

M3 Socket Head Cap Screw: Which Hex Key Size Fits?

M3 · GB/T 70.1 head + matching key · g per piece · kg / 1000 pcs · carbon steel 7.85 g/cm³

M3

GB/T 70.1 · dk 5.5 · k 3 · s 2.5 mm

Nominal diameter d	3 mm
Coarse pitch P (GB/T 196 series)	0.5 mm
Head diameter dk (max)	5.5 mm
Head height k (max)	3 mm
Hexagon socket width across flats s (key size)	2.5 mm
Thread length b (partly threaded basis)	2d+6 for L<=125, 2d+12 for 125<L<=200, 2d+25 for L>200 (b <= L)

Row-level standard labelling: dimensions follow GB/T 70.1-2008 Socket Head Cap Screws (the current edition, max nominal values; head diameter is the plain-head max and head height k is taken from that series) as the primary source; ISO 4762 is the equivalent ISO series, cited for series reference only - no table values are reproduced from it. Two bases have to be kept apart: the GB/T 70.1-2008 / ISO 4762 size series runs from M1.6 to M64 and does not include M18 or M22, so the M18 and M22 pages here are given on the DIN 912 basis (that German series includes M18 and M22, bracketed there as non-preferred sizes); the other eleven sizes are on the GB/T 70.1 / ISO 4762 basis (including M14, also bracketed as non-preferred there). The socket width across flats s is a nominal size; actual fit also depends on the socket tolerance and the key's manufacturing tolerance. Tolerances, property classes and surface finish are agreed separately against the buyer's drawing or contract.

Matching Hex Key Dimensions (s=2.5 mm)

Across flats s (mm)	2.5
Long arm L1 (mm)	58.5
Short arm L2 (mm)	20.5

M3 Length Series: Plain Shank, Thread and Unit Weight

Unit weights are computed from the socket head cap screw configuration: full-diameter plain shank plus a pitch-diameter threaded section plus the cylindrical head (with the hexagon socket reduction). The basis is identical to the spec_json weightCalc of the socket head cap screw SKUs in our product catalog - same parameters, same formula, fully reproducible. Thread length b follows the same partly threaded rule as the catalog in three bands (2d+6 for L<=125, 2d+12 for 125<L<=200, 2d+25 for L>200, capped at the shank length, i.e. fully threaded b = L when the shank is shorter).

Nominal length L (mm)	Thread b (mm)	Plain shank (mm)	Unit weight (g/pc) g / piece	Bulk (kg/1,000 pcs) kg / 1000 pcs
M3×8	8	0	1	1
M3×10	10	0	1	1
M3×12	12	0	1	1
M3×16	12	4	1	1
M3×20	12	8	1	1
M3×25	12	13	2	2
M3×30	12	18	2	2

Configuration basis (same source as the product catalog): shank = plain section $\pi/4 \times d^2 \times (L-b)$ plus threaded section $\pi/4 \times d^2 \times b$ ($d_2 = d - 0.6495P$, ISO basic profile pitch diameter); head = $\pi/4 \times dk^2 \times k \times 0.85$ (0.85 is the volume reduction factor for the hexagon socket cavity and top chamfer, the same value as the catalog headFactor); multiplied by 7.85 g/cm3 for carbon steel. Rounded to avoid false precision (whole g below 100 g, 10 g steps below 1,000 g, 100 g steps above). Lengths listed are the common range; other lengths are made to order.

Calculation Basis and Assumptions Disclosed

Dimensions come from fastenerCalc.SHCS_DIMS (GB/T 70.1 socket head cap screws, max nominal values) and fastenerCalc.HEX_KEY_DIMS (GB/T 5356-2021 hex key standard series arm lengths, ISO 2936 equivalent, max nominal values). Unit weights are computed by fastenerCalc.socketHeadWeightG with the same parameters and formula as the spec_json weightCalc (method=shcs_formula) of the socket head cap screw SKUs in our product catalog: full-diameter plain shank plus pitch-diameter threaded section ($d_2 = d - 0.6495P$) plus head $\pi/4 \times dk^2 \times k \times 0.85$, at 7.85 g/cm3 for carbon steel, base metal only, coating excluded. Thread length b follows the same rule as the catalog (2d+6 for L<=125, 2d+12 for 125<L<=200, 2d+25 for L>200, capped at the shank length). No table values are reproduced from any copyrighted standard (for example ASME B18.3).

Boundary: (1) unit weights are theoretical geometry estimates (excluding coatings and any part-to-part variation in the socket cavity and chamfer) for quotation, freight and packing budgets; trade settlement is against actual measurement; (2) head dimensions are max nominal values and actual parts vary within tolerance - this chart is not an acceptance basis; (3) the lengths listed are the common range, and unlisted lengths are made to order; (4) the socket width across flats s is nominal, and the fit varies with the socket tolerance and the key's tolerance band - where rounding risk is high, use a higher-grade key or replace a worn one.

References

- GB/T 70.1 Socket Head Cap Screws (National Public Service Platform for Standards Information) — https://openstd.samr.gov.cn/bzgk/gb/std?std_no=GB%2FT%2070.1-2008
- GB/T 5356-2021 Hexagon Socket Screw Keys (National Public Service Platform for Standards Information; issued 2021-11-26, effective 2022-06-01, replacing GB/T 5356-2008) — <https://openstd.samr.gov.cn/bzgk/std/newGbInfo?hcno=7720858B71E0141DBDA547E1DED3A8C4>

- GB/T 196 General Purpose Metric Screw Threads - Basic Dimensions, coarse pitches (same table as fastenerCalc.pitchOf) — https://openstd.samr.gov.cn/bzgk/gb/std?std_no=GB%2FT%20196-2003
- DIN 912 hexagon socket head cap screw dimension table (the basis for the M18 and M22 pages, which are outside the GB/T 70.1-2008 / ISO 4762 size series; three-way cross-check across kovafasteners / fullerfasteners / fasten.it, second-level sources) — <https://www.kovafasteners.com/din-912/>
- Unit weights cross-checked row by row against socket head cap screw SKU spec_json weightCalc in the product catalog (same engine and basis as the product pages)

Disclaimer: This table is engineering estimate data for selection, quotation and freight estimation reference only, not a design basis or acceptance standard.

Material Density Conversion

Table values are for carbon steel (7.85 g/cm3); other materials convert by density ratio: weight x factor (geometry unchanged). Socket head cap screws are commonly supplied in A2-70 (304) / A4-80 (316) stainless and in alloy steel.

Material	Density (g/cm3) g/cm³	Conversion Factor
Carbon Steel	7.85	×1.000
304 Stainless (A2)	7.93	×1.010
316 Stainless (A4)	7.98	×1.017
Brass	8.5	×1.083

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