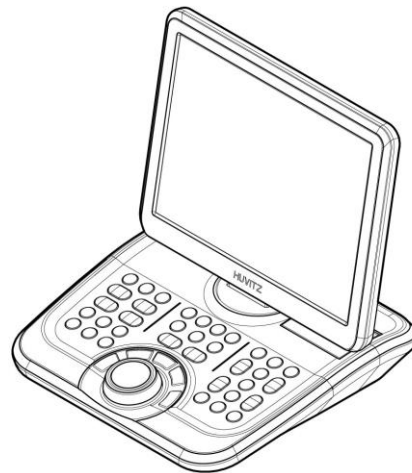
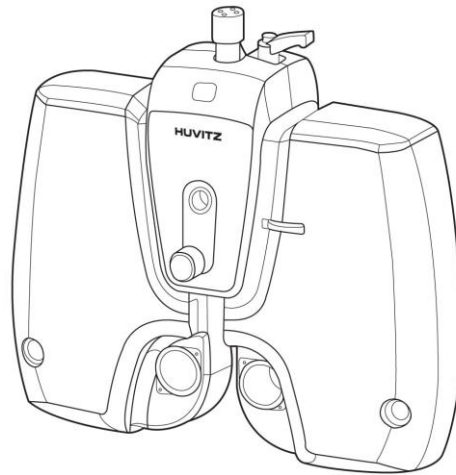


Service Manual

Digital Refractor HDR-9000



HUVITZ Co. Ltd.

Contents

Contents.....	2
1. Introduction.....	4
2. Before Getting Started	5
2.1 Checking Software Versions	5
2.2 Setting-Up System Parameters.....	6
2.3 Using Engineer Mode.....	7
3. Confirmation Check Procedure	9
3.1 Purpose of Confirmation Check.....	9
3.2 Confirmation Check	9
3.2.1 Checking the Initialization Sequence.....	9
3.2.2 Post Aging Test Procedures for the Refractor Body.....	10
3.2.3 Checking Procedures for the Operation Panel	11
4. Disassembling procedure and Parts Description.....	14
4.1 Removing the Covers	14
4.2 Replacing the Circuit Board.....	19
4.3 Description of Parts.....	20
4.3.1 Disk Assembly – Patient’s Side	20
4.3.2 Disk Assembly – Examiner’s Side.....	21
4.3.3 SUB1 GEAR 120 ASS’Y	22
4.3.4 SUB1 GEAR 120 DUAL ASS’Y.....	23
4.3.5 HALL Sensor Ass’y	24
4.4 Replacement Procedure of Sensors	25
4.5 Disassembling the Operation Panel.....	28
4.6 Removing the LCD Panel Cover of the Operation Panel.....	29
4.7 Replacing Printing Paper	30
4.8 Disassembling the Junction Box	31
4.9 Cleaning the Lenses in the Refractor Body.....	32
5. Trouble shooting.....	34
5.1 Wiring Diagram and Board Description	34
5.1.1 Operation Panel	34
5.1.2 Refractor Body	36
5.1.3 Junction Box.....	39

Appendix	42
A. Checking Software Versions	42
B. System Setting	44
C. Communication	47
D. Calibrating Touch Pad	51
E. Using Engineer Mode	53
F. Upgrading Software	65

1. Introduction

This manual provides information about maintenance on HUVITZ refractor Model HDR-9000. For correct maintenance, it is necessary to understand this manual thoroughly before beginning any treatment on the instrument.

In case the instrument cannot be repaired by the procedures described in this manual, contact and inform our technical service department of the detailed information about your problem with product number and software version.

The design or specifications subject to modification without advanced notice due to improvement.

2. Before Getting Started

2.1 Checking Software Versions

It is very essential for the engineers who perform maintenance or troubleshooting on the Digital Refractor to check version information of the system before starting the job. Also it is always required to check and provide version information of the product before contacting the Technical Support Department at Huvitz.

HDR-9000 Digital Refractor is consists of three parts, Refractor Body, Operation Panel and Junction Box. The Refractor Body is functionally divided into three parts, upper head, right and left battery. Each part of them has its own driving mechanism and driving software. The Operation Panel is functionally divided into two parts, GUI and Button & communication interface. Each part of them also has its own software.

GUI App Version	0.1.7
BtnBase Version	1.0.0
RB-PT Version	1.04
RB-R Version	1.01
RB-L Version	1.01
JunctionBox Version	1.0.0

[Version Information]

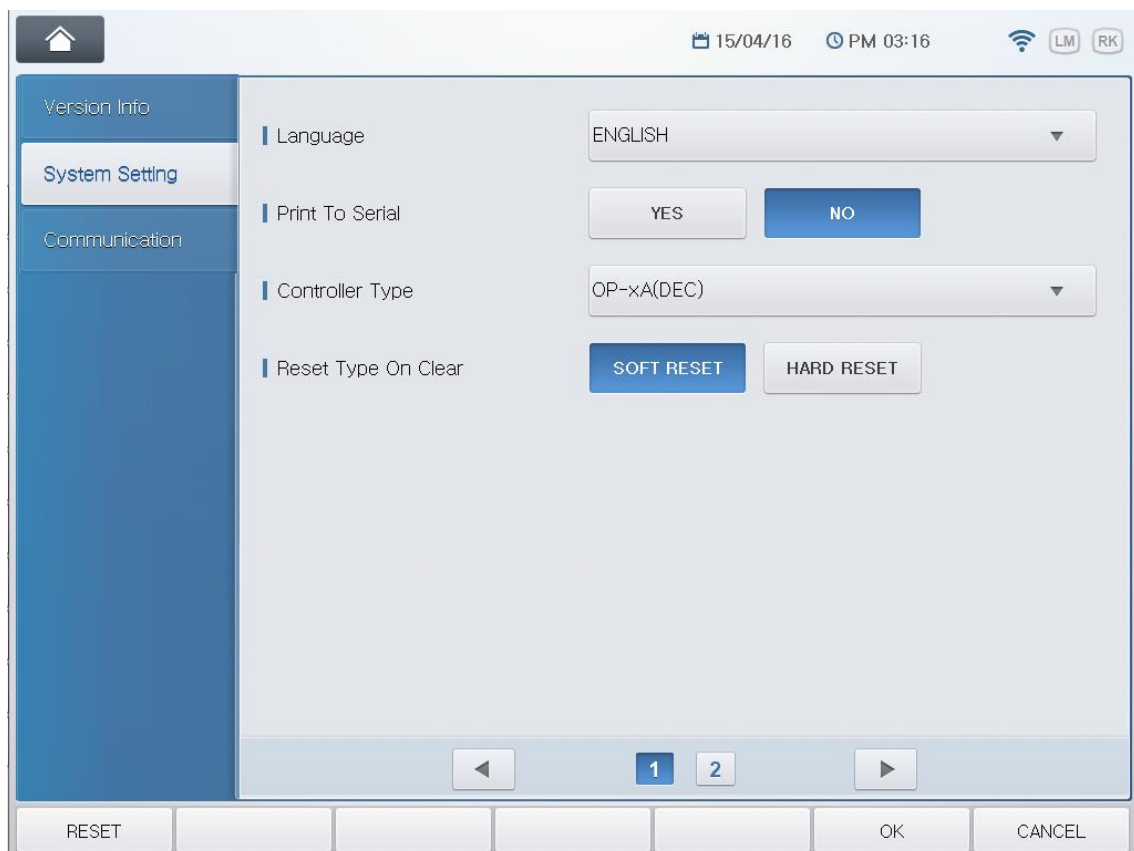
Refer to appendix for more detailed information and how-to.

2.2 Setting-Up System Parameters

It is very common to interface HDR-9000 Digital Refractor with several different optometric instruments. But it varies from customer to customer that what kinds of and how many instruments are interfaced with. So it's required for the engineer who installs and sets up refraction system at customer's place to set up initial system parameters according to customer's needs and environment.

Parameters listed below are the most common parameters required to be set after installation.

- ◆ Language
- ◆ Print To Serial (Whether to use PC interaction or not)
- ◆ Chart notation (decimal / feet / meter) & Controller type
- ◆ Reset Type On Clear
- ◆ Chart device
- ◆ Chart connection type (serial / IR)



[System Setting]

Refer to appendix for more detailed information about system setting.

There are more parameters that customer can set up according to his or her flavor. Just refer to the Operator's Manual and find the chapter that explains 'System Configuration' menu.

2.3 Using Engineer Mode

When you're referring this manual you may often encounter parts that ask you to execute 'Engineer Mode' to check or fix something. The Engineer Mode provides special functions to aid engineers easily perform maintenance and troubleshooting.

- ◆ **Gear Test**

It is to aid service engineer checking the status of motors in the Refractor Body.

- ◆ **Test Mode**

It is to aid service engineer checking the status of sensors and the movement of motors in the Refractor Body.

- ◆ **Check Button**

It is to aid service engineer checking the status of keypad in the Operation Panel whether buttons are working properly or not.

- ◆ **Check Lens**

It is to aid service engineer checking the status or cleaning lenses in the Refractor Body.

- ◆ **Ping Test**

It is to aid service engineer checking the status of communication between Operation Panel and other devices such as Refractor Body, chart.

- ◆ **Touch Calibration**

It is to aid service engineer calibrate the Touch Screen.



[Engineer Mode]

Refer to appendix for more detailed information about this mode.

3. Confirmation Check Procedure

3.1 Purpose of Confirmation Check

The purpose of inspecting the Huvitz product before taking it out for installation at customer's place is to find out possible defects or changes on original alignment made on them during the shipping and to confirm the settings for normal operation.

3.2 Confirmation Check

Confirmation check includes the procedures listed below.

- ◆ Checking the initialization :
After test installation, check if it finishes its initialization sequence without any abnormal symptom such as strange noise or smell, abnormal movement.
- ◆ Checking normal operation by performing the self-execution function :
Once it's turned on and ready, perform the self-execution mode to see if it operates without problem. It's also aimed to give some stress on the mechanical parts of the Refractor Body.
- ◆ Eye inspection on the Refractor Body :
After the self-execution, check with your eyes if the Refractor Body functions and responses correctly.
- ◆ Eye inspection on the Operation Panel :
Check with your eyes if the Operation Panel functions correctly.
- ◆ Checking the data communication :
Install and interface more optometric instruments with Digital Refractor and check if they interacts well with it.

3.2.1 Checking the Initialization Sequence

① Preparations

Install a HDR-9000 digital refraction system to be checked.

Check if the HDR-9000 system is performing the initialization sequences correctly.

② Procedure

To begin the aging test, press the following key sequences on the Operation Panel.

- ALT + MENU
- ALT + START
- ALT + NEXT

3.2.2 Post Aging Test Procedures for the Refractor Body

① Check the PD adjustment function.

- Press PD button.
- Check if the PD-check lenses are inserted properly.
- Turn the dial clockwise or counter-clockwise several times.
- Press PD button again to finish this step.

② Check the convergence function.

- Press FAR and NEAR button on the display several times.
- Check if the Refractor Body is converging correctly.
- Stop this step when the HDR-9000 Refractor Body is in FAR mode.

③ Check the initialization sequences again.

- Turn off the power.
- Turn on the power again.
- Check if the disk plates in the Refractor Body are aligned properly after the initialization sequences.
- Repeat this step 3 to 5 times.

④ Check the auxiliary lenses.

- To enter the lens-checking mode, press the following key sequences.

ALT + MENU

ALT + START

ALT + TEST

"Check Lens"

- Change the selection of eye to binocular:
By pressing the OU button.

- Skip SPH and CYL lenses by pressing ‘+’ button 4 times.
 - Check the auxiliary lenses one by one by comparing the lenses in the test windows of Refractor Body with the information on the LCD of the Operation Panel.
 - Finish this step when all the auxiliary lenses are checked.
By pressing the MENU button or OK/CANCEL.
- ⑤ Check the direction of rotary prism lenses.
- Reset the Refractor Body by pressing the CLEAR button twice.
 - Select rotary prism lenses
By pressing the BIBO or BDBU button.
 - Check if the direction of prism base is down.
- ⑥ Check the initial position of the dual cross cylinder lenses in cylinder mode.
- Select dual cross cylinder lenses on the right by pressing the dots group chart button twice.
 - Check if the split line of the lens is vertical.
 - Change the selection of eye to left by pressing the LEFT button.
 - Check if the split line of the lens is vertical
(The split line is horizontal in <+> cylinder mode).

3.2.3 Checking Procedures for the Operation Panel

- ① Check the touch panel
- By touching buttons on the display to see if touched position is correctly recognized.
- ② Check if the printer prints properly.
- ② Check the buttons.
- Check the buttons by the Check Button Test menu in the Engineer mode.
 - Execute Engineer mode.
 - Execute Check Button Test menu by pressing “Check Button” button on the display.
 - Press the buttons indicated on the menu screen. If a button is not recognized correct, it gives 2 more times of trial. If it finally fails recognizing a button, it records the button as failed.
 - Press OK or CANCEL to stop the test and return to menu mode.

3.2.4 Checking Procedures for Data Communication

① Checking with Ref/Keratometer.

- Check the Option menu of MRK or HRK for the communication.
Set the BPS option to 9600.
- Measure a model eye or a patient.
- Press PRINT button for transferring the measured data.
- Press RK button with SHIFT pressed on the Operation Panel after the MRK or HRK finishes printing.
- Select and load the data received.
- Check if the data is correct.

② Checking with Lensmeter.

- Check the Option menu of CLM or HLM for the communication.
Set the RS232 option.
Set the BPS option to 9600.
- Measure a lens.
- Press PRINT button for transferring the measured data.
- Press LM button with SHIFT pressed on the Operation Panel after the CLM or HLM finishes printing.
- Select and load the data received.
- Check if the data is correct.

③ Checking with CCP-3100

- Check the System Settings menu of the Operation Panel for CCP-3100.
Set the Chart Connection option to SERIAL (it doesn't support IR option).
Set the Chart Device option to CCP-3100.
- Store the change by pressing the button OK or "HOME" button on the display.
- Press some chart buttons and check the response of CCP-3100.

④ Checking with CDC-4000

- Check the System Settings menu of the Operation Panel for CDC-4000.
Set the Chart Connection option to SERIAL (it doesn't support IR option).
Set the Chart Device option to CDC-4000.
- Store the change by pressing the button OK or "HOME" button on the display.
- Press some chart buttons and check the response of CDC-4000.

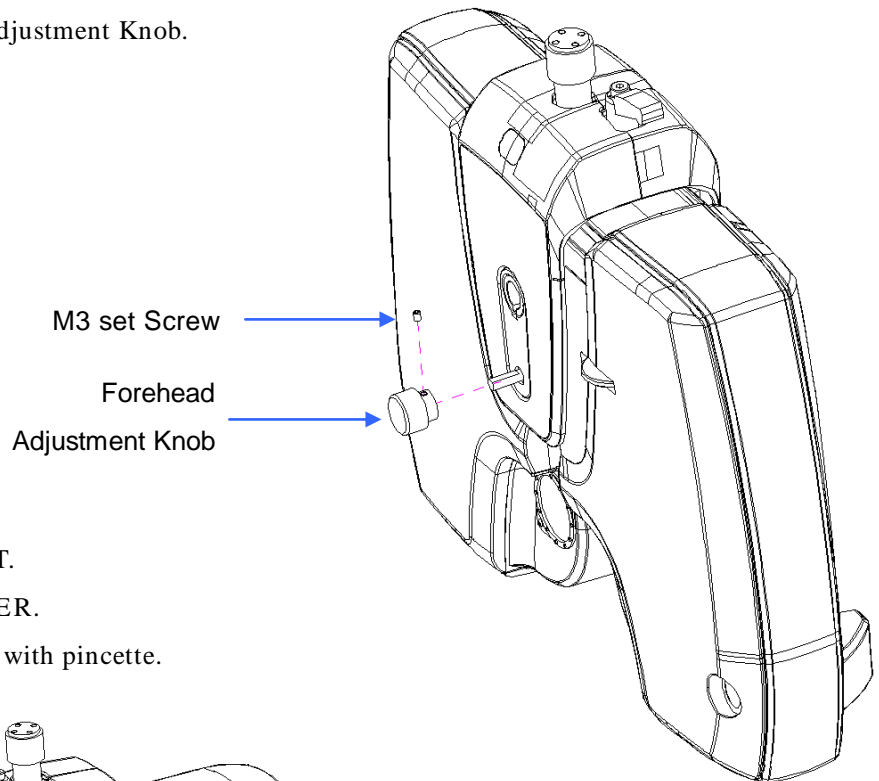
⑤ Checking with HDC-7000~ 9000

- Check the System Settings menu of the Operation Panel for HDC-7000.
Set the Chart Connection option to SERIAL or IR.
Set the Chart Device option to HDC-7000.
- Store the change by pressing the button OK or “HOME” button on the display.
- Press some chart buttons and check the response of HDC-7000.

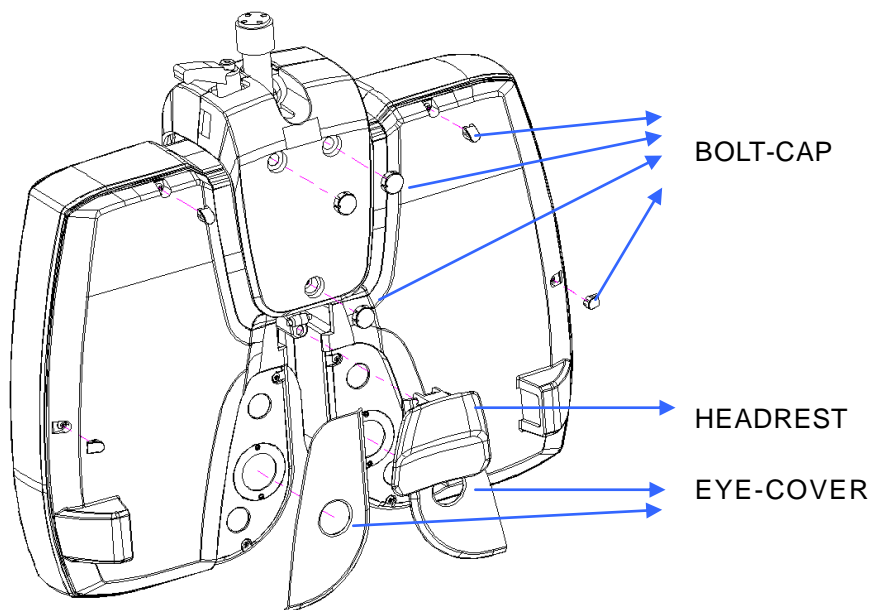
4. Disassembling procedure and Parts Description

4.1 Removing the Covers

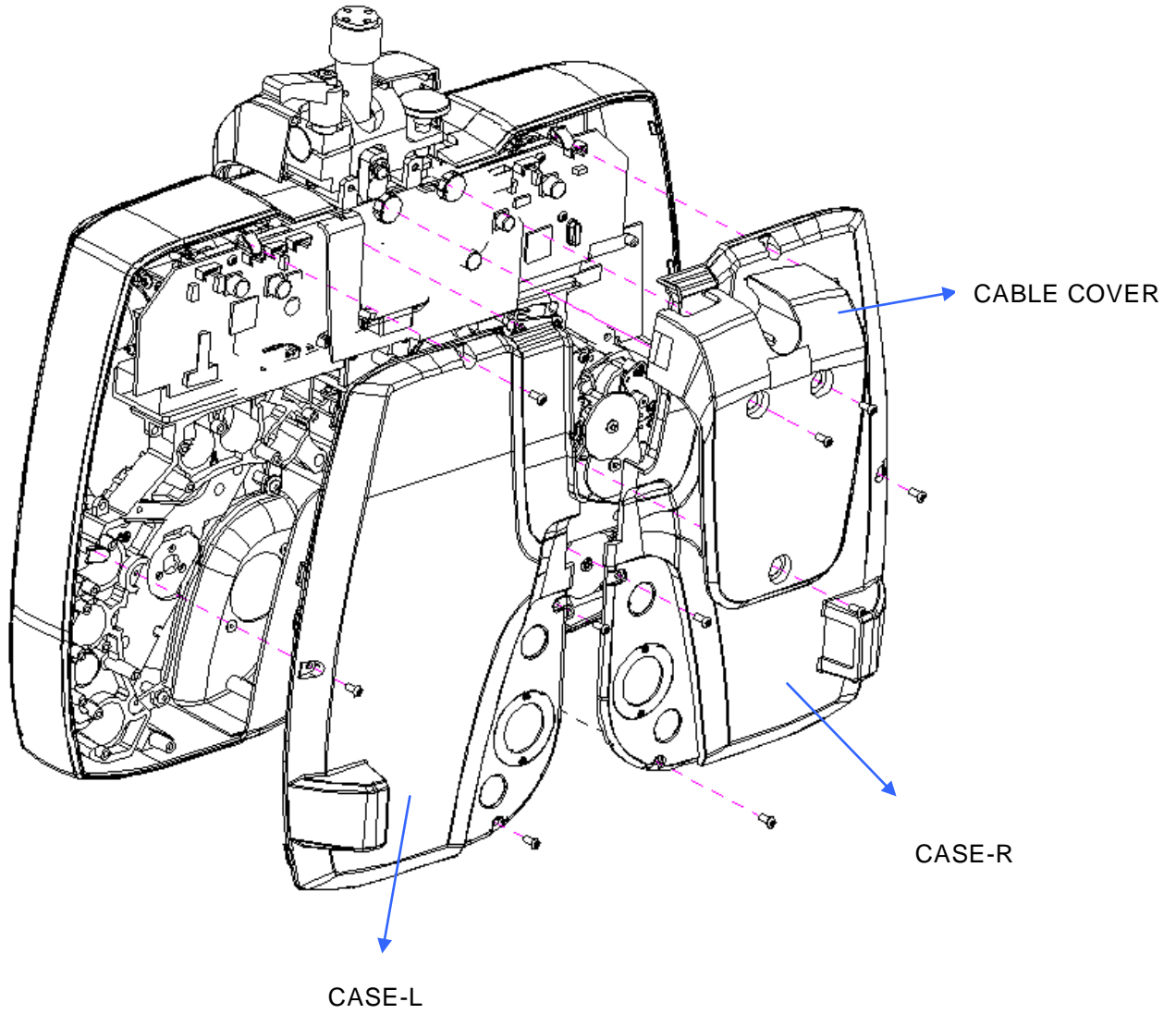
- Unscrew the M3 set screw in the Forehead Adjustment Knob first.
- Remove the Forehead Adjustment Knob.



