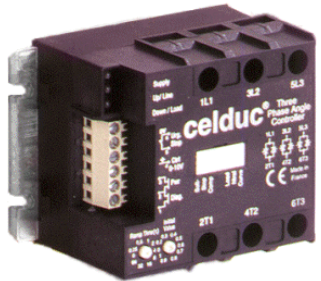


# DIGITAL THREE PHASE ANGLE CONTROLLER

- ▶ Allows to set the voltage applied to different sort of loads with 3 wires, 4 wires or inside the delta wiring:
  - ▶ Resistive (Bulbs, UV and IR lamps, ovens, ...),
  - ▶ Inductive (inductors, transformers, ...),
  - ▶ Motor (motorfan speed control (60 to 100% from the nominal speed),
  - ▶ Rectified (power supplies, ...).
- ▶ Small housing, easy and ready to use.
- ▶ Large mains frequency and voltage range.
- ▶ Fully optoisolated full cycle three phase phase angle controller (balanced currents, less harmonics, ...)
- ▶ Dynamic control voltage range according to the power factor of the load.
- ▶ Softstart and softstop functions (increase lifetime expectancy of the load).
- ▶ Adjustable filter regarding fast input voltage changes (ramps).
- ▶ Motor softstarting functions to control its speed within the stable area.
- ▶ Input-output transfer characteristic linearization function (resistive load).
- ▶ Diagnostic features : Status given on LED and AC/DC switches.

## SVTA4684



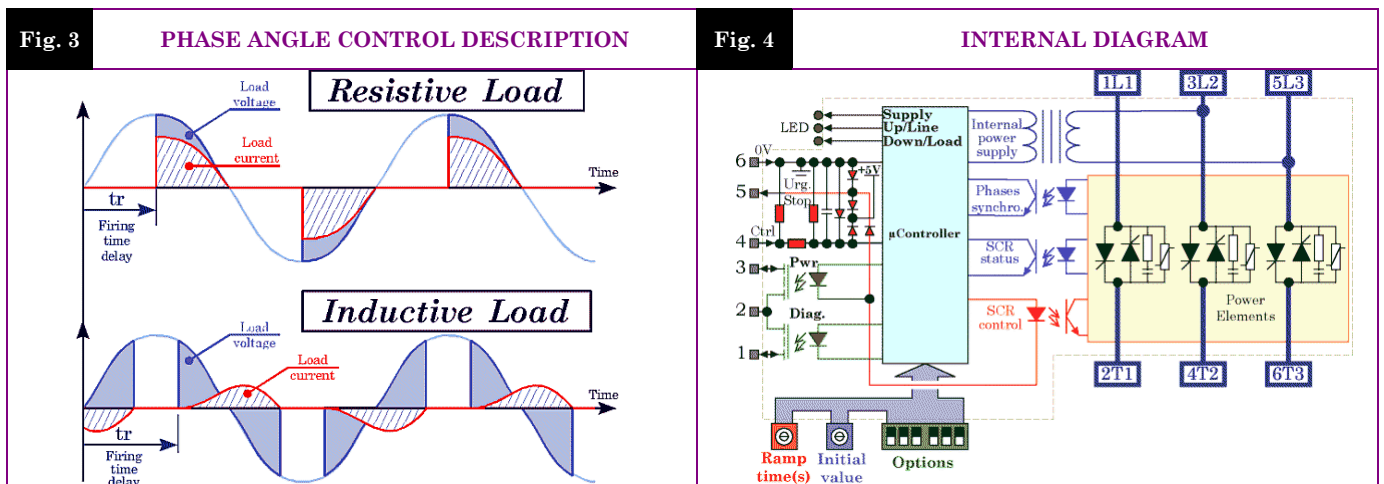
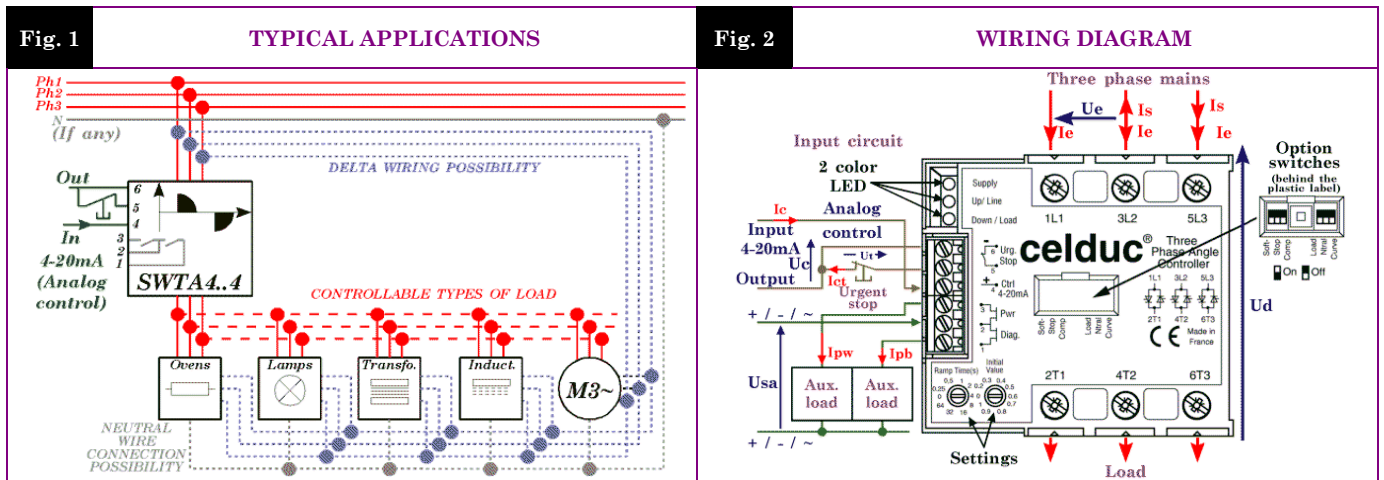
Proportional analog current control input

