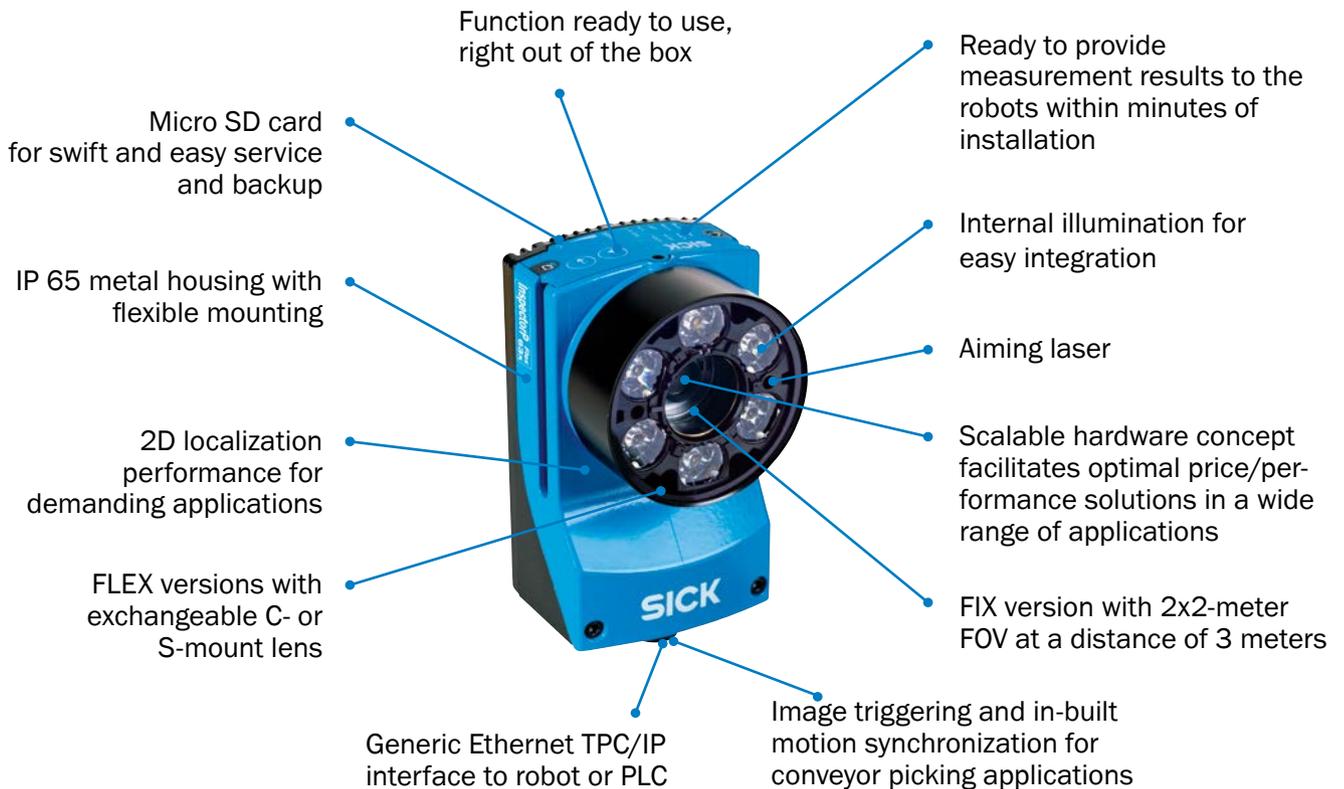# PLOC2D

EASY TO USE AND FLEXIBLE
PART LOCALIZATION SENSOR SYSTEM

Robot guidance systems

SICK

Sensor Intelligence.

POWERFUL AND FLEXIBLE AUTOMATION. READY TO USE, RIGHT OUT OF THE BOX.

Wave goodbye to transferring parts in tailored fixtures and trays, and say hello to automatic 2D part localization instead. With the SICK PLOC2D sensor system, you can manage rapid production change-overs, simplify introduction of new parts, and achieve an overall higher level of flexibility in your production system.

