Faster and more powerful than anything in its class!
Great Performance from a Sensor with No Blind Spots

The development of the F160 represents the arrival of a remarkable vision sensor that answers the needs of today's inspection line. It has the processing speed required for ultra high-speed lines and, using memory cards, has the capacity required for multi-product lines. Choose from a comprehensive selection of cameras for just the right type of inspection, and customize screens and operations to ensure optimum on-site operability. Initial setup can be performed even by inexperienced operators thanks to user-friendly conversational menus, and inspection performance has been comprehensively improved using new algorithms. All of OMROM's technology and know-how has come together to bring you the optimum vision sensor - the F160, a sensor you can use with confidence.

Creating New Possibilities with Incredible Speed

The F160 can be applied to ultra high-speed lines. It allows a greater range of inspections within the required tact time, contributing greatly to the improvement of inspection quality.

The newly-developed Double-speed Camera allows images to be captured up to 4 times faster than with previous cameras, and image processing can now be achieved 2 to 10 times faster than before. For example, gray search for the image shown in Picture 1 below can be performed for 5,000 items in a minute inspection lines. Also, because each individual inspection is made at high speed, the total inspection time for complicated applications has been dramatically reduced. This creates extra time for inspections that were not possible before, leading to significant improvements in inspection quality.

<table>
<thead>
<tr>
<th>New speed</th>
<th>Adaptability</th>
</tr>
</thead>
<tbody>
<tr>
<td>F160</td>
<td>New inspection functions</td>
</tr>
<tr>
<td>High speed</td>
<td>Simple operation</td>
</tr>
</tbody>
</table>

Creating New Possibilities with Incredible Speed

<table>
<thead>
<tr>
<th>Image capture time</th>
<th>Inspection processing time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Existing products</td>
<td>Up to 4 times as fast 2 to 10 times as fast</td>
</tr>
<tr>
<td>F160</td>
<td></td>
</tr>
</tbody>
</table>

*Example: More than one inspection item*
Use in a Wide Variety of Applications with a Greatly Reduced Installation Time

- **Data-handling Capacity Increased with Memory Cards**
  The F160 enables reductions in setup costs and allows a greater number of scenes to be used. The F160 is equipped with a memory card slot that allows the number of available scenes to be increased simply by inserting a card. With a 128-MByte card, for example, up to 1,000 scenes can be saved (see note). The construction of computer-based systems for exchanging scene data is no longer required.
  
  Note: The actual number of scenes that can be saved depends on the scene settings.

- **Increased Functionality for Storing Images**
  Up to 35 scenes of measurement images and improper images (i.e., images of improper products) can be stored. Also, because the most recent improper image can be viewed while performing measurement, problems in the inspection line can be analyzed without stopping production.

- **Screen Capture**
  Images of menu-setting screens, measurement screens, and improper screens can be captured and stored in the memory card. This feature is very useful for creating documentation.

A Wide Variety of Cameras

OMRON’s Double-speed Cameras, F150 Cameras, or F200/F300 Cameras can be connected. Use the camera that meets your speed, cost, and lighting requirements.

- **Double-speed Camera**
  F160-S1/SLC20/SLC50
  The shutter speed can be set to one of 8 settings from the Controller. Cameras with intelligent lighting or compact LED lighting are also included in the lineup.

- **F150 Camera**
  F150-S1A/SLC20/SLC50/SL20A/SL50A
  Compact and cost-effective. Models with intelligent lighting or compact LED lighting are available.

- **F200/F300 Camera**
  Existing cameras can be used by just moving them from the F200/F300 to the F160.

Customize Operations, Screens, and Output to Suit Your Requirements

- **Operations**
  - **Menu Masking**
    Incorrect operation can be prevented by masking menu items for settings that must not be changed. This function also simplifies the operations required to change menu settings and helps save time.
  
  - **Shortcut Keys**
    Frequently used operations can be allocated to specific console keys. Menus can be switched at the touch of a button.

- **Screens**
  - **Screen Messages**
    Screen messages can be changed to suit the on-site environment and can be displayed in any desired position on the screen.
  
  - **Drawing Figures**
    Figures such as lines, boxes, circles, and cross cursors can be drawn. It is also possible to change these figures at measurement positions.

- **Output**
  - **RS-232C Format**
    The output format can be changed to suit system specifications.
  
