MAKERBOX

Digital Transformation Partner

Digital Transformation

Digital transformation is an essential option for companies to take a leap forward in future industries.
MAKERBOX is growing by thinking and solving problems together with partners heading into the 4th industrial era.

MAKERBOX's verified technology obtained through continuous research and development is used in various industrial fields such as testing, manufacturing, production, and inspection that require the introduction of automation.

Various Industry Area

MAKERBOX's unique technologies, including testing and measurement, motion control, and simulation, are used in a variety of industries.

Continuous R&D

Through the company-affiliated research institute, we are constantly researching and developing technologies that can respond to future industries.
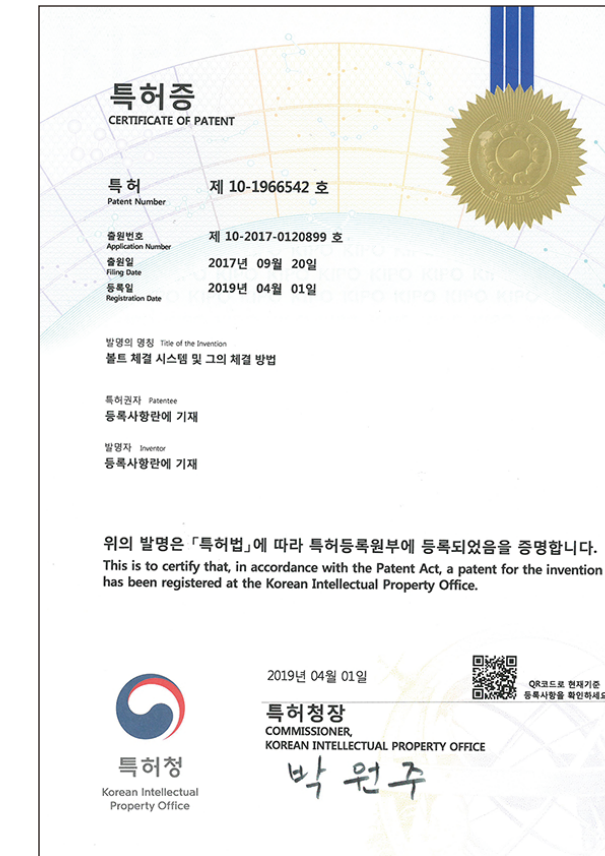
Verified Technology

We propose solutions with verified technology, including certification as a venture company, software specialist, and holding related patents and copyrights.
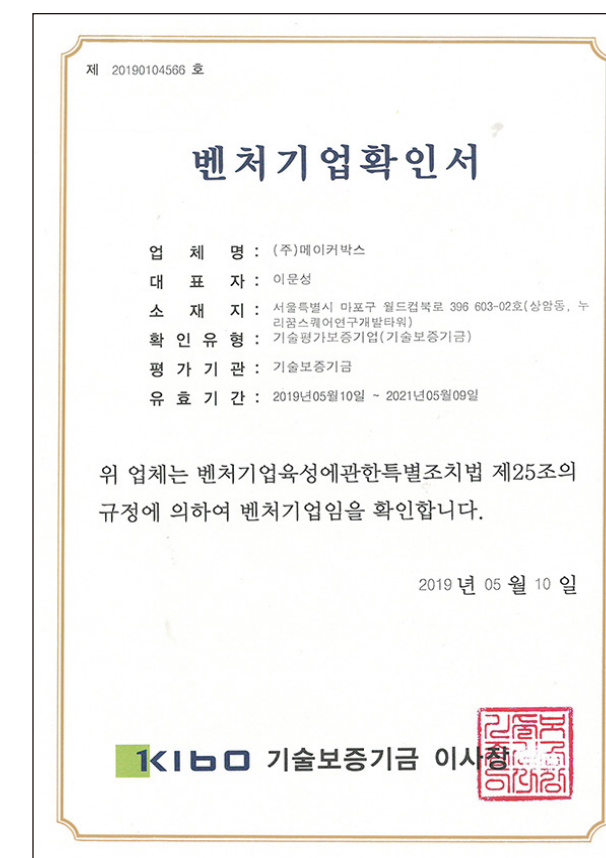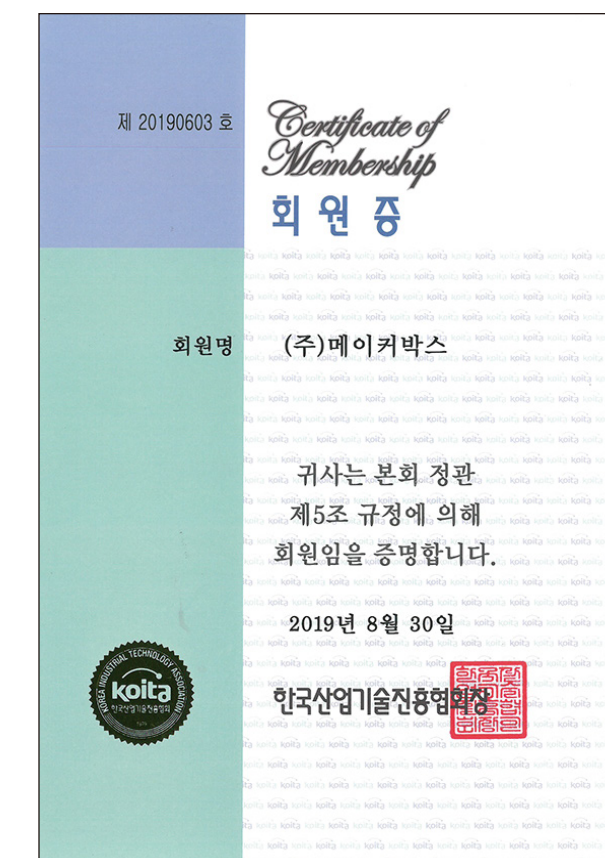
Certificate of Trademark

Certificate of Patent

R&D Institute

Venture Business Certificate

Membership of KOITA

Membership of KORAIA

Integration Solution

Digital transformation is an important process
that creates the foundation for future business,
so it requires an integrated approach that penetrates
the entire industry, rather than just a one-time project.

MAKERBOX opens the way to the next step
by providing integrated solutions for a variety of purposes,
from project planning to after-sales management
to new projects and remodeling, improvement,
and maintenance/repair of existing processes.

Project Planning

Pre-verifying the project
through in-depth analysis
and suggest the optimal process.

Solution Build

Building integrated solutions
based on our proprietary technologies
in hardware, software, and data.

Follow-up Management

Providing user manuals, training,
and maintenance to ensure smooth use
of the solution.

Hardware

Optimal hardware configuration
required for the project, including facility,
electrical equipment, wiring,
and control rack production, etc

Software

Developing software
that can respond to various devices
and platforms considering
functionality, usability, and aesthetics

Data

Implement MES and process
automation systems by collecting
generated data and analyzing it
through algorithms and machine learning

System Components
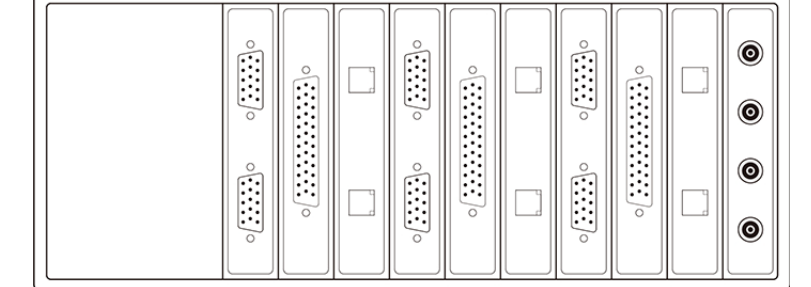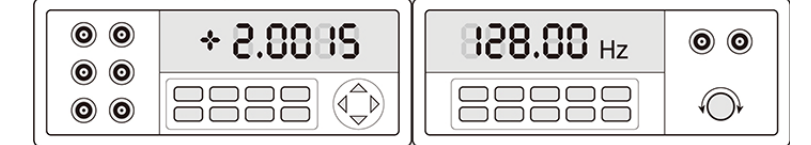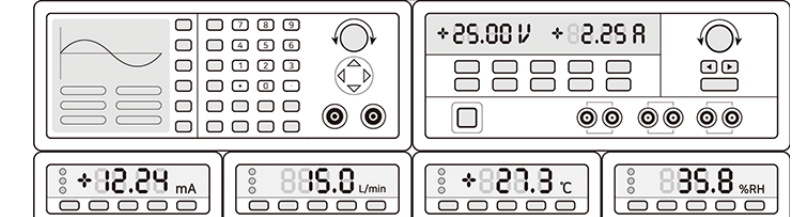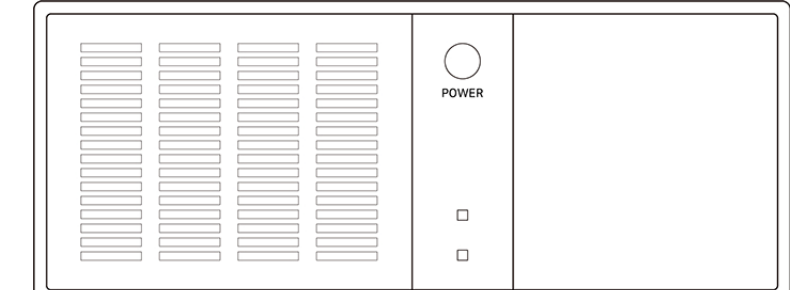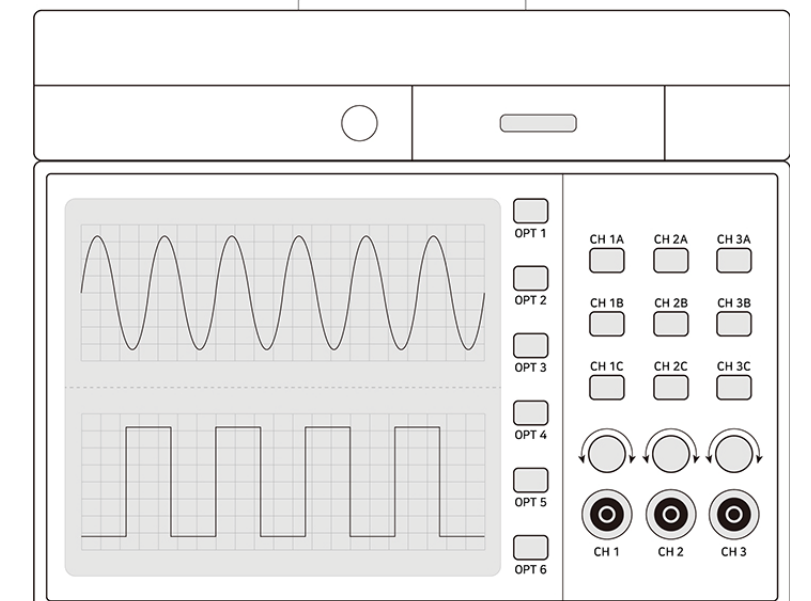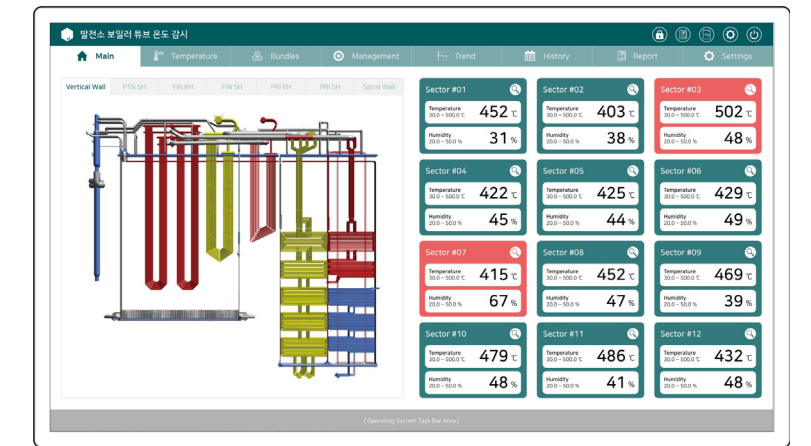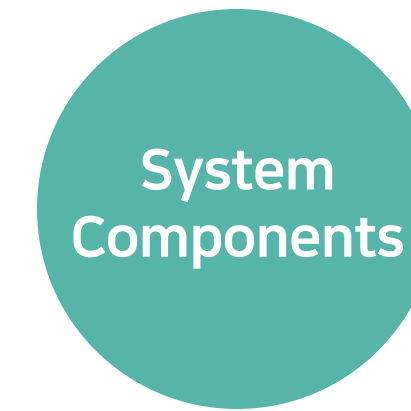
Our Technology

With the goal of converging numerous technologies
that can be applied to industries such as
test, measurement, motion control, and simulation,
we are constantly presenting and progressing
our own research and development tasks, and through this,
we are deriving continuous improvement plans
not only for new projects but also for completed projects.

The industry continues to evolve without stopping.
With us, you can look ahead to the future
without worrying about being left behind.

Test and Measurement

Test and measurement are core technologies that form the basis of all solutions,
and various types of projects are being carried out through collaboration with
domestic and foreign hardware companies and self-development of system integration operation software.

Motion Control

Through precise control based on various actuator driving technologies
such as motors, multi-axis robots, hydraulic and pneumatic, etc., it performs functions suitable
for the purpose such as performance, limit testing, and realization of a test environment.

Simulation

Various variables can be predicted and applied in advance
through precise environmental simulation and real-time technology
such as process prediction, facility predictive maintenance, HILS / SILS, and BIM.

Partners and Clients

Based on our unique technology,
we provide optimal solutions to various industries
and develop together by sharing the value
of win-win cooperation with partners and clients.

LG	ASML	DOOSAN
Honeywell	Valeo	HYUNDAI
SK hynix	SWATCH GROUP	KRRI Korea Railroad Research Institute
ex Korea Expressway Corporation	Ministry of National Defense Republic of Korea	KEPCO
HONGIK UNIV.	HYU HANYANG UNIVERSITY SEOUL, KOREA	PEC POINT ENGINEERING
AJINEXTEK	ni	HEXAGON

Our Works

01 Placement and Transfer of Weight for Photomask Polishing

02 Set Screw Automatic Tightening

03 Forklift Engine Load Test

04 Braking Device ECU Performance Test

05 Power Plant Boiler Tube Temperature Monitoring

06 Remote Controller Comprehensive Performance Test

07 Suction/Diffusion Type Gas Detector Performance Test

08 Vehicle Seat Friction Wear Test

09 Integrated Monitoring of Multiple Measuring Devices

10 Panel Overcoating Process Accumulated Current Monitoring

11 Automotive Clutch Performance Test

12 Remote Monitoring of Train Point-machine

13 EUV Lithography Equipment Component Inspection

14 Plasma Signal Inspection and Measurement

15 Establishment of ADAS Test Environment

16 Performance Test of Hydrogen Recirculation Blower for Hydrogen Vehicles

17 Vision Data Collection and Reporting

18 Performance Output Test for Each Semiconductor(MOSFET) State

Placement and Transfer of Weight for Photomask Polishing

Purpose

· Work through self-weight polisher weight placement simulation and transfer for photomask polishing

Main Fuctions

· Weight movement and placement through robot control

· Position calculation based on vision data

· Load cell, servo motor measurement and control

Expected Effects

· Reduction of placement errors due to introduction of simulation

· Reduce human error

· Increased production efficiency

Flatness Revision

- Flatness
- Floor Setting
- Location
- 3D Mode

Model
1220 × 1400 (13T)

