Industrial Data Logger & Advanced Sensor Node

User Manual (Eng.)

Version 1.0

TEL™

TOKYO ELECTRON
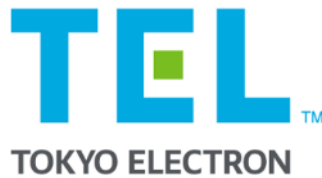
User information

FCC

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

NOTE: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

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

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1. Introduction

The industrial datalogger supports 4 channels and supports up to 8 Advanced Sensor Nodes for each channel. (Up to 32 sensor nodes are supported.)
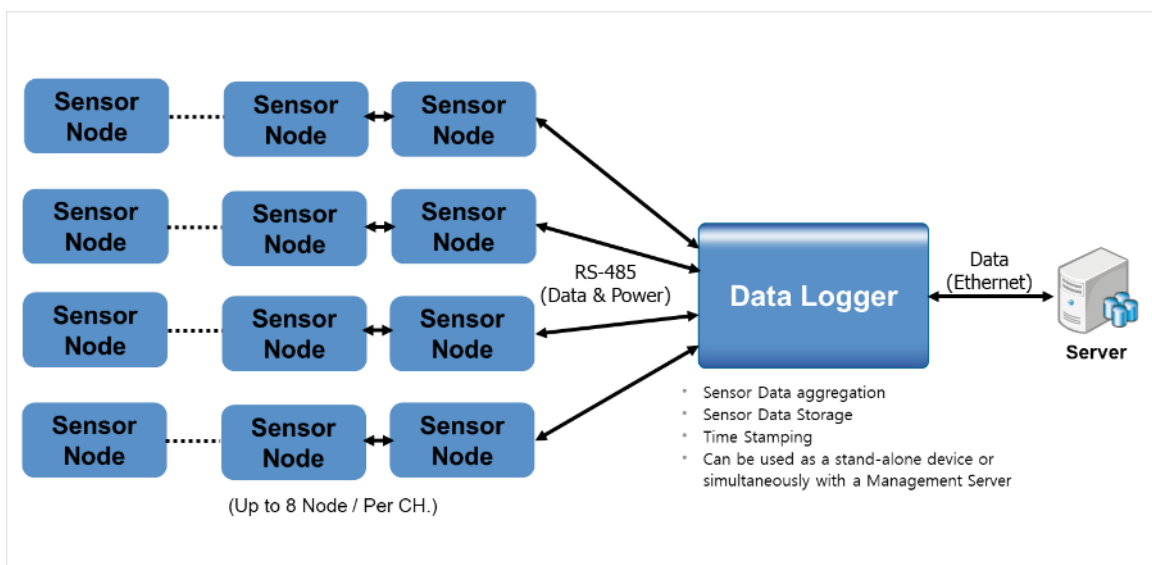
1-1. Features

Data Logger

- ❖ **Sensor Node Data Gathering**
- ❖ **Sensor Node Control**
- ❖ **Data Transmission**
- ❖ **4 CH / 32 Node Support (8 Node / Per Channel)**

Advanced Sensor Node

- ❖ **Sensor Node Interface (RS-485 With Power)**
- ❖ **External Sensor Interface : Terminal Block 8 Pin**
- ❖ **Sensor Input Power : 5 or 24V**
- ❖ **ADC_Single Ended : 24 bit Sigma-Delta (-10V ~ +10V)**
- ❖ **ADC_Differential : 24 bit Sigma-Delta (-10V ~ +10V)**
- ❖ **ADC_Current : : 0 ~ 20mA**

1-2. System configuration

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1-3. System Specification

| Data Logger / Hardware Specification	
Ports	Ethernet & PoE : 1 port System Console : 1 port(RS232 DB9) Serial Interface : RS485, 4CH / 64 Node (16 Node / CH)
Physical feature	Speed and Duplex Auto sensing and crossover cable Auto detection
Status Display	Power, System Status, RS-485 Link/Act LED
Memory	Flash : 1Gbytes DDR3 : 1Gbytes SD Memory : 32GByte
Power Supply	DC 24V
Size	Width: 210, Height:43, Depth:150 (mm)
Weight	525g (Not including power adapter, bracket)
Operation Environment	Temperature 0~60℃ Humidity 0~90%, non condensation

