



# GS 754 Forked Photo Electric CCD Sensors

## Technical Description

### Parameterization *Version 4*



© All rights reserved, in particular the rights of reproduction and translation. Duplication or reproduction in any form (print, photocopies, microfilm or data) may only be carried out with the expressed written consent of Leuze electronic GmbH & Co.  
We reserve the right to make changes for the technical improvement of the product.

**Table of contents**

<b>1</b>	<b>General Information .....</b>	<b>5</b>
1.1	Explanation of Symbols .....	5
1.2	Declaration of Conformity .....	5
<b>2</b>	<b>Safety Notices .....</b>	<b>6</b>
2.1	Safety Standard .....	6
2.2	Intended Use .....	6
2.3	Organizing Measures .....	6
<b>3</b>	<b>Control and Display Elements .....</b>	<b>7</b>
<b>4</b>	<b>Description .....</b>	<b>8</b>
4.1	General Description .....	8
<b>5</b>	<b>Optical Data .....</b>	<b>8</b>
<b>6</b>	<b>LED Indicators .....</b>	<b>8</b>
<b>7</b>	<b>Device Configuration .....</b>	<b>9</b>
7.1	General Information .....	9
7.1.1	Terminal program .....	9
7.2	Basic configuration of the terminal program (interface P) .....	9
7.3	Configuration of the measurement, analysis and output procedures over interface P .....	10
7.3.1	GS 754...-29/42... configuration table .....	10
7.3.2	GS 754...-100/42... configuration table .....	11
<b>8</b>	<b>Precision and Linearity .....</b>	<b>12</b>
<b>9</b>	<b>Error Messages (interfaces P and M12) .....</b>	<b>13</b>
<b>10</b>	<b>Digital Measurement Value Output (P and M12 interfaces) .....</b>	<b>14</b>
10.1	ASCII format for the P and M12 interfaces .....	15
10.2	Binary format for the P and M12 interfaces .....	16
<b>11</b>	<b>Analog measurement value output (interface M12) .....</b>	<b>17</b>
<b>12</b>	<b>Typical Areas of Application .....</b>	<b>18</b>
12.1	Diameter Detection .....	18
12.1.1	ASCII display via RS232 (P and M12 interfaces) .....	18
12.1.2	Binary display via RS232 (P and M12 interfaces) .....	18
<b>13</b>	<b>Edge Detection and Height Verification .....</b>	<b>19</b>
<b>14</b>	<b>Special Configurations .....</b>	<b>20</b>
14.1	Teachable single-object- and edge-measurement for devices with analog output .....	20
14.1.1	Teach-in in the middle of the measurement field .....	20
14.1.2	Teach-in at the end of the measurement field .....	20
14.1.3	Teach-in at the start of the measurement field .....	21
14.2	Changeover of the edge assignment with single-object measurement .....	21
14.3	Edge measurement with non-continuous objects .....	22
14.4	Level changeover for the switching output PIN 2 .....	22
14.4.1	Function standard .....	22
14.4.2	Function standard inverted .....	22
14.4.3	Function photo-electric-sensor dark switching .....	23
14.4.4	Function photo-electric-sensor light switching .....	23

## 1 General Information

### 1.1 Explanation of Symbols

The symbols used in this operating manual are explained below.



**Attention**

*This symbol appears in front of text which must be carefully observed. Failure to heed this information can lead to injuries to personnel or damage to the equipment.*



**Notice**

*This symbol indicates text which contains important information.*

### 1.2 Declaration of Conformity

The GS 754 forked photo electric sensors with CCD have been developed and produced in accordance with the applicable European standards and directives.



**Notice**

*The corresponding declaration of conformity can be requested from the manufacturer.*

The manufacturer of the GS 754 forked photo electric sensors with CCD, Leuze electronic GmbH & Co. in D-73277 Owen/Teck, possesses a certified quality assurance system in accordance with ISO 9001.



## 2 Safety Notices

### 2.1 Safety Standard

The GS 754 forked photo electric sensors with CCD have been developed and tested by the manufacturer in accordance with the applicable safety standards.

### 2.2 Intended Use

The GS 754 forked photo electric sensors are used with a control system or an evaluation unit for the purpose of detecting and gauging of small objects in industrial production processes.



**Attention**

*The protection of personnel and the device cannot be guaranteed if the device is operated in a manner not corresponding to its intended use.*



**Attention**

*Access to or changes on the device, except where expressly described in this operating manual, is not authorized.*

### 2.3 Organizing Measures

All entries in this operating manual must be heeded, in particular those in the section "Safety Notices".

Carefully store this operating manual where it is accessible at all times.

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

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.

Repairs, in particular the opening of the housing, may only be carried out by the manufacturer or a person authorized by the manufacturer.

