

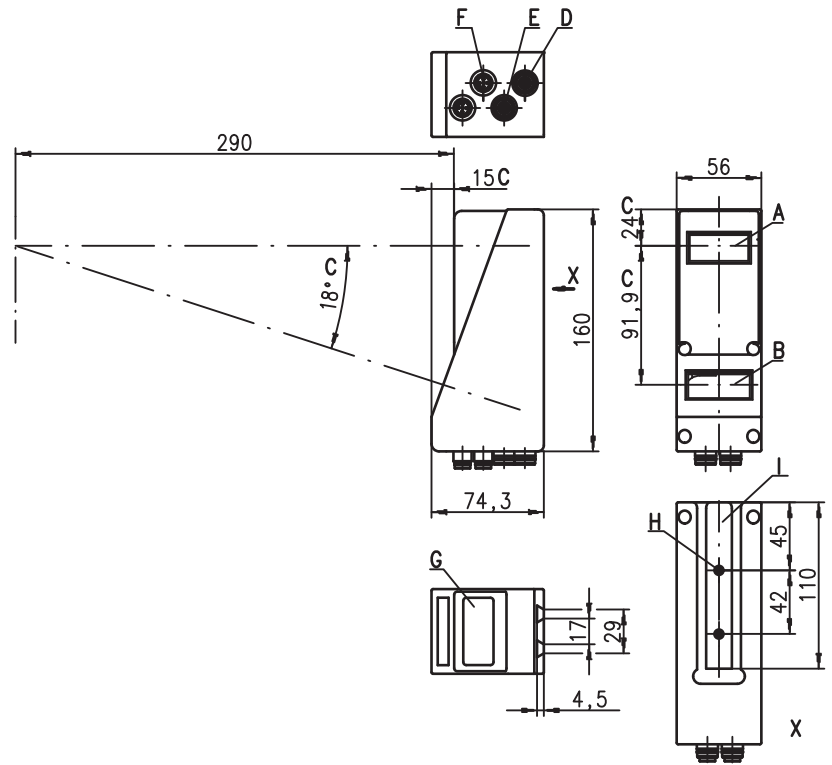
**LRS 36**

**Line sensor for object detection**

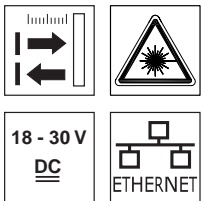
-2010/02 50112362



**Dimensioned drawing**



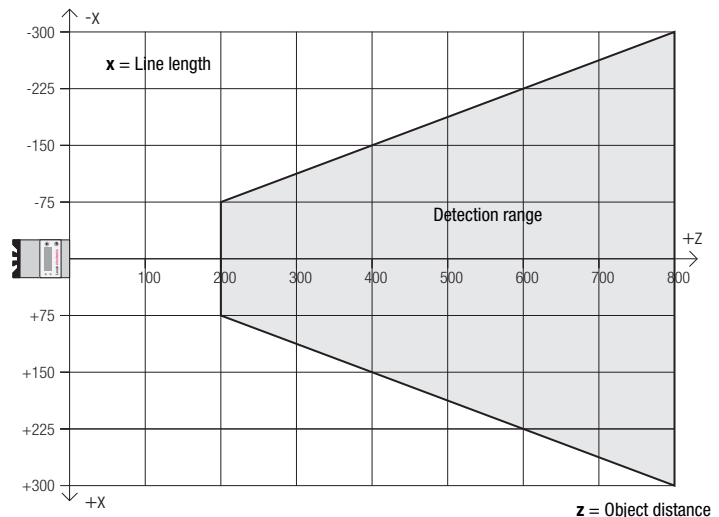
- A** Transmitter
- B** Receiver
- C** Optical axis
- D** X1: M12x1 plug, logic + power, 8-pin, A coded
- E** X2: M12x1 socket, Ethernet, 4-pin, D coded
- F** X3: M12x1 socket, logic, 8-pin, A coded
- G** OLED display and key pad
- H** M4 thread, 4.5 deep
- I** Holder for mounting system BT 56 / BT 59



**200 ... 800mm**

- Line sensor for object detection
- Response time 10ms
- Detection area: 200 ... 800mm
- Length of laser line: max. 600mm
- Configuration via Fast Ethernet
- OLED display with key pad for alignment aid and status display: inspection task, switching outputs
- Measurement value display in mm on OLED display as an alignment aid
- Up to 16 detection fields with logic operation option
- Up to 16 inspection tasks
- Compact construction
- Robust design and easy operation

**Detection range, typical**



**Accessories:**

(available separately)

- Mounting systems BT 56, BT 59
- Cable with M12 connector (K-D ...)
- Configuration software (part of the delivery contents)

We reserve the right to make changes • DS\_LRS\_36en.fm

## Specifications

### Optical data

Detection range <sup>1)</sup>	200 ... 800mm (z direction)
Light source	laser
Wavelength	658nm (visible red light)
Laser line	600x3mm at 800mm
Laser warning notice	see remarks

### Object detection

Minimum object size in x direction <sup>2)</sup>	2 ... 3mm
Minimum object size in z direction <sup>2)</sup>	2 ... 6mm

### Timing

Response time	≥10ms (configurable)
Delay before start-up	approx. 1.5s

### Electrical data

Operating voltage $U_B$ <sup>3)</sup>	18 ... 30VDC (incl. residual ripple)
Residual ripple	≤ 15% of $U_B$
Open-circuit current	≤ 200mA
Ethernet interface	UDP
Switching outputs	2 x 24V / 100mA / push-pull <sup>4)</sup> on X1 4x 24V / 100mA / push-pull <sup>4)</sup> on X3
Inputs	1 x 24V (trigger) on X1 1 x 24V (enable) on X1 3 x 24V (inspection task selection) on X3

### Indicators

Green LED	continuous light	ready
	off	no voltage
Yellow LED	continuous light	Ethernet connection available
	flashing	Ethernet data transmission active
	off	no Ethernet connection available