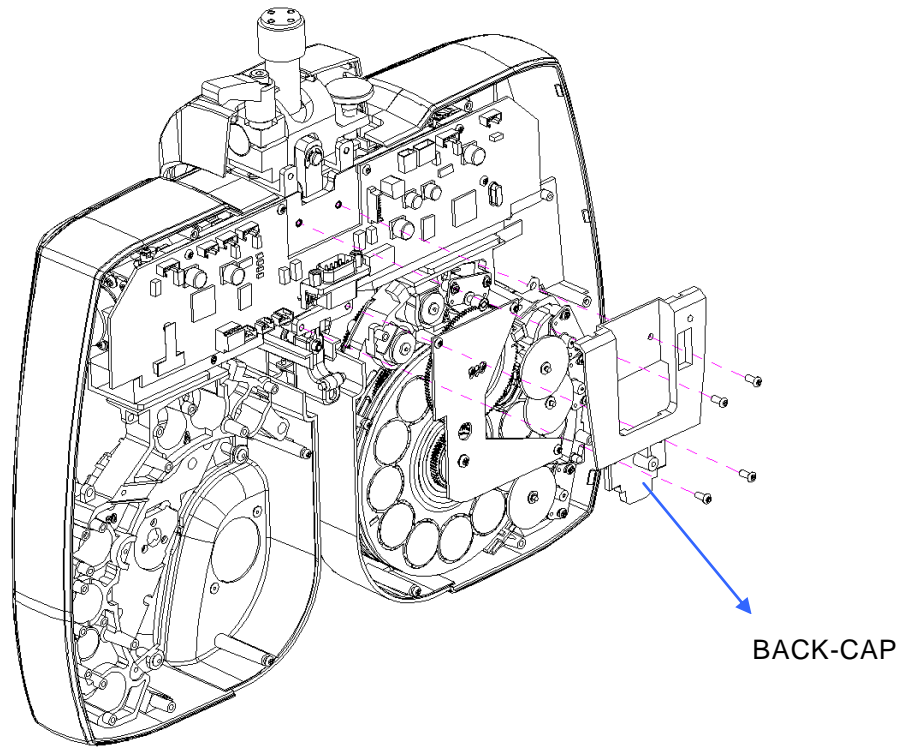
- Remove the HEADREST.
- Remove the EYE-COVER.
- Remove the BOLT-CAP with pincette.



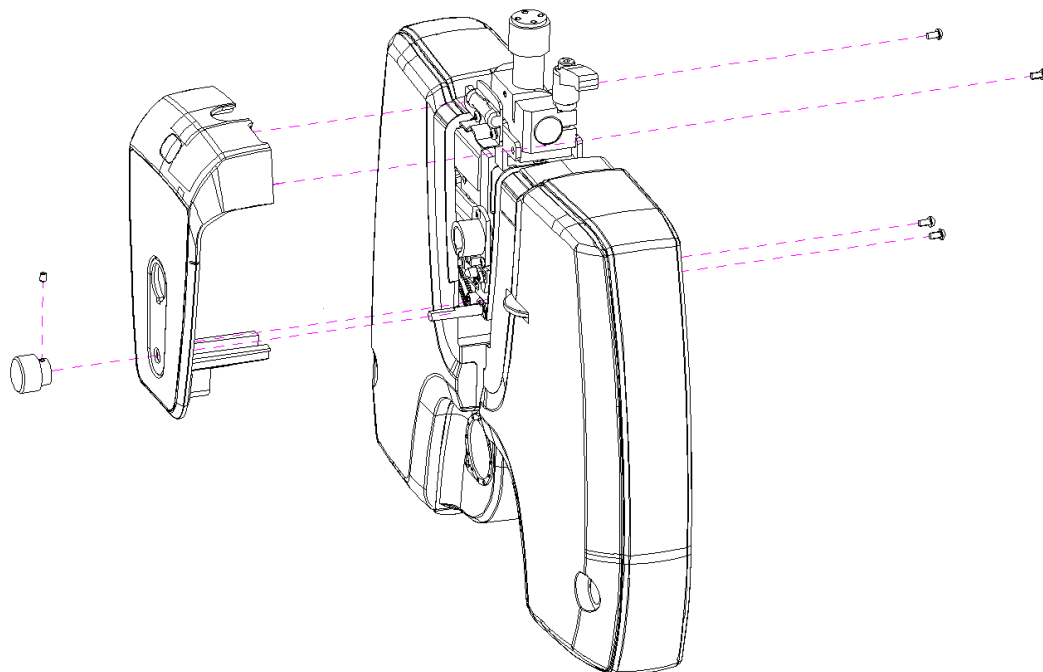
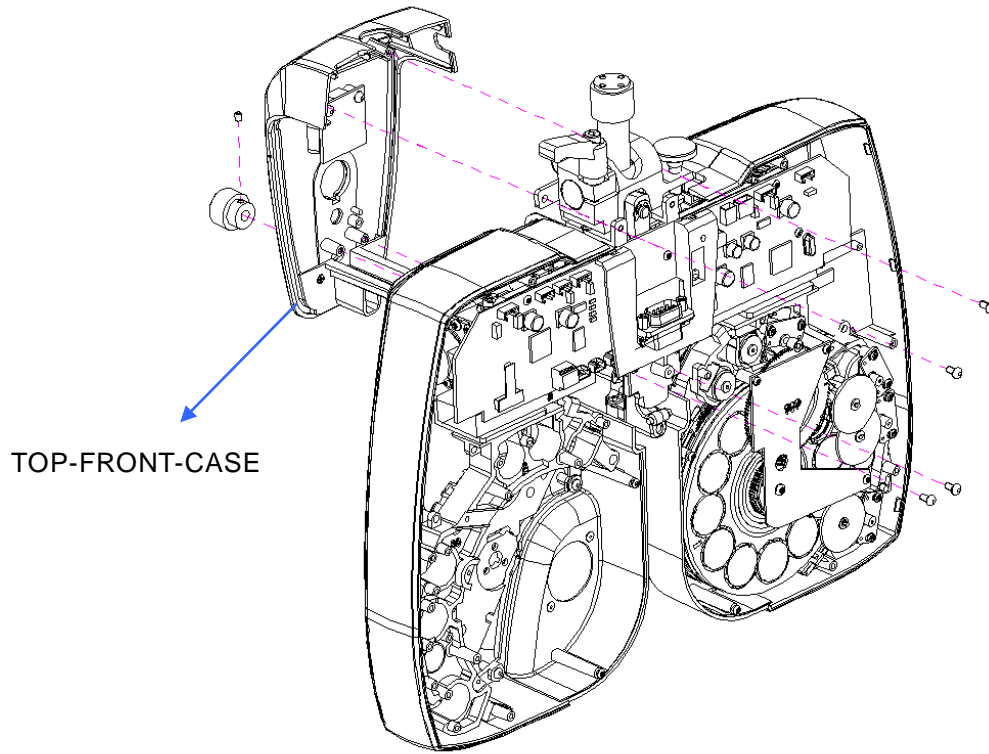
- Unscrew 3- M2.6 screws and remove the CABLE-COVER.
- Unscrew 8- M2.6 screws and remove the CASE-R / CASE-L.



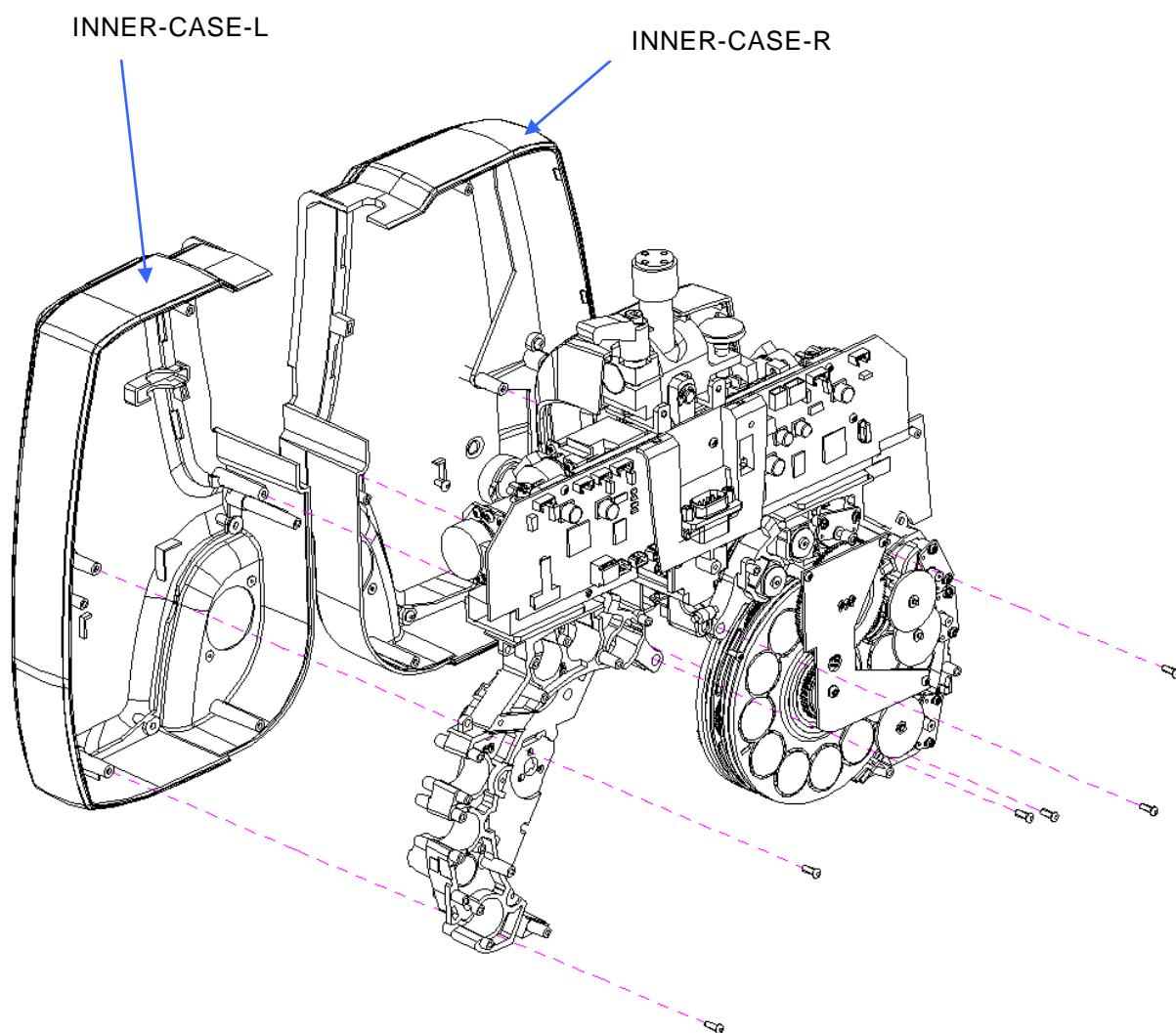
- Unscrew - M2.6 screws and remove BACK-CAP



- Unscrew 3- M2.6 screws and remove TOP-FRONT-CASE

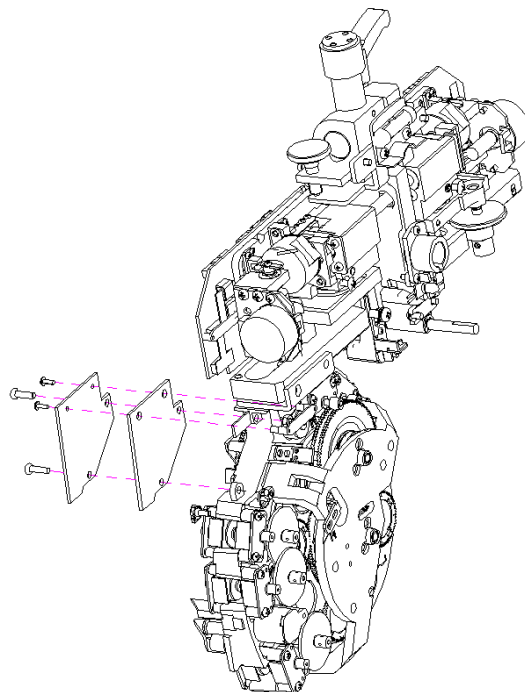
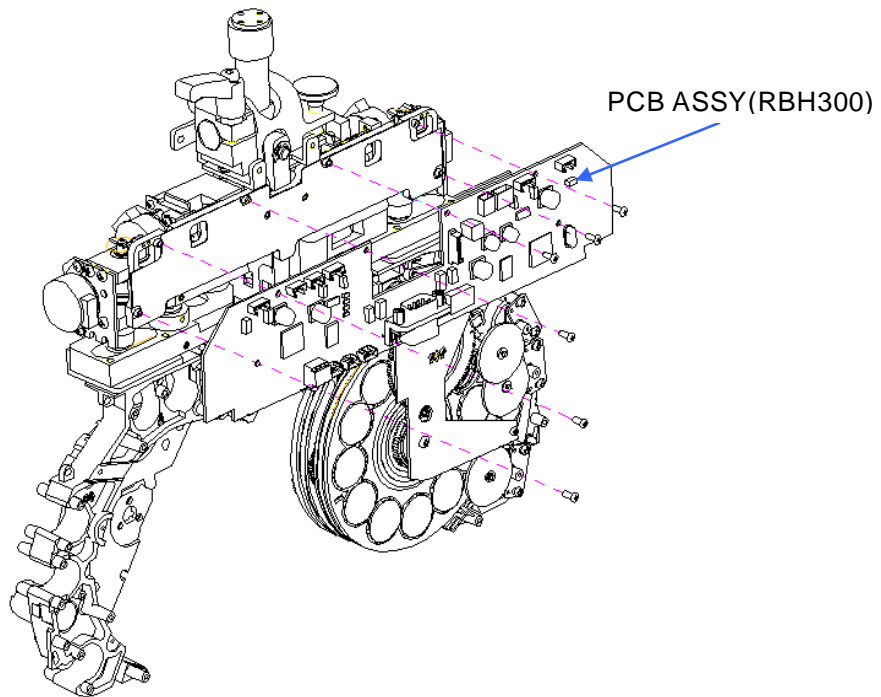


- Unscrew 6- M2.6 screws and remove INNER-CASE-L / INNER-CASE-R



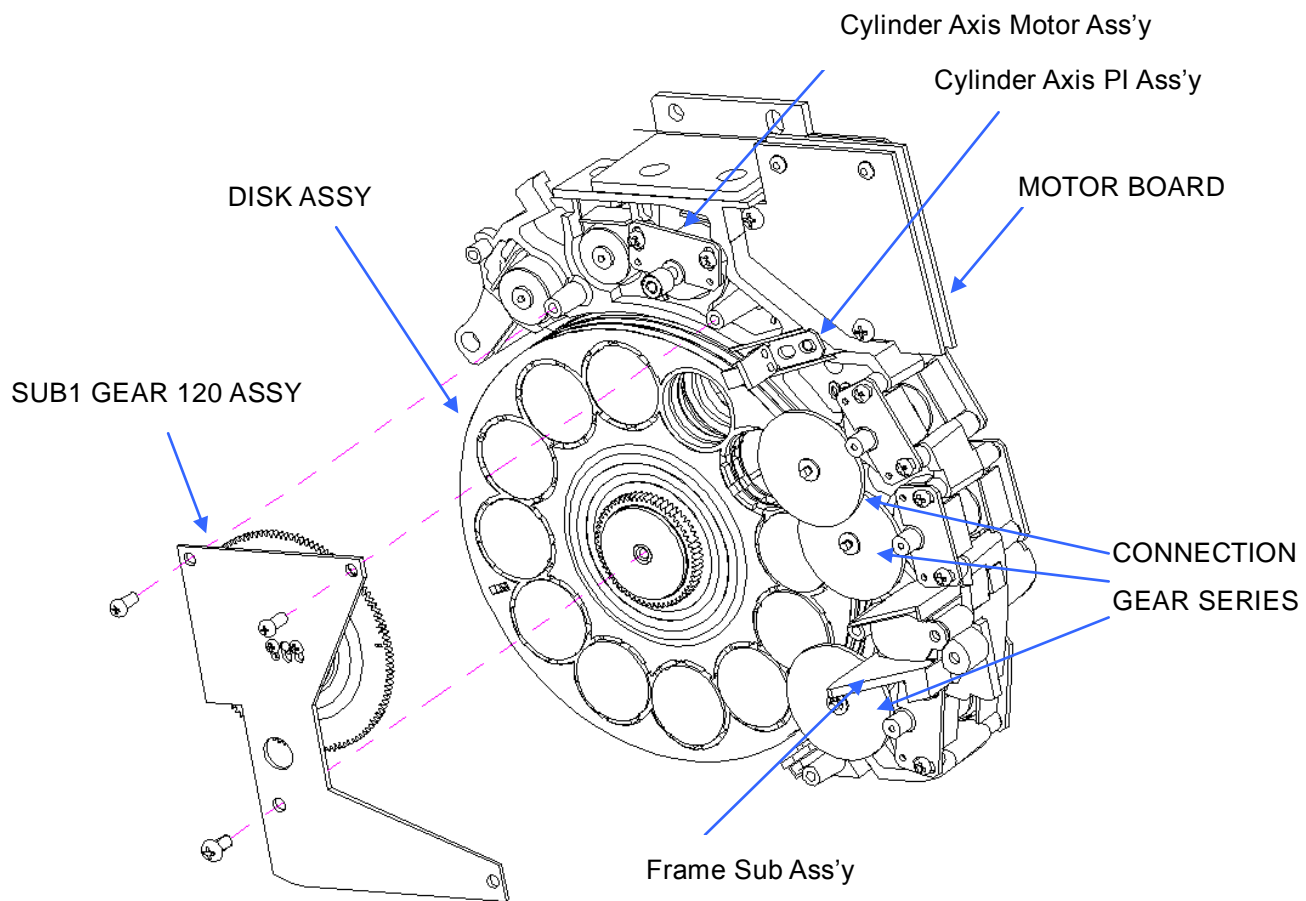
4.2 Replacing the Circuit Board

- Make it sure to turn off the power before removing the covers or replacing the circuit board.
- Disconnect all the connectors from the circuit board and unscrew 6 screws.

