



GS 70

Forked photoelectric sensor

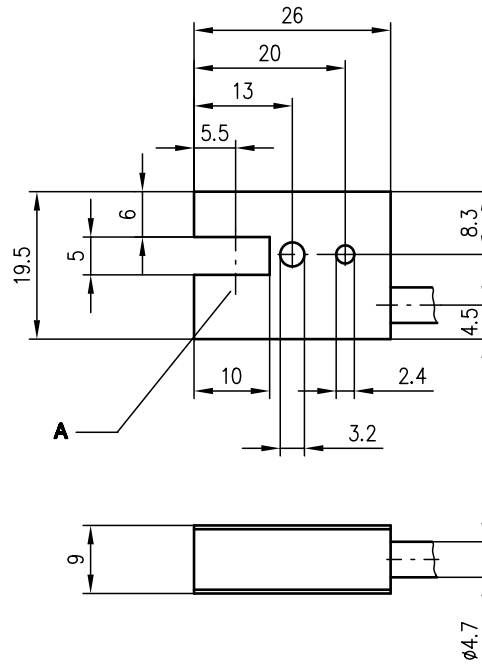


5mm

mini

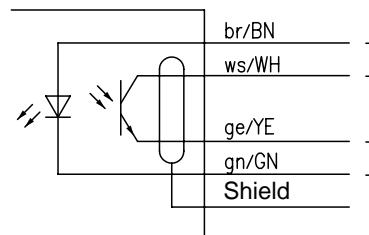
- Small construction volume enables application in small spaces
- Metal construction offers high firmness
- High insensitivity towards soiling and shocks
- Through selection of appropriate amplifiers optimally adaptable to applications

Dimensioned drawing



A Optical axis

Electrical connection



We reserve the right to make changes • MS\_a01e.fm

ISO 9001



Accessories:

(available separately)

- Amplifier for mini photoelectric sensors, e.g.
  - VS 9/1 (Part No. 500 00632)
  - IVS 9/4.8 (Part No. 500 12303)
  - VS 27/24 (Part No. 500 82005)
  - IVS 28/44.8 (Part No. 500 19808)



### Specifications

#### Optical data

Mouth width 5mm  
Light source LED (modulated light)  
Wavelength 880nm

#### Electrical data

Transmitter GaAs  
Transmitting current max. 200mA at D=0.05  
Receiver Si phototransistor  
Inverse voltage  $U_{CEO}$  max. 35VDC

#### Mechanical data

Housing aluminium red anodised  
Weight approx. 60g  
Cable length 2000mm  
Cable cross-section 4x0.14mm<sup>2</sup>+shield

#### Environmental data

Ambient temp. (operation/storage) -20°C ... +60°C/-30° ... +70°C  
Protection class IP 40

### Tables

### Diagrams

### Order guide

Designation	Part No.
GS 70	500 00067

### Remarks

- If a cable lengthening should be necessary, make sure that the shield is lead continuously.

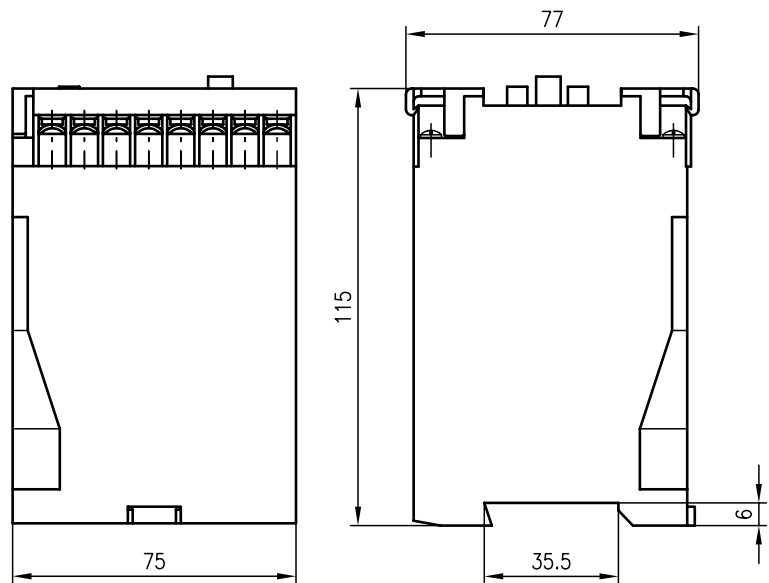


VS 100

Amplifier

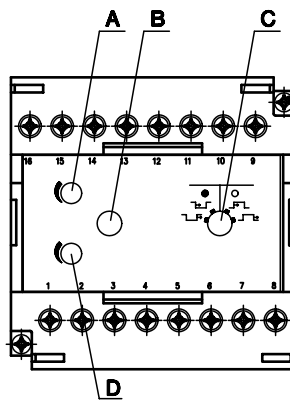


Dimensioned drawing



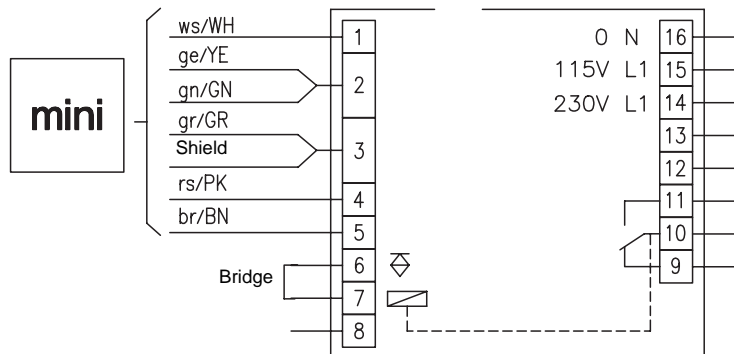
115/230 V  
AC

- Amplifier for connection of all mini photoelectric sensors (GaAs)
- Relay or PNP transistor output
- Adjustable time delay, light/dark switching and sensitivity adjustment
- Multicolour display for detailed information about the switching and operating status, allows for preventive maintenance
- Plastic housing with snap-on mounting for standard rail



- A Sensitivity adjustment
- B Indicator diode
- C Light/dark switching slow oper./release
- D Time delay

Electrical connection



Accessories:

We reserve the right to make changes • MS\_v14e.fm



### Specifications

#### Timing

Switching frequency	70Hz
Response time	8ms
Delay before start-up	≤ 100ms

#### Electrical data

Operating voltage $U_B$	115/230VAC ± 10%, 50/60Hz
Power consumption	≤ 4.5VA
Insulation test voltage	input - output 4kVAC relay - output 4kVAC
Switching output	PNP transistor output
Function characteristics	light or dark switching (reversible)
Signal voltage high/low	≥ 22V/≤ 2V
Output current	max. 100mA
Switching output <sup>1)</sup>	relay, 1 change-over contact
Switching voltage, relay	250 VAC/DC
Switching power, relay	50W/60VA
Sensitivity	adjustable

#### Indicators

LED green	light path free/reflection
LED yellow	light path free/reflection, no performance reserve
LED red	light path interrupted, or no reflection

#### Mechanical data

Housing	plastic standard housing
Weight	450g
Connection type	terminals

#### Environmental data

Ambient temp. (operation/storage)	-20°C ... +50°C / -30°C ... +70°C
Protective circuit <sup>2)</sup>	1, 3
VDE safety class	II
Protection class	housing IP 40 terminals IP 20, fulfils contact protection acc. to VBG 4 IEC 60947-5-2

Standards applied

#### Options

Switching delay (slow oper./release)	0 ... 10s
--------------------------------------	-----------

1) Suitable spark extinction must be provided with inductive or capacitive loads  
 2) 1=transient protection, 3= short-circuit protection for transistor output

### Tables

### Diagrams

### Order guide

Designation	Part No.
VS 100 Z	500 00645

### Remarks

- The output relay can be activated through a bridge between 6 and 7.

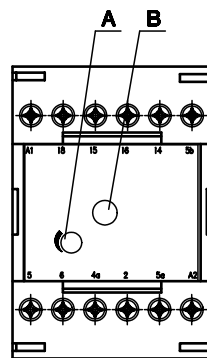
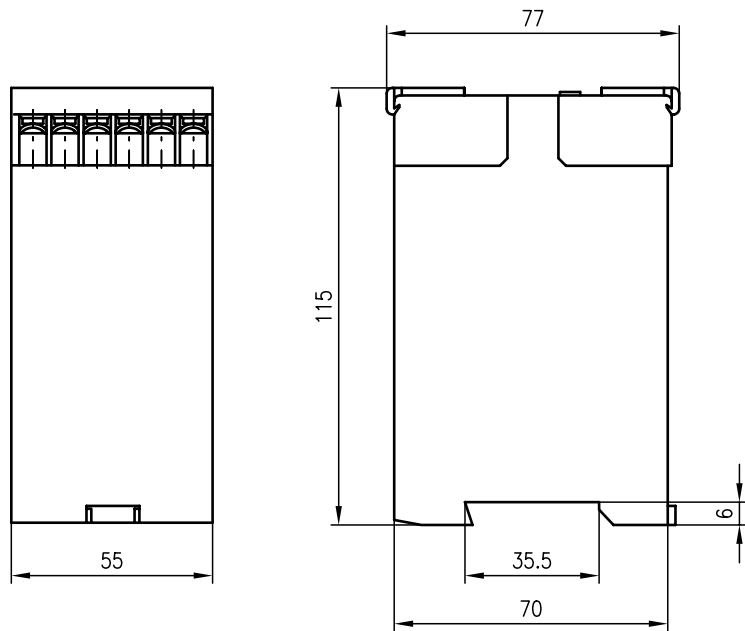


## VS 100

## Amplifier



### Dimensioned drawing



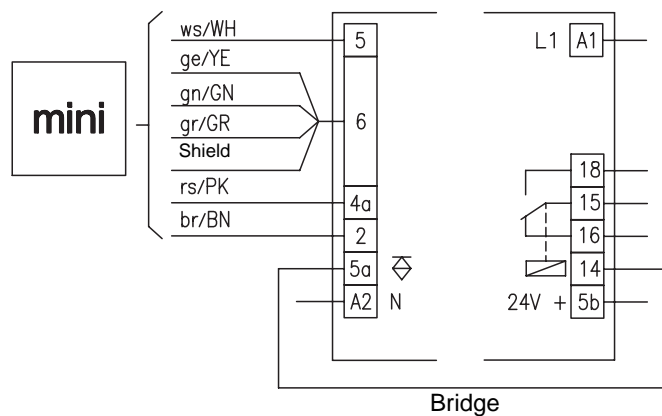
- A Sensitivity adjustment
- B Indicator diode



115/230 V  
AC

- Amplifier for connection of all mini photoelectric sensors (GaAs)
- Relay or PNP transistor output
- Multicolour display for detailed information about the switching and operating status, allows for preventive maintenance
- Plastic housing with snap-on mounting for standard rail
- Secure galvanic isolation between input/output

### Electrical connection



### Accessories:

We reserve the right to make changes • MS\_v13e.fm



### Specifications

#### Timing

Switching frequency	100Hz
Response time	5ms
Delay before start-up	≤ 100ms

#### Electrical data

Operating voltage $U_B$	230VAC ± 10%, 50/60Hz 115VAC ± 10%, 50/60Hz through soldering of a bridge inside the device
Power consumption	≤ 4.5VA
Insulation test voltage	input - output 4kVAC relay - output 4kVAC
Switching output	PNP transistor output
Function characteristics	light or dark switching (reversible inside the device)
Signal voltage high/low	≥ 22V/≤ 2V
Output current	max. 100mA
Switching output <sup>1)</sup>	relay, 1 change-over contact
Switching voltage, relay	250VAC/DC
Switching power, relay	50W/60VA
Sensitivity	adjustable

#### Indicators

LED green	light path free/reflection
LED yellow	light path free/reflection, no performance reserve
LED red	light path interrupted, or no reflection

#### Mechanical data

Housing	plastic standard housing
Weight	350g
Connection type	terminals

#### Environmental data

Ambient temp. (operation/storage)	-20°C ... +50°C / -30°C ... +70°C
Protective circuit <sup>2)</sup>	1, 3
VDE safety class	II
Protection class	housing IP 40 terminals IP 20, fulfils contact protection acc. to VBG 4
Standards applied	IEC 60947-5-2

1) Suitable spark extinction must be provided with inductive or capacitive loads  
2) 1=transient protection, 3= short-circuit protection for transistor output

### Tables

### Diagrams

### Order guide

Designation	Part No.
VS 100	500 00644

### Remarks

- The output relay can be activated through a bridge between 5a and 14.
- +24VDC are present on terminal 5b.

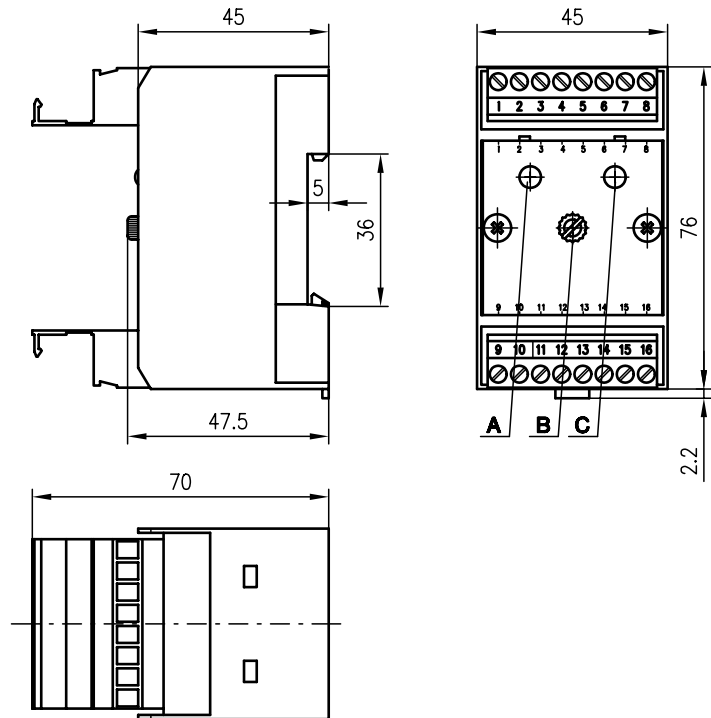


VS 29

Amplifier



Dimensioned drawing



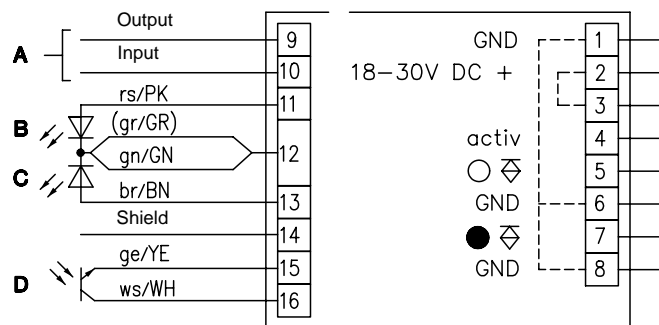
- A Operation indicator
- B Sensitivity adjustment
- C Switching indicator



18 - 30 V  
DC

- Cascadable high-power amplifier for up to 8 mini light axes
- Penetration of multilayered coloured foils, in connection with LS 29 L
- Indicator LED for process monitoring
- Complementary outputs
- Plastic housing with snap-on mounting for standard rail

Electrical connection



- A Synchronisation
- B Display
- C Transmitter
- D Receiver



Accessories:

(available separately)

- mini photoelectric sensor LS 29 L

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### Specifications

#### Timing

Switching frequency 200Hz  
 Response time 2.5ms  
 Delay before start-up ≤ 100ms

#### Electrical data

Operating voltage  $U_B$  18 ... 30VDC (incl. residual ripple)  
 Residual ripple ≤ 15% of  $U_B$   
 Bias current 55mA with LS 29 L, light path free  
 Switching output 2 PNP transistor outputs, complementary  
 Function characteristics light/dark switching  
 Signal voltage high/low  $\geq (U_B - 2V) / \leq 2V$   
 Output current max. 200mA respectively  
 Test or activation input (active) high active: High signal  $\geq 10V$   
 Low signal  $\leq 2V$

Sensitivity adjustable

#### Indicators

LED yellow light path free  
 LED green ready (supply voltage connected)

#### Mechanical data

Housing plastic green  
 Weight approx. 120g  
 Connection type Combicon with screw terminals (max. 2.5mm<sup>2</sup>)  
 Environmental data  
 Ambient temp. (operation/storage) -25°C ... +55°C / -40°C ... +70°C  
 Protective circuit <sup>1)</sup> 1, 2, 3  
 VDE safety class III, protective extra-low voltage  
 Protection class housing IP 40  
 terminals IP 20, fulfils contact protection acc. to VBG 4  
 IEC 60947-5-2

Standards applied

#### Options

Cascading maximum 8 devices

1) 1=transient protection, 2=polarity reversal protection, 3= short-circuit protection for transistor output

### Tables

Operating range with	
LS 29 L	35m

### Diagrams

### Order guide

Designation	Part No.
VS 29/44.8	500 80860

### Remarks

- Max. 8 amplifiers cascable.
- If testing input not used, connect active to + $U_B$  (bridge 3-4).
- A maximum of 8 amplifiers is cascable. Device 1 works as master (sync input open), controls device 2 on the device's sync input by using its own sync output. The sync output of device 2 controls the sync input of device 3 etc. Connect + $U_B$  and GND of the devices with each other.

