Fiber Optic Light Sources and Light Guides

LLS2 / MHAA and MHAB Series

The MHAA / AB series Halogen light sources are compact with a robust design. These light sources are suitable for mounting. The complete product range includes: 100W, 150W and 100W NIR (1127nm). The light source can be controlled manually and through external controls, including 0-5 V analog control and parallel 8-bit digital control.

In addition, we offer the LLS2, a low-power consumption, long-life LED light source using the latest in high brightness LED technology.

These light sources can be used with fiber light guides that require less space and allow you to select from a huge range of lighting shapes and configurations.

Advantages of Fiber Optic Light Guides:
- Compact Illuminating Unit Size
- Highest Intensity Output
- Uniform Light
- All Visible Wavelengths and IR When Required
- Directional Light Control
- External Heat and Noise From Illuminated Area
NEW PRODUCT

LLS 2 - LED Light Source

Long Life, Low Energy Consumption, High Performance

- Long life-time (more than 30,000 hours) (*)
- Low power consumption: 35 watts (max.)
- Light output (**): 175 klx at active diameter 8 mm
- Color temperature: 5,500 K
- Accepts light guides up to 13 mm
- External strobe capabilities: minimal pulse duration 200 μs at 20% duty
- Voltage input: 90 VAC to 260 VAC (50/60 Hz)
- Optical output: optimized for 4 - 10 mm
- Uniformity of light spot: Gaussian like light distribution shape
- RoHS compliant
- CE Approved
- External control pin layout and Light guide connection compatible with MHAA/AB Series. Please follow standard safety procedures when operating the LLS 2 Light Source.

Characteristics

| Dimensions | Length: 240 mm (9.45 in) | Widths: 85 mm (3.35 in) | Height: 120 mm (4.72 in) |
| Weight | 2.1 kg (4.62 lbs) |
| Operating Temperatures | -10°C (+14°F) to 40°C (104°F) (Humidity 20% to 90%) |
| Storage Temperatures | -40°C (-40°F) to 60°C (140°F) (Humidity 30% to 95%) |
| Cooling Method | Forced Air Cooling (fan) |
| Housing | Powder painted steel |

Control Characteristics

- Manual Control Interface (Front): On / Off switch
- Manual / remote switch
- Intensity control
- LED status indicator lights
- Power switch
- Alarm indicator (e.g. over-temperature)
- Power indicator
- Remote / manual switch
- Analog interface
- AC power supply inlet
- Digital interface
- Dip switches
- Cooling air intake

(*) 70% drop of intensity according to LED supplier
(**) Measured after 1,100 mm long light guide at 50 mm distance
The 100W Halogen Light Source is the standard model in the Halogen Light Source Series because it exhibits excellent performance in all aspects.

- Worldwide power supply specifications (100/200V switch type)
- Compliance with CE Marking safety standards
- Environmentally friendly and in compliance with the RoHS Directive

**Halogen Light Sources**

### MHAA-100W Series

**Order Code**
- MHAA-100W-100V
- MHAA-100W-200V

**Input Voltage Selector:**
- At 115 With 100V 200V (AC Type)
- At 230 With 100V 200V (AC Type)

**Input Voltage**
- AC100-120V/200-240V (50/60Hz)

**Input Current (Typ):**
- 2.4A (At AC 100V Input)  1.2A (At AC 200V Input)

**Lamp Voltage:**
- DC 14.7V±0.2V (Max.) (LM-150 LM-150C) DC 11.7V±0.2V (Max.) (LM-100)

**Rated Life:**
- 50 Hours (LM-150), 500 Hours (LM-150C), and 1,000 Hours (LM-100)

**Color Temperature:**
- 3,100K (LM-150) 3,200K (LM-150C) 3,100K (LM-100)

**Average Illuminance:**
- Approximately 80,000 Lx (LM-150), 45,000 Lx (LM-150C), and 30,000 Lx (LM-100)

**External Remote Connector:**
- D-SUB15S

**Connector MC-EXC-02**

**Cable with External Remote Connection:**
- A-0510 A-0516

**Long Life Type A-0521**

**Replacement Lamp:**
- LM-100 (12.0V,100W)

**Protection Function:**
- Lamp Burn-out Detection Function: Monitor output, LED (RED) on front panel ON
- Lamp Overcurrent Detection Function: Monitor output, cut off lamp power, LED (RED) on front panel ON
- Internal High Temperature Detecting Function: Monitor output, cut off lamp power

**Safety Standard:**

**Special Power Supply Unit Specifications (AC100V Type):**

<table>
<thead>
<tr>
<th>Model</th>
<th>Order Code</th>
<th>Remarks</th>
<th>Product Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>MHAA-100W</td>
<td>A-0510</td>
<td>RM:ADRY008</td>
<td>A-0512</td>
</tr>
<tr>
<td>MHAA-100W</td>
<td>A-0511</td>
<td>With External R-8</td>
<td>A-0513</td>
</tr>
<tr>
<td>MHAA-100W</td>
<td>A-0514</td>
<td>With Digital Dimmer</td>
<td>A-0514</td>
</tr>
</tbody>
</table>

### MHAB-150W Series

**Order Code**
- MHAB-150W-100V
- MHAB-150W-200V

**Input Voltage Selector:**
- At 115 With 100V 200V (AC Type)
- At 230 With 100V 200V (AC Type)

**Input Voltage**
- AC100-120V/200-240V (50/60Hz)

**Input Current (Typ):**
- 2.4A (At AC 100V Input)  1.2A (At AC 200V Input)

**Lamp Voltage:**
- DC 14.7V±0.2V (Max.) (LM-150 LM-150C) DC 11.7V±0.2V (Max.) (LM-100)

**Rated Life:**
- 50 Hours (LM-150), 500 Hours (LM-150C), and 1,000 Hours (LM-100)

**Color Temperature:**
- 3,100K (LM-150) 3,200K (LM-150C) 3,100K (LM-100)

**Average Illuminance:**
- Approximately 80,000 Lx (LM-150), 45,000 Lx (LM-150C), and 30,000 Lx (LM-100)

**External Remote Connector:**
- D-SUB15S

**Connector MC-EXC-02**

**Cable with External Remote Connection:**
- A-0510 A-0516

**Long Life Type A-0521**

**Replacement Lamp:**
- LM-100 (12.0V,100W)

**Protection Function:**
- Lamp Burn-out Detection Function: Monitor output, LED (RED) on front panel ON
- Lamp Overcurrent Detection Function: Monitor output, cut off lamp power, LED (RED) on front panel ON
- Internal High Temperature Detecting Function: Monitor output, cut off lamp power

