

Laser Auto-Collimator

H350R (B) -C

Instruction Manual Ver1.3

Suruga Seiki Co.,Ltd.

OST Department

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<Inquiry/Contact> Page 24

1. Introduction

1.1 Preface

Thank you for choosing SURUGA'S production in this time.

Please read this instruction manual and use this system correctly. And keep this manual carefully and read again in case you need this manual.

Regarding peripherals equipments like image processing unit, please refer to manuals that attached with each system.

In case of missing or damaging this manual, please inquiry to us on referring <Inquiry/Contact> (refer to Page24)

Please be careful, configuration and accessories depend on the purchasing contract.

Caution

Unauthorized reproduction or duplication of this manual in part or in all is strictly prohibited.

Information in this manual is subject to change without prior notice.

This manual has been prepared carefully; however, please contact us if you have questions or suggestions.

In case of paging disorder and missing page, we would like to replace it.

1.2 Components and Accessories

This production consists of bellow components and accessories. Please check them.

■ Laser Auto Collimator Configuration in case purchasing only system

Optical Head Main Body	1 Qty
AC Adaptor (6V 2A) · Image output cable (BNS-P)	1Qty(Length 1.5m)
Beam diameter switching plate*	1Qty

*) Switching the output beam diameter from $\phi 6$ to $\phi 1\text{mm}$ or $\phi 2\text{mm}$ is available.

In case $\phi 3$ or $\phi 4$ is required, please purchase a variable aperture .

Instruction Manual	1Qty
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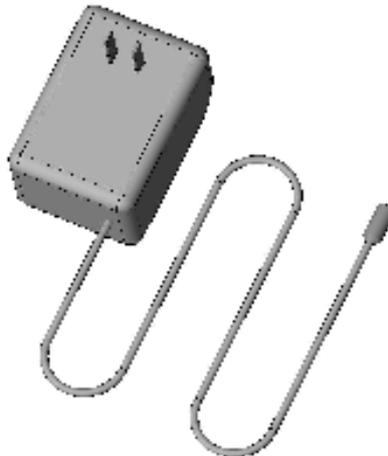


Fig. AC Adaptor 1Qty (length 1.5m)

Laser Auto Collimator Configuration in case of set purchasing

Set Configuration Table

Set name	Set model	Monitor	Monitor bracket	Stand	Tilt	Image Processing	Switching Plate
Main body+ LCD Monitor	H350R-C ^{*1} xxx/D	VCPM-5656P	—	—	—	—	H350-AP
Half set	H350R-C ^{*1} xxx/D-H	VCPM-5656P	HA10-MB	HA10	HB10	—	H350-AP
IP set 500	H350R-C ^{*1} xxx/IP5	—	—	—	—	HIP-500-P	H350-AP
IP set 1000	H350R-C ^{*1} xxx/IP10	—	—	—	—	HIP1000-P	H350-AP
Full set 500	H350R-C ^{*1} xxx/F5	VCPM-5656W	HA10-MB	HA10	HB10	HIP-500	H350-AP
Full set 1000	H350R-C ^{*1} xxx/F10	VCPM-5656W	HA10-MB	HA10	HB10	HIP-1000	H350-AP

*1) xxx means measurement range (050 means for $\pm 0.5\text{deg}$, 100 means for $\pm 1\text{deg}$)

Configuration/Accessory

Optical head

Optical head main body	1 Qty
AC Adaptor (DC6V 850mA ^{*1} (DC12V 300mA ^{*2}), Length 1.5m)	1 Qty
*1) for H350R(B)-C050&H350R(B)-C100	
*2) for H350R-C175	
Beam diameter switching plate (Switching to $\phi 1, \phi 2$ available)	1 Qty

Accessory

LCD Monitor

LCD Monitor body	1 Qty
AC Adaptor for LCD Monitor (DC12V 1.25A)	1 Qty
Converting connector ⁾	1 Qty

*) Model Suffix is P: RCA Plug-BNC Plug

Model Suffix is W: RCA Plug-BNC Jack

Monitor Bracket	1 Qty
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Stand

HA10 (In case half / Full set)	1 Qty
Screw M3-12 (For installing stand-tilt)	4 Qty
2 Axis tilting stage	
HB10	1 Qty
Screw M3-8 (For installing tilt head)	4 Qty
Conversion Plate	
H350-AP	1 Qty

1.3 Introduction of Options

We line up following option and please purchase as your requirements.

