

## Operating Manual for the End User

# SAFETY 40

## SAFETY LIGHT GRIDS

This operating manual is an integral part of any safety light grid **SAFETY 40** and addressed to the operating and service personnel of the operator.

**Caution:** Changes require the prior approval of the manufacturer of the machines. In addition, our detailed technical description available in the languages German, English and French is to be requested and observed.

If the instructions according to this manual and the technical description are not or insufficiently observed, you will risk accidents. In this case, WERAC Elektronik GmbH shall not be liable for any damage caused.

### Functional Description

Our safety light grids incorporate the certified components transmitter, receiver and control unit.

First, the control unit is to be activated via the start activation T1, T2, which is carried out by the daisy chain when pressing the start button. If the light grids (LG) are vacant and without interruptions (the individual light beams are sequentially recalled), the output relays (OSSD) A and B are triggered. In the daisy chain, each safety contact (output relay A – connection A1-A2 and output relay B – connection A5-A6) must be integrated into the further process from each OSSD.

The start and restart interlock must be realised by the daisy chain. With failure of one relay, the second relay remains de-energised, i.e. in a safe state. The switching state of the relays is visibly displayed for the user in the control unit. After grid-ON or a LS interruption, the light grid is in OFF state displayed by the red LED. Unless interruption of the light grid is present, the yellow LED is additionally displayed.

If the gain reserve of at least one light beam has significantly reduced compared to the last adjustment, the yellow LED is blinking (with the LG still working). Furthermore, the insufficient gain reserve in the energised state is displayed by the yellow LED flashing additionally to the green LED. This indicates the operator to clean the light grids (including a re-adjustment, if required).

### Technical Specifications for Control Unit WGN 100-1

Requirement level according to IEC EN 61496-1	Type 4
Response time	see type label on transmitter and receiver
Operating voltage for control unit WGN 100	24 V AC $\pm$ 10% (48 - 62 Hz)
Operating temperature permitted	0 ... +50°C
Output contacts: max. switching voltage max. switching current at 230 V~ (ind. charge)	250 V~ 2 A
Input delay after grid-ON	~ 4 s
Input delay after Test-ON	$\leq$ 70 ms
Housing	Sheet metal housing with Makrolon cover (IP 20)
Electrical connection	Clamping plug, up to 2.5 mm <sup>2</sup> RJ 45 plug (transmitter and receiver)
Status display	red, yellow, green

Table 1

The relay outputs are grid-separated from the light barriers; according to IEC60664 -1 excess voltage category III. All transmitters WGS4..., and WLS4... and all receivers WGE4..., and WLE4... can be connected. The maximum cable length of the transmitters and receivers is 15 m, for cascades 10 m.

The control unit is suitable **only** for the integration into the control cabinet and can be snapped up a TS35 rail. The control cabinet must achieve at least contamination level 2 according to IEC EN 60439-1. The carrier rail TS 35 must be connected with the protective earth conductor PE.

## Technical Specifications for Transmitter and Receiver

	<b>WGS 4.../WGE 4... WLS 4.../WLE 4...</b>
Requirement level according to IEC EN 61496-1, -2	Type 4
Infrared intense pulsed light (950 nm) focussed to	$\pm 2^\circ$
Operating temperature permitted	0...+50 °C
Traffic light display (see table 4)	red, yellow and green LED in the transmitters
Display grid on	Yellow LED in the receiver
Housing	Aluminium profile tube 19 x 29 mm yellow (RAL 1021) powder-coated Protection type IP 65, washer made of polycarbonate
System length (active length of the light grid)	50 mm to 2000 mm in intervals of 50 mm for 14 and 30 mm and 70 mm to 1995 mm in intervals of 35 mm for 40 mm resolution
Vacancy (field without active elements in the LG)	Length in mm in the type label (last 3 figures after I or O)
Height of protective field	see type label on transmitter and receiver
Resolution (WGS and WGE)	14, 30 or 40 mm also available in combination e.g. 14/40 mm
Coverage with 14 mm resolution with 30 mm and 40 mm resolution	0...6 m 0...6 m, with reinforced transmitters 3...10 m
Electrical connection	Round cable with a length of 165 mm, 8-pin + screen with plug M12 x 1 (socket)
Cascades	Permitted for 3 light grids maximum
Maximum cable length of transmitter and receiver to the control unit	15 m with cascades 10 m

Table 2

### Mounting of the Transmitter and Receiver

The transmitters and receivers are to be replaced only by replacement parts with the identical type label which are to be positioned in exactly the same position as the replaced parts. Changes to the configuration are to be carried out only by qualified persons and using the technical description.

### Rail Fixing

The housing of the transmitters and receivers is provided with two continuous groove sections on the back side. The retaining blocks WHK1 can be positioned at any location required and fixed using a set screw M4. Up to a unit length of 1200 mm, 2 retaining blocks, which are mounted with an edge distance of approx. 100 mm are sufficient. Lengths exceeding 1200 mm to 2000 mm require an additional retaining block. An appropriate fixing bracket WHW1 for adjusting both axes can be ordered with us.

The retaining block WHK1 is additionally provided with a cross-hole for the direct fixing without need to be adjusted.

### Hinge Fixing

The hinge bracket WSH1 enables a more comfortable fixing to the groove sections, and allows for the adjustment in axis of rotation.

### End Piece Fixing

A retaining bracket WHW2 allows for a facilitated fixing as the adjustment can be realised in the axis of rotation. For reasons of stability, this fixing option can be used only for transmitters and receivers with a unit length of 800 mm maximum.

### Adjustment Mode

The use of the adjustment mode must be carried out by authorised and qualified personnel only.

Each connection of a new light grid, with a new number of lines, to the control unit requires a re-adjustment mode. The control unit indicates the operator the required adjustment mode using the optical signals of the LED lamps (see table 4).

