

## Information 405 e

### Thermal Protectors Series 01 Types C01 / CK1 / C02 / S01 / SK1 / S02

#### Application:

Thermal Protectors of Series 01 - Types 01 / K1 (NC) and 02 (NO) are utilised for overheating protection of all kinds of electrical equipment or devices, most suitable for electrical motors whereat after overheating and subsequent cooling an automatic resetting is required. Conditionally by the high pressure stability of the housing, they can either be attached on or embedded within coil windings. CK1 and SK1 are the preferred types for low switching temperatures.

#### Design:

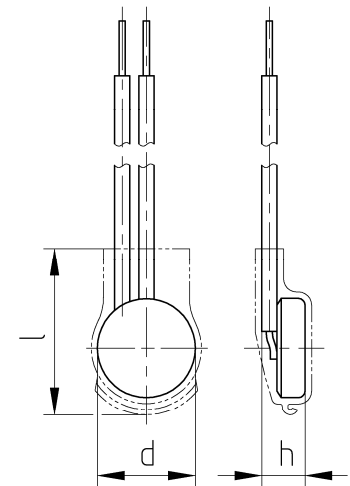
These switches are equipped with a high capacity contact mechanism, wherein the bimetallic disc can move freely, without the current flowing through it. An additional spring disc maintains constant contact pressure until reaching its switching temperature.

Versions:

S01 / SK1 / S02 with insulation cap  
 C01 / CK1 / C02 without insulation cap

#### Operation:

If, in the case of overheating, the rated switching temperature of the bimetallic disc is reached, it suddenly snaps over and opens (01 / K1) or closes (C02 / S02) the contact. After cooling down beyond its resetting temperature, the bimetallic disc returns automatically to its initial position.



|                                                         |              |
|---------------------------------------------------------|--------------|
| Diameter <b>d</b><br>(with / without<br>insulation cap) | 9.4 / 9.0 mm |
| Height <b>h</b><br>(with / without<br>insulation cap)   | 4.7 / 4.3 mm |
| Length of insulation<br>cap <b>l</b>                    | 15 mm        |
| dimensions (average)                                    |              |

#### Features:

|                                        |                                                                                                                                                                                                       |
|----------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Specially flat design</b>           | : to fit closely built-up circuits                                                                                                                                                                    |
| <b>Quick response sensitivity</b>      | : Featured by small protector mass and the metal-housing                                                                                                                                              |
| <b>Excellent long term performance</b> | : due to instantaneous switching, fine silver contacts, constant contact resistance and to electrically as well as mechanically unstressed bimetallic disc, reproducible switching temperature values |
| <b>Instantaneous switching</b>         | : with constant contact pressure over the whole temperature range                                                                                                                                     |
| <b>Very short bounce times</b>         | : < 1 ms                                                                                                                                                                                              |
| <b>Temperature resistance</b>          | : by use of high temperature resistant materials and components                                                                                                                                       |