### Mechanical data

Housing	aluminum frame with plastic cover
Optics cover	glass
Weight	620g
Connection type	M12 connector

### Environmental data

Ambient temp. (operation/storage)	-30°C ... +50°C/-30°C ... +70°C
Protective circuit <sup>6)</sup>	1, 2, 3
VDE safety class	III, protective extra-low voltage
Protection class	IP 67
Laser class	2M (according to EN 60825-1 and 21 CFR 1040.10 with Laser Notice No. 50)
Standards applied	IEC 60947-5-2

- 1) Luminosity coefficient 6% ... 90%, entire detection range, at 20°C after 30minutes warmup time, medium range  $U_B$
- 2) Minimum value, depends on distance and object, requires testing under application conditions
- 3) For UL applications: for use in class 2 circuits according to NEC only
- 4) The push-pull switching outputs must not be connected in parallel
- 5) Number of detection fields: up to 16 with the option of logic combination  
Number of inspection tasks: up to 16 (8 of these can be activated via inputs)
- 6) 1=transient protection, 2=polarity reversal protection, 3=short circuit protection for all outputs, requires external protective circuit for inductive loads

## Interface assignments

X1 - logic and power		
Pin No.	Signal	Colour
1	+24VDC	WH
2	Act (activation)	BN
3	GND	GN
4	Ready	YE
5	Trig (trigger)	GY
6	OutCas (cascading)	PK
7	Tx (for service personnel only)	BU
8	Rx (for service personnel only)	RD

8-pin M12 plug, A coded

X2 - Ethernet		
Pin No.	Signal	Colour
1	Tx+	YE
2	Rx+	WH
3	Tx-	OR
4	Rx-	BU

4-pin M12 socket, D coded

X3 - logic		
Pin No.	Signal	Colour
1	Out4	WH
2	Out3	BN
3	GND	GN
4	Out2	YE
5	Out1	GY
6	InSel3 <sup>1)</sup>	PK
7	InSel2 <sup>1)</sup>	BU
8	InSel1 <sup>1)</sup>	RD

8-pin M12 socket, A coded

- 1) The 3 switching inputs InSel1-3 are used to select the inspection task 0-7. In this context, "000" stands for Inspection Task 0, "001" for Inspection Task 1, etc. The switching time between 2 inspection tasks is < 100ms

#### Notice!

The Inspection Tasks 8-15 can be switched via LRSsoft or Ethernet. The setting via Ethernet overwrites the inspection task set via input InSel1-3.

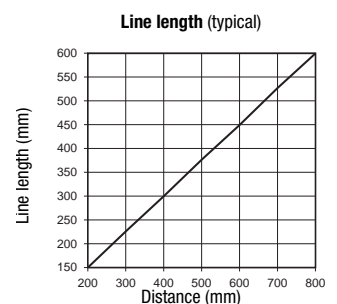
## Order guide

	<b>Designation</b>	<b>Part No.</b>
Line profile sensor	LRS 36/6	50111330

## Tables

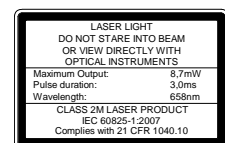
LED	State	Display during measurement operation
green	continuous light	Sensor ready
	off	Sensor not ready
yellow	continuous light	Ethernet connection established
	flashing	Ethernet data transmission active
	off	No Ethernet connection

## Diagrams



## Remarks

- **Approved purpose**  
This product may only be used by qualified personnel and must only be used for the approved purpose. This sensor is not a safety sensor and is not to be used for the protection of persons.
- **Warmup time:**  
After a warmup time of 30 min., the light section sensor has reached the operating temperature required for an optimum object detection.




## Establish connection to PC




The LRS is configured via a PC using the **LRSsoft** program before it is integrated into the process control.


In order to be able to establish an UDP communication with the PC, the IP address of your PC and the IP address of the LRS must lie in the same address range. The LRS has no built-in DHCP client, so that you need to set the address manually. This is done the easiest way via the PC.

### **Notice!**

 If you are using a desktop firewall, please ensure that the control can communicate with the LRS via the Ethernet interface on ports 9008 and 5634 using UDP. Furthermore, the firewall must allow ICMP echo messages to pass through for the connection test (ping).

If the PC is usually connected to a network using DHCP address allocation, the easiest way to access the LRS is by applying an alternative configuration in the TCP/IP settings of the PC and connecting the LRS directly to the PC.

☞ Check the network address of the LRS by pressing the  button during normal operation of the LRS twice in succession, then by pressing  twice and followed by pressing the  button again.

This will take you to the Ethernet submenu and enable you to read the current settings of the LRS consecutively when pressing  repeatedly.

☞ Make a note of the values for IP-Address and Net Mask Addr..

The value in Net Mask Addr. specifies which digits of the IP address of the PC and LRS must match so that they can communicate with each other.

Address of the LRS	Net mask	Address of the PC
192.168.060.003	255.255.255.0	192.168.060.xxx
192.168.060.003	255.255.0.0	192.168.xxx.xxx

Instead of **xxx** you can now allocate any numbers between 000 and 255 to your PC, but NOT THE SAME numbers as contained in the address of the LRS.

For example 192.168.060.110 (but not 192.168.060.003!). If LRS and PC have the same IP address, they cannot communicate with each other.

### Configuring the IP address for a PC

☞ Log in to your PC as an administrator.

☞ Using Start->System control go to the Network connections (Windows XP) menu or to the Network center and release center (Windows Vista) menu.

☞ There select the LAN connection and bring up the associated Features page by right clicking with the mouse.

☞ Select the Internet Protocol (TCP/IP) (by scrolling down, if necessary) and click on Properties.

☞ In the Internet protocol (TCP/IP) Properties window select the Alternate configuration tab.

☞ Configure the IP address of the PC in the address range of the LRS.  
**Attention:** do not use the same as for the LRS!