Function ready to use, right out of the box

Ready to provide measurement results to the robots within minutes of installation

Micro SD card for swift and easy service and backup

Internal illumination for easy integration

IP 65 metal housing with flexible mounting

Aiming laser

2D localization performance for demanding applications

Scalable hardware concept facilitates optimal price/performance solutions in a wide range of applications

FLEX versions with exchangeable C- or S-mount lens

FIX version with 2x2-meter FOV at a distance of 3 meters

Generic Ethernet TPC/IP interface to robot or PLC

Image triggering and in-built motion synchronization for conveyor picking applications

The PLOC2D is a vision sensor system for the localization of parts in 2D. The system is equipped with a high-quality imager combined with a high-performance localization algorithm for reliable and fast part localization. The sensor system is self-contained in the IP 65 housing, connects directly to the robot controller or PLC, and is ready to use out of the box. The web-based user interface is designed and tailored for easy setup and maintenance in the production line.

PERFORMANCE OR EASE OF USE? WHY NOT BOTH?

Automation equipment needs to demonstrate the right balance between performance and usability. It must keep up with demanding production rates, while at the same time be user-friendly and flexible enough to meet any unexpected challenges that may arise. The PLOC2D is designed around the powerful SICK InspectorP camera – with a uniquely user-friendly interface at its core.

Future-proof production with the PLOC2D

The PLOC2D system is available in different versions, based around different InspectorP cameras. Whatever your application, you can always find a solution for your specific needs. Each PLOC2D version offers great flexibility and scalability. With an Ethernet TCP/IP robot- and PLC interface, it lives up to the Industry 4.0 vision, making integration into any present or future production system a breeze.

Up and running in minutes

The PLOC2D part localization sensor system offers a whole new level of flexibility. Right out of the box, it can be set up and configured for your application in just a matter of minutes, without the need for specialist machine vision expertise. Once configured, it can operate as a stand-alone unit for everything from localization of tiny electronic components to handling of car parts.

Make it yours

The PLOC2D is available in both a pre-calibrated FIX version, and FLEX versions with open optics where you select the lens and illumination for your specific application. The PLOC2D can be configured from any computer connected through a web browser. All functionality for integration with most robot brands and PLCs is included.
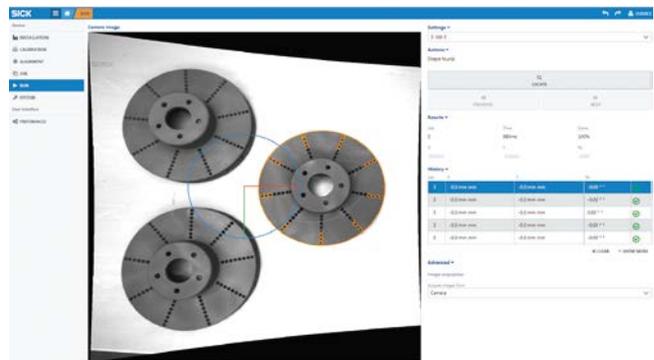
WHATEVER YOUR APPLICATION, PLOC2D CAN PLAY ITS PART

GET TO KNOW THE PLOC2D'S KEY BENEFITS

With its intuitive and innovative user interface, the PLOC2D's functionality can easily be tailored for use in any part localization application. Setup and configuration can be performed in a matter of minutes, without the need for an automation specialist.

Web browser user interface
Simply connect the PLOC2D to an external PC, laptop or tablet and start configuring it in the web browser-based interface. There's no need to install software on external units – everything is included in the PLOC2D – and backup is a breeze thanks to its SD card port.

FLEX and FIX versions
PLOC2D is available both as a FIX version, pre-calibrated from SICK, as well as FLEX versions with open optics where you select the lens and illumination tailored for the application. The FLEX versions are easy to calibrate with the calibration templates available from SICK.