Surface
Rear

LOT ID
N1234123

ID Number
34123

Name
Adrian MILLER

Flatness Diagram

Flatness Range

- 🔴 12 ㎛ ~ 17 ㎛
- 🟡 09 ㎛ ~ 12 ㎛
- 🟢 06 ㎛ ~ 09 ㎛
- 🔵 03 ㎛ ~ 06 ㎛
- 🔵 00 ㎛ ~ 03 ㎛

Front　　8.0 ㎛

Back　　16.7 ㎛

TTV　　20.7 ㎛

1,440

1,220

Reference

3D View

4
3
2
1
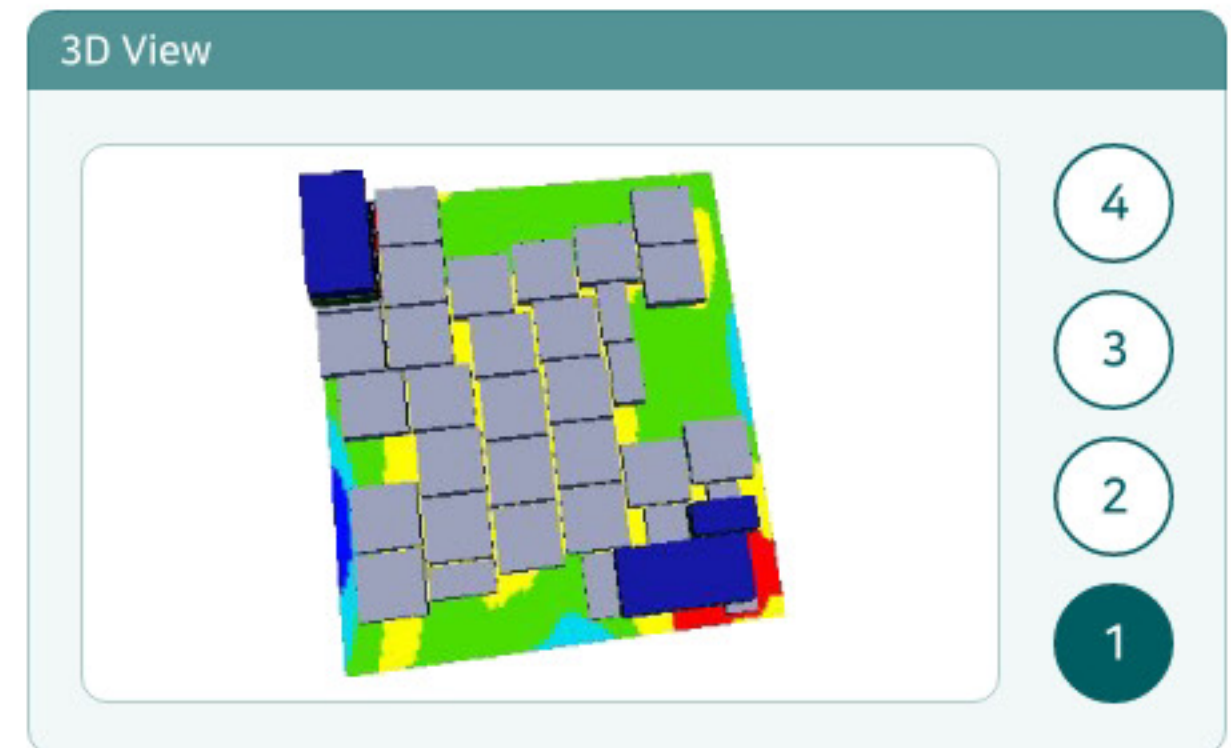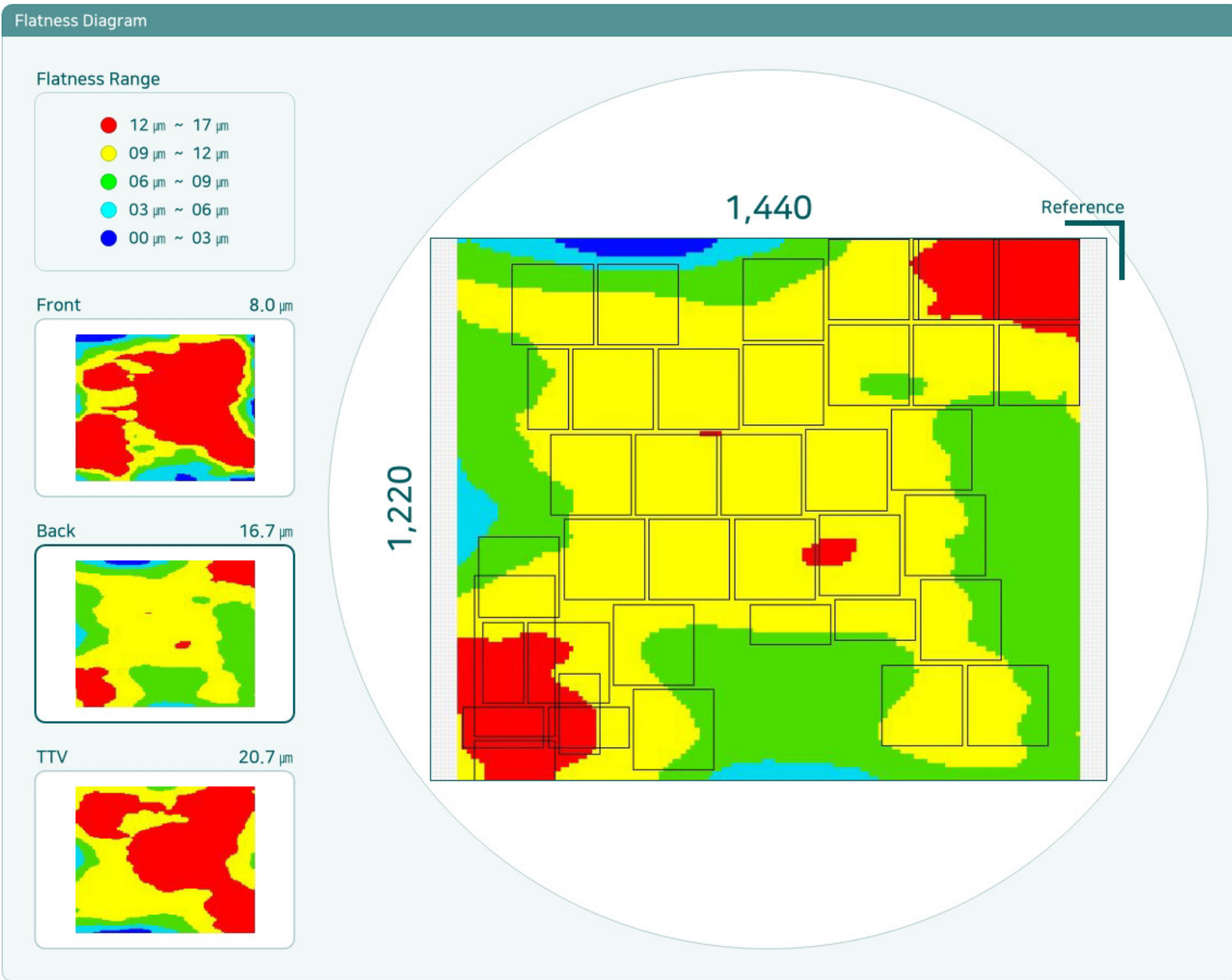
Edit Weight

10 kg	5 kg	2.5 kg

- ⊕ Insert
- ⊖ Delete
- ↻ Reset

Total Amount of Weights

2 EA	29 EA	8 EA

Total Weight
185.0 kg

Total Quantity
39 EA

Estimated Time
11 min **30** sec

Set Screw
Automatic Tightening

———

Purpose
· Automatic locking of setscrews for vehicle steering and seat parts

Main Fuctions
· Servo motor motion control
· Congestion induction by current/voltage measurement

Expected Effects
· Reduce human error
· Increased production efficiency

Locking Station #01

▶ Play | ⓘ Locking Info. | ↻ Data Reset | ↻ Quantity Reset

Locking Results

No.	Barcode	E.C.	C.C.	D.C.	M.C.	Slope	Result	CT	Time	Min	Max	Deviation
1	AE1506180245	1.07	1.07	1.07	1.07	1.02	OK	13.8	19:34:50	1.05	1.12	0.01
2	AE1506180423	1.07	1.06	1.07	1.07	1.05	OK	13.8	19:34:55	1.06	1.11	0.01
3	AE1506180263	1.07	1.07	1.08	1.07	1.07	OK	13.8	19:35:06	1.04	1.08	0.01
4	AE1506182362	1.07	1.07	1.11	1.07	1.06	OK	13.8	19:35:11	1.05	1.10	0.01
5	AE1506182312	1.07	1.07	1.15	1.07	1.07	OK	13.8	19:35:17	1.04	1.05	0.01

Product Info.

Model Name
MK-T06834

Barcode
AE1506180245

Cycle Time
5.4 s

Quantity

OK	005
NG	000
Total	005

Current Graph

(Current Consumption (A) vs Time (ms))

Servo Motor Test

⊖ 1.2 mm/s ⊕

▶ Start
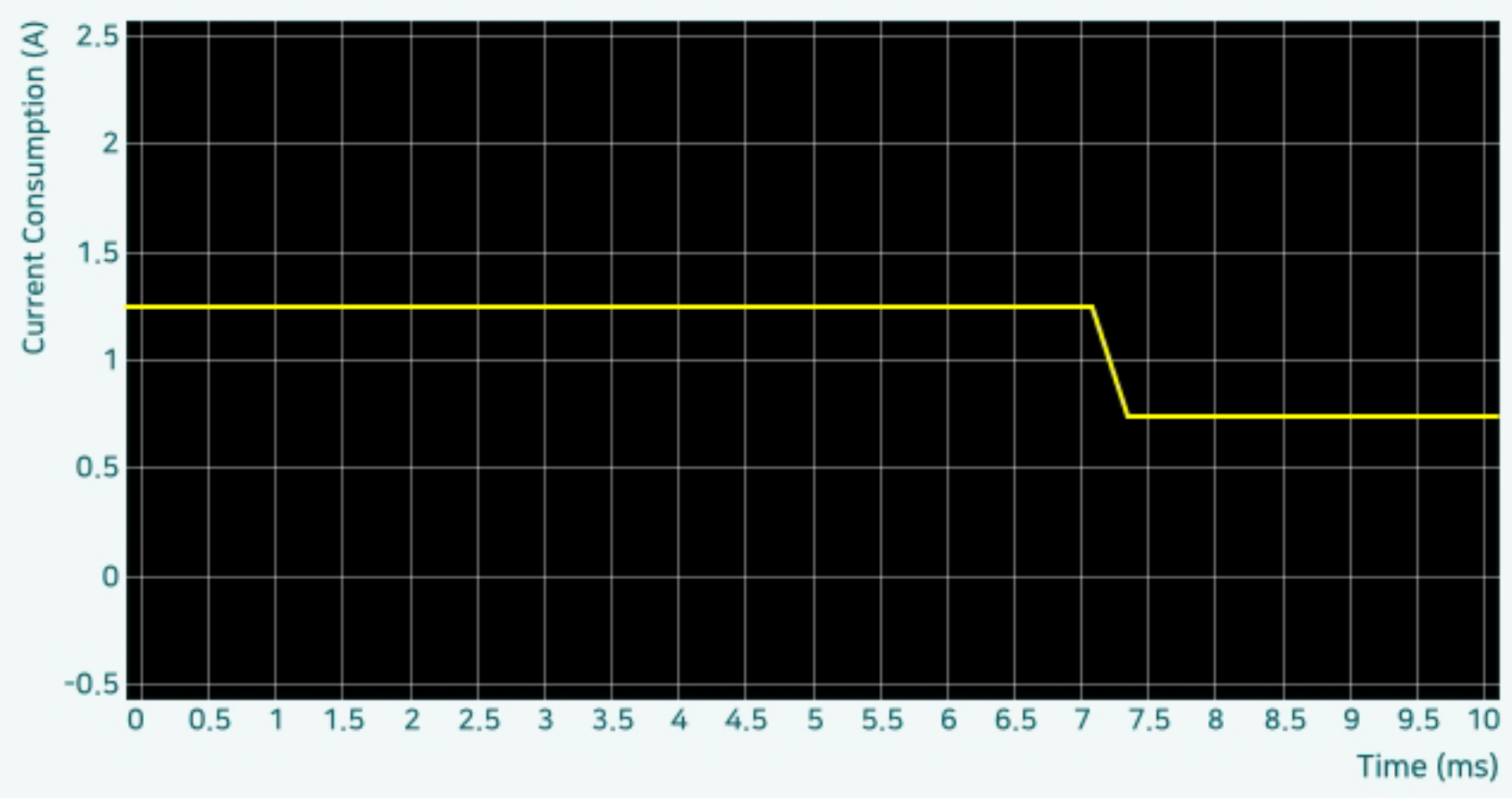
Locking Info.

Initial Current
0.32 A

Present Current
0.15 A

Status
OK

Locking Station #02

▶ Play | ⓘ Locking Info. | ↻ Data Reset | ↻ Quantity Reset

Locking Results

No.	Barcode	E.C.	C.C.	D.C.	M.C.	Slope	Result	CT	Time	Min	Max	Deviation
1	AE1507008304	1.07	1.07	1.07	1.07	1.02	OK	13.9	19:34:50	1.05	1.12	0.01
2	AE1506189731	1.07	1.06	1.07	1.07	1.05	OK	13.8	19:34:55	1.06	1.11	0.01
3	AE1503230263	1.05	1.07	1.08	1.07	1.07	OK	13.8	19:35:06	1.04	1.08	0.01
4	AE1506182362	1.07	1.07	1.11	1.07	1.06	OK	14.4	19:35:11	1.05	1.10	0.01
5	AE1506182312	1.11	1.07	1.15	1.07	1.07	OK	13.8	19:35:17	1.04	1.05	0.01

Product Info.

Model Name
MK-T06840

Barcode
AE1507008304

Cycle Time
5.2 s

Quantity

OK	005
NG	000
Total	005

Current Graph

(Current Consumption (A) vs Time (ms))

Servo Motor Test

⊖ 1.2 mm/s ⊕

▶ Start
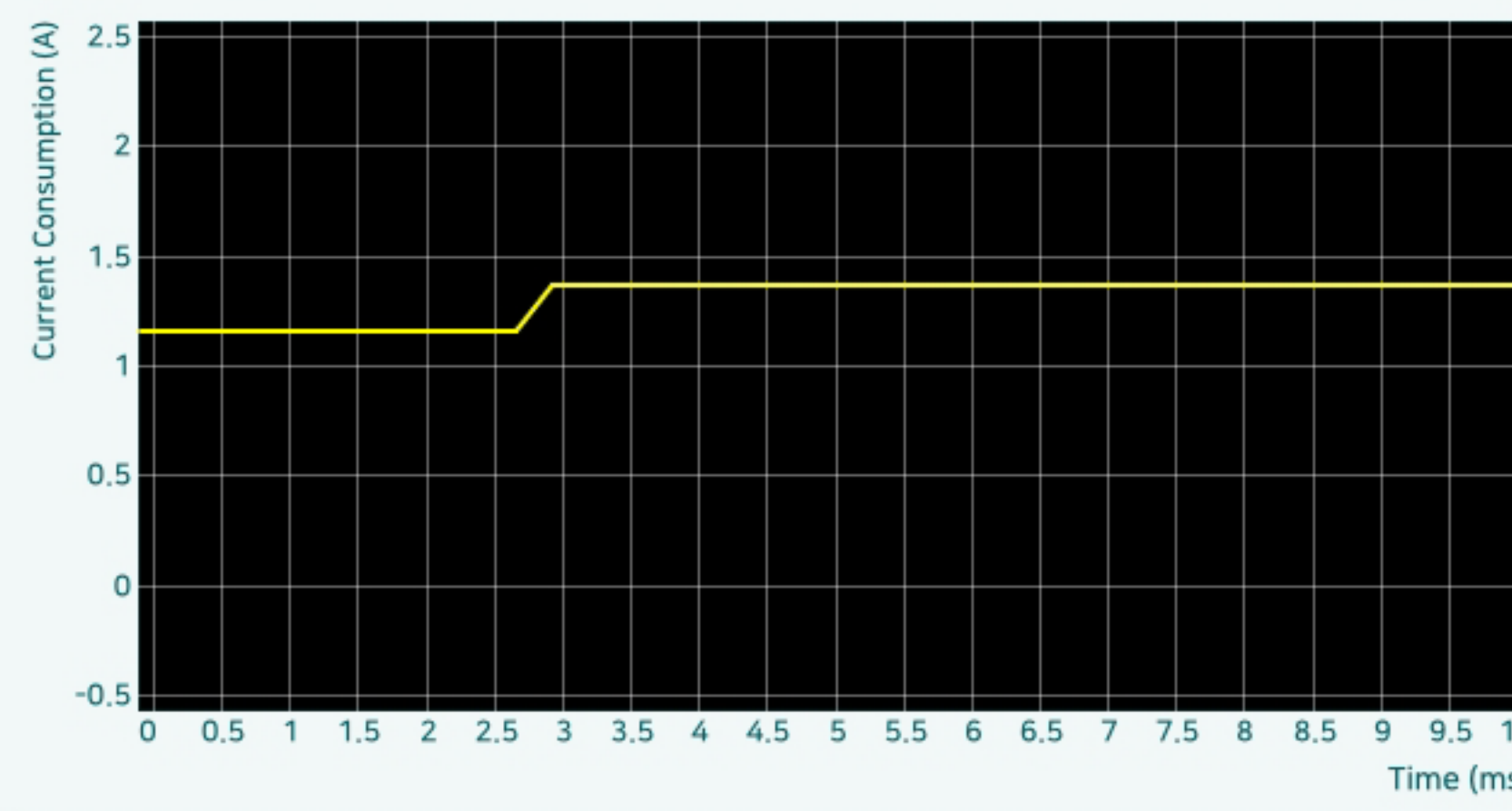
Locking Info.

