USER MANUAL

SPK+

DAEWON GSI
DAEWON GLOBAL SYSTEM INTEGRATION

※ Installation, maintenance and repairing

※ Operation

Basic operation

※ User manual

※ Supervisor manual

System configuration

※ Supervisor manual

※ Engineer manual

※ Installation plan

Installation, maintenance and repairing

SPK+

DAEWON GSI
DAEWON GLOBAL SYSTEM INTEGRATION

It is necessary to have full knowledge of the installation requirement.

It is only possible to deal with the troubles one may experience during the installation when considered below. Please fully understand below before inspection.

Installation condition

Location

The surface must be horizontal.

The system shouldn't be interfered from vibration by surrounding machines or equipments when installed in a plant or structure.

Vibration may causes in malfunction of the image processing unit.

Finish all the welding before the installation. The residues from welding may cause deformation of the system structure.

Environment

Operation temperature is between 0℃ to 45 ℃.

The location must be cool and dust free

Lighting

Installing location shouldn't have great difference of the intensity of the illumination

Keep the system away from direct light from sun or fluorescent light.

Make sure that the system is not under direct sun light during the day time.

Use a curtain if it is necessary.

Clearance

Please make sure that there is enough clearance for A/S or repairing.

The front and back of the machine should have enough clearance for repairing or maintenance.

Plan the cable route properly for the maintenance of the feed hopper and the vibrator connected to the feeder.

The front of the machine needs clearance for the discharge of sorted material or changing chutes.

Main circuit breaker

Please use a circuit breaker for the main power.

The system is installed with a circuit breaker but use circuit breaker at the main power supplier to ensure safety.

SPK+ | Safety precaution

General

For the SPK+.

- The equipment or operation may damaged when **'Caution'** sign is ignored.
- The operator may get damaged or injured when **'Warning'** sign is ignored..

'WARNING'

1. Stop the air supply and discharge remaining air before changing or repairing system parts.
2. Please follow the manual to inspect the system's PCBs without any arbitrary action
3. Do not remove any safety fence during the system is operating. Restore all the safety fence after inspection for safe system operation..
4. Keep clear from imaging parts or maintenance area as there are many dynamic parts when air / power is supplied.
5. Please wear protective goggle during sampling to avoid eye injury when the system operates.

'CAUTION'

1. Do not diagnose or change system's PCBs without full understanding of procedure.
2. Semiconductor parts are vulnerable to static discharge. Wear anti-static wrist strap and use a lead coil to avoid damage of the electro components.
   Please connect wrist strap to the earth terminal.
3. Handle or change PCBs with antistatic equipment.
   i) Prevent static discharge by anti-static wrist strap in work space or around equipments.
      - Do not touch power supply terminal without antistatic measures.
      - Keep the PCBs in anti-static plastic bags.
   ii) Shut down main power when removing / changing PCBs..

SPK+ | Safety precaution 2

'WARNING'

1. Main switch is also emergency switch. In emergency case, turn off color sorter with this main switch.

'CAUTION'

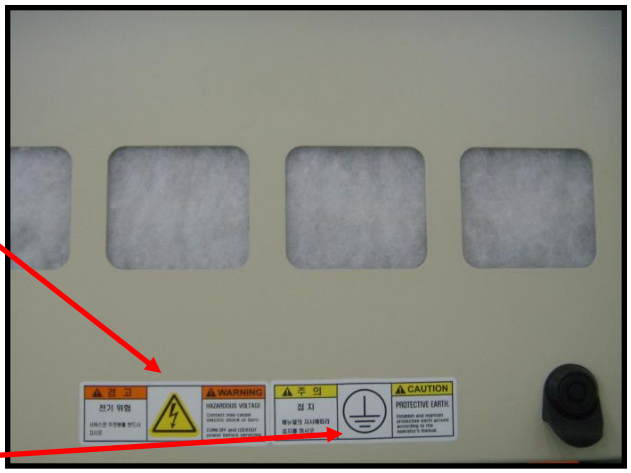
1. Rear door is heavy. Recommend to open rear door with two people.

SPK+ | Safety label 1

Safety label

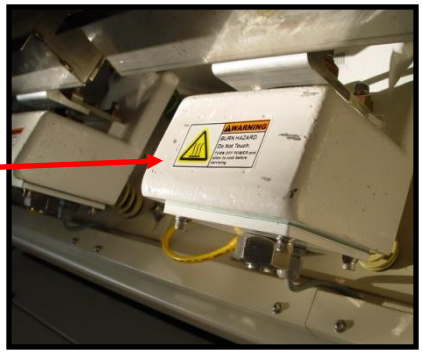
Attach safety label at the dangerous regions.
-The orange color label expresses the behaviors to be prohibited.
-The yellow color label expresses the dangerous situations.
-The sky blue color label expresses the general matters to be observed.

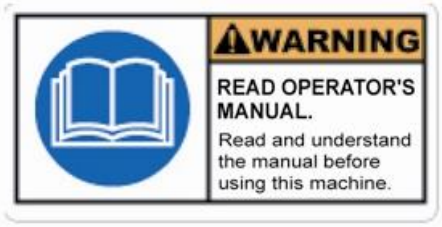
The mark of **"Hazardous voltage" warns to be injured from the electric shock.**



"Earth mark"

The mark of **"Burn hazard" warns to be burned.**





"Acknowledge of manual"

Safety label

SPK+ | Safety label 2

"Main power"

"Crane loop-adhered location"

"Compressed air flow direction"

SPK+ – Product contents

Specification

Model	Dimension (WxLxH)	Input to M/C(ton/hr)	Power(kw)	Compressor Power(HP)	Channel
SPK+1	1015x1400x1790	1~3	2	10	84
SPK+2 EXP	1825x1400x1790	2~6	2.5	20	128
SPK+3	1825x1400x1790	3~9	3	20	252
SPK+4 EXP	2615x1400x1790	4~12	4	30	336
SPK+5	2615x1400x1790	5~15	4.5	30	420

★ The specifications and designs can be changed without any notice. The capacity depends on impurity ratio

SPK+ | Product information

SPK+ SERIES, DAEWON GSI is optical grain color sorter with high capacity and high sorting ability.

SPK+ requires minimum installation space with easy moving and keeping.

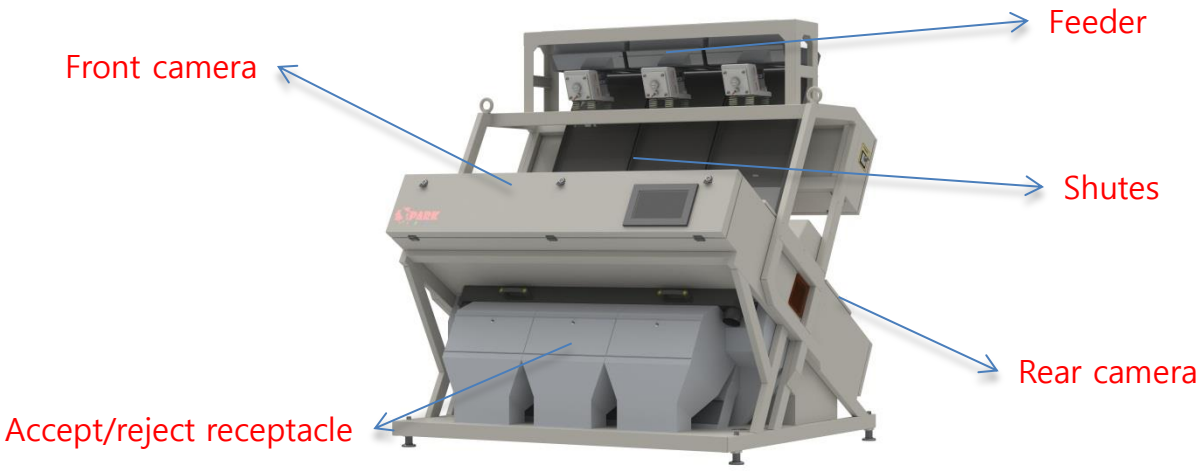


fig 1.1 : Parts description

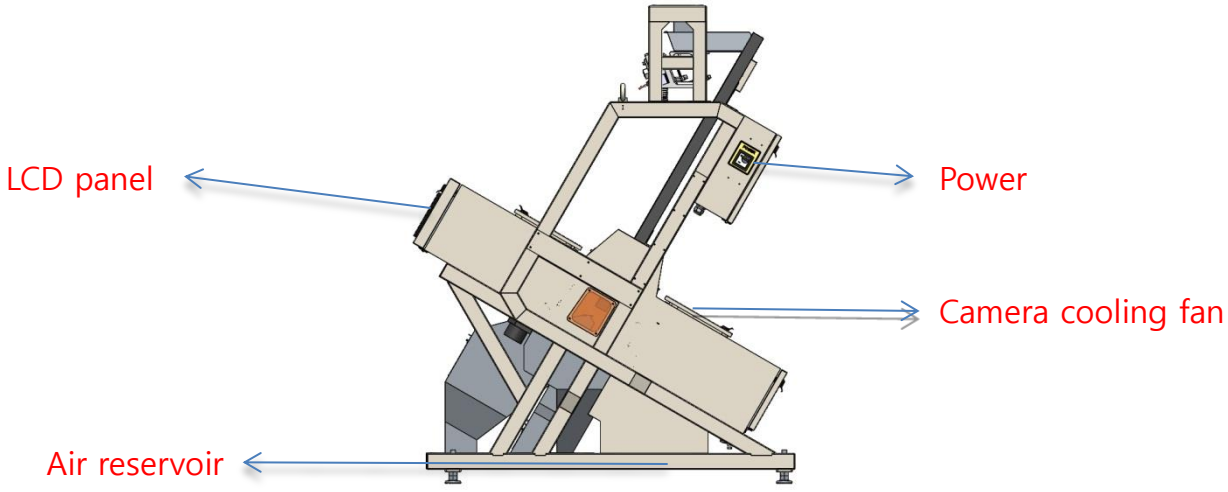


fig 2.1 : Parts description

SPK+ | Product installation information 1

1. Do not install at the location with condition below
   - Room temperature above 40℃
   - Room temperature below 0℃
   - Humid with dew form
   - Vibration from other than the system
   - Location with static discharge
   - Location with high voltage and chemicals

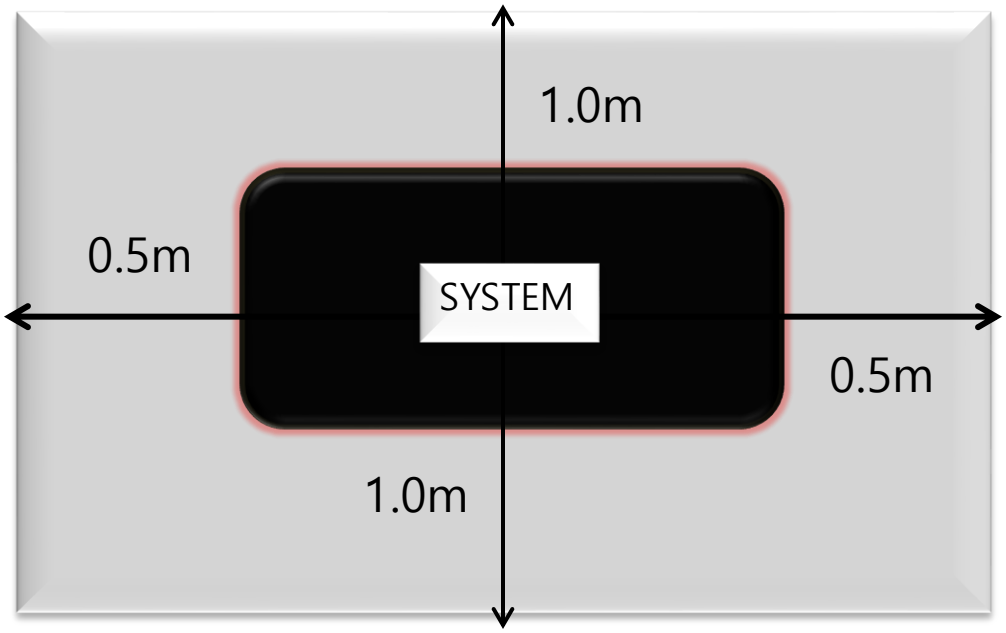


fig 3.1 : Minimum space required

2. Keep the clearance as the Illustration 3.1 for the operation and maintenance.
3. Never weld directly to the system.
   Please cover the system when it is necessary to weld next to the system.
4. Supply AC380V 50Hz, 60Hz after installing primary circuit breaker.
5. Connect the earth cable.
6. Arrange air-compressor as the system requires compressed air for air-guns.

   Arrange suitable air compressor, dryer, cooler and filters for optimum performance of the system
   Refer to the air-compressor manual for the air-compressor management.

SPK+ | Product installation information 2

Power supply connection

Requirement

Understand cable connection drawing and connect the earth before laying out power cable.

Check the end point of the earth and make sure it is firmly connected.

Check the power supply connection refer to the system's data or tag.

Check for any static discharge or momentary high-voltage after the power supply connection is made.

Do not connect any other motors at the power supply to prevent any induced current.

The main power supply must be connected with circuit breaker with fuses to protect the system from power failure.

Attention : It is recommended that the power supply connection to be done by an electrical engineer.

Installation procedure

1. Supply the power using circuit breakers and fuses after connecting earth
   Insulate front and side of the system, then remove the cover.
2. The color of main power supply cable is distinguished as below
   AC power supply : black
   Earth : yellow/green
3. Connect the earth cable from the main power cable to the earth connector.
   Refer to the earth connection requirement.
   Connect AC power supply cable to the terminal L1, L2, L3 and L4.
4. Tie the cables firmly with cable tie, then insert in cable ducts.
5. Close the cover.

SPK+ | Product installation information 3

Compressed air supply connection

Requirement

Keep the dust or oil out of the compressed air supply.
Dust or oil may result in malfunction of the air gun nozzles.
This will deteriorate sorting ability.
The system is installed with air filer but install oil filter prior to the compressor.

Warning : The air filtering system in the system is based on the factories air filtering system but use both system together.
The pressure of the compressed air must not exceed the set value from engineers.

fig 4.1 : Air unit

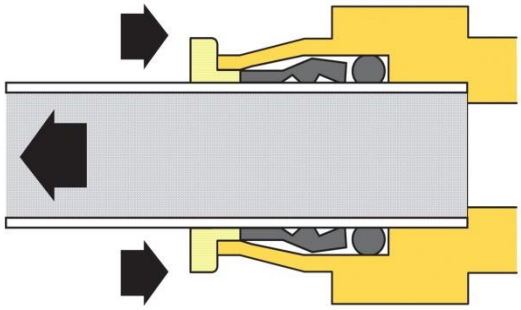


fig 4.2 : Air tube connector

Air valve

Positioned between the filter and regulator.

Opens when the knob is turned clockwise.

Closes when the knob is turned anti-clockwise.

Pay attention for the violent air blow within the system when the valve is switched off.

※ **SPK+** Is installed with quick connectors so there will be air leakage under the condition below.

『When the cutting plane of the tube is not the perfect circular shape』

『When the tube is not pushed to the end』

『When the 'O-ring' is missing』

SPK+ | Product installation information 4

Air pressure configuration

-Configure the air pressure refer to the pressure gauge.

fig 5.1 : pressure gauge

fig 5.2 : pressure gauge

fig 5.3 : pressure gauge

1)Pull down the knob until it 'clicks' as shown in the Illustration 5.1
2)Turn the knob until the gauge presents the set value from engineer as shown in the illustration 5.2
3)Push up the knob when the pressure reached set value from the engineer as shown in illustration 5.3

Pressure regulator valve

Located between the air filter and regulator

This valve configures the air pressure of the air guns and the pressure is presented at the gauge.

The pressure is configured turning the knob.

The system requires higher air pressure when the size of the sorting target increases.

Attention – Never set the pressure value over / below engineer's set value as it will damage ejector.

No one removes the air-gun except Daewon GSI's engineers as it is sophisticatedly assembled and tested by Daewon GSI.

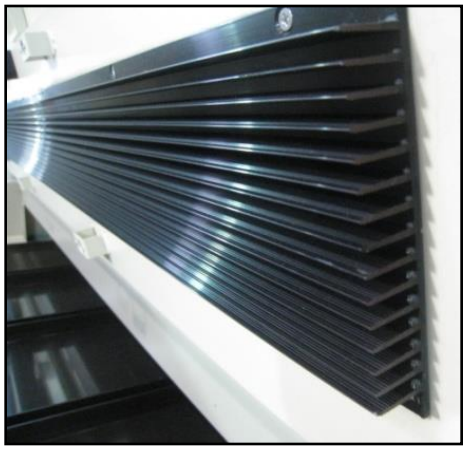
The air leakage will result in deterioration of the operation and also the repairing / re-installing is extremely difficult.

SPK+ | Regular cleaning 1

It requires regular cleaning to maintain sorting ability and cleanness.
The sorting ability will be deteriorated without regular cleaning.
The cleaning procedure is shown below.

Turn off the power.

Wipe the bran or any impurities out with a smooth piece of cloth



Clean the camera cooling system with a smooth piece of cloth to avoid scratch

SPK+ | Regular cleaning 2

Clean superiority/inferiority outlet with A piece of smooth cleaning cloth to prevent any scratches.

Clean the surface of the system with a piece of smooth cleaning cloth to prevent any scratches.

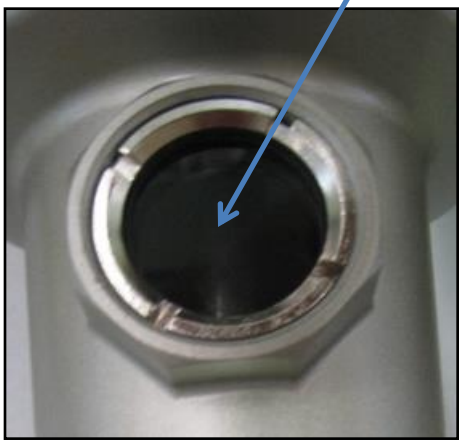
Clean the windows of the system with a piece of smooth cleaning cloth to prevent any scratches..

SPK+ | Regular cleaning 3

Air-unit Inspection

Check the windows and remove any water collected in the unit on a regular basis.

Attention : Air in the compressor must be discharged after the system stopped.



Inspection window

Let the air out
by opening the valve

SPK+ | Maintenance 1

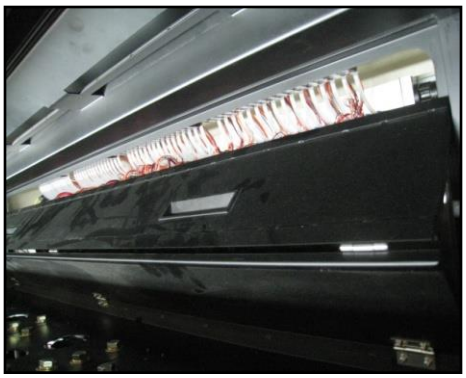
◆ Replacing the air-guns

The sorting ability deteriorate when the air-gun doesn't work or the air pressure is low.
In this case the air gun must be replaced.

Attention : Turn off the power and close the air-unit valve before the replacement

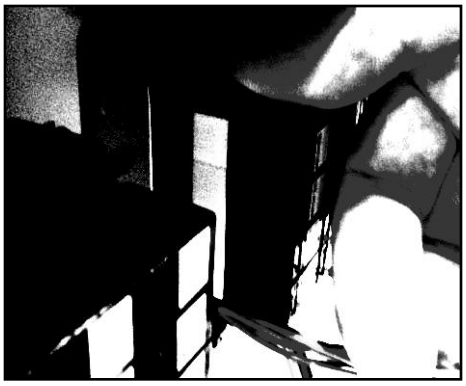
1. Turn off the power and close the air-unit valve to stop the air flow.

2. Open the rear camera door with a key provided together.

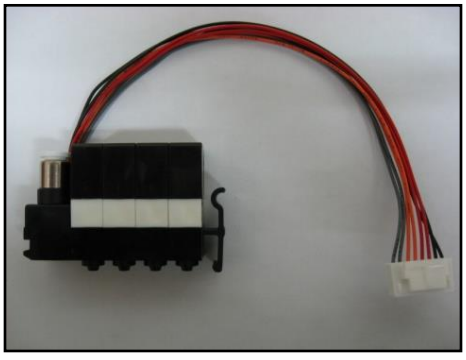


3. Open the inner door

4. Then you will be able to locate the air-guns



5. Remove the air-guns by pressing the upper part of air-guns.



6. The procedure for installing new air-guns is the other way around.

※ Attention
Daewon GSI is not responsible for any result occurred by replacing air-guns without permission

◉ **Feeder malfunction.**

1. Is the feed switch on?
2. Is the air pressure normal?
3. Is there any alarming sound?
4. Isn't the pneumatic circuit frozen?
5. Is the material storage filled with material?

◉ **Ejector malfunction**

1. Is the eject button pressed?
2. Is the air pressure normal?
3. Isn't the pneumatic circuit frozen?

◉ **Alarming**

1. Is the compressor operating?
2. Isn't the air-pressure below 2kg/㎠?
3. Is the light source (lamps/LED) on?
4. Isn't the pneumatic circuit frozen?

◉ **Sorting deterioration**

1. Isn't there any dirt or scratches preventing optimal transfer of the material?
2. Is the backdrop or sensitivity of sensor correct?
3. Is the timing setting correct?
4. Isn't the window on the imaging unit dirty?
5. Is the vibration rate of the vibrator constant?
6. Is the air pressure ranging 4.0kg/㎠ - 6.0kg/ ㎠
   (may variable according to material)

OPERATION

SPK+

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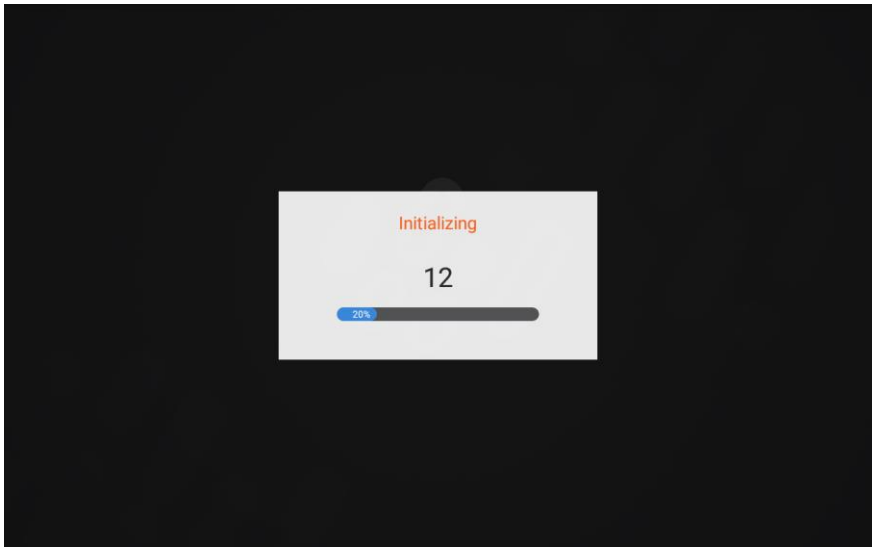
Basic Operation 1

◆ Start operation

1. Turn on the air-compressor .
2. Open the air-valve when compressor reached enough pressure .
3. Check the pressure gauge whether it presents the **engineer's set** value .
4. Supply main power .

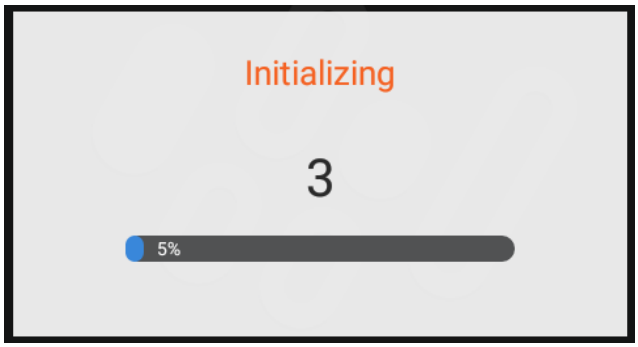
Pic 1.1 : Power Switch

5. Turn on the power switch as the **Pic 1.1**.
6. The loading massage will appear on the screen as **Pic 1.2 when the power is on.**
   The main display appears after loading



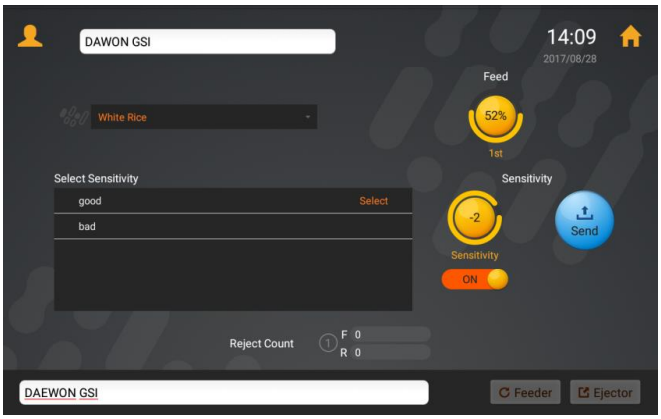
Pic 1.2 : System Loading

Basic Operation 2



Pic 1.3 : Loading Processing Graph

7. **Pic 1.3 Loading progress graph will appear on the Pic 1.2 system loading screen.**
   User may have to wait for 15~20 sec.