**Safety Standard:**

**Special Power Supply Unit Specifications (AC100V Type):**

<table>
<thead>
<tr>
<th>Model</th>
<th>Order Code</th>
<th>Remarks</th>
<th>Product Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>MHAB-150W</td>
<td>A-0520</td>
<td>RM:ADRY008</td>
<td>A-0521</td>
</tr>
<tr>
<td>MHAB-150W</td>
<td>A-0522</td>
<td>With External R-8</td>
<td>A-0523</td>
</tr>
<tr>
<td>MHAB-150W</td>
<td>A-0524</td>
<td>With Digital Dimmer</td>
<td>A-0524</td>
</tr>
</tbody>
</table>

### Optional Parts

- MagicLight Fiber Optic Light Guides: MHAA MHAB Series
- Replacement lamp LM-100
- External Remote Connector D-SUB15S
- Connector MC-EXC-02
- Cable with External Remote Connection
- Long Life Type A-0521
- Replacement Lamp LM-100 (12.0V,100W)
- External Digital Dimmer
- Lamp Burn-out Detection Function: Monitor output, LED (RED) on front panel ON
- Lamp Overcurrent Detection Function: Monitor output, cut off lamp power, LED (RED) on front panel ON
- 0ºC to 45ºC: Linear Decrease Down to 80%RH at 31ºC and 50%RH at 40ºC
- Worldwide power supply specifications

**Note:**
- May be unable to use with plastic fibers.
Infrared 100W Halogen Light Source

MHAB-100W-IR

- Irradiation of silicon transmission wavelength (3127nm or more)
- Radiation mechanism due to unique technology

**Example Application**

<table>
<thead>
<tr>
<th>Model</th>
<th>MHAB-100W-IR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Order Code</td>
<td>MHAB-100W-IR-100V</td>
</tr>
<tr>
<td>AC Voltage</td>
<td>100V</td>
</tr>
<tr>
<td>Setting At Shipping</td>
<td>AC cable: With MC-AC100A-2.0M</td>
</tr>
<tr>
<td>Input Voltage</td>
<td>AC AC100V-240V(50Hz/60Hz)</td>
</tr>
<tr>
<td>Compatible Lamp*</td>
<td>LM-100-IR (DC100V)</td>
</tr>
<tr>
<td>Lamp Voltage</td>
<td>DC 10.7± 0.2V(Max.)</td>
</tr>
<tr>
<td>Average Of Lamp Life</td>
<td>1,000 Hours Nominal</td>
</tr>
<tr>
<td>Installation</td>
<td>Rubber Legs Placed on Flat Surface</td>
</tr>
<tr>
<td>Weight</td>
<td>Approximately 3.2Kg</td>
</tr>
<tr>
<td>Standard Functions</td>
<td>Manual intensity control/ External volume intensity control/ External analog intensity control</td>
</tr>
<tr>
<td>External Dimensions</td>
<td>W120 × H110 × D257mm</td>
</tr>
<tr>
<td>Product Code</td>
<td>A-0524</td>
</tr>
</tbody>
</table>

**Spectral Characteristic Data**

- **Relative Sensitivity**
  - Wavelength (nm)
  - Relative Sensitivity

**Example Application**

- IR Coaxial Penetration Observation
- IR Through place Observation
- IR Pick-Up Chip Bonding
- Solder Bump
- Alignment Mark
- Bonding Inspection

**Spare Lamp**

- **Model** | LM-100-IR |
- **Specification** | IR Reflection Coating for 100W |
- **Product Code** | A-8216 |

**Lens Series for IR System**

- **Model** | MHF-LH50-80D-IR |
- **Specification** | For IR 80D | For IR 60D |
- **Product Code** | A-0235 | A-0236 |

**Heat Resistance Light Guide**

- **Model** | MSG4-1100S-HR |
- **Specification** | Heat Resistant |
- **Product Code** | A-0637 |

**Note:** Only heat-resistant light guides can be used.

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Small and lightweight lamp house without power supply unit. This unit is ideal when there is not enough space to install a lamp house and power supply together. The compact lamp house can be installed with the operation voltage of a lamp, and a cooling fan supplied remotely.

**Lamp House**

MHF-LH Series

**Model**

- **MHF-LH50**
- **MHF-LH100**

**Compatible Lamp**

- **MHF-LH50**: LM-50 (12V/50W)
- **MHF-LH100**: LM-100 (12V/100W)

**Lamp Rated Voltage/Metal**

- **MHF-LH50**: DC12V/50W
- **MHF-LH100**: DC12V/100W

**Average Lamp Life**

- **MHF-LH50**: Approximately 2,000 Hours Nominal
- **MHF-LH100**: Approximately 1,000 Hours Nominal

**Color Temperature**

- **MHF-LH50**: 3,000K
- **MHF-LH100**: 3,100K

**Operating Temperature and Humidity**

- 0ºC-45ºC/20%-80%RH

**Weight**

- **MHF-LH50**: 0.8kg
- **MHF-LH100**: 3.2Kg

**Optional Parts**

- Replacement lamp: LM-50 LM-100

**Product Code**

- A-0466

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**Note:** Only compatible lamps can be used. Many lamps are powered on at rated current and the time measurements until their filaments blow are normally distributed. The average time from the peak time until the survival ratio of 50% is called the average life. The average illuminance is measured at 50mm from the fiber end at the maximum intensity when a MORITEX standard light guide (MSG4-2200S) is attached.
RS-485 Communication Unit

**MCGA-204D**

Light controller for the batch control of MORITEX standard light sources and power supplies by RS-485 communication

- Single unit for controlling 1 channel or 2 channels
- Batch control of up to 16 channels by unit connection
- Standard light sources and power supplies connectable (Some older models not supported)