**4-20mA**

**200->480VAC**

**50A(95A) AC51**

| Mains Voltage | Mains Frequency | Max AC-51 Current         | Max AC-53a Current    | Control Input | Status Outputs         | In / Out Insulation | Wire Size                                      | Dimensions (WxHxD) | Weight |
|---------------|-----------------|---------------------------|-----------------------|---------------|------------------------|---------------------|--|--------------------|--------|
| 200 to 480VAC | 40 to 65Hz      | 50A (95A) (with heatsink) | 22.5A (with heatsink) | 4-20mADC      | 0 to 24VDC<br>1A AC/DC | 4kV                 | In=2.5mm <sup>2</sup><br>Out=10mm <sup>2</sup> | 100x78x56.5 (mm)   | 500g   |



*Proud to serve you*

**SETTINGS**

|                             |   |  |                                 |                    |  |  |  |   |
|-----------------------------|---|--|---------------------------------|--------------------|--|--|--|---|
| <b>SETTINGS AND OPTIONS</b> | <b>Label</b>  | <b>“Ramp Time (s)”</b>                         | <b>“Initial Value”</b>          | <b>“Soft Stop”</b> | <b>“Comp”</b>  | <b>“Load”</b>  | <b>“Ntrl”</b>  | <b>“Curve”</b>  |
|                             | <b>Description</b>  |  |                                 |                    |  |  |  |   |
|                             | <b>Function</b>   | Ramp up time (Softstart and smooth transients) | Initial load voltage (footstep) | Ramp down time     | Allows to adapt the control signal range whatever the power factor of the load | Ask the unit to make a softstart up to the max. before analog control. | Tells the unit the load star point is connected to the mains neutral | Tells the unit what kind of in-out response to use (angle or RMS voltage linearity) |
|                             | <b>Setting possibilities</b>  | Ts= 0 to 64s                                   | Vi=0 to 100%                    | 0 x ts =           | <b>On (Up)</b>   | <b>On (Up)</b>   | <b>On (Up)</b>   | <b>On (Up)</b>  |
|                             | White squares = buttons<br>Example :<br>= all switches down (OFF) (factory setting) |  |                                 | 0,5 x ts =         | Inductive load   | Motor  | Star wiring with neutral (4 wires)                                   | RMS voltage control   |
| ts =                        |   |  |                                 | <b>Off (Down)</b>  | <b>Off (Down)</b>  | <b>Off (Down)</b>  | <b>Off (Down)</b>  |   |
| 2 x ts =                    |   |  |                                 | Resistive load     | Other loads than motors  | Delta or star without neutral  | Phase angle control  |   |

