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INSPECTpro

Type 5413-2071/...

Mobile measuring and evaluation unit for process inspection and quality monitoring

The INSPECTpro is a portable, battery-powered measuring and evaluation unit for recording analog and incremental measurands. The (random-sample) tests can be performed, analyzed and documented quickly and effectively and thereby contribute to optimum quality in bolted joint assembly and a variety of other applications.
Optional software modules expand the INSPECTpro to create an individual, custom testing system.

- Portable, battery-operated measuring and evaluation unit
- Connectivity for a range of sensors
  (with optional adapter cable, depending on type)
- Optional two measuring channels
- Optional software modules for extended function
- Touchscreen
- Optional connection of wireless sensors

Description

INSPECTpro consists of a two-part housing, the display unit and the base unit. The display unit with 7.7 inch TFT color display can be pivoted in increments of 10 ° from 0 ° to 100 ° relative to the base unit. The device is intuitively operated via the touchscreen on the display unit and the speed buttons.
The easy-to-change lithium-ion battery is located beneath a cover in the base unit. Sensors and interface cables are simply connected on the rear of the device.
Various sensors with passive analog, active analog and incremental measurement signals can be connected to the INSPECTpro. A range of sensors can be connected via optional adapter cables.
Whether as a stationary testing system for maintenance, in a lab or during in-process testing, the INSPECTpro offers ergonomic and comfortable handling.
The scope of application of the INSPECTpro with the basic license can be expanded through optional software modules.
Thanks to the integrated AUTOCODE system, automatic sensor detection of appropriately equipped sensors is ensured to minimize errors in the application.
Upon request, the INSPECTpro is calibrated with the desired optional sensors as a measuring chain in our calibration lab.

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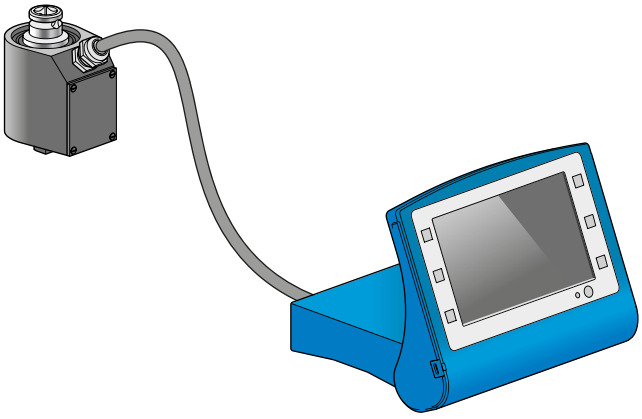
Technical data

Measuring channels	Channel 1	Passive, analog (0.4 ... 5 mV/V) Incremental (quadrature signal 5 ... 24 V, max. counting frequency 40 kHz, switching level 2.5 V)
	Optional	Channel 1 active, analog (1 ... 10 V)
	Optional	Channel 2 passive, analog (0.4 ... 5 mV/V)
Integrated calib. resistance		40 kΩ, 43.58 kΩ, 87.15 kΩ, 174.65 kΩ
Interfaces		Mini USB, USB, RS-232, RJ-45
	Optional	Wireless with 2.4 GHz and 5 GHz
Power supply		Lithium-ion battery 7.2 V, 4.5 Ah (external charging device)
	Optional	Power supply for continuous operation
Mains supply		Charging device 100 ... 240 V Power supply 100 ... 240 V
Operating system		Windows Compact Embedded 7.0
Display		7.7-inch TFT color display, pivotable
Operation		Touchscreen, speed buttons
Software		INSPECTpro basic
	Optional	Software modules (see application)
User languages		Multiple languages: CZ, DE, GB, ES, FR, IT, NL, PL, TR, CN; online selection
Achievable meas. uncertainty		≤ 0.5 %
Resolution		16-bit
Sampling rate		100 Hz ... 5 kHz with data reduction
	Optional	100 Hz ... 5 kHz freely adjustable by operator (HQ-Graphic software module)
Memory card		SD 4 GB, permanently installed
Operating temp. range (Nominal temp. range)		10 ... 40 °C
Service temp. range		0 ... 50 °C
Storage temp. range		–20 ... 70 °C
Relative humidity		max. 70 %, non-bedewing/non-condensing
Level of protection		IP 50
Protection class		III (protective extra-low voltage)
Weight		1.5 kg (4.5 kg including case and supplied accessories)

