



LECTOR®620

Image-based code reader



Intended use

The image-based LECTOR®620 is an intelligent sensor for automatic, stationary 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®620 sends the reading data to a higher-level computer via its host interface for further processing.

The purpose of these operating instructions is to allow you to take the LECTOR®620 into operation quickly and easily, and to achieve the first reading results. It describes the commissioning for an application with **one** LECTOR®620. Further information is available in the *online help* of the *configuration software SOPAS* or on the *product page* on the *web* (www.sick.com/lector).

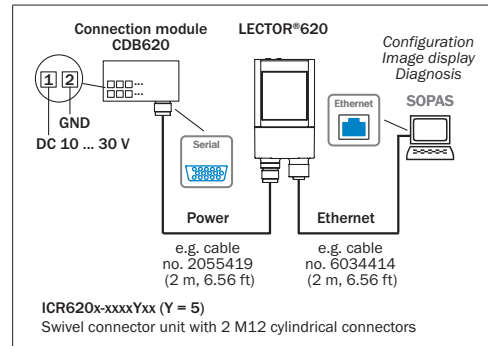
Safety information

- Read this manual before commissioning of the LECTOR®620 in order to familiarize yourself with the device and its functions.
- Connect or disconnect electrical linkages between the LECTOR®620 and other devices only under de-energized conditions. Otherwise, the devices could suffer damage.
- Conductor cross sections have to be selected and implemented according to valid engineering standards. If the supply voltage for the LECTOR®620 is not fed via the connection module CDB620/CDM420, the LECTOR®620 needs to be protected by a separate slow-blow fuse of max. 2.0 A in the feeding circuit.
- Only use the LECTOR®620 under permitted ambient conditions (e.g. temperature, ground potential) (→ see section “*Technical specifications (extract)*”).
- Do not look into the reading window of the LECTOR®620, in order to avoid potential eye injury due to the bright, integrated illumination.
- Do not open the LECTOR®620. If the device is opened, any warranty claims against SICK AG shall be deemed invalid.

Commissioning and configuration

Step 1: Electrical installation

1. Connect the communication interface of the LECTOR®620 to the PC.
2. Supply the LECTOR®620 with voltage.



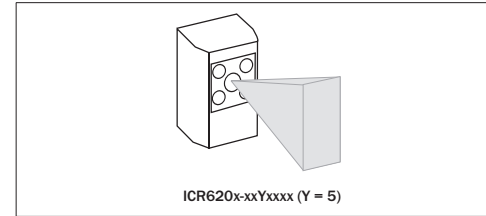
LECTOR®620 with swivel connector unit

Step 2: Installation and alignment

- Mount LECTOR®620 on a holder using 2 screws (M5). To do this, use the blind hole threads in the housing (pair at the front or bottom) or in the two sliding nuts on the sides. Mounting bracket no. 2020410 can be attached at the bottom or on the sliding nuts. Screw the screws max. 5 mm into the blind hole threads (→ see section “*Device structure*”).

Aligning the LECTOR®620 with its reading window towards the code

- Take account of the shape, alignment and dimensions of the field of view in front of the LECTOR®620.



Field of view in front of the device, dimensions depending on distance

Taking account of the reading distance which is dependent on resolution

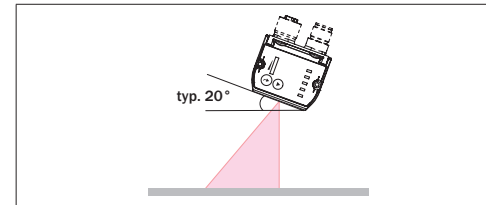
The LECTOR®620 automatically sets its focal distance to the reading distance from the code using the Auto-Setup function.

Max. reading distance with min. resolution

Max. reading distance	Minimum resolution
50 mm (1.97 in)	0.10 mm (3.9 mil)
80 mm (3.15 in)	0.15 mm (5.9 mil)
110 mm (4.33 in)	0.20 mm (7.9 mil)
135 mm (5.32 in)	0.25 mm (9.8 mil)
165 mm (6.50 in)	0.30 mm (11.8 mil)
280 mm (11.03 in)	0.50 mm (19.7 mil)
430 mm (16.94 in)	0.75 mm (29.5 mil)

Regarding fields of view, see the “*Mechanical installation*” chapter in the *online help*.

