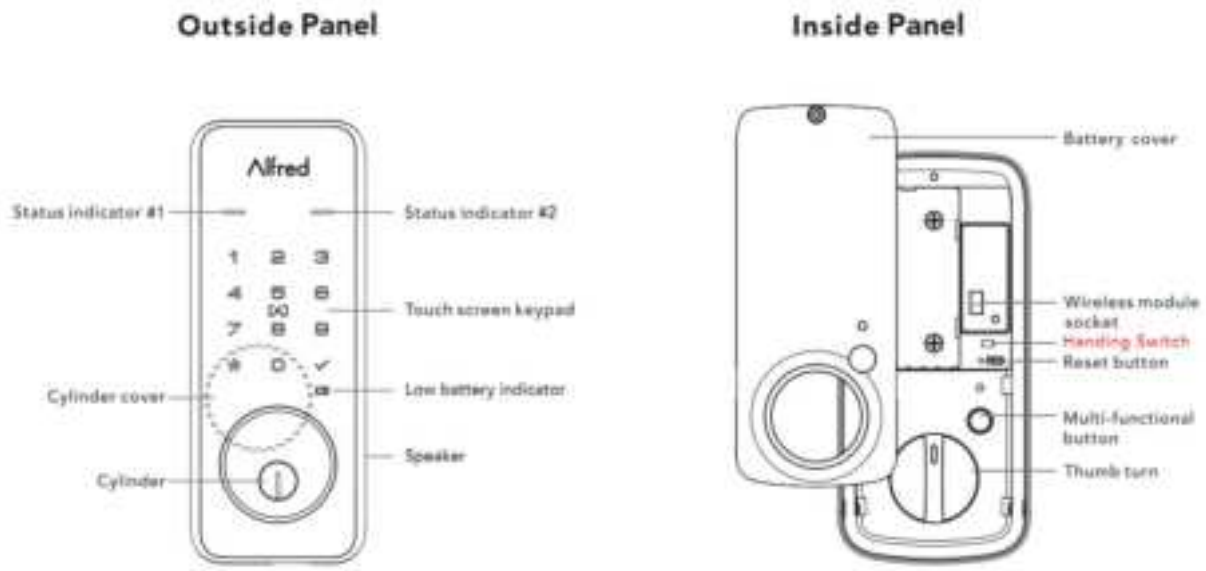
1 INTERFACES & ACCESSORIES



Terminology	Description
Touch screen keypad	Used to operate various functions of the door lock
Indicator light	Status indicator #1 Status indicator #1 Low battery indicator Identify indicator
Speaker	For voice prompts
Main power supply interface	Lithium-Ion battery
Backup power supply interface	USB-C interface power supply
Button	Reset button Multi-function button
Thumb turn	For manual lock / unlock operation
Handing Switches	Used to set the "rotation direction when the Thumb turn is locked"

2 FEATURES & SPECIFICATIONS

2.1 Structural Characteristics

Parameter	Value
Product Identifier	DB2S
Color	black
Shell Material	kirsite
Shell Fire-proof Level	Frosting
Usage	For indoor use.
Operating Temperature	-25-55℃
Relative Humidity	20-80%

2.2 Hardware Characteristics

Parameter	Value
Module	EFR32ZG23A010F512GM40
TX Power	Max: 14dBm
Antenna Distance	40m (Indoor) /150m (Outdoor)
Indicator Light Color	1 red, 1 green, 1 low battery, 1 door indicator.
Input Voltage	4.7~5.5V
Battery Info	Lithium-Ion battery
Working Current	Module: 10mA(Wake Up), 40mA（Send message） Door Lock body: 52mA(Wake Up), 190mA（operate door lock）
Standby Current	Module: 25uA Door Lock body: 170uA

