

*Royal Exclusiv pumps & skimmers*

Vorgebirgsstr. 28 // 50389 Wesseling // Germany

Fon +49(0)2236/88055-0 // Fax +49(0)2236/88055-20

info@royal-exclusiv.de // www.royal-exclusiv.de



Since 1986



## Operating and maintenance instructions for AutoSwitch ON/OFF

For all switchable outlets with capacitive sensor and delay release

v2.0

**ENG**



## Operating and maintenance instructions for AutoSwitch ON/OFF

For all switchable outlets with capacitive sensor and delay release

### 0.1 Foreword

The capacitive sensor of the switchable outlet recorded contact-free electro-metals, almost all plastics, glass, ceramics, wood, paper, oils, fats, water and all aqueous materials. The sensor is equipped with a NC- and C- contact, which supplied to the socket with voltage / or which separates from the voltage.

### 0.2 Packaging content

- Socket unit with relay
- Connected cable for the power plug
- Connected sensor
- Slide of sensor with plastic knurled screw to fixing of the slide
- Bar to the secure the slide and sensor on the tank to be monitored

Bars are available in 3 different lengths 320, 250, 160mm

### 0.3 Commissioning

Please see the switchable socket with the capacitive sensor from the packaging and check the product for any shipping damage must appear immediately within 24 hours, at the competent dealer.

The switchable socket with capacitive sensor is fully pre-installed and can immediately on a filter sump, etc. to be installed. **!! Max load: 2500 Watts!!** The **maximum distance for the function of the sensor is 8mm!**

### 0.4 Operating and display elements

Self explanatory. The LEDs shows the status:

The green LED indicates whether there is voltage

The yellow LED shows whether the relay is working

The red LED indicates whether the sensor has tripped

The delay/relay can completely with mode Rel. on / / Rel. off on or be turned off.

The delay can be controlled either *rough (grob)* or *fine (fein)*.

### 0.5 Installation with the help of the carriage

The supplied slide and bar installed as follows. Super-glue, mirror tape or double-sided tape can be used for fixing the rail where to monitored containers.

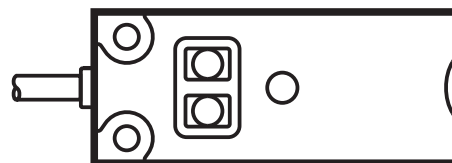
### 0.6 Maintenance

The operation of the device is maintenance-free. For proper functioning, it is worth noting:

The active surface and if necessary a freedom from deposits and foreign bodies are free to keep.

### 0.7 Setting non-contact sensor

Please note the following pages.



