

# Industrial Automation Guide 2016



Industrial Products & Systems

# Targeted Technologies

## Creating maximum output with minimum input

By identifying the many ways of innovation in specific industries we developed the 'targeted technologies' concept. It's a way of thinking about technology in a prioritized format. Prioritized according to our customers' most pressing needs. The result? A set of solutions that make immediate impact on the core of our customers' businesses. A set of solutions that hit the target every time. Take a look at the examples on our website.

[industrial.omron.eu/technologies](https://industrial.omron.eu/technologies)





## PROplus Line

If you have a complex application or one where you need to address special needs, then the PROplus Line is the answer. That's because PROplus products are designed to be customisable.

The possibility to modify a PROplus product means that your application is unique. However, this does not mean that the PROplus Line is not a ready-made solution. On the contrary, it is a challenge.

For example, the PROplus 4000 series is designed to be modified to meet your needs. It can be modified to meet your needs in terms of I/O, communication, and more. This makes the PROplus 4000 series a challenge.

## EE-NH temperature controller

The new EE-NH series is the most powerful and precise temperature controller. It features a 16-bit A/D converter and a 16-bit D/A converter. It also has a 16-bit timer and a 16-bit counter. The EE-NH series is designed to be modified to meet your needs. It can be modified to meet your needs in terms of I/O, communication, and more. This makes the EE-NH series a challenge.

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## Technologies

### Creating maximum output with minimum input

Whatever type of automated machinery you are specialized in, you know that there are many ways to innovate. You are already aware that there are many possible areas for improvement. But where do you start? Where do you focus your efforts? Where can you make the biggest difference with the least amount of effort?

At Omron, we asked ourselves these questions too. And by identifying the answers in specific industries we developed the 'targeted technologies' concept. It's a way of thinking about technology in a prioritized format. Prioritized according to our customers' most pressing needs. The result? A set of solutions that make immediate impact on the core of our customers' businesses. A set of solutions that hit the target every time. Take a look at the examples below.

## Technologies

### Sysmac: the all-in-one platform

We know that machine builders prefer different product solutions for different challenges. But this can cause hierarchy headaches and communications issues. That's why we developed Sysmac: a single unified platform that is open, scalable, flexible, and totally focused on maximising the speed and flexibility of machines. A platform that integrates robotic, motion and sequential logic control into a single multitasking system.

[Learn more](#)



### 361°: the perfect match

When it comes to sensors and components, we know that our customers all have different needs. That's why our product development in this area is driven by the 361° Approach. It produces product families that offer a total all-round choice. From quality products suited to standard environments to specialist devices that can handle extremes. A full circle of choice, all with an extra degree of quality and proven reliability.

[Learn more](#)



## The 361° portfolio

**PROplus**  
PROplus products are designed for specific applications or customer demands.

[Learn more](#)



### LITE

LITE sensors are the most effective without any compromise in quality.

[Learn more](#)



### PRO

If you want extra performance in your sensors and components the Omron PRO Line is your perfect choice.

[Learn more](#)



## Product groups

### Sysmac controller

The Sysmac controller is the heart of the Sysmac system. It is the central unit that controls the entire system. It is designed to be modified to meet your needs. It can be modified to meet your needs in terms of I/O, communication, and more. This makes the Sysmac controller a challenge.

### Sensors

Sensors are the eyes and ears of the machine. They are designed to be modified to meet your needs. They can be modified to meet your needs in terms of I/O, communication, and more. This makes the sensors a challenge.

### Relays

Relays are the switches of the machine. They are designed to be modified to meet your needs. They can be modified to meet your needs in terms of I/O, communication, and more. This makes the relays a challenge.

### Robotics

Robotics are the hands of the machine. They are designed to be modified to meet your needs. They can be modified to meet your needs in terms of I/O, communication, and more. This makes the robotics a challenge.

### Drives

Drives are the muscles of the machine. They are designed to be modified to meet your needs. They can be modified to meet your needs in terms of I/O, communication, and more. This makes the drives a challenge.

## Related product news



With new G2 sensors, you only pay for what you need. Optimizing relative placement sensors in the new G2 range have been specifically designed to offer a cost-effective sensing solution or standard sensing conditions, making it unnecessary to buy more sensors than you actually need.

