ELECTRONICAL INDUSTRY by celduc® relais

www.celduc-relais.com

DESIGNER & MANUFACTURER OF SOLID STATE RELAYS AND MAGNETIC SENSORS

MOTION CONTROL, HEATING CONTROL, POWER CONTROL

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DESIGNER & MANUFACTURER OF SOLID STATE RELAYS AND MAGNETIC SENSORS

MOTION CONTROL, HEATING CONTROL, POWER CONTROL
OUR SOLUTIONS .......................... pages 20-36

PRODUCTS
MADE IN
FRANCE FOR
MORE THAN
50 YEARS!

• Single phase SSR
  and optional modules
  for diag. function

• Power Solid State Relays
  with Diagnostics

• EMC optimised SSRs

• Two-phase
  Solid State Relays

• 2-leg three-phase and
  Three-phase SSRs

• Analogue control relays
  (single phase and three-phase)

EMR vs SSR ............................. page 34

WHY CHOOSING CELDUC SSR? ......... page 35
celduc® group specializes in electrical engineering and electronics. With many years of experience celduc® is fully focused on serving its market and customers all over the world. The company was founded in 1964 by Michel Guichard. Set up near Saint-Etienne, the celduc® group is the only French company producing and selling solid state relays. Today celduc® group has:
- 200 employees
- Two production centers totaling 10 000 square meters
- A worldwide presence

A strong innovation to challenge the future

celduc® relais constant product development and commitment to work with customers to develop bespoke solutions has increased its production capacity by around 10 to 15 % per year. Innovation is the challenge that celduc® relais has to take up every day by anticipating the market trends and implementing specific knowledge and skills in partnership with industry and research.

From design to manufacturing

celduc® relais controls the complete chain: design, development, production, testing and marketing. celduc® relais manufactures the most comprehensive range of Solid State Relays but has also developed its own production equipment to ensure the most efficient manufacturing methods. Thanks to this high-capacity and unique tooling, celduc® products can be found all over the world and have been recognized by the most renowned industrial companies.
HIGH QUALITY PRODUCTS

Quality is of paramount importance and is maintained at all times, aided by our own specially developed in house testing equipment. celduc® relais solid state relays and magnetic sensors are manufactured in accordance with the major international standards (UL, CSA, EN, VDE, CE, ATEX, …)...

All products are designed, tested and manufactured in compliance with the strictest international standards and always with reliability and safety in front of our mind.

The solutions displayed in this brochure should be considered as non-exhaustive examples.
Solar/Photovoltaic cell is an electrical component that converts part of the radiant energy contained in light into electrical energy. Silicon is the initial product in the manufacturing process of silicon wafer-based solar cells involving several stages:

- **RAW-MATERIAL (SILICON)**
- **INGOT SQUARING**
- **WAFER SLICING AND CLEANING**
- **DIFFUSION / TREATMENT / DOPING**
- **ANTI-REFLECTIVE COATING**
- **ANNEALING** (for drying the metal contacts on the wafers)
- **WIRE CELLS**
- **SYSTEM** (Energy storage, solar trackers)
- **MODULE** (Solar cells are encapsulated and then placed into an aluminum frame)

**FROM INGOT TO MODULE**
For all equipment used for these processes Solid State Relays are widely used because of their ability to work in harsh environments without operating problems.
DIFFUSION FURNACE

Thermal processing furnaces, also known as diffusion furnaces, have been widely known and used for many years to perform a variety of semiconductor fabrication processes, including annealing, diffusion, oxidation, and chemical vapour deposition. These furnaces are designed to heat semiconductor wafers to desired temperatures to promote either diffusion of the dopants to a desired depth while maintaining line width smaller than 1 micron or to perform other conventional processing techniques such as the application of an oxide layer to the wafer or deposition of a chemical vapour layer to the wafer.

KEY PRODUCTS

SOLID STATE RELAYS
SINGLE PHASE
THREE-PHASE

with diagnostics
SOD range pages 22-23
cel3pac® range pages 32-33

• Heating control of infrared light elements

PHOTOVOLTAIC CELLS MANUFACTURING

Image courtesy of centrotherm international AG
Bare silicon has a high surface reflection of over 30%. The reflection is reduced by texturing and by applying anti-reflection coatings (ARC) to the surface.

CELDUC® RELAIS, MORE THAN 50 YEARS MARKET EXPERIENCE AND HIGH QUALITY PRODUCTION IN FRANCE

ADVANTAGES:
SSRs control of the heating zones will ensure that temperature requirements are accurately carried out.

KEY PRODUCTS
SOLID STATE RELAYS
SINGLE PHASE
okpac® range
pages 20-21
THREE-PHASE
sightpac® range
pages 32-33
FAST-FIRING FURNACE
REGENERATION FURNACE

Fast firing furnace is used for burning out and sintering of solar cell metal contacts. Usually, the firing zone is equipped with short wave infrared light elements. After first exposure to light mono-crystalline solar cells might suffer performance losses due to light induced degradation (LID). Therefore, a regeneration process is applied directly after fast firing.

