ULTRASONIC WATER METER
User's Manual

MODEL: XONIC 5L

Contents

## 1. Product Description

Xonic 5L is transit-time water meter with high accuracy. The meter is equipped with lithium primary battery that can operate up to 8 years. General specifications are as in below.

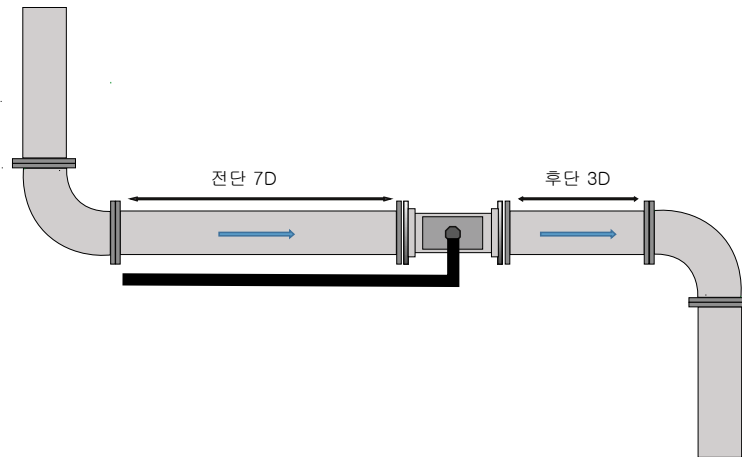|	
Principle	Ultrasonic Transit-Time
Velocity	0.02 ~ 10m/sec
Flange Material	Stainless Steel 304
Sensor Type	Insertion
Power Supply	3.6V
Battery Life	8 years

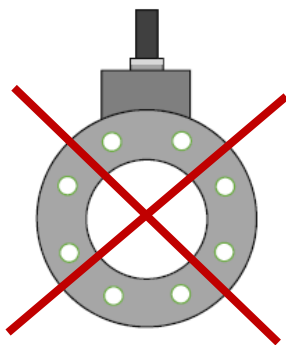Delivery Items: electronics, cable, battery, flange
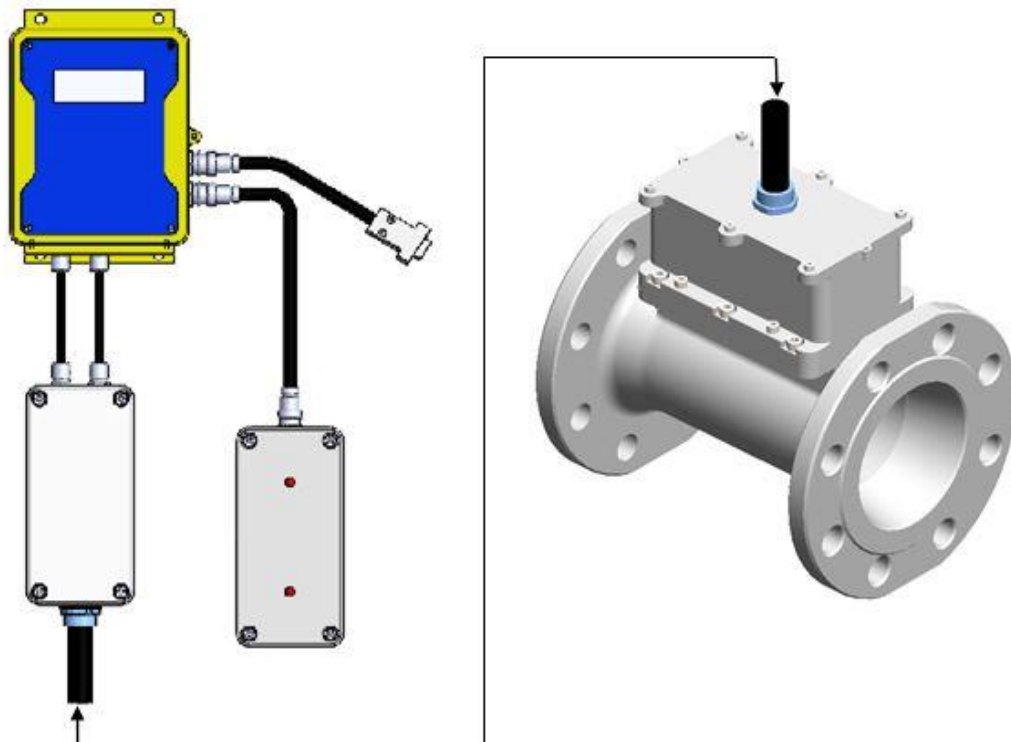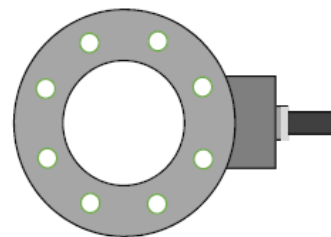
2. Installation Considerations

Choose an installation place that has enough straight pipe run. 7D for upstream and 3D for downstream.
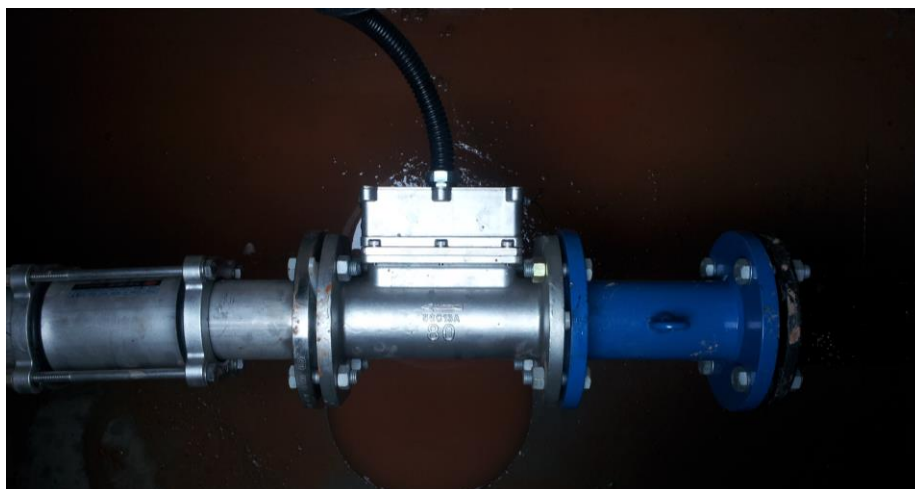

Make sure that the sensor part is not located at the top. Error may occur due to the air bubble in the upper part.

(Incorrect Installation)   (Correct Installation)

Correctly installed water meter.

## 3. Scope of Application

This is flow calibration and adjustment specification of Xonic 5L ultrasonic water meter.

The flow rate can be adjusted to fit 80mm, 100mm, 150mm, 200mm, 250mm, and 300mm flanges of Xonic 5L ultrasonic flowmeter.

There are Factory mode and User mode, various flow related data can be calibrated or selected.

4. Xonic 5L Main Board in-output terminal

(1) Main Board
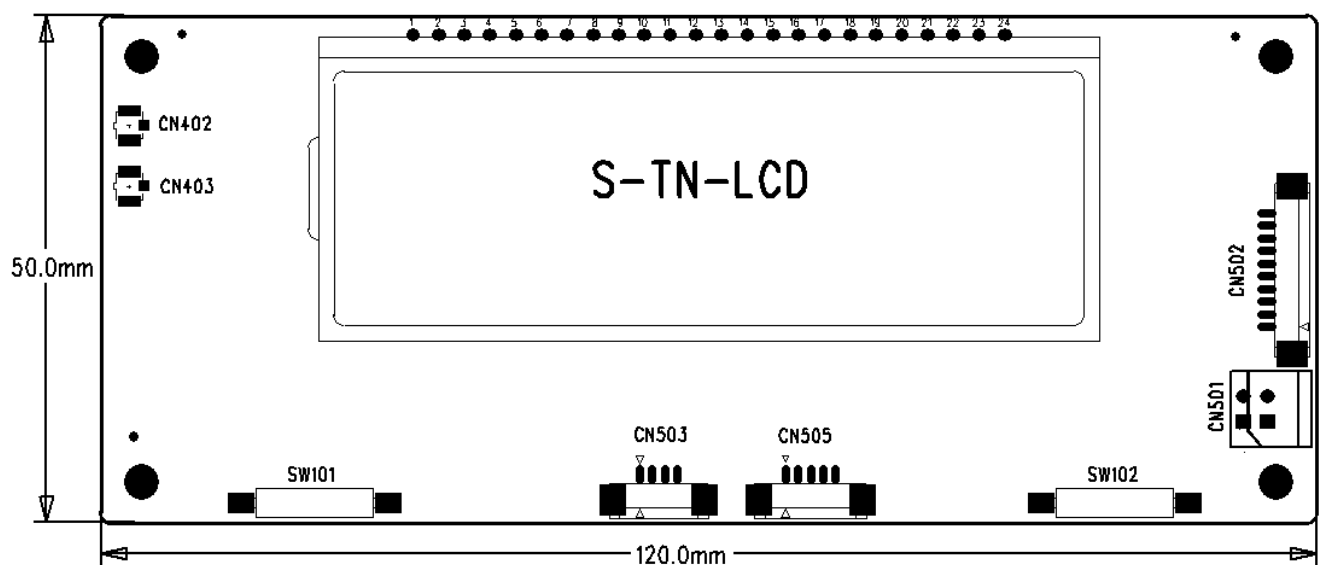
(1) CN402_Sensor_Up Connector