### 3 Control and Display Elements

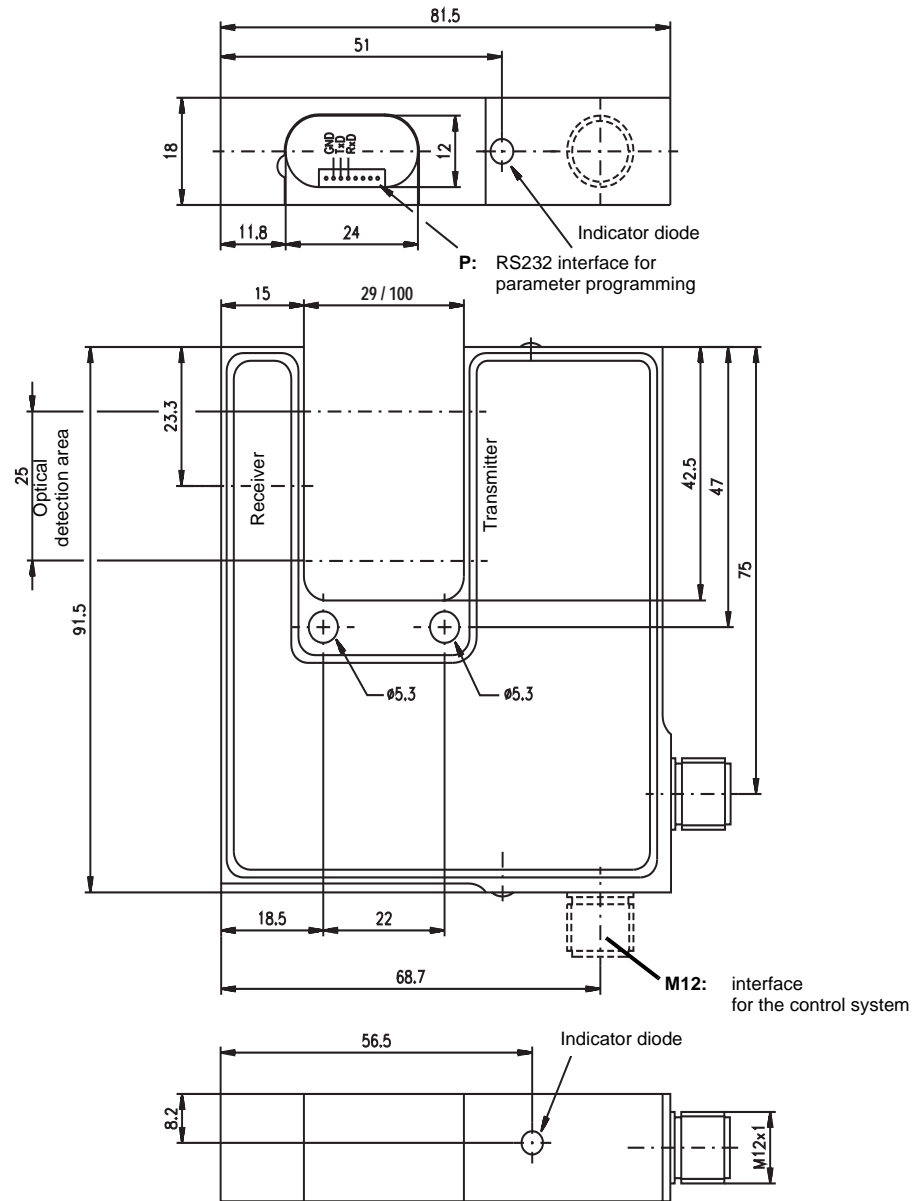


Figure 3.1: Positioning of operating and indicator elements

## 4 Description

### 4.1 General Description

The central part of the unit is an optical sensor that generates a horizontal band of light (Figure 3.1). The band of light illuminates a CCD camera. This CCD array produces an output signal that depends on the number of illuminated pixels.

The system has a permanent calibration and guarantees maximum precision and stability at any time.

Each sensor has two interfaces (see Figure 3.1).

1. Interface P (standard RS 232 interface):  
Programming interface for configuring the measurement modes and for visualising the measurement values.
2. M12 interface (process interface):  
Data for the control system are transmitted via this interface. Depending on the sensor type used, the measurement values are output either in analog or digital form.

Depending on the sensor type used, not all measurement values are available at the P and M12 interfaces.

**Example:** The analog interface can only output one measurement value at a time. The digital interface can output any number of measurement values.

## 5 Optical Data

	GS 754...-29/42... / GS 754...-100/42...	
	Output modes 1 ... 5	Output mode 7
Measurement range	25 mm	25 mm
Gap width	29 mm	29 mm
Gap depth	42 mm	42 mm
Width of band of light	1 mm	1 mm
Resolution	≤ 0.1 mm over the entire range	≥ 0.014 mm per measurement level
Smallest object	≥ 0.5 mm	≥ 0.5 mm
Light source	Infrared LED	Infrared LED
Wavelength	880 nm	880 nm

Table 1: Optical data

## 6 LED Indicators

LED	Meaning
green, continuously lit	ready
green, flashing	problem

Table 2: LED Indicators

## 7 Device Configuration

### 7.1 General Information

The parametrization cannot be carried out via the M12 interface. For this purpose, you should use the appropriate cable KB-ODS96-... .

To perform the parametrization, you require a PC with an RS232 interface and a terminal program with the following setting.

#### 7.1.1 Terminal program

To do this, you can use any terminal or modem program that can access the serial interface of your PC directly.

Under Microsoft® Windows® 95/98/NT/2000 you can use the "Hyperterminal" program.

### 7.2 Basic configuration of the terminal program (interface P)

<b>Transmission rate</b>	9600 bit/s
<b>Data bits</b>	8
<b>Parity</b>	no
<b>Stop bits</b>	1
<b>Protocol</b>	no

Table 3: Basic configuration of the terminal program (interface P)

### 7.3 Configuration of the measurement, analysis and output procedures over interface P

The appropriate configuration is activated by entering ASCII characters. Letters may be entered in either capital or lowercase form. By entering the ASCII character "R", the state on delivery is restored. Configuration examples can be found at the end of the document.

#### 7.3.1 GS 754...-29/42... configuration table

ASCII commands		Available for interface
<b>Output mode</b>		
1	Output cycle approx. 3 sec.	serial and analog
2	Output cycle approx. 1 sec.	serial and analog
3	Output cycle approx. 500 msec.	serial and analog
4	Output cycle approx. 250 msec.	serial and analog
5	Output cycle approx. 100 msec.	serial and analog
7	Max. measurement frequency approx. 20 msec. (default)	serial and analog
<b>Averaging</b>		
M,m	Averaging across the specified output cycle period	serial and analog
A,a	Output of instantaneous value (default)	serial and analog
<b>Number of objects</b>		
Q,q	Single object measurement (default)	serial
W,w	Measurement of 2 objects	serial
E,e	Measurement of 3 objects	serial
<b>Evaluation process</b>		
=	Diameter detection	serial and analog
-	Edge detection (default)	serial and analog
!	Non-continuous objects	serial and analog
?	Homogenous objects (default)	serial and analog
<b>Reset</b>		
R,r	Reset with config. switching output (7,a,-,o,?) Reset with config. teach-input (7,a,-,t,?)	serial and analog
<b>Edge assignment for analog output (single object measurement)</b>		
D,d	Object diameter	analog
\$	Edge Center	analog
(	Edge Inside (default)	analog
)	Edge Outside	analog
<b>Changing over teach-input / switching output (PIN 2)</b>		
T,t	Function teach-input	analog
O,o	Function switching output	serial and analog
<b>Level changeover for switching output (PIN 2)</b>		
<	Function standard (default)	serial and analog
>	Function standard inverted	serial and analog
*	Function dark-switching photo electric sensor	serial and analog
#	Function light-switching photo electric sensor	serial and analog

Table 4: Parameterizing commands GS 754...-29/42...

