SR-RH-G2D
Controller User's Manual v3.71

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.
This device complies with Part 15 of the FCC rules and Industry Canada licence-exempt RSS standard(s).
Operation is subject to the following two conditions:
(1) this device may not cause interference, and
(2) this device must accept any interference received, including interference that may cause undesired operation.
This Class B digital apparatus complies with Canadian ICES-003.
Cet appareil numérique de la classe B est conforme à la norme NMB-003 du Canada.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes : (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

Contents

1 COMMUNICATION INTERFACE SPECIFICATION

SR-RH-G2D controller supports two serial communication ports IF1 and IF2. The controller communicates with host (MCU，MPU，Controller) using serial communication interface RS232/RS485 (IF1 and IF2) or TCPIP (IF1 only, Built-in UART to TCPIP converter) and complete corresponding operation according to the host command. IF1 is a bidirectional port and is the main port. IF2 is a unidirectional port and is the auxiliary port. The communication parameter is 38400bps 1 start bit, 8 data bits, 1 stop bit with even parity check bit. In the process of serial communication, the least significant bit of one byte is transmitted first and the least significant byte of command data sequence is transmitted first.

2 PROTOCOL DESCRIPTION

2.1. IF1 Protocol

An IF1 communication procedure is sponsored by the host sending commands and data to the controller and the controller returns the result status and data to host after command execution.

The following table shows the process of the host computer command:

HOST	DIRECTION	CONTROLLER (IF1)	COMMENT
Command Data Block	→		The interval between two consecutive bytes in the command data block should be less than 120ms. During command data block sending, synchronization will lost if the host receives any data from the controller and the host should stop command sending and restart the communication after at least 120ms.

The command data block the host sending to the controller should conform to the format of the protocol. The block includes controller address, operation command symbol, command operand and CRC-16 checksum.

The controller completes command execution in 300ms (not including host sending data time) (except 'X' command) after receiving host command and returns the results. During the period, it doesn't process any host data. The feedback of command execution results is as follows:

CONTROLLER (IF1)	DIRECTION	HOST	COMMENT
Response data block	→		The interval between two consecutive bytes in the response data block should be less than 15ms.

The response data block includes address, command execution result status and response data.

After the feedback, a whole communication process finishes.

'A' command is a command without any result returned. 'A' command is special command used as an acknowledgement to command 'C', 'L' and 'E'. Without this acknowledge, 'C', 'L' and 'E' command will keep return the same response data block.

2.2. IF2 Protocol

IF2 do not receive any command from the host. It is an auxiliary port to monitor the RFID function of the channel device. It will send the tag's UID data to host when the controller get any tag's UID data from the reader in device.

CONTROLLER	DIRECTION	HOST	COMMENT
Response data block	→		The interval between two consecutive bytes in the response data block should be less than 15ms.

3 DATA BLOCK FORMAT

3.1 COMMAND DATA BLOCK

Len	Con_adr	Cmd	Data[]	LSB-CRC16	MSB-CRC16

Len: Command data block length 1 byte (including itself). Value range is 5~255.
Con_adr: Controller address, 1 byte. Value range is 0~254. Only will the controller conforming to the address respond the command data block. Value 255 is broadcasting address. All controllers will respond the command data block with a broadcasting address.
Cmd: Operation command symbol, 1 byte.
Data[]: Operation command parameters.
CRC16: CRC-16 checksum, 2 bytes with least significant byte first.

3.2 RESPONSE DATA BLOCK

Len	Con_adr	Status	Data[]	LSB-CRC16	MSB-CRC16

Len: Response data block length, 1 byte(including itself). Value range is 5~255.
Con_adr: Controller address, 1 byte. Value rang is 0~254.
Status: Result status value, 1byte.
Data[]: Response data.
CRC16: CRC-16 checksum, 2 bytes with least significant byte first.

4 CRC16 ALGORITHM

Cyclic Redundancy Check (CRC) computation includes all data from Len. The CRC generation polynomial is $X^{16} + X^{12} + X^5 + 1$ (CRC_POLYNOM = 0x8408) with preset value 0xFFFF (CRC_PRESET = 0xFFFF). The least significant byte of the CRC checksum should be transferred first.

4.1 C code sample

```
unsigned integer crc = CRC_PRESET;
for (i=0; i<cnt; i++)  /*cnt:the length of the data to be caculated/
{
    crc ^= DATA[i];
    for (j=0; j<8; j++)
    {
        if (crc & 0x0001)
            crc = (crc >> 1) ^ CRC_POLYNOM;
        else
            crc = (crc>>1);
    }
}
```

4.2 VB code sample

```
Const CRC_POLYNOM = &H8408& 'Polynominal

'In    iDatByteNumToCreate Total Data byte( except CRC 2 byte)
'Out   CRC_MSB,CRC_LSB

Public Sub CalcCrc16(iDatByteNumToCreateCRC As Integer)
    Dim lngCRC As Long 'Integer
    Dim i As Integer, j As Integer
    Dim lngTest As Long
    lngCRC = &HFFFF&
    For i = 0 To iDatByteNumToCreateCRC - 1
        lngTest = bCommData(i)
        lngCRC = lngCRC Xor (bCommData(i))
        lngCRC = lngCRC And &HFFFF&
        For j = 0 To 7
            If lngCRC And &H1 Then
                lngCRC = (lngCRC \ 2) Xor CRC_POLYNOM
                lngCRC = lngCRC And &HFFFF&
```

```
            Else
                lngCRC = lngCRC \ 2
            End If
        Next j
    Next i
    CRC_MSB = lngCRC And &HFF
    CRC_LSB = ((lngCRC \ 256) And &HFF) ' 8bit Shift to Right.
End Sub
```

5 OPERATION COMMAND (CMD) SUMMARY

5.1 IF1 Port Command

No.	CMD Name	CMD value	Comment	Response
1	**M** Mode Switch	0x4D	Switch the system between Channel Mode and EAS mode	Y
2	**C** Acquire	0x43	Get the tag's UID and other information in Channel Mode	Y
3	**A** Acknowledge①	0x41	Acknowledge the receiving of the result of the 'C', 'L' and 'E' commands	N
4	**O** Relay Output	0x4F	Control the built-in relay	Y
5	**B** Buzzer and LED	0x42	Control the buzzer and LED	Y
6	**@** Set time	0x40	Set the real clock	Y
7	**D** Delete	0x44	Delete the message buffer content in the controller	Y
8	**F** Configure	0x46	Configure the controller	Y
9	**R** Get command 'F' configure data	0x52	Get current controller configuration data set by command 'F'	Y
10	**X** Read data	0x58	Read out the data content of the tag	Y
11	**I** Infrared	0x49	Enable/disable infrared sensor	Y
12	**G** Get system info	0x47	Get system information	Y
13	**H** Get detailed system information	0x48	Get detailed system information	Y
14	**w** Alarm setting	0x77	Set alarm action of buzzer, LED and relay	Y
15	**U** Alarm mask setting	0x55	Enable or disable corresponding alarm	Y
16	**Q** Inquiry Log data	0x51	Inquiry the backup log data	Y
17	**E** Extract log data	0x45	Extract record from log data	Y
18	**S** Browse log data	0x53	Browse log data with record index	Y
19	**T** Delete log data	0x54	Delete all log data	Y
20	**Z** Get reader status	0x5A	Get the connection status between reader and controller	Y
21	**P** Tag and Person correlation setting	0x50	Set the parameters of tag-person correlation detection algorithm	Y

