Alignment System

There are various types of alignment system for various devices, passive or active, with multi purpose as Research and Development and Mass Production.

Suruga Unique Technology

Our core competence is precise process technology. Unique technologies which are manufacturing stages, motion control system integration built up based on core competence and long-term experiences.

Propose the optimal systems

We integrate the optimal systems and a variety of device alignment systems.

Waveguide alignment system

- Waveguide alignment system (PS-1000)
  - Waveguide alignment system (PS-1000H)
  - Waveguide manual alignment package (E8203B)

Alignment control system

- Alignment control system for splitter production (DA200)
- General purpose alignment control system (DA200MP)

LD/PD alignment system

- LD/PD alignment system (PS-2000)
- YAG welding alignment system (YS-1100)
Alignment System Line-up

Selectable alignment system depending on the application as below.

- **Spritter module for manual product line**
  - Waveguide manual alignment package (E8203B)

- **Spritter module for semi-automatic product line**
  - Alignment control system for spritter product line (DA2000)

- **[Basic alignment system] Automatic system**
  - Waveguide alignment system (PS-1000 series)
  - YAG welding alignment system (YS-1100 series)

- **Manual system**
  - High stability waveguide alignment system (PS-1000H series)
  - Waveguide manual alignment package (E8203B)

- **Automatic system**
  - General purpose device for product line
    - General purpose alignment control system (DA200MP series)
  - LD/PD alignment (Active device alignment)
    - LD/PD alignment system (PS-2000 series)
  - Evaluation experiment - LD/PD
    - LD/PD alignment system (PS-2000 series)

- **Production**

- **R and D**

- **Optical fiber alignment**
  - Guidance
  - WG alignment
  - LD/PD alignment
  - Align alignment
  - Manual alignment unit
  - Motionized alignment unit
  - Device unit
  - Fiber holders
  - Device holders
  - Adaptors
  - Contact sensing meter
  - Scintroscope
  - Lens tube
  - Monitoring unit
  - CCD camera
  - Monitor
  - Lighting
  - UV equipment
  - Pump
  - Probe
  - Alignment system
    - Alignment controller
    - WG alignment
    - LD/PD alignment
Optical Fiber Alignment

General Alignment Controller System: DA200MP Series

This is alignment controller system with general function for waveguide device, LD/PD module that covered from research development to production use.

**Features of DA200MP**
- Skill-less
  - Simple, single-button operation for the beginner.
- Effective use of time
  - The automation offered by DA200MP takes care of the routine tasks, giving engineers more time to be ingenious.
- For embedded users program
  - Can be embedded alignment and control system to users program by command communication.

**Variety alignment pattern** DA200MP implements various alignment pattern necessary for various device correspondence. X alignment(ONE), XY alignment(FLAT), XYZ alignment(FOCUS), XyOz alignment(ROTATE)

**Application software** Available various parameter change and copy by PC. By displaying the profile, can be analyzed.

**Operation method** The alignment controller is a versatile controller has both the stand-alone control that can operate intuitively and remote control by command communications.

**Table: SPEC (Main body)**

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of control axis</td>
<td>Four or eight axes (will be 12 or 16 axes when use 2 controllers)</td>
</tr>
<tr>
<td>Driver</td>
<td>5 phase stepping motor 0.75A/Phase</td>
</tr>
<tr>
<td>Alignment pattern</td>
<td>XY Alignment(FLAT), XyOz Alignment(ROTATE)</td>
</tr>
<tr>
<td>Optical power meter</td>
<td>1310/1490/1550nm ± 20% (Accuracy is ±5% for our tested parameter)</td>
</tr>
<tr>
<td>Analog input</td>
<td>DC0~9V, 2ch</td>
</tr>
<tr>
<td>Control panel</td>
<td>JOS driving hard key, Touch panel operation</td>
</tr>
<tr>
<td>Communication interface</td>
<td>RS232C/USB</td>
</tr>
<tr>
<td>Electrical power (Wpc.)</td>
<td>AC100~240V/10%, 50/60Hz less than 500VA</td>
</tr>
<tr>
<td>External dimensions (WxHxD)</td>
<td>Main body: 230(W) x 350(D) x 160(H)mm</td>
</tr>
<tr>
<td>Weight (Wpc.)</td>
<td>Main body: 5.8Kg (8 axis)</td>
</tr>
<tr>
<td>Applicable stage unit</td>
<td>Suruga’s motorized stage with standard stepping motor</td>
</tr>
</tbody>
</table>

Available power meter for alignment within the range of built-in PD other than communication wave. Please contact us about optical sensitivity characteristics.

