Datasheet ILD-1000

Introduction

This document describes the light sensor ILD-1000. It is used for the detection of intensive, non-uniform light that typically arises by reason of

- Arc welding
- Laser works of metallic work pieces

This device detects the existence as well as the non-existence of an arc and is made for error detection for automatic manufacturing processes. The system consists of the evaluation device ILD-1000 and the sensor IR-M12VA.

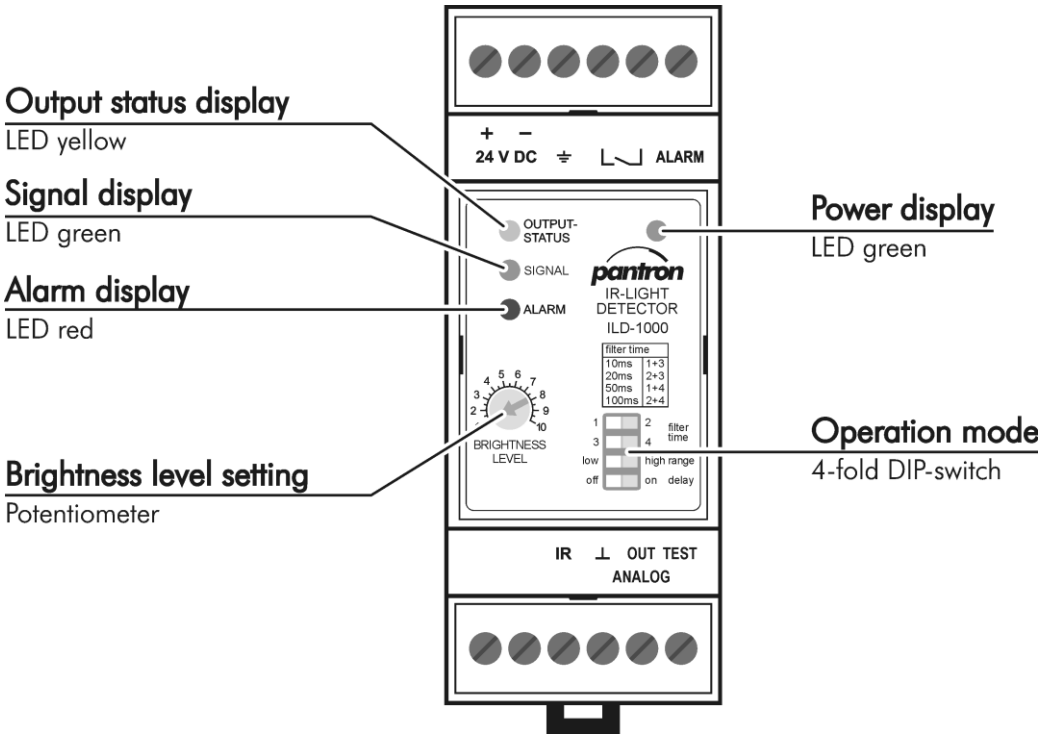
Mode Of Operation

The system reacts to non-uniform (modulated) light in infrared range. Therefore the insensitivity against day light and artificial ambient light is ensured. The device detects modulated light in frequency range of approximately 50 Hz to 1000 Hz only. Uniform light won't be analyzed.

The incoming signal is filtered and added up for a specific period of time. If the appropriate value exceeds a predetermined value then the switching output will be activated.

The switching threshold can be set via potentiometer. The period of filtering is 4-fold switchable via a DIP switch. The measuring range is 2-fold switchable for low and high illuminations. Furthermore an impulse stretching of 100 ms for the switching output can be activated via another DIP switch.

Display content



LEDs

LED output status display: switching indicator – a yellow light signals that the switching output is active. *Notice*: As long as pulse stretching is activated the display is longer active than the sensitivity display.

LED signal: signal display – a green light signals that the light intensity is higher than the threshold that was set.

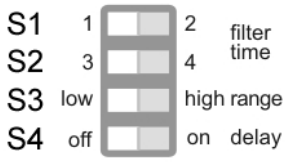
LED alarm: alarm display – a red light signals that a sensor error occurs.

LED power display: a green light is always on as soon as the device is connected to power supply.

Potentiometer

The switching threshold can be set via potentiometer and the corresponding scale is labeled from 1 to 10. The higher the value that was set is the higher is the switching threshold so that the switching output can only be active if the light is very intensive. A small setting value means that the switching threshold is lower and nevertheless low illuminations is still sufficient. The device is more sensitive.

DIP switch



S1, S2: Filter time constant settings. All possible values are shown in the table below:

Switch setting S1	Switch setting S2	Time constant
1	3	10 ms
2	3	20 ms
1	4	50 ms
2	4	100 ms

The time period that can be set with this two DIP switches corresponds to integration period. That means that the sensor signal will be filtered and added for the time period that was set. The outcome of this is the actual measuring value that will be compared with the set threshold.