**INPUT CHARACTERISTICS**

| <b>INPUT CIRCUIT</b>                         | CHARACTERISTIC | LABEL         | VALUE                |                                      | INFO.              |
|--|----------------|---------------|----------------------|--------------------------------------|--------------------|
|  | <b>Labels</b>  |               |                      | <b>“4-20mA”</b>                      | <b>“Urg. Stop”</b> |
| <b>Function</b>                              |                |               | Analog control input | Stop the thyristor controls          |                    |
| <b>Control type</b>                          |                |               | DC control current   | Opening the connection between 5 & 6 |                    |
| <b>Terminals</b>                             |                |               | 4 & 6                | 5 & 6                                |                    |
| <b>Control current range</b>                 |                | <b>Ic</b>     | 4-20mA               | -                                    |                    |
| <b>Release and control threshold current</b> |                | <b>Icsmin</b> | 4.5mA                | -                                    |                    |
| <b>Full power threshold control current</b>  |                | <b>Icsmax</b> | 9.5mA                | -                                    |                    |
| <b>Max. input voltage</b>                    |                | <b>Ucmax</b>  | 30VDC                | 6VDC                                 |                    |
| <b>Max. reverse voltage</b>                  |                | <b>-Ucmax</b> | 30VDC                | 6VDC                                 |                    |
| <b>Release voltage</b>                       |                | <b>Ut</b>     |                      | >1,5V                                |                    |
| <b>Input impedance</b>                       |                | <b>Re</b>     | 250Ω                 | -                                    | <b>See fig. 5</b>  |
| <b>Current to switch</b>                     |                | <b>Ict</b>    | -                    | 20mADC                               | Ict=f(Ut)          |

|                       |   |                   |   |                                |                         |
|-----------------------|---|-------------------|---|--------------------------------|-------------------------|
| <b>STATUS OUTPUTS</b> | <b>Labels</b>                             |                   | <b>“Diag. “</b>   | <b>“Pwr”</b>                   |                         |
|                       | <b>Terminals</b>                          |                   | 1 & 2   | 2 & 3                          |                         |
|                       | <b>Function</b>                           |                   | Indicates a problem detected in the circuit configuration | Indicates the load is supplied |                         |
|                       | <b>Nominal operating voltage</b>          | <b>Usan</b>       | 24VAC/DC  |                                |                         |
|                       | <b>Operating voltage range</b>            | <b>Usa</b>        | 0->28VAC/DC   |                                |                         |
|                       | <b>Max. peak voltage</b>                  | <b>Usap</b>       | 60V   |                                |                         |
|                       | <b>Overvoltage protection</b>             |                   | Built-in 25V size7 varistors                              |                                |                         |
|                       | <b>Minimum load current</b>               | <b>Ipw/Ipb</b>    | 0A  |                                |                         |
|                       | <b>Maximum load current</b>               | <b>Ipw/Ipb</b>    | 1A AC/DC  |                                | <b>See fig. 6</b>       |
|                       | <b>Maximum overload current</b>           | <b>Ipw/Ipb</b>    | 2.4A AC/DC  |                                | @100ms 10% of the cycle |
|                       | <b>On and off state switch resistance</b> | <b>Ron / Roff</b> | 500mΩ / 100MΩ   |                                | <b>See fig. 6</b>       |
|                       | <b>On and off time delay</b>              | <b>Ton / Toff</b> | 0.5ms / 2ms   |                                |                         |

