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DE-960

User Manual

DUALi Inc.

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Revision History

- 2016.12.16 (Ver. 1.00) : First Release
- 2017.06.08 (Ver. 1.10) : Entering user/Admin setting mode, factory reset option, Certification information added.
- 2021.03.08 (Ver. 1.11) : Connector specification added.

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We have our development center in South Korea to provide technical support. For any technical assistance can contact our technical support team as below;

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e-mail : lab@duali.com

CONTENTS

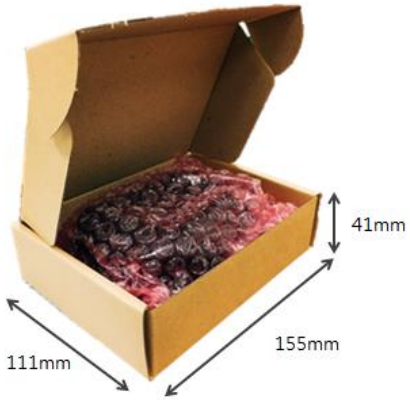
01. Introduction

DE-960 is a wiegand access control reader based on 13.56 Mhz contactless card communication technology with stylish and rugged design. Compliant with IP 67, it can be installed stably both indoor and outdoor. Various authentication types such as smart card, NFC phone and Key pad (Capacitive touch) are supported. Two-factor authentication (combination of smartcard or NFC phone with pin pad) is available for maximum security. In addition to access control, DE-960 can be used in a variety of fields such as time attendance management, parking management, etc.

02. Specification

Authentication	Card/ Key pad (Capacitive Touch)
Communication Interface	Wiegand - 32 / 34 /56/ 58/ 64/ 66 bit RS-232 – 115200bps RS-485 – 115200bps
Operating Frequency	13.56MHz
Credential Type	Contactless > ISO 14443 TYPE A and B > Mifare™ > FeliCa® > ISO 15693 > ISO 18092 (NFC) [Option] Contact (SAM) > ISO7816 Class A (5V) 1 SAM Card Slot (IP65 not guaranteed)
Indicator	LED (RED /BLUE) Keypad (WHITE) Buzzer
Power Supply	12VDC (9- 24 VDC also available) Linear supply recommended, 150 mA @ 12 VDC
Operating Condition	> -4º to 158ºF (-20º to 70ºC guaranteed) > 5% to 90% relative humidity
Storage Condition	> -4º to 158ºF (-20º to 80ºC) > > 5% to 90% relative humidity
Housing Material	PC (polycarbonate)
Dimensions	60(mm) x 115.5(mm) x 25(mm)
Weight	169.6g
Cable length	1000(mm)
Certifications	FCC Certification (US), CE(EU), IP65 compliant

