INST. No. INE-406-0P1

CHINO

# IR-AH Series

# IR-AH Communications (Options)

(IR-AHT, IR-AHS, IR-AHU)

# INSTRUCTIONS

Always keep this instruction with your unit.

Please be sure to deliver this instruction manual with the unit to a final user.

CHINO

# CONTENTS

Page

1. General ····· 1
2. Communications specifications ····· 1
3. Communications procedures ····· 2
   3.1 Basic communications format ····· 2
      1) Commands ····· 2
      2) Positive answer ····· 2
      3) Negative answer ····· 2
   3.2 Data expression ····· 3
   3.3 Numeric data ····· 3
   3.4 Control code ····· 3
4. Details of format ····· 4
   4.1 PV command ····· 4
      4.1.1 Measured data ····· 4
   4.2 SV command ····· 5
      4.2.1 Alarm setpoint values ····· 5
      4.2.2 Emissivity ····· 5
      4.2.3 Signal modulation mode ····· 5
      4.2.4 Modulation ratio ····· 6
      4.2.5 Measurement unit ····· 6
   4.3 XX command ····· 7
      4.3.1 Model number ····· 7
      4.3.2 ROM version ····· 7
      4.3.3 Number of storage data ····· 7
      4.3.4 Stored temperature data ····· 8
5. Error codes ····· 9

## ■Symbols in this instruction manual

The symbols shown below are used depending on important degrees for using the communications safely and avoiding unexpected situations.

| Important degree | Symbols | Contents |
|---|---|---|
| 1 | Caution | For avoiding injury or in physical damage to the communications. |
| 2 | Remarks | Information that we suggest to read carefully. |
| 3 | Reference | Information that you can use as a reference. |

# 1. General

This optional communications is for reading measured data, parameters, and storage data of IR-AH series handheld radiation thermometers by a personal computer.
By this communications, parameters cannot be programmed to your thermometer by a personal computer.

**Caution** During measurement, any answer to the data being received is not executed due to the speed of the CPU.

# 2. Communications specifications

| | |
|---|---|
| ■ Start-stop synchronizing system | RS-232C |
| ■ Half-duplex communications system | |
| ■ Transmission speed | 9600bps |
| ■ Start bit | 1 bit |
| ■ Data length | 7 bits |
| ■ Parity bit | Even |
| ■ Stop bit | 1 bit |
| ■ Character code | ASCII |
| ■ BCC (Block check code) | None |
| ■ Data transmission procedure | None |

**Caution** This communications is only for "Reading" and "Answer".

# *3. Communications procedures*

## 3.1 Basic communications format

### 1) Commands

| STX | Command | Sub-command | Data | ETX (ETB) | CR | LF |
|---|---|---|---|---|---|---|

Command (1 character)

□

R: Reading
A: Answer

Sub-command

□ □ | □ □

Type (2 characters) | Data No. (2 characters)

Type: PV…Measured data
SV…Parameter
XX…Others

Data: 0 to 99

**Reference**

"ETX" is added when the data is one, or added to the last data when plural data are answered to 1 command.
"ETB" is added to data before the last data when plural data are answered to 1 command.

**Caution**

Make sure not to use "BCC code" due to the specifications of CPU and capacities of ROM/RAM.

### 2) Positive answer

| STX | A | Sub-command | = | Data | ETX (ETB) | CR | LF |
|---|---|---|---|---|---|---|---|

**Reference**

A sub-command in the "Reading" command returns as the sub-command in the answer.
This format is applied to the data positively transmitted from your thermometer, too.

### 3) Negative answer

| STX | A | Error code | : | Error data No. | ETX | CR | LF |
|---|---|---|---|---|---|---|---|

**Reference**

Error data No.: First data position (the position counted from the position next to "STX") where an error was detected

# *3. Communication procedures*

## 3.2 Data expression

Data is expressed by the format with fixed length of character between " = ", ",**,**" and "ETX (ETB)".