Optical Components

Name	Angle Unit: deg (Min)	Tolerance Unit:sec	Model	Remark
Optical Parallel	0 (0)	+/-5	HS-0	$\phi 30, t=10$ One face is AL coating
Wedge Substrate	1 (60)	+/-10	HS-100	40*40 t=10 Non Coating
	0.5 (30)		HS-050	
	0.25 (15)		HS-025	
	0.2 (12)		HS-020	
	0.1 (6)		HS-010	

Conversion Plate

Name	Thickness	Model	Remark
Conversion Plate	6mm	H350-AP	

Beam Diameter Switching Plate

Name	Pinhole diameter	Model	Remark
Beam Diameter Switching Plate	$\phi 3$ and $\phi 4$ mm	H350-P	

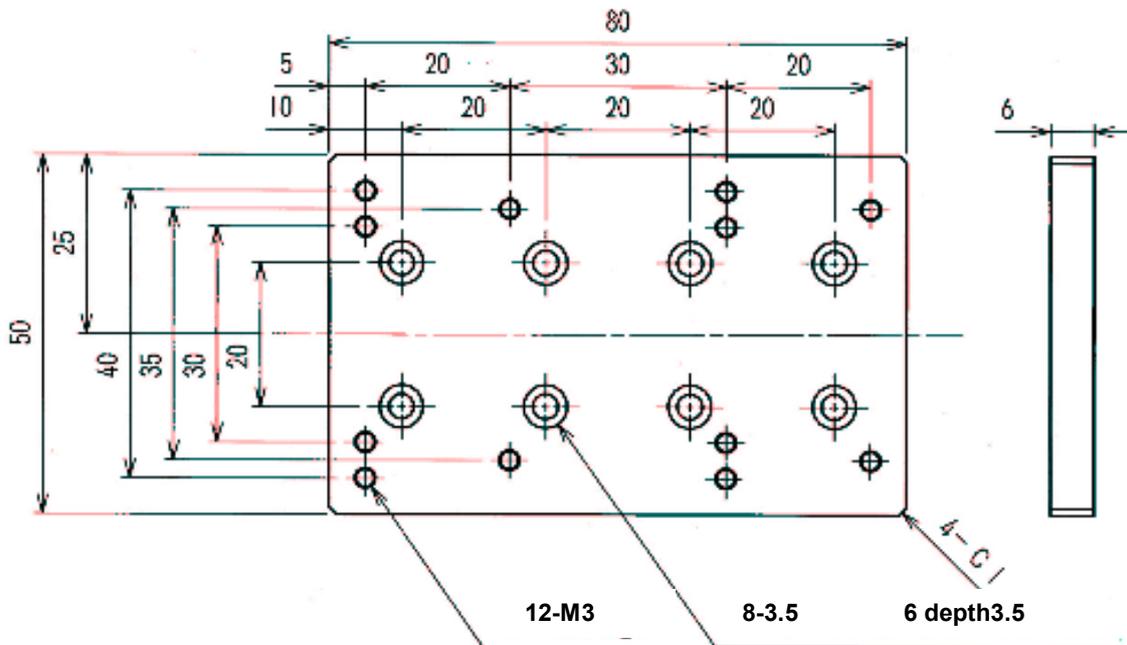


Fig Conversion Plate

1.4 Safety Instruction

Please make sure that read following safety precaution before using.

⊘ Symbol means prohibit.



Caution

Please make sure that keep safety precautions in this manual. In case of negligence, it may cause injury or damage physically.

*Precaution on safety and usage

This production corresponds to class2 laser equipment. This system should be installed and run by the people who have knowledge of safety for laser equipments.

Don't look in the beam directly or observe beam by optical methods.

Don't touch to beam output by fingers or hit an object. Negligence may cause measurement precise lower.

*Cable connection

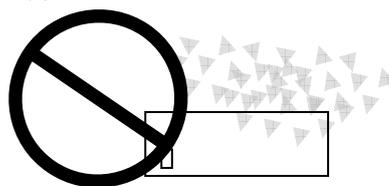
AC Adaptor is attached with H350-C. This adaptor should connect before turning power on and operation should be done under correct connection.

*Don't use adaptor without attached AC adaptor.

*Environment

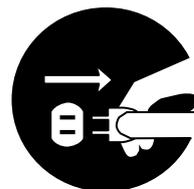
Avoid using this system in following environment

- Many dust and powder dust (especially medal powder)
- Direct sunlight
- Fire and heated place
- Vibrating place
- Splash water and oil
- Inclining and stable place



*Safekeeping/Storage

In case of no usage for long time or transferring this system, make sure unplug from the outlet to prevent unexpected fire or electric shock.





Caution

*Power Source

The standard attached AC adaptor is for only AC100 voltages therefore don't connect AC Adaptor to without AC 100voltage plug outlet. If you would like to run this system without AC100 voltage then please contact our sale person.

*Disassembly/Modification

Make sure that don't disassemble, modify and irregular repair the system.

Negligence may cause the electric shock and dangerous.

If your find something wrong then

please contact Our OST department sales Group.(0120-789-446 tall free)



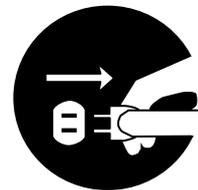
*Repair

In following case, unplug the power cable promptly

After that, please ask the repair for OST department sales Group

After that going on running the system, it may cause fire, electric shock and injury.

- In case of irregular situation like irregular sound, smell bad, smoking
- In case of power code is injured
- Drop the water on this system and foreign objects come into.
- Fall down this system or break the cabinet



*Inquiry/Contact us refer to Page24

1.5 Notification

*Semiconductor laser

The built-in semiconductor laser has own life.

If you find the output light become extremely weak then we recommend replacement of laser and please inquiry and contact us.

Refer to 4.3 Warranty and Service (Page23)

2. System overview

2.1 Main feature

Laser auto collimator is an angle displacement measuring equipment.