[Learn more](#)

## Related product news



ES16 - Omron's new photo sensors combine simplicity with performance.

Drawing on our experience of manufacturing over a million photoelectric sensors a year, we have developed a new generation of ES16 photo sensors that combine simple selection, an excellent level of reliability, versatility, rugged construction and value for money.

[Learn more](#)

## Related product news



With new G2 sensors, you only pay for what you need. Optimizing relative placement sensors in the new G2 range have been specifically designed to offer a cost-effective sensing solution or standard sensing conditions, making it unnecessary to buy more sensors than you actually need.

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# Welcome to our world

## Our best-in-class devices for your automation system

Welcome to Omron's world of advanced industrial automation. The INDUSTRIAL AUTOMATION GUIDE is your essential tool to select best-in-class devices for your automation system. It highlights our core competences in sensing, control, visualisation, motion and panel components.

Of course, Omron offers a much larger range of products than you can find on the attached DVD. For more information on services and company competence visit our website.

Here you will find:

- Latest product news
- Technical product specifications
- 2D / 3D CAD Library
- Customer references
- Technology concepts
- Supporting product documentation
- Knowledge Base - "myOmron"
- Events Calendar
- Contact information

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“To the machine the work of the machine,  
to man the thrill of further creation.”

Kazuma Tateisi, founder of Omron

# Omron at a glance

200.000 products ranging  
input, logic and output

Sensing, Control Systems, Visualization, Drives, Robots, Safety,  
Quality Control & Inspection, Control and Switching Components

7%

Investment in Research & Development

Innovation track  
record of 80 years

Top 150 global patent assignee

1.200 employees dedicated to R&D

11.000 + issued and pending patents

37.000

Employees worldwide

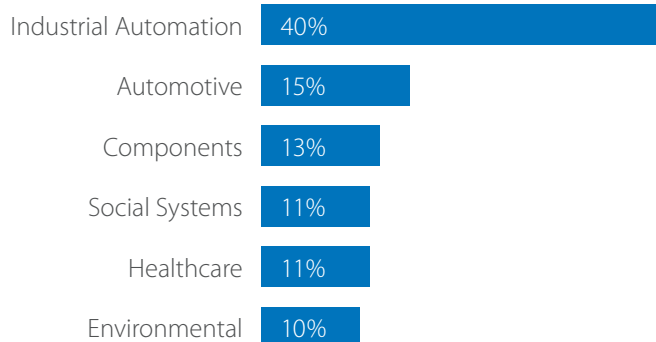
210

Locations worldwide

22

Countries in EMEA

Working for the  
benefit of society



## Close to your needs

Technical training & seminars, technical support, Automation Technology Centers, online community (MyOmron), online catalogues and technical documentation, customer service & sales support, inter-operability labs (Tsunagi), safety services, repairs.

# Your needs, our focus

## Solutions perfectly matching your needs

We asked ourselves: 'What do you need in sensors and components?' Well, first you need reliability. Then a variety and choice of performance levels. You may also want advanced functionality, with special features defined by you – or you may want standardized solutions, with highly competitive prices.

Whatever it is, it can all add up to a wish list that is difficult to fulfil. Until now. That's because our new 361° Approach not only provides a complete all-round offer without gaps, it also puts you at the very centre of the product selection process. It's an approach that leads to a Perfect Match – one with the extra degree of confidence that comes from choosing Omron.

### 361° in one view



Quality



Line-up



Application



Customization



Global availability



Specs

|                           | Quality   | Line-up                                       | Application  | Customization  | Global availability | Specs  |
|---------------------------|---|---|--|--|---------------------|--|
| <b>PRO<sup>plus</sup></b> | Premium   | Tailored                                      | Special  | Yes  | Yes                 | Application oriented                               |
| <b>PRO</b>                | Premium   | Complete                                      | Advanced   | Yes  | Yes                 | Above Standard                                     |
| <b>LITE</b>               | Premium   | Standard                                      | Basic  | No   | No                  | Basic  |
|                           | 'Quality' refers to the standard of manufacturing and the materials used – this translates into reliability | 'Line-up' refers to the number of model types | 'Application' indicates the complexity of the automation | 'Customization' is the possibility to modify the product |                     | 'Specs' refers to the choice of performance levels |



# The extra degree of advantage

## Three distinct lines of sensors and components

### Three distinct lines

361° Approach offers three distinct lines within each sensor or component product category. LITE products are cost-effective without any compromise in quality. PRO products represent the “install & forget” option, offering longer lifetime, higher protection, and more features. While PROplus products are designed for specific applications or customer demands.

