**Photoelectric proximity switch IRF-...**

- flat, strong housing
- especially suitable for detecting glass surfaces (Types -04X to -4X)
- extended range up to 3m (Type IRF-30X)
- Output function determinable by changing the supply voltage polarity

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### Technical Data

<table>
<thead>
<tr>
<th>Type</th>
<th>IRF-04X</th>
<th>IRF-1X</th>
<th>IRF-2X</th>
<th>IRF-4X</th>
<th>IRF-30X</th>
</tr>
</thead>
<tbody>
<tr>
<td>Range</td>
<td>40mm</td>
<td>100mm</td>
<td>200mm</td>
<td>400mm</td>
<td>3m</td>
</tr>
<tr>
<td>Determined at</td>
<td>Mirror</td>
<td>white paper, 80, A4</td>
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<td></td>
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<tr>
<td>Supply voltage</td>
<td>12 to 28 VDC</td>
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<td></td>
<td></td>
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<tr>
<td>Current consumption</td>
<td>25mA</td>
<td></td>
<td></td>
<td>35mA</td>
<td></td>
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<tr>
<td>Max. power dissipation</td>
<td>0.7W</td>
<td></td>
<td></td>
<td>1.0W</td>
<td></td>
</tr>
<tr>
<td>Output, type</td>
<td>Push-pull, short circuit protected</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Output, load</td>
<td>maximum 100mA</td>
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<tr>
<td>Switching frequency</td>
<td>100Hz</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hysteresis, axial</td>
<td>approx. 10% of range</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hysteresis, radial</td>
<td>approx. 2% of range</td>
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<tr>
<td>Operating temperature</td>
<td>-20°C &lt; TA &lt; +50°C</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Housing</td>
<td>Zinc, die casting, with Aluminum cover</td>
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<td></td>
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<tr>
<td>Housing color</td>
<td>black-blue</td>
<td>yellow-blue</td>
<td>red-blue</td>
<td>grey-blue</td>
<td>blue-blue</td>
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<tr>
<td>System of protection</td>
<td>IP65 at EN 60529</td>
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<tr>
<td>Connection</td>
<td>Connector: M18, Binder series 714, 4 terminals</td>
<td></td>
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<tr>
<td>Connection, IRF-..X / S 16</td>
<td>Cable: 3+PE x 0.5mm² + shield / L=3m</td>
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<tr>
<td>Connection, IRF-..X / S 99</td>
<td>Connector: M12, Binder series 713/763, 4 terminals</td>
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<tr>
<td>Options</td>
<td>- switching frequency up to 2kHz, on request</td>
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<td></td>
<td>- with cable connection:</td>
<td>IRF-..X S16</td>
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</tr>
<tr>
<td></td>
<td>- with potentiometer for fine adjustment:</td>
<td>IRF-04X S70</td>
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<tr>
<td></td>
<td>- special lens glueing (high solvent resistant):</td>
<td>IRF-04X S94</td>
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</tr>
<tr>
<td></td>
<td>- with Connector M12, Binder series 713/763:</td>
<td>IRF-..X S99</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- with emitter disable input, and connector M12, 5 terminals</td>
<td>IRF-..X DI S99</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Function and LED indication

- **Object detected:**
  - Connector LED (red): ON
  - Housing LED (green): OFF
  - S 16: LED: RED

- **No object detected:**
  - Connector LED (red): OFF
  - Housing LED (green): ON
  - S 16: LED: GREEN

#### Connection diagram for standard function:

- **Connection:** M18 M12 Cable
- **+24VDC**
- **J:** PNP=OFF
- **R 15Ω:** Out=0V
- **0V:**
- **PE:** yel-grn

#### Connection diagram for inverted function:

- **Connection:** M18 M12 Cable
- **+24VDC**
- **J:** PNP=OFF
- **R 15Ω:** Out=24V
- **0V:**
- **PE:** yel-grn
General mounting prescriptions:
Do not exceed the maximum ratings. The electrical connections must be exactly as shown in the connection diagram. The cable shield must be connected short. The cable shield should be connected to PE or 0V (-) of the supply voltage. Connection cables must not be installed parallel to high voltage cables.

Function
The types IRF-04X to 4X are specialized for mirroring surfaces. The type IRF-30x is applicable for a wide range up to 3m. The sensor works basically as proximity switch on diffuse optical reflections. If the sensor detects reflected light, the LED shows red and the output switches on 0V. If no reflected light will be recognized, the output switches to +24VDC. The push-pull output allows to connect the load to +24VDC or 0V. By changing the polarity of the supply voltage, the output function will be inverted.

LED indication
The sensors types IRF have a red LED in the transparent connector housing and a green LED in front of the housing. The cable type IRF-.. S16 has only a 2-color LED in the housing. Disturbances will be indicated by red flushing of the LED in the housing.