Initial Current
0.32 A

Present Current
0.28 A

Status
OK

Forklift
Engine Load Test

———

Purpose

· Automation of forklift engine testing

Main Fuctions

· Forklift lifting simulation through hydraulic system

· Scenario-based test automation

· CAN communication

Expected Effects

· Increased accuracy due to unmanned testing

· Reduce test cost/time

· Easy to add follow-up performance tests through modularization

Input Data Sheet

Open　Save　Clear　▶ Play

| Time | Analog Input | | | | | | | | Voltage Output | | | |
	# 00	# 01	# 02	# 03	# 04	# 05	# 06	# 07	# 00	# 01	# 02	# 03
0	0.5	0.2	0.2	0.7	0.5	0.1	0.2	0.3	0.9	0.8	1.1	0.9
1	0.4	0.1	0.2	0.5	0.5	0.5	0.7	0.3	1.1	0.8	1.1	1.1
2	0.1	0.7	0.7	0.1	0.5	0.7	0.3	0.3	1.1	0.9	0.8	0.9
3	0.7	0.2	0.7	0.2	0.7	0.1	0.7	0.7	0.9	0.8	0.9	# 03
4	0.1	0.7	0.3	0.7	0.3	0.7	0.7	0.1	0.9	0.9	0.8	# 03

CAN Data Panel

Data Save　Can Save　Save All　Send

No.	Signal	Data	No.	Signal	Data
# 01	ABSFullyOperational	0.0	# 08	ABSFullyOperational	0.0
# 02	ABSFullyOperational	0.0	# 09	ABSFullyOperational	0.0
# 03	ABSFullyOperational	0.0	# 10	ABSFullyOperational	0.0
# 04	ABSFullyOperational	0.0	# 11	ABSFullyOperational	0.0
# 05	ABSFullyOperational	0.0	# 12	ABSFullyOperational	0.0
# 06	ABSFullyOperational	0.0	# 13	ABSFullyOperational	0.0
# 07	ABSFullyOperational	0.0	# 14	ABSFullyOperational	0.0

Alarm Config (V)

No.	Low	High	Port
# 01	-5.0	20.0	N/A
# 02	-5.0	20.0	N/A
# 03	-5.0	20.0	N/A
# 04	-5.0	20.0	N/A
# 05	-	5.0	N/A
# 06	-	5.0	N/A
# 07	-5.0	-	N/A
# 08	-5.0	-	N/A

Alarm Config (I)

No.	Low	High	Port
# 01	-5.0	5.0	N/A
# 02	-5.0	5.0	N/A
# 03	-5.0	5.0	N/A
# 04	-5.0	5.0	N/A
# 05	-	5.0	N/A
# 06	-	5.0	N/A
# 07	-5.0	-	N/A
# 08	-5.0	-	N/A

Time Infromation

Target	AL Check
00 : 50 : 00	10.0 sec
Actual	Cycle
00 : 02 : 30	005 / 100

DO_Switch

Ch_00　Ch_01
Ch_02　Ch_03

AO_V Control

Ch_00	Ch_01	Ch_02	Ch_03	Ch_04	Ch_05	Ch_06	Ch_07
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Ch_08	Ch_09	Ch_10	Ch_11	Ch_12	Ch_13	Ch_14	Ch_15
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

AO_Voltage (Ch_08 ~ Ch_15)

Legend: # 00, # 01, # 02, # 03, # 04, # 05, # 06, # 07

Ch.	# 00	# 01	# 02	# 03	# 04	# 05	# 06	# 07
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
a	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
b	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
c1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
c2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

AO_Voltage (Ch_08 ~ Ch_15)

Legend: # 00, # 01, # 02, # 03, # 04, # 05, # 06, # 07

Ch.	# 00	# 01	# 02	# 03	# 04	# 05	# 06	# 07
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
a	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
b	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
c1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
c2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

DO_V Control #1 (Input Data Sheet)

Ch_00　Ch_01　Ch_02　Ch_03
Ch_04　Ch_05　Ch_06　Ch_07

DO_V Control #2 (DO Switch)

Ch_00　Ch_01　Ch_02　Ch_03
Ch_04　Ch_05　Ch_06　Ch_07

Braking Device
ECU Performance Test

———

Purpose

· ECU performance testing through HILS (Hardware In the Loop Simulation)

Main Fuctions

· Real-Time (RT) platform simulation

· ECU functional verification and limit testing

· CAN communication

Expected Effects

· Contribute to improving product quality by analyzing large amounts of data through repeated testing

· Enables future integration testing with various DUT, including simulation of virtual braking functions

Speed | Ax | RPM | Collision | SW Angle | Yaw Rate
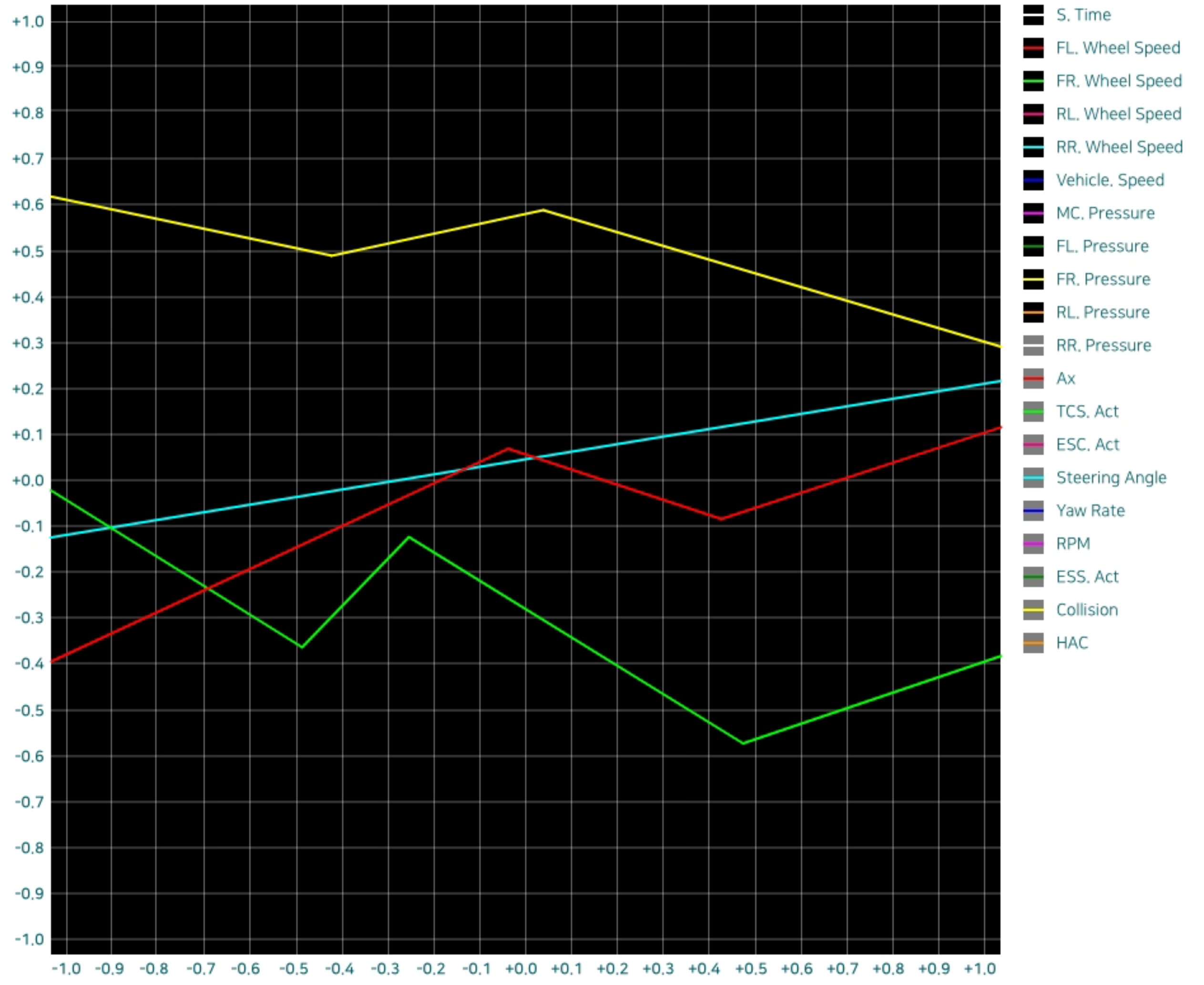TCS Act | ESS Act | HAC Act | ESC Act | Brake Pressure | Graph Start

Brake Ready | Brake On | Collision | ABS Act

ESC Act | TSC Act | ESS Act | HAC Act

Project Name	Slip Coefficient_F	Slip Coefficient_R	
Brake HIL	2.5	0.5	Steering Control
Test Run	Diameter_F #1	Diameter_R #1	
ABS_Test	40	40	Mu-Slip Curve
Tire Model	Diameter_F #2	Diameter_R #2	
Tire Type A	40	40	TPS Control
Target Speed	Radius of Investigation _F	Radius of Investigation _R	
80	50	50	▶ Play
MC Pressure	Dynamic Radius	Braking Distance	
0	650	0	⚙ Settings

km/h

×1000rpm

Graph legend:
- S. Time
- FL. Wheel Speed
- FR. Wheel Speed
- RL. Wheel Speed
- RR. Wheel Speed
- Vehicle, Speed
- MC. Pressure
- FL. Pressure
- FR. Pressure
- RL. Pressure
- RR. Pressure
- Ax
- TCS. Act
- ESC. Act
- Steering Angle
- Yaw Rate
- RPM
- ESS. Act
- Collision
- HAC

Power Plant Boiler Tube Temperature Monitoring

Purpose

· Monitoring the temperature of boiler tubes in operation within the power plant
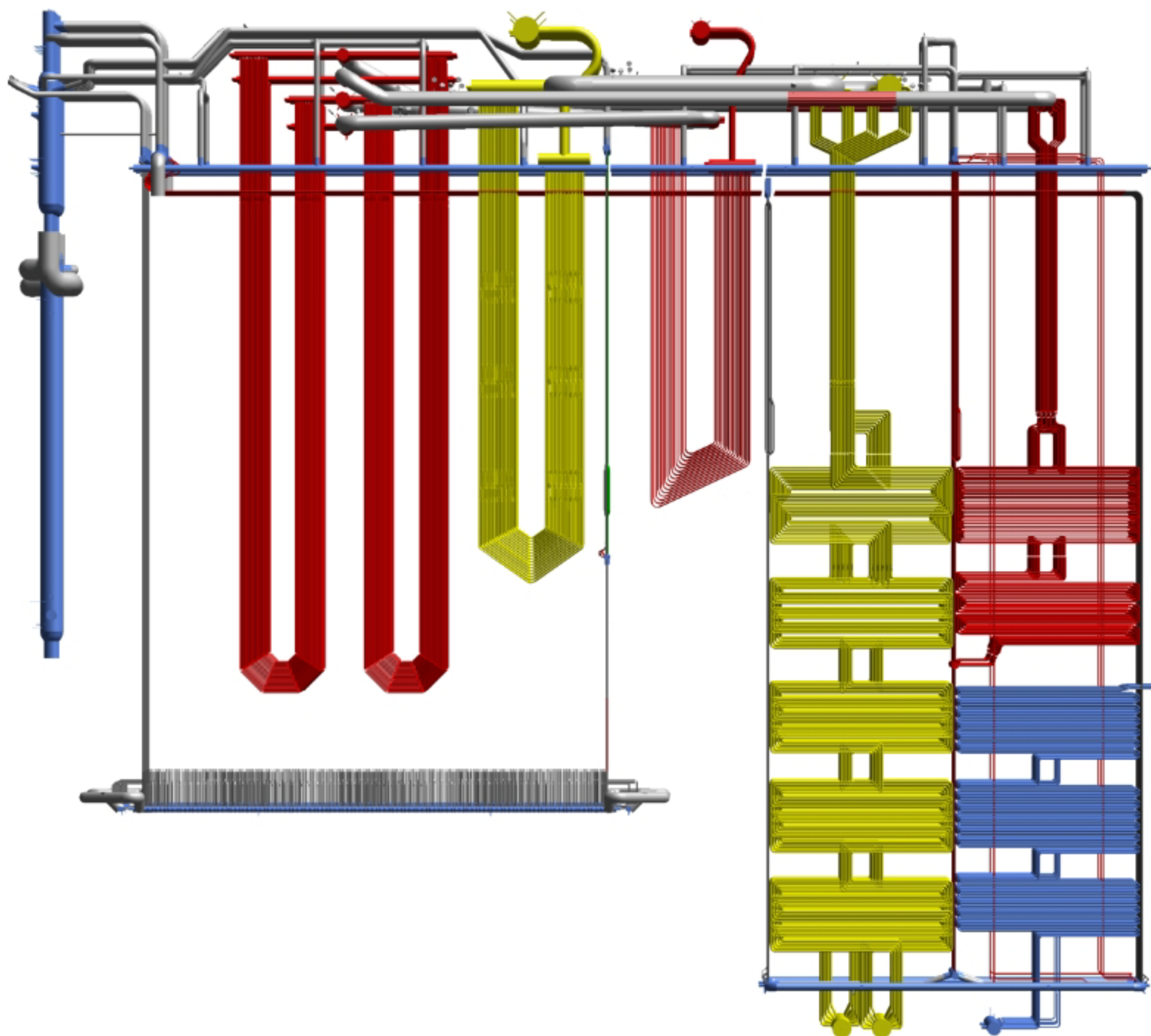
Main Fuctions

· Monitoring current temperature by point

· Alarm after determining abnormal temperature

Expected Effects

· Prevention of accidents such as explosions through real-time abnormality monitoring

Main | Temperature | Bundles | Management | Trend | History | Report | Settings

Vertical Wall | PTN SH | FIN RH | FIN SH | PRI RH | PRI SH | Spiral Wall

Sector #01
Temperature 30.0 ~ 500.0 ℃ **452** ℃
Humidity 20.0 ~ 50.0 % **31** %

Sector #02
Temperature 30.0 ~ 500.0 ℃ **403** ℃
Humidity 20.0 ~ 50.0 % **38** %

Sector #03
Temperature 30.0 ~ 500.0 ℃ **502** ℃
Humidity 20.0 ~ 50.0 % **48** %

Sector #04
Temperature 30.0 ~ 500.0 ℃ **422** ℃
Humidity 20.0 ~ 50.0 % **45** %

Sector #05
Temperature 30.0 ~ 500.0 ℃ **425** ℃
Humidity 20.0 ~ 50.0 % **44** %

Sector #06
Temperature 30.0 ~ 500.0 ℃ **429** ℃
Humidity 20.0 ~ 50.0 % **49** %

Sector #07
Temperature 30.0 ~ 500.0 ℃ **415** ℃
Humidity 20.0 ~ 50.0 % **67** %

Sector #08
Temperature 30.0 ~ 500.0 ℃ **452** ℃
Humidity 20.0 ~ 50.0 % **47** %

Sector #09
Temperature 30.0 ~ 500.0 ℃ **469** ℃
Humidity 20.0 ~ 50.0 % **39** %

Sector #10
Temperature 30.0 ~ 500.0 ℃ **479** ℃
Humidity 20.0 ~ 50.0 % **48** %

Sector #11
Temperature 30.0 ~ 500.0 ℃ **486** ℃
Humidity 20.0 ~ 50.0 % **41** %

Sector #12
Temperature 30.0 ~ 500.0 ℃ **432** ℃
Humidity 20.0 ~ 50.0 % **48** %

Remote Controller Comprehensive Performance Test

Purpose

· Comprehensive performance inspection including power, IR, Bluetooth, etc.

Main Fuctions

· Inspection performed on jigs with targets in random order/specification

· Respond to diversification of communication/power methods through one-time teaching

· Web monitoring of entire process possible by combining MES

Expected Effects

· Increased production efficiency

· Reduce testing cost and time

Manual Mode | Model Register | Emergency Stop | Alarm Reset | Position Reset | Port Setting

Model Search

Open | Save | ▶ Start | ❄ Emission | ✖ Manual | ▲ Up | ▼ Down | ⊕ Insert | ⊖ Delete | ⊖ Delete All

No.	Test ID	Name	Contents	Data	Min	Max	Ref.	1	2	3	4
1	M06138770	S35	Button	#07881524	0	1	-	N/A	N/A	N/A	N/A
2	M06138771	S35	Button	#07881525	0	1	-	N/A	N/A	N/A	N/A
3	M06138772	S35	IR	#07881526	0	20	-	N/A	N/A	N/A	N/A
4	M06138773	S35	Button	#07881527	0	1	Counting Error #002	OK	NG	NG	OK
5	M06138774	L005	Bluetooth	#07881528	0	20	-	N/A	N/A	N/A	N/A

Alarm Message

SB-5150 | OK #1 | OK #2 | OK #3 | OK #4

Servo | Input | Test | Emission | Collect

Quantity

OK	004
NG	001
Total	005

Reset

COM Port Status

Mini PC	Mini PC	Mini PC	Mini PC	Mini PC	Mini PC	Mini PC	Mini PC
COM #10	COM #03	COM #03	COM #03	COM #03	COM #03	COM #03	COM #03

Mini PC	Mini PC	Mini PC	Mini PC	Mini PC	Power #1	Power #2	Current
COM #10	COM #03	COM #03	COM #03	COM #03	COM #03	COM #03	COM #03

QR Code	Orthogonal #1	Orthogonal #2	IR #0	IR #1	IR #2	IR #3	Camera
COM #10	COM #03	COM #03	COM #03	COM #03	COM #03	COM #03	COM #03

(Operating System Task Bar Area)

Suction/Diffusion Type
Gas Detector Performance Test

Purpose

· Calibration and performance testing of gas detectors and major components

Main Fuctions

· Control of actuators such as solvent valves and relays in the inspection machine

· Ensure flexibility in editing calibration values and measurement program sequence