Basic application

For random-sample testing during the assembly process, the INSPECTpro records all influencing quantities directly at the bolted joint. This is done by inserting the torque or torque/angle of rotation sensor with rotating measuring shaft into the application between the output drive of the fastening assembly tool and the tool for torque application to the test item.
The INSPECTpro connects to the sensor and, with appropriately equipped sensors, detects the sensor via AUTOCODE and adjusts automatically; no further adjustments are needed, and the measurement can begin immediately.
During the measurement, the measured values are displayed numerically and evaluated based on tolerance specifications. Furthermore, it is possible to depict measurement processes graphically to identify effects while screwing in, joining or during assembly.
The INSPECTpro is equipped with a statistics module for evaluating the measurement results. The stored measured values can be documented; statistical characteristic values are calculated automatically and are depicted as a histogram or Gaussian distribution curve.



Random-sample testing with the INSPECTpro and a torque sensor

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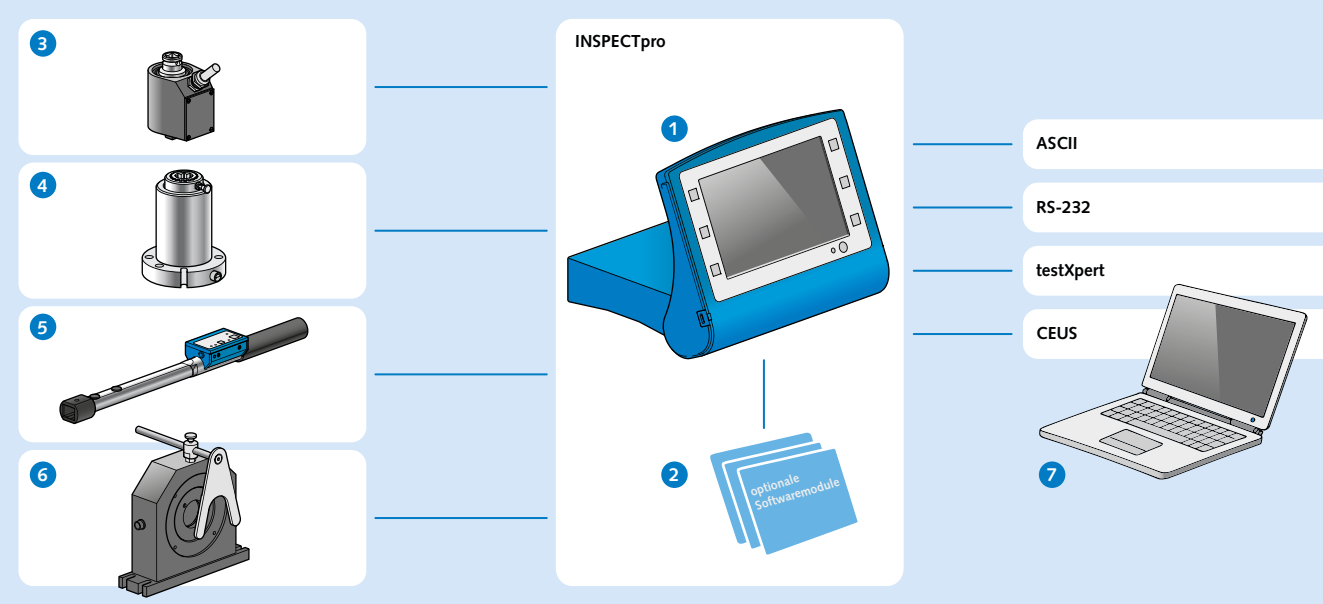


