

# Thermal Cutout

## Temperature Protection for Coils/Windings

### FEATURES

- broad product range for all types of application and load
- small size
- maximum switch load
- good heat transfer
- high temperature sensitivity
- minimal contact resistance
- many approvals

F Type  
B Type

### DESCRIPTION

This thermostat operates as a **thermal cutout**. A thermally sensitive bimetal snap-element with double contacts (single contacts for type F 11) either opens or closes an electrical circuit by switching at a pre-set response temperature. Reset follows automatically after a considerable drop in temperature.

Heat transfer occurs from all sides through convection, radiation or conduction in gaseous or solid media. The circular base plate conducts heat onto the bimetal snap-element, thus also allowing its use as a surface temperature cutout.

### APPLICATIONS

Thermal protection and- under certain conditions - temperature control of electrical machinery and equipment.

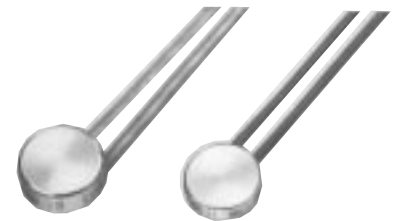
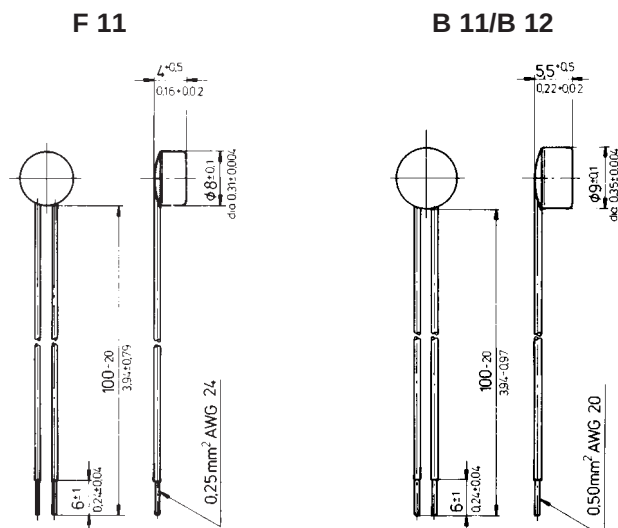
#### Examples