   - Up sensor Pulse, Wave signal in/output terminal (Pulse : Output   / Wave : Input)

   - CONNECTOR spec : Hirose Electric - U.FL-R-SMT(10)

   - 1Pin : 500Khz SIGNAL   /   2Pin :GND

(3)CN403_Sensor_Down Connector

   - Down sensor Pulse, Wave signal in/output terminal (Pulse : Output   / Wave : Input)

   - CONNECTOR spec : Hirose Electric - U.FL-R-SMT(10)

   - 1Pin : 500Khz SIGNAL   /   2Pin :GND

(4)CN501_Power Connector

   - Use DC 3.6V

   - CONNECTOR spec : MOLEX - 5267-2A

   - 1Pin : VCC_3.6V   /   2Pin :GND

(5)CN502_Firmware Write Connector

   - CONNECTOR spec : Yeonho Electronics - 12505WS-10P

   - 1Pin : JTAG_TOD   /   2Pin :JTAG_TOI   /   3Pin : JTAG_TMS   /   4Pin : JTAG_TCK   /   5Pin :
      RESET 6Pin : NC   /   7Pin : 3.6V   /   8Pin : 3.6V   /   9Pin : GND   /   10Pin : GND

(6)CN503_External battery input connector

   - Use external battery DC 3.6V

   - CONNECTOR spec : Yeonho Electronics - 12505WS-4P

    - 1Pin : RS232_TX   /   2Pin :RS232_RX   /   3Pin :GND   /   4Pin : External battery_VALID

(7)CN505_RS232C Communication connector

   - Flow calibration and adjustment

     - CONNECTOR spec : Yeonho Electronics - 12505WS-5P

     - 1Pin : RS232_TX   /   2Pin :RS232_RX   /   3Pin :GND   /   4Pin : GND   /   5PIN : NC

(8)SW101, SW102_Lead Switch

     - Operates with neodymium magnet

     - Lead Switch spec : RPS10

5. Lead Switch operation function.

Bring neodymium magnet into contact with SW101, SW102 to operate the special function of ultrasonic water meter.

(1) Instant display function
- Bring neodymium magnet into contact with Lead Switch SW101.
- Unit is changed from m³ to m³/h.

(2)Delta-T display function
- Bring neodymium magnet into contact with Lead Switch SW102.
- No unit.

(3)Sound Speed display function.
- Bring neodymium magnet into contact with Lead Switch SW101 + SW102 simultaneously.
- No unit.

(4) Actual zero operation function.
- Turn the power OFF.
- After LCD display screen is off, bring neodymium magnet into contact with Lead Switch SW102.
- Turn the power ON.
- The icon and firmware version will be displayed on LCD for about 30 seconds to 1 minute.
- Completed when total flow and m³ unit are displayed on LCD.
- Once actual zero is completed, it starts to operate in Factory mode.(If no battery sign, then it is Factory mode)

(5) Switch to Factory mode
- Turn the power OFF.
- After LCD display screen is off, bring neodymium magnet into contact with Lead Switch SW101.
- Completed when total flow and m³ unit are displayed on LCD.
- It starts to operate in Factory mode.(If no battery sign, then it is Factory mode)

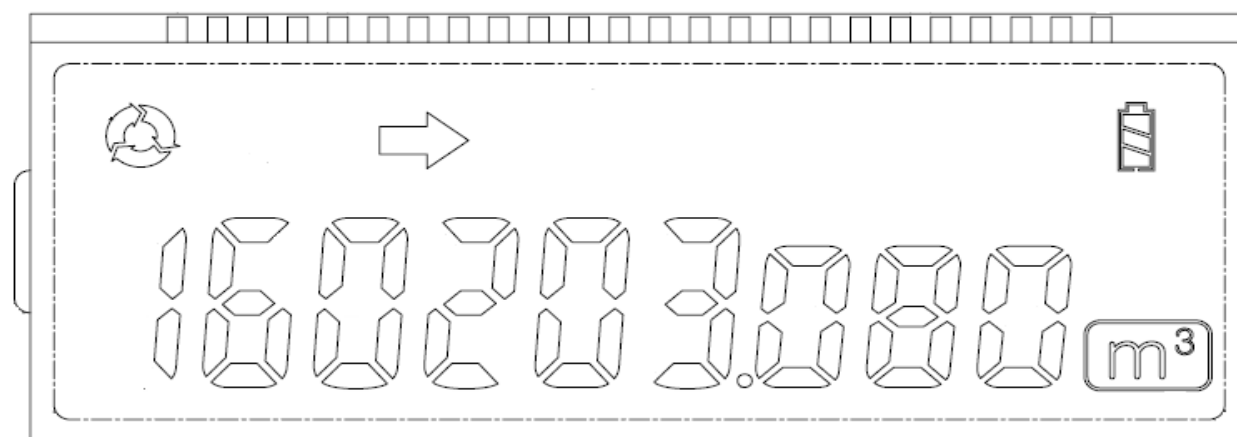(6) Switch to User mode
- Turn the power OFF.
- Once LCD screen is off, turn the power ON.