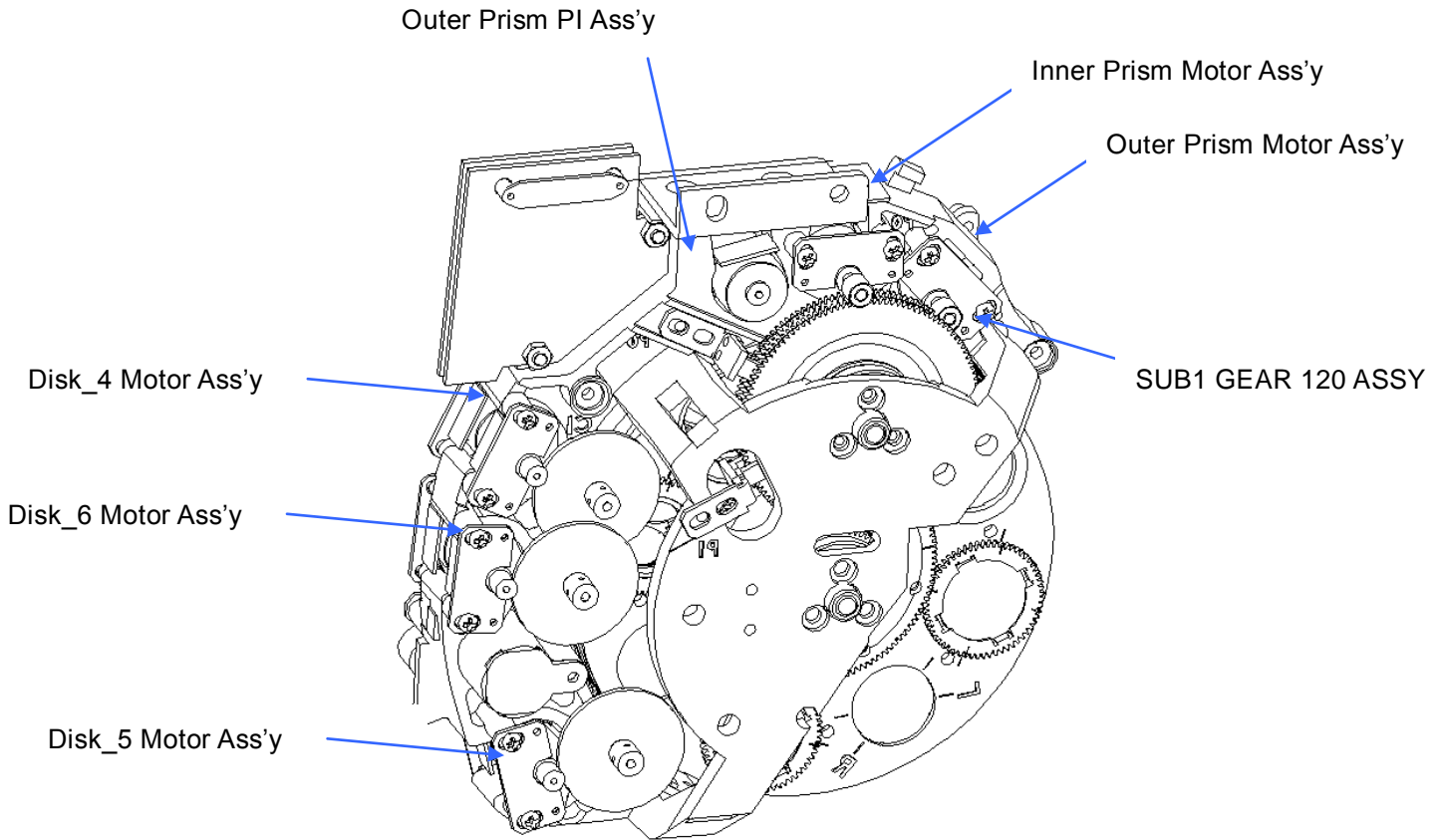


4.3 Description of Parts

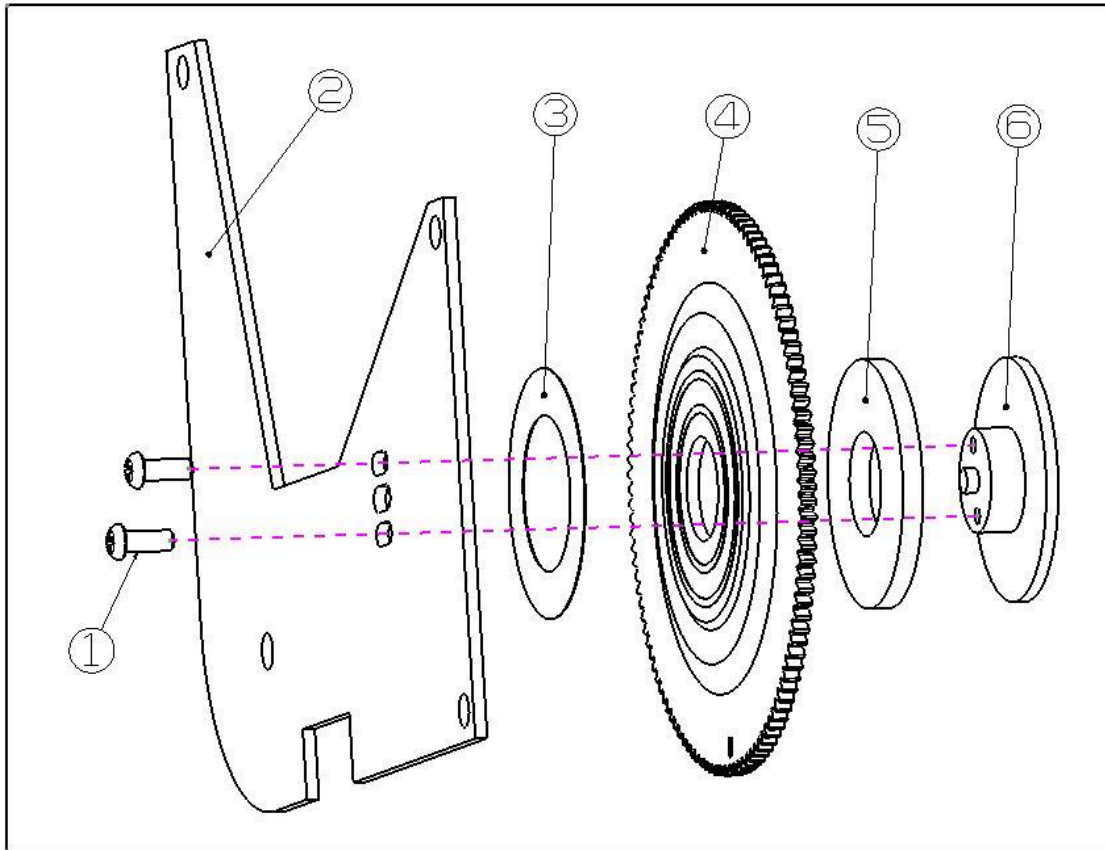
4.3.1 Disk Assembly – Patient's Side



4.3.2 Disk Assembly – Examiner’s Side

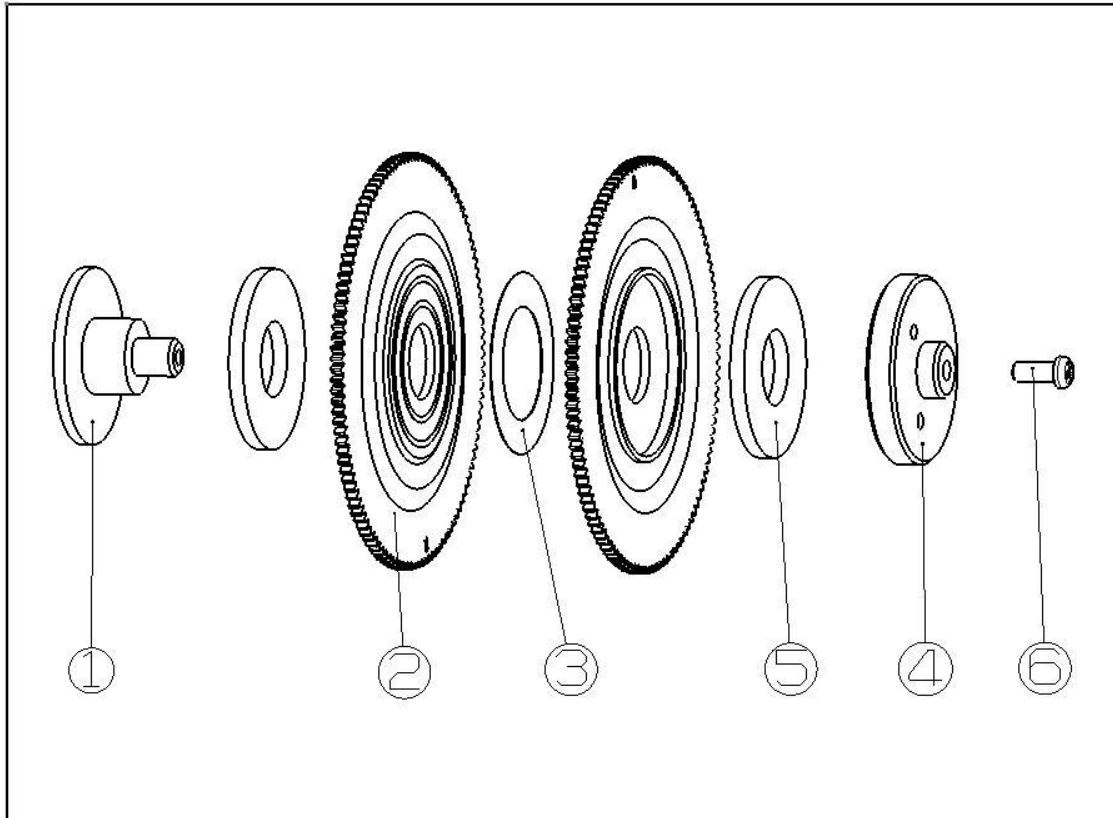


4.3.3 SUB1 GEAR 120 ASS'Y



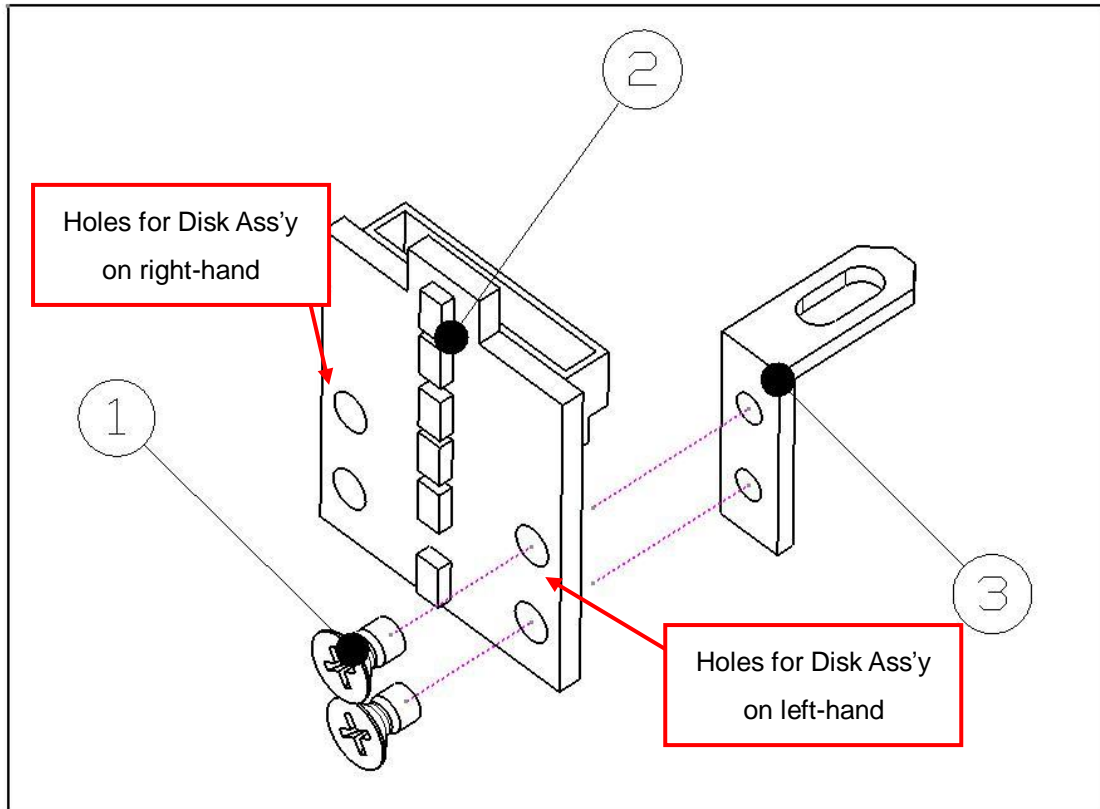
NO.	PART NAME
1	M2*5 Screw
2	main_shaft_fixer
3	Teflon_dia24*dia15*T0.1
4	sub1_gear120
5	NTN1024
6	sub_gear_axis

4.3.4 SUB1 GEAR 120 DUAL ASS'Y



NO.	PART NAME
1	sub_gear_2_shaft
2	sub1_gear120
3	Teflon_dia24*dia15*T0.1
4	main_shaft_fixer
5	NTB1024
6	M2*5 Screw

4.3.5 HALL Sensor Ass'y



NO.	PART NAME
1	Flat M3*6 Screw
2	PCB ASSY
3	magnet sensor guide

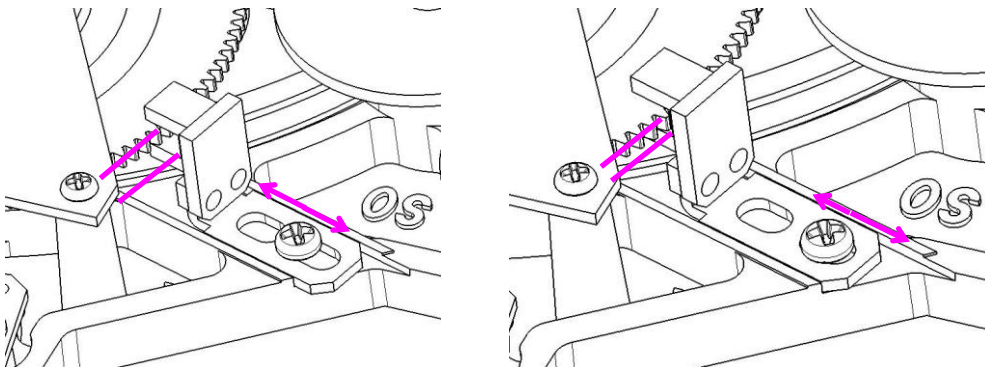
4.4 Replacement Procedure of Sensors

Basically it's not often recommended to replace the sensors in the Refractor Body by service engineers because the sensor position affects the position of lenses and axis. Before replacing any sensor, PI or HALL sensor, contact the customer service department at Huvitz and get enough information and instructions.

Turn off the power and remove the covers of both the upper head and right or left body.

(1) Replacing PI sensors

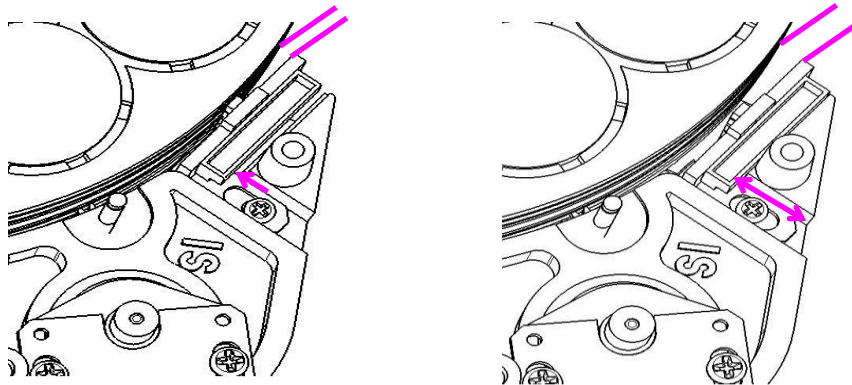
- Before detaching a PI sensor, mark the position of the sensor along its boundary with a sharp tool such as a cutter knife. Then you can assemble a new sensor at the most close position with the original one.
- Disconnect the connector of the sensor board to be replaced.
- Unscrew and remove the PI sensor board.
- Screw a new PI sensor board slightly at the position where a defective board's been removed.
- By referring the marks of original position of replaced sensor board, fix the new board firmly.
- Connect the connector of the new sensor board.
- Turn on the power and check if the initialization sequence is performed correctly.
- Execute the Engineer Menu mode on the Operation Panel.
- Execute the Test Mode function.
- Check the PI sensor value and if the sensor is detecting its origin correctly.



<Adjusting the position of PI sensor>

(2) Replacing HALL sensor

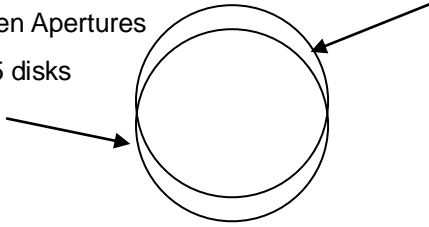
- Before detaching a PI sensor, mark the position of the sensor along its boundary with a sharp tool such as a cutter knife. Then you can assemble a new sensor at the most close position with the original one.
- Disconnect the connector of the HALL sensor board.
- Unscrew and remove the HALL sensor board.
- Screw a new HALL sensor board slightly at the position where a defective board's been removed.
- By referring the marks of original position of replaced sensor board, fix the new board firmly.
- Connect the connector of the new sensor board.
- Turn on the power and check if the initialization sequence is performed correctly. All the open apertures of the disks should be aligned concentric after the initialization sequence. Otherwise contact the customer service department at Huvitz for further measurement and instructions.
- Execute the Engineer Menu mode on the Operation Panel.
- Execute the Test Mode function.
- Check the PI sensor value and if the sensor is detecting its origin correctly.



<Adjusting the position of HALL sensor>

Incorrect Position

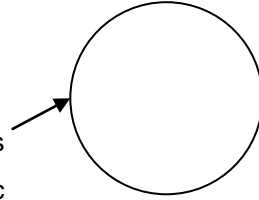
Open Apertures
of 5 disks



Open Aperture
in a disk which
is off-centric.