22	**J** Read tag data setting	0x4A	Set if reading out the tag's designated data content along with its UID collection	Y
23	**K** Set controller address	0x4B	Set the controller address	Y
24	**N** Infrared sensor direction setting	0x4E	Set the infrared sensor's detecting sequence.	Y
25	**V** Set reader connection alarm	0x56	Set if alarming when the connection between the controller and the reader broken	Y
26	**L** Acquire EAS	0x4C	Get the EAS and other information in EAS Mode	Y
27	**a** Start/Stop Log data recording	0x61	Start or Stop background log data recording	Y
28	**B** Get Log data recording status	0x62	Get the current log data recording status	Y
29	**f** Save or restore from backup configuration data	0x66	Save current configuration data to background backup or restore configuration data from backup data.	Y
30	**r** Backup configuration data auto-loading setting	0x72	Enable or disable backup configuration auto-loading	Y

①IF1 will keep the response data block content of command 'C', 'L' and 'E' after sending back them to the host until receiving the acknowledgement command 'A'. Without this acknowledge, IF1 will keep return the same response data block of command 'C', 'L' and 'E'.

5.2 IF2 Port Command

None

6 LIST OF COMMAND EXECUTION RESULT STATUS

Status is one byte length with the lowest 6bit for status code and the most significant 2bit to indicate the free space in background log data record memory.

Status（bit5～bit0）	Meaning	Comment
xx000000	Operation succeed	Command operation has been successfully carried out.
xx000001	Response is a statistic message in Channel Mode	In Channel Mode, controller sends to the host the statistic messages about the quantity of tag and personnel passed.

xx000010	Response is a tag-exist time-overflow message in Channel Mode.	In Channel Mode, controller sends to the host the warning message when one tag has existed in the inductive field for a time over the preset threshold.
xx000011	Response is an infrared-block-time-overflow message in Channel Mode.	In Channel Mode, controller sends to the host the warning message when the infrared sensor has detected blocking for a time over the preset threshold.
xx000100	Response is an infrared-interference-warning message in Channel Mode.	In Channel Mode, controller sends to the host the warning message when the infrared sensor has been interfered and the controller figures out it not a passing action.
xx000101	Response is a message indicating the requested log data record does not exist or has been corrupted.	Controller sends to the host this message when the requested log data record does not exist or has been corrupted.
xx000110	Response is a message indicating the controller is undergoing self-testing and initialization.	Controller sends to the host this message when the controller is undergoing self-testing and initialization. The message will be sent once every second.
xx000111	Response is a message indicating the sequence number of the requested log data record is out of range.	Controller sends to the host this message when the sequence number of the requested log data record is out the range of the background records.
xx001000	Response is a message indicating the command is invalid.	Controller sends to the host this message when the command is invalid.
xx001001	Response is a message indicating the current mode of the controller is incorrect.	Controller sends to the host this message when the controller is not in a correct mode to carry out the command.

xx001010	Response is a message indicating the controller can not switch to the requested mode.	Controller sends to the host this message when the controller is busy and can not switch to the requested new mode.
xx001011	Response is a message indicating the controller has been forced in EAS mode.	Controller sends to the host this message when the controller has been forced in EAS mode and can not switch to other mode.
xx001100	Response is a message indicating the controller fails to save the new infrared sensors' sensing direction.	Controller sends to the host this message when the controller fails to save the new infrared sensor's sensing direction.
xx001101	Response is a message indicating the controller can not disable the background log data recording.	Controller sends to the host this message when the controller is requested to disable the background log data recording while the infrared sensors are in active status.
xx001110	Response is a message indicating the background saved configuration data does not exist or has corrupted.	Controller sends to the host this message when the controller can not restore the configuration data because the background saved configuration data does not exist or has corrupted.
xx001111~xx011111	Reserved	Reserved
xx100000	Response is a statistical message in EAS Mode	In EAS Mode, controller sends to the host the statistical messages about the quantity of personnel passed.
xx100001	Response is a infrared-block-time-overflow message in EAS Mode.	In EAS Mode, controller sends to the host the warning message when the infrared sensor has detected blocking for a time over the preset threshold.

xx100010	Response is a infrared-interference-warning message in EAS Mode.	In EAS Mode, controller sends to the host the warning message when the infrared sensor has been interfered and the controller figures out it not a passing action.
xx100011~xx111110	Reserved	Reserved
xx111111	Response is an error message	Controller sends to the host this message when error occurs in command execution.

Status（bit7～bit6）	**Meaning**
00xxxxxx	Free space in background log data record memory is over 15%
01xxxxxx	Free space in background log data record memory is less than 15%
10xxxxxx	Background log data record memory is full and log data recording has been stopped.
11xxxxxx	Background log data record memory is full and log data has begun to overlap.

7 DETAILED DESCRIPTION OF OPERATION COMMAND

7.1 IF1 Command

There are two work modes for the controller. One is Channel Mode and the other is EAS mode. Some of the commands are only available in one mode and other commands are available in both modes. If a command is only effective in one mode, it will be explicitly noted.

7.1.1 'M' command

Host use 'M' command to get or alter the work mode of the controller.

Host→Controller

Len	Con_adr	Cmd	Data[]	CRC-16	
0x06	0xXX①	0x4D	1byte②	LSB	MSB

① Controller address: 1byte length ranging from 0~254. Only will the controller conforming to the address respond the command. Value 255(0xFF) is broadcasting address. All controllers will respond the command with a broadcasting address.

②bit0 = 0, Channel Mode;
bit0 = 1, EAS Mode;
bit7 = 0, Get current work mode;
bit7 = 1, Set current work mode according to bit0.
Other bits are reserved and should be 0.

The newly set work mode is also effective even after power off and on reset. The work mode must be changed by this command explicitly.

After answering this command, the controller will reboot itself to enter the requested work mode.

If the controller has been forced in EAS mode by hardware jumper setting, the host only can use this command to get the current work mode status and can not make any change.

Host←Controller

Len	Con_adr	Status*	Data[]	CRC-16	
0x06	0xXX	0x00	1byte①	LSB	MSB

** The status's highest 2bits indicate the capacity of free space in background log data record memory.*

① bit1 = 0: bit0 indicates the current work mode.
bit1 = 1: the controller is forced in EAS mode. Bit0 value should be neglected.
bit0 = 0: Channel Mode.
bit0 = 1: EAS Mode.
bit2 – bit7: Reserved. Keep as 0.

7.1.2 'C' command (Channel Mode only)

Host uses 'C' command to get person-passing message and other statistical or alarm messages.

Host→Controller

Len	Con_adr	Cmd	Data[]	CRC-16	
0x05	0xXX	0x43	—	LSB	MSB

The responses of 'C' command can be classified into two types. One is routine response that is the message about person-passing and tag's UID information. The other is auxiliary responses of statistical, internal status, internal control or alarm messages.

The controller adopts a uniform format for the person-passing message and auxiliary messages. This greatly facilitates application software development and timely reaction to various situations.

