

Reliable Detection of Changes
and Differences in Color

– Contributes to Automation of Equipment –

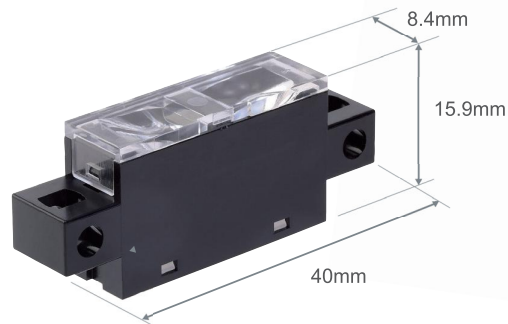


COLOR SENSOR



Reliable Detection of Changes and Differences in Color – Contributes to Automation of Equipment –

New Built-In Color Sensor



With labor shortages becoming more apparent, equipment productivity improvement and functionality are required in a variety of industries.

In the production process, there is an increasing need for visualization of the entire equipment through planned maintenance and remote monitoring.

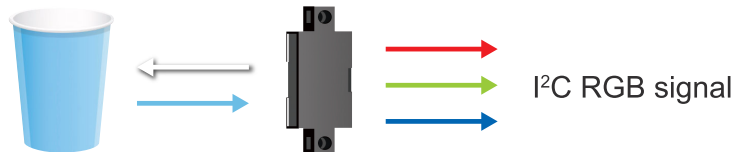
In the service industry, along with adapting to diversifying needs, improvement of productivity through automation is required to reduce workload and labor costs.

We propose a "color sensor" solution as one of the remedies for monitoring such conditions and diversifying needs. Since progressive deterioration of lubricating oil in machine tools can lead to equipment failure, it is possible to estimate when to replace the oil by monitoring the color of the lubricating oil.

Beverage servers can automate beverage selection according to cup color if the operation is color coded. OMRON possibly use the word 'supports' or 'understands the importance of' multi-functionality of equipment to meet diversifying needs. In addition, automation can improve the productivity of store operations. At the same time, automation can improve productivity if other tasks can be performed while the equipment is making beverages.



Color Sensor Principle



A color sensor uses a white LED as its light source to emit light and receive reflected light (the ratio of red, green, and blue is unique to each color) determined by the color of the detected object. The color sensor separates the reflected light received into red, green, and blue, and outputs the red, green, and blue data (RGB data) as voltage values using the I²C communication method.

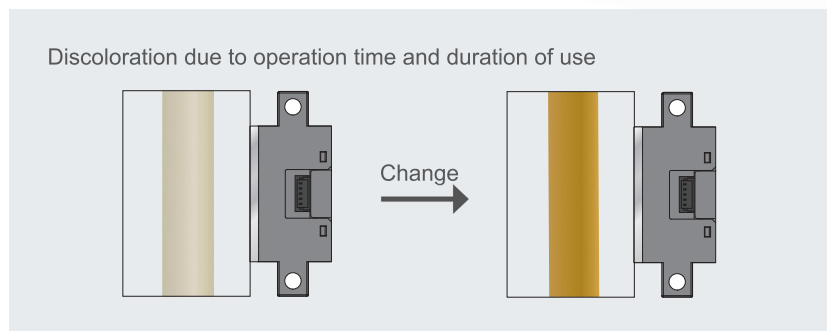
For example, in the case of red and yellow detected objects, the red, green, and blue output values from the color sensor are different for red and yellow reflected light by the white LED, allowing differentiation of red and yellow.



Proposal of Color Sensor Utilization

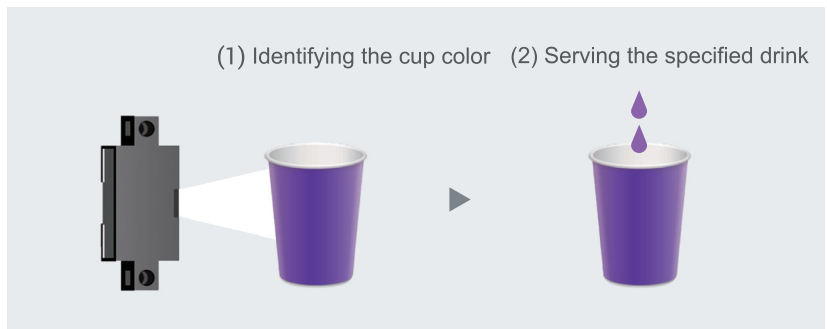
Liquid condition monitoring

A color sensor monitors changes in the color of the liquid and contributes to more efficient equipment maintenance.



