LSIS 400i
Smart Camera

TECHNICAL DESCRIPTION
Sales and Service

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Fax 07021/8650960
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4000-36999
37000-97999

Sales Region South
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Fax 07021/8650911
Postal code areas
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Sales Region East
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Device information - main menu
Information about
• Device type
• Software version
• Hardware version
• Serial number

Status displays - main menu
• Status displays of the switching inputs/outputs
• Display of warnings and errors
• Status information for the device interfaces
• Optional: check program-specific display
See "Indicators in the display" on page 34.

Statistics - main menu
Statistics data for the smart camera.
See "Statistics" on page 38.

Parameter - main menu
Editing Ethernet settings and selecting check programs stored on the LSIS 400i.
See "Parameter menu" on page 39.

Language selection - main menu
Selection of the display language.
See "Language selection menu" on page 40.

Service - main menu
Camera diagnosis and status messages.
See "Service menu" on page 40.

Device buttons:
- Navigate upward/laterally
- Navigate downward/laterally
- ESCAPE leave
- ENTER confirm

Input of values
- Delete digit
- Enter digit
- Save input

Language
- Deutsch
- English
- Español
- Français
- Italiano

Service
Status messages

PWR
- PWR LED
  Off: Device OFF
  Flashes green: Device ok, initialization phase
  Green, continuous light: Device OK
  Orange, continuous light: Service mode
  Flashes red: Device ok, warning set
  Red, continuous light: Device error

BUS
- BUS LED
  Off: No supply voltage
  Flashes green: Bus initialization
  Green, continuous light: Operation OK
  Flashes red: Communication error
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1 General information

1.1 Explanation of symbols

The symbols used in this technical description are explained below.

**Attention!**
This symbol precedes text messages which must strictly be observed. Failure to comply with this information can result in injuries to personnel or damage to the equipment.

**Notice!**
This symbol indicates text passages containing important information.

1.2 Declaration of conformity

The smart cameras of the LSIS 400/i series have been developed and manufactured in accordance with the applicable European standards and directives.

**Notice!**
You can request a copy of the Declaration of Conformity for the device from the manufacturer.

The manufacturer of the product, Leuze electronic GmbH & Co KG in D-73277 Owen/Teck, possesses a certified quality assurance system in accordance with ISO 9001.
2 Safety notices

2.1 General safety notices

Documentation
All entries in this technical description must be heeded, in particular the present chapter "Safety notices". Keep this technical description in a safe place. It should be available at all times.

Safety regulations
Observe the locally applicable regulations and the rules of the employer's liability insurance association.

Repair
Repairs must only be carried out by the manufacturer or an authorized representative.

2.2 Safety standards

The smart cameras of the LSIS 400i series were developed, manufactured and tested in accordance with the applicable safety standards. They correspond to the state of the art.

2.3 Approved purpose

Attention!
The protection of personnel and the device cannot be guaranteed if the device is operated in a manner not complying with its intended use.

Smart cameras of the LSIS 400i series are designed for general applications in industrial image processing, e.g. in automation technology or quality assurance.
In particular, unauthorized uses include:
- in rooms with explosive atmospheres
- operation for medical purposes
2.4 Working safely

Attention!
Access to or changes on the device, except where expressly described in this operating manual, are not authorized.

Safety regulations
Observe the locally applicable legal regulations and the rules of the employer's liability insurance association.

Qualified personnel
Mounting, commissioning and maintenance of the device must only be carried out by qualified personnel.
Electrical work must be carried out by a certified electrician.

Attention!
Smart cameras of the LSIS 400i family correspond to LED Class 1 acc. to EN 60825-1:2003-10 as well as Risk Group 1 (low risk) acc. to EN 62471:2008. With normal reflexive behavior, lights of Risk Group 1 pose no danger.
To completely prevent indirect dangers, such as glare, do not look directly into the light.
3  Device description

3.1  About smart cameras of the LSIS 400\textit{i} series

Smart cameras of the LSIS 400\textit{i} series perform numerous tasks in industrial image processing such as:

\begin{itemize}
  \item Presence monitoring
  \item Completeness monitoring
  \item Omnidirectional 1D and 2D (multiple) code reading
  \item Code qualification acc. to ISO/IEC
  \item Type detection
  \item Position detection
  \item Orientation detection
\end{itemize}

The many possible configurations of the device allow it to be adapted to a multitude of detection tasks.

\textbf{Function overview}

There are 3 basic device types available with various performance characteristics:

\begin{center}
\begin{tabular}{|l|c|c|}
\hline
Features & LSIS 412/\ldots & LSIS 422/\ldots & LSIS 462/\ldots \\
\hline
Blob analysis &  &  &  \\
Presence / completeness & X & X &  \\
Type detection & X & X &  \\
Position / angle & X & X &  \\
Repositioning (X, Y, 360°) & X & X &  \\
Up to 99 objects per tool & X & X &  \\
\hline
Code reading &  &  &  \\
1D-codes (Code 39, Code 128, 2/5 interleaved, Codabar, EAN/UPC, Pharmacode) &  & X & X \\
2D-codes (Data Matrix code ECC 200) & X & X &  \\
Omnidirectional reading & X & X &  \\
Multiple code reading (max. 99) & X & X &  \\
Reference code comparison & X & X &  \\
Code qualification acc. to ISO/IEC 15416, 15415, 16022 & X & X &  \\
Display of the read result in the device display & X & X &  \\
\hline
\end{tabular}
\end{center}
Application examples: blob analysis

Figure 3.1: Application example: presence monitoring

Figure 3.1 shows the presence monitoring of printed lottery numbers with an LSIS 412 during the printing of lottery tickets.

Figure 3.2: Application example: completeness monitoring

Figure 3.2 shows full-crate monitoring with an LSIS 412.
Device description

Figure 3.3: Application example: orientation detection

Figure 3.3 shows the detection of position and angle of individual parts with an LSIS 412.

**Application examples: code reading**

Figure 3.4: Application example: code verification

Figure 3.4 shows the reading of a 1D code (Pharmacode) on pharmaceutical packages and an optional verification of uniformity using a stored reference code with an LSIS 422.
Figure 3.5: Application example: dot-peened Data Matrix code

Figure 3.5 shows the reading of dot-peened 2D codes on engine blocks with an LSIS 422i.

Figure 3.6: Application example: label positioning and label identification

Figure 3.6 shows the presence inspection for the correct label and the reading of the 1D code with an LSIS 462i.
3.2 Characteristics of the smart cameras of the LSIS 400i series

**Performance features:**

- Diverse mounting options with dovetail technology or mounting threads on the front, rear and narrow side of the device.
- Motor-driven focus adjustment with automatic readjustment on change of check program.
- Integrated illumination with special optics for homogeneous illumination of the rectangular field of view, divided into 4 quadrants that can be switched on and off separately.
- Intuitive, backlit, multi-language display with user-friendly menu navigation.
- Real-time clock (time with date) with built-in backup battery.
- Adjustment of all device parameters with a web browser. No additional software needs to be installed.
- M12 connections with Ultra-Lock™ technology.
- Eight freely programmable switching inputs/outputs for the activation or signaling of states.
- Heavy-duty housing of protection class IP 65/67.

**Notice!**

Information on technical data and characteristics can be found in chapter 11.
General information

Basic operation of the LSIS 400i is via a multi-language control panel (display with buttons). The control panel can be used to view statistics and status messages. Two LEDs provide additional optical information on the current operating state of the device.

The eight freely configurable switching inputs/outputs "SWIO 1 … SWIO 8" can be assigned various functions and control e.g. activation of the LSIS 400i or communication with external devices, such as a PLC.

The LSIS 400i can be operated and configured by means of the integrated webConfig via the Ethernet service interface.