Taking account of the reading angle



Selection of the skew angle, depending on the application

- Typically, skew the LECTOR®620 by 20° out of the perpendicular in relation to the surface of the code, in order to avoid disruptive reflections.

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

Step 3: Configuration

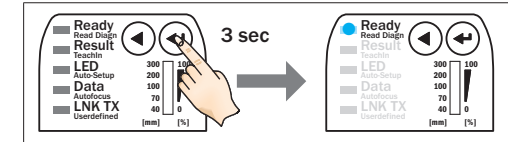
Configuration without PC

The two function buttons and the LEDs with their second display level are used for adapting the reading properties of the LECTOR®620 without a PC.

With the Auto-Setup function, the LECTOR®620 automatically adjusts itself to the reading distance from the code, the light conditions and the quality of a **data matrix code** that is presented.

The values calculated for the three modules, “reading distance, image and code settings” are permanently stored (default), thereby overwriting the existing configuration.

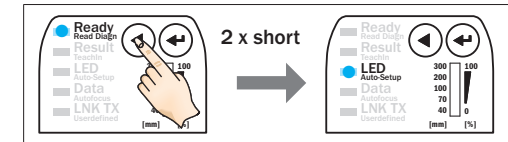
1. Start “Edit” mode.



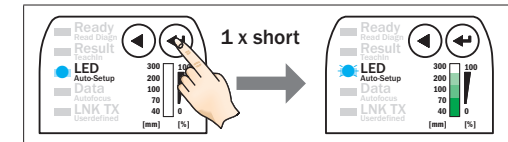
2. Align the LECTOR®620 with the code.



3. Select Auto-Setup.



4. Start Auto-Setup.



Feedback from the LECTOR®620 in Auto-Setup

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

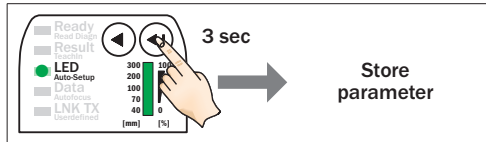
LED	Status
●	Auto-Setup selected
●	Auto-Setup started
●	Auto-Setup successfully finished
●	Auto-Setup partially successful (in at least one of the 3 modules)
●	Auto-Setup was unsuccessful

● = lit; ● = flashing

Important

- If the read result is inadequate (“Auto-Setup” LED lights up yellow or red), check the alignment and the distance of the LECTOR®620 in relation to the code (→ see “*Step 2: Installation and alignment*”).

5. Exit "Edit" mode.



Alternatively, the LECTOR®620 automatically stores the settings if 5 minutes elapse without a key being pressed, and it returns to read mode.

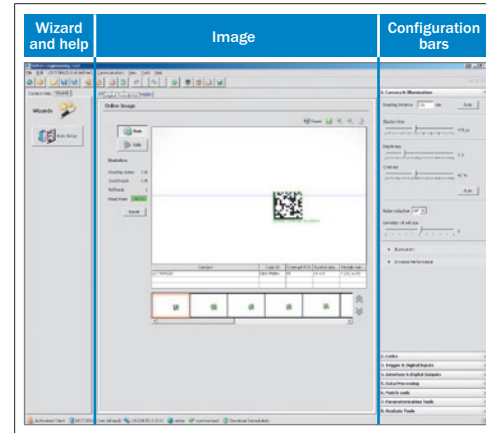
Configuration with PC

The parameters of the LECTOR®620 are adapted to the application and the diagnosis is performed in case of a fault using the configuration software SOPAS. To provide assistance, the LECTOR®620 outputs the images it has taken for display in SOPAS (prerequisite SOPAS: min. V2.32). If the reading properties of the LECTOR®620 has been adapted without a PC, SOPAS is used in general for continuing the configuration (reading trigger, read result formats, data interface, etc.).