A TECHNOLOGY FOR EVERY APPLICATION!

ADVANTAGES:
Phase angle controllers allow the power to be finely adjusted.

KEY PRODUCTS

- Phase angle controller
- Burst control mode controller
- EMC optimised SON range

Image courtesy of centrotherm international AG
Semiconductor annealing (heat treatment) is used for activating silicon wafers injected with impurities (increasing density/speed). The temperature should be accurate at this stage. In fact, if the heat penetrates too deeply, the impurities will diffuse into deeper layers, forming a thick semiconductor layer. Flash annealing limits heat treatment to the surface layer, preventing the diffusion of impurities and allowing the production of extremely thin semiconductor layers. During diffusion process dopants are introduced inside the material. Oxidation process forces oxygen, vapour, to diffuse into the wafer surface at high temperatures between 800 and 1200°C so that a thin, smooth layer of silicon dioxide can be created.

- Heating control

KEY PRODUCTS

SOLID STATE RELAYS
SINGLE PHASE

- celpac® range
  pages 20-21

THREE-PHASE

- cel3pac® range
  pages 32-33

ADVANTAGES:
Using our own-design thyristors technology and RVF process (RoHs Void Free Process) for a longer lifespan (+40%)
SCRUBBERS FOR WAFER CLEANING PROCESS

Scrubber systems are designed to perform one of the most important process functions in Integrated Circuit manufacturing: wafer cleaning. It can be used between any two steps in the wafer manufacturing process. These systems remove contaminants such as particles, residues and other unwanted surface defects that can cause fatal errors in IC devices.

CELDUC® RELAIS’ SSRs ARE THE RIGHT CHOICE FOR ACCURATE AND LONG LIFE TIME TEMPERATURE CONTROL

- Heating control

ADVANTAGES:
An accurate temperature control is needed as chemicals should always be at the precisely correct temperature before being released. Our high power SSRs up to 125A are used to switch ON & OFF the heater to keep the temperature stable.

KEY PRODUCTS
SOLID STATE RELAYS
SINGLE PHASE  THREE-PHASE
okpac® range pages 20-21  cel3pac® range pages 32-33

Image courtesy of Unisem
This sensitive process requires accuracy when dealing with liquid cooling or air conditioning cooling.

**CHILLER**

**CELDUC® RELAIS : A TEAM OF EXPERTS AT YOUR SERVICE. WE CAN EVEN DESIGN SPECIFIC PRODUCTS ACCORDING TO YOUR SPECIFICATIONS**

- **Heating control**

**KEY PRODUCTS**

<table>
<thead>
<tr>
<th>SOLID STATE RELAYS</th>
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</thead>
<tbody>
<tr>
<td>SINGLE PHASE</td>
</tr>
<tr>
<td>2-LEG THREE-PHASE</td>
</tr>
</tbody>
</table>

**ADVANTAGES :**

Controlling the temperature is critical in the production of semiconductor devices. The use of celduc’s Solid State Relay is the right choice!

*Image courtesy of Unisem*
Dry etching is to remove layers from the surface of a wafer during the manufacturing process. Plasmas or etchant gases are used to remove the substrate material.

**ADDITIONS:**

- Heating control

**KEY PRODUCTS**

<table>
<thead>
<tr>
<th>SOLID STATE RELAYS</th>
</tr>
</thead>
<tbody>
<tr>
<td>TWO-PHASE</td>
</tr>
<tr>
<td>2-LEG THREE-PHASE</td>
</tr>
</tbody>
</table>

**SOB range**

- pages 28-29

**SMB range**

- pages 30-31

**ADVANTAGES:**

In this process, substrate temperature is generally considered as an important parameter which explains the use of Solid State Relays rather than ElectroMechanical Relays.
Chemical vapour deposition, or CVD, is a commonly used method of creating thin films used in semiconductor manufacturing. The coating material is vaporized inside a vacuum chamber and begins to uniformly settle on the substrate.

**QUALITY IS CONSIDERED OF PARAMOUNT IMPORTANCE AT CELDUC®RELAIS**

- **ADVANTAGES**: In compliance with the major international standards.

**KEY PRODUCTS**

<table>
<thead>
<tr>
<th>SOLID STATE RELAYS</th>
<th>okpac® range</th>
<th>pages 20-21</th>
</tr>
</thead>
<tbody>
<tr>
<td>SINGLE PHASE</td>
<td>sightpac® range</td>
<td>pages 32-33</td>
</tr>
<tr>
<td>THREE-PHASE</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
GAS SUPPLY SYSTEM

Gases have been a key enabler of the electronics industry. At almost all stages of semiconductors manufacturing, gases are used: Deposition, Photolithography, Etching, Doping, Annealing, Chamber cleaning, etc. These systems are used to safely supply special gases required for semiconductor and solar manufacturing processes.