### Optimized reliability

All three lines are backed by the Omron commitment to quality, so even when you need a price-competitive advantage, you can be confident that they will never let you down.

### Solutions that perfectly match your needs

The 361° Approach ensures that you can quickly and easily identify the perfect match solution to your needs – nothing more, nothing less.

### Optimized costs

Your sensor and component costs are also minimized – because it eliminates over-specification.

### Why an extra 1°?

The extra degree is what you get when you do business with Omron, and that means different things to different customers – all depending on their needs. For example, if you need specification advice, the extra degree is ‘service’. But ultimately, to everyone it means “an extra degree of confidence in the perfect match”.



# Sysmac: A fully integrated platform

## Integration and Functionality

Sysmac is an integrated automation platform dedicated to providing complete control and management of your automation plant. At the core of this platform, the Machine Controller series offers synchronous control of all machine devices and advanced functionality such as motion, robotics and database connectivity. This multidisciplinary concept allows you to simplify solution architecture, reduce programming and optimize productivity.



Machine Automation Controller

FACTORY  
AUTOMATION

MACHINE  
CONTROL



Motion



Filling line

- Motion Control: Integrated within the IDE, and operating in real-time
- Standard PLCopen Function Blocks plus Omron generated motion FB's
- Direct Synchronous control for Position, Speed and Torque



Safety



Assembly

- All safety related data is synchronized with the whole network
- Safety functions such as muting, guard locking, EDM and valve monitoring are simple to manage

- ✓ **One Integrated Development Environment software** for Configuration, Programming, Simulation and Monitoring



## Information



- Sysmac communicates in real-time with Databases such as SQL
- Secure Data: In the event of a server going down or losing communications, data is automatically stored in internal memory
- Sysmac operates with Databases at high speed [1000 table element/ 100 ms] ensuring realistic Big Data Processing to improve productivity and aid predictive maintenance etc.

### ✓ Integrated Automation Control:

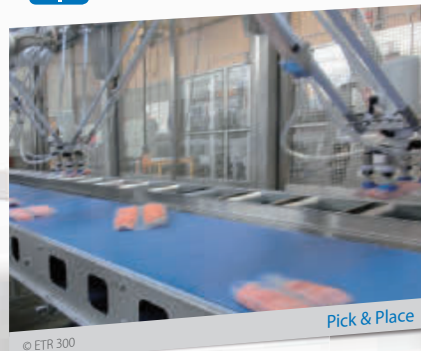
The Sysmac platform is scalable and provides the performance and functionality for a wide range of solutions from simple machines through to manufacturing cells

## Vision



- Higher resolution images available without increasing the vision processing time
- Shape search technology: Provides more stable and accurate object detection for Pick & Place projects

## Robotics



- Up to 8 Delta robots with one controller
- Time-based Robotic Function Blocks make programming easier

## Sensing



- Full control of the process parameter setting and predictive maintenance functions
- High precision detection and positioning data synchronized on the network

# Product selection table

|                              |   |  |  |   |
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| Motion & Drives              |  <p>96 Motion controllers</p>                    |  <p>112 Servo systems</p>                       |  <p>170 Robots</p>                                 |  <p>202 Frequency inverters</p>                |
| Sensing                      |  <p>236 Photoelectric sensors</p>                |  <p>278 Mark and Color sensors</p>              |  <p>284 Lightcurtains and area sensors</p>         |  <p>292 Fiber optic sensors and amplifiers</p> |
| Quality control & Inspection |  <p>370 Inspection &amp; Ident systems</p>     |  <p>426 Measurement sensors</p>               |  |   |
| Safety                       |  <p>462 Emergency stop and control devices</p> |  <p>472 Safety limit switches</p>             |  <p>480 Safety door switches</p>                 |  <p>506 Safety sensors</p>                   |
| Control components           |  <p>574 Temperature controllers</p>            |  <p>596 Power supplies</p>                    |  <p>614 Uninterruptible power supplies (UPS)</p> |  <p>622 Timers</p>                           |
| Switching components         |  <p>682 Electromechanical relays</p>           |  <p>696 Solid state relays</p>                |  <p>706 Low voltage switchgear</p>               |  <p>722 Monitoring products</p>              |
| Software                     |  <p>766 Software</p>                           |  |  |   |