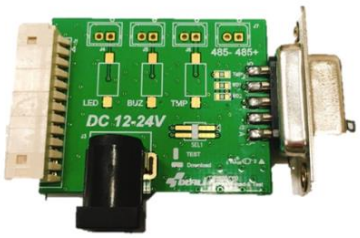
03. Contents Confirmation



3*4 Flat head

Machine screw

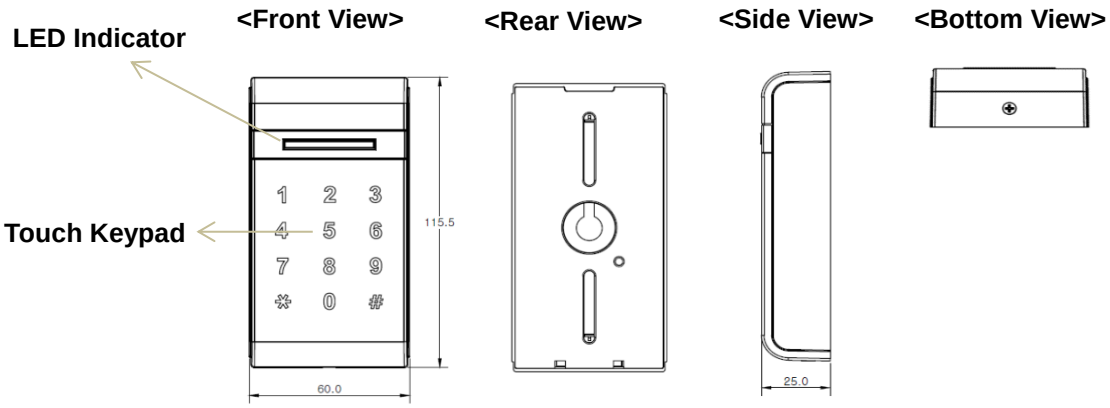
<Option>



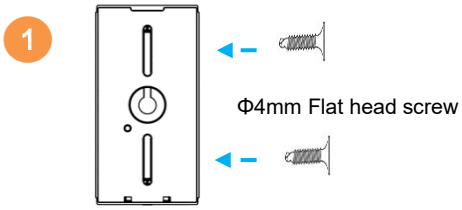
Serial/ USB converter

04. Appearance & Installation

04.1 DE-960 Feature & Dimension

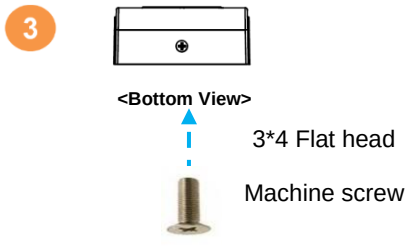


04.2 Mounting DE-960 on the wall

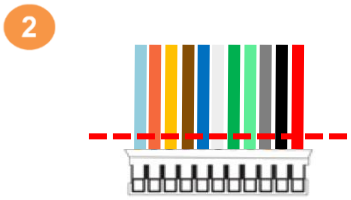


Place the wall mount bracket on the wall and fix it tightly with screw (Φ4mm Flat head)

(Refer to chapter 5, Connection diagram)



Tilt the device slightly and insert to the wall mount from the top. Fix it tightly with 3*4 flat head machine screw.



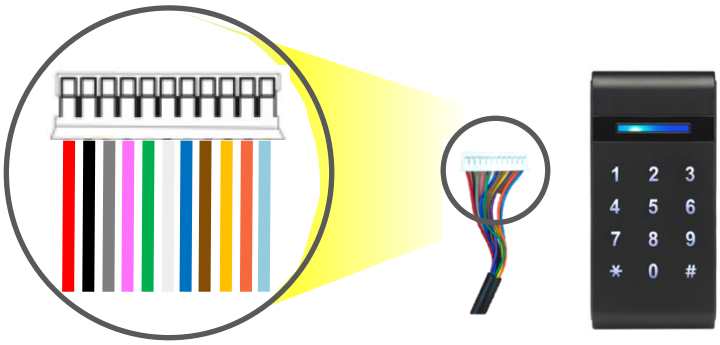
Connect the power and communication cable to DE-960's terminal block.

In case you don't use the cable as it is shipped, you could cut off the end of the cable and use only the wire that you need for connection.

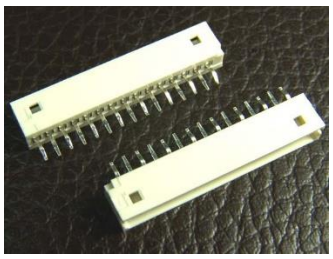
※ Caution

- Do not push the bracket too hard when fixing it to the wall.
- Screw has to be selected depending on the wall's material and condition
- Place the reader to flat panel between the wall mount bracket and the wall.
  It could cause a problem to assemble the device if the bracket is bent.
- Card reading distance can be short if the wall is made of steel or metal.

05. Connection Diagram



- **2.00mm pitch, 12PIN Connector (YEONHO Electronics : 20017HS-12)**
- **Connector to connect with housing (Female)**



20017WS-12(Straight)

20017WR-12 (Right angle)

PIN NAME	COLOR	PIN NUMBER
PWR_IN	RED	1
PWR_GND	BLACK	2
RS232_RX	GRAY	3
RS232_TX	PINK or JADE	4
WGD_D0	GREEN	5
WGD_D1	WHITE	6

PWR_GND	BLUE	7
LED	BROWN	8
BEEP	YELLOW	9
TAMPER	VIOLET	10
RS485+	ORANGE	11
RS485-	SKYBLUE	12

06. Operation & Usage

Basic Operation:

01. Once input power to device, white LED on KEY pad is turned on and off, after that, BLUE & RED LED are turned on.

02. When user present contactless card to the reader, the reader makes 1 time beep sound and turning RED LED.

Tamper (TAMP):

Reader makes alarm when its CASE is forced to open. It also makes TAMPER signal to access controller. In case of closed CASE, TAMPER line (VIOLET) shows 0V and otherwise (open) shows 5V.