Advanced Sensor Node / Hardware Specification	
Ports	Data Logger Interface : RS-485(With Power) Sensor Node Interface : RS-485(With Power) External Sensor Interface : Terminal Block 8 Pin
Main Resource	Core : 32bit-Coretex-M7, 280MHz RAM : 1.4M Bytes Flash: 2MB
Status Display	Power, Network, System Status LED
ADC	Single Ended : 24 bit Sigma-Delta (-10V ~ +10V) Differential : 24 bit Sigma-Delta (-10V ~ +10V) Current Sensing : 0 ~ 20mA
Power	RS-485 / 24V
Size	65.0 x 45.2 x 23.3mm(Not including power bracket)
Weight	130g (Not including power bracket)
Operation Environment	Temperature 0~60℃ Humidity 0~90%, non condensation

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1-4. Port & LED

Data Logger

Front
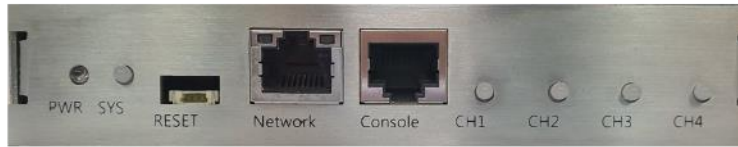
❖ Power LED : Power On (LED On) / Power OFF(LED Off)
❖ System Status LED : System Operating LED Blinking
❖ RS-485 통신 Enable LED : Disable (LED Off) / Enable(LED On)
❖ LED On / Data communication: RED LED Blinking

Back side

Sensor Node

[TOP]   [SIDE]

1-5. Sensor Node Setting

Sensor Node DIP Switch Operating		
Item	Case	Description
DIP Switch ON : 1(High) 	**1**	RS-485 TX Line termination resistor setting
	2	RS-485 RX Line termination resistor setting
	3	High : Single-Ended, Low : Differential
	4	High : Current, Low : Voltage
	5	Sensor Node ID : Bit 3
	6	Sensor Node ID : Bit 2
	7	Sensor Node ID : Bit 1
	8	Sensor Node ID : Bit 0
LED Status	Red	Power On : LED On
	Green	RS-485 Data Flow Status: LED Blinking
	Blue	MCU Status: LED Blinking
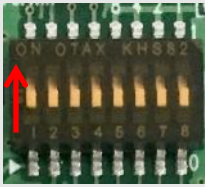
1-6. Sensor Interface

PIN NO.	신호명	비고
1	DC +24V	Black
2	DC +5V	Brown
3	Differential +	Red
4	Differential −	Orange
5	Single Ended Output	Yellow
6	Current Output	Green
7	AGND	Blue
8	DGND	White

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1-6. Node connection

CH1 CH2 CH3 CH4

Sensor Node 1
 - Sensor ID 1 Setting

Sensor Node 2
 - Sensor ID 2 Setting

Sensor Node 8
 - Sensor ID 8 Setting
- Termination resistor Setting

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1-6. Node connection(Cont'd)