Simple configuration with EasyTeach
In order to integrate the PLOC2D, it first has to be aligned with your robot coordinate system. The shape of the object the PLOC2D will be localizing is then specified with the unique EasyTeach function. The outlines of the object can easily be "painted" with the EasyTeach tool, directly in the interface.

Motion synchronization
The PLOC2D can be used in many conveyor picking applications, thanks to its functions for motion synchronization, effective localization of multiple simultaneous parts, and rapid transfer of localization data to the robot.

Sorting functionality
The PLOC2D can be configured to identify and localize specific taught-in objects even when they are placed among other types of objects.

UP AND RUNNING IN MINUTES

With the PLOC2D, a new application can be configured in as little as five minutes, using the intuitive user interface and the EasyTeach function. The precise and rapid calibration and alignment functions ensure swift cloning and/or replacement of sensors, as configuration data can be re-used between devices.
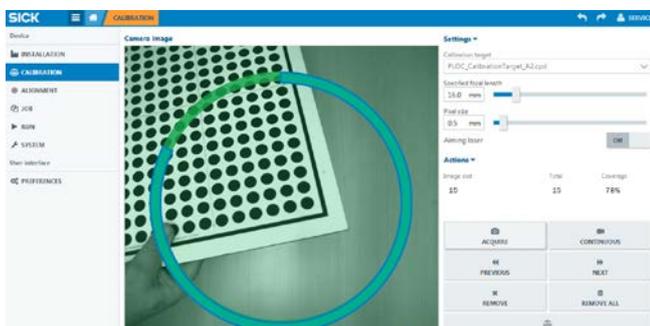

1. Calibrate

The PLOC2D is calibrated within one minute by moving the calibration template through the PLOC2D's field of view. The user interface provides continuous feedback on progress.
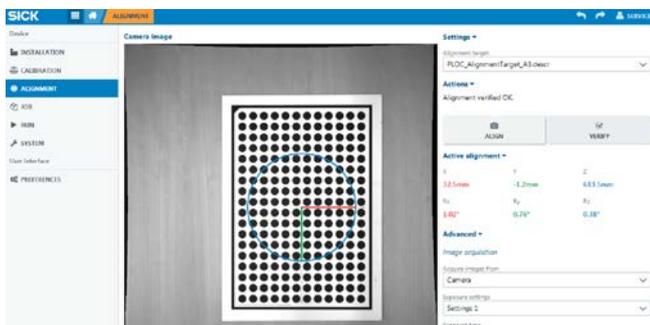
2. Align

The calibration template is placed on the surface where parts will be located. A camera image is grabbed and the positions of reference marks on the template are located. The robot is moved to the marks and the corresponding robot coordinates are calculated. This information means that the PLOC2D always provides results in robot coordinates.
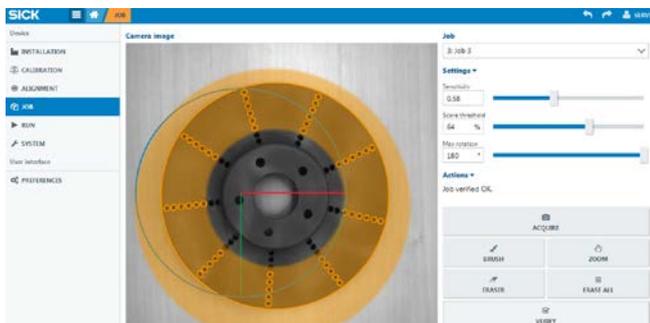

3. Teach

Teach-in of the part shape to be located is performed with the PLOC2D EasyTeach tool. Here, you use the brush tool to paint the outlines of the part, directly in the PLOC2D graphic user interface.

Now you're ready to go!