Pic 1.4.1 : 2D Sensitivity Main Screen

Pic 1.4.2 : RGB Sensitivity Main Screen

Pic 1.4 : Main Screen

8. Touch the Ejector 'Eject' switch (Right One) on the task bar **Pic 1.4**

9. Touch the Feeder 'Feeder' switch (Left One) on the task bar **Pic 1.4**

Basic Operation 3

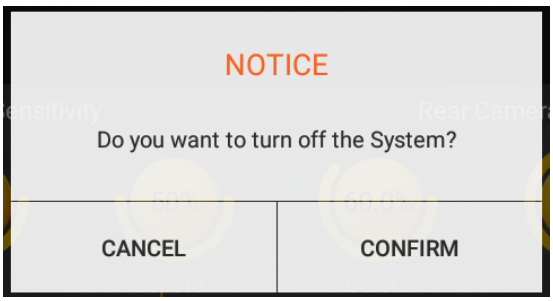
◆ Finish Operation

Pic 2.1 : Task bar

1. Touch the  'Feeder' button on the task bar illustrated as **Pic 2.1**

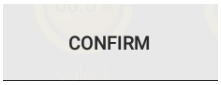
2. Touch the  'Eject' button on the task bar illustrated as **Pic 2.1**

3. Touch the  'Configuration menu' button as **Pic 2.1**



Pic 2.2 : configuration menu

4. Touch the  'System off button' when the pop-up Configuration Menu appears.

A message box will appear when clicking button **Pic. 2.2 then Press**  **button**.

5. Turn off the power switch when the machine stopped.

USER MANUAL

SPK+

DAEWON GSI
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Main display information 1

※ Instruction

The main display presents system information such as sorting mode, feed amount, accumulated

ejection number and sensitivity.

The configuration menu, feeder and eject button stays on continuously

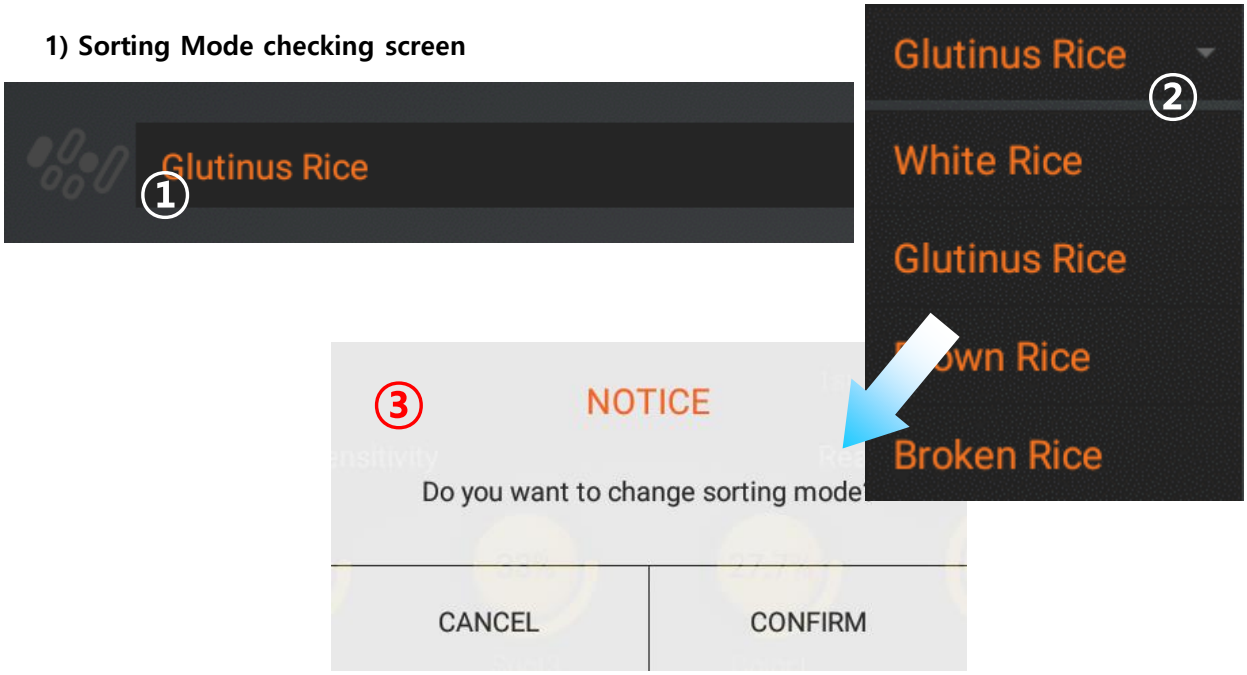
Pic 3.1 : Main Screen (2D Sensitivity, RGB Sensitivity)

The system is ready to operate if the ' Main Screen' appeared

Main display information 2

※ Description of Main Screen

1) Sorting Mode checking screen



1. Sorting Mode - Displays current sorting mode .

2. Sorting mode change – Double click letter in the '①' pop-up screen '②' will be appeared.

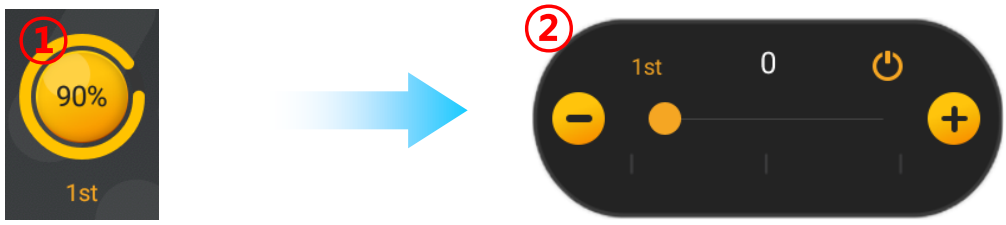
Double click sorting mode what you want to change in the '②' pop-up screen '③; will be appeared.

If you press in the '③' mode will be change and you will see 'Loading process graph' like

Pic 1.3 and then sorting mode will be changed

If you press "NO", mode changing will be stopped.

2) Feeder checking



1. Feed rate indicator - Displays first/second step sorting feed rate of current sorting mode

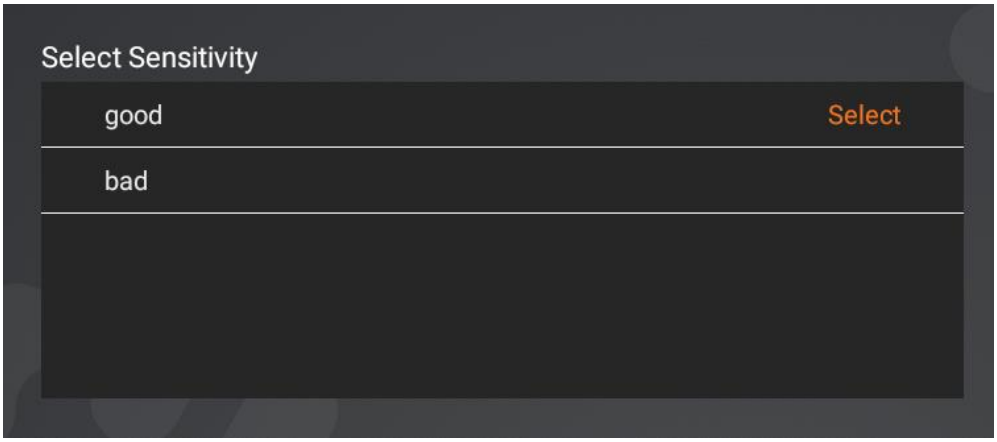
2. Set Feeding – Double click letter in the red box of '①' , you will see arrow like '②'.

Press amount of feeding will be increase, press amount of feeding will be decrease.

Feeding will be adjusted by sorting material.

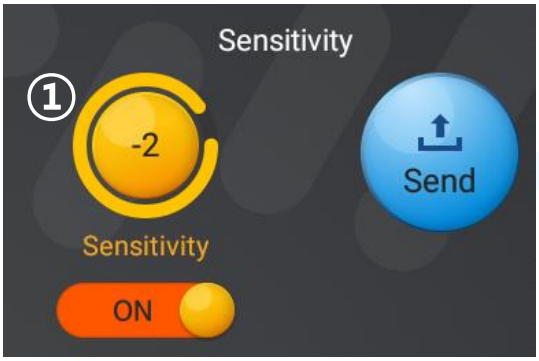
Main display information 3

3) Check sorting sensitivity screen



1. Setting name in the full color graph, it is appeared once camera sensitivity is set.

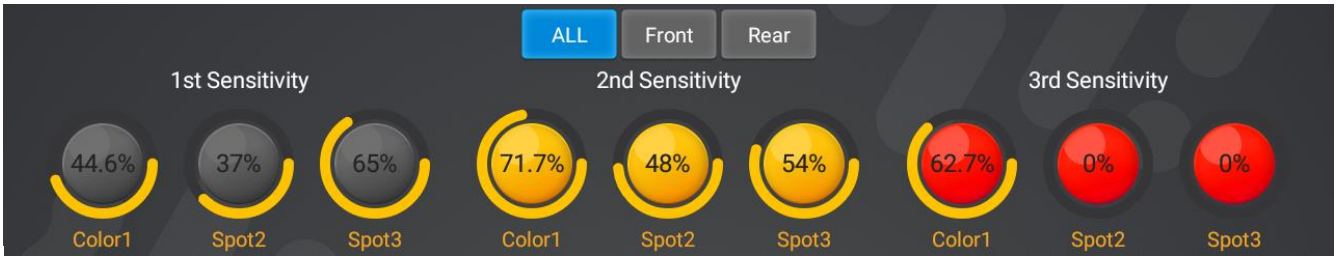
4) Way to modify sorting sensitivity



1. **Set sensitivity** – Change sensitivity and press SEND button picture ② will be appeared.
Once picture changed sensitivity is applied complete, this image is disappeared.

Main display information 3

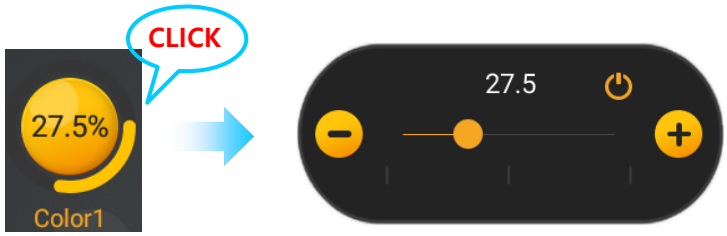
5) RGB sorting sensitivity checking screen



1. **Choose sensitivity of ALL And Front or Rear**
2. **Screen for check and set Color1~3 and Spot1~3 sensitivity of Pass**

6) Way to modify sorting sensitivity

1. **Set sensitivity** – Change and set sensitivity by press  button.



7) Eject (Air gun) button

1. **Eject operation button –** This button is used to start ejecting for removing impurities
2. **Button**–  Grey color means do not run ejector, even though camera sees impurity

 Amber color means run ejector when camera sees impurity.

Main display information 5

8) Feeder Button

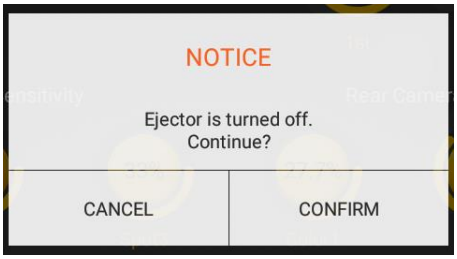
1. **Feeder operation button –** Button for operating feeder by vibration to feed sorting material to color sorter.

2. **Button** 

Grey means do not run feeder

Amber means runs feeder.

9) When try to operate 'Feeder' if 'Eject' is off.



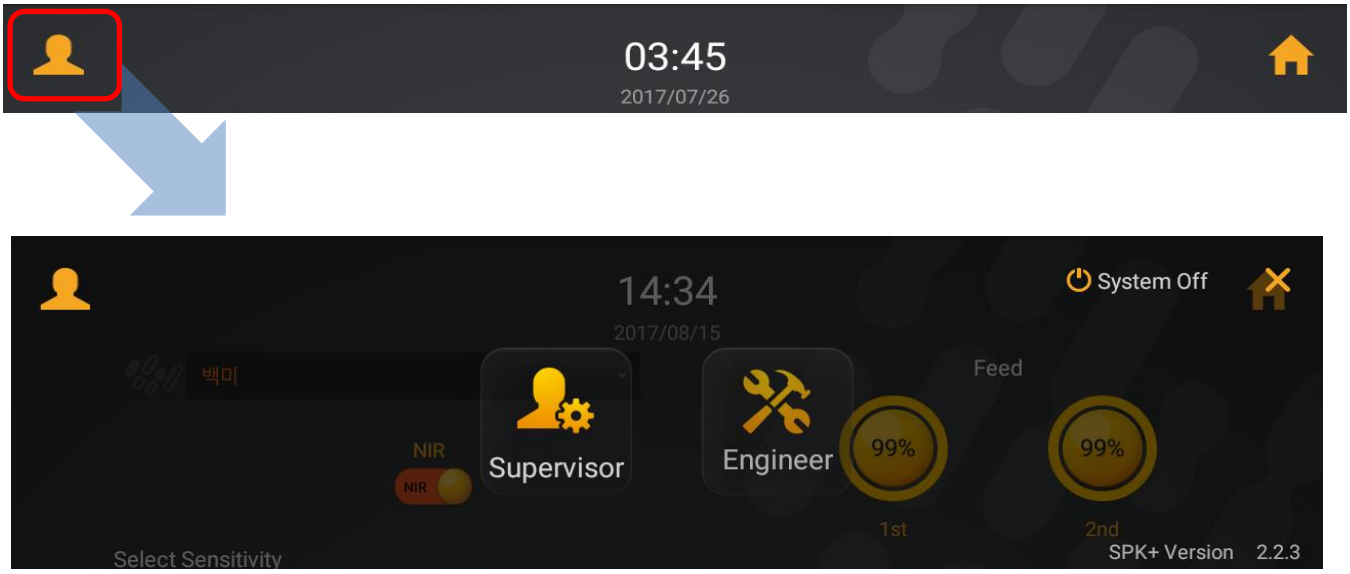
1. **Alert –** Feeder is running when eject is off, all impurities go to accept. This alert is to prevent it.

2. **Button** – "No" - Press 'NO' feeder will be OFF automatically.

"Yes" - Press 'YES' feeder will run even though ejector is off.

Main display information 6

10) MENU



1. MENU button

– Button to enter Supervisor mode. (This engineer mode is different from Supervisor mode which operator sees when color sorter is on.)

2. Description

1. Supervisor - Supervisor menu (Enter more detailed to Camera, Eject etc)

2. Engineer - Allowed to engineer from DAEWON GSI only.

Main display information 7

11) Phone Number.

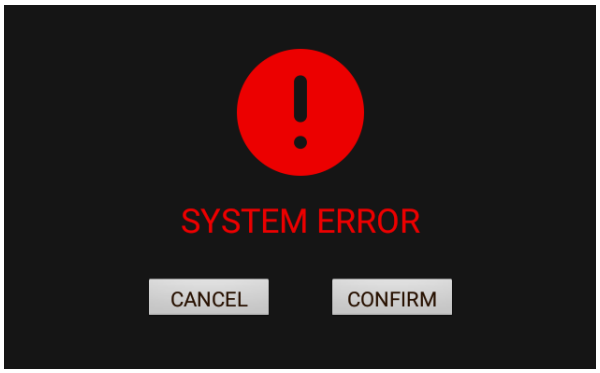
1. Phone number of DAEWON GSI

– We put phone number of DAEWON GSI in this screen.
You can call when color sorter has problem

2. Changing information (*Available in Supervisor mode).

– You can put other name or phone number in this screen.
(You can put engineer contact number in your country.)

10) System Error Check



1. Indicates system errors. Color of 'SYSTEM ERROR CHECK' bar will display when color sorter has problem

Main display information 8

12) System Error

– Press system check bar which is blinking, you can see sensor check screen. (Please check description of Sensor check.)

Set user level

※ Change to Supervisor mode or engineer mode

- Change to Supervisor mode or engineer mode.
- turn off the system.

Pic 4.1 : User configuration

1. Supervisor

   - Supervisor mode

2. Engineer

   - Engineer mode

- Press password to change to Supervisor mode or engineer mode

3. Power off

 - turn off the system.

4. UI version checking screen
   – UI version what is running is showed at left-button side of screen.
   (SPK-3 Version 2.0)

Supervisor Manual

SPK+

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Set user level

※ Change to Supervisor mode

1. Press 

Pic 5.2 : key pad

Pic 5.1 : User configuration

2. Touch the "supervisor" button, then a key pad will appear as **Pic 5.2.**

3. Put a pin code and click enter button, then **Change to Supervisor mode**

4. Supervisor - More authorization than general operator.

※ SUPERVISOR mode is allowed to authorized Supervisor only.

Supervisor menu(Set system, ejector, and camera)

※ Description of Supervisor menu

1. Press menu button.

2. Appear menu for Supervisor in the **Pic 6.1.**

- Set ejector, sorting mode, User, System, Feeding, Camera, System off

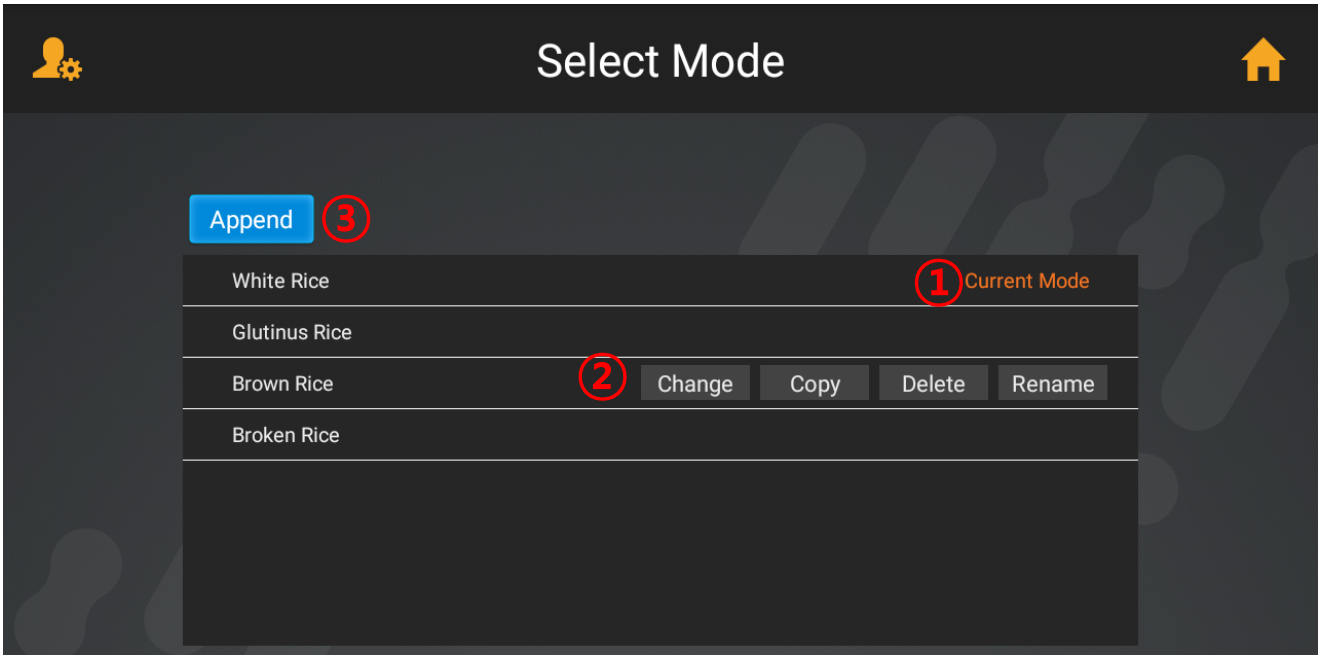
Pic 6.1 : Supervisor menu screen

Select mode 1

※ SELECT MODE

- Functions related to the mode (Mode Addition, Mode Change, Mode Copy, Mode Description, Mode Comparison and etc)

1. The screen for the Selection of the material to be selected is displayed as shown in **Pic 7.1** when the Mode Selection is pressed in **Pic 6.1** in the previous page.



Pic 7.1 : The screen of the Selection of the material to be selected

1. Current mode– It displays of the currently used Mode No. and Mode name.

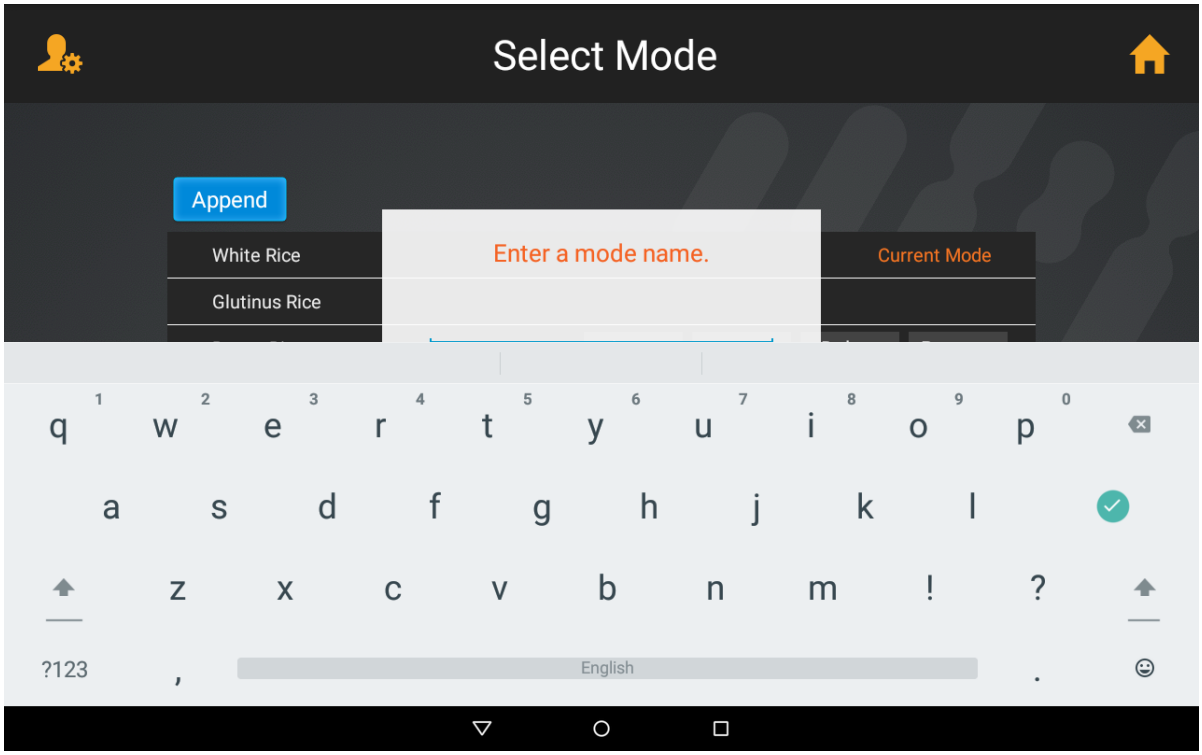
2. Material

- MODE CHANGE : Change — Mode change is available with the selected mode.
- MODE COPY : Copy — The data can be copied from the current mode to the target mode.
- RENAME : Rename — The name of the selected mode can be changed.

3. Mode operation

- Append : Append — additional mode creation with new name

Select mode 2



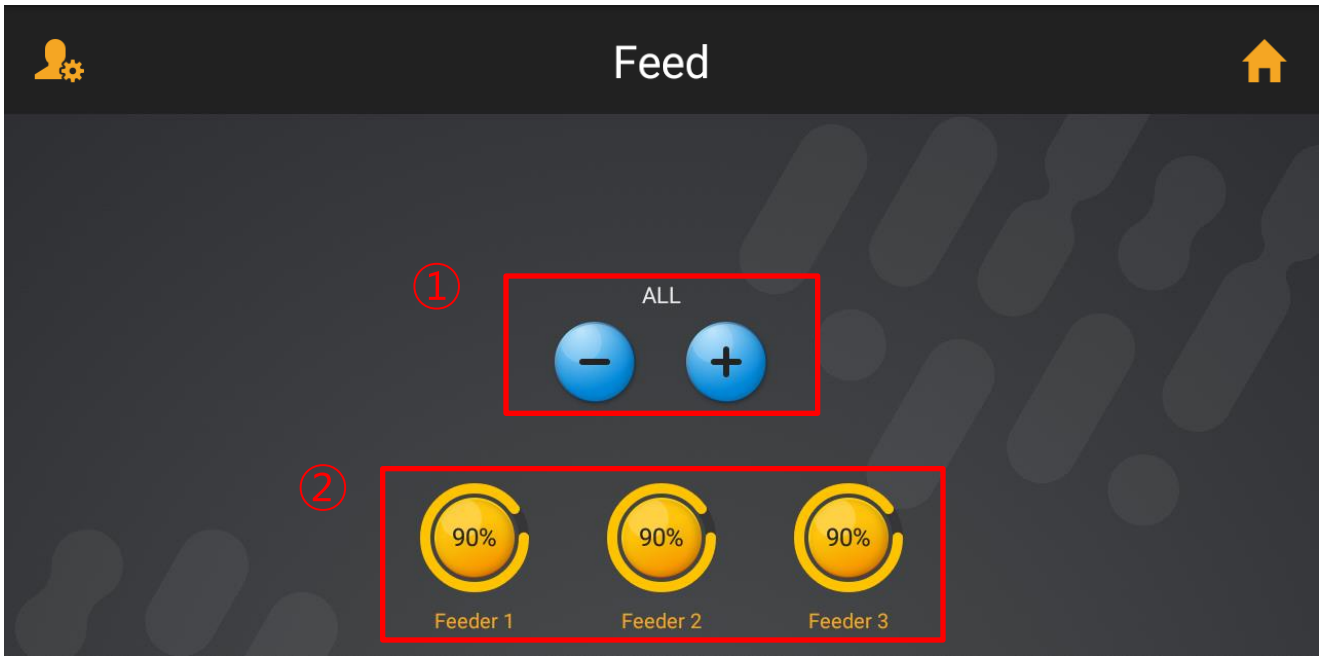
Pic 7.2 : Mode Append

Feed setting 1

※ Screen for Feed Setting

- Mode for set vibration of each feeder.

