# ADV Data Logger & Advanced Sensor Node

# User Manual (Eng.)

**Version 1.0**

TOKYO ELECTRON

# 1. Introduction

**The industrial datalogger supports 4 channels and supports up to 12 Advanced Sensor Nodes for each channel. (Up to 28 sensor nodes are supported.)**

## 1-1. Features

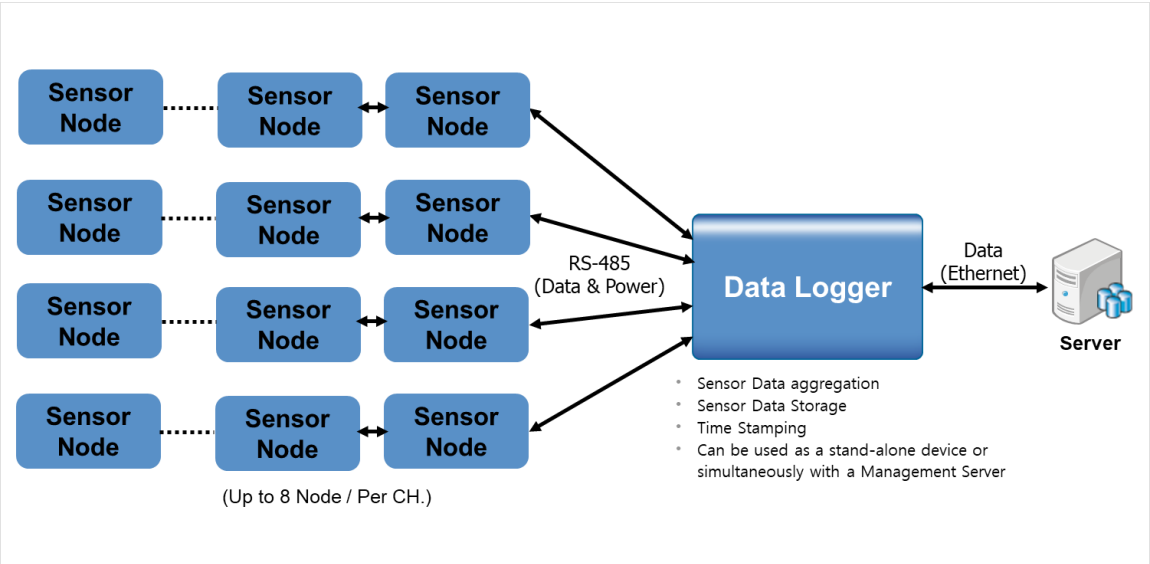
**Data Logger**

- ❖ Sensor Node Data Gathering
- ❖ Sensor Node Control
- ❖ Data Transmission
- ❖ 4 CH / 48 Node Support ( 12 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



## 1-3. System Specification

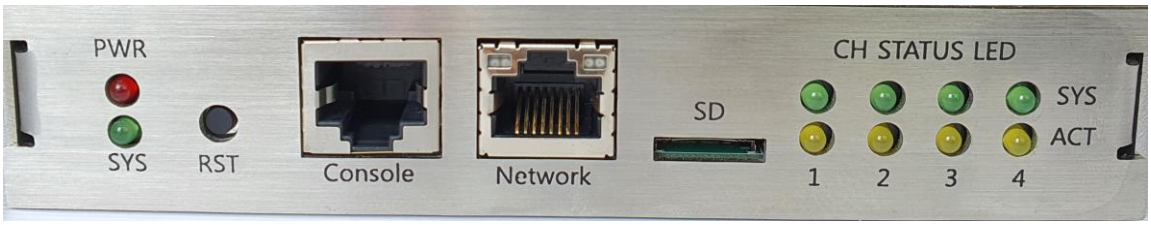
| Data Logger / Hardware Specification | |
|---|---|
| **Ports** | Ethernet : 1 port<br>System Console : 1 port(RS232 DB9)<br>Serial Interface : RS485, 4CH / 48 Node (12 Node / CH) |
| **Physical feature** | Speed and Duplex Auto sensing and crossover cable Auto detection |
| **Status Display** | Power, System Status, RS-485 Link/Act LED |
| **Memory** | Core : Dual ARM Cortex-A9, 1GHz<br>Flash : 1Gbytes<br>DDR3 : 2Gbytes |
| **Power Supply** | DC 24V |
| **Size** | 135mm(150mm) x 115mm x 25mm (With fixing guide 150mm) |
| **Weight** | 570g |
| **Operation Environment** | Temperature 0~50℃<br>Humidity 0~90%, non condensation |

