

LECTOR®65x Dynamic Focus



Image-based code reader
with dynamic focus control

SICK
Sensor Intelligence.



Correct use

The LECTOR®65x Dynamic Focus image-based code reader with integrated illumination is an intelligent SICK IDpro sensor. It is used for automatic, stationary identification and decoding of codes on moving or stationary objects. It reads all commonly used 1D codes (bar codes/stacked codes) and 2D codes (matrix codes).

The LECTOR®65x Dynamic Focus sends the read data to a higher-level computer via its host interface for further processing.

Correct use also includes compliance with all information in these operating instructions and the supplementary [LECTOR®65x Technical Information](#) (no. 8016185).

The LECTOR®65x product family includes two distinct version series: **Dynamic Focus** and **Flex**. Depending on the particular model, the version series offer different options in terms of the following:

- Sensor resolution and image frame rate of imager
- Type and focal distance of lens unit
- Light color of integrated/integrable illumination
- Type and combination of electrical connections
- Device enclosure rating and type of material used for the reading window in the optics protective hood

About this document

The purpose of these operating instructions is to allow you to put the **LECTOR®65x Dynamic Focus** into operation quickly and easily and to achieve initial read results. These instructions describe a stand-alone application for a **LECTOR®65x Dynamic Focus** based on the default settings. The device used in this scenario could, for example, take the form of a **LECTOR®654 Dynamic Focus** (model name V2D654R-MEHA6: sensor resolution 4 megapixels, focal distance of lens 54 mm, white LED illumination, IP 65 optics protective hood with glass reading window). The optional CDB650-204 connection module can be used to achieve industrial-standard signal distribution with the **LECTOR®65x Dynamic Focus**.

The operating instructions are valid for the following variants:

Connection variant 1:

- LECTOR®652 Dynamic Focus, model name V2D652R-MEWA6
- LECTOR®654 Dynamic Focus, model name V2D654R-MEWA6

Connection variant 2:

- LECTOR®654 Dynamic Focus for Systems, model name V2D654R-MEWHF6

For the exact features, see *“Device overview”*, page 5.

For the sake of simplicity, the **LECTOR®65x Dynamic Focus** will be referred to below as the *“LECTOR®65x”*.

Supplementary and applicable documents

More detailed information about mounting and electrical installation as a stand-alone device in accordance with these operating instructions is available in the [LECTOR®65x Technical Information](#) (no. 8016185). This technical information describes and presents:

- Optional mounting accessories (brackets)
- The suppression of possible ground potential equalization currents in applications with distributed systems
- Pin assignments and lead color assignments of cables
- Electrical wiring diagrams for the CDB650-204/CDM420-0006 connection modules (in relation to the **LECTOR®65x**)
- Overview list and license texts for open-source software

Information about configuring the **LECTOR®65x** can be found in the online help function of the SOPAS ET configuration software.

The documents are available on the web in PDF format. Simply visit the SICK product page for the **LECTOR®65x**: www.mysick.com/en/lector65x

Safety information

- This chapter is about the safety of commissioning personnel, as well as operators of the system in which the **LECTOR®65x** is integrated.
- Read these instructions carefully before commissioning the **LECTOR®65x** in order to familiarize yourself with the device and its functions. The operating instructions are considered a part of the device and must be kept in an

accessible location in the immediate vicinity of the **LECTOR®65x** at all times!

- The **LECTOR®65x** falls into LED risk group RG 1 and laser class 1M. For details of hazards and protective measures → see *“LEDs and laser radiation”*, page 3.
- During operation, the surface temperature of the **LECTOR®65x** housing (particularly on the rear of the device where the cooling fins are located) can reach 70 °C.
- The following requirements must be met if the IP 65 enclosure rating is to be maintained during operation (otherwise, the device will no longer meet the conditions for any specified IP enclosure rating):
 - The black cover for the micro SD card slot (rear of device) must be screwed tight to the device.
 - The SICK cables plugged into the M12/M8 connections must be screwed tight.
 - Electrical connections that are not being used must be fitted with yellow protective caps/plugs, which must be screwed tight (as on delivery).
- Only operate the **LECTOR®65x** without the cover for the micro SD card slot for a short period while inserting or removing the memory card. During this time, protect the device against moisture and dust.
- Opening the **LECTOR®65x** housing, which is screwed closed – including the optics protective hood – will invalidate any warranty claims against SICK AG. For further warranty provisions, see the General Terms and Conditions of SICK AG, e.g., on the delivery note of the **LECTOR®65x**.
- Data integrity: SICK AG uses standardized data interfaces, such as standard IP technology, in its products. The emphasis here is on the availability of products and their features. SICK AG always assumes that the integrity and the confidentiality of the data and rights which are affected by the use of these products will be ensured by the customer. In all cases, appropriate security measures, such as network separation, firewalls, virus protection, and patch management, must be taken by the customer on the basis of the situation in question.

