

Power Distribution | Demand Management

# PREFABRICATED RIPPLE CONTROL PLANT

### Features

- 1 to 6 relays 230 V, 16 A two-way contact
- 1 to 4 relays 230 V, 40 A normally open contact
- Relays, pluggable, with blind cover for unused slots
- USB-interface and optical interface in accordance with IEC 62056-21 for parameterization, ripple-control signal analysis and protocol evaluation
- In case of parameterization via USB, no supply voltage connection is necessary.
- Optional pluggable PROM as alternative, simple solution for parameterization tasks
- DIN-rail mounting in accordance with DIN EN 60715 possible
- Swistra®-functionalities (option)
- Pluggable communication module (Ethernet) Optional
- Underfrequency detection



### Technology

All Swistec ripple control receivers use state-of-the-art, recently developed filter algorithms capable of reliably processing ripple control signals with operating voltages below 0.3%  $U_n$  – a result of state-of-the-art processor technology combining high CPU power with little power consumption.

### Time Program Functions

- Internal clock (remotely synchronised) for autonomous operation of up to 8 work schedules with 15 switching times each
- Free assignment of work schedules to the relays
- Real-time clock with super-cap (option), voltage interruptions can be bridged for a minimum of 48 hours.

### Programming

The programming can be done via the standard optical interface (acc. to IEC 62056-21) or via an optional USB interface. As an alternative, a plug-in PROM is available allowing the programming of the SRvario by simply plug in a pre-programmed PROM – ideal if large-scale production is foreseen.

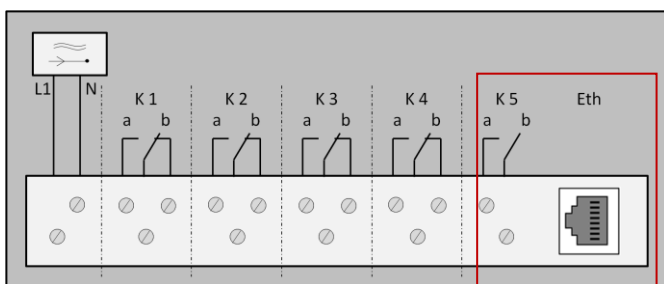
### Logging

Each received ripple control signal is logged and can be traced using an attached PC or laptop. This feature allows easier trouble shooting in case of any dysfunction of the device that is controlled by the SRvario.