![Figure 3.7: Detecting objects with webConfig](image)

With webConfig, individual check programs can be set up for detecting objects. The object being searched for is displayed in green in Figure 3.7.
3.3 Device construction

![Device construction diagram](image)

The smart cameras of the LSIS 400i series can be operated as individual "stand alone" devices. The LSIS 400i features multiple M12 connectors / sockets for the electrical connection of the supply voltage, the interfaces and the switching inputs and outputs.

![Stand-alone connection diagram](image)

3.4 Stand-alone connection

The smart cameras of the LSIS 400i series can be operated as individual "stand alone" devices. The LSIS 400i features multiple M12 connectors / sockets for the electrical connection of the supply voltage, the interfaces and the switching inputs and outputs.

The host/service interface is used to configure the LSIS 400i. Configuration is performed via the integrated webConfig, which can be accessed via a PC with a current browser.

The freely configurable switching inputs and outputs are used for process control. The LSIS 400i can exchange data with the process control via the RS 232 or Ethernet process interface. The protocol used for this purpose can be configured for the specific application in webConfig.
4 Installation and mounting

4.1 Storage, transportation

Attention!
When transporting or storing, package the device so that it is protected against collision and humidity. Optimal protection is achieved when using the original packaging. Heed the required environmental conditions specified in the technical data.

Unpacking
- Check the packaging for any damage. If damage is found, notify the post office or shipping agent as well as the supplier.
- Check the delivery contents using your order and the delivery papers:
  - Delivered quantity
  - Device type and model as indicated on the nameplate
  - Package insert
The name plate provides information as to what LSIS type your device is. For specific information, please refer to chapter 9.

Name plates of the smart cameras of the LSIS 400i series

![Device name plate LSIS 400i](image)

- Save the original packaging for later storage or shipping.
If you have any questions concerning your shipment, please contact your supplier or your local Leuze electronic sales office.
- Observe the applicable local regulations when disposing of the packaging materials.
4.2 Mounting the LSIS 400i

The LSIS 400i smart cameras can be mounted in various ways:

- By means of four M4 screws on the rear of the device, four M4 screws on the front of the device or two M4 screws on the narrow side of the device.
- By means of a BT 56/BT 59 mounting device on the two fastening grooves on the narrow side or rear of the device.

4.2.1 Fastening with M4 x 6 screws

![Fastening options using M4 threaded holes](image)

Figure 4.2: Fastening options using M4 threaded holes
4.2.2 Mounting devices

The BT 56 and BT 59 mounting devices are available for fastening the LSIS 400i. The BT 56 is designed for rod installation (Ø 16mm to 20mm). The BT 59 is used to fasten to ITEM aluminum profiles. For ordering instructions, please refer to chapter "Type overview and accessories" on page 45.

**BT 56 mounting device**

![Diagram of BT 56 mounting device]

Clamping jaws for mounting on the LSIS 400i

Clamp profile for mounting to round or oval pipes Ø 16 … 20mm

All dimensions in mm

**Figure 4.3: BT 56 mounting device**
Installation and mounting

Figure 4.4: Mounting examples of LSIS 400/ with BT 56

**BT 59 mounting device**

Figure 4.5: BT 59 mounting device

- A Holder, turnable 360°
- B ITEM joint, angle adjustable ±90°
- C M 8x16 screw cylinder, M 8 wave washer, M 8 sliding block, connectors for ITEM profile (2x)
4.3 Device arrangement

4.3.1 Selecting a mounting location

In order to select the right mounting location, several factors must be considered:

- The camera distance resulting from the respective image field (see figure 4.6 on page 20).
- The permissible cable lengths between the LSIS 400i and the host system depending on which interface is used.
- The display and control panel should be very visible and accessible.
- For configuring and commissioning with the webConfig tool, the service interface should be easily accessible.
- Mount the LSIS 400i so that the object being inspected is not exposed to direct sunlight or strong ambient light.

When selecting a mounting location, pay further attention to:

- Maintaining the required environmental conditions (temperature, humidity).
- Possible soiling of the viewing window due to liquids, abrasion by boxes, or packaging-material residues.
- Lowest possible chance of damage to the LSIS 400i by mechanical collision or jammed parts.

4.3.2 Determining the camera distance

In figure 4.6, the principle relationship between camera distance and the resulting image field is represented.

In general, the visible image field increases with the camera distance. If a larger image field is needed, the camera distance must be increased accordingly. This also results in a decrease in the resolution of the image, however.

The diagram shows the relationship between camera distance (= path from the front edge of camera to the object) and image field for objective models with focal lengths of 8mm and 16mm.

For camera distances between 50mm and 250mm, particularly homogeneous illumination of the image field is ensured by the integrated illumination.

Camera distances greater than 1000mm can be realized. In this case, the axis of the diagram is extrapolated accordingly.

Listed on the right side of the diagram is the pixel size that corresponds to the respective image field.

A segmented object is detected in the image only if at least 16 pixels in size.
Installation and mounting

Figure 4.6: Camera distance / image field

<table>
<thead>
<tr>
<th>Camera distance [mm]</th>
<th>Field of view (mm)</th>
<th>Pixel size [mm]</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
<td>0,07</td>
</tr>
<tr>
<td>100</td>
<td>50 x 32</td>
<td>0,13</td>
</tr>
<tr>
<td>200</td>
<td>100 x 64</td>
<td>0,20</td>
</tr>
<tr>
<td>300</td>
<td>150 x 96</td>
<td>0,27</td>
</tr>
<tr>
<td>400</td>
<td>200 x 128</td>
<td>0,33</td>
</tr>
<tr>
<td>500</td>
<td>250 x 160</td>
<td>0,53</td>
</tr>
<tr>
<td>600</td>
<td>300 x 191</td>
<td>0,60</td>
</tr>
<tr>
<td>700</td>
<td>350 x 223</td>
<td>0,66</td>
</tr>
<tr>
<td>800</td>
<td>400 x 255</td>
<td>0,73</td>
</tr>
<tr>
<td>900</td>
<td>450 x 287</td>
<td>0,80</td>
</tr>
<tr>
<td>1000</td>
<td>500 x 319</td>
<td>0,87</td>
</tr>
<tr>
<td>1100</td>
<td>550 x 351</td>
<td>0,94</td>
</tr>
</tbody>
</table>

Example image field size at distances of 100mm and 700mm.

8 mm objective

16 mm objective

Field of view [mm] 400 x 255mm

8 mm

16 mm

Pixel size [mm] 752 x 480px

400 x 255mm

30 x 20mm

200 x 130mm

752 x 480px

752 x 480px

700

0 100
4.4 Cleaning

Clean the housing window of the LSIS 400i with a soft cloth after mounting. Remove all packaging remains, e.g. carton fibers or Styrofoam balls. In doing so, avoid leaving fingerprints on the front cover of the LSIS 400i.

**Attention!**
Do not use aggressive cleaning agents such as thinner or acetone for cleaning the device. Use of improper cleaning agents can damage the housing window and display.

Notice for model with plastic screen:
The surfaces are preferably to be cleaned with standard household dishwashing soap mixed in water, wiped with a soft cloth or sponge, and carefully dabbed dry (never rub intensely!). For a thorough cleaning, solvent-free, antistatic plastic cleaners approved for use with plastics are recommended. Never use abrasive cleaners or organic solvents such as alcohol or acetone, as these could scratch the surfaces or cause cracks to form.
5 Electrical connection

The smart cameras of the LSIS 400i series are connected using variously coded M12 connectors. This ensures unique connection assignments.

For the general locations of the individual device connections, please refer to the device detail shown below.

Notice!

Ready-made cables are provided for all connections. For additional information, refer to chapter chapter 9.

Figure 5.1: Location of the electrical connections
5.1 Safety notices for the electrical connection

Attention!
Do not open the device yourself under any circumstances! The housing of the LSIS 400i contains no parts that need to be adjusted or maintained by the user.