| Advanced Sensor Node / Hardware Specification | |
|---|---|
| **Ports** | Data Logger Interface : RS-485(With Power)<br>Sensor Node Interface : RS-485(With Power)<br>External Sensor Interface : Terminal Block 8 Pin |
| **Main Resource** | Core : 32bit-Coretex-M7, 280MHz<br>RAM : 1.4M Bytes<br>Flash: 2MB |
| **Status Display** | Power, Network, System Status LED |
| **ADC** | Single Ended : 24 bit Sigma-Delta (-10V ~ +10V)<br>Differential : 24 bit Sigma-Delta (-10V ~ +10V)<br>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℃<br>Humidity 0~90%, non condensation |

# 1-4. Port & LED

## Data Logger

### [Front]




### [Rear]


- Power LED (PWR) : Power On (LED On) / Power OFF( LED Off)
- System Status LED (SYS) : System Operating LED / Blink
- CH STATUS LED : SYS (Port Enable : ON / Port Disable : OFF)
  ACT(Data Communication LED / Blink)

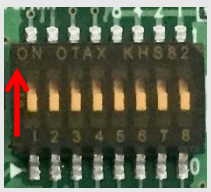
## Sensor Node


[TOP]

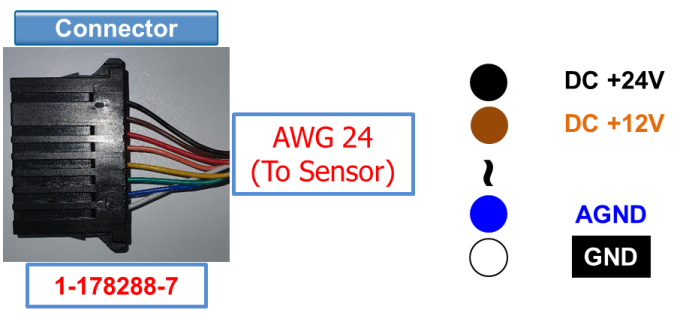
[SIDE]

# 1-5. Sensor Node Setting

**Sensor Node DIP Switch Operating**

| Item | Case | Description |
|---|---|---|
| DIP Switch<br>ON : 1(High)<br>  | 1 | RS-485 TX Line termination resistor setting |
| | 2 | Unspecified |
| | 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 |

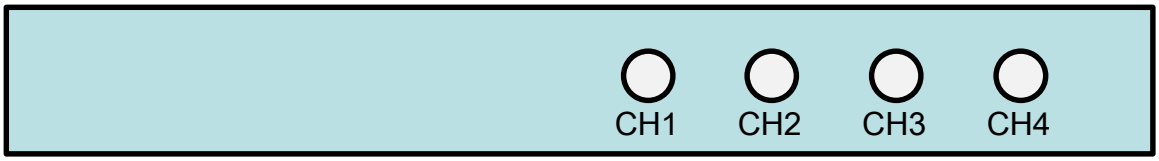
# 1-6. Sensor Interface



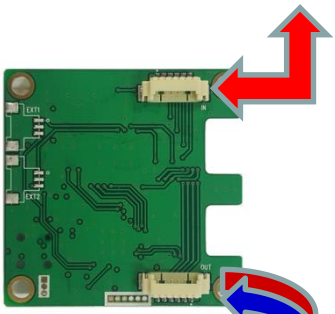

| PIN NO. | Signal | Cable Color |
|---|---|---|
| 1 | DC +24V | Black |
| 2 | DC +12V | Brown |
| 3 | Differential + | Red |
| 4 | Differential - | Orange |
| 5 | Single Ended Output | Yellow |
| 6 | Current Output | Green |
| 7 | AGND | Blue |
| 8 | DGND | White |