1. Press FEED in the **Pic 6.1** feed setting screen **Pic 8.1** will be appeared.



Pic 8.1 : FEED SETTING

1. Generally, from Feed No.1 ~ No.2 are 1st step sorting, Feed No. 3 are 2nd step sorting.

2. ① in the **Pic 8.1** is control button for all feeders.

3. ② in the **Pic 8.1** is control button for each feeder.

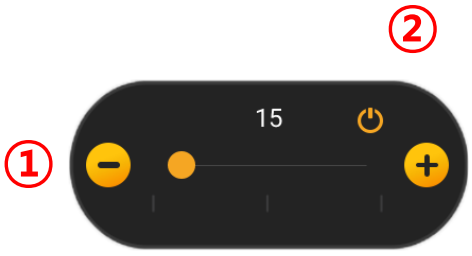
4. Press 

icon shown as above, then **Pic 8.2** will be appeared.

5. Set 1st feeding according to previous machine capacity.

   Set 2nd feeding according to amount of 1st rejection.

Feed setting 2



Pic 8.2 : Feeding setting

1. Press  in the **Pic 8.2** feeding will be increased.

   Press  in the **Pic 8.2** feeding will be decreased.

1 .Feed Number – Number of chute

2. Feed Input - Set speed of feeder vibration

3. ON/OFF button

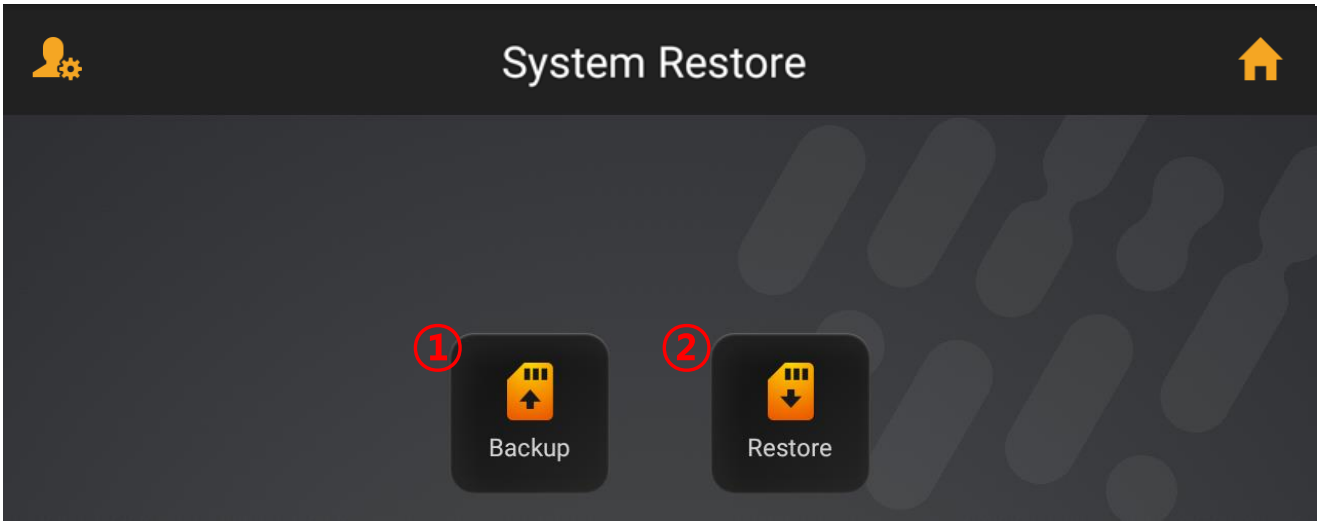
 - ON or OFF of each chute's feeder.

System setting (System backup)

※ System Backup

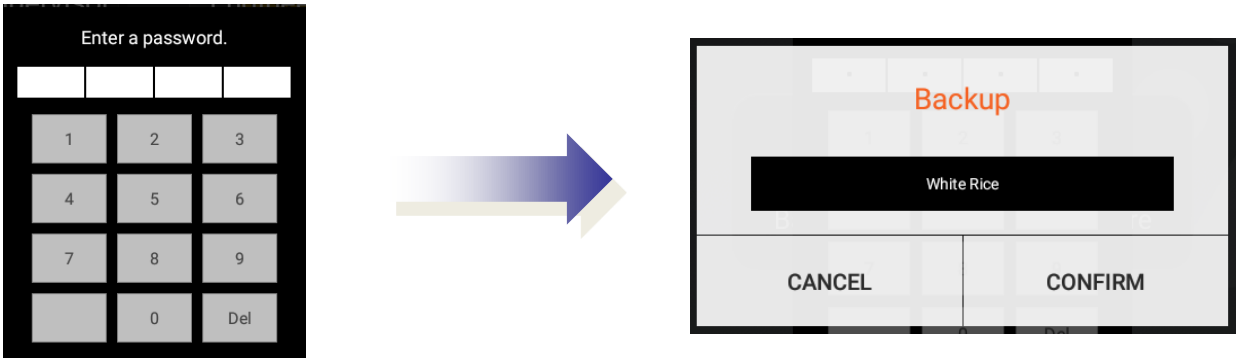
- A function of saving the data of the current system in the currently used system

1. The System backup/Recovery screen is displayed keyboard when "**System backup** " is selected in **Pic 6.1** as shown in **Pic 9.1** on the previous page.



Pic 9.1 System backup/recovery screen

1. How to use system Backup



※ System backup is used to save the changed data in the current mode and the system recovery is used to call the previously saved data in current mode.

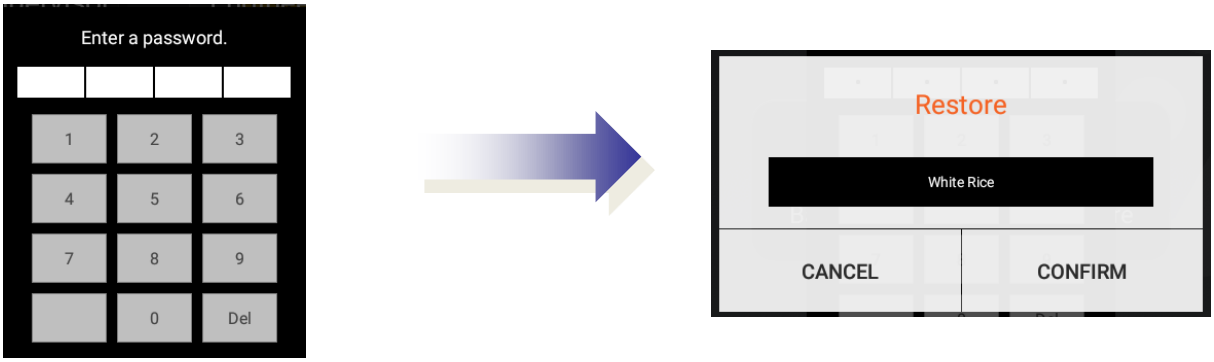
※ System backup is a mode to save the changed data in the current mode.
The backup is not allowed except for the engineer of Daewon GSI

System setting (System restore)

※ System Restore

- Restore when error from operator/engineer or data changing by system error

2. How to use system restore



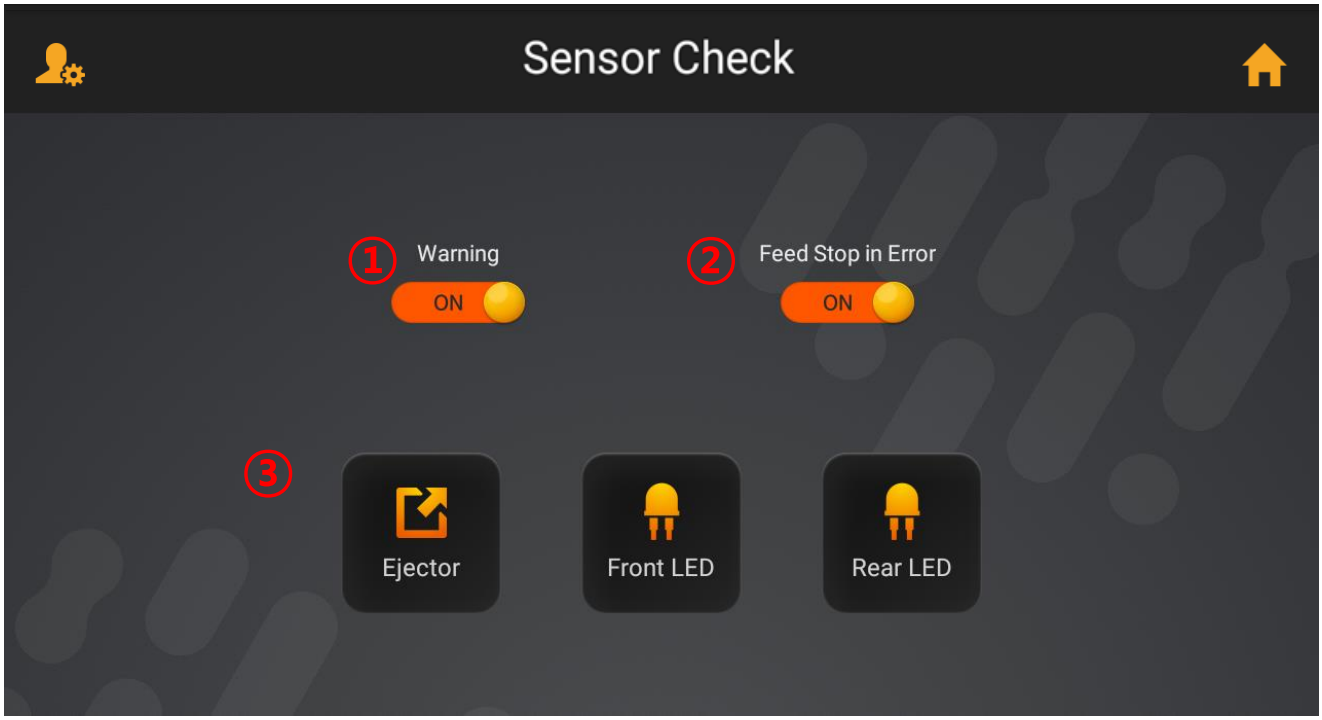
1. Press 'System Restore' button.
2. Press PASSWORD and press 'ENT'.
3. Press 'Confirm' button for mode you want to restore.
4. System loading and then finish to restore..

System setting (Sensor check)

※ Set input/output

- Mode for control all basic system

1. The Sensor check screen is displayed keyboard when "Sensor check" is selected in **Pic 6.1** as shown in **Pic 10.1** on the previous page.



Pic 10.1 : Set Input/Output

1. Warning

- When sensor error message is appeared, close message and operate color sorter continuous.

2. Stop feeder when error

- When off this function, color sorter is operating even error message is appear.

3. Error check of DIO input

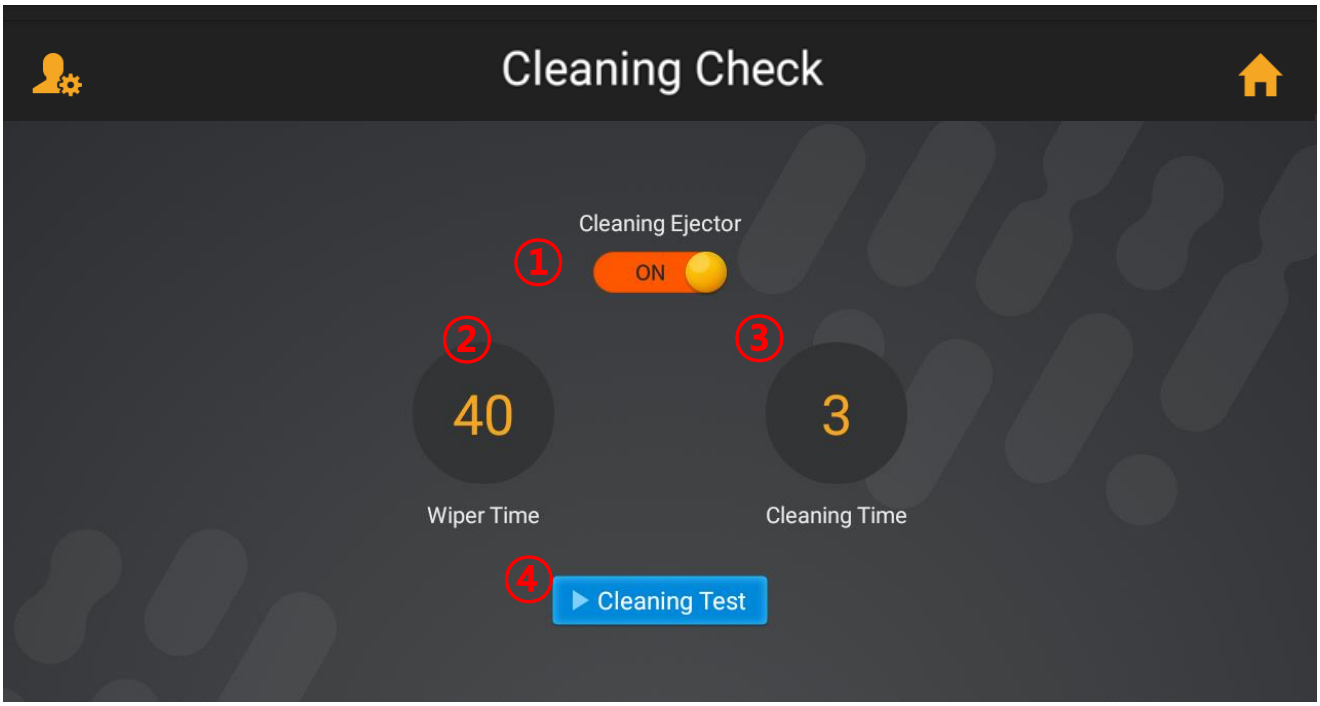
- When ejector has error, you can see eject error check screen.
- Front LED : Show error of front LED.
- Rear LED : Show error of rear LED

System setting (Cleaning check)

※ Set input/output

- Mode for control cleaning time and testing wiper.

1. The Cleaning check screen is displayed keyboard when "Cleaning check" is selected in **Pic 6.1** as shown in **Pic 11.1** on the previous page.



Pic 11.1 : Cleaning Check

1. Operate ejector while cleaning

- Usually ejector is off while cleaning, but if on this button, ejector is on while cleaning.

2. Cleaning time

- Set interval of cleaning time. (Set by minute)

3. WIPER TIME (WIPER)

Set time of waiting to operate feeder again after cleaning. (Set by second)

4. Clean Test

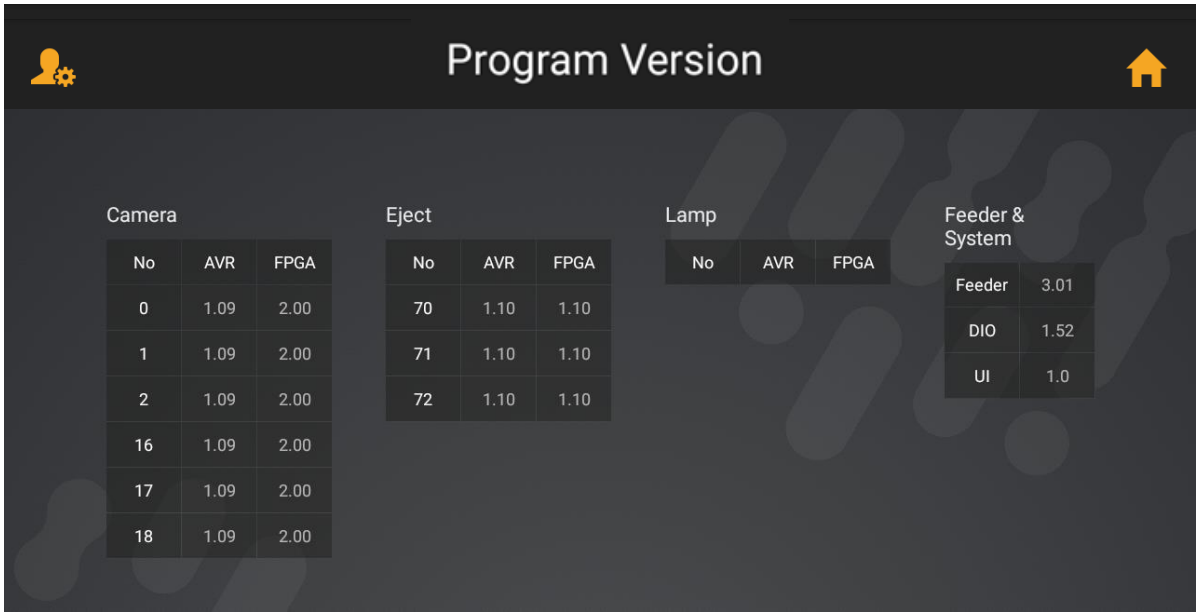
- Operate wiper by manual.

System setting (Program version)

※ PROGRAM VERSION

- Function to check program version of each boards

1. The Program Version screen as shown in **Pic 12.1** is displayed when "**Program Version**" is pressed in **Pic 6.1** on the previous page.



Pic 12.1 : Program Version screen

※ Pic 12.1 : Description on the Program Version screen

- CAMERA : AVR, FPGA VERSION OF EACH CAMERA
- EJECTOR : PSOC, FPGA VERSION OF EACH EJECTOR
- LED : LED DRIVER BOARD VERSION
- FEEDR & SYSTEM : FEEDER, DIO, UI VERSION

Reject counter 1

※ Ejector counter

- Display real time count of reject by graph for each camera.

1. Press ejector counter in the **Pic 6.1, Pic 13.1** will be appeared.

Pic 13.1 : Real time count

※ Display count of all the ejects

1. Select camera
2. Display real time counter of 84 ejectors by graph.

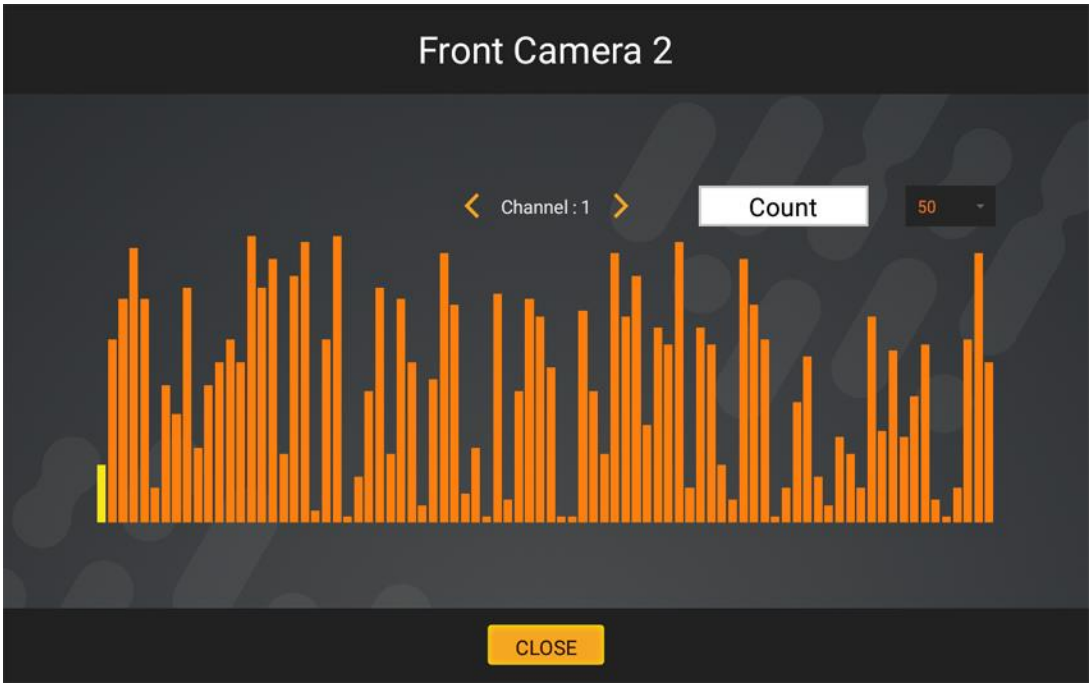
Reject counter 2

※ Ejector counter by camera

- **Select(click) camera, then real time counter of 84 ejectors is displayed.**

1. Press ① in the **Pic 13.1, Pic 14.1** will be appeared.

.



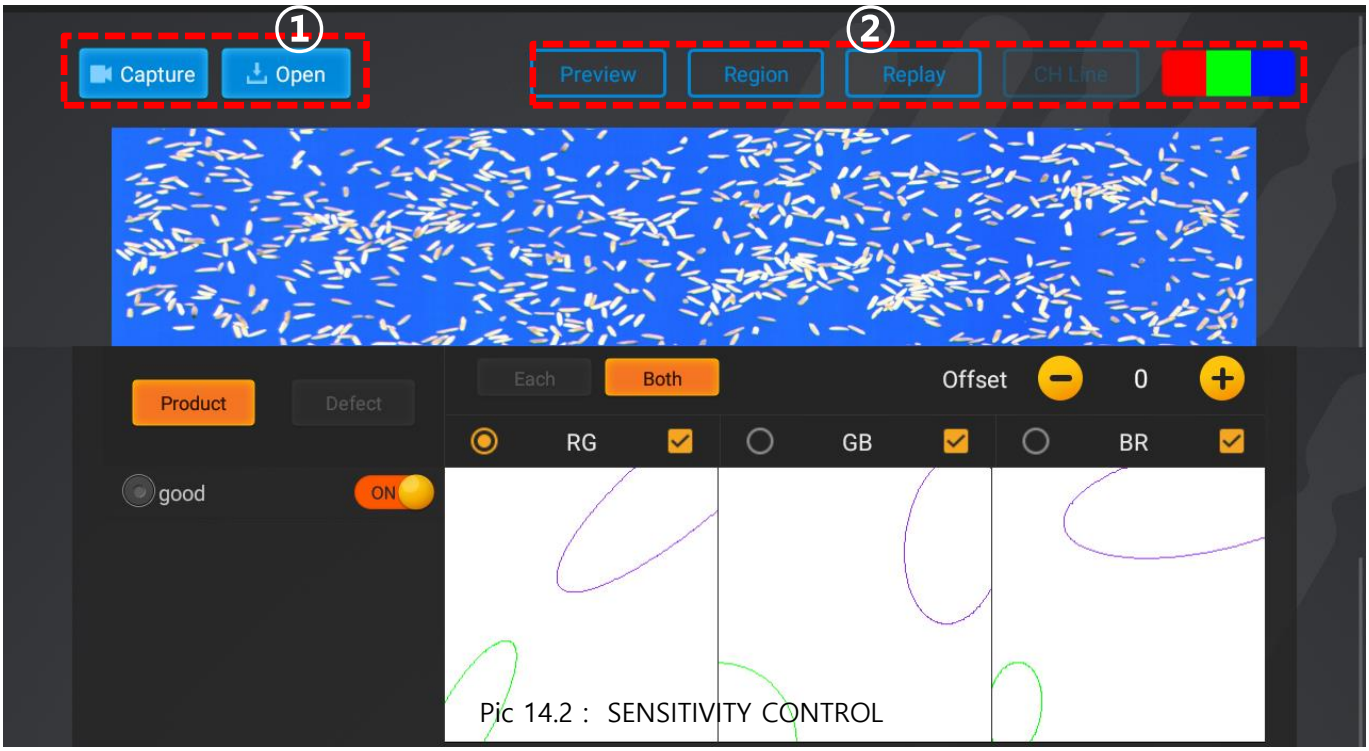
Pic 14.1 : Ejector counter by camera

Display real time counter of 84 ejectors of selected camera.

Set camera sensitivity (Set 2D sensitivity 1)

※ Color CCD sensitivity control

- Set sensitivity at the each front/rear camera.



