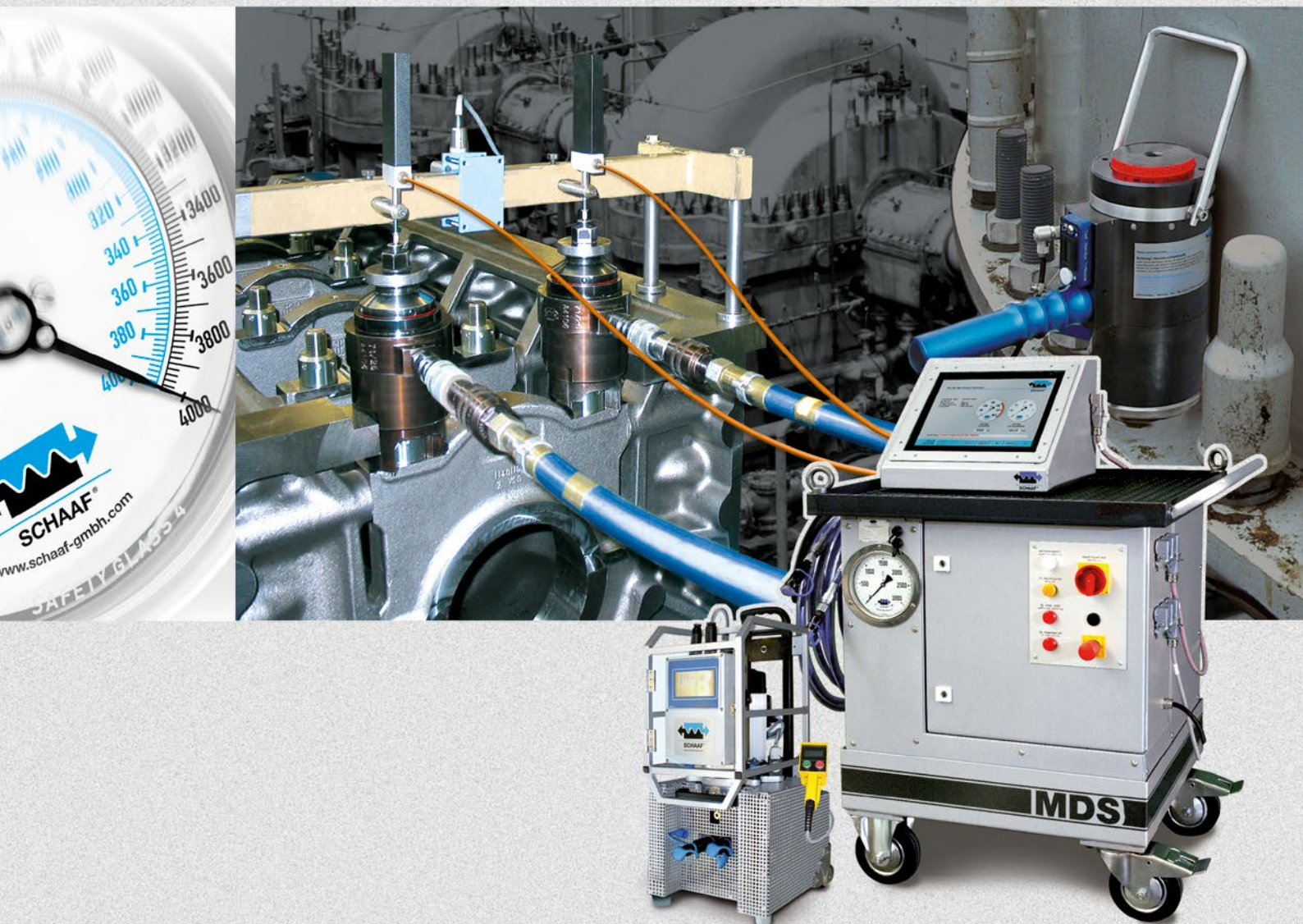


MDS

Mounting Documentation System

User-friendly - Enhanced safety - Unbriable