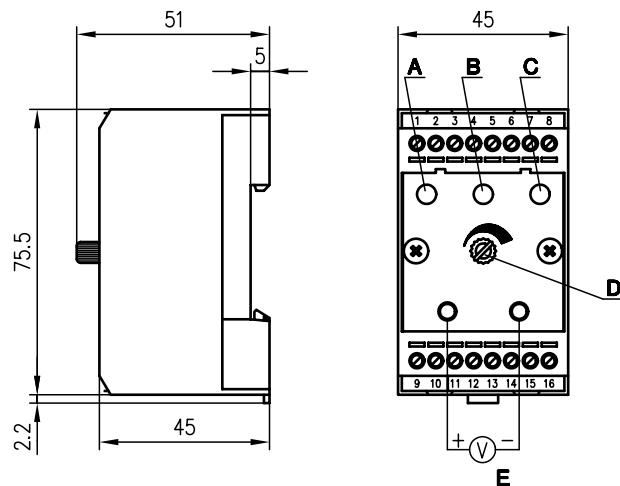


IVS 28

Amplifier



Dimensioned drawing



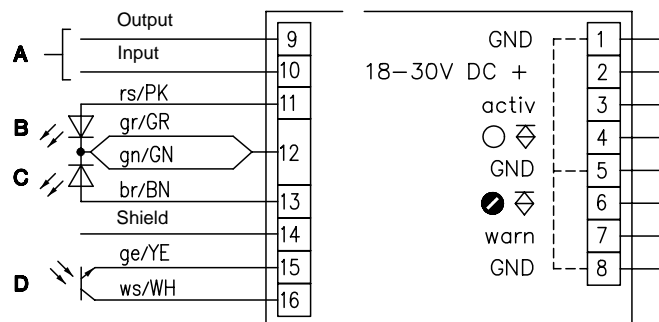
- A Indicator diode: in operation
- B Indicator diode: output Q,  $\bar{Q}$
- C Indicator diode: warning
- D Sensitivity adjustment
- E Measuring output



18 - 30 V  
DC

- Cascading of up to 10 amplifiers
- Amplifier for connection of all mini photoelectric sensors
- Outputs are short-circuit proof and polarity reversal protected
- Easy alignment of the connected photoelectric sensors through analogue output (0 ... 10V)
- Warning output - for increased availability
- Activation input allows function testing of the sensor and interlinking a number of sensors

Electrical connection



- A Synchronisation
- B Display
- C Transmitter
- D Receiver



Accessories:

We reserve the right to make changes • MS\_v11e.fm



## Specifications

### Timing

Switching frequency	1000Hz
Response time	0.5ms
Delay before start-up	≤ 50ms
Transmitter and synchronous pulse length	20ms (pulse-duty factor 1:16)

### Electrical data

Operating voltage $U_B$	18 ... 30VDC (incl. residual ripple)
Residual ripple	≤ 10% of $U_B$
Bias current	≤ 80mA
Switching output	2 PNP transistor outputs, complementary
Function characteristics	light/dark switching
Signal voltage high/low	≥ ( $U_B - 2V$ )/≤ 2V
Output current	max. 200mA respectively
Sensitivity	adjustable

### Indicators

LED green	ready (supply voltage connected)
LED yellow continuous light	free light path/reflection (with performance reserve)
LED yellow flashing	free light path/reflection (without performance reserve)
LED red	warning output active

### Mechanical data

Housing	plastic green
Weight	approx. 120g
Connection type	screw terminals (max. 2.5mm <sup>2</sup> )

### Environmental data

Ambient temp. (operation/storage)	-20°C ... +60°C/-30°C ... +70°C
Protective circuit <sup>1)</sup>	1, 2, 3
VDE safety class	III, protective extra-low voltage
Protection class	housing IP 40 terminals IP 20, fulfils contact protection acc. to VBG 4 IEC 60947-5-2

Standards applied

### Options

<b>Activation input</b> activ	>
Transmitter active/not active	≥ 10V/≤ 2V or not connected
Activation/disable delay	≤ 1ms
<b>Warning output autoControl</b> warn	PNP transistor, counting principle
Signal voltage high/low	≥ ( $U_B - 2V$ )/≤ 2V
Output current	max. 200mA
<b>Cascading</b>	maximal 10 devices
<b>Analogue output</b>	0 ... 10V, max. 10mA

1) 1=transient protection, 2=polarity reversal protection, 3= short-circuit protection for transistor output

## Remarks

- A maximum of 10 amplifiers is cascadable. Device 1 works as master (sync input open), controls device 2 on the device's sync input by using its own sync output. The sync output of device 2 controls the sync input of device 3 etc. Connect + $U_B$  and GND of the devices with each other.
- The activation input of the amplifier enables function control and logical connection of several systems through a special circuit. If this function is not needed, this connection (active) must be directly connected to + $U_B$ .
- autoControl is a counting principle. The photoelectric sensor is counting switching cycles with reduced performance reserve. After three consecutive cycles with reduced performance reserve (LED flashing), the separate warning output is activated and remains active until corresponding measures (cleaning, alignment etc.) have provided optimum performance reserve.
- The device can be snapped on a standard rail.

## Order guide

Designation	Part No.
IVS 28/44.8	500 19808



VS 27

Amplifier



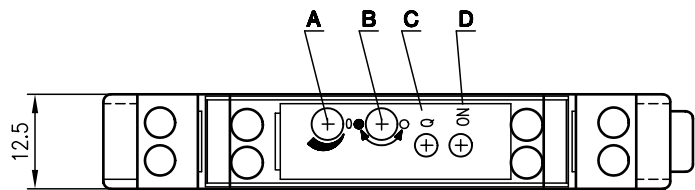
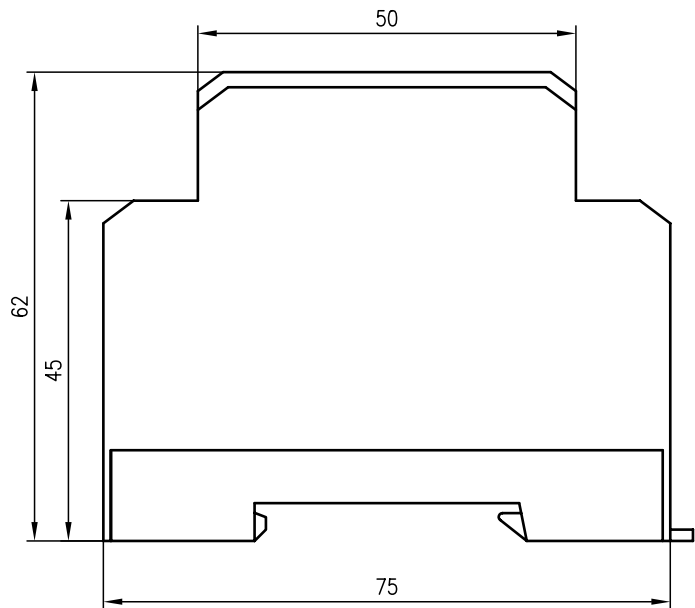
10 - 30 V  
DC

- Amplifier for connection of all mini photoelectric sensors (GaAs)
- Wide voltage range 10 ... 30V with PNP and NPN switching output
- Light/dark switching and sensitivity adjustment for optimal adaptation to the application
- Outputs are short-circuit proof and polarity reversal protected, this guaranteeing riskless mounting
- Plastic housing with snap-on mounting for standard rail



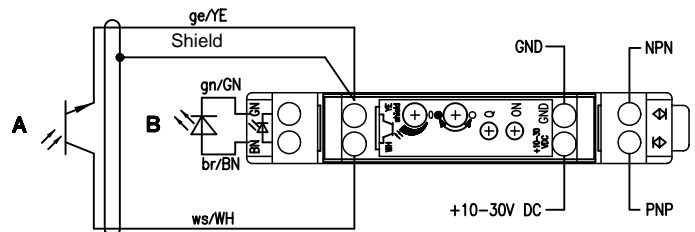
Accessories:

Dimensioned drawing



- A Sensitivity adjustment
- B Light/dark switching
- C Switching indicator
- D Operation indicator

Electrical connection



- A Receiver
- B Transmitter

We reserve the right to make changes • MS\_v10e.fm



### Specifications

#### Timing

Switching frequency	200Hz
Response time	2.5ms
Delay before start-up	≤ 100ms

#### Electrical data

Operating voltage $U_B$	10 ... 30VDC ± 10%
Bias current	≤ 30mA
Switching output	PNP and NPN transistor output
Function characteristics	light or dark switching (reversible)
Signal voltage high/low	$\geq (U_B - 2V) / \leq 2V$
Output current	max. 200mA
Sensitivity	adjustable

#### Indicators

LED green	ready, transmitter operating
LED yellow	light path free/reflection (with performance reserve)
LED yellow flashing	light path free/reflection (without performance reserve)

#### Mechanical data

Housing	plastic
Weight	80g
Connection type	screw terminals
Cable cross-section	0.25mm <sup>2</sup> ... 1.5mm <sup>2</sup>

#### Environmental data

Ambient temp. (operation/storage)	-20°C ... +60°C/30 °C ...+70°C
Protective circuit <sup>1)</sup>	1, 3
Protection class	housing IP 40 terminals IP 20, fulfils contact protection acc. to VBG 4 IEC 60947-5-2
Standards applied	

1) 1=transient protection, 3= short-circuit protection for transistor output

### Tables

### Diagrams

### Order guide

Designation	Part No.
VS 27/24	500 82005

### Remarks

- One gallium mini photoelectric sensor can be connected to the gallium amplifier VS 27/24.
- The device can be snapped on a standard rail.



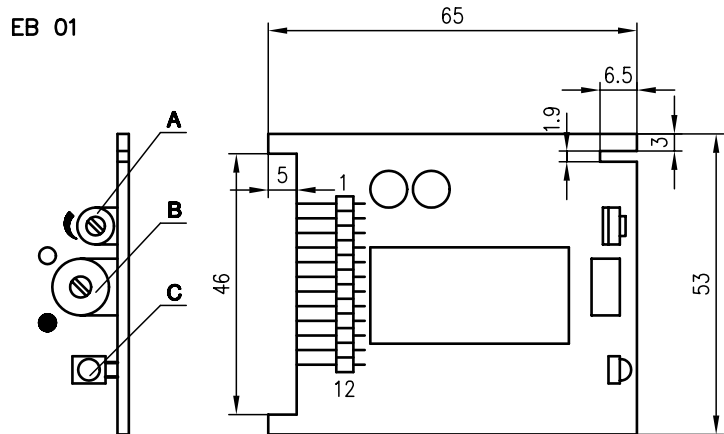
EB 01

Accessories

Amplifier module



Dimensioned drawings



- A Sensitivity adjustment
- B Light/dark switching
- C Indicator diode

- Plug-in module for amplifier VS 25/4 R
- Connection of all GaAS mini photoelectric sensors
- Sensitivity adjustment through potentiometer
- Light/dark switching through control knob
- LED indicator (illuminates during free light path/reflection)

Specifications

Transmitter

Pulse current  
 Frequency  
 Pulse-duty factor

max. 440 mA  
 approx. 330 Hz

$$T = \frac{T_1}{T_2} = \frac{0,25ms}{3,00ms} = \frac{\text{Pulse}}{\text{Pause}}$$

Receiver

Minimal input pulse  
 Switching frequency  
 Output capability  
 Output

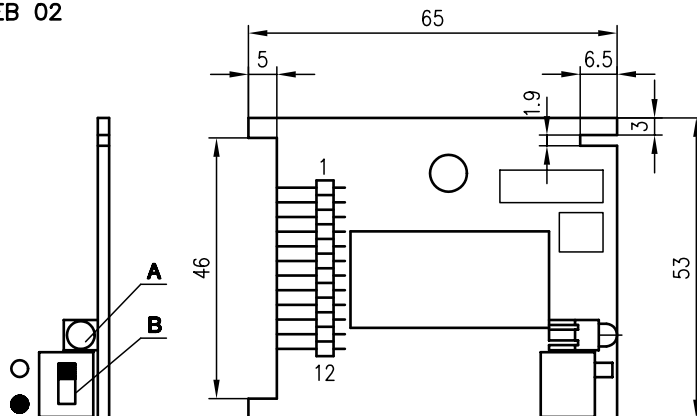
approx. 11 ms  
 approx. 45 Hz  
 max. 100 mA  
 short-circuit proof

Order guide

Designation	Part No.
EB 01	500 10633

## Dimensioned drawings

EB 02



- A Indicator diode  
 B Light/dark switching

## Specifications

### Transmitter

Pulse current

 approx. 10mA to approx. 230mA  
 automatically adjustable  
 approx. 330Hz

Frequency

Pulse-duty factor

$$T = \frac{T_1}{T_2} = \frac{0,25ms}{3,00ms} = \frac{\text{Pulse}}{\text{Pause}}$$

### Receiver

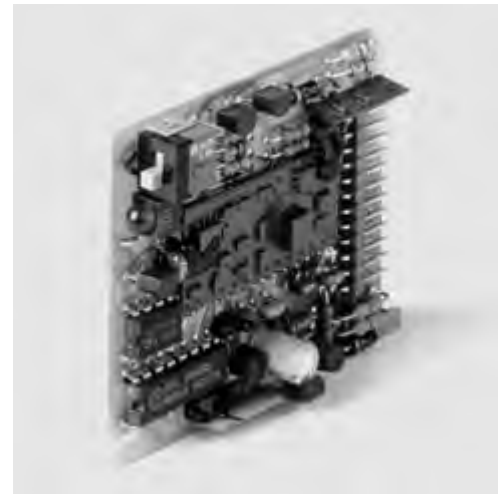
 Minimal input pulse  
 Switching frequency  
 Output capability  
 Output

 approx. 11ms  
 approx. 45Hz  
 max. 100mA  
 short-circuit proof

## Order guide

Designation	Part No.
EB 02	500 10634

### Amplifier module



- Plug-in module for amplifier VS 25/4 R
- Connection of all GaAS mini photoelectric sensors
- Sensitivity calibration through external circuit
- Light/dark switching through sliding switch
- LED indicator (illuminates during free light path/reflection)



## Description of functions

### General Information

The **VS 25/4 R** is the basic component for building a modular **3 fold multiplexed amplifier**.

By using the clock generator of the control component **SB 01**, the single amplifier components are controlled through a multiplexed process. Therefore, no mutual interference of the single light axes is possible. A maximum of **three plug-in ports for amplifier components EB 01 or EB 02** are available. These can be equipped depending on the application.

The possibility to connect a measurement instrument to each amplifier module enables optimum alignment of each light axis.

The amplifier modules **EB 02** are equipped with an **automatic calibration possibility** and a **warning signal output**. Through this, photoelectric sensors operated with this module are able to detect **minor shadowing** and to **compensate increasing contamination**. If the amplifier reaches the limit of its control range through **increasing soiling** a separate warning output issues an error message. This **warning output** is only erased, after having returned to optimum conditions and another impulse for automatic calibration.

### Remarks

- The free plug-in ports for the amplifier modules EB 01 and EB 02 can be equipped according to each application.
- With amplifier modules EB 02, an automatic calibration for compensation of soiling, misalignment etc. is induced through an external polling pulse (connection terminals 36/50).  
If the limit of the control range should be reached during this process, a common warning output is activated and the LED corresponding to this module on the SB 01 activated.
- A measurement instrument can be connected to the terminals 32/33/34 and 46/47/48. Through this an optimum mechanical basic adjustment is possible.



## Description of functions

The control component SB01 includes a clock generator with a clock frequency of approx. 2kHz. This pulse succession is assigned to the connected amplifier modules in multiplex process.

Through this, at a given time only one of the amplifiers is active and a mutual interference can not happen.

When connecting the operating voltage, an automatic self-calibration is performed for about 1 s on all amplifier modules EB 02.

Through this, the transmitter current of these modules is adjusted to enable detection of objects with little shadowing with sufficient performance reserve. This adjustment can be cyclically repeated through an external PNP signal transmitter or a "positive" switching contact. During this process, a device internal pulse of 1 s duration is generated. The transmitter current is regulated accordingly if it is apparent that since the last automatic calibration, the effective signal on the receiver has become smaller. In case the limit of the control range should be reached during readjustment, the warning output is activated (PNP transistor and relay contact); in addition to that, the corresponding LED on the SB 01 is activated. To avoid unwanted switching processes during automatic calibration function, the switching outputs of the EB 02 modules are bridged.

Apart from this special automatic calibration function, the amplifier module EB 02 is a photoelectric sensor-alternating light amplifier with PNP transistor and relay output with light/dark switching for all gallium mini photoelectric sensors of the Leuze shipping program.

The amplifier module EB 01 is also an alternating light amplifier with PNP transistor and relay output, sensitivity adjustment, and light/dark switching.

## Order guide

	<b>Designation</b>	<b>Part No.</b>
<b>Amplifier</b>	VS 25/4 R including SB 01	500 13009
<b>Control component</b>	SB 01	500 10635
<b>Amplifier module 1</b>	EB 01	500 10633
<b>Amplifier module 2</b>	EB 02	500 10634

The amplifier modules EB 01 and EB 02 have to be ordered separately.