7.3.2 GS 754...-100/42... configuration table

ASCII commands		Available for interface
<b>Output mode</b>		
1	Output cycle approx. 3 sec.	serial, A1, A2
2	Output cycle approx. 1 sec.	serial, A1, A2
3	Output cycle approx. 500 msec.	serial, A1, A2
4	Output cycle approx. 250 msec.	serial, A1, A2
5	Output cycle approx. 100 msec.	serial, A1, A2
7	Max. measurement frequency approx. 20 msec. (default)	serial, A1, A2
<b>Averaging</b>		
M,m	Averaging across the specified output cycle period	serial, A1, A2
A,a	Output of instantaneous value (default)	serial, A1, A2
<b>Number of objects</b>		
Q,q	Single object measurement (default)	serial, A1, A2
W,w	Measurement of 2 objects	serial
E,e	Measurement of 3 objects	serial
<b>Evaluation process</b>		
=	Diameter detection	serial, A1, A2
-	Edge detection (default)	serial, A1, A2
!	Non-continuous objects	serial, A1, A2
?	Homogenous objects (default)	serial, A1, A2
<b>Reset</b>		
R,r	Reset with config. switching output (7,a,-,o,?) Reset with config. teach-input (7,a,-,t,?)	serial, A1, A2
<b>Edge assignment for analog output A1 (single object measurement)</b>		
\$	Edge Center	A1
(	Edge Inside (default)	A1
)	Edge Outside	A1
<b>Edge assignment for analog output A2</b>		
	Object diameter (only if diameter detection activ [=])	A2
<b>Activation teach-input</b>		
T,t	activate teach-function (default)	A1, A2
O,o	deactivate teach-function	A1, A2
<b>Level changeover for switching output</b>		
<	Function standard (default)	serial, A1, A2
>	Function standard inverted	serial, A1, A2
*	Function dark-switching photo electric sensor	serial, A1, A2
#	Function light-switching photo electric sensor	serial, A1, A2
<b>Level changeover for analog output A1 and A2</b>		
I,i	current 0 ... 20 mA	A1, A2
U,u	voltage 0 ... 10 V	A1, A2

Table 5: Parameterizing commands GS 754...-100/42...

## 8 Precision and Linearity

The maximum theoretical measuring range is 28.6mm (2048 \* 14 µm).  
 The maximum measuring range is dependent on the output mode.

The measurement values of the serial and analog interfaces are linearised.  
 The sensor makes the measurement values available in the following resolutions, depending on the output mode chosen:

### Resolution:

	Output modes 1 ... 5	Output mode 7
<b>Serial interface</b>	0.1 mm (ASCII)	0.014 mm (binary)
<b>Analog interface</b>	0.1 mm (Current/Voltage)	0.014 mm (Current/Voltage)

Table 6: Resolution

### Linearity in output modes 1 ... 5:

In output modes 1...5 the measurement values are scaled. These measurement values are scaled to the standard 4...20mA interface via the internal microcontroller. The resulting measurement field for output modes 1...5 is 25.3 mm (1807 \* 14 µm).

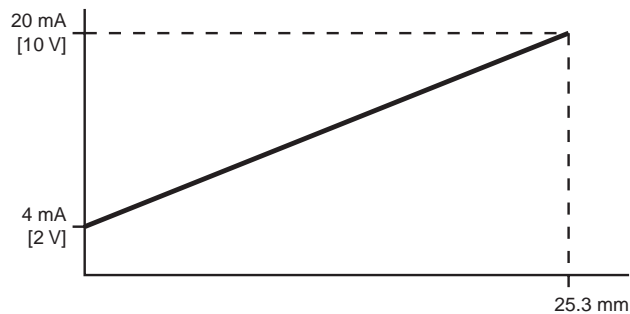


Figure 8.1: linearity in output modes 1 ... 5

### Linearity in output mode 7:

In output mode 7 the measurement values are not scaled. Each measurement value is directly output by the internal microcontroller. The resulting measurement field for output mode 7 is 25.3 mm (1807 \* 14 µm) and the output current 0...19.1 mA.

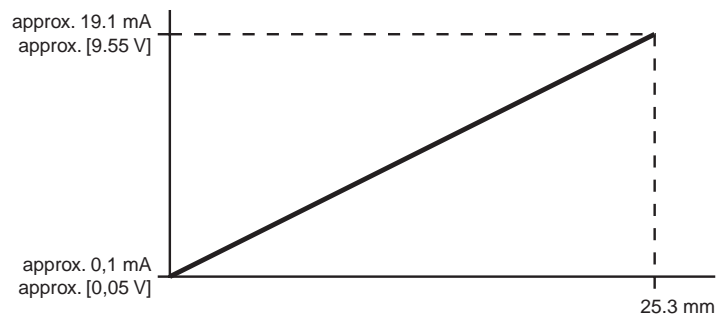


Figure 8.2: linearity in output mode 7

## 9 Error Messages (interfaces P and M12)

Errors vary depending on the configured measurement, analysis and output variants.

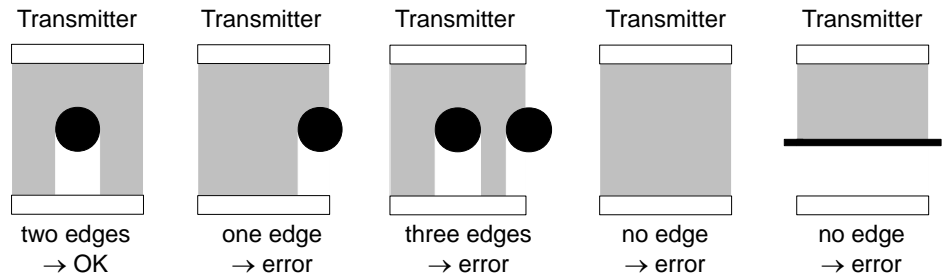
The errors are output at both the P and M12 interfaces.

Serial output	Modes 1 ... 5 Mode 7	Fewer edges than specified		More edges than specified		Light path fully blocked	
		Middle pos.	Dia.	Middle pos.	Dia.	Middle pos.	Dia.
		000	000	555	555	999	999
Analog current	Modes 1 ... 5	3.5 mA		>20 mA		>20 mA	
	Mode 7	0 mA					
Analog voltage	Modes 1 ... 5	1.75 V		>10 V		>10 V	
	Mode 7	0 V					
Warning output		High Level (+24 V)		High Level (+24 V)		High Level (+24 V)	

Table 7: Error messages (standard function)

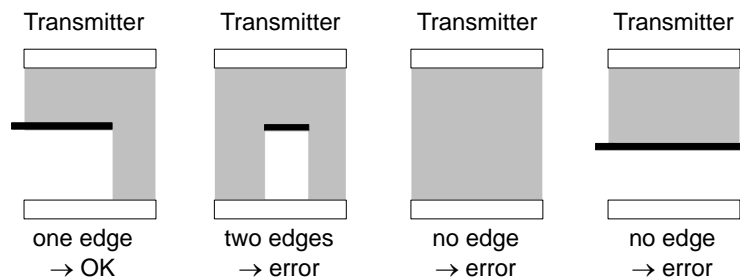
### Example of diameter detection:

In this setting the sensor expects two object edges. If more or fewer object edges are detected, an error message is output.