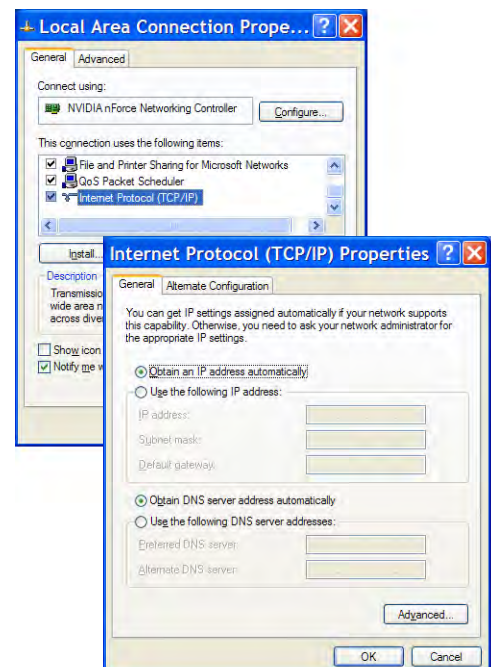
☞ Set the Subnet mask of the PC to the same value as the one for the LRS.

☞ Close the configuration dialog by confirming all windows using **OK**.

☞ Connect the interface X2 of the LRS directly to the LAN port of your PC. Use a KB ET-...-SA-RJ45 cable for the connection.

The PC will first try to establish a network connection via the automatic configuration. This will take a few seconds. Following that the alternative configuration, which you have just set up, is activated, and thus the PC can communicate with the LRS.

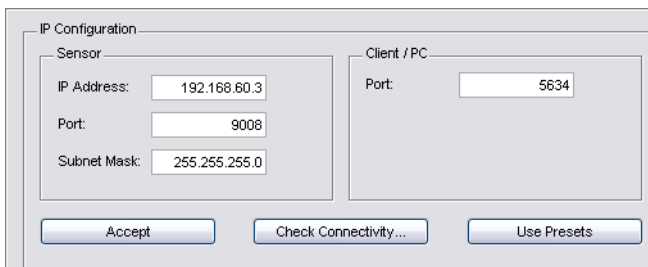
Information about configuring the LRS using **LRSsoft** software can be found in the Technical Description.



## Commissioning

For the commissioning and integration of the sensor in the process control the following steps are necessary:

1. Configuring the LRS - see chapter 8 of the Technical Description.
2. Programming process control - see chapter 9 of the Technical Description.
- or
3. Connecting the switching inputs and outputs accordingly - see chapter 6 of the Technical Description.
4. Adapt the IP configuration of the LRS such that it can communicate with the process control. This can be done either via the display of the LRS or in **LRSsoft** in the Configuration area. Here you can change network address and associated net mask as well as the ports via which the LRS communicates with process control.



5. Save the changed settings in the LRS using the Configuration->Transmit to sensor command.
6. Connect LRS to process control via the Ethernet interface.
7. Establish connections for activation, triggering and cascading, if necessary.

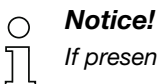
## Installing the software

### System requirements

The PC used should meet the following requirements:

- Pentium® or faster Intel® processor > 1.5 GHz (Pentium 4, Celeron, Xeon) or compatible models by AMD® (Athlon 64, Opteron, Sempron)  
The processor must support the SSE2 instruction set.
- At least 512 MB free main memory (RAM), 1024 MB recommended
- CD-ROM drive
- Hard disk with at least 1 GB available memory.
- Ethernet port
- Microsoft® Windows XP SP2/3 / Vista SP1

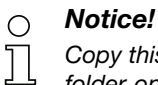
### Installation procedure



#### Notice!

If present, uninstall Matlab Runtime before beginning with the installation of the LXSsoft Suite.

The LXSsoft\_Suite\_Setup.exe installation program is located on the supplied CD.



#### Notice!

Copy this file from the CD to an appropriate folder on your hard drive. This requires administrator privileges.

To start the installation process, double-click on file LXSsoft\_Suite\_Setup.exe.

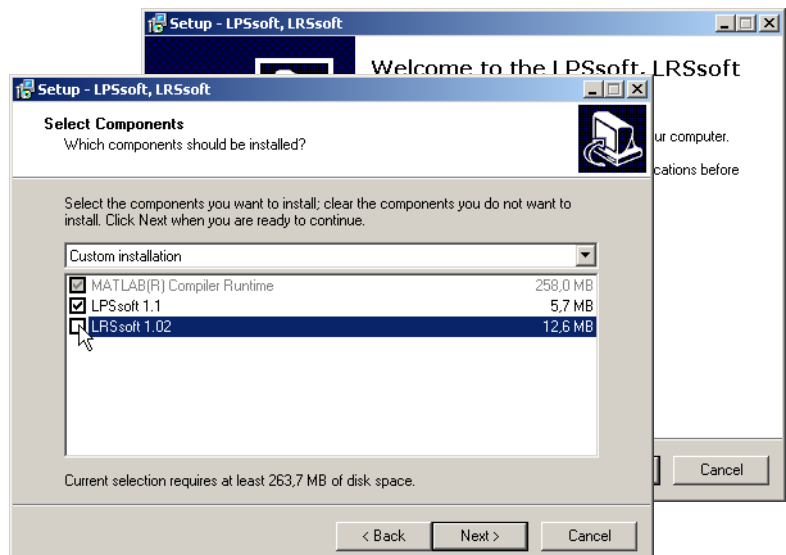
In the first window, click on Next.

In the next window, you can select whether you would like to install LRSsoft only, or LPSsoft in addition.

You will need LPSsoft in addition, for configuring light section sensors of the LPS series with your PC.

You cannot deselect the first option, MATLAB Compiler Runtime, since this component is needed in all cases.

Select the desired options and click on Next and, in the next window, click on Install.

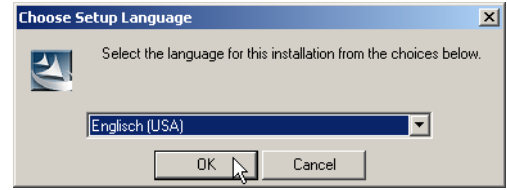


**LRS 36**

**Line sensor for object detection**

The installation routine starts. After a few seconds, the window for selecting the installation language for the Matlab Compiler Runtime (MCR) appears. The MCR is used for 3D visualization in **LPSsoft**. It is only available in English or Japanese.