It outputs the parallel light that collimates built-in light source. If illuminating the light to reflection mirror that is located small distance from the collimated light, then in case of inclining surface, returned image is misaligned. This distance that the image transfer is proportional to focus distance of built-in lens and inclined angle eventually angle measurement is completed.

Main Feature

- * Detecting small angle displacement by the built-in CCD Camera and video output the input angle displacement from BNC connector of the main body.
- * Due to semiconductor laser, excellent for orientation and stability.
- * Switching aperture mechanism allows being variable output beam diameter therefore it is possible to select the beam diameter to measurement objects.
- *LD power and CCD shutter speed is adjustable. Please refer to basic specification about built-in light source wavelength and sight range.

2.2 Components name and function

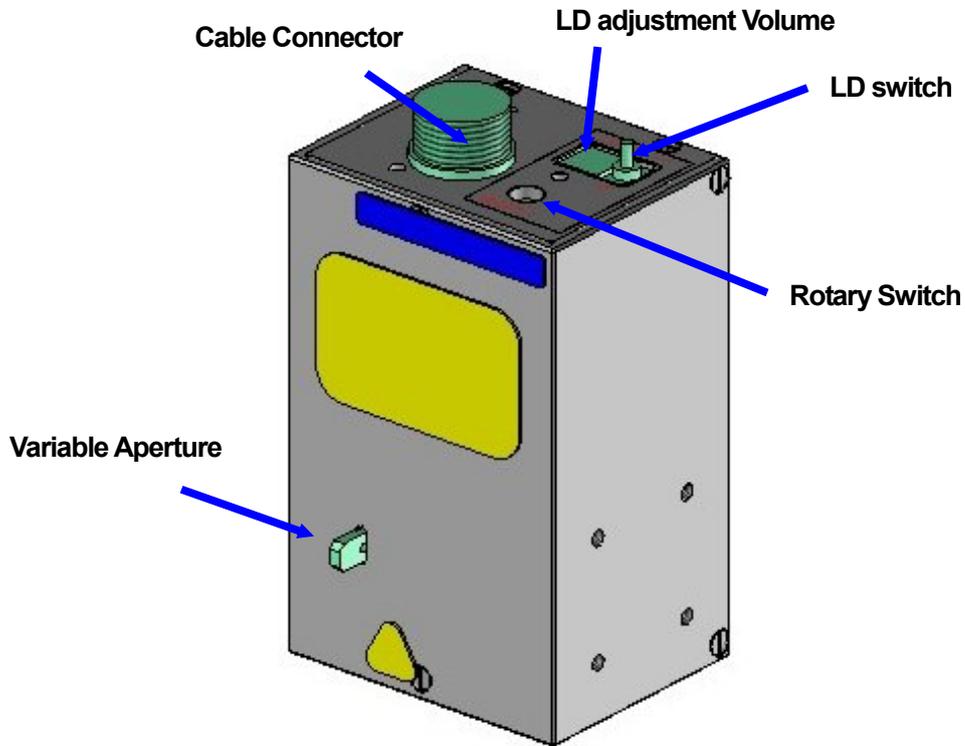


Fig1-1 H350-C Main Body

*Cable Connector

Input power source and output image signal

Connect the attached cable

*Rotary Switch

Switching CCD camera speed

(1/100、1/250、1/500、1/1000、1/2000、1/5000、1/10000、1/100000 sec)

• LD volume

Adjust the output light (Maximum output is less than 1mW)

• Variable Aperture

Switching output beam diameter (ϕ 1,2,3,4,6)

• LD switch

Turn on/off the LD output (Built-in CCD power don't shut down)

2.3 Connection of Components configuration and instrument

As requirement, it is possible to measure with connecting your stand, monitor etc...

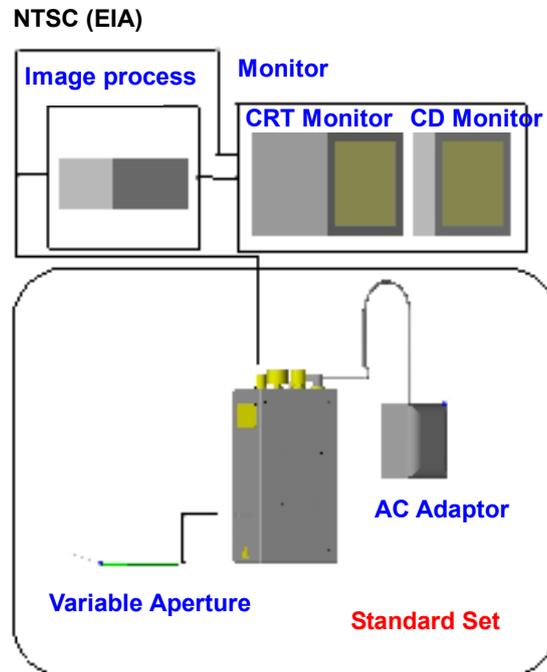


Fig2. Components configuration and connection example

Stand

HA10 Install the rod on the M8 tap hole of stand base.