Multi Channel

CH1 CH2 CH3 CH4

Sensor Node 1
 - Sensor ID1 Setting

Sensor Node 2
 - Sensor ID 2 Setting

Sensor Node 8
 - Sensor ID 8 Setting
 - Termination resistor Setting

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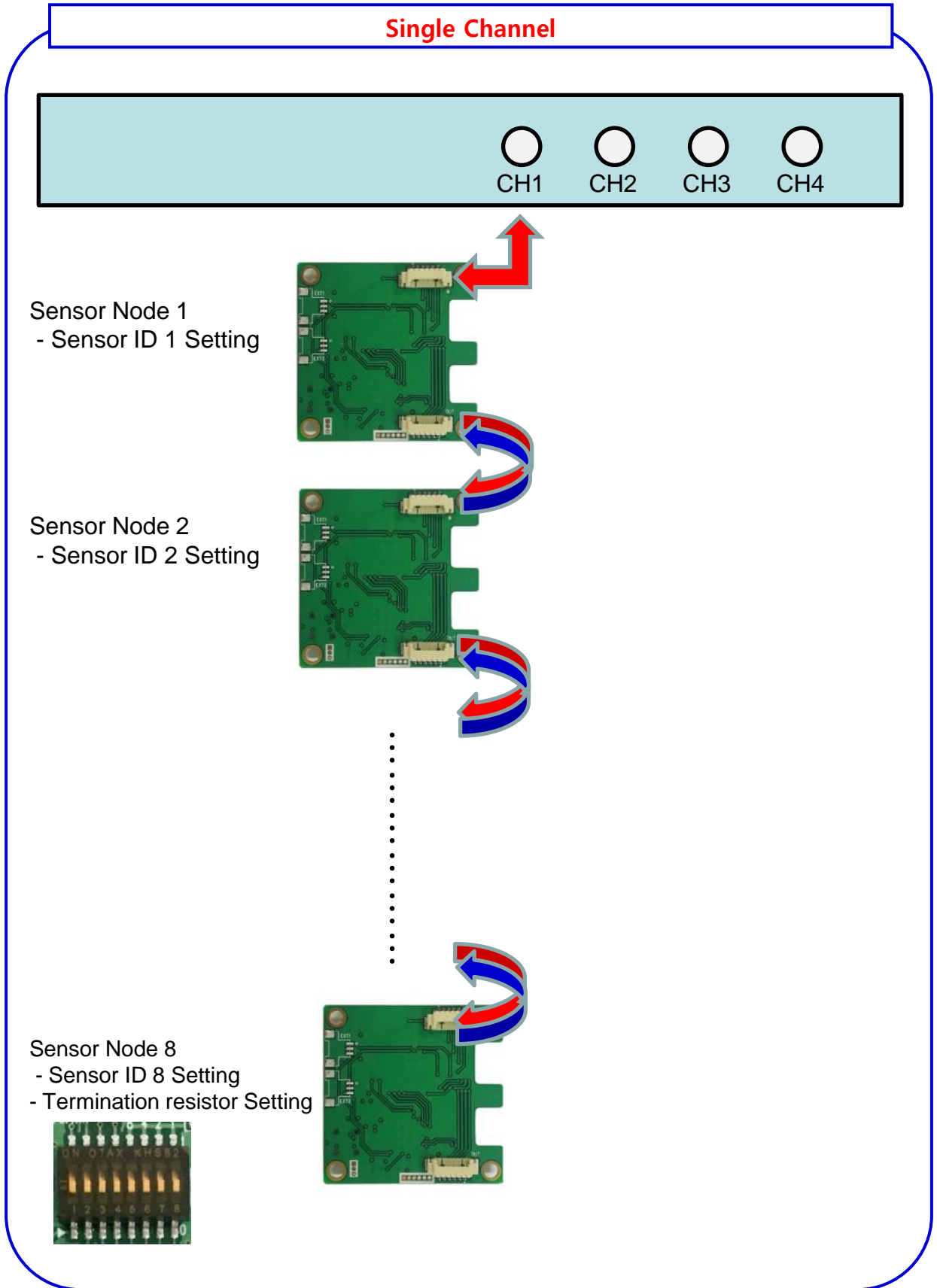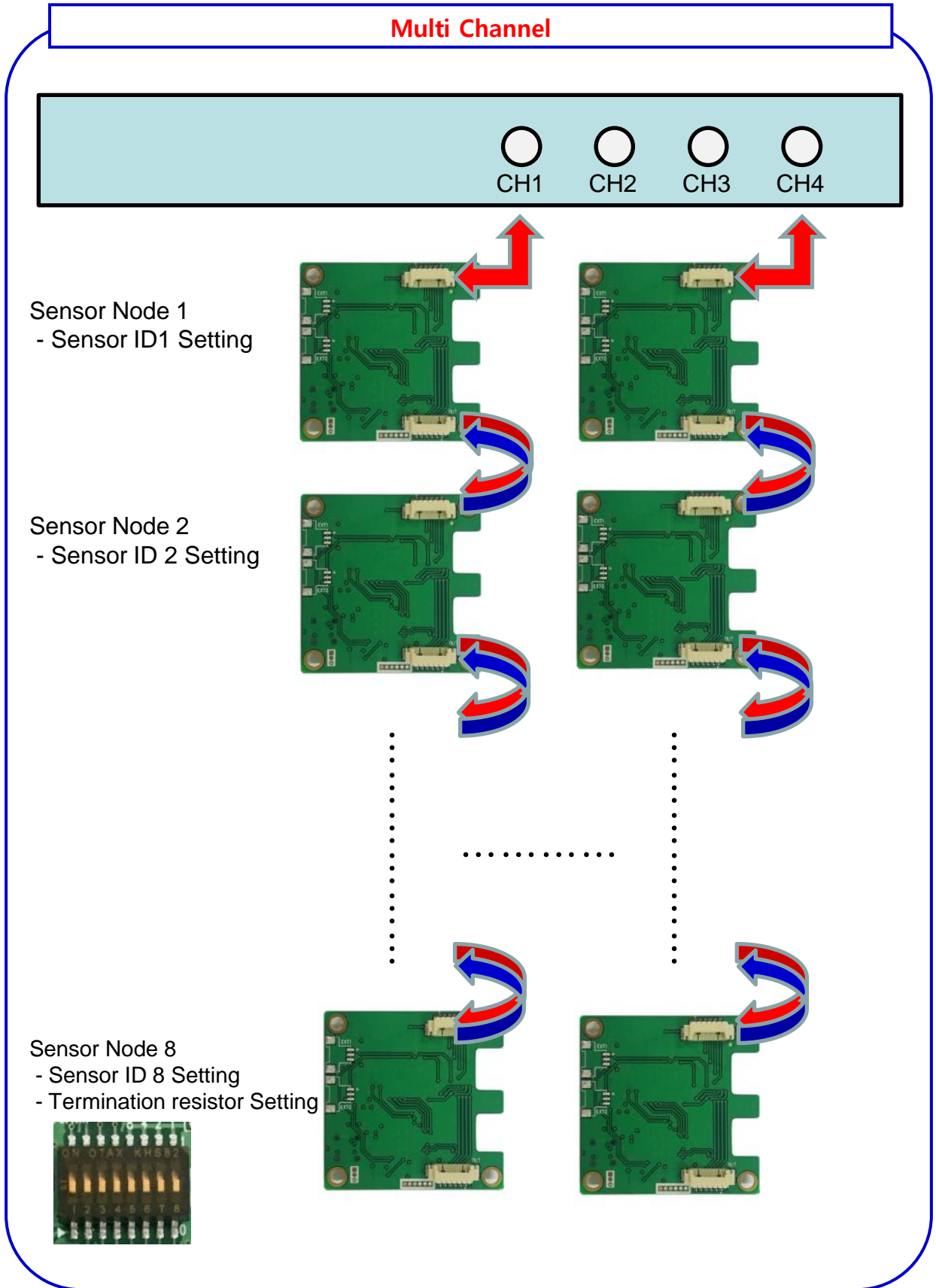
2-2. Connection of Management Console