The longer the selected filter time constant is the higher is the measuring value and that leads to an increased sensitivity of the device. Simultaneously the device gets more slow. However that does not mean that the set filter time constant of for example 10 ms causes a response time of always 10 ms. If the signal is intensive enough then it is possible that the response time is significant shorter.

This setting is also suited for fitting the device to the type of light that has to be detected. It is advisable to choose a shorter filter time constant if the device should detect a short, intensive flash. The same applies to an existing background brightness that has to be ignored. A longer filter time constant causes a more sensitive device and avoids that a short interruption of the signal leads to a switch back of the switching output at once.

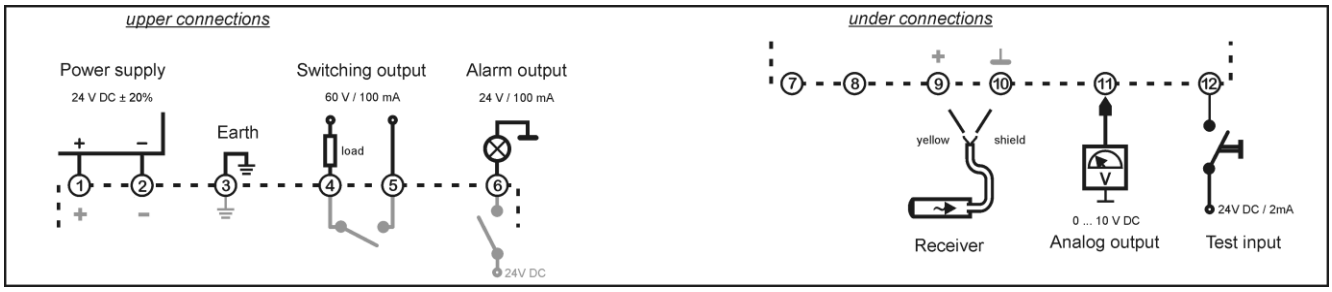
S3: Measurement range change-over. The setting low is designed for low illuminations and accordingly the setting high for high illuminations. The selection of the setting high implicates that the threshold that was set via potentiometer will be additionally multiplied by a factor so that the threshold can be fit to very high measuring values.

We recommend to start with the setting low. If the sensitivity of the device is too high then simply switch over to setting high. The measuring value also depends on the distance between sensor and light source.

S4: Impulse stretching of switching output. If this DIP switch is turned on then the switching output is active for at least 100 ms even if the detected light impulse is shorter.

It is possible to adjust the DIP switches while the system is online. The device adopts the changed adjustments after a short delay.

Wiring diagram



For a EMC-compatible installation it is necessary to connect the protective earth connecting terminal 3 via short way to control box or earth of the machine.

Outputs

The switching output is a potential-free, short-circuit proofed semiconductor switching output and is able to switch up to 60V AC and DC. It is active as long as the illumination passes over the threshold that was set. As well as 100 ms afterwards if impulse stretching is active.

The alarm output provides 24V and is short-circuit proofed, too. It is active as soon as a sensor error like wire breakage or short-circuit occurs.

The analog output and the test input have no function yet. It is not allowed to use the connecting terminals 7 and 8.

Operating procedure

It is allowed to mount the light sensor with DIN-rail (DIN 43880) vertically and horizontally. Devices that release dangerous heat have to be mounted in a distance of at least 20 mm. Furthermore it is necessary to keep a distance from top and bottom of the device to other parts of 15 mm. This distance is needed for the electrical connection. The supply voltage of the device is 24 V DC ± 20 %.

Connect the device to a suitable 24V power supply. Afterwards connect the sensor IR-M12VA to the connecting terminals 9 and 10 and align the sensor with the light source. Identify the fitting filter time constant and the threshold setting and set the DIP switch settings.

Please notice that the disconnection as well as the reconnection of the senor during operation may cause a temporary output signal.

Technical Specifications

Supply voltage	24 V DC / ±20% / 2,4 W
Switching output	Normally open contact (semi-conductor relay), potential-free, short-circuit proof 60 V AC (DC) / 100 mA R_{on} ca. 23 Ohm
Alarm output	PNP, 24 V DC, 100 mA, short-circuit proof
Mounting	DIN rail DIN 43880
Electrical connection	0,14 - 2,5 mm² plug connection
Operating temperature	-25 °C ... +50 °C
Storage temperature	-40 °C ... +80 °C
Housing material	NORYL (self-extinguishing)
Protection class	IP 20
Dimensions	W x H x D: 35,5 x 90 x 58,5 mm