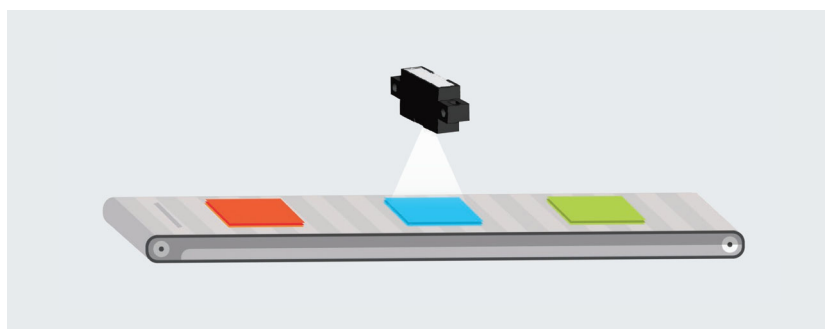
Multi-functionalization of equipment

The operation according to the color information of the detected object can contribute to multi-functionalization of the equipment and automation of business operations.



Stable operation of equipment

Detecting objects by color, rather than differences in the amount of reflected light as with conventional optical sensors, can contribute to stable operation of the equipment.



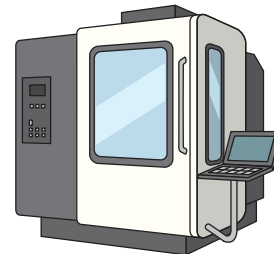
Liquid condition monitoring

A color sensor monitors changes in the color of the liquid which contributes to more efficient equipment maintenance.