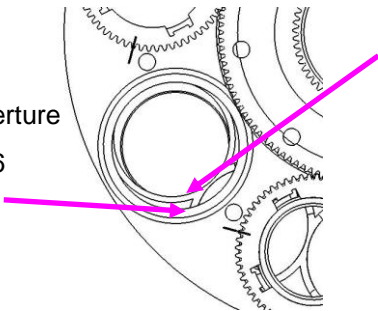
Correct Position

All Open Apertures
are concentric



Incorrect Position

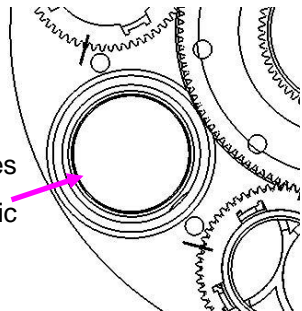
Open Aperture
of Disk #6



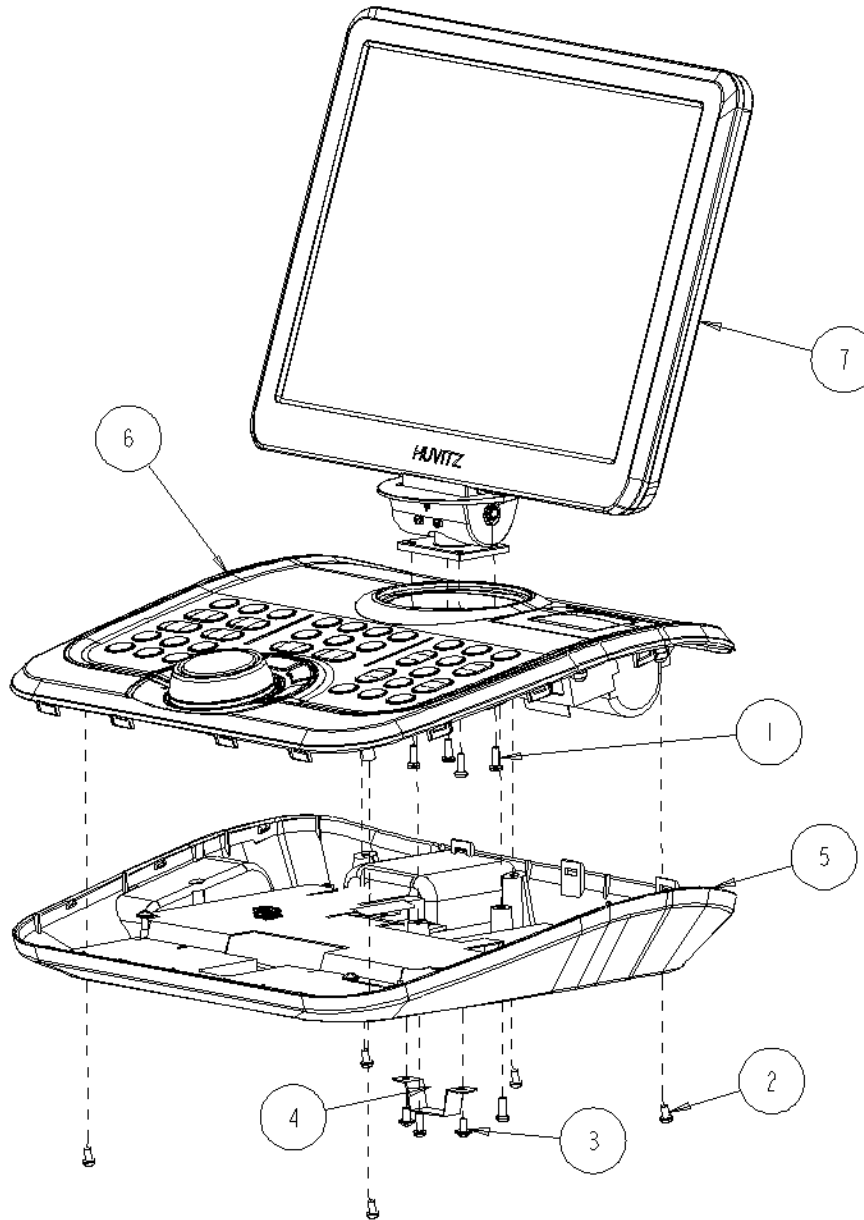
Open Aperture
of Disk #5

Correct Position

All Open Apertures
are concentric



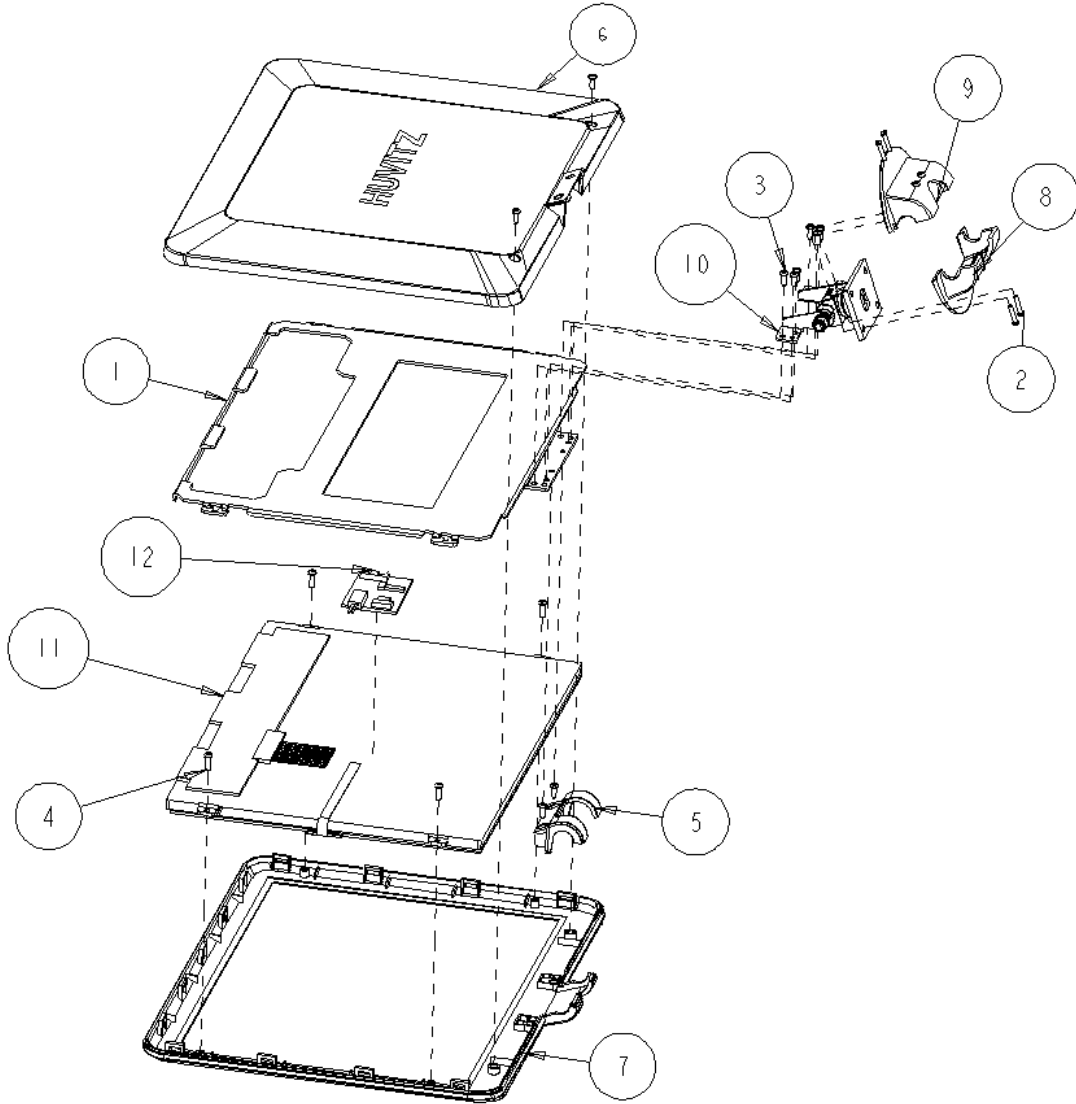
4.5 Disassembling the Operation Panel



Removing procedure for the bottom case of the Operation Panel

7	D6MASS006-A	D6_DP-LCD-COVER-ASSY
6	D6MASS003-A	D6_DP-TOP-COVER-ASSY
5	D6MASS002-A	D6_DP-BASE-COVER-ASSY
4	3024A000063	D6_HARNESS-HOLD-PLATE
3	1515STL0001	TAPPING-SCREW2-PH-WA-M3L6-NI
2	1512STL0006	TAPPING-SCREW2-PH-M3L8-NI
1	1502MPZ0308	MACHINE-SCREW-PH-M3L8-NI

4.6 Removing the LCD Panel Cover of the Operation Panel

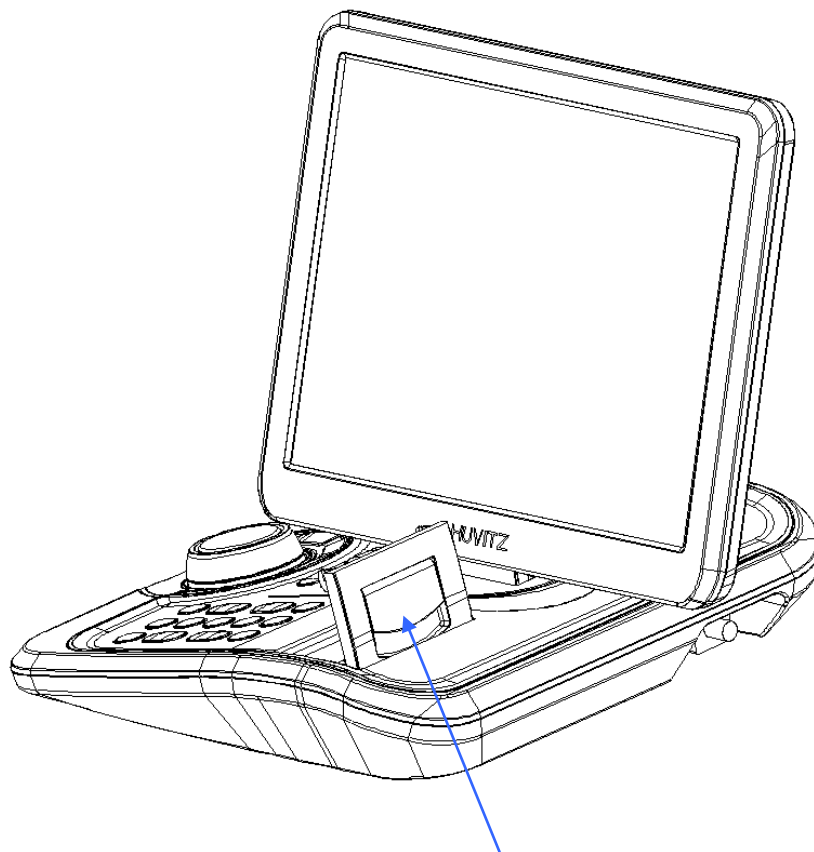


12	G3EPCB4001-A	PCB-ASSY-ROTOUCH-100
11	7202LGRCLH3-A	LCD-GRAPHIC-TOUCH-SCREEN
10	3099A000046	D6_HINGE_22
9	2000MS00065	D6_OP-HINGE-COVER2
8	2000MS00064	D6_OP-HINGE-COVER1
7	2000MPR0068	D6_OP-LCD-FRONT-COVER
6	2000A001186	D6_OP-LCD-BACK-COVER
5	2000A001185	D6_OP-LCD-HINGE-COVER
4	1512STL0007	TAPPING-SCREW2-PH-M2.6L8-NI
3	1502STL0009	MACHINE-SCREW-PH-M2.6L6-NI
2	1502STL0006	MACHINE-SCREW-PH-M2L10-NI
1	1030MP00301	D6_OP-HINGE-LCD-BRACKET

4.7 Replacing Printing Paper

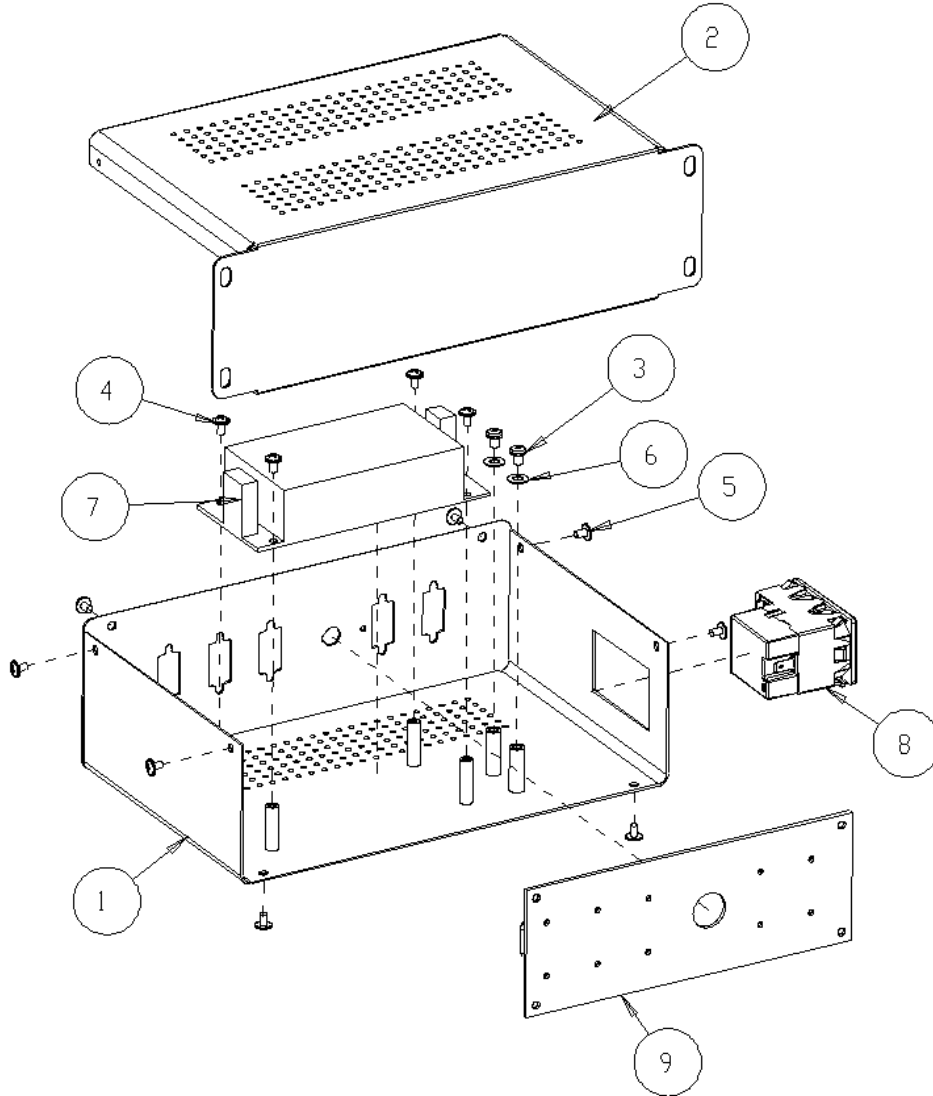
Replace the roll of printing paper as soon as possible after the red line appears on the paper according to the procedure below:

- Tilt the LCD monitor 90° degree to open the printer cover.
- Pull the opening lever on the printer cover.
- Pull the remaining paper out.
- Load a new roll of paper into the printer case.
- Check the printing side (smooth side must face upside)
- Pull out the end edge of the paper from the printer cover slot and close the cover.



Opening Lever of the Printer

4.8 Disassembling the Junction Box

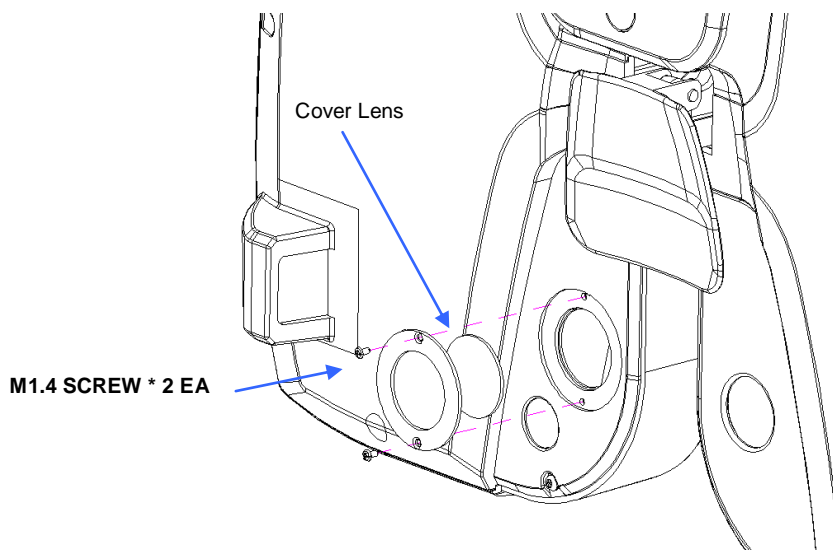


9	D6PCB0009	PCB-ASSY-RJB-800
8	790500A0002	INLET-SWITCH
7	7501P□W0002	SMPS-RPS-60-15
6	1566STL0002	STAR-WASHER-M4
5	1515STL0001	TAPPING-SCREW2-PH-WA-M3L6-NI
4	1503STL0018	MACHINE-SCREW-PHW-M3-L6
3	1502STL0041	MACHINE-SCREW-PH-M4L5-NI
2	1020MS00004	D6_JUNCTION-BOX-COVER
1	1020MS00003	D6_JUNCTION-BOX

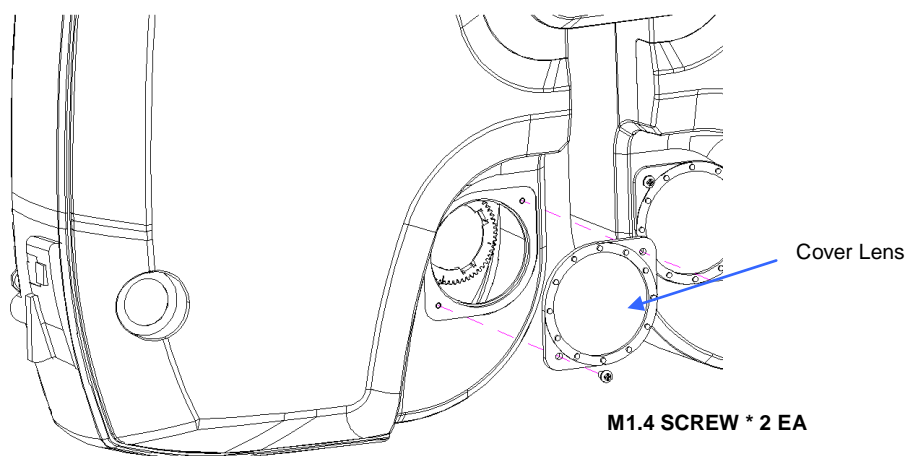
4.9 Cleaning the Lenses in the Refractor Body

HDR-9000 Digital Refractor is designed to allow service engineers cleaning the lenses inside for maintenance. To clean the lenses in the Refractor Body, just follow the sequence below.

- (1) Remove the cover glasses from both the patient's and the examiner's side so that a service engineer have access to the internal lenses. Before unscrew bolts from the test window, clean your work desk and cover it with wide paper of texture so that you don't miss the tiny bolts from the test windows.



<Patient's Side>



<Examiner's Side>

- (2) Check the connection and turn on the Digital Refractor. If it has no problem during its initialization sequence, proceeds to the next cleaning procedure.
- (3) Execute the Engineer Menu mode on the Operation Panel. Refer to appendix for detailed information about entering and operating functions of Engineer Menu mode.
- (4) Execute the Lens Check function in the Engineer Menu mode. Refer to appendix for detailed information about operating Lens Check function.



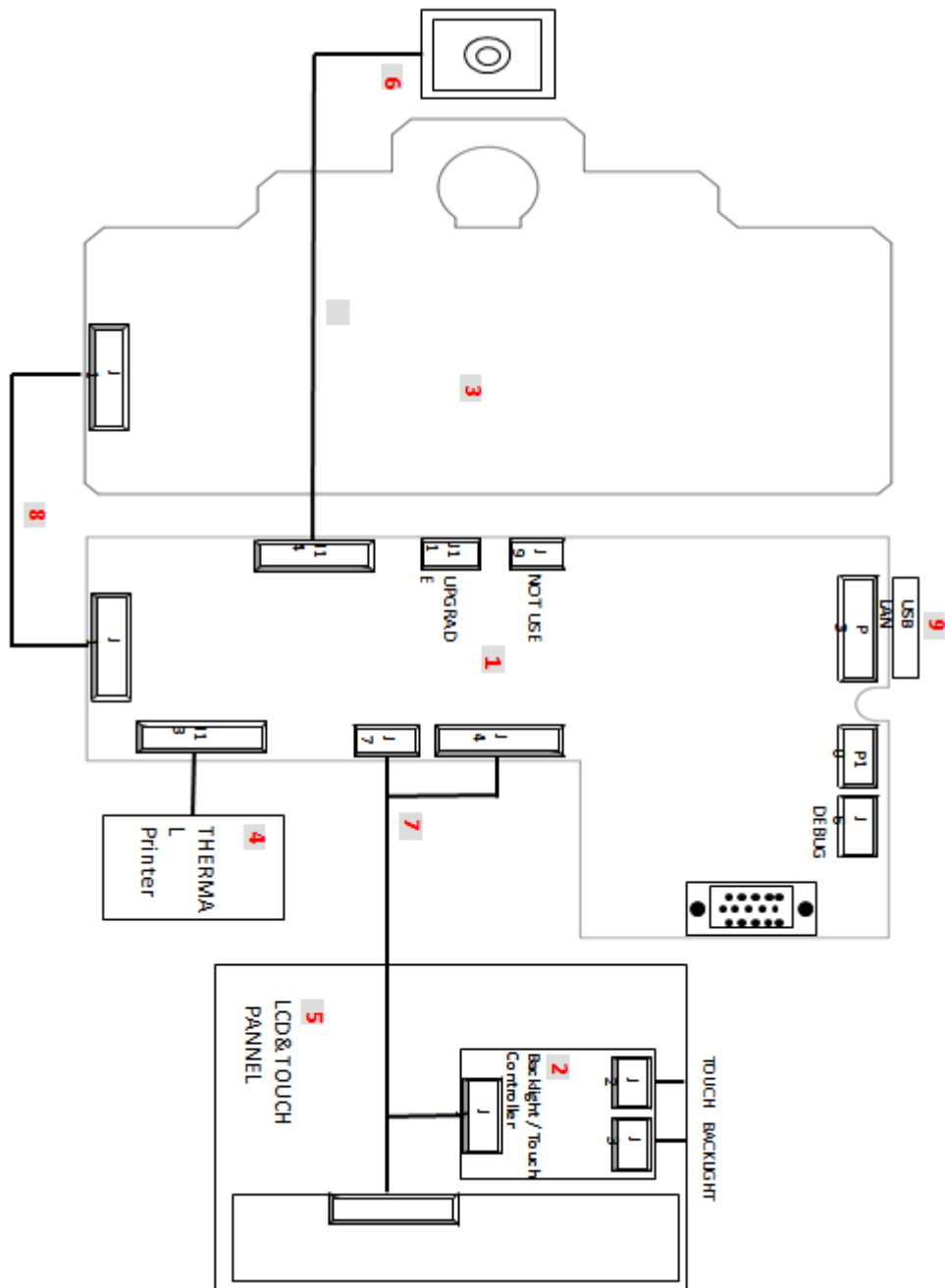
- (5) Insert lenses one by one and clean it both the front and the rear side by using alcohol swabs with a handle. While cleaning lenses, touch the lenses softly with care so that they don't fall off from lens disks.
- (6) After completing cleaning lenses, turn off the power and assemble the cover glasses to the test window.