Installing and starting the configuration software

1. Install the SOPAS software from the enclosed "Software & Manuals Auto Ident" DVD onto the PC (alternatively, download and install it from the website at "www.sick.com/downloads-autoident"). Select the "Complete" option as selected by the install wizard.
2. Start the "Single Device" program option.
Path: Start > Program Files > SICK > SOPAS Engineering Tool > SOPAS (Single Device)
3. Establish the connection between the software and LECTOR®620 via Ethernet.
The connection wizard starts automatically for this purpose.
4. Select the LECTOR®620 from the available devices.

Software setup



Configuring reading properties with the wizard

- Start the AUTO-SETUP wizard on the left in the program window and follow the instructions in the dialog box. With the Auto-Setup function, the LECTOR®620 automatically adapts itself to the reading distance from the code, the light conditions and the quality of a data matrix code that is presented. The parameter values calculated for the three modules, "reading distance, image and code settings" are temporarily stored at first. SOPAS displays the parameters values in the according parameters under the both configuration bars, CAMERA & ILLUMINATION and CODES.

Continuing configuration

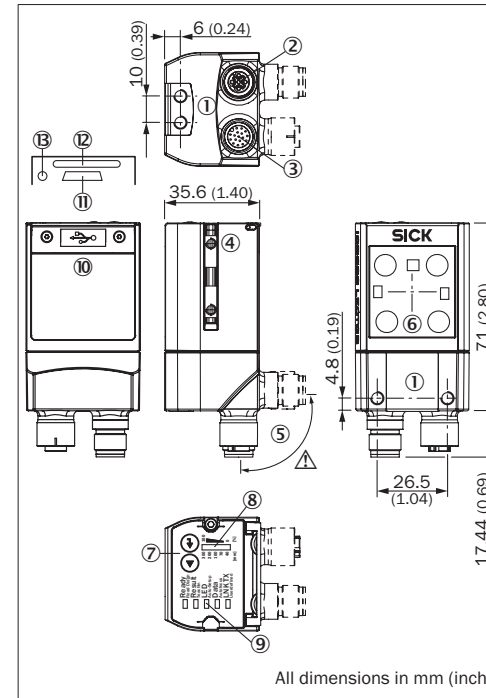
1. To optimize the LECTOR®620 individually in the image and code settings, click the CAMERA & ILLUMINATION and CODES configuration bars on the right and adjust the parameter values.
2. To make the changes visible directly, click the EDIT button in the Online Image display window.
The LECTOR®620 records images and decodes them using the current settings.
The switching inputs and outputs as well as data output via the host interface are deactivated in EDIT mode.
3. Make settings for additional functions such as reading trigger, read result formats, data interface, etc.
4. In the Online Image window, click the RUN button and test the settings in read mode.
5. Finally, store the configuration permanently in the LECTOR®620 and on the PC.

Important

Select the SOPAS program option to take the LECTOR®620 into operation in the network (e.g. CAN bus) together with other SICK products.
Path: Start > Program Files > SICK > SOPAS Engineering Tool > SOPAS

Product description

Device structure



- ① Blind hole thread M5, 5 mm deep (4 x), for mounting the LECTOR®620
- ② "Ethernet" connection
- ③ "Power/Serial Data/CAN/I/O" connection
- ④ Sliding nut M5, 5 mm deep (2 x)
- ⑤ Swivel connector unit
- ⑥ Reading window
- ⑦ Function button (2 x)
- ⑧ Bar graph display
- ⑨ LED for status display (2 levels), 5 x
- ⑩ Cover (flap)
- ⑪ "USB" connection (operational from Q2/2011)
- ⑫ Slot for Micro-SD memory card
- ⑬ LED for Micro-SD memory card (status display)

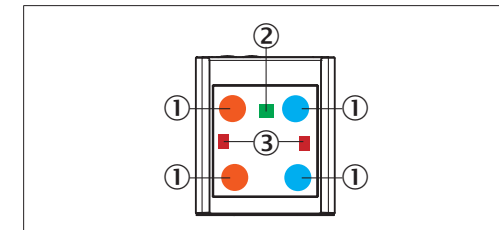
For detailed dimensional drawings of the LECTOR®620 and mounting bracket no. 2020410, see the "Mechanical installation" chapter in the online help.