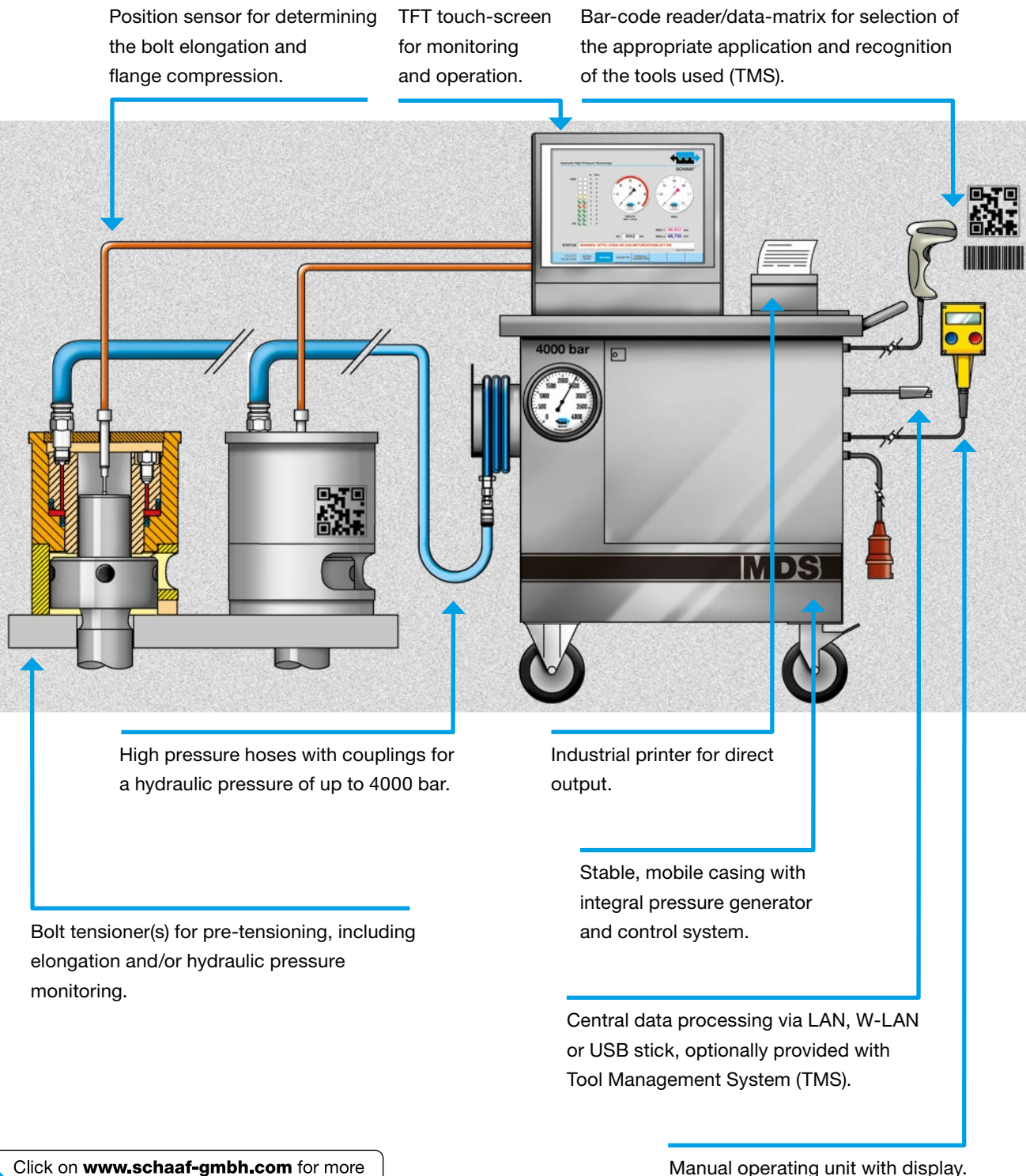
MDS – 100% documented
High-quality bolting due to
process reliability.