Challenge

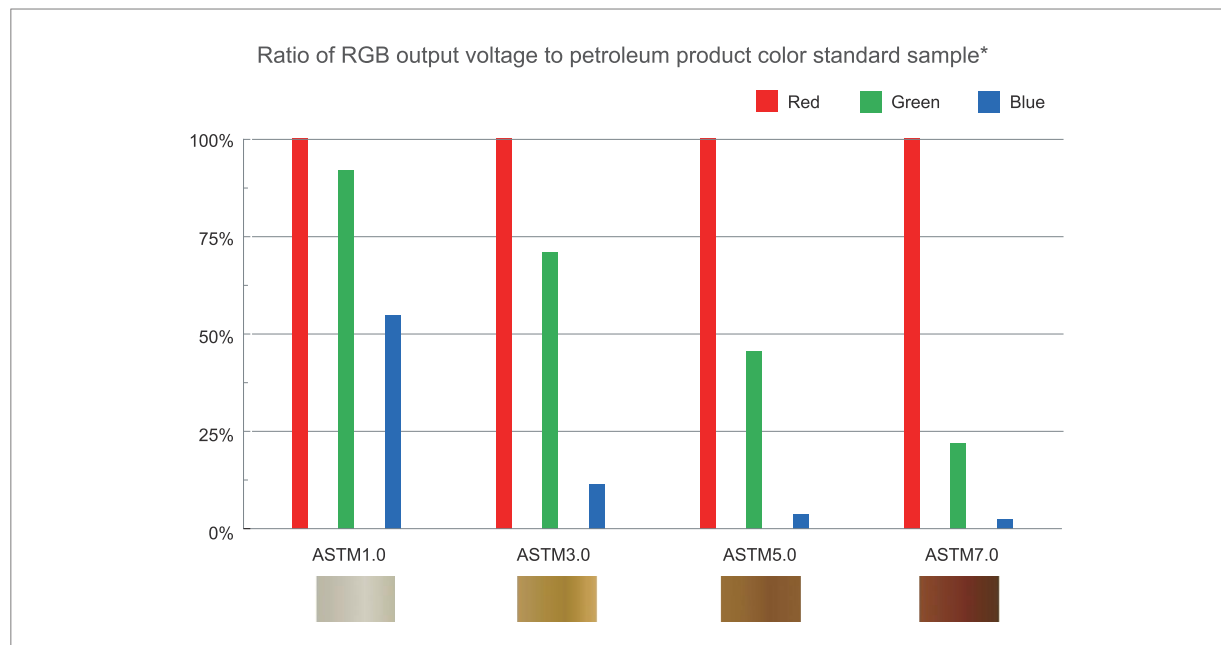
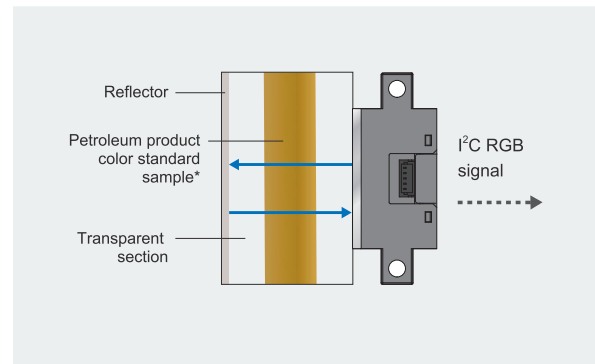
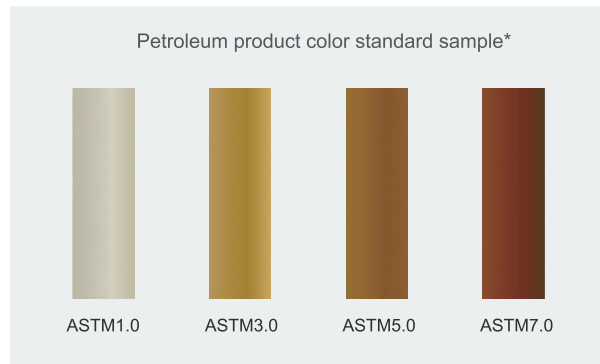
Deterioration of lubricating oil can cause equipment failure. If the timing of replacement is delayed due to the personal judgment criteria of each person in charge or the frequency of inspections, there is a risk of sudden breakdown or destruction of the equipment, which may result in loss of production for a certain period of time.

Example applications
Machine tool



Color sensor

By monitoring the color of the lubricating oil with a color sensor, the deterioration of the oil for each equipment can be quantitatively monitored by color, and the oil can be replaced at the optimum time without depending on personal criteria.



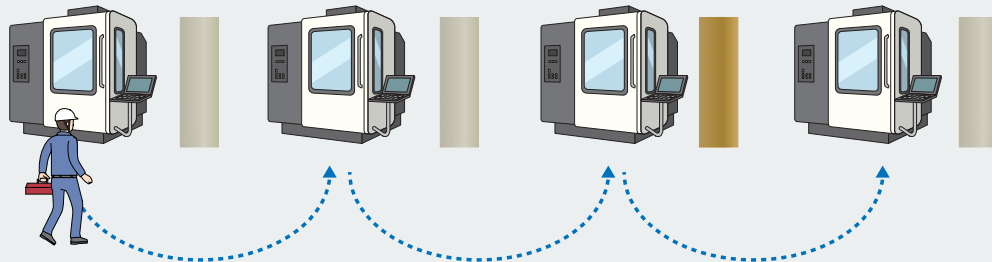
Using the petroleum product color standard sample*, the output voltage values of the color sensor were graphed as a ratio of green and blue to red.

*For ASTM color

Challenge

Lubricating oil degradation differs for each equipment depending on operating conditions, making the oil replacement complicated and increasing man-hours required for management.