2Axis tilt stage

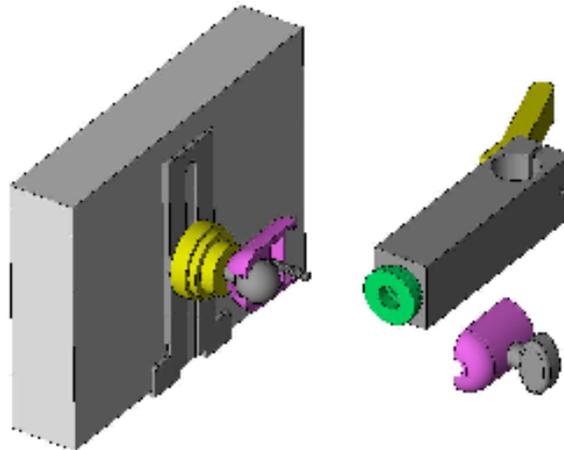
Fix the rod clamp attached with stand by attached screws to black knob side. Install the auto collimator on the stage of the other side of black knob. Please install the auto collimator by using attached screws and in this time the black knob should be located under the auto collimator, the opening side for measurement.

Monitor

Connect the conversion connector to attached connector and RCA plug, yellow from monitor.

Monitor bracket

Install the bracket that attached with monitor to the monitor.
Sandwich the lowlet of the monitor bracket as like bellow figure.
Install the monitor bracket on the rod and clamp it.



AC Adaptor

Connect AC adaptor to auto collimator and LCD monitor.
Please use the attached AC adaptor,DC6V and 2A.
Please use the attached AC adaptor,DC12V and 1.25Amp,to LCD monitor, red connector,

Others and accessories

Regarding to instruction of the image processing units, please refer to each instruction manual respectively

3. Operation method

3.1 Measurement method

Regarding to contents of instruction here, it is the method under using SURUGA optional 2axis tilt stage (HB10), optical parallel and wedge substrate. In case of purchasing only main body then refer to this method and set up the systems.

3.1.1 Installation of auto collimator

Install the autocollimator on 2axis tilt stage (HB10)

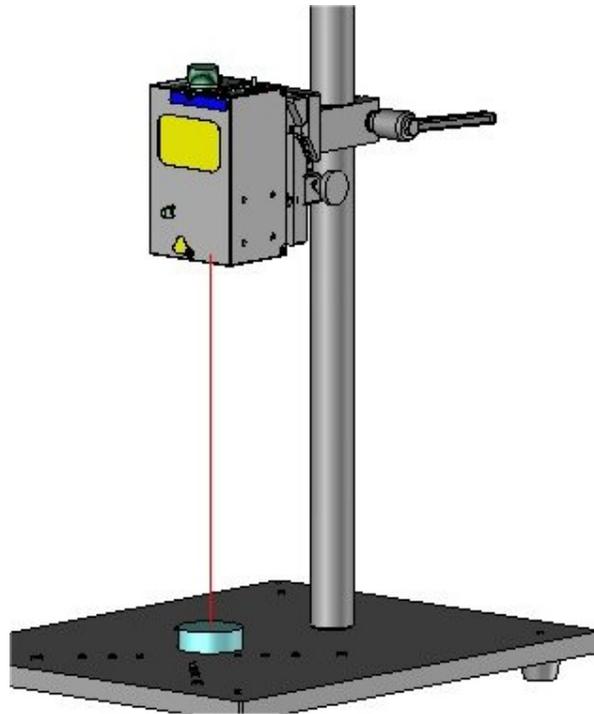


Fig3. Setup (example)

3.1.2 Auto Collimator setting position

The distance from laser output of main body to the optical parallel (HS-0) should be within measurement distance.

Adjusting 2 axis tilt stage (HB-10) as like the laser light reflected on the optical parallel superimpose with the center on the reference (center) from the monitor film or image processing equipment.

Refer to 4.2 Basic specifications (Page21) about measurement distance

3.1.3 Angle correction

Put on the wedge substrate and illuminate the measurement light

(In case of non-coating wedge substrate, put the optical parallel on the wedge substrate)

Against the measurement center (3.1.1 – 3.1.2) that set by using optical parallel, measurement angle that the reflect light point indicates is the wedge substrate angle.

Please measure on this point as reference angel (correction value)

In case of purchasing the half set or main body/LCD monitor, the corrected LCD film is attached with monitor and refers to this film as visual inspection.

In case of purchasing the full set or high rigidity set, please refer image processing instruction manual.