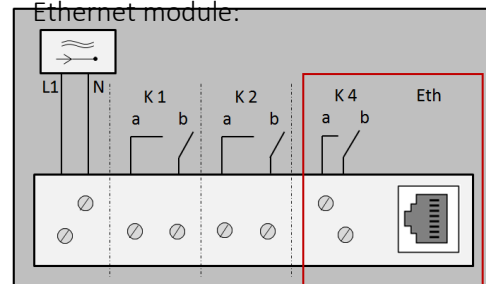
Technical Data					
<b>Power supply:</b>	<ul style="list-style-type: none"> <li>▪ Mains voltage 100 – 250 VAC</li> <li>▪ Frequency of mains voltage 50 Hz +2% ... -2%</li> <li>▪ Power consumption &lt; 1W/10VA cap.</li> <li>▪ Surge voltage resistance 12 kV 1.2/50 <math>\mu</math>s acc. to IEC 60060-1</li> </ul>				
<b>Filter data:</b>	<ul style="list-style-type: none"> <li>▪ Operating frequency 110 – 2000 Hz (programmable)</li> <li>▪ Operating voltage <math>U_f &gt; 0.3\% U_n</math> and <math>U_f &gt; U_{nf}</math></li> <li>▪ Non-operating voltage <math>U_{nf} \geq 0.1\% U_n</math></li> <li>▪ Maximum control voltage 8 to 15 times <math>U_f</math> (depending on frequency)</li> <li>▪ <i>Swistra</i><sup>®</sup> functions Available, option</li> </ul>				
<b>Output data:</b>	<table border="0" style="width: 100%;"> <tr> <td style="width: 50%; vertical-align: top;"> <ul style="list-style-type: none"> <li>▪ Type <b>16A relays</b></li> <li>▪ Number of relays up to 6 (bistable, change over contact free of potential, idle position is programmable)</li> </ul> </td> <td style="width: 50%; vertical-align: top;"> <ul style="list-style-type: none"> <li>▪ <b>40A relays</b></li> <li>up to 4 (bistable, normally open contact free of potential, idle position is programmable)</li> </ul> </td> </tr> <tr> <td style="vertical-align: top;"> <ul style="list-style-type: none"> <li>▪ Nominal switching voltage <math>U_c</math> 250 V, 50 Hz</li> <li>▪ Nominal switching current <math>I_c</math> 16 A</li> <li>▪ Optical indication of relay position latch</li> <li>▪ Terminals from 1 x 1.5mm<sup>2</sup> up to 1 x 4mm<sup>2</sup> or 2 x 2.5mm<sup>2</sup></li> </ul> </td> <td style="vertical-align: top;"> <ul style="list-style-type: none"> <li>250 V, 50 Hz</li> <li>40 A</li> <li>latch</li> <li>from 1 x 1.5mm<sup>2</sup> up to 1 x 10mm<sup>2</sup> or 2 x 4mm<sup>2</sup></li> </ul> </td> </tr> </table>	<ul style="list-style-type: none"> <li>▪ Type <b>16A relays</b></li> <li>▪ Number of relays up to 6 (bistable, change over contact free of potential, idle position is programmable)</li> </ul>	<ul style="list-style-type: none"> <li>▪ <b>40A relays</b></li> <li>up to 4 (bistable, normally open contact free of potential, idle position is programmable)</li> </ul>	<ul style="list-style-type: none"> <li>▪ Nominal switching voltage <math>U_c</math> 250 V, 50 Hz</li> <li>▪ Nominal switching current <math>I_c</math> 16 A</li> <li>▪ Optical indication of relay position latch</li> <li>▪ Terminals from 1 x 1.5mm<sup>2</sup> up to 1 x 4mm<sup>2</sup> or 2 x 2.5mm<sup>2</sup></li> </ul>	<ul style="list-style-type: none"> <li>250 V, 50 Hz</li> <li>40 A</li> <li>latch</li> <li>from 1 x 1.5mm<sup>2</sup> up to 1 x 10mm<sup>2</sup> or 2 x 4mm<sup>2</sup></li> </ul>
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<b>Real-time clock</b>	<ul style="list-style-type: none"> <li>▪ Accuracy +/- 20 x 10<sup>-6</sup></li> <li>▪ Power reserve (option) &gt; 48 hours</li> </ul>				
<b>Resistance to climatic conditions:</b>	<ul style="list-style-type: none"> <li>▪ Operating temperature -25 ... +70°C</li> <li>▪ Storage temperature -30 ... +80°C</li> </ul>				
<b>Design:</b>	<ul style="list-style-type: none"> <li>▪ Protection IP 53</li> <li>▪ Size (height x width x depth) without extended mounting device: 170 x 105 x 61mm with extended mounting device: 185 x 105 x 61mm</li> </ul>				

## Circuit Diagrams

Fitted with up to 4 16A relays and Ethernet module:



Fitted with up to 2 40A relays and Ethernet module:



## Communication modules

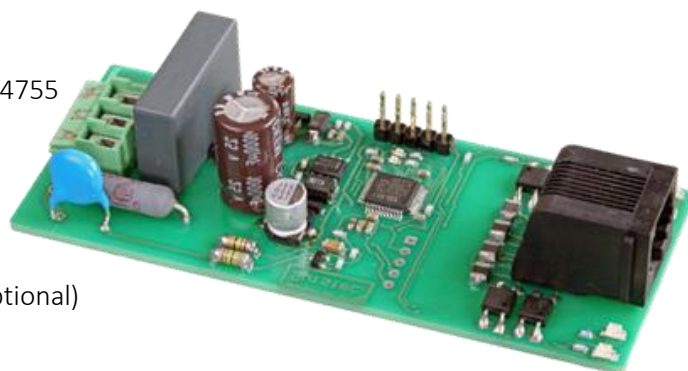
Currently, communication modules for Ethernet are available. The module is plugged in the far-right position instead of relays 5 and 6 (16A) or 3 and 4 (40A). Optionally, an additional relay (8A closing contact) can be fitted into the communication module.