Before connecting the device please ensure that the supply voltage matches the value printed on the nameplate.

Connection of the device and cleaning must only be carried out by a qualified electrician.

Ensure that the functional earth (FE) is connected correctly. Unimpaired operation is only guaranteed when the functional earth is connected properly.

If faults cannot be cleared, the device should be switched off from operation and protected against accidental use.

The smart cameras of the LSIS 400i series are designed in accordance with safety class III for supply by PELV (protective extra-low voltage with reliable disconnection).

Notice!
Protection class IP 65/67 is achieved only if the connectors and caps are screwed into place!
5.2 Electrical connection of the LSIS 4x2

The LSIS 4x2 is equipped with three M12 connectors/sockets which are A- and B-coded. For subsequent interface variants, the space is reserved for a fourth connection.

- The **voltage supply** (18 … 30VDC) is connected at the PWR connector (Vin, GND).
- The **8 freely configurable switching inputs/outputs** are connected to the PWR connector and to the BUS OUT socket (IO1 … IO8).
- The **RS 232 interface** is a process interface of the LSIS 400. It is connected to the BUS OUT socket (Tx, Rx).
- The **Ethernet cable for configuring and commissioning** with webConfig and for transferring process data is connected to the SERVICE connector.

Described in detail in the following are the individual connections and pin assignments.

![Connections diagram](image-url)

Figure 5.2: Connections of the LSIS 4x2

Described in detail in the following are the individual connections and pin assignments.
5.2.1 Electrical connection

### PWR - voltage supply and switching inputs/outputs 1 to 4

<table>
<thead>
<tr>
<th>Pin</th>
<th>Name</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>VIN</td>
<td>Positive supply voltage +18 ... +30VDC</td>
</tr>
<tr>
<td>2</td>
<td>IO1</td>
<td>Configurable switching input/output 1</td>
</tr>
<tr>
<td>3</td>
<td>GND</td>
<td>Negative supply voltage 0VDC</td>
</tr>
<tr>
<td>4</td>
<td>IO2</td>
<td>Configurable switching input/output 2</td>
</tr>
<tr>
<td>5</td>
<td>IO3</td>
<td>Configurable switching input/output 3</td>
</tr>
<tr>
<td>6</td>
<td>IO4</td>
<td>Configurable switching input/output 4</td>
</tr>
<tr>
<td>7</td>
<td>NC</td>
<td>Not Connected</td>
</tr>
<tr>
<td>8</td>
<td>FE</td>
<td>Functional earth</td>
</tr>
</tbody>
</table>

Table 5.1: Pin assignments - PWR

Preferably, use the "KB M12/8-...-BA" ready-made cables, see table 9.4 "PWR cables for the LSIS 400i" on page 46.

#### Supply voltage

The smart cameras of the LSIS 400i series are designed in accordance with safety class III for supply by PELV (protective extra-low voltage with reliable disconnection).

#### Connecting functional earth FE

Ensure that the functional earth (FE) is connected correctly. Unimpaired operation is only guaranteed when the functional earth is connected properly. All electrical disturbances (EMC couplings) are discharged via the functional earth connection.

#### Switching input / output

The smart cameras LSIS 4x2i feature 8 freely programmable, opto-decoupled switching inputs / outputs IO1 ... IO8.

The switching inputs can be used to activate various internal functions of the LSIS 400i (trig-gering of image acquisition, check program selection ...). The switching outputs are used for the output of result and status messages and for triggering an external flash control.

Switching inputs/outputs IO1 to IO4 are located on the PWR M12 connector.

Switching inputs/outputs IO5 to IO8 are located on the BUS OUT M12-socket.

Notice! Assignment as input or output and the corresponding function can be set via webConfig!
Electrical connection

If not explicitly configured in webConfig, the ports are preset as follows:

- IO1 start trigger input, triggers image acquisition
- IO2 result OK output, switches in event of positive evaluation result
- IO3 result NOK output, switches in event of negative evaluation result
- IO4 ready output, switches when ready for operation

Described in the following is the external wiring for use as a switching input or output; the respective function assignments to the switching inputs/outputs are set in webConfig.

### Function as switching input

![Connection diagram of IO1 through IO8 configured as switching inputs](image)

**Figure 5.3:** Connection diagram of IO1 through IO8 configured as switching inputs

### Function as switching output

![Connection diagram of IO1 through IO8 configured as switching outputs](image)

**Figure 5.4:** Connection diagram of IO1 through IO8 configured as switching outputs

**Attention!**

Each configured switching output is short-circuit proof! Do not load the respective switching output of the LSIS 400i with more than 60mA at +18 … +30VDC in normal operation!
5.2.2 BUS OUT - RS 232 and switching inputs/outputs 5 to 8

The RS 232 interface is used to output test results, see webConfig manual for details.

<table>
<thead>
<tr>
<th>BUS OUT (8-pin socket, A-coded)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pin</td>
</tr>
<tr>
<td>1</td>
</tr>
<tr>
<td>2</td>
</tr>
<tr>
<td>3</td>
</tr>
<tr>
<td>4</td>
</tr>
<tr>
<td>5</td>
</tr>
<tr>
<td>6</td>
</tr>
<tr>
<td>7</td>
</tr>
<tr>
<td>8</td>
</tr>
</tbody>
</table>

Table 5.2: Pin assignment BUS OUT

- Preferably, use the "KB M12/8-…-SA" ready-made cables, see table 9.6 "BUS OUT cables for the LSIS 400i" on page 47:
  - If using the RS 232 interface, use only shielded cables (cable lengths up to 10m)
  - If not using the RS 232 interface, you may also use unshielded cables with longer lengths

If using self-made cables, observe the following notice:

**Notice for connecting the RS 232 interface!**

Ensure adequate shielding. The entire connection cable must be shielded and earthed.

**RS 232 cable assignments**

![RS 232 pin assignments](image)

Figure 5.5: RS 232 pin assignments

**Switching input / output**

The freely configurable switching inputs/outputs are described in chapter 5.2.1.
5.2.3 SERVICE - Ethernet host/configuration interface

The LSIS 400 makes an Ethernet interface available for configuration and for transferring process data.

### SERVICE (4-pin socket, D-coded)

<table>
<thead>
<tr>
<th>Pin</th>
<th>Name</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>TD+</td>
<td>Transmit Data +</td>
</tr>
<tr>
<td>2</td>
<td>RD+</td>
<td>Receive Data +</td>
</tr>
<tr>
<td>3</td>
<td>TD-</td>
<td>Transmit Data -</td>
</tr>
<tr>
<td>4</td>
<td>RD-</td>
<td>Receive Data -</td>
</tr>
<tr>
<td></td>
<td>Thread</td>
<td>FE</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Functional earth (housing)</td>
</tr>
</tbody>
</table>

Table 5.3: SERVICE pin assignments

*Preferably, use the ready-made "KB ET - … - SA", "KB ET - … - SSA" and "KB ET - … - SA-RJ45" cables, see "Accessories for the host/service interface" on page 48.

If using self-made cables, observe the following notice:

**Notice for connecting the Ethernet interface!**

Ensure adequate shielding. The entire connection cable must be shielded and earthed. The RD+/RD- and TD+/TD- wires must be stranded in pairs.

Use at least CAT 5 cables for the connection.

### Ethernet cable assignment

Figure 5.6: Cable assignments - SERVICE on RJ-45
6 Commissioning and configuration

6.1 Establishing a connection between PC and LSIS 400i

6.1.1 Starting the device

Apply the supply voltage +18 … +30VDC (typ. +24VDC).