（1） Routine Response（Host←Controller）

A．When the controller is set to only process the tag's UID

Len	Con_adr	Status	Data[]			CRC-16	
			Tag UID	In/Out	Time		
0x14	0xXX	0x00*	8bytes①	1byte②	6Bytes③	LSB	MSB

** The status's most significant 2bits indicate the capacity of free space in background log data record memory.*

① Tag UID= "00 00 00 00 00 00 00 00" means "nobody no tag";
Tag UID= "FF FF FF FF FF FF FF FF" means "one person passed without carrying a tag"
Tag UID= "xx xx xx xx xx xx xx xx" means 8bytes UID with LSB first.

② 1byte direction data
Bit7~bit4 are 0s. Bit3~bit0 represent the motion direction:
1 – Forwardly passing;
2 – Reversely passing;
3 – Uncertain direction;;
4 – Infrared sensors are closed. Direction judge is disabled;
0 – Nobody.

③6bytes time stamp for year-month-day-hour-minute-second in 24hour format.

B．When the controller is set to process the tag's UID and data content (refer to 'J' command):

Len	Con_adr	Status	Data[]				CRC-16	
			Tag UID	In/Out	Time	Tag data		
0x14＋Valid tag data length	0xXX	0x00*	8bytes UID①	1byte②	6bytes③	④	LSB	MSB

** The status's most significant 2bits indicate the capacity of free space in background log data record memory.*

① Tag UID= "00 00 00 00 00 00 00 00" means "nobody no tag". In this case, there is no tag data item.

Tag UID= "FF FF FF FF FF FF FF FF" means "one person passed without carrying a tag". In this case there is no tag data item.

Tag UID= "xx xx xx xx xx xx xx xx" means 8bytes UID with LSB first. In this case, there will be tag data item if reading tag data content successfully. Otherwise, there will be no tag data item.

② 1byte direction data

Bit7~bit4 represent whether the tag data item exists.

3 – Tag data item exists

Others – No tag data item.

Bit3~bit0 represent the motion direction:

1 – Forwardly passing;

2 – Reversely passing;

3 – Uncertain direction;;

4 – Infrared sensors are closed. Direction judge is disabled;

0 – Nobody.

③6bytes time stamp for year-month-day-hour-minute-second in 24hour format.

④ Designated tag data content.

If reading tag data content failed, there will be no tag data item.

If reading tag data content succeed, this item will comprises designated tag data content which is organized in block unit with least significant block first. There are 4 bytes in one block with prefix of 1 byte security status of each block.

（2） Auxiliary Response（Host←Controller）

Statistic Message: when the device has been idle (no tag, no infrared sensor detection triggered, no unprocessed message) for a preset time (configurable), the controller will deliver the statistic message about the quantity of personnel passed and tag detected.

Len	Con_adr	Status*	Data[]					CRC-16	
			forward passing	reverse passing	uncertain direction passing	Tag detected	Time		
0x13	0xXX	0x01	2bytes①	2bytes②	2bytes③	2bytes④	6bytes⑤	LSB	MSB

** The status's most significant 2bits indicate the capacity of free space in background log data record memory.*

①forward passing personnel number with LSB first.

②reversely passing personnel number with LSB first.

③uncertain direction passing personnel number with LSB first.

④detected tag number with LSB first.

⑤6bytes time stamp for year-month-day-hour-minute-second in 24hour format.

Tag-exist time-overflow Message: when the detected tag stayed in the controller's buffer for a preset time (configurable) without relative personnel passing action, the controller will deliver this message.

A. When the controller is set to only process the tag's UID

Len	Con_adr	Status*	Data[]		CRC-16	
			Tag UID	Time		
0x13	0xXX	0x02	8bytes①	6bytes②	LSB	MSB

** The status's most significant 2bits indicate the capacity of free space in background log data record memory.*

①existing time overflowed tag's UID with LSB first.

②6bytes time stamp for year-month-day-hour-minute-second in 24hour format.

B. When the controller is set to process the tag's UID and data content (refer to 'J' command):

Len	Con_adr	Status*	Data[]				CRC-16	
			Tag UID	Time	Tag data status	Tag data		
0x14 ＋ Tag data length	0xXX	0x02	8bytes①	6bytes②	1byte③	④	LSB	MSB

** The status's most significant 2bits indicate the capacity of free space in background log data record memory.*

①existing time overflowed tag's UID with LSB first.

②6bytes time stamp for year-month-day-hour-minute-second in 24hour format.

③Tag data status byte:

3 – Tag data item exists

Others – No tag data item.

④ Designated tag data content.

If reading tag data content failed, there will be no tag data item.

If reading tag data content succeed, this item will comprises designated tag data content which is organized in block unit with least significant block first. There are 4 bytes in one block with prefix of 1 byte security status of each block.

Infrared-block-time-overflow Message: when one or more of the infrared sensors have been kept blocked for a preset time (configurable), the controller will deliver this message.

Len	Con_adr	Status*	Data[]	CRC-16	
			Time		
0x0B	0xXX	0x03	6bytes①	LSB	MSB

** The status's most significant 2bits indicate the capacity of free space in background log data record memory.*

①6bytes time stamp for year-month-day-hour-minute-second in 24hour format.

Infrared-interference-warning Message: when the two outside infrared sensors have been triggered and the controller finds out it not a valid personnel passing motion, the controller will deliver this message.

Len	Con_adr	Status*	Data[]	CRC-16	
			Time		
0x0B	0xXX	0x04	6bytes①	LSB	MSB

** The status's most significant 2bits indicate the capacity of free space in background log data record memory.*

①6bytes time stamp for year-month-day-hour-minute-second in 24hour format.

7.1.3 'A' command

When the host has correctly received the feedback of command 'C', 'L' and 'E', it should issue this command as an acknowledgement.

Host→Controller

Len	Con_adr	Cmd	Data[]	CRC-16	
0x05	0xXX	0x41	-	LSB	MSB

Host←Controller

None

7.1.4 'O' command

The host uses this command to control the device's built-in relay to pick-up, last for a requested time and drop out.

Host→Controller

Len	Con_adr	Cmd	Data[]	CRC-16	
			Action Time		
0x06	0xXX	0x4F	1byte①	LSB	MSB

①the relay's pick-up duration is Time*100ms, 0<Time<255.

Host←Controller

Len	Con_adr	Status*	Data[]	CRC-16	
0x05	0xXX	0x00	—	LSB	MSB

** The status's most significant 2bits indicate the capacity of free space in background log data record memory.*

7.1.5 'B' command

The host uses this command to control the device's built-in LED & Buzzer to flash & beep.

Host→Controller

Len	Con_adr	Cmd	Data[]						CRC-16	
			Buzzer beep time in one cycle	Buzzer mute time in one cycle	Buzzer action times	LED on time in one cycle	LED off time in one cycle	LED color and flash times		
0x0B	0xXX	0x42	1byte T1①	1byte T2②	1byte T3③	1byte T4④	1byte T5⑤	1byte T6⑥	LSB	MSB

① Buzzer beep duration(T1*100ms), 0<=T1<=255.

② Buzzer mute duration (T2*100ms), 0<=T2<=255.

③ Buzzer action times(0<=T3<=255).

④ LED light on duration(T4*100ms), 0<=T4<=255.

⑤ LED light off duration(T5*100ms), 0<=T5<=255。

⑥ Bit6~bit0 designates the LED flash times (0<=T6<=127);
Bit7 designates the color of the LED, 0 for red and 1 for green.