Further modules under development (non-exhaustive list):

- Wireless M-Bus
- Zigbee
- 6LoWPAN
- KNX-RF

### Features

- 1 to 6 relays 230 V, 16 A two-way contact
- In accordance with Australian standard AS/NZS-4755
- 4 relays 24V; optionally 8 relays
- 100mA
- RJ45-modular jack
- Programming via secure wireless
- Bluetooth-LE interface from a mobile device (optional)
- Optional IP65 housing



### Technology

All Swistec ripple control receivers use state-of-the-art, recently developed filter algorithms capable of reliably processing ripple control signals with operating voltages below 0.3%  $U_n$  – a result of state-of-the-art processor technology combining high CPU power with little power consumption.

The SRdred is a small, reliable ripple control receiver specifically designed to meet the requirements of the Australian standard AS/NZS-4755, making use of the secure wireless BLE interface technology.

The SRdred, Swistec's ripple-control demand response enabling device (DRMs), can be installed directly in or near customer devices such as:

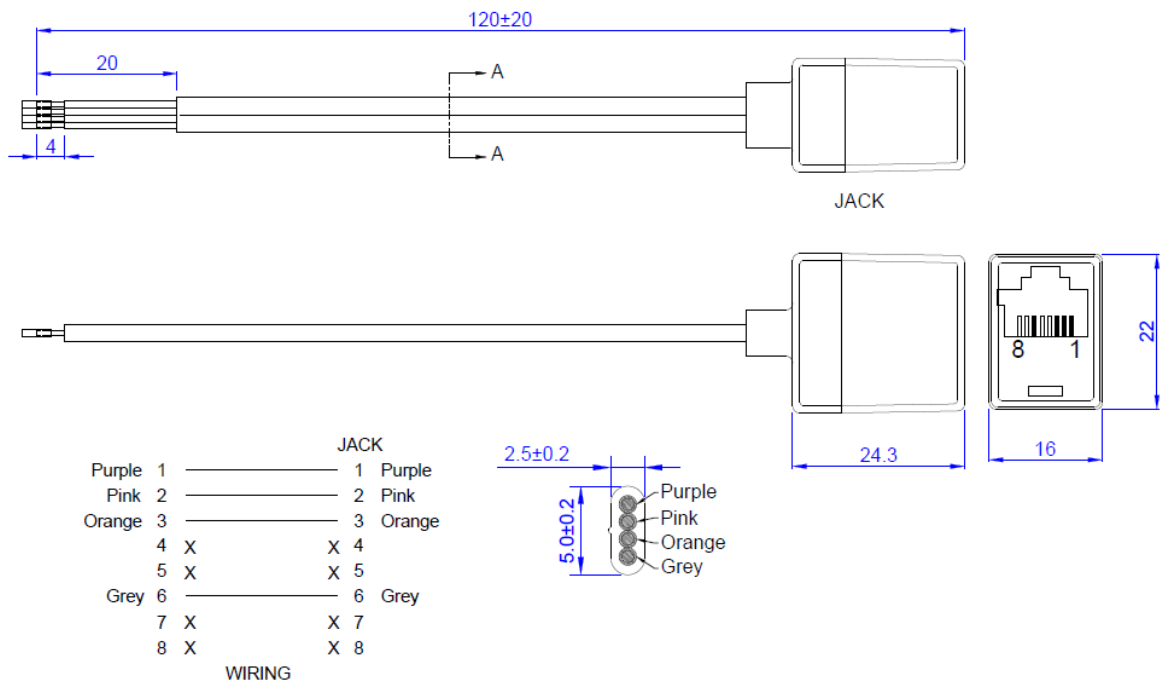
- Air conditioners
- Pool pump controllers
- Hot water heaters
- Electric water heaters
- Street lights
- EV charge controllers.