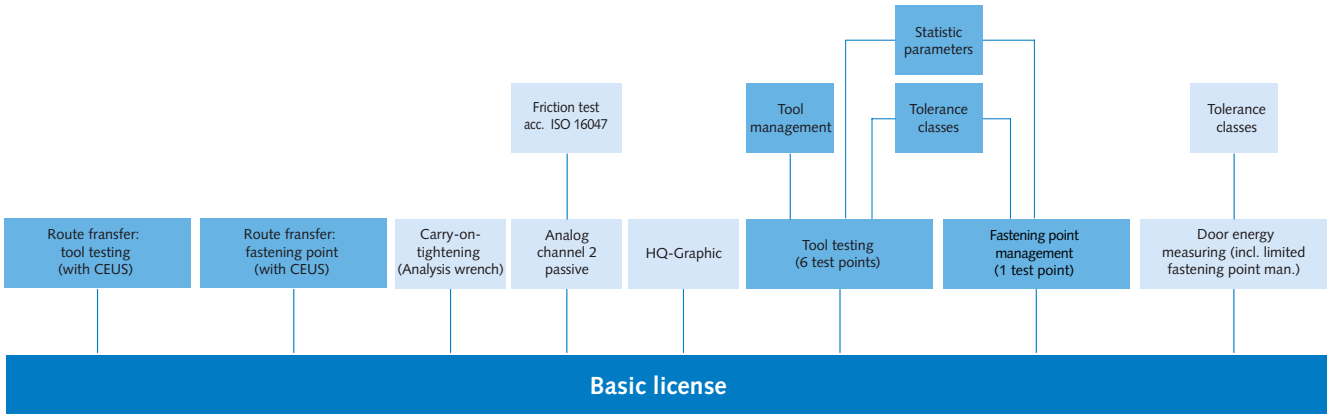
The system components for mobile process inspection and quality monitoring

The system components

An overview of the system components for mobile process inspection and quality monitoring:

1. Measuring and evaluation unit INSPECTpro
2. Optional software modules
3. Sensors for torque and torque/angle of rotation with rotating measuring shaft
4. Sensors for torque with fixed measuring shaft
5. Analysis wrench (handheld torque/angle of rotation wrench) – cable connected or as wireless version
6. Sensors for clamping force
7. PC for evaluating and documenting the tests with higher-level software

The optional software modules are subject to the following license dependencies: Each optional license requires the underlying license.



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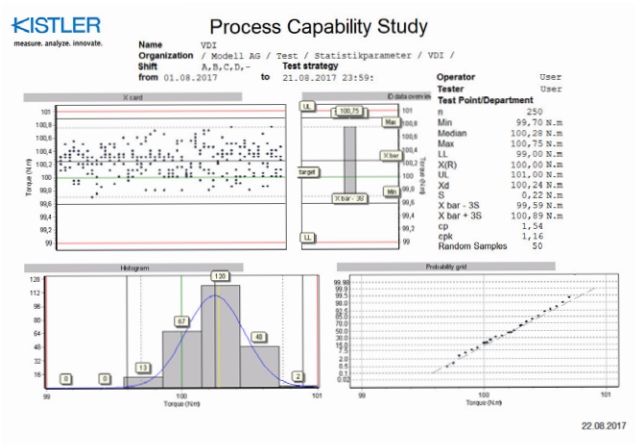
Optional software modules expand the scope of application:

Route transfer fastening point

The optional "Route transfer fastening point" software module on the INSPECTpro can be used with the Windows CEUS software.

In "Route transfer fastening point" software module peak values can be determined and carry-on-tightening torques can be measured according to VDI/VDE 2645 Part 3. An additional module is not required for this.

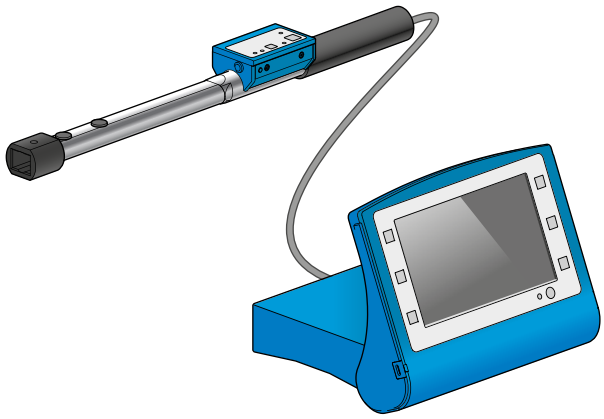
With the CEUS software, fastening points can easily be specified on a PC, organized and the test intervals planned. After a route has been created, it is exported to the INSPECTpro via a USB cable, selected there and then processed. The graphical process analysis and documentation are then performed on the PC after the data have been re-imported.



The graphical process analysis indicates at a glance whether the process is capable or if measures are necessary.