# 1-6. Node connection

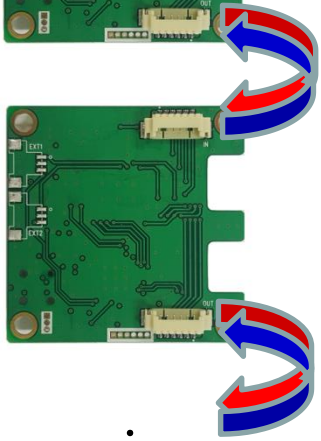
**Single Channel**

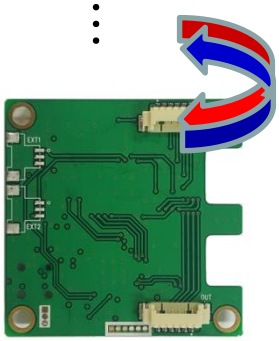



Sensor Node 1
- Sensor ID 1 Setting

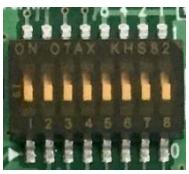


Sensor Node 2
- Sensor ID 2 Setting



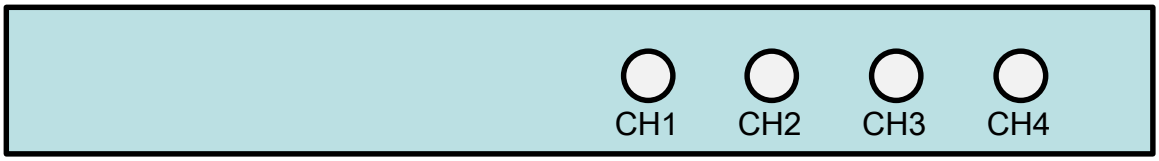


Sensor Node 8
- Sensor ID 8 Setting
- Termination resistor Setting



# 1-6. Node connection(Cont'd)

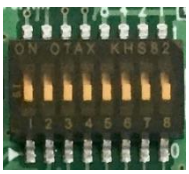
**Multi Channel**




Sensor Node 1
- Sensor ID1 Setting

Sensor Node 2
- Sensor ID 2 Setting

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



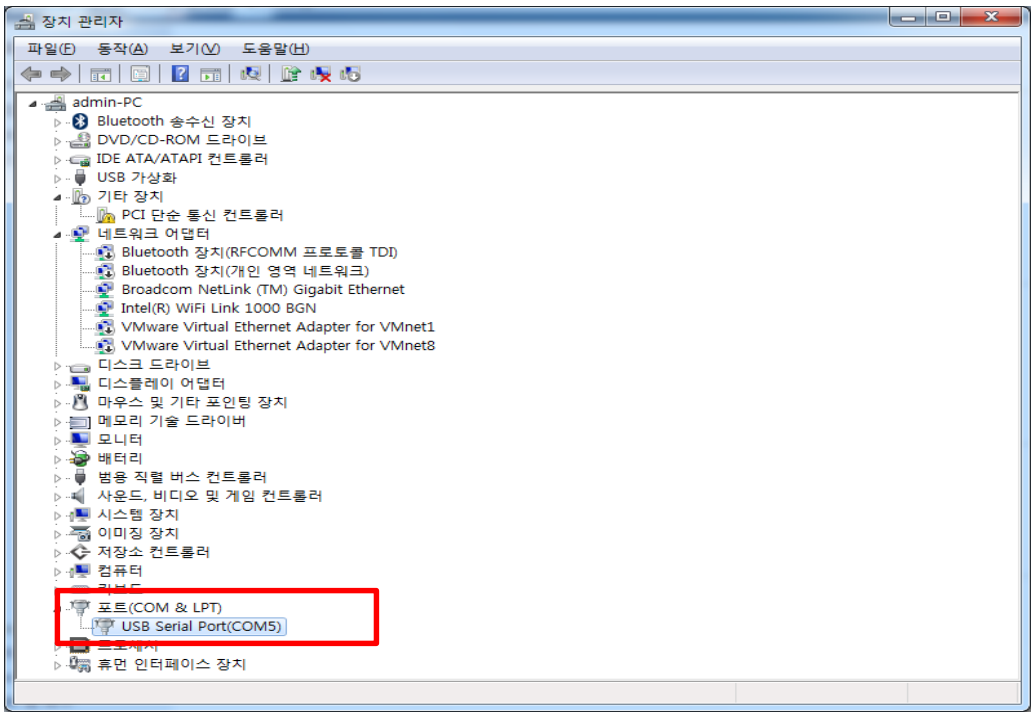
## 2-2. Connection of Management Console

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



# 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
root@TEL:~#
root@TEL:~# pwd
/home/root
root@TEL:~#
```

## 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@TEL:~# vi /etc/hostname
Data_Logger                          ##. ‘Change to 'Data_Logger'
root@TEL:~# 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@TEL:/# date 041915432022                ##. Time Setting
Tue Apr 19 15:43:00 UTC 2022

root@TEL:/# hwclock –w                       ##. Save set time to RTC

root@TEL:/# hwclock –r                       ##. RTC Time Cheeck
Tue Apr 19 15:44:27 2022  0.000000 seconds

root@Data_Logger:~#
```

## 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@TEL:~# vi /etc/network/interfaces
# /etc/network/interfaces -- configuration file for ifup(8), ifdown(8)