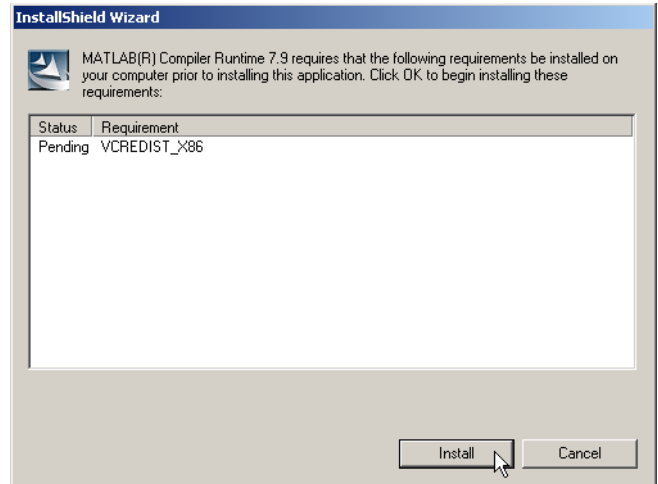
☞ *Therefore keep in the Choose Setup Language window the selection English and click on OK.*



Depending on the configuration of your Windows system the adjacent dialog can also appear (missing component VCREDIST\_X86).

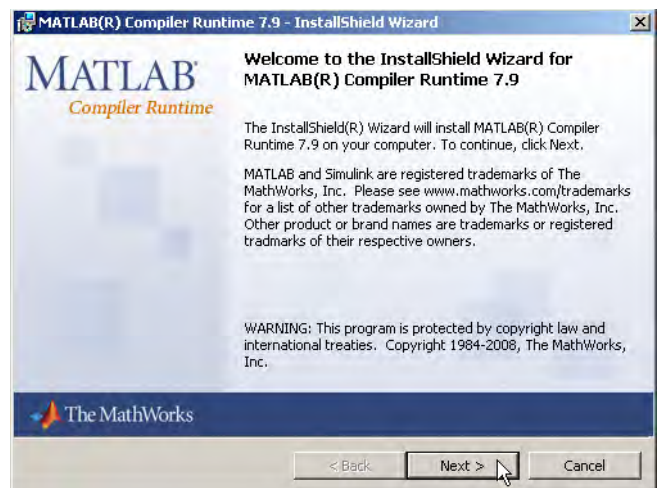
☞ *Click on Install*

Two additional installation windows will appear, which do not require any further entry.



After some time (up to several minutes depending on the system configuration) the start screen of the MCR installer will appear.

☞ *Click on Next.*



The window for entering user data appears.

☞ *Enter your name and the company name and then click on Next.*

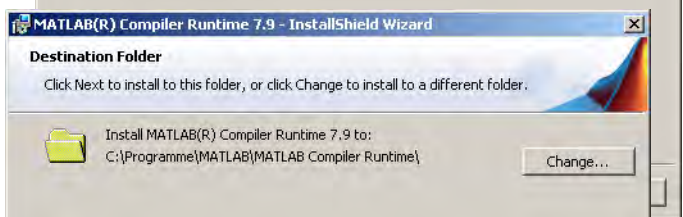


☞ *It is essential that you retain the default folder in the window for the selection of the installation path (Destination Folder).*

The standard path is

C:\Programme\MATLAB\MATLAB Compiler Runtime\.

☞ *Click on Next and in the next window click on Install.*



The installation will start and the adjacent status window will be displayed. This can again take several minutes.

Following successful MCR installation, the InstallShield Wizard Completed window appears.

☞ *Click on Finish to end the MCR-installation.*

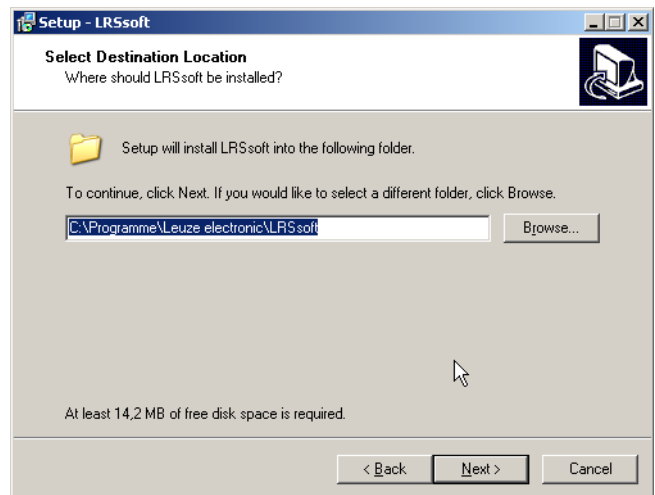


The window for selecting the installation path for **LRSsoft** now appears.

☞ *Keep the default folder and click on Next.*

The installation of **LRSsoft** starts. If you also selected **LPSsoft** for installation, upon completion of the **LRSsoft** installation, the same window then reappears for entering the installation path for **LPSsoft**.

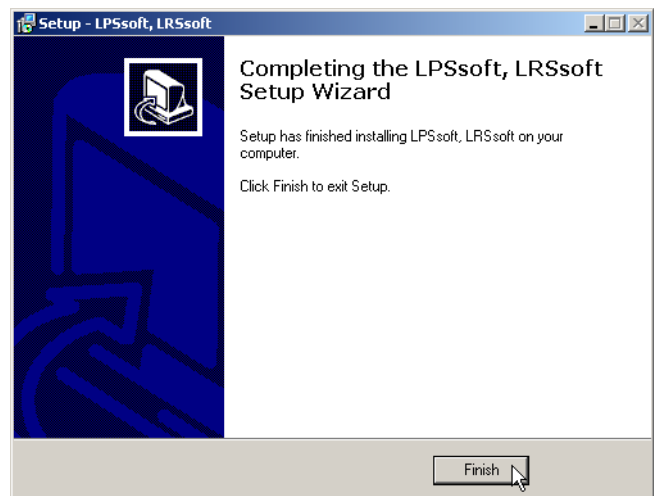
☞ *Keep the default folder in this case as well and click on Next.*



Upon completion of the installation process, the adjacent window appears.