### Deliverables:

- A quick and easy inclusion of a customer or consumer into a DRED-program of the electricity providers.
- Optional programming of the device via an APP with Bluetooth communication
- Setting the DRED-mode of the device through a ripple-control transmission
- Well suited for dynamic electricity pricing models

Technical Data		
Power supply:	<ul style="list-style-type: none"> <li>▪ Mains voltage</li> <li>▪ Frequency of mains voltage</li> <li>▪ Power consumption</li> <li>▪ Surge voltage resistance</li> </ul>	100 - 230 VAC -15% ...+15% 50 Hz +/- 2% 4kV 1.2/50 $\mu$ s in accordance with IEC 60060-1
Filter data:	<ul style="list-style-type: none"> <li>▪ Operating frequency</li> <li>▪ Operating voltage</li> <li>▪ Non-operating voltage</li> <li>▪ Maximum control voltage</li> <li>▪ Measuring input voltage</li> <li>▪ Sampling rate</li> <li>▪ <i>Swistra</i> functions</li> </ul>	110 – 2000 Hz (programmable) $U_f \geq 0.3\% U_n$ and $U_f > U_{nf}$ $U_{nf} \geq 0.1\% U_n$ 8 to 15 times $U_f$ (depending on frequency) 85 - 264 VAC 0.2 ms available, option
Output data:	<ul style="list-style-type: none"> <li>▪ Number of relays</li> <li>▪ Nominal switching voltage <math>U_c</math></li> <li>▪ Nominal switching current <math>I_c</math></li> <li>▪ Optical indication</li> </ul>	4 (potential-free contacts); optionally 8 24 V 100 mA none
Resistance to climatic conditions:	<ul style="list-style-type: none"> <li>▪ Operating temperature</li> <li>▪ Storage temperature</li> </ul>	-20 ... +70°C -30 ... +70°C
Type of protection:	IP20 (IP65 Housing optional)	
Types of installation:	directly via BLE interface on-site	
Unit dimensions:	length x width x depth	200 x 40 x 40 mm Without Housing

### Standard Optional Housing



# SRcompact

## Ripple Control Receiver

### Features

- 1 to 6 relays 230 V, 16 A two-way contact
- 2 relays 230 V, 16 A change-over contacts
- Indication of relay switch positions via LED
- Optical interface in accordance with IEC 62056-21 for parameterization, ripple control signal analysis and protocol evaluation
- DIN-rail mounting in accordance with DIN EN 60715 possible
- Compatible with all telegram systems commonly used (incl. DIN 43861-301)
- Swistra functionalities (option)
- Underfrequency detection
- Reaction on loss and return of power individually programmable
- Time Program Functions
- Network wide clock synchronisation



### Technology

All Swistec ripple control receivers use state-of-the-art, recently developed filter algorithms capable of reliably processing ripple control signals with operating voltages below 0.3%  $U_n$  – a result of state-of-the-art processor technology combining high CPU power with little power consumption.

### Time Program Functions

- Internal clock (remotely synchronised) for autonomous operation of up to 8 work schedules with 15 switching times each
- Free assignment of work schedules to the relays
- Real-time clock with super-cap (option), voltage interruptions can be bridged for a minimum of 48 hours.

### Programming

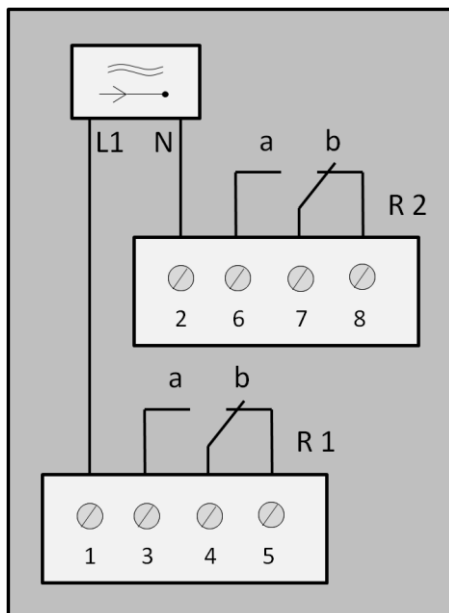
The programming is done via the standard optical interference (acc. To IEC 62056-21). The programming application is running on PCs. Laptops or tablets under Windows XP or Windows 7.