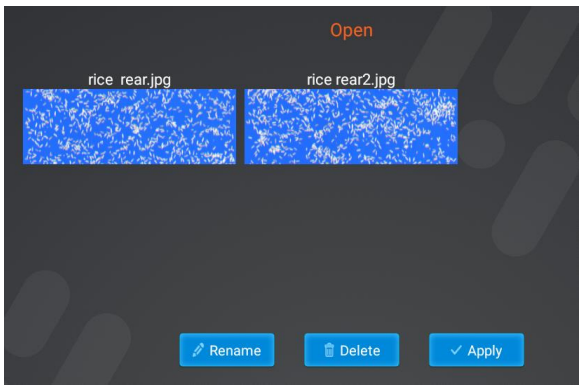
Pic 14.2 : SENSITIVITY CONTROL

1. Capture, replay, Open, Source

- Image capture : capturing image during feeding.
- Open : loading the saved image

2. Preview, Replay, CH Line, Source

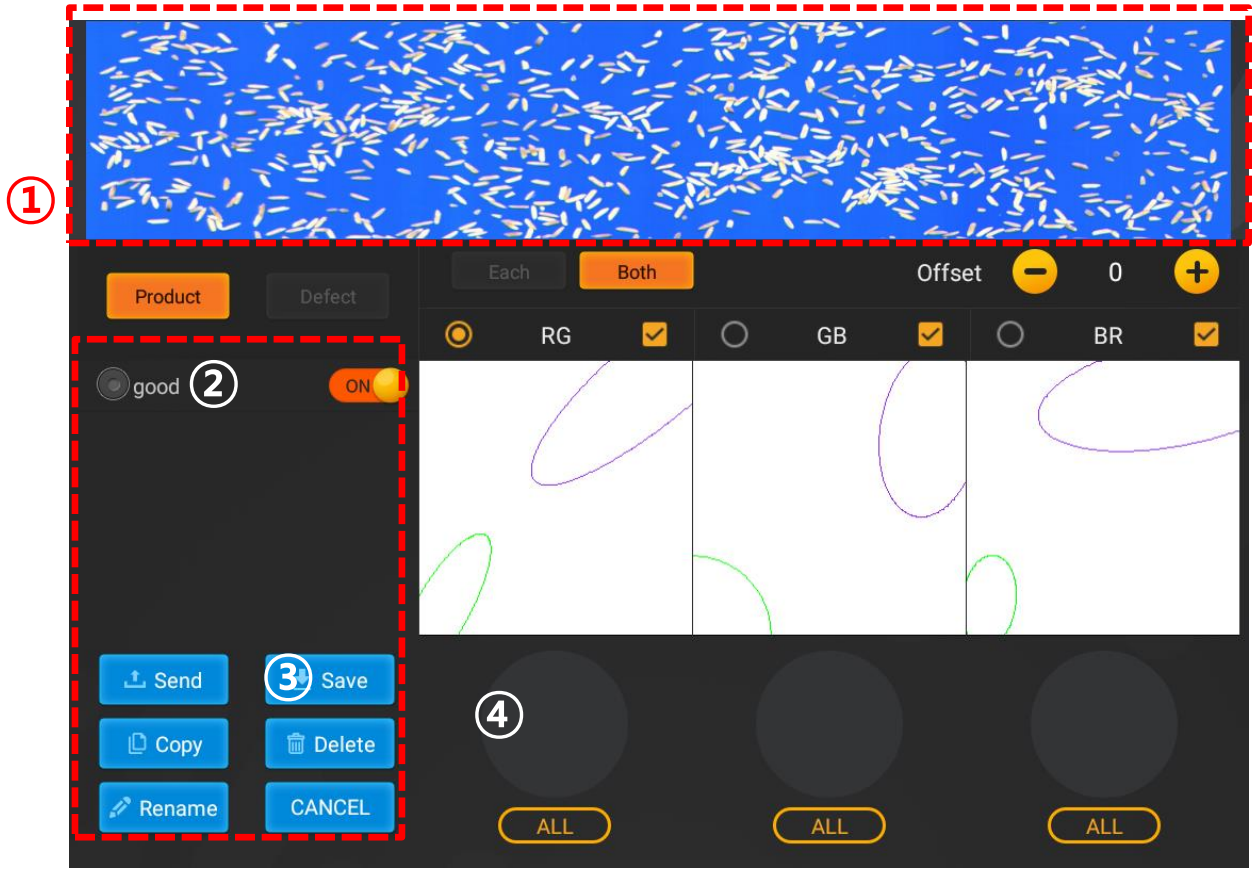
- Preview: Hide the displayed image.
- Replay: Sorting result can be checked by LED display and ejector without more feeding through image replaying.



Set camera sensitivity (Set 2D sensitivity 2)

2. SET REGION: Change region or move mode. Zoom in, out available at move mode.

Display channel line, color image.

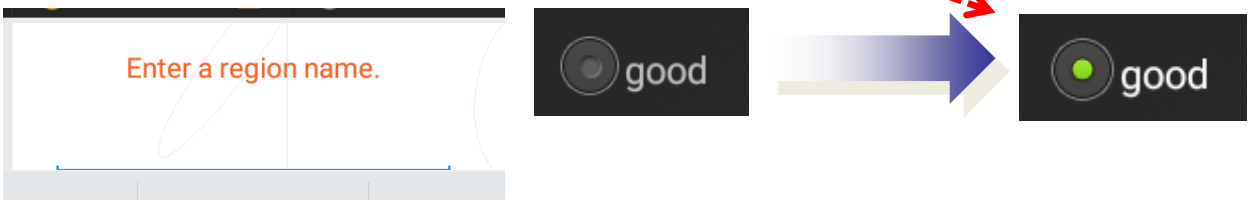


1. Selected area can be saved

- If you select BR, you can move L/R and slope.

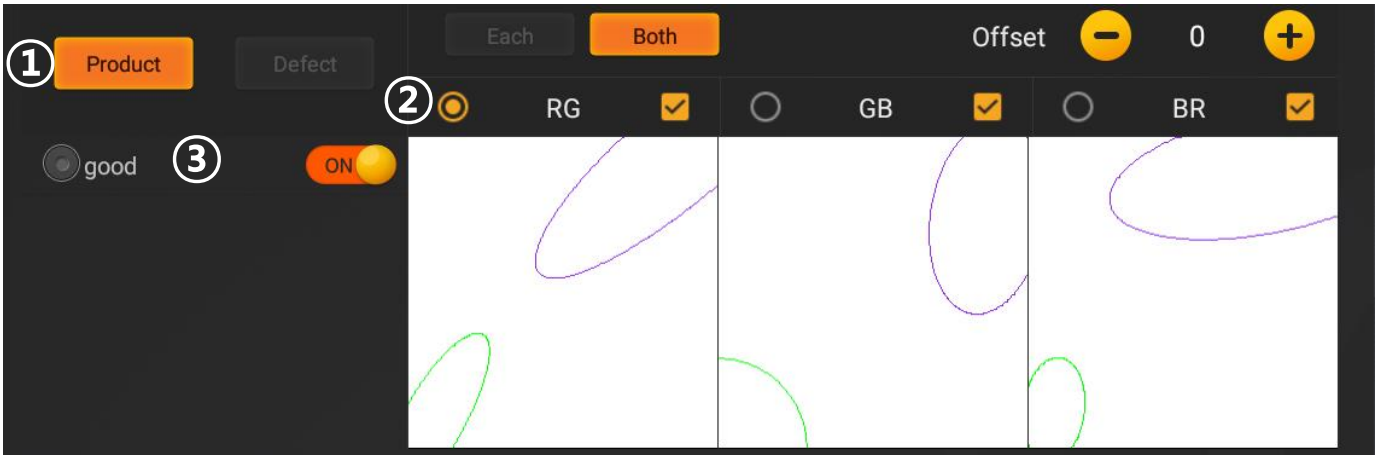
2. Displays saved area
- Send, Copy: Send/Copy region of the list shown above.
- Rename, Delete : Rename / Delete selected region in the list.

3. Save : Save created area.



4. Displays the value of area (Good, bad) on Red/Green, Green/Blue, Blue/Red graph

Set camera sensitivity (Set 2D sensitivity 3)



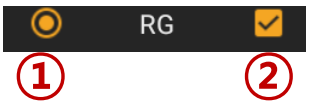
1. PRODUCT/DEFECT graph type and region list.

• Product Mode : : It is used to set 'Accept area' from graph, Out of Accept area is recognized as reject.

• Defect Mode : : It is used to set 'Reject area' from graph, Out of Accept area is recognized as accept.

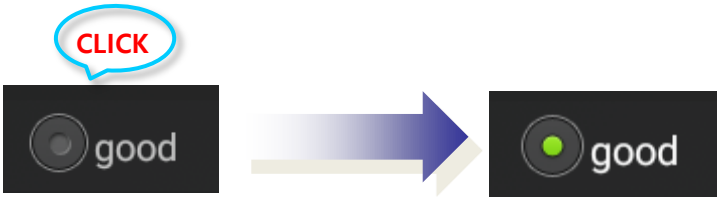
※ The area which is cross 'Product Mode' and 'Defect Mode' will be recognized as 'Defect Mode

2. RG/ GB/ BR : Red-Green / Green-Blue / Blue-Red three graph can be selected.

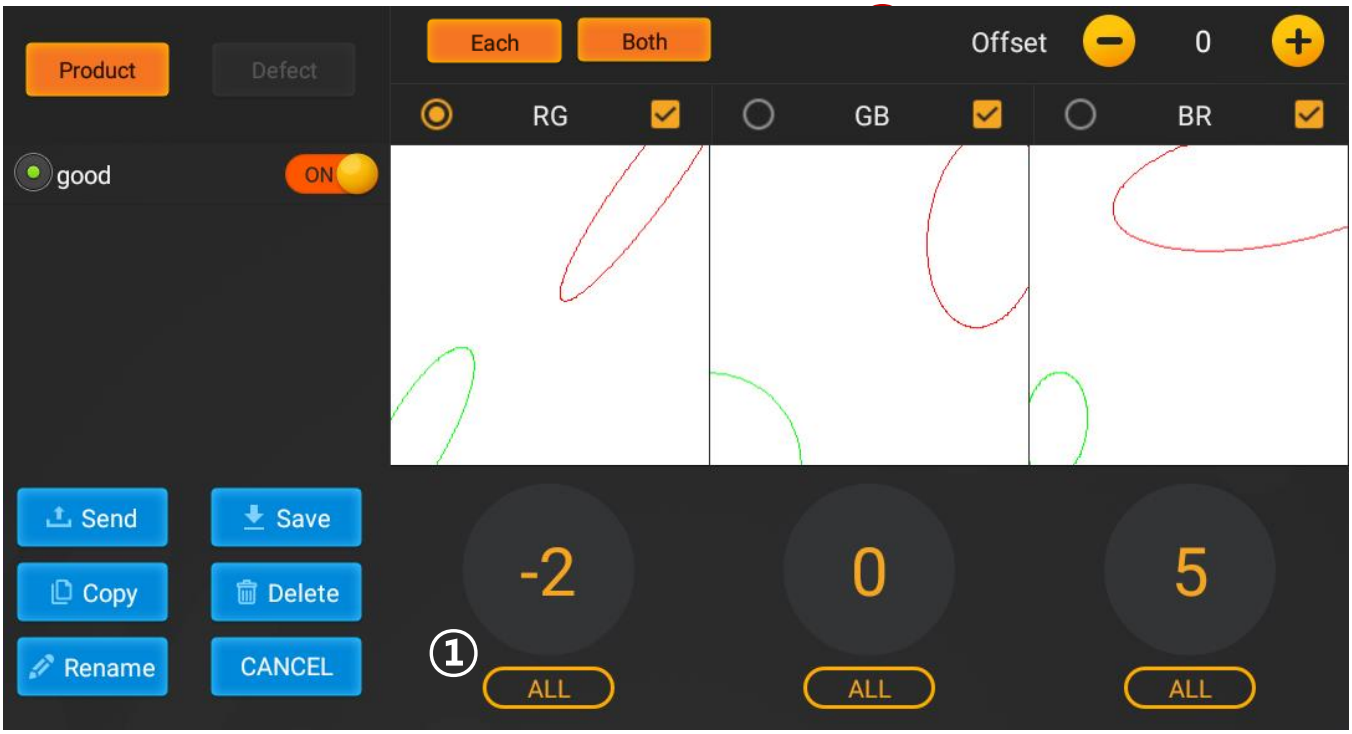


1. It indicates that the graph type is selected.
2. It indicates that the graph type is used.
3. Area list – open and display saved area.

• "COPY" button pops up, if area list wasn't selected. If area was selected, rename, on/off, delete, copy buttons pop up.



Set camera sensitivity (Set 2D sensitivity 4)



1. Camera sensitivity.

- Graph can be controlled by all, long axis, short axis through numeral button.
- BOTH : display both of area DEFECT, PRODUCT
- EITHER : display either DEFECT or PRODUCT
- Select BAD value from the area list and touch SEND to apply sensitivity

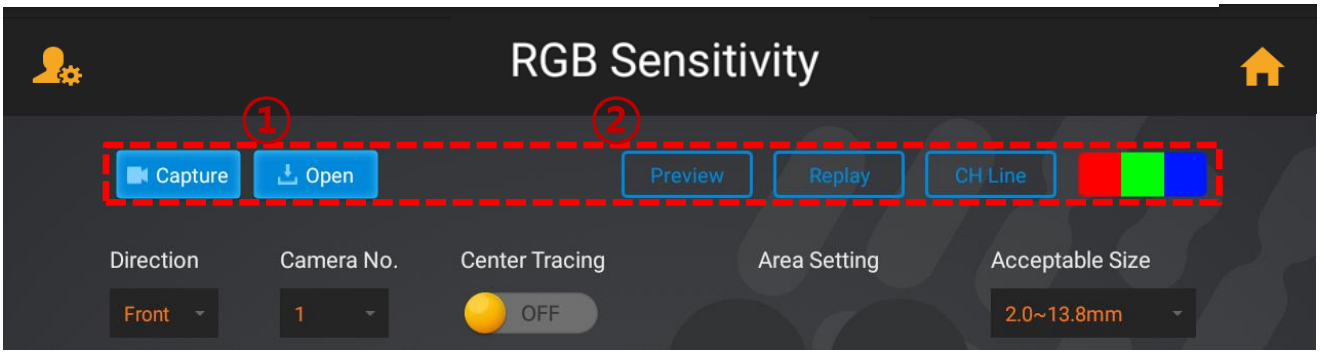
※ Sensitivity control

1. If you can see specific defective material from the accepted box, increase related defect mode graph sensitivity and touch " SEND"
   Or capture one more image though falling related defect material and add one more graph of defective.
2. If you can see specific Acceptable material from the rejected box, increase related product mode graph sensitivity and touch " SEND".
   If some area of Product mode and Defect mode is crossed then decrease the crossed defect mode area sensitivity and touch "SEND"
   Or capture one more image though falling related acceptable material and add one more graph for product

Set camera sensitivity (Set RGB sensitivity)

※ Menu of set RGB sensitivity

- Menu of set Color1~3/Spot1~3 sensitivity of Front/Rear camera



Pic 15.1 : Screen of set sensitivity

1. Capture, Open

- Image capture : capturing image during feeding.
- Open : loading the saved image

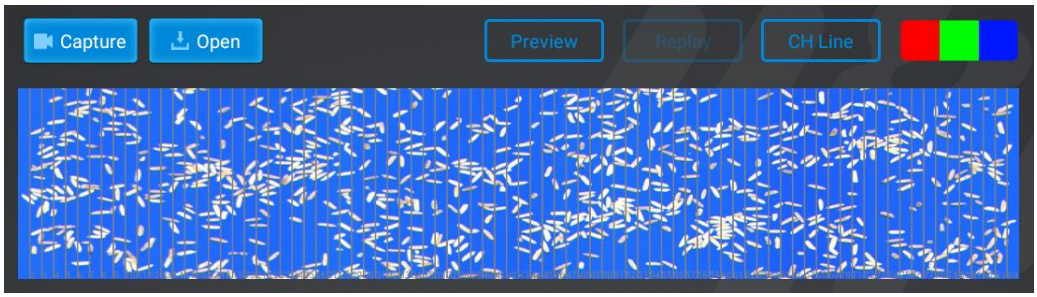
2. Preview, Replay, CH Line, Source

- Preview: Hide the displayed image.
- Replay: Sorting result can be checked by LED display and ejector without more feeding through image replaying.

Pic 15.2 : The list of saved image

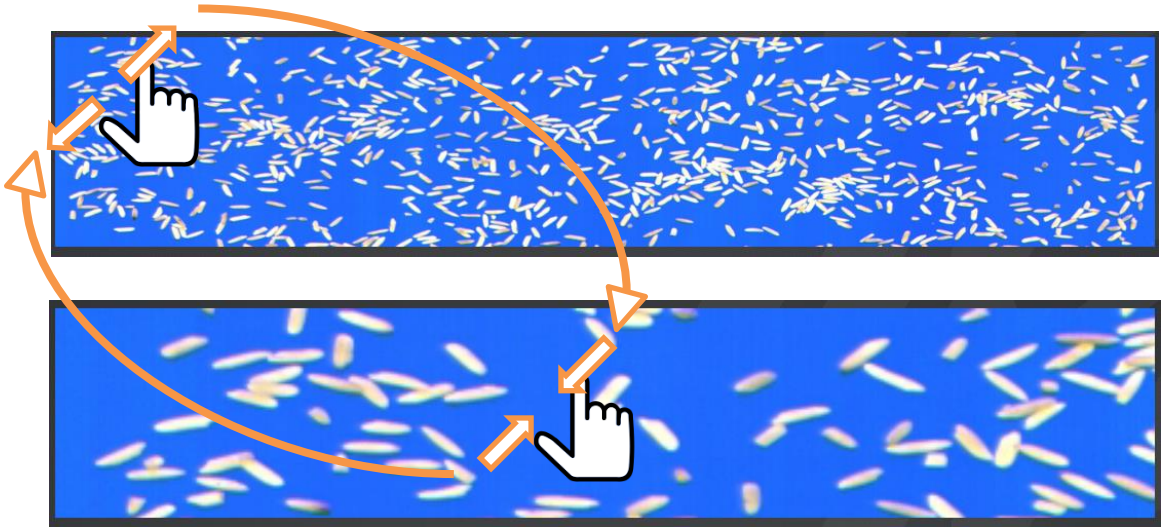
Set camera sensitivity (Set RGB sensitivity)

- CH Line : Possible to check captured image will be on the chute.

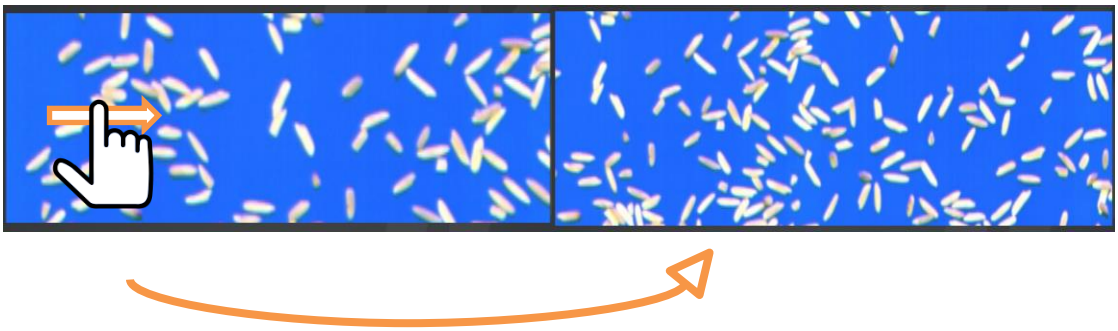


3. Zoom in,/out, Move

- Zoom in/out: Draw your two fingers outward/inward on screen to zoom in/out.



- Move : Quickly draw your finger vertically or horizontally across screen.

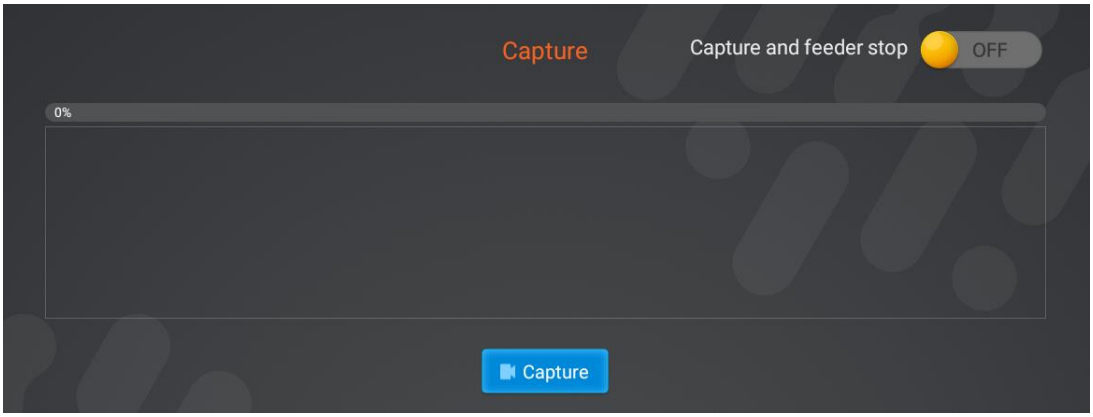


Set camera sensitivity (Set RGB sensitivity)

※ Capture image

- Capture image of sorting material from the current camera module

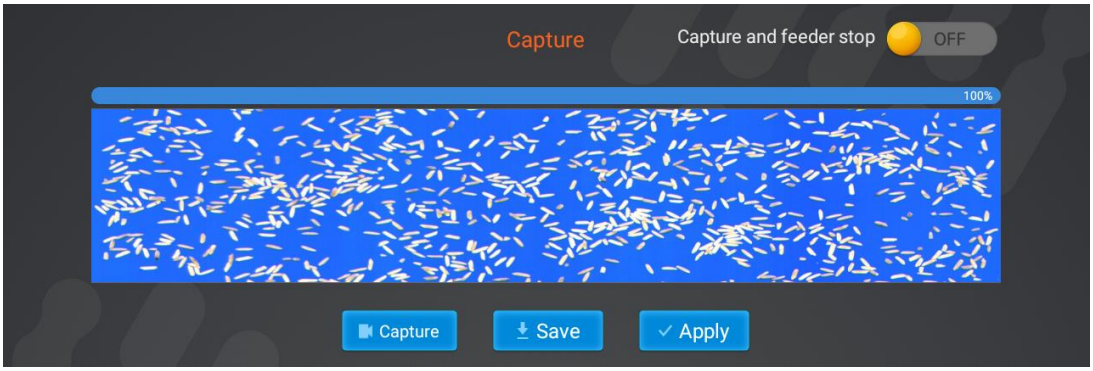
1. Press ejector counter in the **Pic 15.1, Pic 15.3** will be appeared.



Pic 15.3 : Capture image.

1. Capture

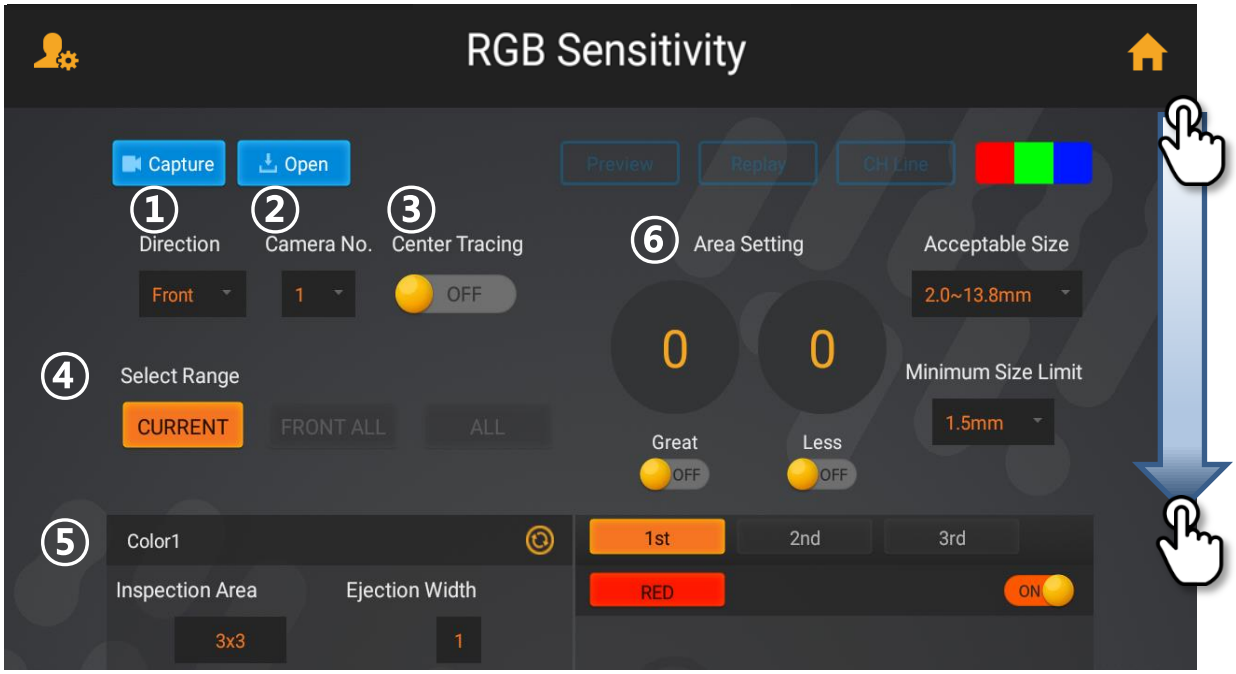
- Capture and feeder stop : Stop feeding as soon as sorting material is detected.
- Image capture : capturing image during feeding. Image will display as below when sorting material is detected.



