

# Photo-electric Amplifier ISG-N137

## 1-channel amplifier (manual gain setting)

- Amplifier with modulated infrared light
- Range up to 35 m (115 ft)
- Automatically check of the Sensor heads
- Sensitivity adjustable with potentiometer
- Adjustable switching-on and switching-off delay
- Switching mode light/dark switchable
- Basic transmit power 20% / 100% switchable
- 4 different selectable transmit frequencies
- Transistor output (npn/pnp)
- Alarm output
- Transmitter and receiver connections are short-circuit proof
- 11-pin DIN rail mounting socket for simple installation



### Description

This 1-channel photo-electric amplifier from Pantron is a processor controlled amplifier with an integrated analysis and sensor head control unit. The photo-electric amplifier works with modulated infrared light, which enables a high degree of immunity to ambient light and cross talk from neighbouring photo-sensors. The manual gain setting, adjusted with a potentiometer located on the front side, enables the user to simplify the installation and work.

According to the application the amplifier can be switched to the different working conditions by DIP-switches. Thus, the user can switch to different basic transmit levels, which selected according to the range and the pollution level, to increase the fine adjustment of the sensitivity. Thus, the object recognition can be optimize.

For the error detection at the sensor heads there is

a permanent active sensor control unit. This unit shows the user, if an error is at the transmitter or at the receiver.

An alarm display and output, which shows errors and the limit of the transmit power and is connectable with a PLC, enables users to safely work with the photoelectric amplifier.

### Ordering Guide

Supply voltage	Model
230 V AC	ISG-N137/230VAC
115 V AC	ISG-N137/115VAC
24 V AC	ISG-N137/24VAC
24 V DC	ISG-N137/24VDC



#### Safety Instructions

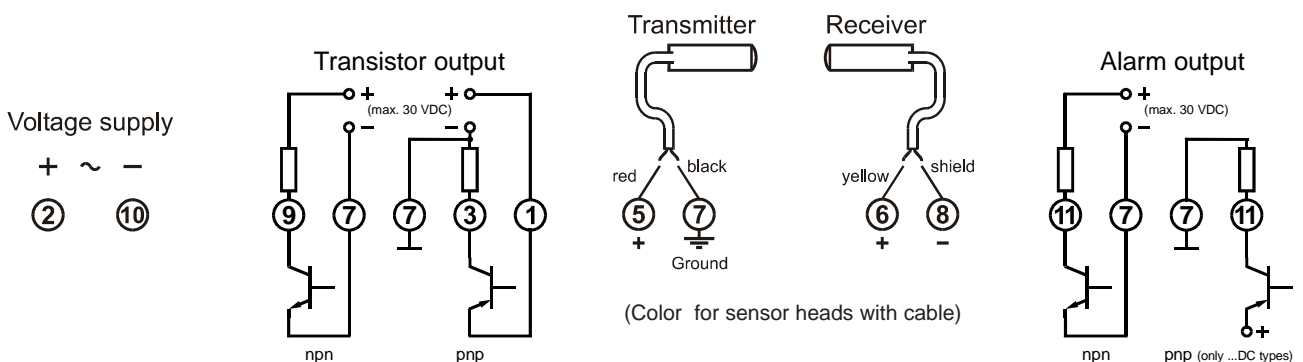
The operation of infrared amplifier ISG... is not authorized for applications where safety of the person depends on the device function.