**OUTPUT CHARACTERISTICS**

| CHARACTERISTIC  | LABEL             | VALUE                                |                                  |                               | INFO.  |
|---|-------------------|--------------------------------------|----------------------------------|-------------------------------|--|
|   |                   |                                      |                                  |                               |  |
| Mains voltage range   | Ue                | 200 -> 480VAC                        |                                  |                               |  |
| Non-repetitive peak voltage   | Uep               | 1200V                                |                                  |                               |  |
| Oversvoltage protection   | VDR               | Built-in 510V size 14 varistors      |                                  |                               |  |
| Maximum nominal currents<br><i>Nota : Wire cross section limited to 10mm<sup>2</sup> (50A) by the terminals</i> | Ie                | Resistive<br>I <sub>thmax</sub> AC51 | Motor<br>I <sub>emax</sub> AC53a | Motor<br>I <sub>e</sub> AC53a | See fig. 7<br>for limits<br>Values with<br>heatsink<br>Delta wiring :<br>See<br>installation<br>manual |
|   |                   | 50A (95A)                            | 22.5A                            | 16A                           |  |
| Maximum line currents in delta wiring   | I <sub>Line</sub> | 87A (165A)                           | 39A                              | 22.5A                         |  |
| Max motor power   | Pe                | 11kW @400VAC                         |                                  |                               |  |
| Non-repetitive peak overload current (1 cycle of 10ms)  | ITSM              | 1500A                                |                                  |                               | See fig. 8   |
| Melting limit for choosing the protective fuses   | I <sup>2</sup> t  | 11000A <sup>2</sup> s                |                                  |                               | @10ms  |
| Minimum load current  | I <sub>emin</sub> | 100mA                                |                                  |                               |  |
| Maximum leakage current   | I <sub>elk</sub>  | 7mA                                  |                                  |                               | @400VAC 50Hz   |
| Power factor  | Pf                | 0->1                                 |                                  |                               |  |
| Mains frequency range   | F                 | 40->65Hz                             |                                  |                               |  |
| Max. off-state voltage rise   | dv/dt             | 500V/μs                              |                                  |                               |  |
| Protection against fast voltage transients  |                   | Buit-in RC network                   |                                  |                               |  |
| Max. current rise   | di/dt             | 50A/μs                               |                                  |                               |  |
| On-state voltage drop   | U <sub>d</sub>    | 1.4V                                 |                                  |                               | @I <sub>th</sub>   |
| Resistive part of the voltage drop  | r <sub>t</sub>    | 3.5mΩ                                |                                  |                               | @125°C   |
| Potential part of the voltage drop  | V <sub>to</sub>   | 0.9V                                 |                                  |                               | @125°C   |
| Maximum junction temperature  | T <sub>jmax</sub> | 125°C                                |                                  |                               |  |
| Junction/case thermal resistance per power element  | R <sub>thjc</sub> | 0.3K/W                               |                                  |                               | Total = 3<br>power<br>elements   |
| Case heatsink thermal resistance  | R <sub>thcs</sub> | -                                    |                                  |                               |  |
| Built-in heatsink thermal resistance vertically mounted   | R <sub>thra</sub> | 4K/W                                 |                                  |                               | @ΔTra=60°C   |
| Heatsink thermal time constant  | T <sub>thra</sub> | 15min                                |                                  |                               | @ΔTra=60°C   |
| Inputs/power outputs insulation voltage   | U <sub>imp</sub>  | 4kV                                  |                                  |                               |  |
| Input/status outputs insulation voltage   | U <sub>ied</sub>  | 2.5kV                                |                                  |                               |  |
| Inputs/case insulation voltage  | U <sub>imp</sub>  | 4kV                                  |                                  |                               |  |
| Status outputs/case insulation voltage  | U <sub>imp</sub>  | 4kV                                  |                                  |                               |  |
| Isolation resistance  | R <sub>io</sub>   | 1GΩ                                  |                                  |                               |  |
| Isolation capacitance   | C <sub>io</sub>   | <8pF                                 |                                  |                               |  |
| Storage ambient temperature   | T <sub>stg</sub>  | -40->+100°C                          |                                  |                               |  |
| Operating ambient temperature   | T <sub>amb</sub>  | -40->+90°C                           |                                  |                               | See fig. 7   |
| Max. case temperature   | T <sub>c</sub>    | 100°C                                |                                  |                               |  |

