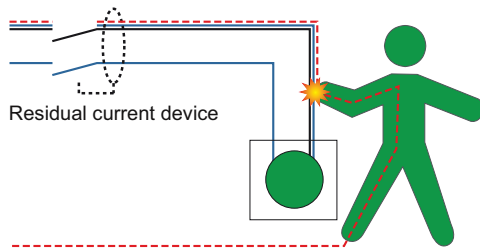


Earth leakage protection

Response time of high-sensitivity residual current devices 30 mA

All the high-sensitivity residual current devices (30 mA) in the Acti 9 range conform to the IEC/EN 61008 and IEC/EN 61009 standards. The response times defined by these standards guarantee their effectiveness in protecting people against direct contacts.



Response time

The response time of a residual current device is the time between the appearance of a dangerous leakage current and circuit power down.

Types AC, A, Si

Fault current (mA)		Maximum response time (ms)
$I_{\Delta n}/2$	15 mA	No tripping
$I_{\Delta n}$	30 mA	300 ms
$2 \times I_{\Delta n}$	60 mA	150 ms
$5 \times I_{\Delta n}$	150 mA	40 ms

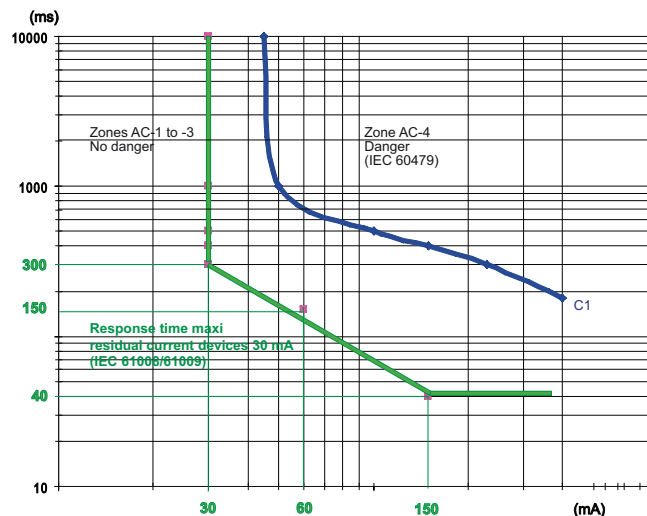
Type B, DC leakage current

Fault current (mA)		Maximum response time (ms)
$I_{\Delta n}/2$	15 mA	No tripping
$2 \times I_{\Delta n}$	60 mA	300 ms
$4 \times I_{\Delta n}$	120 mA	150 ms
$10 \times I_{\Delta n}$	300 mA	40 ms

These response times conform to the specifications of the IEC/EN 61008, IEC/EN 61009 and IEC/EN 62423 (DC leakage current) standards.

They guarantee protection of people against direct contacts for the following reasons :

- when a person comes into direct contact with a live conductor, the current passes directly through the human body,
- this current, with the same magnitude, is detected by the residual current device.



- The IEC 60479 technical report studies the sensitivity of the human body to the electric current. Curve c1 defines for each current value the maximum time before the current causes injury to a person.
- Superimposing the two curves shows that the above response times protects the users.

Measuring the response time

If the user wishes to check the response time of his residual current devices, he should follow a specific procedure to:

- establish a leakage current of calibrated magnitude,
- measure the exact response time.

Procedure

The measuring instruments must conform to IEC/EN 61557-6.

Carry out the operations in the following order according to the safety instructions:

- disconnect the loads,
- install the measuring instrument downstream of the residual current device to be tested (for example on a power outlet),
- perform the measurement.

Earth leakage protection

Response time of medium-sensitivity residual current devices

100 mA...1000 mA

Response time of iC60 Vigi and iLD residual current devices

The medium-sensitivity residual current devices (100...1000 mA) in the Acti 9 range conform to IEC/EN 61008, IEC/EN 61009 and IEC/EN 62423 (DC leakage current):

- their response time guarantees personal protection against indirect contacts and fire risks,
- in the case of selective versions (S), a "non-tripping time" guarantees discrimination with the residual current devices installed downstream.

Types AC, A, Si

Instantaneous residual current devices

Residual current device		Sensitivity (I Δ n)			
		100 mA	300 mA	500 mA	
Fault current (mA)	I Δ n/2	50	150	250	No tripping
					Max. response time
	I Δ n	100	300	500	300 ms
	2 x I Δ n	200	600	1000	150 ms
	5 x I Δ n	500	1500	2500	40 ms
500 A					40 ms

Selective (S) and time-delayed (R) residual current devices

Residual current device		Sensitivity (I Δ n)				Type			
		100 mA	300 mA	500 mA	1000 mA	Selective (S)		Time-delayed (R)	
Fault current (mA)	I Δ n/2	50	150	250	500	No tripping		No tripping	
						Non-tripping time	Response time	Non-tripping time	Response time
	I Δ n	100	300	500	1000	130 ms	500 ms	300 ms	1000 ms
	2 x I Δ n	200	600	1000	2000	60 ms	200 ms	150 ms	500 ms
	5 x I Δ n	500	1500	2500	5000	50 ms	150 ms	150 ms	300 ms
500 A						40 ms	150 ms	150 ms	300 ms

Type B, DC leakage current

Instantaneous residual current devices

Residual current device		Sensitivity (I Δ n)		
		300 mA	500 mA	
Fault current (mA)	I Δ n/2	150	250	No tripping
				Max. response time
	2 x I Δ n	600	1000	300 ms
	4 x I Δ n	1200	2000	150 ms
	10 x I Δ n	3000	5000	40 ms
5 A...200 A				40 ms

Selective (S) residual current devices

Residual current device		Sensitivity (I Δ n)	
		300 mA	
Fault current (mA)	I Δ n/2	150	No tripping
			Non-tripping time
	2 x I Δ n	600	130 ms
	4 x I Δ n	1200	60 ms
	10 x I Δ n	3000	50 ms
5 A...200 A		40 ms	150 ms

Definitions

Response time

Time between the appearance of a hazardous leakage current and circuit power down.

Non-tripping time

For selective and time-delayed devices, the non-tripping time is the time between the appearance of a hazardous leakage current and the device tripping.

If the leakage current disappears before this time, the device does not trip.

This fast disappearance of the leakage current can be due to:

- the transient nature of the fault (e.g. the current generated by a switching surge),
- the interruption of the fault current by another faster residual current device situated downstream.

Selective and time-delayed devices therefore afford the user:

- better immunity against nuisance tripping,
- total discrimination between residual current devices.