VS 25

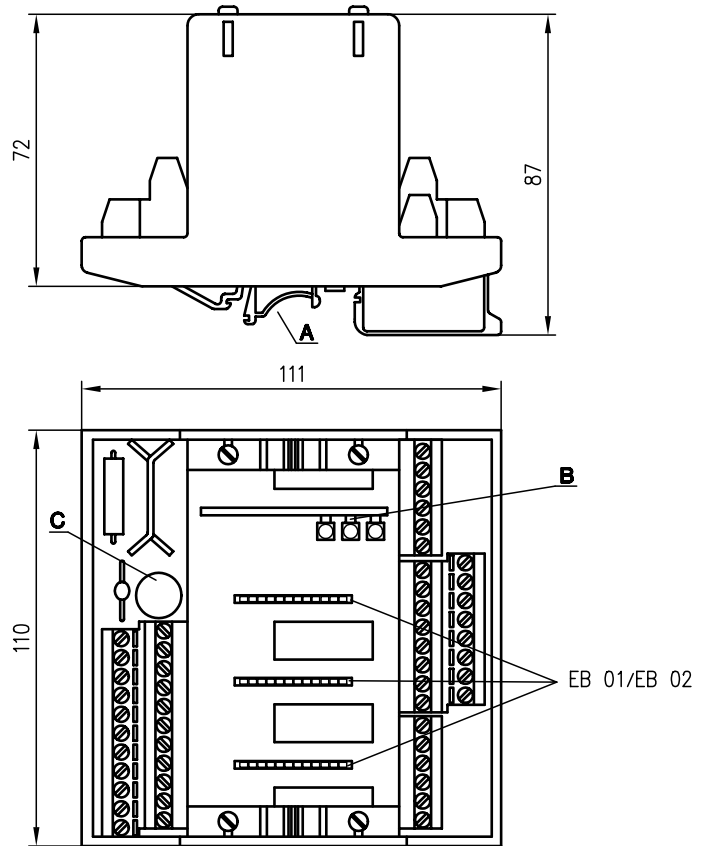
Amplifier



- Multiplex amplifier for connection of a max. of 3 mini photoelectric sensors (GaAs)
- Through multiplex operation no mutual interference of the individual light axes
- Modular construction enables task-oriented equipment of the basic board
- Connection option for measurement instrument enables easy alignment of the photoelectric sensors
- Activation input allows function testing of the sensor and interlinking a number of sensors

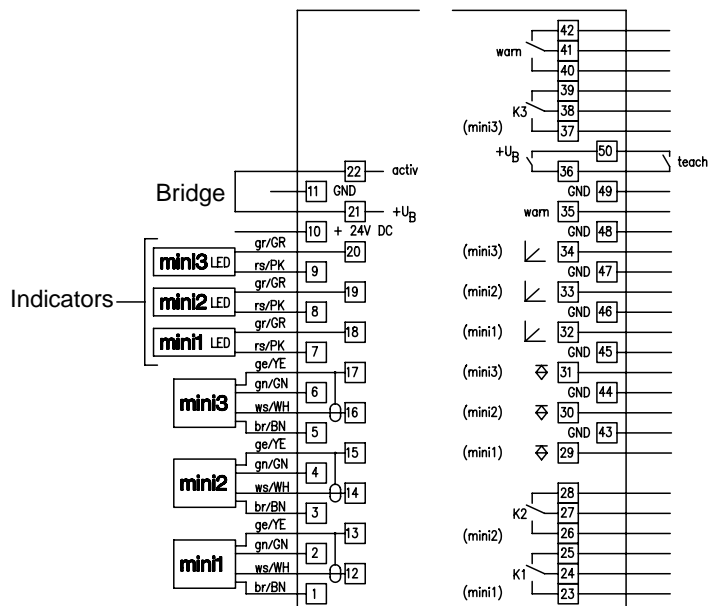


Dimensioned drawing



- A** Universal base for optional installation on all DIN EN mounting rails
- B** Indicator diodes
- C** Fuse

Electrical connection



We reserve the right to make changes \* MS\_v08e.fm

Accessories:

(available separately)

- Amplifier modules
  - EB 01 (Part No. 500 10633)
  - EB 02 (Part No. 500 10634)



## Specifications

### Timing

Switching frequency	45 Hz
Response time	11 ms
Delay before start-up	≤ 100 ms

### Electrical data

Operating voltage $U_B$	24 VDC ± 10%
Residual ripple	≤ 10%
Bias current	≤ 150 mA
Switching output	PNP transistor output light or dark switching (reversible)
Function characteristics	EB 01 reversible through control knob EB 02 reversible through slide switch
Signal voltage high/low	$\geq (U_B - 2V) / \leq 2V$
Output current	transistor outputs: max. 100 mA
Analogue output	as adjustment and alignment aid
Switching output <sup>1)</sup>	relay, 1 change-over contact
Switching voltage, relay	250 VAC/DC
Switching power, relay	50 W/60 VA
Sensitivity	module EB 01: potentiometer adjustment module EB 02: automatic self-alignment

### Indicators

LED red	end of the regulating range of EB 02 reached
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### Mechanical data

Housing	plastic green
Weight	300 g
Connection type	screw terminals

### Environmental data

Ambient temp. (operation/storage)	-20°C ... +50°C / -30°C ... +70°C
Protective circuit <sup>2)</sup>	2, 3
Fuse	fine-wire fuse 2 Am (5x20mm)
Protection class	IP 20 fulfils contact protection acc. to VBG 4
Standards applied	IEC 60947-5-2

### Options

Activation input activ	
Transmitter active/not active	≥ 8V/≤ 2V or not connected

1) Suitable spark extinction must be provided with inductive or capacitive loads  
2) 2=polarity reversal protection, 3= short-circuit protection for transistor output

## Remarks

- The device VS 25/4 R is designed for connection of max. 3 light axes. Type and number of amplifier modules EB 01 and EB 02 can be chosen independently.
- The corresponding modules have to be ordered separately.
- The photoelectric sensors can be optimally aligned via a connectable measuring instrument.
- The activation input active enables function control and logical connection of several systems. If this function is not needed, this connection active must be directly connected to + $U_B$ .
- The terminals 21/22 are bridged in shipping state.
- The amplifier modules are designed as plug-in cards and may only be plugged in currentless state.
- **The shield of the receiver has to be connected to the terminals of the same light axis.**  
mini 1 - terminal 13  
mini 2 - terminal 15  
mini 3 - terminal 17
- The shield detangling has to be short to ensure the greatest possible overlapping of the signal wires.

## Order guide

Designation	Part No.
VS 25/4 R	500 13009

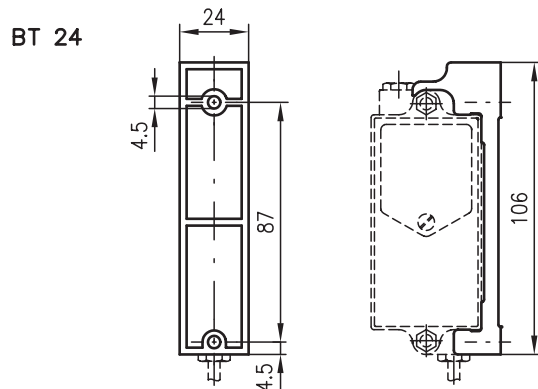
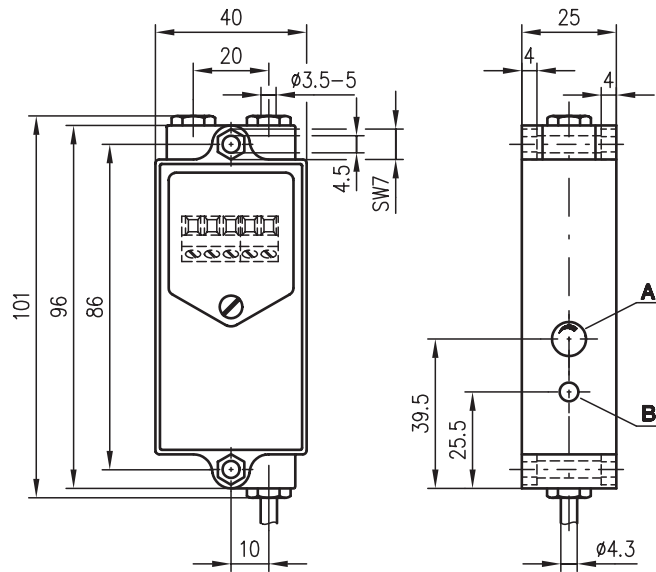


VS 24

Amplifier

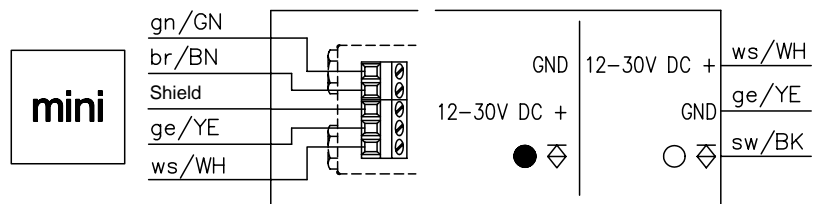


Dimensioned drawing



A Sensitivity adjustment  
B Indicator diode

Electrical connection



12 - 30 V  
DC

- Amplifier for connection of all mini photoelectric sensors (GaAs)
- Light/dark switching and sensitivity adjustment for optimal adaptation to the application
- Outputs are short-circuit proof and polarity reversal protected, this guaranteeing riskless mounting
- Plastic housing with cable connection



Accessories:

(available separately)

- Mounting system BT 24 (Part No. 500 11791)

mini

We reserve the right to make changes • MS\_v07e.fm



### Specifications

#### Timing

Switching frequency	100Hz
Response time	5ms
Delay before start-up	≤ 100ms

#### Electrical data

Operating voltage $U_B$	12 ... 30VDC
Residual ripple	≤ 15%
Bias current	≤ 30mA
Switching output	PNP transistor output
Function characteristics	light or dark switching (by reversing the polarity of $U_B$ )
Signal voltage high/low	$\geq (U_B - 2V) / \leq 2V$
Output current	max. 100mA
Sensitivity	adjustable

#### Indicators

LED red	light path free/reflection
LED red flashing	light path free/reflection, no performance reserve

#### Mechanical data

Housing	plastic, red
Weight	80g
Cable length	2000mm
Cable cross-section	3x0.25mm <sup>2</sup>

#### Environmental data

Ambient temp. (operation/storage)	-20°C ... +60°C / -30°C ... +70°C
Protective circuit <sup>1)</sup>	1, 3
Protection class	IP 65
Standards applied	IEC 60947-5-2

1) 1=transient protection, 3= short-circuit protection for transistor output

### Tables

### Diagrams

### Order guide

Designation	Part No.
VS 24/4	500 11265

### Remarks

- The screw terminals for connection of the photoelectric sensor are accessible through removal of the front cover.
- The cable entry of the photoelectric sensor to be connected is done via the cable gland (cable diameter 3.5 ... 5mm).

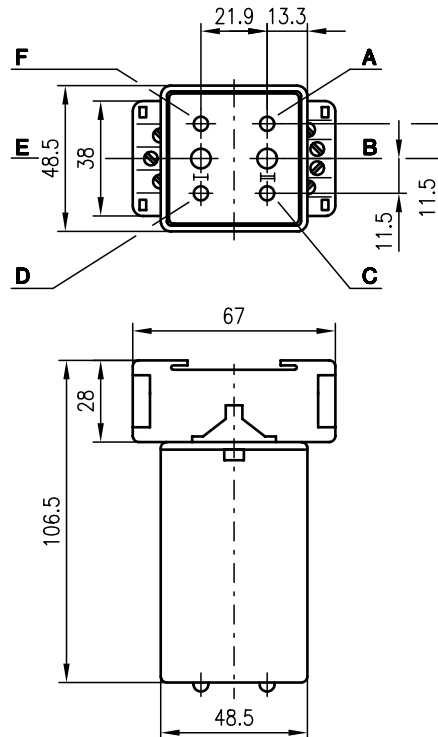


VS 10

Amplifier



Dimensioned drawing

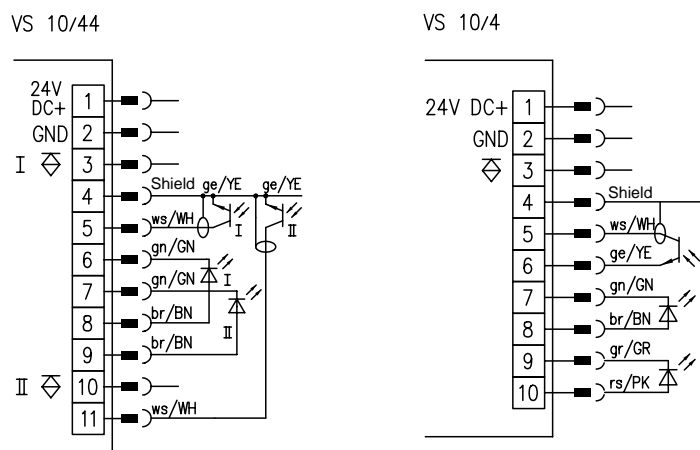


- A Light/dark switching
- B Indicator diode
- C Sensitivity adjustment
- only for VS 10/44
- D Light/dark switching
- E Indicator diode
- F Sensitivity adjustment



- Amplifier for connection of all mini photoelectric sensors (GaAs)
- The PNP transistor output is short-circuit proof and polarity reversal protected
- Light/dark switching and sensitivity adjustment for optimal adaptation to the application
- Indicator diode used as alignment aid for simple mounting
- Plastic housing with 11-pin connector, attachable to standard rail

Electrical connection



Accessories:

We reserve the right to make changes • MS\_v06e.fm



### Specifications

<b>Timing</b>	<b>VS 10/4</b>	<b>VS 10/44</b>
Switching frequency	100Hz	
Response time	5ms	
Delay before start-up	≤ 100ms	
<b>Electrical data</b>		
Operating voltage U <sub>B</sub>	24VDC ± 10%	
Residual ripple	± 10%	
Power consumption	≤1.5W	3W
Switching output	1 PNP transistor	2 PNP transistors
Function characteristics	light or dark switching (reversible)	
Signal voltage high/low	≥ (U <sub>B</sub> -2V)/≤ 2V	
Output current	max. 100mA	
Sensitivity	adjustable	
<b>Indicators</b>		
LED yellow	light path free/reflection	
LED yellow flashing	light path free/reflection, no performance reserve	
<b>Mechanical data</b>		
Housing	plastic standard housing	
Weight	90g	
Connection type	11-pin connector	
<b>Environmental data</b>		
Ambient temp. (operation/storage)	-20°C ... +50°C / -30°C ... +70°C	
Protective circuit <sup>1)</sup>	1, 3	
Protection class	housing IP 40 terminals IP 20, fulfils contact protection acc. to VBG 4	
Standards applied	IEC 60947-5-2	

1) 1=transient protection, 3= short-circuit protection for transistor output

### Tables

### Diagrams

### Order guide

	<b>Designation</b>	<b>Part No.</b>
For connection of one mini photoelectric sensor	VS 10/4	500 00633
For connection of two mini photoelectric sensors	VS 10/44	500 00634

### Remarks

- VS 10/4 - single amplifier for connection of **one** mini photoelectric sensor.
- VS 10/44 - double amplifier for separate connection of **two** mini photoelectric sensors. Double amplifier with separate sensitivity adjustment, indicator diode, light/dark switching and transistor output.

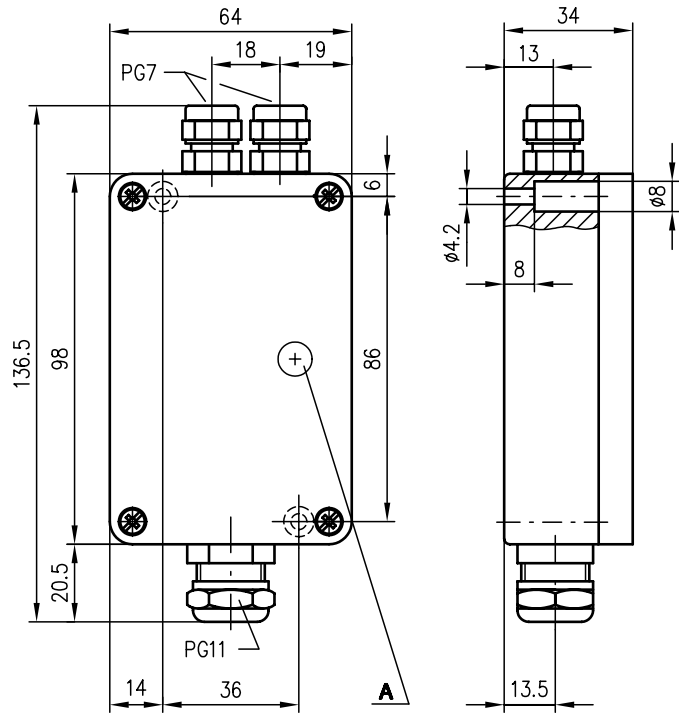


## IVS 9

## Amplifier



### Dimensioned drawing



**A** Indicator diode  
internal: sensitivity adjustment light/dark switching

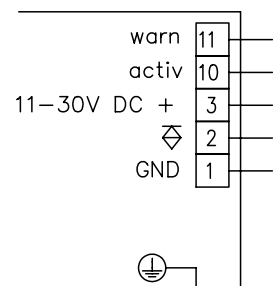
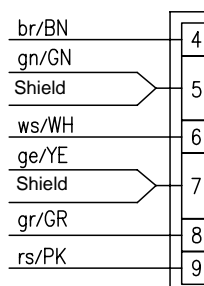


11 - 30 V  
DC

- Amplifier for connection of all mini photoelectric sensors (GaAs)
- The PNP transistor output is short-circuit proof and polarity reversal protected
- Indicator diode used as alignment aid for simple mounting
- Plug-in time module provides optional functions
- Activation input allows function testing of the sensor and interlinking a number of sensors
- Warning output - for increased availability

### Electrical connection

mini



### Accessories:

(available separately)

- Time modules
  - ZK 7810 (Part No. 500 00672)
  - ZK 7820 (Part No. 500 00673)



## Specifications

### Timing

Switching frequency	100Hz
Response time	5ms
Delay before start-up	≤ 100ms

### Electrical data

Operating voltage $U_B$	11 ... 30VDC
Residual ripple	≤ 15%
Bias current	≤ 80mA
Switching output	PNP transistor output
Function characteristics	light or dark switching (reversible)
Signal voltage high/low	$\geq (U_B - 2V) / \leq 2V$
Output current	max. 100mA
Sensitivity	adjustable

### Indicators

LED red	light path free/reflection
LED red flashing	light path free/reflection, without performance reserve

### Mechanical data

Housing	aluminium powder coated, red
Weight	approx. 300g
Connection type	screw terminals

### Environmental data

Ambient temp. (operation/storage)	-20°C ... +60°C / -30°C ... +70°C
Protective circuit <sup>1)</sup>	1, 2, 3
Protection class	IP 65
Standards applied	IEC 60947-5-2

### Options

<b>Activation input</b> activ	
Transmitter active/not active	$\geq 8V / \leq 2V$ or not connected
<b>Warning output autoControl</b> warn	PNP transistor, counting principle
Signal voltage	$\geq (U_B - 2V) / \leq 2V$
Output current	max. 100mA

### Time modules

- The standard device is expandable through add-on time modules (even at a later point)
- **Transient pulse** separately adjustable slow operation and pulse length, 100ms ... 5s (ZK 7810) respectively
  - **Slow operation and slow release** separately adjustable from 200ms ... 10sec (ZK 7820)

1) 1=transient protection, 2=polarity reversal protection, 3= short-circuit protection for transistor output

## Order guide

Designation	Part No.
IVS 9/4.8	500 12303

## Tables

## Diagrams

## Remarks

- The activation input of the amplifier enables function control and logical connection of several systems through a special circuit. If this function is not needed, this connection (active) must be directly connected to  $+U_B$ .
- autoControl is a counting principle. The photoelectric sensor is counting switching cycles with reduced performance reserve. After three consecutive cycles with reduced performance reserve (LED flashing), the separate warning output is activated and remains active until corresponding measures (cleaning, alignment etc.) have provided optimum performance reserve.