**General configuration**

![Diagram of RS-485 Communication Unit](image)

**Example of Application**

- Halogen light source and LED power supply control by RS-485 communication
- Batch control of production processes by RS-485 communication

**RS-485 Communication Unit**

![Diagram of RS-485 Communication Unit](image)

**Options**

**Option Attachment Drawing for Halogen Light Sources**

- Replacement Lamp
- Cable with External Remote Connector

**LED Power Supply**

- MLEK-A/B (1 Channel, 2 Channel Series)
- MLEK-A (Conversion Plug/Spool for 3 Channels)
- MLED-G02512LRD
- MLED-E00811L (Supports ON/OFF illumination only)

**Communication Specifications**

- Communication Interface: RS-485
- Communication System: Asynchronous, Simplex
- Transmission Speed: 115.2 (19.2−115.2) Kbps

**Options**

- AC ADAPTOR
- TERMINAL RS485 CH2/IF CH1/IF

**Communication Board**

- 8 Bit 8 or More Ports Necessary
- One RS-485 Port Enough
- External Control By Analog (DC 0-5V)

**Difficult to Route Many Cables**

- One Cable Enough

**Host Equipment**

- Host
- RS-485

**For light source compatibility, specifications and product codes of the options, see corresponding pages.**
Light Source Equipment Options

Light Source Internal Shutter

Product (optional at time of shipping)

Internal type means that installation space is not necessary.

Achieves a long life time that averages the shutter being opened and closed 50 million times.

Independent OPEN and CLOSE is possible regardless of modulation function.

Either opening or closing for the shutter can be chosen when voltage is superimposed.

* Not sold separately as an individual item.

* For each of the 50W, 100W, and 150W light sources, there are customized specification models each with an built-in power supply.

Specifications

* Operation input voltage: DC 24V ±3.2VA

* Shutter response speed: Normally Open: 1ms Normaly Closed: 10ms

External Input Voltage [V] (1500)

150W MSH-06 MSH-08 MSH-010

(150)

LM-100 LM-150 LM-150C

MHF-PT002

Light Source Internal Color Filter

Made-to-order

Light Source Internal Color Filter

* Contact Morita about the mounting dimensions.

Light Source Fixture

MHF-PT002 (4 pcs/set)

For Use with MHAA-100W/MHAB-150W

External Analog Control Connection Specifications

External 8-Bit Digital Control Connection Specifications

Signal Output Detection Circuit Connection Example

Linear Intensity Control (MHAB-150W-LI Only)

Options

Options

Options

Options

Options

Options
### Light Guides

#### Ring Light Guides

- Illumination from 360° produces uniform light. These light guides are optimum for CCD camera and microscope inspections.

#### Explanation of Model Code

<table>
<thead>
<tr>
<th>Model</th>
<th>Product Code</th>
<th>Fiber Type</th>
<th>Tube Material</th>
<th>Special Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>MRG/P</td>
<td>A-0600</td>
<td>Glass</td>
<td>SUS Flexible + PVC Tube</td>
<td>Heat Resistant End 300°C *Glass Type Only</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Glass</td>
<td>SUS Flexible Tube</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Plastic</td>
<td>SUS Flexible + PVC Tube</td>
<td>Heat Resistant End</td>
</tr>
</tbody>
</table>

#### Model Codes

- **MRP12-1500V**: Minimum Bend R=30
- **MRP18-1500V**: Minimum Bend R=30
- **MRP25-1500V**: Minimum Bend R=70
- **MRP31-1000S**: Minimum Bend R=40
- **MRG2S 1500S**: Minimum Bend R=40
- **MRG10-1000S/1500S**: Minimum Bend R=40
- **MRG31-1000S/1500S/MRP31-1000S**: Minimum Bend R=40
- **MRP30-1500V**: Minimum Bend R=40
- **MRP40-1500S/1500S**: Minimum Bend R=40
- **MRG44-1000S/1500S**: Minimum Bend R=40
- **MRG53-1000S/1500S**: Minimum Bend R=40
- **MRG61-1000S/1500S**: Minimum Bend R=40
- **MRG48-1000S/1500S**: Minimum Bend R=40
- **MRG58-1000S/1500S**: Minimum Bend R=40
- **MRG67-1000S/1500S**: Minimum Bend R=40
- **MRG77-1000S/1500S**: Minimum Bend R=40
- **MRP48-1000S**: Minimum Bend R=40
- **MRG67-1000S/1500S**: Minimum Bend R=40
- **MRG77-1000S/1500S**: Minimum Bend R=40

*Use Quartz Adapter KA-03 When Using 100w Light Source*
In addition to our standard straight type light guides, many different options are available such as random assembly, heat resistant, and small diameter types.

These light guides are ideal for spot and coaxial illumination. Select a product to suit the application.

**Explanation of Model Code**

- **G**: Glass
- **P**: Plastic
- **S**: SUS Flexible Tube
- **HR**: Heat Resistant
- **HR VM**: Heat Resistant and Heat-resistant Material
- **SUS Flexible + Interlock**: Heat Resistant and Interlocking Type
- **L**: L-shape Type

**Straight Light Guides**

- **MSG3-1100S-SD**
  - Minimum Bend R=25
  - Product Code: A-0622
- **MSG4-1100S/2200S/MSP4-1100S**
  - Minimum Bend R=30
  - Product Code: A-0623
- **MSG6-1100S/2200S-RM**
  - Minimum Bend R=30
  - Product Code: A-0624

**Bifurcated Light Guides**

- **MWG-500R** (Interlocking Type)
  - Minimum Bend R=120
  - Product Code: A-0647
- **MWG-1000S-SD**
  - Minimum Bend R=30
  - Product Code: A-0648
- **MWG-1000SR**
  - Minimum Bend R=30
  - Product Code: A-0649
- **MWG-1000S**
  - Minimum Bend R=30
  - Product Code: A-0650
- **MWG-1000S-L**
  - Minimum Bend R=30
  - Product Code: A-0651

Use these light guides for applications where lighting from two directions is needed, for example when using a microscope or CCD camera, or for pattern recognition. Coatings and tube materials can be selected to suit the purpose. Interlock type tube material allows for any necessary bending and for fixing in position. SUS flexible (“goose neck”) type tube material allows you to move the light guide around freely in a small space.
**Fiber Optic Light Sources and Light Guides**

**MHAA MHAB Series**

### Multifurcated Light Guides

- A 3 to 4 multifurcated light guide can be used when it is necessary to illuminate an object from many different angles, for example in the case of IC pin inspection.