## 3.3 Numeric data

Data is characters with fixed length and right justified. (except Para. [4.3.1 Reading model number] with left justified)
Numeric figures exist before and after a decimal point.
The following list is for treatment of positive sign, negative sign, and “0” at receiving and transmitting.

| Item | Condition | Contents |
|---|---|---|
| Sign | At receiving | Positive sign: “ + ” or “space (△ )” is acceptable. Negative sign: “ – ”. “ + ” or “ – ” is placed just left to a numeric figure. |
| | At transmitting | Positive sign “ + ” is expressed by “space ( △)” Negative sign “ – ” is placed just left to a numeric figure. |
| “0” at higher digits | At receiving | “0” (zero): “0” or “space ( △) ” is acceptable. |
| | At transmitting | “0” (zero): Zero-suppressed |
| Data length | At receiving | Variable length When no data exists, a positive answer returns assuming that no setting is changed. |
| | At transmitting | Fixed length Refer to [4. Communications format]. |

**Caution**

The following data are not acceptable as numeric figures.
"12△3", "-△234", "-.123", "123△", "123. " etc.
("△ " mark means a space.)

## 3.4 Control code

| ASCII commands | ASCII codes |
|---|---|
| STX | 02h |
| ETX | 03h |
| ETB | 17h |
| LF | 0Ah |
| CR | 0Dh |

# *4. Details of format*

This followings are the descriptions of the "Command", "Sub-command" and "Data".

Reference

Add control codes when following commands are used for communications items (Refer to [3.1 Basic communications format].)
For numeric data, refer to [3.3 Numeric data].

## 4.1 PV command

### 4.1.1 Measured data (1st data: 1 byte, 2nd data: 4 bytes, 3rd data: 5 bytes, 4th data: 5 bytes)

Caution

PV command is not for reading. Data is transmitted from your thermometer positively.

Reference

In the standard measurement of your thermometer, PV command is transmitted at the releasing Meas key.
In the continuous measurement, PV command is transmitted at every display renewals.

APV01=□, □□□□, □□□□□, □□□□□

◆ **1st data: Data status**

0: Normal
1: Overflow
2: Underflow
3: Hardware abnormal

◆ **2nd data: Emissivity**

Integer: 1 digit, Decimal point: 1 digit, Decimal: 2 digits
Range : 0.01 to 1.99

◆ **3rd data : Temperature data**

For less than 300ºC or 300ºF :
Integer : 3 digits, Decimal point: 1 digit, Decimal : 1 digit

Reference

If the integral includes a sign, it becomes 2 digits.

For 300ºC or 300ºF or more : Integer: 4 digits

Reference

A space is inserted in the most significant digit.
When the data status is "1" or "2", "99999" is inserted.

◆ **4th data : Not using**

Caution

This is a dummy data.
"99999" is inserted as the dummy data.

# *4. Details of format*

## 4.2 SV command

### 4.2.1 Alarm setpoint values (1st data: 5 bytes, 2nd data: 5 bytes)

Reading

RSV02

ASV02=□□□□□, □□□□□

◆ **1st data: High alarm setpoint value**

Integer: 4 digits

Range

IR-AHT : -49 to 1000ºC ( -57 to 1832ºF)

IR-AHS : 601 to 3000ºC (1114 to 5432ºF)

IR-AHU : 901 to 3000ºC (1654 to 5432ºF)

◆ **2nd data : Low alarm setpoint value**

Integer: 4 digits

Range

IR-AHT : -50 to 999ºC ( -58 to 1832ºF)

IR-AHS : 600 to 2999ºC (1112 to 5431ºF)

IR-AHU : 900 to 2999ºC (1652 to 5431ºF)

Reference: A space is inserted in the most significant digit of "High alarm setpoint value" and "Low alarm setpoint value".

Remarks: Each setpoint value is of 5 bytes.

