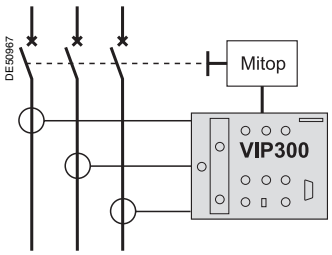
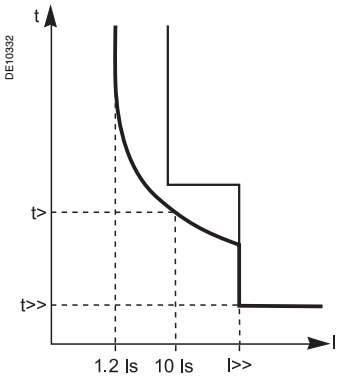


Simplified wiring diagram.

Self-powered protection relay

The VIP300 relay is designed for use in power distribution systems. It may be used to protect MV/LV transformers, incoming points of industrial installations or branch feeders.
The VIP300 provides protection against phase-to-phase faults and earth faults. The choice of tripping curves and multiple settings make is suitable for use in a wide variety of discrimination schemes.
The VIP300 is a self-powered relay (supplied by current sensors) requiring no auxiliary power supply.
It actuates a Mitop release.
The VIP300 is available in three models:
■ VIP300LL and VIP300P, designed for use with RM6, SFset and Evolis 24 kV circuit breakers
□ VIP300LL: phase and earth protection
□ VIP300P: phase protection only
■ VIP300LH, designed for use with Ringmastercircuit breakers: phase and earth protection with an equivalent time multiplier table on the front to convert settings.



Phase and earth fault curves.

Phase protection

The phase protection has two separately adjustable thresholds:
■ the low threshold may of the definite time or IDMT type
■ the high threshold is of the definite time type.
The IDMT curves comply with standard IEC 60255-3. They are of the standard inverse, very inverse and extremely inverse types.
The low threshold may also be used with the RI curve.

Earth protection

Earth fault protection is based on residual current measurements using the sum of the sensor secondary currents.
Like phase protection, earth protection has two separately adjustable thresholds.

Equipment description

The VIP300 relay is mounted in an injected polycarbonate casing that protects them against dripping water and dusty environments.
The front is protected by a transparent cover fitted with a sealing gasket. The cover may be lead-sealed to protect access to the settings.
Rotary selector switches are used for setting. The phase and earth fault current settings are set in amperes. This means that the graduations on the front must be adapted to suit the sensor range used. This is done by fitting the appropriate setting label when mounting the relay.
The connection is made on the back of the relay using fast-on type connectors.

Indication

Two indicators show the cause of tripping (phase or earth fault). The indication is maintained even if relay power is cut.
Two LEDs (phase and earth) indicate that the low threshold has been overrun and that the time delay is running.

Presentation of sensors

Sensors for VIP300

To obtain the indicated performance characteristics, VIP300 relays must be used with the specified sensors. The relay/sensor assembly is defined to respect the technical characteristics indicated, in particular:

- operation over the enitre range
- response time
- accuracy
- short-circuit thermal withstand.

The three sensors must be of the same type.

Sensors for VIP300LL and VIP300P

- CRa 200/1 and CRb 1250/1 sensors are used on RM6 units (models since 1998).
- CSa 200/1 and CSb 1250/1 sensors are used on SFset circuit breakers.

CSa and CSb sensors have the same number of secondary turns as the CRa et CRb sensors respectively.

- CEa 200/1 and CEb 1250/1 sensors are used on 24 kV Evolis integrated circuit breakers (lateral versions).

Sensors for VIP300LH

- 200/1 and 800/1 are used on Ringmaster circuit breakers.

VIP300 sensor input ratings

Each VIP 300 has two input ratings corresponding to two different operating ranges. For this reason, the input transformers have an intermediate tapping point on their primary winding. Each tapping point corresponds to a rating with a different operating range.

Choosing the right sensor

Choose the sensor to be used and the VIP300 connection range in accordance with the desired current setting range.