Single phase motors  
Generators  
Convertors  
Transformers  
Pumps

Heating elements  
Signal transmitters  
Fire detectors  
Magnets  
Relays

Chokes  
Coils  
Power supplies  
Inverters

### DIMENSIONS



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## TECHNICAL DATA

| Type                                                                      | F 11                                                                                                                     | F 11U                                  | B 11                                   | B 12                                   |
|---------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------|----------------------------------------|----------------------------------------|----------------------------------------|
| Voltage rating 50 – 60 Hz*                                                | 250 V                                                                                                                    | 250 V                                  | 250 V                                  | 250 V                                  |
| Current rating at $\cos \varphi = 1,0^*$                                  | 2,0 A                                                                                                                    | 2,0 A                                  | 6,3 A                                  | 6,3 A                                  |
| Current rating at $\cos \varphi = 0,6^*$                                  | 1,2 A                                                                                                                    | 1,2 A                                  | 4,0 A                                  | 4,0 A                                  |
| max. load 48h**<br>at $\cos \varphi = 1.0$                                | 3,0 A                                                                                                                    | 4,0 A                                  | 8,0 A                                  | 10,0 A                                 |
| Contact arrangement                                                       | Normally closed N-C<br>Normally open N-O                                                                                 |                                        |                                        |                                        |
| Switch operations at rated current*                                       | E I (10 000)                                                                                                             | E I (10 000) 35E2 (3500)               | E I (10 000)                           | E I (10 000)                           |
| Contact resistance***                                                     | < 40 mΩ                                                                                                                  | < 40 mΩ                                | < 40 mΩ                                | < 40 mΩ                                |
| Response temperature range                                                | +70 °C to<br>+160 °C<br>343 K to 433 K                                                                                   | +70 °C to<br>+160 °C<br>343 K to 433 K | +50 °C to<br>+160 °C<br>323 K to 433 K | +50 °C to<br>+160 °C<br>323 K to 433 K |
| Tolerance (minimum)                                                       | ±5 K ±10 K ±15 K                                                                                                         | ±5 K ±10 K ±15 K                       | ±5 K ±10 K ±15 K                       | ±5 K ±10 K ±15 K                       |
| Max. permanent temperature of switch mechanism*                           | T 175                                                                                                                    | T 175                                  | T175                                   | T 175                                  |
| Housing material                                                          | silver-plated steel<br>hard epoxy                                                                                        | silver-plated steel<br>hard epoxy      | nickel-plated steel<br>Duroplast       | nickel-plated steel<br>Duroplast       |
| Protection                                                                | sealed against ingress of dust,<br>lacquer, oil, resin etc.                                                              |                                        |                                        |                                        |
| Strength of shape without permanent deformation                           | 800 N/mm <sup>2</sup>                                                                                                    | 800 N/mm <sup>2</sup>                  | 900 N/mm <sup>2</sup>                  | 900 N/mm <sup>2</sup>                  |
| Vacuum tightness Δ                                                        | standard<br>Ref. P102                                                                                                    | standard<br>Ref. P102                  | standard<br>Ref. P102                  | standard<br>Ref. P102                  |
| Rate of leak                                                              | 0.133–0.0133<br>bar cm <sup>3</sup> /s                                                                                   | 0.133–0.0133<br>bar cm <sup>3</sup> /s | 0.133–0.0133<br>bar cm <sup>3</sup> /s | 0.133–0.0133<br>bar cm <sup>3</sup> /s |
| Insulation resistance/<br>dielectric strength<br>Execution according to U | Standard 1250 V 50–60 Hz<br>P301 2000 V 50–60 Hz<br>P302 2750 V 50–60 Hz<br>P303 3750 V 50–60 Hz<br>P304 4000 V 50–60 Hz |                                        |                                        |                                        |
| Overheat protector ÜHS                                                    |                                                                                                                          | 10,0 (1,2) A                           |                                        | 16,0 (8,0) A                           |
| Short circuit proof                                                       | 10,0 A                                                                                                                   | 10,0 A                                 | 36,0 A                                 | 36,0 A                                 |
| Max. load 500 V AC                                                        | 0.8 A                                                                                                                    | 0.8 A                                  | 2.0 A                                  | 2.0 A                                  |
| 110 V AC                                                                  | 6.0 A                                                                                                                    | 6.0 A                                  | 12.0 A                                 | 12.0 A                                 |
| 60 V DC                                                                   | 1.0 A                                                                                                                    | 1.0 A                                  | 3.0 A                                  | 3.0 A                                  |
| 42 V DC                                                                   | 1.2 A                                                                                                                    | 1.2 A                                  | 4.2 A                                  | 4.2 A                                  |
| 6/12/ 24 V DC                                                             | 1.8 A                                                                                                                    | 1.8 A                                  | 5.5 A                                  | 5.5 A                                  |
| Min. load                                                                 | 50 m A                                                                                                                   | 50 m A                                 | 50 m A                                 | 50 m A                                 |

Note: \* Approved ratings- other specific values on request.

\*\* Cycling rate 72/h

\*\*\* Contact resistance in standard version.

Δ On request.

## CURRENT SENSITIVITY

The thermostats are not current sensitive at rated currents. At loads above the rated values, upto maximum loading there is self-heating of the current-carrying contacts. If current sensitive cutouts are required, please refer to the data sheet „Thermal cutouts – current sensitive thermal protection for coils/windings (Nr. 395).

## INSULATION RESISTANCE

Housing (with insulation)  
to earth 2750Veff. AC P 302

On request, in special housing,  
upto 4000Veff. AC P 304

Across open contacts, dependent  
on response temperature 500Veff. AC

Voltage of coil depending on application,  
please ask.

## CONNECTIONS

Flexible leads or solid wire in different lengths and cross-sections are available – please ask.

## RESPONSE TEMPERATURES, TOLERANCE

Temperature stepped in 5 °C intervals, and tolerance in K from 50 °C to 160 °C. Special switch-off and reset temperatures available on request.

Rate of temperature rise from 0.1 K/min. to max. 1.0 K/min.

Insulation of the housing will slow down the cutout's response.

Standard reset temperature between 5 K and 50 K, depending on response temperature.