  - **Conversational Menus**
    The F160 also has menus designed in a conversational style so that even personnel with little experience can perform settings with ease.

- **I/O Monitor**
  The status of input and output terminals can be displayed on the screen. This function can be used for checking wiring when making adjustments to the system.

- **Password Setting**
  Passwords can be set to restrict the personnel allowed to operate the F160. This function helps to improve security and reduce incorrect operation.

- **Color Display**
  Messages and figures can be made easier to view by using different colors.
Inspection revolutionized with new algorithms.

- **QUEST Character Recognition**
  
  Use any type of character.

  The F160 uses OMRON's character recognition system - QUEST.

  Features:
  - The user does not have to register characters.
  - High-level of discrimination of similar characters.
  - Adapts to fluctuations in shape and size.

- **“Variable Box” Measurement for Defect Inspection**
  
  The measurement region can be set to change automatically when performing inspections for objects with varying sizes, such as electronic chip components. This feature ensures that the optimum measurement regions are always used for inspection.

- **Flexible Search**
  
  Using this method, matching is performed using more than one reference image and so the F160 can perform inspection for objects with varying shapes. This feature helps to reduce incorrect judgements.

- **A Variety of Functions Accessible with Easy-to-Use Menus**

  - **Rotation Search**
    
    Using this method, search is performed while the image is rotated. Processing is performed 10 times faster than with existing models. Using angle interpolation, it is possible to detect angles with a high degree of precision.

  - **Classification**
    
    A search is performed for more than one model, and the model number with the highest correlation is output. The flexible search function can be used for applications involving objects with different shapes.

  - **Edge Width**
    
    The positions of both edges of an object are detected with high accuracy, and from this the width of the object is calculated. It is not necessary to set expressions for calculating the width.

  - **Labeling**
    
    The number of labels (i.e., objects) inside the measurement region is counted. After they have been sorted according to area or center of gravity, the measurement data for specified labels is output.

  - **Position Displacement Compensation**
    
    Using only the outline of the object, 2-stage position compensation, and setting priorities for the compensation direction are all possible.

  - **Expressions**
    
    Judgement and data output based on a maximum of 32 expressions is possible. Up to 32 variables (representing other expressions) can be used, enabling more complex calculations.
**Standard Models**

<table>
<thead>
<tr>
<th>Name</th>
<th>Model number</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Controller</td>
<td>F160-C10E</td>
<td>NPN Input/Output</td>
</tr>
<tr>
<td>F160-C15E</td>
<td></td>
<td></td>
</tr>
<tr>
<td>F160-C15E</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Double-speed Camera</td>
<td>F160-SLC20</td>
<td></td>
</tr>
<tr>
<td>Camera with Intelligent Lighting</td>
<td>F160-SLC50</td>
<td></td>
</tr>
<tr>
<td>Camera only</td>
<td>F160-S1</td>
<td></td>
</tr>
<tr>
<td>Camera with Light</td>
<td>F150-SLC20</td>
<td></td>
</tr>
<tr>
<td>Camera only</td>
<td>F150-S1</td>
<td></td>
</tr>
<tr>
<td>Compatible F150 Cameras</td>
<td>F150-SL20A</td>
<td></td>
</tr>
<tr>
<td>Camera with Light</td>
<td>F150-SL20A</td>
<td></td>
</tr>
<tr>
<td>Camera only</td>
<td>F150-S5A</td>
<td></td>
</tr>
<tr>
<td>Camera</td>
<td>F200-S</td>
<td></td>
</tr>
<tr>
<td>F300-S</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Camera with Intelligent Lighting</td>
<td>F300-S2R</td>
<td>With separable head.</td>
</tr>
<tr>
<td>Frame-shutter Camera</td>
<td>F300-S3DR</td>
<td></td>
</tr>
<tr>
<td>Consolle</td>
<td>F160-KP</td>
<td></td>
</tr>
<tr>
<td>F150-KP</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Color LCD Monitor</td>
<td>F150-M05L</td>
<td></td>
</tr>
<tr>
<td>Monochrome CRT Video Monitor</td>
<td>F150-M09</td>
<td></td>
</tr>
<tr>
<td>Memory Card</td>
<td>F160-N64S</td>
<td>Memory capacity: 64 Mbytes</td>
</tr>
<tr>
<td>Console</td>
<td>F160-VSR3</td>
<td>For Double-speed Camera and compatible F150 Cameras, Cable length: 3 m</td>
</tr>
<tr>
<td>Camera Cable</td>
<td>F160-VSR4</td>
<td>For F300-S only, Cable length: 3 m</td>
</tr>
<tr>
<td>Monitor</td>
<td>F150-VM</td>
<td>Cable length: 2 m</td>
</tr>
<tr>
<td>Parallel Cable</td>
<td>F160-VP</td>
<td>Loose wire cable for parallel I/O connectors</td>
</tr>
</tbody>
</table>