MDS

PG 28

MDS

Mounting Documentation System for control and monitoring of the axial, hydraulic bolt-tightening process.



Advantages

- 100% documented quality of bolt connections
- Increased work safety thanks to frequent pressure and elongation characteristic monitoring (according to Hooke's Law)
- Automatic shutdown in case of process errors
- Guarantee of the correct bolting load
- Ability to prove that the generation of pre-tensioning force was correct in the event of damage thanks to documented logging of the tension positions and pressures and clamping procedure
- Self-monitoring of the MDS by means of integral self-test and redundant pressure transmitter monitoring
- Simple, clear and comfortable user interface that leads through process
- Automated control of multiple pressure circuits in accordance with different pre-tensioning force generation programs
- Over 60,000 original data sets of tightening parameters can be stored
- Password-protected parameter input
- Simple copy and paste of new data sets for new bolting conditions
- Mobile or fixed units possible
- Operator guidance in selectable language
- Long service lifetime and user-friendly maintenance intervals
- Integral Tool Service Indicator (TSI)
- Optional Tool Management System (TMS)
- Ideal for individual or series assembly – rapid pre-tensioning force generation
- Data output as diagram or table
- Data output on customer quality assurance sheets
- Precise pressure generation with a tolerance of ± 10 bar at 4000 bar. More precise pressure range regulation in various pressure ranges according to customer requirements.
- Almost unlimited capability for archiving of tightening procedures for individual or complete bolt-tightening systems
- Assembly errors are eliminated due to integrated process guidance
- High load-cycle values and long lifetime
- Tensioning programs and reports can be transferred via USB or LAN-Access

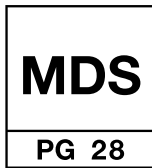
Areas of Application

SCHAAF MDS is ideally suited for:

- Generating a bolt pre-tensioning force for which 100% operational sequencing, safety and data logging are required.
- Engine-building: Main bearing, connecting rod bearing, cylinder head
- Power plants: e.g. Turbines, compressors
- Ring gear bolt connections: e.g. wind power plants
- Tower fittings: e.g. crane construction
- General mechanical engineering



MDS for large engine mounting area.