VIP300LL / VIP300P sensors	Rating	Current setting range
CRa, CSa, CEa 200/1	x 1	10 A - 50 A
	x 4	40 A - 200 A
CRb, CSb, CEb, 1250/1	x 1	63 A - 312 A
	x 4	250 A - 1250 A

VIP300LH sensors	Rating	Current setting range
Ringmaster 200/1	x 2	20 A - 100 A
	x 4	40 A - 200 A
Ringmaster 800/1	x 2	80 A - 400 A
	x 4	160 A - 800 A

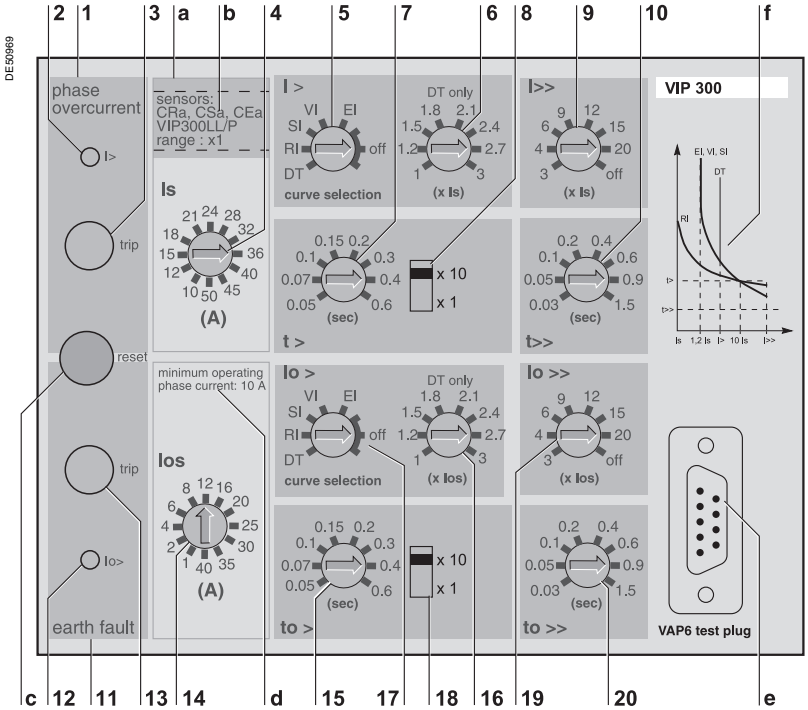
For a given operating range, the bottom of the current setting range represents the minimum operating current of the relay.

Description of VIP300 relays

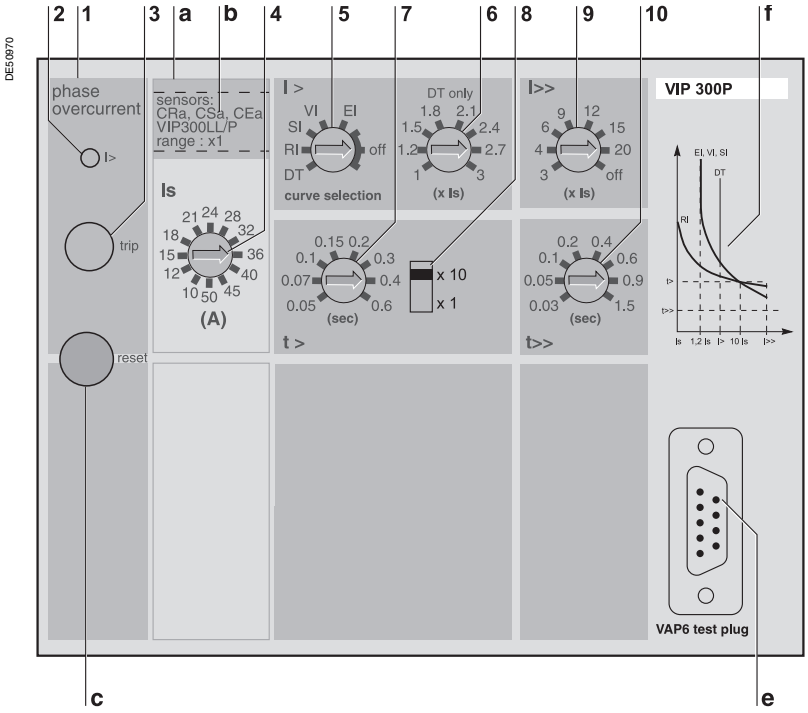
Phase protection
1. *phase overcurrent protection zone*
2. *threshold overrun indicator*
3. *phase trip indicator*
4. *phase current setting Is*
5. *choice of low threshold curve type*
6. *low threshold I>*
7. *low threshold time delay t>*
8. *multiplying factor (low threshold)*
9. *high threshold I>>*
10. *high threshold time delay t>>*