### Important Notice

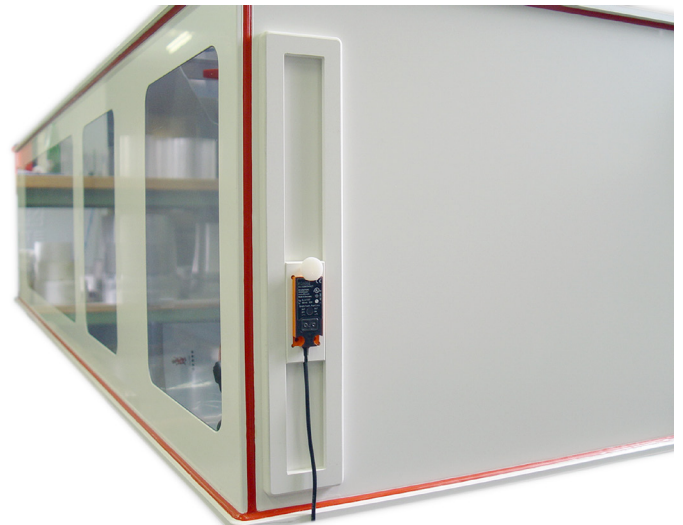
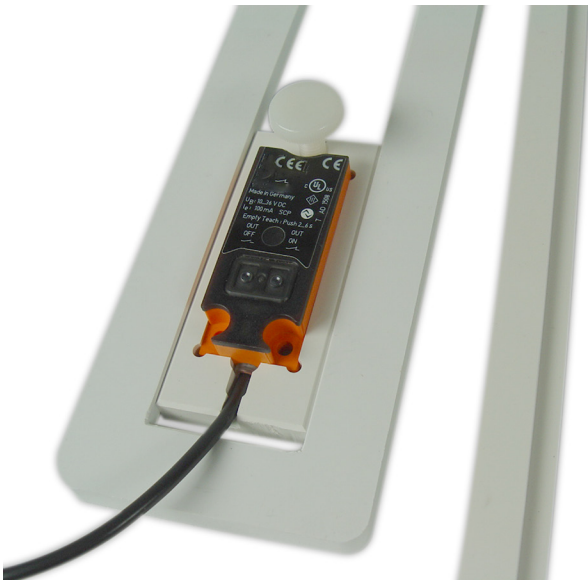
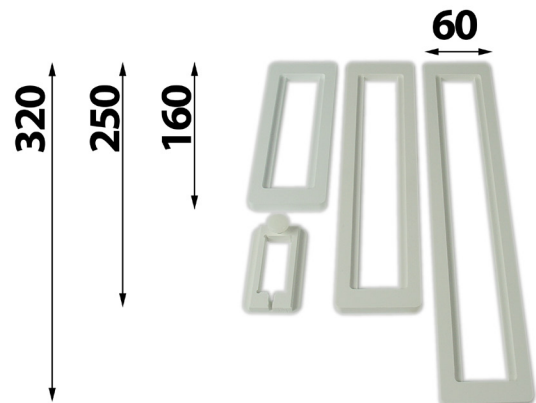
Please read this manual carefully before you install the device. We recommend not to proceed the installation of the device until you read the manual. This prevents any questions and problems that might occur in installation process. As soon as you power-on the device for the first time, you agree that you read and understood this manual. In doubt or if anything is unclear please contact your supplier/vendor or dealer before you start-up the device.

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For more information, please visit [www.royal-exclusiv.de](http://www.royal-exclusiv.de). Simply enter the part number or name into the search box or email: [info@royal-exclusiv.de](mailto:info@royal-exclusiv.de).

All information subject to change. We try our best, but printing errors reserved.

## 1 Preliminary note

### 1.1 Symbols used

- Operating elements are indicated as follows:  
Example: [OUT OFF] = Button “OUT OFF”.
- An instruction is indicated by “▶”.  
Example: ▶ Mount the unit as shown.
- A reaction to the action is indicated by “>”.  
Example: > Yellow LED on.



Important note

Non-compliance can result in malfunctions or interference.



Information

Supplementary note.