## QUALITY ASSURANCE

Production item testing  
Voltage test, switch function  
Nominal switching temperature

Random sample quality testing  
Life expectancy to VDE 0631/EN 60730  
Function test to AQL 1.0  
Nominal response temperature AQL 1.0  
Measurement tolerance ±2 °C AQL 4.0  
Other values AQL 4.0

## CONNECTIONS (Standard)

| Type          | Lead length standard | Code                         | Temperature Class (VDE) | Cross section                                                                             | Coating/ Insulation                       | Conductor                                                          | Colour                           |
|---------------|----------------------|------------------------------|-------------------------|-------------------------------------------------------------------------------------------|-------------------------------------------|--------------------------------------------------------------------|----------------------------------|
| F 11          | 100–20 mm            | L510<br>L517<br>L515         | B<br>F<br>C             | 0.25 mm <sup>2</sup><br>0.25 mm <sup>2</sup><br>0.24 mm <sup>2</sup>                      | Textil/Lack<br>Polyolefine<br>PTFE        | tinned copper<br>tinned copper<br>silvered copper                  | black<br>blue<br>white           |
| B 11/<br>B 12 | 100–20 mm            | L520<br>L531<br>L528<br>L540 | B<br>F<br>H<br>C        | 0.5 mm <sup>2</sup><br>0.5 mm <sup>2</sup><br>0.5 mm <sup>2</sup><br>0.62 mm <sup>2</sup> | Textil/Lack<br>Polyolefine<br>FEP<br>PTFE | tinned copper<br>tinned copper<br>tinned copper<br>silvered copper | yellow<br>blue<br>white<br>white |

Lead stripping: standard  $6 \pm 1$  mm

a = ends stripped

b = half insulated

c = stripped and lead end tinned

### INSULATION

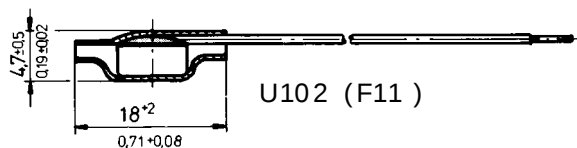
Standard versions of the thermostats are un-insulated.

If insulation is desired, the standard insulation (class) should be selected for the appropriate response temperature or max. operating temperature.

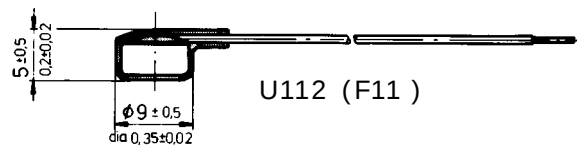
The temperature resistance of the connecting leads allows for the nominal response temperature of the cutout.

The leads used are consistent with insulation class and dielectric strength stated.

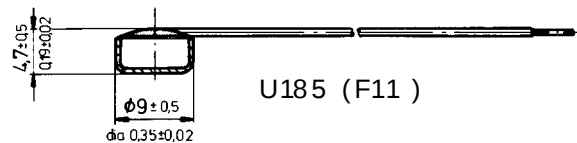
Example:



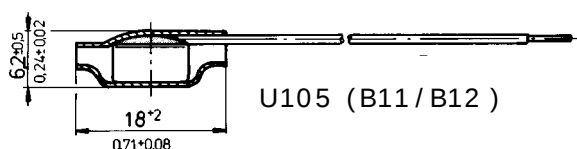
U102 (F11 )



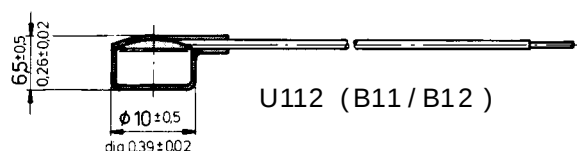
U112 (F11 )



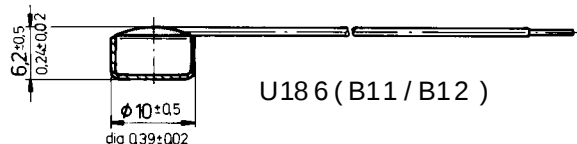
U185 (F11 )



U105 (B11 / B12 )



U112 (B11 / B12 )



U186 (B11 / B12 )

| Type      | Version | Description                                                             | Insulation Class (VDE) |
|-----------|---------|-------------------------------------------------------------------------|------------------------|
| F 11      | U 102   | Standard SHB transparent shrink material                                | B                      |
| F 11      | U 104   | SSB radiation cross-linked heat-shrink sleeve black for normally closed | B                      |
| F 11      | U 106   | SSH radiation cross-linked heat-shrink sleeve transparent               | F                      |
| F 11      | U 116   | Standard shrink sleeve PTFE                                             | H                      |
| F 11      | U 112   | UWF coating hard epoxy                                                  | F                      |
| F 11      | U 185   | Standard Insulation cap ST                                              | B                      |
| F 11      | U 180   | Insulation cap PET                                                      | H                      |
| B 11/B 12 | U 103   | Standard SHB transparent shrink material                                | B                      |
| B 11/B 12 | U 105   | SSB radiation cross-linked heat-shrink sleeve black for normally closed | B                      |
| B 11/B 12 | U 109   | red for normally open                                                   |                        |
| B 11/B 12 | U 107   | SSH radiation cross-linked heat-shrink sleeve transparent               | F                      |
| B 11/B 12 | U 139   | shrink sleeve PTFE                                                      | H                      |
| B 11/B 12 | U 112   | UWF coating hard epoxy                                                  | F                      |
| B 11/B 12 | U 186   | Standard Insulation cap ST                                              | B                      |
| B 11/B 12 | U 181   | Insulation cap PET                                                      | H                      |