2. Save, Apply

- Save : Save image.
- Apply : Display image on RGB sensitivity screen.

Set camera sensitivity (Set RGB sensitivity)



RGB sensitivity modify content

① : Used when set front/rear camera sensitivity.

② : Used when camera move.

③ : Used when set center trace.

④ : Camera section: Front/Rear/All.

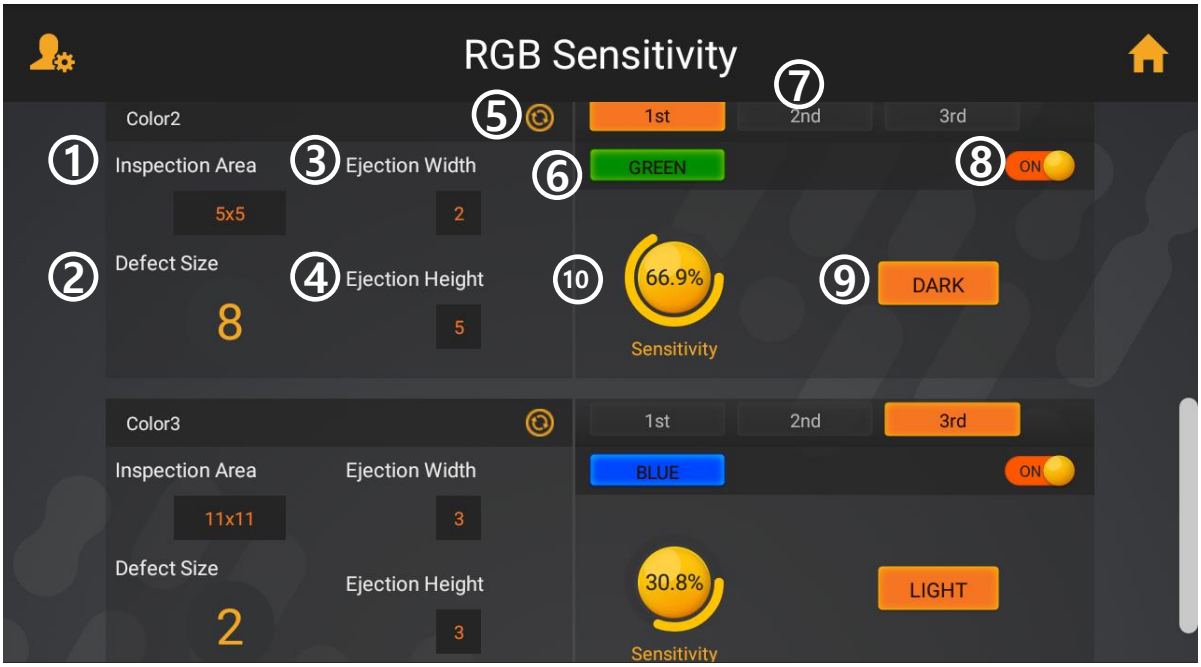
⑤ : Used when modify color/spot sensitivity.

⑥ : Used when apply shape control.

1. Great, Less, Acceptable Size, Minimum Size Limit

- Great/Less : Sort the material that have greater/lesser than the threshold. The range varies from 0 to 1023.
- Acceptable Size : Set acceptable size.
- Minimum Size Limit : Set minimum size limit.

Set camera sensitivity (Set RGB sensitivity)



RGB sensitivity modify content

① **Set inspection size.**
② **Set defect size. :** According to material size, defective size should be adjusted..
③ **Set Ejection Width.**
④ **Set Ejection Height.**
⑤ **Used when choose between color/spot sensitivity. D**
⑥ **Used when choose color channel.**
⑦ **Choose Pass of a current camera.**
⑧ **Used when enable sensitivity.**
⑨ **When DARK/LIGHT is enabled, darker/lighter material is defect.**
⑩ **Used when modify color/spot sensitivity.**

※ Way to adjust sensitivity

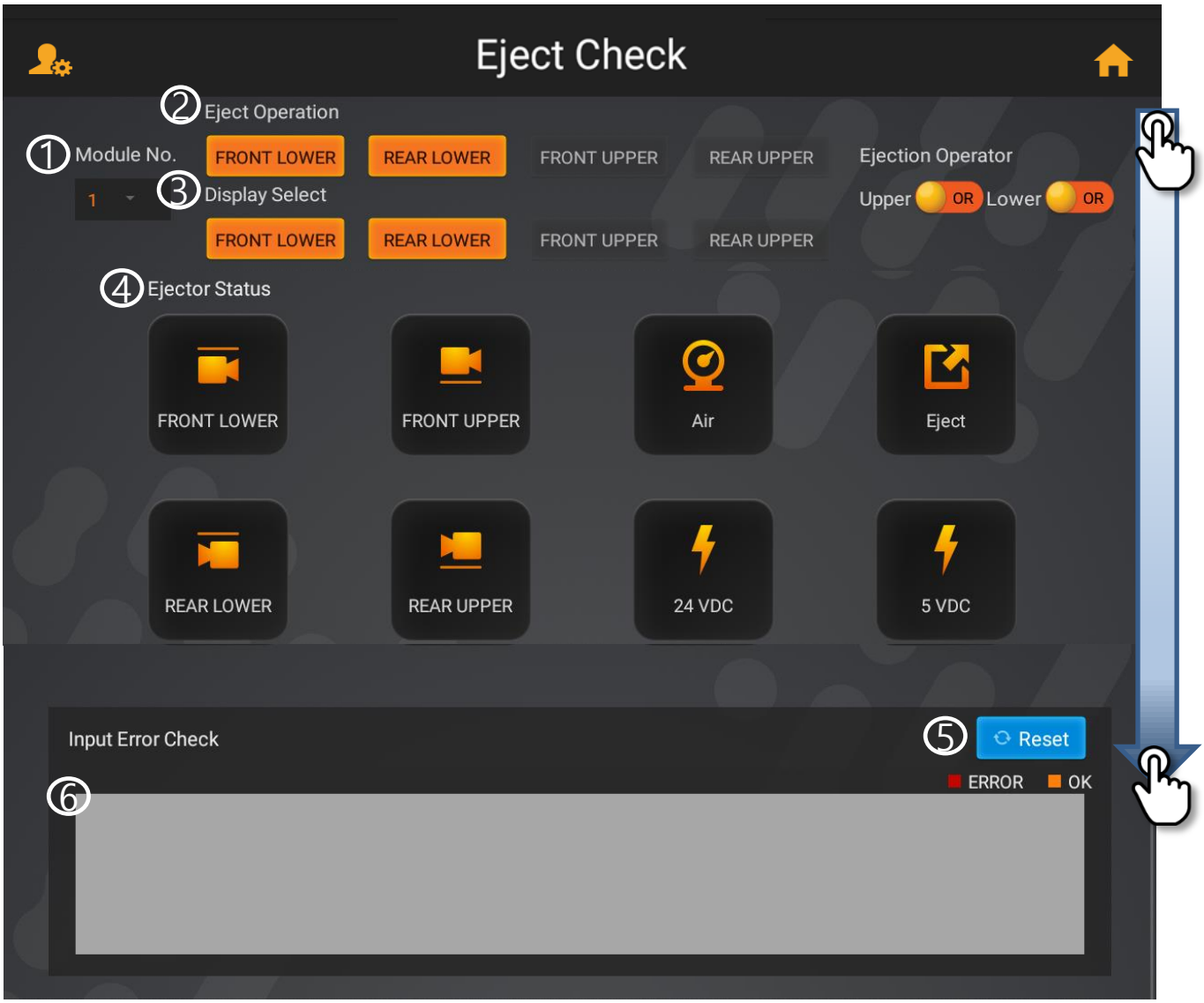
1. **Spot1~3 and color1~3 sensitivity is changed by adjusting the Dark / Light color value of the selected channel.**
2. **The Value of Color1~3 sensitivity is 0.0 to 99.9, and the value of spot1~3 Sensitivity is 0 to 99.**
3. **The options for color channel in the color1~3 and spot1~3 sensitivity are Red, Green, and blue. And depending on the selected color channel, the values of red, green, and blue are displayed as above image.**

Ejector monitoring 1

※ EJECTOR MONITORING

- Eject board status, voltage etc

1. Touch EJECTOR MONITORING from **Pic 6.1** then you can see following screen.



Pic 16.1 : EJECTOR MONITORING

Ejector monitoring 2

※ Pic 16.1 : Explanation of eject monitoring menu

1. MODULE NUMBER - EJECT BOARD NO.(SELECT EJECT)

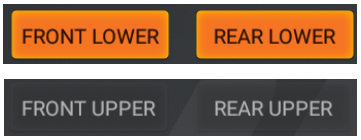
2. EJECTION AND/OR

- Adjusts operation of ejector when each lower and upper camera of both sides found impurities.

- Impurities are rejected when either front or rear camera found it.
- Impurities are rejected when both front and rear camera found it.

3. Display Select

- Output LED Display signal from Front/Rear Camera Enable/Disable button



Enable : Output ejector running signal from Camera

Disable : Do not output ejector running signal from Camera.

4. Eject status

- Front lower - Display ejector signal status of front lower camera.
- Rear lower - Display ejector signal status of rear lower camera.
- Front upper - Display ejector signal status of front upper camera.
- Rear upper Display ejector signal status of rear upper camera.
- AIR : Display Air signal status of eject board.
- EJECT POWER : Display Power status of all eject board.
- EJECT ERROR : Display error of eject board.

5. Error Reset

- Refresh error status of eject board.

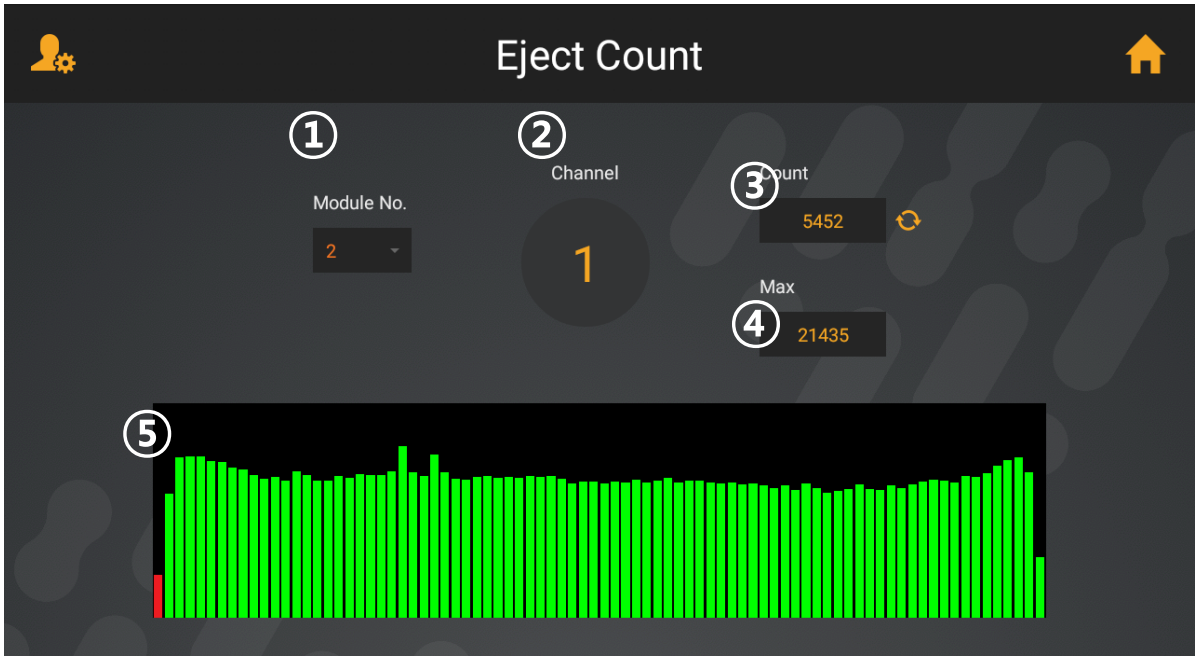
6. Ejector error check

- Display error(red color) on each module

Ejector count

※ Accumulate count - Show accumulate ejector by graph

1. Press eject counter in **Pic 6.1** you will see **Pic 17.1** .



Pic 17.1 : Accumulate count

1. **Module No.** - Number of eject back board (Select eject supervisor want)

2. **Channel** - Display accumulate count one(1) ejector among 64 ejectors of one module.

3. **Count reset**

   - Initialization of ejector when changing ejector.
   - Display of count of each module.

4. **Maximum** – Display the highest of accumulate count of ejector among 84 ejectors in one module.

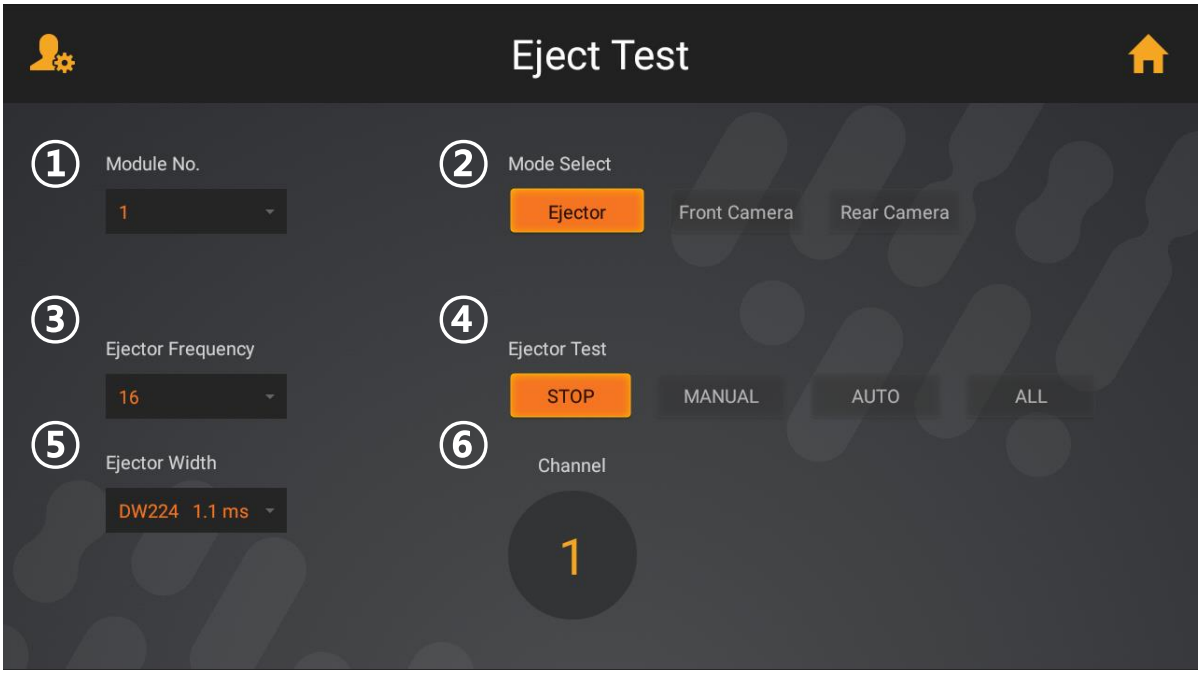
5. **Display accumulate counter by graph** – Display accumulate counter of 84 ejectors in module by graph

.

Ejector test

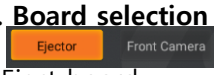
※ Eject test – A function to check the normal operation by pressing Eject.

1. The Eject test screen is displayed as shown in **Pic 18.1** when the **Eject Test** is pressed in **Pic 6.1** in the previous page.



Pic 18.1 : Eject Test screen

1. Module No.
- Select the Eject Module.

2. Board selection
- 

: Select type of module to test such as ejector and camera.
- Eject board : Operate the air gun on the Eject board.
- Front/Rear camera : Operate the air gun from the camera itself. (However, the frequency and width cannot be controlled.)

3. Eject Test button
- STOP : It stops the air gun which is under the test.
- MANUAL : The user selects and tests the air gun directly.
- AUTO : It tests the air gun from the currently selected channel to channel 64 automatically.
- ALL : It operates the 64 channels in the currently selected module simultaneously.

4. Eject frequency
- It selects the operation frequency of the air gun. (16Hz, 32Hz, 64Hz, 128Hz)

5. Eject channel
- It selects the operation range of the air gun. (768us ~ 1024us)

6. Eject width
- It selects the object for emitting the air gun test signal.
- It is inactivated in case of selecting the camera mode on the Eject test button

Engineer Manual

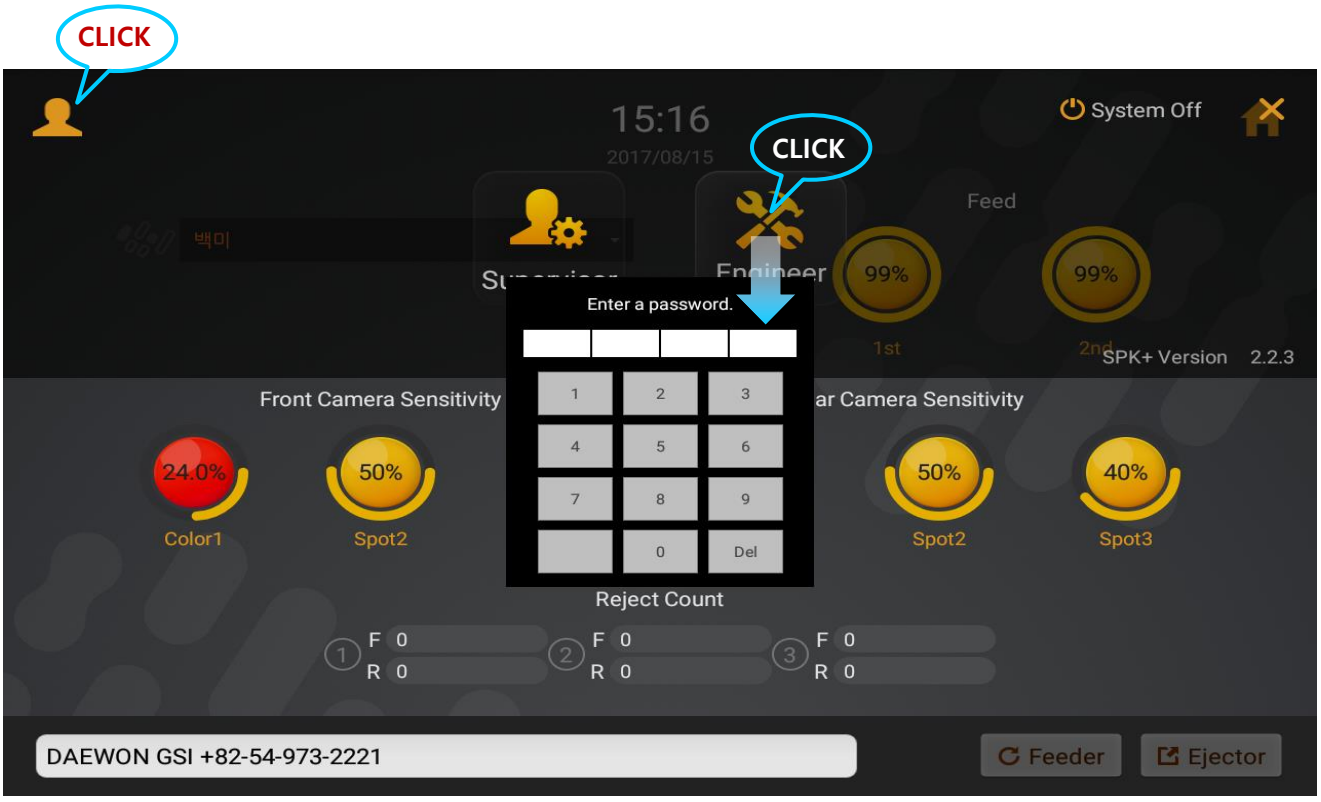
SPK+

DAEWON GSI
DAEWON GLOBAL SYSTEM INTEGRATION

Set user level

※ How to reach to engineer mode

1. Press 



Pic 19.1 : User configuration

2. Select Engineer from **Pic 19.1** then pops password up.

3. Engineer class - you can see additional menu with engineer class.

4. Change password – Available to change administrator password

※ Only for engineer.

Engineer menu

※ ENGINEER CLASS MENU

1. Select Menu from Main.

2. You can see Engineer class menu as **Pic 20.1**.

- all menu available with engineer class

Pic 20.1 : Menu

※ All menu for commissioning by engineer
Only for authorized DAEWON GSI ENGINEERS.

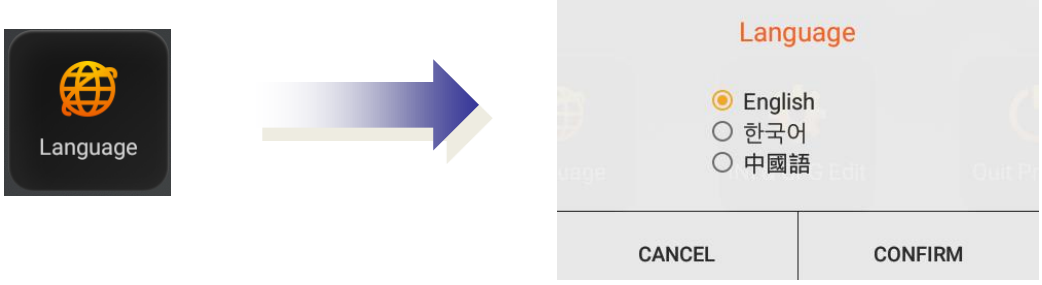
System util

※ System Util

- **A function to select the language, to correct the set file and to terminate the UI program**

Pic 21.1 System Util Screen

1. Language selection – The combo box is displayed when the language selection button is selected and it is applied immediately when the country and language are selected.



2. Correction of setting file – IniEdit program is executed when "Confirm" is pressed.

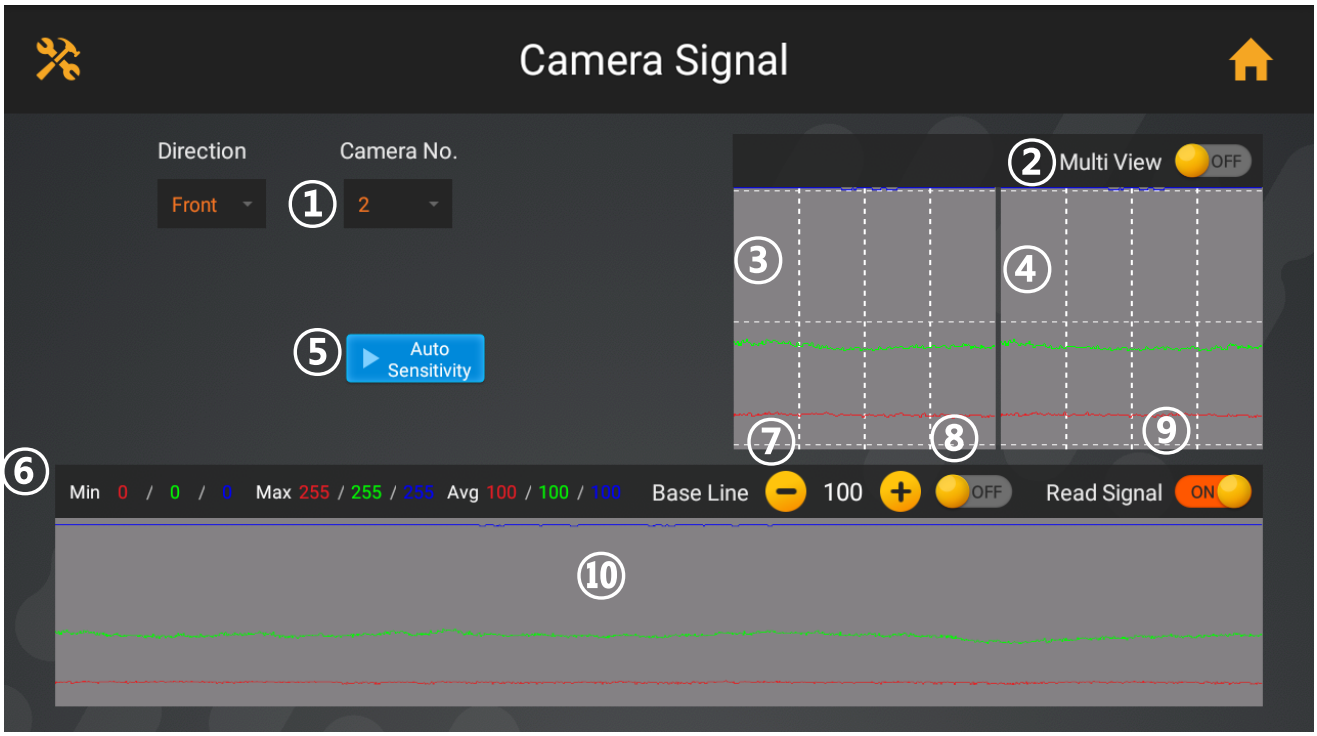
3. Program termination – Not the system but the UI can be terminated.