POWER CIRCUIT

**INTERNAL POWER SUPPLY**

| INTERNAL<br>POWER SUPPLY | CHARACTERISTIC        | LABEL | VALUE       | INFO. |
|--------------------------|-----------------------|-------|-------------|-------|
|                          | Terminals             |       | 3L2 & 5L3   |       |
|                          | Mains voltage range   | Ue    | 200->480VAC |       |
|                          | Consumption           | Is    | 1mA typical |       |
|                          | Mains frequency range | F     | 40-65Hz     |       |
|                          | Turn-on time          | tm    | 100ms       |       |

**GENERAL INFORMATION**

| CONNEC-<br>TIONS | Connections                           |  | Power  | Input terminal block   |  |
|------------------|---------------------------------------|--|--|------------------------|--|
|                  | Screwdriver advised                   |  | Posidriv 2 or 0.8 x 5.5mm  | 0.8 x 2mm              |  |
|                  | Min and max tightening torque         |  | 1.8->3N.m  |                        |  |
|                  | Number and cross section of the wires |  | 2 x 1.5->6mm <sup>2</sup><br>(10mm <sup>2</sup> without ferrule) | 1 x 2.5mm <sup>2</sup> |  |
|                  | Screwdriver for settings              |  | 0.8 x 2mm  |                        |  |

| MISC. | Housing     |  | UL94V0                               |  |
|-------|-------------|--|--------------------------------------|--|
|       | Mounting    |  | Omega DIN rail (DIN50022) or screwed |  |
|       | Noise level |  | Low audible vibrations               |  |
|       | Weight      |  | 500g                                 |  |

**STANDARDS**

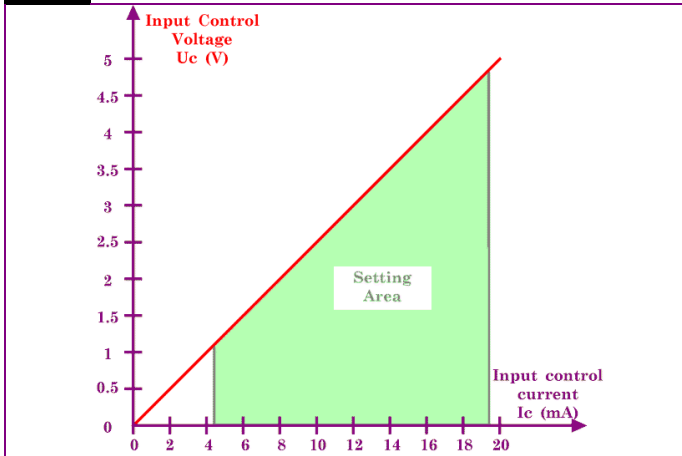
| GENERAL | Standards                       |  | EN60947-4-2 & EN60947-4-3  |  |
|---------|---------------------------------|--|--|--|
|         | Protection level                |  | IP2L0  |  |
|         | Protection against direct touch |  | Accordin to V.D.E. 160 part 100 :<br>Back hand and finger safety |  |
|         | CE marking                      |  | Yes  |  |
|         | UL, cULUS and VDE approvals     |  | Pending  |  |

| E.M.C.<br>IMMUNITY | TYPE OF TEST                      | STANDARD     | LEVEL  | EFFECT    |
|--------------------|-----------------------------------|--------------|--|-----------|
|                    | E.S.D. (Electrostatic discharges) | EN61000-4-2  | 8kV (air)<br>4kV (touch)   | No effect |
|                    | Radiated electromagnetic fields   | EN61000-4-3  | 10V/m  | No effect |
|                    | Fast transients bursts            | EN61000-4-4  | 2kV direct coupling on the power side<br>2kV coupling by clamp on the input side                               | No effect |
|                    | Electric chocks                   | EN61000-4-5  | 1kV direct coupling differential mode (input and output)<br>2kV direct coupling common mode (input and output) | No effect |
|                    | Voltage drop                      | EN61000-4-11 | -  |           |