2.2.1 Console cable provided by the product is to be connected to Console Port (RJ-45) at the front panel of TEK-SYRX as well as PC & laptop computer which terminal emulation software is installed.
   *. Terminal emulation Download (Free software)
      Tera Term Home Page → http://ttssh2.sourceforge.jp/

2.2.2 Configuration of terminal communication is as follows:

   *. Protocol : Serial
   *. Port : It is to check through Device Manager (Port) of PC or laptop computer
   *. Baud rate : 115200
   *. Data bits : 8
   *. Parity : None
   *. Stop bits : 1
   *. Flow Control : None

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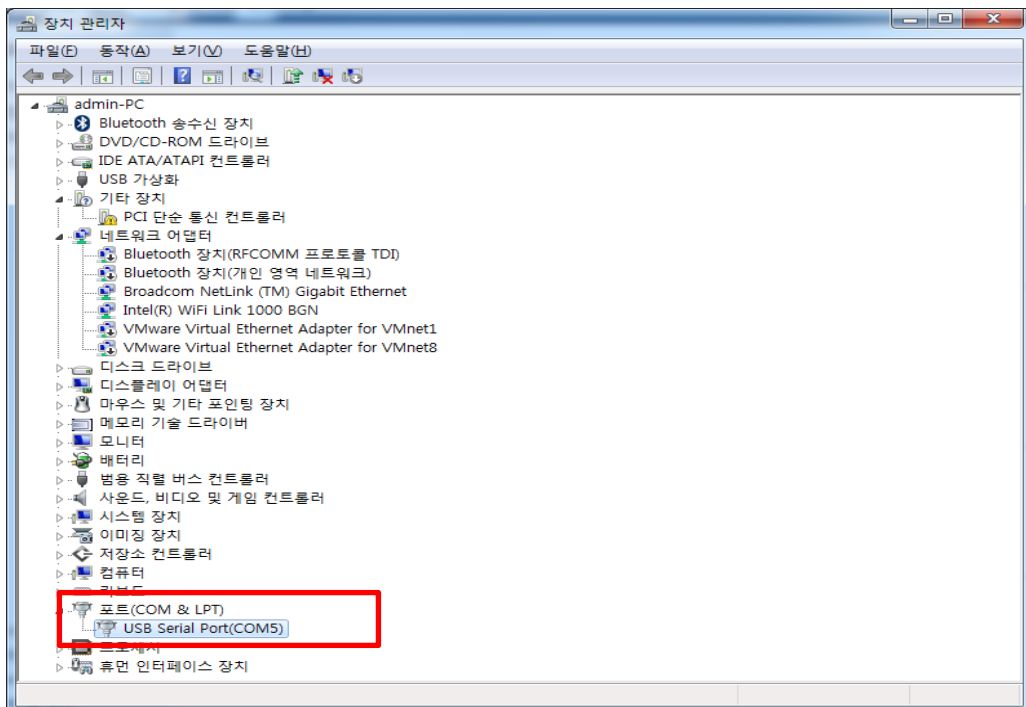
3. CLI (Command Line Interface)

3-1. Login

Use the 'root' account when logging in. (No password)
The login directory is / home / root.
Other commands are the same as for Linux.

< Examples >

```
login as: root
Last login: Fri Mar 24 12:50:33 2017 from 192.168.0.50
root@root@100:~#
root@root@100:~# pwd
/home/root
```

3-2. Hostname Configuration

The Hostname of the Data Logger can be changed by editing the / etc / hostname file. Changes to Hostname will be reflected after Reboot.

< Examples >

```
root@100:~# vi /etc/hostname
Data_Logger                            ##. Change to 'Data_Logger'
root@100:~# reboot                     ##. Reboot for the modification to
                                           take effect..
```

3-3. Time Configuration

Set the time using the 'Date' command.
You must update the current time on the RTC to save time after shutdown.

< Examples >

```
root@Data_Logger:~# date 032413072017          ##. Time setting
Fri Mar 24 13:07:00 UTC 2017

root@100:/etc# rtc w                            ##. Save set time to RTC
status: 0
after year: 17
month: 3
day: 24
wday: 5
hours: 13
mins: 6
secs: 58
2017-3-24 13:7:5:5
root@Data_Logger:~#
```

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3-4. Configure Network

Network settings can be changed by editing the /etc/default/ipconfig.conf file.
IP Assignment Mode (Static or DHCP), IP Address, Netmask, Default Gateway
can be set.