**System Configuration**

1. Connect F200/S3DR only with the F160-VSR4/R3 camera cables.
2. Connect the F200/S only with the F150-S5A camera cables.
3. F160-C10E, F200-S, F300-S2R, and F300-S4R do not conform to the EC Directive.
Specifications

- **Controller: F160-C10E/C15E**
  - **Term** Specifications
  - **Conversational Menu Mode**
  - **Expert Menu Mode**
  - **Connectable Cameras**
    - F150-S1A/SL20A/SL50A/SLC20A/SLC50A, F160-S1/SLC20/SLC50A
    - F300-S/S2R/S3DR/S4R etc.
  - **Number of Connectable Cameras**
    - 1
    - 2
  - **Number of Pixels**
    - 512 x 484 (1 x V)
  - **Number of Scenes**
    - 32 (displays possible using Memory Cards)
  - **Image storage function**
    - Maximum of 32 images stored
  - **Filtering**
    - Smoothing (large, weak), edge enhancement, edge reduction, sharpen, rolloff, rolloff and vertical, rolloff, erosion, dilation, background suppression
  - **Position displacement compensation**
    - Set either automatically or manually
  - **Compensation directions**
    - X, Y, and (360°) directions
  - **Approx. 1 kg**
  - **Approx. 4.5 kg**
  - **(with no condensation)**
  - **Operating or storage: 35% to 85% (with no condensation)**
  - **10% to 90%**

- **Component Names and Functions**
  - **F160-C10E/C15E**

**Filtering**
- Smoothing (large, weak), edge enhancement, edge reduction, sharpen, rolloff, rolloff and vertical, rolloff, erosion, dilation, background suppression

**Position displacement compensation**
- Set either automatically or manually
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**Accessories**
- Instruction manual and 4 mounting brackets

**References**
- Instruction manual
- 4 mounting brackets
Lenses (for use with the F150-S1 and F150-S1A only)

- With reference to the optical graph below, select the lens and combination of Extension Tubes that give the required field of vision and camera distance.

### CCTV Lenses

<table>
<thead>
<tr>
<th>Model</th>
<th>Dimensions</th>
<th>Focus locking mechanism</th>
</tr>
</thead>
<tbody>
<tr>
<td>3Z4S-LE C815B</td>
<td>42 dia.</td>
<td>None</td>
</tr>
<tr>
<td>3Z4S-LE B1214D-2</td>
<td>50 dia.</td>
<td>None</td>
</tr>
<tr>
<td>3Z4S-LE C1614A</td>
<td>10 dia.</td>
<td>None</td>
</tr>
<tr>
<td>3Z4S-LE B2514D</td>
<td>15 dia.</td>
<td>None</td>
</tr>
<tr>
<td>3Z4S-LE B5014A</td>
<td>25 dia.</td>
<td>None</td>
</tr>
<tr>
<td>3Z4S-LE B7514C</td>
<td>32 dia.</td>
<td>None</td>
</tr>
</tbody>
</table>

### Extension Tubes

<table>
<thead>
<tr>
<th>Model</th>
<th>Contents</th>
</tr>
</thead>
<tbody>
<tr>
<td>3Z4S-LE EX-C6</td>
<td>A set of six Extension Tubes of thicknesses 40, 20, 10, 5, 1, and 0.5 mm respectively.</td>
</tr>
</tbody>
</table>

### Meaning of Optical Graph

The X axis of the graph shows the field of vision L (mm), and the Y axis shows the camera distance A (mm). The curves on the graph indicate different lenses, and the “t” values indicate the lengths of the Extension Tubes.

The values given in the optical graph are only approximate values. It is recommended that the camera distance is adjusted by sliding the Camera forward or backward to get the required field of vision for actual operation.

### Optical Graph

![Optical Graph Diagram]

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