<table>
<thead>
<tr>
<th>Model</th>
<th>Product Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>M3G4-1000S</td>
<td>A-0663</td>
</tr>
<tr>
<td>M3G4-2000S</td>
<td>A-0664</td>
</tr>
<tr>
<td>M4G4-1000S</td>
<td>A-0665</td>
</tr>
<tr>
<td>M4G4-2000S</td>
<td>A-0666</td>
</tr>
<tr>
<td>M3G3-1000S-SD</td>
<td>A-0667</td>
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<tr>
<td>M3G3-2000S-SD</td>
<td>A-0668</td>
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<tr>
<td>M4G3-1000S-SD</td>
<td>A-0669</td>
</tr>
<tr>
<td>M4G3-2000S-SD</td>
<td>A-0670</td>
</tr>
</tbody>
</table>

### Plate Type Light Guides

- These plate type light guides do not require much space due to their slim, compact design.
- MORITEX’s unique reflected light inducer allows for even and bright illumination. They can be used for multi-observation inspections that require transmitted and uniform illumination such as backlighting electronic components or semi-transparent surfaces.

<table>
<thead>
<tr>
<th>Model</th>
<th>Product Code</th>
</tr>
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<tbody>
<tr>
<td>MPP30-1500S-2</td>
<td>A-0655</td>
</tr>
<tr>
<td>MPP60-1500S-2</td>
<td>A-0656</td>
</tr>
<tr>
<td>MPP90-1500S-2</td>
<td>A-0657</td>
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</tbody>
</table>

*Plastic light guides that cannot be used with 150W light sources: MPP30-1500S, MPP60-1500S, and MPP90-1500S. Use quartz adapter (KA-03) when using a 100W light source.
### Fiber Optic Light Sources and Light Guides

#### MHAA MHAB Series

### Line Light Guides

These light guides can be used when line illumination or line scan CCD lighting is necessary.

<table>
<thead>
<tr>
<th>Model</th>
<th>Product Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>MKG50-1500S</td>
<td>A-0684</td>
</tr>
<tr>
<td>MKG50×0.5W-1500S</td>
<td>A-0685</td>
</tr>
<tr>
<td>MKG180-1500S</td>
<td>A-0686</td>
</tr>
<tr>
<td>MKP180-1500S</td>
<td>A-0687</td>
</tr>
</tbody>
</table>

*150W light sources cannot be used with MKP180-1500S. Use quartz adapter (KA-03) when using a 100W light source.

### Condenser Lenses for Line Light Guides

**MLK-50**

- Cylindrical focusing lens with the MKG50 light guide achieves a highly uniform beam with greater illuminance.

**MLP-180**

- Cylindrical focusing lens with the MKP180/MKG180 light guides achieves a highly uniform beam with greater illuminance.

### Model Code Explanation

- **MK**
  - Fiber Type
  - Line Length
- **Length:** S
- **+0.5W:** 2-Branch

### Condenser Lenses Specifications

**MLK-50**

- Light source: 100W halogen light source (Volume: max)
- Fiber: MKG50-1500S for MLK-50
- MKP180-1500S for MLP-180

**MLP-180**

- Light source: 100W halogen light source (Volume: max)
- Fiber: MKG50-1500S for MLK-50
- MKP180-1500S for MLP-180
Long Width Line Light Guides

- Line light guides with a uniform line width of 180mm can be connected to produce seamless, uniform illumination of high intensity over long widths.
- These light guides are available in multiples of 180mm from 360mm to 1440mm long. Use these long width light guides for illumination when inspecting LCD, PDP, and other glass boards and substrates or sheet products with line CCD cameras. Please note that a variable number of light sources are needed for each individual unit depending on the length.

MFKG Series
Line Light Guides (glass fiber)

<table>
<thead>
<tr>
<th>Model</th>
<th>Fiber Type</th>
<th>Line Length(mm)</th>
<th>Required Quantity of Light Source</th>
<th>Product Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>MFKG1620-8000G-F1-3LD-HR</td>
<td>Glass</td>
<td>1620</td>
<td>3</td>
<td>G-0711</td>
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<tr>
<td>MFKG1260-6000G-F1-3LD-HR</td>
<td>Glass</td>
<td>1260</td>
<td>3</td>
<td>G-0712</td>
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<tr>
<td>MFKG1080-4500G-F1-3LD-HR</td>
<td>Glass</td>
<td>1080</td>
<td>3</td>
<td>G-0713</td>
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<td>MFKG900-3600G-F1-3LD-HR</td>
<td>Glass</td>
<td>900</td>
<td>3</td>
<td>G-0714</td>
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<tr>
<td>MFKG720-2700G-F1-3LD-HR</td>
<td>Glass</td>
<td>720</td>
<td>3</td>
<td>G-0715</td>
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<tr>
<td>MFKG600-2200G-F1-3LD-HR</td>
<td>Glass</td>
<td>600</td>
<td>3</td>
<td>G-0716</td>
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<tr>
<td>MFKG540-1800G-F1-3LD-HR</td>
<td>Glass</td>
<td>540</td>
<td>3</td>
<td>G-0717</td>
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<tr>
<td>MFKG400-1440G-F1-3LD-HR</td>
<td>Glass</td>
<td>400</td>
<td>3</td>
<td>G-0718</td>
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<tr>
<td>MFKG360-1200G-F1-3LD-HR</td>
<td>Glass</td>
<td>360</td>
<td>3</td>
<td>G-0719</td>
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<tr>
<td>MFKG320-800G-F1-3LD-HR</td>
<td>Glass</td>
<td>320</td>
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<td>G-0720</td>
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MFKP Series
Line Light Guides (plastic fiber)