6.LCD Display

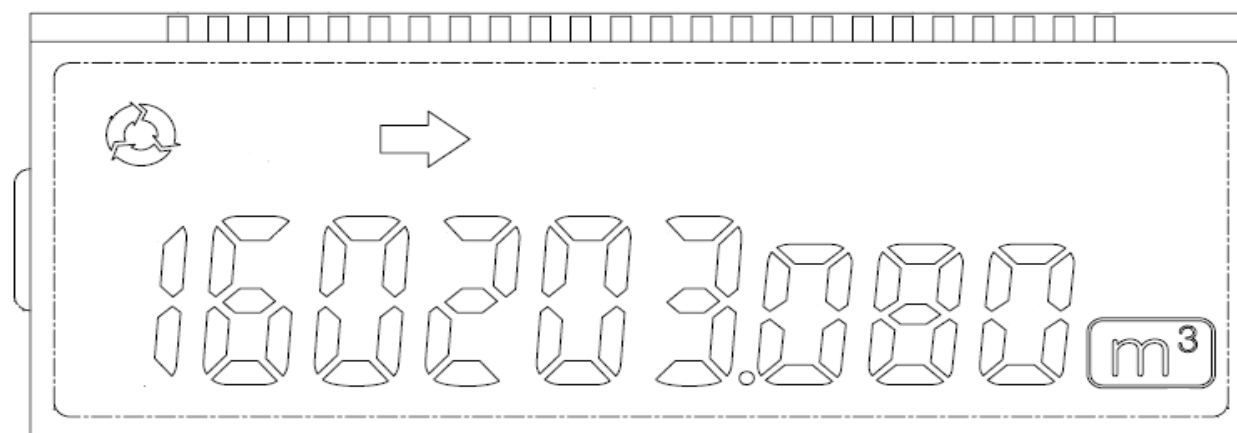(1) Full screen with icon and number.
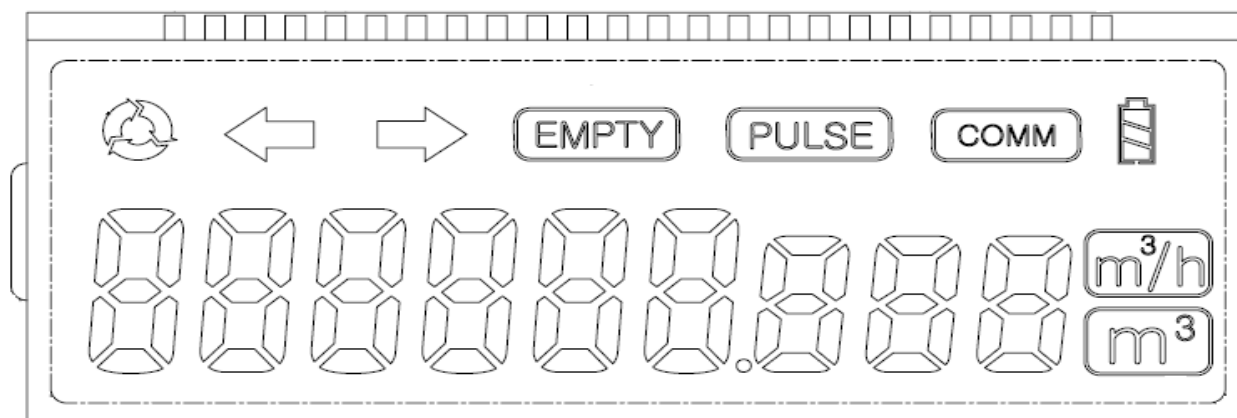
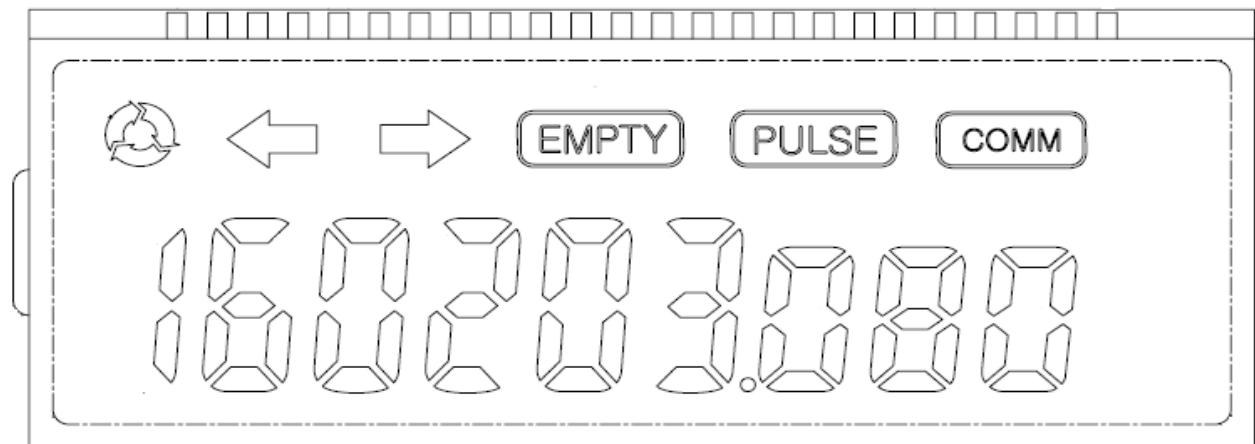
(2) User mode screen.

- with battery sign

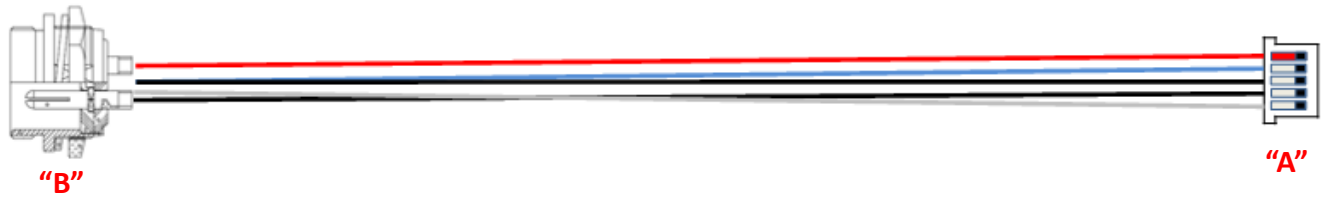(3) Factory mode screen.

- no battery sign.

(4) Firmware version, Actual zero operation screen

- − 6-digit integers indicate the firmware version.
- − 3 decimal places indicate the pipe diameter.

7. PC and Xonic-5L communication cable connection

(1)XONIC 5L RS232 CIRCULAR cable

"B"   **"A"**

(2) XONIC 5L RS232 CABLE

"C"   **"D"**

(3) XONIC 5L EXTERNAL BATTERY CIRCULAR

"E"   **"F"**
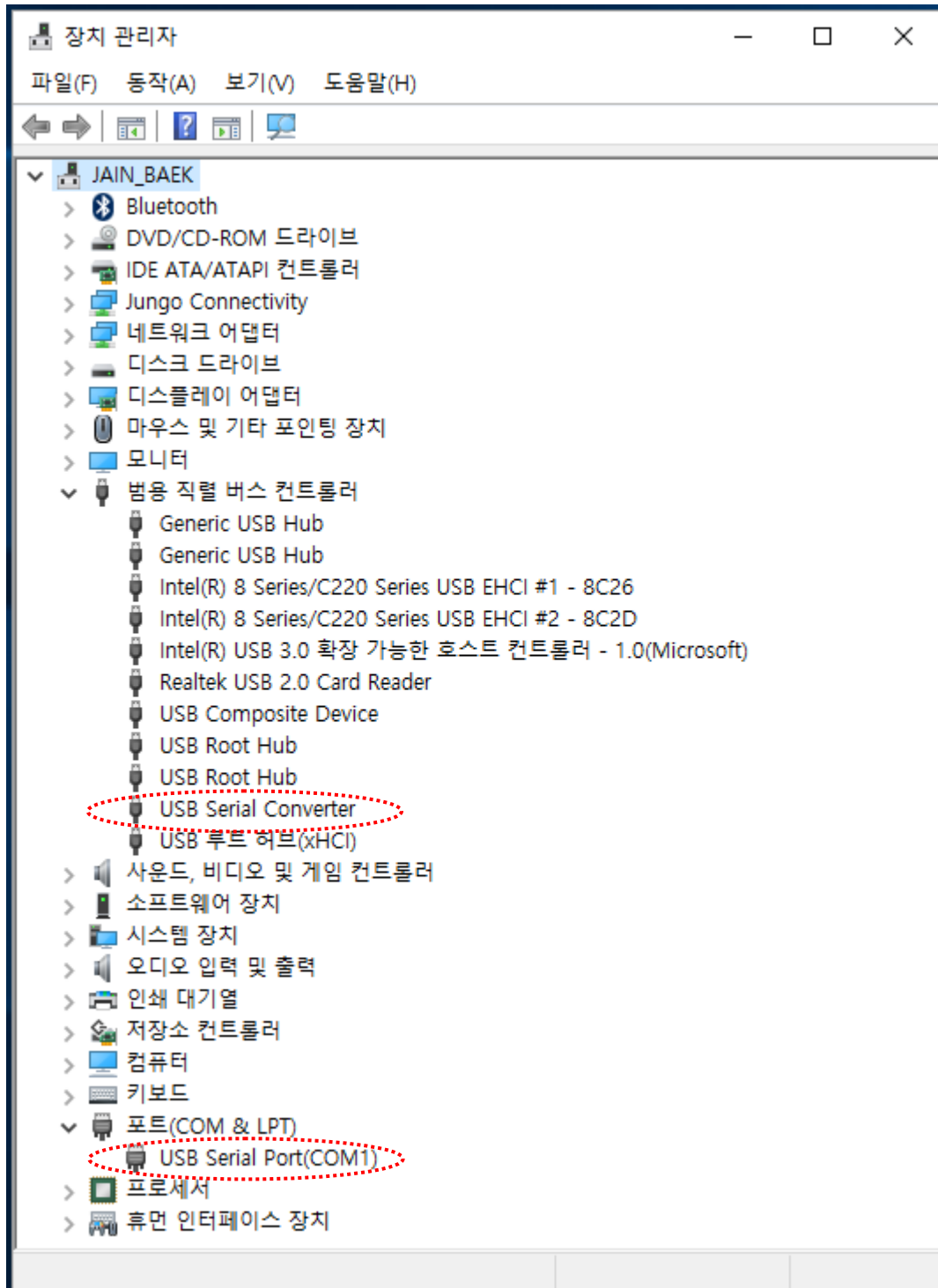
(4) USB TO RS232 Serial Converter

(5) Connect XONIC-5L and PC comm cable

- Connect XONIC-5L RS232 CIRCULAR cable **"A"** to Main Board CN505.