Applicable Stage Unit: P.4-019~
Alignment Controller System for Splitter Production: DA200

This is the alignment system with alignment function that is made for easy on the field. This dedicated controller makes easy to operate and improved production efficiency.

Features
- **Skill-less**
  Simple, single-button operation for the beginner.
- **Specialized sequencer for production.**
  Can be realized by working more efficiently with the monitor design for the splitter production process.
- **Compact design**
  Meet your needs for flexibility and space savings.

**Skill-less**
Simple, single-button operation for the alignment beginner. Contact sensing meter (CSM) provides a skill-less for all splitter productions.

**Sequence operation**
Available sequence operation by the touch panel display for splitter production line.

**Overall cost reduction**
The automated splitter production allows totally reduction of cost, such as skill-less operation, efficiently and reduced equipment space.

### SPEC (Main body)
- **Number of control axis:** 6-axis
- **Driver:** 5 phase stepping motor 0.75A/Phase
- **Alignment pattern:** XY Alignment (FLAT), XY 4x Alignment (ROTATE)
- **Optical power meter:** 1310/1490/1550nm [± 2% (Accuracy is ±5% for our tested parameter)]
- **Analog input:** DC0 ± 5V 2ch
- **Control panel:** JOG driving hard key, Touch panel operation
- **Communication interface:** RS232C, USB
- **Electrical power:** AC100~240V±10% 50/60Hz less than 500VA
- **External dimensions (1pc.)**
  - Main body: 230W × 350D × 160H (mm)
  - Control panel: 235W × 150D × 30H (mm)
- **Weight (1pc.)**
  - Main body: 5.8kg
  - Control panel: 0.7kg
- **Applicable stage unit:** ES3800-8A/8B (Please contact us for more information.)

Even other than a communication wavelength, the light receiving range of built-in PD is available as the power meter for alignment.

Please inquire for optical sensitivity characteristic.

Applicable stage (ES3800-8A/8B P.4-020)

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**Contact information**
URL: http://eng.surugaseiki.com E-mail: e-ost@suruga-g.co.jp
TEL: +81-3-6711-5014 FAX: +81-3-6711-5021
We offer the best suited alignment system, which fulfills the needs of customers and characters of devices, covering a wide range of alignment specifications varying from waveguide device evaluation for research and trial use till UV bonding of splitters and AWG devices for production use.

- **Features**
  - Automatic Alignment
    Positioning optical axis of optical fiber and waveguide device in quickly.
  - Posture adjustment
    Automatically operated an angle control and GAP adjustment between devices by our own facing technique.
  - Holders
    It is a comprehensive style catalog with the introduction of a range of holders for devices.
  - Software
    Consisted micro sequence of process by the interactive interface of alignment software.
    Also control the device evaluation equipment such as IL and PDL measurement is available.
  - Customization
    We can provide a solution to meet your requirements.

- **Alignment system basic configuration**

  - **Alignment software**
  - **Bus extended BOX**
  - **Motor driver**
  - **Power meter**
  - **Electrical BOX**
  - **M/C**
  - **A/D**
  - **Light source**
  - **Alignment components (Alignment unit, holder)**

- **PC specification**
  - CPU: over than Core2Duo
  - HDD: over than 40GB
  - Memory: over than 2GB
  - The bus capacity: PCI-Ex/1.0/1
  - OS: Windows Professional 7/32bit

- **Optical power meter recommended type**
  - MT9810A, MT9810B (ANRITSU)
  - 8153A, 8163A, 8163B (Agilent Technologies)
  - AQ2201 (Yokogawa Electric Corporation)
Motorized stage alignment unit

6-axis stage unit for alignment system
- Available proximity a microscope and probe according to have a space of upper optical axis.
- 30% smaller than former model.
- Available standard holder on the catalog.
- Corresponds to automatic 3 to 5-axis unit

<table>
<thead>
<tr>
<th>Alignment unit (6-axis)</th>
<th>Axis</th>
<th>Travel distance</th>
<th>Resolution</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>X</td>
<td>50mm</td>
<td>0.05um</td>
</tr>
<tr>
<td></td>
<td>Y</td>
<td>10mm</td>
<td>0.00125um</td>
</tr>
<tr>
<td>Z (Optical axis)</td>
<td>50mm</td>
<td>0.0015um (Pulse)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>±0.5'</td>
<td>±0.5'</td>
<td>±0.5'</td>
</tr>
<tr>
<td></td>
<td>±0.5'</td>
<td>±0.5'</td>
<td>±0.5'</td>
</tr>
</tbody>
</table>

