Current Transformer Burden with Lead Resistance

Total burden on a current transformer from the lead length and size and the relay or meter burden, against the CT's rated VA, with the longest lead allowed.

Method: Burden = I² R (IEC 61869-2 terminology); IEC 60364-5-52 Annex G (conductor resistivity in service)

Input parameters

Unit system: SI

Parameter	Value	Unit
Rated secondary current	5.0000	A
One-way lead length (CT to relay or meter)	30.000	m
Lead cross-section	2.5000	mm²
Resistivity of the lead at its temperature Default: copper in service (IEC 60364-5-52 Annex G, 1.25 × the 20 °C value).	0.022500	Ω·mm²/m
Burden of the relay or meter at rated current	1.0000	VA
Rated burden of the CT	15.000	VA

Calculated results

Parameter	Value	Unit
Lead resistance, go and return	0.54000	Ω
Lead burden I_s² R_L	13.500	VA
Total burden	14.500	VA
Share of the rated burden used	96.667	%
Longest one-way lead for the rated burden	31.111	m

Formula and method

$$R_L = \frac{2\rho L}{A}, \quad S_L = I_s^2 R_L, \quad S_t = S_L + S_b$$

Variables

I_s	Rated secondary current	A
L	One-way lead length (CT to relay or meter)	m
A	Lead cross-section	m²
ρ	Resistivity of the lead at its temperature	Ω·m
S_b	Burden of the relay or meter at rated current	VA
S_n	Rated burden of the CT	VA
R_L	Lead resistance, go and return	Ω
S_L	Lead burden I_s² R_L	VA
S_t	Total burden	VA
u	Share of the rated burden used	-
L_{max}	Longest one-way lead for the rated burden	m

Method and standards

Joule burden of the secondary loop.

Assumptions and limits

- Resistive burden; power factor of burdens ignored.
- A total under 25 % of the rated burden is flagged for metering CTs.

References

- Burden = I^2 R (IEC 61869-2 terminology)
- IEC 60364-5-52 Annex G (conductor resistivity in service)

Report details

Report reference	FCC-2NMN-C4V8 (the same inputs always give the same reference)
Generated	17 November 2026, 19:45 UTC
Calculator	Current Transformer Burden with Lead Resistance
Method last reviewed	12 November 2026
Software release	FireCAD Calc, release of 17 November 2026
Release checks	3 reference cases of this calculator, computed independently, are checked on every release

Results are for engineering estimation. Verify critical designs against the referenced standards and your own data.

This calculator online

https://calc.firecad.com/electrical/protection/ct-burden-lead-wire

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.