2.3 Software Characteristics

Parameter	Value
Wireless Technology	Z-Wave®

Certification Type	Z-Wave Plus® V2
SDK Version	7.18.4
Library Type	Enhanced 232 Slave
Role Type	ZWAVEPLUS_INFO_REPORT_ROLE_TYPE_SLAVE_SLEEPING_LISTENING (0x07)
Generic Device Type	GENERIC_TYPE_ENTRY_CONTROL (0x40)
Specific Device Type	SPECIFIC_TYPE_DOOR_LOCK (0x01)
Security Class	Non-Security, S0, S2-ACCESS
SmartStart	Support. After powering on, SmartStart is auto active if it' s out of the network.
Over The Air （OTA）	Support. Firmware can be updated via RF.
Multichannel Device	No
Association	Support. Refer to Section 4.7 Association Group Info.
Factory Reset	Support. Refer to Section 3.6 How to factory reset.
Power-down Memory	Support. All command settings will stay unchanged even power down.
Timed battery report	Support. Refer to Configuration Parameter 3.
Low battery warning	Support.
Door State Report	Support. When door lock mode changed, send out notification via Group 1.
User code Report	Support. When user code changed, send out notification via Group 1.

3 PRODUCT QUICK START

3.1 Important safety information

Please read this Engineering Specification carefully for correct and effective use.

Failure to follow the recommendations set forth by Alfred Limited may be dangerous or cause a violation of the law. The manufacturer, importer, distributor, and/or reseller will not be held responsible for any loss or damage resulting from not following any instruction in this guide or in other materials.

The product is intended for indoor use in dry locations only. Do not use in damp, moist, and /or wet locations.

3.2 About Z-Wave

Z-Wave is the international wireless protocol for communication in the Smart Home.

Z-Wave ensures a reliable communication by reconfirming every message (two-way communication) and every mains powered node can act as a repeater for other nodes (meshed network) in case the receiver is not in direct wireless range of the transmitter.

This device and every other certified Z-Wave device can be used together with any other certified Z-Wave device regardless of brand and origin as long as both are suited for the same frequency range.

If a device supports secure communication it will communicate with other devices secure as long as this device provides the same or a higher level of security. Otherwise it will automatically turn into a lower level of security to maintain backward compatibility.

This device can be operated in any Z-Wave network with other Z-Wave certified devices from other manufacturers. All mains operated nodes within the network will act as repeaters regardless of vendor to increase reliability of the network.

This device is a security enabled Z-Wave Plus product that is able to use encrypted Z-Wave Plus messages to communicate to other security enabled Z-Wave Plus products. S2 Security Enabled Controller is required to operate the device.

3.3 About 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.

3.4 How to add the product into Z-Wave network

1. Follow the user guide of hub to enter inclusion mode.
2. Operate on lock following guide below:
   1) Enter master mode (** + Master PIN Code + √)
   2) Input "8" to enter "function extension settings"
   3) Input "1" to enter "Include mode"

3.5 How to remove the product from Z-Wave network

1. Follow the user guide of hub to enter exclusion mode.
2. Operate on lock following guide below:
   1) Enter master mode (** + Master PIN Code + √)
   2) Input "8" to enter "function extension settings"
   3) Input "2" to enter "Exclusion mode"

3.6 How to factory reset

1. Operations on lock
   1) Open the door and keep the lock in "unlock" status.
   2) Open battery box and find the reset button.
   3) Use a sharp thing to press and hold the reset button
   4) Keep holding the reset button and remove the battery from battery box then replace it.
   5) Keep holding the reset button down until you hear the lock beep (Can take up to 10 seconds).
2. Please use this procedure only when the network primary controller is missing or otherwise inoperable.
3. Default master pin code is "12345678", please modify it after reset (Refer to programming instruction).

3.7 Z-Wave DSK Location

You can find the QR code when you open the battery box

You may also find the QR Code and DSK on individual package of each product.

Please do not remove or damage them.