**ADVANTAGES:**
Accurate temperature control to keep the gas temperature very stable.
This technology is used to solder the electronic components on a PCB. This technology is used to solder the electronic components on a PCB. This reliable and automatic system is widely used in the electronics industry. Wave soldering process is composed by four steps:

1. **FLUX SPRAYING**
   Cleaning the metal surface is a key step in the process in order to ensure soldering performance.

2. **PRE-HEATING**
   PCBs travel through a heat tunnel to carry out pre-heating and activate flux. The drying is made by infra-red lamps. To dry efficiently, an accurate temperature control is necessary.

3. **WAVE SOLDERING**
   The PCBs go into a melting tin bath which is warmed up to 220+-3°C or 240°C for lead free process. The temperature has to be regulated accurately. As copper starts melting at about 240 °C, therefore, when reaching this temperature, the tin bath starts being polluted by copper and the soldering can crack.

4. **COOLING**
   As temperature reaches its peak values during wave soldering process, the PCBs should be cooled up to room temperature, in the cooling zone.

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**KEY PRODUCTS**

**SOLID STATE RELAYS**

- **ANALOGUE CONTROL**
  - Single phase SO4
  - Three-phase SVTA
  - pages 26-27

- **EMC OPTIMISED**
  - EMC optimised SON range
  - pages 24-25

---

**SSRS SWITCH ON & OFF**

THE HEATER TO KEEP
THE TEMPERATURE STABLE AND
TO ALLOW A BETTER SOLDERING

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**ADVANTAGES:**
Phase angle controllers allow the load power to be finely adjusted.
REFLOW SOLDERING

Reflow soldering is another process to solder components on PCB. Different steps in the process:

1. APPLYING SOLDERING PASTE
   Soldering Alloy is applied on PCB with serography process.

2. COMPONENTS ARE PLACED ON PCB
   SMD components are picked & placed.

3. THERMAL SOAK
   Reflow soldering also depends on flux contained in solder paste. Temperature has to increase to activate the flux.

4. REFLOW SOLDERING
   Peak temperature leads solder paste to be melted and reflowed. Temperature control plays a crucial role in reflow soldering process. Too low a temperature stops solder paste from sufficiently reflowing while too high a temperature may cause damage on SMT components or boards.

5. COOLING
   Temperature will go down soon after top temperature is achieved during step n° 4. Cooling ensures the solder to be solidified.

KEY PRODUCTS

<table>
<thead>
<tr>
<th>SOLID STATE RELAYS</th>
<th>SINGLE PHASE</th>
<th>TWO-PHASE</th>
<th>THREE-PHASE</th>
</tr>
</thead>
<tbody>
<tr>
<td>celpac® range</td>
<td>pages 20-21</td>
<td>SOB range</td>
<td>sightpac® range</td>
</tr>
<tr>
<td></td>
<td></td>
<td>pages 28-29</td>
<td>pages 32-33</td>
</tr>
</tbody>
</table>

ADVANTAGES:
SSR control of the heating zones will ensure that temperature requirements are accurately carried out.

Image courtesy of TSM Soldering Co. Korea
• Heating control

CELDUC® RELAIS IS A RELIABLE AND EXPERIENCED PARTNER IN THE ELECTRONICAL INDUSTRY

KEY PRODUCTS

SOLID STATE RELAYS
SINGLE PHASE

celpac® range pages 20-21

THREE-PHASE

cel3pac® range pages 32-33

ADVANTAGES:
Lifetime and control accuracy of celduc®'s SSRs are the key features to maintain the test conditions very precisely during long periods of testing.
Solid State Relays are widely used in the equipment for flat panel display manufacturing:
- **Pre Bake Oven**
- **Hot air Oven** System for the hardening process of substrate
- **Screen coating** to protect the screen against scratches, touch, reflection, ... this coating is applied to the substrate in liquid form and then cured in large oven. One problem with preferred coating compositions is that the temperature cannot be tolerated by the glass substrate of the screen panel. For example, one protective coating composition cures at about 800°C and the maximum temperature the glass substrate can withstand is about 550°C before it brings thermal damage. To compensate, the protective coating is "cured" in an oven set at a temperature lower than specified but for an extremely long period of time.
- **Heat treatment after coating**: after coating the screen is put in a large chamber for heat treatment 250°C ± 3°C. There are around 5 heaters beams, each one controlled in temperature to insure the right temperature (± 3°C).
• Conveyor motor control
• Up/down film roller motor control
• Cutting station motor control
• Sealing heating resistance control

CELDUC® IS THE PREFERRED GLOBAL EXPERT OF WORLD’S LARGEST MANUFACTURERS

KEY PRODUCTS

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<th>SINGLE PHASE SSRs</th>
<th>POWER SSRs WITH DIAGNOSTICS</th>
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</thead>
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<td>SOD/SILD</td>
</tr>
<tr>
<td>pages 20-21</td>
<td>pages 22-23</td>
</tr>
</tbody>
</table>

Image courtesy of HOONGA
With our integrated back to back thyristors technology (direct copper bonded ceramic) offering a very high life expectancy, our SSRs are perfectly adapted to the requirements of electronics processing machines manufacturers. Our single phase range okpac® SO9 or celpac® SU9 are ideal solutions for heating resistance control.