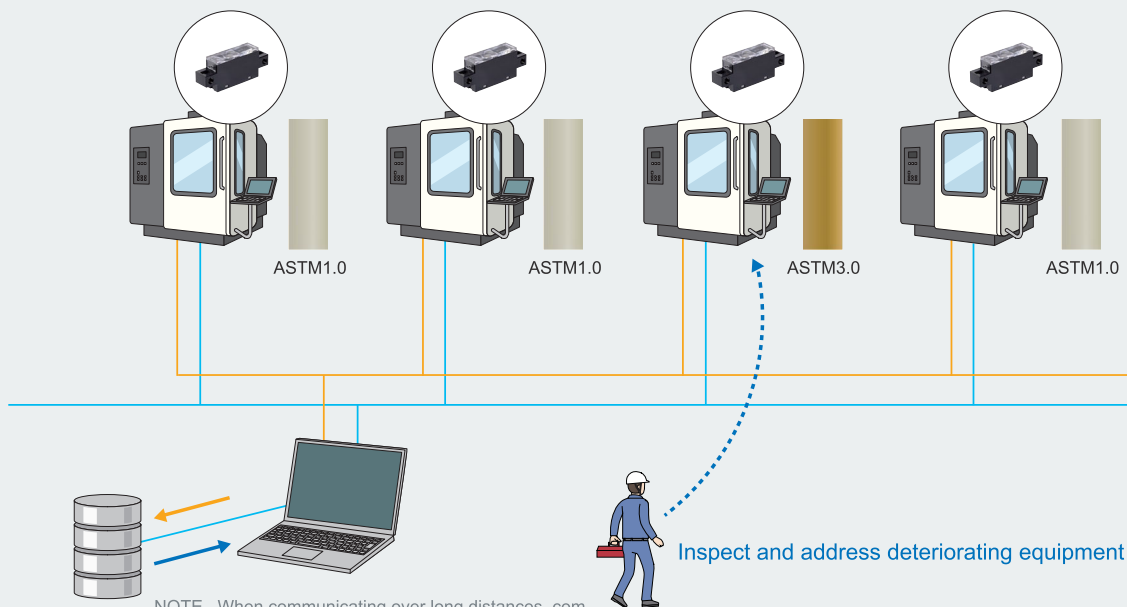
Since each equipment operates under different conditions and the lubricating oil deteriorates at different speeds, all equipment is visually inspected on a regular basis.



Color sensor

Color sensors can be used for remote monitoring. The deterioration of lubricating oil in each equipment can be monitored by color, contributing to optimization of oil replacement timing and efficiency.

Lubricating oil replacement for only the necessary equipment can be planned for optimal timing.



NOTE . When communicating over long distances, communication through a network such as that of machine tools is recommended.

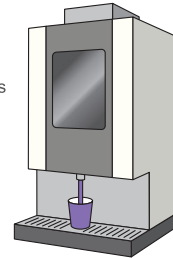
Multi-functionalization of equipment

Assists equipment multifunctionality and work automation by an operation based on the color information of the detected object.

Challenge

Presence/absence detection sensors can detect presence/absence, but cannot output signals according to type.