Detailed 6-axis stage unit P.4-022

Alignment software

Automatic alignment application “IROHA” is the dedicated software for alignment.
- JOG – Stage driving operation by PC mouse-clicked.
- Automatic alignment – Automatically controlled alignment (XY alignment, XYZ alignment, XYZ alignment).
- Touch-sensing – Control a touch-point and a GAP from devices automatically.
- Automatic facing – Automatic facing control from devices.
- External equipment control – Communication with an external connection equipment (GP-IB, Serial, I/O).
- Profile display – Beam profile measurement and displaying and saving of results.
- Output display – Optical power display.
- Program driving – Micro sequence programing function.

Alignment pattern

XY Alignment (FLAT)
XYZ Alignment (FOCUS)
XYZ Alignment (ROTATE)

Our original contact sensor/facing function

- Can be automatic recognition by precision positioning and displacement sensor of motorized stage connection point that contacted between devices with any grams.
- Can be positioned parallel between devices automatically by consisted 2-axis goniometer stage controller for connecting sensor during sampling tilt.

Benefit
- Better than use the processing image.
- No deformation such as breakage, tilting.
- As precision positioning and sampling by displacement sensor, it is able to display the tables because of good reproducibility.
High-Stability Waveguide Alignment System: PS-1000H Series

This is a waveguide alignment system pursued static stability after alignment process, which can offer a system component that is best suited for a long-hour measurement of micro core devices.

Features

- High-Stability is improved by using a motorized thermal management stages.
- Improved product safety through isothermal device.
- Available standard device holder.
- We can customized for your needs.

Thermal stability data

The following graph shows the fluctuation example, after alignment. The strain stability with thermal control is better than former unit.

(When using the thermostatic device, this is the repeating measurement example for 2 hours stability data after rounded-end optical fiber alignment.)
Waveguide Manual Alignment Package: E8203B

This is a very useful package for manual operation of waveguide device (splitter) alignment and UV bonding. Our long history of producing various alignment units concluded that this is one of the best component alignment packages. With a selection of holders, development/trial purposed evaluations of various waveguide devices are possible.

**Features**
- Manual stage alignment unit having coarse and fine adjusting device.
- Standard equipment upper unit with monitoring/UV changeover stage.
- Available standard device holder.

*Accessories:* Bracket for V20-501S (P.4-048), VFGB5F (P.4-058)

<table>
<thead>
<tr>
<th>Axis</th>
<th>Travel distance</th>
<th>Resolution</th>
</tr>
</thead>
<tbody>
<tr>
<td>X</td>
<td>±0.5mm</td>
<td>Coarse motion:10μm/scale Fine motion:0.5μm/scale</td>
</tr>
<tr>
<td>Y</td>
<td>±0.5mm</td>
<td>Coarse motion:10μm/scale Fine motion:0.5μm/scale</td>
</tr>
<tr>
<td>θx</td>
<td>±2.5°</td>
<td>Approx 29°/scale</td>
</tr>
<tr>
<td>θy</td>
<td>±2.5°</td>
<td>Approx 28°/scale</td>
</tr>
<tr>
<td>θz</td>
<td>±4.0°</td>
<td>Approx 33°/scale</td>
</tr>
</tbody>
</table>

**Holder/Accessories**

The following goods are not included. (Sold separately)
- Various holders (Fiber, FA, and WG)
- Observation equipments (Lens tube, CCD camera, monitor and lighting)
- UV radiation equipment (UV light source)

Configuration example for spritter module alignment

This is the configuration example for spritter module. Please order as necessary.