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## 2 Safety instructions

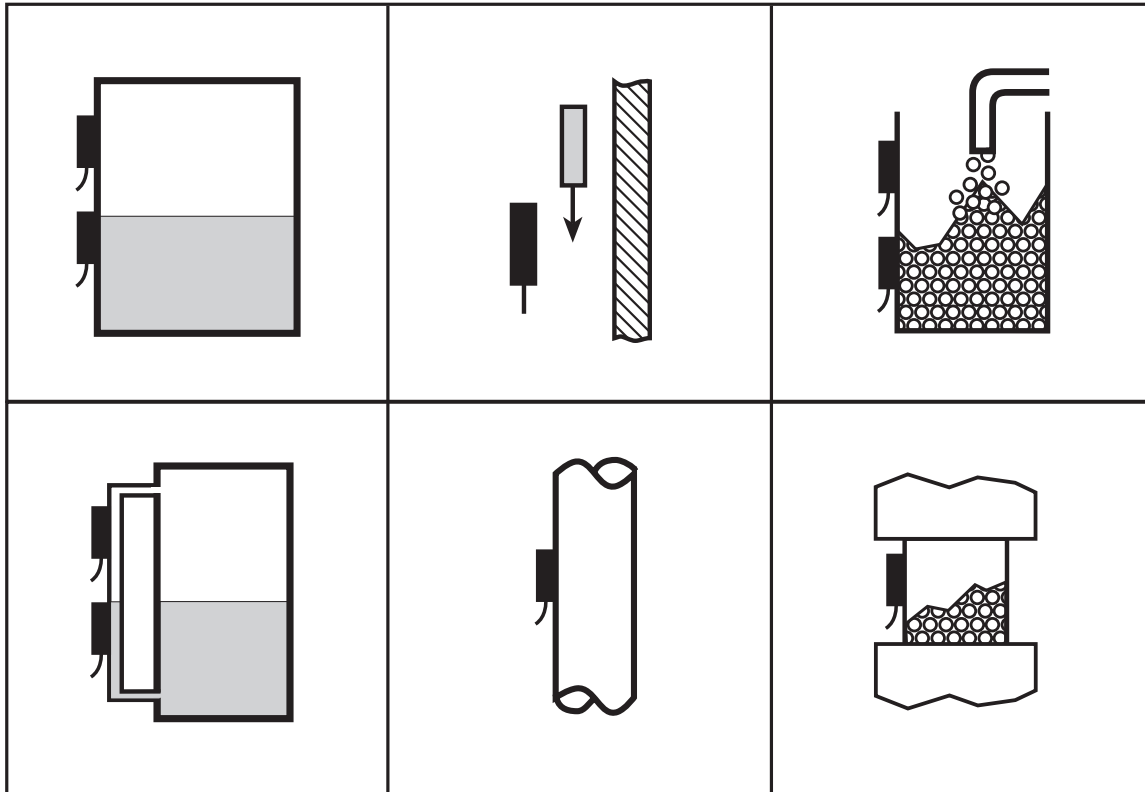
- Please read the product description prior to set-up of the unit. Ensure that the product is suitable for your application without any restrictions.
- The unit conforms to the relevant regulations and EC directives.
- Improper or non-intended use may lead to malfunctions of the unit or to unwanted effects in your application.
- That is why installation, electrical connection, set-up, operation and maintenance of the unit must only be carried out by qualified personnel authorised by the machine operator.

## 3 Functions and features

- capacitive sensor used as level or proximity sensor
- detects without contact metals, almost all plastics, glass, ceramics, wood, paper, oils, greases, water and all hydrous materials and indicates their presence by providing a switched signal
- automatic adjustment to the medium to be detected by means of programming buttons
- in level applications the sensor detects the medium through the tank wall (only suitable for non-metallic tanks)