LED Control:

Reader turns on RED LED when LED Signal (BROWN) with 0V. In case of 5V, BLUE LED will be on.

Buzzer Control:

Reader makes beep sound when BEEP Signal (YELLOW) with 0V.

07. Output Format

[Data format]

- **Data format can be decided by setting. (Refer to chapter 10)**
- <34 bit>

Parity Bit (1bit)	Data [1~32] (32bit)	Parity Bit (1bit)
Bit 1	Bit 2 ~ Bit 33	Bit 34

First Bit (Parity) : Even parity of bit 2 ~ bit 17

Data [1-32] : ID number (transmission data)

Last Bit (Parity) : Odd parity of bit 18 ~ bit 33

<66 bit>

Parity Bit (1bit)	Data [1~64] (64bit)	Parity Bit (1bit)
Bit 1	Bit 2 ~ Bit 65	Bit 66

First Bit (Parity): Even parity of bit 2 ~ bit 33

Data[1-64] : ID number(transmission data)

FeliCa™ card – IDM data(8bytes)

Mifare® card – Card serial number(4bytes)+0x00(4bytes)

Last Bit (Parity) : Odd parity of bit 34 ~ bit 65

<32bit>

Data[1-32] : ID number(transmission data)

<64bit>

Data[1-64] :

FeliCa™ card – IDM data(8bytes)

Mifare® card – Card serial number(4bytes)+0x00(4bytes)

08. Function configuration (Key Setting)

User can easily change the settings of DE-960 using touch Key. To change various setting such as 1) Key press mode 2) LED color 3) buzzer on / off 4) Data output length 5) Data output format (Forward / Reverse) 9) Factory Reset, it is required to enter Administrator mode or User mode.

※ Administrator mode: In this mode, all setting change function is available without any limitation. (Suitable for System installation service provider)

※ User mode: In this mode, relatively simple function that does not affect the system such as 2) LED color 3) Buzzer on / off type 5) Data output format (Forward / Reverse) can be customized.

08.1 Enter admin setting mode

- Using DE-960 Touch KEY, you can enter admin setting mode.

<How to enter Admin setting mode>

1. Press “*” “*” (two times) “5” “#”, buzzer sounds and it enters “Admin password input mode”
2. Input password (Max. 8 digit, Default. 12345678)
3. Press “#” then RED/BLUE LED will blink and finally enter setting mode..
4. Input the mode number to change.
5. Press “#” to finish and press “*” to go back to the setting menu.
6. If there is no more input during 10 sec, it automatically finishes.

- PASSWORD can be changed through F/W build.

08.2 Enter user setting mode

- Using DE-960 Touch KEY, you can enter user setting mode.
- How to enter user setting mode.

7. Press “*” “*” (two times) “8” “#” then buzzer sounds and it enters “Admin password input mode”
8. Input password (Max. 4 digit, Default. 1234)
9. Press “#” then RED/BLUE LED will blink and finally enter setting mode..
10. Input the mode number to change.
11. Press “#” to finish and press “*” to go back to previous setting menu.
12. If there is no more input during 10sec, it automatically finishes.

- PASSWORD can be changed through F/W build.

08.3 Key Mode setting

- When **RED/BLUE LED** keep blinking, press **[1]** to enter KEY mode setting menu.
- After entering, press option number below.

  ※ this mode is only available in admin mode.

Key	State	Description
1	Direct Mode + PIN	Input KEY Direct mode – CARD detect & PIN
2	Buffer Mode + PIN	Input KEY Buffer mode – CARD detect & PIN
3	Direct Mode	Input KEY Direct mode
4	Buffer Mode	Input KEY Buffer mode

- Press option number and “#” to save option to flash memory. Then DE-960 will reboot.
- Press“*” to return to setting menu.
- It would be set to 1 (Direct Mode + PIN) If you press other buttons except 1~4.

08.4 Default LED setting

- When RED/BLUE LED keep blinking, press **[2]** to enter default LED setting menu.
- After entering, press option number below.