### Example of edge detection:

In this setting the sensor expects only one object edge. If more or fewer object edges are detected, an error message is output.



### 10 Digital Measurement Value Output (P and M12 interfaces)

The measurement value output is dependent on the type of sensor used and the configuration which is set.

There are a number of different output modes available.

These are divided into two primary output variants:

1. Output modes 1, 2, 3, 4, 5:

The measurement value output is performed at 0.3 Hz, 1 Hz, 2 Hz, 4 Hz or 10 Hz. The measurement values are linearized by the sensor and converted to mm values. Conversion of the pixel data is no longer necessary. The sensor transmits the measurement values to both the P and M12 interfaces. The digital information is, in this case, transmitted in ASCII format and can be read using the terminal program. The resolution is 0.1 mm.

2. Output mode 7:

The measurement value output is performed at 50 Hz. The sensor transmits the measurement values to both the P and M12 interfaces. The digital information is, in this case, transmitted in binary format and can no longer be read using the terminal program. The resolution is 0.014 mm.

The various output formats are explained on the following pages using examples.

### 10.1 ASCII format for the P and M12 interfaces

Readable ASCII data are only output via the digital interfaces in output modes 1, 2, 3, 4, 5. The resolution is 0.1 mm.

ASCII commands		Measurement value output in ASCII format
=, q, 5	Diameter detection	Middle-Pos.:125 Diameter:020
-, q, 5	Edge detection	Edge-Pos.:185

#### Example of diameter detection:

Middle-Pos.: 125 (equivalent to 12.5 mm)  
 Diameter: 020 (equivalent to 2.0 mm)

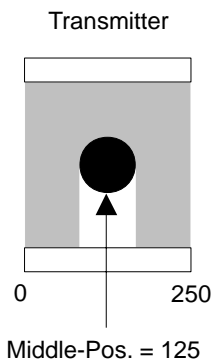


Figure 10.1: Example Diameter detection (ASCII format)

The middle of the object is located at CCD position 12.5 mm.  
 The diameter of the object is 2.0 mm.

#### Example of edge detection:

Edge pos.:185 (equivalent to 18.5 mm)

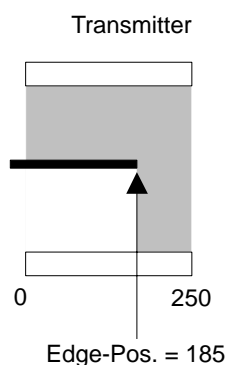


Figure 10.2: Example Edge detection (ASCII format)

The edge of the object is located at CCD position 18.5 mm.



Example of edge detection:

Measurement value output in binary format								
Data						Byte designator		
D <sub>5</sub>	D <sub>4</sub>	D <sub>3</sub>	D <sub>2</sub>	D <sub>1</sub>	D <sub>0</sub>	P <sub>1</sub>	P <sub>0</sub>	
Edge-Pos. (low byte)						0	0	Byte 0
Edge-Pos. (high byte)						0	1	Byte 1

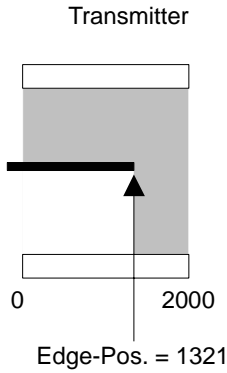


Figure 10.4: Example Edge detection (binary format)

The edge of the object is located at CCD pixel 1321.

Measurement value output in binary format								
Data						Byte designator		
D <sub>5</sub>	D <sub>4</sub>	D <sub>3</sub>	D <sub>2</sub>	D <sub>1</sub>	D <sub>0</sub>	P <sub>1</sub>	P <sub>0</sub>	
1	0	1	0	0	1	0	0	Byte 0
0	1	0	1	0	0	0	1	Byte 1

010100101001  
Value: 1321  
(1321 x 0.014 mm = 18.5 mm)

## 11 Analog measurement value output (interface M12)

The analog current and voltage values are available only at the M12 interface. These values vary depending on the type used and on the configuration. The measuring range is changed in output modes 1...5 and in output mode 7 (see Chapter 8).

	Output modes 1 ... 5	Output mode 7
Analog current	0.063 mA / 0.1 mm	0.01057 mA / 0.014 mm
Analog voltage	0.0316 V / 0.1 mm	0.005285 V / 0.014 mm

Table 8: Data Formats for the Analog Interface M12

## 12 Typical Areas of Application

### 12.1 Diameter Detection

Depending on which interface is used, data for up to three objects can be output. Data for more than one object can only be transmitted via the serial interface. The analog value is always based on the edge or diameter information.

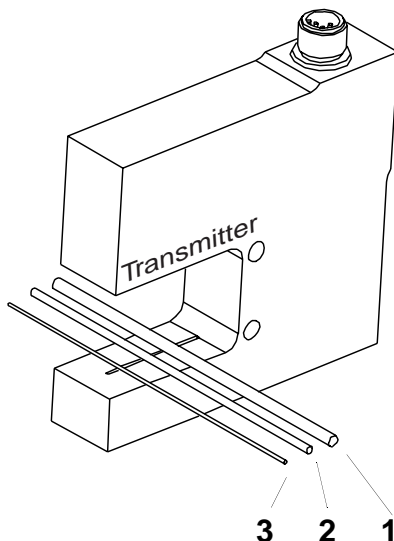


Figure 12.1: Sample Application Diameter Detection

#### 12.1.1 ASCII display via RS232 (P and M12 interfaces)

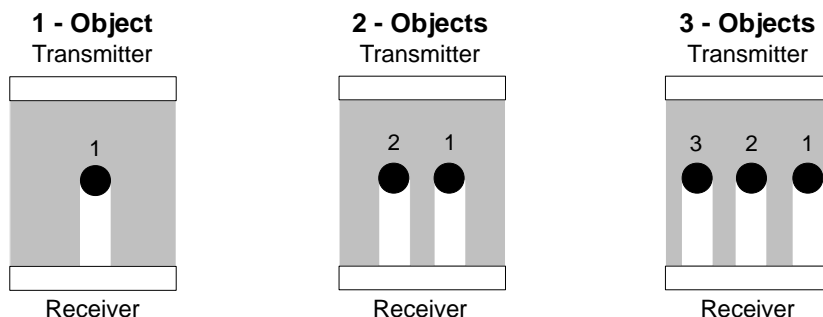
Parameter		ASCII output data via S1 and S2
Q,q	Single object detection	Middlepos. : xxx Diameter: xxx
W,w	Detection of two objects	Middlepos. : xxx Diameter: xxx Middlepos. : xxx Diameter: xxx
E,e	Detection of three objects	Middlepos. : xxx Diameter: xxx Middlepos. : xxx Diameter: xxx Middlepos. : xxx Diameter: xxx