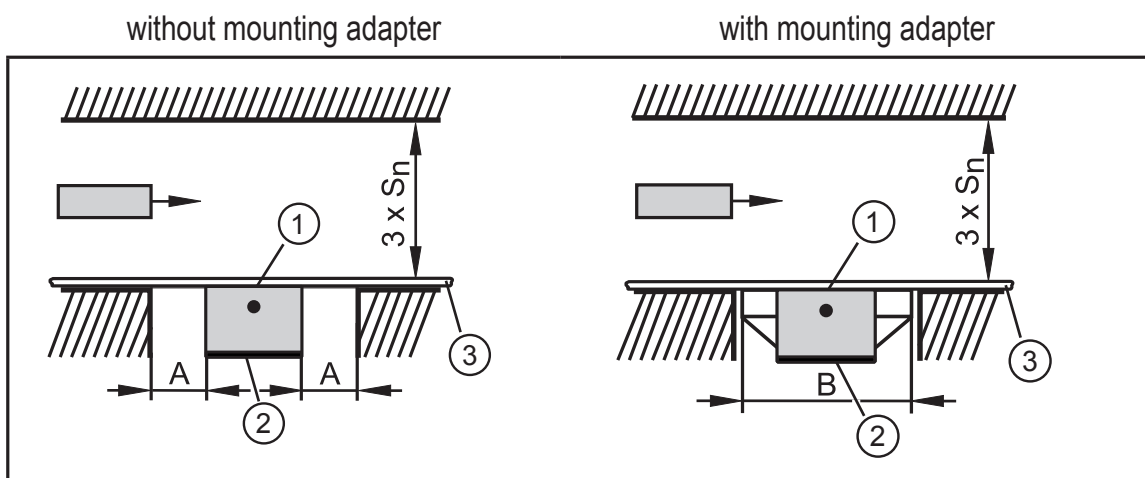


### 3.1 Application examples



### 4.2 Use as proximity sensor

#### 4.2.1 Installation and installation remarks



- 1: sensing face
- 2: programming buttons
- 3: plastic plate

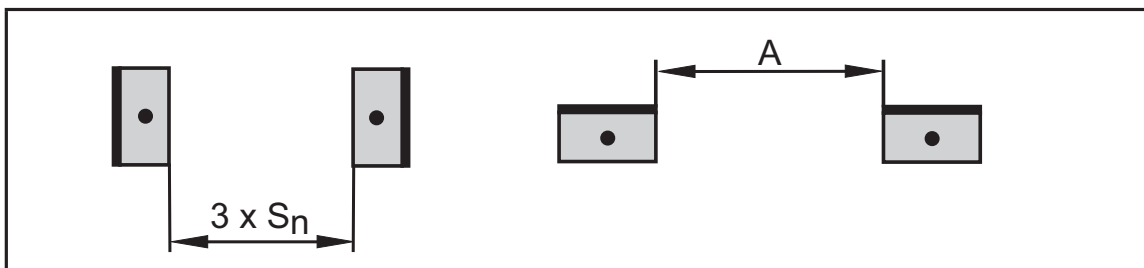
- $S_n$ : nominal sensing range (see data sheet)
- A: distance = 8 mm
- B: width of the mounting adapter = 36 mm

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- ▶ Align the sensing face (1) to the object. Make sure that the programming buttons (2) remain accessible.
- ▶ Adhere to the indicated minimum distances to metallic objects opposite and beside the sensor (free space).
- ▶ Non-metallic objects (e.g. plastic fixtures) are allowed within the lateral free space.
- ▶ Fix the sensor with appropriate fixing screws to the designated location.
- ▶ If the sensor is installed behind a plastic plate (3), the object will be detected through the wall. Depending on the material used and the wall thickness the sensor characteristics might change slightly. Do not use conductive plastics! If possible, use thin walls.

#### 4.2.2 Minimum distances

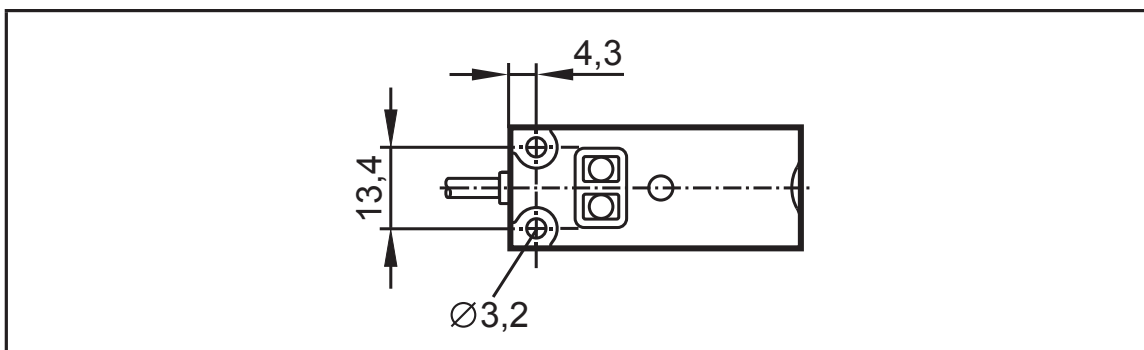
Installation of several sensors of the same type



$S_n$ : nominal sensing range (see data sheet)

A: sensor distance 50 mm

#### 4.2.3 Sensor bore hole dimensions



### 4.3 Notes on laying of the connection cable

- ▶ Lay the cable as straight as possible and do not coil it.
- ▶ If necessary, cut the cable to the required length.