The installation routine added a new **Leuze electronic** program group in your Start menu that contains the installed programs **LRSsoft** and, if selected, **LPSsoft**.

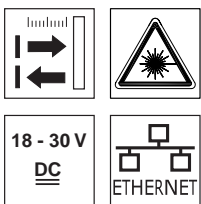
☞ *Click on Finish and then start the desired program from the Start menu.*



LPS 36

Line profile sensor

-2010/02 50111079



200 ... 800mm

- Line sensor for profile measurement
- Calibrated system
- Measurement range: 200 ... 800mm
- Length of laser line: max. 600mm
- Measurement data transfer via Fast Ethernet
- OLED display with key pad for alignment aid and status display: inspection task
- Measurement value display in mm on OLED display
- Optional incremental transmitter input
- Up to 376 value pairs (x,z) along the laser line

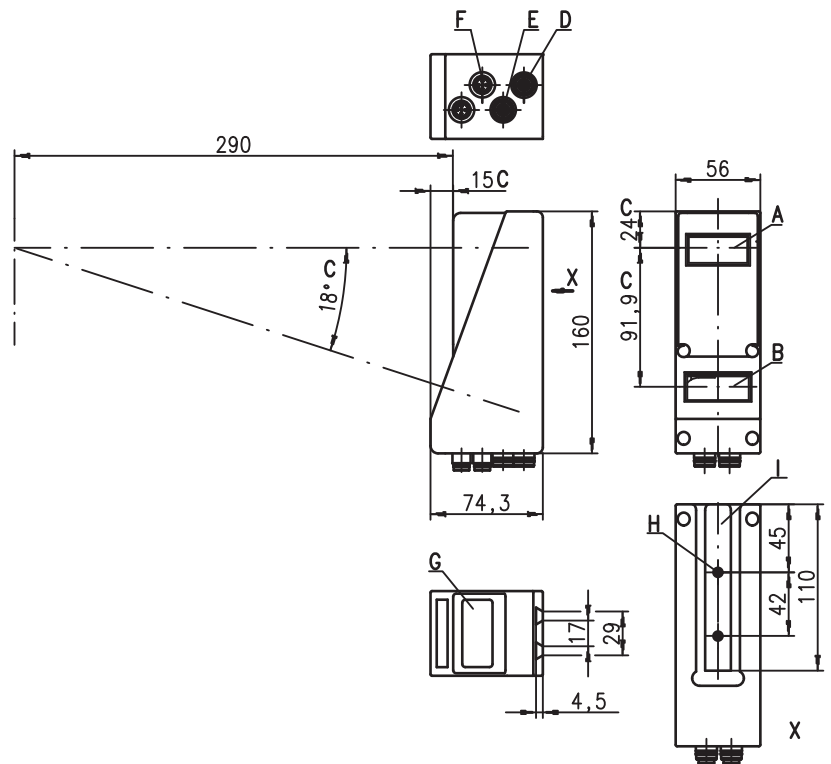


Accessories:

(available separately)

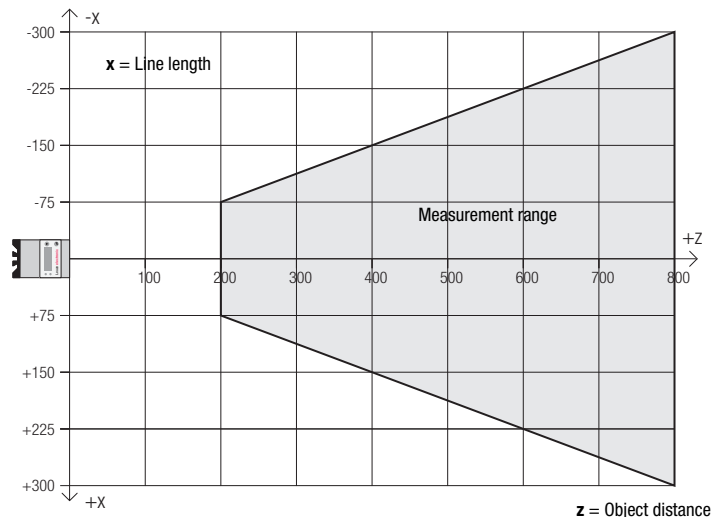
- Mounting systems BT 56, BT 59
- Cable with M12 connector (K-D ...)
- Configuration software

Dimensioned drawing



- A Transmitter
- B Receiver
- C Optical axis
- D X1: M12x1 plug, logic + power, 8-pin, A coded
- E X2: M12x1 socket, Ethernet, 4-pin, D coded
- F X3: M12x1 socket, Encoder, 8-pin, A coded (LPS 36/EN only)
- G OLED display and key pad
- H M4 thread, 4.5 deep
- I Holder for mounting system BT 56 / BT 59

Measurement range, typical



We reserve the right to make changes • DS\_LPS\_36en.fm

## Specifications

### Optical data

Measurement range <sup>1)</sup>	200 ... 800mm (z direction)
Light source	laser
Wavelength	658nm (visible red light)
Laser line	600x3mm at 800mm
Laser warning notice	see remarks

### Error limits (relative to measurement distance)

Resolution in x direction <sup>2)</sup>	1 ... 1.5mm
Resolution in z direction <sup>2)</sup>	1 ... 3mm
Linearity in z direction <sup>3)</sup>	≤ ±1%
Repeatability in z direction <sup>3)</sup>	≤ 0.5%
B/w detect. thresholds (6 ... 90% rem.)	≤ 1%

