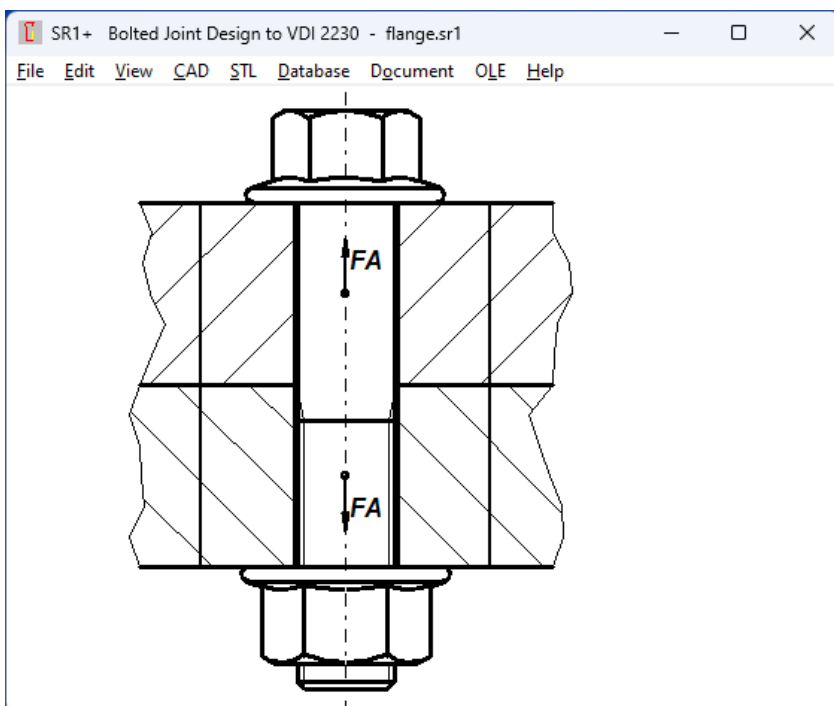# SR1 / SR1+

Bolted Joint Design
according to VDI 2230

for Windows

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Calculation Basis

SR1 Software calculates, in accordance with VDI2230-1:2015, high-stress bolted joints with concentric or eccentric strain and load. The calculation enables graphical representation of load-extension diagrams and scale drawings.
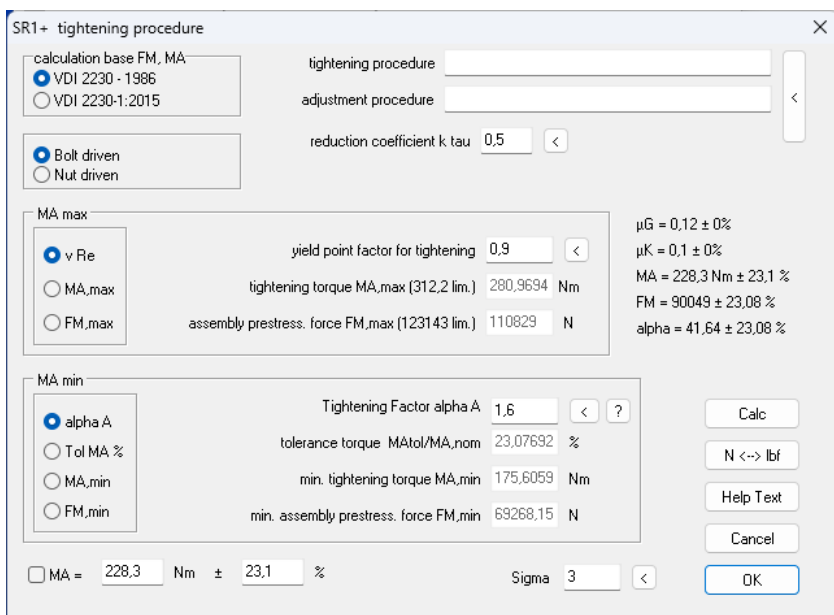
Dimensioning