Commissioning and configuration

Scope of delivery

- The version of the **LECTOR®65x Dynamic Focus** ordered, including two M5 sliding nuts. Electrical connections fitted with protective caps/plugs. Without connecting cables
- Hexagon key, wrench size 2 for opening/closing the cover of the micro SD card slot
- Printed operating instructions in German (no. 8016182) and English (no. 8016183). Other language versions (if applicable) are available in PDF format from the online product page: www.mysick.com/en/lector65x
- Optional accessories, such as brackets and connecting cables, are only supplied if ordered separately

Step 1: Mounting and alignment

Tools and aids required

- Two or four M5 screws for mounting the **LECTOR®65x** on a bracket supplied by the customer. Screw length

is dependent on the mounting base (wall thickness of bracket). When using optional SICK brackets, screws for the **LECTOR®65x** are included.

Mounting requirements

- The permissible ambient conditions for the operation of the **LECTOR®65x** must be observed (e.g., ambient temperature, ground potential → see *“Technical specifications (excerpt)”*, page 4 and *“Risk of injury/risk of damage due to electrical current!”*, page 2).
- Dissipation of lost heat from device: It is important to ensure good heat transfer from the device to the mounting base (e.g., profile) via the bracket, particularly in the case of high ambient temperatures! If the device is highly enclosed, make sure there is enough space between the rear of the device and the wall to allow the lost heat to be properly dissipated into the air by means of convection.
- Stable bracket with sufficient load-bearing capacity and suitable dimensions for the **LECTOR®65x**. Weight depends on model, max. 950 g (not including cables). Dimension drawing → see *“Device design”*, page 3
- Shock- and vibration-free mounting
- Clear view of the codes to be detected on the objects

Mounting the LECTOR®65x

1. Connect the designated cable(s) to the **LECTOR®65x**.
2. Optional: Attach the SICK bracket that has been ordered separately (e.g., mounting bracket no. 2069169) to the **LECTOR®65x** using the two sliding nuts. For further details see the *“Mounting”* chapter of the [LECTOR®65x Technical Information](#) (no. 8016185).
3. Otherwise, mount the **LECTOR®65x** on a bracket using M5 screws. To do this, either use the 4 threaded mounting holes on the rear of the device or, alternatively, use the two M5 sliding nuts in the lateral slots (→ see *“Device design”*, page 3). Insert the screws into the threaded mounting holes/sliding nuts by a maximum of 5 mm.

Aligning the LECTOR®65x reading window with the code

- Remember to consider the shape and alignment of the field of view in front of the **LECTOR®65x**.

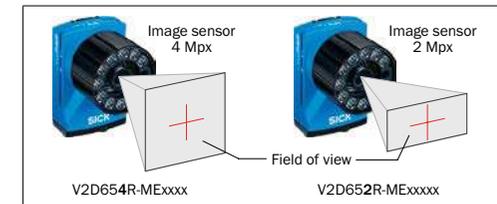


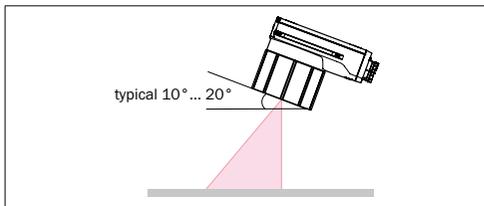
Image-sensor-dependent viewing ranges in front of the device; the extent is distance-dependent

Taking account of the reading distance, which is dependent on resolution

Using the Auto-Setup function, the **LECTOR®65x** automatically adjusts its focal distance to suit the reading distance from

the code. For the resulting reading range → see "Field of view diagram", page 5.

Taking account of the reading angle



Selection of the skew angle, depending on the application

- Tilt the LECTOR®65x away from the plane that is perpendicular to the surface of the code to avoid as many interfering reflections as possible. Typically, this angle will be between 10° and 20°.

In the case of codes created on metal, e.g., by dot peening, an angle of between 0° (bright field light) and 45° (dark field light) may be advisable.

For further information about aligning the field of view with the object, see the "Mounting" chapter of the [LECTOR®65x Technical Information](#) (no. 8016185).

CDB650-204 connection module

- Mount the CDB650-204 connection module in the vicinity of the LECTOR®65x. If you are using the serial data interfaces (RS-232), we recommend a maximum distance of 5 m. Mount the CDB650-204 in such a way that the device remains accessible at all times. In relation to this, see the [CDB650-204 Connection Module Operating Instructions](#) (no. 8016155), which are enclosed in printed form with the device.

Step 2: Electrical installation

- Only skilled electricians with appropriate training and qualifications are permitted to perform electrical installation.
- Standard safety requirements must be met when working in electrical systems.
- Electrical connections between the LECTOR®65x and other devices may only be made or disconnected when there is no power to the system. Otherwise, the devices may be damaged.
- Where connecting cables with one end open are concerned, make sure that bare wire ends are not touching (risk of short circuit when the supply voltage is switched on). Wires must be appropriately insulated from each other.
- Wire cross sections of the supply cable from the customer's power system should be designed and protected in accordance with the applicable standards. If the supply voltage for the LECTOR®65x is not supplied via the CDB650-204 connection module, the LECTOR®65x must be protected by a separate slow-blow fuse with a max. rating of 2.0 A. This fuse must be located at the start of

the supply circuit.