<table>
<thead>
<tr>
<th>Model</th>
<th>Fiber Type</th>
<th>Line Length(mm)</th>
<th>Required Quantity of Light Source</th>
<th>Product Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>MFKP1620-8000P-SRM-L</td>
<td>Plastic</td>
<td>1620</td>
<td>3</td>
<td>P-0711</td>
</tr>
<tr>
<td>MFKP1260-6000P-SRM-L</td>
<td>Plastic</td>
<td>1260</td>
<td>3</td>
<td>P-0712</td>
</tr>
<tr>
<td>MFKP1080-4500P-SRM-L</td>
<td>Plastic</td>
<td>1080</td>
<td>3</td>
<td>P-0713</td>
</tr>
<tr>
<td>MFKP900-3600P-SRM-L</td>
<td>Plastic</td>
<td>900</td>
<td>3</td>
<td>P-0714</td>
</tr>
<tr>
<td>MFKP720-2700P-SRM-L</td>
<td>Plastic</td>
<td>720</td>
<td>3</td>
<td>P-0715</td>
</tr>
<tr>
<td>MFKP600-2200P-SRM-L</td>
<td>Plastic</td>
<td>600</td>
<td>3</td>
<td>P-0716</td>
</tr>
<tr>
<td>MFKP540-1800P-SRM-L</td>
<td>Plastic</td>
<td>540</td>
<td>3</td>
<td>P-0717</td>
</tr>
<tr>
<td>MFKP400-1440P-SRM-L</td>
<td>Plastic</td>
<td>400</td>
<td>3</td>
<td>P-0718</td>
</tr>
<tr>
<td>MFKP360-1200P-SRM-L</td>
<td>Plastic</td>
<td>360</td>
<td>3</td>
<td>P-0719</td>
</tr>
<tr>
<td>MFKP320-800P-SRM-L</td>
<td>Plastic</td>
<td>320</td>
<td>3</td>
<td>P-0720</td>
</tr>
</tbody>
</table>

Structure of Long Width Line Light Guides

- Condenser Lenses
- Main Body of Light Guides

Made-to-order

Example of Production Record

MFKG1620-8000G-F1-3LD-HR
Light Length: 8,000mm
Fiber Length: 1,620mm
Model: F1
Light Source: 3 light type large diameter cap / Special element attached / Heat resistant specification

Inspection of LCD glass panel inspection
Inspection of color filters
Inspection of sheet surface conditions

Features
- Improved uniformity through unique optical fiber manufacturing technology.
- Support for a line length of up to 3,600mm is possible.
- Ultra-uniform lighting is made possible for the condenser lens unit by using a uniquely designed optical system.
- Special optical elements that reduce light source irregularity can be installed in the light input bundle area. (Optional)
- The number of input dispersions and light source cap is specified by the customer.

Usage
- Inspection of LCD glass panel inspection
- Inspection of color filters
- Inspection of sheet surface conditions

Ultra-Uniform Fiber Illumination

MFKG-F1 Model
An ultra-uniform model for length light guides. This model has made ultra-even possible through improvement of the falling of light intensity at the connection area, as well as through unique technology in which the light guide incidence sides give uniformity to irregularities in the light source equipment.

Usage
- Inspection of LCD glass panel inspection
- Inspection of color filters
- Inspection of sheet surface conditions

Features
- Improved uniformity through unique optical fiber manufacturing technology.
- Support for a line length of up to 3,600mm is possible.
- Ultra-uniform lighting is made possible for the condenser lens unit by using a uniquely designed optical system.
- Special optical elements that reduce light source irregularity can be installed in the light input bundle area. (Optional)
- The number of input dispersions and light source cap is specified by the customer.

Example of Production Record

MFKG1620-8000G-F1-3LD-HR
Light Length: 8,000mm
Fiber Length: 1,620mm
Model: F1
Light Source: 3 light type large diameter cap / Special element attached / Heat resistant specification

Inspection of LCD glass panel inspection
Inspection of color filters
Inspection of sheet surface conditions

Features
- Improved uniformity through unique optical fiber manufacturing technology.
- Support for a line length of up to 3,600mm is possible.
- Ultra-uniform lighting is made possible for the condenser lens unit by using a uniquely designed optical system.
- Special optical elements that reduce light source irregularity can be installed in the light input bundle area. (Optional)
- The number of input dispersions and light source cap is specified by the customer.

Usage
- Inspection of LCD glass panel inspection
- Inspection of color filters
- Inspection of sheet surface conditions

Features
- Improved uniformity through unique optical fiber manufacturing technology.
- Support for a line length of up to 3,600mm is possible.
- Ultra-uniform lighting is made possible for the condenser lens unit by using a uniquely designed optical system.
- Special optical elements that reduce light source irregularity can be installed in the light input bundle area. (Optional)
- The number of input dispersions and light source cap is specified by the customer.

Usage
- Inspection of LCD glass panel inspection
- Inspection of color filters
- Inspection of sheet surface conditions
Dome Type Light Guide

- The fiber emission light from the 360° internal facing of the lower area inside the dome is reflected on the dome surface.
- This results in indirect illumination that provides uniform illumination of a work surface.
- Useful in instances when problems arise due to halo effect caused by illumination.

* A compact type (2 types: external diameter of Ø14 or Ø80) can also be manufactured.

Built-in Lamp Light Guides

- Because a ring light is integrated with a light source (Tungsten or halogen lamp) no-fiber routing is required, therefore making this unit ideal for illuminating robots, X-Y drive units, and other movable parts.