Different combinations of bolt diameters / strength classes are calculated from the input of concentric/ eccentric axial force or shearing force, static/ dynamic load and tightening method which are then used as a basis for more detailed calculation.
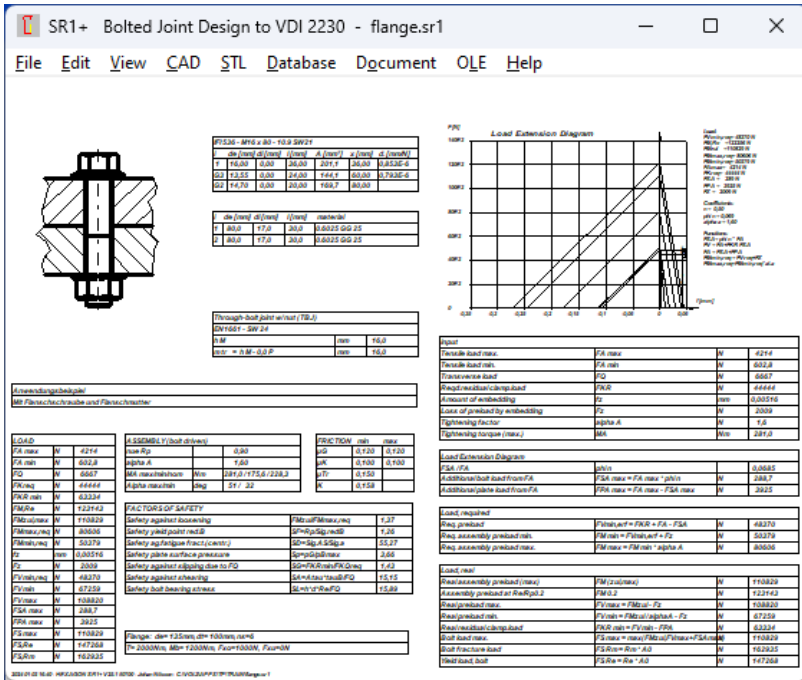
Data Base for Bolts and Threads

You can choose any of the following items from the database: shank and waisted bolt dimensions according to ISO, as well as metric standard and fine threads, bolt heads (hexagon head, hexagon socket head, hexagon socket counter sunk head, hex flange bolt, 12-point flange bolt) and nuts (hexagon nut, heavy hex nut, hex flange nut, hexagon nut with prevailing torque, hex flange nut with prevailing torque). The data base files may be extended and modified by the user. Alternatively, you can define special stepped bolts. Additional data base files and corresponding drawings are available for fasteners still commonly used in the United States with inch (English) thread dimensions. While the data base information is provided for diameters and pitch combinations (threads/inch) all dimensions in these data base files have been converted to SI units, i.e.1.00inch = 25.4mm. And Ksi stress factors are converted to N/mm².

Clamping Plates

You can freely define the dimensions, material, E-Modulus, and permissable pressure of up to 20 clamping plates. The database can be appended to include additional materials, E-Modulus, and permissible pressure information to meet the needs of the user. The experienced user can create special effects with clamping pieces to modify the SR1 deflection calculations to supplement FEA calculations and torque / angle measurements.

Concentric and Eccentric Load
SR1 calculates bolted joints with concentric and eccentric strain and load.

Tightening Procedure
You can define yield point coefficient, tightening torque, or required assembly prestressing load. SR1 calculates min/max values by tolerances of tightening tool and friction coefficients.

Friction
The most important friction coefficients for thread, headseat and seam are available for use in the integrated data base. The friction coefficient data base can be appended by the user to include new combinations of materials.

M-Alpha Diagram
M-Alpha Diagram and F-Alpha Diagram with torque and clamping force are displayed as a function of angle of turn starting at the „Elastic Origin".

Load-extension Diagram
Load-extension diagrams for assembly status and working status can be displayed on screen and printed on any Windows printer.

Printout
All elastic compliances, forces, loads and tightening moments are calculated. The input and result data can be output to screen and printer, or saved to file.

Table Drawing and Quick View
Tables with the most essential results together with drawing of the calculated bolted joint.

CAD Interface
SR1 generates a scale drawing of the bolted joint, showing bolt, clamping piece, nut or dead hole. Transfer of data to CAD via DXF or IGES files.

HEXAGON Help System
Dialogue windows provide buttons for help text and images. For error messages you can have a description and solution suggestions displayed.

SR1+ with Flange Calculation
The extended version SR1+ calculates the maximum load for a single bolted joint from the flange forces, bending moments and torque of a circular flange.

System Requirements
SR1/SR1+ is available as32-bit app or as 64-bit app for Windows 11, Windows 10, Windows 7.

Delivery Scope
SR1/SR1+ program with user manual (pdf), data base files, help images and sample applications, declaration of conformity, perpetual license.

Guarantee
HEXAGON gives a 24 month guarantee on full functionality of the software. We provide help and support by email without extra charge. Registered users are regularly kept informed of updates and new editions.