4 SOFTWARE FUNCTION DEFINITION

4.1 User Behavior Interaction

User behavior	Out of the network	In the network
Power on	Key panel light is on The unlocking indicator light or locking indicator light is on Send Inclusion Requests for SmartStart	Key panel light is on The unlocking indicator light or locking indicator light is on
Inclusion network	Enter master mode (** + Master PIN Code + √) Input "8" to enter "function extension settings" Input "1" to enter "Inclusion mode"	NA
Exclusion network	NA	Enter master mode (** + Master PIN Code + √) Input "8" to enter "function extension settings" Input "2" to enter "Exclusion mode"
unlock	The green indicator lights up for 3 seconds	The green indicator lights up for 3 seconds Send Notification Report and Door Lock Operation Report to association group
Lock	The red indicator lights up for 3 seconds	The red indicator lights up for 3 seconds Send Notification Report and Door Lock Operation Report to association group
User code (Add / delete / modify)	NA	Send Notification Report and User code Report to association group

4.2 Supported Command Classes

Command Class	Version	Not added	Non-secure added	Securely 0 added		Securely 2 added	
				Non-secure CC	Secure CC	Non-secure CC	Secure CC
ZWAVEPLUS_INFO	2	Support	Support	Support		Support	
ASSOCIATION	2				Support		Support
ASSOCIATION_GRP_INFO	3				Support		Support
Multichannel Association	3				Support		Support
NOTIFICATION	8				Support		Support
Door Lock	4				Support		Support
User Code	2				Support		Support
Schedule Command Class	4				Support		Support
Door Lock Logging	1				Support		Support
Configuration	4				Support		Support
Application Status	1	Support	Support	Support		Support	
Time	1	Support	Support	Support		Support	
Time Parameters	1				Support		Support
VERSION	3				Support		Support
MANUFACTURER_SPECIFIC	2				Support		Support
DEVICE_RESET_LOCALLY	1				Support		Support
POWERLEVEL	1				Support		Support
Indicator	3				Support		Support
BATTERY	1				Support		Support
SECURITY	1	Support	Support	Support		Support	
SECURITY_2	1	Support	Support	Support		Support	
TRANSPORT_SERVICE	2	Support	Support	Support		Support	
SUPERVISION	1	Support	Support	Support		Support	
FIRMWARE_UPDATE_MD	5				Support		Support
Language	1				Support		Support

4.3 Basic Command Class mapping

Basic Command maps to Door Lock Command Class, as shown below.

Command	Value	Mapped	Value	Function
Basic Set	0x00	Door Lock Operation Set	Door Unsecured	Open the door
	0xFF		Door Secured	Close the door

Basic Report	0x00	Door Lock Operation Report	Door Unsecured	The door is opened
	0xFF		Door Secured	The door is closed
Basic Get		Door Lock Operation Get		

4.4 Z-Wave Plus Info

Parameter	Value
Version	2
Role Type	7 (ZWAVEPLUS_INFO_REPORT_ROLE_TYPE_SLAVE_SLEEPING_LISTENING) (APPLICATION_FREQ_LISTENING_MODE_1000ms)
Node Type	0 (ZWAVEPLUS_INFO_REPORT_NODE_TYPE_ZWAVEPLUS_NODE)
Installer Icon Type	0x0300 (ICON_TYPE_GENERIC_DOOR_LOCK_KEYPAD)
User Icon Type	0x0300 (ICON_TYPE_GENERIC_DOOR_LOCK_KEYPAD)

4.5 Manufacturer Specific

The Command is used to advertise manufacturer specific information.

Parameter	Value
Manufacturer ID 1	0x04
Manufacturer ID 2	0x65
Product Type ID 1	0x01
Product Type ID 2	0x03
Product ID 1	0x00
Product ID 2	0x04(DB2S)

4.6 Version

The Command may be used to obtain the Z-Wave library type, the Z-Wave protocol version used by the application, the individual command class versions used by the application.

Parameter	Value
Protocol Library Type	0x03
Protocol Version	0x07

Protocol Sub Version	0x12
Firmware 0 Version	Main Chip Firmware Version Major
Firmware 0 Sub Version	Main Chip Firmware Version Minor
Hardware Version	0x04(DB2S)
Number of firmware targets	0x01
Firmware 1 Version	Door Lock Firmware Version Major
Firmware 1 Sub Version	Door Lock Firmware Version Minor

4.7 Association Group Info

The Command is used to manage associations to Node ID destinations.