### Timing

Measurement time	10ms
Delay before start-up	approx. 1.5s

### Electrical data

Operating voltage U <sub>B</sub> <sup>4)</sup>	18 ... 30VDC (incl. residual ripple)
Residual ripple	≤ 15% of U <sub>B</sub>
Open-circuit current	≤ 200mA
Ethernet interface	UDP
RS 232 interface	9.600 ... 115.200 baud
Switching outputs	2x 24V / 100mA / push-pull <sup>5)</sup>
Trigger input	24V
Enable input	24V

### Indicators

Green LED	continuous light	ready
	off	no voltage
Yellow LED	continuous light	Ethernet connection available
	flashing	Ethernet data transmission active
	off	no Ethernet connection available

### Mechanical data

Housing	metal/plastic housing
Optics cover	aluminum frame with plastic cover
Weight	glass
Connection type	620g
	M12 connector

### Environmental data

Ambient temp. (operation/storage)	-30°C ... +50°C/-30°C ... +70°C
Protective circuit <sup>6)</sup>	1, 2, 3
VDE safety class	III, protective extra-low voltage
Protection class	IP 67
Laser class	2M (according to EN 60825-1 and 21 CFR 1040.10 with Laser Notice No. 50)
Standards applied	IEC 60947-5-2

- 1) Luminosity coefficient 6% ... 90%, entire measurement range, at 20°C after 30minutes warmup time, medium range U<sub>B</sub>
- 2) Minimum and maximum value depend on measurement distance
- 3) Reflectivity 90%, identical object, identical environment conditions, measurement object ≥ 50x50mm<sup>2</sup>
- 4) For UL applications: for use in class 2 circuits according to NEC only
- 5) The push-pull switching outputs must not be connected in parallel
- 6) 1=transient protection, 2=polarity reversal protection, 3=short circuit protection for all outputs

## Interface assignments

X1 - logic and power		
Pin No.	Signal	Colour
1	+24VDC	WH
2	In1 (activation)	BN
3	GND	GN
4	Out1 (ready)	YE
5	In2 (trigger)	GY
6	Out2 (cascading)	PK
7	RS 232-Tx	BU
8	RS 232-Rx	RD

8-pin M12 plug, A coded

X2 - Ethernet		
Pin No.	Signal	Colour
1	Tx+	YE
2	Rx+	WH
3	Tx-	OR
4	Rx-	BU

4-pin M12 socket, D coded

X3 - encoder		
Pin No.	Signal	Colour
1	Enc. +24VDC	WH
2	(GND)	BN
3	GND	GN
4	Enc. A+	YE
5	Enc. A-	GY
6	Enc. B+	PK
7	Enc. B-	BU
8	+5VDC Out	RD

8-pin M12 socket, A coded

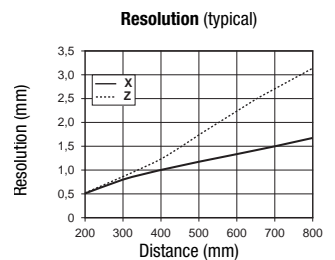
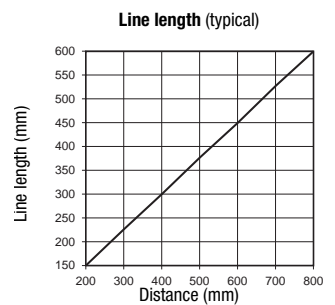
## Order guide

	Designation	Part No.
Line profile sensor		
Without encoder interface	LPS 36	50111325
With encoder interface	LPS 36/EN	50111324

## Tables

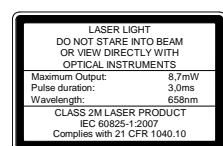
LED	State	Display during measurement operation
green	continuous light	Sensor ready
	off	Sensor not ready
yellow	continuous light	Ethernet connection established
	flashing	Ethernet data transmission active
	off	No Ethernet connection

## Diagrams



## Remarks

- **Approved purpose**  
The LPS 36 distance sensors are optical electronic sensors for the optical, contactless measurement of distance to objects.
- **Warmup time:**  
After a warmup time of 30 min., the light section sensor has reached the operating temperature required for an optimum measurement.
- **Encoder interface (LPS 36/EN):**  
24V single ended (A+, B+) or 5V differential (A+/A-, B+/B-)



**Establish connection to PC**

The LPS is configured via a PC using the **LPSsoft** program before it is integrated into the process control.

In order to be able to establish an UDP communication with the PC, the IP address of your PC and the IP address of the LPS must lie in the same address range. The LPS has no built-in DHCP client, so that you need to set the address manually. This is done the easiest way via the PC.

**Notice!**

*If you are using a desktop firewall, please ensure that the control can communicate with the LPS via the Ethernet interface on ports 9008 and 5634 using UDP. Furthermore, the firewall must allow ICMP echo messages to pass through for the connection test (ping).*

If the PC is usually connected to a network using DHCP address allocation, the easiest way to access the LPS is by applying an alternative configuration in the TCP/IP settings of the PC and connecting the LPS directly to the PC.

☞ *Check the network address of the LPS by pressing the **↵** button during normal operation of the LPS twice in succession, then by pressing **▼** twice and followed by pressing the **↵** button again.*

This will take you to the Ethernet submenu and enable you to read the current settings of the LPS consecutively when pressing **▼** repeatedly.

☞ *Make a note of the values for IP-Address and Net Mask Addr..*

The value in Net Mask Addr. specifies which digits of the IP address of the PC and LPS must match so that they can communicate with each other.

Address of the LPS	Net mask	Address of the PC
192.168.060.003	255.255.255.0	192.168.060.xxx
192.168.060.003	255.255.0.0	192.168.xxx.xxx

Instead of **xxx** you can now allocate any numbers between 000 and 255 to your PC, but NOT THE SAME numbers as contained in the address of the LPS.

For example 192.168.060.110 (but not 192.168.060.003!). If LPS and PC have the same IP address, they cannot communicate with each other.