## Logging

Each received ripple control is logged and can be traced using an attached PC or laptop. This feature allows easier trouble shooting in case of any dysfunction of the device that is controlled by the *SRcompact*.

Technical Data		
<b>Power supply:</b>	<ul style="list-style-type: none"> <li>▪ Mains voltage</li> <li>▪ Frequency of mains voltage</li> <li>▪ Power consumption</li> <li>▪ Surge voltage resistance</li> <li>▪ Terminal sizes</li> </ul>	230 VAC (-20% ... +15%) 50 Hz (-2% ... +1%) < 1 W / 10 VA cap. 8 kV 1.2/50 $\mu$ s accord. IEC 60060-1 Supply and relays 1 x 2.5 mm <sup>2</sup> (AWG 22-12)
<b>Filter data:</b>	<ul style="list-style-type: none"> <li>▪ Operating frequency</li> <li>▪ Operating voltage</li> <li>▪ Non-operating voltage</li> <li>▪ Maximum control voltage</li> <li>▪ Swistra functions</li> </ul>	110 – 2000 Hz / programmable $U_f \geq 0.3\% U_n$ und $U_f > U_{nf}$ $U_{nf} \geq 0.1\% U_n$ 8-15 times $U_f$ (depending on frequency) Available, option
<b>Output data:</b>	<ul style="list-style-type: none"> <li>▪ Number of relays</li> <li>▪ Number of outputs</li> <li>▪ Nominal switching voltage <math>U_c</math></li> <li>▪ Nominal switching current <math>I_c</math></li> <li>▪ Optical indication</li> </ul>	2, bistable 1 change-over contact each, free of potential 250 V, 50 Hz 16 A, $\cos \phi = 1$ LED
<b>Real time clock:</b>	<ul style="list-style-type: none"> <li>▪ Accuracy</li> <li>▪ Power reserve (option)</li> </ul>	$\pm 20 \times 10^{-6}$ > 48 h, SuperCap optional
<b>Resistance to climate conditions:</b>	<ul style="list-style-type: none"> <li>▪ Operating temperature</li> <li>▪ Storage temperature</li> </ul>	-20 ... +60°C -30 ... +60°C
<b>Case:</b>	<ul style="list-style-type: none"> <li>▪ Size</li> </ul>	H = 90 mm, W = 35 mm, D = 61 mm
<b>Mounting:</b>	<ul style="list-style-type: none"> <li>▪ Type of mounting</li> </ul>	DIN rail or wall mounting

## Circuit Diagrams



### Features

- 1 to 6 relays 230 V, 16 A two-way contact
- 4 relays, each with a 30 VDC / 2 A gold coated contact
- Indication of relay switch positions via LED
- Optical interface in accordance with IEC 62056-21 for parameterization, ripple control signal analysis and protocol evaluation
- DIN-rail mounting in accordance with DIN EN 60715 possible
- Compatible with all telegram systems commonly used (incl. DIN 43861-301)
- Swistra functionalities (option)
- Underfrequency detection
- Reaction on loss and return of power individually programmable
- Time Program Functions
- Network wide clock synchronisation



### Technology

All Swistec ripple control receivers use state-of-the-art, recently developed filter algorithms capable of reliably processing ripple control signals with operating voltages below 0.3%  $U_n$  – a result of state-of-the-art processor technology combining high CPU power with little power consumption.

### Time Program Functions

- Internal clock (remotely synchronised) for autonomous operation of up to 8 work schedules with 15 switching times each
- Free assignment of work schedules to the relays
- Real-time clock with super-cap (option), voltage interruptions can be bridged for a minimum of 48 hours.

### Programming

The programming is done via the standard optical interference (acc. To IEC 62056-21). The programming application is running on PCs. Laptops or tablets under Windows XP or Windows 7.

### Logging



Each received ripple control is logged and can be traced using an attached PC or laptop. This feature allows easier trouble shooting in case of any dysfunction of the device that is controlled by the SReeg.