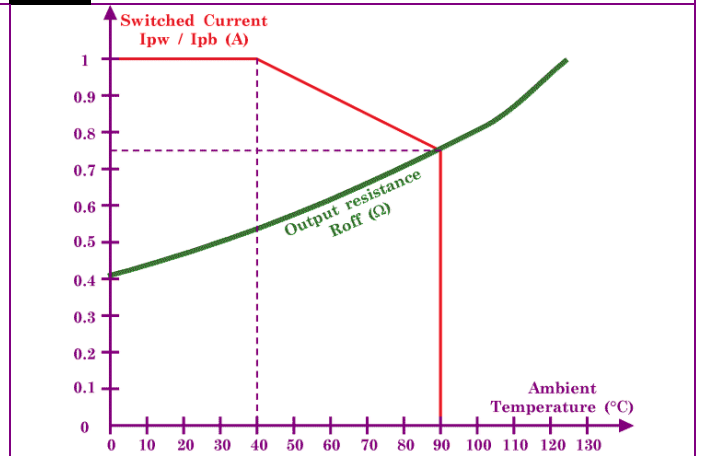
| E.M.C.<br>EMISSION | Characteristics                     | Standard  | Level | Effect  |
|--------------------|-------------------------------------|-----------|-------|---|
|                    | Radiated and conducted disturbances | NFEN55011 |       | <p>The conducted or radiated disturbances generated by solid state relays depend on the wiring and load configuration.</p> <p>The test method recommended by the European standards and concerning electromagnetic compatibility leading to results far from reality, we decided to advise our customer in order to adapt their filtering scheme to their application.</p> <p><b>Please refer to the SVTA – SWTA installation manual.</b></p> |