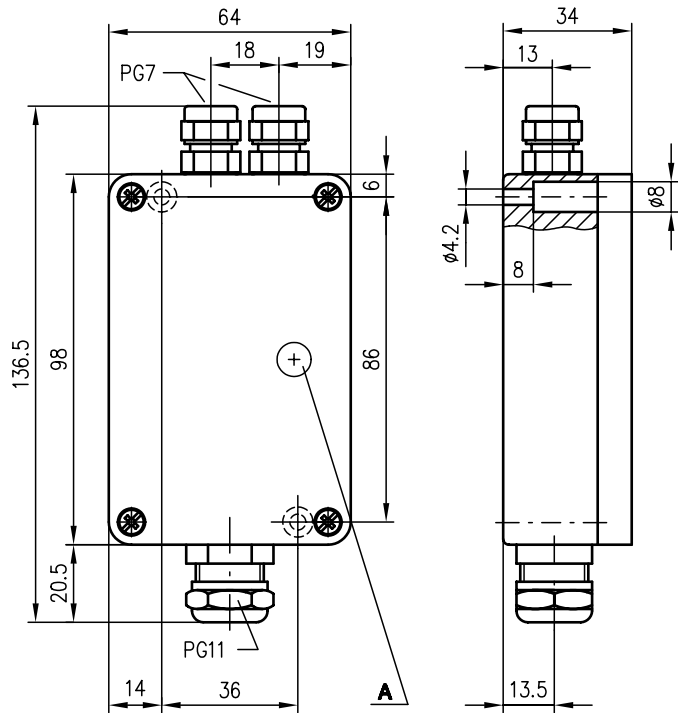


VS 9

Amplifier



Dimensioned drawing



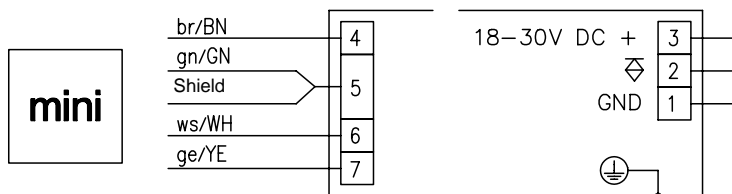
A Indicator diode  
internal: sensitivity adjustment light/dark switching



18 - 30 V  
DC

- Dynamic amplifier for connection of all mini photoelectric sensors (GaAs) for detection of fast events
- Through alternating light operation higher insensitivity of the connected mini photoelectric sensors towards ambient light
- The PNP transistor output is short-circuit proof and polarity reversal protected
- Metal housing for robust application

Electrical connection



Accessories:

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### Specifications

<b>Timing</b>	
Response time	0.5ms
Delay before start-up	≤ 100ms
<b>Electrical data</b>	
Operating voltage $U_B$	18 ... 30VDC
Residual ripple	≤ 15%
Bias current	≤ 80mA
Switching output	PNP transistor output
Output pulse	approx. 50ms
Function characteristics	dynamic dark switching (transistor for approx. 50ms activated at change from light to dark)
Signal voltage high/low	$\geq (U_B - 2V) / \leq 2V$
Output current	max. 100mA
Sensitivity	adjustable
<b>Mechanical data</b>	
Housing	aluminium powder coated, red
Weight	approx. 320g
Connection type	screw terminals
<b>Environmental data</b>	
Ambient temp. (operation/storage)	-20°C ... +60°C / -30°C ... +70°C
Protective circuit <sup>1)</sup>	1, 2, 3
Protection class	IP 65
Standards applied	IEC 60947-5-2

1) 1=transient protection, 2=polarity reversal protection, 3= short-circuit protection for transistor output

### Tables

### Diagrams

### Order guide

Designation	Part No.
VS 9/4.1	500 10357

### Remarks

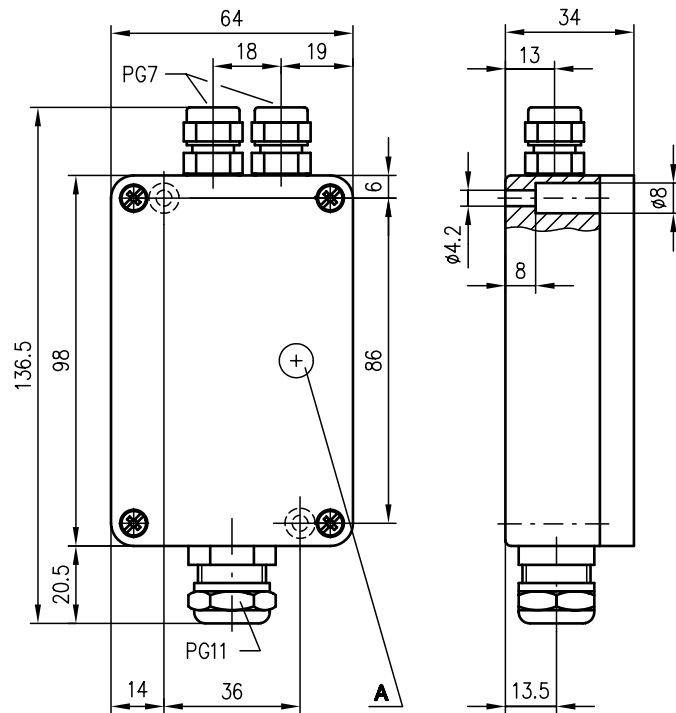


VS 9

Amplifier



Dimensioned drawing



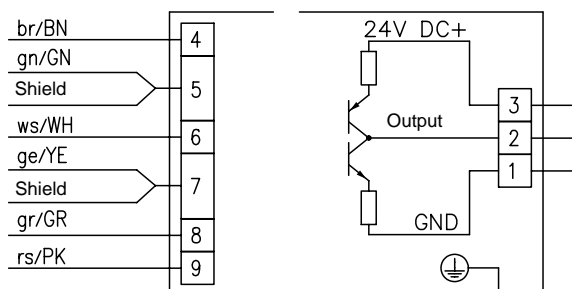
A Indicator diode internal: sensitivity adjustment



- Amplifier for connection of all mini photoelectric sensors (GaAs)
- Through alternating light operation higher insensitivity of the connected gallium mini photoelectric sensors towards extraneous light
- The NPN and PNP transistor outputs are short-circuit proof and polarity reversal protected as push-pull outputs
- Indicator diode used as alignment aid for simple mounting
- Metal housing for robust application

Electrical connection

mini



Accessories:

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### Specifications

#### Timing

Switching frequency	200Hz
Response time	2.5ms
Delay before start-up	≤ 100ms

#### Electrical data

Operating voltage $U_B$	24VDC ± 10%
Residual ripple	≤ 15%
Bias current	≤ 90mA
Switching output	push-pull output, triggered NPN transistor output, light switching PNP transistor output, dark switching
Signal voltage high/low	$\geq (U_B - 2V) / \leq 2V$
Output current	max. 500mA
Sensitivity	adjustable

#### Indicators

LED red	light path free/reflection (with performance reserve)
LED red flashing	light path free/reflection (without performance reserve)

#### Mechanical data

Housing	aluminium powder coated, red
Weight	approx. 330g
Connection type	screw terminals

#### Environmental data

Ambient temp. (operation/storage)	-20°C ... +60°C / -30°C ... +70°C
Protective circuit <sup>1)</sup>	1, 2, 3
Protection class	IP 65
Standards applied	IEC 60947-5-2

1) 1=transient protection, 2=polarity reversal protection, 3= short-circuit protection for transistor output

### Tables

### Diagrams

### Order guide

Designation	Part No.
VS 9/1	500 00632

### Remarks

- One gallium mini photoelectric sensor can be connected to the gallium amplifier VS 9/1.



VS 3

Amplifier



115/230 V AC

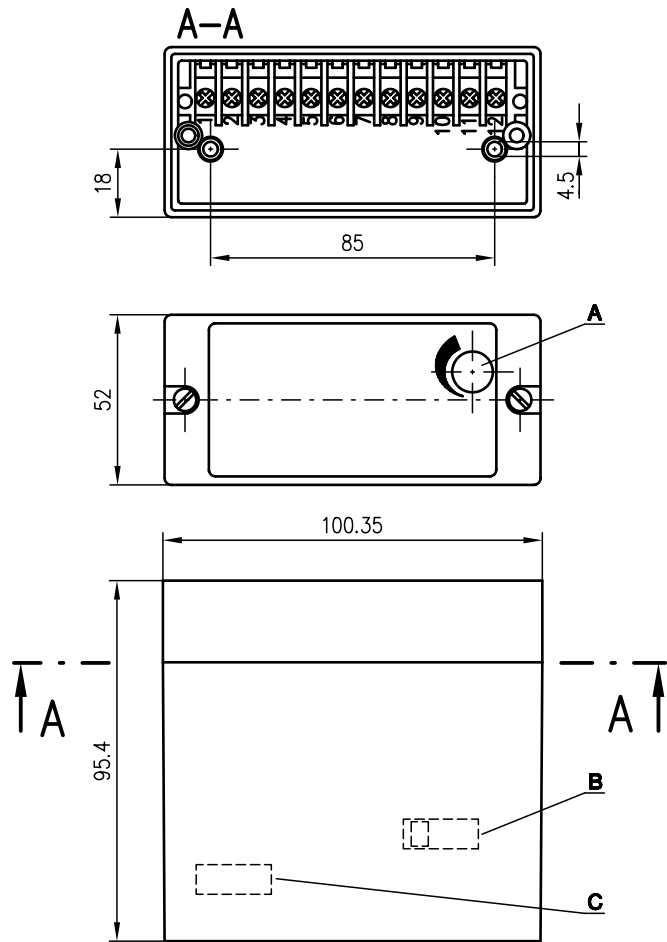
- Amplifier for connection of all mini photoelectric sensors (GaAs)
- Light/dark switching and sensitivity adjustment for optimal adaptation to the application
- Through alternating light operation higher insensitivity of the connected mini photoelectric sensors towards ambient light
- Relay output or NPN transistor output
- Screw connection or on demand snap-on mounting for standard rail



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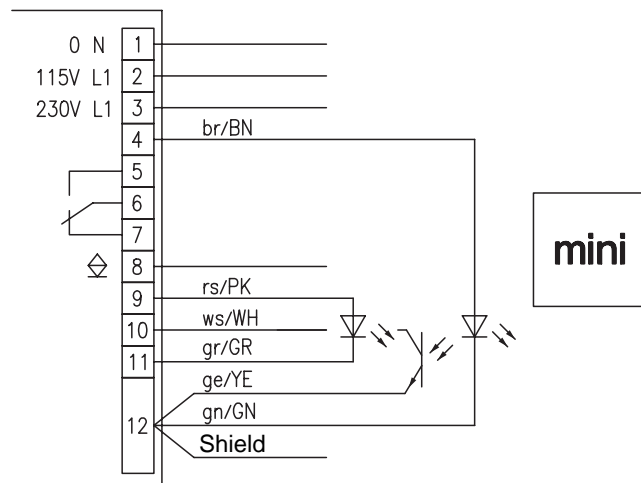
Accessories:

Dimensioned drawing



- A** Sensitivity adjustment below the protecting cap
- B** Internal: light/dark switching
- C** Internal: fuse

Electrical connection





## Specifications

### Timing

Switching frequency (relay)	20Hz
Switching frequency (transistor)	200Hz
Response time	2.5ms
Delay before start-up	≤ 100ms

### Electrical data

Operating voltage $U_B$	115/230VAC ± 10%, 50/60Hz
Power consumption	≤ 5.5VA
Insulation test voltage	input-output 4kVAC relay output 4kVAC
Switching output	NPN transistor output
Function characteristics	light or dark switching (reversible)
Signal voltage high/low	≥ 22V/≤ 2V
Output current	max. 50mA
Switching output <sup>1)</sup>	relay, 1 change-over contact
Switching power, relay	50W/60VA
Switching voltage, relay	250VAC/DC
Sensitivity	adjustable

### Mechanical data

Housing	plastic grey
Weight	490g
Connection type	screw connection

### Environmental data

Ambient temp. (operation/storage)	-20°C ... +50°C / -30°C ... +70°C
Protective circuit <sup>2)</sup>	1, 3
Fuse	fine-wire fuse 0.25mA semi time-lag (5x20mm)
Protection class	IP 40
Standards applied	IEC 60947-5-2

1) Suitable spark extinction must be provided with inductive or capacitive loads

2) 1=transient protection, 3= short-circuit protection for transistor output

## Tables

## Diagrams

## Order guide

Designation	Part No.
VS 3/71	500 00624

## Remarks

- One gallium mini photoelectric sensor can be connected to the gallium amplifier VS 3/71.
- Housing with snap-on mounting to standard rail on demand.
- Special voltage on request.
- The slide switch for light/dark switching as well as the fine-wire fuse are located inside the housing.

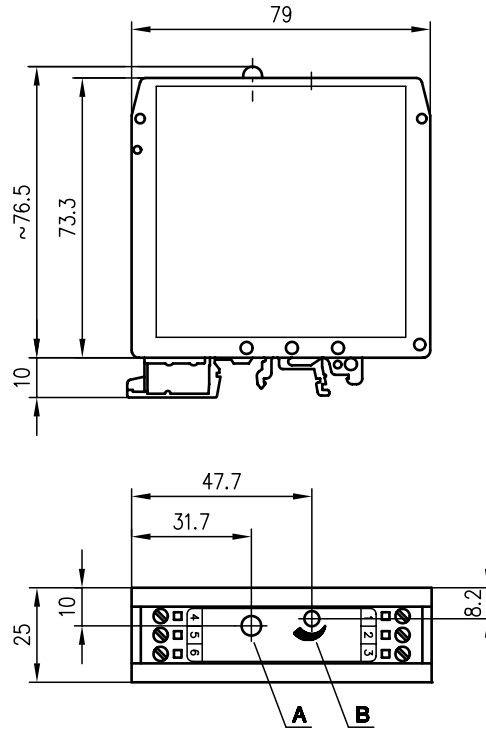


NT 24

Power supply unit



Dimensioned drawing

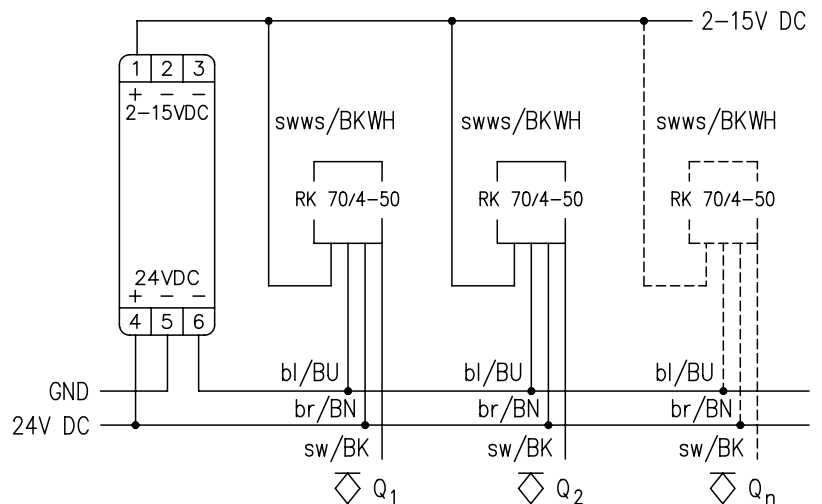


A Operation indicator  
B Output voltage

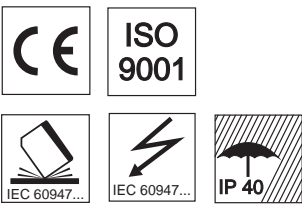
24 V  
DC

- Power supply unit with adjustable output voltage (2 ... 15V)
- Central voltage adjustment via multiturn potentiometer with use of the power supply unit NT 24 for up to 60 devices RK 70/4-50
- Plastic housing with snap-on mounting for standard rail

Electrical connection



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Accessories:



## Specifications

### Electrical data

Operating voltage $U_B$	24VDC filtered $\pm 20\%$
Residual ripple	$\leq 10\%$ of $U_B$
Output voltage	2 ... 15V (adjustable via 3-turn potentiometer)
Output current	max. 300mA

### Indicators

LED green	ready (supply voltage connected)
-----------	----------------------------------

### Mechanical data

Housing	plastic green
Weight	approx. 90g
Connection type	screw terminals (max. 0.75mm <sup>2</sup> )

### Environmental data

Ambient temp. (operation/storage)	-20°C ... +60°C/-30°C ... +70°C
Protective circuit <sup>1)</sup>	3
Protection class	housing IP 40 terminals IP 20, fulfils contact protection acc. to VBG 4 IEC 60947-5-2

Standards applied

1) 3=short circuit protection

## Tables

## Diagrams

## Order guide

Designation	Part No.
NT 24	500 24574

## Remarks

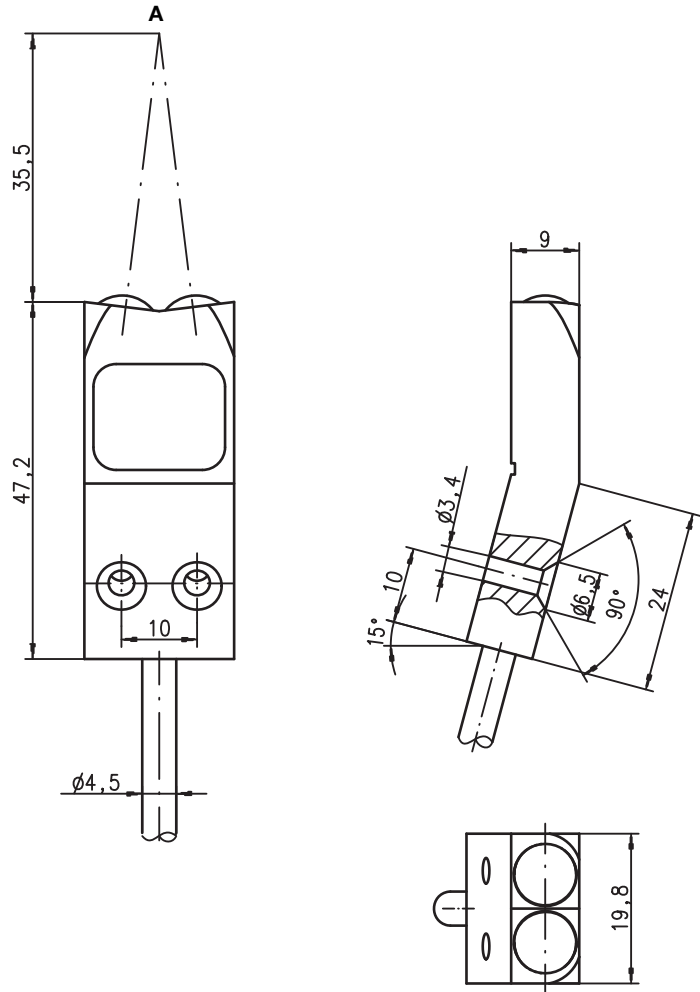
- The power supply unit NT 24 is suited for the supply voltage adjustment of up to 60 devices RK 70/4-50.