FIELDS OF APPLICATION

The flexibility of the PLOC2D makes it suitable for a large variety of applications. You can set up the PLOC2D for use in just a matter of minutes, without the need for a vision or automation specialist. The PLOC2D FIX version is pre-calibrated for a FOV of 2x2 meters – suitable for many standard applications. The user-configurable FLEX versions give you even more options.
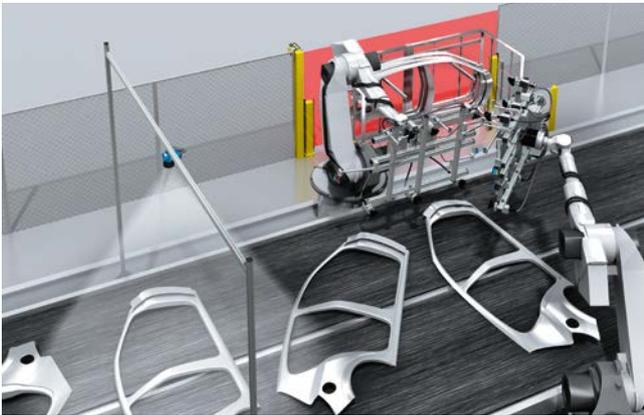
Robot belt picking – press line automation
The PLOC2D is available in a pre-calibrated version with a 2x2-meter field of view, making it suitable for the high-precision localization of large sheet metal stampings.
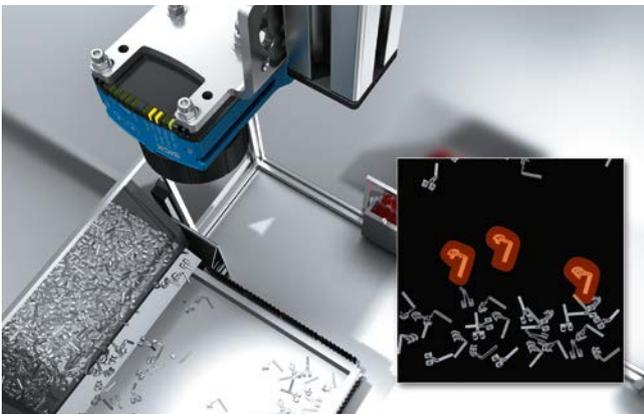
Robot picking from anyfeeders
The PLOC2D's ability to locate multiple simultaneous parts in the image combined with its generic interface make it easy to integrate in small part handling applications.

Robot packaging

With support for conveyor tracking and the capacity to locate more than 120 parts per minute, the PLOC2D is the perfect guidance sensor for secondary packaging applications.

Robot machine tending

The PLOC2D is equipped with a generic interface that is compatible with most robot and PLC brands used in the machine tool industry. The sample robot programs available make it easy to build machine tool tending solutions.
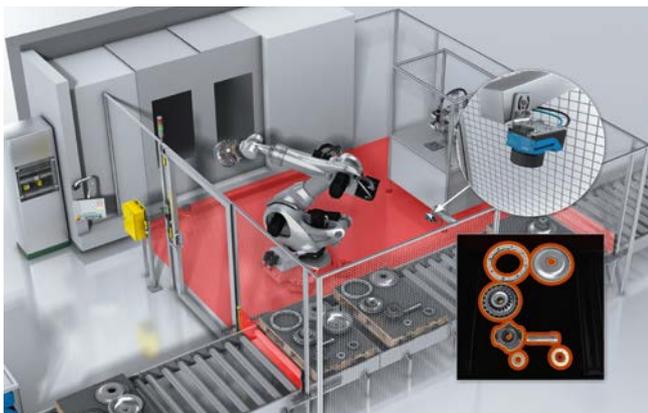
Robot picking of kitted parts

The PLOC2D not only provides the position and orientation of work pieces, it can also identify if a located part is of the correct type. This makes it the perfect sensor system for sorting and kitting applications.

EASY TO USE AND FLEXIBLE PART LOCALIZATION SENSOR SYSTEM

Product description

The PLOC2D is a vision sensor system for localization of parts in 2D. The system is equipped with a high quality imager combined with high performance localization algorithm for reliable and fast part localization. The sensor system is self-contained in the IP 65 housing and connects directly to the robot controller or PLC and is out of the box ready to use. The user interface is designed and tailored for easy setup and maintenance in the production line.