Example applications
Drink dispenser

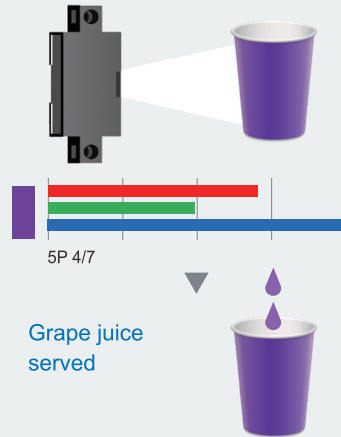


Color sensor

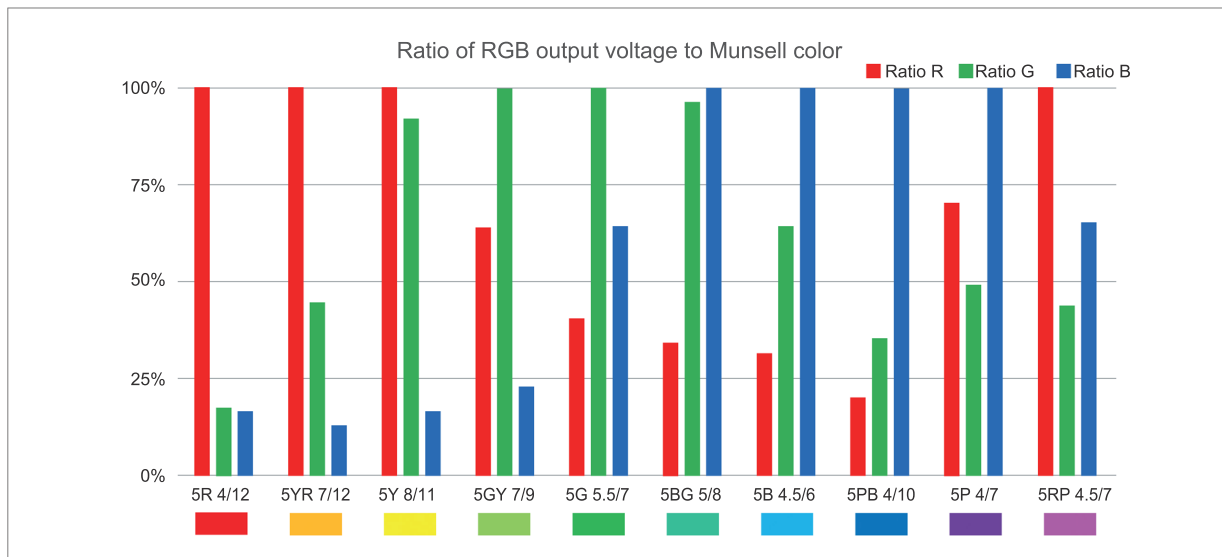
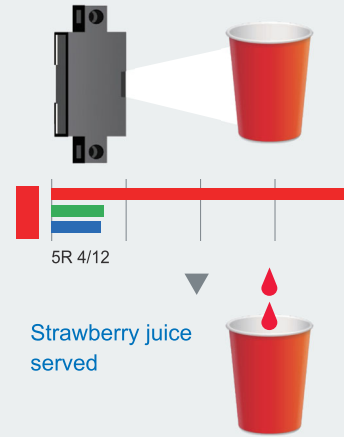
By color coding the equipment operation with signal output corresponding to the color of the color sensor, it is possible to build multi-functional equipment that meets diversifying needs.

For example, if the color of a purple cup is recognized, grape juice is served; if the color of a red cup is recognized, strawberry juice is served; and so on. It also reduces beverage disposal losses due to wrong button operation.

1. Cup color is purple



2. Cup color is red



Using Munsell color, the maximum output voltage value of the color sensor was set as 100%, and the ratio of each voltage value to the maximum voltage value was graphed. The ratio of RGB data changes according to the Munsell color.

Stable operation of equipment

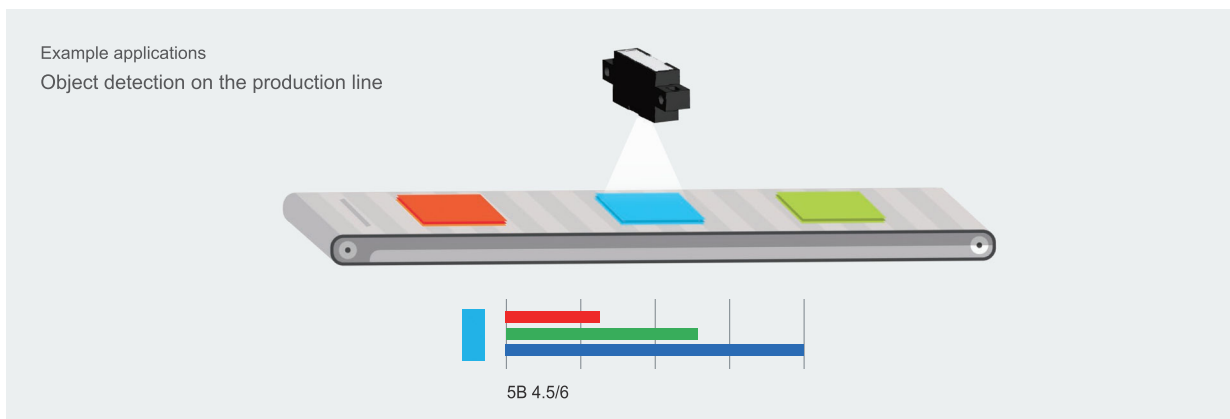
Provides stable operation of equipment by detecting the objects by color.

Challenge

In the case of conventional optical sensors, which detect the difference in the amount of reflected light, backgrounds may be detected or the object may not be stably detected due to the background.