# Sensing

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*Quick Link*



# Sensing

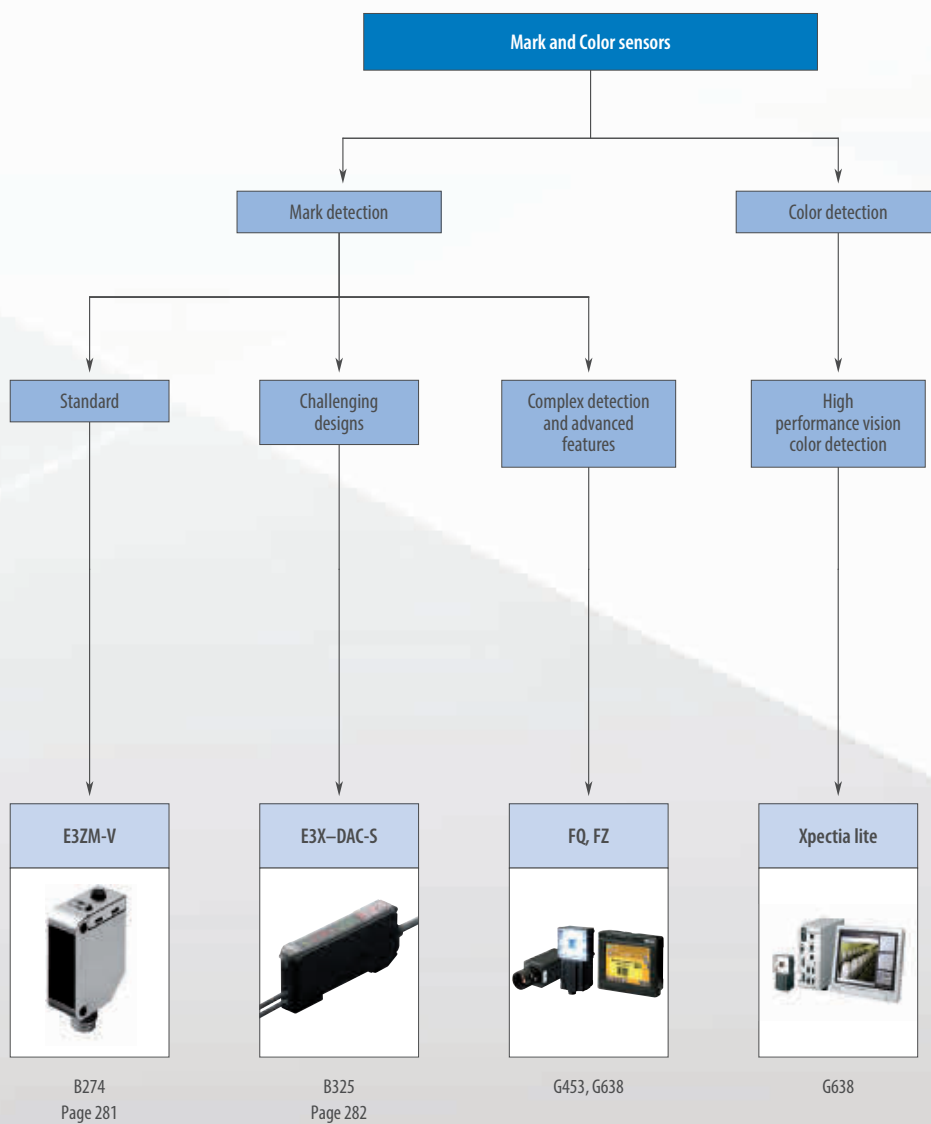
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## FAST ADAPTION TO CHANGING PACKAGINGS


### Choose the performance you need

Packaging machines have to adapt quickly to a large variety of different packaging designs with minimal change-over time and no quality loss. For sensors detecting registration marks or colors this requires flexibility and simplicity in handling while keeping the precision and operational stability. At OMRON we closely work together with leading packaging machine makers to evaluate the requirements for sensors from commonly used packaging material as well as most critical designs or materials. Our portfolio is set up to balance the performance and budget requirements in these situations ... simply choose the performance you need.