Table 9: ASCII representation, output modes 1 ... 5

Example for xxx:123 (12.3 mm)

#### 12.1.2 Binary display via RS232 (P and M12 interfaces)

Due to the fast output of measurement values, only data for single-object detection can be output in this output mode. The measurement values cannot be displayed on the screen (see Chapter 10.2).



### 13 Edge Detection and Height Verification

With this measurement, the sensor expects only one edge within the measurement field. An error message results if more or fewer edges are detected by the system.

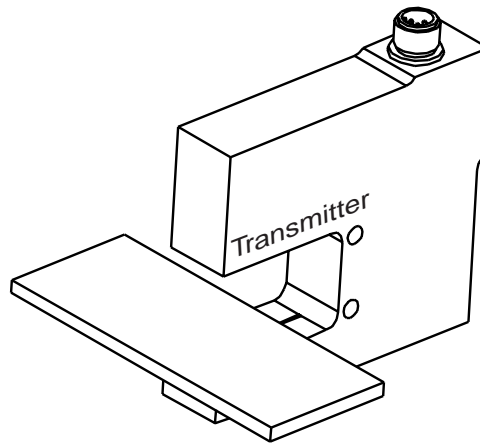
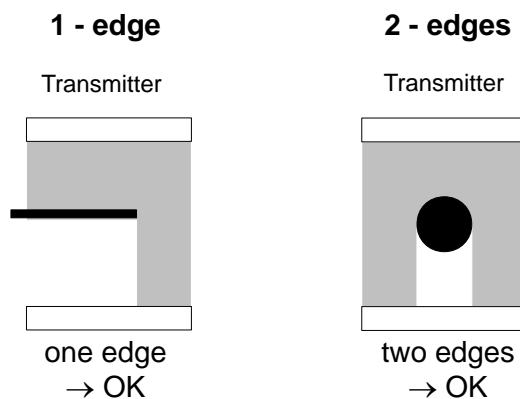


Figure 13.1: Edge Detection and Height Verification



Various configurations are possible with this measurement. The following only applies to devices with an analog interface:

1. Linear edge measurement over the entire measuring range (see chapter 8)
2. Teach-in edge measurement with 5V-output at teaching point

These functions are described in the following.

## 14 Special Configurations

### 14.1 Teachable single-object- and edge-measurement for devices with analog output

Connection pin 2 of devices with analog output can be configured as a warning output or as a teaching input. If pin 2 is has been configured as a teaching input, edge-adjustment is possible here at 5 V. In this way, any given point of the measurement field can be assigned the output value 5 V. It is no longer necessary to adjust the process software.

#### 14.1.1 Teach-in in the middle of the measurement field

The measurement value is output linearized. As a result, the entire measurement field is available for the measurement.

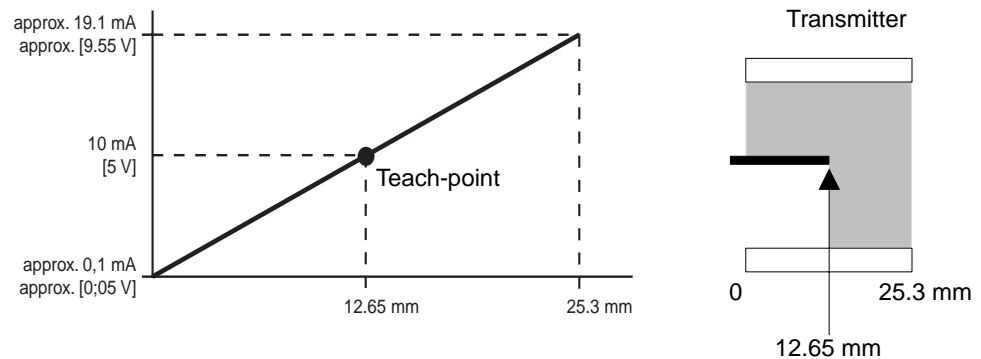


Figure 14.1: Teach-in (edge in the middle of the measurement field)

#### 14.1.2 Teach-in at the end of the measurement field

The measurement value is output linearized. The measurement field range is restricted. A change in measurement value no longer occurs at the beginning of the measurement field.

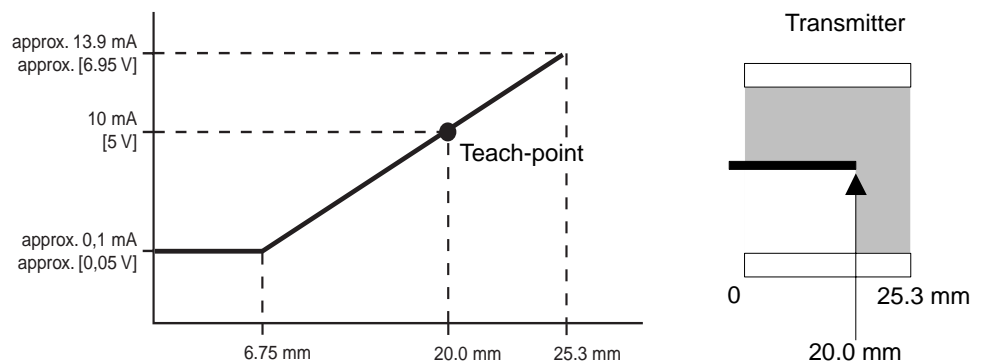


Figure 14.2: Teach-in (edge at the end of the measurement field)

### 14.1.3 Teach-in at the start of the measurement field

The measurement value is output linearized. The measurement field range is restricted. A change in measurement value no longer occurs at the end of the measurement field.