Camera waveform

※ STAGE SETTING

- A function of visual checking for camera controlling on the camera output signal by converting to display

1. The stage control screen as shown in **Pic 22.1** when "**Stage control**" is pressed in **Pic 20.1** on the previous page.



Pic 22.1 : Stage control screen

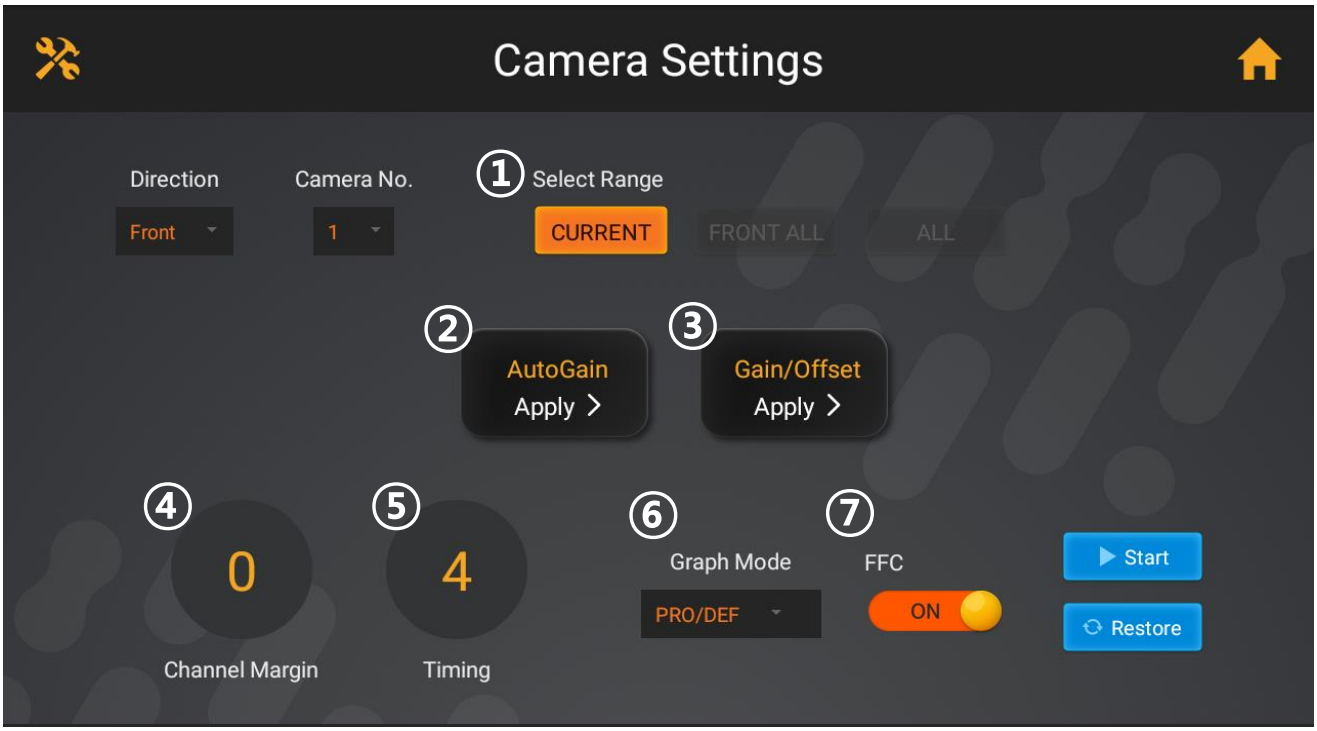
1. CAMERA NO.: Current selected camera
2. MULTI VIEW : A box for checking the signal display for accumulated camera output signal
3. CHANNEL : Displays left/right of camera signal.
4. HORIZONTALITY : Displays top/bottom of camera signal.
5. AUTO SENSITIVITY : Auto control according to reflect range
6. MIN/MAX/AVR : MIN/MAX/AVR value of camera background
7. BASE LINE VALUE : RANGE : 0~ 255
8. BASE LINE : ENAVLE/DISAVLE BASE LINE.
9. READ SIGNAL: READING CAMERA SIGNAL.
10. Displays camera signal of 0~1344 pixel range.

Camera configuration

※ CAMERA CONFIGURATION

- Control channel margin, size, trigger, reject setting, gain, offset, timing etc

1. You can see Camera configuration as **Pic 23.1** when you select "camera configuration on **Pic 20.1**.



Pic 23.1 : Camera Configuration

1. Camera section: Front/Rear/All.
2. AutoGain : Apply auto gain for the current camera.
3. Gain/Offset : Control signal gain/standard.
4. Channel Margin : Treat margin of defect area as defect too.
5. Timing : Control when ejector will reject defect.
6. Graph Mode : Choose among of PRODUCT/DEFECT, PRODUCT1/PRODUCT2, DEFECT1/DEFECT2
7. Calibration

   Starts calibration- Automatically calibration of camera signal

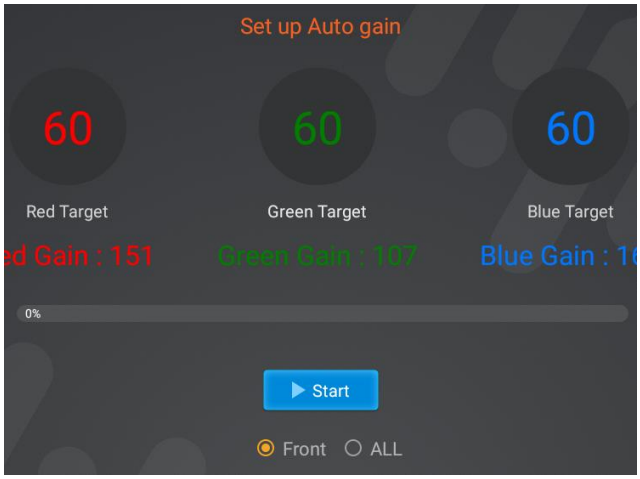
   - ON : apply calibrated value
   - OFF : off calibrated value
   - Restore : Send calibration parameters to the current camera.

2. You can see Gain/Offset screen as **Pic 23.2** when you select "Gain/Offset" on **Pic 23.1**.

Pic 23.2 : Gain/Offset

2. RED GAIN : Control Red signal gain
   RED OFFSET : Control Red signal standard
3. GREEN GAIN : Control green signal gain
   GREEN OFFSET : Control green signal standard
4.. BLUE GAIN : Control Blue signal gain
   BLUE OFFSET : Control Blue signal standard

3. You can see Auto Gain screen as **Pic 23.3** when you select "Auto Gain" on **Pic 23.1**.



Pic 23.3 : Auto Gain Screen.

: Begin auto gain procedure for each color channel such as Red, Green, Blue.

Camera configuration

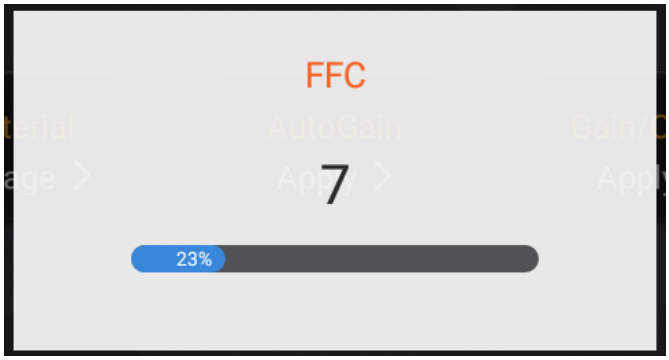
※ Camera calibration

- Make distribution of background signal even by calibration.

4. You can see camera calibration screen(1/2) as **Pic 23.4** when you select "Start" on **Pic 23.1**.

Pic 23.4 : Camera calibration screen(1/2)

5. You can see the progress of camera calibration as **Pic 23.5** When you turned off all LEDs and pressed "Confirm" on **Pic 23.4.**



Pic 23.5 : The progress of camera calibration screen.

6. You can see camera calibration screen(2/2) as **Pic 23.6** when popup of **Pic 23.5** is closed.

Pic 23.6 : Camera calibration screen(2/2)

7. You can see the progress of camera calibration as **Pic 23.5** When you turned on all LEDs and pressed "Confirm" on **Pic 23.6.**

Select sensitivity

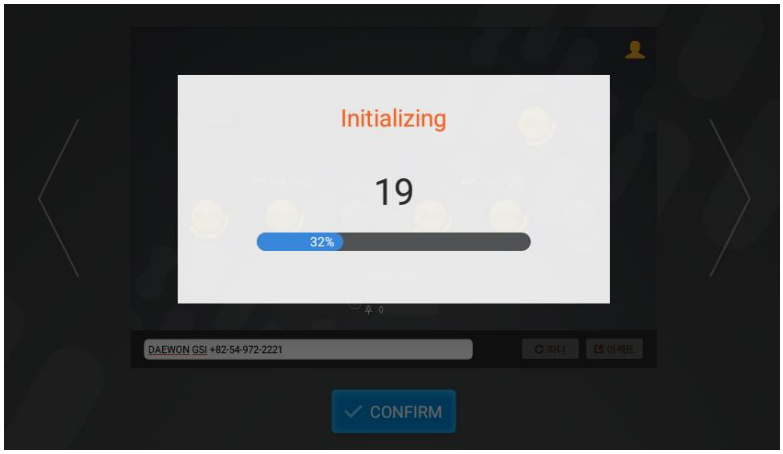
※ Menu of select camera sensitivity

- Choose 2D graphic sensitivity or RGB sensitivity.

※ Pic 24.1 : Description select camera sensitivity

1. **2D graph sensitivity.**
2. **RGB sensitivity.**

Select camera sensitivity screen is changed in engineer by which mode engineer selects.



Pic 24.2 : Screen of select camera sensitivity

※ Pic 24.2 : Description of select camera sensitivity

When operator change camera sensitivity mode, screen in the Pic 24.2 is appeared and then mode is changed.

Eject monitoring

※ Eject monitoring

- Eject board (Eject monitoring and voltage of eject board)

1. Press "Eject monitoring" button in **Pic 20.1** and Eject monitoring screen appear.

Pic 24.1 : Eject monitoring screen

1. Front/Rear CAMERA

- Output trouble signal from Front/Rear Camera Enable/Disable button

- FRONT LOWER REAR LOWER **Enable** : Output ejector running signal from Camera

- FRONT UPPER REAR UPPER **Disable** : Do not output ejector running signal from Camera.

Installation plan

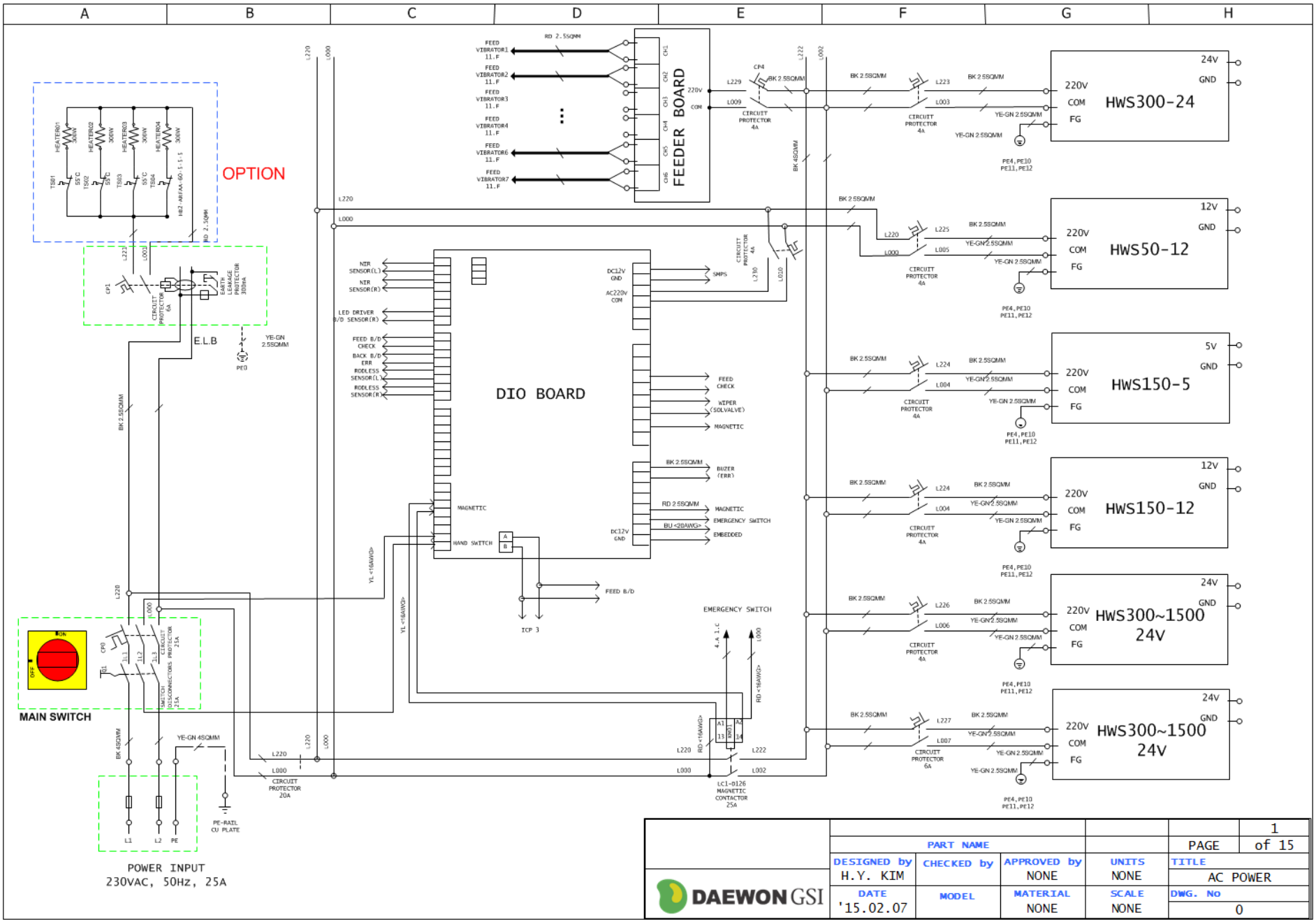
SPK+

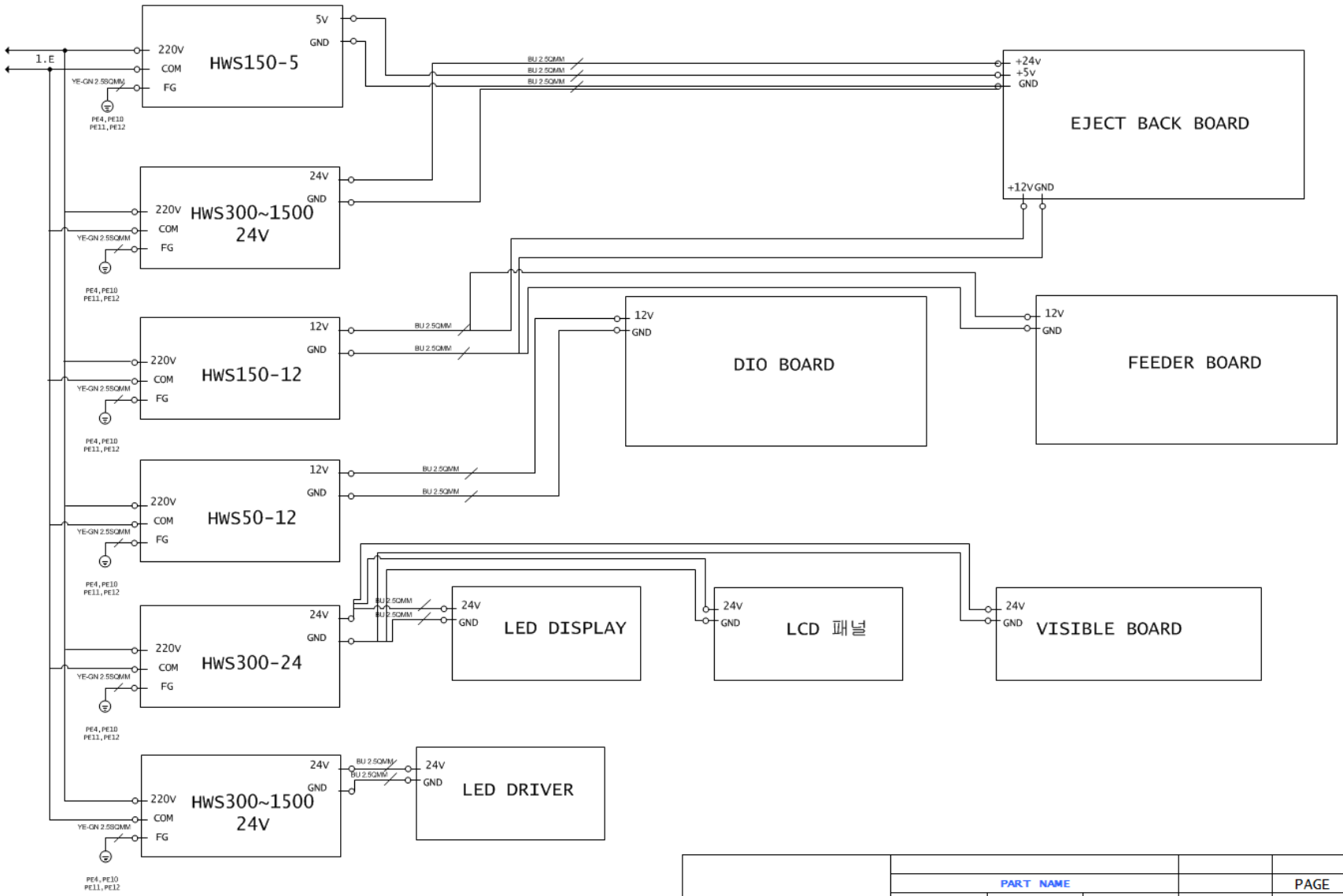
A	B	C	D	E	F	G	H

CONTENTS

DAEWON GSI

PART NAME				
DESIGNED by H.Y. KIM	CHECKED by	APPROVED by NONE	UNITS NONE	TITLE CONTENTS
DATE '15.02.07	MODEL	MATERIAL NONE	SCALE NONE	DWG. No 0


A
B
C
D
E
F
G
H
OPTION
HEATER01 300W
HEATER02 300W
HEATER03 300W
HEATER04 300W
TS01 55°C
TS02 55°C
TS03 55°C
TS04 55°C
HB2-AR/FAA-6D-5-5-5-5
RD 2.5SQMM
CP1
CIRCUIT PROTECTOR 6A
EARTH LEAKAGE PROTECTOR 30mA
E.L.B
PE0
YE-GN 2.5SQMM
BK 2.5SQMM
MAIN SWITCH
ON
OFF
CP0
SWITCH DISCONNECTORS PROTECTOR 25A
BK 4SQMM
YE-GN 4SQMM
CIRCUIT PROTECTOR 20A
PE-RAIL CU PLATE
L1
L2
PE
POWER INPUT
230VAC, 50Hz, 25A
FEED VIBRATOR1 11.F
FEED VIBRATOR2 11.F
FEED VIBRATOR3 11.F
FEED VIBRATOR4 11.F
FEED VIBRATOR6 11.F
FEED VIBRATOR7 11.F
FEEDER BOARD
CH1
CH2
CH3
CH4
CH5
CH6
220V
COM
L220
L000
L229
L009
CP4
CIRCUIT PROTECTOR 4A
L222
L002
L223
L003
HWS300-24
24V
GND
FG
PE4, PE10
PE11, PE12
L225
L005
HWS50-12
12V
L224
L004
HWS150-5
5V
L226
L006
HWS300~1500 24V
L227
L007
CIRCUIT PROTECTOR 6A
DIO BOARD
NIR SENSOR(L)
NIR SENSOR(R)
LED DRIVER B/D SENSOR(R)
FEED B/D CHECK
BACK B/D ERR
RODLESS SENSOR(L)
RODLESS SENSOR(R)
DC12V
GND
AC220V
COM
SMPS
L230
L010
FEED CHECK
WIPER (SOLVALVE)
MAGNETIC
BUZZER (ERR)
EMERGENCY SWITCH
EMBEDDED
HAND SWITCH
FEED B/D
ICP 3
YL-16AWG
RD-16AWG
BU-28AWG
EMERGENCY SWITCH
4-A 1-C
LC1-D126 MAGNETIC CONTACTOR 25A
DAEWON GSI
PART NAME
DESIGNED by H.Y. KIM
CHECKED by
APPROVED by NONE
UNITS NONE
TITLE AC POWER
DATE '15.02.07
MODEL
MATERIAL NONE
SCALE NONE
DWG. No 0
PAGE 1 of 15



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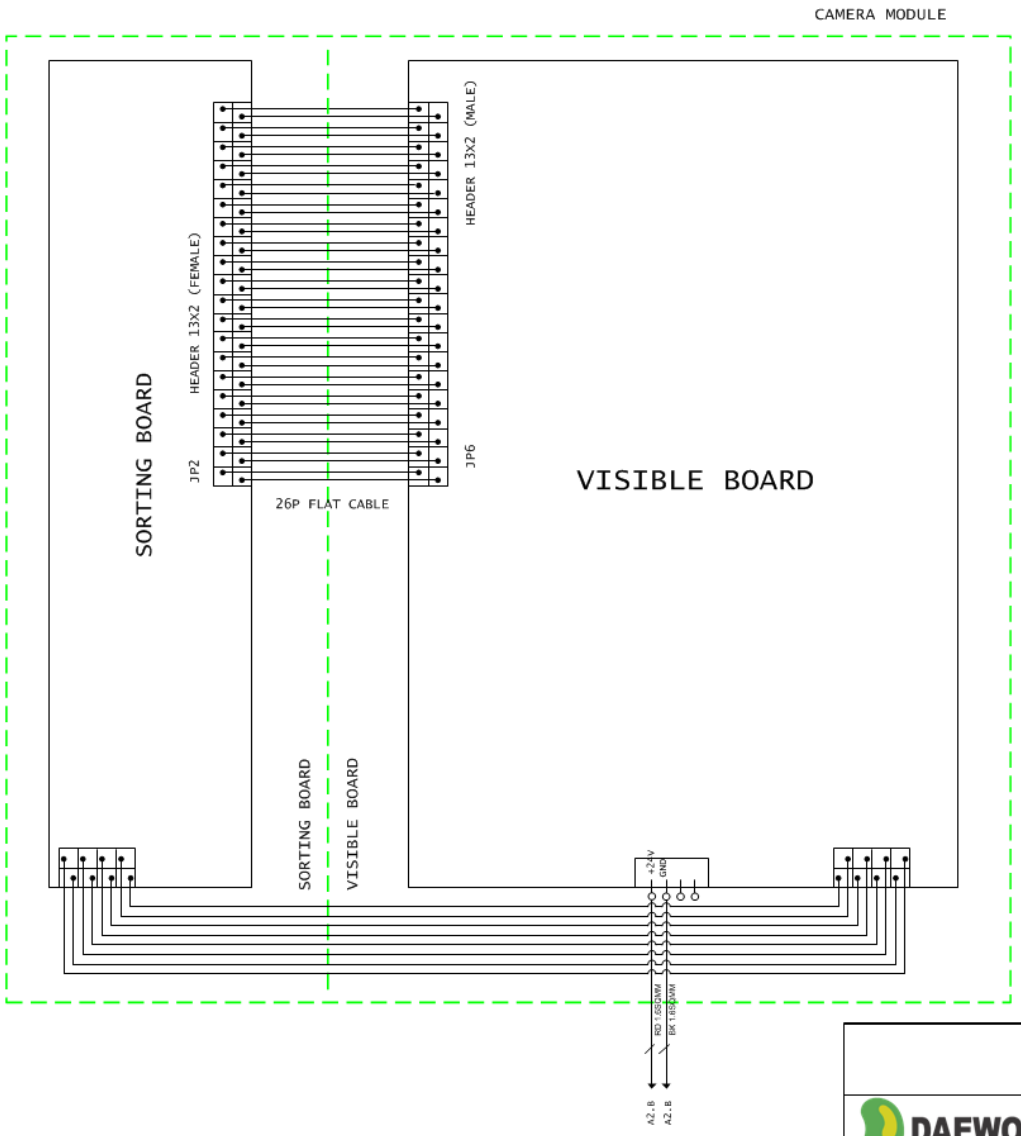
	PART NAME			PAGE	of 15
DAEWON GSI	DESIGNED by H.Y. KIM	CHECKED by	APPROVED by NONE	UNITS NONE	TITLE DC POWER
	DATE '15.02.07	MODEL	MATERIAL NONE	SCALE NONE	DWG. No 0



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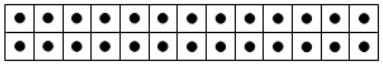