Earth protection
11. *earth fault protection zone*
12. *threshold overrun indicator*
13. *earth trip indicator*
14. *earth current setting Ios*
15. *low threshold time delay to>*
16. *low threshold Io>*
17. *choice of low threshold curve type*
18. *multiplying factor (low threshold)*
19. *high threshold Io>>*
20. *high threshold time delay to>>*

Other functions
a. *setting label*
b. *sensor and range information*
c. *indicator reset*
d. *minimum operating current*
e. *VAP6 test plug*
f. *VIP300LL: tripping curves*
VIP300LH: equivalent time multiplier table for conversions.

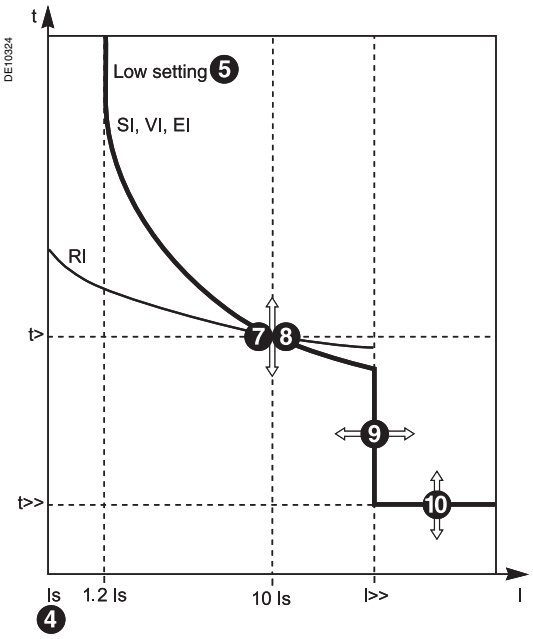


VIP300LL/VIP300LH front panel.

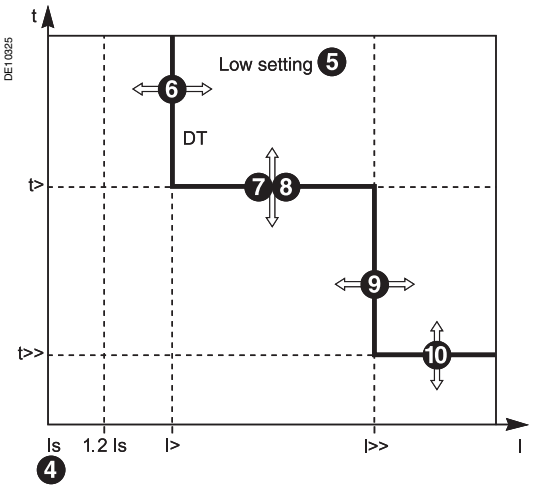


VIP300P front panel.

*See also **c: indicator reset button.***



Curve 1: phase setting ➡ IDMT low threshold



Curve 2: phase setting ➡ definite time low threshold

VIP300LL, VIP300LH and VIP300P phase protection

■ **1: phase protection setting zone**
The phase protection settings are located in the top half of the front panel.