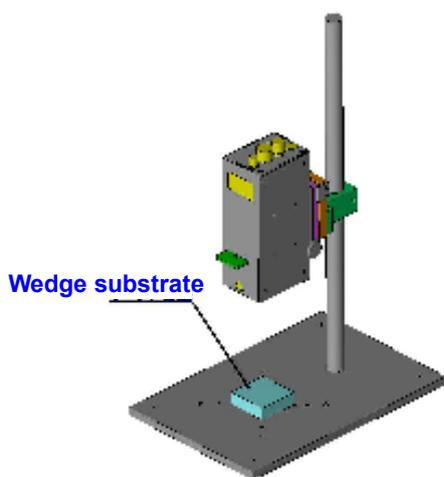


Fig4. Wedge substrate setup

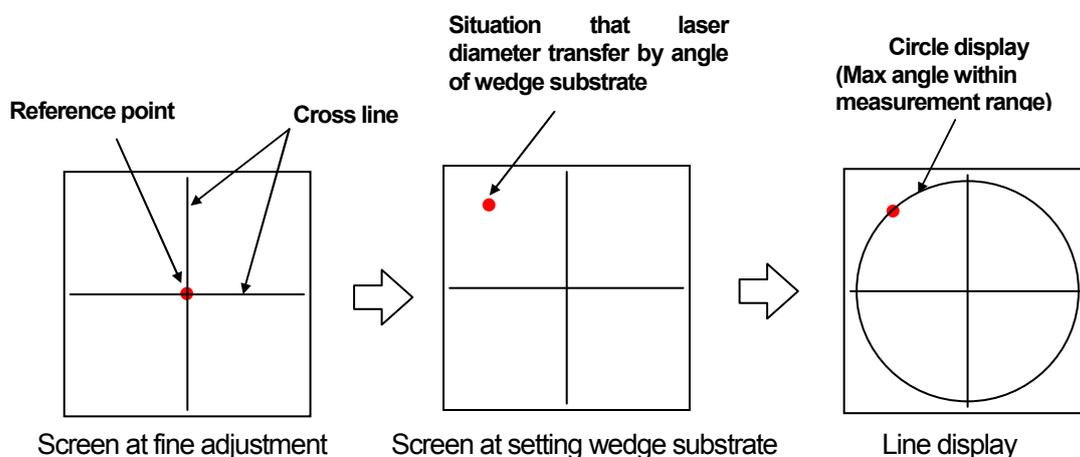
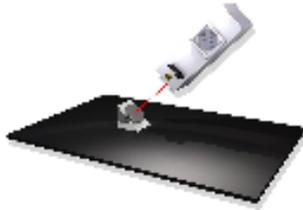


Fig5. Measurement by CCD

3.2 Measurement example

The following are some of applications on using this production. Please measure on referring them.

Mounting optical parts



For example in optical parts assembling process of optical pick up. Inclining inspection at assembly prism or mirror/lens is available to chassis.

HIP-500/HIP-1000 also increases measurement effectiveness with its travel distance measuring function and pass-fall grading function.

Inclination adjustment of LD optical axis



Optical axis adjustment is available in LD mounting process. By direct insertion of the light from LD, measuring inserted light can be achieved. Power off the light from Auto collimator and Auto collimator needs to be placed as base

line. During measuring internal light source needs to be off

*When operation parallelism adjustment or intensity distribution check besides measuring inclination of LD optical axis, Please use “Proco” Profile and collimation checker.

Assembling adjustment of Optical Pickup lens



During a mounting and curing process, it evaluates inclination of pickup lens against collimation-out from a chassis. Suruga’s auto collimator can change a diameter of output beam between $\Phi 1$ to 4 (Non slit case, $\Phi 6$) and can properly illuminate with light volume adjustment function.

Inclination of Deflection test for Optical Disk or Spindle Motor



Checking the amount of linearity & deflection of optical disk or spindle motor. By using a featured HIP-1000’s “Orbital measurement” function, the central point of rotation deflection can be observed with real time measuring of orbital tracking.

HDD Head Inclination Check



Enable to measure inclination of HDD disk, such as GMR head

Measuring Parallelism between CCD Device and Cover Glass



Measuring derivation between CCD reflected light and Cover Glass reflected light. The label measurement function of HIP-1000 enable numerical value display of angle derivation (Parallelism)

Inclination & parallelism measurement of various items



Available for parallelism checking of various items, such as Optical Device, Various metallic parts. By using additional jig instrument, it can achieve measuring rectangular angle of rectangular mirror. *Performance depends on surface coarseness of metal surface

Adjustment of Factory Instrument



Available to measure the inclination and parallelism of surface table, parts etc.

Auto collimator supports increase of production yield rate. It provides surveillance on the production line and adjustment in assembling process.

4. Others

4.1 Trouble shooting

4.1.1 Symptom and action

Symptom	Cause	Action	Refer page
No laser output	Unplug power code	Plug the power code properly	—
	Output power is weak	Adjust power volume	Page 10
	Laser's life is completed	Contact our sales person	Page 8 Page 23
No laser indication on the screen and monitor	The distance to measurement object is too far	Set the distance that to measurement object within measurement distance for each production	Page 20
	Due to measuring the angle displacement over measuring range.	Measure the object within measurement range.	—
	Laser's life	Contact our sales person	Page 8 Page 23
Difficult to read laser light	Reflection rate of measurement object is low	Adjust by variable aperture or attach the mirror on the measurement object	—
Light volume on the monitor is strong	CCD Sensitivity is high	Adjust the shutter speed	Page 10
		In case using image processing, adjust the binarization level.	Refer to image processing instruction manual
Ghost appears	Laser power is too strong	Adjust laser power level	Page 10 Page 20
	CCD Sensitivity is high	Adjust the shutter speed	Page 10
		In case using image processing, adjust the binarization level.	Refer to image processing instruction manual

4.1.2 The action again at appearing the ghost

In case of using internal light source to this system, the ghost might appear around origin point.