The camera starts up and the following message appears on the display:

```
Startup...
Leuze electronic
GmbH + Co. KG
```

After a few seconds, brief device information appears:

```
LSIS 412i M43 W1
Leuze electronic
GmbH + Co. KG
SW: V 0.51.0  HW:0
SN: 0902-082905016
RS232
```

Afterwards, the LSIS 400i switches to normal operation and displays the active interfaces as a status message.

6.1.2 Establishing an Ethernet connection

The Ethernet connection is used as the host interface and for configuring the LSIS 400i via a PC with a browser.

Notice!

*In order for the PC and LSIS 400i to communicate with one another, both must be on the same subnet and have different network addresses.*

Normally, it is sufficient to adjust the Ethernet settings (= TCP/IP configuration) on one of the two devices (LSIS 400i/PC) to those of the other device.

If the PC is normally connected to a network using DHCP address assignment, the easiest way to access the LSIS 400i is to create an alternative configuration in the TCP/IP settings of the PC. This method lends itself if the LSIS 400i is not connected to an existing network during later operation. For further information on this topic, refer to chapter 6.1.3.

Alternatively, you can also integrate the LSIS 400i in an existing network and configure it from a PC that is also connected to the network. For further information on this topic, refer to chapter 6.1.4.
6.1.3 Configuring the LSIS 400i from a laptop without a network

- Check the network address of the LSIS 400i by pressing the enter button three times in sequence during normal operation of the LSIS 400i.

This switches you to the Network settings submenu, where you can read the current settings of the LSIS 400i.

- Note the values for Addr and Mask.

The value in Mask specifies which digits of the IP address of the PC and LSIS 400i must match in order to communicate with one another.

E.g. 192.168.060.110 (but not 192.168.060.101!).

- Instead of xxx, you can now assign your PC any numbers between 000 and 255, but NOT THE SAME numbers as used with the LSIS 400i.

E.g. 192.168.060.110 (but not 192.168.060.101!).

If the LSIS 400i and the PC have the same IP address, they cannot communicate with one another.

### Setting the IP address on the PC

- Log into your PC as administrator.

- Select Start->Control Panel to access the Network Connections menu (Windows 2000/XP) or Network and Sharing Center (Windows Vista).

- There, select Local Area Connection and right-click to open the corresponding properties page.

- Select Internet Protocol (TCP/IP) (scroll down if necessary) and click Properties.

- In the Internet Protocol (TCP/IP) Properties window, select the Alternate Configuration tab.

- Set the IP address of the PC in the address range of the LSIS 400i.

   **Attention:** Not the same as for the LSIS!

- Set the subnet mask of the PC to the same value as on the LSIS 400i.

- Close the settings dialog by confirming all windows with OK.

- Connect the “Service” interface of the LSIS 400i directly to the LAN port of your PC.

---

<table>
<thead>
<tr>
<th>Address of the LSIS 400i</th>
<th>Net mask</th>
<th>Address of the PC</th>
</tr>
</thead>
<tbody>
<tr>
<td>192.168.060.101</td>
<td>255.255.255.0</td>
<td>192.168.060.xxx</td>
</tr>
<tr>
<td>192.168.060.101</td>
<td>255.255.0.0</td>
<td>192.168.xxx.xxx</td>
</tr>
</tbody>
</table>

Table 6.1: Address assignment in the Ethernet
Figure 6.1: Connecting the LSIS 400/i to the PC

The PC first tries to establish a network connection via the automatic configuration. This takes a few seconds, after which the alternate configuration, which you just set, is activated. The PC can then communicate with the LSIS 400/i.

6.1.4 Integrating the LSIS 400/i in an existing network

If it should be possible to reconfigure the LSIS 400/i later during running operation and if a network connection is present at the installation site, you can set the LSIS 400/i according to the parameters of the existing network. In principle, it is possible in this case to have the address set automatically by means of DHCP, or you can assign a fixed address.

- Ask your network administrator which method is to be used and – if using fixed address assignment – which settings should be used for address, subnet mask and gateway.

**With DHCP server**

- Use the display on the LSIS to activate the DHCP function (see "Changing the network settings on the display" on page 42).

Following activation of the DHCP function, the sensor automatically restarts. If you now connect the sensor to a network with DHCP server, it is automatically assigned an IP address.

You can now configure the LSIS 400/i via any PC on the same network.

**With fixed IP address**

- Use the display on the LSIS to set the parameters previously received by the network administrator (see "Changing the network settings on the display" on page 42).

The sensor restarts after the Ethernet configuration is changed. If you now connect the sensor to a network, it operates with the manually assigned IP address.

You can now configure the LSIS 400/i via any PC on the same network.
6.2 Configuring via webConfig

With Leuze webConfig, an operating-system independent, web-technology based, graphical user interface is available for configuring smart cameras of the LSIS 400i series. Through the use of HTTP as communication protocol and by using only standard technologies on the client side (HTML, JavaScript and AJAX), which are supported by all commonly used, modern browsers (e.g. Mozilla Firefox beginning with Version 3.0 or Internet Explorer beginning with Version 7.0), it is possible to operate the Leuze webConfig tool on any internet-ready PC.

Start a browser on your PC and enter the following address: 192.168.60.101 or the address previously set by you / the address assigned by the DHCP server. 192.168.60.101 is the default Leuze service address for communication with the smart cameras of the LSIS 400i series.

You can check the network address of the LSIS 400i by pressing the enter button on the display three times in sequence during normal operation of the LSIS 400i.

If the IP address is entered correctly in the browser, the following start page appears on your PC.

![webConfig start page](image)

**Notice!**
The webConfig tool is completely contained in the firmware of the LSIS 400i. Depending on firmware version, the start page may vary from that shown above.

The webConfig menus are intuitive to operate and contain both help texts as well as tooltips. Because the webConfig user interface is always being developed further, it is described in a separate software description. All released versions of this software description can be found in the download area of the Leuze electronic homepage: [www.leuze.de/...](http://www.leuze.de/...)
Activities in webConfig

Use webConfig to set up the LSIS 400i. When doing so, observe the following points:

- Configure at least one check program and activate it.
- Set up one of the 8 IOs as a trigger input for the check program. Make certain that this input is correctly connected (see chapter 5.2).
- If you use the RS 232 interface to communicate with the process control, you must configure the transmission parameters of the RS 232 interface in the data output tool of the respective check program.

For information on how that functions in webConfig, please refer to the webConfig software description.
7 Display and control panel

7.1 Structure of the control panel

![Structure of the control panel]

Figure 7.1: Structure of the control panel

7.2 Status display and operation

7.2.1 Indicators in the display

| IO1 ... IO8 | Switching input or output 1 ... 8 active (function depends on set configuration). |
| ATT | Warning (Attention) |
| ERR | Internal device error (Error) |
| TMP | Permissible internal device temperature exceeded / not met |
| RS232 | Type of integrated process interface |
| ETH | Status display for the Ethernet connection: |
| ETH100 means that a 100Mbit Ethernet connection exists. |
| ETH10 means that a 10Mbit Ethernet connection exists. |
| If ETH is not displayed, there is no Ethernet connection. |

In the center of the display, optional check program-specific displays can be displayed.
7.2.2 Control buttons

- **Up** Navigate upward/laterally.
- **Down** Navigate downward/laterally.
- **ESC** Exit menu item.
- **ENTER** Confirm/enter value, change menu levels.

**Navigating within the menus**

The menus within a level are selected with the up/down buttons. The selected menu item is activated with the enter button.

Press the ESC button to move up one menu level. When one of the buttons is actuated, the display illumination is activated for 10 min.

**Setting values**

If input of a value is possible, the display looks like this:

```
00001
C-0123456789 save
Standard ----- Unit
0000 | |
```

Use the and buttons to set the desired value. An accidental, incorrect entry can be corrected by selecting and then pressing .

Then use the buttons to select save and save the set value by pressing .