NOTE

Risk of damaging the swivel connector unit

The connector unit is allowed to be moved by max. 180° from end point to end point of the rotation.

Illumination unit



- ① Integrated illumination = 4 x LED (2 x red/2 x blue)
- ② Feed-back spot (e.g. for Good Read) = 1 x green LED
- ③ Aiming laser (can be switched off) = 2 x red laser LED

CAUTION

LED and laser radiation

The accessible radiation from the laser 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 - incorrect use can lead to the user being exposed to dangerous radiation.

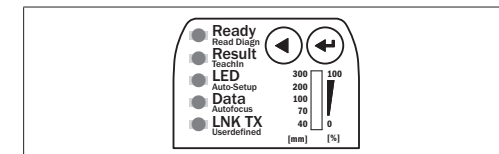
- Do not deliberately look directly into the light sources for a lengthy period.
- Comply with the latest version of the applicable provisions on photobiological safety of lamps and lamp systems as well as on laser protection.

For further information, → see the "Technical specifications (extract)".

Important

No maintenance is required in order to ensure compliance with risk group RG 1/laser protection class 1.

Status displays, functions



Status displays on the first display level

Display	LED	Status
Ready	●	Device ready for reading
	●	Hardware fault
Result	●	Successful reading
LED	●	Illumination on (in reading mode)
Data	●	Data output via host interface
LNK TX	●	Data traffic via Ethernet

● = lit; ● = flashing

Status displays on the second display level

Display	LED	Status
Read Diagn	●	Read diagnosis selected
	●	Read diagnosis started
TeachIn	●	Teach-in match code selected
	●	Teach-in match code started
	●	Teach-in match code successfully completed
	●	No code teach-in was possible
Auto-Setup	●	Auto-Setup selected
	●	Auto-Setup started
	●	Auto-Setup successfully finished
	●	Auto-Setup partially successful (in at least one of the 3 modules)
	●	Auto-Setup was unsuccessful
Autofocus	●	Autofocus selected
	●	Autofocus started
	●	Autofocus successfully completed
	●	Autofocus was unsuccessful

● = lit; ● = flashing

Read Diagn

Percentage evaluation: the LECTOR®620 records images and decodes them using the current settings for the reading properties. The read rate of the last 10 attempts is displayed in % above the bar graph display.

TeachIn

Teach-in of a match code: the LECTOR®620 reads the presented code and stores it permanently (default) as the match code for future code comparisons in read mode.