This ghost is the reflected light from surface of LD device and it is not defective.

To remove this ghost, please adjust following steps.

1. Reduce the laser power and complete adjustment that ghosts doesn't appear.
2. Rise up shutter speed and complete adjustment that ghosts doesn't appear.
3. In case of using image-processing unit, rise up binarization level and complete adjustment that ghosts doesn't appear.

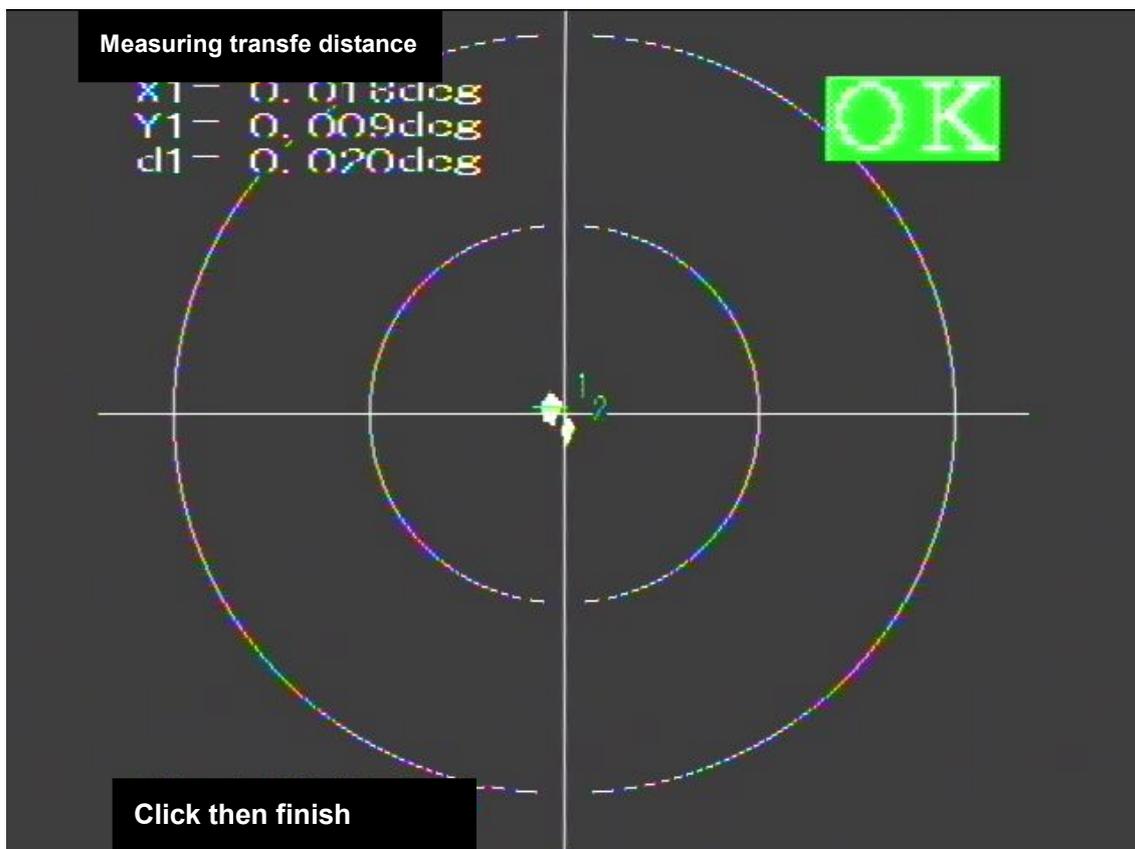


Fig6. The ghost on LD Cover Glass (on using HIP-1000)

Internal optical system is adjusted as refer to the internal light source of auto collimator.

In case that auto collimator is used against external input, ghost appearance might depends on the laser deviation direction

If the ghost appears, change deviation direction of laser or adjust laser power.

And in case of adjusting on auto collimator side, adjust the CCD shutter speed.

4.2 Basic Specification

To improve this production, the specification or overviews are subject to change without prior notice.

4.2.1 Specification

Usage environment	:	0 – 40 deg.C	20 - 80 %RH (non condense)
Storage environment	:	0 – 40 deg.C	20 - 80 %RH (non condense)
Electric Power	:		
		:	Input AC100 to 240 Voltage \pm 10 % 50/60Hz
		:	Output DC 6V, 850mA (DC12V, 300mA*)
			*) for H350R-C175 only
Light source	:	Red semiconductor laser	
		:	Blue purple semiconductor laser (Bule LD type)
Laser wavelength	:	650 nm	
Inside light source delivation	:		
		:	Strate delivation (Orientation is Vertical as base surface is refered)
Laser output	:	Less than 1.0 mW (Class2)	
Aperture	:	ϕ 1,2,3,4,6 mm (Variable)	
Measuring Wavelength	:	650+/-10 nm	
		:	405+/-10 nm (Blue LD Type)