## 5 Electrical connection

- ! The unit must be connected by a qualified electrician. The national and international regulations for the installation of electrical equipment must be adhered to.

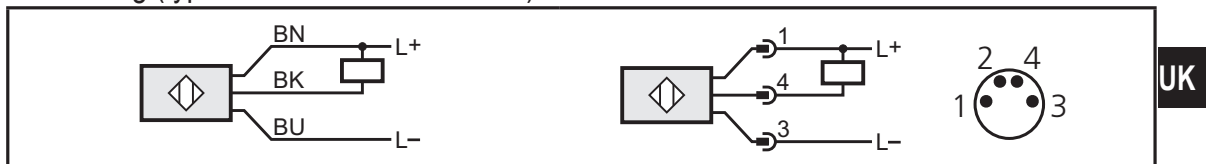
- ▶ Disconnect power
- ▶ Connect the unit

### 5.1 Wiring

p-switching (type ...FPKG... or ...FPOG...)



n-switching (type ...FNKG... or ...FNOG...)



BN = brown, BK = black, BU = blue

BN = OUT / IO-Link

4: OUT / IO-Link

### 5.2 Unit versions with auto-detect

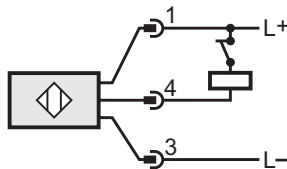
On power up, unit types with auto-detect (types ...FAKG or ...FAOG...) detect automatically if the output is connected to L- (p switching) or to L+ (n switching).

- ▶ Disconnect the unit to acknowledge a change of the load connection.

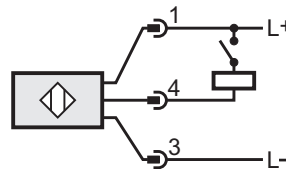
- ! Automatic load detection is only ensured when a resistor is switched in series to a **closed** mechanical contact.



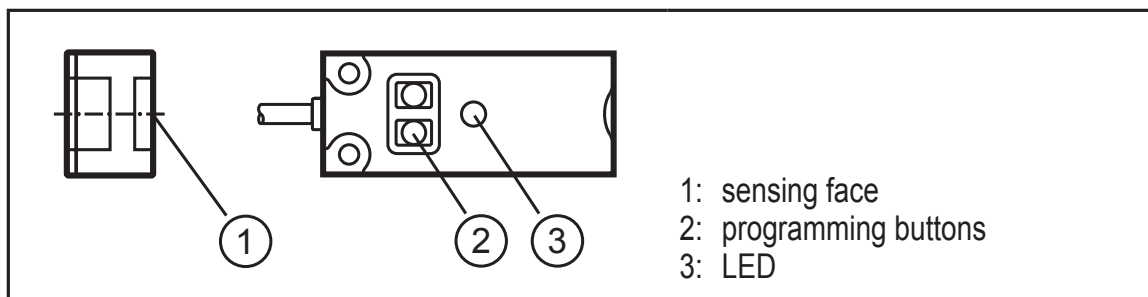
load detection is possible



load detection impossible



## 6 Operating and display elements



## 7 Settings

### 7.1 Basic teach empty state

Using the basic teach empty state the unit suppresses the installation environment. The basic teach empty state resets the unit, an adjustment teach already carried out is deleted.

<p>► Empty the tank until the level is at least 20 mm below the sensor.</p>	
<p>Set the unit as normally open (output closes when the tank is full):</p> <p>► <b>Press</b> [OUT OFF] for min. 2 s (max. 6 s).</p> <p>&gt; While pressing the pushbutton the LED flashes slowly. After releasing the pushbutton, the LED goes out.</p>	



<p>Set the unit as normally closed (output opens when the tank is full):</p> <ul style="list-style-type: none"> <li>▶ <b>Press [OUT ON]</b> for min. 2 s (max. 6 s).</li> <li>&gt; While pressing the pushbutton the LED flashes slowly. After releasing the pushbutton, the LED lights continuously.</li> </ul>	
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The unit is now ready for operation. For the detection of media with a low dielectric constant (e.g. plastic granulates or oils) no further setting is required.