Technical Data		
<b>Power supply:</b>	<ul style="list-style-type: none"> <li>▪ Mains voltage</li> <li>▪ Frequency of mains voltage</li> <li>▪ Power consumption</li> <li>▪ Surge voltage resistance</li> <li>▪ Terminal sizes</li> </ul>	230 VAC (-20% ... +15%) 50 Hz (-2% ... +1%) < 1 W / 10 VA cap. 8 kV 1.2/50 $\mu$ s accord. IEC 60060-1 Supply and relays 1 x 2.5 mm <sup>2</sup> (AWG 22-12)
<b>Filter data:</b>	<ul style="list-style-type: none"> <li>▪ Operating frequency</li> <li>▪ Operating voltage</li> <li>▪ Non-operating voltage</li> <li>▪ Maximum control voltage</li> <li>▪ Swistra functions</li> </ul>	110 – 2000 Hz / programmable $U_f \geq 0.3\% U_n$ and $U_f > U_{nf}$ $U_{nf} \geq 0.1\% U_n$ 8-15 times $U_f$ (depending on frequency) Available, optional
<b>Output data:</b>	<ul style="list-style-type: none"> <li>▪ Number of relays</li> <li>▪ Number of outputs</li> <li>▪ Nominal switching voltage <math>U_c</math></li> <li>▪ Nominal switching current <math>I_c</math></li> <li>▪ Optical indication</li> </ul>	4, bistable 1 change-over contact each, free of potential 30 VDC or 250 VAC / 50 Hz 2 A or 0.2 A resp. 60 W LED
<b>Real-time clock:</b>	<ul style="list-style-type: none"> <li>▪ Accuracy</li> <li>▪ Power reserve (option)</li> </ul>	+/- 20 x 10 <sup>-6</sup> > 48 h, SuperCap optional
<b>Resistance to climate conditions:</b>	<ul style="list-style-type: none"> <li>▪ Operating temperature</li> <li>▪ Storage temperature</li> </ul>	-20 ... +60°C -30 ... +60°C
<b>Design:</b>	<ul style="list-style-type: none"> <li>▪ Mounting</li> <li>▪ Size (height x width x depth)</li> </ul>	DIN rail or wall mounting 90 x 35 x 61 mm

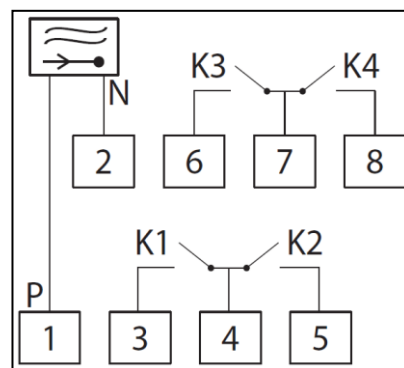
### Switching of low and ultra low currents and voltages

The relays used for this receiver type were specifically designed to switch very low currents and voltages. This is achieved by using gold coated contacts. With the SReeg, the utilities are capable to fulfil the new requirements in accordance with the revised EEG – the law on renewable energies – in Germany, issued in January 2012. According to this law, all renewable energy producing equipment must be controllable through the appropriate utility. With this receiver and 4 dedicated ripple control signals, such equipment can perfectly be controlled, enforcing 4 different output power ratings. Of course, the SReeg not only is for renewables, but is suitable for all purposes where low or ultra low currents or voltages need control.

#### Optional sealable case



#### Circuit Diagram



## Features

- 2 relays 230 V with 1 closing contact each
- Analogue voltage output 0-10 V (optional) for control of street light dimmers
- Compatible with all telegram systems commonly used (incl. DIN 43861-301)
- Swistra functionalities (optional)
- Reaction on loss and return of power individually programmable
- Time Program Functions, astronomical calendar
- Network wide clock synchronisation
- Optical interface in accord. with IEC 62056-21 for parameterization



## Technology

The SRLux is a state-of-the-art ripple control receiver, especially designed for streetlight control applications. The receiver disposes of two relays (16 A change-over contact) and can directly be installed into cable boxes inside lamp posts. The optional available analogue output of 0-10 V allows control of streetlight dimmers.