Carry-on-tightening (in accordance with VDI/VDE 2645 Part 3)

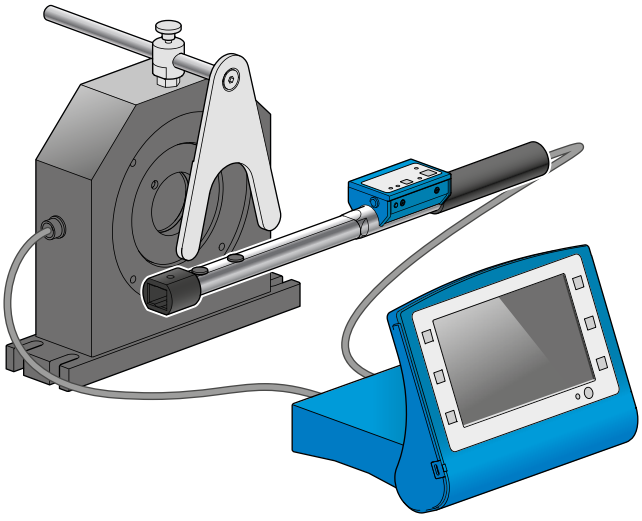
With the optional "Carry-on-tightening" software module on the INSPECTpro, carry-on-tightening torques can be determined together with the Analysis wrench Type 5413-1500/...



Carry-on-tightening torques are determined with the INSPECTpro and the Analysis wrench

Analog channel 2 passive

The optional "Analog channel 2 passive" software module on the INSPECTpro enables testing with a second, passive analog sensor, such as a clamping force sensor Type 5413-1952/..., fastener force sensor Type 5413-1900/... or tension/compression force sensor Type 5413-1940/...



INSPECTpro with clamping force sensor and Analysis wrench

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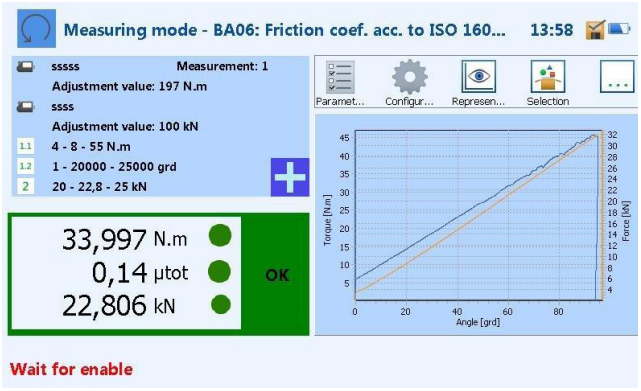
Friction test according ISO 16047

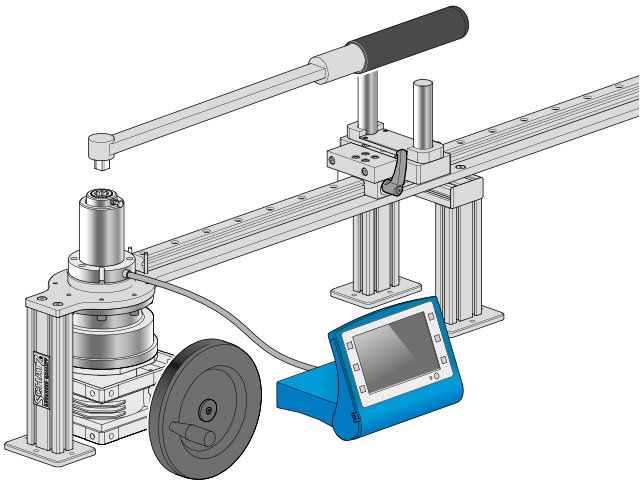
The optional "Friction test according ISO 16047" software module on the INSPECTpro (requires activation of the "Analog channel 2 passive" software module) enables measurement of the total friction coefficient of a bolt or nut with a clamping force sensor Type 5413-1952/... and an Analysis wrench Type 5413-1500/... as well as the corresponding mechanical accessories. This calculation is performed automatically following a one-time entry of the bolt parameters according to DIN EN ISO 16047 with the INSPECTpro.