**Ring Main Body**

**Lamp House**

**Options**

- Cord, Power Supply

<table>
<thead>
<tr>
<th>Model</th>
<th>Fiber Type</th>
<th>Product Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>MDP120-1000S</td>
<td>Plastic</td>
<td>A-0719</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Model</th>
<th>Fiber Type</th>
<th>Ring Internal Diameter A (mm)</th>
<th>Ring External Diameter B (mm)</th>
<th>Adapter Mounting Pitch C (mm)</th>
<th>Fiber Illumination Angle D (°)</th>
<th>Mounting 4-M3 E (mm)</th>
<th>Product Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>MRG-L31</td>
<td>Compound Glass</td>
<td>ø16</td>
<td>ø85</td>
<td>10</td>
<td>10°</td>
<td>ø45</td>
<td>A-0725</td>
</tr>
<tr>
<td>MRG-L48</td>
<td>ø48</td>
<td>ø75</td>
<td>15</td>
<td>15°</td>
<td>ø60</td>
<td>A-0726</td>
<td></td>
</tr>
<tr>
<td>MRG-L61</td>
<td>ø61</td>
<td>ø90</td>
<td>15</td>
<td>15°</td>
<td>ø76</td>
<td>A-0727</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Model</th>
<th>Lamp Type</th>
<th>Product Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>MZ-01</td>
<td>Halogen</td>
<td>A-0728</td>
</tr>
<tr>
<td>MZ-02</td>
<td>Tungsten</td>
<td>A-0729</td>
</tr>
</tbody>
</table>
Light Guide Options

Option Attachment Drawing for Straight/ Bifurcated/ Multifurcated Light Guides

See corresponding pages for light guide compatibility, specifications, and option commodity codes.
For Straight/ Bifurcated/ Multifurcated Light Guides

Condenser Lenses

- These high performance condenser lenses were uniquely developed by MORITEX for optical fiber light guides. Through careful design and production, MORITEX ensures high quality performance at reasonable cost.

<table>
<thead>
<tr>
<th>Product Name</th>
<th>Product Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>ø31</td>
<td>ø60</td>
</tr>
<tr>
<td>ø53</td>
<td>ø80</td>
</tr>
<tr>
<td>ø48</td>
<td>ø75</td>
</tr>
<tr>
<td>ø61</td>
<td>ø90</td>
</tr>
</tbody>
</table>

Compatible model Dimension A (mm) Dimension B (mm)

- MRG-53
- MRG-61

Light Guide Options

Fiber Optic Light Sources
- For Straight/ Bifurcated/ Multifurcated Light Guides

Measuring Method:

- Position the illuminometer visually at the center of the illumination range (narrow or wide) and measure the illumination. Set the illumination of the light source to 30,000 lx for standard measurement (measurement using the standard light guide and measuring instrument).
- If the illumination of the light source set to 30,000 lx exceeds 99,900 lx (upper limit of the measuring instrument) in standard measurement, reduce the luminous energy to the measurable range and set the illuminance of the light source to 30,000 lx for standard measurement (measurement using the standard light guide and measuring instrument).

Central Illuminance

Illuminance Characteristic and Illumination Range of Condenser Lenses

<table>
<thead>
<tr>
<th>Model</th>
<th>Key Features</th>
<th>Product Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>ML-30</td>
<td>For straight or 2-branch (SMF-28)</td>
<td>A-8311</td>
</tr>
<tr>
<td>ML-40</td>
<td>For small diameter type (SMF-28)</td>
<td>A-8302</td>
</tr>
<tr>
<td>ML-50</td>
<td>For two lenses of two groups. Condenses into A uniform, centrally illuminated light guide output axis.</td>
<td>A-8303</td>
</tr>
<tr>
<td>ML-70</td>
<td>For two lenses of two groups. Condenses into A uniform, centrally illuminated light guide output axis.</td>
<td>A-8304</td>
</tr>
<tr>
<td>MLZ-100</td>
<td>For two lenses of two groups. Condenses into A uniform, centrally illuminated light guide output axis.</td>
<td>A-8305</td>
</tr>
<tr>
<td>MFS-60P</td>
<td>For two lenses of two groups. Condenses into A uniform, centrally illuminated light guide output axis.</td>
<td>A-8306</td>
</tr>
<tr>
<td>MFS-60</td>
<td>For two lenses of two groups. Condenses into A uniform, centrally illuminated light guide output axis.</td>
<td>A-8307</td>
</tr>
</tbody>
</table>

|MRF-10 | Color Temperature Conversion Filter | A-8311 |
| MRF-20 | Color Filter Set (R/G/Y) | A-8321 |
| MRF-30 | Diffusion Filter | A-8322 |
| MRF Filter Frame | MRF Filter frame | A-8323 |

* Each individual color filter (MLF-20) is 3,000JPY

By using a filter holder (FAF-10), the following filters can be attached:

- MRF-10
- MRF-20
- MRF-30

These filters are made for ML-50 condenser lenses.

Polarizing Filter for Straight Light Guides

ME-01

- Can be attached to either the filter holder (FAF-10) or various lenses.

<table>
<thead>
<tr>
<th>Model</th>
<th>Product Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>ME-01</td>
<td>A-8340</td>
</tr>
</tbody>
</table>

Side-Illumination Adapter

MQ-01

- Used to bend illumination 90° from the light guide output axis.

<table>
<thead>
<tr>
<th>Model</th>
<th>Product Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>MQ-01</td>
<td>A-8341</td>
</tr>
</tbody>
</table>

Light Guide Coupling Adapter

MAD-01

- This adapter joins the inside on the output side of one light guide to the input side of another.

<table>
<thead>
<tr>
<th>Model</th>
<th>Product Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>MAD-01</td>
<td>A-8347</td>
</tr>
</tbody>
</table>

Quartz Adapter

KA-03

- * Use this adapter when combining a 10mm light source and a plastic light guide.

<table>
<thead>
<tr>
<th>Model</th>
<th>Product Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>KA-03</td>
<td>A-8348</td>
</tr>
</tbody>
</table>

Inner Diameter Adapter

<table>
<thead>
<tr>
<th>Model</th>
<th>Compatible model</th>
<th>Diameter A (mm)</th>
<th>Diameter B (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MS-03</td>
<td>NMC-31</td>
<td>a31</td>
<td>a60</td>
</tr>
<tr>
<td>MS-04</td>
<td>NMC-46</td>
<td>a45</td>
<td>a75</td>
</tr>
<tr>
<td>MS-05</td>
<td>NMC-53</td>
<td>a53</td>
<td>a80</td>
</tr>
<tr>
<td>MS-06</td>
<td>NMC-61</td>
<td>a80</td>
<td>a95</td>
</tr>
</tbody>
</table>

* Specify the bore or internal diameter as required. The tolerance for the internal diameter ±0.1±0.
* Coating processing not performed for the internal diameter.