5. Trouble shooting

5.1 Wiring Diagram and Board Description

5.1.1 Operation Panel

- Wiring Diagram

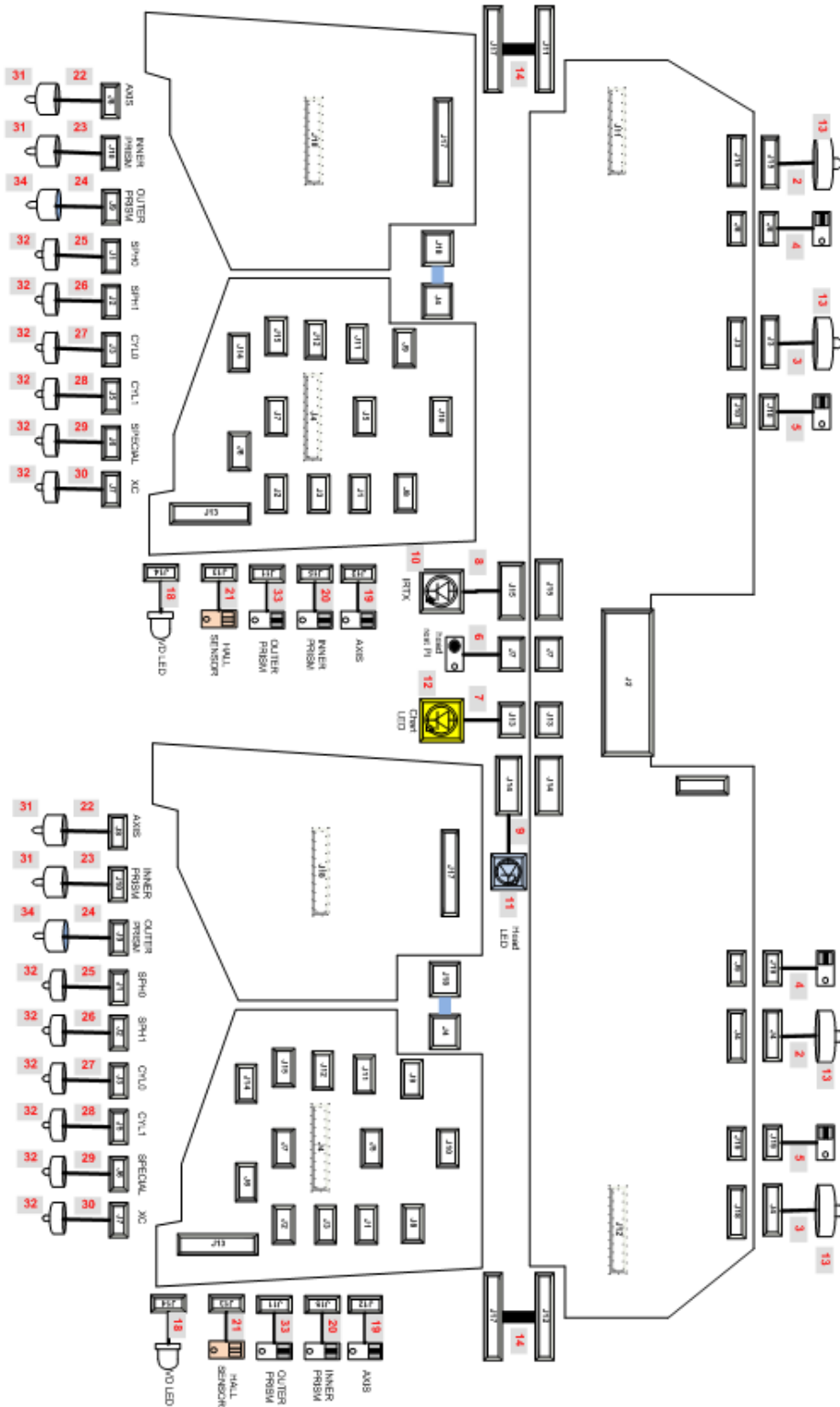


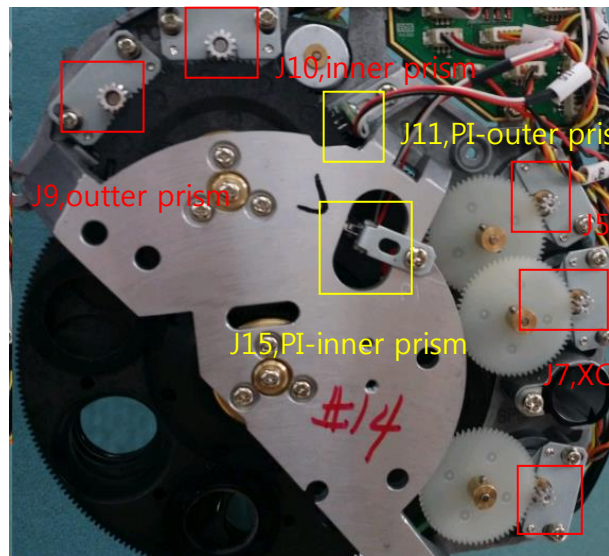
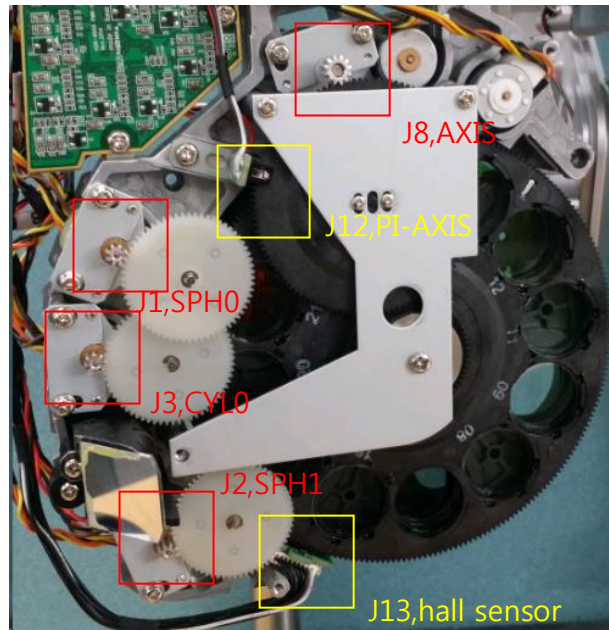
● Board Description

Item	QTY	Code	Description	Remarks
1	1	D6EPCB0006-AA	PCB ASSY	D6, OP MAINBOARD, ROBASE-100
2	1	D6EPCB0008-AA	PCB ASSY	D6, OP LCD TOUCH BOARD, ROTOUCH-100
3	1	D6EPCB0007-AA	PCB ASSY	D6, OP SWITCH BOARD, ROSWITCH-100
4	1	6400TPH0641-A	TPH(THERMAL PRINTER HEAD)	SMP640UG
5	1	7202LGRCLH3-B	LCD MONITOR	CLAA104XA02CW(CPT), H3104A- HDN3D62
6	1	6440ERO205B-A	ENCODER	REC16D25-205-B, Jog Dial
7	1	D6EHAR0001-AA	HARNESS ASSY	OP LCD HINGE ASSY
8	1	D6EHAR0006-AA	HARNESS ASSY	HARNESS(OP KEYPAD)
9	1	7999S000010-A	USB LAN DONGLE	TL-WN725, USB LAN CARD

5.1.2 Refractor Body

- Wiring Diagram





J6, SPECIAL

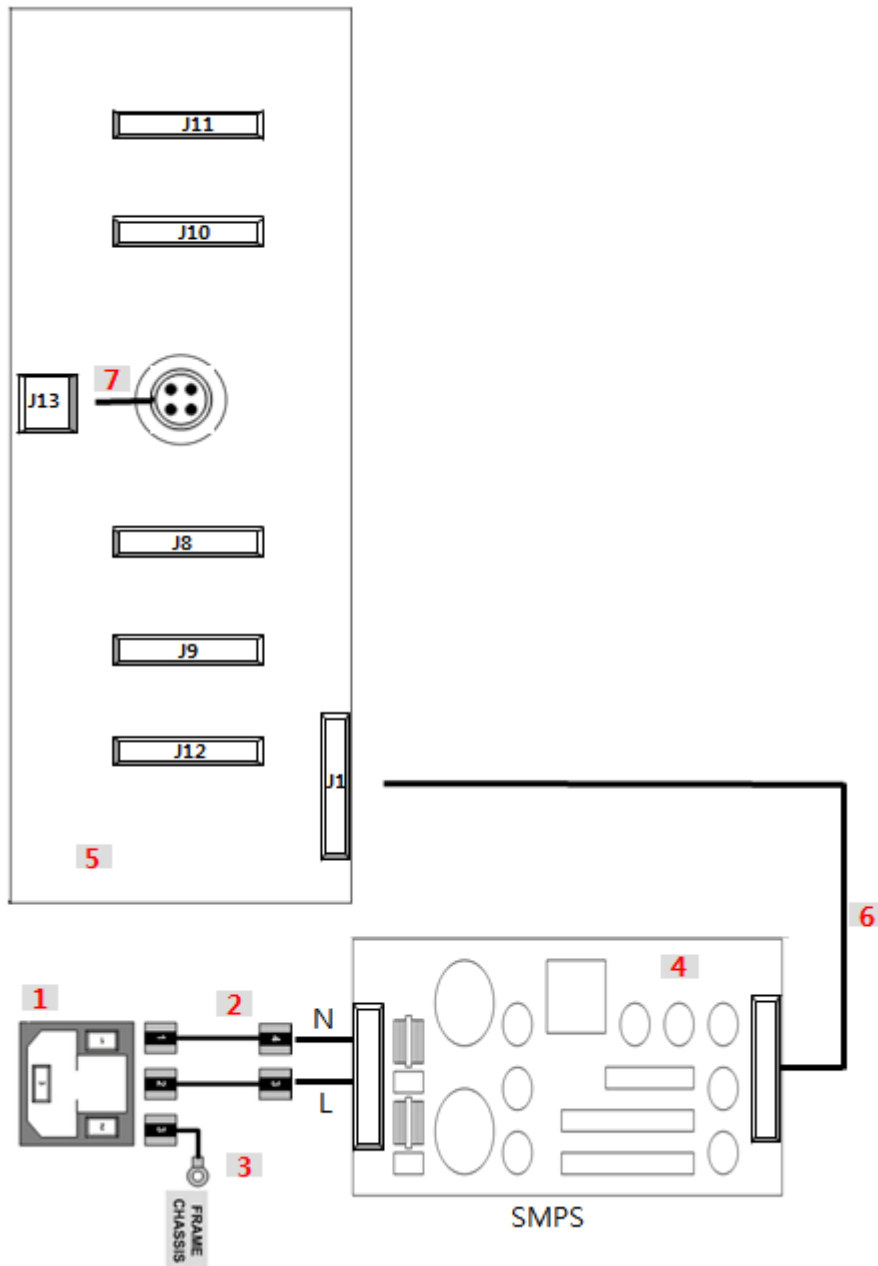
● Board Description

Item	QTY	Description	Remarks
1	1	PCB ASSY	REFRACTOR BODY HEAD (RBH-100)
2	2	HARNESS ASSY	STEP MOTOR-PD
3	2	HARNESS ASSY	STEP MOTOR-TILT
4	2	HARNESS ASSY	PI-PD
5	2	HARNESS ASSY	PI-TILT

6	1	HARNESS ASSY	FOREHEAD CHECK LED
7	1	HARNESS ASSY	CHART LED
8	1	HARNESS ASSY	IR TRANSMIT LED
9	1	HARNESS ASSY	PI-FOREHEAD-CHECK
10	1	PCB ASSY	INFRA RED BOARD (IRB-002)
11	1	PCB ASSY	BLUE LED BOARD (BLUE-V101)
12	1	PCB ASSY (BPLED-100)	POWER LED BOARD, W222, BPLED-100
13	4	MOTOR(STEP)	25BY48L
14	2	HARNESS ASSY	HEAD TO MOTOR BOARD
15	1	PCB ASSY	REFRACTOR BODY UPPER LEFT (RBM-UL-100)
16	1	PCB ASSY	REFRACTOR BODY LOWER LEFT (RBM-LL-100)
17	1	PCB ASSY	REFRACTOR BODY UPPER RIGHT (RBM-UR-100)
18	1	PCB ASSY	REFRACTOR BODY LOWER RIGHT (RBM-LR-100)
19	2	PCB ASSY	HALL SENSOR BOARD (HSB-002)
20	2	HARNESS ASSY	VD LED
21	2	HARNESS ASSY	PI-AXIS
22	2	HARNESS ASSY	PI-INNER-PRISM
23	2	HARNESS ASSY	HALL SENSOR
24	2	HARNESS ASSY	STEP MOTOR-AXIS
25	2	HARNESS ASSY	STEP MOTOR-INNER-PRISM
26	2	HARNESS ASSY	STEP MOTOR-OUTER-PRISM
27	2	HARNESS ASSY	STEP MOTOR-SYL-0
28	2	HARNESS ASSY	STEP MOTOR-SYL-1
29	2	HARNESS ASSY	STEP MOTOR-CYL-0
30	2	HARNESS ASSY	STEP MOTOR-CYL-1
31	2	HARNESS ASSY	STEP MOTOR-SPECIAL
32	2	HARNESS ASSY	STEP MOTOR-XC
33	6	MOTOR(STEP)	15BY45-63-G
34	12	MOTOR(STEP)	15BY45-62
35	2	HARNESS ASSY	PI-OUTER-PRISM

5.1.3 Junction Box

- Wiring Diagram



● Board Description

Item	QTY	Description	Remarks
1	1	INLET(SWITCH)	KMF1.1163.11 with FUSE / SWITCH
2	1	HARNESS ASSY	D6, HDR-9000 Inlet to SMPS
3	1	HARNESS ASSY	D6, JB Inlet to Earth
4	1	SMPS	RPS-60-15, Meanwell
5	1	PCB ASSY	D6, JUNCTIONBOX BOARD
6	2	HARNESS ASSY	D6, JB SMPS to Junction Board
7	1	HARNESS ASSY	JUNCTION - JB LCAN 1 / D1 공용

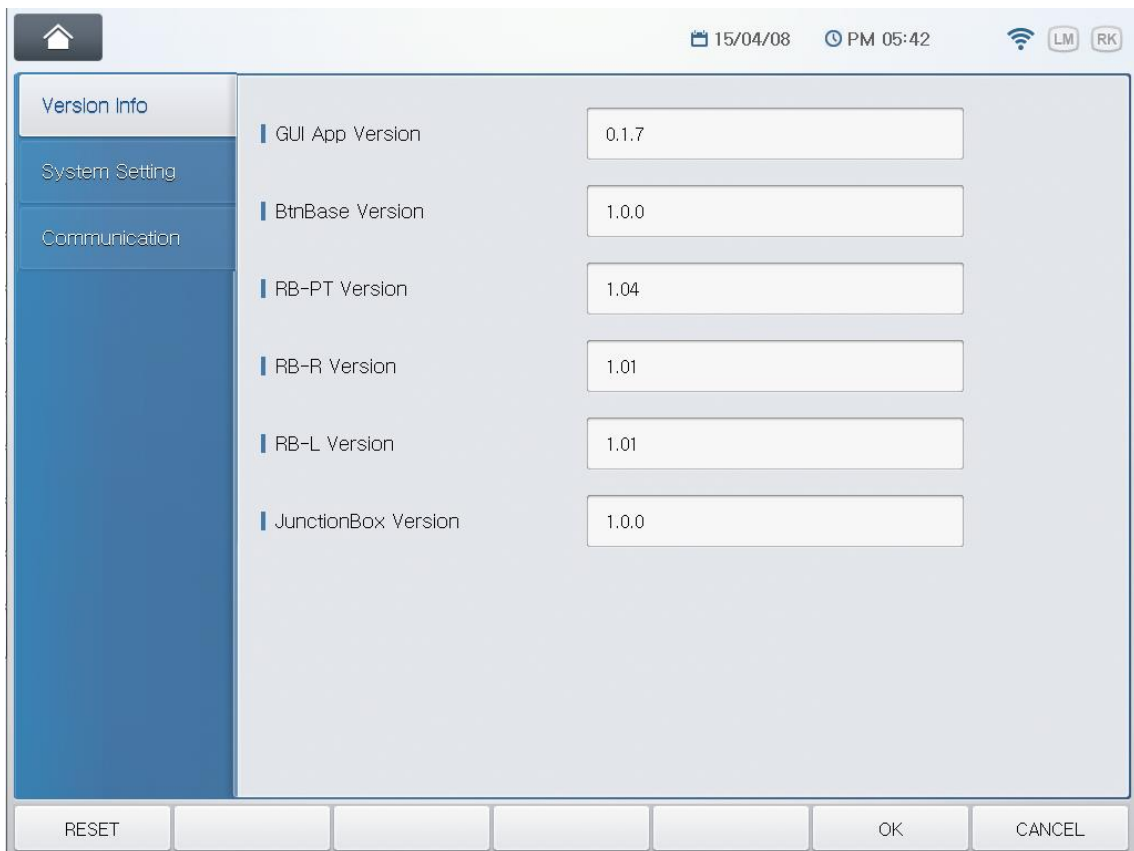
Appendix

A. Checking Software Versions

HDR-9000 Digital Refractor consists of 6 different units, three units in Refractor Body, two units in Operation Panel and one unit in Junction Box. The Refractor Body includes PD & Tilting unit, right-hand lens unit, and left-hand lens unit. The Operation Panel includes button & communication unit and main GUI unit. The Junction Box includes communication unit. Each unit is controlled and operated by own operating system software. You can get the version information of all five units in the menu of the Operation Panel.

To evoke the version information in the menu, follow the sequence below.

- Press 'Settings' button on the display with SHIFT button on the Operation Panel.
- Touch "Version Info" menu on the display.



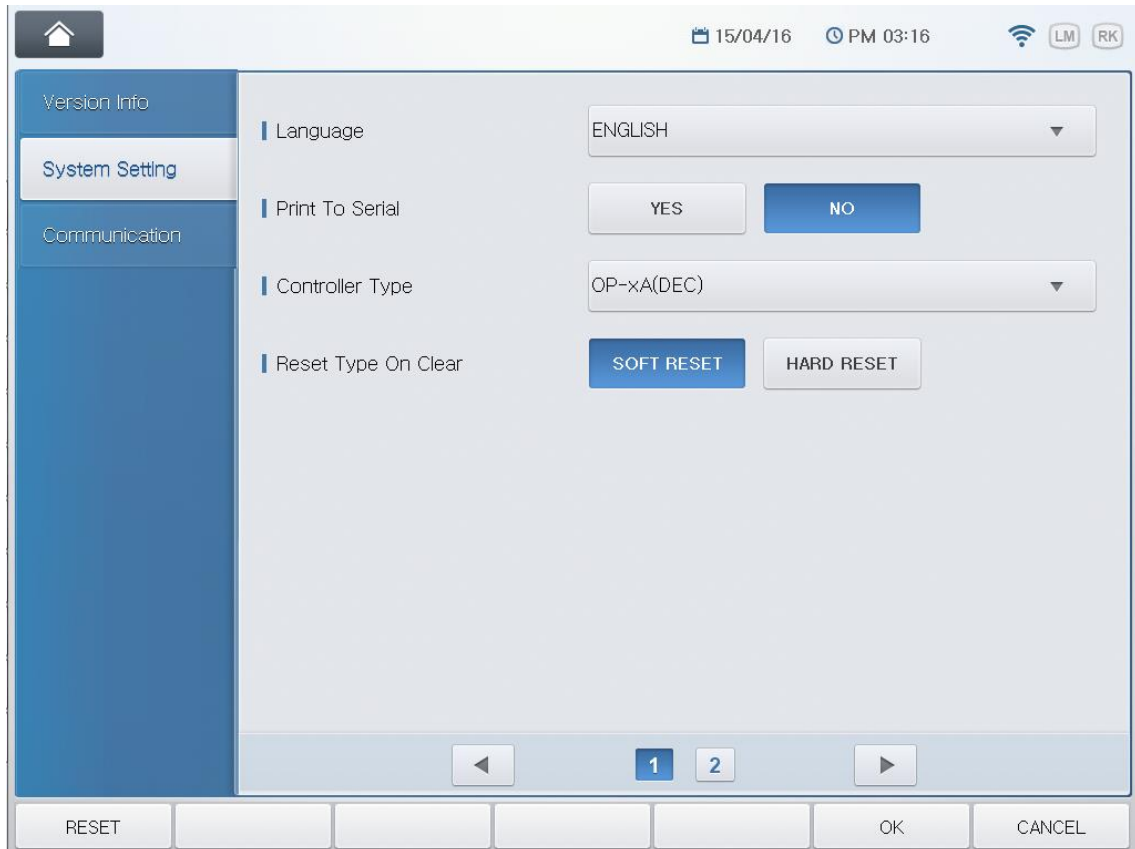
The version information on the display means below.