We offer a wide range with thyristor ratings up to 125A / 660V as well as a wide AC-DC input range with regulated current models. Removable flaps for IP20 protection.
Zero-cross single phase Solid State Relays designed for resistive loads AC-51

**celpac®**

<table>
<thead>
<tr>
<th>Reference</th>
<th>Thyristor rating</th>
<th>Max. switching current at 25°C</th>
<th>Switching voltage</th>
<th>Peak voltage</th>
<th>Control voltage</th>
<th>$I^2t$</th>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>SU942460</td>
<td>25A</td>
<td>depends on heatsink</td>
<td>12-280VAC</td>
<td>600V</td>
<td>3-32VDC</td>
<td>600A²s</td>
<td>For mounting on heatsink</td>
</tr>
<tr>
<td>SUL963460</td>
<td>35A</td>
<td>30A</td>
<td>24-600VAC</td>
<td>1200V</td>
<td>3.5-32VDC</td>
<td>882A²</td>
<td>22.5mm heatsink</td>
</tr>
<tr>
<td>SUL967460</td>
<td>75A</td>
<td>35A</td>
<td>24-600VAC</td>
<td>1200V</td>
<td>3.5-32VDC</td>
<td>7200A²s</td>
<td>22.5mm heatsink</td>
</tr>
</tbody>
</table>

To add functions to your SSR, use our two modules directly pluggable on our SSR type SU and SUL →

**okpac®**

<table>
<thead>
<tr>
<th>Reference</th>
<th>Thyristor rating</th>
<th>Switching voltage</th>
<th>Peak voltage</th>
<th>Control voltage</th>
<th>$I^2t$</th>
</tr>
</thead>
<tbody>
<tr>
<td>SO945460</td>
<td>60A</td>
<td>12-280VAC</td>
<td>600V</td>
<td>3-32VDC</td>
<td>2800A²s</td>
</tr>
<tr>
<td>SO963460</td>
<td>40A</td>
<td>24-600VAC</td>
<td>1200V</td>
<td>3.5-32VDC</td>
<td>1250A²s</td>
</tr>
<tr>
<td>SO965460</td>
<td>60A</td>
<td>24-600VAC</td>
<td>1200V</td>
<td>3.5-32VDC</td>
<td>2800A²s</td>
</tr>
<tr>
<td>SO967460</td>
<td>90A</td>
<td>24-600VAC</td>
<td>1200V</td>
<td>3.5-32VDC</td>
<td>7200A²s</td>
</tr>
</tbody>
</table>

Other models available please visit our website [www.celduc-relais.com](http://www.celduc-relais.com)
Diagnostic information for up to 5 heaters in parallel in a compact and ready to use solution

- Permanent load current monitoring,
- Current teaching function,
- Two alarm thresholds: +/-16% of Iteach,
- Partial load break detection,
- Open load detection,
- Detection of shorted SSR.

See product description page 21

### USE OUR POWER SSRs WITH DIAGNOSTICS
TO SIGNAL SSR AND LOAD STATUS

- Status of the SSR and the load,
- Normally closed status output,
- Without external power supply,
- Status visualisation by yellow LED,
- Status output can be chained,
- This zero cross model switches ON in case of overvoltage.

Solid State Relays SU/SUL combined with ESUC module

Power Solid State Relays with diagnostics: SOD range

"Ready to use" Solid State Contactor: SILD range

To be mounted on heatsink

Compact solution and ready to use solution
Power SSRs with diagnostics

- Our SOD range gives the status of the SSR and the load without external power supply.

<table>
<thead>
<tr>
<th>Reference</th>
<th>Thyristor rating</th>
<th>Switching voltage</th>
<th>Peak voltage</th>
<th>Control voltage</th>
<th>$I^2t$</th>
</tr>
</thead>
<tbody>
<tr>
<td>SOD843180</td>
<td>35A</td>
<td>50-265VAC</td>
<td>600V</td>
<td>7-30VDC</td>
<td>1 250A²s</td>
</tr>
<tr>
<td>SOD845180</td>
<td>50A</td>
<td>50-265VAC</td>
<td>600V</td>
<td>7-30VDC</td>
<td>2 800A²s</td>
</tr>
<tr>
<td>SOD849180</td>
<td>125A</td>
<td>50-265VAC</td>
<td>600V</td>
<td>7-30VDC</td>
<td>22 000A²s</td>
</tr>
<tr>
<td>SOD865180</td>
<td>50A</td>
<td>150-510VAC</td>
<td>1200V</td>
<td>7-30VDC</td>
<td>2 800A²s</td>
</tr>
<tr>
<td>SOD867180</td>
<td>75A</td>
<td>150-510VAC</td>
<td>1200V</td>
<td>7-30VDC</td>
<td>7 200A²s</td>
</tr>
</tbody>
</table>

"Ready to use" Solid State Contactors with diagnostics

- The SILD range of diagnosis relay is in celpac housing (ready to use).