■ **2: threshold overrun indicator**
When the red indicator blinks, the phase protection low threshold time delay is running. When this is the case, if the current does not decrease, the relay will trip.
For IDMT curves (SI, VI, EI), the LED lights up when the current is greater than 1.2 times the current setting Is.
For the IDMT curve (RI), it lights up when the current is greater than the Is setting.
For the definite time curve DT, it lights up when the low threshold is overrun.

■ **3: trip indicator**
It is normally black and turns yellow to indicate that the phase protection has given a tripping order. It stays in the same status, even when the relay is no longer energized.

■ **4: choice of current setting Is**
The current setting range depends on the sensor and range used: the selector switch graduations should be adapted to suit the sensor and range using the setting label.

■ **5: choice of type of low threshold curve**
□ DT: definite time
□ SI: inverse time
□ VI: very inverse time
□ EI: extremely inverse time
□ RI: specific curve
□ off: low threshold disabled.

■ **6: choice of low threshold I>**
The threshold is a multiple of the current setting. It is only active for definite time thresholds (selector switch 5 set to DT).
If the tripping curve is selected with IDMT (selector switch 5 set to RI, SI, VI, EI), the selector switch has no effect.

■ **7: setting of low threshold time delay t>**
If the tripping curve is of the definite time (DT) type, the selector switch sets the low threshold time delay.
If the curve is of the IDMT type (RI, SI, VI, EI), the value displayed is the tripping time for a phase current equal to 10 times the current setting.

■ **8: low threshold time delay multiplying factor**
In the x10 position, the time delay displayed on selector switch 7 is multiplied by 10.

■ **9: setting of high threshold I>>**
The high threshold is chosen as a multiple of the current setting.
In "off" position, the high threshold is disabled.

■ **10: setting of high threshold time delay t>>**
The time delay is set directly in seconds.

Phase protection setting

The numbers indicated on the curves opposite are those of the phase protection setting switches (refer to the diagram of the front view).

Set:
■ current setting Is (4)
■ type of low threshold I> curve (5)
□ IDMT: RI, SI, VI, EI
□ definite time: DT
■ low threshold I> (6). This setting is only active if the low threshold curve chosen is of the definite time DT type (curve 2). For the other choices, SI, VI, EI, RI (fig 1), the selector switch is disabled.
■ low threshold time delay t> (7) and (8)
■ high threshold I>> (9)
■ high threshold time delay t>> (10).

The earth fault threshold overrun indicator only lights up if the phase current is greater than the minimum operating current. See also ***c: indicator reset button****.*

VIP300LL and VIP300LH earth protection

The principle is the same as for phase protection.

■ **11: earth protection setting zone**
The earth protection settings are located in the bottom half of the front panel.

■ **12: threshold overrun indicator**
When this indicator blinks, the earth protection low threshold time delay is running. When this is the case, if the current does not decrease, the relay will trip.
for IDMT curves (SI, VI, EI), the LED lights up when the current is greater than 1.2 times the current setting Ios.
For the IDMT curve (RI), it lights up when the current is greater than the Ios setting.
For the definite time curve DT, it lights up when the low threshold is overrun.

■ **13: trip indicator**
It is normally black and turns yellow to indicate that the earth protection has given a tripping order. It stays in the same status, even when the relay is no longer energized.

■ **14: choice of current setting Ios**
This is the maximum residual current that can flow in the system without the protection being tripped.
The Ios current setting range depends on the sensor and range used: the selector switch graduations should be adapted to suit the sensor and range using the setting label.

■ **15: setting of low threshold time delay to>**
If the tripping curve is of the definite time (DT) type, the selector switch sets the low threshold time delay
If the curve is of the IDMT type (RI, SI, VI, EI), the value displayed is the tripping time for an earth current equal to 10 times the current setting.

■ **16: choice of low threshold Io>**
The threshold is a multiple of the current setting. It is only active for definite time thresholds (selector switch 17 set to DT).
If the tripping curve is selected with IDMT (selector switch 17 set to RI, SI, VI, EI), the selector switch has no effect.

■ **17: choice of type of low threshold curve**
□ DT: definite time
□ SI: inverse time
□ VI: very inverse time
□ EI: extremely inverse time
□ RI: specific curve
□ off: low threshold disabled.