## 7.2 Adjustment teach full state

Necessary for aqueous media. The sensitivity of the unit is optimised. Later on, the adjustment teach full state can be repeated at any time, an adjustment teach empty state already carried out is not affected.

<p>A basic teach empty state must be carried out prior to the adjustment teach full state (→ 7.1 Basic teach empty state)! If it is not possible to empty the tank, a basic teach empty state can be carried out by simulating the empty state (e.g. adjustment when not installed, adjustment at a higher position). For optimum function it is necessary to carry out the “modified basic teach empty state“ → 7.3 Modified basic teach empty state) when the tank is emptied the next time.</p>	<b>UK</b>
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<ul style="list-style-type: none"> <li>▶ Fill the tank until the sensing face of the unit is covered.</li> <li>&gt; For NO the LED lights, for NC it goes out.</li> </ul>	
<p>Set the unit as normally open (output closes when the tank is full):</p> <ul style="list-style-type: none"> <li>▶ <b>Press [OUT ON]</b> for min. 6 s.</li> <li>&gt; While pressing the pushbutton the LED first flashes slowly, after 6 s more quickly. After releasing the pushbutton, the LED lights continuously.</li> </ul>	



<p>Set the unit as normally closed (output opens when the tank is full):</p> <ul style="list-style-type: none"> <li>▶ <b>Press [OUT OFF]</b> for min. 6 s.</li> <li>&gt; While pressing the pushbutton the LED first flashes slowly, after 6 s more quickly. After releasing the pushbutton, the LED goes out.</li> </ul>	
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### 7.3 Modified basic teach empty state

Recommended for deposits in the tank. Deposits are largely suppressed. This is also recommended if it has not been possible to carry out a basic teach empty state (e.g. if the sensor is set up on a full tank; details: → 7.2 Adjustment teach full state)

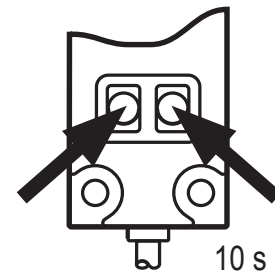
Later on, the modified basic teach empty state can be repeated at any time, an adjustment teach full state already carried out is not affected.

<ul style="list-style-type: none"> <li>▶ Empty the tank until the level is below the sensing face of the unit.</li> <li>&gt; For NO the LED goes out, for NC the LED lights.</li> </ul>	
<p>Set the unit as normally open (output closes when the tank is full):</p> <ul style="list-style-type: none"> <li>▶ <b>Press [OUT OFF]</b> for min. 6 s.</li> <li>&gt; While pressing the pushbutton the LED first flashes slowly, after 6 s more quickly. After releasing the pushbutton, the LED goes out.</li> </ul>	
<p>Set the unit as normally closed (output opens when the tank is full):</p> <ul style="list-style-type: none"> <li>▶ <b>Press [OUT ON]</b> for min. 6 s.</li> <li>&gt; While pressing the pushbutton the LED first flashes slowly, after 6 s more quickly. After releasing the pushbutton, the LED lights continuously.</li> </ul>	

## 7.4 Locking / unlocking

The unit can be electronically locked to protect it against unintentional setting.

- ▶ To lock press [**OUT ON**] and [**OUT OFF**] **simultaneously** for 10 s.
- > Acknowledgement: LED state (yellow) changes for a short time (the lit LED goes out briefly or the LED which is not lit lights briefly).
- ▶ To unlock repeat this step.



If the unit does not react, it may be locked.

## 7.5 IO-Link

### 7.5.1 General information

This unit has an IO-Link communication interface which requires an IO-Link-capable module (IO-Link master) for operation.

The IO-Link interface enables direct access to the sensor values and parameters and provides the possibility to set the parameters of the unit during operation.

In addition communication is possible via a point-to-point connection with a USB adapter cable.