- Connect XONIC-5L RS232 CIRCULAR **"B"** and XONIC-5 RS232 CABLE **"C"**.

- Connect XONIC-5 RS232 CABLE **"D"** and USB TO RS232 Serial Converter**"DB9M"**.
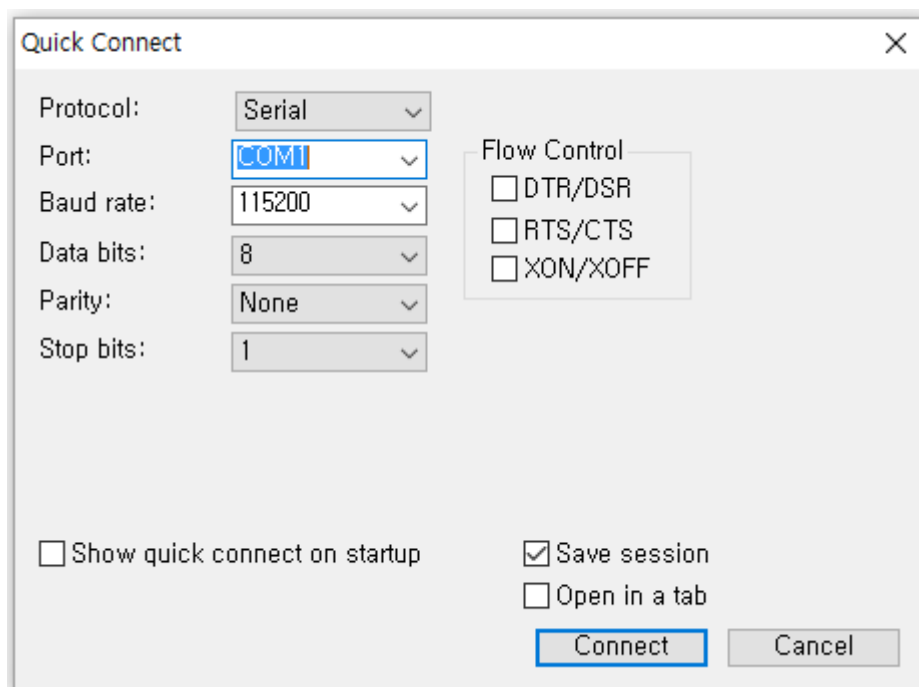
- Connect USB TO RS232 Serial Converter USB to a PC.

8. PC USB TO RS232 serial communication setting

(1)PC USB communication setting.

‒ Install USB TO RS232 Serial Converter operation software on a PC.

‒ Check "**USB Serial Converter**" in Control Panel -> Device Manager -> Universal serial bus controller.

‒ Check **"USB Serial Port(COM**)"** Control Panel -> Device Manager -> Port(COM &LPT)**.**

‒ If there is no "**USB Serial Converter**" in Control Panel -> Device Manager -> Universal serial bus   controller, check if the USB TO RS232 Serial Converter is connected to the PC USB terminal.

‒ If there is no "**USB Serial Converter**" in Control Panel -> Device Manager -> Universal serial bus controller, reinstall the USB TO RS232 Serial Converter operation software on the PC.

(2) PC Hyper Terminal serial communication setting.


```
Quick Connect                                              ✕

Protocol:      Serial          ⌄
Port:          COM1            ⌄      Flow Control
Baud rate:     115200          ⌄        ☐ DTR/DSR
Data bits:     8               ⌄        ☐ RTS/CTS
Parity:        None            ⌄        ☐ XON/XOFF
Stop bits:     1               ⌄


☐ Show quick connect on startup         ☑ Save session
                                        ☐ Open in a tab
                                        [ Connect ]   [ Cancel ]
```

- Port : Set by checking USB Serial Port**(COM number)** in Port(COM & LPT) of the PC device manager.

  - Baud rate : Set as 115200.

  - Data bits : Set as 8.

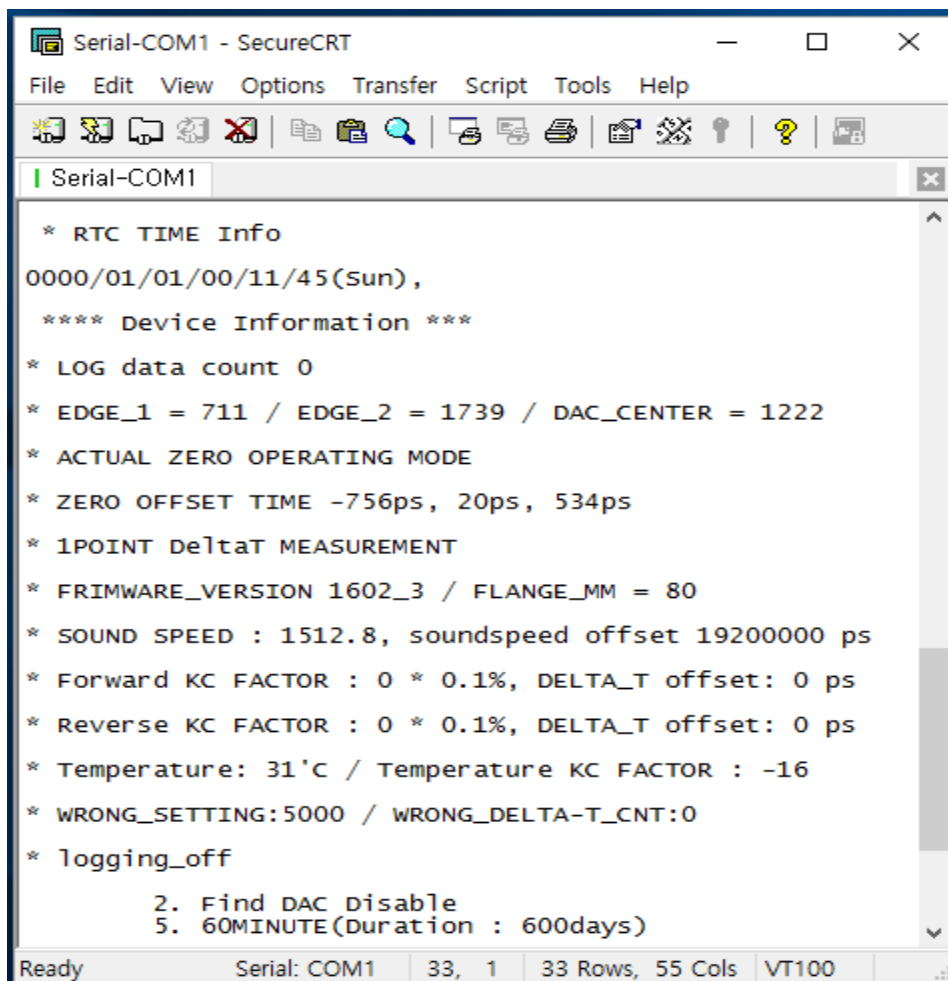 - Parity : Set as None.

  - Stop bits : Set as 1.