At a glance

- Ready-to-use function, tailored for measuring the 2D position of parts
- Alignment of robot and sensor system coordinate systems
- Tools and functions for easy calibration of the FLEX versions
- Intuitive interface for setup and service of devices installed in production
- Stand-alone sensor system – no external PC needed

Your benefits

- The sensor system is ready for measurement when unpacked
- Easy setup and operation does not require the expertise of a machine vision specialist
- Fast and simple calibration of the FLEX versions, alongside a wide range of lens and illumination accessories, ensures easy adaptation to specific requirements
- Powerful teach-in and high accuracy ensures reliable operation
- Simple integration with most robot brands and PLCs

CE

Additional information

➜ www.sick.com/PLOC2D

For more information, simply enter the link or scan the QR code and get direct access to technical data, CAD design models, operating instructions, software, application examples, and much more.

Detailed technical data

The exact device specifications and performance data of the product may deviate from the information provided here, and depend on the application in which the product is being used and the relevant customer specifications.

Features

	PLOC2D-2000	PLOC2D-631C	PLOC2D-631S	PLOC2D-632C	PLOC2D-654C
Type of system	Robot guidance				
Applications	2D part localization				
System features	Stand-alone sensor with easy teach, for localization of parts using 2D measurements				
Example field of view	2000 mm x 2000 mm	–			
Operating range	3 m	–			
Light source	VI83I-BU1441M0 ring light, blue, medium, aiming laser: visible red light (λ = 630 nm ... 680 nm)	Illumination LEDs: (to be ordered separately as accessories) Aiming laser: visible red light (λ = 630 ... 680 nm)			
Laser class	1, complies with 21 CFR 1040.10 except for the tolerance according to "Laser Notice No. 50" from June 24, 2007 (IEC 60825-1:2014, EN 60825-1:2014)				
LED class	Risk group 1 (low risk, IEC 62471 (2006-07) / EN 62471 (2008-09))	–			
Localization principle	Shape comparison				
Sensor resolution	2,048 px x 2,048 px (4.2 Mpixel)	1,280 px x 1,024 px (1.3 Mpixel)		1,600 px x 1,200 px (1.9 Mpixel)	2,048 px x 2,048 px (4.2 Mpixel)
Optical format	C-Mount, 1"	C-Mount, 1/1,8"	S-mount, 1/1,8"	C-Mount, 1/1,8"	C-Mount, 1"

Performance

	PLOC2D-2000	PLOC2D-631C	PLOC2D-631S	PLOC2D-632C	PLOC2D-654C
Part localization time	< 0.5 seconds for the first part in the image and then < 100 ms for additional parts in the image				
Part localization accuracy	+/- 1 mm, +/- 0.1°	+/- 0.5 px, +/- 0.1°			
Output data	X, Y (mm), rotation around Z (degrees)				

Interfaces

Operator interface	Web server

Mechanics/electronics

	PLOC2D-2000	PLOC2D-631C	PLOC2D-631S	PLOC2D-632C	PLOC2D-654C
Connection types	1 x M12, 17-pin male connector (serial, I/Os, voltage supply) 1 x M8, 4-pin female connector (USB, not used) 2 x M12, 8-pin female connector (Gigabit Ethernet, only one connection used) 1 x M12, 4-pin male connector (external illumination)				
Supply voltage	24 V, ± 20 %	12 V ... 24 V, ± 20 %			24 V, ± 20 %
Power consumption	10 W, ± 20 %				
Housing material	Aluminum die cast				
Housing color	Light blue (RAL 5012)				
Window material	PMMA	–			

[1] When using optics cover and male connector.

	PLOC2D-2000	PLOC2D-631C	PLOC2D-631S	PLOC2D-632C	PLOC2D-654C
Dimensions, system (L x W x H)	142.8 mm x 90 mm x 106.1 mm (only housing without lens and protective hood)	108 mm x 63 mm x 46 mm (only housing without lens and protective hood)			142.8 mm x 90 mm x 106.1 mm (only housing without lens and protective hood)
Weight	635 g	430 g			635 g
Enclosure rating	IP65 [1]				

[1] When using optics cover and male connector.