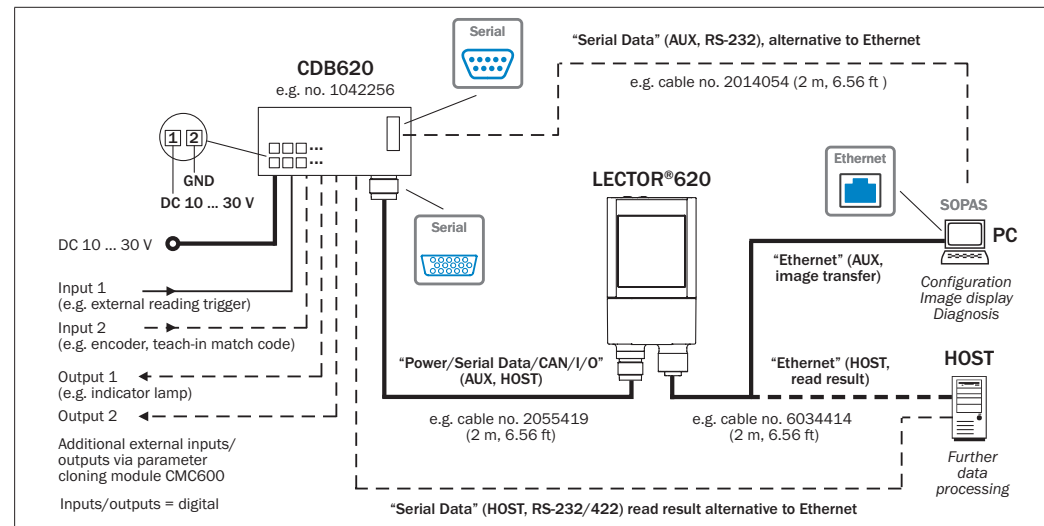
Auto-Setup

The LECTOR®620 automatically adjusts itself to the reading distance from the code, the light conditions and the quality of a data matrix code that is presented. The calculated values are permanently stored (default).

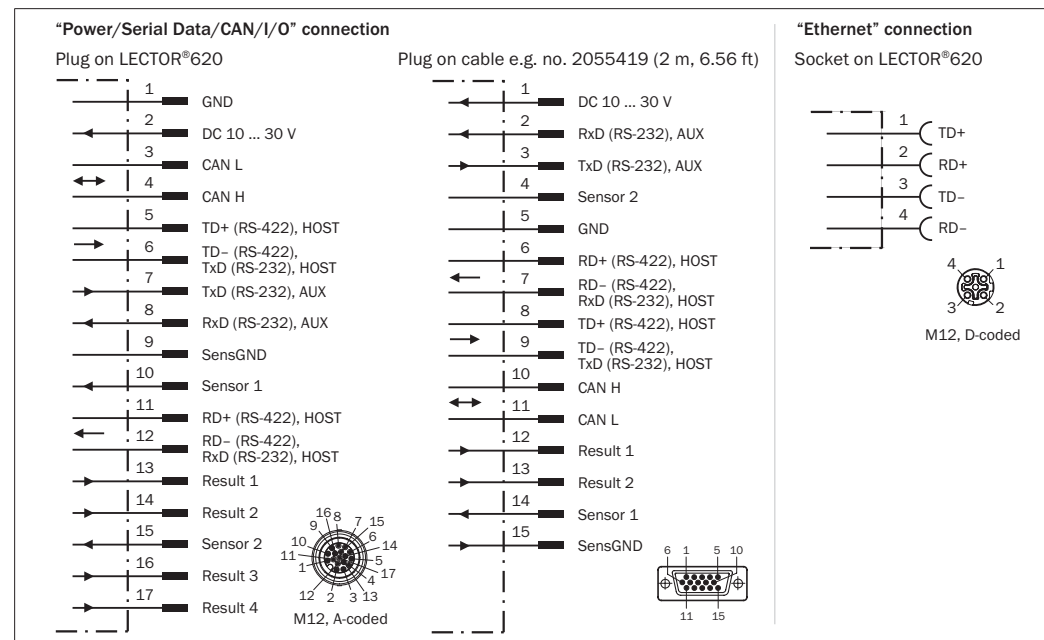
Autofocus

The LECTOR®620 only adjusts itself to the reading distance and stores this permanently (default).

Overview of all interfaces and connection options



Overview of pin assignment



Micro-SD memory card (optional accessory)

Function

The LECTOR®620 additionally stores its most recently modified parameter set externally on the plug-in card (cloning). Furthermore, the LECTOR®620 can optionally record images, e.g. in case of no-reads (for information about the backup concept and additional functions of the memory card, refer to the online help). The memory card is not included in delivery.

Inserting the memory card

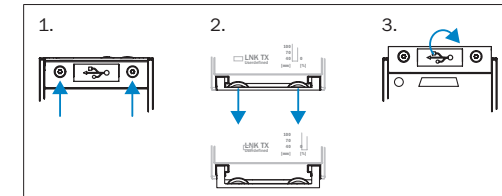
Only use types approved by SICK, in order to ensure reliable function of the memory card. The LECTOR®620 supports memory capacities up to max. 32 GB.

The card slot (→ see ② in the "Device structure" section) can be accessed on the rear of the LECTOR®620 behind the black cover (flap).