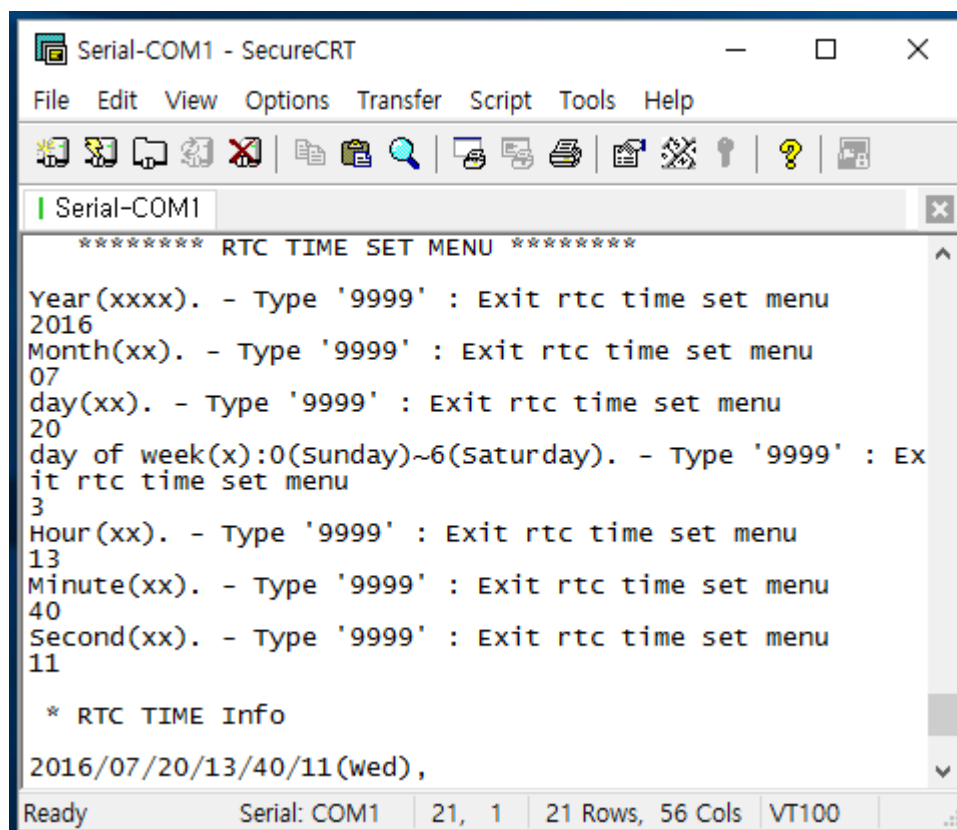## 9. USER MODE RS232 serial communication

(1) USER MODE menu
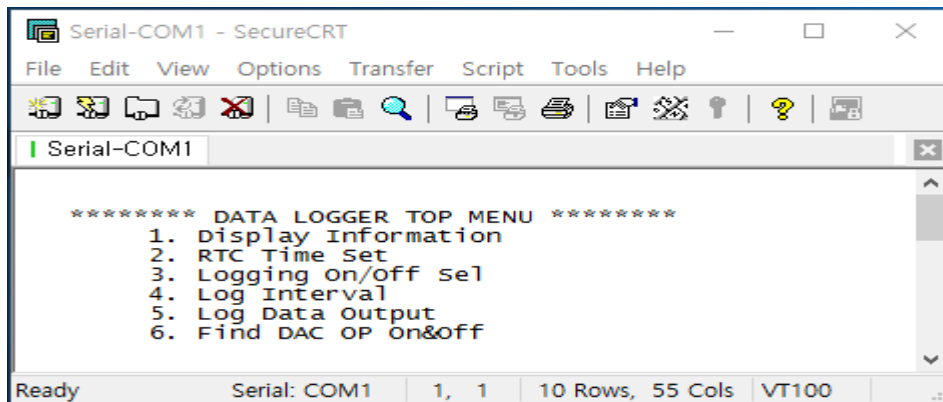
(2) Display Information

- In USER MODE menu, enter number **"1"** on PC keyboard and press Enter.

(4) RTC Time Set

    - In USER MODE menu, press number **"2"** on PC keyboard and press Enter.

    - Year(xxxx) : Enter the year and press Enter. (4 digits)   /   Ex : 2016

    - Month(xx) : Enter the month and press Enter. (2 digits)   /   Ex : 01~12

    - day(xx) : Enter the day and press Enter. (2 digits)   /   Ex : 01~31

    - day of week(x) : Enter the day of week and press Enter. (1 digit) /   Ex : Sunday = 0

    - Hour(xx) : Enter the hour and press Enter. (2 digits)   /   Ex : 01~24

    - Minute(xx) : Enter the minute and press Enter. (2 digits)   /   Ex : 00~59

    - Second(xx) : Enter the second and press Enter. (2 digits)   /   Ex : 00~59

    - After completion, check year, month, day, day of week, and time in RTC TIME Info.

```
Serial-COM1 - SecureCRT                          —    □    ×
File   Edit   View   Options   Transfer   Script   Tools   Help

| Serial-COM1

     ******** RTC TIME SET MENU ********

Year(xxxx). - Type '9999' : Exit rtc time set menu
2016
Month(xx). - Type '9999' : Exit rtc time set menu
07
day(xx). - Type '9999' : Exit rtc time set menu
20
day of week(x):0(Sunday)~6(Saturday). - Type '9999' : Ex
it rtc time set menu
3
Hour(xx). - Type '9999' : Exit rtc time set menu
13
Minute(xx). - Type '9999' : Exit rtc time set menu
40
Second(xx). - Type '9999' : Exit rtc time set menu
11

 * RTC TIME Info

2016/07/20/13/40/11(Wed),

Ready            Serial: COM1   21, 1   21 Rows, 56 Cols  VT100
```
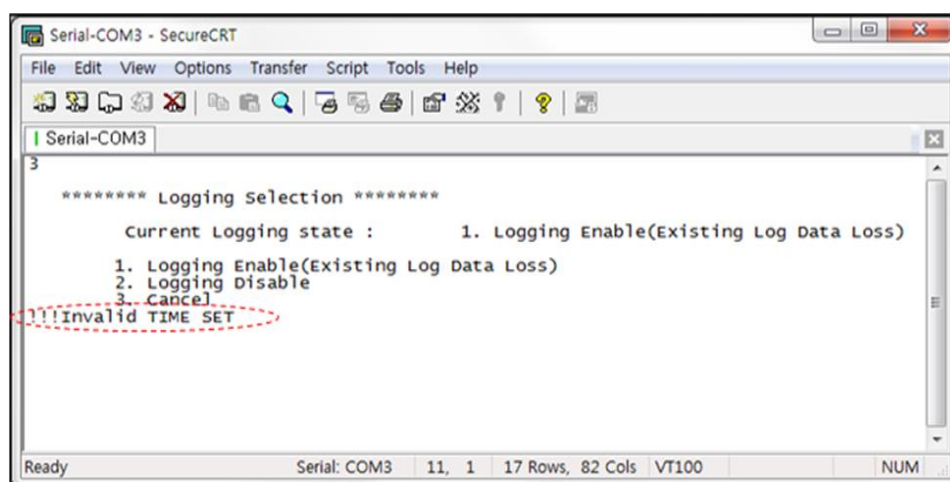
(5) Logging On/Off Selection
- In USER MODE menu, enter number **"3"** on PC keyboard and press Enter.
- 1. Logging Enable(Existing Log Data Loss) : Save log data.
- 2. Logging Disable : Log data is not saved.
- 3. Cancel : No selection and returns to main menu.
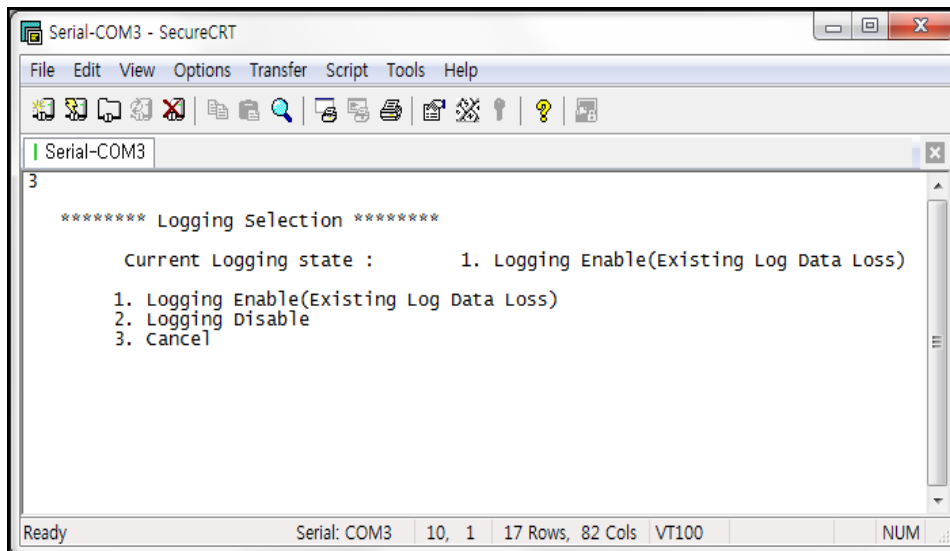

(6) **!!!Invalid TIME SET** error message in Logging On/Off Selection.
- In USER MODE menu, enter number **"3"** on PC keyboard and press Enter.
- On PC keyboard enter number **"1"** and press Enter.
- When error message **" !!!Invalid TIME SET "** appears, set the Display RTC Time again.