4.2.2 H350R(B) - C050

Size (H350R)	:	40x50x80 mm (Only main body) refer to Page20
(H350B)	:	40x50x85 mm (Only main body) refer to Page20
Weight:	:	0.22 kg (Only main body)
Measurement distance	:	0 to 200 mm (ϕ 4,6) 0 to 300 mm (ϕ 1,2,3)
Measurement range	:	+/-0.5 deg

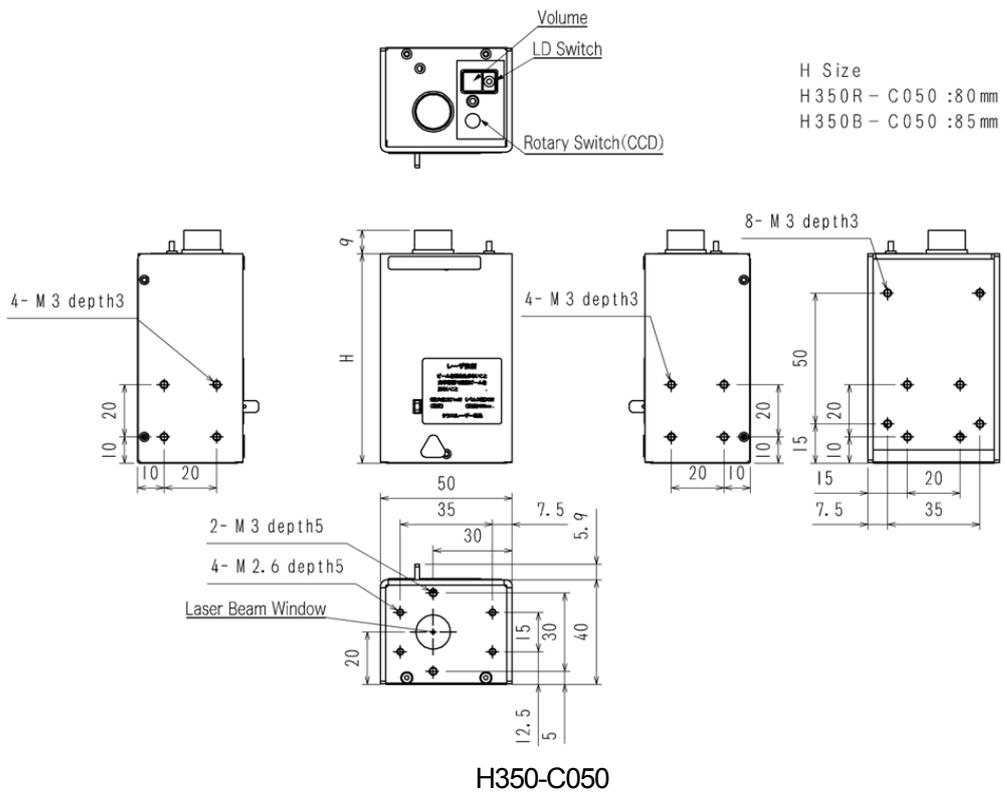
4.2.3 H350R(B) - C100

Size (H350R)	:	40x50x80 mm (Only main body) refer to Page21
(H350B)	:	40x50x85 mm (Only main body) refer to Page21
Weight:	:	0.36 kg (Only main body)
Measurement distance	:	0 to 240 mm
Measurement range	:	+/-1.0 deg

4.2.4 H350R- C175

- Size : 40x50x99 mm (Only main body) refer to Page21
- Weight: : 0.28 kg (Only main body)
- Measurement distance : 0 to 240 mm
- Measurement range : +/-1.75 deg