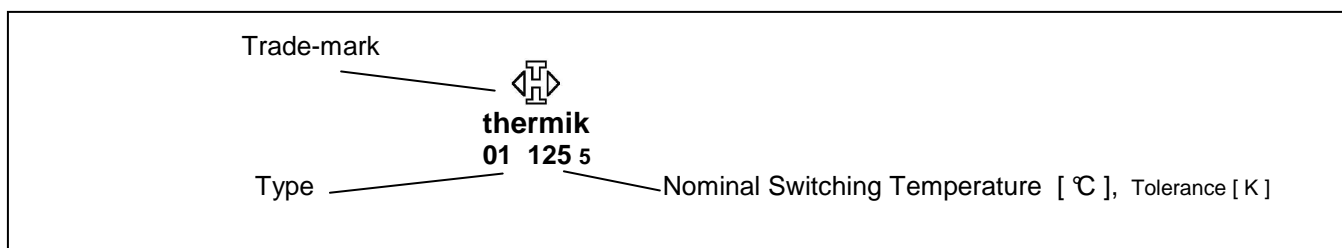
**Technical Data - Series 01**

|                                           |                                                                                                                                                                                                                                                        |                                     |
|-------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|
| Contact type                              | 01 / K1 (NC- normally closed) / 02 (NO- normally open)                                                                                                                                                                                                 |                                     |
| Nominal switching temperature (NST)       | 60 °C – 200 °C                                                                                                                                                                                                                                         |                                     |
| Standard tolerance                        | ± 5 K                                                                                                                                                                                                                                                  | others on request                   |
| Resetting temperature (RST) Standard:     | RST = > 35°C (VDE)                                                                                                                                                                                                                                     |                                     |
| Resetting temperature (RST) UL:           | RST = NST – 35K ±15K                                                                                                                                                                                                                                   |                                     |
| Operating voltage                         | ...500 V AC; DC - available, values on inquiry                                                                                                                                                                                                         |                                     |
| Rated voltage AC                          | 250 V AC (VDE); 277 V (UL)                                                                                                                                                                                                                             |                                     |
| Rated current AC I <sub>NOM</sub>         | 2.5 A cos φ = 1.0                                                                                                                                                                                                                                      | 10,000 switching cycles             |
|                                           | 1.6 A cos φ = 0.6                                                                                                                                                                                                                                      | 10,000 switching cycles             |
|                                           | 1.8 A cos φ = 0.4 – 0.5                                                                                                                                                                                                                                | 10,000 switching cycles             |
| Current sensitivity at I <sub>NOM</sub>   | No                                                                                                                                                                                                                                                     |                                     |
| Max. switching current at 250 V AC        | 6.3A cos φ = 1.0                                                                                                                                                                                                                                       | 3,000 switching cycles              |
|                                           | 7.5A cos φ = 1.0                                                                                                                                                                                                                                       | 300 switching cycles                |
|                                           | 7.2 A cos φ = 0.4 – 0.5                                                                                                                                                                                                                                | 1,000 switching cycles              |
| Contact bounce time                       | < 1 ms                                                                                                                                                                                                                                                 |                                     |
| Impregnation resistance                   | suitable                                                                                                                                                                                                                                               | (acc. to Thermik-test)              |
| Contact resistance                        | < 50 mΩ                                                                                                                                                                                                                                                | with reference to MIL – STD. R 5757 |
| Vibration proof at 10 ..... 60 Hz         | 100 m/s <sup>2</sup>                                                                                                                                                                                                                                   |                                     |
| Pressure stability of housing             | 450 N                                                                                                                                                                                                                                                  |                                     |
| Switch insulation (S01, SK1, S02)         | Insulation cap: Mylar – Nomex <sup>®</sup>                                                                                                                                                                                                             | ® Trade-mark Du Pont                |
| Dielectric strength of the insulation cap | 2 kV <sub>r.m.s.</sub>                                                                                                                                                                                                                                 |                                     |
| Standard connection leads                 | multi stranded wire 0.25mm <sup>2</sup> or AWG 22                                                                                                                                                                                                      |                                     |
| Approvals acc. to design and order        | VDE with reference to EN 60730-1 -2-9; EN 60730-1 -2-3<br>CB *) with reference to EN 60730-1 -2-9; EN 60730-1 -2-3<br>UL with reference to UL 2111; UL 873<br>CSA with reference to C22.2-77<br>CQC with reference to GB 14536.1-1998; GB 14536.3-1996 |                                     |

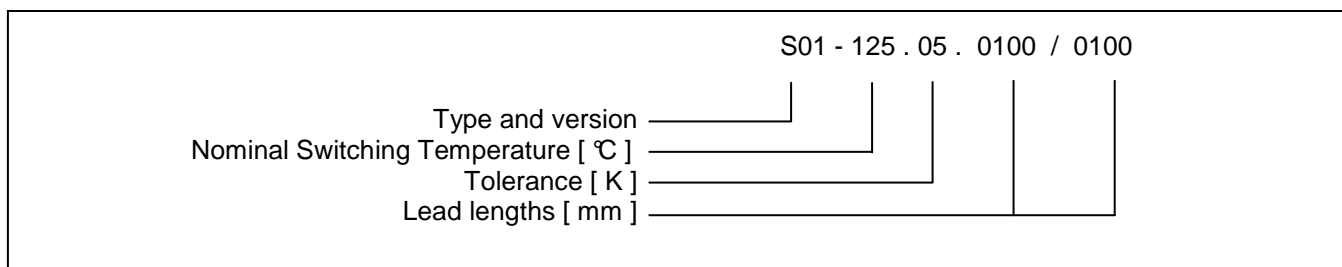
\*\*) The "European Accreditation CB Scheme" Certificate, named CB- Certificate, covers virtually all national approbations.

The data of this table refers to the standard version. For others - please inquire.

**Marking example of the insulation cap:**



**Ordering example:**



### Technical details of STM:

- Insulation material: **Teflon**
- Nominal response temperature: **70 °C - 180 °C**
- Operating voltage: **2.5 VDC - 30 VDC**
- Max. operating voltage: **30 VDC**
- Max. recommended sensor voltage: **2.5 VDC - 7.5 VDC**
- High voltage insulation: **2,5 kV**
- Length of insulation cap: **12,0 mm**
- Diameter: **d" 3,0 mm**

### General Characteristics

Temperature-Resistance-Diagram acc. to IEC 34-11-2, DIN 44081 (single), DIN 44082 (triplex)  
preferred values for nominal response temperatures  $T_{REF}$  60 °C to 190 °C\* in steps of 10 K.

| Temperature                      | Resistance    | Measuring Voltage [V <sub>DC</sub> ] |
|----------------------------------|---------------|--------------------------------------|
| -20 °C to $T_{REF}$ - 20 K       | 20 Ω to 250 Ω | ≤ 2.5 V                              |
| Temperature Range 90 °C - 160 °C |               |                                      |
| $T_{REF}$ - 5 K                  | ≤ 550 Ω       | ≤ 2.5 V                              |
| $T_{REF}$ + 5 K                  | ≥ 1,330 Ω     | ≤ 2.5 V                              |
| $T_{REF}$ + 15 K                 | ≥ 4,000 Ω     | ≤ 7.5 V pulsed                       |

\* The data shown in the table refers to  $T_{REF}$  from 90 °C up to 160 °C. The resistance values for  $T_{REF}$  < 90 °C and > 160 °C are available on request.

### Colour-Coding according to DIN 44081 / 44082

|       |       |       |       |     |      |       |       |      |       |      |
|-------|-------|-------|-------|-----|------|-------|-------|------|-------|------|
| 60    | 70    | 80    | 90    | 100 | 105  | 110   | 115   | 120  | 125   | 130  |
| white | white | white | green | red | blue | brown | blue  | grey | red   | blue |
| grey  | brown | white | green | red | grey | brown | green | grey | green | blue |

|       |       |       |       |       |      |       |       |       |       |
|-------|-------|-------|-------|-------|------|-------|-------|-------|-------|
| 135   | 140   | 145   | 150   | 155   | 160  | 165   | 170   | 180   | 190   |
| red   | white | white | black | blue  | blue | blue  | white | white | black |
| brown | blue  | black | black | black | red  | brown | green | red   | brown |