- All circuits connected to the LECTOR®65x must be designed as SELV circuits (SELV = Safety Extra Low Voltage).

⚠ DANGER

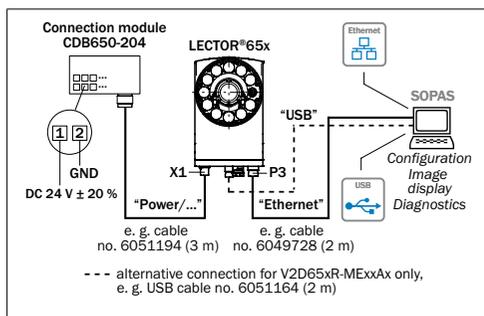
Risk of injury/risk of damage due to electrical current!

The LECTOR®65x is designed to be operated in a system with professional grounding of all connected devices and mounting surfaces to the same ground potential. Incorrect grounding of the LECTOR®65x can result in equipotential bonding currents between the LECTOR®65x and other grounded devices in the system. This can lead to hazardous voltages being applied to the metal housing, cause devices to malfunction or sustain irreparable damage, and damage the cable shield as a result of heat rise, thereby causing cables to catch fire.

- Ensure that the ground potential is the same at all grounding points.
- If the cable insulation is damaged, disconnect the power supply immediately and have the damage repaired.

- See the "Electrical Installation" chapter in the [LECTOR®65x Technical Information](#) (no. 8016185) that is available on the online product page: www.mysick.com/en/lector65x

1. Connect the communication interface of the LECTOR®65x to the PC (Ethernet or USB, depending on model).
2. Supply the LECTOR®65x with a voltage of DC 24 V ± 20 %.



Block wiring diagram for commissioning the V2D65xR-MExxAx

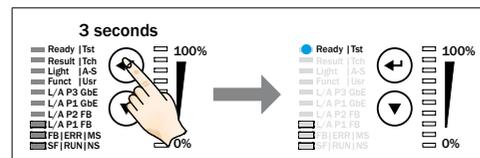
Step 3: Configuration

a. Configuration without PC

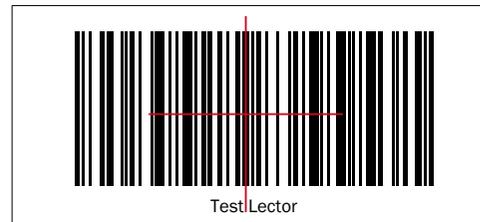
The two function buttons and the LEDs with their second display level are used for adapting the reading performance of the LECTOR®65x without a PC.

The LECTOR®65x uses the Auto-Setup function to adjust itself automatically to suit the reading distance, lighting conditions, and quality of the code presented (not applicable to the Pharmacode standard). According to the default setting, the values calculated for the three parameter modules during this process are saved, thereby overwriting the existing configuration.

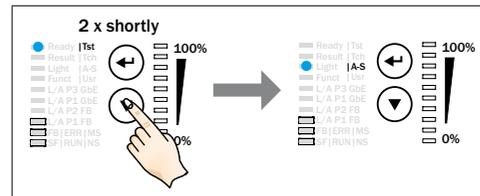
1. Start "Edit" mode.
(For the sake of clarity, the LED status displays, function buttons, and bar display are shown below in compressed form.)



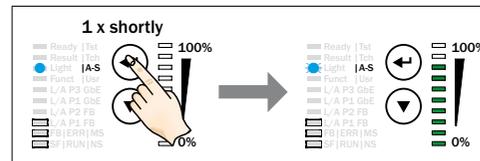
2. Align the LECTOR®65x with the code.



3. Select Auto-Setup.



4. Start Auto-Setup.



Feedback provided by the LECTOR®65x during Auto-Setup

The bar display shows the progress of the Auto-Setup function in percent. 100 % means the Auto-Setup has finished. The color of the "Auto-Setup" LED now signals the success status.

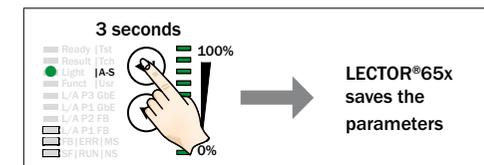
LED A-S (Auto-Setup)	Color	Status
●	Blue	Auto-Setup selected
●	Blue	Auto-Setup started
●	Green	Auto-Setup successfully finished
●	Yellow	Auto-Setup partially successful (in at least one of the 3 parameter modules)
●	Red	Auto-Setup was unsuccessful

● = illuminated; ● = flashing

Important!

- If the read result is inadequate ("Auto-Setup" LED lights up yellow or red), check the alignment and distance of the LECTOR®65x in relation to the code (→ see "Step 1: Mounting and alignment", page 1).

5. Exit "Edit" mode and save the parameters.



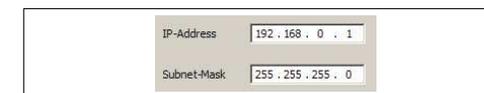
Alternatively, the LECTOR®65x saves the parameters automatically if 5 minutes elapse without a key being pressed, and it returns to read mode.

b. Configuration with PC

The SOPAS ET configuration software is used by default to adapt the LECTOR®65x parameters to the application and to perform diagnostics in the event of an error. The LECTOR®65x supports this process by displaying the images it has recorded in the SOPAS ET software (requirement concerning SOPAS ET: V. 2.38 or higher). If the reading performance of the LECTOR®65x has been adapted without a PC, SOPAS ET is generally used to continue the configuration process (reading clock, read result formats, data interface, etc.).