This process also applies for the connection of cascades or changes to cascades.

### Adjustment of Transmitter and Receiver

- With mounting of transmitters and receivers, the parallel arrangement of the longitudinal axes must be observed. We recommend the use of a spirit level. In addition, the axis of rotation must be properly adjusted.
- Switch the Dip S1-1 to ON (adjustment mode) in the control unit WGN 100.

- Then, determine the tuning range of the receiver by turning around the longitudinal axis. The yellow LED is indicated, if sufficient light reserve is available for all lines. The red LED is indicated, if at least one line can not receive light. If either the yellow or the red LED is not displayed, insufficient light is received to enable operation.
- Set and fix the receiver to the middle position of the tuning range.
- Proceed as with the receivers when adjusting and fixing the transmitters.
- Switch off Dip S1-1. After a break of 5-7s (break to remove hand from the protective field, indicated by jittering red LED), the control unit logs the reference values of the individual lines. If this process is completed, the red LED starts to blink. In order to leave the adjustment mode, turn the power of the grid off. After reapplying the power, the light grid is in a stand-by mode (red and yellow LED flash). It switches to green (OSSD = ON), if the start button is activated and the light grid is vacant.

Note: The OSSDs are switched off in the adjustment mode.

LED states			Meaning	OSSD
red	yellow	green		
			Adjustment mode, grid on, initialising	off
			System Error – Grid off required	off
			Adjustment mode, no signal	off
			Adjustment mode, all lines receive light, but without sufficient buffer	off
			Adjustment mode, all lines receive light	off
			Adjustment mode, 5-7s break before logging of the references	off
			Adjustment mode completed Number of lines and attenuation were logged Grid off required in order to change to normal mode	off
			Normal operation mode, grid on, initialising	off
			System Error – grid off required	off
			Normal operation, not ready yet or interrupted	off
			Normal operation, grid ready for activation (external restart inhibit active)	off
			Normal operation, grid ready for activation Lower light buffer related to the calibrated reference	off
			Normal operation, light grid active and free Lower light buffer related to the calibrated reference	off
			Normal operation, light grid active and free	off
			The red and yellow alternate: Wrong number of lines in memory Adjustment mode required	off
			The red and yellow LED flash: Preset to delivery status (memory deleted) Adjustment mode required	off

Table 3     on,  off,  blink,  flash  jitter  Error blinking

### Cascade Adjustment

First, the light grid directly connected to the control unit is adjusted as described above. For this purpose, the outlet cables to the next light grid are to be split and sealed off using the adjustment connectors WAC1.

Now it is possible to connect and adjust the next light grid. Unless this grid is the last of the cascade, also the cable outlets are to be provided with the adjustment connectors WAC1.

This way enables to cascade up to three light grids.

## Regular Checks and Repairs

For the detection of not allowed modifications, manipulations or defects, the light curtains are to be periodically checked according to the applicable regulations by qualified and experienced personnel.

The test bar is moved through the protective field according to figure 2. While the test bar is in the protective field, only the red LED must flash up in the transmitter.

This also includes the check, whether the stop delay of the machine is within the permitted range. Even for these checks, records are to be prepared and filed.

After repair works, it is to be determined: 1.) that the BWS required for safety is active. (protective field checks using test bar); 2.) reaching the dangerous area is only possible through the protective field; 3.) only if no persons are between protective field and dangerous area, the dangerous process can be carried out; 4.) the specified safety distance between protective field and dangerous area is met, 5.) the BWS reveals no obvious damages; 6.) position and location of the device is correct.

These checks are to be carried out only by an authorised and qualified person.

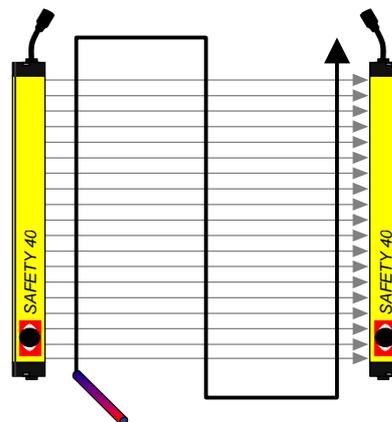


Figure 2: Check of the protective field using a test bar

## Cleaning

The polycarbonate washer of the transmitters and receivers is to be cleaned using a wet and soft cloth. Attention should be paid that the washer is not scratched. Abrasive cleaners and solvents must not be used for cleaning.

## Replacement Part Specifications

Please state with order:

Transmitter type (as previously built in), receiver type (as previously built in),

Control unit type (as previously built in)

Connecting cable (control unit to light grid): cable length optionally 2 m, 3 m, 5 m, 7 m, 10 m, 15 m

Connecting cable for cascade: length optionally 0.3 m, 1 m, 2 m

According to type of fixing:

for rail fixing:

Number of retaining blocks WHK1 and fixing brackets WHW1  
optional number of hinge brackets WSH1

for end piece fixing:

Number of retaining brackets WHW2

## Manufacturer

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## State of Revision

This manual refers to **SAFETY 40** types of the revision 1.15 as of 25<sup>th</sup> May 2007.

## Quality Marks



QM-System acc.  
to ISO 9001/2000



## Intended Use:

The safety systems **SAFETY 40** incorporate the certified components control unit, transmitter and receiver (see type labelling) and are therefore to be used only in connection. The connections between the individual components are to be realised using the cables of the manufacturer WERAC.

The **SAFETY 40** systems are a non-contacting safety devices of Type 4 according to DIN EN 61496-1, which can be used depending on the design of access safety devices for dangerous zones near power-operated work equipment, in consideration of the standards relevant for the machines or systems up to category 4 according to EN 954-1.