**CHARACTERISTIC CURVES**

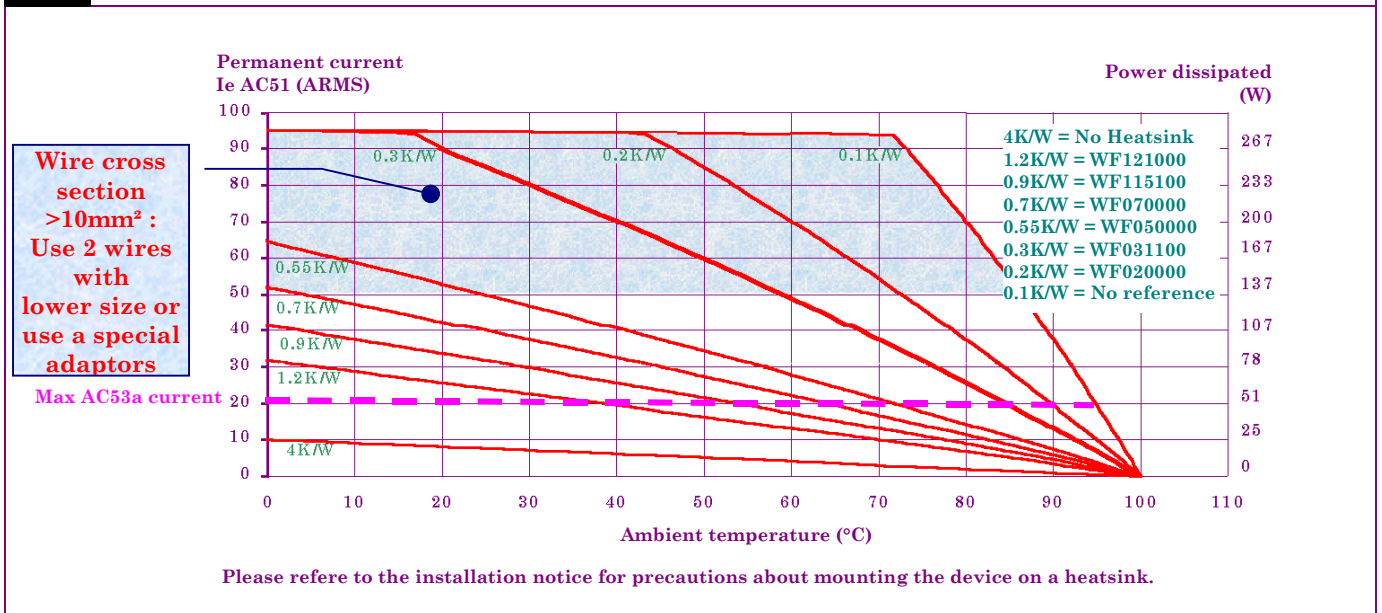
**Fig. 5 CONTROL INPUT CHARACTERISTIC**



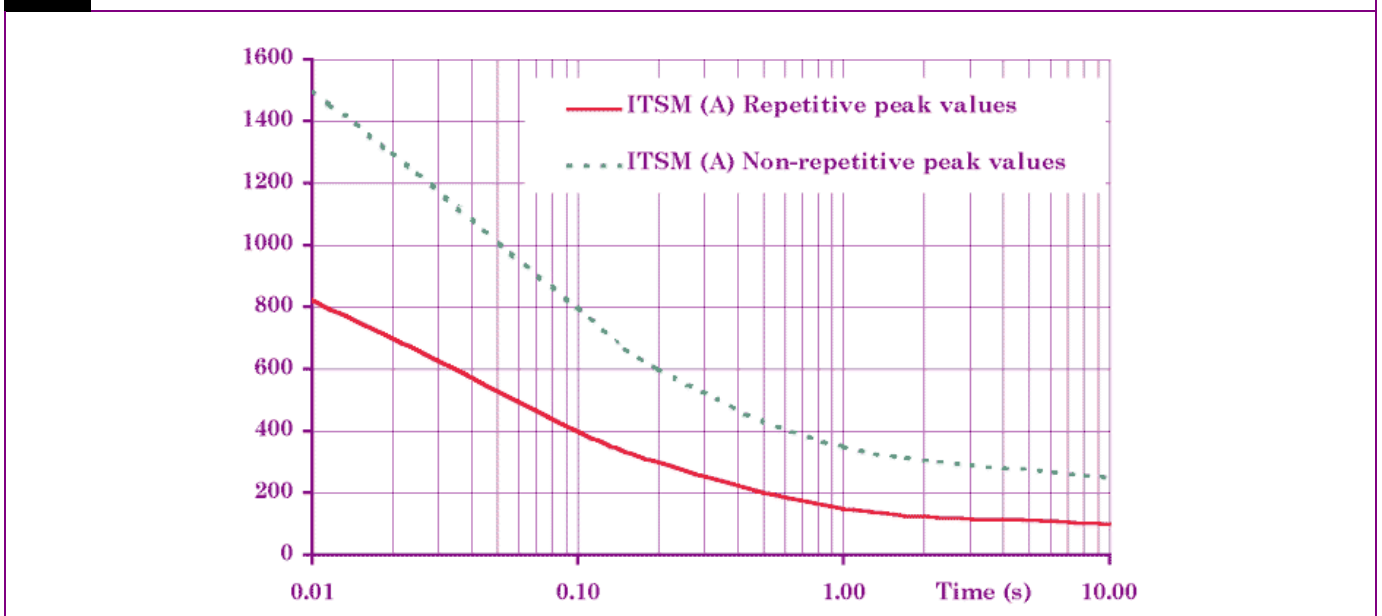
**Fig. 6 STATUS SWITCH CURRENT AND ON RESISTANCE VS TEMPERATURE**