Key	State	Description
1	Default LED Red	Default LED is Red
2	Default LED Blue	Default LED is Blue

- Press option number and “#” to save option to flash memory. Then DE-960 will reboot.
- Press“*” to return to setting menu.
- It would be set to 1 (Default LED RED) If you press other buttons except 1~2.

08.5 Key Push Buzzer setting

- When RED/BLUE LED keep blinking, press **[3]** to enter KEY push buzzer setting menu.
- After entering, press option number below.

Key	State	Description
1	ALL Buzzer ON	Buzzer all turns on about KEY
2	Buzzer Push sound OFF	Buzzer turns off when pressing KEY, but indicator buzzer still works
3	ALL Buzzer OFF	Buzzer all turns off about KEY 3

- Press option number and “#” to save option to flash memory. Then DE-960 will reboot.
- Press“*” to return to setting menu.
- It would be set to 1 (ALL Buzzer ON) If you press other buttons except 1~3.

08.6 Wiegand Length setting

※ This mode is only available in admin mode.

- When RED/BLUE LED keep blinking, press **[4]** to enter Wiegand setting menu.
- After entering, press option number below. (56/ 58 is only available in command setting)

Key	State	Description
1	Wiegand 32Bit	Card Wiegand Data 32bit
2	Wiegand 34Bit	Card Wiegand Data 34bit
3	Wiegand 64Bit	Card Wiegand Data 64bit
4	Wiegand 66Bit	Card Wiegand Data 66bit

- Press option number and “#” to save option to flash memory. Then DE-960 will reboot.
- Press“*” to return to setting menu.
- It would be set to 1 (Wiegand 32Bit) if you press other buttons except 1~4.

08.7 Wiegand Data Foward / Reverse setting

- When RED/BLUE LED keep blinking, press **[5]** to enter Wiegand setting menu.
- After entering, press option number below.

Key	State	Description
1	Data Send Forward	Wiegand Data Sending Forward
2	Data Send Reverse	Wiegand Data Sending Reverse

- Press option number and “#” to save option to flash memory. Then DE-960 will reboot.
- Press“*” to return to setting menu.
- It would be set to 1 (Data Send Forward) if you press other buttons except 1~2.

08.8 Factory reset

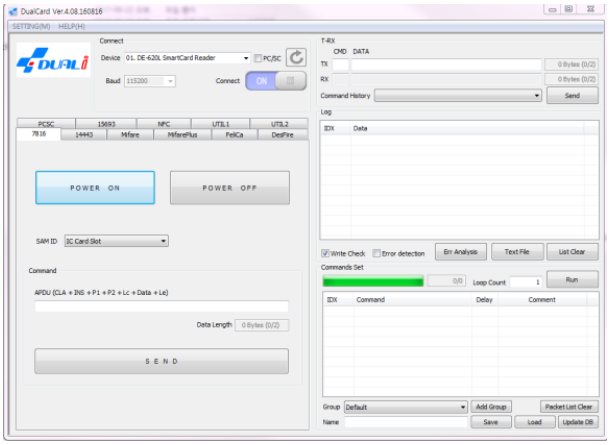
※ This mode is only available in admin mode.

- When RED/BLUE LED keep blinking, press **[9]** to enter Factory reset menu.
- Factory reset menu has no option number.
- Press “#” to save option to flash memory. Then DE-960 will reboot.
- Press“*” to return to setting menu.
- If Factory reset is occurred, then settings would be changed after reset.
- Recovered default factory reset options are below.

  - KEY Input Mode: Direct
  - Buzzer: All ON
  - Password Length: 4 to 12
  - Timeout: 5sec
  - Wiegand Data format: 64bit / NON reverse
  - Default LED color: RED
  - Mifare Key(0), Block(0)

09. Function configuration (Communication setting)

Changing the reader settings is also possible using the SDK (DualCard program) provided by DUALi. You can easily change the setting of 960 by executing the corresponding command referring to the communication frame below. (For more information on dual cards, please refer to DUALi SDK Manual.)



※ STX, LENH (Length High) and LENL (Length Low) value of each communication frame are automatically calculated in the dual card program. Just input corresponding value on each CMD/ DATA fields.

09.1 Wiegand option set (Parity, Reverse)

Following is the communication frame for wiegand option setting. Since it is saved in flash

memory after the first setting, the reader does not need to be set again.