< Examples >

```
root@Data_Logger:~# vi /etc/default/ipconfig.conf
mode=static                                    ##. Static Setting
ipaddr=192.168.0.101                           ##. IP Address Setting
netmask=255.255.255.0                          ##. Netmask Setting
gateway=192.168.0.1                            ##. Default G/W Setting
root@Data_Logger:~#
```

3-5. Configure Channel

Supports Each channel operation (On / Off) setting.
When the power of Datalogger is turned on, all channels are enabled. The
corresponding channel (#) is disabled when '485 _ # _ off.sh' is operated, and the
corresponding channel (#) is enabled when '485 _ # _ on.sh' is operated.

< Examples >

```
root@Data_Logger:~# ./485_1_off.sh
root@Data_Logger:~# ./485_1_on.sh
```

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3-6. Configure External Sensor Node

Sensor node's impact measurement range and sampling period setting can be set by editing the /home/root/kslogger/cmdfile_#.txt file.
• '#' in the file name means Channel number.
Create and manage configuration file for 4 channels (1 ~ 4 channels, 8 IDs for each channel, 00 ~ 07)

The 'cmdfile _ #. Txt' file is applied from the data collection command (kslogger),

The data transmission cycle for each channel is the data transmission cycle set in the format of 'BL + OINV [Transmission Cycle]' and transmits the data collected from the sensor nodes to the data logger. The data transmission cycle of the channel is integrated and applied equally to all nodes.
However, 200ms is recommended for the transmission cycle.
For 'BL + OINV0200'
Means data transmission in 200ms unit on all nodes.

The data sampling cycle for each sensor node is in the format of BL + [node number] ER [sampling period]. In the case of BL + 01ER0100,
Node 01 means to sample (data collection) data in 100ms unit.
However, the sampling cycle range can be set to 5ms, 10ms or 100ms.

< Examples >

```
root@Data_Logger:~# vi cmdfile_1.txt
BL+OINV0200
########################
BL+00ER0010
BL+01ER0100
BL+02ER0010
########################

<Omitted>

########################
BL+06ER00100
BL+07ER0010
BL+08ER0010
########################
```

3‑7. Data collection command

Data collection for each channel and sensor node is done through the kslogger program.
Command execution supports two execution modes.

[Dump Mode]
  It consists of './kslogger dump –h [1,2,3,4] -adv'.
(Channel number is assigned from 1 to 4)
  In Dump mode, if the program session associated with the datalogger is terminated, the Kslogger program will be terminated automatically (for temporary testing purposes).

[Daemon Mode]
  './Kslogger start –h [1,2,3,4] -adv'
   (Channel number is assigned from 1 to 4)
  In Daemon mode, kslogger will continue to run until the shutdown command.

Kslogger launch options are

[cmdfile]
Collects data for the sensor nodes defined in 'cmdfile _ #. Txt' corresponding to the channel number specified when executing the 'kslogger' command (default execution mode).

Kslogger program termination
In Dump mode, you can execute 'Ctrl' + 'c'.
In Daemon mode, use the './kslogger stop' command.

< Examples >

```
root@Data_Logger:~# ./kslogger dump –h 1,2 -adv
##. dump mode by referring to cmdfile of each channel for channel 1 and 2

root@Data_Logger:~#./kslogger start –h 1,2,3,4 -adv
##. Deamon mode by referring to the cmdfile for each channel for channels 1, 2, 3, 4

root@Data_Logger:~#./kslogger stop
##. The running kslogger daemon will shut down.
```

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3-8. Check kslogger log

The log of data collection is stored in the 'log' folder in the same directory as the executable file (kslogger).
The log will generate 'channel _ #. Txt' and 'console _ # _ [runtime_time] .txt'.

< Examples >

```
root@Data_Logger:~# ls –al /log/
-rw-r--r--   1 root    root      4709475 Dec 18 12:38 channel_1.txt
-rw-r--r--   1 root    root      4709405 Dec 18 12:38 channel_2.txt
-rw-r--r--   1 root    root     18722767 Dec 18 12:38 console_1_20171215_175728.txt
-rw-r--r--   1 root    root     18722687 Dec 18 12:38 console_2_20171215_175729.txt
-rw-r--r--   1 root    root          277 Dec 18 12:38 log.txt
```