**RK 756**

**Energetic diffuse reflection light scanner**



**Dimensioned drawing**



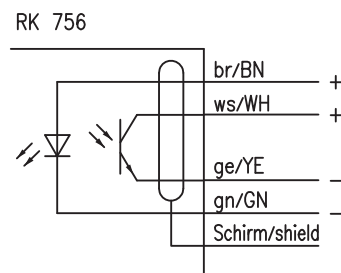
**35 mm**

mini

- Application-specific construction
- Small construction volume enables application in small spaces
- High insensitivity towards soiling and shocks
- Can be optimally adapted to the application through selection of appropriate amplifier
- Narrow light beam

A Focus

**Electrical connection**



ISO 9001



**Accessories:**

(available separately)

- Amplifier for mini photoelectric sensors, e.g.
  - VS 9/1 (Part No. 500 00632)
  - IVS 9/4.8 (Part No. 500 12303)
  - VS 27/24 (Part No. 500 82005)
  - IVS 28/44.8 (Part No. 500 19808)

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## Specifications

### Optical data

Scanning range (white 90%) <sup>1)</sup>	30 ... 40mm
Light source	LED (modulated light)
Wavelength	880nm

### Electrical data

Transmitter	GaAs
Transmitting current	max. 200mA at D=0.05
Receiver	Si phototransistor
Blocking voltage U <sub>CEO</sub>	max. 35VDC

### Mechanical data

Housing	red aluminium, anodised
Optics	glass
Weight	approx. 70g
Cable length	4000mm
Cable cross-section	4x0.14mm <sup>2</sup> +shield

### Environmental data

Ambient temp. (operation/storage)	-20°C ... +60°C/- 30°C ... +70°C
Protection class	IP 65

1) The scanning range depends on the choice and on the sensitivity adjustment of the respective amplifier

## Tables

## Diagrams

## Order guide

Designation	Part No.
RK 756	500 12831

## Remarks

- **Approved purpose:**  
The diffuse reflection light scanner is specially designed for stack detection in feeders.
- The upper and lower scanning range limit varies depending on the reflection properties of the material surface.
- If cable lengthening should be necessary, make sure that the shield is continued without interruption.

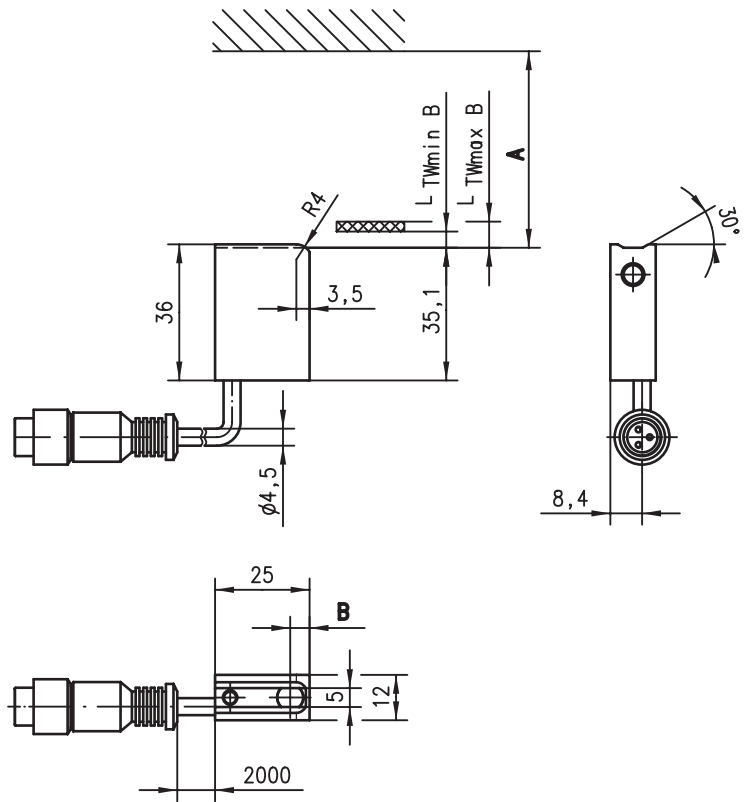


## RT 773

## Energetic diffuse reflection light scanners



### Dimensioned drawing



- A** Free space
- B** Switching point

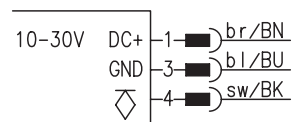


0 ... 5 mm



- Miniature construction with completely integrated electronics
- The PNP transistor output is short-circuit proof and polarity reversal protected
- Immersed optical cover for mechanical protection
- Pollution resistant through specially designed optics

### Electrical connection



### Accessories:



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### Specifications

#### Optical data

Scanning range (white 90%) 0 ... 5mm  
 Light source LED (modulated light)  
 Wavelength 880nm

#### Timing

Switching frequency 300Hz  
 Response time 1.65ms  
 Delay before start-up ≤ 100ms

#### Electrical data

Operating voltage  $U_B$  10V ... 30VDC  
 Residual ripple ≤ 10% of  $U_B$   
 Bias current ≤ 20mA  
 Switching output PNP transistor output  
 Function characteristics light switching  
 Signal voltage high/low  $\geq (U_B - 2V) / \leq 2V$   
 Output current 100mA

#### Mechanical data

Housing aluminium anodised, black  
 Optics cover glass  
 Weight approx. 30g  
 Connection type cable with M12 connector,  
 cable length: 2000mm

#### Environmental data

Ambient temp. (operation/storage) 0°C ... +50°C / -30°C ... +60°C  
 Protective circuit <sup>1)</sup> 2, 3  
 VDE safety class III  
 Protection class IP 65  
 Standards applied IEC 60947-5-2

1) 2=polarity reversal protection, 3=short-circuit protection for all outputs

### Tables

Scanning range	mm	Reflectance factor
$L_{TWminB}$	0.8	6%
$L_{TWmaxB}$	3.5	6%
$L_{TWminB}$	5.0	90%
Free space	8.0	≤ 90%
Switching point	~ 5.0	6%
Switching point	~ 5.5	90%
Switching point is determined with $L_{TW} = 1\text{ mm}$		

### Diagrams

### Order guide

Designation	Part No.
RT 773/4-4	500 38524

### Remarks

- Typical application: Paper edge detection in printing machines
- The upper and lower scanning range limit varies depending on the reflection properties of the material surface.

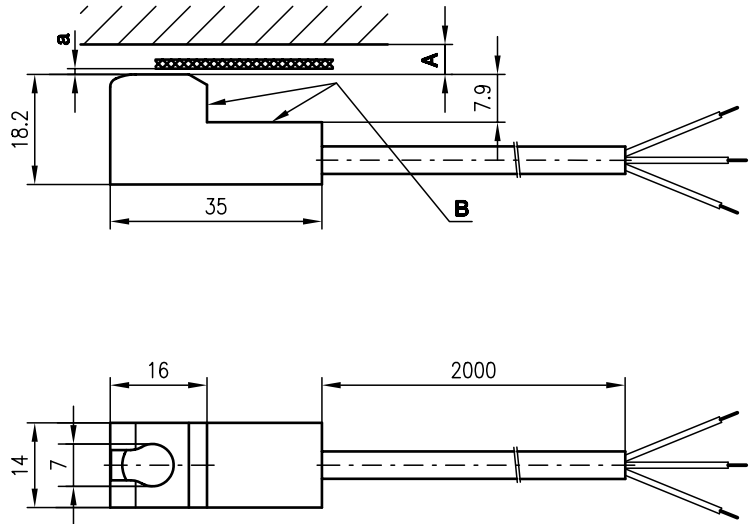


RT 707

Energetic diffuse reflection light scanners



Dimensioned drawing



A Free space  
B Plain

Distance a:  
optimum scanning distance 1.4mm  
scanning range 0 ... 3.5mm with white paper (90%)  
scanning range 0.1 ... 1.6mm with black paper (6%)

Free space A:  
no reflection from 4.5mm (background suppression)

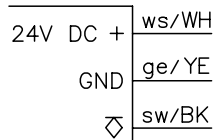


0 ... 3.5mm



- Miniature construction with completely integrated electronics for 24V technology
- The PNP transistor output is short-circuit proof and polarity reversal protected
- Immersed optical cover for mechanical protection
- Pollution resistant through specially designed optics

Electrical connection



Accessories:

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### Specifications

#### Optical data

Scanning range (white 90%)	0 ... 3.5mm
Light source	LED (modulated light)
Wavelength	880nm

#### Timing

Switching frequency	3000Hz
Response time	0.16ms
Delay before start-up	≤ 100ms

#### Electrical data

Operating voltage $U_B$	21.5V ... 25VDC
Residual ripple	≤ 10% of $U_B$
Bias current	≤ 30mA
Switching output	PNP transistor output
Function characteristics	light switching
Signal voltage high/low	≥ ( $U_B - 2V$ ) / ≤ 2V
Output current	50mA

#### Mechanical data

Housing	aluminium anodised, black
Optics cover	glass
Weight	approx. 15g
Cable length	2000mm
Cable cross-section	3x0.25mm <sup>2</sup>

#### Environmental data

Ambient temp. (operation/storage)	0°C ... +50°C / -30°C ... +60°C
Protective circuit <sup>1)</sup>	2, 3
VDE safety class	III
Protection class	IP 65
Standards applied	IEC 60947-5-2

1) 2=polarity reversal protection, 3=short-circuit protection for all outputs

### Tables

Typical applications:

Paper edge detection in printing machines

### Diagrams

### Order guide

Designation	Part No.
RT 707/4-2	500 35072

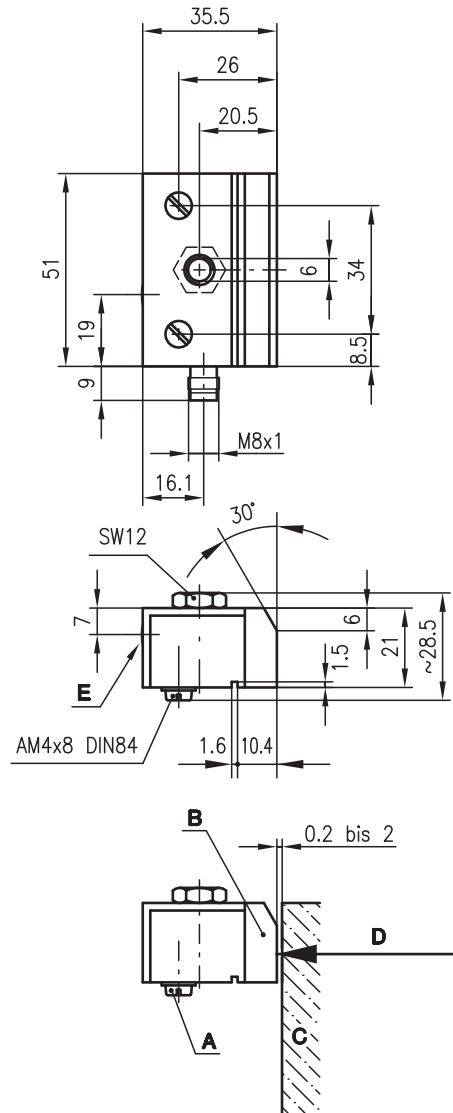
### Remarks

- The upper and lower scanning range limit varies depending on the reflection properties of the material surface.

Part No. 501 10652



**Dimensioned drawing**



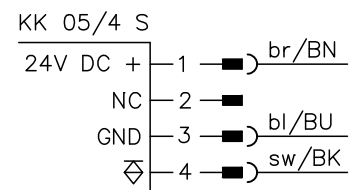
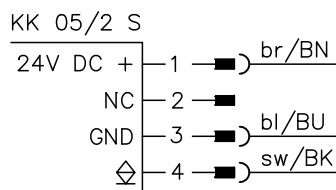
**0.2 ... 2.0mm**



- Capacitive sensor for mass detection
- Connection via M8 connector for fast installation
- NPN / PNP output
- Switching state display

- A** Use only plastic screws with this mounting option!
- B Plastic part:** The mounting parts must be at least 3mm from the plastic part in all directions!
- C** Measurement part
- D** Approaching plane
- E** Indicator diode

**Electrical connection**



**Accessories:**

(available separately)

- Ready-made cables M12 (K-D M8...)



We reserve the right to make changes \* ms\_c05gb.fm

## Specifications

	KK 05/4 S	KK 05/2 S
<b>Sensor data</b>		
Scanning range (relative to paper)	min. 0,2 ... 2,0mm	
Installation width	51 mm	
Installation height	≈ 28,5mm	
Installation depth	36mm	
<b>Timing</b>		
Switching frequency	100Hz	
Input pulse	min. 5ms	
Delay before start-up	≤ 100ms	
<b>Electrical data</b>		
Operating voltage $U_B$	24VDC (incl. residual ripple) functional extra-low voltage with reliable disconnection or protective extra-low voltage (VDE 0100/T 410)	
Residual ripple	≤ 15% the lowest voltage may not be below $U_B - 20\%$	
Power consumption	max. 250mW	
Switching output	PNP transistor	NPN transistor
Function	dark switching if object present: high-impedance output	
Output current	max. 100mA	
<b>Indicators</b>		
Yellow LED	switching state display	
Yellow LED off	object present	
Yellow LED on	no object	
<b>Mechanical data</b>		
Housing	aluminium	
Surface	anodised	
Weight	approx. 60g	
Connection type	M8 connector, 4-pin	
<b>Environmental data</b>		
Ambient temp. (operation/storage)	0°C ... +50°C/-30°C ... +70°C	
Protective circuit <sup>1)</sup>	2, 3	
Protection class	IP 40	
Standards applied	IEC 60947-5-2	

1) 2=polarity reversal protection, 3=short-circuit protection for all outputs

## Tables

## Diagrams

## Order guide

	Designation	Part No.
PNP output	KK 05/4 S	500 29234
NPN output	KK 05/2 S	500 29228

## Remarks

**Approved purpose:** The KK 05 sensors are capacitive sensors for the contactless detection of objects.

- The sensor only detects condensed stacks; single sheets are not detected.
- Mounting parts must be at least 3mm from the plastic in all directions.
- **The plastic foil over the detection surface must NOT be damaged or removed!**

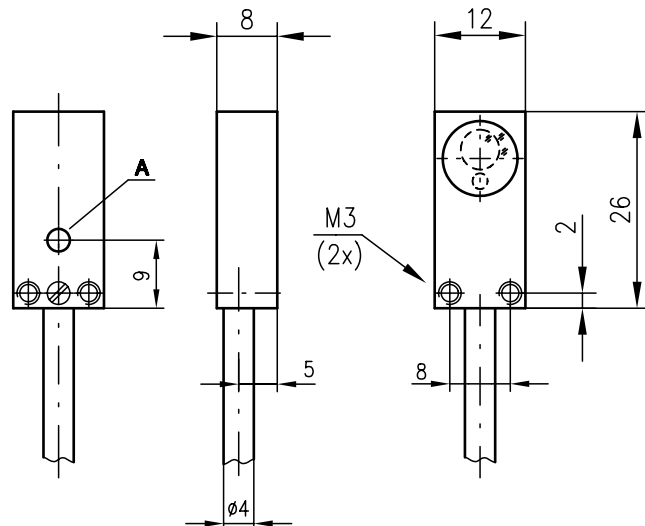


RK 70

Energetic diffuse reflection light scanner



Dimensioned drawing



A Indicator diode



1 ... 50mm



- Miniature construction with completely integrated electronics for 24V technology
- The PNP transistor output is short-circuit proof and polarity reversal protected
- Sensitivity adjustment via control line allows optimal adaptation to the applications
- Central sensitivity adjustment via multiturn potentiometer with use of the power supply unit NT 24 for up to 60 devices RK 70/4-50

Electrical connection

RK 70/4-50	
24V DC +	br/BN
sensitivity	ws/WH
GND	bl/BU
◇	sw/BK



Accessories:

(available separately)

- Power supply unit NT 24 (Part No. 500 24574)

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## Specifications

### Optical data

Scanning range (white 90%)	1 ... 50mm
Light source	LED (modulated light)
Wavelength	880nm

### Timing

Switching frequency	1000Hz
Response time	0.5ms
Delay before start-up	≤ 100ms

### Electrical data

Operating voltage $U_B$	24VDC filtered $\pm 20\%$
Residual ripple	≤ 10% of $U_B$
Bias current	≤ 10mA
Switching output	PNP transistor output
Function characteristics	light switching
Signal voltage high/low	$\geq (U_B - 2V) / \leq 2V$
Output current	100mA
Sensitivity	adjustable via control line (2V ... 24VDC)
	≤ 2V → min. sensitivity
	≥ 15V ... 24V → max. sensitivity

### Indicators

LED yellow on	reflection
LED yellow off	no reflection

### Mechanical data

Housing	plastic
Optics cover	glass
Weight	approx. 170g
Cable length	3000mm
Cable cross-section	4x0.14mm <sup>2</sup> +shield
Cable material	PUR

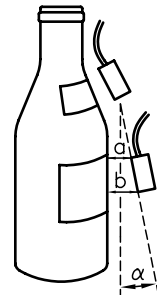
### Environmental data

Ambient temp. (operation/storage)	-20°C ... +60°C/-30°C ... +70°C
Protective circuit <sup>1)</sup>	2, 3
VDE safety class	II, all-insulated
Protection class	IP 65
Standards applied	IEC 60947-5-2

1) 2=polarity reversal protection, 3=short-circuit protection for all outputs

## Tables

Typical application for bottle detection



a≈10mm  
b=12–15mm  
 $\alpha=6-12^\circ$

## Diagrams

## Order guide

	Designation	Part No.
With 3m cable	RK 70/4-50	500 26536

## Remarks

- The upper and lower scanning range limit varies depending on the reflection properties of the material surface.