All Swistec ripple control receivers use state-of-the-art, recently developed filter algorithms capable of reliably processing ripple control signals with operating voltages below 0.3%  $U_n$  – a result of state-of-the-art processor technology combining high CPU power with little power consumption.

## Time Program Functions

- Internal clock (remotely synchronized) for autonomous operation of up to 8 work schedules with 15 switching times each
- Free assignment of work schedules to the relays
- Real-time clock with super-cap (option), voltage interruptions can be bridged for a minimum of 48 hours
- Astronomical calendar.

## Outputs

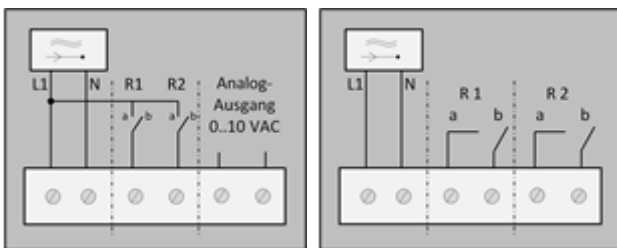
The SRLux disposes of 2 switches with 1 closing contact each. The contacts used in this receiver type have especially been designed to meet the requirements for of street lighting operation. They withstand the typical lamp loads or electronic ballasts. For direct control of streetlight dimmers, an analogue voltage output 0-10 V is available (optional)

## Programming

The programming is done via the standard optical interface (acc. to IEC 62056-21). The programming application is running on PCs, laptops or tablets under Windows XP or Windows 7.

Technical Data		
Power supply:	<ul style="list-style-type: none"> <li>Mains voltage</li> <li>Frequency range of mains voltage</li> <li>Power consumption (supply)</li> <li>Surge voltage resistance</li> <li>Terminal sizes</li> </ul>	230 VAC (-20% ... +15%) 50 Hz (-2% ...+1%) < 1 W / 10 V kap. 8 kV 1,2/50 $\mu$ s accord. IEC 60060-1 Supply and relays 1 x 2.5 mm <sup>2</sup>
Filter data:	<ul style="list-style-type: none"> <li>Operating frequency</li> <li>Operating voltage</li> <li>Non-operating voltage</li> <li>Maximum control voltage</li> <li>Swistra functions</li> </ul>	110 – 2000 Hz / programmable U <sub>f</sub> $\geq$ 0.3% U <sub>n</sub> U <sub>nf</sub> $\geq$ 0.1% U <sub>n</sub> ; U <sub>nf</sub> < U <sub>f</sub> 8-15 times U <sub>f</sub> (depending on frequency) Available, optional
Output data:	<ul style="list-style-type: none"> <li>Number of relays</li> <li>Number of outputs (w/o option)</li> <li>Number of outputs (with option 0..10 V)</li> <li>Nominal switching voltage U<sub>c</sub></li> <li>Nominal switching current I<sub>c</sub></li> <li>Voltage output (optional)</li> </ul>	2, bistable 1 closing contact each, free of potential 1 closing contact each, potential from mains 230 V, 50 Hz 40 A, cos phi = 1 20 A, lamp load 0 – 10 VDC
Real-time clock:	<ul style="list-style-type: none"> <li>Accuracy</li> <li>Power reserve (option)</li> </ul>	+/- 20 x 10 <sup>-6</sup> > 48 h, SuperCap optional
Resistance to climate conditions:	<ul style="list-style-type: none"> <li>Operating temperature</li> <li>Storage temperature</li> </ul>	-20 ... +60°C -30 ... +60°C
Design:	<ul style="list-style-type: none"> <li>Protection</li> <li>Size (height x width x depth)</li> </ul>	IP 51 (optional available: waterproof casing) 84 x 60 x 43 mm

## Circuit Diagram



SRlux without options SRlux with analog output 0..10 VAC



MV Technology Solutions Pty Ltd

Australia: 1300 717 466

New Zealand: 09 889 8089

International: +61 2 9531 6002

[www.mvtech.com.au](http://www.mvtech.com.au)

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