Host←Controller

Len	Con_adr	Status*	Data[]	CRC-16	
0x05	0xXX	0x00	—	LSB	MSB

** The status's most significant 2bits indicate the capacity of free space in background log data record memory.*

7.1.6 '@' command

The host uses this command to set the device's built-in real time clock.

Len	Con_adr	Cmd	Data[]	CRC-16	
			Time		
0x0B	0xXX	0x40	①	LSB	MSB

① 6bytes time stamp for year-month-day-hour-minute-second in 24hour format.
If all bytes are 0s, the host will not set the real time clock but get the current time of it.
Two issues should be noticed in real time clock setting:

A. The controller should be idle (no tag, no infrared sensor detection triggered, no unprocessed message) to set the real time clock.

B. The time that will be set should not be earlier than the latest background log data record.

Host← Controller

Len	Con_adr	Status*	Data[]	CRC-16	
0x0B	0xXX	0x00	Time	LSB	MSB
			①		

** The status's most significant 2bits indicate the capacity of free space in background log data record memory.*

①6bytes time stamp for year-month-day-hour-minute-second in 24hour format. It is the current time of the controller's real time clock.

7.1.7 'D' command

The host uses this command to clear the controller's all tag UID information, message buffers, personnel passing counter and detected tag counter.

Host→Controller

Len	Con_adr	Cmd	Data[]	CRC-16	
0x05	0xXX	0x44	—	LSB	MSB

Host←Controller

Len	Con_adr	Status*	Data[]	CRC-16	
0x05	0xXX	0x00	—	LSB	MSB

** The status's most significant 2bits indicate the capacity of free space in background log data record memory.*

7.1.8 'F' command

The host used this command to configure the controllers' parameters. These parameters will be stored in nonvolatile memory of the controller and be kept despite power off. If the parameters are corrupted, they will be replaced by their default value. The parameters can be retrieved by command 'R'.

Host→Controller

Len	Con_adr	Cmd	Data[]						CRC-16	
			Reader Inventory ScanTime	Reader standby time	Statistic Interval	Threshold of tag exist time and mute time	Threshold of infrared block time	Green LED prompt and background log data setting		
0x0B	0xXX	0x46	1byte T1①	1byte T2②	1byte T3③	1byte T4④	1byte T5⑤	1byte ⑥	LSB	MSB

① Reader's InventoryScanTime(T1*100ms, 3<=T1<=255). Default value is 30 (3s). For the details about the InventoryScanTime, please refer to the device's built-in reader RR9201T's user's manual. The default value is suitable for almost all cases.

② When the device has been idle for T2*1min (0<=T2<255, default value 0), the controller will turn the reader to standby status and switch off the reader's RF field. Set T2 to 0 will disable this action.
When the reader is in standby status, any infrared trigger will return the reader to active status.
If the infrared sensors have been closed by command, this setting will be neglected and the reader

will be kept in active status.

③ When the device has been idle for T3*1s (3<=T3<=255, default value 10), the controller will deliver the statistic message about the personnel passing and tag detected. Set Te to 0 will disable this action.

④ Threshold of tag-exist-time (T4H: bit7~bit4 of T4) and tag-mute-time (T4L: bit3~bit0 of T4).
The tag-exist-time T4H*1s (0<T4H<=15, default value 5) defines the time interval threshold between the tag detected by the device and correlated with a personnel passing action. When the tag's exist-time is over this limit, the controller will deliver a tag-exist-time-overflow message.
The tag-mute-time T4L*500ms (0<T4L<=15, default value 2) defines the mute time for one tag's multiple detections. When a tag have been detected and been correlated with a passing action by the device, the controller will neglect the same tag when it is detected in the next T4L time.

⑤ Threshold of infrared-block-time (T5*1s, 3<=T5<=255, default value 3). If any of the infrared sensors is blocked for over T5 time, the controller will deliver a infrared-block-time-overflow message.

⑥ set green LED prompt and background log data recording. Bit7 and bit0 is available and other bits are reserved.
bit0=0 (default): Stop recording when background log data memory is full.
bit0=1: Overlapping the oldest record when background log data memory is full.
bit7=0: deactivate green LED prompt.
bit7=1 (default): activate green LED prompt.

Green LED prompt means:
In Channel Mode, the green LED will flash when a person passed with a tag (infrared sensors on) or a tag be detected (infrared sensors off).
In EAS Mode, the green LED will flash when a person passed (infrared sensors on).

Host←Controller

Len	Con_adr	Status*	Data[]	CRC-16	
0x05	0xXX	0x00	—	LSB	MSB

** The status's most significant 2bits indicate the capacity of free space in background log data record memory.*

7.1.9 'R' command

The host used this command to retrieve the controllers' parameters set by command 'F'.

Host→Controller

Len	Con_adr	Cmd	Data[]	CRC-16	
			—		
0x05	0xXX	0x52		LSB	MSB

Host←Controller

Len	Con_adr	Cmd	Data[]						CRC-16	
			Reader Inventory ScanTime	Reader standby time	Statistic Interval	Threshold of tag exist time and mute time	Threshold of infrared block time	Green LED prompt and background log data setting		
0x0B	0xXX	0x46	1byte T1①	1byte T2②	1byte T3③	1byte T4④	1byte T5⑤	1byte ⑥	LSB	MSB

** The status's most significant 2bits indicate the capacity of free space in background log data record memory.*

①②③④⑤⑥ refer to command 'F'.

7.1.10 'X' command (Channel Mode only)

The host uses this command to read out data content of a designated tag.

Host→Controller

Len	Con_adr	Cmd	Data[]				CRC-16	
			Tag UID	Start Block number	Quantity of blocks to read	Block unit		
0x10	0xXX	0x58	8bytes①	1bytes②	1byte③	1byte④	LSB	MSB

① Designated tag's UID with LSB first.

② The first block number to be read.

③ The quantity of blocks to read. When the block unit is 4 bytes, the quantity should be less than 16. When the block unit is 8 bytes, the quantity should be less than 8.

④ Block unit. It should be 4 bytes or 8 bytes per block.

Some tags do not support ReadMultipleBlock and only support ReadSingleBlock (refer to ISO15693 protocol). For these tags, the controller only support 4 bytes block unit.

Host←Controller

Len	Con_adr	Status*	Data[]	CRC-16	
0x05 ＋ Tag's data length	0xXX	0x00	①	LSB	MSB

** The status's most significant 2bits indicate the capacity of free space in background log data record memory.*

① Tag's data length is determined by the quantity of blocks to read and the block unit. The data content of each block is prefixed with 1 byte block security status. The data of least significant block is transferred first.

7.1.11 'I' command

Host→Controller

Len	Con_adr	Cmd	Data[]	CRC-16	
			Switch		
0x06	0xXX	0x49	1byte①	LSB	MSB

① Switch=1: close infrared sensors. The controller will close motion direction detect.
Switch=2: open infrared sensors. This is the default status.
Switch=3: inquire infrared sensors status.
Other values are reserved.

Host←Controller

Len	Con_adr	Status*	Data[]	CRC-16	
0x06	0xXX	0x00	1byte①	LSB	MSB

** The status's most significant 2bits indicate the capacity of free space in background log data record memory.*

①"N"(0x4E): infrared sensors are on.
"F"(0x46): infrared sensors are off.

7.1.12 'G' command

The host uses this command to get controller's information.