# The loopback interface
auto lo
iface lo inet loopback

# Wired or wireless interfaces
auto eth0
iface eth0 inet static                          ##. Static Setting
   address 192.168.0.101                        ##. IP Address
   netmask 255.255.255.0                        ##. Netmask
   network 192.168.0.0                          ##. Netmask
   gateway 192.168.0.1                          ##. Default Gateway

root@TEL:~# ifdown eth0                     ##. eth0 Disable(Down)

root@TEL:~# ifup eth0                       ##. eth0 Enable(UP)

fec 2188000.ethernet eth0: Freescale FEC PHY driver [Generic PHY]
(mii_bus:phy_addr=2188000.ethernet:01, irq=-1)
root@TEL:~# libphy: 2188000.ethernet:01 - Link is Up - 100/Full
```

## 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
```

# 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, 16 IDs for each channel, 00 ~ 15)

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

The data Transmission cycle is ADV Sensor node transmits data collected at 200ms Intervals in case of ‘BL+INV0200ADV‘. In the case of ‘BL+INV0200‘, the general Sensor node transmits the collected data at 200ms intervals.

In case of filter application of collected data, it can be set by ‘BL+DIF04000‘. By comparing the received data value with the absolute value collected immediately before, a filter can be applied that removes the data if a value change of 4000 or more occurs.
In some cases, you can change the absolute value applied to the filter.
(Ex. In the case of ‘BL+DIF02000‘, data that has changed in absolute value of 2000 is removed)

**< Examples >**

```
root@TEL:~/kslogger# vi cmdfile_1.txt
BL+INV0200ADV                  #. ADV Sensor node 200ms interval
#BL+INV0200                    #. General Sensor node
BL+DIF04000                    #. Absolute value 4000
BL+00ER0020                    #.  Node 00 Collection setting
#BL+01ER0020                   #. Commented out to exclude node
#BL+02ER0020                       01 Collection
#BL+03ER0020
#BL+04ER0020
#BL+05ER0020
#BL+06ER0020
#BL+07ER0020
#BL+08ER0020
#BL+09ER0020
#BL+10ER0020
#BL+11ER0020
#BL+12ER0020
```

## 3-7. Data collection command

Data collection for each channel and sensor node is performed through the ‘./kslogger start’ command.
When the data collection command is executed, the operating channel refers to the ‘parameter.txt’ data. Channel numbers can be assigned from 1 to 4

Additionally, you can manually set the channel to be executed like ‘./kslogger start –h 1,2. When the ‘kslogger’ command is executed, data is collected for the sensor node defined in ‘cmdfile_#.txt’ corresponding to the specified channel number.

**< Examples >**

```
root@TEL:~/kslogger# more /home/root/kslogger/parameter.txt
-h 1,2,3,4
##. 1, 2, 3, 4 channel data collection

root@TEL:~/kslogger# more parameter.txt
-h 1,2
##. 1, 2 channel data collection

root@TEL:~/kslogger# ./kslogger start
##. Collect and transmit by referring ‘parameter.txt’ file and cmdfile for each channel

root@TEL:~/kslogger# ./kslogger start –h 1,2
##. Collect and transmit channel 1 and 2 data by referring to the cmdfile
```

## 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).

**< Examples >**

```
root@TEL:~/kslogger/log# ls -al
drwxr-xr-x    2 root     root          512 May 18 15:20 .
drwxr-xr-x    5 root     root          712 May 18 15:20 ..
-rw-r--r--    1 root     root        39883 May 18 15:21 channel_1.txt
-rw-r--r--    1 root     root        39883 May 18 15:21 channel_2.txt
-rw-r--r--    1 root     root        39883 May 18 15:21 channel_3.txt
-rw-r--r--    1 root     root        39883 May 18 15:21 channel_4.txt
-rw-r--r--    1 root     root          277 May 18 15:21 log.txt
```

## 3-9. Check system information

You can check HW, SW version and Serial number information with the ‘sysinfo’ command of ADV Data Logger.

**< Examples >**

```
root@TEL:~# sysinfo
Product Name  : Advanced DataLogger
Serial Number : DL0022150001
H/W Version   : 2.0.0
S/W Version   : 0.9.6
```

§ 15.105 Information to the user.

(a) For a Class A digital device or peripheral, the instructions furnished the user shall include the following or similar statement, placed in a prominent location in the text of the manual:

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.

Part 15.21 statement " Change or Modifications that are not expressly approved by the manufacturer could void the user's authority to operate the equipment.