<table>
<thead>
<tr>
<th>Reference</th>
<th>Max. switching current at 25°C</th>
<th>Switching voltage</th>
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<th>Control voltage</th>
<th>$I^2t$</th>
</tr>
</thead>
<tbody>
<tr>
<td>SILD845160</td>
<td>32A</td>
<td>70-280VAC</td>
<td>600V</td>
<td>3-32VDC</td>
<td>1 500A²s</td>
</tr>
<tr>
<td>SILD865170</td>
<td>32A</td>
<td>150-510VAC</td>
<td>1200V</td>
<td>3.5-32VDC</td>
<td>1 500A²s</td>
</tr>
<tr>
<td>SILD867170</td>
<td>35A</td>
<td>150-510VAC</td>
<td>1200V</td>
<td>3.5-32VDC</td>
<td>5 000A²s</td>
</tr>
</tbody>
</table>

Other models available please visit our website: [www.celduc-relais.com](http://www.celduc-relais.com)
You can find standard "low noise" SSRs on the market but these are limited to a low switching current of 5A for domestic applications or to low inductive loads, while lots of pure resistive loads applications have high emission noise. Our new EMC optimized SON range meets these requirements (Conducted emission noise level < 66dBµV) and can control class B appliances on pure resistive loads. According to the application, applicable European standards are different. For celduc®, the major EN standards for Low Electromagnetic Noise Emission are EN55022, EN55011 and EN55014 which represent the main categories for electrical appliances.
Our new EMC optimised SON can control class B appliances on pure resistive loads with switching current > 5A with conducted emission noise level < 66dBµV. This is a great advantage compared to standard "low noise" SSRs currently available on the market.

### SON

**Power and control connections with screws**

<table>
<thead>
<tr>
<th>Reference</th>
<th>Thyristor rating</th>
<th>Switching voltage</th>
<th>Peak voltage</th>
<th>Control voltage</th>
<th>( I^2t )</th>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>SON845040</td>
<td>50A</td>
<td>40-260VAC</td>
<td>600V</td>
<td>6-32VDC</td>
<td>2800A²s</td>
<td>EMC optimised (low electromagnetic emission – low RFI)</td>
</tr>
<tr>
<td>SON865040</td>
<td>50A</td>
<td>50-480VAC</td>
<td>1200V</td>
<td>6-32VDC</td>
<td>2800A²s</td>
<td></td>
</tr>
<tr>
<td>SON867040</td>
<td>75A</td>
<td>50-480VAC</td>
<td>1200V</td>
<td>6-32VDC</td>
<td>7200A²s</td>
<td></td>
</tr>
</tbody>
</table>

### SCFL

**Power connection by FASTON terminals**

<table>
<thead>
<tr>
<th>Reference</th>
<th>Thyristor rating</th>
<th>Switching voltage</th>
<th>Peak voltage</th>
<th>Control voltage</th>
<th>( I^2t )</th>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>SCFL42100</td>
<td>25A</td>
<td>12-280VAC</td>
<td>600V</td>
<td>4-30VDC</td>
<td>312A²s</td>
<td>EMC optimised (low electromagnetic emission – low RFI)</td>
</tr>
<tr>
<td>SCFL62100</td>
<td>25A</td>
<td>24-440VAC</td>
<td>1200V</td>
<td>5-30VDC</td>
<td>312A²s</td>
<td></td>
</tr>
</tbody>
</table>

Other models available please visit our website [www.celduc-relais.com](http://www.celduc-relais.com)
### Comparison of the 3 control modes - setting to 50%