Host→Controller

Len	Con_adr	Cmd	Data[]	CRC-16	
0x05	0xXX	0x47	—	LSB	MSB

Host←Controller

Len	Con_adr	Status*	Data[]			CRC-16	
			Production Code	Main version	Second version		
0x08	0xXX	0x00	1byte	1byte	1byte	LSB	MSB

** The status's most significant 2bits indicate the capacity of free space in background log data record memory.*

7.1.13 'H' command

The host uses this command to get controller's detailed information. This command is available for controller with firmware version over V6.0.

Host→Controller

Len	Con_adr	Cmd	Data[]	CRC-16	
0x05	0xXX	0x48	—	LSB	MSB

Host←Controller

Len	Con_adr	Status*	Data[]				CRC-16	
			Production Code	Main Version	Second Version	Serial Number		
0x0C	0xXX	0x00	1byte	1byte	1byte	4bytes①	LSB	MSB

** The status's most significant 2bits indicate the capacity of free space in background log data record memory.*

① LSB first.

7.1.14 'w' command

The host uses this command to set the action mode of buzzer, LED and relay when alarming. The action mode can be customized to different alarm source. The controller defines 5 alarming source that are person-passing-without-tag, person-reversely-passing, person-uncertain-direction-passing, infrared-interference-warning and EAS alarm.

Host→Controller

Len	Con_adr	Cmd	Data[]	CRC-16	
			Alarm action mode		
0x32	0xXX	0x77	45bytes①	LSB	MSB

① Alarm action mode comprises 45 bytes. Each 9 bytes is a group. 5 groups define action mode for 5 alarming source.

Person-passing-without-tag	Byte 0	Buzzer beeping duration in one cycle. Unit 100ms. Default value 1.
	Byte 1	Buzzer mute duration in one cycle. Unit 100ms. Default value 1.
	Byte 2	Repeating times. Default value 2.
	Byte 3	Red LED light on duration in one cycle. Unit 100ms. Default value 1.
	Byte 4	Red LED light off duration in one cycle. Unit 100ms. Default value 1.
	Byte 5	Red LED flash times. Default value 2.
	Byte 6	Relay pick-up duration in one cycle. Unit 100ms. Default value 0.
	Byte 7	Relay dropout duration in one cycle. Unit 100ms. Default value 0.
	Byte 8	Repeating times. Default value 1.

Person-reversely-passing	Byte 9	Buzzer beeping duration in one cycle. Unit 100ms. Default value 1.
	Byte 10	Buzzer mute duration in one cycle. Unit 100ms. Default value 1.
	Byte 11	Repeating times. Default value 2.
	Byte 12	Red LED light on duration in one cycle. Unit 100ms. Default value 1.
	Byte 13	Red LED light off duration in one cycle. Unit 100ms. Default value 1.
	Byte 14	Red LED flash times. Default value 2.
	Byte 15	Relay pick-up duration in one cycle. Unit 100ms. Default value 0.
	Byte 16	Relay dropout duration in one cycle. Unit 100ms. Default value 0.
	Byte 17	Repeating times. Default value 1.
Person-uncertain-direction-passing	Byte 18	Buzzer beeping duration in one cycle. Unit 100ms. Default value 1.
	Byte 19	Buzzer mute duration in one cycle. Unit 100ms. Default value 1.
	Byte 20	Repeating times. Default value 2.
	Byte 21	Red LED light on duration in one cycle. Unit 100ms. Default value 1.
	Byte 22	Red LED light off duration in one cycle. Unit 100ms. Default value 1.
	Byte 23	Red LED flash times. Default value 2.
	Byte 24	Relay pick-up duration in one cycle. Unit 100ms. Default value 0.
	Byte 25	Relay dropout duration in one cycle. Unit 100ms. Default value 0.
	Byte 26	Repeating times. Default value 1.
Infrared-interference-warning	Byte 27	Buzzer beeping duration in one cycle. Unit 100ms. Default value 1.
	Byte 28	Buzzer mute duration in one cycle. Unit 100ms. Default value 1.
	Byte 29	Repeating times. Default value 2.
	Byte 30	Red LED light on duration in one cycle. Unit 100ms. Default value 1.
	Byte 31	Red LED light off duration in one cycle. Unit 100ms. Default value 1.
	Byte 32	Red LED flash times. Default value 2.
	Byte 33	Relay pick-up duration in one cycle. Unit 100ms. Default value 0.

	Byte 34	Relay dropout duration in one cycle. Unit 100ms. Default value 0.
	Byte 35	Repeating times. Default value 1.
EAS alarm	Byte 36	Buzzer beeping duration in one cycle. Unit 100ms. Default value 1.
	Byte 37	Buzzer mute duration in one cycle. Unit 100ms. Default value 1.
	Byte 38	Repeating times. Default value 2.
	Byte 39	Red LED light on duration in one cycle. Unit 100ms. Default value 1.
	Byte 40	Red LED light off duration in one cycle. Unit 100ms. Default value 1.
	Byte 41	Red LED flash times. Default value 2.
	Byte 42	Relay pick-up duration in one cycle. Unit 100ms. Default value 0.
	Byte 43	Relay dropout duration in one cycle. Unit 100ms. Default value 0.
	Byte 44	Repeating times. Default value 1.

Green LED does not belong to alarm parts and refer to command 'F' for green LED's configuration.

After executing 'M' command, the controller will reset and the alarm action mode will be set to their default value or to auto-loaded value (refer to command 'f' and 'r').

Host←Controller

Len	Con_adr	Status*	Data[]	CRC-16	
0x05	0xXX	0x00	—	LSB	MSB

** The status's most significant 2bits indicate the capacity of free space in background log data record memory.*

7.1.15 'U' command

The host uses this command to enable/disable 5 alarming source individually. The controller defines 5 alarming source that are person-passing-without-tag, person-reversely-passing, person-uncertain-direction-passing, infrared-interference-warning and EAS alarm.

Host→Controller

Len	Con_adr	Cmd	Data[]	CRC-16	
0x06	0xXX	0x55	1byte①	LSB	MSB

① Bit0~bit4 correspond to enable/disable bits for person-passing-without-tag, person-reversely-passing, person-uncertain-direction-passing, infrared-interference-warning and EAS alarm. When a bit is cleared to 0, the corresponding alarm source is disabled. When a bit is set to 1, the corresponding alarm source is enabled.

Bit5~bit6 reserved.

Bit7 is command flag. When bit7 is set to 1, the controller will enable/disable the alarming source according to bit0~bit4's value. When bit7 is cleared to 0, the controller will feedback the current alarming enable/disable setting to the host and the bit0~bit4's value is neglected.

Host←Controller

Len	Con_adr	Status*	Data[]		CRC-16	
0x33	0xXX	0x00	1byte①	45bytes②	LSB	MSB

** The status's most significant 2bits indicate the capacity of free space in background log data record memory.*

① bit0~bit4 correspond to enable/disable bits for person-passing-without-tag, person-reversely-passing, person-uncertain-direction-passing, infrared-interference-warning and EAS alarm. When a bit is cleared to 0, the corresponding alarm source is disabled. When a bit is set to 1, the corresponding alarm source is enabled. bBit5 ~ bit7 are reserved.

② 45 bytes alarm action mode data. Each 9 bytes is a group. 5 groups define action mode for 5 alarming source.