- Reliable mark detection even in changing environmental conditions during machine operation
- Fast and easy setup up after packaging material exchange
- Performance levels fitting the machine value concept



| Type               | Standard print mark detection   | Challenging designs   | Complex detection and advanced features   |
|--------------------|---|---|---|
|                    |  |  |  |
| Model              | E3ZM-V  | E3X-DAC-S   | FQ, FZ  |
| Key feature        | White LED, stainless steel housing  | White LED, RGB ratio comparison and extended functionality                        | High performance vision inspection functionality                                    |
| Detection distance | 12±2 mm   | 5–50 mm   | See QUALITY CONTROL AND INSPECTION GUIDE  |
| Response time      | 50 µs   | 60 µs   |   |
| Page/Quick Link    | 281/B274  | 282/B325  | G453, G638  |

| Type                                 | High performance vision color detection   |   |
|--------------------------------------|---|---|
|                                      |  |   |
| Model                                | Xpectia lite  |   |
| No of simultaneous color inspections | 1 to 128  |   |
| Output                               | Color detected – digital out  | ■ |
|                                      | RGB value out (via ethernet)  | ■ |
|                                      | HSI value out (via ethernet)  | ■ |
| Tolerance adjustment                 | Teachable   | ■ |
|                                      | Manually adjustable   | ■ |
|                                      | Advanced  | ■ |
| Page/Quick Link                      | G638  |   |



Registration mark sensor in compact stainless steel housing

- The registration mark detection sensor in a compact stainless steel housing provides reliable detection of all common registration marks in food packaging applications.
- White LED for stable detection of differently colored or black print marks
  - SUS 316L stainless steel housing
  - Easy-to-use teach-in button or remote teach
  - Fast response time of 50  $\mu$ s

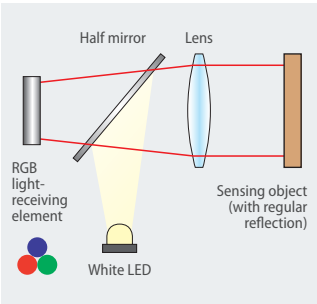
Ordering information

| Sensor type | Sensing distance | Connection method |   |     |   | Order code*1 |             |
|-------------|------------------|-------------------|---|-----|---|--------------|-------------|
|             |                  |                   |   |     |   | NPN output   | PNP output  |
|             | 12 $\pm$ 2 mm    | —                 | — | 2 m | — | E3ZM-V61 2M  | E3ZM-V81 2M |
|             |                  |                   | — | —   | — | E3ZM-V66     | E3ZM-V86    |

\*1 The output configuration (ON or OFF when mark is detected) is teachable. Common operation is output is ON when mark is detected.

Specifications

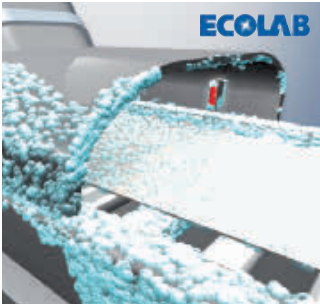
| Item                       | NPN   | E3ZM-V6_  |
|----------------------------|---|---|
|                            | PNP   | E3ZM-V8_  |
| Light source (wave length) |   | White LED (450 to 700 nm)   |
| Power supply voltage       |   | 10 to 30 VDC $\pm$ 10%, ripple (p-p) 10% max.   |
| Protective circuits        |   | Reversed power supply polarity protection, output short-circuit protection, Reversed output polarity protection, and mutual interference prevention |
| Ambient temperature        | Operating                                   | –25 to 55°C   |
|                            | Storage                                     | –40 to 70°C (with no icing or condensation)   |
| Response time              |   | 50 $\mu$ s  |
| Degree of protection       |   | IEC: IP67, DIN 40050-9: IP69K   |
| Material                   | Case  | SUS316L   |
|                            | Lens  | PMMA (polymethylmethacrylate)   |
|                            | Display                                     | PES (polyether sulfone)   |
|                            | Sensitivity adjustment and operation switch | PEEK (polyether ether ketone)   |
|                            | Seals                                       | Fluoro rubber   |



Coaxial optical system with white LED



Remote teaching



Detergent resistant



Reliable detection of standard or semi-transparent marks at normal or high speed





### E3X-DAC-S high functionality mark detection sensor

The E3X-DAC-S provides reliable mark detection for standard as well as challenging applications. The separate sensing head setup allows the easy adaption to the mounting requirements even when space is crucial. The remote amplifier provides easy teaching for standard applications but also on demand full control over the detection performance for most challenging applications.