Installing and starting the configuration software

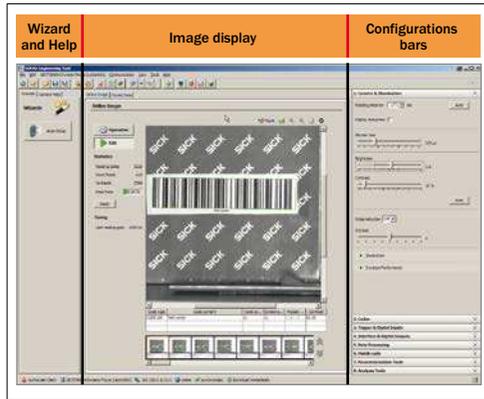
1. Download and install the latest version of the SOPAS ET configuration software, as well as current device description files (*.sdd), from the online product page for the software: www.mysick.com/en/SOPAS_ET by following the instructions provided there. In this case, select the "Complete" option as suggested by the install wizard. Administrator rights may be required on the PC to install the software.
2. Start the "Single Device" program option.
Path: Start > Programs > SICK > SOPAS Engineering Tool > SOPAS (Single Device)
3. Establish a connection between the software and the LECTOR®65x via Ethernet or USB (depending on model). The connection wizard starts automatically so that you can do this.
4. The following IP address is configured by default on the LECTOR®65x:



5. Select the appropriate LECTOR®65x from the list of available devices. SOPAS establishes communication with the LECTOR®65x and loads the associated device description file for the LECTOR®65x. The program window, which is divided into three sections, opens.
6. In the ONLINE IMAGE window, click the EDIT button. The LECTOR®65x now starts recording images consecutively

and uses the current settings to decode them. The effects of any parameter changes are directly visible. In this mode, the switching inputs and outputs are deactivated along with data output via the host interface, even if the AUTO-SETUP wizard is used.

SOPAS Single Device program window



SOPAS Single Device: Example of online image display once the device has been started with "Edit" mode and the field of view has been aligned with a code

Configuring reading performance with the wizard

- Start the AUTO-SETUP wizard on the left in the program window and follow the instructions in the dialog box. The LECTOR®65x uses the Auto-Setup function to adjust itself automatically to suit the lighting conditions, reading distance, and quality of the code presented (not applicable to the Pharmacode standard). The values calculated for the three parameter modules are stored temporarily at first. SOPAS Single Device applies the parameters to the two configuration bars CAMERA & ILLUMINATION and CODES.

Continuing the configuration process

- For custom optimization of the image and code settings of the LECTOR®65x, click the CAMERA & ILLUMINATION and CODES configuration bars on the right and adjust the parameter values accordingly.
- To make the changes directly visible, go to the image display window (ONLINE IMAGE) and click the EDIT button.
- Make settings for additional functions during planned operation such as reading trigger, read result formats, data interface, etc.
- Go to the image display window (ONLINE IMAGE), click the OPERATION button, and test the settings in read mode (real operation).

Completing the configuration process

- Permanently save the entire configuration: Parameter set in LECTOR®65x: Click the button Configuration file on the PC: Click the button.

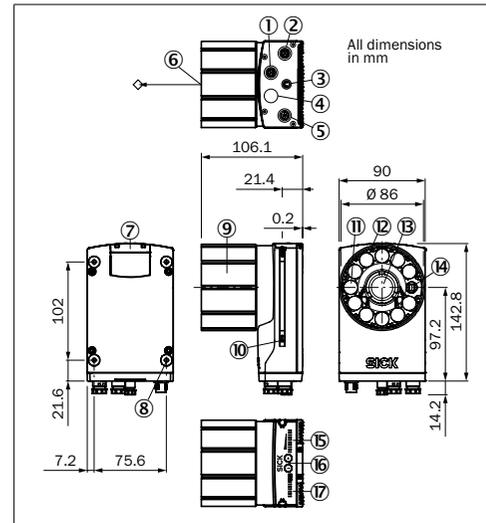
Important!

To put the LECTOR®65x into operation on a network (e.g.,

CAN bus) together with other SICK products, select the "SOPAS" program option. Path: Start > Programs > SICK > SOPAS Engineering Tool > SOPAS.