Person-passing-without-tag	Byte 0	Buzzer beeping duration in one cycle. Unit 100ms. Default value 1.
	Byte 1	Buzzer mute duration in one cycle. Unit 100ms. Default value 1.
	Byte 2	Repeating times. Default value 2.
	Byte 3	Red LED light on duration in one cycle. Unit 100ms. Default value 1.
	Byte 4	Red LED light off duration in one cycle. Unit 100ms. Default value 1.
	Byte 5	Red LED flash times. Default value 2.
	Byte 6	Relay pick-up duration in one cycle. Unit 100ms. Default value 0.
	Byte 7	Relay dropout duration in one cycle. Unit 100ms. Default value 0.
	Byte 8	Repeating times. Default value 1.
Person-reversely-passing	Byte 9	Buzzer beeping duration in one cycle. Unit 100ms. Default value 1.
	Byte 10	Buzzer mute duration in one cycle. Unit 100ms. Default value 1.
	Byte 11	Repeating times. Default value 2.
	Byte 12	Red LED light on duration in one cycle. Unit 100ms. Default value 1.
	Byte 13	Red LED light off duration in one cycle. Unit 100ms. Default value 1.
	Byte 14	Red LED flash times. Default value 2.
	Byte 15	Relay pick-up duration in one cycle. Unit 100ms. Default value 0.

	Byte 16	Relay dropout duration in one cycle. Unit 100ms. Default value 0.
	Byte 17	Repeating times. Default value 1.
Person-uncertain-direction-passing	Byte 18	Buzzer beeping duration in one cycle. Unit 100ms. Default value 1.
	Byte 19	Buzzer mute duration in one cycle. Unit 100ms. Default value 1.
	Byte 20	Repeating times. Default value 2.
	Byte 21	Red LED light on duration in one cycle. Unit 100ms. Default value 1.
	Byte 22	Red LED light off duration in one cycle. Unit 100ms. Default value 1.
	Byte 23	Red LED flash times. Default value 2.
	Byte 24	Relay pick-up duration in one cycle. Unit 100ms. Default value 0.
	Byte 25	Relay dropout duration in one cycle. Unit 100ms. Default value 0.
	Byte 26	Repeating times. Default value 1.
Infrared-interference-warning	Byte 27	Buzzer beeping duration in one cycle. Unit 100ms. Default value 1.
	Byte 28	Buzzer mute duration in one cycle. Unit 100ms. Default value 1.
	Byte 29	Repeating times. Default value 2.
	Byte 30	Red LED light on duration in one cycle. Unit 100ms. Default value 1.
	Byte 31	Red LED light off duration in one cycle. Unit 100ms. Default value 1.
	Byte 32	Red LED flash times. Default value 2.
	Byte 33	Relay pick-up duration in one cycle. Unit 100ms. Default value 0.
	Byte 34	Relay dropout duration in one cycle. Unit 100ms. Default value 0.
	Byte 35	Repeating times. Default value 1.
EAS alarm	Byte 36	Buzzer beeping duration in one cycle. Unit 100ms. Default value 1.
	Byte 37	Buzzer mute duration in one cycle. Unit 100ms. Default value 1.
	Byte 38	Repeating times. Default value 2.
	Byte 39	Red LED light on duration in one cycle. Unit 100ms. Default value 1.
	Byte 40	Red LED light off duration in one cycle. Unit 100ms. Default value 1.
	Byte 41	Red LED flash times. Default value 2.

	Byte 42	Relay pick-up duration in one cycle. Unit 100ms. Default value 0.
	Byte 43	Relay dropout duration in one cycle. Unit 100ms. Default value 0.
	Byte 44	Repeating times. Default value 1.

7.1.16 'Q' command (Channel Mode only)

The host uses this command to query the status of the background log data.

Host→Controller

Len	Con_adr	Cmd	Data[]	CRC-16	
0x05	0xXX	0x51	—	LSB	MSB

Host←Controller

Len	Con_adr	Status*	Data[]			CRC-16	
0x13	0xXX	0x00	Record number	Earliest record time	Latest record time	LSB	MSB
			2bytes①	6bytes②	6bytes③		

** The status's most significant 2bits indicate the capacity of free space in background log data record memory.*

① 2 bytes length total number of background log data records with maximum value 65535 (MSB first).
The sequence number of each record can be used as index number in command 'S'.
② time stamp for the earliest log data record with 6bytes for year-month-day-hour-minute-second in 24hour format. If the record is corrupted, all the 6 bytes will be 0xFF.
③ time stamp for the latest log data record with 6bytes for year-month-day-hour-minute-second in 24hour format. If the record is corrupted, all the 6 bytes will be 0xFF.

7.1.17 'E' command (Channel Mode only)

The host uses this command to extract the earliest record in the background log data.

Host→Controller

Len	Con_adr	Cmd	Data[]	CRC-16	
0x05	0xXX	0x45	—	LSB	MSB

Host←Controller

If the record exists and is not corrupted, the feedback is the same as the routine response and auxiliary response of command 'C' except that the background log data do not save statistic messages. Please refer to command 'C' for details.

If the record does not exists or is corrupted, the feedback is:

Len	Con_adr	Status*	Data[]	CRC-16	
0x05	0xXX	0x05	—	LSB	MSB

** The status's most significant 2bits indicate the capacity of free space in background log data record memory.*

7.1.18 'S' command (Channel Mode only)

The host uses this command to extract a record in the background log data by its sequence number (index number).

Host→Controller

Len	Con_adr	Cmd	Data[]	CRC-16	
			Record index number		
0x07	0xXX	0x53	2bytes①	LSB	MSB

① 2bytes index number with MSB first.

Host←Controller

If the record exists and is not corrupted, the feedback is the same as the routine response and auxiliary response of command 'C' except that the background log data do not save statistic messages. Please refer to command 'C' for details.

If the record index number exceeds the total record number which can be got by command 'Q', the feedback is:

Len	Con_adr	Status*	Data[]	CRC-16	
0x05	0xXX	0x07	—	LSB	MSB

** The status's most significant 2bits indicate the capacity of free space in background log data record memory.*

If the record is corrupted, the feedback is:

Len	Con_adr	Status*	Data[]	CRC-16	
0x05	0xXX	0x05	—	LSB	MSB

** The status's most significant 2bits indicate the capacity of free space in background log data record memory.*

7.1.19 'T' command

The host uses this command to delete all background log data. The deletion is unrecoverable.

Host→Controller

Len	Con_adr	Cmd	Data[]	CRC-16	
0x05	0xXX	0x54	—	LSB	MSB

Host←Controller

Len	Con_adr	Status*	Data[]	CRC-16	
0x05	0xXX	0x00	—	LSB	MSB

** The status's most significant 2bits indicate the capacity of free space in background log data record memory.*

7.1.20 'Z' command

The host uses this command to check whether the reader is correctly connected with the controller and the RF field of the reader is on.

Host→Controller

Len	Con_adr	Cmd	Data[]	CRC-16	
0x05	0xXX	0x5A	—	LSB	MSB

Host←Controller

Len	Con_adr	Status*	Data[]	CRC-16	
0x06	0xXX	0x00	1byte①	LSB	MSB

** The status's most significant 2bits indicate the capacity of free space in background log data record memory.*

① bit7 indicates the connection status of the controller and the reader. If bit7 is set to 1, the connection is normal. If bit7 is cleared to 0, the connection is broken and the controller is trying to reconnect with the reader.

bit1~bit0 indicate the RF field of the reader. 00 for RF off and 01 for RF on.