## SPECIAL VERSIONS

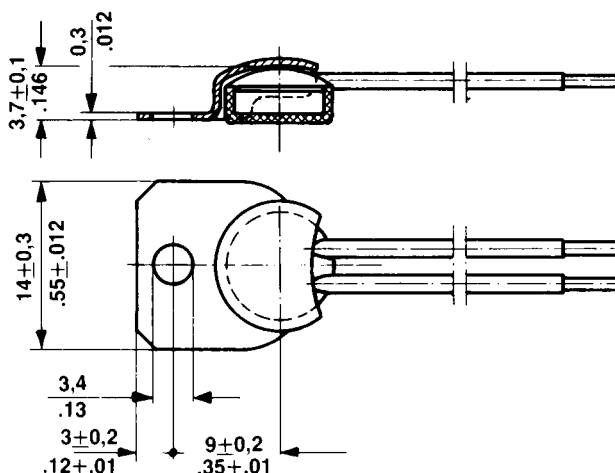
### INSULATION

Special versions are available, please ask.

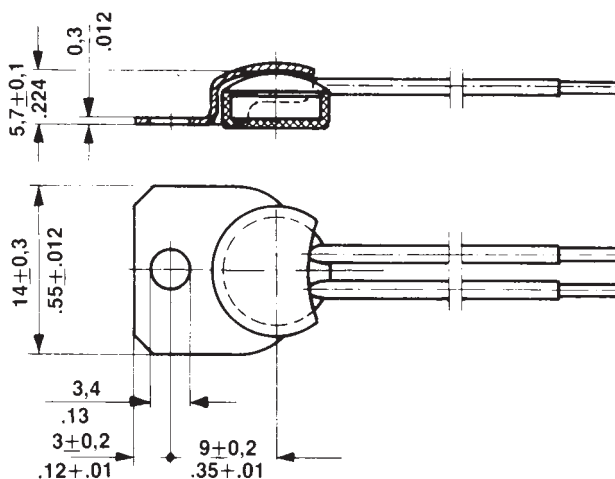
### MOUNTINGS

Single screw fixing bracket (CuBe) for use on flat surfaces with full insulation or cap.

F 11 B 224



B 11 / B 12 B 245



### APPROVALS

Life expectancy, voltage rating, current rating to VDE 0631 or EN 60730, see page 2.  
Additional approvals apply for many countries.  
Information on request.

## INSTALLATION TIPS

When installing thermal cutouts, it is important to ensure good heat transfer. The heat sensitive surface (base) should be placed on/near to the heat source. Heat conducting paste or paint will improve heat transfer.

It should be noted that standard version thermal cutouts have a current-carrying housing, and that with electrically insulated cutouts the impaired heat transfer can alter the effective switching temperature. This should be borne in mind when selecting the nominal response temperature.

With single-phase motors, the cutout should switch the mains supply. It will then switch the motor off if there is any undesirable heating. The motor short circuit current will then be safely interrupted, if this is larger than the current rating of the cutout.

For three-phase motors, the motor current will not be interrupted direct from the mains supply. The cutout installed in the windings should switch in series with the magnetic coil of the contactor. The electrical supply to the cutouts should lead either singly or together from the motor terminals so that connection with the control circuit is possible.

## PRODUCT MARKING

Example:

B12V Type, version  
12510 Nominal response temperature  
(3 digits),  
Tolerance  $\pm$  in K (2 digits)  
074E Month (2 digits), Year (1 digit),  
Country code

## MARKING

Normally closed = blue epoxy, Code No. 2  
Normally open = red epoxy, Code No. 1  
Special markings on request.

## ORDERING EXAMPLE

| Quantity | Type | Temperature       | Version |
|----------|------|-------------------|---------|
| 800      | B 12 | 125 °C $\pm$ 10 K | U 103   |

We reserve the right to change specifications without prior notice.

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