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<th>Control Mode</th>
<th>Working Principles</th>
<th>Advantages</th>
<th>Typical Applications</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>BURST CONTROL MODE</strong></td>
<td>In the time of a given cycle (here 1 or 2 seconds), the variation of the load power is done by eliminating whole alternations. The distribution of eliminations is carried out according to a complex rule. Thus, in the example shown, the load is only powered to 50% because of the elimination of an alternation out of two.</td>
<td>This type of control allows the power to be finely modulated according to the analogue control, while limiting disturbances.</td>
<td>For the control of resistive loads at low thermal inertia such as the short-wave infrared transmitters (infrared tubes).</td>
</tr>
<tr>
<td><strong>FULL WAVE PULSE CONTROLLERS</strong></td>
<td>In the time of a given cycle (variable depending on the models), the variation of the load power is done by eliminating whole alternations. The elimination is done linearly following the cyclic Ton/Tcycle report requested by the control input. Thus, in the example opposite, the load is only powered 50% of the time of the cycle (Ton/Tcycle=0.5).</td>
<td>This type of control presents the advantage of not generating interference since start-up is near 0 voltage.</td>
<td>Adapted to loads with high inertia (industrial furnaces).</td>
</tr>
<tr>
<td><strong>PHASE ANGLE CONTROLLERS</strong></td>
<td>On the principle of the light dimmer, this control mode allows a very fine control of the load power by removing a part of the the mains voltage sinusoid in accordance with the control input. The proportional response between the input control and the output power depends on the controller model and can be linear in angle, $U^2$ or in $U_{rms}$. Thus, in the example below, the load is only powered to 50% because of the elimination of the half of the half-alternations of the mains voltage.</td>
<td>This control mode allows the load power to be finely adjusted, for example, when the refinement of the temperature regulation takes precedence over the electromagnetic disturbances generated by this type of solution (a filter is recommended).</td>
<td>Mainly for loads that react quickly when faced with voltage variation (lamps, motors). Also for DC loads behind a rectifier bridge (heated wires, Peltier effect modules).</td>
</tr>
</tbody>
</table>
# ANALOGUE CONTROL RELAYS

Types of input control: 0-10VDC, 4-20mA, potentiometer or PWM (Pulse Width Modulation).

3 control modes are available:
- Burst control mode controllers
- Full wave pulse controllers
- Phase angle controllers

## SINGLE PHASE RANGE

<table>
<thead>
<tr>
<th>Reference</th>
<th>Thyristor rating</th>
<th>Switching voltage</th>
<th>Control</th>
<th>External power supply required ?</th>
<th>Specifications / Control mode</th>
<th>Fig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>SO465020</td>
<td>50A</td>
<td>200-480VAC</td>
<td>0-10VDC</td>
<td>yes</td>
<td>Phase angle controller</td>
<td>1</td>
</tr>
<tr>
<td>SO465320</td>
<td>50A</td>
<td>200-480VAC</td>
<td>Potentiometer</td>
<td>yes</td>
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<td>1</td>
</tr>
<tr>
<td>SO465320</td>
<td>50A</td>
<td>200-480VAC</td>
<td>Potentiometer</td>
<td>yes</td>
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<td>2</td>
</tr>
<tr>
<td>SG444020</td>
<td>40A</td>
<td>115-265VAC</td>
<td>0-10VDC</td>
<td>no</td>
<td>Phase angle controller</td>
<td>3</td>
</tr>
<tr>
<td>SG468420</td>
<td>70A</td>
<td>200-460VAC</td>
<td>4-20mA</td>
<td>no</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>SG469120</td>
<td>110A</td>
<td>200-460VAC</td>
<td>Potentiometer</td>
<td>no</td>
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<td>3</td>
</tr>
<tr>
<td>SO367001</td>
<td>75A</td>
<td>400VAC</td>
<td>0-10VDC</td>
<td>no</td>
<td>Burst control mode</td>
<td>4</td>
</tr>
</tbody>
</table>

## THREE-PHASE RANGE

<table>
<thead>
<tr>
<th>Reference</th>
<th>Thyristor rating</th>
<th>Switching voltage</th>
<th>Control</th>
<th>External power supply required ?</th>
<th>Specifications / Control mode</th>
<th>Fig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>SVTA4650E</td>
<td>50A</td>
<td>0-10VDC</td>
<td>No</td>
<td>yes</td>
<td>Phase angle controller</td>
<td>5</td>
</tr>
<tr>
<td>SVTA4684E</td>
<td>95A</td>
<td>4-20mA</td>
<td>No</td>
<td>yes</td>
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<td>5</td>
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<tr>
<td>SVTA4691E</td>
<td>125A</td>
<td>Potentiometer</td>
<td>no</td>
<td>yes</td>
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<td>5</td>
</tr>
</tbody>
</table>
Always ahead in solid-state control innovation, celduc® relais has launched a new range of two phase Solid State Relays in okpac® housing with push-in spring power terminals.
Our two-phase range provides two solid state relays in a compact standard 45mm enclosure.