4.2.5 Overview Size



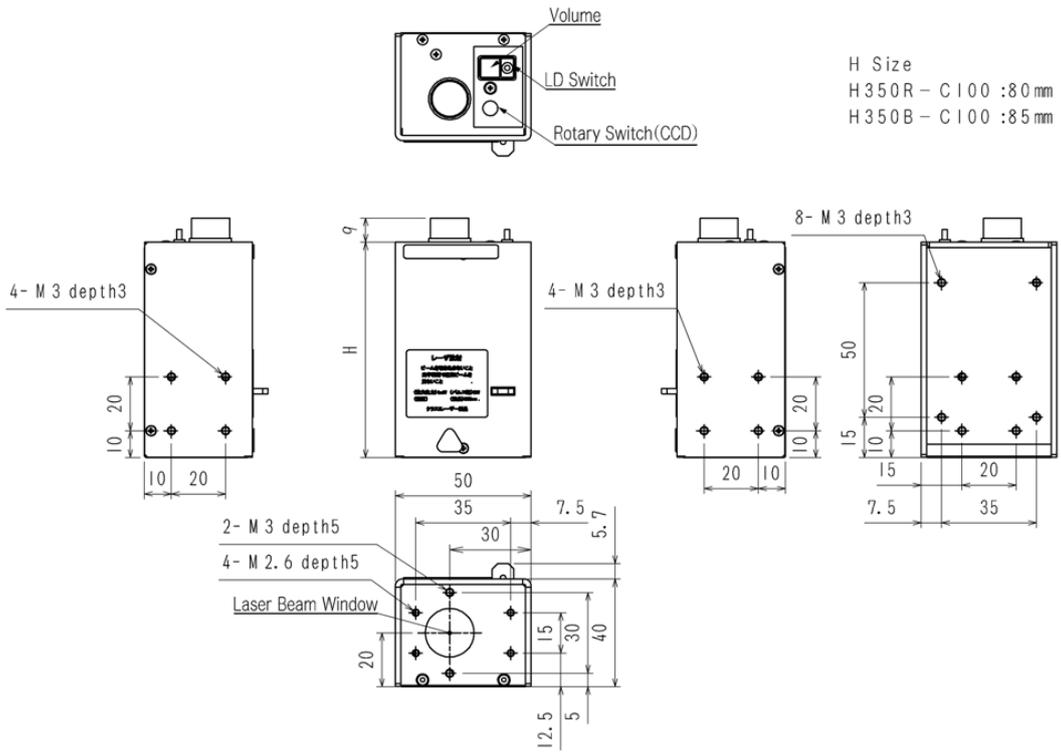


Fig. H350-C100

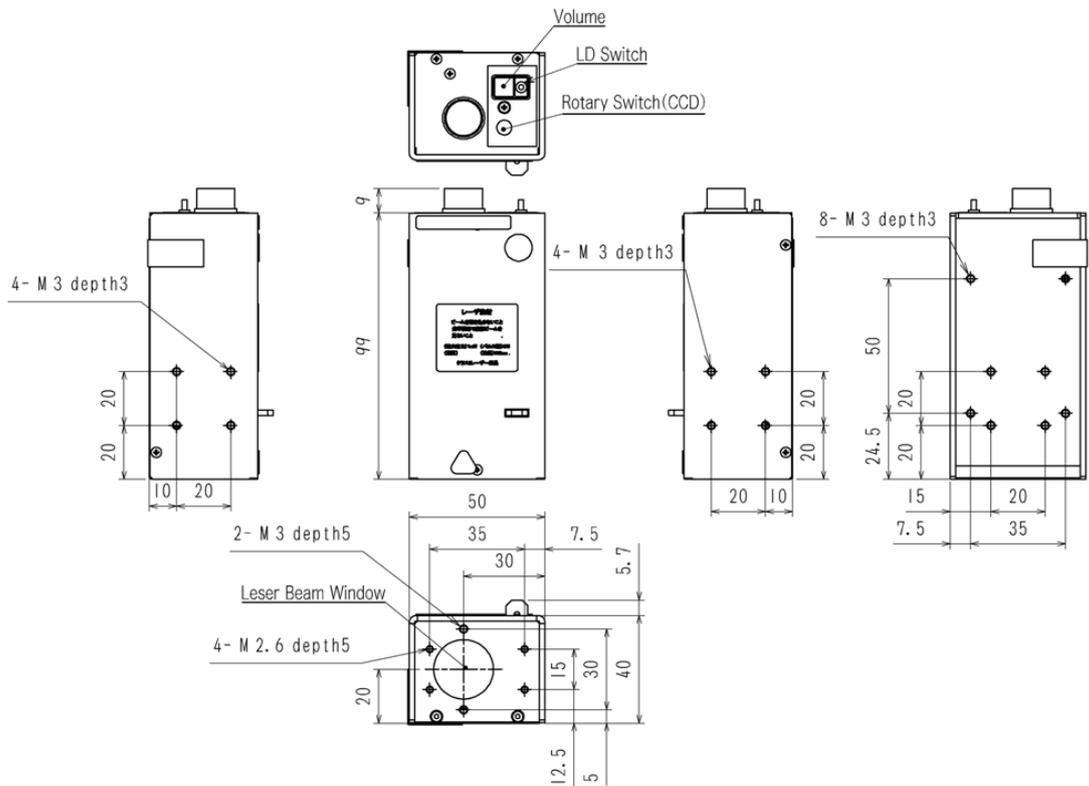


Fig. H350-C175

4.3 Warranty and Service

Warranty

Please inform us the 8 digit serial number that marked on certification or rear side of production at inquiring/contacting us. We record the serial number and deliver date. The warranty period is one year after deliver date. However, in case of following, out of warranty and the repair is chargeable.

- Misusage, due to modification, repair by suruga's engineer, malfunction and damage
- Fall down the system during transportation or transferring. Or irregular operation cause malfunction or damage.
- Fire, Brine Damage, Gas Damage, Abnormal voltage and Act of providence such as earthquake, thunder, wind and flood damage and the others cause malfunction and damage.
- Negligence for instruction manual or caution cause malfunction and damage.

Service

Please check Page 20 before repair request. If you have questions and concern then please contact us, Sales Group of OST department

<During under warranty>

In case that malfunction happen under normal usage following instruction and caution, the repair is free. In case of above malfunction out of warranty, the repair is chargeable.

<Expired warranty period>

In case the performance is maintained by repair, we accept chargeable repair depending on customer's request.

<Repair possible period>

The minimum period of spare parts (the parts to maintain the function) of this product is one year after discontinuing this production. This period is "repair possible period" After this period some case that repair might be possible therefore please contact us.

Notification: About the malfunction on this production, we don't accept responsibility without warranty repair base on the certification.

For More Information Call to us:

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