Color sensor

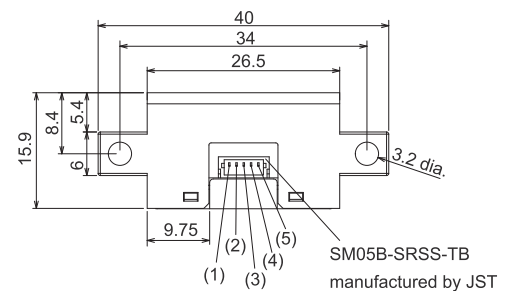
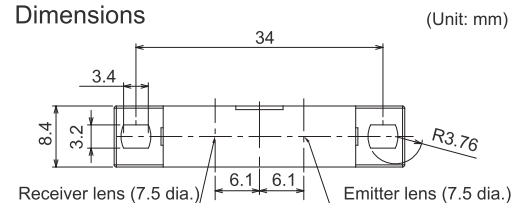
The presence or absence of an object to detect may be confirmed by using a signal output from a color sensor for each color of the detected object.



Product Specifications

Item	Model	B5WC-VB2322-1
Sensing distance		40 mm (white paper)
Light source		White LED
Power supply voltage		5 VDC±5%
Current consumption		18 mA max. (at 5.25 VDC)
Output type		I ² C communications supported
I ² C output		Output voltage value for red/green/blue: 0.45 V±20% (gray reference plate, at sensing distance of 40 mm), Output saturation voltage: Typ 2.75 V (output voltage range: 0 to 2.75 V), SCL/SDA input H voltage: 2.54 to 5.4 V, Input L voltage: 0.9 V max., SDA output L voltage: 0.44 V max. (at output current of 3 mA)
Sampling period		1 msec
Data refresh period		Sampling period (1 msec) x Average count (1 to 50 times)
Ambient temperature range		Operating: -10 to +70°C, Storage: -25 to +80°C (with no icing or condensation)

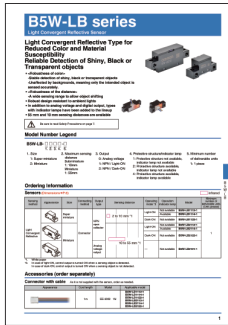
Dimensions



Terminal No.	Name
(1)	Vcc
(2)	SDA
(3)	SCL
(4)	Not used.
(5)	GND

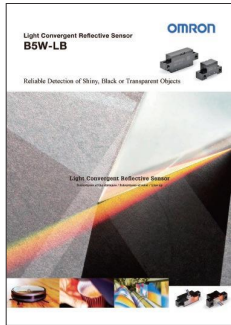


OMRON Optical Sensor Product Lineup



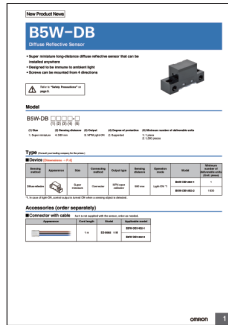
B5W-LB
Light Convergent Reflective
Sensor
Datasheet

Cat. No.: E590-E1



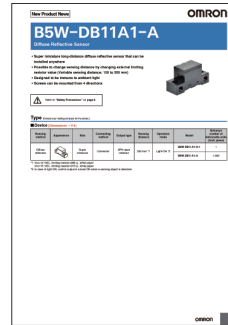
B5W-LB
Light Convergent
Reflective Sensor

Cat. No.: E589-E1



B5W-DB
Diffuse Reflective Sensor
Datasheet

Cat. No.: E601-E1



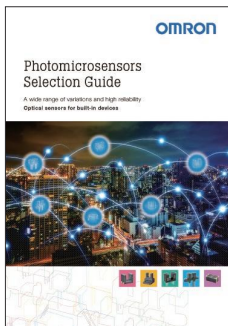
B5W-DB11A1-A
Diffuse Reflective Sensor
Datasheet

Cat. No.: E604-E1



EE-SX3173/4173-P
Photomicrosensor
(Transmissive)
Datasheet

Cat. No.: E586-E1



Photomicrosensors
Selection Guide

Cat. No.: Y211-E1

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