· Monitoring before/during/after the process through UDP communication

· Gas supply control automation equipment set

Expected Effects

· Increased production efficiency

· Reduce testing cost and time

· Increased EOL performance inspection efficiency

Chamber Graph

Temperature [℃] **Humidity [%RH]**
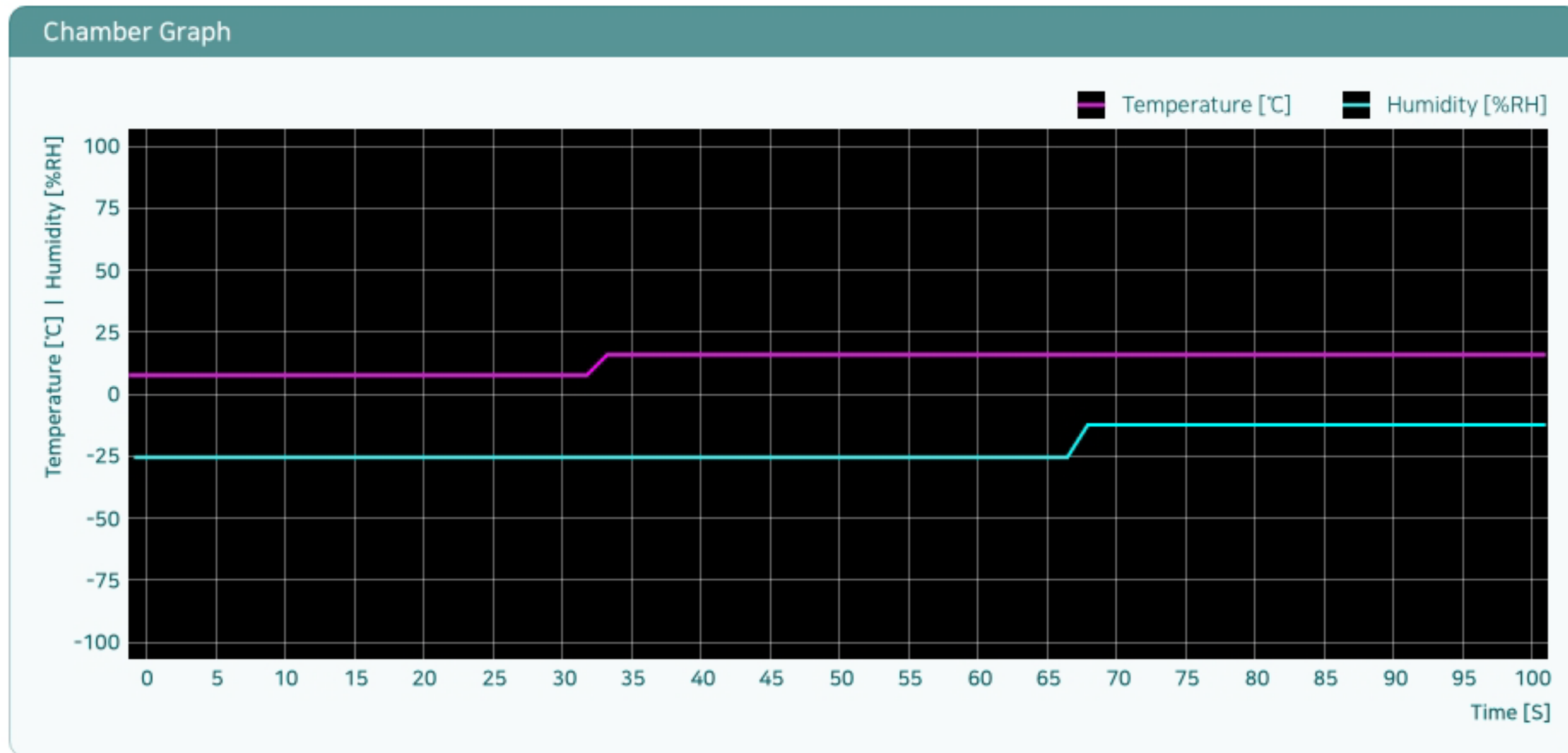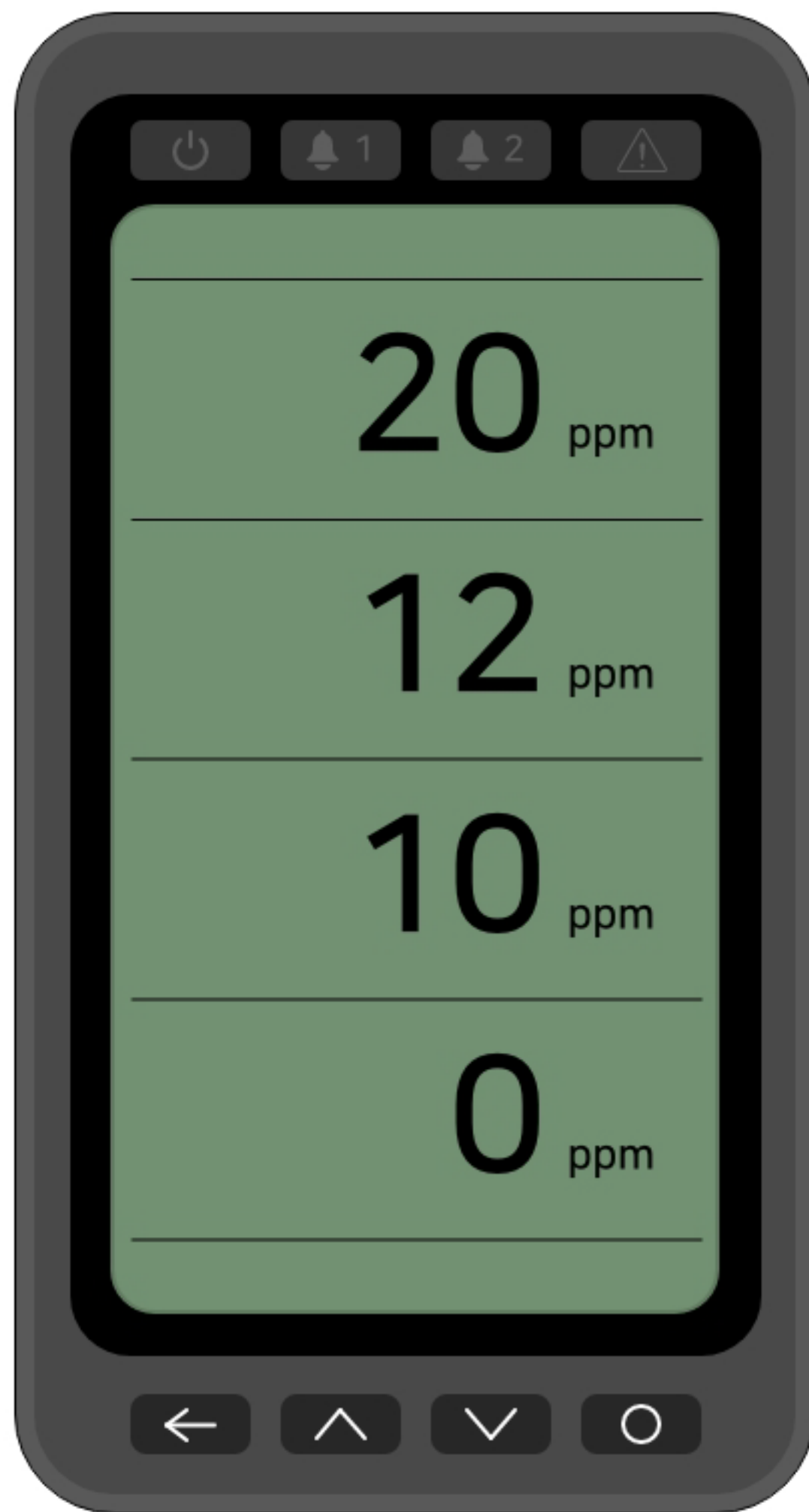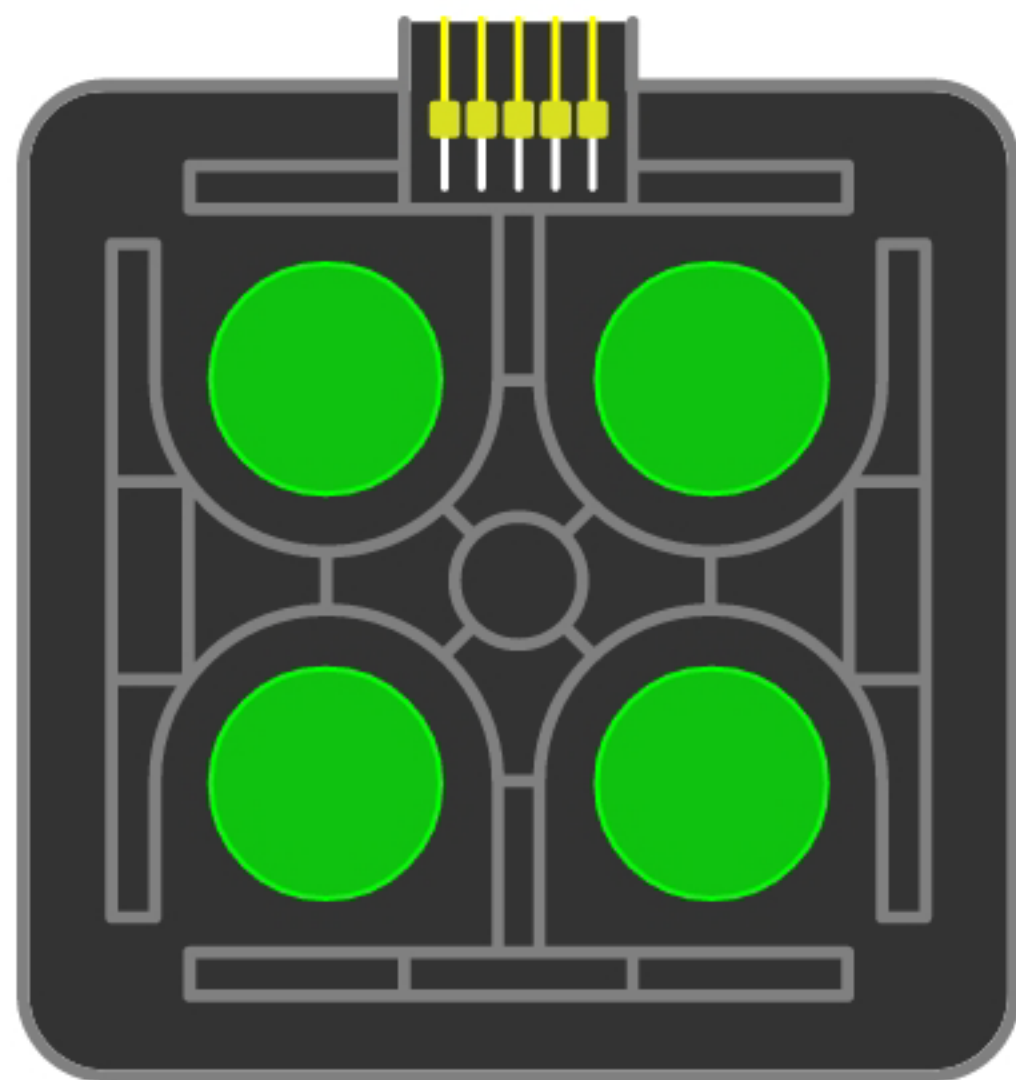
NG List

Process	Specification	Result
#01	Ref. 3574	PASS
#02	N/A	PASS
#03	Ref. 4885	PASS
#04	Ref. 4885	PASS
#05	Ref. 3574	PASS

20 ppm
12 ppm
10 ppm
0 ppm

Flow Status

Purging 0 **bool.purge**

Span 120

bool.gas In

Zero 0 **bool.vent**
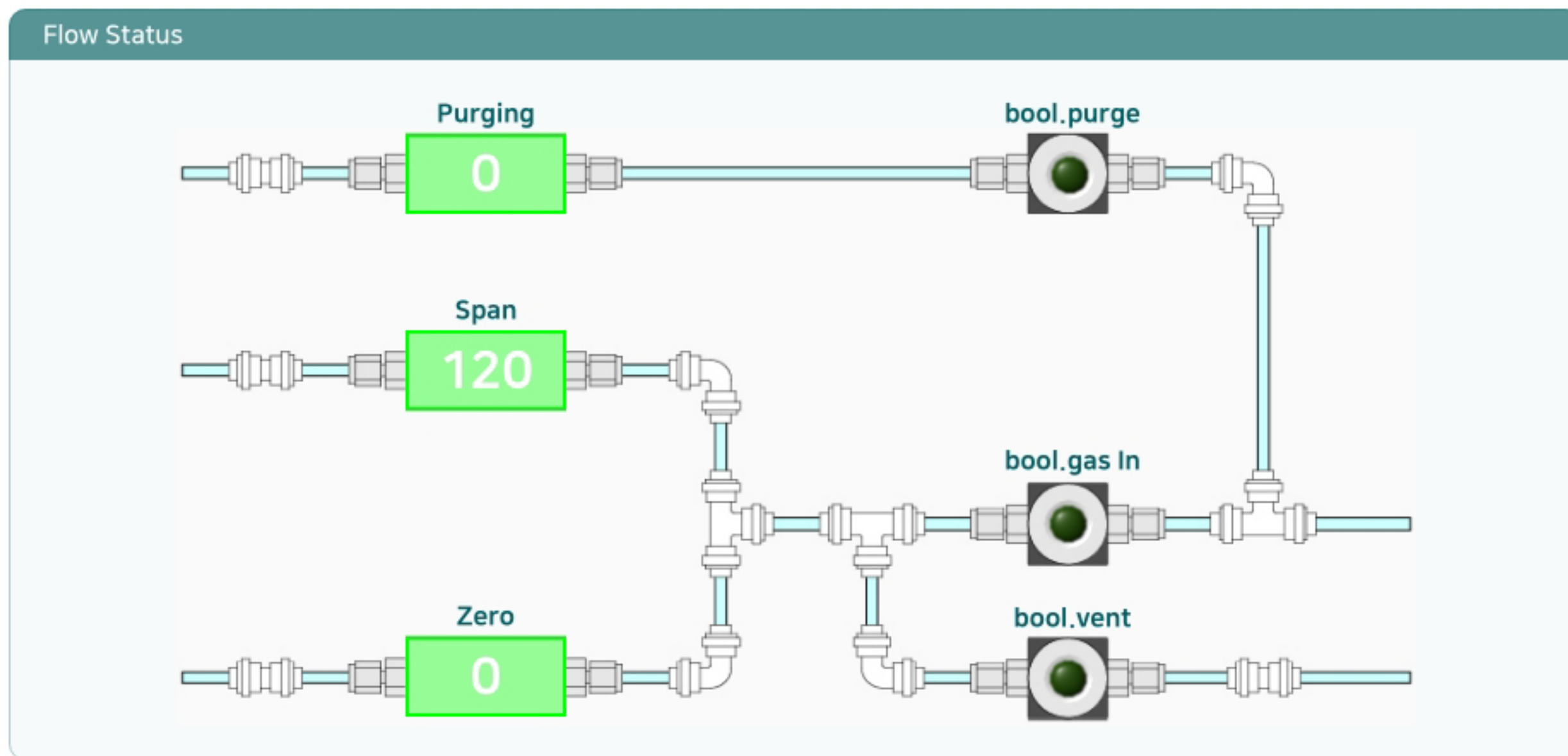
Test Information

User	Adrian Miller
Gas	CO
Output	mA
UMS Ver.	0.5.0

Time & Solenoid

Process	00 : 02 / 00 : 11
Total	00 : 40
Solenoid	SPAN
	ZERO

MFC Flow

#1	400.0 cc/min
#2	401.2 cc/min
#3	399.1 cc/min
#4	0.0 cc/min

Consumption Current

#1	15.1 mA
#2	15.2 mA
#3	15.0 mA
#4	0 mA

(Operating System Task Bar Area)

Vehicle Seat
Friction Wear Test

___

Purpose

· Wearability limit test through repeated friction motion for each vehicle seat material

Main Fuctions

· Servo motor motion control

· Z-axis load control through load cell measurement

· Friction test through reciprocating motion

Expected Effects

· Capable of testing various materials in the same environment

· Easy testing just by entering the number of tests and distance

Weight [N]
12.3 | 30.0

Repetition Distance [mm]
28.1 | 30.0

Number of Repetition [Times]
287 | 500

Time [HH : MM : SS]
00 : 19 : 39

Ready

Weight Data Acquisition Graph

Weight (N)
30
28
26
24
22
20
18
16
14
12
10
8
6
4
2
0
-2
-4
-6
-8
-10

00:05:00   00:10:00   00:15:00   00:20:00
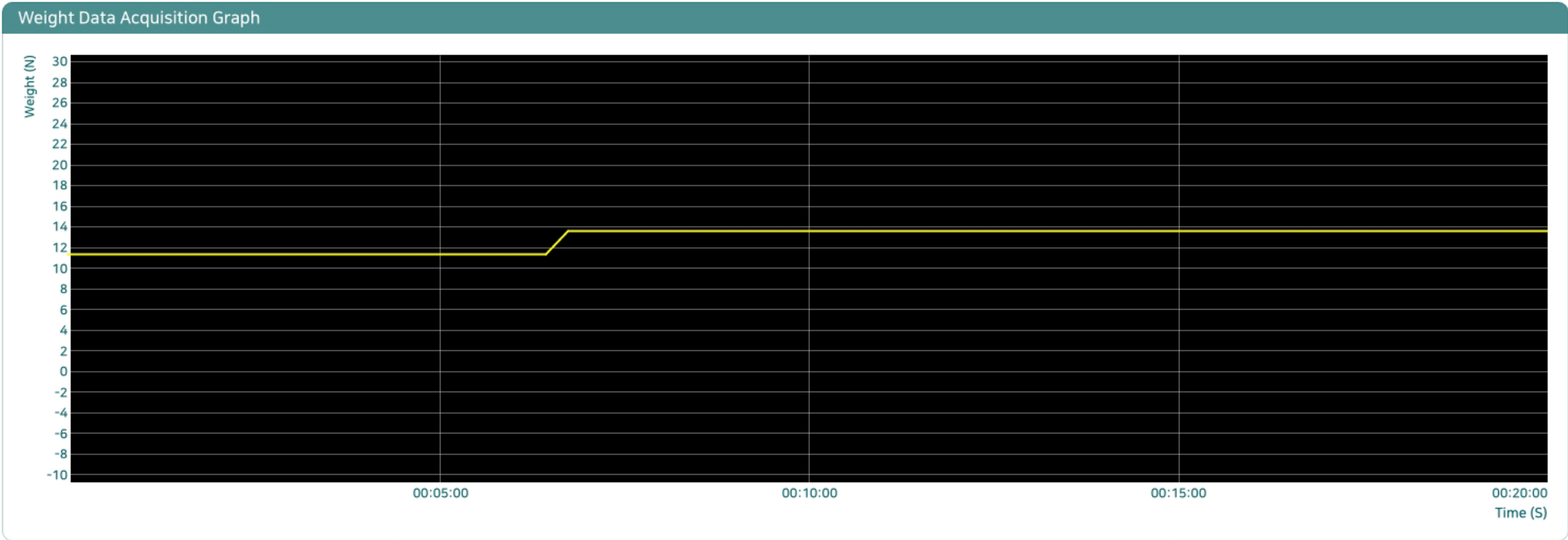
Time (S)