Other bits are reserved.

Please notice that if the connection of the controller and the reader is broken, the feedback of this command may be delayed. The maximum feedback delay will be the reader's InventoryScanTime plus 100ms.

7.1.21 'P' command

The host uses this command to enable the controller's tag and person smart correlation algorithm and set threshold parameters of the algorithm.

The algorithm uses Effective Time Zone (ETZ) to handle the tag-person correlation and be able to identify "one person carrying multiple tag", "one person with tag followed by person without tag" and other complex situation.

The ETZ is the time labeled by the first infrared sensor being triggered when one person passing the channel. It comprises two sectors, Leading Time Zone (LDTZ) and Lagging Time Zone (LGTZ).

The LDTZ is the time before the first infrared sensor being triggered. The leading time parameter defines its duration. All tags sensed in LDTZ will be assigned to the person passing the channel. The leading time parameter can be neglected and in this case all tags sensed before the first infrared sensor being triggered will be assigned to the person passing the channel.

The LGTZ is the time after the first infrared sensor being triggered. The lagging time parameter defines its duration. All tags sensed in LDTZ will be assigned to the person passing the channel.

The leading time parameter and lagging time parameter depend heavily on the actual application situation. The speed and the density of people passing are the main factor in these parameters setting. In most cases, the 1s for leading time parameter and 100ms for lagging time parameter are good choice.

Host→Controller

Len	Con_adr	Cmd	Data[]			CRC-16	
0x08	0xXX	0x50	Flag	Leading time	Lagging time	LSB	MSB
			1byte①	1byte②	1byte③		

①Flag byte defined as following:

Bit7: operation flag. 0 to get current setting and 1 to set parameters using provided value.
Bit6: reserved.
Bit5: parameter choice flag. 0 to set parameters using their default value and 1 to set parameters using provided value. The flag bit is cleared to 0 when the controller powered on.
Bit4: reserved.
Bit3: enable/disable tag-person smart correlation algorithm flag. 0 disables the algorithm and 1 enables the algorithm. The flag bit is cleared to 0 when the controller powered on.
Bit2: reserved.
Bit1: one-person-one-tag flag. When the flag bit is set to 1, only one tag in the ETZ will be assigned to the person passing the channel and other tags will be handled as tag-exist-time-overflow. The flag bit is cleared to 0 when the controller powered on.
Bit0: leading time parameter flag. When the flag bit is cleared to 0, the leading time parameter will be neglected. The flag bit is cleared to 0 when the controller powered on.

The bit1 and bit0's function will only be available when bit3 is set to 1.

② Leading time parameter with unit 50ms. The value should be less then 100. Default value is 20. If the value is over 100, the controller will force this parameter to its default value 20.

③ Lagging time parameter with unit 1ms. Default value is 100.

Host←Controller

Len	Con_adr	Status*	Data[]			CRC-16	
0x08	0xXX	0x00	Flag	Leading time	Lagging time	LSB	MSB
			1byte①	1byte②	1byte③		

** The status's most significant 2bits indicate the capacity of free space in background log data record memory.*

① the current using flag setting.
② the current using leading time parameter.
③ the current using lagging time parameter.

7.1.22 'J' command (Channel Mode only)

The host uses this command to define if reading out the tag's data content along with its UID. The data content is organized in block unit. There are 4 bytes per block prefixed with 1 byte block security status.

Host→Controller

Len	Con_adr	Cmd	Data[]				CRC-16	
0x09	0xXX	0x4A	Operation flag	Trying times	Start block address	Block number	LSB	MSB
			1byte①	1byte②	1byte③	1byte④		

① Operation flag byte.
bit0=0(default): no data content. UID only.
bit0=1: reading data content along with UID.
bit1=0: try reading data content operation only once
bit1=1: try reading data content operation as much as given times value if one operation failed.
bit7=0: get current command 'J' parameters.
bit7=1: set command 'J' parameters as given values.
Other bits are reserved.

② Reading data content operation trying times definition byte. It defines when one operation of reading data content failed, the maximum retrying times the controller can do. Its minimum value is 1 and maximum value is 5. If given value is greater than 5, the controller will set it to 2.

③ Start block address of the data to be read out. Command 'J' only supports 4 bytes block unit.

④ Block numbers. The value should be greater than 0 and less than 6. Out range value will be

rejected.

The command can only be carried out when the controller in idle status.

Host←Controller

Len	Con_adr	Status*	Data[]				CRC-16	
0x09	0xXX	0x4A	Operation flag	Trying times	Start block address	Block number		
			1byte①	1byte	1byte	1byte	LSB	MSB

** The status's most significant 2bits indicate the capacity of free space in background log data record memory.*

① Current operation flag value:
bit0=0: no data content. UID only.
bit0=1: reading data content along with UID.
bit1=0: try reading data content operation only once
bit1=1: try reading data content operation as much as given times value if one operation failed.
Other bits are reserved.

7.1.23 'K' command

The host uses this command to set or get the controller's address.

Host→Controller

Len	Con_adr	Cmd	Data[]		CRC-16	
0x07	0xXX	0x4B	1byte①	1byte②	LSB	MSB

① Flag byte. Value 0 means to get the controller's current address. Value 1 means to set the controller's address as the given parameter. Other value will be treated as 0.

② New controller address parameter. Range is 0~254.

Host←Controller

Len	Con_adr	Status*	Data[]	CRC-16	
0x05	0xXX	0x00	—	LSB	MSB

** The status's most significant 2bits indicate the capacity of free space in background log data record memory.*

If command 'K' is executed successfully, the controller will reply using new address. Otherwise the controller still uses its old address.

7.1.24 'N' command

The host uses this command to query or set the infrared sensor sensing sequences. The controller has 4 infrared sensors for motion detection. The sequence direction of the sensors determines the forward passing and reversely passing arbitration. The host can alter passing direction arbitration by this command.

Host→Controller

Len	Con_adr	Cmd	Data[]	CRC-16	
0x06	0xXX	0x4E	1byte①	LSB	MSB

① Operation flag:
bit0 = 0: normal infrared sensor sequence.
bit0 = 1: reversed infrared sensor sequence.
bit7 = 0: query operation. Bit0 value should be neglected.
bit7 = 1: set operation. The infrared sensor sequence will be set as bit0 defined.
Other bits are reserved.

Host←Controller

For successful set operation, the feedback is:

Len	Con_adr	Status*	Data[]	CRC-16	
0x05	0xXX	0x00	—	LSB	MSB

** The status's most significant 2bits indicate the capacity of free space in background log data record memory.*

For successful query operation, the feedback is:

Len	Con_adr	Status*	Data[]	CRC-16	
0x06	0xXX	0x00	1byte①	LSB	MSB

** The status's most significant 2bits indicate the capacity of free space in background log data record memory.*

① bit0=0: normal infrared sensor sequence.
bit0=1: reversed infrared sensor sequence.
Other bits are reserved.

7.1.25 'V' command

The host uses this command to query or set the alarm of controller-reader connection. If alarm enabled, the buzzer will keep beeping and the green LED flashing when the connection broken. The connection alarm is disabled when the controller powered on.

Host→Controller

Len	Con_adr	Cmd	Data[]	CRC-16	
0x06	0xXX	0x56	1byte①	LSB	MSB

① Operation flag byte.

bit0 = 0: no alarm when the connection broken.

bit0 = 1: alarm when the connection broken.

bit7 = 0: query current connection alarm setting. In this case, the bit0's value will be neglected.

bit7 = 1: enable/disable connection alarm according to bit0's value.