ID	Name	Count	Profile	Function
1	Lifeline	5	General: Lifeline (0x0001)	**Device Reset Locally Notification (0x5A01) :** Issued when Factory Reset is performed. **Battery Report(0x8003):** Issued periodically to report the current battery level; Issued when battery becomes low. **Door Lock Operation Report(0x6203):** Issued when door lock mode changed **Notification Report(0x7105):** Issued when door lock event changed **User Code Report(0x6303):** Issued when user code changed by keypad **Master Code Report(0x6310)** Issued when master code changed by keypad **User Code Keypad Mode Report(0x630A)** Issued when keypad mode changed by keypad **Configuration Report(0x7006)** Issued when the volume configuration value is changed by keypad **Indicator Report(0x8703):** Issued when indicator set received.
2	On/Off control	5	General: Control (0x2000)	**Basic Set (0x2001) :** Issued when door lock mode changed (value is determined by parameter 0x04)

4.8 Notification

The Command is used to advertise events or states, such.

Notification Type = Access Control (0x06), according to Table 4-8-1

Notification Type = Home Security (0x07), according to Table 4-8-2

Table 4-8-1:

Description	Event	Alarm type	Alarm Level	Parameters
Manual lock operation (mechanical key or thumb turn)	0x01	0x15	0x01	
Manual unlock operation (mechanical key or thumb turn)	0x02	0x16	0x01	
RF lock operation	0x03	0x18	0x01	
RF unlock operation	0x04	0x19	0x01	
Keypad lock operation	0x05	0x15	0x02	
Keypad unlock operation	0x06	0x13	User ID	User Code Report
			0xFB	Master Code Report
Auto lock locked operation	0x09	0x1B	0x01	
Lock jammed	0x0B	0x00	0x00	
All user codes deleted	0x0C	0x21	0xFF	
Single user code deleted	0x0D	0x21	User Id	User Code Report
New user code added (add and modify)	0x0E	0x70	User Id	User Code Report
			0xFB	Master Code Report
New user code not added due to duplicate code	0x0F	0x71	User Id	User Code Report
			0xFB	Master Code Report
New program code entered : unique code for lock configuration	0x12	0x70	0x00	Master Code Report
Manually enter user access code exceeds code limit	0x13	0x00	0x00	
Door opened	0x16	0x00	0x00	
Door closed	0x17	0x00	0x00	

Table 4-8-2:

Description	Notification Event	Alarm type	Alarm Level	Parameters
Tampering Product covering removed (front escutcheon removed from door)	0x03	0x00	0x00	

4.9 Door Lock

The Command is used to operate and configure a door lock device.

1. Support Door Lock Mode: Door Secured (0xFF), Door Unsecured (0x00)
2. Door Lock Capabilities Report Command:
   1) Supported Operation type Bit Mask Length = 0x01
   2) Supported Operation Type Bit Mask 1 = 0x02 (Constant operation)
   3) Supported Door Lock Mode List Length = 0x02
   4) Supported Door Lock Mode 1 = 0x00 (Door Unsecured)
   5) Supported Door Lock Mode 2 = 0xFF (Door Secured)
   6) Supported Outside Handle Modes Bitmask = 0x00
   7) Supported Inside Handle Modes Bitmask = 0x00 (No Handle)
   8) Supported door components = 0x03 (Bolt & Door)
   9) ARS = 1
   10) HRS = TAS = BTBS = 0
3. Door Lock Operation Set Command:
   1) Door Unsecured (0x00)
   2) Door Secured (0xFF)
4. Door Lock Operation Report Command:
   1) Door Unsecure, example: 00 01 02 FE FE 00 00
   Door Lock Mode = 0x00 (Door Unsecured)
   Outside Door Handles Mode = 0 (Disabled), Inside Door Handles Mode = 1 (Handle 1 = Enable)
   Door Condition = 2 (Bolt Unlocked, Door Open)
   Lock Timeout minutes = 0xFE (No unlocked period)
   Lock Timeout Seconds = 0xFE (No unlocked period)
   Target Door Lock Mode = 0x00 (Door Unsecured)
   Duration = 0x00
   2) Door Secured, example: FF 01 01 FE FE FF 00
   Door Lock Mode = 0xff (Door secured)
   Outside Door Handles Mode = 0 (Disabled), Inside Door Handles Mode = 1 (Handle 1 = Enable)
   Door Condition = 1 (Bolt Locked, Door Closed)
   Lock Timeout minutes = 0xFE (No unlocked period)
   Lock Timeout Seconds = 0xFE (No unlocked period)
   Target Door Lock Mode = 0x00 (Door Unsecured)
   Duration = 0x00
5. Door Lock Configuration Report Command:
   1) Operation Type = 0x01 (Constant operation)
   2) Supported Door Lock Mode 1 = 0x00 (Door Unsecured)
   3) Supported Door Lock Mode 2 = 0xFF (Door Secured)
   4) Lock Timeout minutes = 0xFE (No unlocked period)
   5) Lock Timeout Seconds = 0xFE (No unlocked period)
   6) Auto-relock time 1 = 0