Sensors with disable input, types IR-.--.-DI:
If several sensors are installed close to another, it is necessary to use sensors with disable input. By using the disable input DI, each sensor can be controlled in a short reaction time. If only one sensor is activated in the same time, a mutual influence is precluded.

DI= 0V or not connected = emitter enabled
DI= High(+24VDC) = emitter disabled
For a correct function the sensor must be enabled for at minimum >= 7.5ms (DI=0V). If the DI input will be disabled, the outputs holds the previous output status from the last enabled time.

The DI input is PNP compatible.

Operating Manual / EC - Declaration of Conformity:

Maintenance
Protect the sensor and the optional fibre optics against pollution. If the fibre optics or the sensor lenses are contaminated, clean with alcohol. Do not use aggressive solvents. Optical fibres can be destroyed by strong solvents. Equipment must only be repaired or serviced by the manufacturer.

Safety Informations
The sensors types IRF-. must not be used for Accident-Prevention! When installing and operating with the sensor, it is necessary to take into consideration the relevant international and other national regulations.

Standards met:
- EN 61000-6-1/-2, EN 61000-6-3/4, EN 60529
- Machine directive: 98/37/EG
- Low voltage directive: 73/23/EWG, 93/68/EWG
- EMC 89/336/EWG, 91/263/EWG, 92/31/EWG, 93/68/EWG

General Notes
We reserve the right to modify our equipment. Our equipment is designed such way, that it has the least possible adverse effect on the environment. It neither emit nor contain any damaging or siliconized substances and use a minimum of energy and resources. No longer usable or irreparable units must be disposed of in accordance with local waste disposal regulations.

Declaration of Conformity
The conformity of the devices with the EC standards and directives and the observation of the Quality Safety System ISO 9001, declares:

Hans Bracher, Matrix Elektronik AG
# Optoelectronic Proximity Switch IRF-1X S18

- Especially suitable for detecting of transparent foils

<table>
<thead>
<tr>
<th>Type</th>
<th>IRF-1X S18</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Technical Data</strong></td>
<td></td>
</tr>
<tr>
<td>Range on chrome steel plate</td>
<td>100 mm</td>
</tr>
<tr>
<td>Supply voltage</td>
<td>12-28 VDC / Ripple max. 10% Vpp</td>
</tr>
<tr>
<td>Current consumption</td>
<td>55mA</td>
</tr>
<tr>
<td>max. Power dissipation</td>
<td>1.54W</td>
</tr>
<tr>
<td>Circuit speed</td>
<td>2kHz</td>
</tr>
<tr>
<td>Hysteresis: axial direction</td>
<td>ca. 10% of operating distance</td>
</tr>
<tr>
<td>Hysteresis: radial direction</td>
<td>ca. 2% of operating distance</td>
</tr>
<tr>
<td>Output</td>
<td>1x Push-Pull / max. 100mA / short circuit protected</td>
</tr>
<tr>
<td>Ambient temperature TA</td>
<td>-20°C &lt; TA &gt; +50°C</td>
</tr>
<tr>
<td>Housing</td>
<td>Zinc die casting with Alu-cover</td>
</tr>
<tr>
<td>Housing color</td>
<td>yellow-blue</td>
</tr>
<tr>
<td>System of protection</td>
<td>IP65 according EN 60529</td>
</tr>
<tr>
<td>Connection</td>
<td>Connector M18</td>
</tr>
</tbody>
</table>

## Function and LED-Display

- **Sensor IRF-1X / S18 Chrome steel plate**
  - Distance 100mm
  - Focussed light beam hits the receiver
  - Red LED = ON
  - Green LED = OFF

- **Sensor IRF-1X / S18 Chrome steel plate**
  - Emitter beam diffused by the foil, no light hits the receiver
  - Red LED = OFF
  - Green LED = ON

### Output N-switching

- 1+ 2 Output 3-

### Output P-switching

- 1+ 2 Output 3-

**X-Function:** Reverse polarity of the power supply is followed by an invert function of the output.
Operating Manual:

Mounting prescriptions
We recommend that the sensor is installed insulated from the protective earth. The sensor must only be used with the voltage shown on the identification label. The shield is to connect with the protective earth (PE) in a wide area or to connect to "-". The connection cable must not be installed parallel to high voltage cables. The stated limit values must not be exceeded. The sensor has one Push-Pull-output. The load (Relay or other loads) can be connected at "+" or at "-". The sensor must be mounted absolutely parallel the mirror plate.

Function
The emitter light beam is focussed to a point of 2mm diameter at a distance of 100mm. At this distance of 100mm the emitter light beam will be reflected by mirroring plate (e.g. polished chromium steel, no triple mirrors allowed) and the beam hits on the receiver lens. The sensor is switching ON. If the emitter beam hits an transparent foil between the sensor and the mirror plate the light beam will be diffuse reflected and no light hits the receiver lens. The sensor is switching OFF. The operating state is shown by the red and green LED. The red is flushing on and the green LED is switching off, when the receiver has detected light.

