Overview

• Compact image processing sensor for automatic inspection of colored objects
• A synthesis of high-performance image processing technology with simple, compact sensors
• For applications in manufacturing, the packaging industry and food and beverages industry
• Process-oriented implementation thanks to degree of protection IP65
• Integration in plant automation using digital inputs and outputs
• Quick familiarization with task thanks to the teach-in function

Benefits

• Eminently suitable for use in harsh industrial environments thanks to IP65 degree of protection
• Control of extremely high-speed processes possible thanks to the short inspection time of the sensor (approximately 30 inspections per second)
• Short changeover times thanks to simple model change
  - 16 inspection models can be taught
  - Inspection models are selected using digital inputs
• Flexible adaptation to the individual applications possible
  - Flexible adjustment of image window and operating distance
  - Flexible adjustment of parameters
• Fast commissioning
  - No image processing knowledge necessary
  - No programming necessary

Application

The SIMATIC MV220 image processing sensor is a complete image processing system for automatic inspection of color objects. It completes the product portfolio in the low-end image processing segment and high-end segment of conventional sensors.

Due to its high performance and simplicity, simple color inspection tasks are accessible that are too complex for the other image processing systems and which exclude themselves on grounds of cost.

The module is used in:
• Manufacturing and assembly systems for automobile industry suppliers and electronics
• Checking the presence of colored components

Design

The SIMATIC MV220 image processing sensor combines all the components required for the test in a compact housing:
• Rugged plastic/metal housing with IP65 degree of protection
• Digital camera for evaluation of color pictures:
  - CMOS chip
  - Resolution of 640 x 480 pixels
• Continuously adjustable lens:
  - Variable image field from 40 x 30 mm to 200 x 150 mm
  - Variable object distance from 50 mm to 250 mm
• Integrated white lighting
• Laser-based alignment tool
• Operator controls and displays:
  - Input keys
  - Display
  - LEDs
• M12 plug and socket with connections for:
  - Power supply
  - Digital inputs and outputs
• M4 fastening holes for mechanical fixing system for industrial sensors

Function

The following functions are available:
• Teaching in the models using one or more good parts
• Inspecting an object using the features extracted during teach-in
• Inspection can be performed on stationary and moving objects
• Inspection of the object supplies a good/bad statement in accordance with the set threshold values
• The results are output on two digital outputs:
  - OK: Compliance of the object with the saved model is better or equal to the set threshold value
  - N_OK: Compliance of the object with the saved model is worse than or equal to the set threshold value

Mode of operation

Manual alignment of the sensor is supported by a laser-based alignment tool. Two laser beams project two light spots into the image window of the sensor.

The sensor is calibrated to the ambient conditions, menu-driven, based on the templates supplied.

The inspection tasks are taught by presenting one or more good objects. The result of teach-in can be saved in one of 16 data records. The learned inspection task can then be tested immediately in test mode.

To start the evaluation mode you have to select a trained object data record and switch to "RUN" mode. The sensor starts the evaluation after triggering.

Depending on the trained threshold values and the actual evaluated values, the result is output to the OK or N_OK digital outputs for a good or bad result respectively.

The inspection task can be changed by selecting a different data record (model) in "RUN" mode.

Any sensor faults or errors in operating the sensor are reported in the diagnostics. Evaluation mode continues or is terminated depending on the type of error.
## Technical specifications

### MV220 Vision Sensor

**Image sensor**
- **Image acquisition**: CMOS sensor (color); 640 x 480 pixels
- **Size of the image field**: Continuously variable; depending on the object distance
  - For object distance of 50 mm: 40 x 30 mm
  - For object distance of 250 mm: 200 x 150 mm
- **Number of distinguishable colors**: Depending on inspection severity; 2048 colors / 64 colors / 16 colors
- **Inspection types**: Matching, recognition
- **Inspection triggering**: External; via digital input
- **Output of results**: "OK" and "N_OK"; via LEDs and digital outputs

**Lighting**
- **Light source**: Integrated white LEDs
- **Light intensity**: 800 LUX for object distance of 150 mm
- **External lighting**: Controllable via digital output

**Functions**
- **Operator control**: 4-character text display and 4 operator buttons
- **Alignment tool**: Using laser projection (laser class 2)
- **Number of models that can be stored**: 16; using digital inputs
- **Teach-in of models**: Using "Teach-in"
- **Diagnostics messages**: Using LED, text display and digital output
- **Operating status display**: Using LED and digital output
- **Disabling operation of keys**: Possible using digital input

**Interfaces**
- **Digital inputs**: 6 inputs, 24 V DC of which one trigger input (100 µs delay time) and 5 inputs for model selection and key disabling
- **Digital outputs**: 5 outputs; 24 V DC
  - Outputs for results, 500 mA
  - Outputs for diagnostics and external lighting, 100 mA
  - Outputs for operating status, 20 mA
- **Connection of digital inputs and outputs**: M12 socket and M12 plug, 8-pole
- **Mounting the sensor**: Using M4 fixing holes

### MV220 Vision Sensor

#### General Specifications

- **Supply voltage**
  - Rated value: 24 V DC
  - Voltage range: 20.4 to 28.8 V DC, with reverse polarity protection
- **Current consumption, max.**: 2 A
- **Material**
  - Housing: Plastic, aluminum
  - Lens cover: Plastic
- **Weight**: 113 x 35 x 90 mm
- **Degree of protection**: IP65 acc. to DIN EN 60529
- **Ambient temperature**: 0 – 45°C
- **Mechanical strength**
  - Oscillations: acc. to IEC61131-2
  - Shock: acc. to IEC61131-2

#### Selection and Ordering data

- **Order No.**: 6GF5 110-0AA00-0AA0

### Accessories

- **M12 cable plug**: With 5 m PUR cable, black, shielded, 8-pole (8 x 0.25 mm²) 3RX8 000-0CB81-1GF0
- **M12 cable plugs**: With 5 m PUR cable, black, shielded, 8-pole (8 x 0.25 mm²) 3RX8 000-0CD81-1GF0
- **Round-steel fixing bar**: Diameter = 12 mm, length = 200 mm, for fixing system for sensors 3RX7 315
- **Round-steel fixing bar**: Diameter = 12 mm, length = 300 mm, for fixing system for sensors 3RX7 316
- **Holding plate**: For accommodating the SIMATIC MV 220, use in connection with fixing bar; for fixing system for sensors 3RX7 326
- **Mounting base**: With 12 mm receptacle for sensor fixing system 3RX7 322
Machine Vision Systems
Vision Sensors
SIMATIC MV220

Dimensions

Schematics

MV220 Vision Sensor, X1 interface

MV220 Vision Sensor, X2 interface

MV220 Vision Sensor, socket pin assignment

MV220 Vision Sensor, plug pin assignment