NOTE

Risk of damage due to moisture

Protect the LECTOR®620 against moisture when the cover is open. The cover must be screwed on firmly in order to comply with protection class IP 65.



1. Unscrew both of the flap screws (captives) (TX6).
2. Carefully pull the upper edge of the flap away from the housing a little at the level of the hinges on the side. Use both of the recesses on the inside of the flap to do this.
3. Fold the flap upwards starting from the bottom edge.

NOTE

Risk of data loss or irreparable damage to the memory card

The write procedure onto the memory card by the LECTOR®620 is indicated by the green LED lighting up (③) next to the card slot.

- Do not remove the memory card during the write procedure, and do not switch off the supply voltage either (similar to a digital camera).
- To remove the memory card safely, select the REMOVE CARD function under ANALYSIS TOOLS/MICROSD CARD in the configuration software SOPAS.

Technical specifications (extract)

Type	LECTOR®620
Focus	Autofocus (during teach-in of the reading distance)
Illumination of the field of view (LEDs)	Visible light, red ($\lambda = 617 \pm 15$ nm), blue ($\lambda = 470 \pm 15$ nm)
Feedback spot in the field of view (LED)	Visible light, green ($\lambda = 525 \pm 15$ nm)
LED risk group	Risk group 1 acc. to IEC 62471-1: 2006-07/EN 62471-1: 2008-09. Beam density: $L_b < 10$ kW/(m ² sr) within 100 s $L_a < 28/\alpha$ kW/(m ² sr) within 10 s at a distance ≥ 200 mm (7.88 in)
MTBF of the LEDs	75.000 h, at ambient operating temperature 25 °C (+77 °F)
Aiming laser (field of view)	Visible light, red ($\lambda = 630 \dots 680$ nm), can be switched off
Laser class	Class 1 acc. to IEC 60825-1: 2007-03. Corresponds to 21 CFR 1040.10 with the exception of the deviations acc. to Laser Notice No. 50 dated 24 June 2007. P < 0.39 mW per laser module
Image sensor	752 x 480 pixels (WVGA resolution), grey values
Image frame rate	60 Hz (for WVGA resolution)
Host interface	RS-232/RS-422 or Ethernet port serial: 300 bd ... 115.2 kbd
Aux interface	RS-232 or Ethernet port serial: 57.6 kbd
Ethernet interface	10/100 Mbit/s, TCP/IP, FTP
CAN interface	20 kbit/s ... 1 Mbit/s
Switching inputs Switching outputs	2 x IN ($I_{in} = \max. 32$ V, $I_{in} \leq 5$ mA) 4 x OUT ($I_{out} \leq 100$ mA)
Supply voltage	DC 10 ... 30 V, SELV/PELV acc. to IEC 6034-4-41: 2005
Power consumption	Typ. 3 W (with switching outputs without load)
Housing/weight	Aluminum diecasting/approx. 170 g (6 oz.)
Electrical safety	Acc. to EN 60950-1: 2006-04/A11: 2009-03
Protection class	III
Enclosure rating	IP 65 (EN 60529: 1991-10/A2: 2002-02)
EMC	Electromagnetic interference EN 61000-6-3: 2007-09 Electromagnetic immunity EN 61000-6-2: 2006-03
Rigidity Shock resistance	Acc. to EN 60068-2-6: 2008-02 Acc. to EN 60068-2-27: 2009-05
Temperature	Operation: 0 to +50 °C (+32 to +122 °F), storage: -20 to +70 °C (-4 to +158 °F)

For detailed technical specifications, see *online data sheet* on the product web page (www.sick.com/lector).

Explanation of electrical safety

⚠ WARNING

The LECTOR®620 is designed to be operated in a system with proficient grounding of all connected devices and mounting surfaces to the same ground potential. If this condition is not met, potential equalization currents may flow along the cable shields, leading to the following dangers: dangerous touch voltage on the metal housing, incorrect function or irreparable damage to the LECTOR®620 as well as heating of the cables, even leading to spontaneous combustion.