■ **18: low threshold time delay multiplying factor**
In the x10 position, the time delay displayed on selector switch 15 is multiplied by 10.

■ **19: setting of high threshold Io>>**
The high threshold is chosen as a multiple of the current setting Ios.
In "off" position, the high threshold is disabled.

■ **20: setting of high threshold time delay t>>**
The time delay is set directly in seconds.

Earth protection setting

The principle is the same as for phase protection.

Set:
■ current setting Ios (14)
■ type of low threshold Io> (17)
□ IDMT: RI, SI, VI, EI
□ definite time: DT
■ low threshold Io> (16). This threshold is only active if the low threshold curve chosen is of the definite time DT type. For the other choices, SI, VI, EI, RI, the selector switch is disabled.
■ low threshold time delay to> (15) et (18)
■ high threshold Io>> (19)
■ high threshold time delay to>> (20)

Operation
The high and low thresholds operate separately.
The tripping order results from a "logical OR" between the two thresholds.

Technical characteristics

Phase protection	**Accuracy**	
Low threshold I>	±5 % or 0/+2 A	(1)
Low threshold time delay t>definite time	±2 % or ±20 ms	(2) (8)
IDMT	class 5, IEC 60255-3 or 0/+20 ms	(2) (8)
High threshold I>>	±5 %	
High threshold time delay t>>	±2 % or ±20 ms	(2)
Drop-out/pick-up %	95 %	
Storage time	20 ms	
Earth protection		
Low threshold Io>	±5 % or 0/+2 A	(3) (4) (5)
Low threshold time delay to>definite time	±2 % or ±20 ms	
IDMT	classe 5, IEC 60255-3 ou 0/+ 25 ms	(2) (5) (8)
High threshold Io>>	±5 %	
High threshold time delay to>>	±2 % or ±20 ms	(2) (8)
Drop-out/pick-up %	95 %	
Storage time	20 ms	

General characteristics	**Value**	
Continuous thermal withstand	240 A	with CRa, CSa or CEa sensor
	1500 A	with CRb, CSb or CEb sensor
	240 A	with RMR 200/1 sensor
	960 A	with RMR 800/1 sensor
Short-time thermal withstand	25 kA / 1 s	with CRa, CRb, RMR 800/1, CSa, CEa, CSb or CEb sensor
	25 kA / 1 s	with RMR 200/1 sensor on range x2
	20 kA / 1 s	with RMR 200/1 sensor on range x4
Operating frequency	50 Hz ±10 %, 60 Hz ±10 %	
Operating temperature	–25 °C to +70 °C	
Storage temperature	–40 °C to +85 °C	
Weight	1.7 kg	

Minimum operating current	**Range**	**Value**	
VIP300LL/VIP300P + CRa, CSa or CEa sensor	x1	10 A	(7)
	x4	40 A	
VIP300LL/VIP300P + CRb, CSb or CEb sensor	x1	63 A	
	x4	250 A	
VIP300LH + RMR 200/1 sensor	x1	20 A	
	x2	40 A	
VIP300LH + RMR 800/1 sensor	x1	80 A	
	x2	160 A	

Climatic withstand	**Standard**	**Severity**
Low temperature operation	IEC 60068-2-1	–25 °C, 16 h
Low temperature storage	IEC 60068-2-1	–40 °C, 96 h
High temperature operation	IEC 60068-2-2	+70 °C, 16 h
High temperature storage	IEC 60068-2-2	+85 °C, 96 h
Fast changes in temperature	IEC 60068-2-14	–25 °C à +70 °C, 5 cycles
Operation in damp heat	IEC 60068-2-3	56 days, 93 % HR
Salt spray	IEC 60068-2-52	severity 1