## Technical Data

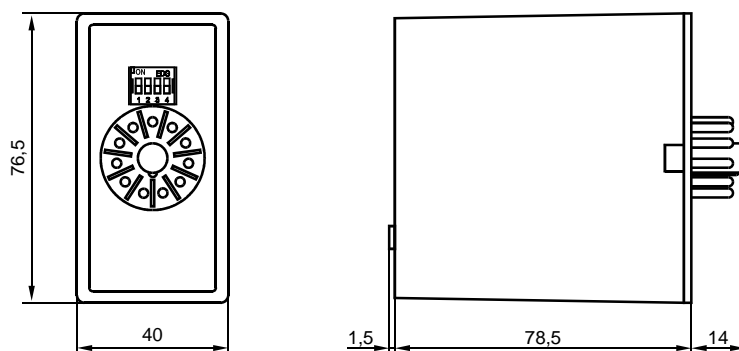
Operating basis	Modulated IR-light
Max. Range (through beam)	
Sensor heads Standard	25 m (82 ft)
Sensor heads High Power	35 m (115 ft)
Displays:	
Switching status	LED yellow
Sensitivity	LED green
Alarm	LED red
Sensor error	2 x LED red
Power ON	LED green
Switching function	Light / dark, selectable
Switching delay	0 - 10 s
Housing	Plastic
Housing protection	IP 40
Temperature (operation)	-25 °C ... +60 °C
Mounting orientation	Free
Mounting	11-pin DIN-socket
Size (mm)	40 x 76,5 x 78,5

Supply voltage	230 V AC, 115 V AC, 24 V AC, 24 V DC
Voltage tolerance	...AC: 10 %; ...DC: 20%
Power consumption	...AC: 4,2 VA; ...DC: 1,7 W
Transmit frequency (kHz)	3,0; 3,3; 3,7; 4,0
System power	manual adjustable
Basic transmit level	20 % / 100 %, selectable
Relay output:	-
Switching data (max.)	
Switching frequency	
Transistor output	nnp / npnp
Switching data (max.)	100 mA / 30 V DC
Switching frequency	Basic transmit level 20%: 50Hz Basic transmit level 100%: 10Hz
Alarm output	nnp / npnp (npnp only ...DC devices)
Switching data (max.)	24 V DC / 100 mA

## Wiring diagram



## Dimensions



Dimensions in mm

## General Description

### 1. Principle of operation

The system (consisting of one transmitter, one receiver and one amplifier) works with modulated infrared light.

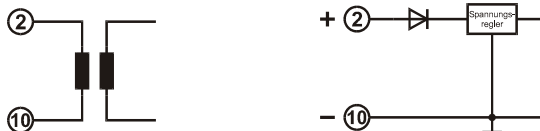
According to the channel condition, the displays and outputs are set.

### 2. Connections

The amplifier is connected with an 11-pin DIN mounting socket.

#### a) Power Supply (POWER)<sup>1</sup>

The power supply will be connected on PIN 2 and PIN 10. For devices with direct current, PIN 2 is positive and PIN 10 is neutral (see picture 1).



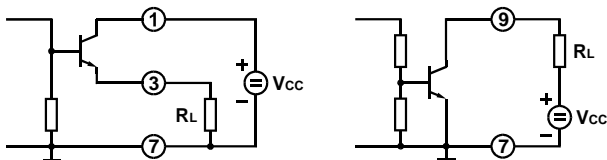
picture 1: left: AC-Connection, right: DC-Connection

#### CAUTION!

The AC-supply devices are isolated from main.  
A grounded connection on the low voltage side is required (PIN 7).

#### b) Transistor output<sup>1</sup>

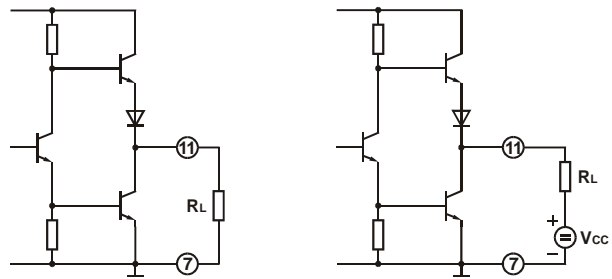
The amplifier has two transistor outputs (pnp and npn output). The pnp output is PIN 3 and the npn output is PIN 9 (see picture 2). The maximum allowable switching data is 30 V DC / 100 mA.



picture 2: left: pnp-output, right: npn-output

#### c) Alarm output (ALARM)<sup>1</sup>

The Alarm output has 24 V DC output voltage and a maximum current value from 5 mA (AC-Devices) and 100 mA (DC-Devices). To evaluate the signal connect the evaluation unit between the positive (PIN 9) and the neutral (PIN 7), see picture 3.



picture 3: left: pnp-output, right: npn-output

### 3. Functions terminology

With the functions the amplifier can be switched to different workings conditions. The functions are selected by DIP-switches on the bottom of the amplifier.

