Total Demand Distortion and Current THD

Total demand distortion of a load current against maximum demand current, current THD against the fundamental and the short-circuit ratio at the supply point.

Method: Total demand distortion definition

Input parameters

Unit system: SI

Parameter	Value	Unit
Fundamental current at measurement	600.00	A
Maximum demand current (12-month average)	900.00	A
Short-circuit current at the supply point	25,000	A
3rd harmonic	15.000	A
5th harmonic	140.00	A
7th harmonic	70.000	A
9th harmonic	5.0000	A
11th harmonic	40.000	A
13th harmonic	28.000	A

Calculated results

Parameter	Value	Unit
Total harmonic current (rms)	164.72	A
Total demand distortion	18.303	%
Current THD	27.454	%
Short-circuit ratio	27.778	

Notes for this case

• TDD = √(ΣI_h²)/I_L divides by maximum demand current, so a lightly loaded drive with high THD may still have a low TDD. Limits for TDD depend on the short-circuit ratio I_sc/I_L in the harmonic standard the utility applies; enter the orders that matter (add higher orders if measured).

Formula and method

$$TDD = \frac{\sqrt{\sum_h I_h^2}}{I_L}, \quad THD_I = \frac{\sqrt{\sum_h I_h^2}}{I_1}$$

Variables

I_1	Fundamental current at measurement	A
I_L	Maximum demand current (12-month average)	A
I_{sc}	Short-circuit current at the supply point	A
I_3	3rd harmonic	A
I_5	5th harmonic	A
I_7	7th harmonic	A
I_9	9th harmonic	A
I_{11}	11th harmonic	A
I_{13}	13th harmonic	A

I_H	Total harmonic current (rms)	A
TDD	Total demand distortion	-
THD_I	Current THD	-
I_{sc}/I_L	Short-circuit ratio	-

Method and standards

Demand distortion.

Assumptions and limits

- Orders entered dominate; rms values.

References

Total demand distortion definition

Report details

Report reference	FCC-RQ6A-YFKR (the same inputs always give the same reference)
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Calculator	Total Demand Distortion and Current THD
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Software release	FireCAD Calc, release of 22 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/power-quality/total-demand-distortion

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.