**Selecting options**

If options can be selected, the display looks like this:

```
o OFF
ON Standard ----- Unit
OFF | |
```

Select the desired option with the and buttons. Activate the option by pressing .
7.2.3 LED status displays

**PWR LED**

- **PWR off**
  - Device OFF
  - no supply voltage

- **PWR flashes green**
  - Device ok, initialization phase
  - no inspection possible
  - voltage connected
  - self test running
  - initialization running
  - check program is activated

- **PWR green continuous light**
  - Device ok
  - inspection mode
  - self test successfully finished
  - device monitoring active

- **PWR orange continuous light**
  - Service mode
  - configuration mode
  - configuration via webConfig

- **PWR flashes red**
  - Device ok, warning set
  - inspection mode
  - temporary operating fault
  - for details, see “Error signaling via LED” on page 44

- **PWR red continuous light**
  - Device error / parameter enable
  - no inspection possible
  - for details, see “Error signaling via LED” on page 44

**BUS LED**

- **BUS off**
  - No supply voltage
  - no communication possible

- **BUS flashes green**
  - Bus initialization
  - can be very short, 1 pulse

- **BUS green continuous light**
  - BUS ok
  - device ready for sending/receiving

- **BUS flashes red**
  - Communication error
  - UART error (frame error, parity error, ...)
7.3 Menu description

After voltage is applied to the smart camera, a startup screen is displayed for several seconds. Afterwards, the main menu appears in the display.

7.3.1 The main menus

Device information - main menu
Information about
- Device type
- Software version
- Hardware version
- Serial number

Status displays - main menu
- Status displays of the switching inputs/outputs
- Display of warnings and errors
- Status information for the device interfaces
- Optional: check program-specific display
  See "Status displays" on page 38.

Statistics - main menu
Statistics data for the smart camera.
See "Statistics" on page 38.

Parameter - main menu
Configuration of the smart camera.
See "Parameter menu" on page 39.

Language selection - main menu
Selection of the display language.
See "Language selection menu" on page 40.

Service - main menu
Camera diagnosis and status messages.
See "Service menu" on page 40.
Notice!
The display offers only limited configuration options. The configurable parameters are des-
cribed here in chapter 7.3. Only the webConfig provides complete configuration options and is largely self-explanatory. The use of the webConfig tool is described in chapter 6. There, you will also find notes on commissioning with the aid of webConfig.

7.3.2 Status displays

Status displays - main menu
• Status displays of the switching inputs/outputs
• Display of warnings and errors
• Status information for the device interfaces
• Optional: check program-specific display
See "Indicators in the display" on page 34.
Press the enter button to select between network settings and switching inputs and outputs.

The Network settings submenu offers information on the set network address of the LSIS 400, the corresponding net mask and the gateway address. Value "Channel 1" is displayed by default. Currently (06/2009), only one Ethernet channel is supported.

The Sw. inputs / outputs submenu offers information on the current configuration of the IOs of the LSIS 400. For each of the 8 IOs, the assigned name and state are displayed (input = I/output = O).

7.3.3 Statistics

Statistics - main menu
In the Statistics menu, you can see the total number of parts that have been checked since the last time the counter was reset, how many test results were OK and how many were not OK.
7.3.4 Parameter menu

Parameter handling
The Parameter handling submenu is used to lock and release the parameter input via the display and for resetting to default values.

<table>
<thead>
<tr>
<th>Level 3</th>
<th>Level 4</th>
<th>Selection/configuration option</th>
<th>Description</th>
<th>Standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parameter enable</td>
<td></td>
<td>OFF/ON</td>
<td>The standard setting (OFF) prevents unintended parameter changes. If parameter enabling is activated (ON), parameters can be changed manually.</td>
<td>OFF</td>
</tr>
<tr>
<td>Parameters to default</td>
<td></td>
<td>By pressing the enter button after selecting Parameters to default, all parameters are reset to their standard settings without any further security prompts. In this case, English is selected as the display language.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 7.1: Parameter handling submenu

Program selection
In the Program selection submenu, a scrollbar can be used to activate any of the check programs stored on the LSIS 400i.

A selected program is immediately activated by pressing the enter button. If, however, a test cycle is currently being executed at this moment, this test cycle is executed to completion and evaluated.

As the new check program is being activated, the green "PWR" LED flashes.

<table>
<thead>
<tr>
<th>Level 3</th>
<th>Level 4</th>
<th>Selection/configuration option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Program name 1</td>
<td></td>
<td>Here, you will find check programs previously set in webConfig.</td>
<td></td>
</tr>
<tr>
<td>Program name 2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Program name 3</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 7.2: Program selection submenu
Display and control panel

Ethernet
The host/service interface of the LSIS 400i is configured in the Ethernet submenu.

<table>
<thead>
<tr>
<th>Level 3</th>
<th>Level 4</th>
<th>Selection/configuration option</th>
<th>Standard</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Description</td>
<td></td>
</tr>
<tr>
<td>Ethernet 1</td>
<td>IP address</td>
<td>The IP address can be set to any value in the xxx.xxx.xxx.xxx format.</td>
<td>192.168.060.101</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Normally, the network administrator specifies the IP address that is to be set here. If DHCP is activated, the setting made here has no effect and the LSIS 400i is set to the values that it obtains from the DHCP server.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Gateway</td>
<td>The gateway address can be set to any value in the xxx.xxx.xxx.xxx format. The LSIS 400i communicates with participants in other subnets via the gateway. Splitting the read application over multiple subnets is rather uncommon; the setting of the gateway address, thus, usually has no meaning.</td>
<td>000.000.000.000</td>
</tr>
<tr>
<td></td>
<td>Net mask</td>
<td>The net mask can be set to any value in the xxx.xxx.xxx.xxx format. Usually, the LSIS 400i is used in a private Class C network and the default setting can be accepted without change. Attention: It is possible to enter any values for xxx.xxx.xxx.xxx. Only the values 255 or 000 are permissible for xxx, however. If other values are set, an error message appears upon restart of the LSIS 400i.</td>
<td>255.255.255.000</td>
</tr>
<tr>
<td></td>
<td>DHCP activated</td>
<td>Off/On If DHCP is activated, the LSIS 400i draws its settings for IP address, gateway and net mask from a DHCP server. The manual settings made above have no effect, but are retained and are again active if DHCP is deactivated.</td>
<td>Off</td>
</tr>
</tbody>
</table>

Table 7.3: Ethernet submenu

7.3.5 Language selection menu
There are 5 display languages available:
- Deutsch (german)
- English
- Español (spain)
- Français (french)
- Italiano (italian)

7.3.6 Service menu

Status messages
This menu item is used exclusively for service purposes by Leuze electronic.
7.4 Operation

Shown here is an example describing important operating procedures in detail.

**Parameter enabling**

During normal operation parameters can only be viewed. If parameters need to be changed, the **ON** menu item in the **Parameter enabling** menu must be activated. To do this proceed as follows:

1. In the Parameter menu, use the **▼** buttons to select the **Parameter handling** menu item.

2. Press the enter button to enter the **Parameter handling** menu.

3. In the Parameter handling menu, use the **▼** buttons to select the **Parameter enable** menu item.

4. Press the enter button to enter the **Parameter enable** menu.

5. In the Parameter enable menu, use the **▼** buttons to select the **ON** menu item.

6. Press the enter button to switch on parameter enabling.

The PWR LED lights up orange. You can now set individual parameters via the display.

7. Press the ESC button twice to return to the main menu.
Network configuration

Information on network configuration can be found in chapter “Commissioning and configuration” on page 29. If you need to set the IP address of the LSIS 400i via the display, proceed as follows:

Changing the network settings on the display

In the Parameter menu, use the buttons to select the Ethernet menu item.

Press the enter button to enter the Ethernet menu.

Press the enter button again to enter the Ethernet 1 menu.