- To find information about measures to guard against danger, refer to the “*Electrical installation*” chapter in the *online help* or on the product web page (www.sick.com/lector).

Maintenance and care

The LECTOR®620 does not contain any components that require maintenance.

- Clean the reading window (plastic) if it is dirty, in order to achieve the full reading rate. Do this carefully using a soft, damp cloth (with a mild cleaning agent).

Sources for obtaining additional information

Additional information about the LECTOR®620 and its optional accessories can be found as follows:

“Software & Manuals Auto Ident” DVD (no. 2039442)

- Mechanical installation and electrical installation (in online help)
- These operating instructions
- Configuration software SOPAS with online help
- Ordering information in the catalog
- Publications dealing with the accessories
- Overview list and license texts for open source software

Product web page of the LECTOR®620 (www.sick.com/lector)

- Detailed technical specifications (online data sheet)
- Dimensional drawing and 3D CAD dimension models in various electronic formats
- EC Declaration of Conformity
- Overview of command strings
- Updates of the configuration software SOPAS and other useful software
- All publications contained on the aforementioned DVD (via links)
- Overview list and license texts for open source software

Support is also available from your sales partner:
www.sick.com/group/EN/home/general/Pages/worldwide.aspx

Copyright notices for open source programs

Exclusion from liability

The firmware of the LECTOR®620 was developed using open source software.

The user is exclusively responsible for any modification made to open source components. All warranty claims shall be invalidated in this case.

The following exclusion from liability applies to the **GPL components** in relation to the rights holders:

This Program is distributed in the hope that it will be useful, but WITHOUT ANY WARRANTY; without even the implied warranty for MECHANABILITY or FITNESS FOR A PARTICULAR PURPOSE. See the GNU General Public License for more details.

With regard to the **other open source components**, we refer to the exclusions from liability of the rights holders in the license texts on the supplied “Software & Manuals Auto Ident” DVD.

List of software licenses and license texts

In the LECTOR®620 product, SICK uses unmodified open source software and, as far as required and permitted in accordance with the relevant license condition, modified open source software.

The firmware of the LECTOR®620 is therefore subject to the copyrights listed below. Please refer to the license tests on the supplied DVD for the corresponding license conditions.

The license texts can also be downloaded free of charge from the following address: www.sick.com/lector.