- GUI App Version : software version of main GUI unit of the Operation Panel
- BtnBase Version : software version of button and communication unit of the Operation Panel
- RB-PT Version : software version of PD & Tilting unit of the Refractor Body
- RB-R Version : software version of right-hand lens unit of the Refractor Body
- RB-L Version : software version of left-hand lens unit of the Refractor Body
- JunctionBox Version : software version of communication unit of the Junction Box

If a version number is displayed “?”, it means that the unit is not communicating with the Operation Panel properly. In this case, reset the power of the whole system and retry checking the version information.

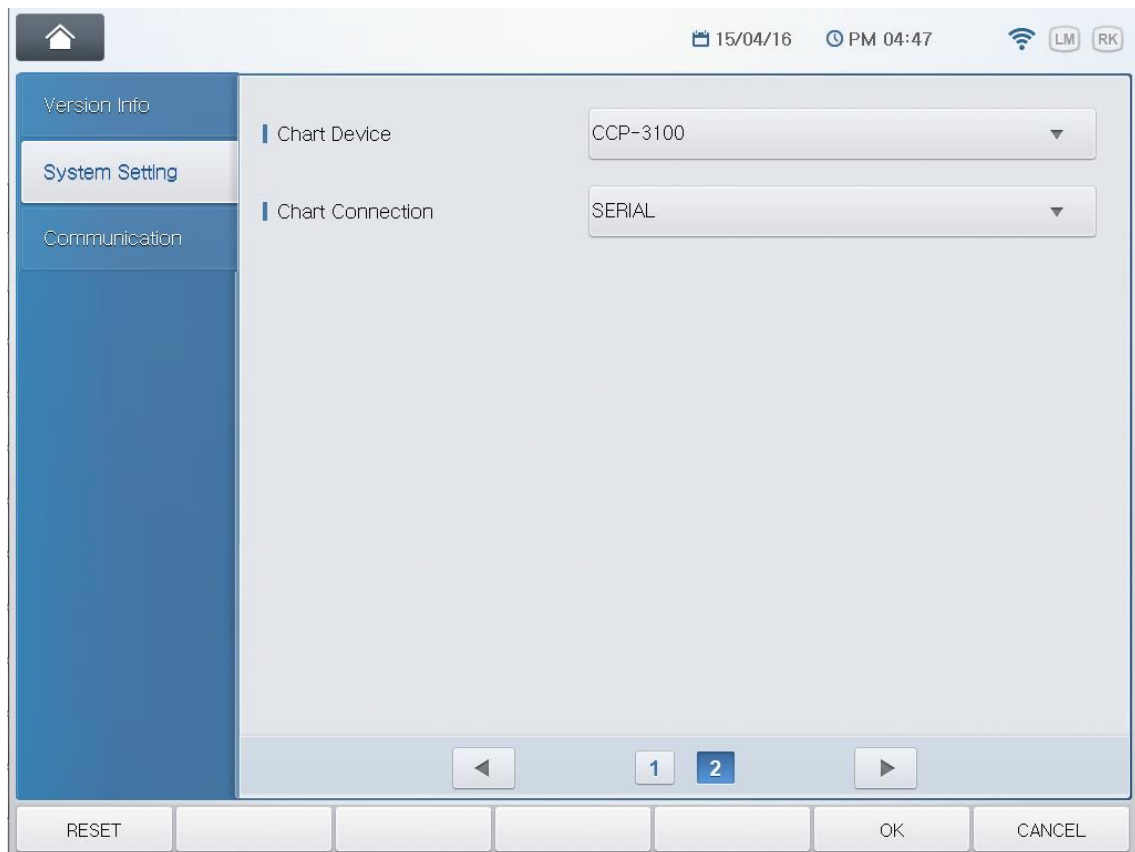
B. System Setting

HDR-9000 Digital Refractor provides to aid the user or the engineer who installs the system to set up some basic and crucial system parameters.



The system parameter divided two pages and provides 6 parameters to setting-up.

- Language
- Print To Serial (Whether to use PC interaction or not)
- Chart notation (decimal / feet / meter) & Controller type
- Reset Type On Clear
- Chart device
- Chart connection type (serial / IR)



(1) Setting chart device

Select the chart device name which is connected to the Digital Refractor. Then touch the “Proceed” icon on the dialog box.

(2) Setting chart connection type (serial / IR)

Select how the chart device is connected and interfaced with the Digital Refractor. Then touch the “Proceed” icon on the dialog box.

The option list is consisted depending on the chart device type selected in the previous step. For example, if CCP-3100 is selected for chart device, option list in this step would include “SERIAL” only. SERIAL is for wired connection and IR-CH* is for wireless connection and the number at the end is the channel number which should be identical to that of the chart device.

(3) Setting chart notation (decimal / feet / meter) & Controller type

Select the type of chart device and controller type which is connected to the Digital Refractor. Then touch the “Proceed” icon on the dialog box. The chart type should also be identical to that of chart device.

The option list is consisted depending on the chart device type selected in the first step. For example, if CDC-4000 is selected for chart device, option list in this step would not include CN and R type as CDC-4000 does not support these types.

(4) Setting whether to use PC interaction or not

Select whether to interface the Digital Refractor with PC or not. PC interface is provided by a special option package named HDRMate. Then touch the “Proceed” icon on the dialog box.

Setting it to YES would turn on transferring examination result to PC via HDRMate communication package.

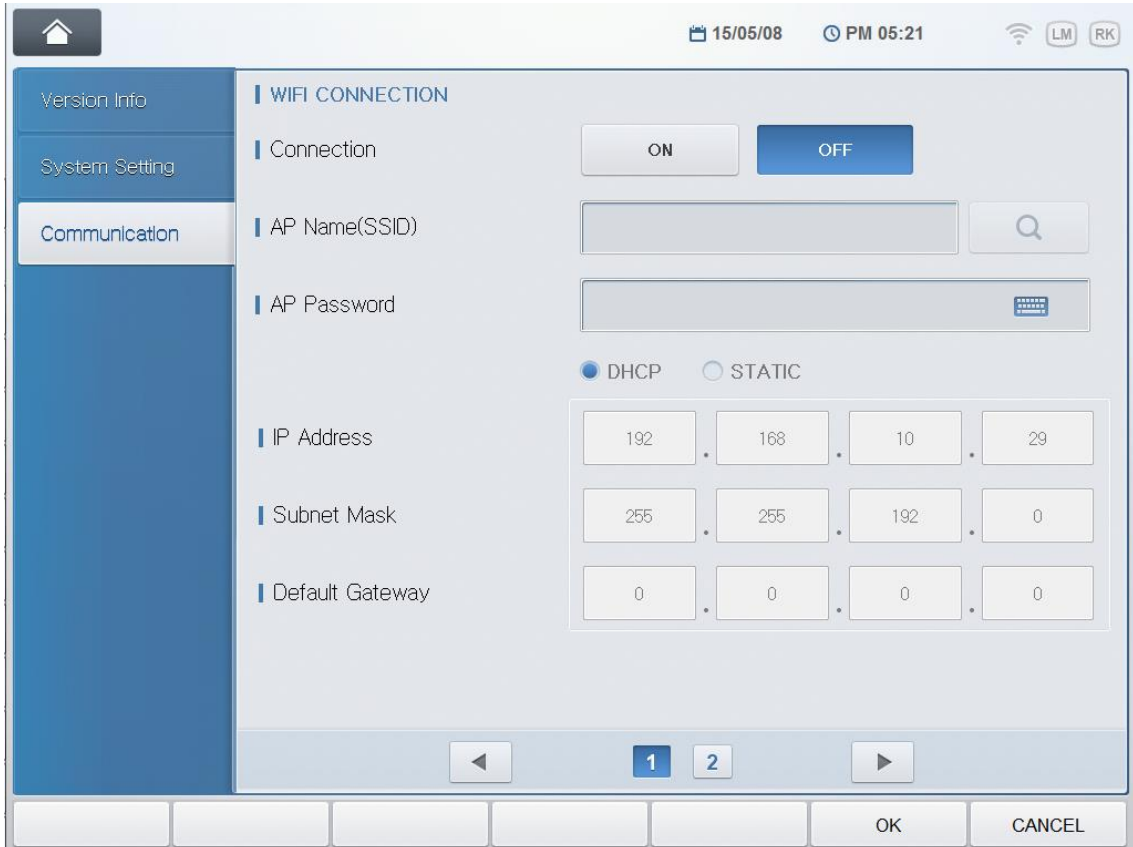
(5) Checking and saving the results

This final step is to confirm the results from previous steps and to save the results. If you’re sure all the information selected for system parameters are correct, touch the “SAVE” button on the display. Otherwise touch the “EXIT” button – this will trigger the initial setup wizard again when the system is turned on next time.

It’s also possible to reconfigure the system parameters in “System Settings” menu without the aid of the initial setup wizard.

C. Communication

HDR-9000 Digital Refractor provides to aid the user or the engineer who installs the system to set up the communication parameters for wifi and serial connection.



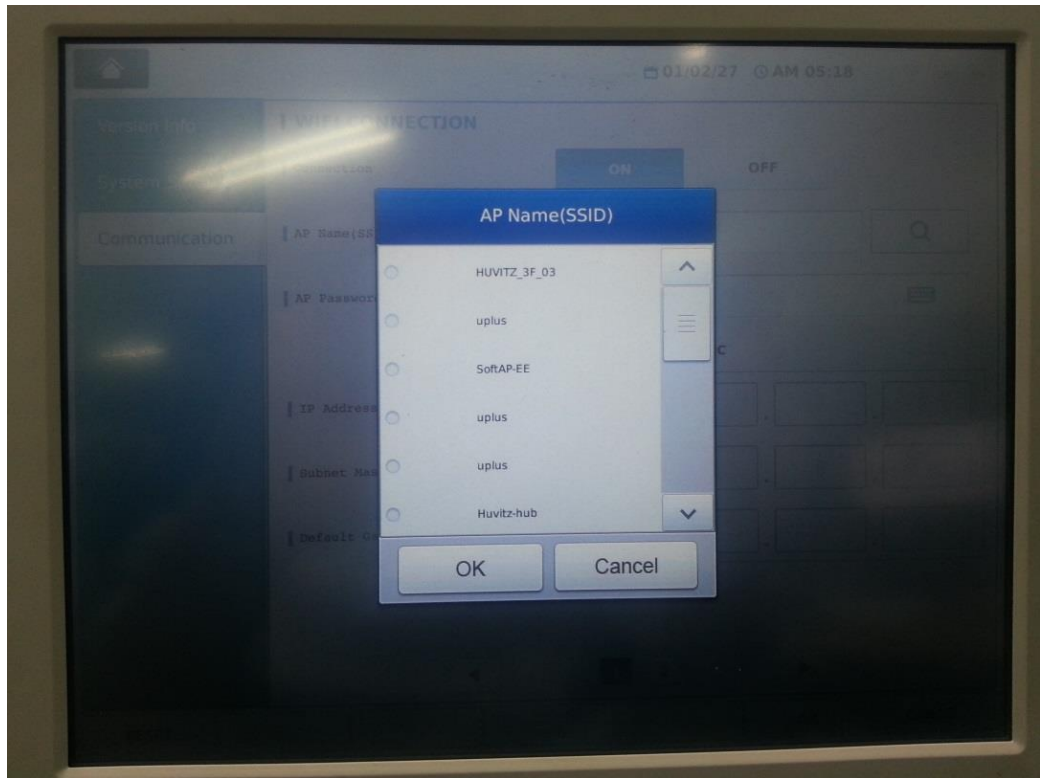
The communication parameters divided two pages. 1page is about the wifi connection and 2page is about the serial connection.

- **WIFI CONNECTION**

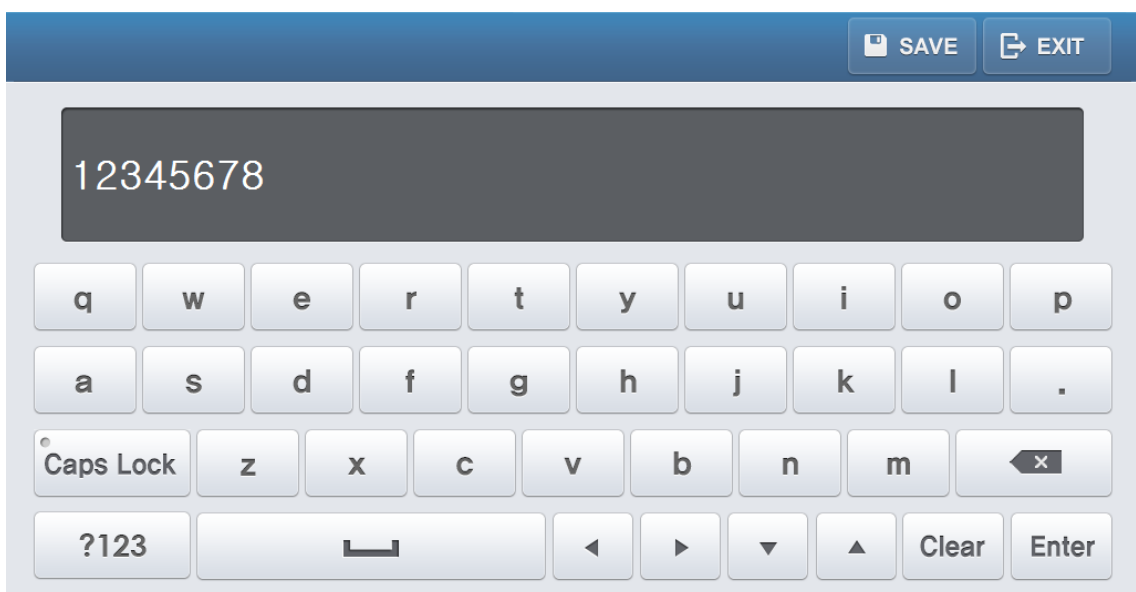
It is possible to select to turn on or off the product's wifi function by utilizing the ON, OFF at the Connection part. If set with DHCP, set the two, Ap Name(SSID) and AP Password below, and press OK to complete setting. When OK is selected, function is operated when the following value is set.

Function key at the lower part of the screen gets modified when product button's shift is pressed on after selecting ON. Select the "wifi apply" button, the second button from the left to save setting to either ON or OFF.

AP Name(SSID) part is the part that selects the access point for the wifi to connect with, and the name of the wireless router that is used normally. The following pop-up screen appears when the Find button on the right is pressed on, and user can see the list that can be selected presently.

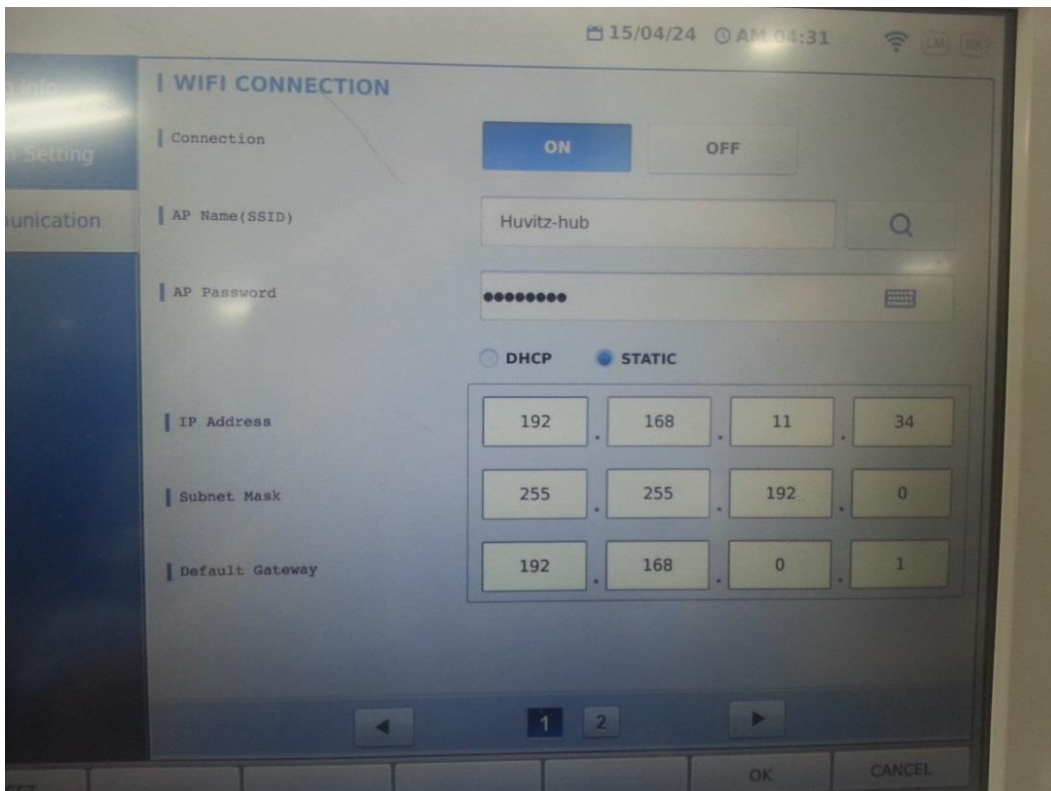


AP Password part sets the ap's password set above. Virtual keyboard pops up when user touches screen's Edit box.



Virtual keyboard's UI is as shown on the above diagram. It is possible to enter the necessary value by touching the screen. To save the value, press on the "SAVE" button at the upper part of the keyboard's right side. When "EXIT" is pressed on, it ends without getting saved.

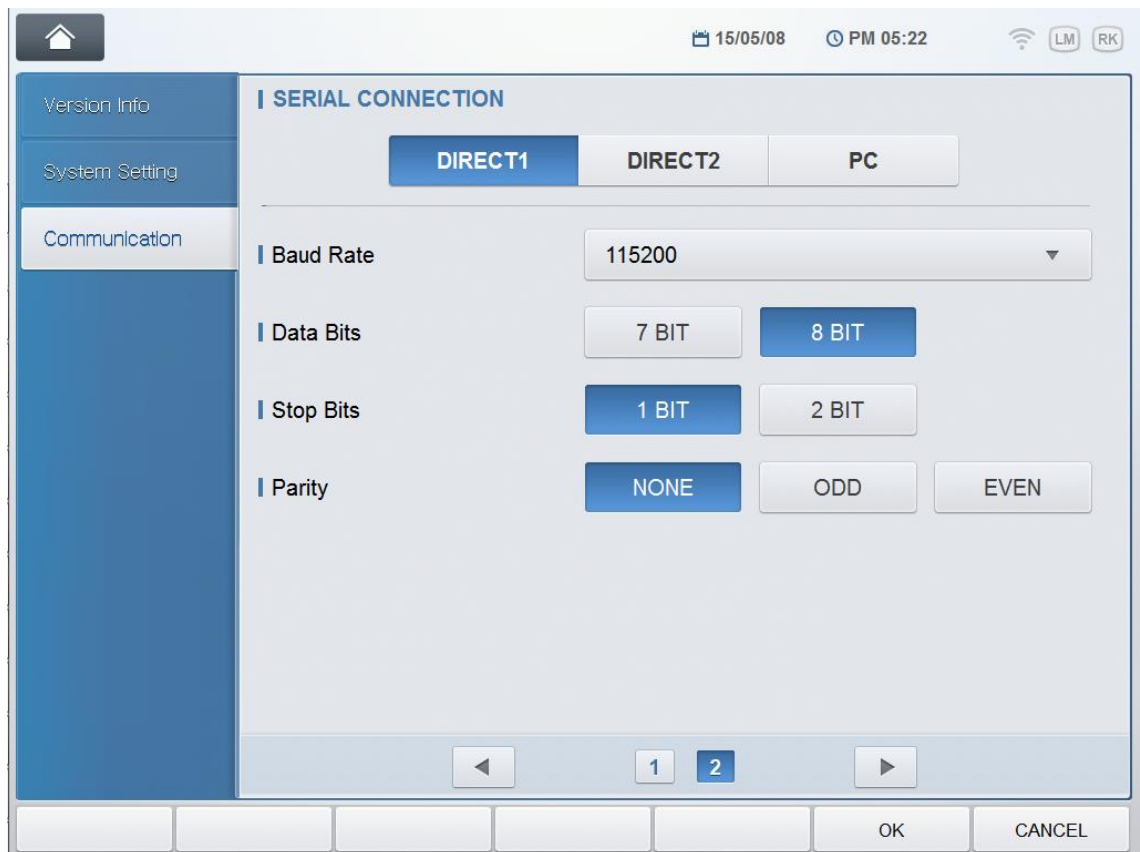
The below IP Address, Subnet Mask and Default gateway are the detailed setting that is vitalized when the connection part setting is "ON" and when set static.



Virtual keyboard pops up when user touches the box with set value to modify the value.

When all the settings are completed, exit the setting by pressing once again on the "wifi apply" button explained above or by pressing on the "OK" button situated on the right side of the screen.

Seconds are needed since it takes time to modify and to save the file, described above and to save the setting while exiting the screen.