Use the buttons successively to select the IP address, Gateway and Net mask menu items and set the desired values or activate the DHCP function.

Exit the Ethernet 1 menu with the ESCAPE button

The message shown at the side appears. Confirm with OK to initiate a restart and to activate the changed configuration.
Check program selection

During running operation of the LSIS 400i, you can simply change the check program via the display. Prerequisite for this is that multiple check programs were set up previously via webConfig.

In the Parameter menu, use the buttons to select the Program selection menu item.

Press the enter button to enter the Parameter handling menu.

In the Program selection menu, use the buttons to select the desired check program.

Press the enter button to activate the check program.
A selected program is immediately activated by pressing the enter button. If, however, a test cycle is currently being executed at this moment, this test cycle is executed to completion and evaluated.
As the new check program is being activated, the green "PWR" LED flashes.
Press the ESC button twice to return to the main menu.
8 Diagnostics and troubleshooting

8.1 Error signaling via LED

<table>
<thead>
<tr>
<th>Error</th>
<th>Possible error causes</th>
<th>Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Status LED PWR Off</td>
<td>• No supply voltage connected to the device</td>
<td>❏ Check supply voltage</td>
</tr>
<tr>
<td></td>
<td>• Hardware error</td>
<td>❏ Send device to customer service</td>
</tr>
<tr>
<td>Red, flashing</td>
<td>• Warning</td>
<td>❏ Query diagnostic data and carry out the</td>
</tr>
<tr>
<td></td>
<td></td>
<td>resulting measures</td>
</tr>
<tr>
<td>Red, continuous light</td>
<td>• Error: no function possible</td>
<td>❏ Internal device error</td>
</tr>
<tr>
<td>Orange, continuous light</td>
<td>• Device in service mode (parameter enable)</td>
<td>❏ Reset service mode with webConfig or</td>
</tr>
<tr>
<td></td>
<td></td>
<td>display</td>
</tr>
</tbody>
</table>

Table 8.1: General causes of errors

Notice!
Please use chapter 8 as a master copy should servicing be required. Cross the items in the “Measures” column which you have already examined, fill out the following address field and fax the pages together with your service contract to the fax number listed below.

Customer data (please complete)

Device type: ________________________________  
Software version: ____________________________  
Company: ________________________________  
Customer order number: ____________________________  
Contact person/Department: ____________________________  
Phone (direct): ____________________________  
Fax: ____________________________  
Street / No: ____________________________  
ZIP code/City: ____________________________  
Country: ____________________________  

Leuze Service fax number:  
+49 7021 573 - 199
9 Type overview and accessories

9.1 Type overview LSIS 400i

<table>
<thead>
<tr>
<th>Type designation</th>
<th>Focal length of objective</th>
<th>Housing window</th>
<th>Function range</th>
<th>Part No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>LSIS 412i M43-W1</td>
<td>8mm</td>
<td>Glass</td>
<td>●</td>
<td>50108177</td>
</tr>
<tr>
<td>LSIS 412i M43-W1-01</td>
<td>8mm</td>
<td>Plastic</td>
<td>●</td>
<td>50112928</td>
</tr>
<tr>
<td>LSIS 412i M45-W1</td>
<td>16mm</td>
<td>Glass</td>
<td>●</td>
<td>50108990</td>
</tr>
<tr>
<td>LSIS 412i M45-W1-01</td>
<td>16mm</td>
<td>Plastic</td>
<td>●</td>
<td>50112929</td>
</tr>
<tr>
<td>LSIS 422i M43-W1</td>
<td>8mm</td>
<td>Glass</td>
<td>●</td>
<td>50108178</td>
</tr>
<tr>
<td>LSIS 422i M43-W1-01</td>
<td>8mm</td>
<td>Plastic</td>
<td>●</td>
<td>50113050</td>
</tr>
<tr>
<td>LSIS 422i M45-W1</td>
<td>16mm</td>
<td>Glass</td>
<td>●</td>
<td>50109829</td>
</tr>
<tr>
<td>LSIS 422i M45-W1-01</td>
<td>16mm</td>
<td>Plastic</td>
<td>●</td>
<td>50113054</td>
</tr>
<tr>
<td>LSIS 462i M43-W1</td>
<td>8mm</td>
<td>Glass</td>
<td>●</td>
<td>50113053</td>
</tr>
<tr>
<td>LSIS 462i M43-W1-01</td>
<td>8mm</td>
<td>Plastic</td>
<td>●</td>
<td>50113052</td>
</tr>
<tr>
<td>LSIS 462i M45-W1</td>
<td>16mm</td>
<td>Glass</td>
<td>●</td>
<td>50113051</td>
</tr>
<tr>
<td>LSIS 462i M45-W1-01</td>
<td>16mm</td>
<td>Plastic</td>
<td>●</td>
<td>50113037</td>
</tr>
</tbody>
</table>

Table 9.1: Type overview LSIS 400i

9.2 Accessory mounting device

<table>
<thead>
<tr>
<th>Type designation</th>
<th>Description</th>
<th>Part No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>BT 56</td>
<td>Mounting device with dovetail for rod</td>
<td>50027375</td>
</tr>
<tr>
<td>BT 59</td>
<td>Mounting device with dovetail for ITEM aluminum profile</td>
<td>50111224</td>
</tr>
</tbody>
</table>

Table 9.2: Mounting devices for the LSIS 400i
Type overview and accessories

9.3 Accessory ready-made cables for voltage supply

9.3.1 Contact assignment of PWR connection cable

PWR connection cable (8-pin socket, A-coded)

<table>
<thead>
<tr>
<th>Pin</th>
<th>Name</th>
<th>Core color</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>VIN</td>
<td>brown</td>
</tr>
<tr>
<td>2</td>
<td>IO1</td>
<td>white</td>
</tr>
<tr>
<td>3</td>
<td>GND</td>
<td>blue</td>
</tr>
<tr>
<td>4</td>
<td>IO2</td>
<td>black</td>
</tr>
<tr>
<td>5</td>
<td>IO3</td>
<td>grey</td>
</tr>
<tr>
<td>6</td>
<td>IO4</td>
<td>pink</td>
</tr>
<tr>
<td>7</td>
<td>NC</td>
<td>violet</td>
</tr>
<tr>
<td>8</td>
<td>FE</td>
<td>orange</td>
</tr>
<tr>
<td></td>
<td>Thread</td>
<td>bright</td>
</tr>
</tbody>
</table>

Table 9.3: Pin assignments KB M12/8-…-BA

9.3.2 Order codes of the cables for voltage supply

<table>
<thead>
<tr>
<th>Type designation</th>
<th>Description</th>
<th>Part No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>M12 socket for PWR, axial connector, open cable end</td>
<td></td>
<td></td>
</tr>
<tr>
<td>KB M12/8-1000-BA Cable length 1m</td>
<td></td>
<td>50110170</td>
</tr>
<tr>
<td>KB M12/8-2000-BA Cable length 2m</td>
<td></td>
<td>50110171</td>
</tr>
<tr>
<td>KB M12/8-5000-BA Cable length 5m</td>
<td></td>
<td>50110172</td>
</tr>
<tr>
<td>KB M12/8-10000-BA Cable length 10m</td>
<td></td>
<td>50110173</td>
</tr>
<tr>
<td>KB M12/8-15000-BA Cable length 15m</td>
<td></td>
<td>50110174</td>
</tr>
<tr>
<td>KB M12/8-20000-BA Cable length 20m</td>
<td></td>
<td>50110175</td>
</tr>
<tr>
<td>KB M12/8-25000-BA Cable length 25m</td>
<td></td>
<td>50110176</td>
</tr>
<tr>
<td>KB M12/8-30000-BA Cable length 30m</td>
<td></td>
<td>50110177</td>
</tr>
</tbody>
</table>