#### **a) Basic transmit level (transmit power)<sup>1 2</sup>**

The basic transmit level is a power level which enables the user to switch the amplifier switch less sensitive.

100 %: The amplifier has the maximum sensitivity (maximum range).

20 %: The amplifier has 20 % of the maximum sensitivity.

#### **b) Switching mode<sup>1</sup>**

The switching function describes the output behavior of the infrared beam. There are two types of switching functions:

Light mode operation: The transistor outputs open on interruption of the infrared beam.

Dark mode operation: The npn-transistor output switches to ground (PIN 9 → PIN 7) and the pnp-transistor output switches to plus (PIN 3 → PIN 1) on interruption of the infrared beam.

#### **c) Transmit frequency (transmit freq.)<sup>1</sup>**

The transmit frequency means the modulation frequency at which the amplifier works. If more than one sensor head is mounted side by side, the amplifier must be set to different frequencies. Each amplifier reacts only with its own transmit frequency and place.

#### **d) Switching-on delay (t-ON)<sup>2</sup>**

Switching-on delay is the time between the presence (light mode operation) or the absence (dark mode operation) of the infrared beam and turning the output on.

#### **e) Switching-off delay (t-OFF)<sup>2</sup>**

Switching-off delay is the time between the absence (light mode operation) or the presence (dark mode operation) of the infrared beam and turning the output off.

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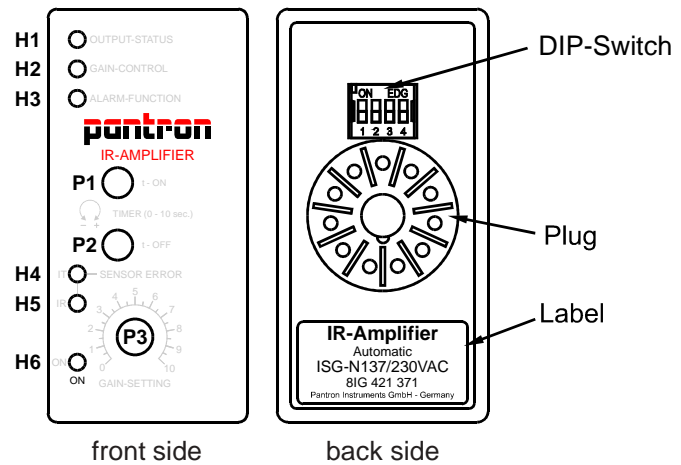
<sup>1</sup> Inscription side label

<sup>2</sup> Inscription front label

## Operating Instructions

Display contents:

- H1: Output status indicator (yellow)
- H2: Sensitivity display (green)
- H3: Alarm display (red)
- H4: Transmitter error display (red)
- H5: Receiver error display (red)
- H6: Power ON display (green)
- P1: Switching-on delay
- P2: Switching-off delay
- P3: Gain setting



### 1. Choose the sensor heads

Before you turn on the amplifier, select the transmitter and receiver for your application. This includes choosing the sensor heads, body style, and cable length or quick disconnect that meets your requirements.

### 2. Connect wiring to the socket

The amplifier is designed for simple installation. An 11-pin socket must be used for installation. The wiring diagram is printed on the side label from the amplifier or see **Wiring diagram**. For more information see **General Description** point 2 **Connections**.