Advantages of using our two-phase SSRs:
• Cost reduction of the complete solution
• Simple wiring
• Compact standard 45mm housing

<table>
<thead>
<tr>
<th>Reference</th>
<th>Thyristor rating</th>
<th>Switching voltage</th>
<th>Peak voltage</th>
<th>Control voltage</th>
<th>$I^2t$</th>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>SOB942660</td>
<td>2x25A</td>
<td>12-280VAC</td>
<td>600V</td>
<td>10-30VDC</td>
<td>600A²s</td>
<td>2 controls</td>
</tr>
<tr>
<td>SOB943360</td>
<td>2x35A</td>
<td>12-280VAC</td>
<td>600V</td>
<td>10-30VDC</td>
<td>1250A²s</td>
<td>1 control</td>
</tr>
<tr>
<td>SOB965660</td>
<td>2x50A</td>
<td>24-600VAC</td>
<td>1200V</td>
<td>10-30VDC</td>
<td>2500A²s</td>
<td>2 controls</td>
</tr>
<tr>
<td>SOB967660</td>
<td>2x75A</td>
<td>24-600VAC</td>
<td>1200V</td>
<td>10-30VDC</td>
<td>7200A²s</td>
<td>2 controls</td>
</tr>
</tbody>
</table>

New range of two phase Solid State Relays in okpac® housing with push-in spring power terminals. Limited to 24A by connections.

<table>
<thead>
<tr>
<th>Reference</th>
<th>Thyristor rating</th>
<th>Switching voltage</th>
<th>Peak voltage</th>
<th>Control voltage</th>
<th>$I^2t$</th>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>SOBR965660</td>
<td>2x50A</td>
<td>24-600VAC</td>
<td>1200V</td>
<td>10-30VDC</td>
<td>2500A²s</td>
<td>2 controls</td>
</tr>
<tr>
<td>SOBR965560</td>
<td>2x50A</td>
<td>24-600VAC</td>
<td>1200V</td>
<td>10-30VDC</td>
<td>2500A²s</td>
<td>2 controls - 1 common internal connection on input</td>
</tr>
</tbody>
</table>

Other models available please visit our website: [www.celduc-relais.com](http://www.celduc-relais.com)
Our SMB and SGB ranges are designed for controlling three phase loads connected in delta or, if balanced, connected in star without the neutral connection. Two of the three phases are switched by the SSR, the third being directly connected. Simplicity of wiring ensures this reliable solution can be easily integrated into control systems.
2 leg three-phase solid state relays

Our SMB and SGB ranges are designed for controlling three phase loads connected in delta or, if balanced, connected in star without the neutral connection. Two of the three phases are switched by the SSR, the third being directly connected. Simplicity of wiring ensures this reliable solution can be easily integrated into control systems.

<table>
<thead>
<tr>
<th>Reference</th>
<th>Thyristor rating</th>
<th>Switching current AC-51 (at 40°C)</th>
<th>Switching current AC-53 (at 40°C)</th>
<th>Switching voltage</th>
<th>Peak voltage</th>
<th>Control voltage</th>
<th>I²t</th>
<th>Protections</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>cel3pac® range</strong></td>
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<tr>
<td>SGB8850200</td>
<td>2x50A</td>
<td>3x50A</td>
<td>3x12A</td>
<td>24-640VAC</td>
<td>1600V</td>
<td>4-30VDC</td>
<td>2800A²s</td>
<td>VDR</td>
</tr>
<tr>
<td>SGB8890200</td>
<td>2x125A</td>
<td>3x85A</td>
<td>3x32A</td>
<td>24-640VAC</td>
<td>1600V</td>
<td>4-30VDC</td>
<td>22000A²s</td>
<td>VDR</td>
</tr>
<tr>
<td><strong>sightpac® range</strong></td>
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<tr>
<td>SMB8650510</td>
<td>2x50A</td>
<td>3x30A</td>
<td>3x12A</td>
<td>24-640VAC</td>
<td>1600V</td>
<td>4-30VDC</td>
<td>2800A²s</td>
<td>RC - VDR</td>
</tr>
<tr>
<td>SMB8670910</td>
<td>2x75A</td>
<td>3x35A</td>
<td>3x16A</td>
<td>150-520VAC</td>
<td>1600V</td>
<td>4-30VDC</td>
<td>7200A²s</td>
<td>RC – VDR Aux. contact</td>
</tr>
</tbody>
</table>

Other models available please visit our website: [www.celduc-relais.com](http://www.celduc-relais.com)
Superior design, easy installation, optimum lifespan and price effectiveness are delivered with the new generation of three-phase Solid State Relays.

SMT RANGE (45MM VERSION)
SGT RANGE (100MM VERSION)
### Three-phase Solid State Relays & Contactors

- Maximum peak voltage up to 1600V,
- Thyristor rating up to 125A,
- AC or DC Input control available,
- Using TMS² technology thyristors and RVF process (RoHs Void Free Process) for a longer lifespan (+40%),
- IP20 protection on terminals with removable flaps,
- Protections available: RC snubber, VDR, TVS.