(7) Logging On/Off Selection setting.

- In USER MODE menu, enter number **"3"** on PC keyboard and press Enter.

- Enter number **"1"** on PC keyboard and press Enter.

- Select to save log data.

- Completer when **"Init FRAM"** message appears.

* Caution if you select 1.Logging Enable(Existing Log Data Loss), the existing data will be deleted.
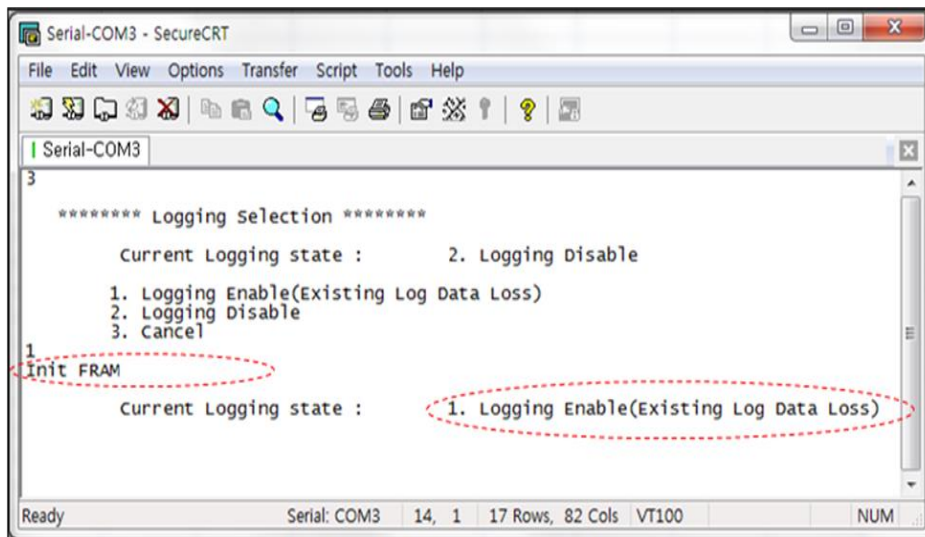
- In USER MODE menu, enter number **"3"** on PC keyboard, and press Enter.

- In PC keyboard, enter number **"2"** and press Enter.

- If **"Current Logging state : 2. Logging Disable"** message appears, log data is not saved.
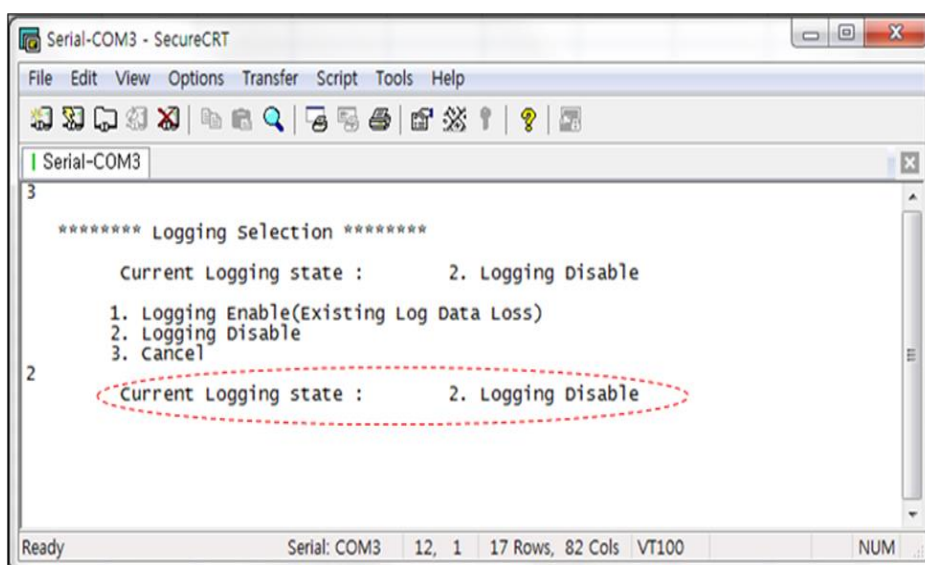
(8) Log Interval setting.

- In USER MODE menu, enter number **"4"** on PC keyboard, and press Enter.
- Enter Log Interval time using number on PC keyboard, and press Enter.
- Current Log Interval displays the days that can be saved with the selected Log Interval time.
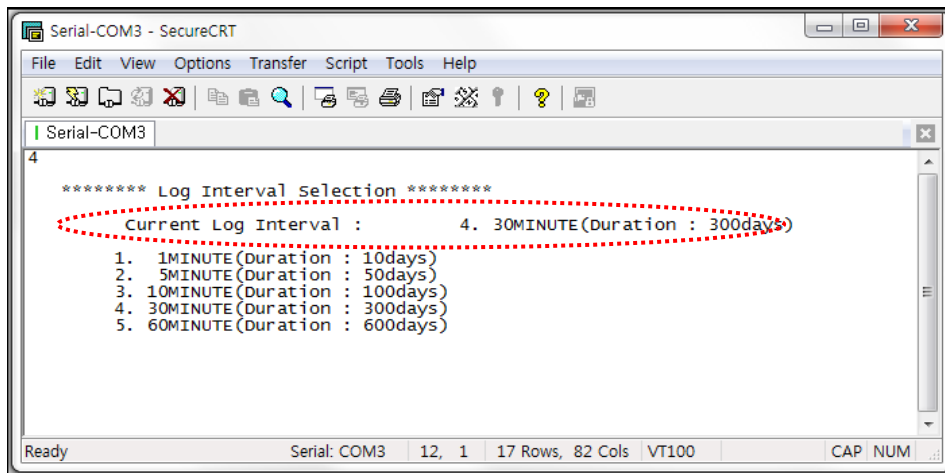
(9) Log Data Output setting.

- In USER MODE menu, enter number **"5"** on PC keyboard, and press Enter.
- Maximum number of log data is 16383.
- *** Caution: Save Xonic 5L log data on PC using log function of Hyper Terminal.**
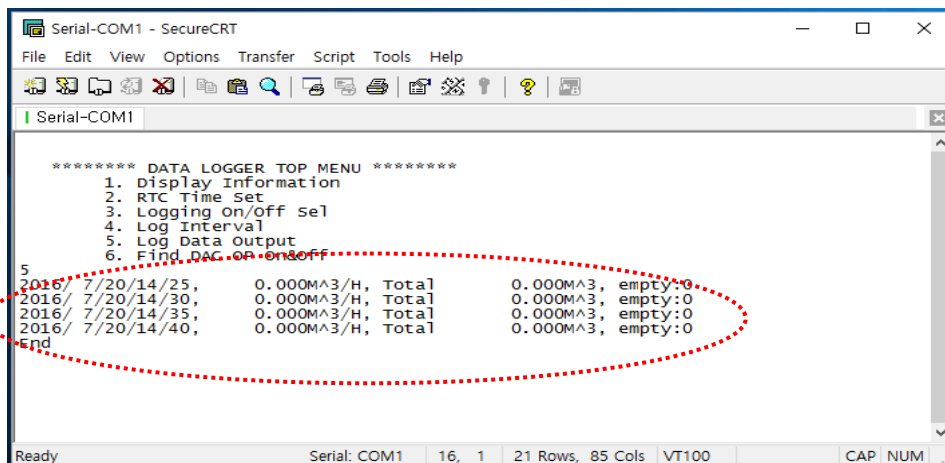
(10) Find DAC OP On & Off setting.

- Do not use.