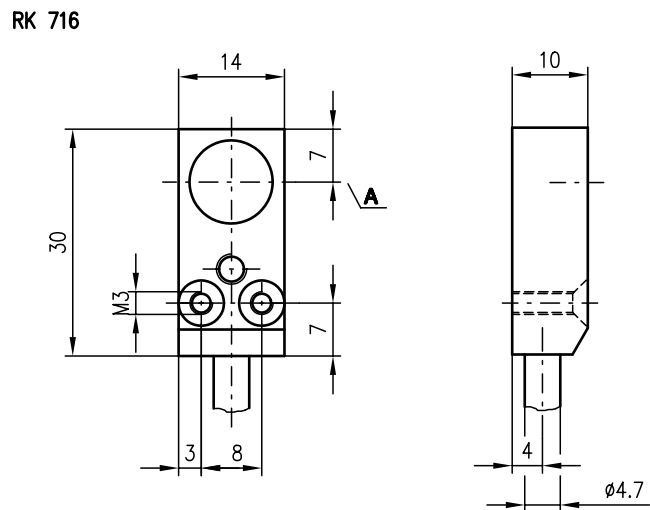
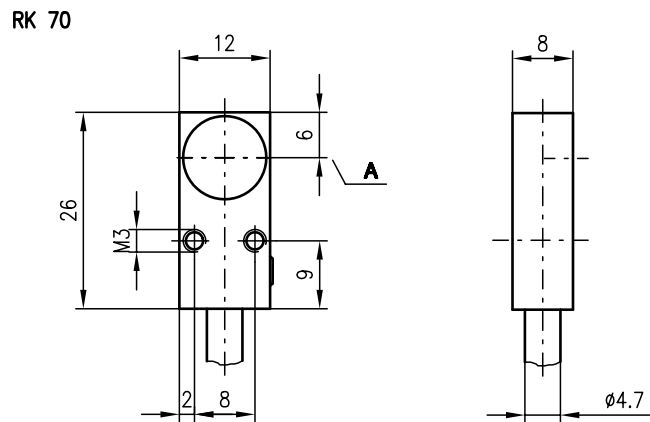


RK 70/RK 716

Energetic diffuse reflection light scanner

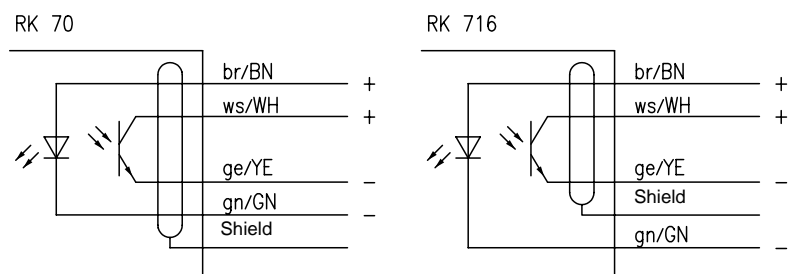


Dimensioned drawing



A Optical axis

Electrical connection



10mm  
2.5mm



- Small construction volume enables application in small spaces
- Scratch resistant glass cover
- High insensitivity towards soiling and shocks
- Through selection of appropriate amplifiers optimally adaptable to applications



Accessories:

(available separately)

- Amplifier for mini photoelectric sensors, e.g.
  - VS 9/1 (Part No. 500 00632)
  - IVS 9/4.8 (Part No. 500 12303)
  - VS 27/24 (Part No. 500 82005)
  - IVS 28/44.8 (Part No. 500 19808)

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### Specifications

	RK 70	RK 716
<b>Optical data</b>		
Scanning range (white 90%) <sup>1) 2)</sup>	1 ... 10mm	0.5 ... 2.5mm
Light source	LED (modulated light)	
Wavelength	880nm	
<b>Electrical data</b>		
Transmitter	GaAs	
Transmitting current	max. 200mA at D=0.05	
Receiver	Si phototransistor	
Inverse voltage U <sub>CEO</sub>	max. 35VDC	
<b>Mechanical data</b>		
Housing	aluminium red anodised	
Optics	glass	
Weight	approx. 70g	approx. 90g
Cable	2000mm	
Cable cross-section	4x0.14mm <sup>2</sup> +shield	
<b>Environmental data</b>		
Ambient temp. (operation/storage)	-20°C ... +60°C/-30°C ... +70°C	
Protection class	IP 65	

### Tables

### Diagrams

### Order guide

Designation	Part No.
RK 70	500 00390
RK 716	500 00575

### Remarks

- The upper and lower scanning range limit varies depending on the reflection properties of the material surface.
- If a cable lengthening should be necessary, make sure that the shield is lead continuously.

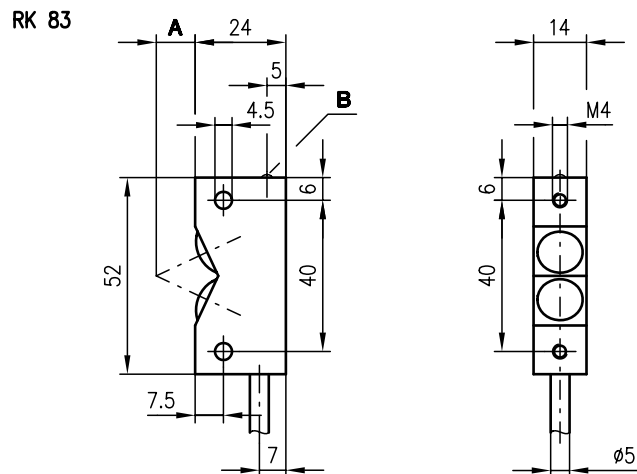
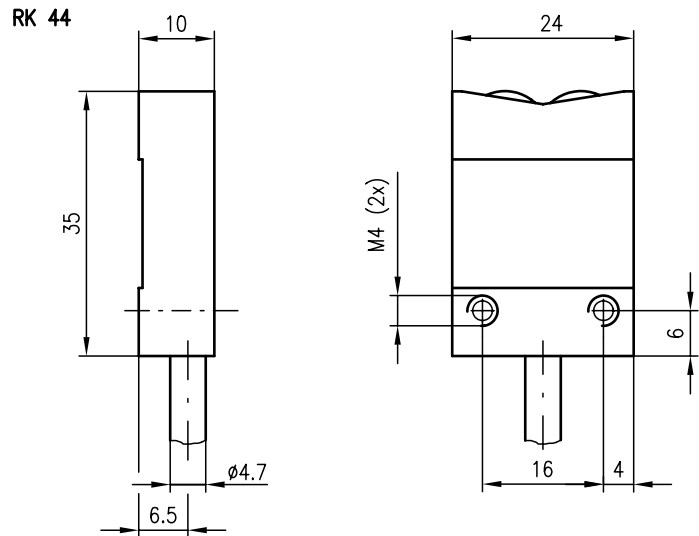


RK 44/RK 83

Energetic diffuse reflection light scanner

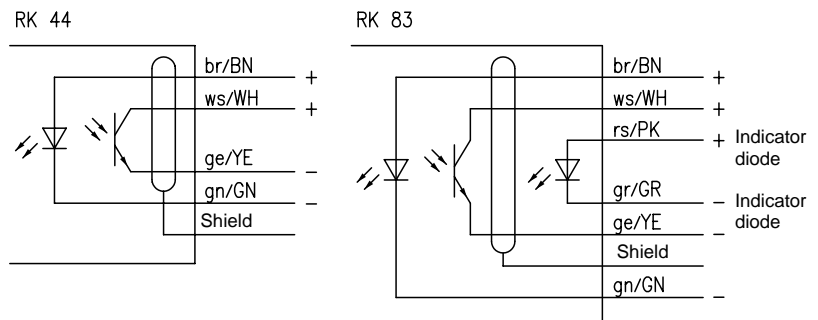


Dimensioned drawing



A Focus  
B Indicator diode

Electrical connection



40mm  
20mm



- Small construction volume enables application in small spaces
- High insensitivity towards soiling and shocks
- Through selection of appropriate amplifiers optimally adaptable to applications
- Small light beam with RK 44
- Indicator diode as alignment aid for fast mounting (only for RK 83)



Accessories:

(available separately)

- Amplifier for mini photoelectric sensors, e.g.
  - VS 9/1 (Part No. 500 00632)
  - IVS 9/4.8 (Part No. 500 12303)
  - VS 27/24 (Part No. 500 82005)
  - IVS 28/44.8 (Part No. 500 19808)

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### Specifications

	RK 44	RK 83
<b>Optical data</b>		
Scanning range (white 90%) <sup>1) 2)</sup>	15 ... 40mm	0 ... 20mm
Light source	LED (modulated light)	
Wavelength	880nm	
<b>Electrical data</b>		
Transmitter	GaAs	
Transmitting current	max. 200mA at D=0.05	
Receiver	Si phototransistor	
Inverse voltage U <sub>CEO</sub>	max. 35VDC	
<b>Indicators</b>		
LED red		reflection
<b>Mechanical data</b>		
Housing	aluminium red anodised	
Optics	glass	
Weight	approx. 70g	approx. 130g
Cable length	2000mm	
Cable cross-section	4x0.14mm <sup>2</sup> +shield	6x0.14mm <sup>2</sup> +shield
<b>Environmental data</b>		
Ambient temp. (operation/storage)	-20°C ... +60°C/30 °C ...+70°C	
Protection class	IP 65	

1) The scanning range depends on the choice and on the sensitivity adjustment of the respective amplifier  
 2) With RK 83 objects are safely suppressed at distances starting at 50mm

### Tables

### Diagrams

### Order guide

Designation	Part No.
RK 44	500 19080
RK 83	500 00483

### Remarks

- The upper and lower scanning range limit varies depending on the reflection properties of the material surface.
- If a cable lengthening should be necessary, make sure that the shield is lead continuously.
- Based on its beam characteristics, the diffuse reflection light scanner RK 44 can detect objects through a slit with dia. ≥ 4.5 mm parallel to the flat housing and over the complete scanning range.



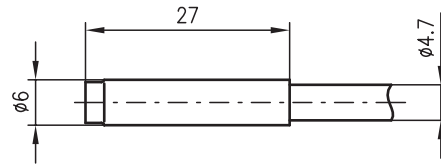
## RK 41

## Energetic diffuse reflection light scanner



### Dimensioned drawing

RK 41



30 mm



- Small construction volume enables application in small spaces
- Metal construction offers high firmness
- Scratch resistant glass cover
- High insensitivity towards soiling and shocks
- Through selection of appropriate amplifiers optimally adaptable to applications



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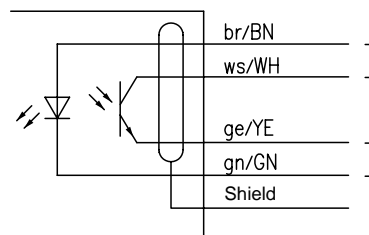


### Accessories:

(available separately)

- Amplifier for mini photoelectric sensors, e.g.
  - VS 9/1 (Part No. 500 00632)
  - IVS 9/4.8 (Part No. 500 12303)
  - VS 27/24 (Part No. 500 82005)
  - IVS 28/44.8 (Part No. 500 19808)

### Electrical connection





## Specifications

### Optical data

Scanning range (white 90%) <sup>1)</sup>  
Light source  
Wavelength

### RK 41

1 ... 30mm  
LED (modulated light)  
880nm

### Electrical data

Transmitter  
Transmitting current  
Receiver  
Inverse voltage  $U_{CEO}$

GaAs  
max. 200mA at D=0.05  
Si phototransistor  
max. 35VDC

### Mechanical data

Housing  
Optics  
Weight  
Cable length  
Cable cross-section

aluminium red anodised  
glass  
approx. 70g  
2000mm  
4x0.14mm<sup>2</sup>+shield

### Environmental data

Ambient temp. (operation/storage)  
Protection class

-20°C ... +60°C/-30°C ... +70°C  
IP 65

1) The scanning range depends on the choice and on the sensitivity adjustment of the respective amplifier

## Tables

## Diagrams

## Order guide

Designation	Part No.
RK 41	500 10395

## Remarks

- The upper and lower scanning range limit varies depending on the reflection properties of the material surface.
- If a cable lengthening should be necessary, make sure that the shield is lead continuously.



# RK 713

# Retro-reflective photoelectric sensors



800mm

mini

- Small construction volume enables application in small spaces
- Scratch resistant glass optics
- High insensitivity towards soiling and shocks
- Indicator diode as alignment aid and function indicator
- Through selection of appropriate amplifiers optimally adaptable to applications

ISO 9001

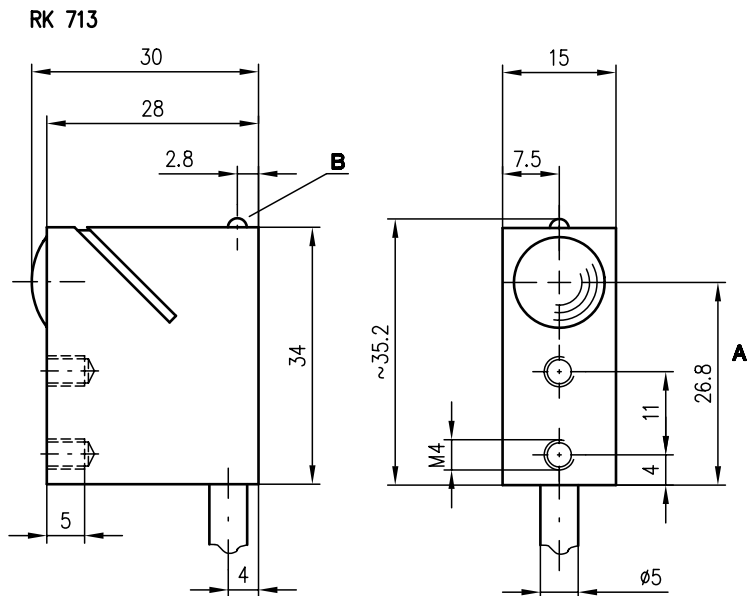


### Accessories:

(available separately)

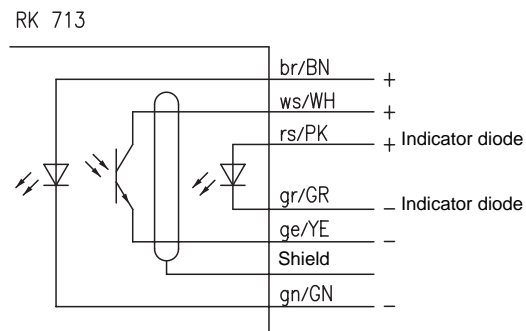
- Amplifier for mini photoelectric sensors, e.g.
  - VS 9/1 (Part No. 500 00632)
  - IVS 9/4.8 (Part No. 500 12303)
  - VS 27/24 (Part No. 500 82005)
  - IVS 28/44.8 (Part No. 500 19808)
- Reflectors
- Reflective tapes

## Dimensioned drawing



- A Optical axis
- B Indicator diode

## Electrical connection



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### Specifications

#### Optical data

Operating range <sup>1)</sup> 0 ... 800mm  
 Light source LED (modulated light)  
 Wavelength 880nm

#### Electrical data

Transmitter GaAs  
 Transmitting current max. 200mA at D=0.05  
 Receiver Si phototransistor  
 Inverse voltage U<sub>CEO</sub> max. 35VDC

#### Indicators

LED red reflection

#### Mechanical data

Housing aluminium red anodised  
 Optics cover glass  
 Weight approx. 90g  
 Cable 2000mm  
 Cable cross-section 6x0.14mm<sup>2</sup>+shield

#### Environmental data

Ambient temp. (operation/storage) -20°C ... +60°C/-30°C ... +70°C  
 Protection class IP 65

1) The operating range depends on the choice and on the sensitivity adjustment of the respective amplifier

### Tables

RK 713

Reflectors		Operating range
TK	100x100	0 ... 0.8m
TK	50x50	0 ... 0.7m
TK	82	0 ... 0.8m
TK	60	0 ... 0.4m
TK	45	0 ... 0.6m
TG	60	0 ... 0.5m
Tape 2	100x100	0 ... 0.35m

TK ... = adhesive  
 TKS ... = screw type  
 Tape 2 = adhesive

### Order guide

Designation	Part No.
RK 713	500 00568

### Remarks

- If a cable lengthening should be necessary, make sure that the shield is lead continuously.