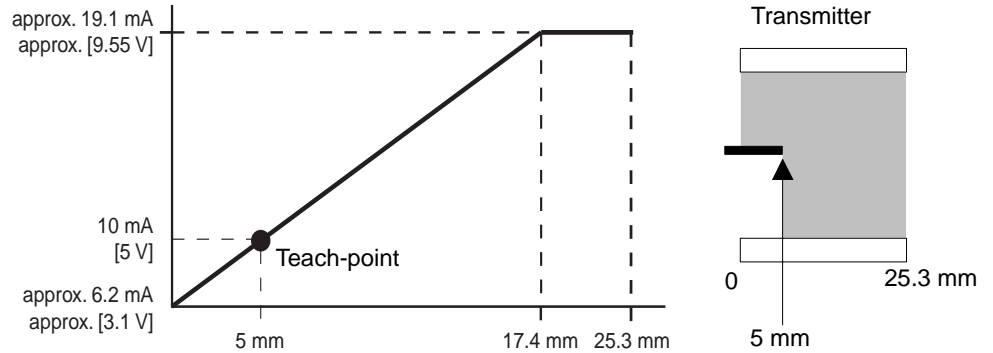
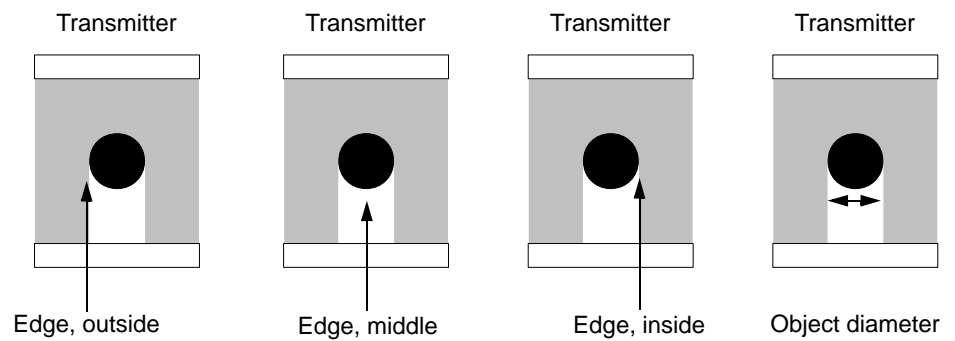


Figure 14.3: Teach-in (edge at the start of the measurement field)

### 14.2 Changeover of the edge assignment with single-object measurement

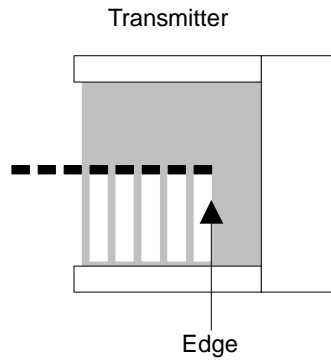
Only one piece of edge information can be output via the analog interface. With single-object measurement, the sensor sees two edges. Using these edges, information such as object diameter and object middle can be calculated. These edge assignments can be configured.



### 14.3 Edge measurement with non-continuous objects

With this function, net-like objects, e.g. fabric, can be detected.

Here, the first edge of the object is output as the measurement value. All other edges are suppressed. In this configuration the number of edges is not checked. Error messages are not output.



### 14.4 Level changeover for the switching output PIN 2

When PIN 2 is configured as a switching output, various logical functions can be assigned to this switching output. A distinction is made between standard and photo-electric-sensor functions.

Configuration	Function	Switching output Pin 2		
		Object partially in the measurement field	Object completely in the measurement field	Object not in the measurement field
<	Standard	high	low	high
>	Standard inverted	low	high	low
*	Dark switching	high	high	low
#	Light switching	low	low	high

Table 10: Level changeover for the switching output PIN 2

#### 14.4.1 Function standard

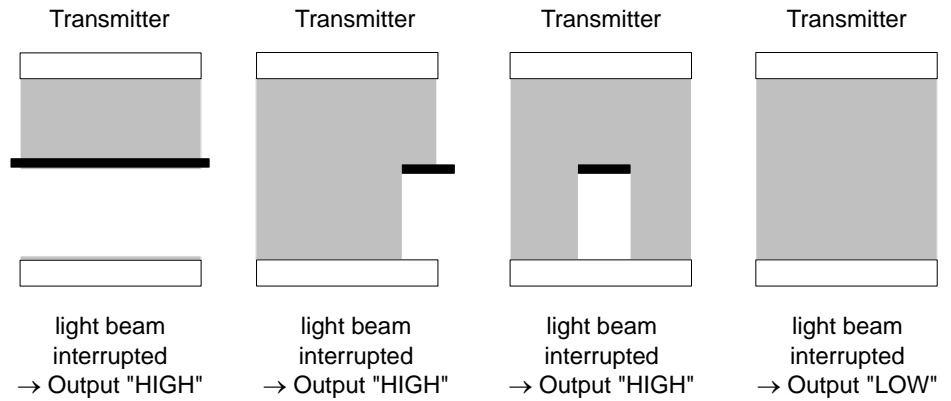
The number of object edges is monitored and output as described in chapter 9.

#### 14.4.2 Function standard inverted

The number of object edges is monitored and output inverted as described in chapter 9.

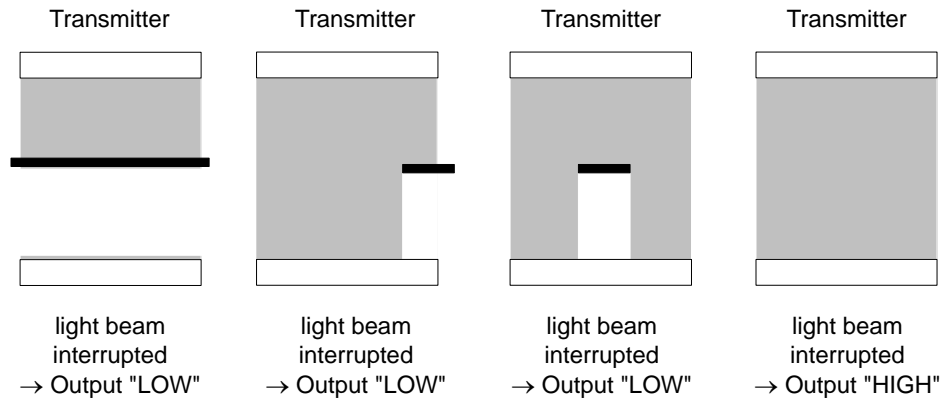
**14.4.3 Function photo-electric-sensor dark switching**

When configured for the photo-electric-sensor function, the number of edges is not monitored. The entire measuring range is analysed as a throughbeam photo electric sensor. The switching output functions on a dark-switching basis.