Test Settings

Test Velocity
100.0 mm/sec

Z-axis Velocity
100.0 mm/sec

Repeat Distance
30.0 mm

Limit Weight
30.0 N

Number of Repetition
500 times

Ready   Reset Position

▶ Start

Weight Data Acquisition Graph

X-Axis
좌측 제한   우측 제한
원위치   서보 알람

Y-Axis
상부 제한   하부 제한
원위치   서보 알람

Graph Settings

Time Range
＋   ＋
0 ~ 0
－   －

Repeat Range
＋   ＋
0 ~ 0
－   －

Auto Scale
＋   ＋
0 ~ 0
－   －

Manual Control

Integrated Monitoring
of Multiple Measuring Devices

Purpose
· Simultaneous testing and monitoring of various types of connected measuring devices for testing defense products

Main Fuctions
· Provides separate communication methods for each instrument and product
· Simultaneous testing of multiple products

Expected Effects
· Report calculation based on standardized reports
· Increase testing efficiency by enabling multiple measurements with one device

Frequency [kHz]
0.03

Pressure [hPa]
350.0

Flow [L / min]
0.05

Voltage [V]
18.0

Current [A]
0.1

Graph

Vibration

Flow

Frequency

Current
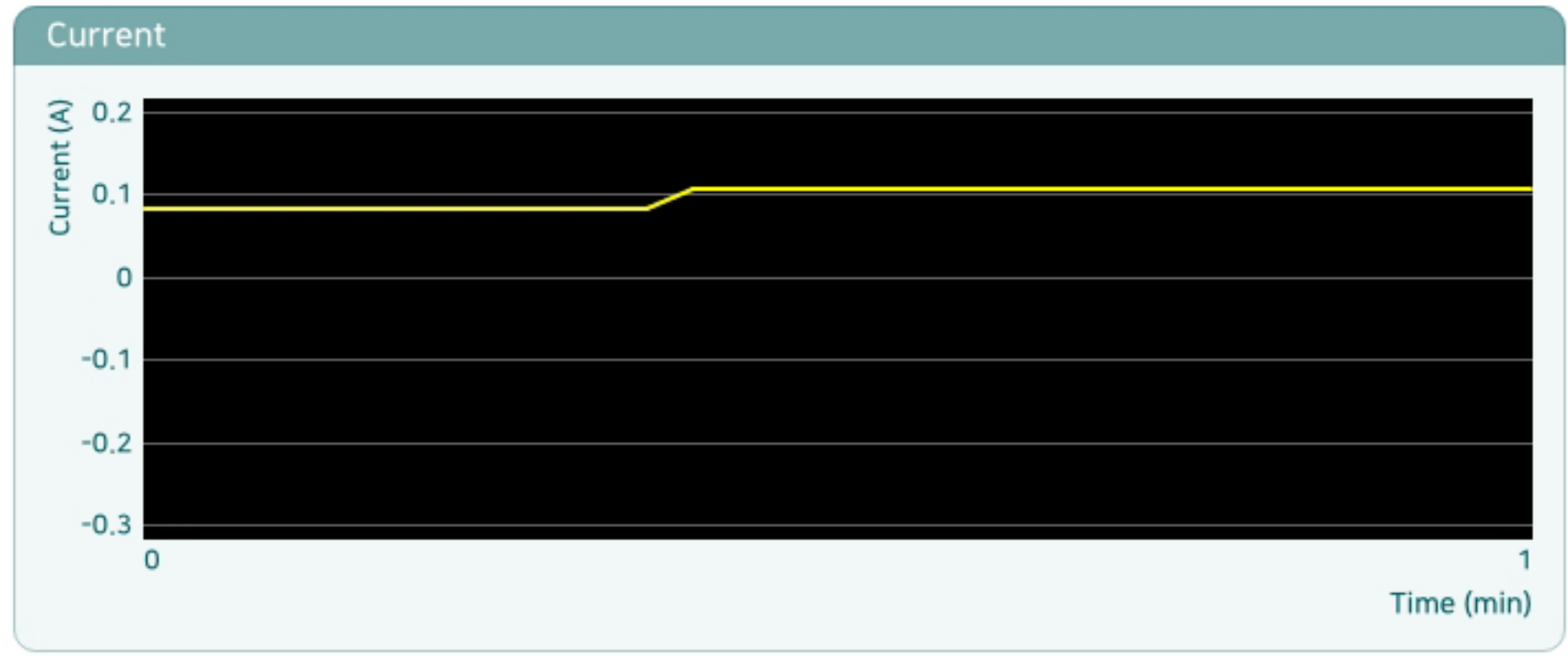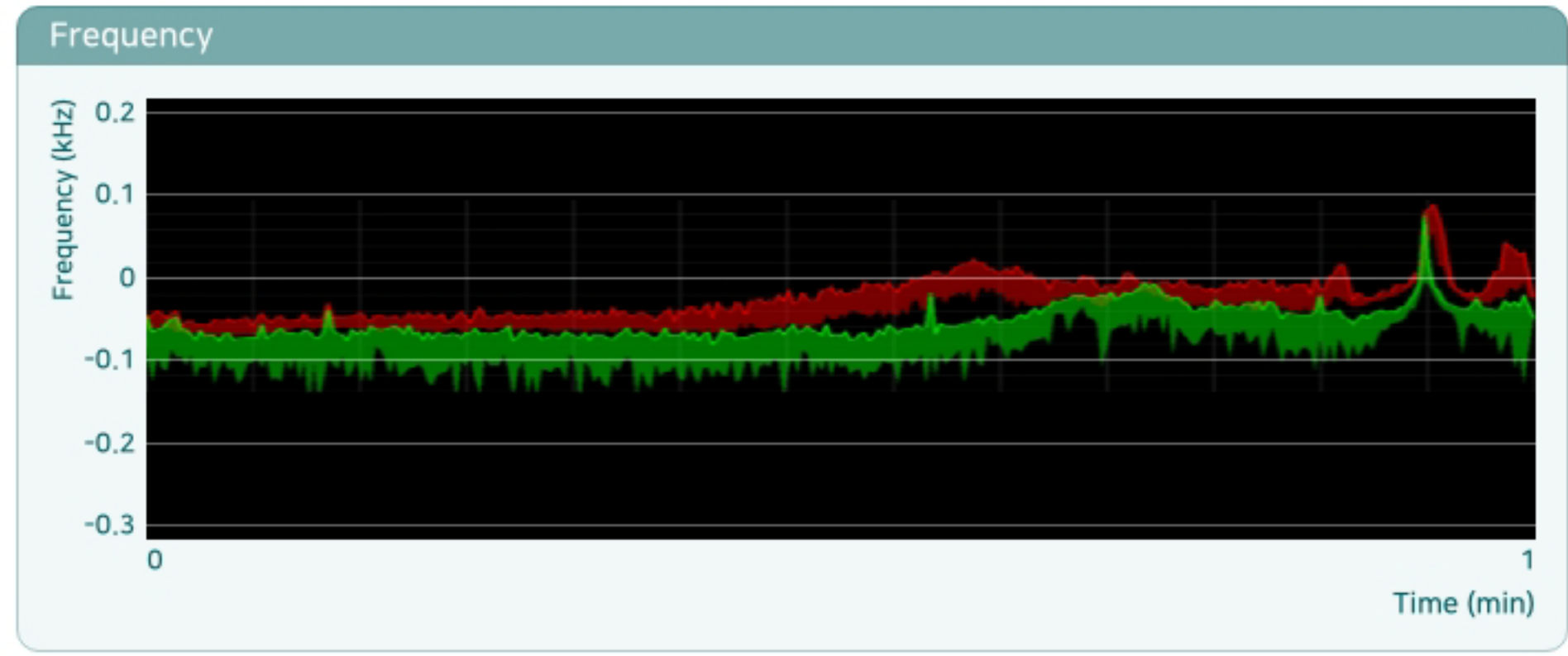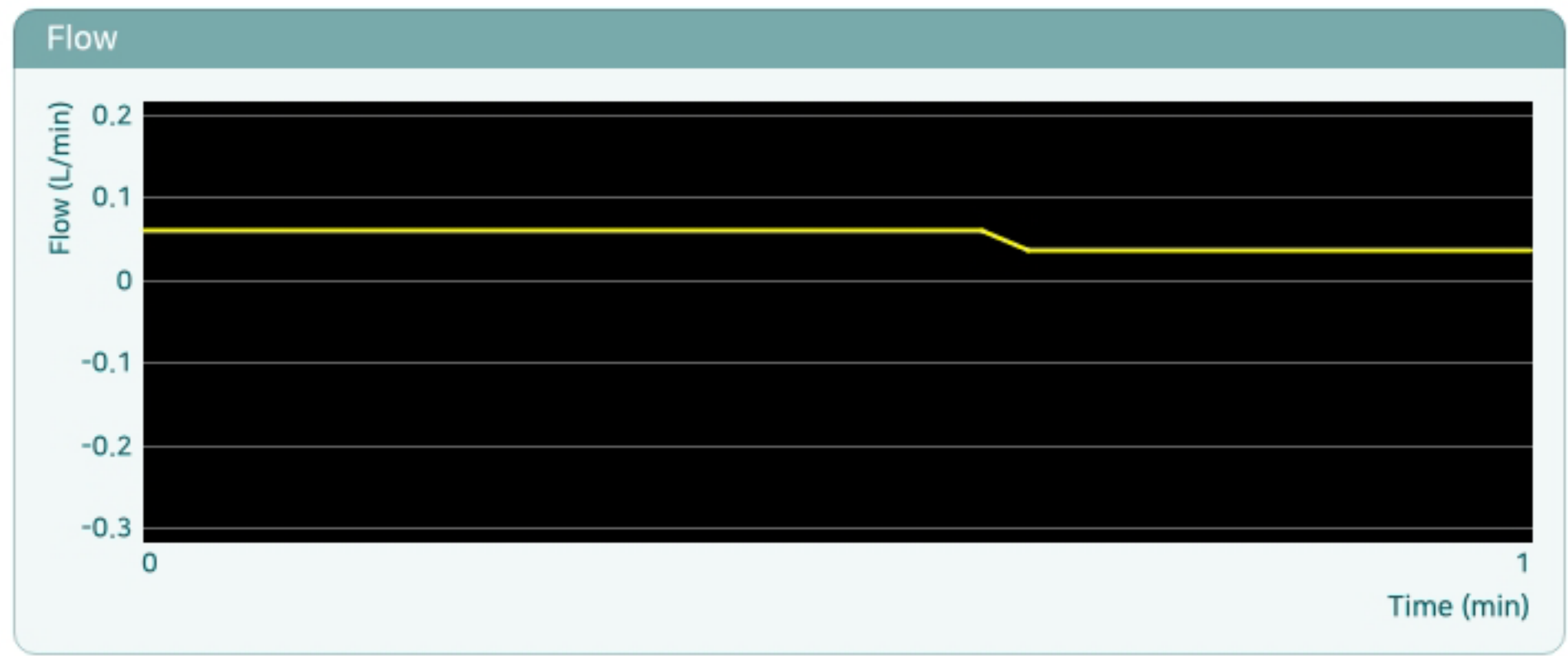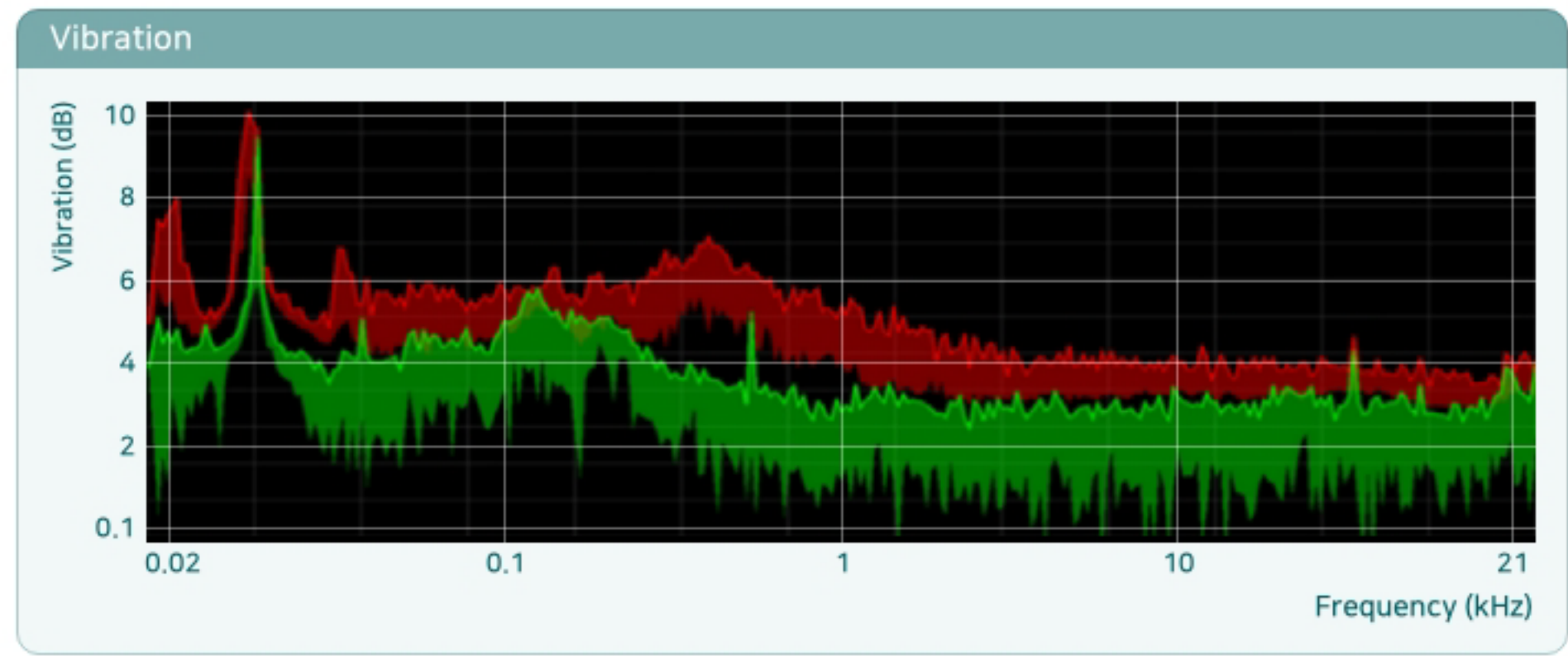
Time Setting

− **60** min +

Test Start

Main Voltage Setting

− **18.0** v +

| 18 v | 28 v | 32 v |

Sub Voltage Setting

− **5.0** v +

Signal Generating Test

주파수 측정기　디지털 멀티미터　상대압력 측정기　절대압력 측정기　온습도 센서　신호 발생기　전원 공급기 A　전원 공급기 B　유량센서 4140　유량센서 4045

(Operating System Task Bar Area)

Panel Overcoating Process Accumulated Current Monitoring

Purpose

· Accumulated current monitoring for uniform coating of display panel film

Main Fuctions

· Measure current and accumulated current values in the product painting factory water tank

· User-defined data range can be set

· Alarm occurs when range is exceeded

Expected Effects

· Prevent accidents by monitoring the status of multiple water tanks in an integrated manner

· Collect analyzable data and track trends

Sector #1

| Integrating Current 0.00 ~ 10000.00 Ah | 5040.2 Ah |
| Current 0.00 ~ 50.00 A | 21.3 A |

Sector #2

| Integrating Current 0.00 ~ 0.00 Ah | 00.0 Ah |
| Current 0.00 ~ 0.00 A | 00.0 A |

Sector #3

| Integrating Current 0.00 ~ 0.00 Ah | 00.0 Ah |
| Current 0.00 ~ 0.00 A | 00.0 A |

Sector #4

| Integrating Current 0.00 ~ 10000.00 Ah | 5001.1 Ah |
| Current 0.00 ~ 50.00 A | 20.4 A |

Sector #5

| Integrating Current 0.00 ~ 10000.00 Ah | 5012.2 Ah |
| Current 0.00 ~ 50.00 A | 20.1 A |

Sector #6

| Integrating Current 0.00 ~ 0.00 Ah | 00.0 Ah |
| Current 0.00 ~ 0.00 A | 00.0 A |

Sector #7

| Integrating Current 0.00 ~ 10000.00 Ah | 4993.2 Ah |
| Current 0.00 ~ 50.00 A | 19.2 A |

Sector #8

| Integrating Current 0.00 ~ 0.00 Ah | 00.0 Ah |
| Current 0.00 ~ 0.00 A | 00.0 A |

Integrating Current Graph

Integrating Current (Ah) — Time (second)

- Sector #1
- Sector #2
- Sector #3
- Sector #4
- Sector #5
- Sector #6
- Sector #7
- Sector #8

Current Graph

Current (A) — Time (second)