Technical characteristics

Mecanical withstand	Standard	Severity
Vibrations	IEC 60255-21-1	class 2
Shocks and bumps	IEC 60255-21-2	class 2
Earthquakes	IEC 60255-21-3	class 2
Enclosure degree of protection	EN 60529	IP54 (cover closed)
Fire resistance	IEC 60695-2-1	650 °C
Electrical withstand	**Standard**	**Severity**
Sensor input isolation	IEC 60255-5	2 kV rms, 50 Hz, 1 mn
1.2/50 µs impulse voltage	IEC 60255-5	5 kV (6)
Oscillatory waves - 1 MHz burst	IEC 60255-22-1	2.5 kV cm (6)
		1 kV dm
Fast transient bursts	IEC 60255-22-4	4 kV common and diff. modes, 5 kHz burst (6)
1.2/50(8-20 µs) hybrid wave	IEC 61000-4-5	2 kV, 42 Ω (6)
Electrostatic discharge	IEC 60255-22-2	8 kV in air, 6 kV on contact
HF electromagnetic field	IEC 60255-22-3	30 V/m not modulated, 27 to 1000 MHz
	EN 50082-2	10 V/m modulated, ampl., 80 to 1000 MHz
	EN 50082-2	10 V/m modulated, impuls., 900 MHz

(1) *Value given for three-phase VIP300 power supply. For single-phase operation, the accuracy range is ±10% or 0/+5A.*
For the low threshold, this does not generally represent a real operating situation. However, it may occur during injection testing carried out with a single-phase supply.
The error is mainly due to the non-linearity of the sensors and VIP300 input transformers for low currents; the inaccuracy is accentuated when the relay is only supplied by one phase.
(2) *The accuracy is indicated for a fault (sinusoidal current) that occurs when the VIP300 is already supplied by the current flowing through the circuit breaker. In the event of closing on a fault, the tripping time may be increased by:*

- *+30 ms at 1.5 Is*
- *+20 ms from 2 Is to 10 Is*
- *+10 ms above 10 Is.*

(3) *Generally speaking, the accuracy ranges of earth protection times and thresholds are indicated for a VIP300 supplied by a current that is greater than or equal to the minimum operating current. The measurement of a threshold for earth protection with a single-phase supply is therefore not significant if the threshold is lower than the minimum operating current.*
(4) *Value given for three-phase VIP300 supply. For single-phase testing, the accuracy is ±10% or 0/+5A.*
For the low threshold, this may occur when the earth protection is tested with a single-phase supply and no supply by the other phases.
(5) *Under the following specific conditions:*

- *VIP300LL*
- *with CRa sensor*
- *wired to x1 range*
- *if Ios < 8 A*
- *if three-phase current < 20 A*

the threshold and time delay characteristics are:

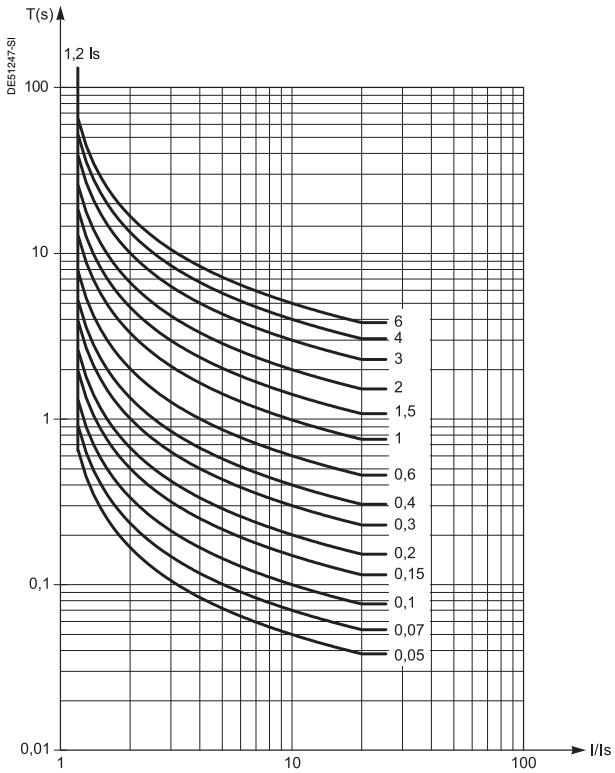
- *low threshold: ±10 % or 0/+4 A*
- *class not specified.*