**Configuring the IP address for a PC**

☞ *Log in to your PC as an administrator.*

☞ *Using Start->System control go to the Network connections (Windows XP) menu or to the Network center and release center (Windows Vista) menu.*

☞ *There select the LAN connection and bring up the associated Features page by right clicking with the mouse.*

☞ *Select the Internet Protocol (TCP/IP) (by scrolling down, if necessary) and click on Properties.*

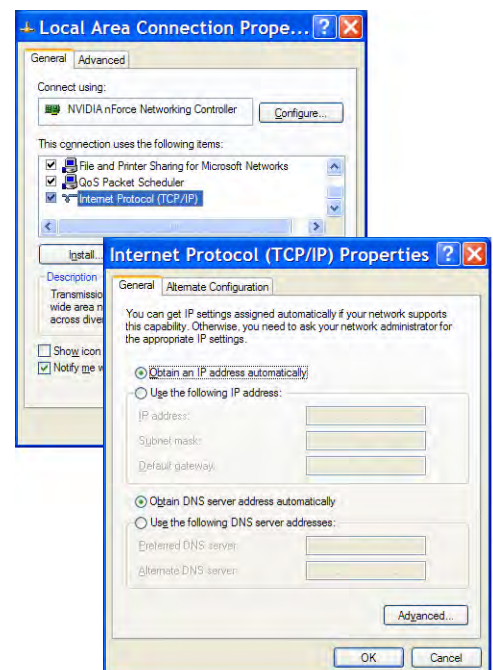
☞ *In the Internet Protocol (TCP/IP) Properties window select the Alternate configuration tab.*

☞ *Configure the IP address of the PC in the address range of the LPS. **Attention:** do not use the same as for the LPS!*

☞ *Set the Subnet mask of the PC to the same value as the one for the LPS.*

☞ *Close the configuration dialog by confirming all windows using OK.*

☞ *Connect the interface X2 of the LPS directly to the LAN port of your PC. Use a KB ET-...-SA-RJ45 cable for the connection.*



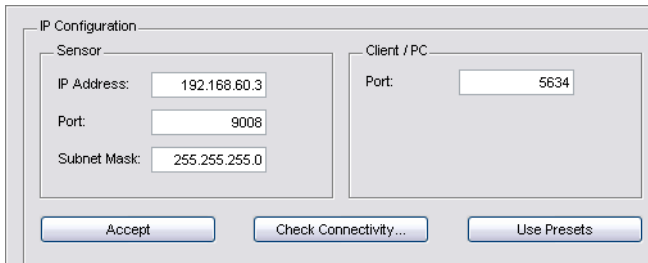
The PC will first try to establish a network connection via the automatic configuration. This will take a few seconds. Following that the alternative configuration, which you have just set up, is activated, and thus the PC can communicate with the LPS.

Information about configuring the LPS using LPSsoft software can be found in the Technical Description.

## Commissioning

For the commissioning and integration of the sensor in the process control the following steps are necessary:

1. Configuring the LPS - see chapter 8 of the Technical Description.
2. Programming process control - see chapter 9 of the Technical Description.
3. Adapt the IP configuration of the LPS such that it can communicate with the process control. This can be done either via the display of the LPS or in **LPSsoft** in the Configuration area. Here you can change network address and associated net mask as well as the ports via which the LPS communicates with process control.



4. Save the changed settings in the LPS using the Configuration->Transmit to sensor command.
5. Connect LPS to process control via the Ethernet interface.
6. Establish connections for activation, triggering and cascading, if necessary.

## Installing the software

### System requirements

The PC used should meet the following requirements:

- Pentium® or faster Intel® processor > 1.5 GHz (Pentium 4, Celeron, Xeon) or compatible models by AMD® (Athlon 64, Opteron, Sempron)  
The processor must support the SSE2 instruction set.
- At least 512 MB free main memory (RAM), 1024 MB recommended
- CD-ROM drive
- Hard disk with at least 1 GB available memory.
- Ethernet port
- Microsoft® Windows XP SP2/3 / Vista SP1

### Installation procedure



#### Notice!

If present, uninstall Matlab Runtime before beginning with the installation of the LXSsoft Suite.

The LXSsoft\_Suite\_Setup.exe installation program is located on the supplied CD.



#### Notice!

Copy this file from the CD to an appropriate folder on your hard drive. This requires administrator privileges.

To start the installation process, double-click on file LXSsoft\_Suite\_Setup.exe.

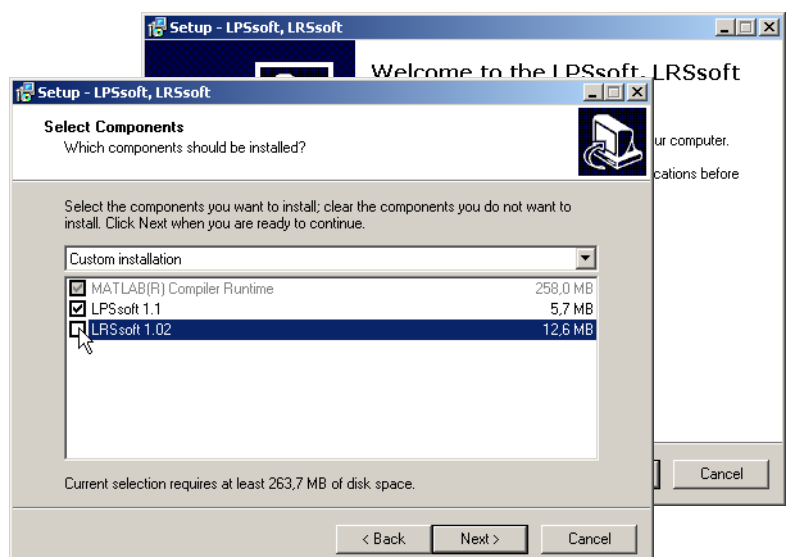
In the first window, click on Next.

In the next window, you can select whether you would like to install LPSsoft only, or LRSsoft in addition.

You will need LRSsoft in addition, for configuring light section sensors of the LRS series with your PC.