Ambient data

Ambient operating temperature	0 °C ... +50 °C [1]
Ambient storage temperature	−20 °C ... +70 °C [1]
Shock load	EN 60068-2-27:2009-05
Vibration load	EN 60068-2-6:2008-02

[1] Permissible relative air humidity: 0 % ... 90 % (non-condensing).

Ordering information

Integrated applications	Items supplied	Type	Part no.
High resolution 2D localization of parts, with device factory calibrated for field of view 2000 x 2000 mm at approximately 3 m reading distance	Camera, complete with integrated lens and illumination, factory calibrated, with integrated PLOC2D software	PLOC2D-2000	1086007
Basic resolution 2D localization of parts in medium fields of view at medium reading distances	Camera with c-mount for lens and integrated PLOC2D software	PLOC2D-631C	1089629
Basic resolution 2D localization of parts in small fields of view at short reading distances	Camera with s-mount for lens and integrated PLOC2D software	PLOC2D-631S	1089627
Medium resolution 2D localization of parts in medium/large fields of view at medium/long reading distances	Camera with c-mount for lens and integrated PLOC2D software	PLOC2D-632C	1089628
High resolution 2D localization of parts in large fields of view	Camera with c-mount for lens and integrated PLOC2D software	PLOC2D-654C	1087255

Dimensional drawings (Dimensions in mm (inch))
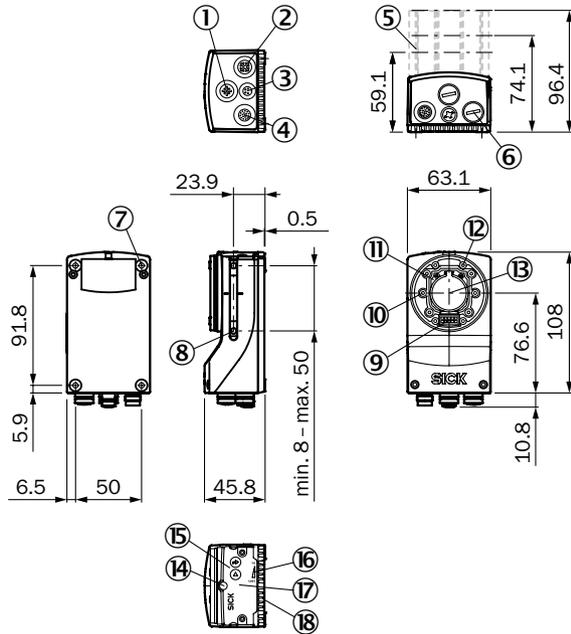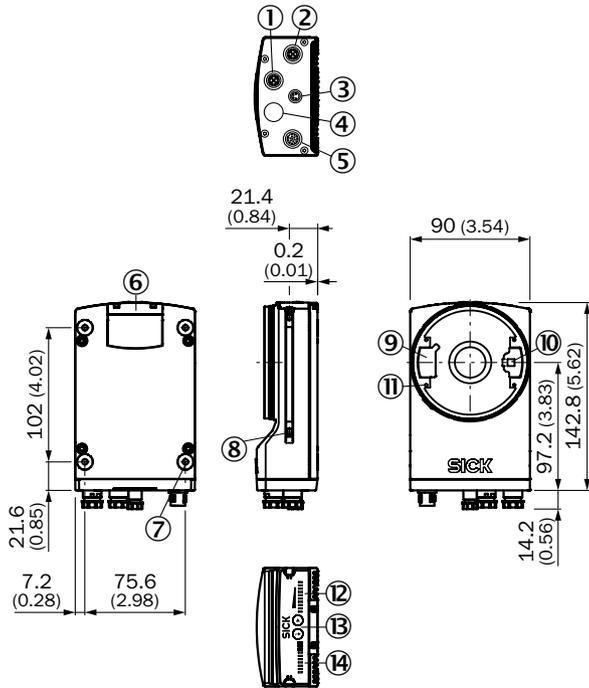
① "Ethernet" P1 connection
② P3 connection "Ethernet"
③ X2 "USB" connection or "trigger external lighting", depending on type
④ P2 connection "CAN OUT", depending on type
⑤ X1 "Power/Serial Data/CAN/I/O" connection or "CAN IN", depending on type
⑥ Cover for the microSD memory card
⑦ M5 blind tapped holes, 5 mm deep (4 x), for mounting the sensor
⑧ Sliding nut M5, 5.5 mm deep (2 x), for mounting (as alternative)
⑨ Plug connector for connecting the integrated lighting
⑩ Outlet, aiming laser
⑪ 2.5 mm blind tapped holes (4 x) for mounting the spacers for the integrable illumination
⑫ Bar graph display
⑬ Function button (2 x)
⑭ LED for status display (2 levels), 10 x