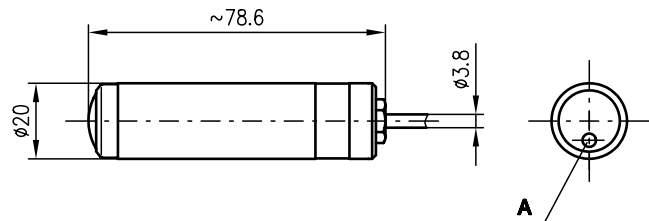
## LS 74/LS 91

## Throughbeam photoelectric sensors

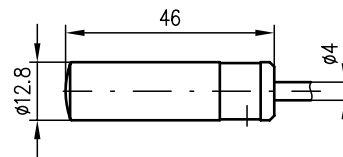


### Dimensioned drawing

LS 74



LS 91



A Indicator diode only at receiver



5m  
2m



- Scratch resistant glass cover
- High insensitivity towards soiling
- Convex optics
- Through selection of appropriate amplifiers optimally adaptable to applications
- Indicator diode as alignment aid and function indicator

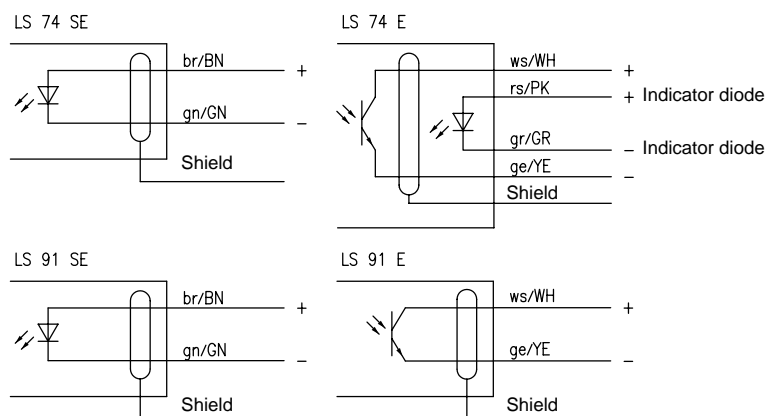


### Accessories:

(available separately)

- Mounting systems
  - BT 01 (Part No. 500 03371)
  - BT 91 (Part No. 500 09420)
- Amplifier for mini photoelectric sensors, e.g.
  - VS 9/1 (Part No. 500 00632)
  - IVS 9/4.8 (Part No. 500 12303)
  - VS 27/24 (Part No. 500 82005)
  - IVS 28/44.8 (Part No. 500 19808)

### Electrical connection





### Specifications

<b>Optical data</b>	<b>LS 74</b>	<b>LS 91</b>
Operating range <sup>1)</sup>	0 ... 5m	0 ... 2m
Light source	LED (modulated light)	
Wavelength	880nm	
<b>Electrical data</b>		
Transmitter	GaAs	
Transmitting current	max. 200mA at D=0.05	
Receiver	Si phototransistor	
Inverse voltage U <sub>CEO</sub>	max. 35VDC	
<b>Indicators</b>		
LED red (receiver)	light path free	
<b>Mechanical data</b>		
Housing	aluminium red anodised	epoxy powder coating
Optics	glass	
Weight	approx. 180g	approx. 120g
Cable length	2000mm	
Cable cross-section	2x0.14mm <sup>2</sup> +shield 4x0.14mm <sup>2</sup> +shield (only for receiver LS 74)	
<b>Environmental data</b>		
Ambient temp. (operation/storage)	-20°C ... +60°C/-30°C ... +70°C	
Protection class	IP 65	

1) The operating range of the throughbeam photoelectric sensors depends on the amplifier and diaphragm selections

### Tables

### Diagrams

### Order guide

	<b>Designation</b>	<b>Part No.</b>
Transmitter and receiver	LS 74	
Transmitter	LS 74 Se,6000	500 00224
Receiver	LS 74 E,6000	500 00225
Transmitter and receiver	LS 91	
Transmitter	LS 91 Se,4000	500 00262
Receiver	LS 91 E,4000	500 00263

### Remarks

- If a cable lengthening should be necessary, make sure that the shield is lead continuously.



LS 71/LS 72

Throughbeam photoelectric sensors



800mm

mini

- Small construction volume enables application in small spaces
- Metal construction offers high firmness
- Scratch resistant glass cover
- High insensitivity towards soiling and shocks
- Through selection of appropriate amplifiers optimally adaptable to applications

ISO 9001



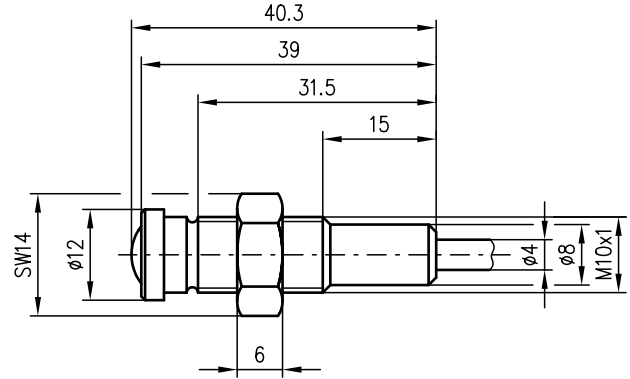
Accessories:

(available separately)

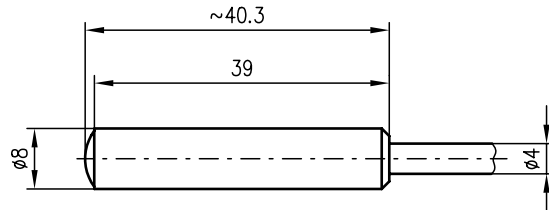
- Amplifier for mini photoelectric sensors, e.g.
  - VS 9/1 (Part No. 500 00632)
  - IVS 9/4.8 (Part No. 500 12303)
  - VS 27/24 (Part No. 500 82005)
  - IVS 28/44.8 (Part No. 500 19808)

Dimensioned drawing

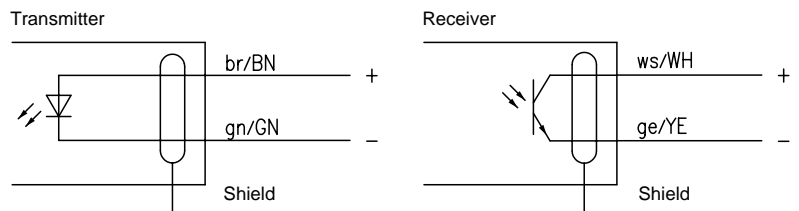
LS 71



LS 72



Electrical connection



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### Specifications

#### Optical data

Operating range <sup>1)</sup>	0 ... 800mm
Light source	LED (modulated light)
Wavelength	880nm

#### Electrical data

Transmitter	GaAs
Transmitting current	max. 200mA at D=0.05
Receiver	Si phototransistor
Inverse voltage U <sub>CEO</sub>	max. 35VDC

#### Mechanical data

Housing	<b>Transmitter</b>	<b>Receiver</b>
Optics	aluminium red anodised	natural colour anodised
Weight	glass	
Cable length	approx. 70g	
Cable cross-section	2000mm	
	2x0.14mm <sup>2</sup> +shield	

#### Environmental data

Ambient temp. (operation/storage)	-20°C ... +60°C/-30°C ... +70°C
Protection class	IP 64

1) The operating range of the throughbeam photoelectric sensors LS 71 and 72 depends on the amplifier selections

### Tables

### Diagrams

### Order guide

	<b>Designation</b>	<b>Part No.</b>
Transmitter and receiver	LS 71	
Transmitter	LS 71 Se	500 00215
Receiver	LS 71 E	500 00216
Transmitter and receiver	LS 72	
Transmitter	LS 72 Se,3000	500 00217
Receiver	LS 72 E,3000	500 00218

### Remarks

- If a cable lengthening should be necessary, make sure that the shield is lead continuously.



## LS 66

## Throughbeam photoelectric sensor



6m  
12m



- Small construction volume enables application in small spaces
- Metal construction offers high firmness
- Shockproof
- Through selection of appropriate amplifiers optimally adaptable to applications
- Various accessories



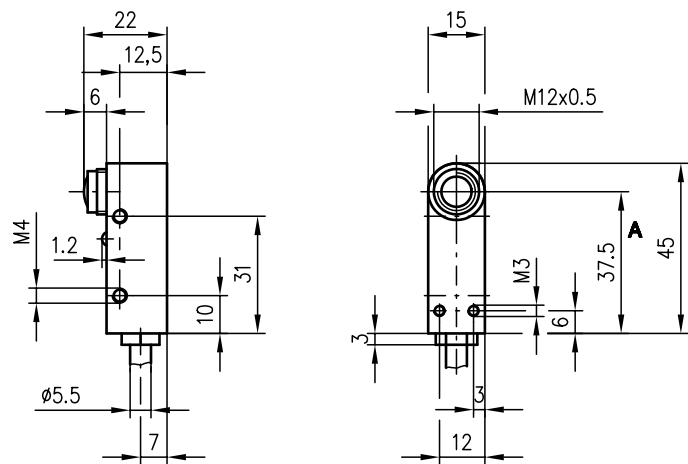
### Accessories:

(available separately)

- Adjusting and mounting device BT 66 (Part No. 500 16515)
- Compressed-air adapter DV 66 (Part No. 500 16516)
- Protection tube connection piece ET 316-01 (Part No. 500 11893)
- Pin diaphragm:
  - Diameter 2.0mm BL 66 (Part No. 500 15051)
- Slit diaphragm:
  - Slit width 1.5mm BL 66.1 (Part No. 500 15052)
- Pin diaphragm:
  - Diameter 2.0mm including compressed-air adapter BL 66.2 (Part No. 500 20003)
  - Mechanical alignment aid ARH 66 (Part No. 500 19029)

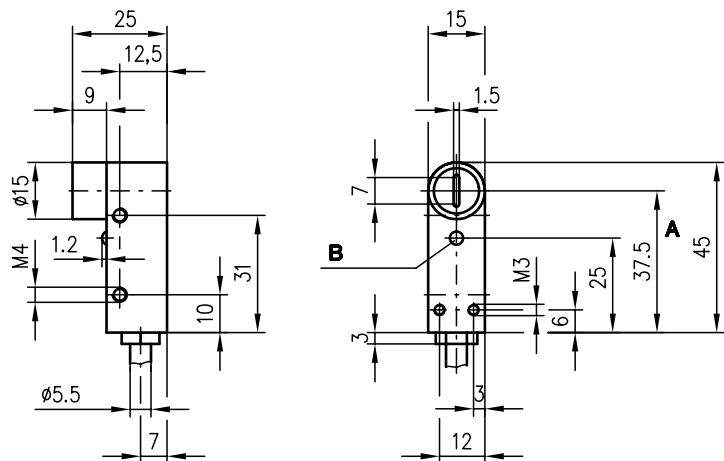
### Dimensioned drawing

#### Transmitter



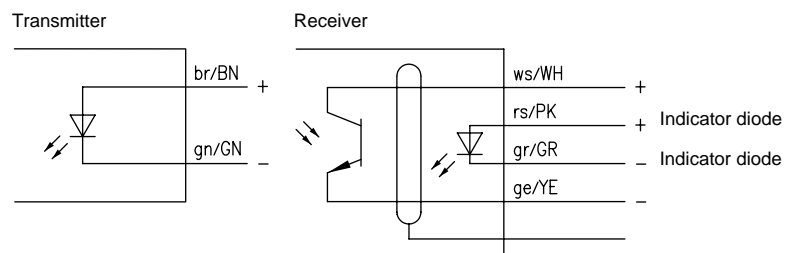
#### Receiver

with diaphragm BL 66.1



- A Optical axis
- B Indicator diode

### Electrical connection





### Specifications

#### Optical data

Operating range <sup>1)</sup> 0 ... 6m, 0 ... 12m  
Light source LED  
Wavelength 880nm

#### Electrical data

Transmitter GaAs  
Transmitting current max. 200mA at D=0.05  
Receiver Si phototransistor  
Inverse voltage max. 35VDC

#### Indicators

Receiver LED red light path free

#### Mechanical data

Housing aluminium red anodised  
Optics glass  
Weight approx. 80g  
Cable length 10000mm  
Cable cross-section 2x0.25mm<sup>2</sup>

#### Receiver

approx. 150g

4x0.25mm<sup>2</sup>+shield

#### Environmental data

Ambient temp. (operation/storage) -20°C ... +60°C/-30°C ... +70°C  
Protection class IP 65

1) The operating range of the throughbeam photoelectric sensor LS 66 depends on the amplifier and diaphragm selections

### Tables

Diaphragm	VS VS 25/4 R with EB 01
w/o diaphragm	0 ... 12m
BL 66	0 ... 2m
BL 66.1	0 ... 4m
BL 66.2	0 ... 3m

Diaphragm	VS IVS 28/44.8
w/o diaphragm	0 ... 6m
BL 66	0 ... 1m
BL 66.1	0 ... 2m
BL 66.2	0 ... 2m

Diaphragm	VS VS 371
w/o diaphragm	0 ... 6m
BL 66	0 ... 1m
BL 66.1	0 ... 2m
BL 66.2	0 ... 2m

### Diagrams

### Order guide

	Designation	Part No.
Transmitter and receiver	LS 66	
Transmitter	LS 66 Se	500 14689
Receiver	LS 66 E	500 14688

### Remarks

- For secure control of e.g. tools with small diameters, the light beam can be optimally adjusted through pin or slit diaphragms.
- If a cable lengthening should be necessary, make sure that the shield is lead continuously.
- Combination of several photoelectric sensor systems in one cable, even if shielded, can cause interferences.
- The shielded photoelectric sensor conductors should not be lead in shared plug connections together with other conductors.



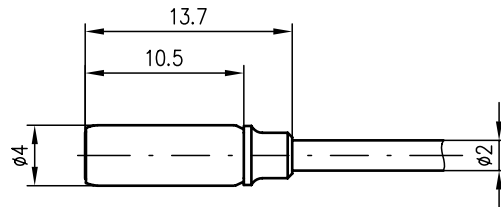
## LS 31/LS 40

## Throughbeam photoelectric sensor

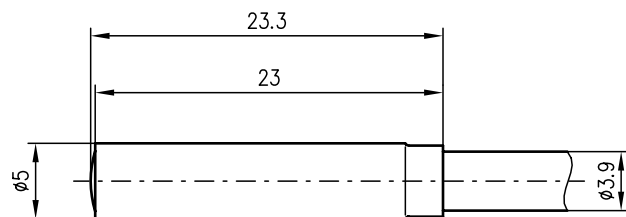


### Dimensioned drawing

LS 31



LS 40



500mm



- Miniature construction enables application in limited spaces
- Metal construction offers high firmness
- Scratch resistant glass cover
- High insensitivity towards soiling and shocks
- Through selection of appropriate amplifiers optimally adaptable to applications

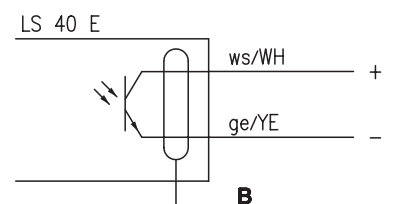
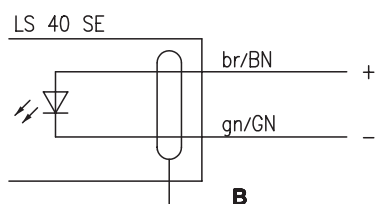
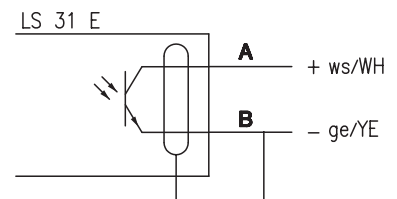
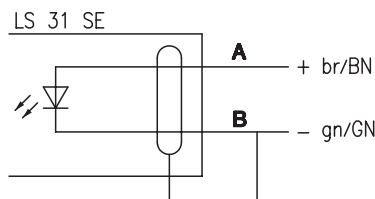


### Accessories:

(available separately)

- Amplifier for mini photoelectric sensors, e.g.
  - VS 9/1 (Part No. 500 00632)
  - IVS 9/4.8 (Part No. 500 12303)
  - VS 27/24 (Part No. 500 82005)
  - IVS 28/44.8 (Part No. 500 19808)

### Electrical connection



- A** Insulated wire (tr/TR or ws/WH)
- B** Shield



### Specifications

#### Optical data

Operating range <sup>1)</sup>  
Light source  
Wavelength

#### LS 31

0 ... 500mm  
LED (modulated light)  
880nm

#### LS 40

#### Electrical data

Transmitter  
Transmitting current  
Receiver  
Inverse voltage U<sub>CEO</sub>

GaAs  
max. 200mA at D=0.05  
Si phototransistor  
max. 35VDC

#### Mechanical data

Housing  
Optics  
Weight  
Cable length  
Cable cross-section  
Cable type

stainless steel V2A  
plastic  
approx. 40g  
2000mm  
0.14mm<sup>2</sup>  
sheathing PVC  
internal conductor polyethyl-  
ene

aluminium red anodised  
glass  
70g  
2x0.14mm<sup>2</sup>+shield

#### Environmental data

Ambient temp. (operation/storage)  
Protection class

-20°C ... +60°C/-30°C ... +70°C  
IP 65

1) The throughbeam photoelectric sensor operating range depends on the choice of the amplifier