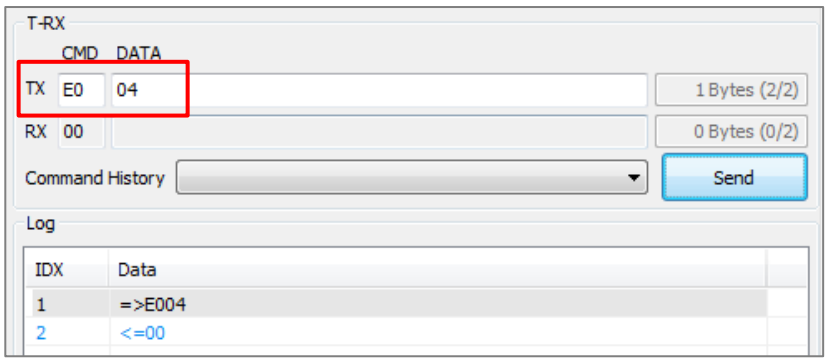
(115,200bps, 8 data, no parity, 1 stop bit)

STX	LENH	LENL	CMD	DATA	LRC
0x02	0x00	0x02	0xE0	DATA[0]	LENH^LENL ^ CMD ^ DATA[0]

(^: exclusive oring)

DATA[0]	State	Description
Bit0 - RFU Bit1(0x02)- Reverse ON Bit2(0x04)- Parity OFF Bit3..7 – RFU	00	Parity OFF / Reverse OFF
	02	Parity OFF / Reverse ON
	04	Parity OFF / Reverse OFF
	06	Parity ON / Reverse ON

Tip – To change the Wiegand option to Parity ON / Reverse OFF



09.2 LED option setting

Following is the communication frame for LED color setting. Since it is saved in flash memory

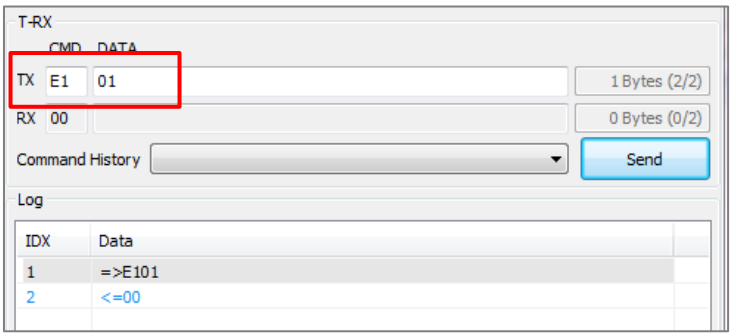
after the first setting, the reader does not need to be set again.

(115,200bps, 8 data, no parity, 1 stop bit)

STX	LENH	LENL	CMD	DATA[0]	LRC
0x02	0x00	0x02	0xE1	0x00 > BLUE LED Default 0x01 > RED LED Default	LENH^LENL ^ CMD ^ DATA[0]

DATA[0]	State	Description
Bit0	00	Default LED BLUE
	01	Default LED RED

Tip – To change the LED option to RED LED



09.3 Mifare KEY type, Block number, ID position, Wiegand format option set

Following is the communication frame for Mifare KEY type, Mifare block number, Mifare ID position, Wiegand format option set. Since it is saved in flash memory after the first setting, the reader does not need to be set again.

(115,200bps, 8 data, no parity, 1 stop bit)

STX	LENH	LENL	CMD	DATA[0..9]	LRC

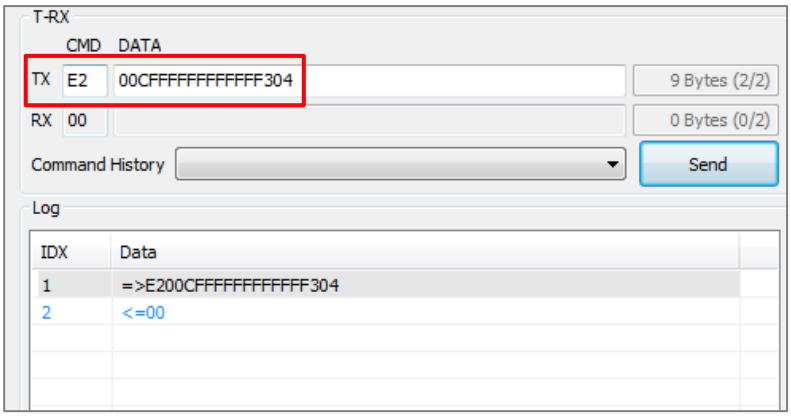
0x02	0x00	0x0B	0xE2	DATA[0] ~ DATA[9]	LENH^LENL ^ CMD ^ DATA[0]^..^DATA[9]