**14.4.4 Function photo-electric-sensor light switching**

With photo electric sensor level, the entire measurement range is analysed as a throughbeam photo electric sensor. The switching output functions on a light-switching basis.





Leuze electronic GmbH + Co.  
 Postfach 11 11, D-73277 Owen/Teck  
 Tel. (07021) 5730, Fax (07021) 573199  
 E-mail: info@leuze.de  
 http://www.leuze.de

## Vertrieb und Service

### A

Ing. Franz Schmachtl KG  
 Postfach 362, A-4021 Linz/Donau  
 Tel. Int. + 43 (0) 732/7646-0  
 Fax Int. + 43 (0) 732/785036  
 E-mail: office.linz@schmachtl.at

### ARG

Neumann SA.  
 Calle 55 N° 6043 (ex Buenos Aires 945)  
 1653 Villa Ballester  
 Provinz Buenos Aires, Argentina  
 Tel. Int. + 54 11 (0) 4/768-3449  
 Fax Int. + 54 11 (0) 4/767-2388

### AUS

Balluff-Leuze Pty. Ltd.  
 2 Rocco Drive  
 AUS-Scoresby VIC 3179  
 Melbourne, Australia  
 Tel. Int. + 61 (0) 3 /97642366  
 Fax Int. + 61 (0) 3/97533262  
 E-mail: balluff\_leuze@matcol.com.au

### B

Leuze electronic nv/sa  
 Steenweg Buda 50, B-1830 Machelen  
 Tel. Int. + 32 (0) 2/2531600  
 Fax Int. + 32 (0) 2/2531536  
 E-mail: leuze.info@leuze.be

### BR

Leuze electronic Ltda.  
 Av. Juruá, 150-Alphaville  
 BR-06455-010 Barueri-S. P.  
 Tel. Int. + 55 (0) 11/72956134  
 Fax Int. + 55 (0) 11/72956177  
 E-mail: leuzeelectronic@originet.com.br

### CH

Leuze electronic AG  
 Ruchstuckstrasse 25  
 CH-8306 Brütisellen  
 Tel. Int. + 41 (0) 1/8340204  
 Fax Int. + 41 (0) 1/8332626

### CZ

Schmachtl CZ Spol. SR. O.  
 Videnska 185, 25242 Vestec-Praha  
 Tel. Int. + 420 (0) 2/44 001500  
 Fax Int. + 420 (0) 2/44 910700  
 E-mail: office@schmachtl.cz

### CO

Componentes Electronicas Ltda.  
 P.O. Box 478, CO-Medellin  
 Tel. Int. + 57 (0) 4/3511049  
 Telex 66922  
 Fax Int. + 57 (0) 4/3511019

### DK

Desim Elektronik APS  
 Tuasingevej, DK -9500 Hobro  
 Tel. Int. + 45/ 9851 0066  
 Fax Int. + 45/ 9851 2220

### D

Leuze electronic GmbH + Co.  
 Geschäftsstelle Dresden  
 Niedersiedlitzer Str. 60, 01257 Dresden  
 Telefon (0351) 284 1105  
 Telefax (0351) 284 1103  
 E-mail: vgd@leuze.de

Lindner electronic GmbH  
 Schulerburger Landstraße 128  
 30165 Hannover  
 Telefon (0511) 966057-0  
 Telefax (0511) 96 6057-57  
 E-mail: lindner@leuze.de

W + M planttechnik  
 Dipl.-Ing. Wörtler GmbH + Co.  
 Tannenbergsstraße 62, 42103 Wuppertal  
 Telefon (0202) 37112-0  
 Telefax (0202) 318495  
 E-mail: wmpla@rga-net.de

Leuze electronic GmbH + Co.  
 Geschäftsstelle Frankfurt  
 Moselstraße 50, 63452 Hanau  
 Telefon (06181) 9177-0  
 Telefax (06181) 917715  
 E-mail: vgf@leuze.de

Leuze electronic GmbH + Co.  
 Geschäftsstelle Owen  
 In der Braike 1, 73277 Owen/Teck  
 Telefon (0 7021) 9850-910  
 Telefax (0 7021) 9850-911  
 E-mail: vgo@leuze.de

Leuze electronic GmbH + Co.  
 Geschäftsstelle München  
 Ehrenbreitsteiner Str. 44, 80993 München  
 Telefon (089) 14365-200  
 Telefax (089) 14365-220  
 E-mail: vgm@leuze.de

### E

Leuze electronic S.A.  
 c/ Juan Güell, 32, E-08028 Barcelona  
 Tel. Int. + 34 9 3/4097900  
 Fax Int. + 34 93/4903515  
 E-mail: leuze@chi.es

### F

Leuze electronic sarl.  
 Z.I. Nord Torcy, B.P. 62-BAT 3  
 F-77202 Marne la Vallée Cedex 1  
 Tel. Int. + 33 (0) 1/60051220  
 Fax Int. + 33 (0) 1/60050365  
 E-mail: leuze@club-internet.fr  
 http://www.leuze-electronic.fr

### FIN

SKS-teknikka Oy  
 P.O. Box 122, FIN-01721 Vantaa  
 Tel. Int. + 358 (0) 9/852661  
 Fax Int. + 358 (0) 9/8526820

### GB

Leuze Maysr electronic Ltd.  
 Generation Business Park  
 Barford Rd, St Neots  
 GB-Cambs. PE19 6YQ England  
 Tel. Int. + 44 (0) 1 480/408500  
 Fax Int. + 44 (0) 1 480/403808  
 E-mail: mail@leuzemayser.co.uk  
 http://www.leuzemayser.co.uk

### GR

UTECO A.B.E.E.  
 16, Mavromichali Street  
 GR-18538 Piraeus  
 Tel. Int. + 30 (0) 1/4290710  
 Fax Int. + 30 (0) 1/4290770

### GUS + EST + LV + LT

All Impex GmbH  
 Grenzstraße 28, Gebäude 46  
 01109 Dresden  
 Telefon (0351) 8900946  
 Telefax (0351) 8900947

### H

Kvalix Automatika Kft.  
 Box 83, H-1327 Budapest  
 Tel. Int. + 36 (0) 1/3794708  
 Fax Int. + 36 (0) 1/3698488  
 E-mail: info@kvalix.hu  
 http://www.kvalix.hu