10. FACTORY MODE   RS232 serial communication

(1) FACTORY MODE menu

- Menu from 1 to 6 are same as USER MODE menu.
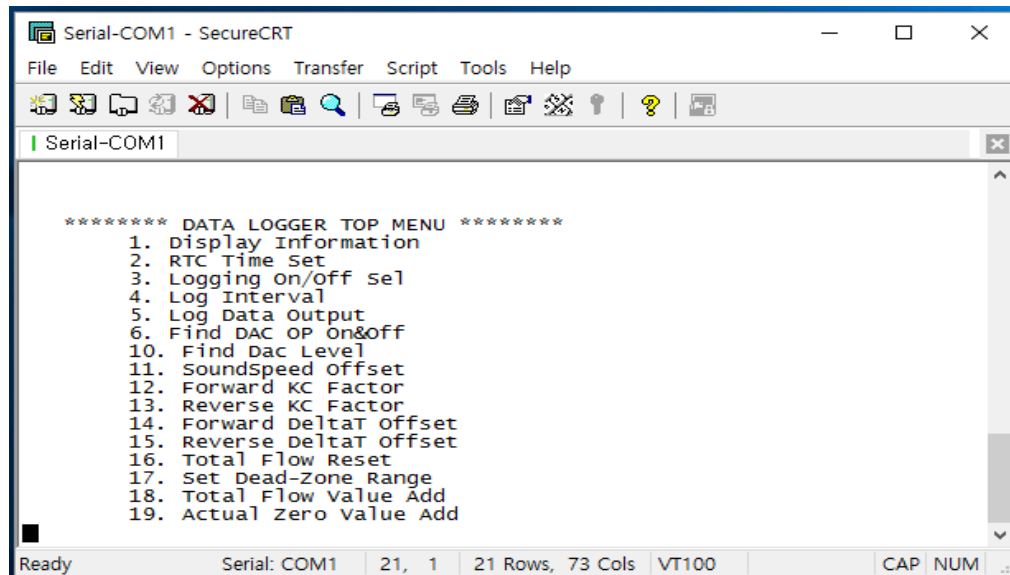
(2) Find Dac Level setting

- In FACTORY MODE menu, enter number **"10"** on PC keyboard and press Enter.

- System will reboot and search Wave signal again.

- Actual Zero value save in memory does not change.
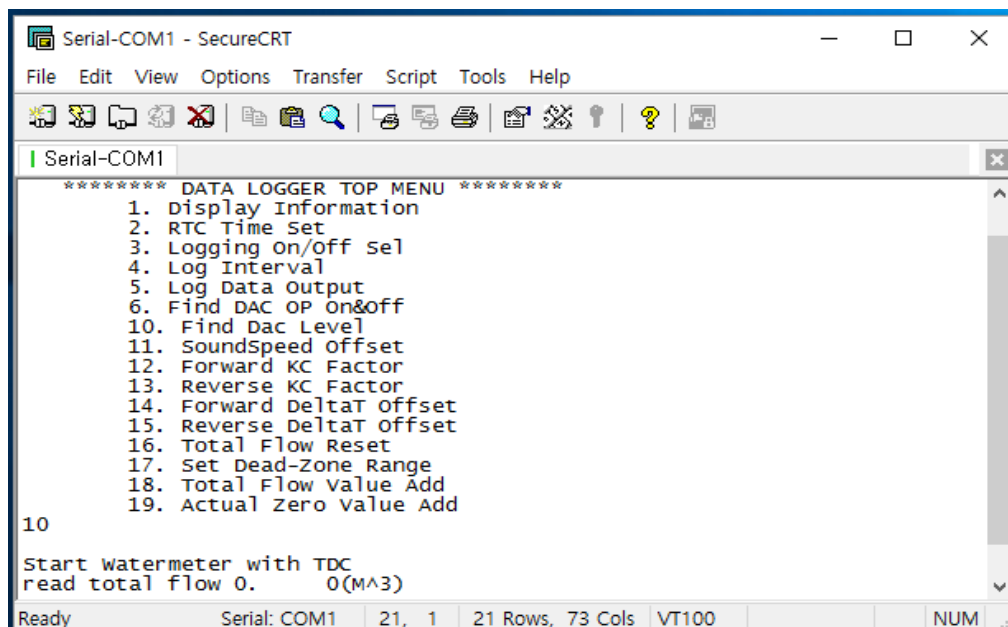
(3) SoundSpeed Offset correction

- In FACTORY MODE menu, enter number **"11"** on PC keyboard and press Enter.

- Check ultrasonic sound speed table according to water temperature and enter the value in numbers.

- Ex : If water temperature is 25℃ and sound speed is 1496.7m/s, enter sound speed as a number 1496.7m/s * 10 = **"14967"**

- Check temperature in Display Information

(4) Forward KC Factor correction

- In FACTORY MODE menu, enter number **"12"** on PC keyboard and press Enter.

- Enter error value of measured Q3 flow.

- Ex : If error of measured Q3 flow is -5.5%, enter it as a number -5.5% * 10 = **"55"**

(5) Reverse KC Factor correction

- In FACTORY MODE menu, enter number **"13"** on PC keyboard and press Enter.

- Enter error value of measured Q3 flow.

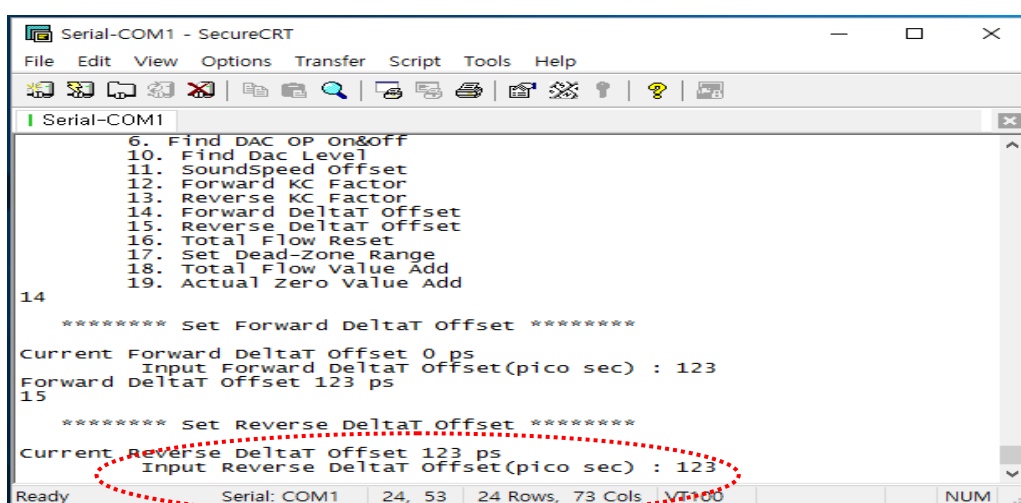- Ex : If error of measured Q3 flow is -5.5%, enter it as a number -5.5% * 10 = **"55"**
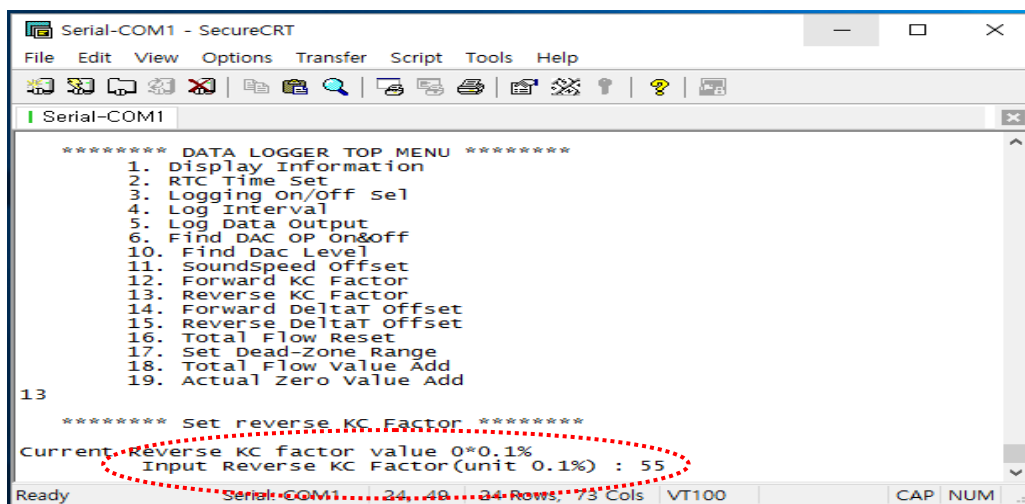
(6) Forward DeltaT Offset correction

- In FACTORY MODE menu, enter number **"14"** on PC keyboard and press Enter.