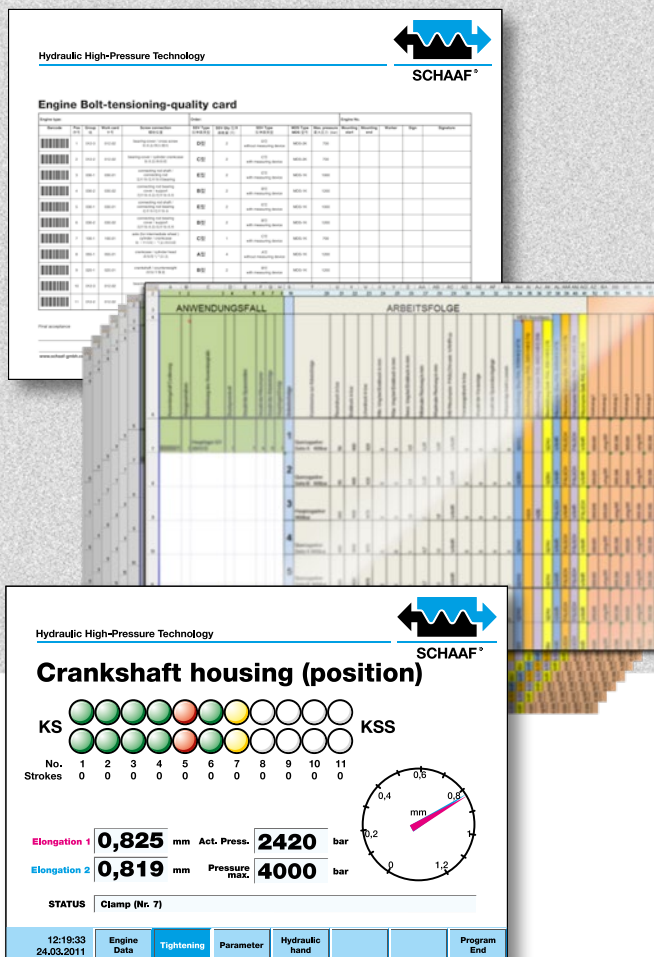
MDS

Suitable for engine manufacturing

The SCHAAF **Mounting Documentation System (MDS)** is a pressure generator that documents the tightening procedure for bolted joints. This ensures 100% verifiability of the joint quality. The material homogeneities are monitored (according to Hooke's Law) during generation of the pre-tightening force.

This involves monitoring of the pressure - elongation curve. All additional quality parameters can be specified individually and the system meets the tightening specifications and shuts down automatically when an error appears.

Visualised indication on the display monitor



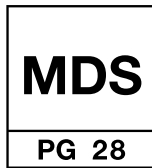
Design variants

MDS can be provided with the following options:

- Colour or B+W printer
- Radio-operated remote controller with display
- LAN/W-LAN/USB interface
- Remote access for remote maintenance
- TMS interface (Tool Management System)
- TSI interface (Tool Service Indicator)
- Radio-operated sensors
- Sensors integrated in the bolt tensioners or supplied separately
- Central specification of bolting data via SAP interface, database, USB interface or copy and paste
- 1-3K design type for separate control of multiple independent pressure circuits
- Rotation angle and torque control for bolt tensioners with automated motorised re-tightening function
- Optional colour coding of the used equipment



MDS in use on crankshaft bearing tensioners and as elongation controller - also optionally with pressure control.

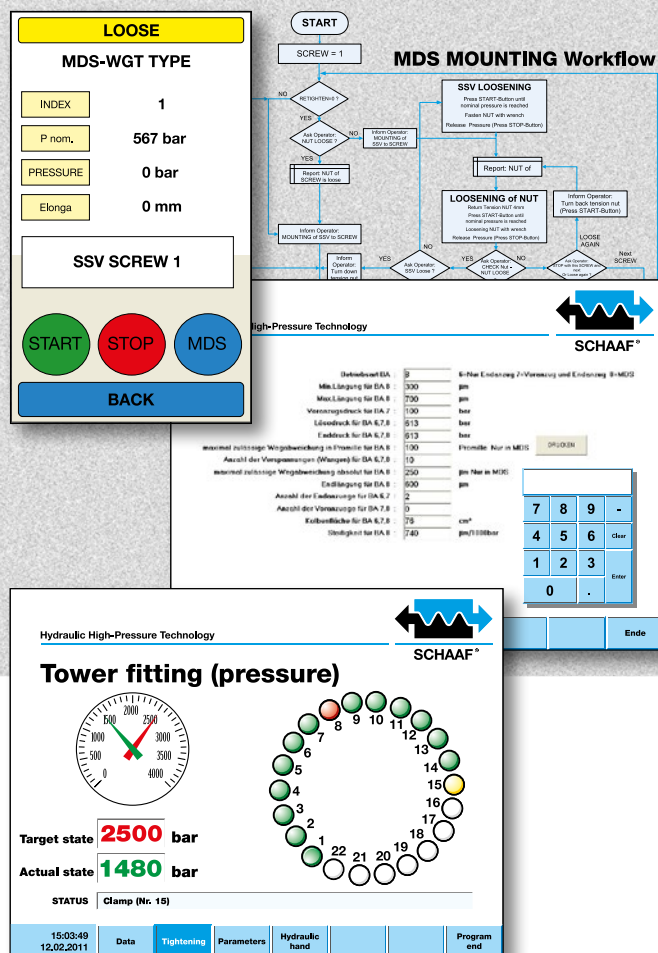


MDS

Suitable for the wind power industry

The SCHAAF **Mounting Documentation System (MDS)** is optimised for mobile and standard applications when building and servicing wind power plants. As soon as the parameters for bolting conditions are entered they become available to the operator. The text display ensures that the operator can create an assembly with 100% reliability - even in the case of problematic bolting conditions. All cases are saved in the assembly guide system so that even inexperienced workers can always achieve 100% quality during assembly.