Filter Holder

FAF-10

- This filter holder fits a straight, bifurcated, or multifurcated light guide with irradiation port of ø8.0 in the outside diameter. A color temperature conversion filter (MLF-10), color filter (MLF-20 Series of R, G, and Y colors) and diffusion filter (MLF-30) can be installed.
System Chart for Ring Light Guides

- Diffusion Filter
  - MS-02
  - MS-03
  - MS-04
  - MS-05
  - MS-06
- Internal Diameter Adapter
  - MS-02
  - MS-03
  - MS-04
  - MS-05
  - MS-06

*Set internal dimensions (internal diameter tolerance +0.1/-0) as desired

Diffusion Filter
- Quartz Adapter
  - KA-03

Internal Diameter

Mounting Direction

Ring Light Guide

Quartz Adapter
  - KA-03

See corresponding pages for light guide compatibility, specifications, and option commodity codes.

-MD-02~06

When this reflection type diffuse lighting adapter is used, light from the ring light guide is directed outwards by reflection, which results in diffused and uniform illumination, ideal for laser mark recognition applications.

Diffusion Filter

- Model
  - MD-02
  - MD-03
  - MD-04
  - MD-05
  - MD-06

- Compatible Ring Light Guide Type
  - MRG31
  - MRG48
  - MRG53
  - MRG61
  - MRG75

- External Diameter (mm)
  - ø44
  - ø46
  - ø48
  - ø49
  - ø50

- Thickness (mm)
  - 7

- Product Code
  - A-8404
  - A-8405
  - A-8406
  - A-8407
  - A-8408

- Color Temperature Conversion Filter

- Model
  - MF-02
  - MF-03
  - MF-04
  - MF-05
  - MF-06

- Compatible Ring Light Guide Type
  - MRG31
  - MRG48
  - MRG53
  - MRG61
  - MRG75

- External Diameter (mm)
  - ø46
  - ø65
  - ø69
  - ø76
  - ø90

- Product Code
  - A-8364
  - A-8365
  - A-8366
  - A-8367
  - A-8368

- Polarizing Filter

- Model
  - MI-02
  - MI-03
  - MI-04
  - MI-05
  - MI-06

- Compatible Ring Light Guide Type
  - MRG31
  - MRG48
  - MRG53
  - MRG61
  - MRG75

- External Diameter (mm)
  - ø44
  - ø63
  - ø67
  - ø74
  - ø88

- Product Code
  - A-8384
  - A-8385
  - A-8386
  - A-8387
  - A-8388

- Short WD Adapter

- Model
  - MA-02
  - MA-03
  - MA-04
  - MA-05
  - MA-06

- Compatible Ring Light Guide Type
  - MRG31
  - MRG48
  - MRG53
  - MRG61
  - MRG75

- External Diameter (mm)
  - ø44
  - ø63
  - ø67
  - ø74
  - ø88

- Product Code
  - A-8384
  - A-8385
  - A-8386
  - A-8387
  - A-8388

- Reflection Type Diffuse Lighting Adapter

- Model
  - MDC-06

- Compatible Ring Light Guide Type
  - MRG31
  - MRG48
  - MRG53
  - MRG61
  - MRG75

- External Diameter (mm)
  - ø46
  - ø65
  - ø69
  - ø76
  - ø90

- Product Code
  - A-8406

- Ring Light Guide MRG Series is sold separately.

- Indirect Diffuse Lighting Adapter Series

- Quartz Adapter
  - KA-03

- Diffusion Filter
  - MK-02
  - MK-03
  - MK-04
  - MK-05
  - MK-06

- Color Temperature Conversion Filter
  - MF-02
  - MF-03
  - MF-04
  - MF-05
  - MF-06

- Polarizing Filter
  - MI-02
  - MI-03
  - MI-04
  - MI-05
  - MI-06

- Short WD Adapter
  - MA-02
  - MA-03
  - MA-04
  - MA-05
  - MA-06

- Internal Diameter Adapter
  - MS-02
  - MS-03
  - MS-04
  - MS-05
  - MS-06

- Indirect Diffuse Lighting Adapter
  - MD-02
  - MD-03
  - MD-04
  - MD-05
  - MD-06

- Reflection Type Diffuse Lighting Adapter
  - MDC-06

- Mounting Direction

- Setting this filter at the light irradiation end of a ring light guide suppresses illuminance irregularity, achieving a soft illumination effect.

- Optimum if working distance is short and gentle-angle illumination is necessary.

- Use to prevent halation by illumination or irregular reflection.

- Use for color imaging

- Completed Patent Registration

- Model
  - MD-02
  - MD-03
  - MD-04
  - MD-05
  - MD-06

- Compatible Ring Light Guide Type
  - MRG31
  - MRG48
  - MRG53
  - MRG61
  - MRG75

- External Diameter (mm)
  - ø44
  - ø46
  - ø49
  - ø50
  - ø51

- Thickness (mm)
  - 7

- Product Code
  - A-8404
  - A-8405
  - A-8406
  - A-8407
  - A-8408

- Model
  - MF-02
  - MF-03
  - MF-04
  - MF-05
  - MF-06

- Compatible Ring Light Guide Type
  - MRG31
  - MRG48
  - MRG53
  - MRG61
  - MRG75

- External Diameter (mm)
  - ø46
  - ø65
  - ø69
  - ø76
  - ø90

- Thickness (mm)
  - 5.5

- Product Code
  - A-8364
  - A-8365
  - A-8366
  - A-8367
  - A-8368

- Model
  - MI-02
  - MI-03
  - MI-04
  - MI-05
  - MI-06

- Compatible Ring Light Guide Type
  - MRG31
  - MRG48
  - MRG53
  - MRG61
  - MRG75

- External Diameter (mm)
  - ø44
  - ø63
  - ø67
  - ø74
  - ø88

- Thickness (mm)
  - 8.5

- Product Code
  - A-8384
  - A-8385
  - A-8386
  - A-8387
  - A-8388

- Model
  - MA-02
  - MA-03
  - MA-04
  - MA-05
  - MA-06

- Compatible Ring Light Guide Type
  - MRG31
  - MRG48
  - MRG53
  - MRG61
  - MRG75

- External Diameter (mm)
  - ø44
  - ø63
  - ø67
  - ø74
  - ø88

- Product Code
  - A-8384
  - A-8385
  - A-8386
  - A-8387
  - A-8388

- Model
  - MDC-06

- Compatible Ring Light Guide Type
  - MRG31
  - MRG48
  - MRG53
  - MRG61
  - MRG75

- External Diameter (mm)
  - ø46
  - ø48
  - ø51
  - ø52
  - ø53

- Thickness (mm)
  - 7

- Product Code
  - A-8409

- Completed Patent Registration

- Ring light guide MRG Series is sold separately.