- **SERIAL CONNECTION**

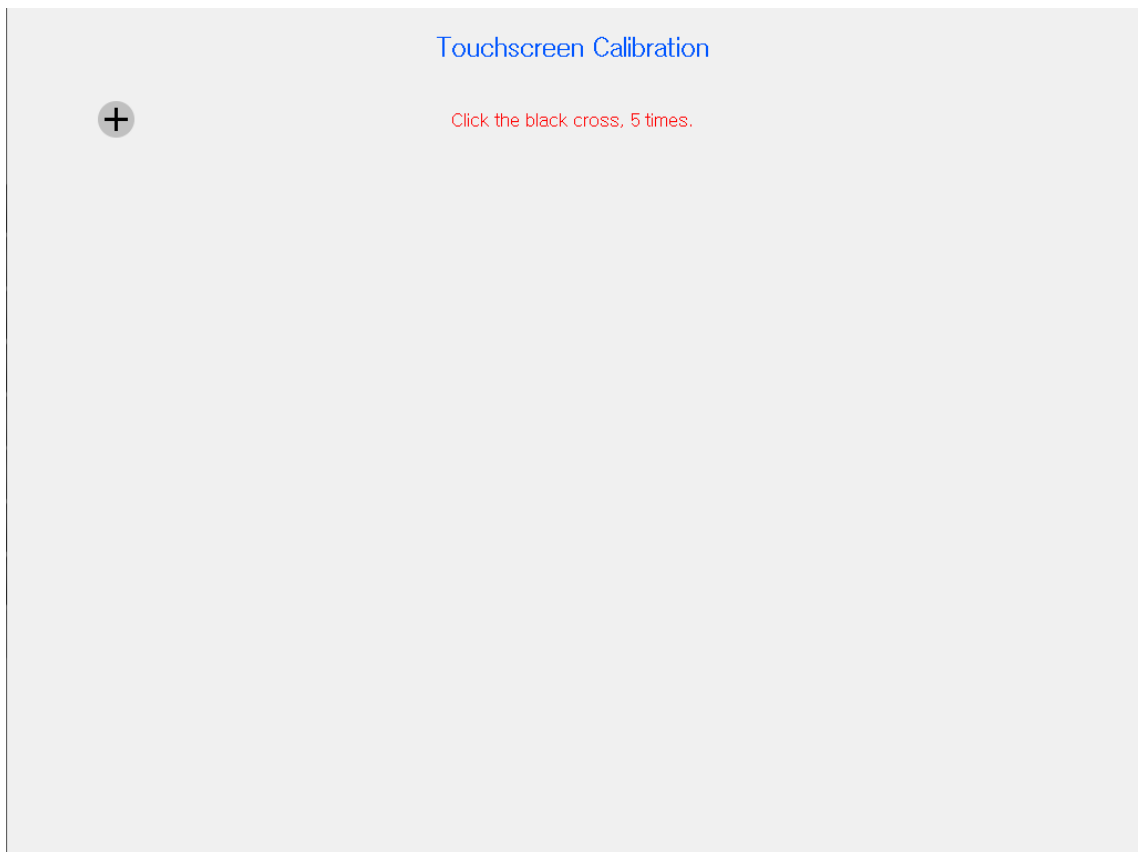
It is possible to configure parameters of each serial ports. Actually, it is for the direct ports of the junction box. According to the configuration of each ports, direct1, direct2, and pc, it is able to communicate with other devices(RK, LM,..) as their serial configuration.

D. Calibrating Touch Pad

If the touch position is not recognized correctly, you should calibrate it. To execute the calibration function, follow the sequence below.

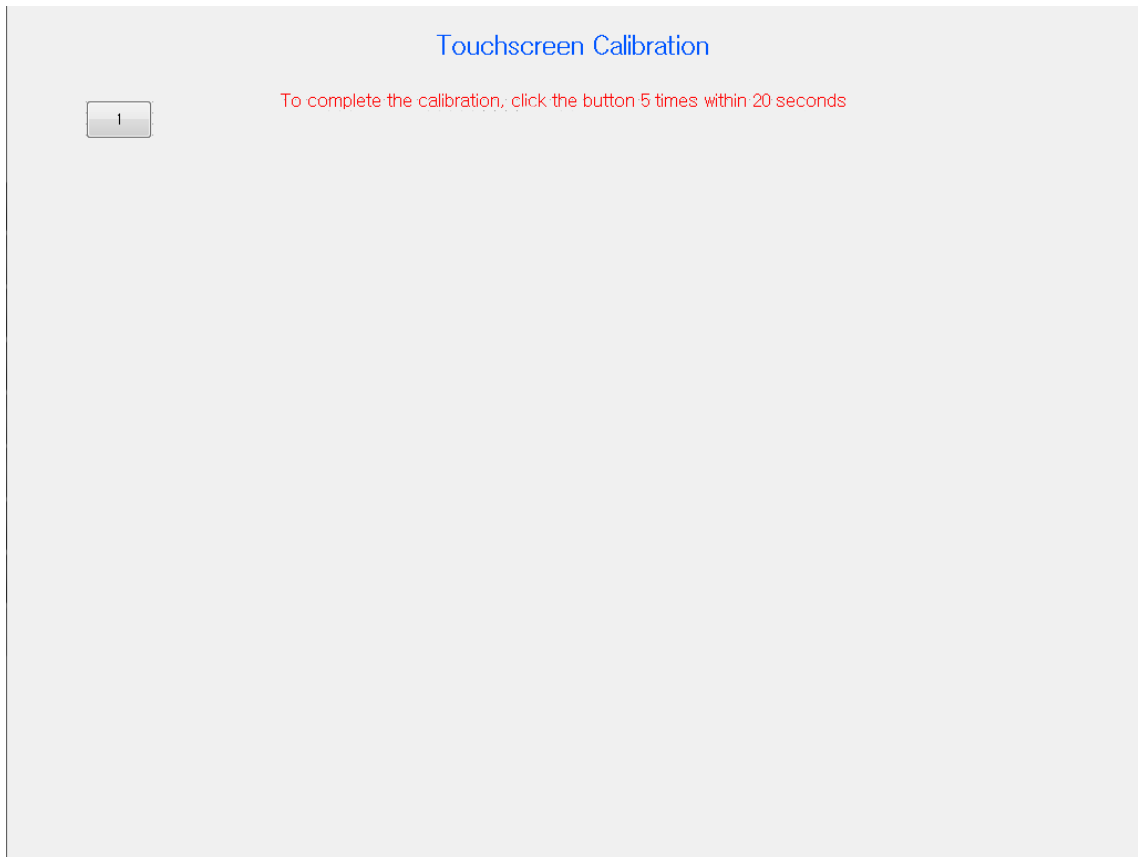
- Press TEST button with ALT button on the Main Menu screen.

If and when it is hardly possible to execute the touch calibration function, we placed into the function on the Main Menu screen. The only press TEST with ALT button to execute the calibration function.



[Guide Mark]

To calibrate the touch position, you have to make five times of input on the touch pad by targeting and touch the guide mark. You have to touch the center of the guide mark as possible as you can to complete calibration with precision.



[Confirm Screen]

When you complete inputting five times, it displays the button five times. To complete the calibration, You have to click the button five times within 20 seconds. Otherwise go back to the previous screen(Guide mark). Pressing both the five buttons within 20 seconds, it complete the touch calibration.

E. Using Engineer Mode

(1) Entering The Mode

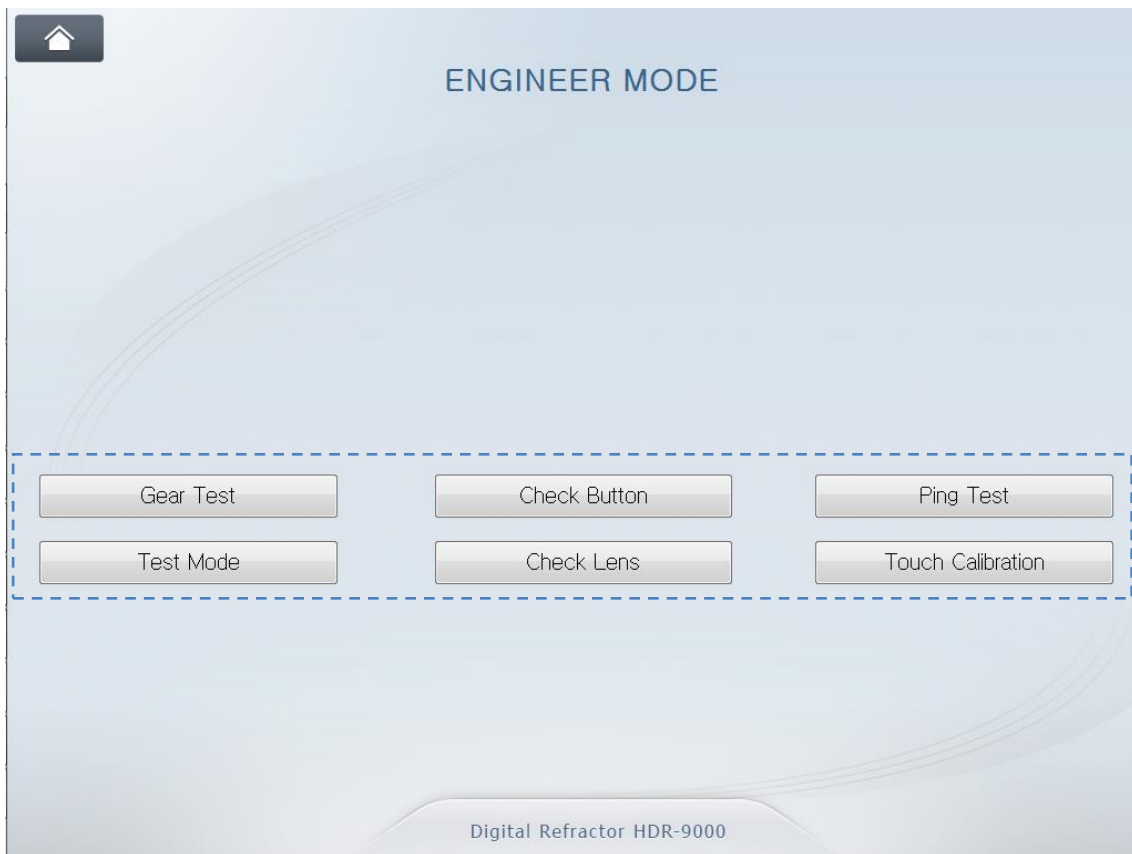
Before executing the Engineer Menu mode, close or exit other menu mode or dialog window, and make it in the main examination mode like below.



[Main Examination Mode]

Pressing buttons on the Operation Panel according to following sequence leads to entering the 'Engineer Mode'.

- ALT + MENU
- ALT + START
- ALT + TEST



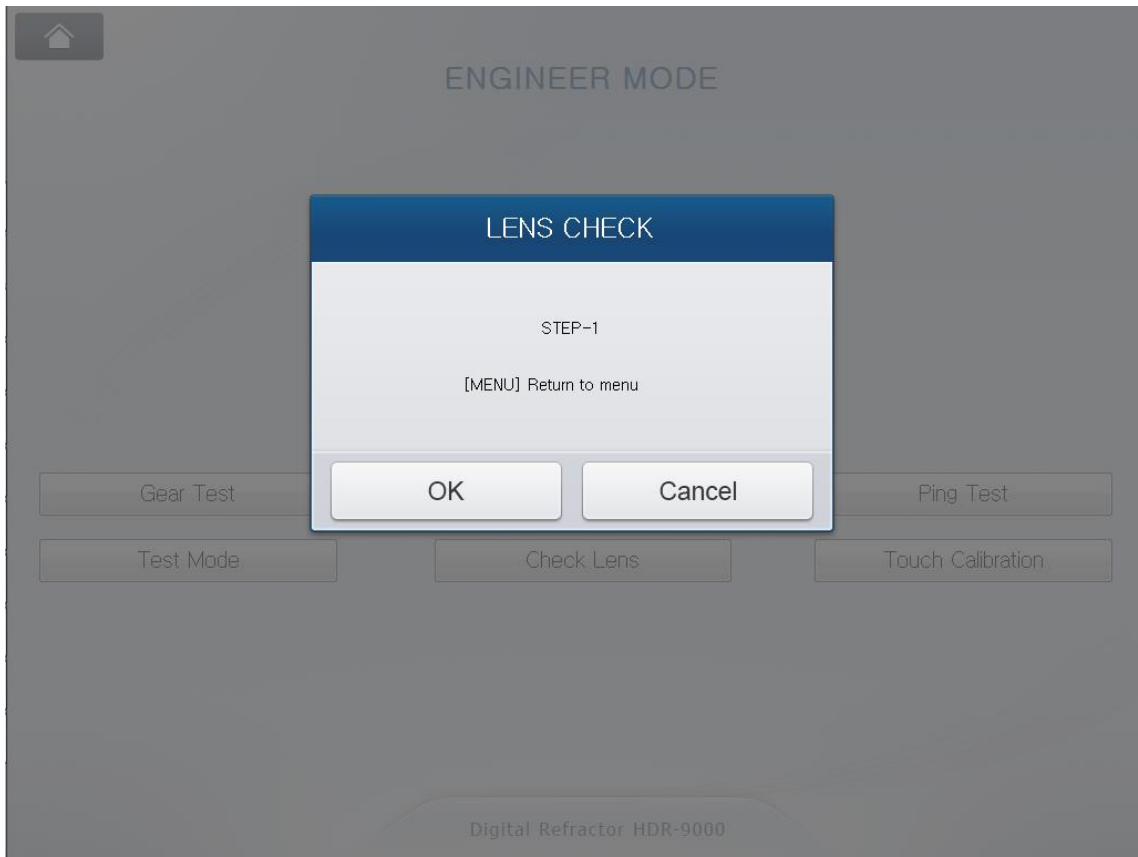
[Engineer Mode]

(2) Using Check Lens Function

This function is to aid service engineer checking the status or cleaning lenses in the Refractor Body by allowing it inserts lenses one by one and disk by disk. Touching the “CheckLens” button on the display executes the Lens Check function.




To end using this function and to return to the menu mode, press the MENU button on the keypad of Operation Panel or press OK/Cancel button on the display.

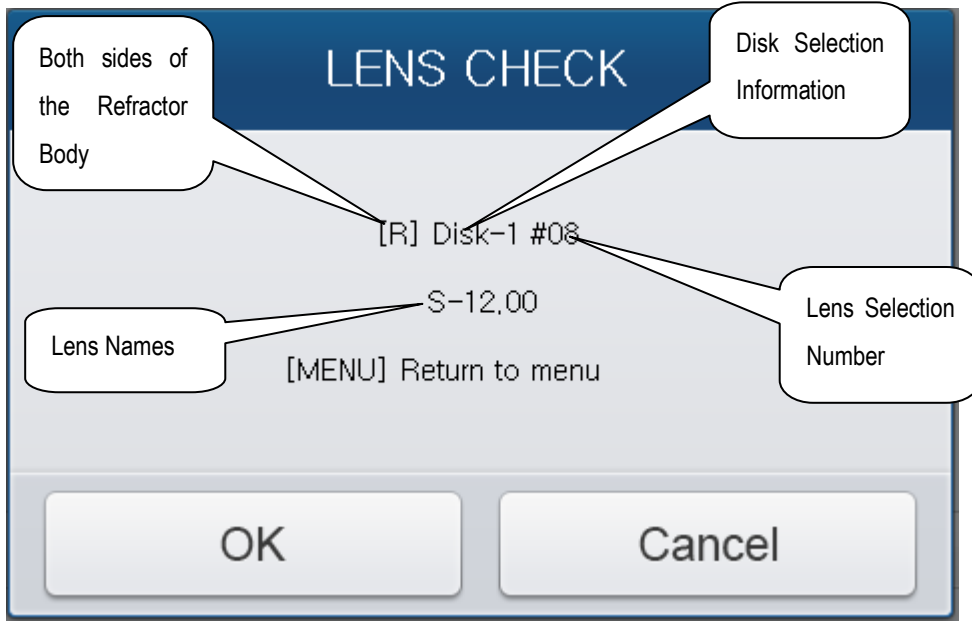




[Dialog box - Lens Check]

In this function mode, buttons for serving lens operation are like below.

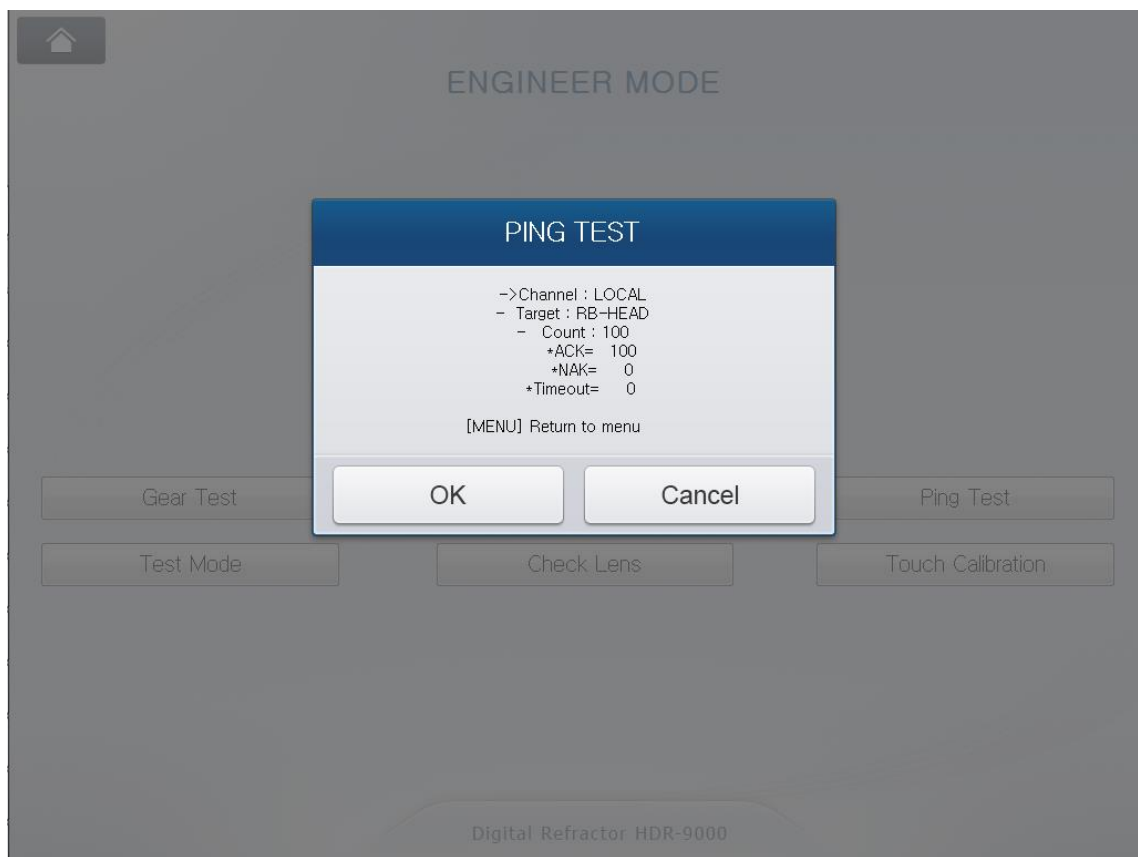
- 
: Select right or both or left Refractor Body
- 
: change disk selection
- 
(Dial) : changes lens selection



(3) Using Ping Test Function

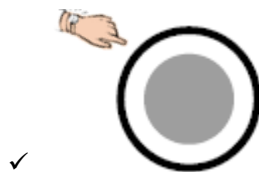
This function is to aid service engineer checking the status of communication between Operation Panel and other devices such as Refractor Body, chart. Touching the 'Ping Test' button on the display executes the Ping Test function for communication status check.

To end using this function and to return to the menu mode, press the MENU button on the keypad of Operation Panel or press OK/Cancel button on the display.