- NCURSES – 5.7- License:
Copyright (c) 2006 Free Software Foundation, Inc.
- ZLib 1.2.3:
Copyright (C) 1995-2004 Jean-loup Gailly and Mark Adler
- e2fsprogs-1.41.11 (UUID-license based on BSD 3-clause license):
Copyright (C) 1996, 1997 Theodore Ts'o.
- Dropbear – 0.52.tar.bz2:
Copyright (c) 2002-2008 Matt Johnston - Portions copyright (c) 2004 Mihnea Stoenescu
 - Import code in keyimport.c is modified from PuTTY's import.c, licensed as follows: PuTTY is copyright 1997-2003 Simon Tatham - Portions copyright Robert de Bath, Joris van Rantwijk, Delian Delchev, Andreas Schultz, Jeroen Massar, Waz Furlong, Nicolas Barry, Justin Bradford, and CORE SDI S.A.
- OpenSSH – 5.1p1
 - Cryptographic attack detector for ssh - source code: Copyright (c) 1998 CORE SDI S.A., Buenos Aires, Argentina.
 - Copyright 1995, 1996 by David Mazieres <dm@cs.mit.edu>.
 - Copyright (c) 1983, 1990, 1992, 1993, 1995 The Regents of the University of California.
 - Remaining components of the software are provided under a standard 2-term BSD licence with the following names as copyright holders: Markus Friedl, Theo de Raadt, Niels Provos, Dug Song, Aaron Campbell, Damien Miller, Kevin Steves, Daniel Kouril, Wesley Griffin, Per Allansson, Nils Nordman, Simon Wilkinson
Portable OpenSSH additionally includes code from the following copyright holders, also under the 2-term BSD license: Ben Lindstrom, Tim Rice, Andre Lucas, Chris Adams, Corinna Vinschen, Cray Inc., Denis Parker , Gert Doering, Jakob Schlyter, Jason Downs, Juha Yrjölä, Michael Stone, Networks Associates Technology, Inc., Solar Designer, Todd C. Miller, Wayne Schroeder, William Jones, Darren Tucker, Sun Microsystems, The SCO Group, Daniel Walsh
 - Portable OpenSSH contains the following additional licenses:
 - snprintf replacement: Copyright Patrick Powell 1995
 - Compatibility code (openssh-compat): Some code is licensed under a 3-term BSD license, to the following copyright holders: Todd C. Miller, Theo de Raadt, Damien Miller, Eric P. Allma, The Regents of the University of California, Constantin S. Svintsoff
 - Some code is licensed under an ISC-style license, to the following copyright holders: Internet Software Consortium: Todd C. Miller, Reyk Floeter, Chad Mynhier
 - Some code is licensed under a MIT-style license to the following copyright holders: Free Software Foundation, Inc.
- GNU GENERAL PUBLIC LICENSE (Version 2, June 1991): Copyright (C) 1989, 1991 Free Software Foundation, Inc., 51 Franklin Street, Fifth Floor, Boston, MA 02110-1301 USA
 - BusyBox 1.16.1: Copyright (C) 1989, 1991 Free Software Foundation, Inc., 51 Franklin Street, Fifth Floor, Boston, MA 02110-1301 USA
- iproute2-2.6.34: Copyright (C) 1989, 1991 Free Software Foundation, Inc., 51 Franklin Street, Fifth Floor, Boston, MA 02110-1301 USA
- kexec-tools-2.0.1: Copyright (C) 1989, 1991 Free Software Foundation, Inc., 51 Franklin Street, Fifth Floor, Boston, MA 02110-1301 USA
- libelf-0.8.12: Copyright (C) 1989, 1991 Free Software Foundation, Inc., 51 Franklin Street, Fifth Floor, Boston, MA 02110-1301 USA
- libgcc: Copyright (C) 1989, 1991 Free Software Foundation, Inc., 51 Franklin Street, Fifth Floor, Boston, MA 02110-1301 USA
- ltrace-0.5: Copyright (C) 1989, 1991 Free Software Foundation, Inc., 51 Franklin Street, Fifth Floor, Boston, MA 02110-1301 USA
- lzo-2.03: Copyright (C) 1989, 1991 Free Software Foundation, Inc., 51 Franklin Street, Fifth Floor, Boston, MA 02110-1301 USA
- lzo-2.03: Copyright (C) 1989, 1991 Free Software Foundation, Inc., 51 Franklin Street, Fifth Floor, Boston, MA 02110-1301 USA
- mtdev-1.3.1: Copyright (C) 1989, 1991 Free Software Foundation, Inc., 51 Franklin Street, Fifth Floor, Boston, MA 02110-1301 USA
- porcps-3.2.8 (only ps used): Copyright (C) 1989, 1991 Free Software Foundation, Inc., 51 Franklin Street, Fifth Floor, Boston, MA 02110-1301 USA
- udev-1.19: Copyright (C) 1989, 1991 Free Software Foundation, Inc., 51 Franklin Street, Fifth Floor, Boston, MA 02110-1301 USA
- libstdc++:
GNU LESSER GENERAL PUBLIC LICENSE (Version 3, 29 June 2007): Copyright (C) 2007 Free Software Foundation, Inc. <<http://fsf.org/>>
- Glibc 2.8
 - GNU LESSER GENERAL PUBLIC LICENSE (Version 3, 29 June 2007): Copyright (C) 2007 Free Software Foundation, Inc. <<http://fsf.org/>>
 - GNU GENERAL PUBLIC LICENSE (Version 3, 29 June 2007): Copyright © 2007 Free Software Foundation, Inc. <<http://fsf.org/>>

Source codes

The source codes licensed under GPL and LGPL can be ordered from the responsible SICK national agency.
Contact data:
www.sick.com/group/EN/home/general/Pages/world-wide.aspx