### Ordering information

#### Pre-wired

| Item            | Functions  | Order code (for pre-wired types with 2 m cable length) |             |
|-----------------|--|--|-------------|
|                 |  | NPN output   | PNP output  |
| Standard models | Timer, response speed change   | E3X-DAC11-S  | E3X-DAC41-S |
| Advanced models | Same as standard models + simultaneous determination (2 colors)<br>AND/OR output, remote setting | E3X-DAC21-S  | E3X-DAC51-S |



### Specifications

| Item                       |                       | Standard models<br>E3X-DAC1, E3X-DAC4<br>E3X-DAC6, E3X-DAC8   | Advanced models<br>E3X-DAC2, E3X-DAC5   |
|----------------------------|-----------------------|---|---|
| Light source (wave length) |                       | White LED (420 to 700 nm)   |   |
| Number of registered marks |                       | 1   | 2 (simultaneous determination)  |
| Power supply voltage       |                       | 12 to 24 VDC $\pm$ 10%, ripple (p-p) 10% max.   |   |
| Protective circuits        |                       | Power supply reverse polarity protection, output short circuit protection, output reverse polarity protection, mutual interference prevention         |   |
| Ambient temperature        | Operating             | -25 to 55°C   |   |
|                            | Storage               | -30 to 70°C (with no icing or condensation)   |   |
| Response time              | Super-high-speed mode | Operation or reset: 60 $\mu$ s  | Operation or reset: 120 $\mu$ s   |
|                            | Standard mode         | Operation or reset: 1 ms  | Operation or reset: 2 ms  |
| Sensitivity setting        |                       | Teaching (one-point teaching or teaching with/without workpiece) or manual adjustment   |   |
| Functions                  | Detection mode        | Automode (automatic selection of C-mode or I-mode)<br>C-mode (RGB ratio)<br>I-mode (light intensity)<br>Mark mode (Intensity and ratio of RGB values) |   |
|                            | Operating mode        | ON for match (ON for same color as registered color) or ON for mismatch (ON for different color from registered color)                                |   |
|                            | Timer function        | Timer type: OFF delay, ON delay, or one-short<br>Timer time: 1 ms to 5 s (variable)   |   |
|                            | Control outputs       | –   | Output for each channel, AND output, and OR output                                      |
|                            | Remote control        | –   | One-point teaching, teaching with/without workpiece, zero reset, and light emission OFF |
| Degree of protection       |                       | IEC60529 IP50 (with protective cover attached)  |   |

### Recommended fiber heads

| Sensor type | Size            | Recommended operating distance (mm) | Comment                                      | Order code             |
|-------------|-----------------|-------------------------------------|--|------------------------|
|             | M6              | 5                                   | Standard mark detection                      | E32-CC200 2M           |
|             | 29x25.5x11.2 mm | 40 to 50                            | Long distance – plastic                      | E32-L15 2M             |
|             | 23x20x9 mm      | 25 to 30                            | Long distance – metal                        | E32-A09 2M             |
|             | M3              | 10                                  | High precision mark detection (dia 1mm spot) | E32-EC31 2M + E39-EF51 |

Fiber amplifier connectors

| Shape   | Type                      | Comment   | Order code          |
|---|---------------------------|---|---------------------|
|  | Fiber amplifier connector | 2 m PVC cable                                   | E3X-CN21            |
|  |                           | 30 cm PVC cable with M12 plug connector (4 pin) | E3X-CN21-M1J 0.3M   |
|   |                           | 30 cm PVC cable with M8 plug connector (4 pin)  | E3X-CN21-M3J-2 0.3M |



Easy to operate detection of challenging or colored registration marks.



Detection of challenging registration marks e.g. with texts or graphics.