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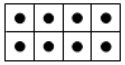
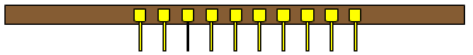


CCD_CELL SENSOR (TOP VIEW)



CCD_CELL SENSOR (SIDE VIEW)

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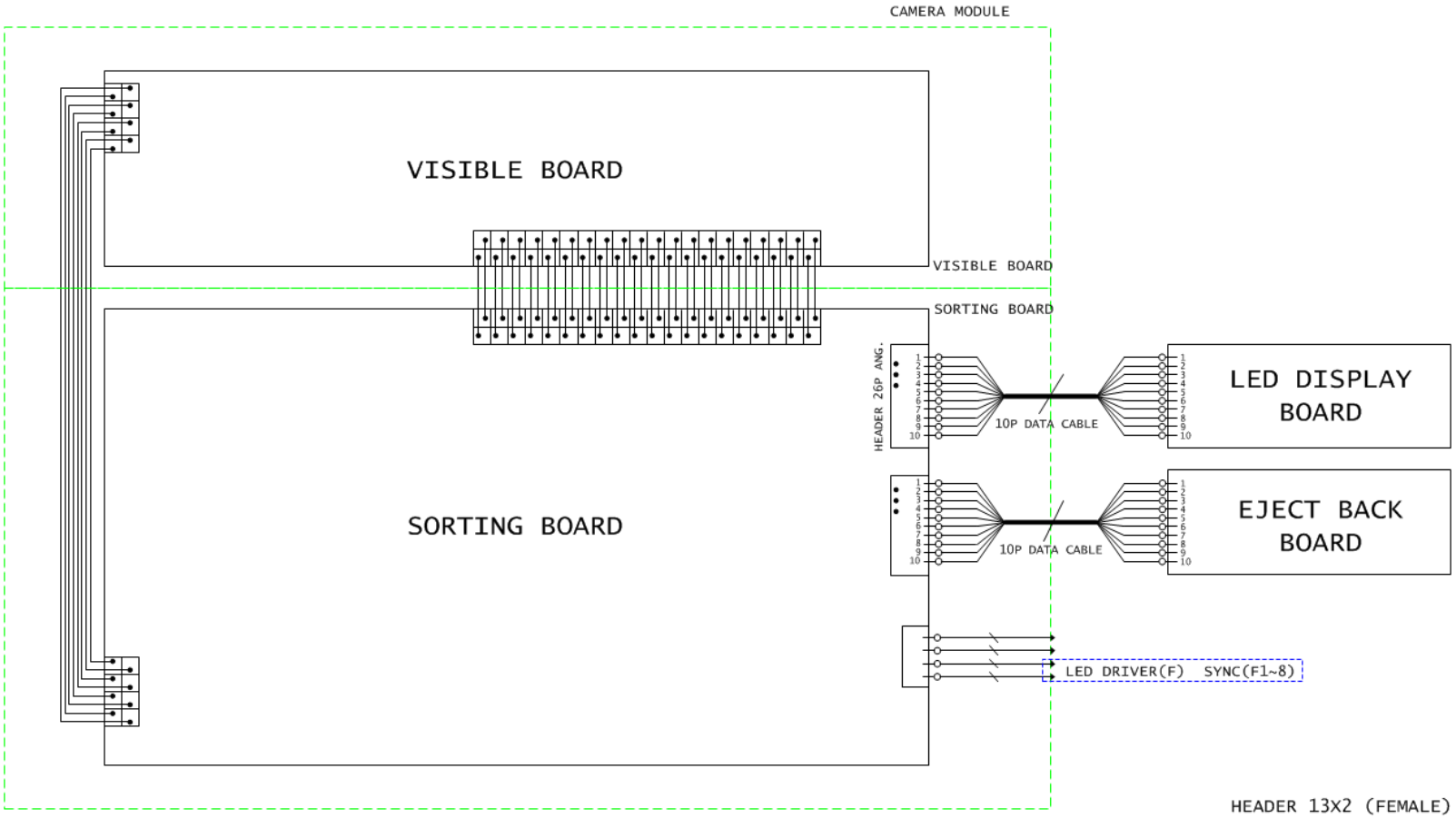
	PART NAME			PAGE	of 15
DAEWON GSI	DESIGNED by H.Y. KIM	CHECKED by	APPROVED by NONE	UNITS NONE	TITLE VISIBLE
	DATE '15.02.07	MODEL	MATERIAL NONE	SCALE NONE	DWG. No 0



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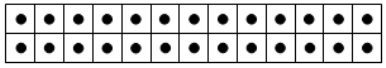

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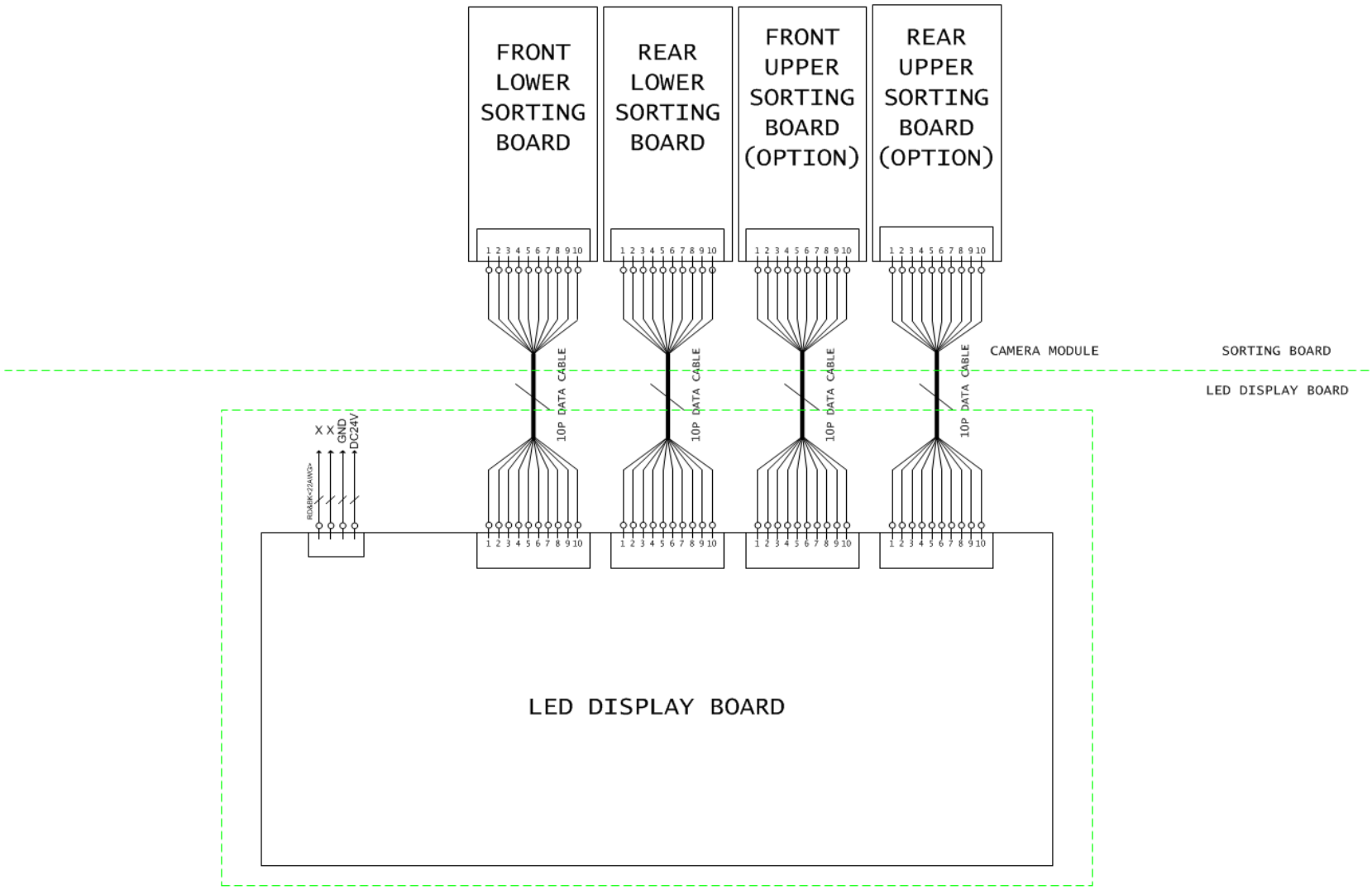

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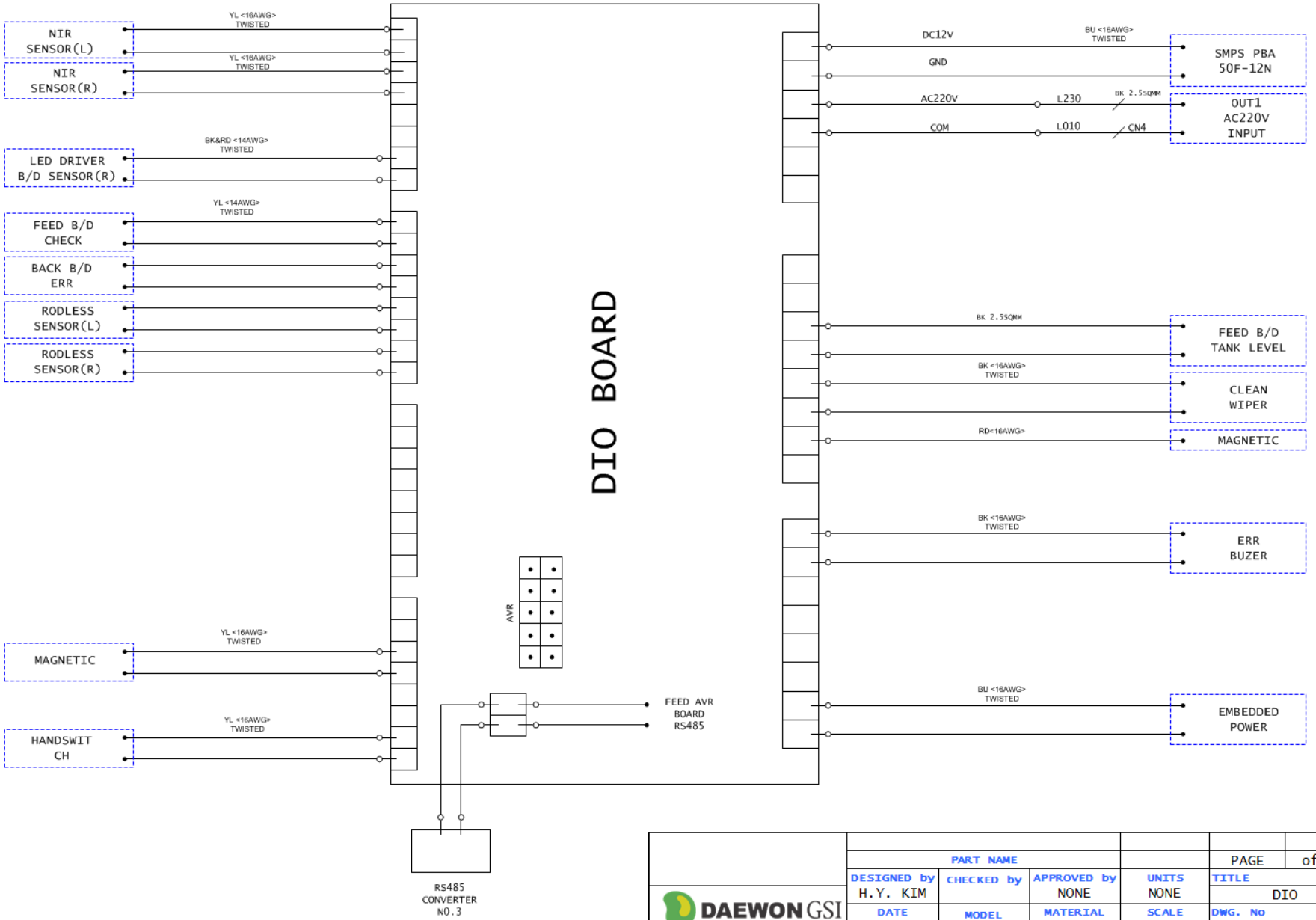

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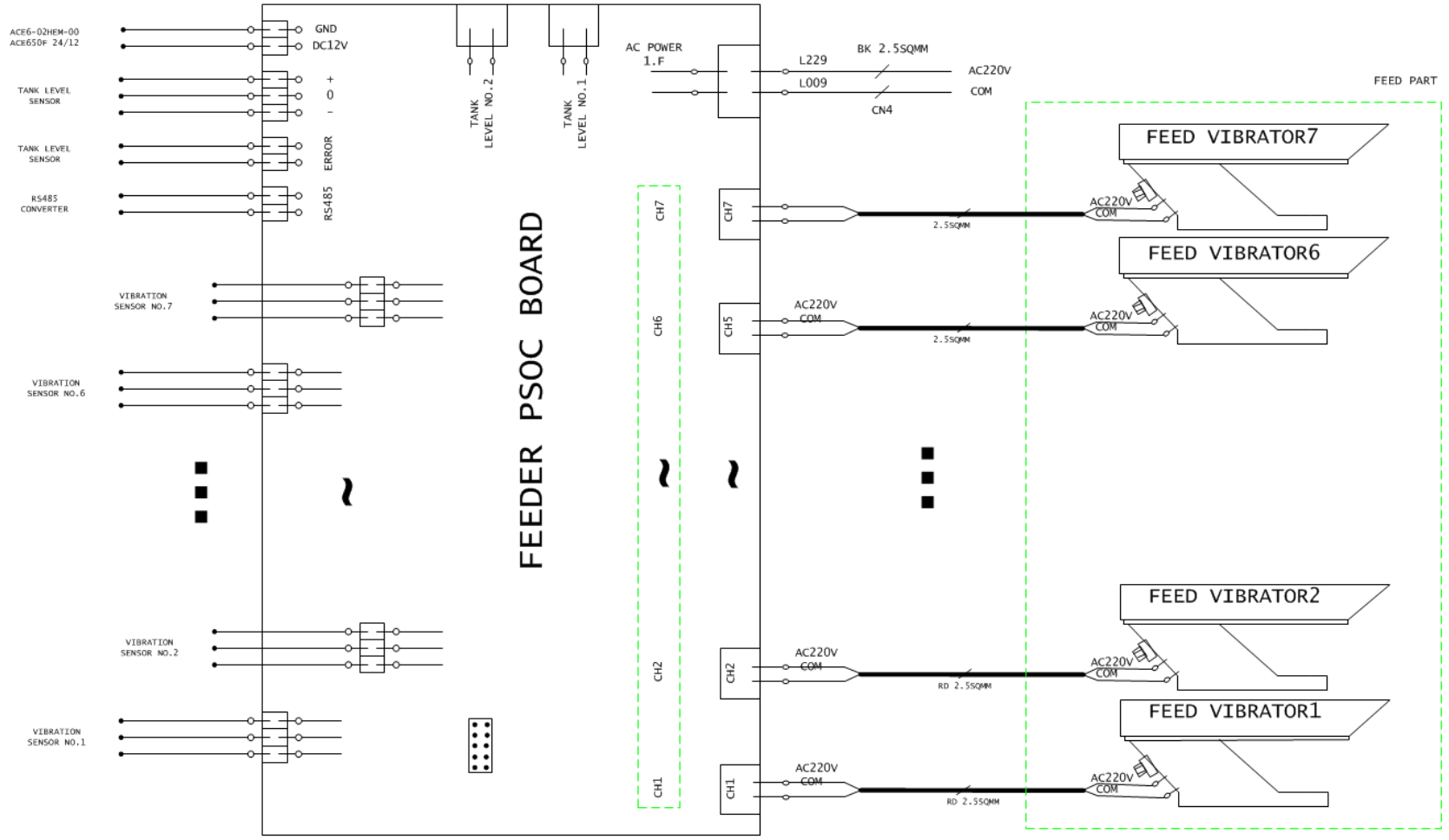
	DATE '15.02.07	MODEL	MATERIAL NONE	SCALE NONE	DWG. No 0



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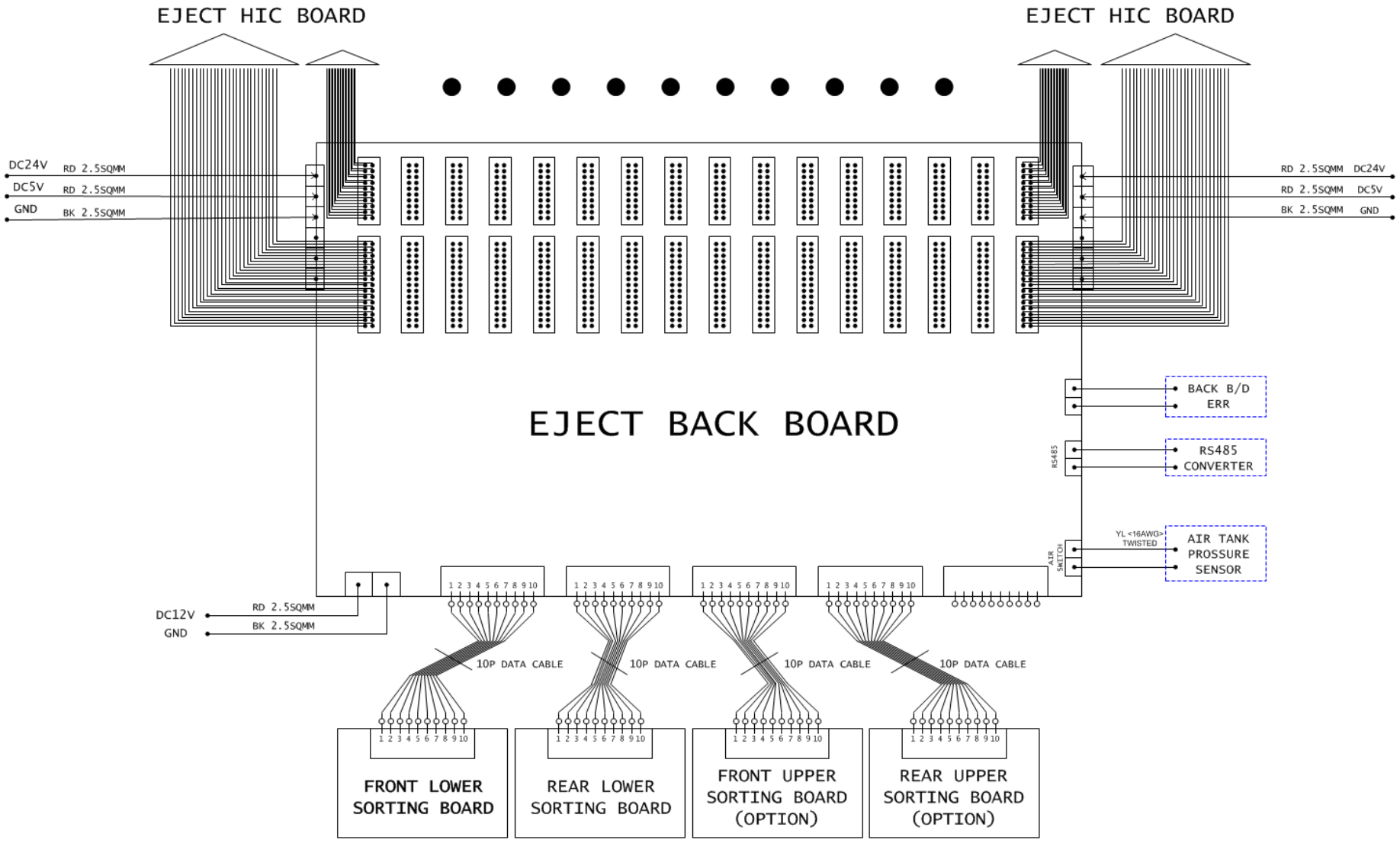
	DATE: '15.02.07	MODEL:	MATERIAL: NONE	SCALE: NONE	DWG. No: 0



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	PART NAME			PAGE	of 15
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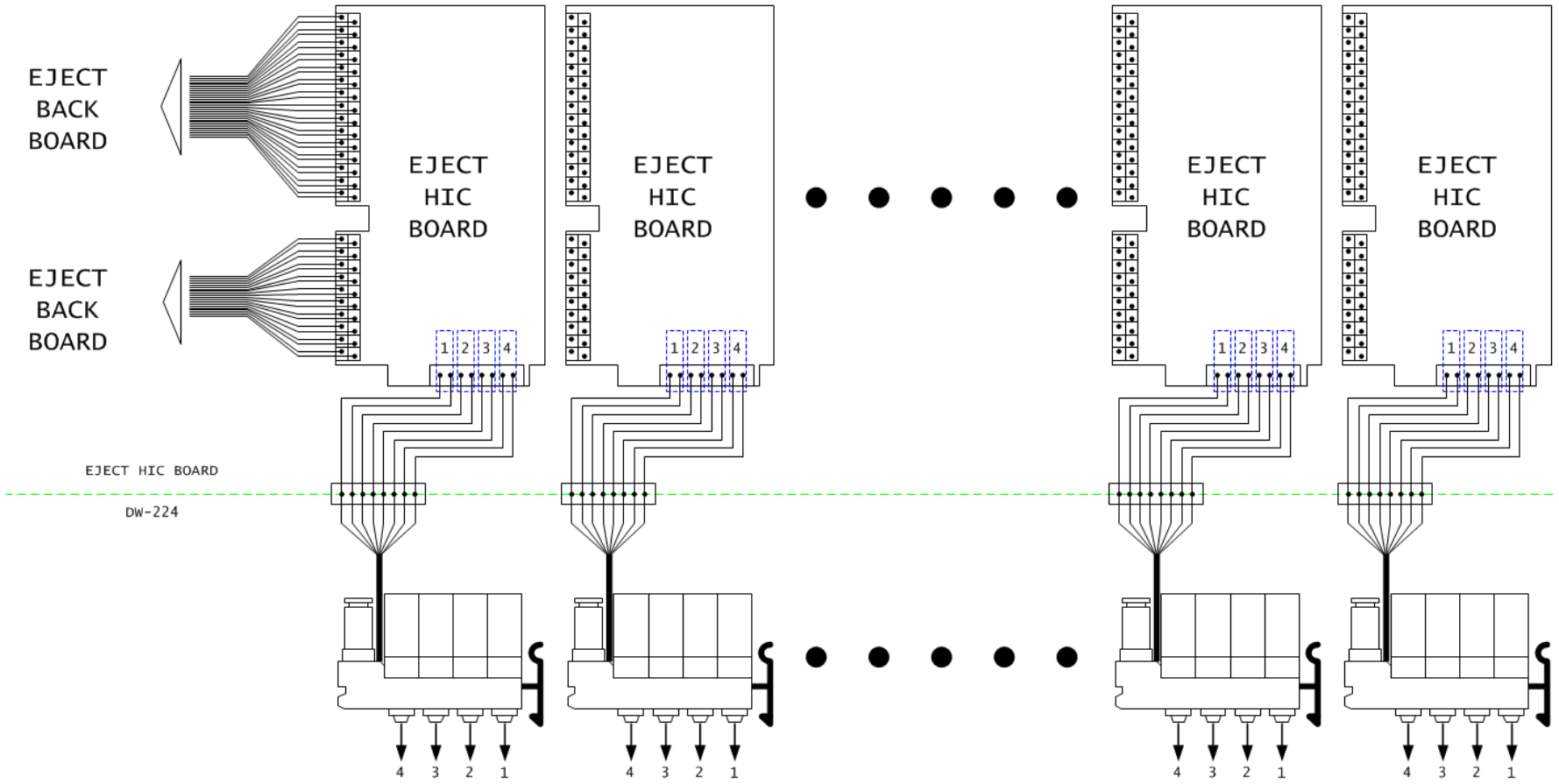
	DATE '15.02.07	MODEL	MATERIAL NONE	SCALE NONE	DWG. No 0