7) Auto-relock time 2 = 0

8) Hold and release time 1 = 0x00

9) Hold and release time 2 = 0x00

10) BTB = TA = 0

The auto relock time mapping table of door lock and Z-Wave is as follows:

Z-Wave definition	Door lock function
Auto-relock time = 0	disabled
Auto-relock time = 1 - 30	30 Seconds
Auto-relock time = 31 - 60	60 Seconds
Auto-relock time = 61 - 120	120 Seconds
Auto-relock time = 120 – 65535	180 Seconds

4.10 Door Lock Logging

The Command provides an audit trail in an access control application. Each time an event takes place at the door lock, the system logs the user's ID, date, time etc.

Max records stored = 250

4.11 User Code

The Command is used to manage User Codes in access control systems

1. Support users: 250
2. Support master code
3. Supported User ID Status: available(0x00), enabled/grant access (0x01)
4. Supported Keypad Modes: Normal mode, Vacation mode, Privacy mode

   In Privacy mode, it will ignore Door Lock Operator Set Command, and will send Application Rejected Request.
5. User Code Capabilities Report Command:

   1) Supported Users = 250

   2) MC (Master Code) Support = 1

   3) MCD (Master Code Deactivation) Support = 0

   4) UCC (User Code Checksum) Support = 0

   5) MUCR (Multiple User Code Report) Support = 0

   6) MUCS (Multiple User Code Set) Support = 0

   7) Supported User ID Status Bit Mask Length = 1

   8) Supported User ID Status Bit Mask 1 = 0x03 (Available & Enabled/Grant Access)

   9) Supported Keypad Modes Bit Mask Length = 1

   10) Supported Keypad Modes Bit Mask 1 = 0x07 (Normal mode, Privacy mode, Locked Out mode)

   11) Supported Keys Bit Mask Length = 8

   12) Supported Keys Bit Mask 1 = 0x00

   13) Supported Keys Bit Mask 2 = 0x00

   14) Supported Keys Bit Mask 3 = 0x00

   15) Supported Keys Bit Mask 4 = 0x00

16) Supported Keys Bit Mask 5 = 0x00

17) Supported Keys Bit Mask 6 = 0x00

18) Supported Keys Bit Mask 7 = 0xFF (digits 0-7)

19) Supported Keys Bit Mask 8 = 0x03 (digits 8-9)

4.12 Schedule

The Command allows scheduling the execution of commands for a given duration in a supporting device. It is a generic Command Class that may be used to schedule commands of any other Command Class.