※ Wiegand 34 Bit, 48 Bit, 66Bit is following wiegand parity option of command 0xE0 bit2 (Refer to 9.1 to set Parity option)

DATA[x]	State	Description
DATA[0]	Mifare KEY type	0: A KEY 1: B KEY
DATA[1..6]	Mifare Key	Default Key is 0xFFFFFFFFFFFF
DATA[7]	Mifare Block Number	Mifare Block Number: 0 ~ 0xFF (0 = UID)
DATA[8]	Mifare ID Position	ID Position
DATA[9]	Wiegand Length	Wiegand Data length: 0x04 → Wiegand 32bit 0x07 → Wiegand 56bit Else anything: Wiegand 64bit (Refer to 9.1 to set Parity option)

Tip- To set Mifare Reading condition as

1) A KEY 2)) FFFFFFFFFFFF 3)Blocknum 4)position 5) Wiegand 32 bit



09.4 KEY Mode option set

Following is the communication frame for Key mode setting. Since it is saved in flash memory after the first setting, the reader does not need to be set again.

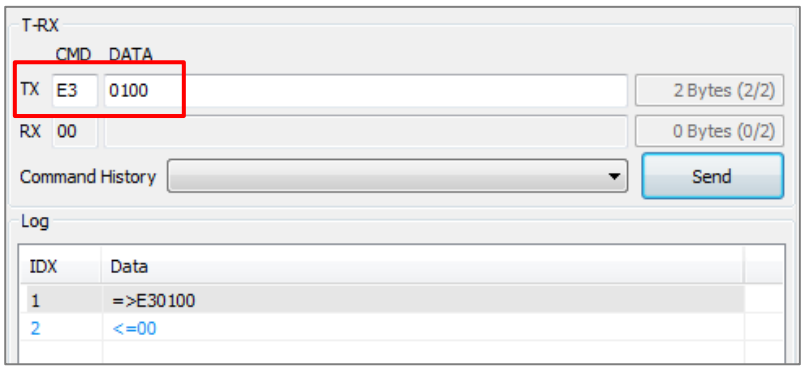
(115,200bps, 8 data, no parity, 1 stop bit)

STX	LENH	LENL	CMD	DATA[0]	DATA[1]	LRC
0x02	0x00	0x02	0xE3	0x01	DATA[1]	LENH^LENL ^ CMD ^ DATA[0]^DATA[1]

(^: exclusive oring)

DATA[1]	State	Description
0x00	Direct Mode + PIN	Input KEY Direct mode
0x01	Buffer Mode + PIN	Input KEY Buffer mode

Tip – To change the KEY Mode to Direct Mode+PIN



09.5 PASS Buffer Length option set

Following is the PASS Buffer communication frame for setting. Since it is saved in flash memory after the first setting, the reader does not need to be set again.

(115,200bps, 8 data, no parity, 1 stop bit)

STX	LENH	LENL	CMD	DATA[0]	DATA[1]	DATA[2]	LRC
0x02	0x00	0x02	0xE3	0x02	DATA[1]	DATA[2]	LENH^LENL ^ CMD ^ DATA[0]^DATA[1]^ DATA[2]