- Sector #1
- Sector #2
- Sector #3
- Sector #4
- Sector #5
- Sector #6
- Sector #7
- Sector #8
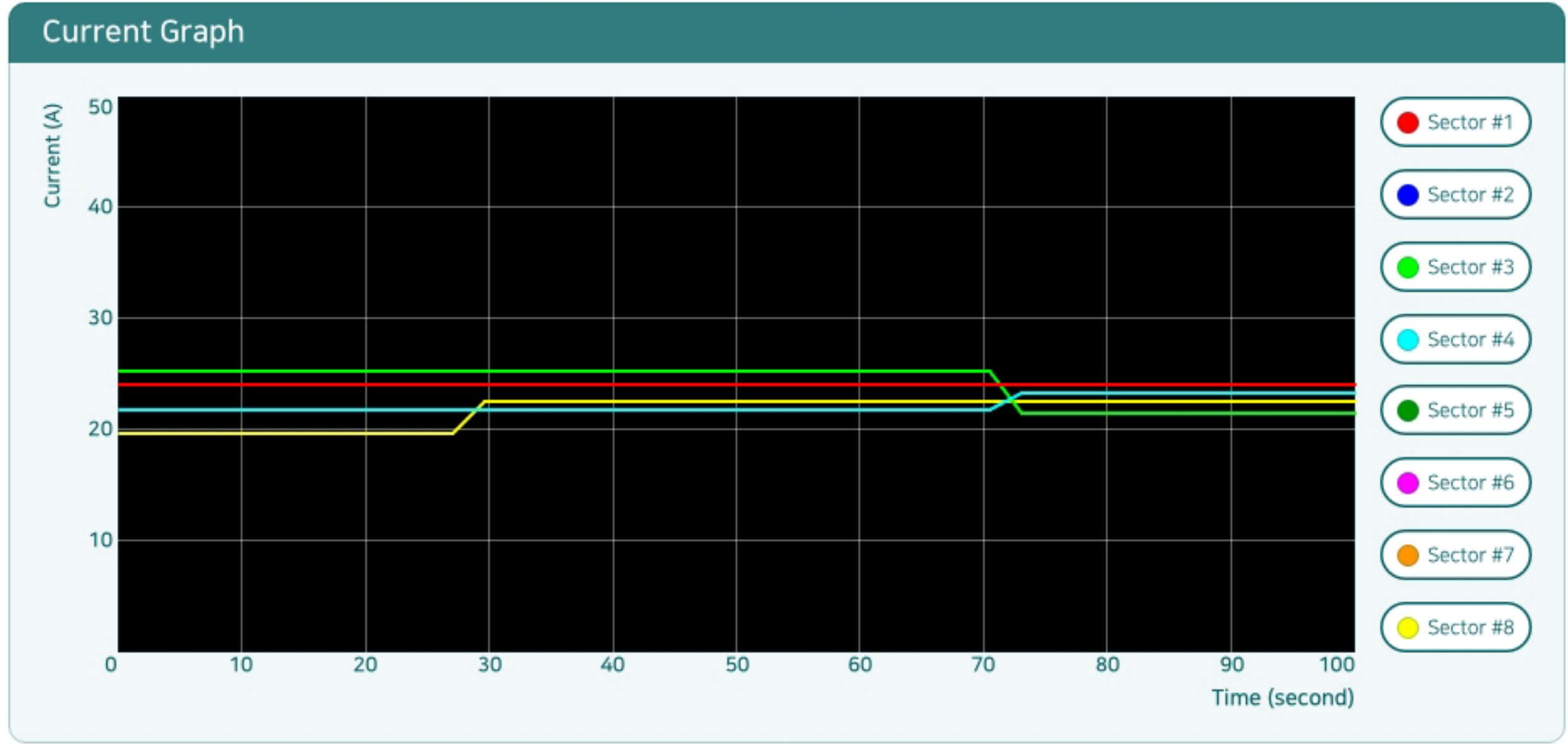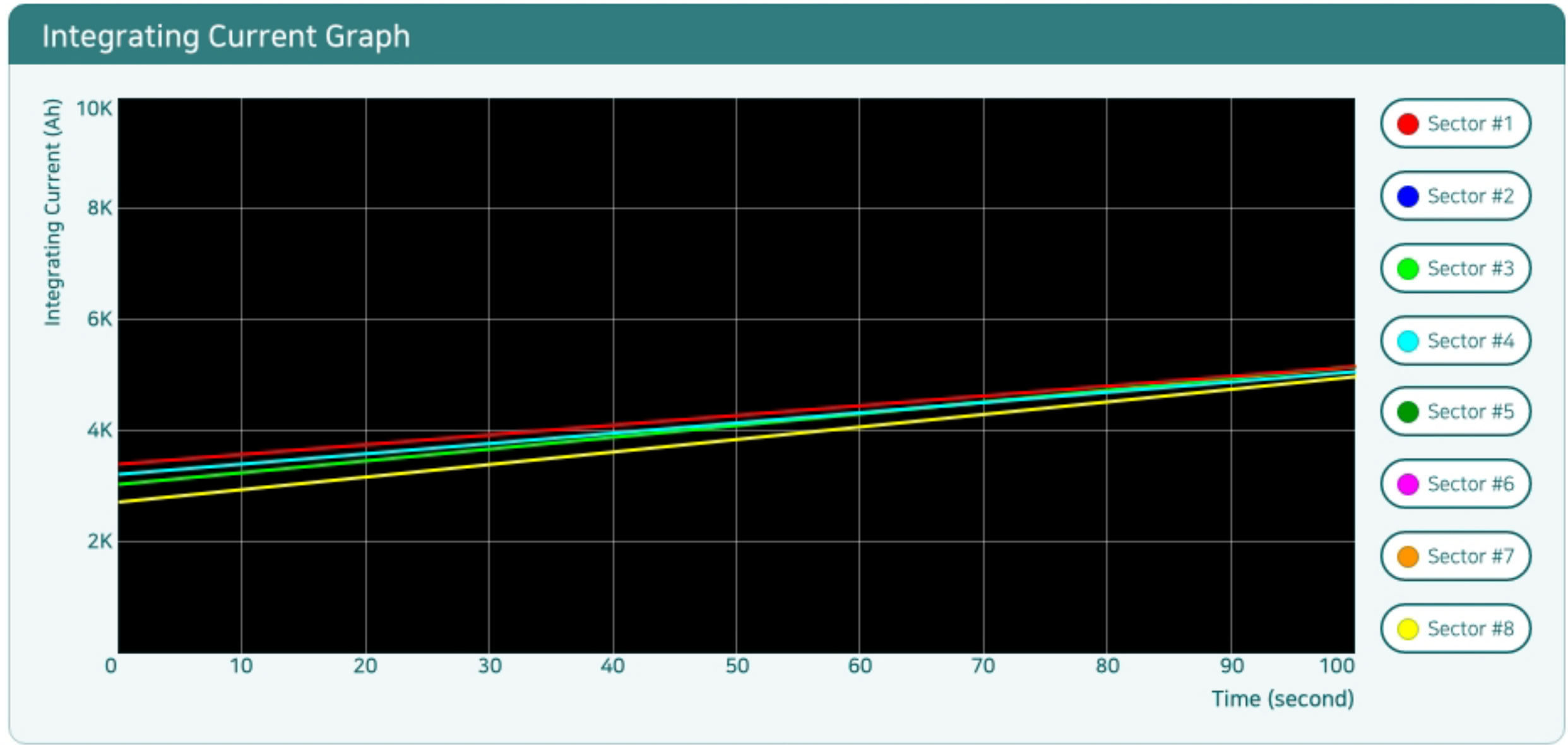
Automotive Clutch Performance Test

Purpose
· Performance testing of truck clutch products

Main Fuctions
· Precise pneumatic and motion control

Expected Effects
· Cost and time reduction through unmanned testing

| Test Elective | **Pre-Load** | Full Travel | Efficiency | Response | Air Tight | Burst | Sensor | Stop Ring | Config |

Ref. No.
RF0395729-03

Model
E Machine 650

Force
452.9 N

Temp
0.00 mm

Position
NaN mm

CPCA #1
NaN mm

CPCA #2
NaN mm

Type
Type A

Sample
Sample #05

Duty
NaN %

Flow
6.5 LPM

Tank
NaN bar

P. Pressure
NaN bar

S. Pressure
0.00 bar

▶ START

■ STOP

CPCA Graph

Force (N): 1000, 900, 800, 700, 600, 500, 400, 300, 200, 100, 0

Stroke (mm) / CPCA (mm): 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40

Legend: Frc(N)_Pos, Frc(N)_CPCA
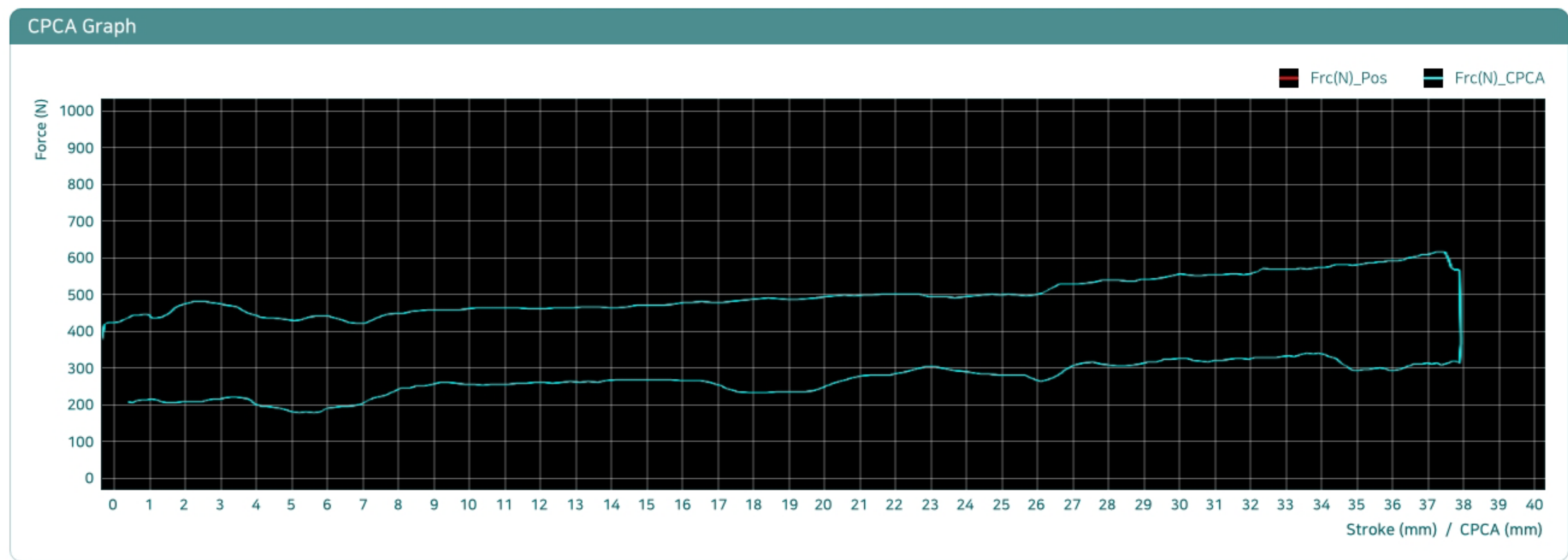
Configuration

Position #1
⊖ 0.0 mm ⊕

Position #2
⊖ 20.2 mm ⊕

Position #3
⊖ 38.0 mm ⊕

Velocity
⊖ 1.0 mm/sec ⊕

Repeat
⊖ 1 times ⊕

Limit Load
⊖ 600.0 N ⊕

Result

Spec
310~350 N at 100.5 mm

Max
483.8 N

Min
283.1 N

Hys's
200.7 N

Spec
38 mm Min at 605.3 N

Stroke
37.6 mm

Servo Motor Status

# 01	ON	# 06	OFF
# 02	ON	# 07	OFF
# 03	ON	# 08	OFF
# 04	OFF	# 09	ON
# 05	ON	# 10	OFF

Sol Status

# 01	OFF	# 06	ON
# 02	ON	# 07	ON
# 03	ON	# 08	OFF
# 04	ON	# 09	ON
# 05	OFF	# 10	OFF

Alarm ON

CPCA Position

Brake ON

Position Order

Vout #1	0.00
Vout #2	0.00
Stk #1	9.67
Stk #2	47.67
Encoder	0.00 mm

Position Order

Motor Stop

Jog Mode

(Operating System Task Bar Area)

Remote Monitoring
of Train Point-machine

Purpose

· Detection of the function of point-machine for train's track

Main Fuctions

· Real-time monitoring of current, voltage, and sensor values of the control unit

· Defect inspection through algorithm

Expected Effects

· Possible to predict when aging equipment will lose its functionality

· Safety accident prevention and efficient predictive maintenance

정위
반위
전환 불량
전환 정상
전환중
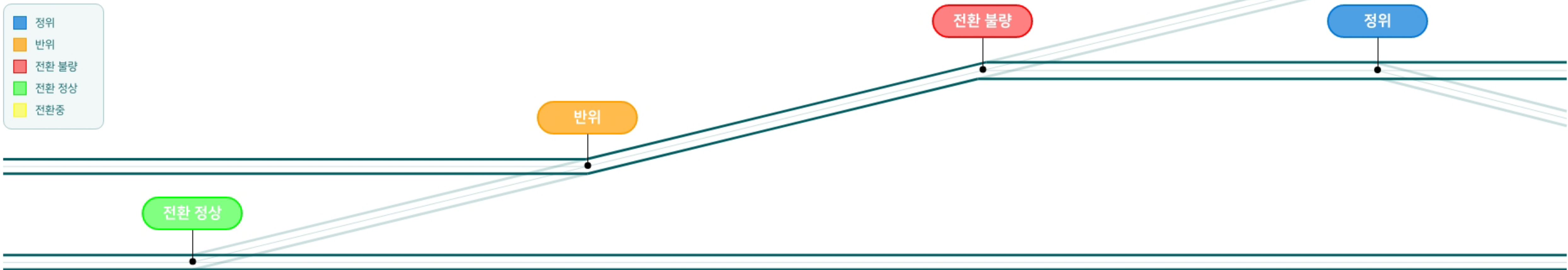
전환 불량

정위

반위

전환 정상

110B

표시전원 출력전압	표시전원 입력전압
24.2 V	24.1 V
제어전원 입력전압	전동기전원 입력교류전압
24.2 V	AC 224 V
전동기 반위구동 교류전압	전동기 정위구동 교류전압
AC 000 V	AC 000 V
전동기 구동전류	전환 누적 횟수
00.00 A	92

센싱 보드　광통신 컨버터　정상

110A

표시전원 출력전압	표시전원 입력전압
24.0 V	24.1 V
제어전원 입력전압	전동기전원 입력교류전압
24.1 V	AC 222 V
전동기 반위구동 교류전압	전동기 정위구동 교류전압
AC 000 V	AC 000 V
전동기 구동전류	전환 누적 횟수
00.00 A	7

센싱 보드　광통신 컨버터　정상

108

표시전원 출력전압	표시전원 입력전압
24.0 V	24.2 V
제어전원 입력전압	전동기전원 입력교류전압
24.0 V	AC 224 V
전동기 반위구동 교류전압	전동기 정위구동 교류전압
AC 000 V	AC 000 V
전동기 구동전류	전환 누적 횟수
00.00 A	9

센싱 보드　광통신 컨버터　정상

109

표시전원 출력전압	표시전원 입력전압
24.2 V	24.1 V
제어전원 입력전압	전동기전원 입력교류전압
24.1 V	AC 220 V
전동기 반위구동 교류전압	전동기 정위구동 교류전압
AC 000 V	AC 000 V
전동기 구동전류	전환 누적 횟수
00.00 A	9

센싱 보드　광통신 컨버터　정상

EUV Lithography Equipment Component Inspection

Purpose

· Check specifications of major components of exposure equipment

Main Fuctions

· Multi-axis motor, robot control

· Vision data acquisition and defect inspection

· Precise data specification inspection

Expected Effects

· Scenario-based precision testing of key components

· Reduce human error through unmanned automation of precision parts

Setting & Control | SCARA Robot | Pneumatic | Functional Test | Settings

CU & P-DRIVER MOTOR

POSITION MOVE

Reset | Change Set Immediately ✓

Control Target

ON | ○ Radial | ○ Z Slide | ● P Drive

Control Mode | ○ ABS | 100000 inc
| ● REL | Apply

Home | Radial | Z Slide | P Drive
All Home | Stop | Stop | Stop

MAXON Position Profile

Velocity	Acceleration	Deceleration
30	150	150

Graph

Inc | Velo | Curr

1 Revolution : inc
Radial : 2000
Z Slide : 400
P Drive : 144000

Inc	1008024 n/a
Velo	40 rpm
Curr	227 mA

ORTHOGONAL ROBOT

POSITION MOVE

Control Target

ON | ○ X | ○ Y | ● Z

Control Mode | ○ ABS | 1.0 mm
| ● REL | Apply

Home | X | Y | Z
All Home | Stop | Stop | Stop

Orthogonal Robot Profile

Velocity	Acceleration	Deceleration
40000	200000	200000

JOG MOVE

Z+ / Z- / X- / X+ / Y+ / Y-

Motor Status

	X Axis	Y Axis	Z Axis
Servo On			
Limit+			
Home			
Limit-			
InMotion			
Alarm			

	X Axis	Y Axis	Z Axis
CMD	-107236	105499	-218926
ENC	-107236	105499	-218926
Length	-808.54	105.499	-218.926
Torque	-3000	5400	27300

Z Axis Stroking MOTOR

POSITION MOVE

Control Target

ON | ● Axis 1 | ○ Axis 2 | ○ Axis 3

Control Mode | ○ ABS | 0.100 mm
| ● REL | Apply | Apply All

Home | Install | Cal | TESA | Align

Axis 1 | Axis 2 | Axis 3 | TESA
Axis 1 Stop | Axis 2 Stop | Axis 3 Stop

TESA

P Drive

1 Axis | 2 Axis | 3 Axis

○ Axis 1 | ○ 0.1mm
○ Axis 2 | ● 0.01mm
● Axis 3 | ○ 0.001mm

UP / DOWN

VAC HOLD | TESA Complete

Graph

Read

CMD	24.120 mm
	194483 inc
Curr_Pos	24.111 mm
	194411 inc

Z1 Stroke — CMD | Pos

CMD	26.536 mm
	213958 inc
Curr_Pos	26.531 mm
	213920 inc

Z2 Stroke

CMD	25.297 mm
	203968 inc
Curr_Pos	25.285 mm
	203869 inc

Z3 Stroke

HEADER MODULE

POSITION MOVE

Control Target

ON | ○ LM [mm] | ● ROT [deg]