**Fig. 7 POWER DISSIPATED AND LOAD CURRENT LIMIT VS TEMPERATURE**



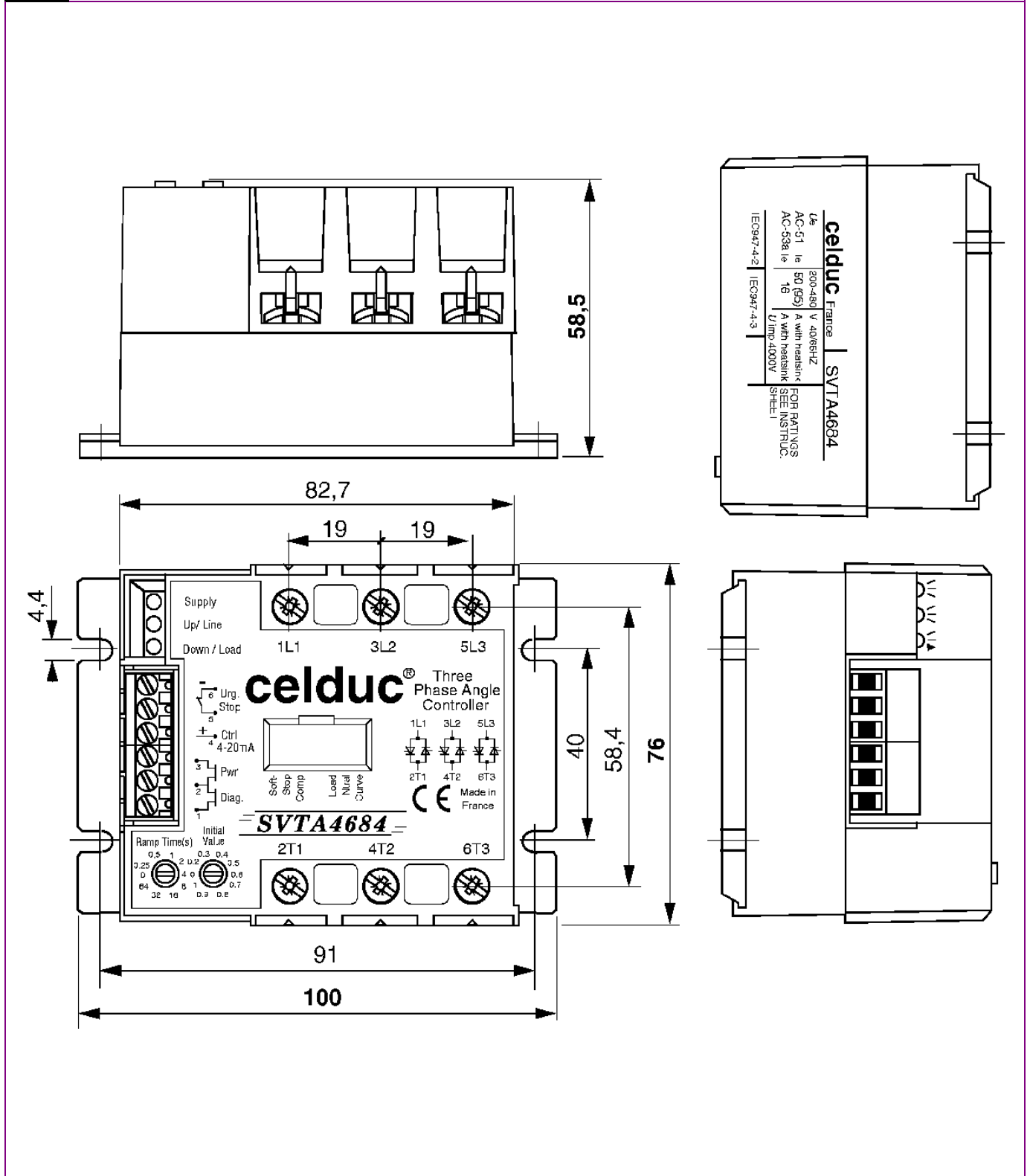
**Fig. 8 CURRENT OVERLOAD CHARACTERISTIC (ITSM PER POWER ELEMENT)**



**DIMENSIONS AND ACCESSORIES**

Fig. 9

**DIMENSIONS**



ISO 9001  
N° 1993/1106a

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