- Enter error value of measured Q2 flow.

- When 80mm measurement error is ±0.1 : Enter value ±12ps / When 80mm measurement error is ±2.5 : Enter value ±300ps

- When 100mm measurement error is ±0.1 : Enter value ±15ps / When 100mm measurement error is ±2.5 : Enter value ±375ps

- When 150mm measurement error is ±0.1 : Enter value ±18ps / When 150mm measurement error is ±2.5 : Enter value ±450ps

- When 200mm measurement error is ±0.1 : Enter value ±22ps / When 200mm measurement error is ±2.5 : Enter value ±550ps

(7) Reverse DeltaT Offset correction

- In FACTORY MODE menu, enter number **"15"** on PC keyboard and press Enter.

- Enter error value of measured Q2 flow.

- When 80mm measurement error is ±0.1 : Enter value ±12ps / When 80mm measurement error is ±2.5 : Enter value ±300ps

- When 100mm measurement error is ±0.1 : Enter value ±15ps / When 100mm measurement error is ±2.5 : Enter value ±375ps

- When 150mm measurement error is ±0.1 : Enter value ±18ps / When 150mm measurement error is ±2.5 : Enter value ±450ps

- When 200mm measurement error is ±0.1 : Enter value ±22ps / When 200mm measurement error is ±2.5 : Enter value ±550ps
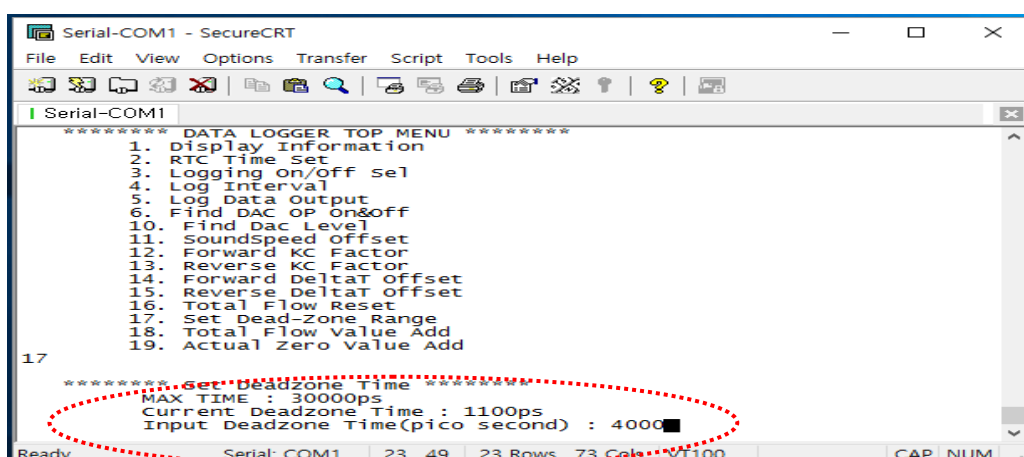
(8) Total Flow Reset function

- In FACTORY MODE menu, enter number **"16"** on PC keyboard and press Enter.
- Total value changes to **"0.000"**.
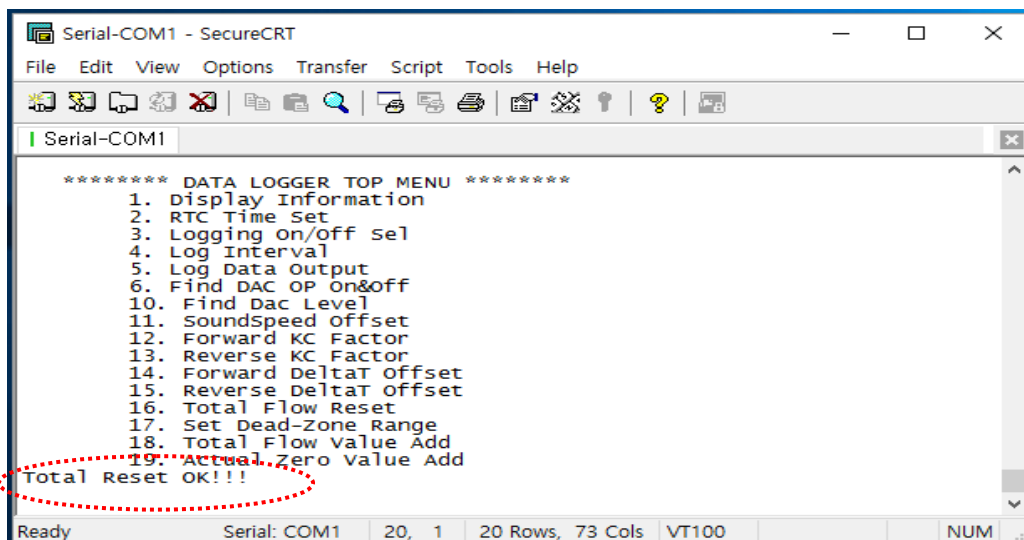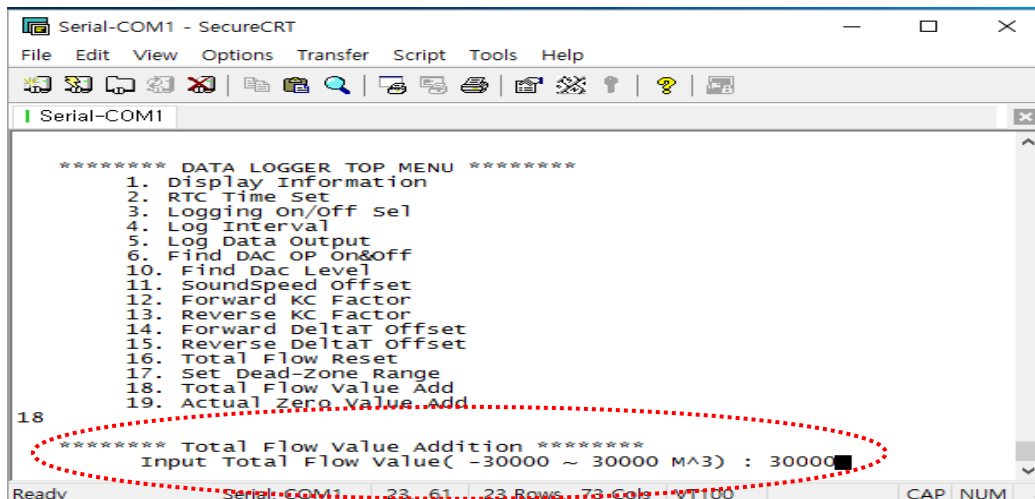

(9) Set Dead-Zone Range adjust

- In FACTORY MODE menu, enter number **"17"** on PC keyboard and press Enter.
- User can adjust starting flow Q0.
- 80mm Q0 operates when inputting a value of $0.8\,\text{m}^3/\text{h}$(3600ps) or more (0.1 m³/h is 456ps)
- 100mm Q0 operates when inputting a value of $1.4\,\text{m}^3/\text{h}$(4800ps) or more (0.1 m³/h is 342ps)
- 150mm Q0 operates when inputting a value of $2.2\,\text{m}^3/\text{h}$(5000ps) or more (0.1 m³/h is 228ps)
- 200mm Q0 operates when inputting a value of $3.52\,\text{m}^3/\text{h}$(6500ps) or more (0.1 m³/h is 182ps)

(10) Total Flow Value Add adjust

    - In FACTORY MODE menu, enter number **"18"** on PC keyboard and press Enter.

    - Total value can be inputted. Input below -30000 ~ +30000 at once.

    - Total value can be inputted below -30000 ~ +30000, and if it is above this range, enter continuously.

       Ex : If the input value is +80000, enter it 3 times by +30000.

(11) Actual Zero Value Add adjust

    - In FACTORY MODE menu, enter number **"19"** on PC keyboard and press Enter.

    - Actual Zero Value can be inputted. Input below -30000 ~ +30000 at once.

Total value can be inputted below -30000 ~ +30000, and if it is above this range, enter continuously.

       Ex : If the input value is +80000, enter it 3 times by +30000.