- The ring light guide MRG-75-1000S/1500S is sold separately.
**Light Guide Data**

### Mechanical Characteristics and Environment Resistance

#### Mechanical Characteristics

- **Minimum Bend Radius**
  
The minimum bend radius of fiber optic light guides is determined mainly by the tube’s bend radius. It is also influenced by the diameter and length of the fiber optic bundle. If you bend a light guide over its limit, it cannot perform properly because transmitted light quantity decreases due to bending or disconnection of optical fiber. Note that bend radius is larger for optical fiber with a random sequence.

- **Durability for Repeated Bending**
  
Although durability of optical fiber for repeated bending varies depending on types, it is not very good overall. Optical fiber breaks or deteriorates because of twisting, friction with other optical fiber, and friction within tubing (coating for a fiber optic bundle). When this happens, transmitted light quantity reduces and a light guide cannot perform sufficiently. Durability for repeated bending is even lower for optical fiber with a random sequence. If more durability is required, use a flexible light guide (special order) with a different internal structure and special coating agent.

#### Environment Resistance

- **Heat Resistance**
  
The normal heat resistance ranges for raw plastic fiber, multi-component glass fiber, and quartz fiber are 70, 430°C (except oiling), and 1,000°C (except coating) respectively. Upper limit temperature for light guides ends differs according to the heat resistance of adhesives and coating materials used to protect optical fiber. Upper limit temperature for raw plastic fiber, multi-component glass fiber, and quartz fiber are 70°C, 200°C, and 200°C respectively.

  - If higher heat resistance is required, please use heat-resistant line guides (special order, 300°C for multi-component glass fiber and quartz fiber). If even higher heat resistance is required, quartz fiber light guides that are resistant to 500°C can be manufactured.

  - Life of raw optical fiber varies according to temperature that it is used at, and the amount and type of change in temperature. Please contact us before using light guides in special conditions.

#### Heat Resistance

<table>
<thead>
<tr>
<th>Optical Fiber</th>
<th>Heat Resistance of Base Fiber (°C)</th>
<th>End Heat Resistance of Standard Products (°C)</th>
<th>End Heat Resistance of Heat-Resistant Products (°C)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plastic</td>
<td>70</td>
<td>200</td>
<td>300</td>
</tr>
<tr>
<td>Multi-Component Glass</td>
<td>430 (Except Oil)</td>
<td>200</td>
<td>300</td>
</tr>
<tr>
<td>Quartz</td>
<td>1,000 or More (except Coating)</td>
<td>200</td>
<td>300, 100</td>
</tr>
</tbody>
</table>

- **Moisture Resistance and Water Resistance**
  
Moisture resistance and water resistance of optical fiber is not very high. If moisture/water resistance is required, please use light guides with appropriate specifications (special order). (Only multi-component glass fiber is available.) Graph 1 is the result of autoclave test. (One cycle = 20 min. at 112°C, 100% humidity, 2kg/cm² pressure → regular temperature, humidity, air pressure)

### Transmittance Rate and Luminosity Distribution Characteristics

#### Optical Fiber Data

<table>
<thead>
<tr>
<th>Fiber Diameter</th>
<th>Composite Glass</th>
<th>Plastic</th>
<th>Quartz</th>
</tr>
</thead>
<tbody>
<tr>
<td>5μm</td>
<td>200μm/800μm/1000μm</td>
<td>180μm/1000μm</td>
<td>200μm/800μm (Others)</td>
</tr>
</tbody>
</table>

- **Transmission at 10m or less**

- **Data of a bundle (not element wire data)**

- **For reference only. Consult MORITEX for details**

#### Spectral Transmission of Different Light Guides

- **Transmittance (%)**

- **Upper Temperature**

  - Standard Type: 200°C Special Order: 300°C

- **Duraability**

  - □: excellent - ○: acceptable - ×: not recommended

  - For reference only. Consult MORITEX for details

  - “Data of a bundle (not element wire data)”

  - “Transmission at 10m or less”

### Distribution Characteristics of Light Guide and Halogen Light Source

#### Length and Transmission of Light Guide

- **Transmissivity (%)**

- **Entrance Angle**

- **Upper Temperature**

  - Standard Type: 200°C Special Order: 300°C

- **Duraability**

  - □: excellent - ○: acceptable - ×: not recommended

  - For reference only. Consult MORITEX for details

  - “Data of a bundle (not element wire data)”

  - “Transmission at 10m or less”

### Light Guide and Halogen Light Source

#### Distribution Characteristics of Line Light Guide

- **Transmissivity (%)**

- **Entrance Angle**

- **Upper Temperature**

  - Standard Type: 200°C Special Order: 300°C

- **Duraability**

  - □: excellent - ○: acceptable - ×: not recommended

  - For reference only. Consult MORITEX for details

  - “Data of a bundle (not element wire data)”

  - “Transmission at 10m or less”

### Spectral Transmission of Different Light Guides

- **Transmittance (%)**

- **Upper Temperature**

- **Duraability**

  - □: excellent - ○: acceptable - ×: not recommended

  - For reference only. Consult MORITEX for details

  - “Data of a bundle (not element wire data)”

  - “Transmission at 10m or less”

- **Wavelength (nm)**

- **Fiber Diameter**

- **Brightness Level**

  - 32 - 256

- **No. of Cycles (Times)**

- **Brightness Level**

  - 32 - 256

- **Wavelength (nm)**

- **Fiber Diameter**

- **Brightness Level**

  - 32 - 256

- **Wavelength (nm)**

- **Fiber Diameter**

- **Brightness Level**

  - 32 - 256