Visualised indication on the display monitor



Design variants

MDS can be provided with the following options:

- Radio-operated remote controller with display
- LAN/W-LAN/USB interface
- Remote control for remote maintenance
- TMS interface (Tool Management System)
- TSI interface (Tool Service Indicator)
- Radio-operated sensors
- Integrated or separate elongation sensors
- Mobile unit
- Central specification of bolting data via SAP interface, database or copy and paste
- Rotation angle and torque control for bolt tensioners with motorised re-tightening function
- Documented pre-tightening force generation with the option of residual force detection during bolting maintenance periods



Use of MDS for documentation of bolt pre-tensioning force for tower base bolting of wind power plants.

MDS

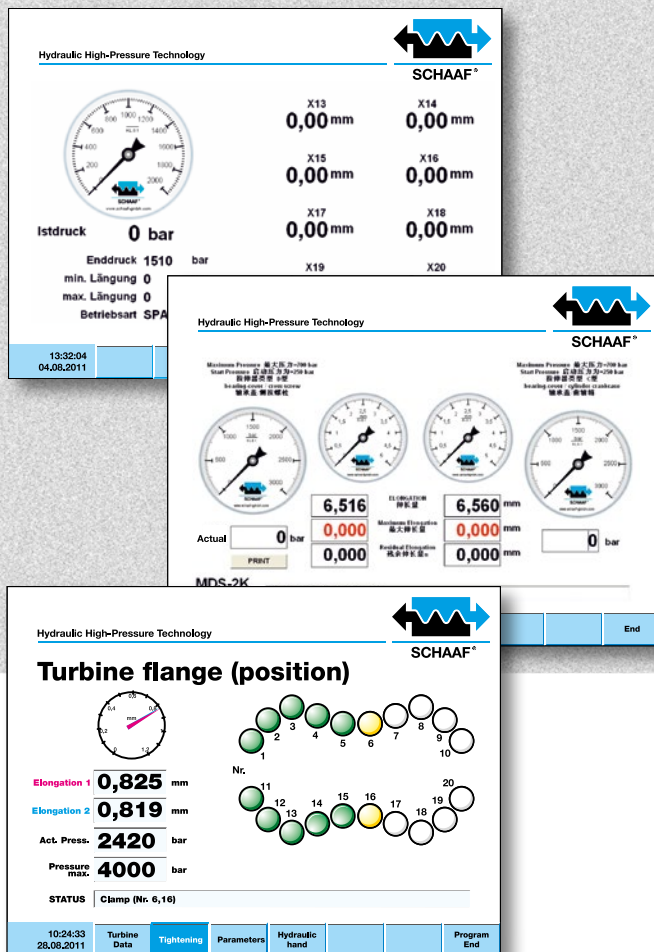
PG 28

MDS

Suitable for turbine manufacturing

The SCHAAF **Mounting Documentation System (MDS)** is controlled by a digital database that is specific to each turbine installation. All process data are accessed from the digital database and the entire tightening procedure is documented - even in the case of stepwise increase of the pre-tightening force. Operation is carried out by the separate remote control unit and can be performed from great distances due to its large display. Pressurisation to the specified values can be effected very rapidly because the SCHAAF high pressure equipment has a very high rated flow capacity.