<table>
<thead>
<tr>
<th>Reference</th>
<th>Thyristor rating</th>
<th>Switching current AC-51 (40°C)</th>
<th>Switching current AC-53 (40°C)</th>
<th>Switching voltage</th>
<th>V peak</th>
<th>Control voltage</th>
<th>I²t</th>
<th>Protections</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>cel3pac® range</strong></td>
<td></td>
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</tr>
<tr>
<td>SGT8678500</td>
<td>3x75A</td>
<td>3x54A</td>
<td>3x16A</td>
<td>24-520VAC</td>
<td>1600V</td>
<td>24-255VAC/DC</td>
<td>7 200A²s</td>
<td>RC – VDR</td>
</tr>
<tr>
<td>SGT8690500</td>
<td>3x125A</td>
<td>3x64A</td>
<td>3x32A</td>
<td>24-520VAC</td>
<td>1600V</td>
<td>4-30VDC</td>
<td>22 000A²s</td>
<td>RC – VDR</td>
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<td>SGT8850200</td>
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<td>3x42A</td>
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<td>24-640VAC</td>
<td>1600V</td>
<td>4-30VDC</td>
<td>2800A²s</td>
<td>VDR</td>
</tr>
<tr>
<td>SGT8858200</td>
<td>3x50A</td>
<td>3x42A</td>
<td>3x12A</td>
<td>24-640VAC</td>
<td>1600V</td>
<td>24-255VAC/DC</td>
<td>2 800A²s</td>
<td>VDR</td>
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<tr>
<td>SGT9834300</td>
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<td>24-660VAC</td>
<td>1600V</td>
<td>4-30VDC</td>
<td>1250A²s</td>
<td>TVS</td>
</tr>
<tr>
<td>SGT9854300</td>
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<td>3x42A</td>
<td>-</td>
<td>24-660VAC</td>
<td>1600V</td>
<td>4-30VDC</td>
<td>2800A²s</td>
<td>TVS</td>
</tr>
<tr>
<td>SGT9874300</td>
<td>3x75A</td>
<td>3x54A</td>
<td>-</td>
<td>24-660VAC</td>
<td>1600V</td>
<td>4-30VDC</td>
<td>7200A²s</td>
<td>TVS</td>
</tr>
<tr>
<td><strong>sightpac® range</strong></td>
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<tr>
<td>SMT8620520</td>
<td>3x25A</td>
<td>3x20A</td>
<td>3x5A</td>
<td>24-520VAC</td>
<td>1200V</td>
<td>4-30VDC</td>
<td>380A²s</td>
<td>RC – VDR</td>
</tr>
<tr>
<td>SMT8628520</td>
<td>3x25A</td>
<td>3x20A</td>
<td>3x5A</td>
<td>24-520VAC</td>
<td>1200V</td>
<td>24-255VAC/DC</td>
<td>380A²s</td>
<td>RC – VDR</td>
</tr>
</tbody>
</table>

Other models available please visit our website: [www.celduc-relais.com](http://www.celduc-relais.com)
SSRs give you the following advantages compared to EMRs:

- Very high number of switching cycles > 10 million
- Very low consumption for control
- Not sensitive to shocks and vibrations
- Very high frequency switching (in temperature control, low switching frequency limits the accuracy)
- Availability of special controls and diagnostics
- Specific switching modes (zero-cross switching, peak starting, …) allowing a higher life-span of the loads and the relays.

Conclusion:
- SSRs can be used to control loads (temperature, motors, accessories) for reducing maintenance periods, reducing energy consumption.
- Additional features to the SSR, such as diagnostics, bus communication, local temperature controller, can save space, wiring and system information.
OUR STRENGTHS

MORE THAN 50 YEARS OF EXPERIENCE ON THE MARKET AND A HIGH QUALITY LEVEL OF PRODUCTION IN FRANCE.

CONTROL OF THE COMPLETE CHAIN
design, development, production, testing and marketing.

ANALYSIS OF CUSTOMERS’ REQUIREMENTS
celduc® relais is the indisputable global expert and preferred choice of companies all over the world.

A WORLDWIDE PRESENCE IN MORE THAN 60 COUNTRIES
for a better understanding of customer’s needs and offering of solutions which fully meet their requirements.

CONSTANT PRODUCT DEVELOPMENT
our experienced R & D engineers constantly work on developing 10 to 15% of new products each year.

IN COMPLIANCE WITH THE MAJOR INTERNATIONAL STANDARDS
our products are designed, tested and manufactured in accordance with the strictest international standards.

MADE IN FRANCE
MAGNETIC SAFETY SENSORS

to ensure the safety of machine operators.

celduc® relais is offering 2 ranges to cover all your needs:
- Coded magnetic Safety sensors with REED technology
- Coded magnetic Safety sensors fully electronics, Hall Effect Technology

REED RELAYS & SWITCHES

For detection of clearance, position and level in extreme environments with no mechanical link between moving parts. These magnetically actuated maintenance free Reed switches can meet the toughest challenges that industry can throw at them.
MORE INFORMATION NEEDED?  www.celduc-relais.com

CATALOGUES AND GENERAL INFORMATION LEAFLETS

Product Guide

Single-phase solid state relays & contactors celpac® range

Three-phase solid state relays & contactors cel3pac® & sightpac® ranges