You cannot deselect the first option, MATLAB Compiler Runtime, since this component is needed in all cases.

Select the desired options and click on Next and, in the next window, click on Install.

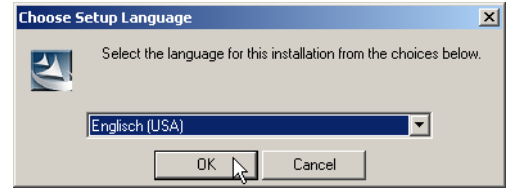


**LPS 36**

**Line profile sensor**

The installation routine starts. After a few seconds, the window for selecting the installation language for the Matlab Compiler Runtime (MCR) appears. The MCR is used for 3D visualization in **LPSsoft**. It is only available in English or Japanese.

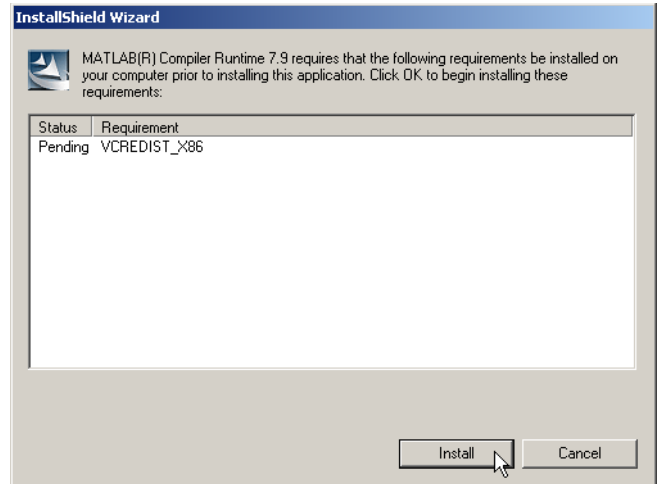
☞ *Therefore keep in the Choose Setup Language window the selection English and click on OK.*



Depending on the configuration of your Windows system the adjacent dialog can also appear (missing component VCREDIST\_X86).

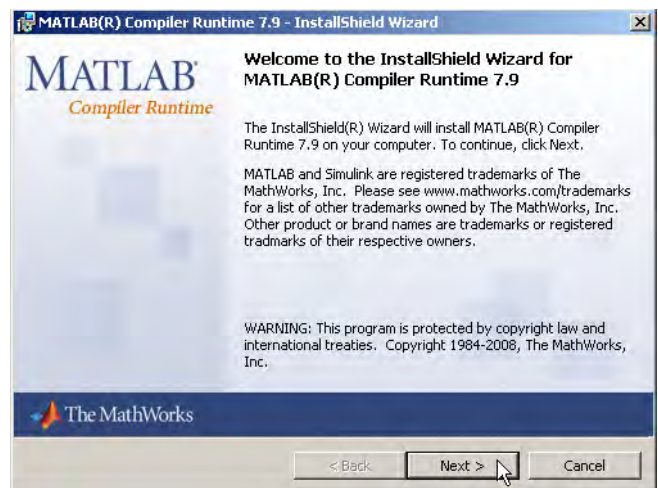
☞ *Click on Install*

Two additional installation windows will appear, which do not require any further entry.



After some time (up to several minutes depending on the system configuration) the start screen of the MCR installer will appear.

☞ *Click on Next.*



The window for entering user data appears.

☞ *Enter your name and the company name and then click on Next.*

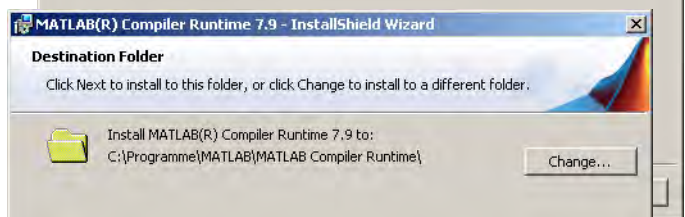


☞ *It is essential that you retain the default folder in the window for the selection of the installation path (Destination Folder).*

The standard path is

C:\Programme\MATLAB\MATLAB Compiler Runtime\.

☞ *Click on Next and in the next window click on Install.*



The installation will start and the adjacent status window will be displayed. This can again take several minutes.

Following successful MCR installation, the InstallShield Wizard Completed window appears.

☞ *Click on Finish to end the MCR-installation.*

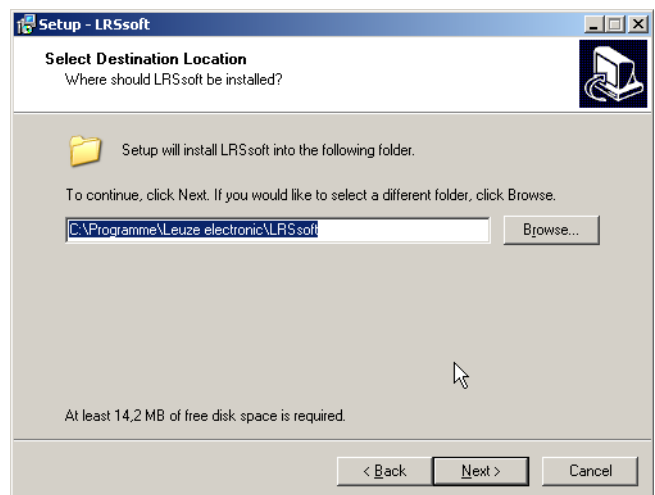


The window for selecting the installation path for **LPSsoft** now appears.

☞ *Keep the default folder and click on Next.*

The installation of **LPSsoft** starts. If you also selected **LRSsoft** for installation, upon completion of the **LPSsoft** installation, the same window then reappears for entering the installation path for **LRSsoft**.

☞ *Keep the default folder in this case as well and click on Next.*



Upon completion of the installation process, the adjacent window appears.

The installation routine added a new **Leuze electronic** program group in your Start menu that contains the installed programs **LPSsoft** and, if selected, **LRSsoft**.

☞ *Click on Finish and then start the desired program from the Start menu.*