Host←Controller

Len	Con_adr	Status*	Data[]	CRC-16	
0x06	0xXX	0x00	1byte①	LSB	MSB

** The status's most significant 2bits indicate the capacity of free space in background log data record memory.*

①bit0 = 0: no alarm when the connection broken.

bit0 = 1: alarm when the connection broken.

Other bits are reserved.

7.1.26 'L' command (EAS Mode only)

The host uses 'L' command to get person-passing message, EAS alarm message and other statistical or alarm messages.

Host→Controller

Len	Con_adr	Cmd	Data[]	CRC-16	
0x05	0xXX	0x4C	—	LSB	MSB

The responses of 'L' command can be classified into two types. One is routine response that is the message about person-passing and EAS information. The other is auxiliary responses of statistic, internal status and control or alarm messages.

（1） Routine Response（Host←Controller）

Len	Con_adr	Status*	Data[]		CRC-16	
0x0C	0xXX	0x00	1byte①	6bytes②	LSB	MSB

** The status's most significant 2bits indicate the capacity of free space in background log data record memory.*

①Flag byte.

0: No person. No EAS.

1: Person-forward-passing,

2. Person-reversely-passing.

3. Person-uncertain-direction-passing.

4. EAS alarming and infrared sensors are active.

5. EAS alarming and infrared sensors are closed.

Other values are reserved.

②6bytes time stamp for year-month-day-hour-minute-second in 24hour format.

（2） Auxiliary Response（Host←Controller）

Statistic Message: when the device has been idle (no tag, no infrared sensor detection triggered, no unprocessed message) for a preset time (configurable), the controller will deliver the statistic message about the quantity of personnel passed.

Len	Con_adr	Status*	Data[]				CRC-16	
			forward passing	Reverse passing	uncertain direction passing	Time		
0x13	0xXX	0x20	2bytes①	2bytes②	2bytes③	6bytes④	LSB	MSB

** The status's most significant 2bits indicate the capacity of free space in background log data record memory.*

①forward passing personnel number with LSB first.
②reversely passing personnel number with LSB first.
③uncertain direction passing personnel number with LSB first.
④6bytes time stamp for year-month-day-hour-minute-second in 24hour format.

Infrared-block-time-overflow Message: when one or more of the infrared sensors have been kept blocked for a preset time (configurable), the controller will deliver this message.

Len	Con_adr	Status*	Data[]	CRC-16	
			Time		
0x0B	0xXX	0x21	6bytes①	LSB	MSB

** The status's most significant 2bits indicate the capacity of free space in background log data record memory.*

①6bytes time stamp for year-month-day-hour-minute-second in 24hour format.

Infrared-interference-warning Message: when the two outside infrared sensors have been triggered and the controller finds out it not a valid personnel passing motion, the controller will deliver this message.

Len	Con_adr	Status*	Data[]	CRC-16	
			Time		
0x0B	0xXX	0x22	6bytes①	LSB	MSB

** The status's most significant 2bits indicate the capacity of free space in background log data record memory.*

①6bytes time stamp for year-month-day-hour-minute-second in 24hour format.

7.1.27 'a' (Channel Mode only)

The host uses this command to start or stop background log data recording. Stopping log data

recording could fasten tag processing speed to cope with large quantity tag situation. The stop of log data recording could only be available when the infrared sensors are closed. If the infrared sensors are active, the controller will start background log data recording automatically.

Host→Controller

Len	Con_adr	Cmd	Data[]	CRC-16	
0x06	0xXX	0x61	1byte①	LSB	MSB

①Bit0 = 0: stop background log data recording.
Bit0 = 1: start background log data recording.
Other bits are reserved.

Host←Controller

Len	Con_adr	Status*	Data[]	CRC-16	
0x05	0xXX	0x00	—	LSB	MSB

** The status's most significant 2bits indicate the capacity of free space in background log data record memory.*

7.1.28 'b' command (Channel Mode only)

The host uses this command to query current background log data recording status.

Host→Controller

Len	Con_adr	Cmd	Data[]	CRC-16	
0x05	0xXX	0x62	—	LSB	MSB

Host←Controller

Len	Con_adr	Status*	Data[]	CRC-16	
0x06	0xXX	0x00	1byte①	LSB	MSB

** The status's most significant 2bits indicate the capacity of free space in background log data record memory.*

①Bit0 = 0: background log data recording stopped.
Bit0 = 1: background log data recording started..
Other bits are reserved.

7.1.29 'f' command

The host uses this command to save or restore the controller current using configuration data.

Host→Controller

Len	Con_adr	Cmd	Data[]	CRC-16	
0x06	0xXX	0x66	1byte①	LSB	MSB

①Bit0 = 0: restore controller configuration data from background backup.
Bit0 = 1: save controller current configuration data to background backup.
Other bits are reserved.

The controller's configuration data include the parameters set by command 'M', 'F', 'w', 'P', 'J', 'N', 'I', 'U', 'V', 'a', 'K'.

Host←Controller

Len	Con_adr	Status*	Data[]	CRC-16	
0x05	0xXX	0x00	—	LSB	MSB

** The status's most significant 2bits indicate the capacity of free space in background log data record memory.*

7.1.30 'r' command

The host uses this command to set if the controller should load its configuration data from background backup when it is powered up, resetted or after mode switch. The loading configuration data will override the default value. If the background backup configuration data are corrupted, the loading procedure will abort and the controller will still use its default configuration data value. The controller's configuration data include the parameters set by by command 'M', 'F', 'w', 'P', 'J', 'N', 'I', 'U', 'V', 'a', 'K'.

Host→Controller

Len	Con_adr	Cmd	Data[]	CRC-16	
0x06	0xXX	0x72	1byte①	LSB	MSB

①Bit0 = 0(default): disable background backup configuration data auto-loading.
Bit0 = 1: enable background backup configuration data auto-loading.
Other bits are reserved.

Host←Controller

Len	Con_adr	Status*	Data[]	CRC-16	
0x05	0xXX	0x00	—	LSB	MSB

** The status's most significant 2bits indicate the capacity of free space in background log data record memory.*

7.2 IF2 Command

IF2 is only effective in Channel Mode.

IF2 supports no host command. It is used as an auxiliary port that sends out the tag's UID as soon as the system detects it. The format of IF2's message is as follows:

Host←Controller

Len	Con_adr	Status	Data[]			CRC-16	
			Tag UID	Reserved	Time		
					Y-M-D-H-M-S		
0x14	0xXX	0x00	8bytes UID①	1byte②	6bytes③	LSB	MSB

① UID with LSB sent first.

② 1byte reserved with default value 0.

③ 6bytes time stamp for year-month-day-hour-minute-second in 24hour format.

8 TROUBLESHOOTING

A. The transmitter and receiver of the four infrared sensors in the device should be aimed for normal operation. When powered up, the controller will check the infrared sensors status. If they are not correctly aimed, the LED will continually flash in red. When the infrared sensors are correctly aimed, the controller will pass self-test and beep once to indicate the system in operation.

B. If reader-connection-alarm is active, when the connection between the controller and the reader is broken, the controller will turn alarm beep on while the LED flash in green. The system will return to normal operation when the connection is re-established.