① External illumination connection
② Gigabit Ethernet port
③ USB port
④ Power, serial, CAN, and I/O connection
⑤ 22.7 mm, 37.7 mm, or 60 mm protective cover for optics
⑥ Protective caps/plugs to seal any electrical connections that are not in use
⑦ M5 blind tapped holes, 5 mm deep (4 x), for mounting the sensor
⑧ M5 sliding nut, 5.5 mm deep (4 x), pivoting, for an alternative method of mounting the sensor
⑨ Integrated illumination connection
⑩ Aiming laser (2 x)
⑪ S-mount or C-mount optics module
⑫ 2.5 mm blind tapped holes (4 x) for mounting the spacers for the integrable illumination
⑬ Optical axis and center of the image sensor
⑭ Manual focus screw, underneath cover/label (S-mount Flex)
⑮ Function button (2 x)
⑯ Bar graph display
⑰ Removable cover for microSD memory card slot and manual focus screw (S-mount)
⑱ LEDs for status display (2 levels), 5 x

Accessories

Mounting systems

Mounting brackets and plates

	Brief description	Type	Part no.	PLOC2D-2000	PLOC2D-631C	PLOC2D-631S	PLOC2D-632C	PLOC2D-654C
	Mounting bracket with screws, L-shaped for mounting with sliding nuts, includes angle indicator for adjusting the tilt angle	Mounting bracket	2078970	–	●	●	●	–
	Mounting bracket set consisting of mounting angle, cooling plate and screw including skew angle display	Mounting bracket kit	2069171	●	–	–	–	●

Connection systems

Plug connectors and cables

- **Signal type/application:** Power, serial, CAN, digital I/Os

	Signal type/application	Connection type head A	Connection type head B	Cable	Cable length	Type	Part no.	PLOC2D-2000	PLOC2D-631C	PLOC2D-631S	PLOC2D-632C	PLOC2D-654C
	Power, serial, CAN , digital I/Os	Female connector, M12, 17-pin, straight, A-coded	Male connector, M12, 17-pin, straight, A-coded	To connection module CDB650, 17-wire, suitable for 2 A	5 m	Connection cable (male connector - female connector)	6051195	●	●	●	●	●

- **Signal type/application:** Gigabit-Ethernet

	Signal type/application	Connection type head A	Connection type head B	Cable	Cable length	Type	Part no.	PLOC2D-2000	PLOC2D-631C	PLOC2D-631S	PLOC2D-632C	PLOC2D-654C
	Gigabit Ethernet	Male connector, M12, 8-pin, straight, X-coded	Male connector, RJ45, 8-pin, straight	8-wire, twisted pair, AWG26	5 m	SSL-2J08-G05MACE	6049729	●	●	●	●	●

Further accessories

Calibration tools

	Brief description	Type	Part no.	PLOC2D-2000	PLOC2D-631C	PLOC2D-631S	PLOC2D-632C	PLOC2D-654C
	Target for alignment and calibration, A3-size	PLOC2D alignment and calibration target A3	4092645	●	●	●	●	●
	Target for calibration, A4-size	PLOC2D calibration target A4	4094889	●	●	●	●	●