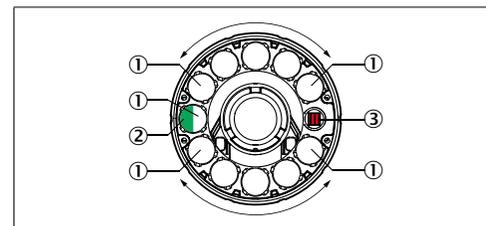
Description of the device

Device design



- All dimensions in mm
- Connection P1, function and design dependent on model
 - Connection P3, function and design dependent on model
 - Connection X2, function and design dependent on model
 - Connection P2, function and design dependent on model
 - Connection X1, function and design dependent on model
 - Reference point for reading distance (center of front window) between LECTOR®65x and object
 - Black cover for the micro SD memory card slot
 - Threaded mounting holes M5, 5 mm deep (4 x) for mounting the LECTOR®65x
 - Optics protective hood for lens unit and integrated illumination
 - Sliding nuts M5, 5.5 mm deep (2 x), retractable, for an alternative method of mounting the LECTOR®65x
 - Feedback LED, green
 - Ring light (11 x LEDs)
 - Lens unit
 - Outlet opening for light beam from aiming laser
 - Bar graph display (10 x LEDs)
 - Function buttons (2 x)
 - LEDs for status display (2 levels), 10 x

Integrated illumination unit



① Illumination = 11 x LEDs

- Feedback LED, green (e.g., to indicate "Good Read"), after a successful read operation (by default) it briefly generates a light spot on the object within the field of view
- Aiming laser for alignment, can be deactivated = 1 x red laser LED, generates a red cross on the object within the field of view

CAUTION

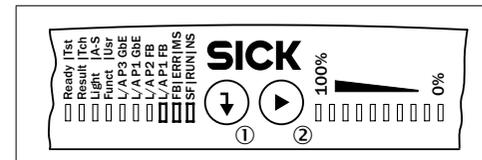
LEDs and laser radiation

The accessible radiation from the laser and the LEDs does not represent a risk due to the normal restrictions imposed by human behavior. It is not possible to entirely rule out temporary, disorientating optical effects on the human eye (e.g., dazzle, flash blindness, afterimages, impairment of color vision), in particular in conditions of dim lighting. No safety precautions are required. Caution - Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.

- Do not intentionally look directly into light sources.
- Do not look at the laser directly with optical instruments (magnifiers).
- Comply with the latest version of the applicable standards on photobiological safety of lamps and lamp systems as well as on laser protection.
- If the product is operated in conjunction with external illumination systems, the risks described here may be exceeded. This must be taken into consideration by users on a case-by-case basis.

Additional information → see "Technical specifications (excerpt)", page 4.

Status indicators, functions



LED status indicators, function buttons, and bar graph display

- Return button
- Arrow button

Status indicators on the first display level

Display	LED	Color	Status
Ready		Green	Device ready to read
		Red	Hardware or software error
Result		Green	Read operation successful
		Red	Read operation unsuccessful
Light		Green	Read mode: Illumination on, internal read gate open
		Green	Function can be defined by user
Funct		Yellow	Function can be defined by user
		Blue	Function can be defined by user
		Red	Function can be defined by user

● = illuminated; ● = flashing

Status displays on the second display level

Display	LED	Color	Status
Tst (Test)		Blue	Test (reading diagnostics) selected
		Blue	Test started
Tch (Teach-in)		Blue	Teach-in selected (default: match code)
		Blue	Teach-in started
		Green	Teach-in successful
A-S (Auto-Setup)		Red	Teach-in unsuccessful (match code default setting; unable to teach in any code)
		Blue	Auto-Setup selected
		Blue	Auto-Setup started
		Green	Auto-Setup successfully finished
		Yellow	Auto-Setup partially successful (in at least one of the 3 parameter modules)
User (User)		Red	Auto-Setup was unsuccessful
		Green	Function can be defined by user
		Yellow	Function can be defined by user
		Blue	Function can be defined by user
		Red	Function can be defined by user

● = illuminated; ● = flashing

Test (reading diagnostics)

Percentage Evaluation: The LECTOR®65x records a series of images and uses the current reading performance settings to decode them. The read rate of the last 10 read operations is displayed in % in the bar graph display.

Teach-in

When you teach in a match code, the LECTOR®65x reads the code that is presented and saves it permanently (in accordance with the default setting) as a target code for future code comparisons during read mode. Pharmacode is only supported following activation with SOPAS.

Auto-Setup

The LECTOR®65x adjusts itself automatically to suit the lighting conditions, reading distance, and quality of the code presented. It saves the calculated values permanently in accordance with the default setting.

Overview of electrical connections

Connection	Connection variant 1 (V2D65xR-MExxAx)	Connection variant 2 (for Systems) (V2D65xR-MExxFx)
	Interfaces	
X1	Power/SerialData/CAN/IO	CAN IN
X2	USB	Triggering of external illumination unit
P1	GB Ethernet ¹⁾	GB Ethernet ¹⁾
P2	-	CAN OUT
P3	GB Ethernet	GB Ethernet

*) Planned, currently has no function.