INSPECTpro determination of the friction coefficient in measuring mode

Tool testing (6 test points)

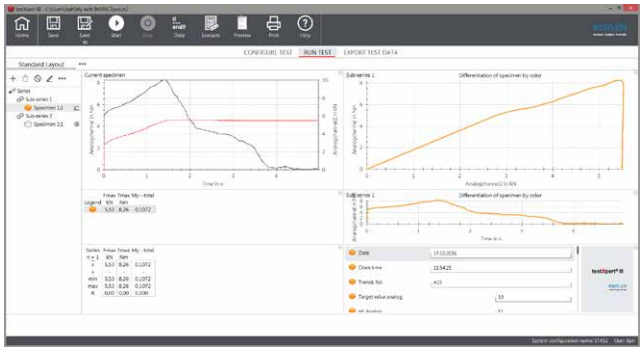
With the optional "Tool testing (6 test points)" software module on the INSPECTpro, tools such as torque wrenches and nutrunners can be tested and calibrated on the basis of VDI/VDE 2645 Part 2 and DIN EN ISO 6789:2003 - Method B for various target torques. As an option, the "Tool management" module can also be activated.



The torque for testing the torque wrench is applied with the hand crank system

HQ-Graphic

With the optional "HQ-Graphic" (High Quality Graphic) software module on the INSPECTpro, the sample rate can be freely set from 100 Hz to 5 kHz. In addition, an INSPECTpro with this module is equipped with a testXpert export function. Together with the Windows testXpert software, measurement data can be professionally analyzed, logged and archived.



testXpert software for statistical and graphical analyses

Tool management

For the optional "Tool management" software module on the INSPECTpro, the "Tool testing (6 test points)" software module must also be activated. Tools can be created and the test specified. For the tool test, tools that have been created then only need to be selected for the test. If there are a number of tools, this saves time and eliminates incorrect entries.

Fastening point management

With the optional "Fastening point management" software module on the INSPECTpro, fastening points can be created and specified for testing. For the measurement of carry-on-tightening torques or peak-value measurements, for example, fastening points that have already been created then only need to be selected for the test. If there are a number of fastening points, this saves time and eliminates incorrect entries.

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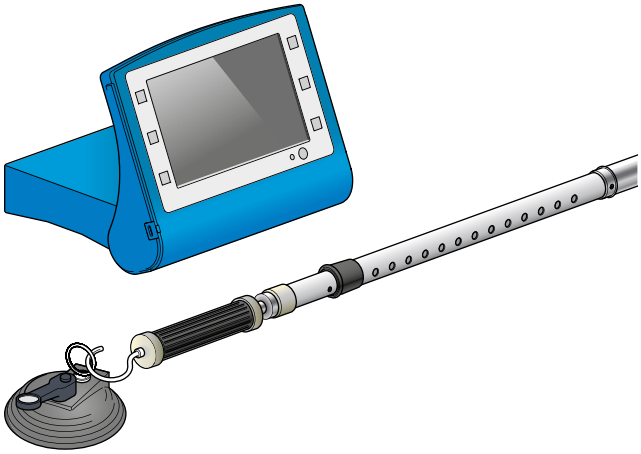
Tolerance classes
If the optional "Tolerance classes" software module is used on the INSPECTpro, one of the following software modules must also be activated: "Fasting point management", "Tool testing (6 test points)" or "Door energy measuring". The repeated input of an upper and lower limit for tolerances is thereby eliminated. Tolerance classes can be defined and then only need to be selected for the respective measuring task.

Statistic parameters
For use of the optional "Statistic parameters" module on the INSPECTpro, either the "Fastening point management" or the "Tool testing (6 test points)" software module must be activated. The repeated input of the individual statistics parameters for the evaluation of the measurement results is thereby eliminated. Statistics parameters can be defined collectively one time and then only need to be selected for the respective measuring task.

Door energy measuring
With the optional "Door energy measuring" software module on the INSPECTpro, comfort measurements for determining the door closing energy on vehicles can be performed. Specifications of various vehicle types can be created one time.



INSPECTpro and spring unit with tension force sensor and suction cup

Route transfer tool testing
The optional "Route transfer tool testing" software module on the INSPECTpro can be used with the CEUS software.
In "Route transfer tool testing" software module regular tests with 1 ... 6 measuring points can be performed. An additional module is not required for this.
With the CEUS software, tools can be easily be specified on a PC, organized and the test intervals planned. After a route has been created, it is exported to the INSPECTpro via a USB cable, selected there and then processed. The graphical process analysis and documentation are then performed on the PC after the data have been re-imported.