Visualised indication on the display monitor

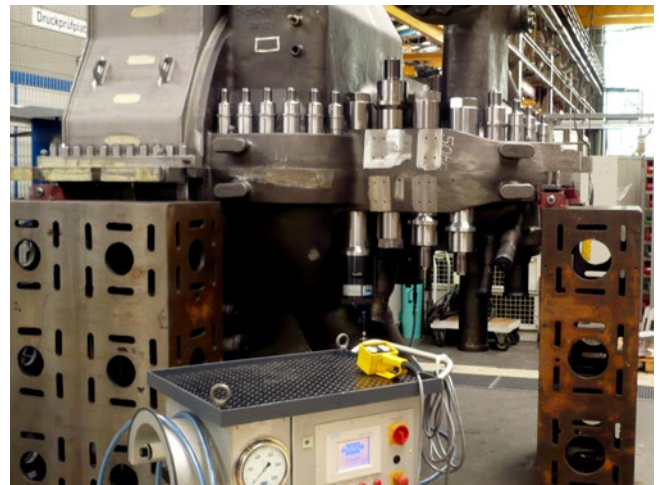


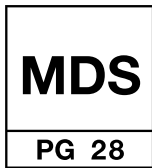
Design variants

MDS can be provided with the following options:

- Colour or B+W printer
- Radio-operated remote controller with display
- LAN/W-LAN/USB interface
- Remote access for remote maintenance
- TMS interface (Tool Management System)
- TSI interface (Tool Service Indicator)
- Radio-operated sensors
- Sensors integrated to the bolt tensioner or supplied separately
- Central specification of bolting data via SAP interface, database, USB interface or copy and paste
- 1-3K design type for independent and separate control of multiple pressure circuits
- Rotation angle and torque control for bolt tensioner with motorised re-tightening function
- Optional colour coding of the used equipment

MDS for use on a turbine.
Tightening sequence and stepwise pre-tightening force is specified by the MDS.

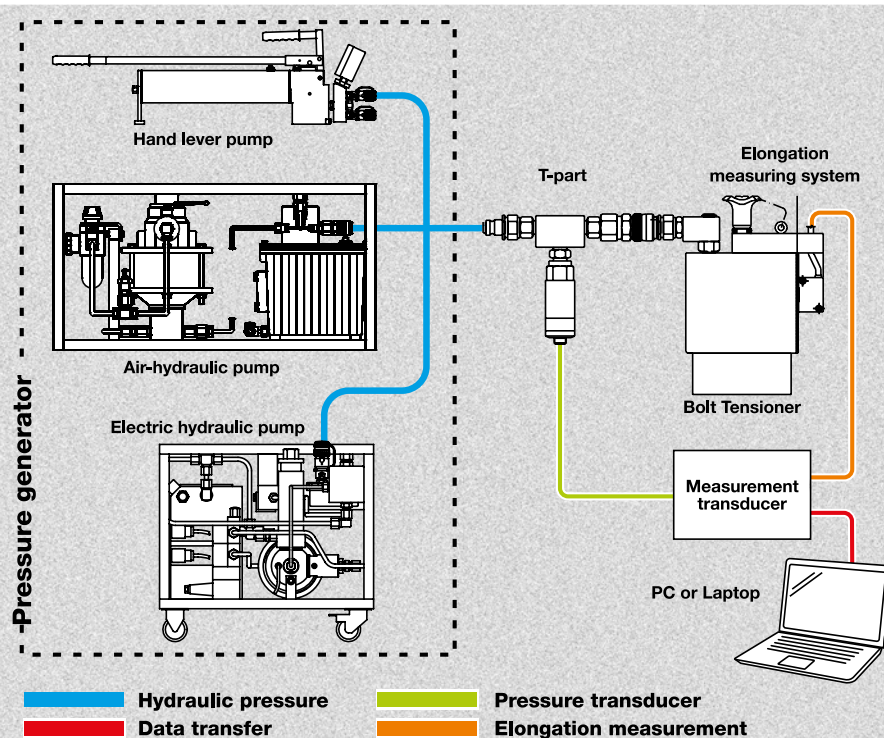




MDS

Mobile MDS and other MDS options

Computer-aided bolt pre-tensioning control for on-site use and MDS applications of general engineering applications using manual, air or electrical/hydraulic pressure generators.