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	PART NAME		EJT HIC	PAGE	of 15
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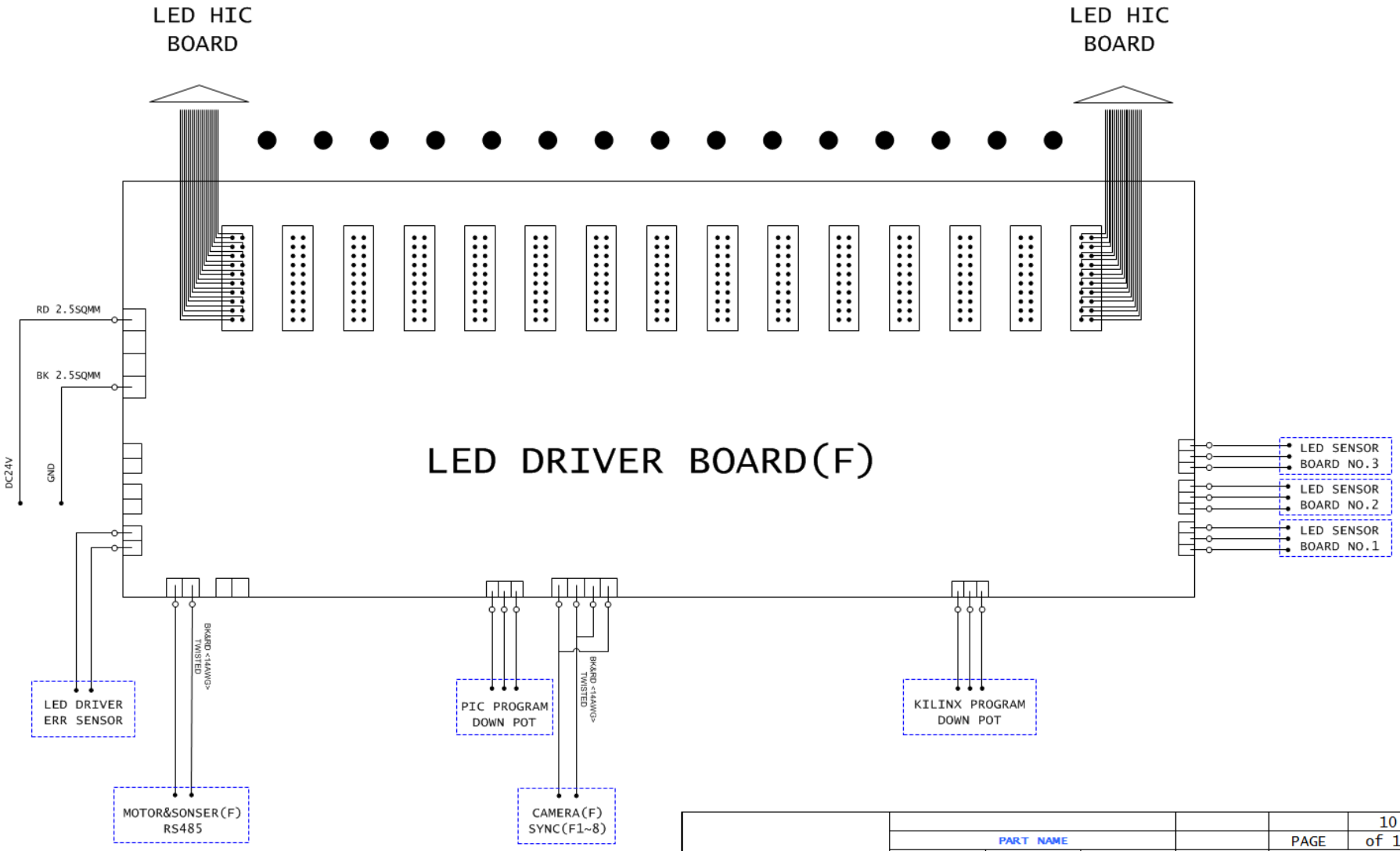
	DATE: '15.02.07	MODEL:	MATERIAL: NONE	SCALE: NONE	DWG. No: 0



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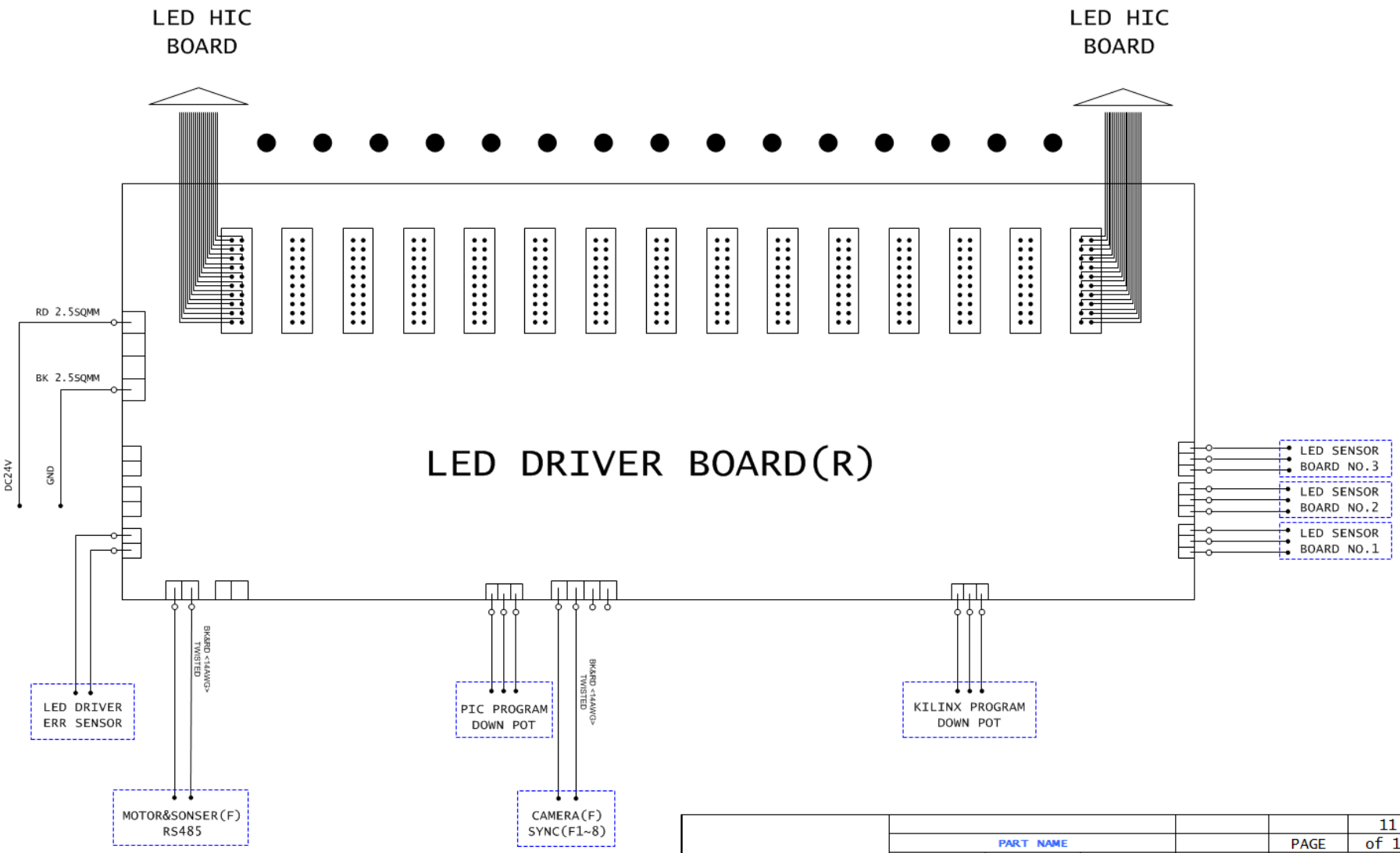
	PART NAME			PAGE	of 15
DAEWON GSI	DESIGNED by H.Y. KIM	CHECKED by	APPROVED by NONE	UNITS NONE	TITLE LED DRIVER[F]
	DATE '15.02.07	MODEL	MATERIAL NONE	SCALE NONE	DWG. No 0



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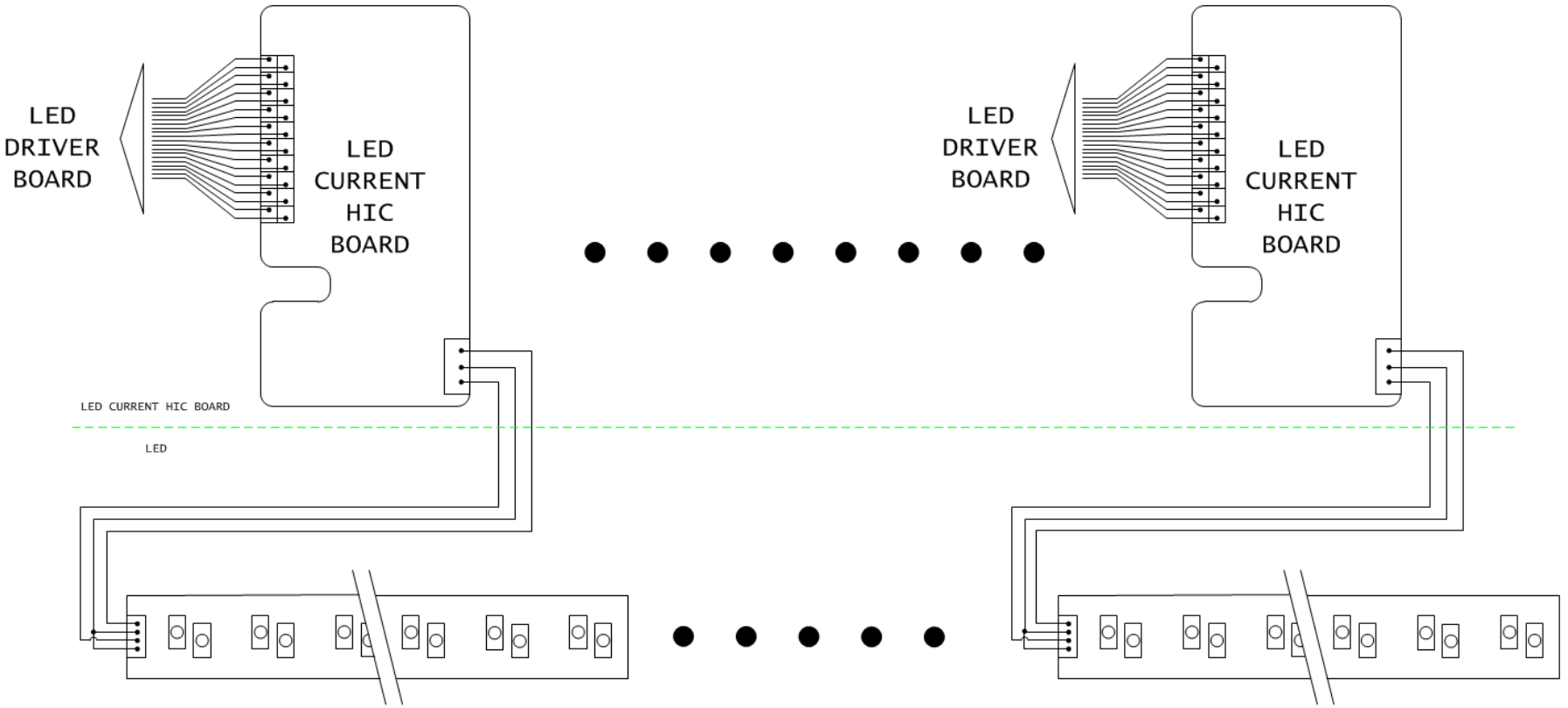
	PART NAME			PAGE	of 15
DAEWON GSI	DESIGNED by H.Y. KIM	CHECKED by	APPROVED by NONE	UNITS NONE	TITLE LED DRIVER[R]
	DATE '15.02.07	MODEL	MATERIAL NONE	SCALE NONE	DWG. No 0



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	PART NAME				PAGE	of 15
	DESIGNED by H.Y. KIM	CHECKED by	APPROVED by NONE	UNITS NONE	TITLE LED HIC	
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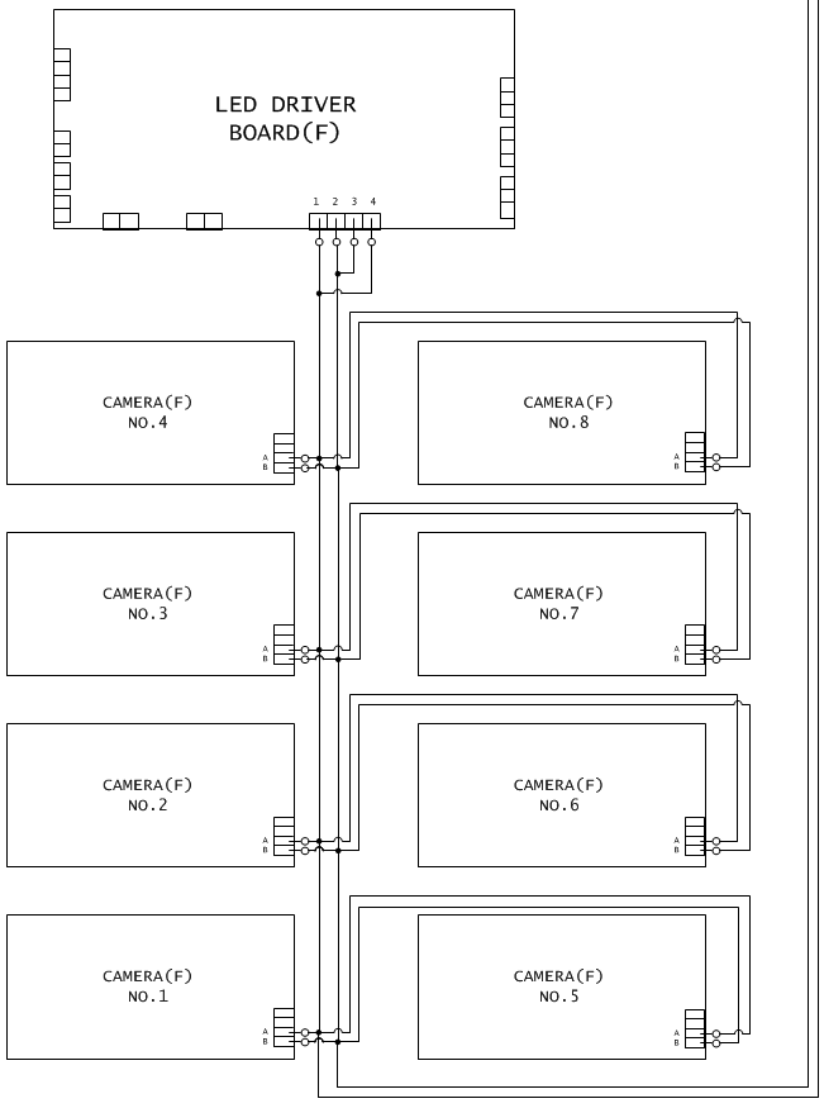

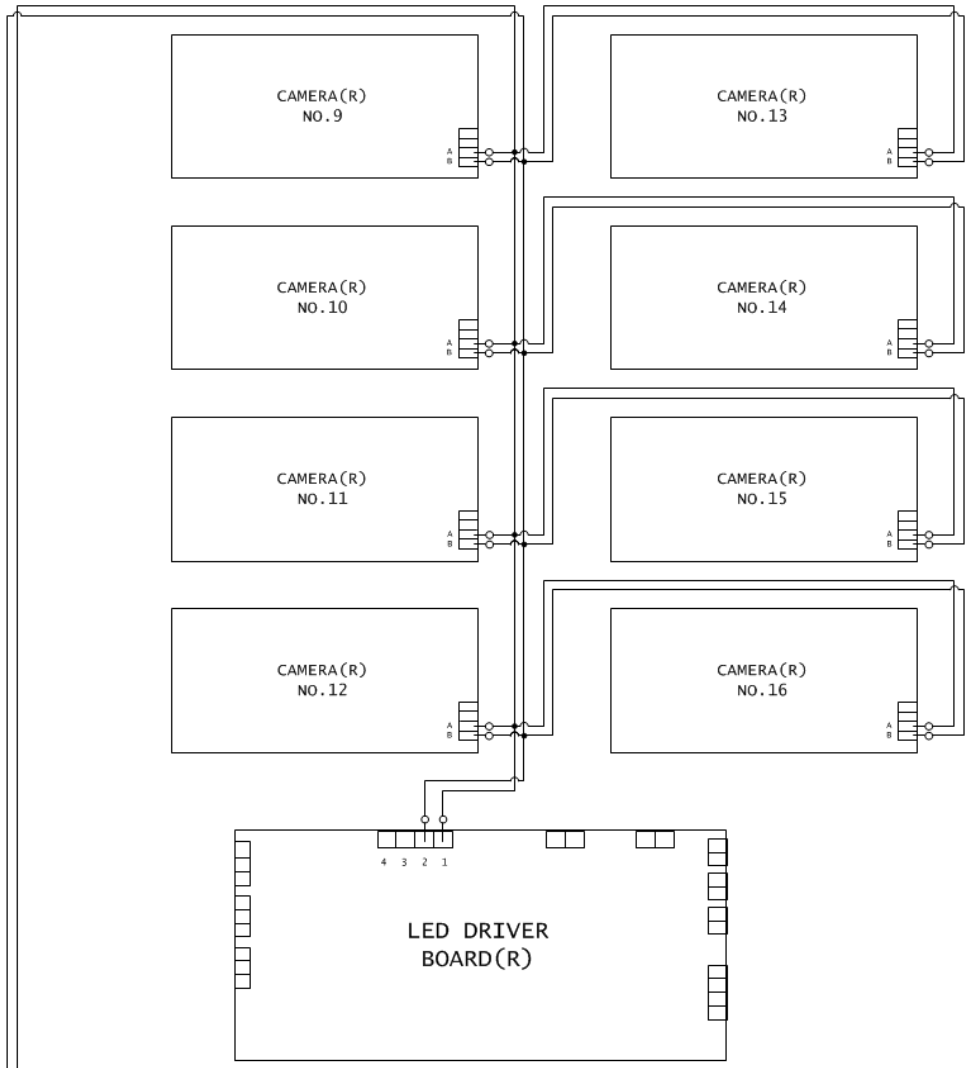

DAEWON GSI	PART NAME			PAGE	13 of 15
	DESIGNED by: H.Y. KIM	CHECKED by:	APPROVED by: NONE	UNITS: NONE	TITLE: CAMERA SYNC
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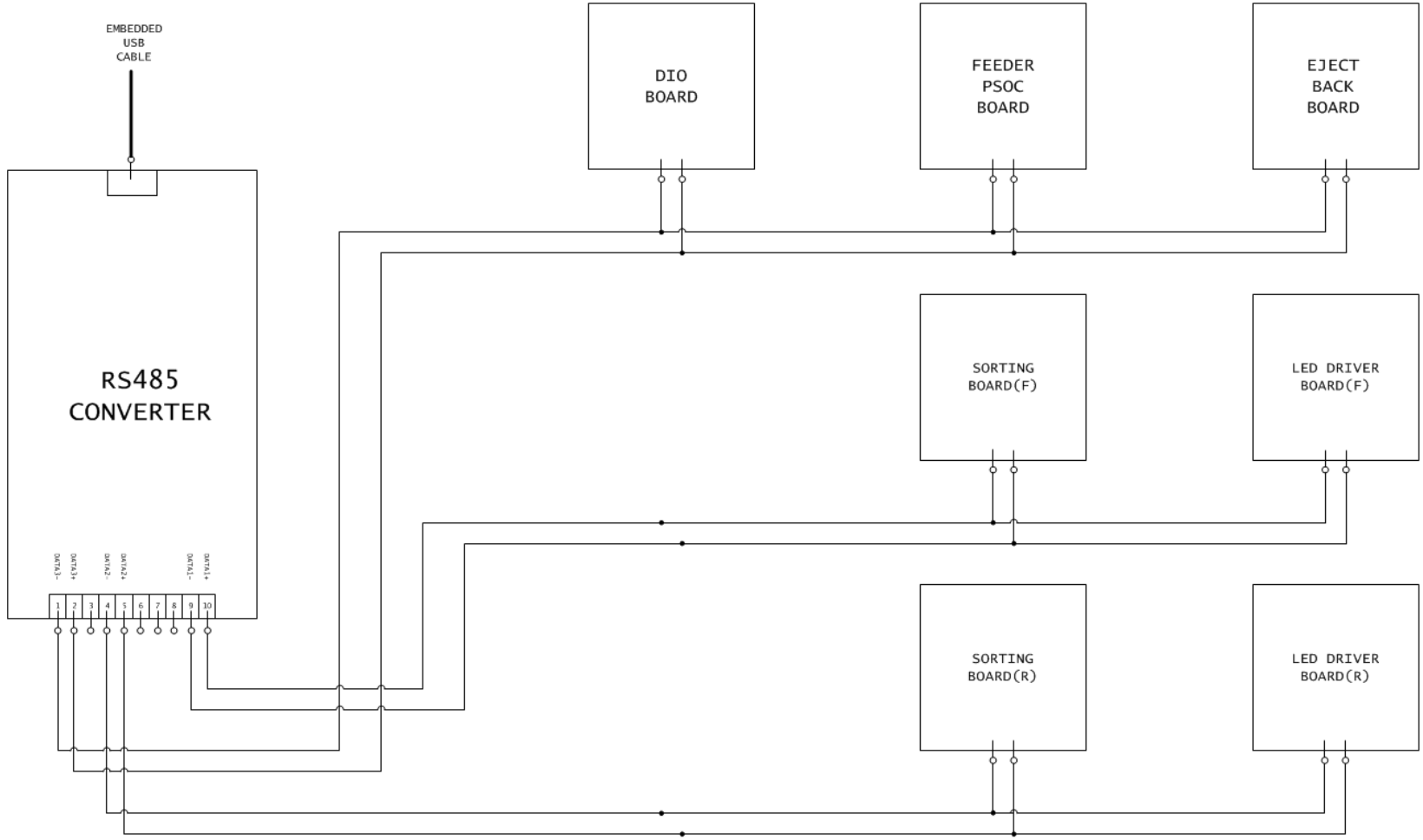

DAEWON GSI	PART NAME			PAGE	14 of 15
	DESIGNED by: H.Y. KIM	CHECKED by:	APPROVED by: NONE	UNITS: NONE	TITLE: 485 COM
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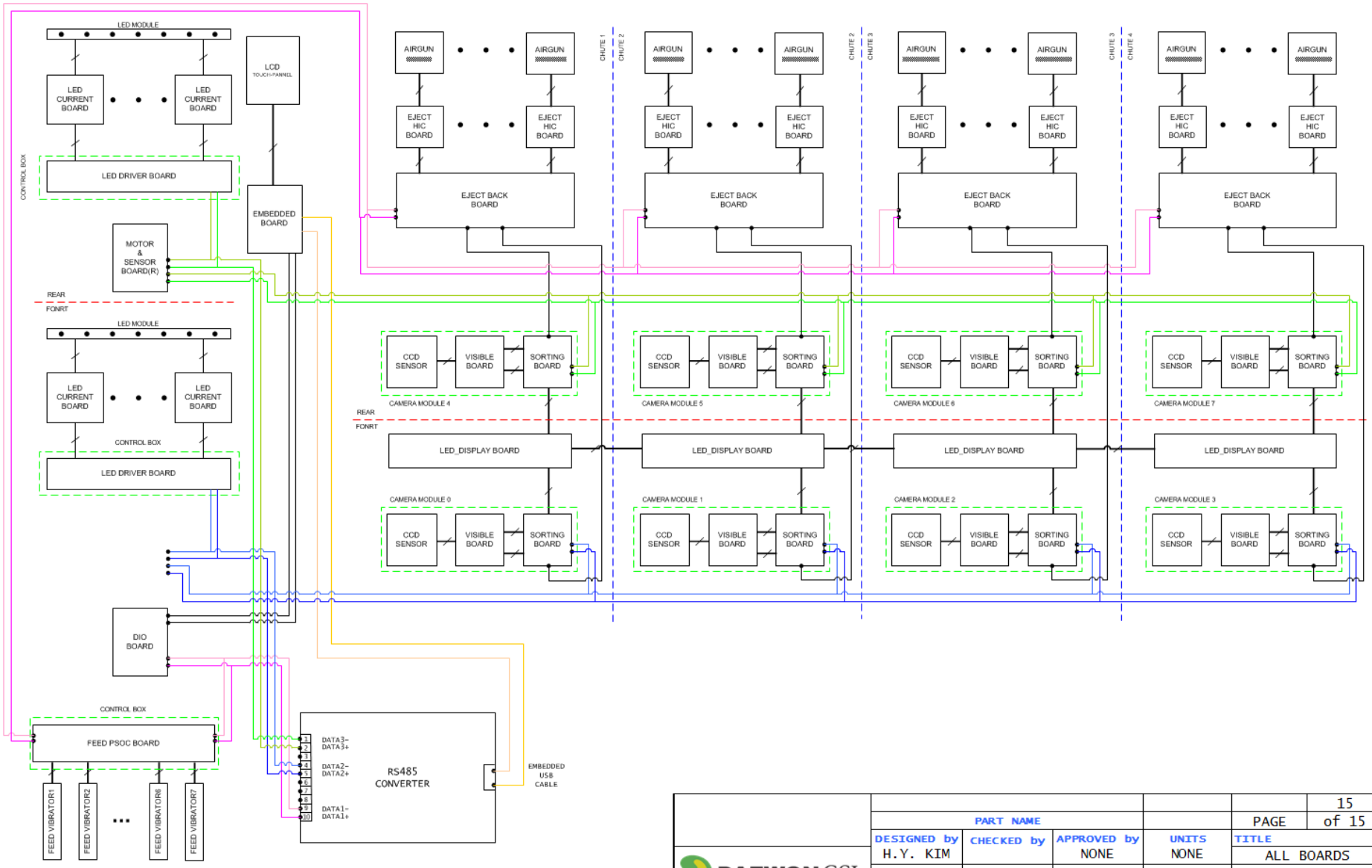

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	PART NAME			PAGE	of 15
DAEWON GSI	DESIGNED by H.Y. KIM	CHECKED by	APPROVED by NONE	UNITS NONE	TITLE ALL BOARDS
	DATE '15.02.07	MODEL	MATERIAL NONE	SCALE NONE	DWG. No 0

DAEWON GSI
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Agent Contact Details