Table 9.4: PWR cables for the LSIS 400/
9.4 Accessory ready-made cables for bus connection

9.4.1 Contact assignment BUS OUT connection cable

<table>
<thead>
<tr>
<th>Pin</th>
<th>Name</th>
<th>Core color</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>IO5</td>
<td>white</td>
</tr>
<tr>
<td>2</td>
<td>IO6</td>
<td>brown</td>
</tr>
<tr>
<td>3</td>
<td>GND</td>
<td>green</td>
</tr>
<tr>
<td>4</td>
<td>IO7</td>
<td>yellow</td>
</tr>
<tr>
<td>5</td>
<td>IO8</td>
<td>grey</td>
</tr>
<tr>
<td>6</td>
<td>Rx</td>
<td>pink</td>
</tr>
<tr>
<td>7</td>
<td>Tx</td>
<td>blue</td>
</tr>
<tr>
<td>8</td>
<td>FE</td>
<td>red</td>
</tr>
<tr>
<td></td>
<td>Thread</td>
<td>bright</td>
</tr>
</tbody>
</table>

Table 9.5: Pin assignments KB M12/8-…-SA

9.4.2 Order codes BUS OUT connection cables

<table>
<thead>
<tr>
<th>Type designation</th>
<th>Description</th>
<th>Part No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>KB M12/8-1000-SA</td>
<td>Cable length 1m</td>
<td>50110178</td>
</tr>
<tr>
<td>KB M12/8-2000-SA</td>
<td>Cable length 2m</td>
<td>50110179</td>
</tr>
<tr>
<td>KB M12/8-5000-SA</td>
<td>Cable length 5m</td>
<td>50110180</td>
</tr>
<tr>
<td>KB M12/8-10000-SA</td>
<td>Cable length 10m</td>
<td>50110181</td>
</tr>
<tr>
<td>KB M12/8-15000-SA</td>
<td>Cable length 15m</td>
<td>50110186</td>
</tr>
<tr>
<td>KB M12/8-20000-SA</td>
<td>Cable length 20m</td>
<td>50110187</td>
</tr>
<tr>
<td>KB M12/8-25000-SA</td>
<td>Cable length 25m</td>
<td>50110188</td>
</tr>
<tr>
<td>KB M12/8-30000-SA</td>
<td>Cable length 30m</td>
<td>50110189</td>
</tr>
</tbody>
</table>

Table 9.6: BUS OUT cables for the LSIS 400

Notice!
Operation of the RS 232 host interface is only permissible with shielded cables with maximum cable length of 10m.
9.5 Accessories for the host/service interface

9.5.1 Ready-made cables with M12 plug/open cable end

<table>
<thead>
<tr>
<th>Name</th>
<th>Pin (M12)</th>
<th>Core color</th>
</tr>
</thead>
<tbody>
<tr>
<td>TD+</td>
<td>1</td>
<td>yellow</td>
</tr>
<tr>
<td>RD+</td>
<td>2</td>
<td>white</td>
</tr>
<tr>
<td>TD-</td>
<td>3</td>
<td>orange</td>
</tr>
<tr>
<td>RD-</td>
<td>4</td>
<td>blue</td>
</tr>
<tr>
<td>FE SH (thread)</td>
<td>-</td>
<td></td>
</tr>
</tbody>
</table>

Table 9.7: Ethernet connection cables featuring M12 plug/open cable end

<table>
<thead>
<tr>
<th>Type designation</th>
<th>Description</th>
<th>Part No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>M12 plug for SERVICE, axial connector, open cable end</td>
<td></td>
<td></td>
</tr>
<tr>
<td>KB ET - 1000 - SA</td>
<td>Cable length 1m</td>
<td>50106738</td>
</tr>
<tr>
<td>KB ET - 2000 - SA</td>
<td>Cable length 2m</td>
<td>50106739</td>
</tr>
<tr>
<td>KB ET - 5000 - SA</td>
<td>Cable length 5m</td>
<td>50106740</td>
</tr>
<tr>
<td>KB ET - 10000 - SA</td>
<td>Cable length 10m</td>
<td>50106741</td>
</tr>
<tr>
<td>KB ET - 15000 - SA</td>
<td>Cable length 15m</td>
<td>50106742</td>
</tr>
<tr>
<td>KB ET - 20000 - SA</td>
<td>Cable length 20m</td>
<td>50106743</td>
</tr>
<tr>
<td>KB ET - 25000 - SA</td>
<td>Cable length 25m</td>
<td>50106745</td>
</tr>
<tr>
<td>KB ET - 30000 - SA</td>
<td>Cable length 30m</td>
<td>50106746</td>
</tr>
</tbody>
</table>
9.5.2 Ready-made cables with M12 plug/RJ-45 plug

<table>
<thead>
<tr>
<th>Name</th>
<th>Pin (M12)</th>
<th>Core color</th>
<th>Pin (RJ-45)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TD+</td>
<td>1</td>
<td>yellow</td>
<td>1</td>
</tr>
<tr>
<td>RD+</td>
<td>2</td>
<td>white</td>
<td>3</td>
</tr>
<tr>
<td>TD-</td>
<td>3</td>
<td>orange</td>
<td>2</td>
</tr>
<tr>
<td>RD-</td>
<td>4</td>
<td>blue</td>
<td>6</td>
</tr>
<tr>
<td>FE</td>
<td>SH (thread)</td>
<td>-</td>
<td></td>
</tr>
</tbody>
</table>

Table 9.8: Ethernet connection cables M12 connector/RJ-45

<table>
<thead>
<tr>
<th>Type designation</th>
<th>Description</th>
<th>Part No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>KB ET - 1000 - SA-RJ45</td>
<td>Cable length 1m</td>
<td>50109879</td>
</tr>
<tr>
<td>KB ET - 2000 - SA-RJ45</td>
<td>Cable length 2m</td>
<td>50109880</td>
</tr>
<tr>
<td>KB ET - 5000 - SA-RJ45</td>
<td>Cable length 5m</td>
<td>50109881</td>
</tr>
<tr>
<td>KB ET - 10000 - SA-RJ45</td>
<td>Cable length 10m</td>
<td>50109882</td>
</tr>
<tr>
<td>KB ET - 15000 - SA-RJ45</td>
<td>Cable length 15m</td>
<td>50109883</td>
</tr>
<tr>
<td>KB ET - 20000 - SA-RJ45</td>
<td>Cable length 20m</td>
<td>50109884</td>
</tr>
<tr>
<td>KB ET - 25000 - SA-RJ45</td>
<td>Cable length 25m</td>
<td>50109885</td>
</tr>
<tr>
<td>KB ET - 30000 - SA-RJ45</td>
<td>Cable length 30m</td>
<td>50109886</td>
</tr>
</tbody>
</table>

Type overview and accessories
9.5.3 Ready-made cables with M12 plug/M12 plug

<table>
<thead>
<tr>
<th>Name</th>
<th>Pin (M12)</th>
<th>Core color</th>
<th>Pin (M12)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TD+</td>
<td>1</td>
<td>yellow</td>
<td>1</td>
</tr>
<tr>
<td>RD+</td>
<td>2</td>
<td>white</td>
<td>2</td>
</tr>
<tr>
<td>TD-</td>
<td>3</td>
<td>orange</td>
<td>3</td>
</tr>
<tr>
<td>RD-</td>
<td>4</td>
<td>blue</td>
<td>4</td>
</tr>
<tr>
<td>FE</td>
<td>SH (thread)</td>
<td>-</td>
<td>SH (thread)</td>
</tr>
</tbody>
</table>

Table 9.9: Ethernet connection cables featuring M12 plug/M12 plug

9.5.4 Connector

<table>
<thead>
<tr>
<th>Type designation</th>
<th>Description</th>
<th>Part No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>D-ET1</td>
<td>RJ45 connector for user-configuration</td>
<td>50108991</td>
</tr>
<tr>
<td>KDS ET M12 / RJ 45 W - 4P</td>
<td>Converter from M12 D-coded to RJ 45 socket</td>
<td>50109832</td>
</tr>
</tbody>
</table>