Control Mode | ● ABS | 0.0 deg
| ○ REL | Apply

Home | All Home

LM | ROT
Stop | Stop

JOG MOVE

0.0 mm | 0.0 deg

Graph

CMD 0.0 mm | Curr_Pos 0.0 mm

LM Profile — CMD | Pos

CMD 0.0 mm | Curr_Pos 0.0 mm

ROT Profile — CMD | Pos

Plasma Signal
Inspection and Measurement

Purpose

· Plasma signal measurement and performance inspection within the semiconductor process

Main Fuctions

· Precise measurement and analysis of plasma signals
· Scenario-based test automation

Expected Effects

· Shorten test time and improve precision by improving old processes

Graph
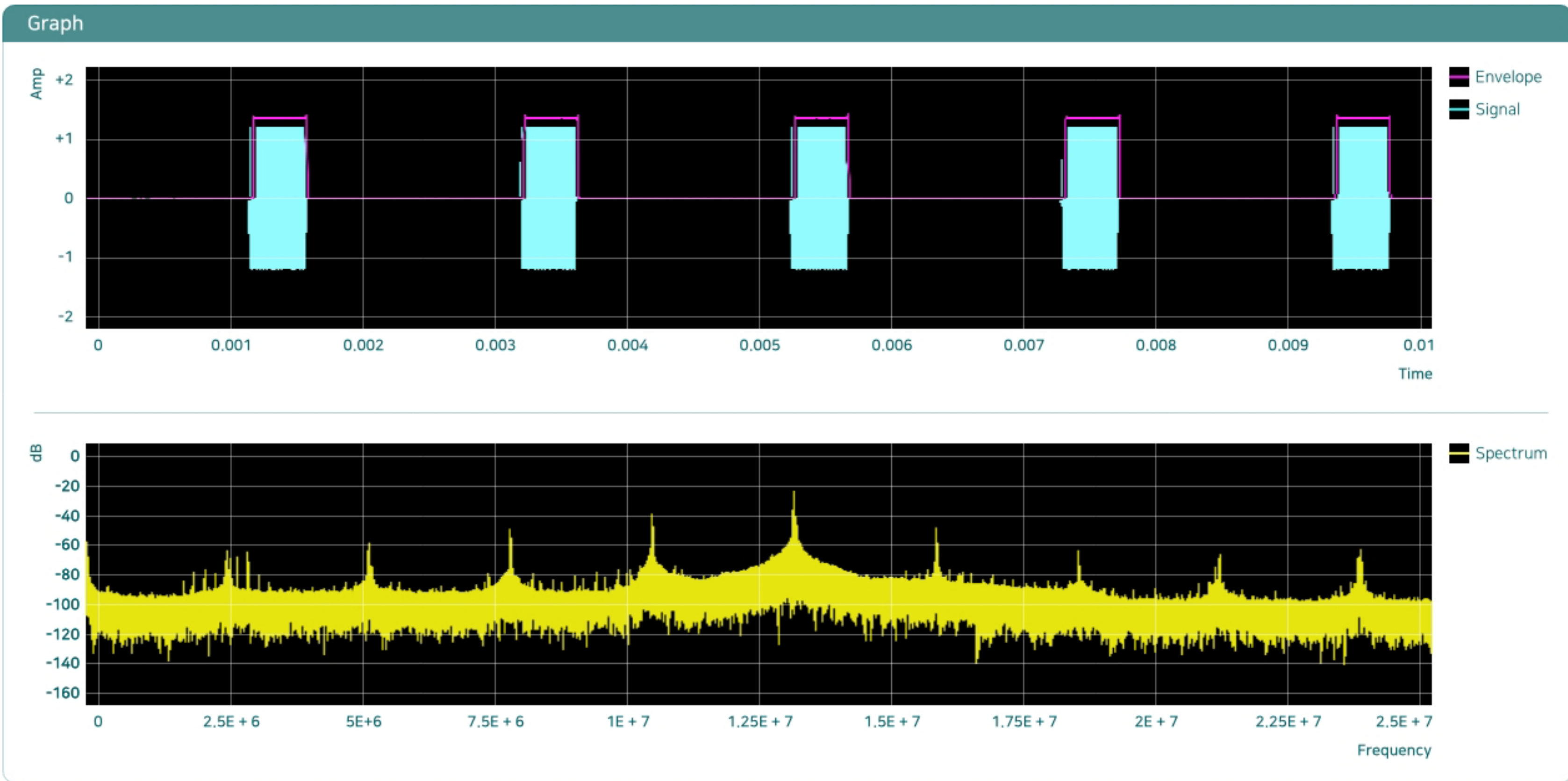
Settings

D:₩User₩APMS₩Adv_Test-1_20250313₩041169.tdms

Open

Save

Start | Pause | Back | Foward

Configuration

Channel Select: CH #0

Count: 500 k

Loop Time: 1 ms

Burst Trigger Level: 600 m

Read Position: 1500

Rising/Falling Time Ref Levels

Channel Select: CH #0

High: 90.00

Middle: 50.00

Low: 10.00

Units: Percent

Division	Index	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	11th	12th	Lower Limit	Upper Limit
Rising Time	0	Rising Time	Rising Time	Rising Time	Rising Time	Rising Time	0s	0s	0s	0s	0s	0s	0s	0	0
Falling Time	0	Falling Time	Falling Time	Falling Time	Falling Time	Falling Time	0s	0s	0s	0s	0s	0s	0s	0	0
Min Value	0	Min Value	Min Value	Min Value	Min Value	Min Value	0	0	0	0	0	0	0	0	0
Max Value	0	Max Value	Max Value	Max Value	Max Value	Max Value	0	0	0	0	0	0	0	0	0
On_Time	0	On_Time	On_Time	On_Time	On_Time	On_Time	0s	0s	0s	0s	0s	0s	0s	0	0
Off_Time	0	Off_Time	Off_Time	Off_Time	Off_Time	Off_Time	0	0	0	0	0	0	0	0	0
Duty Rate	0	Duty Rate	Duty Rate	Duty Rate	Duty Rate	Duty Rate	0	0	0	0	0	0	0	0	0

(Operating System Task Bar Area)

Establishment
of ADAS Test Environment

Purpose

· Establishment of vehicle ADAS simulation and performance test environment (HILS/SILS)

Main Fuctions

· RT platform and software (PXI + Veristand)

· Vehicle driving and performance calculation software (VTD)

· Customizing data collection and testing scenarios

Expected Effects

· Implementation of driving and performance tests and environmental diversification through software

· Reduce costs and time incurred in actual vehicle testing

Now Driving : Snow_Road_Ver1.5

Total

■	S.Time
■	FL. Wheel Speed
■	FR. Wheel Speed
■	RL. Wheel Speed
■	RR. Wheel Speed
■	Vehicle. Speed
■	MC. Pressure
■	FL. Pressure
■	FR. Pressure
■	RL. Pressure
■	RR. Pressure
■	Ax
■	TCS. Act
■	ESC. Act
■	Steering Angle
■	Yaw Rate
■	RPM
■	ESS. Act
■	Collision

Driving Panel : Speed (RPM)
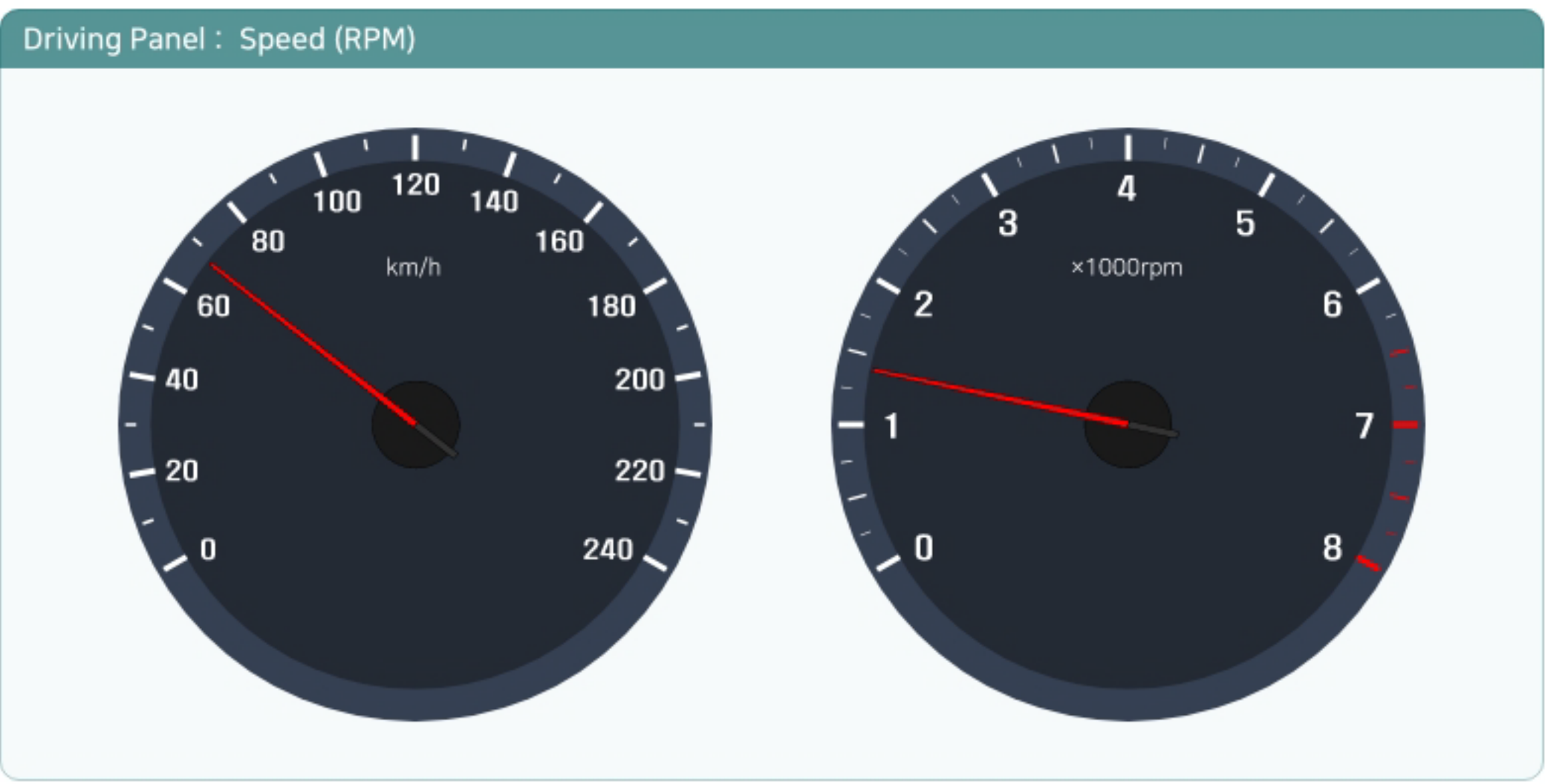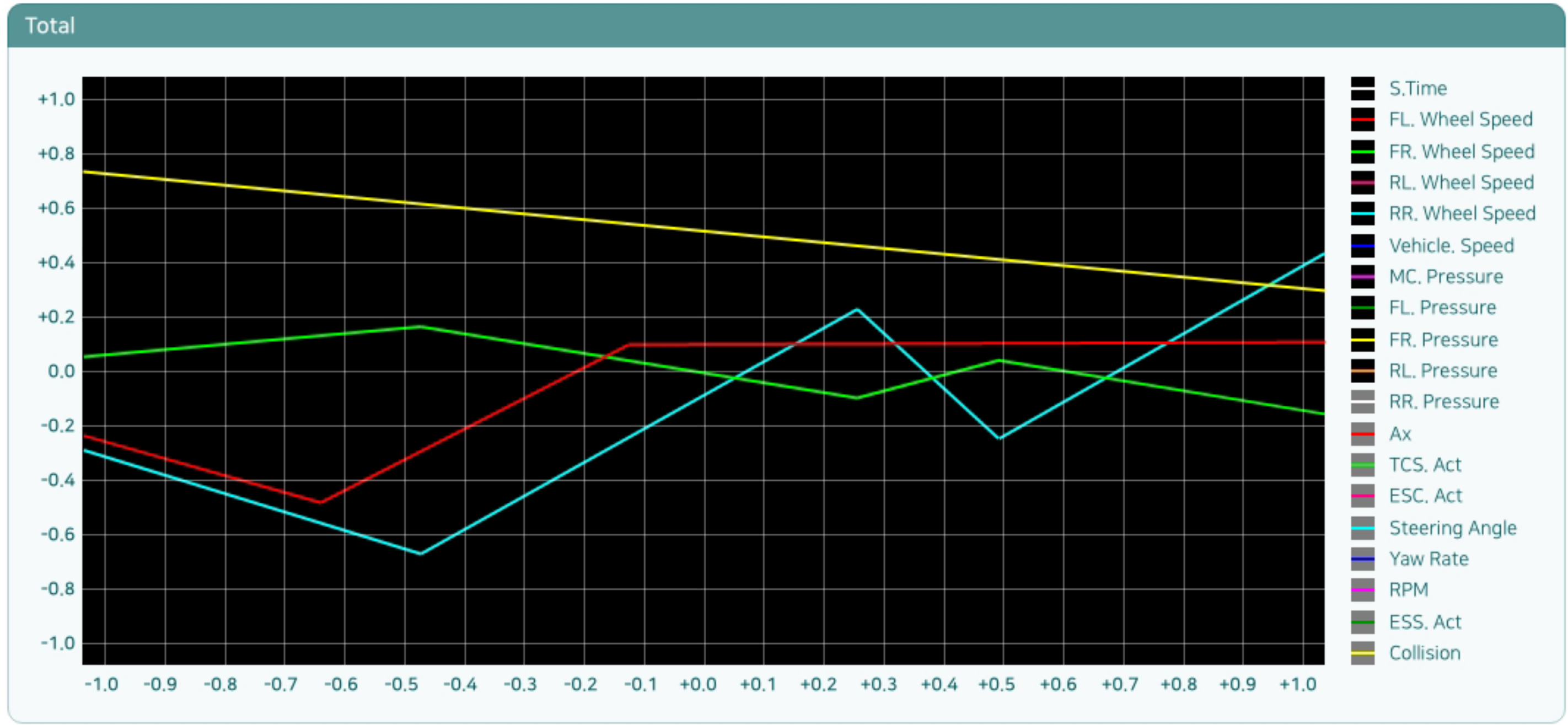
Assistant Function Dashboard

Order	Now in Progress	Caution	Turn	Directory
01	Lane Keeping Assist	🟢	0	D:\User\Assist\Module\lka_01
02	Lane Departure Warning	🔴	2	D:\User\Assist\Module\ldw_01
03	Lane Following Assist	🔴	5	D:\User\Assist\Module\lfa_05
04	Forward Collision-Avoidance Assist	🟢	0	D:\User\Assist\Module\fca_01
05	Autonomous Emergency Braking	🟢	0	D:\User\Assist\Module\aeb_02
06	Blind Spot Warning	🟢	1	D:\User\Assist\Module\bsw_01

Performance Test of Hydrogen Recirculation Blower for Hydrogen Vehicles

Purpose

· Compressor blower test for hydrogen supply in hydrogen vehicles

Main Fuctions

· CAN communication

· Scenario-based performance inspection

Expected Effects

· Cost and time reduction through unmanned testing

▶ RUN	🗎 MAP	∿ CHART	🔔 CELL & ALARM

Fresh Air Inlet　　Compressor Inlet　　Compressor Outlet

T_0	0.0 ℃
H_0	0.0 %RH
P_0	9999.99 hPa

FL_101　0.00 kg/h

| P_1 | 0.00 Bar |
| T1_av | 0.0 ℃ |

| P_2 | 0.00 Bar |
| T2_av | 0.0 ℃ |

| C20 CV 102 | SP | 0.00 % |
| | PV | 0.00 % |

Apply　15,000　118000 rpm

| T_31 | 0.0 ℃ |
| T_32 | 0.0 ℃ |

| C80 CV 101 | SP | 0.00 % |
| | PV | 0.00 % |

Chamber

TEMP SP	TEMP PV	STOP / RUN
0.00 ℃	0.00 ℃	STOP
HUMI SP	HUMI PV	
0.00 %RH	0.00 %RH	
● Connect	● Fault	

CAN State　**CAN Data**

● Fault	Inv Cur	0
● Warning	Inv Vol	0
● Ready	Inv Power	0
● Run	Mot Temp	0
● Complete	IGBT Temp	0
● Reach	INV Temp	0