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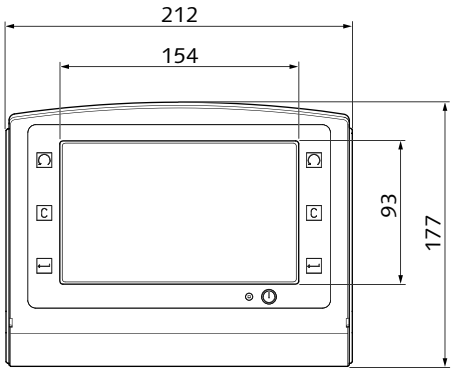
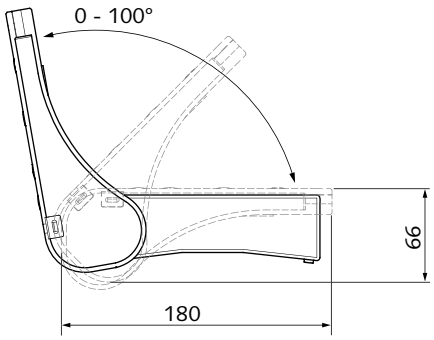
Dimensions

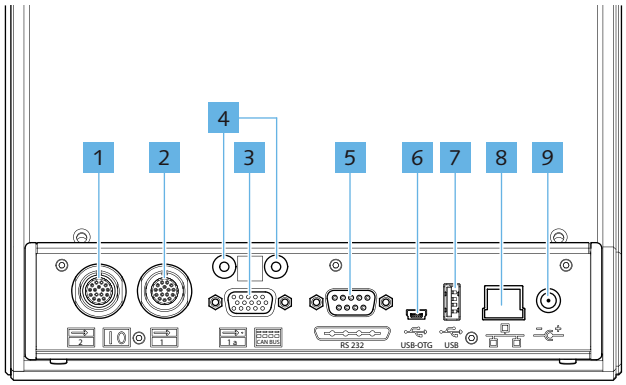


Dimension, device front



Dimension, side view

Connections



Interfaces on the device rear

1 Channel 2 passive, analog, such as clamping force sensor, (optional), digital IO
2 Channel 1 passive, analog/incremental, such as torque/angle of rotation sensor
3 Connection for active analog sensor, channel 1 and CAN-bus (optional)
4 External calibration resistance for channel 1 or 2 (optional)
5 RS-232 data output
6 Mini USB for data transfer, e.g., route transfer, software modules, backup
7 USB mouse, keyboard or barcode scanner (optional)
8 Ethernet - not used
9 Connection of external power supply for continuous operation (optional)

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Included accessories	Type
• INSPECTpro with rechargeable battery	5413-2071/...
• Transport case for secure storage	
• Mini USB cable	
• Second rechargeable battery	
• Charging cradle and charging power supply	
• Carrying strap	

Optional accessories	Type
• Plug-in power supply for continuous operation	55179302
• Additional rechargeable battery	55176288
• Communication cable RS-232	18033260
• Protective cover	18035860
• Analysis wrench (handheld torque/ angle of rotation wrench)	5413-1500/...
• Wireless analysis wrench (wireless handheld torque/angle of rotation wrench)	5413-1500/...-W
• Torque sensors with rotating measuring shaft	5413-1100/..., 5413-1160/..., 5413-1151/...
• Torque/angle of rotation sensors with rotating measuring shaft 5413-1260/..., 5413-1251/...	5413-1200/...,
• Torque sensors with fixed measuring shaft	5413-1030/...
• Hand crank system	5413-4611
• Clamping force sensors	5413-1952/...
• Tension/compression force sensors	5413-1940/...
• Fastener force sensors	5413-1900/...
• Software modules INSPECTpro (Upgrade)	18035916
• Hardware modules INSPECTpro (Upgrade)	44002210

Ordering key

Type 5413-2071/ ☐ ☐

Active analog measuring channel

no	**0**
Channel 1 (1 ... 10 V)	**A**

Wireless sensor connection

no	**0**
2,4 GHz and 5 GHz	**W**

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