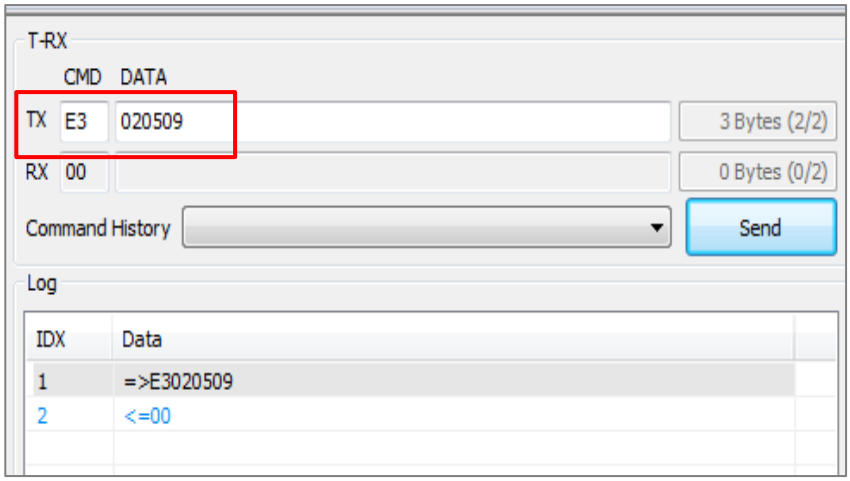
(^: exclusive oring)

DATA[X]	State	Description
DATA[1]	MINIMUM Length	Set password minimum length (Range: 04~0x0B(=11))
DATA[2]	MAXIMUM Length	Set password maximum length (Range: DATA[1]~0x0C(=12))

Tip – To set the length of password as

Minimum: 5 digits

Maximum: 9 digits



09.6 KEY Timeout option set

Following is the communication frame for key time out option setting. Since it is saved in flash memory after the first setting, the reader does not need to be set again.

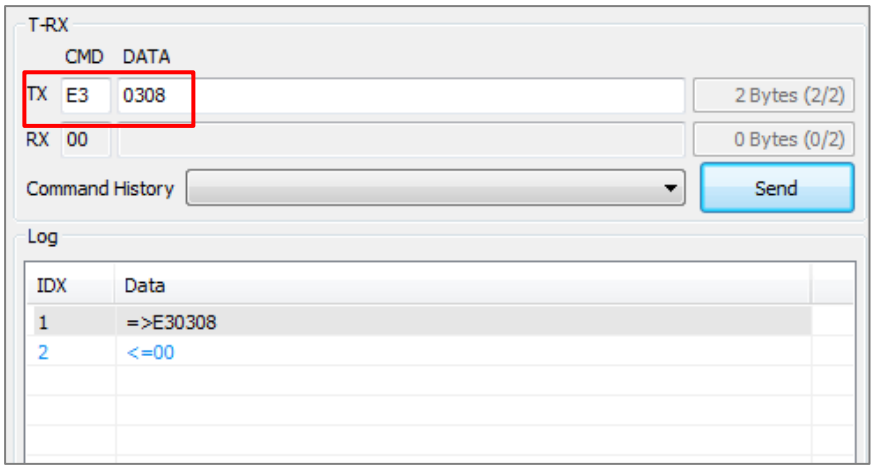
(115,200bps, 8 data, no parity, 1 stop bit)

STX	LENH	LENL	CMD	DATA[0]	DATA[1]	LRC
0x02	0x00	0x02	0xE3	0x03	DATA[1]	LENH^LENL^CMD^ DATA[0]^DATA[1]

(^ : exclusive oring)

DATA[1]	State	Description
0x01~0x0A	Touch Key Timeout	Touch Key timeout setting (Range: 0x01~0x0A(=10))

Tip – To set the Touch key Timeout for 8 seconds



09.7 KEY Push Buzzer option set

Following is the communication frame for Key push buzzer option setting. Since it is saved in flash memory after the first setting, the reader does not need to be set again.

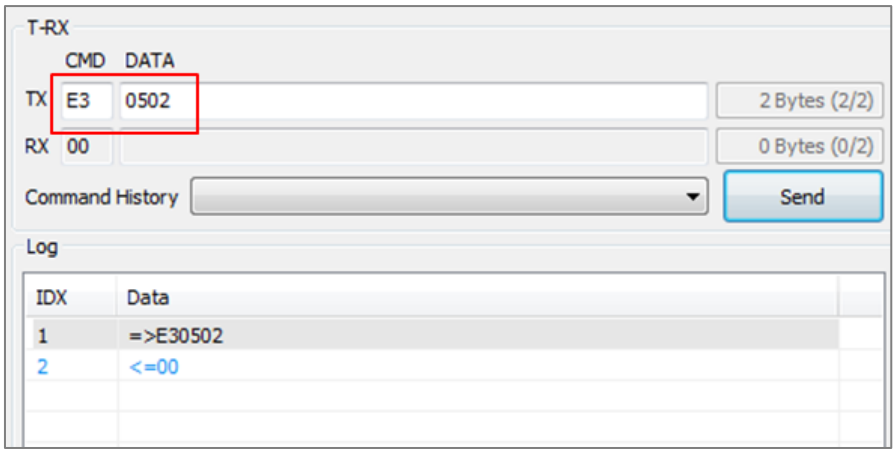
(115,200bps, 8 data, no parity, 1 stop bit)