Storage media

	Brief description	Type	Part no.	PLOC2D-2000	PLOC2D-631C	PLOC2D-631S	PLOC2D-632C	PLOC2D-654C
	microSD memory card with 1 GB for industrial use	microSD memory card	4051366	●	●	●	●	●
	microSD memory card with 2 GB for industrial use	microSD memory card	4077575	●	●	●	●	●

4D*pro*Connectivity

Modules

|	Brief description	Type	Part no.	PLOC2D-2000	PLOC2D-631C	PLOC2D-631S	PLOC2D-632C	PLOC2D-654C
	Connection device basic for connecting one sensor with 2 A fuse, 5 cable glands and RS-232 interface to sensor via M12, 17-pin female connector, all outputs available on screw/spring-loaded terminals.	CDB650-204	1064114	●	●	●	●	●

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Our comprehensive and versatile LifeTime Services are the perfect addition to the comprehensive range of products from SICK. The services range from product-independent consulting to traditional product services.
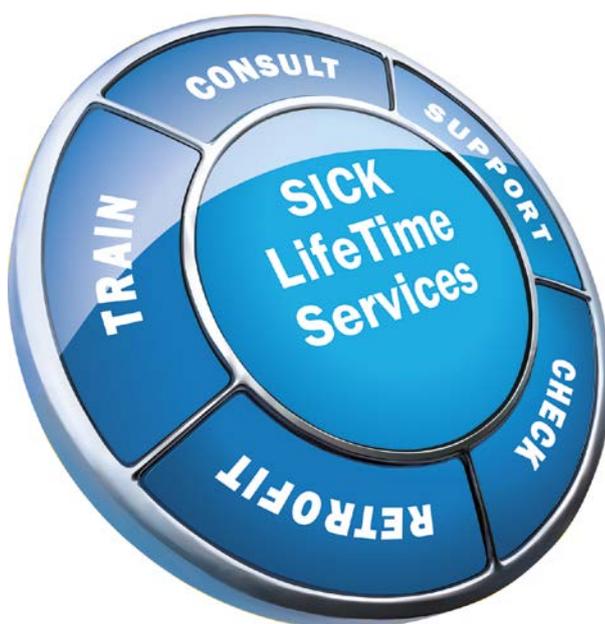
Consulting and design
Safe and professional

Product and system support
Reliable, fast, and on-site

Verification and optimization
Safe and regularly inspected

Upgrade and retrofits
Easy, safe, and economical

Training and education
Practical, focused, and professional

SICK AT A GLANCE

SICK is a leading manufacturer of intelligent sensors and sensor solutions for industrial applications. With more than 8,000 employees and over 50 subsidiaries and equity investments as well as numerous agencies worldwide, we are always close to our customers. A unique range of products and services creates the perfect basis for controlling processes securely and efficiently, protecting individuals from accidents and preventing damage to the environment.

We have extensive experience in various industries and understand their processes and requirements. With intelligent sensors, we can deliver exactly what our customers need. In application centers in Europe, Asia and North America, system solutions are tested and optimized in accordance with customer specifications. All this makes us a reliable supplier and development partner.

Comprehensive services round out our offering: SICK LifeTime Services provide support throughout the machine life cycle and ensure safety and productivity.

For us, that is "Sensor Intelligence."

Worldwide presence:

Australia, Austria, Belgium, Brazil, Canada, Chile, China, Czech Republic, Denmark, Finland, France, Germany, Great Britain, Hungary, Hong Kong, India, Israel, Italy, Japan, Malaysia, Mexico, Netherlands, New Zealand, Norway, Poland, Romania, Russia, Singapore, Slovakia, Slovenia, South Africa, South Korea, Spain, Sweden, Switzerland, Taiwan, Thailand, Turkey, United Arab Emirates, USA, Vietnam.

Detailed addresses and further locations ➜ **www.sick.com**

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