<table>
<thead>
<tr>
<th>Holder (Option)</th>
<th>Product Name</th>
<th>Model</th>
<th>The page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Incident holder</td>
<td>Preset base Preset type WG holder</td>
<td>E300-L E340L-2-A (1)</td>
<td>P.4-029 P.4-031</td>
</tr>
<tr>
<td>Output holder</td>
<td>Preset base Preset type WG holder</td>
<td>E300-R E340R-2-B (2)</td>
<td>P.4-029 P.4-031</td>
</tr>
<tr>
<td>WG holder</td>
<td>Preset type Waveguide holder</td>
<td>E400-10N (3)</td>
<td>P.4-035</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Monitorings (Option)</th>
<th>Product Name</th>
<th>Model</th>
<th>The page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zoom head</td>
<td>V20-501S</td>
<td>P.4-048</td>
<td></td>
</tr>
<tr>
<td>CCD Camera</td>
<td>VSTC-620CCSET</td>
<td>P.4-054</td>
<td></td>
</tr>
<tr>
<td>Monitor</td>
<td>VOT-1500P  (4)</td>
<td>P.4-054</td>
<td></td>
</tr>
<tr>
<td>Cold light</td>
<td>VMEGA100  (4)</td>
<td>P.4-055</td>
<td></td>
</tr>
<tr>
<td>Cold light guide</td>
<td>VFGB5F-1500</td>
<td>P.4-055</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>UV irradiating equipment</th>
<th>Product Name</th>
<th>Model</th>
<th>The page</th>
</tr>
</thead>
<tbody>
<tr>
<td>UV light source</td>
<td>VEXECURE4000-D</td>
<td>P.4-058</td>
<td></td>
</tr>
<tr>
<td>UV light guide (Binary)</td>
<td>VFGB5F1500UVR</td>
<td>P.4-058</td>
<td></td>
</tr>
</tbody>
</table>

GAP adjustment / side alignment of the light guide is enabled by combined with a manual unit. Detailed (P.4-040)

Contact us if you would like to know customized model.
Optical Fiber Alignment

YAG Welding Alignment System: YS-1100 Series

This system can operate fully-automated process from LD/PD module alignment with YAG laser welding work.

With the best-designed micro-positioning mechanism for alignment and our unique software to optimize the use of the mechanism, this welding alignment system can meet a wide range of alignment needs of users.

Features

○ Excellent operability
  Just place the parts, press the button and from the tilt alignment of the device to the YAG welding process will be operated automatically.

○ Support the variety of production process.
  Available processing management depending on the device. We also have library routine for supporting production.

○ Variety of measuring function
  Device judgment function is satisfactory such as measuring a focal length, angle and IL characteristic.

○ Our original automatic facing function.
  Can be adjusted device posture by our original facing function.

Alignment data storage

- profile data storage (Excel)

Measurement focal length and angle

IL characteristic measurement

Alignment system

Alignment controller

WG alignment

LD/PD alignment

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### Process example implementation
Support the alignment and YAG welding of many active devices.

#### Correspondence device
- TO-CAN (TOSA, ROSA, Pigtail) Module
- Bi-Directional Module
- Triplexer Module
- MiniDIL Module
- Butterfly Module

### Alignment unit & YAG laser unit

#### Alignment unit (Motorized 5 axes)

<table>
<thead>
<tr>
<th>Axis</th>
<th>Travel distance</th>
<th>Resolution</th>
</tr>
</thead>
<tbody>
<tr>
<td>X</td>
<td>20mm</td>
<td>0.05um/Pulse (M51/20)</td>
</tr>
<tr>
<td>Y</td>
<td></td>
<td>0.0025°/Pulse (Full)</td>
</tr>
<tr>
<td>θx</td>
<td>±5°</td>
<td>0.002°/Pulse (Full)</td>
</tr>
<tr>
<td>θy</td>
<td></td>
<td></td>
</tr>
<tr>
<td>θz</td>
<td>360°</td>
<td>0.004°/Pulse (Full)</td>
</tr>
</tbody>
</table>

- Ferrule unit (Z (Optical axis)) 70mm 0.05um/Pulse (M51/20)
- YAG head unit (Motorized 2 axes) Y 20mm Tum/Pulse (Full)
  
#### YAG head unit (Motorized 2 axes) Z 30mm

**Alignment unit & YAG laser unit example**

### Application-process
Additional lens alignment function and UV resin hardening are available.

#### Alignment unit & YAG laser unit example

- Lens alignment function
- Correspondence of UV curable
Optical Fiber Alignment

LD/PD Alignment System (Active Device Alignment): PS-2000 Series

We offer the best suited alignment system, which fulfills the needs of customers and characters of devices, covering a wide range of alignment specifications varying from LD/PD device evaluation for research and trial use to UV bonding for production users.

Alignment system configuration example

Features

- Automatic alignment
  Precision automatic positioning for measuring optical ber and LD/PD device in quickly.

- Posture adjusting
  Can be control an angle and GAP between devices by our original facing function.

- Holders
  Available standard device holder.

- Alignment software
  Can be combined micro sequence in the process by the interactive interface of alignment software.

- Customized
  We can customized for your needs.