### HK

Electrical Systems Ltd.  
 14/F Tai Po Commercial Centre  
 152 Kwong Fuk Road  
 Tai Po N.T. Hongkong  
 Tel. Int. + 852/26566323  
 Fax Int. + 852/2651 6808

### I

IVO Leuze Vogtle Malanca s.r.l.  
 Via Soperga 54, I-20127 Milano  
 Tel. Int. + 39 02 /2840493  
 Fax Int. + 39 02 /26 11 0640  
 E-mail: ivoleuze@tin.it

### IL

Galoz electronics Ltd.  
 P.O. Box 35, IL -40850 Rosh Ha'ayin  
 Tel. Int. + 972 (0) 3/9023456  
 Fax Int. + 972 (0) 3/9021990

### IND

Global Tech Corp.  
 403, White House  
 1482 Sadashiv Peth, Tilak Road  
 Pune 411030, India  
 Tel. Int. + 91 (0) 20 /4470085  
 Fax Int. + 91 (0) 20 /4470086

Ultra Tech Services Pvt. Ltd.  
 2nd Floor, A-22, Dr. Mukherjee Nagar,  
 Comm. Complex, Delhi-9, India  
 Tel. Int. + 91 (0) 11/7654154  
 Fax Int. + 91 (0) 11/7652606  
 E-mail: ultratech@vsnl.com

### J

SSR Engineering Co., Ltd.  
 2-18-3 Shimomoguro  
 Meguro-Ku. Tokyo  
 Tel. Int. + 81 (0) 3 /34936613  
 Fax Int. + 81 (0) 3 /34904073

### MAL

Ingermark (M) SDN.BHD  
 No. 29 Jalan KPK 1/8  
 Kawasan Perindustrian Kundang  
 MAL-48020 Rawang,  
 Selangor Darul Ehsan  
 Tel. Int. + 60 (0) 3 /6042788  
 Fax Int. + 60 (0) 3 /6042188

### N

Elteco A/S  
 Postboks 96, N-3901 Porsgrunn  
 Tel. Int. + 47 (0) 35 /573800  
 Fax Int. + 47 (0) 35 /573849

### NL

Leuze electronic B.V.  
 Postbus 1276  
 NL-3430 BG Nieuwegein  
 Tel. Int. + 31 (0) 30 /6066300  
 Fax Int. + 31 (0) 30 /6060970  
 E-mail: info@leuze.nl  
 http://www.leuze.nl

### P

LA2P, Lda.  
 Rua Almirante Sousa Dias, Loja D  
 Nova Oeiras, P-2780 Oeiras  
 Tel. Int. + 351 (0) 21/4422608/58  
 Fax Int. + 351 (0) 21/4422808  
 E-mail: la2p@ip.pt  
 http://www.la2p.pt

### PL

Lenze-Rotiv Sp.z.o.o.  
 Ul. Roździeńskiego 188 B  
 PL-40203 Katowice  
 Tel. Int. + 48 (0) 32/596031  
 Fax Int. + 48 (0) 32/7572734  
 E-mail: lenze@rotiv.com.pl

### RCH

Imp. Tec. Vignola S.A.I.C.  
 Plaza Justicia, Sub El Peral 25  
 Casilla 93-V  
 RCH-Valparaiso  
 Tel. Int. + 56 (0) 32 /257073,  
 256521, Telex 33 0404  
 Fax Int. + 56 (0) 32/258571

### ROC

Great Cofue Technology Co., Ltd.  
 4F-8, 3rd, Sec. 4, Chung Hsin Road  
 San-Chung City  
 Taipei Hsien, Taiwan, R. O. C.  
 Tel. Int. + 886 (0) 2/29838077  
 Fax Int. + 886 (0) 2/29853373

### ROK

Useong Electrade Co.  
 3325, Gadong, Chungang  
 Circulation Complex  
 No 1258, Guro-Bondong, Guroku  
 Seoul, Korea  
 Tel. Int. + 82 (0) 2 /6867314/5  
 Fax Int. + 82 (0) 2 /6867316

### RP

JMTI Industrial Corporation  
 No. 5, Saturn Street  
 Bricktown, Moonwalk  
 Paranaque, Metro Manila, Philippines  
 Tel. Int. + 63 (0) 2 /8446326  
 Fax Int. + 63 (0) 2 /8932202

### RSA

Countapulse Controls (PTY.) Ltd.  
 P.O. Box 40393  
 RSA-Cleveland 2022  
 Tel. Int. + 27 (0) 11/6157556-8  
 Fax Int. + 27 (0) 11/6157513

### S

Leuze electronic AB  
 Headoffice  
 Box 4025, 181 04 Lidingö  
 Tel. + 46 (0) 8 /7315190  
 Fax + 46 (0) 8 /7315105

### SGP

Pepperl + Fuchs Pte. Ltd.  
 P + F Building  
 18, Ayer Rajah Crescent, N. 06-03  
 SGP-Singapore 139942  
 Tel. Int. + 65 /7799091  
 Fax Int. + 65 /8731637

### SK

Schmachtl SK s.r.o.  
 Bardosova 2/A, SK-83309 Bratislava  
 Tel. Int. + 421 (0) 7/ 54777484  
 Fax Int. + 421 (0) 7/ 54777491  
 E-mail: office@schmachtl.sk

### SLO

Tipteh d.o.o.  
 Cesta v Gorice 40  
 SLO-1111 Ljubljana  
 Tel. Int. + 386 (0) 61/ 2005150  
 Fax Int. + 386 (0) 61/ 2005151

### TH

Industrial Electrical Co. Ltd.  
 85/2, 85/3 Soi Sot Phin San  
 Rang Nam Road  
 Rajthavee, Bangkok 10400  
 Tel. Int. + 66 (0) 2 /6 42-6700  
 Fax Int. + 66 (0) 2 /6 42-4250

### TR

Arslan Elektronik A. S.  
 Lülecihendek Cod. Nr. 47  
 Tophane Karaköy, TR-Istanbul  
 Tel. Int. + 90 (0) 2 12/2434627  
 Fax Int. + 90 (0) 2 12/2518385

### USA + CDN + MEX

Leuze Lumiflex Inc.  
 300 Roundhill Drive, Unit 4  
 USA-Rockaway, NJ 07866  
 Tel. Int. + 1 (0) 973/ 5860100  
 Fax Int. + 1 (0) 973/ 586 1590  
 E-mail: info@leuze-lumiflex.com  
 http://www.leuze-lumiflex.com