## 8 Operation

Check whether the unit operates correctly. Bring about a sensor response by taking suitable measures.

Display by LEDs (independent of the programmed output function):

LED yellow OFF:    switching output disabled
LED yellow ON:     switching output enabled

## 9 Maintenance, repair, disposal

The operation of the unit is maintenance-free. To ensure a correct function:

- Keep the sensing face and a clear space, if any, free from deposits and foreign bodies.

When replacing the sensor ensure that installation is done in the same way and a sensor with the same settings is used.

It is not possible to repair the unit.

After use dispose of the unit in an environmentally friendly way in accordance with the applicable national regulations.



## 10 Terms

### Active zone

Area above the sensing face in which the sensor reacts to the approach of the target.

### Output function

Normally open: object within the active zone - output switched.

Normally closed: object within the active zone - output blocked.

Programmable: Choice between normally closed or normally open.

Positive switching: positive output signal (to L-).

Negative switching: negative output signal (to L+).

### Power-on delay time

The time the sensor needs to be ready for operation after application of the operating voltage (in the millisecond range).

### Hysteresis

Difference between the switch-on and the switch-off point.

### Leakage current

Current for the internal supply of 2-wire units, also flows through the load when the output is blocked.

### Current consumption

Current for the internal supply of 3-wire DC units.

### Switch point drift

Shifting of the switch point owing to changes of the operating conditions (e.g. temperature, pressure, air humidity).

### Short-circuit protection

ifm sensors which are protected against excessive current by means of a pulsed short-circuit protection. The inrush current of incandescent lamps, electronic relays and low resistance loads may cause this protection to cut in and turn the sensor off!

### Operating voltage

The voltage range in which the sensor functions safely. A stabilised and smoothed direct voltage should be used! Take into account residual ripple!

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## 11. Defects and claims for compensation, disclaimer

**11.1.** Barring any further claims we are only liable that the supplied goods are free of defects until the initial transfer of perils. Insignificant variations of the contracted appearance and workmanship or marginal limitation of the usability or suitability of the product are unremarkable.

The warranted condition, endurance and usability the product is solely subject to the specification agreed in writing, in the product specification and / or in this manual. Further oral agreements, especially from preliminary talks, advertising and / or in related industrial standards will be only valid as integral part of a written contract. Only conditions and specifications assured specifically by us are valid. We do not accept conditions or specifications made by third parties. Specifically the specification assured in this manual are valid. If the customer wants to use the product for other than the intended purpose, he is obliged to thoroughly check the suitability of the product for the other purposes. We give no warranty and no liability accrues for any applications that are not agreed on by us explicitly and in written form.

Any manipulation of the device, the electronic as well as any attempt to modify the software, to influence the software or to read out or re-engineer the software of the driver unit immediately causes a loss of warranty and all claims and rights expire.

Every user is held responsible for the appropriate usage of his **switchable socket with capacitive sensor**. The user manual does not discharge you from your liability for a safe, appropriate and secure application, installation, operation and maintenance.

By using this manual you agree that in no circumstances the manufacturer can or will be held liable for any personal injuries or property damages which possibly occur due to the usage of the device. This applies specifically for any damages that are due to inappropriate piping or plumbing. Insufficient or missing cleaning- or maintenance intervals and damages that might result due to these are not covered by warranty. This applies especially for calcinations (salt water usage) and accumulated foreign particles (pond usage) such as sand or gravel, which lead to damages on rotors, bearings, rotor housing or motor housing, that are not covered by warranty.

**11.2.** Our warranty for defects is strictly limited to supplementary performance. This is upon our choice either removal of defects or replacement delivery free from defects. In the case of challenge, impossibility or failure of the supplementary performance the customer has the right for impairment or the right to withdraw from the contract.

Additional expenses which arise because the customer has brought the sales item to another place than his subsidiary. The manufacturer explicitly limits the warranty to the device itself. We are not liable for consequential damages, or damages that are caused by a malfunction or failure of the device, such as a loss of animals. It is in the responsibility of the customer to provide back-up devices for the case of a potential malfunction or failure of the device.