1. SCHEDULE_SUPPORTED_REPORT:
   1) Number of Supported Schedule IDs: 10
   2) Support Enable / disable: 0
   3) Fall-back Support: 0
   4) Start Time Support: 1
   5) Number of supported CC: 1
   6) Supported CC 1: USER_CODE_COMMAND_CLASS
   7) Supported Command1: 0x01 (Only Set Commands are supported)
   8) Override Support: 0
   9) Supported Override Types: 0
   10) Number of Supported Schedule Blocks: 1
2. SCHEDULE_SUPPORTED_COMMANDS_REPORT:
   1) Supported Command Class: USER_CODE_COMMAND_CLASS
   2) Supported Command: USER_CODE_SET

4.13 Battery

The Command is used to request and report battery levels for a given device.

1. If send Battery Get to the device, it will issue Battery Report with current battery level to the requester.

2. If re-power on, it will issue Battery Report with current battery level via Lifeline.

3. If waked up, it will detect battery level, and issue Battery Report (Value=0xFF) via Lifeline when battery level is less than 20%.

4. Support timed battery report, refer to Configuration Parameter 3.

4.14 Language

The Command is used to specify the language settings on a device.

1. The supported languages are as follows
   1) English (eng)
   2) Spanish (spa)
   3) Portuguese (por)
   4) French (fre, fra)

5) Chinese (chi, zho)

4.15 Indicator

The Command is used to help end users to monitor the operation or condition of the application provided by a supporting node.

Indicator ID		Property ID	
Node Identify	0x50	On Off Period	0x03
		On Off Cycles	0x04
		On time within an On/Off period	0x05

4.16 Time

The Command is used to read date and time from a supporting node in a Z-Wave network.

4.17 Time Parameters

The Command is used to set date and time in a device hosting this facility

4.18 Configuration

The Command allows product specific configuration parameters to be changed.

Note: No Bulk Support equals to True. ***It will return an Application Rejected Request Command when receiving Configuration Bulk Set or Get (if received without Supervision encapsulation).*** It will reset all its configuration parameters if either manually reset to factory default or receives a Configuration Default Reset Command. It will NOT modify or reset any configuration parameter when being included or excluded of a Z-Wave network.

Parameter	0x01 (1)			
Name	Configure volume level			
Info	Configure volume level			
Properties	Size	1	Min Value	0
	Format	Unsigned Integer	Max Value	2
	Read-only	False	Default Value	2
	Altering capabilities	False	Advanced	False
Description	Configure volume level			

	Value	Function
	0	silent
	1	Low volume
	2	High volume

Parameter	0x02 (2)			
Name	Configure led			
Info	Enable/disable led			
Properties	Size	1	Min Value	0
	Format	Unsigned Integer	Max Value	1
	Read-only	False	Default Value	1
	Altering capabilities	False	Advanced	False
Description	LED on the inside of the product.			
	Value	Function		
	0	OFF		
	1	ON (blink)		

Parameter	0x03 (3)			
Name	Timed battery report			
Info	Configure timed battery report			
Properties	Size	2	Min Value	0
	Format	Unsigned Integer	Max Value	14400(0x3840) (10 days)
	Read-only	False	Default Value	1440(0x05A0) (one day)
	Altering capabilities	False	Advanced	False

Description	Enable/Disable timed battery report and sets how often battery is reported in minutes.	
	Value	Function
	0	Disable timed battery report
	1-14400	Enable timed battery report and sets how often battery is reported in minutes.

Parameter	**0x04 (4)**			
Name	Association Group 2 Settings			
Info	Configure the Basic Set value			
Properties	Size	1	Min Value	0
	Format	Unsigned Integer	Max Value	6
	Read-only	False	Default Value	1
	Altering capabilities	False	Advanced	False
Description	Determine the Basic Set value to control other Z-Wave devices directly.			
	Value	Function		
	0	Disable completely.		
	1	Unlocked Status sends Basic SET 0xFF, Locked Status sends Basic SET 0x00.		
	2	Unlocked Status sends Basic SET 0x00, Locked Status sends Basic Set 0xFF.		
	3	Sends only Basic SET 0xFF when Unlocked Status happens.		
	4	Sends only Basic SET 0x00 when Locked Status happens.		
	5	Sends only Basic SET 0x00 when Unlocked Status happens.		
	6	Sends only Basic SET 0xFF when Locked Status happens.		