X-Function
By changing the polarity of the supply voltage (3 = +, 1 = -), the output mode will be reversed (X-function). The LED function will remain unchanged.

Maintenance
The sensor does not require any special maintenance. Should the sensor become dirty, it should be cleaned with a non-aggressive medium. Equipment should only be repaired or serviced by the manufacturer.

General Notes
Our equipment is designed such way, that it has the least possible adverse effect on the environment. It neither emit or contain any damaging or siliconized substances and use a minimum of energy and resources. No longer usable or irreparable units must be disposed of in accordance with local waste disposal regulations. We reserve the right to modify our equipment.

Safety Informations
Should the sensor cable be broken or the sensor in any way become defect, the output may show any mode. When installing and operating with the Sensors, it is necessary to take into consideration the relevant EU and other national regulations.

Standards met:
- EN 50081-1/-2,  EN 50082-1/-2,
- Low Voltage Directive: 73/23/EWG

Dimensions:

Connection layout:

1 +
2 Output
3 -
4 Protection Earth
**Photoelectric Proximity Switch IRF-1X / S59**

- 50ms rise time delay
- applicable for glass surface detection

<table>
<thead>
<tr>
<th>Type</th>
<th>Technical Data</th>
<th>IRF-1X / S59</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Range</strong></td>
<td>100mm</td>
<td></td>
</tr>
<tr>
<td><strong>Supply voltage</strong></td>
<td>12-28 VDC</td>
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<tr>
<td><strong>Current consumption</strong></td>
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<tr>
<td><strong>Power dissipation</strong></td>
<td>1.54W</td>
<td></td>
</tr>
<tr>
<td><strong>Output</strong></td>
<td>Push-Pull, maximum 100mA, short circuit protected</td>
<td></td>
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<tr>
<td><strong>Response time</strong></td>
<td>500us</td>
<td></td>
</tr>
<tr>
<td><strong>Hysteresis: axial</strong></td>
<td>appr. 10% of maximum range</td>
<td></td>
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<tr>
<td><strong>Hysteresis: radial</strong></td>
<td>appr. 2% of maximum range</td>
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<td><strong>Operating temperature TA</strong></td>
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<td></td>
</tr>
<tr>
<td><strong>Housing</strong></td>
<td>Zinc die casting with Aluminum-cover</td>
<td></td>
</tr>
<tr>
<td><strong>Housing color</strong></td>
<td>yellow and blue</td>
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</tr>
<tr>
<td><strong>Protection rating</strong></td>
<td>IP65 at EN 60529</td>
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</tr>
<tr>
<td><strong>Connection</strong></td>
<td>Connector, M18</td>
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<tr>
<td><strong>Accessories</strong></td>
<td>---</td>
<td></td>
</tr>
<tr>
<td><strong>Option</strong></td>
<td>---</td>
<td></td>
</tr>
</tbody>
</table>

**Function and LED indication**

- **Diffuse reflected light detected**
  - LED, inside connector, shows red, green LED in the housing extinguished

- **No reflection detected**
  - red LED, inside connector, extinguished, LED in the housing shows green

**Function at standard connection of the supply voltage:**

- 1 +
- 2 Output = Low
- 3 -

**Function at reversing connection of the supply voltage:**

- 1 -
- 2 Output = High
- 3 +

**X-Function:** Inversely connection of the supply voltage = inversely output function

**Switching diagram:**

- < 50ms
- > 50ms
- Reflection detected
- Output activated after 50ms
**General mounting prescriptions:**
Do not exceed the maximum ratings. The electrical connections must be exactly as shown in the connection diagram. The cable shield must be connected short. The cable shield should be connected to PE or 0V(−) of the supply voltage. Connection cables must not be installed parallel to high voltage cables.

**Function**
The sensor works basically as proximity switch on diffuse optical reflections. If the sensor detects reflected light, the LED, inside the connector, shows red, the green LED in the housing is extinguished and after a delay time of 50ms, the output switches on +24VDC or 0V (dependent of the polarity of the supply voltage). If no reflected light will be recognized, the red LED, inside the connector extinguished, the LED in the housing shows green and the output switches immediately to 0V or +24VDC (dependent of the polarity of the supply voltage). The push-pull output allows to connect the load to +24VDC or 0V. The function of the LED's is not influenced by the polarity of the supply voltage.

**Maintenance**
Protect the sensor and the optional fibre optics against pollution. If the fibre optics or the sensor lenses are contaminated, clean with alcohol. Do not use aggressive solvents. Optical fibres can be destroyed by strong solvents. Equipment must only be repaired or serviced by the manufacturer.

**Safety Informations**
The sensors type IRF-.. must not be used for Accident-Prevention! When installing and operating with the sensor, it is necessary to take into consideration the relevant international and other national regulations.

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