**11.3.** The customer has to check the goods immediately thoroughly, also for product safety. Apparent damages have to be reported in written form immediately. Hidden damages have to be reported immediately after their discovery. The customer is liable to report transport damages within 24 hours to the carrier and/or the delivery service. Disregarding the rules for checking and reporting results in a loss of warranty.

**11.4.** Furthermore we are not liable for the consequences of inappropriate application, usage, maintenance and handling of the product by the customer or his subsidiaries, neither for normal abrasion. This applies specifically to the consequences of thermal, chemical, electrochemical or electrical influences as well as for infringements against our uses- and maintenance manuals. The same applies to damages which are the result of changes or adjustments by the customer which have not been approved by us in beforehand.

**11.5.** Our liability for wanton negligence is limited to claims of injury of life, body and health, to claims based upon the law on product liability and to claims from culpable fundamental breach of the contract which entail contractual obligations. For the rest our liabilities for wantonly negligent breach of contractual obligations, which are foreseeable at the time of the conclusion of the contract, are barred.

Damages, which are unambiguously attributed to inappropriate usage of the product, are in general to be accounted for by the customer. In the case of returns of the product the customer has to use break-proof packaging for the product. The customer is liable for any damages that can be accounted to an inappropriate packaging.



**11.6.** Claims against us become time-barred within a year after the initial delivery of the goods to the customer. The same applies to claims for damages regardless of their juridical cause. The limitation period does not apply to claims based upon the malicious concealment of damages from the injury of life, health or body and for other damages that result out of intention or wanton negligence.

**11.7.** If it becomes apparent during our examination of damages reported by the customer or in the course of our removal of defects, that the reported damages or claims were made wantonly negligent or unwarranted, we may charge an adequate consideration for our examination and for the removal of defects. The customer has the right to neglect a necessary repairing and to demand the return of the device. In general every examination of damages is bound to lump-sum compensation if it occurs that the customer has to be accounted for the damages.

#### **11.8. Spare parts**

Our liability to deliver and hold spare parts available is limited to the period of 5 years after initial shipment of the product. Our respective list prices apply for spare parts.

#### **11.9. Disposal**

We offer our customers to take back products that fall under the restriction of hazardous substances directive (ElektroG) within Germany free of charge, for products, which were brought into circulation after the 13th of August 2005. We will take care for the disposal. If a customer chooses not to let us take care for the disposal, he takes the responsibility of a disposal according to legal regulations and discharges us from our liabilities according to §10 sect. 2 ElektroG and any associated liabilities of others.

#### **11.10. Subject to alterations**

The manufacture has the right for changes in hardware and software of the product at any time without preliminary notice, as long as these changes advance reliability or quality of the device. No claims can be made if for instance design, functionality or performance of the device changes elementary. The assured specification of the device is always guaranteed.

## **12. Manufacturer's declaration**

Titles against **Royal Exclusiv®** concerning the products described in this manual address on the **Royal Exclusiv®** guarantee clauses. Specification may vary due technical improvements.

### **12.1. Manufacturer**

#### **Royal Exclusiv® pumps and skimmers**

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#### **Made in Germany**

Royal-Exclusiv® EAR-number: WEE.Reg.No. 83082352

### **12.2. Informations and support**

Thank your for purchasing a **Royal Exclusiv®** float switch. This device is a high quality product made in Germany with the highest manufacturing demands on modern CNC machines. This manual is supposed to help you to setup the float switch for use and to advice you with the necessarily maintenance procedures.

To ensure longlasting satisfaction with this product we please you to read this manual carefully and follow our guidelines.

**Royal Exclusiv®** guarantees 5 years of spare part availability for the float switch.

Should the device in some way not meet the high demands you expect from **Royal Exclusiv®** please contact the dealer where you purchases your float switch. This is usually the best way for product support. However you may feel free to contact our support on our website: <http://www.royal-exclusiv.de>

*Royal Exclusio*



*Since 1986*