### Tables

### Diagrams

### Order guide

	Designation	Part No.
Transmitter and receiver	LS 31	
Transmitter	LS 31 Se	500 82029
Receiver	LS 31 E	500 82030
Transmitter and receiver	LS 40	
Transmitter	LS 40 Se	500 10157
Receiver	LS 40 E	500 10158

### Remarks

- If a cable lengthening should be necessary, make sure that the shield is lead continuously.
- **LS 31**  
Opening angle ± 12°



## LS 29

## Throughbeam photoelectric sensor



0 ... 35m



- High performance throughbeam photoelectric sensor for connection to separate amplifier
- Round metal housing M12x1 with protection class IP 67
- 90° deflection via extension unit
- Alignment aid through LED indicator on the transmitter
- Penetration of multilayered coloured foils, in connection with VS 29/44.8

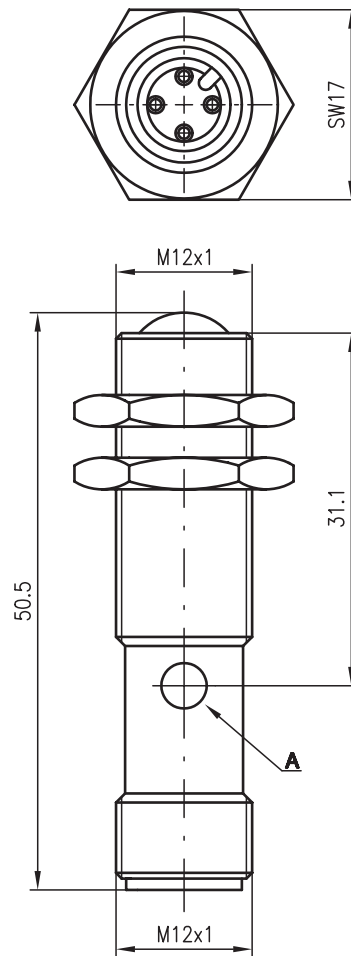


### Accessories:

(available separately)

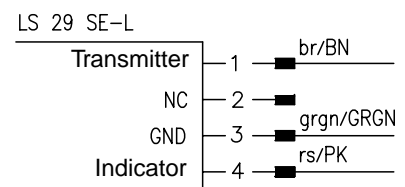
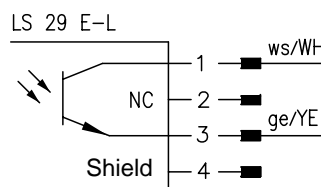
- Amplifier VS 29/44.8 (Part No. 500 80860)
- Diaphragm BL 29 hole Ø1 mm (Part No. 500 82260)
- Deflection mirror US 29 (Part No. 500 80863)
- Cable for transmitter:
  - BK7 KB-029-5000-3-SE (Part No. 500 80864)
  - BK7 KB-029-5000-3A-SE (Part No. 500 81156)
- Cable for receiver:
  - BK7 KB-029-5000-2-E (Part No. 500 81157)
  - BK7 KB-029-5000-2A-E (Part No. 500 81158)

### Dimensioned drawing



A Indicator diode

### Electrical connection





### Specifications

#### Optical data

Operating range <sup>1)</sup>	see table
Light source	LED (modulated light)
Wavelength	880nm

#### Timing

Switching frequency	see amplifier
Response time	see amplifier
Delay before start-up	see amplifier

#### Electrical data

Pre-amplifier	integrated in receiver
Operating voltage	only via separate amplifier

#### Indicators

LED yellow (on transmitter)	light path free, alignment aid
-----------------------------	--------------------------------

#### Mechanical data

Housing	M12 stainless steel
Optics	glass
Weight	12g each
Connection type	M12 connector
Cable	see remarks

#### Environmental data

Ambient temp. (operation/storage)	-25°C ... +60°C/-30°C ... +70°C
Protection class	IP 67
Standards applied	IEC 60947-5-2

1) Operating range: recommended range with performance reserve

### Tables

Operating range with	
VS 29/44.8	35m

### Diagrams

### Order guide

	Designation	Part No.
Transmitter and receiver	LS 29 L	
Transmitter	LS 29 Se-L	500 80861
Receiver	LS 29 E-L	500 80862

### Remarks

- Shielded cables KB 029... are recommended, others upon request.
- Mount receiver close to the amplifier.
- The performance reserve reduces itself about 20% when using the US 29.



## LS 05

## Throughbeam photoelectric sensors



150mm



- Small construction volume enables application in small spaces
- Scratch resistant glass cover
- High insensitivity towards soiling and shocks
- Through selection of appropriate amplifiers optimally adaptable to applications
- Stainless steel version

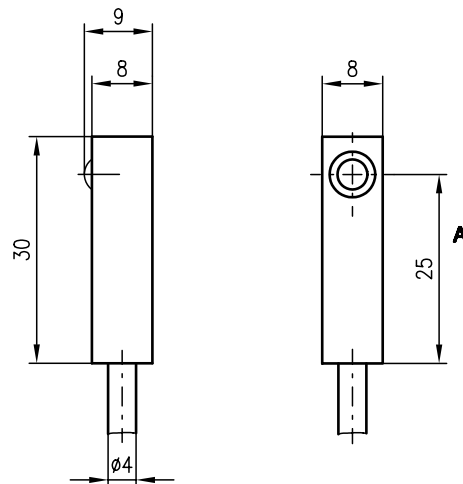


### Accessories:

(available separately)

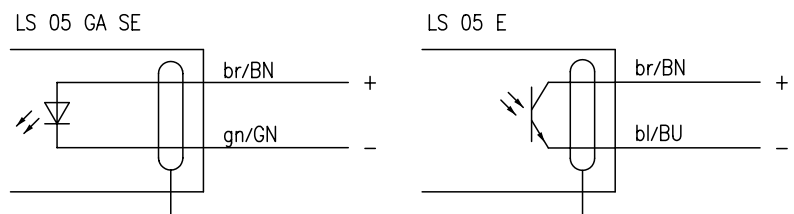
- Amplifier for mini photoelectric sensors, e.g.
  - VS 9/1 (Part No. 500 00632)
  - IVS 9/4.8 (Part No. 500 12303)
  - VS 27/24 (Part No. 500 82005)
  - IVS 28/44.8 (Part No. 500 19808)

### Dimensioned drawing



A Optical axis

### Electrical connection



Remark for receiver connection:  
 brown (br/BN) = white (ws/WH)  
 blue (bl/BU) = yellow (ge/YE)



### Specifications

#### Optical data

Operating range <sup>1)</sup>	0 ... 150mm
Light source	LED (modulated light)
Wavelength	880nm

#### Electrical data

Transmitter	GaAs
Transmitting current	max. 200mA at D=0.05
Receiver	Si phototransistor
Inverse voltage U <sub>CEO</sub>	max. 35VDC

#### Mechanical data

Housing	<b>Transmitter</b>	<b>Receiver</b>
Optics	aluminium anodised	natural colour anodised
Weight	glass	
Cable length	approx. 70g	
Cable cross-section	2000mm	
	2x0.14mm <sup>2</sup> +shield	

#### Environmental data

Ambient temp. (operation/storage)	-20°C ... +60°C/-30°C ... +70°C
Protection class	IP 64

1) The operating range of the throughbeam photoelectric sensor LS 05 GA depends on the selected amplifier

### Tables

### Diagrams

### Order guide

	Designation	Part No.
Transmitter and receiver	LS 05 GA-G	
Transmitter	LS 05 GA Se	500 00188
Receiver	LS 05 E	500 00184
<b>Stainless steel version</b>		
Transmitter and receiver	LS 05.5	
Transmitter	LS 05 Se.5	500 60871
Receiver	LS 05 E.5	500 60969

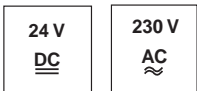
### Remarks

- If a cable lengthening should be necessary, make sure that the shield is lead continuously.



VS 725

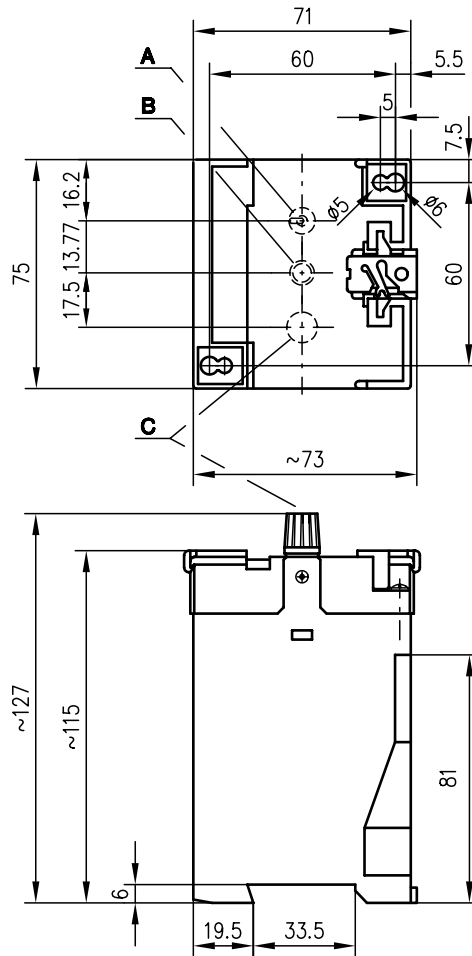
Amplifier



- Dynamic amplifier for connection of all mini photoelectric sensors (GaAs) for detection of fast events
- Sensitivity adjustment for optimum adaptation to the optical or mechanical situation
- Automatic contamination compensation
- Outputs are short-circuit proof and polarity reversal protected, this guaranteeing riskless mounting
- Easy alignment of the photoelectric sensors through connectable alignment mode and additional LED indicator

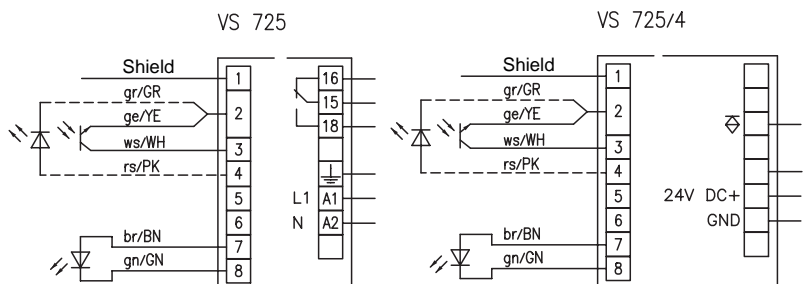


Dimensioned drawing



- A Operating mode
- B Indicator diode
- C Sensitivity adjustment

Electrical connection



Accessories:

(available separately)

- mini photoelectric sensor
  - LS 725 SE, 20000 (Part No. 500 00270)
  - LS 725 E, 5000 (Part No. 500 00271)

We reserve the right to make changes • MS\_v15e.fm



### Specifications

	VS 725/4	VS 725
<b>Timing</b>		
Response time	4ms	
Delay before start-up	≤ 100ms	
<b>Electrical data</b>		
Operating voltage $U_B$	24VDC ± 10%	230VAC ± 10%, 50/60Hz
Residual ripple	≤ 15%	
Bias current	≤ 200mA	
Switching output	PNP transistor output	relay, 1 change-over contact
Output pulse	approx. 200ms	
Function characteristics	dynamic dark switching (output for approx. 200ms activated at change from light to dark)	
Signal voltage high/low	$\geq (U_B - 2V) / \leq 2V$	
Output current	max. 100mA	
Switching voltage, relay		250VAC/DC
Switching power, relay		50W/60VA
Sensitivity	adjustable	
<b>Indicators</b>		
LED green	light path free	
<b>Mechanical data</b>		
Housing	plastic	
Weight	260g	460g
Connection type	terminals	
<b>Environmental data</b>		
Ambient temp. (operation/storage)	-20°C ... +60°C / -30°C ... +70°C	
Protective circuit <sup>1)2)</sup>	1, 2, 3	
Protection class	housing IP 40 terminals IP 20, fulfils contact protection acc. to VBG 4	
Standards applied	IEC 60947-5-2	

### Tables

### Diagrams

### Order guide

	Designation	Part No.
Relay output 230 V AC	VS 725	500 00647
Transistor output 24 V DC	VS 725/4	500 16548

### Remarks

- The amplifier is especially suitable for operation in connection with the LS 725.
- During insufficient performance reserve or light interference  $\geq 1s$ , the output of the VS 725/4 pulses with a frequency of approx. 3Hz. In the alignment mode, this function is switched off.
- The device can be snapped on a standard rail.

## Description of functions and application notes for functional units LS 725 and VS 725/(4)

### Description of functions

The photoelectric sensor amplifiers VS 725 and VS 725/4 are dynamic switching amplifiers.

All Leuze infrared mini photoelectric sensors can be operated with these amplifiers, which provide special advantages for the use with throughbeam and retro-reflective photoelectric sensors.

Very fast minor changes in light conditions, as well as significant light/dark transitions are detected through the dynamic switching behaviour. It is therefore possible to detect objects which are significantly smaller than the lens area (=active light channel) of the used photoelectric sensors.

A darkening which remains for at least 4ms causes an output pulse of 200ms in length.

By using the sensitivity potentiometer, the system is adjusted to the conditions given by the application.

Fast, small area darkening - high sensitivity.

Slow, large area darkening - low sensitivity.

### Commissioning

First, mechanically align the photoelectric sensor, transmitter and receiver to each other.

Connect wired unit to voltage and switch the amplifier to "Alignment".

The indicator LED on the receiver then works in analogue mode. Conduct the alignment between transmitter and receiver in such a way that the indicator LED illuminates with maximum brightness.

In switch position: "Operation" the unit is switched to the operating state.

### Application examples

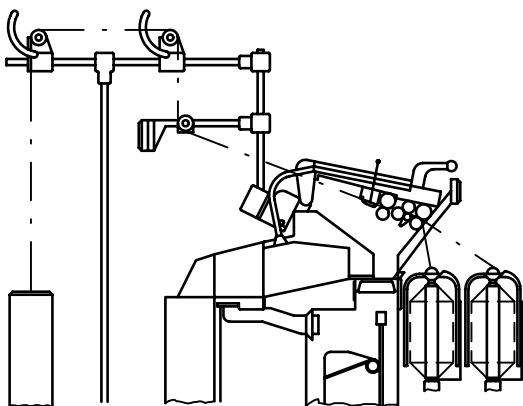
#### 1. Application area of textile machines

For detection of falling rovings, threads, yarns etc.

e.g. on flyer, finisseur, drawing frames etc.

The light beam is lead alongside the warp in such a way that a breaking thread or thread end falls or swings through the light beam.

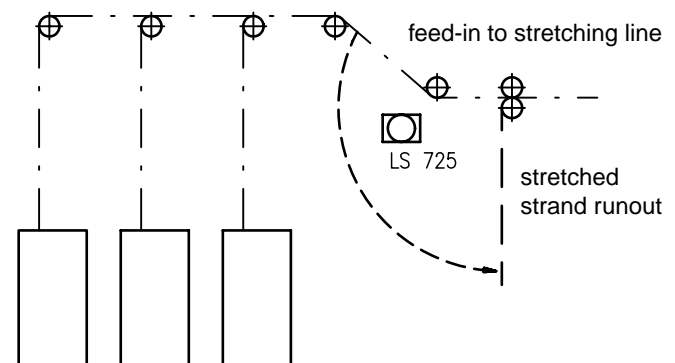
With the flyer, the following mounting positions are possible



#### Photoelectric sensor allocation:

Lead-in control

The axis of the light beam is to be positioned in such a way that a broken strand crosses the light beam.

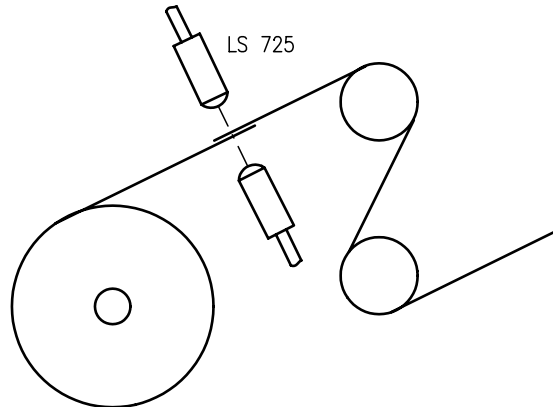


With emptying canisters, the remaining stretched strand run-out swings through the photoelectric sensor range and causes a machine standstill.



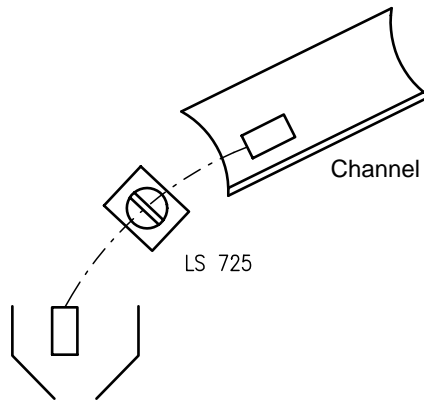
### 2. Adhesive joint detection

On detection of the adhesive joint, the machine is regulated back to initial speed.



### 3. Counting of small parts

Application of LS 725 at the end of channels etc.. Free falling or sliding parts with defined flight path can be detected and counted by the LS 725. Application on punching machines, feeding units, in the packaging industry for counting and dosage procedures.



### 4. Laboratory technology and chemical area

Application of the LS 725 e.g. for drop counting. A significant advantage of the LS 725, is here that as described under 2, the object to be detected, small part or drop, may move through the complete range of the optics (15mm) and will still be securely detected.

### 5. Wire wrapping machines

Especially multi wrapping units signal a wire break through mechanical spring arm allocation. Every spring arm has an assigned micro switch. After a wire break, one or more swivel arm can be monitored by an LS 725.