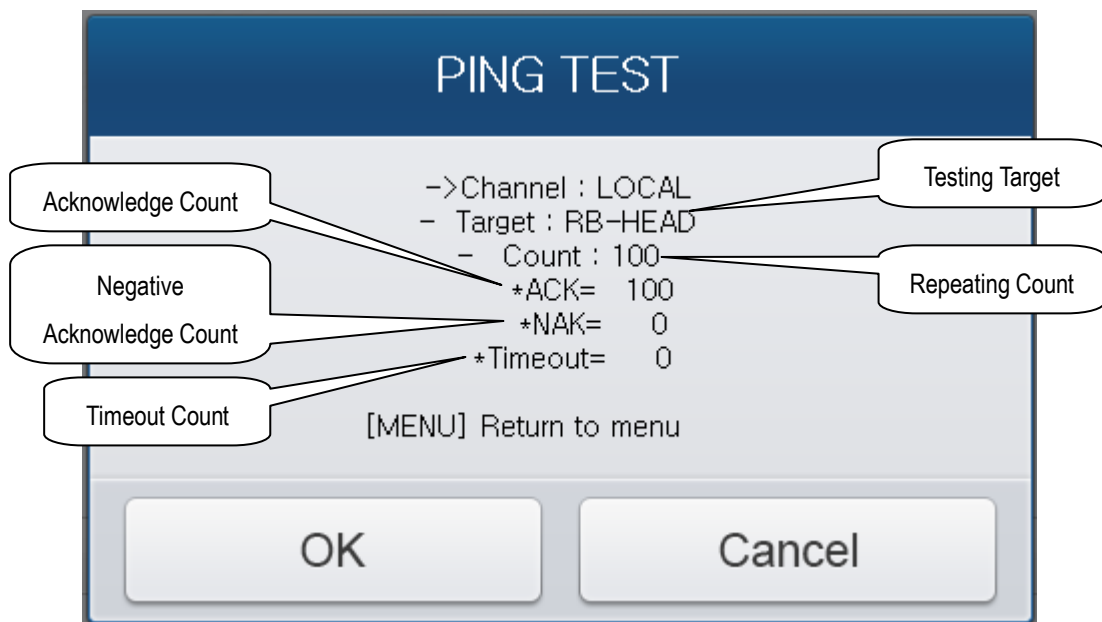
[Dialog box - Ping Test]

In this function mode, buttons for setting and executing a ping test are like below.



(Dial Click): selects test option 'Target' or 'Count'.

- ✓  (Dial) : changes option value.
- ✓  : start a ping test.

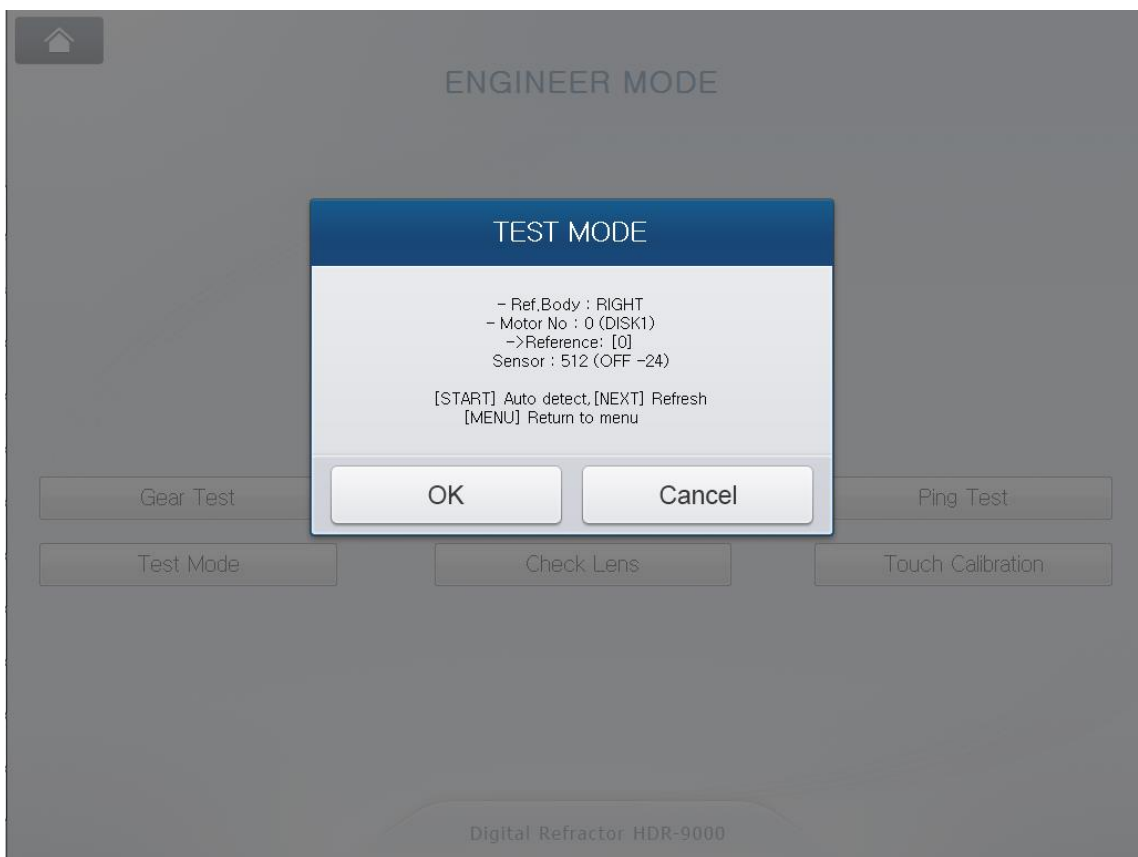


NAK or TIMEOUT gives the count information about how many times it failed communicating bi-directionally with a testing target. Incomplete connection of cable, electronic noise on any point in-between the path between Operation Panel and test target, unstable status of power supply, certain defect or damage in any circuitry may cause unsuccessful communication. So it is easier for service engineers to diagnose if a refraction system is in stable status or not in the view of data communication.

(4) Using Test Mode Function

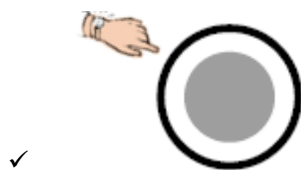
This function is to aid service engineer checking the status of sensors and the movement of motors in the Refractor Body. Touching the ‘Test Mode’ button on the display executes the Test Mode menu.

To end using this function and to return to the menu mode, press the MENU button on the keypad of Operation Panel or press OK/Cancel button on the display.





[Dialog box – Test Mode]

In this function mode, buttons for setting and executing a ping test are like below.



✓ (Dial Click): changes the selection of test option among

'Ref.Body', 'Motor No', 'Reference' and 'Sensor'.

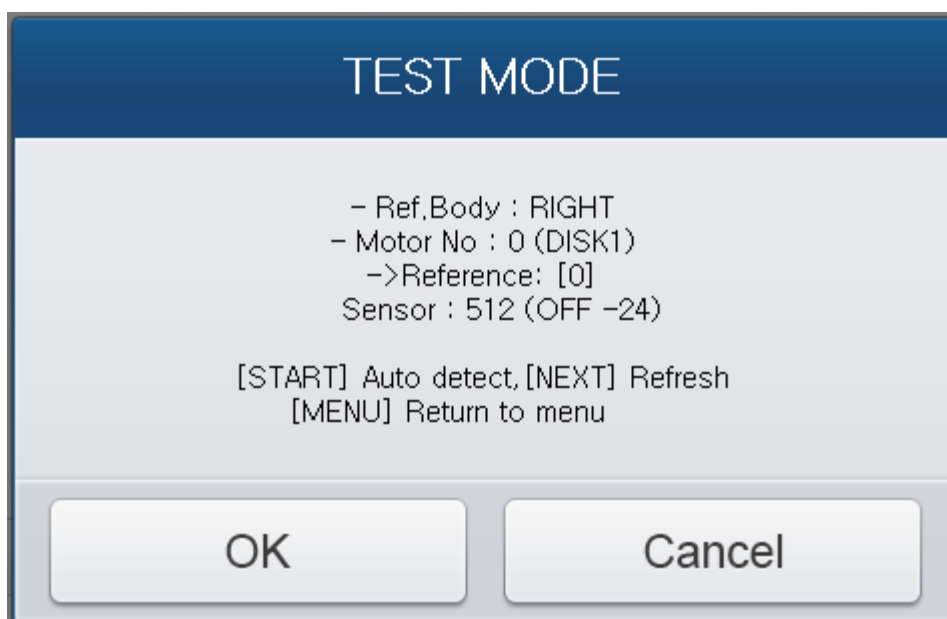
- ✓  (Dial) : changes option value.
- ✓  : start executing auto-detection of motor origin.

The "Ref.Body" option gives a chance to select the target refractor, right or left.

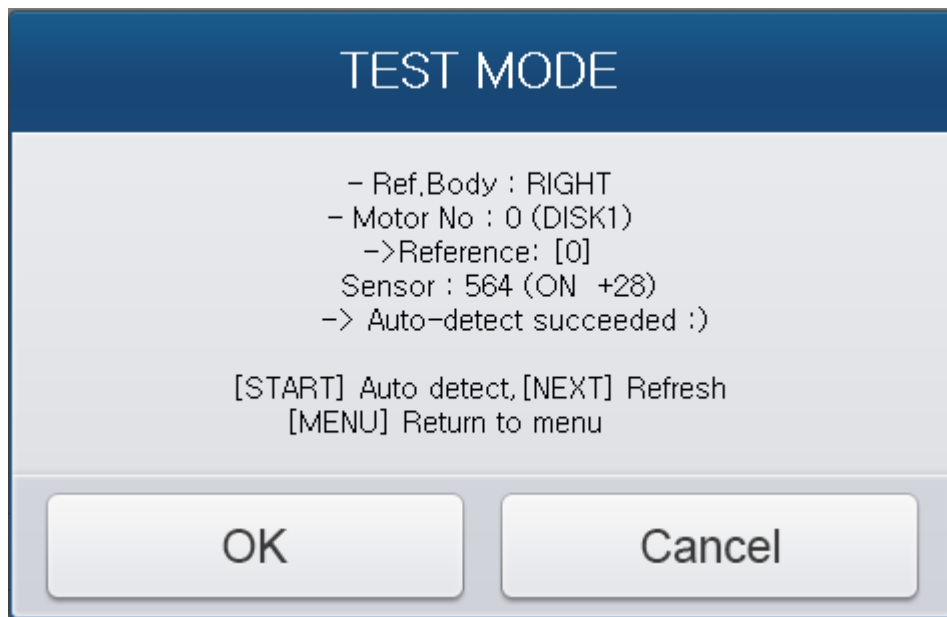
The "Motor No" option is given to select the target motor in the selected refractor including all the motors for driving 6 different disks, 3 different axis, pd and convergence.

The "Reference" item shows the amount of pulse count input by the operator to the selected target motor.

The "Sensor" item shows the read value from the sensor detecting the origin of selected target motor. The information in the parenthesis indicates recognition status and recognition strength of sensor. "ON" means that the origin of target motor is detected. "OFF" means that the origin of target motor is not detected yet. For example, "OFF-24" means that the origin is not detected and it's off from the origin as much as 24 of sensor value.



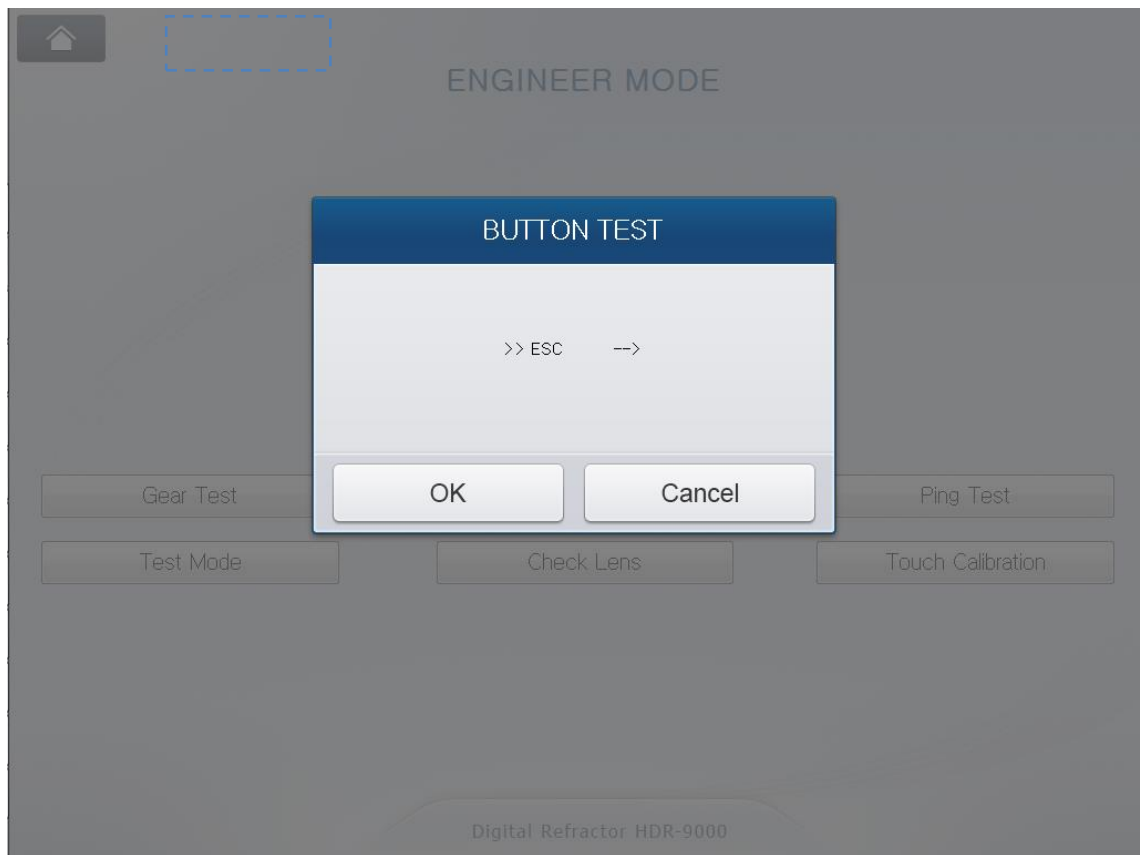
On the contrary, “ON+28” means that the origin of target motor is detected and it is close to the maximum value of sensor as much as 28. The maximum value of sensor differs depending on the type of sensor. Normally the value of sensors for disk position do not exceed 30 and that of sensors for axis, pd, tilting do not exceed 1000.



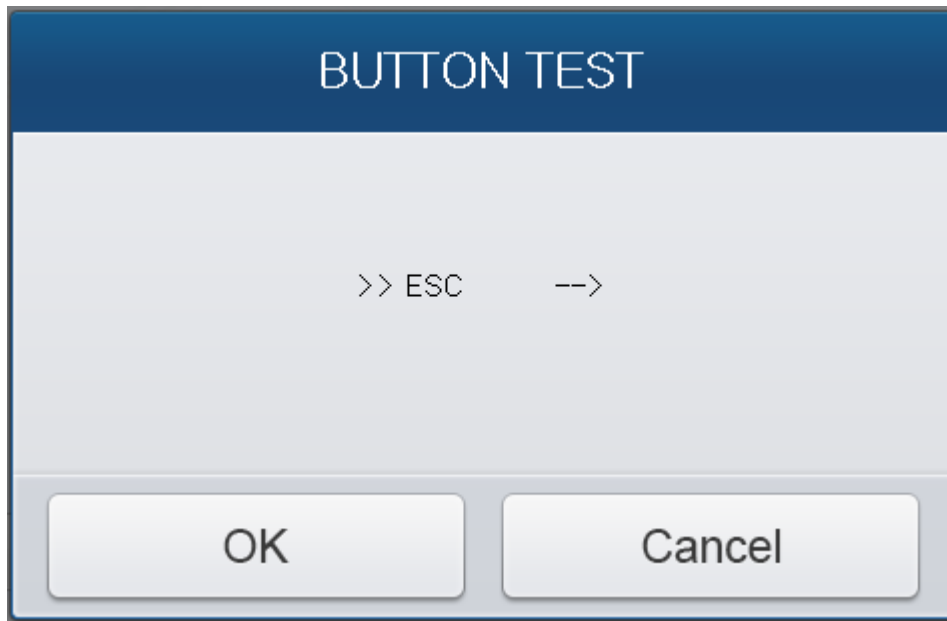
In the above screen shots, one in the left-hand shows that the origin of axis motor is detected by auto detection function. And the other shows the sensor value is increased as much as 774 after driving axis motor 15 pulses. The sign of reference value indicates the direction of driving motor.

(5) Using Check Button Test Function

This function is to aid service engineer checking the status of keypad in the Operation Panel whether buttons are working properly or not. Touching the 'Check Button' button on the display executes the Button Test menu.



To end using this function and to return to the menu mode, press the MENU button on the keypad of Operation Panel or press OK/Cancel button on the display.



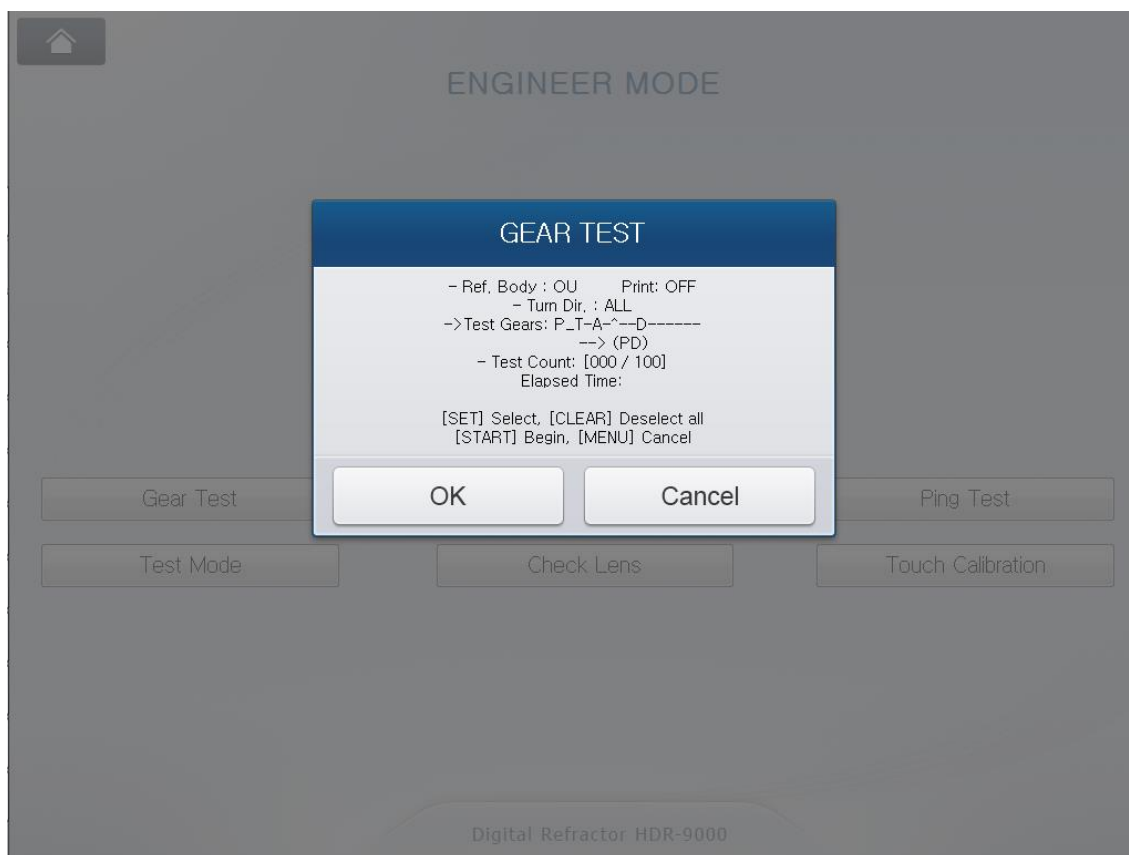
[Dialog box - Button Test]

This function mode checks buttons by instructing the operator to press button which name is displayed on the dialog box. It decides a button is not working properly after giving 3 times of trial when input button is not matching the instructed button name.

It displays the results of the test when all the buttons are tested.

(6) Using Gear Test Function

This function is to aid service engineer checking the status of Motors and Gears in the Refractor Body. Touching the ‘Gear Test’ button on the display executes the Button Test menu.



[Dialog box - Gear Test]

(7) Exiting The Menu

The “HOME” button on the display is to exit Engineer mode. Touching the button makes it exits the engineer menu mode and return to main examination mode.



F. Upgrading Software

HDR-9000 Digital Refractor is consists of three parts, Refractor Body, Operation Panel and Junction Box. The Refractor Body is functionally divided into three parts, upper head, right and left battery. Each part of them has its own driving mechanism and driving software. The Operation Panel is functionally divided into two parts, GUI and communication interface. Each part of them also has its own software.

Upgrading targets are like below.

- ◆ Refractor Body
 - PD & Tilting unit
 - Right-hand lens unit
 - Left-hand lens unit

Refer to the upgrade manual, “[HDR-9000]_Body_UpgradeManual_ENG”, for detailed procedure and how-to.

- ◆ Operation Panel
 - Button & communication unit
 - Main GUI unit

Refer to the upgrade manual, “[HDR-9000]_OPGUI_UpgradeManual_ENG”, for detailed procedure and how-to.

- ◆ Junction Box
 - Communication unit

Refer to the upgrade manual, “[HDR-9000]_JunctionBox_UpgradeManual_ENG”, for detailed procedure and how-to.