### 4.2.2 Emissivity (Data: 4 bytes)

Reading

RSV51

ASV51=□□□□

◆ **Emissivity**

Integer: 1 digit, Decimal point: 1 digit, Decimal: 2 digits

Range : 0.01 to 1.99

### 4.2.3 Signal modulation mode (Data: 1 byte)

Reading

RSV61

ASV61=□

◆ **Signal modulation mode**

Integer: 1 digit

Range : 0 to 3

0 : Real

1 : Peak

2 : Delay

3 : Valley

# *4. Details of format*

### 4.2.4 Modulation ratio (Data: 4 bytes)

Reading
RSV62
ASV62=□□□□

◆ **Modulation ratio**
Integer: 2 digits, Decimal point: 1 digit, Decimal: 1 digit
Range : -0.1 to 99.9

**Caution** When "Hold" is programmed in your thermometer, the data becomes "-0.1".

### 4.2.5 Measurement unit (Data: 1 byte)

Reading
RSV91
ASV91=□

◆ Measurement unit
Integer: 1 digit
0 : ºC
1 : ºF

# *4. Details of format*

## 4.3 XX command

### 4.3.1 Model number (Data: 6 bytes)

Reading

RXX01

AXX01=□□□□□□

◆ Model number
IR-AHT : For IR-AHT
IR-AHS : For IR-AHS
IR-AHU : For IR-AHU

### 4.3.2 ROM version (Data: 5 bytes)

Reading

RXX02

AXX02=□□. □□

◆ ROM version
Integer: 2 digits, Decimal point: 1 digit, Decimal: 2 digits
(Example) △ 1.00

### 4.3.3 Number of storage data (Data: 4 bytes)

Reading

RXX81

AXX81=□□□□

◆ Number of storage data
Integer: 4 digits
Range : 0 to 1000

Reference

Number of temperature data stored in your thermometer returns at communications.

# *4. Details of format*

### 4.3.4 Stored temperature data (1st data: 1 byte, 2nd data: 4 bytes, 3rd data: 5 bytes, 4th data: 5 bytes)

By receiving the command, all data in order of storage are transmitted at intervals of 0.4 second.
Data before the last data is finished with "ETB" and the last data is finished with "ETX".
When any temperature data is not stored in your thermometer, the error command "A9999:0000" returns.

Reference

Even when a communications error is happened, you are required to receive all data up to the last data.
However, when “Break” is detected, the communications is cancelled.

RXX82
AXX82=□, □□□□, □□□□□, □□□□□ EB
AXX82=□, □□□□, □□□□□, □□□□□ EB
.
.
.
AXX82=□, □□□□, □□□□□, □□□□□ EB
AXX82=□, □□□□, □□□□□, □□□□□ EX

◆ **1st data: Data status**
0: Normal
1: Overflow
2: Underflow
4: Hardware abnormal

◆ **2nd data: Emissivity**
Integer: 1 digit, Decimal point: 1 digit, Decimal: 3 digits
Range : 0.01 to 1.99

◆ **3rd data : Temperature data**
For less than 300ºC or 300ºF :
Integer : 3 digits, Decimal point: 1 digit, Decimal : 1 digit

Reference

If the integral includes a sign, it becomes 2 digits.

For 300ºC or 300ºF or more : Integer: 4 digits

Reference

A space is inserted in the most significant digit.
When the data status is "1" or "2", "99999" is inserted.

◆ **4th data : Not using**

Caution

This is a dummy data.
"99999" is inserted as the dummy data.

# *5. Error codes*

| Error No. | Error contents | Error answer<br>Error code: Error data No. |
|---|---|---|
| 1 | Framing error | A0001 : 0000 |
| 2 | Overrun error | A0002 : 0000 |
| 3 | Parity error | A0003 : 0000 |
| 10 | Command error (Undefined numbers other than R, PV, SV、XX) | A0010 : **** |
| 14 | "ETX" missing | A0014 : 0000 |
| 15 | Receiving buffer overflow | A0015 : 0000 |
| 31 | Data not stored | A0031 : 0000 |
| 32 | Data not stored by EEPROM error | A0032 : 0000 |
| 9999 | Other errors | A9999 : 0000 |
| 0 | Positive answer except data reading at adjustment on shipment | A0000 : 0000 |

Reference

Asterisks "****" are filled with an error data position (the position counted from the position next to "STX").
If CRLF as a delimiter for data is not detected, the error code “9999” returns.

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