Overview of pin assignment and design of connections

	Power/SerialData/ CAN/IO	CAN IN	CAN OUT	USB	Triggering of external illumi- nation	GB Ethernet
	17-pin M12 plug, A-coded	5-pin M12 plug, A-coded	5-pin M12 socket, A-coded	4-pin M8 socket	3-pin M8 socket	8-pin M12 socket, X-coded
Pin	Signal	Signal	Signal	Signal	Signal	Signal
1	GND	Shield	Shield	+5 V	Sensor 1	TRD0_P
2	DC 24 V ± 20 %	DC 24 V ± 20 %	DC 24 V ± 20 %	Data-		TRD0_N
3	CAN L	GND	GND	Data+	Result 4	TRD1_P
4	CAN H	CAN H	CAN H	GND	SensGND	TRD1_N
5	TD+ (RS-422/485), Host	CAN L	CAN L			TRD3_P
6	TD- (RS-422/485), Host TxD (RS-232), Host					TRD3_N
7	TxD (RS-232), Aux					TRD2_P
8	RxD (RS-232), Aux					TRD2_N
9	SensGND					
10	Sensor 1, switching input					
11	RD+ (RS-422/485), Host					
12	RD- (RS-422/485), Host RxD (RS-232), Host					
13	Result 1, switching output					
14	Result 2, switching output					
15	Sensor 2, switching input					
16	Result 3, switching output					
17	Result 4, switching output					

Micro SD memory card (optional accessory)

Function

With the optional plug-in memory card, the LECTOR®65x backs up the last permanently saved parameter set externally as well (cloning). Furthermore, the LECTOR®65x can record optional images, e.g., when codes cannot be read (“No Read”) (for details of the parameter backup concept and other memory card functions, see the online help function of the LECTOR®65x).

A memory card is not included in the scope of delivery.

To ensure that the memory card functions reliably, only use types approved by SICK (see [LECTOR®65x Product Information](#), no. 8016253). The LECTOR®65x supports memory cards up to max. 16 GB. The memory card has no write protection that can be activated.

Inserting the memory card

- To avoid damaging the memory card, make sure there is no power to the LECTOR®65x when you insert or remove it.

On the LECTOR®65x, the card slot can be accessed on the rear of the device. It is located behind the black cover above the type label (→ see ⑦ in “Device design”, page 3).

Maintaining the IP 65 enclosure rating: → see “Safety information”, page 1

- To release the cover, use the socket key provided (wrench size 2) to undo both (captive) hexagon socket screws.
- Push the cover away from the device until the card slot can be accessed.
- Making sure it is in the correct position (with the contacts facing the device and pointing down), insert the memory card into the slot until it locks into place.
- Screw the cover back on.

NOTE

Risk of data loss or irreparable damage to the memory card!

The LECTOR®65x does **not** signal when the card is being accessed (for read or write purposes) (like an electronic camera with a memory card).

- If parameter values are changed on the LECTOR®65x using the SOPAS configuration software and the “permanent” option or if functions are started that need to access the memory card (e.g., image recording), do **not** remove the memory card/do **not** switch off the supply voltage.
- To remove the memory card safely during operation, select the REMOVE CARD function under ANALYSIS TOOLS/MICROSD CARD in the configuration software SOPAS and wait for SOPAS to provide confirmation.

Technical specifications (excerpt)

Model name	LECTOR®65x Dynamic Focus
Focus	Dynamic and externally triggered electrical focus adjustment for reading distance (V2D65xR-MExxxx)
Illumination for field of view	11 x LEDs, visible light, white ($\lambda = 6,000 \pm 500$ K), RG 1 risk group (V2D65xR-MEWxxx)
Feedback LED (spot in field of view)	1 x LED, visible light, green ($\lambda = 525 \pm 15$ nm), RG 1 risk group
LED risk group	White/green: Risk group 1 acc. to IEC 62471-1: 2006-07/EN 62471-1: 2008-09. Irradiance: $L_a < 10$ kW/(m ² sr) within 100 s $L_b < 7,6 \times 10^5$ W/(m ² sr) within 10 s with a distance of ≥ 200 mm
Aiming laser (field of view)	Visible light, red ($\lambda = 630$ nm ... 680 nm), can be deactivated
Laser class	Class 1M acc. to IEC 60825-1: 2007-03. Complies with 21 CFR 1040.10 except for deviations pursuant to Laser Notice No. 50 dated June 24, 2007. P < 1.40 mW
Code resolution	≥ 0.12 mm, distance-dependent
Reading distance	See “Field of view diagram”, page 5.
Lens unit	Focal distance 54 mm. (V2D65xR-MExHx)
Image sensor	Monochrome (gray scale value), sensor resolution depends on model, see Table 2 (V2D65xR-MExxxx)
Image frame rate	70 Hz at 2 Mpx, 40 Hz at 4 Mpx (V2D65xR-MExxxx)
Ambient light safety	2,000 lx on code
Bar code types (1D)	2/5 Interleaved, Codabar, Code 128, Code 32, Code 39, Code 93, GS1 DataBar GS1-128/EAN 128, Pharmacode, UPC/GTIN/EAN
2D code types	Data Matrix ECC200, GS1 Data Matrix MaxiCode, PDF417, QR Code
Image memory	Internally 512 MB, externally on optional micro SD card (max. 16 GB)
Serial ¹⁾ RS-232/422/485	Host (300 Bd ... 115.2 kBd), for data output.
Serial RS-232 ¹⁾	Aux (57.6 kBd), for configuration/diagnostics
USB ¹⁾	Aux (USB 2.0), for configuration/diagnostics and image transmission
Ethernet	Aux, Host, image transmission (FTP). 10/100/1,000 Mbit/s, TCP/IP, Ethernet/IP. For MAC address(es) see type label.
CAN	20 kbit/s ... 1 Mbit/s Protocol: SICK CAN sensor network
PROFIBUS ¹⁾	Optional via external fieldbus module CDF600-21xx
PROFINET IO ¹⁾	Optional via external fieldbus module CDF600-2200
Digital switching inputs ¹⁾	2 x physical, 2 x additional external via optional CMC600 module in connection module CDB650-204 or CDM420-0006. $V_{in} = \text{max. } 32$ V, $I_{in} = \text{max. } 5$ mA, opto-decoupled, reverse polarity protected, adjustable debounce time