Options

- Elongation sensors in various accuracies and measuring ranges
 - integrated in tool
 - Gauge
 - Gauge with cable
 - Position sensor with magnetic support and cable
 - Clip-on magnetic position sensor
 - Radio-operated position sensor
- Number of hydraulic outlet ports and pressure ranges
- Language selection in all languages
- RFID chip recognition of used equipment
- Remote control of the MDS
- Remote maintenance
- Various power supply voltages

Specification of tightening data (parameters):

- Excel
- Input to MDS
- SAP interface
- USB interface
- Copy and paste

Other requirements for pre-tightening generation as well combinations can be represented:

- Torque and Rotation angle
- Pre-tightening force
- Elongation
- Temperature
- multiple tightening before, after and during the pre-tensioning process

Quality Assurance

All **MDS** are checked for 100 % process security. During order handling, they are accompanied by ongoing quality assurance measures and supplied with extensive documentation.

Services

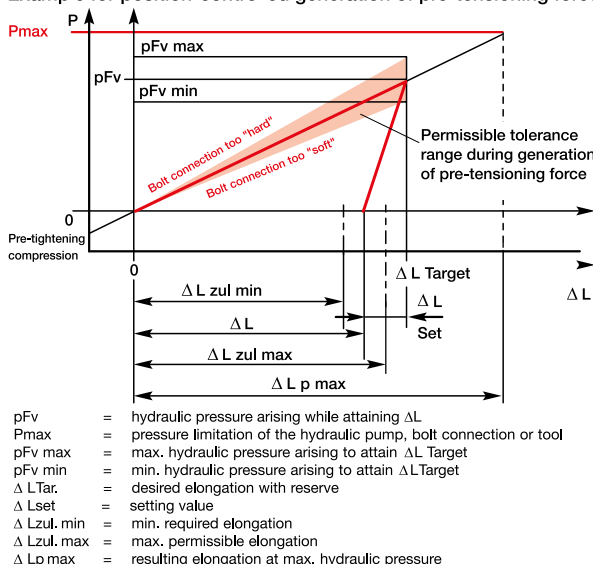
SCHAAF **MDS** are user-friendly, reliable, and manufactured in accordance with the highest level of technical know-how. Our highly-motivated staff would be pleased to train your personnel, in situ or at our works, in the general handling and operation of the mobile and stationary control unit. In this way, all the process parameters can be entered optimally in order to achieve maximum process monitoring and safety. Of course, the **MDS** are supplied ready for operation.

MDS error recognition

The following errors can be identified using **MDS**, amongst others:

- Incorrect bolt material
- Defective bolt material
- Incorrect flange material
- Defective flange material
- Incorrect seal material
- Defective seal material
- Too large gaps from pre-assembly
- Tightening force loss too high due to
 - a: incorrect thread geometry of nut and/or bolt
 - b: excessive surface roughness
 - c: operating error when turning the main nut
 - d: insufficient axial flank clearance

Example for position-controlled generation of pre-tensioning force



Complete solution from SCHAAF

The accessories for the **MDS** such as hydraulic hoses, connection couplings and the hydraulic nuts are aligned to the functions = 100 % system solution.

SCHAAF Accessories and additional product groups

- Bolt Tensioners (SSV)
- Hydraulic Nuts (HM)
- High-pressure generators:
 - manually operated, electric, or air-operated
- High-pressure hydraulic hoses
- Couplings, nipples, adapters and distributor blocks for pressures up to 4,000 bar
- TTG Nuts and Bolts
- Online Bolt Load Monitoring (OBLM)

Certificates and Acceptance Tests

- Specific test reports
- Certificates as per special customer requirements

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