(6) *Not applicable to test plug.*
(7) *Accuracy ±10 % or ±1.5 A.*
The value indicates the guaranteed minimum operating current for three-phase operation.
(8) *The tripping times indicated do not include the mitop response time that depends on the mechanical load (for no load, its tripping time is less than 5 ms).*

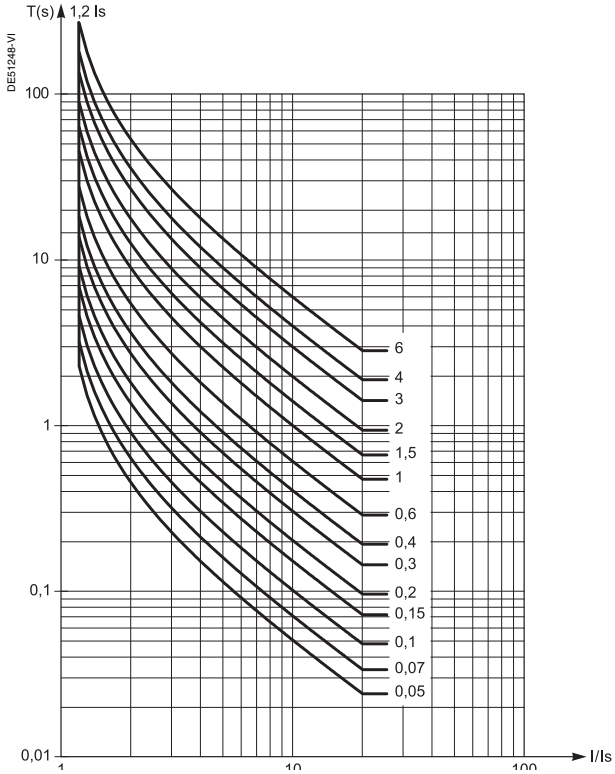
Technical characteristics
IDMT tripping curves

The curves in this chapter indicate the IDMT low threshold tripping times for the 16 t> (or to>) time delay settings.
The phase protection and earth protection curves are the same.
The numbers indicated to the right of the curves represent the settings on the t> (or to>) time delay selector switch.

SI curve

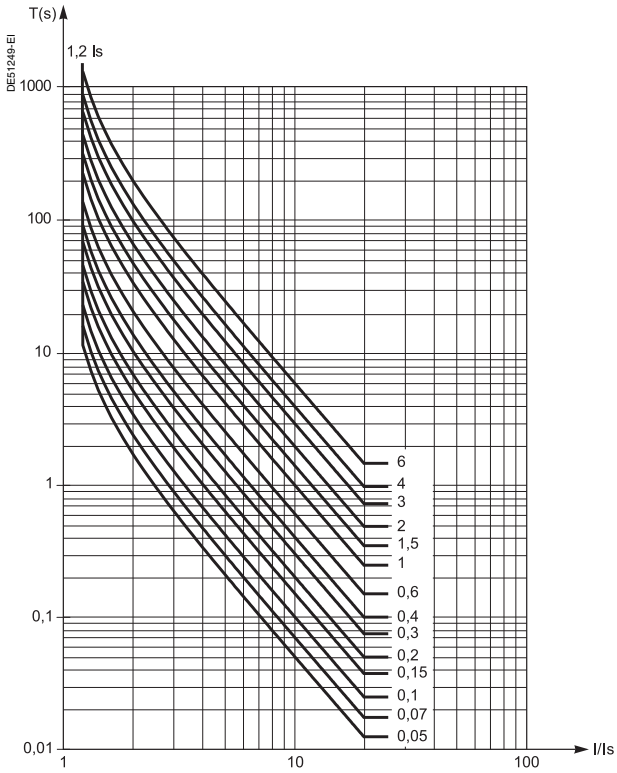


VI curve



Technical characteristics
IDMT tripping curves

EI curve



RI curve