STOP

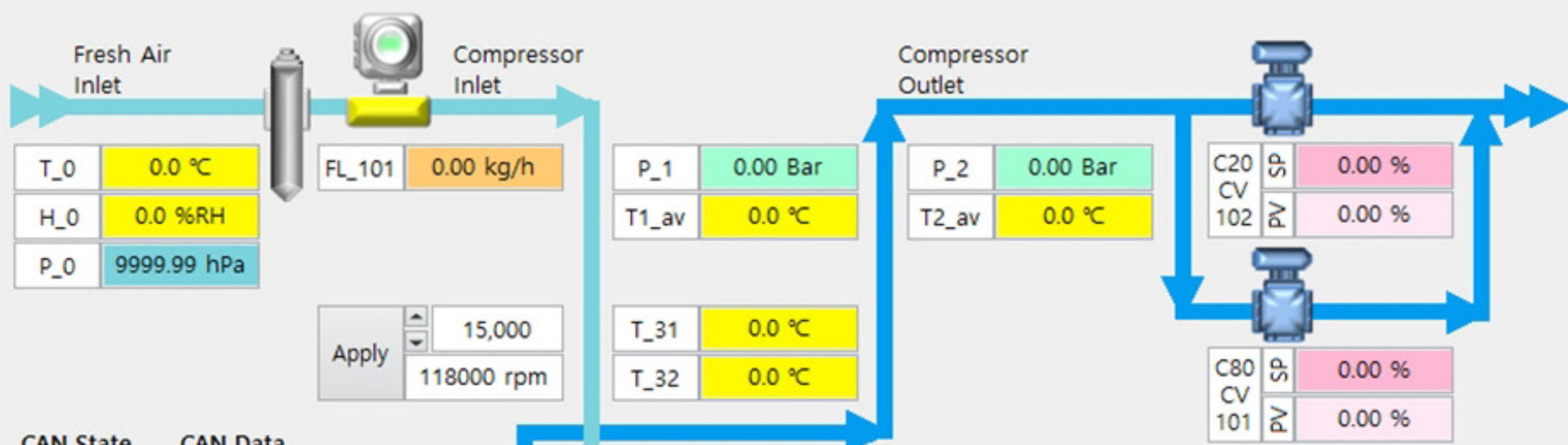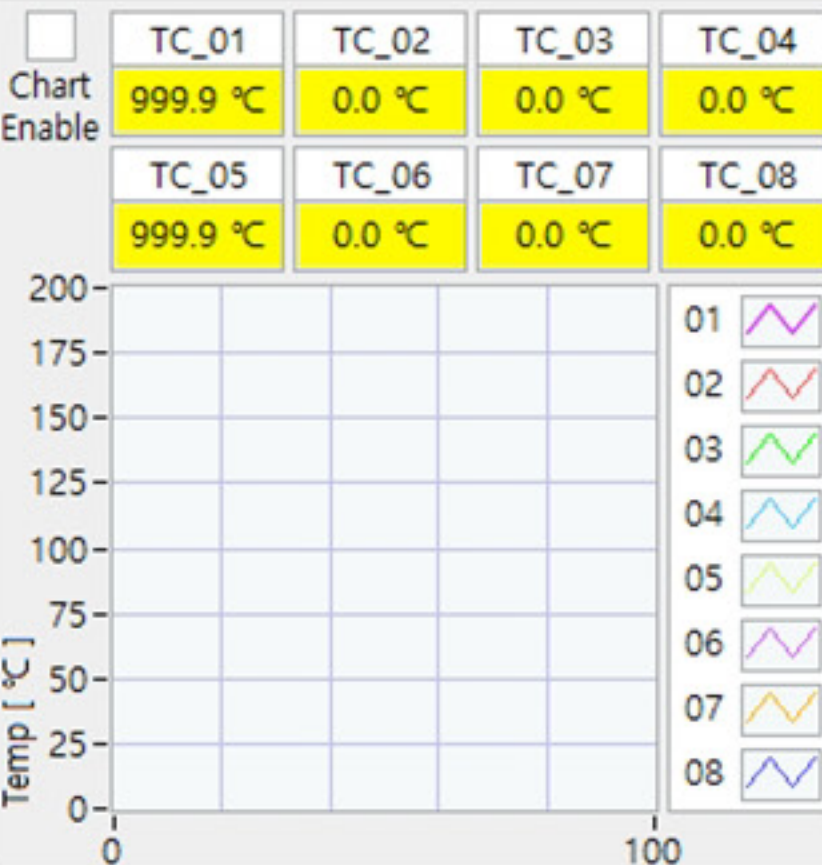| | Speed | 0 rpm |
Analyzer	Volt	0.00 V
	Curr	0.00 A
	Power	0.00 W

Chart Enable

	TC_01	TC_02	TC_03	TC_04
	999.9 ℃	0.0 ℃	0.0 ℃	0.0 ℃
	TC_05	TC_06	TC_07	TC_08
	999.9 ℃	0.0 ℃	0.0 ℃	0.0 ℃

Low Level Power

VOLT SP	VOLT PV	OUTPUT
0.00 V	0.00 V	OFF
CURR SP	CURR PV	
0.00 A	0.00 A	
● Connect	● Fault	

CAN Fault & Warning

| ● Over Load | ● ZC Trip | ● OV Trip | ● UV Trip | ● Over Curr A | ● Over Curr B | ● Over Curr C |
| ● OT Motor | ● OT Air | ● OT GBT | ● Device Short | ● HVIL Check | ● CAN Timeout | |

High Level Power

VOLT SP	VOLT PV	OUTPUT
0 V	0 V	OFF
CURR SP	CURR PV	POWER
0 A	0 A	0 W
● Connect	● Fault	

Chiller

PRESS SP	PRESS PV	STOP / RUN
0 Mpa	0 Mpa	STOP
TEMP SP	TEMP PV	FLOW
0 ℃	0 ℃	0 LPM
● Connect	● Fault	● Remote

Temp [℃] chart: 200 175 150 125 100 75 50 25 0 — 0 ... 100
01 02 03 04 05 06 07 08

Elapsed Time	Wait Stability	End Speed
0.0 s	0.0 s	0

Edit Test Conifg　Load Test Config File　RUN Test　Open Map File　Test Stop
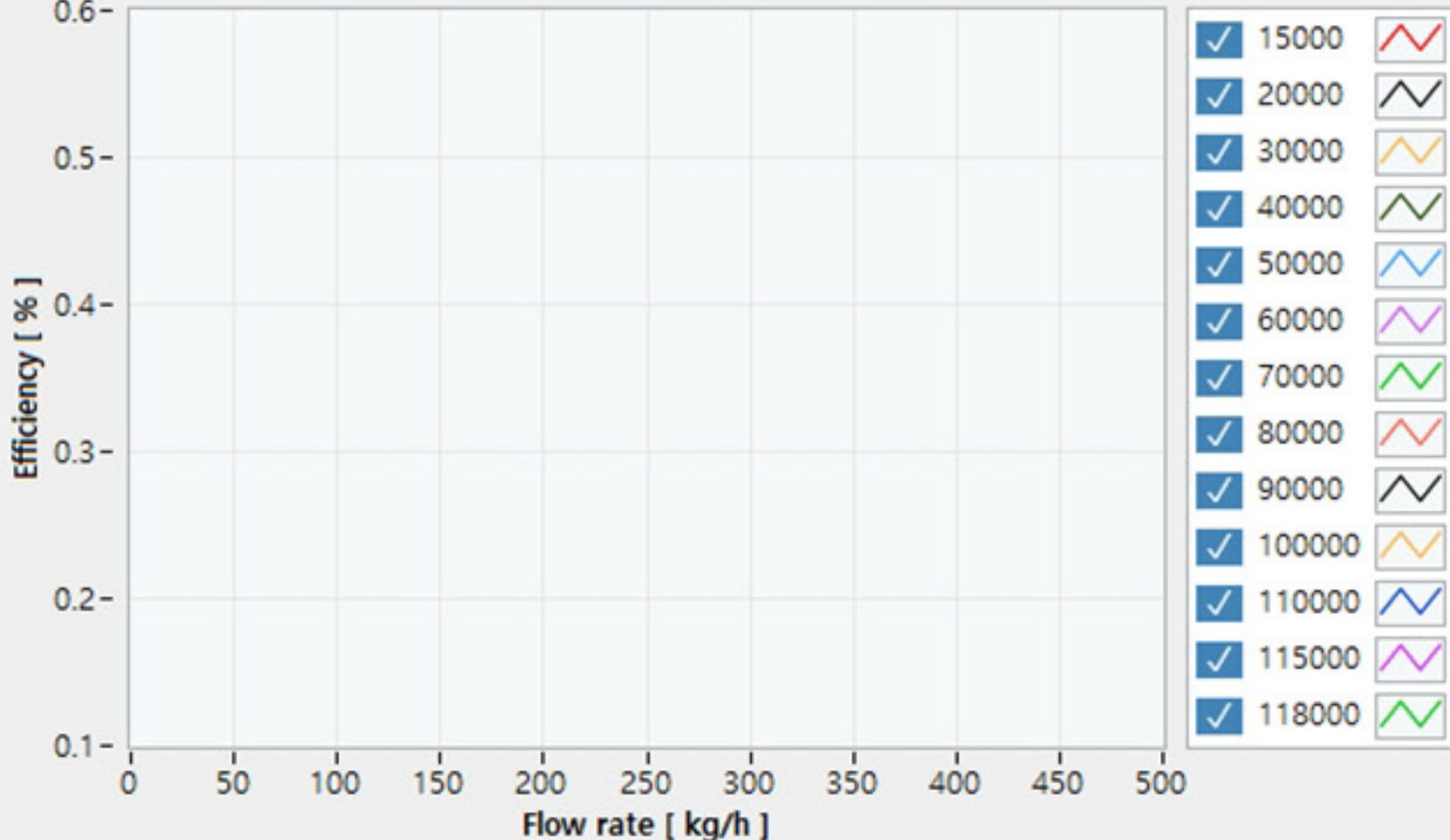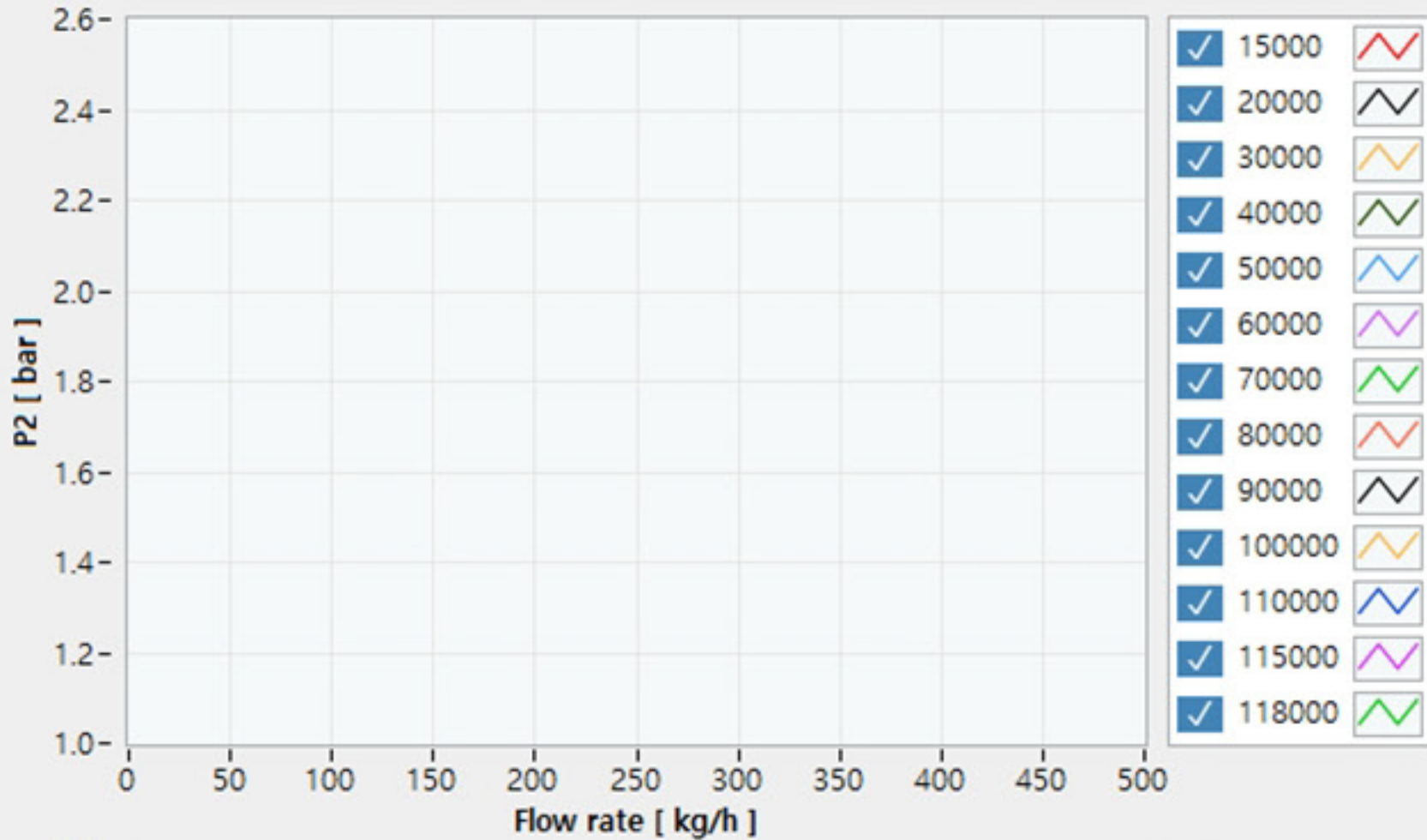
Speed SP[rpm]	Speed PV[rpm]	C80 [%]	P2[bar]	Flow[kg/h]	EFF	P_0[bar]	P_1[bar]	P_2[bar]	T_1[℃]	T_2[℃]	C80FB[%]	C20FB[%]

P2 [bar] chart (Y: 1.0–2.6, X: Flow rate [kg/h] 0–500)

Efficiency [%] chart (Y: 0.1–0.6, X: Flow rate [kg/h] 0–500)

Legend (both charts):
☑ 15000　☑ 20000　☑ 30000　☑ 40000　☑ 50000　☑ 60000　☑ 70000　☑ 80000　☑ 90000　☑ 100000　☑ 110000　☑ 115000　☑ 118000

Current Step	Total Step	Speed SP	Speed PV	p2_C	Efficiency	Flow Rate
0	0	0 rpm	0 rpm	0 bar	0 %	0 kg/h

Test Config Path

Vision Data
Collection and Reporting

_____

Purpose

· Monitoring vision data collected from DUT visual inspection

Main Fuctions

· Data acquisition through vision and real-time communication

· Algorithm-based analysis and reports of acquired data

Expected Effects

· Easy to derive objective results through quantitative analysis

· Expected improvement in yield by shortening procedures through real-time inspection

Quantity

- OK: 13 ea 86.66 %
- NG: 2 ea 13.33 %
- Total: 15 ea

Network

Connected

IP Port

Data Control

Open
Save
Reset

Data Acquisition Table

No.	Date	Time	Result	A	B	C	D	E	F	G	H
1	2019 - 01 - 12	16 : 24 : 21	OK	102.497	649.789	215.547	549.541	941.969	102.497	137.465	548.549
2	2019 - 01 - 12	16 : 24 : 20	OK	215.547	549.541	512.274	548.549	512.274	215.547	548.549	941.969
3	2019 - 01 - 12	16 : 24 : 19	OK	874.546	975.636	649.789	102.497	461.735	137.465	461.735	845.579
4	2019 - 01 - 12	16 : 24 : 18	OK	548.549	102.497	461.735	215.547	894.625	941.969	649.789	169.465
5	2019 - 01 - 12	16 : 24 : 17	OK	845.579	215.547	894.625	941.969	548.549	874.546	215.547	549.541
6	2019 - 01 - 12	16 : 24 : 16	NG	549.541	137.465	548.549	845.579	137.465	894.625	169.465	475.126
7	2019 - 01 - 12	16 : 24 : 15	OK	654.326	874.546	549.541	649.789	215.547	845.579	549.541	215.547
8	2019 - 01 - 12	16 : 24 : 14	OK	649.789	103.493	155.497	392.394	874.546	169.465	941.969	649.789
9	2019 - 01 - 12	16 : 24 : 13	OK	615.312	548.549	137.465	461.735	549.541	392.394	874.546	392.394
10	2019 - 01 - 12	16 : 24 : 12	OK	137.465	152.154	579.462	874.546	169.465	461.735	894.625	102.497
11	2019 - 01 - 12	16 : 24 : 11	OK	169.465	989.623	941.969	894.625	649.789	472.294	845.579	874.546
12	2019 - 01 - 12	16 : 24 : 10	NG	164.567	461.735	874.546	137.465	392.394	495.326	392.394	495.326
13	2019 - 01 - 12	16 : 24 : 09	OK	978.134	941.969	845.579	169.465	495.326	649.789	475.126	461.735
14	2019 - 01 - 12	16 : 24 : 08	OK	941.969	894.625	169.465	512.274	475.126	475.126	512.274	894.625
15	2019 - 01 - 12	16 : 24 : 07	OK	461.735	169.465	392.394	475.126	472.294	512.274	495.326	137.465

(Operating System Task Bar Area)

Performance Output Test
for Each Semiconductor(MOSFET) State

Purpose
· MOSFET research and performance testing

Main Fuctions
· Signal simulation through variable generator (Parameter Analyzer) control
· MOSFET I-V curve notation
· User settings of variable units and ranges

Expected Effects
· Reduction of human error through control of signal simulation devices
· Comparison report calculation through separation by test sequence

I-V	FET Sweep V(DS)	FET Sweep V(G)	FET Sweep V(G) Const	FET Bias - Stress

Time (sec) / Cycle
1.0

I (DS)
0.05E + 1

V (DS)
0.03

V (G)
0.1

▶ Start

Weight Data Acquisition Graph

Current (A) vs Gate Voltage (V)

Double Sweep   Using Start Point   Delay 0.0 sec   Gate Voltage (V)

Test Settings

V DS SMU2	**Repeat (FET)** 1
Range Auto	**Initial G(V)** -5.00
Compliance (A) 1E-3	**Final G(V)** 50.00
Common SMU3	**Point Limit** 40
Gate #1 SMU4	**Starting G(V)** -5.00
Gate #2 SMU5	**V DS Initial** 50.00
Range Auto	**V DS Final** 50.01
INTEG Time Long	**V DS Step** 0.01

↻ Reset

MAKERBOX

R&D Tower, 396, World Cup buk-ro,
Mapo-gu, Seoul, Republic of Korea

| **Phone** | \| | +82-2-6012-9410 | **E-mail** | \| | moon@makerbox.kr |
| **Fax** | \| | +82-2-6000-9411 | **Web** | \| | www.makerbox.kr |

© MAKERBOX Co., Ltd.