Table 9.10: Connectors for the LSIS 400i
9.6 Accessory lights

9.6.1 Front illumination

<table>
<thead>
<tr>
<th>Color</th>
<th>Type designation</th>
<th>Part No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>red</td>
<td>V-ILLU-SPHC-75x50-1</td>
<td>50107769</td>
</tr>
<tr>
<td>white</td>
<td>V-ILLU-SWHC-75x50-1</td>
<td>50107770</td>
</tr>
<tr>
<td>red</td>
<td>V-ILLU-SPHC-150x50-1</td>
<td>50107771</td>
</tr>
<tr>
<td>white</td>
<td>V-ILLU-SWHC-150x50-1</td>
<td>50106713</td>
</tr>
</tbody>
</table>

Table 9.11: Front illumination for the LSIS 400/

<table>
<thead>
<tr>
<th>Cable length</th>
<th>Type designation</th>
<th>Part No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>3m</td>
<td>KB 040-3000 B</td>
<td>50029316</td>
</tr>
<tr>
<td>6m</td>
<td>KB 040-6000 B</td>
<td>50029317</td>
</tr>
<tr>
<td>10m</td>
<td>KB 040-10000 B</td>
<td>50029318</td>
</tr>
</tbody>
</table>

Table 9.12: Connection cables for "LED panel lights for pulsed operation"

9.6.2 Rear illumination

<table>
<thead>
<tr>
<th>Type designation</th>
<th>Part No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>V-ILLU-TRHC-100-1</td>
<td>50039266</td>
</tr>
<tr>
<td>V-ILLU-YWHC-100-1</td>
<td>50039266</td>
</tr>
</tbody>
</table>

Table 9.13: Rear illumination for the LSIS 400/
10  Maintenance

10.1  General maintenance information

Usually, the LSIS 400/i smart camera does not require any maintenance by the operator.

Cleaning

In the event of dust build-up, clean the LSIS 400/i with a soft cloth; use a suitable cleaning agent if necessary.

Notice!

Do not use aggressive cleaning agents such as thinner or acetone for cleaning the device. Use of improper cleaning agents can damage the housing window and display.

Notice for model with plastic screen:
The surfaces are preferably to be cleaned with standard household dishwashing soap mixed in water, wiped with a soft cloth or sponge, and carefully dabbed dry (never rub intensely!). For a thorough cleaning, solvent-free, antistatic plastic cleaners approved for use with plastics are recommended. Never use abrasive cleaners or organic solvents such as alcohol or acetone, as these could scratch the surfaces or cause cracks to form.

10.2  Repairs, servicing

Repairs to the device must only be carried out by the manufacturer. Contact your Leuze distributor or service organization should repairs be required. The addresses can be found on the inside of the cover and on the back.

Notice!

When sending devices to Leuze electronic for repair, please provide an accurate description of the error.

10.3  Disassembling, packing, disposing

Repacking

For later reuse, the device is to be packed so that it is protected.

Notice!

Electrical scrap is a special waste product! Observe the locally applicable regulations regarding disposal of the product.
11 Specifications

11.1 General specifications of the smart cameras

<table>
<thead>
<tr>
<th>Model</th>
<th>LSIS 4x2 M4x-W1(-01)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Version</td>
<td>Smart camera</td>
</tr>
<tr>
<td><strong>Electrical data</strong></td>
<td></td>
</tr>
<tr>
<td>Operating voltage 1)</td>
<td>18 … 30VDC (PELV, Class II)</td>
</tr>
<tr>
<td>Power consumption</td>
<td>Max. 10W</td>
</tr>
<tr>
<td>Process interface</td>
<td>RS 232, Ethernet 10/100Mbit/s</td>
</tr>
<tr>
<td>Service interface</td>
<td>Ethernet 10/100Mbit/s</td>
</tr>
<tr>
<td>Switching input / switching output</td>
<td>8 switching inputs/outputs, freely programmable functions</td>
</tr>
<tr>
<td>- Switching input: 18 … 30VDC depending on supply voltage</td>
<td></td>
</tr>
<tr>
<td>- Switching output: 18 … 30VDC, depending on supply voltage, I max. = 60mA (short-circuit proof)</td>
<td></td>
</tr>
<tr>
<td>- Switching inputs/outputs protected against polarity reversal!</td>
<td></td>
</tr>
<tr>
<td>Real-time clock</td>
<td>Time/date (with battery backup; time/date values are retained even if power is lost)</td>
</tr>
<tr>
<td><strong>Optical data</strong></td>
<td></td>
</tr>
<tr>
<td>Image sensor</td>
<td>Global shutter CMOS</td>
</tr>
<tr>
<td>Number of pixels</td>
<td>752x480</td>
</tr>
<tr>
<td>Electronic shutter speeds</td>
<td>54µs ... 20ms</td>
</tr>
<tr>
<td>Integrated LED illumination</td>
<td>White</td>
</tr>
<tr>
<td>Focal length</td>
<td>8mm (LSIS 4x2/M43…)</td>
</tr>
<tr>
<td>Object distance</td>
<td>50mm ... ∞ (LSIS 4x2/M43…)</td>
</tr>
<tr>
<td>Operating and display elements</td>
<td></td>
</tr>
<tr>
<td>Display</td>
<td>Monochromatic graphical display, 128 x 64 pixel, with background lighting</td>
</tr>
<tr>
<td>Keyboard</td>
<td>4 buttons</td>
</tr>
<tr>
<td>LEDs</td>
<td>2 LEDs for power (PWR) and bus state (BUS), red/orange/green</td>
</tr>
<tr>
<td><strong>Mechanical data</strong></td>
<td></td>
</tr>
<tr>
<td>Protection class</td>
<td>IP 65, IP 67 (each with screwed-on M12 connectors or mounted caps)</td>
</tr>
<tr>
<td>VDE safety class</td>
<td>III</td>
</tr>
<tr>
<td>Weight</td>
<td>500g</td>
</tr>
<tr>
<td>Dimensions (H x W x D)</td>
<td>75 x 55 x 113mm</td>
</tr>
<tr>
<td>Optics cover</td>
<td>Glass (LSIS 4x2/-W1)</td>
</tr>
<tr>
<td>Housing</td>
<td>Diecast aluminum</td>
</tr>
<tr>
<td><strong>Environmental data</strong></td>
<td></td>
</tr>
<tr>
<td>Operating temperature range</td>
<td>0°C … +45°C</td>
</tr>
<tr>
<td>Storage temperature range</td>
<td>-20°C … +70°C</td>
</tr>
<tr>
<td>Air humidity</td>
<td>Max. 90% rel. humidity, non-condensing</td>
</tr>
<tr>
<td>LED illumination</td>
<td>Risk group 1 (low risk) acc. to EN 62471:2008</td>
</tr>
<tr>
<td>Vibration</td>
<td>IEC 60068-2-6, test FC</td>
</tr>
<tr>
<td>Shock</td>
<td>IEC 60068-2-27, test Ea</td>
</tr>
<tr>
<td>Continuous shock</td>
<td>IEC 60068-2-29, test Eb</td>
</tr>
<tr>
<td>Electromagnetic compatibility</td>
<td>EN 61000-6-2, EN 61000-6-4</td>
</tr>
</tbody>
</table>

Table 11.1: Specifications for the LSIS 4x2 M4x-W1(-01) smart camera

1) Protective Extra Low Voltage (PELV) - protective extra-low voltage with reliable disconnection.
11.2 Dimensioned drawing

Figure 11.1: Dimensioned drawing of the LSIS 400 smart camera