STX	LENH	LENL	CMD	DATA[0]	DATA[1]	LRC
0x02	0x00	0x02	0xE3	0x05	DATA[1]	LENH^ LENL ^ CMD ^ DATA[0] ^DATA[1]

(^: exclusive oring)

DATA[1]	State	Description
0x00	BUZZER ON	Touch KEY, All buzzer sound ON
0x01	BUZZER PUSH SOUND OFF	Touch KEY, All buzzer sound OFF but indicator buzzer still works
0x02	BUZZER OFF	KEY Touch sound OFF, Indicator sound is ON

Tip – To disable buzzer (BUZZER OFF)



09.8 RF Scan option set

Following is the communication frame for RF Scan setting. Since it is saved in flash memory after the first setting, the reader does not need to be set again

(115,200bps, 8 data, no parity, 1 stop bit)

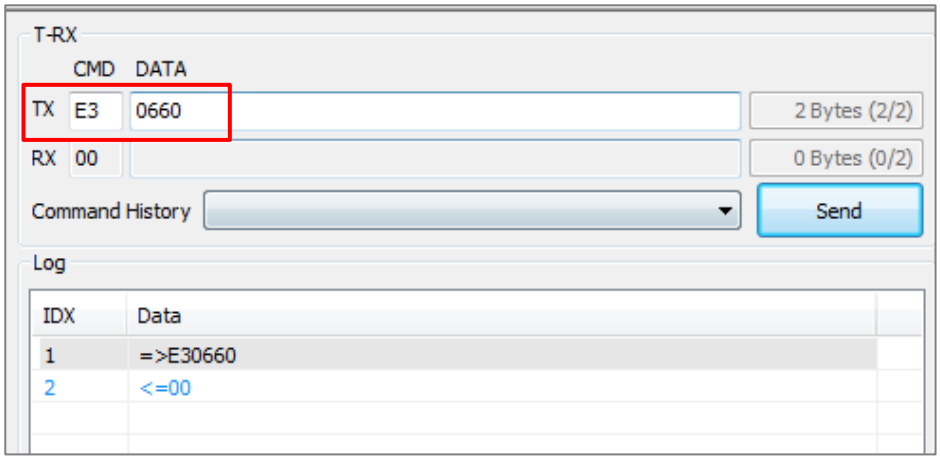
STX	LENH	LENL	CMD	DATA[0]	DATA[1]	LRC
0x02	0x00	0x02	0xE3	0x06	DATA[1]	LENH^ LENL ^ CMD ^ DATA[0] ^DATA[1]

(^: exclusive oring)

DATA[1]	Description
0x40	TYPE-B Scan ON
0x20	Felica Scan ON
0x08	15693 Scan ON

※ Reading Mifare Type A can not be turned off

Tip – To set the reader to read Mifare type A , FeliCa™ and TypeB



10. Certifications

- FCC STATEMENT
- CAUTION: Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. 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. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

*Please contact our service team for the technical/ sales supports

11. Warranty & Service

Warranty and Repair service

- DUALi Inc. warrants to the original consumer or other end user that this product, **DE-960,** is free from defects in materials and workmanship for a period of 1 year from the date of purchase.

※ **Note** Warranty/non-warranty repair fees do not include shipping charges.

‣ The damages(defaults) prescribed below are NOT to be covered by warranty.

- User's misuse of part/component against the provided manual.

- Fault by the unqualified user's own intention of repairs.

- Adding certain functions or extension of system.

PRECAUTIONS

- Do not drop the device.
- Do not modify, repair, or disassemble.
- Do not expose directly to water, alcohol, benzene, etc for cleaning.
- Do not expose directly to flammables.
- Do not place or keep the device near flammables.
- Keep the device away from excessive humidity and dust.
- Do not place heavy objects on the device.
- Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

*Please contact our service team for the technical/ sales supports.

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