### 3. Choose the function

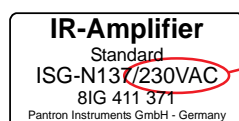
The functions are selectable by DIP-switches on the bottom of the amplifier. For complete description of function, see **General Description** point 3 **Function terminology**. The selection of the functions is described in table 1.

basic transmit level (transmit power) <sup>1</sup>		switching mode <sup>1</sup>		transmit frequency (transmit freq.) <sup>1</sup>	
	100 % <sup>1</sup>		light <sup>1</sup>		4,0 kHz (f1) <sup>1</sup>
	20 % <sup>1</sup>		dark <sup>1</sup>		3,7 kHz (f2) <sup>1</sup>
					3,3 kHz (f3) <sup>1</sup>
					3,0 kHz (f4) <sup>1</sup>

Table 1: Functions

#### 4. Check the supply voltage

Before starting check if the supply voltage value is the same as the connection value. On the bottom of the amplifier is the type plate. The supply voltage is the last two or three numbers of the part number.



supply voltage  
for example: 230 V AC

#### 5. Operating procedure

Plug the amplifier into the socket and switch the power supply on. The Power ON indicator H6 (POWER ON)<sup>2</sup> lights green. To guarantee the regular operation of the infrared amplifier, the sensitivity must be adjusted manually. For this, turn the potentiometer P3 (GAIN-SETTING)<sup>2</sup> from the left side to the right side until the green sensitivity indicator H2 (GAIN-CONTROL)<sup>2</sup> is lit constantly. As the potentiometer is adjusted to the right side, the amplifier will become less sensitive. For description of how the switching output works, see table 2.

After adjustment, the sensitivity display serves as an indicator for the correct adjustment of the amplifier. After many work days the sensor heads polluted slowly. The sensitivity display will begin to flash and eventually go out if the sensor heads become contaminated. When the sensitivity indicator H2 is OFF and the output status indicator H1 is ON, the alarm display H3 lights and the alarm output has 0 V DC after 5 seconds. For optimal working conditions, the sensitivity must be increased or sensor heads must be cleaned. The switching ON and OFF delay is adjustable between 0...10 s using potentiometer P1 and P2.

Note: If the sensitivity display H2 (GAIN-CONTROL)<sup>2</sup> is not lit, the contact between the transmitter and receiver is interrupted, polluted, adjusted incorrectly, or the distance between the sensor heads is too far.

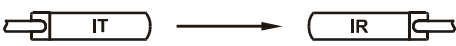





Beam status	Switching function	Output status indicator H1	Transistor output	
			npn (PIN 9)	pnp (PIN 3)
	light		0 V	pnp+
	dark		open	open
	light		open	open
	dark		0 V	pnp+

Table 2: Switching logic

### Sensor monitoring

The amplifier has a sensor control unit, which shows error at the sensor heads. If the display H4 or H5 (SENSOR ERROR)<sup>2</sup> flashes, there is an error at the sensor heads. The display H3 (ALARM)<sup>2</sup> lights and the alarm output is active.

#### H4 flashes - error transmitter

If the display IT-SENSOR ERROR<sup>2</sup> there is a problem at the transmitter connection (PIN 5 and PIN 7).

- The display flashes slow (3 Hz flashing frequency)  
The resistance is too high. The transmitter is not connected or the cable is broken.
- The display flashes fast (9 Hz flashing frequency)  
The resistance is too low. The transmitter has a short circuit.

#### H5 flashes - error receiver

If the display IR-SENSOR ERROR<sup>2</sup> there is a problem at the receiver connection (PIN 6 and PIN 8).

- The display flashes slow (3 Hz flashing frequency)  
The resistance is too high. The receiver is not connected or the cable is broken.
- The display flashes fast (9 Hz flashing frequency)  
The resistance is too low. The receiver has a short circuit.

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<sup>1</sup> Inscription side label

<sup>2</sup> Inscription front label