Model name	LECTOR®65x Dynamic Focus
Digital switching outputs ¹⁾	4 x physical, 2 x additional external via optional CMC600 module in connection module CDB650-204 or CDM420-0006. $V_{out} = V_s - 1.5 V$, $I_{out} \leq 100 \text{ mA}$. Short-circuit protected, temperature protected. Not electrically isolated from supply voltage
Electrical connections	Model-dependent, see "Overview of electrical connections", page 4
Optical indicators	10 x RGB LEDs (status indicators) 1 x LED (feedback LED, green) 10 x RGB LEDs (bar graph display, blue)
Acoustic indicators	1 x beeper for signaling events, can be deactivated
External backup of parametric data	Optional on plug-in micro SD memory card or via optional CMC600 module in connection module CDB650-204 or CDM420-0006.
Supply voltage	DC 24 V \pm 20 %, SELV according to EN 60950-1: 2011-01
Power consumption	Typically 20 W (with switching outputs without load)
Housing/weight	Aluminum die casting/max. 950 g, model-dependent
Reading window material	Model-dependent, glass or plastic (PMMA), 2 mm thick in each case, with scratch-proof coating. (V2D65xR-MExxxx, glass: x = 4, 6, 7; plastic: x = 1, 5, 8, 9), see also Table 2
Safety	Acc. to EN 60950-1: 2011-01
Electrical protection class	III according to EN 60950-1: 2011-01
Enclosure rating	IP 65 according to EN 60529: 2000-09 (V2D65xR-MExxxx) Maintaining the IP 65 enclosure rating: → see "Safety information", page 1
EMC	Radiated emission: EN 61000-6-3: 2007-01 Electromagnetic immunity: EN 61000-6-2: 2005-08
Vibration resistance Shock resistance	According to EN 60068-2-6: 2008-02 According to EN 60068-2-27: 2009-05
Ambient temperature	Operation ²⁾ : 0 °C ... +50 °C, Storage -20 °C ... +70 °C
Permissible relative air humidity	0 % ... 90 %, non-condensing
<p>1) Not applicable to system variant LECTOR®654 Dynamic Focus for Systems, model name V2D654R-MEWHF6.</p> <p>2) Notes regarding adequate dissipation of lost heat → see "Mounting requirements", page 1.</p>	

Table 1

For further technical specifications, see the [Online data sheet](#) on the online product page (www.mysick.com/en/lector65x).

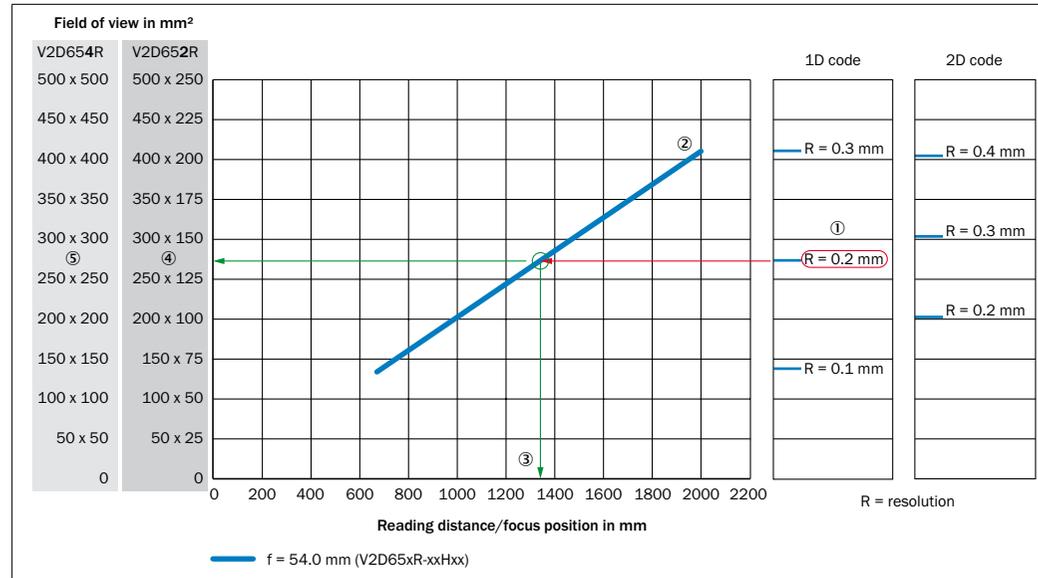
Device overview

Version	Image sensor	Image sensor resolution	Focal distance of lens	LED illumination color	Electrical connections ¹⁾	Reading window	Enclosure rating	Device type	Part no.
LECTOR®652 Dynamic Focus	2 Mpx	2,048 px x 1,088 px	54 mm	White	Connection variant 1	Glass	IP 65	V2D652R-MEWH6	1063405
LECTOR®654 Dynamic Focus	4 Mpx	2,048 px x 2,048 px	54 mm	White	Connection variant 1	Glass	IP 65	V2D654R-MEWH6	1060893
LECTOR®654 Dynamic Focus for Systems	4 Mpx	2,048 px x 2,048 px	54 mm	White	Connection variant 2	Glass	IP 65	V2D654R-MEWHF6	1063229

1) For details of each configuration, see "Overview of electrical connections", page 4.

Table 2

Field of view diagram



Interpreting the diagram

You can use the diagram to determine the following data:

- The maximum reading distance for a selected code resolution
- The dimensions of the available field of view

Example:

Given (in **red**):
Code resolution ①: 0.2 mm
Focal distance of lens ②: 54 mm

Read (in **green**):
Maximum reading distance ③: 1,350 mm
Field of view V2D652R ④: approx. 275 mm x 137 mm
Field of view V2D654R ⑤: approx. 275 mm x 275 mm

Maintenance and care

The LECTOR®65x is maintenance-free. No maintenance is required in order to ensure compliance with risk group RG 1 and laser class 1M.

- In order to obtain maximum reading performance from the LECTOR®65x, the reading window in the optics protective hood must be checked for contamination at regular intervals (e.g., weekly). This applies especially when using the LECTOR®65x in harsh environments (dust, abrasion, moisture, etc.). The reading window must be kept clean and dry for reading.
- If the reading window becomes contaminated, clean it carefully with a soft, moist (mild detergent) cloth.

Important!

If the reading window is scratched or damaged (cracked, broken), the optics protective hood must be replaced by SICK service personnel. Contact SICK Service to arrange this.

Static charge may cause dust particles to adhere to the reading window. This effect can be avoided by using the SICK anti-static plastic cleaner (no. 5600006) in combination with the SICK lens cloth (no. 4003353).

Transport and storage

Transport and store the LECTOR®65x in its original packaging, ensuring that the protective caps/plugs have been screwed onto the electrical connections. Do not store outdoors. To ensure that any residual moisture present can escape, do not store the device in airtight containers. Do not expose to aggressive media (e.g., solvents such as acetone). Storage conditions: dry, dust-free, no direct sunlight, storage temperature -20 °C ... 70 °C, as little vibration as possible, relative air humidity max. 90 % (non-condensing).

Repair

Repair work on the LECTOR®65x may only be performed by qualified and authorized service personnel from SICK AG.

Disassembly and disposal

⚠ WARNING

Risk of injury due to hot device surface!

In read mode, the surface of the LECTOR®65x housing (particularly the rear of the device) can reach temperatures of up to 70 °C.

- Before commencing disassembly, switch off the device and allow it to cool down as necessary.

Any LECTOR®65x which can no longer be used at the end of the product life cycle must be disposed of in an environmentally-friendly manner in accordance with the country-specific waste disposal regulations that are applicable at the time. As it is categorized as electronic waste, the LECTOR®65x must never be disposed of with household waste! SICK AG is not currently able to take back devices that can no longer be used.

Sources for obtaining additional information

Additional information about the LECTOR®65x and its optional accessories can be found in electronic form on the following online product pages:

Image-based code reader LECTOR®65x (www.mysick.com/en/lector65x)

- Detailed technical specifications (online data sheet)
- EC declaration of conformity
- Dimensional drawing and 3D CAD dimension models in various electronic formats
- Field of view diagrams
- Compatible accessories (including cables, brackets, trigger sensors, external illumination units)
- LECTOR®65x Dynamic Focus Operating Instructions in German (no. 8016182) and English (no. 8016183), other languages if applicable
- LECTOR®65x Technical Information in German (no. 8016184) and English (no. 8016185)
- Ordering information in the LECTOR®65x Product Information in German (no. 8016252) and English (no. 8016253)
- Publications dealing with accessories

Integrating the LECTOR®65x into PROFIBUS DP (www.mysick.com/en/cdf600-2)

- CDF600-21xx PROFIBUS DP Fieldbus Module Operating Instructions in German (no. 8015334) and English (no. 8015335), other languages if applicable
- CDF600-21xx PROFIBUS DP Fieldbus Technical Information in German (no. 8015336) and English (no. 8015337)

Integrating the LECTOR®65x into PROFINET IO (www.mysick.com/en/cdf600-2)

- CDF600-2200 PROFINET IO Fieldbus Module Operating Instructions in German (no. 8015921) and English (no. 8015922), other languages if applicable

Documents on request

- Overview of command strings for LECTOR®65x

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www.sick.com/worldwide.

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For details of the associated license texts that relate to the license overview provided below, please refer to the Technical Information for the LECTOR®65x, License Texts for Open-source Software (no. 8016467). This can be downloaded from the LECTOR®65x product page on the web:
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